NEOVOLTA

Hybrid Inverter

NV16KAC

WITH BREAKER



Installation Manual

For support scan here

800.364.5464

NEOVOLTA.COM

V2.09182026

DECLARATION

NeoVolta. (hereinafter referred to as "NeoVolta") reserves the right to modify the frame dimensions, functionality, technical data, parameters, standards without prior notice.

The contents of this manual have been checked for accordance with its described hardware and software. However, the contents of this manual may be subject to appropriate modification as a result of product upgrade, specification change and update of the manual, we cannot guarantee full accordance all the time. But the data in this manual are reviewed regularly and any necessary corrections are included in subsequent editions. Suggestions for improvement from readers are appreciated.

No part of this manual may be reproduced in any form, or by any means, without prior written permission of NeoVolta.

NeoVolta.

OTHER RIGHTS

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

Using data contained in firmware or software developed by NeoVolta, in part or in full, for commercial purposes by any means is prohibited.

Reverse engineering, cracking or any other operation that destroys the original programming design of software developed by NeoVolta is prohibited.

PREFACE

Thankyou for choosing hybrid inverter (hereinafter referred to as "inverter").

This user manual presents a detailed description of with respect to product features, structural characteristics, functions, installation, parameter settings, troubleshooting, commissioning and daily maintenance, etc. Be sure to carefully read through the safety precautions before use and keep it properly at a place for easy access.

Compliance Notice — UL 9540 Third Edition · Clause 46.14

The NV16KAC Hybrid Inverter is designed and validated for use as the Power Conversion Equipment (PCE) in a DC Energy Storage System (DC ESS) as defined under UL 9540, Third Edition. The NVPlus-16-H battery system holds a standalone UL 9540 Third Edition DC ESS listing and has been confirmed compatible with the NV16KAC through manufacturer interoperability testing (Renon Technology, Report FM-RD-DQA-014-017, Rev. A01, April 2026).

In accordance with UL 9540 Third Edition Clause 46.14, this section of the installation manual constitutes the required manufacturer documentation establishing a valid and compliant DC ESS pairing. The following sections define the requirements that must be met for this combination to remain within the scope of the UL 9540 Third Edition DC ESS listing:

Validated Compatible Inverter Model

Parameter	Value
Brand	NeoVolta
Model	**NV16KAC**
Inverter certification	UL 1741 SA / SB · IEEE 1547-2018 · Certificate No. [XXXXX]
ARM firmware version	1.0706 (230205)
DSP firmware version	1.0806 (100011)
HMI firmware version	1.0301 (3.09)
Interoperability test report	FM-RD-DQA-014-017 Rev A01 · Renon Technology (Shenzhen) Co., Ltd. · 2026-04-30
Test summary	35 tests · 34 PASS · 1 N/A (inverter-side forced charging not applicable to NV16KAC)

Electrical Interface Requirements

Parameter	Specification
Battery chemistry	LiFePO4 (Lithium Iron Phosphate)
Rated battery voltage	51.2 V DC (nominal)
Battery voltage operating range	40 V – 58 V DC
Charge cutoff voltage	56.8 V (CAN frame 0x351)
Maximum charging current	157 A (BMS-requested; CAN frame 0x351)
Maximum discharging current	190 A (BMS-requested; CAN frame 0x351)

Communication and Control Interface Requirements

CAN Frame	BMS Fault Condition	Required Inverter Response	Verified
0x359	Cell undervoltage protection	Battery powers off; inverter shuts	**PASS**
0x359	Discharge high-temperature	Displays A03-Bat Disconnect + A23-	**PASS**
0x359	Discharge high-temperature	Inverter shuts down	**PASS**
0x359	Discharge low-temperature	Displays A03-Bat Disconnected +	**PASS**
0x359	Discharge low-temperature	Inverter shuts down	**PASS**
0x359	Discharge overcurrent	Displays A04-Bat Under Volt	**PASS**
0x359	Discharge overcurrent	Inverter shuts down	**PASS**
0x359	Charging high-temperature	Displays A24-Bat Over Temp	**PASS**
0x359	Charging low-temperature	Displays A25-Bat Under Temp	**PASS**
—	BMS communication	Stop within 18 s; report A28-BMS	**PASS**
—	BMS communication	Stop within 20 s; resume within 60 s	**PASS**

Protection Coordination Requirements

CAN Frame	BMS Fault Condition	Required Inverter Response	Verified
0x359	Cell undervoltage protection	Battery powers off; inverter shuts	**PASS**
0x359	Discharge high-temperature	Displays A03-Bat Disconnect + A23-	**PASS**
0x359	Discharge high-temperature	Inverter shuts down	**PASS**
0x359	Discharge low-temperature	Displays A03-Bat Disconnected +	**PASS**
0x359	Discharge low-temperature	Inverter shuts down	**PASS**
0x359	Discharge overcurrent	Displays A04-Bat Under Volt	**PASS**
0x359	Discharge overcurrent	Inverter shuts down	**PASS**
0x359	Charging high-temperature	Displays A24-Bat Over Temp	**PASS**
0x359	Charging low-temperature	Displays A25-Bat Under Temp	**PASS**
—	BMS communication	Stop within 18 s; report A28-BMS	**PASS**
—	BMS communication	Stop within 20 s; resume within 60	**PASS**

IMPORTANT NOTES

- Please assure the intactness of product enclosure and all safety covers before installation. Operation must conform to the requirements of this manual and local industrial safety regulations and/or electrical codes.
- In the event of damage or loss of user manual, users download a new copy online at NeoVolta.com.
- Contents of this manual may be subject to appropriate modification as a result of product upgrade, specification change and update of the manual.
- If any item as stated in this manual is not clear, please contact our technical service department. 800.364.5464
- If any anomaly occurs after power up or during the operation, it is essential to stop the machine and identify the fault or seek technical services as soon as possible.

It will be referred to as "inverter" hereinafter unless otherwise specified.

The inverter must only be installed by professional technicians. The professional technician is required to meet requirements as follows:

- Know electronic, electrical wiring and mechanical expertise, and be familiar with electrical and mechanical schematics.
- Be familiar with local standards and relevant safety regulations of electrical systems.
- Have received professional training related to the electrical equipment installation and commissioning.
- Be able to quickly respond to hazards or emergencies that occur during installation and commissioning.

TECHNICAL SUPPORT

Before installation, wiring, operation, and repair to the inverter, please read carefully and strictly comply with all its safety precautions in this manual.

Please ensure all the warning marks on the inverter are clear and distinct. Replace or add the obscure or missed warning marks.

If you have any question, or anything that it is not clear for you, or have some troubles during installation, wiring, and/or operation, you are suggested to contact us at 800.364.5464.

CONTENT

1 Notes on this manual 001 1.1
Scope of validity 001 1.2
Target group 001 1.3
Symbols used 002 **2**
Safety 003 2.1
Important safety instructions 003 2.2
Explanation of symbol 006 **3**
Introduction 007 3.1
Basic features 007 3.2
Electrical connection 007 3.3
Work modes 010 3.4
Dimension 012 3.5
Terminals of PV inverter 012 **4**
Installation 015 4.1
Check for physical damage 015 4.2
Packing list 015 4.3
Mounting 016 **5**
Electrical connection 021 5.1
PV connection 021 5.2
Grid connection (GEN connection) 022 5.3
Back-up: load connection 023 5.4
Battery connection 025 5.5
WiFi connection (optional) 027 5.6
CT installation instructions 028 5.7
Earth connection 029 5.8
RSD (ON / OFF) installation 030 **6**
LCD operation 031

6.1 Control panel 033
6.2 Working status 034
6.3 Setting 039
6.4 Maintenance setting 050 **7**
Generator use operation guide 056 7.1
Generator use diagram 056 7.2
Generator operation notes 058 7.3
Generator setting 059 **8**
Inverter parallel guide 062 8.1
Parallel system diagram 062 8.2
Parallel communication cable connection 064 8.3
Parallel operation notes 064 8.4
Parallel system setting ..... 066 **9 AC**
couple (micro-inverter) guide ..... 068 9.1 AC
couple connection ..... 068 9.2 AC
couple function setting 069 **10**
Advanced mode operation guide 071 10.1
Advanced mode introduction 071 **11**
APP operation 076 11.1
Home page 076 11.2
Local mode 076 **12**
Fault diagnosis and solutions 084 **13**
Technical parameters 087 13.1
Inverter specification 087

1 Notes on this manual

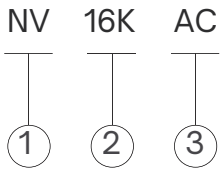
1.1 Scope of validity

This manual is an integral part of hybrid, it describes the assembly, installation, commissioning, maintenance, and failure type of the product. Please read it carefully before operating.

The R12-16KLNA series consist of the following inverter models:

(1) Inverter terminals with circuit breakers.

- **R12KLNA-P6**
- **R16KLNA-P6**



Naming rules, For example: NV16KAC.

NV = NeoVolta

16K = Output Power in kW

AC = Alternating Current

Store this manual where it will be always accessible.

1.2 Target group

This manual is for qualified electricians. The tasks described in this manual only can be performed by qualified electricians.

1.3 Symbols used

The following types of safety instructions and general information appear in this document as described below:



- "Danger" indicates a hazardous situation which, if not avoided, will result in death or serious injury.



- "Warning" indicates a hazardous situation which, if not avoided, could result in death or serious injury.



- "Caution" indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.



- "Note" provides tips that are valuable for the optimal operation of ours.

2 Safety

2.1 Important safety instructions



- Danger to life due to high voltages in the inverter!
- All work must be carried out by qualified electrician.
- The equipment is not to be used by unauthorized personnel, unless they have been given supervision or instruction.
- Children should be supervised to ensure that they do not play with the equipment.



- Danger of burn injuries due to hot enclosure parts!
- During operation, the upper lid of the enclosure and the enclosure body may become hot.
- Only touch the lower enclosure lid during operation.



- Possible damage to health as a result of the effects of radiation!
- Do not stay closer than 8in to inverter for any length of time.



- Grounding the PV generator. Comply with the local requirements for grounding
- the PV modules and the
  PV generator. It is recommends connecting the generator frame and other electrically conductive surfaces in a manner which ensures continuous conduction and ground these in order to have optimal protection of system and persons.



- ~~Ensure input DC voltage □Max. DC voltage. Over voltage may cause damage.~~
- Permanent damage to inverter or other losses, which will not be included in warranty!



- Authorized service personnel must disconnect both AC and DC power from inverter before attempting any maintenance, cleaning or working on any circuits connected to inverter.
- Do not operate the inverter when the device is running.
- Risk of electric shock!

- Please keep the user manual properly. When operating equipment, in addition to following the general precautions in this document, follow the specific safety instructions. We will not be liable for any consequence caused by the violation of the safety operation regulations and design, production, and usage standards.
- Only accessories shipped with the inverter are recommended for use, Otherwise, it may result in a risk of fire, electric shock, or injury to person.

- Make sure the existing wiring is in good condition and the wire is not undersized. Do not disassemble any parts of the inverter which are not mentioned in the installation guide. It contains no user-serviceable parts. See warranty for instructions on obtaining service. Attempting to service the inverter yourself may result in a risk of electric shock or fire and will void your warranty.
- Keep away from flammable, explosive materials to avoid fire disaster.
- The installation place should be away from humid or corrosive substance.
- Authorized service personnel must use insulated tools when installing or working with this equipment.
- Never touch either the positive or negative pole of the PV connecting device. It's strictly prohibited touching both at the same time.
- The unit contains capacitors that remain charged to a potentially lethal voltage after the MAINS, battery and PV supply has been disconnected.
- Hazardous voltage will present for up to 5 minutes after disconnection from power supply.
- CAUTION-RISK of electric shock from energy stored in capacitor, never operate on the inverter couplers, the MAINS cables, Battery cables, PV cables or the PV generator when power is applied. After switching off the PV, battery, and Mains, always wait for 5minutes to let the intermediate circuit capacitors discharge before unplugging DC, battery in plug and MAINS couplers.
- When accessing the internal circuit of inverter, it is very important to wait 5 minutes before operating the power circuit or demounting the electrolyte capacitors inside the device. Do not open the device beforehand since the capacitors require time to suffciently discharge!
- Surge protection devices (SPDs) for PV installation.



- Over-voltage protection with surge arresters should be provided when the PV power system is installed.
- The grid connected inverter is not fitted with SPDs in both PV input side and MAINS side.

- Lightning will cause a damage either from a direct strike or from surges due to a nearby strike.
- Induced surges are the most likely cause of lightning damage in majority or installations, especially in rural areas where electricity is usually provided by long overhead lines. Surge may be included on both the PV array conduction and the AC cables leading to the building.
- Specialists in lightning protection should be consulted during the end use application. Using appropriate external lightning protection, the effect of a direct lightning strike into a building can be mitigated in a controlled way, and the lightning current can be discharged into the ground.
- Installation of SPDs to protect the inverter against mechanical damage and excessive stress include a surge arrester in case of a building with external lightning protection system (LPS) when separation distance is kept.

- To protect the DC system, surge suppression device (SPD type2) should be fitted at the inverter end of the DC cabling and at the array located between the inverter and the PV generator, if the voltage protection level (VP) of the surge arresters is greater than 1100V, an additional SPD type3 required for surge protection for electrical devices.
- To protect the AC system, surge suppression devices (SPD type2) should be fitted at the main incoming point of AC supply (at the consumers cutout), located between the inverter and the meter/distribution system.
- All DC cables should be installed to provide as short a run as possible, and positive and negative cables of the string or main DC supply should be bundled together. Avoiding the creation of loops in the system.
- Spark gap devices are not suitable to be used in DC circuits once conducting, they won't stop conducting until the voltage across their terminals is typically more than 30 volts.

Anti-islanding effect

• Islanding effect is a special phenomenon that grid-connected PV system still supply power to the nearby grid when the voltage loss has happened in the power system. It is dangerous for maintenance personnel and the public.

Hybrid series inverter provide active frequency drift (AFD) to prevent islanding effect.

PE connection and leakage current

• The end-use application shall monitor the protective conductor by residual current operated protective device (RCD) with rated fault current Ifn□ 240mA which automatically disconnects the device in case of a fault.

• The device is intended to connect to a PV generator with a capacitance limit of approx. 700nf.

• Incorrect grounding can cause physical injury, death or equipment malfunction and increase electromagnetic.



- High leakage current!
- Earth connection essential before connecting supply.

Battery safety instructions

• Hybrid series inverter should be worked with low voltage battery, for the specific parameters such as battery type, nominal voltage and nominal capacity etc, please refer to chapter 13.

• As accumulator batteries may contain potential electric shock and short-circuit current danger, to avoid accidents that might be thus resulted, the following warnings should be observed during battery replacement:

1. Do not wear watches, rings or similar metallic items.
2. Use insulated tools.
3. Put on rubber shoes and gloves.

4. Do not place metallic tools and similar metallic parts on the batteries.
5. Switch offload connected to the batteries before dismantling battery connection terminals.
6. Only personal with proper expertise can carry out the maintenance of accumulator batteries.

2.2 Explanation of symbol

This section gives an explanation of all the symbols shown on the inverter and on the type label.

Table 2-1 Symbols on the type label

Symbols	Symbols on the type label
	UL certified.
	This symbol indicates that you should wait at least 5mins after disconnecting the inverter from the utility grid and from the PV panel before touching any inner live parts.
	Keep dry! The package/product must be protected from excessive humidity and must be stored under cover.
	Refer to the operating instructions.
	Fragile - The package/product should be handled carefully and never be tipped over or slung.
	Products should not be disposed as household waste.
	No more than six (6) identical packages being stacked on each other.
	Components of the product can be recycled.
	Danger of hot surface!
	Danger of high voltage and electric shock!
	Caution! Failure to observe a warning indicated in this manual may result in injury.

3 Introduction 3.1 Basic features

Hybrid series is a high-quality inverter which can convert solar energy to AC energy and store energy into battery.

The inverter can be used to optimize self-consumption, store in the battery for future use or feed into public grid. Work mode depends on PV energy and user's preference. It can provide power for emergency use during the grid lost by using the energy from battery and inverter (generated from PV).

3.2 Electrical connection

Figure 3-1 Electrical connection diagram

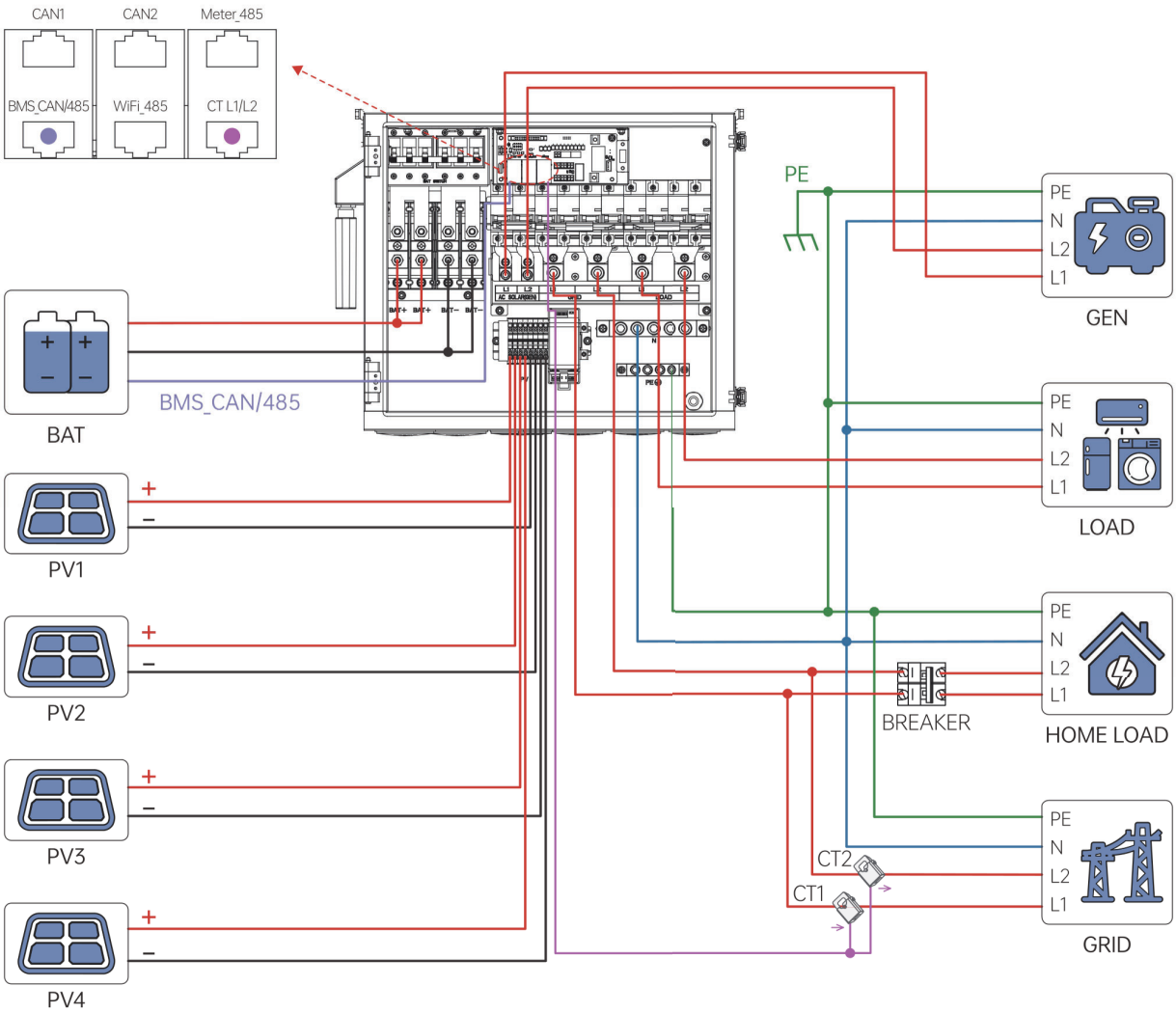
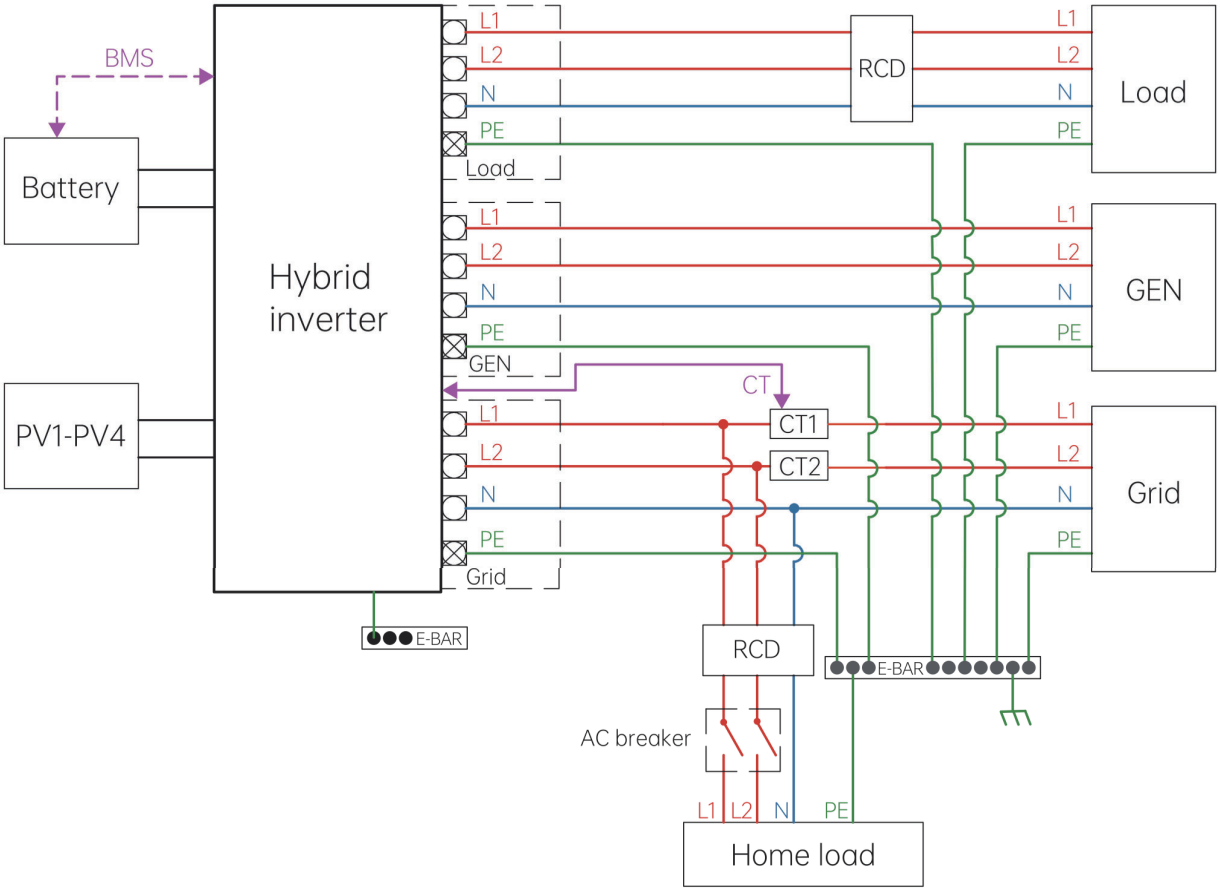
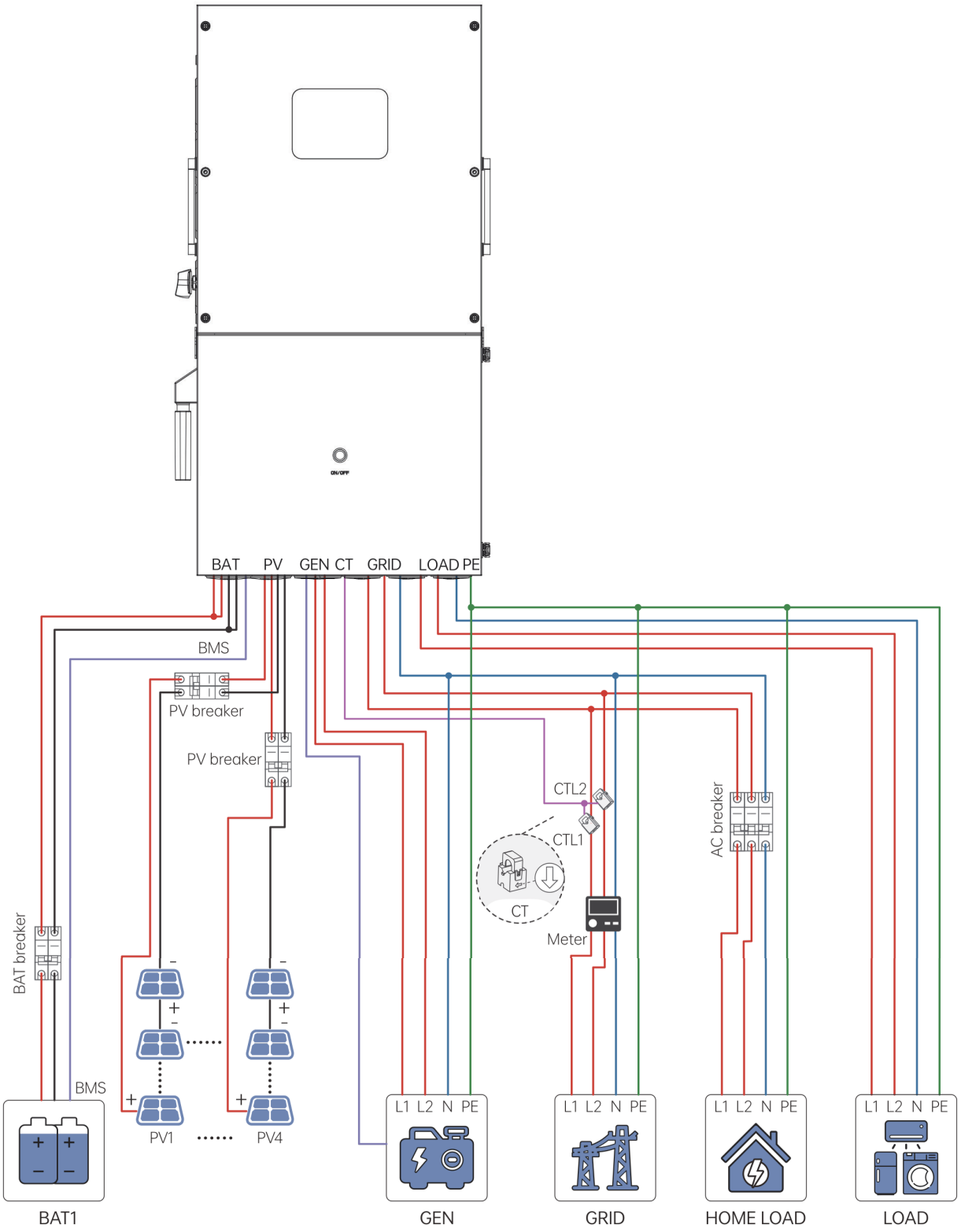


Figure 3-2 System basic wiring diagram



All switches and RCD devices in the figure are for reference only, and the specific installation shall be subject to local regulations.

- Please control the home loads, and make sure it's within the "BACK-UP output rating" under BACK-UP mode, otherwise the inverter will shut down with an "overload fault" warning.
- Please confirm with the mains grid operator whether there are any special regulations for grid connection.



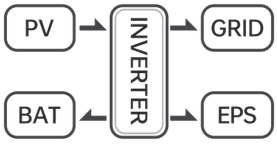
- The arrow on the CT points to the power grid, as shown.
- If the CT connector is improperly connected, the inverter cannot read the data correctly, so that the relevant working conditions cannot be realized normally.

3.3 Work modes

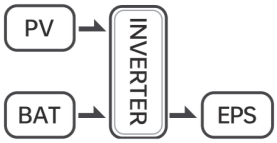
Inverter provides multiple work modes based on different requirements.

Work mode: self-use

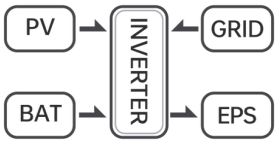
1. When PV, Grid, Battery is available:



A. Solar energy provides power to the loads as first priority, if solar energy is sufficient to power all connected loads, solar energy excess power will provides to charge battery, and then reduntant power will feed to grid.

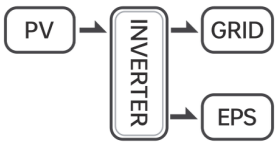


B. Solar energy provides power to the loads as first priority, if solar energy is not sufficient to power all connected loads, battery energy will supply power to the loads at the same time.

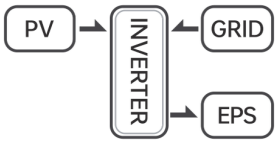


C. Solar energy provides power to the loads as first priority, if solar energy and battery are not sufficient to power all connected loads, utility energy (Main grid) will supply power to the loads with solar energy at the same time.

2. When PV, Grid is available (without battery):

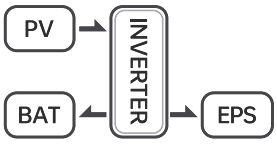


A. Solar energy provides power to the loads as first priority, if solar energy is sufficient, the excess power will be fed to grid.

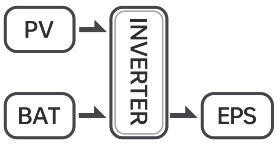


B. Solar energy provides power to the loads as first priority, if solar energy is not sufficient to power all connected loads, Grid energy will supply power to the loads at the same time.

3. When PV, Battery is available (Grid is disconnected):



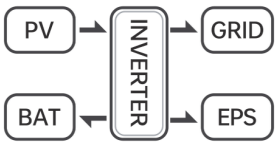
A. Solar energy provides power to the loads as first priority, if solar energy is sufficient to power all connected loads, solar energy will provides to charge battery.



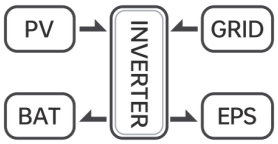
B. Solar energy provides power to the loads as first priority, if solar energy is not sufficient to power all connected loads, battery energy and solar energy will supply power to the loads at the same time.

Work mode: peak shift

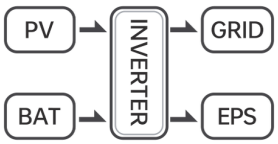
1. When PV, Grid, Battery is available:



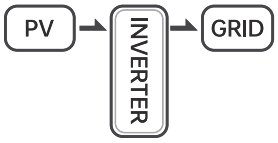
A. On charge time, solar energy will charge battery as first priority. The excess energy will supply power to the loads. If solar energy is sufficient to supply loads and charge battery, and If there's still some extra energy, then the excess power will feed the power to grid.



B. On charge time, solar energy will charge battery as first priority, then the excess solar energy will supply power to loads. If solar energy is not sufficient to charge battery and supply loads, grid will supply all the connected loads with solar energy together.

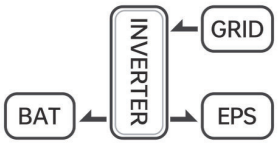


C. On discharge time, solar energy provides power to the loads as first priority, if solar energy is sufficient to supply loads, and if there's still some extra energy from solar energy, then the excess power and battery will deliver the power to the grid at the same time.

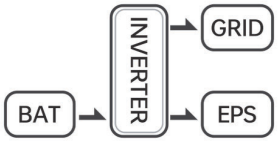


D. In the period of no charge or discharge, the solar power supply loads at first priority, excess energy to the grid.

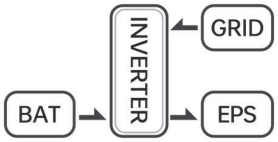
2. When Grid, Battery is available (PV is disconnected):



A. On charge time, grid will charge battery and supply power to the connected loads at the same time.



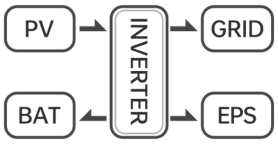
B. On discharge time, if load power is less than battery power, battery will supply power to loads as first priority, the excess power will be feed to grid.



