USER
MANUAL

MEGAREVO

ENERGY STORAGE INVERTER

- Color screen and generator port version
  R8KL1DA-G2S~R10KL1DA-G2S
- No color screen but with generator port version
  R8KL1A-G2S~R10KL1A-G2S

DECLARATION

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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.

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PREFACE

Thank you for choosing energy storage 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.

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 may ask local distributors, offices or our Technical Service Department for a new one.
- 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.
- 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.

The information from following sources is all effective.

Scan the QR code for the latest information and services:

WhatsApp

Service time: 24/7

Users may acquire general technical data and information through MEGAREVO official website: *http://www.megarevo.com*

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 MEGAREVO via its recommended contact information in this manual or contact its sales representatives or service engineers.

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1 Notes on this manual

1.1 Scope of validity

This user manual presents a detailed description of with respect to assembly, installation, commissioning, maintenance, and troubleshooting, etc. Be sure to carefully read through the safety precautions before installing or using the inverter and keep the manual properly at an easily accessible place.

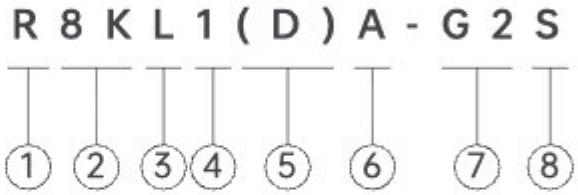
The G2S series consist of the following inverter models:

(1) No color screen but with generator port version

- R8KL1A-G2S
- R10KL1A-G2S

(2) Color screen and generator port version

- R8KL1DA-G2S
- R10KL1DA-G2S



Naming rules, For example: R8KL1(D)A-G2S

- ① "R": "REVO series".
- ② "8K": "output power 8kW ".
- ③ "L": " Input low-voltage".
- ④ "1": "Output single phase".
- ⑤ "D": "Energy storage inverter with a color screen".
- ⑥ "A": "Energy storage inverter with generator interface".
- ⑦ "G2": " Second generation machine".
- ⑧ "S": "G2 Super version".

1.2 Target group

Only the qualified electricians who have carefully read and understood the manual should perform the installation and maintenance of the energy storage inverter.

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 leads to the best results.

2 Safety

2.1 Safety precautions

- Danger to life due to high voltages in the inverter!
- All work must be carried out by qualified electrician.
- The appliance must not use by children or persons with reduced physical sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction.
- Children should be supervised to ensure that they do not play with the appliance.

- Danger of burn injuries due to hot enclosure parts!
- During operation, the upper lid of the enclosure and the enclosure body may become hot.
- During operation, only the touch screen needs to be operated.

- Possible health damage from radiation effects!
- Do not stay within 20cm of the inverter for a long time.

- PV modules used with inverter should have an IEC61730 class A rating.
- Use only PV modules with IEC61730 class A and a maximum system voltage higher than 50V or a maximum power higher than 240W, and these systems are potentially accessible or accessible to the public.
- The minimum resistance between the photovoltaic circuit and the inverter grounding system must not be less than 30 MΩ, otherwise the inverter will shut down. The inverter performs an automatic insulation test daily.
- The insulation resistance for installing the photovoltaic panels must not be less than 10 MΩ.

- There is a risk of shock hazard if the total minimum resistance requirement is not met.
- Ensure input DC voltage ≤ Max. DC voltage of the inverter. 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 or cleaning or working on any circuits connected to inverter.
- Do not touch anything other than the screen during operation, there is a risk of electric shock.

2.1.1 Important safety instructions

- Please keep the user manual properly. When performing installation or maintenance, in addition to following the general precautions in this manual, 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.
- Accessories only together with the inverter shipment are recommended here. Other- wise may result in a risk of fire, electric shock, or injury to person.
- Make sure that existing wiring is in good condition and those wires are not undersized. Do not disassemble any parts of inverter which are not mentioned in installation guide. The package does not contain user-serviceable parts except for additional ordering. Please refer to 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 PV connecting device. Strictly prohibit 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.
- Please note the 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 any device is energized. 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 sufficiently discharge!

2.1.2 Install surge protection devices (SPDs) for PV

- 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 arrester is greater than 1100V, an additional SPD type 3 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.

2.1.3 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 happened in the power system. It is dangerous for maintenance personnel and the public.
- The inverter provides Active Frequency Drift (AFD) to prevent islanding effect.

2.1.4 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.

WARNING

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

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

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

Symbol	Explanation
CE	CE mark. The inverter complies with requirements of applicable CE guidelines.
	Refer to the operating instructions.
	Products should not be disposed as household waste.
	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.
	PE mark, which is a grounding point indicating the position for connecting the PE cable.

2.3 Maintenance related information

The maintenance instructions should include the following content:

- Intervals and instructions for any Preventive maintenance required to maintain safety. (For example, periodically block terminals).
- Instructions for accessing the operator's access area (if present), including warning not to enter other areas of the equipment.
- Part number and instructions for obtaining any required operator replaceable parts.
- Safety and cleaning instructions (if recommended).
- If there are multiple power sources supplying PCE, information should be provided in the manual to indicate which or which disconnecting devices need to be operated to completely isolate the equipment.
- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.
- When the photovoltaic array is exposed to light, it supplies a d.c. voltage to the PCE.

2.4 Battery maintenance

G2S series energy storage 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 section 4.1.

Only personal with proper expertise can carry out the maintenance of accumulator batteries.

As accumulator batteries may contain potential electric shock and short-circuit currentdanger, to avoid accidents that might be thus resulted and to ensure the machine operats normally, the following warnings should be observed during battery replacement and maintenance:

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 off load connected to the batteries before dismantling battery connection terminals.
6. Disconnect the charging power supply before connecting or disconnecting the battery terminals.
7. Ensure that the battery is not accidentally grounded. if accidentally grounded, please remove the power supply from the ground and contact any part of the grounded battery, which may cause electric shock.(Suitable for devices without grounded power circuits and remote battery power supplies). It can reduce the possibility of such electry shocks.

1. When replacing batteries, please replace them with the same type and quantity of batteries or Battery pack.
2. Dispose of old batteries according to local regulations. Do not throw them in thetrash or into the fire.
3. Do not open or damage the battery. The released electrolyte is harmful to the skinand eyes of the human body. It may be toxic.

2.5 Low voltage earthing system

The grounding of the power system is directly related to the personal and property safety of users, as well as the normal operation of electrical and electronic equipment. According to the regulations of International Electrotechnical Commission (IEC), low-voltage distribution system is called TT system, TN system and IT system according to different grounding modes. The TN system is further divided into TN-C, TN-S, and TN-C-S systems.

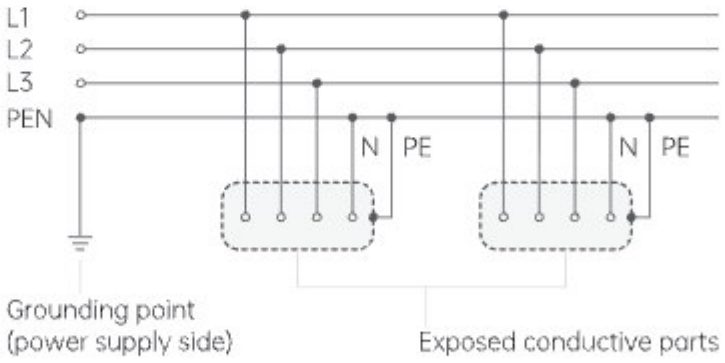
2.5.1 TN system

TN system, known as protective neutral connection. When a fault electrifies the metal casing of electrical equipment, it forms a short circuit between the phase and zero lines, resulting in low circuit resistance and high current, which can cause the fuse to quickly fuse or the protective device to act to cut off the power supply. In the TN system, there are three types of systems: TN-C, TN-S, and TN-C-S.

(1) TN-C system

The N line and PE line are integrated throughout the entire system.

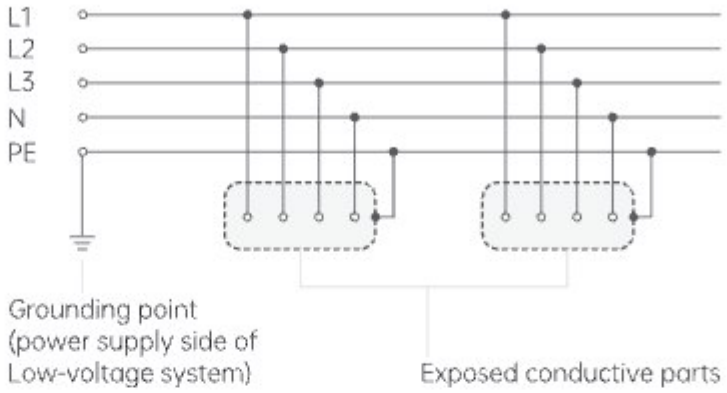
Figure 2-1 TN-C system



(2) TN-S system

The N line and PE line are separated throughout the system.

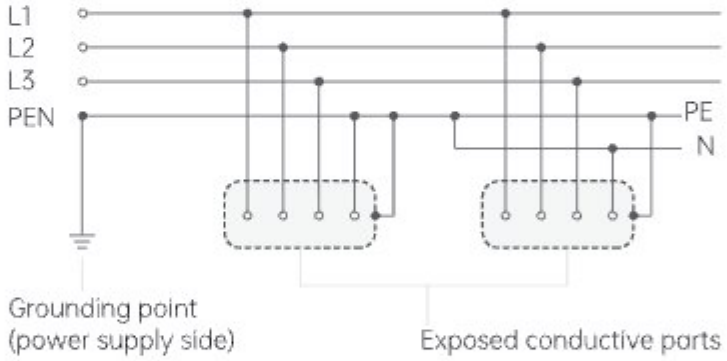
Figure 2-2 TN-S system



(3)TN-C-S system

In the whole system, N line and PE line are usually integrated only before the power incoming point of low-voltage electrical device, and they are divided into two lines after the power incoming point.

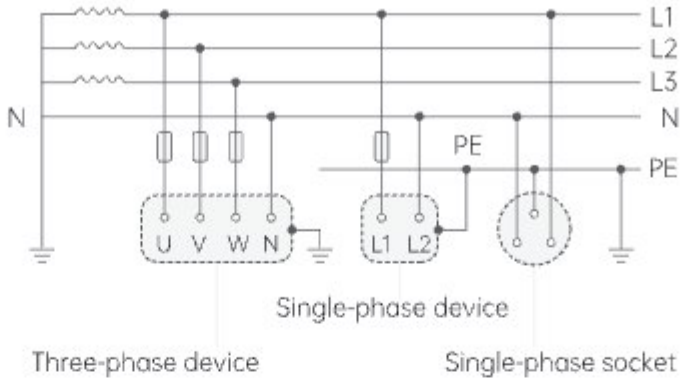
Figure 2-3 TN-C-S system



2.5.2 TT system

TT system is a system where the neutral point of the power supply is directly grounded, and the exposed conductive part of the electrical equipment is also directly grounded. The grounding of the neutral point of the power supply is usually called working grounding, while the grounding of the exposed conductive part of the equipment is called protective grounding. In the TT system, these two grounds must be independent of each other. Equipment grounding can refer to each device with its own independent grounding device, or multiple devices sharing a common grounding device.

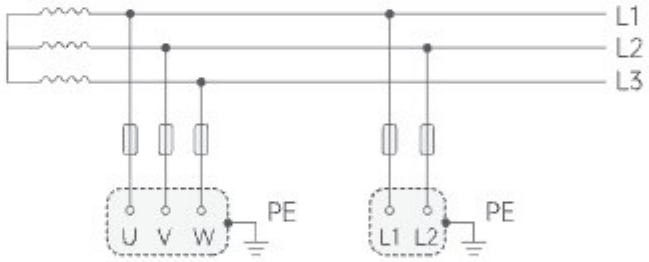
Figure 2-4 TT system



2.5.3 IT system

IT system is a system where the neutral point of the power supply is not grounded, and the exposed conductive part of the electrical equipment is directly grounded.IT system can set neutral wires, but IEC does not recommend setting neutral wires.If a neutral line is set and a ground fault occurs at any point of the N line in the IT system, the system will no longer be an IT system.

Figure 2-5 IT system



3 Introduction

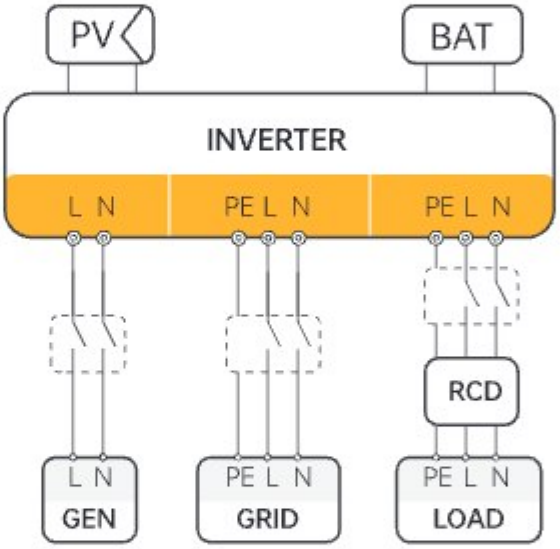
3.1 Basic features

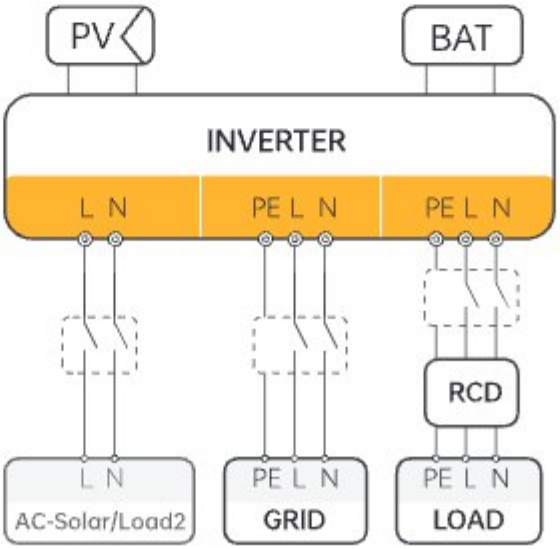
The Energy storage inverter is a high-quality inverter that converts solar energy to AC electricity and store energy in the battery.

The inverter can be used to optimize self-consumption, reserve electricity for future use or feed electricity back into the public grid, depending on PV generation and user's preference. During a grid outage, the inverter can power loads in an emergency using energy stored in the battery or generated by PV.

3.2 System diagram

Figure 3-1 R8KL1(D)A-G2S~R10KL1(D)A-G2S





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

- Please control the total pawer of household loads to stay within the inverter's rated range, otherwise the inverter will shut down with an "Over load" warning.
- Please confirm with the mains grid operator whether there are any special regulations for grid connection.

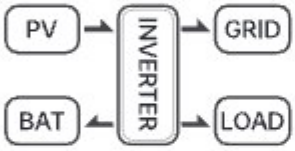
3.3 Work modes

Schematic diagram

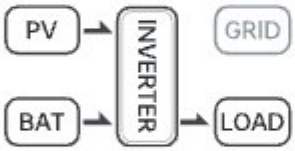
Inverter provides multiple work modes based on different requirements.

Work mode: self consumption

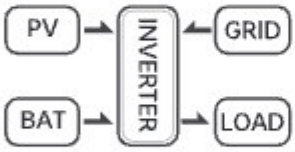
I. When PV, Grid, Battery is available:



Solar energy provides power to the loads as first priority. If the solar energy is sufficient to power all connected loads, then the surplus solar energy will charge the battery. The remaining energy will be fed into the grid.

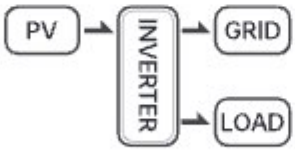


Solar energy provides power to the loads as first priority, if solar energy is not sufficient to power all connected loads, battery energy will supply power to the loads at the same time.

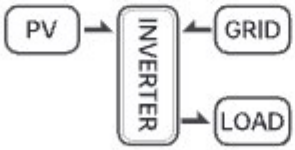


Solar energy provides power to the loads as first priority, if solar energy and battery are not sufficient to power all connected loads, utility energy (Main Grid) will supply power to the loads with solar energy at the same time.

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

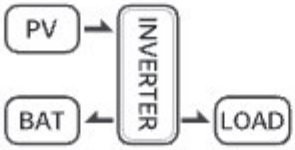


Solar energy provides power to the loads as first priority, if solar energy is sufficient, the excess power will be fed to grid.

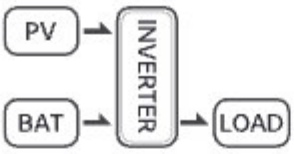


Solar energy provides power to the loads as first priority, if solar energy is not sufficient to power all connected loads, Grid energy will supply power to the loads at the same time.

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



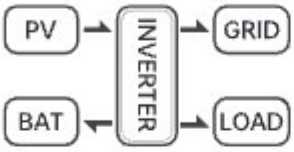
Solar energy provides power to the loads as first priority, if solar energy is sufficient to power all connected loads, solar energy will provides to charge battery.



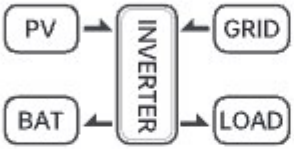
Solar energy provides power to the loads as first priority, if solar energy is not sufficient to power all connected loads, battery energy and solar energy will supply power to the loads at the same time.

Work mode: peak shift

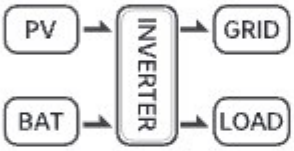
I. When PV, Grid, Battery is available:



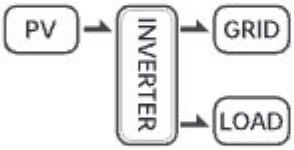
On charge time, solar energy will charge battery as first priority. The excess energy will supply power to the loads. If solar energy is sufficient to supply loads and charge battery, and If there's still some extra energy, then the excess power will feed the power to grid.



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.

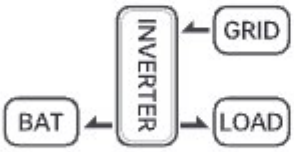


On discharge time, solar energy provides power to the loads as first priority, if solar energy is sufficient to supply loads, and if there's still some extra energy from solar energy, then the excess power and battery will deliver the power to the grid at the same time.

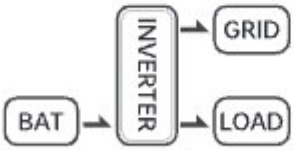


In the period of no charge or discharge, the solar power supply loads at first priority, excess energy to the grid.

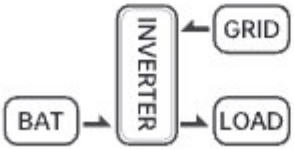
II. When Grid.Battery is available(PV is disconnected):



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



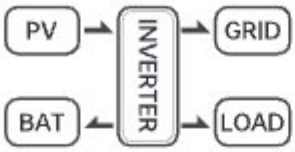
On discharge time, if load power is less than battery power, battery will supply power to loads as first priority, the excess power will be feed to grid.



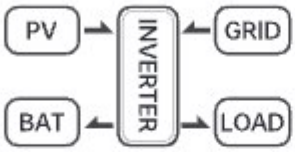
On discharge time, if load power is more than battery power, battery and grid will supply power to the loads at the same time.

Work mode: battery priority

I. When PV, Grid, Battery is available:

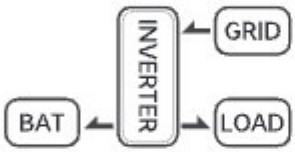


Solar energy will charge battery as first priority, if solar energy is excess, the excess power will supply load. If there's still some extra energy, then the excess power will be fed to grid.



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.

II. When Grid.Battery is available(PV is disconnected):



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

- If the power selling function is not enabled, the inverter works in Self consumption, Peak shift or battery priority will not feedback electricity to grid.

In addition to the above three basic modes, there is also an "Advanced Mode". Please refer to Chapter 8 for details.

The grid takes precedence over the generator. The generator stops working when the grid is detected. When the battery and generator are operating simultaneously, if the generator is sufficient to power all connected loads, any excess power is used to charge the battery, but only 50% of the generator's total power is supplied to the battery.

3.4 Dimension

Figure 3-2 Energy storage inverter with color screen and generator port. (R8KL1DA-G2S~R10KL1DA-G2S)

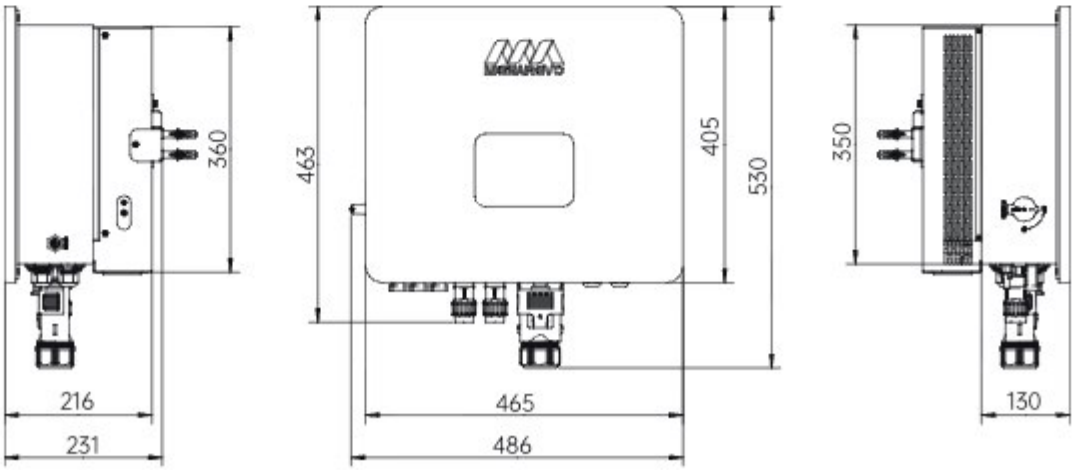
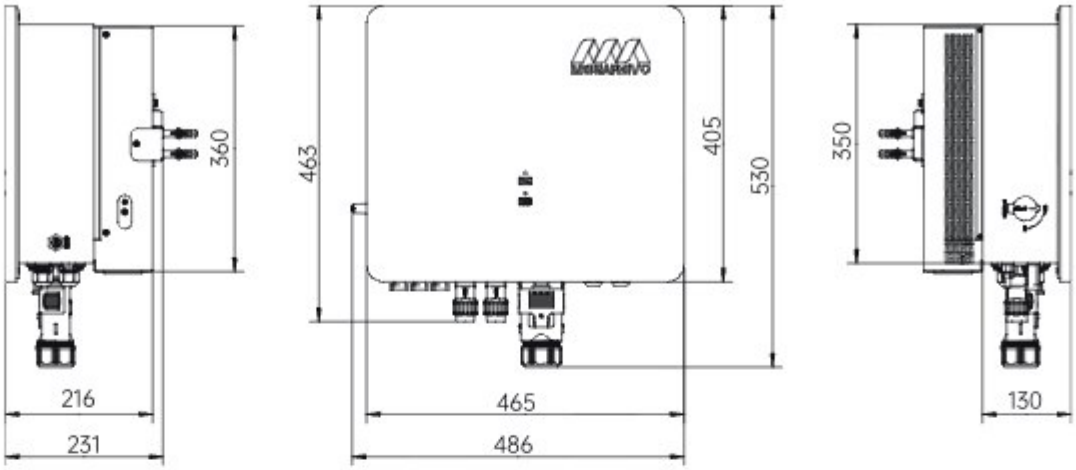
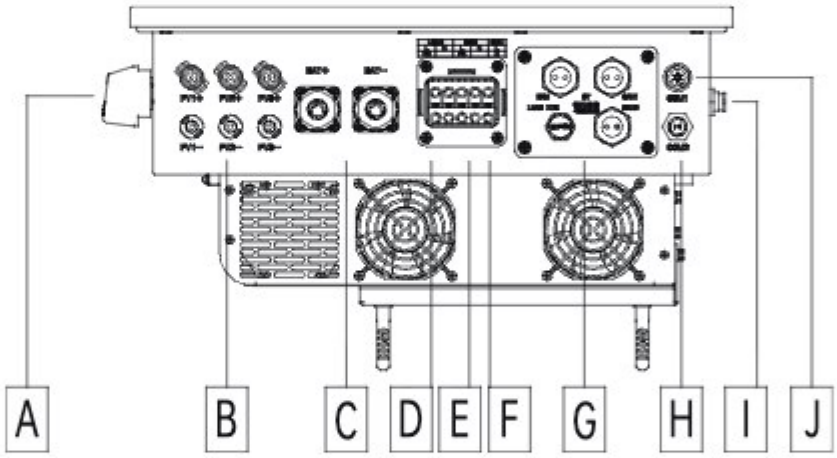


Figure 3-3 Energy storage inverter with generator but without color screen port (R8KL1A-G2S~R10KL1A-G2S)



3.5 Energy storage inverter overview

Figure 3-4 Terminal diagram of the inverter with generator port

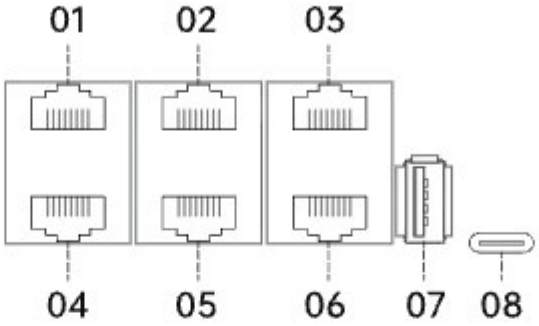


Object	Description
A	DC switch
B	PV input
C	BAT input
D	Load
E	Grid
F	Generator
G	CAN1/CAN2/CT/CAN_BMS/485_BMS/DRM/LEAD NTC
H	COM2 (WIFI)
I	COM3 (Not available for upgrade)
J	COM1 (DRY IO)

WARNING

- Qualified electrician will be required for the installation.

