

Preventive Maintenance Manual

PowerStack



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About This Manual

To ensure system safety and operational efficiency, routine inspections of the energy storage system (ESS) are required. This manual introduces the inspection intervals and procedures for the ESS.

This manual takes the products sold in markets following IEC standards as an example. Products sold in other markets are similar in terms of inspection requirements.

Target Group

This manual is intended for operators in energy storage plants and qualified electrical technicians.

How to Use This Manual

Read through this manual carefully before using the product, and keep it properly in an easy-to-reach place.

To increase customer satisfaction, the product and its manual will be updated and improved constantly. If the manual you have received is slightly inconsistent with the real product, it is probably owed to a product update. In such a case, the real product shall take precedence.

The manual may be updated and revised from time to time, however, there still might be slight deviations from the real product or errors. In such cases, the actual product you have purchased should take precedence. You can find the latest manual by scanning the QR code on the product or reaching your sales.

The figures in this manual are for reference only. The actual product received may differ.

Symbols in the Manual

To ensure the safety of life and property for users when using the product and to improve the efficiency of product use, the manual provides relevant information, which are highlighted by the following symbols.

Symbols used in this manual are listed below. Please review carefully for better use of this manual.

DANGER

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

Indicates a moderately hazardous situation which, if not avoided, will result in death or serious injury.

⚠ CAUTION

Indicates a slightly hazardous situation which, if not avoided, may result in minor or moderate injury.

NOTICE

Indicates a potential hazard which, if not avoided, will result in device malfunction or property damage.










“NOTE” indicates supplementary information, emphasis on specific points, or tips related to the use of the product that might help to solve your problems or save your time.

Signs on the Product

Observe at all times the warning signs on the product, including:

Sign	Definition
	High voltages inside! Risk of electrical shock hazards when touching it.
	Protective earthing (PE) terminal. This terminal must be connected for reliable grounding to ensure the safety of the operator.
	Read the manual before performing any operation on the product.
	After the product is disconnected from external power sources, wait at least 5 minutes before touching any of its internal conductive parts.
	Danger! Do not work on the product when it carries voltage.
	Beware of heavy weights! Lifting the heavy object directly may cause back injury. Please lift it with the assistance of proper tools.
	Beware of explosion.
	Beware of corrosion.
	Do not dispose of it together with household waste.

Sign	Definition
	No fires.
	A nearby medical facility must be set up.
	If it gets in your eyes, flush your eyes immediately with running water or saline, and seek medical advice in time.
	Wear safety goggles.
	The product is recyclable.
	The lithium battery is recyclable.
	Noise hazard! Wear earplugs.

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1 Validity

This manual applies to the following models of the PowerStack series energy storage system (ESS).

- ST255CS-2H
- ST510CS-4H

External Design

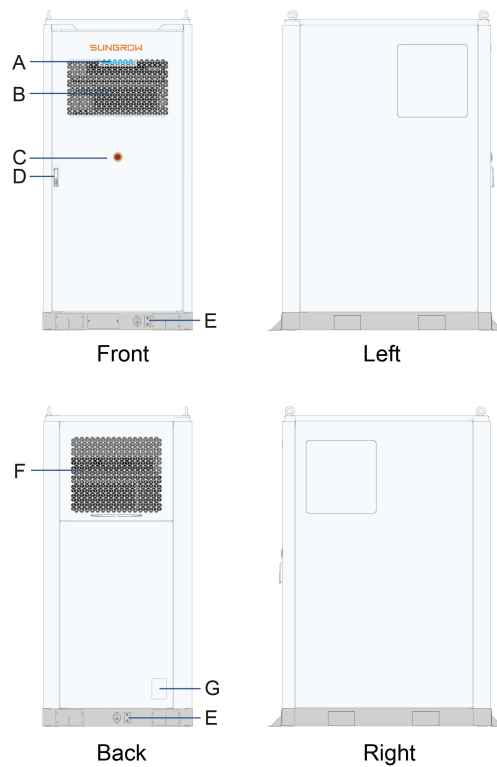


Figure 1-1 ST255CS-2H External Design

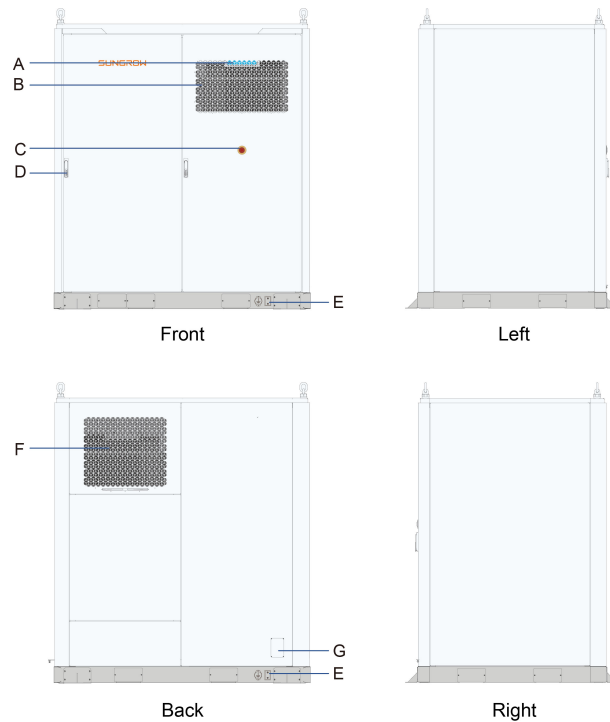


Figure 1-2 ST510CS-4H External Design



*The figure is for reference only. Optional components such as explosion vent panel and emergency ventilation fans are not shown. The actual product shall prevail.

No.	Item
A	LED indicator
B	Air inlet
C	Emergency stop button
D	Door lock
E	Grounding point
F	Air outlet
G	Nameplate

Internal Components

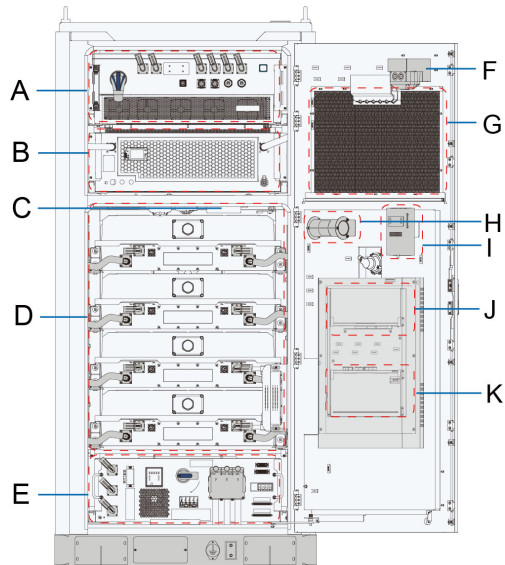


Figure 1-3 Internal Components of ST255CS-2H

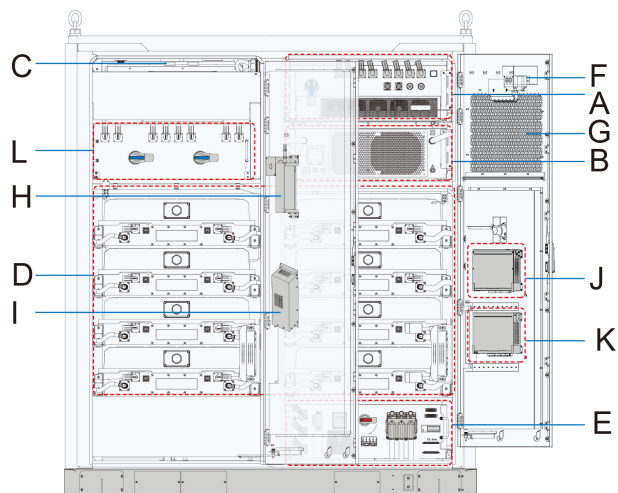


Figure 1-4 Internal Components of ST510CS-4H



*The figure is for reference only. The selection or location of some components is subject to change based on the project design. The final configuration of the supplied product shall prevail.

No.	Name
A	DC/AC power converter unit (SC125CX)
B	Liquid cooling unit
C	Fire suppression system (FSS) detector

No.	Name
D	Battery Rack (compartment)
E	Battery supply panel (BSP)
F	Alarm sounder
G	Stainless steel vent mesh
H	Aerosol
I	Dehumidifier
J	LC300
K	EMS300CP (optional)
L	Switch gear (S/G)

2 Safety Overview

2.1 Personnel Requirements

All inspection operations must and may only be performed by qualified technical personnel. Qualified technical persons must:

- Hold a valid electrician license as required by the country or region where the product is located.
- Be familiar with local standards and relevant safety codes for electrical systems.
- Be proficient in the principles and structure of the equipment and have experience in equipment operation or training.
- Read through this manual carefully and master relevant safety instructions, and clearly recognize all potential hazards associated with equipment operation and maintenance.

2.2 Weather and Environment Requirements

Weather Requirements

WARNING

- **Inspect the equipment in good weather conditions whenever possible. Stop inspection in severe weather conditions, such as heavy rain, fog, or strong wind.**
- **Do not open the door and maintain the system on rainy, humid, or windy days. SUNGROW shall not be held liable for any possible damage arising from failure to observe this instruction.**
- **Do not open the cabinet door on days with rain, snow, heavy fog, or high humidity. Make sure the sealing strip around the door does not curl after closing the cabinet door.**
- **Perform special inspection in response to adverse seasonal and weather conditions, such as rainy seasons, extreme cold, extreme heat, and typhoons.**

Place Warning Signs

NOTICE

To prevent unauthorized personnel from approaching the equipment and causing accidental operation or injury, observe the following precautions:

- Put up highly visible warning signs around the equipment to prevent accidents caused by inadvertent switching-on.
- Set up warning signages or fence off a warning zone near the equipment.

Escape Route

NOTICE

Power plants where the products are installed are typically located in remote field environments. Please observe the following precautions:

- Equip the site with appropriate rescue facilities.
- Keep all escape routes and rescue routes clear off any obstruction.

2.3 Protective Equipment

The protective equipment include personal protective equipment (PPE) and ESE (electrical safety equipment).

PPE

Wear the following PPE when performing inspection operations on the equipment. The PPE must comply with local regulatory requirements.



Reflective vest



Safety gloves



Safety helmet



Safety goggles

Earplugs

Safety shoes

ESE

If live work is required, a minimum of two operators must be present on site and the following ESE must be prepared to ensure personal safety.



Rescue pole

Insulated stool

Mask

2.4 Inspection Tools

Use safe, reliable, well-maintained inspection tools that are within their validity period to ensure the proper operation of equipment and personal safety.

Part of Inspection Tools

Clamp meter

1500 Vdc multimeter

Phase rotation tester



Screwdriver

Wrench set

Torque wrench

The above serves only as examples of part of common inspection tools. A comprehensive list of common inspection tools is not provided here. For the specific tools required for a given inspection item, see the "Tool Preparation" section for each respective inspection item.

2.5 Operation Requirements

Battery Safety

⚠ WARNING

- There are no user-maintainable parts inside battery units.
- Only personnel authorized by SUNGROW can remove, replace, or dispose of batteries. Users are not allowed to perform battery maintenance.

⚠ DANGER

Dismantling or incinerating batteries may result in fire.

Electrical Safety

⚠ DANGER

- Touching power grid or contact points and terminals in the devices connected to the power grid may lead to electric shock!
- Voltage may be generated on the battery or grid side. Verify that there is no voltage present using a standard voltmeter before touching.

⚠ DANGER

Hazardous high voltage inside the product!

- Always note and observe warning signs on the product.
- Observe safety precautions listed in this manual and other pertinent documents.
- Observe relevant protection requirements and precautions for batteries.

⚠ DANGER

Ensure the system has stopped running before power-off!

⚠ DANGER

Voltage may remain in the batteries even after the power supply of the ESS is disconnected. Before performing any operation, wait 10 minutes and then verify that the equipment is completely de-energized.

⚠ WARNING

Replacement of internal components must be performed exclusively by qualified personnel.

⚠ WARNING

- **To prevent electric shock, do not perform any maintenance operations beyond those covered in this manual.**
- **If maintenance services are required, contact SUNGROW Customer Service for maintenance.**

Component Safety**NOTICE**

- **Do not spray paint over any internal or external components of the equipment.**
- **Do not apply cleaning agents to any components or expose them to harsh chemicals.**

2.6 Component Disposal

Do not dispose of the damaged components identified during inspection as general waste. Some components may be recycled, while others may pose environmental hazards.

Please contact an authorized, specialized recycling service in your locality for proper disposal of the product and its internal components.

3 ESS

3.1 Inspection Items

The inspection items for the ESS are listed in the table below.



- The recommended maintenance intervals are listed below. These intervals should be adjusted based on the installation site conditions.
- The maintenance frequency is subject to factors like plant size, installation position, and on-site environment. For the equipment operating in sandy or dusty environments, it is necessary to increase the frequency of maintenance.

No.	Item	Description	Maintenance Interval
1	External inspection	<ol style="list-style-type: none"> 1. Check whether there are flammable materials around the cabinet. 2. Check whether the welds between the cabinet and the foundation steel plate are secure, and whether there is rust. 3. Check the enclosure for damage, paint peeling, oxidation, or other abnormal conditions. 4. Check whether the door lock operates smoothly and properly. Lubricate the door locks and hinges if necessary. 5. Check whether the sealing strip is secured properly. Intact sealing strips effectively prevent water ingress into the cabinet. Inspect the sealing strips thoroughly and promptly replace any damaged strips. 	Every year
2	System status and cleanliness	<ol style="list-style-type: none"> 1. Clean the foundation (with vacuum cleaner or broom). 2. Check the cabinet's air inlet filter screen for dust or dirt. Clean the filter screen if necessary. 	Every six months

No.	Item	Description	Maintenance Interval
		<ol style="list-style-type: none"> 1. Check whether there is foreign debris, dust, or dirt inside the cabinet. Clean internal dust if necessary. (Use vacuum cleaner instead of broom) 2. Check whether the air inlets and outlets of the cabinet are blocked. 3. Check whether internal screws fall off. 4. Check whether there is water ingress. 5. Check the coolant pipes for leaks. 	Every year
		<ol style="list-style-type: none"> 1. Check the cabinet and its internal devices for deformation and damage. 2. Check the internal devices for abnormal noise during operation. 3. Check whether the internal or enclosure temperature is too high. 4. Check whether the internal humidity are within the allowable range. 5. Check whether there is oxidation or rust inside. 	Every two years
3	Cable connection	<ol style="list-style-type: none"> 1. Check whether the power cables are loose. If so, fasten the cable at the specified torque. 2. Check the power cables for damage. Pay particular attention to areas where the cables contact metal surfaces for signs of cuts. 3. Check whether the cables are routed in compliance with the standards, and whether there are short circuits or other abnormal conditions. In case of any abnormal condition, take corrective measures immediately. 4. Check whether all cable inlets and outlets of the cabinet are properly sealed. 5. Check the power cables for loose or missing insulated cable ties. 	Every year

No.	Item	Description	Maintenance Interval
4	Grounding and equipotential bonding	<ol style="list-style-type: none"> 1. Check whether the ground connection is properly made. Ensure the ground resistance does not exceed 4 Ω. 2. Check whether the equipotential bonding inside the system is correct. 3. Check whether the cable shielding and the insulating sleeves are in proper contact, and whether the grounding flat steel is properly secured. 	Every year
5	Components	<ol style="list-style-type: none"> 1. Check the operating status of the cooling fan module. Check whether the fan is blocked or generates unusual noise during operation. Clean the cooling module with a vacuum cleaner if necessary. 2. Regularly check all metal components for rust. 	Every six months
		<ol style="list-style-type: none"> 1. Check that the surge protection devices and fuses are damage-free and functioning properly. Replace the damaged surge protection devices and fuses promptly. 	Every year
6	Functionality	<ol style="list-style-type: none"> 1. Check the configurable parameters on the Web. 2. Check the operation records of the Rack and whether the current, voltage, and temperature are within the allowable range. 3. Safety function: Check whether the emergency stop button functions properly. 4. Check the warning signs and other markings on the equipment, and replace them promptly if they are blurred or damaged. 5. For a long-idle battery energy storage system, perform charging and discharging every six months 	Every six months

No.	Item	Description	Maintenance Interval
		to bring the system SOC to 30%–40%. Ensure the SOC values are consistent after recharging.	
7	Liquid cooling system	<ol style="list-style-type: none"> 1. Check whether the fan blades rotate properly and are free of damage. Replace the fan if its blades cannot operate properly or are damaged. 2. Check if the blockage area at the pump's air inlet exceeds 5%. If it does, clean it using a brush. 3. Visually check the pump body (excluding pipe joints) for visible dripping (except condensation). If dripping is observed, replace the pump seal rings. 4. Check via the upper computer software for liquid cooling unit alarms. If a low coolant level alarm is reported, refill the coolant. 5. Check whether the coolant contains visible impurities, whether the antifreeze color has significantly darkened, or whether the pH value is below 7.3. 6. (Optional) Check whether the dehumidifier operates properly. Log in to the LC user interface and check the operating status of the dehumidifier. Check the dehumidifier drain pipe for blockages or U-shaped bends. 	Every six months
8	FSS	<p>Visual Inspection</p> <ol style="list-style-type: none"> 1. Visually check the sprinkler. Check the device for any external damage and verify whether it is being stressed by adjacent devices. 2. Visually check the FSS piping. Check the device for any external damage and verify whether it is being stressed by adjacent devices. 	Every year

No.	Item	Description	Maintenance Interval
		<ol style="list-style-type: none"> 3. Visually check the detector. Check the device for any external damage and verify whether it is being stressed by adjacent devices. Check whether the device status indicator is normal. 4. (Optional) Visually check the alarm sounder. Check the device for any external damage and verify whether it is being stressed by adjacent devices. 5. (Optional) Visually check the FSS gas extinguishant piping for Packs. Check the device for any external damage and verify whether it is being stressed by adjacent devices. 6. (Optional) Visually check the data concentrator. Check the device for any external damage and verify whether it is being stressed by adjacent devices. 7. Visually check the aerosol for damage and deformation. 8. (Optional) Visually check the explosion vent panel for damage or deformation. 9. (Optional) Visually check the emergency ventilation fans. Clean any dust or foreign debris. 	
		<p>Linkage test (Australia only). Request qualified third-party personnel to conduct a linkage test of the FSS at least once a year to ensure its stable operation. Any additional requirements from local fire authorities must also be observed.</p>	Every year
		<p>(Optional) Perform multi-sensor detector maintenance. Remove dust inside the detector using an air blower. After cleaning, log in to the LC user interface and check the smoke concentration</p>	Every three months

No.	Item	Description	Maintenance Interval
		measured by the detector. A reading of less than 3 mg/m ³ is considered acceptable.	
		(Optional) Perform combustible gas detector, smoke detector, and heat detector maintenance. Check the indicator status of the combustible gas detector. Check the detector's operating status via the software. Check the indicator status of the smoke detector and heat detector.	
		(Optional) Visually check the gas cylinder. Check the device for any external damage and verify whether it is being stressed by adjacent devices. Check whether the pointer is within the green zone.	
		(Optional) Check whether the emergency ventilation fans operate normally. Log in to the LC user interface and check the operating status of the fans.	
		(Optional) Replace the combustible gas detector.	Every two to three years
		(Optional) Replace the multi-sensor detector.	Every eight years
		(Optional) Replace the smoke detector and heat detector.	Every eight to ten years
		(Optional) Replace the aerosol.	Every ten years



This manual covers scenarios for different system configurations. Perform maintenance based on the actual on-site project configuration.

3.2 External Inspection

3.2.1 Safety Precautions

⚠ WARNING

Follow the procedure for working at heights when performing inspection on the top of the cabinet. Maintenance personnel must wear the appropriate PPE, such as a safety helmet and safety harness for working at height.

⚠ WARNING

- Maintenance personnel must wear the appropriate PPE when handling flammable materials . The PPE must comply with relevant national standards. Required PPE includes, but is not limited to, safety helmets, safety gloves, and protective clothing.
- Handle flammable materials during daylight hours whenever possible. If night-time handling is unavoidable, do not use open-flame lighting sources.
- Do not smoke and avoid any activities that involve open flames or ignition sources while handling flammable materials.
- Do not throw, drag, or roll any flammable materials.

⚠ WARNING

- Rust removers release highly flammable gases. Keep rust removers away from sources of heat, sparks, open flames, or static electricity.
- Use rust removers only in a well-ventilated environment.
- Avoid contact of rust removers with skin and eyes, and avoid inhaling rust removers. In case of contact or inhalation, seek immediate medical attention.

NOTICE

When closing the door, ensure the sealing strip around the door does not curl.

3.2.2 Material Preparation

3.2.2.1 Tool Preparation

Before external inspection, it is suggested to prepare the appropriate tools, including but not limited to those listed below, to ensure the maintenance work can be completed smoothly.

No.	Item	Quantity (pcs)	Description
1	Ladder	1	A 2.5-meter A-shaped ladder is recommended (The cabinet is 2450 mm in height. You may select the ladder according to the height of the foundation on-site.)

No.	Item	Quantity (pcs)	Description
2	Safety harness	1	-
3	Safety helmet	1	-
4	Safety gloves	1	-
5	Dust mask	1	-
6	Protective clothing	1	-
7	Rust remover	1	It is recommended to use a metal surface rust remover that can quickly remove rust without corroding the material of the workpiece.
8	Wrench	1	Open-end and socket wrenches are recommended.
9	Cleaning cloth	1	Cleaning cloths or other suitable cleaning tools are recommended.
10	Alcohol or other non-corrosive cleaning agents	1	If water cannot remove the dirt, you may use the following cleaning agents. <ul style="list-style-type: none"> • 97% alcohol. • Commonly used non-corrosive cleaning agent in your locality.
11	Sandpaper	1	-
12	Soft brush	1	-
13	Paint	1	Color: RAL9003*
14	Zinc-rich primer	1	-
15	Grease lubricant	1	-
16	Industrial vacuum cleaner	1	It is recommended to use an industrial vacuum cleaner equipped with swivel casters and fixed casters.

*The recommended color in this manual applies to the standard configuration. For customized products, refer to the actual color used on the product.

3.2.2.2 Consumable Parts List



The following list is for reference only. If any items differ from the parts used on site, the on-site parts shall prevail.

No.	Name	Material No.	Included in factory spare parts list?
1	Hex bolt (fully threaded)	S0A00224	Yes
2	Big washer (Grade A)	S-Q-000394	Yes
3	Cross-recessed hex head fastener assembly	S-Z-000636	Yes
4	Standard spring washer	S-Q-000070	Yes
5	Hinge assembly	F-U-000530	No
6	Sealing strip	F-E-000870	No
7	Warning label	F-GC-00764	No

3.2.3 Inspection Procedure

The workflow for external inspection is shown in the figure below. The maintenance task takes approximately 20 minutes.

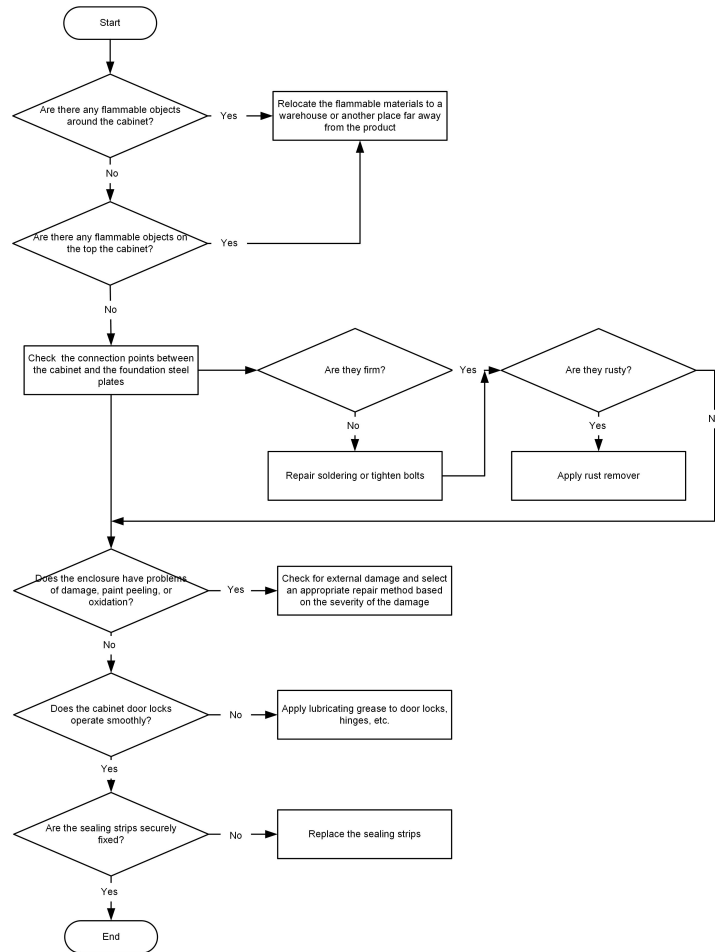


Figure 3-1 Workflow for External Inspection

3.2.4 Inspection Procedure (Every Year)

Step 1 Check whether there are flammable materials around or on the top of the ESS.



Common flammable materials include, but are not limited to, linoleum, wood, paint, plastic products, and decorative and finishing materials.

- a. Wear PPE such as a safety helmet and protective clothing. Visually check for any flammable materials around the ESS.
- b. Wear a safety harness and other appropriate PPE, and climb a ladder to check for any flammable materials at the top of the ESS.
- c. If any flammable materials are found, wear safety gloves, dust masks, and other appropriate PPE, and move these materials to a designated storage area away from the ESS.

- Step 2** Check whether the welds between the ESS and the foundation steel plate are secure, and whether there is rust.
- Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
 - Wear a safety helmet and safety gloves. Check whether the connection points between the ESS and the foundation steel plates are secure.
 - For welded connection, check whether the welds between the cabinet and the foundation steel plates are secure. If loose connections, cracks, or any other abnormal conditions are found, re-weld the affected areas. After welding, apply an anti-corrosion treatment to the new welds.



Figure 3-2 Secured by Welding

*The figure is for reference only.

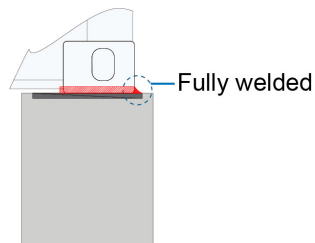


Figure 3-3 Continuous Welding

*The figure is for reference only.

- For bolted connection, check whether the bolts securing the cabinet to the foundation steel plates are secure by pushing gently on the cabinet. If any looseness is detected, tighten the bolts using a torque wrench.

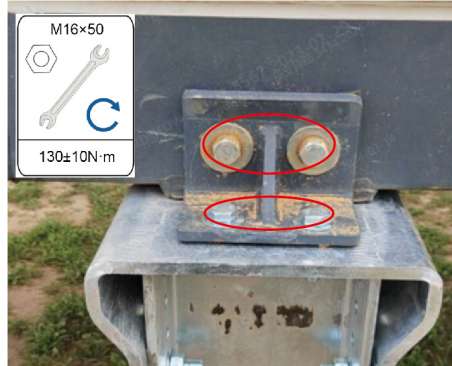


Figure 3-4 Secured by Bolts

*The figure is for reference only.

- e. Check the connection points between the ESS and the foundation steel plate for rust. If rust is found, remove it using sandpaper or rust remover. Once the surface is dry, apply a protective coating with a soft brush.

Step 3 Check whether there is any damage, paint peeling, or oxidation on the ESS enclosure.

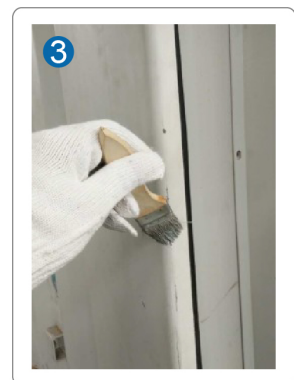
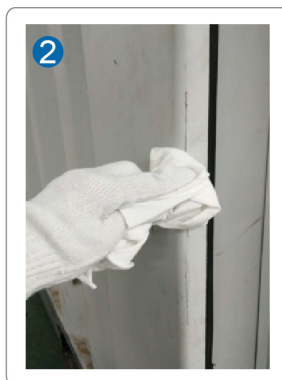
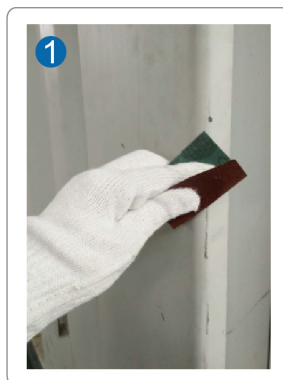
Check the external damage and choose an appropriate solution based on the severity.

a. Level 1: removable dirt and stains.

1. Wet the cloth (or other scrubbing tools) with water and use it to clean the affected area.
2. If the dirt or stain persists, use 97% alcohol to wipe the affected area until it is clean enough to meet the standards (You may also use non-corrosive cleaning agents that are commonly used in your locality.)

b. Level 2: irremovable dirt and stains.

1. Polish the area with paint burrs or scratches using sandpaper to smooth the surface.
2. Wet the cloth with water or 97% alcohol and scrub the affected area to remove the dirt and stain from the surface.
3. Once the surface is dry, apply touch-up paint to the scratched area using a soft brush. Ensure the paint is evenly applied.



*The figure is for reference only.

- c. Level 3: primer damage with substrate exposed.
1. Polish the damaged area using sandpaper to remove the rust or burrs and create a smooth surface.
 2. Wet the cloth with water or 97% alcohol and scrub the affected area to remove the dirt and stain from the surface.
 3. Once the surface is dry, spray zinc-rich primer paint over the area with exposed substrate. Ensure the paint completely covers the exposed substrate.
 4. After the primer is dry, apply touch-up paint to the damaged area using a soft brush. Ensure the paint is evenly applied.



*The figure is for reference only.

Step 4 Check whether the door lock operates properly. Lubricate the door locks and hinges if necessary.

- a. Wear safety gloves, then open and close the ESS cabinet door. Check the door lock and hinges for smooth operation.



Figure 3-5 Door Lock and Hinge

*The figure is for reference only.

- b. If the door lock or hinge feels stiff or gets stuck when opening or closing the door, check for the jammed position and apply grease lubricant to the hinge at that spot.
- c. If the door lock body is rusted and the cabinet door cannot be opened, request a spare part for replacement.

- Step 5** Check whether the sealing strip is secured properly. Intact sealing strips effectively prevent water ingress into the ESS. Inspect the sealing strips thoroughly and promptly replace any damaged strips.
- Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
 - Wear safety gloves, and open the ESS cabinet door. Check the sealing strips for cracks, detachment, or severe wear. Gently pull and lift them to check their flexibility and resilience.

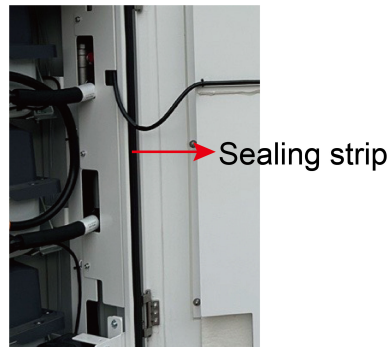


Figure 3-6 Sealing Strip

*The figure is for reference only.

- If any abnormal condition is found during the inspection, it is recommended to replace the corresponding sealing strip.
 - Apply silicone sealant to the sealing strip joints.
- End

3.3 System Status and Cleanliness

3.3.1 Safety Precautions

⚠ WARNING

Internal devices must be replaced by qualified personnel to ensure safety.

⚠ WARNING

- It is not recommended to open the cabinet door to check for abnormal noise during the equipment operation.
- Before opening the cabinet door and investigating abnormal noise, shut down the system first.

⚠ WARNING

- **Do not clean with water directly. Use a vacuum cleaner if necessary.**
- **Do not use cleaning agents for internal devices or expose them to harsh chemicals.**

3.3.2 Material Preparation

3.3.2.1 Tool Preparation

Before system status and cleanliness inspection, it is suggested to prepare the appropriate tools, including but not limited to those listed below, to ensure the maintenance work can be completed smoothly.

No.	Item	Quantity (pcs)	Description
1	Safety helmet	1	-
2	Safety gloves	1	-
3	Ladder	1	A 2.5-meter A-shaped ladder is recommended (The ESS is 2450 mm in height. You may select the ladder according to the height of the foundation on-site.)
4	Safety harness	1	-
5	Window screen brush	1	It is recommended to use a window screen brush to clean the mesh screen.
6	Dust mask	1	-
7	Thermometer	1	Non-contact thermometers are recommended.
8	Multimeter	1	-
9	Hygrometer	1	-
10	Desiccant	As required	<ul style="list-style-type: none"> • Desiccants containing activated carbon, silica gel, calcium chloride, or cellulose are recommended. • If the humidity inside the cabinet is too high, consider whether a dehumidifier is required.

