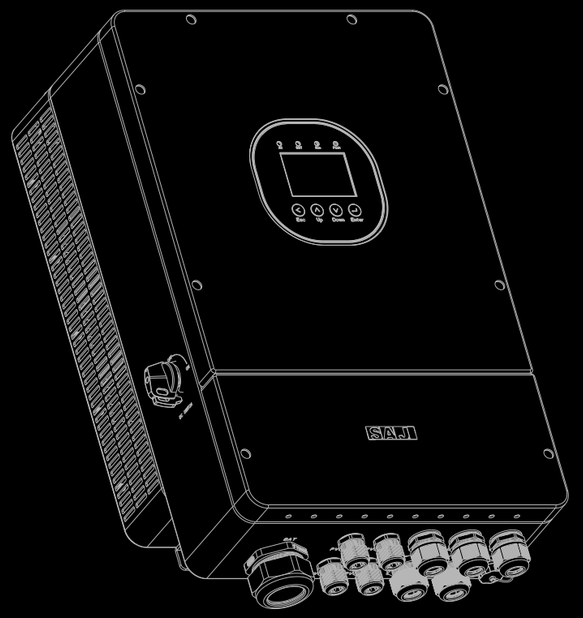
GUANGZHOU SANJING ELECTRIC CO., LTD

Tel: (86)20 66608588 **Fax:** (86)20 66608589 **Web:** www.saj-electric.com

Add: SAJ Innovation Park,No.9, Lizhishan Road, Science City, Guangzhou High-tech Zone , Guangdong, P.R.China

V1.0



H2 Series

HYBRID INVERTER

USER MANUAL

H2-(5K-10K)-LS2

Preface

Thank you for choosing SAJ products. We are pleased to provide you first-class products and exceptional service.

This manual provides information about installation, operation, maintenance, troubleshooting and safety. Please follow the instructions of this manual so that we can ensure delivery of our professional guidance and whole-hearted service.

Customer-orientation is our forever commitment. We hope this document proves to be of great assistance in your journey for a cleaner and greener world.

We make constant improvements on the products and their documentation. This manual is subject to change without notice; these changes will be incorporated in new editions of the publication. To access the latest documentation, visit the SAJ website at https://www.saj-electric.com/.

Guangzhou Sanjing Electric Co., Ltd.

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1.

SAFETY PRECAUTIONS

■ Before installing, using, and maintaining this equipment, read the safety information and precautions thoroughly, and comply with them during operations.

■ Failure to follow any of the instructions or warnings in this document can result in electrical shock, serious injury, or death, or can damage the equipment, potentially rendering it inoperable. SAJ shall take no responsibility for any personal injuries or property damage caused by improper use.

1.1. Scope of Application

This user manual describes instructions and detailed procedures for installing, operating, maintaining, and troubleshooting of the following SAJ inverters:

H2-5K-LS2; H2-6K-LS2; H2-7.6K-LS2; H2-8K-LS2; H2-10K-LS2

Please read this manual carefully before installations and operations. Keep this manual in a readily accessible place for future reference.

1.2. Target Group

This manual is intended for any qualified personnel to install, operate, maintain and troubleshoot the inverter and related system components. The qualified personnel have training, knowledge, and experience in:

- Installing electrical equipment.
- Applying all applicable installation codes.
- Analyzing and reducing the hazards involved in performing electrical work.
- Installing and configuring batteries.
- Selecting and using Personal Protective Equipment (PPE).

Servicing of batteries must only be performed or supervised by qualified personnel with knowledge of batteries and their required precautions. Keep unqualified personnel away from batteries.

No responsibility is assumed by SAJ Electric for any consequences arising out of the use of this material.

1.3. Safety Levels

DANGER

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

WARNING

·WARNING indicates a hazardous situation which, if not avoided, can result in death or serious injury or moderate injury.

CAUTION

· CAUTION indicates a hazardous condition which, if not avoided, can result in minor or moderate injury.

NOTICE

· NOTICE indicates a situation that can result in potential damage, if not avoided.

1.4. Safety Instructions

DANGER

· There is possibility of fatal personnel injuries due to electrical shock and high voltage.
· Do not touch the operating component of the inverter; it might result in burning or death.
· To prevent risk of electric shock during installation and maintenance, please make sure that all AC and DC terminals are disconnected prior to work.
· Do not touch the surface of the inverter while the housing is wet, otherwise, it might cause electrical shock.
· Do not stay close to the inverter while there are severe weather conditions including storm, lightning, etc.
· Before opening the housing, the SAJ inverter must be disconnected from the grid and PV generator; you must wait for at least five minutes to let the energy storage capacitors completely discharge after disconnecting from power source.

WARNING

Danger to life due to fire or explosion
· In the event of fault, do not conduct any direct action on the inverter.
· Disconnect PV array from inverter via an external disconnection device. If there is no external disconnection device present, wait until no more DC power is applied to the inverter.
· Disconnect the AC circuit breaker, or keep it disconnect if it is tripped, and secure it against reconnection.
· Do not touch non-insulated parts or cables.
· Do not touch non-insulated parts or cables.
·The installation, service, recycling and disposal of the inverters must be performed by qualified personnel only in compliance with national and local standards and regulations.
·Any unauthorized actions including modification of product functionality of any form may cause lethal hazard to the operator, third parties, the units or their property. SAJ is not responsible for the loss and these warranty claims.
·The SAJ inverter must only be operated with PV generator. Do not connect any other source of energy to the SAJ inverter.
·Be sure that the PV generator and inverter are well grounded in order to protect properties and persons.

CAUTION

·The inverter will become hot during operation. Please do not touch the heat sink or peripheral surface during or shortly after operation.
·Risk of damage due to improper modifications.

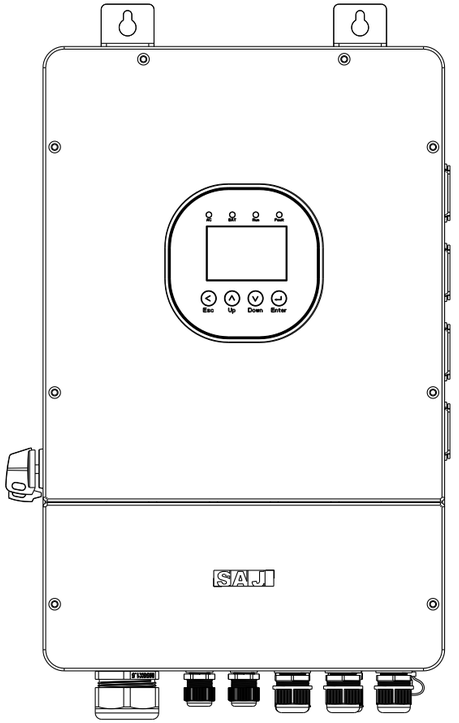
NOTICE

·Moving or reinstall the inverter to another location might void the warranty without prior written permission from SAJ.

1.5. Explanations of Symbols

To ensure the safety of people and equipment, follow the safety symbols on the equipment.

Symbol	Description
	**Dangerous electrical voltage** This device is directly connected to public grid, thus all work to the inverter shall only be carried out by qualified personnel.
	**Danger to life due to high electrical voltage!** There might be residual currents in inverter because of large capacitors. Wait for 5 minutes before you remove the front lid.
	**Notice, danger!** This is directly connected with electricity generators and public grid.
	**Danger of hot surface** The components inside the inverter will release a lot of heat during operation. Do not touch metal plate housing during operating.
	**An error has occurred.** Please go to “Troubleshooting” to remedy the error.
	**This device SHALL NOT be disposed of in residential waste.** Please go to “Recycling and Disposal” for proper treatments.



2.

PRODUCT INFORMATION

2.1. General Introduction

The SAJ H2 series low-voltage inverter is a transformer-less hybrid solar inverter, which is a key component of a complete energy storage system.

The inverter contains maximum power point tracking (MPPT), battery charging/discharging circuit and full-bridge inverting circuit. It converts solar power to grid-compliant AC power for home loads and sell extra power to the grid. The solar power can also be stored into the battery for later use when grid is down or during peak electricity price period.

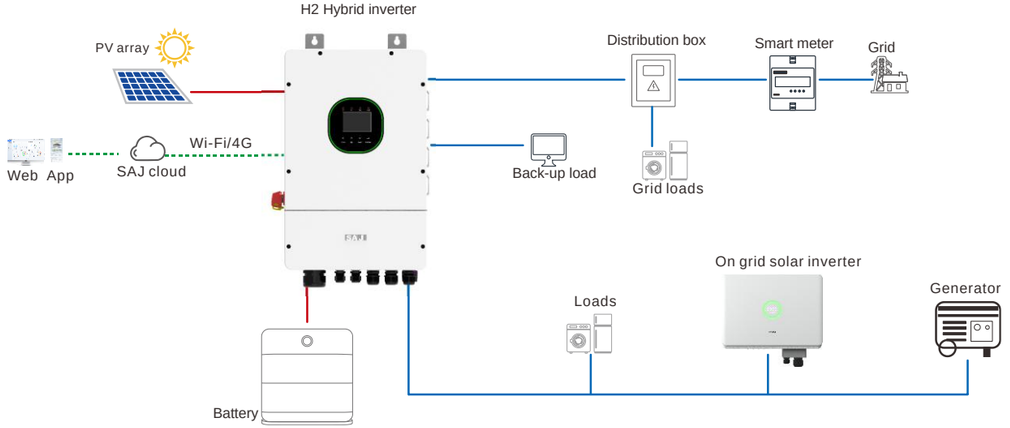


Figure 2.1. Application topology

When power outage occurs, the inverter transfers the critical loads to battery power immediately and seamlessly without supply interruption to the critical loads.

2.2. Model Description

H2 - *x*K - LS2

H2: Product series.

*x*K: Rated energy. For example, 5K indicates that the rated energy of this inverter is 5 kW.

L: Low voltage; S2: single phase with 2MPPT.

2.3. Dimension

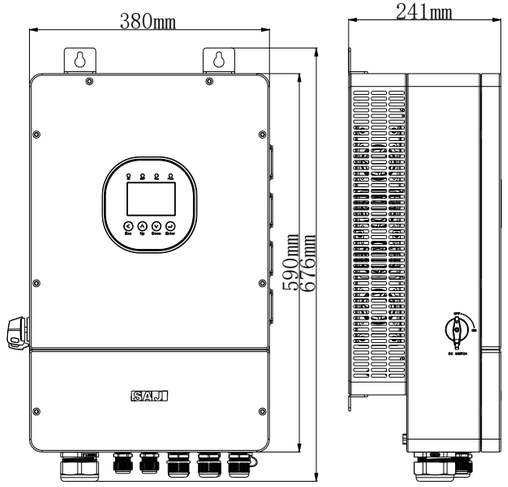


Figure 2.2. Dimension of the H2 series inverter

2.4. Bottom View

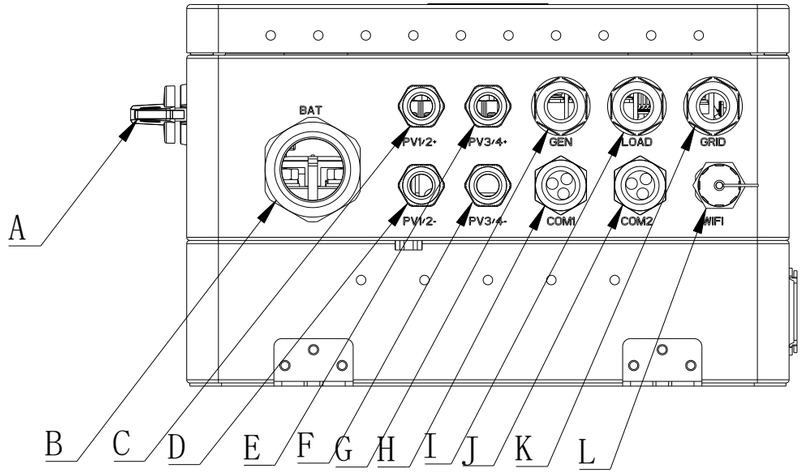


Figure 2.3. Bottom View of the H2 series inverters

Callout	Silkscreen	Description
A	DC SWITCH	DC switch
B	BAT	Cable gland: For battery cable connection
C	PV1/2+	Cable gland: For PV positive cables 1 and 2
D	PV1/2-	Cable gland: For PV negative cables 1 and 2
E	PV3/4+	Cable gland: For PV positive cables 3 and 4
F	PV3/4-	Cable gland: For PV negative cables 3 and 4
G	GEN	Cable gland: For generator or smart-load cable connection
H	COM1	Cable gland: For communication cable 1
I	LOAD	Cable gland: For load cable connector
J	COM2	Cable gland: For communication cable 2
K	GRID	Cable gland: For grid cable connection
L	WIFI	Wi-Fi port

Table 2.1. Cable glands, ports, and switch at the bottom of the inverter

2.5. Electrical Terminals

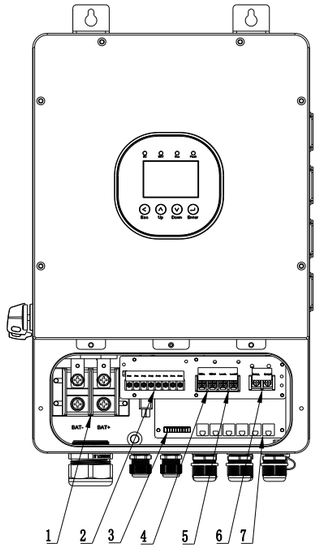


Figure 2.4. Terminals in the junction box

Callout	Silkscreen	Description
1	BAT+ and BAT-	Battery connection terminals
2	PV1+, PV1-, PV2+, PV2-, PV3+, PV3-, PV4+, and PV4-	PV connection terminals
3	CT1+, CT1-, BAT_T+, BAT_T-, EX_SD+, GND_S, G, G_S, +12V_RSD, and GND_S	Communications terminal block
4	GEN_L and GEN_N S-Load_L and S-Load_N	Terminals for connecting a generator or smart loads
5	Load_L and Load_N	Load connection terminals
6	Grid_L and Grid_N	Grid connection terminals
7	MODBUS_RS485, BMS_CAN, Parallel-1, Parallel-2, DRM, and METER_RS485	RJ45 communication ports

Table 2.2. Terminals in the junction box

2.6. LED Status Indicators

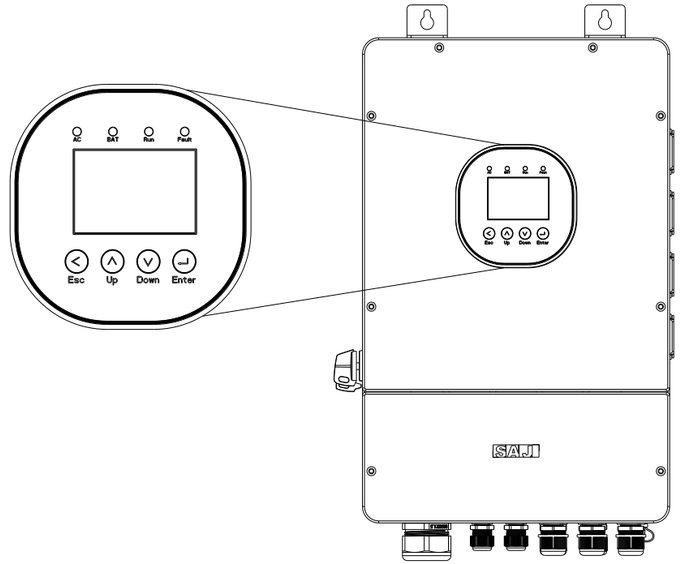


Figure 2.5. LED status indicators and buttons

LED indicator	Color	Status	Description
AC	Green	Solid on	The grid is connected and working properly.
BAT	Green	Solid on	The battery is working properly.
Run	Green	Solid on	The inverter is working properly.
Fault	Red	Solid on	The inverter is not working properly.

