USER MANUAL

Energy Storage System

READ THE INSTRUCTIONS COMPLETELY BEFORE OPERATING THE EQUIPMENT

Check the utility voltage before turning ON the unit if connected.

Verify the inverter's programmed grid type before connecting to the utility.

The inverter will be programmed in 120/240V Split-Phase at 60Hz by default.

Disregarding these instructions could result in permanent damages to the inverter

DISCLAIMER

UNLESS SPECIFICALLY AGREED TO IN WRITING, THE MANUFACTURER:
(A) DOES NOT WARRANT THE ACCURACY, SUFFICIENCY OR SUITABILITY OF ANY TECHNICAL OR OTHER INFORMATION PROVIDED IN ITS MANUALS OR OTHER DOCUMENTATION.
(B) ASSUMES NO RESPONSIBILITY OR LIABILITY FOR ANY LOSS OR DAMAGES, WHETHER DIRECT, INDIRECT, CONSEQUENTIAL, OR INCIDENTAL, ARISING OUT OF THE USE OF SUCH INFORMATION. USE OF SUCH INFORMATION SHALL BE ENTIRELY AT THE USER'S RISK.
The manufacturer is not responsible for system failure, damage or injury resulting from improper installation of its products.
Information in this manual is subject to change without notice.
This manual is applicable to following inverter model: SEL-11K4AH-210TU

Table of Contents

IMPORTANT SAFETY INSTRUCTIONS

SYMBOLS THAT APPEAR IN THIS DOCUMENT

WARNING: This symbol indicates information that, if ignored, could cause serious injury, equipment damage, or death.

CAUTION: This symbol indicates information that, if ignored, could result in minor injury or equipment damage.

NOTE: This symbol indicates relevant information that is not related to hazardous situations.

WARNINGS

Read this entire document before installing or using the inverter. Failure to follow any of the instructions or warnings in this document can result in electrical shock, serious injury, or death. Damage to the inverter is also possible, potentially rendering it inoperable.

High Risk due to fire or electrocution – Installation, maintenance and connection of inverters must be performed by qualified personnel, in compliance with local electrical standards, wiring rules and requirements of local power authorities and/or companies.

The temperature of some parts of the inverter may exceed 60 ℃ during operation. DO NOT touch the inverter during operation to avoid being burnt.

Ensure children are kept away from inverters.

DO NOT open the front cover of the inverter. Apart from performing work at the wiring terminal (as instructed in this manual), touching or changing components without authorization may cause injury to people, damage to inverters and annulment of the warranty.

Static electricity may damage electronic components. Appropriate methods must be adopted to prevent such damage to the inverter; otherwise the inverter may be damaged and the warranty annulled.

Ensure the output voltage of the proposed PV array is lower than the maximum rated input voltage of the inverter; otherwise the inverter may be damaged and the warranty annulled.

When exposed to sunlight, the PV array generates dangerous high DC voltage. Please operate according to our instructions, or it will result in danger to life.

PV modules should have an IEC61730 class A rating.

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

The system must have Ground connections and Neutral connections.

Solar PV+/PV- are UNGROUNDED. Note, you may ground PV Racking/Mounts, but doing so directly to the inverter will likely result in damage in the case of a direct lightning strike to the PV array. Ground the PV racking directly to earth ground.

DO NOT connect the grid to the “AC OUT” output terminal.

DO NOT reverse the polarity of batteries. **Damage WILL occur.**

DO NOT exceed **600 V DC** on any MPPT on the inverter.

DO NOT turn off the battery breaker if there is current flowing in or out of the battery in any amount.

DO NOT use impact drivers to tighten any fasteners on the inverter.

Use conduit for AC and DC wires entering/exiting the wiring compartment to meet NEC and CSA code

ALL terminals/breakers, including battery, MPPT, and AC Terminal Blocks should have only one conductor connected to each terminal. Pig tailing is an acceptable method to legally connect two wires to one circuit.

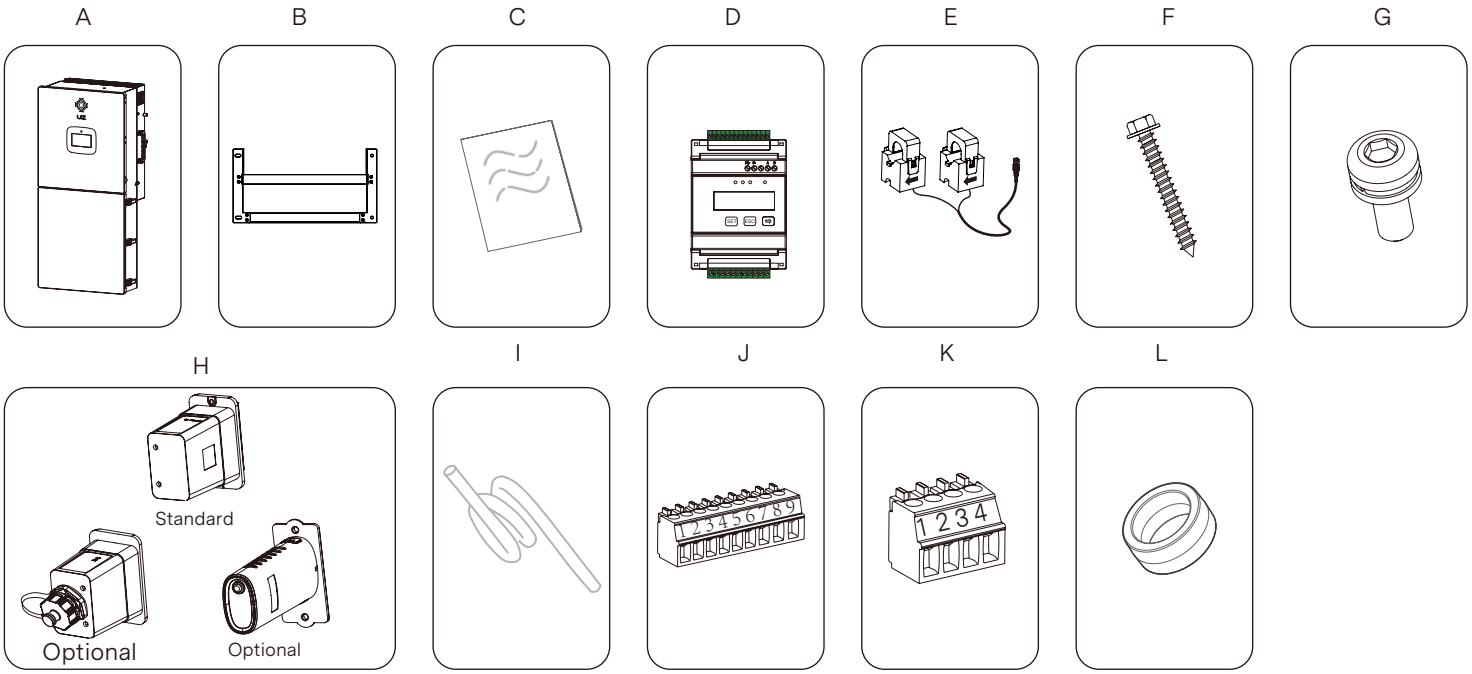
SYMBOLS USED

Labels	Description
	Danger of high voltage and electric shock! Only qualified personnel may perform work on the inverter.
	Residual voltage exists after the inverter is powered off. It takes 5 minutes for system to discharge to a safe voltage.
	Danger of hot surface
	Environmental Protection Use Period
	Refer to the operating instructions
	Product should not be disposed as household waste.
	Grounding terminal

1. Get to Start

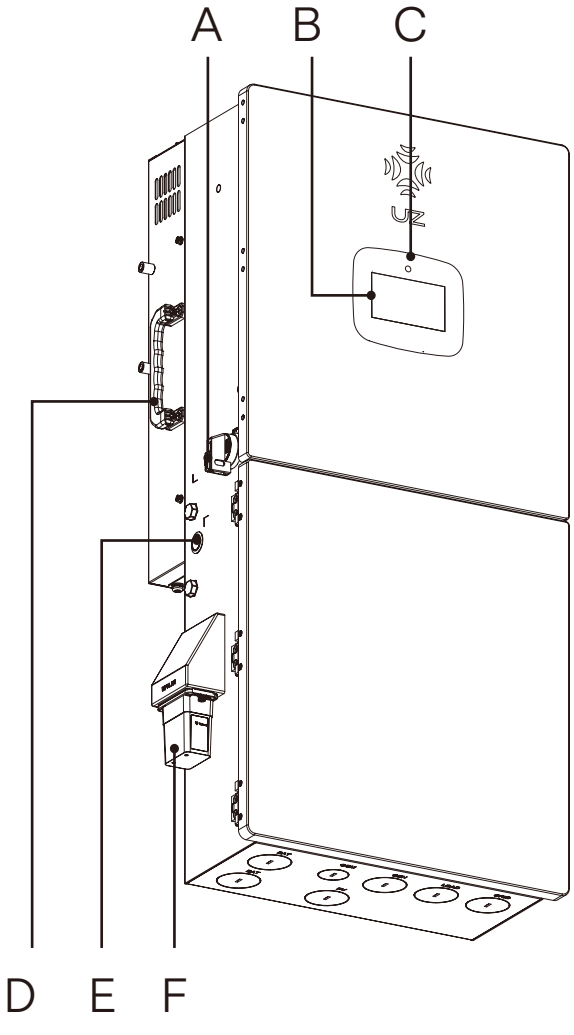
1.1 Component Guide

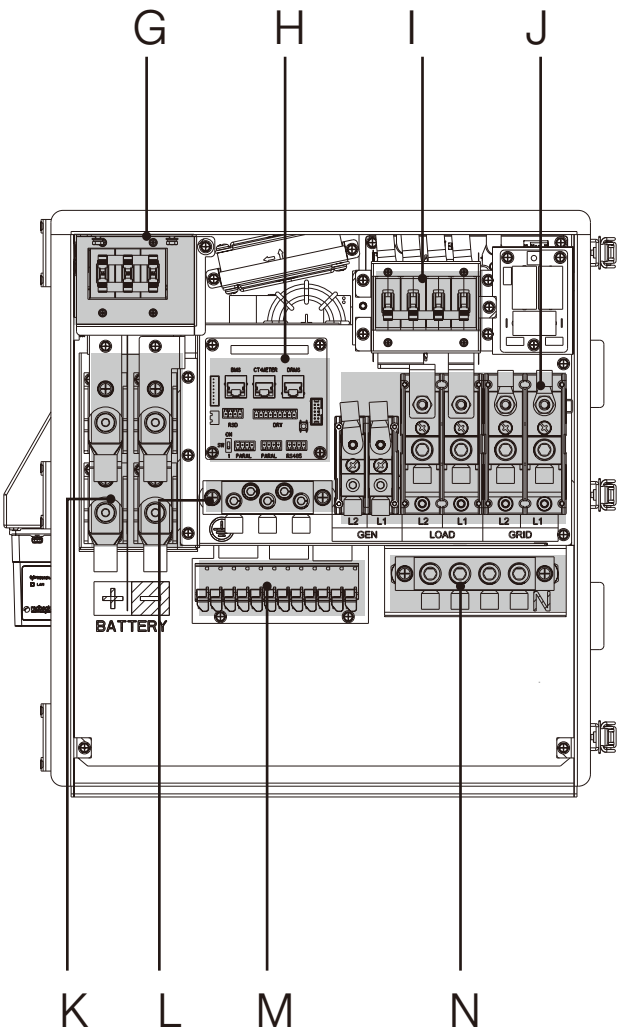
The box should include all items shown below. If there is any damage or missing parts, please contact your dealer immediately.



Component	Description	Quantity
A	Inverter	1
B	Mounting Bracket	1
C	File Package	1
D	Meter pack (Optional)	1
E	CT Pack	1
F	M6 Expansion Screw	4
G	M6 Security Screw	1
H	Wi-Fi / LAN Module (Optional)	1
I	Parallel Cable (Optional)	1
J	9-Pin Terminal	1
K	4-Pin Terminal	4
L	Toroid	2

1.2 General Description

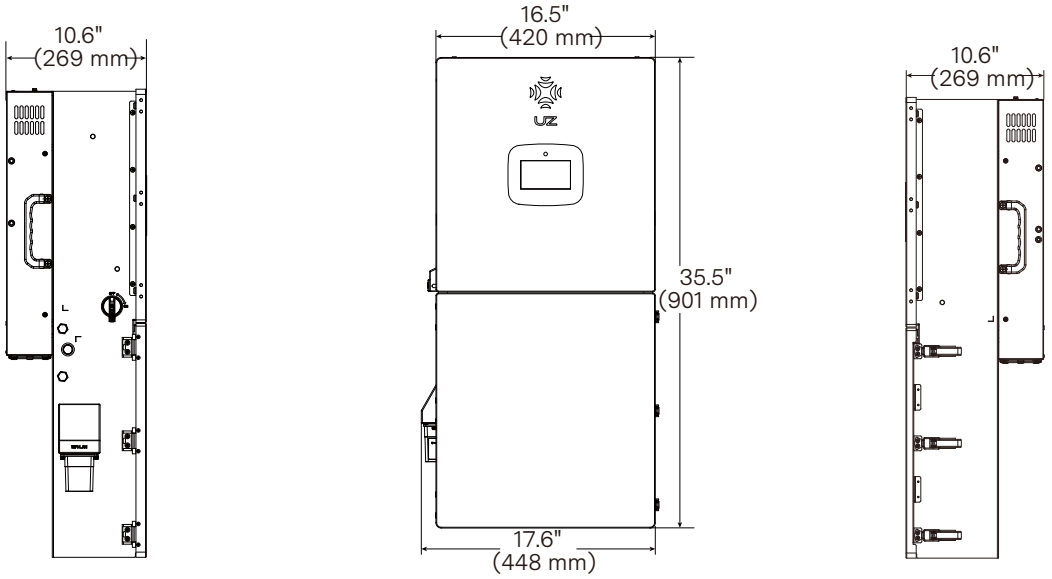




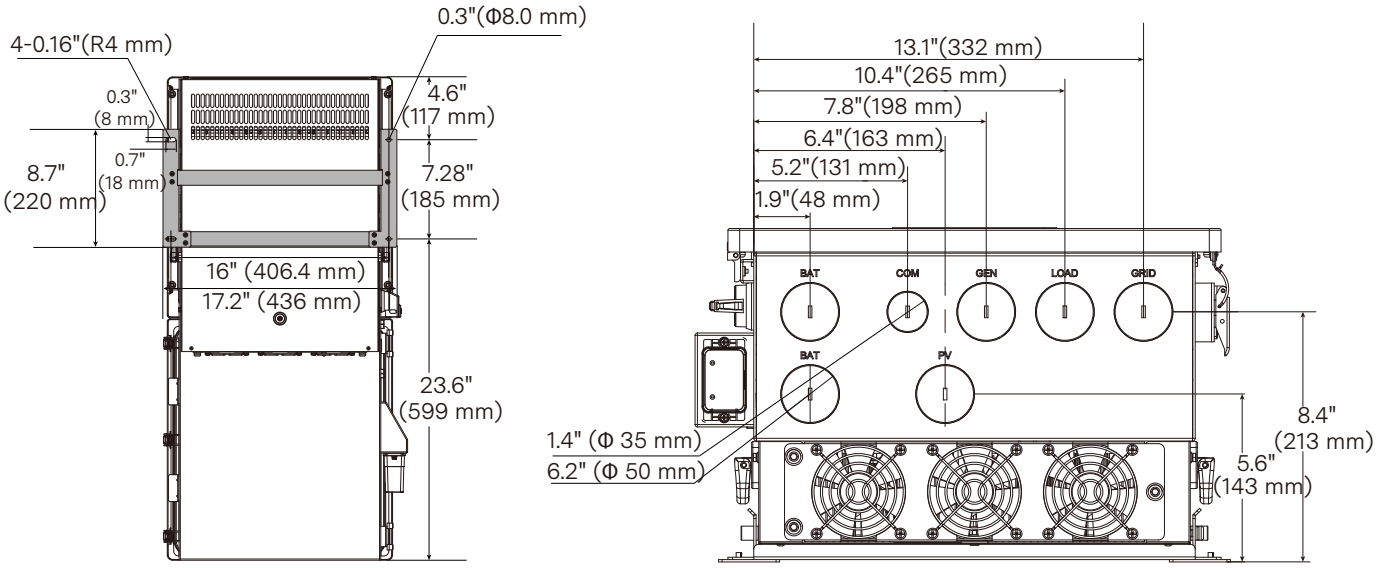
Component	Description
A	PV Switch
B	LCD Touchscreen
C	LED Indicator
D	Handle
E	ON/OFF Button
F	Wi-Fi / LAN Module

Component	Description
G	Battery Breaker
H	Communication Connection Ports (RS485, BMS, DRM, CT, DRY, RSD, PARAL)
I	LOAD Breaker
J	GEN/LOAD/GRID Terminals
K	Battery Terminals
L	Ground Busbar
M	PV connection Terminal Block
N	Neutral Busbar

1.3 Specifications



(**LCD** Touchscreen)



Torque value application note

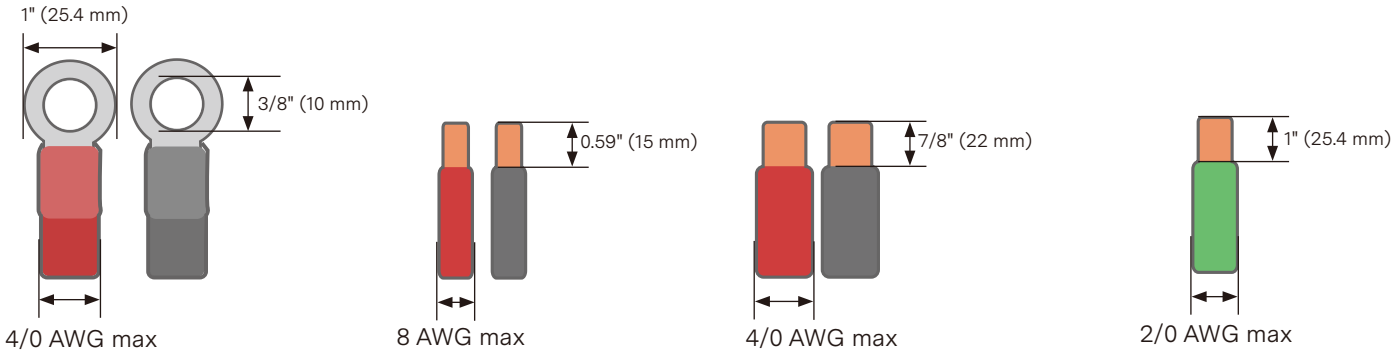
Terminal	Torque [lb-in]	Torque [N·m]
BAT +/ -	106 lb-in	12 N.m
GEN	110 lb-in	12.4 N·m
LOAD	165 lb-in	18.6 N·m
GRID	165 lb-in	18.6 N·m
Neutral busbar	94 lb-in	10.6 N·m
Ground busbar	94 lb-in	10.6 N·m

AC/DC connection requirements

Prepare cables recommended below as needed.

Port/Terminal	Recommended cable size range	Recommended strip length
BAT+/-	2 AWG (2pcs) or 4/0 AWG	/
GEN	1 AWG to 1/0 AWG	5/8 (16 mm)
LOAD	2/0 AWG to 4/0 AWG	7/8 in (22 mm)
GRID	2/0 AWG to 4/0 AWG	7/8 in (22 mm)
Neutral busbar	2/0 AWG to 4/0 AWG 1 AWG to 1/0 AWG (GEN)	1 in (25.4 mm)
Ground busbar	1/0 AWG to 2/0 AWG 1 AWG to 1/0 AWG (GEN)	1 in (25.4 mm)
MPPT	10 AWG to 8 AWG	0.59 in (15 mm)

Batteries | PV Conductors | AC Conductors | Ground



1.4 Basic System Architecture

Typically, an ESS (Energy Storage System) consists of PV array, inverter, battery, loads and sensors.
The inverter is a high-quality device which can convert solar energy into AC energy. The energy generated by inverter can be preferentially supplied to its self consumption, stored in the battery for future use, or fed into public grid.
For whole-home load consumption, connect the utility grid diretly to the "Grid" terminal.

- An external breaker must be installed between the grid and the inverter. Size the breaker according to code.
- Connect the "LOAD" output to the Main panel. Follow electric code to select proper wire gauge.

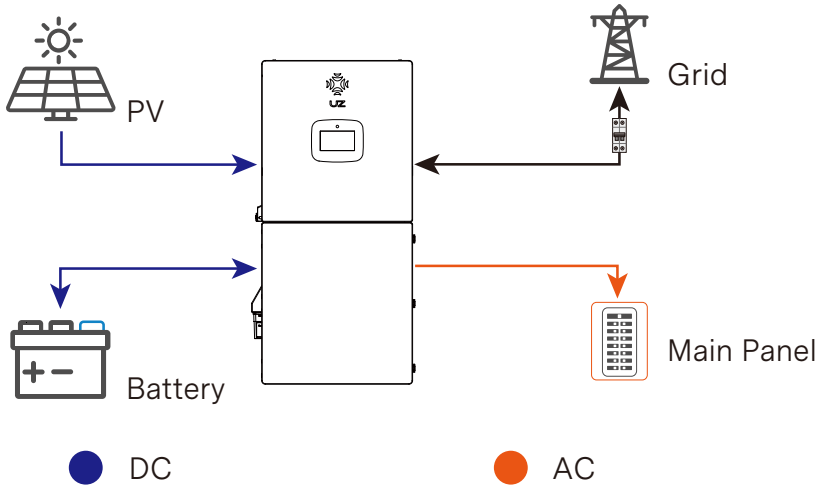


Figure 1–1 Whole-Home Load

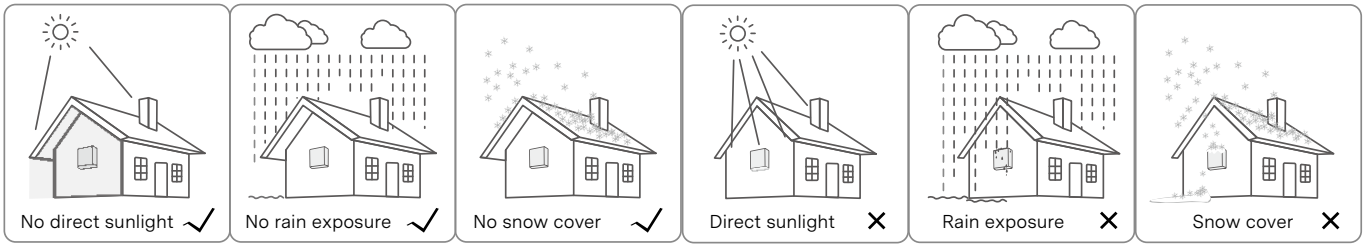
2. Mounting

2.1 Mounting the Inverter

2.1.1 Mounting Requirements

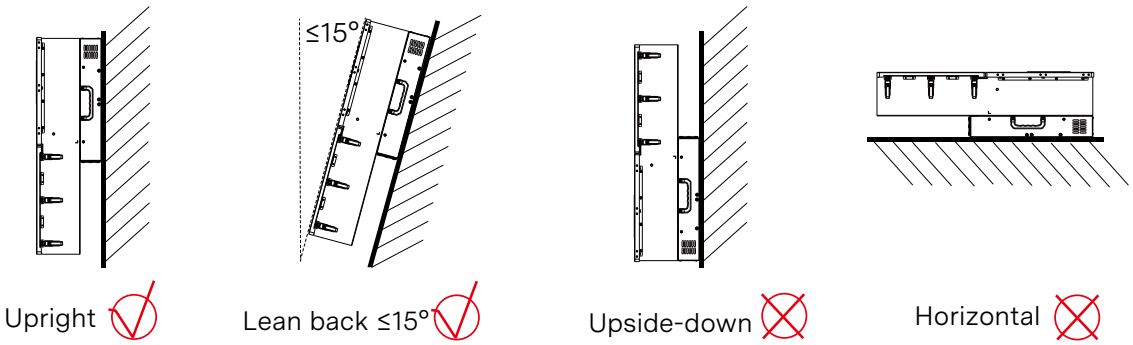
Environment Requirements

- With a NEMA 3R protection rating, the inverter can be mounted indoors or outdoors.
- The inverter is suitable for use in residential non-habitable spaces.
- The mounting location must be inaccessible to unrelated personnel since the enclosure and heat sinks are extremely hot during operation.
- Do not install the inverter in areas containing highly flammable materials or gases.
- To ensure optimum operation and long service life, the ambient temperature must be below 50 °C.
- The inverter must be mounted in a well-ventilated environment to ensure good heat dissipation.
- Identify the inverter location on a stub frame, a brick wall or a concrete wall. Ensure the carrier, where the inverter is mounted, can support the weight of the inverter.
- Do not install the inverter in a rest area since it will cause noise during operation.
- The installation height should be reasonable, and please make sure it is easy to operate and view the display.
- Product label and warning symbols shall be clear to read after installation.
- To ensure long service life, the inverter must not be exposed to direct solar irradiation, rain, or snow. It is recommended that the inverter be mounted in a sheltered place.



Angle Requirements

Mount the inverter vertically or at a maximum back tilt of 15°. Do not install the inverter in a wrong direction. Always keep the connection area downward.



Clearance Requirements

Considering the diamensions of the inverter, find a suitable location for the system. There must be at least:

- 39.37 in (1000 mm) of clearance from inverter/battery to doors/windows
- 19.69 in (500 mm) of vertical clearance
- 13.78 in (350 mm) of side clearance .

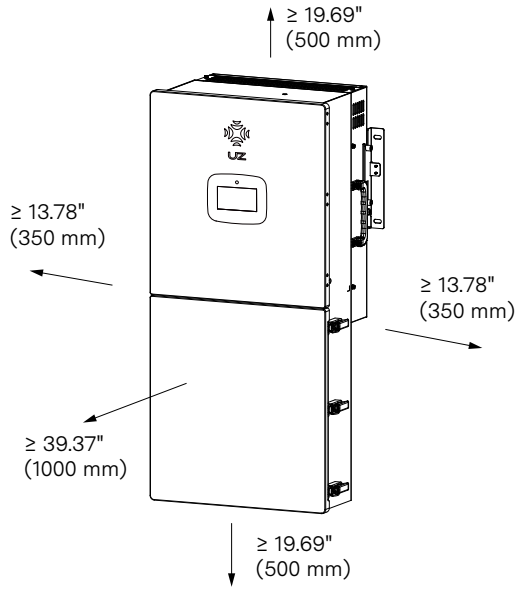


Figure 2–1 Clearance requirement for single installation

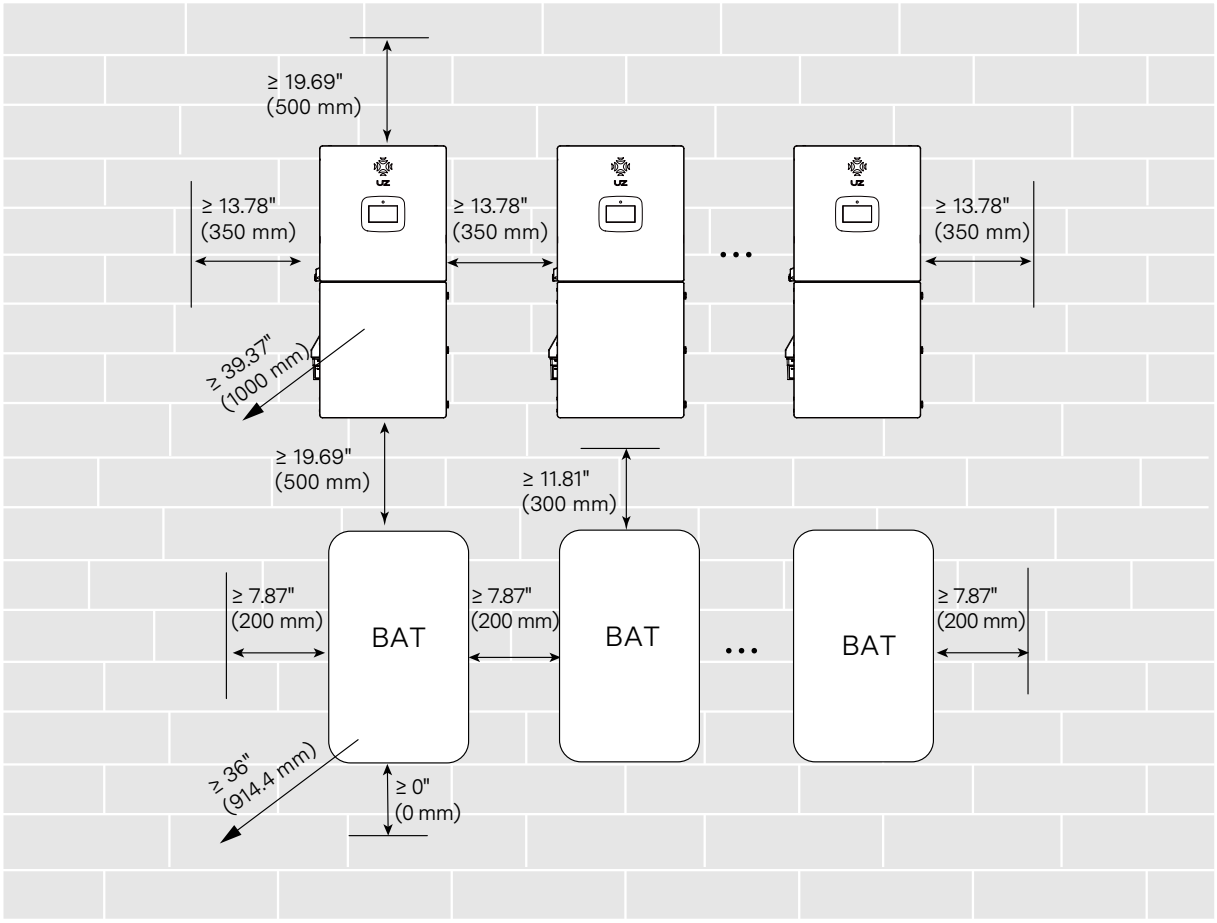


Figure 2–2 Clearance requirement for ESS

2.2 Mounting Instructions

⚠ Before drilling the hole on the wall, ensure no damage on the electric wire and/or water pipe inside the wall.