No.	Item	Quantity (pcs)	Description
11	Rust remover	1	It is recommended to use a metal surface rust remover that can quickly remove rust without corroding the material of the workpiece.
12	Sandpaper	1	-
13	Soft brush	1	-
14	Zinc-rich primer	1	-
15	Dry tissue or dry cloth	1	It is recommended to use cleaning tools that are dry, such as dry tissue and cloth
16	Industrial vacuum cleaner	1	It is recommended to use an industrial vacuum cleaner equipped with swivel casters and fixed casters.
17	Screwdriver	1	Electric screwdrivers are recommended.
18	Wrench	1	Open-end and socket wrenches are recommended.
19	Flashlight	1	Flashlights, searchlights, or other lighting devices are recommended.

3.3.2.2 Consumable Parts List



The following list is for reference only. If any items differ from the parts used on site, the on-site parts shall prevail.

No.	Name	Material No.	Included in factory spare parts list?
1	OT terminal	G-L-000403	No
2	Cross-recessed hex head fastener assembly	S-Z-000636	No
3	Cross-recessed hex bolt, spring washer, and flat washer assembly	S-Z-000454	No
4	Cross-recessed hex bolt and spring washer assembly	S-Z-000012	No

No.	Name	Material No.	Included in factory spare parts list?
5	Hex bolt, spring washer, and big flat washer assembly	S0A00224	No
6	Big washer (Grade A)	S-Q-000394	No
7	Hex flange nut	S-B-000033	No
8	Hex bolt (fully threaded)	S-A-000065	No
9	Montmorillonite desiccant	Y-G-000049	Yes
10	Sealing strip	F-E-000870	No

3.3.3 Inspection Procedure

The workflow for system status and cleanliness inspection is shown in the figure below.

Every Six Months

The maintenance task takes approximately 10 minutes.

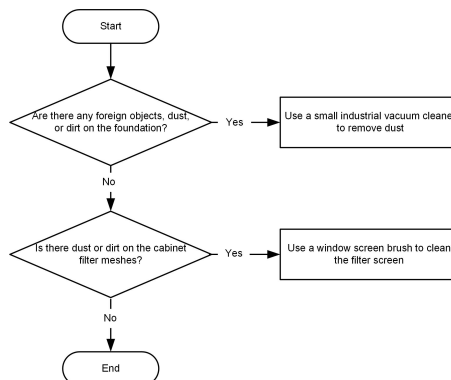


Figure 3-7 Workflow for System Status and Cleanliness Inspection (Every Six Months)

Every Year

The maintenance task takes approximately 15 minutes.

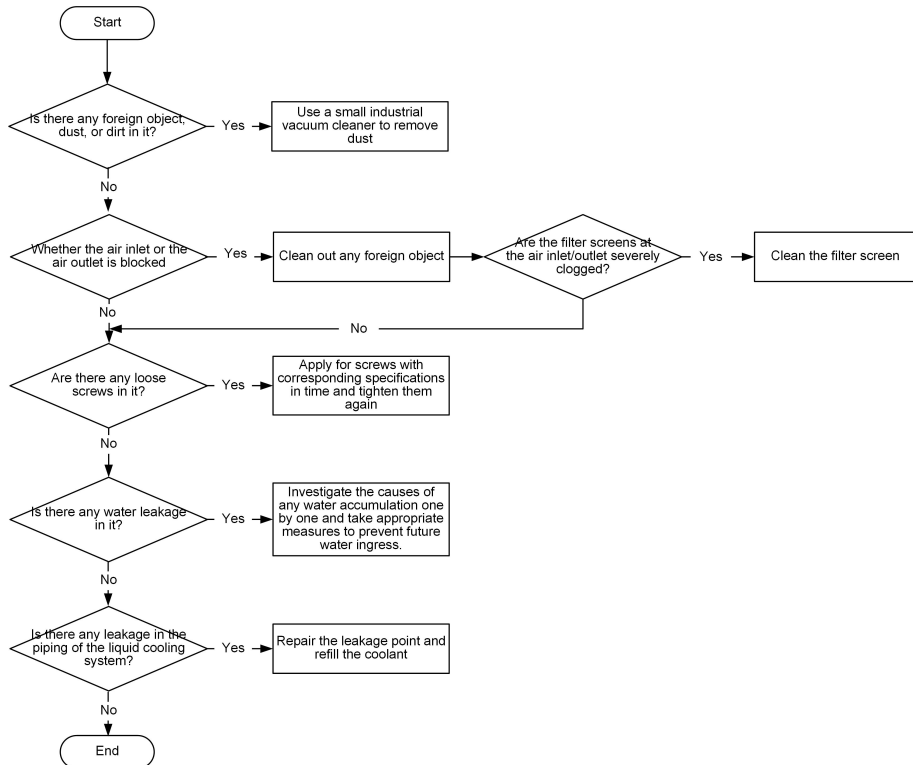


Figure 3-8 Workflow for System Status and Cleanliness Inspection (Every Year)

Every Two Years

The maintenance task takes approximately 20 minutes.

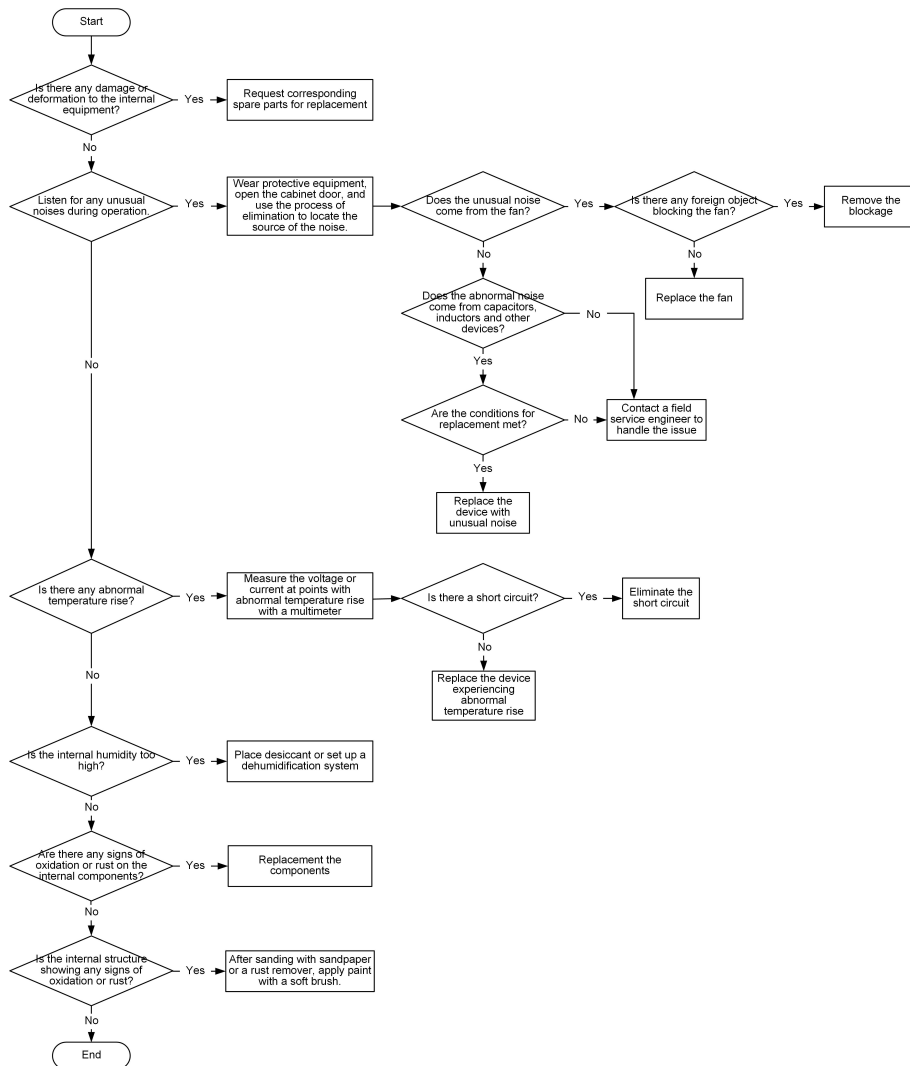


Figure 3-9 Workflow for System Status and Cleanliness Inspection (Every Two Years)

3.3.4 Inspection Procedure (Every Six Months)

Step 1 Check whether there is foreign debris, dust, or dirt on the foundation.

- a. Visually check the foundation for foreign debris, dust, or dirt.
- b. If there is excessive dust, wear dust masks and remove dust using a broom or an industrial-grade vacuum cleaner.

Step 2 Check whether there is dust or dirt on the filter screens at the air inlets and outlets of the ESS. Clean the screens if necessary.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear a safety helmet and safety gloves, and check the metal filter screens of the ESS.

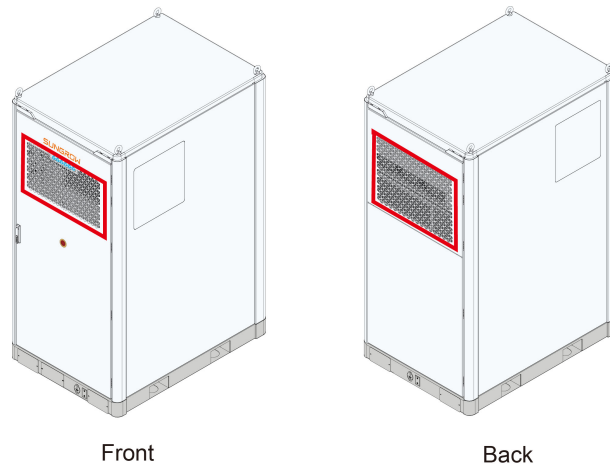


Figure 3-10 Filter Screens

*The figure is for reference only.

- c. If severe dust accumulation is found on the filter screens, clean with a screen cleaning brush.

--End

3.3.5 Inspection Procedure (Every Year)

Step 1 Check whether there is foreign debris, dust, or dirt inside the ESS.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear a safety helmet and safety gloves, and open the ESS cabinet door.
- c. Wipe the inner surfaces of the ESS with a dry tissue or cloth. Determine whether internal dust removal is required based on the amount of dirt observed on the used tissue or cloth.



Figure 3-11 Wipe with a Dry Tissue or Cloth

*The figure is for reference only.

- d. If excessive dust is found inside the ESS, shut down the system, wear dust masks, and remove dust using an industrial-grade vacuum cleaner.

Step 2 Check whether the air inlets and outlets of the ESS cabinet are blocked.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear a safety helmet and safety gloves, and open the ESS cabinet door.
- c. Check whether there is blockage in the air inlet of the liquid cooling unit and in the air outlet of the fan installation area.

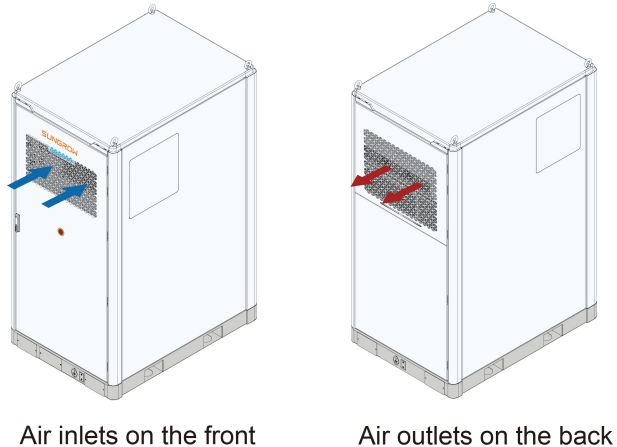


Figure 3-12 Air Inlet and Outlet

*The figure is for reference only.



For the equipment working in sandy or dusty environments, it is necessary to shorten the maintenance interval.

- d. If any blockage is found, remove it and manually rotate the fan to check whether it spins smoothly.
- e. If the filter screens of the air inlets and outlets are severely blocked, clean the filter screens.

Step 3 Check whether there are any missing screws inside the ESS.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear a safety helmet and safety gloves, and open the ESS cabinet door.
- c. Visually check for any missing screws inside the ESS. It is recommended to compare with adjacent equipment of the same model for reference.

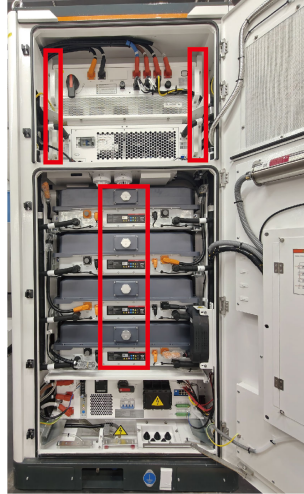


Figure 3-13 Locations of Screws

*The figure is for reference only.

- d. If any screws are missing, promptly request screws with the same specifications and install them using a torque wrench. For bolt tightening torque values, see [8.3 Tightening Torque](#).

Step 4 Check whether there is water ingress into the ESS.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear a safety helmet and safety gloves, and open the ESS cabinet door.
- c. Use a flashlight or a searchlight to carefully inspect all corners of the cabinet for water accumulation.



Figure 3-14 Inspect with Flashlight or Searchlight

*The figure is for reference only.

- d. If water accumulation is detected, systematically investigate the system until the source is located, and implement corresponding measures to prevent further water ingress.
 1. Check whether the ESS cabinet door is fully closed and whether the door seal strips are compromised.
 2. Check whether all cable inlets and outlets are properly sealed.
 3. Check whether there is condensation due to high humidity.

Step 5 Check the liquid cooling pipes inside the ESS for leakage.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear a safety helmet and safety gloves, and open the ESS cabinet door.
- c. Use a flashlight or a searchlight to carefully inspect all corners of the cabinet for leakage.



Figure 3-15 Inspect with Flashlight or Searchlight

*The figure is for reference only.

- d. If coolant leakage is detected, locate the source. After the repair is completed, refill the coolant.

Open the ESS cabinet door and refill the tank until the coolant level in the glass tube is between the midline and the H line.

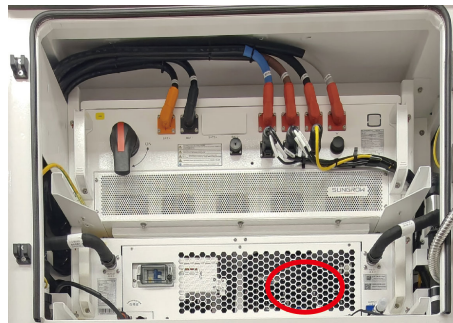


Figure 3-16 Location of Level Gauge

*The figure is for reference only.

For specific instructions regarding coolant refilling, draining, and pH testing, see “Coolant Filling and Drainage Operations” in [ST255CS Operation & Maintenance Guide](#).

--End

3.3.6 Inspection Procedure (Every Two Years)

Step 1 Check the internal devices of the ESS for deformation and damage.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear a safety helmet and safety gloves, open the ESS door, and visually check the internal devices.



Figure 3-17 ESS Cabinet Interior

*The figure is for reference only.

- c. Check where there is any visible damage on the Packs and the components and cables within the DC/AC power converter unit and BSP.
- d. If any of the above conditions is found, request corresponding spare parts for replacement promptly.

Step 2 Check the internal devices for abnormal noise during operation.

NOTICE

It is not recommended to open the cabinet door to perform this inspection item.

- a. Wear a safety helmet. Standing near the ESS, listen carefully to identify any unusual sounds (excluding wind noise, regular current noise, etc.).

- b. If any abnormal noise is identified, wear safety gloves, open the ESS cabinet door, and locate the source of the noise using the elimination method.
- c. If the noise originates from the fan, shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- d. Check whether the fan is blocked by any foreign objects. If no blockage is found but the noise persists, consider replacing the fan.
- e. If the abnormal noise originates from capacitors, inductors, or other components, replace the part if conditions allow. If replacement is not feasible, contact a field service engineer for support.

Step 3 Check whether the internal or enclosure temperature of the ESS is too high.



Due to varying rated operating conditions for different devices, there is no unified standard for temperature rise assessment. You may measure and analyze the temperatures of multiple systems to facilitate the assessment.

- a. Power off the system at the end of charging or discharging. Wear a safety helmet and safety gloves, and open the ESS cabinet door.
- b. Measure the temperatures of Pack cables and other components inside the cabinet using a non-contact thermometer to check for any abnormal temperature rise.



Figure 3-18 Measure Temperature

*The figure is for reference only.

- c. If abnormal temperature rise is detected, measure the voltage or current at the identified point using a multimeter during system operation to rule out potential short circuits.
- d. For non-short circuit faults, it is recommended to directly request spare parts and replace the components with abnormal temperature rise.

Step 4 Check whether the humidity inside the ESS is within the normal range.

- a. Wear a safety helmet and safety gloves, and open the ESS cabinet door.
- b. Use a hygrometer to check whether the ambient humidity is within the range of 0% to 100% (non-condensing). Simultaneously, check the cabinet interior for water stains or condensation.
- c. If the ambient humidity is excessively high or condensation is observed inside the ESS, it is recommended to place desiccant packs inside the cabinet.



Figure 3-19 Desiccant Packs

*The figure is for reference only.

NOTICE

Ensure the desiccant packs do not block the air inlets and outlets of the equipment.

- d. If condensation is observed inside the cabinet, check whether the cabinet door is sealed properly.
- e. If the humidity inside the cabinet remains excessively high, assess the need for a dehumidifier. If required, contact the field service engineer.

Step 5 Check for oxidation or rust inside the ESS.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear a safety helmet and safety gloves, open the ESS cabinet door, and visually check for rust or oxidation.
- c. If rust or oxidation is found inside the cabinet, it is recommended to replace the affected components.
- d. If rust or oxidation is found on the structural members, remove the rust using sandpaper or rust remover, and apply touch-up paint with a soft brush.

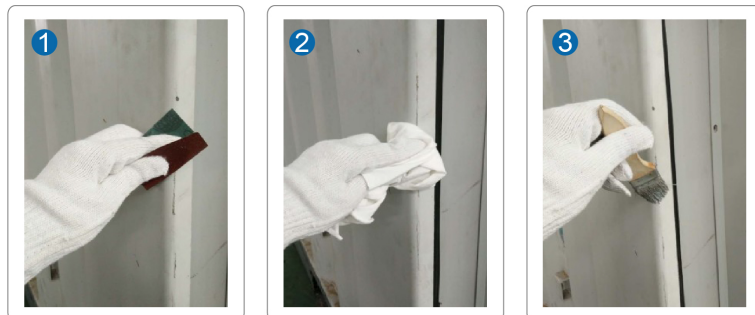


Figure 3-20 Remove Rust and Apply Paint

*The figure is for reference only.

--End

3.4 Cable Connection

3.4.1 Safety Precautions

⚠ DANGER

High voltages! Danger of electric shock!

- Do not touch any live part!
- Before inspection, ensure the AC and DC sides are voltage-free.

⚠ WARNING

- Check the polarity of all input cables. Verify that the cable markings match the copper bar labels to ensure the correct polarity for each input.
- Do not forcibly pull any wires or cables, as this may diminish their insulation performance.
- Ensure that all cables and wires have sufficient space for any bends.
- Take necessary auxiliary measures to reduce the stress on cables and wires.

NOTICE

Connect and disconnect the cables by following the standard operation procedure. Avoid any rough or forceful operation.

NOTICE

When inserting or removing the power cable plugs of the Packs, press and hold the button on the plug. Failure to do so may result in a loose connection, poor contact, or damage to the connector.

NOTICE

Cable remediation must comply with the applicable standards or regulations in the country/region where the project is located.

3.4.2 Material Preparation

3.4.2.1 Tool Preparation

Before cable inspection, it is suggested to prepare the appropriate tools, including but not limited to those listed below, to ensure the maintenance work can be completed smoothly.

No.	Item	Quantity (pcs)	Description
1	Safety helmet	1	-
2	Safety gloves	1	-
3	Firestop putty	As required	Firestop putty becomes stiff at low temperatures. You can soften it by placing it in warm water at around 50°C before use.
4	Thermal imager	1	It is recommended to use an infrared thermal imager.
5	Screwdriver	1	Phillips screwdrivers are recommended.
6	Wrench	1	Open-end and socket wrenches are recommended.
7	Flashlight	1	Flashlights, searchlights, or other lighting devices are recommended.
8	Heat gun	1	-
9	Heat shrink tubing	As required	-

3.4.2.2 Consumable Parts List



The following list is for reference only. If any items differ from the parts used on site, the on-site parts shall prevail.

No.	Name	Material No.	Included in factory spare parts list?
1	Container cable assembly	B0A03008	Yes
2	Pack communication cable	D0JT0293	Yes
3	Heat shrink tubing	F-P-000062	No
4	Waterproof connector	F-E-000627	No
5	Cable tie	Y-G-000043	No

3.4.3 Inspection Procedure

The inspection workflow for cable connections is shown in the figure below. The maintenance task takes approximately 20 minutes.

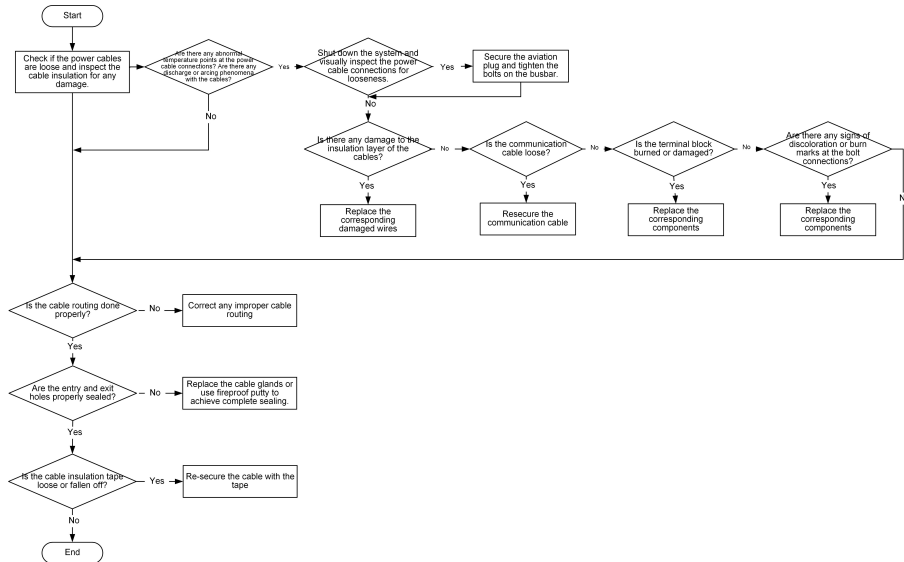


Figure 3-21 Inspection Workflow for Cable Connections

3.4.4 Inspection Procedure (Every Year)

Step 1 Check whether are any loose power cable connections. If so, fasten them at the specified torque. Check the power cables for damage. Pay particular attention to areas where the cables contact metal surfaces for signs of cuts.

- a. Wear a safety helmet and safety gloves, and open the ESS cabinet door.
- b. During the equipment charging/discharging, use a thermal imager to measure all power cable connection points and check for significant temperature anomalies. The areas to be checked include the aviation plugs between Packs, as well as those between the Pack and the DC/AC power converter unit, and the bolt connections between AC power cables and copper bars.



Figure 3-22 Measure with Thermal Imager

*The figure is for reference only.

- c. When the system is powered on, check the power cables and the communication cables inside the ESS for arcs.
- d. If any abnormal conditions such as loose connection or arc discharge are observed, shut down the system promptly and perform inspection. For specific procedures of shutting down the system, see [8.4.1 Startup/Shutdown via Web](#).
- e. Use a compatible torque wrench to tighten the bolts on the copper bar of the devices including the DC/AC power converter unit and BSP. For bolt tightening torque values, see [8.3 Tightening Torque](#).
- f. Check all power cables and control cables inside the cabinet for insulation damage using a flashlight or a searchlight. Pay particular attention to areas such as bends, hinge points, and pipe connection points. If any insulation damage is found, replace the affected cable promptly.
- g. Check whether the communication cables are securely connected. Fasten any loose connections.

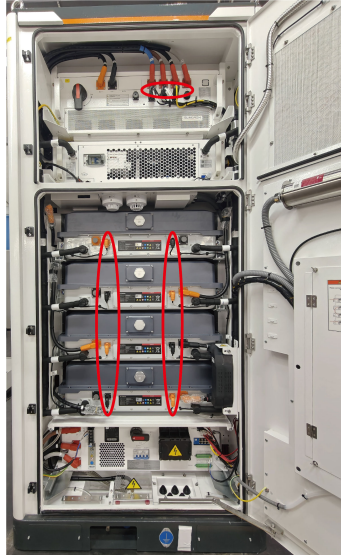


Figure 3-23 Position of Communication Cables

*The figure is for reference only.

- h. Check the terminal blocks inside the cabinet for burn marks, physical damage, or other anomalies. If abnormal issues are found, replace the affected part.
- i. Check all bolt connections for discoloration or burn marks. If discoloration or burn marks are found, it is recommended to replace the affected bolts.

Step 2 Check whether the cables are routed in compliance with the standards, and whether there are short circuits or other abnormal conditions.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear a safety helmet and safety gloves, and open the ESS cabinet door.
- c. Visually inspect the connections between the Pack and the DC/AC power converter unit, the DC/AC power converter unit and the BSP, and the BSP and other equipment, checking for any damage to the cable shielding and ensuring that the cable routing complies with standards.
- d. Replace any cable with external damage. For cable replacement procedures, see [8.2 Prepare Cables](#).
- e. If the cables are not routed in compliance with the standards, correct the routing.

Step 3 Check whether the cable inlets and outlets of the ESS are all sealed properly.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear a safety helmet and safety gloves, and open the ESS cabinet door.
- c. Check if the cable inlets and outlets of the ESS are fully sealed. Replace the cable glands or seal the cable inlets and outlets using firestop putty if necessary.

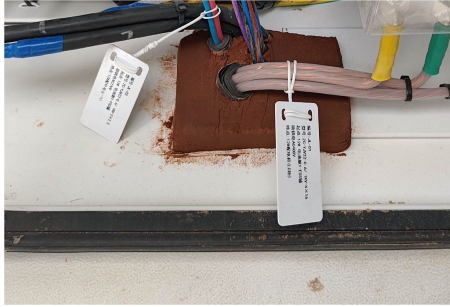


Figure 3-24 Seal Cable Inlets/Outlets

*The figure is for reference only.

- d. Check whether the cable inlets and outlets of the Rack, DC/AC power converter unit, BSP, and other equipment are properly sealed, and verify if there are any holes, gaps, or detached sealing materials.

Step 4 Check the power cables for loose or missing insulated cable ties.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear a safety helmet and safety gloves, and open the ESS cabinet door.
- c. Use a flashlight or a searchlight to check the power cables and the control cables inside the equipment for damaged, loose, or detached insulated cable ties.

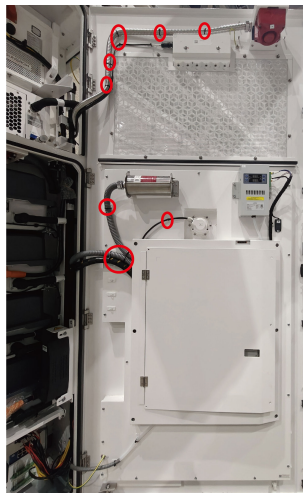


Figure 3-25 Locations of Cable Ties

*The figure is for reference only.

- d. If any such condition is found, re-secure the cables using cable ties.

--End

3.5 Grounding and Equipotential Bonding

3.5.1 Safety Precautions

NOTICE

The cabinet must employ dual grounding, with both grounding points reliably grounded.
Grounding must be completed by strictly following the applicable local standards and regulations.

3.5.2 Material Preparation

3.5.2.1 Tool Preparation

Before grounding and equipotential bonding inspection, it is suggested to prepare the appropriate tools, including but not limited to those listed below, to ensure the maintenance work can be completed smoothly.

No.	Item	Quantity (pcs)	Description
1	Safety helmet	1	-
2	Safety gloves	1	-
3	Multimeter	1	-
4	Screwdriver	1	Phillips screwdrivers are recommended.
5	Wrench	1	Open-end and socket wrenches are recommended.
6	Ground resistance tester	1	-

3.5.2.2 Consumable Parts List



The following list is for reference only. If any items differ from the parts used on site, the on-site parts shall prevail.

No.	Name	Material No.	Included in factory spare parts list?
1	Grounding cable	-	No

NOTICE

It is recommended that the grounding cable have a cross-sectional area equal to half that of the phase wire, and that the grounding cable use the same conductor material as the phase wire.

3.5.3 Inspection Procedure

The inspection workflow for grounding and equipotential bonding is shown in the figure below. The maintenance task takes approximately 15 minutes.

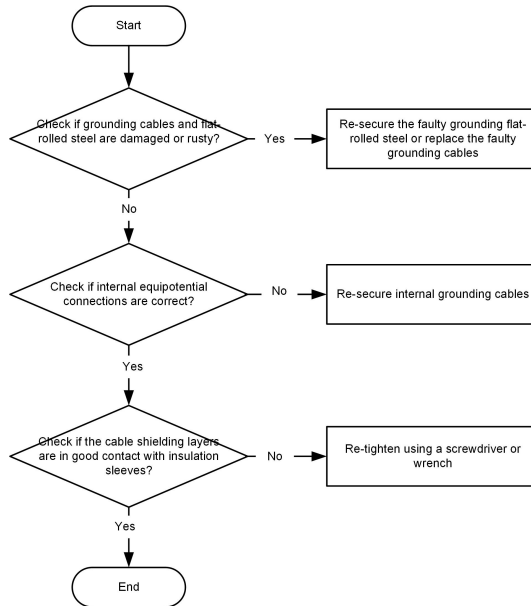


Figure 3-26 Workflow for Grounding and Equipotential Bonding Inspection

3.5.4 Inspection Procedure (Every Year)

Step 1 Check whether the ground connection is properly made. Ensure the ground resistance does not exceed 4 Ω .

i To ensure accuracy, it is recommended to repeat the measurement with the probes placed in different directions.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear safety helmets and safety gloves. Visually inspect the grounding cables or flat steels connected to the two grounding points of the ESS for any damage or rust.
- c. Use a multimeter to measure the resistance of the conductor between the ESS grounding point and a reliable earth ground. Ensure that the resistance does not exceed 4 Ω . If the value exceeds 4 Ω , re-secure the grounding flat steel or replace the grounding cable.



Figure 3-27 Measure Resistance at Grounding Point

*The figure is for reference only.

Step 2 Check whether the equipotential bonding inside the ESS is correct.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear a safety helmet and safety gloves, and open the ESS cabinet door.
- c. Gently shake the cables to verify that the equipotential bonding connection is secure.



Figure 3-28 Equipotential Bonding Connections

*The figure is for reference only.

- d. If any loose connections are found, secure them using a screwdriver or a wrench. For specific tightening torque values, see [8.3 Tightening Torque](#).

Step 3 Check whether the cable shielding and the insulating sleeves are in proper contact, and whether the grounding flat steel is properly secured.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear a safety helmet and safety gloves. Gently shake the grounding cable, insulating sleeve, and grounding flat steel to verify the connections are secure.
- c. If any loose connections are found, secure them using a screwdriver or a wrench. For specific tightening torque values, see [8.3 Tightening Torque](#).

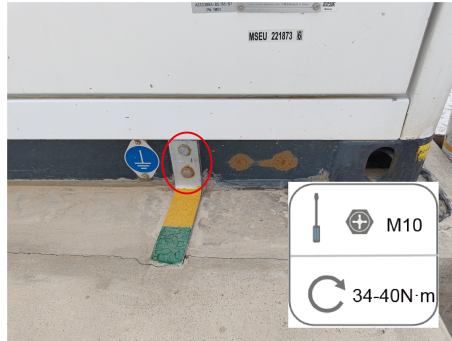


Figure 3-29 Tighten Loose Connection

*The figure is for reference only.

--End

3.6 Components

3.6.1 Safety Precautions

⚠ WARNING

- Circuit boards and components must be cleaned only with dry tools such as dry tissue. SUNGROW shall not be held liable for any possible component damage caused by the use of other cleaning tools.
- Ensure the equipment is powered off before performing any maintenance operations. Do not perform any operations on live equipment!

NOTICE

Be sure to check the ventilation of the air inlet and outlet. Failure to do so may lead to damage from overheating, as the module will be unable to cool properly.

3.6.2 Material Preparation

3.6.2.1 Tool Preparation

Before component inspection, it is suggested to prepare the appropriate tools, including but not limited to those listed below, to ensure the maintenance work can be completed smoothly.

No.	Item	Quantity (pcs)	Description
1	Safety helmet	1	-

No.	Item	Quantity (pcs)	Description
2	Safety gloves	1	-
3	Dust mask	1	-
4	Screwdriver	1	Electric screwdrivers are recommended.
5	Cleaning cloth	1	Cleaning cloths or other suitable cleaning tools are recommended.
6	Industrial vacuum cleaner	1	It is recommended to use an industrial vacuum cleaner equipped with swivel casters and fixed casters.
7	Flashlight	1	Flashlights, searchlights, or other lighting devices are recommended.
8	Rust remover	1	It is recommended to use a metal surface rust remover that can quickly remove rust without corroding the material of the workpiece.
9	Sandpaper	1	-
10	Soft brush	1	-
11	Zinc-rich primer	1	-
12	Multimeter	1	-
13	Laptop computer	1	-

3.6.2.2 Consumable Parts List



The following list is for reference only. If any items differ from the parts used on site, the on-site parts shall prevail.

