Table 7-1 Cable Requirements

No.	Item	Type	Specification	
			Outer Diameter (mm)	Cross-sectional area of conductor (mm^2)
1	DC cable	PV cable, complying with 1,000V standard	5.9–8.8	4/6
2	Battery Cable	Copper Cable	15–24	70–95
3	Communication cable*	Shielded twisted pair	4.5–18	0.2–1.5
		CAT 5E outdoor shielded network cable**		8 × 0.2
4 5	AC cable (BACK UP/ GRID)	Outdoor single-core copper/ aluminum cable	L1, L2, L3, and N wire: 10–32 PE wire: 8–32	SH110/125CX:120–300
		Outdoor multi-core copper/ aluminum cable	L1, L2, L3, and N wire: 20–72 PE wire: 8-24	SH110/125CX: 120–240
6	Additional Grounding cable	Outdoor single-core copper cable	S/2 S: Cross-sectional area of the phase wire.***	

- If local regulations have other requirements for AC cables and additional grounding cable, select cable specifications according to the local regulations.
- The factors that affect cable selection include rated current, cable type, routing mode, ambient temperature, and maximum expected line loss.
- The cabling distance between the battery and the inverter should be less than 40 m, and within 5 m is recommended.
- To ensure proper heat dissipation, the installation distance between the inverter and the battery should be greater than 0.8m.

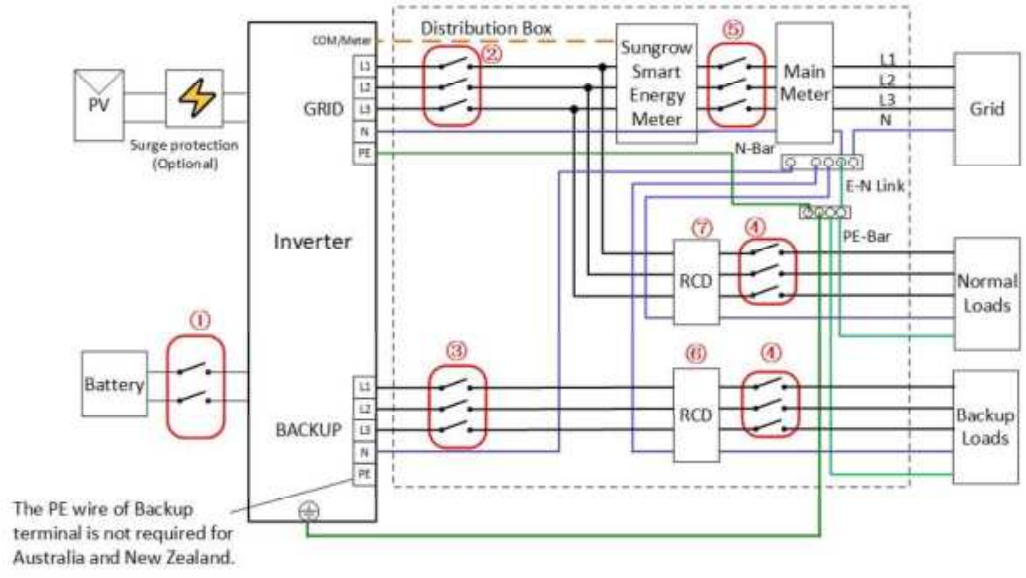
*Do not coil the communication cable.
**To meet shielding and anti-interference requirements:

- Shielded Ethernet cables are mandatory.It is recommended to use CAT 5E or CAT 6 shielded cables.
- Use Ethernet cables with magnet cores at both ends, and in some cases, add magnet cores in the middle.

***This rule applies only if the phase wires and the PE wire are identical in material. If the materials are different, make sure the cross-section of the PE wire allows it to produce a conductance equivalent to that resulting from the application of this table.

Backup Wiring Diagram (Australia and New Zealand)

The neutral cable of GRID side and BACKUP side must be connected together according to the wiring rules AS/NZS_3000. Otherwise the backup function will not work.



NO.	SH110CX
①	250A/ 1000V DC Breaker*
②	320-400A/400V ** TypeA AC Circuit Breaker (I_{max}: 400A)
③	250A/ 400V TypeA AC Breaker(I_{max}: 250A)

NO.	SH110CX
④	Depends on Load
⑤	Depends on loads and inverter capacity
⑥⑦	30 mA RCD (Comply with local regulations)

1. *If the battery includes a user-operable DC circuit breaker, no additional DC breaker is required.

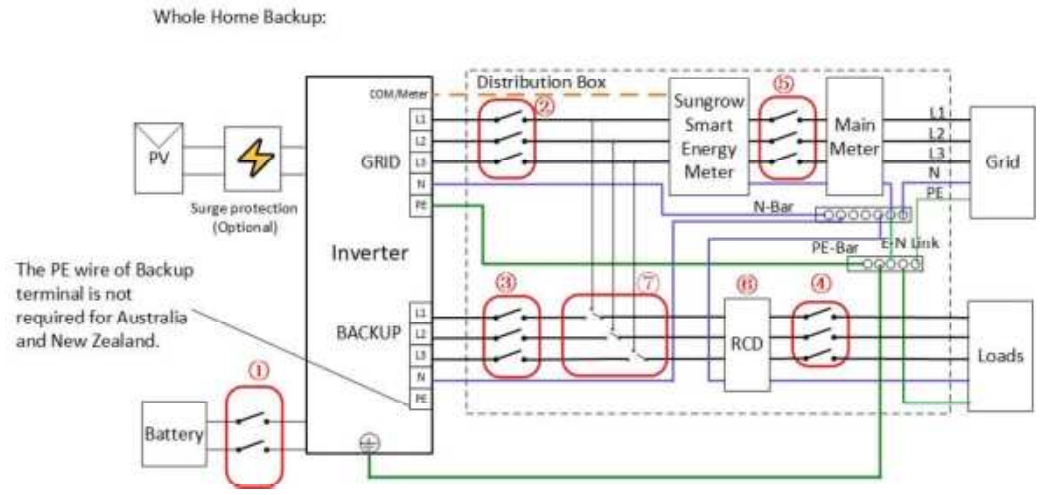
2. ** Select MCB with appropriate rated current based on actual needs, including wiring plan, number of loads, and inverter capacity.

3. Values in the table are recommended and can be adjusted as necessary.

4. To enhance system safety, set an "Input Power Limit" for the inverter immediately after wiring. Calculation formula: Input Power Limit (kW) ≤ 3×230×0.8×rated current of the main switch.

The specifications of the AC breaker must be configured according to the recommendations in the user manual (do not exceed the recommended maximum current value). Otherwise, there is a risk of inverter failure.

Whole Site Backup Wiring Diagram (Australia and New Zealand)



NO.	SH110CX
①	250A/1000V DC breaker
②	320~400A/400V TypeA AC breaker (I_{max}: 400A)
③	250A/ 400V TypeA AC Breaker (I_{max}: 250A)
④	Depends on Load

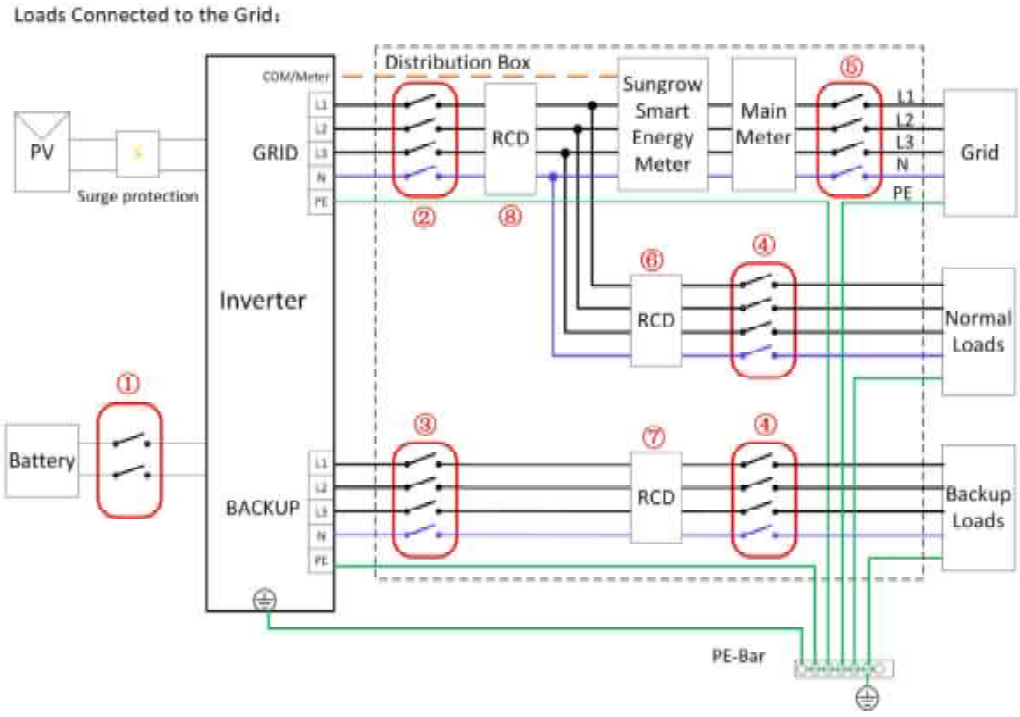
NO.	SH110CX
⑤	Depends on loads and inverter capacity
⑥	30mA RCD (Comply with local regulation)
⑦	320~400A/400V manual changeover switch*

*The manual changeover switch should be prepared by users separately. A 320~400A manual changeover switch is required for the whole site backup scenario. When switching to "BACKUP" using the changeover switch, loads will be supplied by the PV installation and battery. When the inverter is faulty or undergoing maintenance, switch to "GRID" to ensure the loads can work normally.

The specifications of the AC breaker must be configured according to the recommendations in the user manual (do not exceed the recommended maximum current value). Otherwise, there is a risk of inverter failure.

Backup Wiring Diagram (Other Countries)

The following diagram is an example for grid systems without special requirement on wiring connection.



NO.	SH125CX
①	250A/1000V DC breaker *
②	320-400A/400V ** TypeA AC breaker (I_{max}: 400A)

NO.	SH125CX
③	250A/ 400V TypeA AC Breaker (I_{max}: 250A)
④	Depends on Load
⑤	Depends on loads and inverter capacity
⑥⑦	30mA RCD (Comply with local regulation)
⑧	1250mA RCD (Comply with local regulation)

1. *If the battery is integrated with a readily accessible internal DC breaker, no additional DC breaker is required.

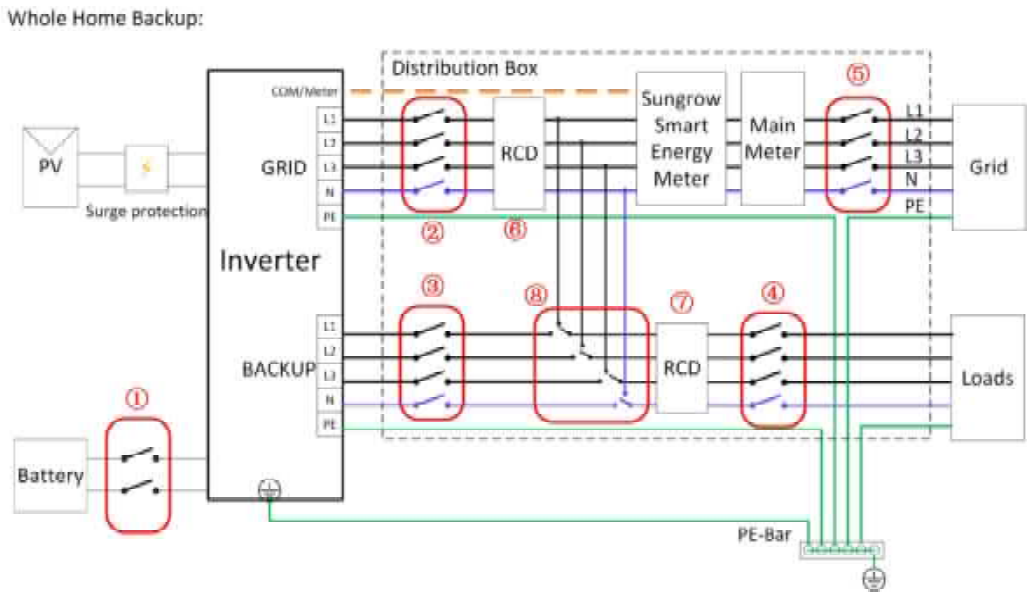
2. **Select an MCB with an appropriate rated current based on the actual requirements, including the overall wiring scheme, the number of loads, and the inverter's load-carrying capacity.

3. The values in the table are recommended values and can be set to other values according to actual conditions.

4. To improve the safety of the system, set the "Import Power Limit" for the inverter immediately after completing the wiring. The formula used to calculate the import power limit should be: Set value of Import Power Limit (kW) ≤ 3×230×0.8×rated current of the main switch.

The specifications of the AC breaker must be configured according to the recommendations in the user manual (do not exceed the recommended maximum current value). Otherwise, there is a risk of inverter failure.

Whole Site Backup Wiring Diagram (Other Countries)



NO.	SH125CX
①	250A/1000V DC breaker
②	320-400A/400V ** TypeA AC breaker (I_{max}: 400A)
③	250A/ 400V TypeA AC Breaker (I_{max}: 250A)
④	Depends on loads
⑤	Depends on loads and inverter capacity
⑥	1250mA RCD (Comply with local regulation)
⑦	30mA RCD (Comply with local regulation)
⑧	≥320~400A/400V manual changeover switch*

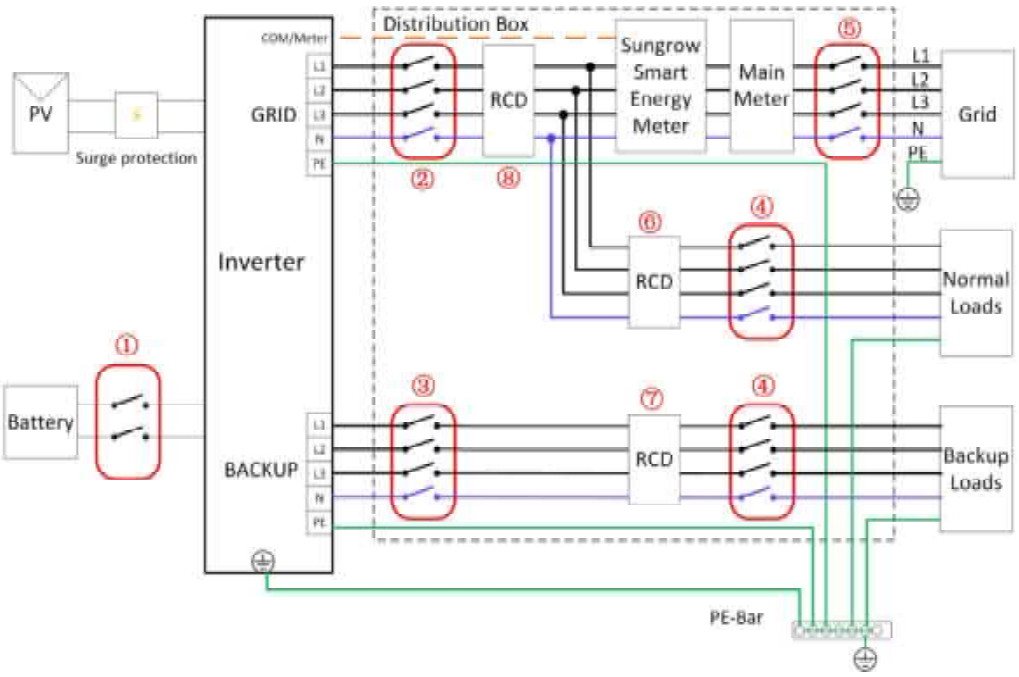
*The manual changeover switch should be prepared by users separately. When switching to "BACKUP" using the changeover switch, loads will be supplied by the PV installation and battery. When the inverter is faulty or undergoing maintenance, switch to "GRID" to ensure the loads can work normally.

The specifications of the AC breaker must be configured according to the recommendations in the user manual (do not exceed the recommended maximum current value). Otherwise, there is a risk of inverter failure.

Backup Wiring Diagram TT System

The following diagram is an example for grid systems without special requirement on wiring connection.

Loads Connected to the Grid:



NO.	SH110/125CX
①	250A/1000V DC breaker *
②	320-400A/400V ** TypeA AC breaker (I_{max}: 400A)
③	250A/ 400V TypeA AC Breaker (I_{max}: 250A)
④	Depends on loads
⑤	Depends on loads and inverter capacity
⑥⑦	30mA RCD (Comply with local regulation)
⑧	SH110CX: 1100mA RCD (Comply with local regulation) SH125CX: 1250mA RCD (Comply with local regulation)

1. *If the battery is integrated with a readily accessible internal DC breaker, no additional DC breaker is required.

2. **Select an MCB with an appropriate rated current based on the actual requirements, including the overall wiring scheme, the number of loads, and the inverter's load-carrying capacity.

3. The values in the table are recommended values and can be set to other values according to actual conditions.

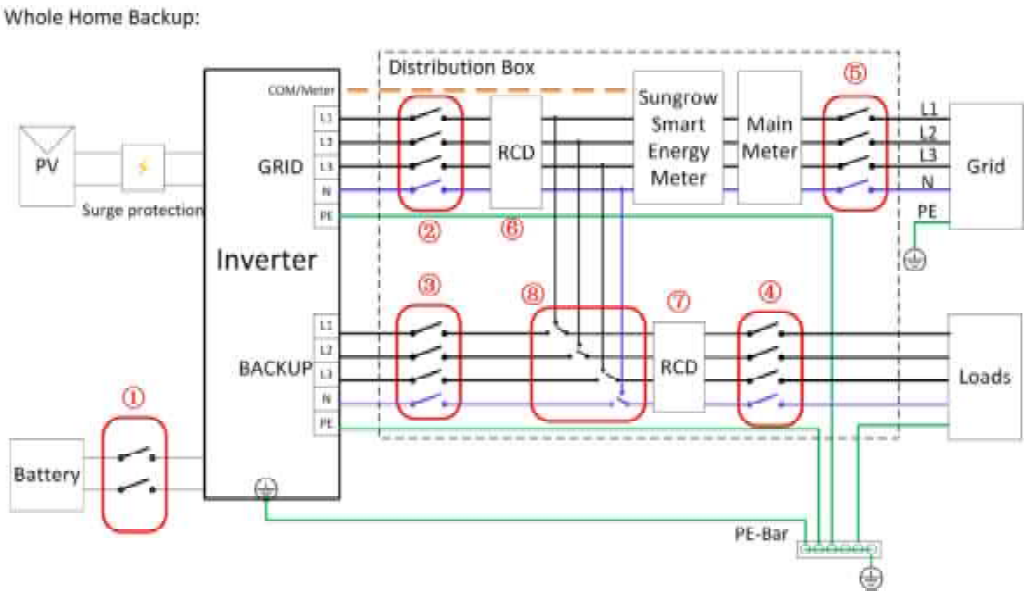
4. To improve the safety of the system, set the "Import Power Limit" for the inverter immediately after completing the wiring. The formula used to calculate the import power

limit should be: Set value of Import Power Limit (kW) ≤ 3×230×0.8×rated current of the main switch.

The specifications of the AC breaker must be configured according to the recommendations in the user manual (do not exceed the recommended maximum current value). Otherwise, there is a risk of inverter failure.

Whole Site Backup Wiring Diagram TT System

The following diagram is an example for grid systems without special requirement on wiring connection.



NO.	SH110/125CX
①	250A/1000V DC breaker
②	320-400A/400V TypeA AC breaker (I_{max}: 400A)
③	250A/ 400V TypeA AC Breaker (I_{max}: 250A)
④	Depends on loads
⑤	Depends on loads and inverter capacity
⑥	SH110CX: 1100mA RCD (Comply with local regulation) SH125CX: 1250mA RCD (Comply with local regulation)
⑦	30mA RCD (Comply with local regulation)
⑧	≥320~400A/400V manual changeover switch*

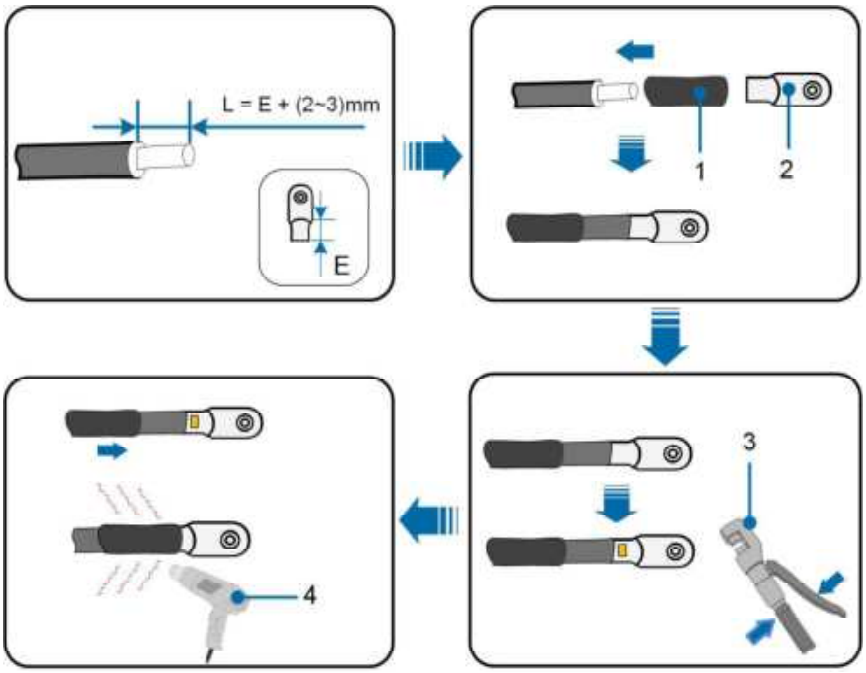
*The manual changeover switch should be prepared by users separately. When switching to "BACKUP" using the changeover switch, loads will be supplied by the PV installation and

battery. When the inverter is faulty or undergoing maintenance, switch to "GRID" to ensure the loads can work normally.