⚠ The inverter is heavy! Two or three persons are recommended to install the inverter.
To prevent potential damages and injuries from inverter falling down, please ensure that the inverter is well-mounted.

Please prepare an electric screwdriver and a marker. You may need expansion plugs or anchors for concrete.

Procedures

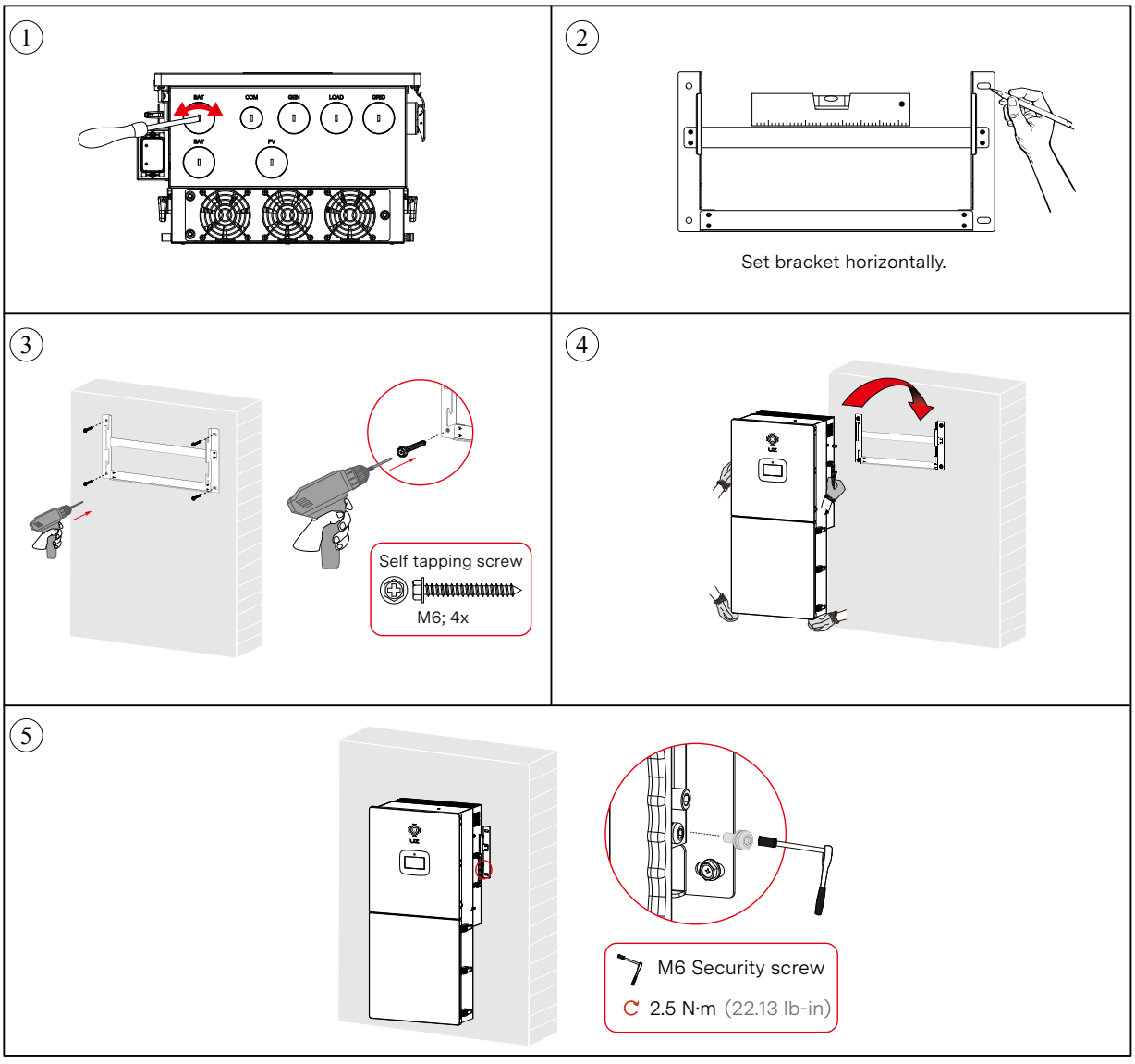
Step 1 Insert and rock the flat-head screwdriver left and right to fully remove the knock out as needed.

Step 2 Level the mounting bracket against the mounting surface and mark the hole positions with a marker.

Step 3 Drive the screws through the mounting bracket into the mounting surface. Ensure the bracket is firmly attached.

Step 4 Mount the inverter.

Step 5 Secure the inverter with the security screw.



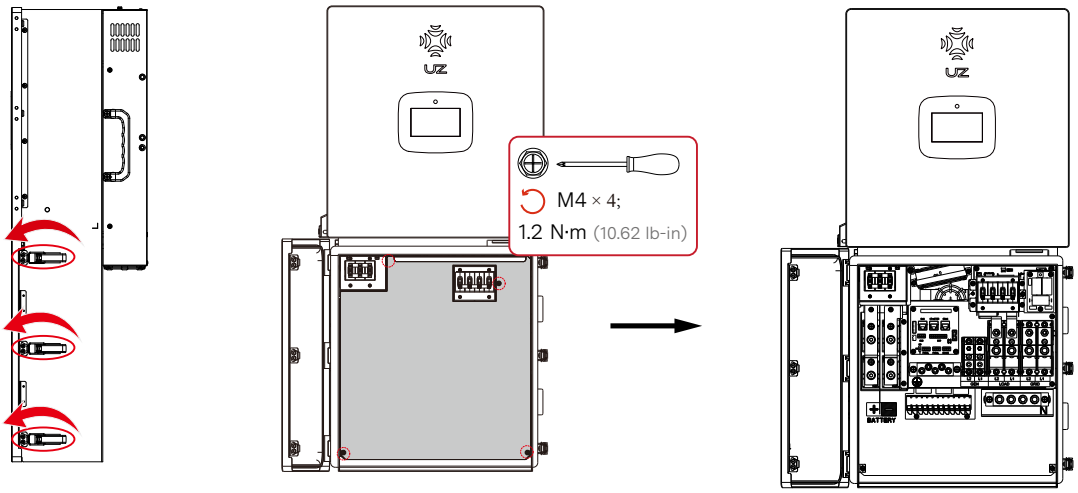
3. Electrical Connection

3.1 Removing Insulation Cover

A shielding cover has been installed over the wiring box of the ESS inverter to protect users from potential electrical injuries. Before electrical connections, remove the insulation cover from the wiring area temporarily, as shown in figure below.

> ⚠ Before removing the cover, please ensure that the inverter and all cables to be installed have been completely powered off during the whole process of installation and connection.

> ⚠ After the electrical connections are complete, if no other connections are made in the wiring area, replace the insulation cover and ensure the grounding cable is well-connected again.

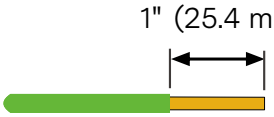


3.2 PE Connection

> ⚠ The inverter must be grounded; otherwise, there will be an electric shock risk.

> ⚠ If the positive pole or negative pole of the PV array is required to be grounded, the inverter output (to AC grid) must be isolated by transformer in accordance with IEC62109-1, -2 standards.

A protective earth (PE) busbar is intergated in the inverter. Please be sure to connect the PE cable to the PE busbar for reliable grounding.
A minimum gauge size of 1/0 AWG green or green-yellow wire is recommended.



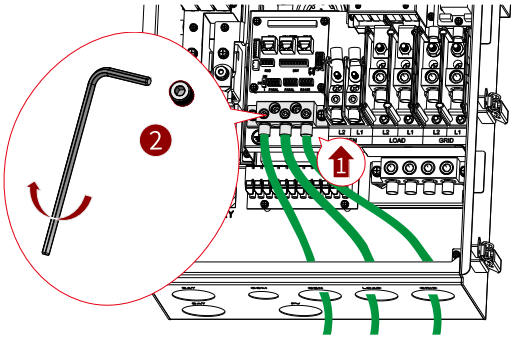
Terminal	Cable specification	Torque (lb-in)	Torque (N·m)
PE	1/0 AWG to 2/0 AWG	94	10.6
PE (GEN)	1 AWG to 1/0 AWG	94	10.6

Procedures

Step 1 Thread the PE cables into wiring box through GEN/ LAOD /GRID connection ports.

Step 2 Insert the PE cable into the busbar accordingly, and tighten terminal screws.

Step 3 Make sure that all cables are securely in place.



3.3 GEN/LOAD/GRID Connection

1. Before connecting the GEN/LOAD/GRID terminal, ensure that both the AC terminal and the DC terminal are powered off and the PV switch is OFF. Otherwise there is a risk of high voltage shock.
2. To reduce the risk of fire, please add an overcurrent protection device (OCPD or 'circuit breaker') in accordance with the National Electrical Code ANSI / NFPA 70.
3. An external AC breaker, usually located in a load panel or solar dedicated AC sub-panel, is needed for an on-grid / AC connection to isolate the inverter from the utility grid when necessary.

Procedures

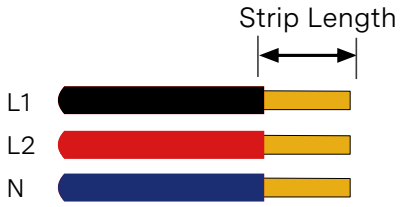
Step 1 Prepare the proper cable, and strip an appropriate length of the cable insulation. It is recommended to use outdoor dedicated cables.

Step 2 Thread the cables into the wiring box through GEN/ LOAD /GRID connection ports accordingly.

Step 3 Insert the wire into the terminal according to the label on the terminal block, and then tighten the terminal screws with a proper torque. Finally, ensure that all cables are securely in place.

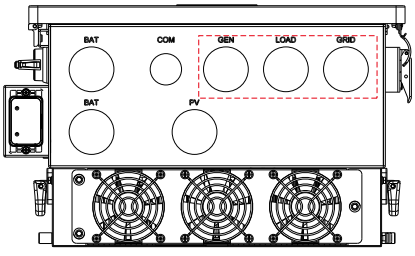
- AC cable connection ports in the illustrations are for reference only. Select appropriate ports as needed.

①



Terminal	Cable specification	Torque (lb-in)	Torque (N·m)	Strip Length
GEN	1 AWG to 1/0 AWG	110	12.4	5/8 in (16 mm)
LOAD	2/0 AWG to 4/0 AWG	165	18.6	7/8 in (22 mm)
GRID	2/0 AWG to 4/0 AWG	165	18.6	7/8 in (22 mm)
N	2/0 AWG to 4/0 AWG	94	10.6	1 in (25.4 mm)
N (GEN)	1 AWG to 1/0 AWG	94	10.6	1 in (25.4 mm)

②



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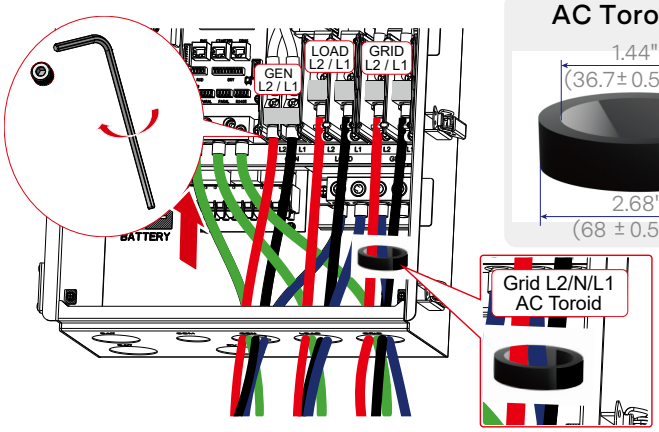
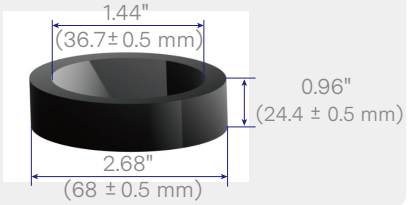


AC Toroid Dimension:



3.4 PV Connection

> ⚠ Photovoltaic arrays exposed to sunlight will generate dangerous voltages!
> Before connecting the PV terminal, ensure that both the AC terminal and the DC terminal are powered off and the PV switch is OFF. Otherwise there is a risk of high voltage shock.

Procedures

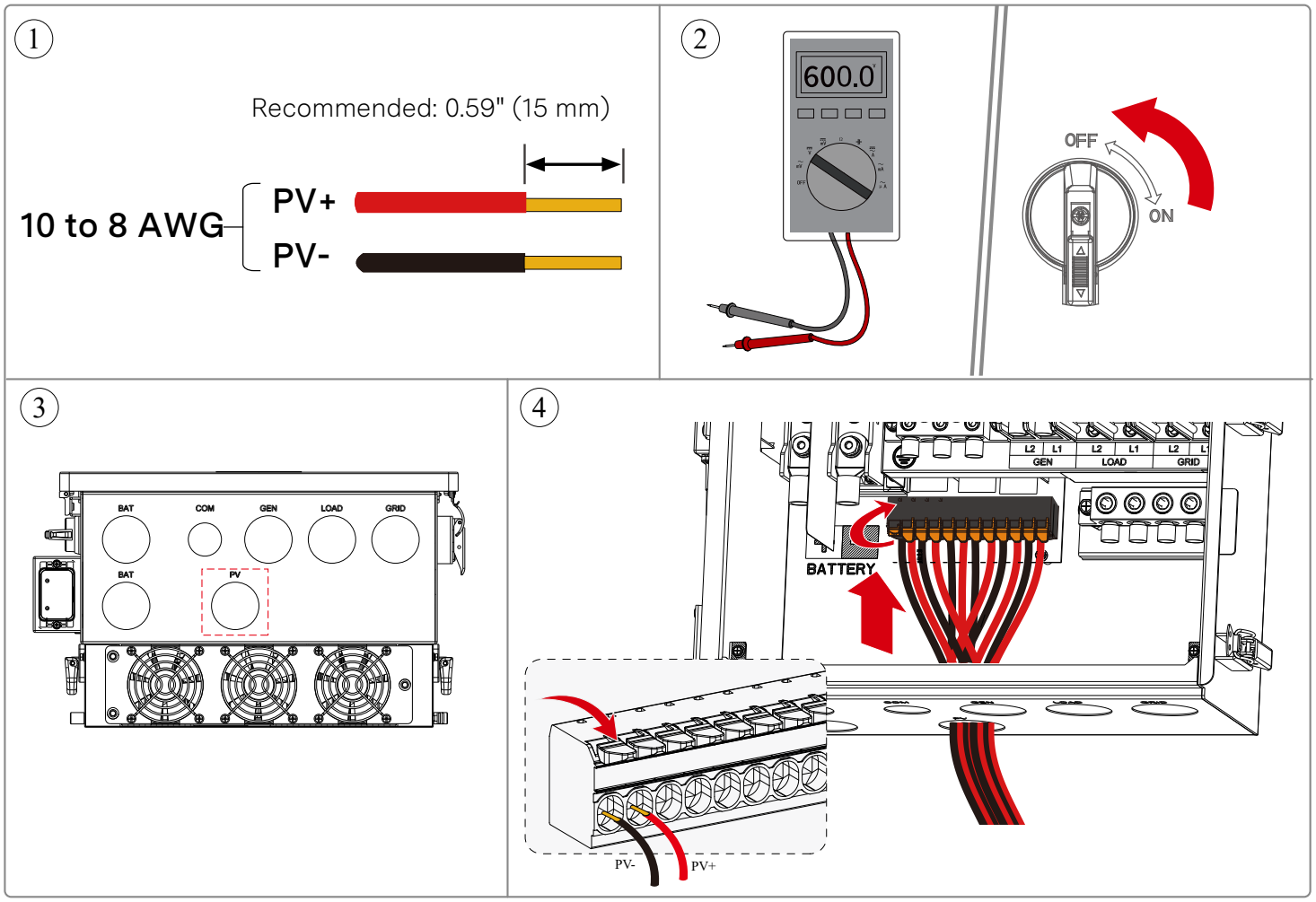
Step 1 Prepare the proper cable we recommended as shown below, and strip an appropriate length of the cable insulation. It is recommended to use outdoor dedicated PV cables.

Step 2 Inspection before connection.

- Check correct polarity of wire connection from PV modules and PV input connectors.
- The test voltage cannot exceed 600 VDC.
- Ensure that the PV switch is OFF.

Step 3 Thread the cables into wiring box through PV connection ports.

Step 4 Open the switches of PV input connector. Insert the stripped cable into the PV input connector. When doing so, ensure that the stripped cable and the PV input connector are of the same polarity. Finally, close switches and ensure the wires are tightly fixed.



3.5 Battery Connection

> ⚠ Before connecting the battery terminal, ensure that both the AC terminal and the DC terminal are powered off and the PV switch is OFF. Otherwise there is a risk of high voltage shock.

Procedures

Step 1 Prepare the proper cable and OT terminal we recommended as shown below, and strip an oppropriate length of the cable insulation. It is recommended that the battery cable be less than or equal to 3 m.

Step 2 Thread the cables into wiring box through BAT connection ports.

Step 3 Insert and tighten the cables into the battery terminals.

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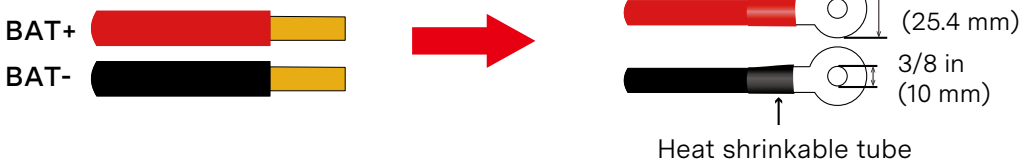

Battery	Cable Specification	Torque (lb-in)	Torque (N·m)
Single	4/0 AWG	106	12
Two paralleled	2 AWG	106	12

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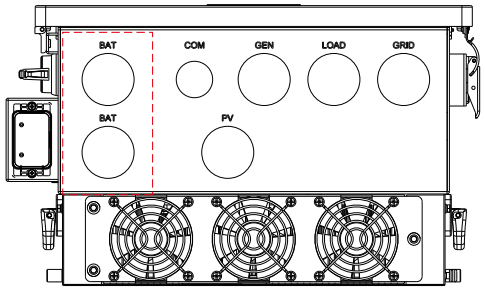

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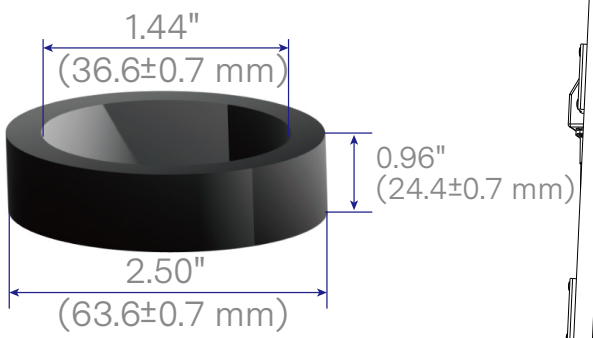
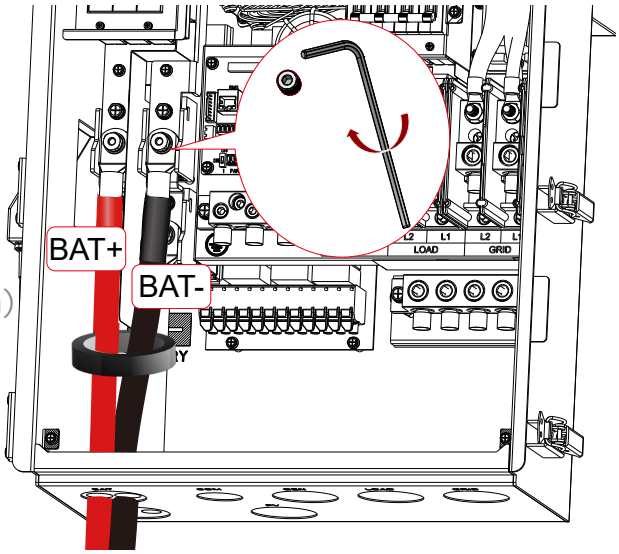
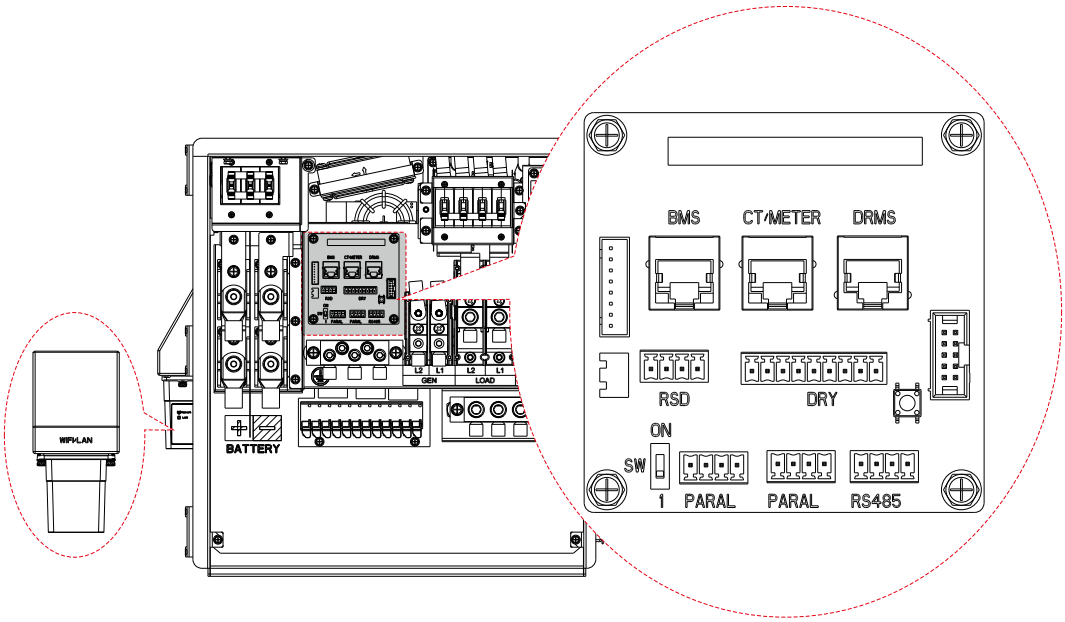
DC Toroid Dimension:





3.6 Communication Connection

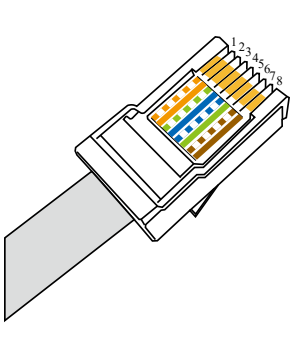


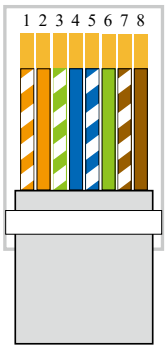
Interface		Description
BMS		Lithium battery communication interface
CT/METER		For CT/Meter communication or Grid current sense
DRMS		Demand response mode for Australia application
RSD (rapid shutdown de - vice)		RSD control interface
9-Pin	GEN	Generator control
	NTC	Temperature sensor terminal of lead-acid battery
	RMO	Remote off control
	DRY	DI/DO control
PARAL		4-Pin interface for parallel communication
		A matched resistance switch for parallel communication
RS485		4-Pin interface for RS485 communication
Wi-Fi		For Wi-Fi/LAN communication

3.7 BMS Connection (Only for Lithium Battery)

This manual ONLY illustrates the pinout sequence of BMS at INVERTER SIDE. For details about the pinout sequence at battery side, see the user manual of the battery you use, and the following pinout diagram of battery side is only for illustration.

Standard RJ45 Pinout





RJ45 Pin Configuration	
Pin	Color
1	White-Orange
2	Orange
3	White-Green
4	Blue
5	White-Blue
6	Green
7	White-Brown
8	Brown

Always face the flat side of the terminal, and count the pin slots from left to right from 1 to 8. Read the pin definitions of both the battery and inverter carefully

Pin definition of terminal

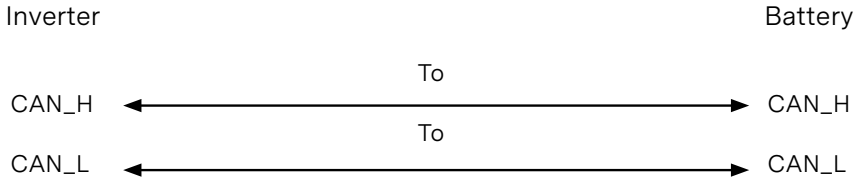
Inverter

Inverter	
Pin	Definition
1	/
2	/
3	/
4	CAN_H
5	CAN_L
6	/
7	/
8	/

Battery

Battery	
Pin	Definition
1	/
2	/
3	/
4	CAN_H
5	CAN_L
6	GND
7	/
8	/

CAN BUS connection principle



BMS Communication Cable Preparation

Procedures

Step 1 Prepare RJ45 terminals and strip appropriate length of COM cables.

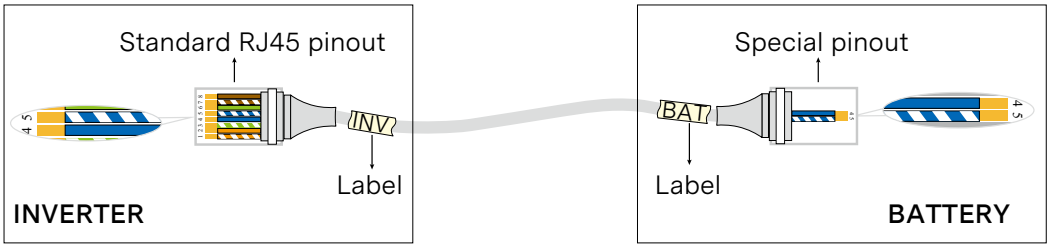
Step 2 According to pin definitions and cable order, assemble the RJ45 terminals and crimp communication wires. There are two methods to assemble the RJ45 terminals.

Step 3 Then label the RJ45 terminals (BAT or INV) to avoid confusion.

Step 4 After finishing wire-making, use a multimeter or other specific tool to check if your cable is good, bad, or wired incorrectly.

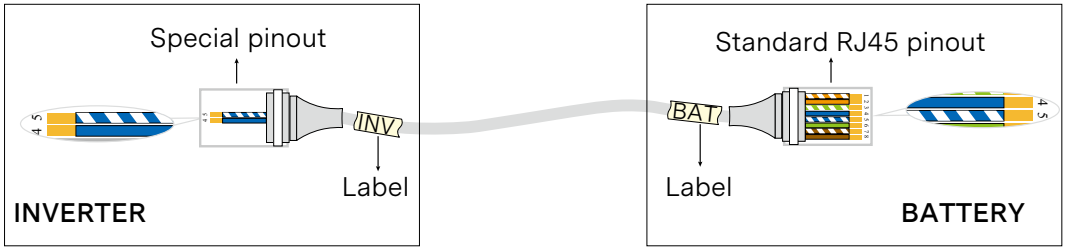
Method 1:

Use the INVERTER RJ45 pinout as the standard pinout to crimp wires, then the battery side will be a non standard one (special pinout). Cut off the other no-used wires (1/2/3/6/7/8) for the battery RJ45 terminal.



Method 2:

Use the BATTERY RJ45 pinout as the standard pinout to crimp wires, then the inverter side will be a non standard one (special pinout). Cut off the other no-used wires (1/2/3/6/7/8) for the inverter RJ45 terminal.

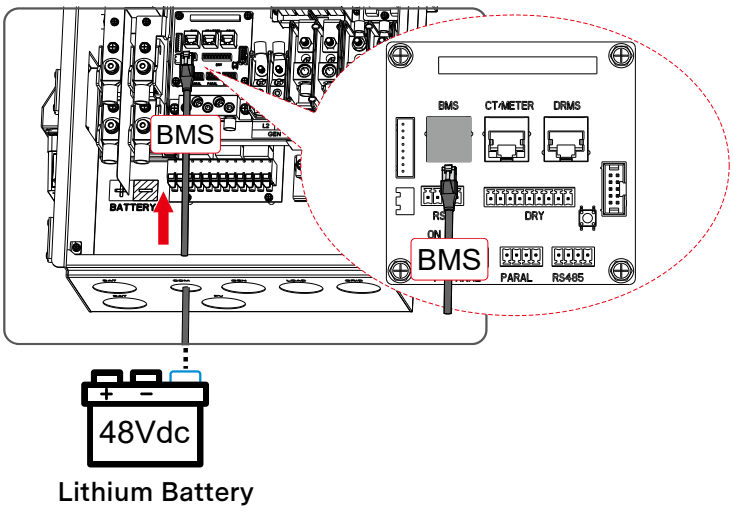


BMS Communication Cable Connection

Procedures

Step 1 Lead the BMS cable through the COM port.

Step 2 Insert the RJ45 terminal into BMS port.



