EK60 series

Hybrid Inverter

EK60 H3-(2.9K-6K)-LS2

User Manual



Version 1.1

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- **Headquarter**: Guangzhou Sanjing Electric Co., Ltd.
- **Address**: SAJ Innovation Park, No.9, Lizhishan Road, Guangzhou Science City, Guangdong, P.R.China.
- **Tel**: +86 20 6660 8588
- **E-mail**: service@saj-electric.com
- **Website:** https://www.saj-electric.com/

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About this document

This user manual provides introductions and instructions of operating, maintaining, and troubleshooting the following SAJ product:

- EK60 H3-(2.9K-6K)-LS2

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Note:

Illustrations in this document show only essential details and may differ from the actual product.

Target Audience

This document is applicable to the personnel that transport, install, and operate on the product. The personnel are required to have the following qualifications:

- A certain level of expertise in electronics, electrical wiring, and mechanical knowledge in electrical and mechanical schematics.
- Being familiar with the composition and working principles of the product and its upstream and downstream equipment.
- Professional training related to the installation and commissioning of electrical equipment.
- The ability to respond urgently to dangers or emergencies that may arise during installation or commissioning.
- Being familiar with relevant standards and regulations in the country or region where the project is located.
- Being familiar with the contents in this manual.

Use of the Manual

Read the user manual carefully before any installation, operation and maintenance and follow the instructions during installation and operation. Always keep the printed manual available for future reference.

Levels of Warning Messages

DANGER

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

WARNING

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

CAUTION

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

NOTICE

Indicates a situation which, if not avoided, can result in property damage.

Revision history

Version	Date	Changes
V1.1	2026-07-04	Third version. Updated 6. Attach correct label to the inverter *(on page 35)* and 8. Commissioning on App *(on page 40)*.
V1.0	2026-06-18	Second version. Updated contents of 5.4. Zero export device connection *(on page 33)* and 7.1. Start up the system *(on page 37)*.
V0.0	2026-03-30	First version.

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1. Safety instructions

1.1. Safety symbols

Symbol	Description
	**Danger:** Electrical shock hazard This device is directly connected to public grid and thus all work to the system shall only be carried out by qualified personnel.
	**Danger:** Hot surface The components inside the battery will release a lot of heat during operation. Do not touch metal plate housing during operating.
	**Danger:** Risk of electric shock from energy stored in capacitor. Do not open the cabinet door until 5 minutes after disconnecting all sources of supply.
	**Warning:** No open flames Do not place or install near flammable or explosive materials.
	**Caution** Keep the product out of reach of children.
	**Caution:** Check the user manual before service If an error has occurred, refer to the troubleshooting instructions to remedy the error.
	**Caution** This device shall NOT be disposed of in residential waste.
	**Caution** This battery module shall NOT be disposed of in residential waste.
	**CE Mark** Equipment with the CE mark fulfills the requirements of the Low Voltage Directive and Electro Magnetic Compatibility.
	**RoHS compliant mark** Equipment with the RoHS mark does not exceed the allowable amounts of the restricted substances defined in Restriction of Hazardous Substances in Electrical and Electronic Equipment.
	**RCM compliant mark** Equipment with the RCM mark is in compliance with AS/NZS 4417.1 & 2 and the EESS.
	**Recyclable**

1.2. Inverter safety instructions

Personal Safety

DANGER

Risk of personnel hazard or equipment damage due to improper operations

Improper operations performed on energized equipment by unqualified personnel may lead to equipment failure or safety hazards.

- Only qualified and trained professionals who are familiar with electrical installation and local codes may install, maintain, or repair the equipment.
- Before any operation, read the safety precautions thoroughly and always follow the standard procedures during operation. Non-standard and improper operations on the energized equipment may cause fire, electric shocks, or explosion.
- Do not reconstruct or alter the equipment, add components, or change the installation sequence without permission. Any unauthorized operation including modification of product functionality of any form may cause lethal hazard to the operator, third parties, the units or their property.
- Before any operation, remove conductive objects such as watches, bracelets, bangles, rings, and necklaces to prevent electric shocks.
- During operation, do not open the housing or touch electrical terminals.

WARNING

Risk of personal injury due to direct contact with the components or housing

Direct contact with hazardous moving or hot components during the inverter's operation may lead to personal injury.

- Do not touch a running fan with your hands, components, screws, or any other tools.
- During operation, do not touch heat sink area with bare hands as the inverter surface may become hot.

CAUTION

Risk of equipment damage and personal injury

If you detect any unusual odors, hear abnormal noises, or notice smoke during operation, immediately shut down the unit and disconnect all power sources.

NOTICE

Risk of equipment malfunction and safety hazards

Failure to follow proper guidance and neglect of regular monitoring prevents the timely identification and prevention of potential issues.

- Read the entire user manual before installation and keep it at hand for future reference.
- Regularly check the status via the monitoring interface to promptly detect any abnormalities.

Electrical Safety

DANGER

Risk of high voltage and electric shock

Before any operation, disconnect the inverter from all AC and DC power sources and wait at least 5 minutes to allow internal capacitors to discharge.

WARNING

Risk of overheat, fire and equipment damage

Obstructing ventilation or allowing foreign objects to enter the equipment may lead to fire hazards.

- During operation, ensure that the ventilation vents or heat dissipation systems are not obstructed or covered by other objects to prevent fire due to high temperature.
- During operation, prevent foreign matter from entering the equipment. Otherwise, equipment short-circuits or damage, load power derating, power failure, or personal injury may occur.
- Do not place any foreign objects or liquid containers on the inverter.

Environment Requirements

DANGER

Risk of severe electrical shock

- A lightning strike can induce a sudden and massive power surge, which poses severe hazard to both personnel and equipment.
- Installation, operation, and maintenance is prohibited during thunderstorms.

Mechanical Safety

NOTICE

Risk of equipment failure or physical injury

Installing or operating an inverter with pre-existing physical damage compromises safety and functionality.

- Before unpacking the inverter, check the outer packing materials for damage, such as holes and cracks, and check the inverter model. If any damage is found or the inverter model is not what you requested, do not unpack the package and contact your supplier as soon as possible.
- Before installation, inspect the equipment for any visible damage or signs of transportation damage. If damage is found, do not install or use the equipment.

1.3. Recycling and disposal

NOTICE

This product should not be disposed as a residential waste.

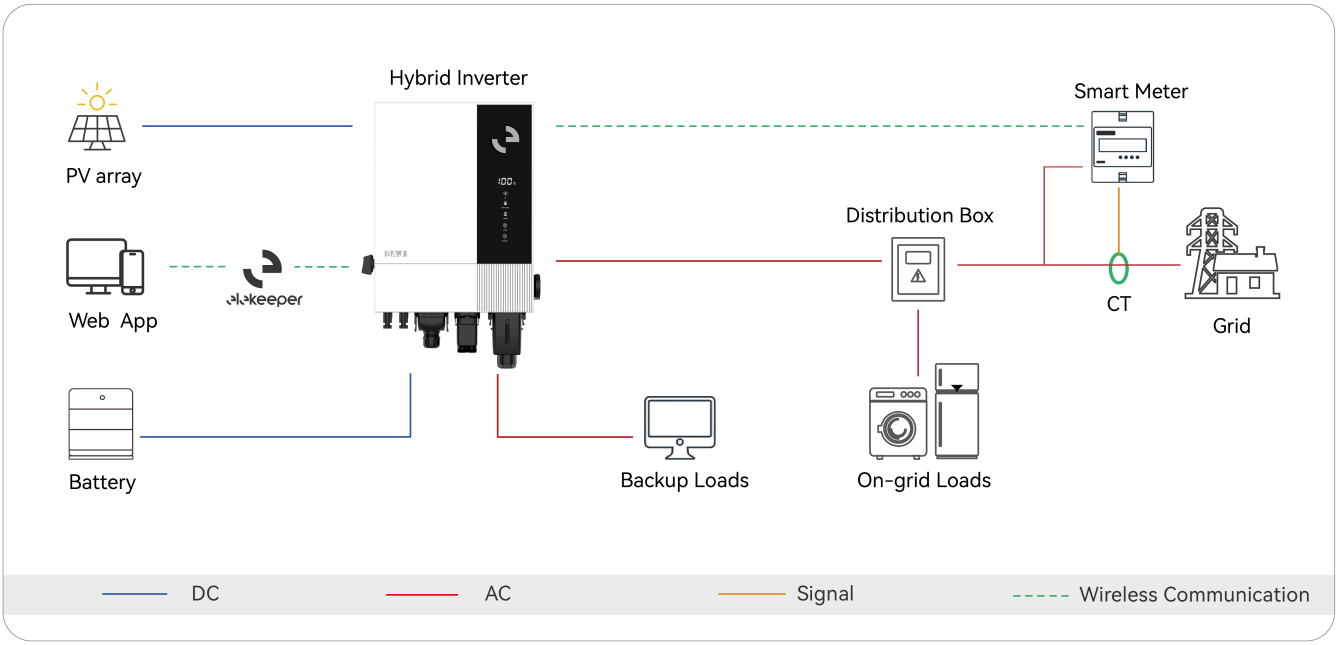
Some components inside the equipment can be recycled and reused, while others may pose a pollution risk to the environment. Please contact a locally authorized professional recycling agency for the proper handling of the product and its internal components.

2. Product information

2.1. System overview

The inverter is a transformer-less, low-voltage hybrid inverter and serves as a core component in energy storage systems. It provides the following features:

- The inverter integrates maximum power point tracking (MPPT), battery charging/discharging circuit and full-bridge inverting circuit.
- The inverter converts solar power to grid-compliant AC power for home loads and sells extra power to the grid. The solar power can also be stored into the battery for later use during grid failures or peak electricity price periods.
- When power outage occurs, the inverter seamlessly switches critical loads to battery power without supply interruption.



2.2. Work modes

The system supports the following working modes:

AI Mode

The working mode with AI Saving enabled. The system leverages AI-powered intelligent scheduling based on forecasts of PV generation, load demand, and electricity pricing to optimally allocate energy sources and usage, minimizing electricity bills and maximizing grid-export revenue.

Self-consumption Mode

The self-consumption mode maximizes the use of electricity generated by PV and minimizes the electricity purchased from the grid to reduce costs.

Period	Working logic
PV power is sufficient	**[PV→ Loads > Battery > Grid]** Any PV power will first supply the loads,with any surplus being used to charge the battery. Any excess power can then be exported to the grid.
PV power is insufficient	**[Battery + Grid → Loads]** Both the battery and the grid power the loads. The battery discharges power to the loads first. Once the battery reaches its minimum SOC, it stops discharging, and the grid supplies power to the loads.

Time-of-use Mode

The time-of-use mode allows the users to set the battery charging and discharging time according to the local peak and valley electricity prices.

Period	Working logic
Charging period (with lower electricity price)	[**Grid→ Battery**] The battery charges from the grid at a preset charging power until reaching the preset stop-charging SOC (%).
Discharging period (with higher electricity price)	[**Battery→ Loads**] The battery discharges to loads at a preset discharging power until reaching the preset stop-discharging SOC (%).
Other period	The working logic is the same as self-consumption mode.

Back-up Mode

The back-up mode is suitable for areas with frequent power outages. In this mode, the battery capacity is maintained at a relatively high level to ensure that loads work normally when the grid is off. The battery will not be discharged until a grid outage occurs.

Period	Working logic
Grid outage occurs	**[PV → Loads > Battery]** The PV power will first supply the loads, with any surplus being used to charge the battery.

Period	Working logic
No grid outage	**[PV → Loads > Battery > Grid]** The PV power will supply the loads first and any surplus will be used to charge the battery. Excess power can then be exported to the grid.

Table 2.1. With sufficient PV power

Period		Working logic
Battery SOC > preset capacity	Grid outage occurs	**[Battery → Loads]** The battery discharges power to the loads until the battery reaches its minimum SOC.
	No grid outage	**[Grid → Loads]** The grid powers the loads.
Battery SOC ≤ preset capacity	Grid outage occurs	**[Insufficient PV → Loads]** Only the insufficient PV supplies power to the loads. The battery will not be discharged until its SOC becomes higher than the preset capacity.
	No grid outage	**[Grid → Loads]** Only the grid powers the loads.

Table 2.2. With insufficient PV power

2.3. Product models

Model description

EK60 H3 - xK - LS2 - IE
① ② ③ ④ ⑤

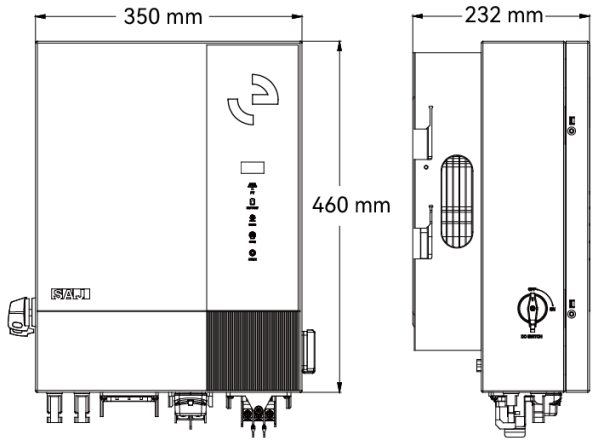
①	The product series.
②	The inverter model.
③	The rated capacity in kWh of the inverter. For example, 3K indicates the rated power of the inverter is 3 kW.
④	Low-voltage, single-phase inverter with 2 MPPTs.
⑤	It can be blank or IE. IE means the Ireland model.

Product models

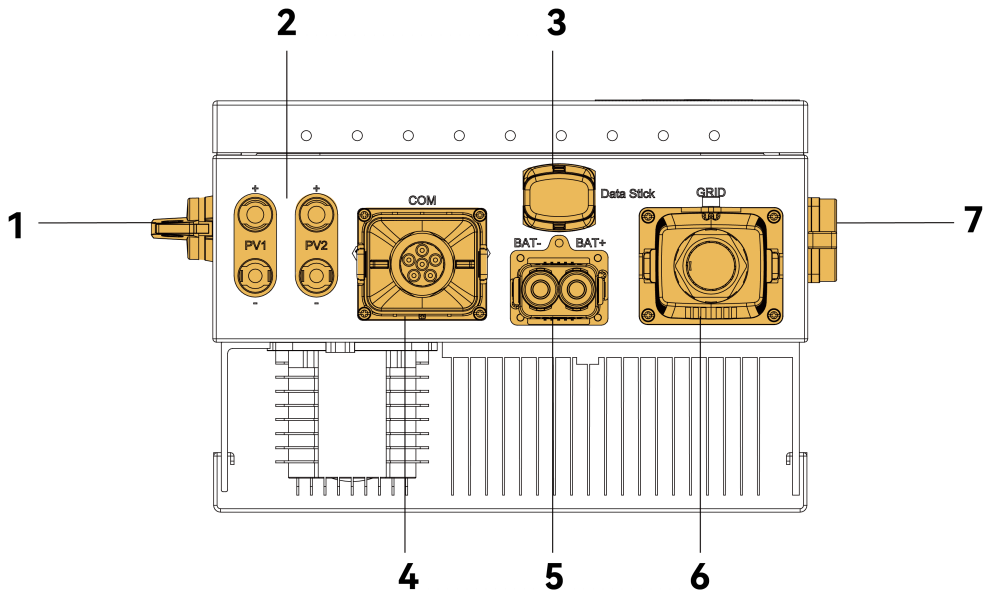
EK60 H3-2.9K-LS2	EK60 H3-4.6K-LS2
EK60 H3-3K-LS2	EK60 H3-5K-LS2
EK60 H3-3.6K-LS2	EK60 H3-6K-LS2
EK60 H3-4K-LS2	EK60 H3-6K-LS2-IE

2.4. Dimensions

Dimensions (H*W*D): 460*350*232 mm



2.5. Electrical terminals



Callout	Silkscreen	Description
1	DC Switch	DC switch which controls the PV connection.
2	PV1+ / PV1- / PV2+ / PV2-	The positive and negative PV input terminals.
3	Data Stick	Port for connecting a communication module.
4	COM	Cable gland for communication cables.
5	BAT- / BAT+	Cable glands for negative and positive battery cables.
6	GRID	Cable gland for grid cables.
7	BACK-UP	Backup loads socket.

Table 2.3. Bottom view

2.6. LED indicators

Panel	Display	Color	Status	Description
		White	*Integer* (example, 50)	Battery state of charge (SOC). For example, 50%.
			--	The battery communication is lost or inactive.
	 PV	White	Solid on	The PV array is working.
		Red	Solid on	The PV array is faulty.
		--	Off	The PV array is disconnected or inactive.
	 BATTERY	White	Solid on	The battery is charging.
			Breath (on 1s, off 1s)	The battery is discharging.
		Red	Solid on	The battery is faulty.
		--	Off	The battery is disconnected or inactive.
	 GRID	White	Solid on	The inverter is connected to grid.
			Breath (on 3s, off 3s)	The inverter is working off-grid.
		Red	Solid on	AC connection point is faulty.
		--	Off	No grid connection.
	 COM	White	Solid on	In good communication with the meter, BMS, and cloud.
			Breath (on 1s, off 1s)	Lost communication with the meter, the BMS, or cloud.
		Red	Off	Lost communication with all meters, BMS, and cloud.
	 STATE	White	Solid on	The inverter is working properly.
		Red	Solid on	The inverter is faulty.

Table 2.4. LED indicators

3. Transportation and Storage

DANGER

- Observe all safety symbols displayed on the packaging prior to transportation.
- Maintain stable driving conditions throughout transportation to prevent the inverter from colliding or dropping, as internal power components may be damaged, potentially causing short circuits or explosions upon subsequent power-up.
- Ensure that transport vehicles are not overloaded and that weight is distributed evenly.
- Do not drill holes into the product or its housing for any transportation-related purpose. Such modifications can damage the structural integrity and functionality of the device.
- Do not store or transport the equipment in damp, flammable, or explosive environments.

WARNING

- When moving the equipment, use the original packaging or dedicated handling tools to avoid muscle strain from lifting heavy objects alone.
- Wear suitable protective gloves when manually handling equipment.
- When lifting the inverter, grip it firmly at the designated handles and support the base. Keep the unit level to avoid dropping.
- Do not unpack the inverter packaging if it is not used immediately.
- Do not store the inverter in areas exposed to direct sunlight, rain, strong electric fields, or high humidity. Such conditions can cause overheating, electrical failure, or corrosion.
- Do not store inverters near chemically corrosive substances or in locations prone to pests or rodents. These can cause irreversible damage to housing and internal components.
- Do not stack heavy objects on top of the inverter enclosure during storage.
- Do not tilt or invert the packaging. Maintain the upright orientation as indicated on the carton to prevent internal displacement or component stress.

CAUTION

- The storage temperature must remain between -40℃ to +60℃ (-40℉ to +140℉), with relative humidity between 0% and 95% (non-condensing).
- Store inverters in a clean, dry, and well-ventilated area to avoid moisture buildup and overheating.
- Promptly replace any packaging materials that have been damaged by insects or rodents.

NOTICE

- It is recommended to retain the original packaging for future relocation or return for repair.
- Before long-term storage (exceeding 6 months), ensure the storage environment meets requirements and periodically inspect the packaging integrity. Check for environmental damage, pest intrusion, or packaging degradation.

4. Installation

4.1. Installation environment requirements

- Do not expose the device to direct solar irradiation as this could cause power derating due to overheating.
- The installation environment must be free of inflammable or explosive materials.
- The device must be installed in a place away from any heat source.
- Do not install the device at a place where the temperature changes extremely.
- Keep the device away from children.
- Do not install the device in the bedroom, toilet, or bathroom.
- When installing the device at the garage, keep it away from the driveway.
- Keep the device from water sources such as taps, sewer pipes and sprinklers to prevent water seepage.
- For outdoor installation, keep the device away from direct sunlight, rain and snow.
- Ensure the inverter is installed in a well-observed area where the LED display panel can be easily read for real-time status checks.