Table 2.3. Description of LED status indicators

Button	Description
Esc	Exit the current operations.
Up	Move the screen up one line.
Down	Move the screen down one line.
Enter	Open the settings for the selected item.

Table 2.4. Description of buttons

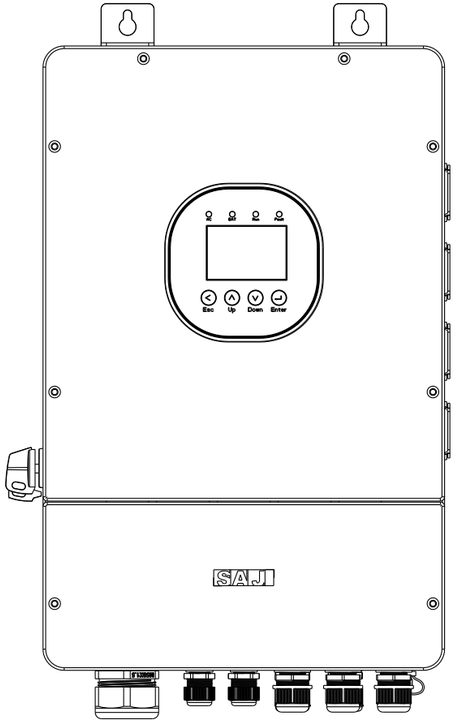
2.7. Datasheet

Model	H2-5K-LS2	H2-6K-LS2	H2-7.6K-LS2	H2-8K-LS2	H2-10K-LS2
PV String Input					
Max. PV array power [Wp]@STC	10000	12000	15200	16000	20000
Max. DC voltage [V]	500				
MPPT voltage range [V]	90–480				
Rated DC Voltage [V]	360				
Start voltage [V]	80				
Max. input current [A]	20/20		40/40		
Max. short current [A]	25/25		50/50		
No. of MPPT	2				
Battery Port Connection					
Battery type	Lead-acid battery; lithium battery				
Voltage range [V]	40–60				
Max. charging/discharging current [A]	100	120	190	190	240
AC Output [On-grid]					
Rated AC power [W]	5000	6000	7600	8000	10000
Max. apparent power [VA]	5500	6600	8360	8800	10000
Rated output current [A]@230 V AC	21.8	26.0	33.0	34.8	43.5
Max. output current [A]	25.0	30.0	38.0	40.0	45.5
Rated AC voltage and range	L/N/PE, 220, 230, 240/180–280 V				
Rated output frequency and range [Hz]	50; 60 45–65				
Power factor [cosϕ]	0.8 leading–0.8 lagging				

Model	H2-5K-LS2	H2-6K-LS2	H2-7.6K-LS2	H2-8K-LS2	H2-10K-LS2
Total harmonic distortion [THDi]	< 3%				
AC Output [Back-up Mode]					
Max. Output Power [VA]	5000	6000	7600	8000	10000
Max. output current [A]	25.0	30.0	38.0	40.0	45.5
Peak output apparent power [VA]	6000, 60s	7200, 60s	9120, 60s	9600, 60s	12000, 60s
Rated AC voltage and range [V]	L/N/PE, 220, 230, 240/180–280 V				
Rated output frequency and rang [Hz]	50, 60 45–65				
Output THDv (@ Liner Load)	< 3%				
AC Input [On-grid]					
Rated AC voltage and range （V)	L/N/PE, 220, 230, 240/180–280 V				
Rated input frequency [Hz]	50; 60				
Max. current@220 V AC	50	60	76	80	91
Efficiency					
Max. Efficiency	97.6%				
Euro Efficiency	97.0%				
Protection					
Battery input reverse polarity protection	Integrated				
Overload protection	Integrated				
AC short circuit current protection	Integrated				
DC surge protection	Type II				
AC surge protection	Type II				
Anti-islanding protection	Integrated				
AFCI protection	Optional				
RSD protection	Optional				
Interface					
PV connection	Terminal block				
AC connection	Terminal block				
Battery connection	Terminal block				
Display	LCD + App				

Model	H2-5K-LS2	H2-6K-LS2	H2-7.6K-LS2	H2-8K-LS2	H2-10K-LS2
Communication	Wi-Fi, Ethernet, or 4G (optional)				
General Data					
Topology	Non-isolated				
Operating temperature range	-40℃ to +60℃ (-40℉ to 140℉) [50℃ to 60℃ with derating]				
Cooling method	Intelligent fan cooling				
Ambient humidity	0%–100% No condensation				
Altitude	4000m (>3000m Power derating)				
Noise [dBA]	< 50				
Ingress protection	IP65				
Mounting	Wall mounting				
Dimension [H x W x D]	590 x 380 x 241 mm (23.23 x 14.96 x 9.49 inch)				
Weight	29 kg (63.93 lb)				
Warranty [year]	Refer to the warranty policy.				
Standard	EN 62109-1/2, EN 61000-6-2/4, EN 50438, EN 50549, C10/11, IEC 62116, IEC 61727, RD 1699, RD 413, UNE 206006, UNE 206007, NTS, CEI 0-16, CEI 0-021, AS 4777.2, NBR 16149, NBR 16150 VDE-AR-N 4105, VDE 0126-1-1				

Table 2.5. Inverter datasheet



3.

INSTALLATION

3.1. Installation Diagram

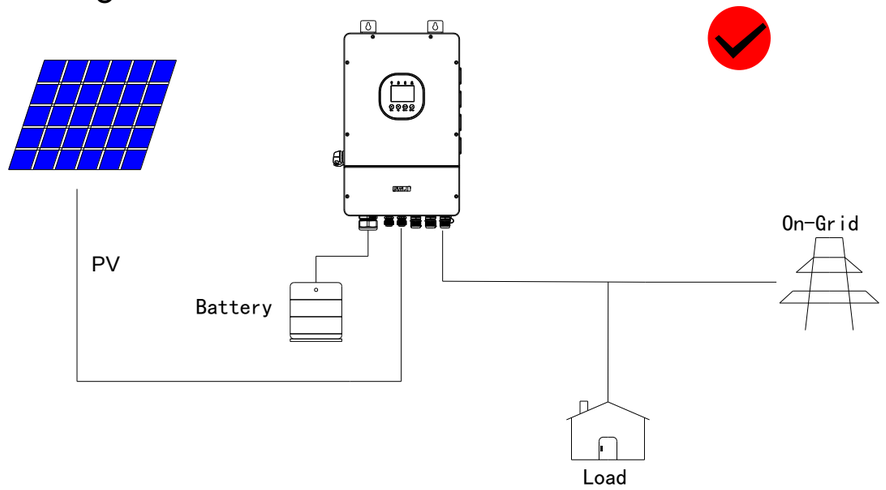
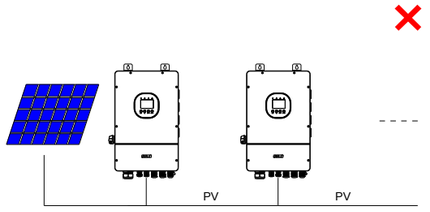
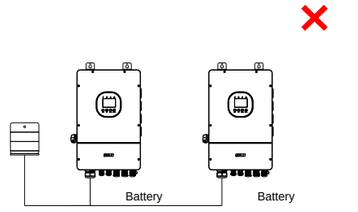


Figure 3.1. Applicable scenario

The following installation examples should be avoided. Any damage caused will not be covered by the warranty policy.



Single PV string can not be connected to multiple inverters.



Single battery bank can not be connected to multiple inverters.

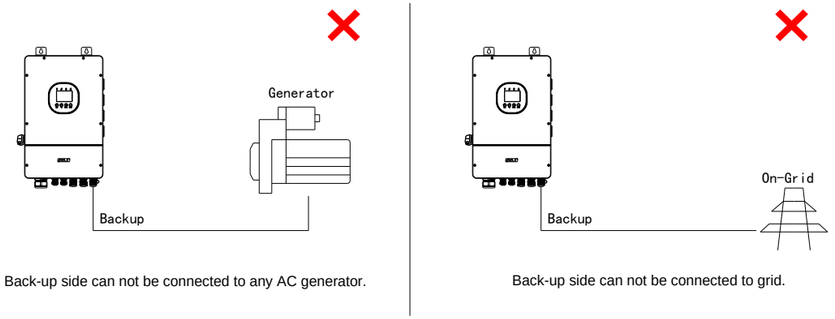


Figure 3.2. Not applicable scenarios

3.2. Installation Tools

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

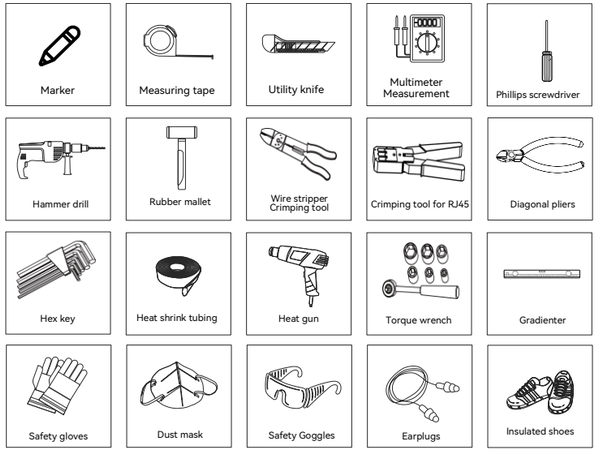


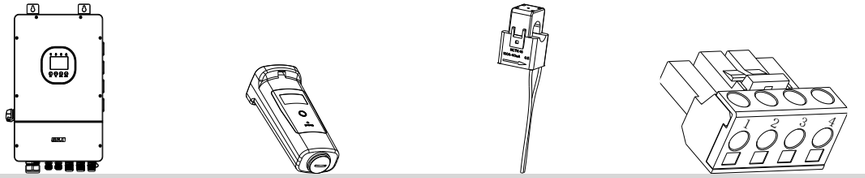
Figure 3.3. Recommended tools for installation

3.3. Pre-installation Check

■ **Outer Packing**

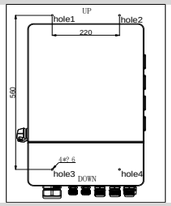
Although SAJ's inverters have passed stringent test and are checked before they leave the factory, the inverters may still suffer damages during transportation. Check the package for any obvious signs of damage, and if such evidence is present, do not open the package and contact your dealer as soon as possible.

■ **Package Contents**



Inverter x1 | Communication module x1 | CT x1 | Terminal x1

Battery temperature sensor x1 | Allen wrench x1 | M6*50 expansion bolt x4 | Documents



Hole positioning paper

3.4. Mounting Orientation and Clearance

- The inverter uses natural convection cooling and can be installed indoor or outdoor.
- Do not expose the inverter to direct sunlight cause overheating might cause power derating.

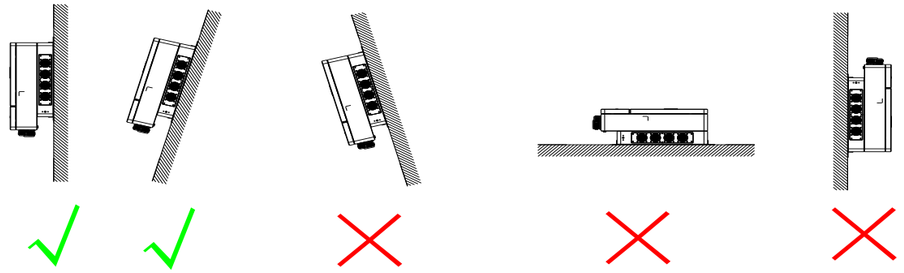


Figure 3.4. Mounting method

- Mount vertically with tilting angle no greater than 15°. Never install the inverter horizontally or upside down.
- Install the inverter at eye level for easy inspection of the LED indicators and possible maintenance activities.
- The minimum clearance requirement for multiple inverter installation is shown as below.

