SUNGROW
Clean power for all

User Manual

MV Grid-Connected PV Inverter

SG1100UD-MV/SG3300UD-MV/SG4400UD-MV/SG4400UD-MV-20



All Rights Reserved

All Rights Reserved

No part of this document can be reproduced in any form or by any means without the prior written permission of Sungrow Power Supply Co., Ltd (hereinafter "SUNGROW").

Trademarks

SUNGROW and other SUNGROW trademarks used in this manual are owned by SUNGROW.

All other trademarks or registered trademarks mentioned in this manual are owned by their respective owners.

Software Licenses

- It is prohibited to use data contained in firmware or software developed by SUNGROW, in part or in full, for commercial purposes by any means.
- It is prohibited to perform reverse engineering, cracking, or any other operations that compromise the original program design of the software developed by SUNGROW.

About This Manual

This manual describes the transportation and storage, mechanical installation, electrical connection, power up and shutdown, web operation, troubleshooting, and maintenance of the MV Grid-Connected PV Inverter.

Target Group

This manual is intended for professional technicians who are responsible for the installation, operation, and maintenance of the product.

Qualified personnel must:

- Have certain electrical wiring, electronic, and mechanical expertise, and be familiar with electrical and mechanical schematics;
- Be familiar with the composition and operating principles of the PV system and its related products;
- Have received professional training related to the installation and commissioning of electrical equipment;
- Be able to respond quickly and effectively to dangers or emergencies that may occur during the process of installation and commissioning;
- Be familiar with applicable local standards and specifications applicable in the project's location in country/region.

How to Use This Manual

Please read this manual carefully before using the product and keep it properly at a place for easy access.

In order to provide customers with the best usage experience, the products and product manuals are always in the process of improvement and upgrade. If the manual received is slightly inconsistent with the product, it may be a result of product version upgrade, and the actual product shall prevail.

Contents of the manual may be updated and amended continuously, so it is possible that there may be some errors or slight inconsistency with the actual product. Please refer to the actual product purchased, and the latest manual can be obtained from **support.sungrowpower.com** or sales channels.

A large number of pictures are provided to help users better understand and use this manual. These pictures are used for illustration only and may not be an exact representation of the real product.

Symbol Explanations

To ensure the safety of the users and their properties when they use the product and to make sure that the product is used in an optimal and efficient manner, this manual provides users with the relevant safety information highlighted by the following symbols.

Below is a list of symbols that are used in this manual. Review them carefully to make 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 additional information, emphasized contents or tips that may be helpful, e.g., to help you solve problems or save time.

Symbol on Products

Observe at all times the warning signs on the equipment. Failure to do so may result in equipment damage or safety incidents, including:

Sign	Description
	High voltage inside! Risk of electric shock by touching it!
	Temperature beyond the acceptable range for the human body. Do not touch! Otherwise, it may lead to injuries.
	Protective grounding (PE) terminal which needs to be firmly grounded to ensure the safety of operators.
	The MV grid-connected inverter can only be maintained and overhauled after being powered off for 20 minutes.

Sign	Description
	It is recommended to wear noise-cancellation earplugs since the product may generate noise during operation.

⚠ WARNING

SUNGROW assumes no responsibility for equipment damage or safety incidents resulting from failure to observe safety signs.

⚠ WARNING

Do not remove or damage the signs. Replace them immediately if they become faded or damaged.

Contents

All Rights Reserved.....I
About This Manual.....II
1 Safety Instructions.....1
1.1 Unpacking and Inspection.....2
1.2 Hoisting and Transportation.....3
1.3 Electrical Connection.....3
1.4 Operation.....5
1.5 Operation and Maintenance.....5
1.6 Disposal.....7
2 Product Description.....8
2.1 Validity.....8
2.2 Product Introduction.....8
2.3 Product Composition.....9
2.4 Main Internal Equipment.....10
2.4.1 Appearance of Inverter Unit.....10
2.4.2 Internal Structure of Inverter Unit.....11
2.4.3 Main Parts of Transformer.....13
2.4.4 Main Parts of Power Distribution Cabinet.....15
2.4.5 Main Parts of RMU.....18
3 Transport and Storage.....20
3.1 Precautions.....20
3.2 Transportation Requirements.....20
3.3 Storage Requirements.....21
3.3.1 Storage Environment.....21
3.3.2 Protection During Storage.....22
3.3.3 Routine Inspection for Long-term Storage.....22
4 Mechanical Mounting.....23
4.1 Safety Precautions.....23
4.2 Inspection Before Installation.....24
4.2.1 Scope of Delivery.....24
4.2.2 Product Inspection.....25
4.3 Installation Environment Requirements.....25
4.3.1 Installation Site.....25
4.3.2 Foundation.....26

4.3.3 Performance Requirements for Firestop Sealant Materials..... 26
4.3.4 Installation Spacing..... 27
4.3.5 Installation Position Requirements..... 28
4.4 Hoisting and Fixing..... 29
4.4.1 Preparation Before Hoisting..... 29
4.4.2 Requirements for hoist and lifting rope..... 29
4.4.3 During Hoisting..... 30
4.4.4 Fastening of Connectors..... 31
4.4.5 Fixing..... 32
4.4.6 Installating Oil-Water Separator..... 33
4.5 Install DC Coupling Equipment (Optional)..... 36
5 Electrical Connection..... 38
5.1 Precautions..... 38
5.2 Wiring Overview..... 40
5.3 Preparation Before Wiring..... 41
5.3.1 Installation Tools..... 41
5.3.2 Open the Product Door..... 42
5.3.3 Cables..... 43
5.3.4 Position of Cable Inlet..... 44
5.3.4.1 Cable Inlet Preparation..... 44
5.4 Ground Connection..... 47
5.4.1 Overview..... 47
5.4.2 Grounding Flat Steel..... 48
5.4.3 Grounding Cable..... 48
5.5 DC Input Connection..... 49
5.5.1 Overview..... 50
5.5.2 Removing Insulation Board Before Connection..... 52
5.5.3 OT/DT Terminal Requirement..... 53
5.5.4 Procedure..... 53
5.5.5 Securing Cables..... 56
5.6 AC Side Connection..... 58
5.6.1 Inspection Before Wiring..... 58
5.6.2 Procedure..... 58
5.6.3 Securing AC Cable..... 59
5.7 DC Coupling Wiring (Optional)..... 61
5.8 Communication Connection..... 63
5.8.1 Overview..... 63
5.8.2 Procedure..... 63
5.9 Switch/Ethernet Communication..... 64
5.10 Check After Wiring..... 64

5.10.1 Inspection....64
5.10.2 Locking Cabinet Door....65
6 Powering Up and Powering Down....67
6.1 Safety Instructions....67
6.2 Powering Up Operations....67
6.2.1 Removing Film on MV Grid-connected PV Inverter....67
6.2.2 Installing Surge Arrester (Optional)....69
6.2.3 Installing the Breather....71
6.2.4 Adjusting De-energized Tap Changer....72
6.2.5 Opening Pressure Relief Valve....73
6.2.6 Removing Foam Part from Oil Thermometer....73
6.2.7 Draining Oil from Transformer....74
6.3 Inspection Before Powering Up....75
6.3.1 Inverter Unit....75
6.3.2 PV Array....75
6.3.3 Checking Grid Voltage....75
6.3.4 Transformer....75
6.4 Powering Up Steps....76
6.5 Powering Down Operations....76
6.5.1 Planned Powering Down....76
6.5.2 Unplanned (Emergency) Powering Down....77
7 O&M on WEB....79
7.1 Communications Diagram....79
7.2 Preparation Before Login....79
7.2.1 Login (Laptop)....79
7.2.2 Login (Mobile Device)....80
7.3 Login Method....80
7.4 Interface Introduction....81
7.4.1 Homepage....81
7.4.2 Viewing Fault Information....81
7.4.3 Viewing Alarm Information....81
7.4.4 Boot/Shutdown....82
7.4.5 Setting Initial Parameters....82
7.4.6 Setting Operation Parameters....82
7.4.7 Setting Protection Parameters....82
7.5 Modifying Password....83
7.6 Logout....84
8 Troubleshooting....85
8.1 MV Grid-connected PV Inverter Troubleshooting....85

8.1.1 Viewing Fault/Alarm Information..... 85
8.1.2 Check Method..... 85
8.2 Other Faults..... 96
9 Routine Maintenance..... 99
9.1 Safety Instructions..... 99
9.2 Inspection After Power Off..... 100
9.3 Maintenance Period..... 101
9.3.1 Maintenance (Every Three Years)..... 101
9.3.2 Maintenance (Every Two Years)..... 102
9.3.3 Maintenance (Every Year)..... 103
9.3.4 Maintenance (Every Six Months to One Year)..... 104
9.4 Common Maintenance Items..... 105
9.4.1 Cleaning Air Inlet of Inverter Unit..... 105
9.4.2 Cleaning Air Outlet of Inverter..... 106
9.4.3 Cleaning Air Inlet of Power Distribution Cabinet..... 107
9.4.4 Cleaning Air Outlet of Power Distribution Cabinet..... 108
9.4.5 Cleaning the Floor Drain and Oil Drainage Hole..... 108
9.4.6 Appearance Repair..... 109
9.4.6.1 Detergent Cleaning..... 109
9.4.6.2 Finish Paint Repair..... 110
9.4.6.3 Double-Layer Paint Repair..... 113
9.4.7 Checking Door Locks and Hinges..... 116
9.4.8 Checking Sealing Strips..... 116
9.5 Replacing Fuse..... 116
9.5.1 Replacing DC Side Fuse..... 116
9.5.2 Replacing AC SPD Fuse..... 117
9.5.3 Replacing power distribution cabinet supply fuse..... 118
9.6 Replacing Fans..... 118
9.7 Replacing Aviation Connector (Optional)..... 119
10 Appendix..... 121
10.1 Technical Parameters..... 121
10.2 Tightening Torques..... 130
10.3 Long-Term Equipment Maintenance and Lifecycle Management Strategy..... 130
10.4 Quality Assurance..... 131
10.5 Contact Information..... 132

1 Safety Instructions

When installing, commissioning, operating, and maintaining the product, strictly observe the labels on the product and the safety requirements in the manual. Incorrect operation or work may cause:

- Injury or death to the operator or a third party.
- Damage to the product and other properties.

⚠ WARNING

- **Do not perform any operation on the product (including but not limited to, handling, installing, powering on, or maintaining the product, performing electrical connection, and working at heights) in harsh weather conditions, such as thunder and lightning, rain, snow, and Level 6 or stronger winds. SUNGROW shall not be held liable for any damage to the device due to force majeure, such as earthquakes, floods, volcanic eruptions, mudslides, lightning strikes, fires, wars, armed conflicts, typhoons, hurricanes, tornadoes, and other extreme weathers.**
- **In case of fire, evacuate from the building or product area and call the fire alarm. Re-entry into the burning area is strictly prohibited under any circumstances.**

NOTICE

Please operate the product under the condition that you are familiar with and understand the content of this manual, and have appropriate tools.

NOTICE

- **Tighten the screws with the specified torque using tools when fastening the product and terminals. Otherwise, the product may be damaged. And the damage caused is not covered by the warranty.**
- **Learn how to use tools correctly before using them to avoid hurting people or damaging the device.**
- **Maintain the device with sufficient knowledge of this manual and use proper tools.**

- The safety instructions in this manual are only supplements and cannot cover all the precautions that should be followed. Perform operations considering actual on-site conditions.
- SUNGROW shall not be held liable for any damage caused by violation of general safety operation requirements, general safety standards, or any safety instruction in this manual.
- When installing, operating, and maintaining the product, comply with local laws and regulations. The safety precautions in this manual are only supplements to local laws and regulations.
- During the product transport, installation, wiring, maintenance, etc., the materials and tools prepared by users must meet the requirements of applicable local laws and regulations, safety standards, and other specifications. SUNGROW shall not be held liable for any damage to the product caused by the adoption of materials and tools that fail to meet the above-mentioned requirements.
- Operations on the product, including but not limited to, handling, installing, wiring, powering on, maintenance, and use of the product, must not be performed by unqualified personnel. SUNGROW shall not be held liable for any damage to the product resulting from operations done by unqualified personnel.
- Where the transport of the product is arranged by users, SUNGROW shall not be held liable for any damage to the product that is caused by users themselves or the third-party transport service providers designated by the users.
- SUNGROW shall not be held liable for any damage to the product caused by the negligence, intent, fault, improper operation, and other behaviors of users or third-party organizations.
- SUNGROW shall not be held liable for any damage to the product arising from reasons unrelated to SUNGROW.

1.1 Unpacking and Inspection

⚠ WARNING

Check all safety signs, warning labels, and nameplates on products. Ensure that the safety signs, warning labels, and nameplates are clearly visible and not removed or covered before the product is decommissioned.

NOTICE

After receiving the product, check whether the appearance and structural parts of the product are damaged, whether the transformer leaks oil, and whether the packing list is consistent with the actual ordered product. If there are problems with the above inspection items, do not install the product and contact SUNGROW in time.

1.2 Hoisting and Transportation

⚠ WARNING

Risk of personal injury or device damage due to incorrect operation!

- **Follow the procedure of work of heights when walking on the top of the MV Grid-Connected PV Inverter.**
- **All hoisting and transportation must comply with the relevant codes and regulations of the nation/region where the project is located.**

NOTICE

All equipment and tools used during operation must have been regularly maintained.

⚠ CAUTION

Improper hoisting may cause personal injury!

- **It is strictly prohibited to stand within 10m outside the operating area (i.e., under the boom and the hoisted machine) to avoid casualties.**
- **The product must be hoisted and moved by professional personnel. Before the operation, be sure to wear proper PPE with an arc rating that meets the product requirements.**
- **Stop hoisting in the event of severe weather, such as heavy rain, thick fog, or strong wind.**
- **When hoisting and moving the product, be aware of its size and weight and keep the balance to prevent it from turning over or falling.**

1.3 Electrical Connection

⚠ DANGER

Before electrical connections, please make sure that the product is not damaged. Otherwise, it may cause danger!
Before electrical connections, please make sure that the product switch and all switches connected to the product are set to "OFF", and use measuring equipment to ensure that there is no voltage at the connection. Otherwise, an electric shock may occur!

⚠ DANGER

PV modules will generate lethal high voltage when exposed to sunlight.

- **Operators must wear proper personal protective equipment during electrical connections.**
- **Before performing an electrical connection, be sure to disconnect the PV combiner box and use measuring equipment to ensure that cables are voltage-free.**
- **Respect the protection requirements and precautions of PV modules.**

⚠ DANGER

Danger to life due to a high voltage inside the MV Grid-Connected PV Inverter!

- **Be sure to use special insulation tools during cable connections.**
- **Note and observe the warning labels on the product, and perform operations strictly following the safety instructions.**
- **Respect all safety precautions listed in this manual and other pertinent documents.**

⚠ WARNING

Damage to the device caused by incorrect wiring is not covered by the warranty.

- **Perform wiring in the proper order as specified in the user manual, otherwise, it may cause fires.**
- **Electrical connection must be performed by professional personnel who wear personal protective equipment.**
- **All cables used in the PV system must be firmly attached, properly insulated, and adequately dimensioned.**
- **Installation not performed in compliance with the installation specifications, or unauthorized installation or alteration, may result in safety incidents or equipment damage.**

⚠ WARNING

Before connecting the PV module to this product, check and confirm the polarity correctness of the PV module, and then connect it to the corresponding position of this product.
During the installation and operation of the product, please ensure that the positive or negative polarities of PV strings do not short-circuit to the ground. Otherwise, an AC or DC short-circuit may occur, resulting in product damage. The damage caused by this is not covered by the warranty.

NOTICE

Comply with the regulations related to the local grid during wiring.

1.4 Operation

⚠ DANGER

When the product is working:

- **It is strictly forbidden to touch the live parts of the product. Otherwise, an electric shock may occur.**
- **It is strictly prohibited to disassemble any parts of the product. Otherwise, an electric shock may occur.**
- **It is strictly prohibited to touch any hot parts of the product (such as the heat sink). Otherwise, it may cause burns.**

1.5 Operation and Maintenance

⚠ DANGER

Risk of MV Grid-connected PV Inverter damage or personal injury due to incorrect service!

- **Before maintaining the product, be sure to disconnect the Load switch/ Circuit breaker of the PV combiner box and the load switch/disconnector of the transformer.**
- **After the MV Grid-connected PV Inverter is powered off for 20 minutes, measure the voltage and current with measuring equipment. Only when there is no voltage nor current can operators who wear protective equipment operate and maintain the MV Grid-connected PV Inverter.**
- **Maintenance operations need to be carried out by professional personnel wearing protective equipment to ensure that there is no voltage or current present.**
- **During maintenance, be sure to check the warning labels in the product and comply with the requirements on them.**
- **Even if the MV Grid-connected PV Inverter is shut down, it may still be hot and cause burns. Operating the MV Grid-connected PV Inverter with protective gloves after it cools down.**

⚠ DANGER

The devices inside the MV Grid-connected PV Inverter carry high voltage. Touching these devices may lead to fatal electric shock.

- **Live line measurement can only be performed by professional personnel who know the PV system well. Before measurement, be sure to take proper protection methods (e.g., wear insulating gloves, etc.).**
- **During live line measurement, the operator must be accompanied by others to ensure personal safety.**

⚠ DANGER

Electric shock or fire may occur due to device damage or system fault.

- **Visually inspect for device damages or other hazards before the operation**
- **Check whether other external devices or circuit connections are in a safe state.**
- **Make sure the device is in a safe state before operating.**

⚠ DANGER

Do not perform any work on the control cable while the product or the external control circuit is powered. The externally powered control circuit may generate hazardous voltages inside the product even after the power is disconnected.

⚠ DANGER

If only the DC switch is turned off, the cable connection terminals in the AC and DC cabinets of the inverter unit will still carry voltage.

⚠ WARNING

In daily operation, t he doors of the product and its internal components must all be closed and locked. Besides, the keys should be pulled out and properly kept by the designated personnel. This prevents accidents caused by unauthorized entries and protects the internal components against rain water or damage by animals.

⚠ WARNING

Do not open the cabinet door of any component of the inverter unit on sandy and windy days or when the relative humidity exceeds 95%.

⚠ WARNING

If some devices need to be replaced during operation and maintenance, please contact SUNGROW.

⚠ WARNING

Wait at least 20 minutes after the product stops running and ensure that the voltage has dropped to within the safe voltage range, the low-voltage cabinet is connected with the grounding cable, the transfer switch, if any, is in the grounding position, the grounding switch, if any, is closed, and the load switch, if any, is open. After confirming that all inspection items meet the requirements, maintain or repair the product following the warning labels inside the product.

⚠ WARNING

Only qualified and authorized personnel are allowed to perform maintenance or other operations on the MV Grid-connected PV Inverter.

⚠ CAUTION

To prevent misuse or accidents caused by unrelated personnel, post prominent warning signs or demarcate safety warning areas around the device to prevent accidents caused by misuse.

NOTICE

To avoid the risk of electric shock, do not perform any other maintenance operations beyond those described in this manual. If necessary, contact SUNGROW for maintenance. Otherwise, the losses caused are not covered by the warranty.

NOTICE

If work is carried out while the device is live, insulation protection is necessary and at least two personnel should be present at the site at the same time.
The PV plants and the MV Grid-connected PV Inverter are usually located in off-city fields, and appropriate field rescue facilities should be prepared for use in need.
Some components and devices of the MV Grid-connected PV Inverter, such as inverter units and heat dissipation fans, may produce noise during operation.
In case of a fault in the MV Grid-connected PV Inverter, the noise may get louder. Therefore, earplugs are recommended when you get close to the MV Grid-connected PV Inverter.

1.6 Disposal

Do not dispose of MV Grid-connected PV Inverter or any of its internal components as regular waste. Please contact a specialized, authorized recycling agency in the local area to properly dispose of MV Grid-connected PV Inverter or its components.

⚠ WARNING

Please scrap MV Grid-connected PV Inverter in accordance with relevant local regulations and standards to avoid property losses or casualties.

2 Product Description

2.1 Validity

This manual applies to the following models:

- SG1100UD - MV
- SG3300UD - MV / SG3300UD - MV - 20
- SG4400UD - MV / SG4400UD - MV - 20

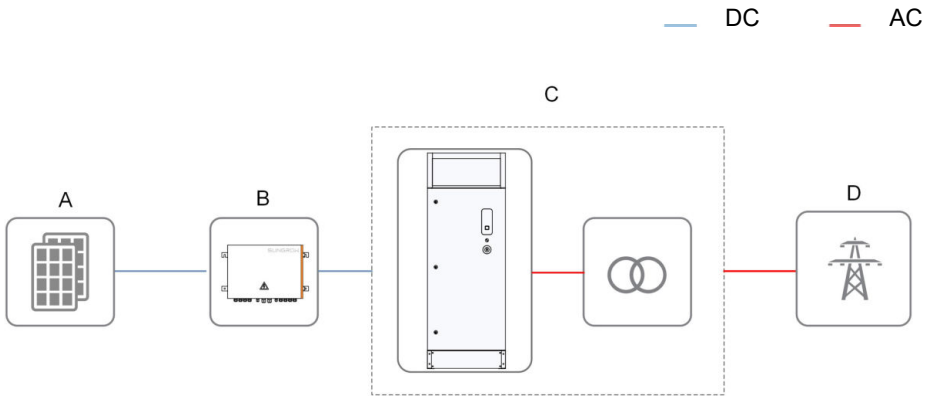
MV is short for “Medium Voltage”.

PV is short for “Photovoltaic”.

Unless otherwise specified, this manual takes SG4400UD–MV as an example to briefly introduce the installation and operation methods of the product.

2.2 Product Introduction

The MV Grid-connected PV Inverter, designed and manufactured by SUNGROW, is mainly applied to large-and-medium PV power plants. The MV Grid-connected PV Inverter can meet the requirements of modular design and quick installation for medium and largescale PV power plants, and can ensure long-term, reliable, and safe feed-in operation.

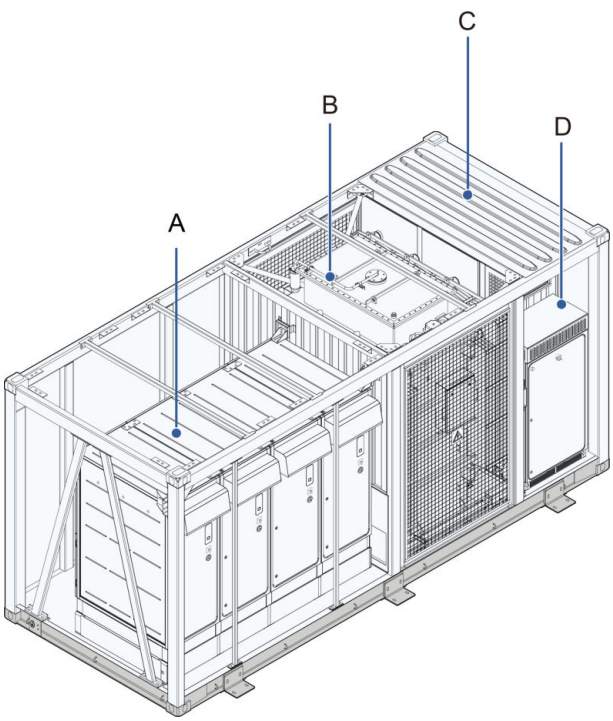


No.	Name	Description
A	PV array	Monocrystalline silicon, polycrystalline silicon, and thin film without grounding.
B	PV combiner box	Combine the current of multiple PV strings and output.

No.	Name	Description
C	MV Grid-connected PV Inverter	Include the inverter units that convert the DC current from the PV arrays into low-voltage AC current. Include a transformer that converts the low-voltage AC current output by the inverter units into medium-voltage AC current. The inverter units and transformer operate in coordination to convert the DC power from the PV array into AC power, step it up, and feed it into the MV grid.
D	Grid	-

2.3 Product Composition

SG4400UD-MV is taken as an example to introduce main devices inside the MV Grid-connected PV Inverter. The product consists of 4 inverter units.

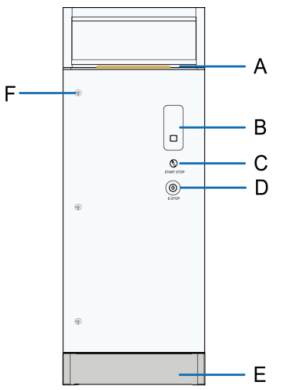


No.	Name	Description
A	Inverter units	Convert the DC current generated by PV modules into low-voltage AC current.

No.	Name	Description
B	Transformer	Convert the low-voltage AC current output by the inverter units into medium-voltage AC current.
C	Ring Main Unit (RMU)	Connecting the grid to the transformer.
D	Power distribution cabinet	For communication and power distribution.

2.4 Main Internal Equipment

2.4.1 Appearance of Inverter Unit



No.	Name
A	Top air inlet
B	Indicator panel
C	Start/Stop knob
D	Emergency stop button. In case of emergency, press this button to disconnect the AC circuit breaker and DC load switch.
E	Base
F	Lock

LED Indicator

Table 2-1 Indicator Status Description

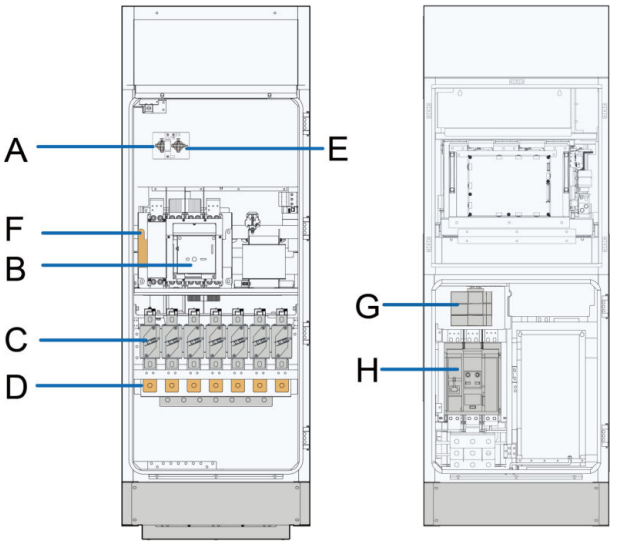
Color	Status	Description
 Blue	Steady on	The inverter unit is in grid-connected operation.
	Fast blinking (interval: 0.2s) (Invaid for Europe) 	WiFi connection is established and data communication is in process. No fault is detected.
	Slow blinking (interval: 0.5s) 	The inverter unit is in a deep standby state.
	Glowing and fading (interval: 2s) 	The DC and AC side are powered on, or the AC side is powered on, the inverter unit is in a standby or is starting (not connected to the grid).
 Red	Steady on	A fault occurred and the system cannot be connected to the grid for power generation.
	Blinking (Interval 0.2s) (Invaid for Europe)	WiFi connection is established and data communication is in process. A fault is detected.
 Grey	Off	The AC and DC power are disconnected.

⚠ WARNING

Voltage may still be present in AC side circuits after the indicator is off. Pay attention to the electrical safety during operating.

2.4.2 Internal Structure of Inverter Unit

The major components are shown in the following figure.



No.	Name	Description
A	Maintenance switch QS2	Disconnect it before maintenance and repair.
B	DC load switch QS1	Control the on/off of the DC side circuits of the inverter unit.
C	DC branch fuse	-
D	DC wiring copper bar	-
E *	Off-grid commissioning power supply switch QS5	Turn on this switch in the off-grid commissioning mode.
F	DC SPD Fuse	-
G	Off-grid Commissioning Fuse	-
H	AC circuit breaker QF1	Control the on/off of the AC side circuits of the inverter unit.

* is optional.

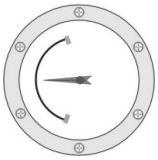
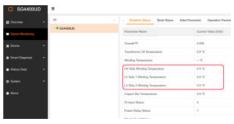
* The figure is for reference only. And the actual product received shall prevail.

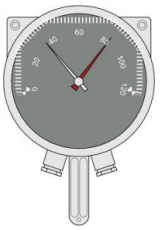
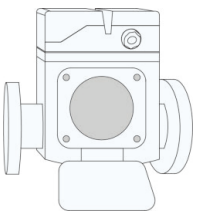
The QS5 and QS2 switches are mechanically interlocked, with a lock tab between them, and hence cannot be turned on at the same time.

