USER MANUAL



Solar Hybrid Inverter

SGS-16K25MAX | SGS-18K28MAX

Version: V01

Contents

1. Safety 1
1.1 How to use this manual 1
1.2 Symbols in this manual 1
1.3 Warning 1
2. Production Instruction 2
2.1 Instructions 2
2.2 Product Features 2
2.3 System Connection Diagram 3
2.4 Production Overview 5
2.5 Dimension Diagram 6
3. Installation 7
3.1 Select the mount location 7
3.2 Packing List 8
3.3 Mount the Inverter 9
3.4 Remove the terminal cover & anti-insect net 10
4. Connection 11
4.1 Split-phase Mode 11
4.2 Cable & circuit breaker requirements 11
4.3 GRID & LOAD & GEN connection 13
4.4 Battery Connection 14
4.5 PV connection 15
4.6 Dry contact connection 16
4.7 Grounding connection 17
4.8 Final assembly 17
4.9 Start up the inverter 17
4.9.1 Introduction 17
4.9.2 Precautions for connecting the parallel connecting lines 18
5. Operating Instructions 26
5.1 Operation interface 26
5.1.1 Operation buttons 26
5.1.2 LED indicators 26
5.1.3 LCD screen 27
5.2 Parameter setting 30
5.2.1 Basic setting 31
5.2.2 Work Mode Setup 31
5.2.3 Battery Setup 34
5.2.4 Grid Connection Setup 37
5.2.5 Advanced Setup 40
5.2.6 Firmware Upgrade via USB Drive 42
5.3 Time-slot Charging/Discharging Function 43
5.4 Battery parameters 44
6. Communication 45
6.1 Overview 45
6.2 USB-1 Port 45
6.3 USB-2 Display Port 46
6.4 Wi-Fi port 46
6.5 CAN/RS485/BMS1 Port 47
6.6 CAN port 47
6.7 DRM (Specific Markets Only) 47
6.8 External CT Prot 48
6.9 DIP Switch Configuration 49
6.10 Dry Contact Function 49
7. Fault and Remedy 50
7.1 Fault code 50
7.2 Troubleshooting 52
8. Protection and Maintenance 53
8.1 Protection features 53
8.2 Maintenance 54
8.3 Storage 55
9. Datasheet 56

1. Safety

1.1 How to use this manual

This manual contains important information, guidelines, operation, and maintenance manual for the following products.
The manual must be followed during installation and maintenance.

1.2 Symbols in this manual

DANGER	DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.
WARNING	WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION	CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
NOTICE	NOTICE provides some tips on the operation of products.

1.3 Warning

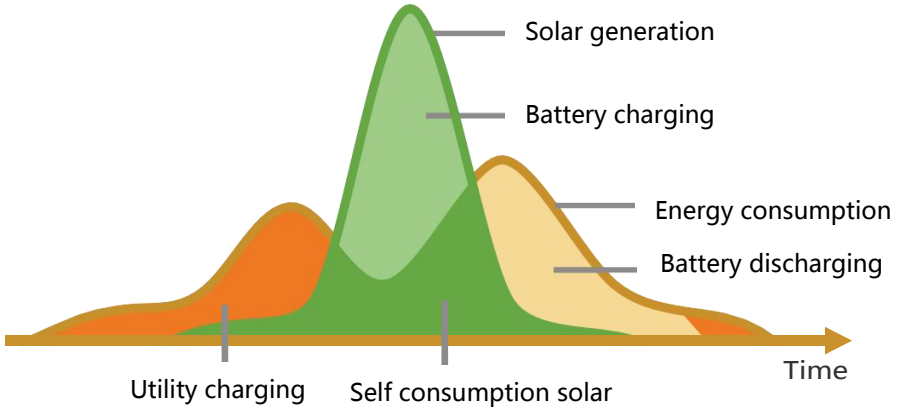
This chapter contains important safety instructions. Read and keep this manual for future reference.

- Be sure to comply with the local requirements and regulations to install this inverter.
- Beware of high voltage. Please turn off the switch of each power source before and during the installation to avoid electric shock.
- For optimum operation of this inverter, please follow the required specifications to select the appropriate cable size and necessary protective device.
- Do not connect or disconnect any connections when the inverter is working.
- Do not open the terminal cover when the inverter is working.
- Make sure the inverter is well grounded.
- Never cause AC output and DC input to short circuit.
- Do not disassemble this unit. For all repairs and maintenance, please take it to a professional service center.
- Never charge a frozen battery.

2. Production Instruction

2.1 Instructions

The product is a new type of solar energy storage inverter, integrating solar energy storage, utility charging, energy storage, and AC sine wave output. It adopts DSP control and features high response speed, reliability, and industrial standards through an advanced control algorithm.



2.2 Product Features

- Supports lead-acid battery and Li-ion battery connections.
- When the lithium-ion battery is dormant, it is equipped with three activation functions; the connection of mains, generator, or PV power supply can trigger the activation of the battery.
- Supports smart load function with intelligent load connection control based on battery status.
- Supports phase voltage adjustment in the range of 100 Vac, 105 Vac, 110 Vac, 115 Vac, 120 Vac, 127 Vac, and 133 Vac.
- Supports AC coupling function for flexible integration into existing PV systems.
- Supports three PV inputs, with the function of simultaneously tracking the maximum power charging or carrying capacity of three MPPTs.
- Three MPPT channels with a tracking efficiency of up to 99.9% and a maximum single-channel current of 42 A, perfectly compatible with high-power PV modules.
- 2 charging modes are available: solar only, grid/solar hybrid charging.
- Support split-phase or three-phase pure sine wave output.
- With time-slot charging and discharging setting functions, it helps users to take advantage of peak and valley tariffs and save electricity costs.
- Energy saving mode function to reduce no-load energy losses.
- With two output modes of utility bypass and inverter output, with uninterrupted power supply function.
- LCD large screen dynamic flow diagram design, easy to understand the system data and operation status.
- 360° protection with complete short-circuit protection, overcurrent protection, over/undervoltage protection, overload protection, backfill protection, etc.

- Support CAN, USB, and RS485 communication.

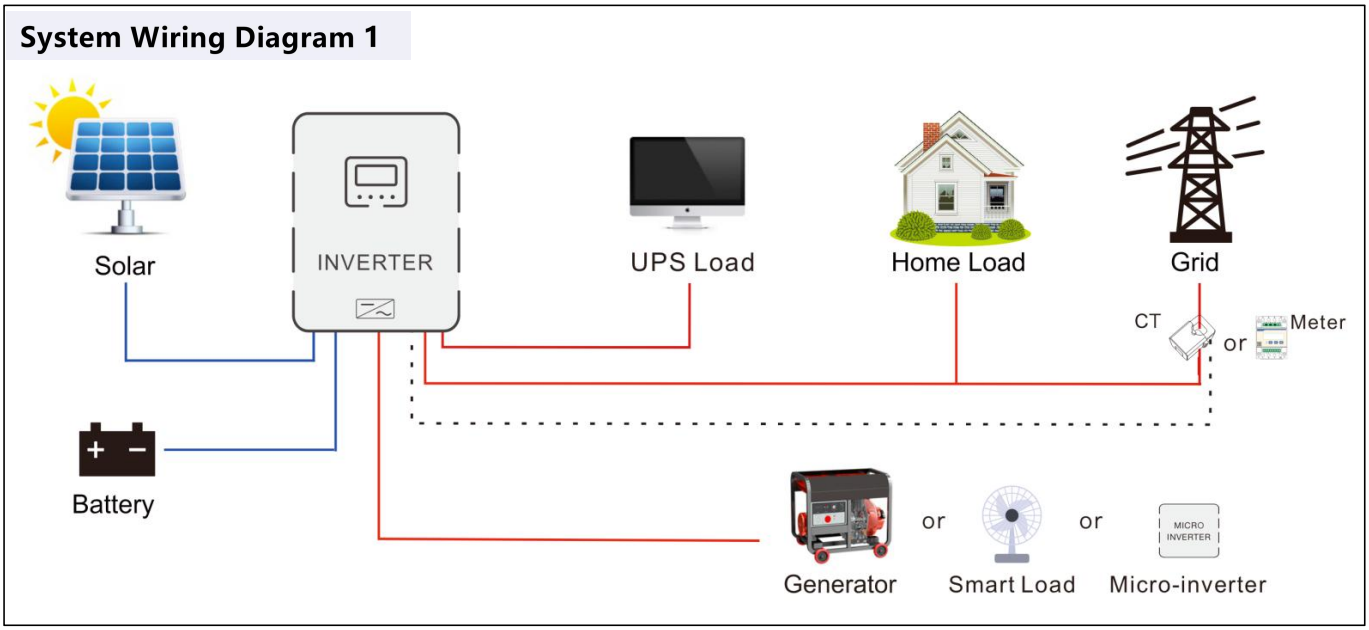
2.3 System Connection Diagram

The diagram below shows the system application scenario of this product. A complete system consists of the following components:

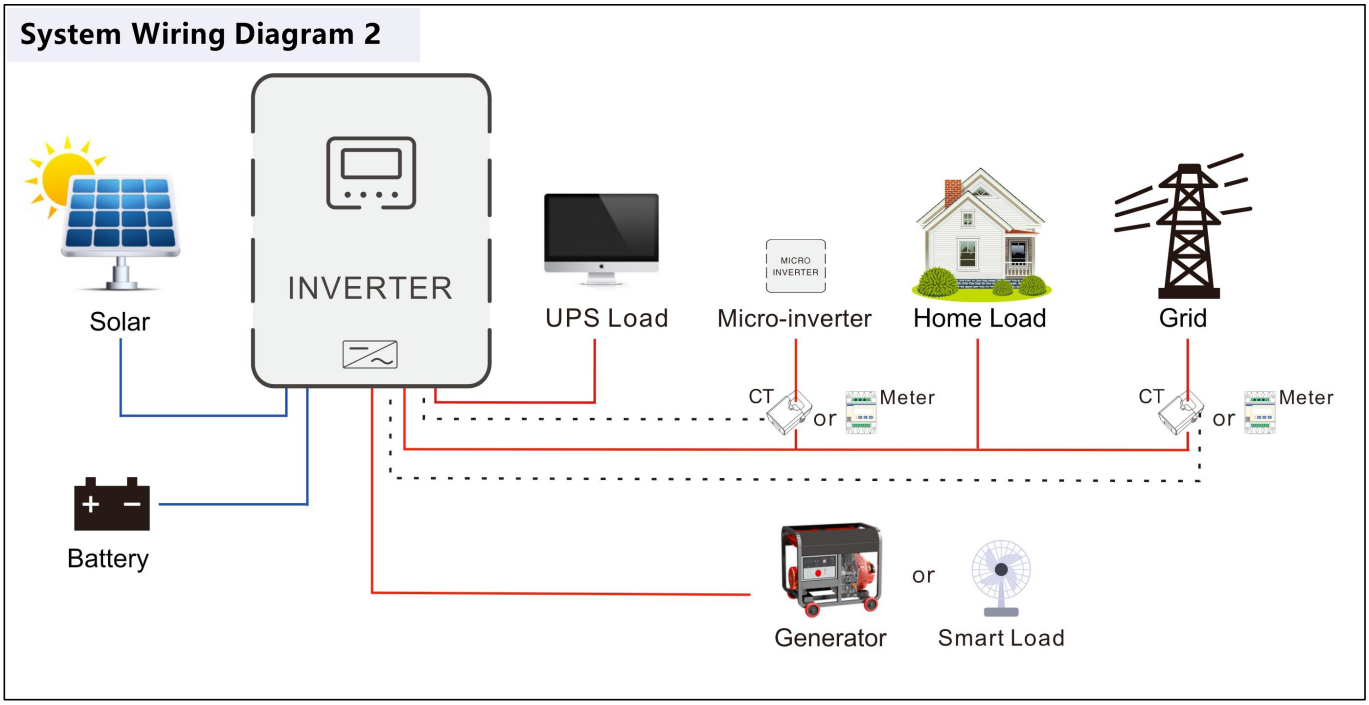
- **PV modules:** Converters of light energy into DC energy, which can be used to charge the battery via an inverter or directly inverted into AC power to supply the load.
- **Grid:** The utility grid connection to the mains AC input, supplying power to loads while charging batteries. The system can operate off-grid when batteries and PV modules power the loads.
- **Battery:** The system that ensures the regular power supply of the system load when the solar energy is insufficient and there is no mains power.
- **Home load:** Various household and office loads can be connected, including refrigerators, lamps, televisions, fans, air conditioners, and other AC loads.
- **Generator/Smart Load/Micro-inverter Input:** When connected to an AC generator, it supplies power to loads and charges batteries simultaneously. Without a generator connection, this input can be configured as a Smart Load output to power loads. When connected to micro-inverters, it supplies power to loads and charges batteries concurrently.
- **Inverter:** The energy conversion device of the whole system.

The actual application scenario determines the specific system wiring method.

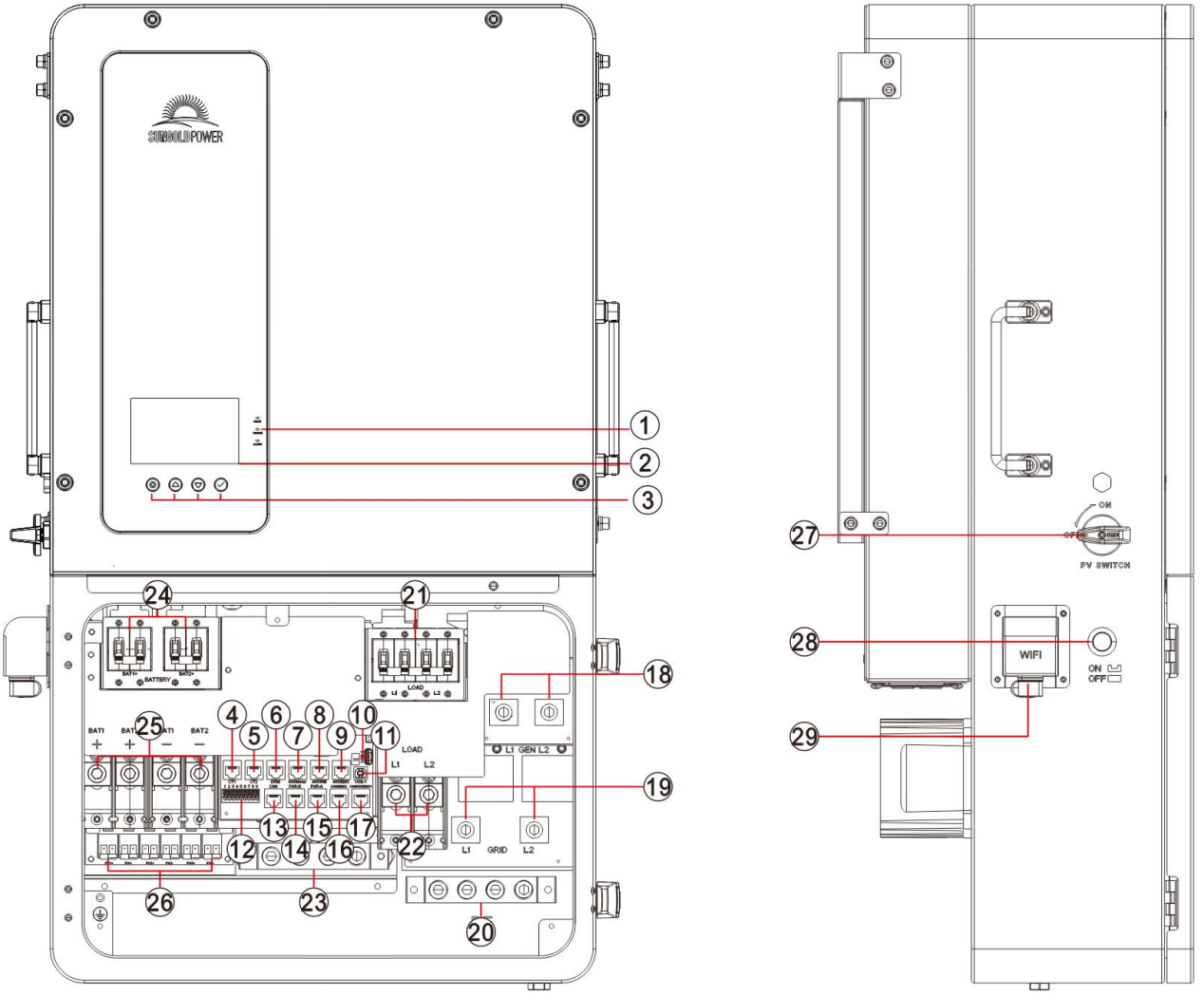
System Wiring Diagram 1



System Wiring Diagram 2

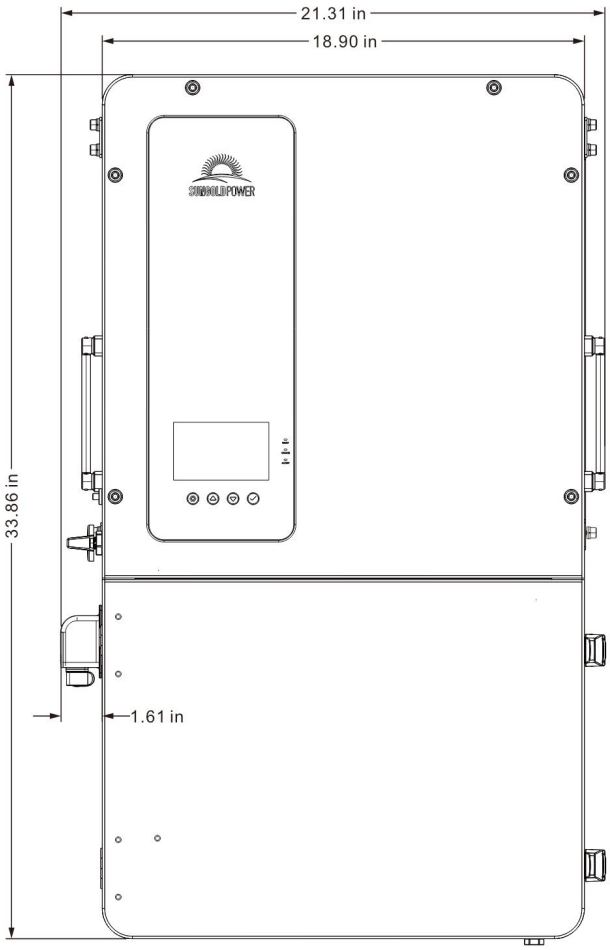


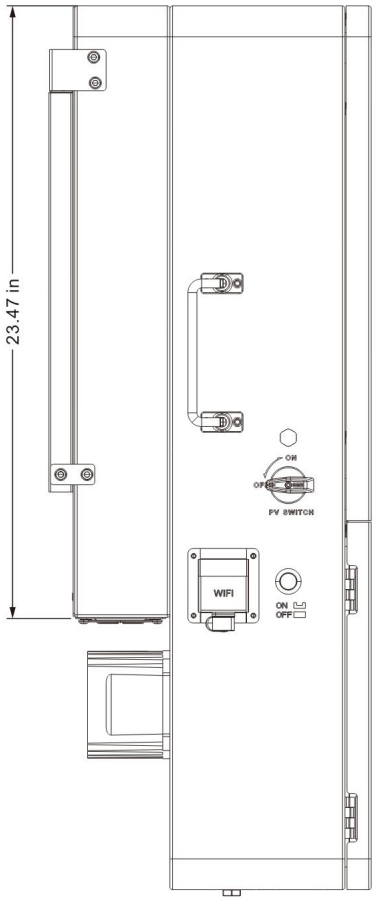
2.4 Production Overview

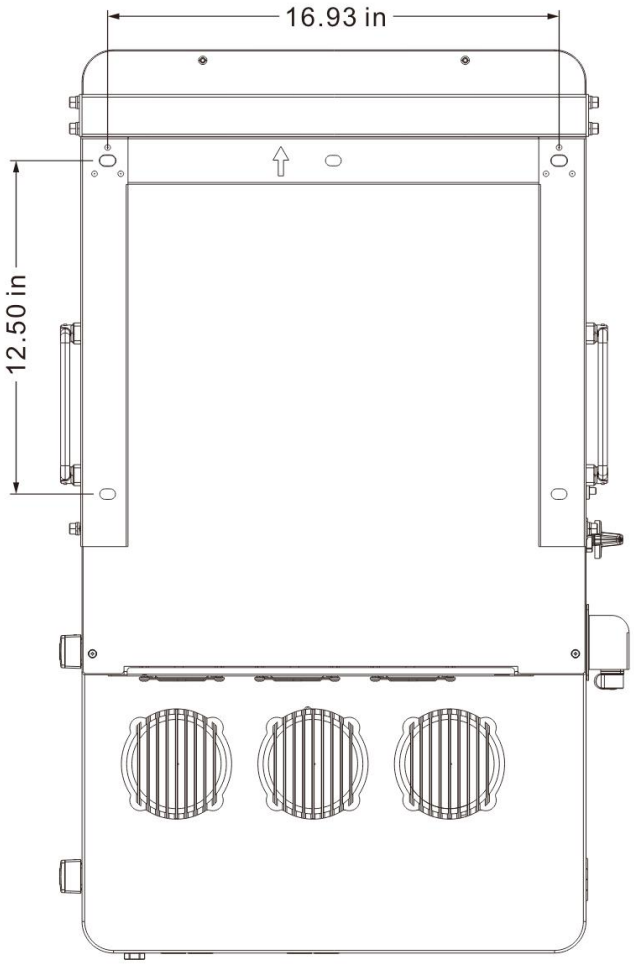


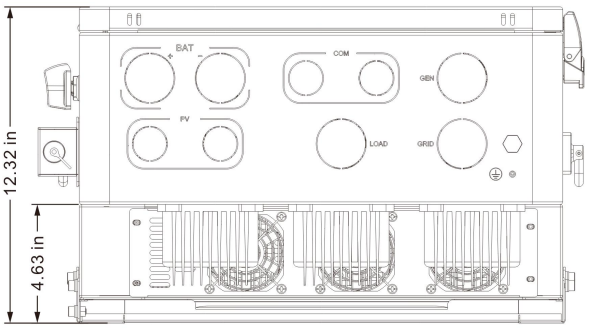
1	LED Indicator Light	2	LCD Screen	3	Operation Button
4	Grid CT1	5	Micro-inverter CT2	6	DRM Port
7	485/Meter Port	8	485/WiFi Port	9	485/EMS Port
10	Display USB-2 Port	11	USB-1 Port	12	Dry Contact Interface SC1
13	CAN Communication Port	14	Parallel Port-B	15	Parallel Port-A
16	CAN/BMS2 Port	17	CAN/485/BMS1 Port	18	Generator Input (L1+L2)
19	Grid Input (L1+L2)	20	PE Terminal	21	Load AC Circuit Breaker
22	Load Output (L1+L2)	23	N Line Terminal	24	Battery Circuit Breaker
25	Battery Input	26	PV Input	27	PV DC Circuit Breaker
28	Start Switch	29	WiFi Module		