Figure 3-5 Signal line/communication interfaces



DRM (01)	CT / Energy meter (02)	CAN1 (03)	Type-A (07)	Type-C (08)
LEAD NTC (04)	CAN_BMS/485_BMS (05)	CAN2 (06)		

Port function

- DRM (01): For modes of demand response.
- CT/Energy meter (02): For external grid side CT or energy meter to detect current size.
- CAN1/CAN2 (03/06): Parallel communication.
- LEAD NTC (04): For communication of battery temperature.
- CAN_BMS/ 485_BMS (05): BMS communication for lithium batteries.
- Type-A (07): Color screen upgrade.
- Type-C (08): Standby program upgrade.

4 Technical parameters

4.1 Inverter specification

Table 4-1 Technical parameter

PV input data

Model	R8KL1A-G2S R8KL1DA-G2S	R10KL1A-G2S R10KL1DA-G2S
Max.DC input power (kW)	12	15
No. of MPPT /Max. number of input strings	2/2	
Start-up voltage (Vd.c.)	100	
Max.PV input voltage (Vd.c.)	550	
MPPT Range (Vd.c.)	80~500	
Full power MPPT voltage range (Vd.c.)	250~425	
Max.Input current (Ad.c.)	16/32	
OVC categories	II	
Max. PV isc (Ad.c.)	24	

Battery input data

Model	R8KL1A-G2S R8KL1DA-G2S	R10KL1A-G2S R10KL1DA-G2S
Nominal voltage (Vd.c.)	48	
Max.Charging /discharging current (Ad.c.)	160/160	200/200
Battery voltage range (Vd.c.)	40-58	
Battery type	Lithium or lead acid battery	
Charging strategy for li-Ion battery	Self-adaption to BMS	

On-grid AC output data (grid side)

Model	R8KL1A-G2S R8KL1DA-G2S	R10KL1A-G2S R10KL1DA-G2S
Nominal output power (kVA/kW)	8/8	10/10
Max.Apparent Power (kVA)	8.8	10
Nominal Output Voltage (Va.c.)	230	
Output frequency (Hz)	50/60	
Nominal AC current(Aa.c.)	34.8	43.5
Max.AC current (Aa.c.)	38.3	43.5
Output power factor	1 (0.8leading…0.8lagging)	
Output THDi	< 3%	
Max.feedback current (Aa.c.)	43.5	43.5
Max.output overcurrent protection (Aa.c.)	43.5	43.5
OVC categories	III	
Inrush current (Aa.c.@3um)	114.9	130.5
Max.output fault current (Aa.c.@3um)	114.9	130.5

AC input data(generator)

Model	R8KL1A-G2S R8KL1DA-G2S	R10KL1A-G2S R10KL1DA-G2S
Max.input power (kW)	8.8	10
Max.discharge power (kW)	8.8	10
Max.input current (Aa.c.)	38.3	43.5
Max.charging current (Aa.c.)	19.2	21.8

AC output data(load side)

Model	R8KL1A-G2S R8KL1DA-G2S	R10KL1A-G2S R10KL1DA-G2S
Output voltage rated (Va.c.)	230	
Nominal output frequency (Hz)	50/60	
Output THDu	< 2%	

Efficiency

Model	R8KL1A-G2S R8KL1DA-G2S	R10KL1A-G2S R10KL1DA-G2S
Europe efficiency	≥ 96.5%	
MPPT efficiency	99.9%	
Battery charge/ discharge efficiency	95.6%	
Max. DC efficiency	97.2%	

Protection

Model	R8KL1A-G2S R8KL1DA-G2S	R10KL1A-G2S R10KL1DA-G2S
Island protection	Yes	
Insulation resistor detection	Yes	
Residual current monitoring unit	Yes	
Output over current protection	Yes	
Load output short protection	Yes	
Output over voltage protection	Yes	
Output under voltage protection	Yes	

General data

Model	R8KL1A-G2S R8KL1DA-G2S	R10KL1A-G2S R10KL1DA-G2S
On-grid and off-grid switching time (ms)	10	
Operating temperature (℃)	-25 ~ +60	
Operating humidity	0-95% (Non-condensing)	
Operating elevation	0~2000m (Derating over 2000m)	
Ingress rating	IP65	
Weight (kg)	25.8	
Size (W/D/H) (mm)	486×231×530	
Cooling	Natural convection	
Noise emission (dB)	<35	
Customer interface	Color screen (option)	
Communication With RS485/Wi-Fi/ GPRS/CAN/DRM	possess/optional/optional/possess/possess	
Standby loss (W)	< 15	
Grid connection standards	CE	
Pollution degree	II	
Topology	Non-isolated	

5 Installation

5.1 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.

5.2 Packing list

Please check the equipment first after opening and removing them from the package. The packing list is shown as below.

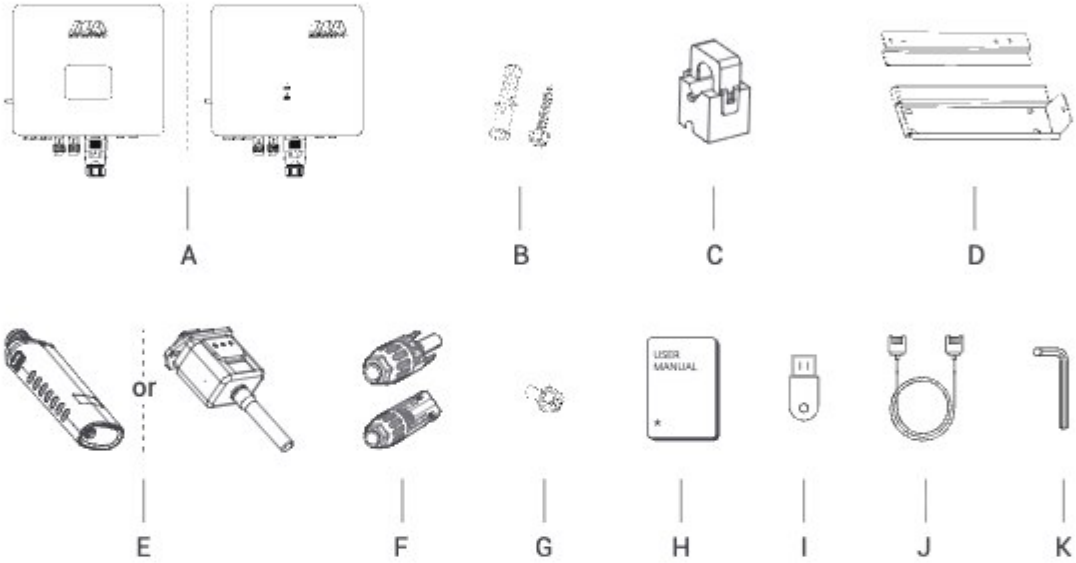


Table 5-1 Packing list

Object	Description
A	Inverter
B	Expansion pipe (4pcs) and Self-tapping screw (4pcs)
C	CT (CTSA016-90A-90mA, inner radius 16mm)
D	Hanger
E	WiFi module or GPRS module (optional)
F	PV connectors (3*positive, 3*negative)
G	Hex head bolt (8pcs)
H	User manual
I	USB flash drive
J	2M Parallel communication cable (optional)
K	Allen wrench (added for the generator interface virsion)

5.3 Mounting

Installation precaution:

The inverter can be installed indoors or outdoors (IP 65). Make sure the installation site meets the following conditions:

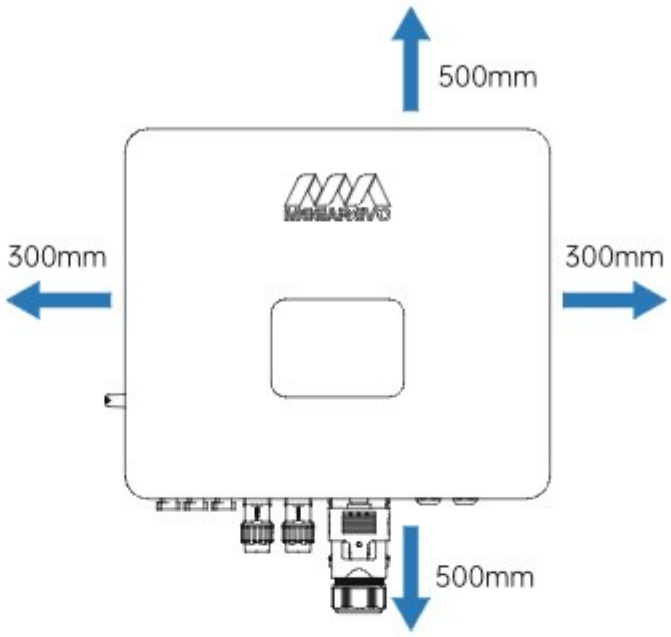
- Not in direct sunlight.
- Not in areas where highly Flammable materials are stored.
- Not in potential explosive areas.
- Not in the cool air directly.
- Not near the television antenna or antenna cable.
- Not higher than altitude of about 2000m above sea level.
- Not in environment of precipitation or humidity (> 95%).
- Under good ventilation condition.
- The ambient temperature in the range of -25 ~ +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. Inverter must be supported or strengthened if the wall support is insufficient (such as wooden wall and the wall covered by thick layer of decoration).

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

Figure 5-1 Recommended installation locations

Space requirement

Figure 5-2 Inverter mounting clearance



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

Installation

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

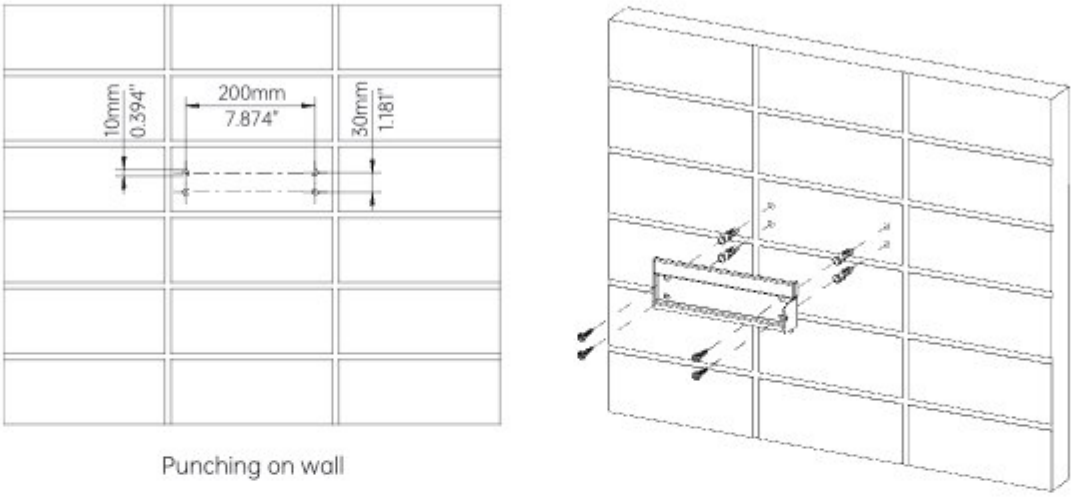
Tools required for installation is shown as below.

Figure 5-3 Installation tools

Step1: Mounting the hanging rack on the wall.

1. Place the hanging rack on the wall, mark the location of the 4 holes and then remove it.
2. Drill holes with a drill, making sure they are deep enough (about 50~60 mm) 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.

Figure 5-4 Inverter hanging plate installation

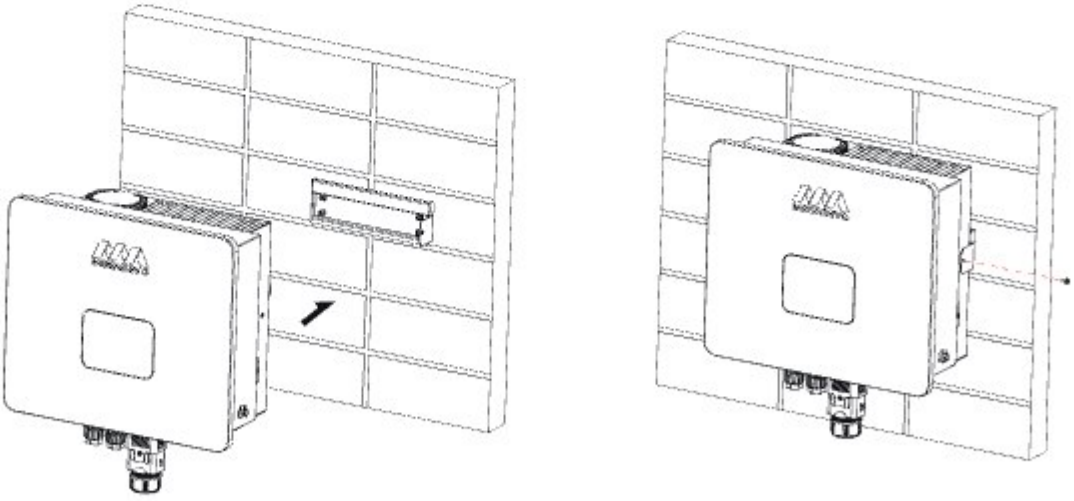


Punching on wall

Step2: Lift the inverter and fix the inverter to the wall by aligning the hole of the inverter with the expansion bolt.

Step3: Tighten the fixing screws on the right side of the inverter.

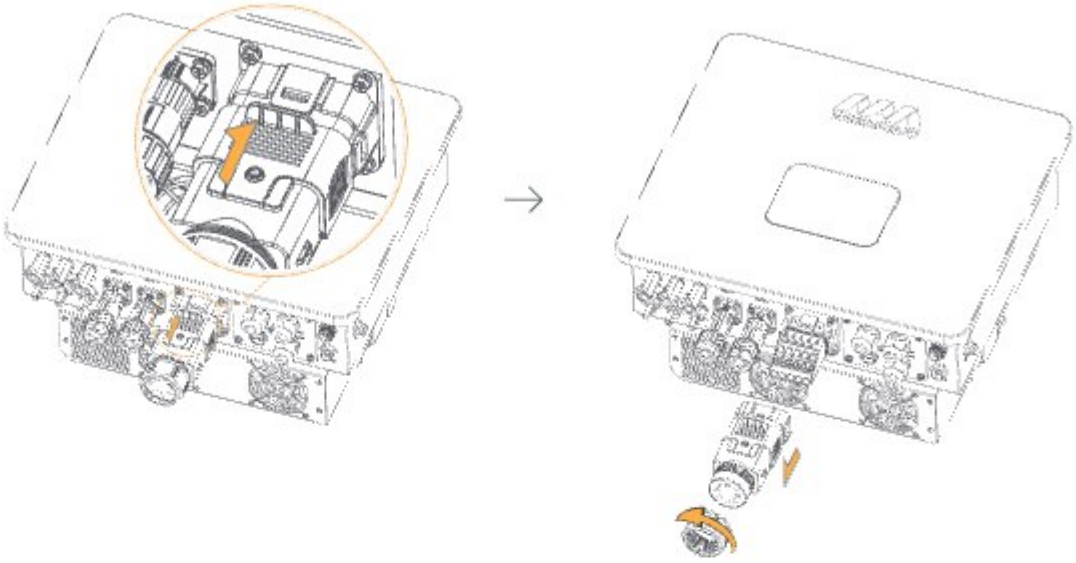
Figure 5-5 Inverter installation instructions



Step4: Please remove the waterproof box under the lower part of the machine.

(1) Disassembly method for inverters with generator interface

Figure 5-6 Inverter installation instructions

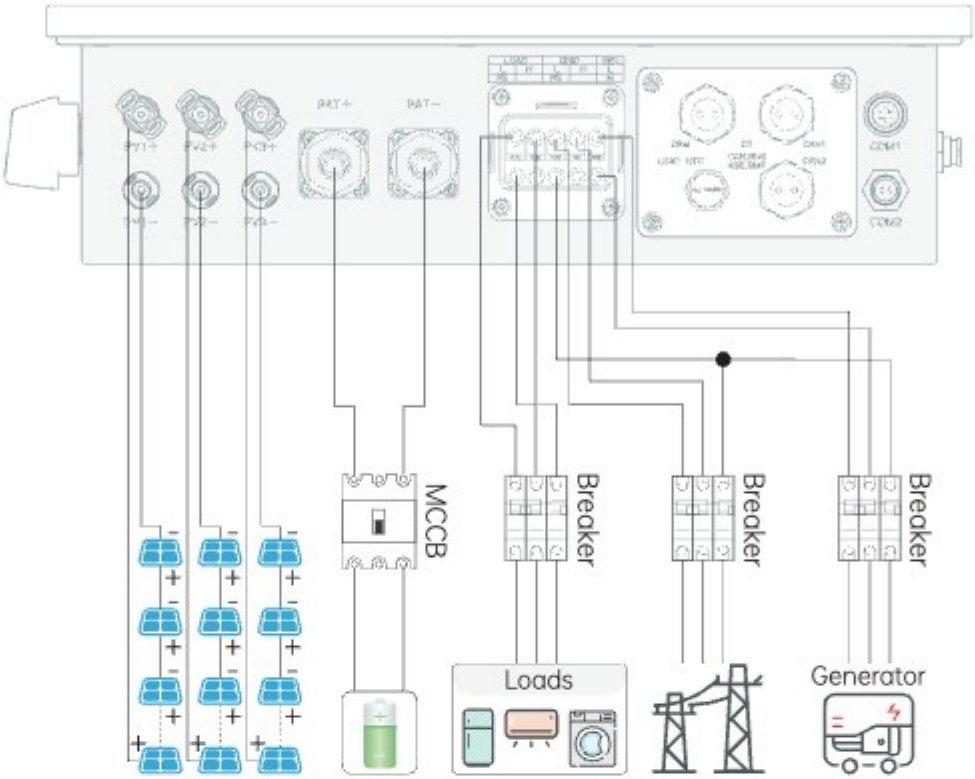


The installation steps for the non-touchscreen model are the same as those for the touchscreen model.

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

6 Electrical connection

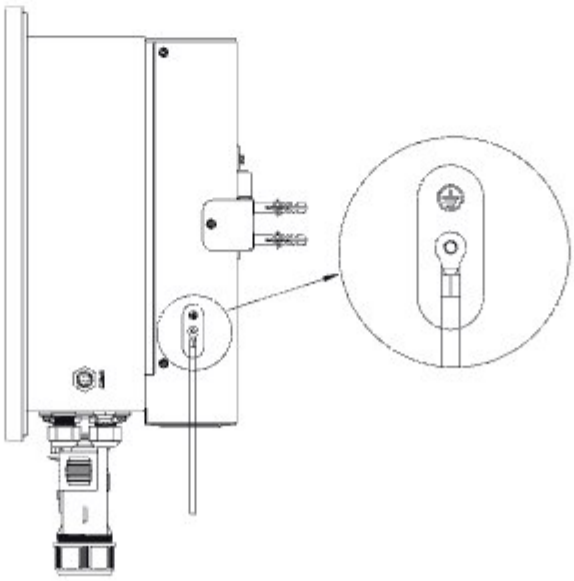
Figure 6-1 Electrical wiring diagram for the inverter with generator interface



6.1 PE cable installation

An external ground connection is provided at the right side of inverter. Prepare OT terminals: M4. Use proper tools to crimp the lug to the terminal. Use the appropriate cable for wiring. (Cable Size ≥ 7AWG)

Connect the OT terminal to the right side of the inverter with ground cable. The torque is 2Nm.



6.2 PV input cable installation

Energy storage inverter can be connected in series with 3-strings PV modules for 8kW, 10kW.

Select PV modules with excellent function and reliable quality. Open-circuit voltage of PV module array connected to the inverter should not exceed <Max. DC input voltage>; operating voltage should be conformed to MPPT voltage range.

Technical data	R8KL1A-G2S R8KL1DA-G2S	R10KL1A-G2S R10KL1DA-G2S
Max. DC input voltage (V)	550	
MPPT range (V)	80-500/360	

WARNING

- The voltage of PV module is very high, which already achieve dangerous voltage range, please comply with electric safety rules during installation.
- Please do not make PV positive or negative grounded!

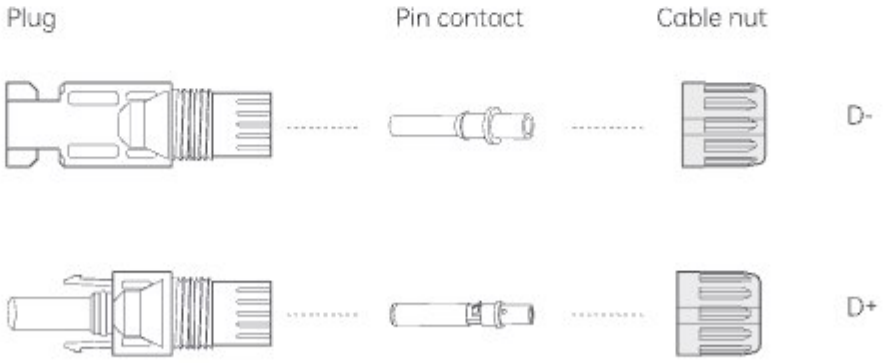
- The following requirements of PV modules need to be applied for each input area. In order to save cable and reduce the DC loss, we suggest installing the inverter near PV modules.

Connection steps:

Step1: Check the PV module.

1. Use multimeter to measure the voltage of PV module array.
2. Check the PV+ and PV- from the PV string combiner box and ensure its correctly.
3. Please ensure the impedance between the PV+ pole and PV- pole to earth within MΩ level.

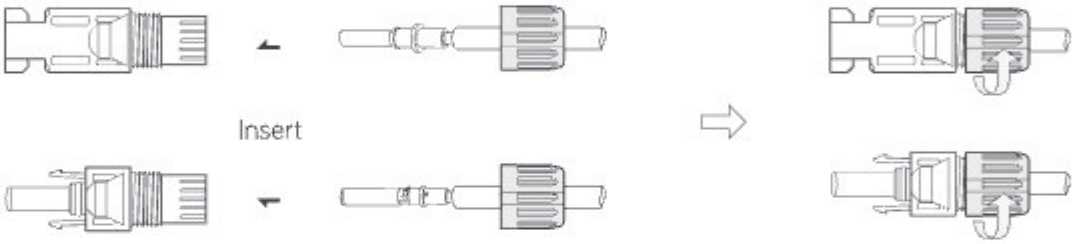
Step2: Separating the DC connector.



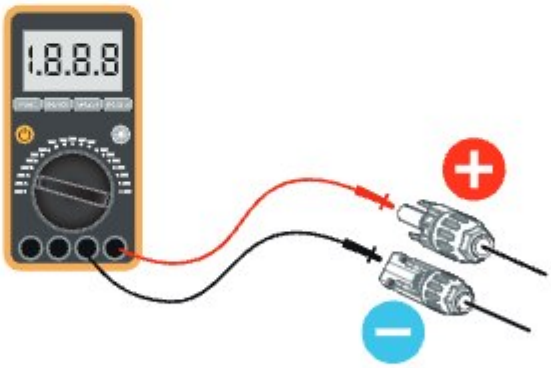
Step3: Wiring.

1. Choose the 10 AWG wire to connect with the cold-pressed terminal.
2. Remove 10mm of insulation from the end of wire.
3. Insert the insulation into pin contact and use crimping plier to clamp it.

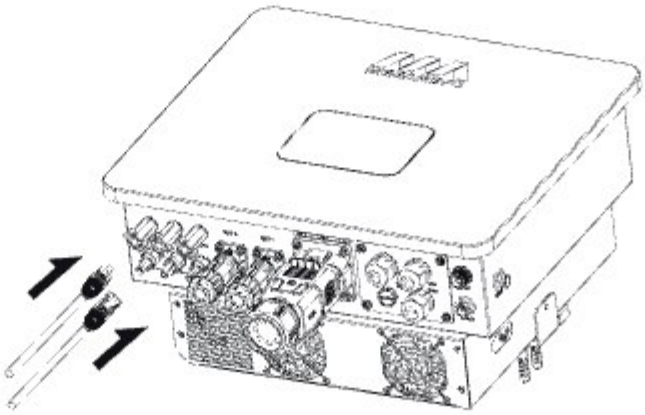
Step4: Insert pin contact through the cable nut to assemble into back of the male or female plug. When you feel or heard a "click" sound the pin contact assembly is seated correctly.



Step5: Measure PV voltage of DC input with multimeter and verify polarity of DC input cable.



Step6: Plug the PV conntector into the corresponding PV connector on inverter.



- Before turn on PV power, please turn on the DC switch at first to avoid damaging the inverter.

CAUTION

- Danger of burn injuries due to hot enclosure parts! If DC inputs are accidently reversely connected or inverter is faulty or not working properly, it is NOT allowed to turn off the DC switch. Otherwise it may cause DC arc and damage the inverter or even lead to a fire disaster. The correct actions are as follows:Use a clip-on ammeter to measure the DC string current.
- If it is above 0.5A, please wait for the solar irradiance reduces until the current decreases to below 0.5A.
- Only after the current is below 0.5A, you are allowed to turn off the DC switches and disconnect the PV strings.
- In order to completely eliminate the possibility of failure, please disconnect the PV strings after turning off the DC switch to aviod secondary failures due to continuous PV energy on the next day. Please note that any damages due to wrong operations are not covered in the device warranty.

6.3 AC cable installation (grid or gen)

Step1: Check the grid voltage.

1. Check the grid voltage and compare it with the permissive voltage range (Please refer to technical data).
2. Disconnect the circuit board from all the phases and secure it to prevent reconnection.

Step2: Select the appropriate cable and cable lug.

Model	R8KL1A-G2S R8KL1DA-G2S	R10KL1A-G2S R10KL1DA-G2S
Cable (AWG)	≥ 7 (10.6mm²)	≥ 6 (13.3mm²)

Step3: Disassemble the waterproof connector and waterproof cover, and thread the cable through the waterproof connector.

Step4: Wiring.