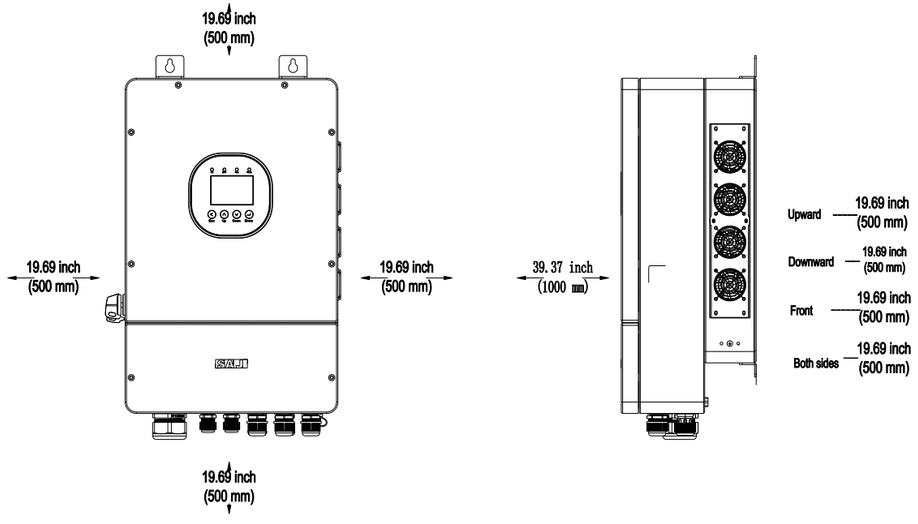


Figure 3.5. Minimum clearance

3.5. Wall Mounting

Step 1. Depending on your configurations, choose one of the following manners to mark and drill screw holes on the wall:

Note: Reserve enough distance at the inverter bottom for cable connection.

- Configurations without a hole positioning paper: The distance between the upper and the bottom screw holes is 546 mm.

  On the wall, mark and drill four holes as shown below. Use a rubber mallet to insert four expansion tubes into the holes.

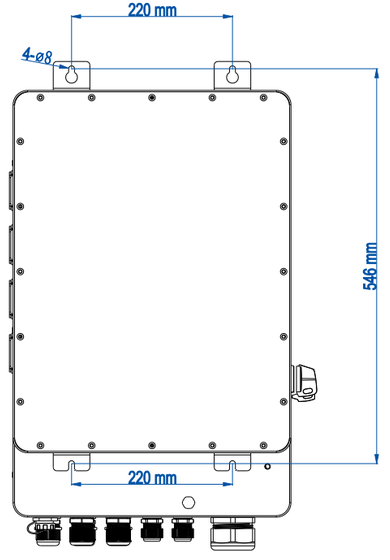


Figure 3.6. Marking the screw holes on the wall (for configurations without a hole positioning paper)

- Configurations with a hole positioning paper: The distance between the upper and the bottom screw holes is 560 mm.

  Stick the hole positioning paper onto the wall. Drill four holes according to the instructions of four holes (hole1, hole2, hole3, and hole4). Then, remove the paper.

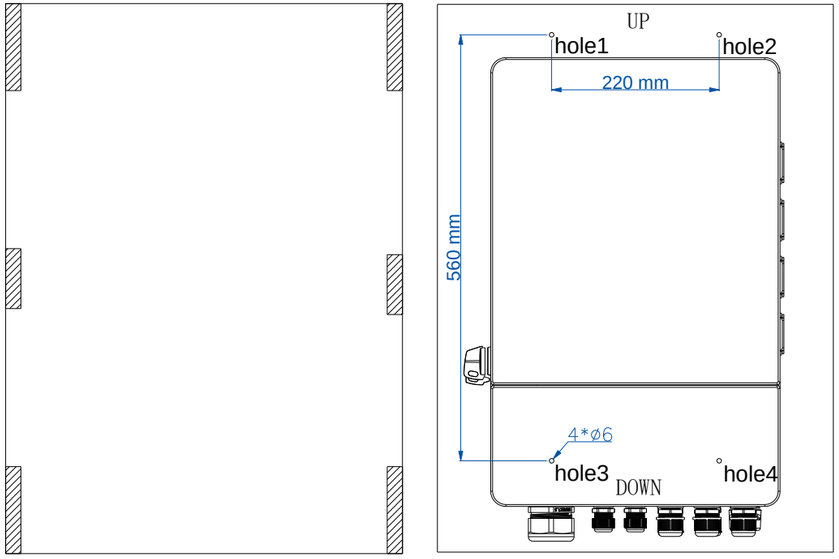


Figure 3.7. Marking the screw holes on the wall (for configurations with a hole positioning paper)

Step 2. Use a rubber mallet to insert four expansion tubes into the holes. Insert four M6*50 expansion bolts into the drilled holes. Reserve 5 mm distance between the wall and the head of the screw.

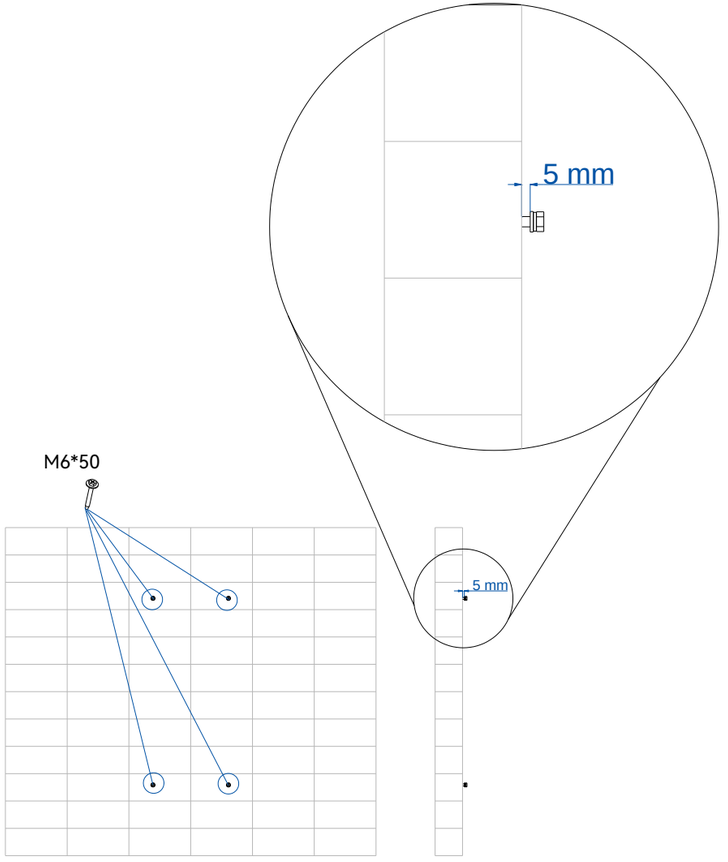


Figure 3.8. Drilling holes

Step 3. Mount the inverter onto the wall.

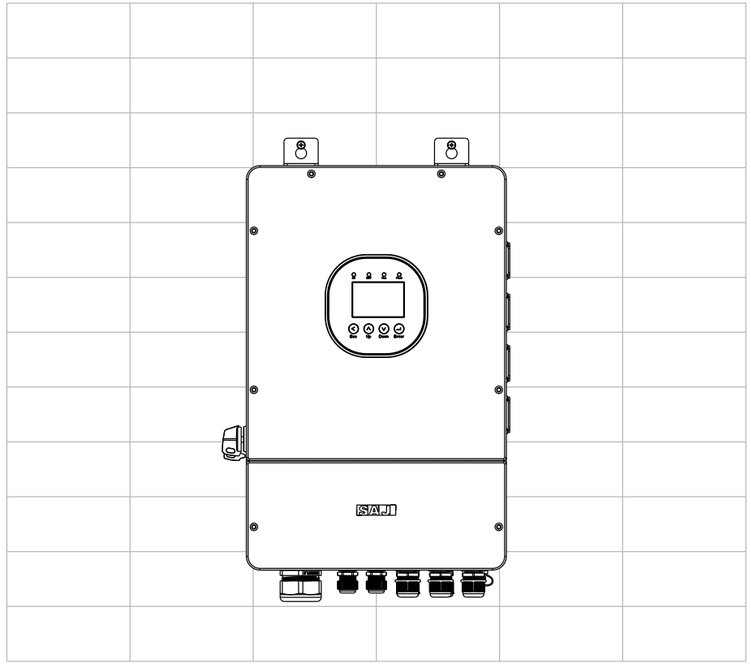


Figure 3.9. Mounting the inverter

Step 4. Tighten the four expansion bolts.

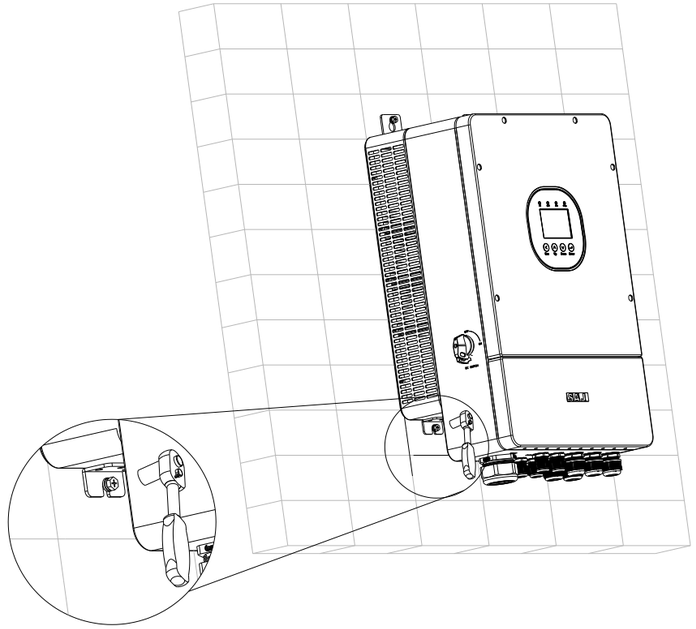


Figure 3.10. Securing the bottom locking brackets

3.6. Installing the Battery

Install the battery. For details, refer to the battery user manual.

CAUTION: On one battery, do NOT connect its positive port (BAT+) to its negative port (BAT-). This will short-circuit this battery, causing serious battery damage.

Note: For regulation compliance, you can install a battery isolator ≥70A near the inverter, except that you are using the SAJ B2 battery model which has a built-in DC isolator in its low-voltage box unit: B2-5.0-LV1 or B2-5.0-LV2

4.

ELECTRICAL CONNECTION

4.1. Safety Instructions

Electrical connection must only be carried out by professional technicians. Before connection, necessary protective equipment must be employed by technicians including insulating gloves, insulating shoes and safety helmet.

DANGER

- Dangerous to life due to potential fire or electricity shock.
- The wiring and connection of the inverter should be carried out by qualified technicians in accordance with local and national electrical standards and regulations.

WARNING

When the photovoltaic array is exposed to light, it supplies a DC voltage to the inverter.

NOTICE

- Electrical connection should in conformity with proper stipulations, such as stipulations for cross-sectional area of conductors, fuses and ground protection.
- The overvoltage category of the DC input port is II and that of the AC output port is III.

4.2. Connecting the Grounding Cable

About this task

This additional grounding cable must be connected before other electrical connection.

The cable needs to be prepared by the user. It is recommended that a 6-mm2 conductor cross-sectional area of cable be used.

Earth fault alarm: This inverter complies with IEC 62109-2 clause 13.9 for earth fault alarm monitoring. If an earth fault alarm occurs, an error code <31> can be viewed on the SAJ App Elekeeper.

Note: The inverter cannot be used with functionally earthed PV Arrays.

Procedure

Connect the grounding cable as shown below:

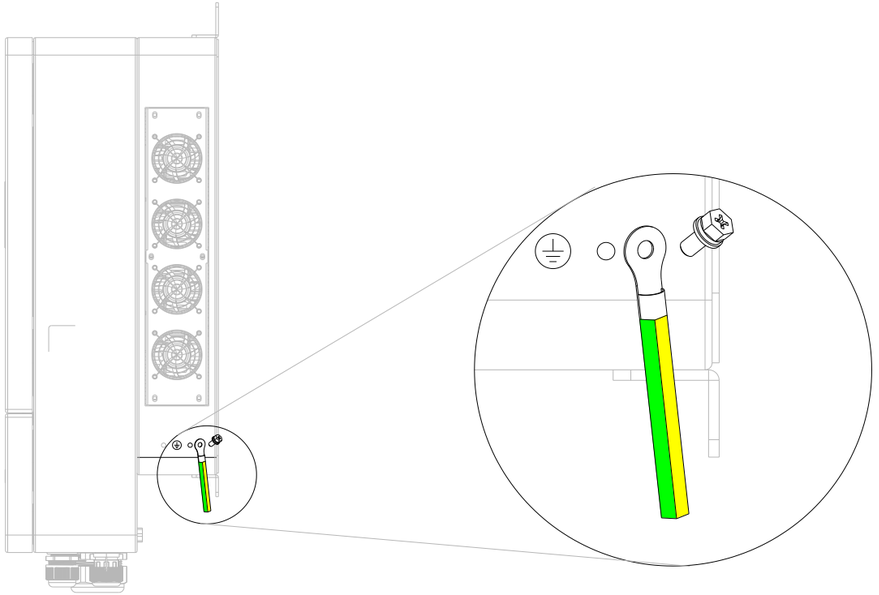


Figure 4.1. Installing the grounding cable

4.3. Opening the Junction Box of the Inverter

On both sides of the junction box cover, use the Allen Wrench to loosen the screws. Then, remove the cover.

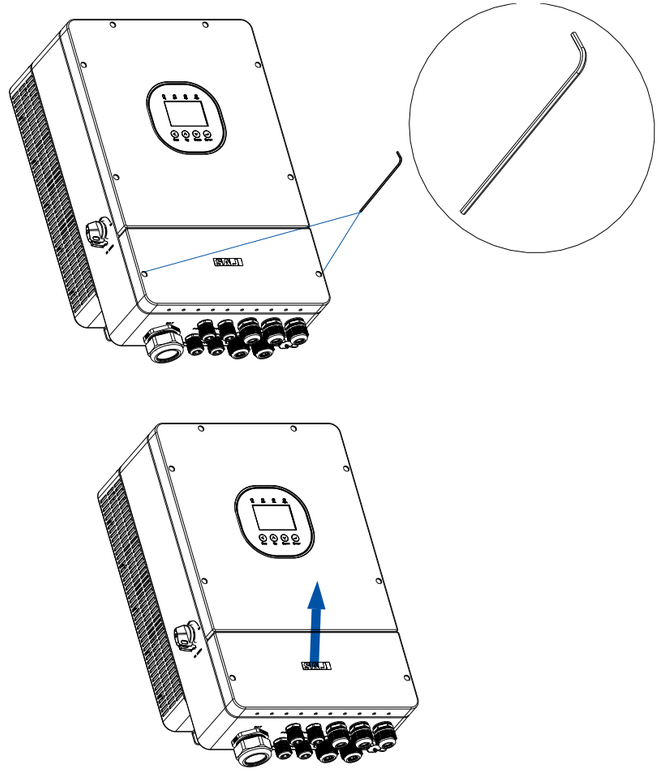


Figure 4.2. Opening the junction box

4.4. Assembling the AC-side Electrical Connection

For safety and regulation compliance, a circuit breaker is required to be installed between the grid and the inverter. Choose the breaker and cables according to the following table.