2.5 Dimension Diagram









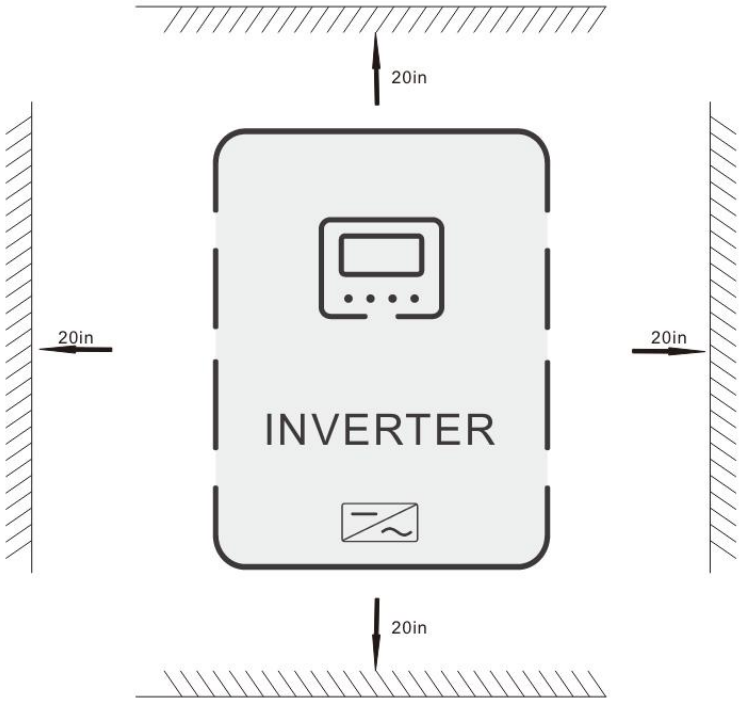
3. Installation

3.1 Select the mount location

The product can be used outdoors (protection class IP65). Please consider the following before selecting the location:

① Choose a solid wall to install the inverter
② Mount the inverter at eye level
③ Adequate heat dissipation space must be provided for the inverter
④ The installation location is a cool and ventilated place, under the photovoltaic panels or under the eaves, not in direct sunlight exposure

The ambient temperature should be between -40~60℃ (-40~140℉) to ensure optimal operation.



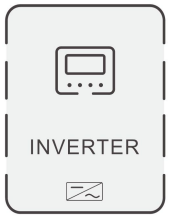
DANGER

Do not install the inverter where highly flammable materials are near by.
Do not install the inverter in potential explosive areas.
Do not install the inverter with lead-acid batteries in a confined space.

CAUTION

Do not install the inverter in direct sunlight.
Do not install or use the inverter in a humid environment.

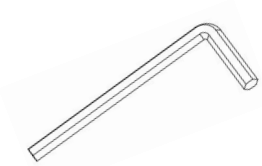
3.2 Packing List



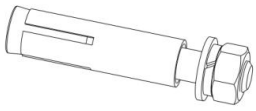
Hybrid inverter
x 1pcs



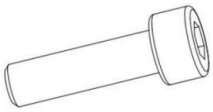
Wall mount bracket
x 1pcs



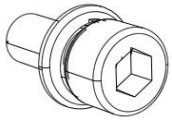
Hex Key_L-Type_5mm/
Hex Key_L-Type_8mm
x 1pcs / x 1pcs



Expansion screws
M8*60mm
x 5pcs



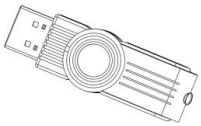
Spare screw
M6*18mm
x 1pcs



Hex socket head
triple-combination
screws M6*16
x 3pcs



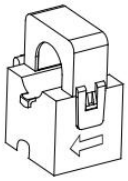
Keys
x 4pcs



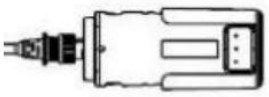
USB flash drive
x 1pcs



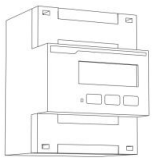
Parallel connection
cable
x 1pcs



CT
x 1pcs



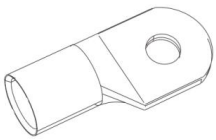
WiFi module
x 1pcs



Meter (Optional)
x 1pcs



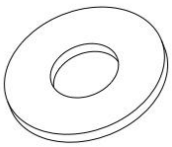
Warranty Card
x 1pcs



Cold-pressed terminal
SC70-8
x 6pcs



M8 socket wrench
x 1pcs



M8 flat washer
x 5pcs



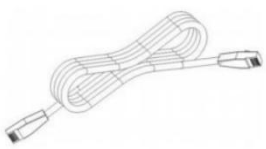
User manual
x 1pcs



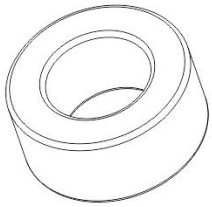
Quality certificate
x 1pcs



Outgoing inspection
report
x 1pcs



Battery
communication cable
x 1pcs



Magnetic ring
(Model: T58x38x20)
x 2pcs

(Model: T40x25x15)
x 6pcs

(Model: T36x23x15C)
x 2pcs

NOTICE

Introduction: Anti-interference magnetic rings
Function: When external wiring is long or there is uncertain electromagnetic interference in the usage environment, it is recommended to install magnetic rings on the wires. Magnetic rings can be directly slipped onto the wires or wrapped around them in a single loop.

- 2 magnetic rings of model T58x38x20, primarily used on the battery side to suppress interference generated during battery charging and discharging.
- 6 magnetic rings of model T40x25x15, primarily used on power lines for mains power, generator loads, and photovoltaic systems to suppress external interference.
- 2 magnetic rings of model T36x23x15C, primarily used to be fitted onto various communication lines (such as WiFi lines, external CT lines, parallel machine lines, 485 lines, CAN lines, etc.) to suppress interference during signal transmission.

3.3 Mount the Inverter

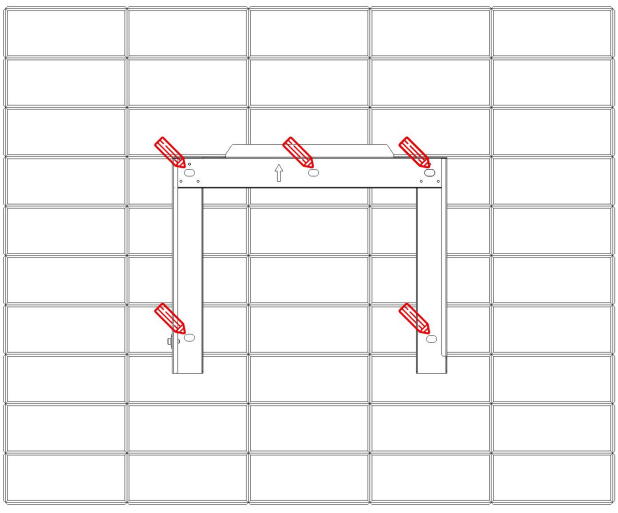
Step 1: Determine the positions for drilling holes. Ensure the position of the holes is level, then mark them with a marker pen. Use the hammer drill to drill holes in the wall. Keep the hammer drill perpendicular to the wall. Do not shake when drilling, so as not to damage the wall. If the error of the hole is too big, you need to reposition.

Step 2: Insert the M8*60 expansion bolt vertically into the hole and pay attention to the insertion depth of the expanding bolt (should be deep enough)

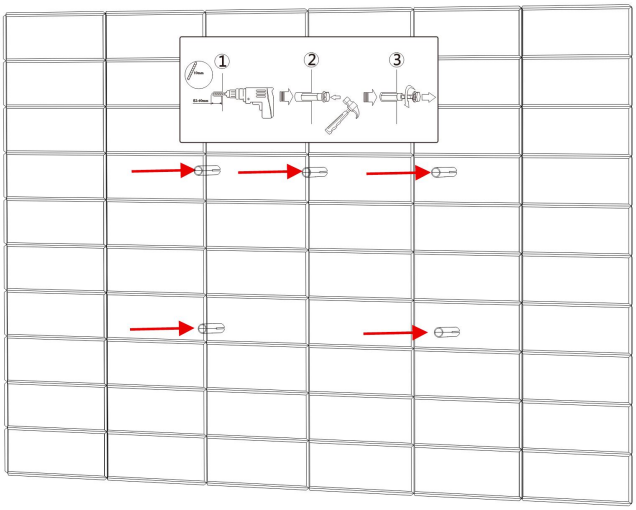
Step 3: Align the wall hanger with the position of the holes. Fix the wall hanger on the wall by tightening the expansion bolt with nuts.

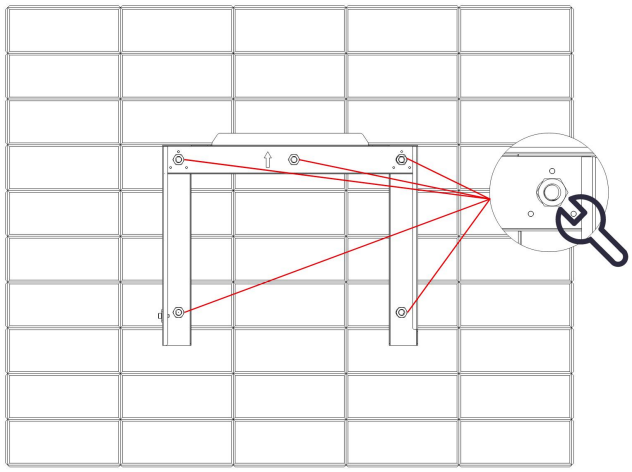
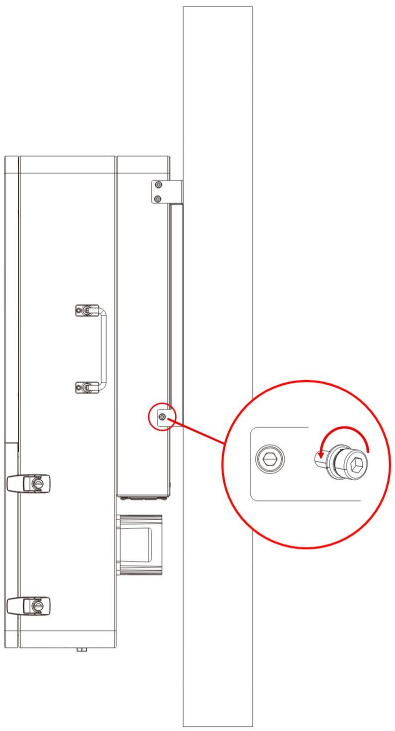
Step 4: Align the mounting holes and attach the inverter to the wall bracket, securing it in place with safety screws.

Step 1

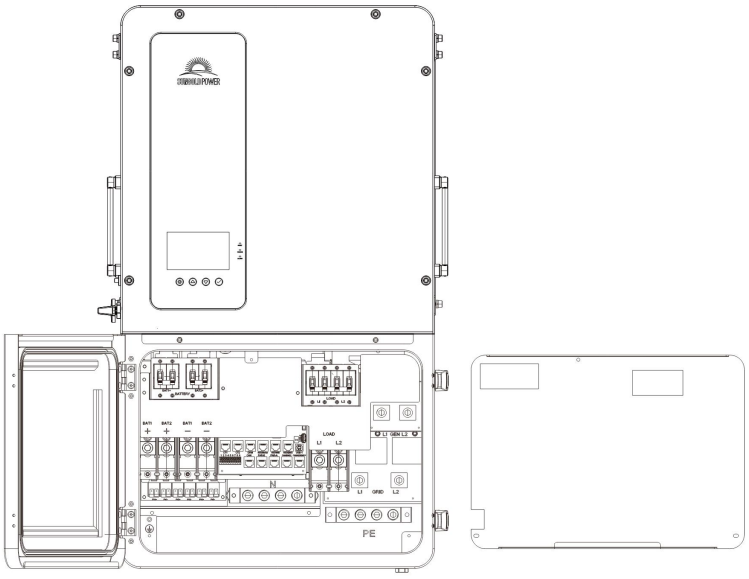
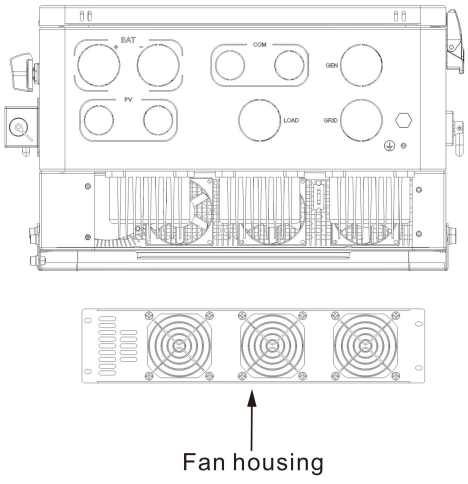


Step 2



Step 3	Step 4
	

3.4 Remove the terminal cover & anti-insect net

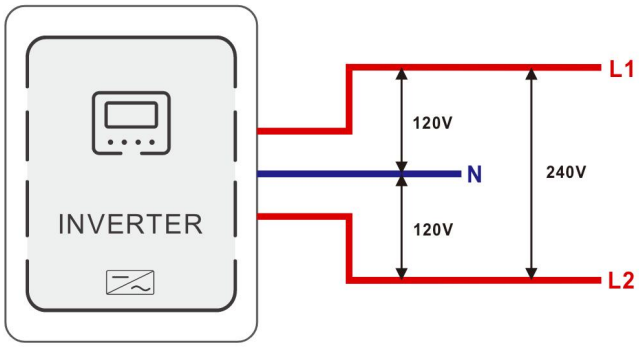
Use the key to unlock the tower latch, and the protective cover will open.	Removable fan cover for cleaning
	

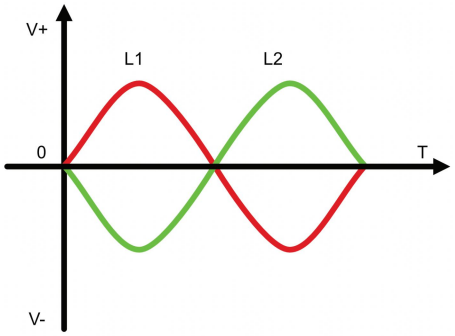
NOTICE

When using the device in areas with poor air quality, the fan cover is easily blocked by air particles, please disassemble and clean the fan regularly to avoid affecting the inverter's internal air flow rate, which may trigger the device over-temperature protection fault (19/20 faults) affecting the power supply and the service life of the inverter.

4. Connection

4.1 Split-phase Mode





Project	Description
AC output phase voltage (L1-N, L2-N)	90~140 Vac, 120 Vac default
AC output line voltage (L1-L2)	180~280 Vac, default

NOTICE

- Users can change the output voltage through the settings menu. For details, refer to Chapter 5.2.
- The output voltage corresponds to the parameter setting item 【Work Mode Setup】-【Output Phase Voltage】, and the output phase voltage can be set within the range of 100V to 133V.

4.2 Cable & circuit breaker requirements

- **PV INPUT**

Models	Cable Diameter	Max. Input Current	Circuit Breaker Specifications
SGS-16K25MAX	6 mm²/10 AWG	42A	2P-50A
SGS-18K28MAX	6 mm²/10 AWG	42A	2P-50A

- **BATTERY**

Models	Cable Diameter	Max. Input Current	Circuit Breaker Specifications
SGS-16K25MAX	95 mm²/000 AWG	170*2A	2P-200A / Dual Circuits
SGS-18K28MAX	95 mm²/000 AWG	190*2A	2P-200A / Dual Circuits

- **Grid**

Models	Output Mode	Cable Diameter	Max. Input Current	Circuit Breaker Specifications
SGS-16K25MAX	Split-phase	95 mm²/000 AWG(L1/L2/N)	200A	3P-250A
SGS-18K28MAX	Split-phase	95 mm²/000 AWG(L1/L2/N)	200A	3P-250A

● GENERATOR INPUT

Models	Output Mode	Cable Diameter	Max. Input Current	Circuit Breaker Specifications
SGS-16K25MAX	Split-phase	35mm²/2AWG(L1/L2/N)	80A	3P-100A
SGS-18K28MAX	Split-phase	35mm²/2AWG(L1/L2/N)	80A	3P-100A

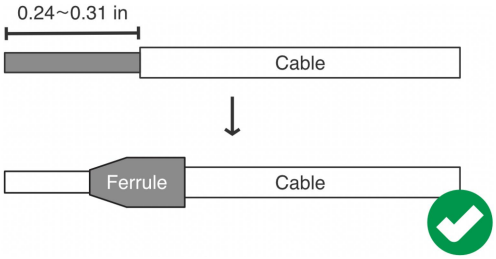
■ Load

Models	Output Mode	Cable Diameter	Max. Output Current	Circuit Breaker Specifications
SGS-16K25MAX	Split-phase	95mm²/000AWG(L1/L2/N)	200A	3P-250A
SGS-18K28MAX	Split-phase	95mm²/000AWG(L1/L2/N)	200A	3P-250A

⚠ NOTICE

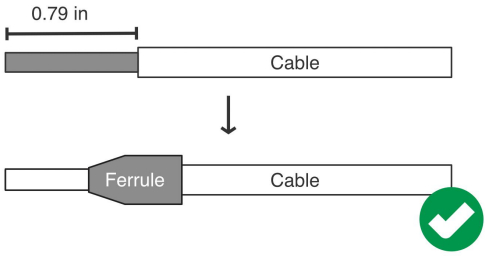
● PV input:

① Use a stripper to remove the 6–8 mm (0.24–0.31 in) insulation of the cable.
② Fix the ferrule at the end of the cable (the ferrule needs to be prepared by the user).



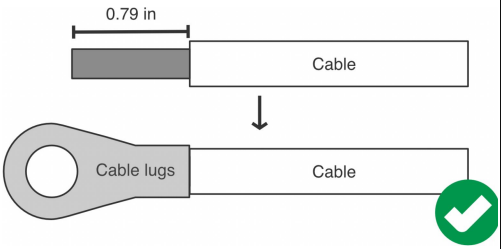
● AC input & AC output & Generator:

Use a stripper to remove the 20 mm (0.79 in) insulation of the cable.