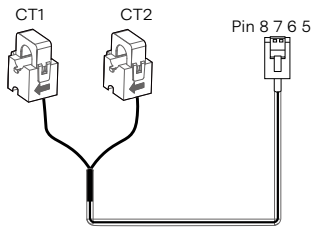
Lithium Battery

3.8 CT/Meter Connection

A CT/Meter is applied to monitor electricity usage of all loads.
RJ45 Terminal Configuration for CT and Meter Communication

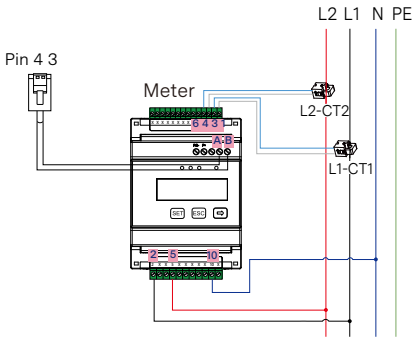
Pin	Function Description
1	--
2	--
3	RS485_A
4	RS485_B
5	CT2-
6	CT2+
7	CT1+
8	CT1-

CT Connection



RJ45	CT Cable Label
Pin5(CT2-)	CT2-L2
Pin6(CT2+)	
Pin7(CT1+)	CT1-L1
Pin8(CT1-)	

Meter + CT connection



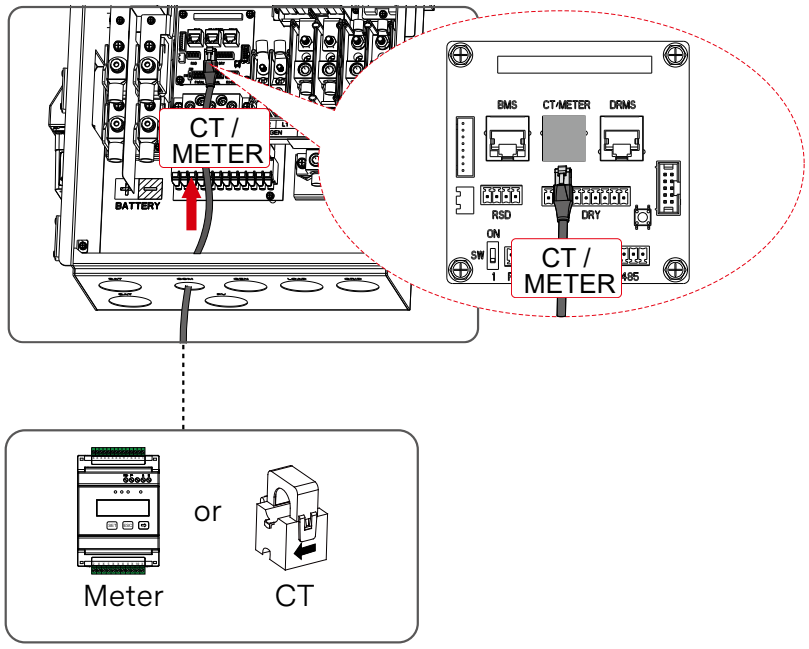
RJ45	Meter
Pin3(RS485_A)	A
Pin4(RS485_B)	B

CT/Meter Communication Cable Connection

Procedures

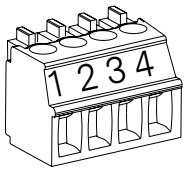
Step 1 Make the RJ45 terminal according to above function description of each Pin definition.

Step 2 Lead the CT/Meter cable through the COM port. And insert the RJ45 terminal into CT/METER port.



3.9 RS485 Connection

4-Pin interface for RS485 communication:



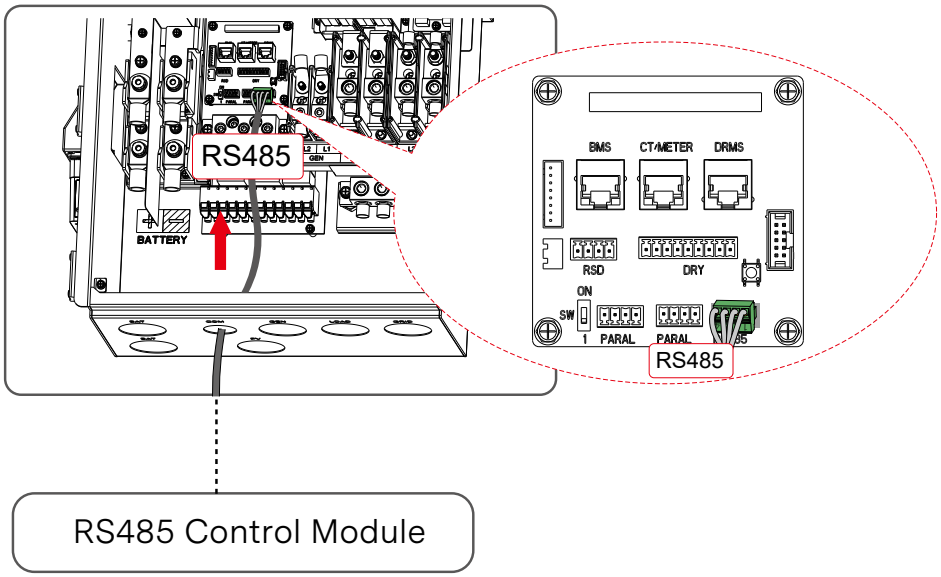
Pin	Function Description
1	RS485_A
2	RS485_B
3	RS485_A
4	RS485_B

RS485 Communication Cable Connection

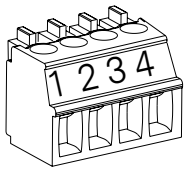
Procedures

Step 1 Make the 4-Pin terminal according to above function description of each Pin definition.

Step 2 Lead the RS485 cable through one COM port. And insert the 4-Pin terminal into RS485 port on inverter panel.



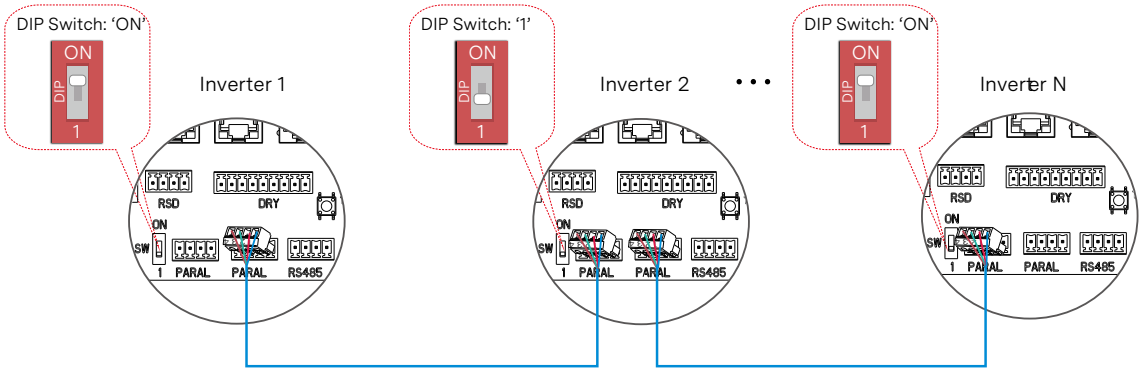
3.10Parallel Communication Connection



Pin	Function Description
1	GND_S
2	PARA_SYNC
3	CAN_L
4	CAN_H

Parallel Communication Cable Connection

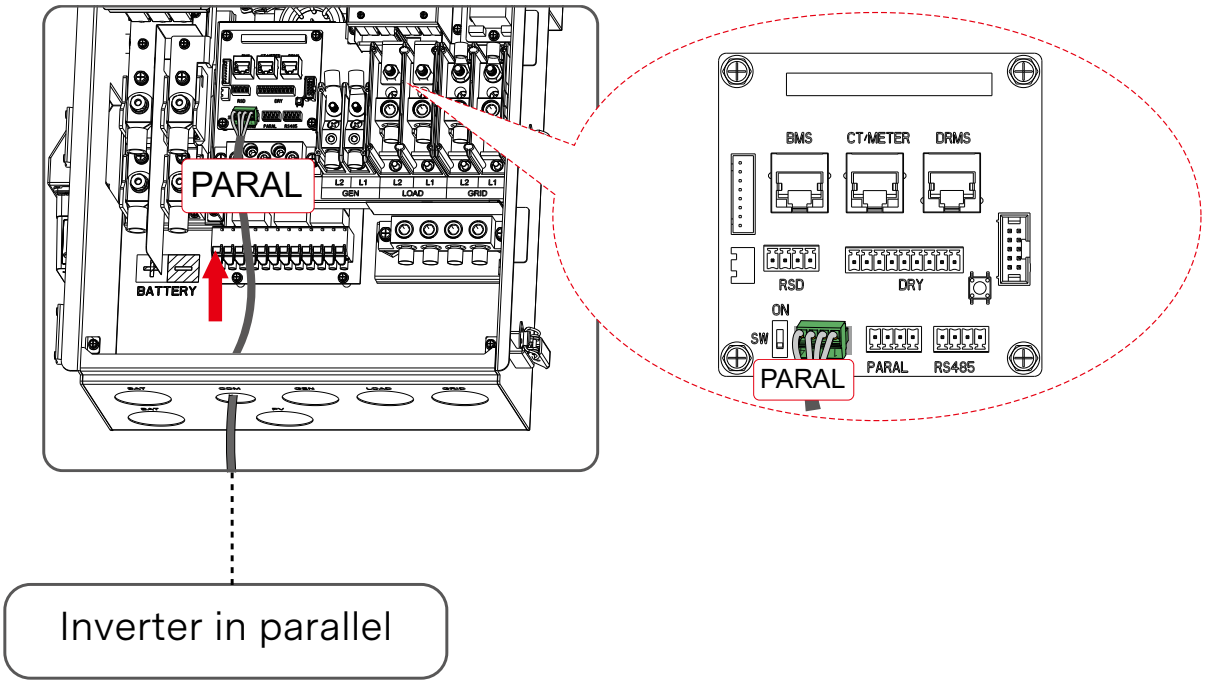
It is necessary to turn the matched resistance switch of inverter 1 and inverter N to “ON” in parallel connection mode.



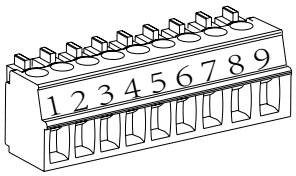
Procedures

Step 1 Make the 4-Pin terminal according to above function description of each Pin definition.

Step 2 Lead the Parallel communication cable through one COM port. And insert the 4-Pin terminal into PARA port.



3.11 NTC/RMO/DRY Connection(s)

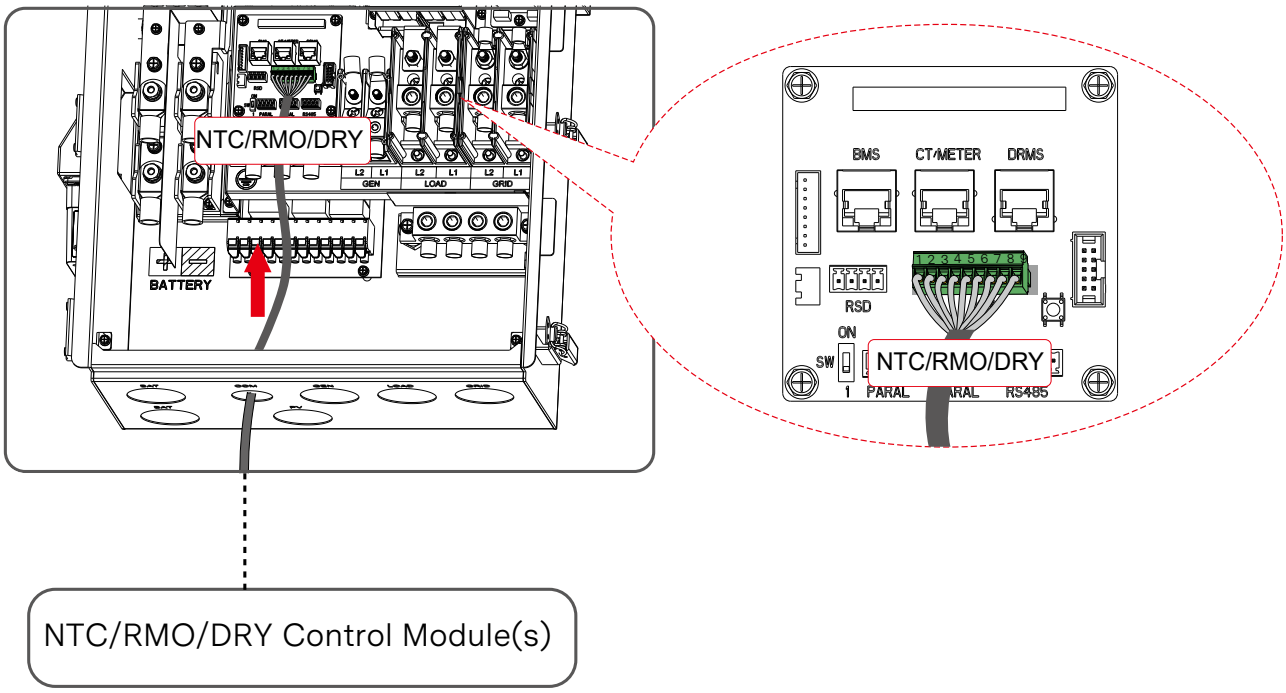


Pin	Function Description
1	GEN Control
2	GEN Control
3	NC1 (Normal Close)
4	NO2 (Normal Open)
5	N2
6	NC2 (Normal Close)
7	Remote Of
8	GND S (Lead-acid Battery NTC BAT)
9	Lead-acid Battery NTC BAT+

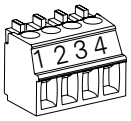
Procedures

Step 1 Make the 9-Pin terminal according to above function description of each Pin definition for the auxiliary port you want to use.

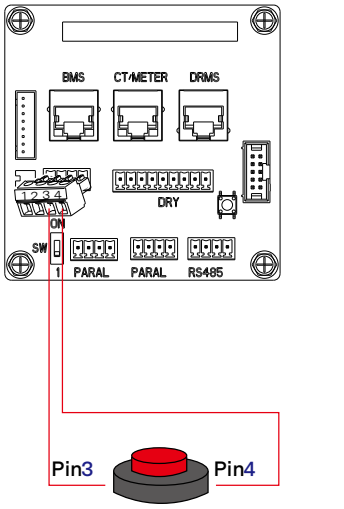
Step 2 Lead the NTC/RMO/DRY cable (s) through one COM port. And insert the 9-Pin terminal into DRY port.



3.12RSD Connection



Pin	3	4
Description	Emergency Stop Signal Button	

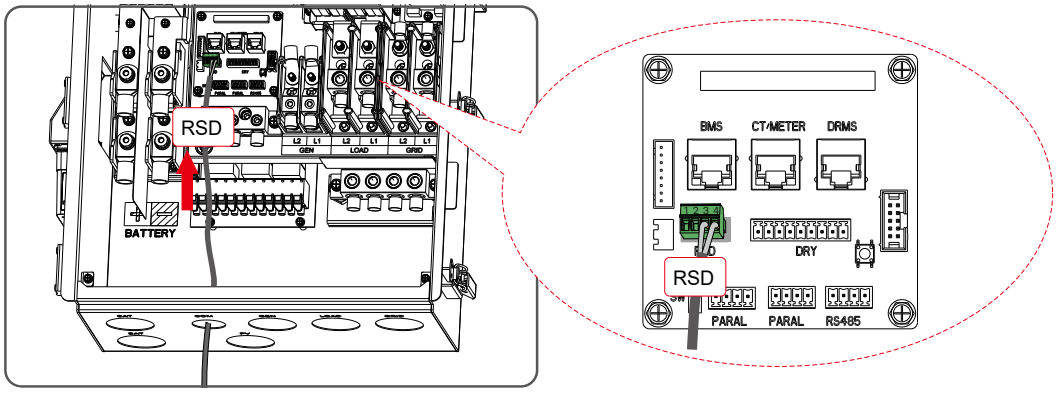


Normally Open Rapid Shutdown Signal Button

Procedures

Step 1 Make the 4-Pin terminal according to above function description of each Pin definition.

Step 2 Lead the RSD Communication cable through the COM port. And insert the 4-Pin terminal into RSD port.



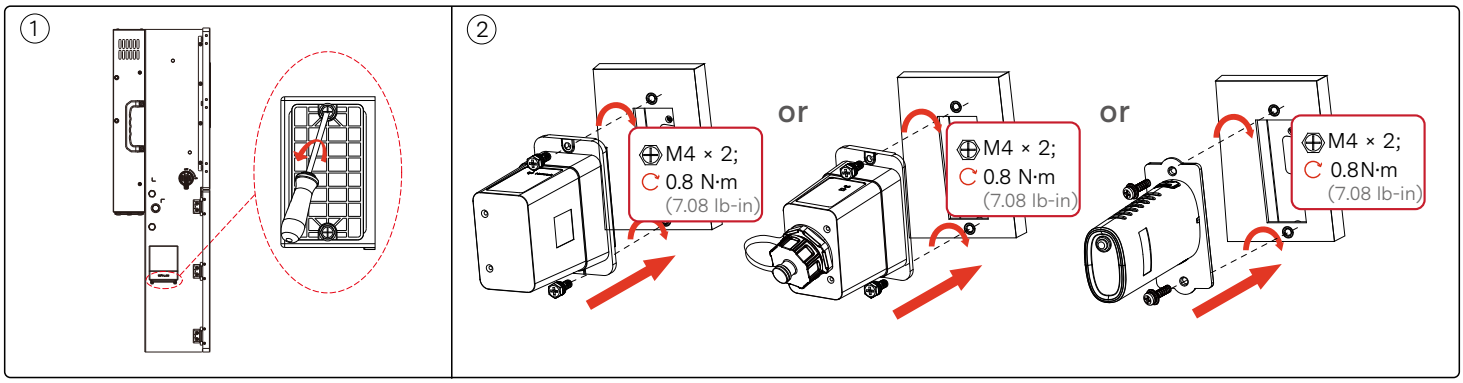
3.13WiFi/LAN Module Connection

For details, please refer to the corresponding Module Installation Guide in the packing.
The appearance of module may be slightly different. The figure shown here is only for illustration.

Procedures

Step 1 Unscrew and remove the cover.

Step 2 Install and secure the module.



4. Wiring Diagrams

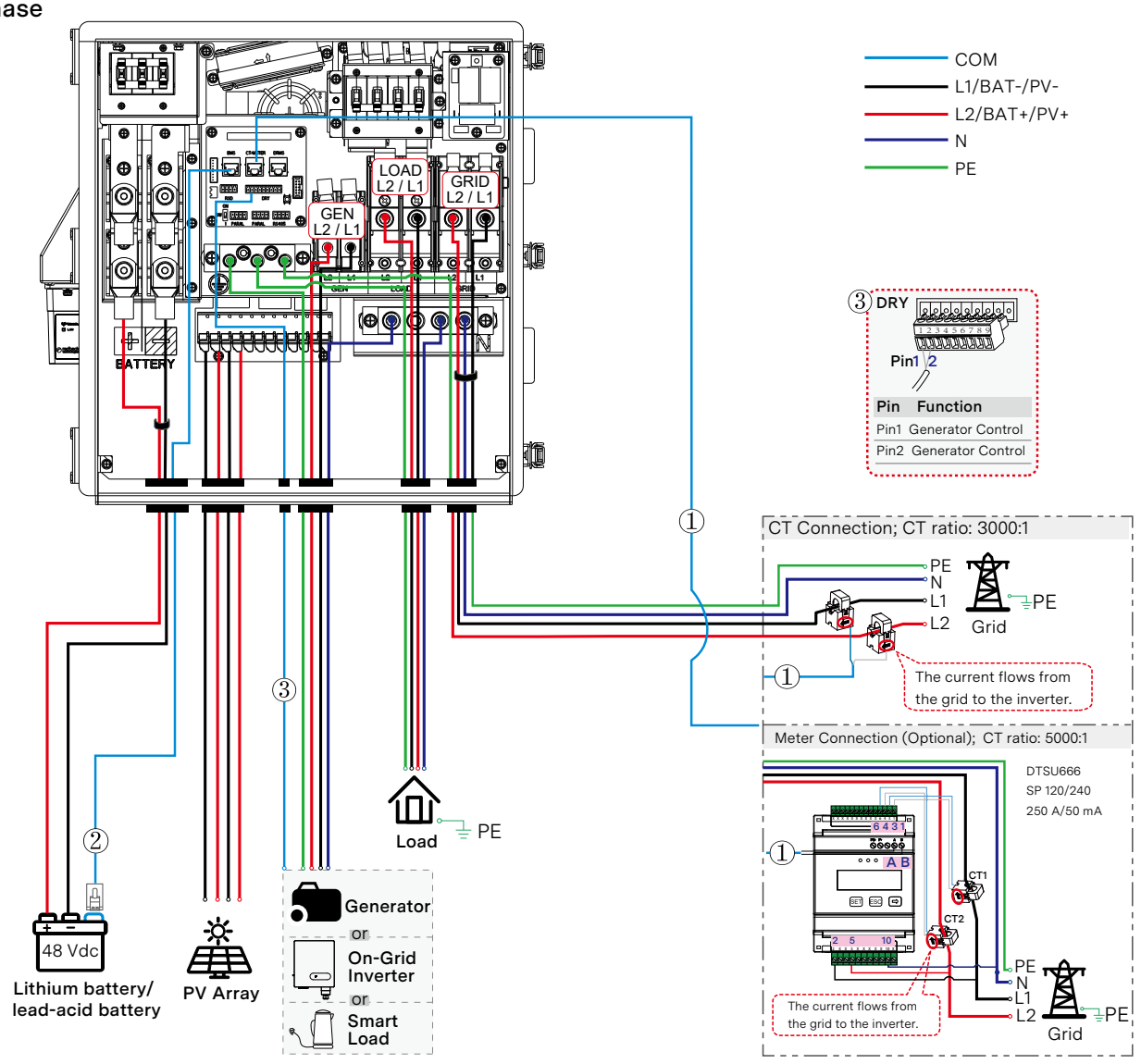
This Chapter illustrates wiring diagram of general use cases. While these diagrams offer general guidance, they may not encompass all variations and specifics required by load codes. Consult with relevant authorities and ensure compliance before proceeding wiring. The diagram presented herein are not exhaustive and should not be relied upon solely for permitting or warranty verification. Installers are encouraged to exercise caution, seek professional advice when necessary, and undertake installations in accordance with established electrical standards and regulations.

> ⚠ Ensure that the inverter and all cables to be installed have been completely powered off during the whole process of installation and connection. Otherwise, high voltage may result in fatal injury.

Standard Non-parallel Wiring Diagram

Diagram 01

120/240Vac Split Phase
120/208Vac 2/3 Phase



① CT/Meter communication connection (meter is optional)

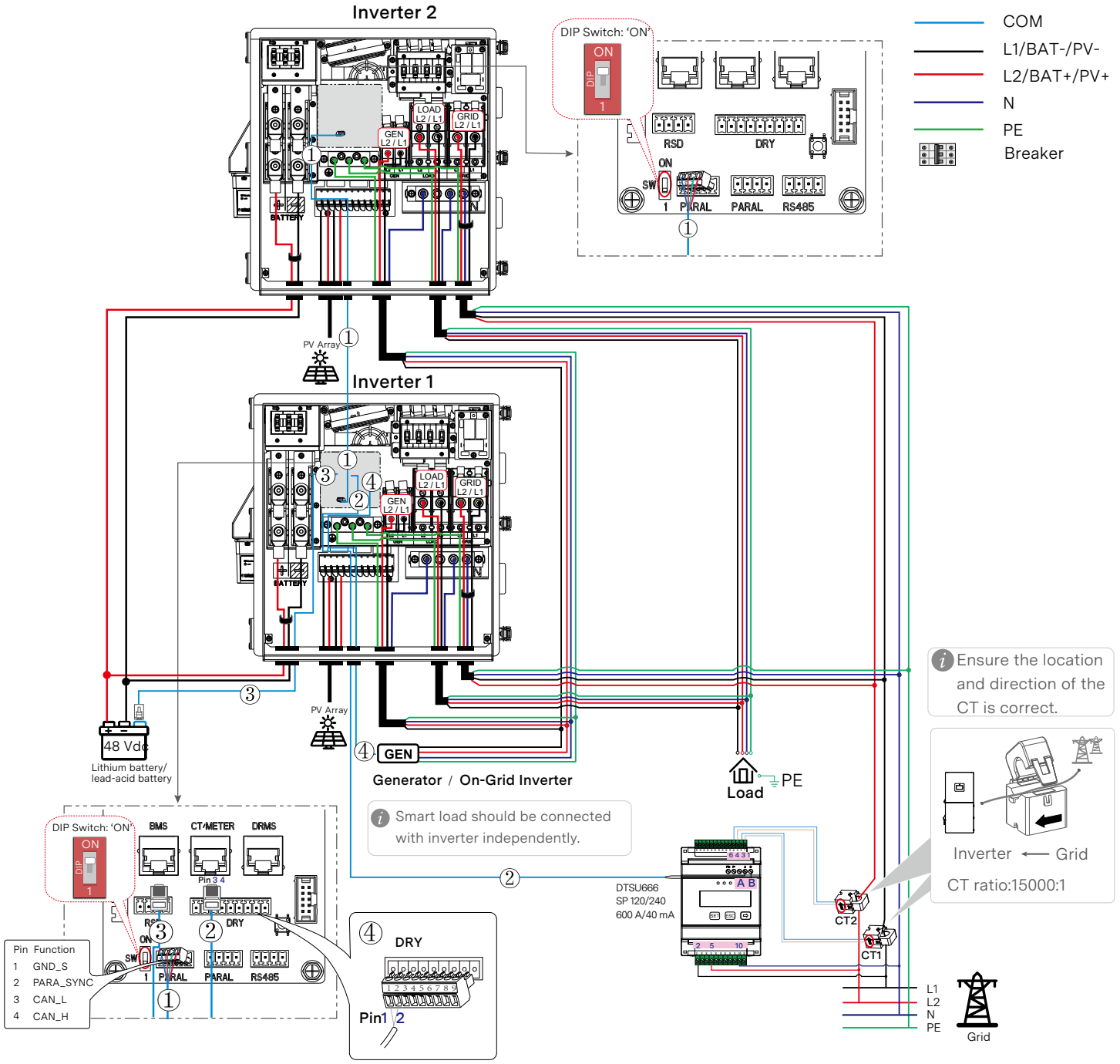
② BMS communication connection (only for lithium battery)

③ DRY communication connection (only for GEN)

Split Phase Parallel Connection Mode-Scheme A (N=2)

Diagram 02

120/240Vac Split Phase
120/208Vac 2/3 Phase



① Parallel communication connection

② Meter communication connection (meter is optional)

③ BMS communication connection (only for lithium battery)

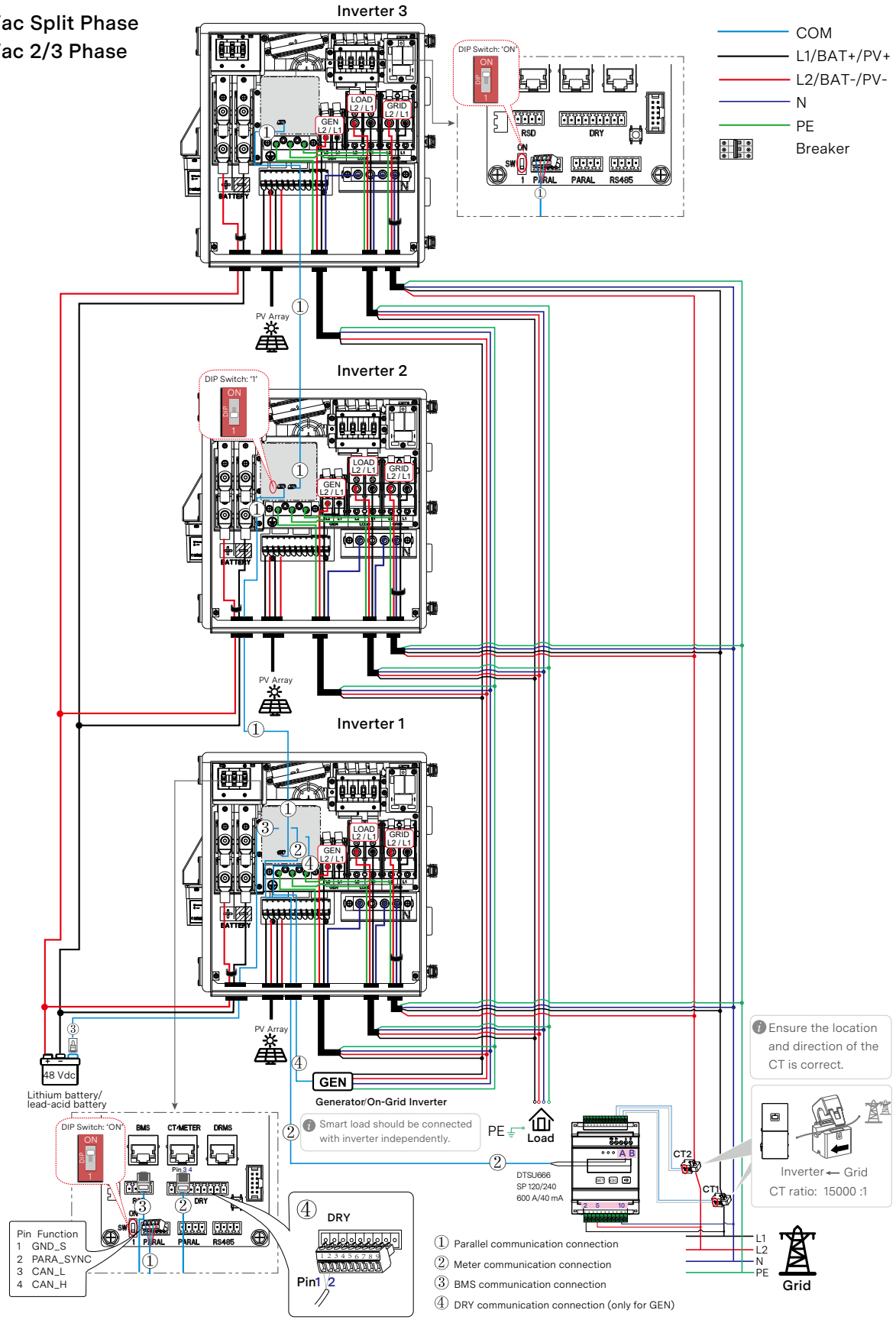
④ DRY communication connection (only for GEN)

* Meter and BMS communication cables can be connected to any inverter of the parallel system, but they must be inserted into the same inverter and this inverter will be inverter 1.
* Please refer to **Note for parallel wiring diagrams** to learn more information about this parallel diagram.