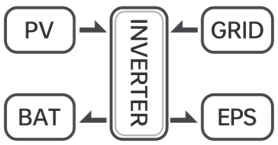
C. On discharge time, if load power is more than battery power, battery and grid will supply power to the loads at the same time.

Work modes: Bat priority

1. When PV, Grid, Battery is available:

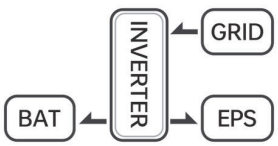


A. Solar energy will charge battery as first priority, if solar energy is excess, the excess power will supply load. If there's still some extra energy, then the excess power will be feed the power to grid.



B. Solar energy will charge battery as first priority, if solar energy is excess, the excess power will supply load. If solar energy is not sufficient to charge battery and supply loads, grid will supply power to loads.

2. When Grid, Battery is available (PV is disconnected):



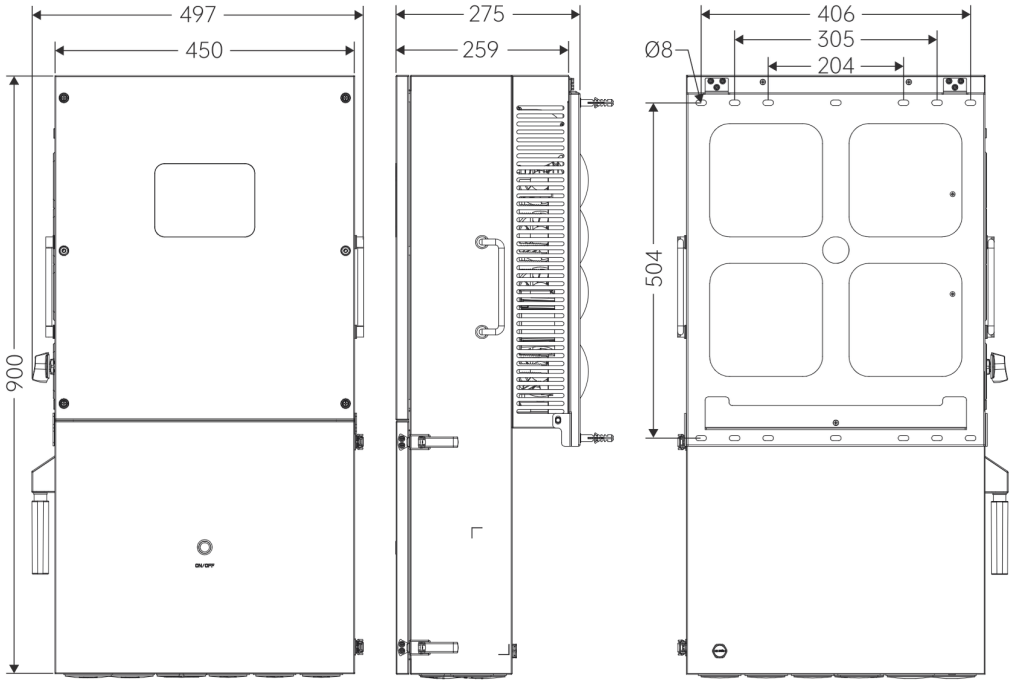
Grid will supply power to load and charge battery at the same time.

- If set anti-reverse function allowable, Once on the work mode of self-use, peak shift, battery priority, the system will not feed power to grid.

In addition to the above three basic modes, there is also an "advanced mode". Please refer to chapter 10 for details.

3.4 Dimension

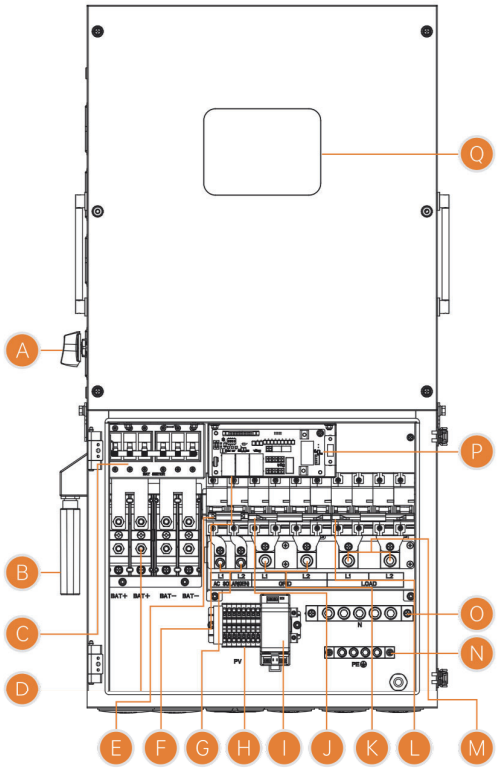
Figure 3-3 Product size

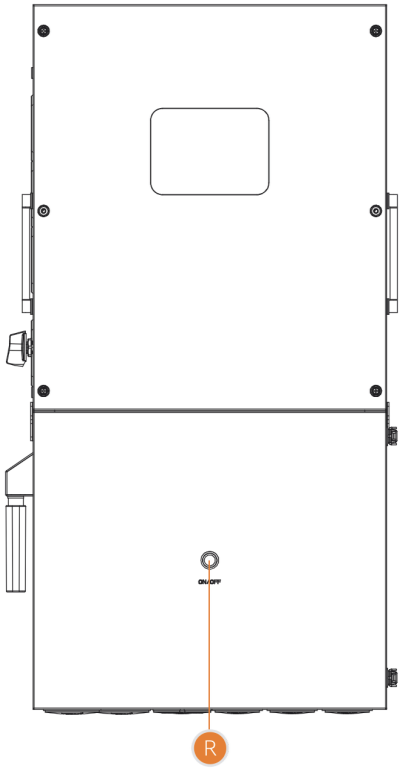


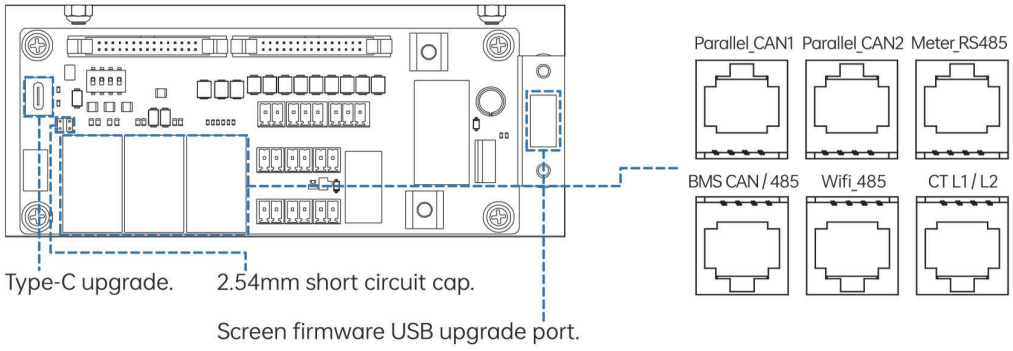
3.5 Terminals of PV inverter

Object	Description
A	DC switch.
B	Wi-Fi.
C	Battery circuit breaker.
D	BAT input.
E	AC SOLAR (Generator) circuit breaker.
F	CAN1 / CAN2 / Meter_RS485 / BMS_CAN / 485 / CTL1L2 / Type-C upgrade.
G	AC SOLAR (Generator) input.
H	PV1~PV4 input.
I	Rapid shutdown system transmitter.
J	Grid circuit breaker.

Object	Description
K	Grid output.
L	EPS load circuit breaker.
M	EPS load output.
N	PE terminal.
O	N terminal.
P	Screen firmware USB upgrade port.
Q	Touch panel.
R	On / Off button.





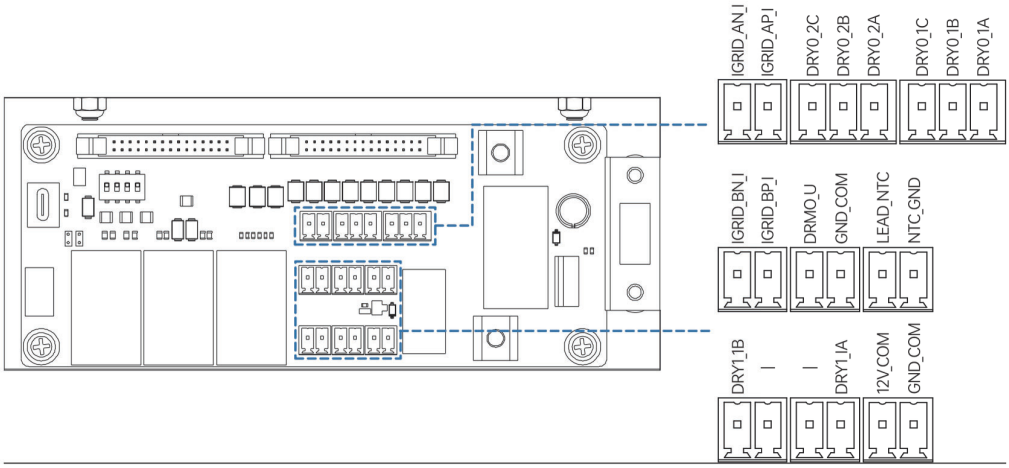


Port function

- CAN1 / CAN2: Communication interface for connecting inverters.
- Meter_RS485: Read the inverter data and send it to the screen.

- Meter_RS485: Read the inverter data and send it to the screen. BMS-485 / BMS-
- CAN: BMS communication for lithium batteries. Wi-Fi_485: Standby crystal port
- for the Wi-Fi module. CT L1 / L2: For external grid side CT to detect current size.
- TYPE-C UPDATE: Update inverter software locally on PC via USB-A port. 2.54mm
- short circuit cap: To use the battery software remote upgrade
- function, you need to insert two "2.54mm short circuit caps". If the battery does not use this function, do not insert the "2.54mm short circuit cap". Otherwise, "BMS communication exception" will occur.

- Screen firmware USB upgrade port: Upgrade the screen firmware using the USB port.



- DRY1_1B / DRY1_1: Used to start the inverter driver. DRY0_2A (common):
- Reserved dry contact port. DRY0_2B (normally open): Reserved dry contact port.
- DRY0_2C (normally closed): Reserved dry contact port. DRY0_1A (common):
- Together with the other two contacts, the switch function
- is formed.
- DRY0_1B (normally open): In the generator automatic mode, the contact is closed when starting.
- DRY0_1C (normally closed): In the generator automatic mode, the contact is disconnected when starting.
- +12V_COM / GND COM: Used to connect Rapid Solar Shutdown (RSS).
- IGRID_BN_I / IGRID_BP_I: CT standby cable port.
- IGRID_AN_I / IGRID_AP_I: CT standby cable port.
- LEAD_NTC / LEAD_GND: Lead-acid battery temperature sampling input interface. DRMO_U / GND_COM: Reserved dry contact port.
-
-

WARNING

- Qualified electrician will be required for the installation.

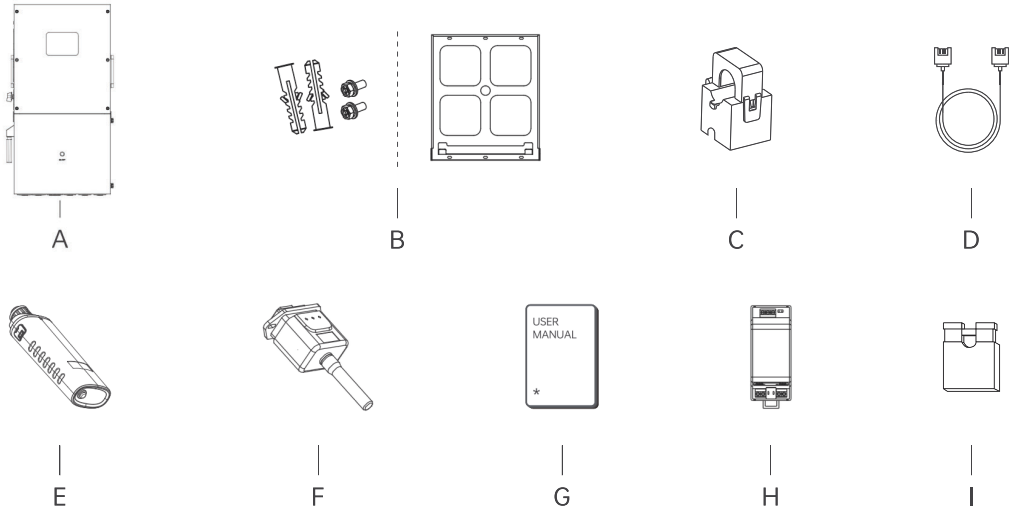
4 Installation

4.1 Check for physical damage

Make sure the inverter is intact during transportation. If there is any visible damage, such as cracks, please contact your dealer immediately.

4.2 Packing list

Open the package and take out the product, please check the accessories first. The packing list shown as below.



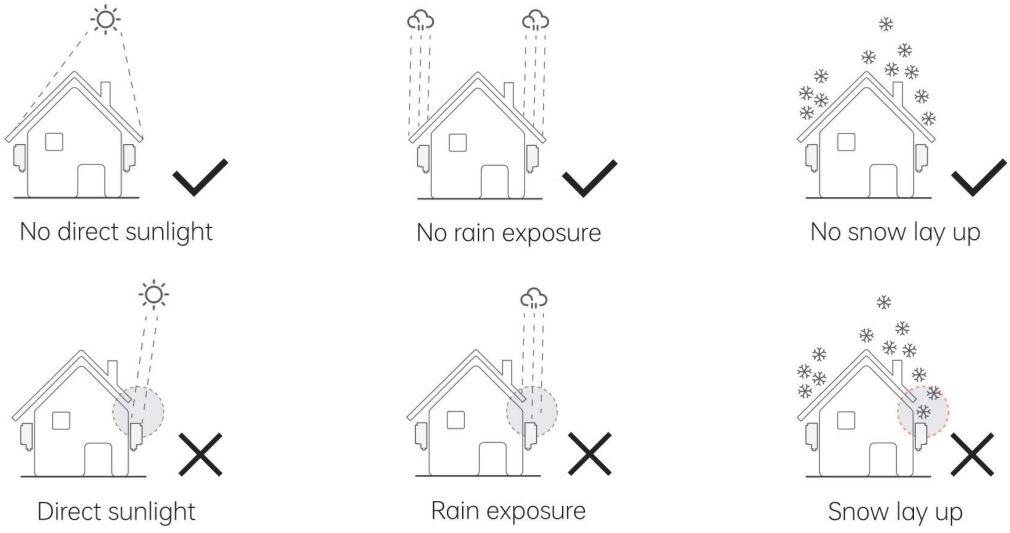
Object	Description
A	Inverter.
B	Expansion screws and pan-head screws, Hanging rack.
C	CT (CTSA035-200A-100mA, innerradius 35mm).
D	6ft Ethernet Cable for parallel connection
E	Wi-Fi module.
F	GPRS module (optional).
G	User manual.
H	Rapid shutdown system transmitter (optional).
I	2.54mm short circuit cap (optional).

4.3 Mounting

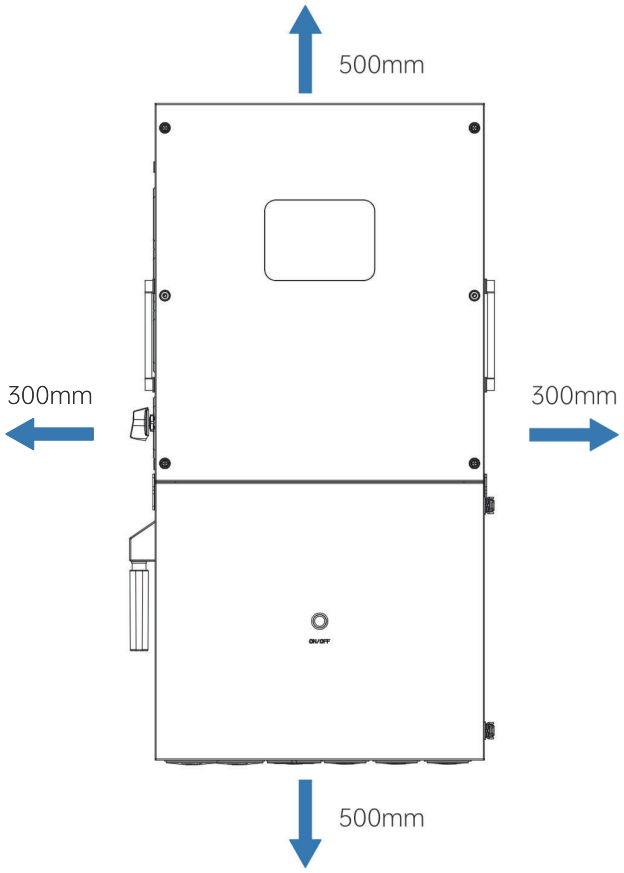
Installation precaution:
Inverter is designed for outdoor installation (IP65). Make sure the installation site meets the following conditions:

- Not in direct sunlight.
- Not in areas where highly flammable materials are stored.
- Not in potential explosive areas.
- Not in the cool air directly.
- Not near the television antenna or antenna cable.
- Not higher than altitude of about 2000m above sea level.
- Not in environment of precipitation or humidity (>95%).
- Under good ventilation condition.
- The ambient temperature in the range of -20 to +60 .
- The slope of the wall should be within ± 5°.
- The wall hanging the inverter should meet conditions below:
    1. Solid brick/concrete, or strength equivalent mounting surface.
    2. If the wall strength is not enough (e.g. wooden walls, walls covered by thick decorative layers), the inverter must be supported or reinforced.

Please AVOIDE direct sunlight, rain exposure, snow laying up during installation and operation.



Space requirement



Position	Min. size
Left	300mm
Right	300mm
Top	500mm
Bottom	500mm
Front	1000mm

Mounting

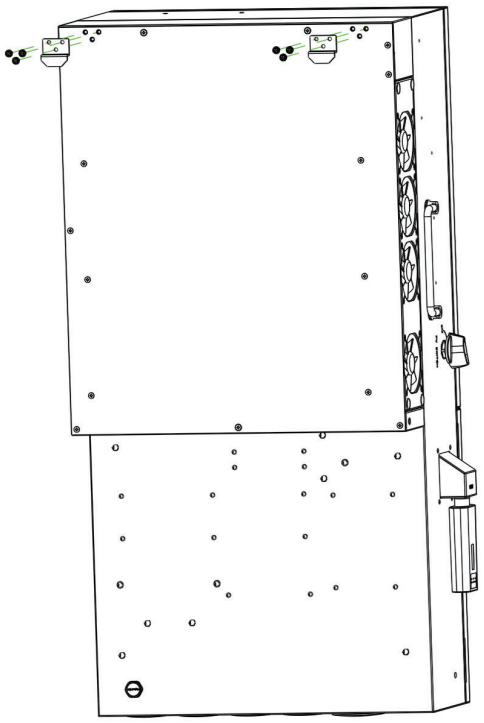
Tools required for installation.

Installation tools: crimping pliers for binding post and RJ45, screwdriver, hex key wrench, manual wrench etc.



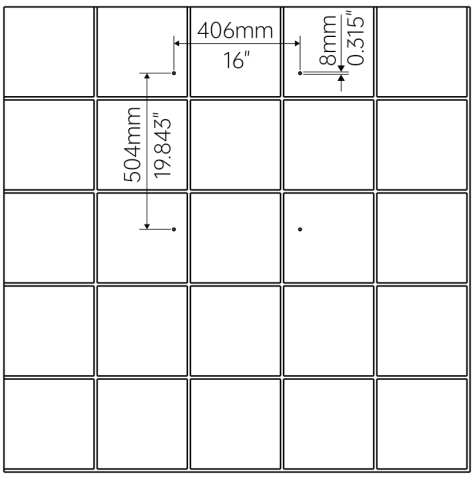
Step1: Mounting the hanging rack on the inverter.

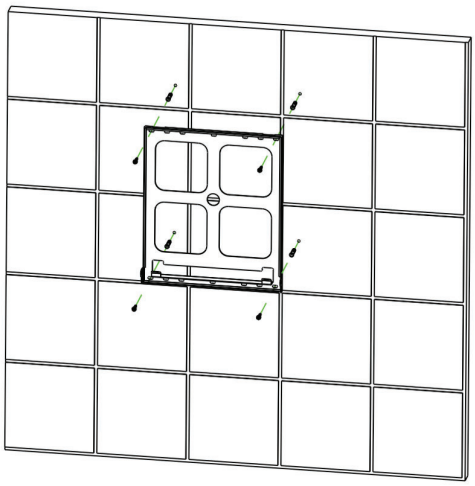
1. Place the hanging rack on the back of the inverter.
2. Then install the Hex head bolt into the inverter.



Step2: Mounting the hanging rack on the wall.

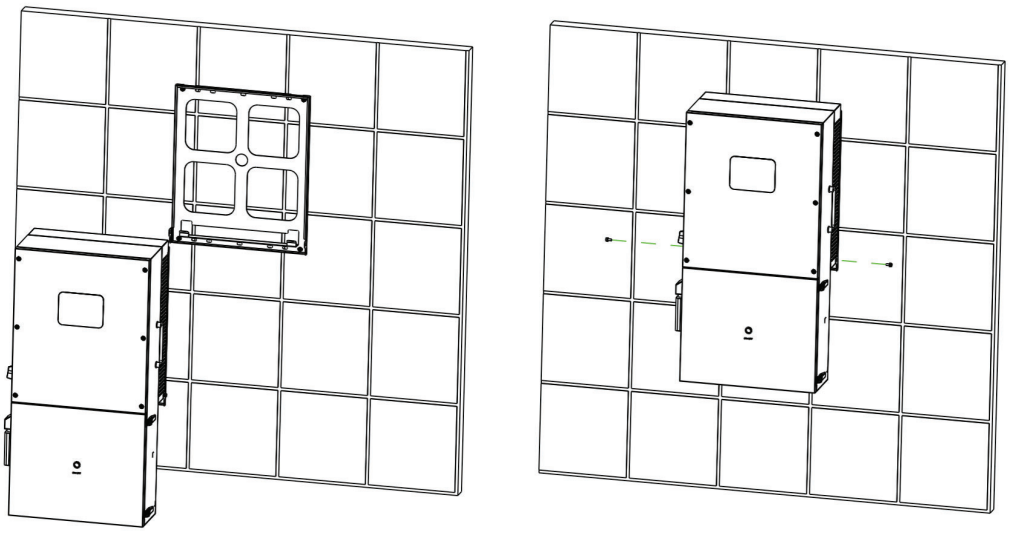
1. Mount the bracket on the wall, mark the positions of the four holes (hole positions, refer to the figure below), then remove it.
2. Drill holes with a drill, making sure they are deep enough (55mm < depth < 65mm) to support the inverter.
3. Then install the expansion pipes into the hole with a proper hammer and fix the hanging rack with self-tapping screws. The torque is 5Nm.



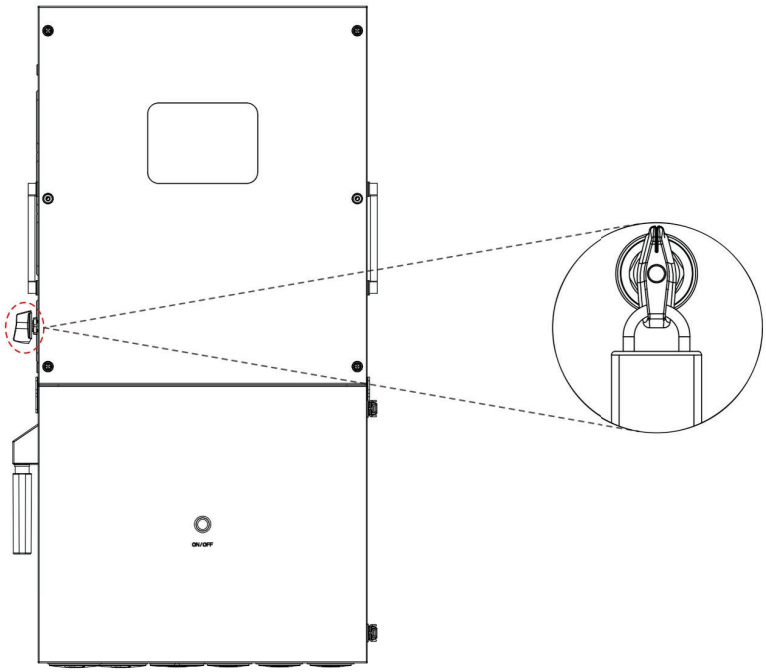


Step3: Secure the inverter to the wall.

1. Lift the inverter and suspend it from the hoisting bracket. Align the expansion bolts with the holes on the inverter and secure the inverter to the wall.
2. Tighten the fixing screws on the right side of the inverter.

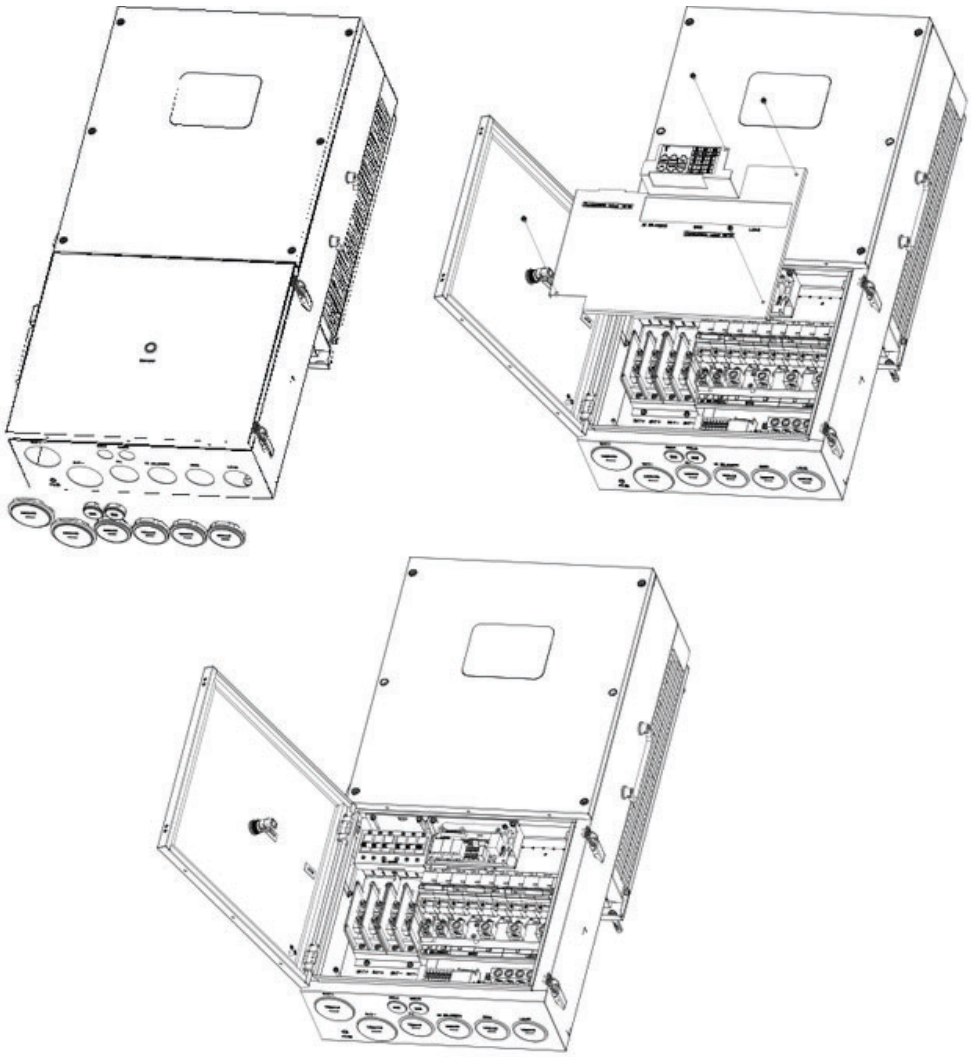


Step4: Tighten the nut of expansion bolt and install an anti-theft lock on DC switch of the inverter.



Step5: Disassembly of the inverter's waterproof components.

1. The two latches on the lower right of the inverter open upward to open the waterproof cover.
2. Open the bottom cover of the inverter and use a phillips screwdriver to remove the plastic protective plate designed to prevent contact with live parts.
3. Remove the waterproof plug at the bottom of the inverter.



Step6: Use the appropriate conduit to connect to the wiring hole at the bottom of the inverter.

Step7: After installation, to ensure that the machine does not fall off, please reconfirm that the machine is fixed to the rack.

WARNING

- Nothing should be stored on or placed against the inverter.

5 Electrical connection 5.1 PV connection

Hybrid can be connected in series with 4-strings PV modules for 12kW, 16kW. Select PV modules with excellent function and reliable quality. Open-circuit voltage of module arrays connected in series should be less than Max. DC input voltage; operating voltage should be conformed to MPPT voltage range.

Technical data	
MPPT voltage range (without battery) (V)	120 - 500
MPPT voltage range (with battery) (V)	120 - 430
MAX.DC input voltage (V)	500

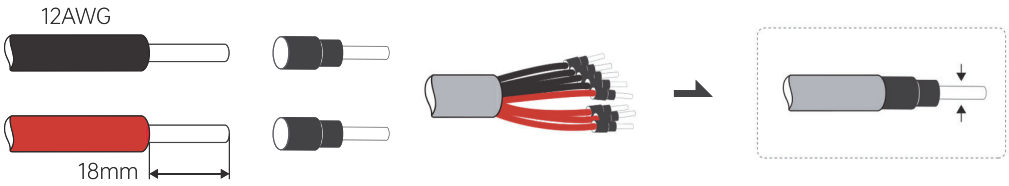
WARNING

- PV module voltage is very high, which already achieve dangerous voltage range, please comply with electric safety rules when connecting.
- Please do not make PV positive or negative ground!

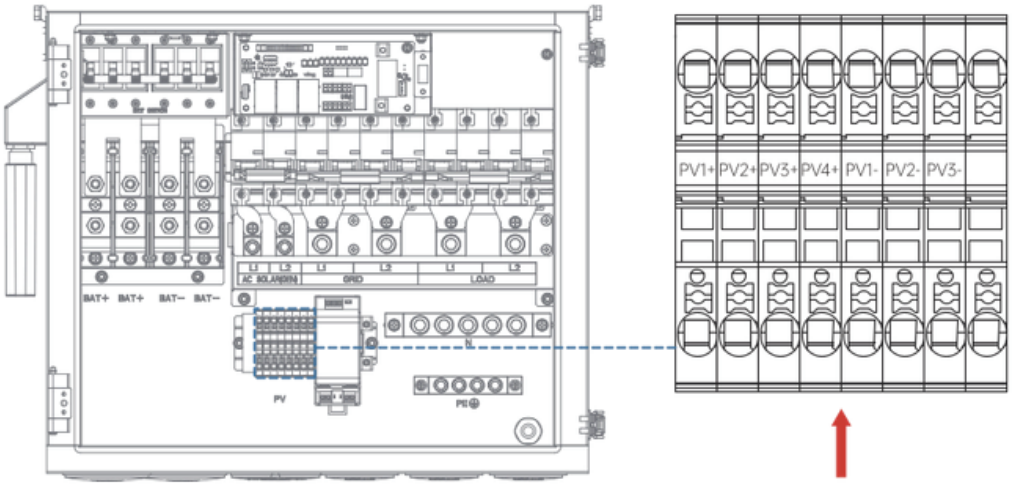
- The following requirements of PV modules need to be applied for each input area.
- Please do not make PV positive or negative ground!
- In order to save cable and reduce the DC loss, we suggest installing the inverter near PV modules.