No.	Name	Material No.	Included in factory spare parts list?
1	Emergency stop switch	K-A-000076	No
2	Door light assembly	B-Q-005902	No
3	Travel switch	K-A-000283	No

3.6.3 Inspection Procedure

The workflow for device inspection is shown in the figure below.

Every six months

The maintenance task takes approximately 10 minutes.

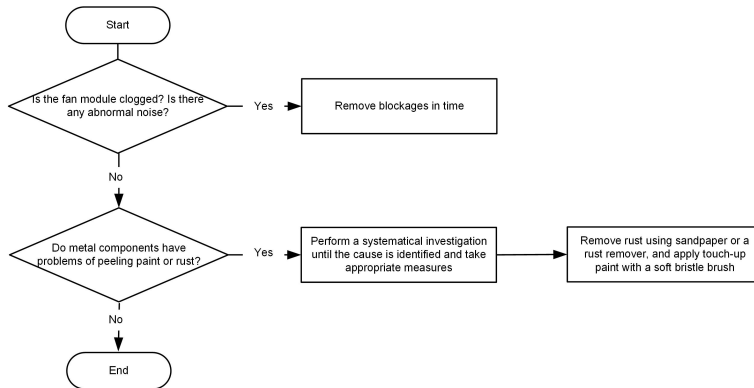


Figure 3-30 Workflow for Component Inspection (Every Six Months)

Every Year

The maintenance task takes approximately 5 minutes.

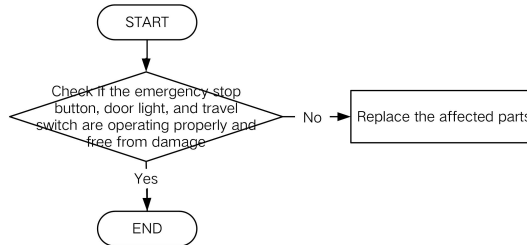


Figure 3-31 Workflow for Component Inspection (Every Year)

3.6.4 Inspection Procedure (Every Six Months)

Step 1 Check the operating status of the cooling fans, and see if there is any blockage or abnormal noise during operation. Clean the cooling module with a vacuum cleaner if necessary.

- a. Wear safety helmets and safety gloves. Check whether the fans within the system are all operating properly and whether there are any abnormal noises while the system is operating.
- b. If abnormal noise is detected, log in to the Web interface of the EMS by referring to [8.1.1 EMS Login Steps](#). Choose **Device monitoring > Energy storage unit view** to check for fan alarms.
- c. If any alarm is present, shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).

- d. Check the air ducts and fans of the ESS for blockage.
- e. If any blockage is found in the air ducts or fans, remove it promptly. You may use a vacuum cleaner to clean the cooling module.

Step 2 Regularly check all metal components for rust.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear a safety helmet and safety gloves, and open the ESS cabinet door.
- c. Use a flashlight or searchlight to carefully inspect all corners of the equipment for signs of paint peeling or rust.



Figure 3-32 Inspect with Flashlight or Searchlight

*The figure is for reference only.

- d. If rust is found, perform the following inspections:
 - 1. Check whether the ESS cabinet door is fully closed and whether the door seal strips are compromised.
 - 2. Check whether all cable inlets and outlets are properly sealed.
 - 3. Check whether there is condensation due to high humidity.
- e. Remove the corrosion using sandpaper or rust remover. Apply paint over the affected area with a soft brush, and use a vacuum cleaner to remove any residual dirt or debris.

--End

3.6.5 Inspection Procedure (Every Year)

Step 1 Check whether the emergency stop button, door light, and travel switch are functioning properly without damage. If any of the devices above is damaged, replace it promptly.

- a. Wear a safety helmet and safety gloves, and check whether the emergency stop button on the cabinet door functions normally.

- b. Open the ESS cabinet door, and check the door light and the travel switch for damage.
- c. If any of the devices above is damaged, replace it promptly.

--End

3.7 Functionality

3.7.1 Safety Precautions

DANGER

After the emergency stop button is pressed, the internal FSS power supply will remain connected to power. Do not touch!

NOTICE

If any of the following conditions persist for more than 120 hours during maintenance or system shutdown, capacity loss may occur, and such loss will not be covered under the warranty.

- The discharging cell voltage is below 2.7 V.
- Any Rack SOC is 0%.



The Web user interfaces may vary across software versions. The screenshots in this manual are for reference only.

3.7.2 Material Preparation

3.7.2.1 Tool Preparation

Before functional inspection, it is suggested to prepare the appropriate tools, including but not limited to those listed below, to ensure the maintenance work can be completed smoothly.

No.	Item	Quantity (pcs)	Description
1	Laptop computer	1	-
2	Network cable	1	-
3	Safety helmet	1	-
4	Safety gloves	1	-

3.7.2.2 Consumable Parts List



The following list is for reference only. If any items differ from the parts used on site, the on-site parts shall prevail.

No.	Name	Material No.	Included in factory spare parts list?
1	Liquid cooling system emergency stop switch structural part	B-J-019056	No
2	Emergency stop switch	K-A-000076	No
3	Door light assembly	B-Q-005902	No

3.7.3 Inspection Procedure

The workflow for the functional inspection is shown in the figure below. The maintenance task takes approximately 20 minutes.

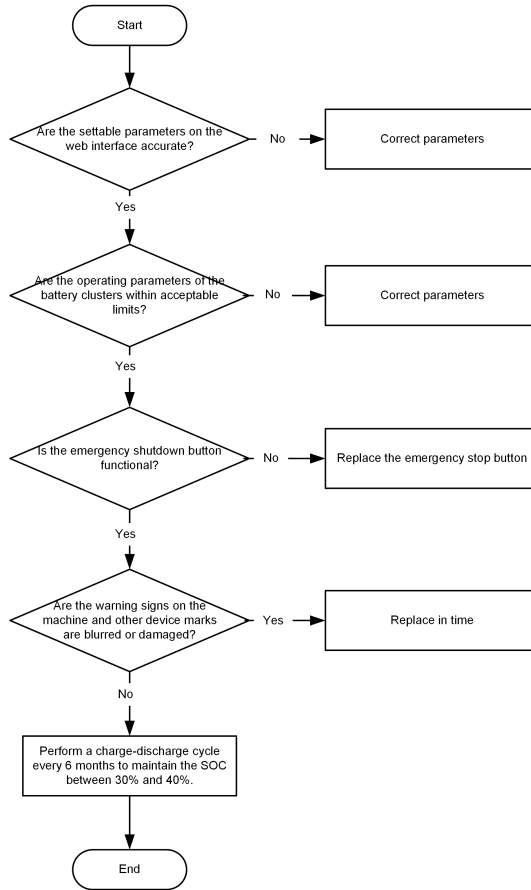
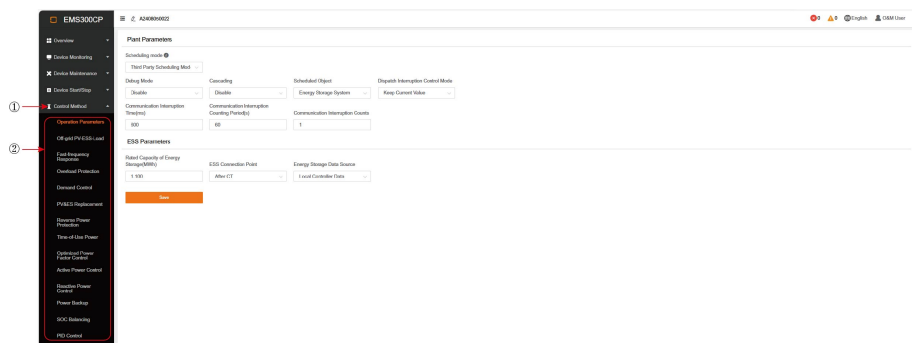


Figure 3-33 Workflow for Functional Inspection

3.7.4 Inspection Procedure (Every Six Months)

Step 1 Check the configurable parameters on the Web.

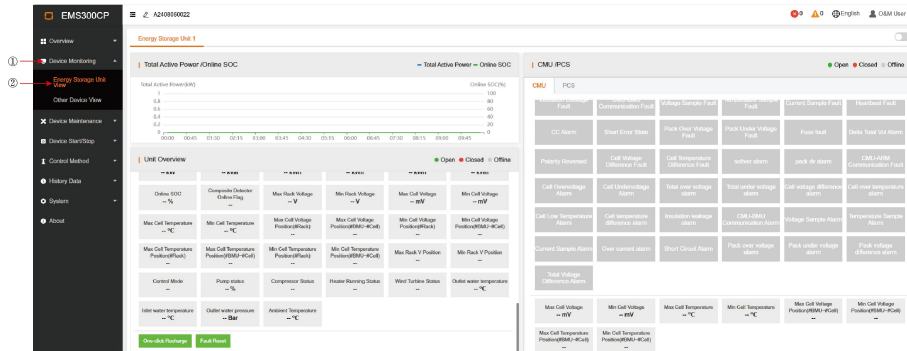
- Log in to the EMS Web user interface. For specific instructions, see [8.1.1 EMS Login Steps](#).
- Click **Control strategy**. Check whether the settings on the **Operation parameters**, **Off-grid PV-ESS-Load**, and **Fast frequency response** pages are correct.



*The figure is for reference only.

Step 2 Check the operation records of the Rack and whether the current, voltage, and temperature are within the allowable range.

- Log in to the EMS Web user interface. For specific instructions, see [8.1.1 EMS Login Steps](#).
- Choose **Device monitoring > Energy storage unit view**. Check the operation records of the Racks, and whether the current, voltage, and temperature are within the allowable range.



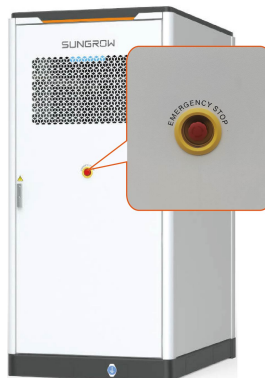
*The figure is for reference only.



- ST255CS-2H: Maximum current: 0–181 A. Maximum DC output voltage: ≤ 934.4 V. Temperature range: -30°C to 50°C .
- ST510CS-4H: Maximum current: 0–181 A. Maximum DC output voltage: ≤ 934.4 V. Temperature range: -30°C to 50°C .

Step 3 Safety function: Check whether the emergency stop button functions properly.

- Wear a safety helmet and safety gloves. When the ESS is operating, press the emergency stop button and check whether the DC switch turns off.



*The figure is for reference only.

- Wait approximately 5 min, and check whether the LED indicator is off.
- Use the key to release the emergency stop button. Power on the DC side, restart the ESS, and check whether the ESS resumes normal operation.

- Step 4** Check whether the warning signs and other markings on the equipment are clear and intact. Replace any markings that are blurry or damaged promptly.
- a. Visually check whether the warning labels on the equipment, including the ESS enclosure, the DC/AC power converter unit, BSP, and Packs, are legible.
 - b. If any labels are detached, damaged, or soiled, remove them. Clean the affected surface with alcohol and attach new labels once the surface is completely dry.
- Step 5** For a long-idle ESS, perform charging-discharging every six months to bring the system SOC to 30%–40%. Ensure the SOC values are consistent after recharging.

NOTICE

- During maintenance or shutdown, if the SOC of any Rack falls to 0%, charge it to at least 15% within 120 hours.
- During operation, if the SOC of any Rack falls to 0%, charge it to at least 5% within 2 hours. Alternatively, when the SOC reaches 0%, switch the system to recharging mode via the upper computer EMS.

--End

3.8 Liquid Cooling System

3.8.1 Safety Precautions

WARNING

Under normal conditions, coolant does not pose a health hazard, but excessive exposure may cause irritation to the eyes, skin, and respiratory system.

3.8.2 Material Preparation

3.8.2.1 Tool Preparation

Before liquid cooling system inspection, it is suggested to prepare the appropriate tools, including but not limited to those listed below, to ensure the maintenance work can be completed smoothly.

No.	Item	Quantity (pcs)	Description
1	Safety helmet	1	-
2	Safety gloves	1	-
3	Dust mask	1	-

No.	Item	Quantity (pcs)	Description
4	Ladder	1	A 2.5-meter A-shaped ladder is recommended (The ESS is 2450 mm in height. You may select the ladder according to the height of the foundation on-site.)
5	Safety harness	1	-
6	Soft brush	1	-
7	Screwdriver	1	Electric screwdrivers are recommended.
8	Coolant fill and drain tool	1	-
9	pH test strip	1	-

3.8.2.2 Consumable Parts List



The following list is for reference only. If any items differ from the parts used on site, the on-site parts shall prevail.

No.	Name	Material No.	Included in factory spare parts list?
1	Allcarwell -40°C organic coolant	Y-H-000020	No

3.8.3 Inspection Procedure

The inspection workflow of the liquid cooling system is shown in the figure below. The maintenance task requires approximately 20 min.

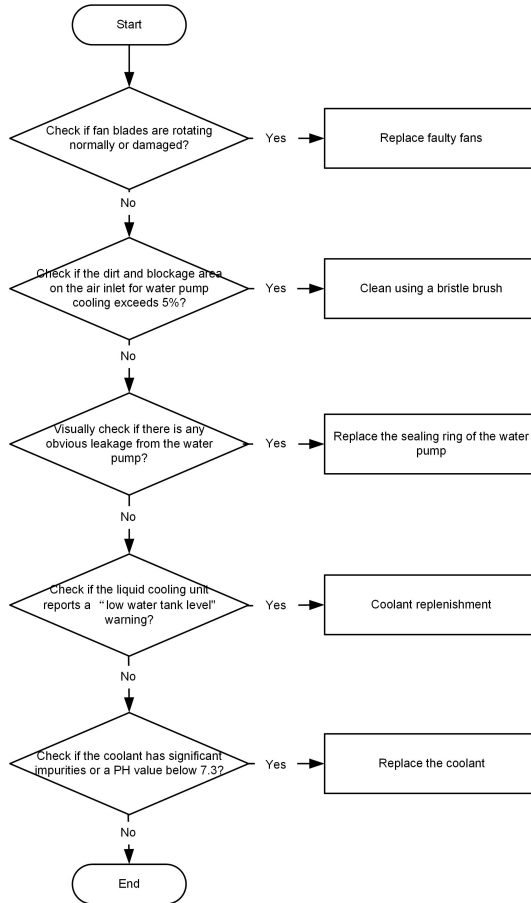


Figure 3-34 Inspection Procedure for Liquid Cooling System

3.8.4 Inspection Procedure (Every Six Months)

Step 1 Check whether the fan blades rotate properly and are free of damage. Replace the fan if its blades cannot operate properly or are damaged.

- a. Power off the liquid cooling system. Wear appropriate PPE, including a safety helmet, gloves, and a safety harness, and set up a ladder. Then, climb the ladder and visually inspect the fans at the back of the liquid cooling unit for blade damage.

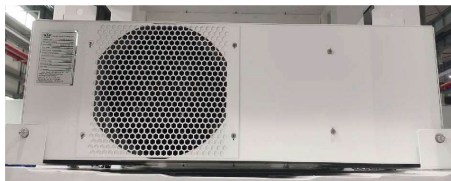


Figure 3-35 Back of Liquid Cooling Unit

*The figure is for reference only.

- b. Replace the fan if its blades cannot operate properly or are damaged.

Step 2 Check if the blockage area at the pump's air inlet exceeds 5%. If it does, clean it using a brush.

- a. Power off the system. Remove the mesh cover on the front of the liquid cooling unit, and check if the blockage area at the pump's air inlet exceeds 5%.



Figure 3-36 Front of Liquid Cooling Unit

*The figure is for reference only.

- b. If the blockage area exceeds 5%, clean it using a brush.

Step 3 Visually check the pump body (excluding pipe joints) for visible dripping (except condensation). If dripping is observed, replace the pump seal rings.

- a. Power off the liquid cooling system, and remove the mesh cover on the left side of the liquid cooling unit. Check the pump body and the pipe joints for any dripping (except condensation).



Figure 3-37 Pump of Liquid Cooling Unit

- b. If dripping is found, drain coolant from the system.
- c. Replace the seal rings of the pump and pipe joints.



- Coolant drained from the system must be collected and treated to render it harmless.
- For specific procedures regarding coolant refilling, draining, and pH testing, see "Coolant Filling and Drainage Operations" in [ST255CS Operation & Maintenance Guide](#).

Step 4 Check via the upper computer software if any alarms are reported. If a "Low coolant level" alarm is reported, refill the coolant.

- If a "Low coolant level" alarm is reported, check for coolant leaks. If no leaks are found, refill the coolant. Open the ESS cabinet door and refill the tank until the coolant level in the glass tube is between the midline and the H line.

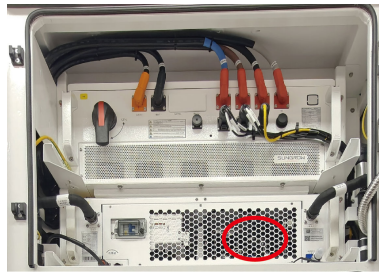


Figure 3-38 Location of Level Gauge

*The figure is for reference only.

Step 5 Check whether the coolant contains visible impurities, whether the antifreeze color has significantly darkened, or whether the pH value is below 7.3.

- Shut down the system via the LC software.
- Turn off the upstream AC power supply switch. Use a multimeter to verify that the terminals of the AC main circuit (L1, L2, L3) on the BSP are voltage-free.
- Turn off the AC main switch, AC auxiliary switch, and UPS switch on the BSP panel.
- Press and hold the UPS power button for 3 s to power off the UPS.
- Turn off the switch on the panel of the liquid cooling unit.
- Remove the plug from the fill port.
- Slightly open the valve (do not fully open it) and discharge approximately 10 ml of coolant.



*The figure is for reference only.

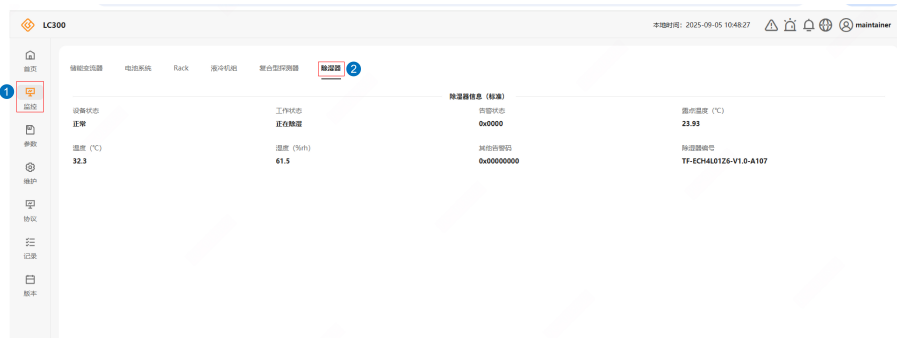
- h. Use pH test strips or a pH meter to measure the pH value of the coolant sample. If the current pH value is below 7.3, replace the coolant (drain and refill the system).



- It is recommended to replace the coolant every five to six years.
- For specific procedures regarding coolant refilling, draining, and pH testing, see “Coolant Filling and Drainage Operations” in [ST255CS Operation & Maintenance Guide](#).

Step 6 Check whether the dehumidifier operates normally.

- a. Log in to the LC software. For login instructions, see [8.1.2 LC Login Steps](#).
- b. Go to the dehumidifier’s device information page and check parameters such as **Device status**, **Alarm status**, and **Other alarm codes** for any abnormal conditions. If any abnormal condition is detected, record the status information and alarm code, and contact the SUNGROW service team.



- c. Check the dehumidifier drain pipe for blockages or U-shaped bends. If a blockage is found, clear the pipe; if a U-shaped bend has formed, trim the pipe to ensure it runs smoothly without bends or twists.



Semiconductor dehumidifier



Compressed refrigeration dehumidifier

*The figure is for reference only.

--End

3.9 FSS

3.9.1 Safety Precautions

⚠ DANGER

If there is an obvious fire or explosion at the site, do not attempt to go near the ESS for an emergency mechanical operation.

NOTICE

- The FSS must be inspected and maintained regularly by dedicated personnel who have received specialized training and passed qualification examinations.
- If the O&M personnel receive an alarm or fault from an ESS via the monitoring software or plant-level FACP, request qualified fire protection personnel to conduct an on-site inspection under confirmed safe conditions and then manually reset the alarm or fault.

3.9.2 Material Preparation

3.9.2.1 Tool Preparation

Before FSS inspection, it is suggested to prepare the appropriate tools, including but not limited to those listed below, to ensure the maintenance work can be completed smoothly.

No.	Item	Quantity (pcs)	Description
1	Safety helmet	1	-

No.	Item	Quantity (pcs)	Description
2	Safety gloves	1	-
3	Screwdriver	1	A small, thin, straight screwdriver is recommended.

3.9.2.2 Consumable Parts List



The following list is for reference only. If any items differ from the parts used on site, the on-site parts shall prevail.

No.	Name	Material No.	Included in factory spare parts list?
1	Smoke detector	V-H-000015	No
2	Heat detector	V-H-000017	No
3	Detector base	V-D-000591	No
4	Sprinkler	V-D-000982	No
5	Sounder beacon	V-D-000926	No
6	Combustible gas detector	V-H-000026	No
7	Pipe cap	CY-C-00044	No
8	Metal hose	CY-B-00004	No
9	Stainless steel hose fitting	CY-C-00013	No
10	Sprinkler hose	F0YB0001	No

3.9.3 Inspection Procedure

The inspection workflow for the fire suppression system is shown in the figure below.

Every Year

The maintenance task takes approximately 10 minutes.

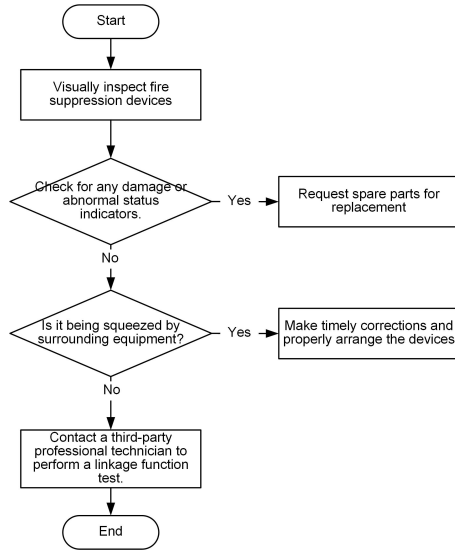


Figure 3-39 Workflow for FSS Inspection (Every Year)

Every three months

The maintenance task requires approximately 0.5 h.

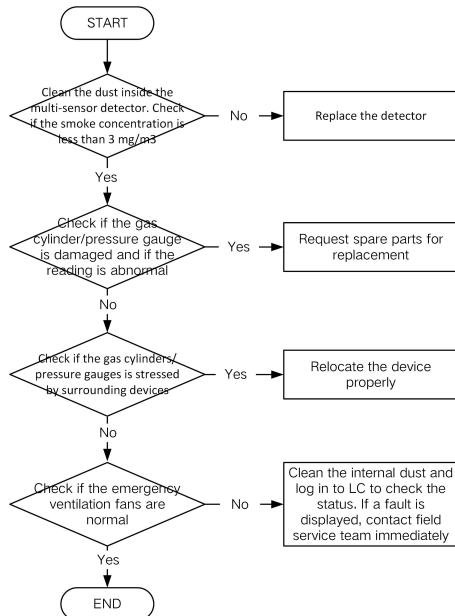


Figure 3-40 Inspection Procedure for Fire Suppression System (Once Every Three Months)

3.9.4 Inspection Procedure (Every Year)

⚠ WARNING

Before performing the following operations, shut down the Block by referring to [8.4.1 Startup/Shutdown via Web](#). Wait at least 15 minutes after powering off to ensure the system is fully de-energized. Then, turn off the UPS power before proceeding with any further operation.

Step 1 Visual Inspection.

- a. Visually check the sprinkler.



Figure 3-41 Sprinkler

*The figure is for reference only.

- b. Visually check the FSS piping.



Figure 3-42 FSS Piping

*The figure is for reference only.

- c. Visually check the detector.



Figure 3-43 Detector

*The figure is for reference only.

- d. (Optional) Visually check the alarm sounder.

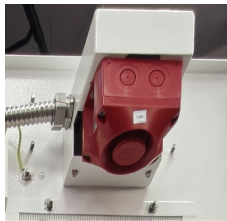


Figure 3-44 Alarm Sounder

*The figure is for reference only.

- e. (Optional) Visually check the FSS gas extinguishant piping for Packs.

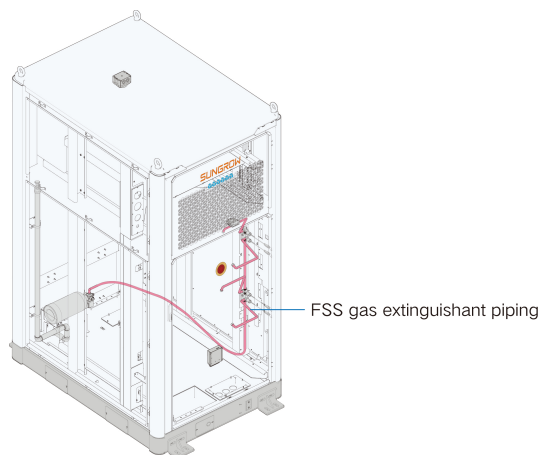


Figure 3-45 FSS Gas Extinguishant Piping for Packs

*The figure is for reference only.

- f. (Optional) Visually check the data concentrator.

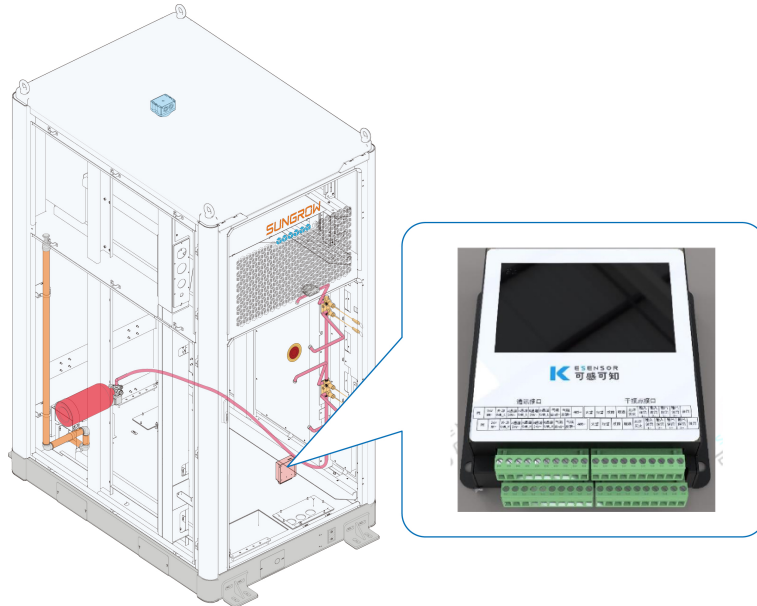


Figure 3-46 Data Concentrator

*The figure is for reference only.

- g. Visually check the aerosol.



Figure 3-47 Aerosol

*The figure is for reference only.

- h. (Optional) Visually check the explosion vent panel for damage or deformation.



Figure 3-48 Explosion Vent Panel

*The figure is for reference only.

- i. (Optional) Visually check the emergency ventilation fans. Clean any dust or foreign debris.

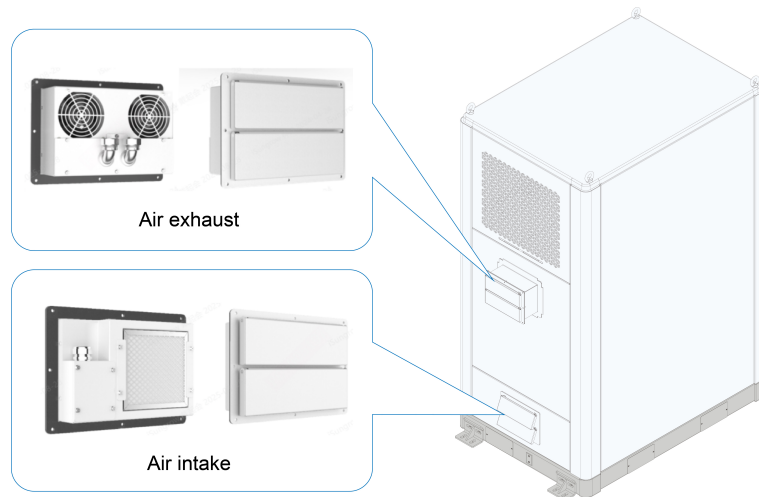


Figure 3-49 Emergency Ventilation Fan

*The figure is for reference only.

- j. If any of the devices above are damaged or their status indicators are abnormal, request spare parts for replacement promptly.
- k. If any of the devices above are stressed by adjacent devices, reposition them promptly to ensure sufficient clearance.

Step 2 Linkage control test.



Request qualified third-party personnel to conduct a linkage test of the FSS at least once a year to ensure its stable operation. Any additional requirements from local fire authorities must also be observed.

--End

3.9.5 Inspection Procedure (Every Three Months)

⚠ WARNING

Before performing the following operations, shut down the Block by referring to [8.4.1 Startup/Shutdown via Web](#). Wait at least 15 minutes after powering off to ensure the system is fully de-energized. Then, turn off the UPS power before proceeding with any further operation.

Step 1 (Optional) Perform multi-sensor detector maintenance.

- a. Open the front door of the ESS. The multi-sensor detector is located at the top front of the cabinet.
- b. Remove dust inside the detector using an air blower.



Figure 3-50 Detector

*The figure is for reference only.

- c. After cleaning, log in to the LC user interface and check the smoke concentration measured by the detector. A reading of less than 3 mg/m³ is considered acceptable. For LC login instructions, see [8.1.2 LC Login Steps](#).

Step 2 (Optional) Perform combustible gas detector, smoke detector, and heat detector maintenance.

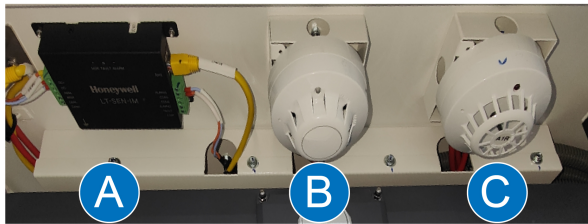


Figure 3-51 Detectors

*The figure is for reference only.

No.	Item
A	Combustible gas detector
B	Smoke detector
C	Heat detector

- a. Open the front door of the ESS. The combustible gas detector, smoke detector, and heat detector are located at the top front of the cabinet.
- b. Visually check the indicator status of the combustible gas detector. If the indicator is blinking green, the status is normal. If the indicator shows yellow, check whether the

cables of the combustible gas detector are secure. If the fault cannot be identified, please contact SUNGROW.

- c. Check whether the indicators of the smoke detector and heat detector are blinking red. Log in to the LC software. If the LC displays an FSS fault, check if the detector cable connections are secure. For LC login instructions, see section 8.1.2 LC Login Steps. If the fault cannot be identified, please contact SUNGROW.

Step 3 (Optional) Visually check the gas cylinder.

- a. Open the back door of the ESS. The gas cylinder is located at the bottom rear of the cabinet.
- b. Check the device for any external damage and verify whether it is being stressed by adjacent devices.
- c. Check the pressure gauge and see whether the pointer is within the green zone. If not, please contact SUNGROW.

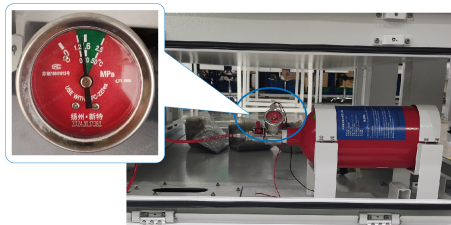


Figure 3-52 Pressure Gauge

*The figure is for reference only.

Step 4 (Optional) Check whether the emergency ventilation fans operate normally.

- a. Remove dust inside the emergency ventilation fans using an air blower.
- b. Log in to the LC user interface and check the operating status of the emergency ventilation fans. For login instructions, see [8.1.2 LC Login Steps](#).

If the **Operating mode** shows **Fault**, please contact SUNGROW promptly.

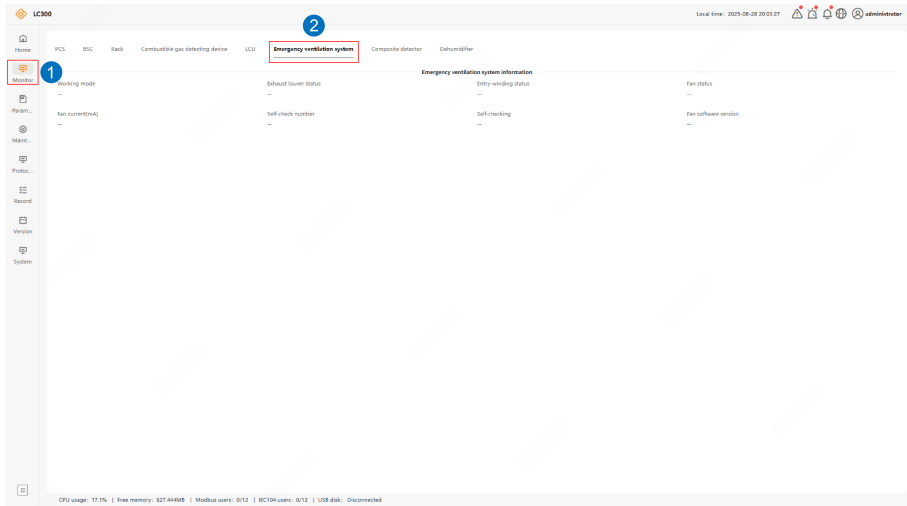


Figure 3-53 Emergency Ventilation System Panel

--End

3.9.6 Inspection Procedure (Component Replacement)



Replace FSS devices periodically based on the specific project configuration and on-site conditions. Recommended replacement intervals are as follows. The actual replacement schedule shall be determined based on on-site conditions.