Split Phase Parallel Connection Mode-Scheme B (N=3)

Diagram 03

120/240Vac Split Phase
120/208Vac 2/3 Phase



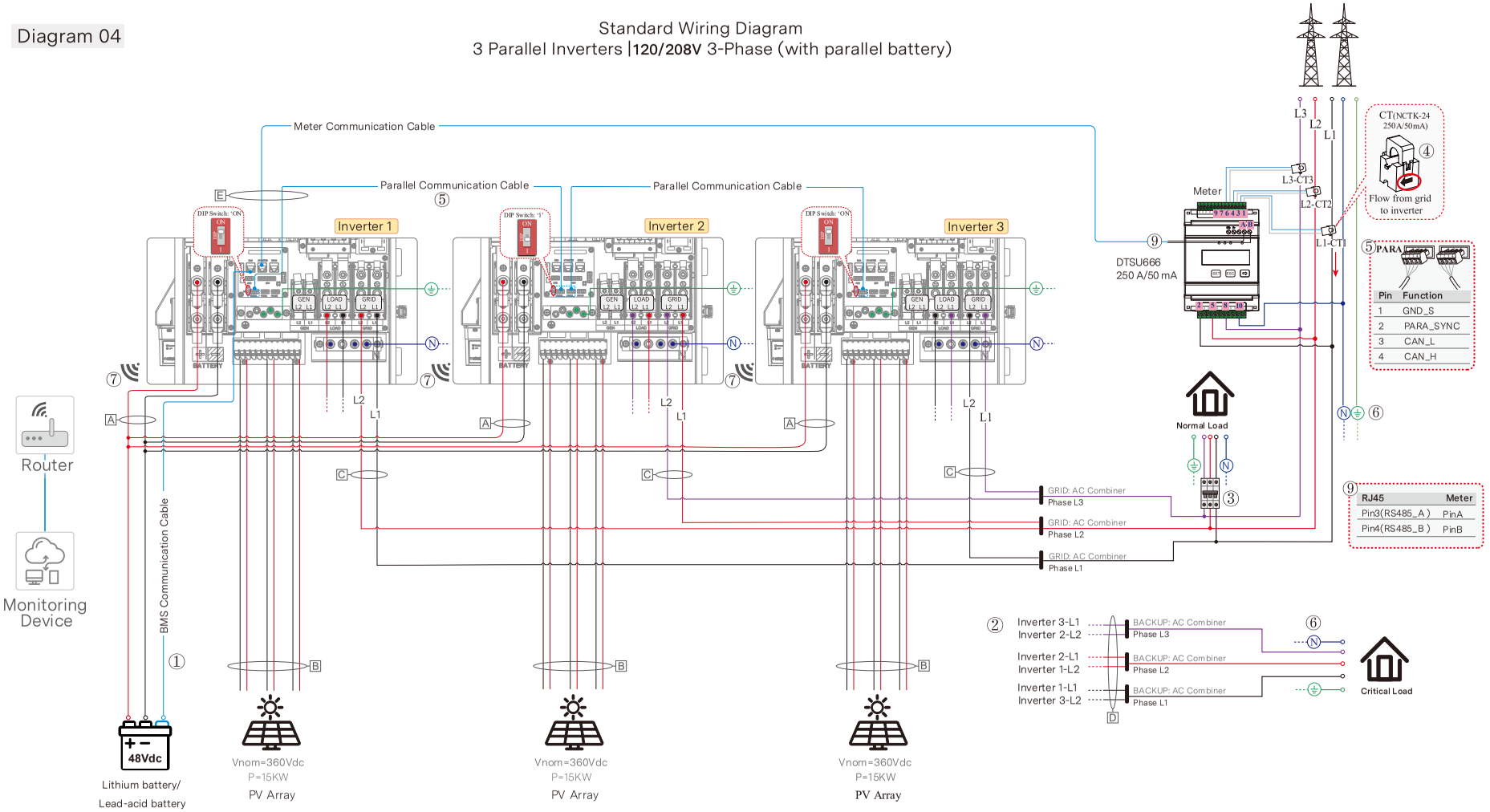
* Meter and BMS communication cables can be connected to any inverter of the parallel system, but they must be inserted into the same inverter and this inverter will be inverter 1.
* Please refer to **Note for parallel wiring diagrams** to learn more information about this parallel diagram.

Note for parallel wiring diagrams

1. BMS communication connection is only for lithium battery.
2. It is necessary to turn the matched resistance switch (or DIP switch) of inverter 1 and inverter N to “ON” and others to “1” in parallel connection mode.
3. It is necessary to additionally purchase suitable CT and energy meter according to the specific requirements in parallel connection mode-Scheme B in which the CT ratio is 15000:1.
4. For a parallel system, it is required to enable parallel mode on one of the inverters, which can be done via the LCD (navigate to **Advanced Setting > Inverter > Parallel**) or the APP (log in as an **Installer** first, then go to **Setting > Inverter > Parallel**).
5. In one parallel system, the smart load is only allowed to be connected to GEN port in a non-parallel way.
6. The external DC/AC breakers are not supplied with the inverter and must be purchased separately. Prepare the external parallel breakers with a nominal current ≥ 2 * N * $I_{max.}$ (N refers to the parallel inverter quantity; I_{max} refers to the maximum output current of the inverter.)

Diagram 04

Standard Wiring Diagram
3 Parallel Inverters |120/208V 3-Phase (with parallel battery)



① BMS is only for Lithium battery.

② The wiring method of critical load is as the same as that of the grid.
In 'Inverter N-L1', 'N' represents inverter serial number; 'L' represents the phase of live wire in GRID/BACKUP connection.

③ If breakers are prepared by yourself, refer to TABLE 1 for breaker specification.

④ The arrow indicates the current in CT flows from the grid to the inverter.

⑤ Parallel communication cable connection details.

⑥ (N) (⏚) These symbols represent a common neutral/ground connection respectively.

⑦ WLAN/Wi-Fi

⑧ Meter and BMS communication cable must be connected to inverter 1 (master inverter), and CTs are required to connect in order of CT1 , CT2, and CT3.

⑨ Meter communication cable connection details.

(AC) L2 / (DC) PV+ / (DC) BAT +
(AC) L1 / (DC) PV- / (DC) BAT -
L3
NEUTRAL
GROUND
COM

TABLE 1
BREAKER RECOMMENDATION

LOCATION	SPECIFICATION
Battery side(DC)	300A/80V
GEN side(AC)	≥60A/250V
Grid side(AC)	≥60A/250V
Backup side(AC)	≥60A/250V
Normal load side(AC)	Depends on required pass-through

TABLE 2
WIRE GAUGE GUIDE (COPPER)

LABEL	CONDUCTOR
A	4/0 AWG
B	10-8 AWG
C	Min. 6 AWG
D	Min. 6 AWG
E	24-23 AWG CAT6

Note for Three-phase Wiring Diagrams

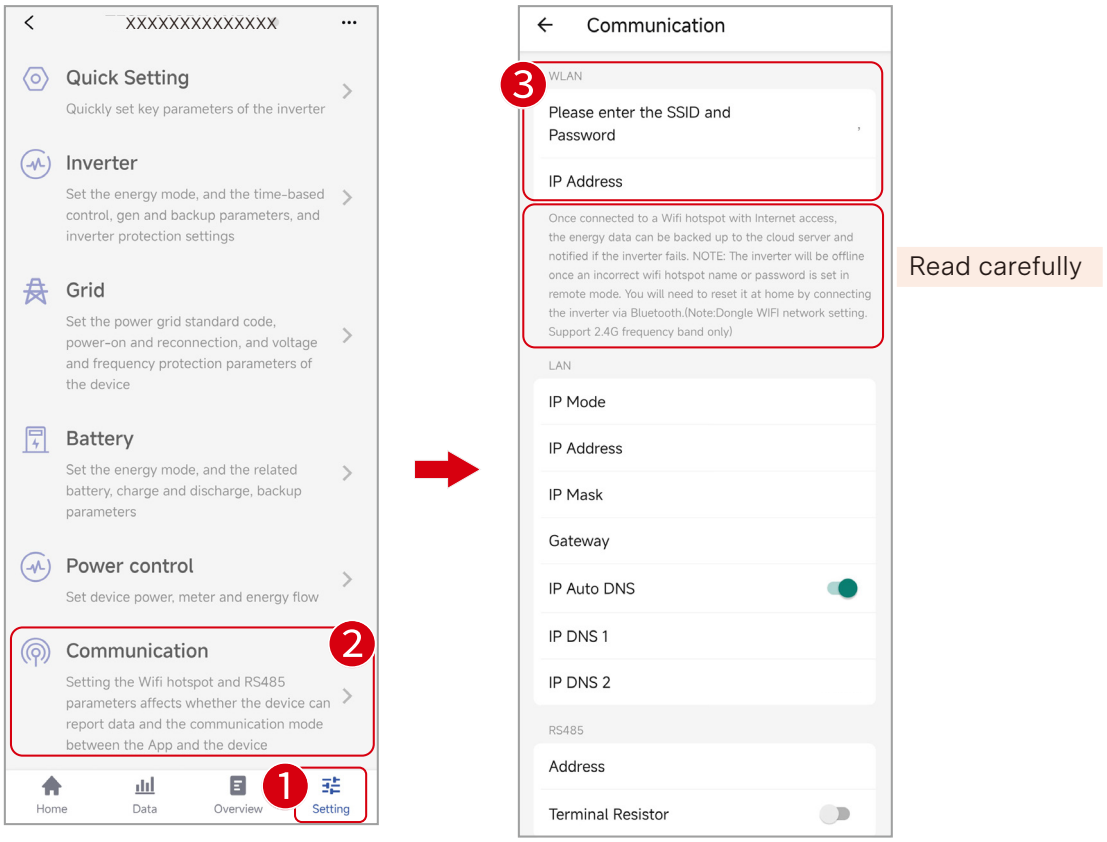
1. For three-phase connection, specific settings must be configured via the LCD screen or the app.
2. Detailed connection steps of each port have been illustrated in **Chapter 3. Electrical Connection**, please read carefully.
3. BMS connection is only applicable to lithium battery.
   - For shared lithium battery connection, please refer to diagram 04 to connect the BMS communication cable.
   - For standalone lithium battery connection, the BMS communication cable needs to be connected to each inverter.

App Setting Guide for Three-phase Connection

In three-phase connection mode, it is necessary to connect the APP to each inverter and set related parameters by following the steps below.

Step 1 Make sure the inverters are on standby. Then connect to any inverter in the three-phase system and login as an installer.

Step 2 Wi-Fi configuration. Connect all inverters in the parallel system to the router separately.



Step 3 Ensure the firmware versions of all inverters in the system are consistent.(Figure 4-1)

Step 4 Reset factory data of every inverter (as shown in Figure 4-2).

> After resetting, the inverter must be completely powered off before any other operations. Specifically, disconnect all power sources (PV, BAT, and Grid) and wait for 2 minutes until the internal power supply of the inverter is completely discharged. A full power-off cycle is required after using the reset command at any stage.

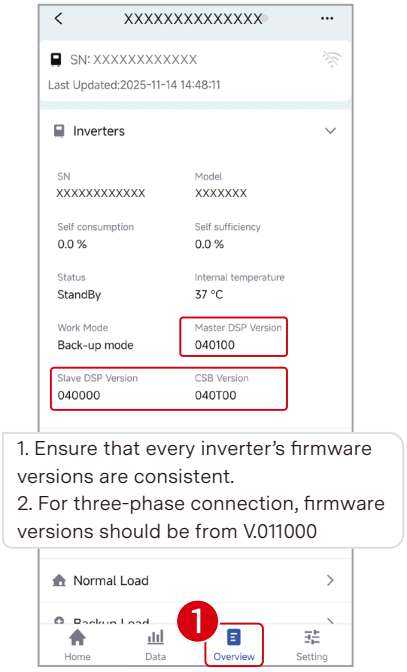


Figure 4–1 Firmware version check

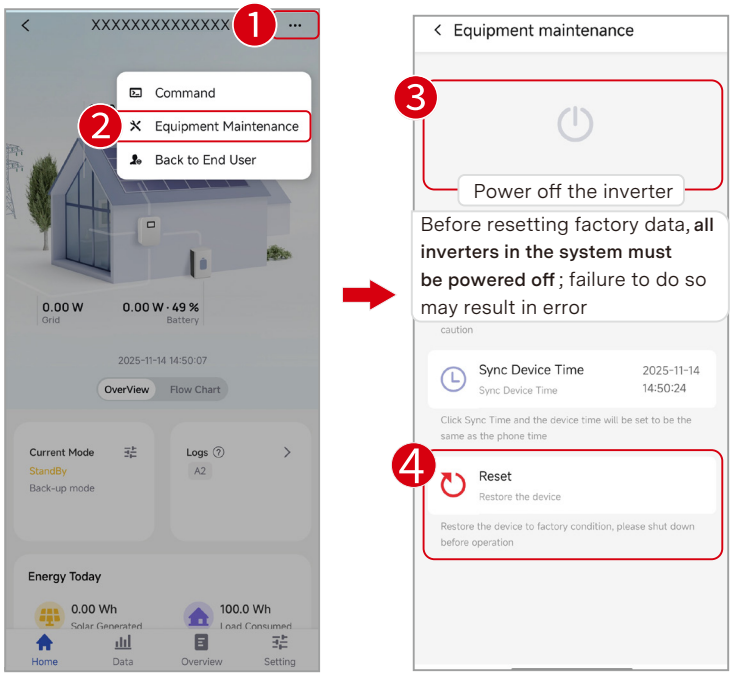
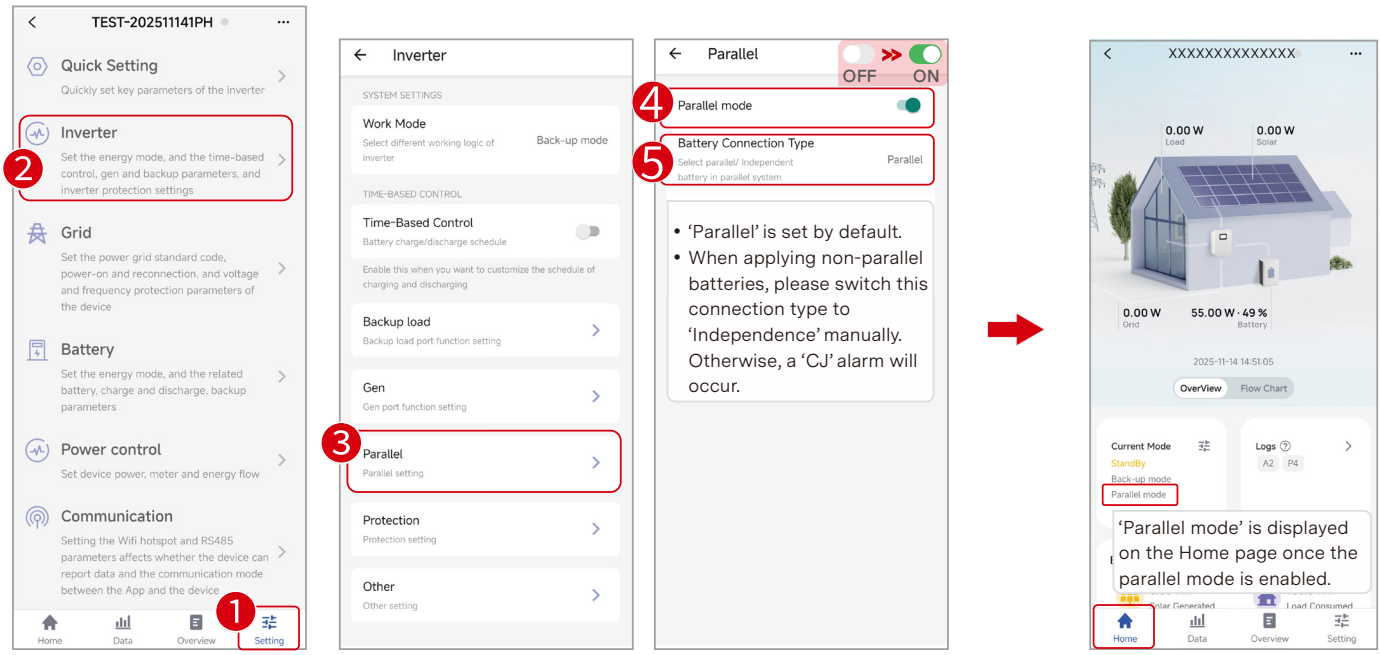


Figure 4–2 Reset factory data

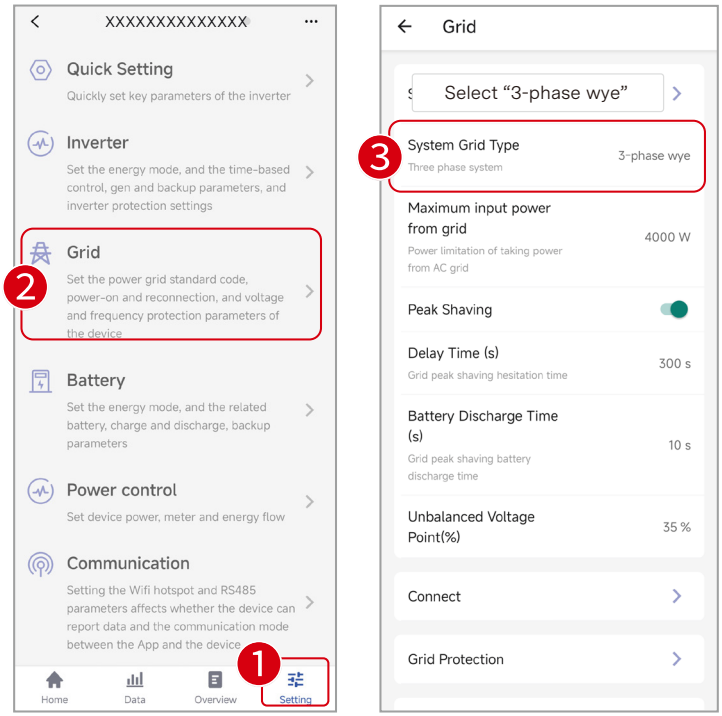
Step 5 Enable parallel mode and configure three-phase system. Users only need to set parallel parameters on one inverter. All inverters in the parallel system will automatically synchronize the settings.

> 1. Before activating parallel mode, all inverters in the system shall finish **step a) separately**; otherwise, the parallel connection may fail.
> 2. After setting each parameter, please refresh the page. It is recommended to allow an interval of 3 seconds to ensure successful synchronization of the parameters.
> 3. When the parallel communication cable is well-connected and the function runs normally with parallel mode enabled, parameters applied on any inverter will be automatically synchronized to the others. This means parameters only need to be set on one inverter.
> 4. Please strictly follow the sequence for three-phase configuration:
>
> · a) Enable parallel mode;
>
> · b) Set the system grid type;
>
> · c) Set the three phase system (set phase position).
>
> Otherwise, error alarms may occur and the inverter will not work normally.

▶ a) Enable parallel mode

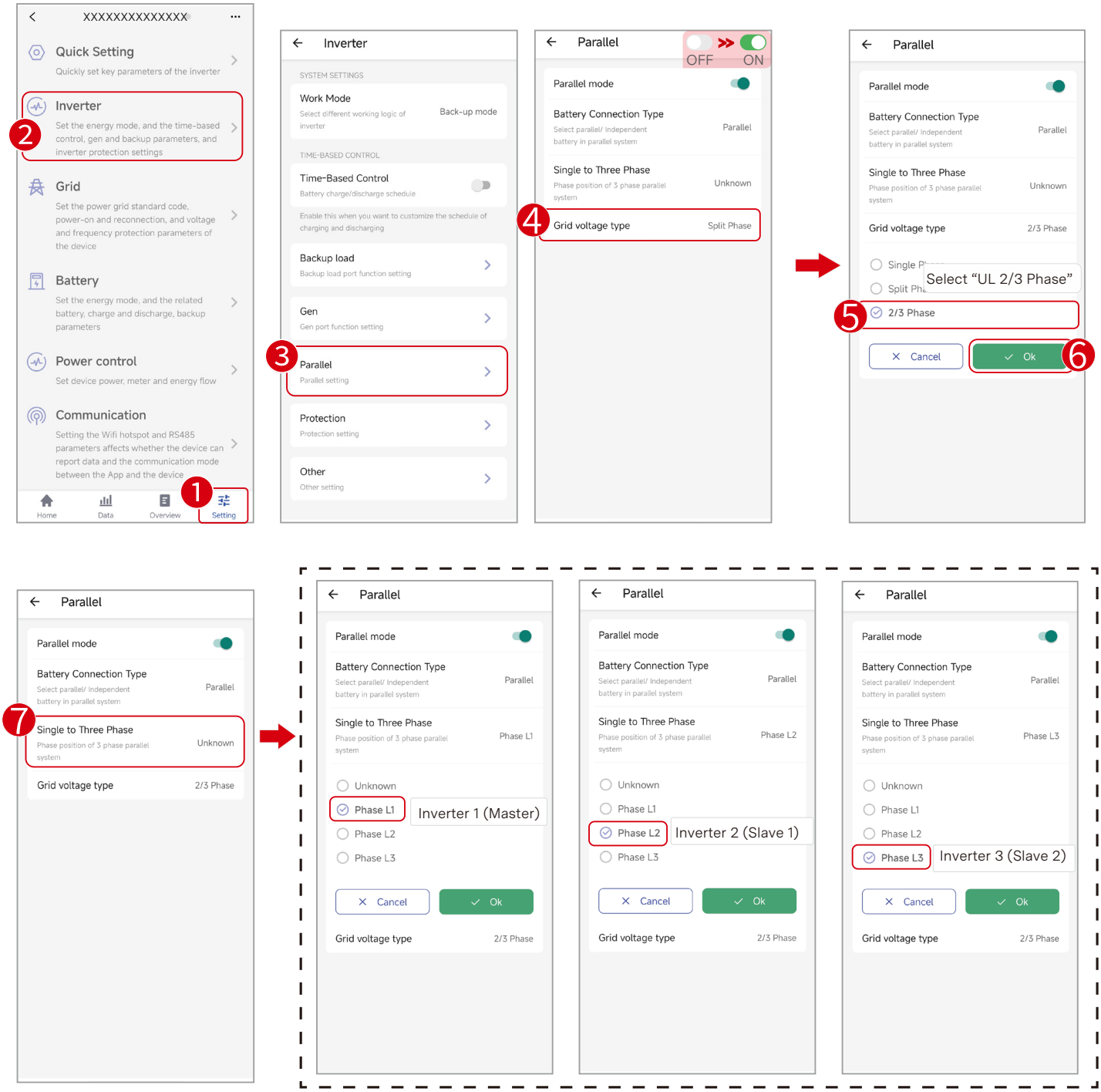


▶ b) System Grid Type setting

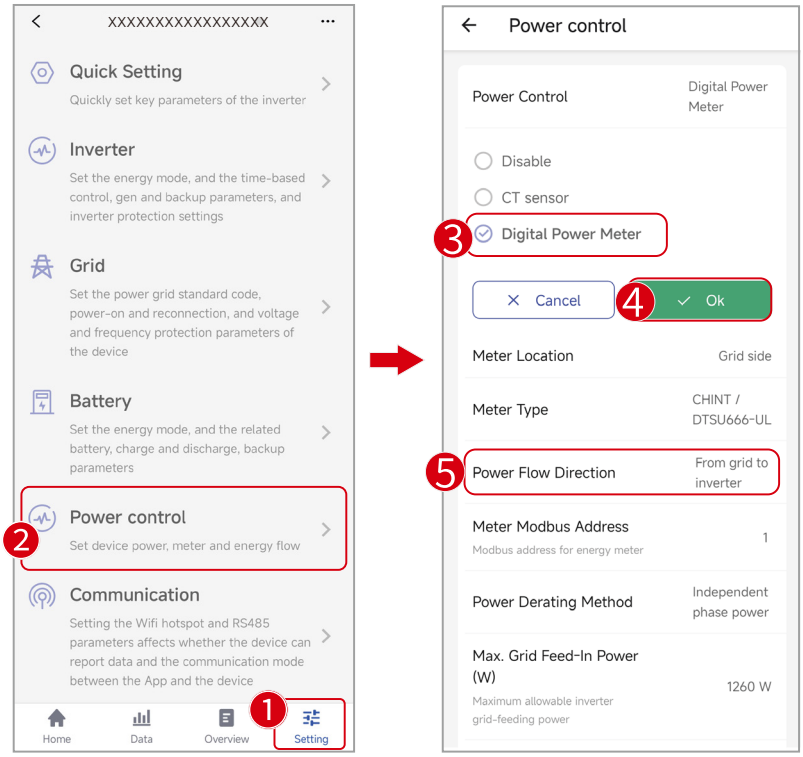


▶ c) Grid voltage type and phase position setting

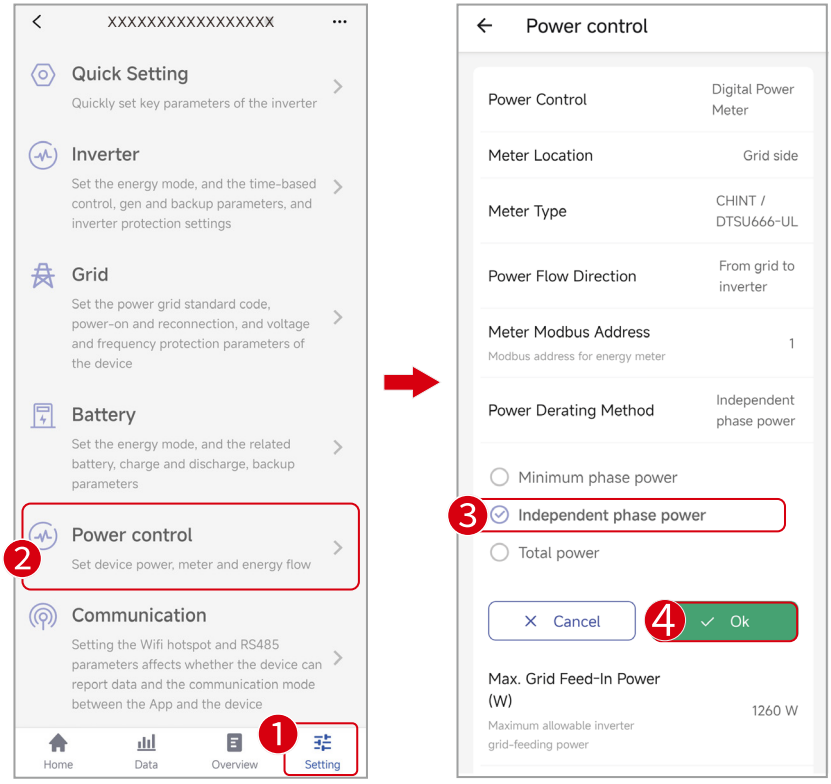
This step should be performed separately on each parallel inverter; otherwise, the parallel connection may fail.



Step 6 Set power control and power flow direction



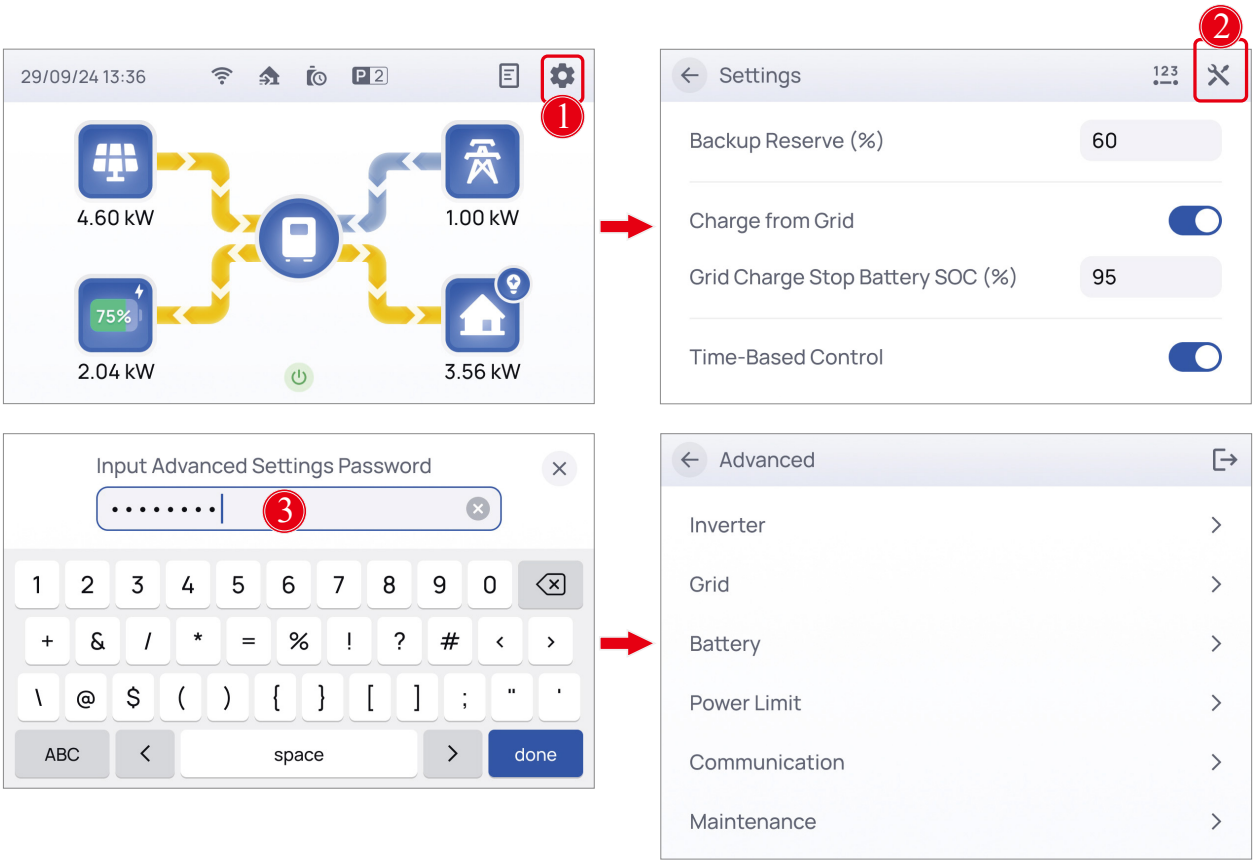
Step 7 Set Power Derating Method.