Step1: Wiring.

1. Choose the 12AWG wire to connect with the cold-pressed terminal.
2. Remove 18mm of insulation from the end of wire.



Step2: Cross the PV cables through the PV port, Connect PV cables to PV terminals.



5.2 Grid connection (GEN connection)

Step1: Check the grid voltage.

1. Check the grid voltage and compare with the permissive voltage range (Please refer to technical data).
2. Disconnect the circuit board from all the phases and secure against re-connection.

Step2: Grid cables selection.

Please use the cables corresponding to the inverter type and specifications in the attached table.

Model	NV12KAC	NV16KAC
Cable	1/0 AWG	1/0 AWG

Step3: GEN cables selection.

Please use the cables corresponding to the inverter type and specifications in the attached table.

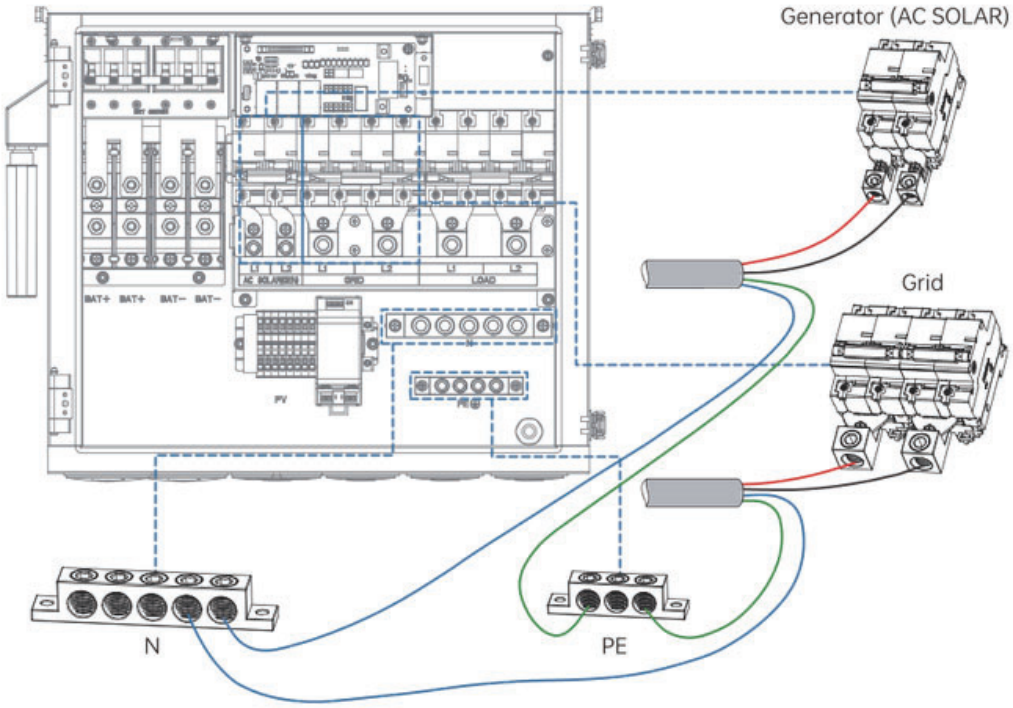
Model	NV12KAC	NV16KAC
Cable 6AWG		5AWG

Step4: Remove 18mm of insulation from the end of wire.



Step5: The terminal hole diameter for grid connection is 0.6in; for diesel generator connection is 0.5in; and for the N-line copper busbar is 0.6in.

Step6: Route the diesel generator power cable and grid cable through the corresponding outlet ports at the inverter base, connect them to their designated terminals in the bottom junction box, and securely tighten them using 6mm and 8mm hex key wrenches respectively.



5.3 Back-up: load connection

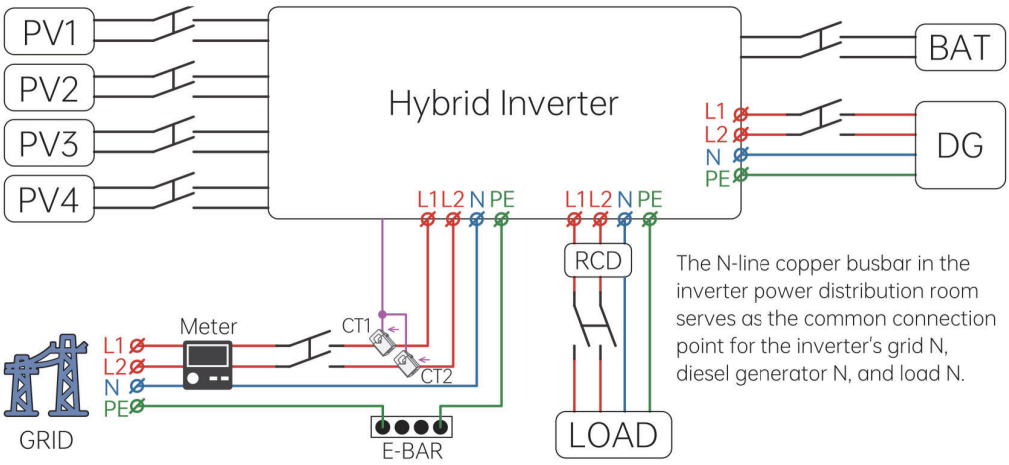
Inverter has on and off grid function, the inverter will deliver output power through AC port when the grid is on, and it will deliver output power through back-up port when the grid is off.

Load port: important load.

1. For inverter, the standard PV installation typically consists of the connecting the inverter with both panels and batteries. In the event that batteries aren't connected into the system, it's strongly advised against using the system as a back-up. If the system is used as a back-up as mentioned here, Damages will not be covered under the standard warranty and the manufacture will not be liable for consequences arising as result of the user not following this instruction.

2. Hybrid inverters are able to supply overload output as its "back-up". For details, please refer to the technical parameters of inverter. And the inverter has self-protection dreading at high ambient temperature.

3. For complicated application, or special load, please contact after-sales team.



- In case of discrepancies between wiring mode of local policy and the operation guide above, especially for the wiring of neutral line, grounding, and RCD, please contact us before any operation!

Back-up: load connection

Step1: Make BACK-UP wires.

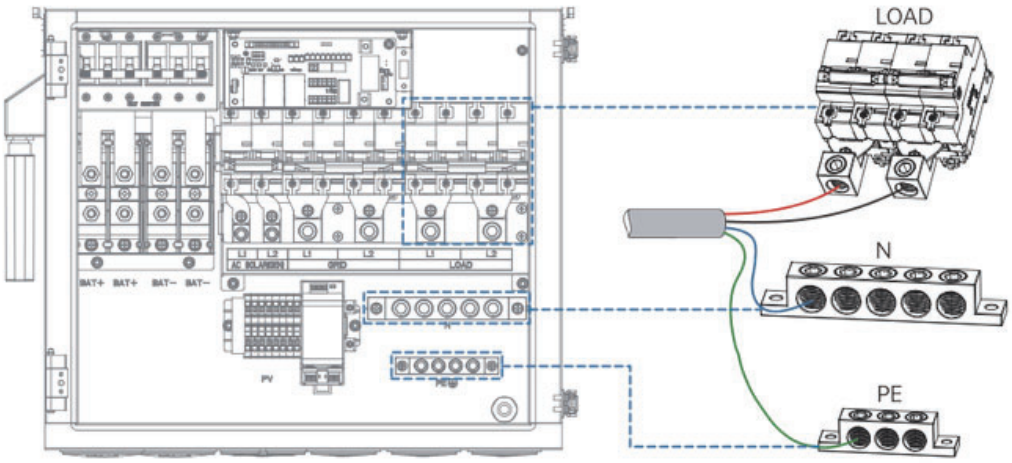
Model	NV12KAC	NV16KAC
Cable	1/0 AWG	1/0 AWG

Step2: Remove 18mm of insulation from the end of wire.



Step3: The terminal diameter for the load circuit breaker is 0.6in; the terminal hole diameter for the N-line copper busbar is 0.6in; and the terminal diameter for the PE-line copper busbar is 0.4in.

Step4: Connect the load cable to the inverter's load terminal (LOAD port), then securely tighten it using an 8mm hex key wrench. For the N busbar and PE busbar, use 8mm and 6mm hex key wrenches respectively.



Requirements for BACK-UP load

WARNING

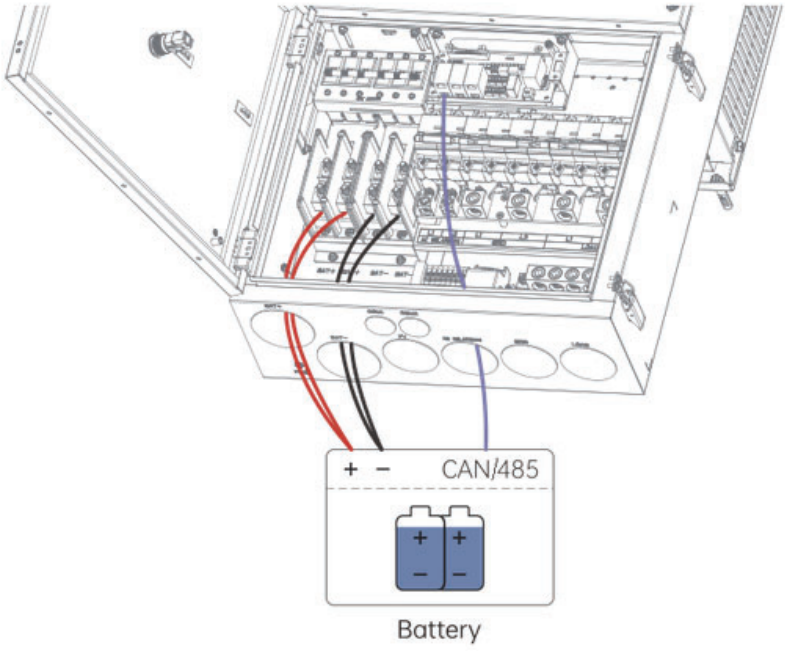
- Make sure the BACK-UP load power rating is within BACK-UP output rating, otherwise the inverter will shut down with an "over load" warning.
- When an "over load" appears, adjust the load power to make sure it is within the BACK-UP output power range, then turn the inverter back on.
- For the nonlinear load, please make sure the inrush power should be within the BACK- UP output power range.

5.4 Battery connection

The charging & discharging system of the hybrid series inverter is designed for a 48V lithium battery.

Before choosing a battery, please note the maximum voltage of the battery, it can't exceed 58V and the battery communication should be compatible with the hybrid inverter. Note: Always use POS and NEG battery terminals.

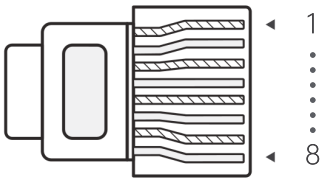
Battery connection diagram



BMS PIN definition

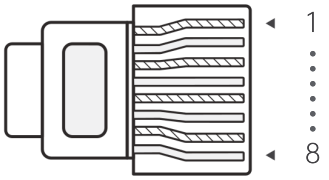
Communication interface between inverter and battery is RS485 or CAN with a RJ45 connector.

Step1: Definition of the BMS interface when the 2.54mm short circuit cap is not inserted.



	PIN	1	2	3	4	5	6	7	8
CAN	Definition	X	X	X	BMS_ CANH	BMS_ CANL	X	X	X
RS485	Definition	X	X	X	X	X	GND	BMS_485A	BMS_485B

Step2: Definition of the BMS interface when a 2.54mm short circuit cap is inserted.



	PIN	1	2	3	4	5	6	7	8
CAN	Definition	RS485_ WIFIA	RS485_ WIFIB	X	BMS_ CANH	BMS_ CANL	X	X	X
RS485	Definition	RS485_ WIFIA	RS485_ WIFIB	X	X	X	GND	BMS_ 485A	BMS_ 485B

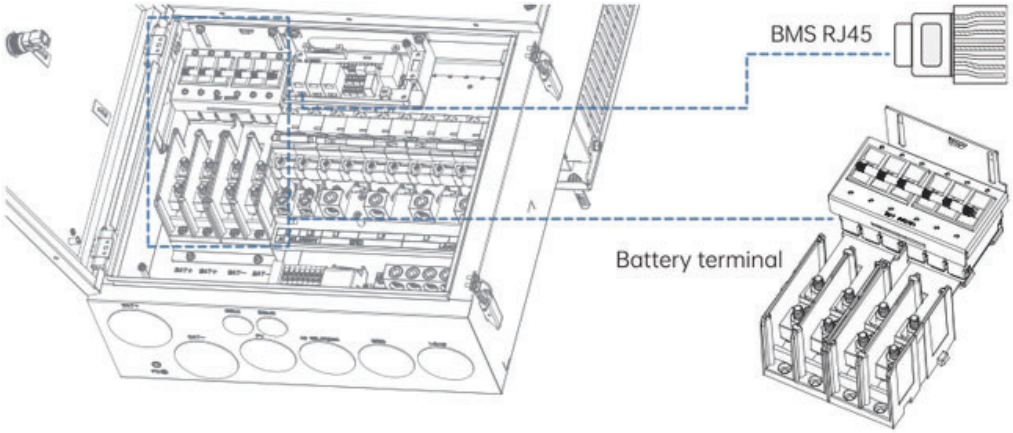
- The battery communication can only work when the battery BMS is compatible with the inverter.

Power connection battery

Step1: Select four battery cables and strip 0.7in of insulation. The battery terminal features four connection ports, with two for the positive pole and two for the negative pole. Select 4 O-terminals with an aperture of M8. Insert the wire into the O-terminal and clamp it with crimping pliers. Fasten with heat shrinkable sleeve to ensure insulation reliability.



Step2: Thread the battery cable through the battery terminal block located on the inverter, then connect the battery cable to the appropriate battery terminals, and use a 13mm hexagonal socket wrench to tighten the nut to ensure a secure connection.

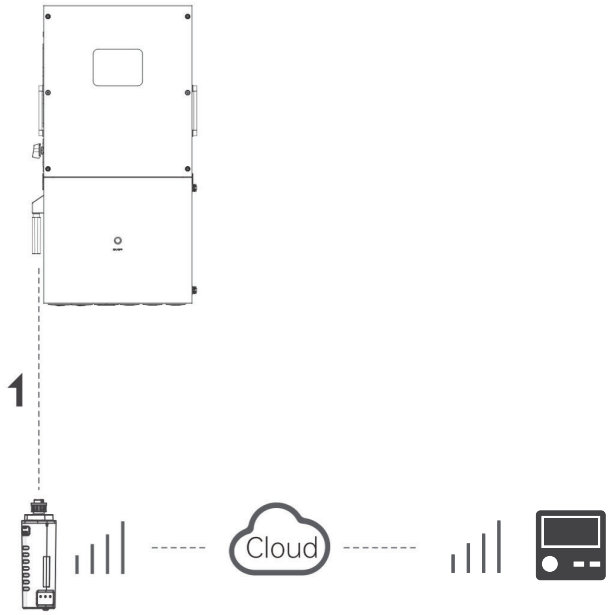


- Positive and negative wires are not allowed to reverse.

5.5 WiFi connection (optional)

The inverter provides a WiFi port which can collect data from inverter and transmit it to monitoring-website by WiFi.

Purchase the product from supplier if needed.



WIFI connection steps

Step1: Assemble the WIFI adapter to the COM port on the left side of the inverter.

Step2: Establish the connection between the inverter and the router.

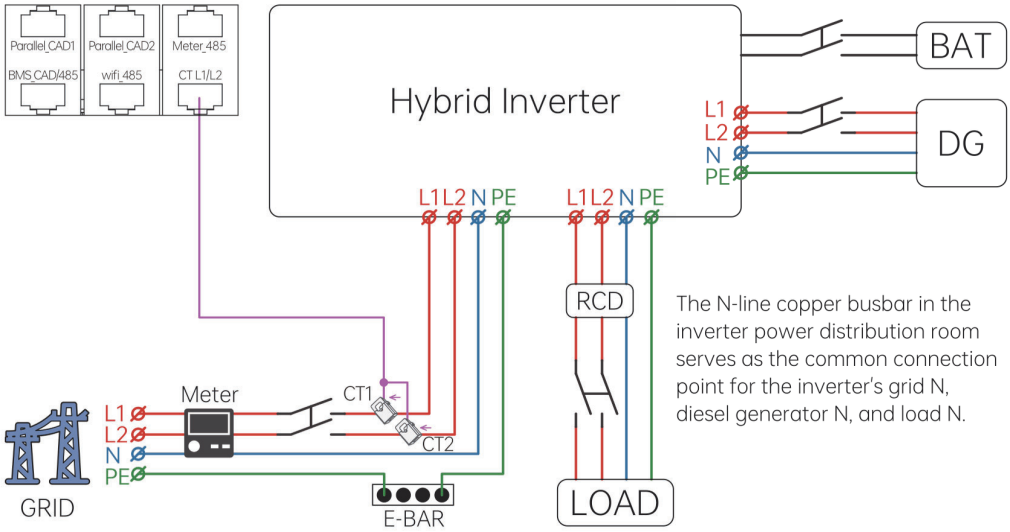
Step3: Create a user account online. (Please check the "WIFI adaptor user manual" for more details).

5.6 CT installation instructions

CT is short for "current transformation" and is used to detect the current of the power grid. The attached CT is a CT with two CTSA035-200A-100mA connected to one network port.

When connecting the split-phase power grid (North america), clip two CTS, CT-L1 clip the L1 phase of the power grid, and CT-L2 clip the L2 phase of the power grid. CT arrow direction points to the power grid.

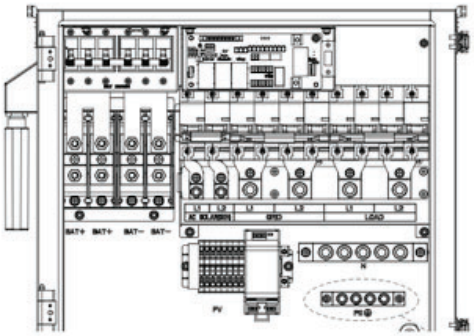
- If CT is not installed or installed reversely, the functions of "Anti-reflux", "Self-use", "Peak-shift"... will not be realized.
- The direction of the arrow on the CT, points from this inverter to the GRID!

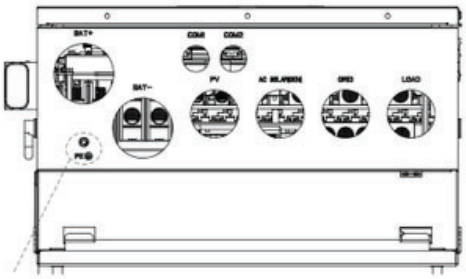


5.7 Earth connection

The ground cable should be connected to the ground cable of the power distribution box to prevent the original ground conductor from failing in emergencies.

Please connect the grounding wire of the distribution box to the grounding screw at the bottom of the inverter or the PE copper bar inside. When installing the grounding wire, it is not allowed to use multi-point grounding.

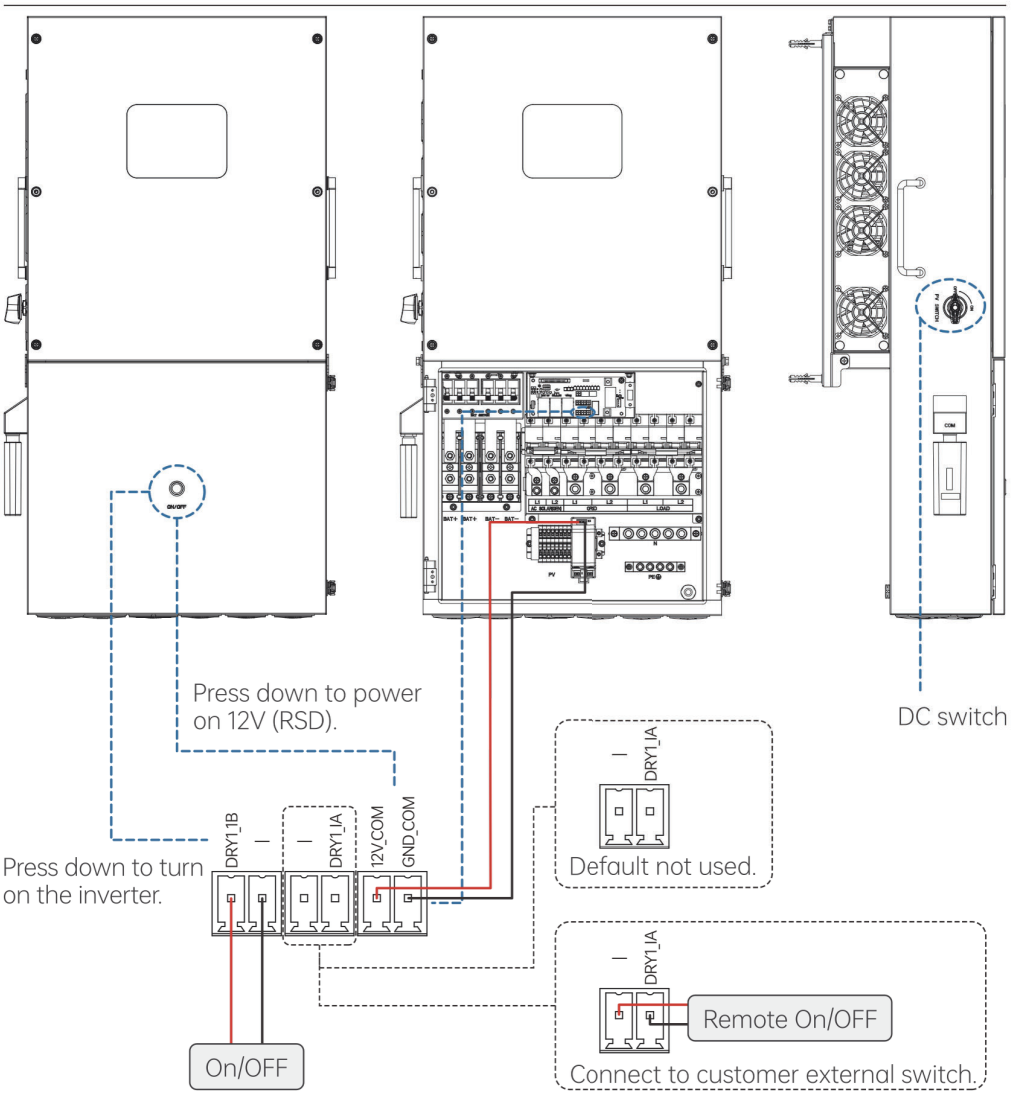




5.8 RSD (ON / OFF) installation

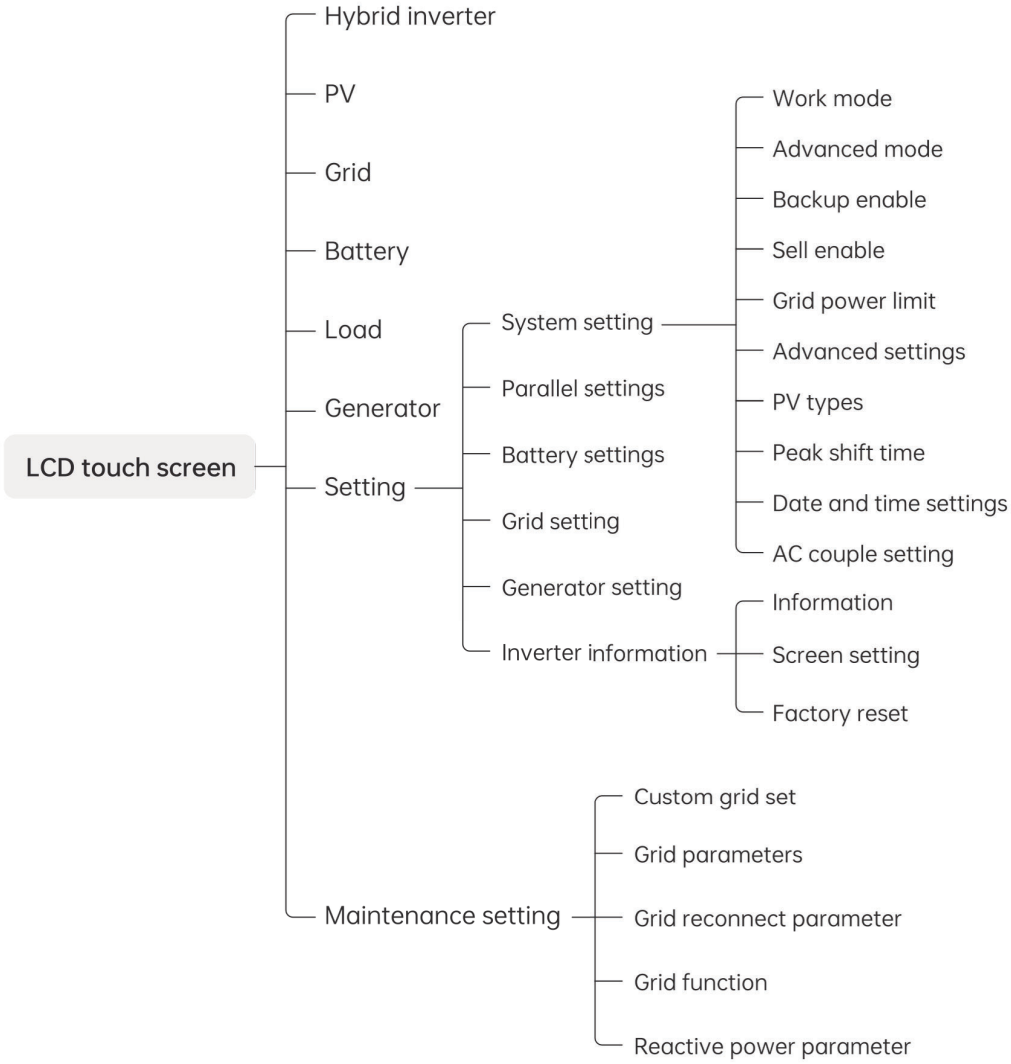
RSD function and ON / OFF function are the same button. **ON / OFF:** The button is connected to dry contacts "DRY1_1B" and "DRY1_1A"
through two terminals, if the two terminals are both shorted, the inverter will power on. In addition, the inverter reserves a remote power off terminals. The contact has been shorted before delivery. If necessary, customers can connect a external switch to control the inverter ON and OFF. **RSD:** short for "rapid shutdown".

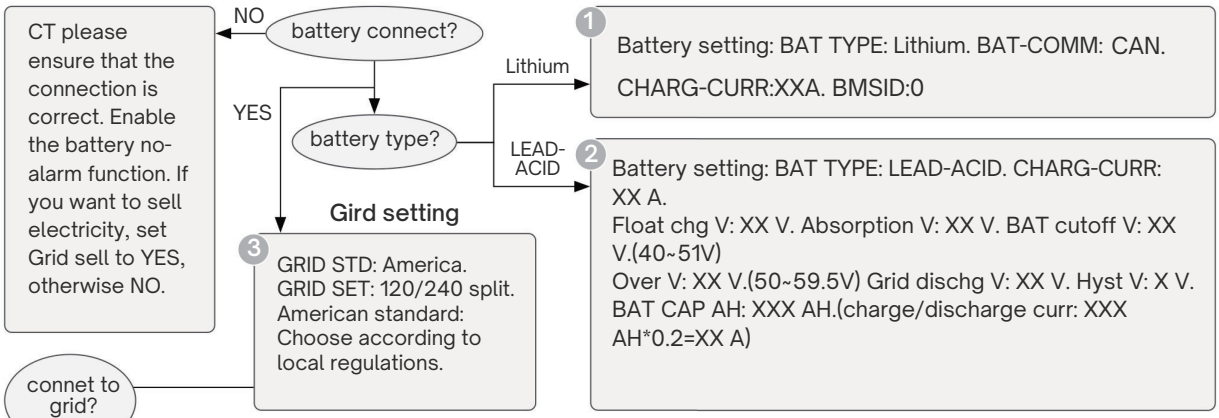
PV system circuits installed on or in buildings
include a rapid shutdown function to reduce shock hazard for emergency responders. Release this button to deactivate the 12V ('12VCOM') power supply, which
provides power to the RSD transmitter. When the RSD transmitter shuts down, all PV modules will be de-energized. **DC switch:** PV input switch.

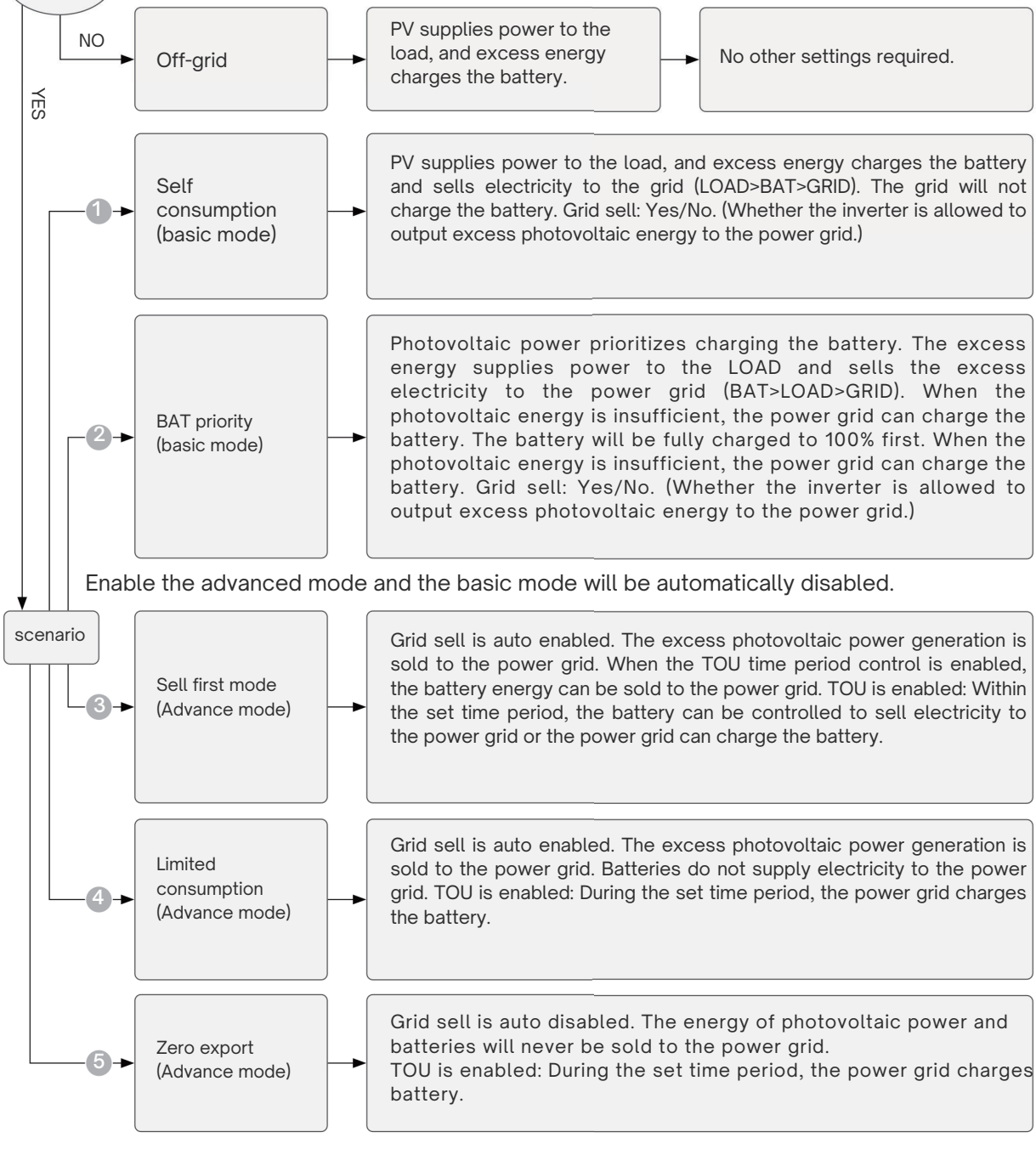


6 LCD operation

Figure 6-1 LCD touch screen operation flow chart



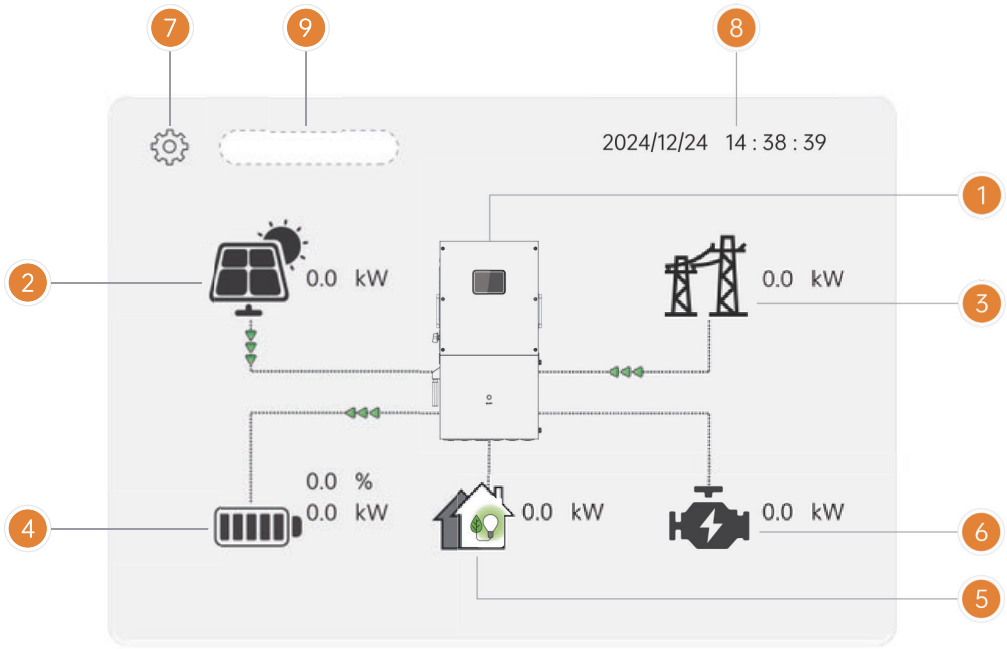

CT please ensure that the connection is correct. Enable the battery no-alarm function. If you want to sell electricity, set Grid sell to YES, otherwise NO.
NO
battery connect?
YES
battery type?
Lithium
LEAD-ACID
1
Battery setting: BAT TYPE: Lithium. BAT-COMM: CAN.
CHARG-CURR:XXA. BMSID:0
2
Battery setting: BAT TYPE: LEAD-ACID. CHARG-CURR: XX A.
Float chg V: XX V. Absorption V: XX V. BAT cutoff V: XX V.(40~51V)
Over V: XX V.(50~59.5V) Grid dischg V: XX V. Hyst V: X V.
BAT CAP AH: XXX AH.(charge/discharge curr: XXX AH*0.2=XX A)
Gird setting
3
GRID STD: America.
GRID SET: 120/240 split.
American standard: Choose according to local regulations.
connet to grid?