Ensure the QS5 switch is in the OFF state during the grid-connection process.

2.4.3 Main Parts of Transformer

The transformer is equipped with multiple protective devices such as the oil thermostat, the pressure gauge, and the oil level gauge.

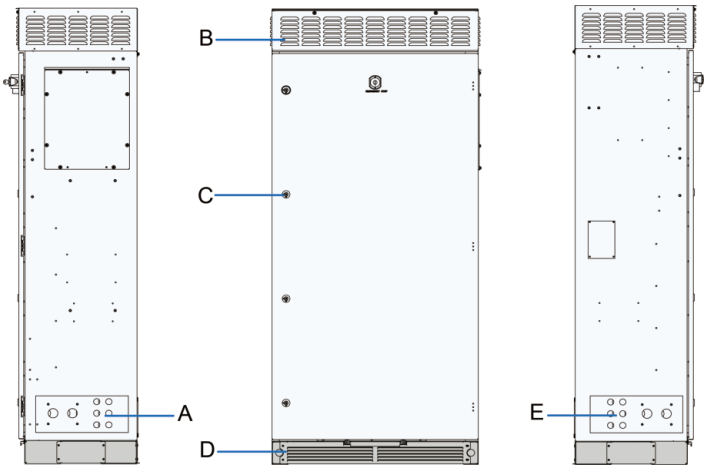
Graphics	Name	Description
	Oil level gauge	Indicate the level of stored oil in the transformer.
	De-energized tap-changer	Adjust the output voltage of the transformer.
	Drain valve and sampling valve	Drain the oil from the transformer into a container through a clean hose.
	Winding monitor (Physical temperature gauge, directly installed on the transformer body)	For versions with different temperatures, the alarm temperature and tripping temperature thresholds are different. Please refer to the actual product.
	Winding monitor (Integrated in SCU)	The software is integrated in the winding temperature gauge in the SCU, which can check the winding temperature in real time and monitor multiple areas (HV side, LV side 1/2). Ensure that winding temperature detection on SCU is turned on, and click **Device Monitoring > Real-time Values** to view the

Graphics	Name	Description
		HV Side Winding Temperature, **LV Side 1 Winding Temperature** and **LV Side 2 Winding Temperature**.
	Automatic pressure relief valve	When a fault occurs inside the transformer, a large amount of gas is generated, and the pressure of the insulating oil rises sharply. This valve automatically opens to drain the oil when the pressure reaches the threshold, so that the internal pressure of the transformer can be rapidly reduced to a normal value. And a signal is sent to trip the circuit breaker.
	Oil thermostat	For versions with different temperatures, the alarm temperature and tripping temperature thresholds are different. Please refer to the actual product.
	Gas relay	When a fault occurs in the transformer, the oil in the oil tank will be decomposed to generate gas, and the gas will rise and enter the gas relay. • In case the gas generated is light, the alarm signal contact will be connected, and alarm signal will be sent out. • In case the gas generated is heavy, the tripping signal contact will be connected, and the circuit breaker in the RMU trips, so that the transformer will be disconnected from the grid to avoid device damage.

Please confirm the specific type of the winding monitor (physical temperature gauge or software integrated in SCU).

2.4.4 Main Parts of Power Distribution Cabinet

The power distribution cabinet is used for communication and power distribution.



No.	Item
A	Cable inlet
B	Air inlet
C	Door lock
D	Air outlet
E	Cable inlet

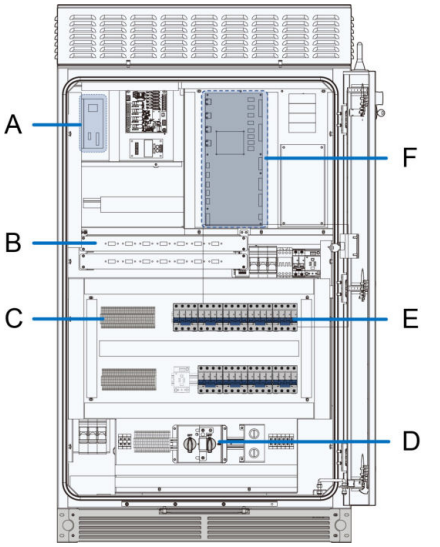


Figure 2-1 Main Parts of 15kVA Power Distribution Cabinet

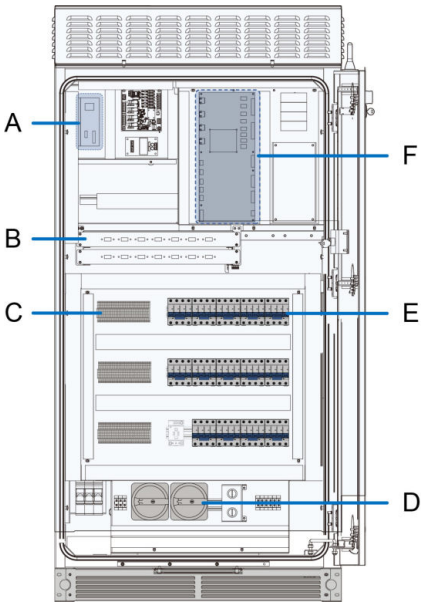


Figure 2-2 Main Parts of 30kVA Power Distribution Cabinet

* The figure is for reference only. The actual product may differ.

No.	Description
A	Switch port or Ethernet port
B	Fiber optic termination box
C	Wiring terminal block

No.	Description
D	QS4, main switch
E	micro circuit breaker
F	SCU

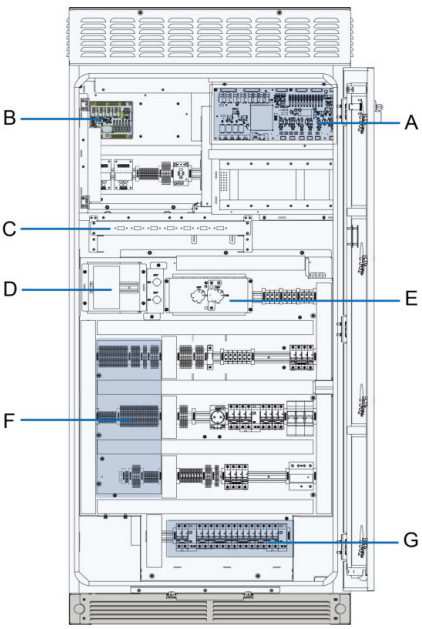


Figure 2-3 Main Parts of 40kVA Standardized Power Distribution Cabinet

* The figure is for reference only. The actual product may differ.

No.	Description
A	SCU
B	DIDO
C	Fiber Optic Terminal Box
D	Switch
E	Load Switch
F	External Terminal
G	Miniature Circuit Breaker Installation Area

Please adopt Ethernet or switch communication according to the actual situation on site.

2.4.5 Main Parts of RMU

Introductions to the Ring Main Units (RMUs) from ABB and ORMAZABAL are provided here as example.

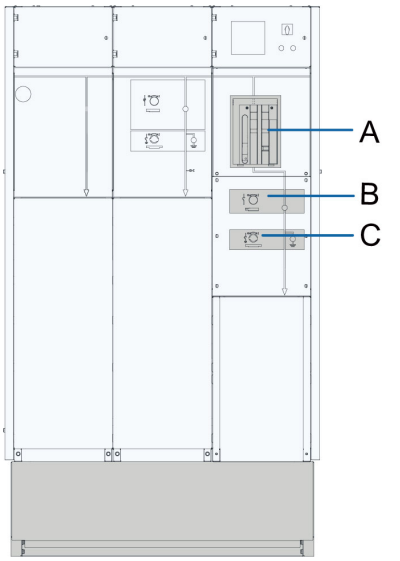


Figure 2-4 RMU (ABB)

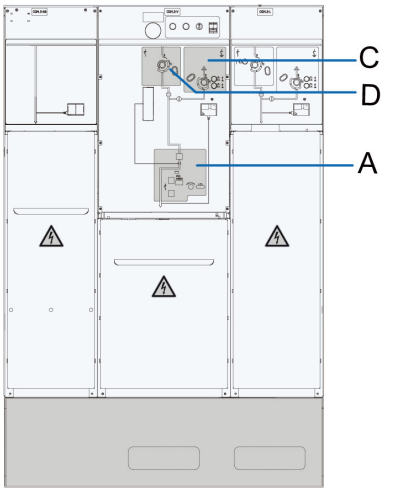


Figure 2-5 RMU (ORMAZABAL)

* The figures are for reference only. The actual product may differ.

No.	Name
A	VCB (Vacuum Circuit Breaker)
B	Disconnector
C	Earthing switch

No.	Name
D	Load switch (only available on Ormazabal)

3 Transport and Storage

3.1 Precautions

⚠ CAUTION

Failure to transport and store the product in accordance with the requirements in this manual may invalidate the warranty.

3.2 Transportation Requirements

⚠ WARNING

In the whole process of loading, unloading, and transport, follow strictly the applicable safe operating procedure in the country/region where the project is located.

⚠ WARNING

During transportation, the orientation and securing method of the equipment on the transport vehicle shall comply with the transportation documentation provided by SUNGROW. Otherwise, specific arrangements are subject to SUNGROW's prior review and approval.

Tool and Personnel Requirements

- Choose appropriate means of transportation according to the size and weight of the product.
- All the tools used on the product, or during operation, must have undergone proper maintenance.
- The tool used for transport must have a sufficient load capacity.
- Extra traction may be required to move the equipment along a slope.
- Personnel engaged in loading, unloading, and anchoring operations should all have received relevant training, especially in safety.
- Transport the product in accordance with relevant local regulations and standards.

Safety Requirements

- The product must stand upright during transport.
- Do not put the products in stacks.
- During transportation, the product is placed horizontally with a tilt angle of ≤ 15 °.
- Avoid collision or strong shock during transport.
- Wear proper PPE with an arc rating that meets the product requirements when operating the product.

- The power distribution cabinet side of the container should face the rear of the vehicle.

Transport Route Requirements

- Before transport, inspect the transport route in advance, particularly for obstructions, to ensure the vehicle can travel safely and smoothly along the route.

> Pre-transport route inspection should cover the following items: road conditions, height limits, actual heights, width limits, actual widths, weight limits, traffic restrictions, and potential obstructions.

- In most cases, the total weight of a truck that carries the product will exceed the general weight limit on the road. Therefore, to transport the product in a truck, an overweight permit from the relevant local agency in that area may be required.
- To transport the product by water, ensure the waterway meets the requirements for the vessel to sail fully-loaded.

3.3 Storage Requirements

3.3.1 Storage Environment

- MV Grid-connected PV Inverter should be stored in an environment with a temperature ranging from -40°C to 70°C (except for transformer). If the ambient temperature is too low, take necessary heating measures for MV Grid-connected PV Inverter's internal devices.
- MV Grid-connected PV Inverter should be stored in a warehouse with a humidity of less than 55%. If the average ambient humidity is lower than 55%, it is suggested to change the desiccants every three months; if the humidity is higher than 55%, change the desiccants every month. The montmorillonite desiccant should be used. Each the inverter unit requires 8 bags of desiccant, at least 200g per bag. Before grid connection, take the desiccants out of MV Grid-connected PV Inverter.
- Keep the product on a dry, flat, and solid ground that has sufficient bearing capacity and is not covered by vegetation. The ground where the product is kept should be flat, with a horizontal error of less than 0.25%, and have an overall slope of less than 5 degree.
- Avoid storing MV Grid-connected PV Inverter in places where it may come in touch with rainwater, or in low-lying places, to prevent the accumulated rainwater from getting into it. If MV Grid-connected PV Inverter must be stored outdoors due to restrictions on site, elevate its base off the ground to a certain height. The height should be decided according to the geological, meteorological, and other conditions on site.
- Avoid storing MV Grid-connected PV Inverter in places where corrosive gas or dust may be produced or accumulated, or in places within 30 km (20 miles) of saline-alkaline land or pollution-generating industrial complex such as chemical plants and PV power plants (chemical gas class: 1C1, solid particle level: 1S2). Avoid storing MV Grid-connected PV Inverter in environments contaminated with halogen and sulfur pollutants.
- Do not install MV Grid-connected PV Inverter in places with vibration or a magnetic field strength of over 30A/m.

- Do not store MV Grid-connected PV Inverter in environments with flammables and explosives.
- To prevent MV Grid-connected PV Inverter from being stored for an overly long period of time, please apply the "first-in, first-out" method to product storage.
- When the outdoor ambient temperature is between 52 °C and 60 °C, the external load on the power distribution cabinet must not exceed 50 %.

3.3.2 Protection During Storage

- During the process of product handling and storage, impacts or collisions to the product must be avoided.
- Before storage, make sure the doors of the product and its internal devices are all locked. During storage, avoid opening the doors, unless it is necessary.
- Seal off the product's air inlet/outlet and the DC cable inlet area. During the period of storage, make sure the protective films on the air inlet/outlet are intact. Meanwhile, take effective measures to prevent the ingress of rainwater, dust, and sand into the product.
- Do not have the MV Grid-Connected PV Inverter stressed with heavy weights. The MV Grid-connected PV Inverter should not be stacked in more than four layers, and heavy weights are not allowed on the top of the MV Grid-Connected PV Inverter, power distribution cabinet, transformer, and protective cover for low-voltage copper bars.

3.3.3 Routine Inspection for Long-term Storage

- Perform regular inspection, at least once every half a month. Check whether the dust cover is damaged and whether the product and its internal devices are intact.
- It is suggested that units that have not been put into operation (from the date of receipt by the customer) and the units shut down temporarily (from the date of shutdown) should not be stored for more than three months. If stored for a long period of time, sealing measures and necessary tests and inspections are required for the product. For products shut down temporarily, put desiccants inside them. It is needed to open the door and visually inspect the product and its internal devices for damage first.
- For a product shut down/stored for over six months, inspect its electrical components (IGBT module, DC fuses, fans, etc.), and take dehumidification and dedusting measures for the whole product. For detailed operation, please contact SUNGROW.
- The UPS and their batteries must be charged once every six months after leaving the factory (EXW Date).

4 Mechanical Mounting

⚠ WARNING

Respect all local standards and requirements during mechanical installation.

4.1 Safety Precautions

⚠ WARNING

- **Personnel engaged in loading, unloading, and anchoring operations should all have received relevant training, especially in safety.**
- **Only install the product when it is complete and intact.**
- **Before installation, ensure that the product and all internal equipment are intact, without any damage.**

⚠ WARNING

Risk of personal injury or device damage due to incorrect operation!

- **Follow the procedure of work of heights when walking on the top of the MV Grid-Connected PV Inverter.**
- **All hoisting and transportation must comply with the relevant codes and regulations of the nation/region where the project is located.**

⚠ WARNING

The escape routes must be kept clear off any obstruction.

NOTICE

- **If any tool is used for unpacking, be careful not to damage the product.**
- **After receiving the product, check whether the appearance and structural parts of the product are damaged, whether the transformer leaked oil, and whether the packing list is consistent with the actual ordered product. If there are problems with the above inspection items, do not install the product and contact SUNGROW in time.**

⚠ CAUTION

Improper hoisting may cause personal injury!

- **It is strictly prohibited to stand within 10m outside the operating area (i.e., under the boom and the hoisted machine) to avoid casualties.**
- **Only professional personnel can operate the product, and be sure to wear personal protective equipment when operating.**
- **Stop hoisting in the event of severe weather, such as heavy rain, thick fog, or strong wind.**
- **Be sure to hoist the product smoothly and evenly to avoid collision and vibration. Do not turn the product upside down, nor hoist it for a long time.**
- **When hoisting and moving the product, be aware of its size and weight and keep the balance to prevent it from turning over or falling.**

4.2 Inspection Before Installation

4.2.1 Scope of Delivery

Accessories delivered with the product are listed below:

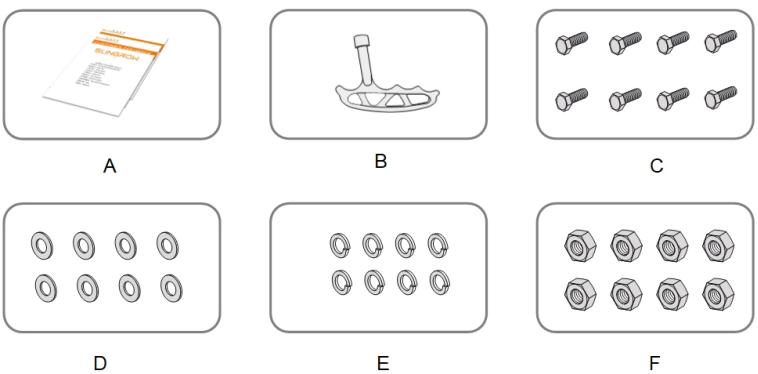


Figure 4-1 Scope of Delivery

No.	Name
A	Relevant documents (the certificate of quality, warranty card, delivery inspection report, etc.)
B	Key
C	M16 * 45 bolt
D	M16 flat washer
E	M16 spring washer

No.	Name
F	M16 nut

The accessories shown in above figures are for reference only. The product received may differ.

4.2.2 Product Inspection

- Check whether the product received is the ordered one.
- Check that the scope of delivery is consistent with the contract against the packing list.
- Visually check the product for any damage.

If any problems are found or there is any question, please contact the forwarding company or SUNGROW.

⚠ WARNING

Only install the product when it is complete and intact.
Before installation, ensure that:

- **The product is in good condition, without any damage.**
- **The product and all internal equipments are intact, without any damage.**

4.3 Installation Environment Requirements

4.3.1 Installation Site

- The climate environment and geological conditions, such as stress wave emission and underground water level, should be fully considered when selecting the installation site.
- The installation site should be dry and well ventilated.
- There should be no trees around the installation site to prevent branches or leaves blown off by heavy winds from blocking the door or air inlet.
- There are no underground facilities on site.
- The installation site should be away from areas where toxic and harmful gases are concentrated, and free from inflammable, explosive, and corrosive materials.
- Do not install the MV Grid-Connected PV Inverter in places where corrosive gas or dust may be produced or accumulated, or in places within 30 km (20 miles) of saline-alkaline land or pollution-generating industrial complex such as chemical plants and PV power plants (chemical gas class: 1C1, solid particle level: 1S2).
- Do not install the MV Grid-Connected PV Inverter in environments contaminated with halogen and sulfur pollutants.
- Do not install the MV Grid-Connected PV Inverter in places with vibration or a magnetic field strength of over 30A/m.
- The installation site should be far away from residential areas to avoid noise.

4.3.2 Foundation

Given that the installation site has been decided and the foundation has been set up before the arrival of the product, details on these two items will not be included in this manual.

- The soil at the installation site should be compact. It is recommended that the relative density of soil at the installation site be no less than 98%. Take relevant measures to ensure a stable foundation in case of loose soil.
- If the MV Grid-Connected PV Inverter is installed in a place with dense vegetation, in addition to regular weeding, harden the ground underneath the MV Grid-Connected PV Inverter to stop weeds from growing.
- The foundation pit must be compacted and filled to provide sufficient and effective support for the product.
- The foundation should be higher than the horizontal ground to prevent the product base and the interior from rain erosion.
- The cross-sectional area and height of the foundation should meet the requirements.
- Cabling should be considered when building the foundation.
- Pre-bury the threading pipe at the bottom of the foundation according to the location of the cable inlet holes at the bottom of the product.
- A drainage system is necessary to prevent the bottom or internal equipment of the product from being soaked in water during the rainy season or during heavy rainfall.
- The dregs excavated during foundation construction should be removed immediately to avoid the latter impact on hoisting.
- Pre-bury the channel steel.
- According to the IEC 61936 standard, if mineral oil is used as the insulating liquid, an oil tray is necessarily required, to prevent the insulating liquid from leaking and thus contaminating the underground water or soil.

4.3.3 Performance Requirements for Firestop Sealant Materials

- Apparent density ≤ 1.6 × 10^3 kg/m^3
- When immersed in tap water at 20 °C ± 5 °C, the material must maintain integrity for ≥ 3 days without swelling or cracking.
- When immersed in a 3% ammonia solution at 20 °C ± 5 °C, the material must maintain integrity for ≥ 3 days without swelling or cracking.
- When immersed in a 3% hydrochloric acid solution at 20 °C ± 5 °C, the material must maintain integrity for ≥ 3 days without swelling or cracking.
- When placed in an environment with relative humidity 90 % ± 5 % and temperature 45 °C ± 5 °C, the material must maintain integrity for ≥ 360 h without cracking or powdering.
- When subjected to freeze-thaw cycles consisting of immersion in water at 23 °C ± 2 °C for 18 h, freezing at -20 °C ± 2 °C (starting the 3-hour period once the material reaches

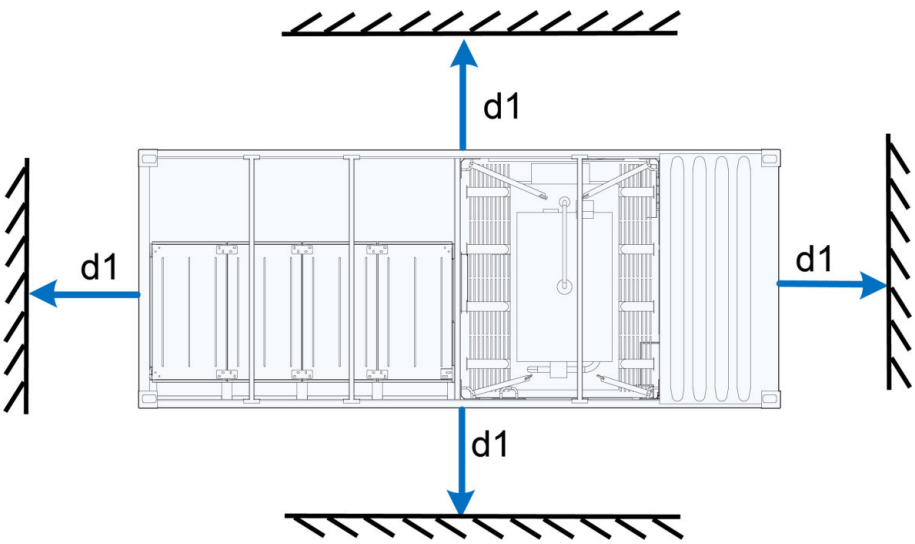
-18 °C), and subsequent exposure to 50 °C ± 2 °C for 3 h, the material must withstand ≥ 15 cycles without cracking or powdering.

- The material must meet B2 grade requirements for combustion performance according to GB 8624.
- The material must limit toxic gas emissions to meet at least ZA2 grade according to GB/T 20285.
- The material must have air permeability ≤ 3.5 m³/(m²·h).
- For overseas firewall versions, the material must maintain fire resistance integrity (Fr) ≥ 3.0 h; the backing cotton pad must not ignite, flame duration must not exceed 10 s, and probe must not penetrate any gaps.
- The material must maintain fire insulation (Fr) ≥ 3.0 h. Temperature rise at any point on the unexposed side and frame surface must not exceed 180 °C.
- After fire resistance testing, the material must not develop any holes that allow water flow on the unexposed side during water spray testing.
- In addition to complying with the national standards of the country of use, foam sealants and fireproof mud must not release corrosive gases such as chlorine, ammonia , or sulfur under operating temperatures of -40 to 85℃. Halogen-free and environmentally friendly sealing materials must be used.

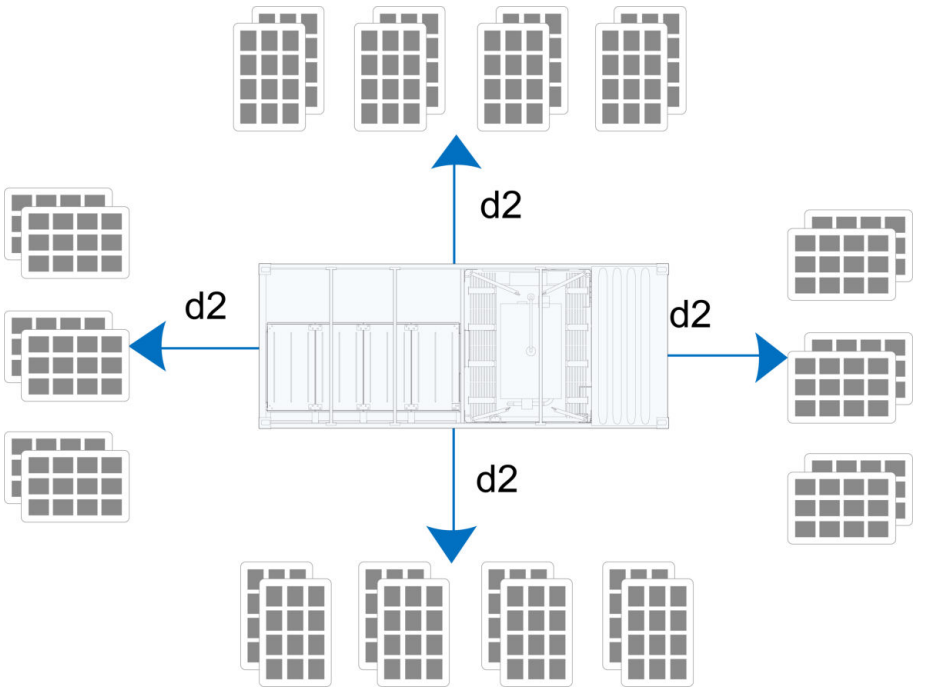
4.3.4 Installation Spacing

To ensure better heat dissipation and facilitate later maintenance, reserve enough space around the installation site.

Surrounded by Obstructions or Heat Sources



Surrounded by PV Arrays



Model	Required Distance d1	Required Distance d2
SG1100UD-MV	≥10m	≥5m
SG3300UD-MV		
SG4400UD-MV/SG4400UD-MV-20		

⚠ WARNING

If there is any other device within 10m of MV Grid-connected PV Inverter, please consult with SUNGROW.

4.3.5 Installation Position Requirements

The installation position needs to meet the heat dissipation performance of the product, and the appropriate position should be selected according to the installation location of the product.

4.4 Hoisting and Fixing

4.4.1 Preparation Before Hoisting

⚠ WARNING

- **Put up warning signages or fence off a warning zone in the operation area at the site.**
- **Make sure the cabinet doors of the product are all locked.**

⚠ WARNING

- **The whole hoisting work at the site should be carried out under the guidance of qualified technical persons.**
- **Professional cranes must be used and must be operated by qualified personnel. Otherwise, personal injury or product damage may occur!**
- **Follow strictly the safe operating procedure for the crane in the whole process of hoisting. The working site must be kept safe.**
- **Stop hoisting in the event of severe weather, such as heavy rain, thick fog, or strong wind.**

⚠ CAUTION

- **Improper hoisting may cause personal injury!**
- **It is strictly prohibited to stand within 10m outside the operating area (i.e., under the boom and the hoisted machine) to avoid casualties.**

4.4.2 Requirements for hoist and lifting rope

Cranes	Requirement
Rated load	50t
Lifting Ropes	Four lifting ropes of equal length, the length of a single rope is not less than 6.5m. The load that a single rope can bear is not less than 7t.

⚠ WARNING

The hoisting work must be carried out by strictly following the relevant hoisting instructions, with specialized lifting devices used (such as lifting frames and slings).

- The strength of the slings to be used should be determined properly based on the MV Grid-connected PV Inverter's weight.
- Make sure the connections of slings are all secure and reliable, and the length of the sling connected to each corner fitting is the same.
- The sling length can be adjusted properly based on the actual conditions at the site.
- The crane should have a sufficient boom length and swing radius.

4.4.3 During Hoisting

- Ensure safe and reliable connections of all slings.
- Ensure that the product is steady and not tilting during the whole hoisting process.
- The product should be hoisted vertically. Never drag the product on the ground or the top of the lower product, and never pull and push it on any surface.
- Suspend the hoisting when the product is hoisted 300 mm from the supporting surface to check the connection between slings and the product. Continue hoisting only after confirming a reliable connection.
- When the product is in place, place it lightly and smoothly. It is strictly forbidden to throw it to places outside the vertical landing place.
- The outdoor cabinet should be placed on a solid and flat site with good drainage and no obstacles or protrusions.
- Avoid scratching the product during hoisting.