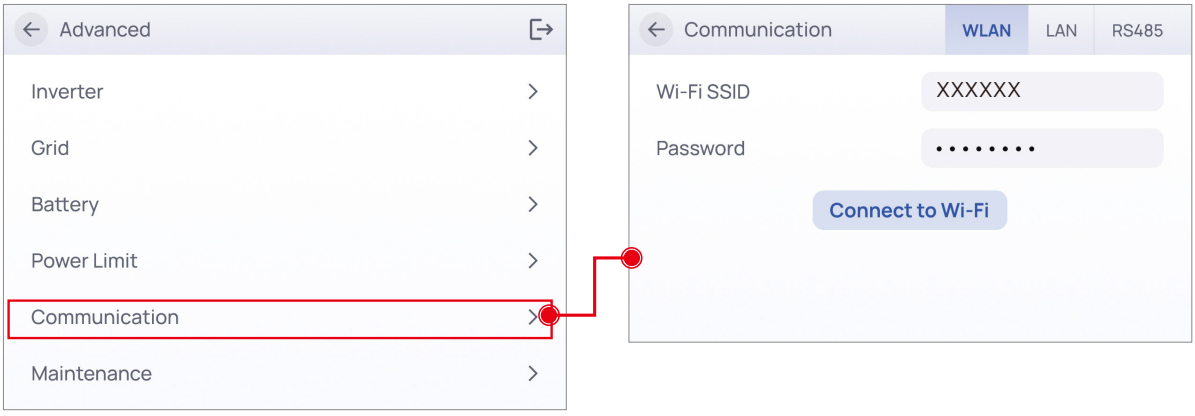
While "Independent phase power" is set by default, it is important to ensure that all inverters in the three-phase system are indeed set to "Independent phase power".

LCD setting guide for three-phase connection

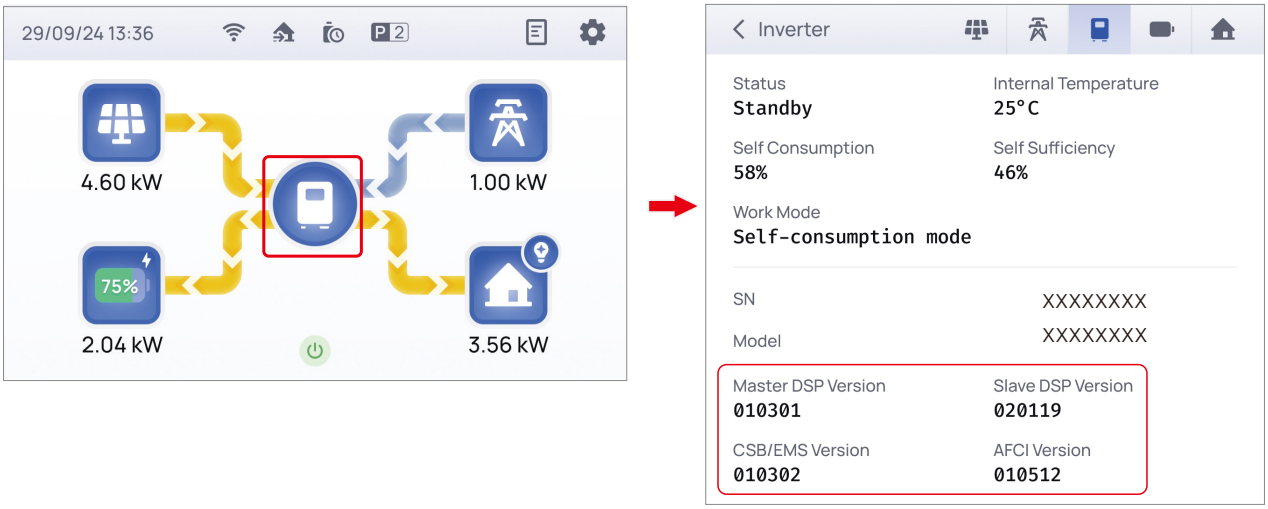
Step 1 Enter the Advanced menu of any inverter in the three-phase parallel system. The initial password is "admin".



Step 2 Wi-Fi configuration. Connect all inverters in the parallel system to the router separately

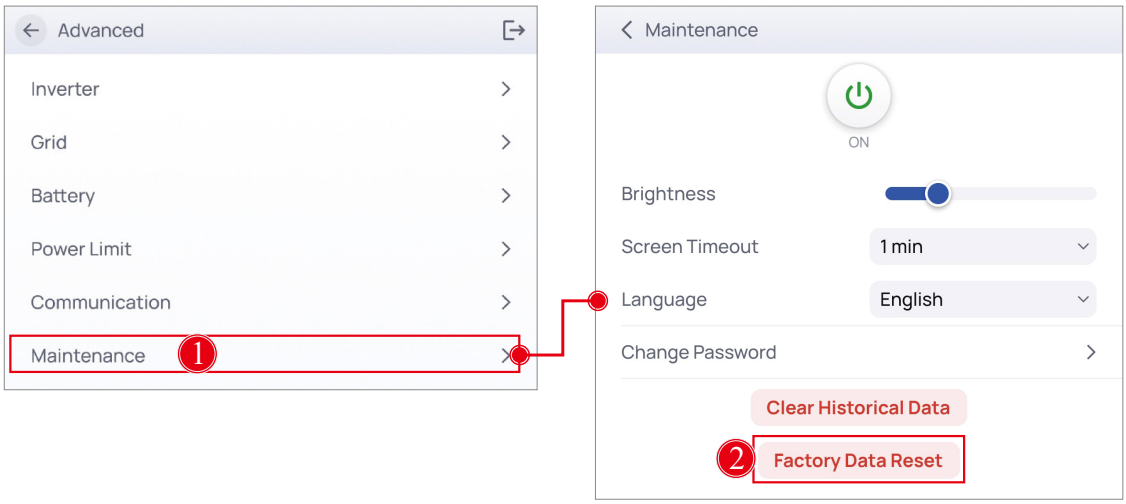


Step 3 Make sure the inverters are on standby and ensure the firmware versions of all inverters in the system are consistent.



Step 4 Reset factory data of every inverter.

After resetting, the inverter must be completely powered off before any other operations. Specifically, disconnect all power sources (PV, BAT, and Grid) and wait for 2 minutes until the internal power supply of the inverter is completely discharged. A full power-off cycle is required after using the reset command at any stage.

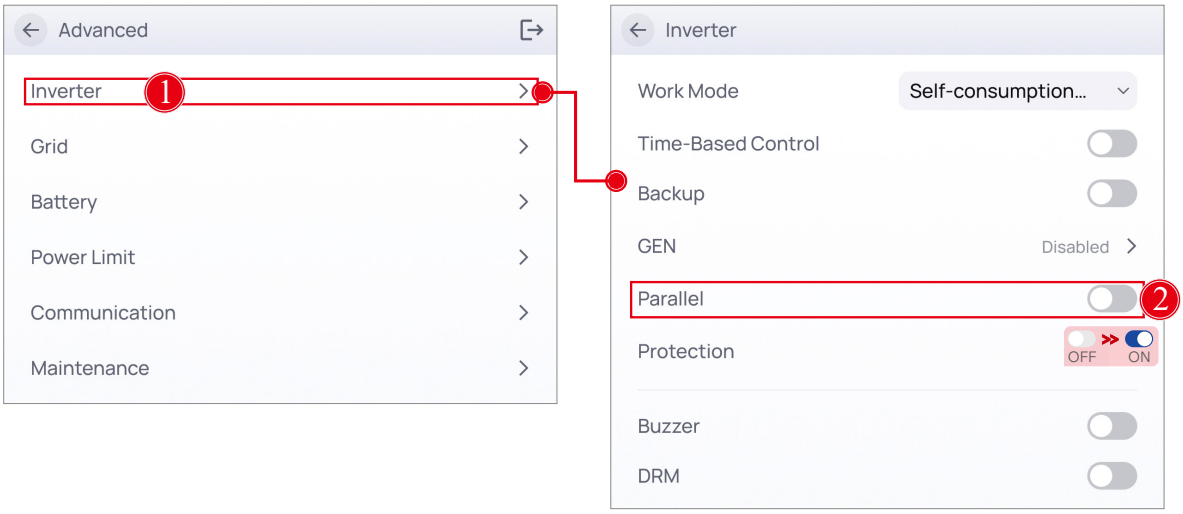


Step 5 Enable parallel mode and configure three-phase system. Users only need to set parallel parameters on one inverter. All inverters in the parallel system will automatically synchronize the settings.

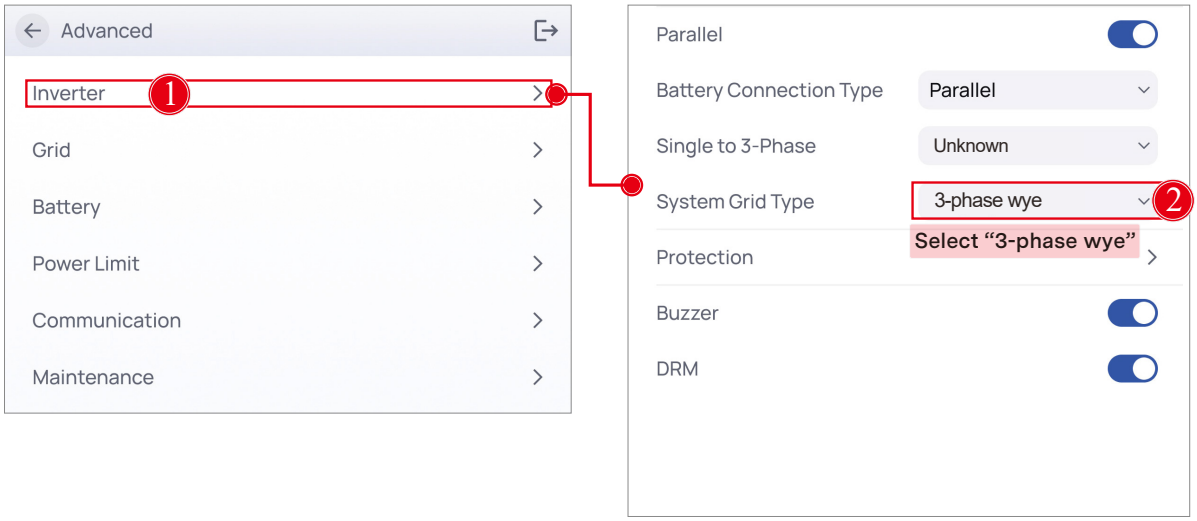
1. Before activating parallel mode, all inverters in the system shall **finish step a) separately;** otherwise, the parallel connection may fail.
2. After setting each parameter, please refresh the page. It is recommended to allow an interval of 3 seconds to ensure successful synchronization of the parameters.
3. When the parallel communication cable is well-connected and the function runs normally with parallel mode enabled, parameters applied on any inverter will be automatically synchronized to the others. This means parameters only need to be set on one inverter.
4. Please strictly follow the sequence for three-phase configuration:
   - a) Enable parallel mode;
   - b) Set the system grid type;
   - c) Set grid voltage type;
   - d) Set phase position.

Otherwise, error alarms may occur and the inverter will not work normally.

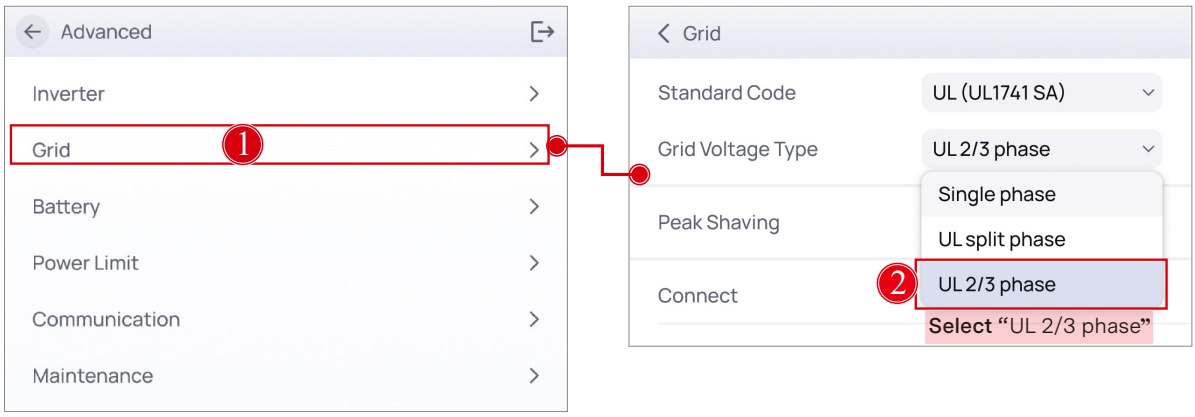
▶ a) Enable parallel mode



▶ b) System Grid Type setting

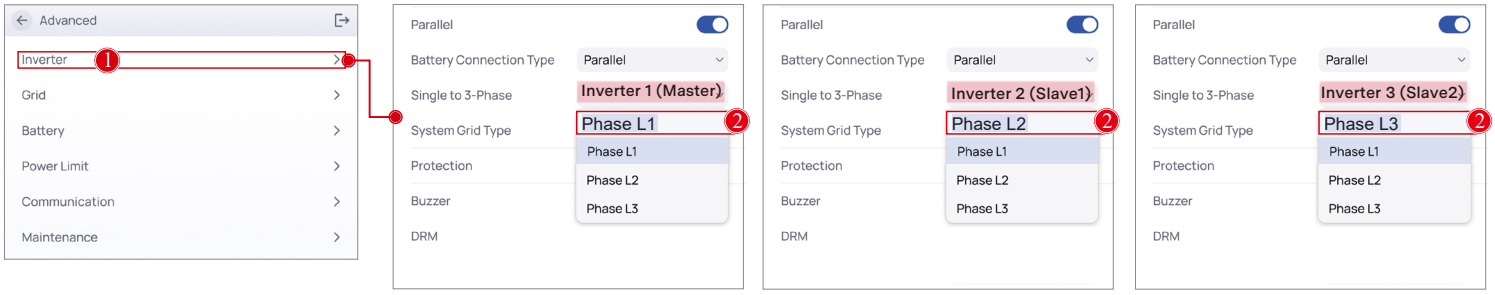


▶ c) Grid voltage type and phase position setting

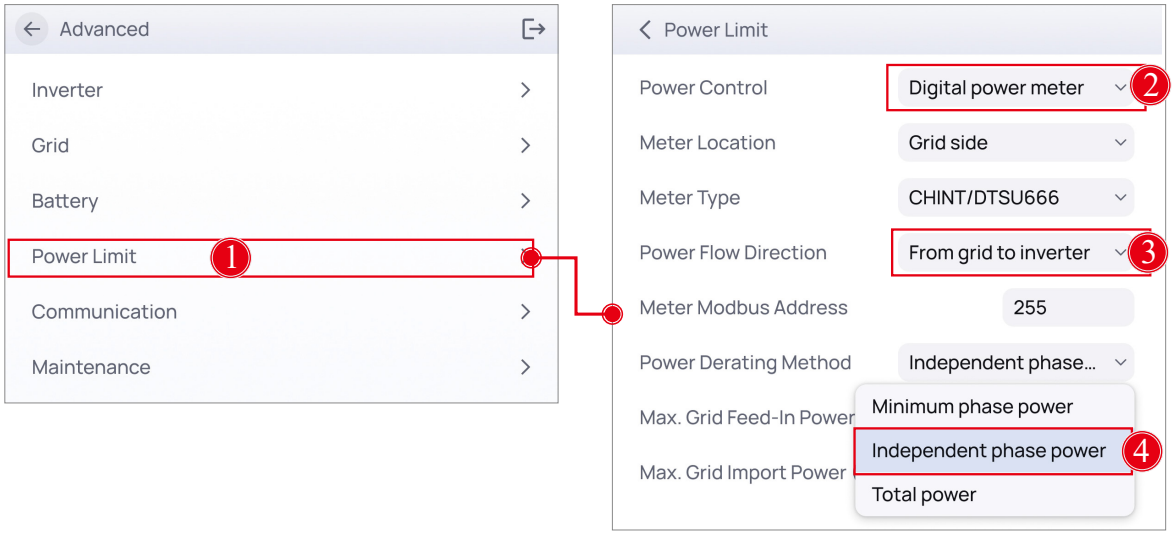


▶ d) Phase position setting

This step should be performed separately on each parallel inverter; otherwise, the parallel connection may fail.



Step 6 Set power control , power flow direction and power derating method.



5. Operation

5.1 Inverter Working Mode

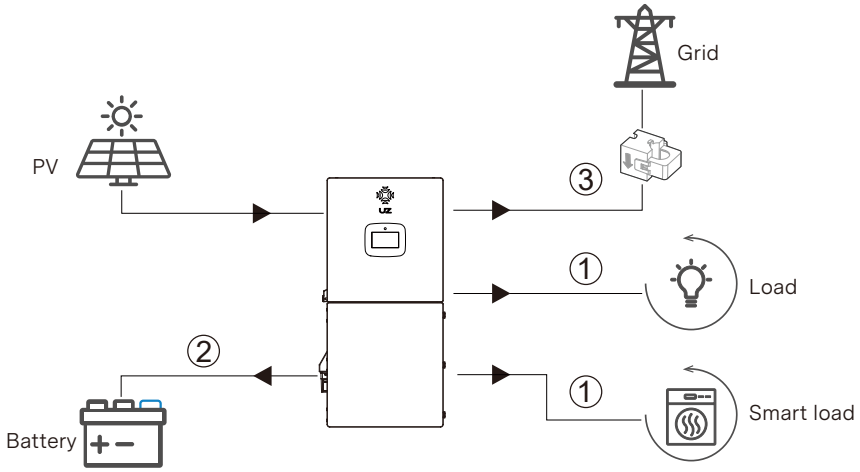
The inverter supports several different working modes.

5.1.1 Self-consumption Mode

Tap **Advanced Setting > Inverter > work mode** on the LCD, and select the "Self-consumption mode".
In Self-consumption mode, the priority of PV energy consumption will be Load > Battery > Grid, that means the energy produced by PV gives priority to loads, the excess energy is used to charge the battery and the remaining energy is fed into the grid.
This is the default mode to increase energy effeciency. There are several situations of self-consumption working mode based on PV energy.

Abundant PV Energy

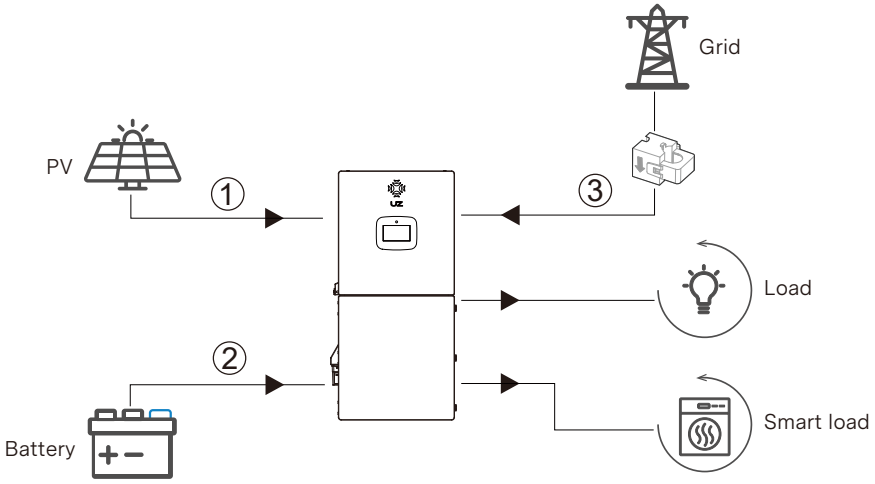
When PV energy is abundant, the inverter delivers PV energy to the load, the battery, and then the grid in sequence.



① ② ③ is the sequence of PV energy transmission.

Limited PV Energy

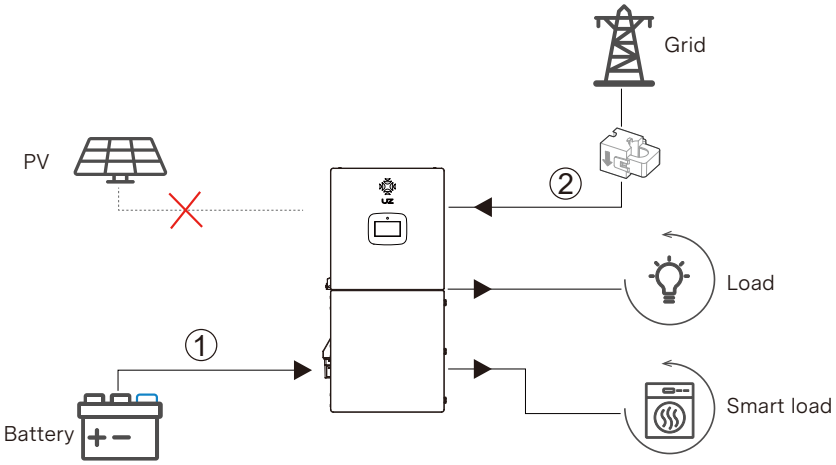
When the PV energy is not enough to cover all consumption, the PV energy will be entirely used by loads, and the insufficient part will be supplied by battery. Then still insufficient parts will be supplied by grid.



① ② ③ is the sequence of loads consumption.

No PV Input

When there is no PV input, such as in the evening or some cloudy or rainy days, the inverter will first discharge the battery energy for load consuming. If the load demand is not met, the loads will consume grid energy



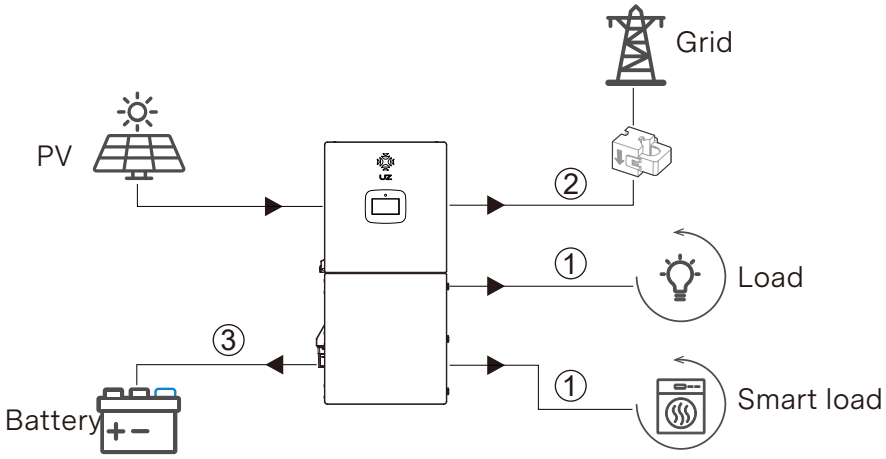
① ② is the sequence of loads consumption.

5.1.2 Feed-in Priority Mode

Tap **Advanced Setting > Inverter > work mode** on the LCD, and select the "Feed-in priority mode".
Under this mode, the priority of PV energy consumption will be Load > Grid > Battery, that means the energy produced by PV gives priority to powering local loads, the excess energy is fed into the grid, and the remaining energy is used to charge the battery

Abundant PV Energy

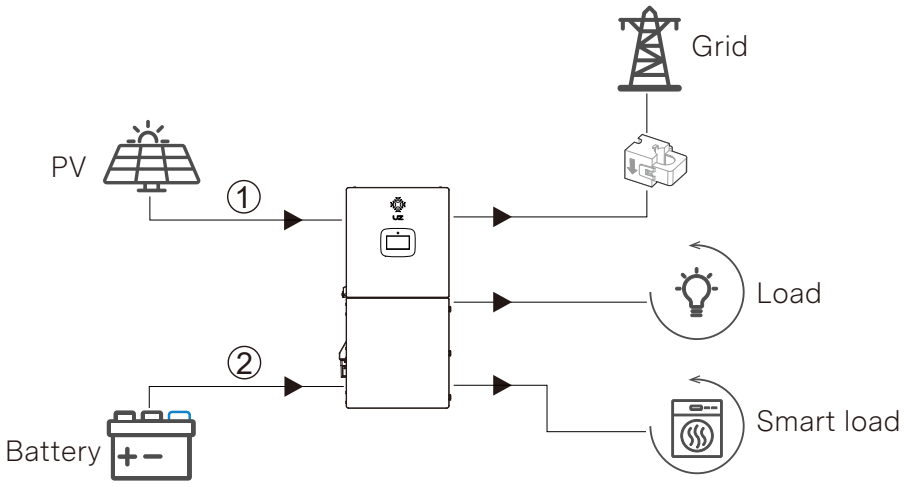
When PV energy is abundant, the PV energy will be first consumed by loads. If there is excess PV power, the power will be fed into grid. If there is still PV energy left after load consuming and grid feeding, then the remaining PV power will be used to charge the battery.



① ② ③ is the sequence of PV energy transmission.

Limited PV Energy

When PV energy is limited and can not meet the feed-in grid power, the battery will discharge to meet it.

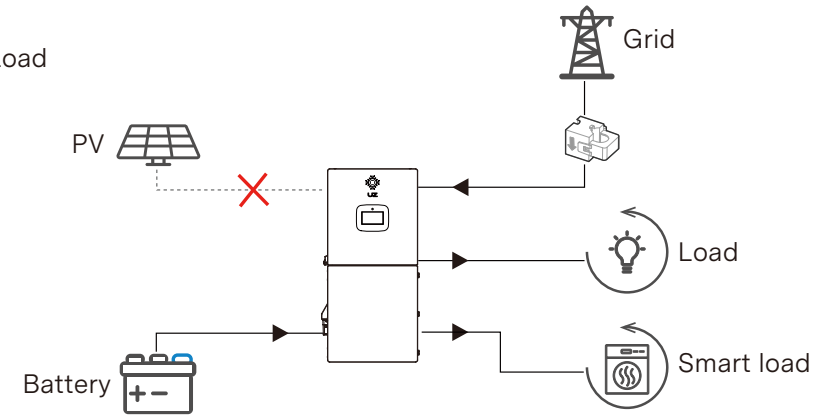


① ② is the sequence of grid feed-in energy

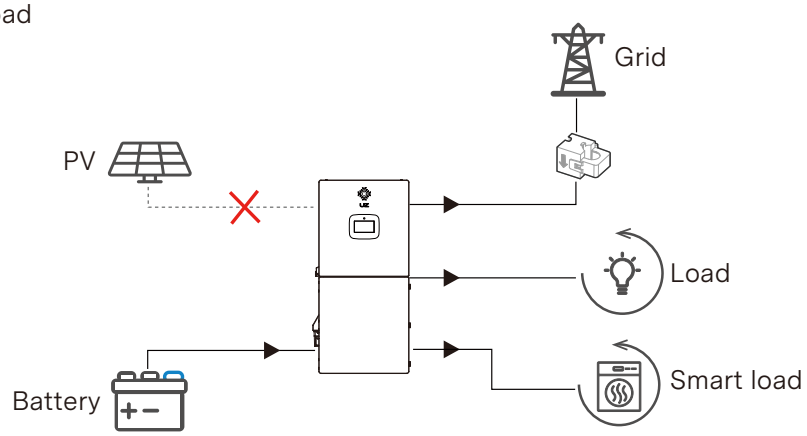
No PV Input

The inverter will first discharge the battery energy for home load consuming when no PV input, such as in the evening or some cloudy or rainy days. If the demand is not met, the loads will consume the grid energy.

$P_{BAT} < P_{Load}$



$P_{BAT} \geq P_{Load}$



5.1.3 Back-up Mode

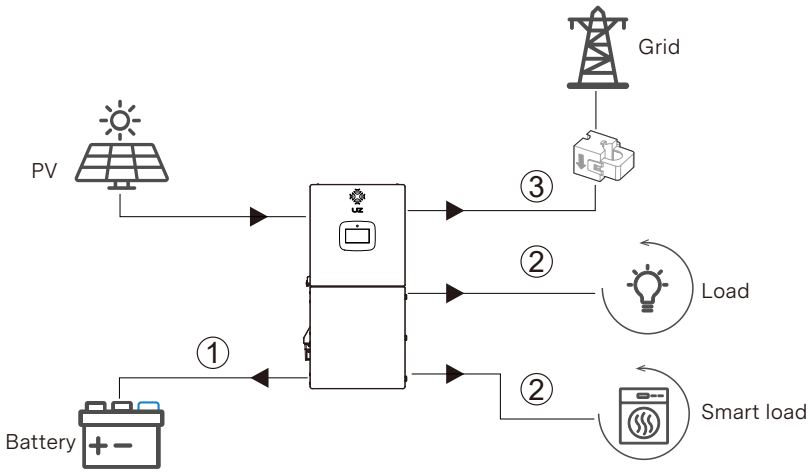
Tap **Advanced Setting > Inverter > work mode** on the LCD, and select the "Back-up Mode". In this mode, the priority of PV energy consumption will be Battery > Load > Grid.
This mode aims to charge the battery quickly, and at the same time, you can choose whether to allow AC to charge the battery

Forbid AC Charging

In this mode, the battery can be charged only with PV power, and the charging power varies with PV power.

Abundant PV Energ

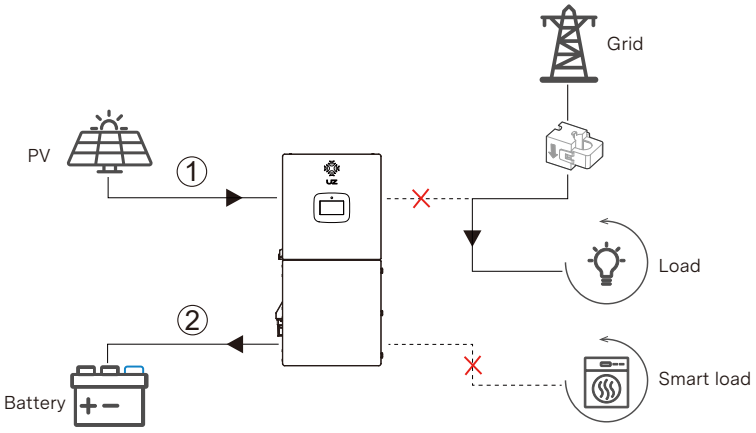
When PV energy is abundant, PV charges the battery first, then meets the load, and the rest is fed into the grid.



① ② ③ is the sequence of PV energy transmission.

Limited PV Energy

When PV energy is limited, PV gives priority to charging the battery, and the grid directly meets the load demand.