NO
Off-grid
PV supplies power to the load, and excess energy charges the battery.
No other settings required.
YES
1
Self consumption (basic mode)
PV supplies power to the load, and excess energy charges the battery and sells electricity to the grid (LOAD>BAT>GRID). The grid will not charge the battery. Grid sell: Yes/No. (Whether the inverter is allowed to output excess photovoltaic energy to the power grid.)
2
BAT priority (basic mode)
Photovoltaic power prioritizes charging the battery. The excess energy supplies power to the LOAD and sells the excess electricity to the power grid (BAT>LOAD>GRID). When the photovoltaic energy is insufficient, the power grid can charge the battery. The battery will be fully charged to 100% first. When the photovoltaic energy is insufficient, the power grid can charge the battery. Grid sell: Yes/No. (Whether the inverter is allowed to output excess photovoltaic energy to the power grid.)
Enable the advanced mode and the basic mode will be automatically disabled.
scenario
3
Sell first mode (Advance mode)
Grid sell is auto enabled. The excess photovoltaic power generation is sold to the power grid. When the TOU time period control is enabled, the battery energy can be sold to the power grid. TOU is enabled: Within the set time period, the battery can be controlled to sell electricity to the power grid or the power grid can charge the battery.
4
Limited consumption (Advance mode)
Grid sell is auto enabled. The excess photovoltaic power generation is sold to the power grid. Batteries do not supply electricity to the power grid. TOU is enabled: During the set time period, the power grid charges the battery.
5
Zero export (Advance mode)
Grid sell is auto disabled. The energy of photovoltaic power and batteries will never be sold to the power grid.
TOU is enabled: During the set time period, the power grid charges the battery.

Abbreviated noun interpretation

Abbreviation	Full name		
RSD	Rapid shutdown	TOU	Time-of-use
CV	Constant voltage	Aux load SOC	Auxiliary load SOC
EPS	EMERGENCY POWER SYSTEM	GRID HYST	GRID hysteresis
ZeroExportP	Zero export power		
BAT COM	Battery communication		
DOD	Depth of discharge		
E-TODAY	Energy-today		

6.1 Control panel

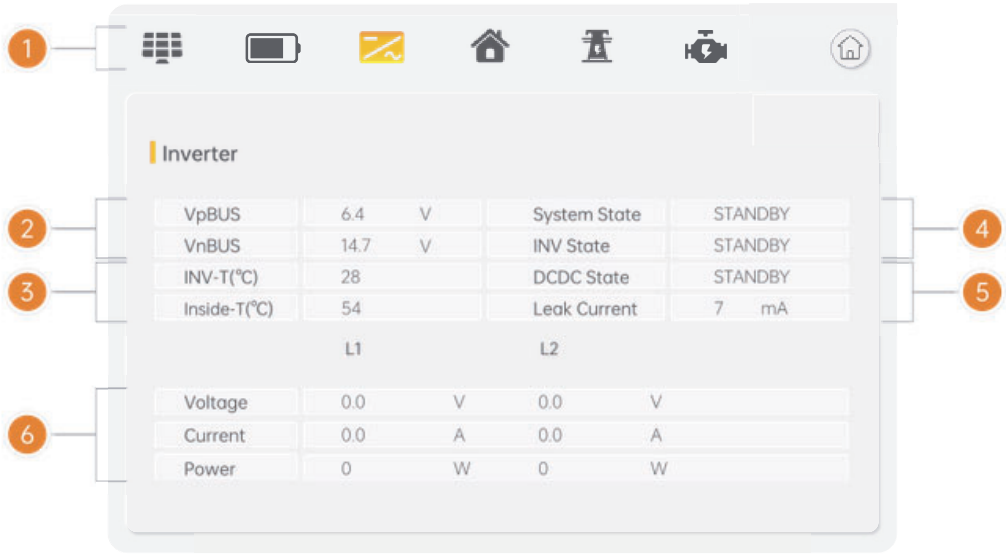


Code	Name	Explanation
1	Hybrid inverter	Click hybrid inverter to enter the working status interface of the hybrid inverter.
2	PV	Display the real-time PV power. Click PV to enter the working status interface of PV.
3	Grid	Display the real-time grid power. Click grid to enter the working status interface of grid.

4	Battery	Display the real-time battery power and percentage of battery surplus capacity from the BMS. Click battery to enter the working status interface of battery.
5	Load	Display the real-time load power. Click load to enter the working status interface of load.
6	Generator	Display the real-time generator power. Click generator to enter the working status interface of generator.
7	Setting	Users can click setting to enter the settings interface.
8	Data/Time	Date and time of the inverter.
9	Alarm information	The alarm information of the current inverter is displayed. For details, see the alarm information table in the appendix.

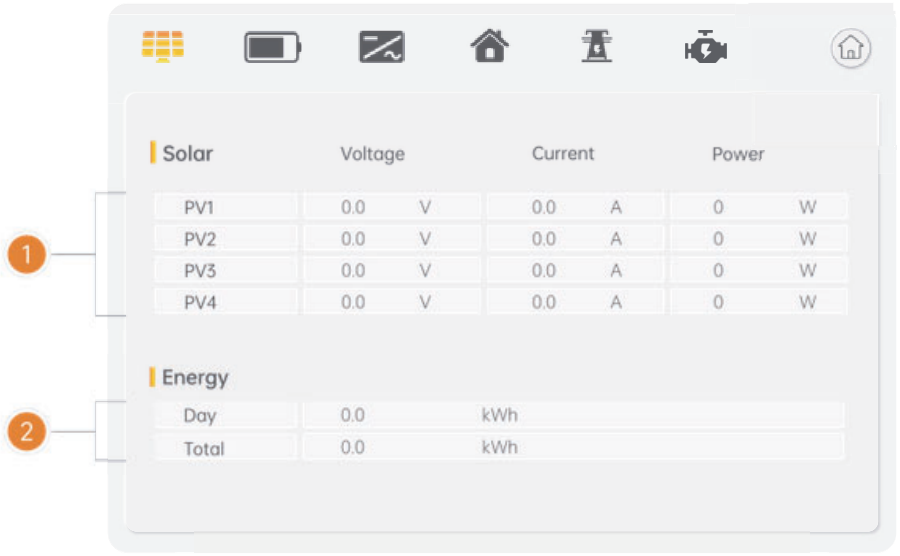
6.2 Working status

6.2.1 Hybrid inverter



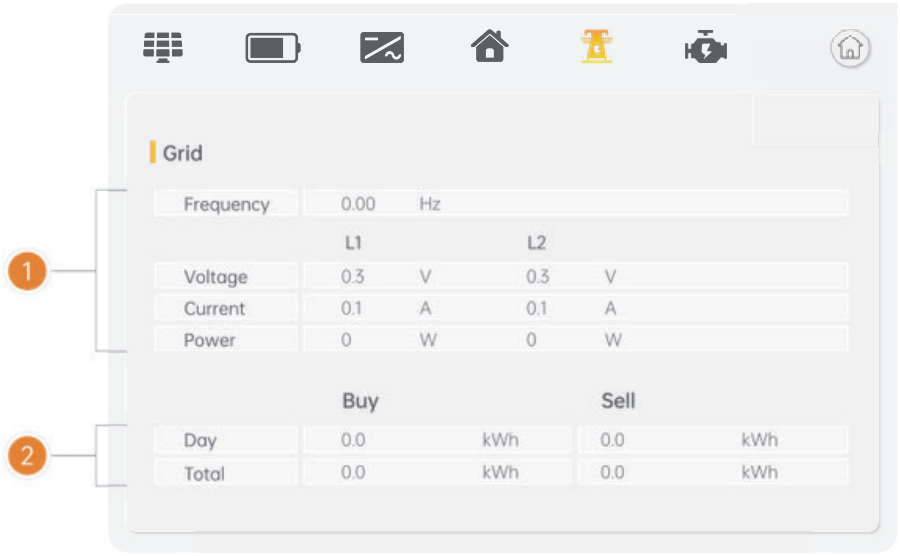
Data panel of hybrid inverter	
1	Users can click onthe icon above to switch devicestatus data (PV, Battery, Hybrid inverter, Load, Grid, BUS) and return to the home page. (not to be repeated later)
2	**VpBUS**: Real-time voltage of bus capacitor of the inverter. **VnBUS**: Real-time voltage of bus capacitor of the inverter.

3	Temperature: **INV-T(C)**: INV temperature. **Inside-T(C)**: Internal ambient temperature of the inverter.
4	Display status information, including system status, Inverter status, and DCDC status. **System status**: Display complete inverter status information, include INIT, STANDBY, PV GRID, BAT GRID, BYP, AC BAT CHG, HYBRID POW etc. **INV**: Displays the inverter status information, including: STANDBY, OFF GRID, GRID, OFF GRID PL, INV TO PFC. **GRID**: Grid connected state. **OFF-GRID**: Off-GRID working state. **OFF GRID PL**: Working state of off-grid conversion to grid connection. **INV TO PFC**: Status of power by public grid turn into on grid working mode. **DCDC status**: Displays charging and discharging status information, include STANDBY, CHARGE, DISCHARGE.
5	**Leak current**: Real-time leak current of the inverter.
6	Display the real-time voltage, current, and power of the device.



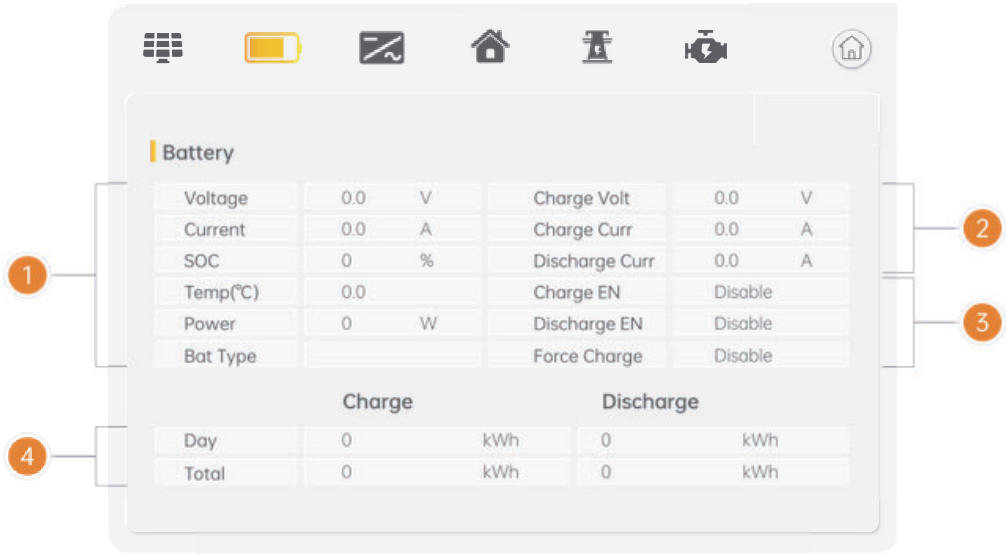
Data panel of PV	
1	Display the working parameters of the four channels of PV (PV1, PV2, PV3, PV4), including real-time voltage, current, and power. (PV input type can be set in the settings).
2	Display the cumulative charging capacity of the PV, including daily and total accumulated energy.

6.2.3 Grid



Data panel of grid	
1	Display the working parameters on the grid, including frequency, real-time voltage, real-time current, and real-time power.
2	Accumulated energy from the power grid to the equipment(Sell) and accumulated energy from equipment to the power grid(Buy), including daily and total accumulated energy.

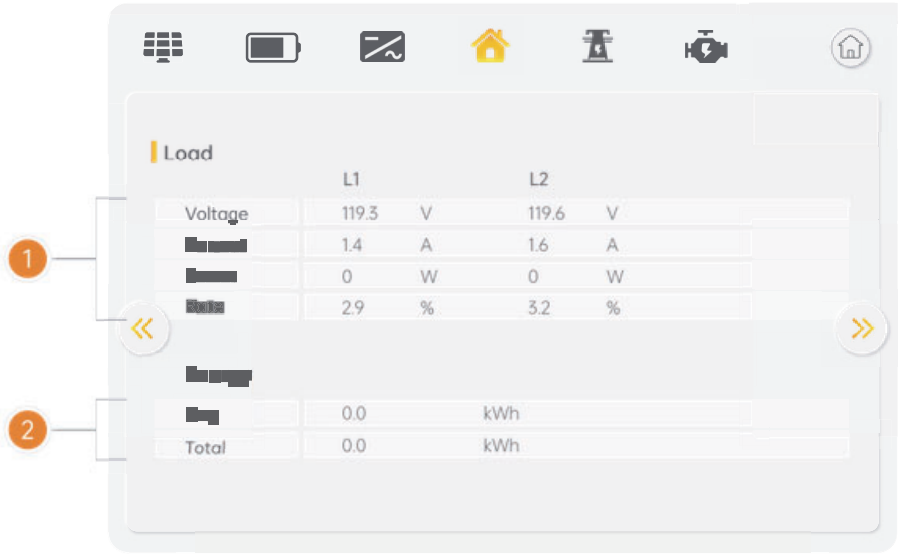
6.2.4 Battery



Data panel of battery	
1	Display the working parameters of the battery, including real-time voltage, real-time current, battery surplus capacity, battery temperature, battery power, and battery type.
2	Display battery charging voltage, charging current, and discharge current.
3	Three working states of batteries (from BMS), including charging, discharging, and forced charging. **Charge EN:** Charge enable. **Discharge EN:** Discharge enable.
4	Accumulated discharge and charging capacity of the battery, including daily and total accumulated energy.

6.2.5 Load

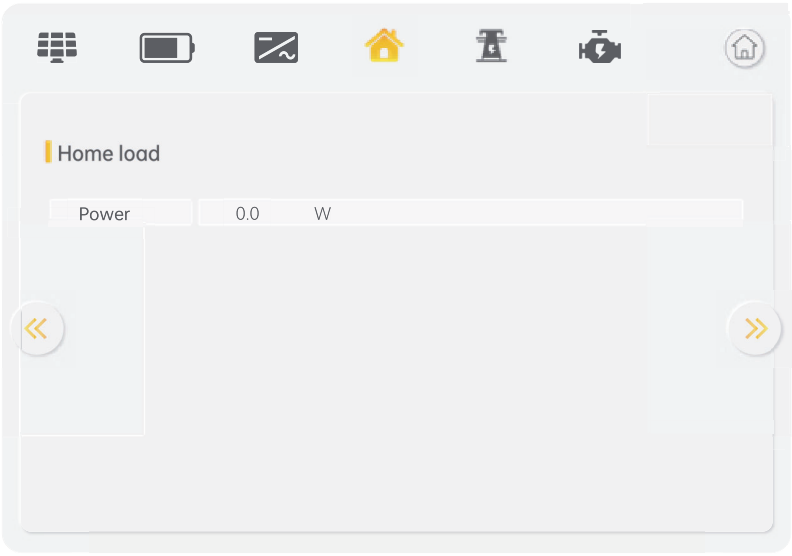
6.2.5.1 Load/page one



User can click « to return to the previous page, and click » to enter the next page. (not to be repeated later)

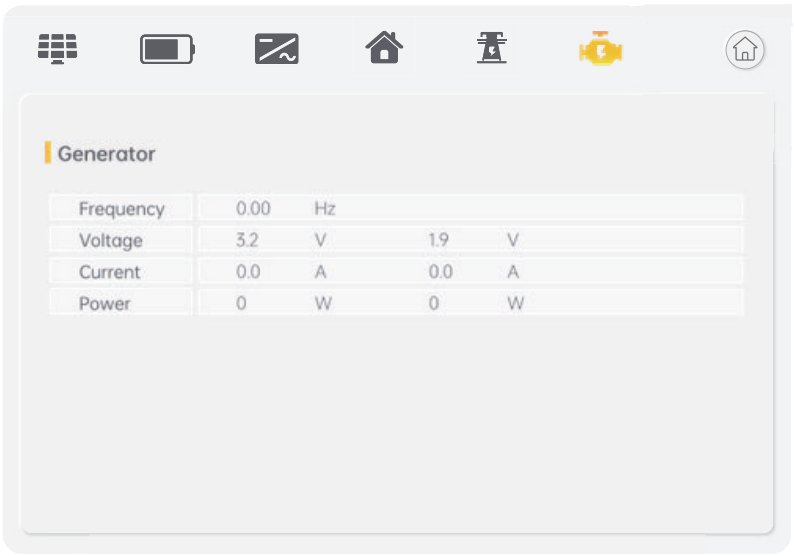
Load/page one	
1	Display the working parameters of the load, including real-time voltage, current, power, and load rate.
2	Accumulated usage of load, including daily and total accumulated energy.

6.2.5.2 Load/page two



When set home load EN to "ENABLE", if you have a load connected to the mains port, you can see its home load power.

6.2.6 Generator

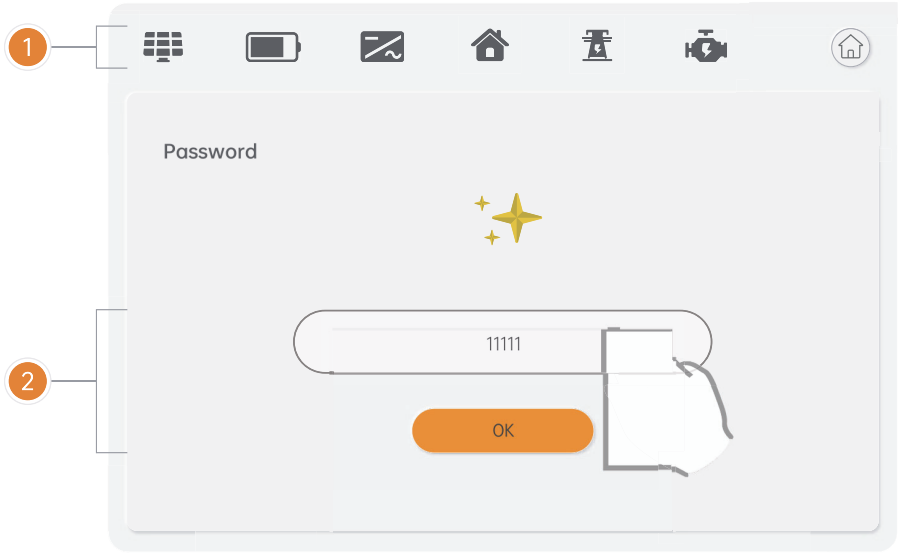


Display the working parameters of the generator, including real-time voltage, current, and power.

6.3 Setting

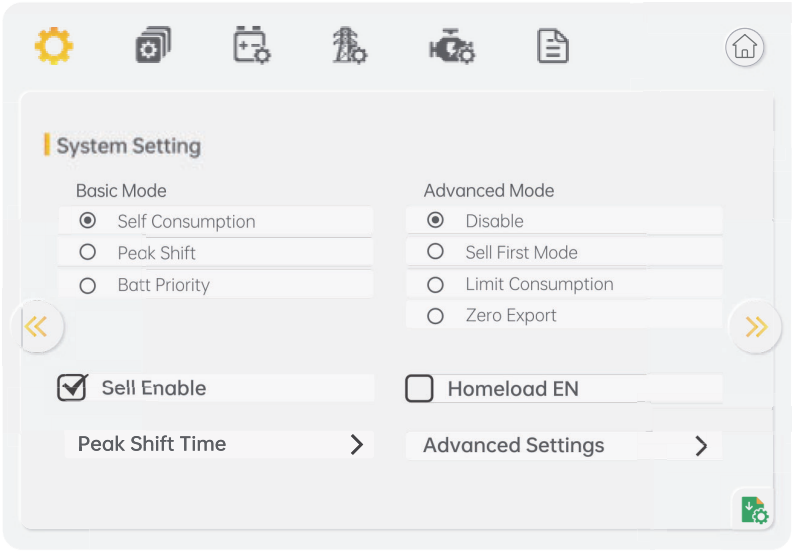
6.3.1 Enter setting

6.3.1.1 Input password



Input password	
1	Users can click on the icon above to enter device status data (PV, Battery, Hybrid inverter, Load, Grid, Generator) and return to the home page.
2	To enter the settings, a password is required. The default password is 11111. Click OK to enter the settings interface.

6.3.1.2 Enter the settings interface



Users can click on the icon above to switch between setting options, machine related information, and return to the home page.

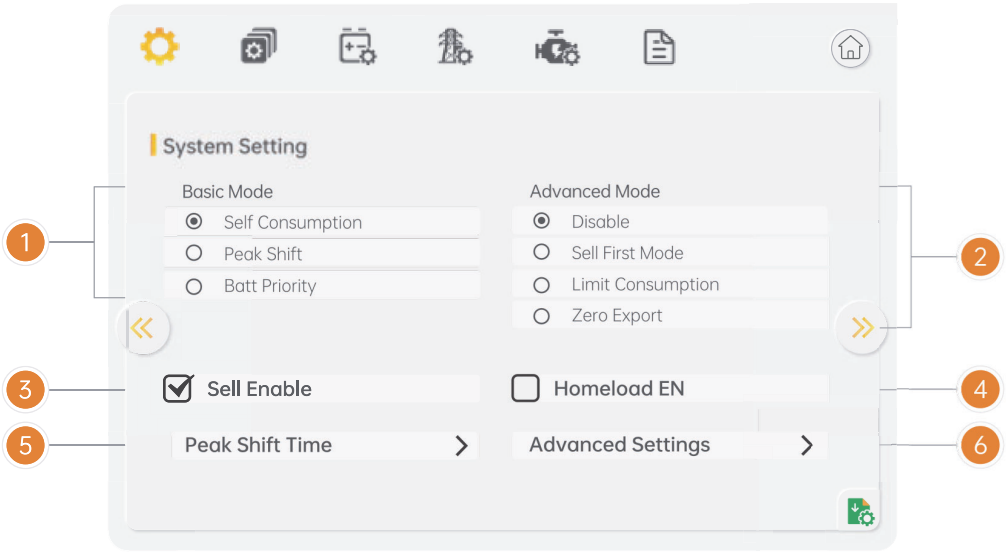
System setting setting | Parallel setting | Battery

Grid setting | Generator setting | Machine

After modifying the parameters, theuser needs to click on this icon to confirm themodification.

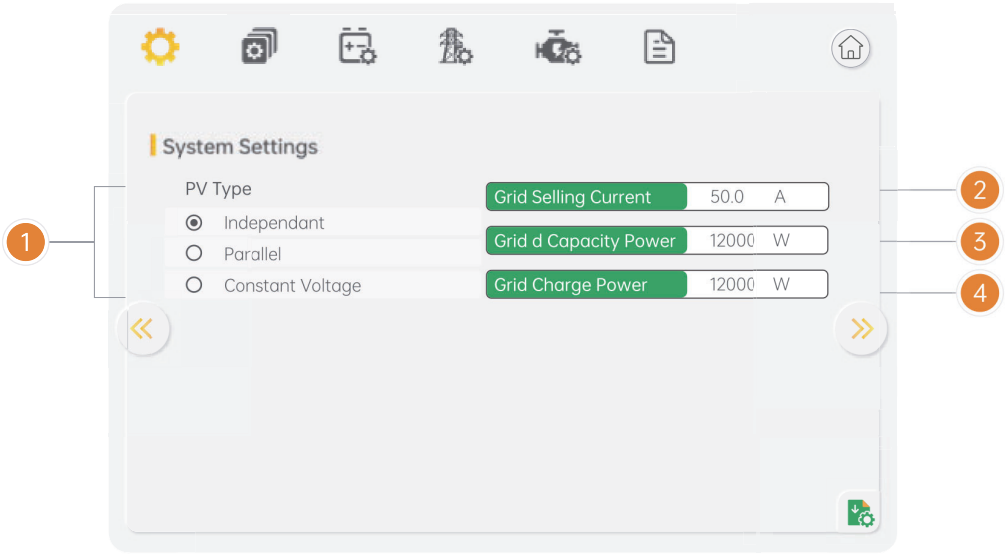
6.3.2 Setting option

6.3.2.1 System setting/page one



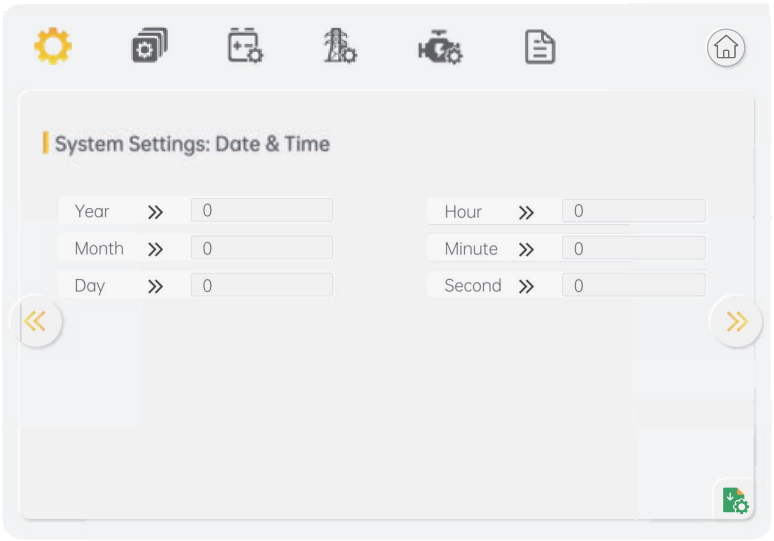
Input password	
1	**Basic mode:** Users have three basic modes to choose from, Self consumption, Peak shift, and battery priority.
2	**Advanced mode:** There are four options here: Disable, Sell first mode, Limited consumption mode and zero export mode. For details about advanced modes, see chapter 10.
3	**Sell enable:** Whether the inverter is allowed to sell electricity to the grid. The option is checked, which means that the inverter can generate electricity to the grid, If this option is not selected, the inverter is prohibited from selling power to the power grid.
4	**Homeload EN:** After this function is enabled, home load statistics is enabled for the inverter and power is correctly displayed.
5	**Peak shift time:** Click to enter the peak shift mode time period setting interface.
6	**Advanced settings**: Users can click **advanced settings** > to enter the advanced settings interface. There are also some attributes of these mode: Global grid charge enable, PV charge only, Bat charge on priority, Time-of-use enable and 6 time-of-use slots. For more advanced mode settings, see chapter 10.

6.3.2.2 System setting/page two



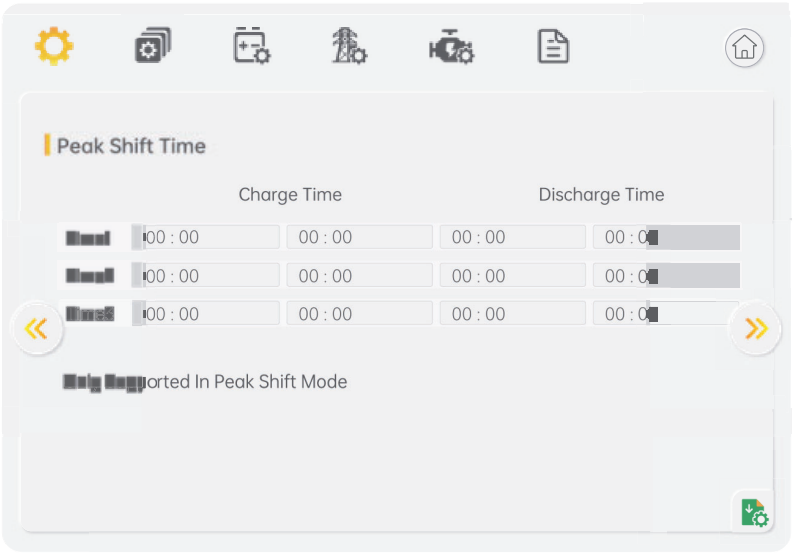
System setting	
1	Users can set PV types, includingindependent, Parallel and constant voltage.
2	Default parameters vary by inverter model, which can be set for the inverter to sell current to the power grid. Grid export limit, Grid selling current, Compare the two parameters and take the minimum value to take effect.
3	The maximum power drawn by the battery and load from the grid.
4	The limiting threshold for battery charging power drawn from the grid (applicable exclusively during charging mode, i.e., the battery's maximum charge power shall not exceed this value).

6.3.2.3 System setting/page three



Date and time settings:
Users can manually modify the year, month, day, hour, minute and second.
The year input range should be between 2000 and 2099.

6.3.2.4 Peak shift time



Setting of charging and discharging time for peak shift.

When the working mode is peak shift, users need to enter this interface to set the charging and discharging time. And users need to manually input the start charge/ discharge time and the end charge/discharge time.