Note: If the inverter is installed far away from the grid connection point, select a larger cable size to ensure that the voltage drop from the grid connection point to the inverter is within 2% of the grid voltage.

Inverter model	AC breaker	Cables size
H2-5K-LS2	50 A	8 AWG
H2-6K-LS2	63 A	8 AWG
H2-(7.6K-8K)-LS2	80 A	8 AWG
H2-10K-LS2	100 A	6 AWG

Table 4.1. Recommended cable specifications

⚠ WARNING

Risk of personal injury due to electric shock!

- Ensure that the equipment is powered off before performing wiring operations.
- Improper wiring of AC conductors will result in risk of electrical failure or equipment damage. Please ensure that all connections are made correctly in accordance with the instructions in this document and in accordance with local wiring codes and regulations before applying power to the unit.

Procedure

Step 1. Strip the insulation on the cable ends. (20-mm/0.79-inch length for LOAD and GRID wires; 10-mm/0.39-inch length for GEN wires)

Cable	Recommended cable	Recommended torque
LOAD	L: 8 AWG	25 LB-IN (2.82 N·m)
	N: 8 AWG	25 LB-IN (2.82 N·m)
GRID	L: 6 AWG	25 LB-IN (2.82 N·m)
	N: 6 AWG	25 LB-IN (2.82 N·m)
GEN	L: 8 AWG	25 LB-IN (2.82 N·m)
	N: 8 AWG	25 LB-IN (2.82 N·m)

Table 4.2. Cable specifications

If needed, you can put an insulation terminal on the cable end, as shown below:

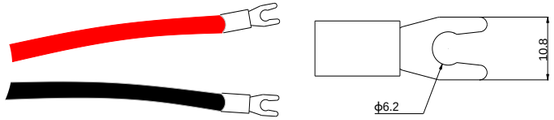


Figure 4.3. Installing insulation terminals

Step 2. Insert the cables through the cable glands GEN, LOAD, and GRID and connect the cables to the corresponding L and N terminals. Then, use a standard torque to tighten the screws on the terminals to secure the cable connection.

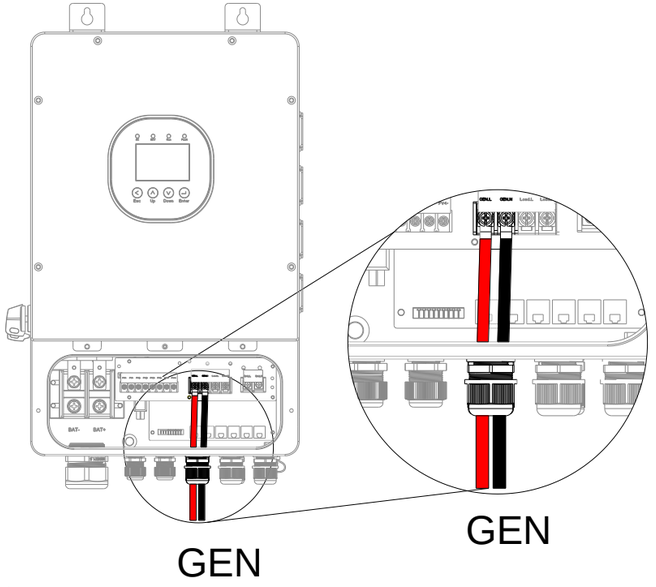


Figure 4.4. Connecting the GEN cables

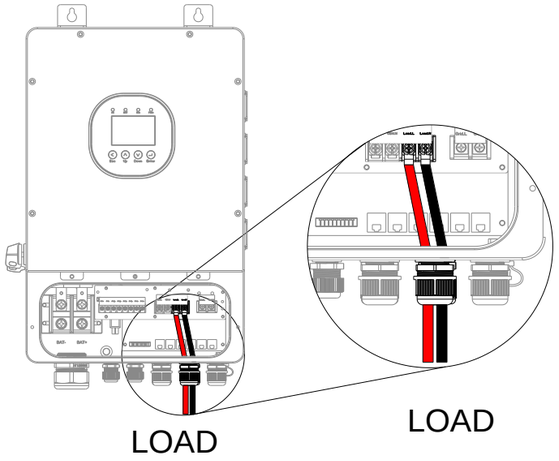


Figure 4.5. Connecting the LOAD cables

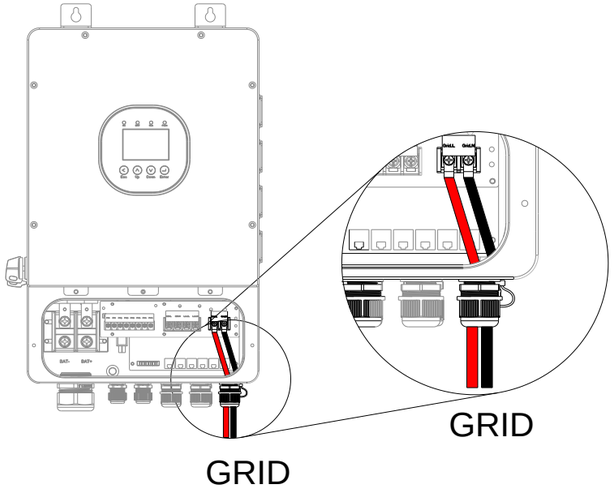


Figure 4.6. Connecting the GRID cables

4.5. Connecting the Battery to the Inverter

About this task

Brand	Compatible batteries models
SAJ	B2-5.0-LV1 and B2-5.0-LV2

Notes:

- For battery details, refer to the *B2-5.0-(LV1, LV2) User Manual*.
- The H2 series inverter is only compatible with the batteries listed above, using of any other untested battery might cause damage to the inverter and thus void the inverter warranty.
- Some utility company or electrical regulation may require a battery isolator to be installed near the inverter. Choose a ≥70A battery isolator for regulation compliance.

Procedure

Step 1. Strip the insulation (20-mm/0.79-inch length) on the positive and negative battery cable ends.

Cable	Recommended cable	Recommended torque
BAT+, BAT-	• H2-(5K-6K)-LS2: 4 AWG • To H2-(7.6k-8K)-LS2: 1 AWG • To H2-10K-LS2: 0 AWG	44 LB-IN (5 N·m)

If needed, you can put a terminal on the cable end, as shown below.

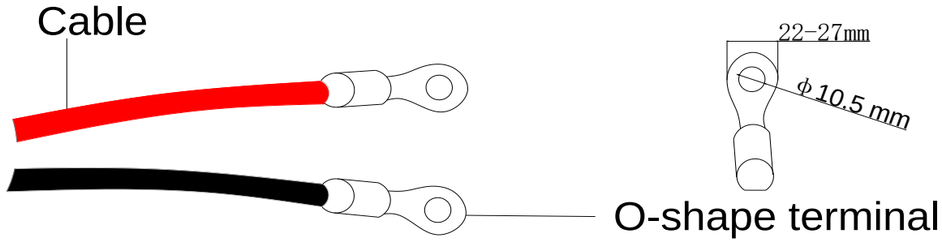


Figure 4.7. Installing insulation terminals

Step 2. Insert the cables through the cable gland BAT and connect the cables to the battery terminals BAT+ and BAT- in the junction box.

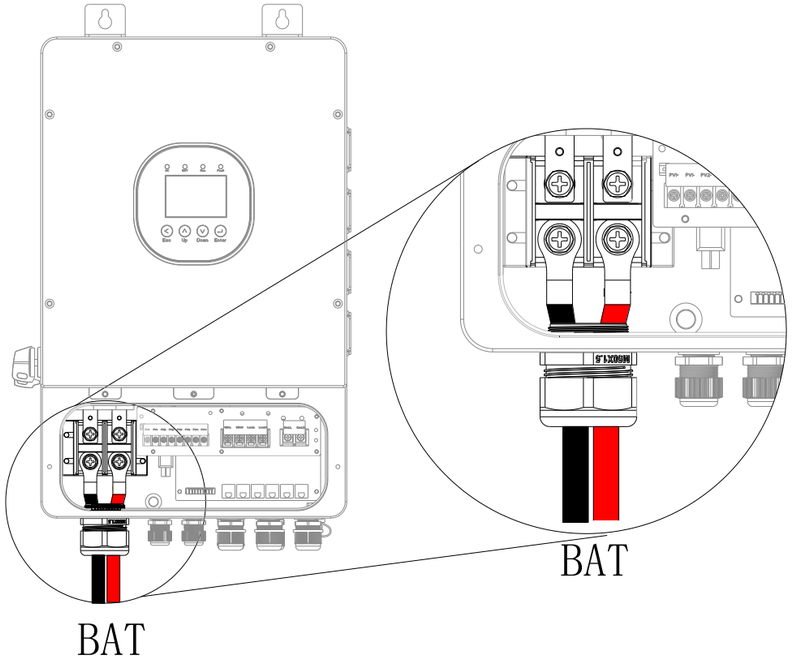
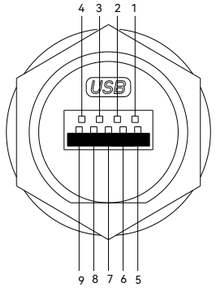


Figure 4.8. Connecting the BAT cables

4.6. Assembling the Communication Connection

4.6.1. Installing the Communication Module

An RS232 USB communication port is provided at the bottom of the junction box. This port is used to connect the communication module, such as a Wi-Fi module or an AIO3 module.



Pin	Description
1	GND: Ground wire
2	485A: 485 communication pin A
3	485B: 485 communication pin B
4	CANL: Low speed CAN signal
5	+5V: Power supply
6	232RX: Send data
7	232TX: Receive data
8	CANH: High speed CAN signal
9	NULL: Null

Table 4.3. Pin definitions

Procedure

Step 1. Remove the cover on the 4G/WIFI port.

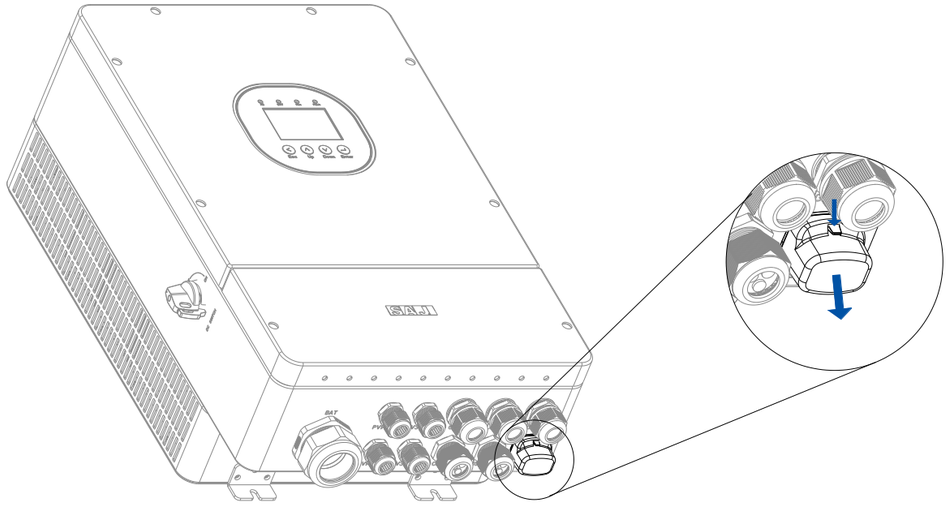


Figure 4.9. Removing the cover of the communication port

Step 2. Insert the communication module into the 4G/WIFI port and secure the module by rotating the nut on the module.

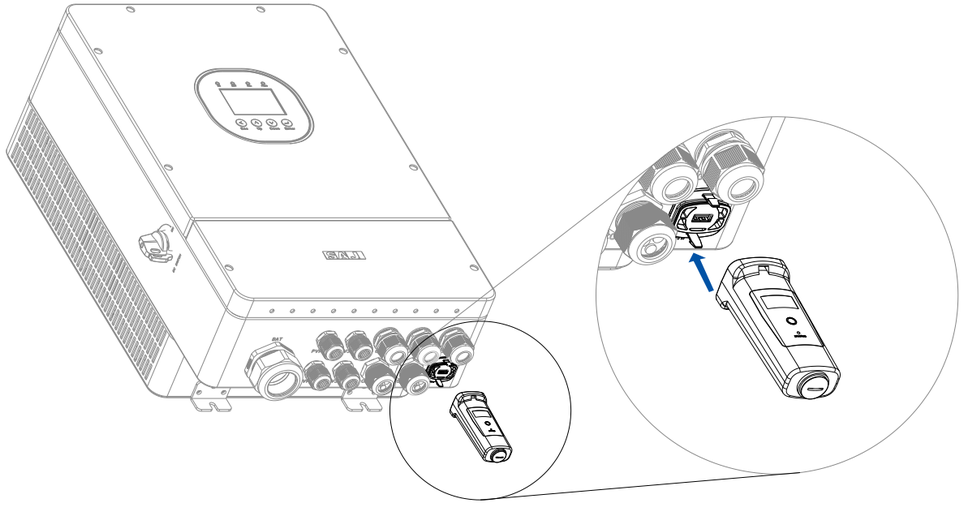


Figure 4.10. Connecting the communication module

4.6.2. Connecting the Battery Temperature Sensor (Optional)

About this task

If lead-acid batteries are used, you need to use the battery temperature sensor.

Procedure

To connect the battery temperature sensor from the battery to the inverter, perform as follows:

Step 1. Connect the battery temperature sensor to the battery.

Step 2. Insert the cable of the battery temperature sensor through the COM1 cable gland. Then, connect the two wires to terminals 3 and 4 on the communications terminal block.

