JUPITER-(3000K, 6000K, 9000K)-H1 Smart Transformer Station

User Manual

Issue	02
Date	2023-09-30

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About This Document

Purpose

This document describes the appearance, transportation, storage, human-machine interaction, and system maintenance of the JUPITER-3000K-H1, JUPITER-6000K-H1, and JUPITER-9000K-H1 Smart Transformer Stations (STSs). Before installing and operating an STS, read through this document to understand the safety precautions and get familiar with the functions and features of the STS.

Figures provided in this document are for reference only.

Intended Audience

This document is intended for photovoltaic (PV) plant operators and qualified electricians.

Symbol Conventions

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

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

Symbol	Description
NOTE	Supplements the important information in the main text. NOTE is used to address information not related to personal injury, equipment damage, and environment deterioration.

Change History

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

Issue 02 (2023-09-30)

Added the low-voltage (LV) coupling scenario where the inverter and PCS are connected to the same MCCB.

- Added the LV coupling scenario where the inverter and PCS are connected to the same MCCB in **Networking Application**.
- Added the exterior of the JUPITER-(3000K,6000K,9000K)-H1 in the LV coupling scenario where the inverter and PCS are connected to the same MCCB in **2.2 Appearance**.
- Added the networking and component configuration description in the LV coupling scenario where the inverter and PCS are connected to the same MCCB in **2.5 Scenario-based Configurations**.
- Updated **6.8.3 Replacing an SPD**.
- Added **Inverter and PCS Status Check (Applicable to LV Coupling Scenarios Where the Inverter and PCS Are Connected to the Same MCCB)**.
- Added **Powering On Inverters, PCSs, and the DTS (Applicable to LV Coupling Scenarios Where the Inverter and PCS Are Connected to the Same MCCB)**.
- Added **6.6 Maintaining Inverters and PCSs (Applicable to LV Coupling Scenarios Where the Inverter and PCS Are Connected to the Same MCCB)**.

Issue 01 (2023-01-30)

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

Contents

1 Safety Information

Statement

Before installing, operating, or maintaining the equipment, read this document, strictly follow the instructions provided herein, and follow all the safety instructions on the equipment and in this document.

The **DANGER**, **WARNING**, **CAUTION**, and **NOTICE** statements in this document do not cover all the safety instructions. They are only supplements to the safety instructions. 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.

Comply with local laws and regulations during transportation, storage, installation, operation, and maintenance.

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

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

- Equipment damage due to force majeure (such as earthquakes, floods, volcanic eruptions, debris flows, lightning strikes, fires, and wars)
- Operation beyond the conditions specified in this document
- Installation or use in environments which are not specified in relevant international, national, or regional standards
- Failure to follow the operation instructions or safety precautions on the product or in this document
- Unauthorized modifications to the product or software code or removal of the product

- Damage caused during transportation by the customer or a third party authorized by the customer
- Storage conditions that do not meet the requirements specified in this document
- Failure to comply with local laws, regulations, and related standards due to the materials and tools prepared by the customer
- Damage caused by the customer's negligence or improper operations or third-party reasons
- 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.

1.1 Personal Safety

DANGER

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

DANGER

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

DANGER

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

DANGER

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

WARNING

During operations, wear personal protective equipment such as protective clothing, insulated boots, safety helmets with face shields, and insulated gloves.

General Requirements

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

Personnel Requirements

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

1.2 Electrical Safety

DANGER

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

DANGER

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

DANGER

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

DANGER

When you power on the system for the first time or perform operations on the main loop with power on, wear arc protection clothes.

DANGER

When the system is running, do not open the cabinet doors or sealing plates in the energized area.

WARNING

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

CAUTION

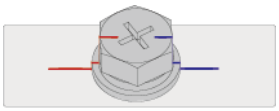
Do not route cables near the air intake or exhaust vents of the equipment.

CAUTION

The equipment has an arc discharge channel for the medium-voltage room. Install the equipment according to the equipment foundation diagram and ensure that the gap between the medium-voltage room and the foundation is filled with materials such as mortar.

General Requirements

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



- After the installation is complete, ensure that protective cases, insulation tubes, and other necessary items for all electrical components are in position to avoid electric shocks.
- Keep the key to the medium-voltage equipment properly. The key can be used only by authorized personnel.
- Use instruments and meters in accordance with the regulations to avoid electric arcs, short circuits, or other risks.
- When operating the control panel of the ring main unit, ensure that you stand on an insulated stool or ladder.

- When the transformer is running with power on, do not operate the no-load voltage regulating switch, do not remove the high/low-voltage tubes, and do not connect cables or copper bars.
- After the equipment stops running, wait for at least 10 minutes to ensure that the voltage is in the safe range. Before maintenance or repair, ensure that the transfer switch is turned to the ground position, the potential indicator is off, the grounding switch of cabinet V in the ring main unit is turned on, and the low-voltage cabinet is grounded.
- During maintenance, turn off the air circuit breaker on the low-voltage side and the switch on the high-voltage side of the equipment, and place warning signs indicating that the switches must not be turned on. If the equipment supports the automatic mode, disable the automatic mode to ensure that the equipment will not be powered on unexpectedly.
- If the equipment has multiple inputs, disconnect all the inputs before operating the equipment.
- Before maintaining a downstream electrical or power distribution device, turn off the output switch on the power supply equipment.
- During equipment maintenance, attach "Do not switch on" labels near the upstream and downstream switches or circuit breakers as well as warning signs to prevent accidental connection. The equipment can be powered on only after troubleshooting is complete.
- If fault diagnosis and troubleshooting need to be performed after power-off, take the following safety measures: Disconnect the power supply. Check whether the equipment is live. Install a ground cable. Hang warning signs and set up fences.
- Check equipment connections periodically, ensuring that all screws are securely tightened.
- Only qualified professionals can replace a damaged cable.
- Do not scrawl, damage, or block any labels or nameplates on the equipment. Promptly replace labels that have worn out.
- Do not use solvents such as water, alcohol, or oil to clean electrical components inside or outside of the equipment.

Grounding

- Ensure that the grounding impedance of the equipment complies with local electrical standards.
- Ensure that the equipment is connected permanently to the protective ground. Before operating the equipment, check its electrical connection to ensure that it is reliably grounded.
- Do not work on the equipment in the absence of a properly installed ground conductor.
- Do not damage the ground conductor.
- For the equipment that uses a three-pin socket, ensure that the ground terminal in the socket is connected to the protective ground point.

Cabling Requirements

- When selecting, installing, and routing cables, follow local safety regulations and rules.

- When routing power cables, ensure that there is no coiling or twisting. Do not join or weld power cables. If necessary, use a longer cable.
- Ensure that all cables are properly connected and insulated, and meet specifications.
- Ensure that the slots and holes for routing cables are free from sharp edges, and that the positions where cables are routed through pipes or cable holes are equipped with cushion materials to prevent the cables from being damaged by sharp edges or burrs.
- If a cable is routed into the cabinet from the top, bend the cable in a U shape outside the cabinet and then route it into the cabinet.
- Ensure that cables of the same type are bound together neatly and straight and that the cable sheath is intact. When routing cables of different types, ensure that they are at least 30 mm away from each other.
- When cable connection is completed or paused for a short period of time, seal the cable holes with sealing putty immediately to prevent small animals or moisture from entering.
- Secure buried cables using cable supports and cable clips. Ensure that the cables in the backfill area are in close contact with the ground to prevent cable deformation or damage during backfilling.
- If the external conditions (such as the cable layout or ambient temperature) change, verify the cable usage in accordance with the IEC-60364-5-52 or local laws and regulations. For example, check that the current-carrying capacity meets requirements.
- When routing cables, reserve at least 30 mm clearance between the cables and heat-generating components or areas. This prevents deterioration or damage to the cable insulation layer.
- When the temperature is low, violent impact or vibration may damage the plastic cable sheathing. To ensure safety, comply with the following requirements:
  - Cables can be laid or installed only when the temperature is higher than 0°C. Handle cables with caution, especially at a low temperature.
  - Cables stored at subzero temperatures must be stored at room temperature for at least 24 hours before they are laid out.
- Do not perform any improper operations, for example, dropping cables directly from a vehicle. Otherwise, the cable performance may deteriorate due to cable damage, which affects the current-carrying capacity and temperature rise.

1.3 Environment Requirements

DANGER

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

DANGER

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

DANGER

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

WARNING

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

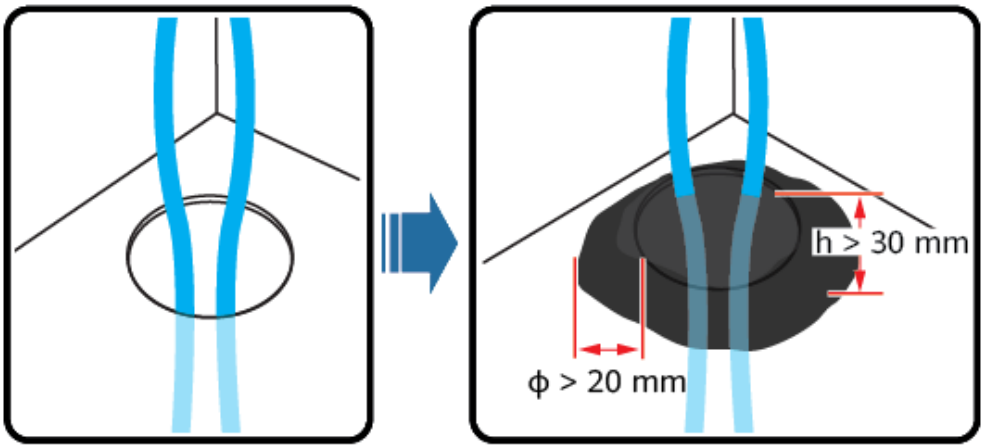
WARNING

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

General Requirements

- Ensure that the equipment is stored in a clean, dry, and well ventilated area with proper temperature and humidity and is protected from dust and condensation.
- Keep the installation and operating environments of the equipment within the allowed ranges. Otherwise, its performance and safety will be compromised.
- Do not install, use, or operate outdoor equipment and cables (including but not limited to moving equipment, operating equipment and cables, inserting connectors to or removing connectors from signal ports connected to outdoor facilities, working at heights, performing outdoor installation, and opening doors) in harsh weather conditions such as lightning, rain, snow, and level 6 or stronger wind.
- Do not install the equipment in an environment with dust, smoke, volatile or corrosive gases, infrared and other radiations, organic solvents, or salty air.
- Do not install the equipment in an environment with conductive metal or magnetic dust.
- Do not install the equipment in an area conducive to the growth of microorganisms such as fungus or mildew.
- Do not install the equipment in an area with strong vibration, noise, or electromagnetic interference.

- Ensure that the site complies with local laws, regulations, and related standards.
- Ensure that the ground in the installation environment is solid, free from spongy or soft soil, and not prone to subsidence. The site must not be located in a low-lying land prone to water or snow accumulation, and the horizontal level of the site must be above the highest water level of that area in history.
- Do not install the equipment in a position that may be submerged in water.
- If the equipment is installed in a place with abundant vegetation, in addition to routine weeding, harden the ground underneath the equipment using cement or gravel.
- Before opening doors during the installation, operation, and maintenance of the equipment, clean up any water, ice, snow, or other foreign objects on the top of the equipment to prevent foreign objects from falling into the equipment.
- When installing the equipment, ensure that the installation surface is solid enough to bear the weight of the equipment.
- All cable holes must be sealed. Seal the used cable holes with sealing putty. Seal the unused cable holes with the caps delivered with the equipment. The following figure shows the criteria for correct sealing with sealing putty.



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

1.4 Transportation Requirements

NOTICE

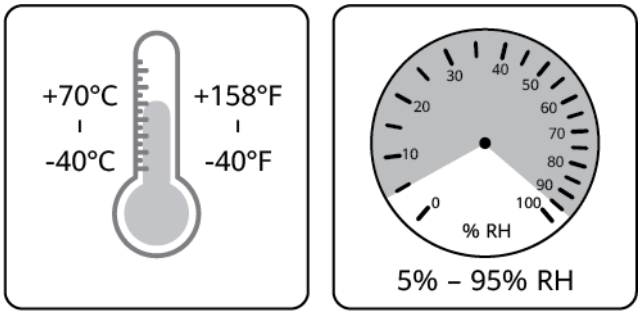
- Requirements for road transportation: Before transporting, conduct road survey to identify any obstacles in the transportation route to ensure that the vehicle can pass through the route safely. Survey information: road condition, height limit, actual height, width limit, actual width, weight limit, traffic restrictions, and obstacles.
- On normal roads, comply with the road speed limit and local regulations. On roads with poor conditions, the driving speed shall be limited to below 60 km/h in the case of slight cracks, potholes, raveling, upheavals/bumps and shall be reduced to below 10 km/h in the case of obvious potholes, cracks, and upheavals/bumps.
- Properly plan the transportation route. Even and fault-free roads are recommended for transportation. If poor road conditions cannot be avoided, comply with the preceding speed limit requirements.
- Driver fatigue is prohibited. Check that containers are secured. If oil leakage is found during the inspection, report the issue to the carrier to seek assistance.

- Select proper transportation tools according to the dimensions and weight of the product.
- When stacking containers, determine the maximum number of stacking layers based on the specifications on the containers. Place the containers neatly to prevent personal injury or equipment damage caused by toppling.
- Place the product horizontally during transportation.
- Prevent the product from colliding or scratching.
- Requirements for waterway transportation: The waterway must meet the requirements of full-load voyage.
- Tilt angle during transportation: ≤ 15°.

1.5 Storage Requirements

- The container doors are closed tightly.
- The equipment is placed horizontally during storage.
- The temperature and humidity of the storage environment are proper. Otherwise, the equipment may be damaged.

Figure 1-1 Storage temperature and humidity



- The storage environment must be clean and dry.
- For extended periods of storage, place silica gel moisture absorbent packs in the medium-voltage room and low-voltage room based on the site environment, and check and replace the silica gel moisture absorbent packs on a regular basis.
- After extended periods of storage, test the equipment in accordance with local laws and regulations and applicable standards before use.

1.6 Mechanical Safety

DANGER

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

WARNING

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

WARNING

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

WARNING

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

WARNING

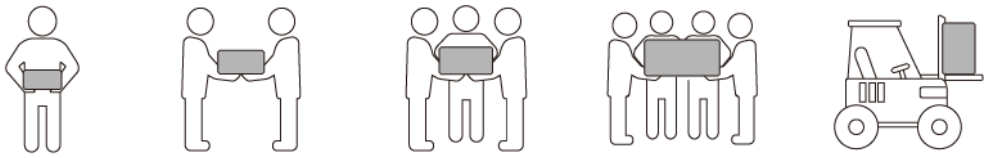
Do not drill holes into the equipment. Doing so may affect the sealing performance and electromagnetic containment of the equipment and damage components or cables inside. Metal shavings from drilling may short-circuit boards inside the equipment.

General Requirements

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

Moving Heavy Objects

- Be cautious to prevent injury when moving heavy objects.



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

scratching the surface of the equipment or damaging the components and cables.

- When moving a heavy object, be aware of the workbench, slope, staircase, and slippery places. When moving a heavy object through a door, ensure that the door is wide enough to move the object and avoid bumping or injury.
- When transferring a heavy object, move your feet instead of turning your waist around. When lifting and transferring a heavy object, ensure that your feet point to the target direction of movement.
- When transporting the equipment using a pallet truck or forklift, ensure that the tynes are properly positioned so that the equipment does not topple. Before moving the equipment, secure it to the pallet truck or forklift using ropes. When moving the equipment, assign dedicated personnel to take care of it.
- Choose sea or roads in good conditions for transportation. Do not transport the equipment by railway or air. Avoid tilt or jolt during transportation.

Working at Heights

- Any operations performed 2 m or higher above the ground shall be supervised properly.
- Only trained and qualified personnel are allowed to work at heights.
- Do not work at heights when steel pipes are wet or other risky situations exist. After the preceding conditions no longer exist, the safety owner and relevant technical personnel need to check the involved equipment. Operators can begin working only after safety is confirmed.
- Set a restricted area and prominent signs for working at heights to warn away irrelevant personnel.
- Set guard rails and warning signs at the edges and openings of the area involving working at heights to prevent falls.
- Do not pile up scaffolding, springboards, or other objects on the ground under the area involving working at heights. Do not allow people to stay or pass under the area involving working at heights.
- Carry operation machines and tools properly to prevent equipment damage or personal injury caused by falling objects.
- Personnel involving working at heights are not allowed to throw objects from the height to the ground, or vice versa. Objects shall be transported by slings, hanging baskets, highline trolleys, or cranes.
- Do not perform operations on the upper and lower layers at the same time. If unavoidable, install a dedicated protective shelter between the upper and lower layers or take other protective measures. Do not pile up tools or materials on the upper layer.
- Dismantle the scaffolding from top down after finishing the job. Do not dismantle the upper and lower layers at the same time. When removing a part, ensure that other parts will not collapse.
- Ensure that personnel working at heights strictly comply with the safety regulations. The Company is not responsible for any accident caused by violation of the safety regulations on working at heights.
- Behave cautiously when working at heights. Do not rest at heights.

Using Ladders

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

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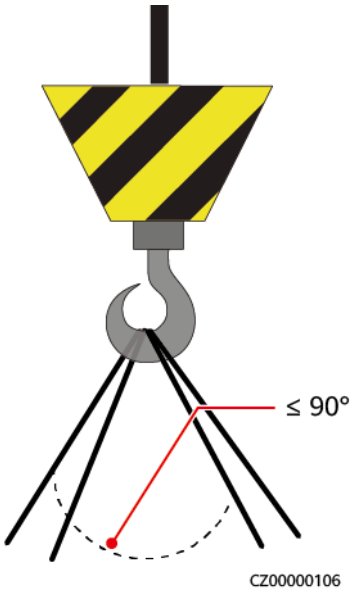
- When a step ladder is used, ensure that the pull ropes are secured.
- When climbing up the ladder, keep your body stable and your center of gravity between the side rails, and do not overreach to the sides.

Hoisting

- Only trained and qualified personnel are allowed to perform hoisting operations.
- Install temporary warning signs or fences to isolate the hoisting area.
- Ensure that the foundation where hoisting is performed on meets the load-bearing requirements.
- Before hoisting objects, ensure that hoisting tools are firmly secured onto a fixed object or wall that meets the load-bearing requirements.
- During hoisting, do not stand or walk under the crane or the hoisted objects.
- Do not drag steel ropes and hoisting tools or bump the hoisted objects against hard objects during hoisting.
- Ensure that the angle between two hoisting ropes is no more than 90 degrees, as shown in the following figure.



Drilling Holes

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

2 Product Description

2.1 Overview

Functions

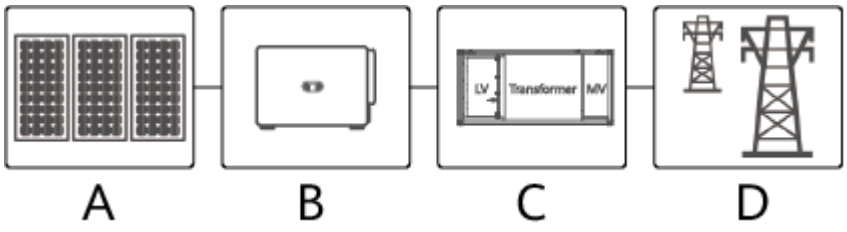
An STS converts LV AC power generated by solar inverters into medium-voltage (MV) AC power and feeds it into a power grid.

It is a steel-structure container that houses devices including the LV panels, transformer, ring main unit, and auxiliary power supply to provide a highly integrated power transformation and distribution solution for utility-scale PV plants in MV grid-connection scenarios.

Networking Application

The STS applies to grid-connected large PV plants. A typical grid-connected PV system consists of PV strings, SUN2000 inverters, switch boxes, and an STS.

Figure 2-1 PV-only scenario



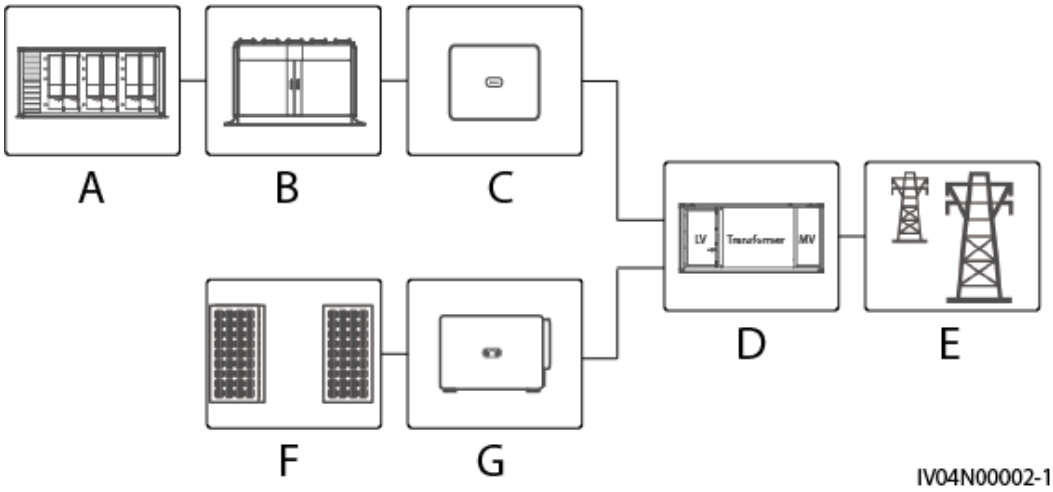
(A) PV string

(B) SUN2000 inverter

(C) STS

(D) Power grid

Figure 2-2 LV coupling scenario where the inverter and PCS are connected to the same MCCB



(A) Smart String ESS	(B) (Optional) DC LV Panel	(C) Smart PCS
(D) STS	(E) Power grid	(F) PV string
(G) SUN2000 inverter		

2.2 Appearance

PV-Only Scenario

Figure 2-3 JUPITER-3000K-H1 exterior (PV-only scenario)

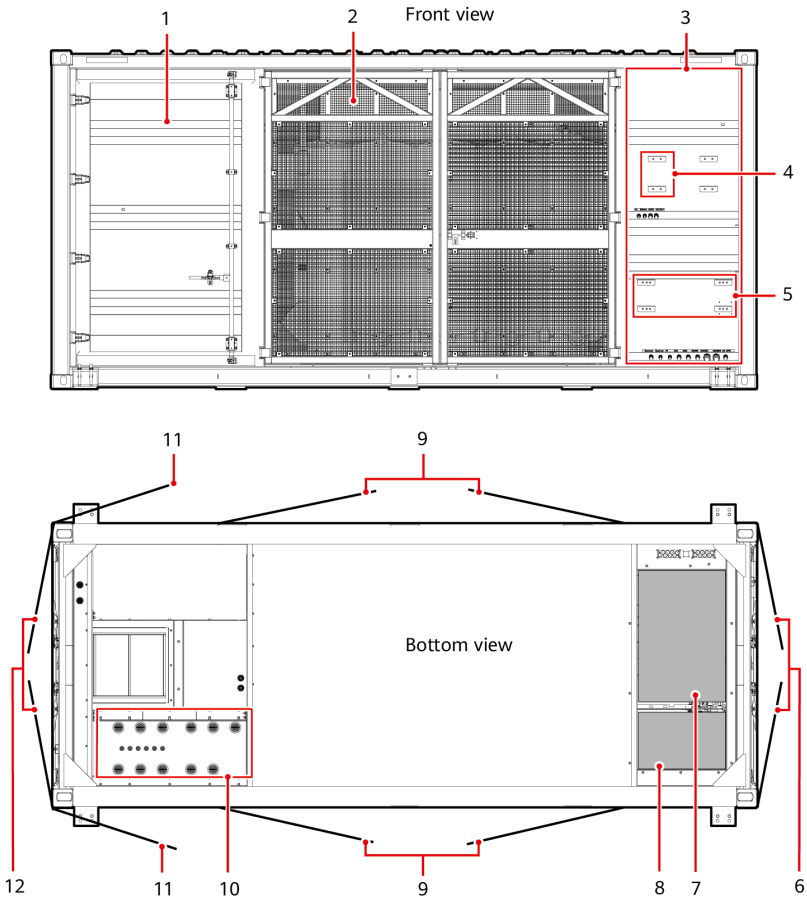


Figure 2-4 JUPITER-6000K-H1 exterior (PV-only scenario)

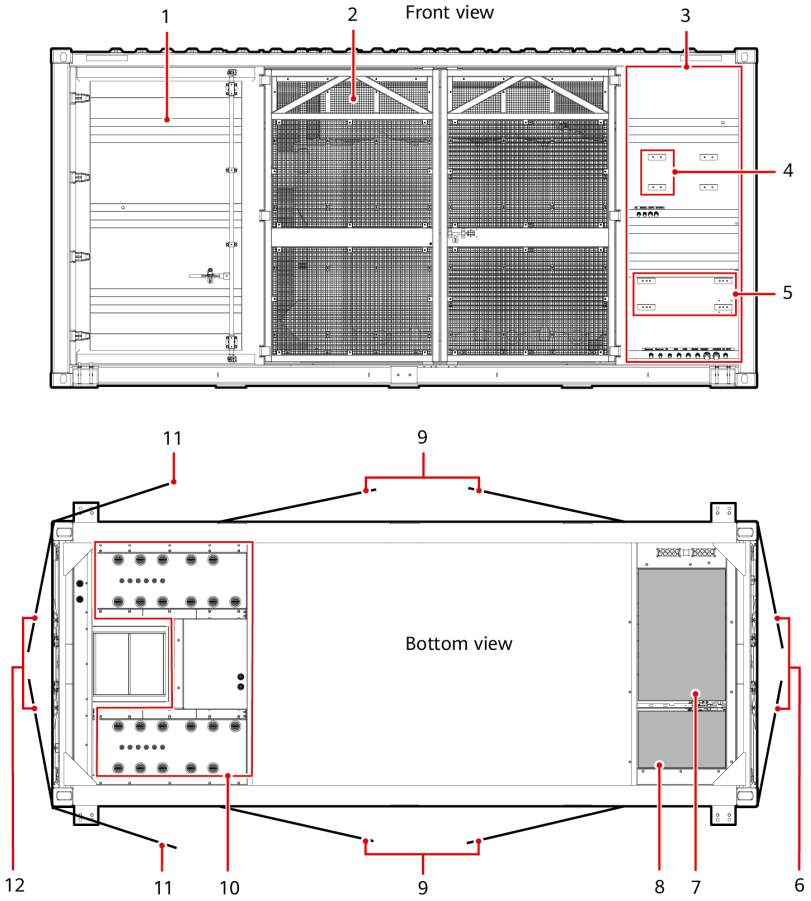
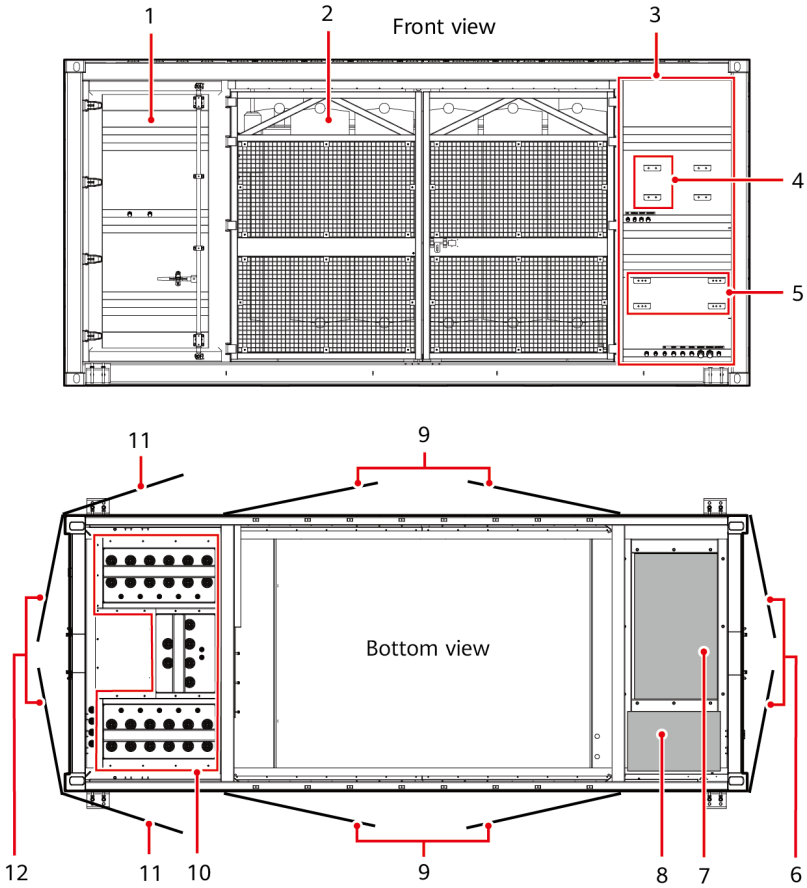


Figure 2-5 JUPITER-9000K-H1 exterior (PV-only scenario)



(1) LV room	(2) Transformer room (TR)	(3) Medium-voltage room (MV)
(4) Installation position for the distributed power supply (UPS)	(5) Installation position for the Smart Array Controller (SACU)	(6) Double-swing door for the MV room
(7) Ring main unit	(8) Auxiliary transformer	(9) Double-swing screen door for the TR room
(10) Holes for AC input power cables	(11) Single-swing door for the LV room	(12) Double-swing door for the LV room

LV Coupling Scenario Where the Inverter and PCS Are Connected to the Same MCCB

Figure 2-6 JUPITER-3000K-H1 exterior (LV coupling scenario where the inverter and PCS are connected to the same MCCB)

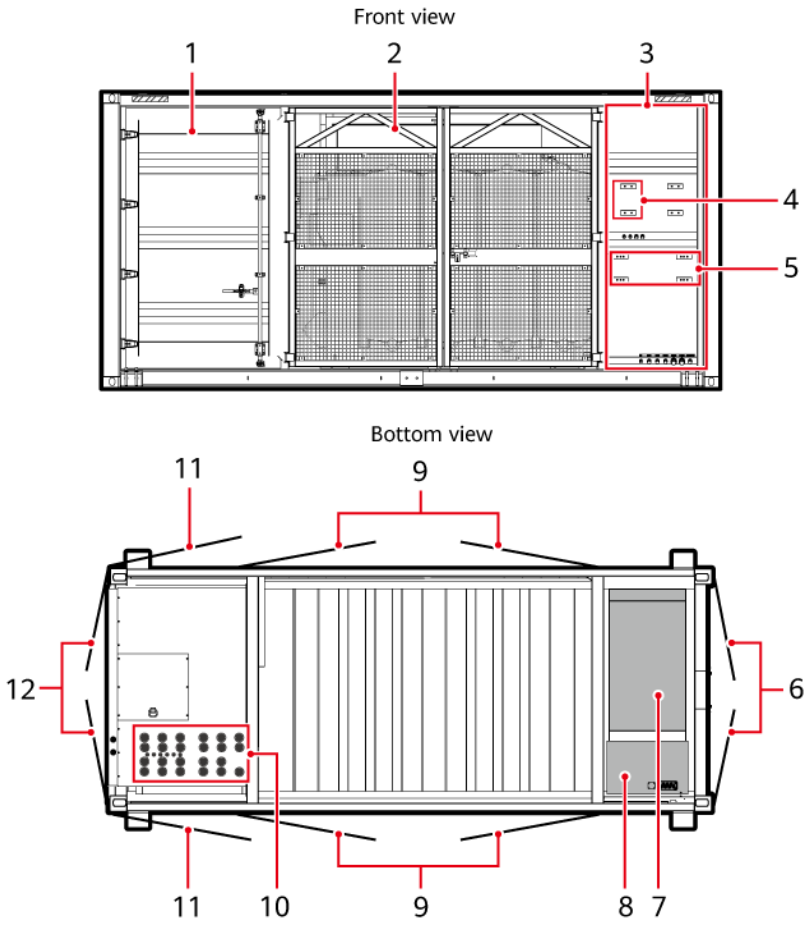


Figure 2-7 JUPITER-6000K-H1 exterior (LV coupling scenario where the inverter and PCS are connected to the same MCCB)

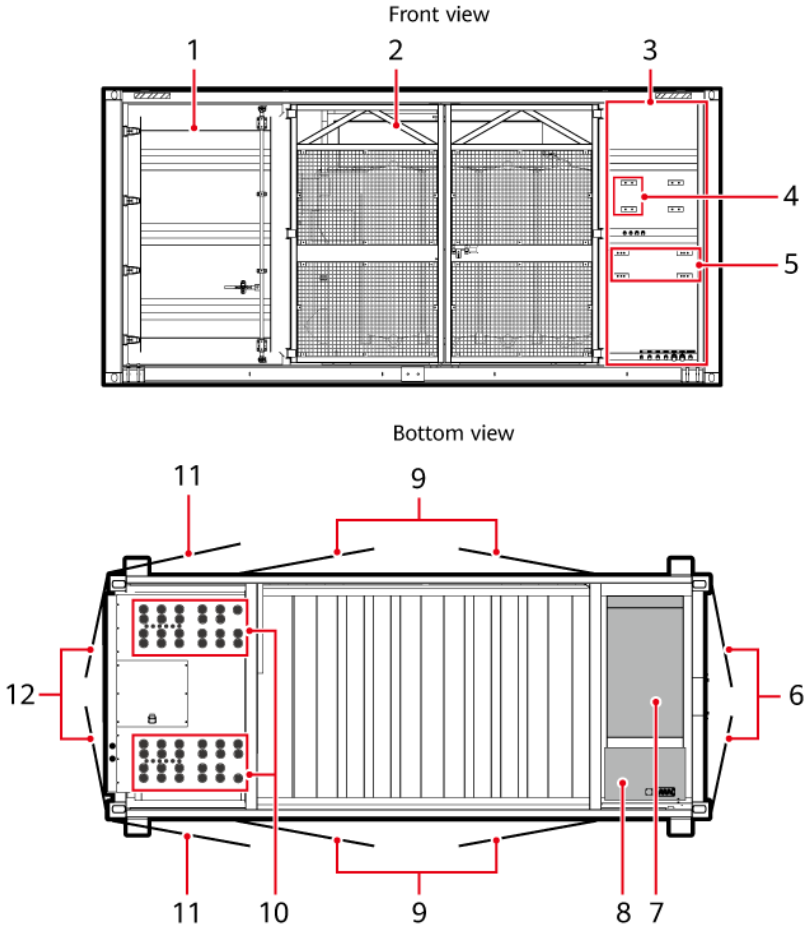
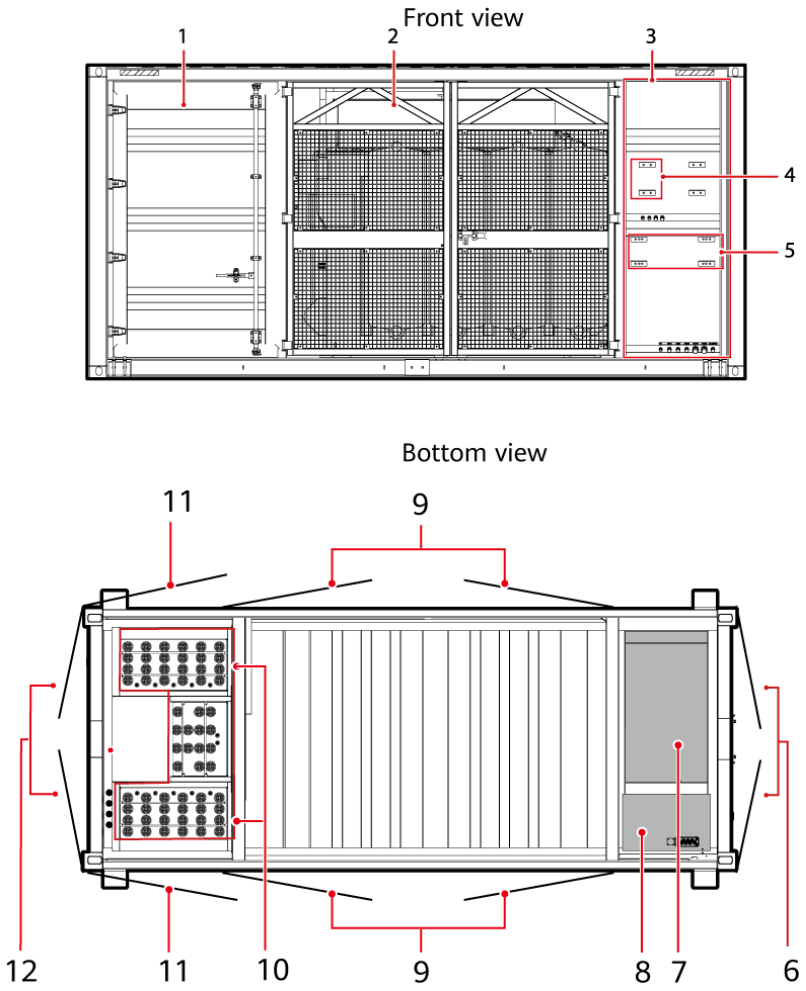


Figure 2-8 JUPITER-9000K-H1 exterior (LV coupling scenario where the inverter and PCS are connected to the same MCCB)



(1) LV room	(2) Transformer room (TR)	(3) Medium-voltage room (MV)
(4) Installation position for the distributed power supply (UPS)	(5) Installation position for the Smart Array Controller (SACU)	(6) Double-swing door for the MV room
(7) Ring main unit	(8) Auxiliary transformer	(9) Double-swing screen door for the TR room
(10) Holes for AC input power cables	(11) Single-swing door for the LV room	(12) Double-swing door for the LV room

Container Dimensions

Figure 2-9 Container dimensions

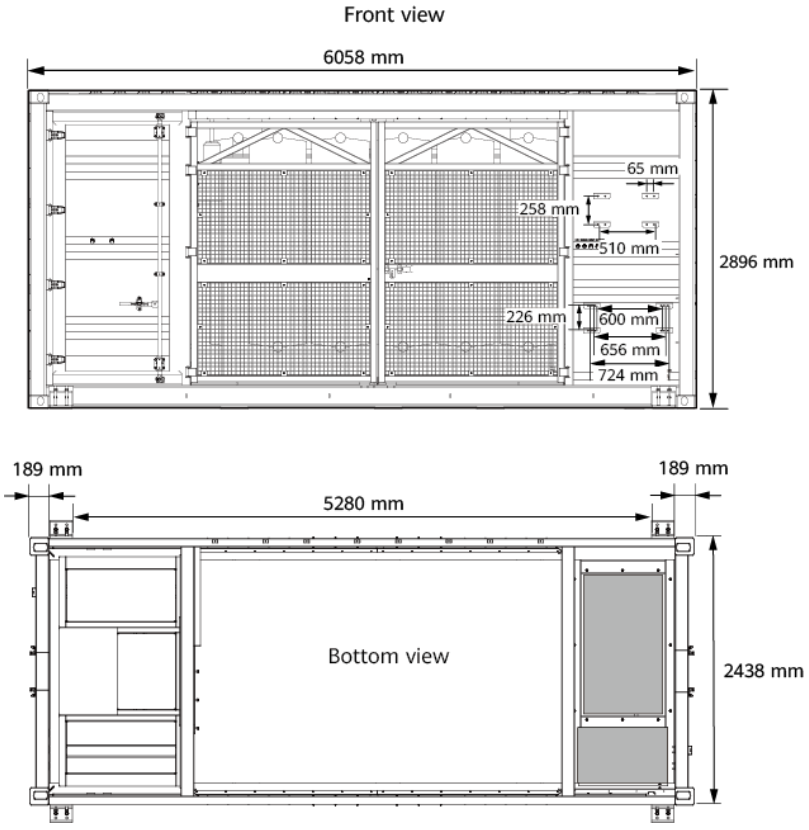
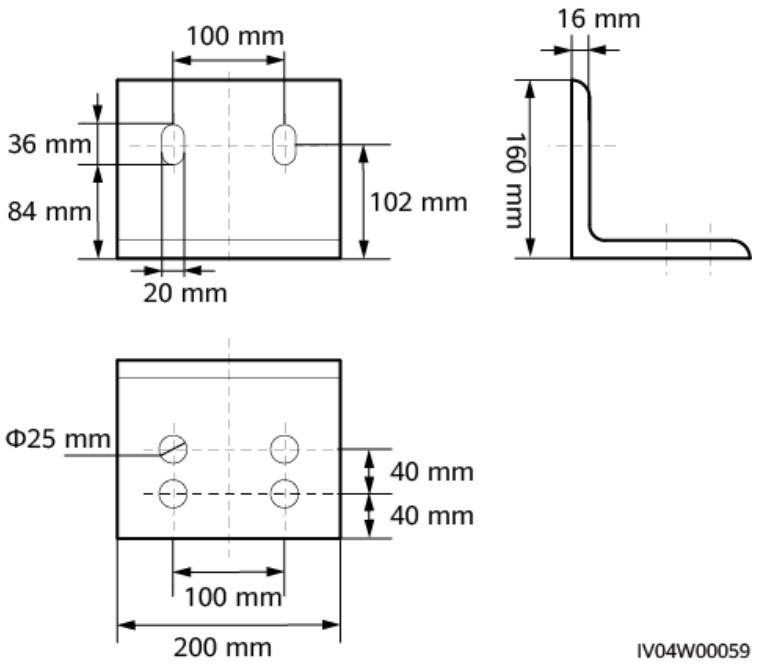


Figure 2-10 Dimensions of an anchor pad



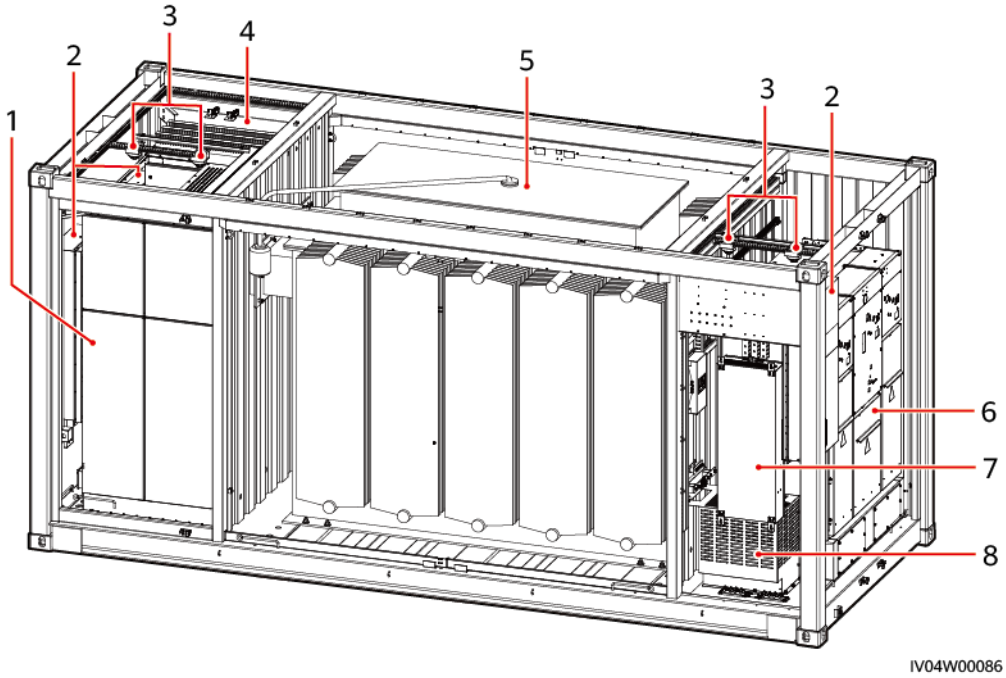
2.3 Label Description

Symbol	Name	Meaning
	Electric shock warning	The equipment operates at high voltage. Only qualified and trained electrical technicians are allowed to install and operate the equipment.
	Grounding	Indicates the position for connecting the protective earthing (PE) cable.
	Height label	The equipment is high. You may need tools such as an insulation stool or a step ladder to facilitate operation.
HW*U 000000 0	Box No. label	Displays the equipment box No.

2.4 Components

2.4.1 Cabinet Description

Figure 2-11 STS components



(1) LV PANEL A	(2) Heat exchangers	(3) Smoke sensors
(4) LV PANEL B	(5) Transformer	(6) Ring main unit
(7) Power distribution box	(8) Auxiliary transformer	-

NOTE

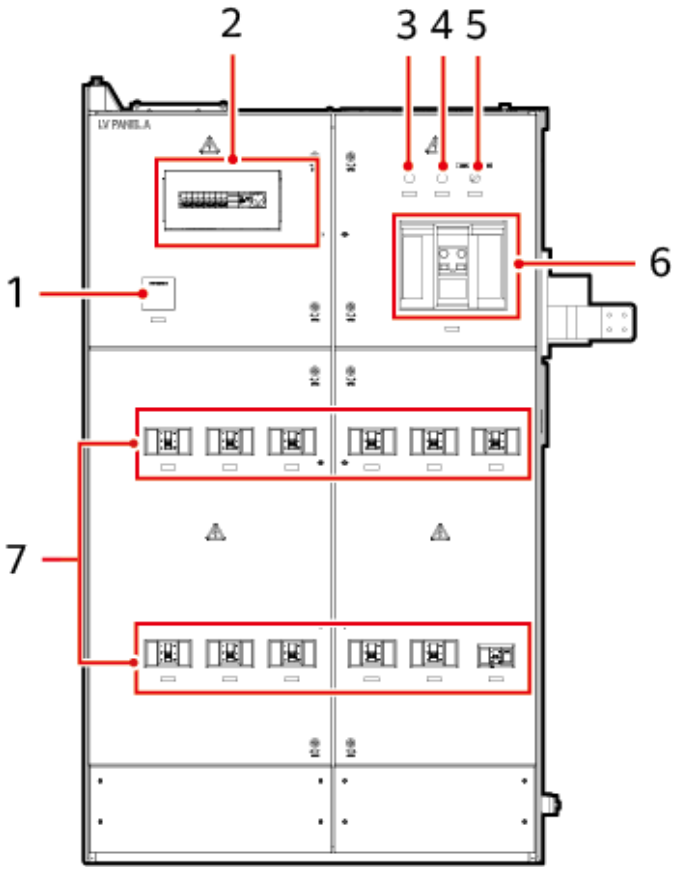
In energy storage scenarios, the auxiliary transformer is optional.

2.4.2 LV Room

2.4.2.1 JUPITER-3000K-H1

The LV panel adopts a single-sided structure. Each LV panel can connect to a maximum of 12 MCCBs. To perform operations or maintenance, you can open the cabinet door of the LV room or enter the STS.

Figure 2-12 Front view of an LV panel

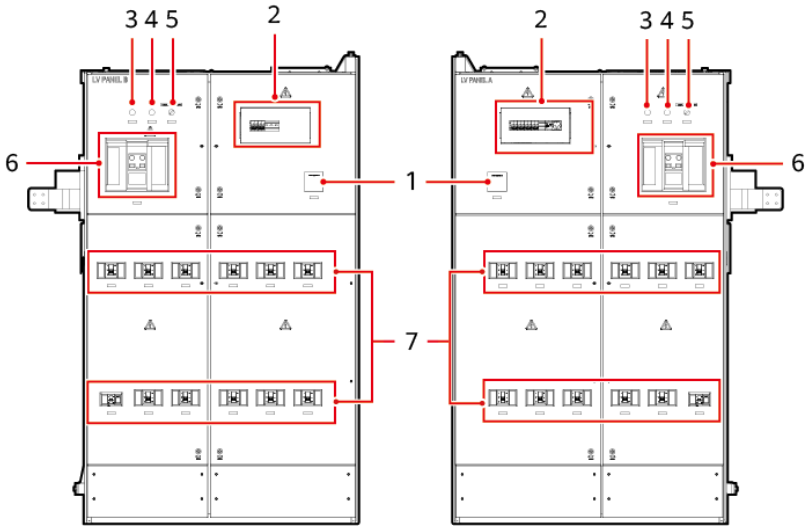


(1) Multimeter (MULTIFUNCTION METER, optional)	(2) Miniature circuit breaker	(3) Off button (PUSH TO OPEN ACB)
(4) On button (PUSH TO CLOSE ACB)	(5) Transfer switch (REMOTE/ LOCAL SWITCH)	(6) Air circuit breaker (ACB)
(7) AC input switches	-	-

2.4.2.2 JUPITER-6000K-H1

The LV panels adopt a single-sided structure and consist of LV PANEL A and LV PANEL B. Each LV panel can connect to a maximum of 24 MCCBs. To perform operations or maintenance, you can open the cabinet door of the LV room or enter the STS.

Figure 2-13 Front view of an LV panel



(1) Multimeters (MULTIFUNCTION METER, optional)

(2) Miniature circuit breakers

(3) Off buttons (PUSH TO OPEN ACB)

(4) On buttons (PUSH TO CLOSE ACB)

(5) Transfer switches (REMOTE/LOCAL SWITCH)

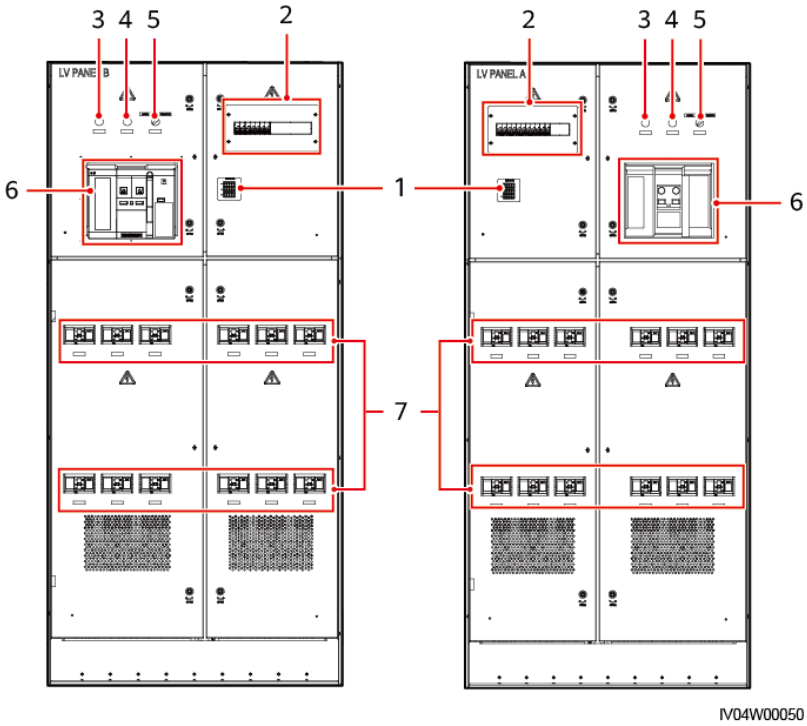
(6) ACBs

(7) AC input switches

2.4.2.3 JUPITER-9000K-H1

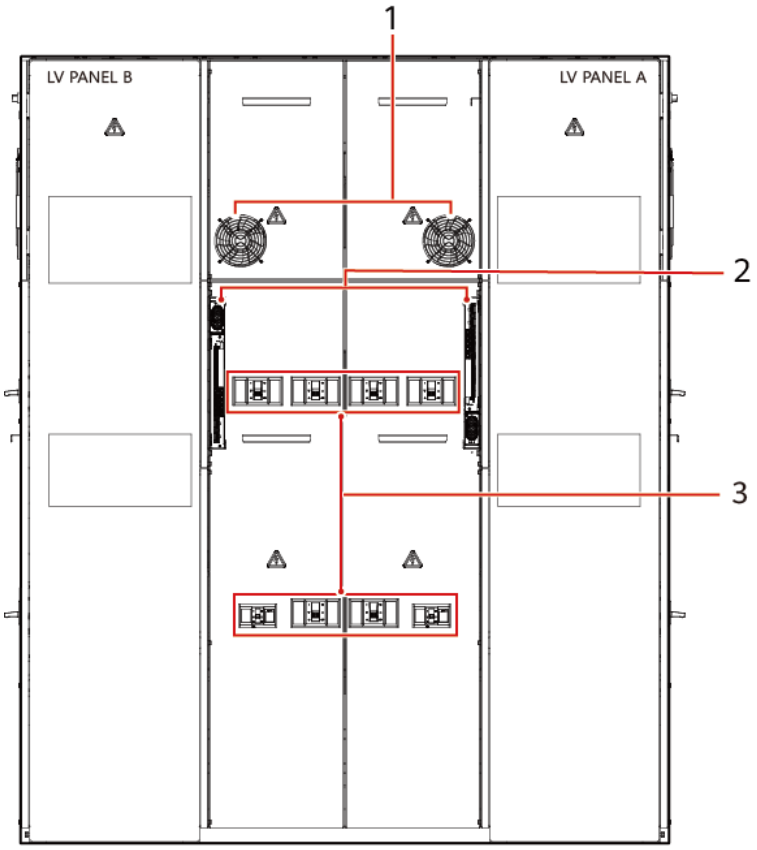
The LV panels adopt a single-sided structure and consist of LV PANEL A and LV PANEL B. Each LV panel can connect to a maximum of 32 MCCBs. To perform operations or maintenance, you can open the cabinet door of the LV room or enter the STS.

Figure 2-14 Front view of an LV panel



(1) Multimeters (MULTIFUNCTION METER, optional)	(2) Miniature circuit breakers	(3) Off buttons (PUSH TO OPEN ACB)
(4) On buttons (PUSH TO CLOSE ACB)	(5) Transfer switches (REMOTE/LOCAL SWITCH)	(6) ACBs
(7) AC input switches	-	-

Figure 2-15 Side view of LV panels



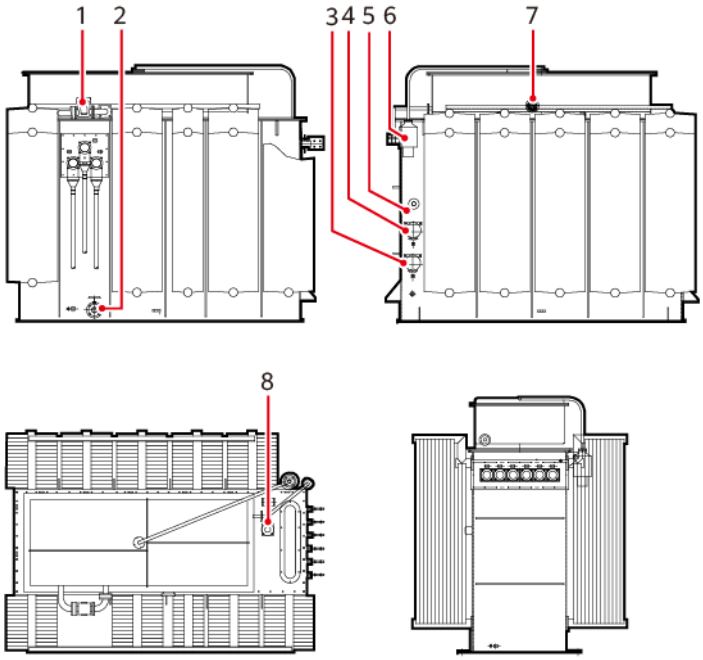
(1) Mixed-flow fans
(2) STS measurement and control modules
(3) AC input switches
-

2.4.3 Transformer Room

The transformer room converts the LV AC power into the MV AC power. The main equipment is a transformer configured with gas, oil temperature, pressure, and oil level protection devices. At the same time, a comprehensive protection device is configured in the MV room for the transformer.

This document uses one type of transformer as an example. The appearance of transformers of different models may vary.

Figure 2-16 Transformer



No.	Item	Function	Description
1	Gas relay	Generates a gas accumulation alarm or an oil flow trip.	• When a minor fault occurs on the transformer, the oil of the transformer generates gas. The gas will rise and enter the gas relay. In this case, the reed switch contact for gas accumulation will be closed to send signals. When there is too much gas, it can be released through the gas nozzle of the gas relay. • When there is a strong gas flow in the transformer, the reed switch contact for oil flow will be closed and the circuit breaker of the ring main unit will trip.
2	Oil feed and drain valve	Refills or drains oil.	• Oil refilling: Refills the transformer oil using an uncontaminated metal or non-rubber hose and oil injection equipment. (Note: Prevent air from entering.) • Oil draining: Lead the transformer oil to a container using an uncontaminated metal or non-rubber hose.
3	Oil surface temperature controller	Measures and controls the temperature of the top layer of transformer oil.	Displays the top layer of transformer oil in real time and issues alarms and trip signals through the built-in temperature control switch.

No.	Item	Function	Description
4	(Optional) Winding thermostat	Measures and controls the transformer winding temperature through thermal simulation by measuring the top oil temperature.	The transformer winding temperature is displayed through **thermal simulation** technology, and the alarm and trip signals are transmitted through the temperature control switch.
5	Off-load tap changer	Regulates the voltage.	There are five levels. Level 1 indicates the maximum tapping value, level 3 indicates the rated tapping value, and level 5 indicates the minimum tapping value.
6	Dehydrating breather	-	The insulation oil is isolated from the atmosphere through the airbag in the conservator. The airbag is connected to the atmosphere through the dehydrating breather. The dehydrating breather contains silica gel to absorb moisture and impurities in the air and maintain good performance of the insulation oil.
7	Oil level gauge	Indicates the oil level.	Indicates the oil level of the transformer oil cabinet and reports the alarms of high and low oil levels.
8	Pressure release valve	Releases pressure.	If a transformer is faulty, a large amount of gas is generated, and the pressure of the insulation oil increases sharply. When the certain threshold is reached, the transformer oil is discharged and the internal pressure of the transformer decreases to a normal value. At the same time, a signal is sent to trip the circuit breaker in the ring main unit.