4.2. Plan the installation site

- Install the device vertically.
- The maximum allowable backward-tilted angle is 15 degrees.
- Do not install it forward-tilted, horizontally or upside down.

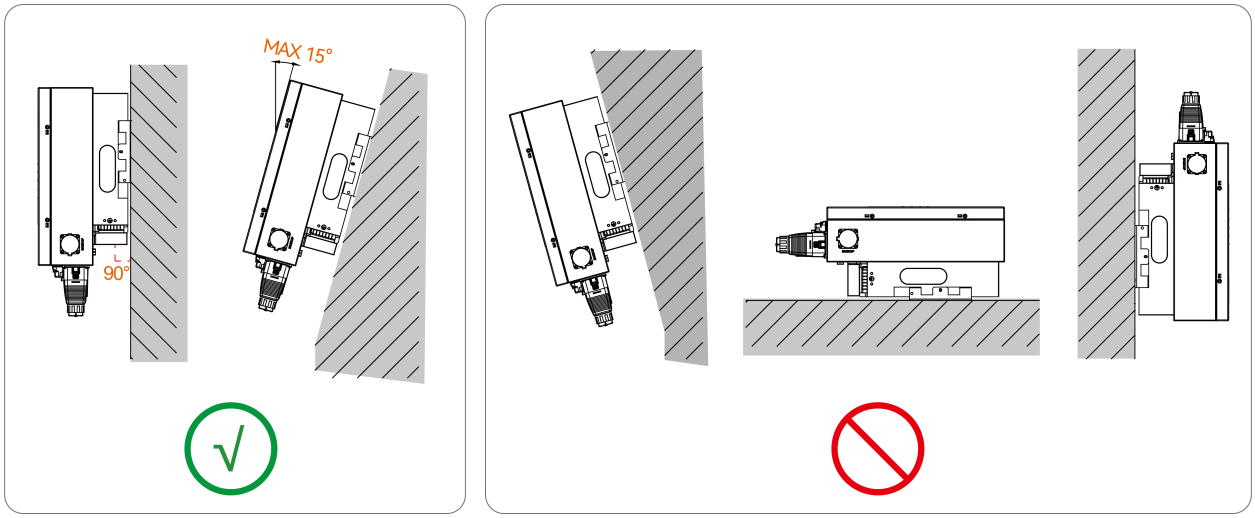


Figure 4.1. Installation location

- Maintain sufficient clearance around the inverter to allow for adequate airflow. This is especially important when installing multiple inverters in the same location.

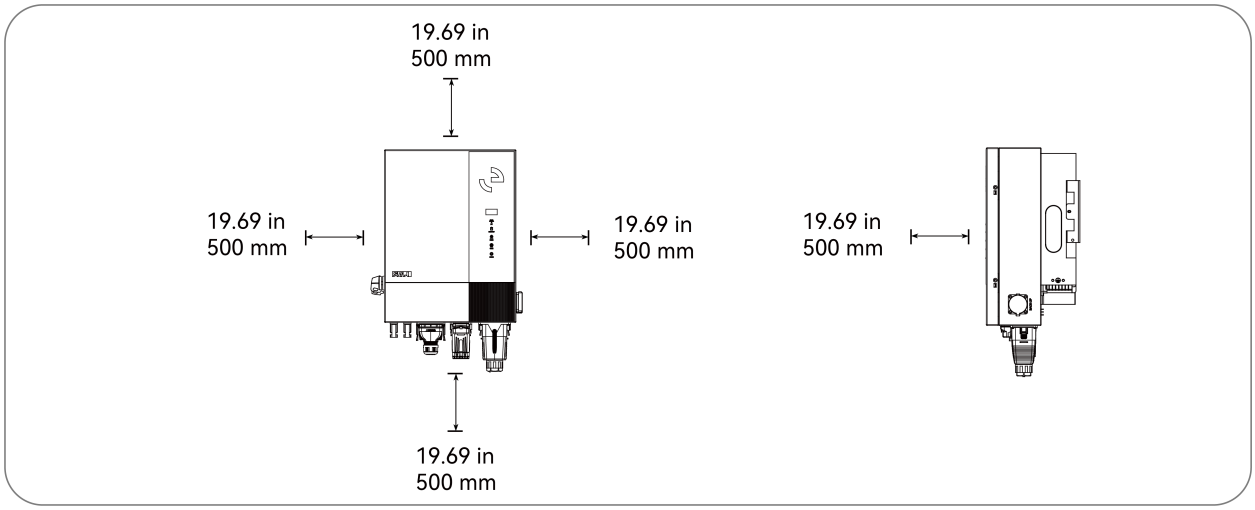


Figure 4.2. Installation clearance

4.3. Installation tools

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

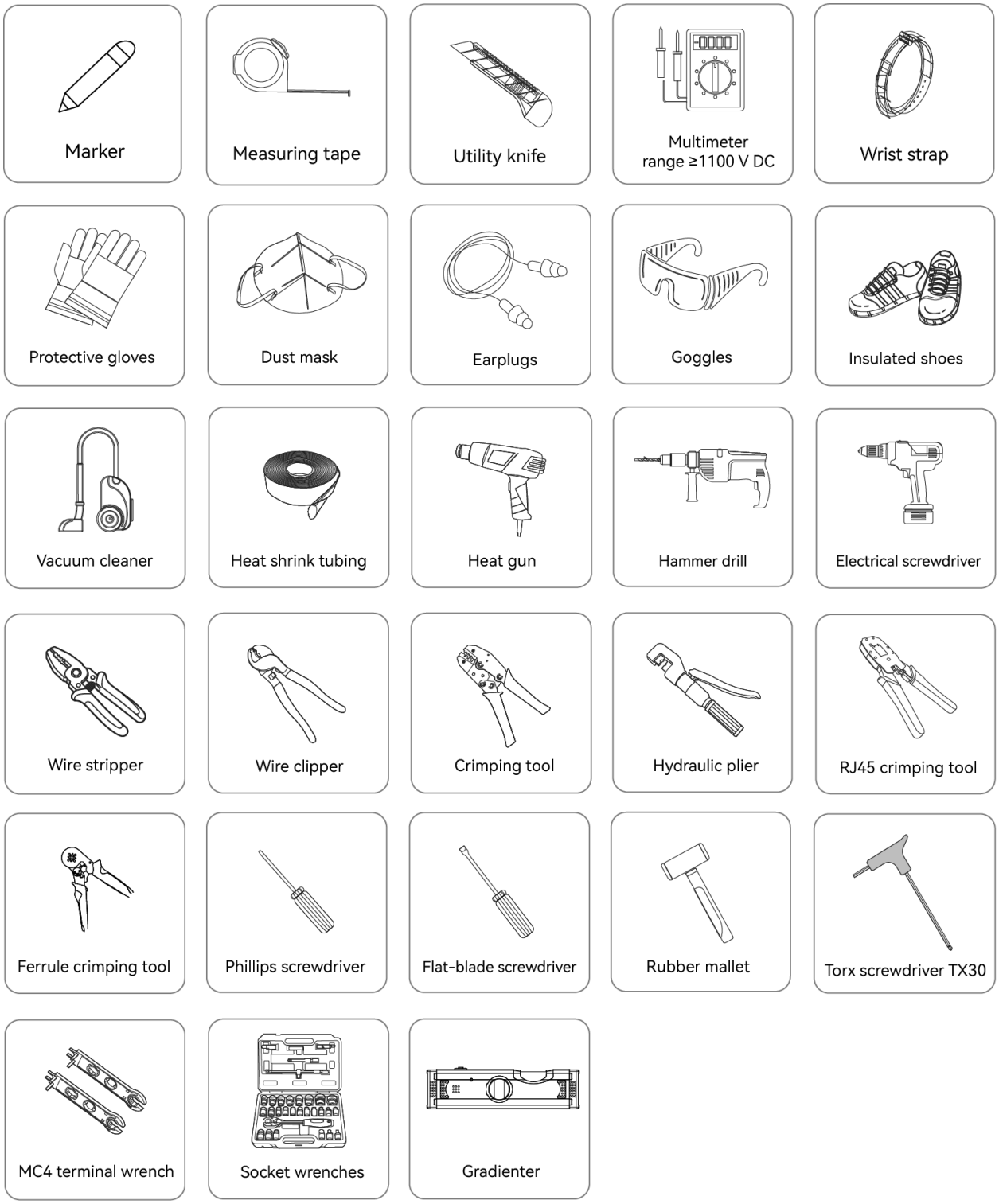
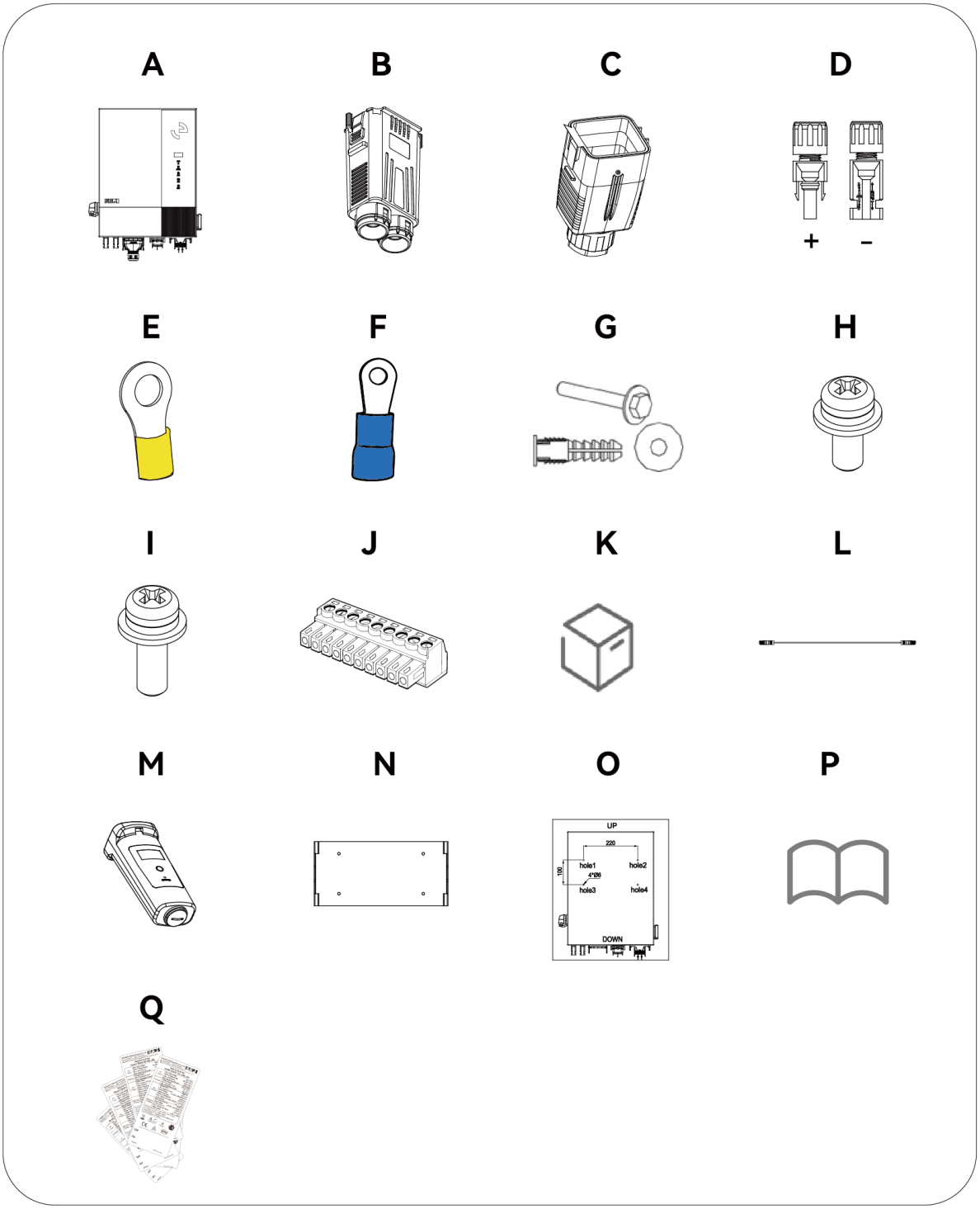


Figure 4.3. Suggested installation tools

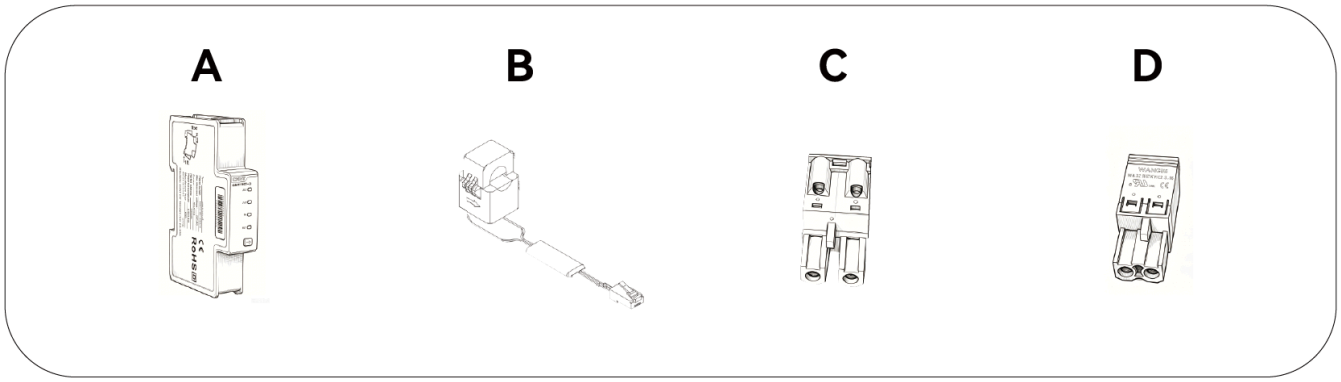
4.4. Packing list



Number	Quantity	Designation
A	1	EK60 H3-(2.9K-6K)-LS2 hybrid inverter.
B	1	Waterproof cover for battery terminals.
C	1	Waterproof cover for AC terminals.
D	2	PV connectors.
E	2	Battery cable lugs (yellow).

Number	Quantity	Designation
F	5	Grounding cable and AC cable lugs (blue).
G	4	M6*50 expansion bolt for fixing the wall-mounting bracket to the wall.
H	2	M4*10 screw for fixing the inverter to the wall-mounting bracket.
I	2	M5*12 screw for connecting the grounding cable.
J	1	10-pin pluggable communication terminal block.
K	1	Zero-export device kit, including SAJ smart meter (*MH-100S2-R*) and current transformer (*CT-100S*).
L	1	Communication cable with RJ45 connectors.
M	1	Communication module.
N	1	Wall-mounting bracket.
O	1	Hole-positioning cardboard.
P	1	Documentation.
Q	1	Power labels.

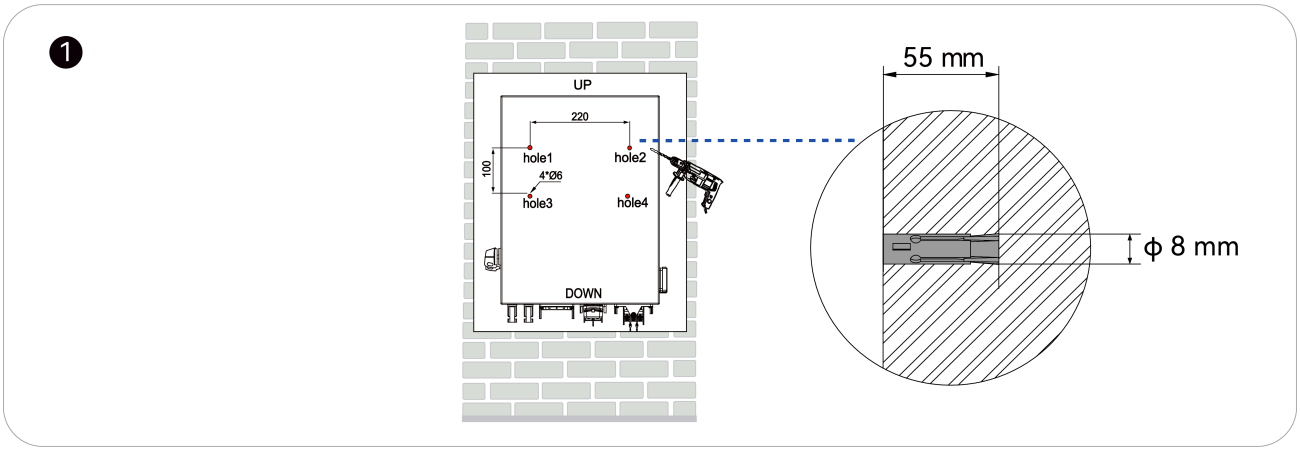
The zero export device kit contains the following items:



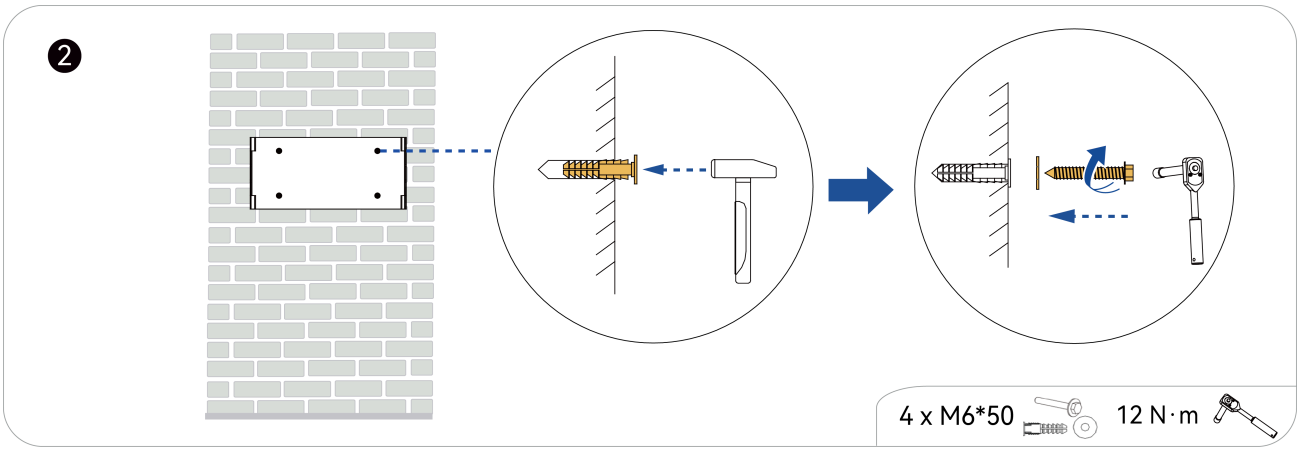
Number	Quantity	Designation
A	1	Smart meter (*MH-100S2-R*).
B	2	Single phase current transformer with communication cable (*CT-100S*).
C	1	2-pin terminal for phase cable connection of L and N.
D	1	2-pin terminal for RS485 communication cable connection between the meter and inverter.