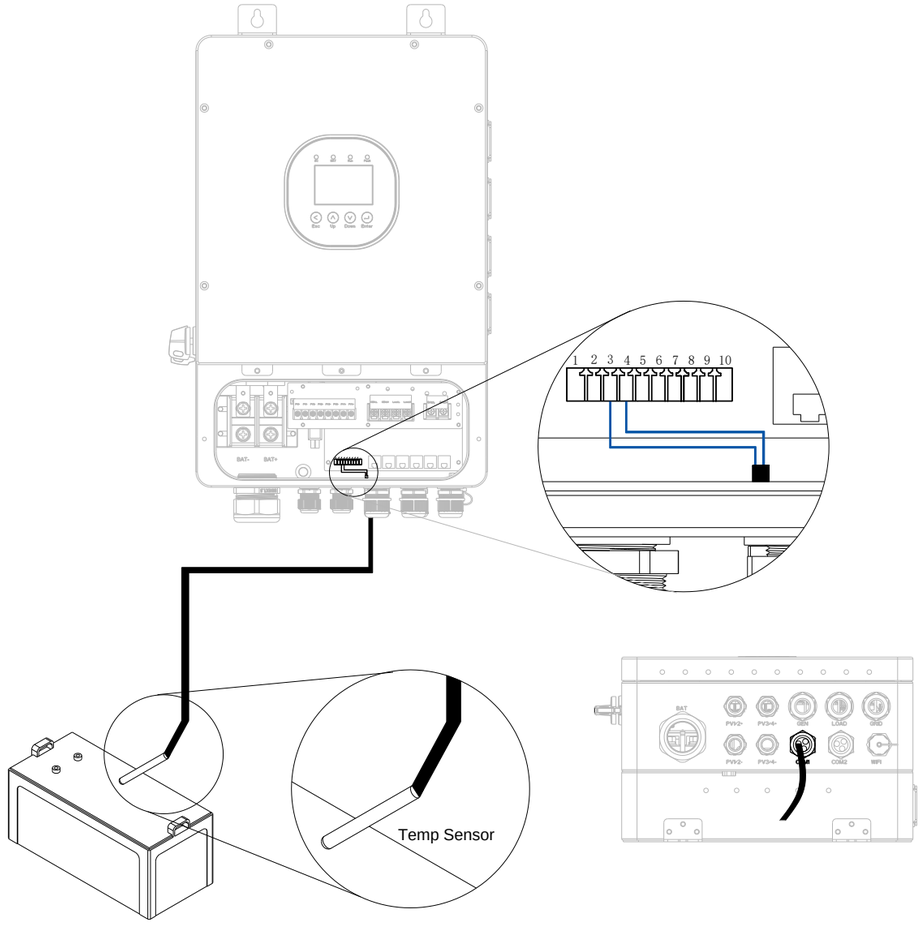


Figure 4.11. Connecting the battery temperature sensor

4.6.3. Connecting the Communication Cables

RJ45 ports

1. Per your needs, prepare communication cables according to the pin definitions of communication ports on the inverter.

MODBUS_RS485	
1	NC
2	NC
3	NC
4	NC
5	NC
6	NC
7	RS485-B2-
8	RS485-A2+

BMS_CAN	
1	NC
2	NC
3	NC
4	CANH
5	CANL
6	NC
7	NC
8	NC

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

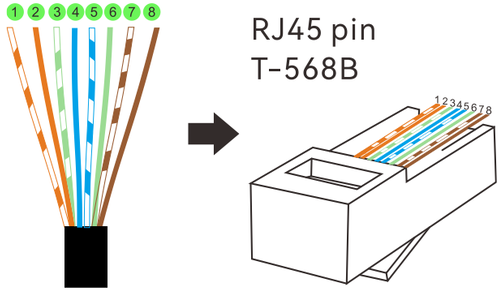
Parallel-2	
1	CANH
2	CANL
3	BKUP TO GRID_BUS+
4	CAN1_H
5	CAN1_L
6	CARRY_BUS+
7	GRID TO BKUP_BUS+
8	GND_S

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-

METER_RS485	
1	RS485-B1-
2	RS485-A1+
3	NC
4	NC
5	NC
6	NC
7	NC
8	NC

Figure 4.12. Pin definitions of the communication ports on the inverter

- For meter connection to the METER_RS485 port, only use pin 1 **RS485-B1-** and pin 2 **RS485-A1+**.
- For connection to the MODBUS_RS485 port, only use pin 7 **RS485-B2-** and pin 8 **RS485-A2+**.



2. Insert the prepared communication cables through the COM1 and COM2 cable glands and connect to corresponding RJ45 ports.

Note: To locate the RJ45 communication ports, refer to section 2.5 "Electrical Terminals".

RJ45 port	**Through (the cable gland on the inverter)**
MODBUS_RS485 (Reserved for future use)	COM1
BMS_CAN (For communication connection to the battery control unit)	
Parallel-1 (For paralleling scenario)	COM2
Parallel-2 (For paralleling scenario)	
DRM (ONLY applicable to Australia)	
METER_RS485 (For communication connection to the meter)	

Table 4.4. Connecting to RJ45 ports

Terminal block

Per your needs, prepare communication cables according to the terminals listed in the below table. Insert the cables through the cable gland COM1 and connect the cables to corresponding terminals.

Note: To locate the communications terminal block, refer to section 2.5 "Electrical Terminals".

Number	**Terminal**	**Description**
1	CT1+	For connecting the CT positive cable
2	CT1-	For connecting the CT negative cable
3	BAT_T+	For temperature detection on external lead acid batteries
4	BAT_T-	For temperature detection on external lead acid batteries
5	EX_SD+	Emergency stop
6	GND_S	Emergency stop
7	G	For external generator dry contact
8	G_S	For external generator dry contact
9	+12V_RSD	For connecting 12V power supply
10	GND_S	For connecting 12V power ground

4.7. Assembling the PV-side Electrical Connection

Step 1. Strip off the insulation (20-mm/0.79-inch length) of the cable ends. User cable ferrules if the cable is of multi-strand type.

Cable	Recommended cable	Recommended torque
PV+, PV-	12 AWG	25 LB-IN (1.68 N·m)

NOTICE

Connect the positive connector to the positive side of the solar panels and connect the negative connector to the negative side of the solar side. Be sure to connect them in right position.

If needed, you can put a terminal on the cable end, as shown below.

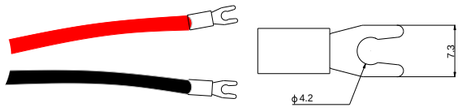


Figure 4.13. Installing insulation terminals

Step 2. Ensure that the DC switch on the left side of the inverter is in OFF position.

Step 3. Insert the PV cables through the PV cable glands and connect the cables to the PV terminals in the junction box.

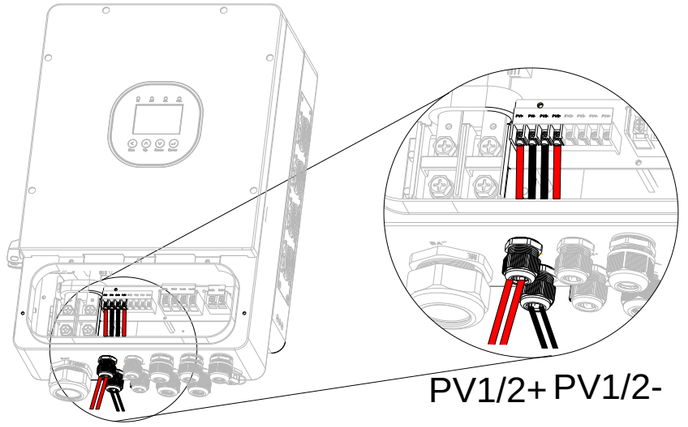


Figure 4.14. Connecting the PV1 and PV2 cables

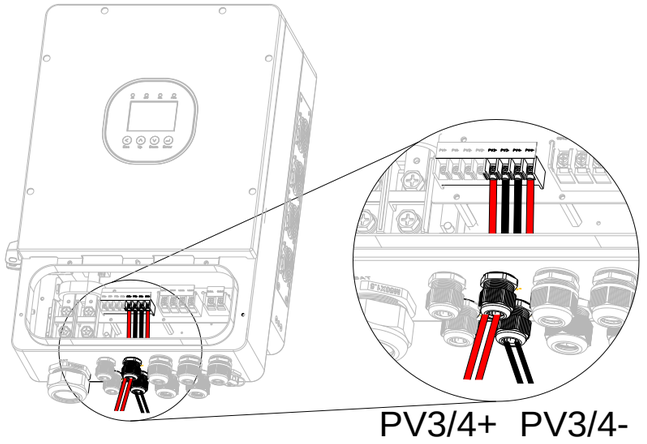


Figure 4.15. Connecting the PV3 and PV4 cables

Step 4. Close the cover of the junction box.

4.8. System Connection

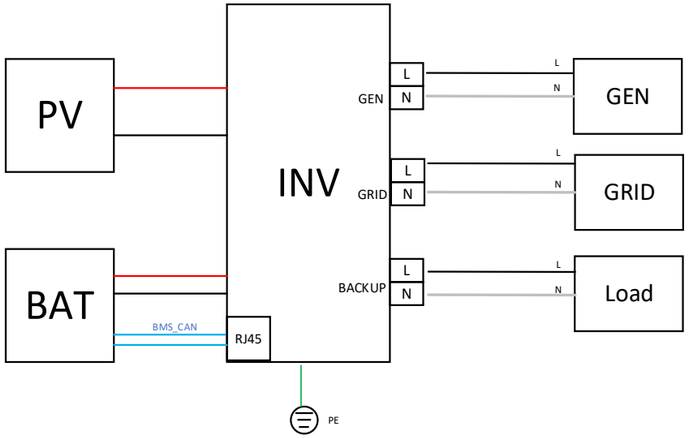


Figure 4.16. With generator

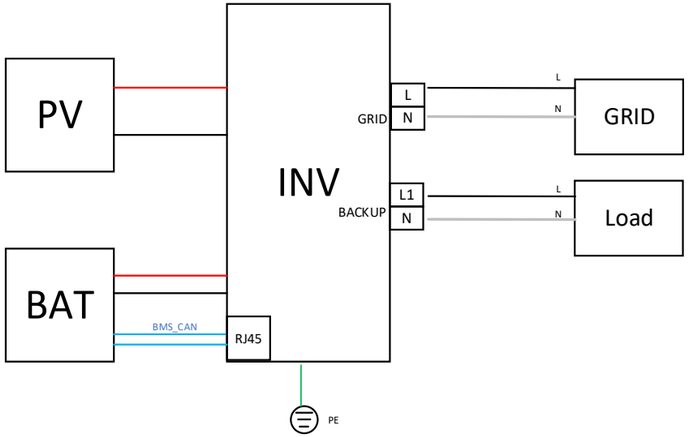


Figure 4.17. Without generator

4.9. External CT connection

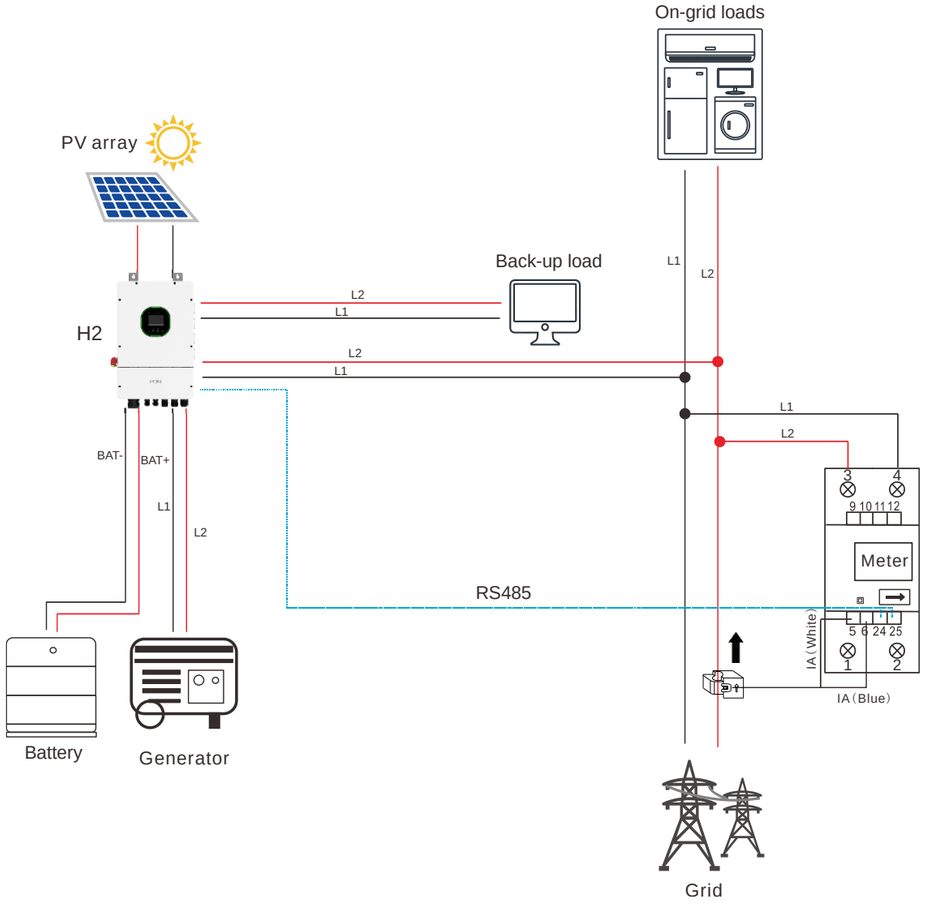


Figure 4.18. External CT connection with a meter

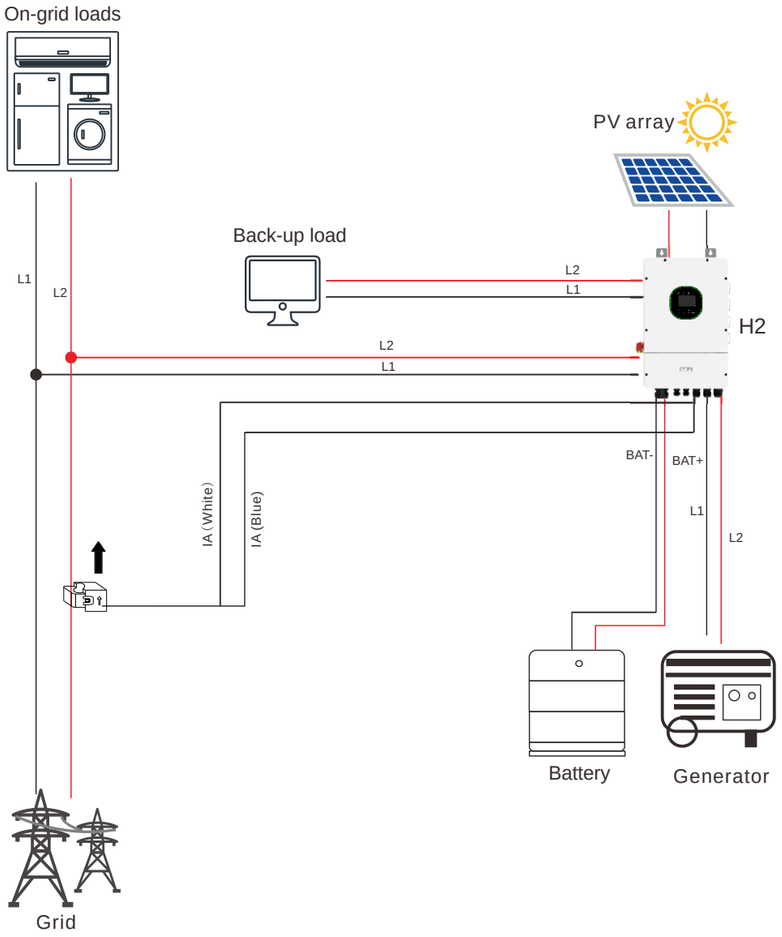


Figure 4.19. External CT connection without a meter

4.10. Parallelling Wiring

Discrete Load Sharing and Parallel Operation: In the grid-connected mode, the inverters work collaboratively through an intelligent energy management system to balance their respective loads; whereas, in the off-grid mode, each inverter independently carries its connected load.