The specifications of the AC breaker must be configured according to the recommendations in the user manual (do not exceed the recommended maximum current value). Otherwise, there is a risk of inverter failure.

7.4 Crimp OT/DT terminal

Crimp OT/DT terminal



(1) Heat shrink tubing (2) OT/DT terminal

(3) Hydraulic pliers (4) Heat gun

Aluminum Wire Requirements

If aluminum wires are selected, use copper-aluminum bimetallic terminals, avoiding direct contact between the copper bar and the aluminum wire.

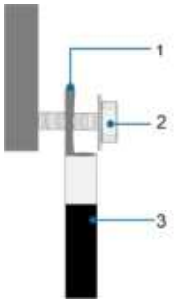


Figure 7-2 Aluminum Wire Terminal Connection Sequence

(1) Copper-aluminum bimetallic terminals (2) Nut (3) Aluminum wire

NOTICE

- **Ensure that the selected terminal can directly contact the copper bar. If uncertain, , 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.**

7.5 External Protective Grounding Connection

⚠ DANGER

- **When the inverter is powered on and running, high current is present. Powering the unit without proper grounding poses a risk of electric shock and may disable essential protection features such as lightning protection. Therefore, before powering on the inverter, ensure that the inverter is reliably grounded. Damages caused by failure to comply are not covered under warranty.**
- **During electrical connections, grounding must be the first and highest-priority step.**

⚠ WARNING

- **Since the inverter is transformerless, neither the positive nor the negative terminals of the PV strings can be grounded. Otherwise, the inverter will not operate normally.**
- **The external protective grounding connection must be completed before making any AC, PV string, or communication connections.**
- **The external protective grounding point provides a reliable ground connection. Do not use an improper grounding conductor for grounding, Otherwise, it may cause product damage or personal injury.**

⚠ WARNING

The external protective grounding terminal must meet at least one of the following requirements:

- **If the grounding cable cross-sectional area ≥ 10 mm² (copper) or 16 mm² (aluminum), it is recommended to ground both the external protective grounding terminal and the AC side grounding terminal.**
- **If the grounding cable cross-sectional area < 10 mm² (copper) or 16 mm² (aluminum), ensure both the external protective ground terminal and AC side ground terminal are grounded.**

Other grounding schemes, which meet the local standards and safety regulations, may also be adopted. However, SUNGROW shall not be held liable for any consequence caused thereby.

7.5.1 Requirements for External Protective Grounding

In PV power generation systems, all non-current-carrying metal parts and equipment enclosures must be grounded (e.g., PV mounting structures, inverter enclosures, etc.).

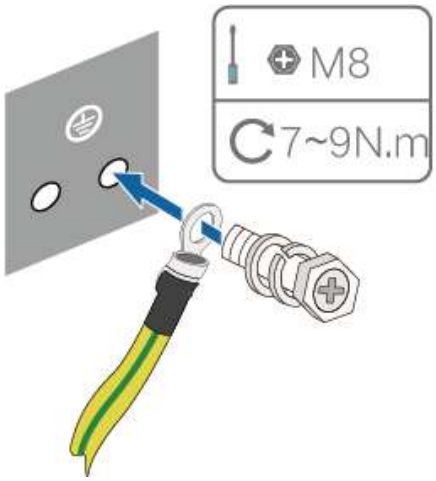
For a single inverter, the external protective grounding terminal must be grounded locally.

For systems with multiple inverters, connect all external protective grounding terminals and PV mounting structure grounding points to an equipotential bonding conductor (specific operations depend on site conditions) to ensure equipotential bonding.

7.5.2 Wiring Steps

Step 1 Prepare the cable by crimping the OT/DT terminal. Refer to Crimp OT/DT terminal for details.

Step 2 Remove the screw from the grounding terminal and use a screwdriver to secure the cable.



Step 3 Apply paint to the grounding terminal to improve its anti-corrosion performance.

Two external protective grounding terminals are available. Use at least one of them for grounding.

The resistance of the inverter's grounding bolt to the ground should be ≤4Ω, and the resistance should be tested and checked every half a year.

- In each PV string, the metal frames of two adjacent modules must be connected using a reliable 4 mm² yellow-green wire.
- The first and last module in each string must be connected to the mounting structure using a yellow-green wire.

--End

7.6 AC Cable Connection

7.6.1 AC side Requirements

The inverter can only be connected to the utility grid with the permission of the local power company.

Before grid connection, confirm that the grid voltage and frequency meet the requirements for the inverter operation. See "**Technical Data**" for detailed parameters. If requirements are not met, contact the power company for help.

AC circuit breaker

An independent three-pole or four-pole circuit breaker must be installed on the AC output side of each inverter to ensure safe disconnection from the grid.

Inverter	Recommended Rated Voltage	Recommended Rated Current
SH110CX, SH125CX	400 V	Grid side: 400 A Load side: 250 A

WARNING

- **Install an AC circuit breaker between the inverter AC side and the grid, to ensure the inverter can disconnect from the grid in a safe manner.**
- **Multiple inverters must not share a single AC circuit breaker.**
- **Do not connect any local load between the inverter and the AC circuit breaker.**

Requirements for Multiple Inverters in Parallel Connection

Where multiple inverters are connected to the grid in parallel, the total number of parallel inverters must not exceed 24. If more than 24 inverters need to be connected, contact SUNGROW to validate the technical solution.

MV Transformer

The MV transformer used together with the inverter should meet the following requirements:

- A distribution transformer can be used. The transformer should be suitable for a PV system with a typical cyclical load pattern (with loads during the daytime and no load at night).
- A dry-type transformer or an oil-immersed transformer can be used, and the shield winding is not required.
- The line voltage on the LV side of the transformer must match the line voltage on the AC output side of the inverter. To connect to a power grid that adopts the IT system, the withstand voltage to ground of the step-up transformer's LV winding, the AC cables, and the secondary equipment (such as the protective relay, detection and measuring device, and other related auxiliary devices) must not be lower than the system voltage of 1100 V.
- Two double-split windings in the same phase of the transformer must be able to withstand a system voltage of at least 1100 V.
- The line voltage on the HV side of the transformer must be consistent with the voltage rating of the grid at the installation site.
- To keep the voltage consistent with the grid voltage, a transformer with a tap changer on the HV side is recommended.
- The operating capacity of the transformer should meet the inverter’s output requirements. At an ambient temperature of 30 °C, the transformer should be able to operate continuously under 1.1 times overload conditions.
- A transformer with a short-circuit impedance of 7% (allowable tolerance: ±10%) is recommended.
- The voltage drop of system cable must not exceed 3%.
- The DC component that the transformer can withstand is 1% of the fundamental current at rated power.
- Regarding the thermal rating, the load profile of the inverter and the environmental conditions at the installation site must be taken into account.
- The apparent power of the inverter must not exceed the transformer power. The maximum AC current of all inverters connected in parallel must be taken into account. If more than 24 inverters need to be connected to the grid, contact SUNGROW to validate the technical solution.
- The transformer must have overload and short-circuit protection features.
- As a critical component of the grid-connected PV system, the transformer's capability to withstand system faults must be taken into account. The faults include: system short circuit, grounding fault, voltage drop, etc.
- Take into account the environmental conditions, such as the ambient temperature, relative humidity, altitude, and air quality, when selecting and installing the transformer.

7.6.2 OT/DT Terminal Requirements

OT/DT terminals (not included in the scope of delivery) are required for AC cable connections. Please prepare the OT/DT terminals by following the requirements below.

OT/DT Terminals for AC Phase Wires

- Specification: M12

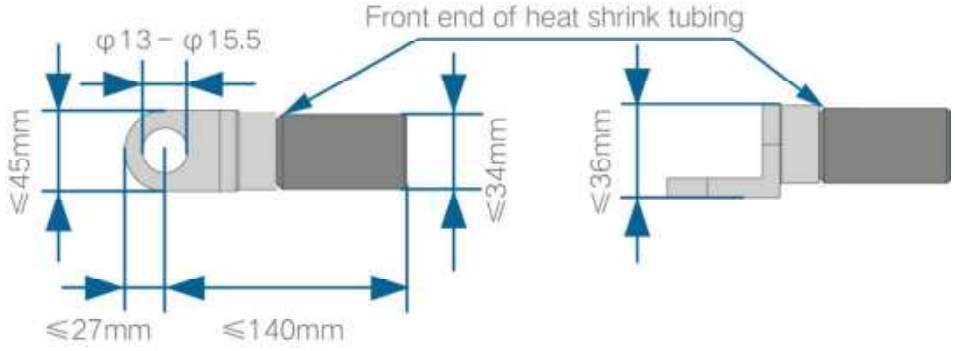


Figure 7-3 Dimensions of Terminal After Crimping

OT/DT Terminal for AC PE wire

- Specification: M12

7.6.3 AC Cable Connection

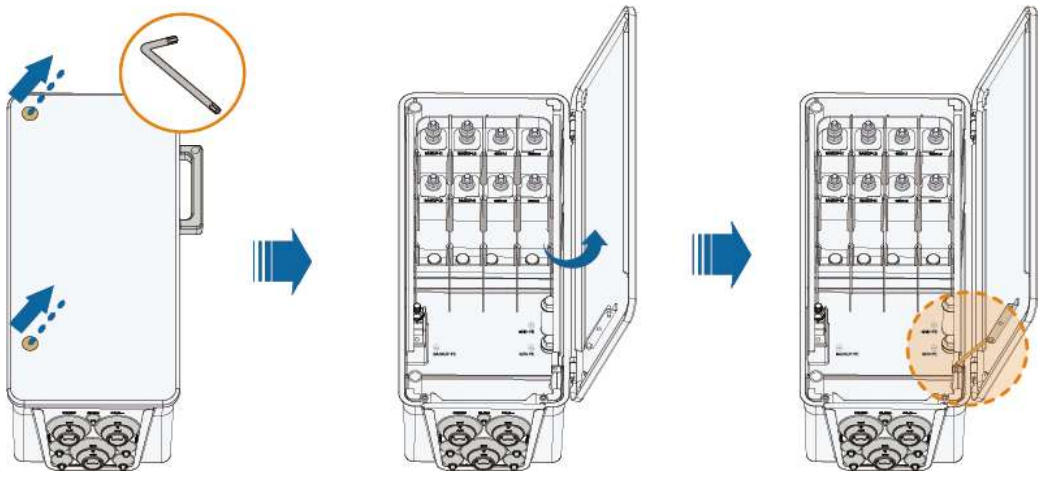
- For motor-type loads, wiring must strictly follow phase sequence requirements to ensure that the phase sequence remains consistent from the inverter's AC terminals to the load. Specifically, the inverter's L1, L2, and L3 must be connected to the load's L1, L2, and L3 in the correct order; otherwise, device malfunctions may occur.
- If abnormal operation is observed, power off the inverter first. Then interchange any two phase conductors on the grid side (or at the grid terminals of the distribution cabinet). If the issue persists, adjust the phase conductors on the load side following the same steps.Repeat this adjustment process until the load operates normally.
- When a parallel system with all backup ports one load, the AC cable length from inverter grid/backup port to the busbar should be kept as equal as possible.

7.6.3.1 Wiring Steps (for 8-hole terminal block/ multi-core cable)

This section gives instructions on wiring using a five-core cable. These steps apply to the four-core cable as well.

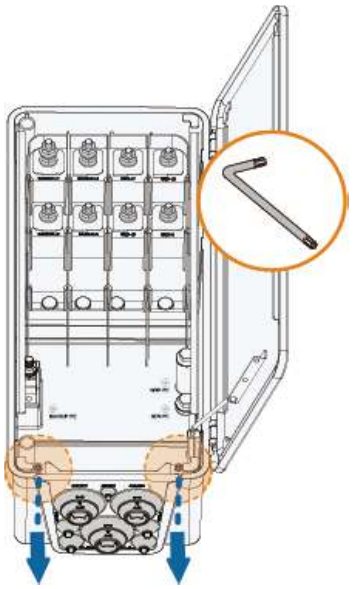
Step 1 Switch off the AC side circuit breaker and prevent it from switching on inadvertently.

Step 2 Loosen the two screws on the front door of the junction box using the Allen wrench (included in the scope of delivery). Then, open the door of the junction box. During wiring, ensure the retaining rod on the junction box keeps its door open.



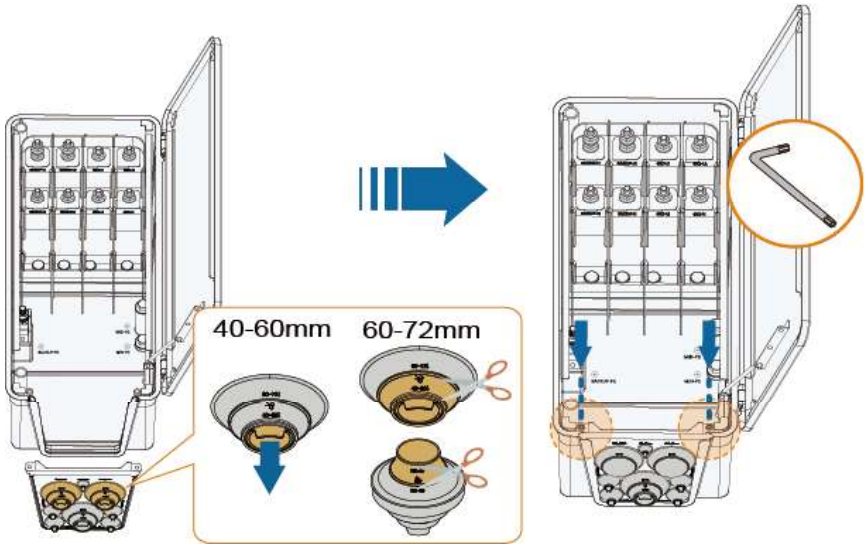
The screws on the door of the junction box are captive screws. After the door is opened, the screws stay on the door and hence will not be lost.

Step 3 Loosen the screws on the bottom sealing plate using the Allen wrench and take the plate out.



The screws on the sealing plate are captive screws. After the sealing plate is removed, the screws remain on the plate and will not be lost.

Step 4 Remove the sealing plug of the BACKUP/GRID terminal's rubber grommet as needed and secure the terminal block with screws.

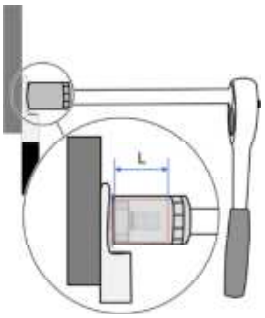


Step 5 Wire as needed in the following order:

NOTICE

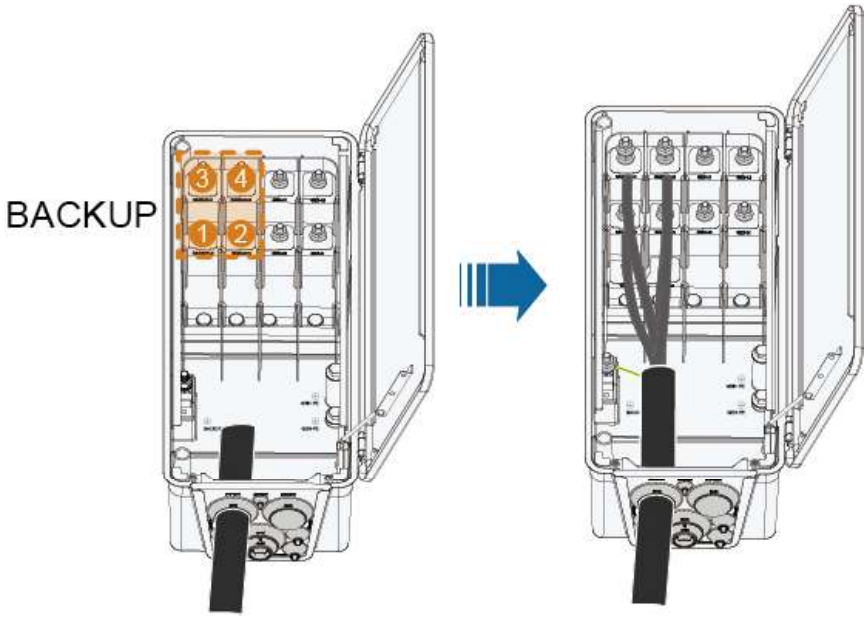
Pay attention to the connection of the PE and N wires. Connecting a phase wire to the terminal for the PE or N wire may lead to permanent damage to the inverter.

Ensure that the inner depth L of the socket used is ≥ 28mm.



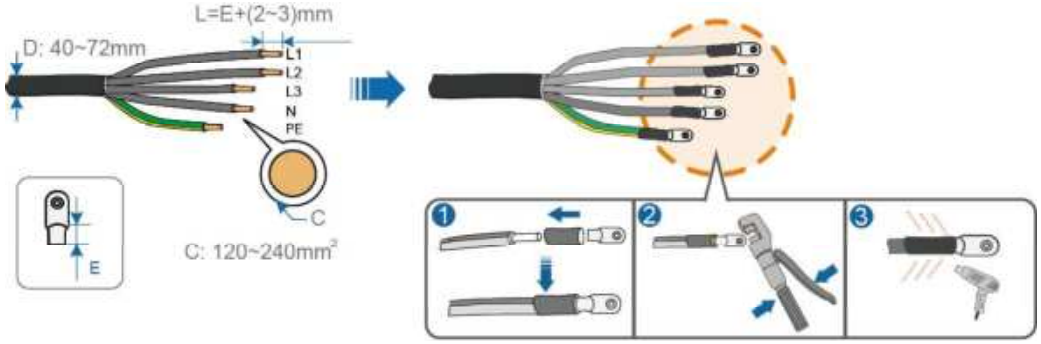
a. Connect the backup cable.

1. Pass the unstripped cable through the corresponding rubber grommet.



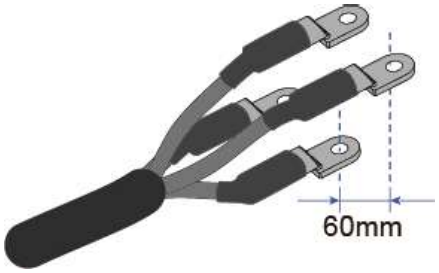
The numbering in the diagram indicates the wiring sequence only.

2. Strip the external protective layer of the AC cable inside the junction box, by referring to the figure below. Pass the stripped conductors through the heat shrink tubes and crimp the OT/DT terminals onto them.

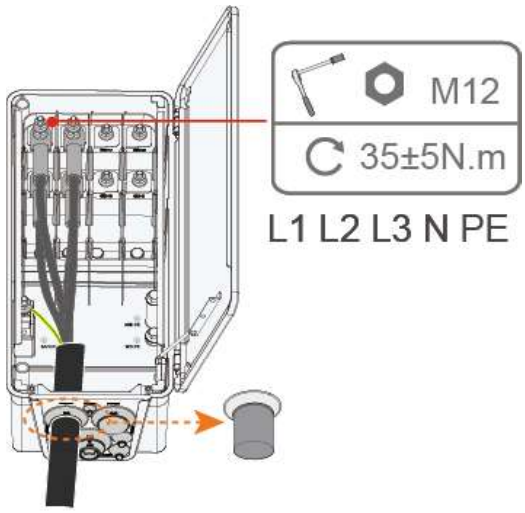


NOTICE

When using a multi-core cable, strip L1 and L2 conductors 60 mm longer than L3 and N conductors.

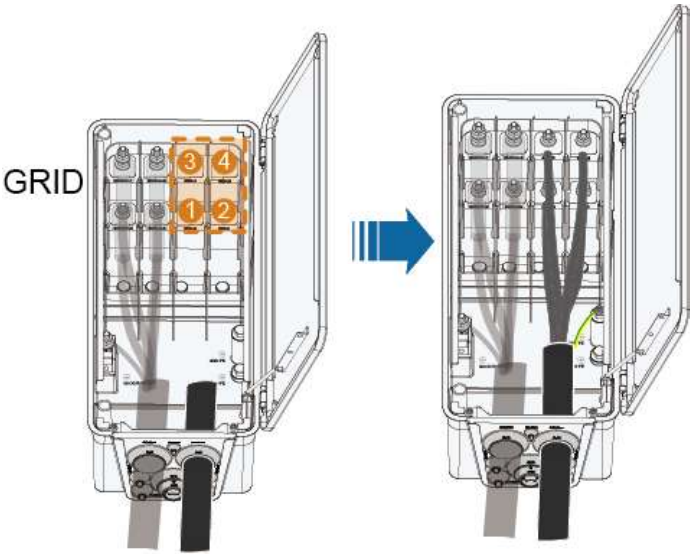


3. After crimping, gently pull the conductors back to verify that the rubber grommet is properly seated (outer side convex, inner side concave) and then fix them to the corresponding terminals.



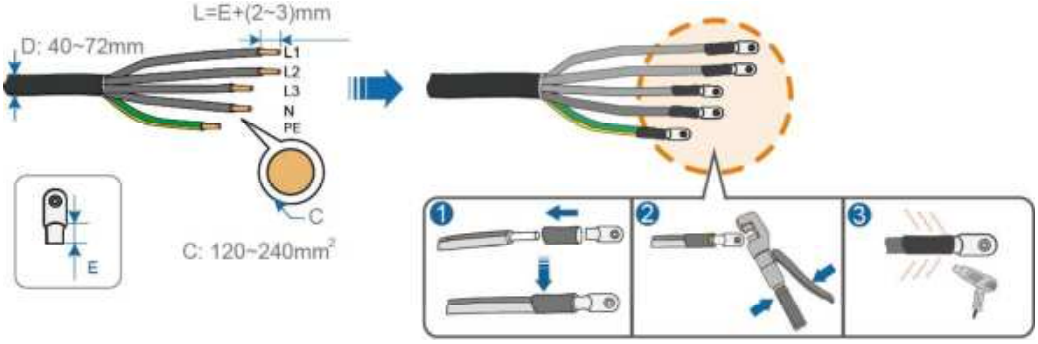
b. Connect the grid cable.