4.5. Wall mounting

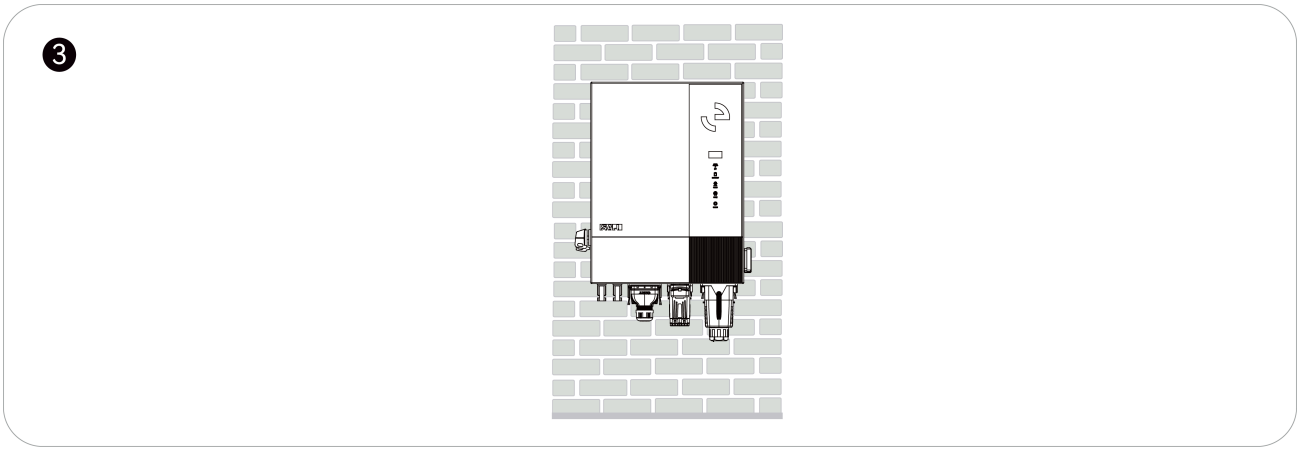
1. Place the hole-positioning cardboard onto the wall. Mark and drill four holes on the wall.



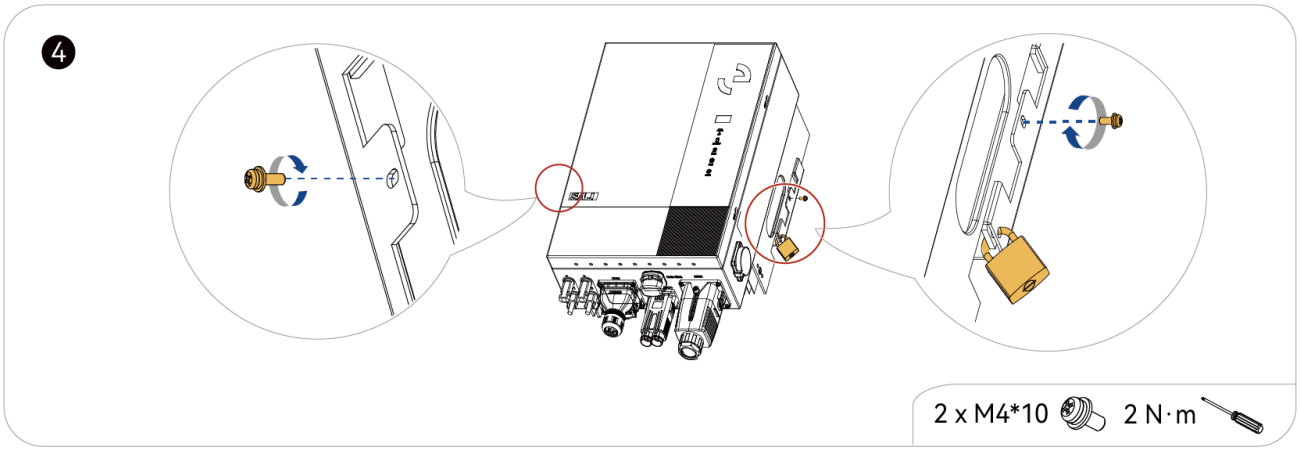
2. Align the holes of the mounting bracket to the drilled holes. Use a rubber mallet to insert four expansion tubes into the holes. Insert the screws into the drilled holes and tighten the screws to fix the mounting bracket to the wall.



3. Mount the inverter onto the bracket.



4. Insert and tighten the screws on both sides of the inverter. A lock can be installed on the right side.



5. Electrical connection

5.1. Electrical connection diagram

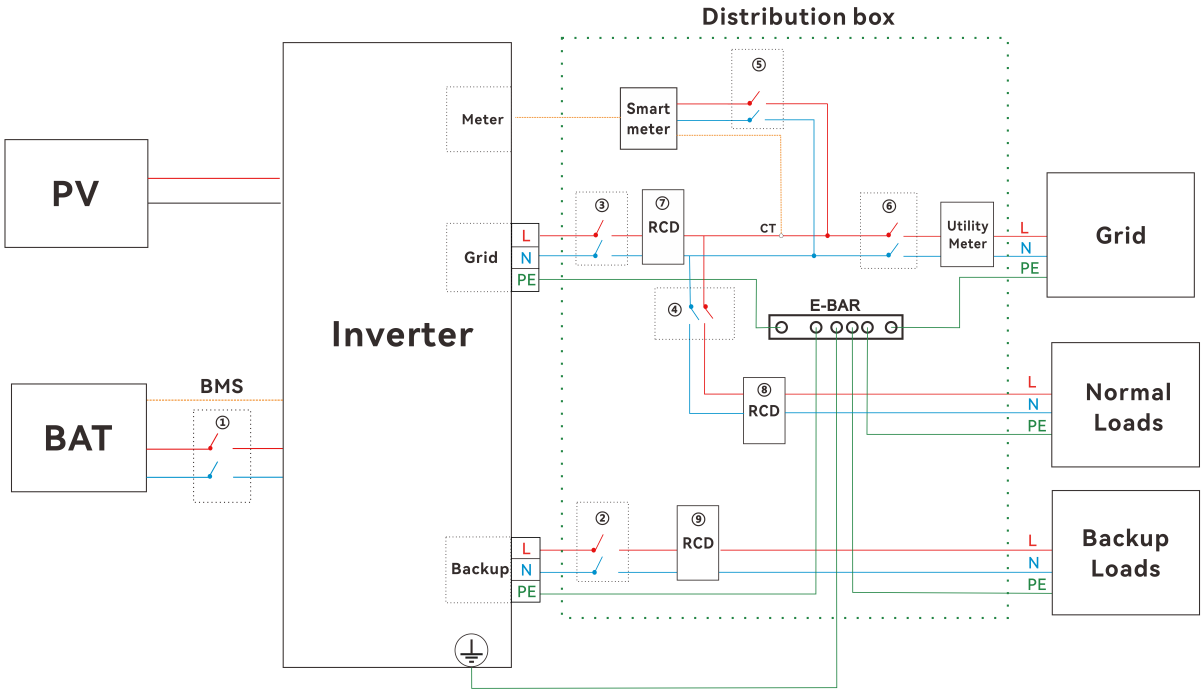


Figure 5.1. System connection diagram

Model	① DC breaker (battery)	② AC breaker (backup loads)	③ AC breaker (grid)	⑦ RCD (grid)	⑧⑨ RCD (normal and backup loads)
H3-2.9K-LS2	100 A / 60 V	20 A / 230 V	20 A / 230 V	300 mA	30 mA
H3-3K-LS2	100 A / 60 V	20 A / 230 V	20 A / 230 V		
H3-3.6K-LS2	125 A / 60 V	20 A / 230 V	20 A / 230 V		
H3-4K-LS2	125 A / 60 V	25 A / 230 V	25 A / 230 V		
H3-4.6K-LS2	160 A / 60 V	25 A / 230 V	25 A / 230 V		
H3-5K-LS2	160 A / 60 V	32 A / 230 V	32 A / 230 V		
H3-6K-LS2	180 A / 60 V	40 A / 230 V	40 A / 230 V		
H3-6K-LS2-IE	180 A / 60 V	40 A / 230 V	40 A / 230 V		

Table 5.1. Recommended breaker specification

Note:

- AC breaker for normal loads (④) and smart meter (⑤) depends on the loads and meter specifications.
- AC breaker for utility meter (⑥) is the main breaker. Ensure the main breaker matches the local grid and total load capacity.
- The values in the table are recommendations only and can be set to other values based on the actual conditions.

5.2. Prepare the cables

Cable (90℃, copper)	H3-2.9K-LS2	H3-3K-LS2	H3-3.6K-LS2	H3-4K-LS2	Stripping length
Ground	4 mm² / 12 AWG		6 mm² / 10 AWG		15 mm
PV	4 mm² / 12 AWG				10 mm
BAT	10 mm² / 6 AWG			25 mm² / 4 AWG	15 mm
Grid	4 mm² / 12 AWG				12 mm
COM	0.5-0.75 mm² / 20-18 AWG				7.5 mm

Cable (90℃, copper)	H3-4.6K-LS2	H3-5K-LS2	H3-6K-LS2 / H3-6K-LS2-IE	Stripping length
Ground	6 mm² / 10 AWG			15 mm
PV	4 mm² / 12 AWG			10 mm
BAT	25 mm² / 4 AWG	35 mm² / 2 AWG	50 mm² / 1 AWG	15 mm
Grid	6 mm² / 10 AWG			12 mm
COM	0.5-0.75 mm² / 20-18 AWG			7.5 mm

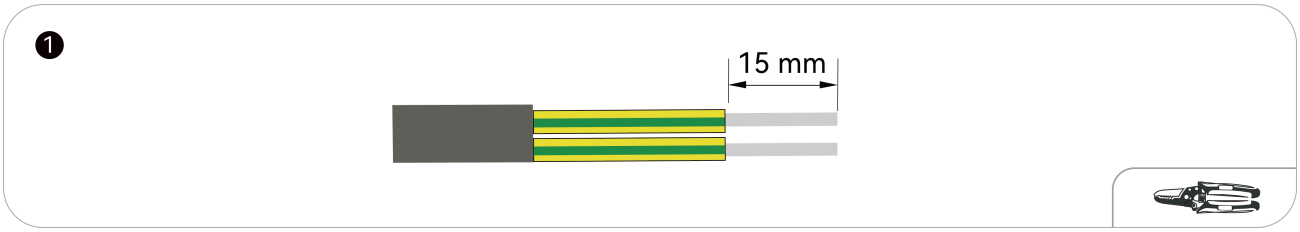
Table 5.2. Recommended cable specification

5.3. Connect the cables

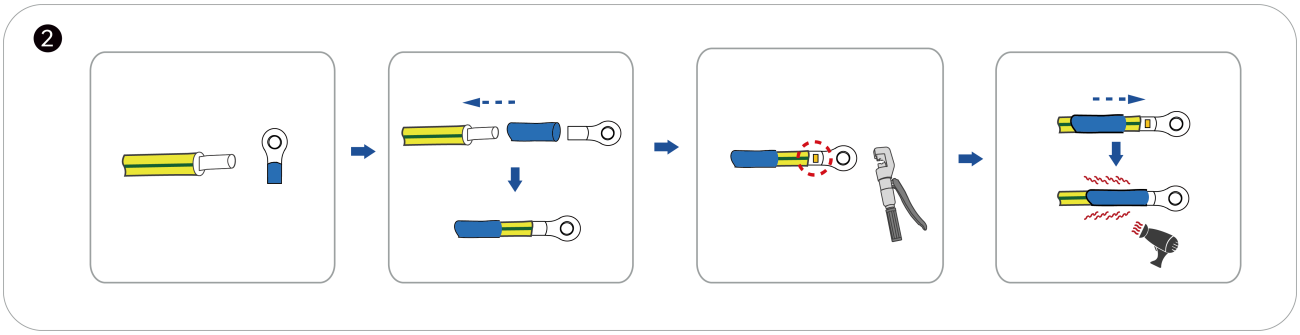
Procedure

1. Connect the grounding cables.

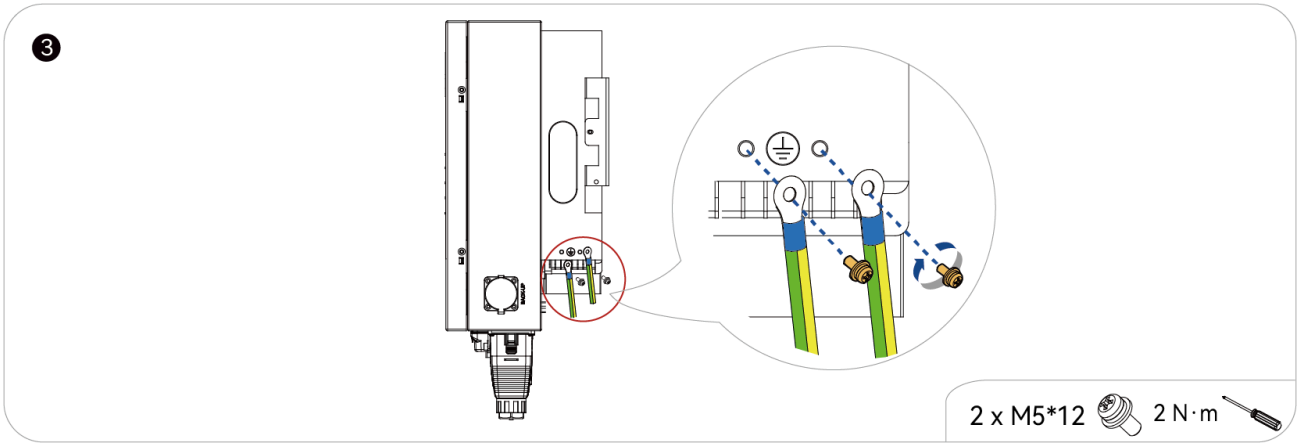
   Strip off the insulation of the grounding cable ends.



   Assemble the cable and cable lug.



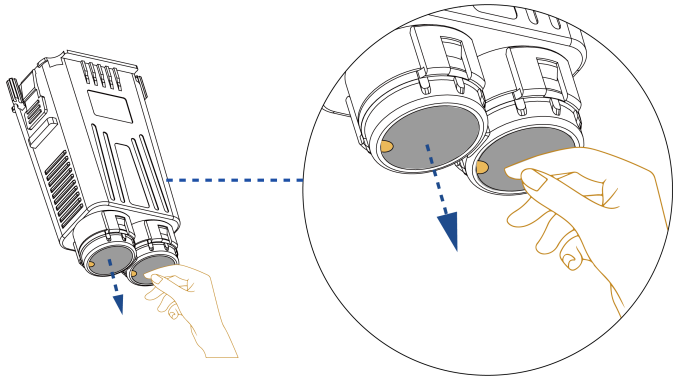
   Insert two screws through the cable lug to the grounding port of the inverter.



2. Connect the battery cables.

Peel off the protective cover at the bottom of the battery cable waterproof cover.

❶



Strip off the insulation of the battery cable ends.

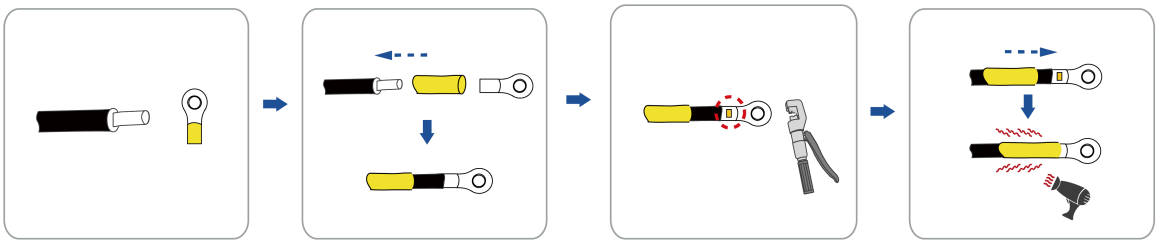
❷





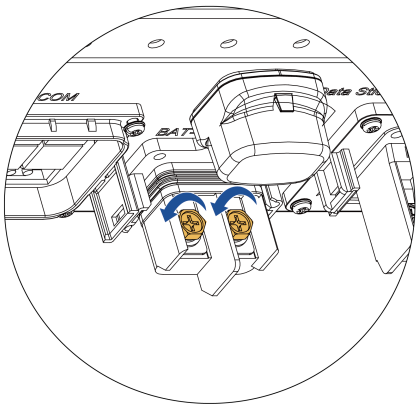
Assemble the cable and cable lug.

❸



Loosen the screws on the battery terminals.

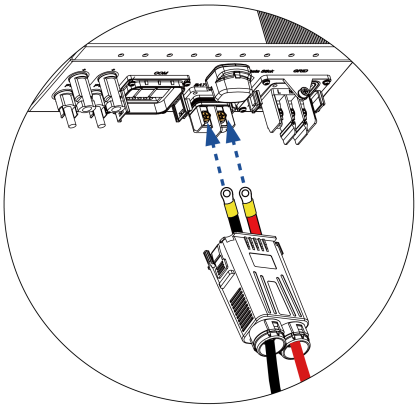
❹





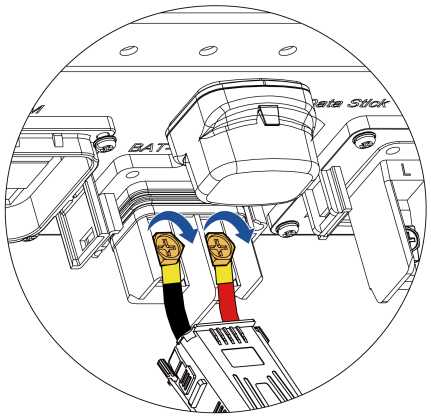
Insert the positive and negative battery cables through the waterproof cover to terminals **BAT-** and **BAT+**.

❺



Tighten the terminal screws.

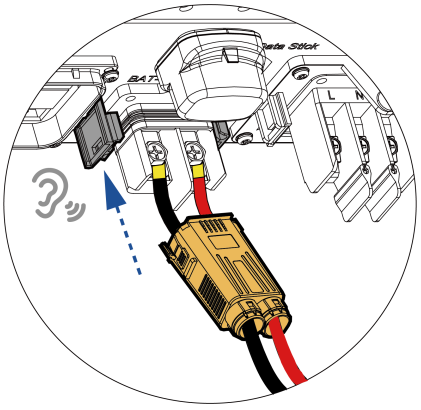
❻



4.5 N·m

Install the waterproof cover to the inverter.

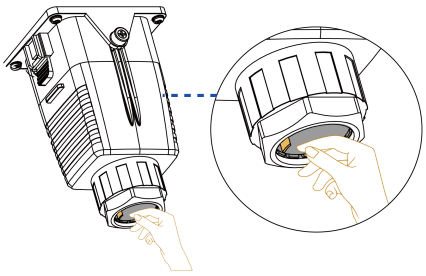
❼



3. Connect the AC cables.

   Peel off the protective cover at the bottom of the AC cables waterproof cover.

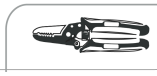
❶



   Strip off the insulation of the AC cable ends.

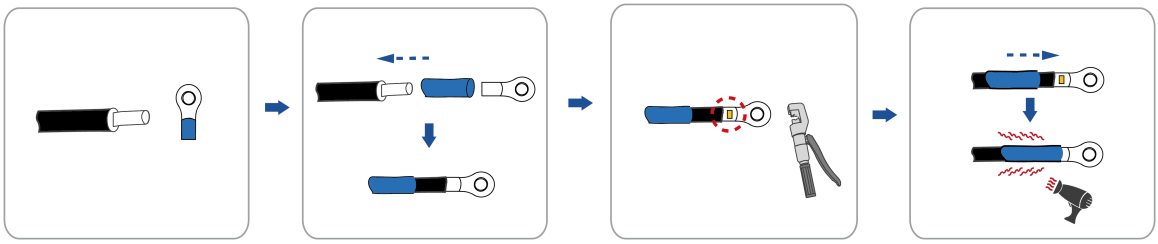
❷





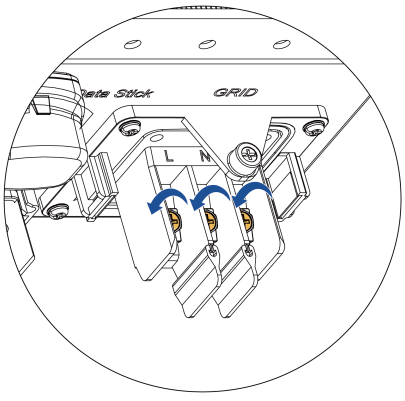
   Assemble the cable and cable lug.