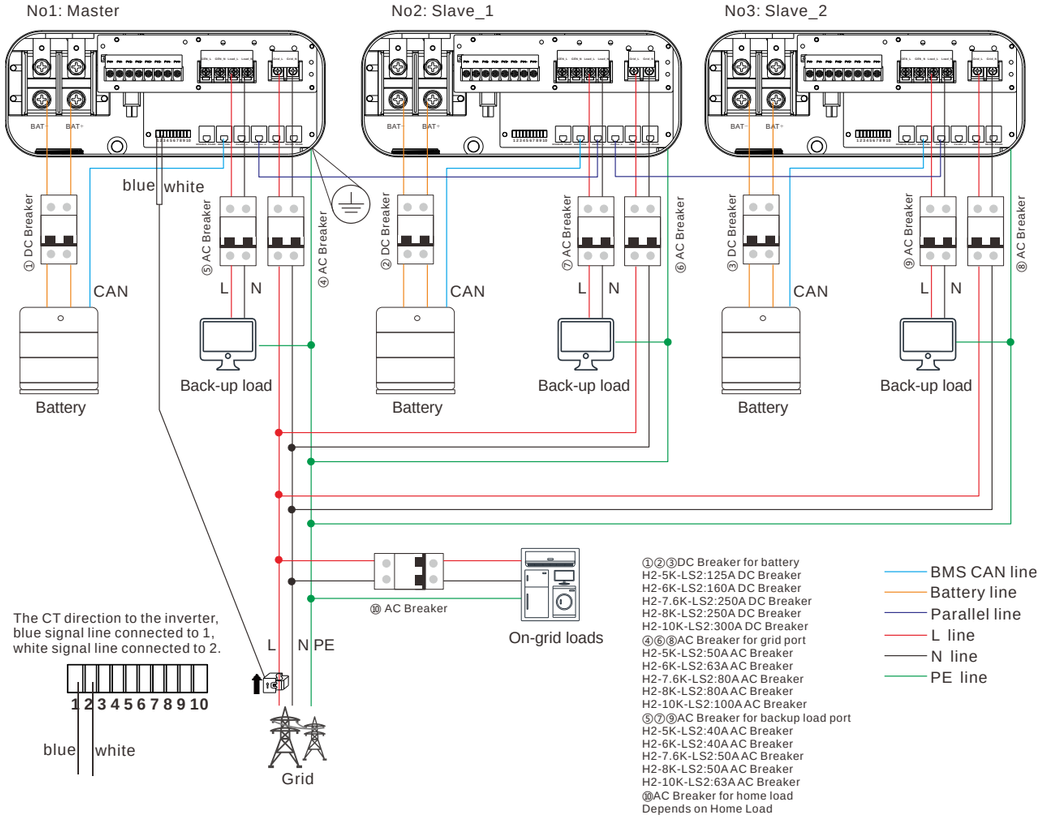


Figure 4.20. Parallelling wiring

5.

STARTUP AND SHUTDOWN

5.1. Startup

5.1.1. Starting the System

To start the inverter, perform as follows:

Step 1. Open the breaker on the grid side.

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

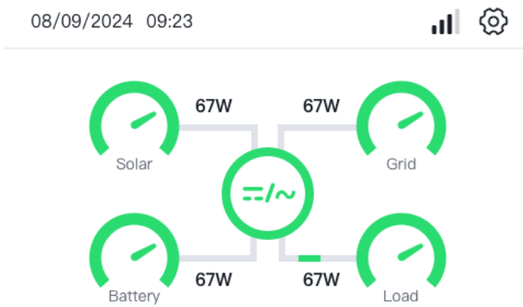
Step 3. Turn on the battery switch on the battery.

Step 4. Check the LED indicator status on the inverter panel to ensure that the inverter is running properly.

For details, refer to section 2.6 "LED Status Indicators".

5.1.2. Operations on the LCD

After the system starts, the touchable Liquid Crystal Display (LCD) on the front panel of the inverter is displayed as follows:

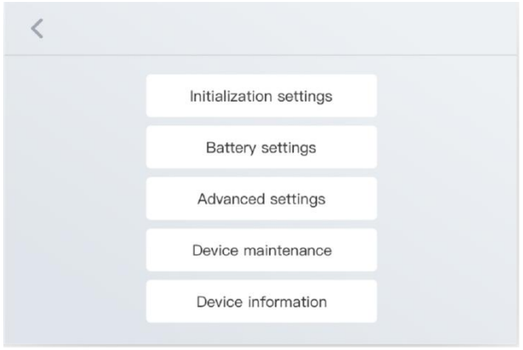


On this page, you can view the energy flow direction and tap each device icon to view the device details.

The central icon can be displayed in one of the statuses:

Color	Status	Color	Status
Green	Running	Yellow	Alarm
Red	Error	Blue	Upgrading

You can tap the setting icon on the top right corner and follow the instructions on the screen to cofnigure the parameters.



5.2. Shutdown

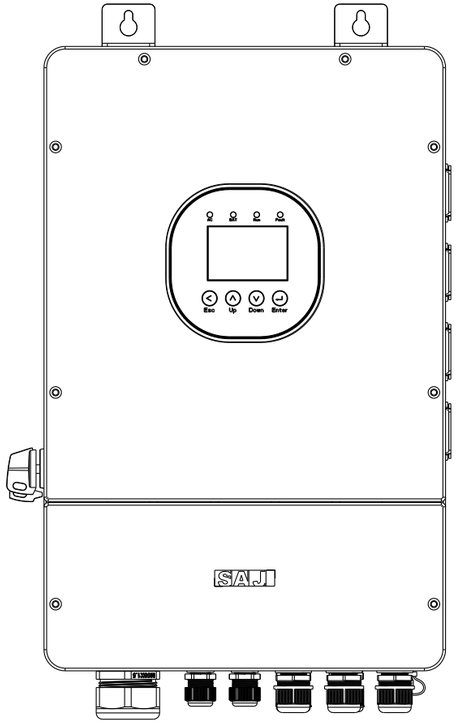
To shut down the inverter, perform as follows:

Step 1. Close the breaker on the grid side.

Step 2. Turn off the DC switch on the inverter.

Step 3. Turn off the battery switch on the battery.

Note: Only in emergency, you can press the E-stop button to shut down the inverter.



6. COMMISSIONING

6.1. Downloading the App

The Elekeeper App can be used for both nearby and remote monitoring. Depending on the communication module used, it supports Bluetooth/4G or Bluetooth/Wi-Fi to communicate with your energy storage system (ESS).

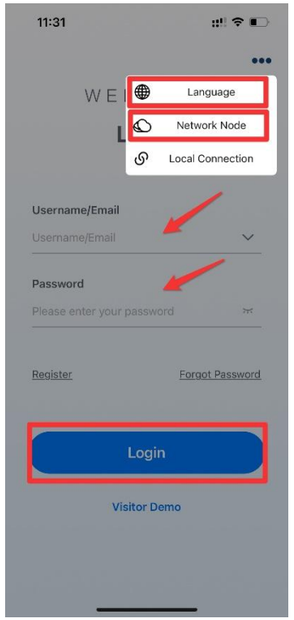
On your mobile phone, search for “Elekeeper” in the App store and download the App.

6.2. Logging In to the App

If you have an account, log in to the App directly:

a. Tap the three-dot icon ••• on the top right corner. Choose the language and network node based on your needs.

b. Log in to the App by using the account and the password.



To apply for a new account, perform as follows:

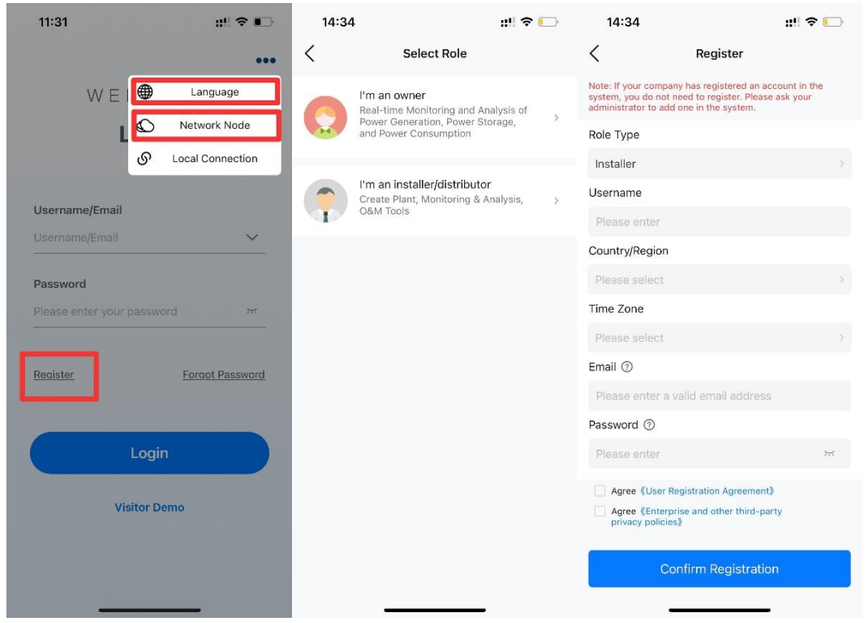
a. Tap the three-dot icon ••• on the top right corner. Choose the language and network node based on your needs.

b. Tap **Register.** Choose whether you are an owner or an installer or distributor.

c. Follow the instructions on the screen to complete the registration.

d. Log in to the App by using the new account and the password.

Example (for installer):



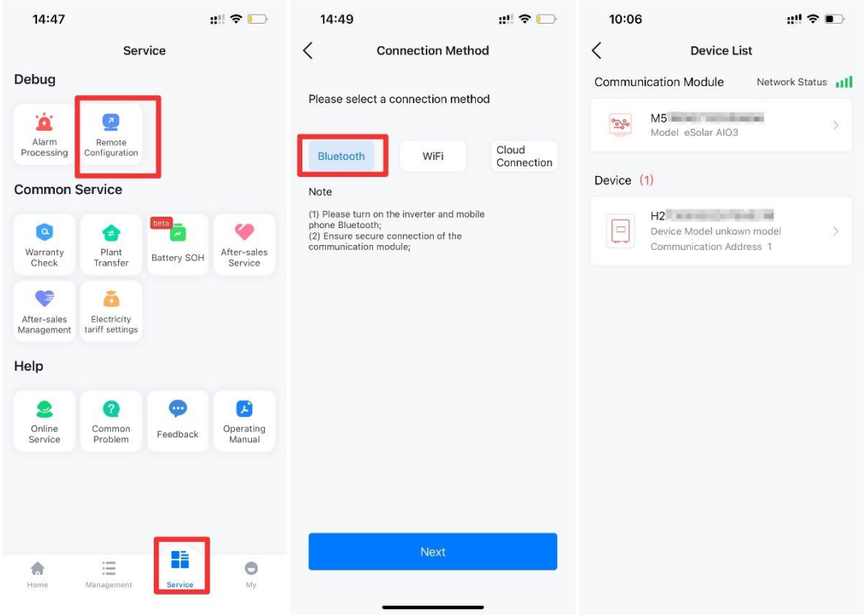
6.3. Performing the Initialization Settings

Prerequisite

The Bluetooth function on your mobile phone is enabled.

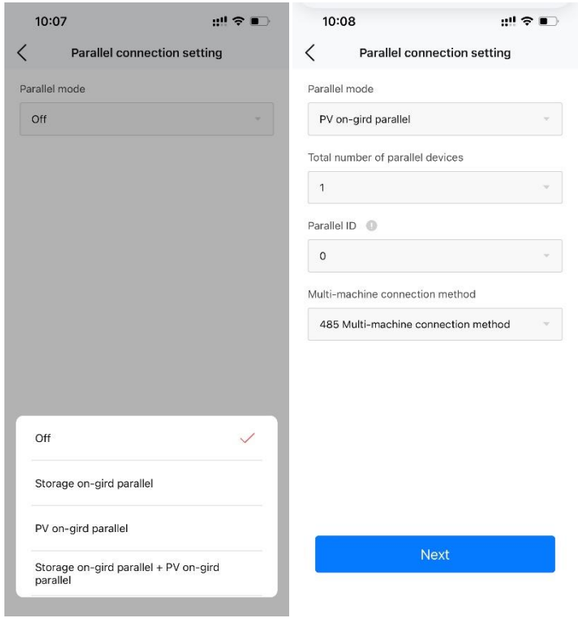
Procedure

1. On the **Service** interface, select **Remote Configuration**. Tap **Bluetooth** and then **Next**. Tap your inverter according to the inverter serial number (SN).