● Battery:

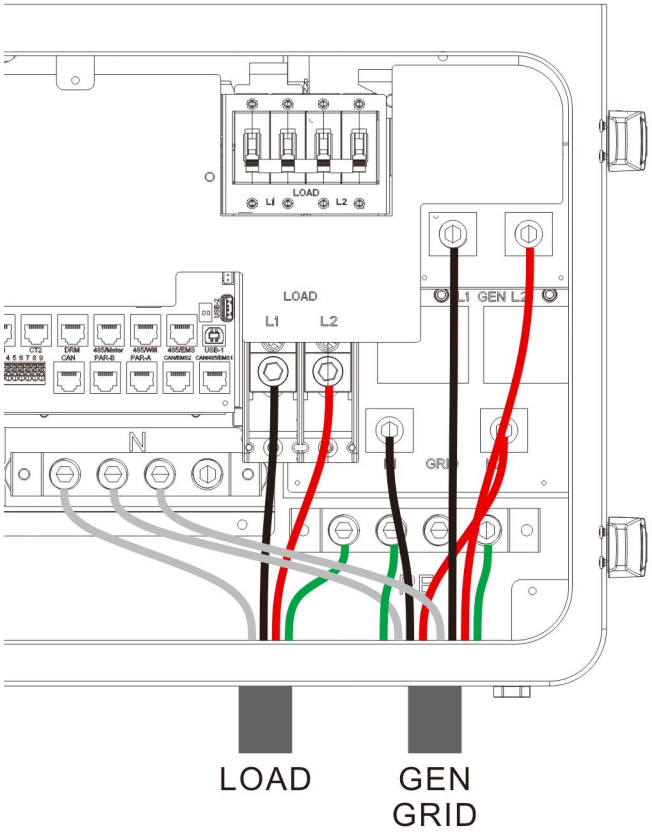
① Use a stripper to remove the 20 mm (0.79 in) insulation of the cable.
② Fix the cable lug provided with the package to the cable end.

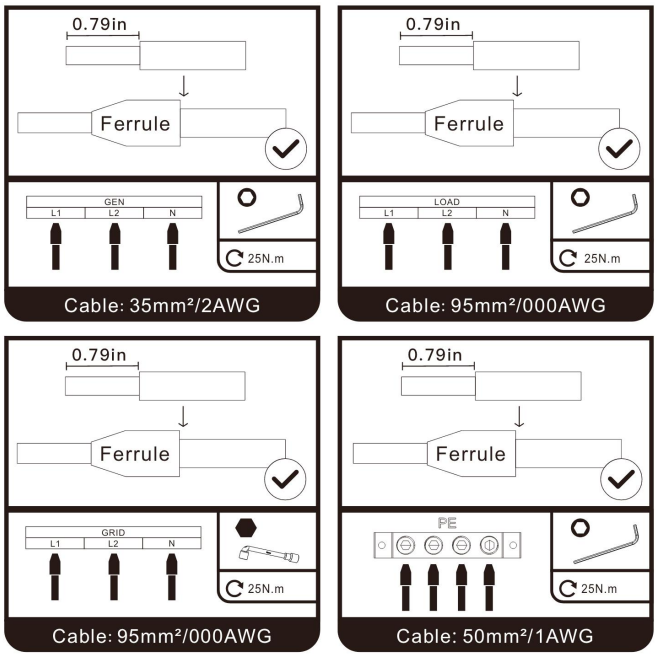


Wire diameter specifications are for reference only. For longer distances between the PV array and inverter, or between the inverter and batteries, use thicker wires to reduce voltage drop and improve system performance.

4.3 GRID & LOAD & GEN connection

Connect the live, neutral, and ground wires according to the cables' position and order shown in the diagram below.



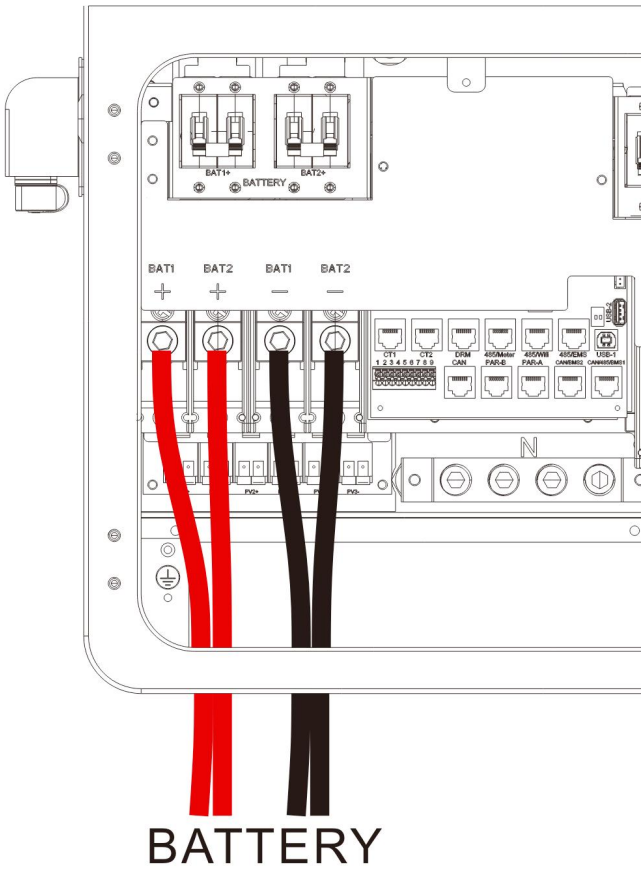


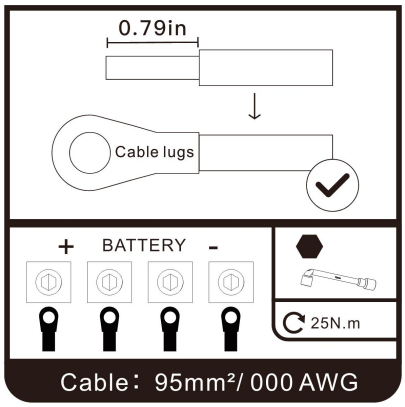
DANGER

- Before connecting AC input and output, the circuit breaker must be turned off to avoid electric shock hazards,and never operate with electricity.
- Please check that the cable used is sufficient for the requirements, too thin, poor quality cables are a serious safety hazard.

4.4 Battery Connection

Connect the positive and negative cables of the battery according to the diagram below.



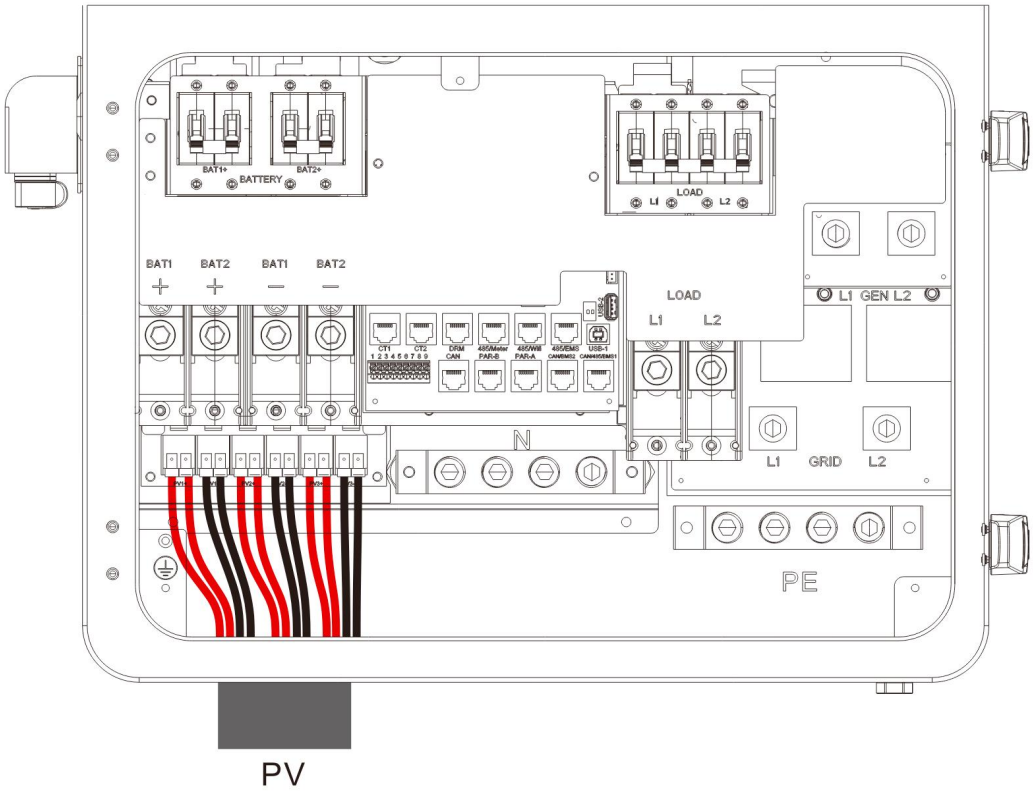


DANGER

- Before connecting battery, the circuit breaker must be opened to avoid the risk of electric shock and must not be operated with electricity.
- Make sure that the positive and negative terminals of the battery are connected correctly and not reversed, otherwise the inverter may be damaged.
- Please check that the cable used is sufficient for the requirements, too thin, poor quality cables are a serious safety hazard.

4.5 PV connection

Connect the positive and negative cables of the three PV circuits according to the diagram below.



DANGER

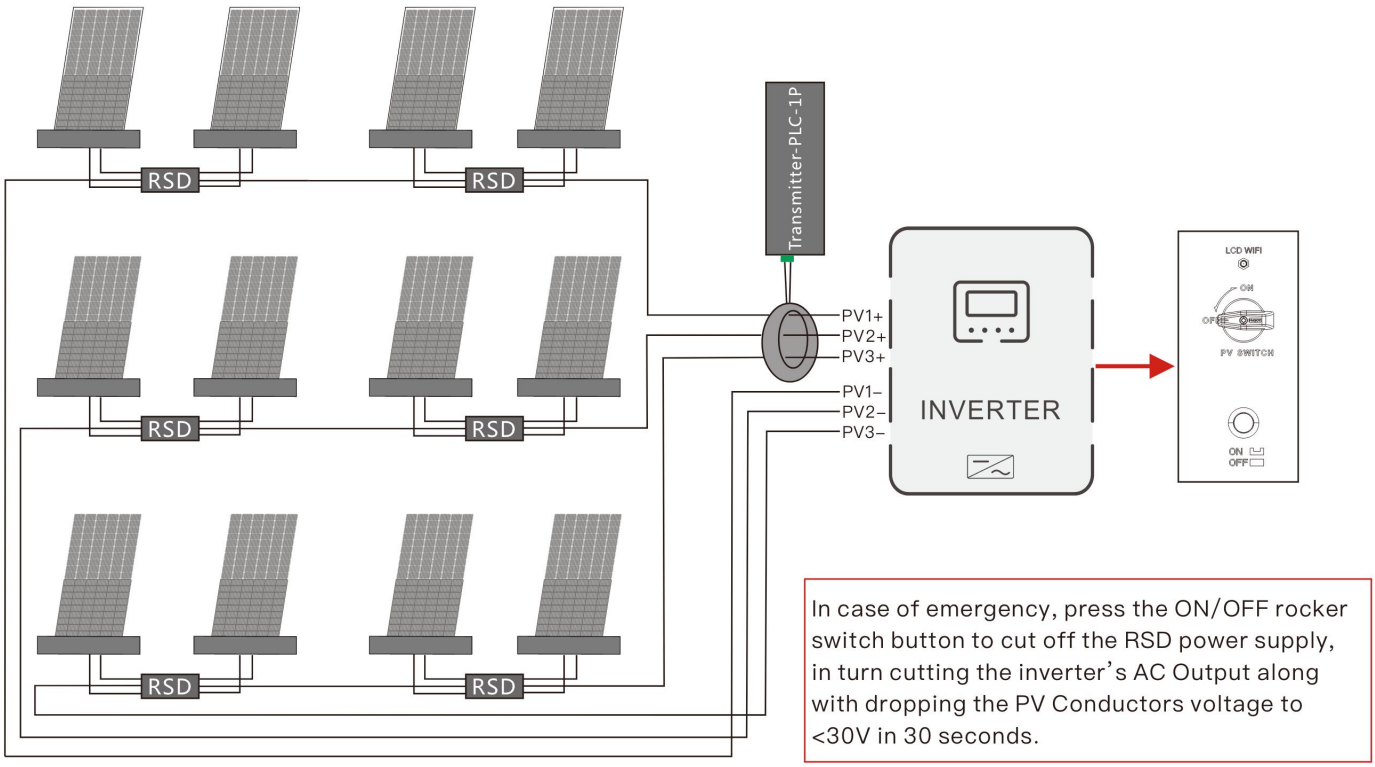
- Before connecting the PV, the circuit breaker must be disconnected to avoid the risk of electric shock and must not be energized.
- Make sure that the open-circuit voltage of the PV modules connected in series does not exceed the maximum open-circuit voltage of the inverter (the value is 600V), otherwise the inverter may be damaged.

Transmitter-PLC Device

The inverter includes a rapid shutdown system that complies with 2017 and 2020 NEC 690.12 requirements. A rapid shutdown switch should be connected to the RSD terminals on the inverter and mounted in a readily accessible location outdoors (check with your AHJ for requirements).

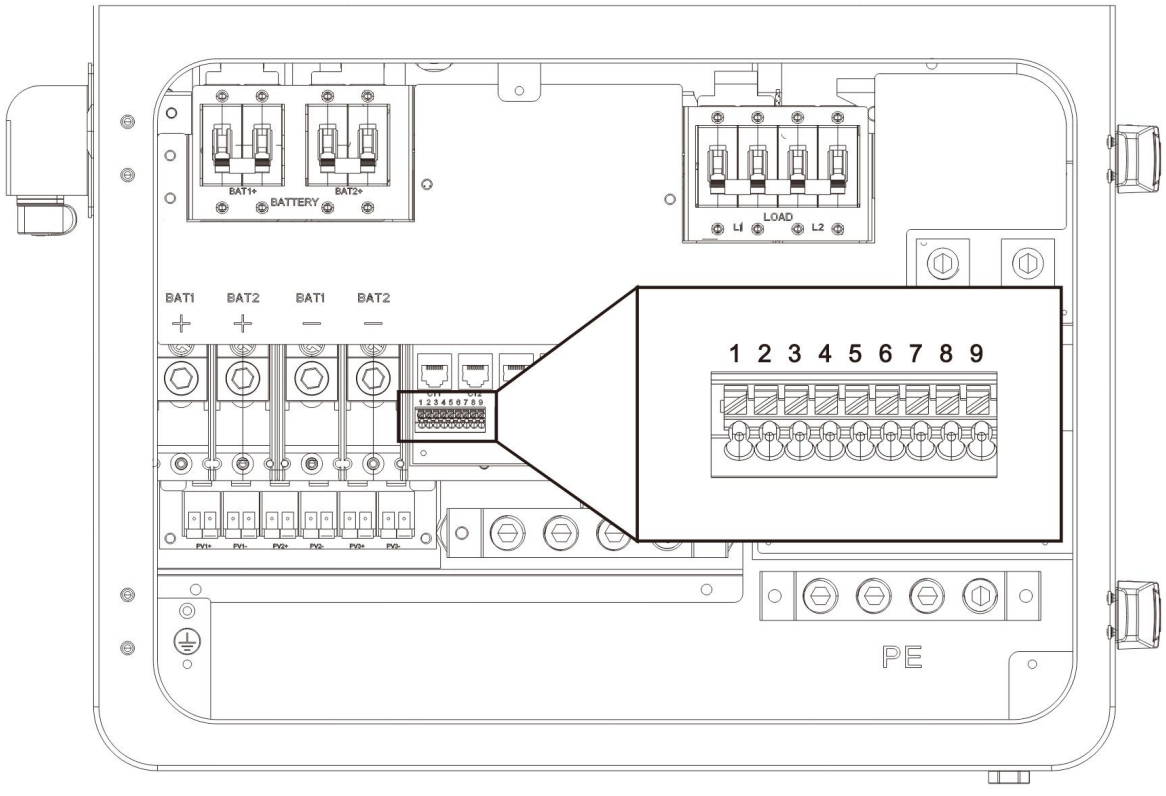
The APsmart Rapid Shutdown System Transmitter-PLC is part of a rapid shutdown solution when paired with APsmart RSD, a PV module rapid shutdown unit. While powered on, the Transmitter-PLC sends a signal to the RSD units to keep their PV modules connected and supplying energy. RSD units automatically enter rapid shutdown mode when the Transmitter-PLC is switched off and resume energy production when power is restored to the Transmitter-PLC.





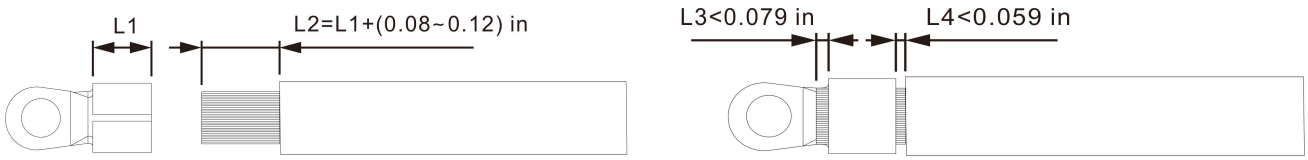
4.6 Dry contact connection

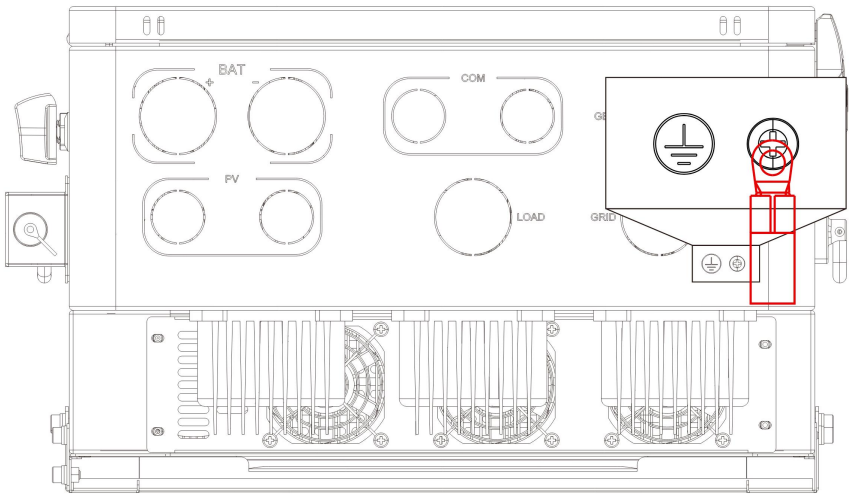
Use a small screwdriver to push back in the direction indicated by the arrow, then insert the communication cable into the dry junction port. (Communication cable diameter 0.2~1.5mm²)



4.7 Grounding connection

Please make sure the grounding terminal connects to the Grounding Bar.





NOTICE

Grounding wire shall be not less than 10 mm² (≈0.0155 in²) in diameter and as close as possible to the earthing point.

4.8 Final assembly

After ensuring that the wiring is reliable and the wire sequence is correct, install the terminal protection cover in place.

• **Step 1:** Close the circuit breaker of the battery.

• **Step 2:** Press the rocker switch on the bottom of the inverter. The screen and indicators light up to indicate that the inverter has been activated.

• **Step 3:** Sequential closing of the circuit breakers for PV, AC input, and AC output.

• **Step 4:** Start the loads one by one in order of power, from small to large

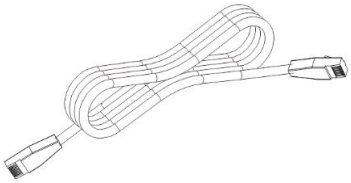
4.9 Start up the inverter

4.9.1 Introduction

1. Up to nine units connected in parallel.

2. When using the parallel operation function, the following connecting lines (package accessories) shall be firmly and reliably connected:

Parallel communication line*1



4.9.2 Precautions for connecting the parallel connecting lines

Warning :

1. PV connection:

When connecting in parallel, the PV arrays connected to each inverter must be independent of each other. The PV arrays corresponding to PV1, PV2, and PV3 ports of the same inverter must also be independent.

2. Battery wiring:

Single-phase, split-phase, or three-phase parallel connection: ensure that all solar storage inverters are connected to the same battery, with BAT + connected to BAT + , BAT - connected to BAT -, and that the connection is correct with the same wiring length and line diameter before power on, so as to avoid the abnormal operation of parallel system output caused by wrong connection.