1. Pass the unstripped cable through the corresponding rubber grommet.



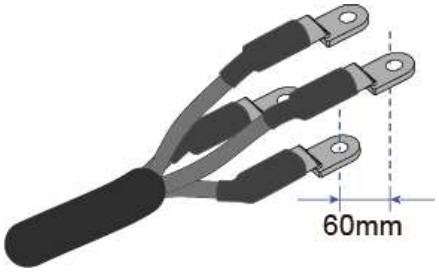
The numbering in the diagram indicates the wiring sequence only.

2. Strip the external protective layer of the AC cable inside the junction box, by referring to the figure below. Pass the stripped conductors through the heat shrink tubes and crimp the OT/DT terminals onto them.

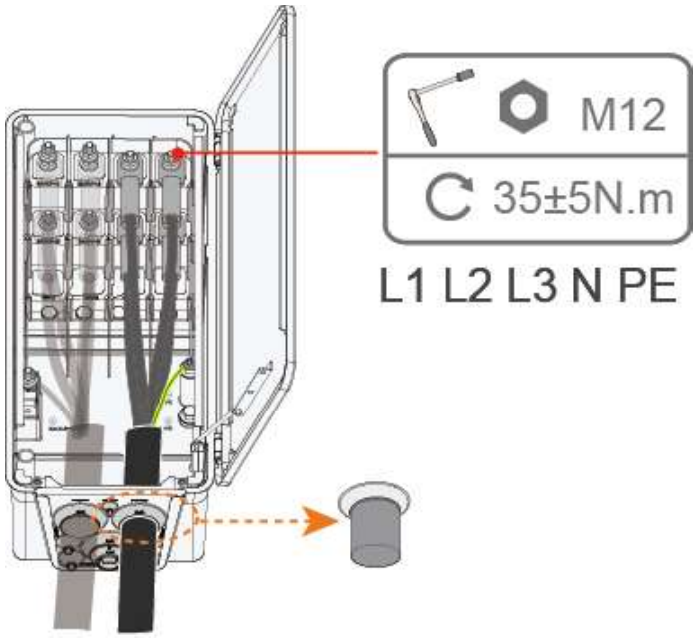


NOTICE

When using a multi-core cable, strip L1 and L2 conductors 60 mm longer than L3 and N conductors.



3. After crimping, gently pull the conductors back to verify that the rubber grommet is properly seated (outer side convex, inner side concave) and then fix them to the corresponding terminals.

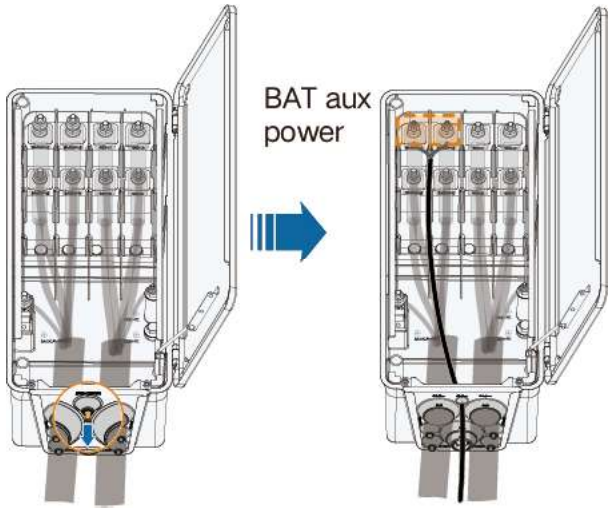


c. Connect the battery auxiliary power cable

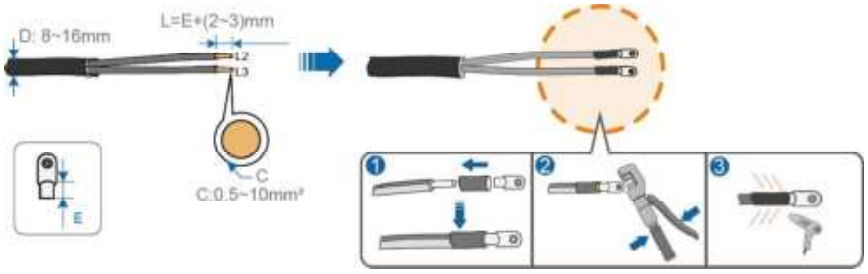
This step applies only to the supporting battery that needs to be powered from the BACKUP port.

Type	Outer Diameter (mm)	Cross-sectional area of conductor (mm^2)
Battery auxiliary power cable	8 - 16	0.5 -10

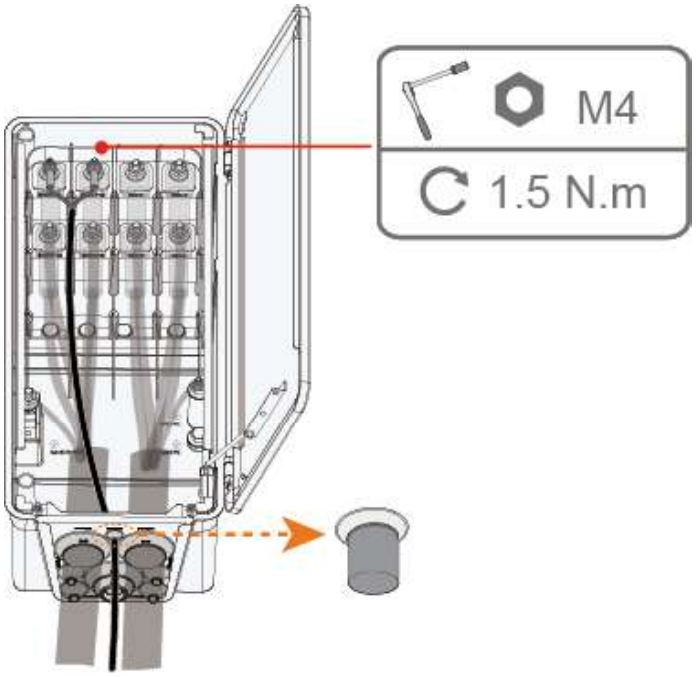
1. Remove the sealing plug of the battery auxiliary power terminal's rubber grommet, then pass the unstripped cable through the corresponding rubber grommet.



2. Strip the external protective layer of the AC cable inside the junction box, by referring to the figure below. Pass the stripped conductors through the heat shrink tubes and crimp the OT/DT terminals onto them.

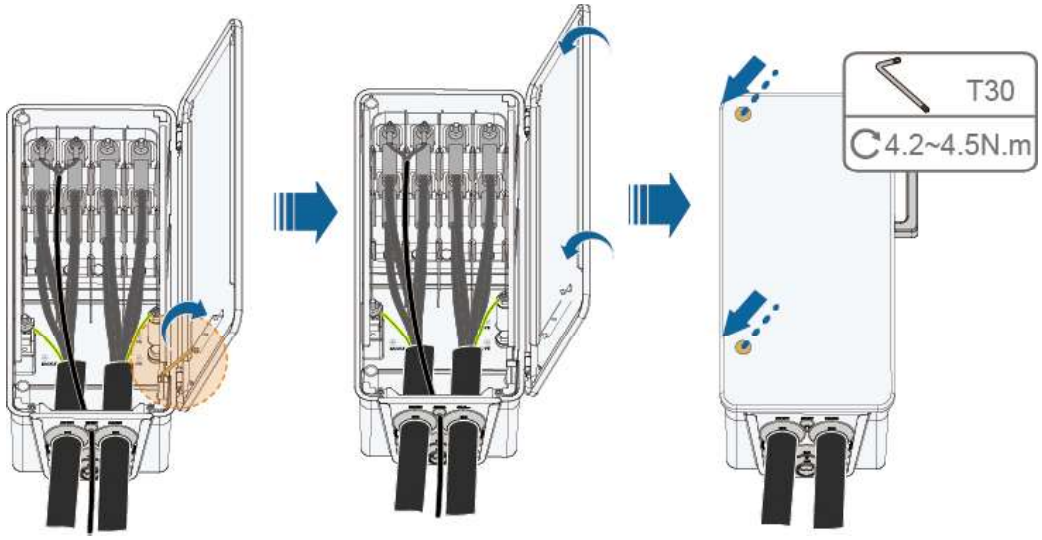


3. After crimping, gently pull the conductors back to verify that the rubber grommet is properly seated (outer side convex, inner side concave) and then fix them to the corresponding terminals.



Step 6 Apply fireproof mud around the rubber grommets where cables enter the terminal block.

Step 7 Remove the door retaining rod and put it back in its original position. Close the door of the junction box, and tighten the two screws on the door using the Allen wrench.



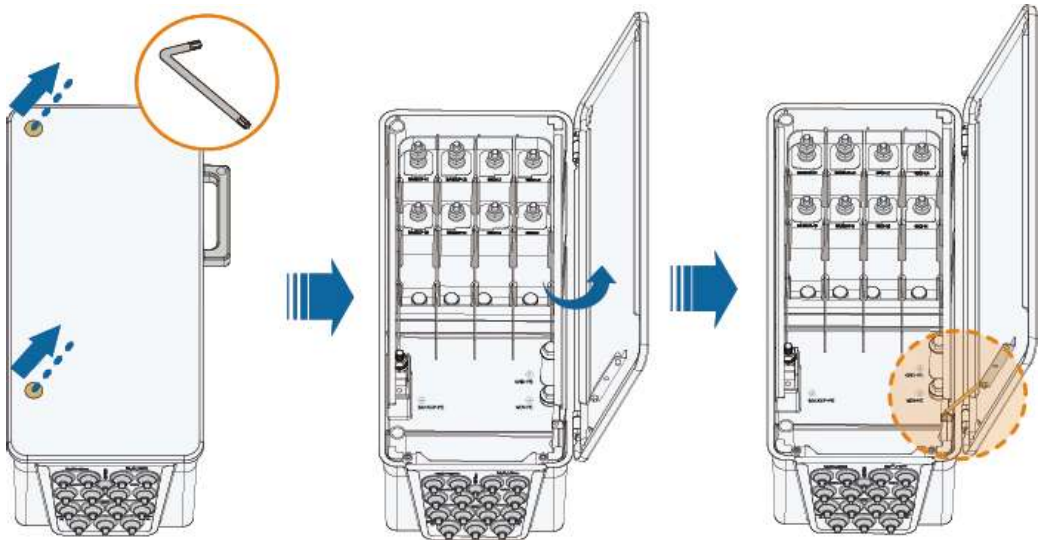
*The figures shown are for reference only. The actual product may differ.

--End

7.6.3.2 Wiring Steps (for 16-hole terminal block/ single-core cable)

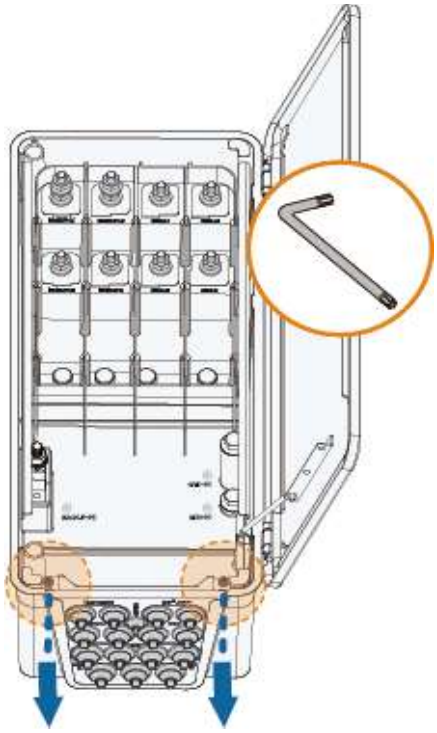
Step 1 Switch off the AC side circuit breaker and prevent it from switching on inadvertently.

Step 2 Loosen the two screws on the front door of the junction box using the Allen wrench (included in the scope of delivery). Then, open the door of the junction box. During wiring, ensure the retaining rod on the junction box keeps its door open.



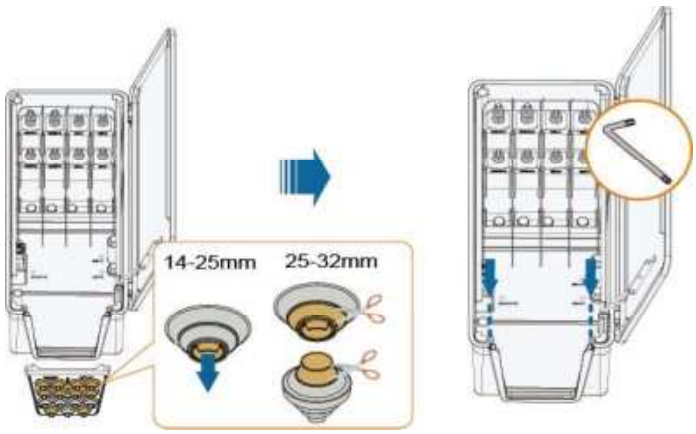
The screws on the door of the junction box are captive screws. After the door is opened, the screws stay on the door and hence will not be lost.

Step 3 Loosen the screws on the bottom sealing plate using the Allen wrench and take the plate out.



The screws on the sealing plate are captive screws. After the sealing plate is removed, the screws remain on the plate and will not be lost.

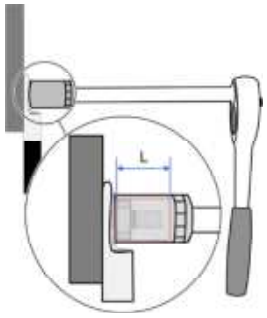
Step 4 Remove the sealing plug of the PE/BACKUP/GRID terminal's rubber grommet as needed, secure the terminal block with screws. Wire as needed in the following order:



NOTICE

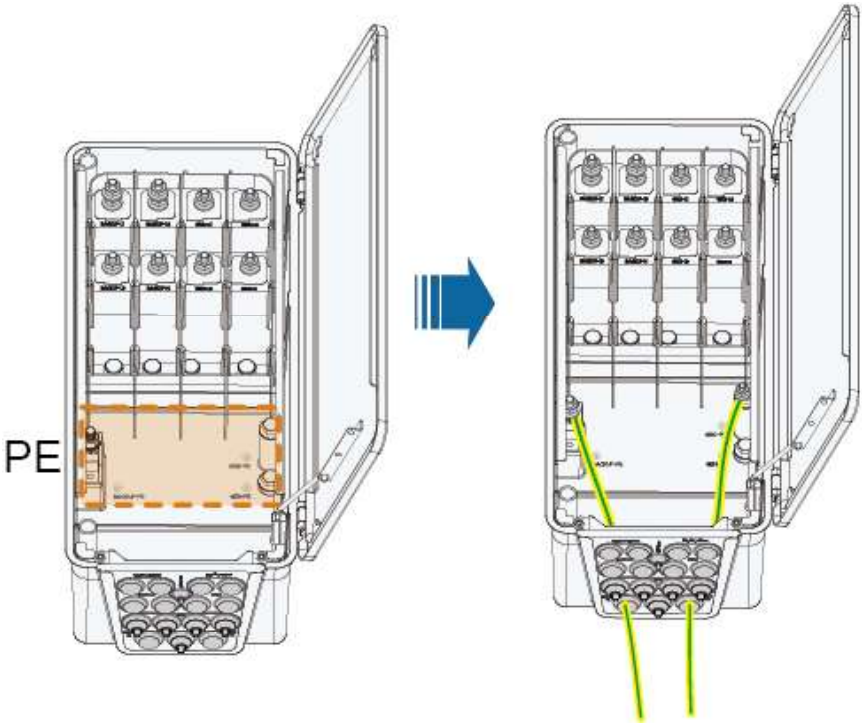
Pay attention to the connection of the PE and N wires. Connecting a phase wire to the terminal for the PE or N wire may lead to permanent damage to the inverter.

Ensure that the inner depth L of the socket used is ≥ 28mm.

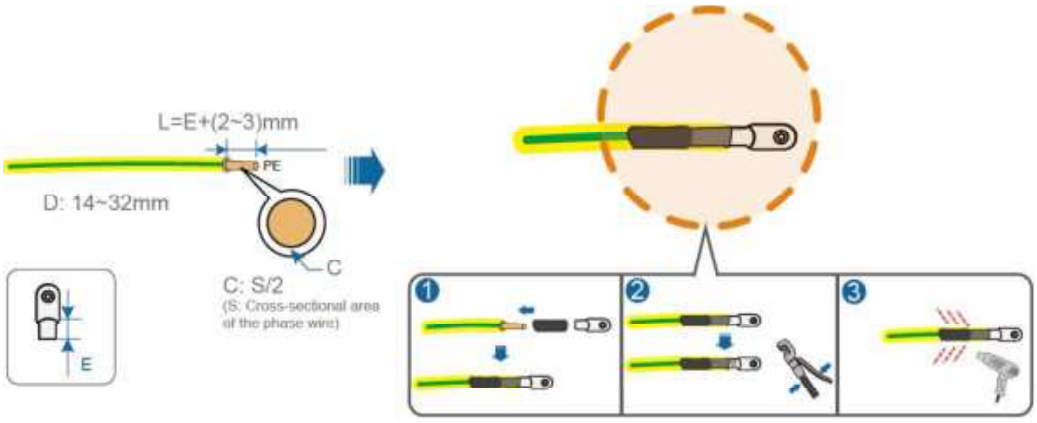


a. Connect the PE cable

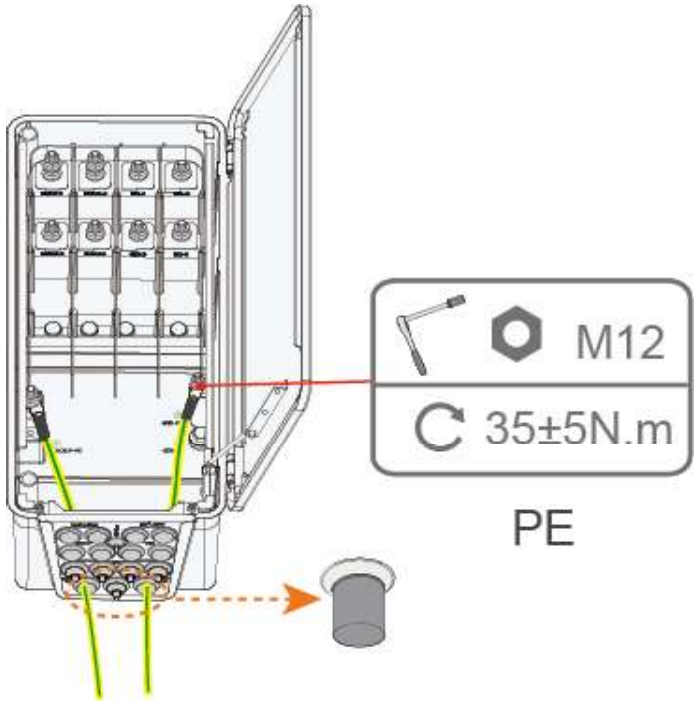
1. Pass the unstripped cable through the corresponding rubber grommet.



2. Strip the external protective layer of the PE cable inside the junction box, by referring to the figure below. Pass the stripped conductors through the heat shrink tubes and crimp the OT/DT terminals onto them.

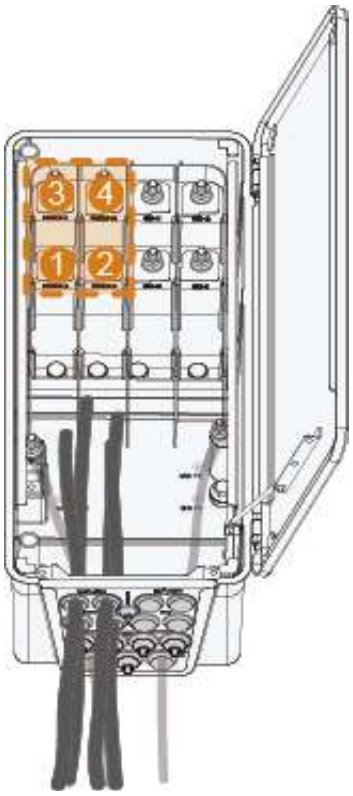


3. After crimping, gently pull the conductors back to verify that the rubber grommet is properly seated (outer side convex, inner side concave) and then fix them to the corresponding terminals.



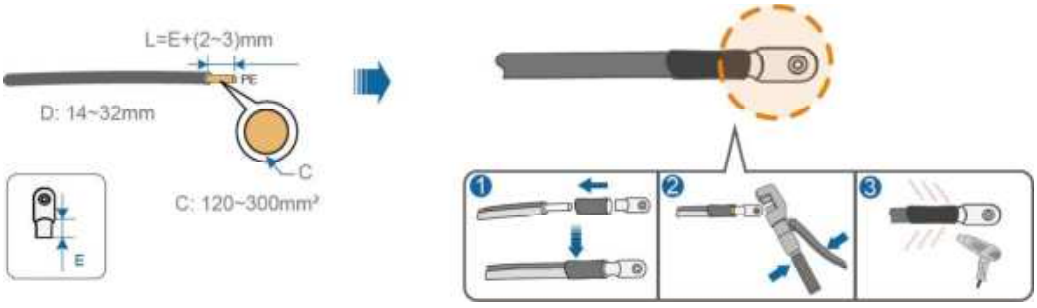
b. Connect the backup cable.

1. Pass the unstripped cable through the corresponding rubber grommet.

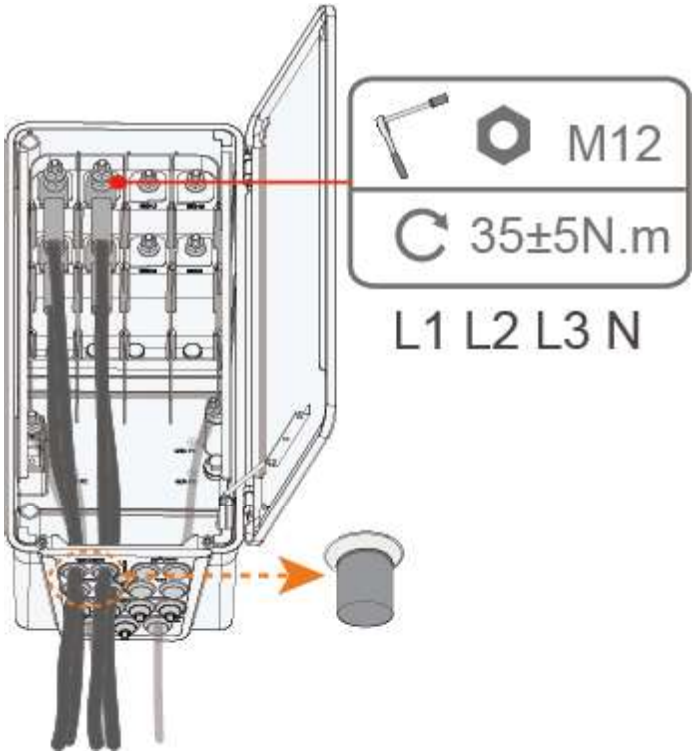


The numbering in the diagram indicates the wiring sequence only.