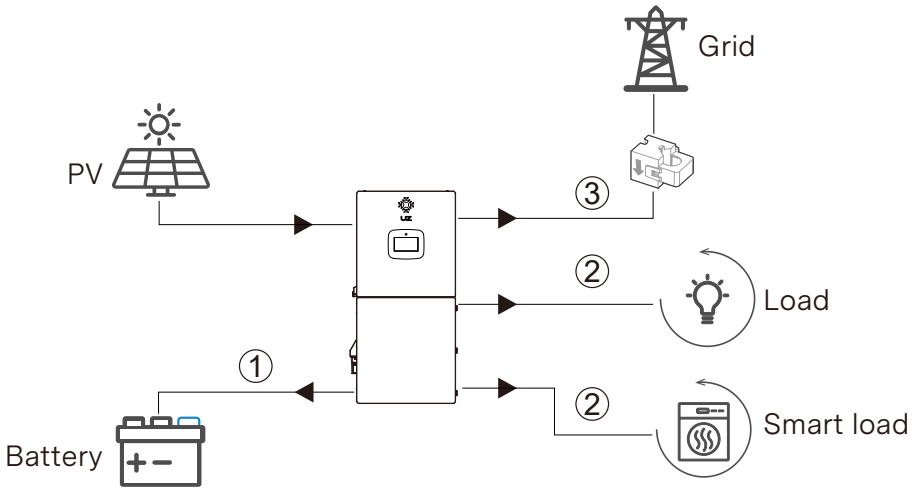
① ② is the sequence of PV energy transmission.

Allow AC Charging

In this situation, the battery can be charged by PV and AC.

Abundant PV energy

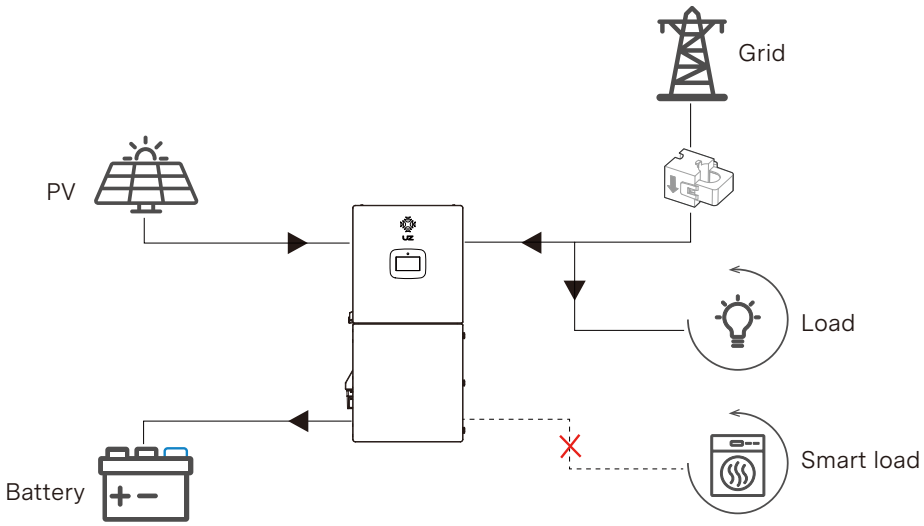
When PV energy is abundant, PV charges the battery first, then meets the loads, and the rest is fed into the grid.



① ② ③ is the sequence of PV energy transmission.

Limited PV Energy

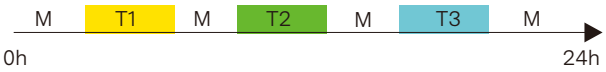
When the PV energy is not enough to charge the battery, the grid energy will charge the battery as supplement. Meanwhile, the grid energy is consumed by loads.



5.1.4 Forced Charge/Discharge Function

According to the demands of application, the user can set the inverter to work on forced charge/discharge the battery in any working mode.
There are three time periods in which you can set this function. Outside of the set periods, the inverter returns to its original working mode. The forced charge/discharge function has the highest priority.

The relationship between the forced charge/discharge function and working mode shown as below.



M : Self-consumption Mode/Feed-in Priority Mode/Back-up Mode
T1: Time period 1 for forced charge/discharge parameter setting
T2: Time period 2 for forced charge/discharge parameter setting
T3: Time period 3 for forced charge/discharge parameter setting
T1, T2, and T3 priority to M.
For the detailed settings, please Tap the icon to enter **Settings** page and enable **Time-based Control** on the LCD.

5.1.5 Off Grid Mode

When the power grid is lost, the system automatically switches to Off-grid mode.
In this mode, inverter can't work without battery.

Declaration for Off-grid Function

- For hybrid inverters, the electrical installation typically includes connection of the inverter to both PV modules and batteries. If there is no available power from batteries or PV modules in off-grid mode, the load port power supply will be automatically terminated. The manufacturer shall hold no liability for any consequences arising from failure to follow this instruction.
- Normally, the off-grid mode switchover time is less than 10 ms. However, the system may fail to enter off-grid mode due to some external factors. Therefore, the users must be aware of the conditions and comply the following instructions:
  - Do not connect loads that require a stable power supply for reliable operation.
  - Do not connect the loads whose total capacity is greater than the maximum load port capacity.
  - Do not connect the loads that may cause very high start-up current surges, such as airconditioner, high-power pump, vacuum cleaner, and hair drier.
  - Due to the condition of the battery itself, battery current might be limited by some factors, including but not limited to the temperature and weather.

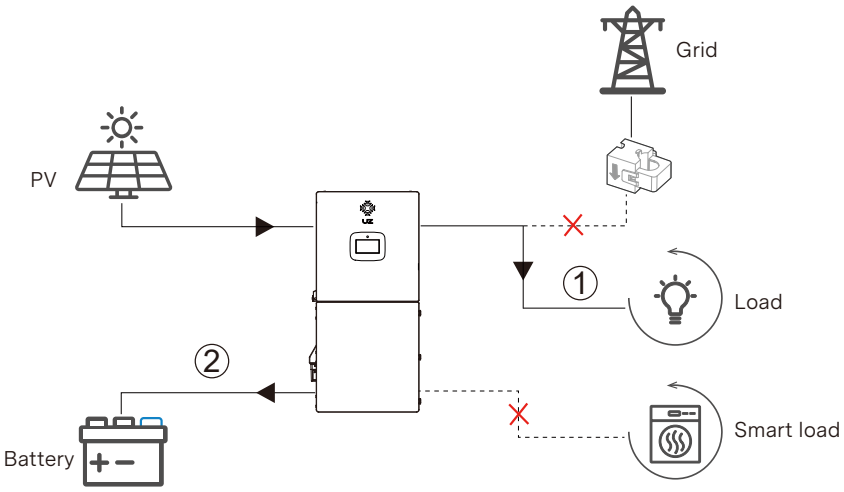
Declaration for Off-grid Overload Protection

- Since the inverter is connceted to the grid via Grid terminal directly and provide 200 A power to the load, once the grid is lost, inverter is unable to supply 200 A power to the load. An over load alarm will occur and the load power will be cut off.
- The inverter will restart in case of overload protection. The restarting time will be 3 minutes if overload protection repeats. After the cumulative overload times up to three, the inverter will be locked. You can unlock the inverter by pressing the power button for 1s to clear the overload alarm. Try to reduce load port power within the maximum limit or remove the loads that may cause very high start-up current surges.

⚠
1. In this mode, please complete the output voltage and frequency settings.
2. It is better to choose the battery capacity greater than 100 Ah to ensure load port function works normally.
3. If output loads are inductive or capacitive loads, to make sure the stability and reliability of system, it is recommended to configure the power of these loads to be within 50% of load port output power range.

Abundant PV energy

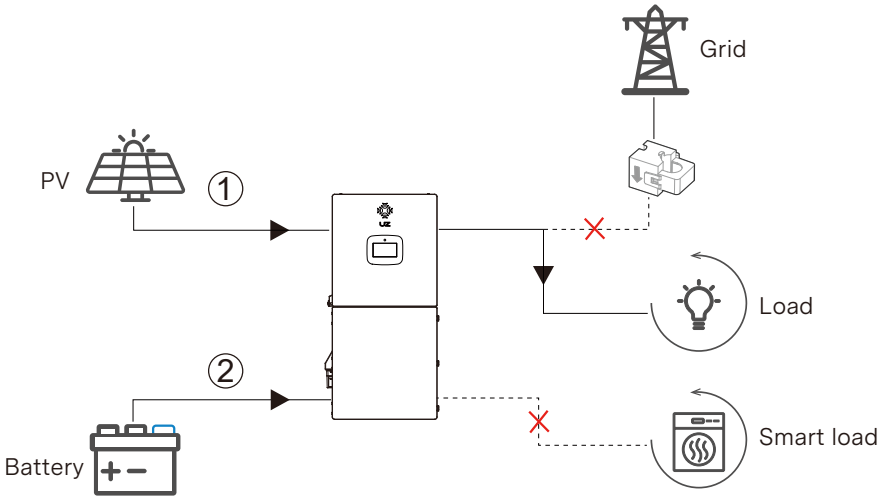
When PV energy is abundant, the PV power will be first consumed by the load, then charge the battery.



① ② ③ is the sequence of PV energy transmission.

Limited PV Energy

When PV energy is limited, loads are first powered by PV and then supplemented by battery



① ② is the sequence of load consumption.

5.2 Startup/Shutdown Procedure

5.2.1 Startup

Before starting up, check whether the installation is secure and strong enough, and whether the system has been well grounded. Then make sure the connections of AC, battery, PV etc. are correct, and confirm the parameters and configurations conform to relevant requirements.

AC Frequency	50/60 Hz	PV Voltage	70 V to 540 V
Battery Voltage	40 V to 64 V	Grid AC Voltage	120/240 V (Split phase) / 208 V (2/3 phase)

Procedures

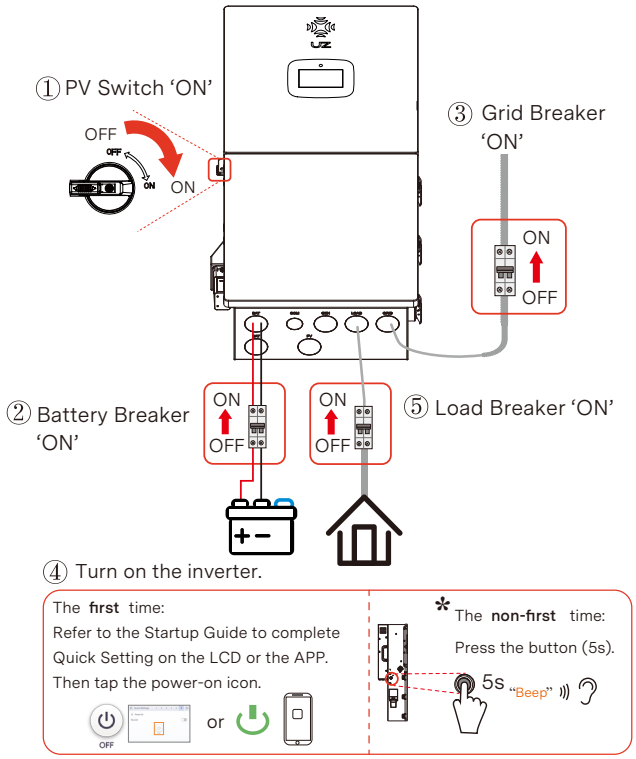
Step 1 Power on the PV Switch.

Step 2 Power on the DC breaker at BATTERY side.

Step 3 Power on the AC breaker at GRID side.

Step 4 Connect the cell phone App via Bluetooth. And click the Power ON in the App for the first time. Refer to App chapter for details. Or you can hold the ON/OFF button on the side of the inverter for 5 s in this step when performing subsequent startup.

Step 5 Power on the AC breaker at LOAD side.



5.2.2 Commissioning

It is necessary to fully commission the inverter system for it is essential to protect the system from fire, electric shock, other damages, and personal injury.

Inspection

Before commissioning, the operator or installer (qualified personnel) must inspect the system carefully and ensure that:

1. The system is properly installed according to the contents and instructions in this manual, and there is sufficient space for operation, maintenance, and ventilation.
2. All terminals and cables are in good conditions.
3. No objects are left in/on the inverter or within the required clearance.
4. The PV and the battery pack are working normally, and the grid is normal.

5.2.3 Start Commissioning

When all items have been checked and the system is ready for use, start the commissioning procedure.

Procedures

Step 1 Power on the system by following the Startup Procedure in section 5.2.1.

Step 2 Set the parameters on the App according to user's needs.

Step 3 Complete commissioning.

5.2.4 Shutdown

Procedures

Step 1 Connect the cell phone App via Bluetooth. And click the Power OFF on the App or the LCD. Refer to App or LCD chapter for details. Or you can hold the ON/OFF button on the side of the inverter for 5 seconds in this step when performing subsequent shutdown.

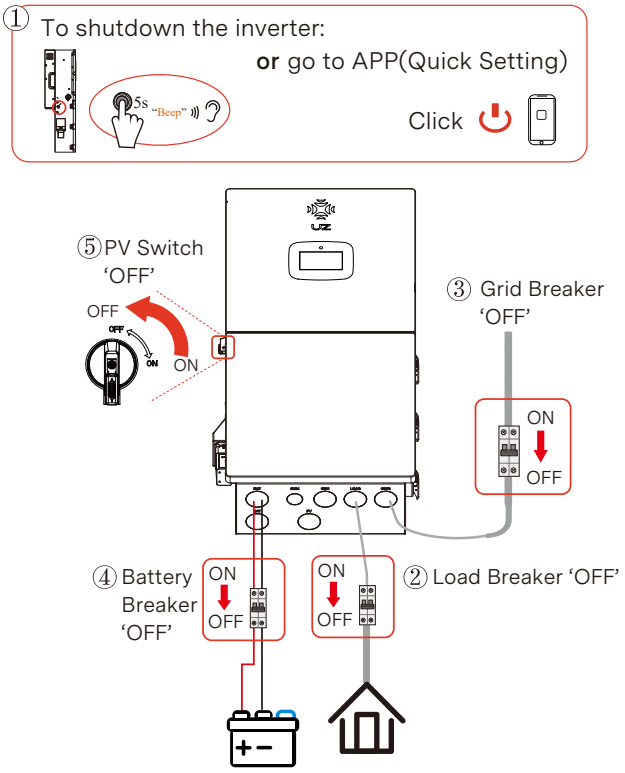
Step 2 Power off the AC breaker at LOAD side.

Step 3 Power off the AC breaker at GRID side.

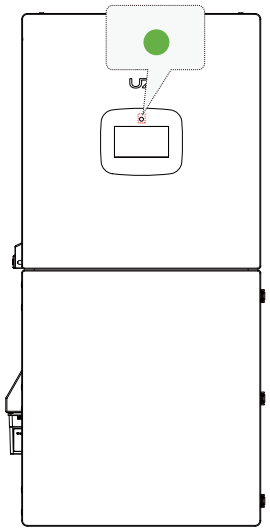
Step 4 Power off the DC breaker at BATTERY side.

Step 5 Power off the PV Switch.

Step 6 To disconnect the inverter cables, please wait at least 5 minutes before touching them.



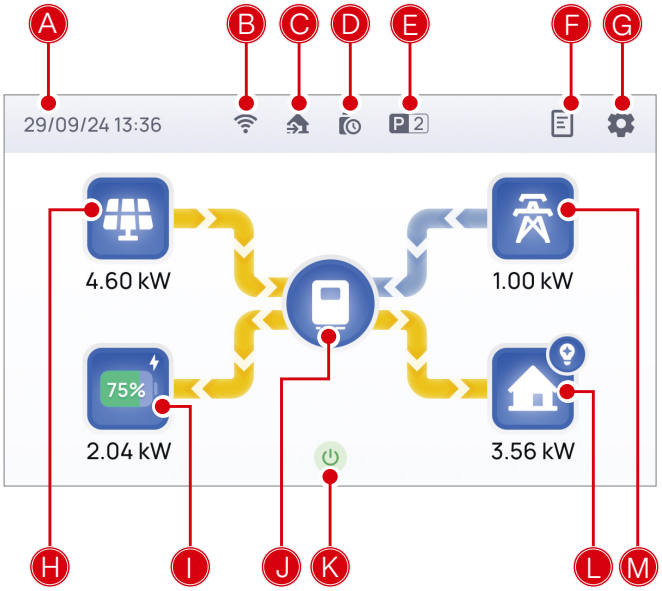
6. User Interface



LED Indicator	Status	Description
Green Led 	On	On-Grid status
	Blink	Standby status
Blue Led 	On	Off-Grid status
Red Led 	On	Fault has occurred
	Light alternately (1 color/0.25s)	Burning code

7. LCD Screen

The LCD is touchscreen, the main screen shows the overall information of the inverter.

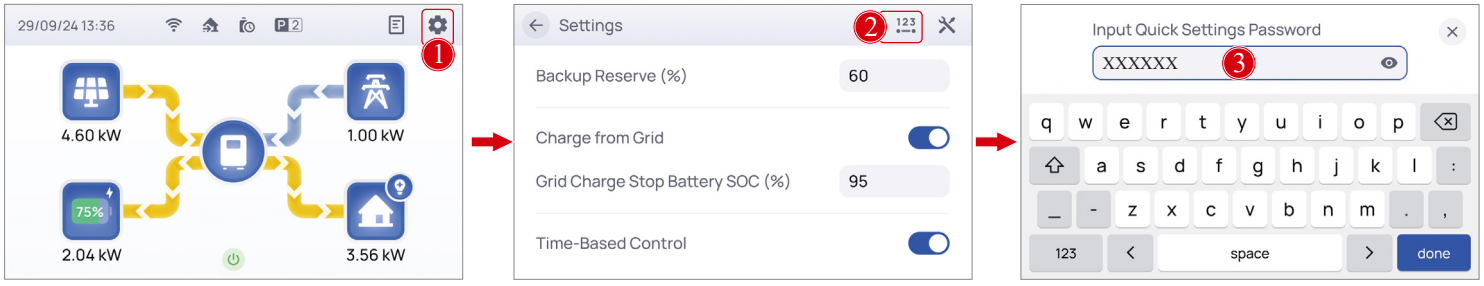


Number	Icon	Description
A	Time	The current system time
B	Wi-Fi	Wi-Fi connection status
C	Working mode	Current working mode Self-consumption mode Back-up mode Feed-in priority mo de
D	Time-based control	The time-based control function is enable
E	Parallel	Number of parallel inverters
F	Log	History log
G	Settings	Settings page
H	Solar icon and power	Tap the icon you can view the solar energy production . Note: When the ' ' icon appears at the top-right corner of the solar icon, it means that the AC coupling function is enabled.
I	Battery icon and pow-er	Tap the icon you can view the battery basic information and charge/discharge capacity
J	Inverter icon power	Tap the icon you can view the inverter basic information
K	Power Button	Tap the button to turn on/off the inverter
L	Home icon and the present power	Tap the icon you can view the load consumption When the ' ' icon appears at the top-right corner of the home icon, it means that he GEN Port works as an output port for the Smart Load connected to the GEN terminal
M	Grid icon and the present power	Tap the icon you can view the grid capacity and feed-in grid capacity

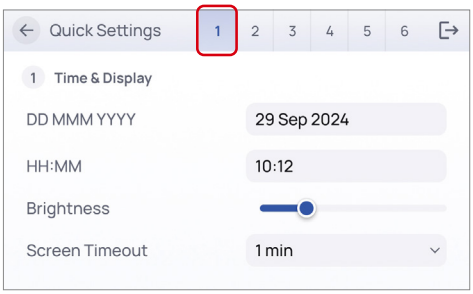
7.1 Quick Setup

A quick setup is required when turning on the inverter for the frst time

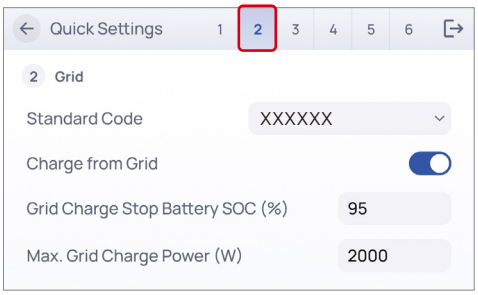
Step 1 Enter the Quick Setup menu. The initial password is "admin".



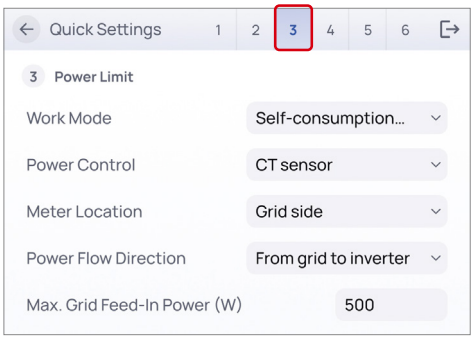
Step 2 Set time and display parameters.



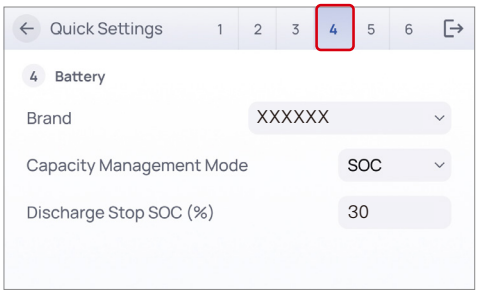
Step 3 Set grid parameters.



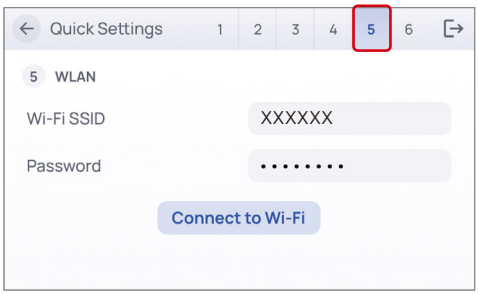
Step 4 Set power limit parameters.



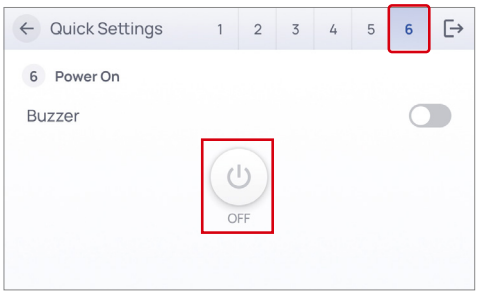
Step 5 Set battery parameters.



Step 6 Connect to Wi-Fi.

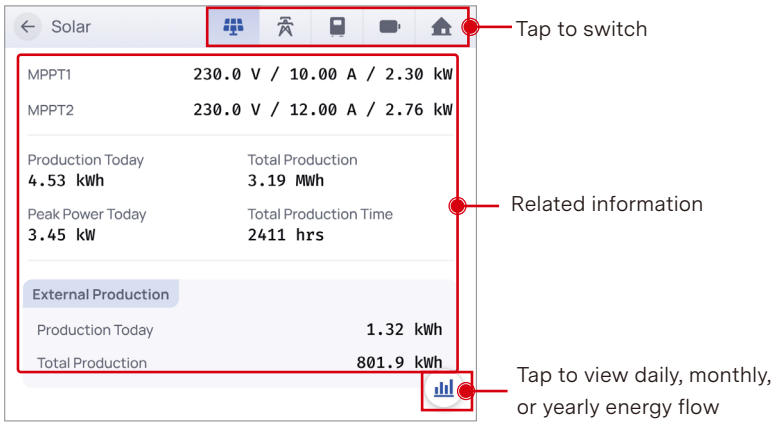


Step 7 Turn on the inverter.



7.2 Data Query

Tap the Solar/Grid/Inverter/Battery/Home icons on the mainscreen to view the production or consumption data/ graphs, as well as related information of your energy system.



Icon	Description
	Solar
	Grid
	Inverter
	Battery
	Home
	Pie chart
	Graph

Data Graph

The energy graph is displayed by Day, Month, Year, and Total. The daily data graphs in the following figures are for illustrative purposes only

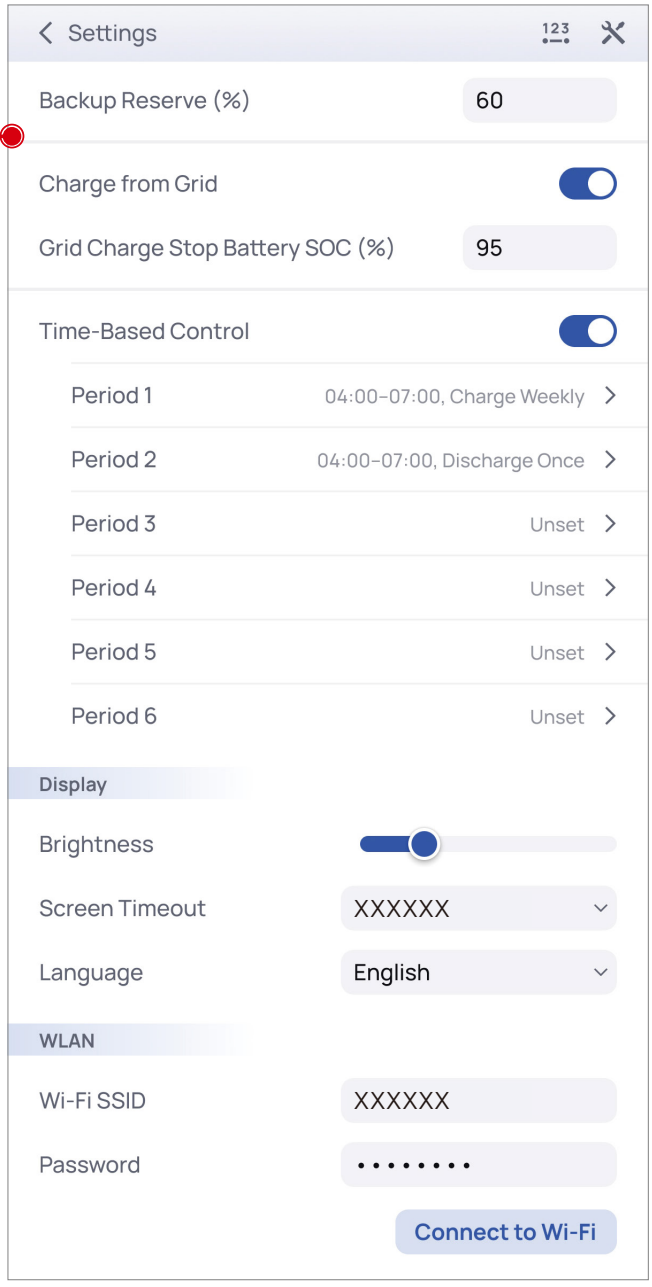
Icon	Description
	Grid capacity
	Feed-in grid capacity
	Generator capacity
	Discharge capacity
	Charge capacity
	Toggle switch

7.3 Settings

Configure basic or advanced parameters based on your needs.

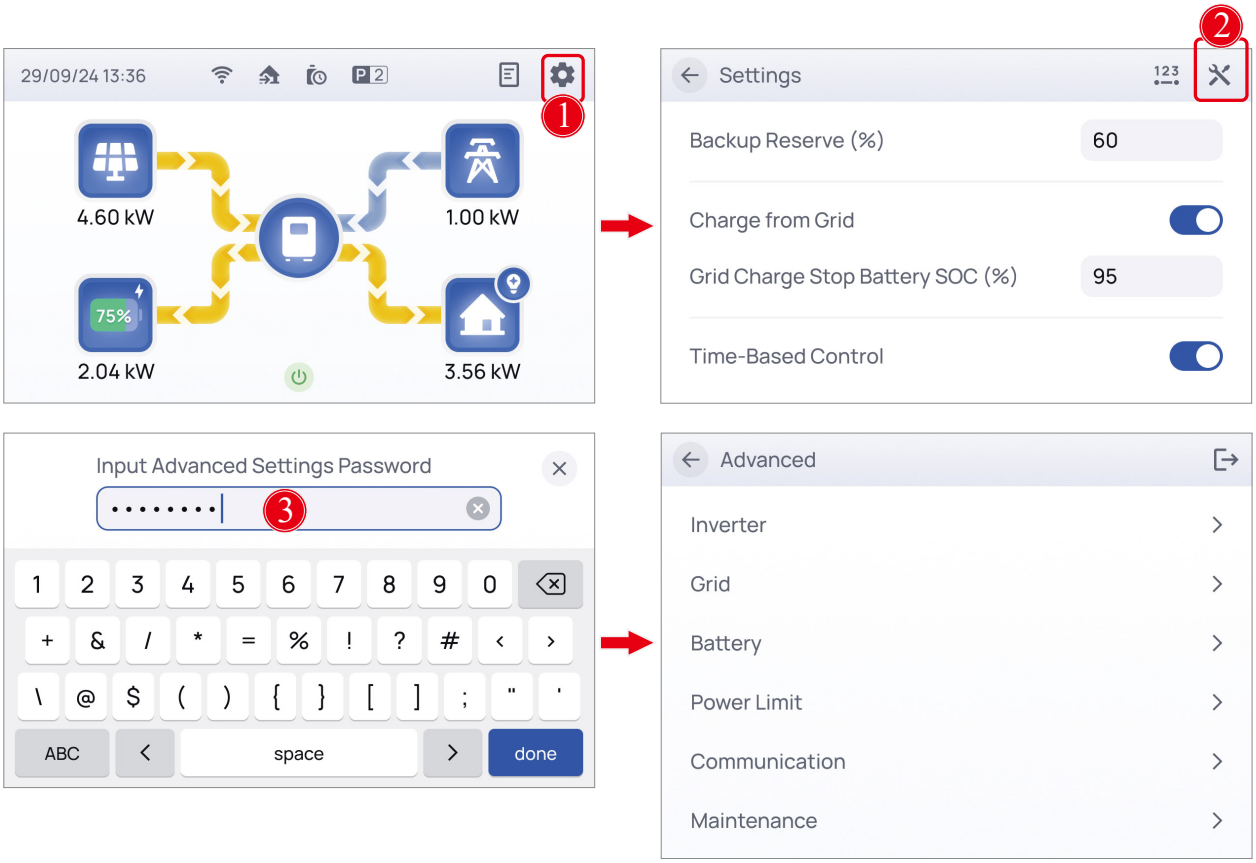
Basic Setting (for End-user)

Tap the " ⚙ " icon to enter the **Setting** page and configure basic parameters.