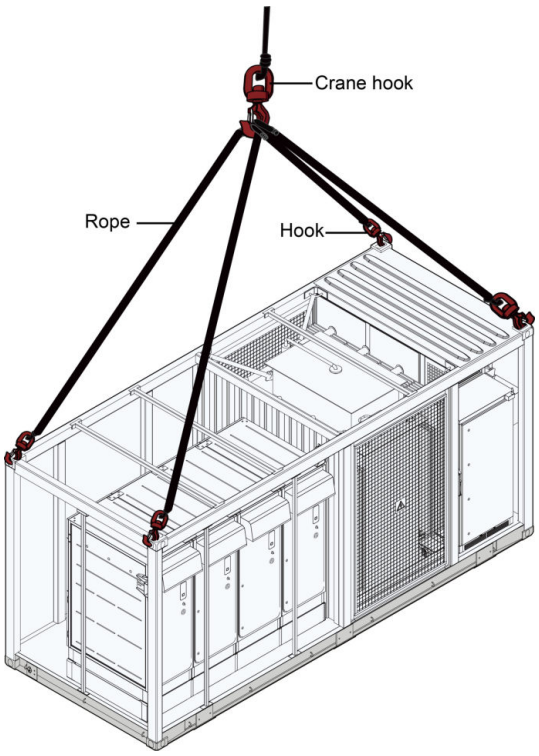


Figure 4-2 SG4400UD-MV Hoisting Diagram

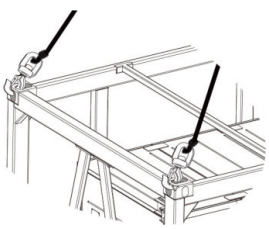
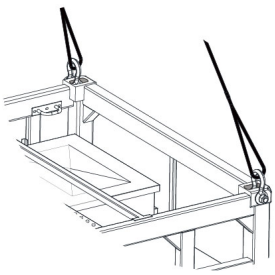
⚠ WARNING

Be sure to hoist the product smoothly and evenly to avoid collision and vibration. Do not turn the product upside down, nor hoist it for a long time. Otherwise, personal injury or product damage may occur!

4.4.4 Fastening of Connectors

Use slings with hooks or shackle to hoist the MV Grid-connected PV Inverter.

The lifting devices should be connected correctly to the MV Grid-connected PV Inverter.

Lifting device	Hook	Shackle
Connections		

Lifting device	Hook	Shackle
Notice	Insert the hook from inside to outside.	Lateral pin of the shackle should be tightened.

⚠ WARNING

- **National and local safety rules should be observed at all times.**
- **Regardless of relevant safety rules may void pertinent warranty claims from SUNGROW.**

4.4.5 Fixing

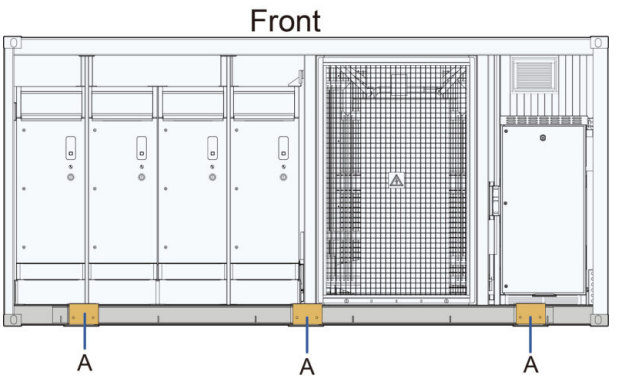
Hoist the product to the intended location and fix it.

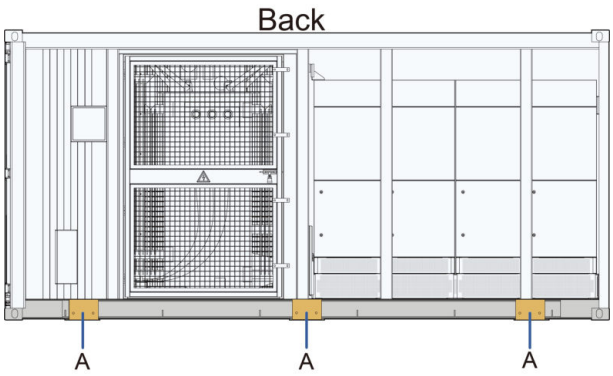
Fixed by Welding

Secure the bottom of the product to the foundation by welding. Take proper measures to prevent the welding point from corrosion after welding.

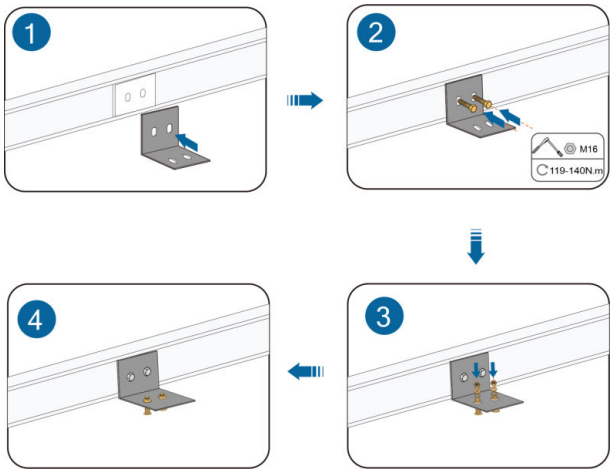
Fixing by L mounting parts

Fix the fixing point at the bottom of the MV Grid-connected PV Inverter(shown as A below) with the existing operating platform using L mounting parts.



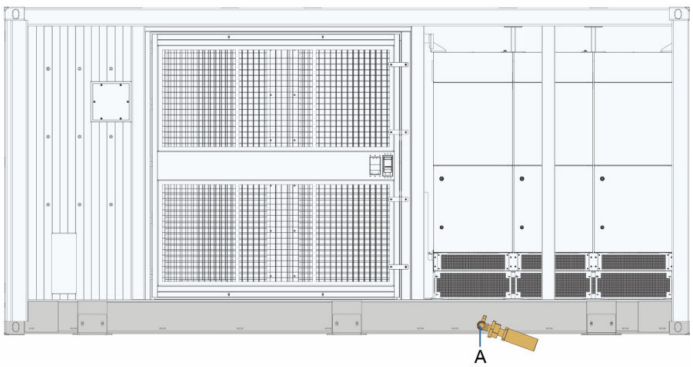


The steps to fixing the L mounting parts is shown in the following figure.



4.4.6 Installating Oil-Water Separator

The MV Grid-connected PV Inverter has two oil drainage holes, located on the front and rear sides of its base, as shown in the figure below.

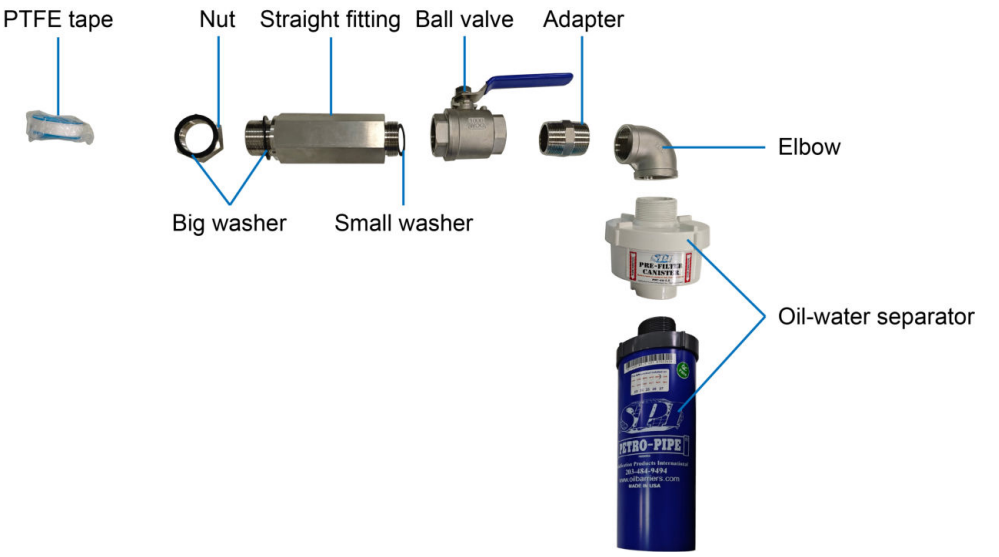


SUNGROW provides an oil-water separator assembly and a seal plug assembly. After securing the MV Grid-connected PV Inverter onto the foundation, install the oil-water separator and seal plug at the two oil drainage holes, respectively. Determine their

installation positions based on the actual on-site requirements (i.e., which drainage hole to use).

Procedure

Step 1 Install the oil-water separator.



Item	Parts	Source
Oil-water separator assembly	Oil-water separator	Included in the scope of supply
	Elbow	
	Adapter	
	Ball valve	
Straight fitting assembly	Small washer	Included in the scope of supply
	Straight fitting	
	Big washer*2	
	Nut	
Others	PTFE tape (thread seal tape)	Included in the scope of supply

a. Remove the rubber plug from the oil drainage hole.

b. Connect the straight fitting to the oil tray: Insert the long threaded end of the fitting (with an outer diameter of 48 mm) through the nut into the oil drainage hole, then tighten the nut to secure the fitting to the oil tray. You can monitor the process through the inspection window near the hole.

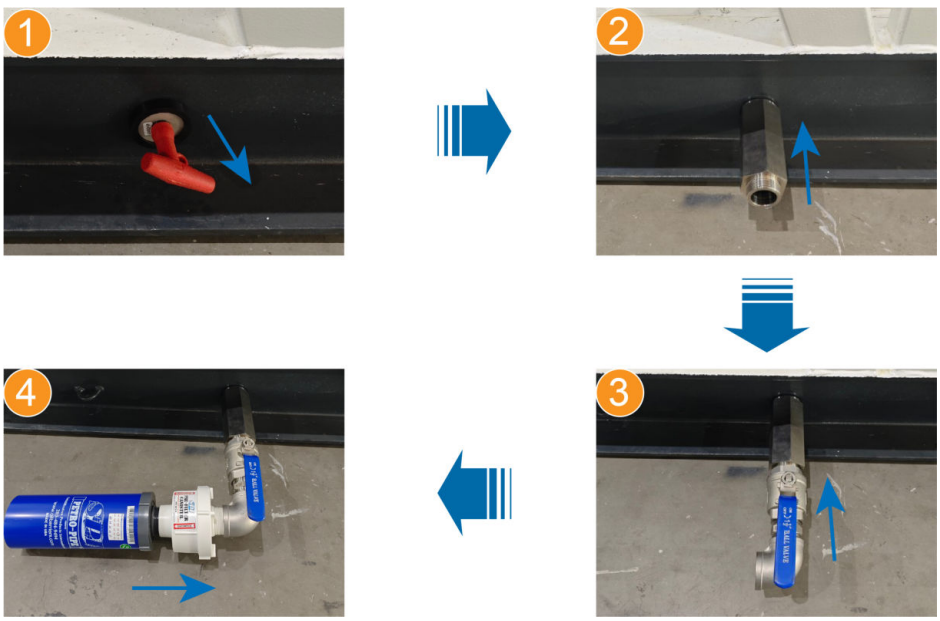
Pay attention to the positions of the flat washers.
Install the flat washers correctly by referring to the figure. Ensure they are tightly against the nut and the straight fitting.

c. Connect the ball valve to the straight fitting (G1 1/2 screw thread): Wrap PTFE tape clockwise around the short threaded end of the fitting for 5–6 turns, ensuring the threads are completely covered. Then, tighten the ball valve onto the straight fitting.

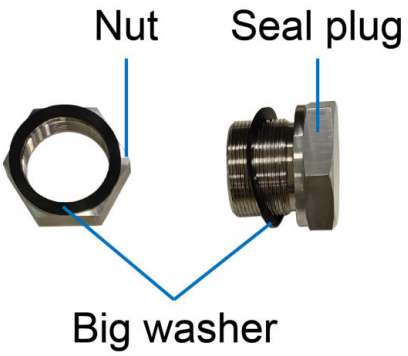
d. Connect the elbow to the ball valve using an adapter. Wrap PTFE tape clockwise around both ends of the adapter, ensuring that the threads are fully covered.

e. Attach the oil-water separator to the elbow. Wrap PTFE tape clockwise around the threaded ends of the parts, ensuring that the threads are fully covered.

- To ensure the device is well-sealed, install the appropriate washer first before fastening the fitting with the nut or attaching the ball valve to the fitting.
- To prevent leakage, please wrap seal tape around the connection points on the fitting and the elbow, etc.



Step 2 Install the seal plug.



Item	Parts	Source
Seal plug assembly	Seal plug	Included in the scope of supply
	Big washer*2	
	Nut	

a. Remove the rubber plug from the oil drainage hole.

b. Insert the threaded end of the seal plug through the nut into the oil drainage hole, and then tighten the nut to secure the plug. You can monitor the process through the inspection window near the hole.

Step 3 Earth filling.

After the oil-water separator is installed, complete electrical wiring for the MV Grid-connected PV Inverter in compliance with the relevant wiring instructions. After completing the electrical wiring, fill the space under and around the oil tray with earth.

--End

4.5 Install DC Coupling Equipment (Optional)

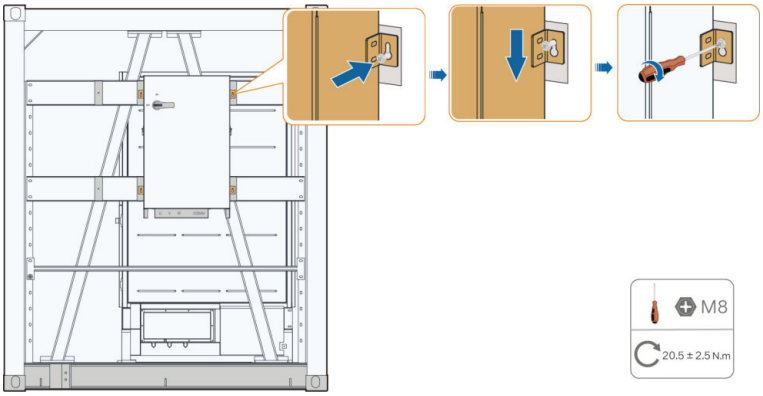
If the product supports DC coupling, the auxiliary power transfer cabinet for the ESS needs to be installed on the exterior of the MV grid-connected PV inverter.

Step 1 Lift the auxiliary power transfer cabinet to the designated installation height and align the mounting holes on the cabinet with those on the crossbeam.

Step 2 Insert M8 bolts through the upper mounting holes of the auxiliary power transfer cabinet, align with the reserved holes on the crossbeam, and tighten the bolts to secure the cabinet in place.

Step 3 Fix the two lower mounting holes of the auxiliary power transfer cabinet in the same way to ensure the cabinet is firmly installed.

--End


M8
20.5 ± 2.5 N.m

5 Electrical Connection

5.1 Precautions

⚠ DANGER

- **Before electrical connections, please make sure that MV Grid-connected PV Inverter is not damaged, otherwise, it may cause danger!**
- **Before making electrical connections, check and confirm 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.**
- **Before electrical connections, please make sure that the product switch and all switches connected to the product are set to "OFF", and use measuring equipment to ensure that there is no voltage at the connection. Otherwise, electric shock may occur!**
- **All switches cannot be closed until the electrical connection is completed.**

⚠ DANGER

PV modules will generate lethal high voltage when exposed to sunlight.

- **Operators must wear proper personal protective equipment during electrical connections.**
- **Before performing an electrical connection, be sure to disconnect the PV combiner box and use measuring equipment to ensure that cables are voltage-free.**
- **Respect the protection requirements and precautions of PV modules.**

⚠ DANGER

Danger to life due to a high voltage inside the MV Grid-Connected PV Inverter!

- **Be sure to use special insulation tools during cable connections.**
- **Note and observe the warnings on the product.**
- **Respect all safety precautions listed in this manual and other pertinent documents.**

⚠ WARNING

Sand and moisture penetration may damage the electrical equipment in the product, or affect their operating performance!

- **Avoid electrical connections during sandstorms or when the relative humidity in the surrounding environment is greater than 95%.**
- **Carry out the electrical connection of the product on fine days with no wind and sand.**
- **Do not perform electrical connections in harsh weather conditions, such as thunder and lightning, rain, snow, and Level 6 or stronger wind.**

⚠ WARNING

Damage to the device caused by incorrect wiring is not covered by the warranty.

- **Perform wiring by strictly following the wiring identifications inside the equipment.**
- **After completing each connection, carefully check that the connection is correct and secure.**
- **Electrical connection must be performed by professional personnel who wear personal protective equipment.**
- **The cables used in the PV generation system must be firmly connected, in good condition, and well insulated to appropriate sizes.**

⚠ WARNING

- **Check and confirm the polarity correctness of the PV string, and then connect it to the corresponding position of this product.**
- **When installing and operating the product, make sure that the positive or negative polarities of PV strings do not short-circuit to the ground. Otherwise, an AC or DC short-circuit may occur, resulting in product damage. The damage caused by this is not covered by the warranty.**

⚠ WARNING

Use the dedicated operating lever to switch off the MV load switch, by referring to the manual for the transformer.

NOTICE

Be sure to check the insulation of the PV arrays set according to the instructions provided by the manufacturer. The PV arrays set must be disconnected from MV Grid-connected PV Inverter during the insulation check.

NOTICE

- **Whenever necessary, wear proper protective equipment such as goggles, insulating gloves, and insulating shoes, and take all necessary auxiliary protective measures to ensure the safety of the personnel and the equipment.**
- **Before operating the product, check and ensure that the tools to be used have undergone regular maintenance.**
- **The inverter units of the MV Grid-Connected PV Inverter have all been tested for insulation between the main circuit and the enclosure before the MV Grid-Connected PV Inverter leaves the factory. Do not perform insulation and withstand voltage tests on any part of the MV Grid-Connected PV Inverter (using a withstand voltage tester or megohmmeter).**

NOTICE

- **Comply with the safety instructions related to PV strings and the regulations related to the local grid.**
- **During electrical connection, do not forcibly pull any wires or cables, as this may compromise the insulation performance.**
- **Ensure that all cables and wires have sufficient space for any bends.**
- **Adopt the necessary auxiliary measures to reduce the stress applied to cables and wires.**
- **Keep a sufficient distance between the cable and the heating device to avoid aging and damage of the insulation layer of the cable caused by high temperature.**
- **For the potentially live parts near the area where the operation is performed, cover them with insulated cloth for insulation shielding.**

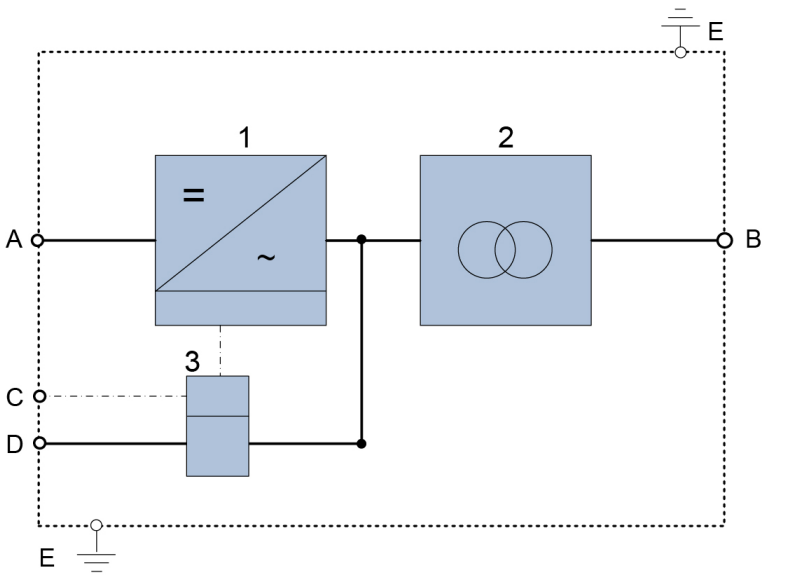
NOTICE

All electrical connections must comply with local and national/regional electrical standards.

- **Cables used by the user shall comply with the requirements of local laws and regulations.**
- **Only with the permission of the national/regional grid department, the MV Grid-Connected PV Inverter can be connected to the grid.**

5.2 Wiring Overview

Power cable Communication cable



1- Inverter unit 2– Transformer 3– Power Distribution Cabinet

Table 5-1 Interface Description

No.	Description	Recommended Cable Specifications
A	DC input port	400 mm ^{2} at most
B	AC output port	70mm^2—500mm^2 (Optional 630mm^2)
C	Communication port	2 × 0.75 mm ^{2} —2 × 1.5 mm ^{2}shielded twisted pair cable
D	External power supply port	—
E	Grounding	Hot-dip galvanized flat steel with a cross-sectional area greater than 124mm²
		50 mm ^{2} — 95 mm ^{2} grounding cable

5.3 Preparation Before Wiring

5.3.1 Installation Tools

Installation tools include but are not limited to the following recommended ones. Use other auxiliary tools on site as needed.


Torque screwdriver


Wire stripper


Hydraulic clamp


Heat gun


Multimeter


Screwdriver


Electric drill


Torque wrench


Protective gloves


Goggles

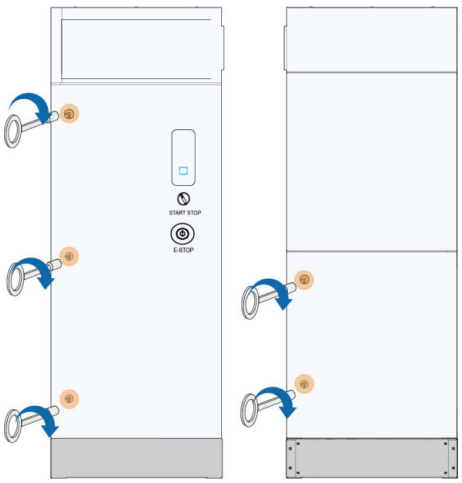

Insulated shoes


Protective clothing

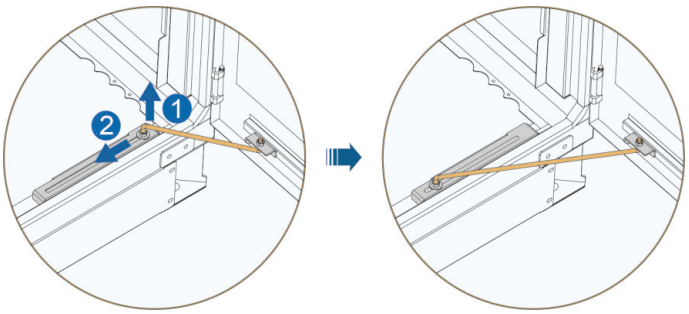

Hard hat

5.3.2 Open the Product Door

Step 1 Open the cabinet door.



Step 2 Fix the doors of the inverter unit cabinet and power distribution cabinet.



Step 3 Remove the protective cover of the wiring area.

--End

5.3.3 Cables

The cables must meet the following requirements:

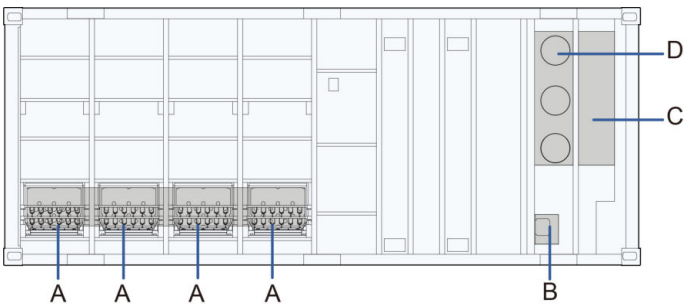
- The current carrying capacity of the cable should meet the requirements. Factors affecting the current-carrying capacity of a conductor include but are not limited to:
  - Environmental conditions
  - Type of the insulation material of the conductor
  - Cabling method
  - Material and cross-sectional area of the cable
- Select cables with a proper diameter according to the maximum load, and the cables should be long enough.
- All DC input cables must be of the same specifications and materials.
- Check the insulation of all DC input cables according to the applicable local rules.
- AC output cables of three phases must be of the same specifications and materials.
- Check the insulation of all AC output cables according to the applicable local rules.
- Only flame-retardant cables can be used.

NOTICE

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

5.3.4 Position of Cable Inlet

For easy wiring, cables between external devices and the product are routed into the product through the bottom cable inlet.



* The figure is for reference only. The product received may differ.

No.	Description
A	DC input cable inlet
B	Power distribution and communication cable inlet
C	AC output cable inlet
D	Pressure relief area

5.3.4.1 Cable Inlet Preparation

Step 1 Identify the marks of hole positions.

Step 2 Drill holes at the marks.

Step 3 Lead cables into the cabinet through the holes, then secure the cables. Cables can be secured in different ways, usually with fireproof mud and waterproof connectors. Generally, you can choose one of them to secure the cables on site.

The figure below shows how to secure the cables with fireproof mud.

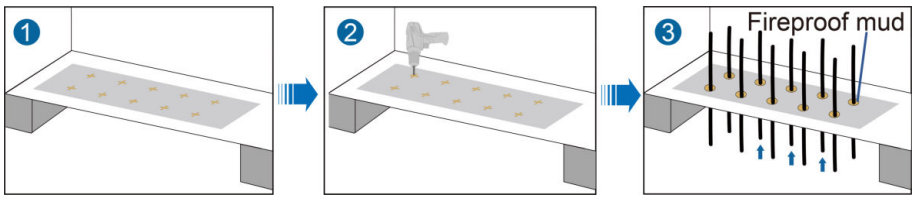


Figure 5-1 Fireproof Mud

There are typically two types of waterproof connectors, single-hole and double-hole. The double-hole waterproof connector allows two cables to pass through. Please select waterproof connectors based on the actual situation and cable requirements on site. The figure below shows how to secure the cables with waterproof connectors.

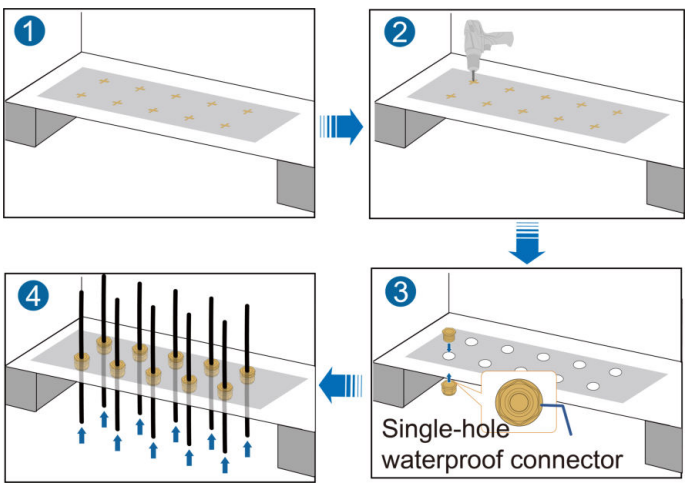


Figure 5-2 Single-hole Waterproof Connector

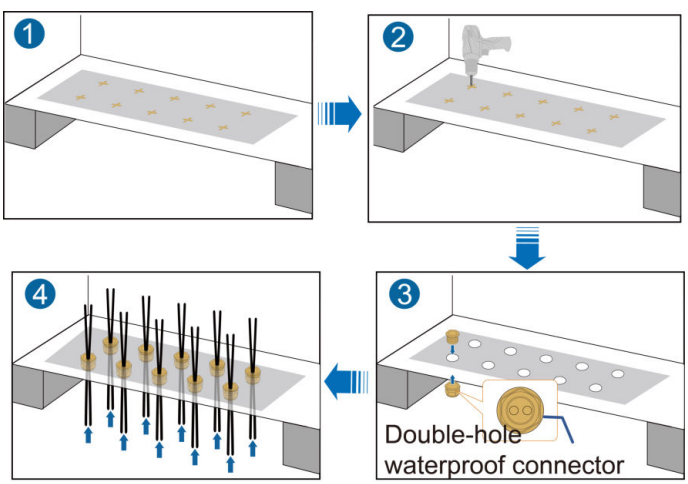


Figure 5-3 Double-hole Waterproof Connector

Different wiring schemes have different requirements for cable diameter. The requirements for cable diameter are shown as follows.