1. Connect the wire to the cold crimp terminal.
2. Remove 18mm of insulation from the end of the wire.
3. Insert the stripped end into the cable lug and clamp it with crimping pliers.

Step5: Insert the terminals into grid ports(loosen or tighten the crimp terminal screws with a one-way screwdriver or an allen wrench). The torque is 2Nm.

Figure 6-2 Grid wiring diagram for the inverter with generator port

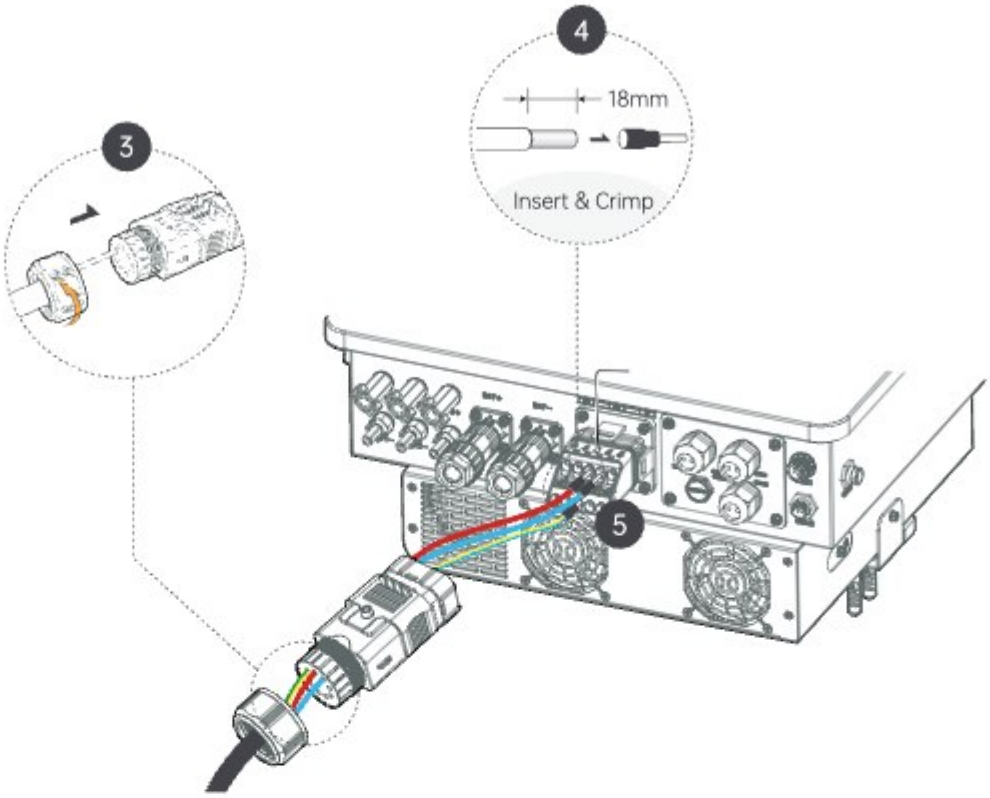


Figure 6-3 Generator wiring diagram

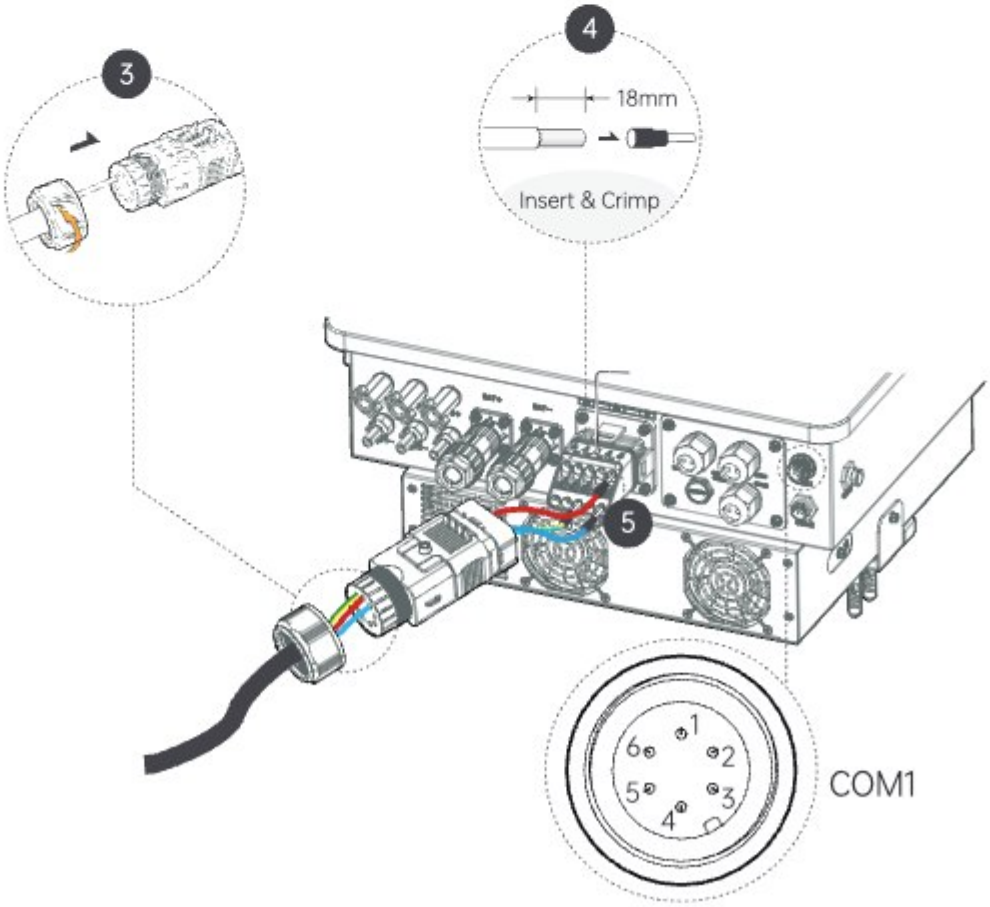


Table 6-1 DRY IO BIN definition

	1	2	3	4	5	6
DRY IO	X	DRYO_1A	DRYO_1B	DRYO_1C	DRYI_1	DRYI_1B

The wiring method of the generator is the same as that of the power grid. The wiring needs to be connected to the appropriate terminal.

- If the generator supports automatic start-stop, the customer can configure it based on the generator's characteristics. For initiating through normally open contact, connect to pins 2 and 4. For initiating through normally closed contact, connect to pins 2 and 3.

6.4 AC cable installation (load)

The inverter has on-grid function and off-grid function along with ability to power loads through the load port. When the inverter works off-grid, users need to switch to "Offgrid enable" function in which the battery supplies power to the load.

In a standard PV installation for an inverter, it typically involves connecting the inverter to both solar panels and batteries. The "Offgrid enable" function is not recommended for systems that are not connected to batteries. Failure to follow the above renovation guidelines will result in the standard warranty becoming void, and the user will be responsible for any resulting issues.

Energy storage inverters can provide overload output based on the technical parameters of the inverter. The inverter is equipped with self-protection against high ambient temperatures.

For complex applications or special loads, please contact our aftersales support.

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

Load connection:

Install an AC circuit breaker between the load output and the load for safety.

Model	R8KL1A-G2S R8KL1DA-G2S	R10KL1A-G2S R10KL1DA-G2S
Micro-breaker (A)	≥ 52	≥ 52

- The absence of an AC circuit breaker in the event of an electrical short circuit in the load measurement will cause damage to the inverter.

Step1: Select the appropriate cable and wire connector.

Model	R8KL1A-G2S R8KL1DA-G2S	R10KL1A-G2S R10KL1DA-G2S
Cable (AWG)	≥ 7 (10.6mm²)	≥ 6 (13.3mm²)

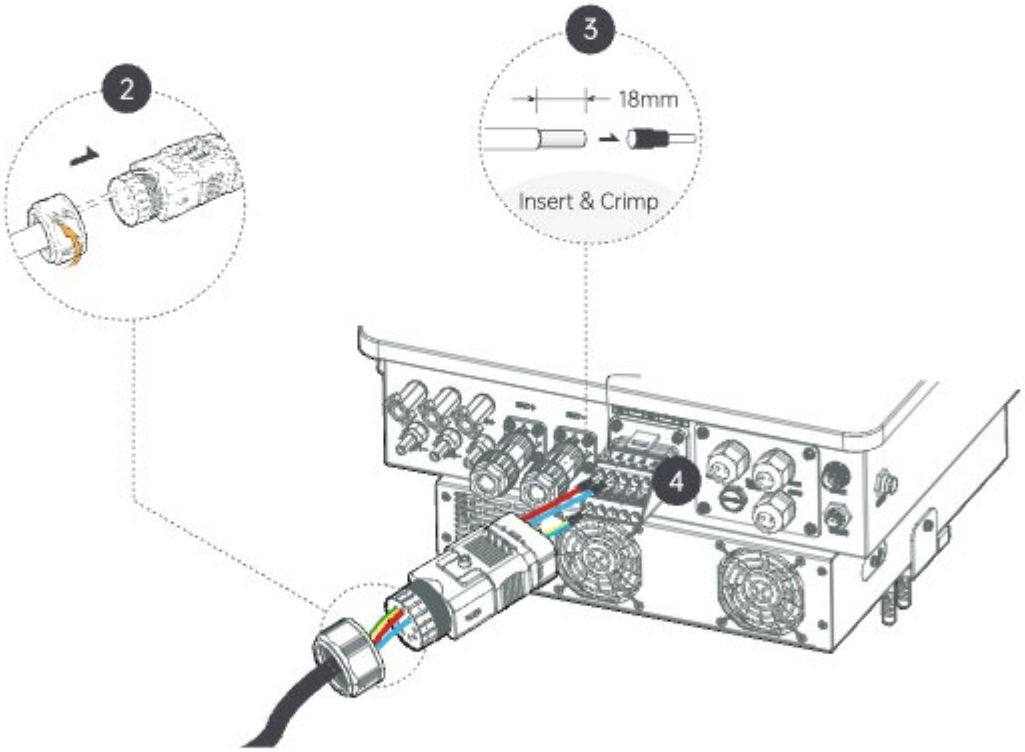
Step2: Disassemble the waterproof connector and waterproof cover, and thread the cable through the waterproof connector.

Step3: Wiring.

1. Connect the wire to the cold crimp terminal.
2. Remove 18mm of insulation from the end of the wire.
3. Insert the stripped end into the cable lug and clamp it with crimping pliers.

Step4 : Insert the terminals into load ports (loosen or tighten the crimp terminal screws with a one-way screwdriver). The torque is 2Nm.

Figure 6-4 Wiring diagram for inverter with generator interface



WARNING

- Ensure that the load output power is within its rated power, otherwise the inverter will shut down with an "over load" warning.
- When "overload" occurs, adjust the load to ensure that its power is within the load output power range before turning on the inverter.
- For nonlinear loads, make sure the surge power is within the load output power range.

6.5 Battery cable installation

The charging & discharging system of energy storage series inverter is designed for 48V lithium battery.

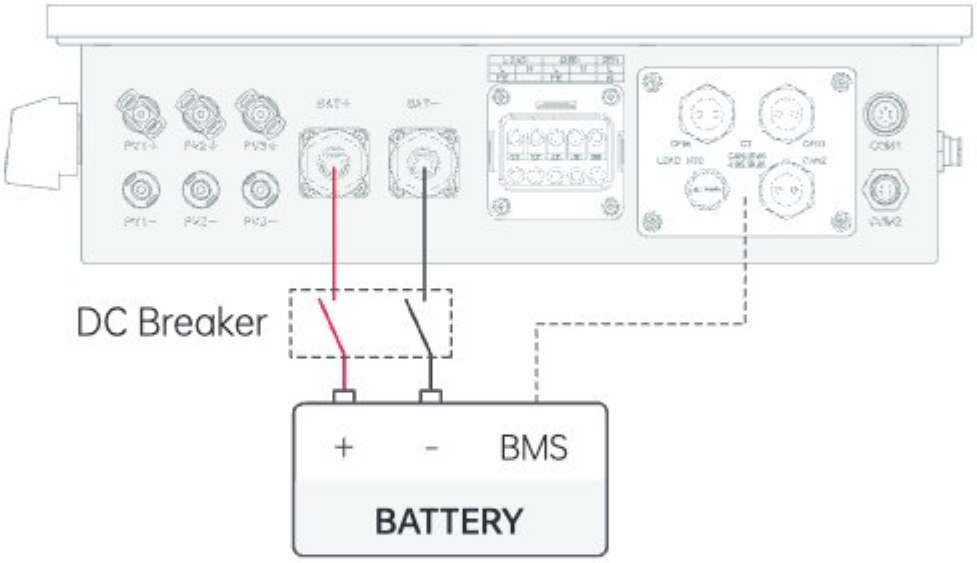
Before choosing batteries, please ensure that its maximum voltage does not exceed 60V and its communication protocol is compatible with the energy storage inverter.

Battery breaker:

Before connecting to battery, please install a no-polarized DC breaker to ensure inverter can securely disconnected from the batteries during maintenance.

Model	R8KL1A-G2S R8KL1DA-G2S	R10KL1A-G2S R10KL1DA-G2S
Current (A)	160	200

Figure 6-5 Battery connection diagram



BMS PIN definition:

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

Figure 6-6 Signal line/communication interfaces

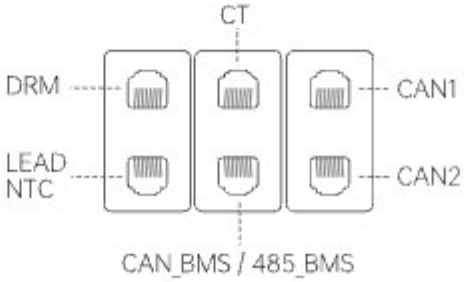
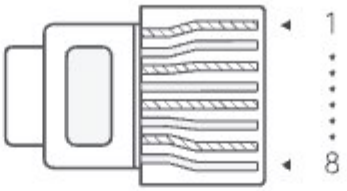


Figure 6-7 BMS PIN definition



	1	2	3	4	5	6	7	8
CAN	X	X	X	BMS_CANH	BMS_CANL	X	X	X
RS485	X	X	X	X	X	GND	BMS_485A	BMS_485B

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

Battery connection steps:

Step1: Select the appropriate cable and O-terminal with an M6 bore.

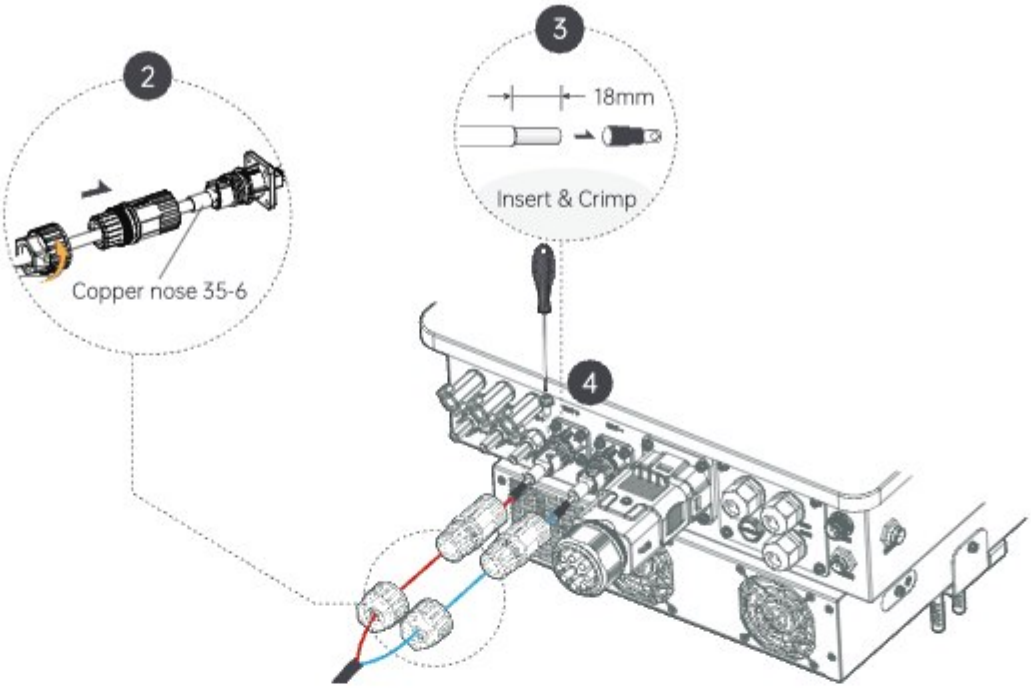
Model	R8KL1A-G2S R8KL1DA-G2S	R10KL1A-G2S R10KL1DA-G2S
Cable (AWG)	≥ 2 (33.6mm²)	≥ 2 (33.6mm²)

Step2: Disassemble the waterproof connector and waterproof cover, and thread the cable through the waterproof connector.

Step3: Wiring.

1. Connect the wire to the cold crimp terminal.
2. Remove 18mm of insulation from the end of the wire.
3. Insert the stripped end into the O-terminal with an M6 bore and clamp it with crimping pliers.

Step4: Insert the terminals into battery ports (loosen or tighten the crimp terminal screws with a one-way screwdriver). The torque is 5Nm.



- Positive and negative lines are not allowed to reverse.

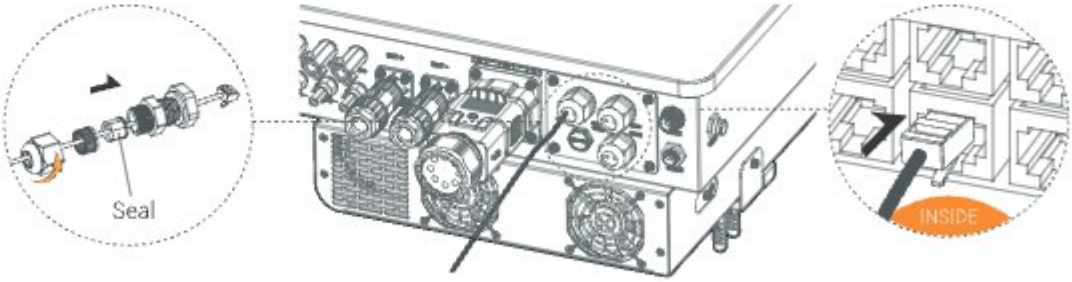
BMS connection steps:

Step1: Disassembly of waterproof connector and waterproof cover.

Step2: Prepare a communication cable (without sheath) and pass the cable through the waterproof connector.

Step3: Insert the RJ45 connector into the BMS port of the inverter.

Step4: Assemble waterproof connectors and waterproof cover.



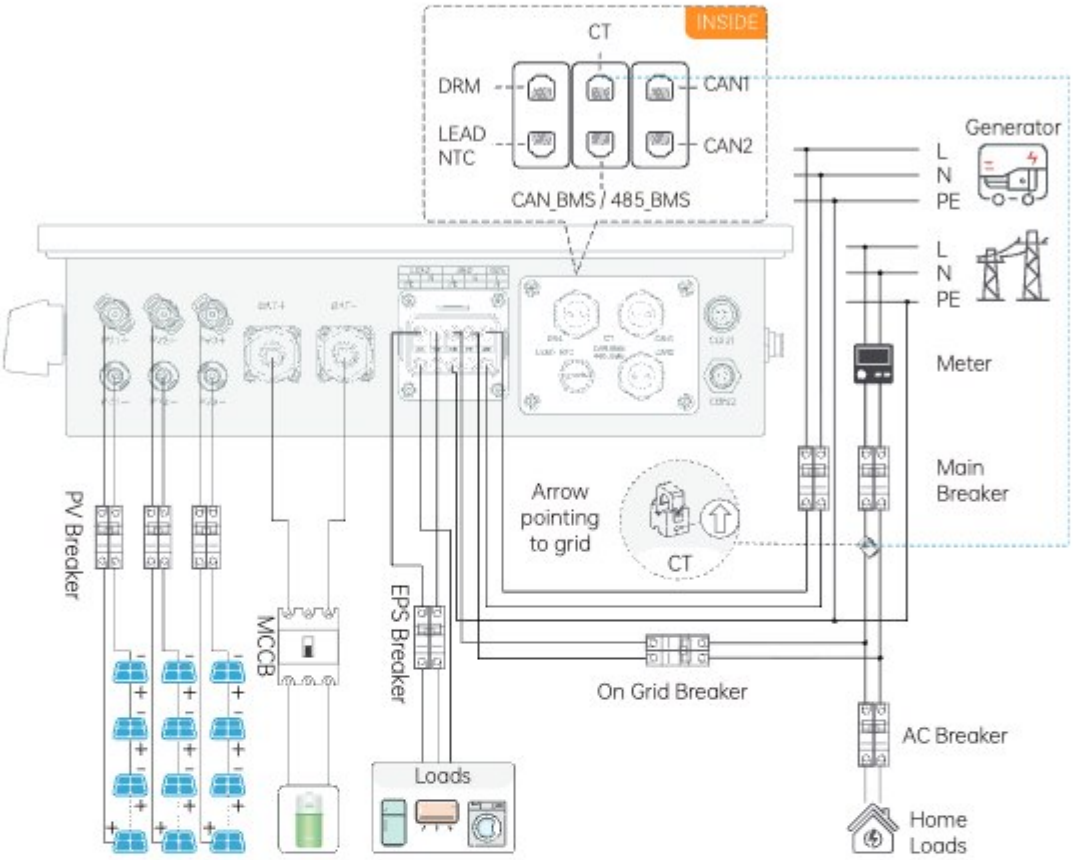
- The seal is for waterproofing. Please make sure it is put back in.

6.6 CT installation instructions

CT stands for "current transform" and is used to detect Grid current.

- If CT is not installed or installed reversely, the functions of "Self Consumption", "Peak Shift", "Battery Priority", will not function correctly.

- The direction of the arrow on the CT points from this inverter to the GRID!
- When connected to single-phase power grid (Europe, Africa, Asia, Australia). A CT is provided in the attachment. Connecting the CT to L phase of the grid.



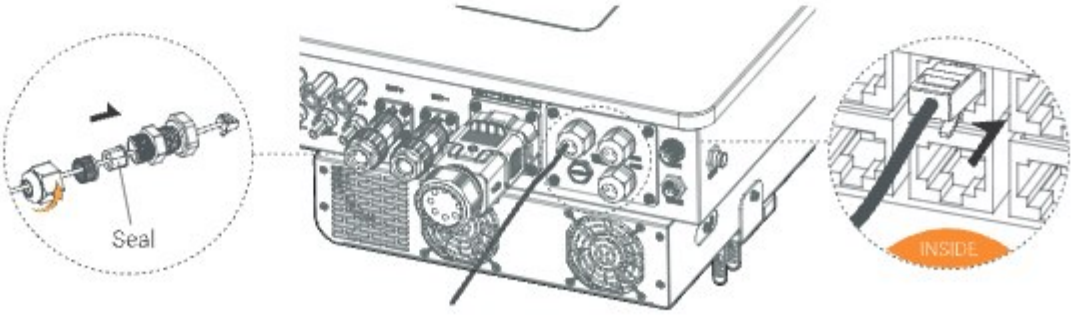
CT connection steps:

Step1: Disassembly of waterproof connector and waterproof cover.

Step2: Prepare a communication cable (without sheath) and pass the cable through the waterproof connector.

Step3: Insert the RJ45 connector into the CT port of the inverter.

Step4: Assemble waterproof connectors and waterproof cover.

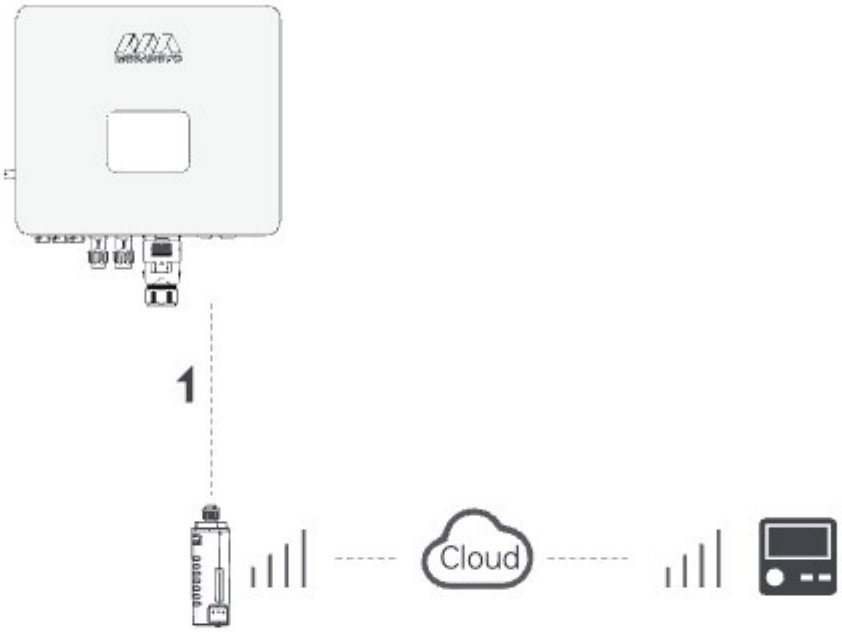


- The seal is for waterproofing. Please make sure it is put back in.

6.7 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.