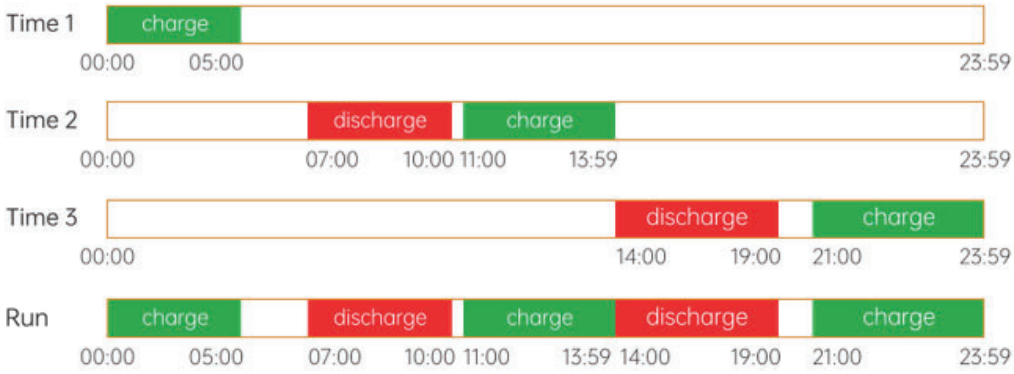
WORK TIME:

1. The maximum allowable setting time is 24 hour (one day), It is allowed to set six different charging and discharging states within 24 hours (time1 twice, time2 twice, time3 twice), The inverter runs repeatedly every day according to



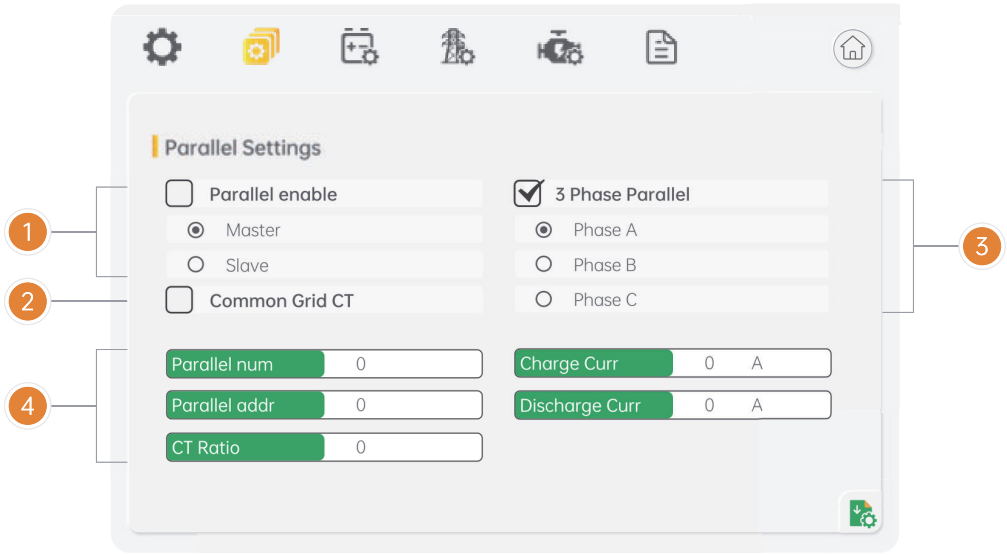
the set time.

2. The inverter executes according to the settings of time1, time2 and time3 in



the order of time. The following figure is an example. Different time periods do not overlap.

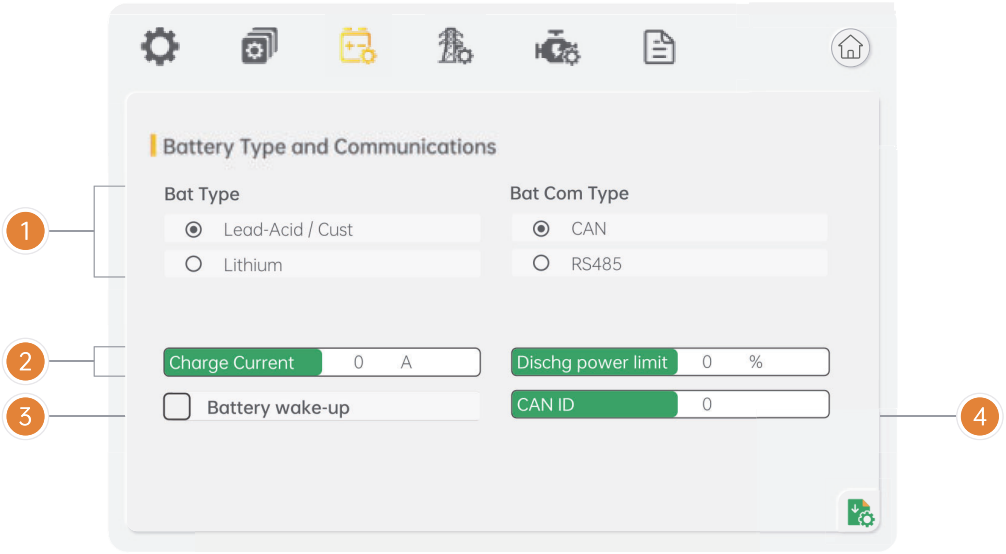
3. If you want to set a continuous charging time from the first night to the next morning. For example, you want to charge the battery from the first day 21:00pm to the next day 5:00am, divide this time period into two time periods (21:00~23:59, 00:00~05:00), and select two charging time periods from Time1, Time2 and Time3 and set them.



Parallel setup menu	
1	**Parallel enable:** Start or disable the parallel function. **Master/Slave:** This interface is used for parallel, and the inverter is selected as the master or slave.
2	**Common grid CT:** Enable or disable CT sharing.
3	**3 Phase parallel:** Enable or disable group 3 phase enable. **PHASE A/B/C:** This interface is used to select the output phase of the device when three phases are used. (Reserved function).
4	**Parallel num:** This operation is used to select the number of parallel inverters. **Parallel addr:** This interface is used to select the parallel address, the host address is set to 1 by default, there is a slave, and the slave is set to 2; If there are two slaves, the slaves are set to 2 and 3 respectively; the address settings of each inverter cannot be the same. **CT ratio:** Set the CT ratio to 2000:1 by default. **Charge curr:** This interface is used to select the parallel charging current. **Discharge curr:** This interface is used to select the parallel discharge current.

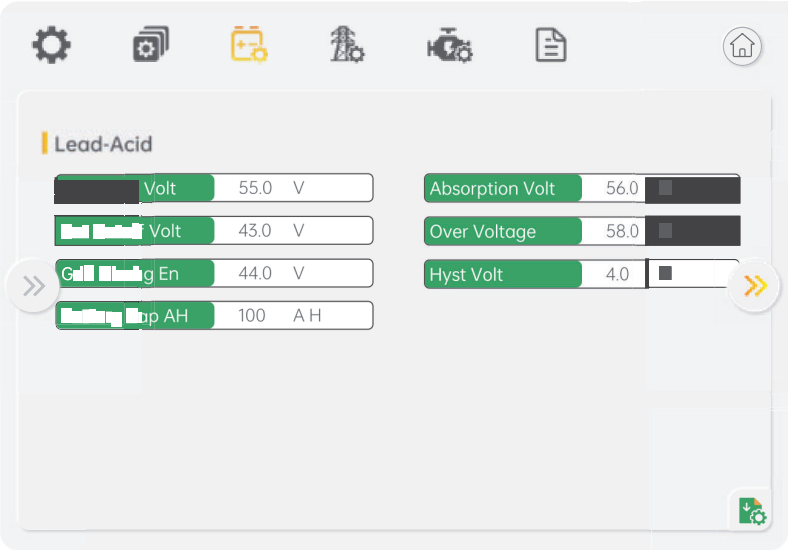
6.3.4 Battery settings

6.3.4.1 Battery type and communications



Battery setup menu	
1	Set battery type and battery communication method. Users can choose the battery type is lead-acid battery/lithium battery, and the battery communication method is CAN/485. The default option is CAN.
2	Users can manually input the value of charging current and discharge power limit.
3	**Battery wake-up:** When the battery is low and the battery relay has been disconnected, the inverter will send instructions to the battery forcibly sucking relay by BMS, and the inverter will charge. The default option is disabled. (Partial battery support) If you want to use this feature, please consult the battery brand supported by the dealer. Use it only when the battery is too low. After the battery wakes up successfully, please turn off the function, otherwise it will affect the normal operation of the inverter.
4	**CAN ID:** The default is 0, and this function is only used for lithium batteries with specific communication protocols. If required, please contact the supplier.

6.3.4.2 Battery setting



Settings required when using lead-acid batteries: Float chg volt: Charge the battery with constant voltage and small current (This interface is used to set the lead acid battery charging voltage. (The input value ranges from 40 to 59.5) Set the floating charge voltage to be less than the constant charge voltage).

Absorption volt: Charge the battery with constant current.

Bat cutoff volt: Discharge protection voltage (This interface is used to set the lead acid battery discharging voltage. (The input value ranges from 40 to 51) discharge cut-off voltage, as recommended by the battery manufacturer).

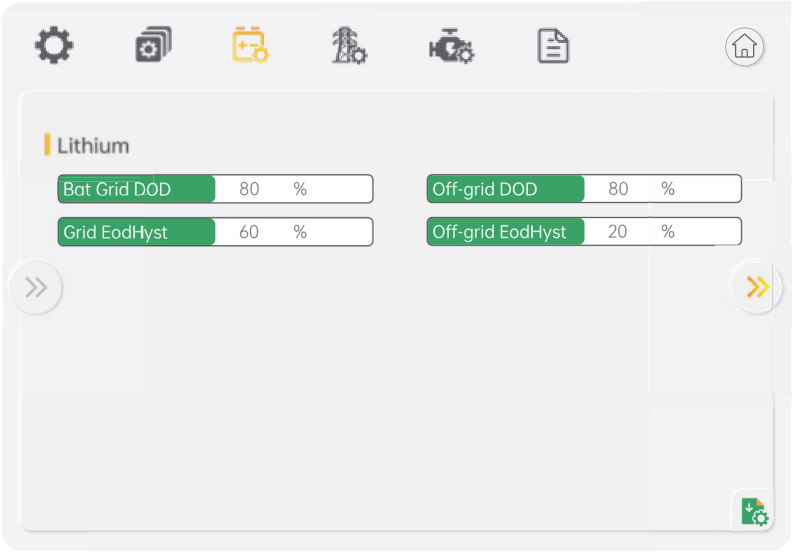
Over voltage: Charging protection voltage (This interface is used to set the lead acid battery charge protection voltage. (The input value ranges from 50 to 59.5) charge protection voltage, as recommended by the battery manufacturer).

Grid dischg en: Discharge cut-off voltage of lead-acid battery in on-gird state.

Hyst volt: If the voltage of a lead-acid battery is too low alarm, charge the battery so that the voltage is higher than the "hyst voltage + cutoff voltage". When the alarm is cleared, the battery can discharge again.

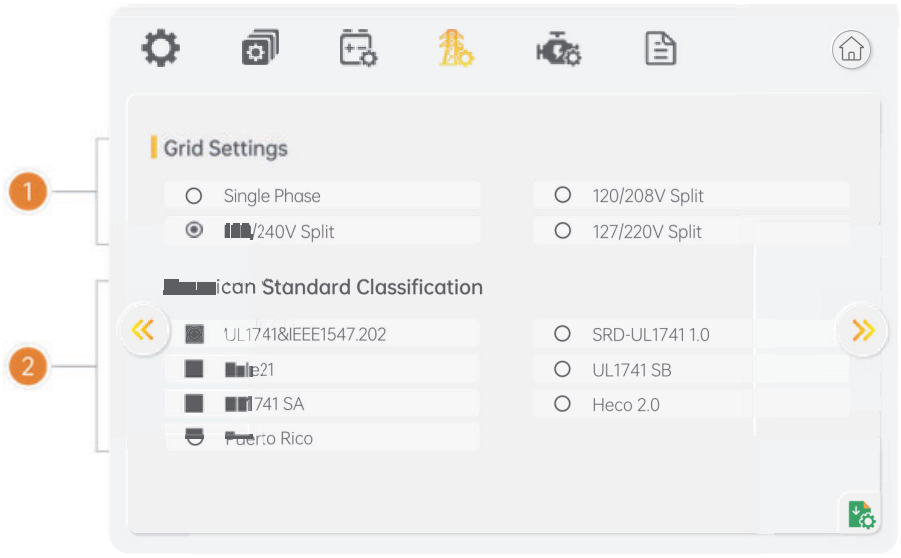
Battery cap AH: Battery capacity (This interface is used to set the lead acid battery capacity. It is related to the input power. (The input value ranges from 50 to 2000) The battery capacity setting will affect the maximum charging current, for example, set 100Ah, the maximum charging current is 100Ah*0.2=20A).

Settings required when using lithium: Bat grid DOD / off-grid DOD: When the battery discharge is higher than the set parameter, the inverter generates a battery low voltage alarm. Distinguish between grid-connected alarm parameters and off-grid alarm parameters. **Grid eod hyst / off-grid eod hyst:** When a low-voltage alarm is generated, the alarm is cleared if the battery charge is higher than the specified amount. The default minimum is 5% end hyst.



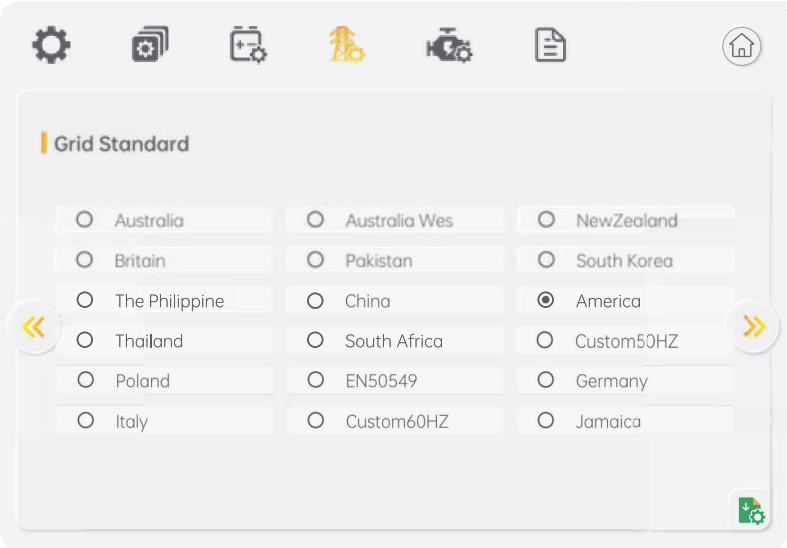
6.3.5 Grid setting

6.3.5.1 Grid setting/page one



Grid setting/page one	
1	**Grid settings:** Inverter default option is 120/240V split phase.
2	**American standard classification:** Effective only when the grid standard is america, American standard classification for multiple regions of america is provided.

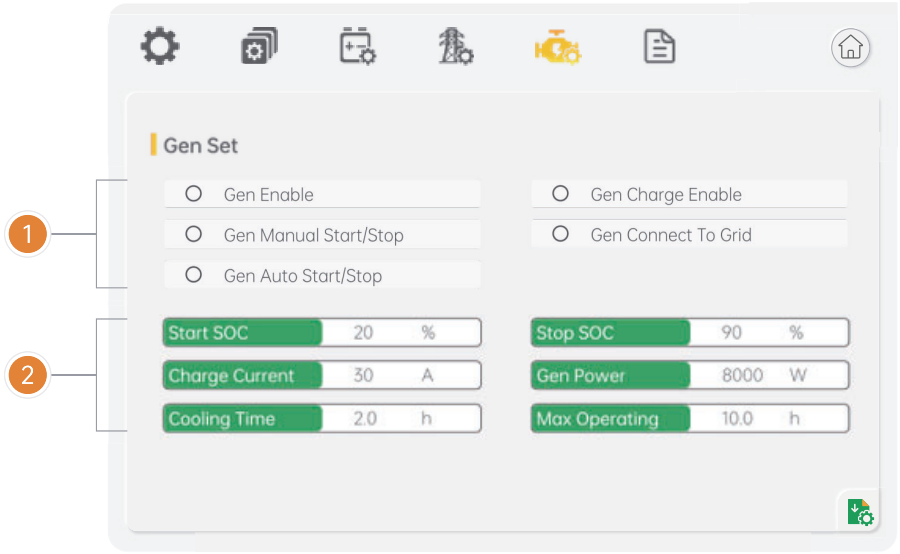
6.3.5.2 Grid setting/page two



This interface is used to select grid standard. Users can set and switch grid standards according to their needs.

Custom50Hz/60Hz: Customize grid settings.

6.3.6 Generator setting



Generator setting (lithium battery)

1

Diesel generator enable settings:

Gen enable: Enable control of the generator function.

Gen chare enable: Generator charge enable control.

Gen auto start/stop: If the user wants the generator to be automatically controlled to start and stop through the dry contact, please enable it.

Gen manual start/stop: The on/off command in manual control mode.

Gen connect to grid: Connect the diesel generator to the grid input port.

2

Diesel generator parameter setting:

Start SOC: When the SOC of battery is lower than the setpoint, the generator dry contact is enabled , the connected generator will be started.

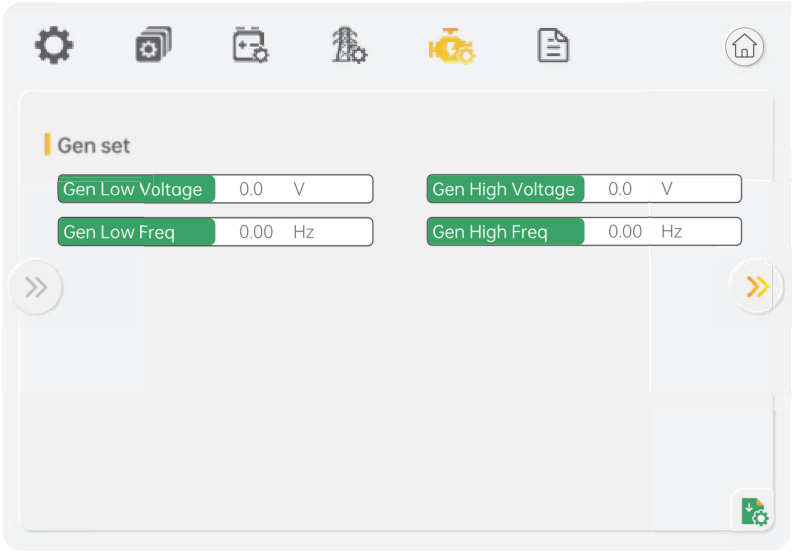
Stop SOC: When the SOC of battery is higher than the set point, the generator dry contact is disabled, the connected generator will be stopped (START SOC<STOP SOC).

Charge current: It indicates the maximum current that the inverter charges the battery from generator.

Gen power: Rated power of generator.

Cooling time: It indicates the waiting time of the generator to restart after it has reached the running time. The unit is 0.1 hour.

Max operating: It indicates the longest time generator can run in one day, when time is up, the generator will be turned off. The value 240 means 24 hours in which state the generator will not be shut down all the time. The unit is 0.1 hour.



The input voltage and frequency of the generator are controlled by the protection parameters of this page.

Gen low voltage: The input value of generator low voltage.

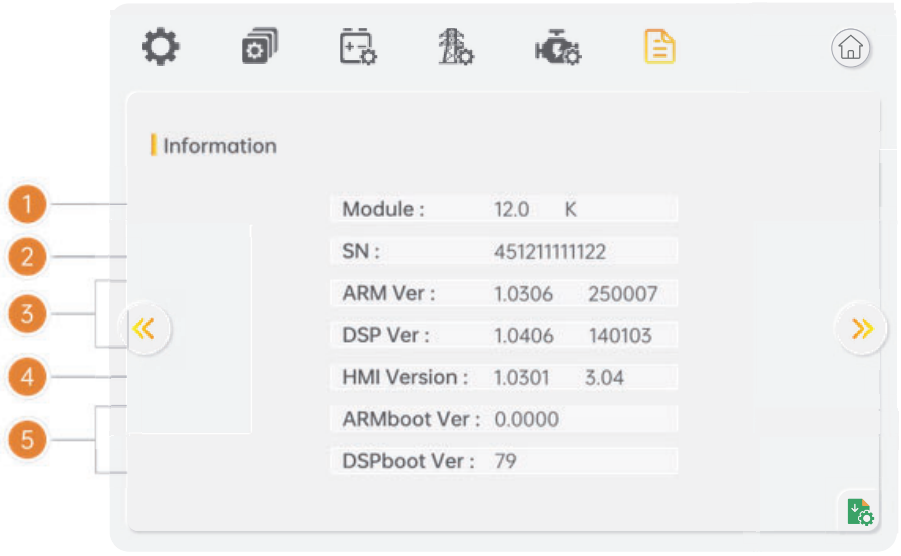
Gen high voltage: The input value of generator high voltage.

Gen low freq: The input value of generator low frequency.

Gen high freq: The input value of generator high frequency.

6.3.7 Inverter information

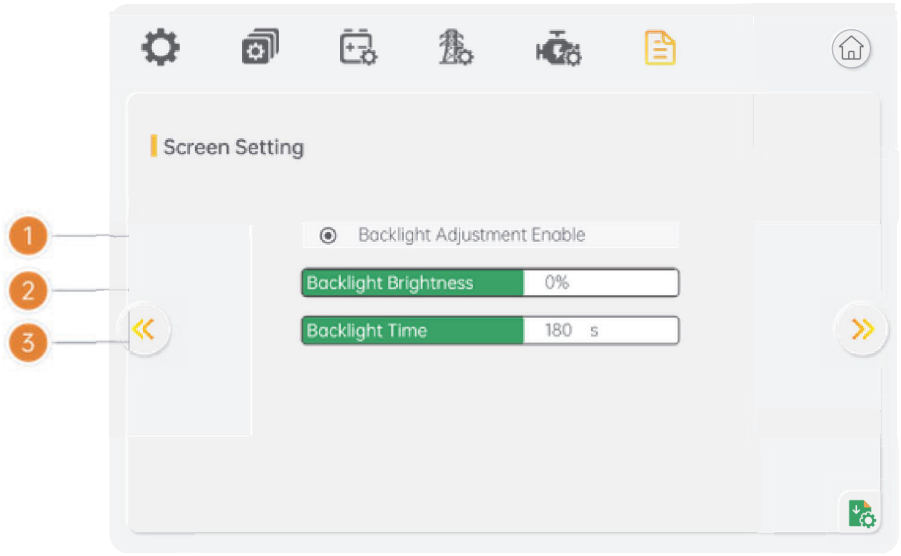
6.3.7.1 Inverter information/page one



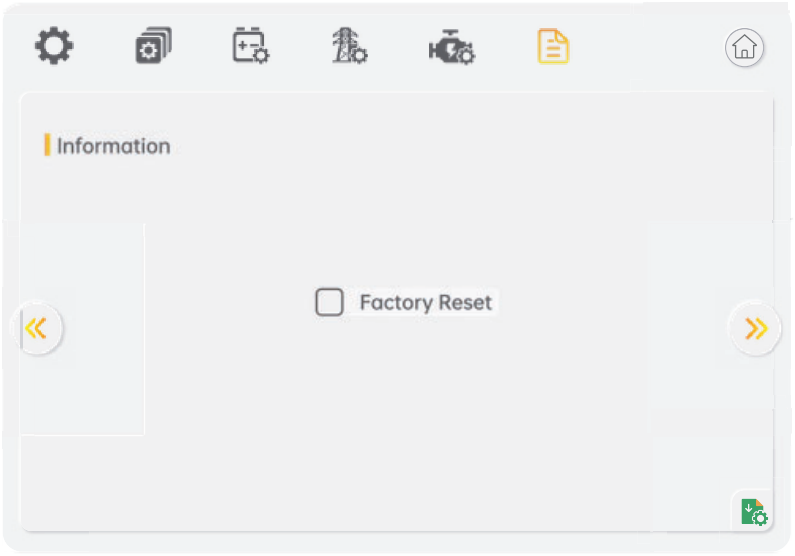
Inverter information/page one	
1	Show inverter module.
2	Hybrid inverter serial number.
3	Show inverter software version.
4	Display firmware version.
5	Display inverter bootloader version.

6.3.7.2 Inverter information/page two

Inverter information/page two	
1	Screen backlight adjustment control, you can use the following options to control the screen backlight. If the option does not enable, the screen will turn off in 3 minutes by default.
2	Screen backlight brightness adjustment. The value ranges from 0 to 100%.
3	Set the screen-off time, value ranges from 5 to 250S.



6.3.7.3 Inverter information/page three



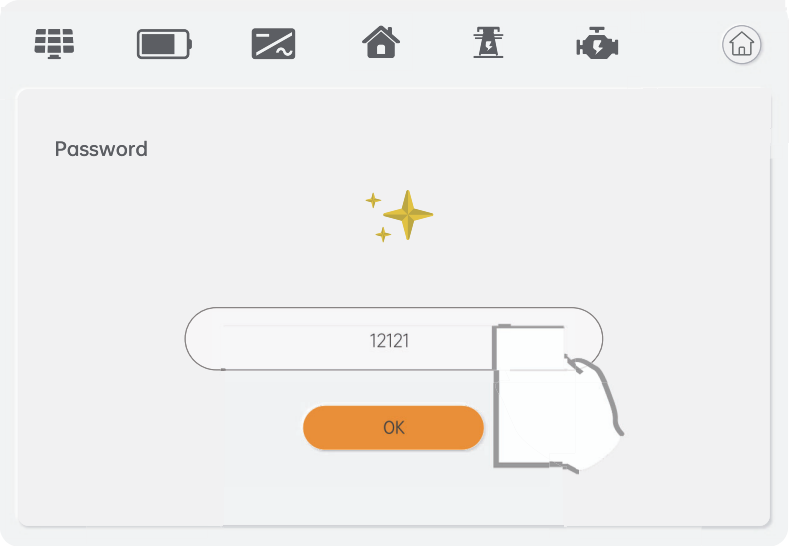
When the inverter is restored to factory settings, the parameters will be reset to the default values. This function takes effect only when the inverter is in the standby state. (ON/OFF button is disabled.)

6.4 Maintenance setting

6.4.1 Enter maintenance setting

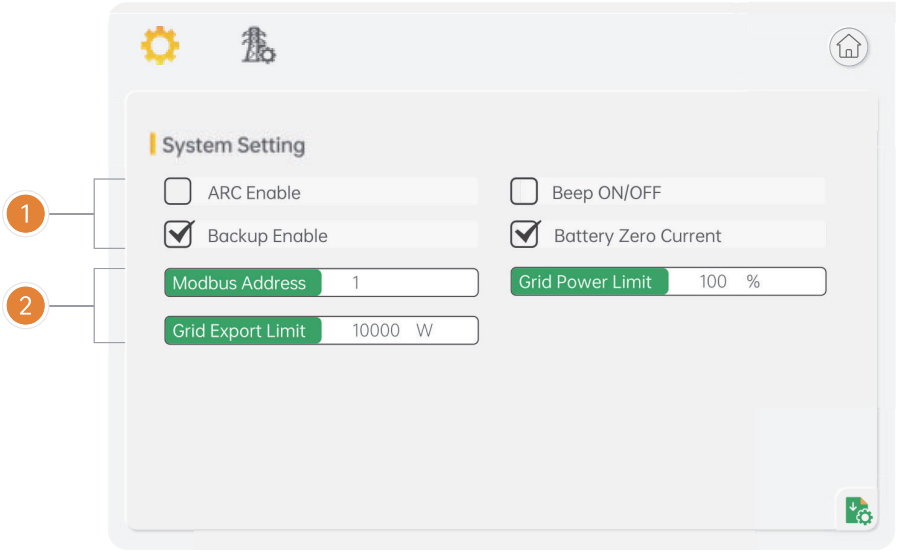
64.1.1 Input password

To enter the maintenance settings, a password is required. The default password is 12121. Click OK to enter the settings interface.



- Under normal circumstances, customers are not allowed to modify this interface parameters, if necessary, please contact the dealer.

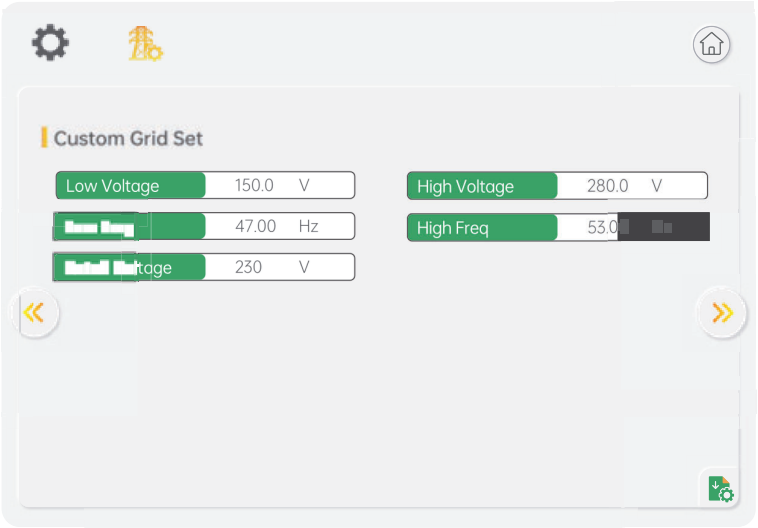
6.4.2 System settings



System settings	
1	**ARC enable:** ARC detection function. **Beep ON/OFF:** Screen alarm switch. Set enabled, the buzzer will sound when the inverter alarms. **Backup enable:** When the grid and PV are powered off, Enable the battery to supply power to the load, default option is enabled. Modbus address: The default value is 1 and you do not need to change it.

1	**Battery zero current (Activated solely under sell first mode configuration):** When the inverter is in a no-charge/no-discharge period (i.e., both gridChg and sell first options are deselected): • If battery zero current is selected: Grid-supplied power directly feeds the load, isolating battery discharge path. • If battery zero current is deselected: Battery priority supply maintains load operation.
2	**Modbus address:** The default value is 1 and you do not need to change it. **Grid power limit:** Users can click to enter the numerical input interface. This function is used to limit the inverter conversion power of the inverter. The default parameter is 100%. **Grid export limit:** Default parameters vary by machine model, allowing you to set the power the inverter sells to the grid.

6.4.3 Custom grid set



This parameter takes effect only when the power grid standard is custom.

Low voltage: The input value of grid low voltage. When the grid voltage falls below this threshold, the inverter triggers a 'Grid under-voltage' fault.

High voltage: The input value of grid high voltage. When the grid voltage exceeds this threshold, the inverter issues a 'Grid over voltage' alarm.

Low freq: The input value of grid low frequency. When the grid frequency drops below this threshold, the inverter triggers a 'Grid under-frequency' alarm.

High freq: The input value of grid high frequency. When the grid frequency exceeds this threshold, the inverter triggers a 'Grid over-frequency' alarm.

Rated voltage: Custom rated voltage setting. If a custom grid is selected, configure this value to modify the inverter's rated output voltage *(only effective under custom grid mode)*.

6.4.4 Grid parameters





Grid protect parameters:

This parameter is determined by the national grid standard. If the user needs to use over-voltage and under-voltage protection, please contact the supplier.

HV means high voltage trip protection.

LV means low voltage trip protection.

HF means high frequency trip protection.

LF means low frequency trip protection.