Wiring scheme	Cables secured by	Number of inputs	Cable diameter
Wiring using single-core cables	Single-hole waterproof connector	5	400mm^2 (outer diameter ≤ 42mm)
		6	
		7	400mm^2 (outer diameter ≤ 32mm)
	Fireproof mud	5	400mm^2 (outer diameter ≤ 42mm)
		6	
		7	
Wiring with cables connected to both sides of copper bar	Double-hole waterproof connector	5	300mm^2 (outer diameter ≤ 26mm)
		6	Not available
		7	
	Fireproof mud	5	300mm^2 (outer diameter ≤ 35mm)
		6	300mm^2 (outer diameter ≤ 32mm)
		7	185mm^2 (outer diameter ≤ 26mm)

* For the number of inputs and the cable size not mentioned above, please confirm with SUNGROW.
* Waterproof connectors (contact SUNGROW in advance if needed) or fireproof mud (prepared by users) are used to seal off the cable inlets/outlets.

⚠ WARNING

After wiring, seal off the cable inlet holes by filling the gaps around the cables with fireproof/waterproof materials such as fireproof mud to prevent the ingress of foreign matter or moisture, thus avoiding affecting the product's long-term operation.

--End

5.4 Ground Connection

⚠ DANGER

Products must be reliably grounded!

- **The grounding cable must be reliably grounded, otherwise, it may cause a fatal electric shock to the operator.**
- **The grounding cable must be reliably grounded, otherwise, equipment may be damaged if struck by lightning.**
- **The grounding cable must be reliably grounded, otherwise, equipment may not operate normally.**

⚠ WARNING

- **Connect the grounding terminal to the protective grounding point before connecting AC cables, DC cables, and communication cables.**
- **Both grounding terminals on the side of the product must be connected to the protective grounding points reliably. SUNGROW shall not be held liable for any damage caused by the violation.**

NOTICE

- **Make necessary grounding and short-circuiting connections.**
- **Before connecting the grounding cable, remove the protective film at the grounding terminal first.**

NOTICE

Note the following during ground connection:

- **Observe specific codes and regulations of the country/region where the project is located to perform ground connections.**
- **All grounding connections inside the MV Grid-connected PV Inverter must be secure and reliable.**
- **The grounding resistance must meet the requirements of local standards and regulations.**

5.4.1 Overview

There are two grounding methods: fixing by welding with grounding flat steel and fixing with grounding cable.

⚠ WARNING

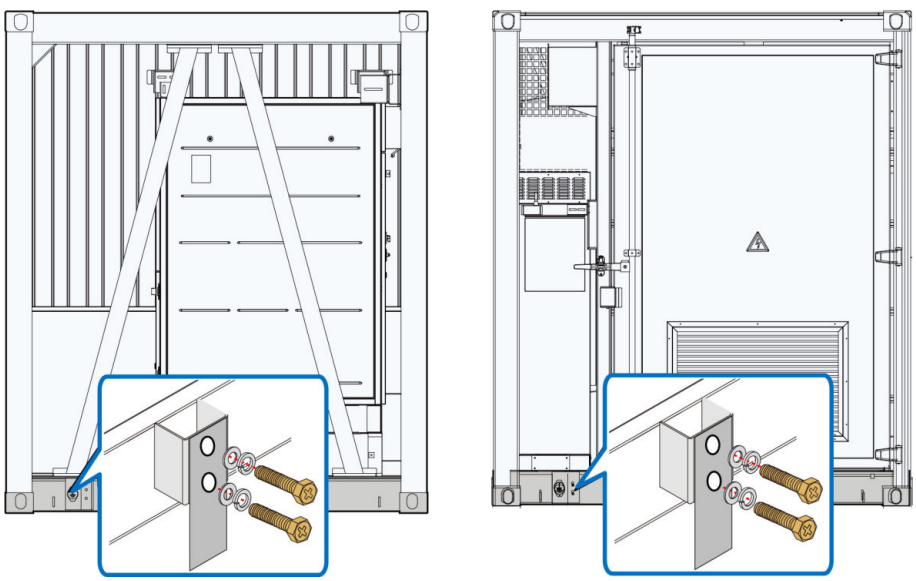
Before proceeding with the ground connection, tear off the protective film on grounding point.

NOTICE

- **The inverter only supports connection to transformers with an IT grounding system and is not compatible with TN system transformers.**
- **For the transformer and RMU in the MV grid-connected PV inverter, the LV side operates in an IT system.**
- **After grounding is completed, whether made by using the flat steel or grounding cable, the exposed metal surface, except the fixing point of grounding connection, needs to go through anti-corrosion treatment.**

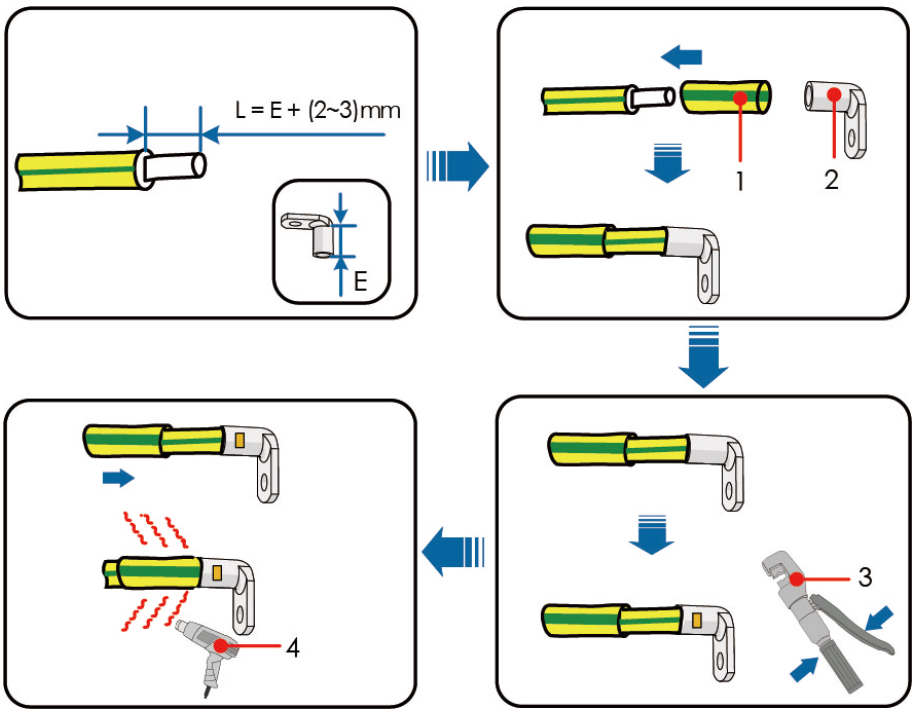
5.4.2 Grounding Flat Steel

Weld the hot-dip galvanized flat steel to the designated grounding point. The maximum overlapping area between the flat steel and the cabinet grounding point is 60 mm*100 mm.



5.4.3 Grounding Cable

Use 50 mm^2 ~ 95mm^2 grounding cables to reliably connect the two grounding terminals to the grounding points of the system.



1: Heat shrink tubing 2: OT/DT terminal

5.5 DC Input Connection

DANGER

The PV arrays will generate lethal high voltage when exposed to sunlight. Respect all safety instructions listed in relevant documents about PV arrays.

WARNING

- **Make sure the PV array is well insulated to the ground before connecting it to the MV Grid-Connected PV Inverter.**
- **Make sure the maximum DC voltage and the maximum short circuit current of any string never exceed the MV Grid-Connected PV Inverter permitted values specified in "Technical Parameters".**
- **Check and confirm the polarity correctness of the PV string, and then connect it to the corresponding position of this product.**
- **When installing and operating the product, make sure that the positive or negative polarities of PV strings do not short-circuit to the ground. Otherwise, an AC or DC short-circuit may occur, resulting in product damage. The damage caused by this is not covered by the warranty.**

⚠ WARNING

- **Observe all safety instructions specified by the manufacturer for the PV modules at the site.**
- **To ensure the stable and efficient operation of the whole system, it is recommended that the PV modules attached to the same MV Grid-connected PV Inverter be identical in manufacturer and model, and the number of PV modules connected in series in each input should be the same.**
- **The open-circuit voltage of the PV array should not exceed the maximum DC input voltage of the MV Grid-Connected PV Inverter. Overly high open-circuit voltage of the PV array may damage MV Grid-connected PV Inverter.**
- **If a ground fault has been found in the PV module, before proceeding with the DC input wiring, remove the fault first.**

5.5.1 Overview

DC wiring area

Negative Grounding

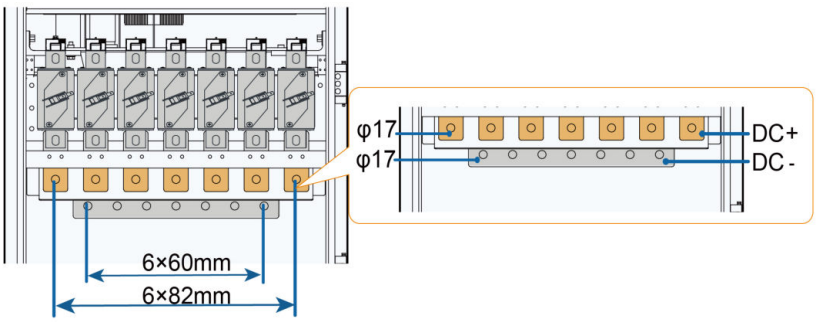


Figure 5-4 7 DC Inputs

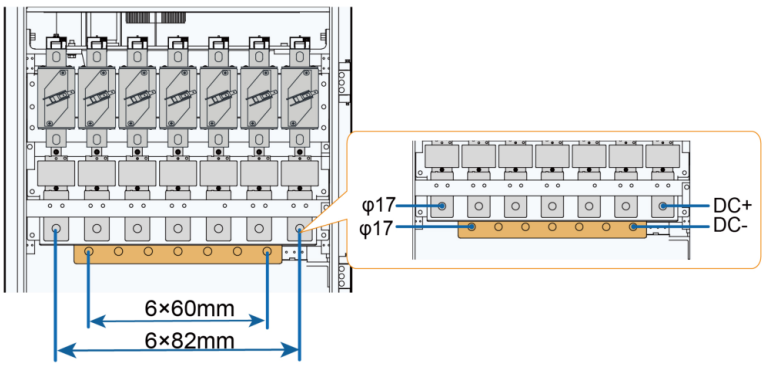


Figure 5-5 7 DC Inputs with MPLC

Floating Grounding

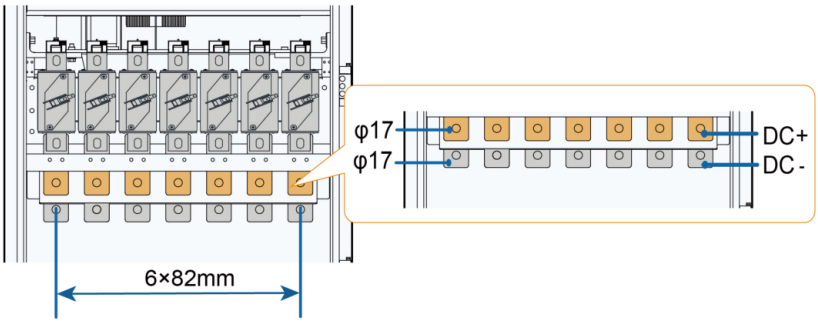


Figure 5-6 7 DC Inputs

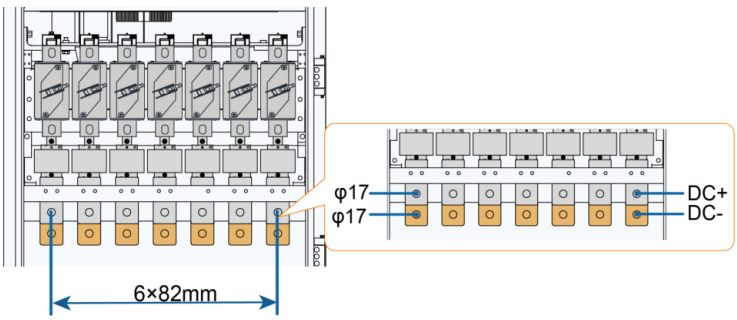


Figure 5-7 7 DC Inputs with MPLC

Illustrations in the manual are for the product with configuration of 7 DC inputs only.

- For the product with 6 DC inputs, in its DC wiring area, the first fuse and copper bar on the right in the illustration are removed.
- For the product with 5 DC inputs, in its DC wiring area, the first fuse and copper bar on the left and right in the illustration are removed.

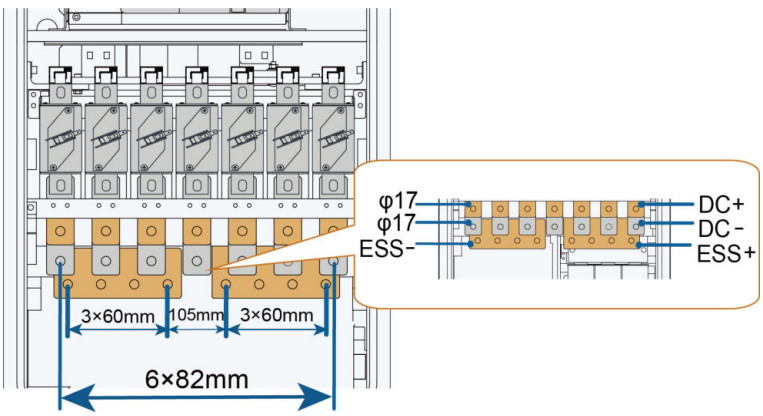


Figure 5-8 7 DC Inputs with ESS

For the product with 7 DC inputs with ESS, in its DC wiring area, the first fuse and copper bar on the left in the illustration are removed.

* The wiring area is subject to the actual product.

Mark	Description
DC+	DC side positive cable connection area
DC-	DC side negative cable connection area
ESS	Energy storage system port
φ17	Copper bar diameter

Wiring hole	Bolt	Torque(N.m)
φ17	M16	119–140N.m

5.5.2 Removing Insulation Board Before Connection

Prerequisite

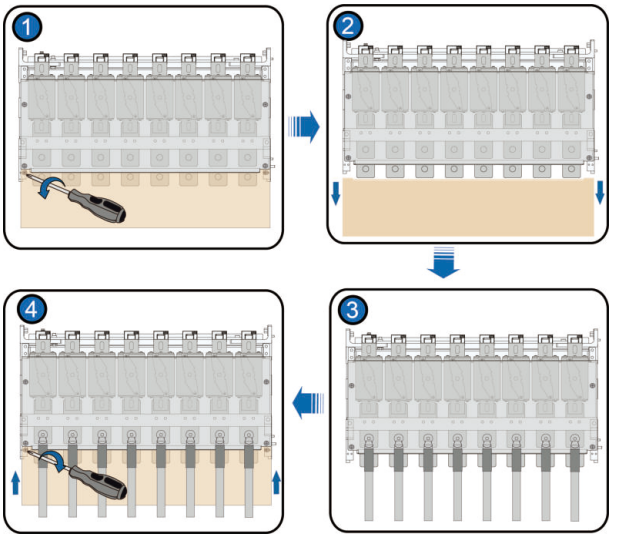
Removing insulation board before cable connections.

Step 1 Remove the two fixing screws on the insulation board with a screwdriver.

Step 2 Move insulation board down onto the bottom plate, and make sure it is placed between the positive and negative cables.

Step 3 Install the negative DC cables.

Step 4 Move the insulation board upward to its original position and install the two fixing screws.



Step 5 Finally, install the positive DC cables.

--End

* The figure is for reference only. The product received may differ.

5.5.3 OT/DT Terminal Requirement

Use OT/DT terminals (not included in the scope of delivery) when connecting the cables to the copper bars on the inverter unit.

Copper OT/DT terminals or copper-aluminum bimetallic OT/DT terminals can be used. When using bimetallic terminals, please select terminals according to the requirements specified in **"NF C33-090-1 -1995"**. The appearance and dimensions of the bimetallic terminal are illustrated in the figure below.

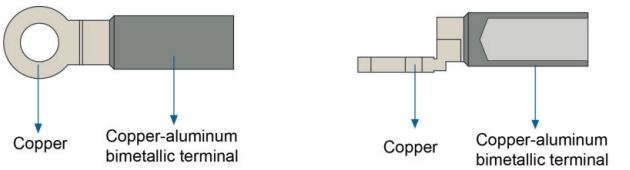


Figure 5-9 Copper-Aluminum Bimetallic Terminal

5.5.4 Procedure

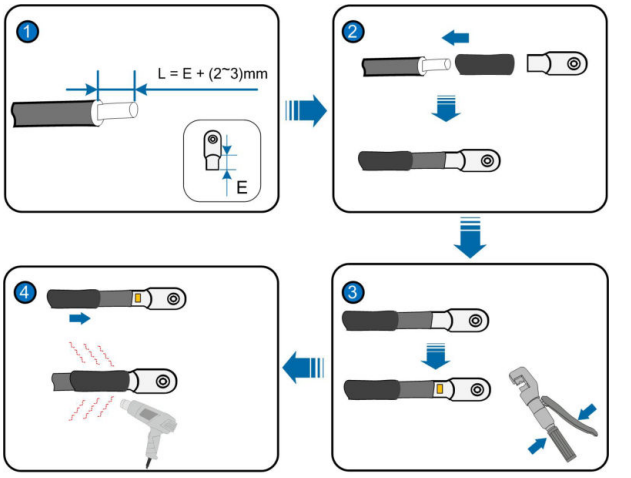
NOTICE

The number of PV strings connected to the DC side of each inverter unit should be consistent. If this is not possible, please contact SUNGROW.

Step 1 Lead the cable into the wiring area through the inlet hole, and mark the cable polarity.

Step 2 Strip the protective layer of the cable to expose the copper core of the wire with strippers.

Step 3 Install the OT/DT terminal to the wire and crimp them with a crimping tool. Install a heat shrink tubing to the terminal and heat it with a heat gun.



If the two-core or multi-core cable is used as the DC input cable, split the cable cores into wires outside the inverter unit first, before leading the cable into the inverter unit.

Step 4 Secure the OT/DT terminal to the copper bar by M16×45* bolts with a tightening torque of 119 - 140 N.m.

- If copper wires are used, fasten the bolt assembly as shown below.

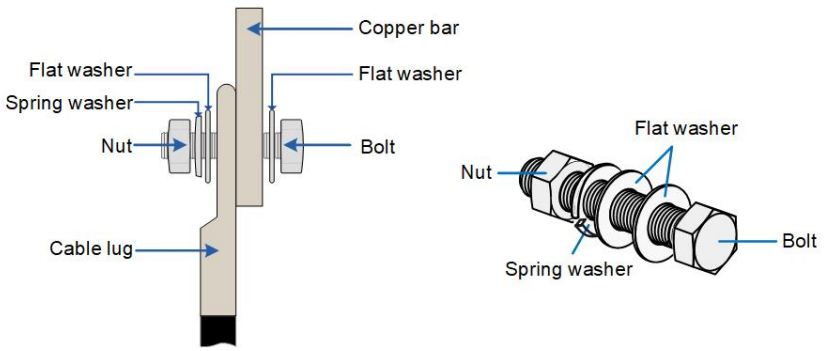


Figure 5-10 Copper Wire Connection

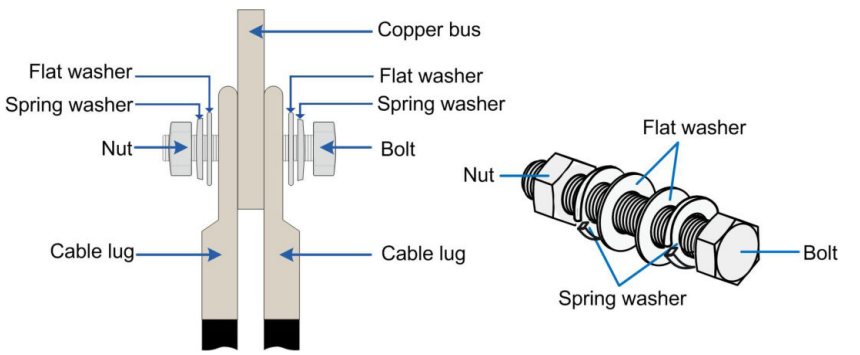


Figure 5-11 Double Side Copper Wire Connection

* The length of bolts used for double-sided wiring should be determined based on the actual conditions at the project site.

NOTICE

To implement double-sided wiring, please contact SUNGROW and provide relevant details to assess the feasibility first.

- If aluminum wires are used, fasten the bolt assembly as shown below.

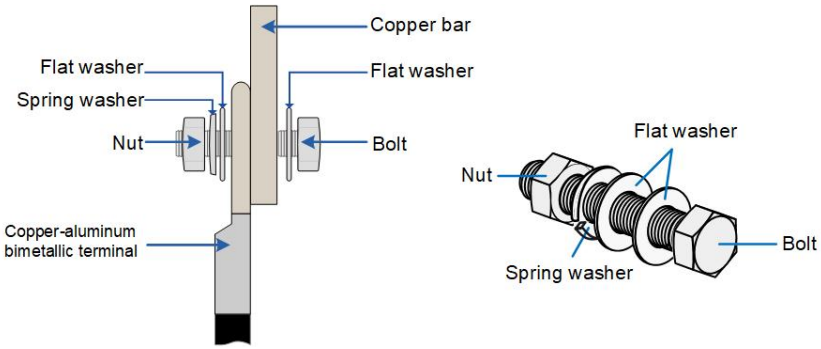


Figure 5-12 Aluminum Wire Connection

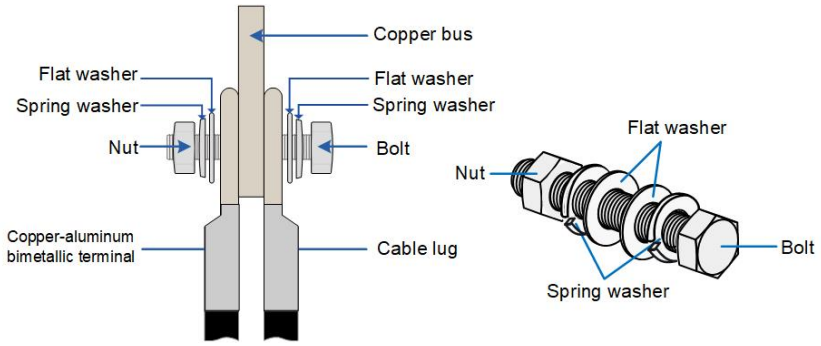
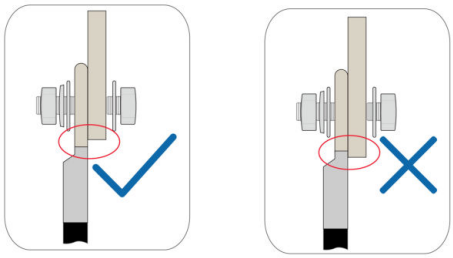


Figure 5-13 Double Side Aluminum Wire Connection

* The length of bolts used for double-sided wiring should be determined based on the actual conditions at the project site.

NOTICE

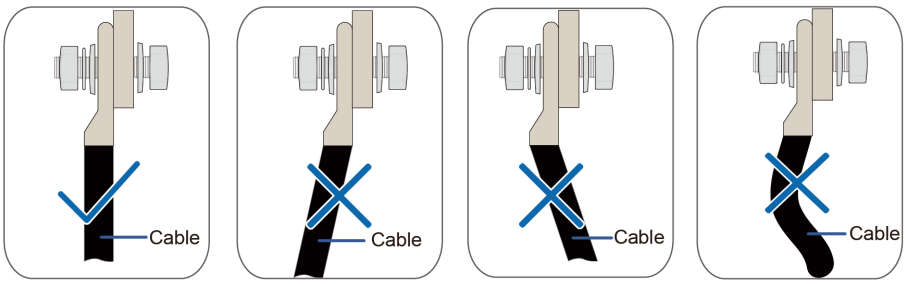
Prevent the aluminum component of the copper-aluminum bimetallic terminal from contacting the copper bar to avoid electrochemical corrosion, abnormal heating due to increased contact resistance, and potential equipment damage.



NOTICE

To implement double-sided wiring, please contact SUNGROW and provide relevant details to assess the feasibility first.

When performing DC wiring, make sure the cables remain vertical to the ground without inclination, to prevent the copper bar from getting deformed due to stress in other directions.



Step 5 Pull the cable back slightly after wiring to ensure that the cable is long enough.

NOTICE

- **Ensure that the selected terminal can directly contact the copper bar. If there are any problems, contact the terminal manufacturer.**
- **Ensure that the copper bar is not in direct contact with the aluminum wire. Otherwise, electrochemical corrosion may occur, impairing the reliability of the electrical connections.**

NOTICE

In addition to complying with the national standards of the country of use, foam sealants and fireproof mud must be halogen-free and environmentally friendly. They must not release corrosive substances such as chlorine, ammonia, or sulfur at operating temperatures ranging from -40°C to 85°C, to prevent damage to equipment.

- Please ensure the upper and lower copper bars are kept in the same plane with a deviation of less than 10mm while performing DC wiring.
- Fix the cable after wiring, and reserve a certain length to avoid damage caused by excessive force on the wiring copper bar due to foundation sinking and other problems.

--End

5.5.5 Securing Cables

Secure the cables after wiring, to avoid damage caused by excessive stress on the wiring copper bar.

- If the product comes with cable clips, follow the steps below to secure the cables.
- If the product does not come with cable clips, or it is not feasible to use cable clips (e.g. cables are connected to both sides of the copper bar), secure the cables with proper

devices within 500mm under the cover plate for AC/DC cable inlet, based on the routing of the cables.

DC cable clamps prevent cable sagging and help avoid arc faults caused by insulation damage from securing cables with metal cable glands.

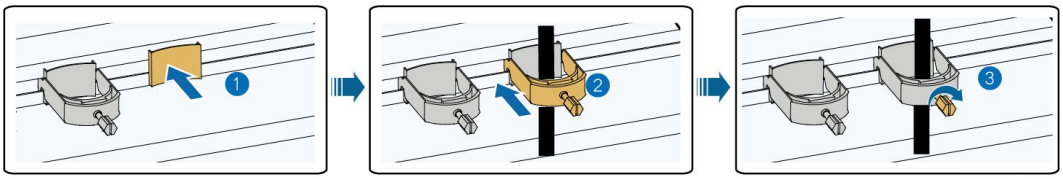
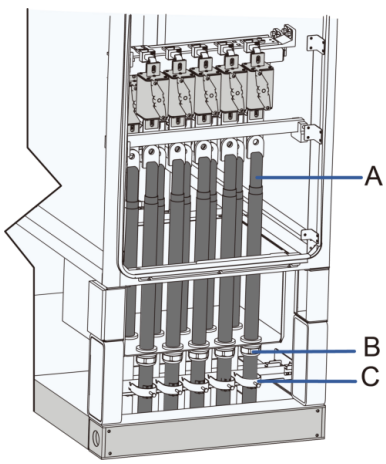


Figure 5-14 Cable Clip Installation

Note: The cable clip is an optional accessory.

Follow-up Operation

The figure below shows the DC side of the inverter unit after the wiring is completed.



* The figure is for illustration only and the actual product on site may be different.

No.	Description
A	Cable
B	Waterproof connector *
C	Cable clip

* Cables can be secured in different ways. In this figure, cables are secured with waterproof connectors, which is for illustration only. The way to secure the cables depends on the actual conditions on site.

The following two grounding methods are recommended:

1. At the string combiner box (SCB) end, use a compliant armored cable gland to ground the cable armor and connect it to the SCB grounding bar.

2. At approximately 1 m below the inverter cable entry, use a compliant grounding clamp and an appropriately sized grounding conductor to establish a separate equipotential bonding connection for the cable armor.

5.6 AC Side Connection

5.6.1 Inspection Before Wiring

- Check and ensure that the AC side of the inverter unit is disconnected.
- Refer to the transformer manual and use the special lever to disconnect the MV load switch.
- Check and ensure that the sleeves and copper bars in the wiring area in the HV compartment are free from damage, deformation, and fracture.

5.6.2 Procedure

Step 1 Lead the cable from external device through the cable entry on the bottom of the cable compartment.

Step 2 Prepare the terminals and install them tightly, where reference can be made to the cable connector installation manual.

The wiring terminal can be connected with either copper cable or aluminium cable.

- In case of copper cable, use copper wiring terminals.
- In case of aluminium cable, use copper-to-aluminium adapter terminals.

The HV wiring terminal can be connected to a maximum of two cables. Select the terminal as needed.