2. Strip the external protective layer of the AC cable inside the junction box, by referring to the figure below. Pass the stripped conductors through the heat shrink tubes and crimp the OT/DT terminals onto them.

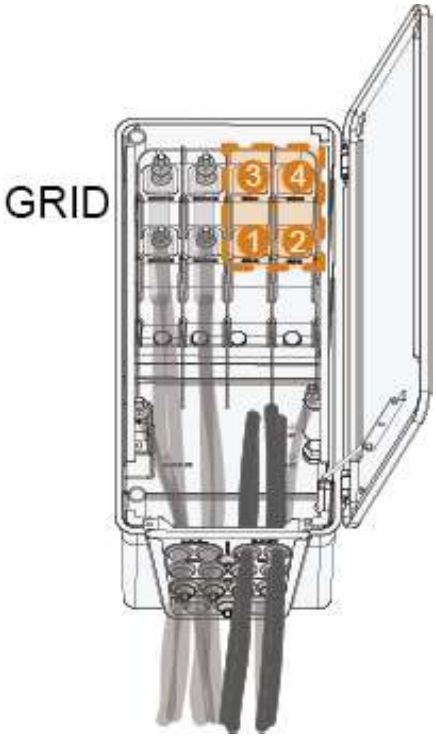


3. After crimping, gently pull the conductors back to verify that the rubber grommet is properly seated (outer side convex, inner side concave) and then fix them to the corresponding terminals.



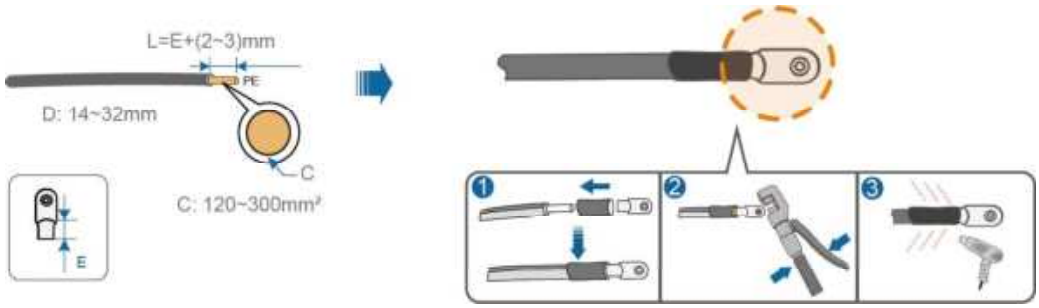
c. Connect the grid cable.

1. Pass the unstripped cable through the corresponding rubber grommet.



The numbering in the diagram indicates the wiring sequence only.

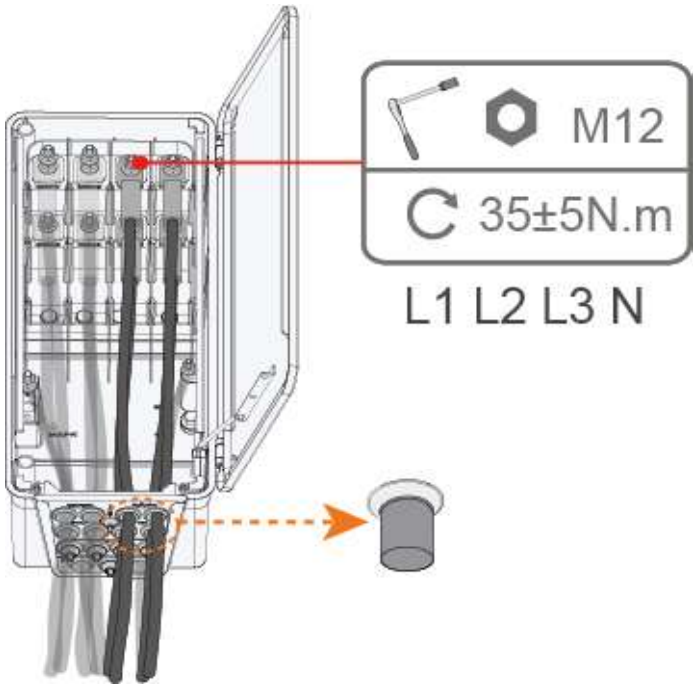
2. Strip the external protective layer of the AC cable inside the junction box, by referring to the figure below. Pass the stripped conductors through the heat shrink tubes and crimp the OT/DT terminals onto them.



NOTICE

After crimping, ensure the center points of all OT/DT terminals are aligned horizontally.

3. After crimping, gently pull the conductors back to verify that the rubber grommet is properly seated (outer side convex, inner side concave) and then fix them to the corresponding terminals.

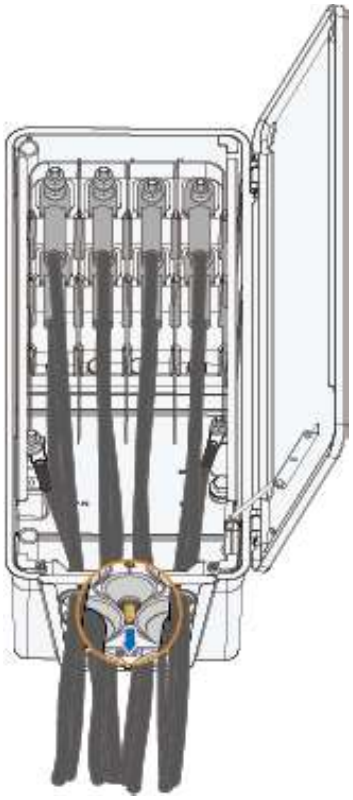


d. Connect the battery auxiliary power cable

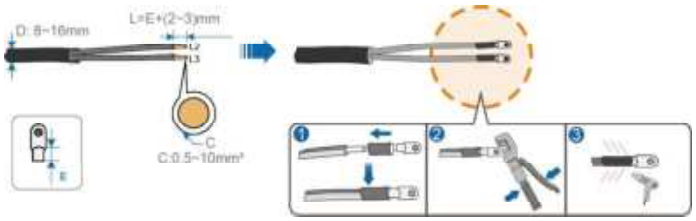
This step applies only to the supporting battery that needs to be powered from the BACKUP port.

Type	Outer Diameter (mm)	Cross-sectional area of conductor (mm^2)
Battery auxiliary power cable	8 - 16	0.5 -10

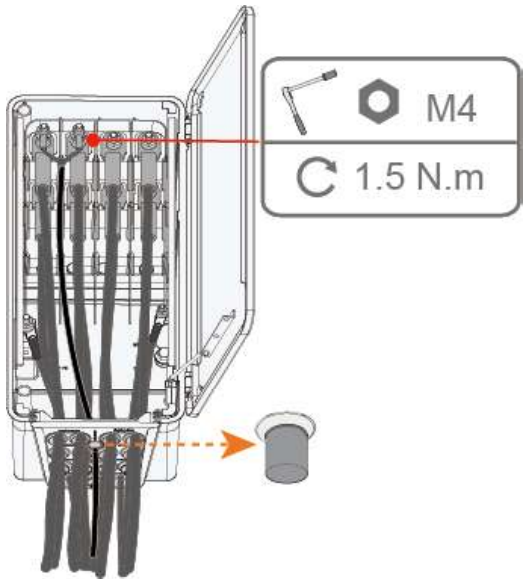
1. Remove the sealing plug of the battery auxiliary power terminal's rubber grommet, secure the terminal block with screws, then pass the unstripped cable through the corresponding rubber grommet.



2. Strip the external protective layer of the AC cable inside the junction box, by referring to the figure below. Pass the stripped conductors through the heat shrink tubes and crimp the OT/DT terminals onto them.

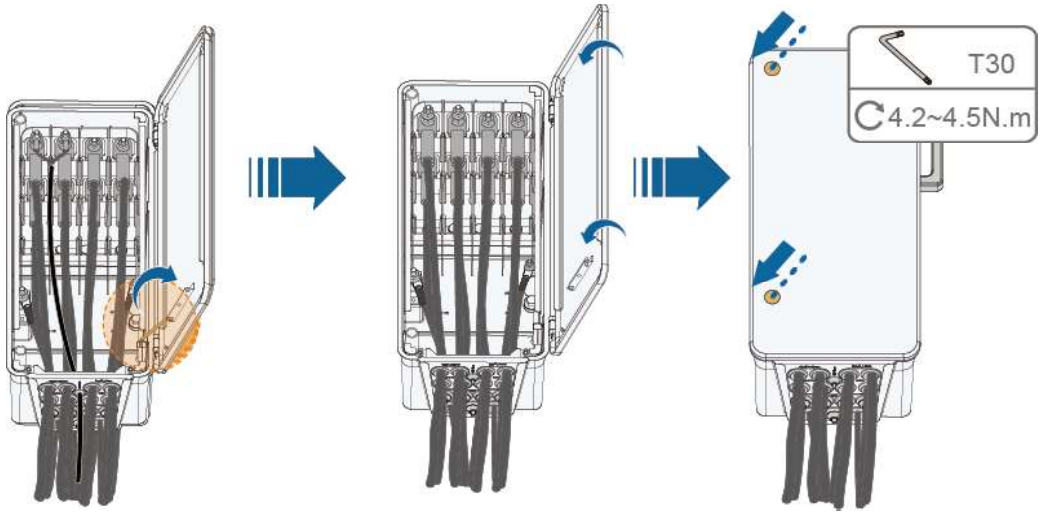


3. After crimping, gently pull the conductors back to verify that the rubber grommet is properly seated (outer side convex, inner side concave) and then fix them to the corresponding terminals.



Step 5 Apply fireproof mud around the rubber grommets where cables enter the terminal block.

Step 6 Remove the door retaining rod and put it back in its original position. Close the door of the junction box, and tighten the two screws on the door using the Allen wrench.



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

--End

7.7 DC Cable Connection

DANGER

Hazardous voltages on the PV string when it is exposed to sunlight!

- **Observe all the safety instructions listed in the documents for the PV string and other relevant documents.**

⚠ WARNING

- **Make sure the PV array is well insulated to the ground before connecting it to the inverter.**
- **Make sure the maximum DC voltage and the maximum short circuit current of any string never exceed inverter permitted values specified in "Technical Data."**
- **Check the positive and negative polarity of the PV strings, and connect the PV connectors to corresponding terminals only after ensuring polarity correctness.**
- **During the installation and operation of the inverter, please ensure that the positive or negative electrodes of PV strings do not short-circuit to the ground. Otherwise, an AC or DC short-circuit may occur, resulting in equipment damage. The damage caused by this is not covered by the warranty.**
- **Electric arc or contactor over-temperature may occur if the DC connectors are not firmly in place, and the loss caused is not covered by the warranty.**
- **If the DC input polarity is reversed or both the positive and negative terminals of different MPPTs are shorted to ground while the DC switches are set to the ON position, do not operate the inverter immediately, as this may cause damage. Wait until string current drops below 0.5 A, turn DC switches OFF, and disconnect the DC connectors to adjust string polarity.**
- **The inverter does not support the full parallel connection of PV strings (Full parallel connection refers to a connection method in that strings are connected in parallel and then connected to the inverter separately).**
- **Do not connect one PV string to multiple inverters. Otherwise, the inverters may be damaged.**

NOTICE

The following requirements about PV string connection must be met. Otherwise, it may cause irreversible damage to the inverter, which is not covered by the warranty.

- **Mixed use of different brand or model of PV modules in one MPPT circuit, or PV modules of different orientation or angles in a string will not necessarily damage the inverter but may degrade system performance.**
- **The inverter enters standby state when the input voltage ranges between 1000 V and 1100 V. The inverter returns to running state once the voltage returns to the MPPT operating voltage range (180 V to 1000 V).**

NOTICE

Note the following items when laying out cables on site:

- **The axial tensile force of DC cables on PV DC connectors must be <80 N.**
- **Avoid prolonged axial stress on connectors during wiring.**
- **Maintain ≥50 mm unbent length at cable roots to prevent bending-induced stress from affecting waterproofing.**
- **Follow the cable manufacturer's requirements for minimum bending radius. If <50 mm, enforce 50 mm (connector requirement); if >50 mm, follow the cable's actual minimum bending radius.**

7.7.1 PV Input Configuration

- The inverter supports multiple PV inputs and provides MPP trackers for all PV inputs, as shown in the figure below.
- The inverter offers several independently operating MPPTs for the PV inputs. Therefore, the configuration of PV strings, such as the model and number of PV modules and tilt and azimuth angles, connected to one MPPT can be different from those connected to another.
- Up to 2 PV strings can be connected to one MPPT. For the best use of their input power, make sure the PV strings connected to the same MPPT are identical in configuration, such as the model and number of PV modules and tilt and azimuth angles.
- The voltage difference between the maximum MPPT voltage and the minimum MPPT voltage shall be ≤ 250V, and there is no limitation on MPPT current.

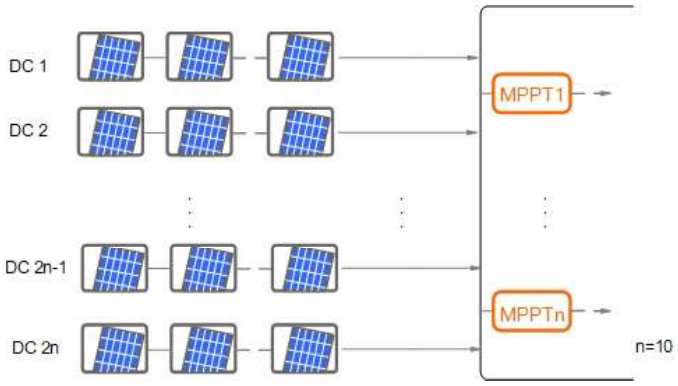
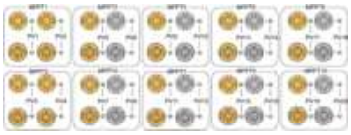
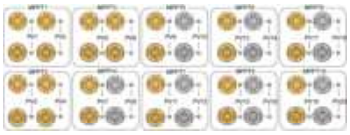
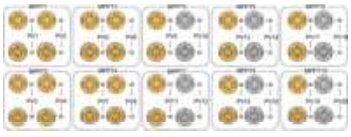


Figure 7-4 PV Input Configuration

Prior to connecting the PV strings to the inverter, make sure the strings all meet the below requirements:

Open-circuit Voltage Limit of Each Input	Max. Current for Input Connector
1100 V	30 A

If the number of PV strings is 10 to 20 for SH110/125CX, i, it is recommended to perform DC input wiring by referring to the table below.

Number of PV Strings	DC PV Terminals	Number of PV Strings	DC PV Terminals
10	Connect to PV1, PV3, PV5, PV7, PV9, PV11, PV13, PV15, PV17, PV19 	11	Connect to PV1, PV2, PV3, PV5, PV7, PV9, PV11, PV13, PV15, PV17, PV19 
12	Connect to PV1, PV2, PV3, PV4, PV5, PV7, PV9, PV11, PV13, PV15, PV17, PV19 	13	Connect to PV1, PV2, PV3, PV4, PV5, PV6, PV7, PV9, PV11, PV13, PV15, PV17, PV19 
14	Connect to PV1, PV2, PV3, PV4, PV5, PV6, PV7, PV8, PV9, PV11, PV13, PV15, PV17, PV19 	15	Connect to PV1, PV2, PV3, PV4, PV5, PV6, PV7, PV8, PV9, PV10, PV11, PV13, PV15, PV17, PV19 
16	Connect to PV1, PV2, PV3, PV4, PV5, PV6, PV7, PV8, PV9, PV10, PV11, PV12, PV13, PV15, PV17, PV19 	17	Connect to PV1, PV2, PV3, PV4, PV5, PV6, PV7, PV8, PV9, PV10, PV11, PV12, PV13, PV14, PV15, PV17, PV19 
18	Connect to PV1, PV2, PV3, PV4, PV5, PV6, PV7, PV8, PV9, PV10,	19	Connect to PV1, PV2, PV3, PV4, PV5, PV6, PV7, PV8,

Number of PV Strings	DC PV Terminals	Number of PV Strings	DC PV Terminals
	PV11, PV12, PV13, PV14, PV15, PV16, PV17, PV19 		PV9, PV10, PV11, PV12, PV13, PV14, PV15, PV16, PV17, PV18, PV19 
20	Connect to PV1, PV2, PV3, PV4, PV5, PV6, PV7, PV8, PV9, PV10, PV11, PV12, PV13, PV14, PV15, PV16, PV17, PV18, PV19, PV20 		

The inverter does not support the connection of strings connected in parallel externally.

7.7.2 Assemble DC Connector (MC4)

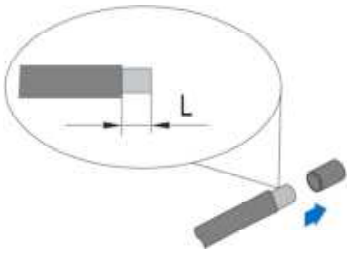
Prerequisite

⚠ CAUTION

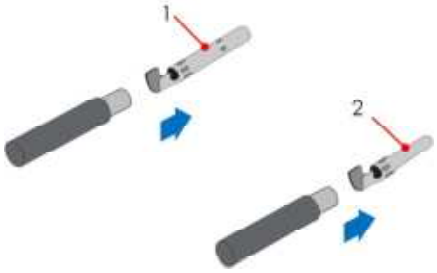
- **If the maximum DC input voltage does not exceed 1000 V, use the MC4 DC terminals included with the shipment.**
- **Use MC4-Evo2 DC terminals if the maximum input voltage is greater than 1000 V. To purchase the MC4-Evo2 DC terminals, please contact SUNGROW.**
- **Using incorrect connectors may result in device damage and will void the warranty.**

To ensure the inverter operates to an ingress protection rating of IP66, use the connectors that come with the product only.

Step 1 Strip the insulation layer of the DC cable by a length of about 7 mm.



Step 2 Crimp the terminal onto the cable.



(1) Positive crimp contact (2) Negative crimp contact

Step 3 Lead the cable through the cable gland, and insert the cable into the insulator until it snaps into place. Pull gently the cable backward to make sure the connection is secure. Tighten the cable gland and the insulator at a torque of 3.4–3.5 N.m.

Step 4 Check and confirm that the PV string cables are connected in the correct polarity.

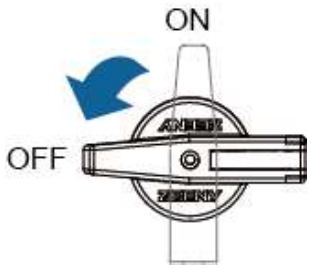
NOTICE

The inverter will report a fault or alarm and not function properly if the positive and negative DC input cables are connected reversely.

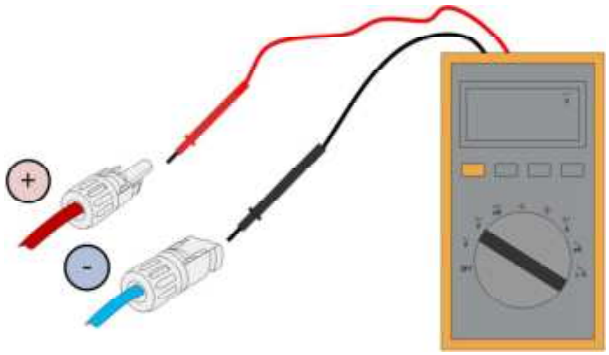
--End

7.7.3 Installing PV Connector

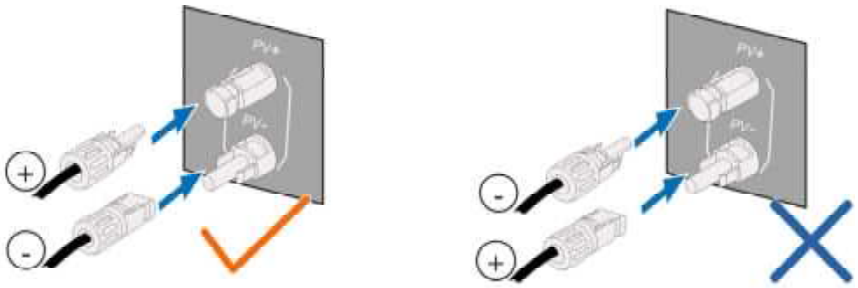
Step 1 Rotate the DC switch to "OFF".



Step 2 Check that the cables of the PV strings are connected in the correct polarity. Ensure the open-circuit voltage does not exceed the inverter upper-limit input voltage of 1100 V.



Step 3 Connect the DC PV connectors to the corresponding terminals until there is an audible click.



Step 4 Connect the cables of other PV strings by following the steps above.

Step 5 Close off the unused PV terminals with the waterproof plugs.

--End

7.8 Battery Connection

7.8.1 Electrical Connection Requirements

This section covers the battery cable connections on the inverter side. For battery-side wiring and configuration, refer to the battery manufacturer's manual.

⚠ WARNING

Use appropriate insulated tools to prevent electric shock or short circuit. If insulated tools are unavailable, cover the exposed metal parts (except the tip) entirely with electrical tape.

⚠ WARNING

Only trained electricians may connect the plug connectors.