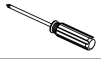
❸



   Loosen the screws on the GRID **L**, **N**, and **PE** terminals.

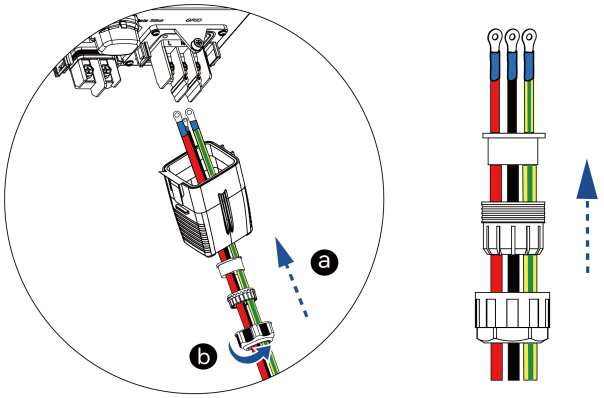
❹





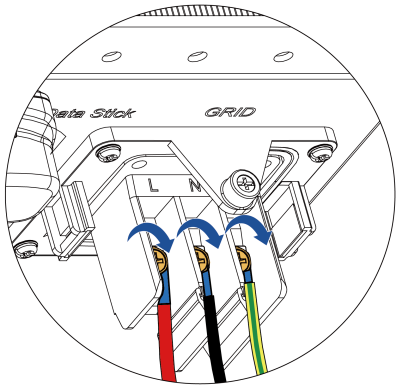
Insert the cables through the waterproof cover to the terminals.

❺



Tighten the terminal screws.

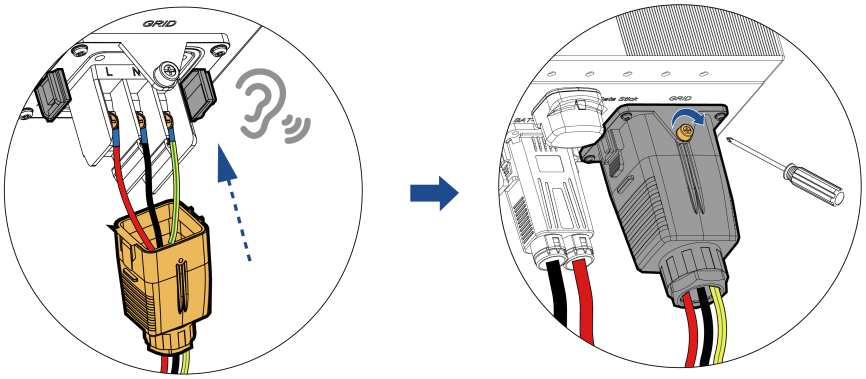
❻



1 N·m

Install the waterproof cover onto the **GRID** terminal, then tighten the screw to secure the cover to the inverter.

❼



1 N·m

4. Connect the communication cables.

   Prepare communication cables according to the pin definition.

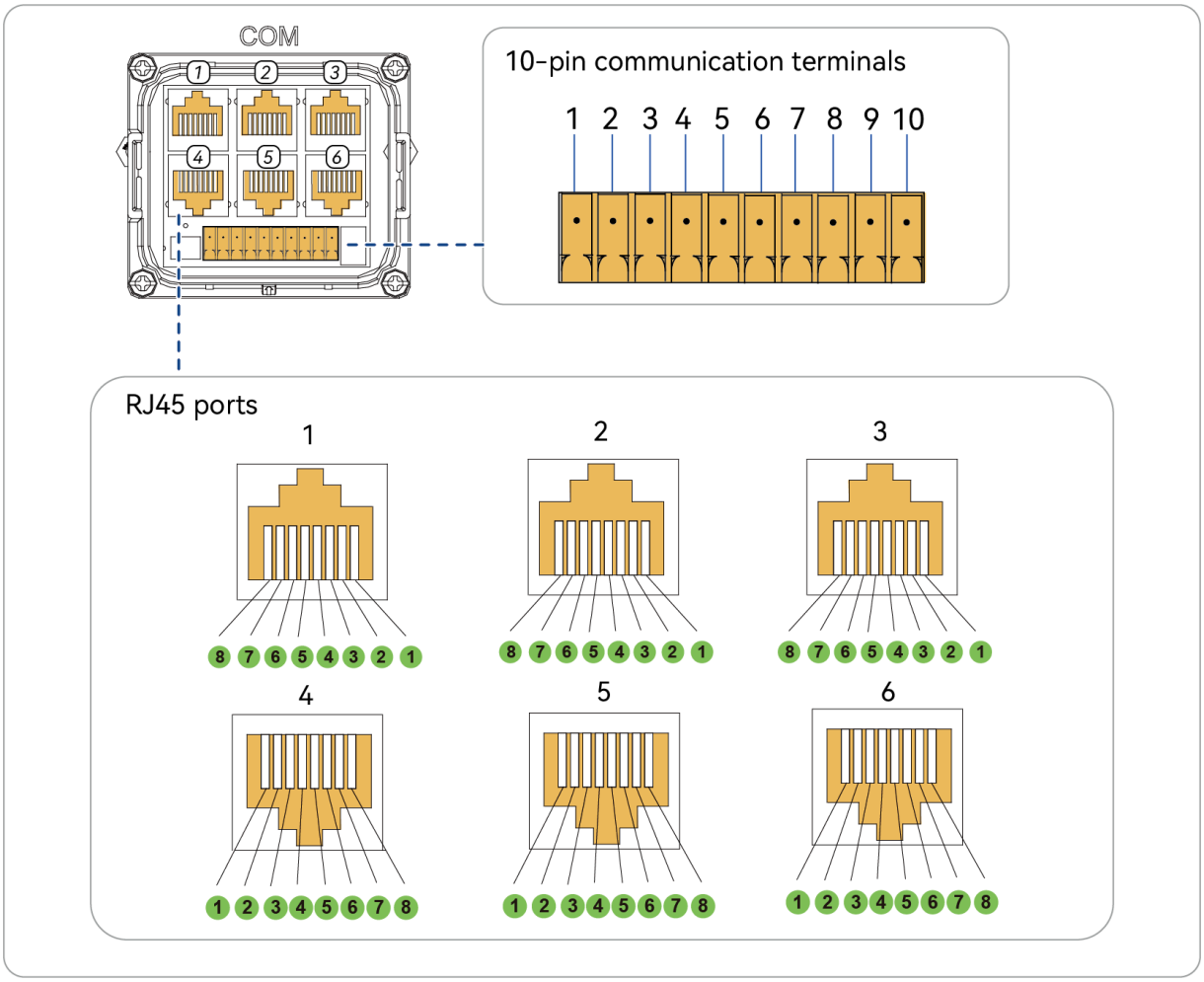


Figure 5.2. Communication terminals and ports

No.	Terminal name	Description
1	GND_S	Ground terminal for connecting to external devices.
2	+12V_W	12V DC power output terminal for connecting to external devices.
3	CT1+	For connecting CT positive cable.
4	CT1-	For connecting CT negative cable.
5	DRY_GEN+	Reserved dry contact.
6	G_S	Ground terminal for reserved dry contact.
7	G	Ground terminal for reserved dry contact.
8	DRY_S	Reserved dry contact.
9	DRY	For connecting to external emergency stop switch.

No.	Terminal name	Description
10	EX_SD+	For connecting to external emergency stop switch.

Table 5.3. 10-pin communication terminals description

Port 1: DRM	
1	DRM 1/5
2	DRM 2/6
3	DRM 3/7
4	DRM 4/8
5	RefGen
6	Com/DRM 0
7	V+
8	V-

Port 2: PARALLEL-1	
1	CANH
2	CANL
3	BKUP TO GRID_BUS+
4	CAN1_H
5	CAN1_L
6	CARRY_BUS+
7	GRID TO BKUP_BUS+
8	GND_S

Port 3: MODBUS-RS485	
1	NC
2	RS485_A
3	RS485_B
4	NC
5	NC
6	RS485_A1
7	RS485_B1
8	NC

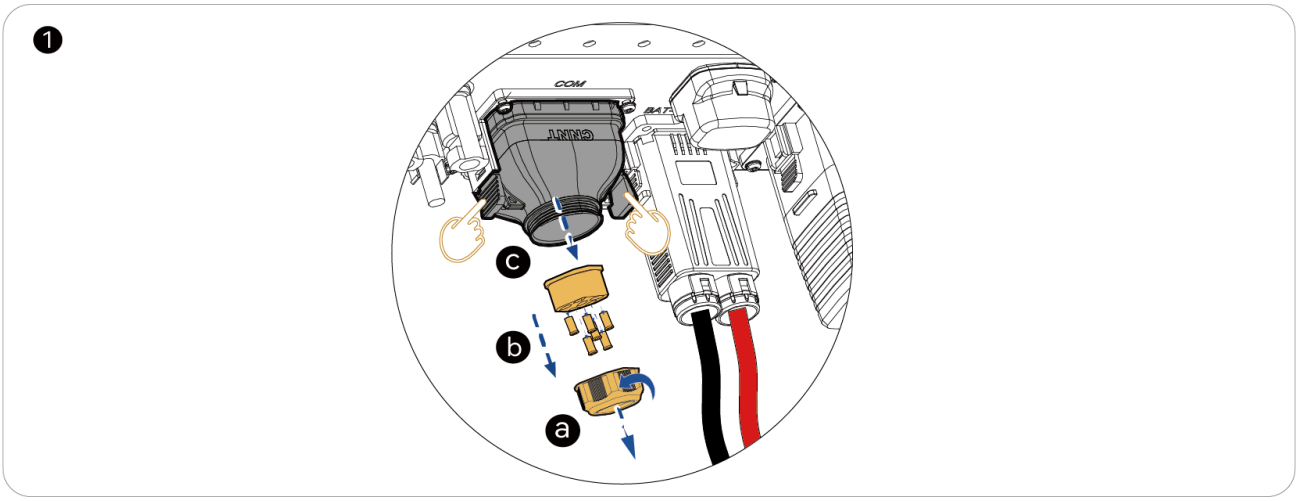
Port 4: METER-RS485	
1	RS485_B1
2	RS485_A1
3	GND_S
4	RS485_B1
5	RS485_A1
6	GND_S
7	RS485_B1
8	RS485_A1

Port 5: PARALLEL-2	
1	CANH
2	CANL
3	BKUP TO GRID_BUS+
4	CAN1_H
5	CAN1_L
6	CARRY_BUS+
7	GRID TO BKUP_BUS+
8	GND_S

Port 6: BMS-CAN	
1	NC
2	NC
3	NC
4	CANH
5	CANL
6	NC
7	NC
8	NC

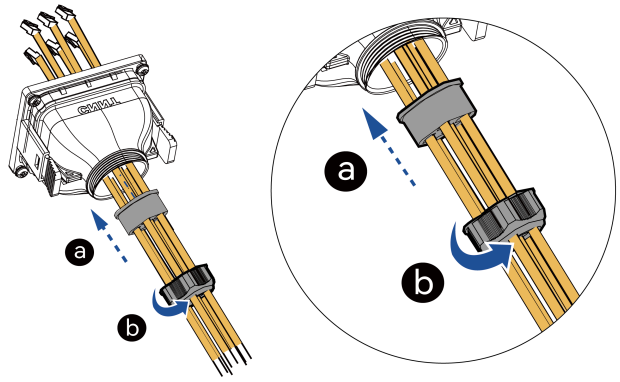
Figure 5.3. RJ45 ports description

Loosen and remove the locking nut of the communication terminal waterproof cover. Remove the six rubber plugs from the O-ring. Press the side latches of the waterproof cover, then detach the cover from the inverter.



Insert the communication cables with RJ45 connectors through the locking nut, O-ring, the waterproof cover. Tighten the locking nut to the waterproof cover body.

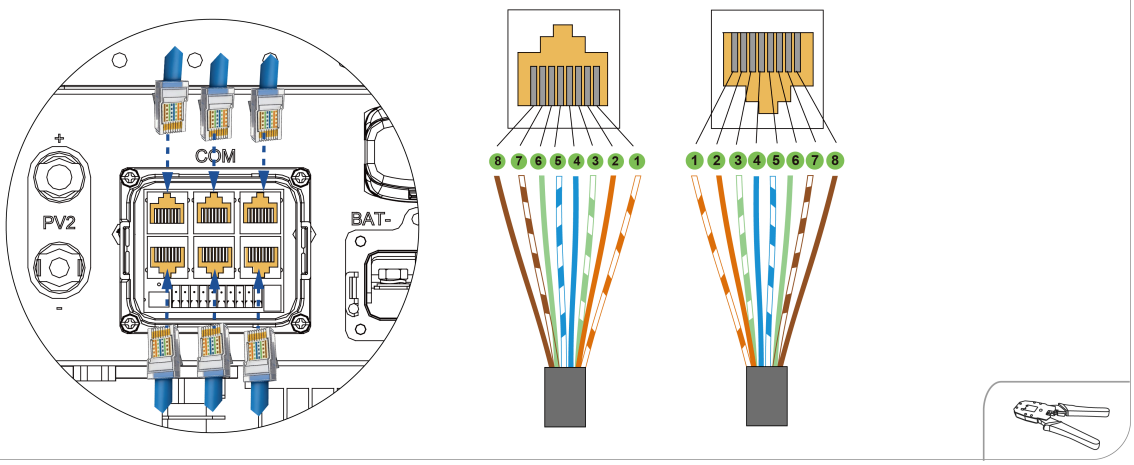
❷



Insert the communication cables to the RJ45 ports.

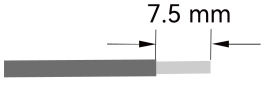
Note: Ensure correct order of pins (1 to 8).

❸ RJ45 connectors

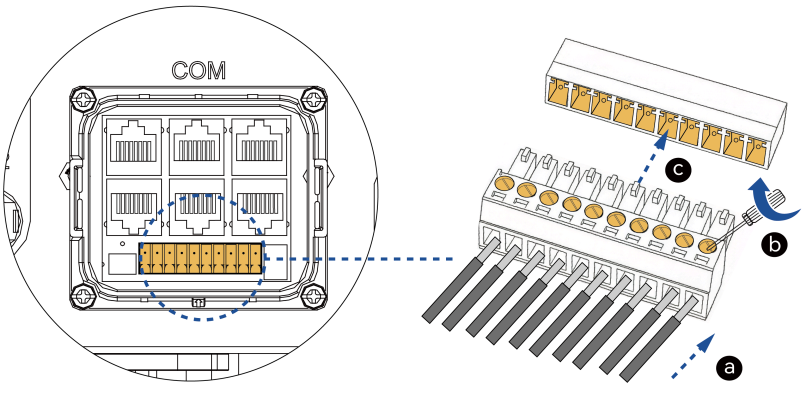


Per your needs, prepare communication cables according to Table 5.3. 10-pin communication terminals description *(on page 27)* and insert the cables to 10-pin connector. Tighten the screws on the connectors, and then insert the connectors into the **COM** terminals.

❹a 10-pin connectors

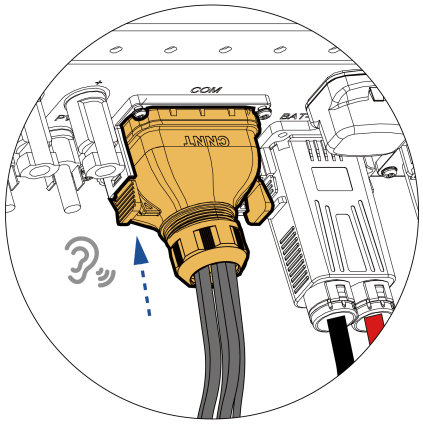


❹b



Install the waterproof cover back to the **COM** terminal.

❺

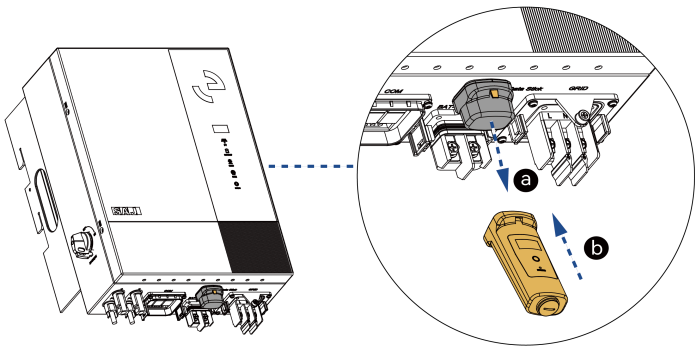


5. Connect the communication module.

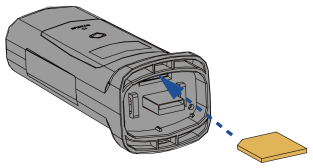
   Remove the cover on the **Data Stick** port and install the communication module to the port.

   Note: For eSolar 4G Pro module, insert the SIM card before installing the communication module to the inverter.

eSolar Wi-Fi Pro Module

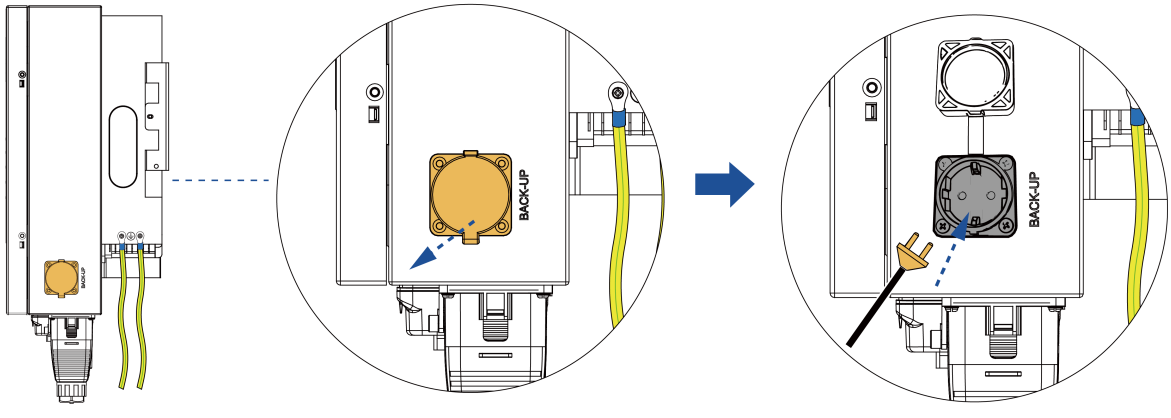


eSolar 4G Pro Module



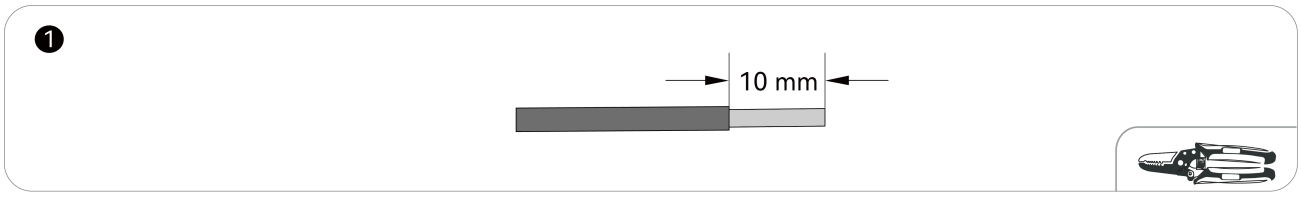
6. Connect the backup loads.

   Open the cover of the backup load socket and insert the plug of the backup loads.