WARNING

Before performing the following operations, shut down the Block by referring to [8.4.1 Startup/Shutdown via Web](#). Wait at least 15 minutes after powering off to ensure the system is fully de-energized. Then, turn off the UPS power before proceeding with any further operation.

Step 1 (Optional) Replace the combustible gas detector. (Every two to three years)

- a. Open the front door of the ESS. The combustible gas detector is located at the top front of the cabinet.

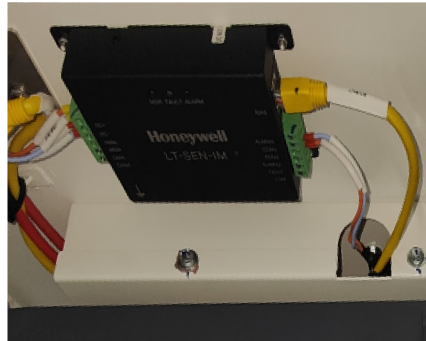


Figure 3-54 Combustible Gas Detector

*The figure is for reference only.

- b. Disconnect the cables from the combustible gas detector.
- c. Remove the M4 flange nuts securing the combustible gas detector at a torque of 1.8–2.4 N·m.
- d. Install the new combustible gas detector and reconnect the cables.

Step 2 (Optional) Replace the multi-sensor detector. (Every eight years)

- a. Open the front door of the ESS. The multi-sensor detector is located at the top front of the cabinet.



Figure 3-55 Multi-Sensor Detector

*The figure is for reference only.

- b. Disconnect the cables from the multi-sensor detector.
- c. Remove the M5 flange nuts securing the multi-sensor detector at a torque of (4.4 ± 0.4) N·m.
- d. Install the new multi-sensor detector and reconnect the cables.

Step 3 (Optional) Replace the smoke detector and heat detector. (Every eight to ten years)

- a. Open the front door of the ESS. The smoke detector and heat detector are located at the top front of the cabinet.

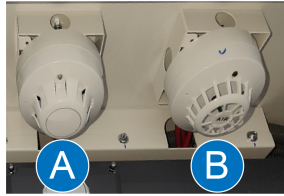


Figure 3-56 Smoke Detector and Heat Detector

*The figure is for reference only.

No.	Item
A	Smoke detector
B	Heat detector

- b. Disconnect the cables from the smoke detector and the heat detector.
- c. Detach the smoke detector and heat detector from their mounting bases.
- d. Install the new smoke detector and heat detector and reconnect the cables.

Step 4 (Optional) Replace the aerosol. (Every ten years)

- a. Remove the M5 bolts securing the aerosol device at a torque of (4.4 ± 0.4) N·m.
- b. Secure the new aerosol device to the assembly, then reinstall the assembly in its original position on the cabinet.

--End

4 DC/AC Power Converter Unit

4.1 Inspection Items

The inspection items for the DC/AC power converter unit are listed in the table below.



- The recommended maintenance intervals are listed below. These intervals should be adjusted based on the installation site conditions.
- The maintenance frequency is subject to factors like plant size, installation position, and on-site environment. For the equipment operating in sandy or dusty environments, it is necessary to increase the frequency of maintenance.

No.	Item	Description	Maintenance Interval
1	External inspection	<ol style="list-style-type: none"> 1. Check the device for signs of rust. 2. Check that the device markings and labels are legible. 3. Check the device for damage or deformation. 	Every year
2	System operating status and environment	<ol style="list-style-type: none"> 1. Check whether there is abnormal noise during the equipment operation. 2. Check the ambient humidity and the dust levels around the equipment. 3. Check the fans and air vents for foreign debris, dust, or dirt. Clean them if necessary. 4. Check for missing screws. 	Every year
3	Cable connection	<ol style="list-style-type: none"> 1. Check whether there are any loose power cables or communication cables, and whether the screws of the DC/AC sockets are properly tightened. 2. Check the power cables and communication cables for damage. Pay particular attention to areas 	Every year

No.	Item	Description	Maintenance Interval
		where the cables contact metal surfaces for signs of cuts. 3. Check the cables for any loose or detached insulation cable ties.	
4	Components	1. Check whether the load switch functions properly mechanically. If not, request replacement.	Every six months
5	Functionality	1. Check whether the operation parameters such as voltage and power are within the allowable range. 2. Save historical curves, fault records, and dispatch records to the relevant files. 3. Check the warning signs on the panel. Replace any blurred or damaged signs.	Every six months



This manual covers scenarios for different system configurations. Perform maintenance based on the actual on-site project configuration.

4.2 External Inspection

4.2.1 Safety Precautions

WARNING

- Rust removers release highly flammable gases. Keep rust removers away from sources of heat, sparks, open flames, or static electricity.
- Use rust removers only in a well-ventilated environment.
- Avoid contact of rust removers with skin and eyes, and avoid inhaling rust removers. In case of contact or inhalation, seek immediate medical attention.

4.2.2 Material Preparation

4.2.2.1 Tool Preparation

Before external inspection, it is suggested to prepare the appropriate tools, including but not limited to those listed below, to ensure the maintenance work can be completed smoothly.

No.	Item	Quantity (pcs)	Description
1	Safety helmet	1	-
2	Safety gloves	1	-
3	Dust mask	1	-
4	Rust remover	1	It is recommended to use a metal surface rust remover that can quickly remove rust without corroding the material of the workpiece.
5	Screwdriver	1	-
6	Cleaning cloth	1	Cleaning cloths or other suitable cleaning tools are recommended.
7	Alcohol or other non-corrosive cleaning agents	1	If water cannot remove the dirt, you may use the following cleaning agents. <ul style="list-style-type: none"> • 97% alcohol. • Commonly used non-corrosive cleaning agent in your locality.
8	Sandpaper	1	-
9	Soft brush	1	-
10	Zinc-rich primer	1	-

4.2.2.2 Consumable Parts List



The following list is for reference only. If any items differ from the parts used on site, the on-site parts shall prevail.

No.	Name	Material No.	Included in factory spare parts list?
1	Nameplate	F-G-000229	No
2	Warning label	F-GC-00764	No

4.2.3 Inspection Procedure

The workflow for external inspection is shown in the figure below. The maintenance task takes approximately 10 minutes.

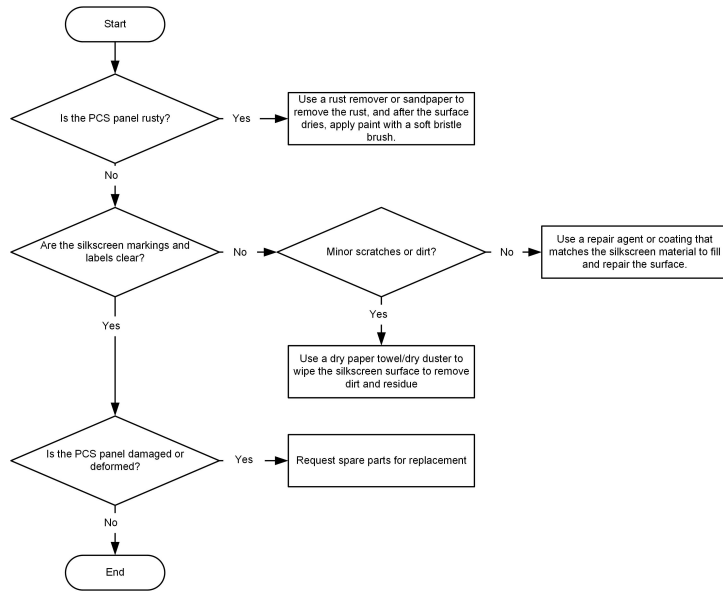


Figure 4-1 Workflow for External Inspection

4.2.4 Inspection Procedure (Every Year)

Step 1 Check the panel of the DC/AC power conversion unit for rust.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear a safety helmet and safety gloves, and check the panel of the DC/AC power conversion unit for rust.

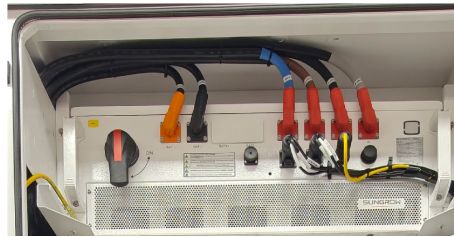


Figure 4-2 Panel of DC/AC Power Converter Unit

*The figure is for reference only.

- c. If rust is found, remove it using sandpaper or rust remover. Once the surface is dry, apply a protective coating with a soft brush.

Step 2 Check whether the markings and labels are legible.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear a safety helmet and safety gloves. Check whether the markings and labels of the DC/AC power converter unit are legible.

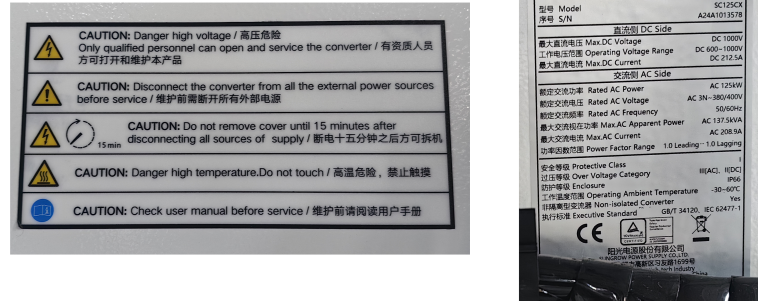


Figure 4-3 Markings of DC/AC Power Conversion Unit

*The figure is for reference only.

- If only minor scratches or stains are present, clean the markings. Gently clean the markings using a dry tissue or cloth to remove any stain and debris.
- If the markings are worn, use a repair agent or coating that matches their material to repair them, or request labels for replacement.

Step 3 Check the DC/AC power converter unit panel for damage and deformation.

- Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- Wear a safety helmet and safety gloves, and check the panel of the DC/AC power converter unit for damage or deformation.
- If any of the above conditions is found, request corresponding spare parts for replacement promptly.

--End

4.3 System Operating Status and Environment

4.3.1 Safety Precautions

WARNING

Circuit boards and components must be cleaned only with dry tools such as dry tissue. SUNGROW shall not be held liable for any possible component damage caused by the use of other cleaning tools.

4.3.2 Material Preparation

4.3.2.1 Tool Preparation

Before inspecting the system's operating status and environment, it is suggested to prepare the appropriate tools, including but not limited to those listed below, to ensure the maintenance work can be completed smoothly.

No.	Item	Quantity (pcs)	Description
1	Safety helmet	1	-
2	Safety gloves	1	-
3	Dust mask	1	-
4	Hygrometer	1	-
5	Desiccant	As required	<ul style="list-style-type: none"> Desiccants containing activated carbon, silica gel, calcium chloride, or cellulose are recommended. If the humidity inside the cabinet is too high, consider whether a dehumidifier is required.
6	Dry tissue or dry cloth	1	It is recommended to use cleaning tools that are dry, such as dry tissue and cloth
7	Alcohol or other non-corrosive cleaning agents	1	<p>If water cannot remove the dirt, you may use the following cleaning agents.</p> <ul style="list-style-type: none"> 97% alcohol. Commonly used non-corrosive cleaning agent in your locality.
8	Screwdriver	1	Electric screwdrivers are recommended.
9	Wrench	1	Open-end and socket wrenches are recommended.
10	Flashlight	1	Flashlights, searchlights, or other lighting devices are recommended.

4.3.2.2 Consumable Parts List



The following list is for reference only. If any items differ from the parts used on site, the on-site parts shall prevail.

No.	Name	Material No.	Included in factory spare parts list?
1	Cross-recessed hex bolt, spring washer, and flat washer assembly	S-Z-000068 S-Z-000072 S-Z-000073	No
2	Hex bolt (fully threaded)	S-A-000048 S-A-000055	No

No.	Name	Material No.	Included in factory spare parts list?
3	Disc spring washer	S-Q-000185	No
4	Hex flange nut	S-B-000033	No
5	Cross-recessed pan head flat and spring washer assembly	S-Z-000431	No
8	Sealing strip	F-E-000990	No
9	Sealing ring	F-E-000868	No
10	Sealant	Y-D-000145	
11	DC fan	E-S-000199 E-S-000271	No
12	Threaded cylindrical pin	S-X-000093	No
13	Protective cover	F-E-000606	No
14	Network port cap	F-A-003434	No
15	Communication terminal cap	F-EC-00086	No

4.3.3 Inspection Procedure

The inspection procedure for system operating status and environment is shown in the figure below. The maintenance task requires approximately 15 min.

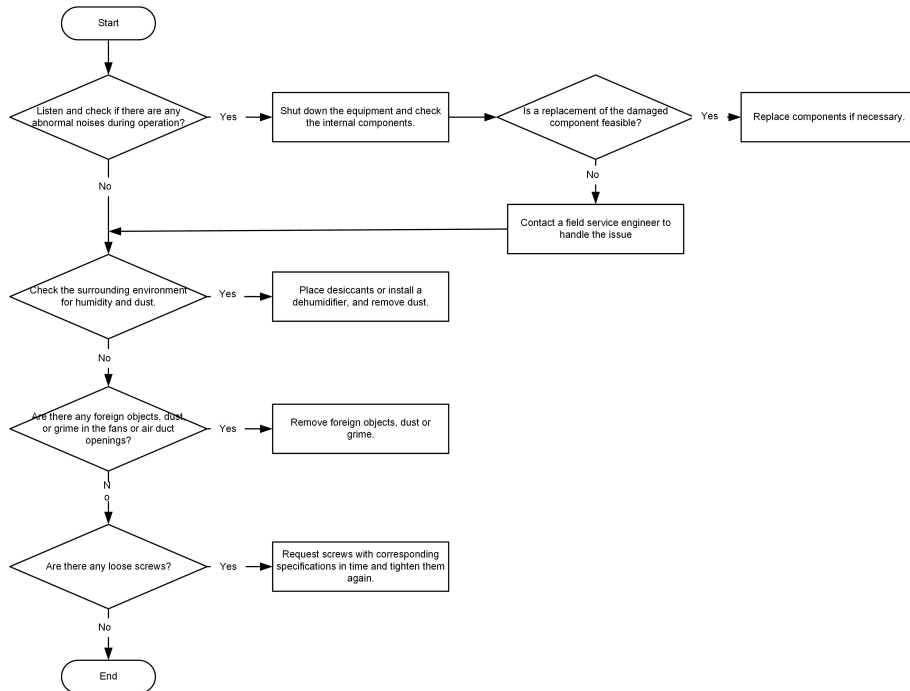


Figure 4-4 Workflow for System Status and Cleanliness Inspection

4.3.4 Inspection Procedure (Every Year)

Step 1 Check for abnormal noise during the operation of the DC/AC power converter unit.

- a. Wear a safety helmet and safety gloves. Standing near the DC/AC power converter unit, listen carefully to identify any unusual sounds (excluding wind noise, regular current noise, etc.).
- b. If any abnormal noise is identified, shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- c. Remove the screws on the panel of the DC/AC power converter unit, and check the internal components for damage.

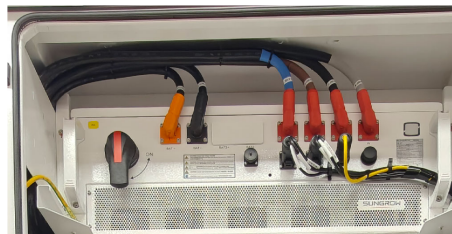


Figure 4-5 Panel of DC/AC Power Converter Unit

*The figure is for reference only.

- d. If on-site conditions permit, replace the parts. If conditions do not permit, please contact the field service engineer.

Step 2 Check the humidity and dust in the surrounding environment.

- a. Wear a safety helmet and safety gloves, and open the ESS cabinet door.
- b. Place a hygrometer outside the cabinet, and check whether the ambient humidity is within the range of 0% to 100%. Simultaneously, check for water stains or condensation near the DC/AC power converter unit.
- c. If the ambient humidity is too high or condensation is observed inside the cabinet, it is advisable to place desiccant packs inside the cabinet.

**Figure 4-6** Desiccant Packs

*The figure is for reference only.

NOTICE

Ensure the desiccant packs do not block the air inlets and outlets of the equipment.

- d. If the humidity inside the cabinet remains excessively high, assess the need for a dehumidifier. If required, contact the field service engineer.
 - e. Wipe the surface of the DC/AC power converter unit with a dry tissue or cloth. Determine whether dust removal is required based on the amount of dirt observed on the used tissue or cloth.
- Step 3** Check whether there is foreign debris, dust, or dirt in the external fans and air ducts. Clean them if necessary.
- a. Wear a safety helmet and safety gloves, keep a safe distance, and listen carefully. Check whether the fans of the DC/AC power converter unit make abnormal noise and whether they are blocked by foreign objects.
 - b. If abnormal noise or foreign object is identified, shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
 - c. Remove the screws from the DC/AC power converter unit compartment panel, and clear the blockage. Manually rotate the fans to check whether they can rotate smoothly. Investigate any abnormal conditions.
 - d. If any fan is found damaged, contact SUNGROW promptly for replacement.
- Step 4** Check for missing screws on the panel of the DC/AC power conversion unit.
- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
 - b. Wear a safety helmet and safety gloves. Visually check the junction box for missing screws. You may use adjacent systems of the same model as a reference.

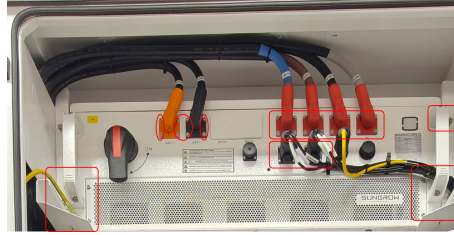


Figure 4-7 Locations of Screws

*The figure is for reference only.

- c. If any screws are missing, promptly request screws with the same specifications and install them using a screwdriver.

--End

4.4 Cable Connection

4.4.1 Safety Precautions

⚠ DANGER

High voltages! Danger of electric shock!

- Do not touch any live part!
- Before inspection, ensure the AC and DC sides are voltage-free.

⚠ WARNING

- Check the polarity of all input cables. Ensure all input cables are connected with the correct polarity.
- Do not forcibly pull any wires or cables, as this may diminish their insulation performance.
- Ensure that all cables and wires have sufficient space for any bends.
- Take necessary auxiliary measures to reduce the stress on cables and wires.

NOTICE

Connect and disconnect the cables by following the standard operation procedure. Avoid any rough or forceful operation.

NOTICE

Cable remediation must comply with the applicable standards or regulations in the country/region where the project is located.

4.4.2 Material Preparation

4.4.2.1 Tool Preparation

Before cable connection inspection, it is suggested to prepare the appropriate tools, including but not limited to those listed below, to ensure the maintenance work can be completed smoothly.

No.	Item	Quantity (pcs)	Description
1	Safety helmet	1	-
2	Safety gloves	1	-
3	Screwdriver	1	Phillips screwdrivers are recommended.
4	Flashlight	1	Flashlights, searchlights, or other lighting devices are recommended.
5	Heat gun	1	-
6	Heat shrink tubing	As required	-

4.4.2.2 Consumable Parts List



The following list is for reference only. If any items differ from the parts used on site, the on-site parts shall prevail.

No.	Name	Material No.	Included in factory spare parts list?
1	Power cable	J-D-000291 J-D-000293 J-D-000304 J-D-000306 J-D-000376 J-D-000435	No
2	Communication cable	J-E-000029	No
3	Shielded cable	J-E-000160	No
4	Cat6a shielded network cable	J-E-000170	No
5	Self-locking nylon cable tie	Y-G-000062	No
6	Cable tie	Y-G-000043	No

No.	Name	Material No.	Included in factory spare parts list?
7	Heat shrink tubing	F-P-000083	No
8	Internally ribbed sleeve	Y-F-000160 F-U-000156	No
9	DC male socket	G-M-000859 G-M-000860	No
10	Signal male socket	G-M-000766 G-M-000767	No
11	Euro-style ferrule	G-L-000120	No
12	OT terminal	G-C-000183 G-C-000205 G-C-000213	No
13	DT terminal	G-L-000250	No

4.4.3 Inspection Procedure

The inspection workflow for cable connections is shown in the figure below. The maintenance task takes approximately 10 minutes.

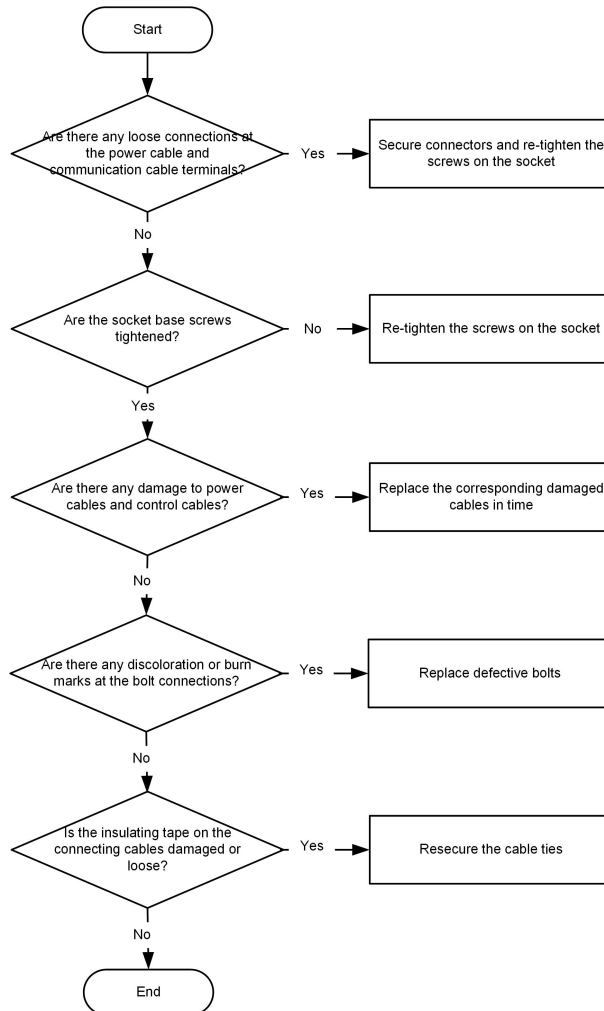


Figure 4-8 Inspection Workflow for Cable Connections

4.4.4 Inspection Procedure (Every Year)

Step 1 Check whether there are any loose power cables or communication cables, and whether the screws of the DC/AC sockets are properly tightened.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear a safety helmet and safety gloves, and open the cabinet door.
- c. Visually check the power cable and communication cable connections on the panel of the DC/AC power converter unit. Secure any loose connections.

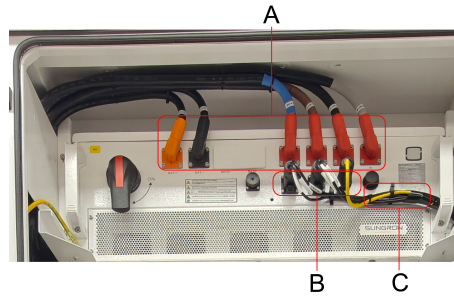


Figure 4-9 Cable Connection

*The figure is for reference only.

No.	Description
A	Power cables and sockets
B	Communication cables and sockets
C	Cable ties

- d. If the cables are not routed in compliance with the standards, correct the routing.
- e. Check whether the screws of the DC/AC sockets are loose. Tighten any loose screws using a screwdriver.

Step 2 Check the power cables and communication cables for damage. Pay particular attention to areas where the cables contact metal surfaces for signs of cuts.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear a safety helmet and safety gloves, and open the cabinet door.
- c. Check all cables inside the equipment for insulation damage using a flashlight or a searchlight. Pay particular attention to areas such as bends, hinge points, and pipe connection points. If any insulation damage is found, replace the affected cable promptly. For cable replacement procedures, see [8.2 Prepare Cables](#).
- d. Check all bolt connections for discoloration or burn marks. If discoloration or burn marks are found, it is recommended to replace the affected bolts.

Step 3 Check the power cables for loose or missing insulated cable ties.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear a safety helmet and safety gloves, and open the cabinet door.
- c. Use a flashlight or a searchlight to check the cables inside the equipment for damaged, loose, or detached insulated cable ties.
- d. If any such condition is found, re-secure the cables using cable ties.

--End

4.5 Components

4.5.1 Safety Precautions

⚠ DANGER

Ensure the AC and DC sides are voltage-free before replacing any component.

NOTICE

Connect and disconnect the cables by following the standard operation procedure. Avoid any rough or forceful operation.

4.5.2 Material Preparation

4.5.2.1 Tool Preparation

Before component inspection, it is suggested to prepare the appropriate tools, including but not limited to those listed below, to ensure the maintenance work can be completed smoothly.

No.	Item	Quantity (pcs)	Description
1	Safety helmet	1	-
2	Safety gloves	1	-
3	Laptop computer	1	-
4	Screwdriver	1	Phillips screwdrivers are recommended.
5	Maintenance tooling	1	Code: A0SJ0699.

4.5.2.2 Consumable Parts List



The following list is for reference only. If any items differ from the parts used on site, the on-site parts shall prevail.

No.	Name	Material No.	Included in factory spare parts list?
1	DC load switch	D0KX0047	No
2	Connecting bar	D0KZ0077	No
3	Load switch handle	K-Z-000372	No

4.5.3 Inspection Procedure

The workflow for the component inspection is shown in the figure below. The maintenance task takes approximately 10 minutes.

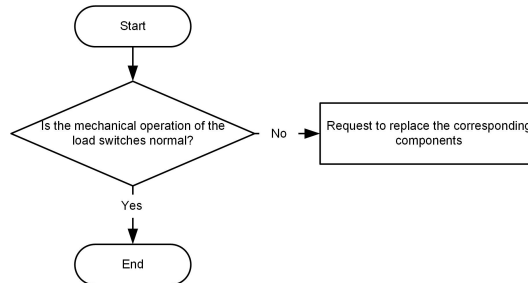


Figure 4-10 Workflow for Component Inspection

4.5.4 Inspection Procedure (Every Six Months)

Step 1 Check the load switch for proper mechanical operation.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Check the load switch for proper mechanical operation.



Figure 4-11 Load Switch

*The figure is for reference only.

- c. If on-site conditions permit, replace the parts. If conditions do not permit, please contact the field service engineer.

--End

4.6 Functionality

4.6.1 Safety Precautions



The Web user interfaces may vary across software versions. The screenshots in this manual are for reference only.

4.6.2 Material Preparation

4.6.2.1 Tool Preparation

Before functional inspection, it is suggested to prepare the appropriate tools, including but not limited to those listed below, to ensure the maintenance work can be completed smoothly.

No.	Item	Quantity (pcs)	Description
1	Laptop computer	1	-
2	Network cable	1	-

4.6.2.2 Consumable Parts List



The following list is for reference only. If any items differ from the parts used on site, the on-site parts shall prevail.

No.	Name	Material No.	Included in factory spare parts list?
1	SC130CX control board assembly	B0P04669	No

4.6.3 Inspection Procedure

The workflow for the functional inspection is shown in the figure below. The maintenance task takes approximately 15 minutes.

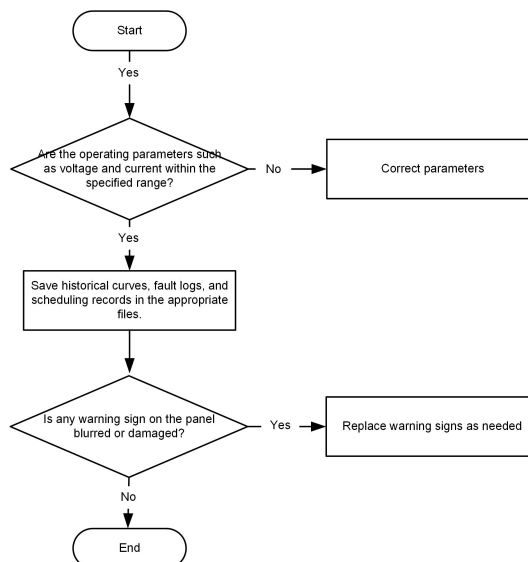
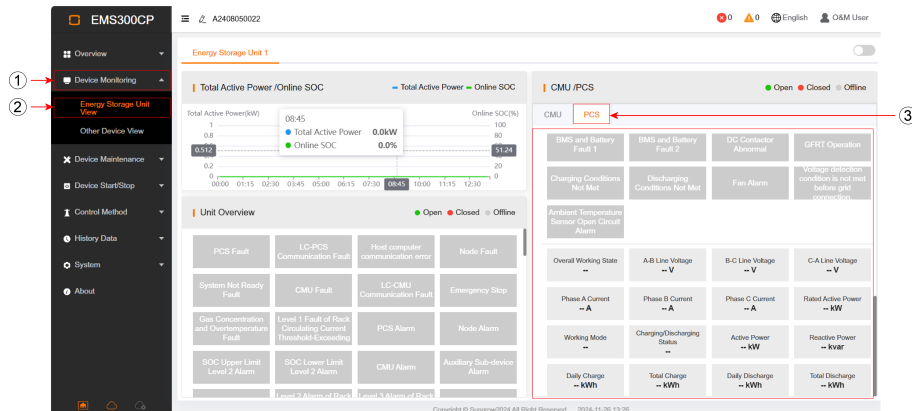


Figure 4-12 Workflow for Functional Inspection

4.6.4 Inspection Procedure (Every Six Months)

Step 1 Check the operation parameters of the DC/AC power conversion unit are within the allowable range.

- Log in to the EMS300CP Web user interface. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- Choose **Device monitoring > Energy storage unit view > PCS**, and check the fault status and the operation parameters. Pay special attention to whether the line voltages and active power are within the allowable range.

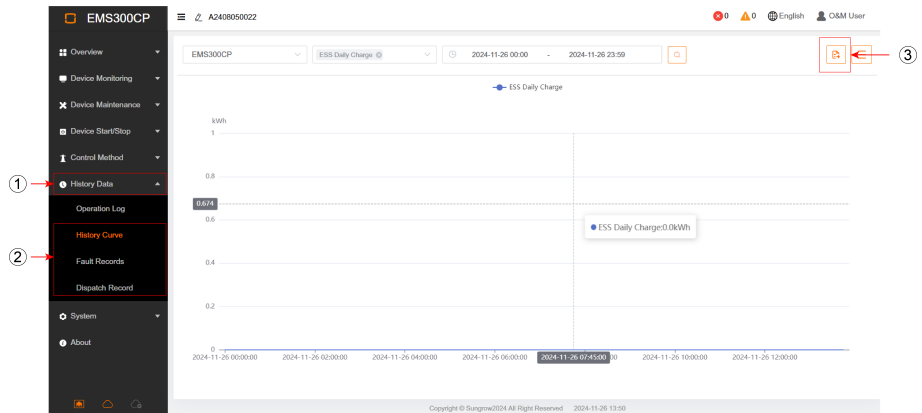


*The figure is for reference only.

- Normal line voltage range (as per grid connection requirements): 422.4–528 Vac.
- Normal active power range: no more than 1.1 times the rated power for long-time operation; no more than 1.2 times the rated power for short-time operation (1 min).

Step 2 Save historical curves, fault records, and dispatch records to the relevant files.

- Log in to the EMS300CP Web user interface. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- Choose **History data > History curve/Fault records/Dispatch records > Export** to export the operation records to your local system.



*The figure is for reference only.

Step 3 Check the warning signs on the panel. Replace any blurred or damaged signs.



Figure 4-13 Warning Signs

*The figure is for reference only.

--End

5 BSP

5.1 Inspection Items

The inspection items of the battery supply panel (BSP) are listed in the table below.



- The recommended maintenance intervals are listed below. These intervals should be adjusted based on the installation site conditions.
- The maintenance frequency is subject to factors like plant size, installation position, and on-site environment. For the equipment operating in sandy or dusty environments, it is necessary to increase the frequency of maintenance.