⚠ WARNING

- **Never disconnect under load.**
- **Battery connectors must not be disconnected under load; they can only be disconnected when the inverter is fully shut down and in no-load condition.**

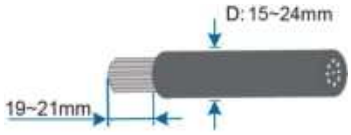
⚠ WARNING

During installation and operation of the inverter, ensure that the battery's positive and negative terminals do not short to ground. Otherwise, a short circuit may occur, resulting in device damage. Damage caused by such incidents is not covered under warranty.

- If the inverter is not connected to a battery, it cannot provide reliable backup power.
- The battery must be grounded through the building's PE bar and not directly to the PE terminal of the inverter.
- The battery does not backfeed into the PV modules.

7.8.2 Assemble Battery Connector

Step 1 Strip off the jacket of the cable.



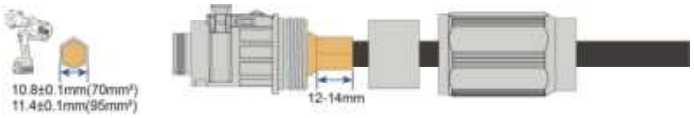
Step 2 Loosen the nut on the connector, and put the nut and the grommet on the cable.

Outer Diameter D(mm)	Sealing Rings
15~18	a+b+c
18~21	a+b

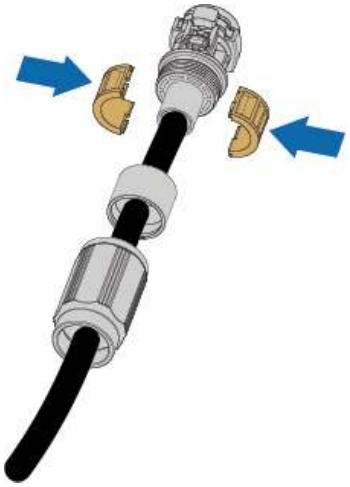
Outer Diameter D(mm)	Sealing Rings
21~24	a

Step 3 Insert the conductor into the cable lug.

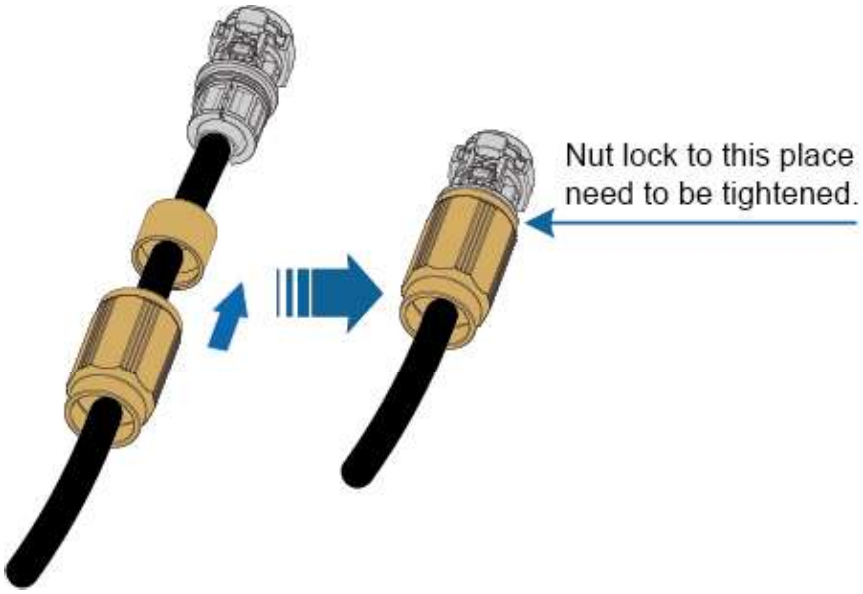
Step 4 Crimp the lug as shown.



Step 5 Place the support over the crimped area.



Step 6 Push the grommet and the nut into the plug, then screw it.



Step 7 Match plug and socket. Insert the connector into the **BAT+** and **BAT-** terminals.

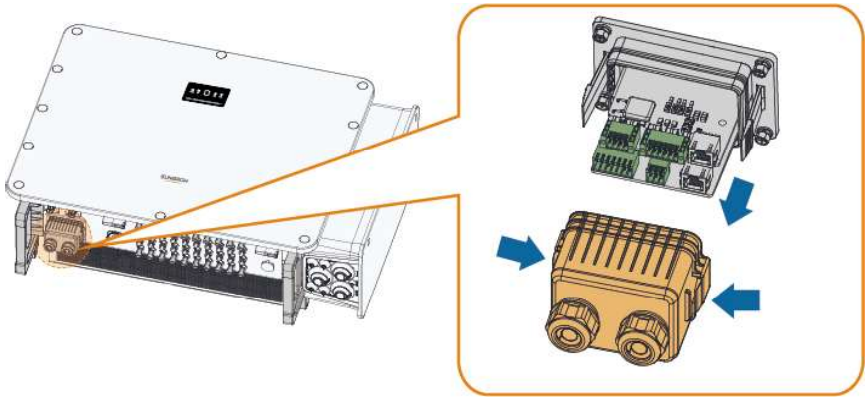
--End

7.9 Communication Connection

7.9.1 Communication Terminal Cover

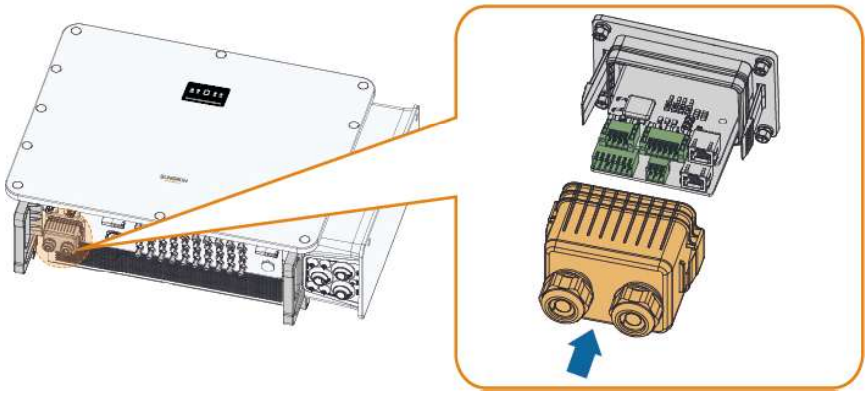
Remove the communication terminal cover

Squeeze firmly both on sides of the communication terminal cover, and then pull the cover out.



Mount the communication terminal cover

Put the cover back in its original position and press it to make it secure in place.



7.9.2 Communication Wiring Area

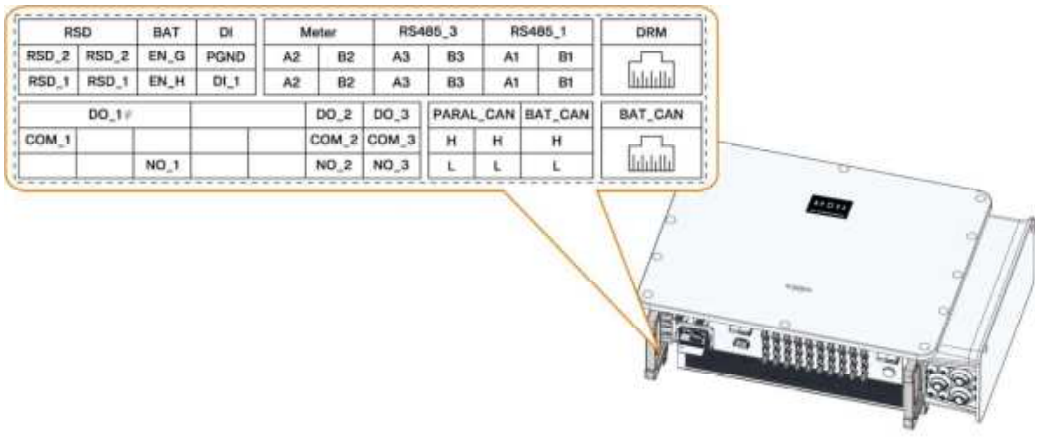
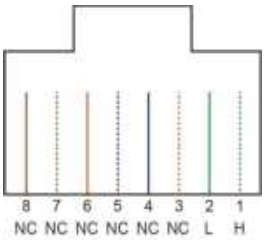


Table 7-2 Terminal Description

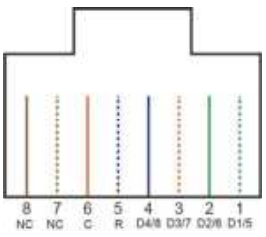
Label	Description
RSD	Connect an external switch to enable the emergency stop function.
BAT	Reserved.

Label	Description
DI	Reserved.
Meter	Connect to the Smart Energy Meter.
RS485_3	Reserved.
RS485_1	The RS485 communication port is used only for the parallel connection of SUNGROW hybrid inverters.
DO_1	Grounding fault/alarm.
DO_2	Reserved.
DO_3	Reserved.
PARAL_CAN	For parallel communication between inverters.
BAT_CAN	To enable the communication between the inverter and the Li-on battery.
DRM	• "AU"/"NZ": Demand response enabling device (DRED) • "DE": NS protection • "DE": Ripple Control Receiver (RCR)

Table 7-3 The label of RJ45 terminal



RJ45–BAT_CAN							
NC	NC	NC	NC	NC	NC	L	H
8	7	6	5	4	3	2	1



RJ45–DRM							
NC	NC	C	R	D4/8	D3/7	D2/6	D1/5
8	7	6	5	4	3	2	1

7.9.3 RS485 Communication Connection

7.9.3.1 Interface Description

The RS485 communication interfaces of the inverter are shown in the figure.

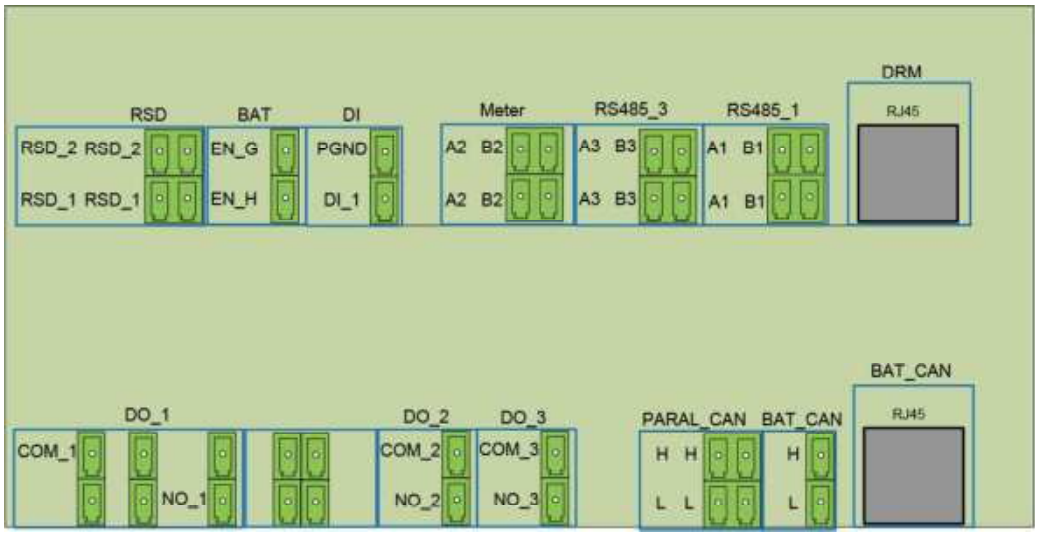


Table 7-4 RS485_1 Terminal Block

No.	Definition
A1	RS485A OUT, RS485A differential signal (+)
A1	RS485A IN, RS485A differential signal (+)
B1	RS485B OUT, RS485B differential signal (-)
B1	RS485B IN, RS485B differential signal (-)

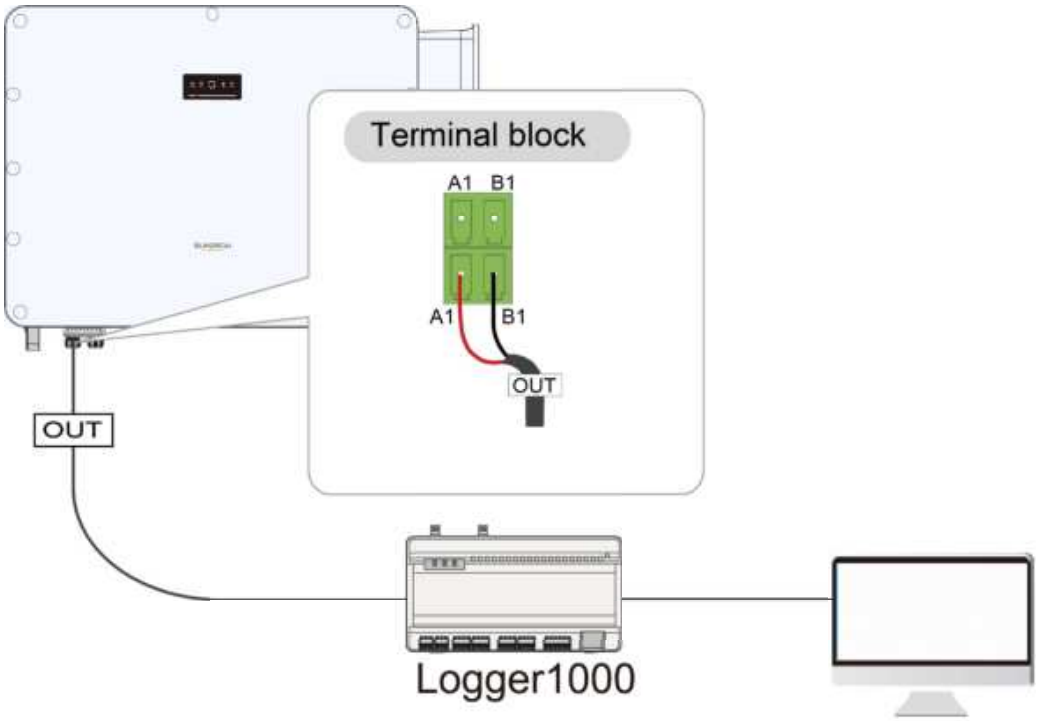
Table 7-5 RS485_3 Terminal Block

No.	Definition
A3	RS485A OUT, RS485A differential signal (+)
A3	RS485A IN, RS485A differential signal (+)
B3	RS485B OUT, RS485B differential signal (-)
B3	RS485B IN, RS485B differential signal (-)

7.9.3.2 RS485 Communication Wiring

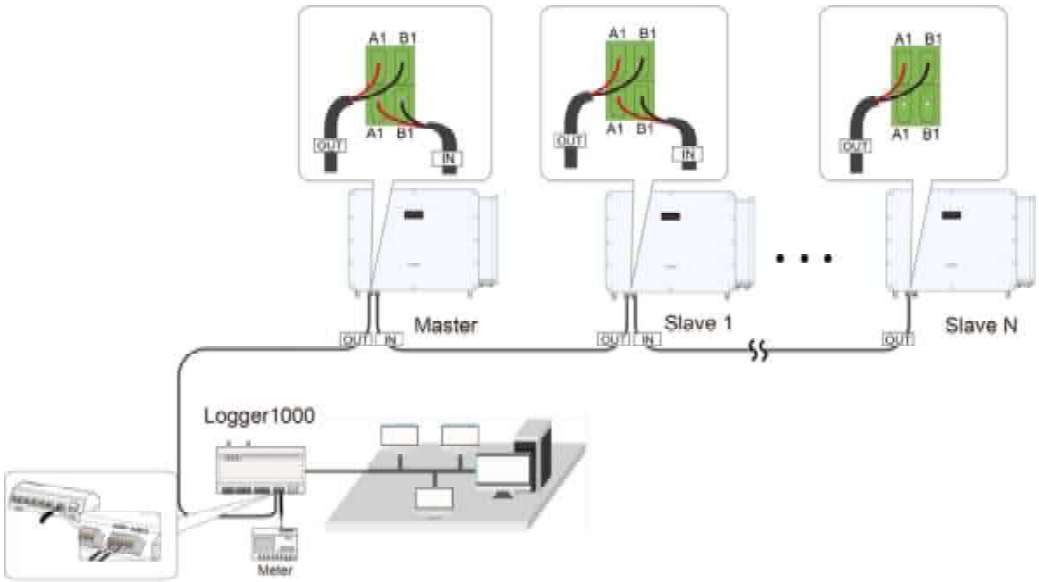
RS485 Communication of One Inverter

Where only one inverter engages in the communication, only one RS485 communication cable is required for wiring.



Multi-inverter Communication System

Where multiple inverters engage in the communication, connect the inverters in a daisy chain using RS485 communication cables.



The RS485 communication cable should not be longer than 1200m.
If multiple inverters are connected to the intelligent communication box for communication, the maximum number of daisy chains and connected devices should meet the relevant requirements (see the user manual for the communication box).

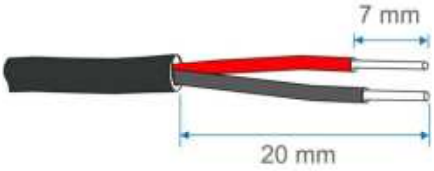
7.9.3.3 Wiring Steps (Terminal Block)

7.9.3.3.1 Wiring Steps for Shielded Twisted Pair

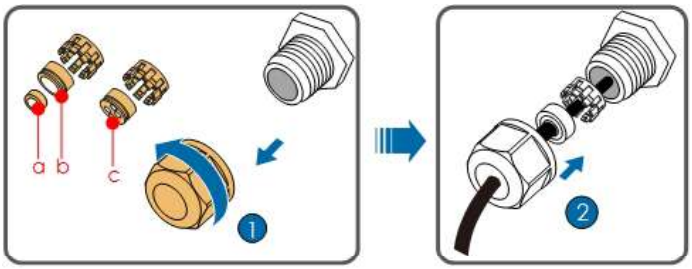
Step 1 Remove the communication terminal box.

Step 2 Unscrew the swivel nut on the terminal cover and select an appropriate sealing ring according to the outer diameter of the cable.

Step 3 Strip the protection layer and insulation layer by specific length.

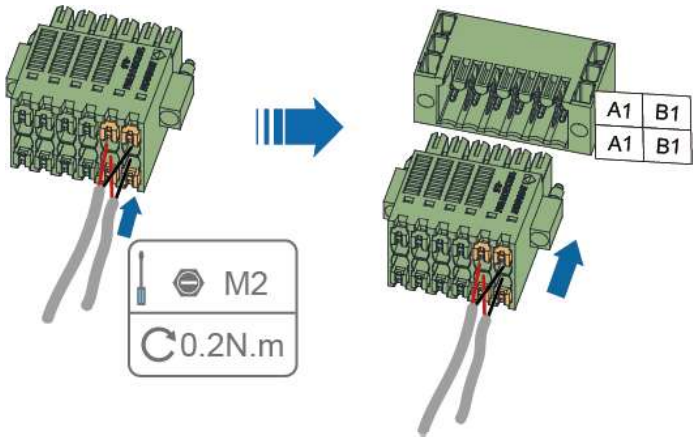


Step 4 Lead the cable through the swivel nut, the sealing ring, and then the opening on the terminal cover.



Cable Diameter D (mm)	Sealing Ring
4.5–6	c
6–12	a+b
12–18	b

Step 5 Fix the wires to the corresponding positions in the terminal block plug.



Step 6 Insert the plug into the corresponding terminal block socket.

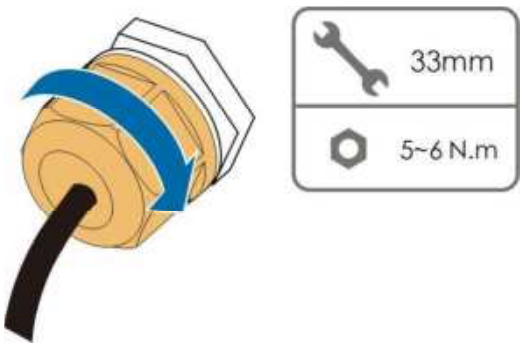
Table 7-6 Terminal Definition

No.	Definition
1	RS485 A (+)
2	RS485 A (+)
3	RS485 B (-)
4	RS485 B (-)

Step 7 If there are other cables that need to be connected to the communication wiring area, skip the steps below and complete the connections of those cables first. If not, proceed with the following steps.

Step 8 Mount back the communication terminal cover by referring to 7.9.1 Communication Terminal Cover.

Step 9 Pull gently the cables backward and tighten the swivel nut clockwise.



Incorrect cable connection will cause abnormalities in the power flow diagram. In this case, please check the wiring.

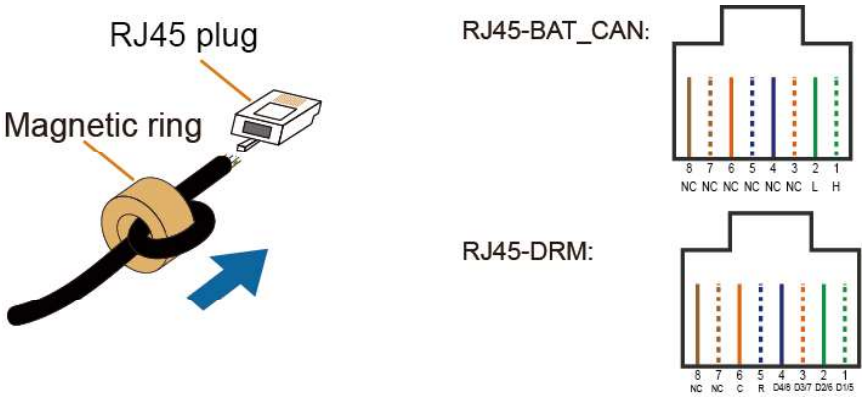
--End

7.9.3.3.2 Wiring Steps for Network Cable

Step 1 Remove the communication terminal box.