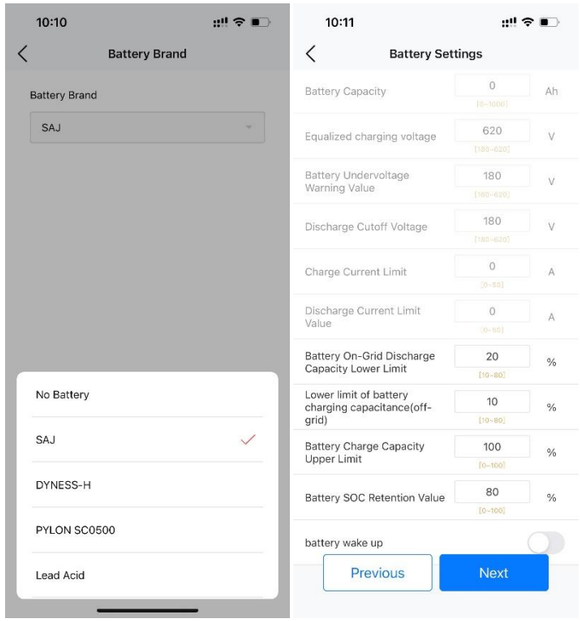
2. Complete the initialization settings by following the instructions on the screen.

a. Parallel connection settings



Configuration	Corresponding parallel mode
Multiple H2 + B2 (parallelling)	Storage on-grid parallel
One H2 + B2 + solar inverter (AC-coupling)	PV on-grid parallel
Multiple H2 + B2 + solar inverter (parallelling + AC-coupling)	Storage on-grid parallel+ PV on-grid parallel

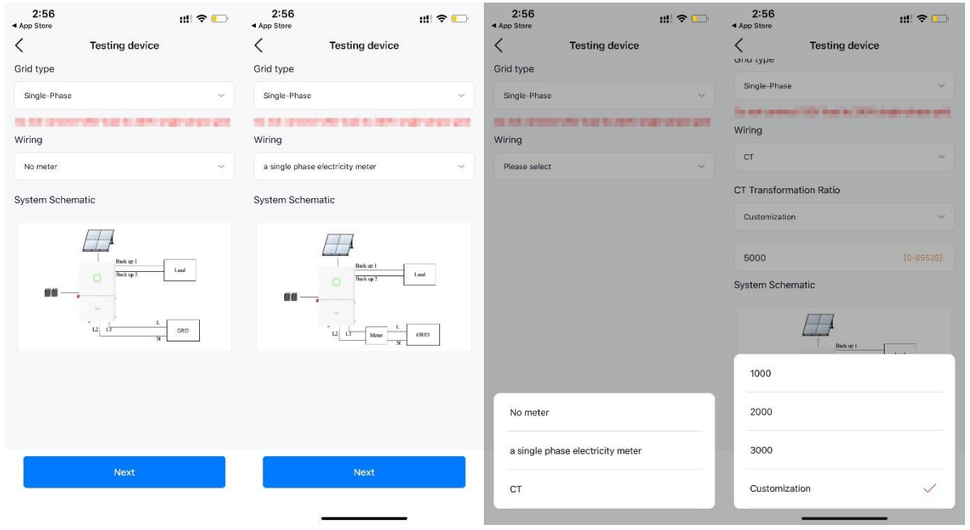
b. Battery brand and settings



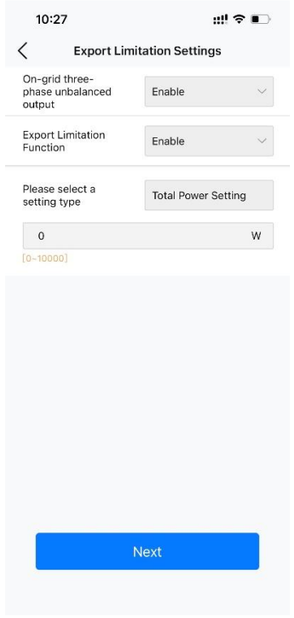
c. Meter and system schematic

Examples:

If you have set **Wiring** to **CT**, you need to set **CT Transformation Ratio**.

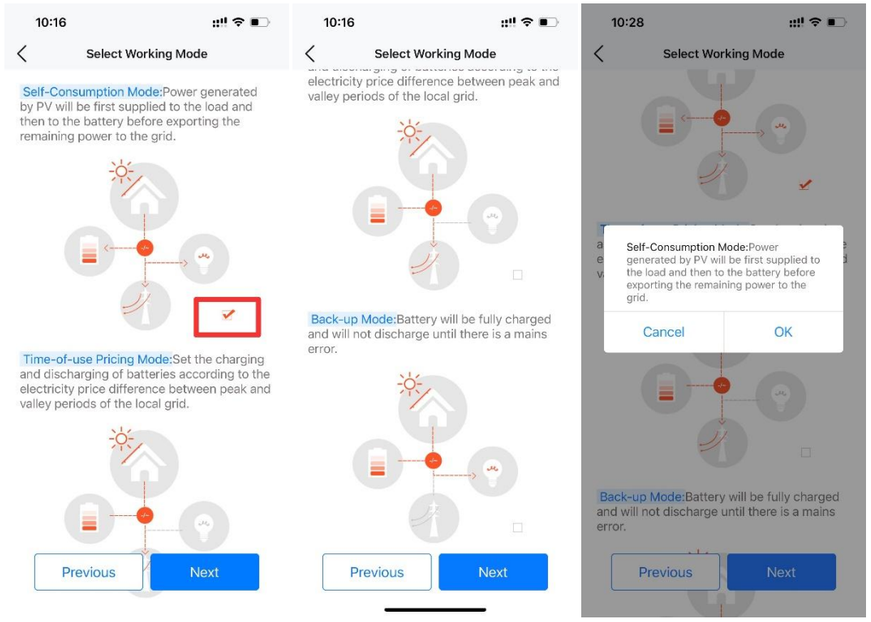


d. Export limitation settings



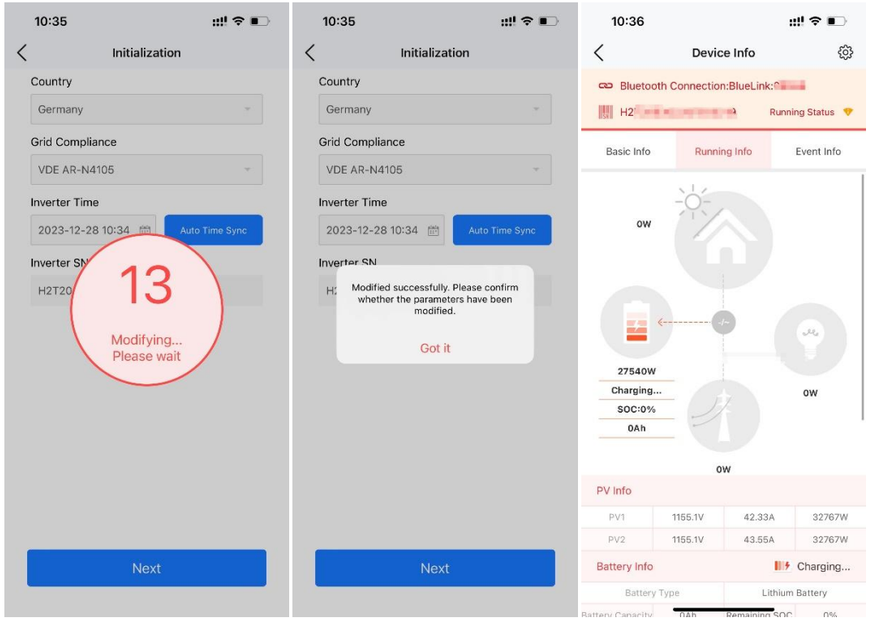
e. Working mode

Example of **Self-Consumption Mode**:



f. Country and grid compliance

g. Initialization completion



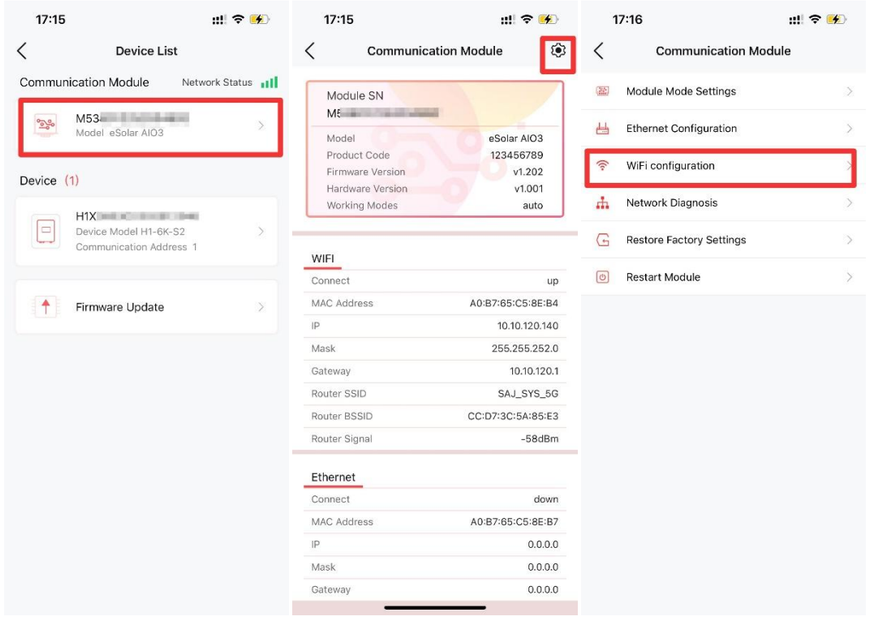
6.4. Configuring the Communication Module

About this task

If you want to remotely monitor the energy storage system and view the device statistics (for example, when you are away from home), connect the communication module installed on the inverter to the network.

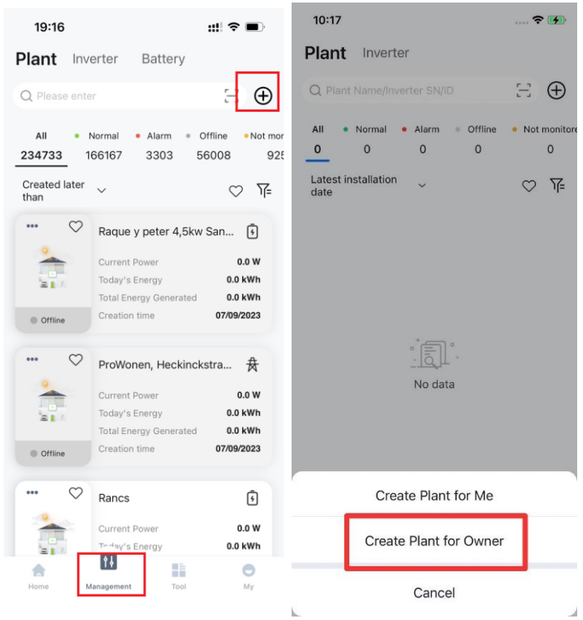
Procedure

1. On the **Device List** page, select your communication module according to its SN.
2. Tap the setting icon on the upper right corner.
3. Select **WiFi Configuration** and set the communication module to connect to your home network.

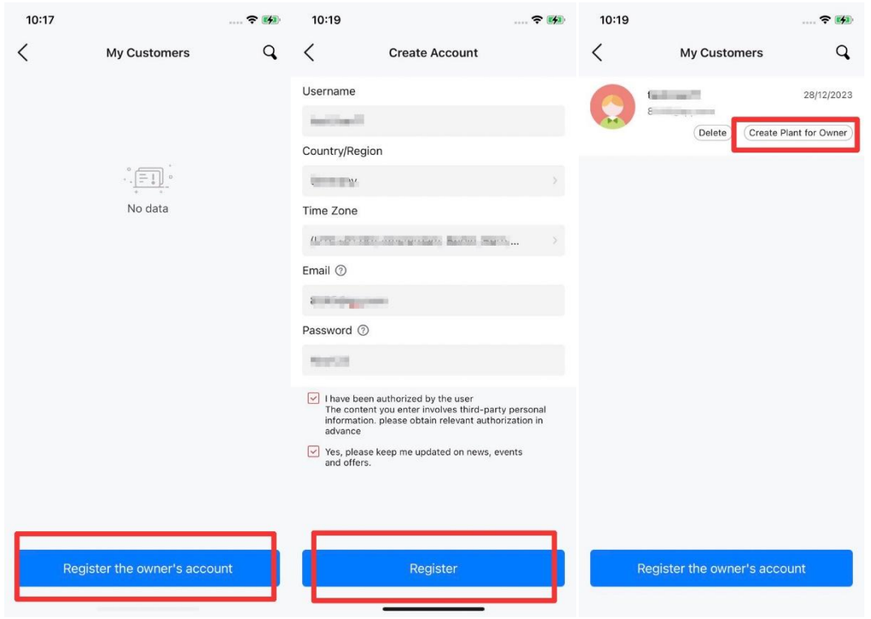


6.5. Creating a Plant

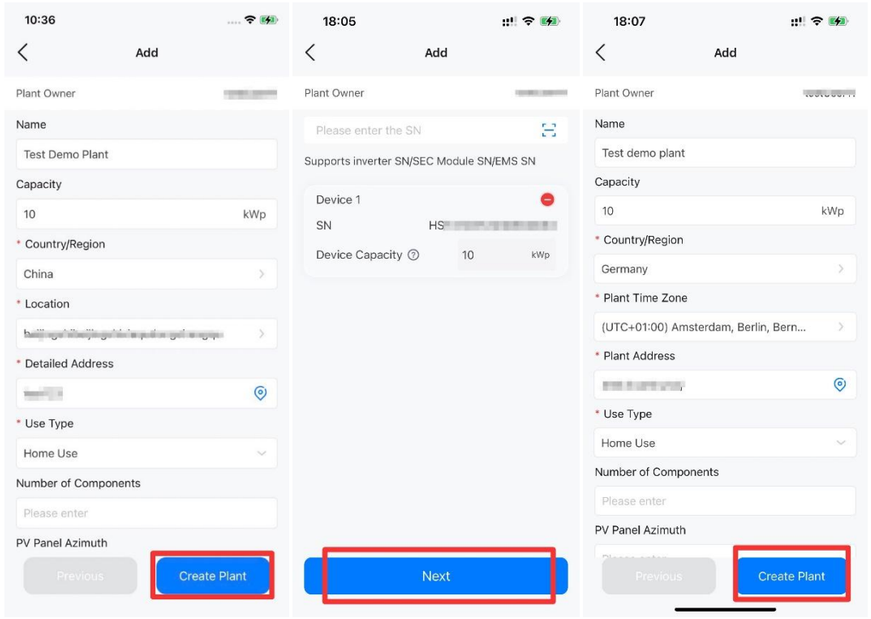
1. On the **Management** page, tap the ⊕ icon on the top right corner. Select **Create Plant for Owner**.