No.	Item	Description	Maintenance Interval
1	External inspection	<ol style="list-style-type: none"> 1. Check the device for signs of rust. 2. Check that the device markings and labels are legible. 3. Check the device for damage or deformation. 	Every year
2	System operating status and environment	<ol style="list-style-type: none"> 1. Check whether there is abnormal noise during the equipment operation. 2. Check the ambient humidity and the dust levels around the equipment. 3. Check the fans and air vents for foreign debris, dust, or dirt. Clean them if necessary. 4. Check for missing screws. 	Every year
3	Cable connection	<ol style="list-style-type: none"> 1. Check whether there are any loose power cables or communication cables, and whether the screws of the DC/AC sockets are properly tightened. 2. Check the power cables and communication cables for damage. Pay particular attention to areas 	Every year

No.	Item	Description	Maintenance Interval
		<p>where the cables contact metal surfaces for signs of cuts.</p> <p>3. Check the cables for any loose or detached insulation cable ties.</p>	
5	Components	<p>1. Check whether the load switch and MCBs operate mechanically properly. If not, request replacement.</p> <p>2. Check whether the UPS indicator functions normally and whether it indicates an alarm.</p> <p>3. Check the UPS battery for leak and deformation.</p> <p>4. Check for any inactive UPS. An inactive UPS needs to be charged every six months.</p>	Every six months
6	Functionality	<p>1. Check the warning signs on the panel. Replace any blurred or damaged signs.</p>	Every six months

5.2 External Inspection

5.2.1 Safety Precautions

WARNING

- Maintenance personnel must wear the appropriate PPE when handling flammable materials . The PPE must comply with relevant national standards. Required PPE includes, but is not limited to, safety helmets, safety gloves, and protective clothing.
- Handle flammable materials during daylight hours whenever possible. If night-time handling is unavoidable, do not use open-flame lighting sources.
- Do not smoke and avoid any activities that involve open flames or ignition sources while handling flammable materials.
- Do not throw, drag, or roll any flammable materials.

⚠ WARNING

- **Rust removers release highly flammable gases. Keep rust removers away from sources of heat, sparks, open flames, or static electricity.**
- **Use rust removers only in a well-ventilated environment.**
- **Avoid contact of rust removers with skin and eyes, and avoid inhaling rust removers. In case of contact or inhalation, seek immediate medical attention.**

NOTICE

When closing the door, ensure the sealing strip around the door does not curl.

5.2.2 Material Preparation**5.2.2.1 Tool Preparation**

Before external inspection, it is suggested to prepare the appropriate tools, including but not limited to those listed below, to ensure the maintenance work can be completed smoothly.

No.	Item	Quantity (pcs)	Description
1	Safety helmet	1	-
2	Safety gloves	1	-
3	Dust mask	1	-
4	Protective clothing	1	-
5	Rust remover	1	It is recommended to use a metal surface rust remover that can quickly remove rust without corroding the material of the workpiece.
6	Wrench	1	Open-end and socket wrenches are recommended.
7	Cleaning cloth	1	Cleaning cloths or other suitable cleaning tools are recommended.
8	Alcohol or other non-corrosive cleaning agents	1	If water cannot remove the dirt, you may use the following cleaning agents. <ul style="list-style-type: none"> • 97% alcohol. • Commonly used non-corrosive cleaning agent in your locality.
9	Sandpaper	1	-

No.	Item	Quantity (pcs)	Description
10	Soft brush	1	-
11	Paint	1	Color: RAL9003*
12	Zinc-rich primer	1	-
13	Grease lubricant	1	-

*The recommended color in this manual applies to the standard configuration. For customized products, refer to the actual color used on the product.

5.2.2.2 Consumable Parts List



The following list is for reference only. If any items differ from the parts used on site, the on-site parts shall prevail.

No.	Name	Material No.	Included in factory spare parts list?
1	Safety warning labels of switch gear	F-G-001963 F-G-002466	No
2	Lightning sign label	F-GC-00818	No
3	Label	F-G-002798	No
4	Label assembly	B-Q-007128	No

5.2.3 Inspection Procedure

The workflow for external inspection is shown in the figure below. The maintenance task takes approximately 10 minutes.

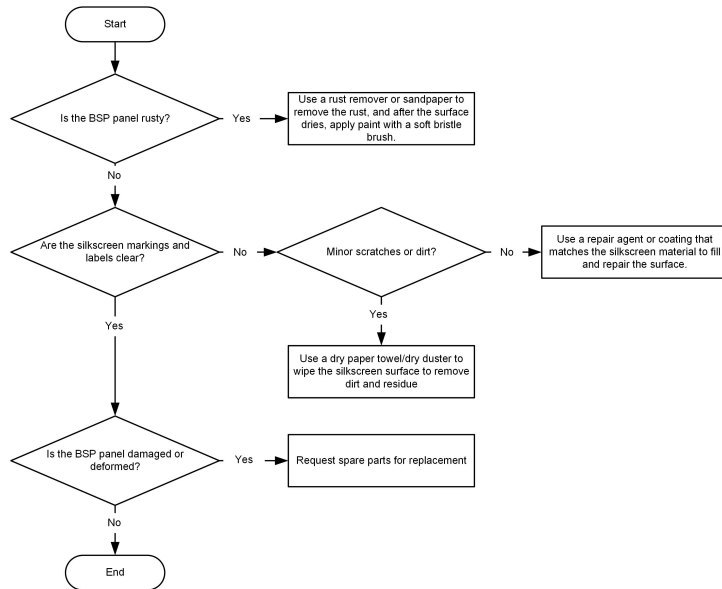


Figure 5-1 Workflow for External Inspection

5.2.4 Inspection Procedure (Every Year)

Step 1 Check the BSP panel for rust.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear a safety helmet and safety gloves, and check the BSP panel for rust.



Figure 5-2 BSP Panel

*The figure is for reference only.

- c. If rust is found, remove it using sandpaper or rust remover. Once the surface is dry, apply a protective coating with a soft brush.

Step 2 Check whether the markings and labels are legible.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear a safety helmet and safety gloves. Check whether the markings and labels of the BSP are legible.

5.3.2 Material Preparation

5.3.2.1 Tool Preparation

Before inspecting the system's operating status and environment, it is suggested to prepare the appropriate tools, including but not limited to those listed below, to ensure the maintenance work can be completed smoothly.

No.	Item	Quantity (pcs)	Description
1	Safety helmet	1	-
2	Safety gloves	1	-
3	Dust mask	1	-
4	Thermometer	1	Non-contact thermometers are recommended.
5	Multimeter	1	-
6	Hygrometer	1	-
7	Desiccant	As required	<ul style="list-style-type: none"> Desiccants containing activated carbon, silica gel, calcium chloride, or cellulose are recommended. If the humidity inside the cabinet is too high, consider whether a dehumidifier is required.
8	Rust remover	1	It is recommended to use a metal surface rust remover that can quickly remove rust without corroding the material of the workpiece.
9	Sandpaper	1	-
10	Soft brush	1	-
11	Zinc-rich primer	1	-
12	Dry tissue or dry cloth	1	It is recommended to use cleaning tools that are dry, such as dry tissue and cloth
13	Industrial vacuum cleaner	1	It is recommended to use an industrial vacuum cleaner equipped with swivel casters and fixed casters.
14	Screwdriver	1	Electric screwdrivers are recommended.

No.	Item	Quantity (pcs)	Description
15	Wrench	1	Open-end and socket wrenches are recommended.
16	Flashlight	1	Flashlights, searchlights, or other lighting devices are recommended.

5.3.2.2 Consumable Parts List



The following list is for reference only. If any items differ from the parts used on site, the on-site parts shall prevail.

No.	Name	Material No.	Included in factory spare parts list?
1	Cross-recessed hex bolt, spring washer, and flat washer assembly	S-Z-000056 S-Z-000112 S-Z-000073	No
2	Hex bolt (fully threaded)	S-A-000054	No
3	Disc spring washer	S-Q-000185	No
4	Hex flange nut	S-B-000085	No
5	End bracket	G-C-000250	No
6	Axial flow fan	E-A-000006	No

5.3.3 Inspection Procedure

The workflow for system operation and environment inspection is shown in the figure below.

Every Year

The maintenance task takes approximately 10 minutes.

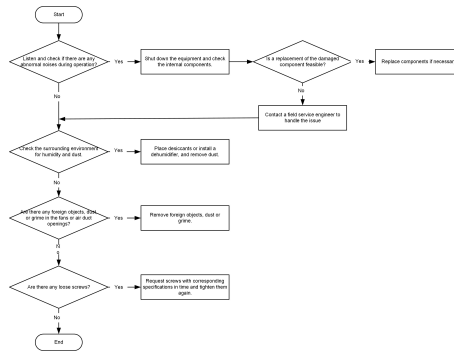


Figure 5-4 Workflow for System Operation and Environment Inspection (Every Year)

5.3.4 Inspection Procedure (Every Year)

Step 1 Check for abnormal noise during the BSP operation.

- a. Wear a safety helmet and safety gloves. Standing near the BSP, listen carefully to identify any unusual sounds (excluding wind noise, regular current noise, etc.).
- b. If any abnormal noise is identified, shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- c. Remove the screws on the panel of the BSP, and check the interior for any damaged component.



Figure 5-5 BSP Panel

*The figure is for reference only.

- d. If on-site conditions permit, replace the parts. If conditions do not permit, please contact the field service engineer.

Step 2 Check the humidity and dust in the surrounding environment.

- a. Wear a safety helmet and safety gloves, and open the ESS cabinet door.
- b. Place a hygrometer outside the cabinet, and check whether the ambient humidity is within the range of 0% to 100%. Simultaneously, check for water stains or condensation near the BSP.
- c. If the ambient humidity is too high or condensation is observed inside the cabinet, it is advisable to place desiccant packs inside the cabinet.



Figure 5-6 Desiccant Packs

*The figure is for reference only.

NOTICE

Ensure the desiccant packs do not block the air inlets and outlets of the equipment.

- d. If the humidity inside the cabinet remains excessively high, assess the need for a dehumidifier. If required, contact the field service engineer.
- e. Wipe the surface of the BSP with a dry tissue or cloth. Determine whether dust removal is required based on the amount of dirt observed on the used tissue or cloth.

Step 3 Check whether there is foreign debris, dust, or dirt in the external fans and air ducts. Clean them if necessary.

- a. Wear a safety helmet and safety gloves, keep a safe distance, and listen carefully. Check whether the fans of the BSP make abnormal noise and whether they are blocked by foreign objects.
- b. If abnormal noise or foreign object is identified, shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- c. Remove the screws from the BSP compartment panel, and clear the blockage. Manually rotate the fans to check whether they can rotate smoothly. Investigate any abnormal conditions.
- d. If any fan is found damaged, contact SUNGROW promptly for replacement.

Step 4 Check for any missing screws on the BSP panel.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear a safety helmet and safety gloves. Visually check the junction box for missing screws. You may use adjacent systems of the same model as a reference.



Figure 5-7 Locations of Screws

*The figure is for reference only.

- c. If any screws are missing, promptly request screws with the same specifications and install them using a screwdriver.

--End

5.4 Cable Connection

5.4.1 Safety Precautions

⚠ DANGER

High voltages! Danger of electric shock!

- Do not touch any live part!
- Before inspection, ensure the AC and DC sides are voltage-free.

⚠ WARNING

- Check the polarity of all input cables. Ensure all input cables are connected with the correct polarity.
- Do not forcibly pull any wires or cables, as this may diminish their insulation performance.
- Ensure that all cables and wires have sufficient space for any bends.
- Take necessary auxiliary measures to reduce the stress on cables and wires.

NOTICE

Connect and disconnect the cables by following the standard operation procedure. Avoid any rough or forceful operation.

NOTICE

Cable remediation must comply with the applicable standards or regulations in the country/region where the project is located.

5.4.2 Material Preparation

5.4.2.1 Tool Preparation

Before cable connection inspection, it is suggested to prepare the appropriate tools, including but not limited to those listed below, to ensure the maintenance work can be completed smoothly.

No.	Item	Quantity (pcs)	Description
1	Safety helmet	1	-

No.	Item	Quantity (pcs)	Description
2	Safety gloves	1	-
3	Screwdriver	1	Phillips screwdrivers are recommended.
4	Wrench	1	Open-end and socket wrenches are recommended.
5	Flashlight	1	Flashlights, searchlights, or other lighting devices are recommended.
6	Heat gun	1	-
7	Heat shrink tubing	As required	-

5.4.2.2 Consumable Parts List



The following list is for reference only. If any items differ from the parts used on site, the on-site parts shall prevail.

No.	Name	Material No.	Included in factory spare parts list?
1	ESS controller cable assembly	B-D-003264	No
2	Cable assembly	B0D00686	
3	Self-locking nylon cable tie	Y-G-000062	No
4	Heat shrink tubing	Y-F-000398 Y-F-000407 Y-F-000409 Y-F-000417	No
5	Protective cover	F-E-000606	No

5.4.3 Inspection Procedure

The inspection workflow for cable connections is shown in the figure below. The maintenance task takes approximately 10 minutes.

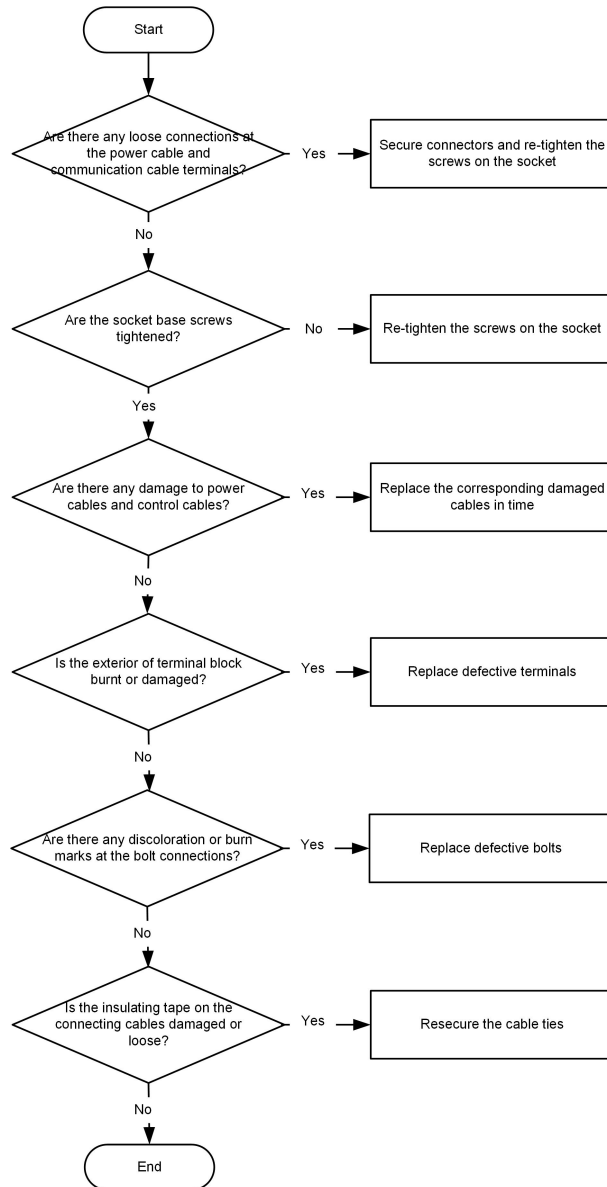


Figure 5-8 Inspection Workflow for Cable Connections

5.4.4 Inspection Procedure (Every Year)

Step 1 Check whether there are any loose power cables or communication cables, and whether the screws of the DC/AC sockets are properly tightened.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear a safety helmet and safety gloves, and open the cabinet door.
- c. Visually check the power cable and communication cable connections on the BSP panel.

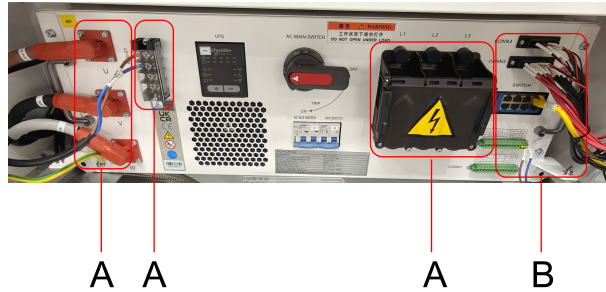


Figure 5-9 Cable Connection

*The figure is for reference only.

No.	Description
A	Power cables and sockets
B	Communication cables and sockets

- d. Replace any cable with external damage. For cable replacement procedures, see [8.2 Prepare Cables](#).
- e. If the cables are not routed in compliance with the standards, correct the routing.
- f. Check whether the screws of the DC/AC sockets are loose. Tighten any loose screws using a screwdriver.

Step 2 Check the power cables and communication cables for damage. Pay particular attention to areas where the cables contact metal surfaces for signs of cuts.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear a safety helmet and safety gloves, and open the cabinet door.
- c. Check all cables inside the equipment for insulation damage using a flashlight or a searchlight. Pay particular attention to areas such as bends, hinge points, and pipe connection points. If any insulation damage is found, replace the affected cable promptly.
- d. Check the terminal blocks inside the cabinet for burn marks, physical damage, or other abnormal conditions. If burning or damage or any other abnormal condition is found, it is recommended to replace the affected terminal block.
- e. Check all bolt connections for discoloration or burn marks. If discoloration or burn marks are found, it is recommended to replace the affected bolts.

Step 3 Check the power cables for loose or missing insulated cable ties.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear a safety helmet and safety gloves, and open the cabinet door.
- c. Use a flashlight or a searchlight to check the cables inside the equipment for damaged, loose, or detached insulated cable ties.
- d. If any such condition is found, re-secure the cables using cable ties.

--End

5.5 Components

5.5.1 Safety Precautions

⚠ DANGER

Ensure the AC and DC sides are voltage-free before replacing any component.

NOTICE

Connect and disconnect the cables by following the standard operation procedure. Avoid any rough or forceful operation.

5.5.2 Material Preparation

5.5.2.1 Tool Preparation

Before component inspection, it is suggested to prepare the appropriate tools, including but not limited to those listed below, to ensure the maintenance work can be completed smoothly.

No.	Item	Quantity (pcs)	Description
1	Safety helmet	1	-
2	Safety gloves	1	-
3	Laptop computer	1	-
4	Screwdriver	1	Phillips screwdrivers are recommended.
5	Maintenance tooling	1	Code: A0SJ0699.

5.5.2.2 Consumable Parts List



The following list is for reference only. If any items differ from the parts used on site, the on-site parts shall prevail.

No.	Name	Material No.	Included in factory spare parts list?
1	Temperature control switch	K-A-000009 K-A-000010	No

No.	Name	Material No.	Included in factory spare parts list?
2	AC miniature circuit breaker (MCB)	K-C-000040 K-M-000200 K-M-000396	No
3	AC molded case circuit breaker (MCCB)	K-C-000040	No
4	Schneider UPS	W-SL-00079	No

5.5.3 Inspection Procedure

The workflow for the component inspection is shown in the figure below. The maintenance task takes approximately 10 minutes.

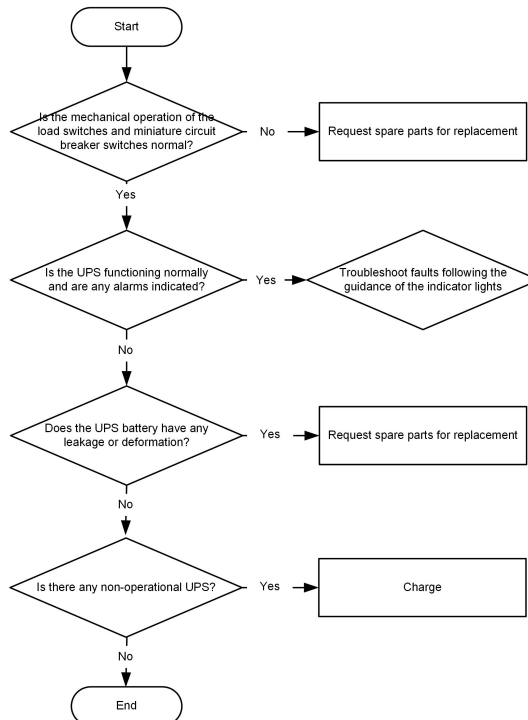


Figure 5-10 Workflow for Component Inspection

5.5.4 Inspection Procedure (Every Six Months)

Step 1 Check the load switch and MCBs for proper mechanical operation.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear a safety helmet and safety gloves, and open the cabinet door.

- c. Check whether the load switch and MCBs turn on and off smoothly and whether any of them has tripped off.

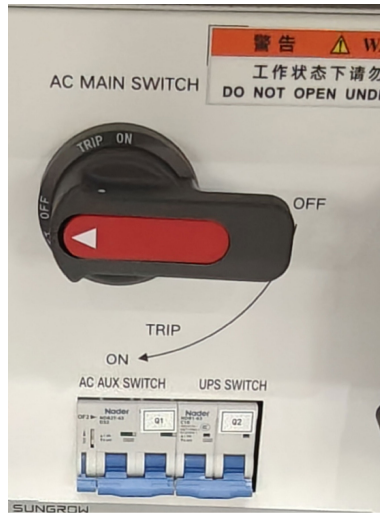


Figure 5-11 Switch

*The figure is for reference only.

- d. If on-site conditions permit, replace the parts. If conditions do not permit, please contact the field service engineer.

Step 2 Check whether the UPS indicator functions normally and whether it indicates an alarm.

- Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- Wear a safety helmet and safety gloves, and open the cabinet door.
- If any UPS indicator is abnormal or indicates an alarm, take corresponding actions based on the abnormal conditions.

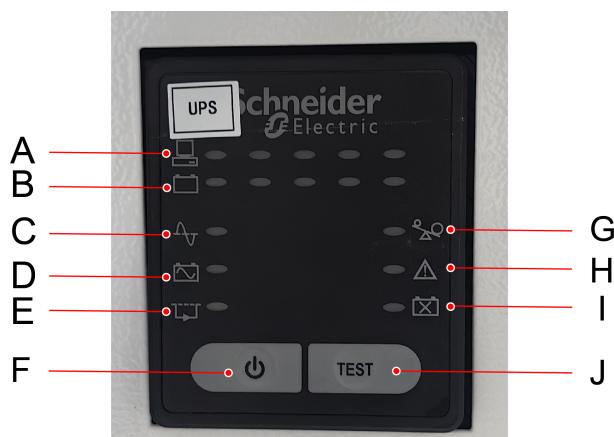


Figure 5-12 UPS Panel

*The figure is for reference only.

No.	Description	No.	Description
A	Load indicator	F	UPS ON/OFF button
B	Battery capacity/input voltage indicator	G	Overload indicator
C	Online Indicator	H	Fault indicator
D	Battery power supply indicator	I	Battery replacement indicator
E	Bypass power supply indicator	J	Battery self-test / input voltage display / silent mode button

Step 3 Check the UPS battery for leak and deformation.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear a safety helmet and safety gloves, and open the cabinet door.
- c. Remove the screws on the BSP panel, and check the UPS battery for damage.
- d. If on-site conditions permit, replace the parts. If conditions do not permit, please contact the field service engineer.

Step 4 Check for any inactive UPS. An inactive UPS needs to be charged every six months.

Charge the UPS when any of the following conditions occurs:

- The UPS fails to turn on after pressing and holding the UPS ON/OFF button for 1 s.
- The battery capacity indicator shows a low battery level.
- The buzzer sounds and the UPS reports a continuous low battery alarm when the battery has only 2 minutes of operating time remaining.

Steps for UPS charging:

- a. Connect the ESS to an external power source (power on the AC side of BSP).
- b. Turn on the AC switch.
- c. Turn on all MCBs (AC auxiliary switch and UPS switch).

NOTICE

The battery must not be stored for more than six consecutive months. If the UPS remains powered off for an extended period, it is recommended to charge the UPS battery at least once every month, for 24 hours each time. Then, perform a self-test. If the abnormal conditions persist after recharging, replace the battery.

NOTICE

--End

5.6 Functionality

5.6.1 Safety Precautions



The Web user interfaces may vary across software versions. The screenshots in this manual are for reference only.

5.6.2 Material Preparation

5.6.2.1 Tool Preparation

Before functional inspection, it is suggested to prepare the appropriate tools, including but not limited to those listed below, to ensure the maintenance work can be completed smoothly.

No.	Item	Quantity (pcs)	Description
1	Laptop computer	1	-
2	Network cable	1	-

5.6.2.2 Consumable Parts List



The following list is for reference only. If any items differ from the parts used on site, the on-site parts shall prevail.

No.	Name	Material No.	Included in factory spare parts list?
1	Safety warning label	F-G-001963 F-G-002466	No
2	Lightning sign label	F-GC-00818	No

5.6.3 Inspection Procedure

The workflow for the functional inspection is shown in the figure below. The maintenance task takes approximately 5 minutes.

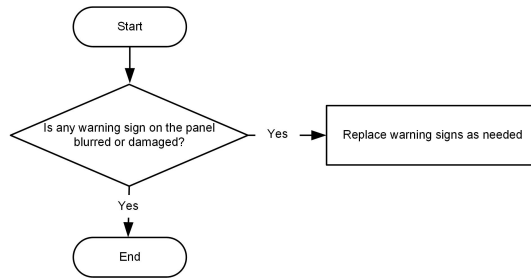


Figure 5-13 Workflow for Functional Inspection

5.6.4 Inspection Procedure (Every Six Months)

Step 1 Check the warning signs on the panel. Replace any blurred or damaged signs.



Figure 5-14 Warning Signs

*The figure is for reference only.

--End

6 Switch Gear



Only ST510CS-4H products are equipped with switch gear (S/G). Perform switch gear inspections as needed based on the project configuration.

6.1 Inspection Items

The inspection items for the switch gear (S/G) are listed in the table below.



- The recommended maintenance intervals are listed below. These intervals should be adjusted based on the installation site conditions.
- The maintenance frequency is subject to factors like plant size, installation position, and on-site environment. For the equipment operating in sandy or dusty environments, it is necessary to increase the frequency of maintenance.

No.	Item	Description	Maintenance Interval
1	External inspection	<ol style="list-style-type: none"> 1. Check the device for signs of rust. 2. Check that the device markings and labels are legible. 3. Check the device for damage or deformation. 	Every year
2	System operating status and environment	<ol style="list-style-type: none"> 1. Check whether there is abnormal noise during the equipment operation. 2. Check the ambient humidity and the dust levels around the equipment. 3. Check for missing screws. 	Every year
3	Cable connection	<ol style="list-style-type: none"> 1. Check whether the power cables are properly connected and whether the cable plugs are fully engaged. 2. Check the power cables for damage. Pay particular attention to areas where the power cables contact metal surfaces for signs of cuts. 	Every year
5	Components	<ol style="list-style-type: none"> 1. Check the load switch for proper mechanical operation. If the load 	Every six months

No.	Item	Description	Maintenance Interval
		switch does not operate properly, request a spare part for replacement.	
6	Functionality	1. Check the warning signs on the panel. Replace any blurred or damaged signs.	Every six months

6.2 External Inspection

6.2.1 Safety Precautions

⚠ WARNING

- Maintenance personnel must wear the appropriate PPE when handling flammable materials . The PPE must comply with relevant national standards. Required PPE includes, but is not limited to, safety helmets, safety gloves, and protective clothing.
- Handle flammable materials during daylight hours whenever possible. If night-time handling is unavoidable, do not use open-flame lighting sources.
- Do not smoke and avoid any activities that involve open flames or ignition sources while handling flammable materials.
- Do not throw, drag, or roll any flammable materials.

⚠ WARNING

- Rust removers release highly flammable gases. Keep rust removers away from sources of heat, sparks, open flames, or static electricity.
- Use rust removers only in a well-ventilated environment.
- Avoid contact of rust removers with skin and eyes, and avoid inhaling rust removers. In case of contact or inhalation, seek immediate medical attention.

NOTICE

When closing the door, ensure the sealing strip around the door does not curl.

6.2.2 Material Preparation

6.2.2.1 Tool Preparation

Before external inspection, it is suggested to prepare the appropriate tools, including but not limited to those listed below, to ensure the maintenance work can be completed smoothly.

No.	Item	Quantity (pcs)	Description
1	Safety helmet	1	-
2	Safety gloves	1	-
3	Dust mask	1	-
4	Protective clothing	1	-
5	Rust remover	1	It is recommended to use a metal surface rust remover that can quickly remove rust without corroding the material of the workpiece.
6	Wrench	1	Open-end and socket wrenches are recommended.
7	Cleaning cloth	1	Cleaning cloths or other suitable cleaning tools are recommended.
8	Alcohol or other non-corrosive cleaning agents	1	If water cannot remove the dirt, you may use the following cleaning agents. <ul style="list-style-type: none"> • 97% alcohol. • Commonly used non-corrosive cleaning agent in your locality.
9	Sandpaper	1	-
10	Soft brush	1	-
11	Paint	1	Color: RAL9003*
12	Zinc-rich primer	1	-
13	Grease lubricant	1	-

*The recommended color in this manual applies to the standard configuration. For customized products, refer to the actual color used on the product.

6.2.2.2 Consumable Parts List



The following list is for reference only. If any items differ from the parts used on site, the on-site parts shall prevail.

No.	Name	Material No.	Included in factory spare parts list?
1	Safety warning labels of switch gear	F-G-001963	No
2	Markings on the switch gear panel	F0ZZ0792	No

6.2.3 Inspection Procedure

The workflow for external inspection is shown in the figure below. The maintenance task takes approximately 10 minutes.

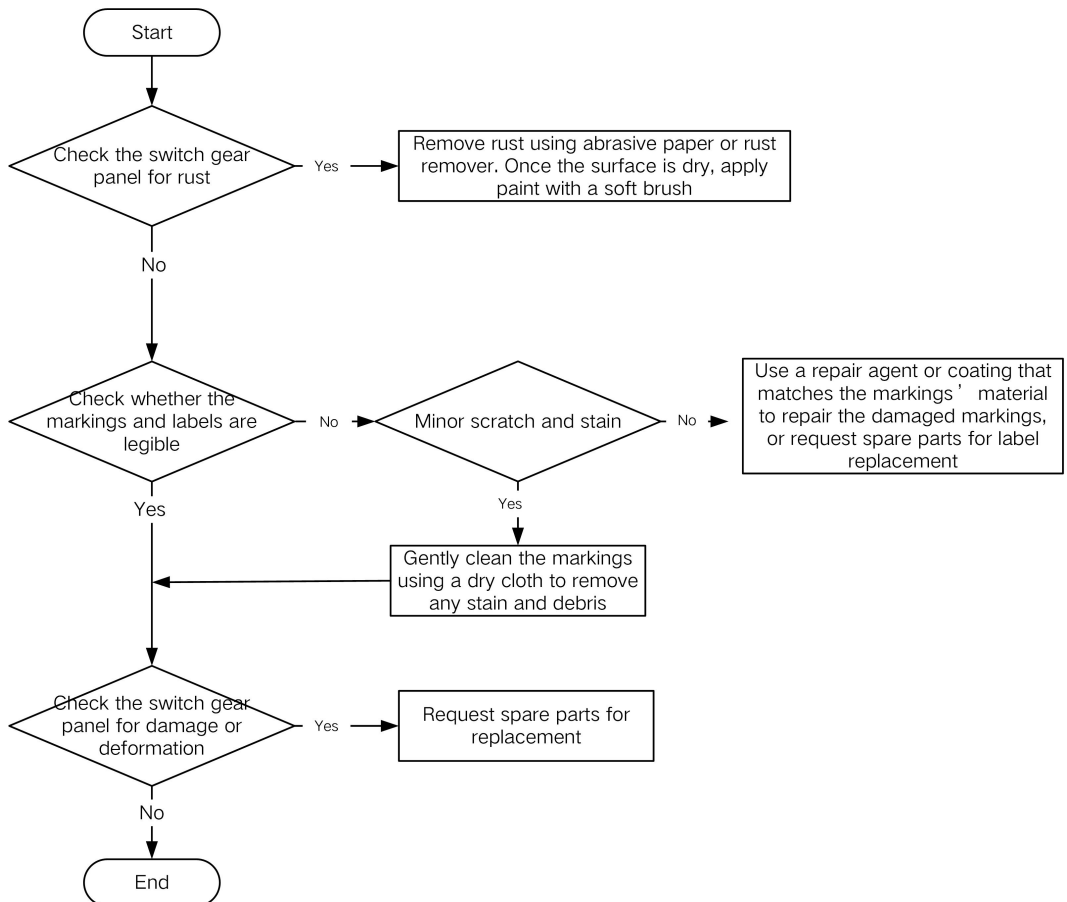


Figure 6-1 Workflow for External Inspection

6.2.4 Inspection Procedure (Every Year)

Step 1 Check the switch gear panel for rust.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear a safety helmet and safety gloves, and check the switch gear panel for rust.

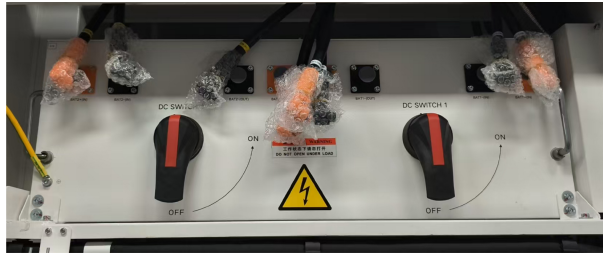


Figure 6-2 Switch Gear Panel

*The figure is for reference only.

- c. If rust is found, remove it using sandpaper or rust remover. Once the surface is dry, apply a protective coating with a soft brush.

Step 2 Check whether the markings and labels are legible.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear a safety helmet and safety gloves. Check whether the markings and labels of the switch gear are legible.
- c. If only minor scratches or stains are present, clean the markings. Gently clean the markings using a dry tissue or cloth to remove any stain and debris.
- d. If the markings are worn, use a repair agent or coating that matches their material to repair them.