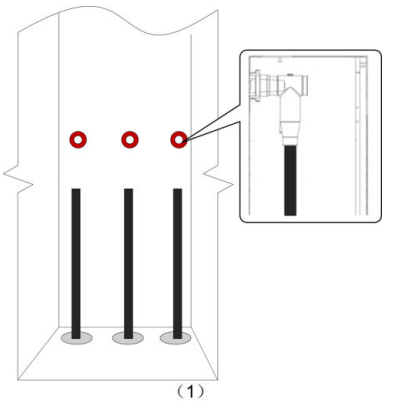


Figure 5-15 One Cable

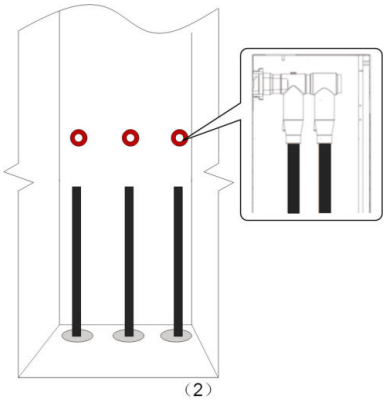


Figure 5-16 Two Cables

--End

Further Operations

Seal the bottom cable entries with fire-proof mud, clear sundries inside the cabinet, and reassemble the sealing plate of the cabinet.

Should there be any unused wiring terminals, block them with insulating caps.

When connecting the AC cable, do not use the hole on the pressure relief plate as a substitute for the AC cable inlet.

5.6.3 Securing AC Cable

After completing the AC cables inside the RMU according to the relevant requirements, secure the AC cables to prevent them from slipping due to stress.

Single-core or three-core cables may be used in the RMU. Secure them in different ways, as shown below.

Single-core cables

If single-core cables are used, secure the three phase cables using cable clips, as shown in the figure below.

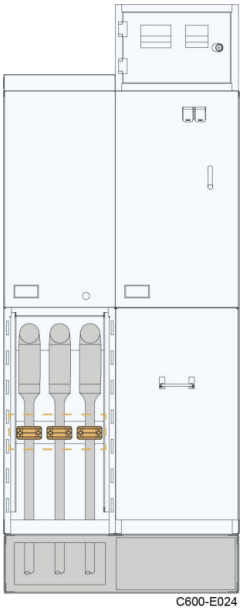


Figure 5-17 Securing single-core cables

Three-core cable

If a three-core cable is used:

- Inside RMU: The phase B cable must be secured with a cable clip.
- RMU base: Add a cable clip under the three-branch breakout boot to secure it. Rubber or other insulating materials can be used to fill the gap to enhance friction.

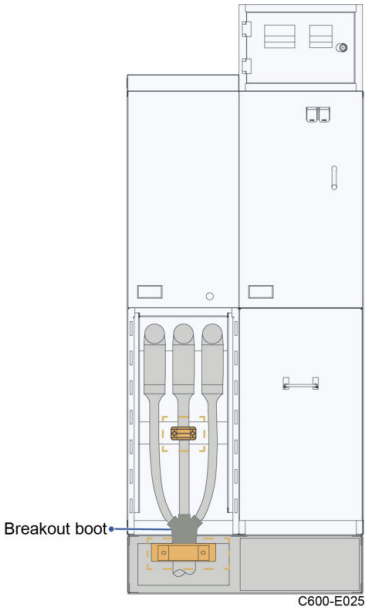


Figure 5-18 Securing a three-core cable

* The RMU in the figures are for reference only and may differ from the real product.

Cable Anti-Sag Fixing

In areas prone to ground settling, to prevent cable sagging, each cable must be secured to the foundation with at least three cable clamps after wiring is completed, as shown below. The spacing between adjacent clamps on the same cable should not exceed 1.5 meters.

If this cannot be achieved, the spacing must be no less than 1.4 meters.

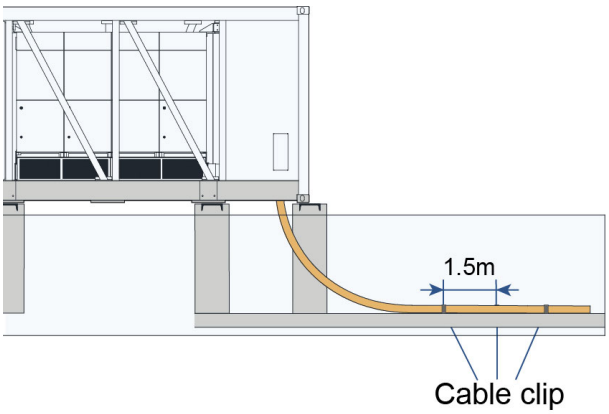
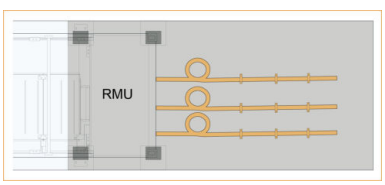


Figure 5-19 Position of Cable Clamps

- The foundation platform used to secure the cables should be integrated with the platform of the MV Grid-Connected PV Inverter. This prevents uneven settling of a separate cable foundation, which could place stress on the cables.
- Before fixing the cables to the foundation, allow sufficient slack to ensure proper strain relief and avoid tension-induced sagging.



5.7 DC Coupling Wiring (Optional)

If the product supports DC coupling, it is necessary to supply power to equipment such as auxiliary power transfer cabinet through the power interface for energy storage equipment power distribution. Complete the wiring by following the steps below.

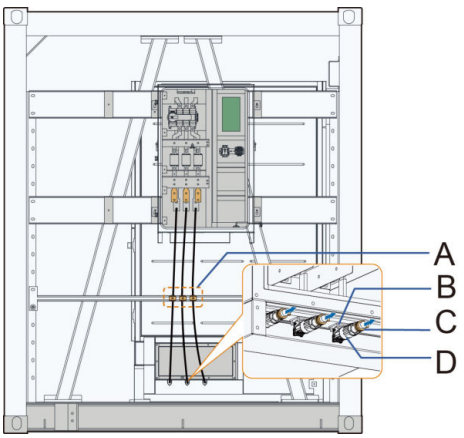
Prerequisite

⚠ WARNING

- **All the plugs need to be sealed and well stored before installation.**
- **Before installing the plug, check the plating of the socket for damage and corrosion. In case any damage or corrosion is found, stop the installation and replace the socket with a new one.**

Introduction

An aviation connector consists of a plug connector and a socket connector. The product will be delivered as shown in the figure below.



*The figure is for reference only. The product received may differ.

No.	Name
A	Cable clamp 1
B	Socket connector
C	Cable clamp 2
D	Plug connector

* All the above items are included in the scope of delievery.

The cable is not included in the scope of delivery. If required, it can be purchased with a reference specification of 1*120mm^2. (For reference only, the final specification should be determined based on the actual power of the LC1000.)

Procedure

Remove the film of the pre-cut knockout.

Step 1 Before wiring, remove the sealing plate from the aviation connectors. Then, remove the pre-cut knockouts from the sealing plate according to the marks to create openings for the cables to pass through.

Step 2 Remove the caps from the socket connectors.

Step 3 Install aviation connectors.

a. Fetch the aviation connectors from the accessories. Crimp the cables onto the plug connectors.

b. Connect the plug connector to the socket connector. The other end of the cable should be connected to the auxiliary power transfer cabinet.

c. Secure the cables properly using cable clamp 1 and cable clamp 2.

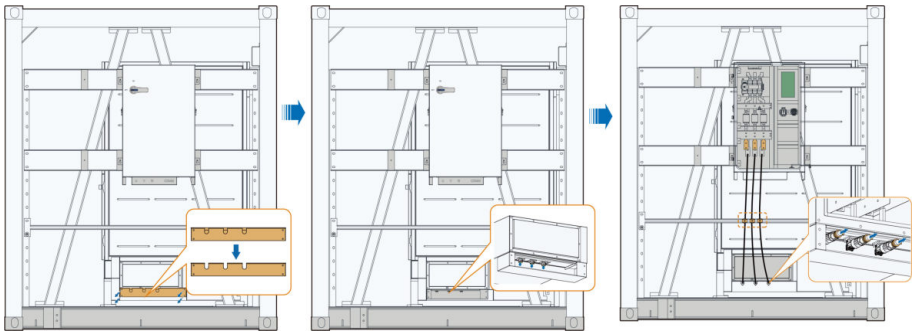


Figure 5-20 DC Coupling Wiring

*The figure is for reference only. The product received may differ.

--End

5.8 Communication Connection

5.8.1 Overview

There is an RS485 communication terminal block inside the power distribution cabinet.

Table 5-2 Port Mark and Definition (Example)

Marks	Plug-compatible Devices
Reserved RS485	PV combiner box, meteo station, electricity meter, transformer, etc.

5.8.2 Procedure

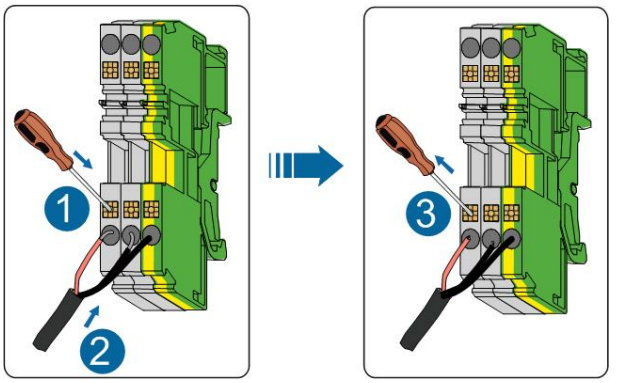
Take one cable as an example.

Step 1 Use a wire stripper to strip off the RS485 shielded twisted pair.

Step 2 Press the metal plate above the terminal with a screwdriver.

Step 3 Insert the cable into the corresponding wiring hole.

Step 4 Loosen the screwdriver, the metal plate returns and compresses the cable.



* The figure is for reference only. The product received may differ.

--End

5.9 Switch/Ethernet Communication

Overview

The switch or Ethernet port is set inside the power distribution cabinet, marked as A in the figure below. Please adopt switch or Ethernet communication according to the actual situation on site.

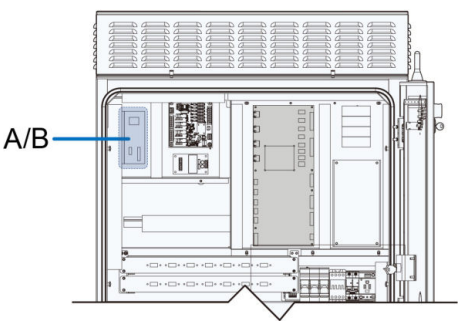


Figure 5-21 15K Power Distribution Cabinet as an example

Connect external monitoring devices to the switch port or Ethernet port by a CAT-5e cable.

5.10 Check After Wiring

5.10.1 Inspection

Check the wiring thoroughly and carefully when all electrical connections have been completed.

- Seal the gap between cables and the wiring holes with fireproof and waterproof materials.
- Put all protective covers back in place firmly.

⚠ WARNING

When the wiring is completed, check for the wiring correctness and then seal the gap between cables and inlet and outlet holes with fireproof/waterproof materials such as fireproof mud to prevent foreign matter or moisture from entering and affecting the long-term normal operation of the MV Grid-Connected PV Inverter.

⚠ WARNING

Put up highly visible warning signs near the product's upstream and downstream switches, to prevent safety incidents caused by accidental switching on.

5.10.2 Locking Cabinet Door

Step 1 Release the fixing doors of the inverter unit cabinet and the power distribution cabinet. Unfix in reverse of the fixing method□refer to 5.3.2 Open the Product Door.

NOTICE

It is forbidden to close the door forcibly when the door is fixed.

Step 2 Lock the cabinet door and pull out the key.

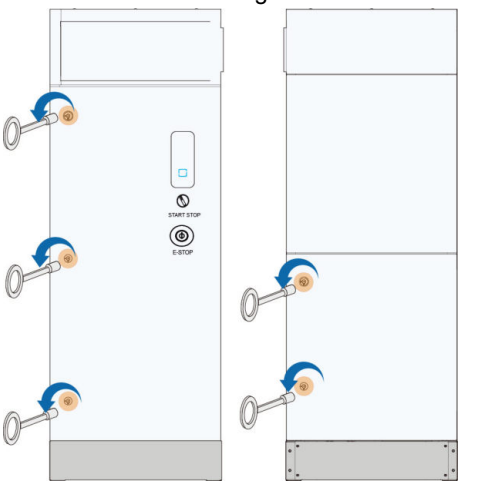
⚠ WARNING

All cabinet doors should be tightly locked, to prevent the ingress of sand and dust into the MV Grid-connected PV Inverter!

⚠ DANGER

Electric shock hazard!
Be sure to lock the cabinet door. Otherwise, non-professionals may be exposed to the running machine, and it may cause casualties.

Ensure all doors are closed and locked. Failure to do so may increase the risk of equipment damage due to dust and water ingress.



--End

6 Powering Up and Powering Down

6.1 Safety Instructions

⚠ DANGER

When the product is working:

- **It is strictly forbidden to touch the live parts of the product. Otherwise, an electric shock may occur.**
- **It is strictly prohibited to disassemble any parts of the product. Otherwise, an electric shock may occur.**
- **It is strictly prohibited to touch any hot parts of the product (such as the heat sink). Otherwise, it may cause burns.**

⚠ DANGER

Even if the MV Grid-Connected PV Inverter is shut down, it may still be hot and cause burns. Operating the MV Grid-Connected PV Inverter with protective gloves after it cools down.

⚠ WARNING

Press the emergency stop button only when the product fails or an emergency occurs to ensure that the product responds quickly.

⚠ WARNING

The product can only be put into operation after confirmed by a professional and approved by the local power department.

⚠ WARNING

For the product with a long shutdown time, it must be checked thoroughly and carefully to ensure all indexes are acceptable before being powered on.

6.2 Powering Up Operations

6.2.1 Removing Film on MV Grid-connected PV Inverter

The highlighted parts of the MV Grid-connected PV Inverter in the figures below are covered with films. Be sure to remove the films before the product is officially put into operation.

Films Distribution Area of MV Grid-connected PV Inverter

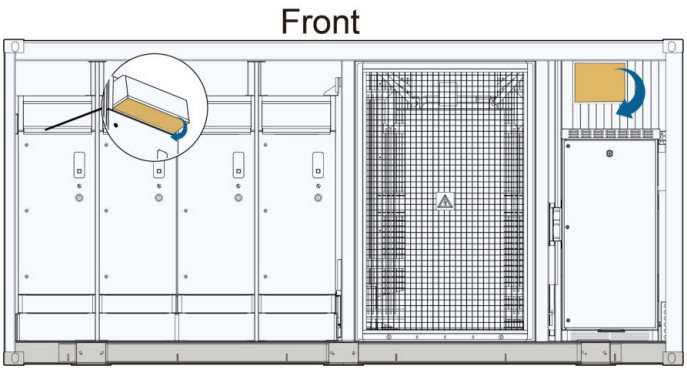


Figure 6-1 Remove Films on the Front

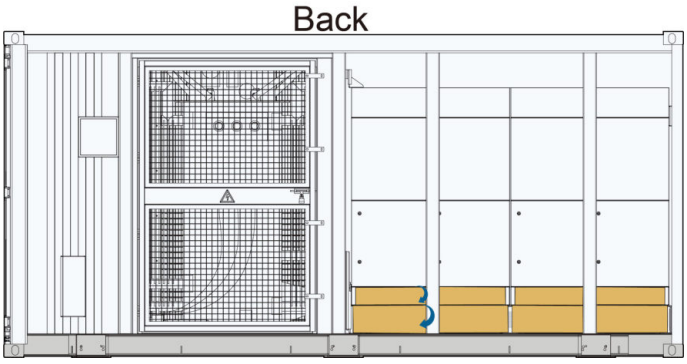


Figure 6-2 Remove Films on the Back

Films Distribution Area of RMU

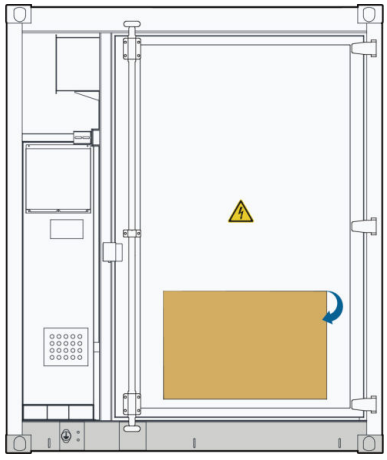
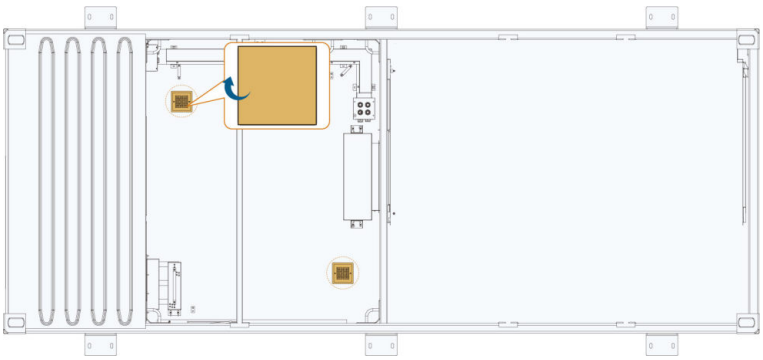


Figure 6-3 Remove Films on the RMU

Remove Films from the Floor Drain (Optional)

The floor drain protective film is only present in solutions where the product base serves as the oil tray (i.e., integrated oil tray solution). For separable oil tray solutions, there is no need to remove any film.



Films Distribution Area of Power Distribution Cabinet

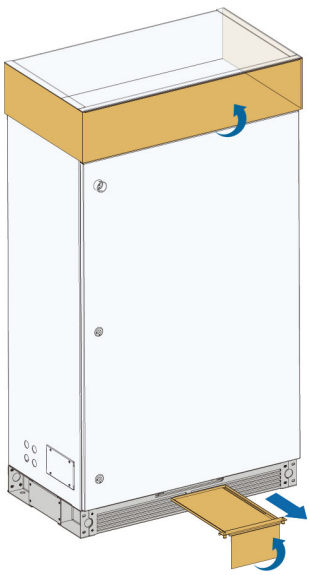


Figure 6-4 Remove Film at Air Inlet/Outlet of Power Distribution Cabinet

* The figure is for reference only. And the actual product received shall prevail.

6.2.2 Installing Surge Arrester (Optional)

If you have purchased a surge arrester from SUNGROW, follow the steps below for installation.

Prerequisite

The instructions below are provided with the surge arrester of the 36kV MV switchgear as an example. For detailed installation instructions, see the installation guide that comes with the surge arrester.

These steps apply only to the 5.6.2 Procedure"One Cable" configuration.

Before installation, ensure that all mounting surfaces on both the front connectors in V-cabinet in RMU and the rear surge arresters are intact.

Step 1 Remove the sealing cap and insulating plug from the front connector.

Step 2 Install the connecting rod.

Thread the M12 end of the connecting rod into the front connector and tighten it with a wrench.

Clean all mounting surfaces at both the front connector and rear connectorsurge arrestor, then apply silicone grease evenly to the mounting locations.

Step 3 Install the double-ended bolt.

Thread the M16 end of the double-ended bolt into the connecting rod and tighten it with a wrench.

Step 4 Install the rear surge arrester.

a. Push the surge arrester onto the back end of the front connector.

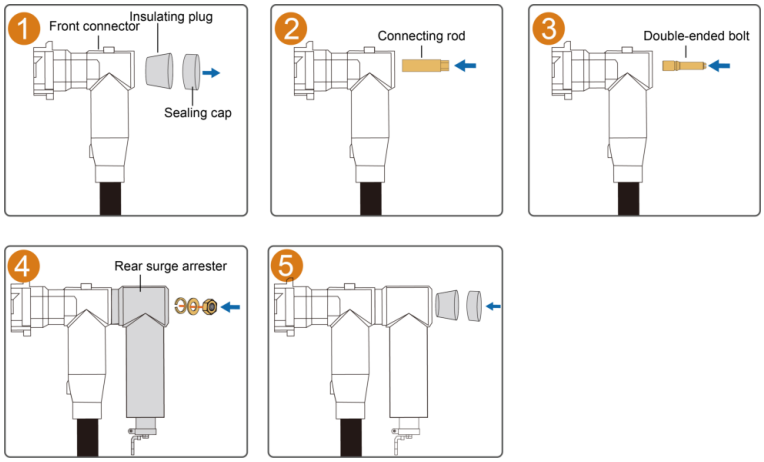
The surge arrester must be pushed in fully.

b. Place the spring washer, flat washer, and nut onto the double-ended bolt in sequence, and tighten them using a socket wrench.

Ensure the surge arrester is fully seated. No gaps should remain after installation.

Step 5 Install the insulating plug and sealing cap.

Apply silicone grease to the insulating plug and press it into the rear of the surge arrester so it mates with the internal bolt. Then cover the plug with the sealing cap.



Step 6 Attach the surge arrester's PE wire and copper braid to the grounding wire of the main cable.

Step 7 Place the surge arrester on the support bracket. Align it with the mounting slots, then secure it using its pre-installed bottom bolts to ensure the bracket provides stable support.

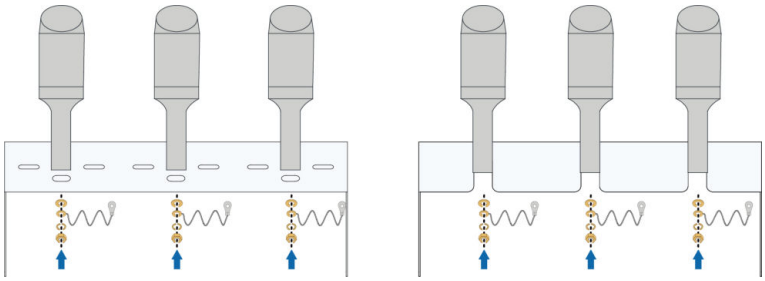


Figure 6-5 Installation of Surge Arrester Support Bracket

Step 8 Connect the surge arrester grounding conductor securely to the grounding copper bar of the RMU.

--End

NOTICE

If the voltage rating exceeds 36kV, a support plate must be installed under the surge arrester.

6.2.3 Installing the Breather

Ensure the breather is properly installed before powering on the MV Grid-Connected PV Inverter. For detailed installation instructions, please refer to the guidelines provided by the breather manufacturer.

Prerequisite

Installation Conditions

Install the breather in a relatively dry outdoor environment.

Installation steps

Step 1 Identify the breather mounting position. Remove the four M12 bolts from the flange cover and take off the cover.

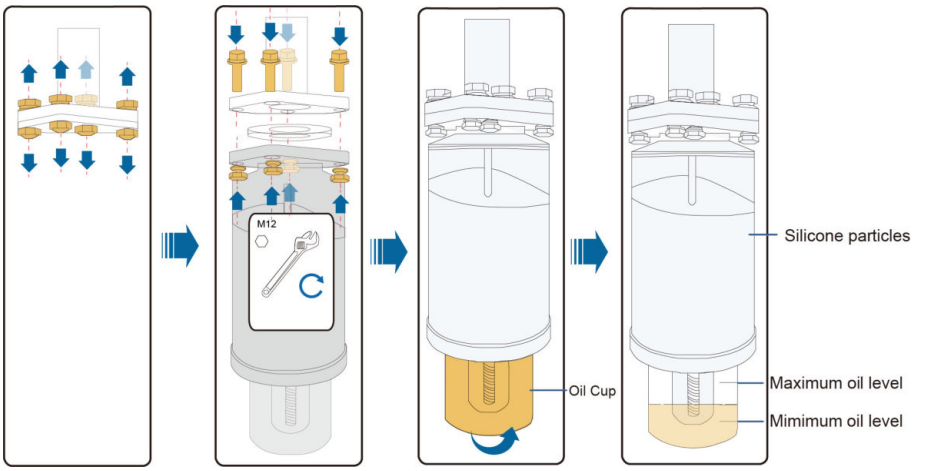
Step 2 Peel off the sealing warning label on the breather. Place the provided rubber gasket onto the flange. Mount the breather onto the flange using the same four M12 bolts in step 1, and tighten securely.

Make sure the gasket is compressed to one-fourth of its original thickness to ensure a proper seal.

Step 3 Remove the oil cup from the bottom of the breather.

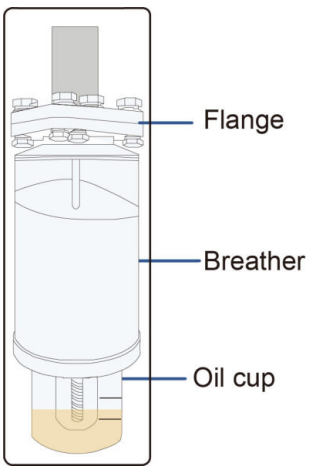
Step 4 Slowly open the oil injection valve and fill the oil cup until the oil level is between the two calibration marks. The upper mark indicates the maximum oil level, and the lower mark indicates the minimum. The oil level must fall within this range.

Step 5 Reinstall the oil cup onto the breather.



--End

Once installed, the breather should appear as shown below:



6.2.4 Adjusting De-energized Tap Changer

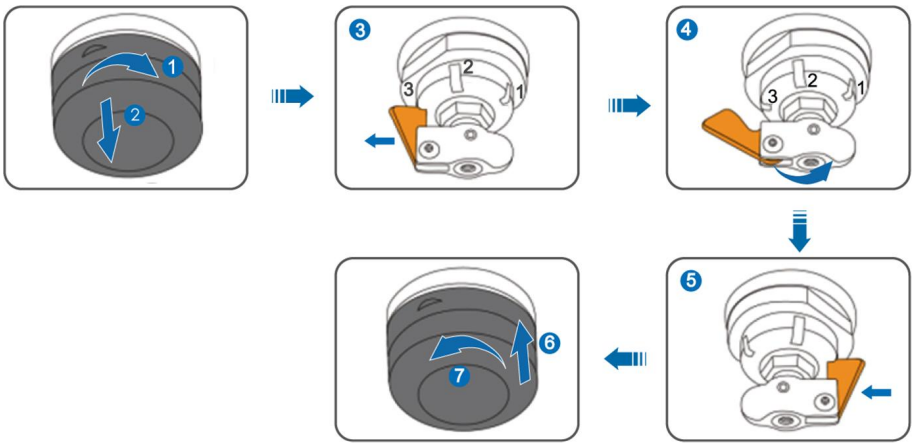
Adjust the output voltage of the transformer. When operating the de-energized tap changer, ensure that the transformer is in a non-excitation state, that is, the high and low voltage sides of the transformer are uncharged.

When the voltage on the LV side remains unchanged, the output voltage on the HV side under different gears is:

Gear	Output Voltage
1	Standard voltage x 1.05
2	Standard voltage x 1.025
3	Standard voltage x 1.0

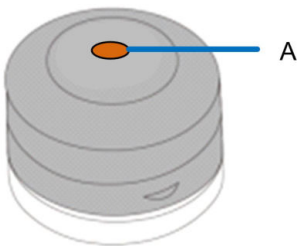
Gear	Output Voltage
4	Standard voltage x 0.975
5	Standard voltage x 0.95

Take adjusting to gear 1 as an example, operate the de-energized tap changer as follows.



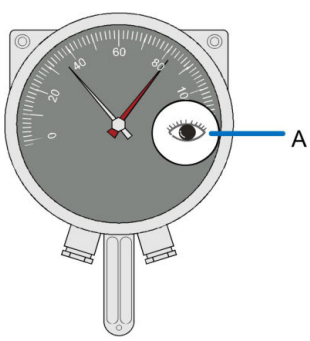
6.2.5 Opening Pressure Relief Valve

Open the cap on the pressure relief valve (marked as A below).



6.2.6 Removing Foam Part from Oil Thermometer

Remove the protective cover on the oil thermometer and remove the foam parts in the protective cover before the MV Grid-Connected PV Inverter is officially put into operation.



After removal, re-install the protective cover.