6.4.5 Grid reconnect parameter



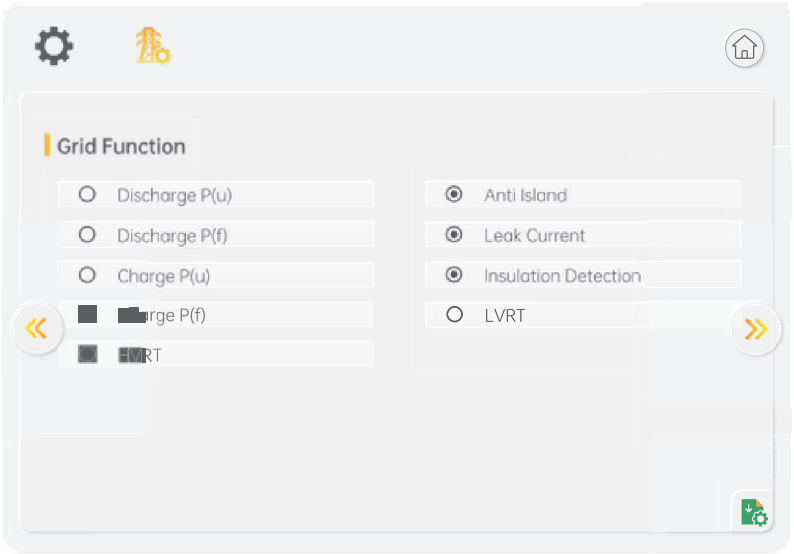
Grid reconnection parameter:

Grid volt low/high: Set the upper and lower limits of power grid voltage reconnect parameters.

Grid freq low/high: Set the upper and lower limits of power grid frequency reconnect parameters.

Grid reconnection time: The grid connection time can be set, but the minimum time cannot exceed 31S.

6.4.6 Grid function



Discharge p(u): Generation voltage response.

When the grid voltage is abnormal, the active power is limited, and the function is enabled when required by the national grid standard.

Discharge p(f): Generation frequency response.

When the power grid frequency is abnormal, the active power will be limited, and the function will be enabled if required by the national power grid standard.

Charge p(u): Charge voltage response.

When the grid voltage is abnormal, the charging power will be limited, and the function will be enabled if required by the national grid standards.

Charge p(f): Charge frequency response.

When the power grid frequency is abnormal, the charging power will be limited, and the function will be enabled if required by the national power grid standard.

HVRT/ LVRT (high/ low voltage ride through):

Enable the high/low voltage ride through function of the inverter.

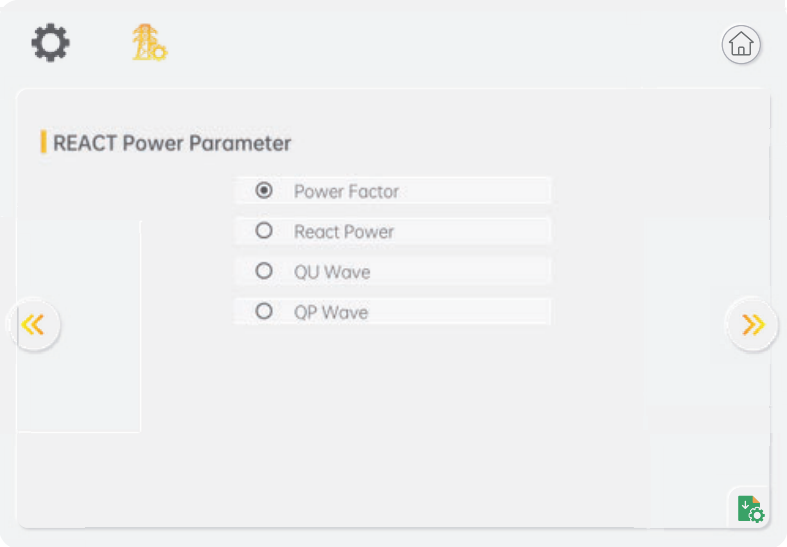
Anti island: When the grid goes down, inverter will detect the loss of power and disconnect from the grid within milliseconds. It prevents your solar panels from feeding electricity into a downed power line. (The default option is enabled)

Leak current: Leak current detect (The default option is enabled.)

Insulation detection: Insulation detect (The default option is enabled).

When the insulation detection function is enabled in the grid connected state, the insulation detection is performed once a day when the photovoltaic energy comes in, and the inverter switches to the by-pass band load. If the inverter is off-grid, the output will be disconnected during insulation detect and the load will stop working.

6.4.7 Reactive power parameter



REACT power parameter: REACT power parameter, including: Power factor, React power, QU wave, QP wave. (For specific country if required by the local grid.)

Power factor: The input value should range between L0.80 and L0.99 or C0.8 and C1.00.

React power: Reactive power control.

The input value should range between -60% and +60%, which varies with the standard.

QU wave: Voltage-reactive curve.

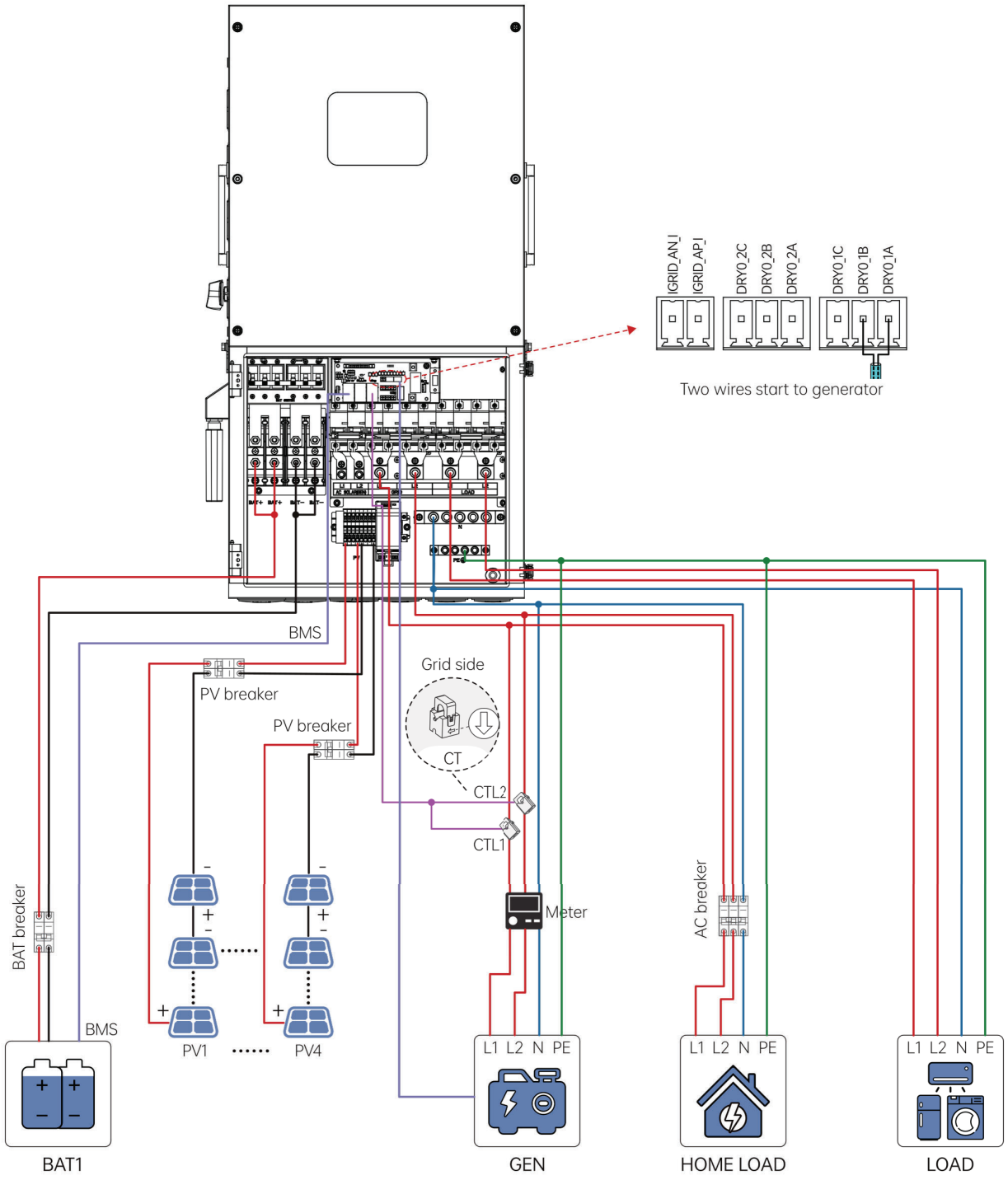
QP wave: Active power-reactive power curve. (These two functions are not available on the screen, please contact the distributor if you need to use them.)

7 Generator use operation guide

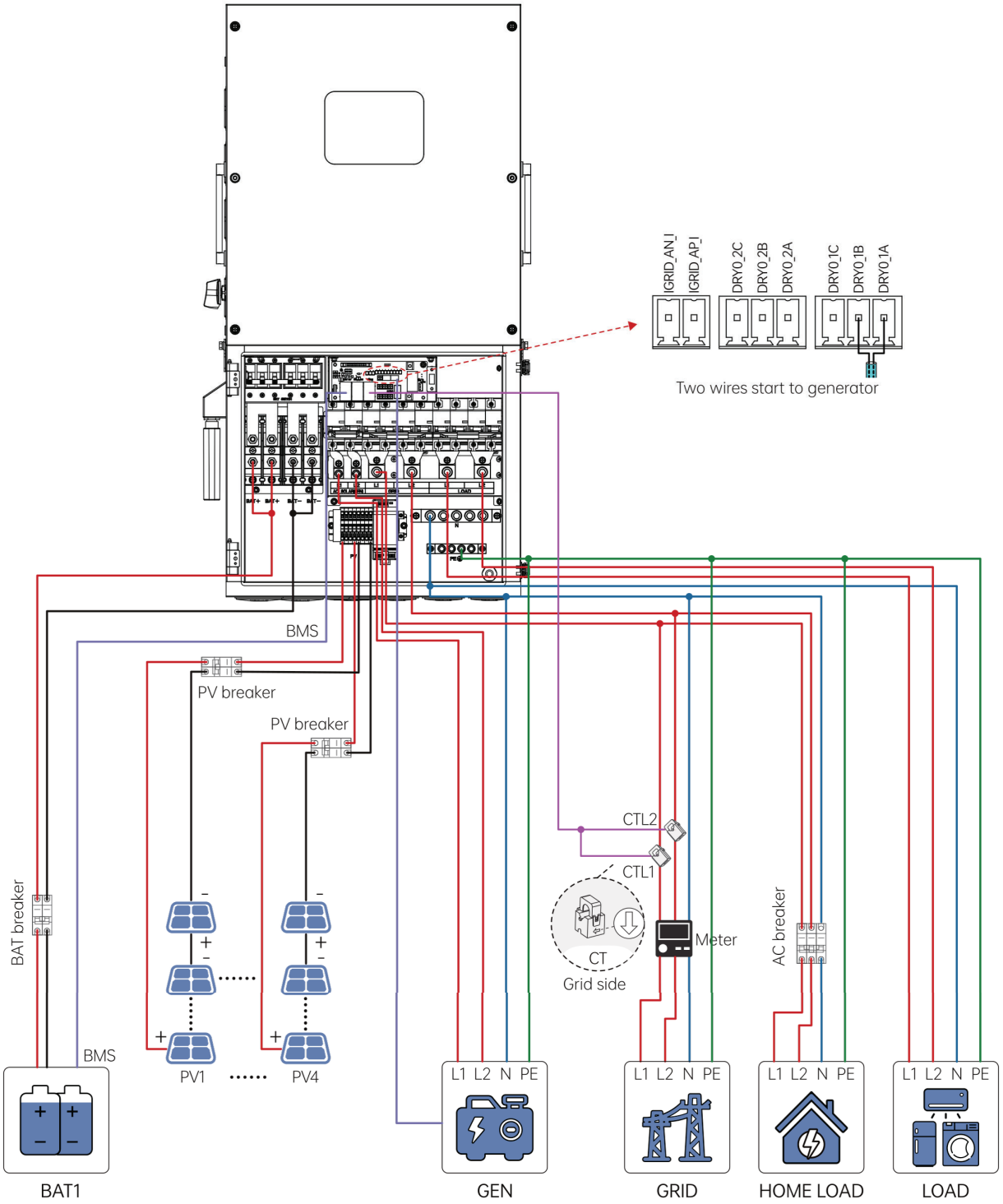
7.1 Generator use diagram

The generator provides two wiring methods for connection, and the customer can choose one of them according to the actual situation.

1. The generator is connected to the grid port of the inverter. The connecting cable shall be covered with CT. It is used in some off gird situations. The system diagram is as follows.

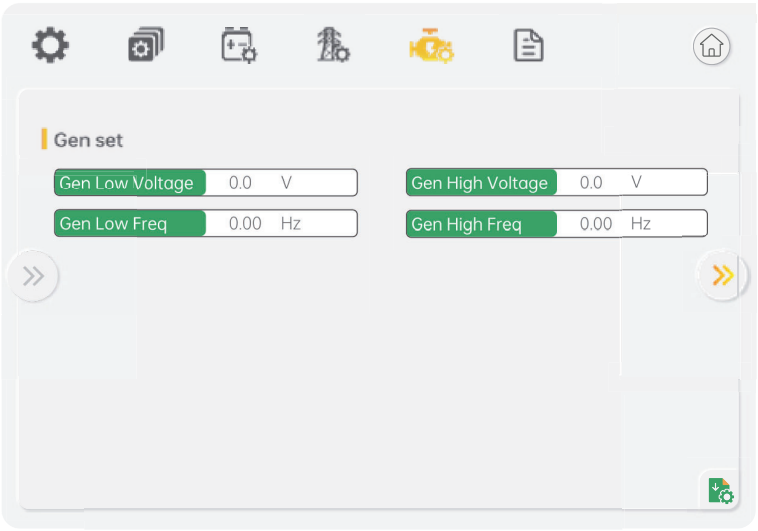


2. The generator is normally connected to the generator port. The connecting cable between the generator and the inverter does not need to be covered with CT. The connection line of the power grid port should be connected with CT. The system diagram is as follows.



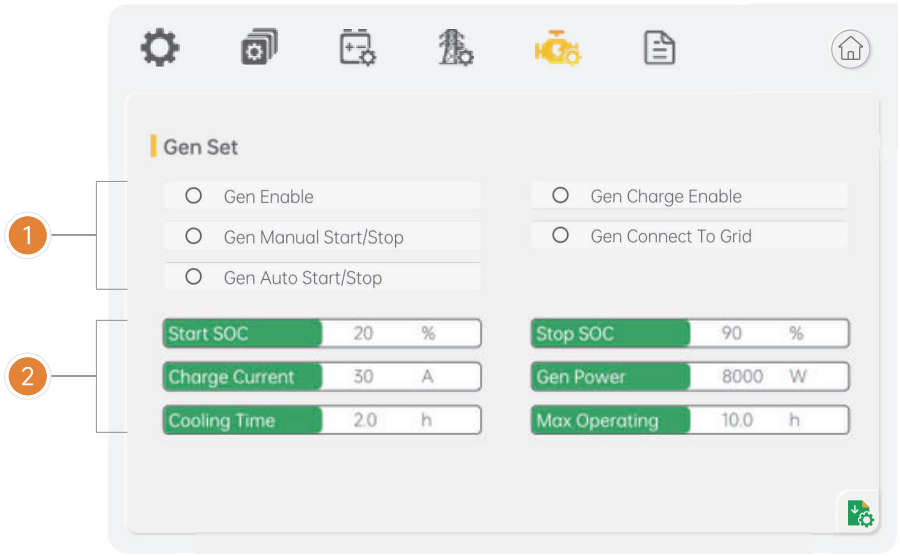
7.2 Generator operation notes

1. Double check that the circuit is connected correctly.
2. The generator provides two modes (automatic and manual) for control, please select one mode to use, do not set both at the same time.
3. When connecting the generator to the power grid port of the inverter, select connect to the grid port.
4. The voltage and frequency range of the generator should be consistent with the current inverter grid setting standards.
5. The two wires start signal DRYO_1A and DRYO_1B of the generator is used to automatically control the start and stop of the generator.
6. When a generator is used in a parallel inverter system, only the two engine start signal wires need to be connected to the master inverter. The generator function must be enabled on both master and slave inverters, with identical parameter configurations across all units.
7. In automatic mode, if the generator abruptly stops during operation while the battery's actual SOC has not reached the stop SOC threshold, the generator will not restart. In this scenario, the start SOC value must be reconfigured to initiate the generator. The same logic applies when using voltage control.
8. The input voltage and frequency of the generator are controlled by the protection parameters of this page.



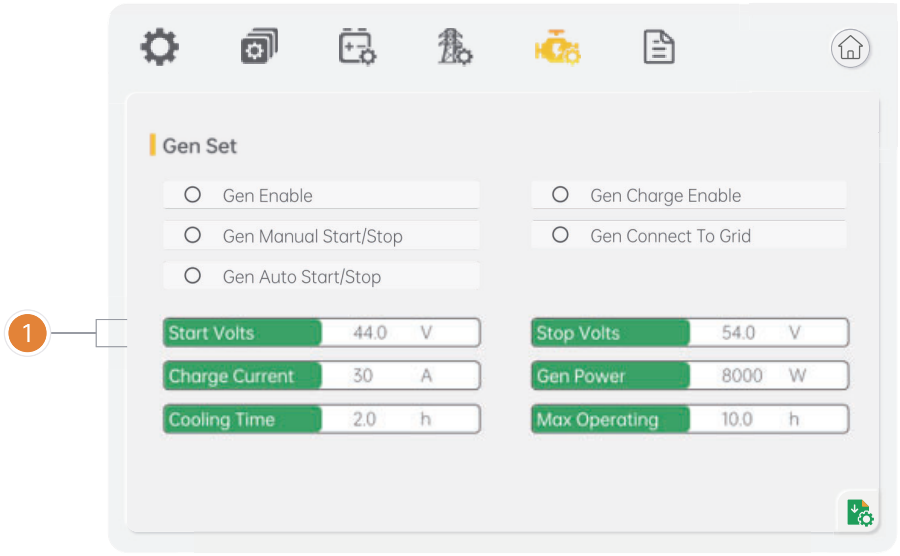
7.3 Generator setting

7.3.1 Generator setting (lithium battery)



Generator setting (lithium battery)	
1	**Diesel generator enable settings:** **Gen enable:** Enable control of the generator function. **Gen chare enable:** Generator charge enable control. **Gen auto start/stop:** If the user wants the generator to be automatically controlled to start and stop through the dry contact, please enable it. **Gen manual start/stop:** The on/off command in manual control mode. **Gen connect to grid:** Connect the diesel generator to the grid input port.
2	**Diesel generator parameter setting:** **Start SOC:** Generator in automatic mode. When the SOC of battery is lower than the set point, the generator dry contact is turn-on and the connected generator will be started. **Stop SOC:** Generator in automatic mode. When the SOC of battery is higher than the set point, the generator dry contact is disconnected, the connected generator will be stopped (START SOC STOP SOC). **Charge current:** It indicates the maximum current that the inverter charges the battery from generator. **Gen power:** Rated power of generator. **Cooling time:** It indicates the waiting time of the generator to restart after it has reached the running time. The unit is 0.1 hour. **Max operating:** It indicates the longest time generator can run in one day, when time is up, the generator will be turned off. The value 240 means 24 hours in which state the generator will not be shut down all the time. The unit is 0.1 hour.

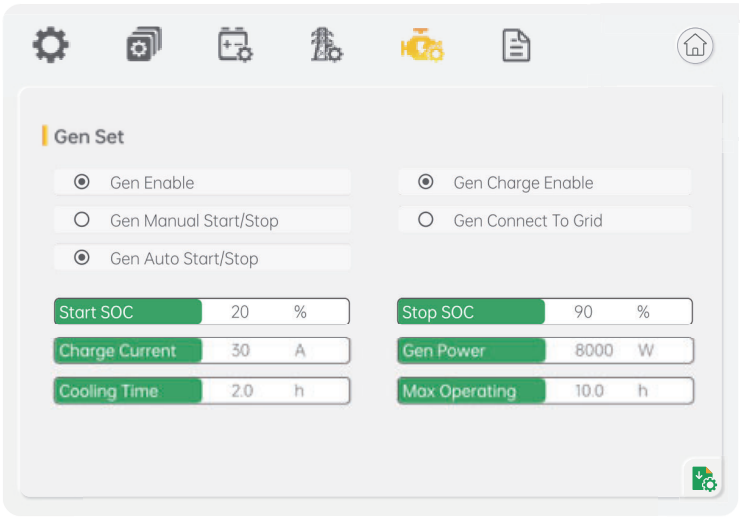
7.3.2 Generator setting (lead-acid battery)



1. **Start volt:** Generator in automatic mode. When the volt of battery is lower than the setpoint, the generator dry contact is turn-on and the connected generator will be started.

   Stop volt: Generator in automatic mode. When the volt of battery is higher than the set point, the generator dry contact is disconnected, the connected generator will be stopped (START volt <STOP volt).

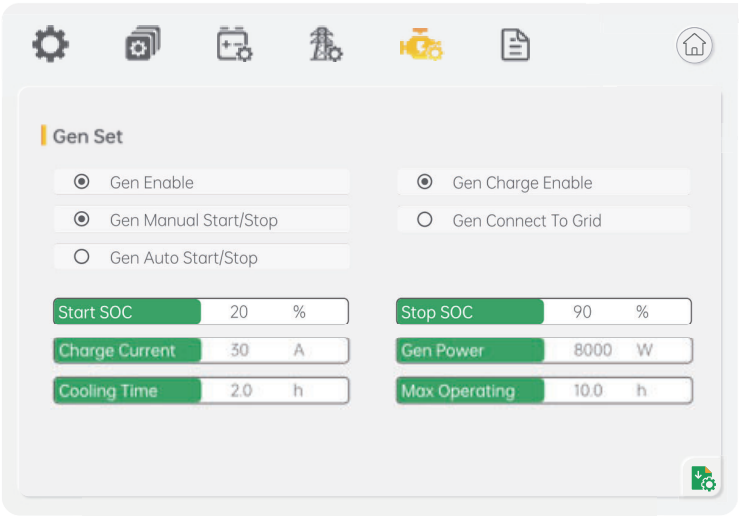
7.3.3 Generator automatic mode setting



As shown in the picture on the left, select gen enable, Gen auto and gen charge enable. Set generator on, off SOC or voltage, charging current, generator power, stop cooling time, maximum running time.

If use the first connection mode, select gen connect to grid.

7.3.4 Generator manual mode setting

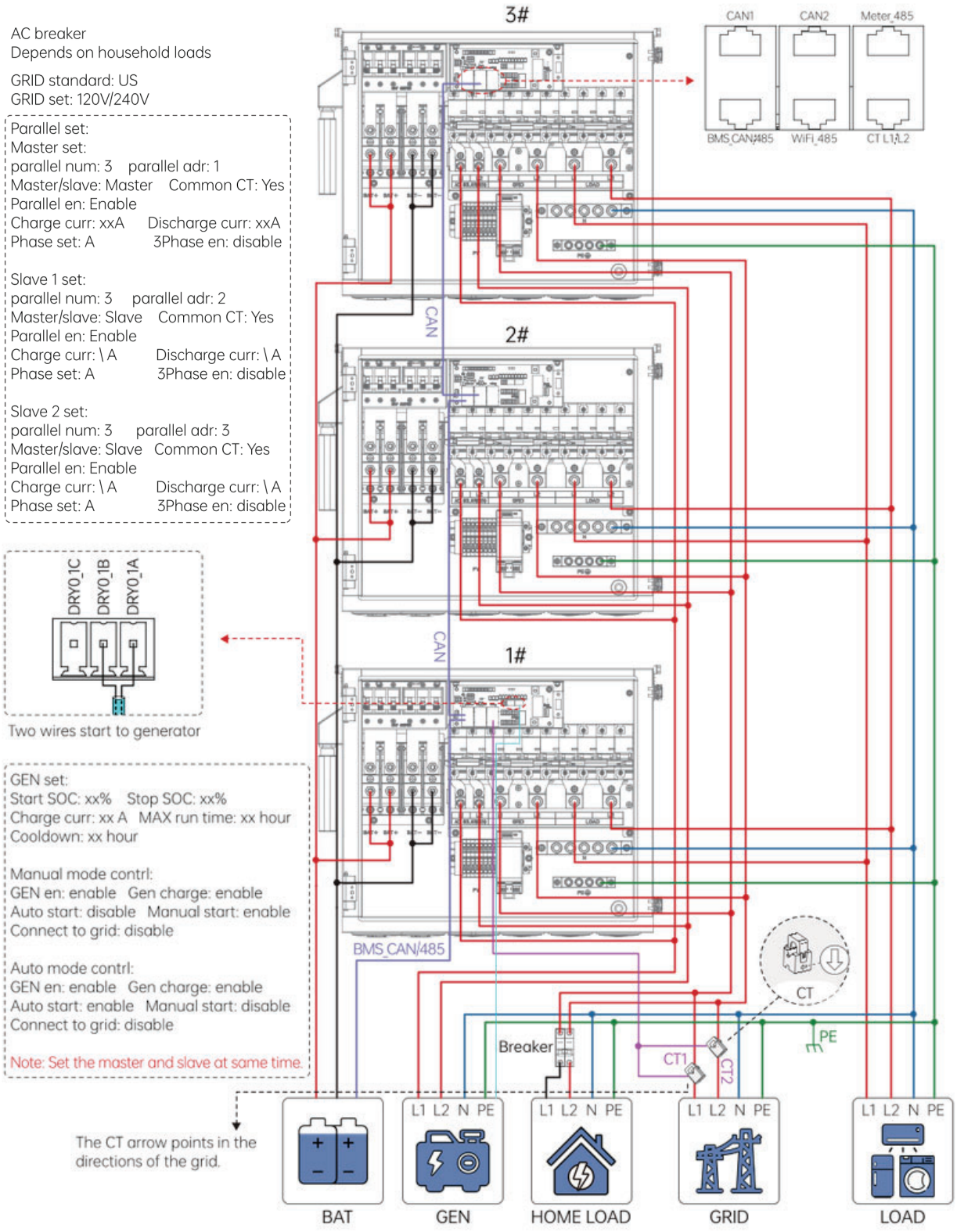


As shown in the picture on the left, select gen enable, Gen manual and gen charge enable. charging current, generator power, stop cooling time, maximum running time.

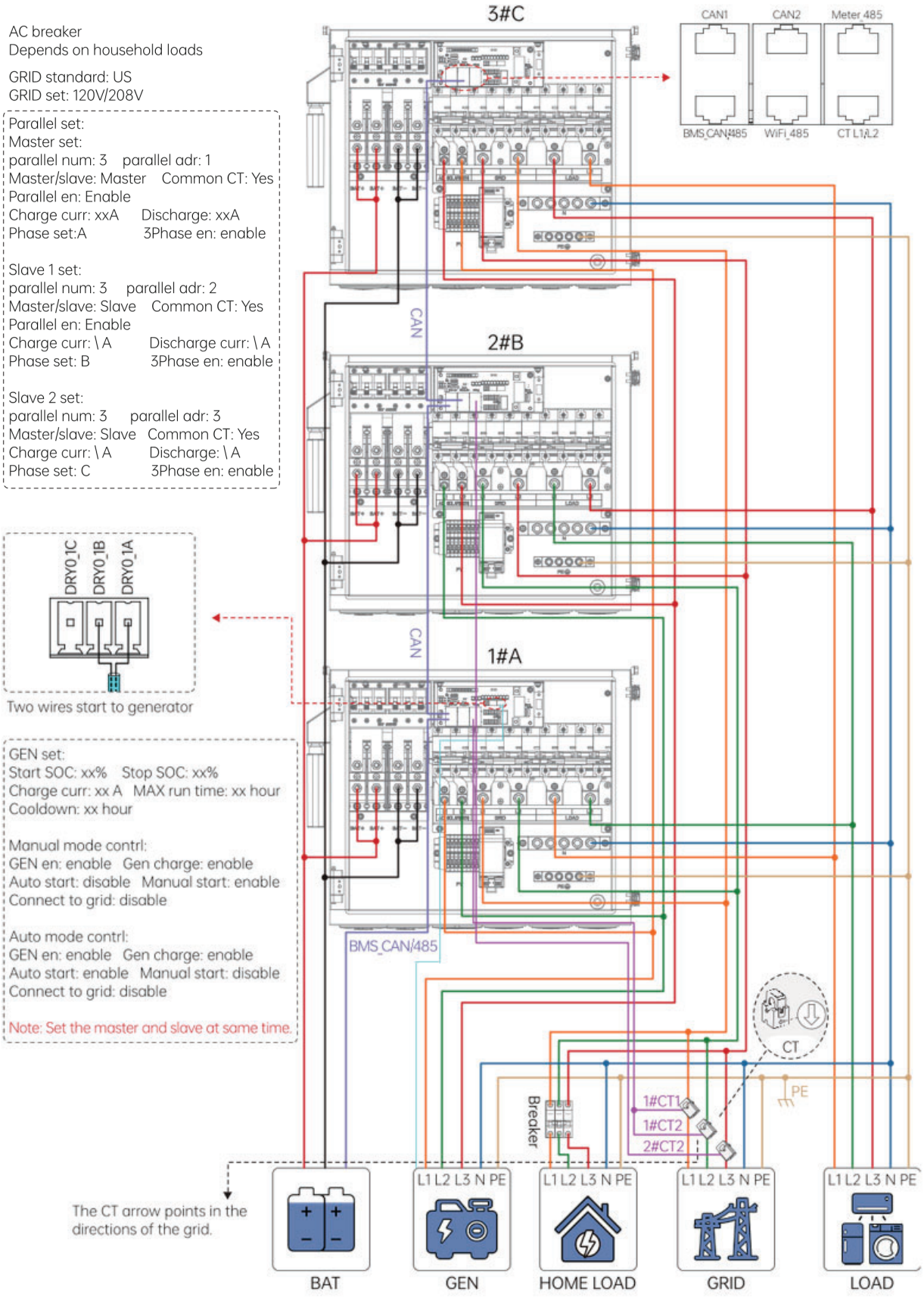
8 Inverter parallel guide

8.1 Parallel system diagram

8.1.1 Split phase (120/240Vac) parallel connection diagram



8.1.2 Parallel connection for 120/208 three phase (american standard)



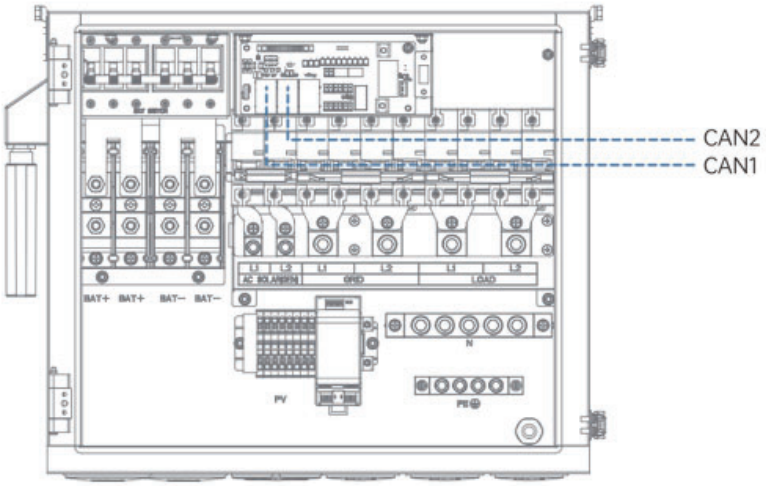
- '1#' labeled unitsarealwaysdesignated asmaster inverters.
- '2#' labeled unitsarealwaysdesignated asslave inverter 1. '3#'
- labeled unitsarealwaysdesignated asslave inverter 2.

Multiple inverters can be installed together to deliver more power. When AC loads are present, all units effectively share the load. The system wiring diagram is as shown above in section 8.1.1.

When using the parallel inverter, the user can choose to share CT or not share CT (without sharing CT, each inverter should be connected to one CT, CT connection method is the same as the single inverter connection method). To use external loads, users must select the COMMON CT wiring method (As shown above) and select COMMON CT ENABLE.

The inverter uses the battery parallel connection mode by default. When using multiple batteries, please refer to the battery manual to correctly connect to the inverter, and connect the battery communication line to the master.