3. LOAD wiring:

When connecting the parallel machines, all the inverse control integrated machines must be connected to L and L, N and N lines connected, PE and PE connected, and ensure that the power is on and off before connecting correctly and the wiring length and wire diameter are the same, to avoid incorrect connections caused by the output of the parallel system not working properly. When connecting three-phase parallel machines, all inverse control integrated machines must be connected N to N wire and PE to PE. The L lines of all machines in the same phase need to be connected together, but the L lines of AC outputs of different phases cannot be connected together. Other precautions are the same as for single-phase connection of parallel machines.

4. GRID wiring:

Parallel connection in single phase: ensure L-to-L, N-to-N, and PE-to-PE connections for all solar storage inverters, and that the connections are correct with the same wiring length and line diameter before power on, so as to avoid the abnormal operation of parallel system output caused by wrong connection. Meanwhile, it is not allowed to have multiple different AC source inputs to avoid damage to the external equipment of the inverter. The consistency and uniqueness of AC source input shall be ensured.

Parallel connection in three-phase: ensure N-to-N and PE-to-PE connection for all solar storage inverters. The L lines of all inverters connected to the same phase need to be connected together. But L lines of different phases cannot be joined together. Other connection precautions are the same as parallel connection in single phase.

5. Wiring of parallel communication line:

Our parallel communication cable is a shielded 8-pin network cable suitable for both single-phase and three-phase parallel connections. Each unit must have one input and one output connection. In a parallel system, the "Parallel A" interface of this machine must be connected to

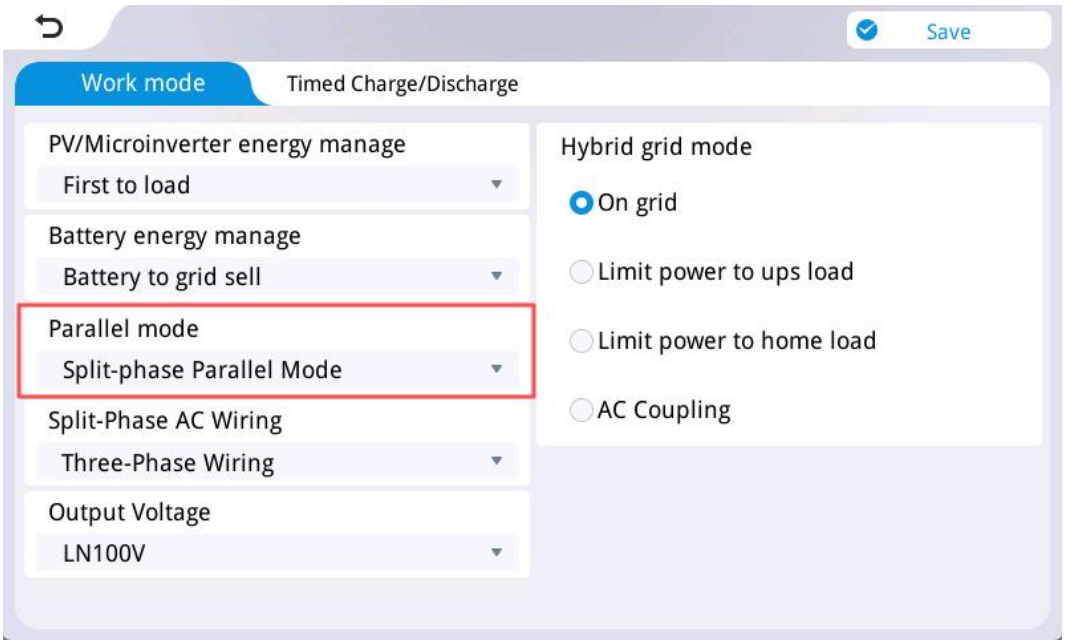
the "Parallel B" interface of the target machine. It is strictly prohibited to connect the "Parallel A" interface of this machine to either the "Parallel B" interface of the same machine or the "Parallel A" interface of the target machine. Additionally, secure each unit's parallel communication cable firmly to the 8-pin network connector to prevent disconnections or poor contacts, which may lead to abnormal system operation or damage to the output.

6. Before and after connecting the system, please check the following system wiring diagrams in detail to ensure that all wiring is correct and reliable before powering on.

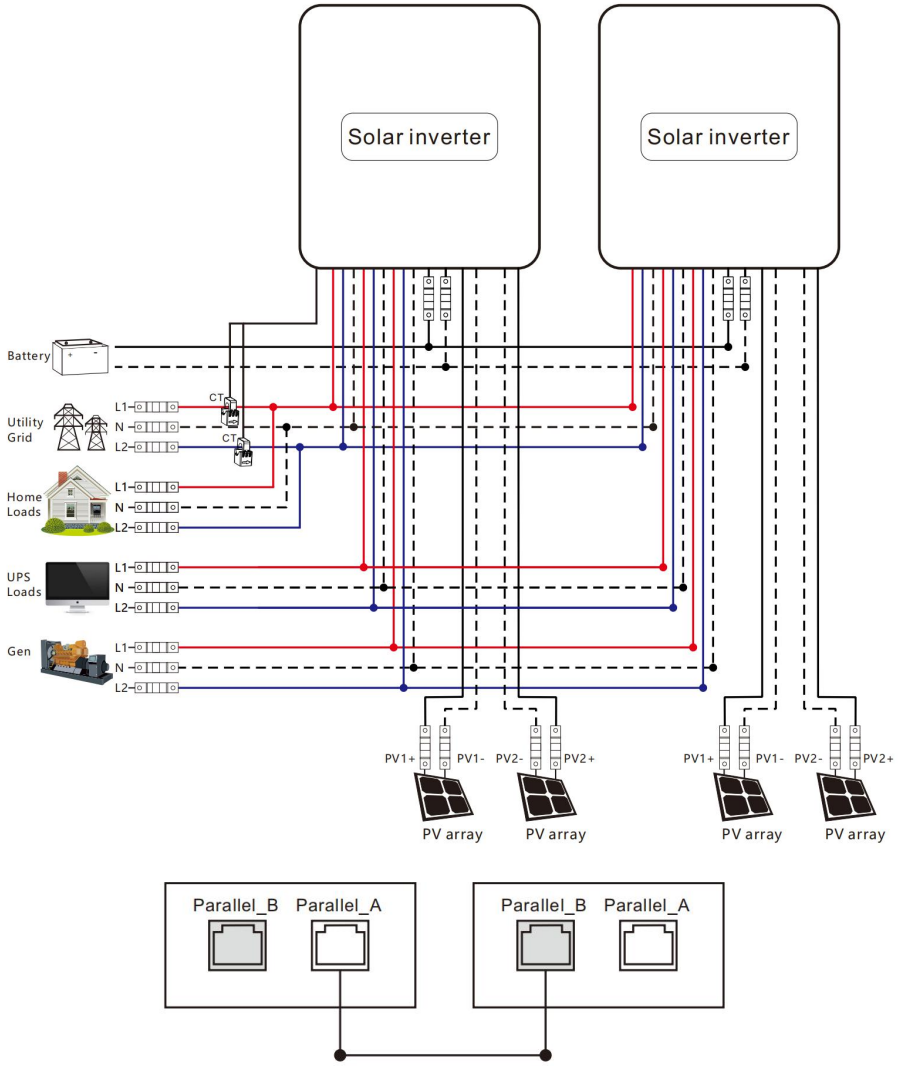
After the system is wired, powered on, and in normal operation, if a new inverter needs to be connected, make sure to disconnect the battery input, PV input, AC input, and AC output, and that all solar storage inverters are powered off before reconnecting to the system

4.9.3 Split-phase parallel connection

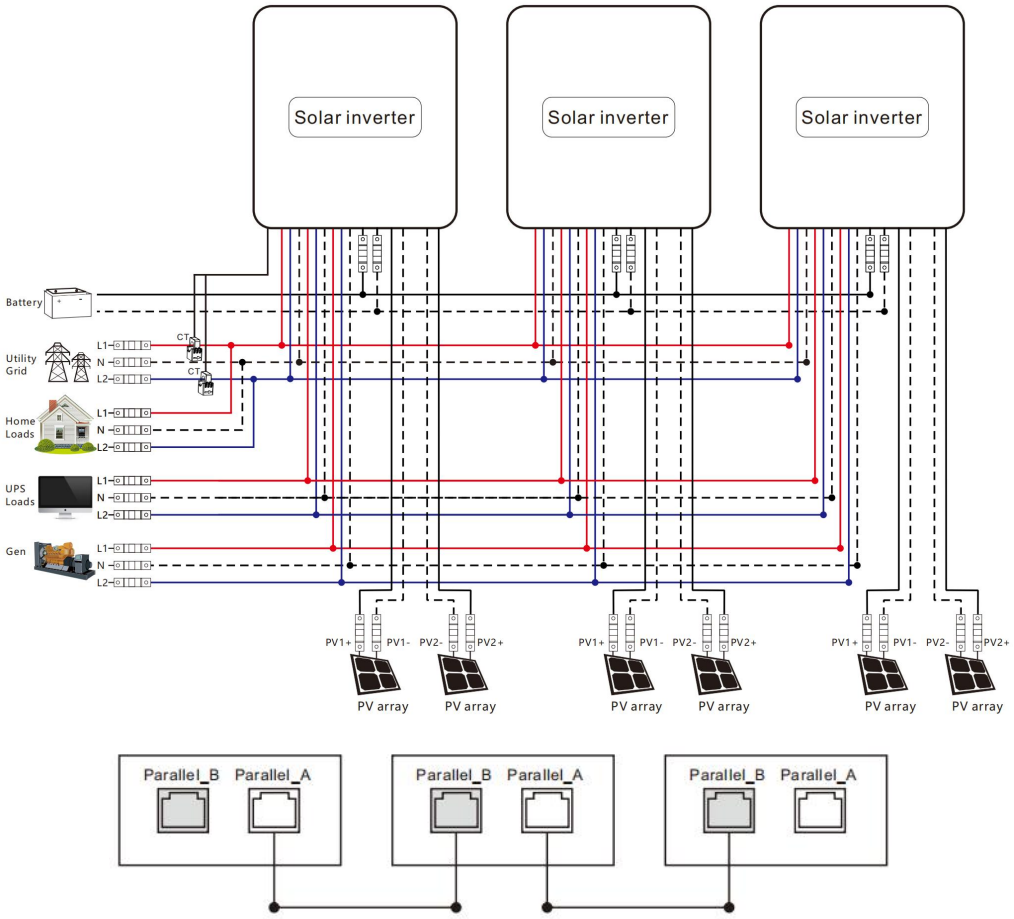
Each inverter's parallel mode must be set to “Split-phase Parallel Mode”. The parallel connection diagram is shown below (multiply the number of units accordingly):



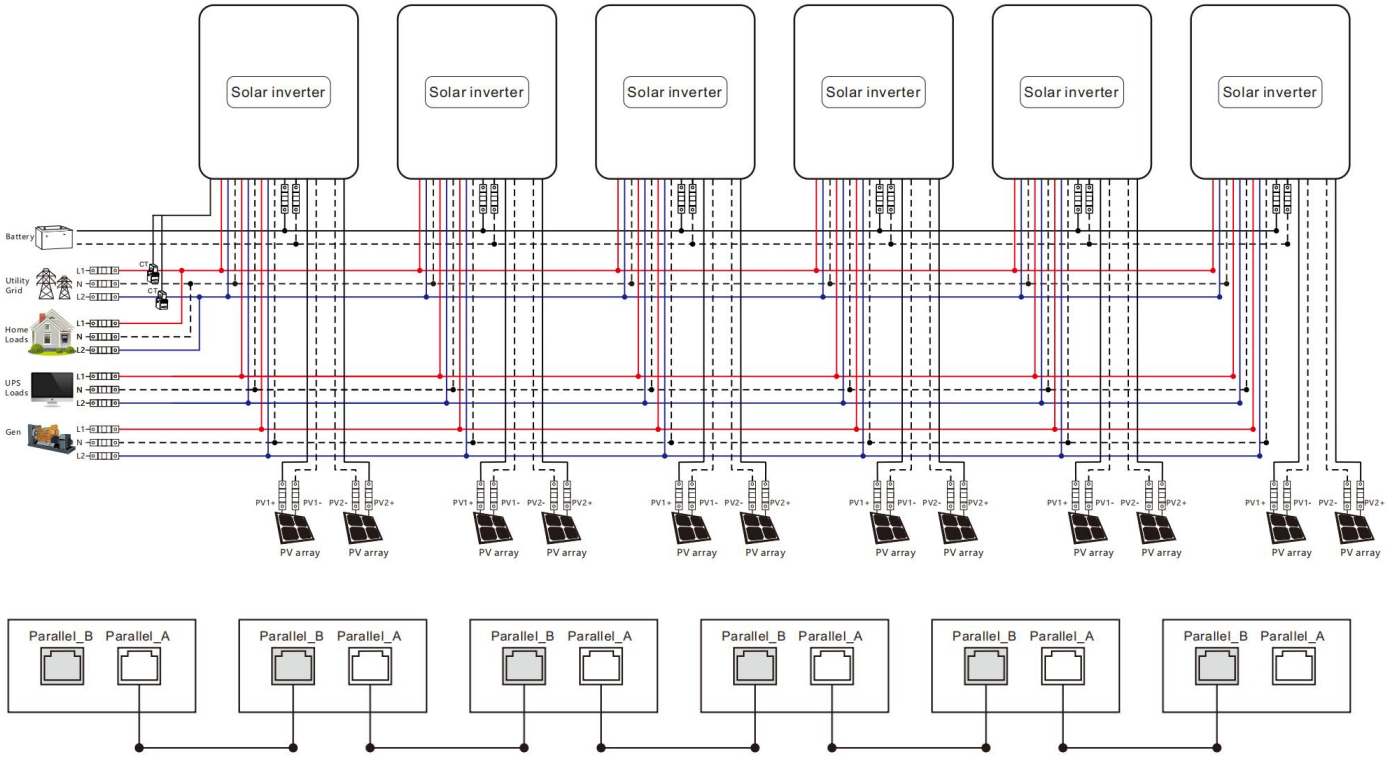
a) Two units connected in parallel:



b) Three units connected in parallel:



c) Multiple units connected in parallel:



4.9.4 Three-phase parallel connection

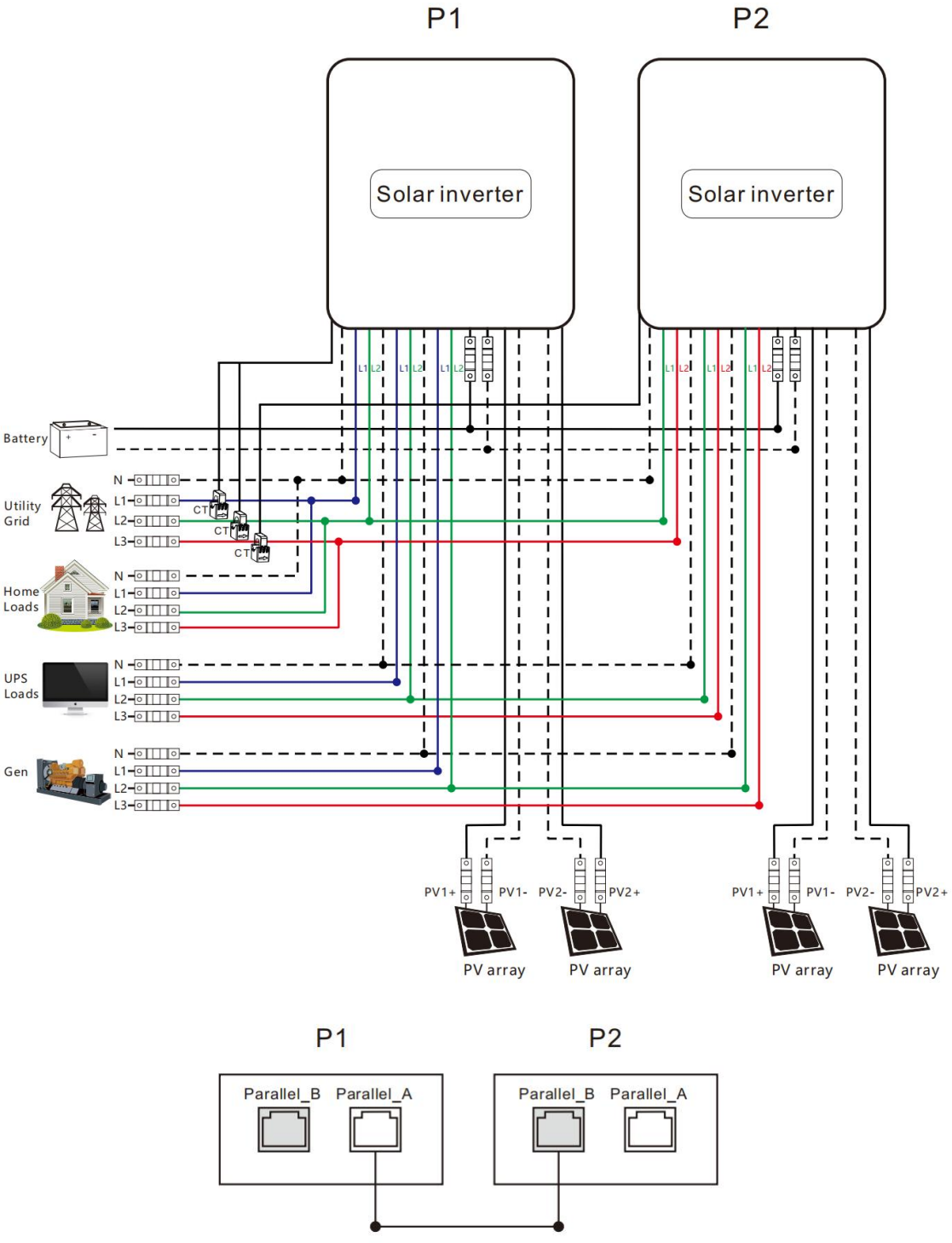
Ensure the parallel communication cables of the inverters are securely clamped with no loose connections.

When multiple inverters operate in parallel, refer to the following schematic diagram:

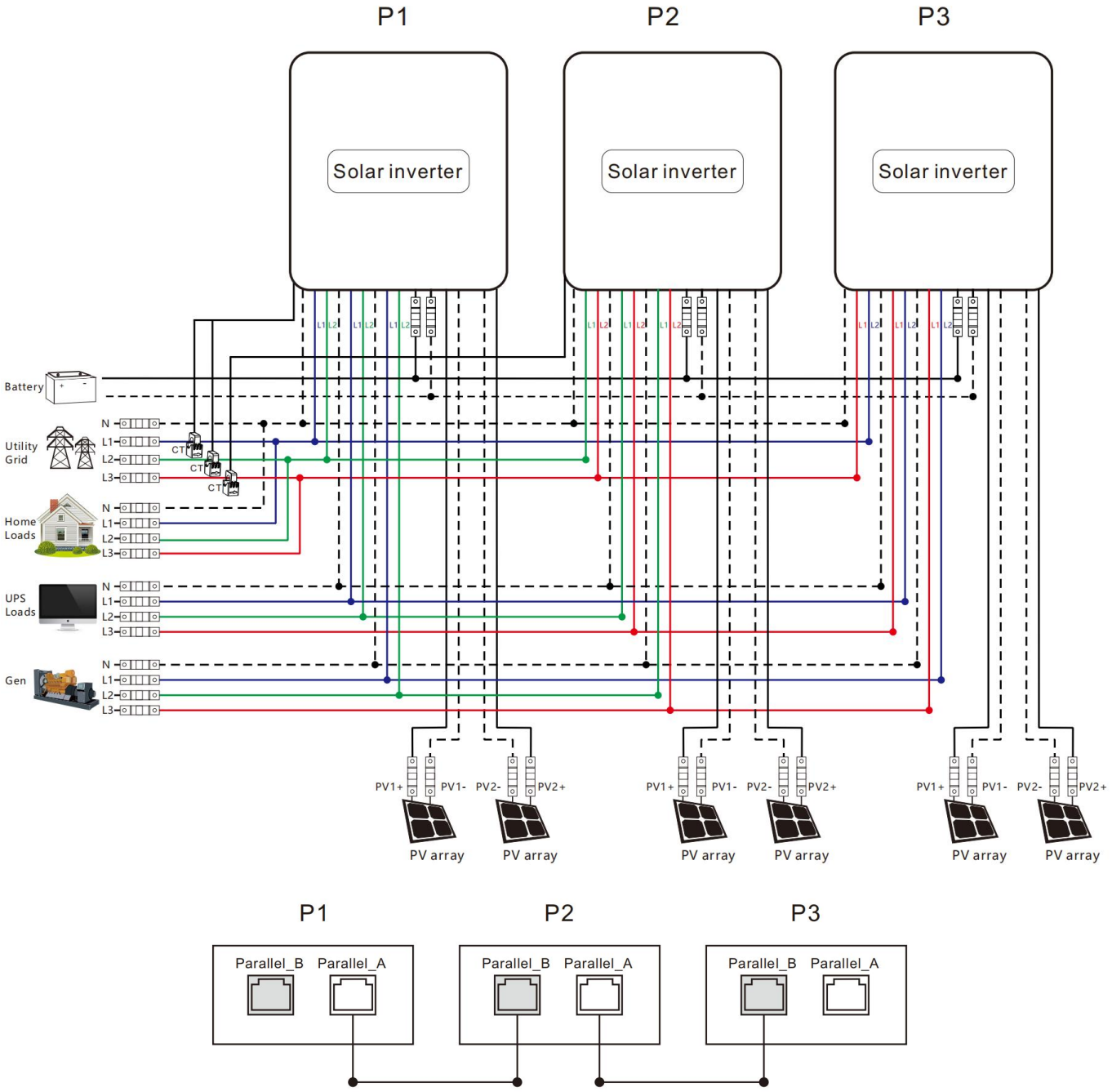
Parallel Operation in three phase :

Two devices form a three-phase system.