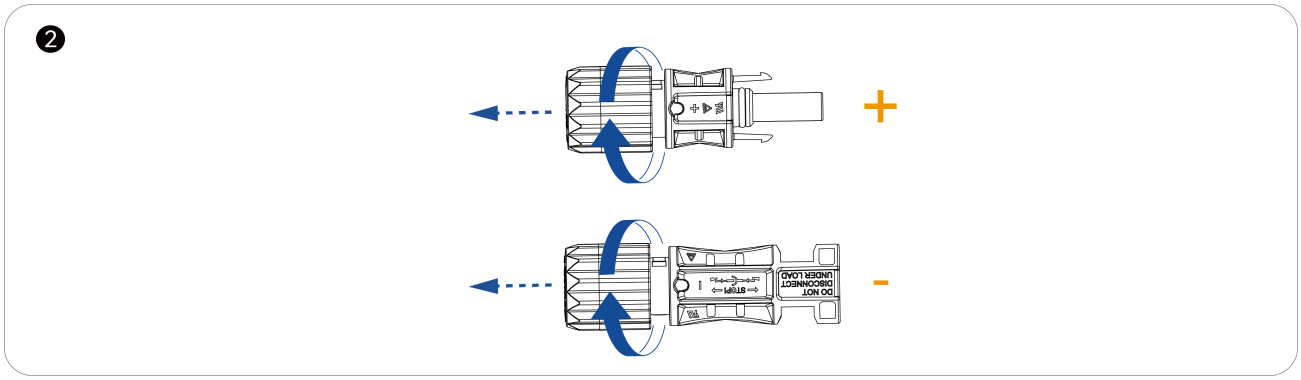


7. Connect the PV cables.

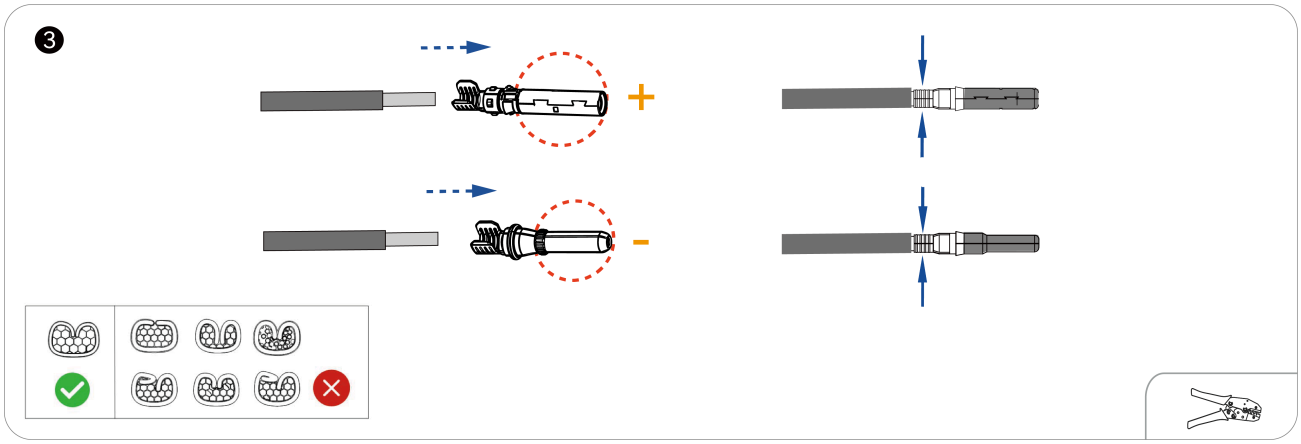
Strip off the insulation of the PV cable ends.



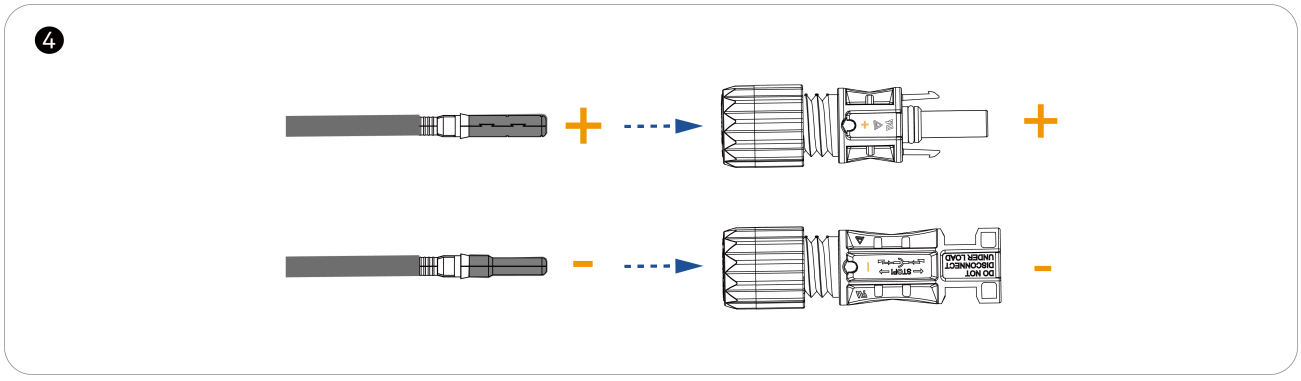
Loosen the lock screws on positive and negative connectors.



Insert the cable ends into the sleeves. Use a crimping plier to assemble the cable ends.

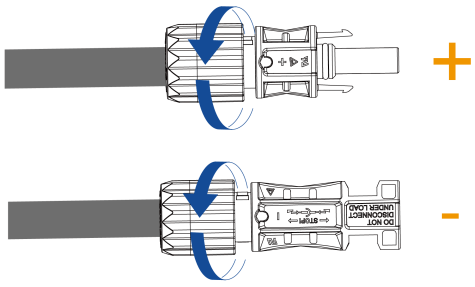


Insert the assembled cable ends into the positive and negative PV connectors. Gently pull the cables backwards to ensure firm connection.



Use an MC4 terminal wrench to tighten the locking screws on the positive and negative cable connectors.

❺

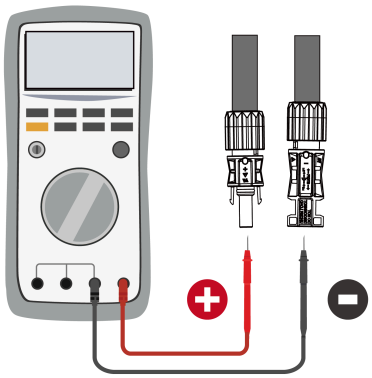


Measure the DC voltage of each positive and negative PV input cable with the multimeter. Make sure that each PV input shows DC voltage around 600 V with correct polarity.

Note:

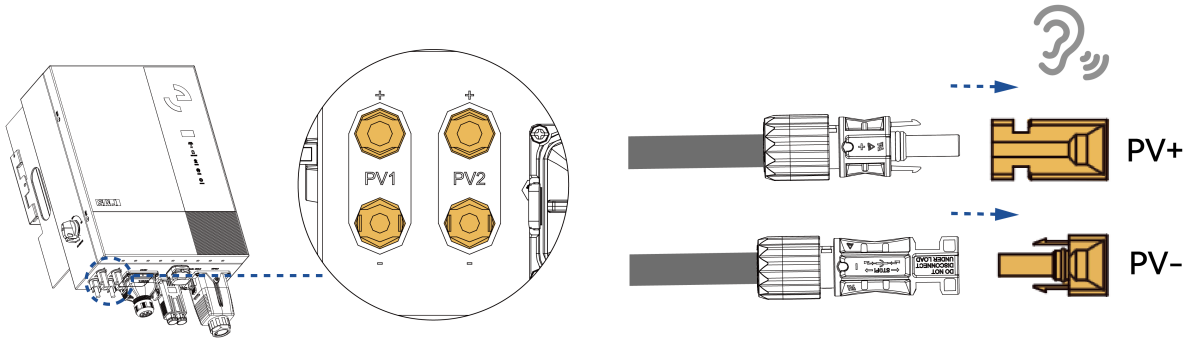
- Use a multimeter with a DC voltage range ≥ 600 V.
- A negative voltage reading indicates reversed DC input polarity. Rewire to correct the polarity.
- A voltage reading over 600 V indicates excessive PV array configuration. Reconfigure the PV array accordingly.

❻



Connect the positive and negative connectors into the **PV+** and **PV-** terminals. A “click” sound should be heard when the cable is assembled correctly.

❼

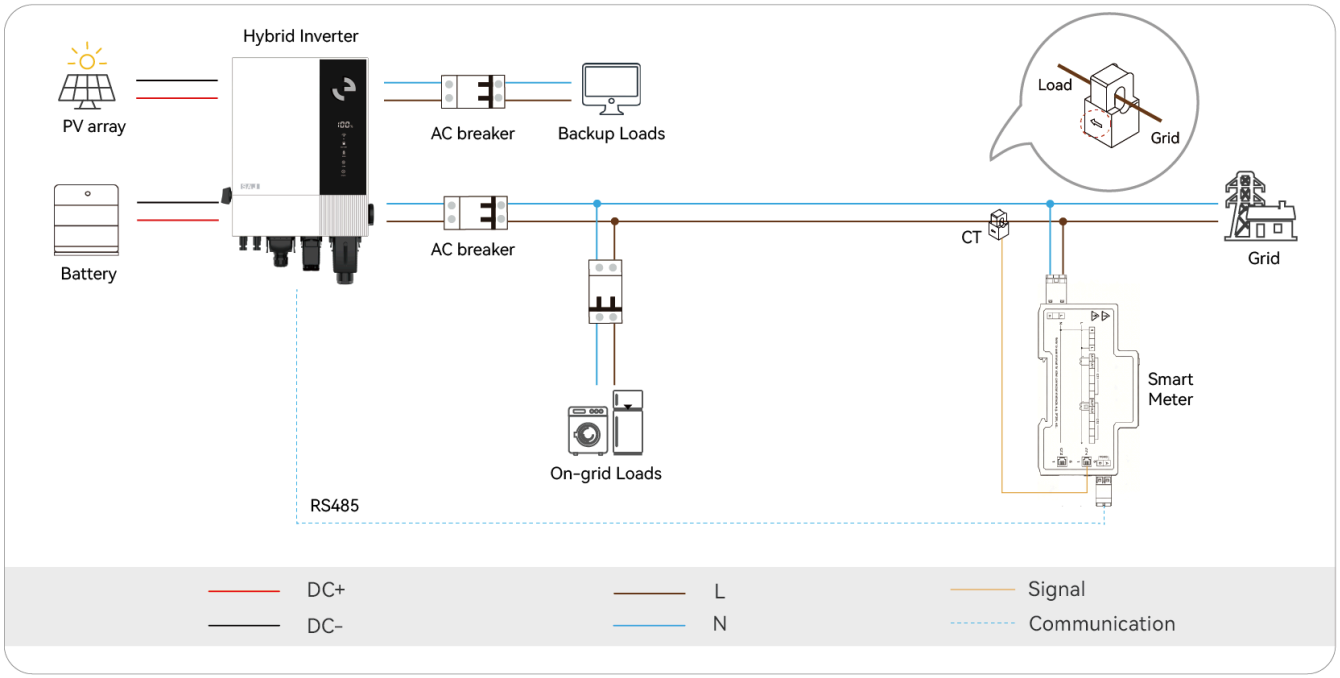


5.4. Zero export device connection

The zero export device is necessary for system installation and provide the operating condition of the inverter via RS485 communication. Connect the smart meter (SAJ *MH-100S2-R*) and CT (*CT-100S*) according to the following steps.

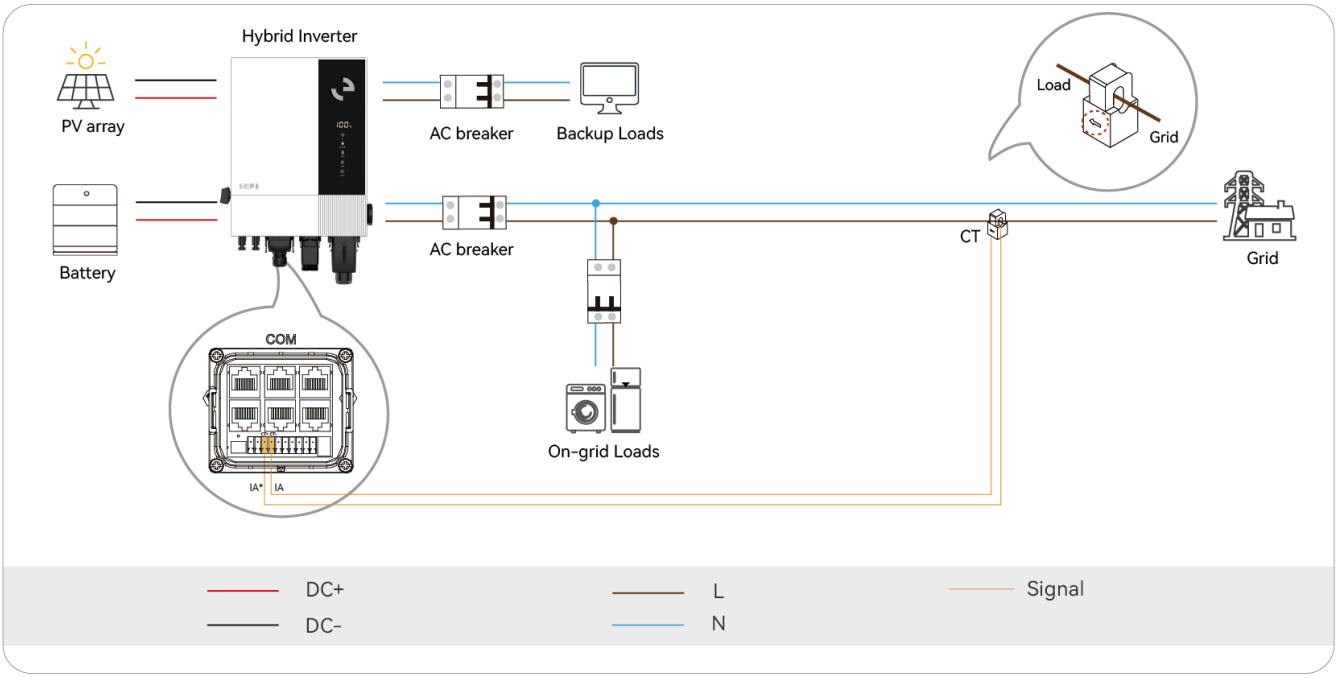
External CT with smart meter

1. Insert the 2-pin terminal (**C** in the smart meter kit) into the smart meter. Connect the meter to phase **L** and **N**.
2. Clamp the CT to phase **L**. Insert the RJ45 plug of the CT communication cable into the smart meter port **CT1**.
3. Insert the other 2-pin terminal (**D** in the smart meter kit) into the smart meter port **RS485**. Connect the communication cable between meter port **RS485** and inverter RJ45 port **METER-RS485**.



External CT without smart meter

1. Clamp the CT to phase **L**.
2. Connect the CT cable **IA*** to communication terminal **CT+**, and cable **IA** to **CT-**.



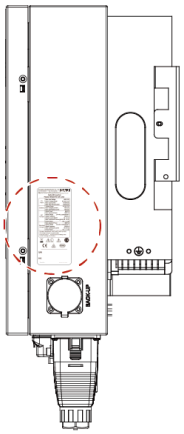
6. Attach correct label to the inverter

NOTICE

The EK60 H3-(2.9K-6K)-LS2 series adopts single stocking keeping unit (SKU) scheme, which means multiple inverter models share the same serial number (SN). Installers need to attach the matching power label on-site and configure the actual power rating via elekeeper App.

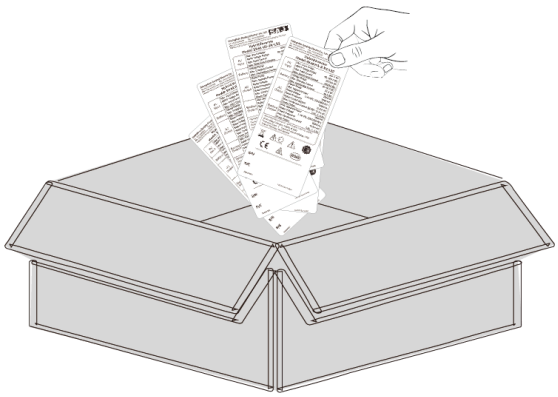
1. Find the power label on the right of the inverter; a 6K default label is attached before delivery.

❶

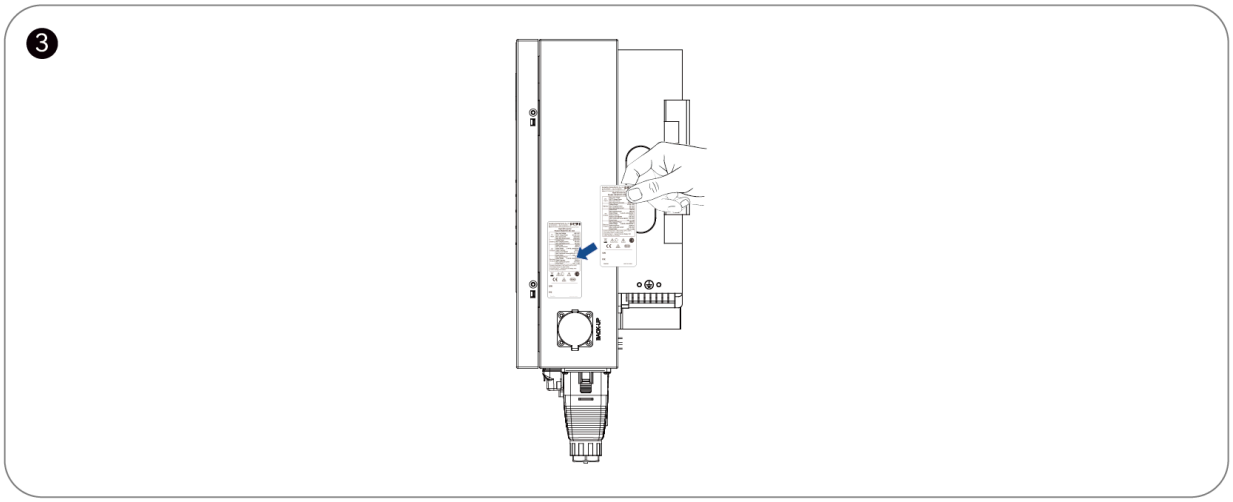


2. Select the label matching the customer's ordered model from the accessory bag.

❷



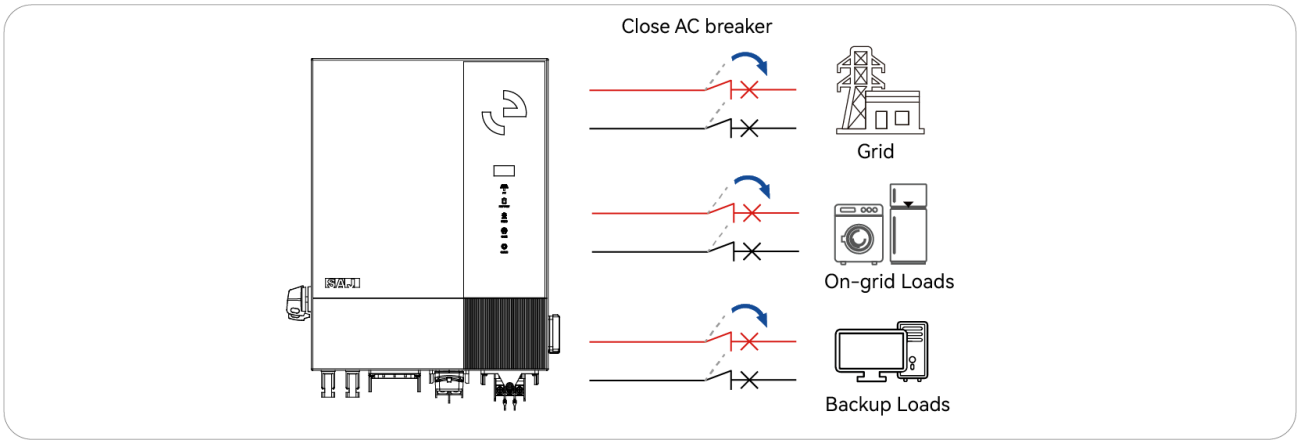
3. Cover the default label completely with the correct label.