8.2 Parallel communication cable connection

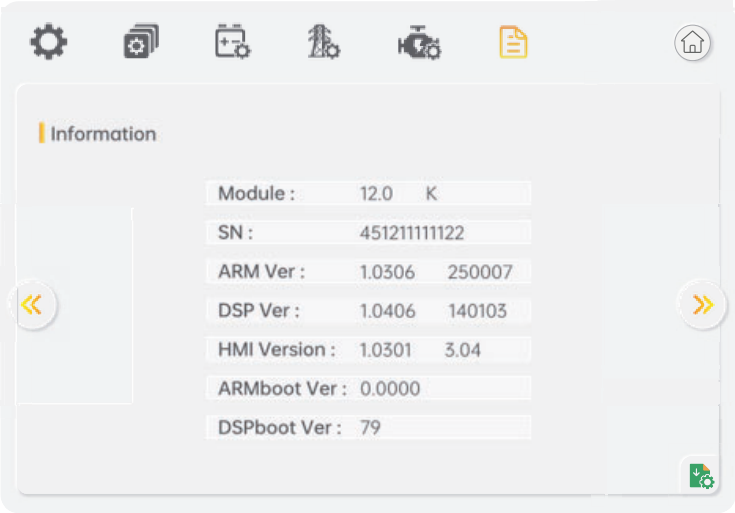


For parallel communication, CAT 5 cables are needed. The units should be connected hand by hand.

When using common batteries, BMS cable needs to be connected to the master unit. The inverter shares the BMS information by inter-unit parallel communication cable.

8.3 Parallel operation notes

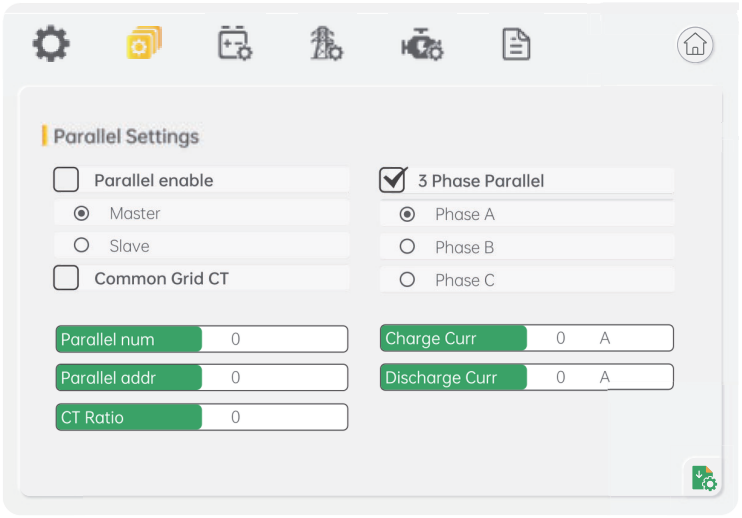
1. Ensure that all inverters in the parallel system are using the same software version. (Different versions of the software have different control logic, which may cause the parallel system to run abnormally.)



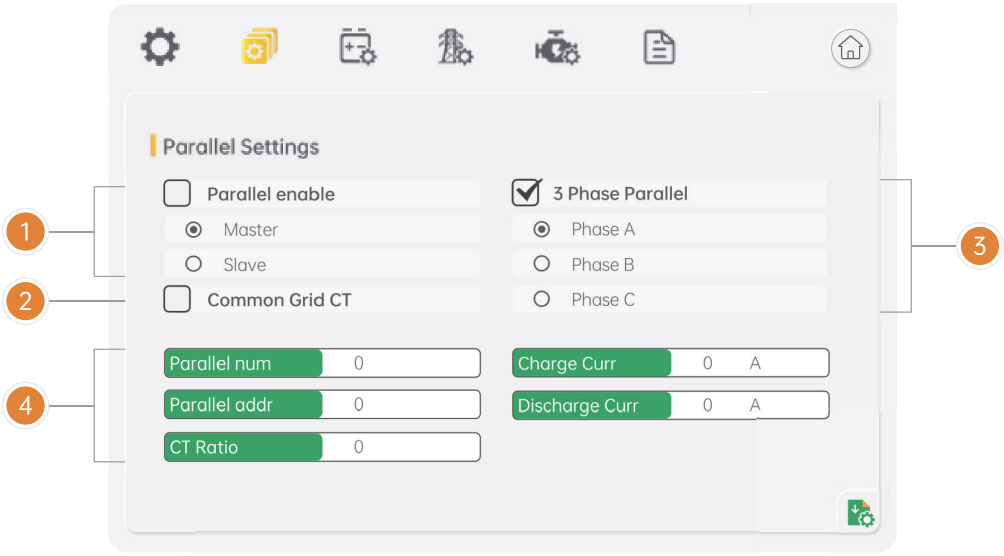
2. Check the circuit connection again to make sure it is properly connected. (In many cases, the abnormal operation of the parallel system is caused by wiring errors)
3. The distance between the AC output end of each inverter and the common contact should be the same, and the role is to adjust the impedance value in the power line so that the current of each inverter is equal.
4. The settings of the parallel system are given in the wiring diagram. Please set them according to the corresponding inverter connection sequence. (The vast majority of parallel systems run abnormally because of incorrect settings.)
5. In a parallel system, multiple batteries are connected in parallel by default, and only the BMS communication line of the battery needs to be connected to the master inverter. (Ensure that the battery system is connected in parallel correctly and the battery communication protocol matches the inverter.)
6. When the parallel system uses the generator function, connect and set up each inverter simultaneously. The purpose is to ensure that the operating state of each inverter is consistent.
7. In a parallel system, the user can choose to common CT (Common CT, current data is transmitted to the master and then distributed to the slave) or not to common CT (each inverter counts current data separately, Need to use multiple CT). When using home load, the user must select common CT.
8. The communication between inverters in the parallel system needs to be completed by parallel communication cables to carry out data transmission and exchange between the master and slave inverters. Each inverter provides two parallel system communication network ports (CAN1, CAN2). The two network ports do not distinguish the sequence.
   If the parallel system fails to run properly, contact after-sales personnel for technical support.
9.

8.4 Parallel system setting

The parallel setting page can be visited in the following steps in the screen:
Password -> Parallel settings



8.4.1 Parallel settings



Parallel setup menu	
1	**Parallel enable:** Start or disable the parallel function. **Master/Slave:** This interface is used for parallel, and the inverter is selected as the master or slave.
2	**Common Grid CT:** Enable or disable CT sharing.
3	**3 Phase Parallel:** Enable or disable group 3 phase enable. **PHASE A/B/C:** This interface is used to select the output phase of the device when three phases are used. (Reserved function).
4	**Parallel num:** This operation is used to select the number of parallel inverters. **Parallel addr:** This interface is used to select the parallel address, the host address is set to 1 by default, there is a slave, and the slave is set to 2; If there are two slaves, the slaves are set to 2 and 3 respectively; the address settings of each inverter cannot be the same. **CT ratio:** Set the CT ratio to 2000:1 by default. **Charge curr:** Set the total battery charging current of multiple parallel inverters, and the current will be evenly distributed to each inverter. Parameters are set only by the master. **Discharge curr:** Set the total battery discharge current of multiple parallel inverters, and the current will be evenly distributed to each inverter. Parameters are set only by the master.

- If you need to assemble the split phase into three phases, please make the following settings:

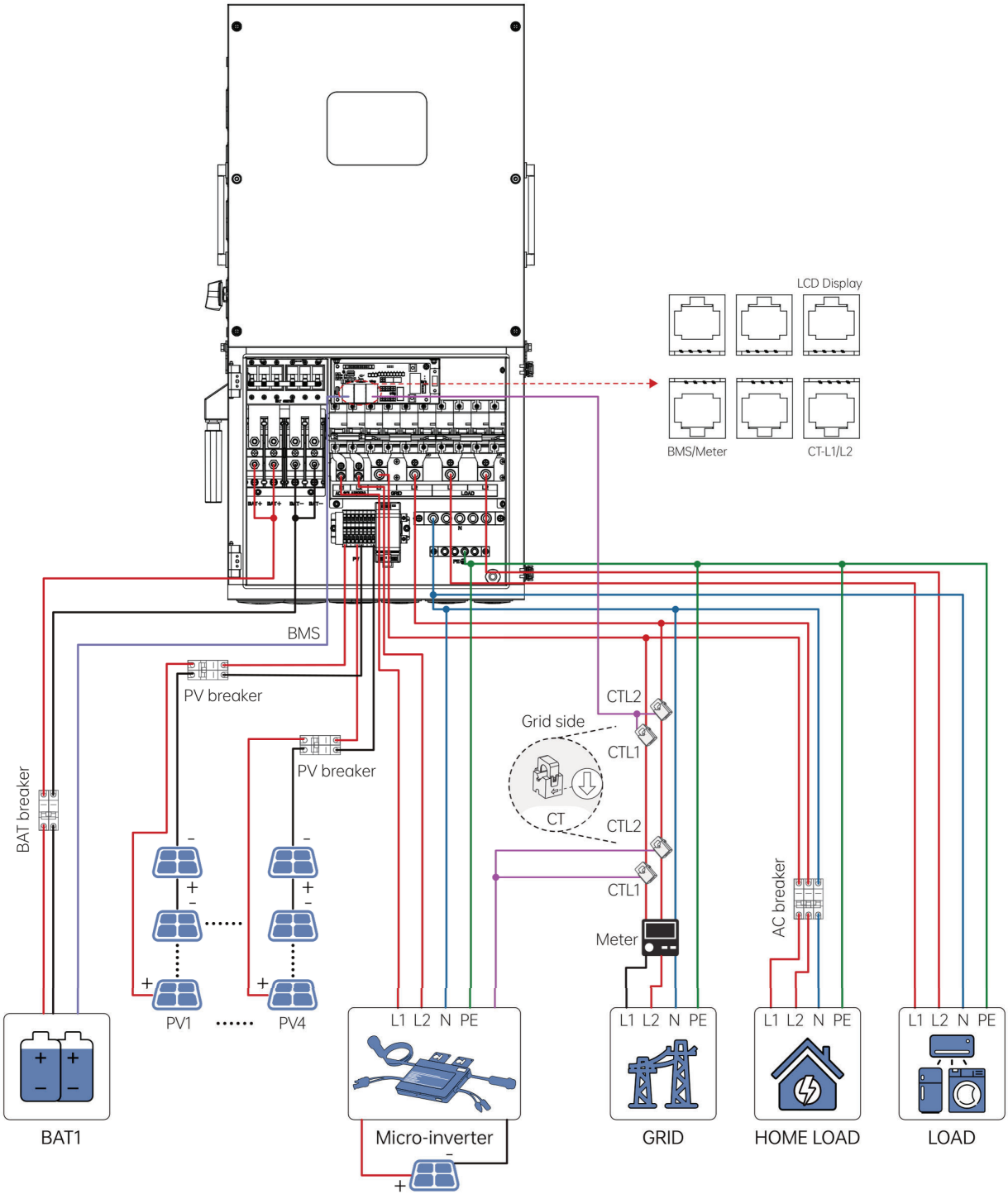
  1. 3PHASE EN; 2. PARALLEL EN; 3. PHASE selection; 4. Grid standard (United states); 5. Power grid settings (US 208V); 6. Master/slave selection; 7. Number of parallel machines.

9 AC couple (micro-inverter) guide

9.1 AC couple connection

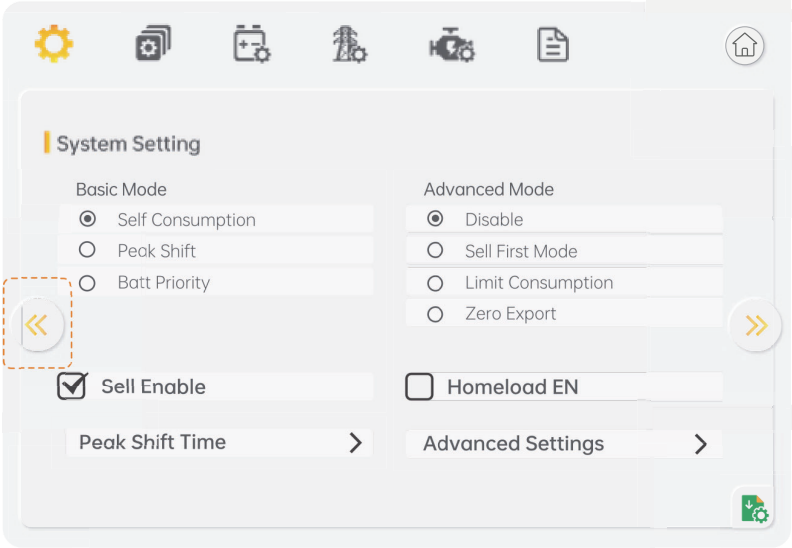
9.1.1 Connect to generator port

Inthe occasion without generator use, we recommend the user to use the generatorterminal to be connected. The power of PV inverters or micro inverters can be measured by the internal sensor of the hybrid inverter.

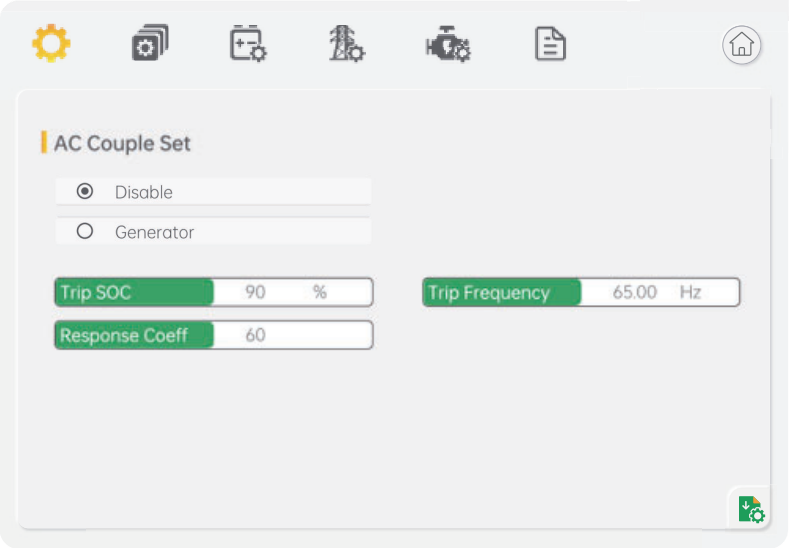


9.2 AC couple function setting

You can access the AC Couple settings page by following these steps:
Password -> System settings



Click the arrow on the next page of the settings interface to find the AC couple settings interface.

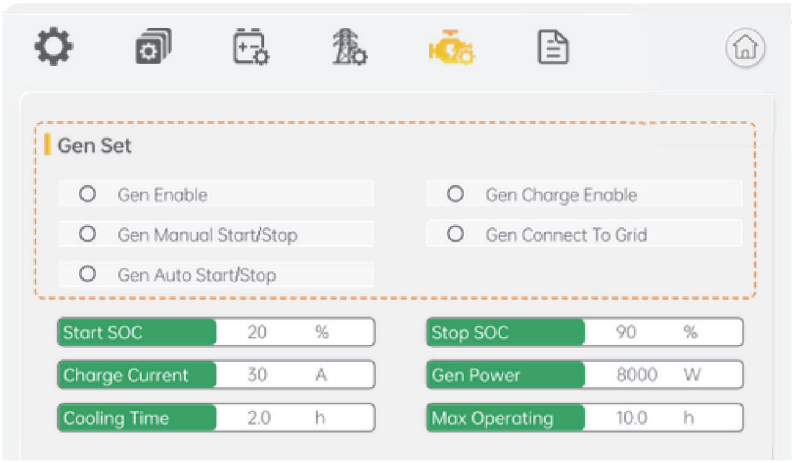


AC couple set: When using AC couple select the generator option. **Trip SOC:** When the battery SOC > the setting value, the PV inverter or micro
inverters will be cut off. This option only takes effect in the event of a grid outage (If there is no power outage on the grid to which the hybrid inverter is connected, the set SOC does not take effect).

In off-grid mode, set SOC-10% > battery SOC, and the AC COUPLE will activate (AC COUPLE can only be used under the condition that a lithium battery is present).

Trip frequency: This function is reserved. In US, it is 64.5Hz by default.

Response coeff: This setting is used to increase or decrease delay in the frequency steps between the rated frequency and trip frequency. If you find that the AC couple is easy to be disconnected after it is connected, you can reduce this value.



Gen enable: As shown in the figure, if you are using an AC couple, you need to manually turn off all functions on the gen enable interface.

If the grid is turned on, then the hybrid inverter will no longer control the power of the photovoltaic inverter by adjusting the frequency.

If the inverter needs to retain grid-tie functionality, then the photovoltaic inverter also requires a pair of CT clamps to be attached to the grid, as shown in figure 9.1.1 (the direction of the CT arrow should be connected according to the photovoltaic inverter user manual).

The hybrid inverter will automatically switch off the AC coupled inverters while the generator needs to be used.

The AC couple function can only be used after matching the hybrid inverter with the photovoltaic inverter. (The photovoltaic inverter needs to have a power generation frequency response function, which is utilized when the hybrid inverter is operating off-grid.)

10 Advanced mode operation guide

10.1 Advanced mode introduction

The hybrid inverter can be programmed to control how and when to use grid power. The advanced mode allow management of flexible loads and time-of-use billing.

There are three advanced mode available: Sell first mode, Limited consumption mode and zero export mode.

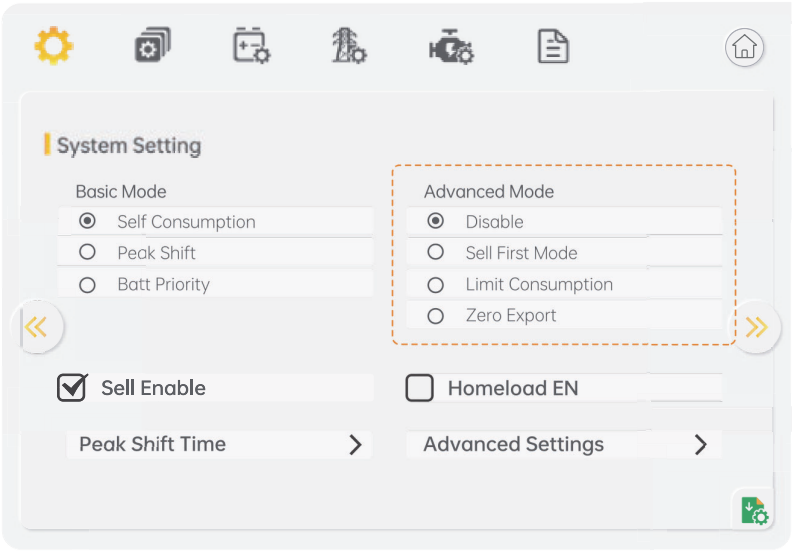
Table 10-1 **Advanced work mode**

	Selling first	Limited consumption	Zero export
Grid sell disable/ enable	Ignored. Be enabled automatically.	For those region with feed-in-tarriff, plz enabled it.	Ignored. Be disabled automatically.
Mode description	**Features:** Bat storage power can be sold out to power under TOU control. **When TOU is enabled:** When inside time slots: Charge or discharge and charge battery first, to grid at scheduled time and specific power without caring consumption. When outside of the time slots: The grid can not charge the battery, only allow the PV to charge the battery. **When TOU is disabled:** Always charge the battery first whatever from pv or grid. The battery doesn't discharge on grid mode.	**Features:** Use some grid power first, then use battery storage power under TOU control. **When TOU is enabled:** Day time: PV power load and charge battery first, surplux power will be feedback to grid (grid sell enable) or limit the pv yield (grid sell disable). The grid charge can be scheduled. When outside of the time slots: The grid can not charge the battery, only allow the PV to charge the battery. **When TOU is enabled:** Night time: discharge battery to power the load if the battery capacity is available. For those region with tiered electricity price, user can set ct limit power to use some grid power first. The grid charge can be scheduled. **When TOU is disabled:** Always charge the battery first whatever from pv or grid. The battery doesn't discharge on grid mode.	**Features:** Never sell power to grid forever. When outside of the time slots: The grid can not charge the battery, only allow the PV to charge the battery. **When TOU is enabled:** Night time: discharge battery to power the load if the battery capacity is available. The grid charge can be scheduled. **When TOU is disabled:** Always charge the battery first whatever from pv or grid. The battery doesn't discharge on grid mode.

There are also some attributes of these mode: Global grid charge enable, PV charge only, Battery first, Time-of-use enable and 6 time-of-use slots. The time slots parameters are shown in as below:

Start time	Endtime	Bat power	Grid charge	Bat SOC
00:00	05:00	8000 W	□	50 %
05:00	08:00	8000 W		50 %
08:00	10:00	8000 W	□	50 %
10:00	16:00	8000 W		50 %
16:00	19:00	8000 W	□	50 %
19:00	23:59	8000 W	□	50 %

10.1.1 Advanced mode setting



Advanced mode: There are four options here: Disable, Sell first mode, Limited consumption mode and zero export mode.

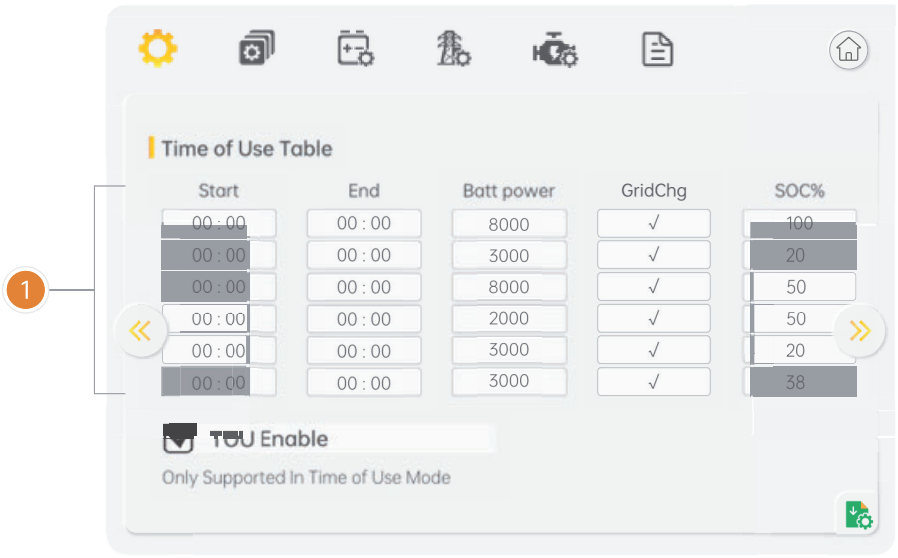
Disable: Only when users selected "disable", the basic work modes (Self consumption, Peak shift, battery priority) take effect. When the user selects the other three options(Sell first, Limit consumption, Zero export), the basic work modes are invalid.

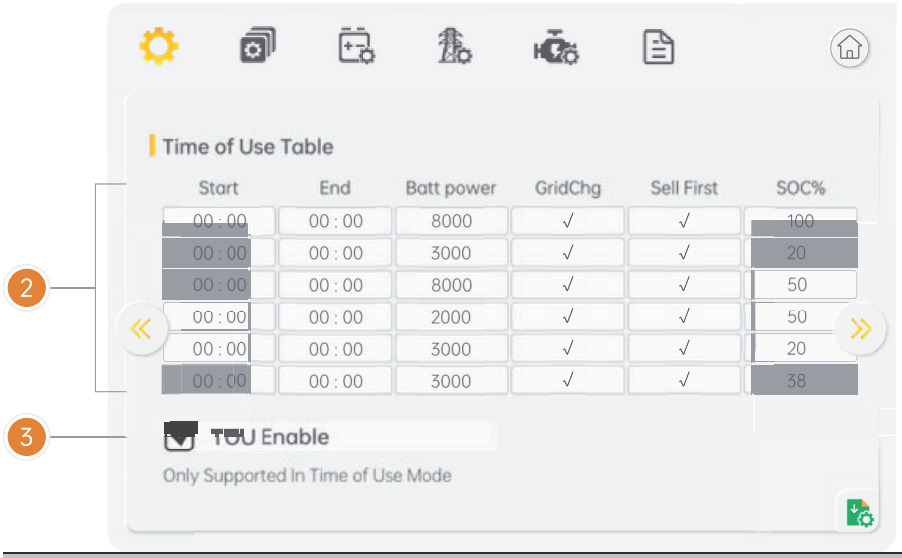
Sell first mode: First consider selling electricity to the grid. In this mode the sell-enable setting is automatically enabled. The users can use this mode to sell back surplus solar power to grid. If time of use is enabled, the battery power can also be sold to grid (Excess PV and battery power can be sold to the grid).

Limit consumption: In this mode, the CT limiters are used to sense the grid power flow direction. The hybrid inverter can be select to sell power or not sell power to grid. There is a CT limit power parameter available in this mode. When the battery is needed to discharge to reduce the load consumption, the grid will cover the parameter set part consumption firstly and the battery discharges energy to makes up the rest part. Other conditions are similar to SELF CONSUME working mode (Excess PV power can be sold to the grid through CT limit.).

Zero export: In this mode, the CT limiters should be installed in the input of the inverter's grid port. The hybrid inverter will not sell power to grid. The user can use zero export power parameter to ensure the inverter won't feedback power to grid (Neither PV nor battery excess power is sold to the grid) .

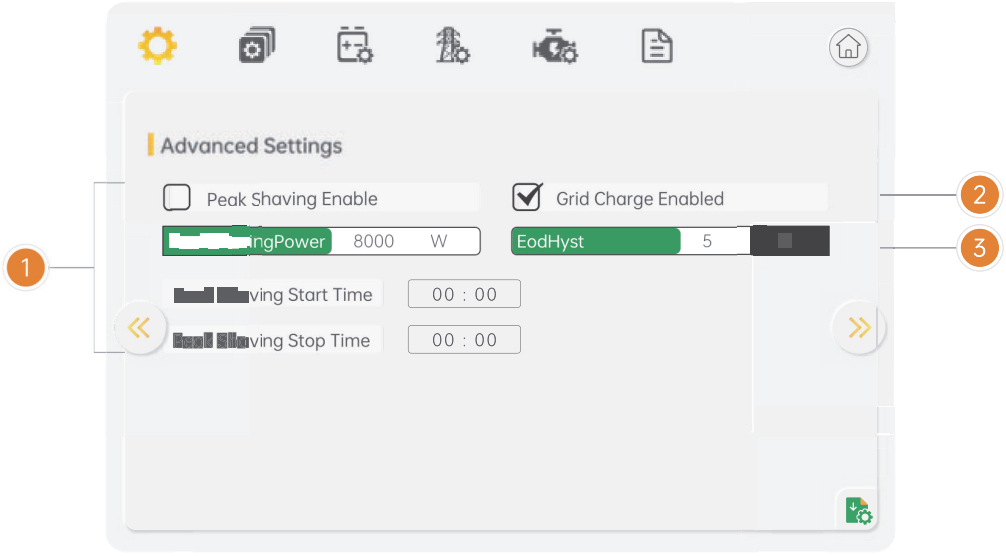
Advanced settings: Users can click to enter the advanced settings interface. There are also some attributes of these mode: Global grid charge enable, PV charge only, Bat charge on priority, Time-of-use enable and 6 time-of-use slots.





Advanced settings/first page	
1	**Time-of-use enable:** There are 6 slots which can be programmed. If grid charge is enabled, the grid is used to power the load and charge the battery to target SOC at specific bat power attribute value. If selling electricity to the grid enable, the battery will discharge to target SOC at specific battery power attribute value (**Time period configuration restriction:** The initial time segment parameters cannot be set entirely to zero values. Failure to configure valid time intervals will result in malfunction of the time-based scheduling functionality.).

1	**Batt power:** The power that the grid charges and discharges to the battery. **GridChg:** Grid is ticked, indicating that in the effective interval of the current interface time period, if the set SOC is greater than the actual SOC of the battery, the power grid will charge the battery (if not ticked, the power grid will not charge the battery); if the set SOC is less than the actual SOC of the battery, the battery can be discharged.
2	**Sell first:** This function is only displayed in the sell first mode, Only after enabling can the battery sell to the grid, otherwise the battery will not sell the grid, Other modes do not have this feature.
3	Only when TOU enable is selected, the time table in the figure can be effective.



Advanced settings/second page

1	**Peak shaving enable:** The configured PeakShavingPower value becomes effective during the active period of peak shaving start/stop (Peak shaving start time < Peak shaving stop time) when peak shaving enable is activated. **PeakShavingPower:** The grid peak shaving capacity (limiting the maximum power inverters can draw from the grid). • During charging, the maximum power drawn from the grid by the combined load and battery is limited. When the load exceeds the threshold, the battery charging current will be dynamically reduced based on the load increase, provided that the total power (load + battery) remains below the PeakShavingPower value. • During discharging, The load prioritizes power supply from the battery (with discharge power capped by the batt_power_limit defined in advanced mode time windows). Excess load demand is supplemented by grid power while maintaining total grid power consumption □ Peak shaving power.

2	**Global grid charge enable:** It is advanced control attribute of grid charge enable. If time of use function is disabled, this attribute is used to judge whether or not to charge the battery by grid. If time of use function is enabled, the battery can be charged by grid only when the time slot grid charge attribute is enabled.
3	**EodHyst:** In the slot period, when the actual SOC value of the battery reaches the set SOC value, the battery will enter the state of no charge or discharge. If actual SOC > set SOC value+EodHyst value, battery discharge is allowed. If actual SOC < set SOC value-EodHyst value, battery charge is allowed.

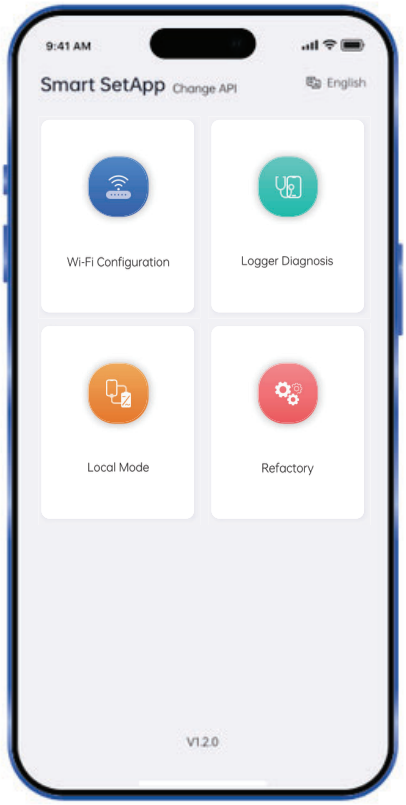


If the use time is started and the inverter is operating outside the timeline, it will run in SELF CONSUME mode.

Advanced mode only makes sense when both the battery and the grid exist.

11 APP operation 11.1 Home page

The home page includes Wi-Fi configuration, Logger diagnostics, Local mode, Re factory, Language toggle (click the upper right corner to switch languages), and change API.



When using the smart set app, the users can view the relevant status of the device in real time and control it wirelessly.

The APP provides the user with two different connectivity options, IoT remote mode (configured by the user according to the SOLARMAN smart APP's user manual) and local mode.