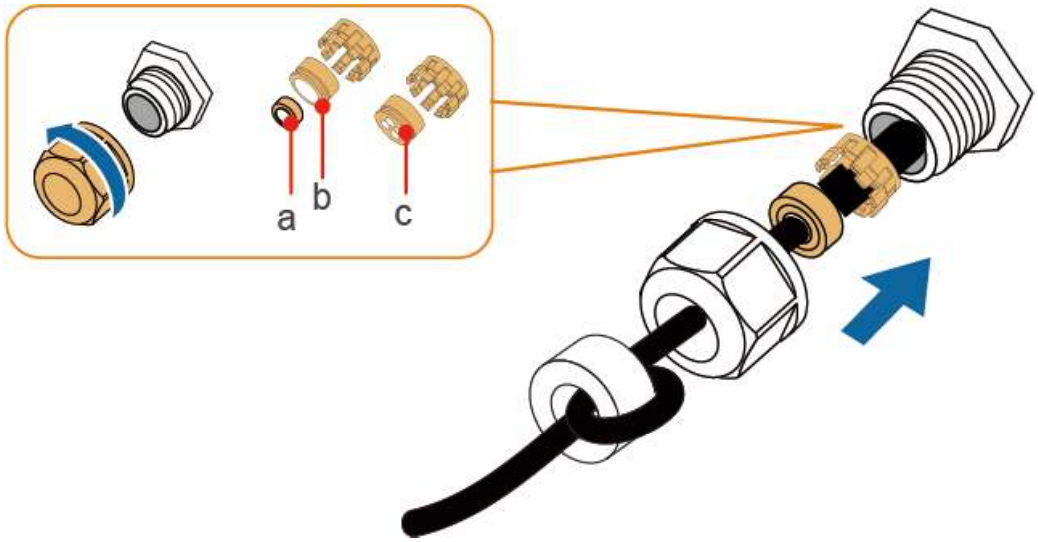
Step 2 Unscrew the swivel nut on the terminal cover and select an appropriate sealing ring according to the outer diameter of the cable.

Step 3 Pass the network cable through the magnetic ring and wrap it around the magnetic ring one time.



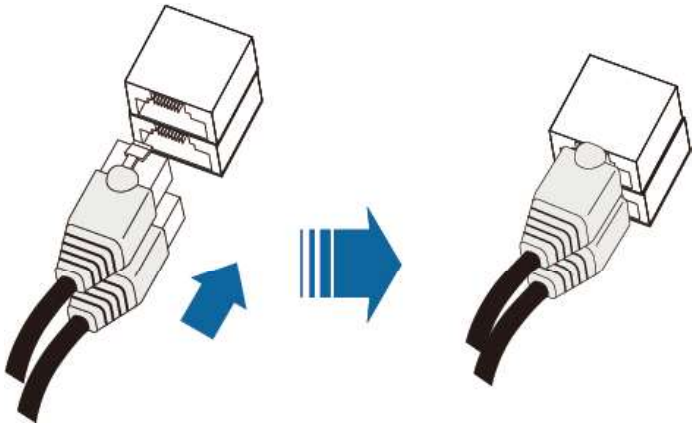
The network cable used for connecting the DRM and BAT_CAN requires a shielded layer.
It is recommended that the outer diameter of the configured shielded network cable be less than 8 mm.

Step 4 Lead the cable through the swivel nut, the sealing ring, and then the opening on the terminal cover.



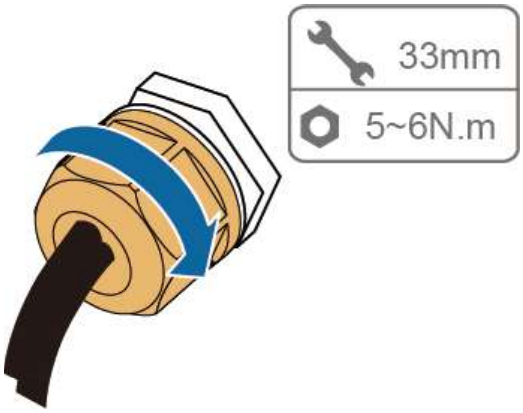
Cable Diameter D (mm)	Sealing Ring
4.5–6	c
6–12	a+b
12–18	b

Step 5 Insert the RJ45 plug into the corresponding terminal block socket.



Step 6 Mount back the communication terminal cover by referring to 7.9.1 Communication Terminal Cover.

Step 7 Pull gently the cables backward and tighten the swivel nut clockwise.

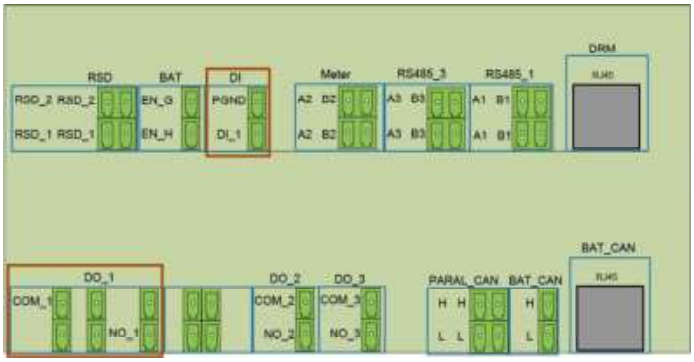


Incorrect cable connection will cause abnormalities in the power flow diagram. In this case, please check the wiring.

--End

7.9.4 Dry Contact Function

The communication wiring area is provided with dry contacts for fault output and emergency stop, as shown in the figure below.



DO Terminals (Fault Output Dry Contact)

The relay can be configured as a fault alarm output. The user can configure it as a normally open (COM_1&NO_1) .

Use LED indicators or other equipment to indicate whether the inverter is in the faulty state. The following Figures show the typical applications of normal open contact :

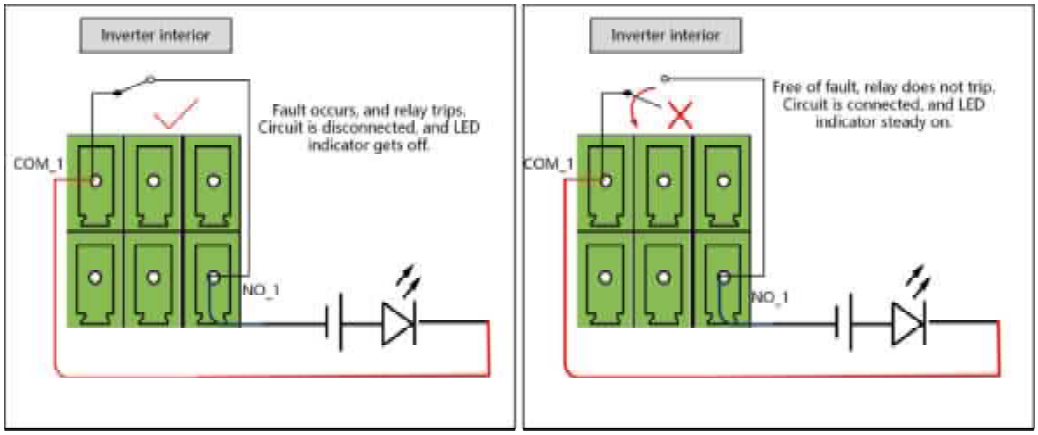


Figure 7-5 Normally Open Contact

Devices connected to the relay must meet the relevant requirements:

AC side Requirements	DC side Requirements
Max. voltage: 230 Vac Max. current: 3 A	Max. voltage: 24 Vdc Max. current: 3 A

DI Terminals (Emergency Stop Dry Contact)

The dry contacts can be configured for emergency stop contact.

When the RSD_1 contact and RSD_2 contact are shorted by external controlled switch (The external switch can be configured as normally open contact or normally closed contact), the inverter will immediately stop.

The dry contacts only support passive switch signal input.

The following figure shows the typical application of local stop dry contact.

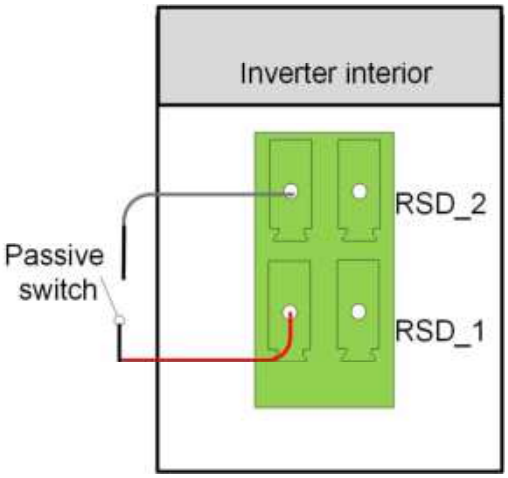


Figure 7-6 Local stop contact

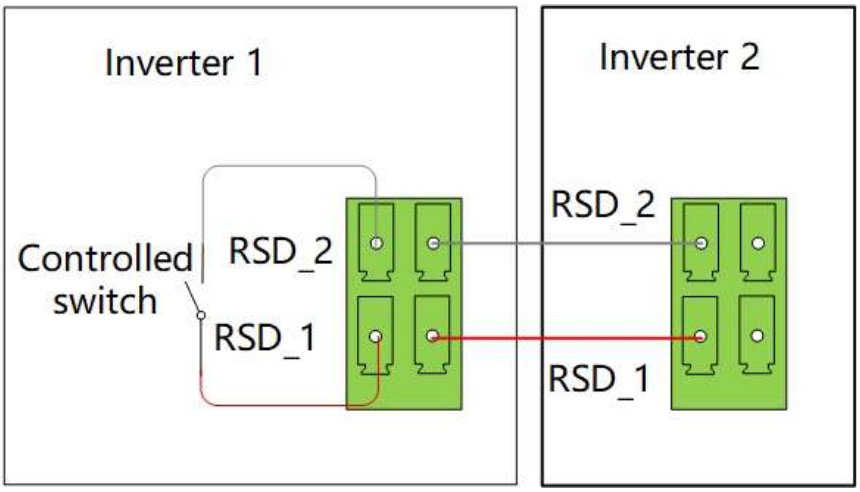


Figure 7-7 Daisy chain topology

When wiring the DI dry contacts, ensure that the maximum wiring distance meet the requirements in 12.2 Wring Distance of DI Dry Contact.

7.9.4.1 Wiring Steps

The wiring of dry contacts is the same as that of the RS485 terminal block.

Please refer to the wiring instructions in 7.9.3.3.1 Wiring Steps for Shielded Twisted Pair.

7.9.5 DRM Connection

DRM and Ripple Control support only one function at the same time.

DRM

The inverter supports the demand response modes as specified in the standard AS/NZS 4777. The inverter has integrated a terminal block for connecting to a DRED.

After the connection, the DRED assert DRMs by shorting together terminals as specified in the table below.

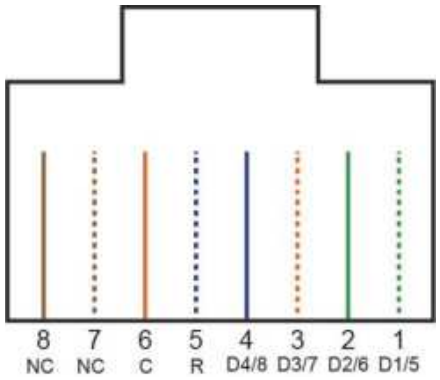
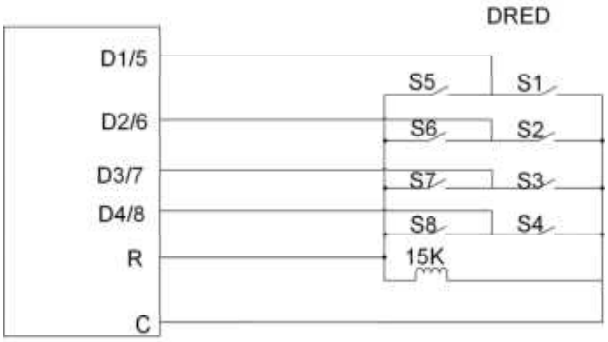


Table 7-7 Method of Asserting DRMs

Mode	Asserted by Shorting Terminals
DRM0	R & C
DRM1	D1/5 & C
DRM2	D2/6 & C
DRM3	D3/7 & C
DRM4	D4/8 & C
DRM5	D1/5 & R
DRM6	D2/6 & R
DRM7	D3/7 & R
DRM8	D4/8 & R

The inverter only supports DRM0.

Wiring between the inverter and the DRED is as follows.



The switches that need to be closed in the state of DRM0 ~ DRM8 are shown in the table below.

Demand Response Mode	Operational Instruction	Switch state
DRM0	OI0	Close S1 and S5
DRM1	OI1	Close S1
DRM2	OI2	Close S2
DRM3	OI3	Close S3
DRM4	OI4	Close S4
DRM5	OI5	Close S5
DRM6	OI6	Close S6
DRM7	OI7	Close S7
DRM8	OI8	Close S8

NS Protection

NS Protection is only applicable to German. NS Protection is triggered by rising signal from Grid Supervision Relais (Ziehl, bender, ABB, Phoenix Contact) at COM2-socket within 100 internal / 200ms overall, due to VDE 4105 for installed systems with together >30kVA.

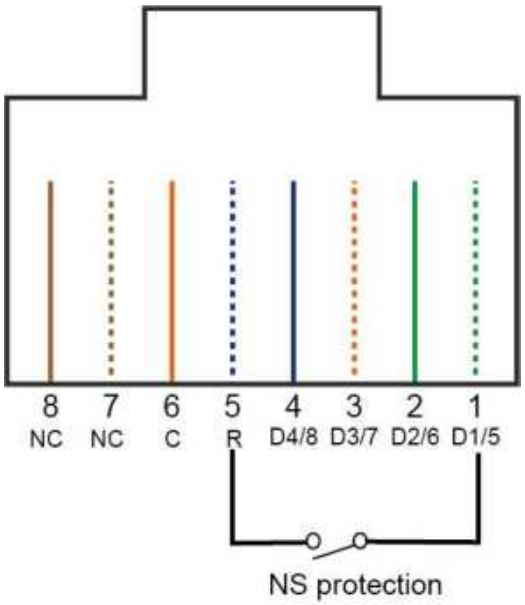
The following table provides the overview of cable connection and parameter setting requirements in different scenarios.

Scenario	Cable Connection	Parameter Setting
Multiple SHCXs + Logger	Necessary to every SHCX	Local: iSolarCloud App Remote: iSolarCloud App/Web

In multiple-inverter system, each inverter must be directly connected to the same NS protection relay.

The DRM1/5 and R terminals on inverter COM2/3 port are used for NS protection.

For a system with single inverter, connect DRM1/5 and R to external NS Protection Relay to realize NS protection, as shown in the following figure.



Ripple Control Receiver

The grid company uses the Ripple Control Receiver to convert the grid dispatching signal and send it as a dry contact signal.

Wiring of the ripple control receiver dry contact cables is shown in the figure below:

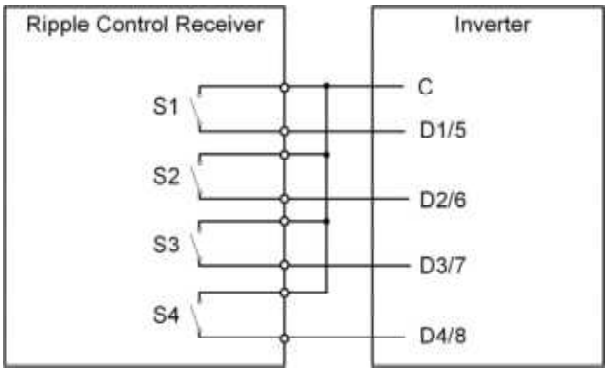
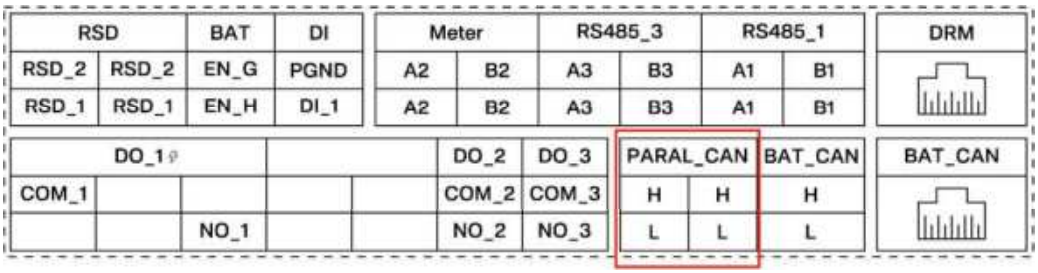


Table 7-8 Method of Asserting DI Mode

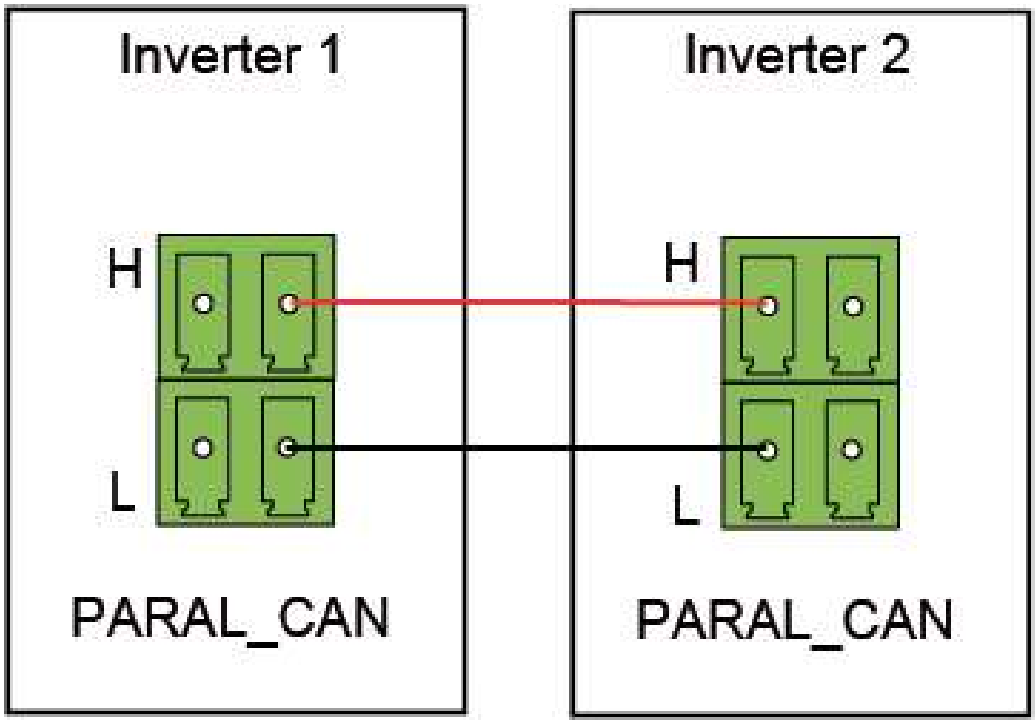
S1	S2	S3	S4	Switch Operation on External RCR	Output power (in % of the Rated AC output power)
0	0	0	0	None	100 % (configurable according to need)
1	0	0	0	Close S1	100 %
0	1	0	0	Close S2	60 %
0	0	1	0	Close S3	30 %
1	1	0	0	Close S1 and S2	0 % (disconnect from grid)

7.9.6 DSP Communiacation Connection

During off-grid parallel operation, multiple inverters can be connected via CAN.



The connection diagram example is as follows.

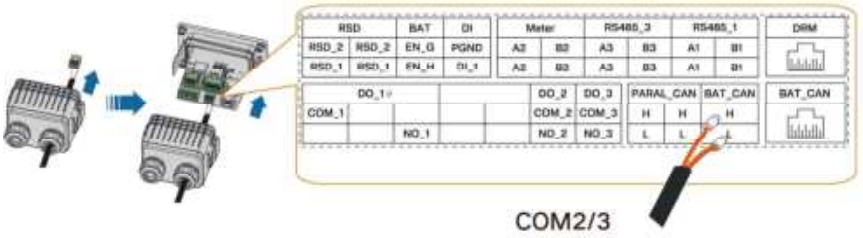


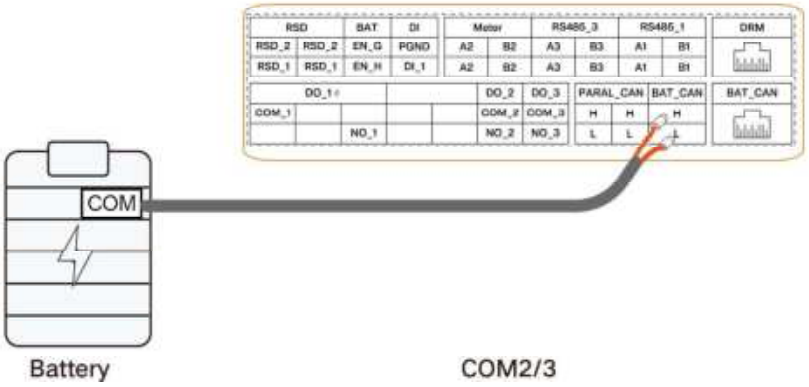
7.9.7 Battery Communication Connection

This is the description of connection to the battery communication cable on the hybrid inverter side. Consult the manual of the battery for the description of connection on the battery side.

Pin terminal connection

Plug the wires into the H, L terminal of the COM2/3 terminal.

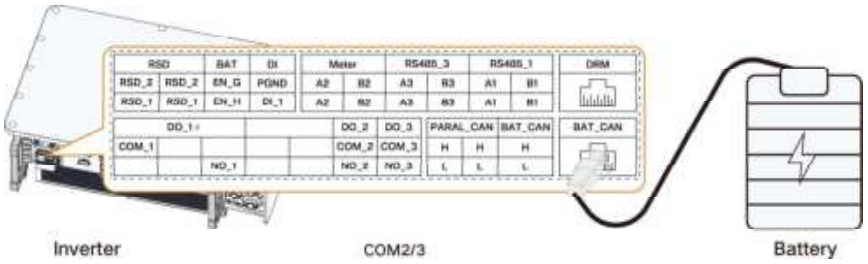




RJ45 connection

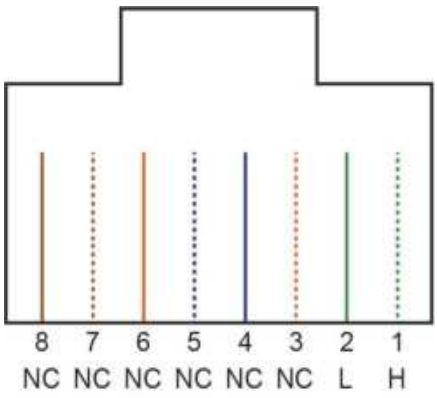
Battery Inverter

Plug the wires into the BMS_CAN terminal of the COM2/3 terminal.