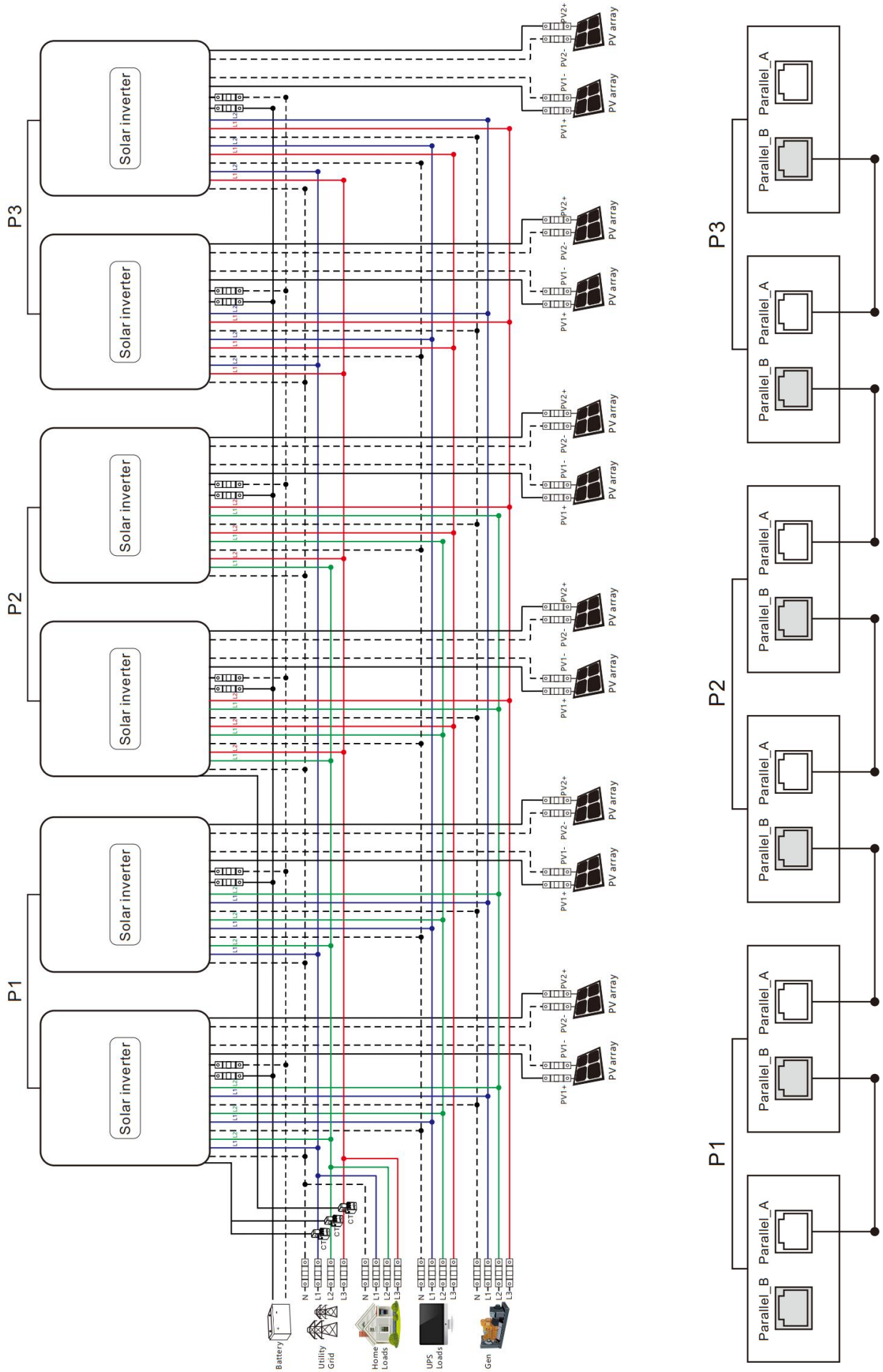
1+1 system:



1+1+1 system:


P1
P2
P3
Solar inverter
Solar inverter
Solar inverter
Battery
Utility Grid
Home Loads
UPS Loads
Gen
N
L1
L2
L3
CT
PV1+
PV1-
PV2-
PV2+
PV array
PV array
PV array
PV array
PV array
PV array
P1
P2
P3
Parallel_B
Parallel_A
Parallel_B
Parallel_A
Parallel_B
Parallel_A

2+2+2 system:


P3
P2
P1
Solar inverter
PV array
PV1+
PV1-
PV2+
PV2-
CT
Battery
Utility Grid
Home Loads
UPS Loads
Gen
Parallel_A
Parallel_B

Notice:

1) Before starting up and running, please check whether the connection is correct to avoid any abnormalities in the system.

2) All wiring must be fixed and reliable to avoid wire drop during use.

3) When the AC output is wired to the load, it shall be properly wired according to the requirements of the electrical load equipment to avoid damage to the load equipment.

4) Settings【Parallel Mode】 need to be set consistently or only for the host. When the machine is running, the voltage set by the host shall prevail, and the master will force the rewrite of the other slave machines to keep the same set. It can only be set in standby mode.

5) The machine's factory default is for single-machine mode. If you use parallel, split-phase, or three-phase functions, you need to set the【Parallel Mode】 item parameters through the screen.

The setting method is: Each time the system powers up, one machine starts while the others remain off. Then, based on the on-site system operation mode, set the【Work Mode Setup】to 【Parallel Mode】. After this machine is set successfully, turn off the machine switch and wait for the machine to be powered down, then set the rest of the machines in turn until all machines are set, and then all machines are powered up again at the same time and enter the working state.

6)【Parallel Mode] Parameter Settings Guide:

When using single-phase parallel operation, set to “Single-Phase Parallel Connection”.

When using the three-phase parallel operation function, the following settings are required:

All machine screens connected to P1 must be set to “Three-Phase Parallel A”;

All machine screens connected to P2 must be set to “Three-Phase Parallel B”;

All machine screens connected to P3 must be set to “Three-Phase Parallel C”.

At this point, the voltage phases between P1-P2, P1-P3, and P2-P3 differ by 120 degrees.

7) After the system runs, the output voltage is measured correctly, and then the load setting is connected.

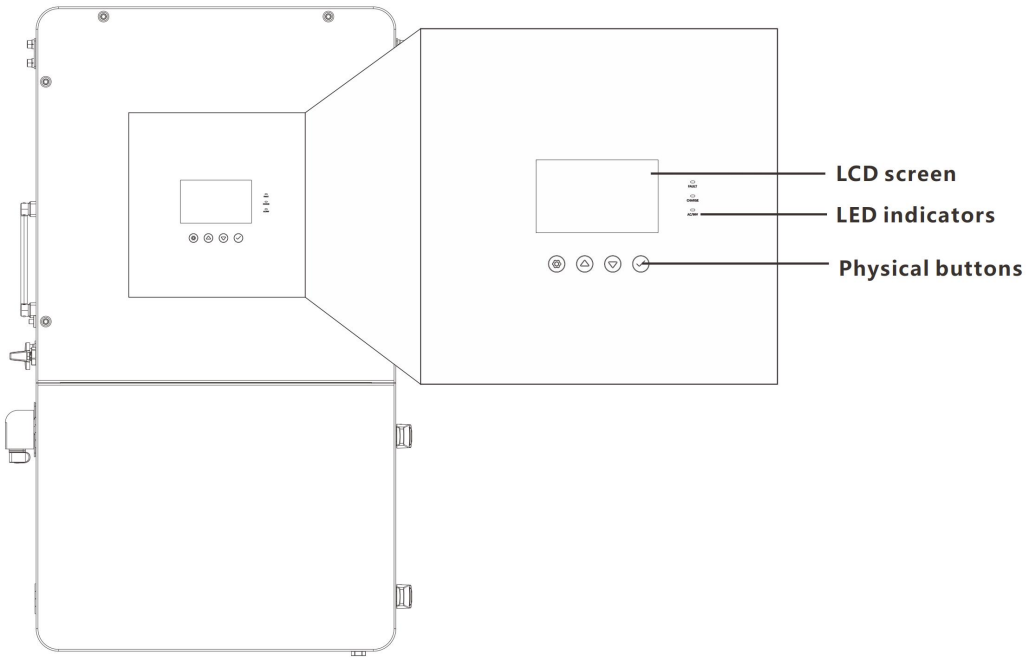
8) For other three-phase parallel connection configurations, such as: 1+1+2; 1+2+3; 2+2+1; 3+1+1; 4+1+1 systems, please contact the manufacturer for technical support.

9) When operating in parallel, inverters shall be installed in accordance with the proximity principle to avoid communication abnormalities caused by excessively long communication lines. If the line length is unavoidable, additional network cables can be used for end-to-end connection to optimize the communication loop.

5. Operating Instructions

5.1 Operation interface

The operation interface of the inverter includes 1 LCD display, 3 LED indicators, and 4 operation buttons.



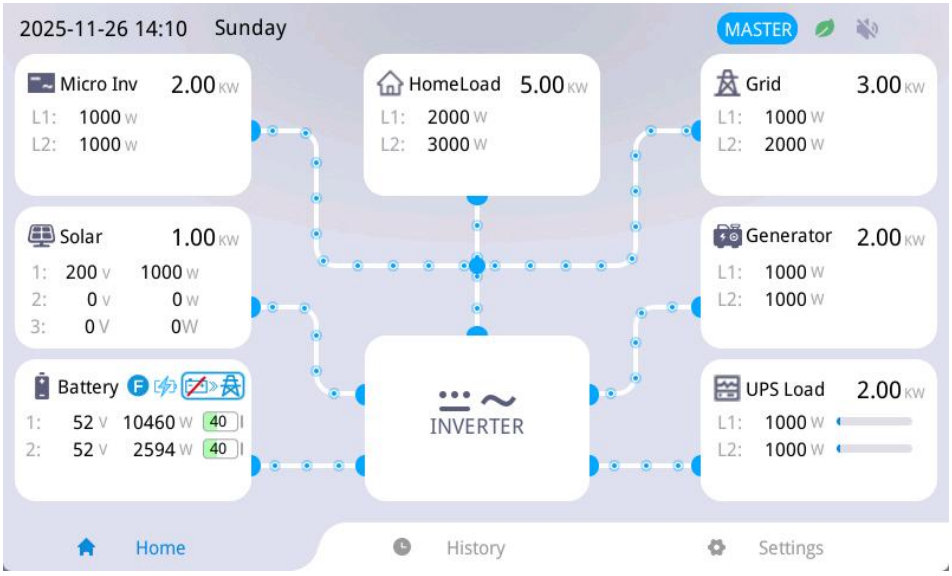
5.1.1 Operation buttons

Buttons	Functional description
	To enter/exit the settings menu
	To last selection
	To next selection
	To confirm/enter the selection in the settings menu

5.1.2 LED indicators

Indicator color	Function	Description
Red	FAULT	Flashing: Error occurred, Primary Fault Steady on: Error occurred, Secondary Fault Not lit: Error occurred, Level 3 or Level 4 fault
Green	CHARGE	Continued: Charging completed
		Flashing: Charging in progress
Yellow	AC/INV	Continued: Utility grid bypass output
		Flashing: Inverter output

5.1.3 LCD screen



The main page displays elements:

Icon	Description	Icon	Description
	Microinverter		Grid
	Solar Panel		Generator
	Battery		UPS Load
	Household Load		Inverter
	Home Page		Energy Saving Mode
	Historical Data		Settings
01 : 05	Local Time		Buzzer
MASTER	Main Unit Logo		Energy Flow

■ View real-time data

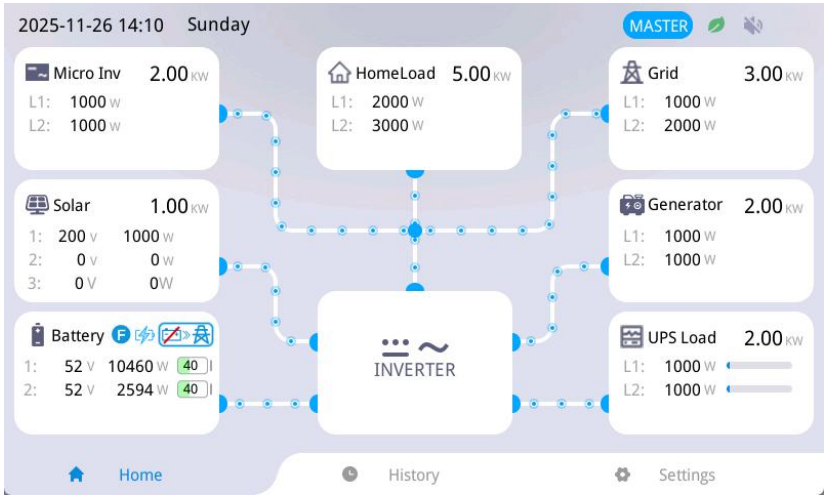
On the LCD home screen, clicking the inverter icon, battery icon, utility grid icon, generator icon, UPS load icon, or PV icon allows viewing of real-time data for each component. The microinverter and household load icons are non-clickable, as their data is fully displayed on the home page.

System Data			
NO.	**Real-Time Data Item**	**NO.**	**Real-Time Data Item**
1	MCU1 Version	12	SN Code (Inverter Serial Number)
2	MCU2 Version	13	Machine Status

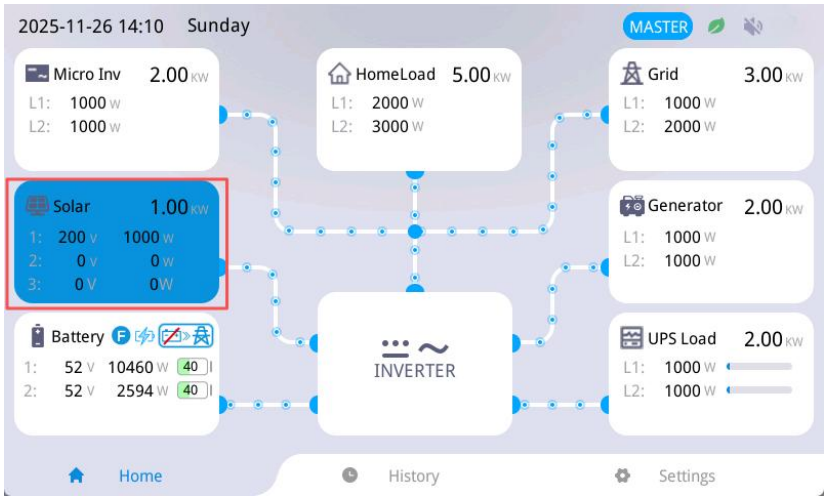
3	Minor Version Number	14	DC/DC Temperature
4	LCD Version	15	DC/AC Temperature
5	Rated Power	16	Transformer Temperature
6	Customer ID	17	External Battery Temperature
7	RS485 Address	18	Parallel Total Local Load Power
8	Bus Positive Voltage	19	Parallel Total Household Load Power
9	Bus Negative Voltage	20	Parallel Total Grid Power
10	Bus Total Voltage	21	Parallel Total Generator Power
11	Slave CPU		
Battery Data			
1	Battery 1 Voltage	7	Battery 2 Voltage
2	Battery 1 Charge/Discharge Power	8	Battery 2 Charge/Discharge Power
3	Battery 1 Charge/Discharge Current	9	Battery 2 Charge/Discharge Current
4	Battery 1 SOC (%)	10	Battery 2 SOC (%)
5	Battery Type	11	BMS Communication Protocol
6	Charging Status	12	BMS Data
Grid Data			
1	L1 Voltage	7	L2 Voltage
2	L1 Current	8	L2 Current
3	L1 Active Power	9	L2 Active Power
4	L1 Apparent Power	10	L2 Apparent Power
5	L1 CT Power	11	L2 CT Power
6	Frequency	12	Utility Charging Current
UPS Load Data			
1	L1 Voltage	7	L2 Voltage
2	L1 Current	8	L2 Current
3	L1 Active Power	9	L2 Active Power
4	L1 Apparent Power	10	L2 Apparent Power
5	L1 Load Rate	11	L2 Load Rate
6	Overall Load Rate	12	Frequency
PV Panel Data			
1	Solar1 Voltage V	6	Solar2 Power W
2	Solar1 Current A	7	Solar3 Voltage V
3	Solar1 Power W	8	Solar3 Current A
4	Solar2 Voltage V	9	Solar3 Power W
5	Solar2 Current A	10	PV Total Power
Generator Data			

1	L1 Voltage	6	L2 Voltage
2	L1 Current	7	L2 Current
3	L1 Active Power	8	L2 Active Power
4	L1 Apparent Power	9	L2 Apparent Power
5	Frequency	10	Grid Charging Current
Home Load Data			
1	L1 Voltage	5	L2 Voltage
2	L1 Current	6	L2 Current
3	L1 Active Power	7	L2 Active Power
4	L1 Apparent Power	8	Frequency

■ Browsing Detailed Data with Buttons



1. Press the up/down buttons, and when "HOME" is highlighted in blue, press the confirm button to select the home page icon.



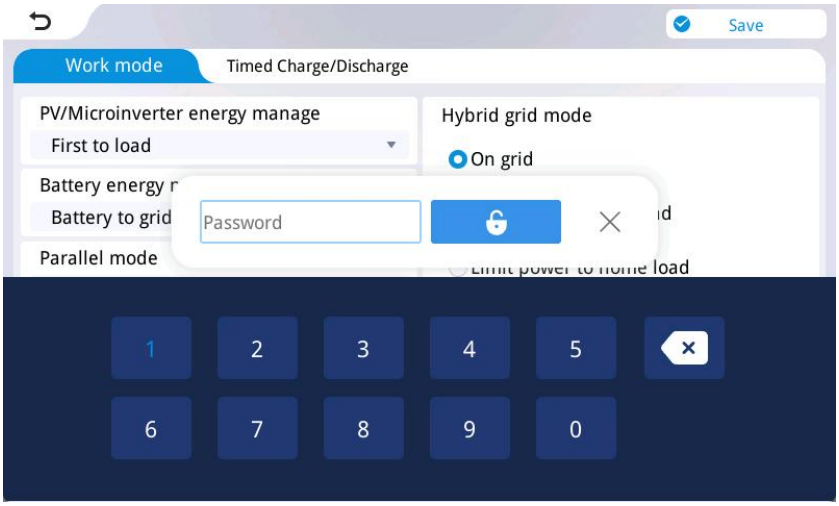
2. After selecting the home page icon, press the confirm button again to enter the data details page.