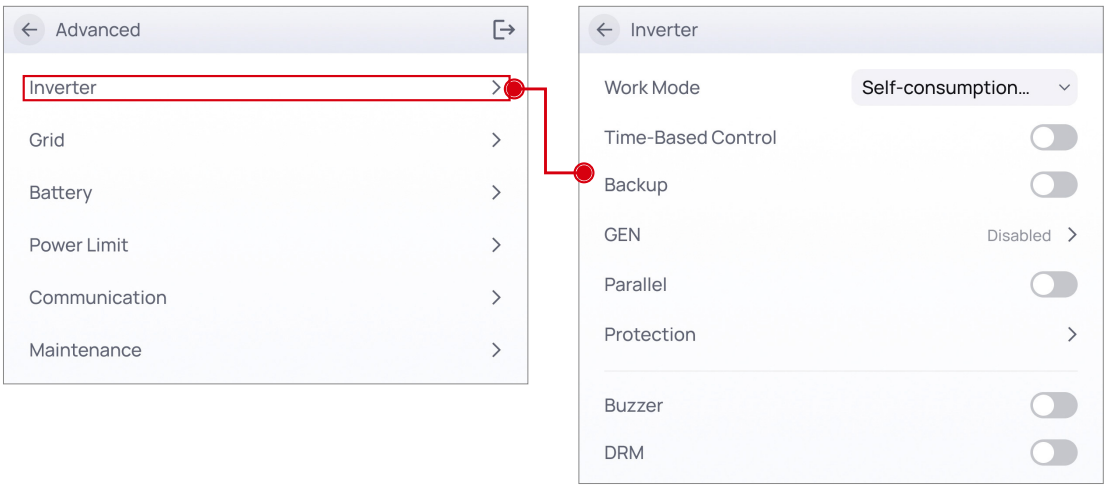
Advanced Settings (for Installer)

Advanced settings provides more parameter configuration options. The initial password is "admin".



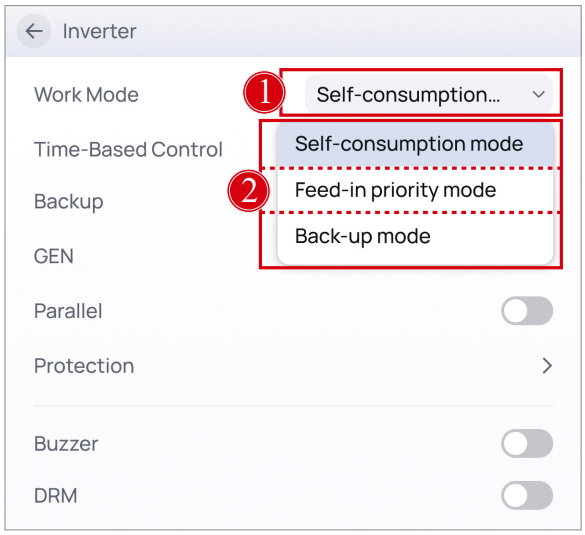
7.3.1 Inverter

Tap **Inverter** to enter the Inverter menu.



Work Mode

There are several work modes available.

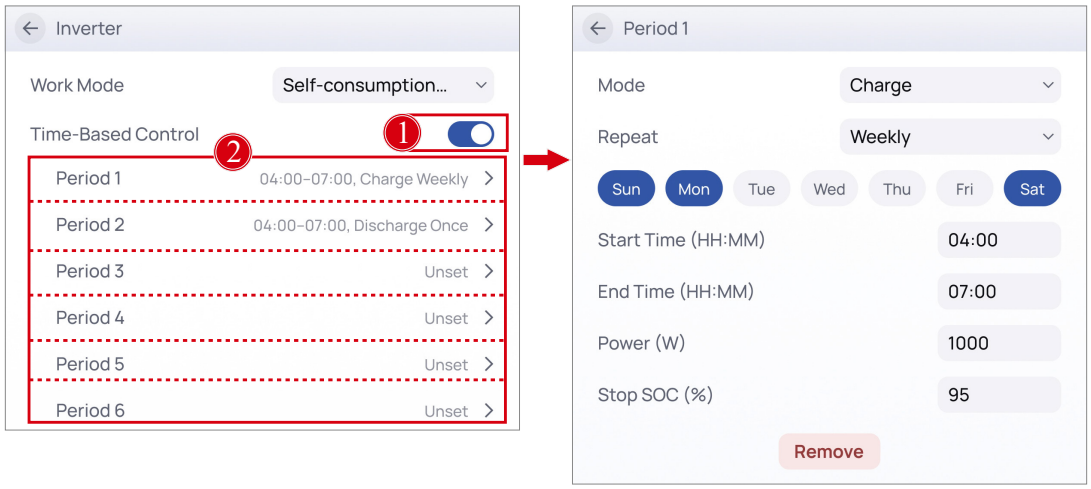


Parameter	Priority (PV Energy Consumption)
Self-consumption mode	Load > Battery > Grid
Feed-in Priority mode	Load > Grid > Battery
Back-up mode	Battery > Load > Grid

Time-based Control

This function is designed to control the time setting of charging and discharging the inverter. You can set the following parameters based on your needs:

- Start charging/discharging time: 00:00 to 23:59
- End charging/discharging time: 00:00 to 23:59
- Run cycle: once or every week
- Run date/day: the exact date

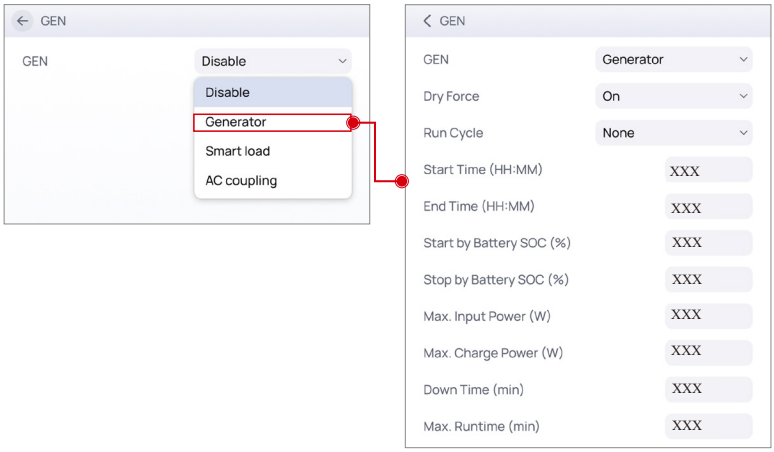


GEN

Tap **Inverter > GEN** to enter the GEN menu.

▶ Generator

The GEN port functions as an input port from the generator in off-grid conditions. The load or the battery can be supplied by the generator input. There are two ways to start and stop the generator : via inverter dry contact or manual control. In the former case, the inverter completely controls the start and stop of the generator. In the latter case, the generator is started and stopped by manual control.



1. The generator capacity should be 1.3 times larger than the capacity of the inverter.
2. Make sure the inverter is on standby before setting the Generator Input Mode.

Parameter	Description
Dry force	When the Grid power is abnormal, the generator is forced to be turned on.
Run Cycle	Generator cycle run mode. You can select None, Weekly or Monthly, which means the genera - tor runs every day, once a week or once a month. Day of Week/Date: the generator will run on the set date. Start Time (HH:MM): the time at which the generator will start running on the set date. End Time (HH:MM): the time at which the generator will end its running on the set date.
Start by Battery SOC (%)	Battery SOC below which the generator starts to charge the battery. Meanwhile, the generator running time should not exceed the set maximum runtime (Min).
Stop by Battery SOC (%)	Battery SOC above which the generator stops charging the battery.
Max. Input Power (W)	Limit the generator input power below the set value (W).
Max. Charge Power (W)	Maximum battery charge power from generator.
Down Time (min)	When the inverter disconnect the input from generator, the generator will keep working for a while by the down time setting value (Min). · For generator that switch on and off by dry contact, it will stop working automatically when the generator working time reaches to the down time setting value (Min). · For generator that are manually switched on and off, it will stop working by manual regardless of the down time setting value (Min).
Max. Runtime (min)	When the generator running time reaches to the setting value, the inverter will disconnect the input from generator. But the generator will keep working for a while defined by “Generator down time (Min)”. **Note:**"Max. Runtime (min) = 0" indicates that the generator's runtime is not subject to the "Max. Runtime" limitation.

Parameter	Description
Start by Battery Voltage (V)	Battery voltage below which the generator starts to charge the battery. Meanwhile, the generator running time should not exceed the maximum runtime setting value (Min).
Stop by Battery Voltage (V)	Battery voltage above which the generator stops charging the battery.

1. The total generator running time is equal to “Max. Runtime (min)” plus “Down Time (min)”.
2. You can set Capacity Management Mode to voltage (V) via **Battery > Capacity Management Mode**, parameter settings about **Start by Battery SOC** (%) will be changed to **Start by Battery voltage (V)**. Also, parameter settings about **Stop by Battery SOC** (%) will be changed to **Stop by Battery voltage (V)**.

Take the following parameter values as an example:

- Max. Input Power (W): 6000 W
- Max. Charge Power (W): 3000 W
- Start by Battery SOC (%): 50%
- Stop by Battery SOC (%): 100%
- Max. Runtime (min): 0 Min
- Down Time (min): 0 Min

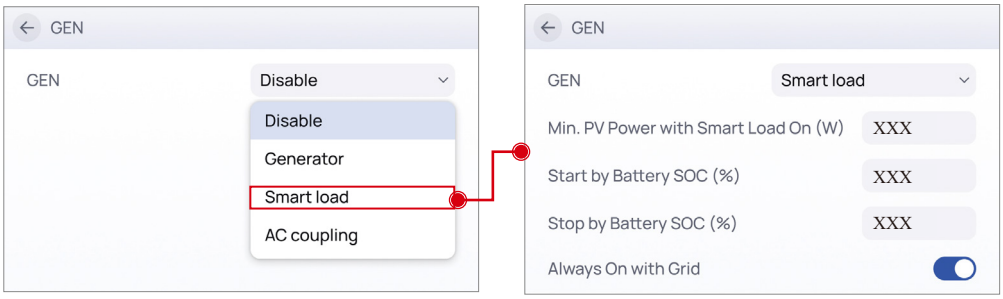
When Capacity Management Mode was set to SOC (%), the generator input status is as follows:

- In Off-Grid mode, the Generator will be ON or OFF depends on the battery SOC and Generator Max Runtime.
  - When the Battery SOC ≤ 50% and the Runtime is less than Max. Runtime (min), the GEN Port function will be enabled and the Generator will be ON.
  - When the Battery SOC ≥ 100% or the Runtime is over Max. Runtime (min), the GEN port function will be disabled and the Generator will be OFF.
- In On-Grid mode, the GEN Port function will be disabled and the Generator will be OFF.

1. If Generator and Grid are normal, the load and battery charging will be powered by the grid in priority.
2. "Max. Runtime (min) = 0" indicates that the generator's runtime is not subject to the "Max. Runtime" limitation.
3. When the capacity mode is set to voltage, the Generator Input Mode still follows the above logic.

▶ Smart Load

The GEN Port works as an output port for the Smart Load connected to the GEN terminal.



Parameter	Description
Min. PV Power with Smart Load On (W)	If the PV input power is higher than the setting value (Power), and the battery SOC exceeds the setting value simultaneously, the Smart Load will switch on.
Start by Battery SOC (%)	If the PV input power is higher than the setting value (Power), and the battery SOC exceeds the setting value simultaneously, the Smart Load will switch on.
Stop by Battery SOC (%)	If the battery SOC is lower than the setting value, the Smart Load will switch off.
Always On with Grid	When click "Always On with Grid" the Smart Load will switch on when the grid is present.
Start by Battery voltage (V)	If the battery voltage is higher than the setting value, and the PV input power exceeds the setting value (Power) simultaneously, the Smart Load will switch on.
Stop by Battery voltage (V)	If the battery voltage is lower than the setting value, the Smart Load will switch off.

> You can set Capacity Management Mode to voltage (V) via **Battery > Capacity Management Mode**, parameter settings about **Start by Battery SOC (%)** will be changed to **Start by Battery voltage (V)**. Also, parameter settings about **Stop by Battery SOC (%)** will be changed to **Stop by Battery voltage (V)**.

Take the following parameter values as an example:

- Min. PV Power with Smart Load On (W): 500 W
- Start by Battery SOC (%): 100%
- Stop by Battery SOC (%): 80%

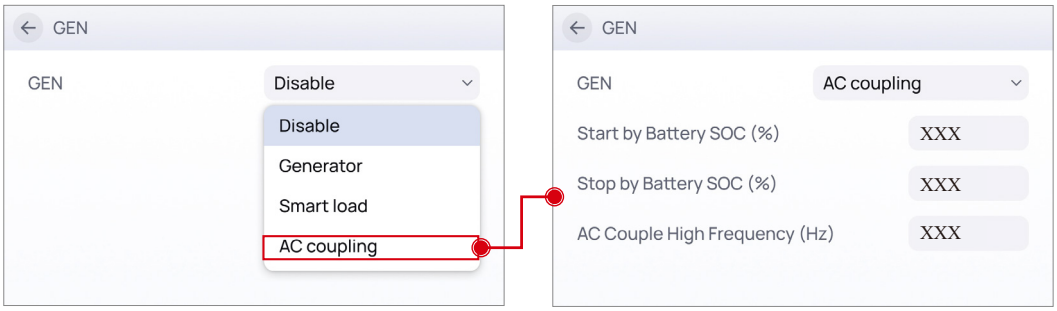
When Capacity Management Mode was set to SOC (%), the situations are as follows:

- **When Always On with Grid is ON**, if the grid is present, the Smart Load will be ON all the time. It is not affected by the change of above parameters. If the grid is not present, the Smart Load output will be ON or OFF depends on the PV power and the battery SOC.
  - If the PV power ≥500W and the battery SOC ≥100% , the Smart Load output will be ON. In the state of Smart Load ON, if the battery SOC <80%, the Smart Load will be OFF.
  - If the PV power <500W or the battery SOC <80%, the Smart Load output will be OFF.
- **When Always On with Grid is OFF** .
  - If the PV power ≥ 500W and the Battery SOC ≥ 100%, the GEN Port function will be enabled and the Smart Load will be ON. In the state of Smart Load ON, if the battery SOC <80%, the Smart Load will be OFF.
  - If the PV power <500W or the Battery SOC <80%, the GEN Port function will be disabled and the Smart Load will be OFF.

▶ AC Coupling

The GEN Port works as an input port from other grid-tied inverter whose rated power should be less than the hybrid inverter. The grid-tied inverter should also support de-rating output power according to the output frequency.

> The capacity of grid-tied inverter should be less than that of hybrid inverter.



Parameter	Description
Start by Battery SOC (%)	If battery SOC is lower than the default value, the inverter powers on and starts charging the battery.
Stop by Battery SOC (%)	If battery SOC is higher than the default value, the inverter powers off and stops charging the battery
AC Couple High Frequency (Hz)	This parameter is used to limit the output power of grid-tied inverter when the hybrid inverter works in off-grid mode. As the battery SOC reaches gradually to the setting value (Off), during the process, the grid-tied inverter output power will decrease linear. When the battery SOC is equal to the setting value (Off), the system frequency will become the setting value (AC Couple Frequency high) and the grid-tied inverter will stop working.
Start by Battery Voltage (V)	If battery voltage is lower than the setting value, the inverter powers on and starts charging the battery.
Stop by Battery Voltage (V)	If battery voltage is higher than the setting value, the inverter powers off and stops charging the battery

> You can set Capacity Management Mode to voltage (V) via **Battery > Capacity Management Mode**, parameter settings about **Start by Battery SOC (%)** will be changed to ***Start by Battery voltage (V)***. Also, parameter settings about **Stop by Battery SOC (%)** will be changed to **Stop by Battery voltage (V)**.

Take the following parameter values as an example:

- Start by Battery SOC (%): 80 %
- Stop by Battery SOC (%): 100%
- AC Couple High Frequency (Hz): 61 Hz

When Capacity Mode is set to SOC (%), the situations are as follows:

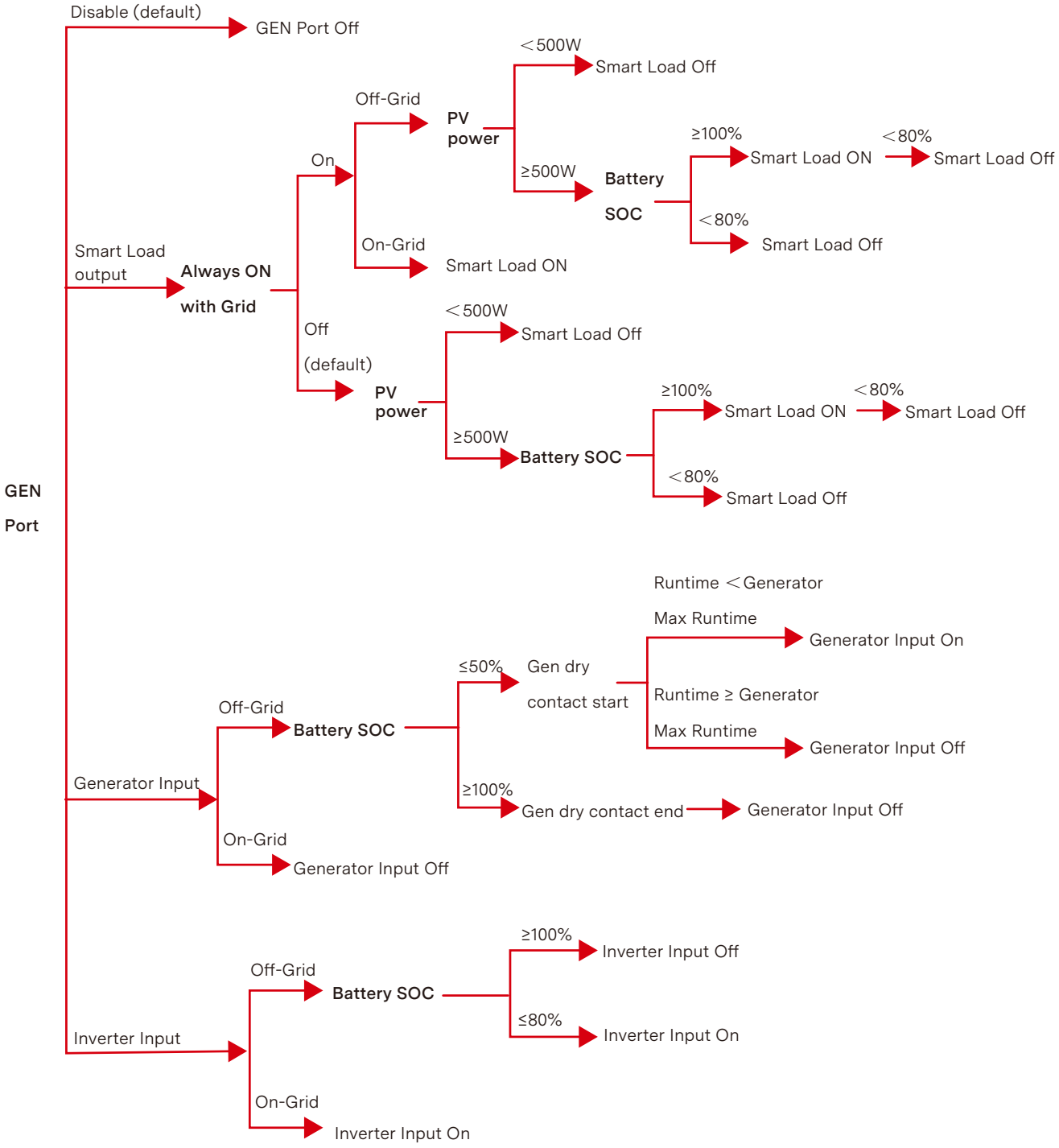
- In off-grid mode, the Inverter Input will be ON or OFF depending on the battery SOC.
  - When the Battery SOC ≤ 80%, the GEN port function will be enabled and Inverter Input will be ON. When the battery charge power is lower than the grid-tied inverter output power, the hybrid inverter will increase the output frequency to maximum 61Hz. Then the grid-tied inverter will work in limited power mode.

. When the Battery SOC ≥ 100%, the GEN port function will be disabled and Inverter Input will be OFF.

· In on-grid mode, the grid-tied inverter works as normal regardless of battery capacity.

▶ **Logic Diagram of Start/Stop Smart Load/Generator/AC Coupling Port Function.**

The parameter values in the following figure are examples only, please set the parameter values according to the actual situation.

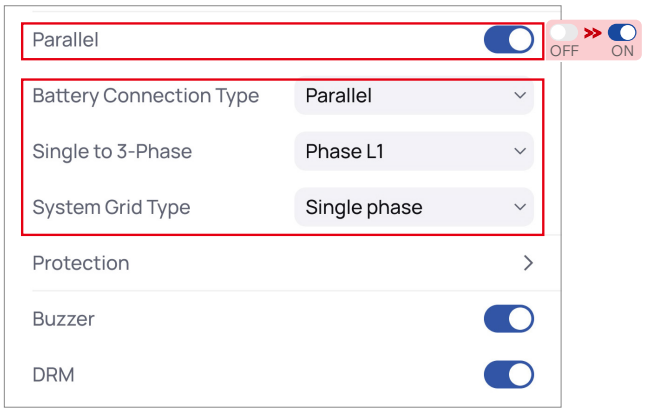


When the Capacity Mode is set to voltage, the GEN Port still follows the above logic.

Parallel

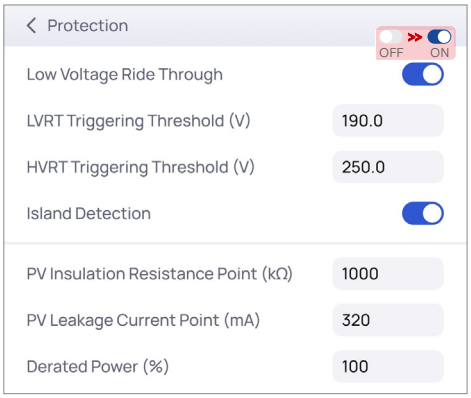
In Inverter menu, if enabling Parallel function, you can set the following parameters:

· Battery Connect Type
· Set phase position and System Grid Type (for more details, please refer to Chapter 4.)



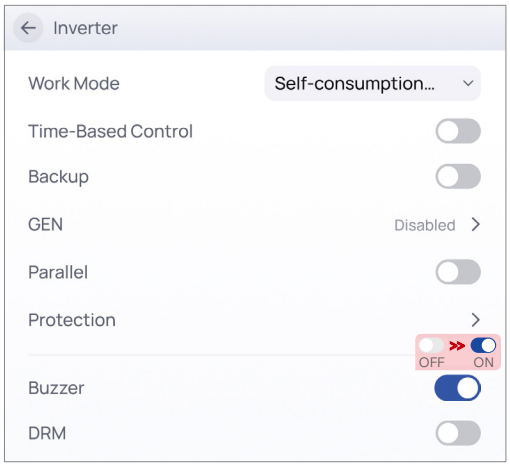
Protection

Tap **Inverter** > **Protection** to enter the Protection menu . Low Voltage Ride Through allows inverter to remain connected to the grid during voltage disturbances. Island Detection enables the inverter to disconnect from the grid when a grid failure occurs.



Buzzer

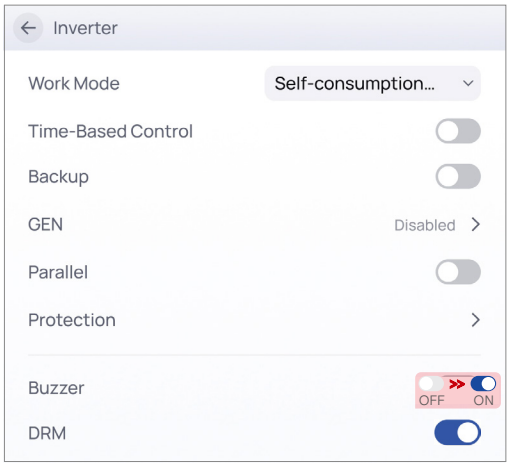
To enable this function, please perform the following steps:



DRM

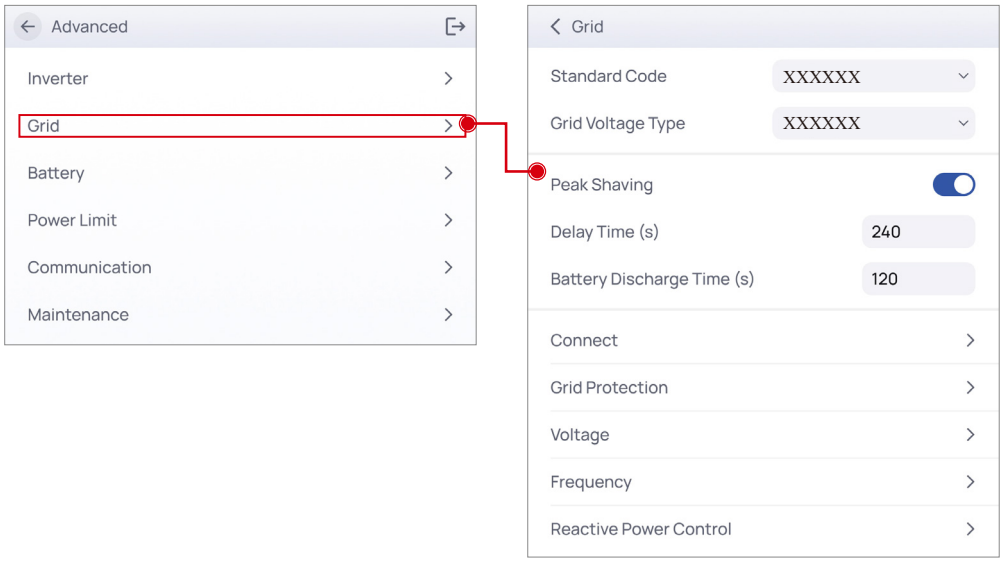
DRMs is a shortened form for “inverter demand response modes”. It is a compulsory requirement for inverters in Australia.

To enable this function, please perform the following steps:



7.3.2 Grid

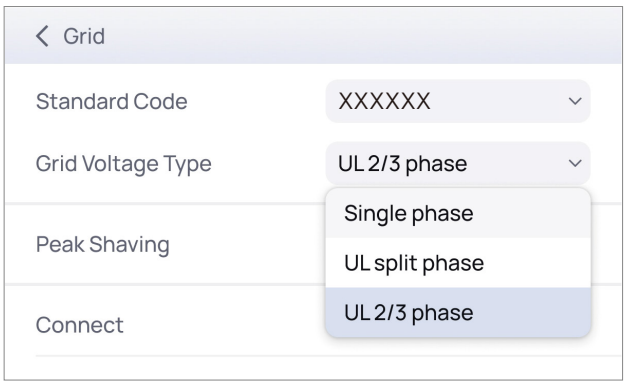
Tap **Grid** to enter the Grid menu.



Note: Please follow the local grid code, and then choose the corresponding grid standard code.

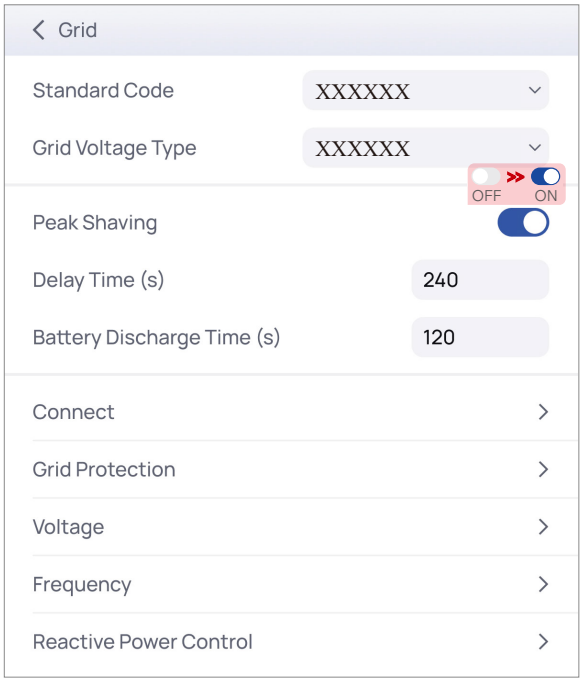
Grid Voltage Type

Set the "Grid Voltage Type" based on the system wiring.



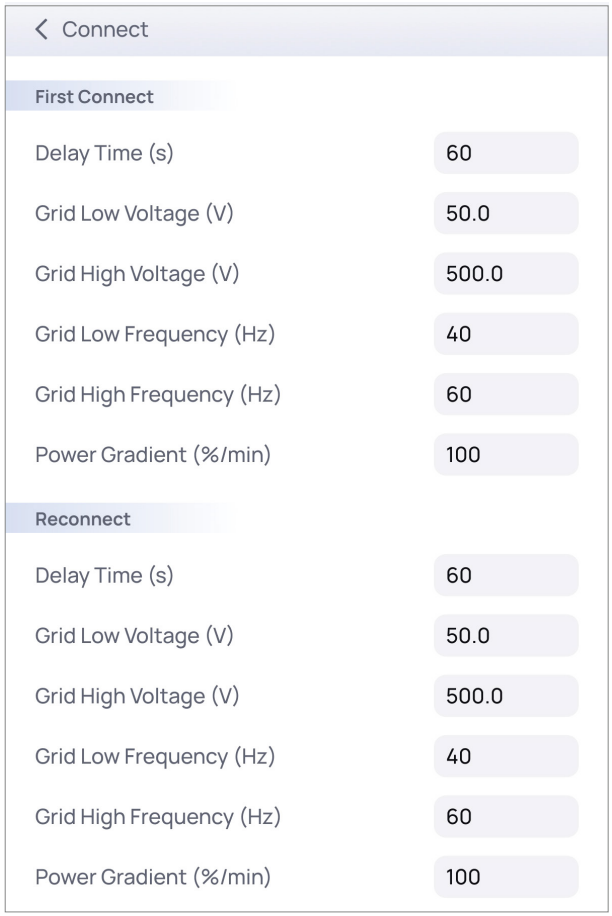
Peak shaving

The peak shaving function allows you to lower the peak power drawn from grid.



Connect

Tap **Grid** > **Connect** to enter the connect menu. Set the parameters based on the actual needs.