Step 3 Check the switch gear panel for damage or deformation.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear a safety helmet and safety gloves, and check the switch gear panel for damage or deformation.
- c. If any of the above conditions is found, request corresponding spare parts for replacement promptly.

--End

6.3 System Operating Status and Environment

6.3.1 Safety Precautions

⚠ WARNING

Replacement of internal components must be performed exclusively by qualified personnel to ensure continuous fire protection.

⚠ WARNING

- It is not recommended to open the cabinet door to check for abnormal noise during the equipment operation.
- Before opening the cabinet door and investigating abnormal noise, shut down the system first.

⚠ WARNING

- Do not clean with water directly. Use a vacuum cleaner if necessary.
- Do not use cleaning agents for internal devices or expose them to harsh chemicals.

6.3.2 Material Preparation**6.3.2.1 Tool Preparation**

Before inspecting the system's operating status and environment, it is suggested to prepare the appropriate tools, including but not limited to those listed below, to ensure the maintenance work can be completed smoothly.

No.	Item	Quantity (pcs)	Description
1	Safety helmet	1	-
2	Safety gloves	1	-
3	Dust mask	1	-
4	Thermometer	1	Non-contact thermometers are recommended.
5	Multimeter	1	-
6	Hygrometer	1	-
7	Desiccant	As required	<ul style="list-style-type: none"> • Desiccants containing activated carbon, silica gel, calcium chloride, or cellulose are recommended. • If the humidity inside the cabinet is too high, consider whether a dehumidifier is required.
8	Rust remover	1	It is recommended to use a metal surface rust remover that can quickly remove rust without corroding the material of the workpiece.

No.	Item	Quantity (pcs)	Description
9	Sandpaper	1	-
10	Soft brush	1	-
11	Zinc-rich primer	1	-
12	Dry tissue or dry cloth	1	It is recommended to use cleaning tools that are dry, such as dry tissue and cloth
13	Industrial vacuum cleaner	1	It is recommended to use an industrial vacuum cleaner equipped with swivel casters and fixed casters.
14	Screwdriver	1	Electric screwdrivers are recommended.
15	Wrench	1	Open-end and socket wrenches are recommended.
16	Flashlight	1	Flashlights, searchlights, or other lighting devices are recommended.

6.3.2.2 Consumable Parts List



The following list is for reference only. If any items differ from the parts used on site, the on-site parts shall prevail.

No.	Name	Material No.	Included in factory spare parts list?
1	Cross-recessed hex bolt, spring washer, and flat washer assembly	S-Z-000112	No
2	Cross-recessed hex bolt, spring washer, and big flat washer assembly	S-Z-000482	No
3	Hex bolt, spring washer, and big flat washer assembly	S0A00225	No
4	Hex bolt (fully threaded)	S-A-000054	No
5	Hex flange nut	S-B-000085	No

6.3.3 Inspection Procedure

The workflow for system operation and environment inspection is shown in the figure below.

Every Year

The maintenance task takes approximately 10 minutes.

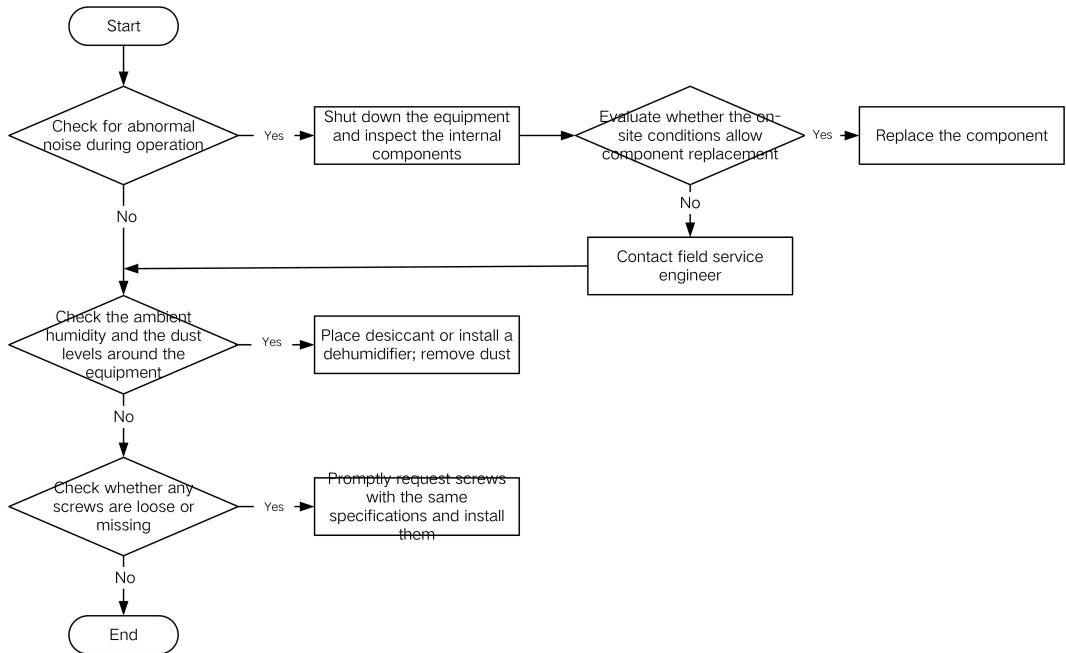


Figure 6-3 Workflow for System Operation and Environment Inspection (Every Year)

6.3.4 Inspection Procedure (Every Year)

Step 1 Check for abnormal noise during the switch gear operation.

- a. Wear a safety helmet and safety gloves. Standing near the switch gear, listen carefully to identify any unusual sounds (excluding wind noise, regular current noise, etc.).
- b. If any abnormal noise is identified, shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- c. Remove the screws on the switch gear panel, and inspect its internal components for damage.

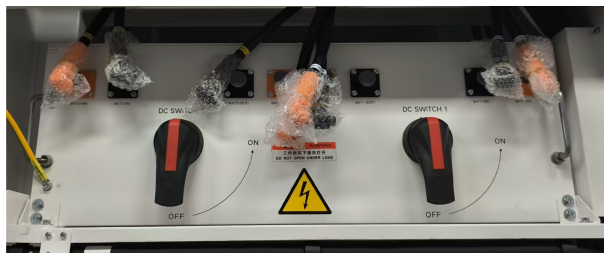


Figure 6-4 Switch Gear Panel

*The figure is for reference only.

- d. If on-site conditions permit, replace the parts. If conditions do not permit, please contact the field service engineer.

Step 2 Check the humidity and dust in the surrounding environment.

- a. Wear a safety helmet and safety gloves, and open the ESS cabinet door.
- b. Place a hygrometer outside the cabinet, and check whether the ambient humidity is within the range of 0% to 100%. Simultaneously, check for water stains or condensation near the switch gear.
- c. If the ambient humidity is too high or condensation is observed inside the cabinet, it is advisable to place desiccant packs inside the cabinet.



Figure 6-5 Desiccant Packs

*The figure is for reference only.

NOTICE

Ensure the desiccant packs do not block the air inlets and outlets of the equipment.

- d. If the humidity inside the cabinet remains excessively high, assess the need for a dehumidifier. If required, contact the field service engineer.
- e. Wipe the surface of the switch gear with a dry tissue or cloth. Determine whether dust removal is required based on the amount of dirt observed on the used tissue or cloth.

Step 3 Check the switch gear for any missing screws.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear a safety helmet and safety gloves. Visually check the switch gear for missing screws. You may use adjacent systems of the same model as a reference.
- c. If any screws are missing, promptly request screws with the same specifications and install them using a screwdriver.

--End

6.4 Cable Connection

6.4.1 Safety Precautions

⚠ DANGER

High voltages! Danger of electric shock!

- **Do not touch any live part!**
- **Before inspection, ensure the AC and DC sides are voltage-free.**

⚠ WARNING

- **Check the polarity of all input cables. Ensure all input cables are connected with the correct polarity.**
- **Do not forcibly pull any wires or cables, as this may diminish their insulation performance.**
- **Ensure that all cables and wires have sufficient space for any bends.**
- **Take necessary auxiliary measures to reduce the stress on cables and wires.**

NOTICE

Connect and disconnect the cables by following the standard operation procedure. Avoid any rough or forceful operation.

NOTICE

Cable remediation must comply with the applicable standards or regulations in the country/region where the project is located.

6.4.2 Material Preparation

6.4.2.1 Tool Preparation

Before cable connection inspection, it is suggested to prepare the appropriate tools, including but not limited to those listed below, to ensure the maintenance work can be completed smoothly.

No.	Item	Quantity (pcs)	Description
1	Safety helmet	1	-
2	Safety gloves	1	-
3	Screwdriver	1	Phillips screwdrivers are recommended.
4	Wrench	1	Open-end and socket wrenches are recommended.
5	Flashlight	1	Flashlights, searchlights, or other lighting devices are recommended.

No.	Item	Quantity (pcs)	Description
6	Heat gun	1	-
7	Heat shrink tubing	As required	-

6.4.2.2 Consumable Parts List



The following list is for reference only. If any items differ from the parts used on site, the on-site parts shall prevail.

No.	Name	Material No.	Included in factory spare parts list?
1	Cable assembly	B0D03182	No
2	Self-locking nylon cable tie	Y-G-000062	No
3	Heat shrink tubing	Y-F-000398 Y-F-000407 Y-F-000409 Y-F-000417	No
4	Protective cover	F-E-000606	No

6.4.3 Inspection Procedure

The inspection workflow for cable connections is shown in the figure below. The maintenance task takes approximately 10 minutes.

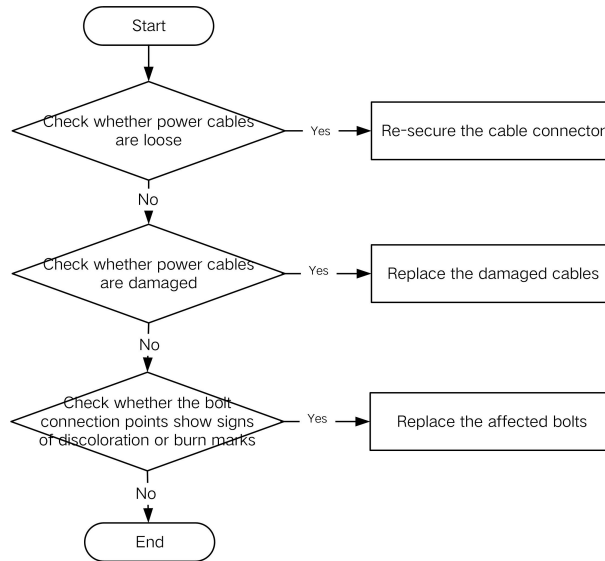


Figure 6-6 Inspection Workflow for Cable Connections

6.4.4 Inspection Procedure (Every Year)

Step 1 Check whether the power cables are properly connected and whether the cable plugs are fully engaged.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear a safety helmet and safety gloves, and open the cabinet door.
- c. Visually check the power cable connections on the switch gear panel.
- d. If the cables are not routed in compliance with the standards, correct the routing.
- e. Check whether the cable plugs are fully engaged. If not, reconnect the plug to ensure a secure connection.

Step 2 Check the power cables for damage. Pay particular attention to areas where the cables contact metal surfaces for signs of cuts.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear a safety helmet and safety gloves, and open the cabinet door.
- c. Check all cables inside the equipment for insulation damage using a flashlight or a searchlight. Pay particular attention to areas such as bends, hinge points, and pipe connection points. If any insulation damage is found, replace the affected cable promptly.
- d. Check all bolt connections for discoloration or burn marks. If discoloration or burn marks are found, it is recommended to replace the affected bolts.

--End

6.5 Components

6.5.1 Safety Precautions

⚠ DANGER

Ensure the AC and DC sides are voltage-free before replacing any component.

NOTICE

Connect and disconnect the cables by following the standard operation procedure. Avoid any rough or forceful operation.

6.5.2 Material Preparation

6.5.2.1 Tool Preparation

Before component inspection, it is suggested to prepare the appropriate tools, including but not limited to those listed below, to ensure the maintenance work can be completed smoothly.

No.	Item	Quantity (pcs)	Description
1	Safety helmet	1	-
2	Safety gloves	1	-
3	Laptop computer	1	-
4	Screwdriver	1	Phillips screwdrivers are recommended.
5	Maintenance tooling	1	Code: A0SJ0699.

6.5.2.2 Consumable Parts List



The following list is for reference only. If any items differ from the parts used on site, the on-site parts shall prevail.

No.	Name	Material No.	Included in factory spare parts list?
1	DC load switch	D0KX0032	No

6.5.3 Inspection Procedure

The workflow for the component inspection is shown in the figure below. The maintenance task takes approximately 10 minutes.

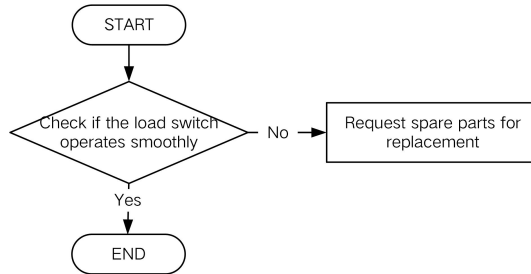


Figure 6-7 Workflow for Component Inspection

6.5.4 Inspection Procedure (Every Six Months)

Step 1 Check the load switch for proper mechanical operation.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear a safety helmet and safety gloves, and open the cabinet door.
- c. Check whether the load switch turns on and off smoothly and whether it has tripped off.



Figure 6-8 Switch

*The figure is for reference only.

- d. If on-site conditions permit, replace the parts. If conditions do not permit, please contact the field service engineer.

--End

6.6 Functionality

6.6.1 Safety Precautions

⚠ DANGER

- **Hazardous high voltage inside the product!**
- **Always note and observe warning signs on the product.**

6.6.2 Material Preparation

6.6.2.1 Tool Preparation

Before functional inspection, it is suggested to prepare the appropriate tools, including but not limited to those listed below, to ensure the maintenance work can be completed smoothly.

No.	Item	Quantity (pcs)	Description
1	Safety helmet	1	-
2	Safety gloves	1	-
3	Warning signs	As required	-
4	Alcohol or other non-corrosive cleaning agents	1	If water cannot remove the dirt, you may use the following cleaning agents. <ul style="list-style-type: none"> • 97% alcohol. • Commonly used non-corrosive cleaning agent in your locality.
5	Cleaning cloth	1	Cleaning cloths or other suitable cleaning tools are recommended.

6.6.2.2 Consumable Parts List



The following list is for reference only. If any items differ from the parts used on site, the on-site parts shall prevail.

No.	Name	Material No.	Included in factory spare parts list?
1	Safety warning labels of switch gear	F-G-001963	No

6.6.3 Inspection Procedure

The workflow for the functional inspection is shown in the figure below. The maintenance task takes approximately 5 minutes.

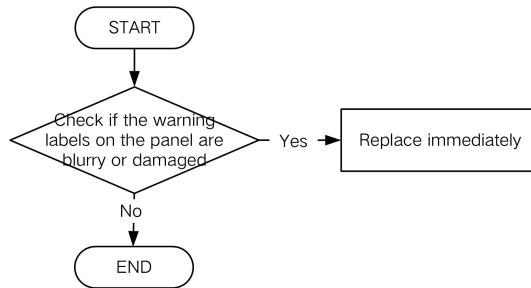


Figure 6-9 Workflow for Functional Inspection

6.6.4 Inspection Procedure (Every Six Months)

Step 1 Check the warning signs on the panel. Replace any blurred or damaged signs.



Figure 6-10 Warning Signs


*The figure is for reference only.

--End

7 ATS (Optional)

7.1 Inspection Items

The inspection items for the automatic transfer switching equipment (ATS cabinet) are listed in the table below.

-  • The recommended maintenance intervals are listed below. These intervals should be adjusted based on the installation site conditions.
- The maintenance frequency is subject to factors like plant size, installation position, and on-site environment. For the equipment operating in sandy or dusty environments, it is necessary to increase the frequency of maintenance.

No.	Item	Description	Maintenance Interval
1	External inspection	<ol style="list-style-type: none"> 1. Check whether there are flammable materials around the cabinet. 2. Check whether the welds between the cabinet and the foundation steel plate are secure, and whether there is rust. 3. Check the enclosure for damage, paint peeling, oxidation, or other abnormal conditions. 4. Check whether the door lock operates smoothly and properly. Lubricate the door locks and hinges if necessary. 5. Check whether the sealing strip is secured properly. Intact sealing strips effectively prevent water ingress into the cabinet. Inspect the sealing strips thoroughly and promptly replace any damaged strips. 	Every year
2	System status and cleanliness	<ol style="list-style-type: none"> 1. Check whether there is foreign debris, dust, or dirt inside the cabinet. Clean internal dust if 	Every year

No.	Item	Description	Maintenance Interval
		<p>necessary. (Use vacuum cleaner instead of broom)</p> <ol style="list-style-type: none"> 2. Check whether the air inlets and outlets of the cabinet are blocked. 3. Check whether internal screws fall off. 4. Check whether there is water ingress. 	
		<ol style="list-style-type: none"> 1. Check the cabinet and its internal devices for deformation and damage. 2. Check the internal devices for abnormal noise during operation. 3. Check whether the internal or enclosure temperature is too high. 4. Check whether there is oxidation or rust inside. 	Every two years
3	Cable connection	<ol style="list-style-type: none"> 1. Check whether the cables are routed in compliance with the standards, and whether there are short circuits or other abnormal conditions. In case of any abnormal condition, take corrective measures immediately. 2. Check whether all cable inlets and outlets of the cabinet are properly sealed. 3. Check whether there are any loose cable connections. If so, fasten them at the specified torque. 4. Check the cables for damage. Pay particular attention to areas where the cables contact metal surfaces for signs of cuts. 5. Check whether the insulated cable ties are loose or missing. 	Every year
4	Grounding and equipotential bonding	<ol style="list-style-type: none"> 1. Check whether the ground connection is properly made. Ensure the ground resistance does not exceed 4 Ω. 	Every year

No.	Item	Description	Maintenance Interval
		<ol style="list-style-type: none"> 2. Check whether the equipotential bonding inside the system is correct. 3. Check whether the cable shielding and the insulating sleeves are in proper contact, and whether the grounding flat steel is properly secured. 	
5	Components	<ol style="list-style-type: none"> 1. Check the cleanliness of the components. 2. Regularly check all metal components for rust. 3. Check the operating status of the cooling fan module. Check whether the fan is blocked or generates unusual noise during operation. 4. Check the contactors (circuit breakers and MCBs) and ensure they operate properly. 	Every six months
6	Functionality	<ol style="list-style-type: none"> 1. Safety function: Check whether the emergency stop button functions properly. 2. Check the warning signs and other markings on the equipment, and replace them promptly if they are blurred or damaged. 	Every six months

WARNING

Ensure the device is completely de-energized before opening the cabinet door.

7.2 External Inspection

7.2.1 Safety Precautions

WARNING

Follow the procedure for working at heights when performing inspection on the top of the cabinet. Maintenance personnel must wear the appropriate PPE, such as a safety helmet and safety harness for working at height.

⚠ WARNING

- Maintenance personnel must wear the appropriate PPE when handling flammable materials . The PPE must comply with relevant national standards. Required PPE includes, but is not limited to, safety helmets, safety gloves, and protective clothing.
- Handle flammable materials during daylight hours whenever possible. If night-time handling is unavoidable, do not use open-flame lighting sources.
- Do not smoke and avoid any activities that involve open flames or ignition sources while handling flammable materials.
- Do not throw, drag, or roll any flammable materials.

⚠ WARNING

- Rust removers release highly flammable gases. Keep rust removers away from sources of heat, sparks, open flames, or static electricity.
- Use rust removers only in a well-ventilated environment.
- Avoid contact of rust removers with skin and eyes, and avoid inhaling rust removers. In case of contact or inhalation, seek immediate medical attention.

NOTICE

When closing the door, ensure the sealing strip around the door does not curl.

7.2.2 Material Preparation

7.2.2.1 Tool Preparation

Before external inspection, it is suggested to prepare the appropriate tools, including but not limited to those listed below, to ensure the maintenance work can be completed smoothly.

No.	Item	Quantity (pcs)	Description
1	Ladder	1	A 2.5-meter A-shaped ladder is recommended (The ATS cabinet is 2450 mm in height. You may select the ladder according to the height of the foundation on-site.)
2	Safety harness	1	-
3	Safety helmet	1	-
4	Safety gloves	1	-
5	Dust mask	1	-

No.	Item	Quantity (pcs)	Description
6	Protective clothing	1	-
7	Rust remover	1	It is recommended to use a metal surface rust remover that can quickly remove rust without corroding the material of the workpiece.
8	Wrench	1	Open-end and socket wrenches are recommended.
9	Cleaning cloth	1	Cleaning cloths or other suitable cleaning tools are recommended.
10	Alcohol or other non-corrosive cleaning agents	1	If water cannot remove the dirt, you may use the following cleaning agents. <ul style="list-style-type: none"> • 97% alcohol. • Commonly used non-corrosive cleaning agent in your locality.
11	Sandpaper	1	-
12	Soft brush	1	-
13	Paint	1	Color: RAL9003*
14	Zinc-rich primer	1	-
15	Grease lubricant	1	-

*The recommended color in this manual applies to the standard configuration. For customized products, refer to the actual color used on the product.

7.2.2.2 Consumable Parts List



The following list is for reference only. If any items differ from the parts used on site, the on-site parts shall prevail.

No.	Name	Material No.	Included in factory spare parts list?
1	M16 flat washer	—	No
2	M16 standard spring washer	—	No
3	M16 nut	—	No

No.	Name	Material No.	Included in factory spare parts list?
4	Sealing strip	F-EA-00034	No

7.2.3 Inspection Procedure

The workflow for external inspection is shown in the figure below. The maintenance task takes approximately 20 minutes.

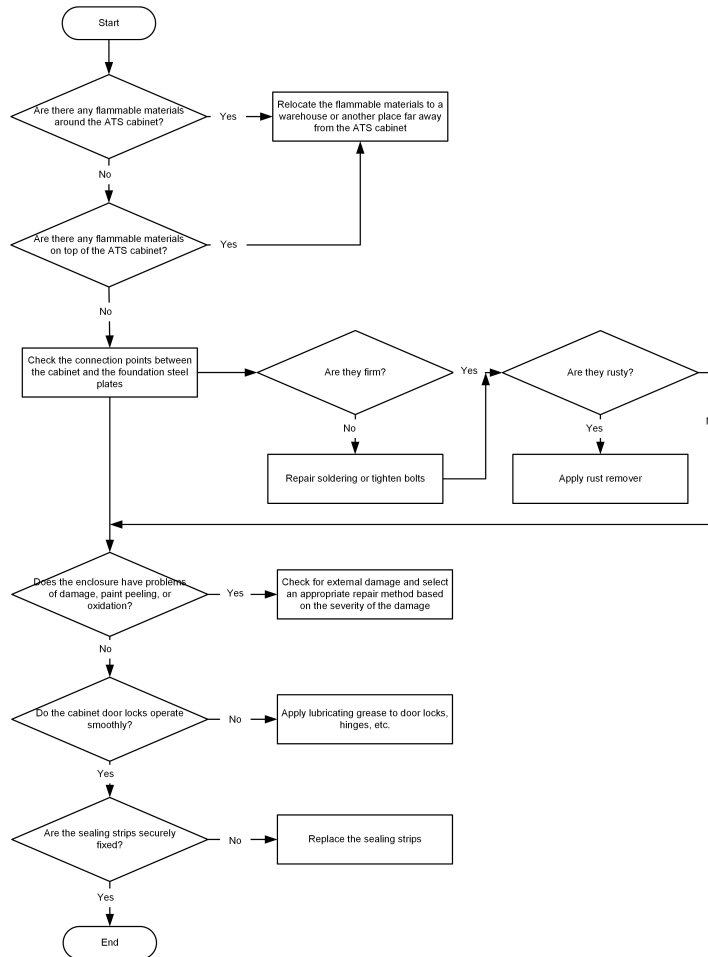


Figure 7-1 Workflow for External Inspection

7.2.4 Inspection Procedure (Every Year)

Step 1 Check whether there are flammable materials around or on top of the ATS cabinet.



Common flammable materials include, but are not limited to, linoleum, wood, paint, plastic products, and decorative and finishing materials.

- a. Wear PPE such as a safety helmet and protective clothing. Visually check for any flammable materials around the ATS cabinet.
- b. Wear a safety harness and other appropriate PPE, and climb a ladder to check for any flammable materials at the top of the ATS cabinet.
- c. If any flammable materials are found, wear safety gloves, dust masks, and other appropriate PPE, and move these materials to a designated storage area away from the ATS cabinet.

Step 2 Check whether the welds between the ATS cabinet and the foundation steel plate are secure, and whether there is rust.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear a safety helmet and safety gloves. Check whether the connection points between the ATS cabinet and the foundation steel plates are secure.
 - For welded connections, check whether the welds between the cabinet and the foundation steel plates are secure. If loose connections, cracks, or any other abnormal conditions are found, re-weld the affected areas. After welding, apply an anti-corrosion treatment to the new welds.



Figure 7-2 Secured by Welding

*The figure is for reference only.

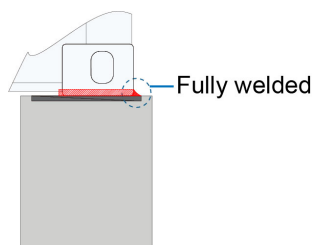


Figure 7-3 Continuous Welding

*The figure is for reference only.

- For bolted connections, check whether the bolts securing the ATS cabinet to the foundation are properly tightened by pushing gently on the cabinet. If any looseness is detected, tighten the bolts using a torque wrench.

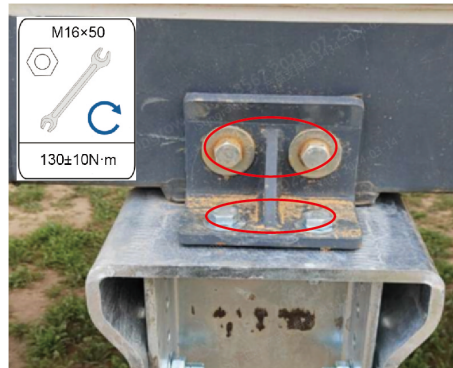


Figure 7-4 Secured by Bolts

*The figure is for reference only.

- c. Check the connection points between the ATS cabinet and the foundation steel plate for rust. If rust is found, remove it using sandpaper or rust remover. Once the surface is dry, apply a protective coating with a soft brush.

Step 3 Check whether there is any damage, paint peeling, or oxidation on the ATS cabinet enclosure.

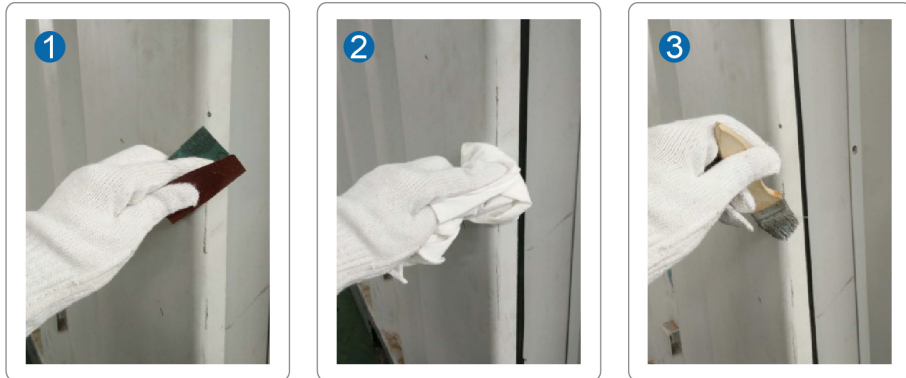
Check the external damage and choose an appropriate solution based on the severity.

a. Level 1: removable dirt and stains.

1. Wet the cloth (or other scrubbing tools) with water and use it to clean the affected area.
2. If the dirt or stain persists, use 97% alcohol to wipe the affected area until it is clean enough to meet the standards (You may also use non-corrosive cleaning agents that are commonly used in your locality.)

b. Level 2: irremovable dirt and stains.

1. Polish the area with paint burrs or scratches using sandpaper to smooth the surface.
2. Wet the cloth with water or 97% alcohol and scrub the affected area to remove the dirt and stain from the surface.
3. Once the surface is dry, apply touch-up paint to the scratched area using a soft brush. Ensure the paint is evenly applied.



*The figure is for reference only.

c. Level 3: primer damage with substrate exposed.

1. Polish the damaged area using sandpaper to remove the rust or burrs and create a smooth surface.
2. Wet the cloth with water or 97% alcohol and scrub the affected area to remove the dirt and stain from the surface.
3. Once the surface is dry, spray zinc-rich primer paint over the area with exposed substrate. Ensure the paint completely covers the exposed substrate.
4. After the primer is dry, apply touch-up paint to the damaged area using a soft brush. Ensure the paint is evenly applied.



*The figure is for reference only.

Step 4 Check whether the door lock operates properly. Lubricate the door locks and hinges if necessary.

- a. Wear safety gloves, and open and close the cabinet door. Check the door lock and hinges for smooth operation.



Figure 7-5 Door Lock and Hinge

*The figure is for reference only.

- b. If the door lock or hinge feels stiff or gets stuck when opening or closing the door, check for the jammed position and apply grease lubricant to the hinge at that spot.
- c. If the door lock body is rusted and the cabinet door cannot be opened, request a spare part for replacement.

Step 5 Check whether the sealing strip is secured properly. Intact sealing strips effectively prevent water ingress into the ATS cabinet. Inspect the sealing strips thoroughly and promptly replace any damaged strips.

- a. Wear safety gloves, and open the cabinet door. Check the sealing strips for cracks, detachment, or severe wear. Gently pull and lift them to check their flexibility and resilience.



Figure 7-6 Sealing Strip

*The figure is for reference only.

- b. If any abnormal condition is found during the inspection, it is recommended to replace the corresponding sealing strip.
- c. Apply silicone sealant to the sealing strip joints.

--End

7.3 System Status and Cleanliness

7.3.1 Safety Precautions

⚠ WARNING

Internal devices must be replaced by qualified personnel to ensure safety.

⚠ WARNING

- It is not recommended to open the cabinet door to check for abnormal noise during the equipment operation.
- Before opening the cabinet door and investigating abnormal noise, shut down the system first.

⚠ WARNING

- Do not clean with water directly. Use a vacuum cleaner if necessary.
- Do not use cleaning agents for internal devices or expose them to harsh chemicals.

7.3.2 Material Preparation

7.3.2.1 Tool Preparation

Before system status and cleanliness inspection, it is suggested to prepare the appropriate tools, including but not limited to those listed below, to ensure the maintenance work can be completed smoothly.

No.	Item	Quantity (pcs)	Description
1	Safety helmet	1	-
2	Safety gloves	1	-
3	Ladder	1	A 2.5-meter A-shaped ladder is recommended (The ATS cabinet is 2450 mm in height. You may select the ladder according to the height of the foundation on-site.)
4	Safety harness	1	-
5	Window screen brush	1	It is recommended to use a window screen brush to clean the mesh screen.
6	Dust mask	1	-

No.	Item	Quantity (pcs)	Description
7	Non-contact thermometer	1	Non-contact thermometers are recommended.
8	Multimeter	1	-
9	Rust remover	1	It is recommended to use a metal surface rust remover that can quickly remove rust without corroding the material of the workpiece.
10	Sandpaper	1	-
11	Soft brush	1	-
12	Paint	1	Color: RAL9003*
13	Zinc-rich primer	1	-
14	Dry tissue or dry cloth	1	It is recommended to use cleaning tools that are dry, such as dry tissue and cloth
15	Industrial vacuum cleaner	1	It is recommended to use an industrial vacuum cleaner equipped with swivel casters and fixed casters.
16	Screwdriver	1	Electric screwdrivers are recommended.
17	Wrench	1	Open-end and socket wrenches are recommended.
18	Flashlight/searchlight	1	Flashlights, searchlights, or other lighting devices are recommended.

*The recommended color in this manual applies to the standard configuration. For customized products, refer to the actual color used on the product.

7.3.2.2 Consumable Parts List



The following list is for reference only. If any items differ from the parts used on site, the on-site parts shall prevail.

No.	Name	Material No.	Included in factory spare parts list?
1	M16 bolt	—	No

No.	Name	Material No.	Included in factory spare parts list?
2	M16 standard spring washer	—	No
3	M16 flat washer	—	No
4	M16 nut	—	No
5	M8 bolt	—	No
6	M8 standard spring washer	—	No
7	M8 flat washer	—	No
8	M8 nut	—	No
9	Sealing strip	F-EA-00034	No

7.3.3 Inspection Procedure

The workflow for system status and cleanliness inspection is shown in the figure below.

Every Year

The maintenance task takes approximately 15 minutes.