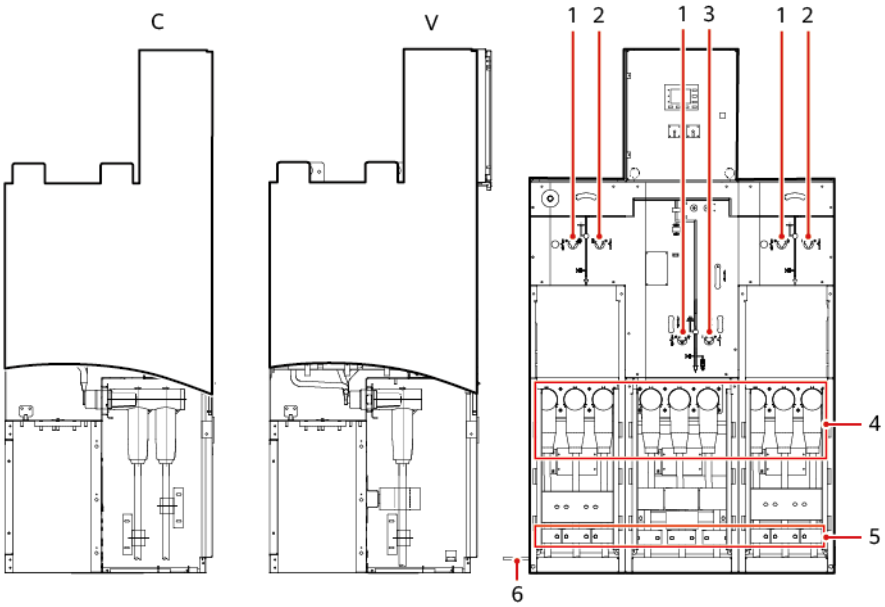
2.4.4 MV Room

2.4.4.1 DQS-12/24 (CVC)

NOTE

No cable connector is installed in cabinet G1 or G3. The cable connectors in the figure are for reference only. The actual position and dimensions may vary.

Figure 2-17 Appearance



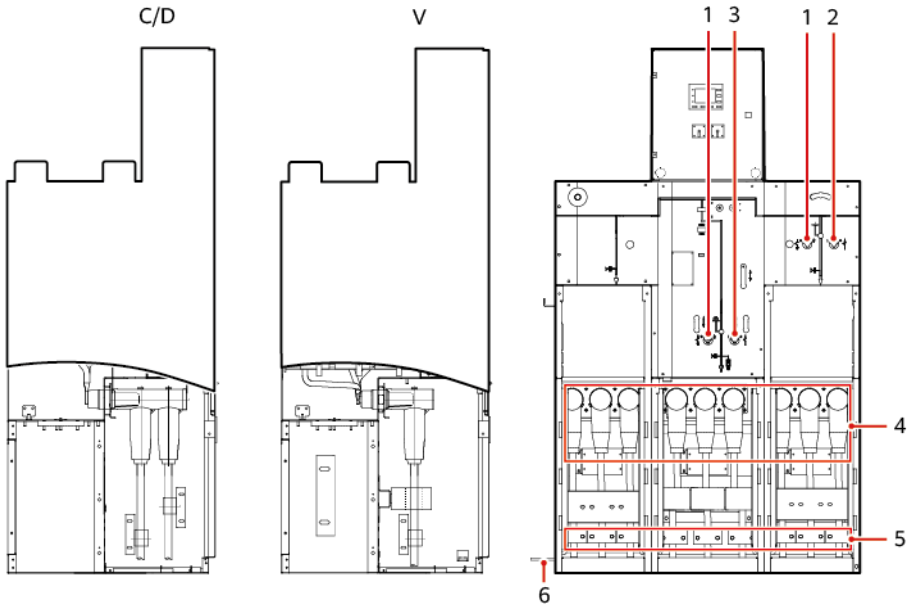
(1) Operation holes of grounding switches
(2) Load switch operation holes
(3) Isolation switch operation hole
(4) Cable connectors
(5) Cable clips
(6) Ground bar

2.4.4.2 DQS-12/24 (DVC)

NOTE

No cable connector is installed in cabinet G1 or G3. The cable connectors in the figure are for reference only. The actual position and dimensions may vary.

Figure 2-18 Appearance



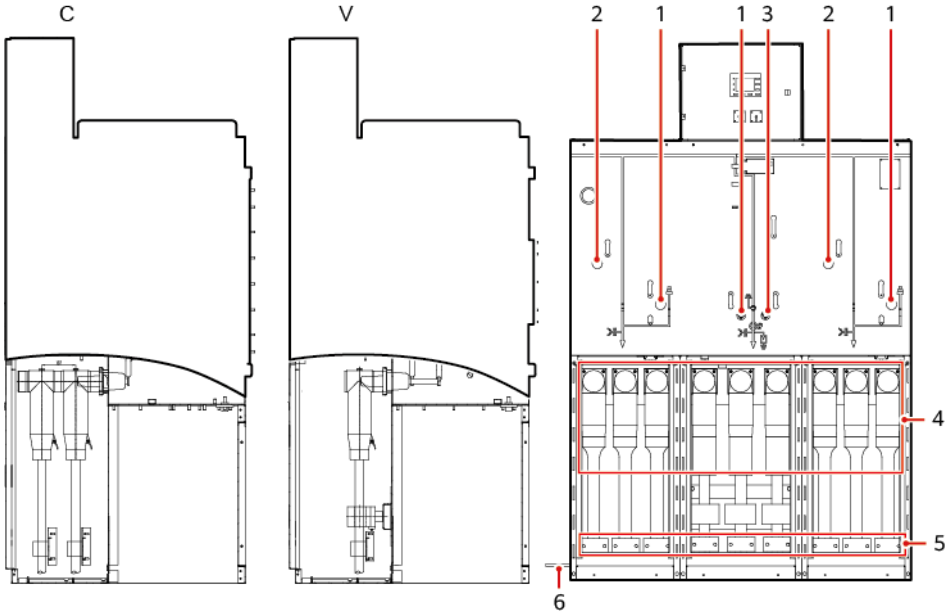
(1) Operation holes of grounding switches
(2) Load switch operation holes
(3) Isolation switch operation hole
(4) Cable connectors
(5) Cable clips
(6) Ground bar

2.4.4.3 DQS-36 and DQS-40.5 (CVC)

NOTE

No cable connector is installed in cabinet G1 or G3. The cable connectors in the figure are for reference only. The actual position and dimensions may vary.

Figure 2-19 Appearance



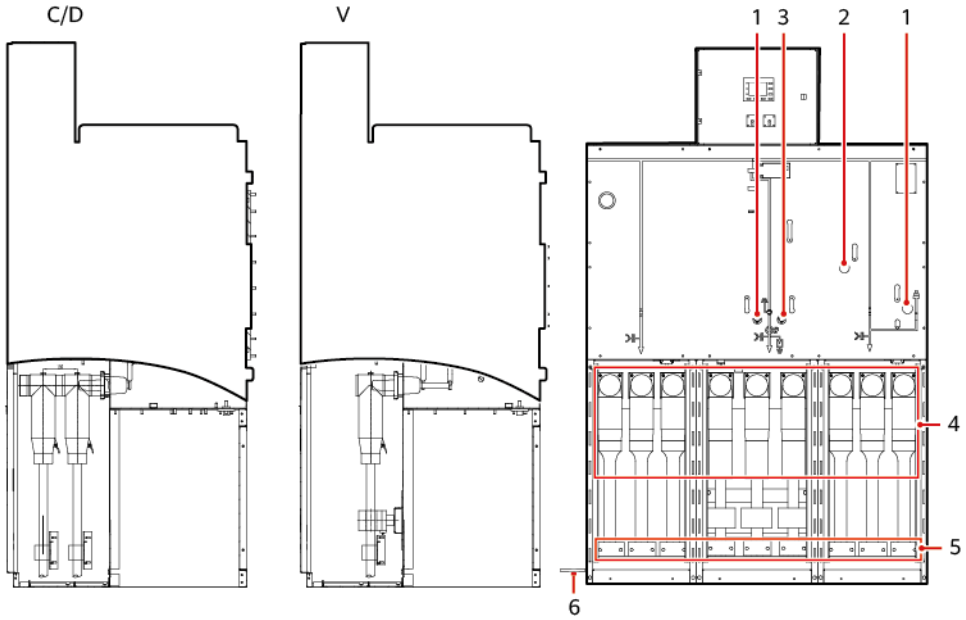
(1) Operation holes of grounding switches
(2) Load switch operation holes
(3) Isolation switch operation hole
(4) Cable connectors
(5) Cable clips
(6) Ground bar

2.4.4.4 DQS-40.5 (DVC)

NOTE

No cable connector is installed in cabinet G1 or G3. The cable connectors in the figure are for reference only. The actual position and dimensions may vary.

Figure 2-20 Appearance



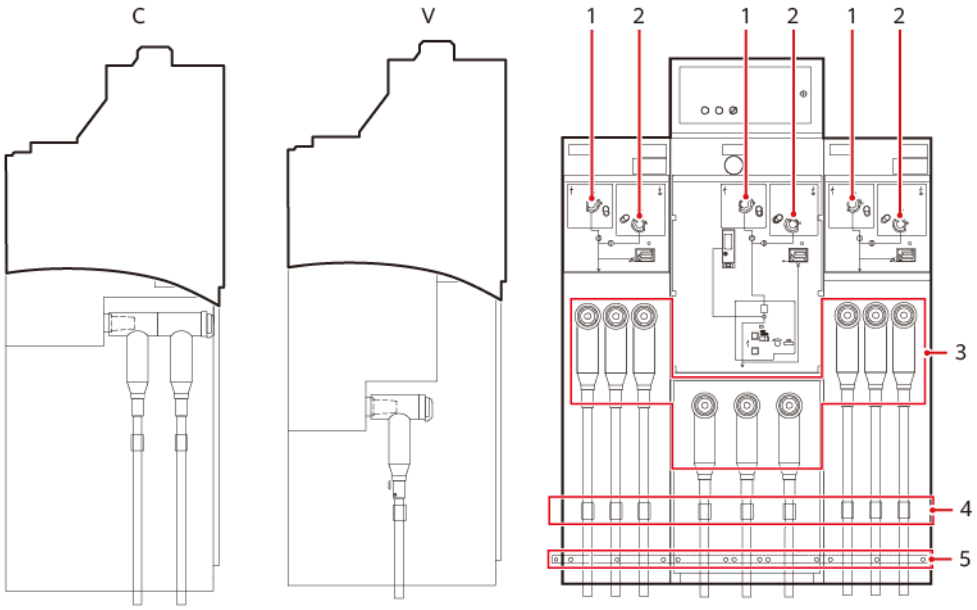
(1) Operation holes of grounding switches
(2) Load switch operation holes
(3) Isolation switch operation hole
(4) Cable connectors
(5) Cable clips
(6) Ground bar

2.4.4.5 CGM.3 (CVC)

NOTE

No cable connector is installed in cabinet G1 or G3. The cable connectors in the figure are for reference only. The actual position and dimensions may vary.

Figure 2-21 Appearance



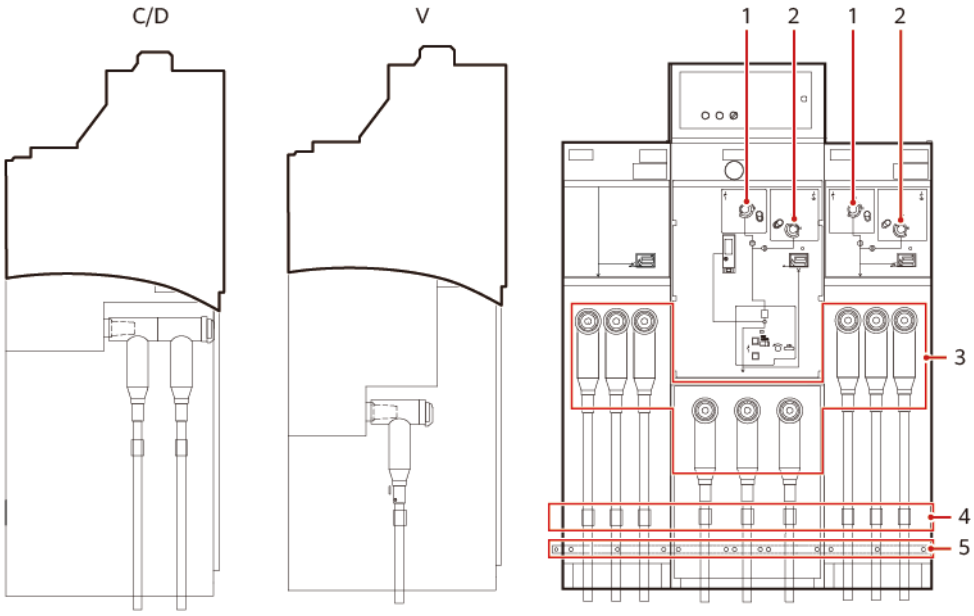
(1) Load switch operation holes
(2) Grounding switch operation holes
(3) Cable connectors
(4) Cable clips
(5) Ground bar
-

2.4.4.6 CGM.3 (DVC)

NOTE

No cable connector is installed in cabinet G1 or G3. The cable connectors in the figure are for reference only. The actual position and dimensions may vary.

Figure 2-22 Appearance



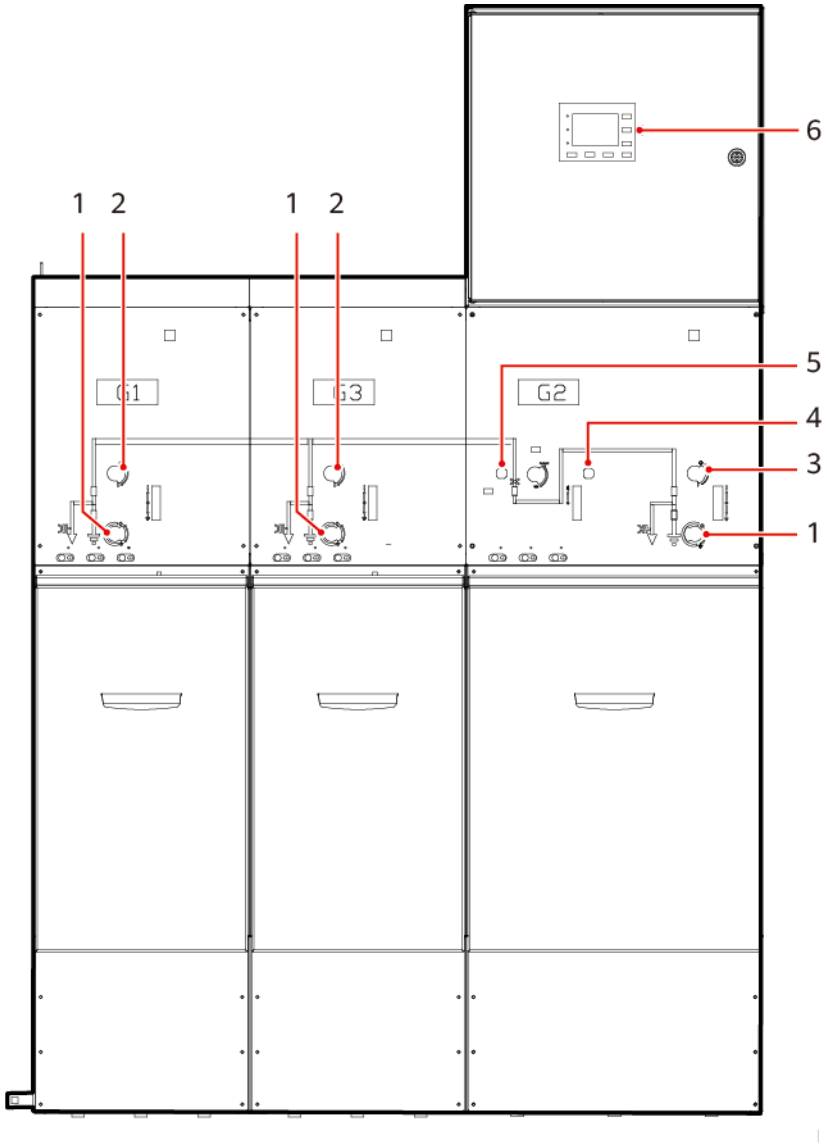
(1) Load switch operation holes
(2) Grounding switch operation holes
(3) Cable connectors
(4) Cable clips
(5) Ground bar
-

2.4.4.7 8DJH12/24 (CCV)

NOTE

- The CCV ring main unit includes a circuit breaker cabinet and two load switch cabinets.
- The secondary room of the ring main unit cannot be opened when the power is on.

Figure 2-23 Appearance



(1) Manual grounding (2) Manual load disconnection (3) Isolator

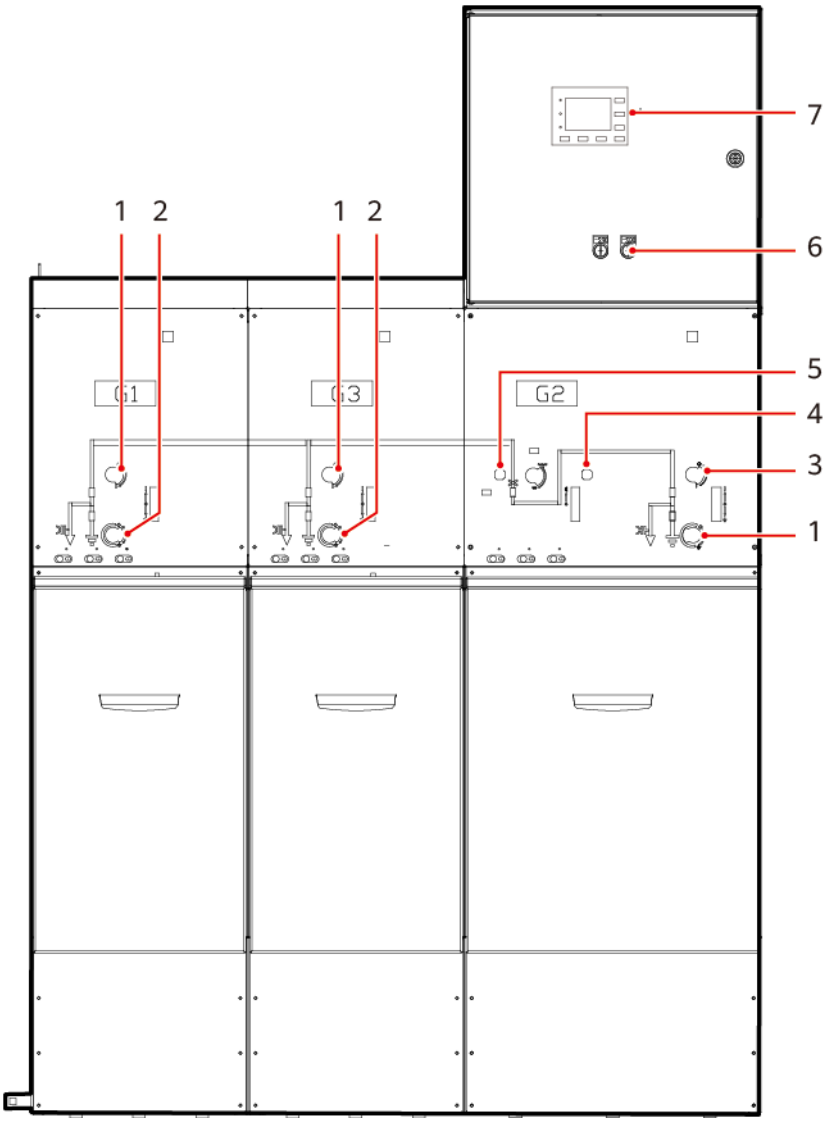
(4) Manually switching off the circuit breaker (5) Manually switching on the circuit breaker (6) Relay

2.4.4.8 8DJH36 (CCV)

NOTE

- The CCV ring main unit includes a circuit breaker cabinet and two load switch cabinets.
- The secondary room of the ring main unit cannot be opened when the power is on.

Figure 2-24 Appearance



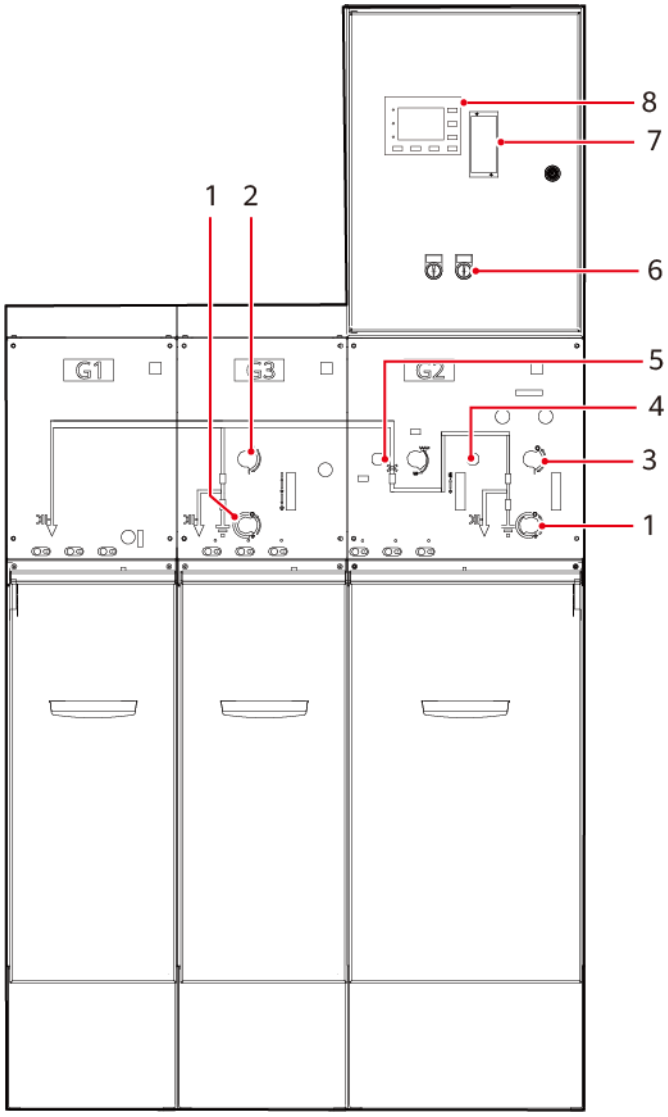
(1) Manual load disconnection	(2) Manual grounding	(3) Disconnector
(4) Manually switch off the circuit breaker	(5) Manually switch on the circuit breaker	(6) Circuit breaker electrical control switch
(7) Relay	-	-

2.4.4.9 8DJH12/24 (DCV)

NOTE

- The DCV ring main unit includes a direct cable entry cabinet, a load switch cabinet, and a circuit breaker cabinet.
- The secondary room of the ring main unit cannot be opened when the power is on.

Figure 2-25 Appearance



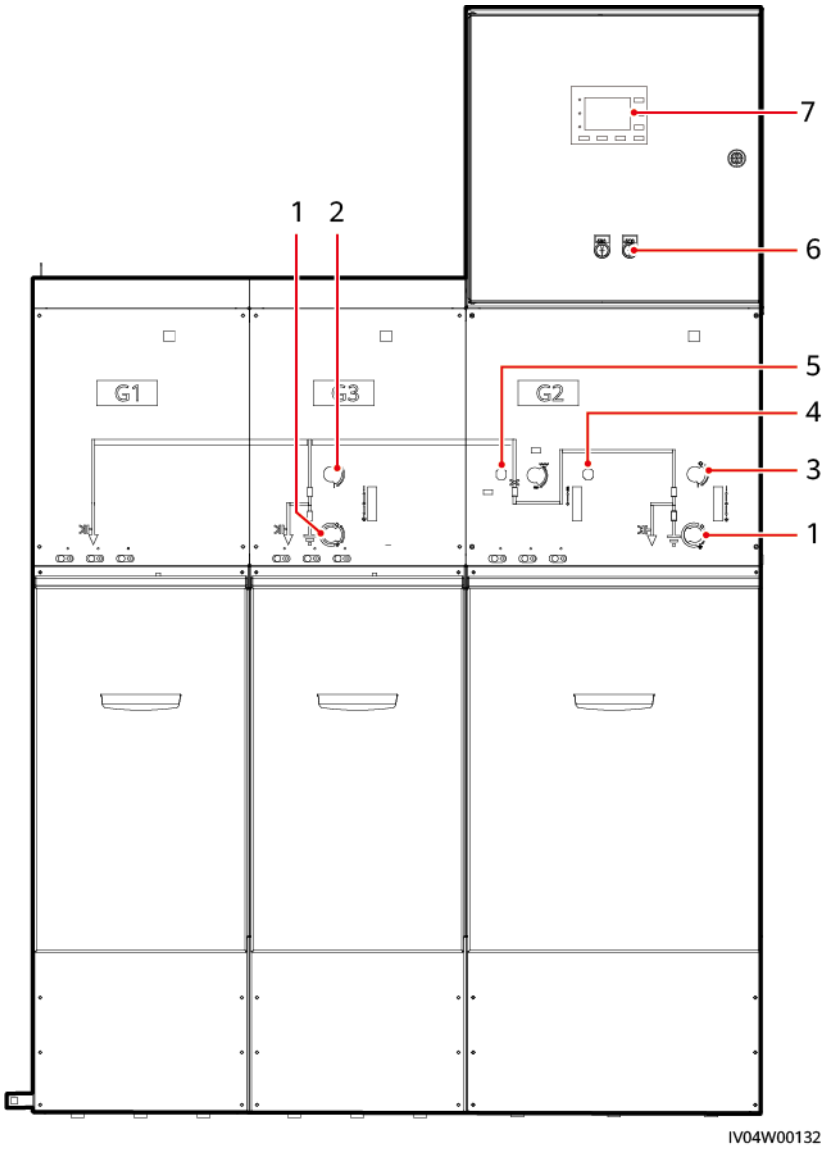
(1) Manual grounding	(2) Manual load disconnection	(3) Disconnector
(4) Manually switch off the circuit breaker	(5) Manually switch on the circuit breaker	(6) Circuit breaker electrical control switch
(7) Temperature and humidity controller (Optional)	(8) Relay	-

2.4.4.10 8DJH36 (DCV)

NOTE

- The DCV ring main unit includes a direct cable entry cabinet, a load switch cabinet, and a circuit breaker cabinet.
- The secondary room of the ring main unit cannot be opened when the power is on.

Figure 2-26 Appearance



(1) Manual grounding	(2) Manual load disconnection	(3) Disconnector
(4) Manually switch off the circuit breaker	(5) Manually switch on the circuit breaker	(6) Circuit breaker electrical control switch
(7) Relay	-	-

2.4.5 STS Measurement and Control System

2.4.5.1 STS Main Control Module

The STS is configured with one main control module, which is located in LV PANEL A. The main control module communicates with the STS measurement and control modules and sends the data of the measurement and control modules to the SACU, which then sends the data to the management system through the switch.

Figure 2-27 Position of an STS main control module

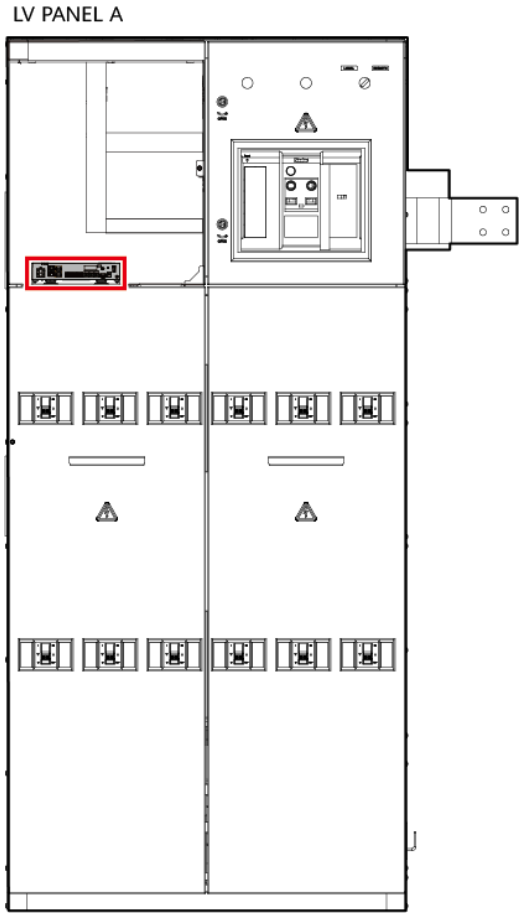
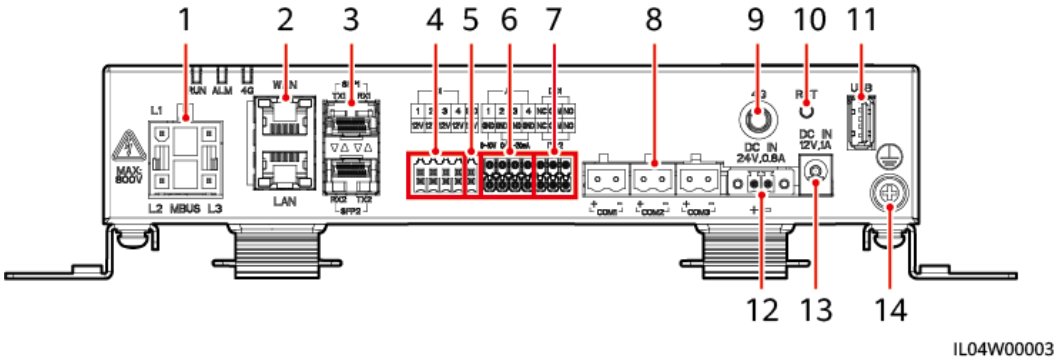


Figure 2-28 Main control module



(1) MBUS ports	(2) Ethernet ports	(3) SFP ports
(4) DI ports	(5) 12 V output power port	(6) AI ports
(7) DO ports	(8) COM ports	(9) 4G antenna port
(10) RST button	(11) USB port	(12) 24 V DC input port
(13) 12 V input power port	(14) Ground point	-

Table 2-1 Port description

No.	Silk Screen	Item	Description
1	MBUS L1/L2/L3	MBUS ports	MBUS ports are not enabled.
2	WAN	Ethernet ports	Provide one WAN port and one LAN port, supporting 10/100/1000 Mbit/s auto-negotiation.
	LAN		
3	SPF 1/2	SFP ports	Support 100M and 1000M optical modules, SFP and eSFP optical modules, and automatic identification of optical module rates. Wavelength supported by the optical modules: 1310 nm (single-mode); transmission distance: 12 km.
4	DI1–DI4	DI ports	Provide four universal DI ports.
5	-	12 V output power port	Supports 12 V DC output.
6	AI1–AI4	AI ports	• AI1 is a voltage-type signal input port, supporting a voltage range of 0–10 V. • AI2–AI4 are current-type signal input ports, supporting current ranges of 0–20 mA and 4–20 mA.
7	DO1–DO2	DO ports	NO COM normally open contact; NC COM normally closed contact. Support a maximum of 12 V signal voltage.
8	COM1–COM3	COM ports	Connect the RS485 cables.
9	4G	4G antenna port	-
10	RST	Restart button	Hold down the button for 3s to 10s to power on and restart the WLAN module. Hold down the button for more than 10s to restore to the default IP address (192.168.0.10). The restored IP address is valid for 5 minutes. Within 3 minutes after power-on and restart, hold down the button for more than 60s to restore to factory settings.
11	USB	USB port	After a USB flash drive is inserted into the USB port, you can use the app to perform local maintenance operations on the main control module, such as firmware upgrade and data export.

No.	Silk Screen	Item	Description
12	DC_IN 24V, 0.8A	24 V DC input port	Provides a 2-pin cord end terminal, supporting 24 V DC input.
13	DC_IN 12V, 1A	12 V DC input port	Supports 12 V DC input.

Table 2-2 Indicator

Indicator	Status		Description
Running indicator (RUN)	Off		The module is not powered on.
	Blinking green slowly (on for 1s and then off for 1s)		The communication between the module and the management system is normal.
	Blinking green fast (on for 0.125s and then off for 0.125s)		The communication between the module and the management system is interrupted or the module is not registered with the network management system.
Alarm/ Maintenance indicator (ALM)	Alarm state	Off	No system alarm is raised.
		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 state	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 is successful.

NOTE

- Local maintenance refers to operations such as full data import and export by connecting a USB flash drive to the USB port on the main control module.
- For details about local maintenance operations (such as importing and exporting all data and exporting logs using a USB flash drive), see the app user manual.
- If an alarm and local maintenance happen concurrently, the alarm/maintenance indicator shows the local maintenance state first. After local maintenance ends, the indicator shows the alarm state.

2.4.5.2 STS Measurement and Control Modules

The JUPITER-3000K-H1 is configured with two measurement and control modules, and the JUPITER-6000K-H1 and JUPITER-9000K-H1 are configured with three, respectively. The measurement and control modules are located in the LV room and MV room, collecting signals in their corresponding areas. The measurement and control modules provide teleindication, telemetering, and telecontrol functions, collect switch status, measure analog voltage and current, and control and adjust fan speeds.

Figure 2-29 Positions of measurement and control modules in the JUPITER-3000K-H1

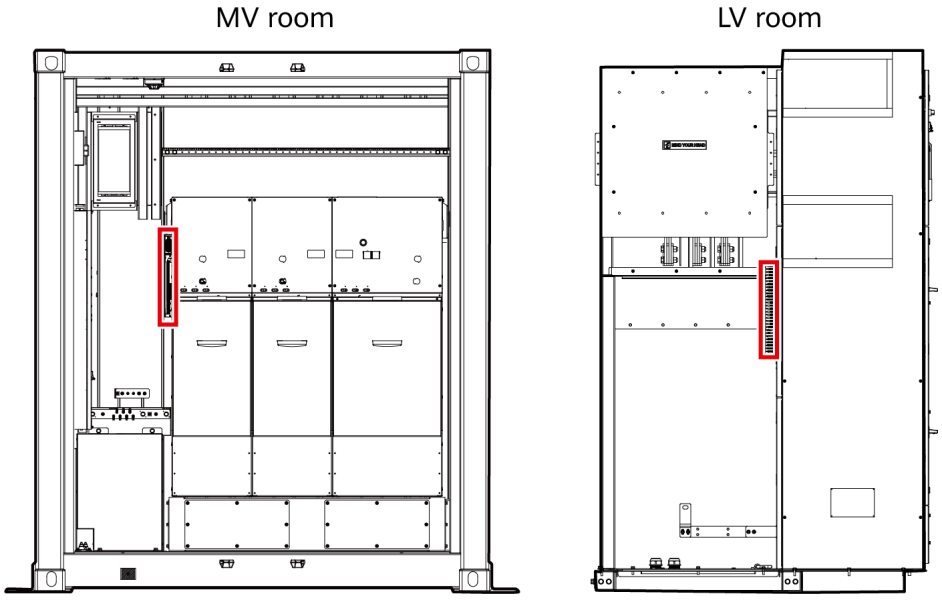


Figure 2-30 Positions of measurement and control modules in the JUPITER-6000K-H1/JUPITER-9000K-H1

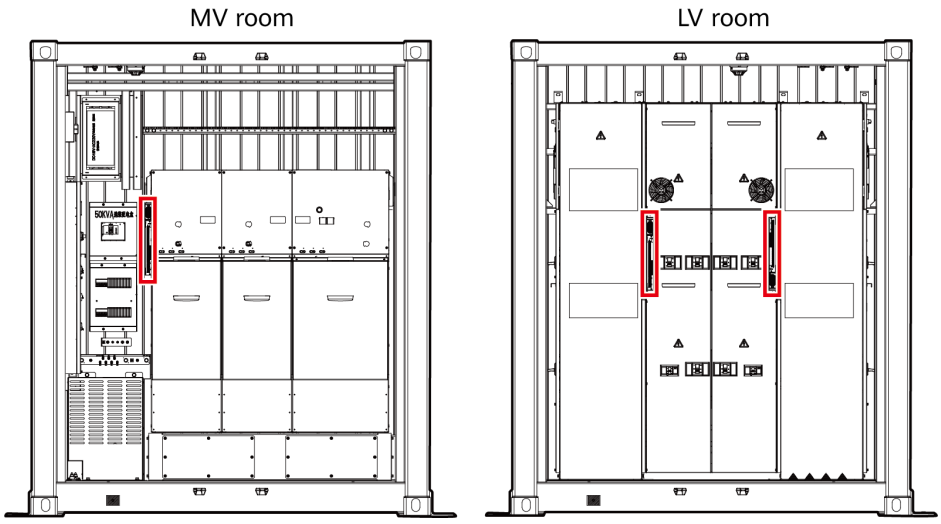
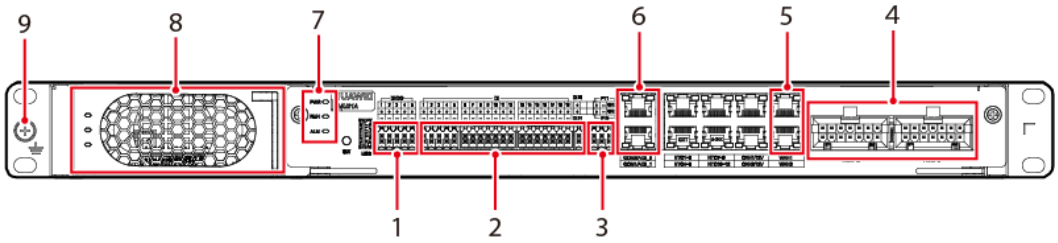


Figure 2-31 Measurement and control module (front)



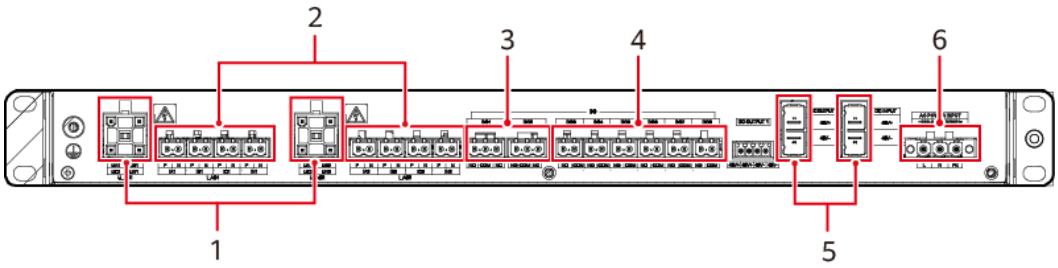
(1) DI/DO ports	(2) DI ports	(3) PT ports	(4) Fan ports
(5) Ethernet ports	(6) COM ports	(7) Indicators	(8) Power supply unit (PSU)
(9) Ground point	-	-	-

Table 2-3 Port description (front)

No.	Silk Screen	Item	Description
1	DI1/ DO1~DI5/DO5	DI/DO ports	Provide five dry contact outputs (normally open dry contacts) and inputs.
2	DI1~DI21	DI ports	Provide 21 dry contact inputs.
3	PT1	PT ports	Provide two ports for PT100 temperature sensors.
	PT2		
4	FAN1~FAN3	Fan ports	Provide six ports for supplying DC power to and controlling fans, and support fan speed detection and adjustment. The maximum power of each fan is 130 W.
	FAN4~FAN6		

No.	Silk Screen	Item	Description
5	WAN1	Ethernet ports	Provide two WAN ports, each of which supports 10/100 Mbit/s auto-negotiation.
	WAN2		
6	COM1	RS485 communications ports	Provide two isolated RS485 communications ports to connect to temperature and humidity sensors.
	COM2		

Figure 2-32 Measurement and control module (rear)



(1) AC voltage detection ports	(2) AC current detection ports	(3) DO1 and DO2 ports	(4) DO3–DO8 ports
(5) DC power cascading port	(6) PSU AC input power port	-	-

Table 2-4 Port description (rear)

No.	Silk Screen	Item	Description
1	U_AC1	AC1 voltage detection port	Detects AC voltage input, supporting single-phase and three-phase voltage detection.
	U_AC2	AC2 voltage detection port	
2	I_AC1	AC1 current detection port	Detects AC current input.
	I_AC2	AC2 current detection port	
3	DO1, DO2	DO output ports	Provide normally closed (NC) and normally open (NO) contacts.
4	DO3~DO8	DO output ports	Provide NO contacts.
5	DC_OUTPUT2	DC power cascading port	Supports 53.5 V DC output.
	DC_INPUT		Supports 53.5 V DC input.
6	AC POWER INPUT	PSU AC input power port	Supports 200–240 V, 50 Hz/60 Hz AC input.

Table 2-5 Indicator description

Silk Screen	Color	Function Definition	Status	Description
RUN	Green	Running status indicator	Blinking at 0.5 Hz	Communication with the main control module is normal.
			Blinking at 2.5 Hz	Communication with the main control module failed.
			Off	The program is not running properly.
PWR	Green	Power indicator	Steady on	The power supply is normal.
			Off	The power supply is abnormal.

2.4.5.3 (Optional) MBUS CCOs

The JUPITER-9000K-H1 is configured with one MBUS central coordinator (CCO), which is located in LV PANEL A.

Figure 2-33 Positions of MBUS CCOs

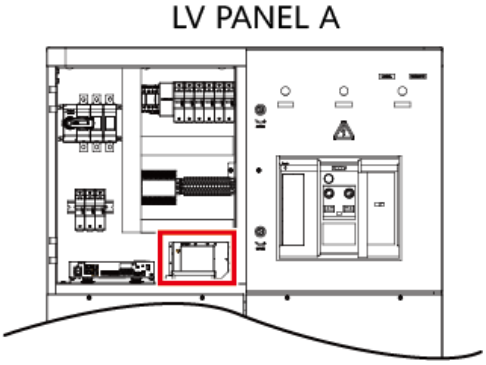
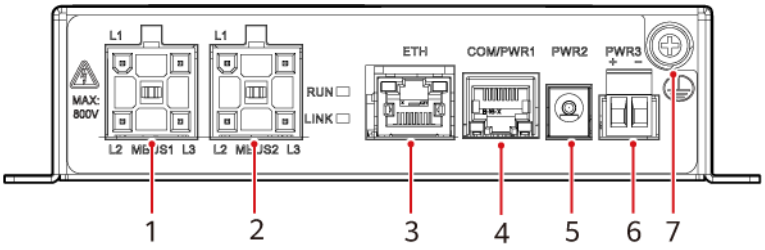


Figure 2-34 Appearance of the MBUS CCOs



(1) AC power cable port 1
(2) AC power cable port 2
(3) FE communications port
(4) RS485 communications port

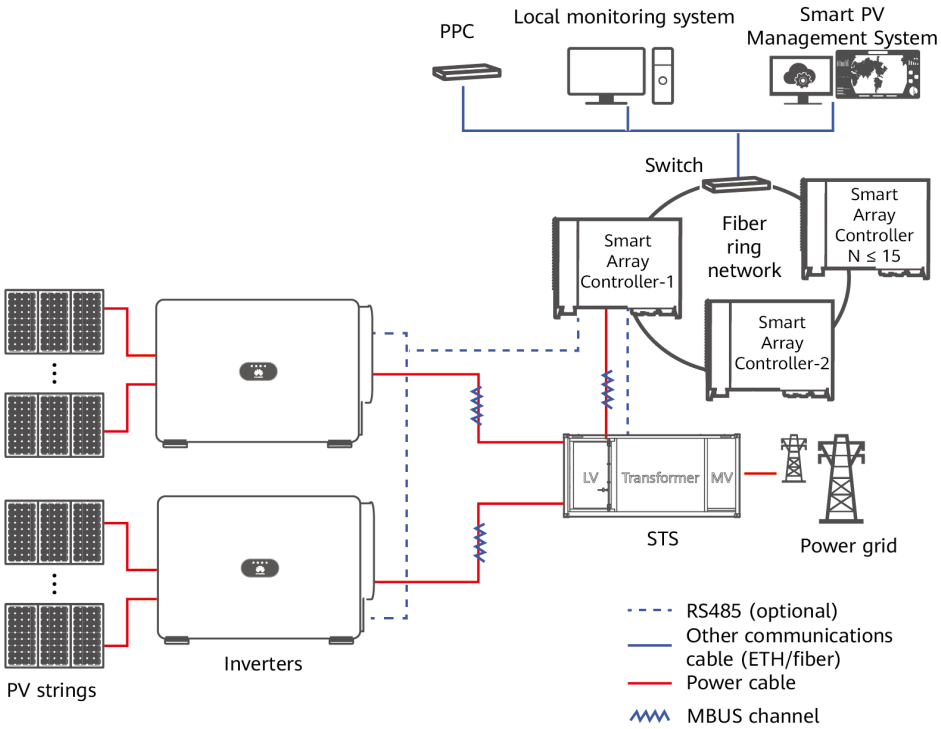
(5) Power port	(6) Power port	(7) Ground point	-

Table 2-6 Indicator description

Silk Screen	Color	Function Definition	Status	Description
RUN	Green	Running status indicator	Steady on	Running properly
			Off	No power supply
LINK	Green	Communication status indicator	Steady on or blinking	Receiving or transmitting data
			Off	No communication

2.5 Scenario-based Configurations

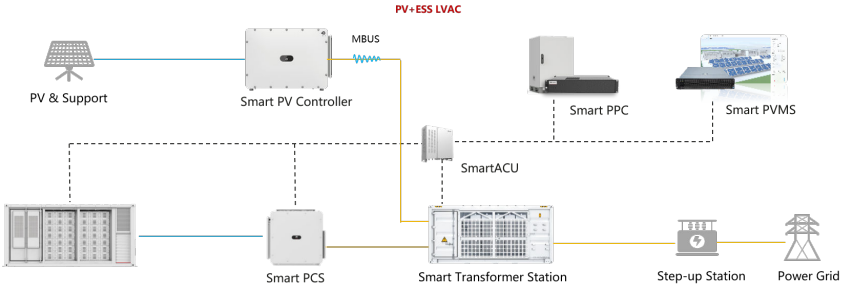
Figure 2-35 PV-only networking (including the MV direct grid connection scenario)



Component	Description
PV string	A PV string consists of PV modules connected in series.

Component		Description
SUN2000 inverter	Rated capacity of the JUPITER-9000K-H1: 9000 kVA at 40°C	Models: SUN2000-185KTL-H1 (≤ 3 x 2) SUN2000-200KTL-H1 (≤ 3 x 2) SUN2000-200KTL-H3 (≤ 3 x 2) SUN2000-215KTL-H0 (≤ 3 x 2) SUN2000-215KTL-H3 (≤ 3 x 2) SUN2000-330KTL-H1 (≤ 15 x 2) SUN2000-330KTL-H2 (≤ 15 x 2)
	Rated capacity of the JUPITER-6000K-H1: 6000 kVA at 40°C	Models: SUN2000-330KTL-H1 (≤ 11 x 2) SUN2000-330KTL-H2 (≤ 11 x 2)
	Rated capacity of the JUPITER-3000K-H1: 3000 kVA at 40°C	Models: SUN2000-330KTL-H1 (≤ 11 x 1) SUN2000-330KTL-H2 (≤ 11 x 1)
STS		Models: JUPITER-3000K-H1, JUPITER-6000K-H1, or JUPITER-9000K-H1
SACU	JUPITER-3000K-H1	Model: SmartACU2000D-D-01
	JUPITER-6000K-H1	Model: SmartACU2000D-D-03
	JUPITER-9000K-H1	Model: SmartACU2000D-D-03
Plant management system		Model: iMaster NetEco NetEco software version: iMaster NetEco V600R022C00SPC120 or later

Figure 2-36 LV AC coupling grid connection in PV+ESS scenarios



Component	Model	Remarks
PV inverter	HA V5 series	None

Component	Model	Remarks
Smart String ESS	LUNA2000-2.0MWH-4H1 LUNA2000-2.0MWH-2H1 LUNA2000-2.0MWH-1H1 LUNA2000-1.0MWH-4H1	The 1C/0.5C/1C half-container solution and hybrid use solution were launched in Q2 of 2023.
PCS	LUNA2000-200KTL-H1	None
DTS	DTS-200K-D0	None
STS	JUPITER-3000K-H1 JUPITER-6000K-H1 JUPITER-9000K-H1	Developed based on the shared MCCB solution in PV-only scenarios.
SACU	SACU2000D	The inverter and ESS are connected to the same SmartLogger. Double-winding transformer: SmartACU2000D-D-01 (configured with an expansion module and a five-port LAN switch) Double-split transformer: SmartACU2000D-D-03 (configured with a five-port LAN switch)

3 Installation Environment Requirements

The equipment is installed outdoors. The site selection requirements are as follows:

- The equipment is heavy. Ensure that the installation surface is solid enough to bear the weight of the equipment.
- The site is not located in a low-lying land. The ground level of the site is above the highest water level of that area in history.
- The ground is solid without spongy or soft soil, and is not prone to water accumulation or subsidence.
- The site is located in a well-ventilated area.
- The site is far away from sources of strong variation, loud noises, and strong electromagnetic interference.
- The site is not above any underground facilities.
- The site must be a class C or higher environment (not a class D or E environment).
- The site is far away from dust, cooking fume, harmful gases, and corrosive, flammable, or explosive objects.
- The site is in an open area and at least 10 m away from any obstacles in all directions.
- The site is at least 50 m away from residential areas.
- The site temperature is within the range of –25°C to +60°C. If the temperature exceeds 55°C, the equipment must be installed in a shaded area.
- 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.

NOTE

- Class C environment: Outdoor areas more than 500 m away from the sea. If a site is near a pollution source, it is 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 chemical factories, rubber plants, and electroplating factories; 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 electroplating 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.

Foundation Requirements

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

- The foundation shall meet the installation and load-bearing requirements of the container.
- The foundation must be above the highest water level of the local area in history and at least 300 mm above the ground.
- The overall flatness of the foundation is less than or equal to 10 mm.
- Bury a grounding grid and reserve a ground copper bar at the ground position of the container. One end of the copper bar must be connected to the buried grounding grid, and the other end must be connected to the main ground point of the container. When burying a grounding grid, reserve sufficient length for the ground copper bar to connect to the main ground point of the container.
- The transformer station adopts bottom cabling. Cables shall be buried under the LV room and MV room in advance.
- The inner diameter of the protective tube shall not be less than 1.5 times the outer diameter of the cable (including the protective layer).
- Construct drainage facilities based on the local geological conditions and municipal drainage requirements to ensure that no water will accumulate at the equipment foundation. The foundation construction must meet the local drainage requirements for the maximum historical rainfall. The drained water must be disposed of in accordance with local laws and regulations.
- Reserve pressure relief channels for the ring main unit, and add protective measures to prevent high temperature gas from burning nearby personnel during pressure relief.
- The insulated ladder shall not block the inlets or outlets of the LV or MV cables. You are advised to put the insulated ladder in front of the door during maintenance.
- According to the IEC 61936 standard, an oil-immersed transformer that uses mineral oil as the insulation liquid must be equipped with an oil tray to prevent groundwater or soil pollution caused by insulation liquid leakage.

Users must strictly comply with the standard. The Company shall not be liable for any environmental pollution or violation of local laws and regulations caused by lack of oil trays.

- If the oil tray is at the bottom of the container, ensure good ventilation on the top of the oil tray. Otherwise, the water vapor from the oil tray will enter the container, resulting in condensation inside the container due to high humidity. As a result, short circuits may occur, causing the STS failure.

  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.

Check Items

No.	Check Item	Acceptance Criteria
1	Platform space	• If the height of the platform is less than or equal to 0.2 m, the distance between the container and the platform outline is 0.1 m to 0.2 m. • If the height of the platform is 0.2 m to 0.5 m, the distance between the container and the platform outline is greater than or equal to 0.8 m. • If the height of the platform is greater than 0.5 m, the distance between the container and the platform outline is greater than or equal to 1.3 m.
2	Cabling space at the bottom	• If there is no maintenance space at the bottom, it is recommended that the cabling space at the bottom of the container be at least 1.2 m high. • If there is maintenance space at the bottom, it is recommended that the cabling space at the bottom of the container be at least 1.5 m high.
3	Cable	• The bending radius of the LV and MV cables is greater than or equal to 15 times the cable diameter. • The voltage drop of the farthest loop does not exceed 5%. • The sensitivity, voltage level, and thermal stability of the cables meet the local design specifications. • The MV cable connector matches the size of the cables used in the project. A sealing tube is used to prevent dust, condensation, and arcing that may damage the cable connector.
4	Pressure relief channel	A pressure relief channel is reserved under the MV room. It is recommended that the STS be built on posts. The distance between the bottom of STS and the ground is greater than or equal to 300 mm.

4 Power-On

DANGER

- Wear personal protective equipment and use dedicated insulated tools to avoid electric shocks or short circuits.
- During operations, wear personal protective equipment such as protective clothing, insulated boots, safety helmets with face shields, and insulated gloves.

DANGER

- Only professional O&M personnel are allowed to operate in the STS to avoid personal injury caused by improper operations.
- Before power-on, ensure that the STS is installed securely, all its internal components are installed, and the check before power-on is complete.
- Immediately stop any operation when an exception occurs. Proceed with the operation only after the exception is rectified.
- Before power-on, place insulation pads under the operation positions.

CAUTION

- The transformer must be powered on by two persons. One person operates the transformer, and the other uses the insulation rescue hook to hold the operator. In the case of any exceptions, the operator shall be quickly pulled away from the equipment.
- STSs are interlocked and must be configured based on the STS installation sequence.
- Only O&M personnel can perform operations, and other personnel must stay more than 10 m away from the STS.

NOTICE

Before the equipment is put into operation for the first time, ensure that the parameters are set correctly by professional personnel. Incorrect parameter settings may result in noncompliance with local grid connection requirements and affect the normal operations of the equipment.

NOTICE

- When operating the transformer, ensure that it is in the no-excitation state, that is, the high and low voltage sides of the transformer are not powered on.
- Perform insulation tests on the medium-voltage side of the transformer and the ring main unit before connecting incoming cables and sealing cable holes.
- Before the insulation tests, ensure that no lightning arrester is installed in cabinet G2 because high voltage may damage the lightning arrester during the tests.
- During insulation tests on the medium-voltage side and the ring main unit, ensure that the grounding switch of the ring main unit is turned off, and that the load switch and disconnector are turned on.

NOTE

This document uses a three-STS system as an example to describe power-on operations.

4.1 Check Before Power-On

4.1.1 Equipment Check

General Inspection

No.	Check Item	Acceptance Criteria
1	Equipment exterior	• The equipment is intact and free from rust and paint flake-off. If the paint flakes off, repair the damaged paint. • The labels on the equipment are clear. Damaged labels must be replaced.
2	Cable exterior	• Cable sheathings are intact and not damaged. • Cable hoses are intact.
3	Cable connection	• 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.

No.	Check Item	Acceptance Criteria
4	Cable routing	• Electric and extra low voltage (ELV) cables are routed separately. • Cables are neat and tidy. • Cable tie joints are evenly cut without burrs. • Cables are placed properly with slack at bending points to avoid stress. • Cables are routed neatly without twists or crossovers in the cabinet.
5	Container cleanness	The container is clean and tidy inside, without any unnecessary cables, cable ends, terminals, or tools. No garbage is found outside the equipment.

Container Check

No.	Check Item	Acceptance Criteria
1	Installation	• The installation meets the design requirements. • The container is level, and each door opens normally.
2	Exterior	The container surface is free from cracks, dents, and scratches. If the paint flakes off, repair the damaged paint.
3	Accessory	The quantity and positions of external accessories installed meet design requirements.
4	Label	All labels are correct, clear, and complete.

LV Panel Check

No.	Check Item	Acceptance Criteria
1	Circuit breaker	The ACBs and MCCBs are turned off. The settings of the circuit breakers must match that provided by the user.
2	Copper bar	The copper bars are not deformed, and no foreign objects are placed on the copper bars.
3	Fuse switch-disconnector	Measure the fuse resistance. The resistance of three phases should be small and their resistance should be close.

No.	Check Item	Acceptance Criteria
4	Surge protective device (SPD)	The SPD indicator is green.
5	(Optional) Multimeter	The multimeter has no reading.
6	Cable	The bolts for installing the cables are tightened and the cables are not loose.
7	Cable hole sealing	Cable holes are sealed.
8	Component	All components are intact.
9	Foreign object	Foreign objects in the LV panels, such as tools and remaining materials, are removed.
10	Residual current circuit breaker	Use the test button to verify that the circuit breaker works properly.

Transformer Check

No.	Check Item	Acceptance Criteria
1	Exterior	The transformer surface is free from cracks, dents, and scratches.
2	Oil leakage	No oil leakage occurs on the transformer surface.
3	Oil temperature	The reading of the transformer oil temperature indicator is close to the ambient temperature. The cover of the oil temperature indicator is installed securely. The surface is clean and the glass is not damaged. The temperature measurement loop is complete and intact.
4	Oil level	The reading of the transformer oil level gauge is consistent with the oil level and temperature curves.
5	Pressure relief valve	The fuse link of the pressure relief valve has been removed, and the pressure relief valve takes no action.
6	Gas relay	• There is no gas inside the gas relay. If there is a small amount of gas, the air can be exhausted through the gas release plug. • The butterfly valve is open.