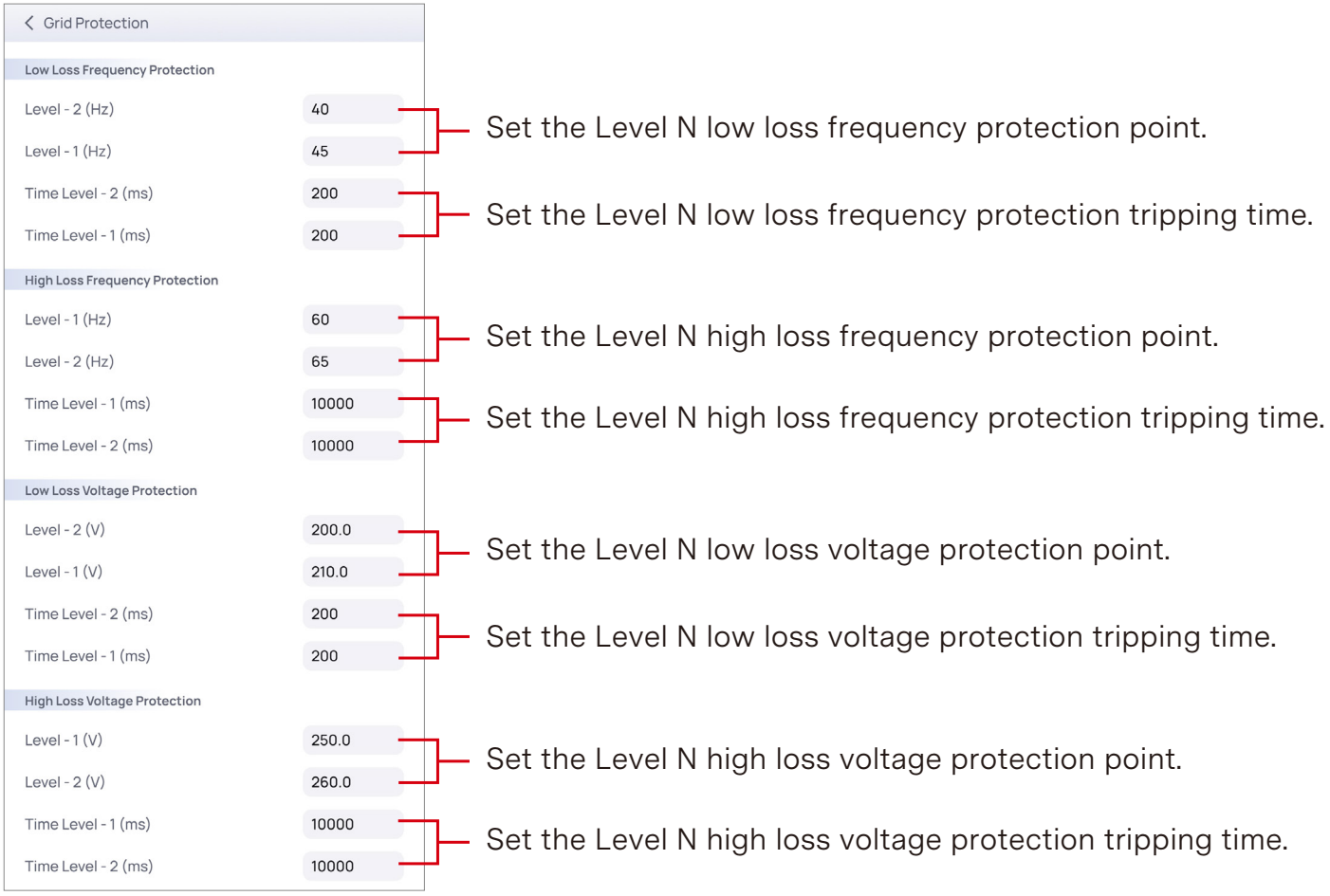


Parameter	Description
Connect	
Delay Time (s)	The waiting time for connecting the inverter to the grid.
Grid Low Voltage (V)	The allowable range of grid voltage when the inverter is first connected to the grid.
Grid High Voltage (V)	
Grid Low Frequency (Hz)	The allowable range of grid frequency when the inverter is first connected to the grid.
Grid High Frequency (Hz)	
Powe Gradient (%/min)	Indicates the percentage of incremental output power per minute based on the local requirements when the inverter is powered on for the first time.
Reconnect	
Delay Time (s)	The waiting time for connecting the inverter to the grid again.
Grid Low Voltage (V)	The allowable range of grid voltage when the inverter is reconnected to the grid.
Grid High Voltage (V)	
Grid Low Frequency (Hz)	The allowable range of grid frequency when the inverter is reconnected to the grid.
Grid High Frequency (Hz)	
Powe Gradient (%/min)	Indicates the duration for the output power increases to the rated power when the inverter reconnects to the grid due to a fault.

Grid Protection

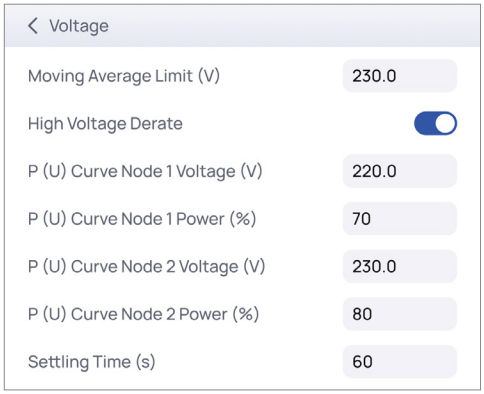
Tap **Grid** > **Grid Protection** to enter the Grid Protection menu . Set the parameters based on the actual needs.

* 'N' represents level number.



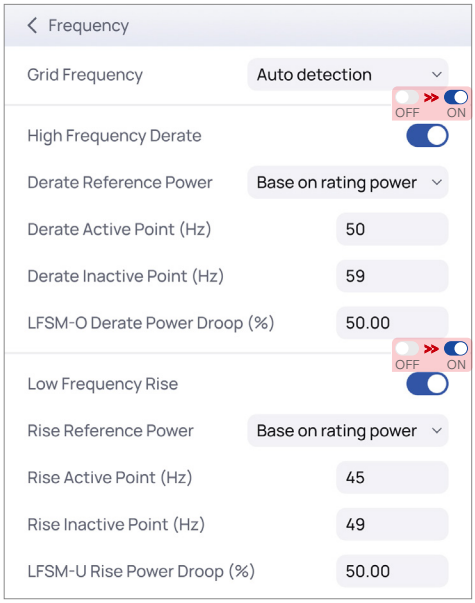
Voltage

Tap **Grid** > **Voltage** to enter the Voltage menu . Set the parameters based on the actual needs.



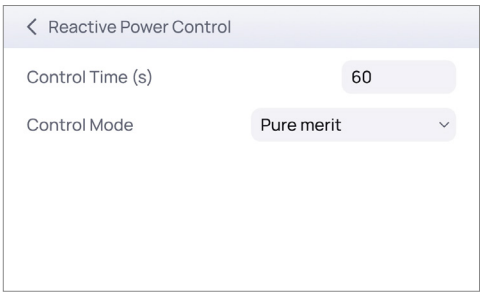
Frequency

Tap **Grid** > **Frequency** to enter the Frequency menu. Set the parameters based on the actual needs.



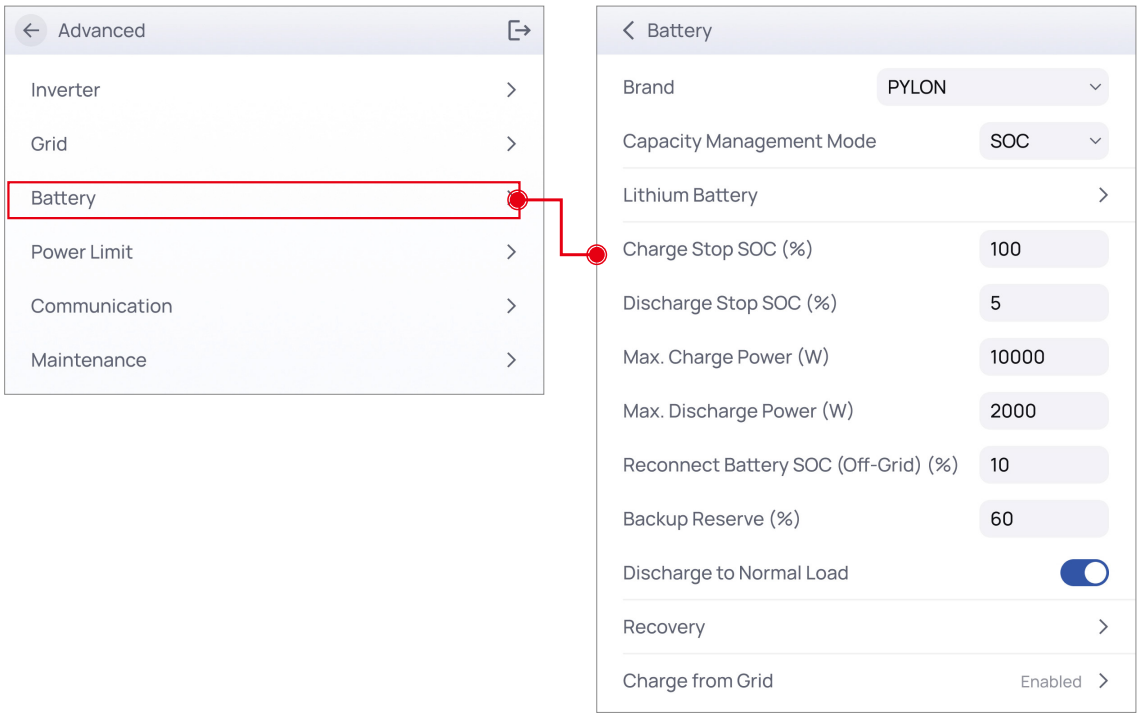
Reactive Power Control

Tap **Grid** > **Frequency** to enter the Frequency menu. Set the parameters based on the actual needs.



7.3.3 Battery

Tap **Battery** to enter the Battery menu.

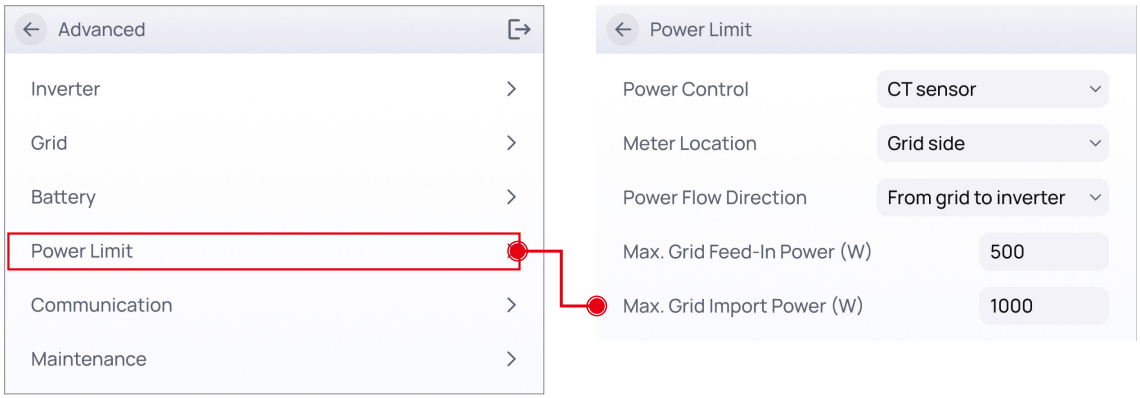


7.3.4 Power Limit

Tap **Power Limit** to enter the power limit menu.

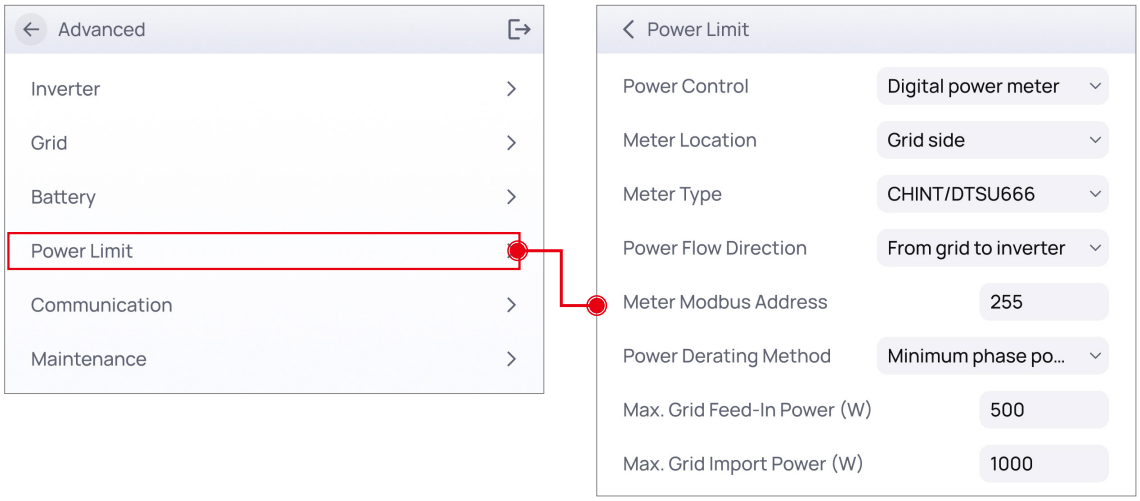
▶ **Inverter + CT**

- Set the "Power Control" to "CT Sensor"
- Set the "Meter Location" to "Grid side"
- Set the "Power Flow Direction" to "Flow grid to inverter"
- Set the "Max. Grid Feed-In Power (W)" if needed
- Set the "Max. Grid Import Power (W) if needed



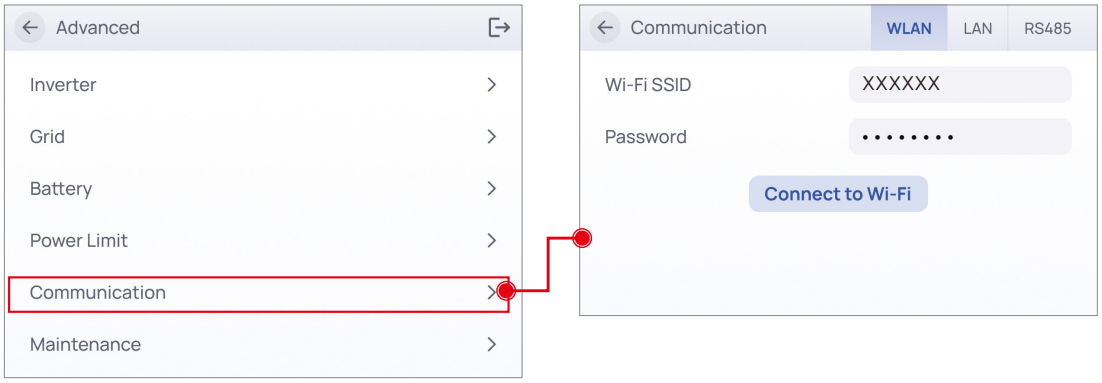
▶ **Inverter + Meter**

- Set the "Power Control" to "Digital power meter"
- Set the "Meter Location" to "Grid side"
- Set the "Meter Type" based on the actual situation
- Set the "Power Flow Direction" to "Flow grid to inverter"
- Set the "Meter Modbus Address" based on actual situation
- Set the "Max. Grid Feed-In Power (W)" if needed
- Set the "Max. Grid Import Power (W) if needed



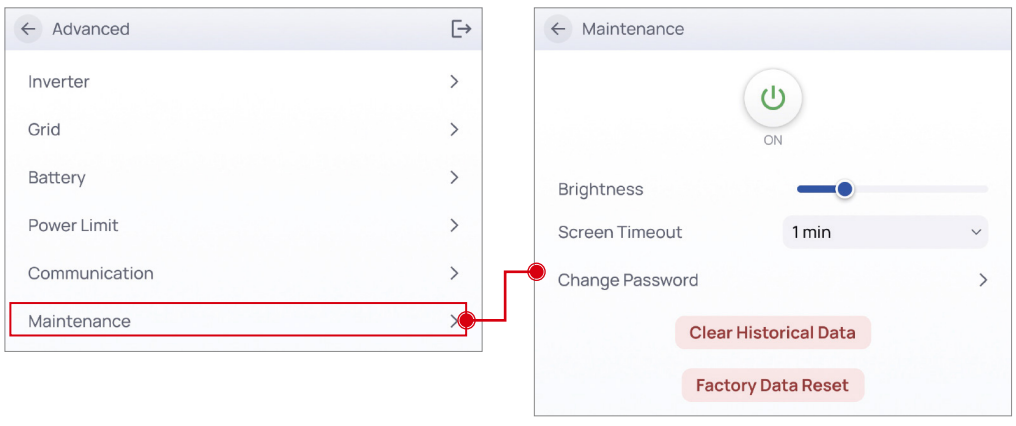
7.3.5 Communication

Tap **Communication** to enter the communication menu.



7.3.6 Maintenance

Tap **Maintenance** to enter the maintenance menu.



8. APP Setting

The app contains "Local Login" and "Cloud Login".

- Local login: The app reads data from inverter through Bluetooth connection with Modbus protocol to display and configure inverter parameter.
- Cloud login: The app reads data from cloud server through API and display inverter parameter.

Download App

- Scan the QR code on the inverter to download the APP.
- Download APP from the App Store or Google Play.

  For more details, refer to the Solarvolt User Manual.

9. Maintenance

> ⚠ Before maintaining and commissioning inverter and its peripheral distribution unit, switch off all the charged terminals of the inverter and wait at least 10 minutes after the inverter is powered off.

9.1 Routine Maintenance

Items	Check content	Maintain Content	Maintenance Interval
Inverter output status	Statistically maintain the status of electrical yield, and remotely monitor its abnormal status.	N/A	Weekly
Inverter running status	. Check that the inverter is not damaged or deformed. . Check for normal sound emitted during inverter operation. . Check and ensure that all inverter communications are running well.	If there is any abnormal phenomenon, replace the relevant parts.	Monthly
Inverter electrical connections	. Check that all AC, DC and communication cables are securely connected; . Check that PGND cables are securely connected; . Check that all cables are intact and free from aging.	If there is any abnormal phenomenon,replace the cable or re-connect it.	Semiannually
Inverter cleaning	Check periodically that the heat sink is free from dust and blockage.	Clean periodically the heat sink.	Yearly

9.2 Troubleshooting

When a fault occurs, please perform troubleshooting according to the following solutions. Contact your dealer if these solutions do not work.

Code	Fault	Solution
A0	Grid over voltage	1. If the alarm occurs occasionally, possibly the power grid voltage is abnormal temporarily, and no action is required. 2. If the alarm occurs repeatedly, contact the local power station. After receiving approval of the local power bureau,revise the electrical protection parameter settings on the inverter through the App. 3. If the alarm persists for along time, check whether the AC circuit breaker / AC terminals is disconnected, or if the grid has a power outage.
A1	Grid under voltage	
A3	Grid over frequency	
A4	Grid under frequency	
A2	Grid absent	Wait till power is restored.
B0	PV over voltage	Check whether the maximum input voltage of a single PV string exceeds the MPPT working voltage. If yes, modify the number of PV module connection strings.
B1	PV insulation abnormal	1. Check the insulation resistance against the ground for the PV strings. If a short circuit has occurred, rectify the fault. 2. If the insulation resistance against the ground is less than the default value in a rainy environment, set insulation resistance protection on the App.
B2	Leakage current abnormal	1. If the alarm occurs occasionally, the inverter can be automatically recovered to the normal operating status after the fault is rectified. 2. If the alarm occurs repeatedly, contact your dealer for technical support.
B4	PV under voltage	1. If the alarm occurs occasionally, possibly the external circuits are abnormal accidentally. The inverter automatically recovers to the normal operating status after the fault is rectified. 2. If the alarm occurs repeatedly or last a long time, check whether the insulation resistance against the ground of PV strings is too low.
B7	PV string reverse	Check and modify the positive and negative polarity of the input string.
C0	Internal power supply abnormal	1. If the alarm occurs occasionally, the inverter can be automatically restored, and no action is required. 2. If the alarm occurs repeatedly, please contact the customer service.

Code	Fault	Solution
C2	Inverter over dc-bias current	1. If the alarm occurs occasionally, possibly the power grid voltage is abnormal temporarily, and no action is required. 2. If the alarm occurs repeatedly, and the inverter fails to generate power, contact the customer service.
C3	Inverter relay abnormal	1. If the alarm occurs occasionally, possibly the power grid voltage is abnormal temporarily, and no action is required. 2. If the alarm occurs repeatedly, please refer to the suggestions or measures of Grid over voltage. 3. If the inverter fails to generate power, contact the customer service center. 4. If there is no abnormality on the grid side, the machine fault can be determined. (If you open the cover and find traces of damage to the relay, it can be concluded that the machine is faulty.) And please contact the customer service.
CN	Remote off	1. Local manual shutdown is performed in APP. 2. The monitor executed the remote shutdown instruction. 3. Remove the communication module and confirm whether the alarm disappears. If yes, replace the communication module. Otherwise, please contact the customer service.
C5	Inverter over temperature	1. If the alarm occurs occasionally, the inverter can be automatically recovered. No action is required. 2. If the alarm occurs repeatedly, please check whether the installation site has direct sunlight, bad ventilation, or high ambient temperature (such as installed on the parapet). Yet, if the ambient temperature is lower than 45° C and the heat dissipation and ventilation is good, please contact customer service.
C6	GFCI abnormal	1. If the alarm occurs occasionally, it could have been an occasional exception to the external wiring. The inverter can be automatically recovered. No action is required. 2. If it occurs repeatedly or cannot be recovered for a long time, please contact customer service.
C8	Fan abnormal	1. If the alarm occurs occasionally, please restart the inverter. 2. If it occurs repeatedly or cannot be recovered for a long time, check whether the external fan is blocked by other objects. Otherwise, Please contact customer service.
C9	Unbalance Dc-link voltage	1. If the alarm occurs occasionally, the inverter can be automatically recovered. No action is required. 2. If the alarm occurs repeatedly, the inverter cannot work properly. Please contact customer service.
CA	Dc-link over voltage	
CB	Internal communication error	1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required. 2. If the alarm occurs repeatedly, the inverter cannot work properly. Pls.contact the customer service center.

Code	Fault	Solution
CC	Software incompatibility	1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required. 2. If the alarm occurs repeatedly, the inverter cannot work properly. Pls. contact the customer service center.
CD	Internal storage error	1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required. 2. If the alarm occurs repeatedly, the inverter cannot work properly. Pls.contact the customer service center.
CE	Data inconsistency	1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required. 2. If the alarm occurs repeatedly, the inverter cannot work properly. Pls. contact the customer service center.
CF	Inverter abnormal	1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required. 2. If the alarm occurs repeatedly, the inverter cannot work properly. Pls.contact the customer service center.
CG	Boost abnormal	1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required. 2. If the alarm occurs repeatedly, the inverter cannot work properly. Pls.contact the customer service center.
CJ	Meter lost	1. Check the meter parameter Settings. 2. Local APP checks that the communication address of the inverter is consistent with that of the electricity meter. 3. The communication line is connected incorrectly or in bad contact. 4. Electricity meter failure. 5. Exclude the above, if the alarm continues to occur, please contact the customer service center.
P1	Parallel ID warning	It is Parallel ID Alarm. Please check the parallel communication cable, and check whether any inverter joins or exits online. All inverters are powered off completely, check the line, and then power on the inverters again to ensure that the alarm is cleared.
P2	Parallel SYN signal warning	Parallel synchronization signal is abnormal. Check whether the parallel com - munication cable is properly connected.
P3	Parallel BAT abnormal	The parallel battery is abnormal. Whether the battery of the inverter is reported low voltage or the battery is not connected.
P4	Parallel GRID abnormal	The parallel grid is abnormal. Whether the grid of the inverter is abnormal.

Code	Fault	Solution
P5	Phase Sequence abnormal	Ensure that Set phase position on APP is consistent with the power grid phase. There are two ways to clear this alarm: 1. Power off each inverter, change the phase sequence for each inverter and then power on inverter. 2. Standby each inverter, change the phase sequence for each inverter on APP, power off inverter, and then power on inverter. If exclude the above, the alarm continues to occur, please contact the customer service center.
D2	Battery over voltage	1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required. 2. Check that the battery overvoltage protection value is improperly set. 3. The battery is abnormal. 4. If exclude the above, the alarm continues to occur, please contact the customer service center.
D3	Battery under voltage	1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required. 2. Check the communication line connection between BMS and inverter (lithium battery). 3. The battery is empty or the battery voltage is lower than the SOC cut-off voltage. 4. The battery undervoltage protection value is improperly set. 5. The battery is abnormal. 6. If exclude the above, the alarm continues to occur, please contact the customer service center.
D4	Battery discharger over current	1. Check whether the battery parameters are correctly set. 2. Battery undervoltage. 3. Check whether a separate battery is loaded and the discharge current exceeds the battery specifications. 4. The battery is abnormal. 5. If exclude the above, the alarm continues to occur, please contact the customer service center.
D5	Battery over temperature	1. If the alarm occurs repeatedly, please check whether the installation site is in direct sunlight and whether the ambient temperature is too high (such as in a closed room). 2. If the battery is abnormal, replace it with a new one. 3. If exclude the above, the alarm continues to occur, please contact the customer service center.
D6	Battery under temperature	
D7	BACKUP output voltage abnor - mal	1. Check whether the BACKUP voltage and frequency Settings are within the specified range. 2. Check whether the BACKUP port is overloaded. 3. When not connected to the power grid, check whether BACKUP output is normal. 4. If exclude the above, the alarm continues to occur, please contact the customer service center.

Code	Fault	Solution
D8	Communication error (Invert - er-BMS)	1. Check whether the battery is disconnected. 2. Check whether the battery is well connected with the inverter. 3. Confirm that the battery is compatible with the inverter.It is recommended to use CAN communication. 4. Check whether the communication cable or port between the battery and the inverter is faulty. 5. If exclude the above, the alarm continues to occur, please contact the customer service center.
D9	Internal communication loss(E-M)	1. Check whether the communication cables between BACKUP, electricity meter and inverter are well connected and whether the wiring is correct. 2. Check whether the communication distance is within the specification range 3. Disconnect the external communication and restart the electricity meter and inverter.. 4. If exclude the above, the alarm continues to occur, please contact the customer service center.
DA	Internal communication loss(M-D)	
CU	Dcdc abnormal	1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required. 2. If the alarm occurs repeatedly, please check: · Check whether the MC4 terminal on the PV side is securely connected · Check whether the voltage at the PV side is open circuit, ground to ground, etc. 3. If exclude the above, the alarm continues to occur, please contact the customer service center.
CP	BACKUP over dc-bias voltage	1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required. 2. If the alarm occurs repeatedly, the inverter cannot work properly. Pls. contact the customer service center.
DB	BACKUP short circuit	1. Check whether the live line and null line of BACKUP output are short-circuited. 2. If it is confirmed that the output is not short-circuited or an alarm, please contact customer service to report for repair. (After the troubleshooting of alarm problems, BACKUP switch needs to be manually turned on during normal use.)
DC	BACKUP over load	1. Disconnect the BACKUP load and check whether the alarm is cleared. 2. If the load is disconnected and the alarm is generated, please contact the customer service. (After the alarm is cleared, the BACKUP switch needs to be manually turned on for normal use.)

10. Technical Specification

Model	SEL-11K4AH-210TU
Efficiency	
CEC. Efficiency	96.50%
Input (PV)	
Max. PV Input Power	15,000 W
Max. PV Voltage	600 V
Start-up Voltage	90 V
MPPT Operating Voltage Range	70 V to 540 V
Max. Input Current per MPPT	30 A / 22 A / 22 A
Max Short Current per MPPT	40 A / 30 A / 30 A
No. of PV Strings per MPPT	2 / 2 / 2
No. of MPPT	3
Input / Output (BAT)	
Battery Type	Lithium-ion/Lead-acid
Nominal Battery Voltage	51.2 V
Battery voltage range	40 V to 64 V
Max. charge/discharge current	210 A / 210 A
Max. charge/discharge power	10,000 W / 10,000 W
Output / Input (Grid)	
Nominal AC Output Power	11,400 W
Max. AC Output Apparent power	11,400 VA
Max. AC Output Current	47.5 A
Max. Grid Passthrough Current	200 A
Nominal Grid Voltage	120 V / 240 V (Split phase), 120 V / 208 V (2/3 phase)
Nominal Grid Frequency	50 Hz /60 Hz
Grid Frequency Range	45 Hz to 55 Hz / 55 Hz to 65 Hz (Adjustable)
Power Factor	> 0.99 @rated power (Adjustable 0.8 LG to 0.8 LD)
THDI	< 3 % (Rated Power)
Output (Load)	
Nominal Output Power	11,400 W
Max. AC Output Power (PF=1)	11,400 W
Nominal Output Current	47.5 A
Peak Output Apparent Power	150%, 10 s
Nominal Output Voltage	120 V / 240 V (Split phase) ,120 V / 208 V (2/3 phase)
Nominal Output Frequency	50 Hz / 60 Hz
Transfer Time	10 ms (typical)
THDV	< 3 % @100% R Load
Output/Input (GEN Port)	Max. 100 A / 24,000 W
Protection	
Protection Category	Class I
DC Switch	Yes
Anti-islanding Protection	Yes
AC Overcurrent Protection	Yes

Model	SEL-11K4AH-210TU
DC/AC Overvoltage Protection	Yes
AC Short Circuit Protection	Yes
PV Reverse Connection	Yes
Surge Arrester	DC Type II, AC Type II
Insulation Resistance Detection	Yes
Leakage Current Protection	Yes
Battery Breaker	Integrated (300 A)
Load Breaker	Integrated (2*200 A)
AFCI/RSD Monitoring	Yes
General	
Max. Operation Altitude	2000 m
Ingress Protection Degree	NEMA 3R
Operating Temperature Range	-25 °C to ~60°C (> 45 °C derating)
Relative Humidity	0 % to 100 %
Cooling Method	Smart Cooling
Mounting	Wall bracket
Dimensions (W*H*D)	17.6*35.5*10.6 inch (448*901*270 mm)
Weight	47 Kg / 103.6 lb
HMI & COM	
Display	LED , LCD
Communication	CAN (for BMS), RS485 (for meter), RS485, CAN (for parallel), Optional: WiFi / LAN
Certification	
Safety	UL 1741/CSA C22.2/UL 1699B
EMC	FCC Part 15 Class B
Grid	UL1741SA, UL1741SB, UL 1741 PCS CRD, IEEE1547, HECO SRD 2.0, CSIP
Warranty	5 Years/10 Years

NOTE

As the technology is constantly updated and improved, the illustrations in this document are for reference only. Contents including illustrations in this document are subject to change without notice.

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