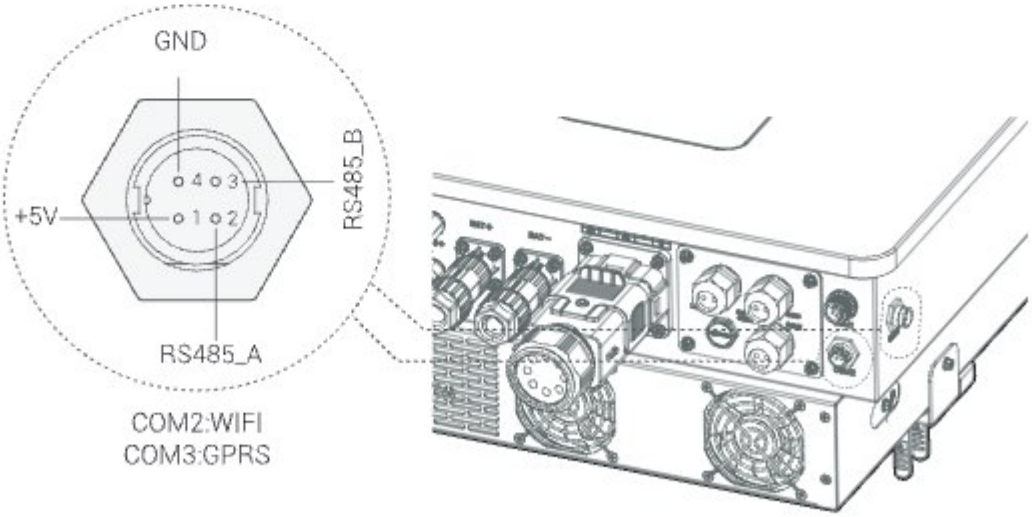


WIFI connection steps:

Step1: Assemble WIFI adaptor to COM2 port at the bottom of the inverter.

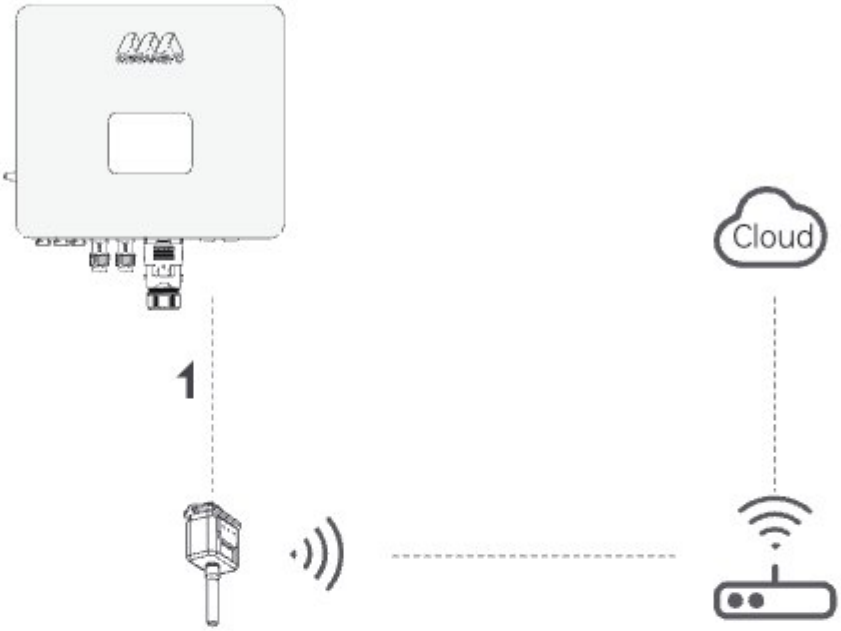
Step2: Establish the connection between the inverter and the router.

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



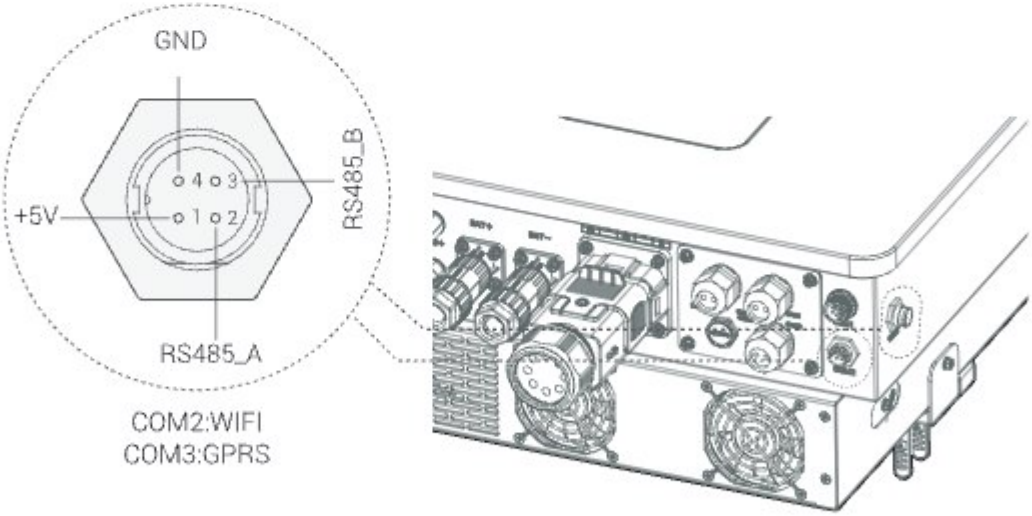
6.8 GPRS connection (optional)

The inverter provides a GPRS (radio frequency) port to control the switching time of a given load via a smart plug (which can be purchased from the supplier if required), thus allowing the load to consume mainly PV energy during operation and minimizing energy costs.



GPRS connection steps:

Please refer to the "Smart Plug user manual" for detailed connection steps.



6.9 Inverter parallel guide

6.9.1 Parallel system diagram

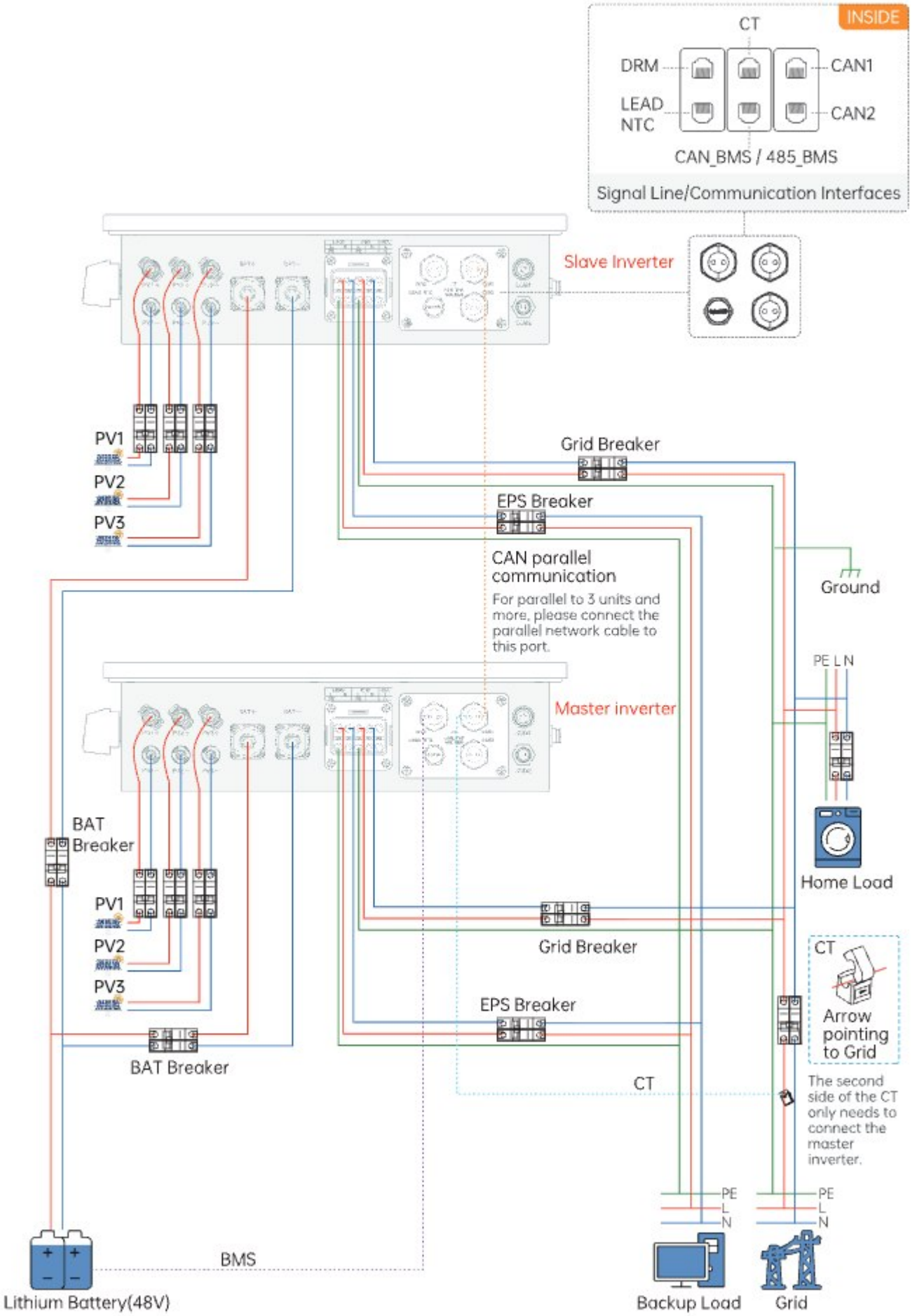
Multiple inverters can be installed together to deliver more power. When there are AC loads connected, all units effectively share the load. The system diagram is as follows.

- If using Common CT connection Method, Please contact your dealer to purchase a larger capacity CT to ensure sampling accuracy.

1. The BMS port: BMS communication for lithium batteries.
2. The CT port: For external grid side CT to detect current size.
3. CAN port: parallel port.

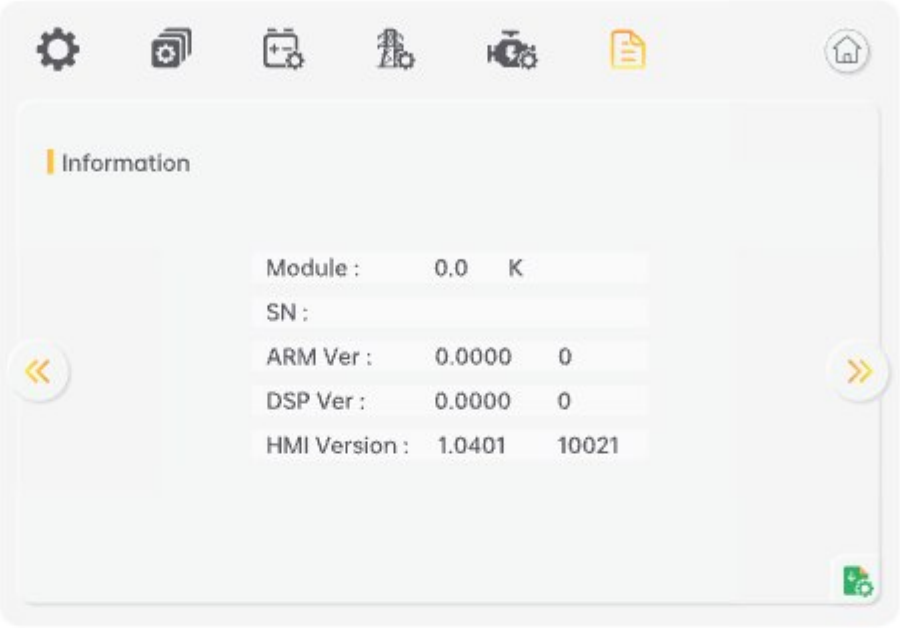
For parallel communication, CAT 6 cables are needed. The units should be connected hand by hand. When using common batteries, BMS cable needs to be connected to the master unit. THE inverter shares the BMS information by inter -unit parallel communication cable.

Please refer to 8.1.3 Setting Option (2) Parallel Settings for details about configuring parallel inverters.


INSIDE
CT
DRM
CAN1
LEAD
NTC
CAN2
CAN_BMS / 485_BMS
Signal Line/Communication Interfaces
Slave Inverter
PV1
PV2
PV3
Grid Breaker
EPS Breaker
CAN parallel communication
For parallel to 3 units and more, please connect the parallel network cable to this port.
Ground
PE L N
Master inverter
Home Load
BAT Breaker
PV1
PV2
PV3
Grid Breaker
CT
Arrow pointing to Grid
EPS Breaker
BAT Breaker
CT
The second side of the CT only needs to connect the master inverter.
PE
L
N
PE
L
N
BMS
Lithium Battery(48V)
Backup Load
Grid

6.9.2 Parallel use matters

1. Make sure all the units in parallel are with the same software version.



2. Connect the loads of the two inverters together first. Please noted that length of the cables connecting the grid power line and the load line of the two inverters should be roughly approximately equal. If user wants to add grid /load ac breaker, please make sure the lines are paralleled/jointed before connected to breaker.
3. Make sure the CT Limiter sensor is installed properly.
4. Please note that the slaver unit will be in the same work mode automatically as the master unit.
5. Only the parallel connection of shared batteries is supported. The BMS communication must be connected to the host.
6. Each photovoltaic input source is independently connected to the inverters, while the grid connections are shared.
7. Set the master and slave servers, number of parallel servers, and address of parallel servers.

6.10 Inverter three phase guide

6.10.1 Three phase system diagram

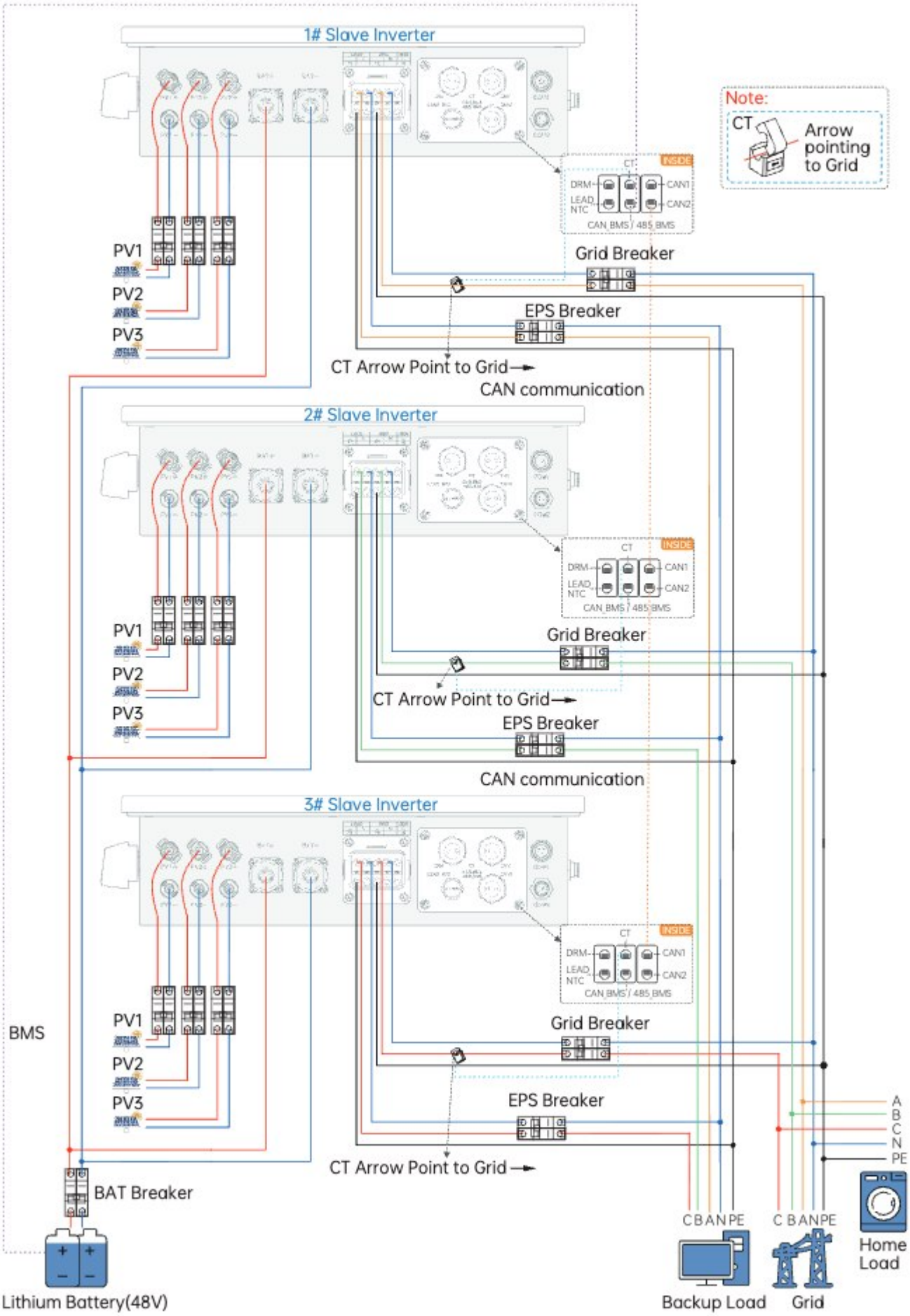
Three single-phase inverters can be combined to form a three-phase inverter. The system block diagram is as follows.

- Please disable the parallel function and enable the group three phase function.
- Set the parallel address of the 1# Master to 1,the parallel address of the 2# slave and the parallel address of the 3# slave to 3.
- Select phase A for the 1# Master inverter and phase A for the grid interface(The host must be set to phase A); Select phase B for the 2# slaver inverter and phase B for the grid interface; Select phase C for the 3# slaver inverter and phase C for the grid interface.
- If a phase sequence error alarm is generated from the inverter, the three-phase phase sequence of the inverter ABC fails on corresponding the three-phase power grid, and the phase sequence needs to be adjusted.

For 3 Phase communication, CAT 6 cables are needed. The units should be connected hand by hand.

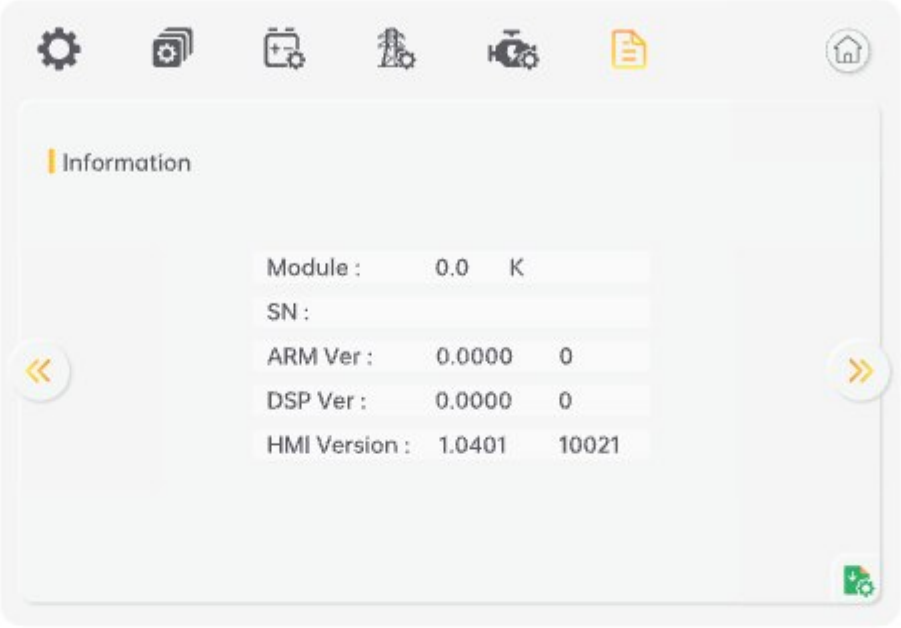
When using common batteries, BMS cable needs to be connected to the master unit. The inverter shares the BMS information by inter-unit parallel communication cable.

Please refer to 8.1.3 Setting Option (2) Parallel Settings for details about configuring parallel inverters.


1# Slave Inverter
2# Slave Inverter
3# Slave Inverter
Note:
CT
Arrow pointing to Grid
INSIDE
CT
DRM
LEAD NTC
CAN1
CAN2
CAN BMS / 485 BMS
PV1
PV2
PV3
Grid Breaker
EPS Breaker
CT Arrow Point to Grid
CAN communication
BMS
BAT Breaker
Lithium Battery(48V)
A
B
C
N
PE
C B A N PE
Backup Load
Grid
Home Load

6.10.2 Three phase use matters

1. Ensure that all three-phase units use the same software version.



2. Connect the load line and the power grid line separately, and it should be noted that the load line andthe N line of the grid line need to be combined.
3. Make sure the CT Limiter sensor is installed properly.
4. Please note that the slaver unit will be in the same work mode automatically as the master unit.
5. Only the parallel connection of shared batteries is supported. The BMS communication must be connected to the host.
6. In the group three-phase system, the main load and the grid line must be connected as phase A, the load of 2# slave and the grid line must be connected as phase B, and the load and grid line of 3# slave must be connected as phase C.
7. When the group is three-phase, it is also necessary to set the number and address of parallel machines.

7 Inverter configuration

Start inverter after checking all the following:

- Ensure all the devices are accessible for operation, maintenance and service.
- Check and confirm that the inverter is firmly installed.
- Space for ventilation is sufficient for one inverter or multiple inverters.
- Nothing is left on the top of the inverter or battery module.
- Inverter and accessories are correctly connected.
- Cables are routed in safe place or protected against mechanical damage.
- Warning signs and labels are suitably affixed and durable.
- Switch on the external AC breaker to power on the inverter control board.
- Measure DC voltage of PV strings and battery and ensure the polarity is correct.
- Measure AC voltage and frequency and ensure they are within local standard.

Figure 7-1 Measure DC voltage of PV strings and battery

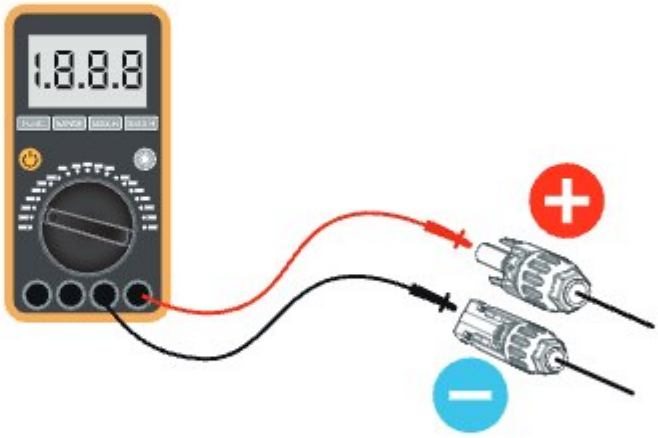


Figure 7-2 Measure AC voltage and frequency

Starting inverter:

- Inverter will start automatically when the PV panel generate enough energy or the battery is charged.
- Check the status of LCD screen,the LCD screen should display the main interface.
- If the LCD screen reports a fault or alarm, please check the below:
  1. All the connections are correct.
  2. All the external disconnect switches are closed.
  3. The DC switch of the inverter is in the "ON" position.
- Enter the setting interface.
- Setting grid standards; Set the PV connection mode; To set the working mode; Set the battery type; To set inverter output power.

Shut down inverter:

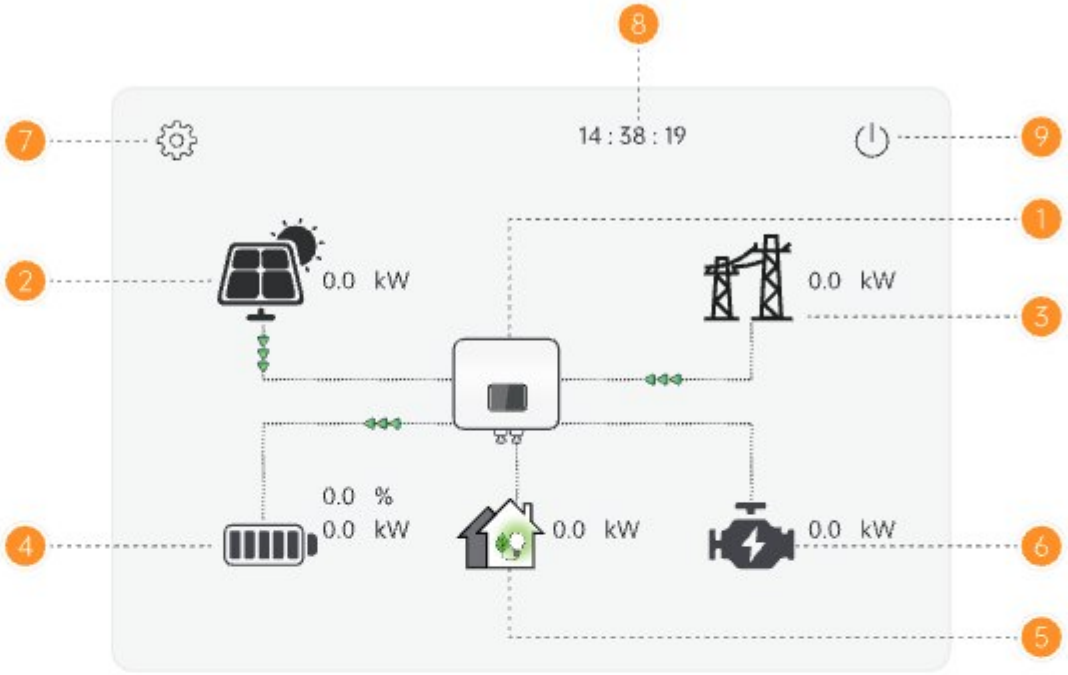
- Disconnect the external AC circuit breaker and secure it against reconnection.
- Rotate the DC switch to the "OFF" position for disconnecting all of the PV string inputs.
- Wait about 10 minutes until the capacitors inside the inverter completely discharge.
- Ensure that the DC cable is current-free via a current clamp (Figure 7-3).