6.2.7 Draining Oil from Transformer

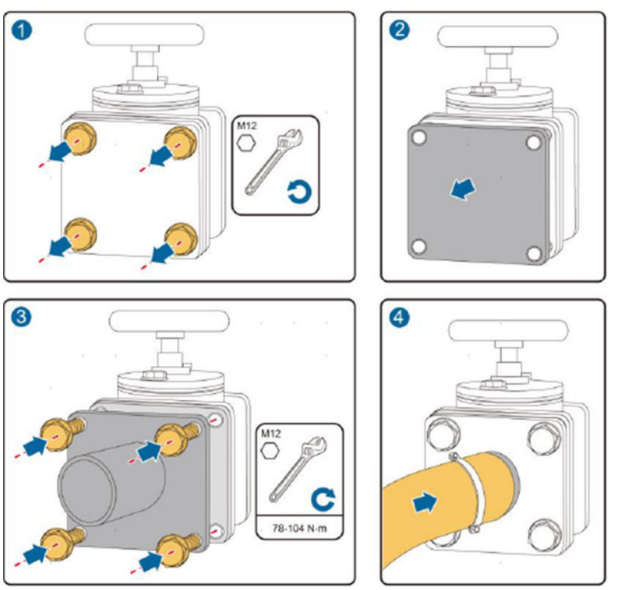
If the transformer is transported with a full oil tank, drain some oil from the transformer after the product is transported to the site.

No.	Device	Source
1	Clean hoses and oil tank	Not included in the scope of supply
2	Cleaning cloth	
3	Wrench	
4	Adjustable wrench	
5	Hose connector	
6	Pipe clamp	

Step 1 Ensure that the drain valve is closed.

Step 2 Remove the cover plate of the drain valve.

Step 3 Remove the cover plate of the drain valve.



Step 4 Open the drain valve and the oil in the transformer slowly flows from the transformer into the tank.

Step 5 Check the position of the oil level gauge according to the temperature-level curve according to the local ambient temperature. Stop draining when the oil in the transformer is reduced to the required level.

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

Step 7 Re-install the cover plate of the drain valve.

--End

6.3 Inspection Before Powering Up

6.3.1 Inverter Unit

- Ensure that the AC and DC switches and all internal micro circuit breakers are disconnected.
- Check and ensure that the emergency stop button is released .
- Check various upstream and downstream electrical switches and buttons, as well as those on the inverter unit, to make sure that they can be operated flexibly and meet the requirements.
- Check whether the film at the air inlet and outlet are removed.
- Check whether the fuse is installed in the AC SPD.

6.3.2 PV Array

The DC side voltage shall not exceed the maximum DC voltage allowed for the MV Grid-Connected PV Inverter. Otherwise, the MV Grid-Connected PV Inverter may be damaged and even cause safety accidents.

To ensure the stable and efficient operation of the whole system, it is recommended that batteries connected to an the MV Grid-Connected PV Inverter should be of the same type and from the same manufacturer, and the number of batteries connected in series should be the same.

6.3.3 Checking Grid Voltage

- Measure accurately the grid 3-phase line-to-line voltages: L1-L2, L1-L3, and L2-L3.The voltages should not exceed the grid permissible voltage and the three phases are in balance.

> Adjust the transfer ratio of the transformer by qualified personnel if the grid voltage deviation is large.

- Measure and record the grid frequency. Measured data should not exceed the grid permissible frequency.
- Measure the THD and check the curve if possible. MV Grid-connected PV Inverter will stop running if the THD is serious.
- Record accurately all the measured data.

6.3.4 Transformer

- Ensure that there are no oil leaks on the transformer surface.
- Check and ensure that the pointer of the oil level gauge is in the normal range.
- Check whether the safety tab of the pressure relief valve has been removed.

- Check and ensure that the temperature measurement circuit is complete.
- Check and ensure that the SPD is firmly and reliably installed.
- Check and ensure that the foam in the oil temperature dial is removed.
- Check and ensure that the oil leakage port of the transformer room is not clogged.
- Check the external air-insulated gap distance, and whether the air-insulated distance between the bushings of different voltage levels and the ground meets the relevant standards.

6.4 Powering Up Steps

Step 1 Close the maintenance switch QS2 of all inverters and close the internal switch QS4 inside the power distribution cabinet.

Step 2 On the V-cabinet of the RMU, turn off the earthing switch, turn on the disconnector, and then turn on the VCB.

⚠ DANGER

For an Ormazabal RMU, On the V-cabinet of the RMU, turn off the earthing switch, turn off the VCB, and turn on the load switch. Then, turn on the VCB again.

Step 3 Click **" Overview "** → **" General Information "** and click **" Shutdown "** in the **" Shortcut Menu "** on the Web page to shut down the MV Grid-connected PV Inverter.

Step 4 Check and ensure that the **" Access Protection Enabling "** switch is off on the Web page.

Step 5 Close the load switch/ Circuit breaker of the upstream PV combiner box.

Step 6 Close the DC load switch QS1 inside all inverters, and close the cabinet doors

Step 7 Rotate the **" START/STOP "** knob to the **" START "** position.

Step 8 Start the MV Grid-connected PV Inverter on the Web page, and the MV Grid-connected PV Inverter begins to enter the grid-connected operation state.

For the position of the above switches, please see 2.4.2 Internal Structure of Inverter Unit and 2.4.4 Main Parts of Power Distribution Cabinet.

--End

6.5 Powering Down Operations

6.5.1 Planned Powering Down

⚠ WARNING

After the equipment stops running, wait at least 20 minutes, and then check and ensure that the voltage is within a safe range. Then, perform maintenance or overhaul by following the instructions on the warning signs on the equipment.

Step 1 Click **“ Overview ”** → **“ General Information ”** and click **“ Shutdown ”** in the **“ Shortcut Menu ”** on the Web page to shut down the MV Grid-connected PV Inverter.

Step 2 Rotate the **“ START/STOP ”** knob to the **“ STOP ”** position.

Step 3 Open the AC cabinet door, check and ensure that the AC circuit breaker QF1 of all inverters is disconnected.

Step 4 Disconnect the maintenance switch QS2 of all inverters, and disconnect the internal switch of the power distribution cabinet QS4.

Step 5 Open the DC cabinet door, disconnect the DC load switch QS1 inside all inverters.

Step 6 On the V-cabinet of the RMU, turn off the VCB, turn off the disconnector, and turn on the earthing switch.

⚠ DANGER

For an Ormazabal RMU, on the V-cabinet of the RMU, turn off the VCB, turn off the load switch, and turn on the VCB again. Then, turn on the earthing switch.

Step 7 Disconnect the load switch/ Circuit breaker of the upstream PV combiner box.

For the position of the above switches, please see 2.4.2 Internal Structure of Inverter Unit and 2.4.4 Main Parts of Power Distribution Cabinet.

--End

6.5.2 Unplanned (Emergency) Powering Down

Step 1 Press the emergency button.

⚠ DANGER

Upon pressing the emergency stop button, only the AC circuit breaker and DC load switch will open. The internal auxiliary power supply and PCB board will still carry voltage. Do not touch them!

Step 2 Rotate the**START/STOP** knob to the**STOP** position.

Step 3 Open the AC cabinet door, check and ensure that the AC circuit breaker QF1 of all inverters is disconnected.

Step 4 Disconnect the maintenance switch QS2 of all inverters, and turn the main switch QS4 inside the power distribution cabinet to OFF.

Step 5 Check and ensure that the DC side load switch QS1 of all inverters is disconnected.

Step 6 On the V-cabinet of the RMU, turn off the VCB, turn off the disconnector, and turn on the earthing switch.

⚠ DANGER

For an Ormazabal RMU, on the V-cabinet of the RMU, turn off the VCB, turn off the load switch, and turn on the VCB again. Then, turn on the earthing switch.

Step 7 Disconnect the load switch/ Circuit breaker of the upstream PV combiner box.

For the position of the above switches, please see 2.4.2 Internal Structure of Inverter Unit and 2.4.4 Main Parts of Power Distribution Cabinet.

⚠ WARNING

- **In case of an emergency, be sure to press the emergency stop button directly to make the equipment stop immediately.**
- **After the emergency stop button is pressed, the AC circuit breaker and the DC load switch will switch off. However, the internal auxiliary power supply and the PCB board will still carry voltage. Do not touch!**
- **The emergency stop button will be locked once it is pressed. It can be unlocked using the dedicated key.**

--End

7 O&M on WEB

It is recommended to perform O&M on the WEB interface after the device is powered on.

7.1 Communications Diagram

The communication wiring inside the PV Inverter is completed before delivery. Connect the laptop to the switch inside the power distribution cabinet using a CAT-5e cable on site to enable Web access on the laptop.

For the location of the Ethernet communication port of the PV inverter, please refer to 5.9 Switch/Ethernet Communication。

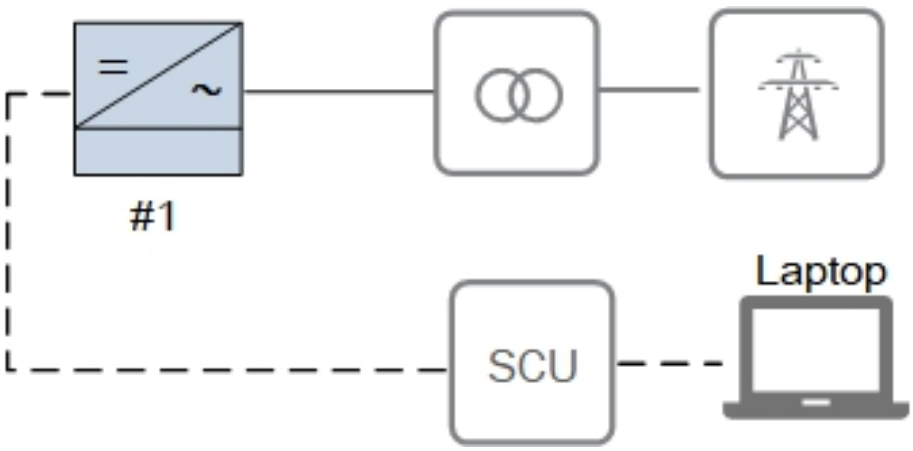


Figure 7-1 Wired Communication Diagram

7.2 Preparation Before Login

7.2.1 Login (Laptop)

Step 1 To connect the laptop to the product, connect the network cable to the network port of the power distribution cabinet switch.

Step 2 Configure the IP address of the laptop. Set the IP address of the laptop to the same network segment as the default IP address.

Default IP address of the NET1 port: 12.12.12.12.
Default IP address of the NET2 port: 14.14.14.14.

--End

7.2.2 Login (Mobile Device)

Prerequisite

Logging in with mobile devices is supported, except in Europe.

Step 1 Enable WiFi on the mobile device (such as a mobile phone), search for the hotspot, such as SG-xxx (xxx represents the device SN), and enter the password. The password is **ESPWifi@123**.

Step 2 Open a browser on the mobile phone and enter the address (11.11.11.1) or domain (sungrow.net) to access the WEB interface.

--End

7.3 Login Method

Step 1 Enter the address in the laptop's address bar to access the login interface.

NET1 port, URL:http://12.12.12.12 or https:// 12.12.12.12.
NET2 port, URL:http://14.14.14.14 or https:// 14.14.14.14.
It is recommended to access securely via HTTPS.

Step 2 Click **Login** on the upper right corner of the interface, and you can choose from **Regular login**,**Certificate login** and **LDAP login** .

- For Regular login, you need to enter the username and password. Please refer to 7.5 Modifying Password.
- For Certificate login, besides entering the username and password, you need to import the certificate.
- For LDAP login, you need to enter username and password.

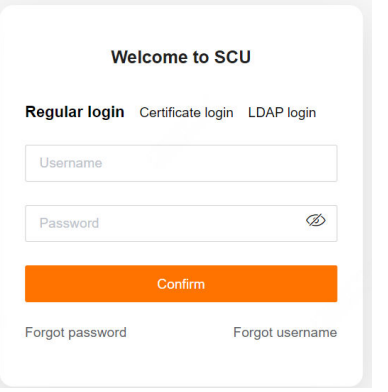
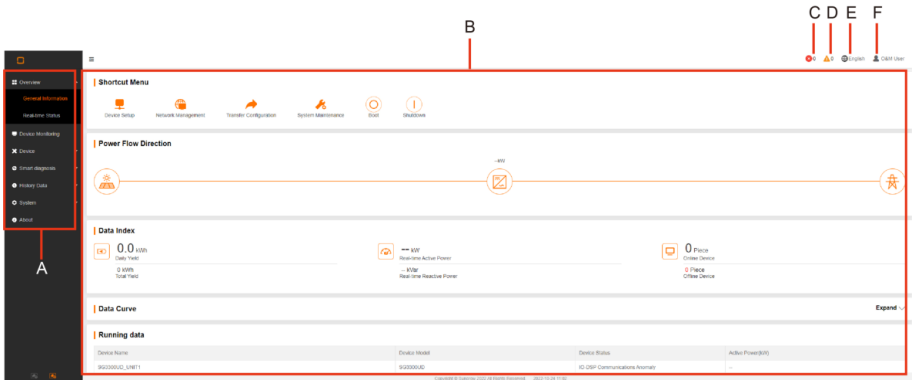


Figure 7-2 Login

--End

7.4 Interface Introduction

7.4.1 Homepage



No.	Description
A	Navigation bar
B	Function display area
C	Fault number
D	Alarm number
E	Language switching options
F	User center

7.4.2 Viewing Fault Information

Step 1 Click **“ Overview ”** → **“ General Information ”** on the left navigation bar to enter the homepage.

Step 2 Click in the upper-right corner of the interface to view information such as the name and time of the fault.

--End

7.4.3 Viewing Alarm Information

Step 1 Click **“ Overview ”** → **“ General Information ”** on the left navigation bar to enter the homepage.

Step 2 Click in the upper-right corner of the interface to view information such as the name and time of the alarm.

--End

7.4.4 Boot/Shutdown

⚠ WARNING

Do not restart the equipment through the WEB system if there is a fault in the DSP or the module. In such cases, perform an inspection after powering off the equipment, ensure there is nothing abnormal, and then power it on again. Otherwise, the equipment may be damaged.

Step 1 Click **" Overview "** → **" General Information "** on the left navigation bar to enter the homepage.

Step 2 Click **Boot** or **Shutdown** in the **Shortcut Menu**. Taking SG4400UD as an example.

- If an inverter unit needs to be started, e.g., Unit 1, check **SG4400UD_Unit1** and click **Save** to turn on the unit. If the MV Grid-connected PV Inverter needs to be started, check the MV Grid-connected PV Inverter, e.g., **SG4400UD** and click **Save** to turn on the MV Grid-connected PV Inverter.
- If an inverter unit needs to be shut down, e.g., Unit 1, check **SG4400UD_Unit1** and click **Save** to shut down the unit. If the MV Grid-connected PV Inverter needs to be shut down, check the MV Grid-connected PV Inverter, e.g., **SG4400UD** and click **Save** to shut down the MV Grid-connected PV Inverter.

--End

7.4.5 Setting Initial Parameters

Step 1 Click **" Device Monitoring "** in the left navigation bar.

Step 2 Pull down **" Country /Region "** to set according to the product location, and pull down **" Machine Choose "** to set according to the actual product model.Click **" Settings "** to complete the initial parameter setting.

The above parameters have been configured before the product leaves the factory.

--End

7.4.6 Setting Operation Parameters

Step 1 Click **" Device Monitoring "** in the left navigation bar.

Step 2 Select a device in the left device list in the function display area. Click **" Operation Parameters "** on the right. enter a value in **" Current Value "** , and then click **" Settings "**

Click **" Configure Synchronization "** to synchronize the settings to other devices of the same type.

--End

7.4.7 Setting Protection Parameters

Step 1 Click **" Monitoring "** in the left navigation bar.

Step 2 Select a device in the left device list in the function display area. Click **“ Protection Parameters ”** on the right. enter a value in **“ Current Value ”** , and then click **“ Settings ”**

Click **“ Configure Synchronization ”** to synchronize the settings to other devices of the same type

--End

7.5 Modifying Password

Laptop

Click in the upper-right corner of the interface, select **Modify Password**, enter the original password and new password, and click **Save**.

- Please change the initial password upon first login.
- By default, passwords must be at least 8 characters long and include upper- and lowercase letters plus numbers. Administrators can adjust the required length and complexity.
- By default, the last three passwords cannot be reused. Administrators can set the allowed reuse count to 1-5.
- Please contact the Administrator if you forgot your password.

Mobile Device

Through the laptop interface, select **System** → **WLAN** → **Password**, delete the original password, and enter the new password, click **Save** to complete the password modification.

Table 7-1 Default User Type

User type	Username	Password
Administrator	administrator	pw@111111
General user	user	pw8888
O&M user	maintain	pw1111
Developer Account	develop	Obtain the SN through customer authorization and generate a dynamic password.
Audit user	auditor	pw5555

7.6 Logout

To protect the account security, it is recommended to log out in time after the operation is completed.

Exit Method

Click and select **Logout** in the upper right corner of any interface.

8 Troubleshooting

If the MV Grid-connected PV Inverter fails to output as expected or the power yield changes abnormally, check the following items before consulting SUNGROW:

- The open-circuit voltage of PV arrays.
- Whether the emergency stop button is pressed.
- Whether the MV Grid-connected PV Inverter limits the output of active power.

If the problem still persists or there are any other questions, please contact SUNGROW. It would be helpful if the following information is provided during a call:

- Model and S/N of the MV Grid-connected PV Inverter and internal equipment.
- Manufacturer and model of the upstream PV combiner boxes and PV modules that connected to the MV Grid-connected PV Inverter.
- Communication and connection scheme of the MV Grid-connected PV Inverter.
- Fault information and a brief description of the fault.
- Pictures of the fault occurrence site (if on-site conditions permit).

8.1 MV Grid-connected PV Inverter Troubleshooting

8.1.1 Viewing Fault/Alarm Information

View the fault and alarm information referring to 7.4.2 Viewing Fault Information and 7.4.3 Viewing Alarm Information.

8.1.2 Check Method

There are three levels of anomalies:

- Important fault: the MV Grid-Connected PV Inverter fails, shuts down, and stops grid-connected power generation.
- Secondary fault: Some parts of the MV Grid-Connected PV Inverter fail, but the MV Grid-Connected PV Inverter can still generate power in a grid-connected state.
- Prompt for fault: the MV Grid-Connected PV Inverter works normally, but its output power decreases due to external factors.

Fault Name	Fault Cause	Fault Level	Corrective Method
Module fault	The drive board generates a fault signal or a hardware over-current occurs.	Important	1. Check whether a short circuit occurs on the AC or DC sides of the MV Grid-Connected PV Inverter. 2. Check the grid for any exceptions.

Fault Name	Fault Cause	Fault Level	Corrective Method
			3. Check whether the appearance of the IGBT module is normal. **NOTICE** **MV Grid-connected PV Inverter has a protection logic that in case of failure of 5 attemps to perform self-tests, it enters in a non-selfrecovery state (it is recommended to wait for 15 minutes for this purpose; meanwhile the power is not cut off on control boards). In this case, do not attempt to power it off and try to restore the MV Grid-Connected PV Inverter, instead, contact SUNGROW personnel for the support.**
Contactor fault	The contactor is faulty.	Important	Disconnect the AC and DC side switches of the MV Grid-Connected PV Inverter, and check whether the appearance of the AC contactor is obviously abnormal after the MV Grid-Connected PV Inverter is completely discharged.
AC current imbalance fault	AC current is unbalanced.	Important	Check the grid for anomalies. Check if there is a phase loss.
Reactor over-temperature	The temperature of the reactor is excessively high.	Important	1. Use a thermometer to check whether the current ambient temperature is within the temperature range advertised by the MV Grid-Connected PV Inverter. 2. Check whether the air inlet of the MV Grid-Connected PV Inverter and inverter unit is normal. Make sure that the air inlet is not blocked, and replace the filter screen if necessary.

Fault Name	Fault Cause	Fault Level	Corrective Method
			3. In the shutdown state, check whether the internal cooling fan of the MV Grid-Connected PV Inverter is stopped by foreign objects.
Control cabinet temperature fault	The temperature inside the control cabinet is excessively high	Important	1. Check whether the grid voltage is normal. 2. Check whether the control fan is normal. 3. Check the AC filter system. Check whether there are abnormalities on the surface of the AC filter capacitor, such as cracking. If necessary, check whether the three-phase current of the capacitor is balanced.
DC under-voltage	DC input voltage is excessively low.	Important	1. In the shutdown state, check whether the DC voltage displayed on the MV Grid-Connected PV Inverter is consistent with the measured value. 2. If not, check whether the DC side cables are shorted or wrongly connected.
DC (Bus) under-voltage	DC bus voltage is excessively low.	Important	Please refer to the troubleshooting method of “DC under-voltage”.
Neutral point shift	Voltage exists between the positive and negative poles of the DC side of the MV Grid-Connected PV Inverter and the neutral point potential.	Important	1. Check whether the DC side voltage of the MV Grid-Connected PV Inverter is short-circuited, whether the input voltage exceeds the allowable range, and whether the grid voltage is abnormal. 2. Check whether DC over-voltage, DC under-voltage, module fault, AC over-current, and other faults exist at the same time in the historical fault interface. If

Fault Name	Fault Cause	Fault Level	Corrective Method
			so, refer to the troubleshooting methods of related faults.
Abnormal temperature	If the temperature at MV Grid-connected PV Inverter inlet exceeds the protection threshold, this fault is triggered.	Important	1. Check whether the ambient temperature is normal; Use a thermometer to check whether the current ambient temperature is within the temperature range advertised by the MV Grid-Connected PV Inverter. 2. Check whether the air inlet of MV Grid-connected PV Inverter and inverter unit is normal; Make sure that the air inlet is not blocked, and replace the filter screen if necessary. 3. In the shutdown state, check whether the cooling fan inside MV Grid-connected PV Inverter/ inverter unit is stopped by foreign objects.
DC cabinet over-temperature	The temperature inside the DC cabinet is excessively high	Important	Refer to the troubleshooting method of “Abnormal Temperature”.
Grid over-voltage	The grid voltage is higher than the set protection value.	Important	1 Check whether the protection parameters in **Parameter Settings** -> **Protection Parameters** meet the grid standards of the location where the MV Grid-Connected PV Inverter is installed. 2 Disconnect the AC breaker switch and measure whether the actual grid voltage is within the normal range. 3 In the shutdown state, check whether the grid voltage displayed on MV Grid-connected PV Inverter

Fault Name	Fault Cause	Fault Level	Corrective Method
			is consistent with the measured value.
Grid under-voltage	The grid voltage is lower than the set protection value.	Important	Refer to the troubleshooting method of "Grid over-voltage".
Frequency fault	The grid frequency is abnormal.	Important	1 Check whether the protection parameters on the interface meet the grid standards of the location where the MV Grid-Connected PV Inverter is installed. 2 In the shutdown state, check whether the grid frequency displayed on the MV Grid-Connected PV Inverter is consistent with the actual value.
Islanding protection	The grid fails or the AC instantaneous voltage exceeds the protection threshold.	Important	1. Check the grid for any exceptions. 2. Check whether a short circuit occurs on the AC side of the MV Grid-Connected PV Inverter. 3. Check whether the AC circuit breaker of the MV Grid-Connected PV Inverters is disconnected.
Control power exception	The control power is abnormal.	Important	1 Check whether the internal and external power supply control switches of the MV Grid-Connected PV Inverter are closed or disconnected at the same time. If they are closed at the same time, please disconnect one of the switches. If they are disconnected at the same time, please close one of the switches. 2 Check whether the internal and external power supply terminals are loose or poorly contacted. Tighten them if necessary.

Fault Name	Fault Cause	Fault Level	Corrective Method
DC voltage sampling fault	The DC voltage sampling is abnormal.	Important	In the shutdown state, check whether the DC voltage displayed on the MV Grid-Connected PV Inverter is consistent with the measured value.
Soft start fault	the MV Grid-Connected PV Inverter fails to start.	Important	Check whether the grid is abnormal, such as harmonics and voltage balance.
DC SPD fault	The DC side SPD of MV Grid-connected PV Inverter fails.	Important	Check the status indicator of the SPD. 1. If the indicator changes from green to red, the SPD is damaged. It may be caused by local thunderstorms. Measure the AC and DC voltage and current. If voltages between the positive and negative poles to the ground are normal, replace the SPD. 2. If the indicator is normal, the SPD may be in poor contact with its holder. Replug the SPD and tighten it.
AC SPD fault	The AC side SPD of MV Grid-connected PV Inverter fails.	Important	1. Refer to the troubleshooting method of "DC SPD fault" to conduct preliminary troubleshooting. 2. Check whether the micro circuit breaker is connected in series with the SPD trips. 3. If not, measure the AC and DC voltage and current. Ensure that there is no exception, and close the micro circuit breaker again.
DC over-voltage	The DC side voltage of MV Grid-connected PV Inverter exceeds the	Important	Disconnect the DC switch of MV Grid-connected PV Inverter and check whether the open-circuit voltage of the PV arrays is normal;

Fault Name	Fault Cause	Fault Level	Corrective Method
	protection threshold.		If not, the PV array configuration may be faulty. 2. Check and ensure that the AC side transformer is connected in a “Y” shape, and that the neutral point is not grounded. 3. In the shutdown state, check whether the DC voltage displayed on the MV Grid-Connected PV Inverter is consistent with the measured value.
PV polarity reversal	The polarity of the positive and negative poles of the PV strings is reversed.	Important	Check whether the DC side cables of the MV Grid-Connected PV Inverter are connected reversely.
Hardware fault	the MV Grid-Connected PV Inverter internal hardware fault	Important	Measure the DC voltage of MV Grid-connected PV Inverter and check whether a short circuit occurs in the MV Grid-Connected PV Inverter.
AC over-current	AC side current of MV Grid-connected PV Inverter is excessively high.	Important	1. Check whether cables on the AC and DC sides of the MV Grid-Connected PV Inverter are loose. 2. Check whether the insulation layer of cables is damaged. 3. Check whether terminals are short-circuited and grounded.
Overload protection	The output of MV Grid-connected PV Inverter exceeds the load limit.	Important	Refer to the troubleshooting method of "AC over-current”.
AC leakage current protection	The leakage current sampling value on the AC side of the MV Grid-Connected PV Inverter	Important	1. Check whether the AC cable is damaged. 2. If the LV side of the transformer is connected in a “Y” shape, ensure that the neutral point is not connected.

Fault Name	Fault Cause	Fault Level	Corrective Method
	exceeds the protection threshold.		
Module over-temperature	The temperature of modules inside inverter unit is excessively high.	Important	1. Check the air inlet. 2. Check whether the air outlet of inverter unit is blocked. Replace the air filter screen if necessary. 3. Check whether the cooling fan is running during the operation of the MV Grid-Connected PV Inverter.
Fan/ Fan 2 exception	Fan/fan 2 inside MV Grid-connected PV Inverter fails.	Important	1. Check whether the grid voltage is normal. Use a multimeter to measure the grid voltage and check for phase loss. 2. Check whether the power supply of the cooling fan is normal. Use a multimeter to measure the three-phase power supply to ensure that the rated input voltage is 400 Vac.
Grounding fault	A grounding fault occurs.	Important	1 Check the DC cables. Check whether the positive grounding cable of each DC branch is damaged. Check whether the DC cable resistance to the ground is normal. 2 Check AC cables. Measure the three-phase voltage to ground and observe whether the voltage value is the same. Check MV Grid-connected PV Inverter and the box-type substation side SPD for damage.
AC switch fault	AC switch fails.	Important	1. Check whether the AC switch trips. 2. Check whether the appearance of the switch is normal.

Fault Name	Fault Cause	Fault Level	Corrective Method
			3. Check whether the AC switch can be normally closed/ disconnected. 4. Use a multimeter to measure whether the AC switch normally controls the on/off of the circuit.
Heat sink over-temperature	The temperature of the heat sink inside the MV Grid-Connected PV Inverter is excessively high.	Important	Check whether the cooling fan is normal. If so, check the air duct for blockage.
GFDI-pro	The DC grounding protection fails.	Important	1. The negative terminal of MV Grid-connected PV Inverter is not reliably grounded. 2. Check whether the negative grounding fuse is blown.
AC fuse fault	The fuse on the AC side of MV Grid-connected PV Inverter fails.	Important	Check whether the AC fuse is normal.
Grid voltage imbalance	Grid voltage is unbalanced.	Important	Measure the grid voltage and check for any imbalance.
Current Imbalance 2/Current Imbalance 3	The alternating current is unbalanced.	Important	Measure the grid voltage and check for phase loss.
AC cabinet over-temperature	The temperature of the AC cabinet exceeds the protection threshold.	Important	1. Check whether the fans inside the AC cabinet work normally. 2. Check whether the air inlet of the AC cabinet is blocked. 3. Check whether there is dust in the air inlet of the AC cabinet. Clean it if necessary.