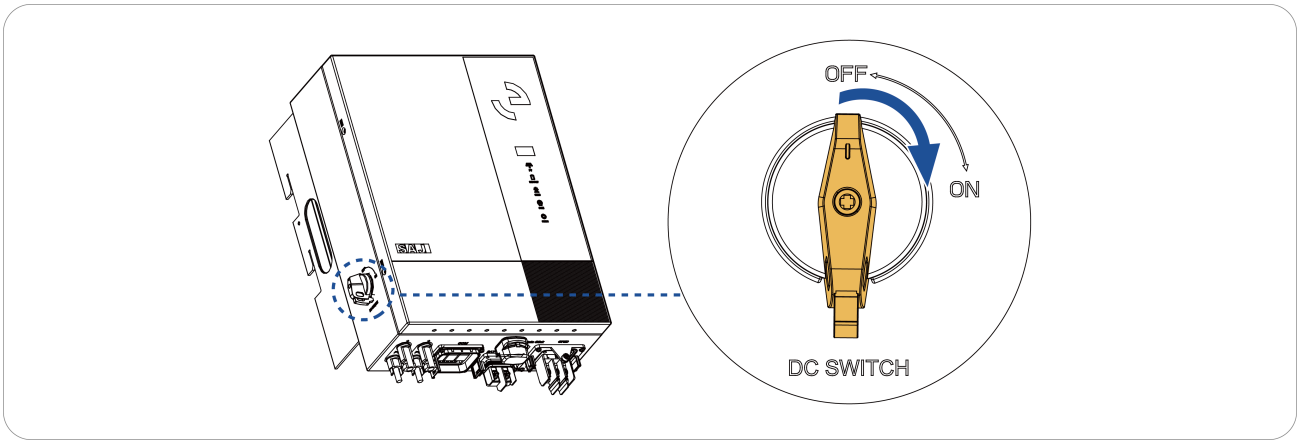
7. Startup and shutdown

7.1. Start up the system

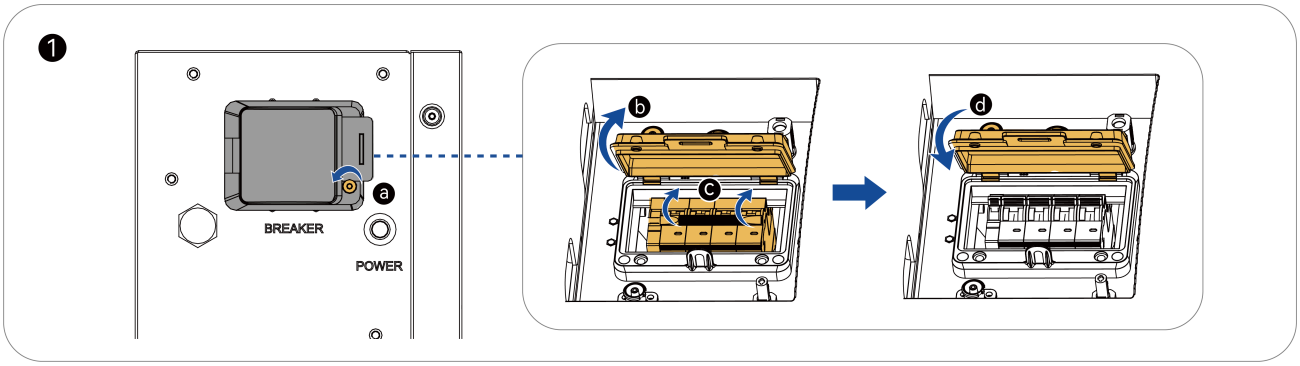
1. Turn on the **load breaker** and **AC breaker** on the grid side.

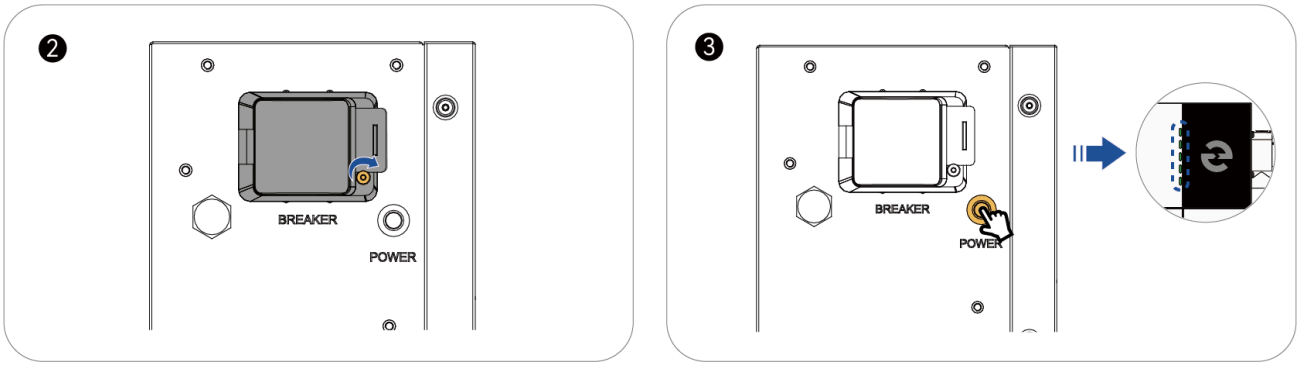


2. Turn on the **DC switch** on the inverter.

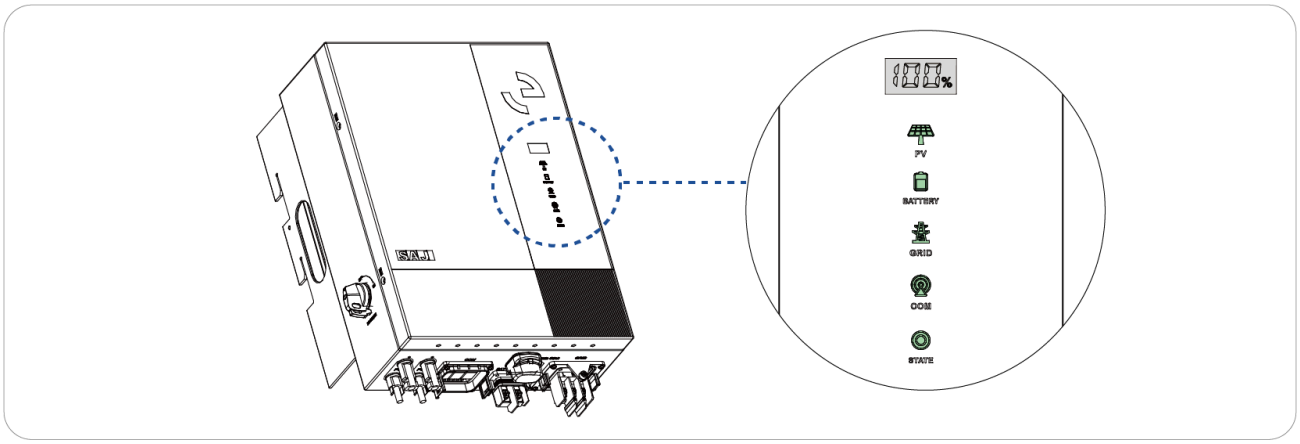


3. Turn on the battery circuit **breaker** to ensure that the battery positive (+) and negative (-) terminals are properly connected to the inverter. Then, press the **power** switch on the battery.





4. Check that the **LED indicators** on the inverter panel remain steadily lit.



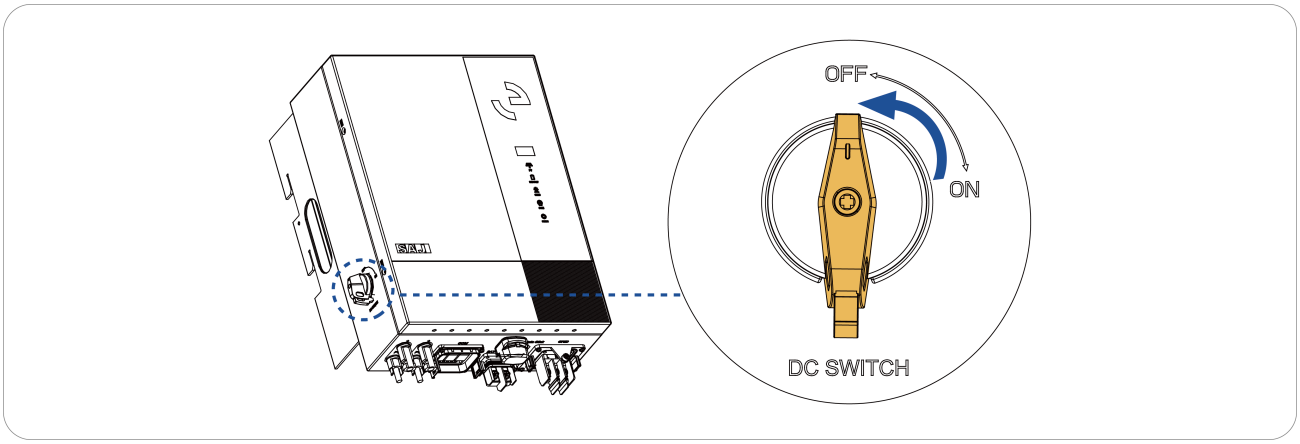
5. Perform initialization configuration on the elekeeper App. For configuration details, refer to 8. Commissioning on App *(on page 40)*.



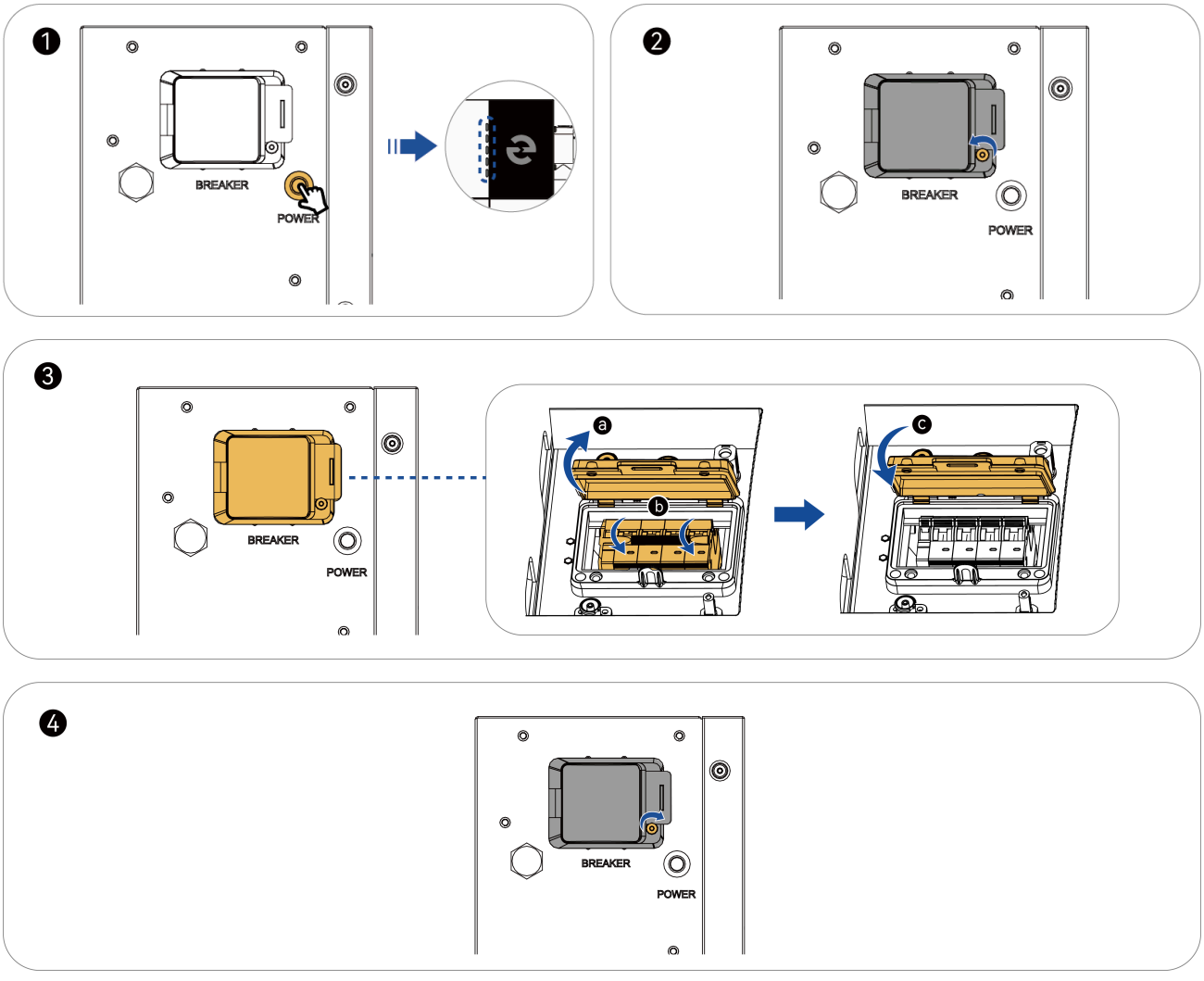
6. If any error occurs, check the error code displayed on the App and refer to the corresponding solutions in 9.2. Troubleshooting *(on page 51)*. If the problem persists, please contact technical support.

7.2. Shut down the system

1. On the inverter, turn off the **DC switch** to disconnect from the PV array.



2. On the battery, press the **power** switch and turn off circuit **breaker** to ensure the positive (+) and negative (-) terminals are disconnected from the inverter.



3. On the grid side, turn off the **load breaker** and **AC breaker** to disconnect from the grid.

8. Commissioning on App

8.1. About elekeeper

The SAJ elekeeper AI energy platform covers residential and C&I scenarios with full ecosystem autonomous AI control. The platform provides the following AI-powered modules:

- **AI Care**: provides six-dimensional system diagnosis and 24/7 system protection.
- **AI Saving**: provides AI-powered working strategy adaptation for various scenarios to maximize user revenue.
- **AI Keeper**: provides intelligent functions including full voice autonomous control, user intent recognition, , electricity data analysis, and autonomous task planning.

8.2. Download the elekeeper App

Search for "elekeeper" in the App store and download the App.

Alternatively, scan the below QR code to download the App.

Note: The detailed operations on the App might vary, depending on the App version in use.

8.3. Sign up at the elekeeper App

The end user, installer, or distributor can follow this procedure to sign up at the elekeeper App. The installer can also follow this procedure to create an account for the end user.

Note: Recommend activating the Location Services on the phone for optimum utilization of the functions.

Procedure

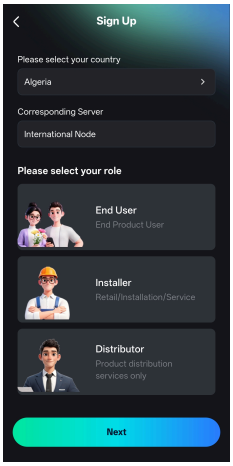
1. Open the App and tap **Sign Up** on the login page.



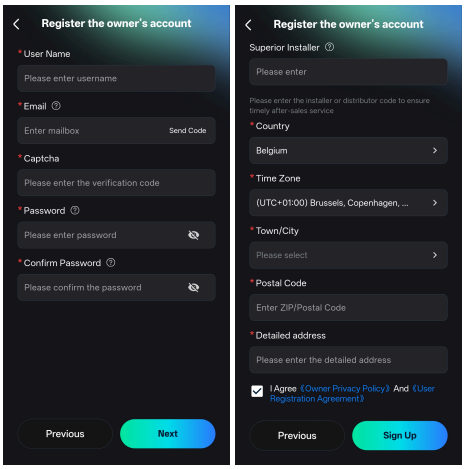
2. Select the country of the installation site and the user role.

Parameter	Description
Corresponding Server	The server is set automatically depending on the selected country.
Please select your role	• **End User**: The owner of the power plant. Select this option when the installer is signing up for the end user. • **Installer**: The installation and retail service providers. • **Distributor**: The distribution service provider.

Table 8.1. Signup parameters

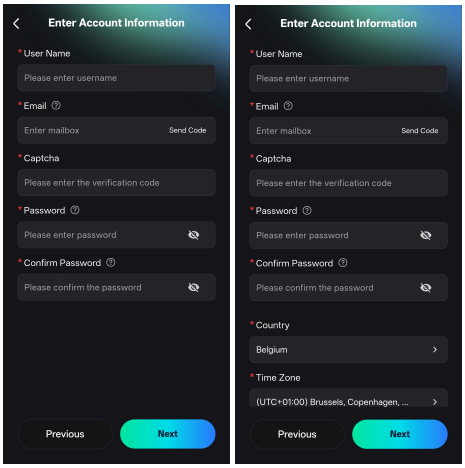


3. For the **End User** role, fill in the user information accordingly.

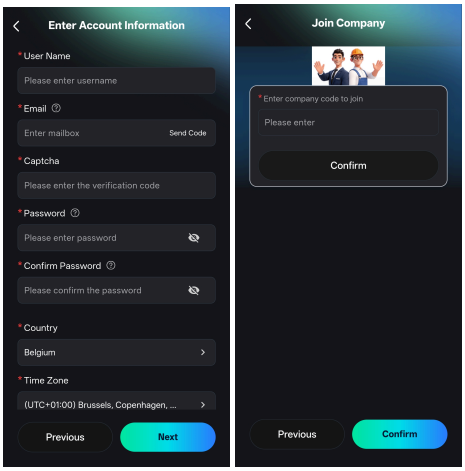


4. For the **Installer** role, either create a company or join an existing company to provide the information accordingly.

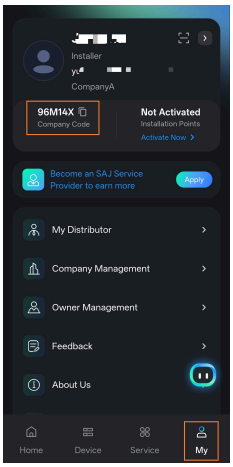
   To create a company:



   To join a company:



   To check an existing user's company code, open page **My**:

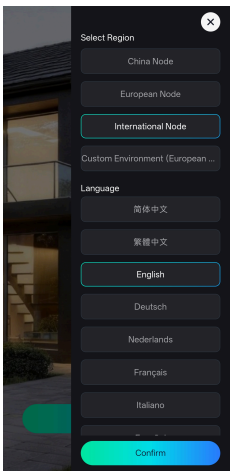


5. For the **Distributor** role, provide similar information as the **Installer** role.

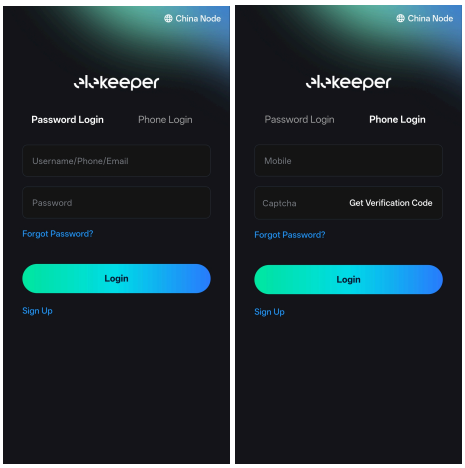
8.4. Log in to the elekeeper App

Procedure

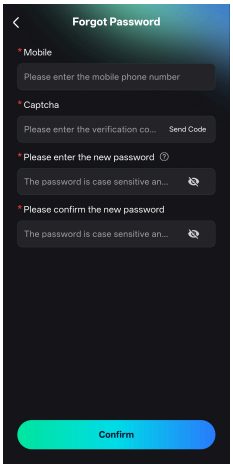
1. Open the App and tap the globe icon on the top right corner.
2. Select the **Region** and **Language** depending on the installation site of the system.