Figure 7-3 Shut down inverter

8 Operation

8.1 LCD operation

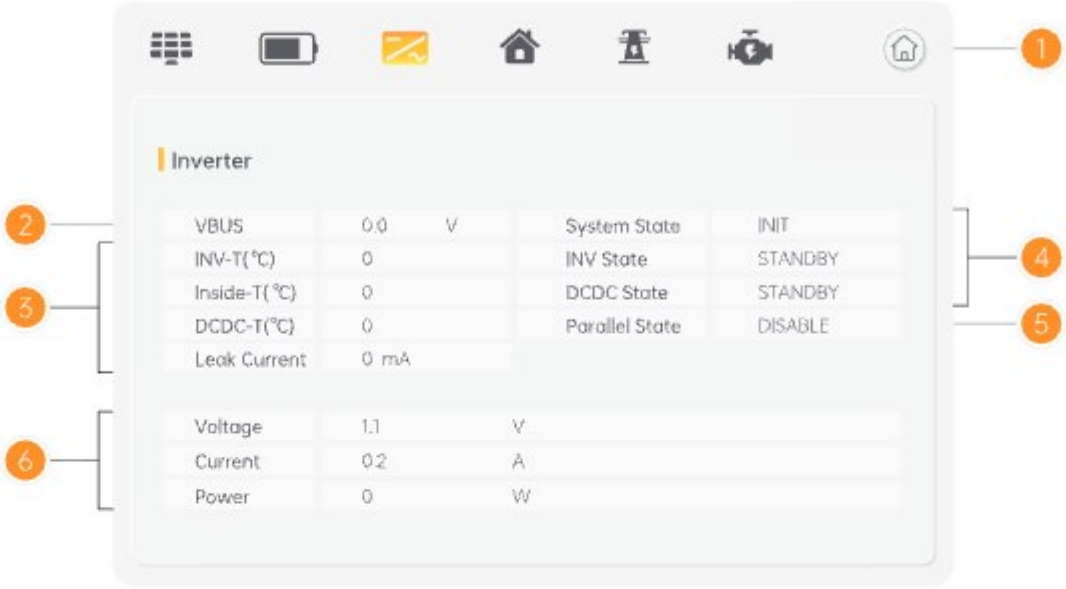
8.1.1 Home page



Code	Name	Explanation
1	Energy Storage Inverter	Click Energy Storage Inverter to enter the working status interface of the energy storage inverter (see section 8.1.2(1) for details).
2	PV	Display the real-time PV power. Click PV to enter the working status interface of PV (see section 8.1.2(2) for details).
3	Grid	Display the real-time grid power. Click Grid to enter the working status interface of grid (see section for 8.1.2(3) details).
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 (see section for 8.1.2(4) details).
5	Load	Display the real-time load power. Click Load to enter the working status interface of load (see section for 8.1.2(5) details).
6	Generator	Display the real-time generator power. Click generator to enter the working status interface of generator (see section for 8.1.2(6) details).
7	Setting	Users can click Setting to enter the settings interface (see section 8.1.3 for details).
8	Time	Display time.
9	Switch	Click the switch to set the switch of the energy storage inverter (see section for 8.1.2(7) details).

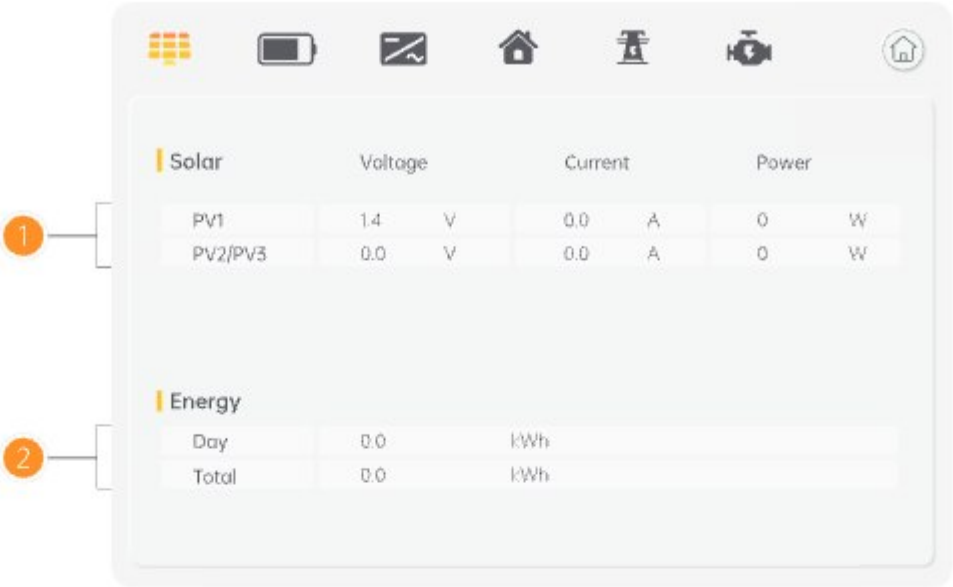
8.1.2 Working status

(1) Energy storage inverter



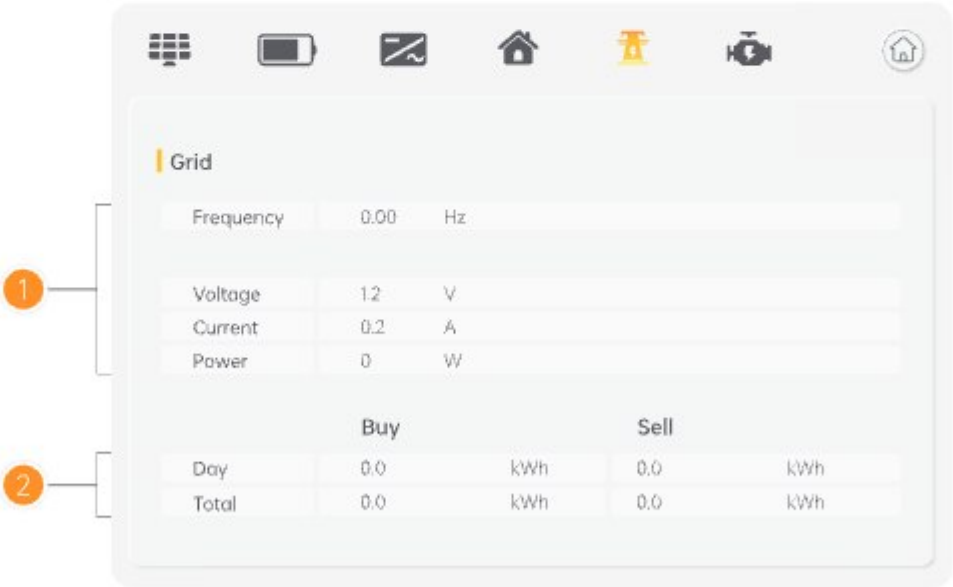
Data panel of energy storage inverter	
1	Users can click on the icon above to switch device status data (PV, Battery, Energy Storage Inverter, Load, Grid, Generator) and return to the Home Page. (Not repeated in subsequent sections.)
2	**VBUS**: Real-time voltage of bus capacitor of the machine.
3	Temperature: **INV-T(℃)**: Temperature of the inverter. **Inside-T(℃)**: Internal temperature of the machine. **DCDC-T(℃)**: Internal temperature of DCDC. **Leak current**: Real-time leak current of the machine.
4	Display status information, including System status, Inverter status, DCDC status and Parallel State. **System Status**: Display complete machine status information, including: 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 PL**: The PFC rectification process of the inverter from off to on. **INV TO PFC**: Status of power by public grid turn into on grid working mode. **DCDC Status**: Displays charging and discharging status information,including: STANDBY, CHARGE, DISCHARGE.
5	**Parallel State**: Display the parallel status of the inverter, including: DISABLE, MASTER, SLAVE.
6	The voltage, current, and power of the inverter side are displayed in real time.

(2) PV



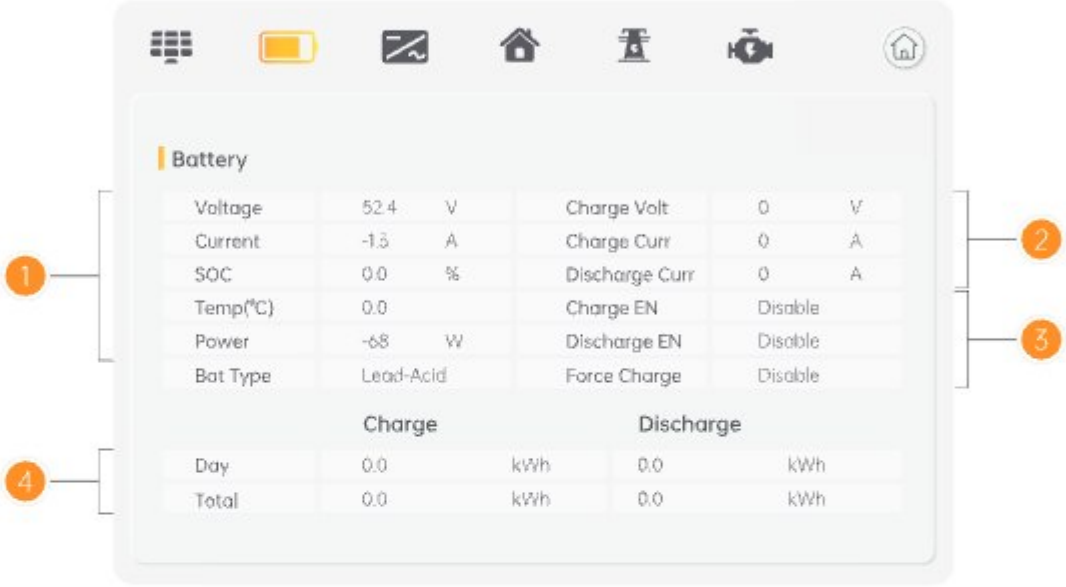
Data panel of PV	
1	Display the working parameters of the two channels of PV (PV1, PV2/PV3), including real-time voltage, current, and power. (PV input type can be set in the settings).
2	Display the cumulative charging capacity of the PV, including daily and total accumulated energy.

(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(Buy) and accumulated energy from equipment to the power grid(Sell), including daily and total accumulated energy.

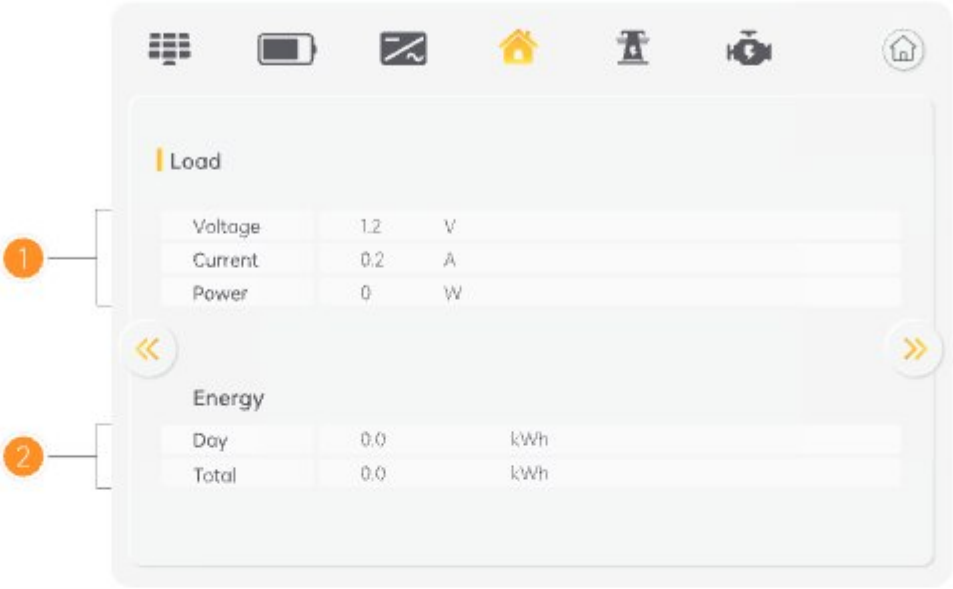
(4) Battery



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 the maximum charge voltage, maximum charge current, and maximum discharge current transmitted by the battery BMS.
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 charge capacity of the battery, including daily and total accumulated energy.

(5)Load

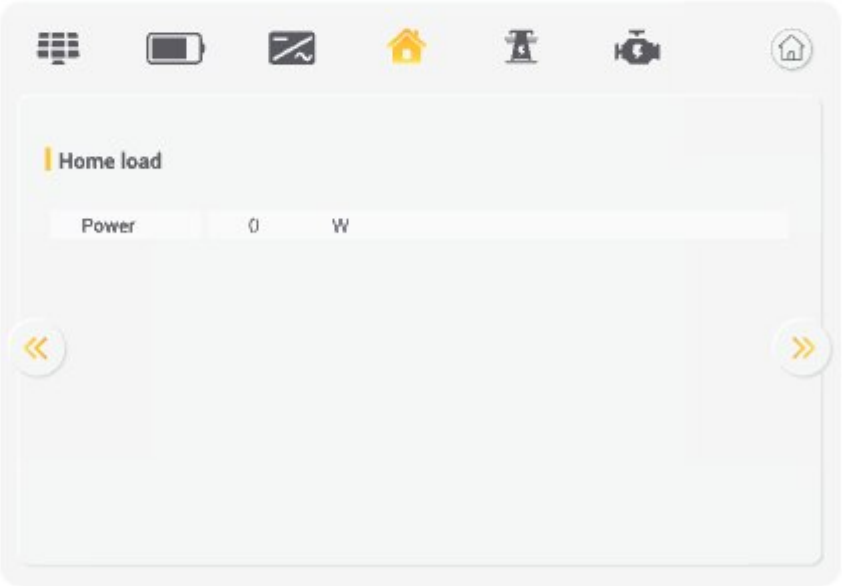
Figure 8-1 Load/page one



User can click « to return to the previous page, and click » to turn to the next page .(Not repeated in subsequent sections.)

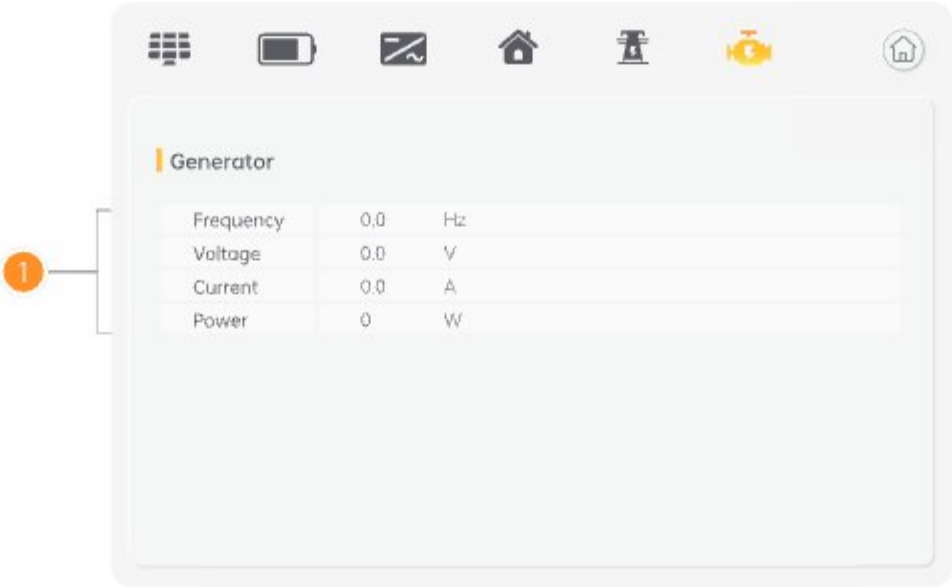
Load/page one	
1	Display the working parameters of the load, including real-time voltage, current, and power.
2	Accumulated usage of load,including daily and total accumulated energy.

Figure 8-2 Load/page two



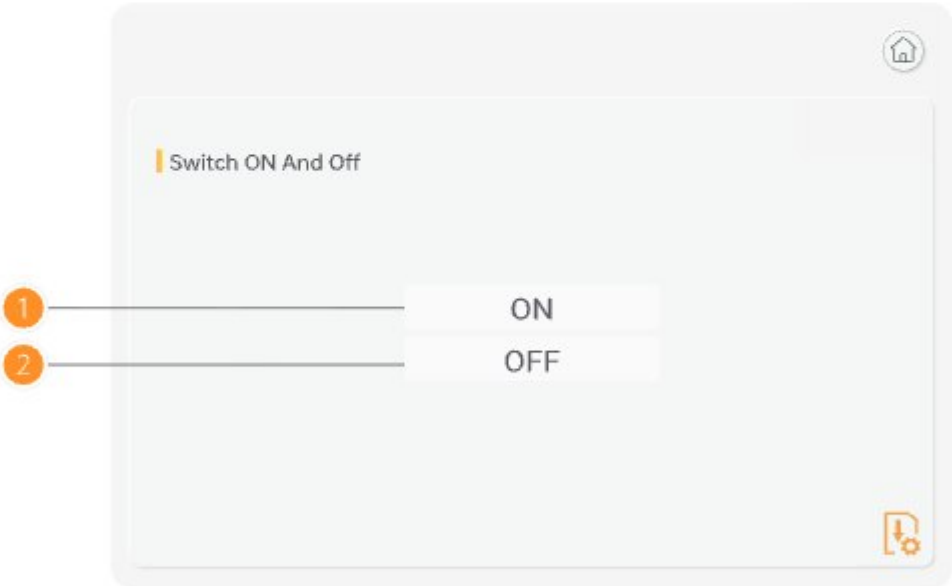
When set Home load EN to "ENABLE", if there is a load connected to the mains port, it displays its Home load power.

(6) Generator



Data panel of generator	
1	Display the operating parameters of the generator, including real-time Frequency, voltage, current, and power.

(7)Switch

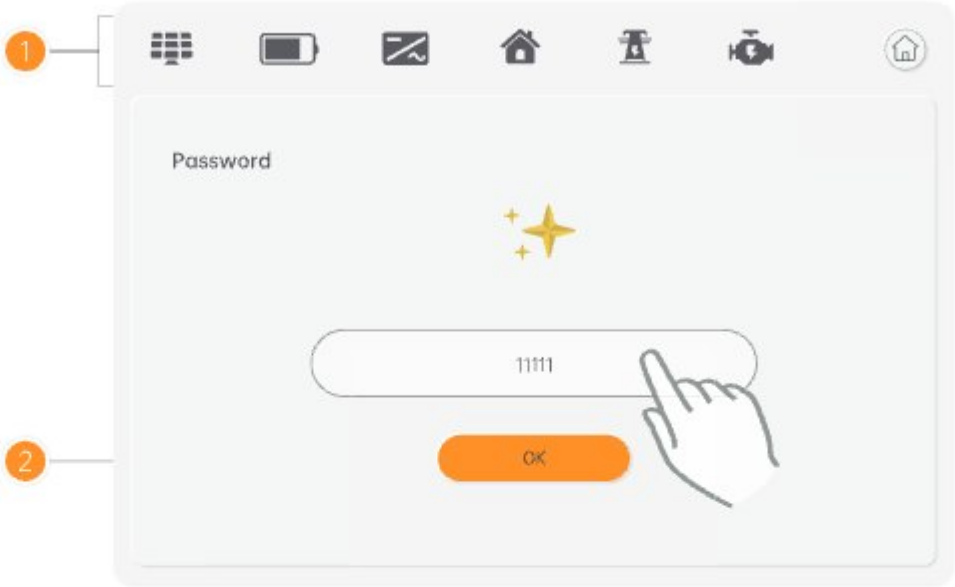


Data panel of switch	
1	Power on: The energy storage inverter works.
2	Power off: The energy storage inverter stops working.

8.1.3 Setting

Enter setting

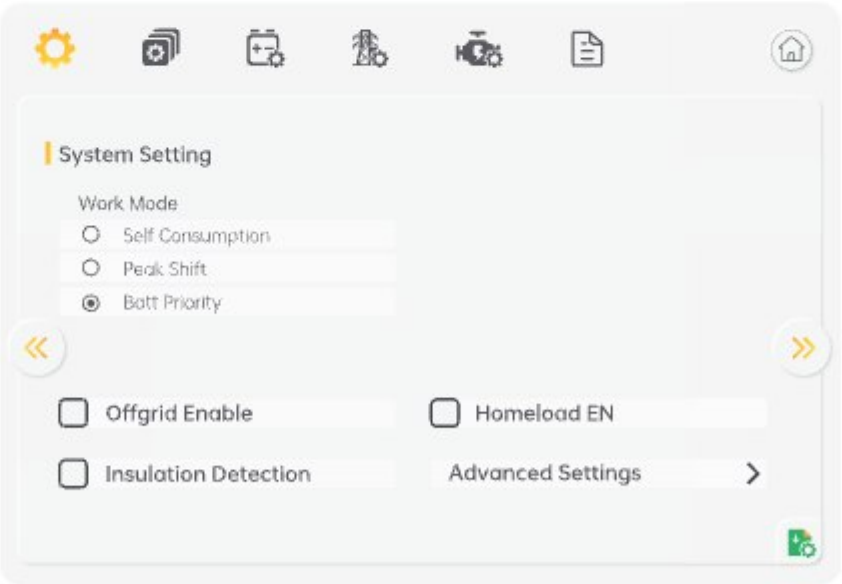
(1) Input password



1. Users can click on the icon above to enter device status data (PV, Battery, Energy Storage 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.

(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.

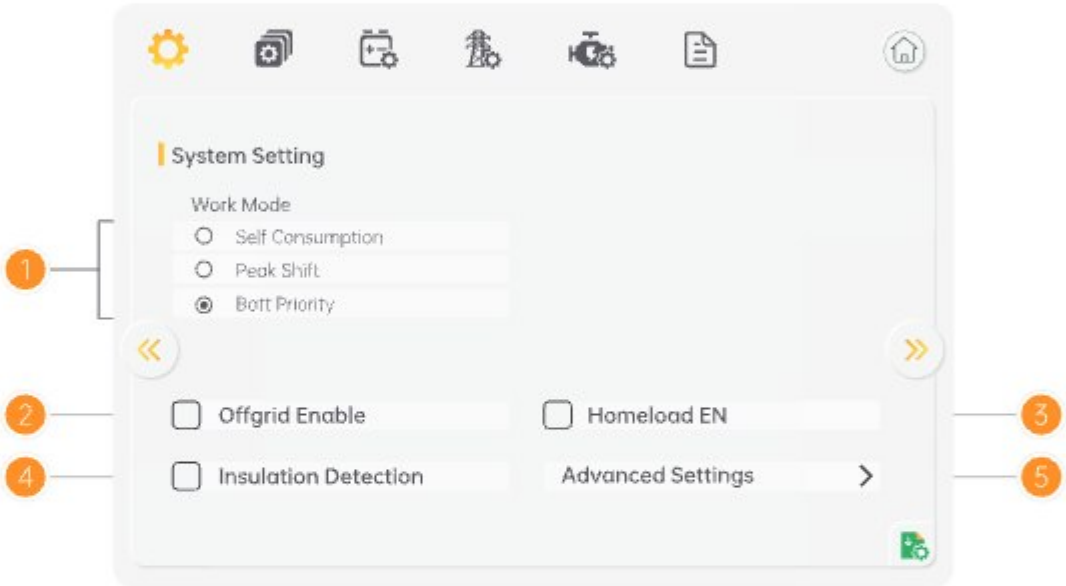
System Setting | Parallel Setting | Battery Setting
Grid Setting | Generator Setting | Machine Information
Return Home Page

After modifying the parameters, the user needs to click on this icon to confirm the modification.

Setting option

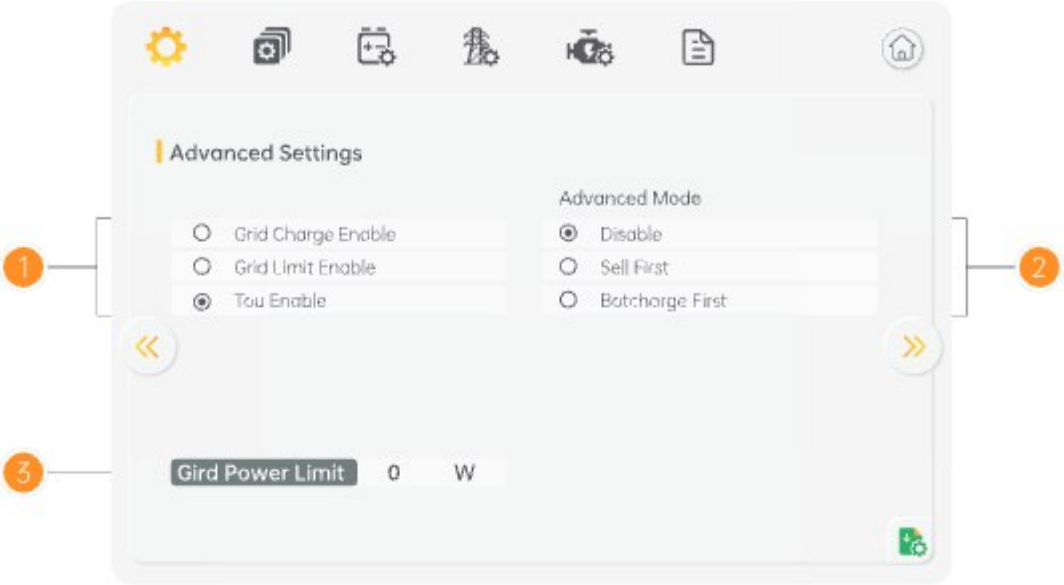
(1) System setting

Figure 8-3 System setting/ page one



1. Users have three working modes to choose from, Self Consumption, Peak Shift, and Battery Priority.
2. **Offgrid Enable:** When the Grid and PV are powered off, Enable the battery to supply power to the load, default option is enable.
3. **Homeload EN:** Enable home load statistics.
4. **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 operating off-grid, the output will be disconnected during insulation detect and the load will stop working.
5. **Advanced Settings**: Users can click to **Advanced Settings >** turn to the advanced settings interface.

Figure 8-4 Advanced settings/ page one



1. Users have three advanced settings to choose from, namely Grid Charge Enable, Grid Limit Enable and TOU Enable.

   Grid Charge Enable: In advanced mode, the grid will charge the battery only if this option is checked.

   Grid Limit Enable: The Grid Power Limit function takes effect only when you check it.

   TOU Enable: Users need to check TOU Enable to enter the work mode of Time-of-use Enable.