No.	Check Item	Acceptance Criteria
7	Dehydrating breather	• The silica gels are dry. • If more than half of the silica gels have changed in color, replace the silica gels. Silica gels can be reused after being exposed to the sun or dried at high temperature.
8	Off-load tap changer	• The off-load tap changer is set according to the requirements of the user. If there is no special requirement, set it to the rated level (level 3). • When setting the level, open the handle. After adjusting the level, close the handle to the slot. • After the check is complete, tighten the protective cover for the level switch.
9	Foreign object	There are no packing materials on the transformer, and there are no foreign objects in the transformer room.
10	Oil drain	The oil drain of the transformer room is not blocked.
11	Screen door	The double-swing screen door of the transformer room is closed and locked.

Ring Main Unit Check

No.	Check Item	Acceptance Criteria
1	Exterior	The cabinet surface is free from cracks, dents, and scratches.
2	SF_6 barometer	The pointer of the SF_6 barometer is in the green area and is at a certain distance from the yellow or red area.
3	Protective device	If there is a relay protection tester or current source, check the value settings of the protective device, including the set value, control word, and software logic. The set value must match that provided by the user.
4	Cable room door	The cable room door is closed.
5	Power supply in the cabinet	The auxiliary AC power circuit breaker in the cabinet is turned on.
6	Foreign object	Foreign objects in the ring main unit, such as tools and remaining materials, are removed.

Inverter and PCS Status Check (Applicable to LV Coupling Scenarios Where the Inverter and PCS Are Connected to the Same MCCB)

No.	Check Item	Acceptance Criteria
1	Inverter power-on check	Perform a power-on check on the inverter. For details, see sections "Check Before Power-On" and "Power-On and Commissioning" in **SUN2000-(250KTL, 280KTL, 300KTL, 330KTL) Series User Manual**.
2	Cable connection between the inverter and the STS	Ensure that the cable connection between the inverter and the STS is correct and reliable. For details, see section "Connecting AC Input Power Cables" in *JUPITER-(3000K, 6000K, 9000K)-H1 Smart Transformer Station User Manual*.
3	PCS power-on check	Perform a power-on check on the PCS. For details, see sections "Checking Before Power-On" and "Power-On and Commissioning" in **LUNA2000-200KTL-H1 Smart Power Control System User Manual**.
4	Cable connection between the PCS and the STS	Ensure that the cable connection between the PCS and the STS is correct and reliable. For details, see section "Connecting AC Input Power Cables" in *JUPITER-(3000K, 6000K, 9000K)-H1 Smart Transformer Station User Manual*.
5	DTS power-on check	Ensure that the cable connection to the DTS is correct and reliable. For details, see *DTS-200K-D0 Distribution Transformer User Manual*.
6	Cable connection between the DTS and the STS	Ensure that the cable connection between the DTS and the STS is correct and reliable. For details, see section "Connecting AC Input Power Cables" in *JUPITER-(3000K, 6000K, 9000K)-H1 Smart Transformer Station User Manual*.

4.1.2 Insulation Test

4.1.2.1 Insulation Test on the Transformer MV Side and the Ring Main Unit

NOTE

- Perform insulation tests on the transformer MV side and the ring main unit before connecting incoming cables and sealing cable holes.
- Before the insulation tests, ensure that no lightning arrester is installed in cabinet G2 because high voltage may damage the lightning arrester during the test.
- During insulation tests on the MV side and the ring main unit, ensure that the grounding switch of the ring main unit is turned off, and that the load switch and disconnector are turned on.
- The methods for performing the insulation test on the CVC/CCV/DVC/DCV ring main units are the same.
- This document uses the CVC ring main unit as an example.

Step 1 Adjust the switch of the ring main unit to be consistent with that in the test schematic diagram.

Step 2 Use a temporary ground cable to ground phase A, B, or C of LV PANEL A and LV PANEL B.

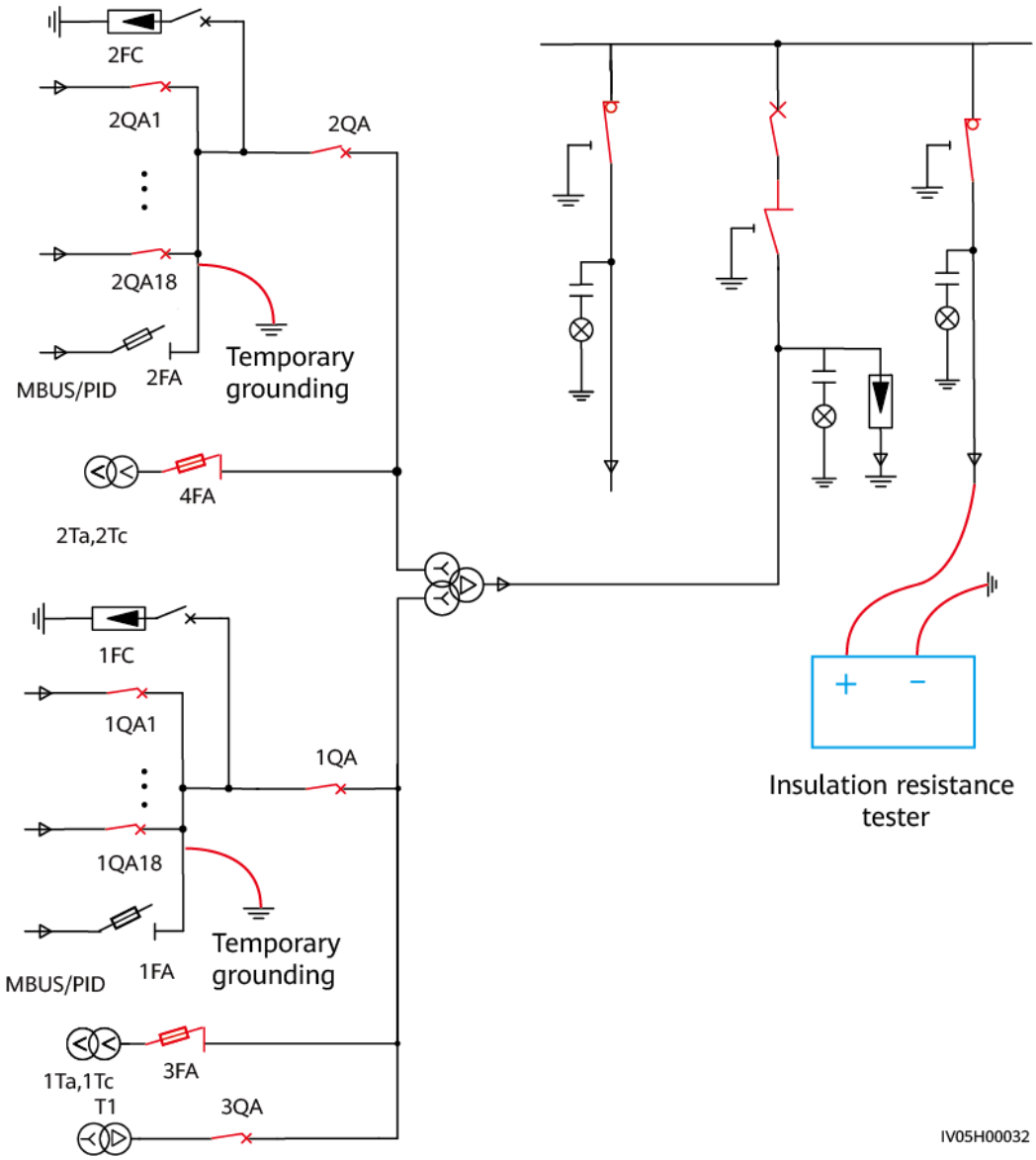
Step 3 Turn off the load switch in cabinet G1 or G3, turn on the grounding switch, and open the door of the cable room.

Step 4 Route the cable of the insulation resistance tester into the cable room from the bottom of cabinet G1 or G3. Connect the positive pole to the bushing and the negative pole to the ground.

Step 5 Close the door of the cable room, turn off the grounding switch, turn on the load switch, and perform the test.

Step 6 Maintain the test voltage of the insulation resistance tester at 2500 V for 1 minute. Record the insulation resistance at 10s, 30s, and 60s, respectively. The insulation resistance must be greater than 100 MΩ.

Figure 4-1 Test schematic diagram



Step 7 After the test is complete, shut down the insulation resistance tester.

Step 8 Turn off the load switch, turn on the grounding switch, and open the door of the cable room. Discharge the test loop by contacting the high-voltage bushing with the ground cable.

Step 9 Remove the test cables and temporary ground cable, and close the door of the cable room.

----End

4.1.2.2 Insulation Test on the Transformer LV Side

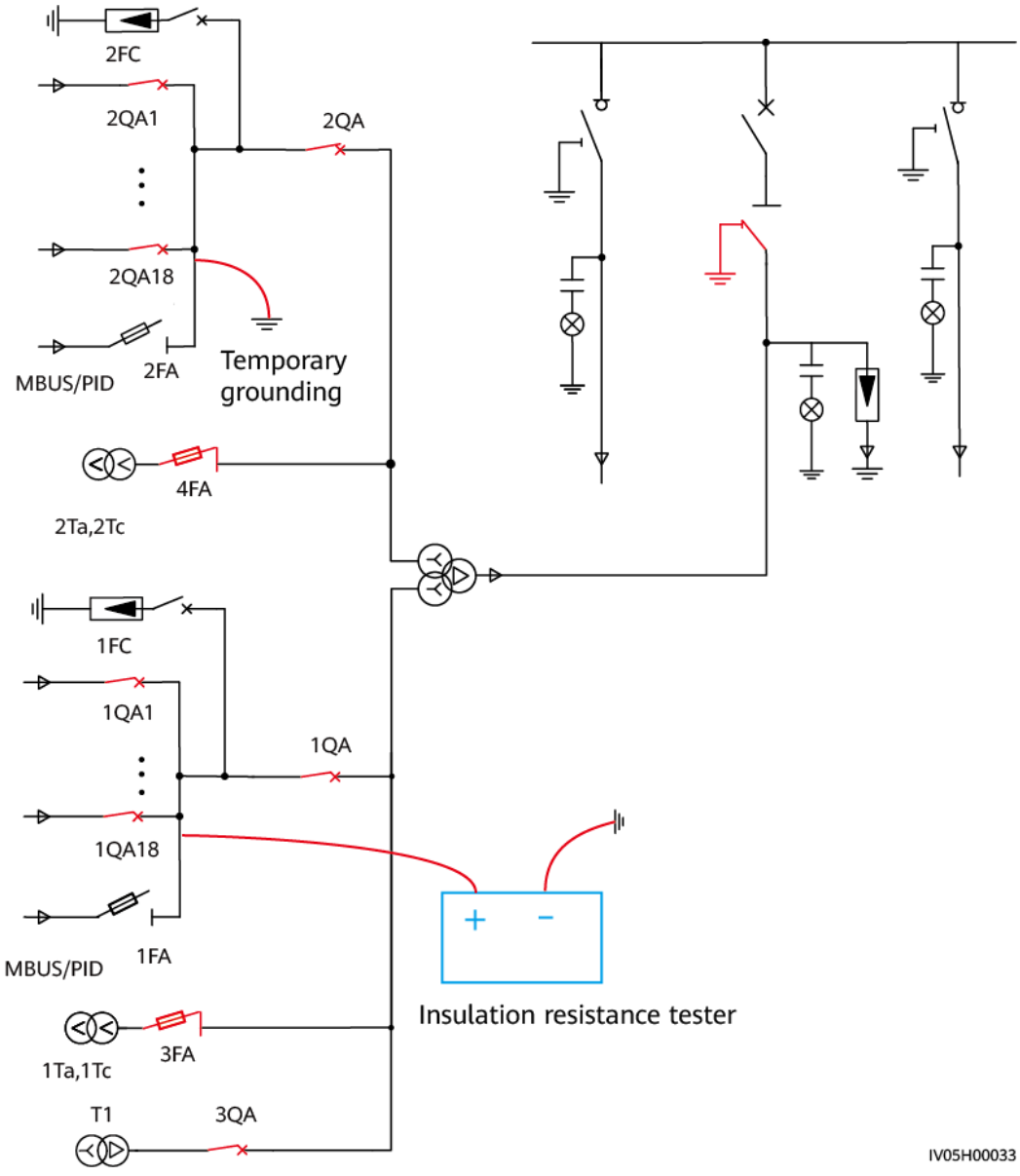
Step 1 Adjust the positions of the switches, as shown in the test schematic diagram. (If LV incoming cables are connected, turn off all the MCCBs for the incoming cables. If the SACU has been installed, turn on the knife fuse switch of the SACU and turn off the three-phase switch inside the SACU.)

Step 2 Use a temporary ground cable to ground phase A, B, or C of LV PANEL B.

Step 3 Connect the positive pole of the insulation resistance tester to phase A, B, or C of LV PANEL A, and connect the negative pole to the ground.

Step 4 Maintain the test voltage of the insulation resistance tester at 1000 V for 1 minute. Record the insulation resistance at 10s, 30s, and 60s, respectively. The insulation resistance must be greater than 10 MΩ.

Figure 4-2 Test schematic diagram



Step 5 After the test is complete, shut down the insulation resistance tester.

Step 6 Discharge the test loop by contacting the test points with the ground cable.

Step 7 Remove the test cables and temporary ground cable.

----End

4.2 Powering On the Ring Main Unit in the MV Room

NOTE

- The cable connection mode and interlocking configuration of the ring main unit vary with projects.
- The layouts of cabinets and switches vary with ring main unit suppliers.
- The combination modes of STSs vary with projects. This document uses three STSs as an example.

4.2.1 Status Check Before Power-On

NOTE

Before checking the switch status of the ring main unit, check the protection function of the relay of the ring main unit. Go to the parameter setting interface of the relay according to the factory setting table. Check that the protection function is enabled and **Protection parameter** is properly set.

Ring Main Units in CVC/CCV Mode (DQS Series and 8DJH Series)

Step 1 Check the status of STS 1, STS 2, and STS 3.

1. Check cabinet G1, turn on the earthing switch, turn off the load switch, open the cable room door, check the cable connections and sealing, and then close the cable room door.
2. Check cabinet G2, turn on the earthing switch, turn off the disconnector, turn off the circuit breaker, open the cable room door, check the cable connections, lightning arrester, and cable sealing, and then close the cable room door.
3. Check cabinet G3, turn on the earthing switch, turn off the load switch, open the cable room door, check the cable connections and sealing, and then close the cable room door.

Step 2 Check Sub-Station Line 1, turn on the earthing switch, turn off the disconnector, and turn off the circuit breaker.

Figure 4-3 Networking diagram of ring main units in CVC mode (DQS series)

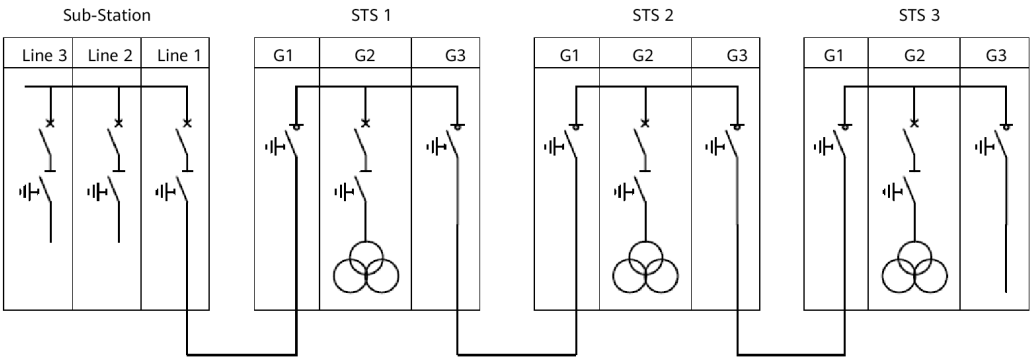
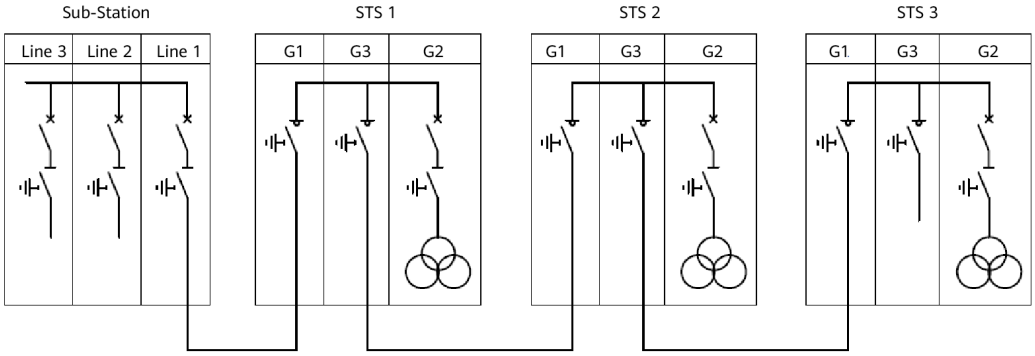


Figure 4-4 Networking diagram of ring main units in CCV mode (8DJH series)



----End

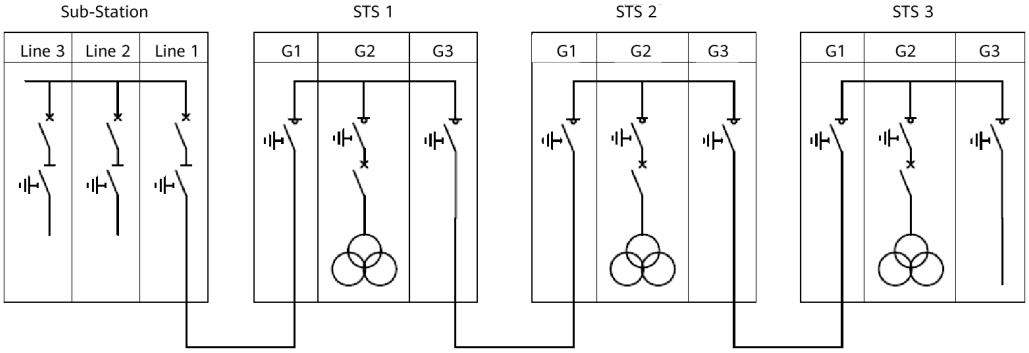
Ring Main Units in CVC Mode (CGM Series)

Step 1 Check the status of STS 1, STS 2, and STS 3.

1. Check cabinet G1, turn on the earthing switch, turn off the load switch, open the cable room door, check the cable connections and sealing, and then close the cable room door.
2. Check cabinet G2, turn on the earthing switch, turn off the load switch, turn on the circuit breaker, open the cable room door, check the cable connections, lightning arrester, and cable sealing, and then close the cable room door.
3. Check cabinet G3, turn on the earthing switch, turn off the load switch, open the cable room door, check the cable connections and sealing, and then close the cable room door.

Step 2 Check Sub-Station Line 1, turn on the earthing switch, turn off the disconnector, and turn off the circuit breaker.

Figure 4-5 Networking diagram of ring main units in CVC mode (CGM series)



----End

Ring Main Units in DVC/DCV Mode (DQS Series and 8DJH Series)

> **CAUTION**
>
> STSs are interlocked and should be configured based on the STS installation sequence.

Step 1 Check the status of STS 3 and configure interlocking between STSs.

1. Check cabinet G3, turn on the earthing switch, turn off the load switch, open the cable room door, check the cable connections and sealing, and then close the cable room door. Pull out the key from the earthing switch, mark the STS and ring main unit numbers on the key (for example, the key to the cabinet G3 earthing switch of STS 3), and store the key properly.
2. Check cabinet G2, turn on the earthing switch, turn off the disconnector, turn off the circuit breaker, open the cable room door, check the cable connections, lightning arrester, and cable sealing, and then close the cable room door.
3. Check cabinet G1, open the cable room door, check the cable connections and sealing, and then close the cable room door. Pull out the key from the cable room door, mark the STS and ring main unit numbers on the key (for example, the key to the cabinet G1 cable room door of STS 3), and take this key to STS 2.

Step 2 Check the status of STS 2 and configure interlocking between STSs.

1. Check cabinet G3, turn on the earthing switch, turn off the load switch, open the cable room door, check the cable connections and sealing, and then close the cable room door. Pull out the key from the earthing switch, mark the STS and ring main unit numbers on the key (for example, the key to the cabinet G3 earthing switch of STS 2). Put this key and the key to the cabinet G1 cable room door of STS 3 in one chain to complete the interlocking configuration between STS 2 and STS 3, and insert the key into the lock hole of the earthing switch.
2. Check cabinet G2, turn on the earthing switch, turn off the disconnector, turn off the circuit breaker, open the cable room door, check the cable connections, lightning arrester, and cable sealing, and then close the cable room door.
3. Check cabinet G1, open the cable room door, check the cable connections and sealing, and then close the cable room door. Pull out the key from the cable room door, mark the STS and ring main unit numbers on the key (for example, the key to the cabinet G1 cable room door of STS 2), and take this key to STS 1.

Step 3 Check the status of STS 1 and configure interlocking between STSs.

1. Check cabinet G3, turn on the earthing switch, turn off the load switch, open the cable room door, check the cable connections and sealing, and then close the cable room door. Pull out the key from the earthing switch, mark the STS and ring main unit numbers on the key (for example, the key to the cabinet G3 earthing switch of STS 1). Put this key and the key to the cabinet G1 cable room door of STS 2 in one chain to complete the interlocking configuration between STS 1 and STS 2, and insert the key into the lock hole of the earthing switch.

2. Check cabinet G2, turn on the earthing switch, turn off the disconnector, turn off the circuit breaker, open the cable room door, check the cable connections, lightning arrester, and cable sealing, and then close the cable room door.
3. Check cabinet G1, open the cable room door, check the cable connections and sealing, and then close the cable room door. Pull out the key from the cable room door, mark the STS and ring main unit numbers on the key (for example, the key to the cabinet G1 cable room door of STS 1), and take this key to Sub-Station.

NOTE

- The earthing switch of cabinet G3 can be operated only when the key is inserted. The key can be pulled out only after the earthing switch is turned on.
- The cable room door of cabinet G1 can be opened only when the key is inserted. The key can be pulled out only after the cable room door is closed.

Step 4 Check the status of Sub-Station Line 1.

1. Check Line 1, turn on the earthing switch, turn off the disconnector, and turn off the circuit breaker.
2. Put the earthing switch interlocking key and cabinet G1 cable room door key of STS 1 in one chain to complete the interlocking configuration between Sub-Station Line 1 and STS 1, and insert the key into the lock hole of the earthing switch.

Figure 4-6 Networking diagram of ring main units in DVC mode (DQS series)

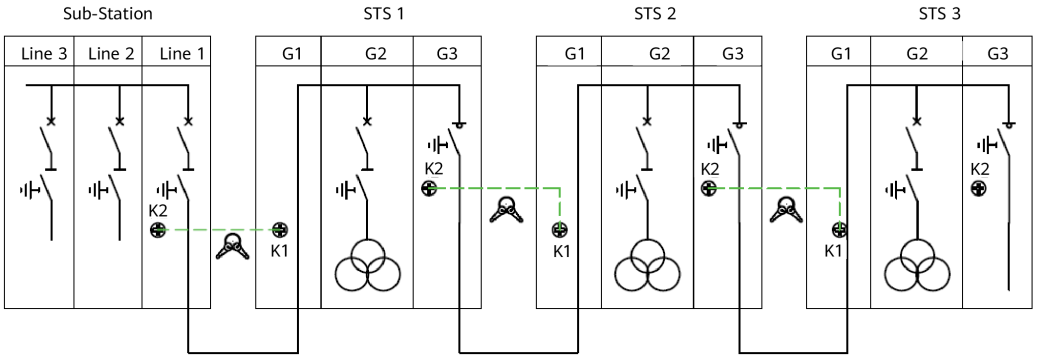
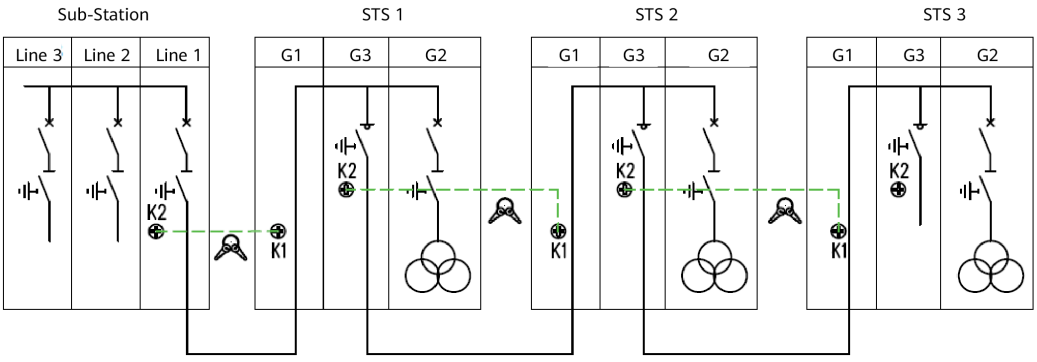


Figure 4-7 Networking diagram of ring main units in DCV mode (8DJH series)



NOTE

- The earthing switch of Line 1 can be operated only when the key is inserted. The key can be pulled out only after the earthing switch is turned on.
- If the earthing switch of Line 1 does not have the interlocking function, store the cabinet G1 cable room door key of STS 1 properly.

----End

Ring Main Units in DVC/DCV Mode (CGM Series)

CAUTION

STSs are interlocked and should be configured based on the STS installation sequence.

Step 1 Check the status of STS 3 and configure interlocking between STSs.

1. Check cabinet G3, turn on the earthing switch, turn off the load switch, open the cable room door, check the cable connections and sealing, and then close the cable room door. Pull out the key from the earthing switch, mark the STS and ring main unit numbers on the key (for example, the key to the cabinet G3 earthing switch of STS 3), and store the key properly.
2. Check cabinet G2, turn on the earthing switch, turn off the disconnector, turn on the circuit breaker, open the cable room door, check the cable connections, lightning arrester, and cable sealing, and then close the cable room door.
3. Check cabinet G1, open the cable room door, check the cable connections and sealing, and then close the cable room door. Pull out the key from the cable room door, mark the STS and ring main unit numbers on the key (for example, the key to the cabinet G1 cable room door of STS 3), and take this key to STS 2.

Step 2 Check the status of STS 2 and configure interlocking between STSs.

1. Check cabinet G3, turn on the earthing switch, turn off the load switch, open the cable room door, check the cable connections and sealing, and then close the cable room door. Pull out the key from the earthing switch, mark the STS and ring main unit numbers on the key (for example, the key to the cabinet G3 earthing switch of STS 2). Put this key and the key to the cabinet G1 cable room door of STS 3 in one chain to complete the interlocking configuration between STS 2 and STS 3, and insert the key into the lock hole of the earthing switch.
2. Check cabinet G2, turn on the earthing switch, turn off the disconnector, turn on the circuit breaker, open the cable room door, check the cable connections, lightning arrester, and cable sealing, and then close the cable room door.
3. Check cabinet G1, open the cable room door, check the cable connections and sealing, and then close the cable room door. Pull out the key from the cable room door, mark the STS and ring main unit numbers on the key (for example, the key to the cabinet G1 cable room door of STS 2), and take this key to STS 1.

Step 3 Check the status of STS 1 and configure interlocking between STSs.

1. Check cabinet G3, turn on the earthing switch, turn off the load switch, open the cable room door, check the cable connections and sealing, and then close the cable room door. Pull out the key from the earthing switch, mark the STS and ring main unit numbers on the key (for example, the key to the cabinet G3 earthing switch of STS 1). Put this key and the key to the cabinet G1 cable room door of STS 2 in one chain to complete the interlocking configuration between STS 1 and STS 2, and insert the key into the lock hole of the earthing switch.
2. Check cabinet G2, turn on the earthing switch, turn off the disconnector, turn on the circuit breaker, open the cable room door, check the cable connections, lightning arrester, and cable sealing, and then close the cable room door.
3. Check cabinet G1, open the cable room door, check the cable connections and sealing, and then close the cable room door. Pull out the key from the cable room door, mark the STS and ring main unit numbers on the key (for example, the key to the cabinet G1 cable room door of STS 1), and take this key to Sub-Station.

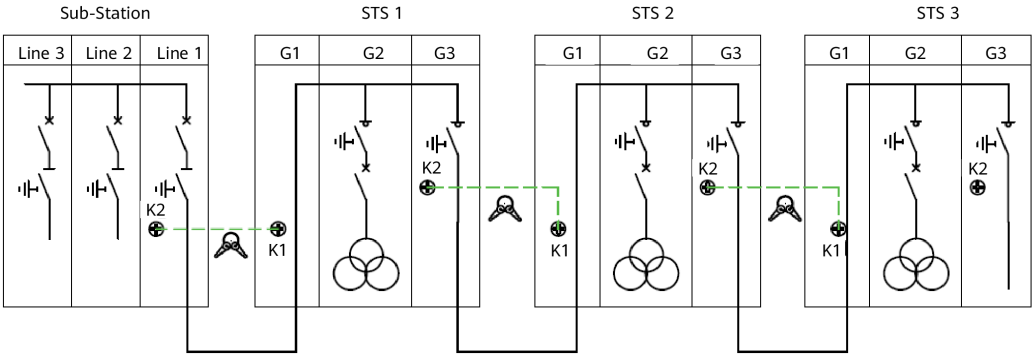
NOTE

- The earthing switch of cabinet G3 can be operated only when the key is inserted. The key can be pulled out only after the earthing switch is turned on.
- The cable room door of cabinet G1 can be opened only when the key is inserted. The key can be pulled out only after the cable room door is closed.

Step 4 Check the status of Sub-Station Line 1.

1. Check Line 1, turn on the earthing switch, turn off the disconnector, and turn off the circuit breaker.
2. Put the earthing switch interlocking key and cabinet G1 cable room door key of STS 1 in one chain to complete the interlocking configuration between Sub-Station Line 1 and STS 1, and insert the key into the lock hole of the earthing switch.

Figure 4-8 Networking diagram of ring main units in DVC mode (CGM series)



NOTE

- The earthing switch of Line 1 can be operated only when the key is inserted. The key can be pulled out only after the earthing switch is turned on.
- If the earthing switch of Line 1 does not have the interlocking function, store the cabinet G1 cable room door key of STS 1 properly.

----End

4.2.2 Powering On Ring Main Units

CAUTION

- Only O&M personnel can perform operations, and other personnel must stay more than 10 m away from the STS.
- Immediately stop any operation when an exception occurs. Proceed with the operation only after the exception is rectified.

4.2.2.1 Operating Ring Main Unit Switches

Ring Main Units in CVC/CCV Mode (DQS Series and 8DJH Series)

Step 1 Operate STS 3 ring main unit switches.

1. Cabinet G3: No operation is needed and keep the earthing switch on.
2. Cabinet G2: Turn off the earthing switch and turn on the disconnector.
3. Cabinet G1: Turn off the earthing switch and turn on the load switch.

Step 2 Operate STS 2 ring main unit switches.

1. Cabinet G3: Turn off the earthing switch and turn on the load switch.
2. Cabinet G2: Turn off the earthing switch and turn on the disconnector.
3. Cabinet G1: Turn off the earthing switch and turn on the load switch.

Step 3 Operate STS 1 ring main unit switches.

1. Cabinet G3: Turn off the earthing switch and turn on the load switch.
2. Cabinet G2: Turn off the earthing switch and turn on the disconnector.
3. Cabinet G1: Turn off the earthing switch and turn on the load switch.
4. Keep all personnel more than 10 m away from the STS and send the STS operation completion message to the booster station.

Step 4 Power on Sub-Station Line 1.

1. Line 1: Turn off the earthing switch and turn on the disconnector.
2. Line 1: Turn on the circuit breakers.
3. Inform the personnel at the STSs to check the ring main units after the power-on is complete.

----End

Ring Main Units in CVC Mode (CGM Series)

Step 1 Operate STS 3 ring main unit switches.

1. Cabinet G3: No operation is needed and keep the earthing switch on.
2. Cabinet G2: Turn off the earthing switch, turn off the circuit breaker, and turn on the load switch.
3. Cabinet G1: Turn off the earthing switch and turn on the load switch.

Step 2 Operate STS 2 ring main unit switches.

1. Cabinet G3: Turn off the earthing switch and turn on the load switch.
2. Cabinet G2: Turn off the earthing switch, turn off the circuit breaker, and turn on the load switch.
3. Cabinet G1: Turn off the earthing switch and turn on the load switch.

Step 3 Operate STS 1 ring main unit switches.

1. Cabinet G3: Turn off the earthing switch and turn on the load switch.
2. Cabinet G2: Turn off the earthing switch, turn off the circuit breaker, and turn on the load switch.
3. Cabinet G1: Turn off the earthing switch and turn on the load switch.
4. Keep all personnel more than 10 m away from the STS and send the STS operation completion message to the booster station.

Step 4 Power on Sub-Station Line 1.

1. Line 1: Turn off the earthing switch and turn on the disconnector.
2. Line 1: Turn on the circuit breakers.
3. Inform the personnel at the STSs to check the ring main units after the power-on is complete.

----End

Ring Main Units in DVC/DCV Mode (DQS Series and 8DJH Series)

Step 1 Operate STS 3 ring main unit switches.

1. Cabinet G3: No operation is needed.
2. Cabinet G2: Turn off the earthing switch and turn on the disconnector.

Step 2 Operate STS 2 ring main unit switches.

1. Cabinet G3: Turn off the earthing switch and turn on the load switch.
2. Cabinet G2: Turn off the earthing switch and turn on the disconnector.

Step 3 Operate STS 1 ring main unit switches.

1. Cabinet G3: Turn off the earthing switch and turn on the load switch.
2. Cabinet G2: Turn off the earthing switch and turn on the disconnector.
3. Keep all personnel more than 10 m away from the STS and send the STS operation completion message to the booster station.

Step 4 Power on Sub-Station Line 1.

1. Line 1: Turn off the earthing switch and turn on the disconnector.
2. Line 1: Turn on the circuit breakers.
3. Inform the personnel at the STSs to check the ring main units after the power-on is complete.

----End

Ring Main Units in DVC/DCV Mode (CGM Series)

Step 1 Operate STS 3 ring main unit switches.

1. Cabinet G3: No operation is needed.
2. Cabinet G2: Turn off the earthing switch, turn off the circuit breaker, and turn on the load switch.

Step 2 Operate STS 2 ring main unit switches.

1. Cabinet G3: Turn off the earthing switch and turn on the load switch.
2. Cabinet G2: Turn off the earthing switch, turn off the circuit breaker, and turn on the load switch.

Step 3 Operate STS 1 ring main unit switches.

1. Cabinet G3: Turn off the earthing switch and turn on the load switch.
2. Cabinet G2: Turn off the earthing switch, turn off the circuit breaker, and turn on the load switch.
3. Keep all personnel more than 10 m away from the STS and send the STS operation completion message to the booster station.

Step 4 Power on Sub-Station Line 1.

1. Line 1: Turn off the earthing switch and turn on the disconnector.
2. Line 1: Turn on the circuit breakers.
3. Inform the personnel at the STSs to check the ring main units after the power-on is complete.

----End

4.2.2.2 Power-On Check for Ring Main Units

Step 1 Check the potential indicators.

- STS 1: The potential indicators of cabinets G1 and G3 blink, and that of cabinet G2 is off.
- STS 2: The potential indicators of cabinets G1 and G3 blink, and that of cabinet G2 is off.
- STS 3: The potential indicator of cabinet G1 blinks, and those of cabinets G2 and G3 are off.

Step 2 Check that the sounds of ring main units are normal.

NOTE

Untightened cable bolts or improperly installed cable connectors may cause arcs, which may generate sizzling arc sound.

----End

4.3 Powering On the Transformer Room

CAUTION

- Only O&M personnel can perform operations, and other personnel must stay more than 10 m away from the STS.
- O&M personnel must wear professional protective clothing, insulation boots, helmets with face protection, and insulation gloves.
- The transformer must be powered on by two persons. One person operates the transformer, and the other uses the insulation rescue hook to hold the operator. In the case of any exceptions, the operator should be quickly pulled away from the STS.

Power on the transformers of STS 1, STS 2, and STS 3 in sequence.

Step 1 Use the charging lever to manually charge the circuit breaker in cabinet G2. After the charging is complete, switch on the circuit breaker in cabinet G2.

Step 2 Check that the potential indicator of cabinet G2 blinks.

Step 3 Check that the sounds of ring main units are normal.

Step 4 Check that the sound of the transformer is normal.

----End

NOTE

- Untightened cable bolts or improperly installed cable connectors may cause arcing, which may generate sizzling arcing sound.
- When the transformer is powered on, a loud buzz will be generated. Then the buzz is weakened rapidly and becomes stably low after about 5 seconds.

4.4 Powering On the Auxiliary Loop

4.4.1 Turning On the SPDs of the LV and the Auxiliary Loops

Step 1 Turn on switch 1QA12 of the 800 V SPD in LV PANEL A.

Step 2 Turn on switch 2QA12 of the 800 V SPD in LV PANEL B.

Step 3 Turn on knife fuse switches 3FA1.1 and 3FA1.2 (in the auxiliary power distribution cabinet of the MV room).

----End

4.4.2 (Optional) Powering On the Auxiliary Transformer

NOTE

- If an auxiliary transformer is configured, perform the following operations to power on the auxiliary loop.
- Perform the following power-on operations based on the specifications of the auxiliary transformer.

5 kVA Auxiliary Transformer

Step 1 Ensure that the fuse is in the ON position.

Step 2 Turn on the disconnector 1QS on the power supply side of the auxiliary transformer to power on the auxiliary transformer.

----End

CAUTION

Turn off the disconnector before powering off the auxiliary transformer.

4.4.3 Powering On the Auxiliary Loop

Step 1 Turn on the auxiliary power supply switch.

Step 2 Turn on the power supply switch of the UPS and low-power auxiliary equipment.

NOTE

- When a UPS is configured, the UPS transfers from the discharging state to the normal running state. Check the indicators on the power supply unit (PSU) and energy storage modules (ESMs). Ensure that the green indicators are blinking fast (4 Hz) and that the yellow and red indicators are off.
- Some auxiliary loops have been powered on before the transformer is powered on.

Step 3 Turn on the smoke sensor and lighting switch in the auxiliary power distribution box in the MV room.

NOTE

The smoke sensor is started. The smoke sensor indicator is blinking slowly and no alarm is generated. The light is on. After the container door of the MV room is closed, the light is off.

Step 4 Turn on the power switch and the switch of the energy storage loop in cabinet G2 of the ring main unit. The operating mechanism of the circuit breaker starts charging. The charging is complete after about 10s.

NOTE

The switch numbers of ring main units may vary depending on the manufacturer. Operate the switches according to the drawing.

Step 5 Turn on the ACB in LV PANEL A. The operating mechanism of the ACB starts charging.

Step 6 Turn on the switch of the measurement and control module and the switch of the insulation monitoring device (IMD, optional) in LV PANEL A.

NOTE

The IMD starts and performs self-check first. The running sequence is as follows:

1. Conducts measurement on the negative pole for 4 seconds. The **HM** LED indicator is blinking fast. The indicators on the LED light strip are lit in sequence, and the internal circuit is detected.
2. Conducts measurement on the positive pole for 4 seconds. The **HM** LED indicator is blinking slowly. The indicators on the LED light strip are lit in sequence, and the internal circuit is detected.
3. Checks the insulation if no fault is found.
4. The normal running status is as follows: The green **WR** LED indicator is on, the yellow LED light strip is on with the eight LED indicators showing the insulation resistance (10 kΩ to 2 MΩ), and the **HM** LED indicator is blinking slowly or fast.

Step 7 Turn on the lighting and smoke sensor switch in the low-voltage room.

NOTE

After the smoke sensor starts, the indicators of the smoke sensors in the LV room and transformer room are blinking slowly and no alarm is generated. The light is on. After all container doors of the LV room are closed, the light is off.

Step 8 Turn on the ACB in LV PANEL B. The operating mechanism of the ACB starts charging.

Step 9 Turn on the switch of the measurement and control module and the switch of the IMD (optional) in LV PANEL B.

NOTE

The IMD starts and performs self-check first. The running sequence is as follows:

1. Conducts measurement on the negative pole for 4 seconds. The **HM** LED indicator is blinking fast. The indicators on the LED light strip are lit in sequence, and the internal circuit is detected.
2. Conducts measurement on the positive pole for 4 seconds. The **HM** LED indicator is blinking slowly. The indicators on the LED light strip are lit in sequence, and the internal circuit is detected.
3. Checks the insulation if no fault is found.
4. The normal running status is as follows: The green **WR** LED indicator is on, the yellow LED light strip is on with the eight LED indicators showing the insulation resistance (10 kΩ to 2 MΩ), and the **HM** LED indicator is blinking slowly or fast.

Step 10 Turn on the UPS auxiliary socket switch and ensure that the socket is energized. Turn on the common power socket switch and ensure that the socket is energized.

----End

4.4.4 Powering On the SACU

Step 1 Turn on switch 3FB3 for the power supply to the SACU in the power distribution cabinet of the MV room.

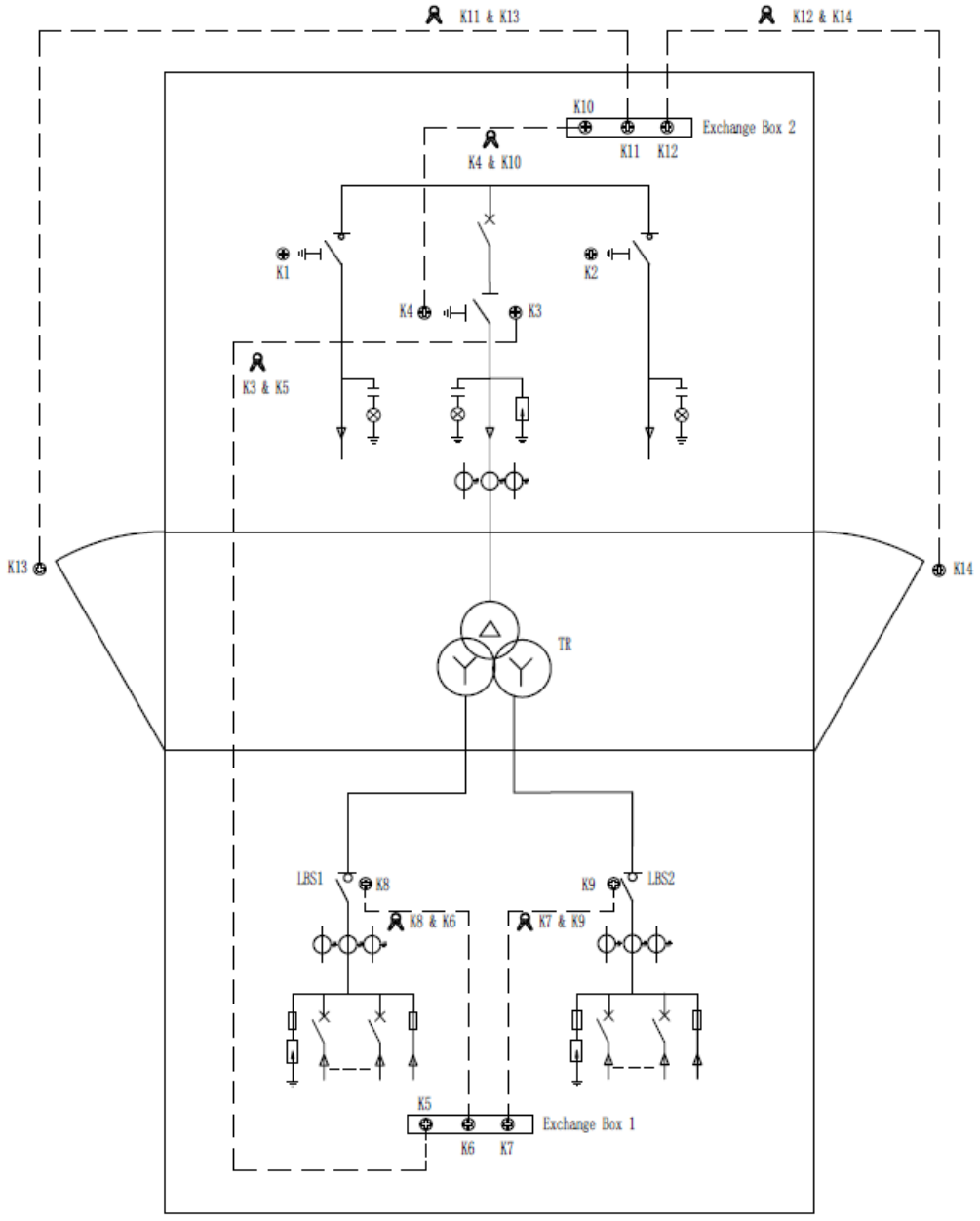
Step 2 Open the door of the SACU and turn on the **QF03** single-phase input switch. The running indicator of the SmartLogger starts blinking after 30 seconds.

----End

4.5 Powering On the LV Loop

4.5.1 (Optional) Unlocking Air Circuit Breakers

The STS interlock is optional. The internal interlocking diagram of the STS is as follows.



Step 1 Take out keys K3&K5 from the disconnector (or load switch) of cabinet G2 in the ring main unit. Insert key K5 into hole K5 of the key distribution box Exchange Box 1 in the LV room and rotate the key to unlock.

Step 2 Take out keys K6&K8 from Exchange Box 1. Insert key K8 into the interlocking hole of the ACB in LV PANEL A and rotate the key to unlock.

Step 3 Take out keys K7&K9 from Exchange Box 1. Insert key K9 into the interlocking hole of the ACB in LV PANEL B and rotate the key to unlock.

----End

NOTE

- The disconnector of cabinet G2 can be operated only when key K3 is inserted. Key K3 can be removed only after the disconnector is turned on.
- On the Exchange Box 1, key K5 can be removed only after keys K6 and K7 are inserted to unlock. Keys K6 and K7 can be removed only after key K5 is inserted to unlock.
- The ACB in LV PANEL A can be turned on only after key K8 is inserted to unlock. Key K8 can be removed only after the ACB in LV PANEL A is turned off.
- The ACB in LV PANEL B can be turned on only after key K9 is inserted to unlock. Key K9 can be removed only after the ACB in LV PANEL B is turned off.

4.5.2 Powering On LV PANEL A

Powering On the Bus

Step 1 Set the remote/local switch 1SAC1 of the ACB in LV PANEL A to the local position.

Step 2 Press the On button to switch on the circuit breaker, and then the circuit breaker stores energy.

Step 3 Set the remote/local switch 1SAC1 to the remote position.

----End

(Optional) Powering On the Voltage Sampling Loop

Step 1 Turn on the knife fuse switch 1FA2 in LV PANEL A. The voltage sampling loop is energized.

Step 2 Check the current operating voltage on the app or SmartLogger WebUI.

NOTE

If a multimeter is configured, you can check the voltage on it.

----End

(Optional) Powering On the MBUS Loop

Step 1 Turn on the knife fuse switch 1FA1 in LV PANEL A.

Step 2 Turn on the three-phase switch FU01 in the SACU.

Step 3 (Optional) If a PID module is configured, turn on QF01.

----End

4.5.3 Powering On LV PANEL B

Powering On the Bus

Step 1 Set the remote/local switch 2SAC1 of the ACB in LV PANEL B to the local position.

Step 2 Press the On button to switch on the circuit breaker, and then the circuit breaker stores energy.

Step 3 Set the remote/local switch 2SAC1 to the remote position.

----End

(Optional) Powering On the Voltage Sampling Loop

Step 1 Turn on the knife fuse switch 2FA2 in LV PANEL B. The voltage sampling loop is energized.

Step 2 Check the current operating voltage on the app or SmartLogger WebUI.

NOTE

If a multimeter is configured, you can check the voltage on it.

----End

(Optional) Powering On the MBUS Loop

Step 1 Turn on the knife fuse switch 2FA1 in LV PANEL B.

Step 2 Turn on the three-phase switch FU02 in the SACU.

Step 3 (Optional) If a PID module is configured, turn on QF02.

----End

4.6 STS Running with Loads

Supplying Power to the Solar Inverters

NOTE

Supply power to the solar inverters after the STS has run without loads for 24 hours.

Step 1 Turn on all MCCBs of the 800 V incoming cables on the LV side.

Step 2 Turn on all switches of the combiner boxes (if any) of the PV array and the DC switches of the solar inverters.

NOTE

If the insulation of the LV PV array is measured before power is supplied, the switches of the combiner boxes can be turned on.

Step 3 Connect a PC to the SmartLogger, search for solar inverters, assign solar inverter addresses, upgrade the SmartLogger software version, and upgrade the solar inverter software version.

Step 4 The solar inverters are running and feeding current.

----End

Supplying Power to the PID (When the IMD Is Configured)

Step 1 Set the IMD device access status of PID1 to **Disable**. After PID1 runs, observe that the **HM** LED on the IMD in LV PANEL A is off.

Step 2 Set the IMD device access status of PID1 to **Enable**, and set the running periods of the IMD and PID. (You can set the IMD period running time to 60 minutes and the PID period running time to 60 minutes.)

Step 3 During the IMD running cycle (The running status of the PID and IMD can be switched through the SmartLogger.) and observe the running status of the IMD in the LV PANEL A.

NOTE

The normal running status of the IMD is as follows:

- The green LED **WR** is steady on.
- Yellow LED light strip: Eight LEDs showing the current actual insulation resistance (10 kΩ to 2 MΩ).
- The **HM** LED indicator blinks slowly or fast.

Step 4 Set the IMD device access status of PID2 to **Disable**. After PID2 runs, observe that the **HM** LED on the IMD in LV PANEL B is off.

Step 5 Set the IMD device access status of PID2 to **Enable**, and set the running periods of the IMD and PID. (You can set the IMD period running time to 60 minutes and the PID period running time to 60 minutes.)

Step 6 During the IMD running cycle (The running status of the PID and IMD can be switched through the SmartLogger.) and observe the running status of the IMD in the LV PANEL B.

----End

Checking the STS with Loads

Step 1 Check the current displayed on the multimeter of LV PANEL A and on the electronic tripper of the ACB. The currents of the three phases should be equal or close.

Step 2 Check the current displayed on the multimeter of LV PANEL B and on the electronic tripper of the ACB. The currents of the three phases should be equal or close.

Step 3 Check the current displayed on the protection device of the MV cabinet. The currents of the three phases should be equal or close.

----End

4.7 STS Running with Loads

NOTE

Supply power to the solar inverters after the STS has run without loads for 24 hours.

Powering On Inverters (Applicable to PV-Only Scenarios)

Step 1 Turn on all MCCBs of the 800 V incoming cables on the LV side of the STS.

Step 2 Turn on all switches of the combiner boxes (if any) of the array and the DC switches of the inverters.

NOTE

If the insulation of the LV array is measured before power is supplied, the switches of the combiner boxes can be turned on.

Step 3 Connect a PC to the SmartLogger, search for inverters, assign inverter addresses, and update the SmartLogger and inverter software versions.

Step 4 Check that the inverters are running and supplying current.

----End

Powering On Inverters, PCSs, and the DTS (Applicable to LV Coupling Scenarios Where the Inverter and PCS Are Connected to the Same MCCB)

DANGER

Before powering on the inverters and PCSs, ensure that the power-on conditions are met. For details, see **Inverter and PCS Status Check (Applicable to LV Coupling Scenarios Where the Inverter and PCS Are Connected to the Same MCCB)**.

Step 1 Turn on all MCCBs of the 800 V incoming cables on the LV side of the STS, including the MCCB connected to the DTS.

Step 2 Turn on the DC switches of the inverters.

Step 3 Turn on the DC switches of the PCSs.

- If a DC LV Panel is configured, turn on the switch of the PCS DC LV Panel corresponding to the MCCB.
- If no DC LV Panel is configured, turn on the PCS switch in the ESS corresponding to the MCCB.

Step 4 Connect a PC to the SmartLogger, search for inverters and PCSs, assign inverter and PCS addresses, and update the SmartLogger, inverter, and PCS software.

Step 5 Send a startup command to the PCS and inverter connected to the same MCCB.

Step 6 Check that the inverters and PCSs are running and supplying current.

NOTE

Before startup, check that the power of the PCSs is 0.

----End

Powering On PID Modules (When IMDs Are Configured)

Step 1 Disable IMD access for PID1. After PID1 starts, check that the **HM** LED indicator on the IMD in LV PANEL A turns off.

Step 2 Enable IMD access for PID1, and set the periodic runtime for the IMD and PID module. (You can set the periodic runtime to 60 minutes for the IMD and PID module.)

Step 3 Observe the running status of the IMD in LV PANEL A within the IMD running period (the running status of the PID module and IMD can be switched through the SmartLogger).

NOTE

The normal running status of the IMD is as follows:

- The green **WR** LED indicator is steady on.
- Yellow LED light strip: Eight LED indicators show the actual insulation resistance (10 kΩ to 2 MΩ).
- The **HM** LED indicator blinks slowly or fast.

Step 4 Disable IMD access for PID2. After PID2 starts, check that the **HM** LED indicator on the IMD in LV PANEL B turns off.

Step 5 Enable IMD access for PID2, and set the periodic runtime for the IMD and PID module. (You can set the periodic runtime to 60 minutes for the IMD and PID module.)

Step 6 Observe the running status of the IMD in LV PANEL B within the IMD running period (the running status of the PID module and IMD can be switched through the SmartLogger).

----End

Checking the STS Running with Loads

Step 1 Check the current displayed on the multimeter of LV PANEL A and on the electronic tripper of the ACB. The currents of the three phases should be equal or close.

Step 2 Check the current displayed on the multimeter of LV PANEL B and on the electronic tripper of the ACB. The currents of the three phases should be equal or close.

Step 3 Check the current displayed on the protection device of the MV panel. The currents of the three phases should be equal or close.

----End

4.8 Checking the STS Running Status

Step 1 Connect the STS to the smart array controller on the WebUI or app. (For details, see the installation guide.)

Step 2 Check that the displayed current, voltage, active power, reactive power, temperature, and switch positions of the STS are consistent with the actual conditions.

Step 3 Check for alarms. No alarm should be generated normally.

----End

5 Human-Machine Interaction

For details about the time and protection parameters of the microcomputer protection relay, see its user guide delivered with the STS.

5.1 (Optional) Modifying Relay Parameters

NOTE

- If high-configuration relay protection is used for the STS, set the relay parameters by referring to this section.
- You can view the STS number on its nameplate. For details, see Where Can I Find the Transformer Nameplate?.

Context

If the power grid recovers from a power failure, the STS automatically delays the switch-on. To prevent the switch in the booster station from tripping due to excessive surge current when multiple STSs are switched on at the same time, you need to change the delay time for automatic switch-on on the LCD of the relay so that the STSs are switched on one by one.

Figure 5-1 Multiple STSs (CCV/DCV)

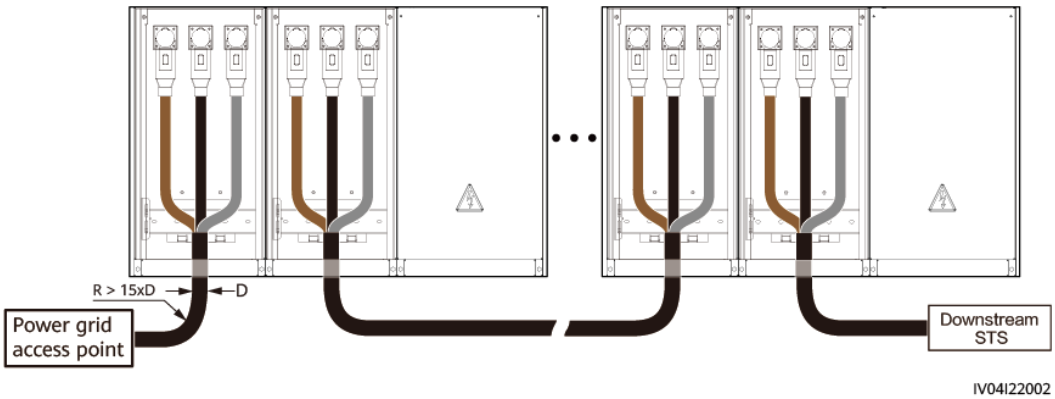
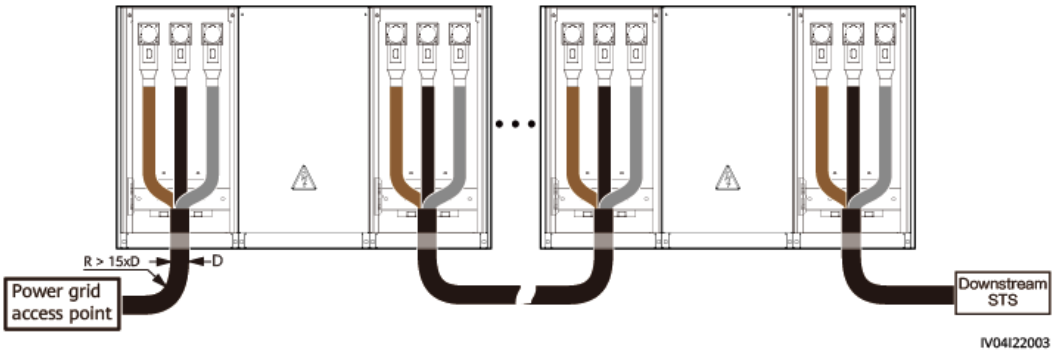


Figure 5-2 Multiple STSs (CVC/DVC)



Procedure (DQS Series and 8DJH Series)

On the LCD of the relay, choose **05.Settings** > **52.Settings** to set the value of **Auto ReClose T**.