NOTICE

Before connecting the communication cable, ensure the wire sequence is consistent.

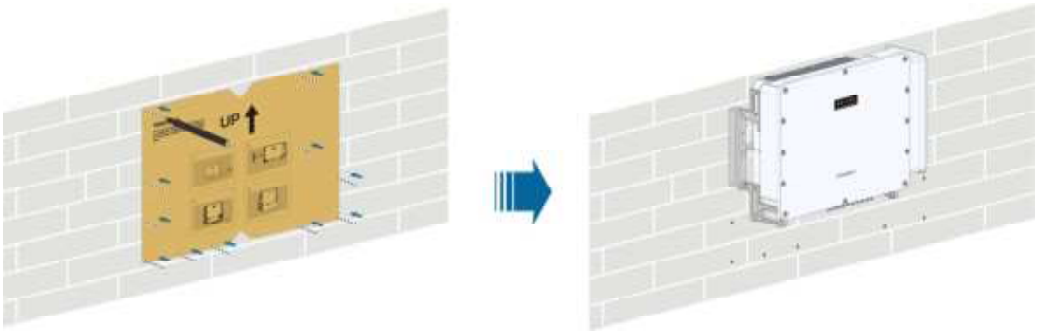


7.10 Install Protective Cover (Optional for SH110CX)

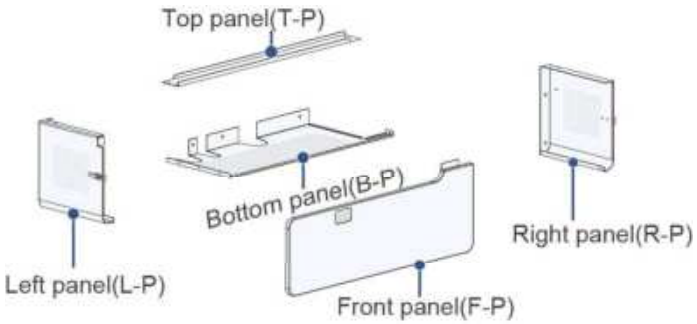
After completing all inverter cable connections, install the protective cover for SH110CX. Prepare the following materials before installation.

Item	Quantity	Specification	Source
countersunk screw	6	M4x8	Delivery scope
hexagon bolt assembly	8	M4x10	Delivery scope
hexagon bolt assembly	1	M6x12	Delivery scope
Hole-drilling template	1	-	Delivery scope
Fully-threaded bolt assembly (bracket-mounting) / Expansion bolt assembly (wall-mounting)	7	M10×45/M10x95 (recommend)	Self-prepared

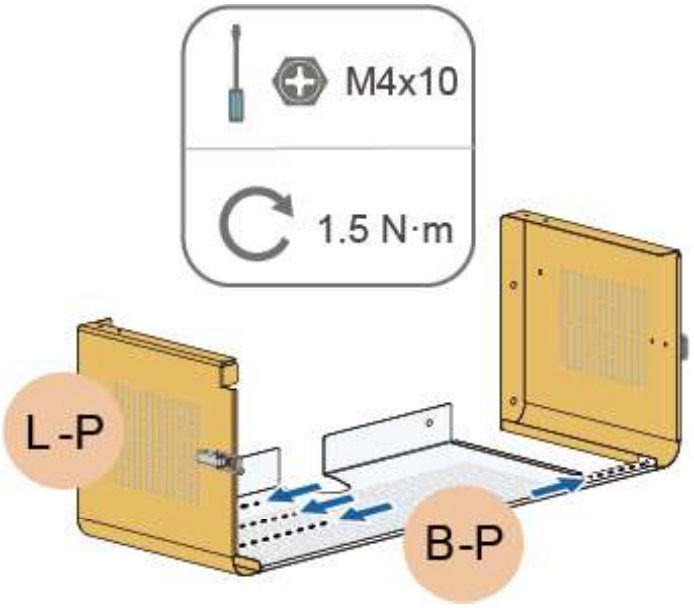
Step 1 Mark the holes for drilling on the wall by Hole-drilling template.



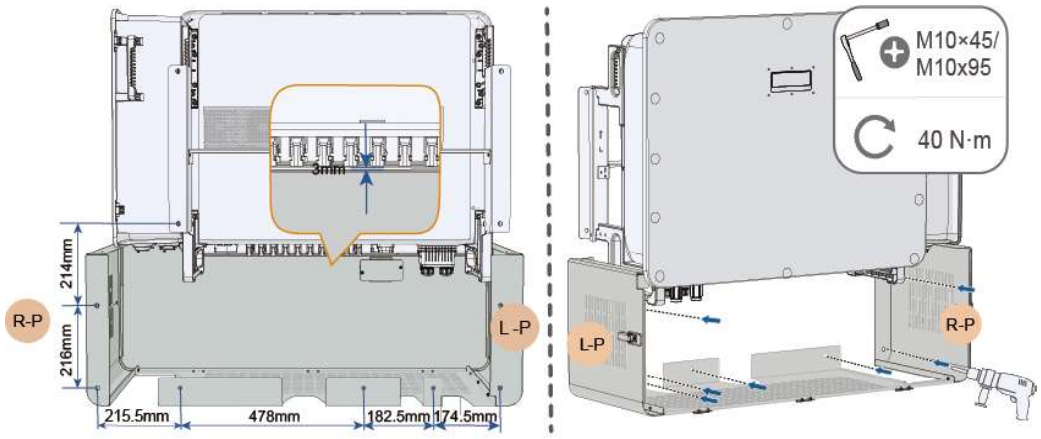
Step 2 The protective cover consists of a top panel, front panel, bottom panel, left panel, and right panel.



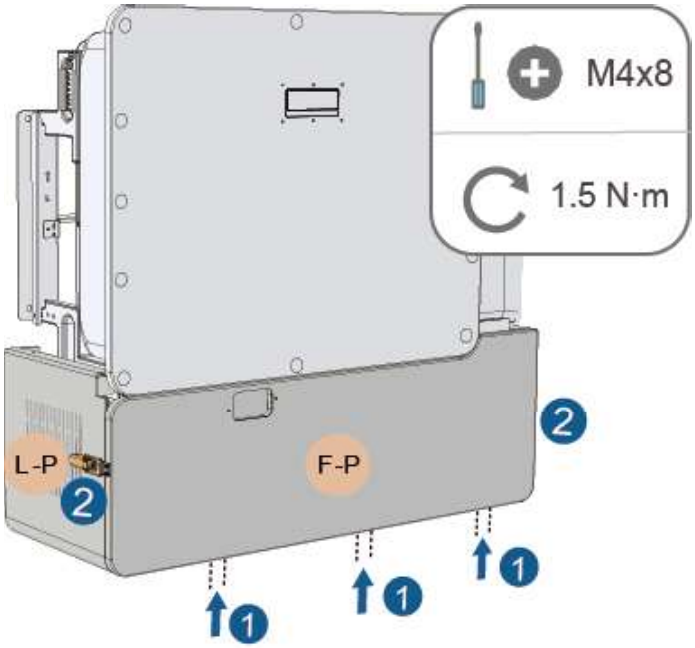
Step 3 Insert the bottom panel into the left and right panels and tighten the screws.



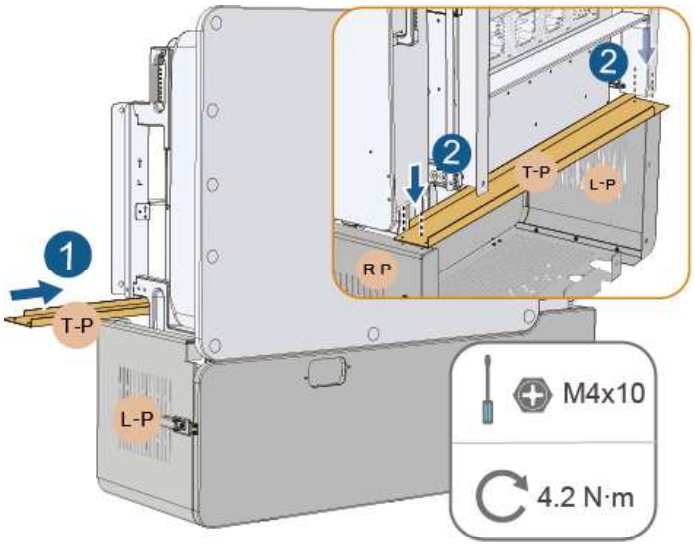
Step 4 After completing the inverter's electrical cable connections, position the protective cover assembly at the bottom of the inverter. Ensure the threaded holes on the panel fasteners align with the corresponding holes on the inverter.



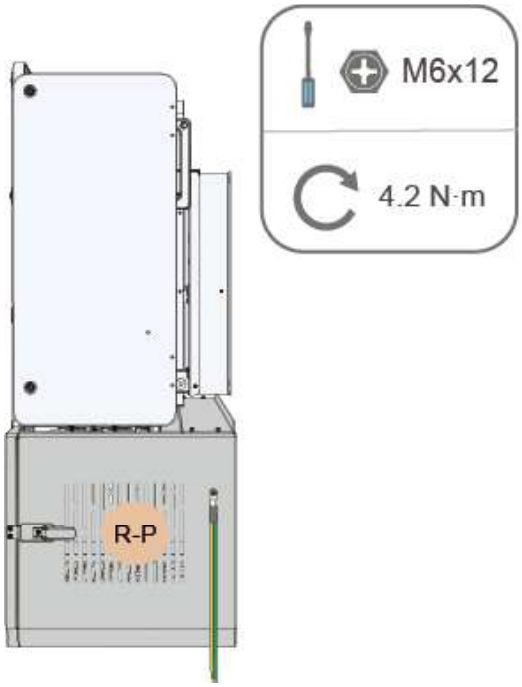
Step 5 Install the front panel, then tighten the bottom, left, right, and front panels.



Step 6 Install and tighten the top panel.



Step 7 Connect the grounding cable to the right panel.



--End

Installing the protective cover may attenuate the wireless communication signal, which can subsequently reduce the effective communication range of the wireless module.

8 iSolarCloud App

8.1 About iSolarCloud

The iSolarCloud App is a mobile application used for power plant management. The App provides plant operation analysis service and enables intelligent mobile O&M. It is designed with functions such as plant operation data display, rapid plant access, parameter setting, quick fault location and notification, and power yield and revenue analysis. With iSolarCloud, convenient and efficient end-to-end plant O&M is allowed.

Connection Methods

Users can log in to the App via remote connection or local access for plant monitoring.

Login by Establishing a Direct Connection (Local)

Establish communication between the mobile phone and the inverter's built-in Bluetooth module to enable mobile maintenance of the inverter. After logging into the App, users can check the information about and set parameters for the inverter.

Direct Login (Local)

Login via Bluetooth connection is applicable only for SUNGROW inverters with built-in Bluetooth modules. Please consult your retailer/installer about whether the inverter is equipped with a Bluetooth module.

Login with an Account (Remote)

Establish communication between the logger and the router or base station to enable data exchange between the inverter and the cloud server. After logging into the App, users can

check the inverter data or send commands to control the inverter on the App. (The inverter can only connect to the cloud through a logger, which supports wireless communication via Wi-Fi or 4G.)

Login Via Account and Password (Remote)

8.2 Install iSolarCloud

Prerequisite

This section introduces how to download and install the iSolarCloud App.

Procedure

Step 1 Search for **iSolarCloud** in App Store, Google Play or other App stores, or scan the QR code below with a mobile phone and download the App by following the onscreen instructions.

Step 2 Tap the downloaded installation package and follow the onscreen instructions to complete the installation. The icon of iSolarCloud will then appear on the screen.

--End

8.3 User Roles

After logging into the iSolarCloud App with different roles, users will have varying levels of access to device operations. The default accounts and passwords corresponding to different user roles can be found in **iSolarCloud App User Manual** **Device Commissioning (V2.1.6.20250218or Later) > Device Connection > Device Connection via WLAN > Identity Verification**.

For account security purposes, please refer to the **Identity Verification** section to change your password promptly after logging into the iSolarCloud App.

8.4 Device Commissioning

For device commissioning operations, please refer to the **Device Commissioning** in the **iSolarCloud App User Manual**. Alternatively, you can scan the QR code below to access the **Device Commissioning** section of the manual.

9 Commissioning

9.1 Inspection Before Commissioning

Check the following items before starting the inverter:

- All equipment has been reliably installed.
- DC switch(es) and AC circuit breaker are in the "OFF" position.
- The ground cable is properly and reliably connected.
- The AC cable is properly and reliably connected.
- The DC cable is properly and reliably connected.
- The communication cable is properly and reliably connected.
- The unused terminals are sealed.
- No foreign items, such as tools, are left on the top of the machine or in the junction box (if there is).
- The AC circuit breaker is selected in accordance with the requirements of this manual and local standards.
- All warning signs & labels are intact and legible.

If the inverter has been mounted but remains non-operational for more than three months, it must be inspected and tested by qualified personnel before being put into operation.

9.2 Commissioning Steps

If the requirements for the above-mentioned items are all met, proceed as follows to start up the inverter for the first time.

Step 1 Power on the battery circuit breaker.

Step 2 Rotate the DC switch to "ON". The DC switch is integrated in the inverter.

Step 3 Turn on the AC circuit breaker between the inverter and the grid.

Step 4 Observe the status of the inverter LED indicator to ensure the inverter is working normally.

Step 5 Install the iSolarCloud App.

Step 6 The first time the inverter is connected to the grid, complete the protection parameter initialization on the iSolarCloud App. If, with sufficient light, the grid conditions meet the grid connection requirements, the inverter will work normally.

Step 7 The home page is automatically displayed when the setting is completed.

⚠ WARNING

Do not close the DC switch when the inverter is in the grid-connected state. Otherwise, the inverter may be damaged due to absence of an insulation resistance test, and the loss caused therefrom will not be covered by warranty.

--End

- Wait 5 minutes after completing the previous step before proceeding to the next one.
- Strictly follow the preceding sequence. Otherwise, the product may be damaged, and the loss caused is not covered by the warranty.
- Before closing the AC circuit breaker between the inverter and the power grid, use a multimeter that is set to the AC gear to ensure that the AC voltage is within the specified range. Otherwise, the inverter may be damaged.

10 Inverter Decommissioning

10.1 Shut Down the Inverter

Prerequisite

⚠ CAUTION

Burn hazard!
There is a risk of burns even after the inverter has been shut down. Wait for the inverter to cool down. Then, perform operations on the inverter wearing safety gloves.

Normally, the inverter does not need to be shut down. However, for maintenance or repair, shutdown is required. Follow the steps below to disconnect the inverter from both AC and DC power. Failure to do so may result in personal injury or equipment damage.

Step 1 Turn off the external AC circuit breaker and prevent it from being accidentally turned back on.

Step 2 Turn off the external DC circuit breaker (external battery circuit breaker), then rotate the inverter's DC switch to the "OFF" position.

Step 3 Wait at least 15 minutes for the internal capacitors to fully discharge.

Step 4 Test the DC cables using a current clamp and ensure they are current-free.

--End

10.2 Dismantle the Inverter

Prerequisite

⚠ CAUTION

Danger of burns and electric shocks!
After the inverter is powered off for 15 minutes, measure the voltage and current using proper instruments. Perform operation and maintenance of the inverter wearing proper protective equipment after confirming that there is no voltage or current present.

- Before dismantling the inverter, disconnect both AC and DC connections.
- If there are more than two layers of inverter DC terminals, dismantle the outer DC connectors before dismantling the inner ones.
- If the original packing materials are available, put the inverter inside them and then seal them using adhesive tape. If the original packing materials are not available, put the inverter inside a cardboard box suitable for the weight and size of this inverter and seal it properly.

Step 1 Refer to 7 Electrical Connection to disconnect all cables of inverter in reverse steps. To disconnect the DC connectors, use a connector wrench to loosen their locking elements, and then fit waterproof plugs.

Step 2 Refer to 6 Mechanical Mounting to dismantle the inverter in reverse steps.

Step 3 If necessary, remove the wall-mounting bracket from the wall.

Step 4 If the inverter will be used again in the future, please refer to 5.3 Inverter Storage for a proper conservation.

--End

10.3 Dispose of Inverter

The user is responsible for disposing of the inverter.

WARNING

Please scrap the product in accordance with relevant local regulations and standards to avoid property damages or personal injuries.

NOTICE

Some parts of the inverter may cause environmental pollution. Please dispose of them in accordance with the disposal regulations for electronic waste applicable at the installation site.

11 Troubleshooting and Maintenance

11.1 Troubleshooting

When an alarm occurs, the alarm information can be viewed through the App.

Alarm ID and corrective measures are as follows:

Alarm ID	Alarm Name	Corrective Measures
002, 003, 014, 015	Grid Overvoltage	Generally, the inverter will be reconnected to the grid after the grid returns to normal. If the fault occurs repeatedly: 1. Measure the actual grid voltage, and contact the local electric power company for solutions if the grid voltage is higher than the set value. 2. Check whether the protection parameters are appropriately set via the App or the LCD. Modify the overvoltage protection values with the consent of the local electric power operator. 3. If the fault still exists, contact SUNGROW.
004, 005	Grid Undervoltage	Generally, the inverter will be reconnected to the grid after the grid recovers. If the alarm occurs frequently: 1. Measure the grid voltage, and contact the local utility grid company for solutions if the grid voltage is below the specified value. 2. Check, through the App, whether the protection parameters are appropriately set. 3. Check whether the AC cable is firmly in place. 4. If the alarm persists, contact SUNGROW.
008	Grid Overfrequency	Generally, the inverter will be reconnected to the grid after the grid recovers. If the alarm occurs frequently: 1. Measure the grid frequency, and contact the local utility grid company for solutions if the grid frequency is beyond the specified range. 2. Check, through the App, whether the protection parameters are appropriately set.
009	Grid Underfrequency	

Alarm ID	Alarm Name	Corrective Measures
		3. If the alarm persists, contact SUNGROW.
010	Grid Power Outage	Generally, the inverter will be reconnected to the grid after the grid recovers. If the alarm occurs frequently: 1. Check whether the grid supplies power reliably. 2. Check whether the AC cable is firmly in place. 3. Check whether the AC cable is correctly connected (whether the live wire and the N wire are in correct place). 4. Check whether the AC switch or circuit breaker is disconnected. 5. If the alarm persists, contact SUNGROW.
012	Excessive Leakage Current	1. The alarm can be caused by poor sunlight or damp environment, and the inverter will be reconnected to the grid after the environment is improved. 2. If the environment is normal, check whether the AC and DC cables are well insulated. 3. If the alarm persists, contact SUNGROW.
013	Grid Abnormal	Generally, the inverter will be reconnected to the grid after the grid recovers. If the alarm occurs frequently: 1. Measure the grid frequency, and contact the local utility grid company for solutions if the grid frequency exceeds the specified value. 2. If the alarm persists, contact SUNGROW.
017	Grid Voltage Unbalance	Generally, the inverter will be reconnected to the grid after the grid returns to normal. If the fault occurs repeatedly: 1. Measure the actual grid voltage. If grid phase voltages differ greatly, contact the electric power company for solutions. 2. If the voltage difference between phases is within the permissible range of the local power company, modify the grid voltage imbalance parameter through the App. 3. If the fault still exists, contact SUNGROW.

Alarm ID	Alarm Name	Corrective Measures
037	High Ambient Temperature	Generally, the inverter will resume operation when the internal or module temperature returns to normal. If the fault persists: 1. Check whether the ambient temperature of the inverter is too high; 2. Check whether the inverter is in a well-ventilated place; 3. Check whether the inverter is exposed to direct sunlight. Shield it if so; 4. Check whether the fan is running properly. Replace the fan if not; 5. If the fault still exists, contact SUNGROW.
039	Low System Insulation Resistance	Wait for the inverter to return to normal. If the fault occurs repeatedly: 1. Check whether the ISO resistance protection value is excessively high via the app, and ensure that it complies with the local regulations. 2. Check the resistance to ground of the string and DC cable. Take corrective measures in case of short circuit or damaged insulation layer. 3. If the cable is normal and the fault occurs on rainy days, check it again when the weather turns fine. 4. If there are batteries, check whether battery cables are damaged and whether terminals are loose or in poor contact. If so, replace the damaged cable and secure terminals to ensure a reliable connection. 5. If the fault still exists, contact SUNGROW.
106	Grounding Cable Fault	1. Check whether the AC cable is correctly connected. 2. Check whether the insulation between the ground cable and the live wire is normal. 3. If the fault still exists, contact SUNGROW.
051	Off-grid Load Overpower	1. Reduce the power of loads connected at the off-grid port, or remove some loads. 2. If the alarm persists, contact SUNGROW.
714	BMS Communication Fault	1. Check whether the communication cable and the terminals are abnormal. If so, correct them to ensure reliable connection.