5.2 Parameter setting

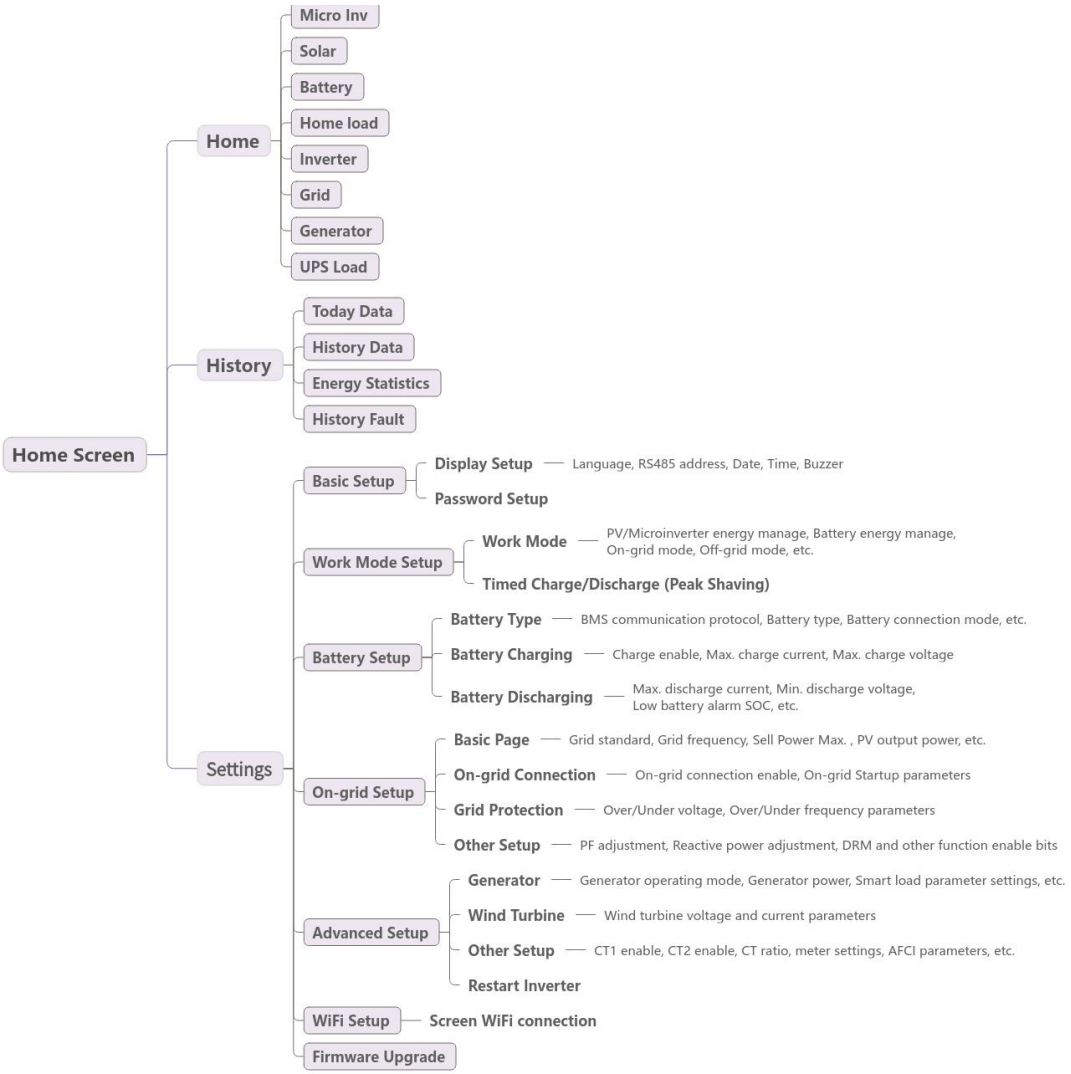
Operation Instructions:

1. Click the "Settings" button in the bottom menu bar of the screen to enter the settings interface. It includes seven categories: "**Basic setup**", "**Work mode setup**", "**Battery setup**", "**On-Grid setup**", "Advanced **setup**", "**WiFi setup**", and "**Firmware Upgrade**".

2. When modifying settings, if password protection is enabled, you must enter the password to change parameters. The default password is “4321”.

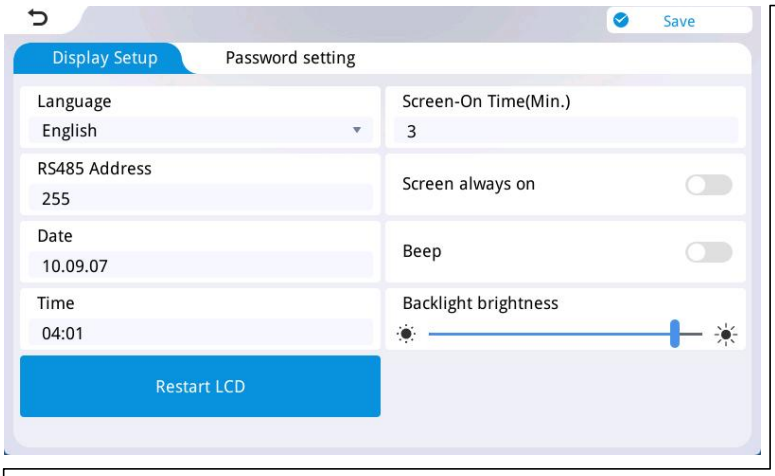


■ **Setting flow chart:**



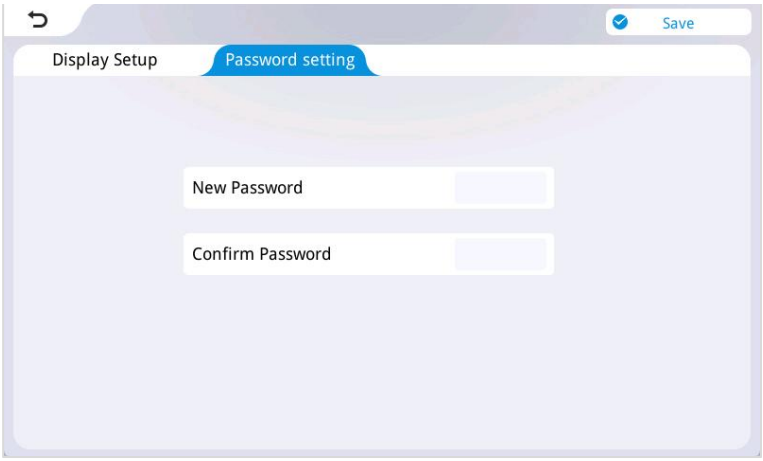
5.2.1 Basic setting

5.2.1.1 Display setup



- **Language:** English, Italian, German, Spanish, Chinese.
- **RS485 Address:** RS485 address of the inverter.
  ① Single device: Adjustable range 1~254.
  ② Parallel devices: Adjustable range 1~9.
- **Date:** Set year, month, day.
- **Time:** Set hour and minute.
- **Screen-On Time(Min.):** Adjustable range 1~30 minutes.
- **Screen always On:** Select whether the screen stays on continuously.
- **Beep:** Select whether to enable buzzer alarm.
- **Backlight brightness:** Adjustable from 0~100%.
- **Restart LCD:** Restart the Screen

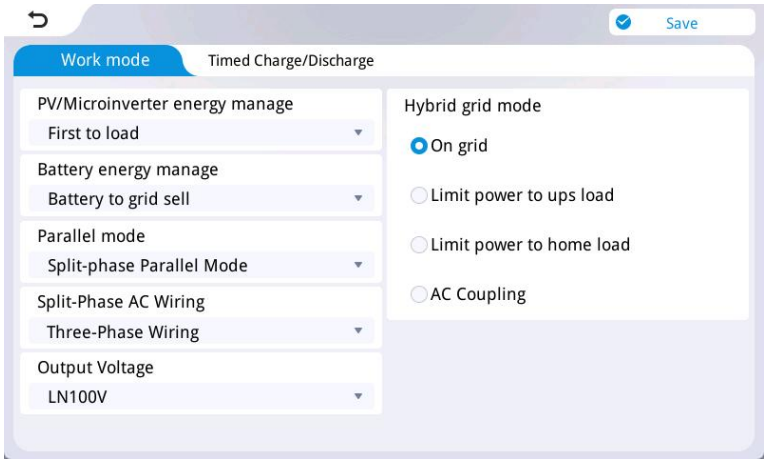
5.2.1.2 Password Setting (Change Password)



- **New Password:** Enter a custom new password.
- **Confirm Password:** Re-enter exactly the same content as the new password above to verify the accuracy of the password setting.

5.2.2 Work Mode Setup

5.2.2.1 Work Mode

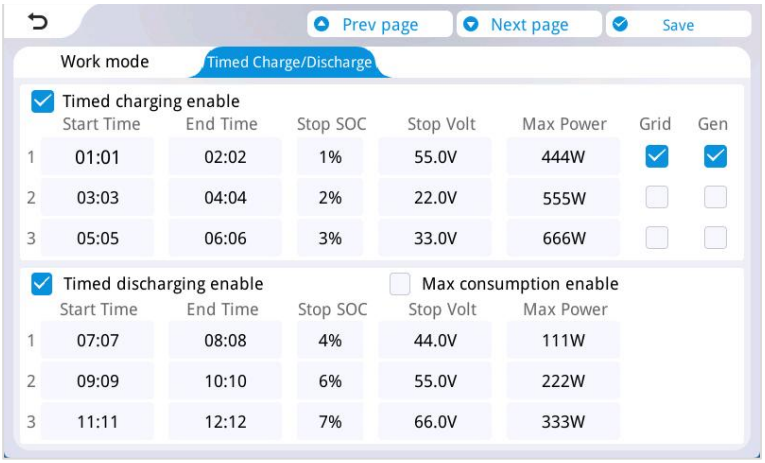


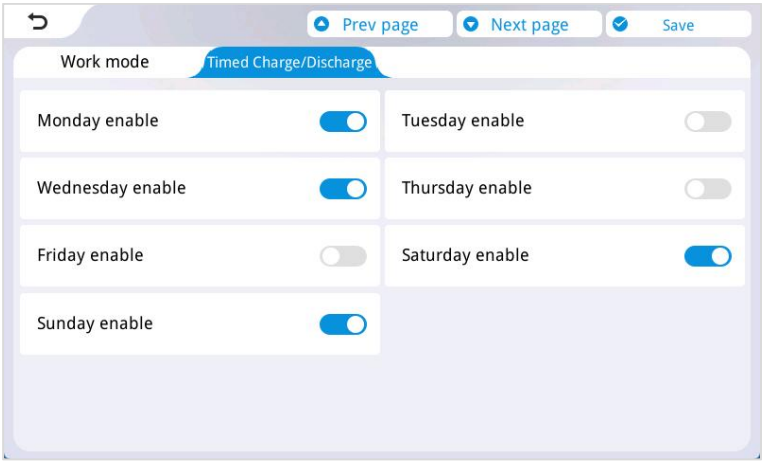
1. **Grid power sales:** on grid output power.
2. **UPS Load:** Connected to the LOAD port of the machine.
3. **Home Load:** Refers to the load connected to the machine's GRID port, which requires external CT or energy meter for use.(Otherwise, the power of the Home load cannot be detected.)
4. **AC Coupling:** Connect the grid-connected inverter to the grid side of the hybrid inverter.

This is the detailed page of "Work Mode"		
Parameter Meaning	**Options**	**Description**
Hybrid grid mode	On-grid	Direct grid connection of excess PV energy.
	Limit power to UPS load	In this mode, solar or battery energy is only used for UPS load and smart load. Excess energy will not be fed into the grid (UPS load is reverse-flow protected).
	Limit power to home load	In this mode, solar or battery energy is used only for the UPS load, smart load, and home load. Excess energy will not be fed into the grid (HOME load is reverse-flow protected).
	AC Coupling	This mode is used to add AC coupling functionality to on-grid inverters. The on-grid inverter needs to be connected to the grid side of the hybrid inverter (effective only when the GEN port is not set to micro-inverter mode); or connected to the generator side of the hybrid inverter (effective only when the GEN port is set to micro-inverter mode). In this mode, the hybrid inverter will use the grid energy from the on-grid inverter to power loads or charge batteries.
PV/Microinverter energy management	When the hybrid grid mode is set to "Limit power supply to UPS load" or when CT1 is not connected, the meter is not communicating, or communication fails (effective only when the meter detection location is set to the grid side), the subsequent loads refer to the UPS load and smart load. When the hybrid grid mode is set to "Limit Home Load/Grid Power Supply" and CT1 is successfully connected or the meter communication is successful (effective only when the meter detection location is set to the grid side), the subsequent loads refer to the UPS load, smart load, and home load.	
	First to Load	PV energy priority: load > charge > on grid. Micro-inverter energy priority: load > charge > on grid.
	First to Charge	PV energy priority: charge > load > on grid. Micro-inverter energy priority: load > charge > on grid.
	First to grid	PV energy priority: load > on grid > charge. Micro-inverter energy priority: load > on grid > charge.
Battery energy management	Standby	Battery only discharges in off-grid working mode.
	Battery to UPS load	The battery can supply power to the UPS load, smart load, and home load, but does not participate in selling power to the grid.
	Battery to home load	The battery powers UPS loads, smart loads, and household loads, but does not participate in grid selling.
	Battery to grid sell	The battery can supply power to the UPS load, smart load, and home load, and participate in selling power to the grid.
Parallel mode	Stand-alone.	
	Parallel operation.	
Grid type	When Single-phase Mode is selected, the default voltage between L1 and L2 is 240 VAC, where L1 shall be connected to the live wire and L2 to the neutral wire.	
	When Split-phase Mode is selected, the phase voltage of L1 and L2 is 120 VAC, the line voltage is 240 VAC, and the phase difference between L1 and L2 is 180°.	

	When Three-phase Mode is selected, the phase voltage of L1 and L2 is 120 VAC, the line voltage is 208 VAC, and the phase difference between L1 and L2 is 120°.
Output phase voltage	Settable: 100V, 105V, 110V, 115V, 120V, 127V, 133V

5.2.2.2 Peak Shaving

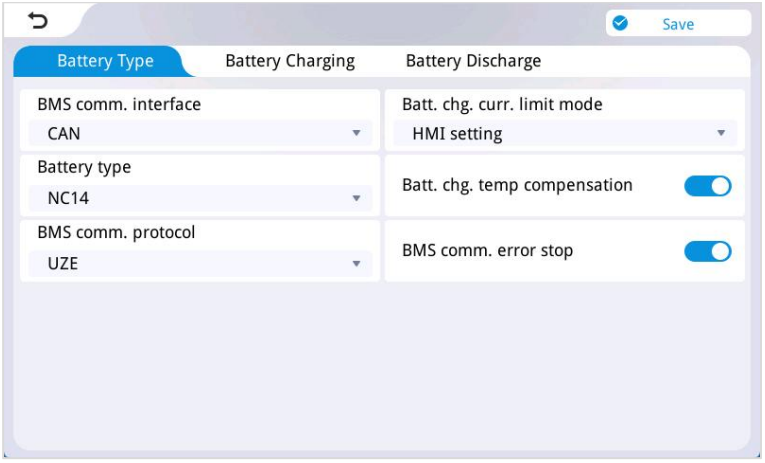




- **Timed charging enable:** Select whether to enable scheduled charging.
- **Timed discharging enable:** Select whether to enable scheduled discharging.
- **Start/End Time:** Set the time period for scheduled charging/discharging.
- **Stop SOC:** Set the battery's cutoff SOC values for charging/discharging during the scheduled charging/discharging time periods. (effective when BMS communication is successful).
- **Stop Volt:** Set the battery's cutoff voltage values for charging /discharging during the scheduled charging/ discharging time periods. (effective when BMS communication is not established or fails).
- **Max. Power:** Setting the battery charging power and discharging power during the scheduled charging and discharging time period.
- **Grid:** Allow the grid to charge the battery during the scheduled charging period.
- **Gen:** Allow the generator to charge the battery during the scheduled charging period.
- **Max. consumption enable:** Allow the battery to discharge outside the scheduled discharging period.
- **Weekly Enable:** Set the days of the week for scheduled charging/discharging (only valid for scheduled charging/discharging).

5.2.3 Battery Setup

5.2.3.1 Battery Type



- **BMS comm. interface:**
  ① **Disable:** BMS communication disabled.
  ② **RS485:** BMS RS485 communication.
  ③ **CAN:** BMS CAN communication.
- **Battery Type:**
  ① **USER define:** All battery parameters can be customized by the user.
  ② **SLd:** Sealed Lead-acid Battery.
  ③ **FLd:** Flooded Lead-acid Battery.
  ④ **GEL:** Gel Lead-acid Battery.
  ⑤ **No battery:** No battery connected.

⑥ **LFP/14/ 15/LFP 16:** Li-$FePO_4$ /14/15/16, corresponding to 14-series, 15-series, and 16-series Li-$FePO_4$ batteries.
⑦ **N13/ N14:** NCM Lithium Battery N13/N14, corresponding to 13-series and 14-series NCM lithium batteries.

- **BMS comm. protocol:** When the BMS port selection item is set to RS485 or CAN, the corresponding lithium battery manufacturer brand shall be selected for communication:

① **485 protocol:**

PACE=PACEEX	RUDA=RADAR	AOGUAN=AUTOONE	OULITE=OLITER	CEF=CFGE
XINWANGDA	XiongTao	DAQIN=Dyness	WOW=SNPOWER	PYL=PYLONTECH
MIT=FOX ESS	XIX=Xinyi energy	POL=PowMr	GUOX=GOTION	SMK=SMK POWER
VOL=VILION	WES	SGP=SUNGOLDPOWER	GSL	PYT=PYLONTECH 2
DYE=DEYE	LUX=LUXPOWER			

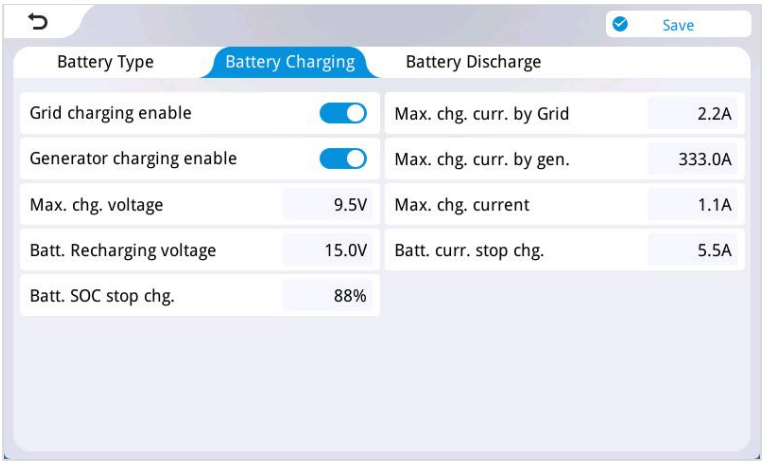
② **CAN protocol:**

UZE=UZENERGY	PYL=PYLONTECH	Victro	LUX=LUXPOWER	HONGHE
WOW=SNPOWER	DYE=DEYE	GSL=GSLENERGY	SGP=SUNGOLDPOWER	RUIXU
RENAC	DUNEXT	General		

Note: Please refer to the actual display on the screen.

- **Battery chg. curr. limit mode(valid for BMS communication):**
  ① **HMI setting:** The maximum battery charging current is limited by the charging current setting value of the inverter.
  ② **BMS setting:** The maximum battery charging current is restricted by the current limit value of the BMS.
  ③ **Inverter setting:** The maximum battery charging current is limited by the derating logic of the device.
- **Batt. Chg Temp Compensation:** Used to select whether to enable temperature compensation.

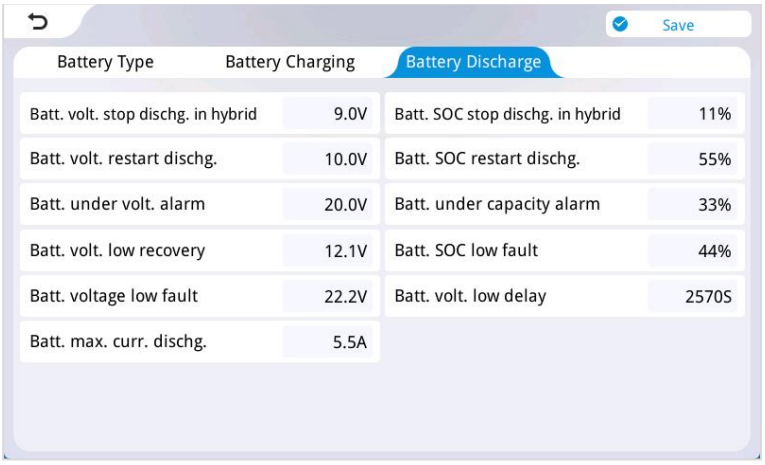
5.2.3.2 Battery Charging



- **Grid charging enable:** Select whether to allow the grid to charge the battery (not applicable to scheduled charging).
- **Generator charging enable:** Select whether to allow the generator to charge the battery (not applicable to timed charging).
- **Max. chg. voltage:** Set the maximum charging voltage during constant voltage charging of the battery.
- **Batt. Recharging voltage:** After the battery is fully charged, the inverter stops charging. Charging resumes when the battery voltage drops below this value. (This setting is effective when BMS communication is not established or has failed.)
- **Batt. SOC stop chg.:** When the SOC reaches the specified value, battery stops charging. (Valid when BMS communication is normal).
- **Max. chg. curr. by Grid:** Set the maximum charging current from the grid to the battery. (**Note**: This value refers to the battery-side current, not the grid-side current, and does not apply to scheduled charging.)
- **Max. chg. curr. by gen.:** Set the maximum charging current from the generator to the battery. (**Note**: This value refers to the battery-side current, not the generator-side current, and does not apply to scheduled charging.).
- **Max. chg. current:** Set the maximum charging current during the constant current phase of battery charging.
- **Batt. curr. stop chg.:** During the constant voltage charging phase, charging will cease when the charging current falls below this value. (Effective when BMS communication is not performed or BMS communication fails).