Parameter	STS1 Value (s)	STS*n* Value (s)
Auto ReClose T	15	15 + 2 x (n-1)

NOTE

- **n** indicates the number of STSs connected to the same main transformer.
- For details about how to operate on the LCD of the relay, see the user manual of the PA620 delivered with the product.

Procedure (CGM.3 Series)

On the LCD of the relay, choose **1.4.2 VOLTAGE_PRESENCE_ABSENCE** > **VOLTAGE_PRESENCE_ABSENCE** to set the values of **Presence_Time** and **Auto ReClose T**.

Parameter	STS1 Value (s)	STS*n* Value (s)
Presence_Time	15	15 + 2 x (n-1)
Auto ReClose T	15	15 + 2 x (n-1)

NOTE

- **n** indicates the number of STSs connected to the same main transformer.
- For details about how to operate on the LCD of the relay, see the user manual of the RPA-220 delivered with the product.

5.2 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.
- The SmartLogger allows a maximum of two users to log in to the WebUI at the same time.

Procedure

Step 1 Connect the network cable between the network port of the PC and the WAN or LAN port of the SmartLogger. It is recommended that the PC be connected to the 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.

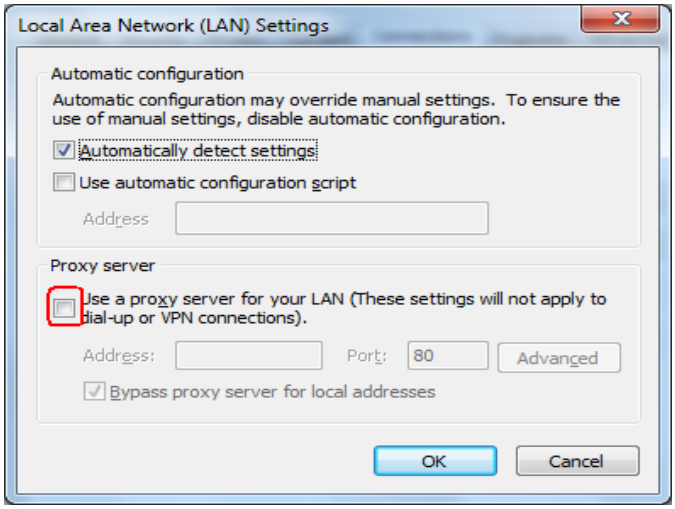
Step 3 Set LAN parameters.

NOTICE

- If the SmartLogger is connected to a LAN and a proxy server has been configured, you need to cancel the proxy server configurations.
- If the SmartLogger is connected to the Internet and the PC is connected to the LAN, do not cancel the proxy server configurations.

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 5-3 LAN settings



5. Click **OK**.

Step 4 Log in to the SmartLogger WebUI.

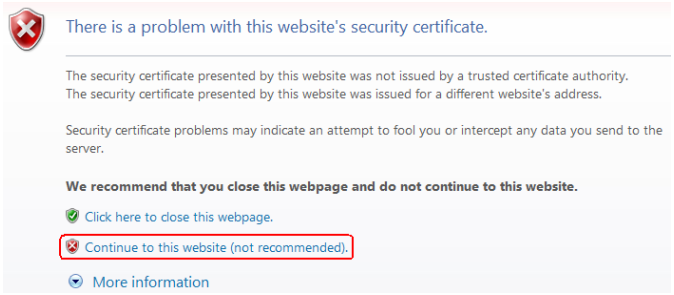
1. In the address box of a browser, enter **https://XX.XX.XX.XX** (*XX.XX.XX.XX* is the IP address of the SmartLogger) and press **Enter**. The login page is displayed.

   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 5-4 Security risk warning



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

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

NOTE

- Update the SmartLogger software as required.
- 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 you lose the password, the device must be restored to its factory settings. In these cases, the Company shall not be liable for any loss caused to the plant.
- You will be locked out for 10 minutes after five consecutive failed password attempts in 5 minutes.
- A dialog box with recent login information is displayed after login. Click **OK**.

----End

Follow-up Procedure

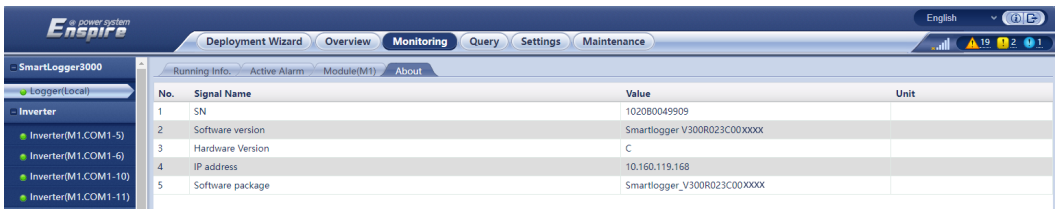
If any page is blank or a menu cannot be accessed after you log in to the WebUI, clear the cache, refresh the page, or log in again.

5.3 Upgrading the SmartLogger

Checking the SmartLogger Software Version

Step 1 Choose **Monitoring** > **Logger(Local)** > **About** and check that the software version is SmartLogger V300R023C00SPC110 or later.

Figure 5-5 Checking the SmartLogger Software Version



----End

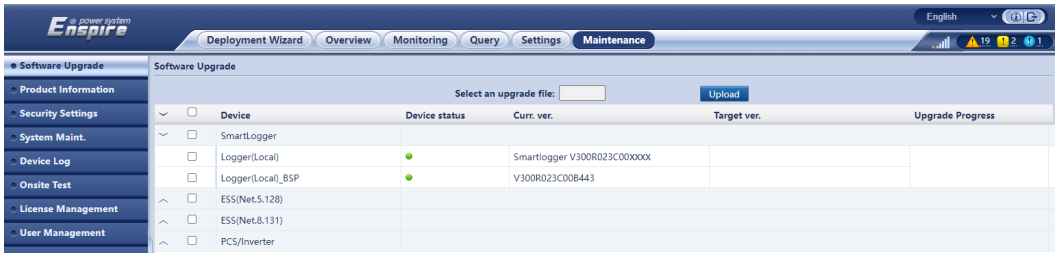
Upgrading the SmartLogger

NOTE

- If the SmartLogger software version is not SmartLogger V300R023C00SPC110 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 target device, and upgrade the SmartLogger.

Figure 5-6 Upgrading the SmartLogger



Step 2 After the software upgrade is complete, the SmartLogger automatically restarts. Log in to the SmartLogger WebUI again 3 minutes 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).

----End

5.4 Connecting the STS

Choose **Maintenance** > **Device Access** > **Auto Search** and connect the STS.

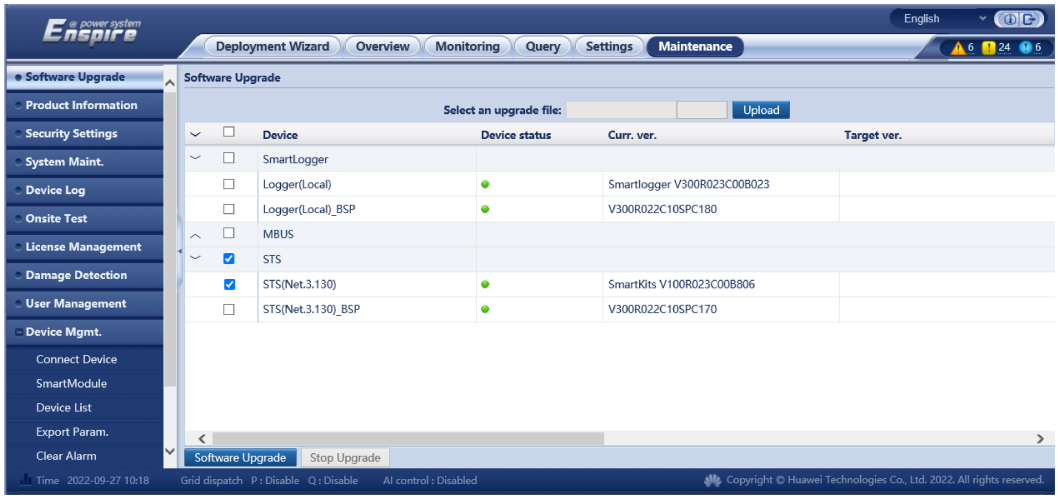
5.5 Upgrading the STS

NOTE

You are advised to upgrade the STS to the latest version. Obtain the STS upgrade package from the Company.

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

Figure 5-7 Software upgrade



Step 2 After the software is upgraded, the STS automatically restarts. Check the software in 3 minutes.

----End

5.6 Setting STS Parameters

NOTE

- Some STS signals are not displayed on the SmartLogger WebUI by default. They will be displayed after you select them by referring to this section.
- The WebUI screenshots are for reference only.

Adding Reserved Signals

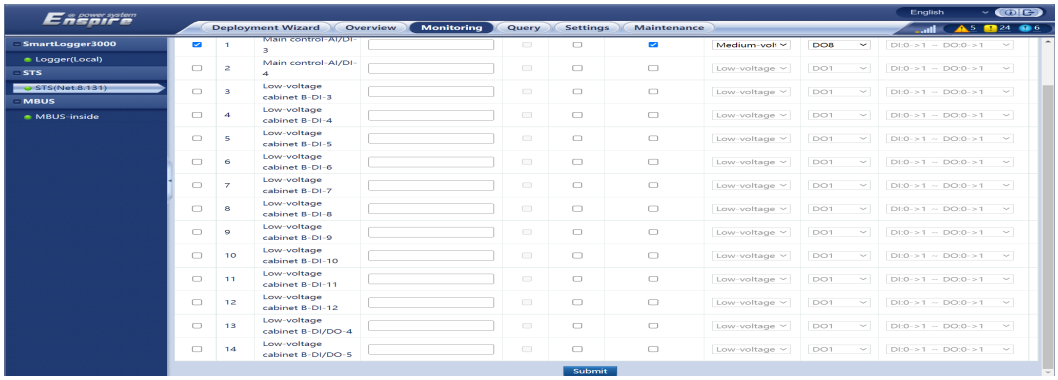
Step 1 Choose **Monitoring** > **STS** > **User-Defined Parameters**, and select the target reserved signal based on the signal address.

Step 2 Set parameters.

Parameter	Description
Signal Name	Enter a user-defined signal name.

Parameter	Description
(Optional) Display	Select this option if the user-defined signal needs to be displayed on the **Teleindication** page.
(Optional) Reverse flag	Select this option if reverse display is required.
(Optional) Signal association	Select this option if telecontrol signals need to be associated. After selecting this option, set the following parameters: • **Associate with telecontrol signal source**: Set the physical location of the associated telecontrol signal measurement and control module. • **Associate with telecontrol IO signal**: Set the port number of the associated telecontrol signal. • **Association policy**: Set the conditions for triggering command execution on the DO port.

Figure 5-8 Setting user-defined parameters



----End

5.7 WLAN Wakeup

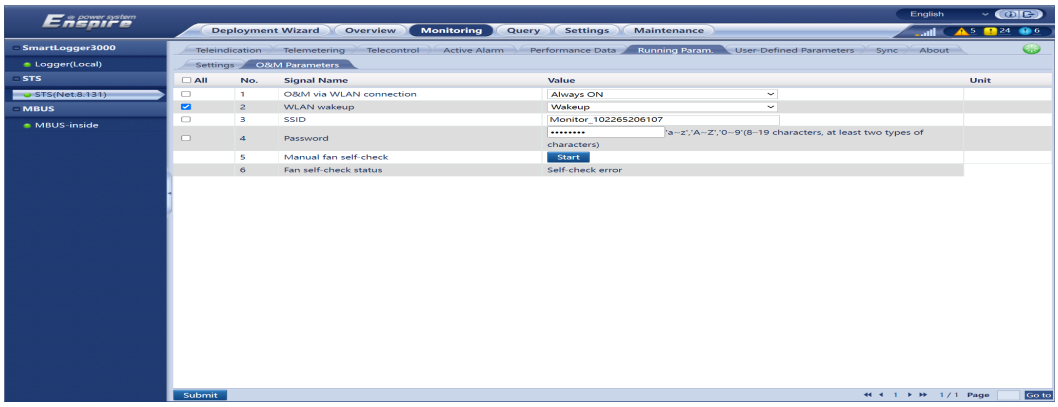
This section describes how to enable the built-in WLAN module of the main control module.

Step 1 Choose **Monitoring** > **STS** > **Running Param.** > **O&M Parameters**.

Step 2 Ensure that **O&M via WLAN connection** is **Always ON**.

Step 3 Set **WLAN wakeup** to **Wakeup**.

Figure 5-9 Parameter settings



----End

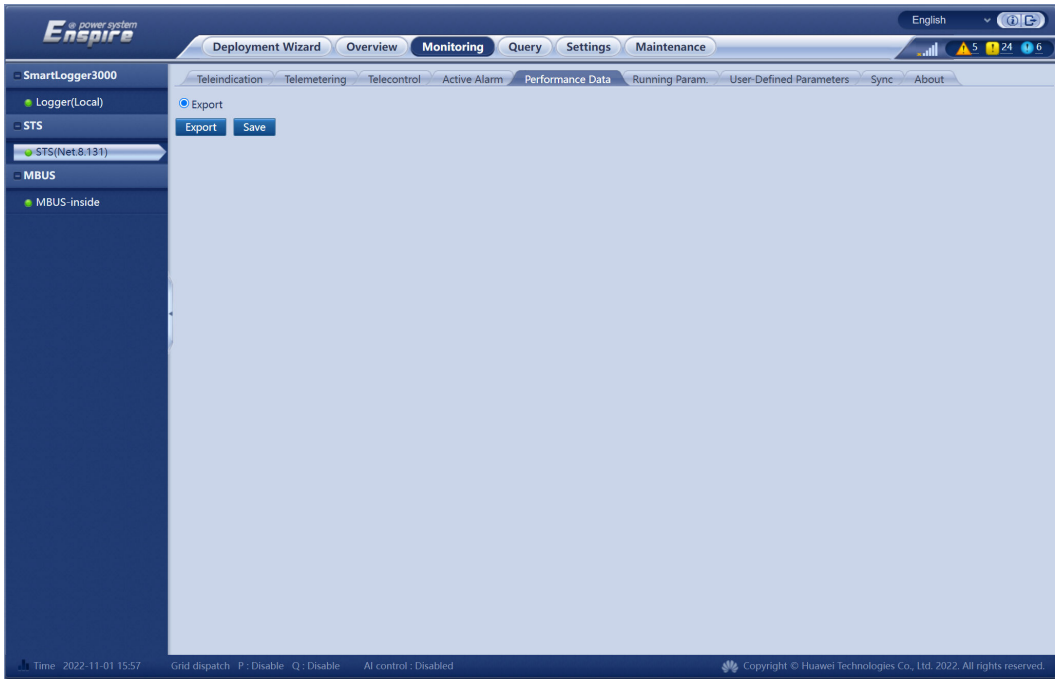
5.8 Exporting Logs

During fault locating, you need to export and send related logs to Huawei engineers for analysis.

Performance Data

Use the **Monitoring** > **STS** > **Performance Data** and export the 5-minute performance data.

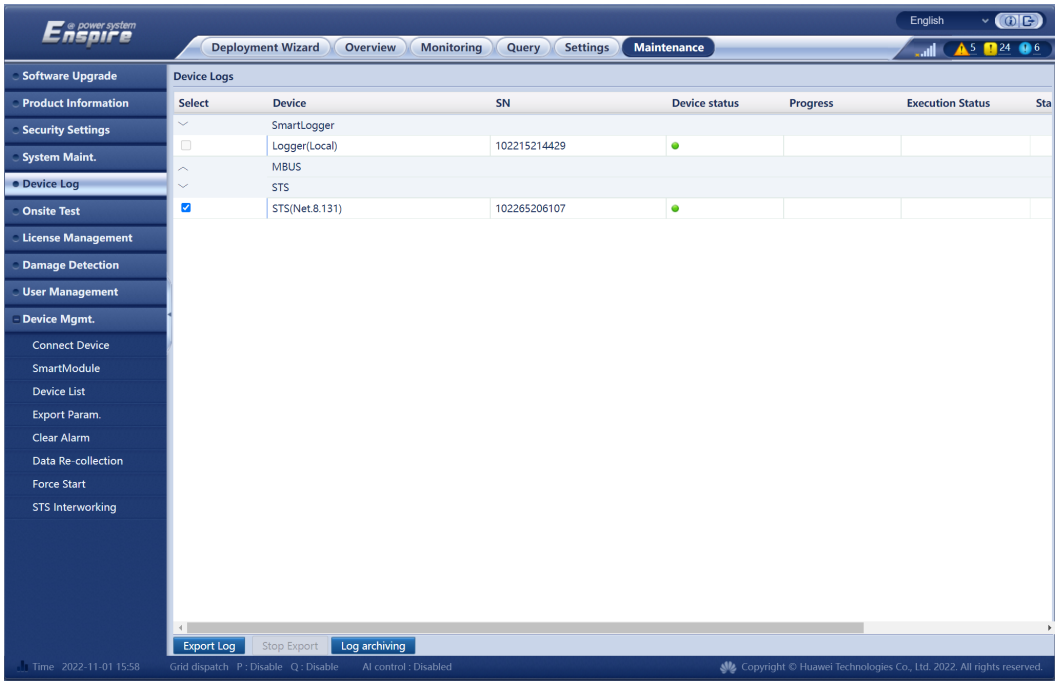
Figure 5-10 Performance data



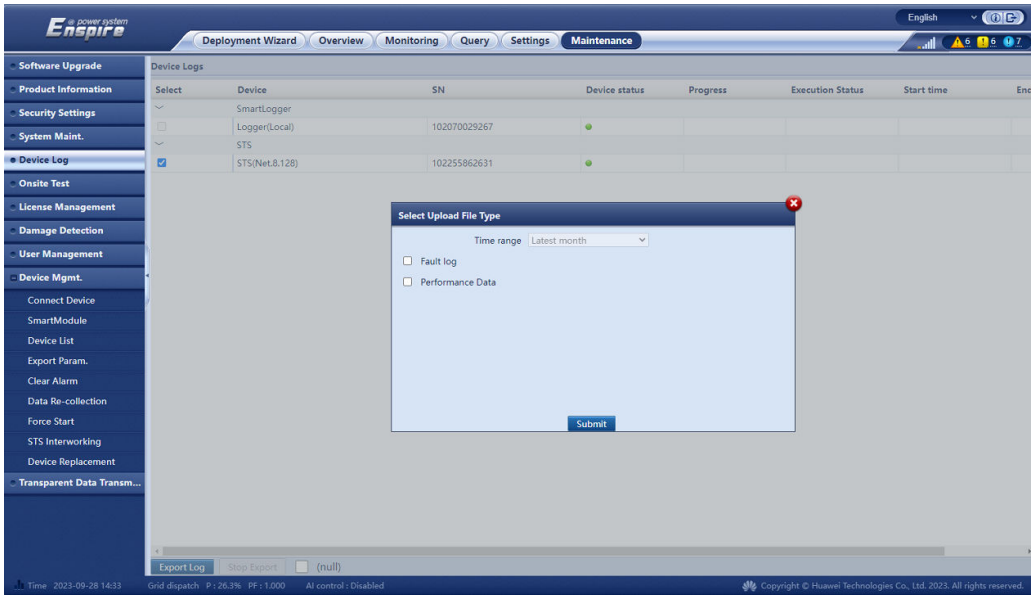
Device Log

Step 1 Choose **Maintenance** > **Device Log**, select the corresponding STS, and click **Export Log**. The **Select Upload File Type** dialog box is displayed.

Figure 5-11 Device log



Step 2 Select **Fault log** and export the logs.



----End

6 System Maintenance

6.1 Precautions

DANGER

- Wear personal protective equipment and use dedicated insulated tools to avoid electric shocks or short circuits.
- Do not use wet cloth to clean exposed copper bars or other conductive parts.

DANGER

Before replacing the monitoring and control device, ensure that the secondary side of the current transformer (CT) is short-circuited and the secondary side of the potential transformer (PT) is open-circuited.

DANGER

In the LV coupling scenario where the inverter and PCS are connected to the same MCCB, when maintaining the inverter and PCS, ensure that the DC switches of the PCS and inverter connected to the same MCCB are turned off.

In the LV coupling scenario where the inverter and PCS are connected to the same MCCB, ensure that the power-on conditions are met before powering on the inverter and PCS. For details, see **Inverter and PCS Status Check (Applicable to LV Coupling Scenarios Where the Inverter and PCS Are Connected to the Same MCCB)**.

WARNING

- Prior to maintenance, power off the equipment.

⚠ CAUTION

Safety requirements in maintenance and repair:

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

NOTICE

- After the equipment stops running, wait for at least 10 minutes to ensure that the voltage is in the safe range. Before maintenance or repair, ensure that the transfer switch is turned to the ground position, the potential indicator is off, the grounding switch of cabinet V in the ring main unit is turned on, and the low-voltage cabinet is grounded.
- During maintenance, turn off the air circuit breaker on the low-voltage side and the switch on the high-voltage side of the equipment, and place warning signs indicating that the switches must not be turned on. If the equipment supports the automatic mode, disable the automatic mode to ensure that the equipment will not be powered on unexpectedly.
- Use a detergent to clean the insulation surface of the lightning arrester. After the detergent is volatilized, evenly apply the silicon grease.
- If protection actions (such as pressure relief, gas protection, and emergency stop) are triggered on the equipment, O&M personnel need to visit the site and perform the following steps:
  1. Set the REMOTE/LOCAL SWITCH of LV PANEL A, LV PANEL B, and ring main unit to the LOCAL position.
  2. If the ring main unit is configured with a transfer switch for automatic mode, set it to OFF or exit the AUTO mode.
  3. Locate and rectify the fault.
  4. Reset the fault signal sources of the STS (such as the emergency stop button, relay protection, and pressure relief valve).
  5. Set the REMOTE/LOCAL SWITCH to the REMOTE position. If this operation cannot be performed, reset all preceding fault signal sources. Then, set the REMOTE/LOCAL SWITCH to REMOTE, LOCAL, and REMOTE in sequence, and wait for at least 2 minutes between each position. The measurement and control module is now reset and you can enable the telecontrol function.

NOTICE

- Maintain the equipment with sufficient knowledge of this document and using proper tools and testing equipment.
- Place temporary warning signs or install fences to prevent unauthorized access to the maintenance site.
- If the equipment is faulty, contact your vendor.
- The equipment can be powered on only after all faults are rectified. Failing to do so may escalate faults or damage the equipment.
- Do not open STS doors for maintenance in sand and dust storms.
- In areas such as deserts, install 18 cm x 25 cm dustproof bags for dust-sensitive devices such as smoke sensors and T/H sensors with climbing devices and seal the bags with seal tape before maintenance. After the maintenance is complete, remove the dustproof bags and close the cabin door.
- Upon completion of each maintenance, you are advised to use cordless vacuum cleaners to remove sand, dust, catkins, and insects inside the equipment. Once the cleaning is complete, close the cabin doors.

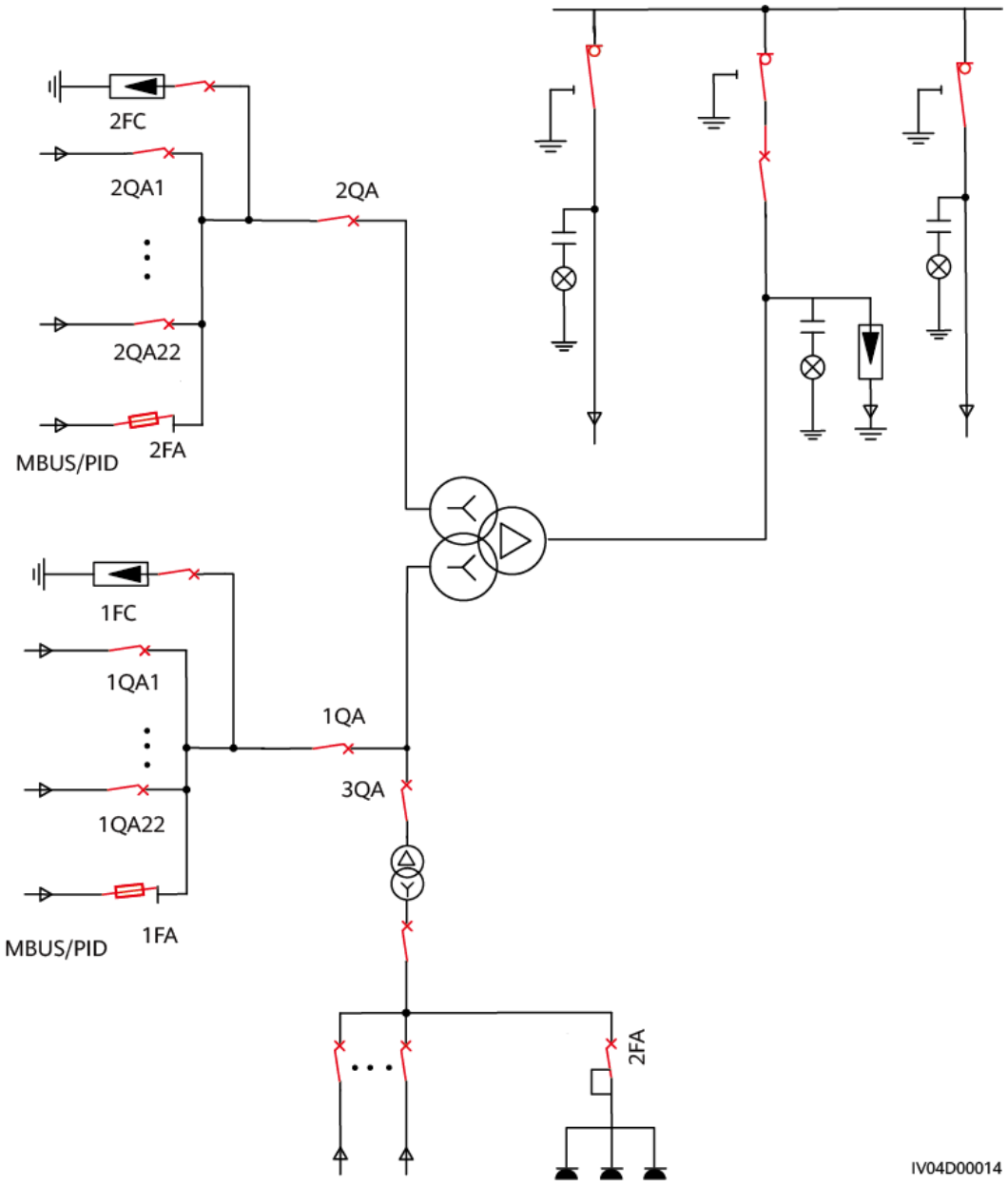
6.2 Shutdown and Power-Off

To power off the equipment system, perform the following operations:

1. Follow the relevant power operation procedure. Wear high-voltage insulation gloves, insulation shoes, and safety helmets, and use operation levers.
2. Turn off AC input switches in the LV cabinet.
3. After checking that all the AC input switches in the LV cabinet are turned off, turn off the air circuit breaker and the PT loop switch.
4. After confirming that the air circuit breaker is turned off, turn off the circuit breaker of cabinet V of the ring main unit. Then turn off the disconnector.
5. If the power indicator indicates no power supply, ensure that cabinet V is grounded according to operation instructions on the panel of the ring main unit.
6. To facilitate the power-off maintenance of the STS, turn off the load switch of the upstream cabinet G3. Ensure that the power supply is off, turn off the load switch of cabinet G1, turn on the ground switches of cabinets G3 and G1, and then check and repair the ring main unit. If the MV side is a DVC/DCV cabinet, to facilitate the power-off maintenance of the STS, turn off the load switch of the upstream cabinet G3. Ensure that the power supply is off, turn on the ground switch of cabinet G3, and then check and repair the ring main unit.

6.2.1 Powering Off the Transformer for Overhaul (Upper Isolation Structure of the Ring Main Unit, CGM)

Figure 6-1 Running status before overhaul



Procedure

Step 1 Remotely turn off the ACB in LV PANEL A.

Step 2 Remotely turn off the ACB in LV PANEL B.

Step 3 Remotely turn off the circuit breaker of cabinet G2 in the ring main unit.

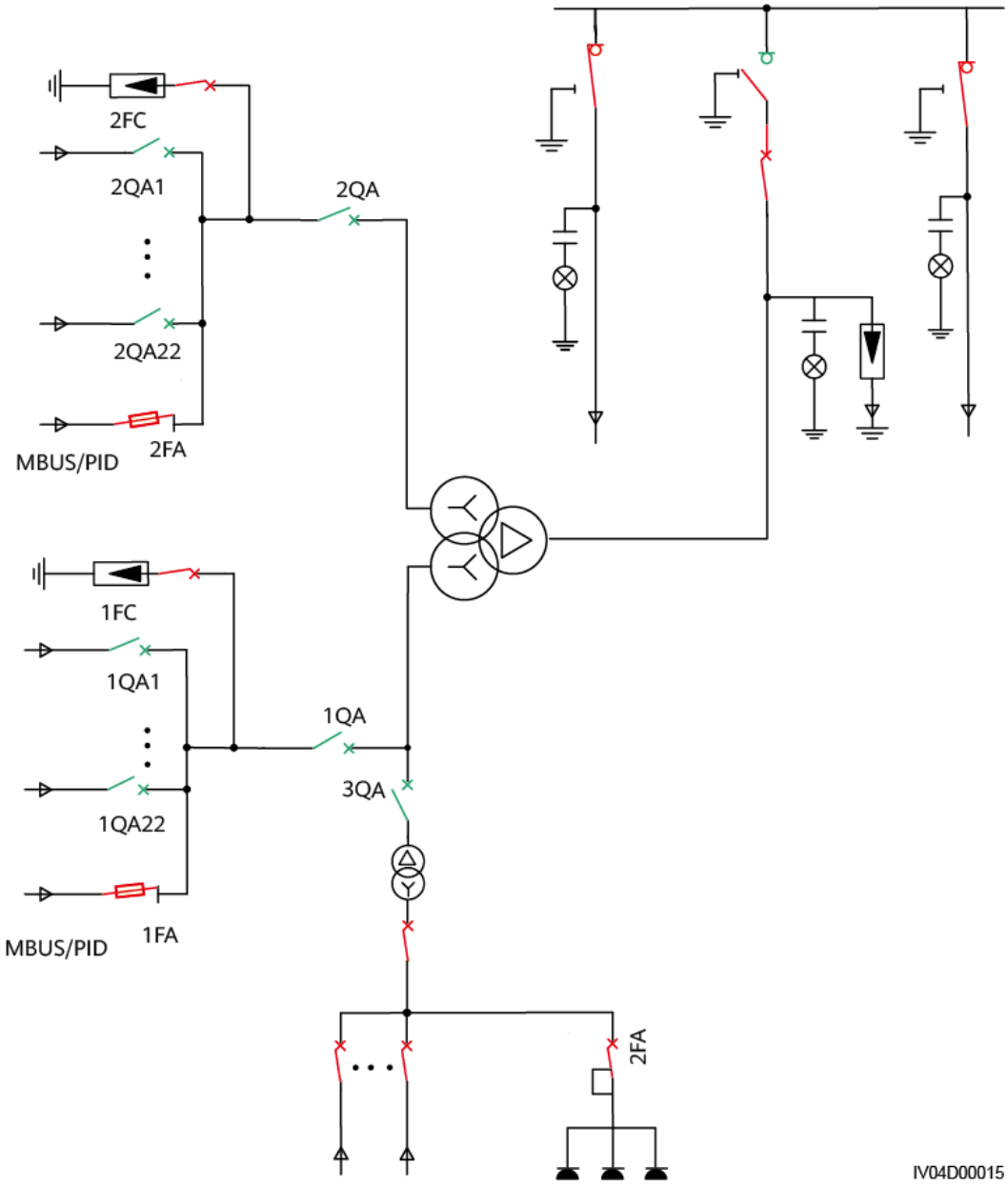
Step 4 Manually turn off the disconnector of cabinet G2 in the ring main unit.

Step 5 Manually turn on the circuit breaker of cabinet G2 in the ring main unit.

Step 6 Manually turn on the ground knife switch of cabinet G2 and lock the operation hole. Install a sign to forbid any operation.

Step 7 Manually turn off all MCCBs of the incoming cables and discharge the busbar of the LV cabinet using a ground cable.

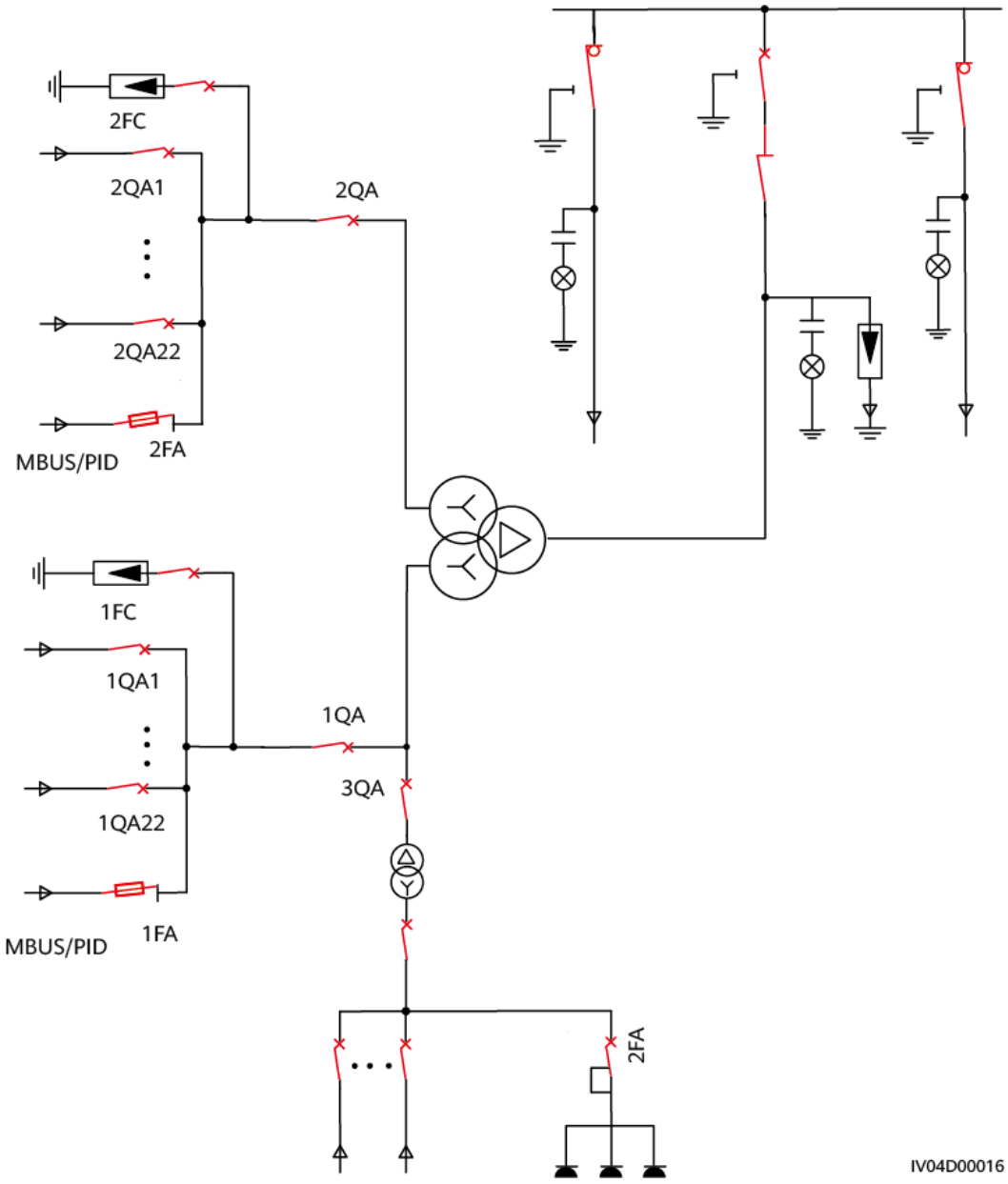
Figure 6-2 Status of the switches after overhaul



----End

6.2.2 Powering Off the Transformer for Overhaul (Lower Isolation Structure of the Ring Main Unit, DQS and 8DJH)

Figure 6-3 Running status before overhaul



Procedure

Step 1 Remotely turn off the ACB in LV PANEL A.

Step 2 Remotely turn off the ACB in LV PANEL B.

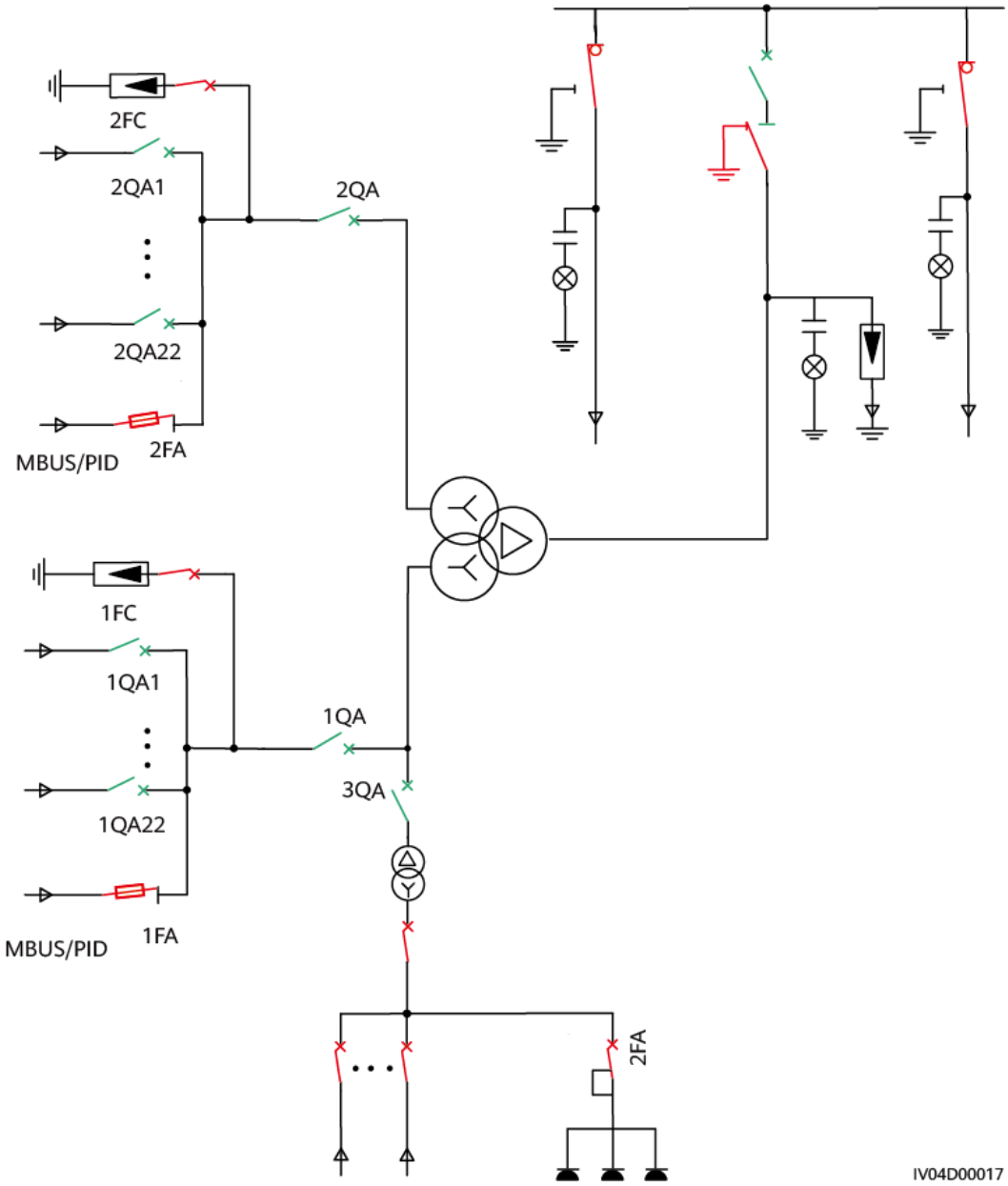
Step 3 Remotely turn off the circuit breaker of cabinet G2 in the ring main unit.

Step 4 Manually turn off the disconnector of cabinet G2 in the ring main unit.

Step 5 Manually turn on the ground knife switch of cabinet G2 and lock the operation hole. Install a sign to forbid any operation.

Step 6 Manually turn off all MCCBs of the incoming cables and discharge the busbar of the LV cabinet using a ground cable.

Figure 6-4 Status of the switches after overhaul



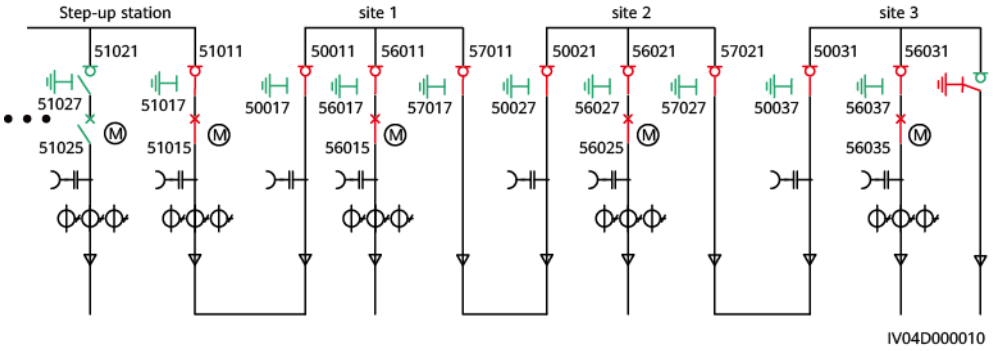
----End

6.2.3 Powering Off the Ring Main Unit for Overhaul

NOTE

- The overhaul procedures for CGM and DQS ring main units are the same. The overhaul procedures for DVC and CVC are the same.
- This document uses CGM CVC ring main unit at site 2 as an example.

Figure 6-5 Status of the switches before overhaul



Procedure

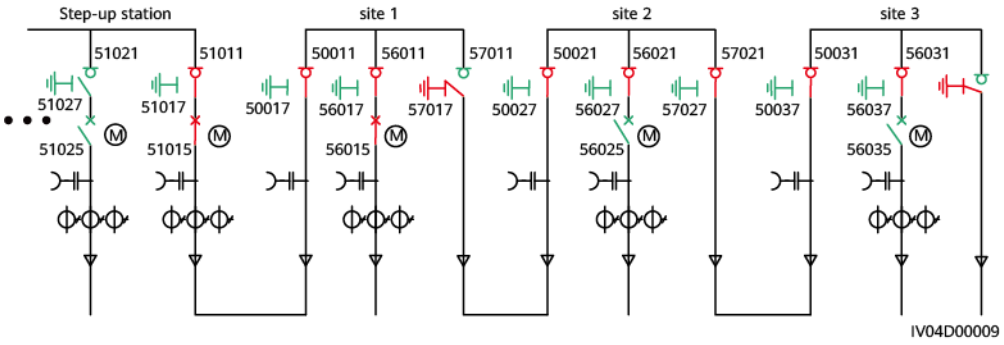
Step 1 Cut off the STS loads at site 3 and turn off circuit breaker 56035 at site 3.

Step 2 Cut off the STS loads at site 2 and turn off circuit breaker 56025 at site 2.

Step 3 Turn off load switch 57011 of cabinet G3 at site 1. After the electric display of cabinet G3 does not blink, turn on grounding switch 57017 of cabinet G3 (pull out the mechanical interlock key to grounding switches 57017 and 50027). Install a sign to forbid any operation.

Step 4 The main loop of the ring main unit at site 2 has been powered off and safety measures have been taken for overhaul.

Figure 6-6 Status of the switches during overhaul



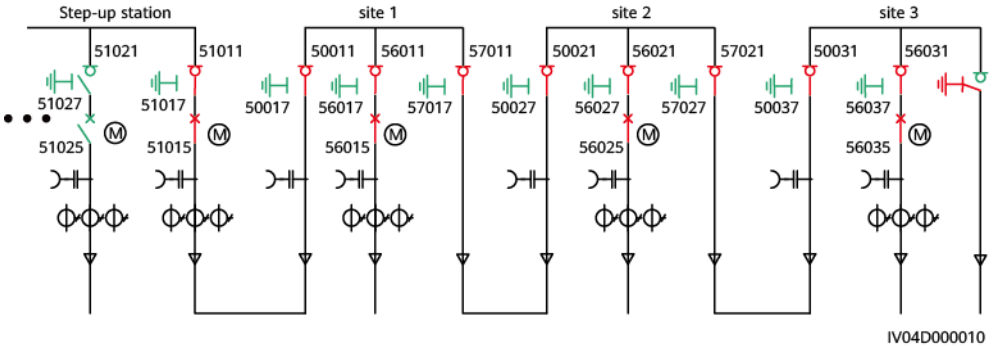
----End

6.3 Overhauling Cables Between STSs (CVC)

NOTE

- For CVC ring main units, the cable overhaul procedures for CGM and DQS are the same.
- This document uses the CGM CVC ring main unit (cables between site 1 and site 2) as an example.

Figure 6-7 Status of the switches before overhaul



Procedure

Step 1 Cut off the STS loads at site 3 and turn off circuit breaker 56035 at site 3.

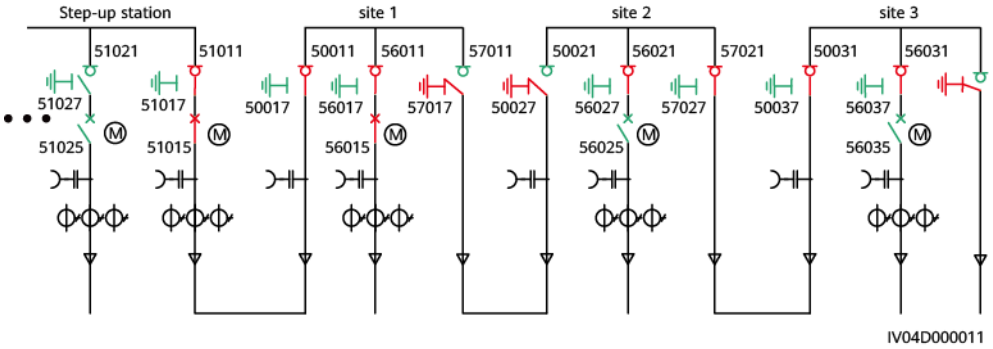
Step 2 Cut off the STS loads at site 2 and turn off circuit breaker 56025 at site 2.

Step 3 Turn off load switch 57011 of cabinet G3 at site 1. After the electric display of cabinet G3 does not blink, turn on grounding switch 57017 of cabinet G3 (pull out the mechanical interlock key to grounding switches 57017 and 50027). Install a sign to forbid any operation.

Step 4 Turn off load switch 50021 of cabinet G1 at site 2. (Insert the mechanical interlock key to grounding switches 57017 and 50027.) Turn on grounding switch 50027 of cabinet G1. Install a sign to forbid any operation.

Step 5 Both ends of the cables between site 1 and site 2 are grounded, safety measures are taken, and the cable compartment doors at both ends are unlocked.

Figure 6-8 Status of the switches during overhaul



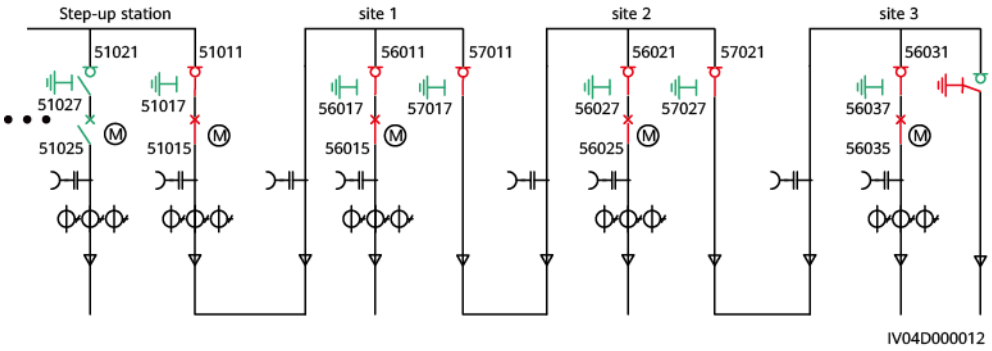
----End

6.4 Overhauling Cables Between STSs (DVC)

NOTE

- For DVC ring main units, the cable overhaul procedures for CGM and DQS are the same.
- This document uses the CGM DVC ring main unit (cables between site 1 and site 2) as an example.

Figure 6-9 Status of the switches before overhaul



Procedure

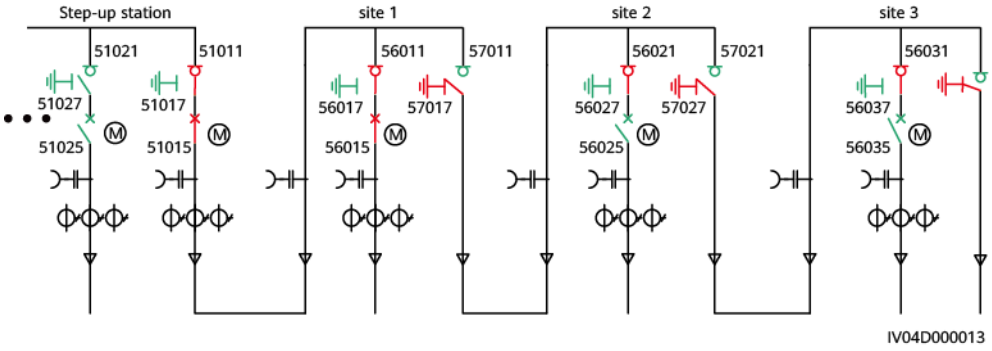
Step 1 Cut off the STS loads at site 3 and turn off circuit breaker 56035 at site 3.

Step 2 Cut off the STS loads at site 2 and turn off circuit breaker 56025 at site 2.

Step 3 Turn off load switch 57011 of cabinet G3 at site 1. After the electric display of cabinet G3 does not blink, turn on grounding switch 57017 of cabinet G3 (pull out the mechanical interlock key to the cable room door and grounding switch 57017 of cabinet G1 at site 2). Install a sign to forbid any operation.

Step 4 One end of the cables between site 1 and site 2 is grounded and safety measures are taken. The door of the cable room at site 1 is unlocked. The door of the cable room at site 2 can be unlocked by inserting the mechanical interlock key.

Figure 6-10 Status of the switches during overhaul



----End

6.5 Routine Maintenance

Routine inspection and maintenance must comply with relevant regulations of the electric utility.

The inspection, maintenance, and repair can only be performed by trained personnel who are familiar with the equipment. The personnel must be certified and comply with the safety regulations issued by the electric utility.

CAUTION

To check, maintain, and repair the system with power-off, you must ensure that:

- The high-voltage power supply is disconnected.
- There is no possible feedback power supply at the high-voltage cable outlet.
- There is no operation at the high-voltage cable outlet.
- All auxiliary power supplies are disconnected, and will not be connected again.

Table 6-1 Maintenance checklist

No.	Check Item	Check Method	Recommended Maintenance Interval	System Powered Off or Not
1	System running status and cleanliness	Check that the appearance and internal components of the equipment are not damaged or deformed.	Once a month	Yes
		Check that there is no abnormal sound when the equipment is running.		No
		Check that the warning labels are clear. If the labels are dirty or damaged, replace them in a timely manner.		No
		Check for condensation inside the equipment. If there is visible condensation, ventilate and dehumidify the equipment.		Yes
		Check the equipment for corrosion or paint peeling, and repaint the damaged area.		No
	LV panel	Check that the voltage and current multimeter and switch-on/off indicator of the low-voltage incoming cable cabinet are normal. If their readings are abnormal, replace them in a timely manner.		No
		Check that the SPD indicator is normal. If the indicator is red, the SPD is faulty and needs to be replaced.		No

No.	Check Item	Check Method	Recommended Maintenance Interval	System Powered Off or Not
	Transformer	Check that there is no oil leakage around the pressure relief valve. If there is, tighten the valve or replace the faulty parts.		Yes
		Check that there is no oil leakage on the bushings of each phase at the high-voltage and low-voltage sides. If there is, tighten the bushings or replace the faulty parts.		Yes
		Check that there is no oil leakage at the connection point between the transformer heat sink and the oil tank flange. If there is, tighten the connection point or replace the faulty parts.		Yes
		Check that the sound of the transformer is normal during operation. If there are abnormal noises, power off the transformer and repair it.		Yes
		Check that the color of the desiccant inside the dehydrating breather does not change. If the color changes from blue to pink or from orange to dark green, replace the desiccant in a timely manner.		No
		Check that the transformer oil in the oil cup of the dehydrating breather is clean. If it is dirty, replace the transformer oil in a timely manner.		No
		If the water volume in the oil tray exceeds 50% of the oil tray volume, drain water in a timely manner.		No
	Ring main unit	Check that the L1/L2/L3 potential indicator is normal. If not, replace it.		Yes

No.	Check Item	Check Method	Recommended Maintenance Interval	System Powered Off or Not
2	LV panel	Perform the switch-on and switch-off test on the ACB of the LV panel.	Once every six months	Yes
		Perform a leakage simulation test on the residual current circuit breaker. Press the test button to verify that the circuit breaker works properly.		Yes
	Transformer	Check that the real-time temperature of the oil temperature indicator is normal. If the difference between the temperature and the temperature displayed on the SmartLogger exceeds ±2°C, the oil temperature indicator is faulty and needs to be repaired in a timely manner.		Yes
	Ring main unit	Check the SF_6 gas pressure gauge to see that the pointer is in the green range. If the pointer is close to red, stop running the ring main unit in a timely manner and perform a refill.		Yes
3	Heat exchanger	Check that the heat exchanger produces no abnormal sounds during operation.	Six months after the first commissioning and once every 6–12 months after that	No
4	Transformer	Test the transformer oil (chromatography analysis, dielectric voltage withstand test, and micro water test).	Once a year	Yes
		Clean the surface of the transformer oil tank, conservator, and heat sink, and tighten the bolts of the anchors, grounding circuit, and main circuit.		Yes
	Ring main unit	Perform manual operation tests on the operation mechanism to check its flexibility. If it fails to be closed or opened, repair the operation mechanism in time.		Yes

No.	Check Item	Check Method	Recommended Maintenance Interval	System Powered Off or Not
5	Cable connection	Check that power cables and signal cables/copper bars are securely connected. If not, properly connect them according to specified torques.	Six months after the first commissioning and once every two years after that	Yes
		Check that cable holes are properly sealed. Ensure that there is no gap.		Yes
		Check that power cables and control cables are not damaged and that the cable exterior in contact with the metallic surface is not scratched.		Yes
		Check that the insulation binding tapes on the wiring terminals of power cables are intact.		Yes
6	LV panel	Check the polyurethane foam at the air intake vent of the LV panel. If the foam is damaged, take a new foam out of the fitting bag, cut and install it using adhesive to fill the gap between the air intake vent and the door of the container LV room to avoid air leakage. This ensures good heat dissipation of the LV panel.	Once every 10 years	No

NOTE

For details about how to maintain equipment in the STS, see the corresponding documents.

6.6 Maintaining Inverters and PCSs (Applicable to LV Coupling Scenarios Where the Inverter and PCS Are Connected to the Same MCCB)

DANGER

In the LV coupling scenario where the inverter and PCS are connected to the same MCCB, when maintaining the inverter and PCS, ensure that the DC switches of the PCS and inverter connected to the same MCCB are turned off.

In the LV coupling scenario where the inverter and PCS are connected to the same MCCB, ensure that the power-on conditions are met before powering on the inverter and PCS. For details, see **Inverter and PCS Status Check (Applicable to LV Coupling Scenarios Where the Inverter and PCS Are Connected to the Same MCCB)**.

Powering Off Inverters

Step 1 Send a shutdown command to the inverter and PCS connected to the same MCCB.

Step 2 Turn off the DC switches of the inverters.

Step 3 Turn off the upstream DC switches of the PCSs.

- If a DC LV Panel is configured, turn off the switch of the PCS DC LV Panel corresponding to the MCCB.
- If no DC LV Panel is configured, turn off the PCS switch in the ESS corresponding to the MCCB.

Step 4 Disconnect the corresponding MCCBs in the STS.

----End

Powering Off PCSs

Step 1 Send a shutdown command to the inverter and PCS connected to the same MCCB.

Step 2 Turn off the upstream DC switches of the PCSs.

- If a DC LV Panel is configured, turn off the switch of the PCS DC LV Panel corresponding to the MCCB.
- If no DC LV Panel is configured, turn off the PCS switch in the ESS corresponding to the MCCB.

Step 3 Turn off the DC switches of the inverters.

Step 4 Disconnect the corresponding MCCBs in the STS.

----End

Powering On Inverters and PCSs (Applicable to LV Coupling Scenarios Where the Inverter and PCS Are Connected to the Same MCCB)

For details, see **Powering On Inverters, PCSs, and the DTS (Applicable to LV Coupling Scenarios Where the Inverter and PCS Are Connected to the Same MCCB)**.