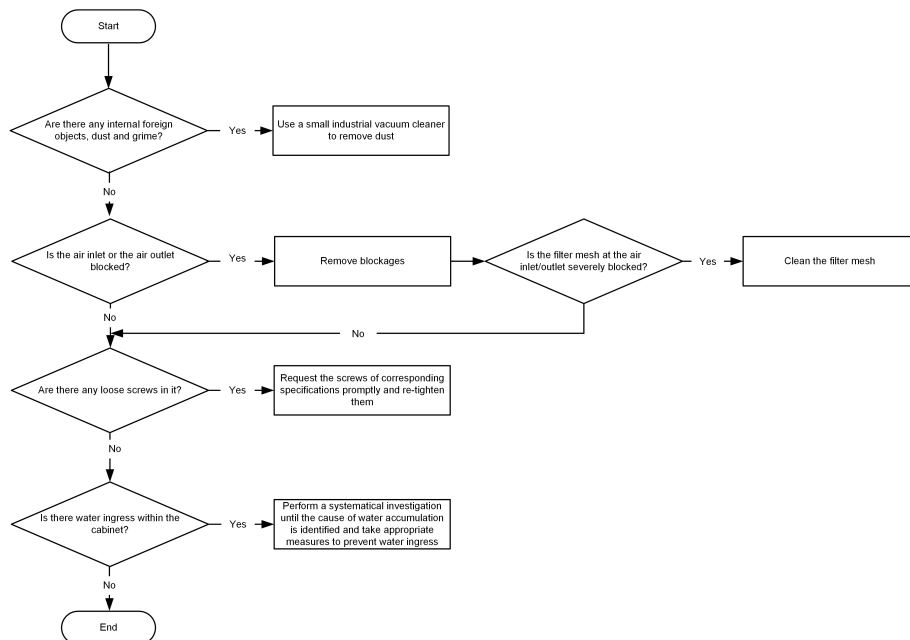


Figure 7-7 Workflow for System Status and Cleanliness Inspection (Every Year)

Every Two Years

The maintenance task takes approximately 20 minutes.



Figure 7-8 Workflow for System Status and Cleanliness Inspection (Every Two Years)

7.3.4 Inspection Procedure (Every Year)

Step 1 Check for foreign debris, dust, or dirt inside the ATS cabinet.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear a safety helmet and safety gloves, and open the cabinet door.
- c. Wipe the inner surfaces of the ATS cabinet with a dry tissue or cloth. Determine whether internal dust removal is required based on the amount of dirt observed on the used tissue or cloth.



Figure 7-9 Wipe with a Dry Tissue or Cloth

*The figure is for reference only.

- d. If excessive dust is found inside the ATS cabinet, shut down the system, wear dust masks, and remove dust using an industrial-grade vacuum cleaner.

Step 2 Check whether the air inlets and outlets of the ATS cabinet are blocked.

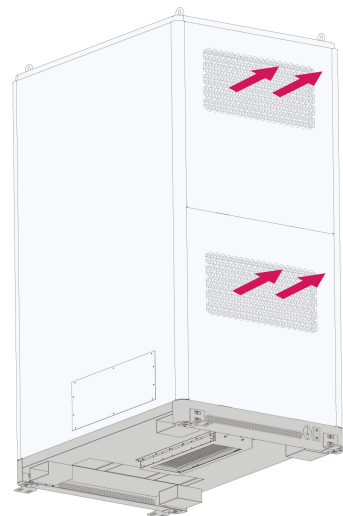
⚠ WARNING

Ensure the Block is shut down before any operation.

- a. Wear a safety helmet and safety gloves, and open the cabinet door.
- b. Check whether the air inlets and outlets of the ATS cabinet are blocked.



Air inlets at front and bottom



Air outlets at rear

Figure 7-10 Positions of Air Inlets and Outlets

*The figure is for reference only.



For the equipment working in sandy or dusty environments, it is necessary to shorten the maintenance interval.

- c. Visually check the air inlets and outlets for blockage. Clear it if any blockage is found.
- d. Remove the filter screens from the air inlets and outlets and see if there is any blockage. Clean or replace them if any blockage is found.

Step 3 Check the ATS cabinet interior for any missing screws.

⚠ WARNING

Ensure the Block is shut down before any operation.

- a. Wear a safety helmet and safety gloves, open the ATS cabinet door, and remove the cover.
- b. Visually check for any missing screws inside the ATS cabinet. It is recommended to compare with adjacent equipment of the same model for reference.



Figure 7-11 Locations of Screws

*The figure is for reference only.

- c. If any screws are missing, promptly request screws with the same specifications and install them using a torque wrench. For bolt tightening torque values, see [8.3 Tightening Torque](#).

Step 4 Check whether there is water ingress into the ATS cabinet.

⚠ WARNING

Ensure the Block is shut down before any operation.

- a. Wear a safety helmet and safety gloves, and open the cabinet door.

- b. Check the corners at the bottom of the ATS cabinet for water accumulation using a flashlight or a searchlight.
- c. If water accumulation is detected, systematically investigate the system until the source is located, and implement corresponding measures to prevent further water ingress.
 1. Check whether the ATS cabinet door is fully closed and whether the door sealing strips are compromised.
 2. Check whether all cable inlets and outlets are properly sealed.
 3. Check whether there is condensation due to high humidity.

--End

7.3.5 Inspection Procedure (Every two years)

Step 1 Check the internal devices of the ATS cabinet for deformation and damage.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear a safety helmet and safety gloves, open the cabinet door, and remove the cover. Visually check the internal devices.
 - Check the ATS cabinet exterior for any visible damage and deformation.
 - Check the internal devices such as circuit breakers for any visible damage and deformation.



Figure 7-12 ATS Cabinet Interior

*The figure is for reference only.

- c. If any of the above conditions is found, request corresponding spare parts for replacement promptly.

Step 2 Check the internal devices for abnormal noise during operation.

NOTICE

It is not required to open the cabinet door to perform this inspection item.

- a. Wear a safety helmet. Standing near the ATS cabinet, listen carefully to identify any unusual sounds (excluding wind noise, regular current noise, etc.).
- b. If any abnormal noise is identified, wear safety gloves, open the cabinet door, and systematically locate the source of the noise.
- c. If the noise originates from the fan, shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- d. Check whether the fan is blocked by any foreign objects. If no blockage is found but the noise persists, consider replacing the fan.



Figure 7-13 Fan

*The figure is for reference only.

- e. If the abnormal noise originates from capacitors, inductors, or other components, replace the part if conditions allow. If replacement is not feasible, contact a field service engineer for support.

Step 3 Check whether the internal or enclosure temperature of the ATS cabinet is too high.



Due to varying rated operating conditions for different devices, there is no unified standard for temperature rise assessment. You may measure and analyze the temperatures of multiple systems to facilitate the assessment.

- a. Power off the system at the end of charging or discharging. Wear a safety helmet and safety gloves, and open the cabinet door.
- b. Measure the temperatures of cables, circuit breakers, and other devices inside the cabinet using a non-contact thermometer to check for any abnormal temperature rise.



Figure 7-14 Measure Temperature

*The figure is for reference only.

- c. If abnormal temperature rise is detected, measure the voltage or current at the identified point using a multimeter during system operation to rule out potential short circuits.
- d. For modular equipment with abnormal temperature rise, it is recommended to request spare parts for replacement.

Component	Operating temperature range
SPD backup fuse	-40°C to 70°C
2-module SPD	-40°C to 70°C
3+1 SPD*	-40°C to 70°C

*In case of a lightning strike, replace the 3+1 SPD.



The device specifications above are for reference only. Operating temperature ranges may vary by device. Always refer to the official technical datasheet for the specific component.

Step 4 Check for oxidation or rust inside the ATS cabinet.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear a safety helmet and safety gloves, open the cabinet door, and visually check for rust or oxidation.
- c. If rust or oxidation is found inside the cabinet, it is recommended to replace the affected components.

- d. If rust or oxidation is found on the structural members, remove the rust using sandpaper or rust remover, and apply touch-up paint with a soft brush.

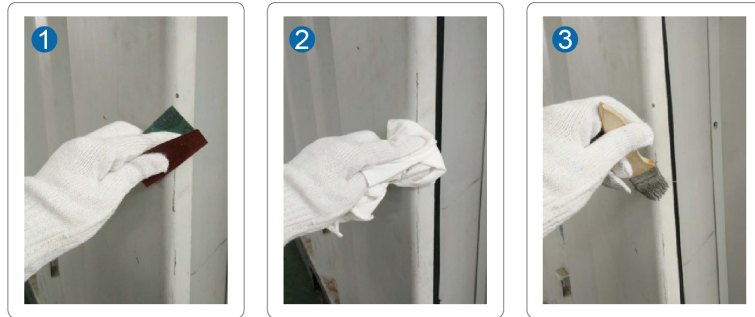


Figure 7-15 Remove Rust and Apply Paint

*The figure is for reference only.

--End

7.4 Cable Connection

7.4.1 Safety Precautions

⚠ DANGER

Do not touch any live part! High voltages! Danger of electric shock!

⚠ WARNING

- Check the phase sequence of all input cables. Verify that the cable markings match the copper bar labels to ensure the correct phase sequence for each input.
- Do not forcibly pull any wires or cables, as this may diminish their insulation performance.
- Ensure that all cables and wires have sufficient space for any bends.
- Take necessary auxiliary measures to reduce the stress on cables and wires.

NOTICE

Connect and disconnect the cables by following the standard operation procedure. Avoid any rough or forceful operation.

NOTICE

Cable remediation must comply with the applicable standards or regulations in the country/region where the project is located.

7.4.2 Material Preparation

7.4.2.1 Tool Preparation

Before cable inspection, it is suggested to prepare the appropriate tools, including but not limited to those listed below, to ensure the maintenance work can be completed smoothly.

No.	Item	Quantity (pcs)	Description
1	Safety helmet	1	-
2	Safety gloves	1	-
3	Firestop putty	As required	Firestop putty becomes stiff at low temperatures. You can soften it by placing it in warm water at around 50°C before use.
4	Thermal imager	1	It is recommended to use an infrared thermal imager.
5	Screwdriver	1	Phillips screwdrivers are recommended.
6	Wrench	1	Open-end and socket wrenches are recommended.
7	Flashlight/ searchlight	1	Flashlights, searchlights, or other lighting devices are recommended.
8	Heat gun	1	-
9	Heat shrink tubing	As required	-

7.4.2.2 Consumable Parts List



The following list is for reference only. If any items differ from the parts used on site, the on-site parts shall prevail.

No.	Name	Material No.	Included in factory spare parts list?
1	Heat shrink tubing	F-P-000062	No
2	Waterproof connector	F-E-000499	No
3	Cable tie	Y-G-000043	No

7.4.3 Inspection Procedure

The inspection workflow for cable connections is shown in the figure below. The maintenance task takes approximately 20 minutes.

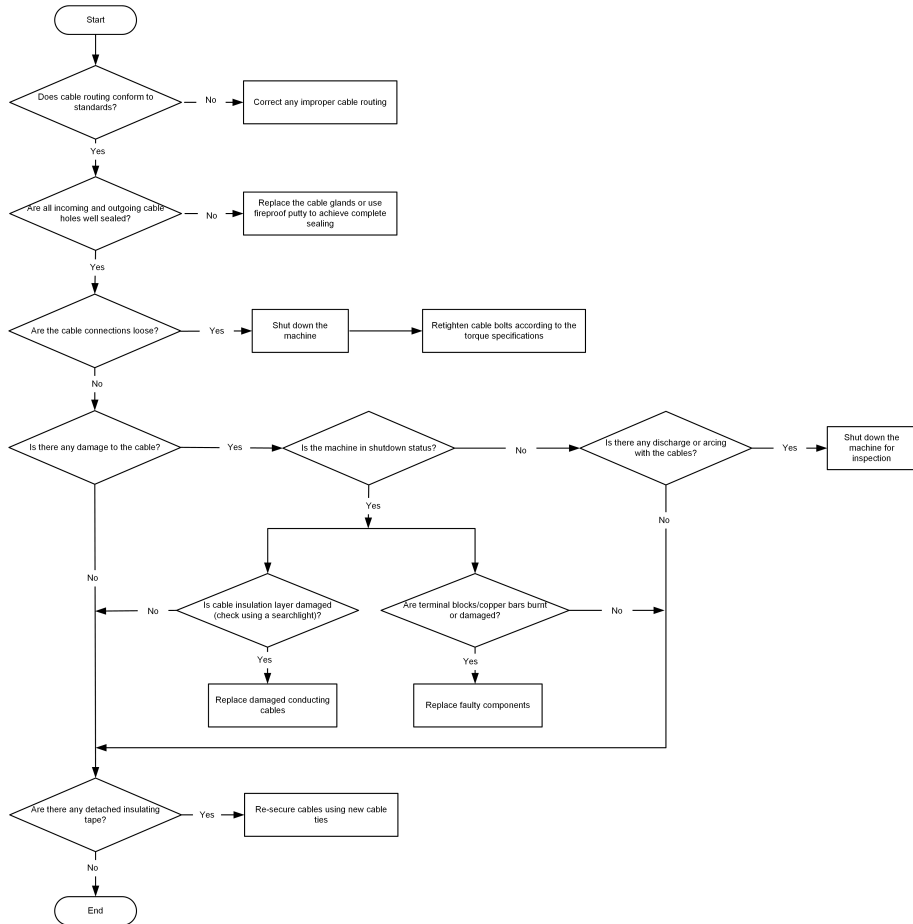


Figure 7-16 Inspection Workflow for Cable Connections

7.4.4 Inspection Procedure (Every Year)

Step 1 Check whether the cables are routed in compliance with the standards, and whether there are short circuits or other abnormal conditions.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear a safety helmet and safety gloves, and open the cabinet door.
- c. Visually inspect the cable routing at the connections between the ATS cabinet and the grid, PV system, diesel generator, ESS, load, and maintenance points to ensure compliance with standards.
- d. If the cables are not routed in compliance with the standards, correct the routing.

Step 2 Check whether the cable inlets and outlets of the ATS cabinet are all sealed properly.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear a safety helmet and safety gloves, and open the cabinet door.
- c. Check if the cable inlets and outlets at the bottom of the ATS cabinet are fully sealed. If they are not, seal them using firestop putty.

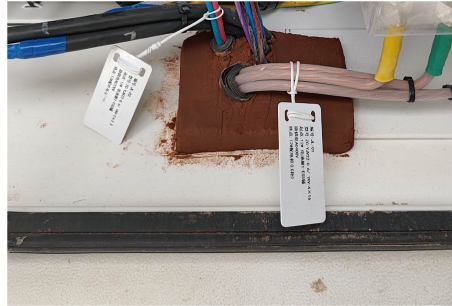


Figure 7-17 Seal Cable Inlets/Outlets

*The figure is for reference only.

Step 3 Check whether the cables are secure. If not, secure them at the specified torque.

- a. Wear a safety helmet and safety gloves, open the cabinet door, and remove the cover.
- b. Use a thermal imager to measure the power cable connection points in the ATS cabinet and check for temperature anomalies. This includes the cables and bolts at the connections to the grid, PV system, diesel generator, ESS, load, and maintenance points.



Figure 7-18 Measure with Thermal Imager

*The figure is for reference only.

- c. If any bolt on the copper bar is loose, tighten it using an appropriate torque wrench. For bolt tightening torque values, see [8.3 Tightening Torque](#).

Step 4 Check the cables for damage. Pay particular attention to areas where the cables contact metal surfaces for signs of cuts.

- a. Check the power cables and the communication cables for arcs when the system is powered on. If any abnormal conditions such as arc discharge are observed, shut down the system immediately and perform inspection. For specific procedures of shutting down the system, see [8.4.1 Startup/Shutdown via Web](#). Replace any cable with external damage. For cable replacement procedures, see [8.2 Prepare Cables](#).
- b. When the system is shut down, check the power cables and the communication cables inside the equipment for insulation damage using a flashlight or a searchlight. If insulation damage is found, replace the affected cable. For cable replacement procedures, see [8.2 Prepare Cables](#).

⚠ WARNING

Cables are most prone to damage at bends, hinge joints, and points where they contact metal surfaces. Pay special attention to these areas during inspection.

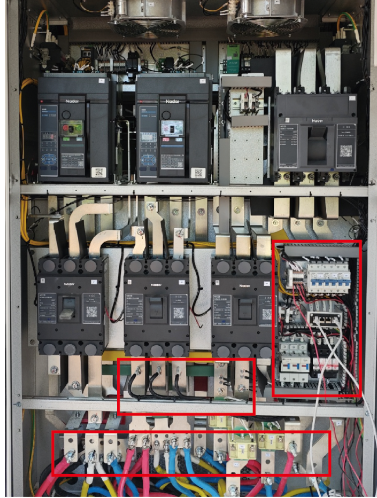


Figure 7-19 Locations of Cables

*The figure is for reference only.

- c. Check the terminal blocks inside the cabinet for burn marks, physical damage, or other anomalies. If abnormal issues are found, replace the affected part.
- d. Check all bolt connections inside the cabinet for discoloration or burn marks. If discoloration or burn marks are found, it is recommended to replace the affected bolts.

Step 5 Check whether the insulated cable ties are loose or missing.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear a safety helmet and safety gloves, open the ATS cabinet door, and remove the cover.
- c. Use a flashlight or a searchlight to check the power cables and the communication cables inside the ATS cabinet for damaged, loose, or detached insulated cable ties.

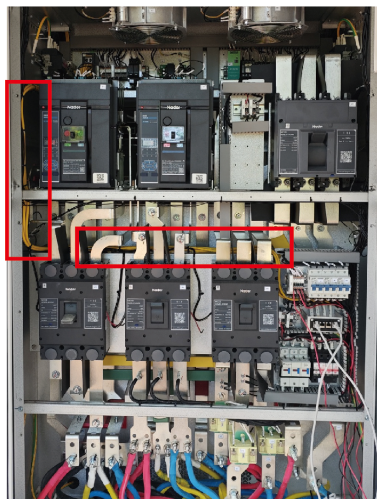


Figure 7-20 Locations of Cable Ties

*The figure is for reference only.

- d. If any such condition is found, re-secure the cables using cable ties.

--End

7.5 Grounding and Equipotential Bonding

7.5.1 Safety Precautions

NOTICE

The cabinet must employ dual grounding, with both grounding points reliably grounded.
Grounding must be completed by strictly following the applicable local standards and regulations.

7.5.2 Material Preparation

7.5.2.1 Tool Preparation

Before grounding inspection, it is suggested to prepare the appropriate tools, including but not limited to those listed below, to ensure the maintenance work can be completed smoothly.

No.	Item	Quantity (pcs)	Description
1	Safety helmet	1	-
2	Safety gloves	1	-
3	Multimeter	1	-
4	Screwdriver	1	Phillips screwdrivers are recommended.
5	Wrench	1	Open-end and socket wrenches are recommended.

7.5.2.2 Consumable Parts List



The following list is for reference only. If any items differ from the parts used on site, the on-site parts shall prevail.

No.	Name	Material No.	Included in factory spare parts list?
1	M5 bolt	-	No

No.	Name	Material No.	Included in factory spare parts list?
2	M5 standard spring washer		No
3	M5 flat washer	-	No
4	M5 nut	-	No
5	M6 bolt	-	No
6	M6 standard spring washer	-	No
7	M6 flat washer	-	No
8	M6 nut	-	No
9	M10 bolt	-	No
10	M10 standard spring washer	-	No
11	M10 flat washer	-	No
12	Grounding cable	-	No
13	Heat shrink tubing	Y-F-000147	Yes

NOTICE

It is recommended that the grounding cable have a cross-sectional area equal to half that of the phase wire, and that the grounding cable use the same conductor material as the phase wire.

7.5.3 Inspection Procedure

The inspection workflow for grounding and equipotential bonding is shown in the figure below. The maintenance task takes approximately 15 minutes.

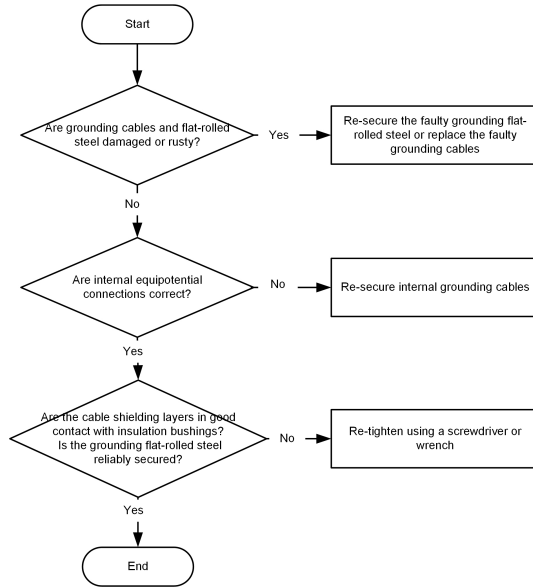


Figure 7-21 Workflow for Grounding and Equipotential Bonding Inspection

7.5.4 Inspection Procedure (Every Year)

Step 1 Check whether the ground connection is properly made. Ensure the ground resistance does not exceed 4 Ω .



To ensure accuracy, it is recommended to repeat the measurement with the probes placed in different directions.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear safety helmets and safety gloves. Visually inspect the grounding cables or flat steels connected to the two grounding points of the ATS cabinet for any damage or rust.
- c. Use a multimeter to measure the resistance of the conductor between the ATS grounding point and a reliable earth ground. Ensure that the resistance does not exceed 4 Ω . If the value exceeds 4 Ω , re-secure the grounding flat steel or replace the grounding cable.



Figure 7-22 Measure Resistance at Grounding Point

*The figure is for reference only.

Step 2 Check whether the equipotential bonding inside the ATS cabinet is correct.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear a safety helmet and safety gloves, and open the cabinet door.
- c. Gently pull the equipotential grounding cables to check whether the connections are secure.

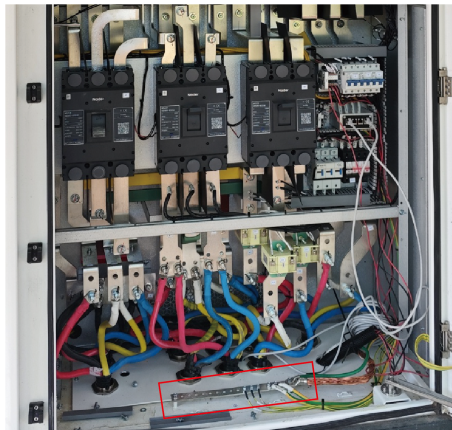


Figure 7-23 Equipotential Bonding Connections

*The figure is for reference only.

- d. If any loose connections are found, secure them using a screwdriver or a wrench. For specific tightening torque values, see [8.3 Tightening Torque](#).

Step 3 Check whether the cable shielding and the insulating sleeves are in proper contact, and whether the grounding flat steel is properly secured.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear a safety helmet and safety gloves. Gently shake the grounding cable, insulating sleeve, and grounding flat steel to verify the connections are secure.

- c. If any loose connections are found, secure them using a screwdriver or a wrench. For specific tightening torque values, see [8.3 Tightening Torque](#).

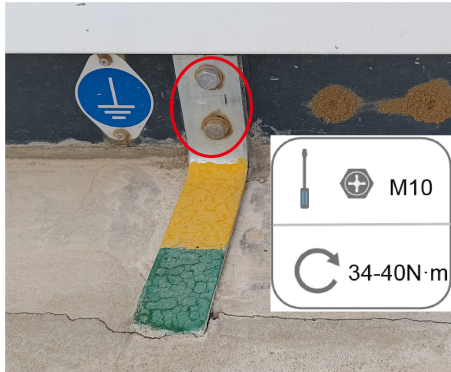


Figure 7-24 Tighten Loose Connection

*The figure is for reference only.

--End

7.6 Components

7.6.1 Safety Precautions

⚠ WARNING

Circuit boards and components must be cleaned only with dry tools such as dry tissue. SUNGROW shall not be held liable for any possible component damage caused by the use of other cleaning tools.

NOTICE

Be sure to check the ventilation of the air inlet and outlet. Failure to do so may lead to damage from overheating, as the module will be unable to cool properly.

7.6.2 Material Preparation

7.6.2.1 Tool Preparation

Before component inspection, it is suggested to prepare the appropriate tools, including but not limited to those listed below, to ensure the maintenance work can be completed smoothly.

No.	Item	Quantity (pcs)	Description
1	Safety helmet	1	-

No.	Item	Quantity (pcs)	Description
2	Safety gloves	1	-
3	Dust mask	1	-
4	Ladder	1	A 2.5-meter A-shaped ladder is recommended (The ATS cabinet is 2450 mm in height. You may select the ladder according to the height of the foundation on-site.)
5	Safety harness	1	-
6	Dry tissue	1	It is recommended to use cleaning tools that are dry, such as tissue.
7	Screwdriver	1	Electric screwdrivers are recommended.
8	Cleaning cloth	1	Cleaning cloths or other suitable cleaning tools are recommended.
9	Flashlight/ searchlight	1	Flashlights, searchlights, or other lighting devices are recommended.
10	Rust remover	1	It is recommended to use a metal surface rust remover that can quickly remove rust without corroding the material of the workpiece.
11	Sandpaper	1	-
12	Soft brush	1	-
13	Zinc-rich primer	1	-
14	Laptop computer	1	-

7.6.2.2 Consumable Parts List



The following list is for reference only. If any items differ from the parts used on site, the on-site parts shall prevail.

No.	Name	Material No.	Included in factory spare parts list?
1	3+1 SPD	K-S-000088	No
3	2-module SPD	K-S-000222	No

No.	Name	Material No.	Included in factory spare parts list?
4	SPD backup fuse	K-T-000402	No

7.6.3 Inspection Procedure

The workflow for device inspection is shown in the figure below.

The maintenance task takes approximately 20 minutes.

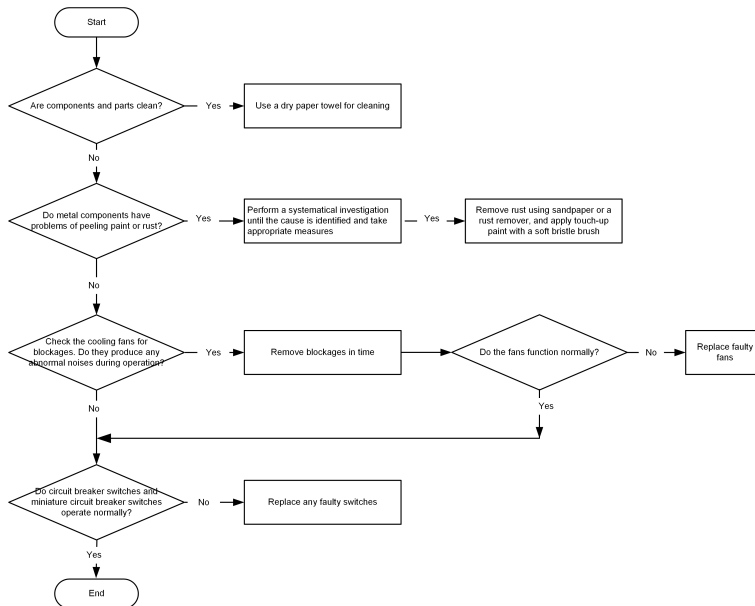


Figure 7-25 Workflow for Component Inspection

7.6.4 Inspection Procedure (Every Six Months)

Step 1 Check the cleanliness of the components.

- Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- Wear a safety helmet and safety gloves, open the cabinet door, and remove the cover.
- Check the circuit boards and other components for foreign debris, dust, and dirt.



Figure 7-26 Circuit Boards and Other Components

*The figure is for reference only.

- d. If any of the above issues are found, clean the affected areas using a dry tissue.

Step 2 Regularly check all metal components for rust.

- a. Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- b. Wear a safety helmet and safety gloves, and open the cabinet door.
- c. Check the ATS cabinet for paint peeling or rust using a flashlight or a searchlight.
- d. If rust is found, perform the following inspections:
 1. Check whether the cabinet door is fully closed and whether the door sealing strips are compromised.
 2. Check whether all cable inlets and outlets are properly sealed.
 3. Check whether there is condensation due to high humidity.
- e. Remove the rust using sandpaper or a rust remover, and apply touch-up paint with a soft brush.

Step 3 Check the operating status of the cooling fan module. Check whether the fan is blocked or generates unusual noise during operation.

- a. Wear a safety helmet and gloves. During system operation, listen to verify that all fans are functioning properly and check for any abnormal noise.

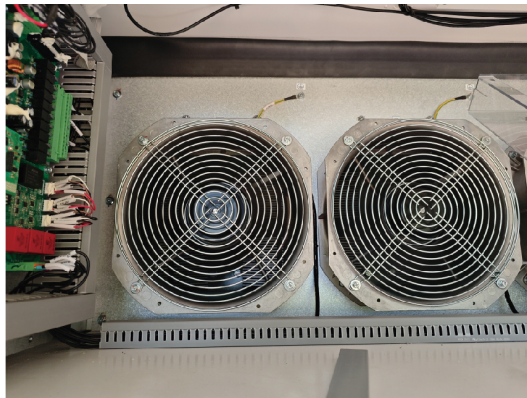
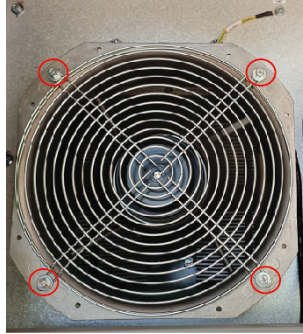


Figure 7-27 Fan

*The figure is for reference only.

- b. If abnormal noises are detected, log in to the EMS (see [8.1.1 EMS Login Steps](#) for login instructions) and check for any fan-related alarms.
- c. If any alarm is present, shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- d. Check the fans inside the ATS cabinet for blockage.
- e. If any blockage is found, remove the blockage immediately and manually rotate the fan to check whether it spins smoothly.
- f. If the fan needs to be replaced, remove the four screws shown in the figure below:



- g. Disconnect the cables of the fan.



- h. Remove the fan and install a new one.

Step 4 Check the contactors (circuit breakers and MCBs) for proper mechanical operation.

- Shut down the Block. For specific instructions, see [8.4.1 Startup/Shutdown via Web](#).
- Wear a safety helmet and safety gloves, open the cabinet door, and remove the cover.
- Manually operate the contactors (circuit breakers and MCBs) to ensure they operate smoothly.

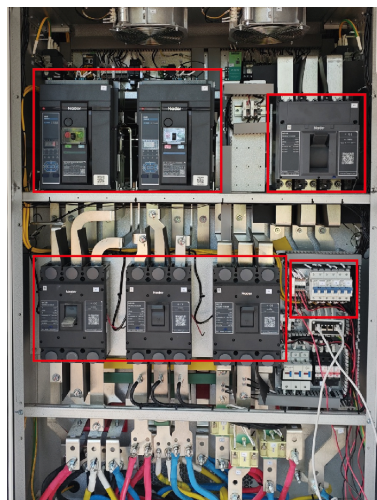


Figure 7-28 Circuit Breakers and MCBs

*The figure is for reference only.

- d. If any operational issues are detected, replace the corresponding switch promptly.

--End

7.7 Functionality

7.7.1 Safety Precautions

⚠ DANGER

- **Hazardous high voltage inside the product!**
- **Always note and observe warning signs on the product.**

7.7.2 Material Preparation

7.7.2.1 Tool Preparation

Before functional s inspection, it is suggested to prepare the appropriate tools, including but not limited to those listed below, to ensure the maintenance work can be completed smoothly.

No.	Item	Quantity (pcs)	Description
1	Safety helmet	1	-
2	Safety gloves	1	-
3	Warning signs	As required	-
4	Alcohol or other non-corrosive cleaning agents	1	If water cannot remove the dirt, you may use the following cleaning agents. <ul style="list-style-type: none"> • 97% alcohol. • Commonly used non-corrosive cleaning agent in your locality.
5	Cleaning cloth	1	Cleaning cloths or other suitable cleaning tools are recommended.

7.7.2.2 Consumable Parts List



The following list is for reference only. If any items differ from the parts used on site, the on-site parts shall prevail.

No.	Name	Material No.	Included in factory spare parts list?
1	Liquid cooling system emergency stop switch structural part	B-J-019056	No
2	Emergency stop switch	K-A-000076	No
3	Warning label	F-GC-00723	No

7.7.3 Inspection Procedure

The workflow for the functional inspection is shown in the figure below. The maintenance task takes approximately 10 minutes.

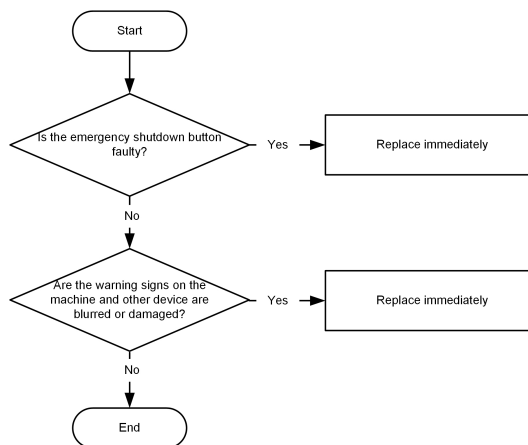


Figure 7-29 Workflow for Functional Inspection

7.7.4 Inspection Procedure (Every Six Months)

Step 1 Safety function: Check whether the emergency stop button functions properly.