3. Choose to use password or phone number for login.



4. (Optional) If you forgot your password, reset your password with phone number verification.



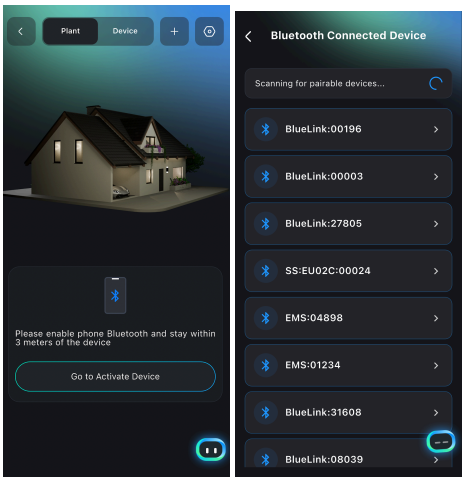
8.5. Perform the initialization settings

NOTICE

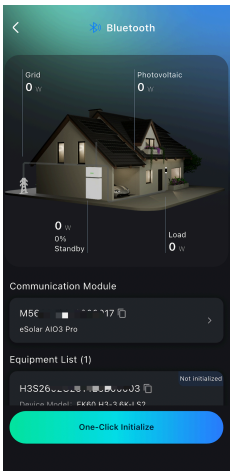
This series adopts single stocking keeping unit (SKU) scheme, which means multiple inverter models share the same serial number (SN). Installers need to attach the matching power label on-site and configure the actual power rating via elekeeper App during commissioning.

Procedure

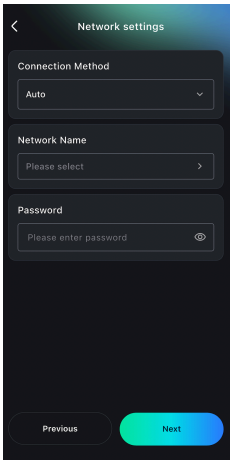
1. Activate and connect to your device via Bluetooth.



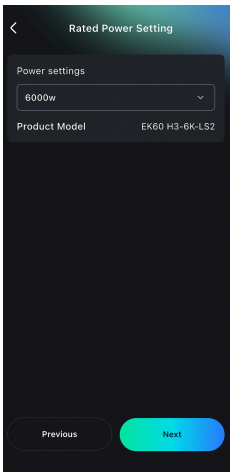
2. Tap one-click initialization.



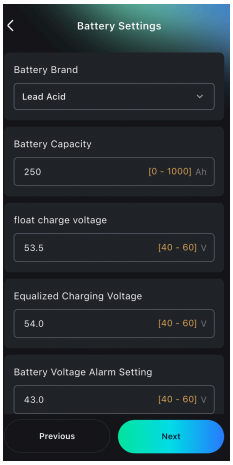
3. Connect the device to the network.



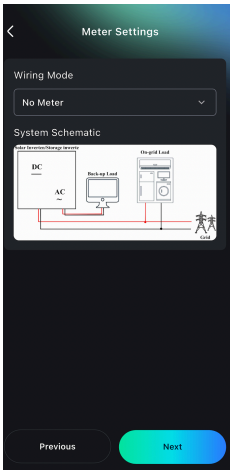
4. Select the correct power rating according to the actual order.



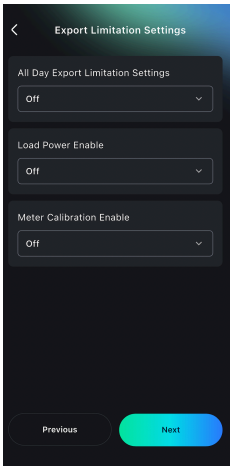
5. Perform the battery settings.



6. Perform the meter settings. Select **Wiring Mode** based on the actual system configuration.



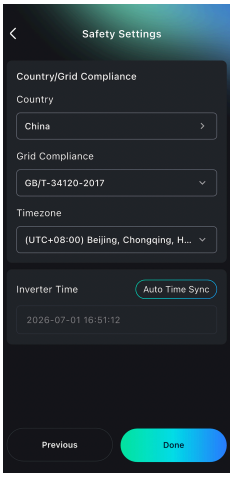
7. Perform the export limitation settings.



8. Configure the working modes. Tap **Current mode** and select the desired working mode. Check the information below to ensure full understanding of the chosen working mode. For detailed explanation of each working mode, refer to 2.2. Work modes *(on page 7)*.



9. Configure the safety settings.
   a. **Country**: the equipment installation location.
   b. **Grid Compliance**: the grid setting.
   c. **Time Zone**: The time zone of the installation site.
   d. **Inverter Time**: Tap **Auto Time Sync** to synchronize with the time of the device where the App is installed.

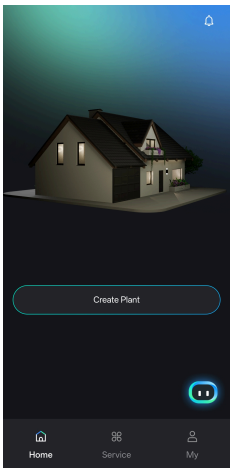


8.6. Create a power plant

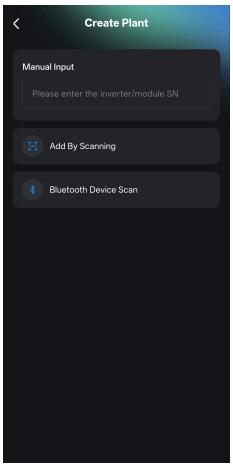
Follow this procedure to create a power plant.

Procedure

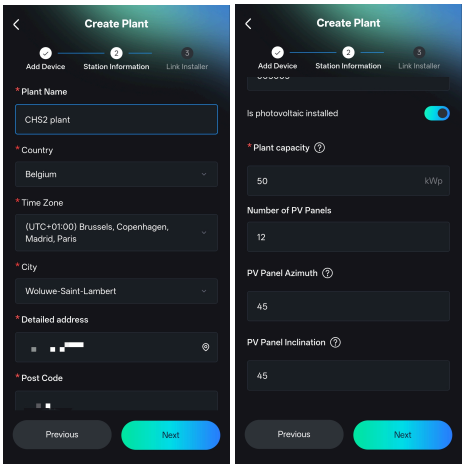
1. On the **Home** page, tap **Create Plant**.



2. Provide the product serial number (SN) to add the devices in the plant.
   - **Manual Input**: Enter the SN of the inverter or the communication module.
   - **Add By Scanning**: Scan the SN.
   - **Bluetooth Device Scan**: Connect to the inverter or communication module through Bluetooth connection. The **BlueLink** is named with the last five numbers of the product SN. For example, 42665.

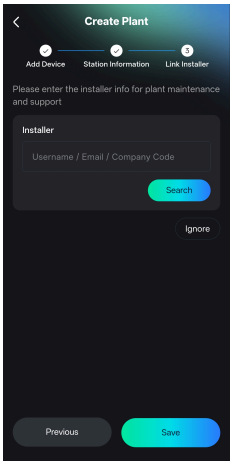


3. Configure the plant details based on the owner's actual information.

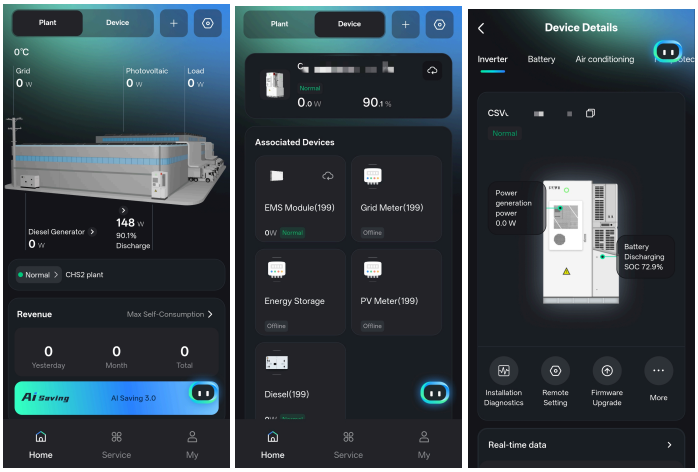


4. Provide the installer information for future maintenance and support purposes.

   The installer company code is created when the installed signs up at the App. For example, 19O67G.



5. After the plant is created successfully, check the plant status as needed.



9. System maintenance

9.1. Routine maintenance

To ensure that the system lifespan, perform the suggested routine maintenance operations.

Note:

To purchase the routine maintenance service, contact the installer, distributor, or **SAJ** product support.

DANGER

Danger of electric shock

Before operating on the system for cleaning, cable inspection, component maintaining, power off the whole system. Do not open any product cover until 5 minutes after disconnecting all sources of supply.

System routine maintenance

Check item	Check method	Maintenance interval
System cleanliness	Check periodically whether the heat sinks are blocked or dirty.	Once every 6 to 12 months
Cleanness of air intake and exhaust vents	Check periodically whether there is dust or foreign objects at the air intake and exhaust vents: 1. Power off the whole system. 2. Remove dust and foreign objects. 3. If necessary, remove the baffle plates from the air intake and exhaust vents for cleaning.	Once every 6 to 12 months (or once every 3 to 6 months based on the actual dust conditions in the environment)
Fan	Check whether the fan generates abnormal noise during operation. Check for and remove any foreign objects from the fan. If the abnormal noise persists, replace the fan.	Once every 6 to 12 months
System running status	1. Check whether the inverter is damaged or deformed. 2. Check whether the inverter generates abnormal sound during operation. 3. Check whether all inverter parameters are correctly set during operation.	Once every 6 months
Electrical connection	1. Check whether cables are disconnected or loose. 2. Check whether cables are damaged, especially whether the cable sheath that contacts a metal surface is damaged.	6 months after the first commissioning and once every 6 to 12 months after that
Grounding reliability	Check whether the PE cable is securely connected.	6 months after the first commissioning and once every 6 to 12 months after that
Sealing	Check whether all terminals and ports are properly sealed.	Once a year

9.2. Troubleshooting

For the errors reported as below, contact the service support for further assistance. The troubleshooting operations must be performed by authorized technicians only.

Error Code	Message	Possible cause	Solutions
1	Master Relay Error	1. Live wire grounding on grid side 2. Grid voltage too low 3. Inverter relay circuit fault	1. Measure the voltage between the ground wire and the neutral wire to see if it exceeds 10V. 2. Measure if the grid voltage is too low.
2	Master EEPROM Error	Inverter internal memory fault	1. Disconnect AC and DC switches for 5 minutes, then restart the inverter. 2. Check if there is a firmware upgrade and whether the correct firmware version is selected.
3	Master Temperature High Error	Inverter temperature too high	1. Check if the inverter's heat dissipation path is blocked. 2. Check if the inverter is installed in direct sunlight. 3. Check if the installation environment has good ventilation.
4	Master Temperature Low Error	Inverter temperature too low	Check if the ambient temperature at the inverter installation location is too low.
5	Master Lost Communication M<->S	Internal communication loss in inverter	Disconnect AC and DC switches for 5 minutes, then restart the inverter.
6	Master GFCI Device Error	Inverter leakage current detection device failure	
7	Master DCI Device Error	Inverter DC component detection device failure	
8	Master Current Sensor Error	Inverter current detection device failure	1. Disconnect AC and DC switches for 5 minutes, then restart the inverter. 2. Check if the string MC4 connectors have reversed polarity.
9	Master Phase1 Voltage High	Grid voltage exceeds the safety permissible range of the inverter	1. Check if the grid voltage is too high. 2. Check if the inverter AC output cable connections are secure and if the grid-tie cable is too thin. 3. Check if the inverter grid compliance specifications are selected correctly.

Error Code	Message	Possible cause	Solutions
10	Master Phase1 Voltage Low	Grid voltage below the safety permissible range of the inverter	1. Check if the grid voltage is too low. 2. Check if the inverter AC output cable connections are secure. 3. Check if the inverter grid compliance specifications are selected correctly.
11	Master Phase2 Voltage High	Grid voltage exceeds the safety permissible range of the inverter	1. Check if the grid voltage is too high. 2. Check if the inverter AC output cable connections are secure and if the grid-tie cable is too thin. 3. Check if the inverter grid compliance specifications are selected correctly.
12	Master Phase2 Voltage Low	Grid voltage below the safety permissible range of the inverter	1. Check if the grid voltage is too low. 2. Check if the inverter AC output cable connections are secure. 3. Check if the inverter grid compliance specifications are selected correctly.
13	Master Phase3 Voltage High	Grid voltage exceeds the safety permissible range of the inverter	1. Check if the grid voltage is too high. 2. Check if the inverter AC output cable connections are secure and if the grid-tie cable is too thin. 3. Check if the inverter grid compliance specifications are selected correctly.
14	Master Phase3 Voltage Low	Grid voltage below the safety permissible range of the inverter	1. Check if the grid voltage is too low. 2. Check if the inverter AC output cable connections are secure. 3. Check if the inverter grid compliance specifications are selected correctly.
15	Master Voltage 10Min High	Grid voltage exceeds the safety permissible range of the inverter	1. Check if the grid voltage is too high. 2. Check if the inverter AC output cable connections are secure and if the grid-tie cable is too thin. 3. Check if the inverter grid compliance specifications are selected correctly.
16	Master OffGrid Voltage Low	Excessive load power on off-grid port, low battery SOC, or high/low battery temperature causing derated battery output	1. Reduce the load connected to the off-grid port. 2. Check if the battery charge is too low. 3. Check if the battery ambient temperature is too high or too low.
17	Master Output_Shorter	External wiring short circuit at back-up port	Correct the external wiring of the back-up port.

Error Code	Message	Possible cause	Solutions
18	Master Grid Frequency High	Grid frequency exceeds local grid upper limit	1. Check if the inverter grid compliance specifications are selected correctly. 2. Disconnect AC and DC switches for 5 minutes, then restart the inverter.
19	Master Grid Frequency Low	Grid frequency below local grid lower limit	
20	BATInputMode Error	Batteries not connected in parallel as required	1. Check if the configured battery input mode is correct 2. If the battery input is confirmed to be in parallel mode, check if all battery connections are secure.
21	Master Phase1 DCV Error	DC component of AC output exceeds limit	Disconnect AC and DC switches for 5 minutes, then restart the inverter.
22	Master Phase2 DCV Error	DC component of AC output exceeds limit	
23	Master Phase3 DCV Error	DC component of AC output exceeds limit	
24	Master No Grid Error	Inverter cannot detect grid voltage	1. Confirm whether the grid is powered off, check if the grid-tie box switch has tripped, and ensure the inverter AC cables are securely connected. 2. If there is no power outage, disconnection, or loose connections after the above checks, close the AC switch and reconnect to the grid.
25	DC ReverseConnect Error	Reverse polarity connection at PV or battery ports	Check the DC port wiring.
26	Parallel machine CAN Com Error	Parallel system CAN communication failure	Check the parallel system CAN communication wiring.
27	Master GFCI Error	System ground leakage current fault detected	1. Disconnect AC and DC switches, check if the AC output ground wire is secure and if the AC wiring is correct. 2. Check if the AC/DC cables are damaged or soaked, and if the panels are soaked.
28	Master Phase1 DCI Error	DC component of AC output exceeds limit	Disconnect AC and DC switches for 5 minutes, then restart the inverter.
29	Master Phase2 DCI Error	DC component of AC output exceeds limit	
30	Master Phase3 DCI Error	DC component of AC output exceeds limit	
31	Master ISO Error	PV string insulation resistance to ground below set value	1. Disconnect AC and DC switches, check if the AC output ground wire is secure and if the AC wiring is correct. 2. Check if the AC/DC cables are damaged or soaked, and if the panels are soaked.

Error Code	Message	Possible cause	Solutions
32	Master Bus Voltage Balance Error	Bus voltage imbalance	Disconnect AC and DC switches for 5 minutes, then restart the inverter.
33	Master Bus Voltage High	DC input voltage exceeds the allowable input limit of the inverter	1. Check the number of panels in each string, calculate whether the open-circuit voltage of the string exceeds the maximum input voltage of the inverter. 2. If the above checks confirm no issues, close the AC switch and restart the inverter.
34	Master Bus Voltage Low	Bus voltage of the inverter is too low	Disconnect AC and DC switches for 5 minutes, then restart the inverter.
35	Master Grid Phase Error	Abnormal phase sequence between three-phase power	Measure the voltage between each phase of the three-phase power to check if it is normal.
36	Master PV Voltage High Error	DC input voltage of the inverter is too high	1. Check the number of panels in each string, calculate whether the open-circuit voltage of the string exceeds the maximum input voltage of the inverter. 2. If the above checks confirm no issues, close the AC switch and restart the inverter.
37	Master Islanding Error	Grid loss causing islanding effect	1. Confirm whether the grid is powered off, check if the grid-tie box switch has tripped, and ensure the inverter AC cables are securely connected. 2. If there is no power outage, disconnection, or loose connections after the above checks, close the AC switch and reconnect to the grid.
38	Master HW Bus Voltage High	DC input voltage exceeds the allowable input limit of the inverter	1. Check the number of panels in each string, calculate whether the open-circuit voltage of the string exceeds the maximum input voltage of the inverter. 2. If the above checks confirm no issues, close the AC switch and restart the inverter.
39	Master HW PV Current High	1. PV string positive and negative poles are reversed 2. Inverter internal damage	1. Check whether the positive and negative poles of the string are reversed. 2. If the above checks confirm no issues, close the AC switch and restart the inverter.

Error Code	Message	Possible cause	Solutions
41	Master Inv Current High	The inverter output current exceeds its rated limit.	1. Disconnect AC and DC switches, check if the AC cables are securely connected. 2. If the above checks confirm no issues, close the AC switch and restart the inverter.
44	Master Grid NE Voltage Error	Live wire grounding on grid side	1. Measure the voltage between the ground wire and the neutral wire. 2. If it exceeds 10V, it indicates a live wire grounding issue.
45	Master Fan1 Error	Fan blade stuck or damaged	1. Check if the external fan (if present) is operating normally. 2. If the fan is operating normally but the fault persists, disconnect AC and DC switches for 5 minutes and restart the inverter.
46	Master Fan2 Error	Fan blade stuck or damaged	
47	Master Fan3 Error	Fan blade stuck or damaged	
48	Master Fan4 Error	Fan blade stuck or damaged	
49	Lost Communication between DSP and PowerMeter	Communication abnormality between inverter and meter	1. Confirm whether the meter is working properly. 2. Check if the communication wiring between the inverter and the meter is secure. 3. Verify that the communication parameter settings between the inverter and the meter are correct, including address, baud rate, etc.
50	Lost Communication between M<->S	Internal communication loss in inverter	Disconnect AC and DC switches for 5 minutes, then restart the inverter.
51	Lost Communication between inverter and Grid Meter	Communication abnormality between inverter and grid meter	1. Confirm whether the meter is working properly. 2. Check if the communication wiring between the inverter and the meter is secure. 3. Verify that the communication parameter settings between the inverter and the meter are correct, including address, baud rate, etc.
52	HMI EEPROM Error	Inverter internal memory fault	1. Disconnect AC and DC switches for 5 minutes, then restart the inverter. 2. Check if there is a firmware upgrade and whether the correct firmware version is selected.