2. Advanced Mode:

   There are three options here: Disable Mode,Sell First Mode and BatCharge First Mode. The advanced mode takes effect only in automatic self Consumption mode.

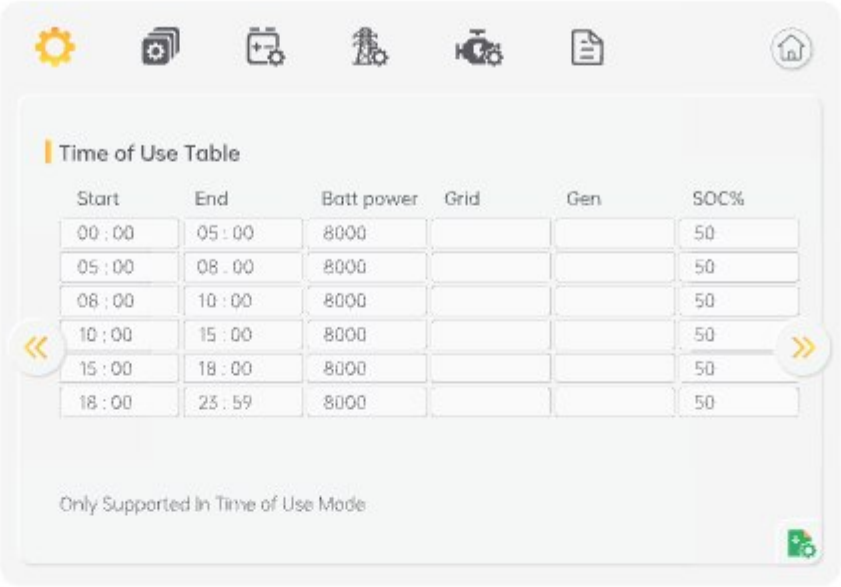
   Disable: When the user selects "Disable", the two working modes are invalid. Only if the other two options are selected, the selected mode (Sell Fiest or BatCharge First) takes effect and work.

   Sell First: In this mode, PV will be given priority to AC output, where the load priority is higher than the grid, and excess energy will be provided to the battery.

   BatCharge First: In this mode, the PV will provide energy to the battery first, and the excess energy will be provided to the AC output, whose load is prioritized over the grid.

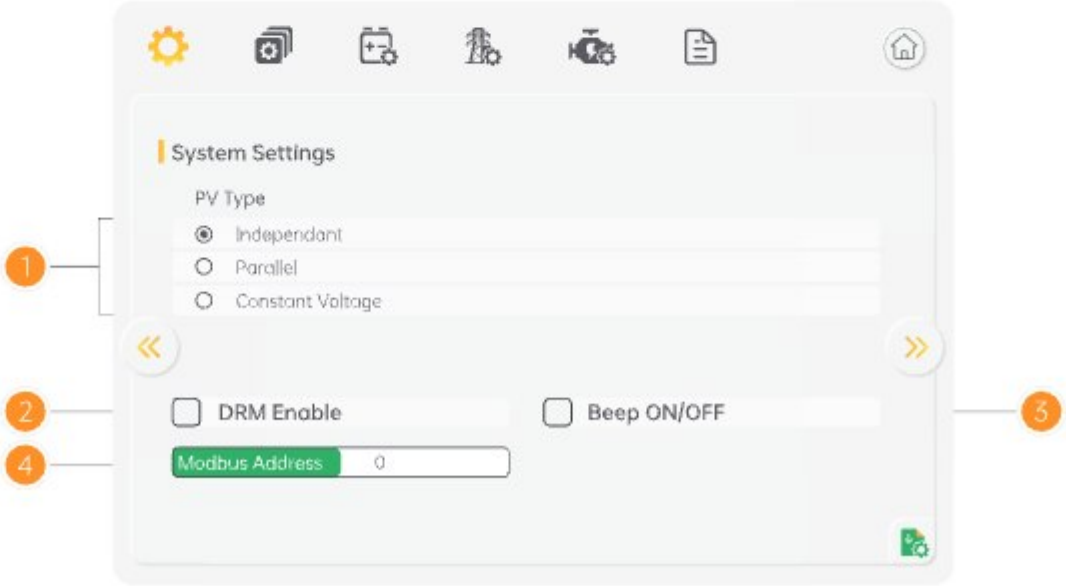
3. **Grid Power Limit:** When insufficient PV energy has been provided to the load, the priority is to provide energy from the grid, and the remaining energy is provided from the battery.

Figure 8-5 Advanced settings/page two



- **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.
- **Grid:** 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).
- **GEN:** GEN is ticked to indicate charging with GEN.
- **Batt power:** The power that the grid charges and discharges to the battery.

Figure 8-6 System setting/page two



1. Users can set PV types, including Independent,Parallel and Constant Voltage.

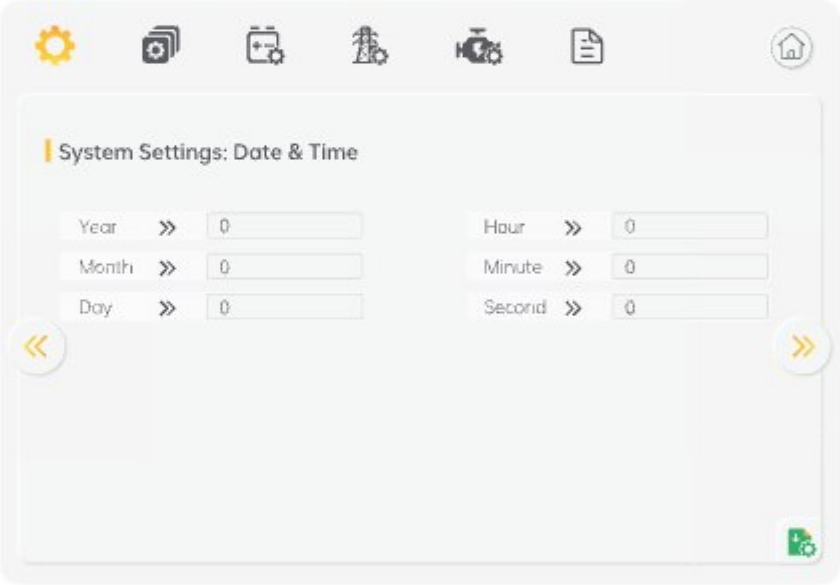
   Independent: The Factory default is independent. When photovoltaic parallel input is set to independent mode, photovoltaic power will be unbalanced.

   Parallel: Parallel is commonly used for testing, two or three photovoltaic circuits are connected in parallel.

   Constant Voltage: Constant voltage mode.

2. **DRM Enable:** Enable or Disable Demand Response Modes.
3. **Beep ON/OFF:** Users can enable or disable the beep function, which takes effect when the inverter alarms.
4. **Modbus Address:** The default Modbus address is 1. Users can change the Modbus address as required.

Figure 8-7 System setting/page three



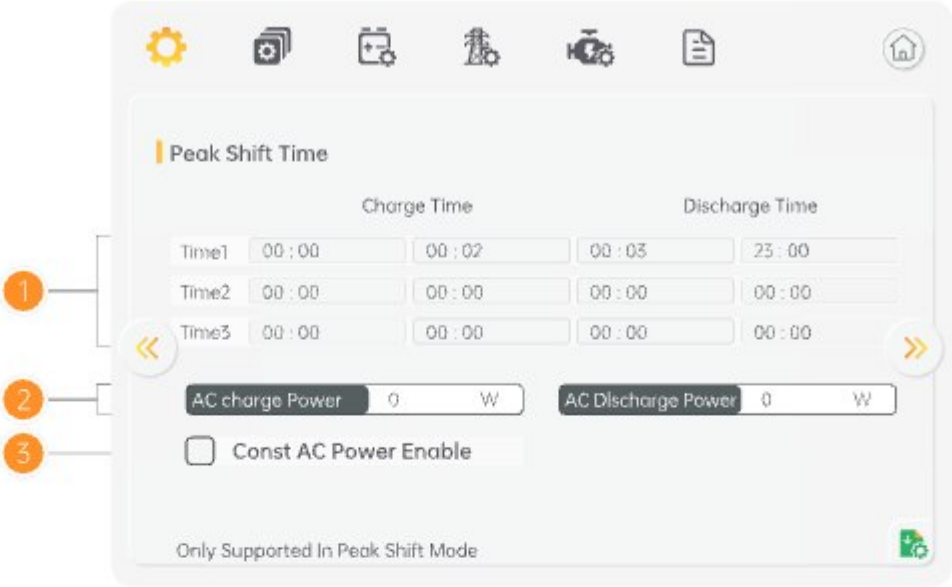
- Date and Time settings

  Users can manually modify the year, month, day, hour, minute and second.

  The year input range should be between 2000 and 2099.

- 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.

Figure 8-8 System setting/page four



1 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 hour (time 1 twice, time 2 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 should not overlap.

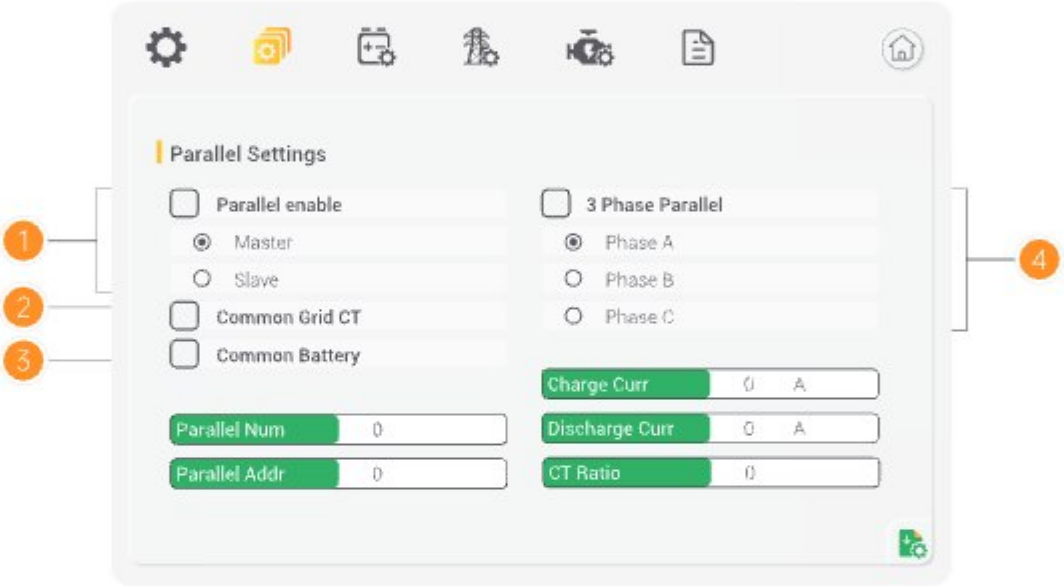
3) If you want to set a continuous charging time from the first night to the next morning. For example, if you want charge battery from first day 21:00pm to next day 5:00am, divide this time period into two time periods (21:00~23:59, 00:00~05:00), and select two charging time periods from Time1, Time2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

2. **ACchargePower:** This feature only works in Peak shift mode, during the charging period. When the PV energy is insufficient to charge the battery, it will draw energy from the grid based on power Settings.

   ACDischargePower: This feature only works in Peak shift mode, during the discharge period, supply energy to the grid at the set power, the actual power depends on the setting and the grid discharge power which is less.

3. **Const ACPower Enable:** The ACchargePower and ACDischargePower functions take effect only when this option is selected.

(2) Parallel setting



1. **Parallel enable:** Enable 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. **Common Battery:** Enable or disable Battery sharing.

4. **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.

   Parallel Num: This operation is used to select the number of parallel machines.

   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.

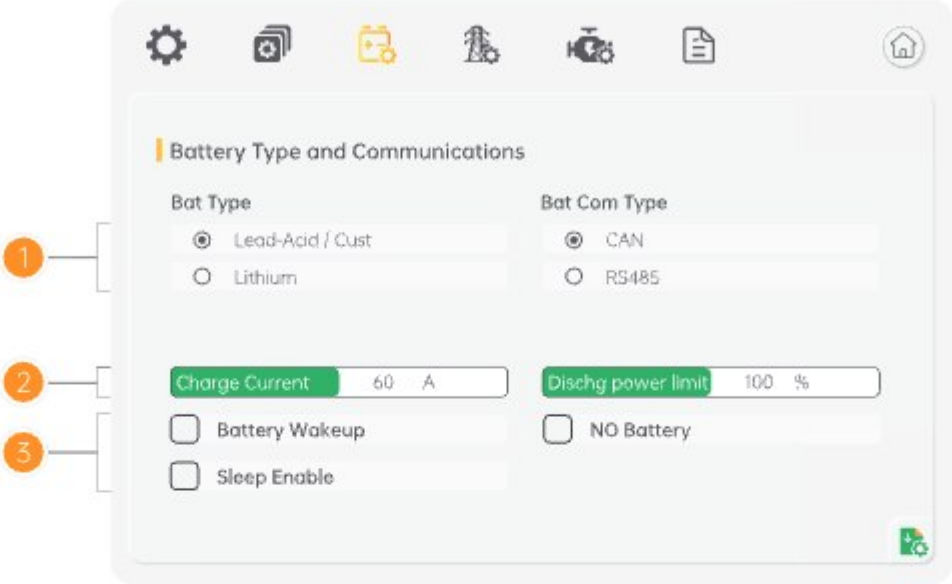
   CT Ratio: Set the detection ratio of CT. Set the CT ratio to 1000:1 by default.

   Charge Curr: Set the charging current of parallel machine.

   Discharge Cur: Set the discharge current of parallel machine.

(3) Battery settings

Figure 8-9 Battery settings/page one



1. Set Battery Type and Battery Communication method

   Users can choose the battery type from lead-acid battery/lithium battery and the battery communication method from CAN/485.The default option is CAN.

2. Users can manually input the value of charging current and discharge power limit.

3. **Battery Wakeup:**

   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 battery.

   The default option is disabled. (Partial battery support)

   If you want to use this feature, please consult the dealer for the supported battery brands. Use it only when the battery level is too low.

   After the battery wakes up successfully, please turn off the function, otherwise it will affect the normal operation of the machine.

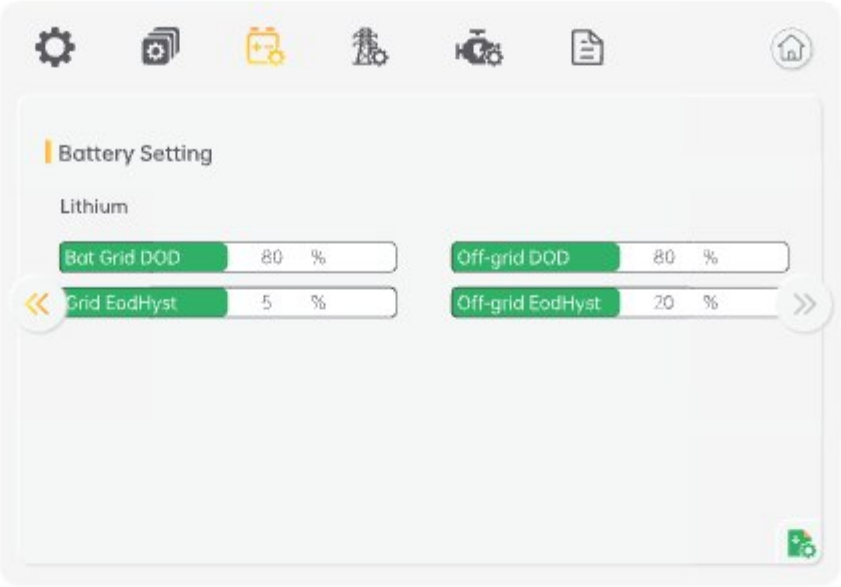
   NO Battery: If you select this option when the battery is not connected, battery alarms will not be generated.

   Sleep Enable: If this function is enabled during grid connection, the DC-DC does not work, and the battery will not discharge to power the loads.

Figure 8-10 Battery settings/page two

- 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).
- **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).
- **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 1000.) The battery capacity setting affects the maximum charging current, for example, setting the capacity to 100Ah corresponds to the maximum charging current of 100A*0.2=20A).
- **Load2 Volt On:** When LOAD2 is disconnected, only the battery is in the charging state, and the set voltage value is reached, LOAD2 is switched on again.
- **Absorption Volt:** Charge the battery with constant current.
- **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.) The charging protection voltage should be as recommended by the battery manufacturer).
- **Load2 Volt Off:** When off-grid, Load2 is disconnected when the battery voltage is lower than the set value. LOAD2 is always in the on-state during grid-connection.

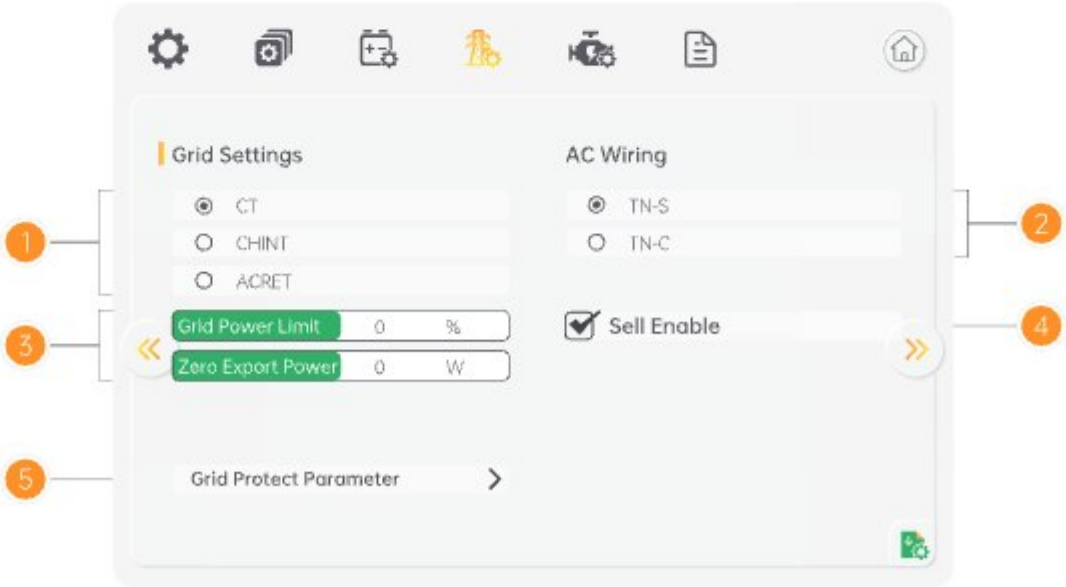
Figure 8-11 Battery settings/page three



- Settings required when using lithium
- **Bat grid DOD/ Off-grid DOD:** When the battery discharges exceed the threshold, the inverter generates a battery low voltage alarm and stops discharging. When the inverter works off-grid, the PV only supplies energy to charge the battery without powering the load until the alarm is cleared. When the inverter is in on-grid mode, the inverter stops working until the alarm is cleared.
- **Grid Eod Hyst:/Off-grid Eod Hyst:** When a low voltage alarm occurs, the battery needs to be charged. When the battery is charged exceed the set value, the alarm will be cleared, and the battery is enabled to discharge.

(4) Grid setting

Figure 8-12 Grid setting/page one



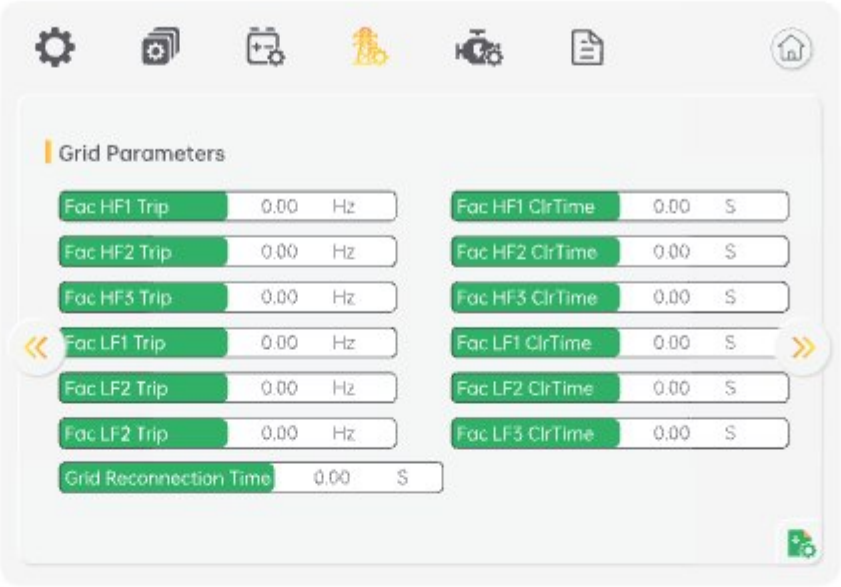
1. Users can choose to use either a CT or an electricity meter to detect the grid current. Currently, the inverter supports grid meters manufactured by CHINT and ACREL.
2. Users can set the AC wiring system to TN-S or TN-C.
3. **Grid Power Limit:** Users can click to enter the numerical input interface. This function is used to limit the conversion power of the inverter. The default parameter is 100%.

   Zero Export Power: If the sampling error occurs when there is an outage in the grid, the user can set the corresponding value to correct it.
4. **Sell Enable:** Users can click to set whether energy is allowed to sell to the grid. If the option is checked, it means that the inverter can feed back electricity to the grid.
5. **Grid Protect parameter:** Users can click to **Grid Protect Parameter >** enter the advanced settings interface.

Figure 8-13 Grid parameters/page one

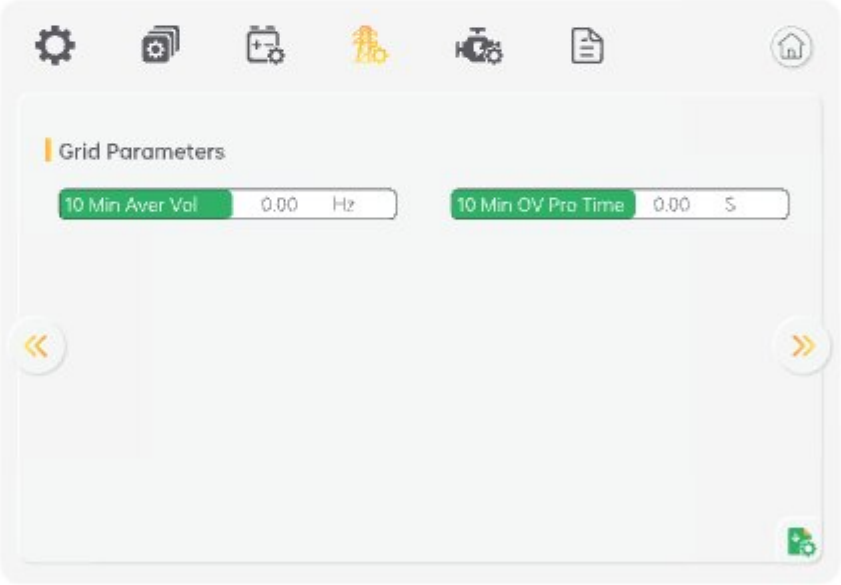
- On this page, users can set overvoltage protection, overvoltage protection time, undervoltage protection, and undervoltage protection time. When grid standards are set, these values are automatically updated according to local safety regulations.

Figure 8-14 Grid parameters/page two



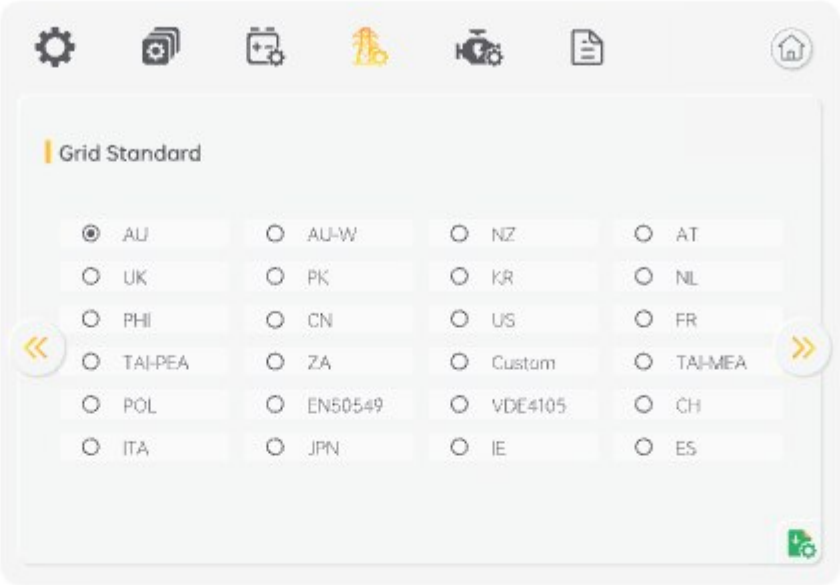
- On this page, users can set over frequency protection, over frequency protection time, under frequency protection, under frequency protection time, and grid reconnection time. When grid standards are set, these values are automatically updated according to local safety regulations.

Figure 8-15 Grid parameters/page three



- Ten minutes Protection voltage and ten protection time have default values of 253V and 603S, respectively. The value of the protection voltage cannot be set exceed the primary overvoltage protection value of the power grid standard. The protection time can only be changed if the Italian safety regulations are set, with a range from 600S to 610S. Every increase of 1 means that the Italian self-test level 1 overvoltage detection time is increased by 1000ms.