6.7 Alarm List

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2300	Fault-induced ACB Tripping in Low-Voltage Cabinet A	Major	1. A short circuit occurs in the low-voltage cabinet A. 2. Low-voltage cabinet A experiences overcurrent.	1. Check whether the low-voltage power loop is short-circuited. If yes, locate and rectify the fault. 2. Check whether overcurrent occurs in the low-voltage power loop. If yes, rectify the fault. 3. Rectify the fault before turning on the switch. 4. If the fault persists, contact your dealer or technical support.
2301	IMD Alarm in Low-Voltage Cabinet A	Major	The 800 V cable or DC side is grounded or the impedance is low.	1. Disconnect the MCCB and inverter in sequence, observe the IMD impedance change, locate the faulty loop, and rectify the fault. 2. Check whether condensation or contaminant particles accumulate on the surface of the bus subrack or insulator. If yes, disconnect the power supply and then perform dehumidification or clean up foreign matters. 3. Check whether the insulation resistance of the low-voltage loop cable is normal. If no, rectify the fault. 4. If the fault persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2302	IMD Warning in Low-Voltage Cabinet A	Minor	The 800 V cable or DC side is grounded or the impedance is low.	1. Disconnect the MCCB and inverter in sequence, observe the IMD impedance change, locate the faulty loop, and rectify the fault. 2. Check whether condensation or contaminant particles accumulate on the surface of the bus subrack or insulator. If yes, disconnect the power supply and then perform dehumidification or clean up foreign matters. 3. Check whether the insulation resistance of the low-voltage loop cable is normal. If no, rectify the fault. 4. If the fault persists, contact your dealer or technical support.
2303	SPD Fault in Low-Voltage Cabinet A	Warning	The SPD takes an action.	1. Check whether the SPD takes an action or is faulty. If yes, disconnect the power supply and replace the SPD. 2. If the fault persists, contact your dealer or technical support.
2304	Overtemperature-induced Tripping in Low-Voltage Cabinet A	Major	1. The cooling system is faulty. 2. The power loop experiences overcurrent. 3. The T/H sensor is faulty.	1. Check whether the cooling system is faulty. If yes, rectify the fault by referring to the user manual. 2. Check whether overcurrent occurs in the low-voltage power loop. If yes, rectify the fault. 3. Check whether the T/H sensor is normal. If not, replace the T/H sensor. 4. If the fault persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2305	High Temperature in Low-Voltage Cabinet A	Minor	1. The cooling system is faulty. 2. The power loop experiences overcurrent. 3. The T/H sensor is faulty.	1. Check whether the cooling system is faulty. If yes, rectify the fault by referring to the user manual. 2. Check whether overcurrent occurs in the low-voltage power loop. If yes, rectify the fault. 3. Check whether the T/H sensor is normal. If not, replace the T/H sensor. 4. If the fault persists, contact your dealer or technical support.
2306	Fan Fault in Low-Voltage Cabinet A	Minor	Cause ID = 1, 3, 4, 6 1. The port terminal is in poor contact. 2. The heat exchanger fan is faulty. 3. The power supply to the fan is faulty. Cause ID = 2, 5 1. The port terminal is in poor contact. 2. The heat exchanger fan is faulty. 3. The power supply to the fan is faulty. 4. The maximum fan speed is incorrectly set.	Cause ID = 1, 3, 4, 6 1. Check whether the cable is loose. If yes, secure the cable. 2. Check whether the fan is faulty. If yes, replace the fan. 3. Check whether the fan port of the monitoring device has a 48 V voltage. If no, replace the monitoring device or PSU. 4. If the fault persists, contact your dealer or technical support. Cause ID = 2, 5 1. Check whether the cable is loose. If yes, secure the cable. 2. Check whether the fan is faulty. If yes, replace the fan. 3. Check whether the fan port of the monitoring device has a 48 V voltage. If no, replace the monitoring device or PSU. 4. Check whether the maximum fan speed is set correctly. 5. If the fault persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2307	Fan Fault Outside Low-Voltage Cabinet A	Minor	Cause ID = 1, 3, 4, 6 1. The port terminal is in poor contact. 2. The heat exchanger fan is faulty. 3. The power supply to the fan is faulty. Cause ID = 2, 5 1. The port terminal is in poor contact. 2. The heat exchanger fan is faulty. 3. The power supply to the fan is faulty. 4. The maximum fan speed is incorrectly set.	Cause ID = 1, 3, 4, 6 1. Check whether the cable is loose. If yes, secure the cable. 2. Check whether the fan is faulty. If yes, replace the fan. 3. Check whether the fan port of the monitoring device has a 48 V voltage. If no, replace the monitoring device or PSU. 4. If the fault persists, contact your dealer or technical support. Cause ID = 2, 5 1. Check whether the cable is loose. If yes, secure the cable. 2. Check whether the fan is faulty. If yes, replace the fan. 3. Check whether the fan port of the monitoring device has a 48 V voltage. If no, replace the monitoring device or PSU. 4. Check whether the maximum fan speed is set correctly. 5. If the fault persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2308	Mixed-Flow Fan Fault in Low-Voltage Cabinet A	Minor	Cause ID = 1, 4 1. The port terminal is in poor contact. 2. The heat exchanger fan is faulty. 3. The power supply to the fan is faulty. 4. The mixed-flow fan of low-voltage cabinet A is incorrectly configured. Cause ID = 2, 5 1. The port terminal is in poor contact. 2. The heat exchanger fan is faulty. 3. The power supply to the fan is faulty. 4. The maximum fan speed is incorrectly set. 5. The mixed-flow fan of low-voltage cabinet A is incorrectly configured. Cause ID = 3, 6 1. The port terminal is in poor contact. 2. The heat exchanger fan is faulty. 3. The power supply to the fan is faulty.	Cause ID = 1, 4 1. Check whether the cable is loose. If yes, secure the cable. 2. Check whether the fan is faulty. If yes, replace the fan. 3. Check whether the fan port of the monitoring device has a 48 V voltage. If no, replace the monitoring device or PSU. 4. Check that the mixed-flow fan of low-voltage cabinet A in the STS is correctly configured. 5. If the fault persists, contact your dealer or technical support. Cause ID = 2, 5 1. Check whether the cable is loose. If yes, secure the cable. 2. Check whether the fan is faulty. If yes, replace the fan. 3. Check whether the fan port of the monitoring device has a 48 V voltage. If no, replace the monitoring device or PSU. 4. Check whether the maximum fan speed is set correctly. 5. Check that the mixed-flow fan of low-voltage cabinet A in the STS is correctly configured. 6. If the fault persists, contact your dealer or technical support. Cause ID = 3, 6 1. Check whether the cable is loose. If yes, secure the cable. 2. Check whether the fan is faulty. If yes, replace the fan. 3. Check whether the fan port of the monitoring device has a 48 V voltage. If no, replace the monitoring device or PSU. 4. If the fault persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2309	Cooling System Fault in Low-Voltage Cabinet A	Major	1. The heat exchanger fan in the low-voltage room is faulty. 2. The power supply to the fan is faulty. 3. Two T/H sensors in the low-voltage room are faulty. 4. The communication between the T/H sensor and the monitoring device is faulty.	1. Check whether the fan is faulty. If yes, replace the fan. 2. Check whether the fan port of the monitoring device has a 48 V voltage. If no, replace the monitoring device or PSU. 3. Check whether the T/H sensor is faulty. If yes, replace the sensor. 4. Check whether the communication between the T/H sensor and the monitoring device is abnormal or whether the RS485 cable is damaged. If yes, rectify the fault. 5. If the fault persists, contact your dealer or technical support.
2310	T/H Sensor Fault in Low-Voltage Cabinet A	Warning	1. The T/H sensor is faulty. 2. The communications cable between the T/H sensor and the monitoring device is in poor contact or damaged.	1. Check whether the T/H sensor is faulty. If yes, replace the sensor. 2. Check whether the communications cable between the T/H sensor and the monitoring device is loose, disconnected, or damaged. If yes, reconnect the communications cable. 3. If the fault persists, contact your dealer or technical support.
2311	Fault-induced ACB Tripping in Low-Voltage Cabinet B	Major	1. A short circuit occurs in the low-voltage cabinet B. 2. Low-voltage cabinet B experiences overcurrent.	1. Check whether the low-voltage power loop is short-circuited. If yes, locate and rectify the fault. 2. Check whether overcurrent occurs in the low-voltage power loop. If yes, rectify the fault. 3. Rectify the fault before turning on the switch. 4. If the fault persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2312	IMD Alarm in Low-Voltage Cabinet B	Major	The 800 V cable or DC side is grounded or the impedance is low.	1. Disconnect the MCCB and inverter in sequence, observe the IMD impedance change, locate the faulty loop, and rectify the fault. 2. Check whether condensation or contaminant particles accumulate on the surface of the bus subrack or insulator. If yes, disconnect the power supply and then perform dehumidification or clean up foreign matters. 3. Check whether the insulation resistance of the low-voltage loop cable is normal. If no, rectify the fault. 4. If the fault persists, contact your dealer or technical support.
2313	IMD Warning in Low-Voltage Cabinet B	Minor	The 800 V cable or DC side is grounded or the impedance is low.	1. Disconnect the MCCB and inverter in sequence, observe the IMD impedance change, locate the faulty loop, and rectify the fault. 2. Check whether condensation or contaminant particles accumulate on the surface of the bus subrack or insulator. If yes, disconnect the power supply and then perform dehumidification or clean up foreign matters. 3. Check whether the insulation resistance of the low-voltage loop cable is normal. If no, rectify the fault. 4. If the fault persists, contact your dealer or technical support.
2314	SPD Fault in Low-Voltage Cabinet B	Warning	The SPD takes an action.	1. Check whether the SPD takes an action or is faulty. If yes, disconnect the power supply and replace the SPD. 2. If the fault persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2315	Overtemperature-induced Tripping in Low-Voltage Cabinet B	Major	1. The cooling system is faulty. 2. The power loop experiences overcurrent. 3. The T/H sensor is faulty.	1. Check whether the cooling system is faulty. If yes, rectify the fault by referring to the user manual. 2. Check whether overcurrent occurs in the low-voltage power loop. If yes, rectify the fault. 3. Check whether the T/H sensor is normal. If not, replace the T/H sensor. 4. If the fault persists, contact your dealer or technical support.
2316	High Temperature in Low-Voltage Cabinet B	Minor	1. The cooling system is faulty. 2. The power loop experiences overcurrent. 3. The T/H sensor is faulty.	1. Check whether the cooling system is faulty. If yes, rectify the fault by referring to the user manual. 2. Check whether overcurrent occurs in the low-voltage power loop. If yes, rectify the fault. 3. Check whether the T/H sensor is normal. If not, replace the T/H sensor. 4. If the fault persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2317	Fan Fault in Low-Voltage Cabinet B	Minor	Cause ID = 1, 3, 4, 6 1. The port terminal is in poor contact. 2. The heat exchanger fan is faulty. 3. The power supply to the fan is faulty. Cause ID = 2, 5 1. The port terminal is in poor contact. 2. The heat exchanger fan is faulty. 3. The power supply to the fan is faulty. 4. The maximum fan speed is incorrectly set.	Cause ID = 1, 3, 4, 6 1. Check whether the cable is loose. If yes, secure the cable. 2. Check whether the fan is faulty. If yes, replace the fan. 3. Check whether the fan port of the monitoring device has a 48 V voltage. If no, replace the monitoring device or PSU. 4. If the fault persists, contact your dealer or technical support. Cause ID = 2, 5 1. Check whether the cable is loose. If yes, secure the cable. 2. Check whether the fan is faulty. If yes, replace the fan. 3. Check whether the fan port of the monitoring device has a 48 V voltage. If no, replace the monitoring device or PSU. 4. Check whether the maximum fan speed is set correctly. 5. If the fault persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2318	Fan Fault Outside Low-Voltage Cabinet B	Minor	Cause ID = 1, 3, 4, 6 1. The port terminal is in poor contact. 2. The heat exchanger fan is faulty. 3. The power supply to the fan is faulty. Cause ID = 2, 5 1. The port terminal is in poor contact. 2. The heat exchanger fan is faulty. 3. The power supply to the fan is faulty. 4. The maximum fan speed is incorrectly set.	Cause ID = 1, 3, 4, 6 1. Check whether the cable is loose. If yes, secure the cable. 2. Check whether the fan is faulty. If yes, replace the fan. 3. Check whether the fan port of the monitoring device has a 48 V voltage. If no, replace the monitoring device or PSU. 4. If the fault persists, contact your dealer or technical support. Cause ID = 2, 5 1. Check whether the cable is loose. If yes, secure the cable. 2. Check whether the fan is faulty. If yes, replace the fan. 3. Check whether the fan port of the monitoring device has a 48 V voltage. If no, replace the monitoring device or PSU. 4. Check whether the maximum fan speed is set correctly. 5. If the fault persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2319	Mixed-Flow Fan Fault in Low-Voltage Cabinet B	Minor	Cause ID = 1, 4 1. The port terminal is in poor contact. 2. The heat exchanger fan is faulty. 3. The power supply to the fan is faulty. 4. The mixed-flow fan of low-voltage cabinet B is incorrectly configured. Cause ID = 2, 5 1. The port terminal is in poor contact. 2. The heat exchanger fan is faulty. 3. The power supply to the fan is faulty. 4. The maximum fan speed is incorrectly set. 5. The mixed-flow fan of low-voltage cabinet B is incorrectly configured. Cause ID = 3, 6 1. The port terminal is in poor contact. 2. The heat exchanger fan is faulty. 3. The power supply to the fan is faulty.	Cause ID = 1, 4 1. Check whether the cable is loose. If yes, secure the cable. 2. Check whether the fan is faulty. If yes, replace the fan. 3. Check whether the fan port of the monitoring device has a 48 V voltage. If no, replace the monitoring device or PSU. 4. Check that the mixed-flow fan of low-voltage cabinet B in the STS is correctly configured. 5. If the fault persists, contact your dealer or technical support. Cause ID = 2, 5 1. Check whether the cable is loose. If yes, secure the cable. 2. Check whether the fan is faulty. If yes, replace the fan. 3. Check whether the fan port of the monitoring device has a 48 V voltage. If no, replace the monitoring device or PSU. 4. Check whether the maximum fan speed is set correctly. 5. Check that the mixed-flow fan of low-voltage cabinet B in the STS is correctly configured. 6. If the fault persists, contact your dealer or technical support. Cause ID = 3, 6 1. Check whether the cable is loose. If yes, secure the cable. 2. Check whether the fan is faulty. If yes, replace the fan. 3. Check whether the fan port of the monitoring device has a 48 V voltage. If no, replace the monitoring device or PSU. 4. If the fault persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2320	T/H Sensor Fault in Low-Voltage Cabinet B	Warning	1. The T/H sensor is faulty. 2. The communications cable between the T/H sensor and the monitoring device is in poor contact or damaged.	1. Check whether the T/H sensor is faulty. If yes, replace the sensor. 2. Check whether the communications cable between the T/H sensor and the monitoring device is loose, disconnected, or damaged. If yes, reconnect the communications cable. 3. If the fault persists, contact your dealer or technical support.
2321	Cooling System Fault in Low-Voltage Cabinet B	Major	1. The heat exchanger fan in the low-voltage room is faulty. 2. The power supply to the fan is faulty. 3. Two T/H sensors in the low-voltage room are faulty. 4. The communication between the T/H sensor and the monitoring device is faulty.	1. Check whether the fan is faulty. If yes, replace the fan. 2. Check whether the fan port of the monitoring device has a 48 V voltage. If no, replace the monitoring device or PSU. 3. Check whether the T/H sensor is faulty. If yes, replace the sensor. 4. Check whether the communication between the T/H sensor and the monitoring device is abnormal or whether the RS485 cable is damaged. If yes, rectify the fault. 5. If the fault persists, contact your dealer or technical support.
2322	Low-Voltage Room Door Opening	Warning	1. The end door of the low-voltage room is open. 2. The threshold switch is faulty.	1. Check whether the end door is open. If yes, close the door. 2. Check whether the threshold switch is faulty. If yes, replace the switch. 3. If the fault persists, contact your dealer or technical support.
2323	Smoke Alarm in Low-Voltage Room	Minor	1. A fire occurs inside the STS. 2. The sensor generates a false alarm.	1. Check whether a fire occurs onsite. If a fire occurs in the low-voltage cabinet, switch off the low-voltage and medium-voltage circuit breakers immediately. If a fire occurs in the ring main unit, switch off the circuit breaker in the booster station. 2. If the fault persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2324	Dual Smoke Sensor Tripping in Low-Voltage Room	Major	A fire occurs inside the STS.	1. Check whether a fire occurs onsite. If a fire occurs in the low-voltage cabinet, switch off the low-voltage and medium-voltage circuit breakers immediately. If a fire occurs in the ring main unit, switch off the circuit breaker in the booster station. 2. If the fault persists, contact your dealer or technical support.
2325	Smoke Sensor Fault in Low-Voltage Room	Warning	Smoke sensor 1/2 in the low-voltage room is faulty.	1. Check whether the smoke sensor is faulty. If yes, replace the sensor. 2. If the fault persists, contact your dealer or technical support.
2326	Overtemperature-induced Tripping in Medium-Voltage Room	Major	1. The cooling system is faulty. 2. The power loop experiences overcurrent. 3. The T/H sensor is faulty.	1. Check whether the cooling system is faulty. If yes, rectify the fault by referring to the user manual. 2. Check whether overcurrent occurs in the low-voltage power loop. If yes, rectify the fault. 3. Check whether the T/H sensor is normal. If not, replace the T/H sensor. 4. If the fault persists, contact your dealer or technical support.
2327	High Temperature in Medium-Voltage Room	Minor	1. The cooling system is faulty. 2. The power loop experiences overcurrent. 3. The T/H sensor is faulty.	1. Check whether the cooling system is faulty. If yes, rectify the fault by referring to the user manual. 2. Check whether overcurrent occurs in the low-voltage power loop. If yes, rectify the fault. 3. Check whether the T/H sensor is normal. If not, replace the T/H sensor. 4. If the fault persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2328	Smoke Alarm in Medium-Voltage Room	Minor	1. A fire occurs inside the STS. 2. The sensor generates a false alarm.	1. Check whether a fire occurs onsite. If a fire occurs in the low-voltage cabinet, switch off the low-voltage and medium-voltage circuit breakers immediately. If a fire occurs in the ring main unit, switch off the circuit breaker in the booster station. 2. If the fault persists, contact your dealer or technical support.
2329	Dual Smoke Sensor Tripping in Medium-Voltage Room	Major	A fire occurs inside the STS.	1. Check whether a fire occurs onsite. If a fire occurs in the low-voltage cabinet, switch off the low-voltage and medium-voltage circuit breakers immediately. If a fire occurs in the ring main unit, switch off the circuit breaker in the booster station. 2. If the fault persists, contact your dealer or technical support.
2330	Smoke Sensor Fault in Medium-Voltage Room	Warning	Smoke sensor 1/2 in the medium-voltage room is faulty.	1. Check whether the smoke sensor is faulty. If yes, replace the sensor. 2. If the fault persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2331	Fan Fault in Medium-Voltage Room	Minor	Cause ID = 1 1. The port terminal is in poor contact. 2. The heat exchanger fan is faulty. 3. The power supply to the fan is faulty. 4. The heat exchanger for the medium-voltage room is incorrectly configured. Cause ID = 2 1. The port terminal is in poor contact. 2. The heat exchanger fan is faulty. 3. The power supply to the fan is faulty. 4. The maximum fan speed is incorrectly set. 5. The heat exchanger for the medium-voltage room is incorrectly configured. Cause ID = 3 1. The port terminal is in poor contact. 2. The heat exchanger fan is faulty. 3. The power supply to the fan is faulty.	Cause ID = 1 1. Check whether the cable is loose. If yes, secure the cable. 2. Check whether the fan is faulty. If yes, replace the fan. 3. Check whether the fan port of the monitoring device has a 48 V voltage. If no, replace the monitoring device or PSU. 4. Check that the heat exchanger for the medium-voltage room in the STS is correctly configured. 5. If the fault persists, contact your dealer or technical support. Cause ID = 2 1. Check whether the cable is loose. If yes, secure the cable. 2. Check whether the fan is faulty. If yes, replace the fan. 3. Check whether the fan port of the monitoring device has a 48 V voltage. If no, replace the monitoring device or PSU. 4. Check whether the maximum fan speed is set correctly. 5. Check that the heat exchanger for the medium-voltage room in the STS is correctly configured. 6. If the fault persists, contact your dealer or technical support. Cause ID = 3 1. Check whether the cable is loose. If yes, secure the cable. 2. Check whether the fan is faulty. If yes, replace the fan. 3. Check whether the fan port of the monitoring device has a 48 V voltage. If no, replace the monitoring device or PSU. 4. If the fault persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2332	Fan Fault Outside Medium-Voltage Room	Minor	Cause ID = 1 1. The port terminal is in poor contact. 2. The heat exchanger fan is faulty. 3. The power supply to the fan is faulty. 4. The heat exchanger for the medium-voltage room is incorrectly configured. Cause ID = 2 1. The port terminal is in poor contact. 2. The heat exchanger fan is faulty. 3. The power supply to the fan is faulty. 4. The maximum fan speed is incorrectly set. 5. The heat exchanger for the medium-voltage room is incorrectly configured. Cause ID = 3 1. The port terminal is in poor contact. 2. The heat exchanger fan is faulty. 3. The power supply to the fan is faulty.	Cause ID = 1 1. Check whether the cable is loose. If yes, secure the cable. 2. Check whether the fan is faulty. If yes, replace the fan. 3. Check whether the fan port of the monitoring device has a 48 V voltage. If no, replace the monitoring device or PSU. 4. Check that the heat exchanger for the medium-voltage room in the STS is correctly configured. 5. If the fault persists, contact your dealer or technical support. Cause ID = 2 1. Check whether the cable is loose. If yes, secure the cable. 2. Check whether the fan is faulty. If yes, replace the fan. 3. Check whether the fan port of the monitoring device has a 48 V voltage. If no, replace the monitoring device or PSU. 4. Check whether the maximum fan speed is set correctly. 5. Check that the heat exchanger for the medium-voltage room in the STS is correctly configured. 6. If the fault persists, contact your dealer or technical support. Cause ID = 3 1. Check whether the cable is loose. If yes, secure the cable. 2. Check whether the fan is faulty. If yes, replace the fan. 3. Check whether the fan port of the monitoring device has a 48 V voltage. If no, replace the monitoring device or PSU. 4. If the fault persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2333	Mixed-Flow Fan Fault in Medium-Voltage Room	Minor	Cause ID = 1, 4 1. The port terminal is in poor contact. 2. The heat exchanger fan is faulty. 3. The power supply to the fan is faulty. 4. The mixed-flow fan of the medium-voltage room is incorrectly configured. Cause ID = 2, 5 1. The port terminal is in poor contact. 2. The heat exchanger fan is faulty. 3. The power supply to the fan is faulty. 4. The maximum fan speed is incorrectly set. 5. The mixed-flow fan of the medium-voltage room is incorrectly configured. Cause ID = 3, 6 1. The port terminal is in poor contact. 2. The heat exchanger fan is faulty. 3. The power supply to the fan is faulty.	Cause ID = 1, 4 1. Check whether the cable is loose. If yes, secure the cable. 2. Check whether the fan is faulty. If yes, replace the fan. 3. Check whether the fan port of the monitoring device has a 48 V voltage. If no, replace the monitoring device or PSU. 4. Check that the mixed-flow fan for the medium-voltage room in the STS is correctly configured. 5. If the fault persists, contact your dealer or technical support. Cause ID = 2, 5 1. Check whether the cable is loose. If yes, secure the cable. 2. Check whether the fan is faulty. If yes, replace the fan. 3. Check whether the fan port of the monitoring device has a 48 V voltage. If no, replace the monitoring device or PSU. 4. Check whether the maximum fan speed is set correctly. 5. Check that the mixed-flow fan for the medium-voltage room in the STS is correctly configured. 6. If the fault persists, contact your dealer or technical support. Cause ID = 3, 6 1. Check whether the cable is loose. If yes, secure the cable. 2. Check whether the fan is faulty. If yes, replace the fan. 3. Check whether the fan port of the monitoring device has a 48 V voltage. If no, replace the monitoring device or PSU. 4. If the fault persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2334	Cooling System Fault in Medium-Voltage Room	Major	1. The heat exchanger fan for the medium-voltage room is faulty. 2. The power supply to the fan is interrupted. 3. Both T/H sensors for the medium-voltage room are faulty. 4. The communication is interrupted between the T/H sensor and the monitoring device.	1. Check whether the fan is faulty. If yes, replace the fan. 2. Check whether the fan port of the monitoring device has a 48 V voltage. If no, replace the monitoring device or PSU. 3. Check whether the T/H sensor is faulty. If yes, replace the sensor. 4. Check whether the communication between the T/H sensor and the monitoring device is abnormal or whether the RS485 cable is damaged. If yes, rectify the fault. 5. If the fault persists, contact your dealer or technical support.
2335	T/H Sensor Fault in Medium-Voltage Room	Warning	1. The T/H sensor is faulty. 2. The communications cable between the T/H sensor and the monitoring device is in poor contact or damaged.	1. Check whether the T/H sensor is faulty. If yes, replace the sensor. 2. Check whether the communications cable between the T/H sensor and the monitoring device is loose, disconnected, or damaged. If yes, reconnect the communications cable. 3. If the fault persists, contact your dealer or technical support.
2336	Medium-Voltage Room Door Opening	Warning	1. The door of the medium-voltage room is open. 2. The threshold switch is faulty.	1. Check whether the end door is open. If yes, close the door. 2. Check whether the threshold switch is faulty. If yes, replace the switch. 3. If the fault persists, contact your dealer or technical support.
2337	High-Configuration Relay Protection Power Fault	Major	1. The relay protection power supply in the medium-voltage room is unavailable. 2. The relay protection in the medium-voltage room is damaged.	1. Check whether the power supply loop of the ring main unit is normal. If no, repair the power supply loop. 2. Check whether the relay protection in the medium-voltage room is damaged. If yes, replace the relay protection. 3. If the fault persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2338	Relay Protection Communication Error in Medium-Voltage Room	Minor	1. The communications cable between the relay protection and the main controller is disconnected. 2. The port terminal is in poor contact.	1. Check whether the communications cable is damaged. If yes, replace the cable. 2. Check whether the terminal is secured. If no, secure the terminal. 3. If the fault persists, contact your dealer or technical support.
2339	Transformer Differential Protection Action	Major	1. An internal fault occurred on the transformer. 2. The cable between the transformer and the ring main unit is faulty. 3. The copper bar between the transformer and the low-voltage cabinet is faulty.	1. Check and download the relay protection event records of the ring main unit onsite, locate the internal fault point of the transformer, and rectify the fault. 2. Check and download the relay protection event records of the ring main unit onsite, locate the fault point of the cable between the transformer and the ring main unit, and rectify the fault. 3. Check and download the relay protection event records of the ring main unit onsite, locate the fault point of the copper bar between the transformer and the low-voltage cabinet, and rectify the fault. 4. Rectify the fault before switching on the medium-voltage circuit breaker. 5. If the fault persists, contact your dealer or technical support.
2340	Transformer Non-electrical Protection Action	Major	The transformer trips due to heavy gas, overtemperature, or pressure relief valve action.	1. Check whether the transformer is faulty. If yes, repair the transformer or reduce the transformer load. Rectify the fault before switching on the medium-voltage circuit breaker. 2. If the fault persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2341	Unloaded State of Disconnector or Spring in Transformer Cabinet G2	Major	1. The power supply to the secondary loop of the ring main unit is abnormal. 2. The travel switch of the energy storage loop is damaged. 3. The rectifier bridge of the energy storage loop is burnt.	1. Check whether the power supply to the secondary loop of the ring main unit is abnormal. If yes, repair the power supply. 2. Check whether the travel switch of the energy storage loop is damaged. If yes, replace the component. 3. Check whether the rectifier bridge of the energy storage loop is damaged. If yes, replace the rectifier bridge. 4. If the fault persists, contact your dealer or technical support.
2342	Circuit Breaker Switch-off Failure in Transformer Cabinet G2	Major	The operation loop of the circuit breaker is faulty. As a result, the remote switch-off fails.	1. Check whether the operation loop of the circuit breaker is faulty. If yes, replace the component. 2. If the fault persists, contact your dealer or technical support.
2343	Transformer Overvoltage Protection Action	Major	1. The medium-voltage power grid experiences overvoltage. 2. The medium-voltage cable is grounded in single-phase mode.	1. Check and download the relay protection event records of the ring main unit onsite, compare the records with the monitoring data of the booster station, identify the fault cause, and rectify the fault. 2. Check whether the medium-voltage cable is damaged. If yes, repair the cable. 3. Rectify the fault before switching on the medium-voltage circuit breaker. 4. If the fault persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2344	Transformer Overcurrent Protection Action	Major	The transformer is overloaded or a short circuit occurs on the low-voltage side but the low-voltage circuit breaker takes no action.	1. Check and download the relay protection event records of the ring main unit onsite, determine the phase where the short circuit occurs, locate the fault point, and rectify the fault. 2. Rectify the fault before switching on the medium-voltage circuit breaker. 3. If the fault persists, contact your dealer or technical support.
2345	Transformer Zero-Sequence Overvoltage Protection Action	Major	The three-phase voltage of the medium-voltage power grid is unbalanced or the single-phase cable is grounded.	1. Check and download the relay protection event records of the ring main unit onsite, compare the records with the monitoring data of the booster station, identify the fault cause, and rectify the fault. 2. Check whether the medium-voltage cable is grounded. If yes, repair the cable. 3. Rectify the fault before switching on the medium-voltage circuit breaker. 4. If the fault persists, contact your dealer or technical support.
2346	Transformer Zero-Sequence Overcurrent Protection Action	Major	The three-phase current of the medium-voltage power grid is unbalanced or the single-phase cable is grounded.	1. Check and download the relay protection event records of the ring main unit onsite, compare the records with the monitoring data of the booster station, identify the fault cause, and rectify the fault. 2. Check whether the medium-voltage cable is grounded. If yes, repair the cable. 3. Rectify the fault before switching on the medium-voltage circuit breaker. 4. If the fault persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2347	Transformer Undervoltage Protection Action	Major	1. The medium-voltage power grid experiences undervoltage. 2. The medium-voltage cable is grounded in single-phase mode.	1. Check and download the relay protection event records of the ring main unit onsite, compare the records with the monitoring data of the booster station, identify the fault cause, and rectify the fault. 2. Check whether the medium-voltage cable is damaged. If yes, repair the cable. 3. Rectify the fault before switching on the medium-voltage circuit breaker. 4. If the fault persists, contact your dealer or technical support.
2348	Circuit Breaker Failure Protection Action	Major	The circuit breaker fails to trip.	1. Check whether the trip coil of the circuit breaker is damaged. If yes, replace the coil. 2. Check whether the handle is pulled out. If no, pull out the handle and ensure that the travel switch is reset. 3. Check whether the door panel of the cable room is properly installed. If no, install the door panel and ensure that the travel switch is in the correct position. 4. Reset the relay protection. 5. If the fault persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2349	Light Transformer Gas	Minor	1. The transformer leaks oil. 2. The transformer is not properly operated during oil recharge. 3. The gas relay or the secondary loop is faulty. 4. The gas relay misbehaves. 5. A minor fault occurs on the transformer and a small amount of gas is generated.	1. Check the seal and weld of the oil tank for oil leakage. If the gas relay misbehaves due to the oil level decrease, check whether the oil level complies with the oil temperature-oil level curve. Power off and refill the transformer if necessary. 2. When the transformer is being repaired or installed, the oil charge method is improper. As a result, the gas in the upper part of the conservator is not exhausted as required. Power off the transformer and refill it until the oil is over the conservator. Then, release oil to an appropriate level by referring to the oil temperature-oil level curve. 3. If there is no gas, check the secondary loop and whether the wire post and lead wire of the gas relay are well insulated. 4. Check whether there is any violent vibration in the local area, whether the gas relay leaks oil, and whether the secondary cable is corroded. 5. Take a gas sample from the gas relay. If the gas is colorless, odorless, and not flammable, it is air. In this case, identify the air intake vent and the reason for air intake, which may be improper oil charge. If the gas has a peculiar smell or is even flammable, it indicates that an internal fault has occurred. In this case, power off and maintain the transformer, and take an oil sample for chromatography analysis. 6. If the fault persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2350	Heavy Transformer Gas–induced Tripping	Major	1. The gas loop is faulty. 2. The transformer is not properly operated during oil recharge. 3. The gas relay misbehaves. 4. A short circuit occurs in the transformer.	1. Check the secondary loop and whether the wire post and lead wire of the gas relay are well insulated. 2. When the transformer is being repaired or installed, the oil charge method is improper. As a result, the gas in the upper part of the conservator is not exhausted as required. Power off the transformer and refill it until the oil is over the conservator. Then, release oil to an appropriate level by referring to the oil temperature-oil level curve. 3. Check whether there is any violent vibration in the local area, whether the gas relay leaks oil, and whether the secondary cable is corroded. 4. Check whether there are obvious bumps and dents on the shell of the transformer, whether the container leaks oil, and whether the pressure relief device is sprayed with oil. If yes, it indicates a serious internal fault. 5. If the fault persists, contact your dealer or technical support.
2351	Transformer Winding Temperature High	Minor	1. The transformer is overloaded. 2. A false alarm is generated due to the secondary loop. 3. The winding thermometer is faulty.	1. Check whether the transformer is overloaded. If yes, the high winding temperature alarm is generated in some scenarios. 2. Check whether a false alarm is generated based on the cable connection of the secondary loop. 3. Check whether the temperature on the monitoring device is the same as that on the winding thermometer. If no, rectify the fault on the winding thermometer. 4. If the fault persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2352	Transformer High Winding Temperature–induced Tripping	Major	1. The transformer is overloaded. 2. A false alarm is generated due to the secondary loop. 3. The winding thermometer is faulty.	1. Check whether the transformer is overloaded. If yes, the high winding temperature–induced tripping occurs in some scenarios. 2. Check whether the circuit breaker trips in error based on the cable connection of the secondary loop. 3. Check whether the temperature on the monitoring device is the same as that on the winding thermometer. If no, rectify the fault on the winding thermometer. 4. If the fault persists, contact your dealer or technical support.
2353	Transformer Oil Level High	Minor	1. The oil level is abnormal due to oil seepage, water seepage, or other accidents. 2. Fake oil level. 3. Too much oil is filled.	1. If gas relay protection is available, remove the trip circuit to prevent accidental tripping. 2. O&M personnel need to check the oil level gauge frequently. If the oil level is too high, drain some oil. 3. If the conservator or the explosion-proof pipe sprays oil abnormally, cut off the power supply of the transformer immediately to prevent the escalation of fault and accident. 4. Check whether the pipes of the dehumidifier/dehumidification device are blocked. If yes, repair the pipes. 5. Drain oil. 6. If the fault persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2354	Transformer Oil Level Low	Minor	1. The transformer leaks oil or seeps oil for a long time. 2. After oil is drained due to maintenance, repair, or tests, the transformer is not refilled to the normal level in time. 3. A false low oil level alarm is generated due to the secondary loop. 4. Oil leaks into the capsule.	1. Check the secondary loop for false actions. If the relay action is correct, refill oil to the transformer. 2. Check whether the capsule is damaged. If yes, replace the capsule. 3. If the fault persists, contact your dealer or technical support.
2355	Transformer Oil Temperature High	Minor	1. The transformer is overloaded. 2. A false alarm is generated due to the secondary loop. 3. The oil surface thermometer is faulty.	1. Check whether the transformer is overloaded. If yes, the high oil temperature alarm is generated in some scenarios. 2. Check whether a false alarm is generated based on the cable connection of the secondary loop. 3. Check whether the temperature on the monitoring device is consistent with that on the oil surface thermometer. If no, rectify the fault on the oil surface thermometer. 4. If the fault persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2356	Transformer High Oil Temperature–induced Tripping	Major	1. The transformer is overloaded. 2. A false alarm is generated due to the secondary loop. 3. The oil surface thermometer is faulty.	1. Check whether the transformer is overloaded. If yes, the high oil temperature–induced tripping occurs in some scenarios. 2. Check whether the circuit breaker trips in error based on the cable connection of the secondary loop. 3. Check whether the temperature on the monitoring device is consistent with that on the oil surface thermometer. If no, rectify the fault on the oil surface thermometer. 4. If the fault persists, contact your dealer or technical support.
2357	Transformer Medium-Voltage Switch Control Loop Disconnection	Major	1. The VCB control loop is open-circuited. 2. The handle of the ring main unit is not pulled out. 3. The door panel of the cable room of the ring main unit is not properly mounted. 4. A switch-on action is taken for high-configuration relay protection.	1. Check whether the switch-on, switch-off, and trip coils of the circuit breaker are damaged. If yes, replace the coils. 2. Pull out the handle and ensure that the travel switch is reset. 3. Mount the door panel of the cable room and ensure that the travel switch is in the correct position. 4. Reset the relay protection. 5. If the fault persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2358	Transformer Pressure Valve Action–induced Tripping	Major	1. The pressure relief valve loop is faulty. 2. The transformer is not properly operated during oil recharge. 3. A short circuit occurs in the transformer. 4. The transformer is not breathing well.	1. Check whether the expander, an elastic element of the pressure relief valve, does not work smoothly, whether thin films are damaged since the bolts securing them are too tight or the pressure relief valve opens, and whether the sealing ring of the pressure relief port is damaged (check whether oil leakage occurs at the port using a piece of paper or a strip of white cloth), and check the secondary loop and whether the wire post and lead wire of the gas relay are well insulated. If yes, replace them or contact the manufacturer. 2. When the transformer is being repaired or installed, the oil charge method is improper. As a result, the gas in the upper part of the conservator is not exhausted as required. Power off the transformer and refill it until the oil is over the conservator. Then, release oil to an appropriate level by referring to the oil temperature-oil level curve. 3. A short circuit fault usually affects the gas relay from which you can take the gas sample first. 4. Check the dampness of the silica gel in the dehumidifier by its color and whether the silica gel exceeds 2/3 of the dehumidifier. Check whether the pipes are blocked by filling nitrogen. 5. If the fault persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2359	Transformer Safety Shutdown	Major	A short circuit occurs in the transformer or the medium-voltage cable is faulty.	1. Check and download the relay protection event records of the ring main unit onsite, determine the phase where the short circuit occurs, locate the fault point, and rectify the fault. 2. Rectify the fault before switching on the medium-voltage circuit breaker. 3. If the fault persists, contact your dealer or technical support.
2360	Maintenance-Free Dehumidifier Fault	Major	1. The cable to the maintenance-free dehumidifier is loose. 2. The maintenance-free dehumidifier is faulty. 3. The maintenance-free dehumidifier is incorrectly configured.	1. Check whether the cable to the secondary loop is properly connected. If no, reconnect the cable. 2. Check whether the maintenance-free dehumidifier is faulty. If yes, replace the dehumidifier. 3. Check that the parameters of the maintenance-free dehumidifier of the STS are correctly configured. 4. If the fault persists, contact your dealer or technical support.
2361	DC Power Distribution Cabinet Door Opening	Warning	1. The door of the DC power distribution cabinet is open. 2. The threshold switch is faulty. 3. The DC power distribution cabinet is incorrectly set.	1. Check whether the cabinet door is open. If yes, close the door. 2. Check whether the threshold switch is faulty. If yes, replace the switch. 3. Check that the DC power distribution cabinet in the STS is correctly configured. 4. If the fault persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2362	Heat Exchanger Fault in Distribution Transformer	Major	Cause ID = 1, 3, 4 1. The port terminal is in poor contact. 2. The heat exchanger fan is faulty. 3. The power supply to the fan is faulty. Cause ID = 2 1. The heat exchanger fan in the auxiliary power distribution cabinet is faulty. 2. The 48 V power module is faulty.	1. Check whether the cable is loose. If yes, secure the cable. 2. Check whether the fan is faulty. If yes, replace the fan. 3. Check whether the fan port of the monitoring device has a 48 V voltage. If no, replace the monitoring device or PSU. 4. If the fault persists, contact your dealer or technical support.
2363	Distribution Transformer Cabinet Door Opening	Warning	1. The door of the distribution transformer cabinet is open. 2. The threshold switch is faulty. 3. The number of distribution transformers is incorrectly configured.	1. Check whether the cabinet door is open. If yes, close the door. 2. Check whether the threshold switch is faulty. If yes, replace the switch. 3. Check that the number of the distribution transformers of the STS is correctly configured. 4. If the fault persists, contact your dealer or technical support.
2364	Protection Action and Switch-on Blocking	Major	The ring main unit experiences overcurrent-induced disconnection and non-electricity protection.	1. Check and download the relay protection event records of the ring main unit onsite, determine the phase where the short circuit occurs, locate the fault point, and rectify the fault. 2. Reset the relay protection after the fault is rectified. 3. If the fault persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2365	Low Insulation Gas Pressure of Ring Main Unit	Major	The insulation gas of the ring main unit leaks.	1. Check the gas pressure indicator or barometer of the ring main unit onsite. If the pointer is not in the green area, the ring main unit leaks air. In this case, contact technical support. 2. If the gas pressure indicator or barometer pointer is in the red area, immediately turn off the load switch of cabinet G3 in the upper-level STS or the feeder switch in the switching station. 3. If the fault persists, contact your dealer or technical support.
2366	Cabinet G1 Short-Circuit Fault Indicator Alarm	Major	The medium-voltage cable in cabinet G1 is not properly grounded or is short-circuited.	1. Check whether the medium-voltage cable connected to cabinet G1 is damaged. If yes, repair the cable. 2. If the fault persists, contact your dealer or technical support.
2367	Cabinet G3 Short-Circuit Fault Indicator Alarm	Major	The medium-voltage cable in cabinet G3 is not properly grounded or is short-circuited.	1. Check whether the medium-voltage cable connected to cabinet G3 is damaged. If yes, repair the cable. 2. If the fault persists, contact your dealer or technical support.
2368	Medium-Voltage Side Underfrequency Protection	Major	The medium-voltage power grid experiences underfrequency.	1. Check and download the relay protection event records of the ring main unit onsite, compare the records with the monitoring data of the booster station, identify the fault cause, and rectify the fault. 2. If the fault persists, contact your dealer or technical support.
2369	Medium-Voltage Side Overfrequency Protection	Major	The medium-voltage power grid experiences overfrequency.	1. Check and download the relay protection event records of the ring main unit onsite, compare the records with the monitoring data of the booster station, identify the fault cause, and rectify the fault. 2. If the fault persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2370	Auxiliary Loop SPD Fault	Warning	The SPD takes an action.	1. Check whether the SPD takes an action or is faulty. If yes, disconnect the power supply and replace the SPD. 2. If the fault persists, contact your dealer or technical support.
2371	EPO	Major	The EPO button is pressed.	1. Repair the STS onsite and check whether the fault is rectified. If yes, reset the EPO button. 2. If the fault persists, contact your dealer or technical support.
2372	UPS-associated Alarm	Major	The UPS is faulty.	1. For details about how to handle alarms, see the UPS user manual. 2. If the fault persists, contact your dealer or technical support.
2373	UPS AC Power Failure	Major	1. The mains power fails. 2. The AC input circuit breaker is OFF.	1. Measure the AC input voltage. If the voltage is abnormal, rectify the power grid fault. 2. Check whether the AC input circuit breaker is OFF. If yes, rectify the downstream circuit fault and switch on the circuit breaker. 3. Check whether the AC input power cable is loose. If yes, secure the cable. 4. If the fault persists, contact your dealer or technical support.
2374	Northbound Communication Certificate Invalid	Warning	The digital signature certificate for northbound communication is invalid.	1. Check the time or replace the digital signature certificate. 2. If the fault persists, contact your dealer or technical support.
2375	Northbound Communication Certificate About to Expire	Warning	The digital signature certificate for northbound communication is about to expire.	1. Replace the digital signature certificate in time. 2. If the fault persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2376	Northbound Communication Certificate Expired	Major	The digital signature certificate for northbound communication has expired.	1. Replace the digital signature certificate immediately. 2. If the fault persists, contact your dealer or technical support.
2377	Controller Certificate Invalid	Warning	Cause ID = 1 The digital signature certificate of the main controller is invalid. Cause ID = 2 The digital signature certificate for the monitoring device in low-voltage cabinet A is invalid. Cause ID = 3 The digital signature certificate for the monitoring device in low-voltage cabinet B is invalid. Cause ID = 4 The digital signature certificate for the monitoring device in the medium-voltage room is invalid.	1. Check the time or replace the digital signature certificate. 2. If the fault persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2378	Controller Certificate About to Expire	Warning	Cause ID = 1 The digital signature certificate of the main controller is about to expire. Cause ID = 2 The digital signature certificate for the monitoring device in low-voltage cabinet A is about to expire. Cause ID = 3 The digital signature certificate for the monitoring device in low-voltage cabinet B is about to expire. Cause ID = 4 The digital signature certificate for the monitoring device in the medium-voltage room is about to expire.	1. Replace the digital signature certificate in time. 2. If the fault persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2379	Controller Certificate Expired	Major	Cause ID = 1 The digital signature certificate of the main controller has expired. Cause ID = 2 The digital signature certificate for the monitoring device in low-voltage cabinet A has expired. Cause ID = 3 The digital signature certificate for the monitoring device in low-voltage cabinet B has expired. Cause ID = 4 The digital signature certificate for the monitoring device in the medium-voltage room has expired.	1. Replace the digital signature certificate immediately. 2. If the fault persists, contact your dealer or technical support.
2380	Local O&M Certificate Invalid	Warning	The digital signature certificate for local O&M is invalid.	1. Check that the time is correct or replace the digital signature certificate. 2. If the fault persists, contact your dealer or technical support.
2381	Local O&M Certificate About to Expire	Warning	The digital signature certificate for local O&M is about to expire.	1. Replace the digital signature certificate in time. 2. If the fault persists, contact your dealer or technical support.
2382	Local O&M Certificate Expired	Major	The digital signature certificate for local O&M has expired.	1. Replace the digital signature certificate immediately. 2. If the fault persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2383	Controller Communication Error	Major	Cause ID = 2 The monitoring device communication is interrupted between the master control and low-voltage cabinet A. Cause ID = 3 The monitoring device communication is interrupted between the master control and low-voltage cabinet B. Cause ID = 4 The monitoring device communication is interrupted between the master control and the medium-voltage room.	1. Check the connection of communications cables. 2. Replace the FE cable. 3. If the fault persists, contact your dealer or technical support.
2384	Software Version Mismatch	Major	The upgrade fails.	1. Perform the update again. 2. If the update fails for multiple times, contact your dealer or technical support.
2385	Low-Voltage Side Underfrequency Protection	Major	Cause ID = 1 Low-voltage cabinet A on the low-voltage side experiences underfrequency. Cause ID = 2 Low-voltage cabinet B on the low-voltage side experiences underfrequency.	1. Check and download STS event records onsite, confirm the fault cause, and rectify the fault. 2. If the fault persists, contact your dealer or technical support.
2386	Low-Voltage Side Overfrequency Protection	Major	Cause ID = 1 Low-voltage cabinet A on the low-voltage side experiences overfrequency. Cause ID = 2 Low-voltage cabinet B on the low-voltage side experiences overfrequency.	1. Check and download STS event records onsite, confirm the fault cause, and rectify the fault. 2. If the fault persists, contact your dealer or technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2387	PSU Faulty	Major	Cause ID = 1 The PSU in low-voltage cabinet A is faulty. Cause ID = 2 The PSU in low-voltage cabinet B is faulty. Cause ID = 3 The PSU in the medium-voltage room is faulty.	1. Replace the PSU. 2. If the fault persists, contact your dealer or technical support.
2388	PSU Protection Triggered	Minor	Cause ID = 1 PSU protection is triggered in low-voltage cabinet A. Cause ID = 2 PSU protection is triggered in low-voltage cabinet B. Cause ID = 3 PSU protection is triggered in the medium-voltage room.	1. Use a multimeter to check whether input or output overvoltage occurs on the PSU. If yes, rectify the fault and power on the PSU again. 2. Check whether the ambient temperature near the PSU is too high. If yes, lower the temperature. 3. Check whether the ambient temperature near the PSU is too low. If yes, power on the PSU again after the ambient temperature becomes normal. 4. Check whether any CAN buses between PSUs are loose. If yes, secure the loose CAN buses. 5. If the fault persists, contact the vendor or technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2389	PSU Communication Error	Warning	Cause ID = 1 The communication between the PSU in low-voltage cabinet A and the measurement and control unit is abnormal. Cause ID = 2 The communication between the PSU in low-voltage cabinet B and the measurement and control unit is abnormal. Cause ID = 3 The communication between the PSU in the medium-voltage room and the measurement and control unit is abnormal.	1. Replace the PSU and check whether the fault persists. 2. If the fault persists, replace the subrack module of the measurement and control system. 3. If the fault persists, contact your dealer or technical support.
2390	Transformer Maintenance Reminder	Warning	Cause ID = 1 The maintenance of the oil temperature indicator is due. Cause ID = 2 The maintenance of the transformer dehydrating breather is due. Cause ID = 3 The transformer oil inspection is due.	1. Check whether the real-time temperature of the oil temperature indicator is normal. If the difference between the real-time temperature and the displayed temperature exceeds 2°C, calibrate the oil temperature indicator. 2. Check whether the color of the desiccant in the dehydrating breather has changed (from blue to pink or from orange to dark green). If yes, replace the desiccant in the dehydrating breather. 3. Perform laboratory test and chromatographic analysis on the transformer oil to check whether it complies with IEC 60296 and IEC 60599.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2391	PID-induced ACB Tripping in Low-Voltage Cabinet A	Major	Cause ID = 1 1. The system-to-ground impedance alarm threshold of the anti-PID device is set too high. 2. The system-to-ground insulation capability of the system has decreased.	1. Check whether the "System-to-Ground Resistance Alarm Threshold" is set properly for the anti-PID device. 2. Check whether the "Low Insulation Resistance" and "Abnormal Residual Current" alarms are generated for the inverters or PCSs in the array. 3. Disable the "Trigger ACB tripping upon IMD alarm" function of the anti-PID device, and then turn on the ACB in low-voltage cabinet A. 4. Disconnect the MCCBs in low-voltage cabinet A one by one. If the "System-to-Ground Resistance Alarm" of the anti-PID device is cleared, locate the faulty point (devices that generate alarms in step 2 are more likely to be faulty). 5. Check whether condensation, cable damage, or build-up of contaminating particles exists on the surface of the busbar frame/ insulator. If yes, cut off the power and rectify the fault. 6. After the fault is rectified, restore the original setting of "Trigger ACB tripping upon IMD alarm" on the anti-PID device. If the fault persists, contact the vendor or technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Suggestion
2392	PID-induced ACB Tripping in Low-Voltage Cabinet B	Major	Cause ID = 1 1. The system-to-ground impedance alarm threshold of the anti-PID device is set too high. 2. The system-to-ground insulation capability of the system has decreased.	1. Check whether the "System-to-Ground Resistance Alarm Threshold" is set properly for the anti-PID device. 2. Check whether the "Low Insulation Resistance" and "Abnormal Residual Current" alarms are generated for the inverters or PCSs in the array. 3. Disable the "Trigger ACB tripping upon IMD alarm" function of the anti-PID device, and then turn on the ACB in low-voltage cabinet A. 4. Disconnect the MCCBs in low-voltage cabinet A one by one. If the "System-to-Ground Resistance Alarm" of the anti-PID device is cleared, locate the faulty point (devices that generate alarms in step 2 are more likely to be faulty). 5. Check whether condensation, cable damage, or build-up of contaminating particles exists on the surface of the busbar frame/ insulator. If yes, cut off the power and rectify the fault. 6. After the fault is rectified, restore the original setting of "Trigger ACB tripping upon IMD alarm" on the anti-PID device. If the fault persists, contact the vendor or technical support.

NOTE

If you cannot rectify faults with the measures listed in troubleshooting suggestions, contact technical support.

6.8 Common Parts Replacement

NOTICE

- For details about how to replace components inside the STS, see the corresponding component installation guide.
- Before replacement, check that a spare component of the same model is available and functional.
- When replacing the component, disconnect the power supply. High voltage is dangerous. Do not perform operations with power on.
- Before replacing a device on the auxiliary loop, turn off the miniature circuit breaker (MCB) on the loop for the device.
- Replace components not listed in this document following the manufacturer's instructions.
- The appearances of the components listed in this document are for reference only. For details, see the documents provided by the manufacturer.
- Dispose of faulty components in accordance with the local disposal act for waste electrical equipment.

6.8.1 (Optional) Replacing a Lightning Arrester

Context

If a lightning arrester is faulty and cannot be repaired during maintenance, power it off and replace it.

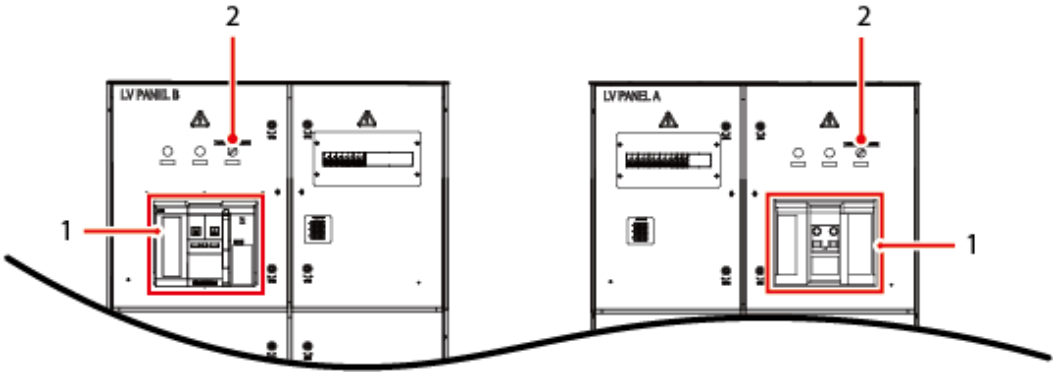
This operation is optional and applies to the scenario where a lightning arrester has been installed.

Power-Off

1. Turn off the ACB (1QA) of LV PANEL A or the ACB (2QA) of LV PANEL B.
2. Set the remote/local switch of the LV panel to the local position.
3. Set the remote/local switch of cabinet G2 in the ring main unit to the local position.
4. Turn off the local on/off switch (VCB) of cabinet G2 in the ring main unit.
5. Turn off the disconnector of cabinet G2 in the ring main unit.
6. Turn on the ground switch of cabinet G2 in the ring main unit.

The following figure shows the positions of the switches.

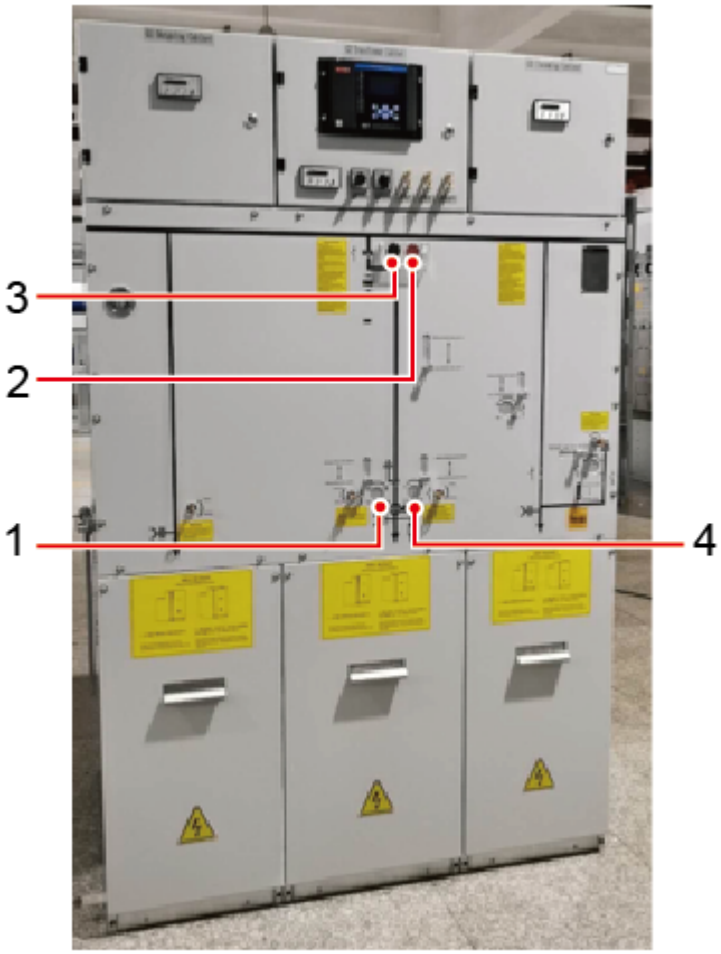
Figure 6-11 Positions of the LV panel switches



(1) ACB	(2) Remote/Local switch

The following figure shows the positions of the ring main unit switches.

Figure 6-12 Positions of the the ring main unit switches (using the DVC as an example)



(1) Ground switch of cabinet G2	(2) Local on/off switch (VCB) of cabinet G2
(3) Remote/Local switch of cabinet G2	(4) Disconnector operation hole of cabinet G2

DANGER

Do not replace a lightning arrester during a thunderstorm.

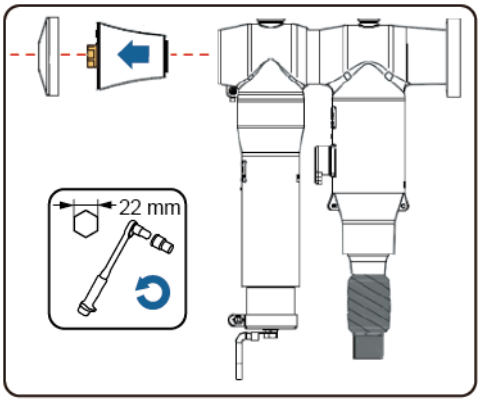
Procedure

Step 1 Loosen the fixing components of the lightning arrester to be replaced.