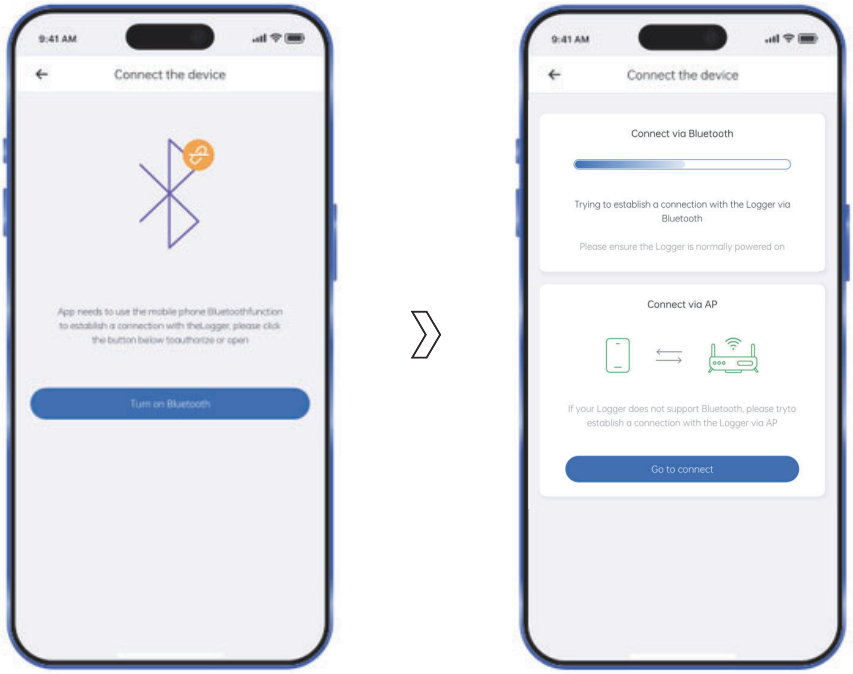
11.2 Local mode 11.2.1 Add a logger

Click on local mode, it will immediately jump to the scanning interface. Scan to enter logger SN (You can find logger SN in the external packaging or on the logger body) or click enter SN to manually enter the SN.

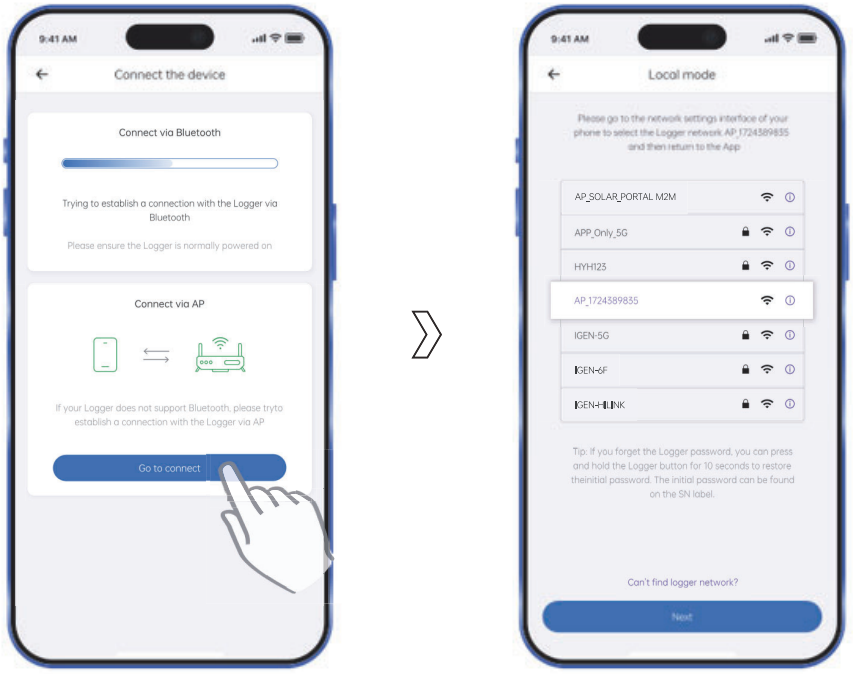


11.2.2 Bluetooth ON

Local mode supports bluetooth connection. You can turn on bluetooth in advance or add a logger firstly and then turn on bluetooth according to the page prompt. If the connection fails, users need to reconnect the logger.



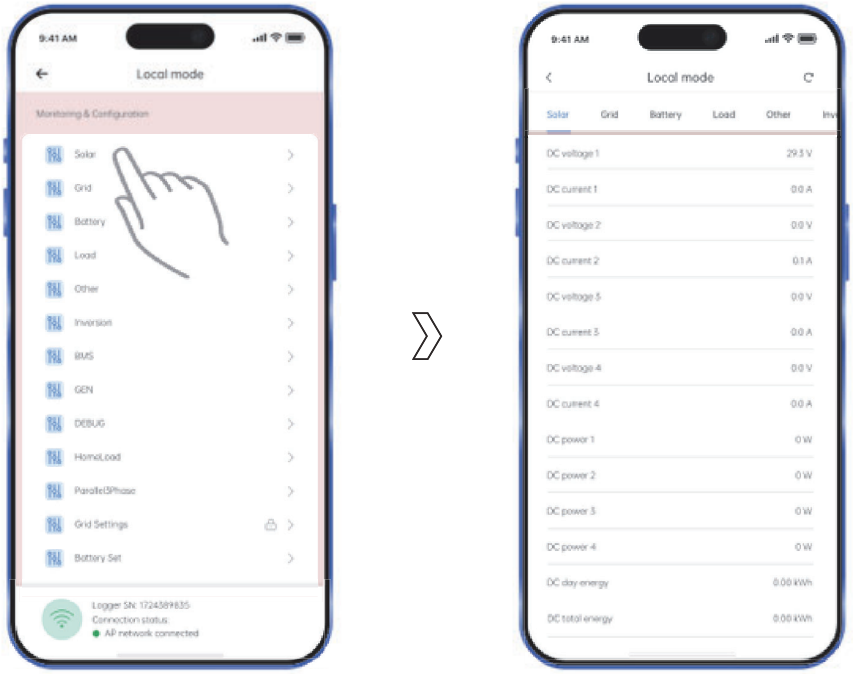
Or:



11.2.3 Enter the local mode interface

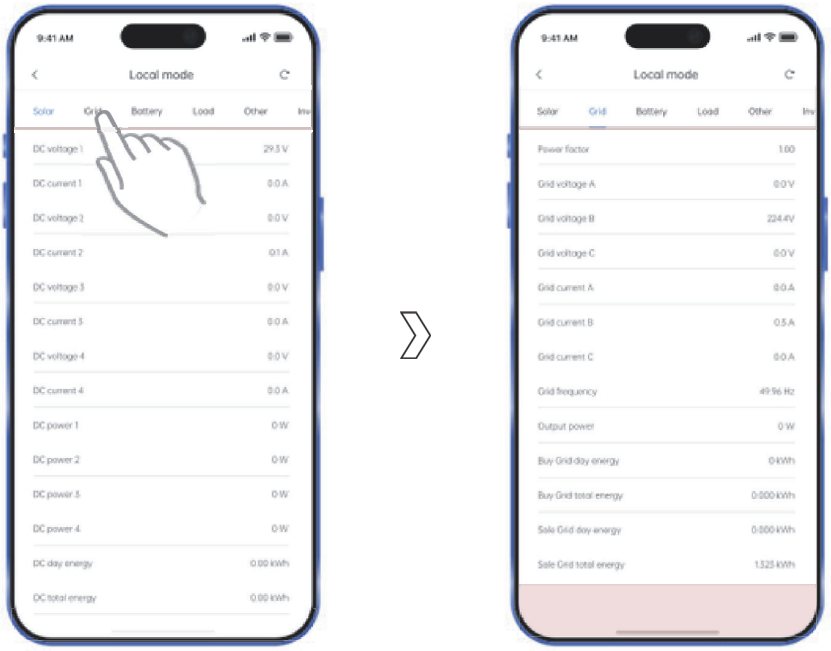
Once the connection is complete, you can view the operating status of the device and the parameters set.

Click on the grouping to go to the detailed parameter page.



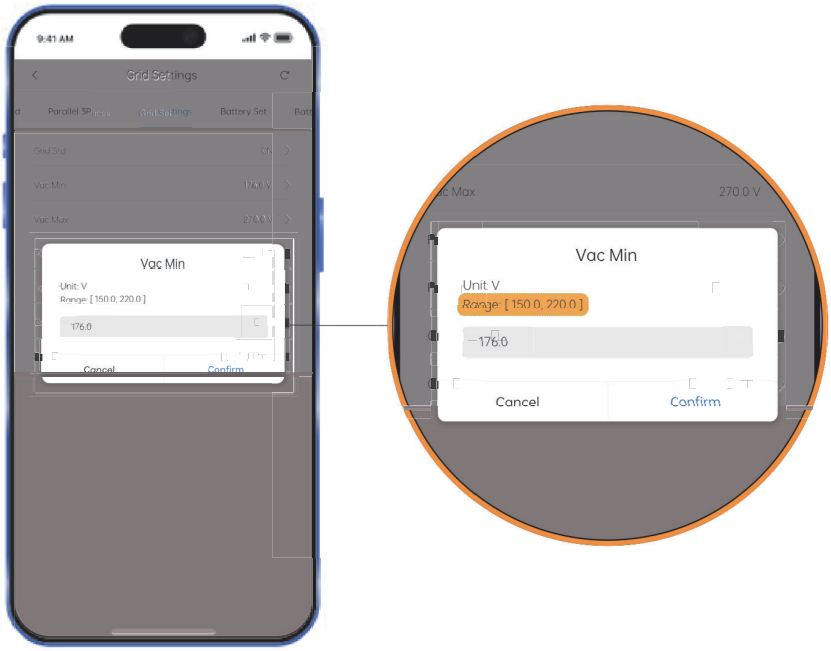
11.2.4 Working status

Click on the top groups to switch. The monitoring & configuration page contains the following subgroups: Solar, Grid,
Battery, Load, Other(Display software version SN code, fault information, working mode, device temperature, inverter temperature, etc.), Inversion, BMS, GEN, DEBUG, Home load, Parallel 3Phase.



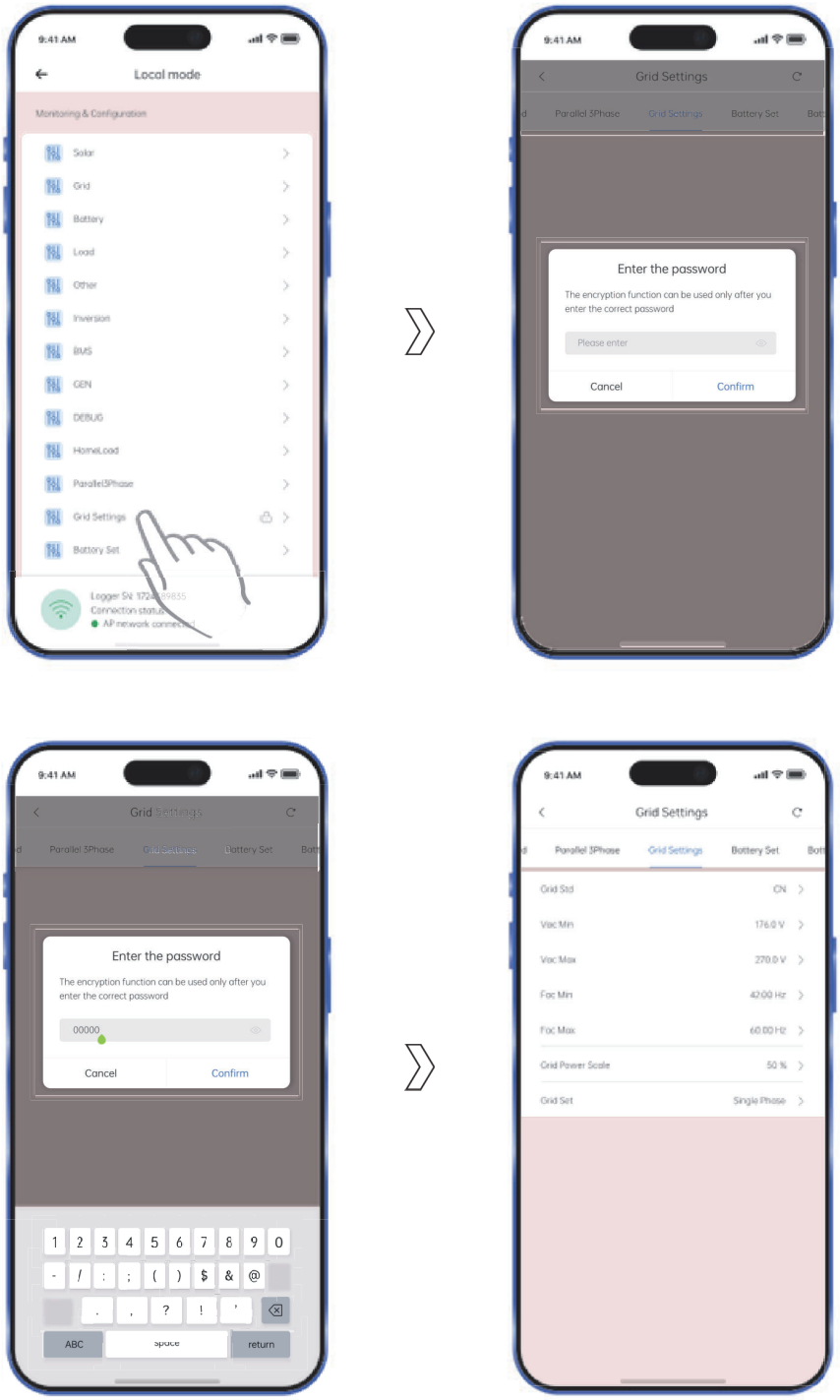
11.2.5 Set parameters

You can set the operating parameters of the device according to their needs. The parameters set by the user need to be within the specified range.



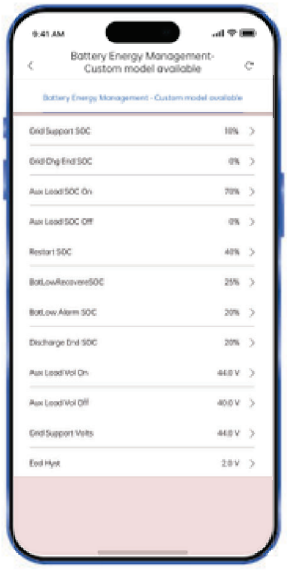
(1) Grid settings and grid protect set.

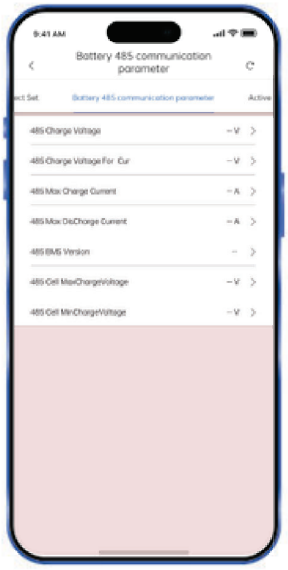
A password is required to access the grid settings. The default password is "00000".



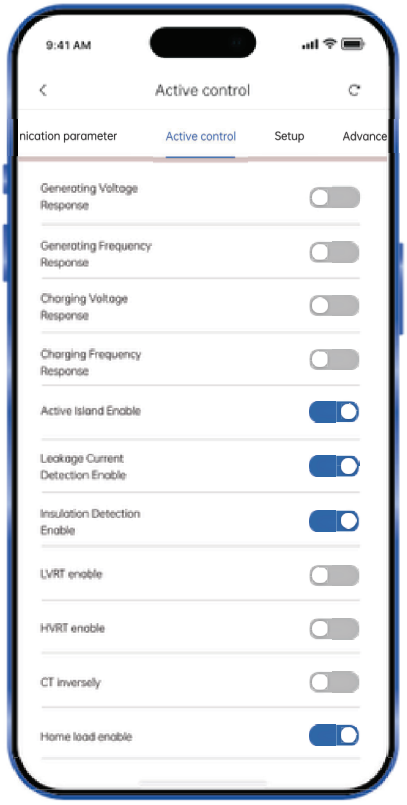
(2) Battery set, Battery management-custom model available and battery 485 communication parameter.





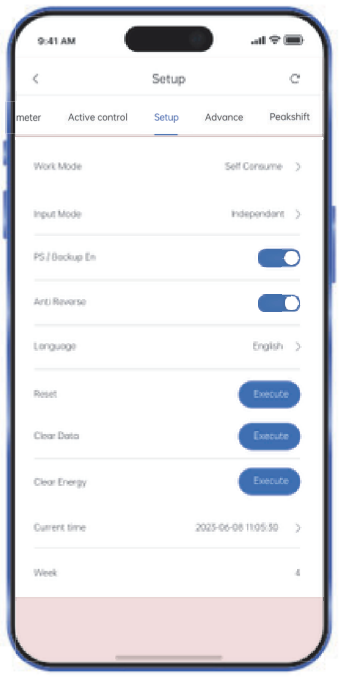


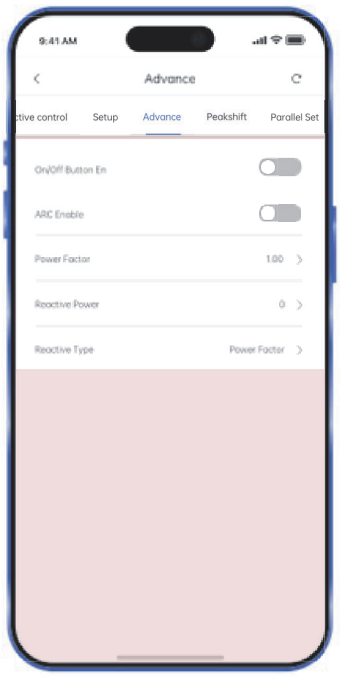
(3) Active control.



(4) Setup and advance.

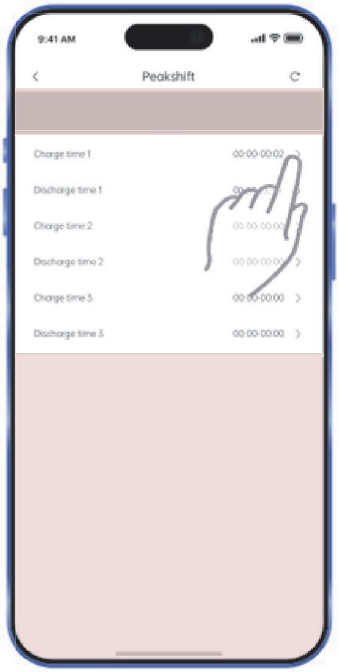
Set work mode and PV input type, language, date/time, etc.

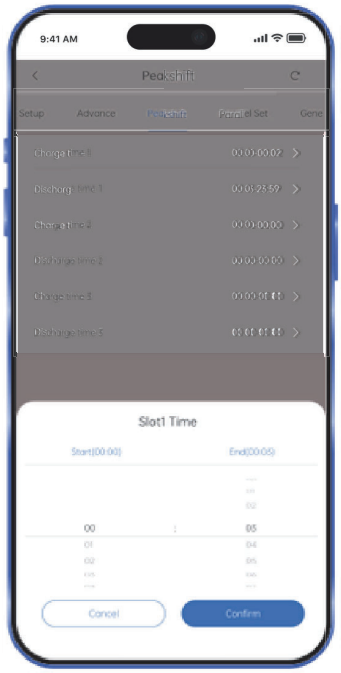




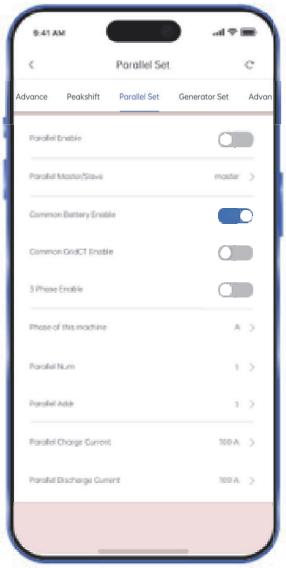
(5) Peak shift.

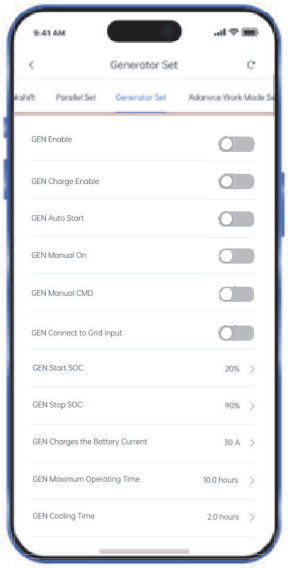
Set peak-shift charging and discharging time. When the operating mode is peak-shift, you need to enter this interface to set the charging and discharging time and manually enter the start charging/ discharging time and the end charging/ discharging time.

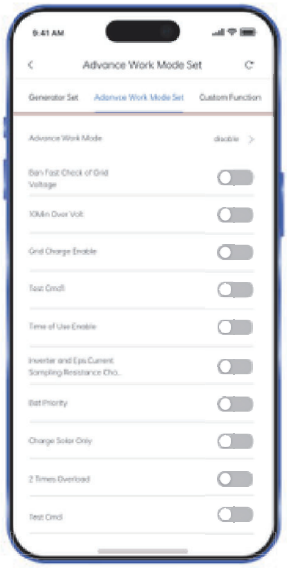


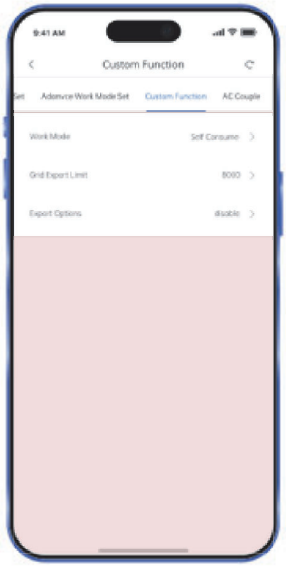


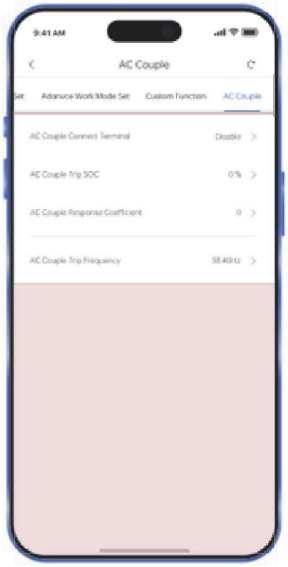
(6) Parallel set, Generator set, Advance work mode set, Custom function and AC couple.











Important: Commissioning Grid Outage Test

The following steps should be completed in commissioning the NV16KAC. After installing the NV16KAC, be sure to test the system to ensure it enters Backup Mode in the event of a grid outage:

1. Simulate a power outage by disconnecting all main breaker grid power.
2. Monitor the system after grid power is cut – the backup power will switch on immediately. If backup power does not automatically, troubleshoot the system.
3. After confirming backup power is engaged, test heavy loads of 3000 watts or more to confirm the backup power is stable (electric dryer, air conditioning, electric cooktop). There should be no flickering lights or indications of power source strain.
4. With backup power engaged, confirm that solar panels are on and functioning.
5. After successfully testing the system in backup mode and confirming that the solar panels are functioning, reintroduce grid power and turn on the service disconnect. This will take the homeowner's system out of backup mode.

12 Fault diagnosis and solutions

The inverter is easy to maintain. When you encounter the following problems, please refer to the solutions below, and contact the local distributor if the problem remains unsolved. The following table lists some of the basic problems that may occur during the actual operation as well as their corresponding basic solutions.

Fault diagnosis table

Table 12-1 Fault diagnosis table

Content	Codes	Explanation	Solutions
Dischg over cur	01	Battery discharge over current. When the battery is loaded, the load is too large.	• Nothing needed to do,wait oneminute for the inverter to restart. • Check whether the load is in compliance with the specification. • Cut off all the power and shut down all the inverters; disconnect the load and plug in to restart inverters, then check.
Over load	02	The load power is greater than other power. (PV, BAT)	• Check whether the load is in compliance with the maximum power of the inverter. • Cut off all the power and shut down all the inverters; disconnect the load and plug in to restart inverters, then check whether the load is short circuited if the fault has been eliminated. Contact customer service if error warning continues. • Check whether the battery is connected.
Bat disconnect	03	Battery disconnect. (Battery voltage not identified)	• Check if battery wiring port is open circuited. • Contact customer service if error warning continues. • Checking system settings, If so, power off and restart.
Bat under volt	04	Battery voltage low that normal range.	• Check if the grid power down. If so, wait for grid to power up, the inverter will automatically charge. • Contact customer service if error warning continues. • Battery low that setting capacity. (SOC<100%-DOD)
Bat low capacity	05	Bat low capacity.	•
Bat over volt	06	The battery voltage is greater than the inverter maximum voltage.	• Checking system settings, If so, power off and restart. • Contact customer service if error warning continues.
Gird low volt	07	Grid voltage is abnormal.	• Check if the grid is abnormal. • Restart the inverter and wait until it functions normally. • Contact customer service if error warning continues.
Grid over volt	08		

Content	Codes	Explanation	Solutions
Grid low freq	09	Grid frequency is abnormal.	• Check if the gridis abnormal. • Restart the inverter and wait until it functions normally. • Contact customer service if error warning continues.
Grid over freq	10		
Gfci over	11	Inverter GFCI exceeds standard.	• Check PV string for direct or indirect grounding phenomenon. • Check peripherals of inverter for current leakage. • Contact the local inverter customer service if fault remains unremoved.
Bus under volt	14	BUS voltage is lower than normal.	• Check the input mode setting is correct. • Restart the inverter and wait until it functions normally. • Contact customer service if error warning continues.
Bus over volt	15	BUS voltage is over maximum value.	• Check the input mode setting is correct. • Restart the inverter and wait until it functions normally.
INV over cur	16	The inverter current exceeds the normal value.	• Restart the inverter and wait until it functions normally.
Cha over cur	17	Battery charge current over than the inverter maximum voltage.	• Restart the inverter and wait until it functions normally.
Meter comm fail	18	Meter comm fail.	• Check whether the meter communication line is connected correctly.
INV under volt	19	INV voltage is abnormal.	• Check if the INV voltage is abnormal. • Restart the inverter and wait until it functions normally. • Contact customer service if error warning continues.
INV over volt	20		
INV freq abnor	21	INV frequency is abnormal.	• Check if the INV frequency is abnormal. • Restart the inverter and wait until it functions normally. • Contact customer service if error warning continues.
IGBT temp high	22	The inverter temperature is higher than the allowed value.	• Cut off all the power of the inverter and wait one hour, then turn on the power of the inverter.
Bat over temp	23	Battery temperature is higher than the allowed value.	• Disconnect the battery and reconnect it after an hour.
Bat under temp	25	Battery temperature is low than the allowed value.	• Check the ambient temperature near the battery to see if it meets the specifications.
Relay open circuit	26	Grid side relay open circuit detection.	• Used to detect whether the relay on the power grid side is disconnected due to a fault.

Content	Codes	Explanation	Solutions
BMS comm.fail	28	Communication between lithium battery and inverter is abnormal.	• Check the cable, crystal, Line sequence. • Checking the battery switch.
Fan fail	29	Fan fail.	• Check whether the inverter temperature is abnormal. • Check whether the fan runs properly. (If you can see it)
Grid over load	30	Power of EPS load too large.	• Reduce the power of the EPS load, thereby reducing the power of the grid.
Grid phase err	31	The grid fault phase.	• Check power grid wiring. • Check photovoltaic panels, PV wire.
Arc fault	32	PV arc fault.	• Contact customer service if error warning continues. •
Bus soft fail	33	Hardware may be damaged and need to troubleshoot the cause.	• Restart the inverter and wait until it functions normally. • Contact customer service if error warning continues.
INV soft fail	34		
Bus short	35		
INV short	36		
Fan fault	37	Fan fault.	• Check whether the inverter temperature is abnormal. • Check whether the fan runs properly. (If you can see it)
PV iso low	38	PV iso low.	• Check if the PE line is connected to the inverter and is connected to the ground. • Contact customer service if error warning continues.
Bus relay fault	3	The inverter may be damaged.	• Restart the inverter and wait until it functions normally. • Contact customer service if error warning continues.
Grid relay fault	9		
EPS rly fault	4		
Gfci fault	0		
Self test fail	41		
System fault	42		
Current DC over	45 47		
Voltage DC over	4 48		

- If an error occurs that is not listed in the table, Please contact customer service.

13 Technical parameters

13.1 Inverter specification

Table 13-1 Inverter specification

PV input data

Technical data	R12KLNA-P6	R16KLNA-P6
Max. DC input power (kW)	18	24
No. of MPPT trackers	4	
MPPT voltage range (without battery) (V)	120 - 500	
MPPT voltage range (with battery) (V)	120 - 430	
Max. DC input voltage (V)	500	
Max. input current per MPPT (A)	16/16/16/16	20/20/20/20
Max. short current per MPPT (A)	22/22/22/22	25/25/25/25

Battery input data

Technical data	R12KLNA-P6	R16KLNA-P6
Nominal voltage (V)	48	
Max. charging/discharging current (A)	250/260	260/280
Battery voltage range (V)	40-58	
Battery type	Lithium / Lead acid	
Charging controller	3-Stage with equalization	

AC output data (on-grid)

Technical data	R12KLNA-P6	R16KLNA-P6
Nominal output power output to grid (kW)	12	16
Max. apparent power output to grid (kVA)	13.2	17.6
Nominal AC voltage (L-N/L1-L2)	(110~120)/(220~240V) split phase, 240V single phase	
Nominal AC frequency (Hz)	60 (55 to 65)	
Nominal AC current (A)	50	66.7
Max. AC current (A)	55	73.3
Max. grid passthrough current (A)	200	
Output THDI	< 3%	

AC output data (back-up)

Technical data	R12KLNA-P6	R16KLNA-P6
Nominal. apparent power (kW)	12	13
Max. apparent power (No PV) (kVA)	12	13.2
Max. apparent power (With PV) (kVA)	13.2*	
Nominal output voltage (V)	120/240	
Nominal output frequency (Hz)	60	
Output power factor	0.8leading~0.8lagging	
Output THDU	< 2%	

Efficiency

Technical data	R12KLNA-P6	R16KLNA-P6
MPPT efficiency Europe efficiency (PV)	99.9%	
Max. PV to grid efficiency (PV) Max.	96.2%	
battery to load efficiency Max. PV to	96.5%	
battery charing efficiency Max. GRID to	94.6%	
battery charing efficiency	95.8%	
	94.5%	

Protection

Technical data	R12KLNA-P6	R16KLNA-P6
Grounding detection	YES	
Arc fault protection	YES	
Island protection	YES	
Insulation resistor detection	YES	
Residual current monitoring unit	YES	
Output over current protection	YES	
Back-up output short protection	YES	
Output over voltage protection	YES	
Output under voltage protection	YES	

General data

Technical data	R12KLNA-P6	R16KLNA-P6
Operating temperature range ( )	-25 ~ +60	

Technical data	R12KLNA-P6	R16KLNA-P6
Relative humidity	0-95%	
Operating altitude	0~4000m (Derating above 2000m altitude)	
Ingress protection	IP65/NEMA 3R	
Weight (with breaker) (kg)	56	
Dimensions (width*height*depth) (mm)	495 * 900 * 260	
Cooling	FAN cooling	
Noise emission (approximately)	57dB*	
Display	Touch panel	
Communication with BMS/meter/EMS	RS485, CAN	
Supported communication interface	RS485, 4G (optional), Wi-Fi	
Self-consumption (W)	< 25	
Safety	UL1741, UL1741SA&SB all options, UL1699B, CSA -C22.2 NO.107.1-01, RSD (NEC690.5, 11, 12)	
EMC	FCC Part 15 Class B	
Grid connection standards	IEEE 1547, IEEE 2030.5, HECO Rule 14H, CA Rule 21 Phase I, II, III, CEC, CSIP, SRD2.0, SGIP, OGPe, NOM, California Prob65	

- **13.2*: During daylight hours, the R16KLNA inverter model delivers a maximum AC-side output power of 16kW, calculated as:**

  Battery: 13.2kW + PV (photovoltaic): 2.8kW = 16kW.

  At night, the maximum AC-side output power is 13.2kW (attributed to the absence of PV generation at night).

- **57dB*: Test condition: Chamber back ground noise max <16dB.**