- Wear a safety helmet and safety gloves. When the ATS cabinet is operating, press the emergency stop button and check whether the circuit breaker turns off.
- Wait approximately 5 min, and check whether the LED indicator is off.
- Use the key to release the emergency stop button. Power on the ATS again and check whether it resumes normal operation.

Step 2 Check whether the warning signs and other markings on the equipment are clear and intact. Replace any markings that are blurry or damaged promptly.

- Visually check whether the warning labels on the ATS cabinet and its internal components are legible.
- If any labels are detached, damaged, or soiled, remove them. Clean the affected surface with alcohol and attach new labels once the surface is completely dry.

--End

8 Appendix

8.1 Web Login

8.1.1 EMS Login Steps

Prerequisite



This section uses the user interface of the standard configuration as an example. The actual user interface may vary.

Preparation Before Login

- Connect the PC to EMS300CP with an Ethernet cable.
- Configure the IP addresses of the PC and the EMS300CP Ethernet ports (ETH1, ETH2, ETH5) to be within the same network segment. The IP addresses of the Ethernet ports are shown in the table below. Take the ETH1 port as an example: The default address is 14.14.14.14; the IP address of the PC can be configured as 14.14.14.X (X cannot be 14), and the subnet mask can be configured as 255.0.0.0.

Table 8-1 Controller IP Addresses

Port	Default IP Address
ETH1	14.14.14.14
ETH2	12.12.12.12
ETH5	13.13.13.13



The IP addresses above are for reference only.

Login Steps

- Step 1** Connect the PC to EMS300CP with an Ethernet cable.
- Step 2** Enter the IP of the Ethernet ports in the address bar of the PC to enter the Web interface of the EMS300CP.
- Step 3** Select the preferred language in the upper right corner. Click **Login** and enter the login password.

User types include **Ordinary user** and **O&M user**.

An **Ordinary user** can view basic information, real-time fault, and device monitoring information of the system.



An **O&M user** not only have the permissions of the **Ordinary user**, but also can set and modify the control strategy and parameter of the system.

Web operation instructions in this manual are based on an **O&M user** account.

Please change the login password after logging in for the first time. To change the login password: Click **O&M user > Change password**.

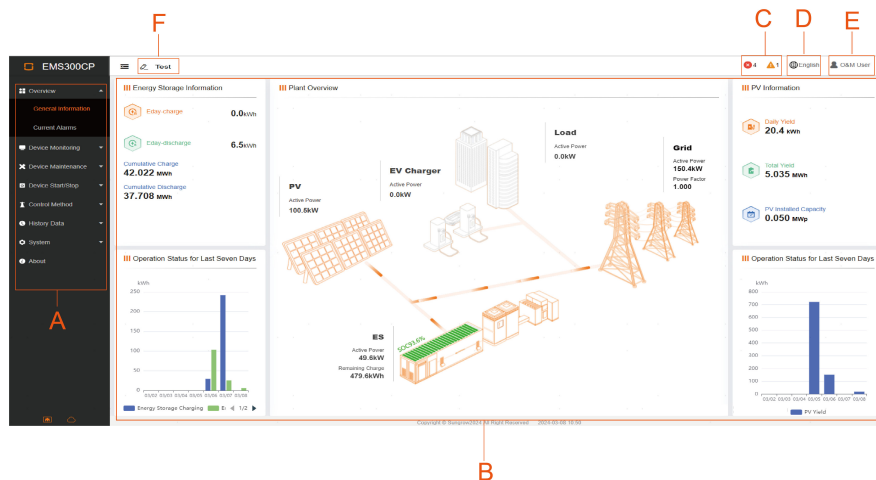


In case you forgot your login password, contact SUNGROW and provide the device S/N and system time to obtain a dynamic password.

--End


Web User Interface


The start page of the Web is shown in the figure below.



No.	Name	Description
A	Navigation bar	Displays the main functions of the Web system.
B	Function display area	Shows detailed information about each function, including query results and parameter settings.
C	Fault/Alarm	Shows the number of faults and alarms in the system. You can click on a number to go to the details page of the fault or alarm.
D	Language	Used to switch between different languages as needed.
E	User	Shows the username of the current account.

No.	Name	Description
F	Plant name	Click  to edit the plant name.

The  icon indicates the connection status of the Ethernet port.

The  icon indicates the cloud access status.



The figure is for reference only. The actual interface may differ.

8.1.2 LC Login Steps

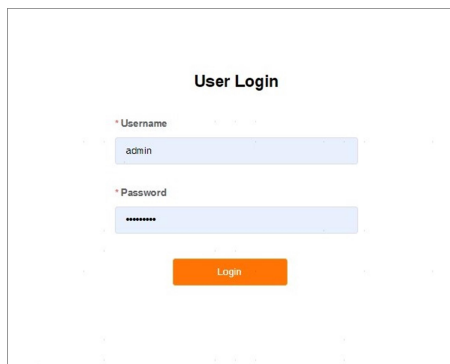
8.1.2.1 Preparation Before Login

- Set the IP address of the PC to be on the same network segment as that of the device.
- Connect the PC to the ETH2 port of the device.
- The default IP address of the ETH2 port is 192.168.13.100. The IP address of the PC can be set to 192.168.13.99 and the subnet mask can be set to 255.255.255.0.

8.1.2.2 Login Steps

Step 1 Connect the PC to the device with an Ethernet cable.

Step 2 In the PC address bar, enter the IP address of the LC, such as 192.168.13.100, to go to the login page, as shown in the following figure.



Step 3 Enter the username and password. Click **Login**.



The system supports two user roles, **Operator** and **Admin**. The password for the **Operator** account is 1111. For passwords for other user roles, please contact SUNGROW.

Step 4 In the upper right corner of the page, select your preferred language.

--End

8.2 Prepare Cables

⚠ DANGER

- **Before electrical connection, check that the cables are all intact and well-insulated. Poor insulation or cable damage may result in safety hazards. If necessary, replace the cable immediately.**
- **Be sure to prepare cables in a safe area away from the equipment. Prevent debris from entering the equipment, which may cause short circuits and fire risks.**

The cables used must meet the following requirements:

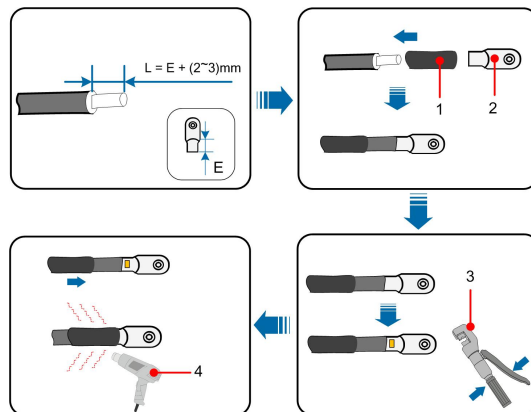
- The cables must have a sufficient current-carrying capacity. The current-carrying capacity of a conductor is subject to factors including but not limited to:
 - Environmental conditions
 - Insulation material of the conductor
 - Cable laying method
 - Material and cross-sectional area of the cable
- Select cables with a proper diameter according to the maximum load, and the cables should be long enough.
- Ensure that all cables and wires have sufficient space for any bends.
- During electrical connection, do not forcibly pull any wires or cables, as this may diminish their insulation performance.
- The DC input cables must be identical in specification and material.
- The three-phase AC output cables must be identical in specification and material.
- Use flame-retardant cables.
- Keep a sufficient distance between the cables and the heat-generating components, to prevent the cable insulation layer from aging or getting damaged due to high temperature.
- After completing each connection, carefully check that the connection is correct and secure. Poor contact or oxidation of the contact surface may cause overheating or even fires.
- Take necessary auxiliary measures to reduce the stress on cables and wires.
- Select cables with appropriate cross-sectional areas, according to the actual environmental conditions for heat dissipation of the cables laid on-site.
- Select communication cables equipped with corresponding shielding protection according to the requirements of SUNGROW.
- Secure the power cables and the communication cables separately. Ensure a minimum clearance of 10 cm between the high-current cables and the low-current cables to avoid electromagnetic interference.

- Inspect the connection between the wiring terminal and the copper bar. If any part of the heat shrink tubing is caught between them, remove it immediately. Otherwise, it may lead to poor contact or even damage due to heat.

NOTICE

- Cables used shall comply with the requirements of local laws and regulations.
- The cable colors in the figures in this manual are for reference only. Please select cables according to local cable codes.

Crimp OT/DT terminal

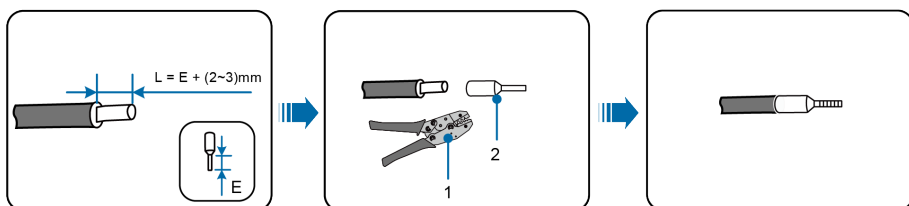


No.	Name	No.	Name
1	Heat shrink tubing	3	Hydraulic pliers
2	OT/DT terminal	4	Heat gun

NOTICE

- Strip the cables with caution. Avoid scratching the core wires.
- After crimping, the conductor crimp barrel of the OT/DT terminal must fully enclose the core wire, forming a closed cavity that ensures a tight and secure connection between the wire and the terminal.
- Take appropriate protective measures when using a heat gun to prevent heat damage to the equipment.

Crimp Ferrule



No.	Name
1	Crimping tool
2	Ferrule

8.3 Tightening Torque

To prevent copper terminals from loosening under stress, which may cause poor contact, or from increased contact resistance that could lead to overheating or fire, ensure the screws securing the terminals are tightened to the following torque specifications.

Screw	Torque (N·m)	Screw	Torque (N·m)
M3	0.7–1	M8	18–23
M4	1.8–2.4	M10	34–40
M5	4–4.8	M12	60–70
M6	7–8	M16	119–140

*The torque values listed in the table apply to bolt-and-nut assemblies only and are not suitable for self-clinching nuts or studs. Please follow the actual conditions on site.

**To reduce the stress on the copper terminals, secure the cable at appropriate positions.

8.4 Power on/off

8.4.1 Startup/Shutdown via Web

Prerequisite



This section uses the user interface of the standard configuration as an example. The actual user interface may vary.

Log in to the EMS. For specific instructions, see [8.1.1 EMS Login Steps](#).

Users can configure the startup settings and start up or shut down the equipment in the plant with one click. The page for on/off-grid startup is shown below.

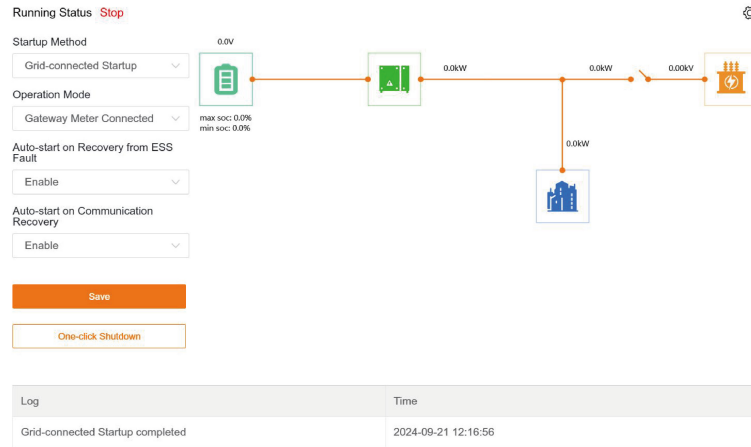


Figure 8-1 On/off-grid Startup


Configure Startup Parameters

Step 1 Choose **Device start/stop > On/off-grid startup**.

Step 2 Determine how the devices in the plant are started in **Startup method**.

- Off-grid Startup

When the device is in the off-grid state, select **Off-grid startup** to start up all the devices in the plant. After a successful startup, the **Operating status** will display “Off-grid”.

Configure the black start parameters before proceeding with the startup. Click  in the upper-right corner to open the black start configuration window. The description of parameters is shown below.

Parameter	Description
Black start SOC threshold	The default value is 46.
Min. units for system operation	Number of units with the minimum SOC.
Load rated power	Set this parameter based on the actual situation.
Startup mode	Select an option based on the actual situation. <ul style="list-style-type: none"> - VSG mode: Users can select VSG mode if there is one or more LCs. - Off-grid mode: Users can select off-grid mode if there is one LC only.
System waiting time	Range: 0–100; 20 by default.
System timeout	Range: 0–200; 60 by default.

- **Grid-connected Startup**

When the device is in the grid-connected state, select **Grid-connected startup** to start all the devices in the plant. After a successful startup, the **Operating status** will display “Grid-connected”.



At least one LC is required to start up the system. The system will start the LC first.

Step 3 Select the **Operating mode**.

Three operating modes are available: Gateway meter connected, Gateway meter not connected, and Auto on/off-grid switching. When the system is in shutdown state, you can select “Gateway meter connected” or “Gateway meter not connected” for startup. After the system starts operating properly, the operating mode will automatically change to “Auto on/off-grid switching”. In this mode, the system will switch between grid-connected startup and off-grid startup according to the voltage changes at the grid connection point.

Step 4 Enable or disable **Auto-startup on recovery from ESS fault**. This function is enabled by default. When this function is enabled, if a fault occurred in the ESS, the plant will restart automatically after recovered from the ESS fault.

Step 5 Enable or disable **Auto-startup on communication recovery**. This function is enabled by default. When this function is enabled, if the ESS communication was interrupted, the plant will restart automatically after the communication is restored.

Step 6 Click **Save**, then click “Yes” in the confirmation dialog to start up the system.

--End

One-click Shutdown

Users can click **One-click shutdown** to shut down the equipment in the plant. At this time, the operating status will be “Shut down”.

View Operation Log

The task details will be shown on the screen while the system is executing the on/off-grid startup/shutdown task.

8.4.2 Power-on Procedure

Inspect the equipment thoroughly before powering it on. The equipment can only be powered on after all the inspection items are confirmed to meet the requirements.

Prerequisite



The power-on instructions here are for reference only.

Step 1 Power on the DC/AC power converter unit: Set the DC load switch of the DC/AC power converter unit to ON. Make sure the emergency stop button on the cabinet has been reset. (Skip this step if the DC/AC power converter unit does not have a load switch.)

Step 2 Power on the ATS (skip this step if there is no ATS).

- a. Turn on the grid-side circuit breaker QF1 (GRID) or diesel generator-side circuit breaker QF2 (GEN), as well as the load-side circuit breaker QF4 (LOAD), ESS-side circuit breaker QF5 (BESS), and PV-side circuit breaker QF6 (PV).
- b. Turn on the control circuit breakers Q1 (AC FAN), Q2 (SMPS), and Q3 (AC 230V).



1. Only one of the grid-side circuit breaker QF1 or diesel generator-side circuit breaker QF2 may be turned on. Decide which one to turn on based on the on-site operating mode.
2. The maintenance circuit breaker QF3 shall remain off under normal circumstances. It may be turned on manually only if there is a system control circuit or thyristor fault.
3. In off-grid mode, both grid-side circuit breaker QF1 and diesel generator-side circuit breaker QF2 are turned off.

Step 3 Power on the system AC side: Turn on QF1 (AC main switch) on the BSP.

Step 4 Power on the AC auxiliary power supply: Turn on Q1 (AC auxiliary switch) on the BSP.

Step 5 Power on the UPS: Turn on Q2 (UPS switch) on the BSP and press the power button on the UPS.



The auxiliary power supply is used to power devices including the switch, LC, and fans.

Step 6 Power on the liquid cooling unit: Open the liquid cooling switch panel to check the status of the circuit breaker in the liquid cooling unit. Turn on any circuit breaker that is off.

Step 7 Start up the system via the control software.

--End

WARNING

If a circuit breaker trips during the power-on process, do not turn on any other circuit breakers. Immediately check for a short circuit in the downstream loads of the tripped circuit breaker.

NOTICE

The above power-on instructions are for reference only and may vary by product model.

8.4.3 Planned Shutdown

Planned shutdown refers to an interruption to the equipment operation that is scheduled in advance for overhaul, test, or maintenance.

Prerequisite

Shut down the system via the control software, and switch off the battery relay (in case of an emergency, you can press the emergency stop button on the ESS).

NOTICE

The power-off instructions here are for reference only.


- Step 1** Preparation for powering off: Shut down the system via the control software (in case of an emergency, you can press the emergency stop button on the cabinet).
- Step 2** Turn off the UPS, and turn off the Q2 (UPS switch) on the panel.
- Step 3** Turn off the Q1 (AC auxiliary switch) on the panel.
- Step 4** Turn off the QF1 (AC main switch) on the panel.
- Step 5** Set the DC load switch of the DC/AC power converter unit to OFF (skip this step if the DC/AC power converter unit has no load switch).

DANGER

Before working on the AC wiring terminals, turn off the upstream switches of the ESS first.

- Step 6** Power off the ATS (skip this step if there is no ATS).

Before powering off, ensure that:

- a. All critical loads stop operating.
- b. The thyristors inside the equipment are disconnected.
-  c. The PV inverter shuts down (if there is an operating inverter in the system).
- d. The DC/AC power converter unit shuts down.
- e. The diesel generator shuts down (if there is an operating diesel generator in the system).

- a. Turn off the PV-side circuit breaker QF6 (PV).
- b. Turn off the ESS-side circuit breaker QF5 (BESS).
- c. Turn off the MCBs Q1 (AC FAN), Q2 (SMPS), and Q3 (AC 230V) in sequence.
- d. Turn off the load-side circuit breaker QF4 (LOAD).
- e. Turn off the maintenance circuit breaker QF3 (MAINTENANCE) (if it was in use before power-off).
- f. Turn off the diesel generator-side air circuit breaker QF2 (GEN) or the grid-side circuit breaker QF1 (GRID).



Turn off circuit breaker QF2 or QF1 according to whether the system was operating in diesel generator mode or grid mode before power-off.

--End

Proceed with voltage test after the system completes self-discharge.

8.5 UPS Troubleshooting

NOTICE

If the UPS experiences any of the following issues, promptly contact SUNGROW field service personnel for component replacement. Do not attempt any operation on your own.

Issue	Possible Cause	Suggested Actions
UPS fails to turn on	Incorrect battery connection	Check whether the battery power cables are connected properly.
	ON/OFF button not pressed	Press the ON/OFF button to turn on the UPS and power the connected device.
	UPS not connected to grid power	Check that the power cables between the UPS and the grid are securely connected.
	Low voltage or no grid voltage	Use a lamp to test the grid power to which the UPS is connected. If the light is dim, check the grid voltage.
UPS fails to turn off	ON/OFF button not pressed	Press the ON/OFF button once to turn off the UPS.
	UPS internal fault	Do not use the UPS. Unplug it and send it for repair immediately.
UPS occasionally beeps	Normal sound during UPS operation	The UPS is protecting the connected devices.
UPS cannot provide expected backup time	UPS battery weakens due to recent outage or is approaching the end of life	Charge the battery. Recharge the battery if the UPS is disconnected from power for a long time. Frequent battery use and high-temperature operation may accelerate battery degradation. If the battery is near the end of its service life, consider replacing the battery, even if the LED indicator does not indicate a replacement is needed.

Issue	Possible Cause	Suggested Actions
All LED indicators are off and the UPS is plugged in.	UPS turned off and battery fully discharged after a long disconnection from power	When power is restored and the battery is sufficiently charged, the UPS will resume normal operation.
Bypass overload alarm on LED panel; UPS alarms continuously	UPS overload	The connected devices exceed the maximum load specified in the technical specifications. The alarm will continue until the overload condition is cleared. Disconnect unnecessary devices from the UPS to resolve overload.
Fault indicator turns on	UPS internal fault	Do not use the UPS. Turn it off and send it for repair immediately.
	Battery replacement indicator blinks, with a short beep every 2 seconds, indicating the battery is disconnected.	Check whether the battery power cables are connected properly.
Battery replacement indicator turns on	Low battery level	Charge the battery for 24 hours. and perform a self-test. If the abnormal conditions persist after recharging, replace the battery.
	Battery self-test failed	The UPS beeps for 1 min and the battery replacement indicator is on. The alarm repeats every 5 hours. After charging the battery for 24 hours, perform self-test to confirm battery status. If the self-test passes, the alarm stops and the LED indicator turns off.
UPS is running on battery despite being connected to grid power	The grid voltage is too high, too low, or unstable. Generators powered by low-quality fuel may not provide stable voltage	Reconnect the UPS to another outlet. Test the input voltage according to the displayed grid voltage.

Issue	Possible Cause	Suggested Actions
Online LED indicator	No LED indicator turns on	The UPS is running on battery power or is not turned on.
	LED indicator is blinking	The UPS is performing an internal self-test.

8.6 Repair Exterior Damage

8.6.1 Clean Removable Dirt

Prerequisite

For dust or dirt on the product enclosure, clean it with water or alcohol as needed.

Tools to be Prepared by Users

Table 8-2 Tools and Materials

No.	Item
1	Cleaning cloth
2	Water
3	Alcohol or other non-corrosive cleaning agents

Step 1 Wet the cloth (or other scrubbing tools) with water, then wipe the dirty areas on the surface.

Step 2 If water cannot remove the dirt, use 97% alcohol to wipe the surface until it is clean enough (You may also use non-corrosive cleaning agents that are commonly used in your area.)



--End

8.6.2 Repair Finish Coat

Prerequisite

If minor scratches or finish coat powdering result in the paint peeling off without exposing the substrate, repair the finish coat.

Selection and Formulation of Finish Coat

Table 8-3 Selection and Formulation of Finish Coat

Brand and Model	Chemistry	Mix Ratio	Thinner	Drying Time (Minimum)
Jotun finish coat Hardtop XP or Hardtop XPL	Two-component chemically-curing aliphatic paint	Ratio of base agent to curing agent: 10:1 (by volume)	Jotun Thinner No. 10	5°C, 24 h 10°C, 12 h 23°C, 5 h 40°C, 3 h
AkzoNobe I finish coat Interthane 990	Two-component acrylic urethane paint	Ratio of base agent to curing agent: 6:1 (by volume)	International GTA056	5°C, 24 h 25°C, 6 h 35°C, 4 h



- If using paints from other manufacturers, please contact SUNGROW for confirmation.
- For two-component paint supplied in two parts, each part must be agitated thoroughly before being mixed in the specified proportions.
- The thinner can be added only after the base and curing agent have been mixed.
- Do not use paint past its shelf life.

Tools to be Prepared by Users

Table 8-4 Tools

No.	Item
1	400-grit / 600-grit sandpaper
2	Cleaning cloth
3	Alcohol
4	Brush
5	Finish coat

No.	Item
6	Coating thickness gauge

Environment Requirements

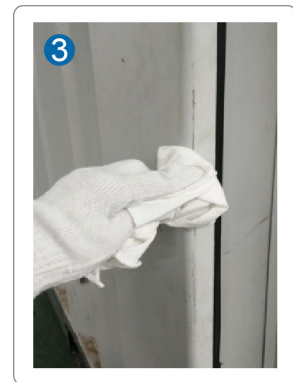
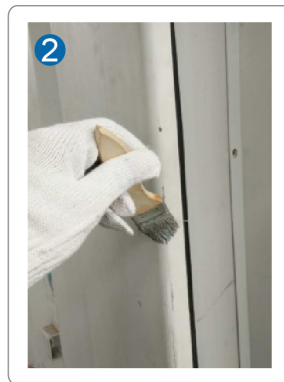
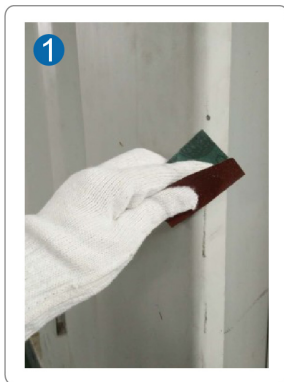
- Ambient temperature: 5°C–40°C
- Substrate temperature: 5°C–60°C
- Relative humidity: 10%–85% RH

Procedure

Step 1 Use sandpaper to grind the area with burrs or scratches until the gray primer is exposed. Measure the primer thickness using a coating thickness gauge. The primer shall be at least 150 µm thick.

Step 2 Remove all residues from the surface using a clean brush.




Step 3 Wipe the surface with a clean cloth dampened with alcohol or a cleaning agent to remove any remaining powder or dust. Ensure the surface is clean.



Step 4 Repair the finish coat.

- a. Check the surface color and prepare the finish coat in the matching color.

Commonly Used Colors for Finish Coat

RAL 7035 (Light gray)	RAL 9003 (Signal white)	RAL 7016 (Anthracite gray)
		

- b. Prepare the finish coat paint according to the specifications provided in [Table 8-3 Selection and Formulation of Finish Coat](#).
- c. Apply the paint in a criss-cross pattern. Once the coat is fully dried, measure the coat thickness with a coating thickness gauge. The thickness for a single layer shall be within the range of 50–100 µm.



- d. When applying multiple coats, make sure the previous coat has completely dried before applying the next. The final total thickness, including both the primer and finish coat, shall be at least 240 μm .

Step 5 Inspect the coating appearance to ensure uniform color, smooth transitions, and compliance with the specified thickness.

--End

8.6.3 Repair Primer and Finish Coat

Prerequisite

If the rusted area is large, with deep scratches and dents exposing the substrate, both the finish coat and primer need to be repaired.

Selection and Formulation of Primer and Finish Coat

Table 8-5 Selection and Formulation of Primer and Finish Coat

Brand and Model	Chemistry	Mix Ratio	Thinner	Drying Time (Minimum)
Jotun primer Jotamasti c 90	Two-component epoxy paint	Ratio of base agent to curing agent: 3.5:1 (by volume)	Jotun Thinner No. 17	5°C, 30 h 10°, 10 h 23°C, 3 h 40°C, 1.5 h
AkzoNobe I primer Interseal 670HS	Two-component epoxy paint	Ratio of base agent to curing agent: 5.67:1 (by volume)	International GTA220	5°C, 36 h 10°C, 16 h 25°C, 10 h 40°C, 4 h
Jotun finish coat Hardtop XP or	Two-component chemically-curing aliphatic paint	Ratio of base agent to curing agent: 10:1 (by volume)	Jotun Thinner No. 10	5°C, 24 h 10°C, 12 h 23°C, 5 h 40°C, 3 h

Brand and Model	Chemistry	Mix Ratio	Thinner	Drying Time (Minimum)
Hardtop XPL				
AkzoNobe I finish coat Interthane 990	Two-component acrylic urethane paint	Ratio of base agent to curing agent: 6:1 (by volume)	International GTA056	5°C, 24 h 25°C, 6 h 35°C, 4 h



- It is recommended to use primer and finish coat from the same manufacturer.
- If using paints from other manufacturers, please contact SUNGROW for confirmation.



- For two-component paint supplied in two parts, each part must be agitated thoroughly before being mixed in the specified proportions.
- The thinner can be added only after the base and curing agent have been mixed.
- Do not use paint past its shelf life.

Tools to be Prepared by Users

Table 8-6 Tools

No.	Item
1	400-grit / 600-grit sandpaper
2	Cleaning cloth
3	Alcohol
4	Brushes of different sizes
5	Grinder (with conical and cylindrical grinding heads)
6	Putty
7	Finish coat
8	Primer
9	Coating thickness gauge

Environment Requirements

- Ambient temperature: 5°C–40°C
- Substrate temperature: 5°C–60°C
- Relative humidity: 10%–85% RH

Procedure

Step 1 Grind all uneven areas of the coating with a grinder or sandpaper until the surface is smooth and shows a metallic luster, with a seamless transition between the rusted area and the intact coating.

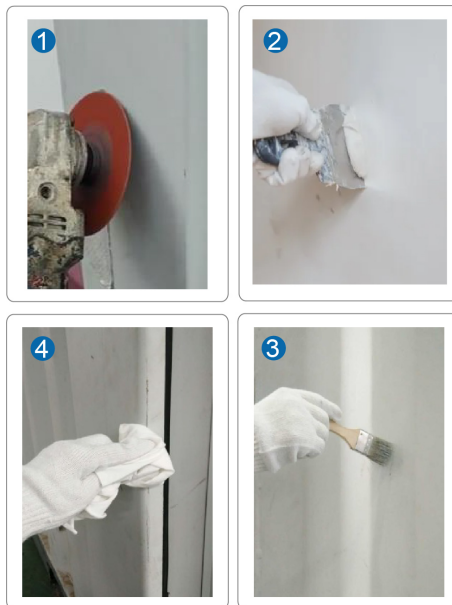


Uneven areas include residual burrs, metal fragments, and welding slag on the mechanical structure, as well as seams and sharp edges.

Step 2 For major defects such as scratches or bumps, apply putty to the target area to create a smooth and even surface.

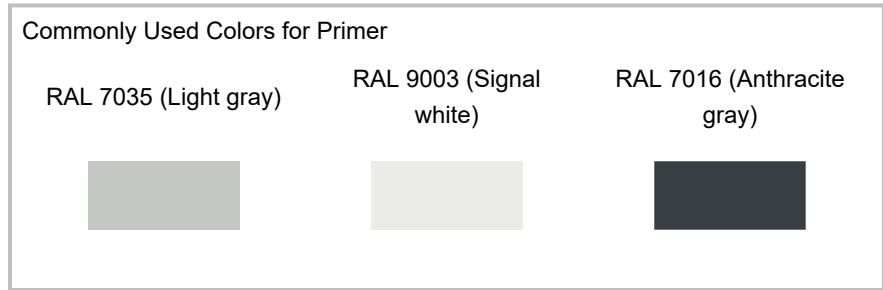
Step 3 Remove all residues from the surface using a clean brush.

Step 4 Wipe the surface with an alcohol-dampened cloth to remove any remaining dust and debris.



Step 5 Repair the primer.

- a. Check the surface color and prepare the primer in the matching color.



- b. Prepare primer according to the specifications provided in [Table 8-5 Selection and Formulation of Primer and Finish Coat](#).
- c. Apply the primer with a small brush as a pre-coat. Measure the coating thickness at corners and seams using a coating thickness gauge, and verify that the thickness is between 70 μm and 80 μm .
- d. After the pre-coat has dried, apply the primer in a criss-cross pattern. After drying, verify that the dry film thickness is within the range of 100–300 μm .

Step 6 To repair the finish coat, see [8.6.2 Repair Finish Coat](#).

Step 7 Inspect the coating appearance to ensure uniform color, smooth transitions, and compliance with the specified thickness.

--End

For spray-type paint:

1. Cover the area within an 800 mm radius around the damaged spot using masking paper.
2. Spray paint the exposed area. After drying, verify that the dry film thickness is within 100–300 μm .

8.7 Terms

Abbreviation	Definition
A	
ATS	Automatic Transfer Switch
B	
BCP	Battery Connection Panel
BSP	Battery Supply Panel
BM	Battery Module
BC	Battery Cluster

Abbreviation	Definition
BMS	Battery Management System
BSC	Battery System Controller
E	
ESS	Energy Storage System
ESC	Energy Storage Cabinet
EMS	Energy Management System
F	
FSS	Fire Suppression System
H	
HVAC	Heating, Ventilating and Air Conditioning
L	
LCS	Liquid Cooling System
LC	Local Controller
M	
MSD	Manual Service Disconnect
P	
PCS	Power Conversion System
PMD	Power Distribution Cabinet
S	
SCC	Smart Control Cabinet
SOC	State Of Charge
U	
UPS	Uninterruptible Power Supply

8.8 Quality Assurance

When product faults occur during the warranty period, SUNGROW will provide free service or replace the product with a new one.

Evidence

During the warranty period, the customer shall provide the product purchase invoice and date. In addition, the trademark on the product shall be undamaged and legible. Otherwise, SUNGROW has the right to refuse to honor the quality guarantee.

Conditions

- After replacement, unqualified products shall be processed by SUNGROW.
- The customer shall give SUNGROW a reasonable period to repair the faulty device.

Exclusion of Liability

In the following circumstances, SUNGROW has the right to refuse to honor the quality guarantee:

- The free warranty period for the whole machine/components has expired.
- The device is damaged during transport.
- The device is incorrectly installed, refitted, or used.
- The device operates in harsh conditions beyond those described in this manual.
- The fault or damage is caused by installation, repairs, modification, or disassembly performed by a service provider or personnel not from SUNGROW.
- The fault or damage is caused by the use of non-standard or non-SUNGROW components or software.
- The installation and use range are beyond stipulations of relevant international standards.
- The damage is caused by unexpected natural factors.

For faulty products in any of above cases, if the customer requests maintenance, paid maintenance service may be provided based on the judgment of SUNGROW.



Product data such as product dimensions are subject to change without prior notice. The latest documentation from SUNGROW should take precedence in case of any deviation.

8.9 Contact Information

In case of questions about this product, please contact us. We need the following information to provide you the best assistance:

- Model of the device
- Serial number of the device

- Fault code/name
- Brief description of the problem

For detailed contact information, please visit: <https://en.SUNGROWpower.com/contactUS>

SUNGROW

Sungrow Power Supply Co., Ltd.

www.sungrowpower.com