2. Apply for an account for the end user.



3. Configure the plant details.



6.6. Viewing the Fixed Power Factor Mode and Fixed Reactive Power Mode

Once **Country** and **Grid Compliance** are selected during initialization, the parameters relating to the reactive power control settings are set automatically. In typical household scenarios, it is no need to change these default parameter values. If you really need to change them, before any modifications, contact SAJ for consultation and ensure that you have necessary electric knowledge and are fully aware of the impact of such modifications.

To view the settings, perform as follows:

1. Check the inverter manufacturing date according to the inverter SN. Take an SN “1 502 0 G 11 01 CN 00000” as an example, in which “11” indicates the manufacturing year is 2011 and “01” indicates the first week of 2011.

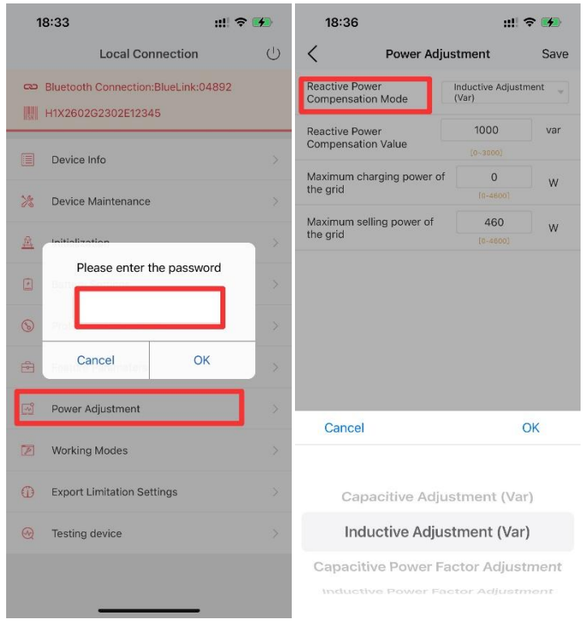
2. Depending on your inverter manufacturing date, view the parameter values as follows:

- For the product manufactured before August 2023: Tap **Power Adjustment** and enter the password. (Contact SAJ for the password.)

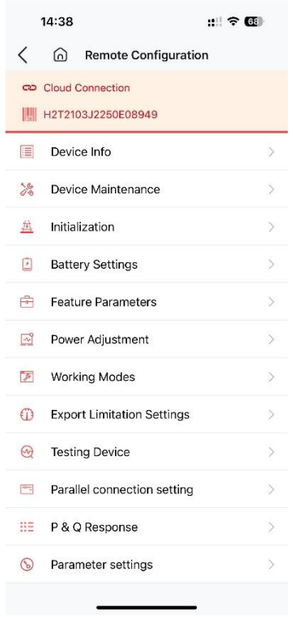
  For **Reactive Power Compensation Mode**:

  - Fixed power factor mode: **Capacitive Power Factor Adjustment** or **Inductive Power Factor Adjustment**. The power factor range is from 0.8 leading to 0.8 lagging.
  - Fixed reactive power mode: **Inductive Adjustment (Var)** or **Capacitive Adjustment (Var).** The power ranges from -60% Pn to 60% Pn.

  Examples:



- For the product manufactured after August 2023: Tap **Parameter settings**.



6.7. Configuring Self-test (For Italy)

About this task

Italian Standard CEI0-21 requires a self-test function for all inverters connected to the utility grid. The self-test ensures that the inverter can be disconnected from the grid when required.

During the self-test, the inverter will check the reaction time for over frequency, under frequency, overvoltage, and undervoltage. If the self-test fails, the inverter will not provide electricity to the grid.

Prerequisite

- Ensure that the communication module (Wi-Fi/Bluetooth/Ethernet) of the inverter is connected to the network. Refer to section 6.4 "Configuring the Communication Module".
- Ensure that **Country** is set to **Italy** and **Grid Compliance** is selected properly.

  To check the settings, choose **Initialization** on the **Local Connection** page.

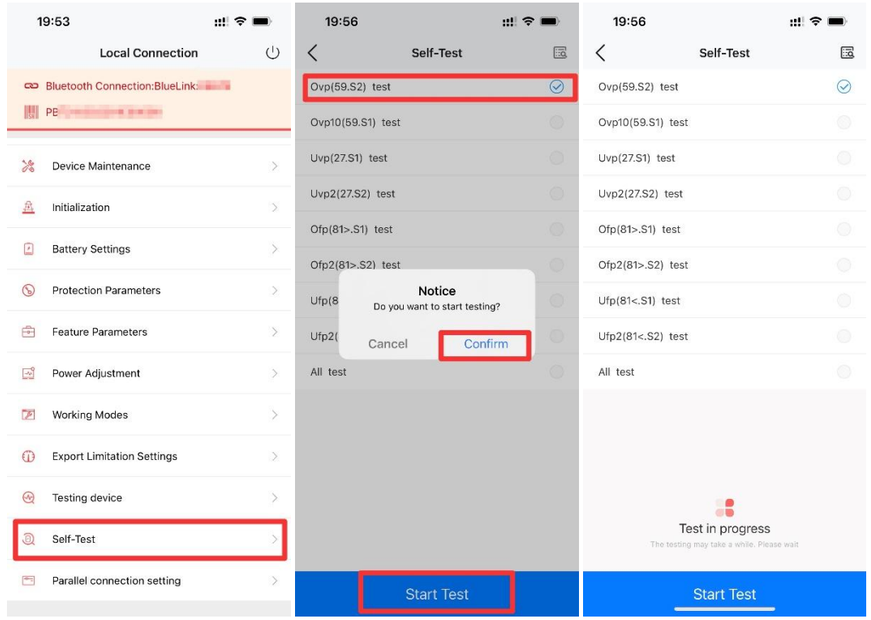
Procedure

1. On the **Local Connection** page, choose **Self-Test**. Set the self-test parameters if needed.
2. Select the required test and tap **Start**.

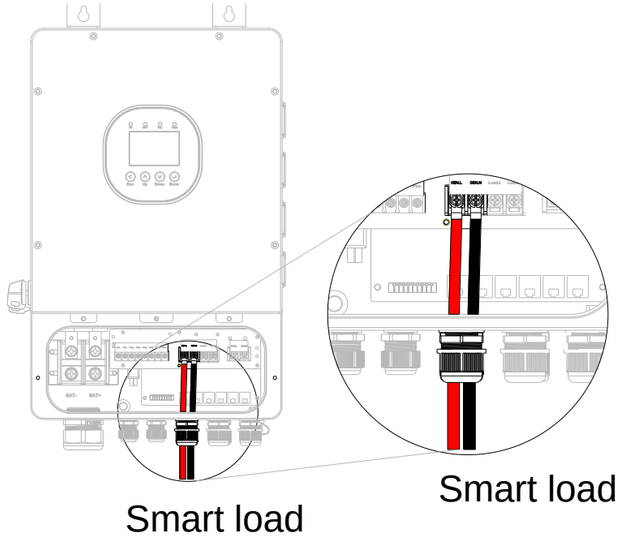
   One test will take around 5 minutes. If you have selected **All test**, all tests will take around 40 minutes.

   After the self-test is completed, you can save the test report.

   If the self-test failed, contact SAJ or your inverter supplier.



6.8. Smart Load Setting

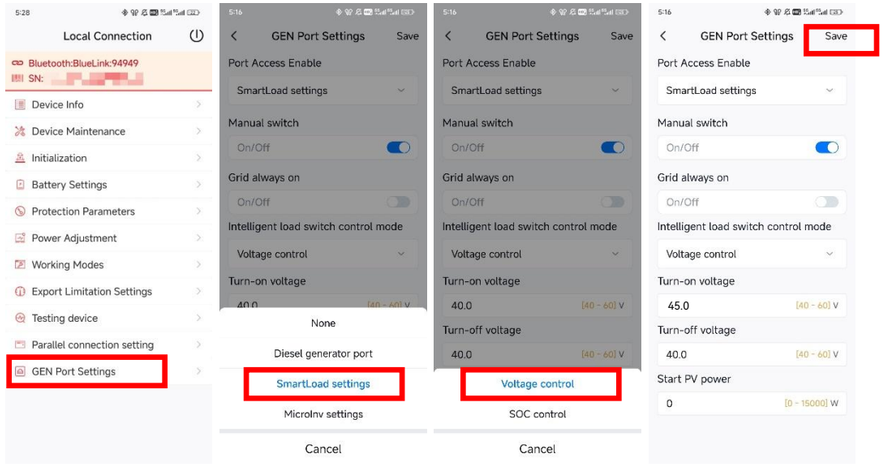


When the battery connected to the inverter is a lead-acid battery, the intelligent load switch control method can choose voltage control or SOC control. When the connected battery is a lithium iron phosphate battery, only SOS control is available.

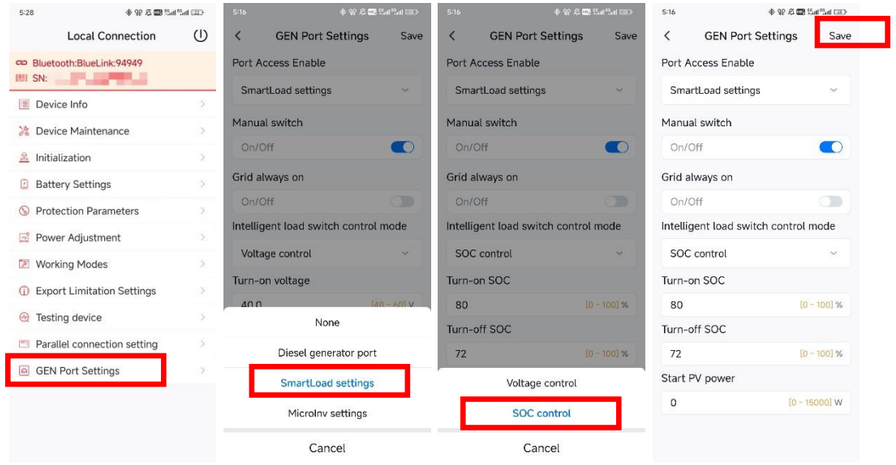
Notes:

- The turn-on voltage must be greater than the turn-off voltage.
- The turn-on SOC must be greater than the turn-off SOC.

- **Voltage control:**



- **SOC control:**



7.

TROUBLESHOOTING

For any errors reported as below, contact the after-sales for service support. The operations and maintenance must be performed by authorized technicians.

Error code	Error message
1	Master Relay Error
2	Master EEPROM Error
3	Master Temperature High Error
4	Master Temperature Low Error
5	Lost Communication M<->S
6	GFCI Device Error
7	DCI Device Error
8	Current Sensor Error
9	Master Phase1 Voltage High
10	Master Phase1 Voltage Low
11	Master Phase2 Voltage High
12	Master Phase2 Voltage Low
13	Master Phase3 Voltage High
14	Master Phase3 Voltage Low
15	Grid Voltage 10Min High
18	Master Grid Frequency High
19	Master Grid Frequency Low
20	BAT Input Mode Error
21	Phase1 DCV High
22	Phase2 DCV High
23	Phase3 DCV High
24	Master No Grid Error
26	Parallel machine CAN Com Error
27	GFCI Error
28	Phase1 DCI High
29	Phase2 DCI High
30	Phase3 DCI High
31	ISO Error
32	Bus Voltage Imbalance
33	Master Bus Voltage High

Error code	Error message
34	Master Bus Voltage Low
35	Master Grid Phase Error
36	Master PV Voltage High
37	Master Islanding Error
38	Master HW Bus Voltage High
39	Master HW PV Current High
40	Master Self-Test Failed
41	Master HW Inv Current High
42	Master SW Inv Current High
44	Master Grid NE Voltage Error
45	Master Fan1 Error
46	Master Fan2 Error
47	Master Fan3 Error
48	Master Fan4 Error
49	Lost Communication between Master and Meter
50	Lost Communication between M<->S
51	Lost Communication between inverter and Grid Meter
52	HMI EEPROM Error
53	HMI RTC Error
54	BMS Device Error
55	BMS Lost. Error
56	CT Device Err
57	AFCI Lost Com.Err
58	Lost Com.H<->S Err
60	EV Lost.Conn Warn
61	Slave Phase1 Voltage High
62	Slave Phase1 Voltage Low
63	Slave Phase2 Voltage High
64	Slave Phase2 Voltage Low
65	Slave Phase3 Voltage High
66	Slave Phase3 Voltage Low

Error code	Error message
67	Slave Frequency High
68	Slave Frequency Low
69	DCDC Lost.ConniWarn
70	DCDC Device Error
71	Parall CAN Lost Com. Err
73	Slave No Grid Error
74	Slave PV Input Mode Error
75	Slave HW PV Curr High
76	Slave PV Voltage High
77	Slave H2 Bus Volt High

8.

APPENDIX

9.1. Recycling and Disposal

This device should not be disposed as a residential waste.

An inverter that has reached the end of its operation life is not required to be returned to your dealer; instead, it must be disposed by an approved collection and recycling facility in your area.

9.2. Warranty

Check the product warranty conditions and terms on the SAJ website: https://www.saj-electric.com/

9.3. Contacting Support

Guangzhou Sanjing Electric Co., Ltd.

Address: SAJ Innovation Park, No.9, Lizhishan Road, Guangzhou Science City, Guangdong, P.R.China.

Postcode: 510663

Website: https://www.saj-electric.com/

Technical Support & Service

Tel: +86 20 6660 8588

Fax: +86 206660 8589

E-mail: service@saj-electric.com

International Sales

Tel: 86-20-66608618/66608619/66608588/66600086

Fax: 020-66608589

E-mail: info@saj-electric.com

China Sales

Tel: 020-66600058/66608588

Fax: 020-66608589

9.4. Trademark

SAJ is the trademark of Sanjing.