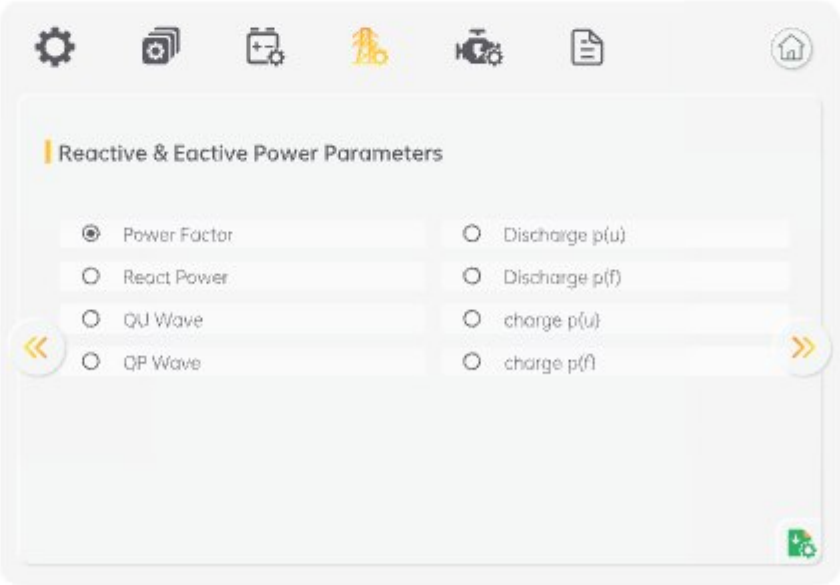
Figure 8-16 Grid setting/page two



- This interface is used to select Grid standard. User can switch grid standards according to their needs.

AU: Australia	**PHI:** Philippines	**POL:** Poland
AU-W: Western Australia	**CN:** China	EN50549
NZ: New Zealand	**US:** America	VDE4105
AT: Austria	**FR:** France	**CH:** Switzerland
UK: United Kingdom	**TAI-PEA:**THAILAND (PEA)	**ITA:** Italy
PK: PAKISTAN	**ZA:** South Africa	**JPN:** Japan
KR: Korea	**Custom:** User defined	**IE:** Ireland
NL: Netherlands	**TAI-MEA:**THAILAND (PEA)	**ES:** Spain

Figure 8-17 Grid setting/page three



- **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).
- **Disharge P(u):** Disharge voltage response.

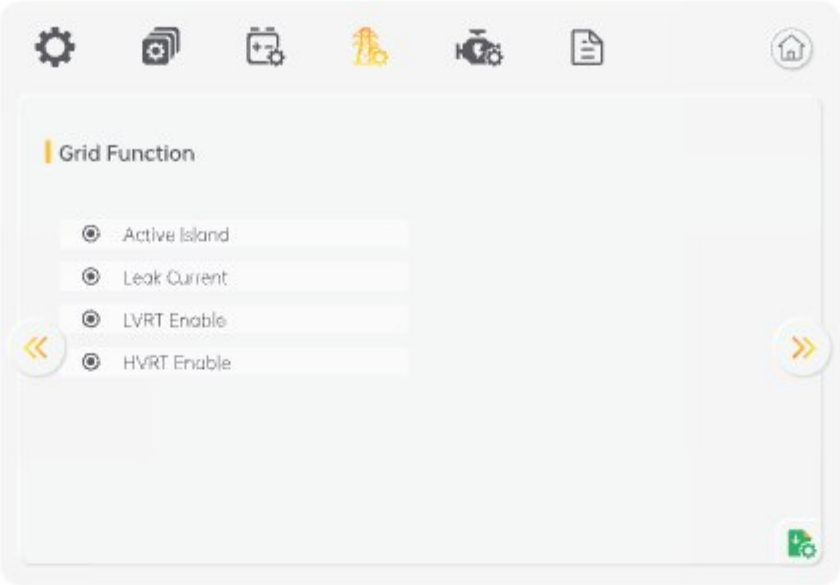
  When the power grid voltage is abnormal, limit the discharge active power and enable the function according to the requirements of the national power grid standard.
- **Disharge P(f):** Disharge frequency response.

  When the power grid frequency is abnormal, limit the discharge active power and enable the function according to the requirements of the national power grid standard.
- **Charge P(u):** Charge voltage response.

  When the power grid voltage is abnormal, limit the Charge active power and enable the function according to the requirements of the national power grid standard.
- **Charge P(f):** Charge frequency response.

  When the power grid frequency is abnormal, limit the Charge active power and enable the function according to the requirements of the national power grid standard.

Figure 8-18 Grid setting/page four

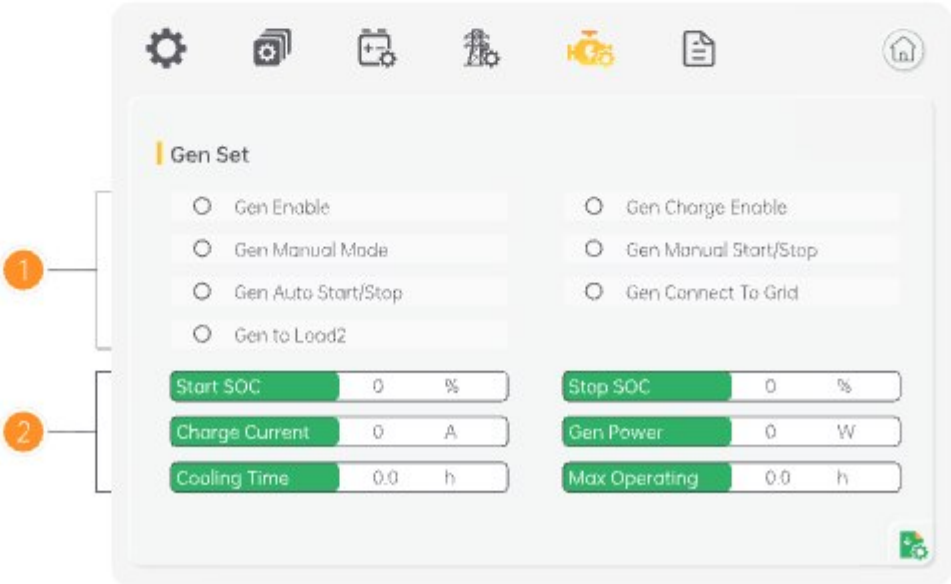


- **Active Island:** Anti-Islanding(The default option is enable).

  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.

- **Leak current:** Leak current detect (The default option is enabled).
- **LVRT Enable:** When the inverter is connected to the grid, the grid voltage suddenly drops, and the inverter can still be connected to the grid for a short time. Use this function to disable Offgrid enabled.
- **HVRT Enable:** When the inverter is connected to the grid, the grid voltage suddenly rises, and the inverter can still be connected to the grid for a short time. Use this feature to disable Offgrid enabled.

(5) Generator setting



1. Diesel generator enable settings:

Gen Enable: Enable control of the Generator function.

Gen Charge Enable: Generator Charge Enable control.

Gen Manual Mode: If the user wants the Generator to be controlled manually, enable it (Manual control enable and automatic control enable are mutually exclusive when set).

Gen Manual Start/Stop: The on/off command in manual control mode.

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 Connect to Grid: When enabled, the generator can be connected to the grid input port.

Gen to Load2: When enabled, the generator port can be used as a second load output port.

2. Diesel generator parameter setting:

Start SOC: When the SOC of battery is lower than the setpoint, the Generator dry contact is enabled and Generator Manual operation is disabled, the connected Generator will be started.

Stop SOC: When the SOC of battery is higher than the set point, the Generator dry contact is enabled and Generator Manual operation 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.

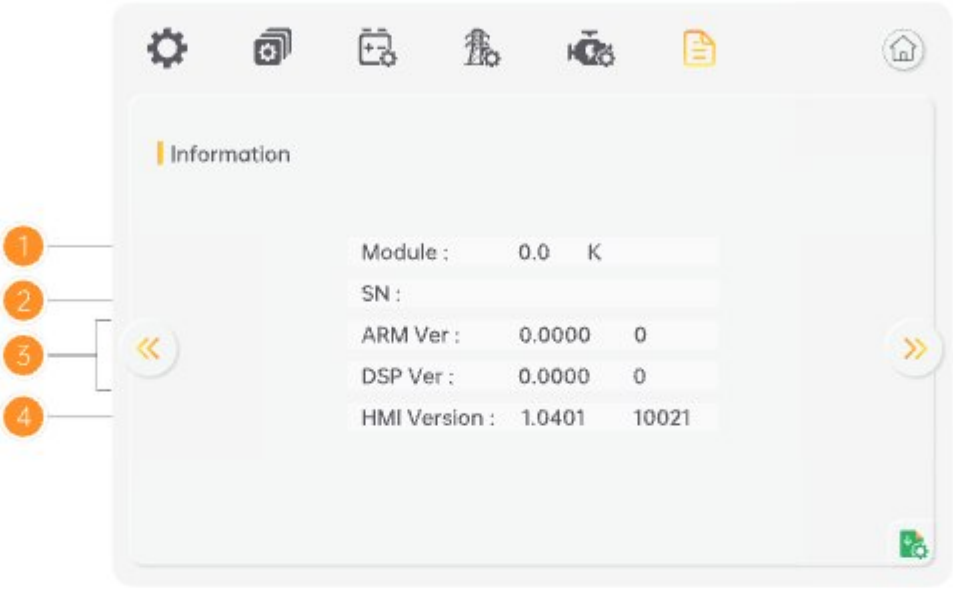
Gen Power: Rated power of Generator.

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 24hours in which the Generator will not be shut down all the time. The unit is 0.1 hour.

(6) Machine information

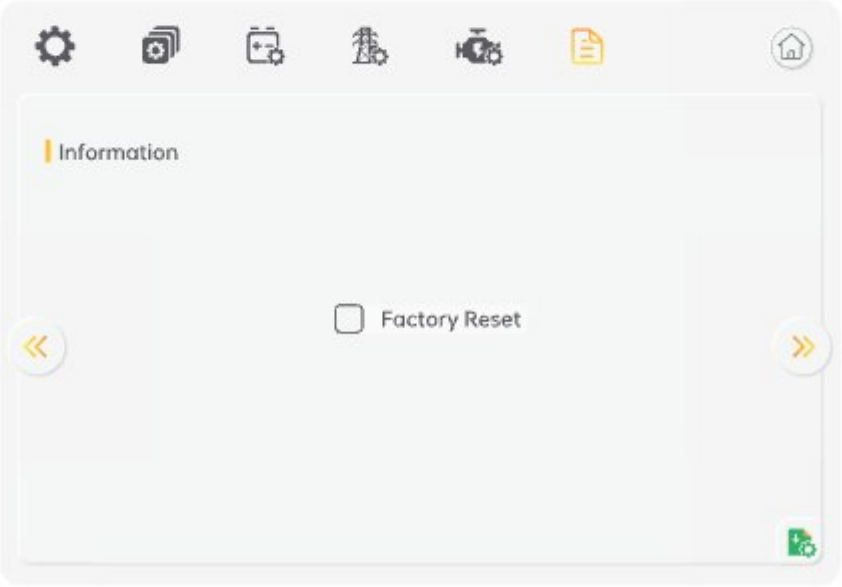
Figure 8-19 Machine information/page one



1. Displays the inverter model.
2. Displays the inverter SN.
3. Displays the software version.
4. Displays HMI version.

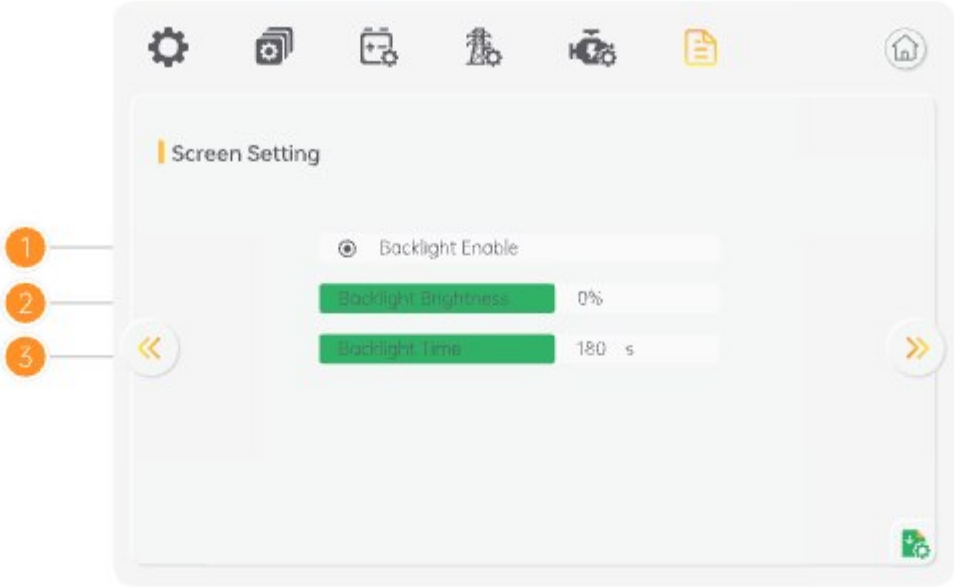
- Please refer to the current interface on the LCD screen to check the latest software version.

Figure 8-20 Machine information/page two



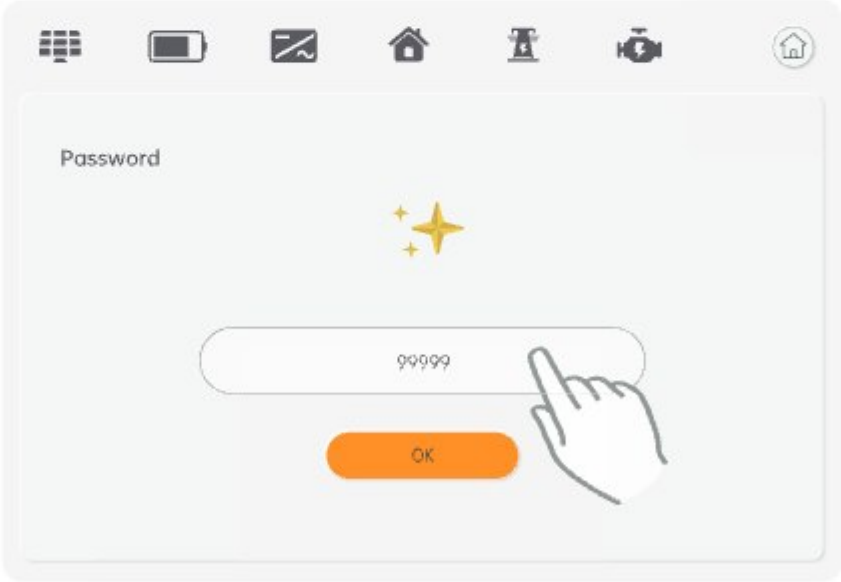
- This interface is used to reset the inverter.

Figure 8-21 Machine information/page three

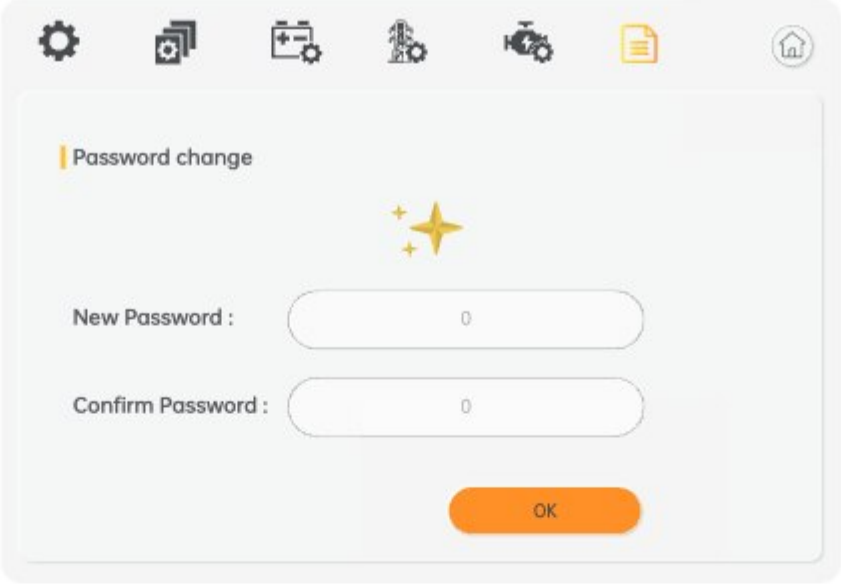


1. LCD backlight is enabled. It is enabled by default.
2. Backlight brightness adjustment. The default value is 0, and the value ranges from 0 to 100%.
3. Backlight time setting. The default value is 180s, with a range from 5 to 250s.

(7) Administrator account



- Users can set "99999" to enter the administrator account and then change the password.



- Click on Machine Information Page four, and then change the password. This page is displayed only when you enter the administrator account.

8.1.4 LED indicators

Only for models without screen.

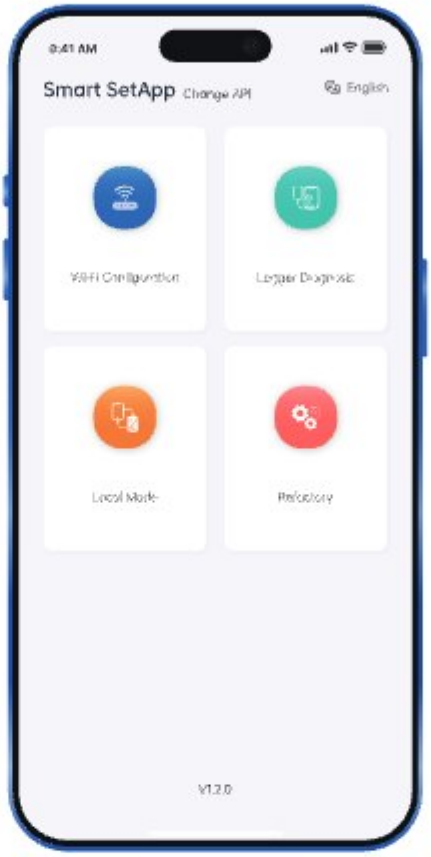
	Normal	Fault	
Grid			Green
Battery			Red

- Battery disconnection or (and) low battery voltage will cause the battery light to turn red.

9 APP operation

9.1 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.



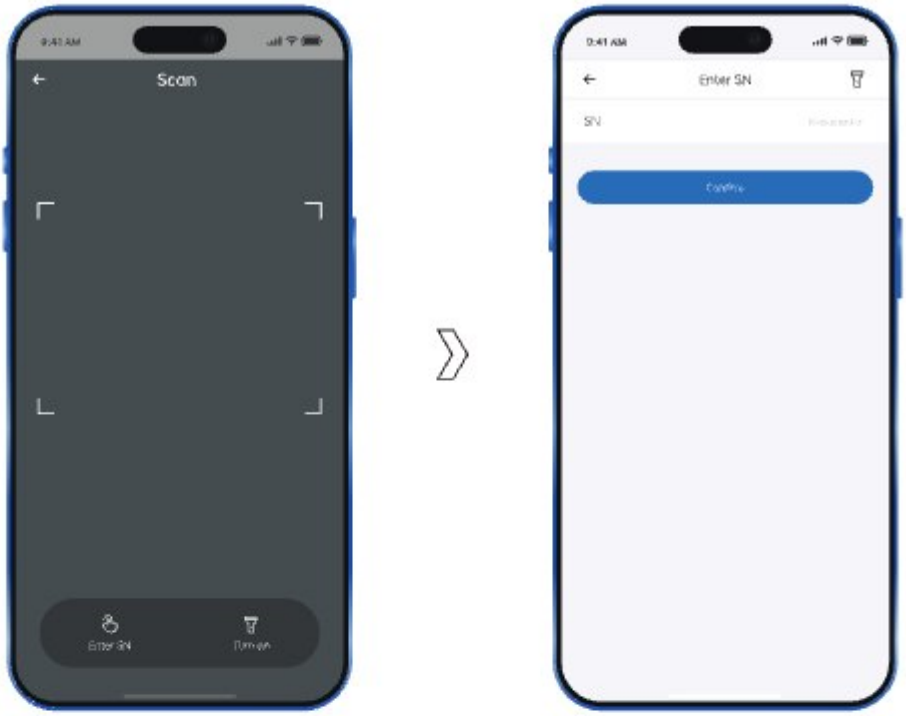
When using the Smart Set app, the users can view the relevant status of the device in real time and control it wirelessly.

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.

9.2 Local mode

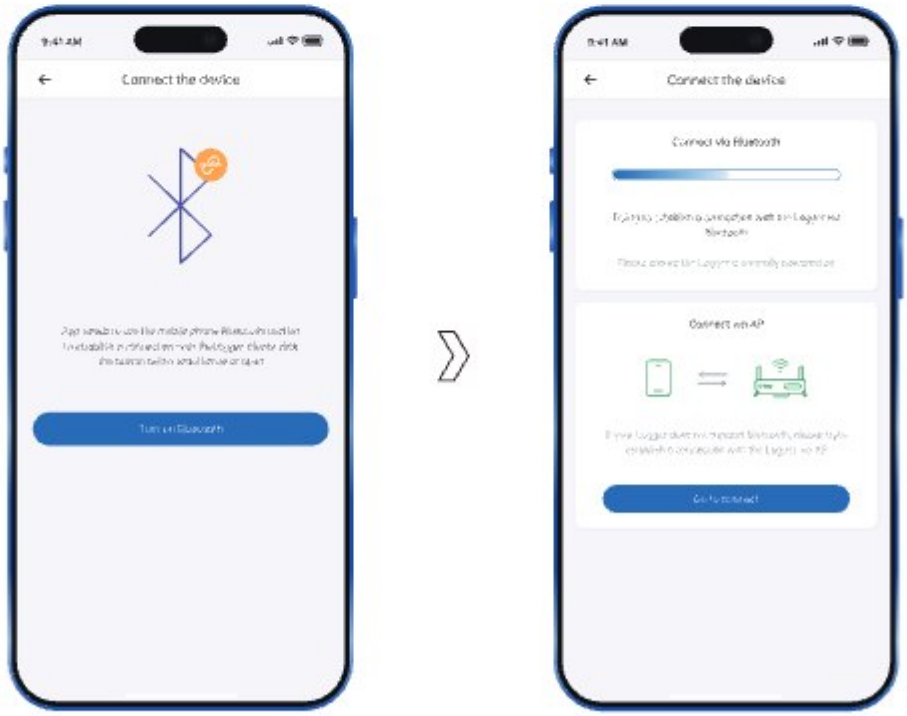
9.2.1 Add a logger

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.

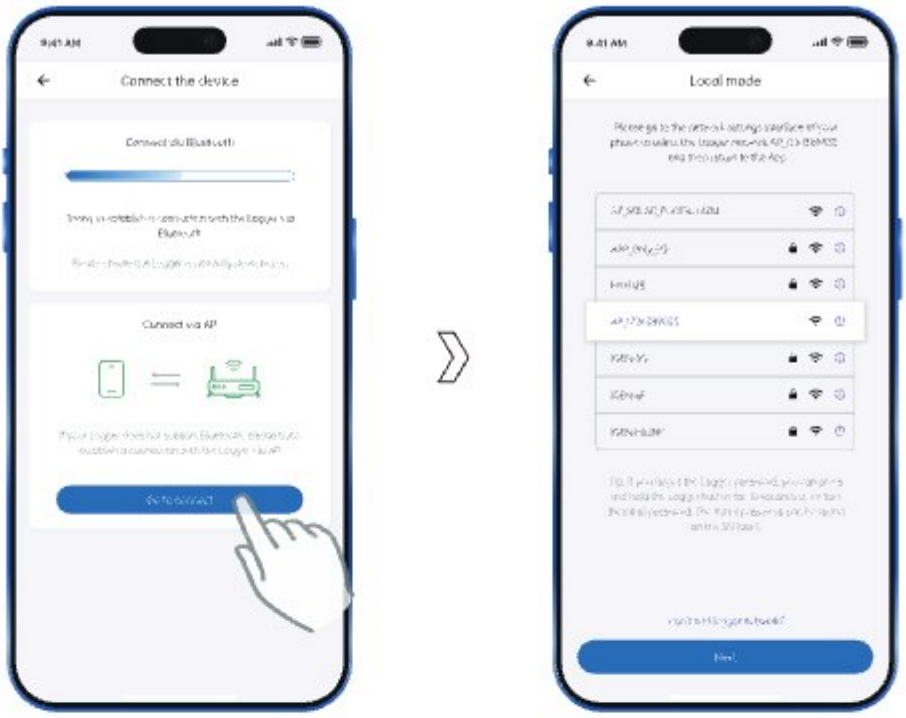


9.2.2 Bluetooth ON

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.