Note: After the battery is fully charged, the inverter stops charging. Charging will resume when the battery SOC drops below this value. (Fixed at Battery Charging Stop SOC - 5%, non-modifiable, effective when BMS communication is normal)

5.2.3.3 Battery Discharging



- **Batt. under volt. alarm:** When the battery voltage is lower than this value, the inverter will report an under-voltage alarm (notifying the user that the battery is about to stop discharging), but the battery will not stop discharging. (Effective when BMS communication is not established or fails.)

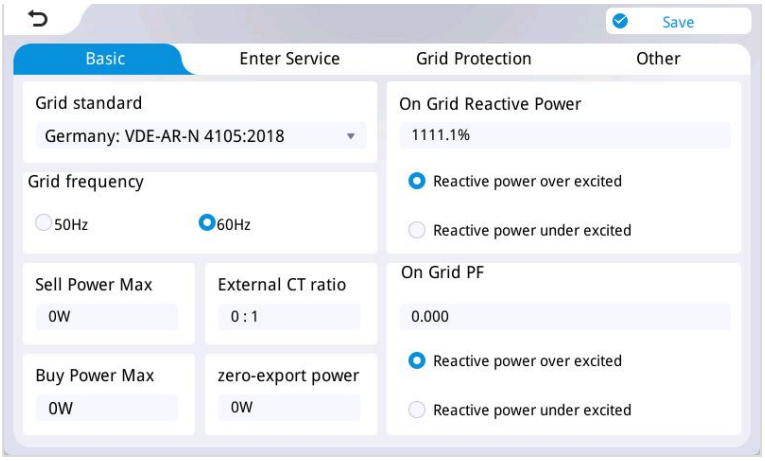
- **Batt. under capacity alarm:** SOC value up to this setting will alarm. The inverter output will not shut down and the fault disappears if the SOC value exceeds 5% of the set value. (Valid when BMS communication is normal)
- **Batt. volt low recovery:** When the battery report voltage low fault, the battery voltage reach this setting, the fault will be cleard.
- **Batt. SOC low fault:** When the battery SOC is lower than this value, the inverter will report a low battery SOC fault and stop discharging. (Effective when BMS communication is normal.)
- **Batt. voltage low fault:** When the battery voltage is lower than this value and after the "Discharge Stop Delay Time" elapses, the inverter will report a low battery voltage fault and stop discharging.
- **Batt. volt. low delay:** Battery stop discharge delay time.
- **Batt. max. curr. dischg.:** Set the max. battery discharger current.

The following settings are only effective in hybrid grid operation mode:

- **Batt. volt. stop dischg. in hybrid:** Discharging stops when the battery voltage is lower than this value. (Effective when BMS communication is not established or fails.)
- **Batt. SOC stop dischg. in hybrid:** Discharging stops when the battery SOC is lower than this value. (Effective when BMS communication is normal.)
- **Batt. volt. restart dischg. :**The inverter stops discharging after low battery voltage, and resumes discharging when the battery voltage rises above this value. (Effective when BMS communication is not established or fails.)
- **Batt. SOC restart dischg.:** The inverter stops discharging after low battery capacity, and resumes discharging when the battery SOC rises above this value. (Effective when BMS communication is normal.)

5.2.4 Grid Connection Setup

5.2.4.1 Basic Page

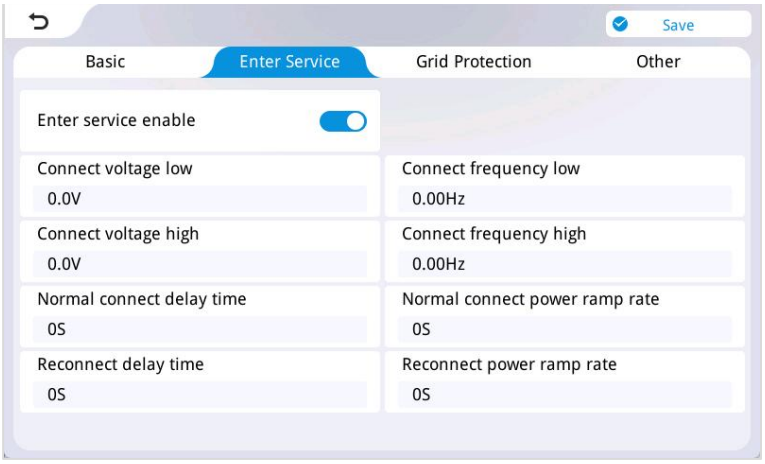


- **Grid frequency:** Select the local grid frequency (50Hz/60Hz).
- **Sell Power Max:** Set the maximum power for feeding into the grid.
- **Buy Power Max:** Maximum power drawn from the grid. If the grid charging power + load power by the grid exceeds this setting, the inverter will prioritize reducing the grid charging power to avoid exceeding the buying power threshold.
- **External CT ratio:** When connecting an external CT, enter the ratio on the CT specification. (CT is fixed for grid-side power collection.)
- **zero-export power:** Error calibration power for anti-backflow, recommended to be set between 20-100W.Due to sampling accuracy issues, in order to bring the anti-backflow side power close to 0W:
  ① When buying power P > 0, set this value to P;
  ② When selling power P > 0, set this value to -P.
- **On Grid Reactive Power:** Setting range 0-100%, expressed as a percentage of reactive power.
- **Reactive power over/under excited:** "over" indicates 0%-100% / "under" indicates -100%～0%.
- **On Grid PF:** Setting range 0.8 ~ 1.
- **Reactive power over / under excited:** "over" indicates 0.8 ~ 1 / "under" indicates -0.8 ~ -1

- **Grid standard (subject to the actual display on the screen.):**

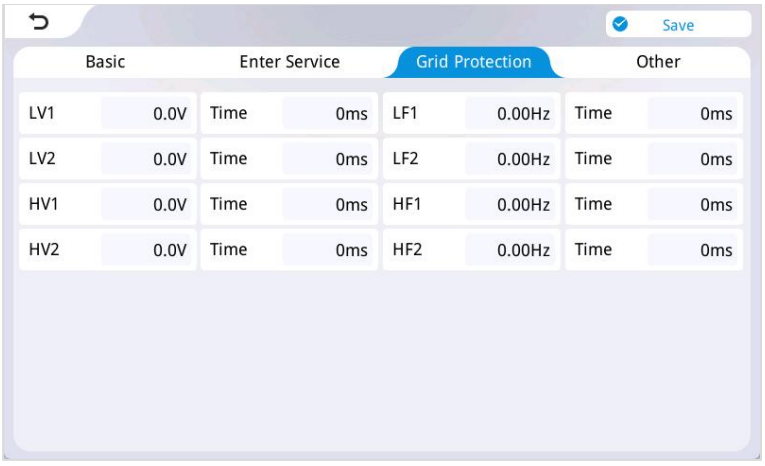
Austria: TE-OVE	Thailand: PEA-MEA PEA-MEA	Italy: CEI 0-21:2022/V1:2022
Germany: VDE-AR-N 4105:2018	Europe: EN 50549-1	Spain: UNE 217002: 2020-10
United States: IEEE Std 1547 2018/IEEE1547		Great Britain: G99
South Africa: NRS097	Australia: AS4777.2 Australia A	Myanmar
Poland: EN 50549-1	Australia: AS4777.2 New Zealand	Thailand: PEA-MEA
Ireland: EN50549-IE	United States: UL1741	Northern Ireland: G99/NI
Great Britain: G98	Puerto Rico	Uninitialized

5.2.4.2 Enter Service(User modification not recommended)



- **Enter service enable:** Grid connection startup setting (enabled by default).
- **Connect voltage low:** Minimum voltage requirement for grid connection.
- **Connect frequency low:** Minimum frequency requirement for grid connection.
- **Connect voltage high:** Maximum voltage requirement for grid connection.
- **Connect frequency high:** Maximum frequency requirement for grid connection.
- **Normal connect delay time:** The delay time for the inverter to connect to the grid when the grid first meets the connection requirements.
- **Normal connect power ramp rate:** The ramp rate of grid-connected power for the first grid connection.
- **Reconnect delay time:** Grid disconnection and reconnection, grid connection delay time.
- **Reconnect power ramp Rate:** Grid disconnection reconnection, rate of rise of grid-connected power.

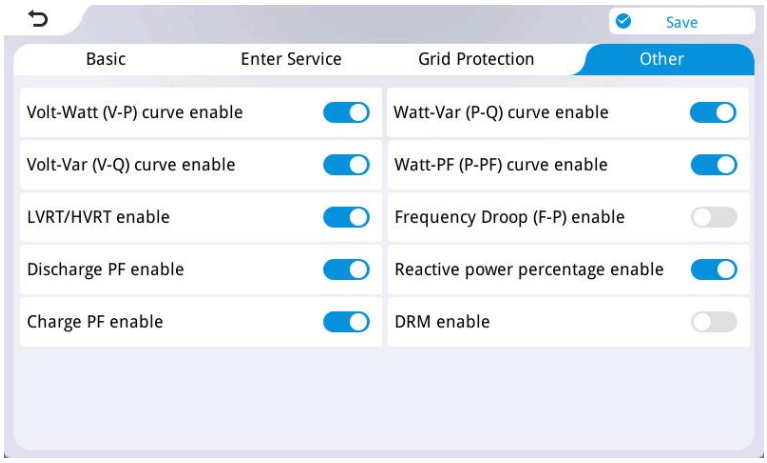
5.2.4.3 Grid Protection (User modification not recommended)



- **Time:** Time Protection Response Time.
- **LV1:**
  Class 1 undervoltage protection point.
  When the grid voltage drops below this threshold and remains so for the corresponding protection response time, the inverter shall disconnect from the grid.
- **LF1:**
  Class 1 underfrequency protection point.
  When the grid frequency drops below this threshold and remains below it for the corresponding protection response time, the inverter shall disconnect from the grid.
- **LV2:**
  Class 2 undervoltage protection point.
  When the grid voltage drops below this threshold and remains below it for the corresponding protection response time, the inverter shall initiate grid disconnection.
- **LF2:**
  Class 2 underfrequency protection point.
  When the grid frequency drops below this threshold and remains below it for the corresponding protection response time, the inverter shall disconnect from the grid.
- **HV1:**
  Class 1 overvoltage protection point.
  When the grid voltage rises above this threshold and remains above it for the corresponding protection response time, the inverter shall disconnect from the grid.

- **HF1:**
  Class 1 overfrequency protection point.
  When the grid frequency exceeds this threshold and remains above it for the corresponding protection response time, the inverter shall disconnect from the grid.
- **HV2:**
  Class 2 overvoltage protection point.
  When the grid voltage exceeds this threshold and persists above it for the preconfigured protection response time, the inverter shall initiate grid disconnection.
- **HF2:**
  Class 2 overfrequency protection point.
  When the grid frequency exceeds this threshold and remains above it for the specified protection response time, the inverter shall disconnect from the grid.

5.2.4.4 Other Page (User modification not recommended)

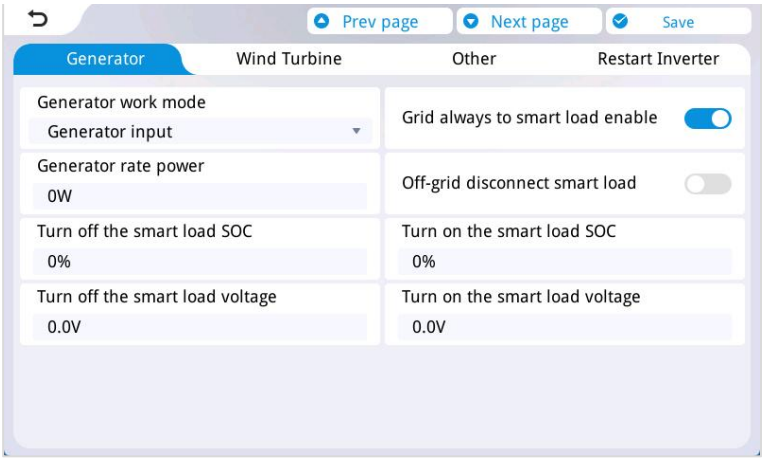


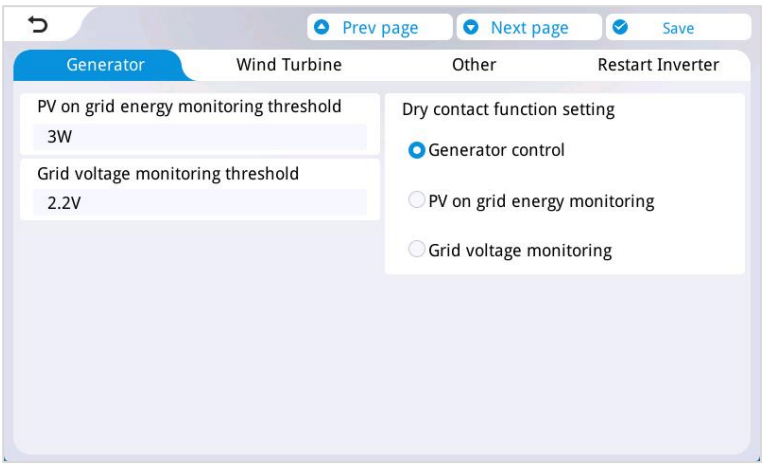
- **Volt-Watt (V-P) curve enable:**
  Regulates the active power of the inverter according to the set grid voltage.
- **Volt-Var (V-Q) curve enable:**
  Adjustment of the inverter reactive power according to the set grid voltage.
- **LVRT/HVRT enable:**
  Adjustment of the grid HV ride-through / LV ride-through values.

- **LFRT/HFRT enable:** According to the preset grid high-frequency/low-frequency ride-through thresholds.
- **Watt-Var (P-Q) curve enable:** Adjustment of the inverter reactive power according to the set active power.
- **Watt-PF (P-PF) curve enable:** Adjustment of the inverter power factor according to the set active power.
- **Frequency Droop (F-P) enable:** Adjustment of inverter output power according to grid frequency.
- **DRM Enable:** Australia only.

5.2.5 Advanced Setup

5.2.5.1 Generator





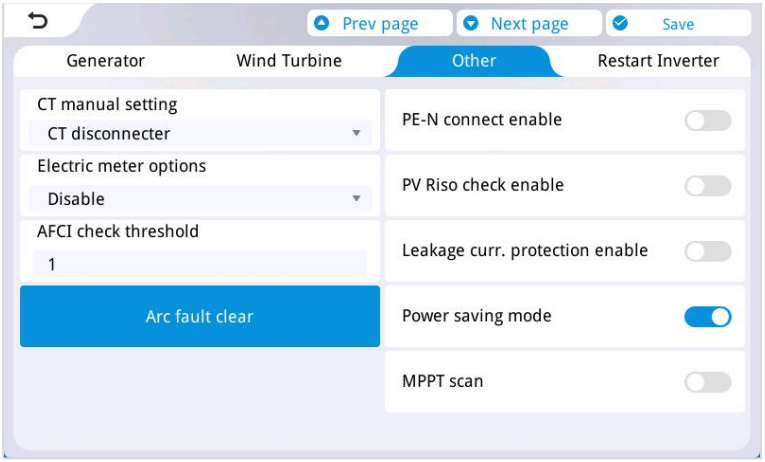
- **Generator work mode:**
  ① **Generator input:** When the generator is connected to the "Gen port", select the "Generator input".
  ② **Micro inverter input:** When the grid-tied inverter is connected to the "Gen Port" of the hybrid inverter, select the "Microinverter Input" .
  ③ **Smart load:** When the load is connected to the "Gen port", select "Smart load output" .
- **Grid always to smart load enable:** When the inverter operates in hybrid grid mode, the smart load remains constantly enabled.
- **Generator rate power:** Setting the rated power of the generator.
- **Off-grid disconnect smart load:** When the inverter operates in off-grid mode, the smart load shall be immediately disabled.
- **Turn on the smart load SOC:** When battery SOC > this value, enable smart load. (Effective when BMS communication is normal)
- **Turn off the smart load SOC:** When battery SOC < this value, disable smart load. (Effective when BMS communication is normal).
- **Turn on the smart load voltage:** When battery voltage > this value, enable smart load. (Effective when BMS communication is not established or fails)
- **Turn off the smart load voltage:** When battery voltage < this value,disable smart load . (Effective when BMS communication is not established or fails).
- **Dry contact function setting:** ① Generator control. ② PV on grid energy monitoring. ③ Grid voltage monitoring.
- **Grid voltage monitoring threshold:** When the grid voltage exceeds the threshold, the dry contact operates.
- **PV on grid energy monitoring threshold:** When the PV grid-connected energy exceeds the threshold, the dry contact operates.

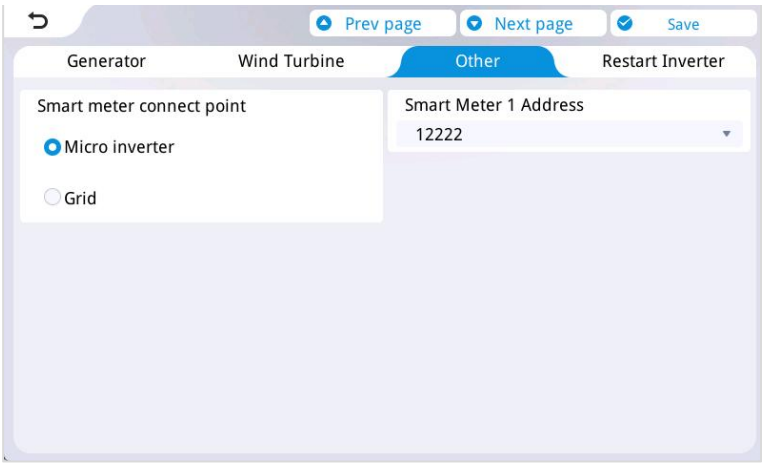
5.2.5.2 Wind Turbine



- **MPPT1/2/3:** Enable for wind turbine input.
- **V1/2/3/4.../14:** Voltage parameters for the wind turbine.
- **C1/2/3/4.../14:** Current parameters for the wind turbine.

5.2.5.3 Other Page





- **CT manual setting:**

Select the CT direction based on the CT installation (ensure that the direction of each phase CT is consistent).

① When the arrow on the CT points to the inverter, set it to "Point to Inverter".

② When the arrow on the CT points to the grid, set it to "Point to Grid".

- **Electric meter options:**

Whether to enable meter.

- **PE-N Connect enable:** Enable automatic switching of PE-N connections.
- **PV Riso check enable:** Enable PV insulation impedance detection.
- **Leakage curr. protection enable:** Enable leakage current protection.
- **Power saveing mode:** When the energy-saving mode is activated:

① If the load power is less than 35W, the inverter output will turn off after 5 min;

② If the load power is greater than 56W, the inverter output will restart immediately.

- **MPPT scan:** When this function is enabled: The inverter will perform an MPPT global scan every 30 min. During the scan, the photovoltaic power will drop to 0W and then reach the maximum power point.

Note: Applicable to scenarios where the photovoltaic panels cannot output maximum power due to shading or other reasons.

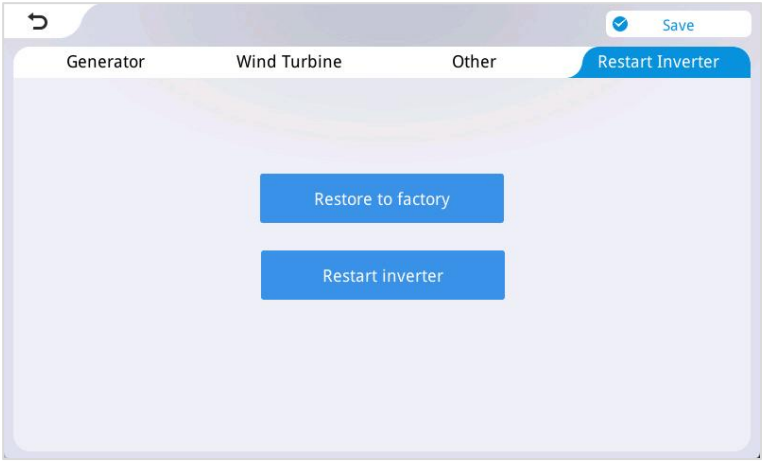
- **Smart Meter 1 Address**
- **AFCI check threshold:** AFCI sensitivity setting range: 0-100.