Error Code	Message	Possible cause	Solutions
53	HMI RTC Error	RTC fault	Contact the installer.
54	BMS Device Error	Battery abnormality	
55	BMS Lost.Conn Warn	BMS not started properly	1. Check if the BMS button is turned on. 2. Check if the BMS button is lit.
59	Lost Communication between inverter and PV Meter	Communication loss between inverter and PV meter	1. Confirm whether the meter is working properly. 2. Check if the communication wiring between the inverter and the meter is secure. 3. Verify that the communication parameter settings between the inverter and the meter are correct, including address, baud rate, etc.
60	EV_Lost.Conn Warn	Communication loss between charging pile and inverter	Contact the installer.
61	Slave Phase1 Voltage High	Grid voltage exceeds the safety permissible range of the inverter	1. Check if the grid voltage is too high. 2. Check if the inverter AC output cable connections are secure and if the grid-tie cable is too thin. 3. Check if the inverter grid compliance specifications are selected correctly.
62	Slave Phase1 Voltage Low	Grid voltage below the safety permissible range of the inverter	1. Check if the grid voltage is too low. 2. Check if the inverter AC output cable connections are secure. 3. Check if the inverter grid compliance specifications are selected correctly.
63	Slave Phase2 Voltage High	Grid voltage exceeds the safety permissible range of the inverter	1. Check if the grid voltage is too high. 2. Check if the inverter AC output cable connections are secure and if the grid-tie cable is too thin. 3. Check if the inverter grid compliance specifications are selected correctly.
64	Slave Phase2 Voltage Low	Grid voltage below the safety permissible range of the inverter	1. Check if the grid voltage is too low. 2. Check if the inverter AC output cable connections are secure. 3. Check if the inverter grid compliance specifications are selected correctly.

Error Code	Message	Possible cause	Solutions
65	Slave Phase3 Voltage High	Grid voltage exceeds the safety permissible range of the inverter	1. Check if the grid voltage is too high. 2. Check if the inverter AC output cable connections are secure and if the grid-tie cable is too thin. 3. Check if the inverter grid compliance specifications are selected correctly.
66	Slave Phase3 Voltage Low	Grid voltage below the safety permissible range of the inverter	1. Check if the grid voltage is too low. 2. Check if the inverter AC output cable connections are secure. 3. Check if the inverter grid compliance specifications are selected correctly.
67	Slave Frequency High	Grid frequency exceeds local grid upper limit	1. Check if the inverter grid compliance specifications are selected correctly. 2. Disconnect AC and DC switches for 5 minutes, then restart the inverter.
68	Slave Frequency Low	Grid frequency below local grid lower limit	
69	DCDC_Lost.Conn Warn	Communication loss between DCDC device and inverter	Contact the installer.
70	DCDC_ Device Error	DCDC device fault	
71	Parall CAN Lost Com. Err	Number of online slave units read by parallel host does not match configured parallel number	1. Check if the slave ID settings are correct. 2. Check if the parallel CAN communication cable is properly connected.
72	LCD Lost comm.Err	Inverter does not receive communication data from LCD	Check if the communication cable between the LCD and the inverter is properly connected.
73	Slave No Grid Error	Inverter cannot detect grid voltage	1. Confirm whether the grid is powered off, check if the grid-tie box switch has tripped and ensure the inverter AC cables are securely connected. 2. If there is no power outage, disconnection, or loose connections after the above checks, close the AC switch and reconnect to the grid.
76	Slave PV Voltage High	DC input voltage of the inverter is too high	1. Check the number of panels in each string, calculate whether the open-circuit voltage of the string exceeds the maximum input voltage of the inverter. 2. If the above checks confirm no issues, close the AC switch and restart the inverter.
78	Grid Power Emergency Disconnect	Grid AC relay disconnects based on external device command	Contact the installer.

Error Code	Message	Possible cause	Solutions
81	Lost Communication D<->C	Internal communication loss in inverter	Disconnect AC and DC switches for 5 minutes, then restart the inverter.
83	Master Arc Device Error	Arc fault device failure	Contact the installer or SAJ Electric service hotline.
84	Master PV Mode Error	PV mode selection error	1. Check whether the inverter string mode is set correctly 2. If the fault persists after resolving the above, contact the installer or SAJ Electric service hotline.
85	Authority expires	Authorization expired	Contact the installer or SAJ Electric service hotline.
86	DRM0 Error	DRMO fault	Contact the installer or SAJ Electric service hotline.
87	Master Arc Error	DC arcing caused by short circuit or poor terminal contact	1. Check if all terminals are properly connected and whether the PV positive/ negative insulation to ground is normal. 2. If the above checks confirm no issues, close the AC switch and restart the inverter.
88	Master SW PV Current High	1. PV string positive and negative poles are reversed 2. Inverter internal damage	1. Check whether the positive and negative poles of the string are reversed. 2. If the above checks confirm no issues, close the AC switch and restart the inverter.
89	Master Battery Voltage High	Battery voltage too high	Battery voltage is higher than the maximum voltage value of the inverter.
90	Master Battery Current High	Battery SOC too low or load too heavy, preventing battery output	1. Reduce the back-up load. 2. Charge the battery or stop using the battery. 3. If the battery charge and load are normal but the fault persists, contact the installer or SAJ Electric service hotline.
91	Master Battery Charge Voltage High	Battery voltage too high during charging	1. Do not turn off the battery during charging. 2. Restart the battery and inverter.
92	Master Battery OverLoad	Battery SOC too low or load too heavy, preventing battery output	1. Reduce the back-up load. 2. Charge the battery or stop using the battery. 3. If the battery charge and load are normal but the fault persists, contact the installer or SAJ Electric service hotline.

Error Code	Message	Possible cause	Solutions
93	Master Battery SoftConnet TimeOut	Battery pre-charging bus failure	Contact the installer or SAJ Electric service hotline.
94	Master Output OverLoad	Load connected to back-up port exceeds H2 maximum output power	Reduce the load connected to the back-up port.
95	Master Battery Open Circuit Error	Inverter cannot detect battery voltage	1. Check if the battery circuit breaker is turned on. 2. Check if the battery power cable connections are secure.
96	Master Battery Discharge Voltage Low	Voltage too low detected during battery discharge overload	1. Do not turn off the battery during discharge. 2. The battery voltage is too low, system protection.
97	BMS Internal Communication Error	1. Communication abnormality between battery high-voltage box and battery pack 2. The last battery pack not connected with a resistor terminator causing abnormal pack quantity recognition by the high-voltage box	1. Check if the communication cable is abnormal. 2. Check if the last battery pack has a terminator connected.
98	Bat Sequence Error	Battery pack communication abnormality	1. Check if the communication cable wiring is correct. 2. Check if the last battery pack has a terminator connected 3. Check if the communication cable is abnormal.
99	Discharge Over Current Protect	Discharge current exceeds set threshold	Wait for the fault to clear or restart.
100	Charge Over Current Protect	Charge current exceeds set threshold	Wait for the fault to clear or restart.
101	Module Under Voltage Protect	Total voltage below set threshold	Force charge the battery.
102	Module Over Voltage Protect	Total voltage above set threshold	Wait for the fault to clear or restart.
103	Single Cell Under Voltage Protect	Cell voltage below minimum set value	Force charge the battery.
104	Single Cell Over Voltage Protect	Cell voltage above set threshold	Wait for the fault to clear or restart.
105	BMS Hardware Error	1. Cell voltage detection module fault 2. Temperature detection module fault 3. Current detection module fault	If the fault persists after restarting, contact the installer.

Error Code	Message	Possible cause	Solutions
106	Charge Cell Under Temperature Protect	Battery charging below 0℃	Wait for the battery temperature to rise until the fault clears.
107	Charge Cell Over Temperature Protect	Battery temperature too high	Wait for the battery temperature to drop until the fault clears.
108	Discharge Cell Under Temperature Protect	Battery temperature too low, relay disconnects to stop discharge	Wait for the battery temperature to rise until the fault clears.
109	Discharge Cell Over Temperature Protect	Battery temperature too high	Wait for the battery temperature to drop until the fault clears.
110	Relay Error	1. Negative or positive relay stuck 2. Negative or positive relay unable to close	If the fault persists after restarting, contact the installer.
111	Pre-charge Error	1. Pre-charge relay damaged 2. Pre-charge resistor open circuit 3. BMS damaged	
112	Insulation Error	Possible leakage current issue in battery pack	Contact the installer.
113	BMS supplier Incompatibility	BMS mismatch between battery pack and high-voltage box	
114	Battery cell supplier Incompatibility	Inconsistent cell manufacturers within battery pack	
115	Battery cell Incompatibility	Inconsistent cell grades within battery pack	
116	Battery pack models or grades are inconsistent	Battery pack model or grade mismatch	
117	Circuit Breaker Is Open	1. Battery circuit breaker not closed 2. Battery circuit breaker auxiliary contact abnormality	Close the battery circuit breaker.
118	Temperature Difference Is Too Wide	Temperature detection module fault	If the fault persists after restarting, contact the installer.
119	Voltage Difference Is Too Wide	Sampling wire loose	
120	Voltage Difference Is Too Wide	Sampling wire loose	

Error Code	Message	Possible cause	Solutions
121	BMS Over Temperature Protect	1. Ambient temperature too high 2. Battery overload	1. Check if the battery ambient temperature is too high. 2. If the temperature is normal, let the battery rest for 30 minutes and restart.
122	Short Circuit Protect	Short circuit between battery positive and negative terminals	Check if the battery wiring is correct.
123	Total voltage match failed	Contact technical personnel to troubleshoot the issue	Contact the installer.
124	The system is locked	Contact technical personnel to troubleshoot the issue	
125	FUSE error protection	Contact technical personnel to troubleshoot the issue	
126	Battery Port Voltage Abnormal Protection	Contact technical personnel to troubleshoot the issue	
127	Heating Film Overtemperature Protection	Contact technical personnel to troubleshoot the issue	Contact the installer.
128	Abnormal Temperature Increases	Contact technical personnel to troubleshoot the issue	
162	Gen Start or Stop Error	Check the connection between the generator and the inverter	
289	Relay over temperature	Charging pile internal status abnormal Relay temperature consistently above 115℃ causing fault	1. Reduce current output, stop charging and let it cool down before attempting to charge again. 2. If the fault occurs again, contact the installer.
290	Overload	Contact technical personnel to troubleshoot the issue	Contact the installer.
291	AC over voltage	Grid voltage at pile input exceeds 276V, or does not recover below 265V after overvoltage	1. Normally, the charging pile fault will clear automatically after the grid returns to normal. If the fault recurs: measure the actual grid voltage. 2. If the grid voltage is indeed higher than 265V, contact the local power company for resolution.

Error Code	Message	Possible cause	Solutions
292	AC under voltage	Grid voltage at pile input below 184V, or does not recover above 196V after undervoltage	1. Normally, the charging pile fault will clear automatically after the grid returns to normal. If the fault recurs: measure the actual grid voltage. 2. If the grid voltage is indeed lower than 196V, contact the local power company for resolution. 3. Check if the charging pile AC wiring is tight.
293	AC over current	Output current value exceeds 18A	1. Stop charging, unplug the charging gun, wait for the charging pile fault status to clear, then try charging again. 2. If the fault recurs, contact the vehicle manufacturer's after-sales service. 3. Stop charging, unplug the charging gun.
294	AC over frequency	Mains AC frequency exceeds 63Hz, or does not recover below 61Hz after over frequency	1. Normally, the charging pile fault will clear automatically after the grid returns to normal. If the fault recurs: measure the actual grid frequency. 2. If the grid frequency is indeed higher than 61Hz, contact the local power company for resolution.
295	AC under frequency	Mains AC frequency below 47Hz, or does not recover above 49Hz after under frequency	1. Normally, the charging pile fault will clear automatically after the grid returns to normal. If the fault recurs: measure the actual grid frequency. 2. If the grid frequency is indeed lower than 49Hz, contact the local power company for resolution.
296	DC residual current exception A	Save one point every 20ms, fault reported if 3 consecutive points exceed 50mA (60~80ms) DC leakage current greater than 6mA (reaction time 10s)	1. Stop charging, unplug the charging gun, wait for the charging pile fault status to clear, then try charging again. 2. If the fault recurs, contact the vehicle manufacturer's after-sales service. 3. Stop charging, unplug the charging gun. 4. If the charging pile remains in a fault state, contact the installer.
297	Emergency Stop	User mistakenly pressed emergency stop button	Reset the emergency stop button.
298	Under temperature	Contact technical personnel to troubleshoot the issue	Contact the installer.

Error Code	Message	Possible cause	Solutions
299	AC residual current	RCD residual current device circuit abnormal (During pile self-test, leakage current not within 5~20mA for 10 consecutive seconds)	1. Restart the device after power off and try charging again. 2. If the fault occurs again, contact the installer.
300	Input terminal over temperature	Loose input terminal wiring, poor contact Selected cable ampacity does not meet requirements	Check if the charging pile AC wiring is tight and if the cable cross-section meets requirements.
301	Bluetooth fault	Contact technical personnel to troubleshoot the issue	Contact the installer.
302	DC residual current exception B	Save one point every 60ms, fault reported if 3 consecutive points exceed 36mA (180~240ms) DC leakage current greater than 6mA (reaction time 10s)	1. Stop charging, unplug the charging gun, wait for the charging pile fault status to clear, then try charging again. 2. If the fault recurs, contact the vehicle manufacturer's after-sales service. 3. Stop charging, unplug the charging gun. 4. If the charging pile remains in a fault state, contact the installer.
303	Relay exception	After plugging in gun, relay detected stuck 3 times consecutively and unable to disconnect (auto-closing)	1. Restart the device after power off and try charging again 2. If the fault occurs again, contact the installer.
304	Grounding error	Voltage between GND and N greater than 36V alarm, does not affect charging	1. Check the voltage between the N wire and PE wire at the charging pile input. 2. If the voltage is greater than 36V, check if the equipment ground wire is loose and ensure good grounding.
305	Phase twisted	Input L and N reversed	Check if the L and N wire sequence of the charging pile input cable is correct.
306	RCD circuit exception	RCD residual current device circuit abnormal (During pile self-test, leakage current not within 5~20mA for 10 consecutive seconds)	1. Restart the device after power off and try charging again. 2. If the fault occurs, contact the installer.
307	RS485 Com time out	1. Wiring issue 2. Backend has update, unable to communicate	1. Check wiring issues, open the cover and reconnect. 2. If the problem cannot be resolved, contact the installer.
308	Electricity exception	Contact technical personnel to troubleshoot the issue	Contact the installer.
311	Meter fault	Contact technical personnel to troubleshoot the issue	

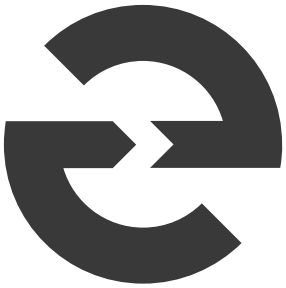
Error Code	Message	Possible cause	Solutions
312	cp exception, cp lower than 2V	CP voltage below 2V	1. Restart the device after power off and try charging again. 2. If the fault occurs again, contact the installer.
318	Connector lock exception	1. Foreign objects may block gun lock 2. Gun not plugged in properly	1. Open the cover for inspection, remove any foreign objects. 2. Plug the gun in properly.
319	Connector current exception	Gun cable specification issue	Contact the installer.
320	DC residual current exception C	Contact technical personnel to troubleshoot the issue	

10. Product specifications

MODEL	H3-2.9K-LS2	H3-3K-LS2	H3-3.6K-LS2	H3-4K-LS2	H3-4.6K-LS2	H3-5K-LS2	H3-6K-LS2	H3-6K-LS2-IE
DC Input								
Max. PV Array Power [Wp] @STC	5800	6000	7000	8000	9200	10000	12000	12000
Max. PV Input Power	4640	4800	5760	6400	7360	8000	9600	9600
Max. DC Input Voltage [V]	600							
MPPT. Voltage Range [V]	80-520							
Rated DC Input Voltage [V]	360							
Startup Voltage [V]	80							
Max. DC Input Current [A]	18/18							
Max. DC Short Circuit Current [A]	25/25							
No. of MPPT.	2							
Battery Parameters								
Battery Type	Lead-acid or LiFePO4							
Battery Voltage Range [V]	40-60							
Max. Charging / Discharging Current [A]	80	80	90	100	110	120	140	140
Charging strategy for Li-ion battery	Self-adaption to BMS							
Communication	CAN							
AC Output (On-grid mode)								
Rated AC Output Active Power [W]	2940	3000	3680	4000	4600	4999	6000	5750
Max. AC Output Apparent Power [VA]	2940	3300	3680	4400	4600	4999	6600	5750
Rated Output Current [A] @220Vac	13.4	13.6	16.7	18.2	20.9	22.7	27.3	25.0
Rated Output Current [A] @230Vac	12.8	13.0	16.0	17.4	20.0	21.7	26.1	25.0
Max. Output Current [A] @220Vac	13.4	15.0	16.7	20.0	20.9	22.7	30.0	25.0
Max. Output Current [A] @230Vac	12.8	14.3	16.0	19.1	20.0	21.7	28.7	25.0
Rated AC Voltage [V]	L+N+PE, 220, 230, 240 / 180-280							
Rated Output Frequency / Range [Hz]	50 Hz : 45-55 60 Hz: 55-65							
Power Factor [cos ϕ]	0.8 leading to 0.8 lagging							
Total Harmonic Distortion [THDi]	<3%							

MODEL	H3-2.9K-LS2	H3-3K-LS2	H3-3.6K-LS2	H3-4K-LS2	H3-4.6K-LS2	H3-5K-LS2	H3-6K-LS2	H3-6K-LS2-IE
AC Input (On-grid mode)								
Rated AC Voltage/ Range [V]	L+N+PE, 220, 230, 240 / 180-280							
Rated Input Frequency [Hz]	50, 60							
Max. AC Input Current [A]	12.8	15	16.4	20	20	25	30	30
AC Output (Back-up mode, EU Socket)								
Max. Output Power [VA]	2940	3300	3680	3680	3680	3680	3680	3680
Max. Output Current [A] @220V	13.4	15	16	16	16	16	16	16
Max. Output Current [A] @230V	12.8	14.3	16	16	16	16	16	16
Peak Output Apparent Power [VA]	1.6 times of the **Max. Output Power**, 10 s duration							
Rated AC Voltage / Range [V]	L+N+PE, 220, 230, 240							
Rated Output Frequency / Range [Hz]	50 Hz : 45-55 60 Hz: 55-65							
Output THDv (@ Linear Load)	<3%							
Efficiency								
Max. Efficiency	97.6%							
Euro Efficiency	97.0%							
Protection								
Battery Input Reverse Polarity Protection	Integrated							
Over load Protection	Integrated							
AC Short Circuit Current Protection	Integrated							
DC Surge Protection	Type II (Optional)							
AC Surge Protection	Type II (Optional)							
Anti-islanding Protection	Integrated							
AFCI Protection	Optional							
RSD Protection	Optional							
Interface								
PV Connection	MC4							
AC Connection	OT terminal							
Battery Connection	OT terminal							
Display	LED+APP							
Communication	Wi-Fi / Ethernet / 4G (Optional)							
General Parameters								
Typology	Non-isolated							

MODEL	H3-2.9K-LS2	H3-3K-LS2	H3-3.6K-LS2	H3-4K-LS2	H3-4.6K-LS2	H3-5K-LS2	H3-6K-LS2	H3-6K-LS2-IE
Operating Temperature Range	-40℃ to +60℃ (power derating with +45℃ to +60℃)							
Cooling Method	Nature							
Ambient Humidity	0-95% Non-condensing							
Altitude [m]	3000							
Noise [dBA]	<40							
Ingress Protection	IP66							
Dimensions [H*W*D] [mm]	460*350*232							
Net Weight [kg]	19.5							
Warranty [Year]	10							
Standard	EN 62109-1/2, EN 61000-6-2/4, IEC 62116, IEC 61727, PEA&MEA, NBR 16149, NBR 16150, PORTARIA No. 140							



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GUANGZHOU SANJING ELECTRIC CO., LTD
Tel: (86) 20 66608588 **Fax:** (86) 20 66608589 **Web:** www.saj-electric.com
Add: No.9, Lizhishan Road, Science City, Guangzhou High-tech Zone, Guangdong, P.R.China

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