Step 2 Remove the ground cable connected to the lightning arrester.

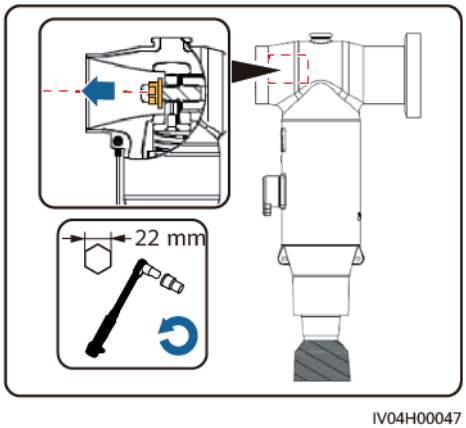
Step 3 Remove the rubber cap and insulation plug from the lightning arrester.

Figure 6-13 Removing the rubber cap and insulation plug from the lightning arrester



Step 4 Remove the nut from the conductive pole assembly.

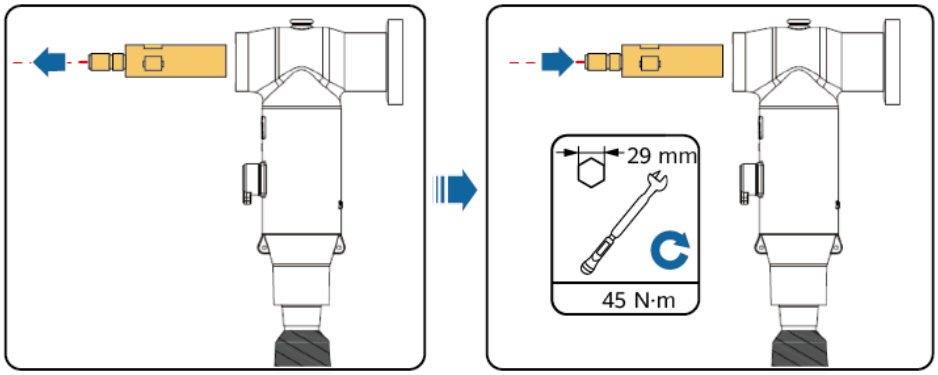
Figure 6-14 Removing the nut



Step 5 Remove the faulty lightning arrester.

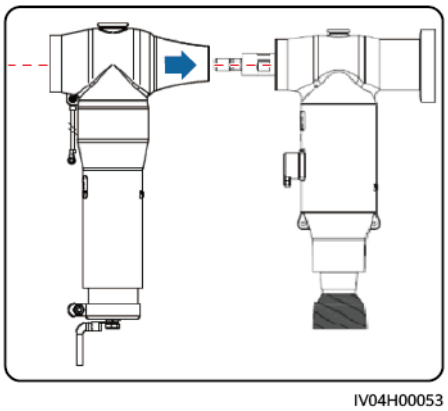
Step 6 Replace the conductive pole assembly with a new one.

Figure 6-15 Removing the conductive pole assembly



Step 7 Install a new lightning arrester.

Figure 6-16 Installing a new lightning arrester

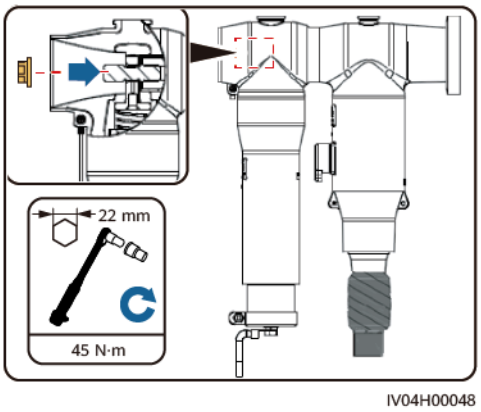


NOTE

Use a detergent to clean the insulation surface of the lightning arrester. After the detergent is volatilized, evenly apply the silicon grease.

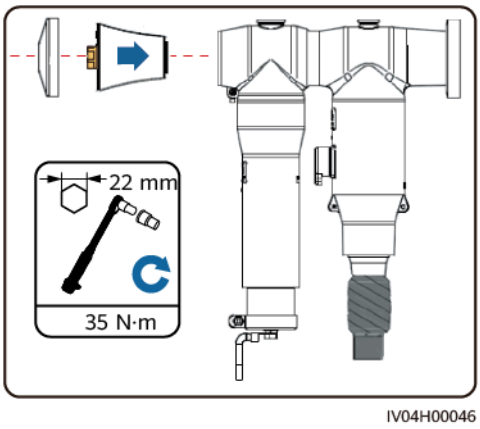
Step 8 Tighten the nut on the conductive pole assembly.

Figure 6-17 Tightening the nut



Step 9 Install the insulation plug and rubber cap.

Figure 6-18 Installing the insulation plug and rubber cap



NOTE

Use a detergent to clean the insulation plug. After the detergent is volatilized, evenly apply the silicon grease.

Step 10 Reinstall the ground cable.

Step 11 Secure the fixing components of the lightning arrester.

----End

Power-On

Perform operations in the reverse order of the power-off operations.

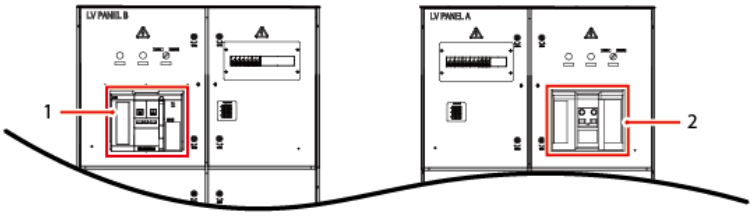
6.8.2 Replacing an ACB

Context

If an ACB is faulty and cannot be repaired during maintenance, power it off and replace it.

The following figure shows the position of the ACB.

Figure 6-19 Position of the ACB



(1) ACB of LV PANEL B	(2) ACB of LV PANEL A

Power-Off

1. Turn off all MCCBs in the LV panel.
2. Turn off the ACB (1QA) of LV PANEL A or the ACB (2QA) of LV PANEL B.
3. Turn off the VCB in the MV room.
4. (Optional) Shut down the UPS inverter 3UI. Perform this operation when the UPS has been installed.

DANGER

Ensure that the equipment is powered off and set the ACB to OFF.

There are 44 MCCBs, as shown in the following figures.

Figure 6-20 MCCBs on the front of the LV panel

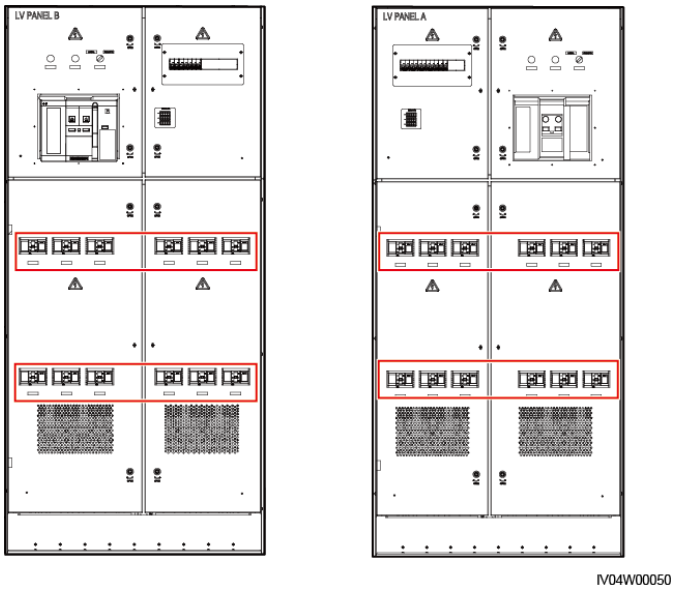


Figure 6-21 MCCBs on the side of the LV panel

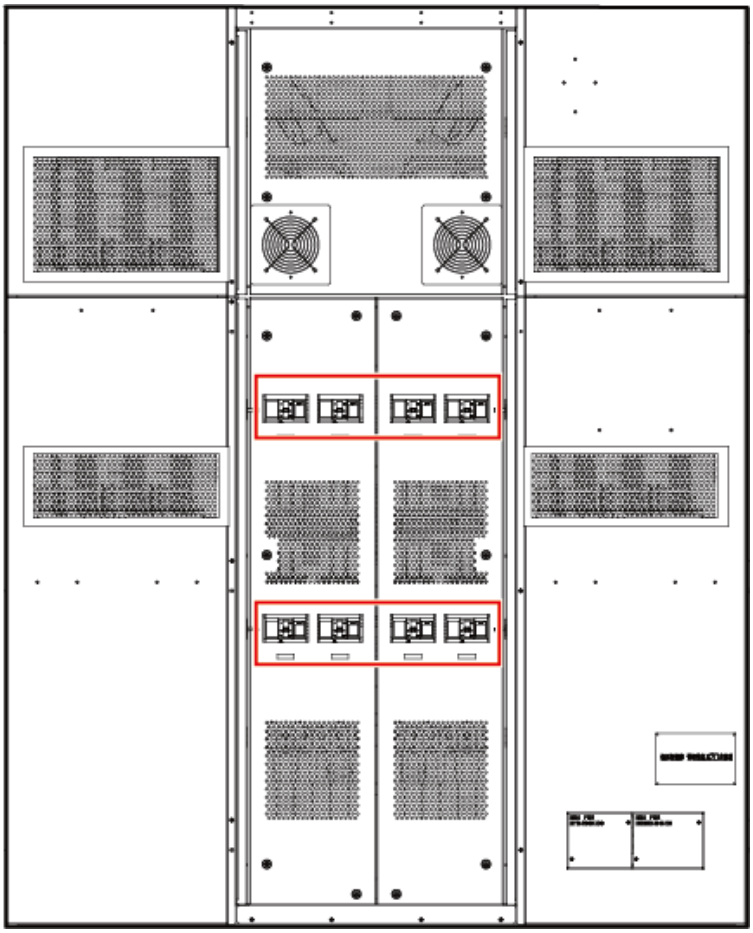
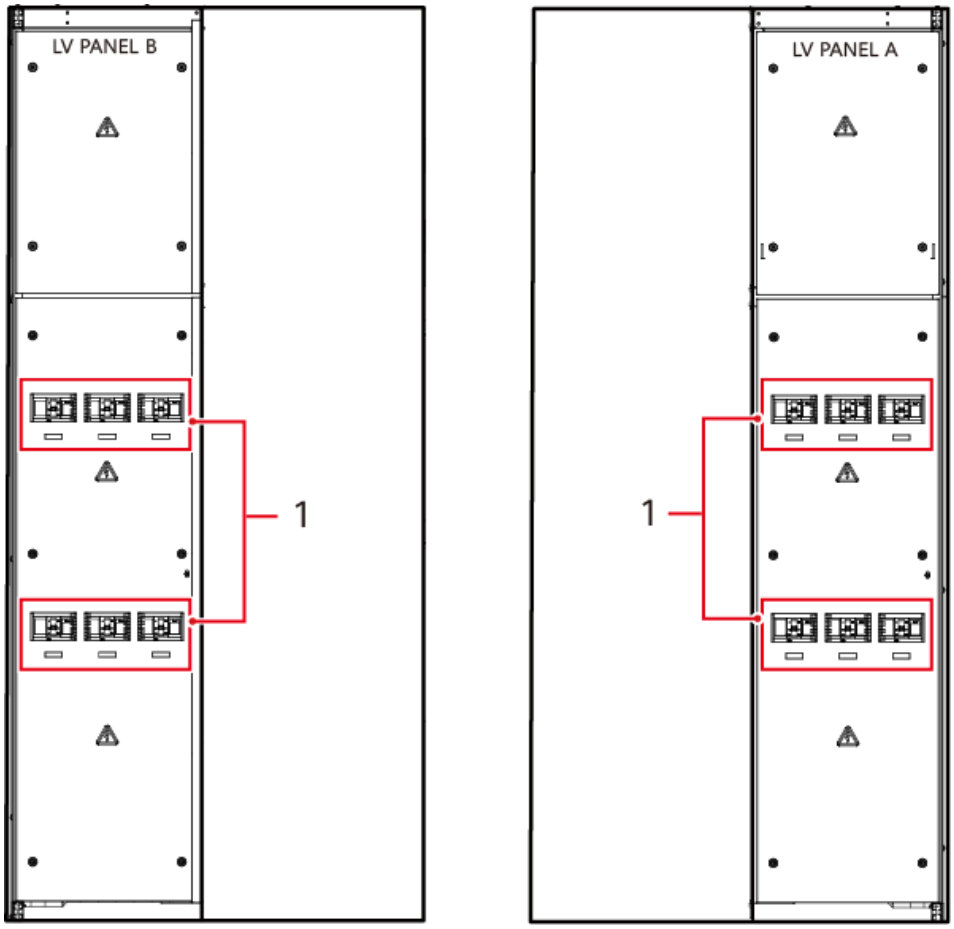


Figure 6-22 MCCB on the rear of the LV panel



Procedure

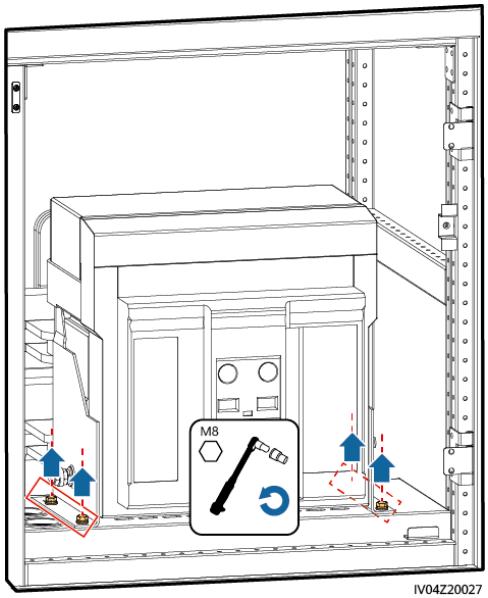
Step 1 Remove the sealing plates from LV PANEL C and LV PANEL A in sequence.

Step 2 Remove the copper bar connected to the rear of the ACB.

Step 3 Remove the signal cable and ground cable from the ACB and record the cable connections.

Step 4 Remove the screws from the ACB.

Figure 6-23 Removing the screws



Step 5 Install a new ACB and tighten the screws on both sides.

Step 6 Reinstall the ground cable, signal cable, and copper bar.

Step 7 Reinstall the sealing plates for LV PANEL A and LV PANEL C in sequence.

----End

Power-On

Perform operations in the reverse order of the power-off operations.

6.8.3 Replacing an SPD

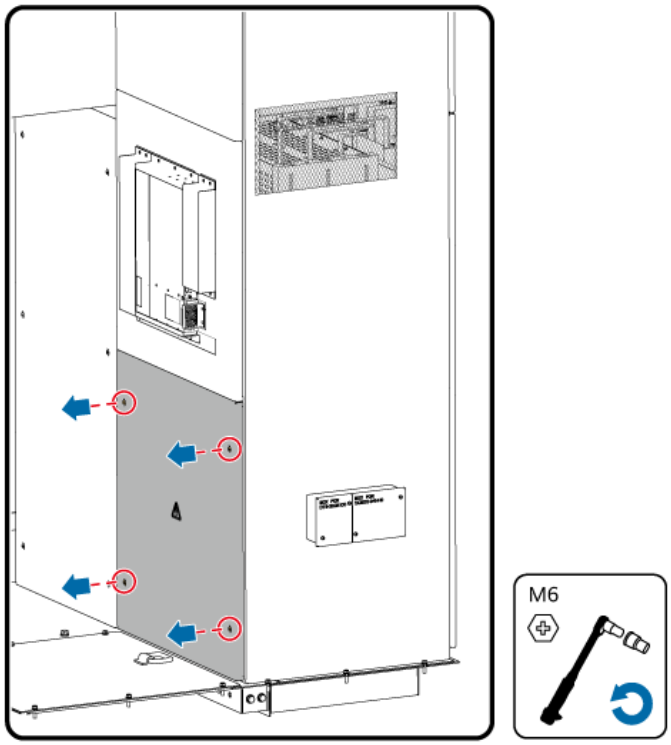
Context

If a surge protective device (SPD) is faulty and cannot be repaired during maintenance, power it off and replace it.

Procedure

Step 1 Remove the sealing plate for the SPD. The following uses the JUPITER-9000K-H1 as an example.

Figure 6-24 Removing the sealing plate



Step 2 Remove the cables from the SPD and record the cable connections.

Step 3 Remove the SPD.

Figure 6-25 Removing the SPD from the JUPITER-6000K-H1

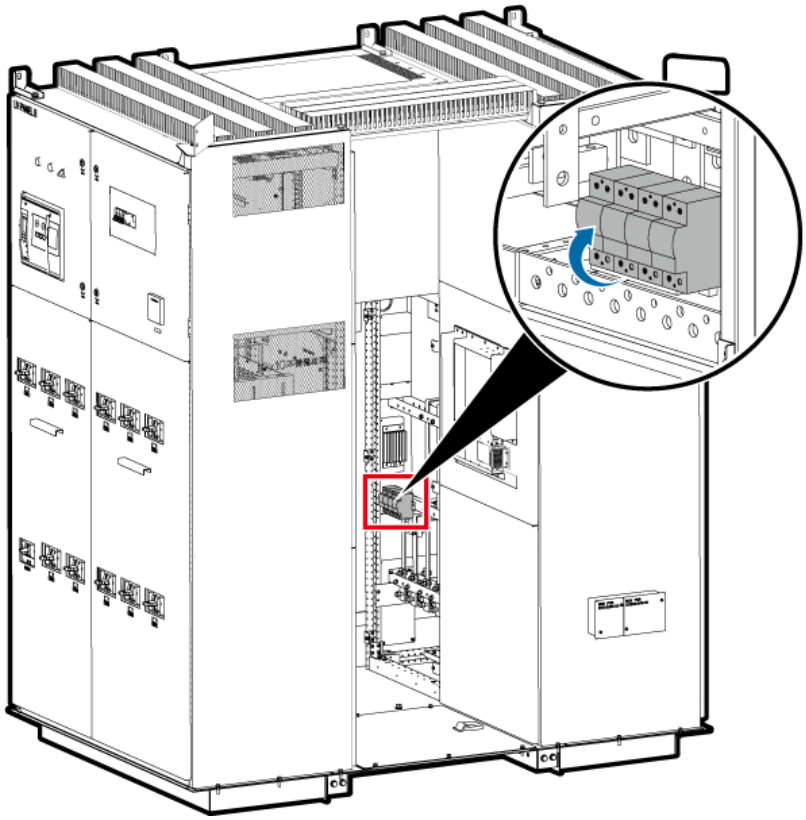
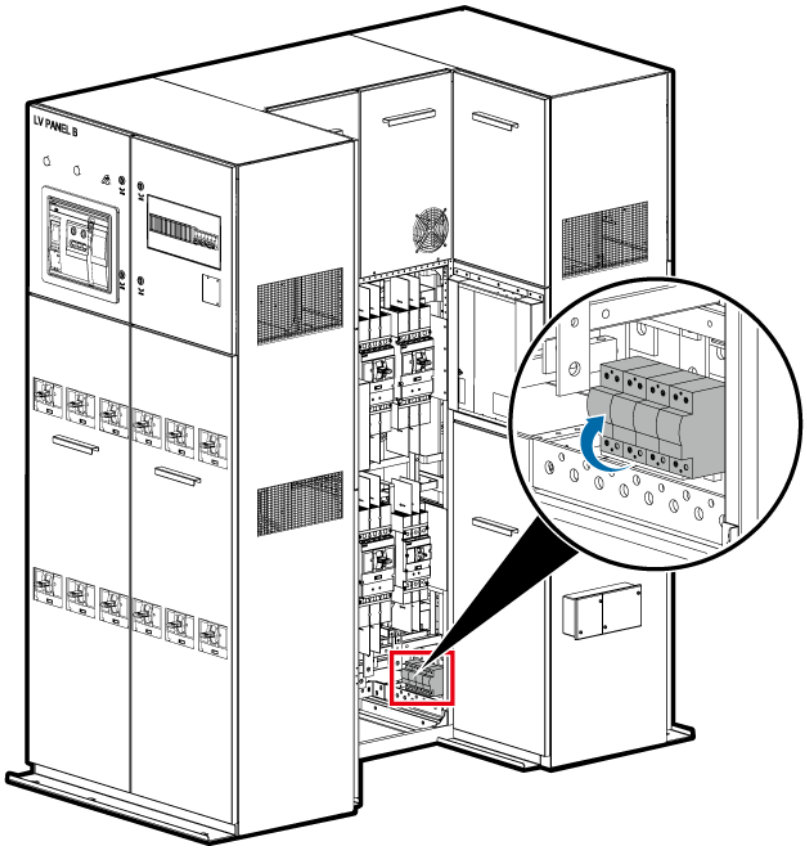


Figure 6-26 Removing the SPD from the JUPITER-9000K-H1



NOTE

The JUPITER-3000K-H1 does not have LV PANEL B. The heater position in LV PANEL A is the same as that of the JUPITER-6000K-H1.

Step 4 Install a new SPD.

Step 5 Reinstall the cables.

----End

6.8.4 Replacing an MCCB

Context

If an MCCB is faulty and cannot be repaired during maintenance, power it off and replace it.

- If the short-circuit current of the MCCB is less than or equal to Icu (ultimate short-circuit breaking capacity), the MCCB needs to be replaced after one occurrence of short circuit.
- If the short-circuit current of the MCCB is less than or equal to Ics (service breaking capacity), the MCCB needs to be replaced after three occurrences of short circuit.

DANGER

Ensure that the equipment is powered off and set the MCCB to OFF.

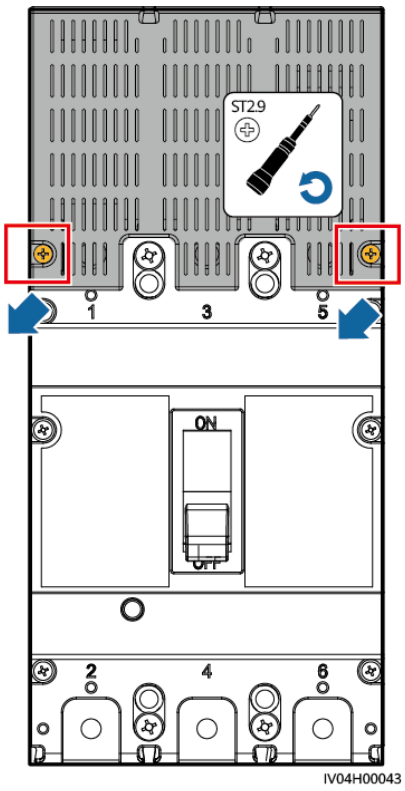
Power-Off

1. Ensure that the inverter and PCS connected to the downstream port of the MCCB are not energized (for example, shut down the inverter or PCS).
2. Turn off the ACB (1QA) of LV PANEL A or the ACB (2QA) of LV PANEL B.
3. Turn off the VCB in the MV room.

Procedure

Step 1 Remove the terminal cover from the MCCB.

Figure 6-27 Removing the cover

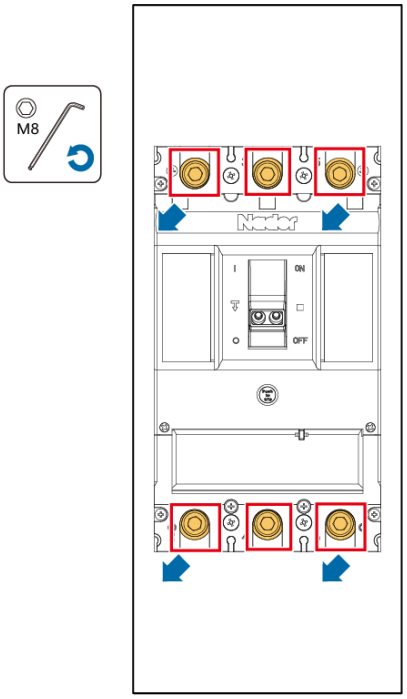


Step 2 Remove the cables from the MCCB and record the cable connections.

NOTE

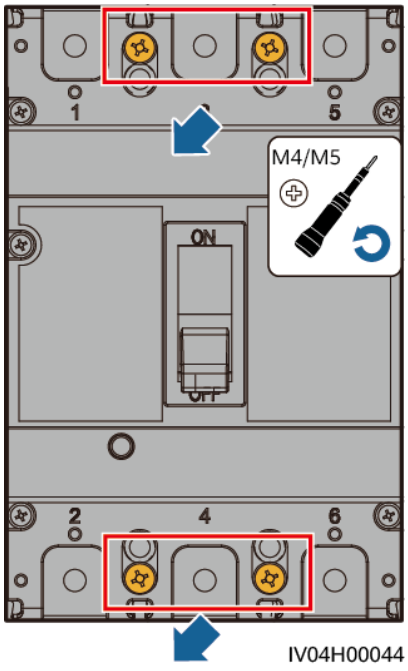
The hex key used for removing cables needs to be prepared by the customer.

Figure 6-28 Removing the cables



Step 3 Remove the screws from the MCCB and remove the MCCB.

Figure 6-29 Removing the screws

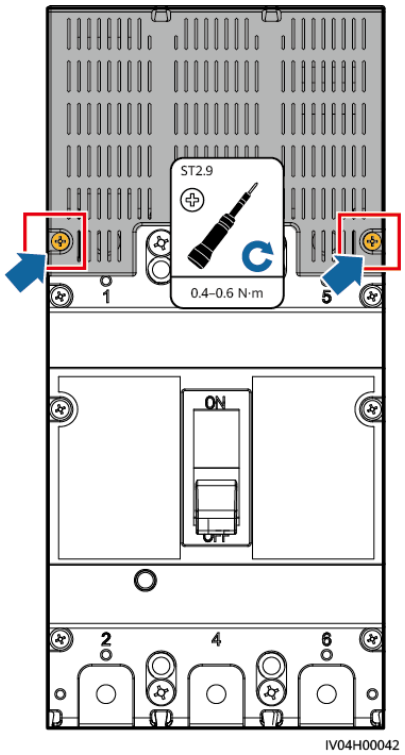


Step 4 Install a new MCCB.

Step 5 Reinstall the cables.

Step 6 Install the cover on the upper part of the MCCB.

Figure 6-30 Installing the cover



----End

Power-On

Perform operations in the reverse order of the power-off operations.

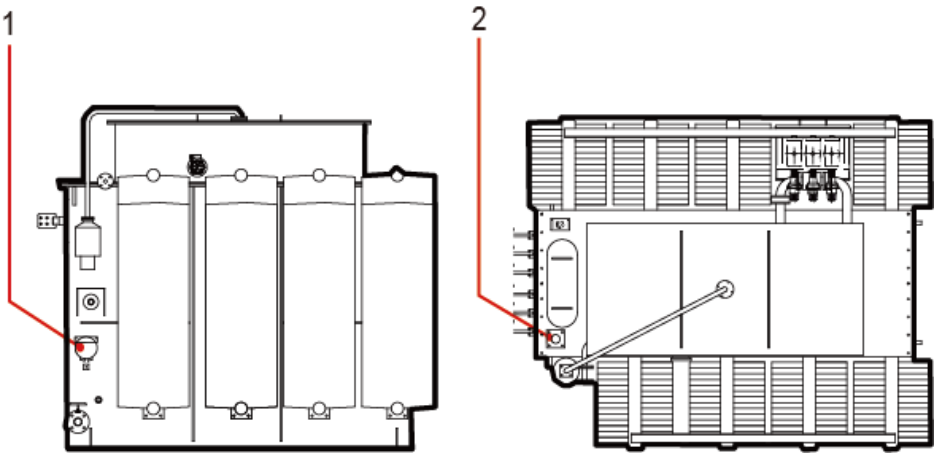
6.8.5 Replacing an Oil Surface Temperature Controller

Context

If an oil surface temperature controller is faulty and cannot be repaired during maintenance, power it off and replace it.

The oil surface temperature controller is located in the transformer room and its position varies according to the model.

Figure 6-31 Position of the oil surface temperature controller



(1) Oil surface temperature controller	(2) Pressure relief valve (thermo-bulb position)

Power-Off

1. (Optional) Shut down the UPS inverter 3UI. Perform this operation when the UPS has been installed.
2. Turn off the ACB (1QA) of LV PANEL A or the ACB (2QA) of LV PANEL B.
3. Turn off the VCB in the MV room.

Procedure

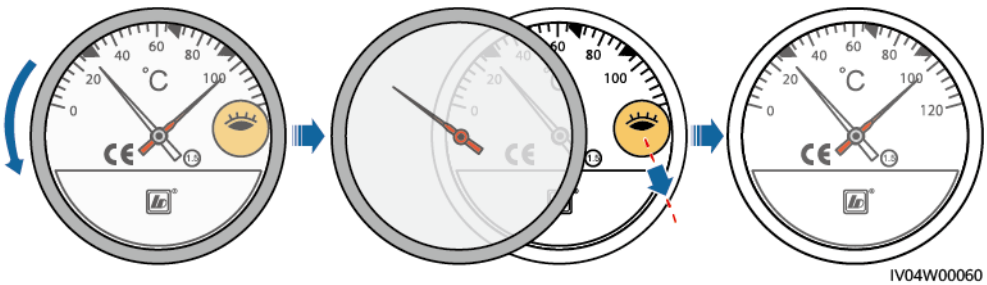
Step 1 Rotate the cover counterclockwise to remove the glass cover.

Step 2 Take out the foam.

Step 3 Rotate the cover clockwise to reinstall the glass cover. Ensure that the white pointer is on the left and the red pointer is on the right.

Step 4 Rotate the knob to put the red and white pointers together.

Figure 6-32 Operating an oil temperature indicator



----End

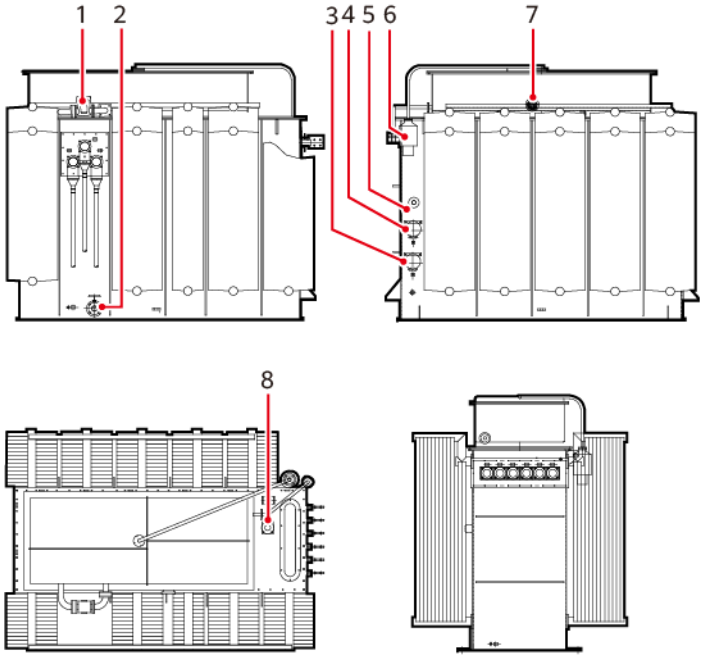
6.8.6 (Optional) Replacing a Winding Thermostat

Context

If a winding thermostat is faulty and cannot be repaired during maintenance, power it off and replace it.

The winding thermostat (marked by 4 in the figure) is located in the TR room.

Figure 6-33 Transformer



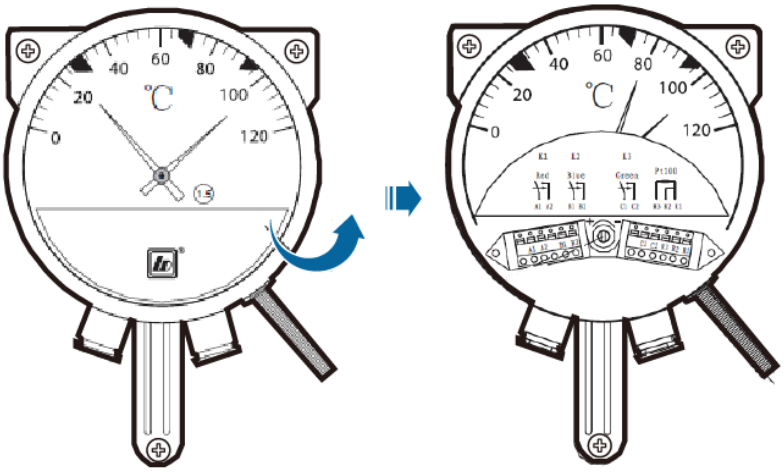
Power-Off

1. (Optional) Shut down the UPS inverter 3UI. Perform this operation when the UPS has been installed.
2. Turn off the ACB (1QA) of LV PANEL A or the ACB (2QA) of LV PANEL B.
3. Turn off the VCB in the MV room.

Procedure

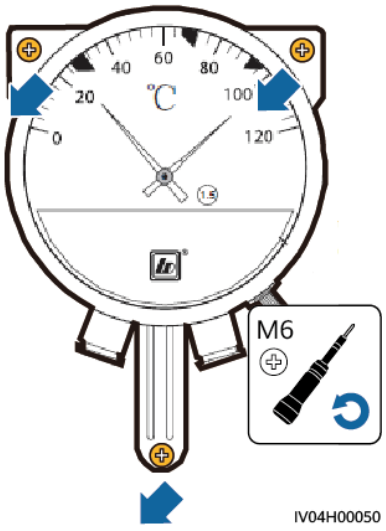
Step 1 Use both hands to rotate the outer metal ring of the winding thermostat counterclockwise, remove the outer metal ring and glass plate, remove the cables from the winding thermostat, and mark the cable.

Figure 6-34 Removing cables



Step 2 Remove the screws from the winding thermostat.

Figure 6-35 Removing screws



Step 3 Install a new winding thermostat.

Step 4 Reinstall the cables.

----End

Power-On

Perform operations in the reverse order of the power-off operations.

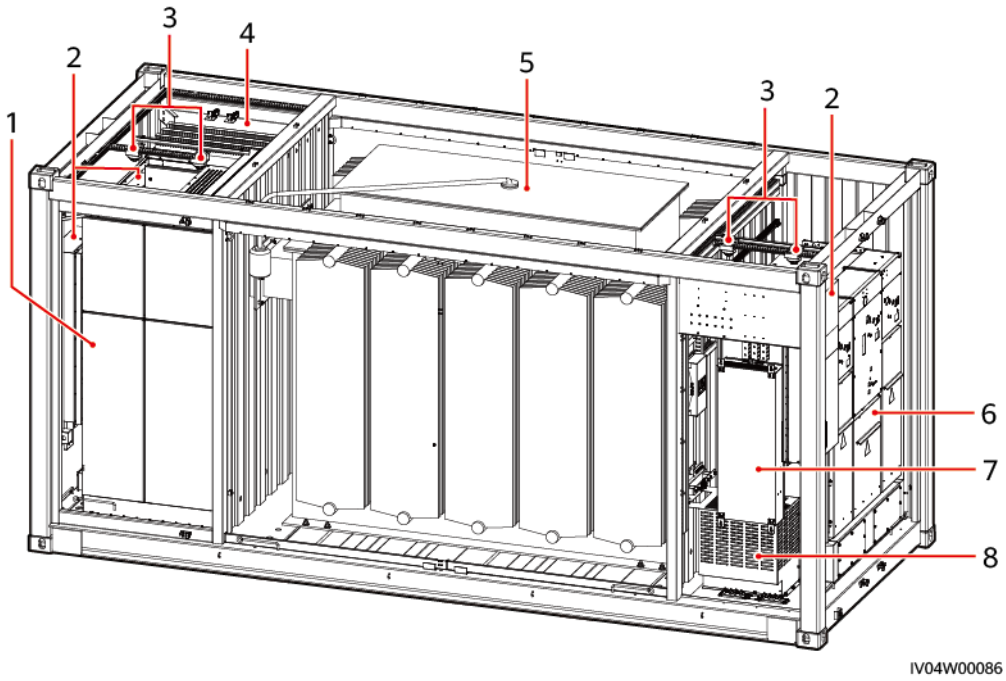
6.8.7 Replacing a Heat Exchanger

Context

If a heat exchanger is faulty and cannot be repaired during maintenance, power it off and replace it.

The JUPITER-9000K-H0 is configured with two heat exchangers, one in LV PANEL A and the other in LV PANEL B.

Figure 6-36 STS components



(1) LV PANEL A	(2) Heat exchangers	(3) Smoke sensors
(4) LV PANEL B	(5) Transformer	(6) Ring main unit
(7) Power distribution box	(8) Auxiliary transformer	-

Power-Off

1. LV PANEL A: Turn off CK1 power switch 1FB3.
2. LV PANEL B: Turn off CK2 power switch 2FB2.
3. MV room: Turn off CK3 power switch 2FB2.

DANGER

After the preceding switches are turned off, the upstream port is still energized. Exercise caution when performing this operation.

Procedure

Step 1 Remove cables from the heat exchanger.

Step 2 Remove the screws from the heat exchanger, and remove the front panel and heat exchanger.

Step 3 Install a new heat exchanger and the front panel, and tighten the screws.

Step 4 Power on the heat exchanger.

----End

Power-On

Perform operations in the reverse order of the power-off operations.

6.8.8 (Optional) Replacing a Power Meter

Context

If a power meter is faulty and cannot be repaired during maintenance, power it off and replace it.

Power-Off

1. Turn off all MCCBs in the LV panel.
2. Turn off the ACB (1QA) of LV PANEL A or the ACB (2QA) of LV PANEL B.
3. Turn off the VCB in the MV room.
4. (Optional) Shut down the UPS inverter 3UI. Perform this operation when the UPS has been installed.

Procedure

Step 1 Remove cables from the power meter.

Step 2 Remove screws from the power meter and remove the power meter.

Step 3 Install a new power meter and tighten the screws.

Step 4 Secure the power meter cables.

----End

Power-On

Perform operations in the reverse order of the power-off operations.

6.8.9 Replacing an MCB

Context

If an MCB is found faulty during maintenance, power it off and replace it.

Power-Off

1. LV PANEL A: Turn off 1QA23, 1QA24, and 1QS. 1QA24 and 1QS are optional.
2. LV PANEL B: Turn off 2QA23, 1QA24, and 1QS. 1QA24 and 1QS are optional.
3. (Optional) Shut down the UPS inverter 3UI. Perform this operation when the UPS has been installed.

DANGER

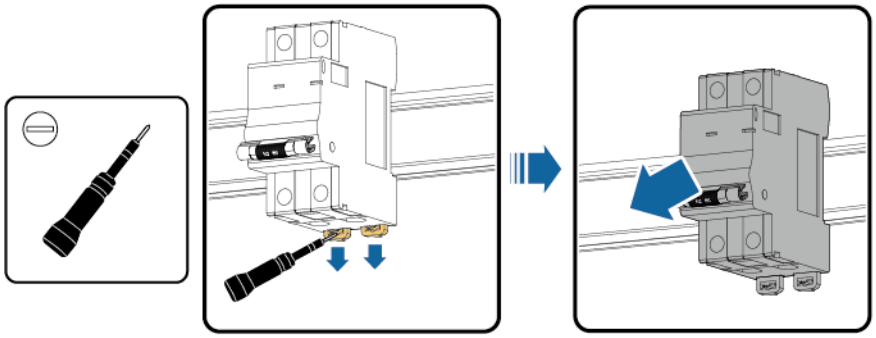
After the preceding switches are turned off, the upstream port is still energized. Exercise caution when performing this operation.

Procedure

Step 1 Remove the cables from the faulty MCB.

Step 2 Remove the faulty MCB.

Figure 6-37 Removing the faulty MCB



Step 3 Install a new MCB.

Step 4 Install the cables to the MCB.

----End

Power-On

Perform operations in the reverse order of the power-off operations.

6.8.10 Replacing a Light

Context

If a light is found damaged during maintenance, power it off and replace it.

Power-Off

1. LV room: Turn off 1FB2.
2. MV room: Turn off 3FB4.

DANGER

After the preceding switches are turned off, the upstream port is still energized. Exercise caution when performing this operation.

Procedure

Step 1 Remove the faulty light.

Step 2 Install a new light in the original position.

----End

Power-On

Perform operations in the reverse order of the power-off operations.

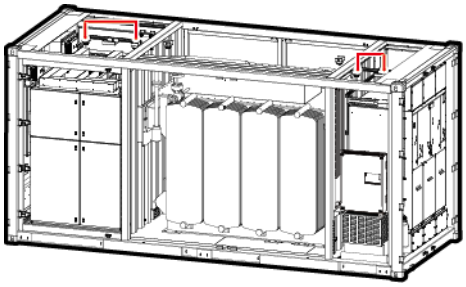
6.8.11 Replacing a Smoke Sensor

Context

If a smoke sensor is found damaged during maintenance, power it off and replace it.

The two smoke sensors (marked by 3 in the figure) are located on the top of the LV room and MV room, respectively.

Figure 6-38 Position of the smoke sensor



Power-Off

1. LV room: Turn off 1FB2.
2. MV room: Turn off 3FB4.

DANGER

After the preceding switches are turned off, the upstream port is still energized. Exercise caution when performing this operation.

Procedure

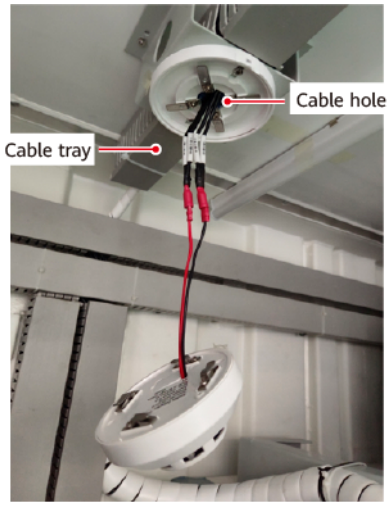
Step 1 Hold the smoke sensor, and rotate it counterclockwise to remove it from the base.

Step 2 Remove the smoke sensor cables.

Step 3 Connect the new smoke sensor cables.

Step 4 (Optional) If a smoke sensor with the BOM number BRJ-301ALG is configured, insert the cables into the cable tray through the cable hole in the base after connecting the cables.

Figure 6-39 Connecting cables of the BRJ-301ALG smoke sensor



Step 5 Insert the smoke sensor into the base and turn it clockwise until it locks in.

----End

Power-On

Perform operations in the reverse order of the power-off operations.

6.8.12 (Optional) Replacing an Alarm Beacon

Context

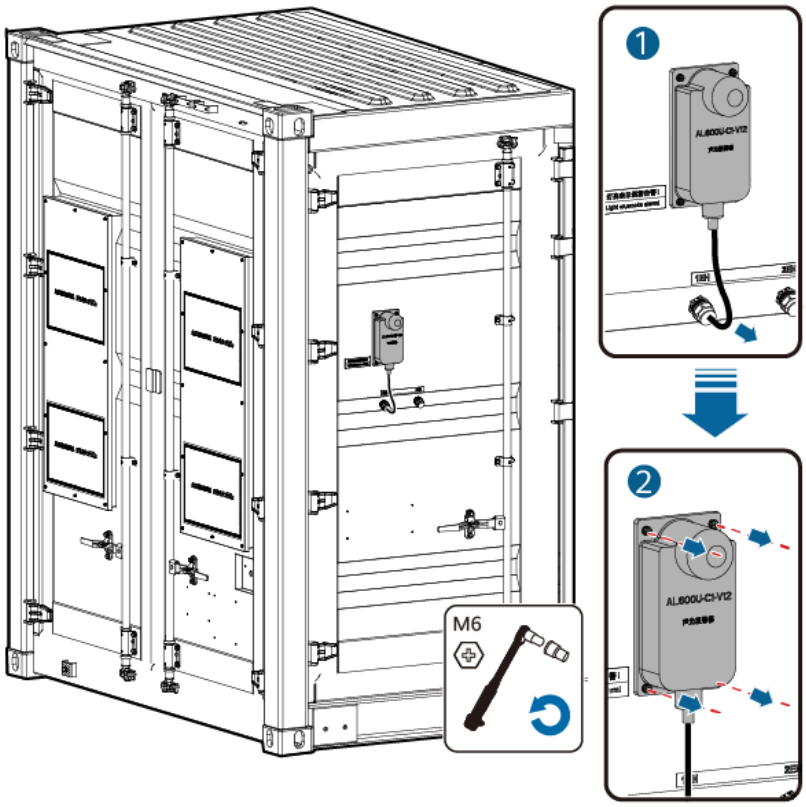
If an alarm beacon is found damaged during maintenance, power it off and replace it.

Procedure

Step 1 Remove the cable from the alarm beacon and record the position.

Step 2 Remove the faulty alarm beacon.

Figure 6-40 Removing a faulty alarm beacon



Step 3 Install a new alarm beacon.

Step 4 Reconnect the cable to the alarm beacon based on the recorded position.

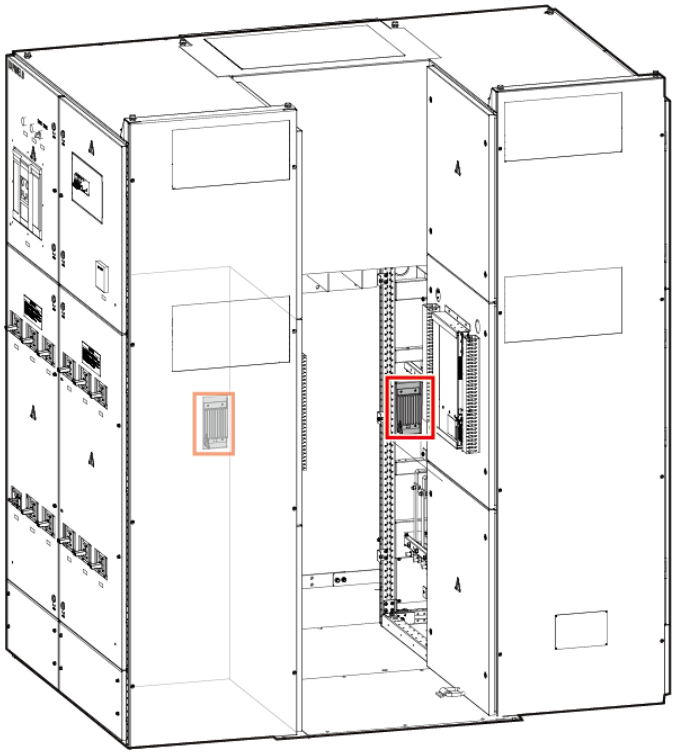
----End

6.8.13 (Optional) Replacing an LV Panel Heater

Context

If a heater is found damaged during maintenance, power it off and replace it.

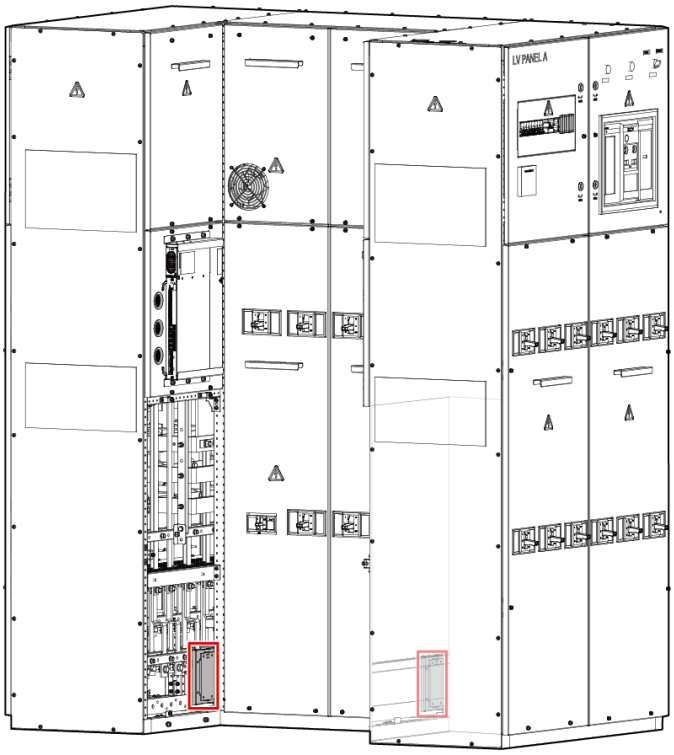
Figure 6-41 Position of the JUPITER-6000K-H1 heater



NOTE

The JUPITER-3000K-H1 does not have LV PANEL B. The heater position in LV PANEL A is the same as that of the JUPITER-6000K-H1.

Figure 6-42 Position of the JUPITER-9000K-H1 heater



Power-Off

1. Ensure that the inverter and PCS connected to the downstream port of the MCCB are not energized (for example, shut down the inverter or PCS).
2. Turn off 1FB4.
3. Turn off the ACB.

Procedure

Step 1 Unscrew and remove the sealing plate inside the LV panel.

Figure 6-43 Screws on the sealing plate of the JUPITER-3000K-H1/JUPITER-6000K-H1 LV panel

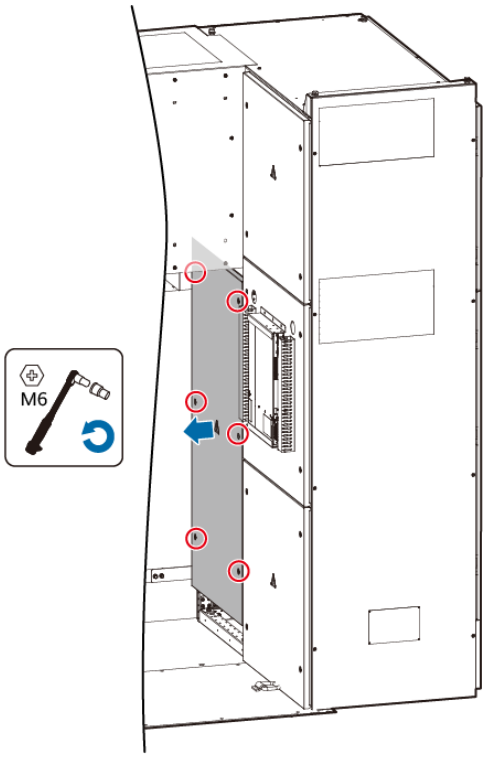
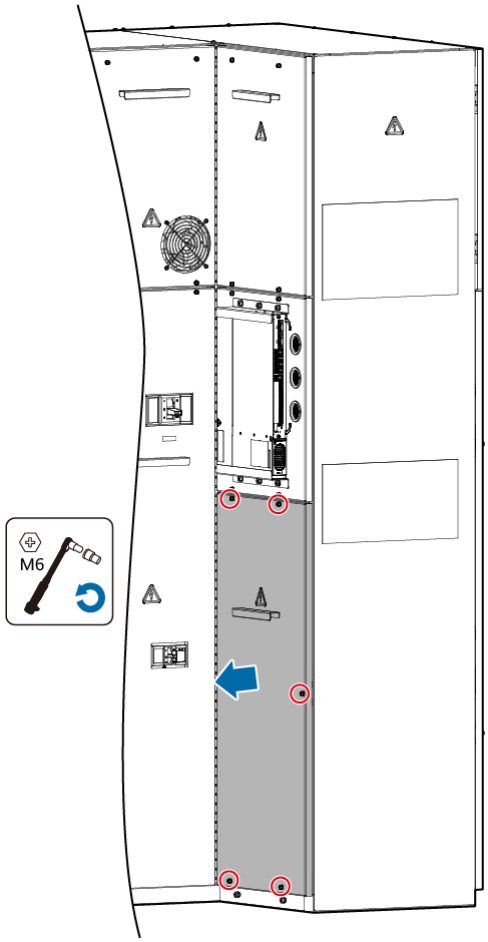


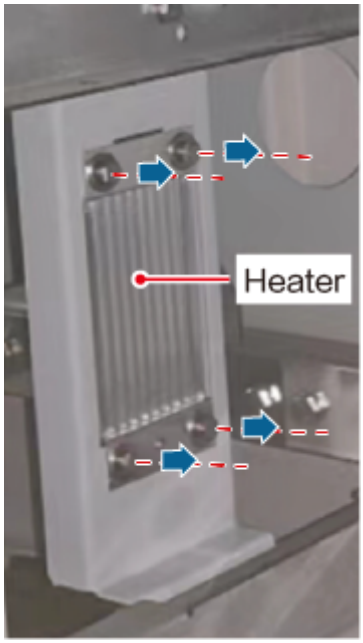
Figure 6-44 Screws on the sealing plate of the JUPITER-9000K-H1 LV panel



Step 2 Record the positions of cables connected to the heater, and disconnect the cables.

Step 3 Remove the heater.

Figure 6-45 Removing the heater



Step 4 Install a new heater in the original position. Use an M6 Phillips screwdriver and tighten the screws to a torque of 5 N·m.

Step 5 Reconnect the cables to the new heater based on the cable connection records. Use an M3 Phillips screwdriver and tighten the screws to a torque of 0.5 N·m.

Step 6 Reinstall the sealing plate to the LV panel. Use an M6 Phillips screwdriver and tighten the screws to a torque of 5 N·m.

Step 7 Power on the heater in the reverse order of powering off the heater.

----End

6.8.14 Replacing T/H Sensors

6.8.14.1 Replacing a T/H Sensor in the LV Panel

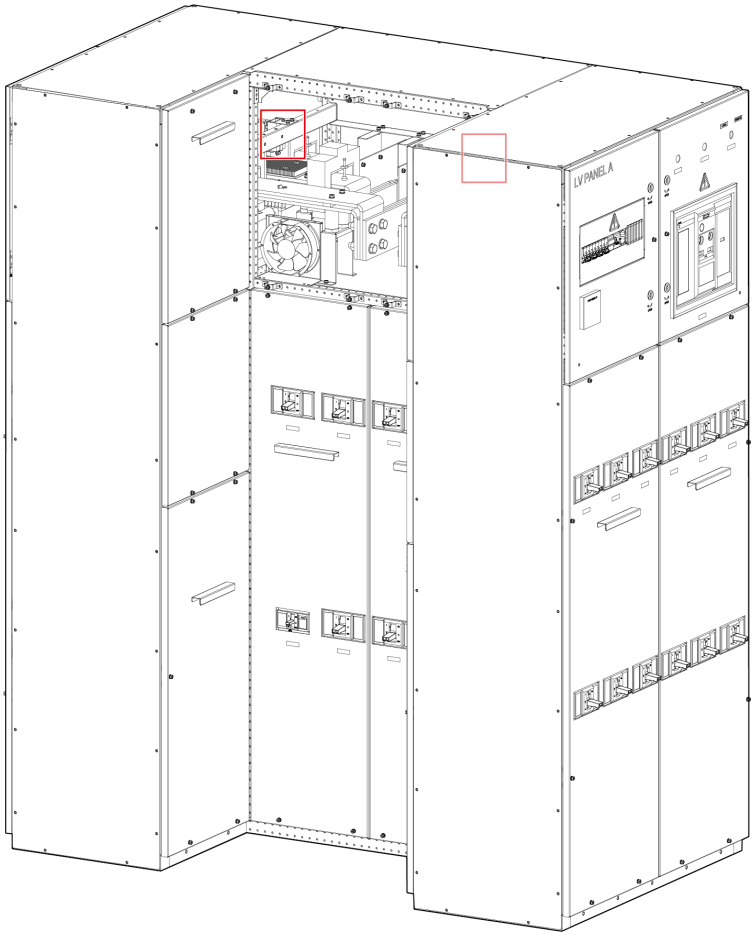
Context

If a T/H sensor is found damaged during maintenance, power it off and replace it.

NOTE

The appearance of the STS varies with the model, but the installation positions of T/H sensors are the same. This section uses one type of appearances as an example.

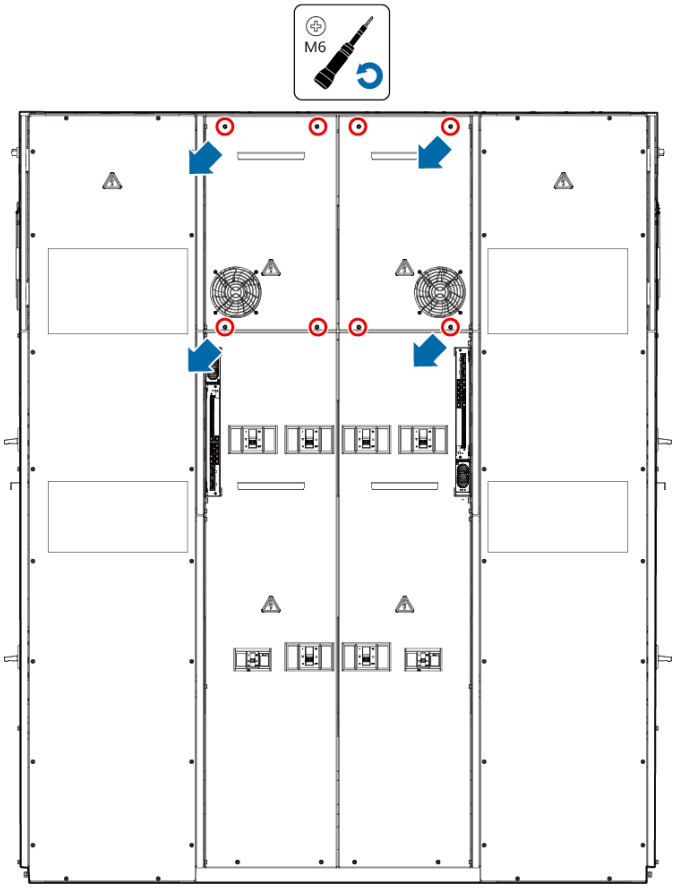
Figure 6-46 Positions of T/H sensors



Procedure

Step 1 Open the LV panel doors.