Fault Name	Fault Cause	Fault Level	Corrective Method
DC fuse anomaly	The fuse on the DC side of inverter unit fails.	Secondary	Check whether the DC fuse is blown. If so, please contact SUNGROW to replace the fuse.
Anti-PID power abnormality	The anti-PID power is abnormal.	Secondary	1. Check the insulation of AC cables. 2. Check the AC SPD. 3. Check and make sure that the neutral point on the LV side of the box-type substation is not grounded.
External power supply abnormal	The external power supply is abnormal.	Secondary	Use a multimeter to measure and check whether the voltage of the external power supply is abnormal.
CT imbalance	The three-phase grid current is out of balance.	Secondary	Check whether the three-phase AC current is balanced on the interface.
Grounding fuse anomaly	The grounding fuse is abnormal.	Secondary	Remove the negative grounding fuse after the MV Grid-Connected PV Inverter is fully discharged. Check whether this fuse is blown. If so, check whether the neutral point of the transformer is not connected and whether the neutral point of PT/CT on the LV side of the box-type substation is grounded.
Meter communication abnormal alarm	The meter communication is abnormal.	Secondary	1. Check whether the communication cable of the meter is damaged. 2. Check the communication terminal of the meter is loose.
Branch fuse abnormal	The fuse on the DC side of MV Grid-connected PV Inverter fails.	Secondary	Check whether the branch fuse is blown. If so, please contact SUNGROW to replace the fuse.

Fault Name	Fault Cause	Fault Level	Corrective Method
Low insulation resistance	The insulation resistance is low.	Secondary	Please refer to the troubleshooting method of “Insulation resistance”.
DC switch anomaly	The DC switch of MV Grid-connected PV Inverter is abnormal.	Secondary	Check whether the branch air switches are all closed, and check whether the state of them is **Closed** on the interface.
Frequency deviation active power regulation	The active power of MV Grid-connected PV Inverter is regulated according to the change of the grid frequency.	Prompt	Check whether the power reduction at over-frequency is enabled on the interface. If so, it indicates that over-frequency occurs during operation.
Voltage deviation reactive power regulation	The reactive power of MV Grid-connected PV Inverter is regulated according to the change of the grid voltage.	Prompt	Check whether the reactive power regulation is set to **QU Mode** on the interface.
GFRT operation	the MV Grid-Connected PV Inverter runs through high voltage and low voltage.	Prompt	Check whether the grid voltage exceeds the set threshold of HVRT or LVRT.

If the fault/alarm cannot be cleared following the above corrective methods and still persists, please contact SUNGROW directly.

Fault Name	Fault Cause	Fault Level	Corrective Method
AC switch off	The AC switch is disconnected.	Important	Please contact SUNGROW.

Fault Name	Fault Cause	Fault Level	Corrective Method
Carrier sync flt	The carrier signal transmission is abnormal.	Important	Please contact SUNGROW.
Drive board fault	The drive board inside the MV Grid-Connected PV Inverter fails.	Important	Please contact SUNGROW.
Parallel machine communication failure	The communication inside the MV Grid-Connected PV Inverter is abnormal.	Important	Please contact SUNGROW.
Machine code repetition fault	The addresses of inverter units inside the MV Grid-Connected PV Inverter are the same.	Important	Please contact SUNGROW.
Temperature and humidity board communication abnormal	The communication of the temperature and humidity board is abnormal.	Secondary	Please contact SUNGROW.
Branch reverse over-current	The branch reverse current is excessively large.	Secondary	Please contact SUNGROW.
DSP communication exception	The communication between the MV Grid-Connected PV Inverter internal control board and smart unit board is abnormal.	Secondary	Please contact SUNGROW.

8.2 Other Faults

Fault Detail	Possible Cause	Corrective Method
MV Grid-connected PV Inverter shuts down shortly after startup	The DC input voltage is just enough to start MV Grid-connected PV Inverter. If MV Grid-connected PV Inverter	Design and connect the PV module series based on the recommended open-circuit voltage, increase the DC voltage

Fault Detail	Possible Cause	Corrective Method
	is connected to loads, and the voltage cannot meet the requirements, causing MV Grid-connected PV Inverter to shut down.	input, and avoid applying the critical voltage value.
Upper computer communication failure	There are many possible reasons, please check one by one according to the description of "Corrective Method".	Check whether the local address, baud rate, and other parameters on the interface are consistent with those on the host computer. Check whether all wiring is good. If RS485 communication is adopted, check whether the A and B terminals are connected reversely. Replace the communication adapter and try again if the communication adapter does not match. If the fault is not caused by the foregoing reasons and still persists, please contact SUNGROW as soon as possible.
WiFi connection unresponsive/failed (Invaid for Europe)	Equipment is not compatible.	1. Refresh the Web page manually. 2. Restart or replace the mobile device and try connecting again. 3. Power off and restart MV Grid-connected PV Inverter to connect again.
Failed is displayed on the operation or protection parameter setting interfaces	There are many possible reasons, please check one by one according to the description of "Corrective Method".	1. Check whether an inverter unit cannot work normally. 2. Check whether inverter unit that works normally can normally accept instructions. 3. Please refer to the troubleshooting method of “DSP communication fault”. If the fault is not caused by the foregoing reasons and

Fault Detail	Possible Cause	Corrective Method
		still persists, please contact SUNGROW as soon as possible.
Fail to export measuring point logs in batches	The amount of data exported at a single time is too large.	1. Export data in batches multiple times. 2. The time interval for exporting data shall not exceed 7 days.

9 Routine Maintenance

9.1 Safety Instructions

⚠ DANGER

Risk of the MV Grid-Connected PV Inverter damage or personal injury due to incorrect service!

- **Disconnect the switches between the product and all power supplies before maintenance.**
- **After the MV Grid-Connected PV Inverter is powered off for 20 minutes, measure the voltage and current with measuring equipment. Only when there is no voltage nor current can operators who wear protective equipment operate and maintain the MV Grid-Connected PV Inverter.**

⚠ DANGER

The devices inside the MV Grid-connected PV Inverter carry high voltage. Touching these devices may lead to fatal electric shock.
Therefore,

- **Live line measurement can only be performed by professional personnel who know the PV system well. Before measurement, be sure to take proper protection methods (e.g., wear insulating gloves, etc.).**
- **During live line measurement, the operator must be accompanied by others to ensure personal safety.**

⚠ DANGER

Electric shock or fire may occur due to device damage or system fault.

- **Visually inspect for device damages or other hazards before the operation**
- **Check whether other external devices or circuit connections are in a safe state.**
- **Make sure the device is in a safe state before operating.**

⚠ WARNING

If some devices need to be replaced during operation and maintenance, please contact SUNGROW.
Do not open the door to maintain the product on rainy, humid, or windy days.
SUNGROW shall not be held liable for any damage caused by a violation of the notice.
For products with long downtime, a comprehensive and detailed inspection of the products must be carried out before powering up the product. First, the product and internal equipment as well as the film at the air inlet and outlet need to be checked for intactness. Then the product should be checked and tested by professionals before commissioning.

⚠ WARNING

Do not open the door to maintain the product on rainy, humid, or windy days. SUNGROW shall not be held liable for any damage caused by a violation of the notice.

⚠ WARNING

Wait for at least 20 minutes after shutdown and then open the cabinet door. Make sure that the inside of the product is completely uncharged before maintaining the product.

NOTICE

Do not leave screws, washers, or other metal parts in the MV Grid-Connected PV Inverter after the maintenance work. Otherwise, damage may be caused to the product!

NOTICE

To avoid the risk of electric shock, do not perform any other maintenance operations beyond those described in this manual. If necessary, contact SUNGROW for maintenance. Otherwise, the losses caused are not covered by the warranty.

⚠ CAUTION

To prevent misuse or accidents caused by unrelated personnel, post prominent warning signs or demarcate safety warning areas around the device to prevent accidents caused by misuse.

9.2 Inspection After Power Off

While the product is operating, do not turn off any AC- or DC-side switches directly. Otherwise, an electrical arc may occur, which may then damage the switch or even the MV Grid-connected PV Inverter.

During the installation and operation of the product, ensure the positive or negative of the PV string is not short-circuited to ground. Otherwise, an AC or DC short-circuit may occur, hence damaging the product. The damage caused therefrom will not be covered by warranty.

Even after the product has stopped running, it may still be hot and cause burns. Wait for it to cool down, then, perform operations on it wearing safety gloves.

Some components of the product (mainly the inverter units) may contain heat-generating parts that remain hot even after the components have stopped operating. Be sure to wear burn-proof gloves or other protective equipment when working on such parts.

- After the equipment is powered off, wait at least 20 minutes before opening its cabinet door.
- Put up highly visible warning signs near the switches that have been switched off, to prevent accidental switching-on.
- Check the insulation.
  1. Disconnect all external connections to the MV Grid-connected PV Inverter and the connections to the internal power supplies.
  2. Make sure the points of disconnection will not be reconnected to power accidentally.
  3. Test using a multimeter and make sure the equipment is completely voltage-free inside.
  4. Make necessary grounding and short-circuiting connections.
  5. For the potentially live parts near the area where the operation is performed, cover them with insulated cloth for insulation shielding.
- Do not leave any screw, washer, or other metal part in the MV Grid-connected PV Inverter during maintenance. Otherwise, the MV Grid-connected PV Inverter may be damaged.
- In most cases, the protective covers inside the equipment need to be removed before the maintenance work. After completing the maintenance work, mount back all protective covers in their original positions, and make sure the screws are all tightened properly.

9.3 Maintenance Period

9.3.1 Maintenance (Every Three Years)

Item	Check method
Monitoring and protective equipment of the transformer	• Oil thermometer: Alarm temperature and tripping temperature. • Pressure relief valve: Check whether the pressure relief valve is in good contact. • Oil level: Check whether the oil level is at a normal range. • Pressure gauge: Check if the pressure gauge is normal.
Transformer oil leakage	Check these components for oil leakage: • De-energized tap-changer • Pressure gauge

Item	Check method
	• Oil level gauge • Oil temperature gauge • Sleeve • Pressure relief valve and sample oil • Sealing part

9.3.2 Maintenance (Every Two Years)

Item	Check method
System status and cleaning	Check the following items, and correct immediately those failing to meet the relevant requirements: • Check whether there is any damage or deformation of the MV Grid-Connected PV Inverter and internal equipment. • Check if there is abnormal noise during the operation of internal equipment. • Check whether the temperature inside the MV Grid-Connected PV Inverter is excessively high. • Check whether the humidity and the amount of dust inside MV Grid-connected PV Inverter are within the normal range. Clean it if necessary.
Warning marks	Check whether the warning labels and marks are clearly visible and free of stains and damage. Replace them if necessary.
Ground of the shielded layer of cables	Check whether the cable shielding layer is in good contact with the insulation sleeve and whether the copper bus bar is firmly fixed.
Wiring between the terminal box and switch *	Check whether the terminal box and the switch are connected correctly.
SPD and fuse	Check whether the SPD and fuse are properly fastened.
Corrosion	Check whether there is oxidation or rust inside MV Grid-connected PV Inverter.

Note: * means optional.

9.3.3 Maintenance (Every Year)

Item	Check method
Exterior of the MV Grid-Connected PV Inverter	Check the following items, and correct immediately those failing to meet relevant requirements: • Check whether there are flammable objects on the top of the MV Grid-Connected PV Inverter. • Check whether the welding points between the MV Grid-Connected PV Inverter and foundation steel plate are firm and if there is corrosion. • Check whether the enclosure of the MV Grid-Connected PV Inverter is damaged, painted, or oxidized. • Check whether the monitoring window and cabinet door can be opened flexibly. • Check whether the sealing strip is fixed properly.
Interior of the MV Grid-Connected PV Inverter	Check whether there are foreign objects, dust, dirt, and condensed water inside the MV Grid-Connected PV Inverter.
Wiring and cable layout	Start to inspect after completely powering down the internal devices of the MV Grid-Connected PV Inverter. For any non-conformances found during the inspection, correct them immediately. • Check whether the cable layout is normal and whether there is a short circuit. For any non-conformances found during the inspection, correct them immediately. • Check whether all inlet and outlet holes of MV Grid-connected PV Inverter are well sealed. • Check whether water leaks into the MV Grid-Connected PV Inverter. • Check whether the power cables are loose, and fasten them again by the torque specified previously. • Check whether the power cables and control cables are damaged, especially the part in contact with the metal enclosure. • Check whether the insulation tapes on the power cable terminals fell off.
Ground connection and equipotential connection	• Check whether the ground connection is correct and the grounding resistance meet the requirements of local standards and regulations. • Check whether the internal equipotential connection is correct.
Fan	• Check the running status of fans.

Item	Check method
	• Check whether the fan blade rotates smoothly. • Check whether there is abnormal noise during the operation of the fans.
Screw	Check whether internal screws fell off.
Exterior of the MV Grid-Connected PV Inverter	Check the following items, and correct immediately those failing to meet relevant requirements: • Check whether there are flammable objects on the top of the MV Grid-Connected PV Inverter. • Check whether the welding points between the MV Grid-Connected PV Inverter and foundation steel plate are firm and if there is corrosion. • Check whether the enclosure of the MV Grid-Connected PV Inverter is damaged, painted, or oxidized. • Check whether the monitoring window and cabinet door can be opened flexibly. • Check whether the sealing strip is fixed properly.
Interior of the transformer	Sample the internal oil at the oil leakage port to analyze the operation status of the transformer.

9.3.4 Maintenance (Every Six Months to One Year)

Item	Check method
Safety function	• Check whether the shutdown key on the touchscreen and the e-stop button work normally. • Simulate shutdown. • Check the warning marks and other device marks, and replace them timely if they are fuzzy or damaged.
Software maintenance	Check the settable parameters on the touchscreen.
Internal components inspection	• Check whether the PCB board and other components are clean. • Check the temperature of the heat sink and the amount of dust accumulated. Clean heat-dissipation IGBT modules with a vacuum cleaner if necessary. • Replace the air filter screen if necessary. Note! Be sure to check the ventilation of the air inlet. Otherwise, the fault may be caused due to overheating if the IGBT module cannot be cooled effectively.

Item	Check method
Air inlet and outlet	Check the temperature of the heat sink and the amount of dust accumulated. Clean heat-dissipation IGBT modules with a vacuum cleaner if necessary.
Device maintenance	• Carry out regular inspection for corrosion of all metal components. • Check the contactor to ensure a normal mechanical operation. • Check the operation parameters (especially voltage and insulation).

The recommended routine maintenance periods in the table are only for reference. The actual maintenance period shall be determined reasonably in consideration of the specific installation environment of the product.
PV power plant scale, location, site environment, and other factors also affect the maintenance period of the product. It is necessary to shorten the maintenance period and increase the maintenance frequency in the event of a heavy sandstorm or dust in the operating environment.

9.4 Common Maintenance Items

It is recommended to clean the inlet and outlet of MV Grid-Connected PV Inverter every six months. If the MV Grid-Connected PV Inverter works in harsh environments, such as desert areas, the maintenance cycle should be shortened.

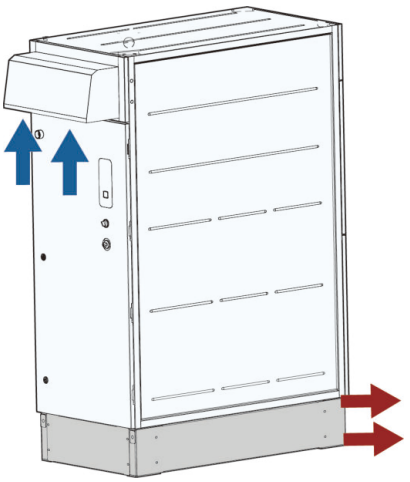
⚠ DANGER

Maintenance work on any part of MV Grid-connected PV Inverter must only be performed when the whole system is voltage-free. Failure to do so may result in electrical shocks!

9.4.1 Cleaning Air Inlet of Inverter Unit

Overview

The following figure shows the heat dissipation mode of the inverter unit. The air inlet is located at the higher parts of the DC cabinet while the air outlet is located at the lower parts of the AC cabinet.

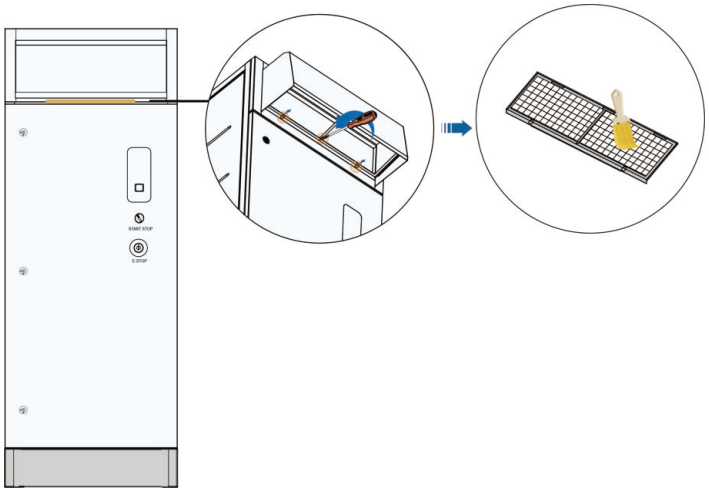


Procedure

Step 1 Use a screwdriver to remove the M5 fixing screws for the first maintenance.

Step 2 Pull the spring plunger at both ends of the filter at the air inlet outward and tilt the filter downward to remove it.

Step 3 Clean and install the filter.



The M5 fixing screw does not need to be reinstalled.

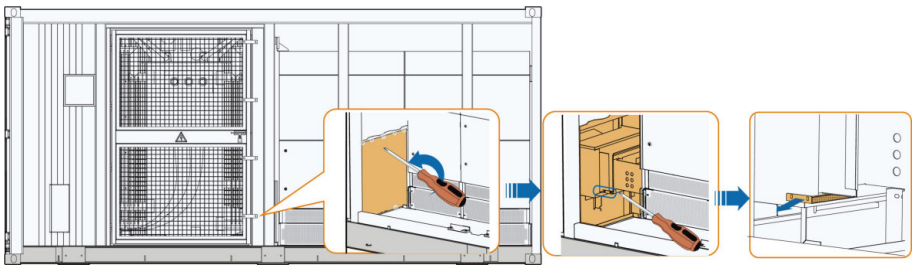
--End

9.4.2 Cleaning Air Outlet of Inverter

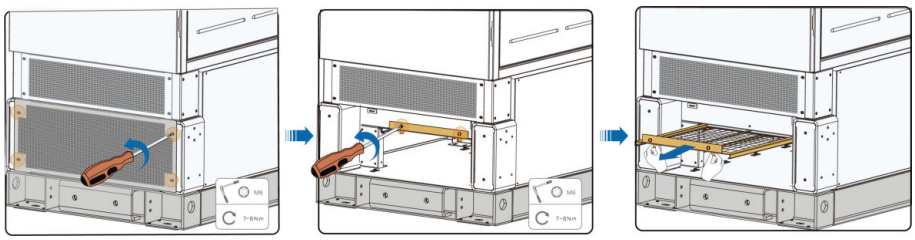
Overview

There are multiple air outlets in this product, which are located between the inverter and the transformer and at the bottom of the AC side of each inverter, as shown in the following figures.

Step 1 Clean the air outlet between the inverter unit and transformer.



Step 2 Clean the air outlets at the bottom of the AC side of the inverter units.



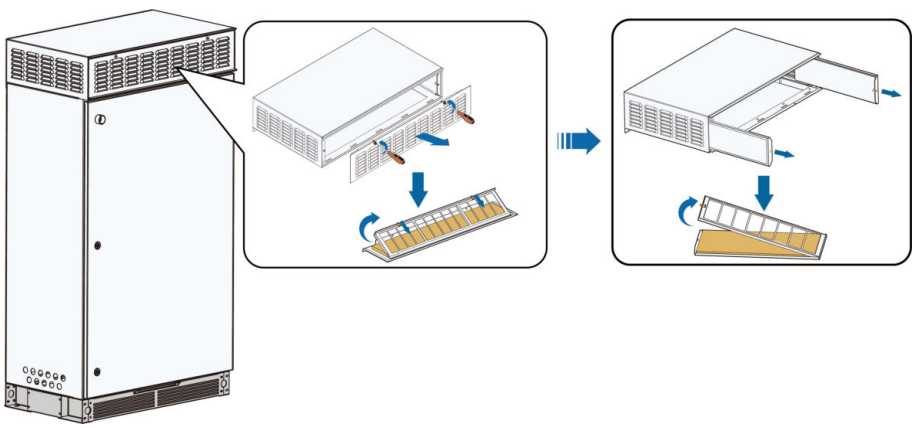
--End

9.4.3 Cleaning Air Inlet of Power Distribution Cabinet

Step 1 Unscrew the two M5 bolts on the mesh cover for the front air inlet, then take the mesh cover down.

Step 2 Pull outward the two spring plungers on the mesh cover for the front air inlet, and open the cotton filter press plate. Then, take out the cotton filter and clean it.

Step 3 Pull out the mesh covers for the air inlets on the two sides. Then, pull outward the spring plungers on the mesh covers, and open the cotton filter press plates. Next, take out the cotton filters and clean them.



Step 4 Put back the cotton filters and mount back the mesh covers following the above steps in reverse order.

--End

If there is visible damage on the cotton filter, it needs to be replaced with a new one.

9.4.4 Cleaning Air Outlet of Power Distribution Cabinet

Step 1 Pull downward the spring plunger on the air outlet at the bottom of the power distribution cabinet.

Step 2 Pull out the filter at the air outlet and clean it.

Step 3 Reinstall the filter in reverse steps.



* The figure is for reference only. And the actual product received shall prevail.

--End

9.4.5 Cleaning the Floor Drain and Oil Drainage Hole

Prerequisite

It is recommended to clean the floor drain and oil drainage holes every six months.

Clean the Floor Drains

Step 1 Remove the two fixing bolts on the floor drain.

Step 2 Take out the floor drain. Then, open its cover, and clean the dirt and debris inside.

Step 3 Close the cover, put the floor drain back, and tighten the fixing bolts.

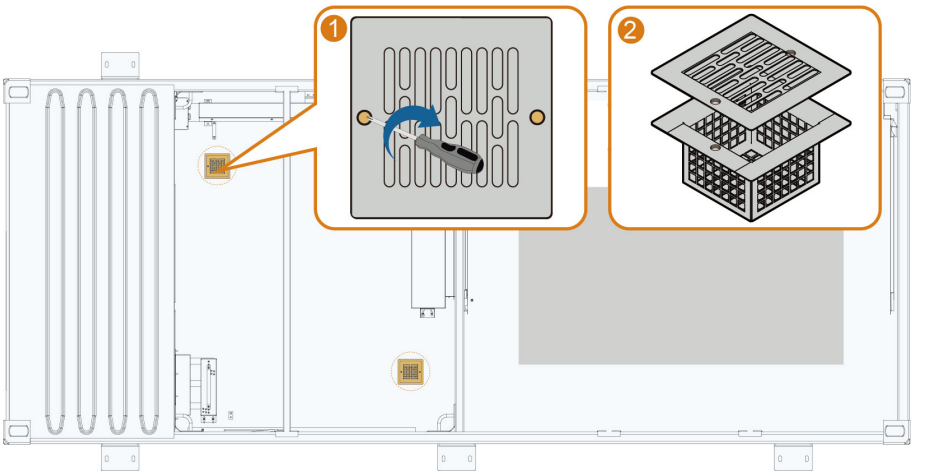


Figure 9-1 Position of Floor Drains

--End

NOTICE

- **Do not tap the floor drain with sharp heavy objects during cleaning, to prevent it from falling from a height.**
- **Protect the floor drain from collisions with the container or other objects during cleaning, as this may result in deformation or paint peeling off.**

Clean Oil Drainage Holes

Besides the floor drain, the equipment also has a oil drainage hole. To ensure proper equipment operation, regularly check the oil drainage hole for blockages. If any clogging is found, promptly clear and clean it.

Location of the oil drain hole on the SG4400UD-MV is shown as the example here.

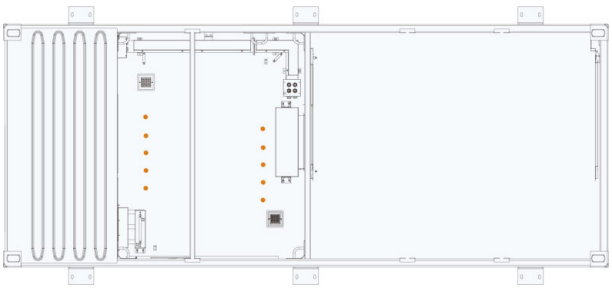


Figure 9-2 Oil Drainage Hole Location on SG4400UD-MV

9.4.6 Appearance Repair

Check if the protective paint sprayed on the enclosure of the product fell off or peeled off. If so, repair it timely.
Spray a special protective paint to the exterior of the product every 5 years.

Solutions

Select different repair solutions based on the damage conditions.

Conditions	Solutions
Surface dirt that can be wiped off	9.4.6.1 Detergent Cleaning
Finish paint falls off, and the primer is intact	9.4.6.2 Finish Paint Repair
Primer is damaged, and the base material is exposed	9.4.6.3 Double-Layer Paint Repair

9.4.6.1 Detergent Cleaning

Prerequisite

For dust or stains on the product surface, you can wipe them off using water and alcohol.

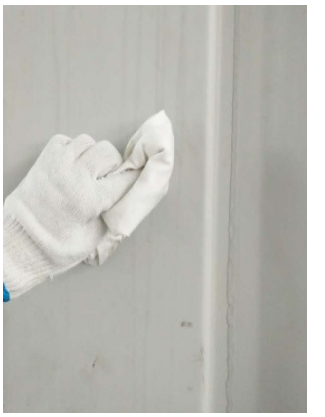
Prepared by Users

Table 9-1 Cleaning Tools

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

Step 1 Wet the cleaning cloth (or other scrubbing tools) with water, and scrub the dirty parts on the surface.

Step 2 If the dirt cannot be cleaned with water, scrub with 97% alcohol till the surface is acceptable. (Or try to use non-corrosive detergents that are generally used locally.)



--End

9.4.6.2 Finish Paint Repair

Prerequisite

For minor scratches or surface paint chalking, where the finish paint has peeled off, but the base material is not exposed, finish paint repair is needed to restore the product appearance.

Finish Paint Selection and Mixing

Table 9-2 Finish Paint Selection and Mixing

Brand and Model	Chemical Component	Mixing Ratio	Thinner	Drying Time (Minimum)
Jotun Finish Coat	Two-component chemically cured aliphatic	Main component :	Jotun Thinner No.10	5℃ 24h 10℃ 12h 23℃ 5h

Brand and Model	Chemical Component	Mixing Ratio	Thinner	Drying Time (Minimum)
Hardtop XP or Hardtop XPL		Hardener= 10:1 (Volume Ratio)		40℃ 3h
AkzoNobel Finish Paint Interthane 990	Two-component acrylic polyurethane paint	Main component : Hardener= 6:1 (Volume Ratio)	International GTA056	5℃ 24h 25℃ 6h 35℃ 4h

- Confirm with SUNGROW before using paints of other brands or models.
- When using a two-component paint, first thoroughly agitate each component individually, and then mix them in the specified proportions for stirring.
- Add the thinner only after the paint and hardener have been mixed.
- Do not use paint that has exceeded its shelf life.

Prepared by Users

Table 9-3 Cleaning Tools

No.	Item
1	400 mesh/600 abrasive paper
2	Cleaning cloth
3	Alcohol
4	Brush
5	Finish paint
6	Film thickness meter

Environment Requirements

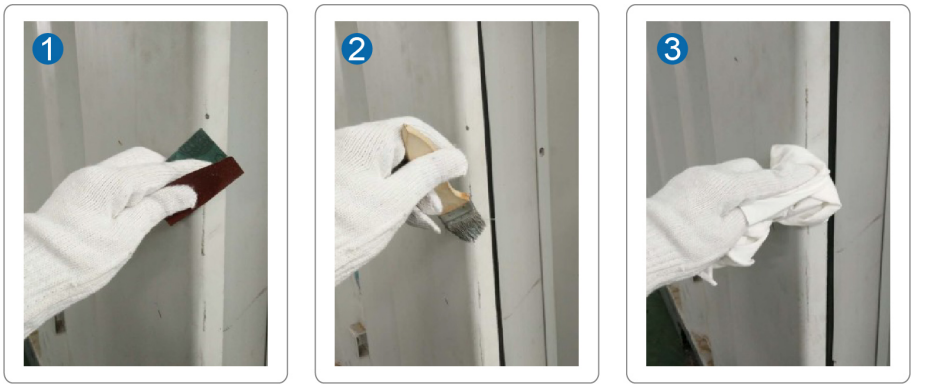
- Ambient temperature: 5℃–40℃
- Base material temperature: 5℃–60℃
- Relative humidity: 10%–85%RH

Repair Steps

Step 1 Polish the paint surface with blistering or scratches with an abrasive paper to expose the gray primer. Use a film thickness meter to measure the primer thickness, which must be at least 150μm.