Alarm ID	Alarm Name	Corrective Measures
		2. Reconnect the communication cable of the meter. 3. If the fault still exists, contact SUNGROW.
932–935, 937, 939	Battery Alarm	Generally, the battery can automatically recover. In case the alarm persist for a long time: 1. If the alarm is caused by ambient temperature, such as over temperature alarm or low temperature alarm, take measures to change the ambient temperature, such as improving heat dissipation conditions. 2. If the fault persists, contact battery manufacturer.
703, 711, 712, 715, 732–736, 739, 832–833, 835–837	Battery Abnormal	1. In case of abnormal battery voltage, check whether the battery power cable connection is abnormal (reverse connection, loose, etc.). If so, connect the battery power cable correctly. 2. Check whether the battery real-time voltage is abnormal if the battery power cable is correctly connected. If so, contact the battery manufacturer. If not,contact SUNGROW. 3. In case of abnormal battery temperature, take measures to change the ambient temperature, such as improving heat dissipation conditions. 4. If the fault persists, contact battery manufacturer.
502-504, 507, 508, 510, 513, 516–518, 994, 996	System Alarm	1. The inverter can continue running. 2. Check whether the related wiring and terminal are abnormal, check whether there are any foreign materials or other environmental abnormalities, and take corresponding corrective measures when necessary. 3. If the alarm persists, please contact SUNGROW.
514	Meter Communication Abnormal Alarm	1. Check whether the communication cable and the terminals are abnormal. If so, correct them to ensure reliable connection. 2. Reconnect the communication cable of the meter. 3. If the alarm still exists, contact SUNGROW.
006, 007, 011, 019, 021, 025,	System Fault	1. Wait for the inverter to return to normal. 2. Disconnect the AC and DC switches, and disconnect the battery side switches if there are

Alarm ID	Alarm Name	Corrective Measures
038, 040–042, 048–050, 052–054, 056, 064–067, 100–102, 105, 107, 113, 117, 200–205, 300, 303–305, 308–316, 320, 600, 601, 605, 608, 612, 616, 620, 624, 995,131		batteries. Close the AC and DC switches in turn 15 minutes later and restart the system. 3. If the fault still exists, contact SUNGROW.
75	Parallel Communication Alarm	1. Wait for the fault to clear automatically. 2. Verify that the parallel connection parameter settings are correct. 3. Inspect the communication wiring between the master and slaves for unconnected, loosely connected, or damaged cables. 4. If the fault occurs repeatedly, contact SUNGROW Customer Service.
90	Inverter Parallel Synchronous Signal Abnormal	1. Check the master and slave settings. Verify that one inverter is set as the master and the remaining inverters are set as slaves. The number of the master and slaves should match the actual configuration, and the slave IDs should be set in sequential order. 2. Check whether the parallel communication wiring is correct, including the wiring of CAN2H/CAN2L in COM1 ports between different devices. 3. Check whether a matching termination resistor is added to the last inverter. The 120Ω resistor (included in the accessories) should be properly connected between CAN2H and CAN2L.

Alarm ID	Alarm Name	Corrective Measures
213	Parallel Inverter Grid Port Wiring Fault	Check whether the phase sequence of wiring at the GRID terminal is consistent across the master and slaves in the system.
214	Parallel Inverter Load Port Wiring Fault	Check whether the phase sequence of wiring at the LOAD terminal is consistent across the master and slaves in the system.
329	AC port wiring abnormal or terminal abnormal	1. Inspect the AC port wiring. 2. Power off and restart the inverter. 3. If the fault does not arise for the aforementioned reason and still cannot be resolved, contact SUNGROW Customer Service.
514	Meter Communication Abnormal Alarm	1. Check whether the meter is connected. 2. Check whether the connection of the meter communication cable is correct and secure. 3. If the fault does not arise for the aforementioned reason and still cannot be resolved, please contact SUNGROW Customer Service.
714	BMS Communication Fault	Check whether the communication cables are correctly connected. If the fault persists, please contact SUNGROW Customer Service.
995	Backup Port Short Circuit	1. Shut down the inverter. 2. Use a multimeter to measure the resistance between every two phase lines and check if they conform to the actual load in the family. 3. Check AC cable connection to the Load port.
69, 635-636	DC Switch Trip Alarm	1. The machine can continue running when only DC Switch 1 or DC Switch 2 trips. 2. Check the alarm-related cables and terminals for any anomalies, check for any environmental anomalies such as foreign objects, and clear the anomalies. 3. If the alarm is not caused by the foregoing reasons and persists, please contact Sungrow Customer Service. 635 and 636 indicate DC Switch 1 and DC Switch 2 tripping, respectively.
304	EPS Relay Fault	1. Try powering off and restarting the inverter.

Alarm ID	Alarm Name	Corrective Measures
		2. If the fault is not caused by the foregoing reason and persists, please contact Sungrow Customer Service.
71, 72	System alarm	It is recommended to manually shut down the unit in case of lightning protection failure and contact Sungrow after-sales professionals for inspection and maintenance.
99	Balanced Bridge Overtemperature	1. Power off and restart the inverter. 2. Check whether the wiring of the temperature sensor inside the device is loose or damaged.
414	Grid Port Overload	Reduce the load power at the backup port or multi-function port, turn off some loads, and click "Clear port overload fault".
415	Backup Port Overload	Reduce the load power at the backup port, turn off some loads, and click "Clear port overload fault".

Contact the installer if the measures listed in the "Troubleshooting Method" column have been taken but the problem persists. Contact SUNGROW if the installer fails to solve the problem.

11.2 Maintenance

11.2.1 Maintenance Precautions

DANGER

When maintaining the product, it is strictly prohibited to open the product if there is an odor or smoke or if the product appearance is abnormal. If there is no odor, smoke or obvious abnormal appearance, repair or restart the inverter according to the alarm corrective measures. Avoid standing directly in front of the inverter during maintenance.
Risk of personal injury or equipment damage due to improper servicing!

- **Be sure to use specialized insulated tools when performing high-voltage operations.**
- **Before maintenance, disconnect the AC circuit breaker on the grid side and then the DC switch. If a fault that may cause personal injury or device damage is found before maintenance, disconnect the AC circuit breaker and wait until the night before operating the DC switch. Otherwise, a fire inside the product or an explosion may occur, causing personal injuries.**
- **Wait 15 minutes after the inverter is powered off, then test the voltage and current using specialized measurement instruments. Maintenance and operation must only be performed by qualified personnel who wear protective equipment after confirming that no voltage or current is present.**
- **Even if the inverter has stopped running, it may still be hot and cause burns. Perform operations on the inverter wearing protective gloves after it cools down.**

CAUTION

To prevent misuse or accidents caused by unrelated personnel: please set up highly visible warning signs around the inverter or fence off a warning zone.

NOTICE

Restart the inverter only after removing the fault that impairs safety performance. As the inverter contains no component parts that can be maintained, never open the enclosure or replace any internal components.
To minimize the risk of electric shocks, do not perform maintenance operations that are not specified in this manual. If necessary, contact SUNGROW for maintenance. Losses arising from failure to observe this instruction will not be covered by warranty.

NOTICE

Touching the PCB or other static-sensitive components may cause damage to the device.

- **Do not touch the circuit board unless it is necessary.**
- **Observe the provisions for protection against electrostatic discharge and wear anti-static wrist straps.**

11.2.2 Routine Maintenance

The maintenance item and period of the device are listed in the table below.

Inspection Item	Inspection Method	Maintenance Period
Device Clean	Check whether the air outlet and heat sink are blocked by dust and other objects. Clean the air outlet and the heat sink if necessary.	Once every six months to a year
Fan	Inspect if there is abnormal noise during operation of the fans. Inspect if there is crack on blades of the fan. If necessary, Replace the fan.	Once a year
Cable inlet design	Check whether the cable inlet hole of the device is fully sealed. If not, fill the crack with fireproof and waterproof materials.	Once a year
Electrical connection	Check whether cables are loose or fall off. Check whether the cable is damaged, especially the part in contact with the metal enclosure.	Once every six months to a year

11.2.3 Fan Maintenance

DANGER

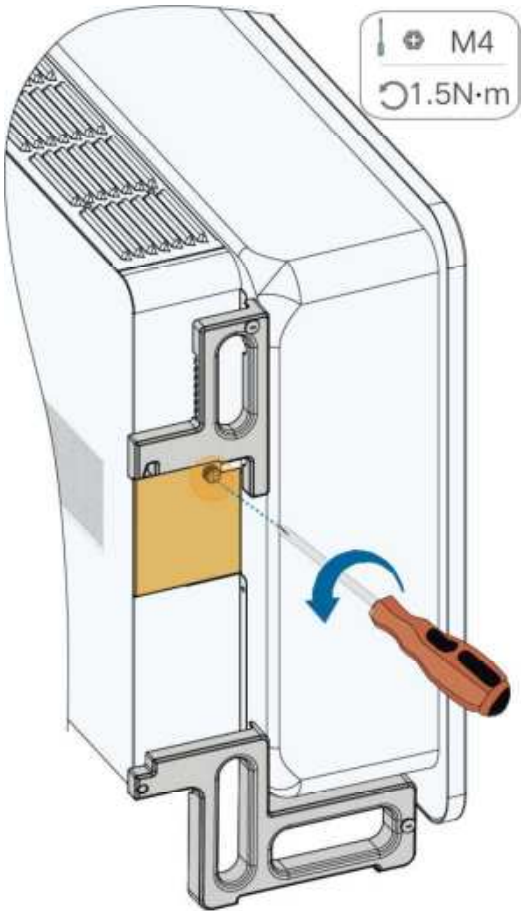
- **Before maintaining its fans, power off the inverter and disconnect it from all power sources.**
- **Wait 15 minutes after the inverter is powered off, then test the voltage and current using specialized measurement instruments. Maintenance and operation must only be performed by qualified personnel who wear protective equipment after confirming that no voltage or current is present.**
- **Fan maintenance must only be performed by qualified technical persons.**

The inverter is equipped with built-in fans for heat dissipation during operation. If the fans do not operate normally, the inverter may not be cooled down and inverter efficiency may decrease. Therefore, it is necessary to clean dirty fans and replace the broken fans in a timely manner.

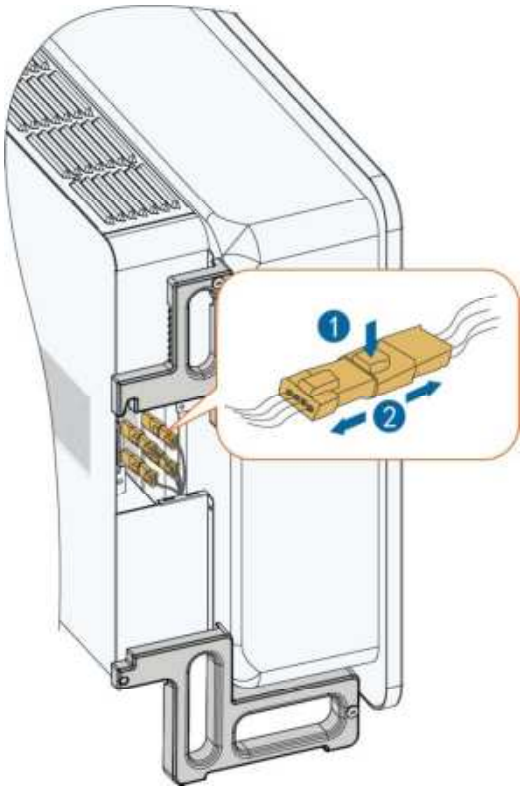
Clean and replace the fans as follows:

Step 1 Stop the inverter, referring to 10.1 Shut Down the Inverter.

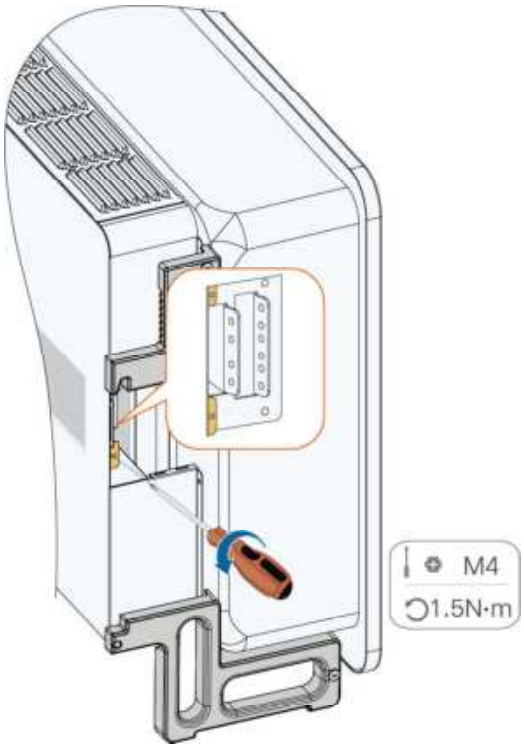
Step 2 Loosen the screw on the cover plate for the fans of the inverter.



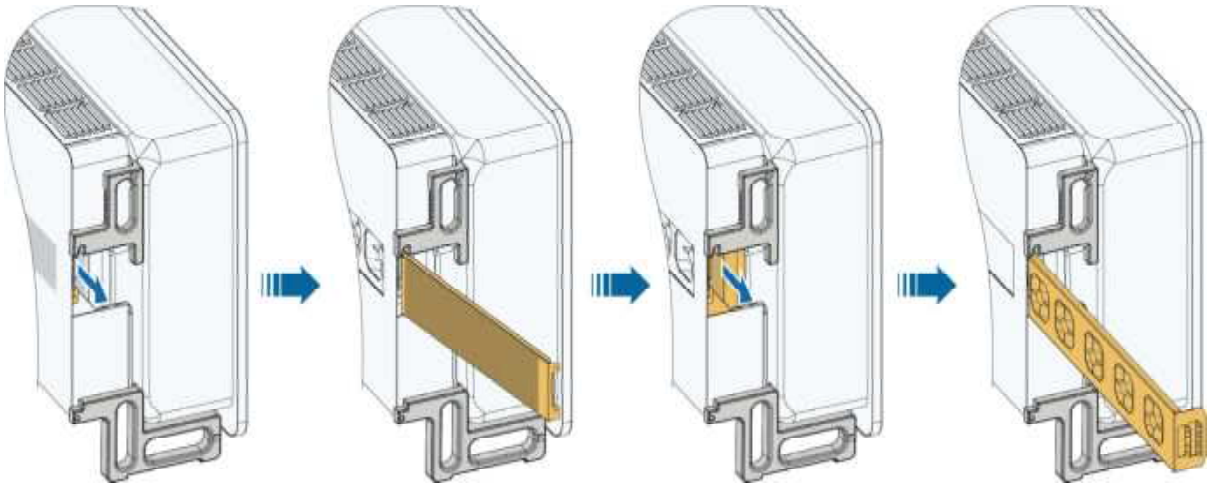
Step 3 Press the key on the connector to release its locking element, and pull the connector out. Then, loosen the screws on the fan holder.



Step 4 Loosen the screws on the side of the fans.



Step 5 Pull out the fan holder and clean the fans using a soft brush or a vacuum cleaner. Replace the fan if it is damaged.



--End

11.2.4 Clean Air Outlet

The inverter generates significant heat during operation and therefore uses forced air cooling.

To ensure proper ventilation, regularly inspect the air inlets and outlets to confirm they are clear and unobstructed.

Clean the air inlets and outlets using a soft brush when needed.

11.2.5 DC Switch Maintenance

Prerequisite

The DC switch is equipped with an automatic disconnection function. When the device detects a major internal fault in the inverter (such as overvoltage, overcurrent, overtemperature, etc.), it triggers the DC switch to automatically disconnect for protection.

If the inverter's DC switch has tripped to the "OFF" position, please follow the procedure below.

Step 1 Check the fault information on the App or Web system of iSolarCloud.

Step 2 In case of a fault inside the inverter, please contact SUNGROW for technical support.

--End

12 Appendix

12.1 Technical Data

Parameter	SH110CX	SH125CX
Input (DC)		
Max. PV input power	220 kWp	250 kWp
Max. PV input voltage*	1100 V	1100 V
Min. PV input voltage / Startup input voltage	180 V / 200 V	180 V / 200 V
Rated PV input voltage	600 V	600 V
MPPT voltage range	180 V - 1000 V	180 V -1000 V
MPP voltage range for rated power	550V - 880V	550V - 880V
No. of independent MPP inputs	10	10
No. of PV strings per MPPT	2	2
Max. PV input current	40 A * 10	40 A * 10
Max. DC short-circuit current	50 A * 10	50 A * 10
Max. current for DC connector	30 A	30 A
Battery data		
Battery type	Lithium-ion battery	Lithium-ion battery
Battery Voltage Range**	129 V - 880 V	129 V - 880 V
Communication	CAN	CAN
Max. charge / discharge current***	200 A / 200 A	200 A / 200 A

Parameter	SH110CX	SH125CX
Max. charge / discharge power	110kW / 110kW	125kW / 125kW
Input and output (AC)		
Max. AC power from grid****	160 kVA	160 kVA @ 230 V
Rated AC output power	110 kW	125 kW
Max. AC output apparent power	110 kVA	125 kVA
Max. AC output current	158.8 A	189.9 A
Rated AC output current	158.8 A	180.4 A
Rated AC voltage	3 / N / PE, 220 V/ 380 V, 230 V/ 400 V	3 / N / PE, 220 V / 380 V, 230 V/ 400 V
AC voltage range	270V - 480V	270V - 480V
Rated grid frequency	50 Hz / 60 Hz	50 Hz / 60 Hz
Grid frequency range	45 Hz – 55 Hz / 55 Hz – 65 Hz	45 Hz – 55 Hz / 55 Hz – 65 Hz
Harmonic (THD)	< 3 % (at 400V AC voltage and rated power)	< 3 % (at 400V AC voltage and rated power)
Power factor at rated power / Adjustable power factor	> 0.99 / 0.8 leading – 0.8 lagging	> 0.99 / 0.8 leading – 0.8 lagging
Feed-in phases / AC connection	3 / 3 - N - PE	3 / 3 - N - PE
Backup data		
Rated voltage	3 / N / PE, 220 V/ 380 V, 230 V/ 400 V	3 / N / PE, 220 / 380 V, 230 / 400 V
Rated frequency	50Hz/60Hz	50Hz/60Hz
THDV (@Linear load)	< 2 % (at rated power)	< 2 % (at rated power)

Parameter	SH110CX	SH125CX
Backup switch time of single inverter	≤10ms	≤10ms
Rated output power	110 kW	125 kW
Peak load power	1.5 times of rated power, 10s	1.5 times of rated power, 10s
Efficiency		
Max. efficiency / European efficiency	98.5 % / 98.2 %	98.6 % / 98.3 %
Protection & function		
Grid monitoring	Yes	Yes
DC reverse polarity protection	Yes	Yes
AC short-circuit protection	Yes	Yes
Leakage current protection	Yes	Yes
DC switch	Yes	Yes
Ground fault monitoring	Yes	Yes
PV string current monitoring	Yes	Yes
Arc fault circuit interrupter (AFCI)	Yes	Yes
Surge protection	DC Type I+II / AC Type II	DC Type I+II / AC Type II
PID zero	Yes	Yes
Battery input reverse polarity protection	Yes	Yes
General data		
Topology	Transformerless	Transformerless
Degree of protection	IP66	IP66

Parameter	SH110CX	SH125CX
Dimensions (W * H * D)	1095 mm * 795 mm * 360 mm	1095 mm * 795 mm * 360 mm
Protective class	Protective class I	Protective class I
Overvoltage category	III[AC]; II[PV] [BATTARY]	III[AC]; II[PV] [BATTARY]
Active anti-islanding method	Frequency shift	Frequency shift
Weight	≤ 128 kg	≤ 128 kg
Mounting method	Wall-mounting bracket	Wall-mounting bracket
Operating ambient temperature range	- 30 ℃ – 60 ℃	- 30 ℃ – 60 ℃
Allowable relative humidity range (non-condensing)	0 – 100 %	0 – 100 %
Corrosion	C5	C5
Cooling method	Smart forced air cooling	Smart forced air cooling
Max. operating altitude	3000 m	3000 m
Noise (Typical)	≤ 65 dB (A)	≤ 65 dB (A)
Grid compliance	IEC 62109-1/-2, IEC 62477-1, IEC 62920, AS/NZS 4777.2:2020, IEC 61683, IEC 62116, IEC 61727, IEC 60068, IEC 61000-6-3, IEC 63027	IEC 62109-1/-2, IEC 62477-1, IEC 62920, EN 55011, IEC 63027, VDE-AR-N 4105, VDEAR- N 4110, NRS 097-2-1, UNE 207002, UNE 207001, NTS 2.1, CEI 0-16, CEI 0-21, EN 50549, EN 50530, IEC 61683, IEC 62116, IEC 61727, IEC 60068, IEC 61000-6-3, IEC 63027
Interface		
Display	LED, Bluetooth + APP	LED, Bluetooth + APP
Communication with battery	CAN	CAN

Parameter	SH110CX	SH125CX
Communication with Logger	RS485	RS485
Communication between Logger and iSolarCloud	4G / WLAN / Ethernet	4G (Optional)/WLAN / Ethernet
DI / DO	DI * 2 / DO * 3	DI * 2 / DO * 3
DC connection type	MC4 (Max. 6 mm²)	MC4 (Max. 6 mm²)
AC connection type	OT / DT terminal (Max. 300 mm²)	OT / DT terminal (Max. 300 mm²)
Country of manufacture	China	China

* Input voltage exceeding the MPPT operating voltage range triggers inverter protection.

** Minimum battery voltage for black-start : 270 V.

*** Depending on the connected battery.

****Max. AC power from grid would be 110kVA for SH110CX and 125kVA for SH125CX if inverter works without backup loads.

12.2 Wring Distance of DI Dry Contact

The maximum wiring distance for DI dry contact terminals must meet the requirements listed below. The wiring distance L is the total length of all DI signal cables.

$$L = 2\sum_{k=1}^{n} L_k$$

L_k is the one-way cable length between the DI dry contact terminal of the k-th inverter and the corresponding terminal of the previous device.

Table 12-1 Maximum Wiring Distance for DI Dry Contact Terminals

Number of Inverters	Maximum Wiring Distance (unit:m)	
	16 AWG / 1.31 mm²	17 AWG / 1.026 mm²
1	13030	10552
2	6515	5276
3	4343	3517

Number of Inverters	Maximum Wiring Distance (unit:m)	
	16 AWG / 1.31 mm^2	17 AWG / 1.026 mm^2
4	3258	2638
5	2606	2110
6	2172	1759
7	1861	1507
8	1629	1319
9	1448	1172
10	1303	1055
11	1185	959
12	1086	879
13	1002	812
14	931	754
15	869	703
16	814	660
17	766	621
18	724	586
19	686	555
20	652	528
21	620	502
22	592	480
23	567	459
24	543	440

NOTICE

If the selected cable gauge is not listed above, for a single inverter, ensure the Input terminal wiring impedance is < 300 Ω. For multiple inverters connected in daisy-chain topology, ensure node impedance is < (300 Ω / number of inverters).

12.3 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.

12.4 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