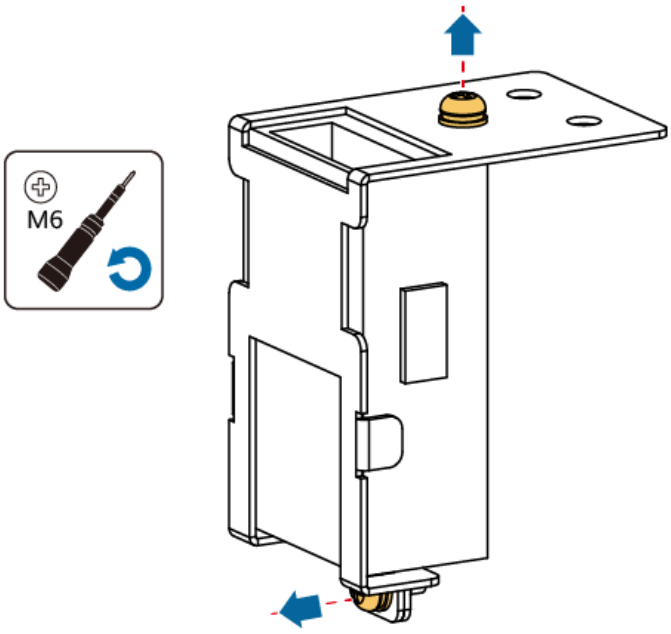
Figure 6-47 Removing doors



Step 2 Remove the cables from the T/H sensor and record their positions.

Step 3 Remove the T/H sensor together with the base.

Figure 6-48 Removing the T/H sensor



Step 4 Set the DIP switch on the new T/H sensor.

Table 6-2 DIP switch settings

Toggle Switch 1	Toggle Switch 2	Toggle Switch 3	Toggle Switch 4	Toggle Switch 5	Toggle Switch 6	Toggle Switch 7
ON	OFF	OFF	OFF	OFF	OFF	OFF

Step 5 Install a new T/H sensor on the base, and install them in the original position.

Step 6 Reconnect the cables to the new T/H sensor based on the cable connection records.

Step 7 Close the doors.

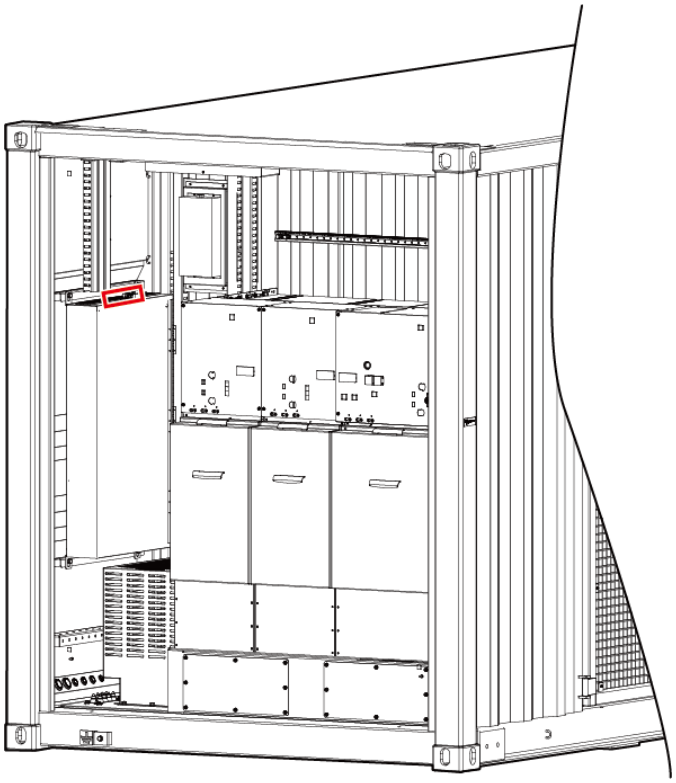
----End

6.8.14.2 Replacing a T/H Sensor in the MV Panel

Context

If a T/H sensor is found damaged during maintenance, power it off and replace it.

Figure 6-49 Position of the T/H sensor

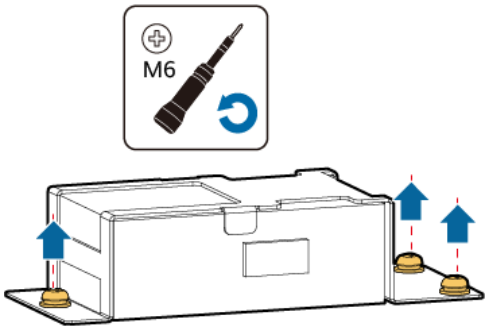


Procedure

Step 1 Remove the cables from the T/H sensor and record their positions.

Step 2 Remove the T/H sensor together with the base.

Figure 6-50 Removing the T/H sensor



Step 3 Set the DIP switch on the new T/H sensor.

Table 6-3 DIP switch settings

Toggle Switch 1	Toggle Switch 2	Toggle Switch 3	Toggle Switch 4	Toggle Switch 5	Toggle Switch 6	Toggle Switch 7
ON	OFF	OFF	OFF	OFF	OFF	OFF

Step 4 Install a new T/H sensor on the base, and install them in the original position.

Step 5 Reconnect the cables to the new T/H sensor based on the cable connection records.

Step 6 Close the doors.

----End

6.8.15 Replacing a Main Control Module

Context

An STS main control module is found damaged during maintenance.

Step 1 Back up the configuration file.

The JUPITER STS supports two configuration file backup modes:

- Automatic backup
- Manual backup

NOTE

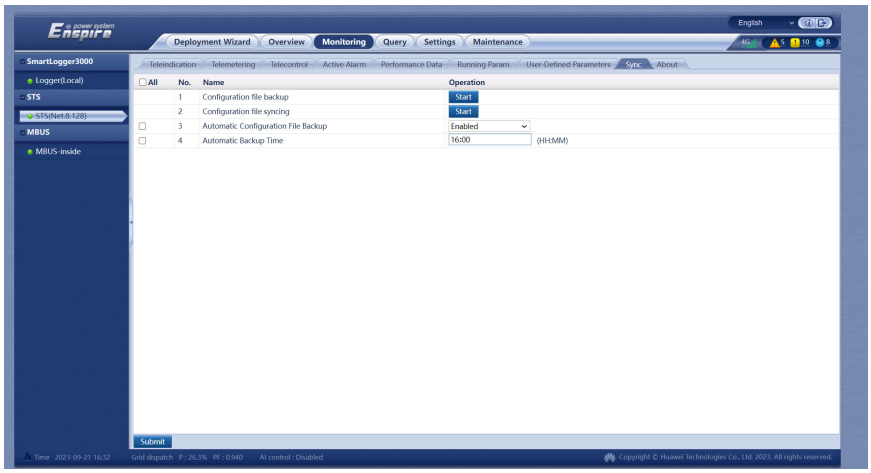
If the main control module cannot communicate with the SmartLogger, skip this step. After replacing the main control module with a new one, set factory parameters.

1. Back up the configuration file. Select a backup mode based on the site requirements.

   Method 1 (manual backup): Log in to the SmartLogger, choose **Monitoring > STS**, click the **Sync** tab, and click **Start** in the **Configuration file backup** row to manually back up the configuration file.

   Method 2 (automatic backup): Log in to the SmartLogger, choose **Monitoring > STS**, click the **Sync** tab, set **Automatic Configuration File Backup** to **Enabled**, and set **Automatic Backup Time** to enable the automatic configuration file backup function.

   Figure 6-51 Configuration file backup



2. After the export is successful, click **Confirm**.

Step 2 Tools: Phillips insulated torque screwdriver and insulated torque socket wrench

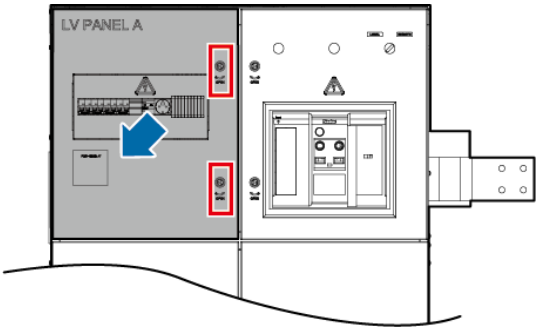
Step 3 Power-off: Turn off 1FB3.

----End

Procedure

Step 1 Open the sealing plate of LV PANEL A based on the silk screen.

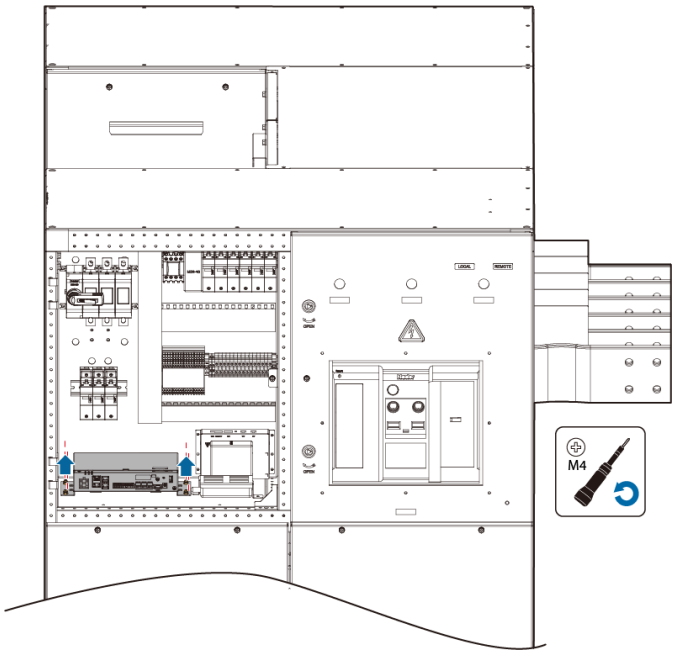
Figure 6-52 Opening the sealing plate of LV PANEL A



Step 2 Remove the cables from the main control module and record their positions.

Step 3 Remove the old main control module.

Figure 6-53 Removing a main control module



Step 4 Install a new main control module in the original position. Use an M4 Phillips screwdriver and tighten the screws to a torque of 1.2 N·m.

Step 5 Reconnect the cables to the new main control module based on the cable connection records.

Step 6 Reinstall the sealing plate of LV PANEL A.

----End

Follow-up Procedure

Step 1 Turn on 1FB3.

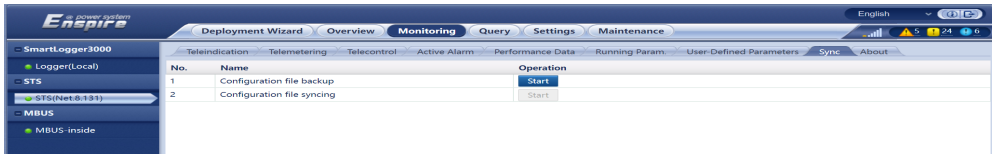
Step 2 Log in to the SmartLogger to check that the communication is normal and that no related alarm is generated.

Step 3 Check the running status of the system and ensure that the functions are restored.

Step 4 (Optional) If the configuration file has been backed up before the device replacement, log in to the SmartLogger and import the backup configuration file to the new device. Otherwise, skip this step.

1. Choose **Monitoring** > **STS** > **Sync** to synchronize the configuration file.

Figure 6-54 Configuration file synchronization



Step 5 (Optional) If the configuration file is not backed up before the device replacement, set the STS running parameters as follows.

1. Log in to the SmartLogger, choose **Monitoring** > **STS** > **Running Param.** > **Settings**, and set related parameters.
2. Choose **Monitoring** > **STS** > **Teleindication** and check the teleindication signals.
3. Choose **Monitoring** > **STS** > **Telemetering** and check the telemetering signals.

Figure 6-55 Running parameters

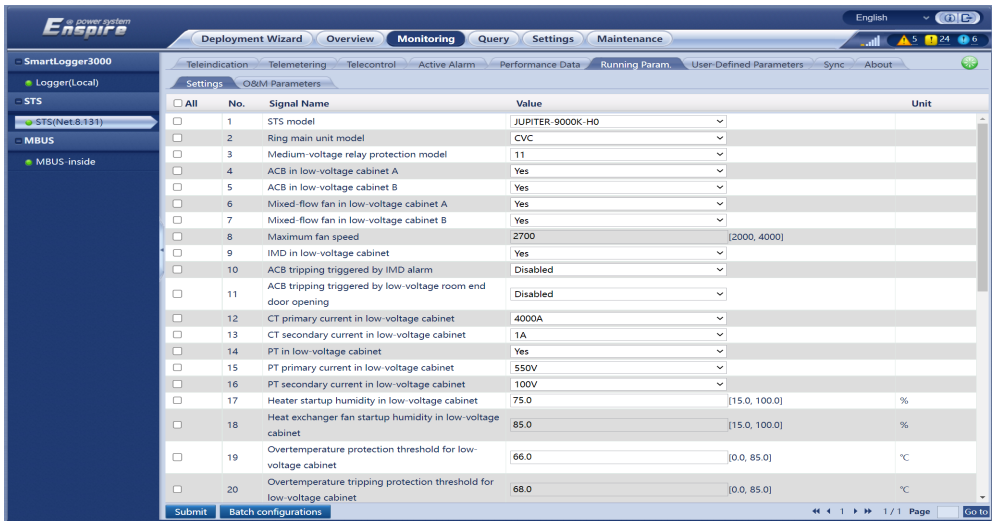


Figure 6-56 Viewing teleindication signal parameters

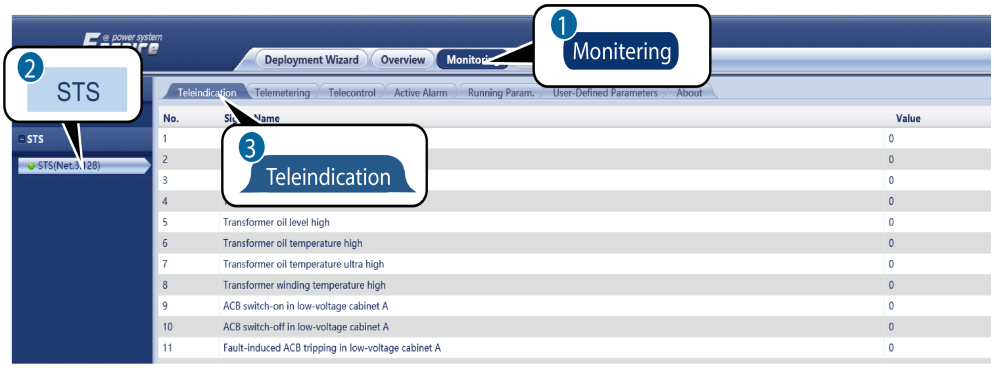


Figure 6-57 Viewing telemetering signal parameters

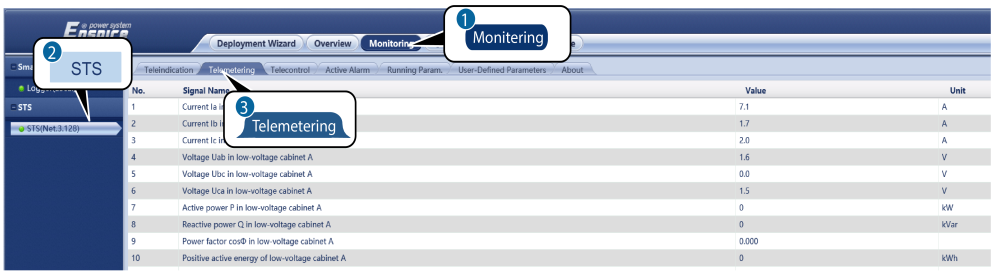


Table 6-4 Running parameters and associated telemetering/teleindication signals

No.	Running Parameter	Description	Associated Teleindication Signal	Associated Telemetering Signal
1	STS model	Ensure that the configured STS model is correct.	-	-
2	Ring main unit model	Set this parameter based on the actual configuration.	– Switch-on/ Switch-off of load switch of ring main unit/ incoming line cabinet G1 – Switch-on/ Switch-off of earthing switch of ring main unit/incoming line cabinet G1 – Switch-on/ Switch-off of load switch of ring main unit/ incoming line cabinet G3 – Switch-on/ Switch-off of earthing switch of ring main unit/incoming line cabinet G3	-
3	Medium-voltage relay protection model	Set this parameter based on the actual configuration.	High-configuration relay protection power loss alarm (associated with the high-configuration relay protection model) **NOTE** The main control teleindication signal uploaded by the relay protection is associated with the relay protection model.	**NOTE** The main control telemetering signal uploaded by the relay protection is associated with the relay protection model.

No.	Running Parameter	Description	Associated Teleindication Signal	Associated Telemetering Signal
4	ACB for low-voltage cabinet A	Set this parameter based on the actual configuration.	– ACB switch-on/ switch-off in low-voltage cabinet A – Fault-induced ACB Tripping in Low-Voltage Cabinet A – Remote operation of ACB in low-voltage cabinet A	-
5	ACB for low-voltage cabinet B	Set this parameter based on the actual configuration.	– ACB switch-on/ switch-off in low-voltage cabinet B – Fault-induced ACB Tripping in Low-Voltage Cabinet B – Remote operation of ACB in low-voltage cabinet B	-
6	Mixed-flow fan for low-voltage cabinet A	Select **Yes** or **No** based on the actual configuration.	-	-
7	Mixed-flow fan for low-voltage cabinet B	Select **Yes** or **No** based on the actual configuration.	-	-
8	Maximum fan speed	Set this parameter based on the actual configuration.	-	-

No.	Running Parameter	Description	Associated Teleindication Signal	Associated Telemetering Signal
9	IMD for low-voltage cabinet	Select **Yes** or **No** based on the actual configuration.	– IMD Warning in Low-Voltage Cabinet A – IMD Alarm in Low-Voltage Cabinet A – IMD Warning in Low-Voltage Cabinet B – IMD Alarm in Low-Voltage Cabinet B	-
10	ACB tripping triggered by IMD alarm	– This parameter is displayed when **IMD for low-voltage cabinet** is set to **Yes**. – Set this parameter to **Disable** or **Enable**.	-	-
11	ACB tripping triggered by low-voltage room end door opening	Set this parameter to **Disable** or **Enable**.	-	-
12	Primary current of CT for low-voltage cabinet	Current range: 2500 A/3000 A/3500 A/4000 A	-	-
13	Secondary current of CT for low-voltage cabinet	Current range: 1 A/5 A		
14	PT for low-voltage cabinet	Select **Yes** or **No** based on the actual configuration.	-	-
15	Primary voltage of PT for low-voltage cabinet	– This parameter is displayed when **PT for low-voltage cabinet** is set to **Yes**. – Voltage range: 480 V/550 V/800 V/1000 V	-	-
16	Secondary voltage of PT for low-voltage cabinet	– This parameter is displayed when **PT for low-voltage cabinet** is set to **Yes**. – Voltage range: 100 V/400 V	-	-

No.	Running Parameter	Description	Associated Teleindication Signal	Associated Telemetering Signal
17	Heater startup humidity in low-voltage cabinet	Humidity range: 15% to 100%	-	-
18	Heat exchanger fan startup humidity in low-voltage cabinet	Humidity range: 15% to 100%	-	-
19	Alarm threshold for high temperature in low-voltage cabinet	Temperature range: 0°C–85°C	-	-
20	Tripping threshold for high temperature in low-voltage cabinet	– Temperature range: 0°C–85°C – The setting must be greater than or equal to the alarm threshold for high temperature.	-	-
21	Heat exchanger in medium-voltage room	Select **Yes** or **No** based on the actual configuration.	-	-
22	Heat exchanger fan startup humidity in medium-voltage room	This parameter is displayed when **Heat exchanger in medium-voltage room** is set to **Yes**.	-	-
23	Alarm threshold for high temperature in medium-voltage room	Temperature range: 0°C–85°C	-	-
24	Tripping threshold for high temperature in medium-voltage room	– Temperature range: 0°C–85°C – The setting must be greater than or equal to the alarm threshold for high temperature.	-	-
25	Auxiliary transformer type	Select **Single-phase** for the 3 kVA and **Three-phase** for the 50 kVA.	-	-

No.	Running Parameter	Description	Associated Teleindication Signal	Associated Telemetering Signal
26	Auxiliary transformer CT	Select **Yes** or **No** based on the actual configuration.	-	– Auxiliary transformer current Ia – Auxiliary transformer current Ib – Auxiliary transformer current Ic – Auxiliary transformer active power P – Auxiliary transformer reactive power Q – Auxiliary transformer power factor cosϕ – Positive active energy of auxiliary transformer – Positive reactive energy of auxiliary transformer – Negative reactive energy of auxiliary transformer
27	Primary current of auxiliary transformer CT	– This parameter is displayed when **Auxiliary transformer CT** is set to **Yes**. – Current range: 5 A/10 A/15 A/20 A/25 A/50 A/100 A/150 A/200 A/250 A/300 A		
28	Secondary current of auxiliary transformer CT	– This parameter is displayed when **Auxiliary transformer CT** is set to **Yes**. – Current range: 1 A/5 A		
29	Maintenance-free dehumidifier	Select **Yes** or **No** based on the actual configuration.	– Maintenance-free dehumidifier heating – Maintenance-free dehumidifier fault	Humidity in transformer cabinet
30	Humidity threshold for dehumidifier to start heating	This parameter is displayed when the **Maintenance-free dehumidifier** is set to **Yes**.		
31	Interval for dehumidifier to start heating			

No.	Running Parameter	Description	Associated Teleindication Signal	Associated Telemetering Signal
32	Heating duration of dehumidifier			
33	Temperature rise threshold for starting dehumidifier			
34	Temperature drop threshold for starting dehumidifier			
35	Transformer winding temperature indicator	Select **Yes** or **No** based on the actual configuration.	– Transformer high winding temperature – Transformer ultra-high winding temperature	Transformer winding temperature
36	Automatic mode of circuit breaker for transformer cabinet G2	Select **Yes** or **No** based on the actual configuration.	Automatic mode of circuit breaker for transformer cabinet G2	-
37	Harmonic monitoring for low-voltage cabinet	Set this parameter to **Enable** or **Disable** as required.	-	This parameter is associated with the total harmonic and single harmonic data.
38	Frequency level	50 Hz/60 Hz	-	-
39	Overfrequency alarm margin	Set this parameter based on the actual configuration.	-	-
40	Underfrequency alarm margin	Set this parameter based on the actual configuration.	-	-
41	ACB tripping caused by overfrequency/ underfrequency	Set this parameter to **Enable** or **Disable** as required.	-	-
42	Delay time for overfrequency/ underfrequency-caused tripping	This parameter is displayed when **ACB tripping caused by overfrequency/ underfrequency** is set to **Enable**.	-	-

No.	Running Parameter	Description	Associated Teleindication Signal	Associated Telemetering Signal
43	UPS	Select **Yes** or **No** based on the actual configuration.	– UPS AC power failure alarm – Other UPS alarms	-
44	DC LV Panel	Select **Yes** or **No** based on the actual configuration.	DC LV Panel door opening	-
45	Quantity of distribution transformers	Set this parameter based on the actual configuration.	– Switch-on of MCCB for distribution transformer n – Distribution transformer n heat exchanger fault – Distribution transformer cabinet door opening	-

----End

6.8.16 Replacing Measurement and Control Modules

The JUPITER-3000K-H1 is configured with two measurement and control modules. Measurement and control module 1 is located in LV PANEL A, and measurement and control module 3 is located in the MV room.

The JUPITER-6000K-H1 and JUPITER-9000K-H1 are configured with three measurement and control modules. Measurement and control module 1 is located in LV PANEL A, measurement and control module 2 is located in LV PANEL B, and measurement and control module 3 is located in the MV room.

6.8.16.1 Replacing a Measurement and Control Module in the LV Room

Context

If a measurement and control module is found damaged during maintenance, power it off and replace it.

The positions of measurement and control modules in an STS vary with the model, but the replacement procedures are the same. This section uses the replacement of the measurement and control module in LV PANEL A as an example.

Power-Off

Replace measurement and control module 1 (CK1).

1. Turn off switch 1FB3 in measurement and control module 1.
2. Turn off the ACB (1QA) of LV PANEL A.
3. If there is a UPS, shut down the UPS inverter.
4. Turn off the vacuum circuit breaker (VCB) in the MV room.

Replace measurement and control module 2 (CK2).

1. Turn off switch 2FB2 in measurement and control module 2.
2. Turn off the ACB (2QA) of LV PANEL B.
3. If there is a UPS, shut down the UPS inverter.
4. Turn off the VCB in the MV room.

DANGER

Before replacing the monitoring and control device, ensure that the secondary side of the current transformer (CT) is short-circuited and the secondary side of the potential transformer (PT) is open-circuited.

Procedure

Step 1 Remove the screws from the cable boxes on both sides of the measurement and control module, and remove the cable boxes.

Step 2 Remove the screws from the PSU positioning kit and remove the PSU positioning kit.

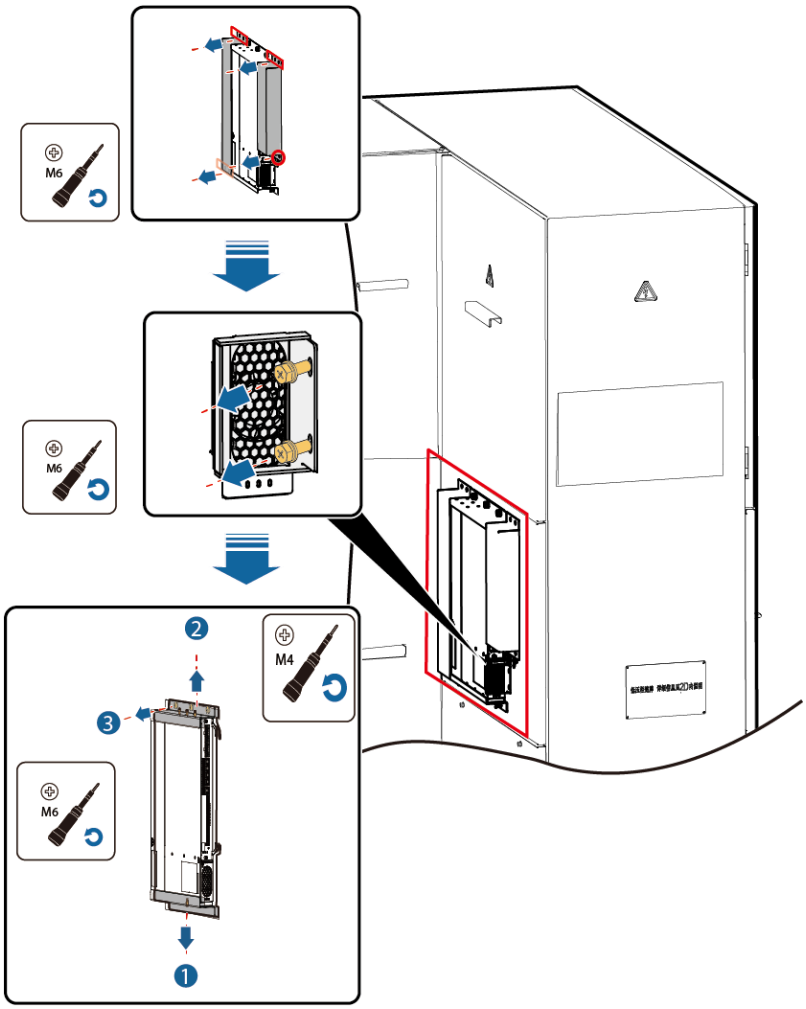
Step 3 Record the positions of cables connected to the measurement and control module, and disconnect the cables.

Step 4 Remove the PSU (to be reused) of the measurement and control module. For details, see **6.8.17 Replacing a PSU of the STS Measurement and Control Module**.

Step 5 Remove the screws from the bracket of the measurement and control module.

Step 6 Remove the bracket above the measurement and control module and take out the measurement and control module.

Figure 6-58 Removing the measurement and control module



Step 7 Install a new measurement and control module in the original position.

Step 8 Reinstall the bracket above the measurement and control module. Use an M6 Phillips screwdriver and tighten the screws to a torque of 5 N·m.

Step 9 Secure the new measurement and control module to the bracket. Use an M4 Phillips screwdriver and tighten the screws to a torque of 1.2 N·m.

Step 10 Reinstall the PSU and positioning kit. Use an M6 Phillips screwdriver and tighten the screws to a torque of 5 N·m.

Step 11 Reconnect the cables to the new measurement and control module based on the cable connection records.

Step 12 Reinstall the cable boxes on both sides of the measurement and control module. Use an M6 Phillips screwdriver and tighten the screws to a torque of 5 N·m.

Step 13 Power on the measurement and control module in the reverse order of the power-off operations.

----End

Follow-up Procedure (PV-only Scenario)

Step 1 Log in to the SmartLogger WebUI, choose **Maintenance** > **Software Upgrade**, upload the STS upgrade package, select the device, and upgrade the STS to ensure that the STS version is the same as the other STS version displayed on the SmartLogger WebUI. If they are inconsistent, upgrade the software version to ensure that no alarm indicating inconsistent measurement and control module software versions is generated.

NOTE

Contact the Company's service engineers to obtain the STS software package.

----End

Follow-up Procedure (LV Coupling Scenarios of PV and ESS)

Step 1 Log in to the SmartLogger WebUI, choose **Maintenance** > **Software Upgrade**, upload the STS upgrade package, select the device, and upgrade the STS to ensure that the STS version is the same as the other STS version displayed on the SmartLogger WebUI.

Step 2 On the SmartLogger WebUI, choose **Monitoring** > **STS > Running Param. > O&M Parameters**, and click **Start** in the row of **Controller location detection** to detect the location of the measurement and control module and assign a physical location to the new measurement and control module.

NOTE

Contact the Company's service engineers to obtain the STS software package.

----End

6.8.16.2 Replacing a Measurement and Control Module in the MV Room

Power-Off

1. Turn off the general 800 V switch.
2. Turn off the general circuit breaker 3FB of the auxiliary loop.
3. Turn off the inverter switch used by the UPS. (This step is optional. Perform this step when configuring the UPS. Skip this step when only maintaining the UPS.)

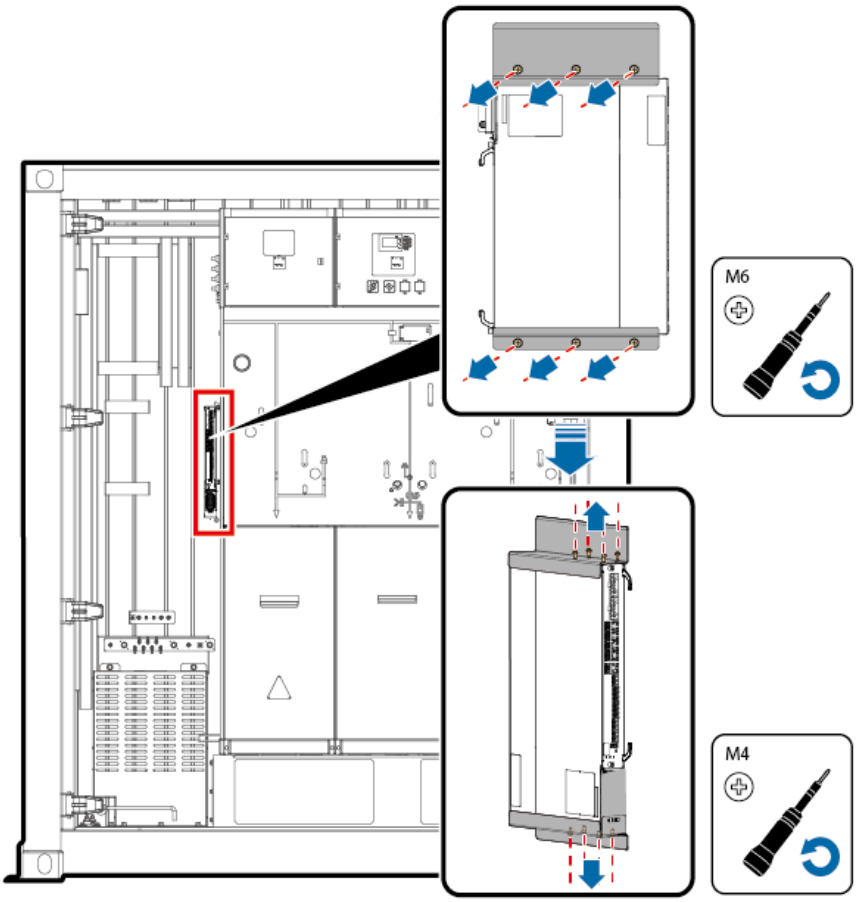
Procedure

Step 1 Open the end door of the MV room.

Step 2 Remove the cables from the measurement and control module and record their positions.

Step 3 Remove the old measurement and control module in the MV room.

Figure 6-59 Removing the old measurement and control module in the MV room



Step 4 Install a new measurement and control module in the original position. Use an M6 Phillips screwdriver and tighten the screws to a torque of 5 N·m.

Step 5 Secure the new measurement and control module to the bracket. Use an M4 Phillips screwdriver and tighten the screws to a torque of 1.2 N·m.

Step 6 Reconnect the cables to the new measurement and control module based on the cable connection records.

Step 7 Power on the measurement and control module in the reverse order of the power-off operations.

----End

Follow-up Procedure

Step 1 Log in to the SmartLogger WebUI, choose **Maintenance** > **Software Upgrade**, upload the STS upgrade package, select the device, and upgrade the STS to ensure that the STS version is the same as the other STS version displayed on the SmartLogger WebUI. If they are inconsistent, upgrade the software version to ensure that no alarm indicating inconsistent measurement and control module software versions is generated.

Step 2 On the SmartLogger WebUI, choose **Monitoring** > **STS** > **Running Param.** > **O&M Parameters**, and click **Start** in the row of **Controller location detection** to perform measurement and control module location detection and assign a physical location to the new measurement and control module.

NOTE

Contact the Company's service engineers to obtain the STS software package.

----End

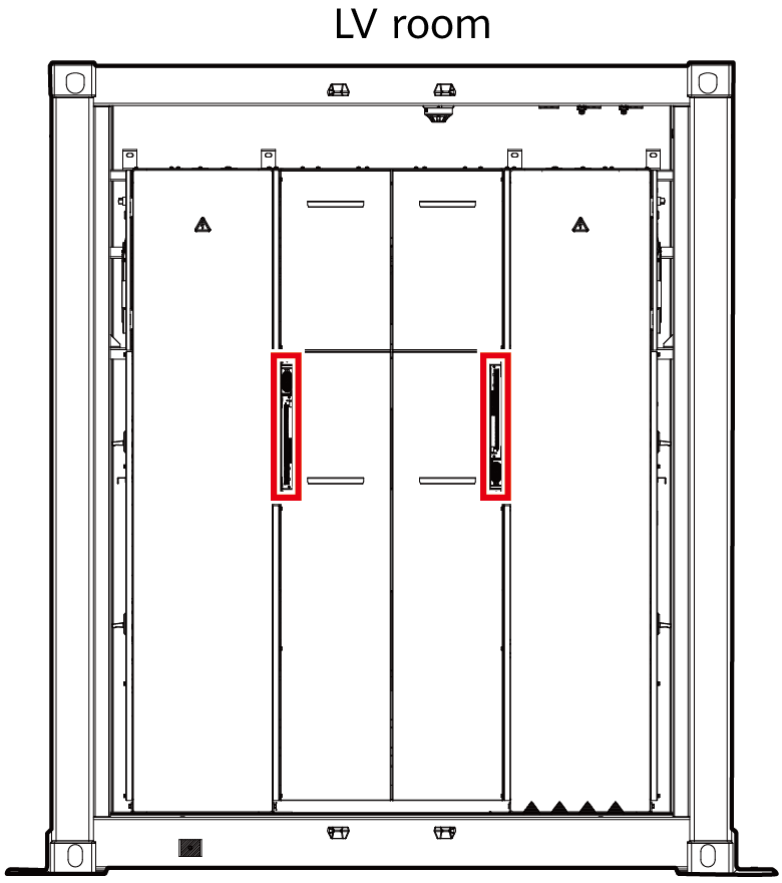
6.8.17 Replacing a PSU of the STS Measurement and Control Module

Context

NOTE

The appearance of the STS varies with the model, but the installation positions of measurement and control modules are the same. This section uses one type of appearances as an example.

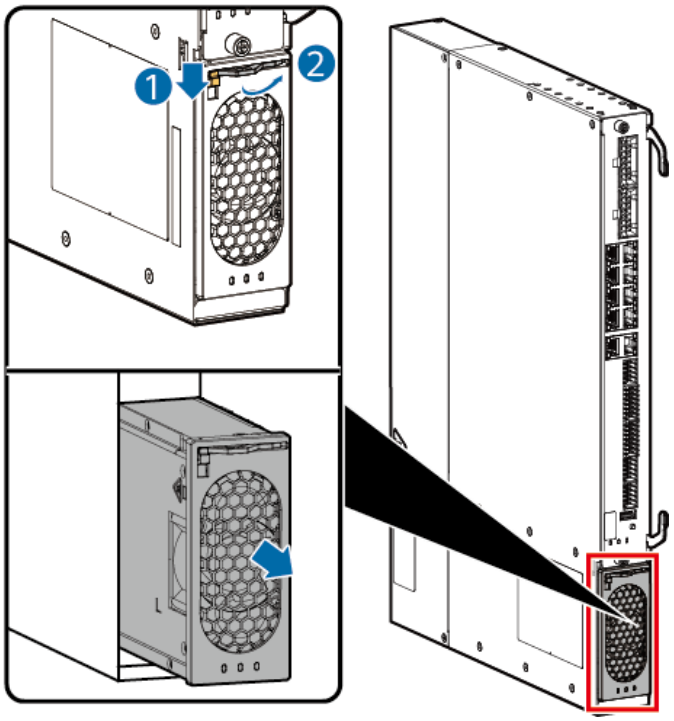
Figure 6-60 Positions of measurement and control modules



Procedure

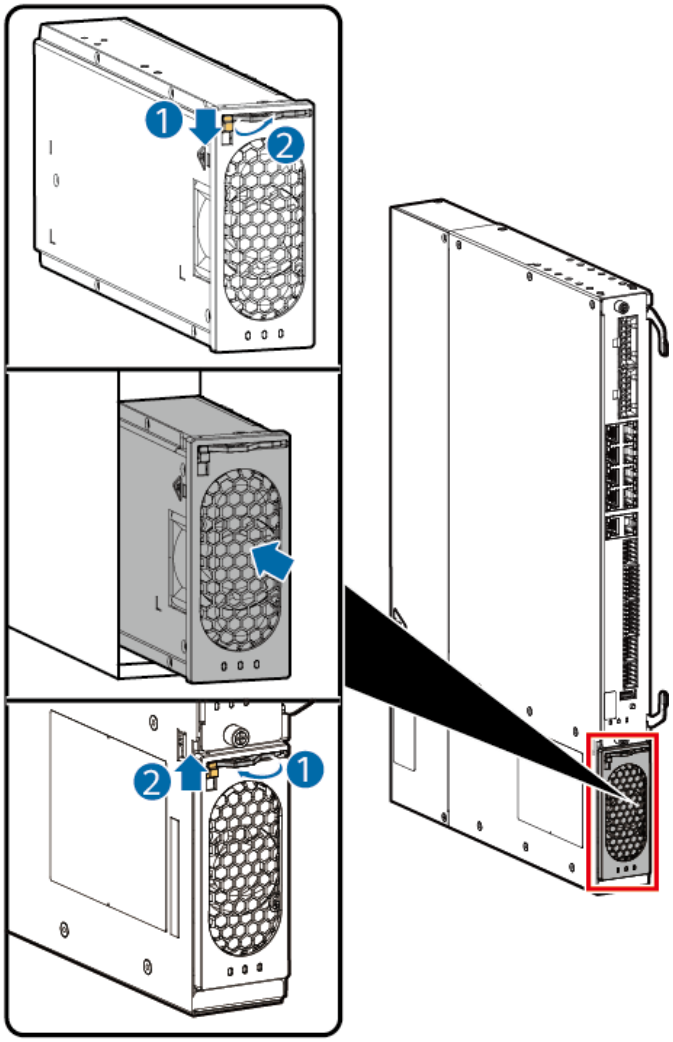
Step 1 Remove the old PSU.

Figure 6-61 Removing a PSU



Step 2 Install a new PSU.

Figure 6-62 Installing a PSU



----End

6.8.18 Replacing a Fuse

Context

If a fuse cannot be used during maintenance, power it off and replace it.

Power-Off

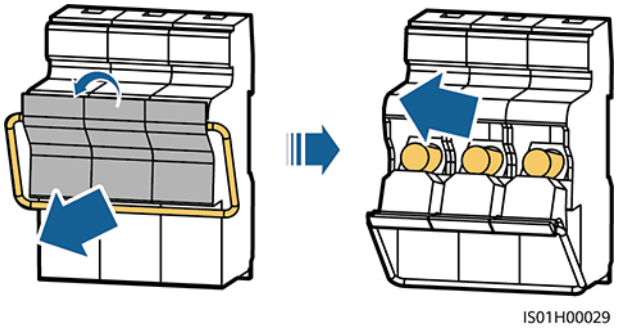
1. 1FA fuse: Turn off 1QS.
2. 1FA1/1FA2/2FA1/2FA2: If no current flows, open the fuse box to replace the fuse.

Procedure

Step 1 Open the fuse switch box.

Step 2 Remove the faulty fuse.

Figure 6-63 Removing the faulty fuse



Step 3 Install a new fuse and close the fuse switch box.

----End

Power-On

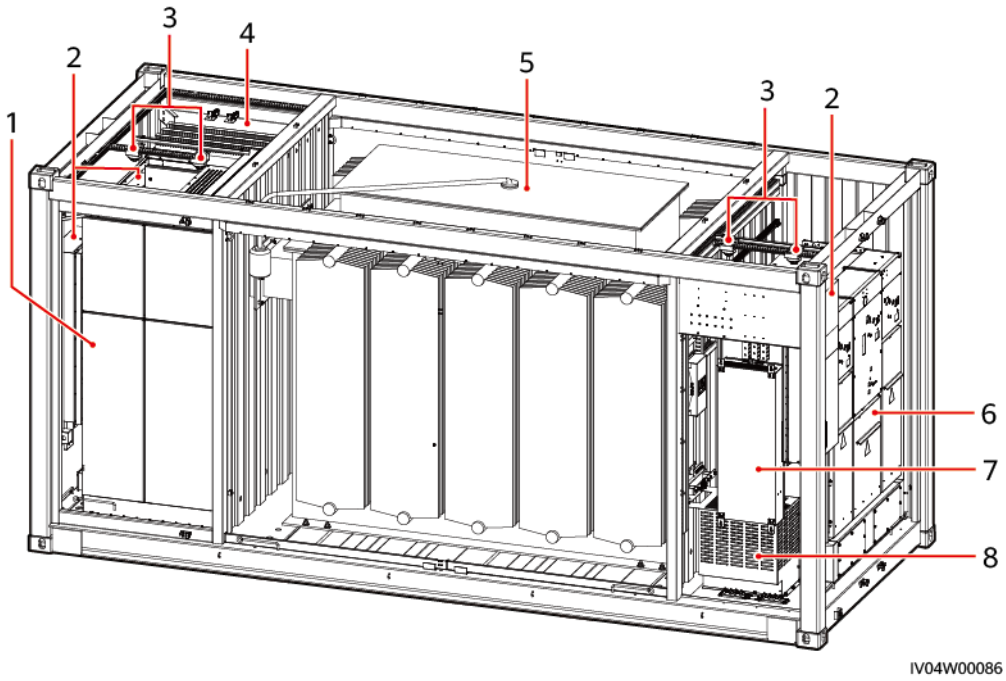
Perform operations in the reverse order of the power-off operations.

6.8.19 Replacing a Ring Main Unit

Context

The ring main unit is located in the MV room (marked by 7 in the figure). For details about the ring main unit, see MV Room.

Figure 6-64 STS components



(1) LV PANEL A
(2) Heat exchangers
(3) Smoke sensors
(4) LV PANEL B
(5) Transformer
(6) Ring main unit

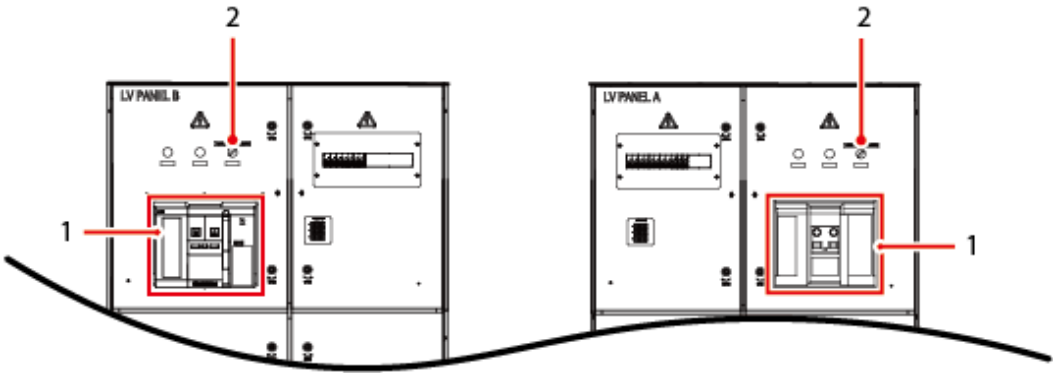
(7) Power distribution box	(8) Auxiliary transformer	-

Power-Off

1. Turn off the ACB (1QA) of LV PANEL A or the ACB (2QA) of LV PANEL B.
2. Set the remote/local switch of the LV panel to the local position.
3. Set the remote/local switch of cabinet G2 in the ring main unit to the local position.
4. Turn off the local on/off switch (VCB) of cabinet G2 in the ring main unit.
5. Turn off the disconnector of cabinet G2 in the ring main unit.
6. Turn on the ground switch of cabinet G2 in the ring main unit.
7. Turn off the general switches of the control loop, heating loop, and energy storage loop of the ring main unit. For details about the switch silk screen, see the circuit diagram.
8. Go to the upper-level STS to turn off the load switch of cabinet G3 and turn on the earthing switch of cabinet G3.
9. For the STS at this level, turn off the load switch of cabinet G1 and turn on the earthing switch of cabinet G1. (Skip this step for cabinet D.)
10. For the STS at this level, turn off the load switch of cabinet G3 and turn on the earthing switch of cabinet G3.

The following figure shows the positions of the switches.

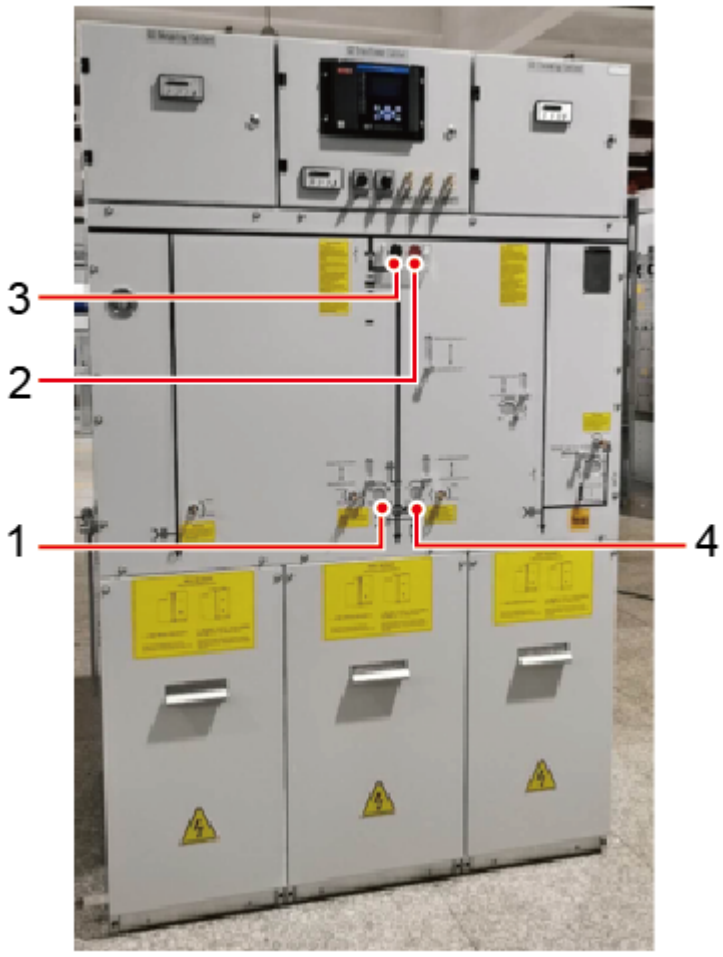
Figure 6-65 Positions of the LV panel switches



(1) ACB	(2) Remote/Local switch

The following figure shows the positions of the ring main unit switches.

Figure 6-66 Positions of the the ring main unit switches (using the DVC as an example)



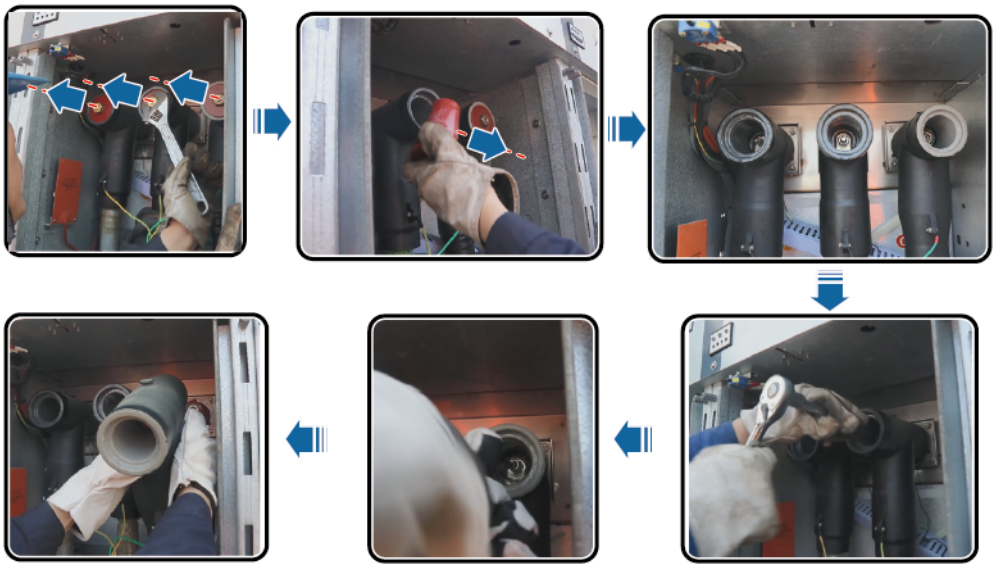
(1) Ground switch of cabinet G2	(2) Local on/off switch (VCB) of cabinet G2
(3) Remote/Local switch of cabinet G2	(4) Disconnector operation hole of cabinet G2

Procedure

Step 1 Ensure that the STS has been powered off and the new ring main unit has been transported to the site.

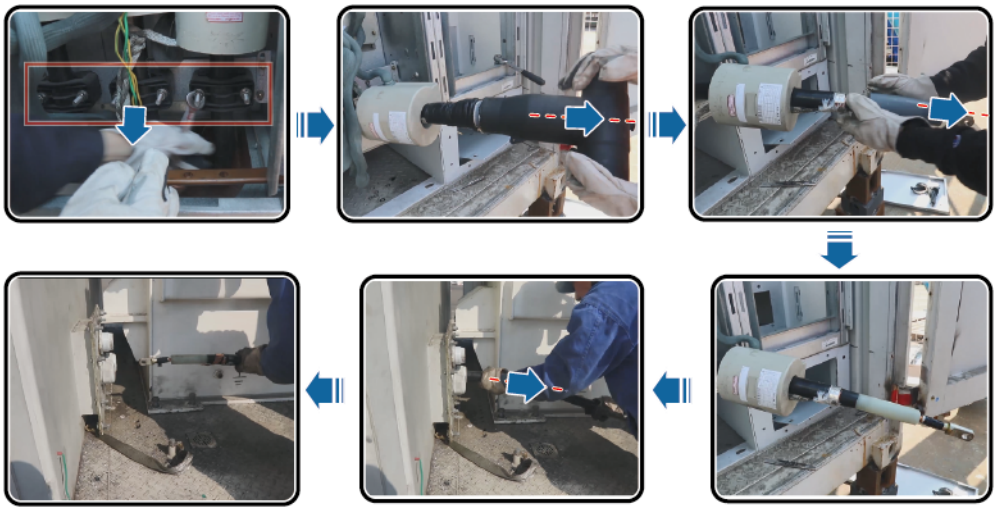
Step 2 Remove AC power cable connectors and wrap the connectors with a clean plastic bag to keep the connectors clean.

Figure 6-67 Removing AC power cable connectors



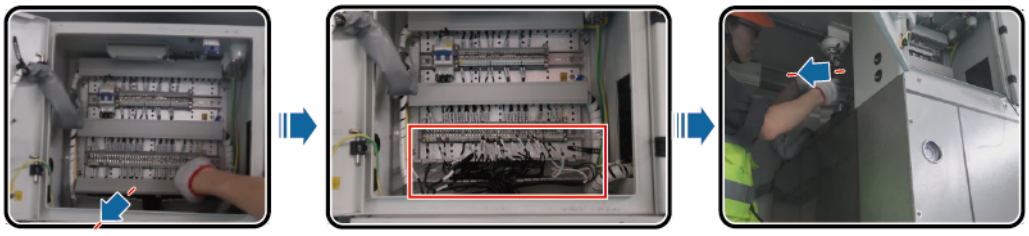
Step 3 Pull AC power cables out of the transformer room.

Figure 6-68 Pulling out AC power cables



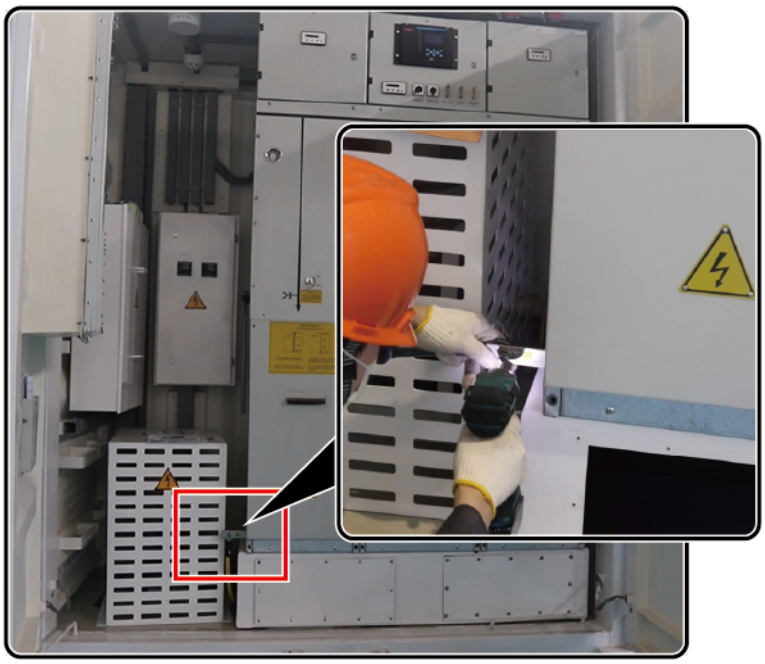
Step 4 Remove cables from the secondary room of the ring main unit and take out the cables from the secondary room.

Figure 6-69 Removing cables from the secondary room of the ring main unit



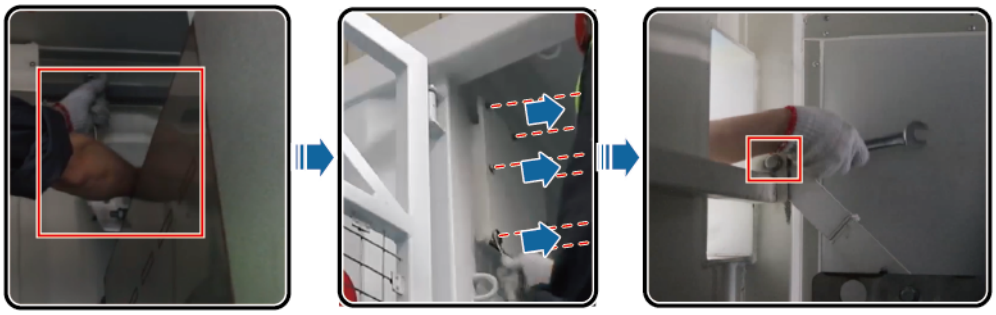
Step 5 Remove the ground cable from the ring main unit.

Figure 6-70 Removing the ground cable



Step 6 Remove screws from the top of the ring main unit.

Figure 6-71 Removing screws from the top of the ring main unit



Step 7 Remove screws from the bottom of the ring main unit.

Figure 6-72 Removing screws from the bottom of the ring main unit

Step 8 Remove the old ring main unit using a forklift.