Step 2 Use a clean brush to remove any residue from the surface.

Step 3 Use a piece of clean cloth dipped in alcohol or detergent to remove the surface powder.



Step 4 Repair the finish paint.

a. Prepare the finish paint with the same color as the appearance.

Common finish paint colors

RAL7035 (Streamer Grey)	RAL9003 (White)	RAL7016 (Dolphin Grey)

b. Mix the finish paint according to the paint model and the requirements of Table 9-2 Finish Paint Selection and Mixing .

c. Apply the finish paint using a brush in a crosshatch pattern. Once the paint fully dried, measure the film thickness using a film thickness meter. Ensure that the single coat thickness falls between 50μm–100μm.



d. When applying multiple layers of paint, wait for each layer to dry completely before applying the next. The total thickness of the primer and finish paint must be at least 240μm.

Step 5 Inspect the paint to ensure it has a uniform color, smooth transitions, and meets the required film thickness.

--End

9.4.6.3 Double-Layer Paint Repair

Prerequisite

If the rusted area is large, or there are deep scratches or dents that expose the base material, perform a double-layer paint repair, including both a primer and a finish paint.

Primer and Finish Paint Selection and Mixing

Table 9-4 Primer and Finish Paint Selection and Mixing

Brand and model	Chemical Component	Mixing Ratio	Thinner	Drying Time (Minimum)
Jotun Primer Jotamastic 90	Two-component epoxy paint	Main component : Hardener= 3.5:1 (Volume Ratio)	Jotun Thinner No.17	5℃ 30h 10℃ 10h 23℃ 3h 40℃ 1.5h
AkzoNobel Primer Interseal 670HS	Two-component epoxy paint	Main component : Hardener= 5.67:1 (Volume Ratio)	International GTA220	5℃ 36h 10℃ 16h 25℃ 10h 40℃ 4h
Jotun Finish Coat Hardtop XP or Hardtop XPL	Two-component chemically cured aliphatic	Main component : Hardener= 10:1 (Volume Ratio)	Jotun Thinner No.10	5℃ 24h 10℃ 12h 23℃ 5h 40℃ 3h
AkzoNobel Finish Paint Interthane 990	Two-component acrylic polyurethane paint	Main component : Hardener= 6:1 (Volume Ratio)	International GTA056	5℃ 24h 25℃ 6h 35℃ 4h

- Use primers and finish paints from the same manufacturer.
- Confirm with SUNGROW before using any paint from a different manufacturer.

- When using a two-component paint, first thoroughly agitate each component individually, and then mix them in the specified proportions for stirring.
- Add the thinner only after the paint and hardener have been mixed.
- Do not use paint that has exceeded its shelf life.

Prepared by users

Table 9-5 Cleaning Tools

No.	Item
1	400 mesh/600 mesh abrasive paper
2	Cleaning cloth
3	Alcohol
4	Brushes with different sizes
5	Grinder (conical and cylindrical polishing heads)
6	Wall putty
7	Finish coat
8	Primer
9	Film thickness meter

Environment Requirements

- Ambient temperature: 5℃–40℃
- Base material temperature: 5℃–60℃
- Relative humidity: 10%RH–85%RH

Repair Steps

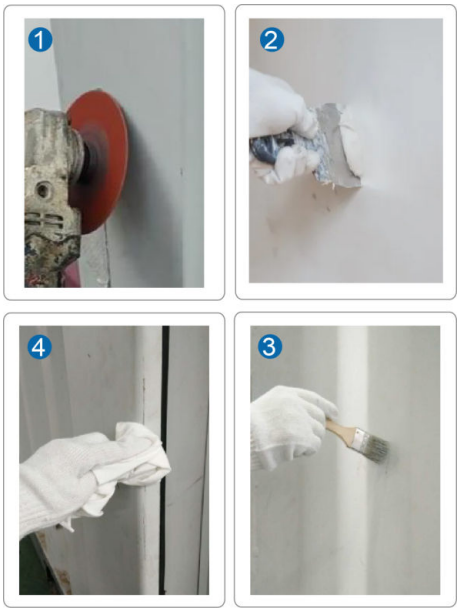
Step 1 Use a grinder or abrasive paper to smooth uneven areas on the surface, achieving a smooth finish with a metallic luster. Ensure a uniform transition from rusted areas to intact coating.

Uneven areas refer to burrs, metal fragments, slag, gaps, and sharp edges on the product.

Step 2 For deeper defects such as scratches or dents, repair them with wall putty to ensure a flat surface.

Step 3 Use a clean brush to remove any residue from the surface.

Step 4 Use a piece of clean cloth dipped in alcohol to remove the surface powder.



Step 5 Repair the primer.

a. Prepare the primer with the same color as the appearance.

Common finish paint colors

RAL7035 (Streamer Grey)	RAL9003 (White)	RAL7016 (Dolphin Grey)

b. Mix the primer according to the paint model and the requirements of Table 9-4 Primer and Finish Paint Selection and Mixing .

c. Apply a primer with a small brush, and use a film thickness meter to ensure the coating thickness in corners and gaps is between 70μm–80μm.

d. After the first layer dries, apply another layer of primer using a brush in a crosshatch pattern. Once it is dry, check that the dry film thickness is within 100μm–300μm.

Step 6 Refer to 9.4.6.2 Finish Paint Repair for finish paint repair.

Step 7 Inspect the paint to ensure it has a uniform color, smooth transitions, and meets the required film thickness.

--End

When using spray paint, follow these steps:

1. Carefully cover the area outside the damaged spot (extending 800mm outward) using masking paper.
2. Spray the exposed area with the paint. After the paint dries, check that the dry film thickness is within the range of 100μm–300μm.

9.4.7 Checking Door Locks and Hinges

Check if the door locks and hinges of the MV Grid-Connected PV Inverter can be used normally after cleaning. Lubricate the door lock holes and hinges properly if necessary.

9.4.8 Checking Sealing Strips

If the sealing strip is in good condition, it can effectively prevent water seepage inside the product. Therefore, carefully check the sealing strip and replace it immediately if there is any damage.

9.5 Replacing Fuse

Before replacing the fuse, ensure that the product is de-energized.

9.5.1 Replacing DC Side Fuse

Step 1 Power off the product according to the normal shutdown steps, refer to 6.5.1 Planned Powering Down.

DANGER

Make sure the PV combiner box is disconnected from the inverter unit.

Step 2 Wait for 20 minutes for the internal capacitors to be completely discharged.

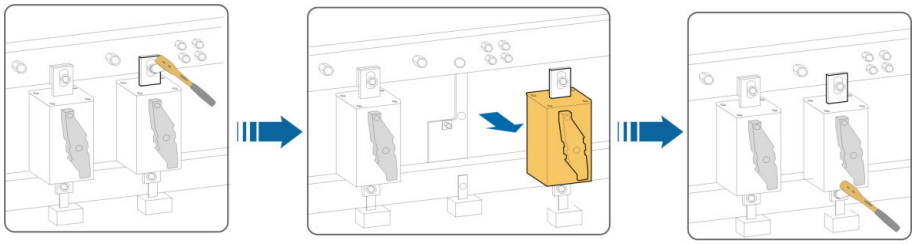
Step 3 Unlock the DC cabinet door and remove the protective cover on the DC fuse.

Step 4 Use a multimeter with a range of 1500 Vdc to measure the DC side voltage of the inverter unit. Check and ensure that the positive voltage, negative voltage, positive to ground voltage, and negative to ground voltage are all zero.

Step 5 Use a multimeter to measure each DC input voltage and ensure that the terminals are uncharged before performing the next operation.

Step 6 Identify the faulty fuse, use a socket wrench to unscrew the fastening bolt of the fuse to be replaced, and remove the faulty fuse.

Step 7 Secure the new fuse with M10×30 * bolts.



Fuse types and configurations may vary by site. When replacing a fuse, refer to the work instructions for the specific project or contact a SUNGROW engineer.

--End

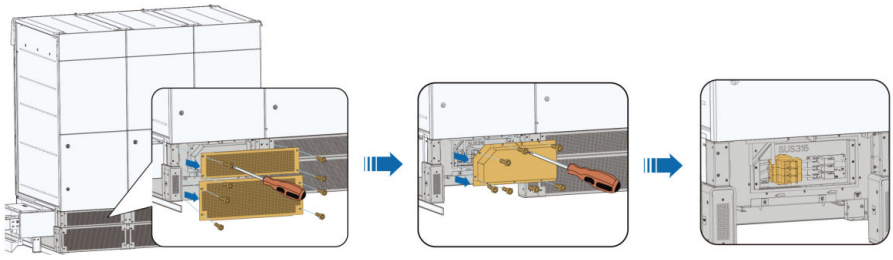
* When the DC input of the inverter unit is equipped with MPLC, the bolts specifications used are M8×30 and M10×30.

9.5.2 Replacing AC SPD Fuse

Confirm the position of the AC SPD Fuse.

The AC SPD fuse is located at the bottom of the AC side of the inverter unit, follow the steps below to remove the sealing plates.

1. Unscrew the bolts around the sealing plate and remove the upper and lower sealing plates.
2. Unscrew the bolts around the inner sealing plate and remove the inner sealing plate.
3. Confirm the AC SPD fuse.

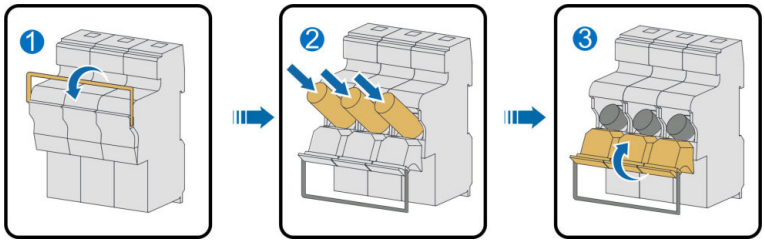


Install fuse

Step 1 Open the fuse holder in the AC side.

Step 2 Insert fuses.

Step 3 Close the fuse holder in the AC side SPD.



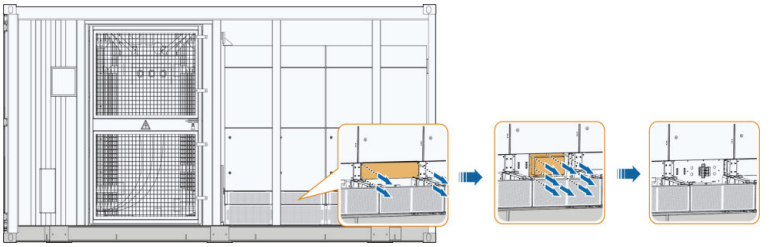
--End

9.5.3 Replacing power distribution cabinet supply fuse

Confirm the position of the power distribution cabinet supply fuse.

The power distribution cabinet supply fuse is located at the bottom of the AC side of the inverter unit, follow the steps below to remove the sealing plates.

1. Unscrew the bolts around the sealing plate.
2. Unscrew the bolts around the inner sealing plate and remove the inner sealing plate.
3. Confirm the power distribution cabinet supply fuse.



9.6 Replacing Fans

Overview

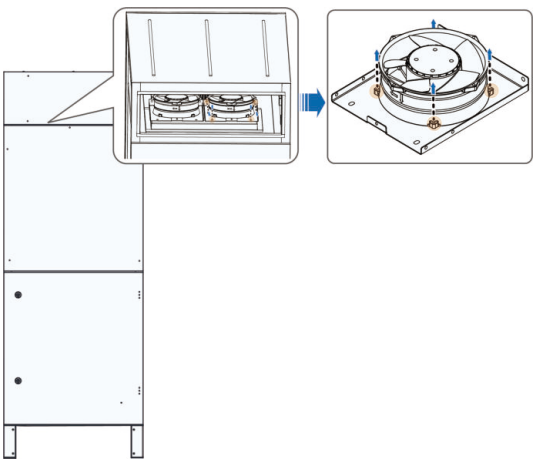
This section describes how to replace fans with an example of replacing the fan at the top right end of the AC side of inverter unit as an example.

Procedure

Step 1 Remove the bolts from the top door on the AC cabinet and open the cabinet door.

Step 2 Remove the M5 bolts between the fan fixing plate and the bottom platform and take down the fan.

Step 3 Remove the four M5 bolts connecting the fan and the fixing plate, and remove the fan.



Step 4 Install a new fan in reverse steps.

--End

9.7 Replacing Aviation Connector (Optional)

If the aviation connector is damaged, replace it in time to ensure the product can operate properly.

⚠ WARNING

After powering down the whole system, verify that there is no voltage within the whole system before proceeding.

Step 1 Remove the damaged aviation connector, by referring to the figure below (This section provides instructions for replacing one connector. These instructions also apply to aviation connectors in other positions).

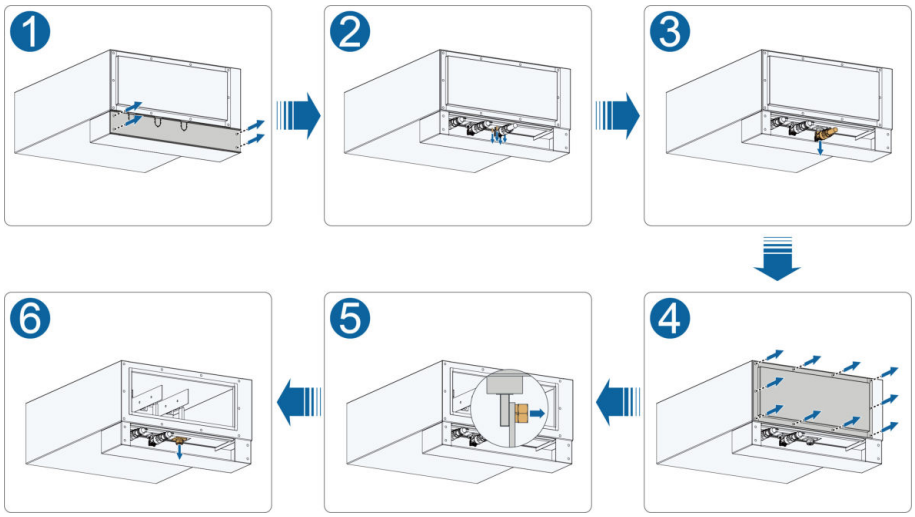
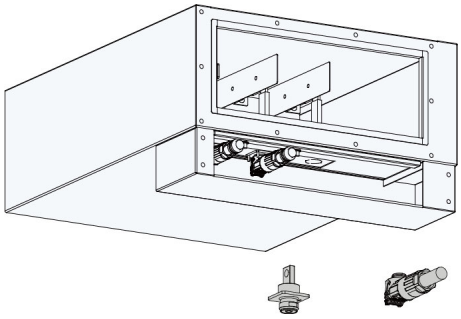


Figure 9-3 Aviation Connector Replacement

After disassembly, it is shown in the following figure.



Step 2 Install the new connector, by completing the above steps in the reverse order.

--End

10 Appendix

10.1 Technical Parameters

SG1100UD-MV

Model	SG1100UD-MV
Input (DC)	
Max. PV input voltage	1500 V
Min. PV input voltage / Start-up input voltage	895 V / 905 V
MPP voltage range	895 – 1500 V
No. of independent MPP inputs	1
No. of DC inputs	5 (optional: 7)
Max. PV input current	1435 A
Max. DC short-circuit current	3528 A
PV array configuration	Negative grounding or floating
Output (AC)	
AC output power	1100 kVA @ 45 ℃, 1133 kVA @ 40 ℃, 1265 kVA @ 22.5 ℃
Max. AC output current	73 A
Rated voltage range	10 kV – 35 kV[1)]
Nominal grid frequency / Grid frequency range	50 Hz / 45 – 55 Hz, 60 Hz / 55 – 65 Hz
Power factor at nominal power / Ajustable power factor	> 0.99 / 0.8 leading - 0.8 lagging
Feed-in phases / AC connection	3 / 3
Efficiency	
Max. inverter unit efficiency	99.0 %
Inverter unit european efficiency	98.8%

Model	SG1100UD-MV
Max. efficiency(including transformer)	98.4%
European efficiency(including transformer)	97.9%
Protection & Function	
DC input protection	DC load switch + fuse
AC protection	AC Circuit breaker
Surge protection	DC Type II / AC Type II
Grid monitoring / Ground fault monitoring	Yes / Yes
Insulation monitoring	Yes
Overheat protection	Yes
Q at night function	Optional
General Data	
Dimensions (W*H*D)	6058 * 2896 * 2438 mm
Weight	8.5 T
Impedance	5% (0~±10%) @1100kVA
Transformer vector	Dy11
Oil type	Mineral oil (PCB free)
Degree of protection	Inverter: IP65 / Others: IP54
Auxiliary power supply	15 kVA (optional: max. 30 kVA)
Operating ambient temperature range[2)]	- 35 to 60 ℃[3)]
Allowable relative humidity range	0 - 100 %
Cooling method	Temperature controlled forced air cooling+ ONAN
Max. operating altitude	1000 m (standard) / > 1000 m (optional)
Display	LED Indicators, Ethernet+WebHMI
Communication	Standard: RS485, Ethernet

Model	SG1100UD-MV
Compliance	CE, IEC 62109, IEC 61727, IEC 62116, IEC 60068, IEC 61683, VDE-AR-N 4110:2018, VDE-AR-N 4120:2018, EN 50549-2, UNE 206007-1:2013,NTS 631, UTE C15-712- 1:2013

1) The maximum rated voltage 36 kV (Italy only).

2) The ambient temperature is determined as the average temperature obtained from at least four temperature monitoring points located at a distance of 1 meter from the equipment, at a height halfway up the machine. The temperature sensors must be shielded from airflow, thermal radiation, and rapid temperature fluctuations to prevent display inaccuracies.If the ambient temperature is below -30°C, pls contact Sungrow.

3)When the temperature is below -20℃, optional configuration is required.

SG3300UD-MV/SG4400UD-MV

Model	SG3300UD-MV	SG4400UD-MV
Input (DC)		
Max. PV input voltage	1500 V	
Min. PV input voltage / Start-up input voltage	895 V / 905V	
MPP voltage range	895 – 1500 V	
No. of independent MPP inputs	3	4
No. of DC inputs	15 (optional: 21)	20(optional: 28)
Max. PV input current	3 * 1435 A	4 * 1435 A
Max. DC short-circuit current	3 * 3528 A	4 * 3528 A
PV array configuration	Negative grounding or floating	
Output (AC)		
AC output power	3300 kVA @ 45 ℃, 3399 kVA @ 40 ℃, 3795 kVA@22.5℃	4400 kVA @ 45 ℃, 4532 kVA @ 40 ℃, 5060 kVA@22.5℃
Max. AC output current	219.2 A	292.2 A

Model	SG3300UD-MV	SG4400UD-MV
Rated voltage range	10 kV – 35 kV[1)]	
Nominal grid frequency / Grid frequency range	50 Hz / 45 – 55 Hz, 60 Hz / 55 – 65 Hz	
Power factor at nominal power / Ajustable power factor	> 0.99 / 0.8 leading - 0.8 lagging	
Feed-in phases / AC connection	3 / 3	
Efficiency		
Max. inverter unit efficiency	99.0 %	
Inverter unit european efficiency	98.8%	
Max. efficiency(including transformer)	98.4%	
European efficiency(including transformer)	97.9%	
Protection & Function		
DC input protection	DC load switch + fuse	
AC protection	AC Circuit breaker	
Surge protection	DC Type II / AC Type II	
Grid monitoring / Ground fault monitoring	Yes / Yes	
Insulation monitoring	Yes	
Overheat protection	Yes	
Q at night function	Optional	
General Data		
Dimensions (W*H*D)	6058*2896*2438 mm	
Weight	17.5 T	20 T

Model	SG3300UD-MV	SG4400UD-MV
Impedance	7% (0~±10%) @3300kVA	8% (0~±10%) @4400kVA
Transformer vector	Dy11	
Oil type	Mineral oil (PCB free)	
Degree of protection	Inverter: IP65 / Others: IP54	
Auxiliary power supply	15 kVA (optional: max. 30 kVA)	
Operating ambient temperature range[2)]	-35 to 60 ℃[3)]	
Allowable relative humidity range	0 - 100 %	
Cooling method	Temperature controlled forced air cooling+ ONAN	
Max. operating altitude	1000 m (standard) / > 1000 m (optional)	
Display	LED Indicators, Ethernet+WebHMI	
Communication	Standard: RS485, Ethernet	
Compliance	CE, IEC 62109, IEC 61727, IEC 62116, IEC 60068, IEC 61683, IEC62271-202, VDE-AR-N 4110:2018, VDE-AR-N 4120:2018, EN 50549-2, UNE 206007-1:2013, NTS 631, UTE C15-712-1:2013	

1) The maximum rated voltage 36 kV (Italy only).

2) The ambient temperature is determined as the average temperature obtained from at least four temperature monitoring points located at a distance of 1 meter from the equipment, at a height halfway up the machine. The temperature sensors must be shielded from airflow, thermal radiation, and rapid temperature fluctuations to prevent display inaccuracies. If the ambient temperature is below -30°C, pls contact Sungrow.

3) When the temperature is below -20℃, optional configuration is required.

SG3300UD-MV-20

Model	SG3300UD-MV-20
Input (DC)	
Max. PV input voltage	1500 V

Model	SG3300UD-MV-20
Min. PV input voltage / Start-up input voltage	938 V / 950 V
MPP voltage range	938 – 1500 V
No. of independent MPP inputs	3
No. of DC inputs	15 (optional: 21)
Max. PV input current	3 * 1435 A
Max. DC short-circuit current	3 * 3528 A
PV array configuration	Negative grounding or floating
Output (AC)	
AC output power	3300 kVA @ 51℃, 3960 kVA @ 23 ℃
Max. AC output current[1)]	229 A
Rated voltage range	10 kV – 35 kV[2)]
Nominal grid frequency / Grid frequency range	50 Hz / 45 – 55 Hz, 60 Hz / 55 – 65 Hz
THD	< 1.5 % (at nominal power)
Power factor at nominal power / Ajustable power factor	> 0.99 / 0.8 leading - 0.8 lagging
Feed-in phases / AC connection	3 / 3
Efficiency	
Max. inverter unit efficiency	99.0%
Inverter unit european efficiency	98.7%
Max. efficiency(including transformer)	98.4%
European efficiency(including transformer)	97.9%
Protection & Function	
DC input protection	DC load switch + fuse
AC protection	AC Circuit breaker
Surge protection	DC Type II / AC Type II

Model	SG3300UD-MV-20
Grid monitoring / Ground fault monitoring	Yes / Yes
Insulation monitoring	Yes
Overheat protection	Yes
Q at night function	Optional
General Data	
Dimensions (W*H*D)	6058 * 2896 * 2438 mm
Weight	17.5 T
Impedance	7 % (0 – ±10 %) @ 3300 kVA
Transformer vector	Dy11
Oil type	Mineral oil (PCB free)
Degree of protection	Inverter: IP65 / Others: IP54
Auxiliary power supply	15 kVA (optional: max. 30 kVA)
Operating ambient temperature range[3)]	- 35 to 60 ℃
Allowable relative humidity range	0 - 100 %
Cooling method	Temperature controlled forced air cooling + ONAN
Max. operating altitude	1000 m (standard) / > 1000 m (optional)
Display	LED Indicators, Ethernet+WebHMI
Communication	Standard: RS485, Ethernet
Compliance	CE, IEC 62109, IEC 61727, IEC 62116, IEC 60068, IEC 61683, IEC62271-202

1) Calculated based on the minimum nominal AC voltage..

2) The maximum rated voltage 36 kV (Italy only).

3) The ambient temperature is determined as the average temperature obtained from at least four evenly distributed temperature monitoring points located at a distance of 1 meter from the equipment, at a height halfway up the machine. The temperature sensors must

be shielded from airflow, thermal radiation, and rapid temperature fluctuations to prevent display inaccuracies.

SG4400UD-MV-20

Model	SG4400UD-MV-20
Input (DC)	
Max. PV input voltage	1500 V
Min. PV input voltage / Start-up input voltage	938 V / 950 V
MPP voltage range	938 – 1500 V
No. of independent MPP inputs	4
No. of DC inputs	20 (optional: 28)
Max. PV input current	4 * 1435 A
Max. DC short-circuit current	4 * 3528 A
PV array configuration	Negative grounding or floating
Output (AC)	
AC output power	4400 kVA @ 51℃, 5280 kVA @ 23 ℃
Max. AC output current[1)]	305 A
Rated voltage range	10 kV – 35 kV[2)]
Nominal grid frequency / Grid frequency range	50 Hz / 45 – 55 Hz, 60 Hz / 55 – 65 Hz
THD	< 1.5 % (at nominal power)
Power factor at nominal power / Ajustable power factor	> 0.99 / 0.8 leading - 0.8 lagging
Feed-in phases / AC connection	3 / 3
Efficiency	
Max. inverter unit efficiency	99.0%
Inverter unit european efficiency	98.7%
Max. efficiency(including transformer)	98.4%
European efficiency(including transformer)	97.9%

Model	SG4400UD-MV-20
Protection & Function	
DC input protection	DC load switch + fuse
AC protection	AC Circuit breaker
Surge protection	DC Type II / AC Type II
Grid monitoring / Ground fault monitoring	Yes / Yes
Insulation monitoring	Yes
Overheat protection	Yes
Q at night function	Optional
General Data	
Dimensions (W*H*D)	6058 * 2896 * 2438 mm
Weight	20 T
Impedance	8 % (0 – ±10 %) @ 4400 kVA
Transformer vector	Dy11
Oil type	Mineral oil (PCB free)
Degree of protection	Inverter: IP65 / Others: IP54
Auxiliary power supply	15 kVA (optional: max. 30 kVA)
Operating ambient temperature range[3)]	- 35 to 60 ℃
Allowable relative humidity range	0 - 100 %
Cooling method	Temperature controlled forced air cooling + ONAN
Max. operating altitude	1000 m (standard) / > 1000 m (optional)
Display	LED Indicators, Ethernet+WebHMI
Communication	Standard: RS485, Ethernet
Compliance	CE, IEC 62109, IEC 61727, IEC 62116, IEC 60068, IEC 61683, IEC62271-202

1) Calculated based on the minimum nominal AC voltage.

2) The maximum rated voltage 36 kV (Italy only).

3) The ambient temperature is determined as the average temperature obtained from at least four temperature monitoring points located at a distance of 1 meter from the equipment, at a height halfway up the machine. The temperature sensors must be shielded from airflow, thermal radiation, and rapid temperature fluctuations to prevent display inaccuracies.

10.2 Tightening Torques

To prevent the cable lugs from loosening under mechanical stress, which may cause poor contact or increased contact resistance and result in overheating or even fire, ensure that the following torque requirements are met when tightening the screws securing the cable lugs:

Bolt	Torque(N·m)	Bolt	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

*Torque values listed in the table are intended for the bolt and nut assembly, and do not apply to riveted nuts or riveted screws, etc. The torque to be adopted should depend on the actual situation.

**Secure the cable at a proper point to reduce the stress on the cable lug.

10.3 Long-Term Equipment Maintenance and Lifecycle Management Strategy

User should follow (including but not limited to operation, maintenance procedures, and system revamping) the operating procedures and practices provided by the supplier to maintain the long-term lifetime of equipment.

During the later operational phase of the power plant, a comprehensive assessment of whether technical revamping is required must be conducted, contingent upon the plant's environmental conditions and operational status. This evaluation is essential to ensure sustained operational performance and asset longevity

10.4 Quality Assurance

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

The software security update period for this product aligns with the warranty period. During the warranty, security patches or updates will be provided if any vulnerabilities or compatibility issues are identified.

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.

10.5 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

MOD00313