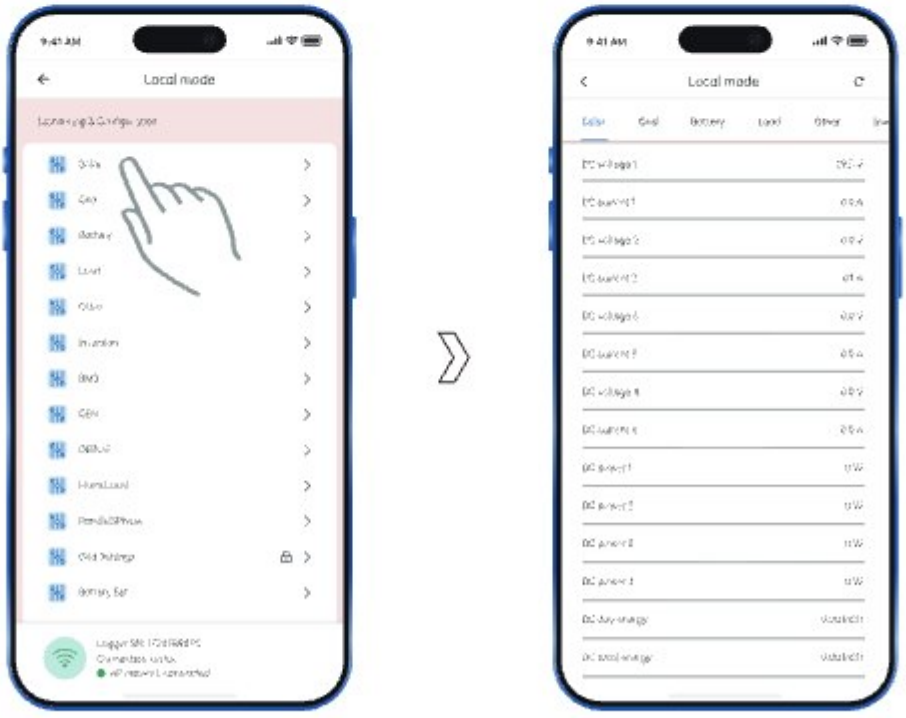
Or:



9.2.3 Enter the local mode interface

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

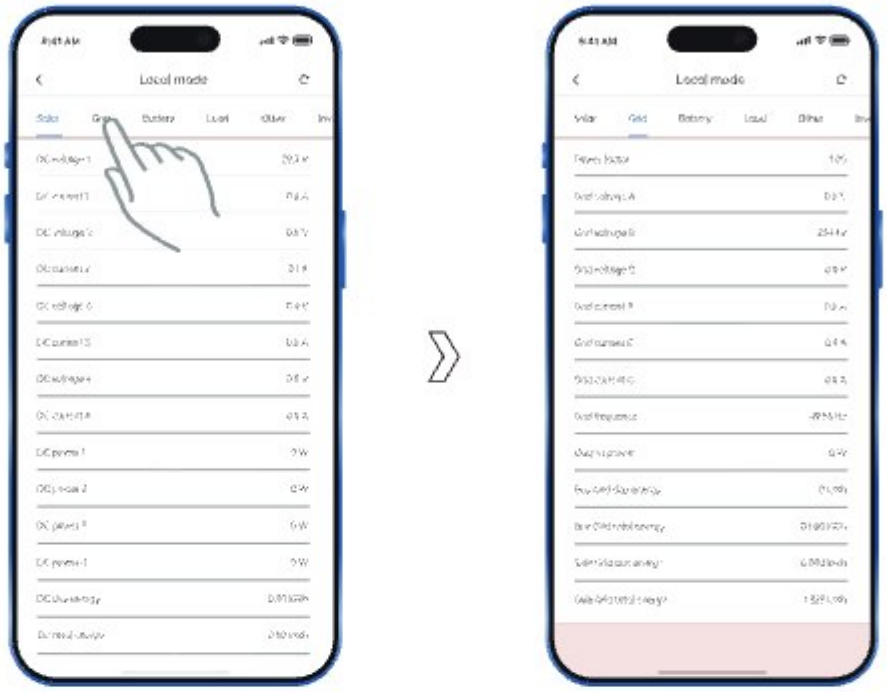
Click on the grouping to go to the detailed parameter page.



9.2.4 Working status

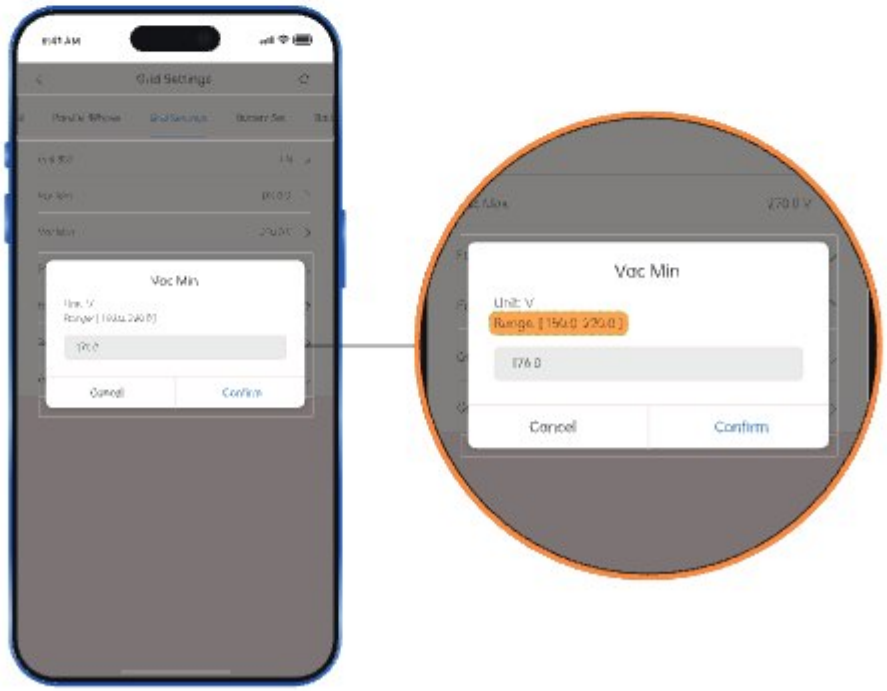
Click on the top groups to switch.

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.



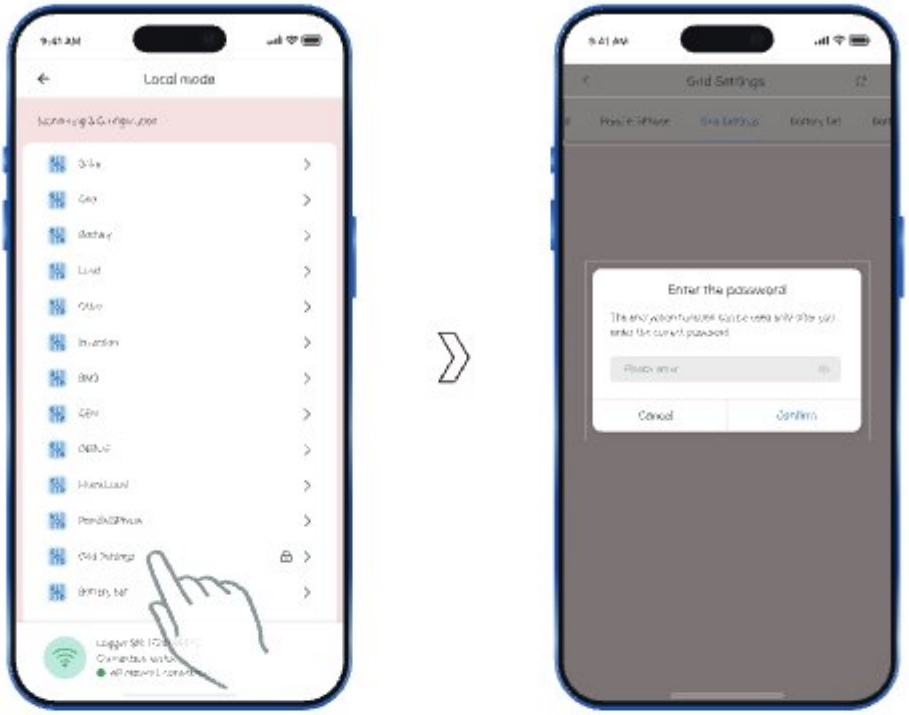
9.2.5 Set parameters

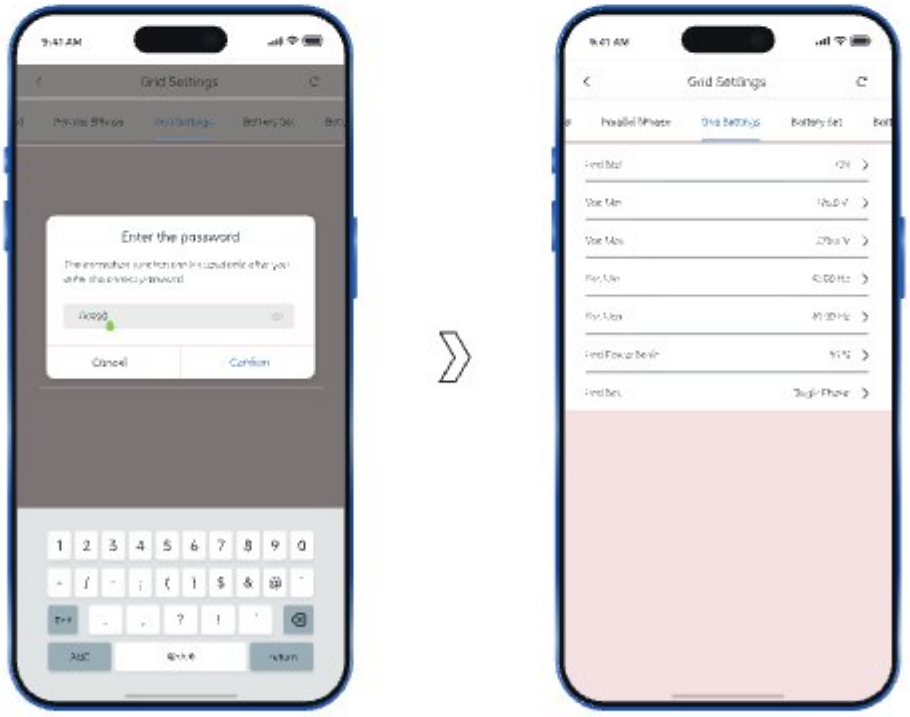
You can set the operating parameters of the device according to their needs. The parameters set by the user need to be within the specified range.



(1) Grid settings and grid protect set

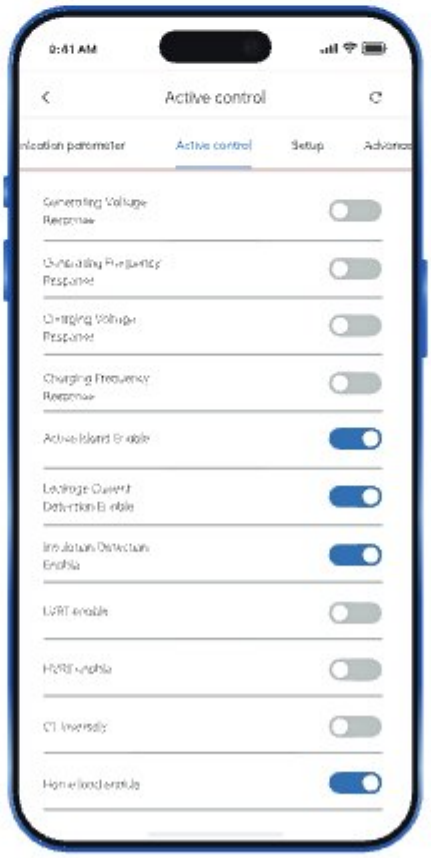
A password is required to access the grid settings. The default password is "00000".





(2) Battery Set, Battery Management-Custom model available and Battery 485 communication parameter

(3) Active control

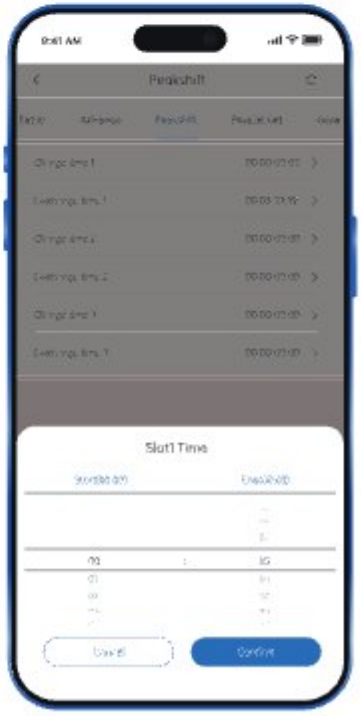


(4) Setup and advance

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.

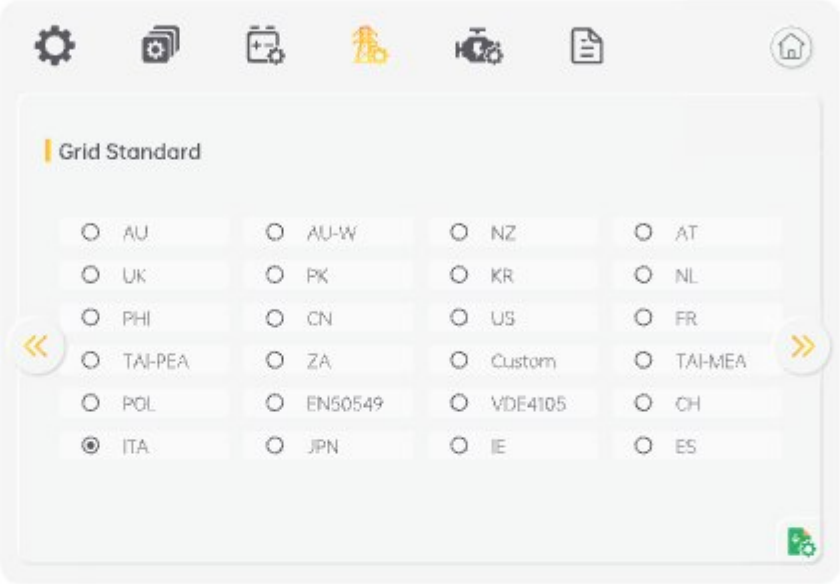


(6) Parallel Set ,Generator Set,Advance Work Mode Set,Custom Function and AC Couple

10 Italy self-testing (auto test fast)

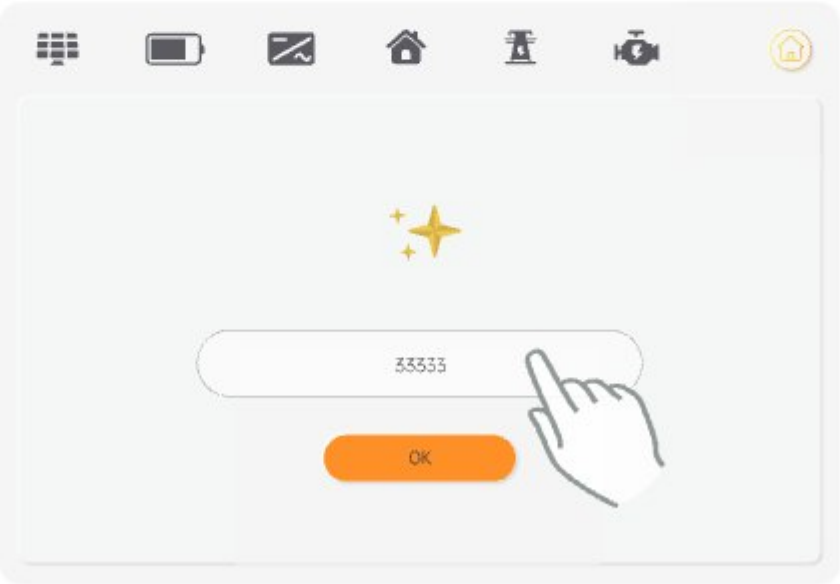
1. As shown in Figure 10-1, the power grid standard is ITA. Ensure that the power grid is connected and the inverter is error-free, otherwise do not test.

Figure 10-1 Grid standard



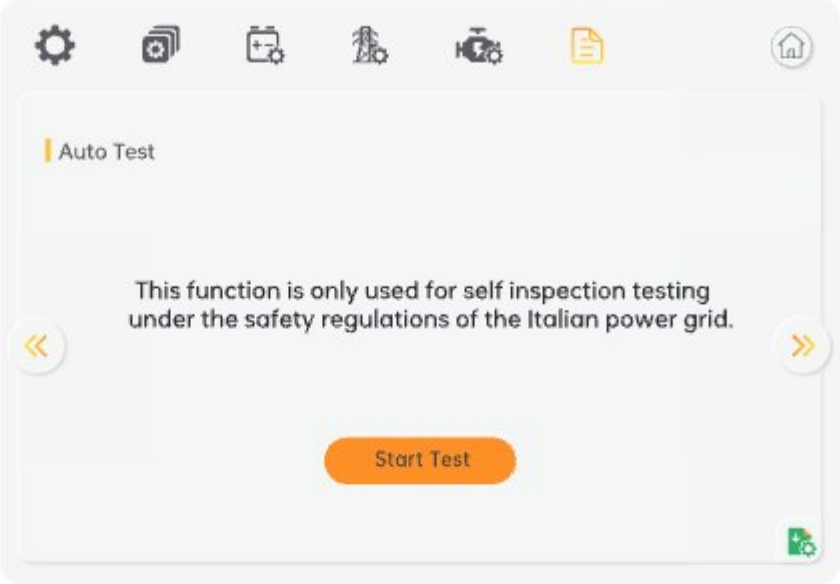
2. Click the setting icon in the upper left corner of the LCD screen to enter the password input interface, enter the password "33333", and click ok, as shown in Figure 10-2:

Figure 10-2 Password



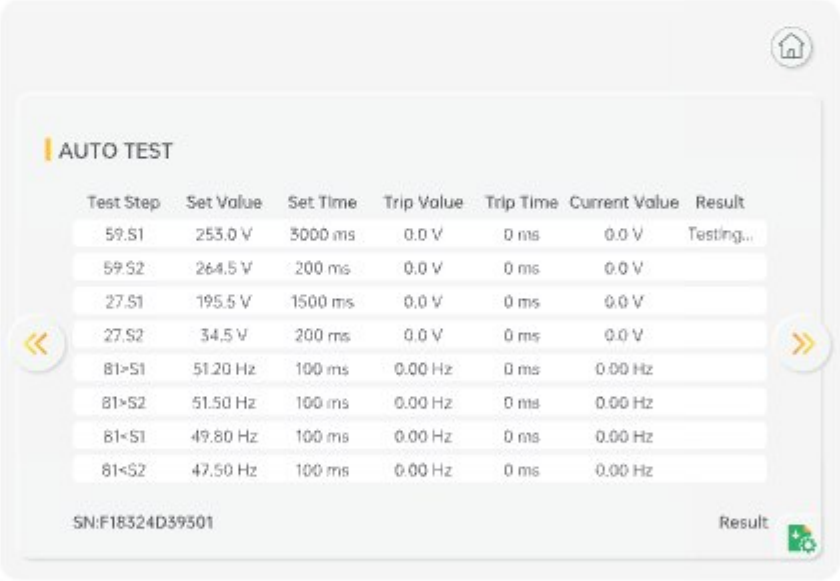
3. Enter the Italy self-test interface and click Start test, as shown in Figure 10-3:

Figure 10-3 Self-test



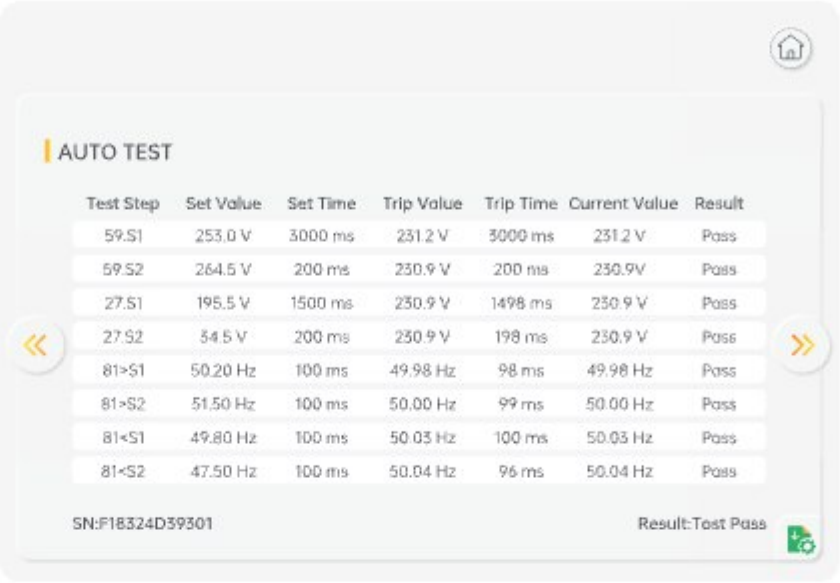
4. Wait until the test is completed, as shown in Figure 10-4, 10-5:

Figure 10-4 Test is completed 01



Test Step	Set Value	Set Time	Trip Value	Trip Time	Current Value	Result
59.S1	253.0 V	3000 ms	0.0 V	0 ms	0.0 V	Testing...
59.S2	264.5 V	200 ms	0.0 V	0 ms	0.0 V	
27.S1	195.5 V	1500 ms	0.0 V	0 ms	0.0 V	
27.S2	34.5 V	200 ms	0.0 V	0 ms	0.0 V	
81>S1	51.20 Hz	100 ms	0.00 Hz	0 ms	0.00 Hz	
81>S2	51.50 Hz	100 ms	0.00 Hz	0 ms	0.00 Hz	
81<S1	49.80 Hz	100 ms	0.00 Hz	0 ms	0.00 Hz	
81<S2	47.50 Hz	100 ms	0.00 Hz	0 ms	0.00 Hz	

Figure 10-5 Test is completed 02



AUTO TEST

Test Step	Set Value	Set Time	Trip Value	Trip Time	Current Value	Result
59.S1	253.0 V	3000 ms	231.2 V	3000 ms	231.2 V	Pass
59.S2	264.5 V	200 ms	230.9 V	200 ms	230.9V	Pass
27.S1	195.5 V	1500 ms	230.9 V	1498 ms	230.9 V	Pass
27.S2	54.5 V	200 ms	230.9 V	198 ms	230.9 V	Pass
81>S1	50.20 Hz	100 ms	49.98 Hz	98 ms	49.98 Hz	Pass
81>S2	51.50 Hz	100 ms	50.00 Hz	99 ms	50.00 Hz	Pass
81<S1	49.80 Hz	100 ms	50.03 Hz	100 ms	50.03 Hz	Pass
81<S2	47.50 Hz	100 ms	50.04 Hz	96 ms	50.04 Hz	Pass

SN:F18324D39301 Result:Test Pass

Object	Description
27.S1	Under voltage protection
27.S2	Under voltage protection
59.S1	Over voltage protection
59.S2	Over voltage protection
81<S1	Under frequency protection
81<S2	Under frequency protection
81>S1	Over frequency protection
81>S2	Over frequency protection

- The user can set the primary overvoltage protection voltage and protection time of the Italian self-test, see 8.1.3Setting Option (4) Grid Setting/page three.

11 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 11-1 Fault diagnosis table

Content	Codes	Explanation	Solutions
Discharge Over Current	00	Battery discharge over current. When the battery is loaded, the load is too large.	• Nothing need to do, Wait one minute for the inverter to restart. • Check whether the load meets the specification. • Cut off all the power and shut down all the machines; disconnect the load and plug in to restart machines.
Over Load	01	The load power is greater than other power(PV,BAT).	• Check whether the load reaches the maximum power of the machine. • Cut off all the power and shut down all the machines; disconnect the load and plug in to restart machines, then check whether the load is short circuited if the fault has been eliminated. • Contact customer service if error warning continues.
Bat Disconnected	02	Battery Disconnect. (Battery voltage not identified)	• Check whether the battery is connected. • Check if battery wiring port is open circuited. • Contact customer service if error persists.
Bat Under Volt	03	Battery voltage low that normal range.	• Checking System Settings, If so, power off and restart. • Check if the grid power down. If so, waiting for the grid power up, and the inverter will automatically charge the battery. • Contact customer service if error persists.
Bat Low Capacity	04	Bat Low capacity.	• Battery Low that setting capacity.(SOC<100%-DOD)
Bat Over Volt	05	The battery voltage is greater than the Inverter maximum voltage.	• Checking System Settings, If so, power off and restart. • Contact customer service if error persists.

Content	Codes	Explanation	Solutions
Gird Low Volt	06	Grid voltage is abnormal.	• Check if the grid is abnormal. • Restart the inverter and wait until it functions normally. • Contact customer service if error persists.
Grid Over Volt	07		
Grid Low Freq	08	Grid Frequency is abnormal.	• Check if the grid is abnormal. • Restart the inverter and wait until it functions normally. • Contact customer service if error persists.
Grid Over Freq	09		
Gfci Over	10	Inverter GFCI exceeds standard.	• Check PV string for direct or indirect grounding phenomenon. • Check peripherals of machine for current leakage. • Contact the local inverter customer service if error persists.
Parallel CAN bus failure	11	The parallel communication is abnormal.	• Check the cable, crystal, Line sequence. • Check if the wiring is correct.
Bus Under Volt	13	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 persists.
Bus Over Volt	14	BUS voltage is over maximum value.	• Check the input mode setting is correct. • Restart the inverter and wait until it functions normally.
INV Over Current	15	The inverter current exceeds the normal value.	• Restart the inverter and wait until it functions normally.
Charge Over Current	16	Battery charge current over than the Inverter maximum voltage.	• Restart the inverter and wait until it functions normally.
Meter Comm Fail	17	The meter communication is abnormal.	• Check the cable, crystal, Line sequence. • Check if the wiring is correct.
INV Under Volt	18	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 persists.
INV Over Volt	19		
INV Freq Abnor	20	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 persists.

Content	Codes	Explanation	Solutions
IGBT Temp High	21	The inverter temperature is higher than the allowed value.	• Cut off all the power of the machine and wait one hour, then turn on the power of the machine.
Bat Over Temp	23	Battery temperature is higher than the allowed value.	• Disconnect the battery and reconnect it after an hour.
Bat Under Temp	24	Battery temperature is low than the allowed value.	• Check the ambient temperature near the battery to check whether it meets the specifications.
BMS Comm Fail	27	Communication between lithium battery and inverter is abnormal.	• Check the cable, crystal, Line sequence. • Checking the Battery switch.
Fan Fault	28	Fan Fault.	• Check whether the Inverter temperature is abnormal. • Check whether the fan runs properly. (If you can see it)
Grid Phase ERR	30	The grid fault phase.	• Check power grid wiring.
Arc Fault	31	PV Arc Fault.	• Check Photovoltaic panels, PV wire. • Contact customer service if error persists.
Bus Soft Fail	32	The inverter may be damaged.	• Restart the inverter and wait until it functions normally. • Contact customer service if error persists.
INV Soft Fail	33		
Bus Short	34		
INV Short	35		
PV Iso Low	37	PVIso Low.	• Check if the PE line is connected to the inverter and is connected to the ground. • Contact customer service if error persists.
Bus Relay Fault	38	The inverter may be damaged.	• Restart the inverter and wait until it functions normally. • Contact customer service if error persists.
Grid Relay Fault	39		
EPS rly Fault	40		
Gfci Fault	41		
CT Fault	43		
Selftest Fail	44		
System Fault	45		

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

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