NOTICE

Use a forklift to move the ring main unit horizontally, and then pull out the ring main unit.

Figure 6-73 Removing the old ring main unit

Step 9 Separate the ring main unit from the base, and remove the old ring main unit using a crane.

Figure 6-74 Removing the old ring main unit

Step 10 Install the new ring main unit in the MV room of the STS. (The installation procedure is in the reverse order of the removal. Only text description is provided here.)

1. Place the new ring main unit on the base using a crane, and secure the ring main unit to the base.
2. Move the ring main unit to the MV room of the STS using a forklift.
3. Tighten the screws at the bottom and top of the ring main unit.
4. Connect the ground cable of the ring main unit and cables of the secondary room, and install AC power cable connectors.

Step 11 Check that cables are securely connected, the environment is clean and tidy, and there are no foreign objects inside the STS. Then close the door of the STS.

----End

Power-On

Perform operations in the reverse order of the power-off operations.

6.8.20 Replacing a Disconnector

Context

If the disconnector in the LV room is faulty during maintenance, power it off and replace it.

Power-Off

1. (Optional) Shut down the UPS inverter 3UI. Perform this operation when the UPS has been installed.
2. Ensure that the inverter or PCS is shut down and not energized.
3. Turn off the ACB (1QA) of LV PANEL A in the LV room.

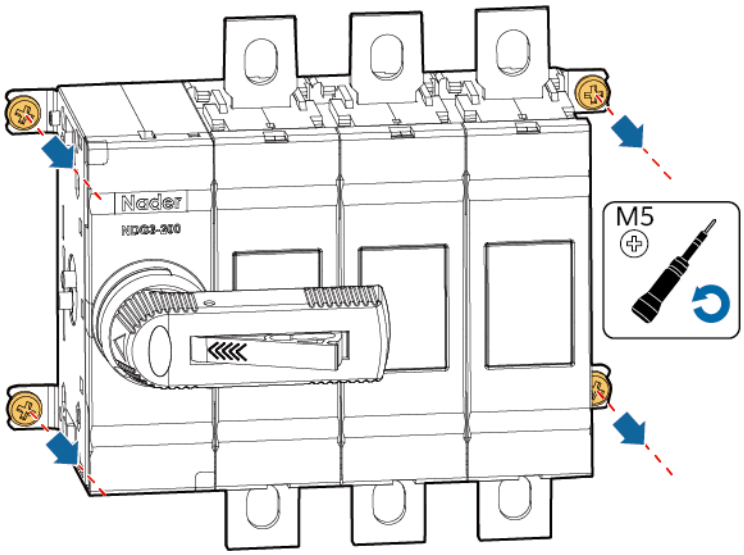
4. Turn off the VCB in the MV room.

Procedure

Step 1 Disconnect cables from the disconnector and label the cables.

Step 2 Remove the faulty disconnector.

Figure 6-75 Removing the disconnector



Step 3 Install a new disconnector and tighten it with a torque of 3 N·m.

Step 4 Connect cables to the disconnector.

----End

Power-On

Perform operations in the reverse order of the power-off operations.

6.8.21 Replacing an Inverter Module

Context

The STS uses two models of inverter modules, one with cord end terminal power cables and the other with socket power cables. When replacing an inverter module, choose a corresponding replacement method. The following are four different replacement scenarios that may occur:

- Socket type - socket type: The old and new inverter modules are the same model, and both use socket power cables.
- Cord end terminal type - cord end terminal type: The old and new inverter modules are the same model, and both use cord end terminal cables.
- Cord end terminal type - socket type: The old inverter module uses cord end terminal power cables, and the new inverter module uses a socket power cable.

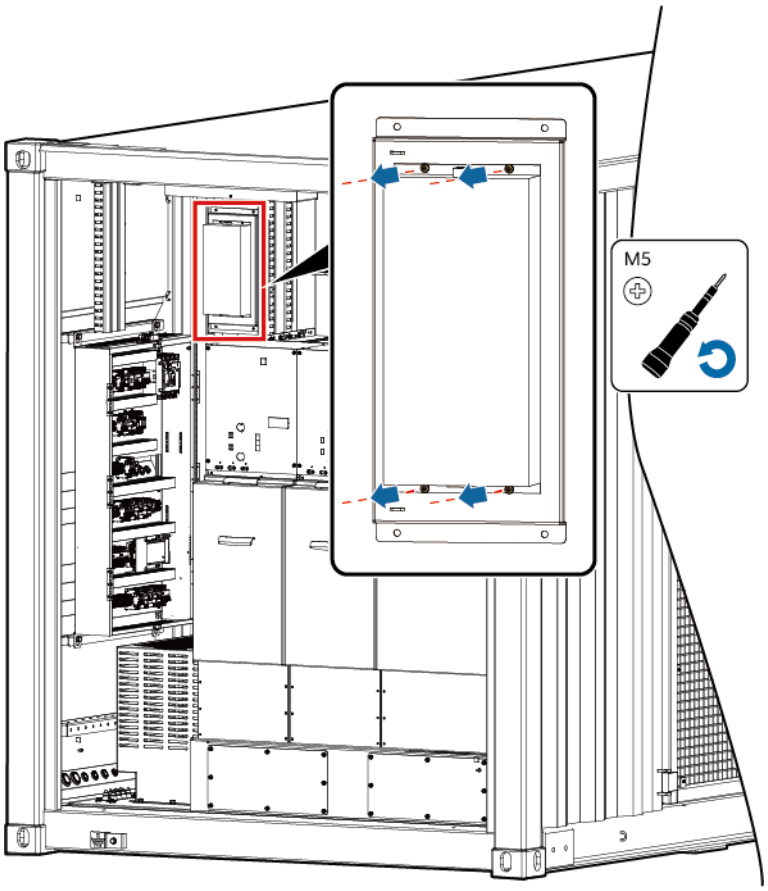
- Socket type - cord end terminal type: The old inverter module uses a socket power cable, and the new power module uses cord end terminal power cables.

Socket Type - Socket Type

Step 1 Remove cables from the inverter module.

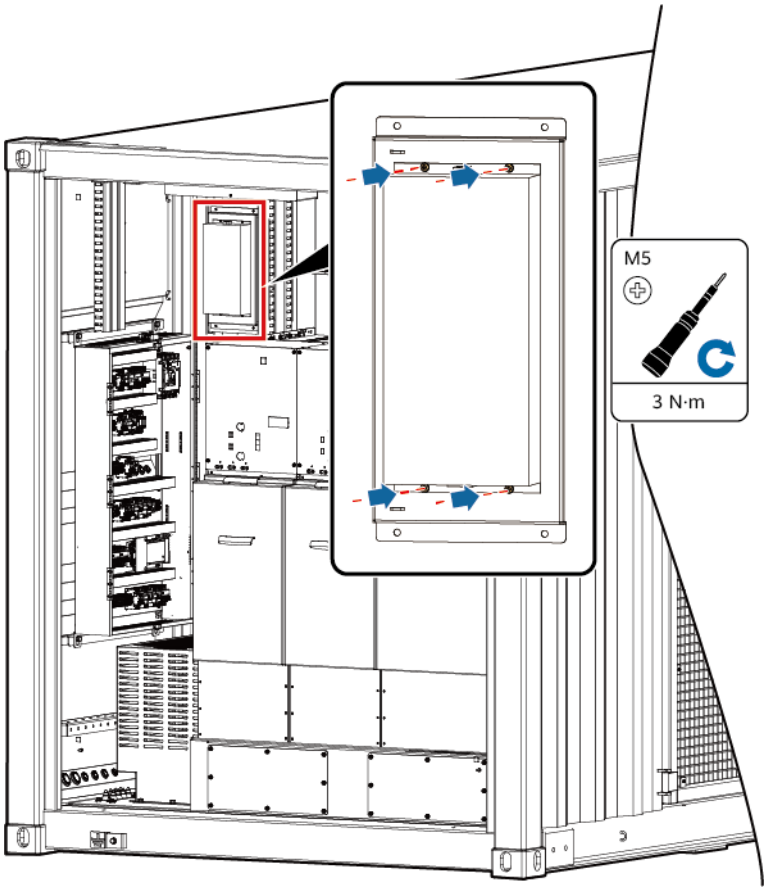
Step 2 Remove the inverter module.

Figure 6-76 Removing the inverter module



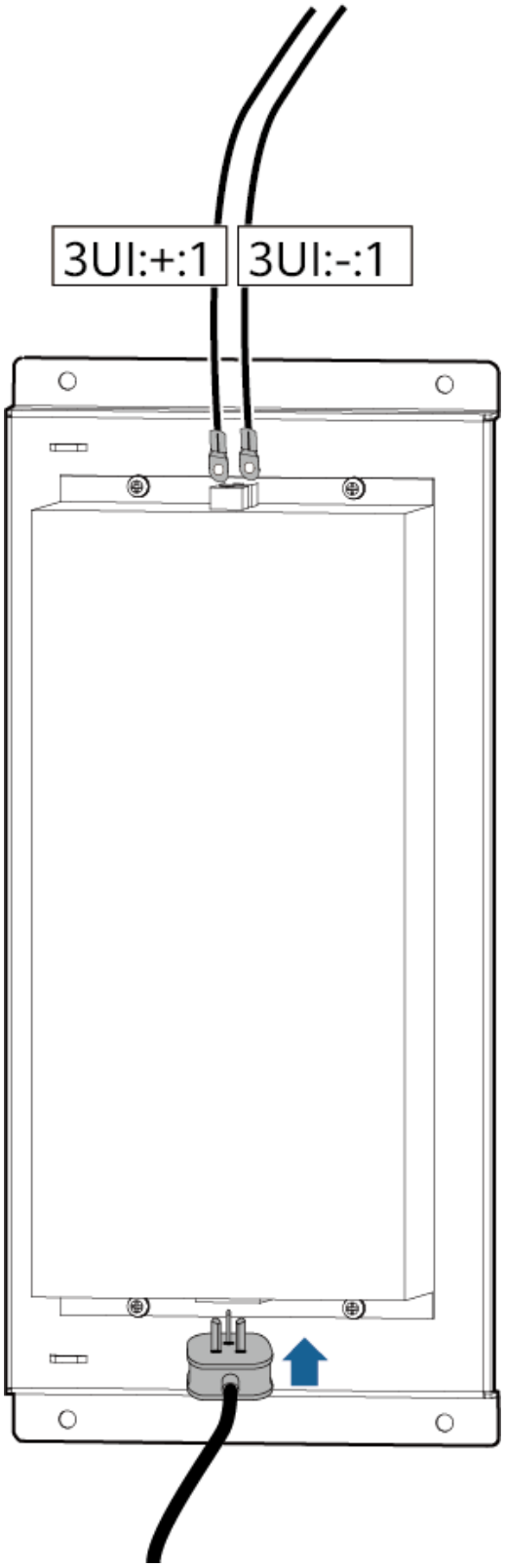
Step 3 Install a new inverter module.

Figure 6-77 Installing an inverter module



Step 4 Connect the cables to the inverter module.

Figure 6-78 Connecting cables

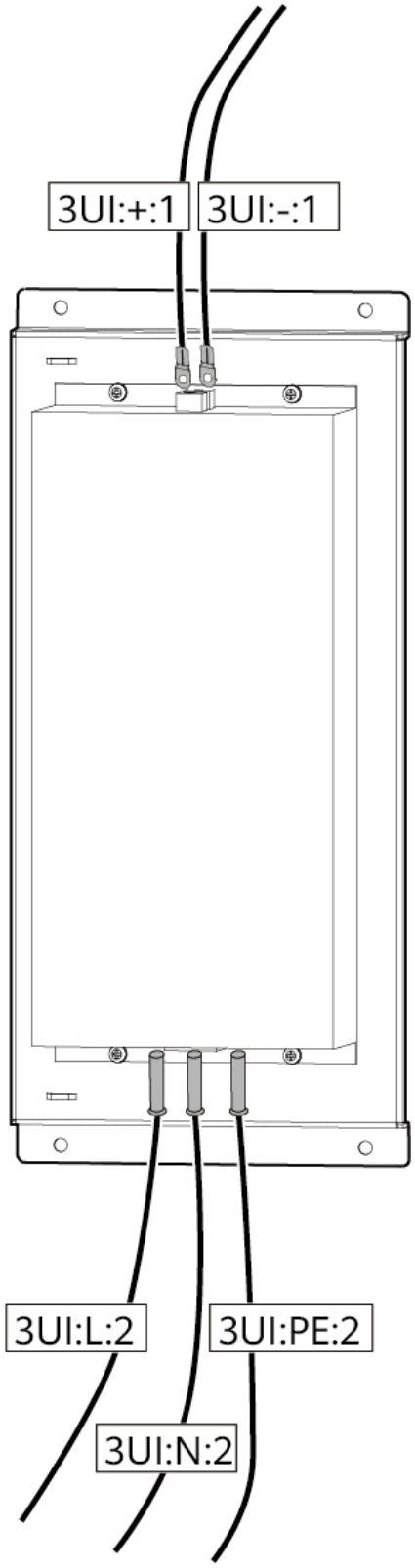


----End

Cord End Terminal Type - Cord End Terminal Type

Step 1 Connect the cables to the inverter module.

Figure 6-79 Connecting cables



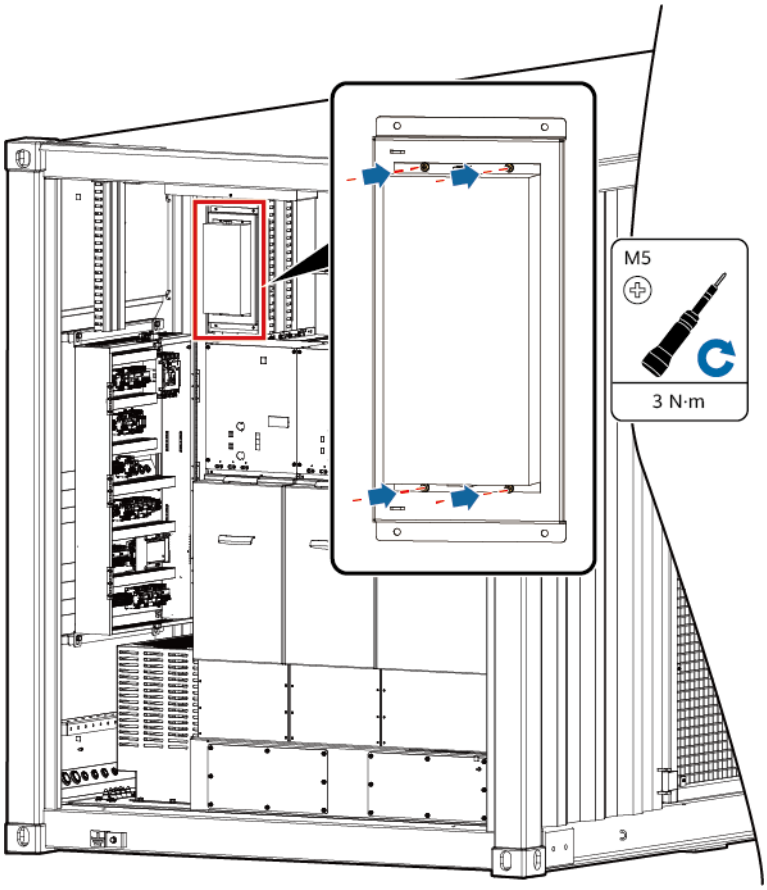
----End

Cord End Terminal Type - Socket Type

Step 1 Record the cable routes and remove cables 3UI:L:2, 3UI:N:2, and 3UI:PE:2 from the STS.

Step 2 Install a new inverter module.

Figure 6-80 Installing an inverter module

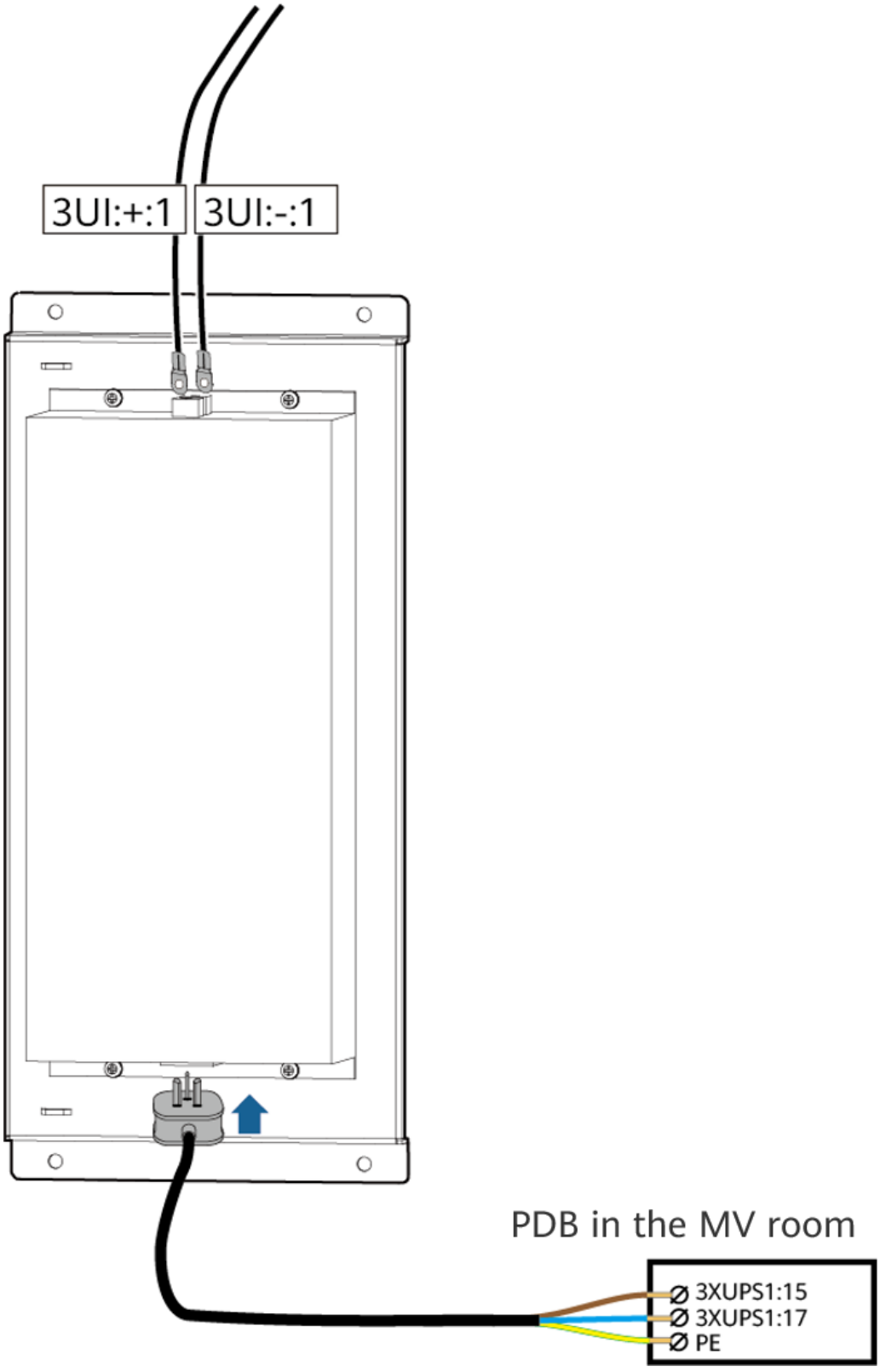


Step 3 Connect the socket cable to the new inverter module and bind the cable along the original route.

NOTE

The socket cable is delivered with the inverter module. Connect the end without a plug to terminals 15 (brown), 17 (blue), and PE (yellow-green) on 3XUPS1.

Figure 6-81 Connecting cables to the inverter module

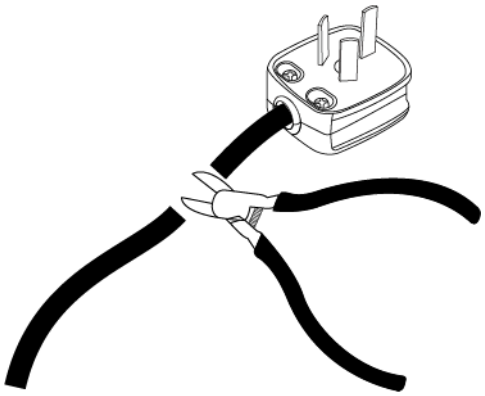


----End

Socket Type - Cord End Terminal Type

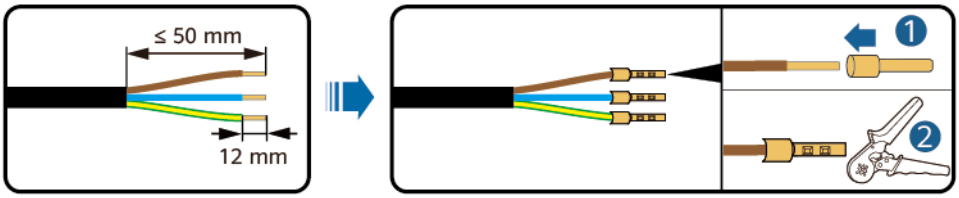
Step 1 Cut off the cable plug.

Figure 6-82 Cutting off the cable plug



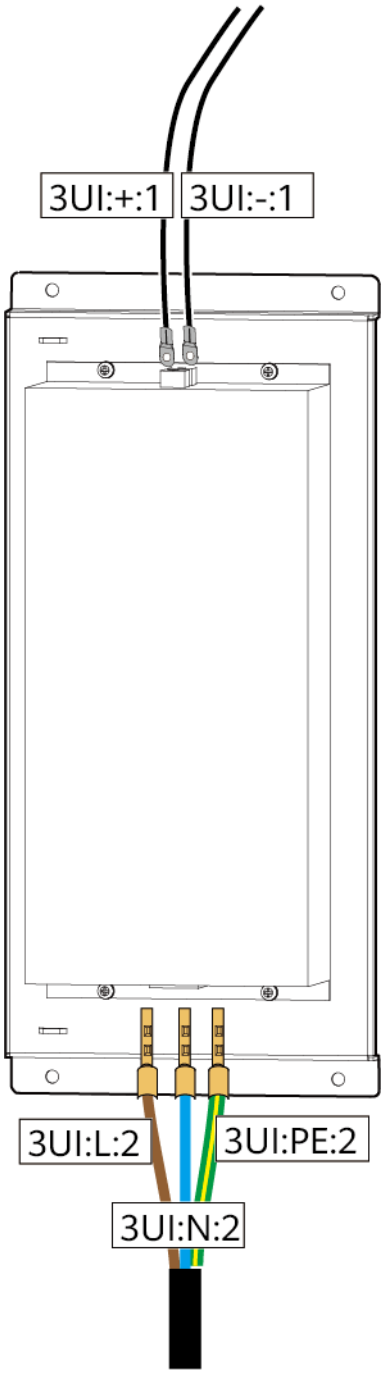
Step 2 Prepare cord end terminals.

Figure 6-83 Preparing cord end terminals



Step 3 Connect the cables to the inverter module.

Figure 6-84 Connecting cables



----End

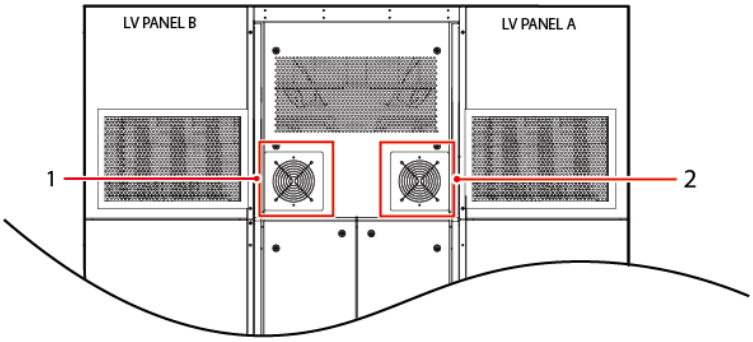
6.8.22 Replacing a Mixed-flow Fan

Context

If a mixed-flow fan is faulty and cannot be repaired during maintenance, power it off and replace it.

The JUPITER-9000K-H1 is configured with two mixed-flow fans, but the JUPITER-(3000K,6000K)-H1 is not configured with mixed-flow fans.

Figure 6-85 Positions of the mixed-flow fans



(1) Mixed-flow fan for LV PANEL B	(2) Mixed-flow fan for LV PANEL A

Power-Off

1. Ensure that the inverter and PCS connected to the downstream port of the MCCB are not energized (for example, shut down the inverter or PCS).
2. Turn off the ACB (1QA) of LV PANEL A or the ACB (2QA) of LV PANEL B.
3. Turn off the VCB in the MV room.

Procedure

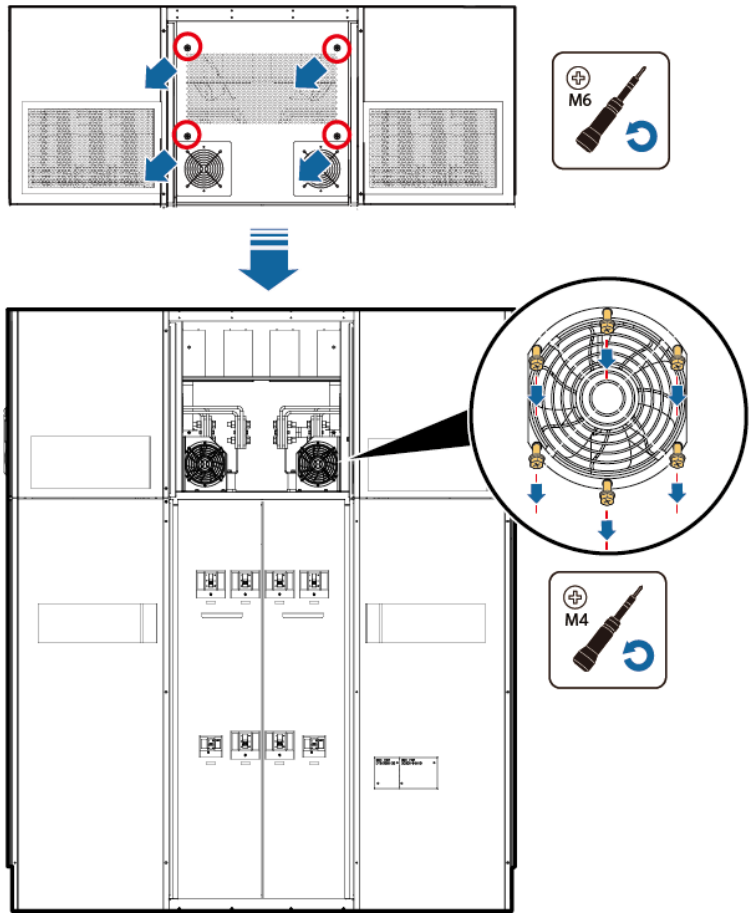
Step 1 Remove the sealing plate from cabinet C.

Step 2 Remove the screws that secure the mixed-flow fan.

Step 3 Record the positions of cables connected to the mixed-flow fan and disconnect the cables.

Step 4 Remove the old mixed-flow fan.

Figure 6-86 Removing the mixed-flow fan



Step 5 Reconnect the cables to the new mixed-flow fan based on the cable connection records.

Step 6 Install the new mixed-flow fan in the original position. Use an M4 Phillips screwdriver and tighten the screws to a torque of 1.2 N·m.

Step 7 Reinstall the sealing plate on cabinet C. Use an M6 Phillips screwdriver and tighten the screws to a torque of 5 N·m.

----End

Power-On

Perform operations in the reverse order of the power-off operations.

Follow-up Procedure

Check the fan self-check status: After power-on, wait about 5 minutes, and choose **Monitoring** > **STS** > **Running Param.** > **O&M Parameters** on the SmartLogger WebUI to check that the fan self-check status is **Normal**.

7 Disposing of the STS

If the STS has reached its service life, dispose of it according to the local disposal act for waste electrical appliances.

8 Technical Specifications

NOTE

Some parameters involve two or more types of cabinets. For details, see the nameplates of the equipment.

Input

Item	JUPITER-3000K-H1	JUPITER-6000K-H1	JUPITER-9000K-H1
AC power	3300 kVA at 40°C	6600 kVA at 40°C	9000 kVA at 40°C
Rated input voltage	800 V		
Rated frequency	• 10 kV/11 kV/13.2 kV/15 kV/20 kV/22 kV/23 kV±10%/30 kV/33 kV/34.5 kV/35 kV: 50 Hz • 13.8 kV/33 kV/34.5 kV: 60 Hz		
Maximum input current at rated voltage	2381.6 A at 40°C	2 x 2381.6 A at 40°C	2 x 3247.7 A at 40°C

Transformer

Item	JUPITER-3000K-H1	JUPITER-6000K-H1	JUPITER-9000K-H1
Rated output voltage and frequency	• 10 kV/11 kV/13.2 kV/15 kV/20 kV/22 kV/23 kV±10%/30 kV/33 kV/34.5 kV/35 kV: 50 Hz • 13.8 kV/33 kV/34.5 kV: 60 Hz		
Tapping range	±2 x 2.5%		

Item	JUPITER-3000K-H1	JUPITER-6000K-H1	JUPITER-9000K-H1
Impedance characteristics	Full crossing impedance: 7.8% (±10%)	• Full crossing impedance: 8.6% (±10%) • Semi-crossing impedance: 14.0% (0% to +10%) • Splitting impedance: 23% (±15%)	• Full crossing impedance: 11.5% (±10%) • Semi-crossing impedance: 19.0% (0% to +10%) • Splitting impedance: 32% (±15%)

Protection

Item	JUPITER-3000K-H1	JUPITER-6000K-H1	JUPITER-9000K-H1
IP ratings of the MV and LV rooms	IP54		
Surge protection	Type I + II		

General Specifications

Item	JUPITER-3000K-H1	JUPITER-6000K-H1	JUPITER-9000K-H1
Dimensions (W x H x D)	6058 mm x 2896 mm x 2438 mm		
Weight	< 15 t	< 23 t	< 28 t
Operating temperature	–25°C to +60°C		
Relative humidity	0%–95% RH		
Rated operating altitude	1000 m		

Feature Parameters

Item	JUPITER-3000K-H1	JUPITER-6000K-H1	JUPITER-9000K-H1
Transformer type	Oil-immersed		
Transformer cooling type	ONAN		
Transformer oil type	Mineral oil		
Transformer vector group	Dy11	Dy11-y11	
MV switchgear	SF_6, 12–40.5 kV, 630 A, 50 Hz/60 Hz, three feeders (CVC/CCV or DVC/DCV), 20 kA/3s, 50/51, 50N/51N, 50BF (optional), 50G/51G (optional)		
LV room	1 x ACB (4000 A/800 V/3P), 11 x MCCB (400 A/800 V/3P)	2 x ACB (4000 A/800 V/3P), 22 x MCCB (400 A/800 V/3P)	2 x ACB (4000 A/800 V/3P), 30 x MCCB (400 A/800 V/3P)
Auxiliary transformer	Specifications • 5 kVA, Ii0, 800 V/230 V/127 V • 50 kVA, Dyn11, 800 V/400 V • 50 kVA, Dyn11, 800 V/220 V		

9 Certificate Management and Maintenance

Preconfigured Certificate Risk Disclaimer

The Huawei-issued certificates preconfigured on Huawei devices during manufacturing are mandatory identity credentials for Huawei devices. The disclaimer statements for using the certificates are as follows:

1. Preconfigured Huawei-issued certificates are used only in the deployment phase, for establishing initial security channels between devices and the customer's network. Huawei does not promise or guarantee the security of preconfigured certificates.

2. The customer shall bear consequences of all security risks and incidents arising from using preconfigured Huawei-issued certificates as service certificates.

3. A preconfigured Huawei-issued certificate is valid from the manufacturing date until November 2041.

4. Services using a preconfigured Huawei-issued certificate will be interrupted when the certificate expires.

5. It is recommended that customers deploy a PKI system to issue certificates for devices and software on the live network and manage the lifecycle of the certificates. To ensure security, certificates with short validity periods are recommended.

Application Scenarios of Preconfigured Certificates

File Path and Name	Scenario	Replacement
/mnt/home/cert/preset/ca.crt	备份根证书	For details about how to replace a certificate, contact technical support engineers to obtain the corresponding security maintenance manual.
/mnt/home/cert/preset/tomcat_client.crt	备份本地证书	
/mnt/home/cert/preset/tomcat_client.my	备份私钥文件	

File Path and Name	Scenario	Replacement
/mnt/home/cert/north/ca.crt	北向通信根证书	
/mnt/home/cert/north/tomcat_client.crt	北向通信本地证书	
/mnt/home/cert/north/tomcat_client.my	北向通信私钥文件	
/mnt/home/cert/app/ca.crt	近端运维根证书	
/mnt/home/cert/app/tomcat_client.crt	近端运维本地证书	
/mnt/home/cert/app/tomcat_client.my	近端运维私钥文件	
/mnt/home/cert/south/ca.crt	控制器根证书	
/mnt/home/cert/south/tomcat_client.crt	控制器本地证书	
/mnt/home/cert/south/tomcat_client.my	控制器私钥文件	

A FAQ

A.1 How to Operate a Transformer

NOTICE

When operating a transformer, ensure that the transformer is in the no-excitation state, that is, the high and low voltage sides of the transformer are not powered on.

A.1.1 Adjusting the Off-Load Tap Changer

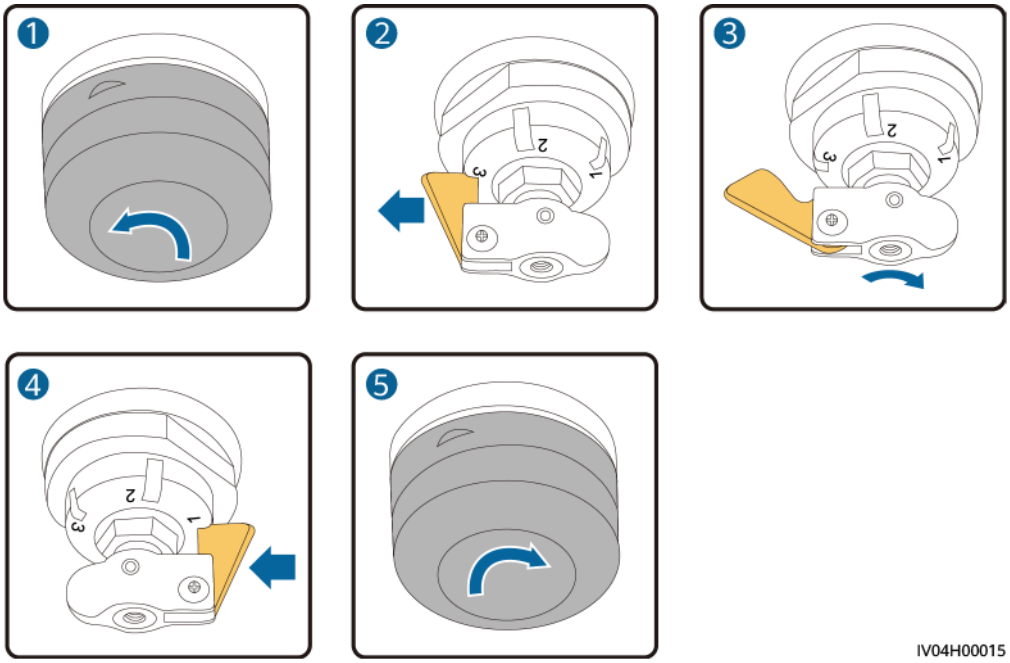
The off-load tap changer can be used to adjust the transformer output voltage. When operating a changer, ensure that the transformer is in the no-excitation state, that is, the high and low voltage sides of the transformer are not powered on.

When the voltage at the low-voltage side remains unchanged, the output voltages at the high-voltage side at different levels are as follows:

- Level 1: standard voltage x 1.05
- Level 2: standard voltage x 1.025
- Level 3: standard voltage
- Level 4: standard voltage x 0.975
- Level 5: standard voltage x 0.95

Step 1 Adjust the off-load tap changer to the level you need.

Figure A-1 Adjusting the off-load tap changer (to level 1 for example)



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A.1.2 Releasing Gas in the Gas Relay

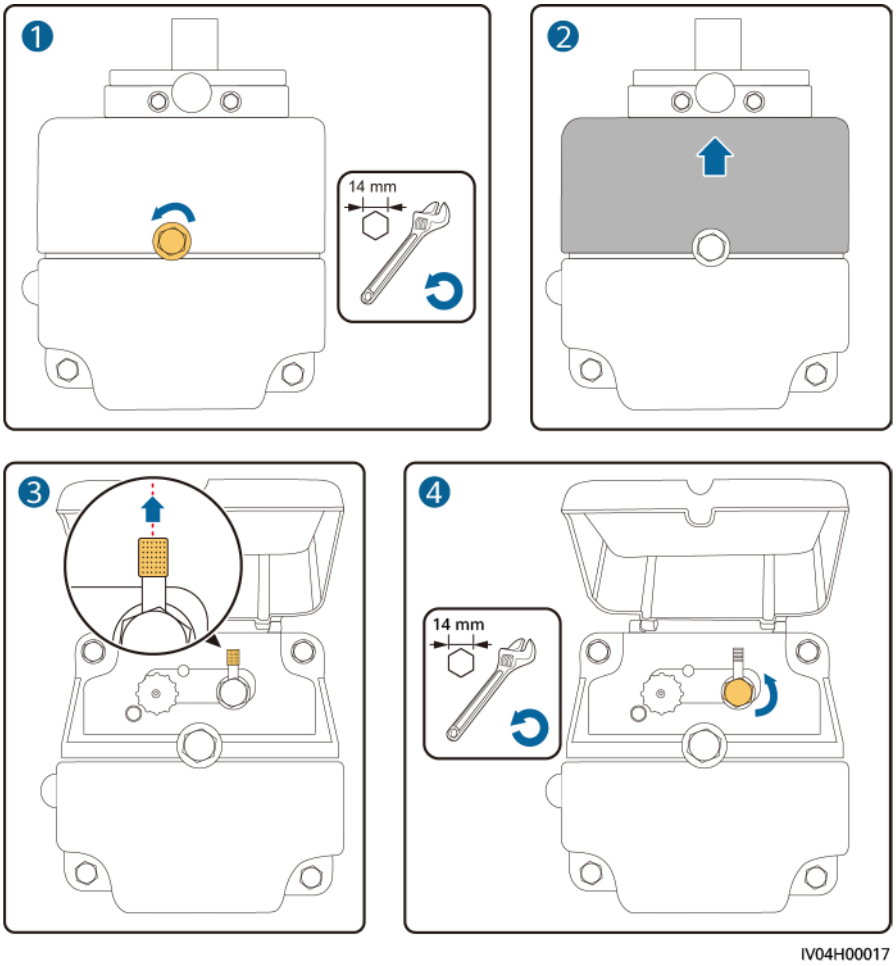
When you see the oil level surface through the glass window of the gas relay, you need to release the gas.

Step 1 Open the cover of the gas relay.

Step 2 Remove the nut from the bleeder plug.

Step 3 Loosen the bleeder plug bolt. The gas gradually runs out until the oil overflows.

Figure A-2 Releasing the gas in the gas relay



Step 4 Tighten the bleeder plug bolt, and reinstall the nut and the cover of the gas relay.

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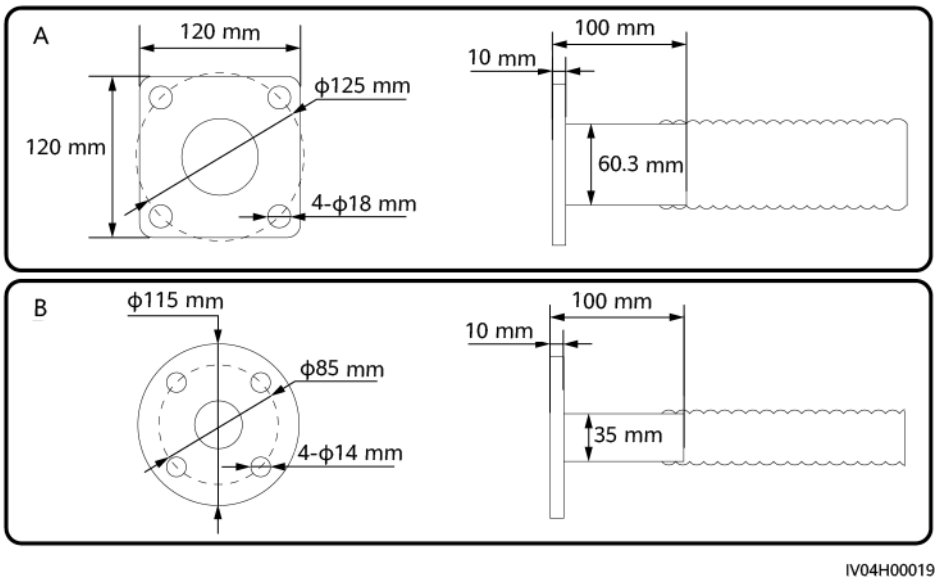
A.1.3 Draining Oil from the Transformer

Check whether the transformer is filled with too much oil based on the oil temperature-oil level curve. If the oil level exceeds the threshold, drain some transformer oil.

Prepare the following materials and tools: a clean steel hose, a 200-liter oil tank, a rag, a wrench (16–18, 17–19, and 22–24), an adjustable wrench (300 mm x 38 mm), a hose connector for oil draining, and a hose clip.

Figure A-3 Hose connector for oil draining



(A) For the hose with a 60 mm inner diameter (oil drain valve)

(B) For the hose with a 35 mm inner diameter (oil feeding and drain valve of the oil cabinet)

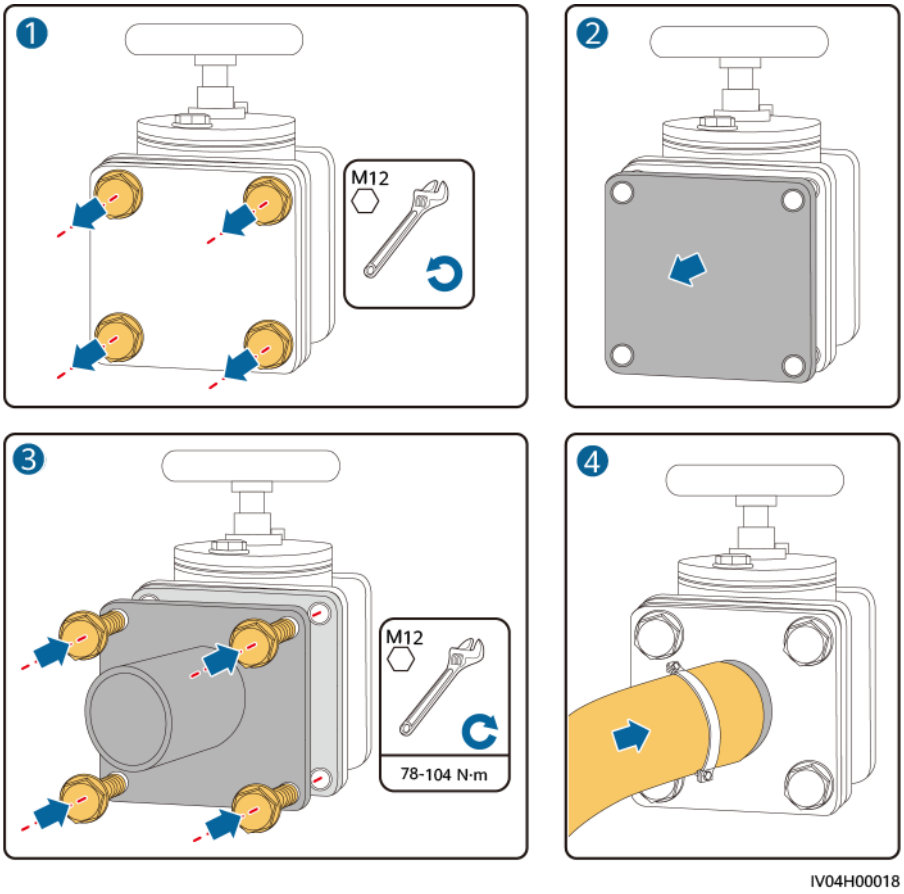
The transformer has two oil drain ventages: DN50 cast-iron oil drain valve at the bottom of the transformer and DN25 copper oil feeding and drain valve at the bottom of the oil cabinet. The oil drain valve is recommended.

Step 1 Ensure that the oil drain valve is closed.

Step 2 Remove the cover from the oil drain valve.

Step 3 Secure the hose connector. Connect one end of the steel hose to the hose connector and the other end to the oil tank.

Figure A-4 Connecting a hose connector



Step 4 Open the oil drain valve to let the oil slowly move from the transformer to the oil tank.

Step 5 Check the position indicated by the oil level gauge according to the local ambient temperature and oil temperature-oil level curve. When the transformer oil drops to the corresponding indication position, stop draining oil.

Step 6 Close the oil drain valve and remove the hose connector and hose.

Step 7 Reinstall the cover on the oil drain valve.

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A.2 How Do I Repair Paint Damage on the Container?

Prerequisites

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

Paint Repair

The container should be intact. If paint has flaked off in a specific area, repaint that area.

NOTE

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

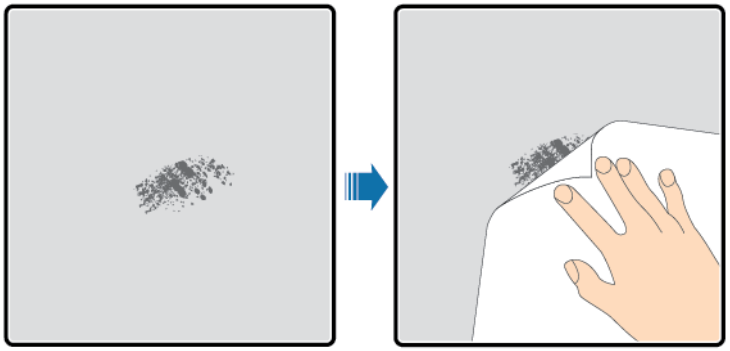
Table A-1 Paint repair

<table>
<tr><th>Paint Damage</th><th>Tools and Materials</th><th>Procedure</th><th>Description</th></tr>
<tr><td>Slight scratch (steel base material not exposed)</td><td rowspan="2">Spray paint or paint, brush (required for repainting a small area), fine sandpaper, anhydrous alcohol, cotton cloth, and painting gun (required for repainting a large area)</td><td rowspan="2">Steps 1, 2, 4, and 5</td><td rowspan="5">1. For the color of the finish coat (acrylic acid paint), see the delivered color palette and Pantone number specified on it.
2. For a few smudges, scratches, or rust, manual paint spraying or brushing is recommended.
3. For many scratches or large-area smudges and rust, use a painting gun to spray paint.
4. The paint coating should be thin and even. Paint drops are prohibited on the coating. The surface should be smooth.
5. Leave the repainted area for about 30 minutes before performing any further operation.</td></tr>
<tr><td>Smudges and rust that cannot be wiped off</td></tr>
<tr><td>Deep scratch (primer damaged, steel base material exposed)</td><td>Spray paint or paint, zinc-rich primer, brush (required for repainting a small area), fine sandpaper, anhydrous alcohol, cotton cloth, painting gun (required for repainting a large area)</td><td>Steps 1, 2, 3, 4, and 5</td></tr>
<tr><td>Logo and pattern damage</td><td colspan="2">If a logo or pattern is damaged, provide the logo size and color number. Seek help from the local advertisement coating supplier to formulate a repair solution based on the logo size, color, and damage.</td></tr>
<tr><td>Dent</td><td colspan="2">1. If a dent is less than 100 mm^2 in area and less than 3 mm in depth, fill the dent with Poly-Putty base and then perform the same operations as those for processing deep scratches.
2. If a dent is greater than 100 mm^2 in area or greater than 3 mm in depth, ask the local supplier for an appropriate repainting solution.</td></tr>
</table>

Procedure

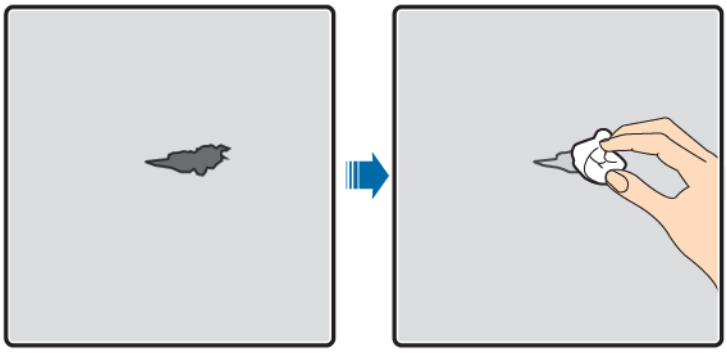
Step 1 Gently polish the damaged areas using fine sandpaper to remove smudges or rust.

Figure A-5 Polishing a damaged area using sandpaper



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

Figure A-6 Wiping a polished or damaged area using anhydrous alcohol



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

NOTICE

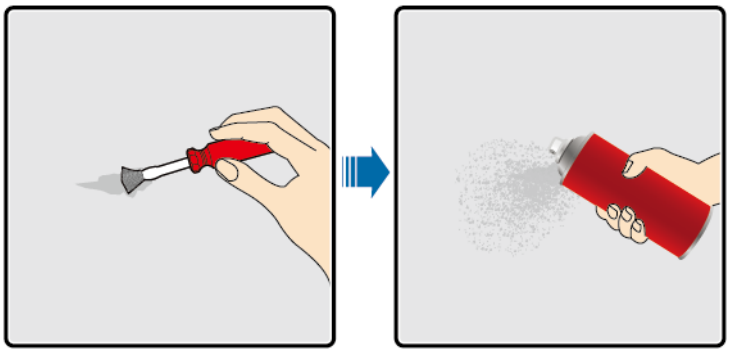
- If the base material is exposed in the area to be repaired, apply epoxy zinc-rich primer, wait until the paint has dried, and then apply acrylic acid top coating.
- Select epoxy zinc-rich primer or acrylic acid top coating with a color the same as the surface coating color of the equipment.

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

NOTICE

- Ensure that the painting is thin, even, and smooth.
- In the case that a container 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 A-7 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 (Δ_E), 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, flaking, or cracks.
- If you choose to spray paint, it is recommended that you spray paint three times before checking the result. If the color does not meet the requirements, paint more times until the painting meets the requirements.

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Paint Supply Information

Table A-1 STS paint requirements

Item	Requirement	Item	Requirement
Primer thickness	40 μm	Primer type	Epoxy zinc rich paint
Intermediate coat thickness	100 μm	Intermediate coat type	Zinc-rich paint

Item	Requirement	Item	Requirement
Top coat thickness	40 μm	Color number of the top coat	Obtain the color number based on the color plate delivered with the product.

NOTE

The following is a paint model list provided by Huawei. The list may be updated irregularly and is for reference only. The price of paint and technical services shall be subject to local price standards.

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

A.3 How Do I Use the Emergency Stop Button?

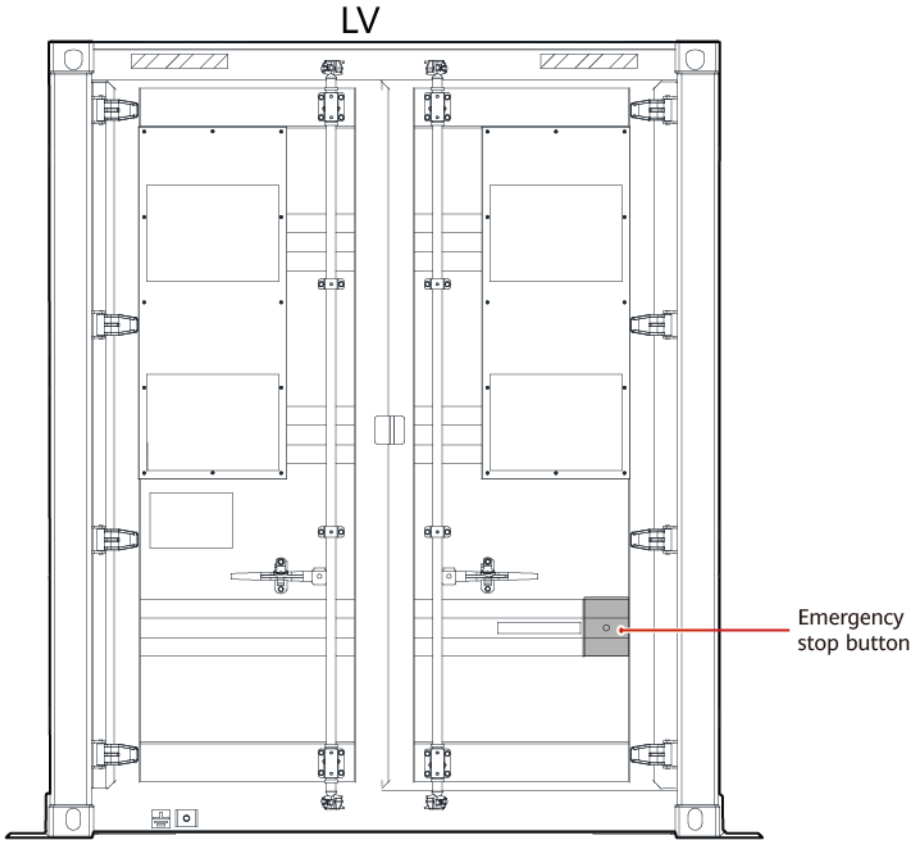
In case of an emergency, such as a fire or an electric shock, press the emergency stop button to power off the STS. The system will turn off the air circuit breaker (ACB) on the LV side and the circuit breaker in the MV room.

DANGER

Pressing the emergency stop button will interrupt services. Exercise caution when performing this operation in non-emergency situations.

Step 1 Press the emergency stop button.

Figure A-8 Pressing the emergency stop button



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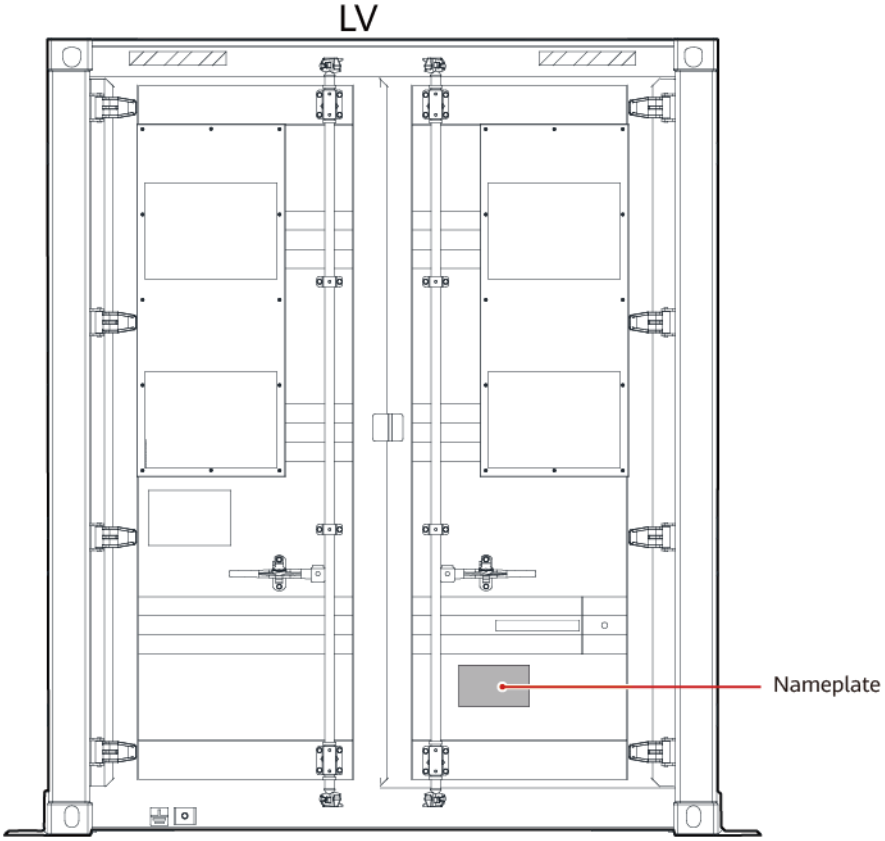
A.4 Where Can I Find the Transformer Nameplate?

You can check the STS information on its nameplate, which is located outside the double-swing door of the LV cabinet, as shown in the following figure.

Figure A-9 Nameplate position



A.5 How Do I Repair the Temperature Control System?

Step 1 Check whether the wiring terminals of the heat exchanger are damaged. If yes, replace the heat exchanger. For details, see **6.8.7 Replacing a Heat Exchanger**.

Step 2 Check whether the fan of the heat exchanger is damaged. If yes, replace the fan.

Step 3 Check whether all T/H sensors in the LV room or MV room are damaged. If yes, replace the T/H sensors. The methods for replacing T/H sensors in different positions are the same. For details, see Replacing a T/H Sensor in the LV Panel.

Step 4 Check whether the RS485 cables of the T/H sensors are damaged. If yes, replace the cables.

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B Acronyms and Abbreviations

A	
ACB	air circuit breaker
C	
COM	communication
CCO	Central Coordinator
I	
IMD	insulation monitor device
L	
LV	low voltage
M	
MBUS	Monitoring Bus
MCCB	Molded Case Circuit Breaker
MV	Medium Voltage
P	
PID	Potential Induced Degradation
PSU	Power Supply Unit
S	
SACU	Smart Array Control Unit
STS	smart transformer station
T	

TR	transformer
U	
UPS	Uninterruptible Power System