0: AFCI disabled; 1-100: AFCI enabled, with higher values indicating lower sensitivity.

- **Arc fault clear**

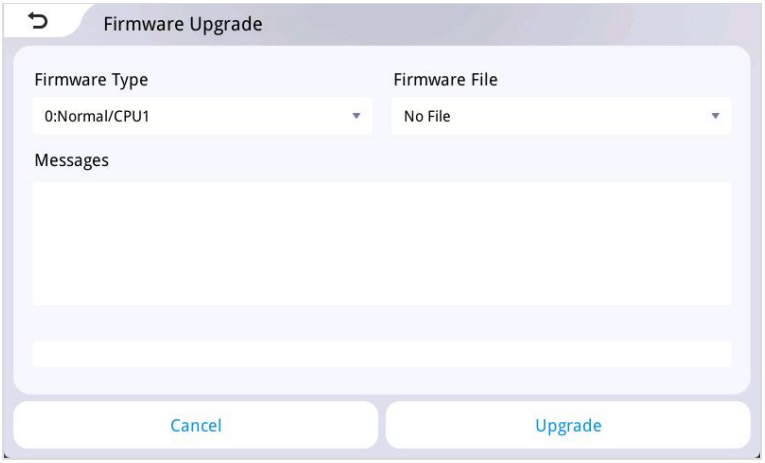
- **Smart meter connect point:** Select the corresponding object based on the power to be collected by the meter.
  ① When the meter is required to collect micro-inverter power, select "Micro inverter" (valid only when the micro-inverter is connected to the grid side);
  ② When the meter is required to collect grid power, select "Grid".

5.2.5.4 Restart Inverter



- **Restore to factory:** Reset all inverter settings.
- **Restart inverter:** Restart the inverter.

5.2.6 Firmware Upgrade via USB Drive



- **Firmware Type:**
  ① Firmware type.
  ② **0 : Normal/CPU1 —** for upgrading the inverter is primary CPU1 program.
  ③ **1 : CPU2 —** for upgrading the inverter is primary CPU2 program.
  ④ **2 : AUX DSP —** for upgrading the inverter is auxiliary DSP program.
  ⑤ **3 : AFCI MCU —** for upgrading the AFCI chip program.
  ⑥ **4 : BMS MCU —** for upgrading the battery BMS program.

- **Firmware File:** Firmware file in the USB drive.
- **Cancel:** Cancel the upgrade.
- **Upgrade:** Update the firmware.

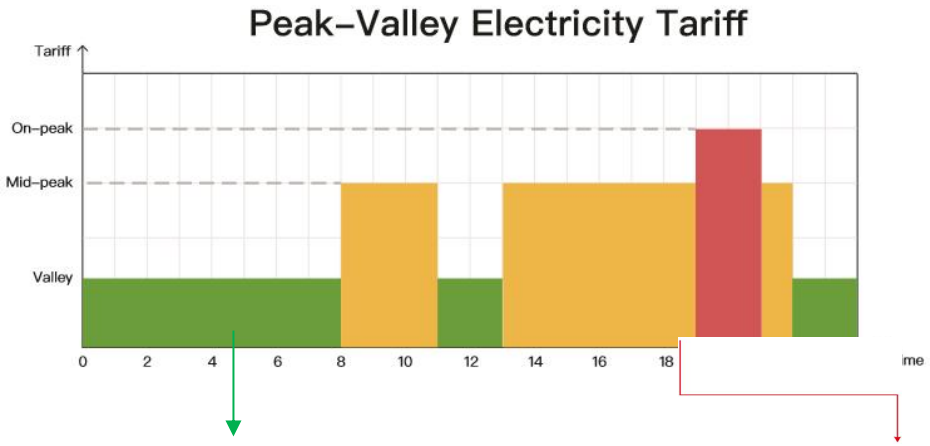
5.3 Time-slot Charging/Discharging Function

The product has the function of charging and discharging at different time periods. Users can set different charging and discharging time periods according to the local peak and valley electricity prices, so as to make rational use of the utility power and photovoltaic energy. When the utility power price is expensive, the battery inverter can be used to supply electricity to the load. When the utility power price is low, the utility power can be used to supply power to the load and charge the battery, which can help users save electricity bills to the greatest extent. Users can enable or disable the time-slot charging and the time-slot discharging functions in the settings menu, and configure the charging and discharging periods, including the scheduled grid-charging start time and duration, as well as the scheduled battery-discharging start time and duration.

The following is an example to assist users in understanding this feature.

Before using this function for the first time, please set the local time in the parameters menu; afterwards, users can set corresponding time periods according to the electricity prices during peak and off-peak hours in the local area.

The device also supports configuring battery discharge outside the scheduled discharge periods.



Time-slot Utility Charging & Loading Function	Time-slot Battery Discharging Function
	
With 3 definable periods, the user can freely set the mains charging/supplying power time within the range of 00:00 to 23:59. During the time period set by the user, if PV energy is available, PV energy will be used first, and if PV energy is not available or insufficient, utility energy will be used as a supplement.	With 3 definable time periods, users can freely set the battery discharge time within the range of 00:00 to 23:59. During the time set by the user, the inverter will give priority to the battery inverter to carry the load, and if the battery power is insufficient, the inverter will automatically switch to mains power to ensure stable operation of the load.

5.4 Battery parameters

- **Lead-acid battery**

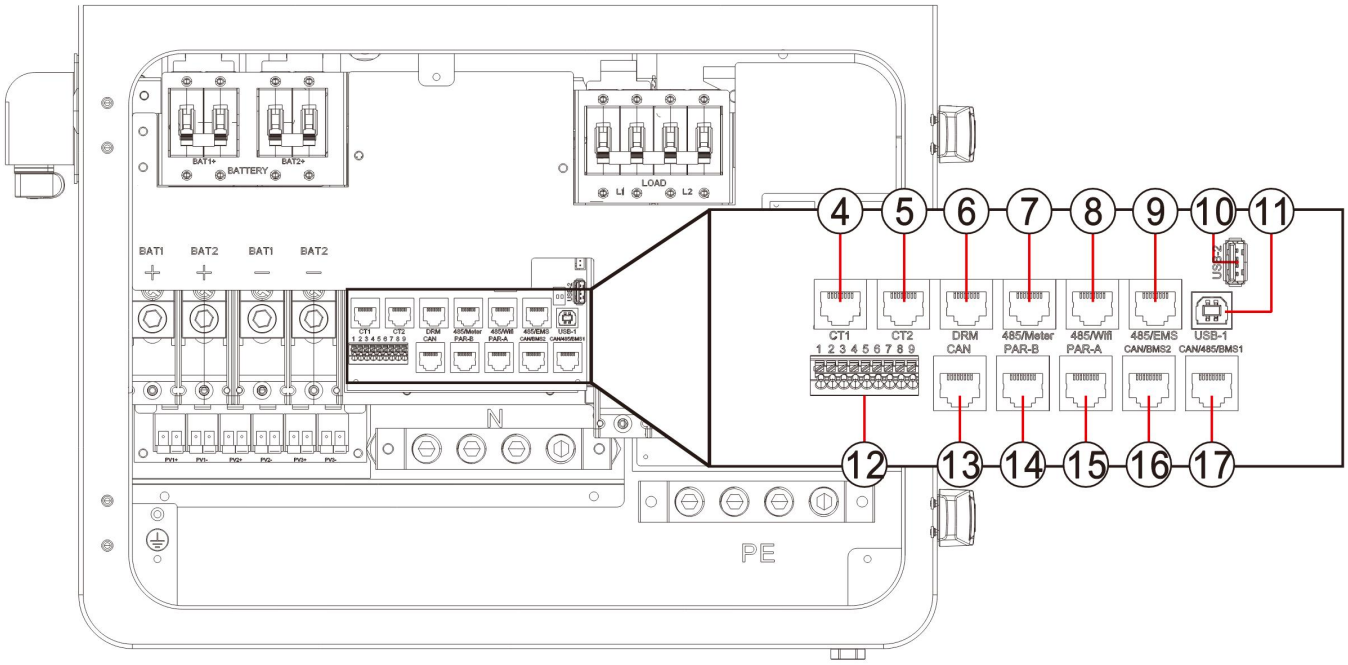
Parameters \ Battery type	Sealed lead acid battery (SLD)	Gel lead acid battery (GEL)	Flooded lead acid battery (FLD)	User-defined (USE)	Adjustable
Overvoltage Disconnect Voltage	60V	60V	60V	60V	
Battery fully charged recovery point	52V	52V	52V	52V	√
Boost Charging Voltage	57.6	57.6	57.6	40 ~60V	√
Undervoltage Alarm Voltage	44V	44V	44V	40 ~60V	√
Undervoltage Alarm Recovery Voltage	Undervoltage alarm voltage + 0.8V				
Low Voltage Disconnect Voltage	42V	42V	42V	40 ~60V	√
Low Voltage Disconnect Recovery Voltage	52V	52V	52V	52V	√
Discharge Limit Voltage	57.6	57.6	57.6V	40 ~ 60V	√
Over-discharge Delay Time	5sV	5sV	5s	1 ~30s	√
Boost Charge Duration	120 min	120 min	120 min	10 ~900 min	√

- **Li-ion battery**

Parameters \ Battery type	Ternary (N13)	Ternary (N14)	LFP (L16)	LFP (L15)	LFP (L14)	Adjustable
Overvoltage Disconnect Voltage	60V	60V	60V	60V	60V	
Battery Fully Charged Recovery Point	50.4V	54.8V	53.6V	50.4V	47.6V	√
Equalization Charging Voltage	-	-	-	-	-	√
Boost Charging Voltage	53.2V	57.6V	56.8V	53.2V	49.2V	√
Undervoltage Alarm Voltage (Fault 01)	43.6V	46.8V	49.6V	46.4V	43.2V	√
Undervoltage Alarm Recovery Voltage (Fault 01)	Undervoltage alarm voltage+0.8V					
Low Voltage Disconnect Voltage (Fault 04)	38.8V	42V	48.8V	45.6V	42V	√
Low Voltage Disconnect Recovery Voltage (Fault 04)	46V	49.6V	52.8V	49.6V	46V	√
Discharge Limit Voltage	36.4V	39.2V	46.4V	43.6V	40.8V	√
Over-discharge Delay Time	30s	30s	30s	30s	30s	√
Boost Charge Duration	120 min	120 min	120 min	120 min	120 min	√

6. Communication

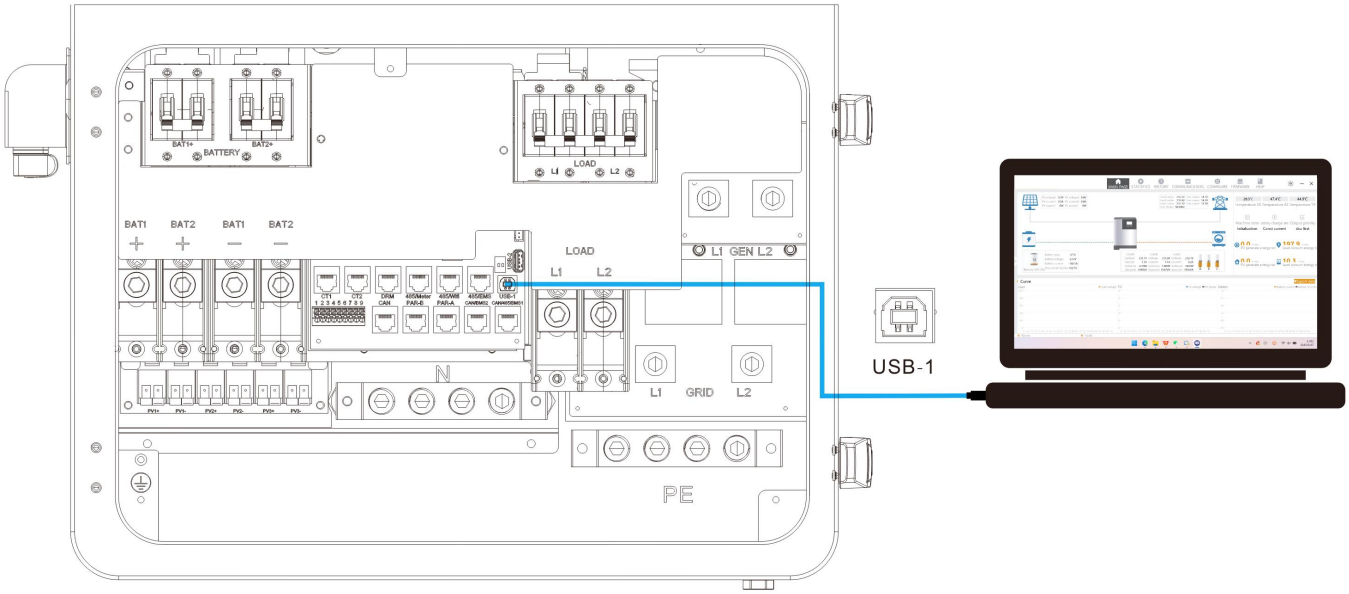
6.1 Overview



4	Grid CT1	5	Micro-inverter CT2	6	DRM Port
7	485/Meter Port	8	485/WiFi Port	9	485/EMS Port
10	Display USB-2 Port	11	USB-1 Port	12	Dry Contact Interface SC1
13	CAN2 Communication Port	14	Parallel Port-B	15	Parallel Port-A
16	CAN/BMS2 Port	17	CAN/485/BMS1 Port		

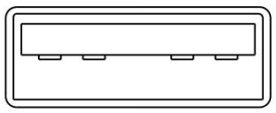
6.2 USB-1 Port

The user can read and modify device parameters through this port by using the host software. Please contact us for the host software installation package if you require one.



6.3 USB-2 Display Port

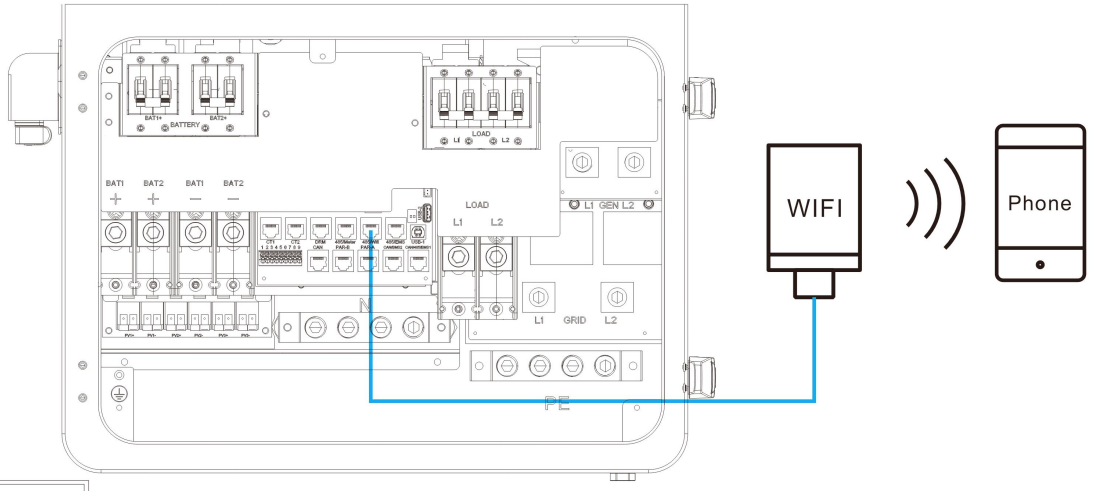
It is used to update the screen firmware.

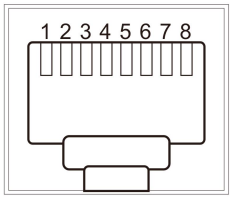


6.4 Wi-Fi port

The WiFi communication port can be connected to the optional RS485-to-WiFi/GPRS communication module independently developed by our company. With this module installed, users can connect to our inverters and monitor the operating status and parameters of the inverters via the mobile app.

- **WiFi Port 1 (either one)**

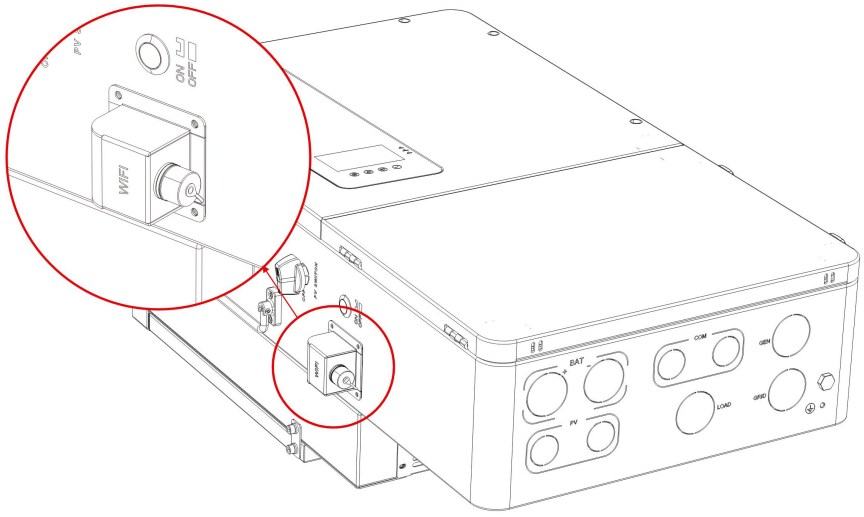


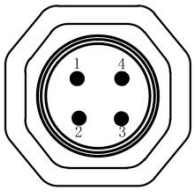


485/WIFI

RJ45	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
Definition	5V	GND	/	/	/	/	RS485-A	RS485-B

- **WiFi Port 2 (either one)**

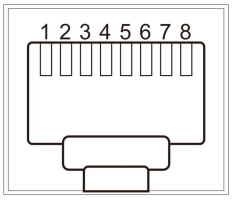




Pin	Description
1	VCC
2	GND
3	RS485-A
4	RS485-B

6.5 CAN/RS485/BMS1 Port

The CAN/RS485/BMS1 interface is used to connect to the BMS lithium battery.



CAN/485/BMS1

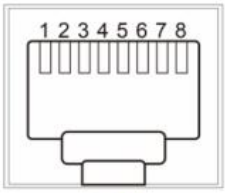
RJ45	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
Definition	RS485-B	RS485-A	/	CANH	CANL	/	RS485-A	RS485-B

⚠ NOTICE

If you need to use the inverter to communicate with the lithium battery BMS, please contact us for the communication protocol or upgrade the inverter to the appropriate software programme.

6.6 CAN port

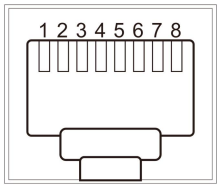
The CAN port is used to connect to the BMS of the Li-ion battery for CAN communication.



CAN

RJ45	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
Definition	/	/	/	CANH	CANL	/	/	/

6.7 DRM (Specific Markets Only)



DRM

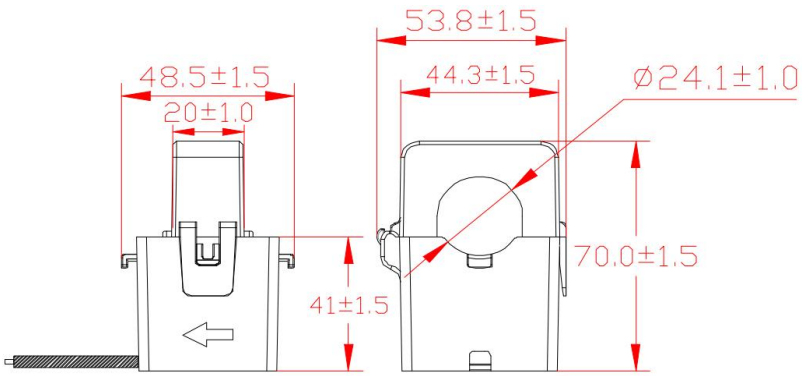
RJ45	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
Definition	DRM5	DRM6	DRM7	DRM8	RefGen	COM/ DRM0	V+	V-

MODEL	RJ45 socket asserted by shorting pins		Requirement
DRM0	5	6	Operate the disconnection device.
DRM5	1	5	Do not generate power to the grid.
DRM6	2	5	Do not generate at more than 50% of rated power.
DRM7	3	5	Do not generate at more than 75% of rated power AND sink reactive power if capable.
DRM8	4	5	Increase power generation (subject to constraints from other active DRM) .

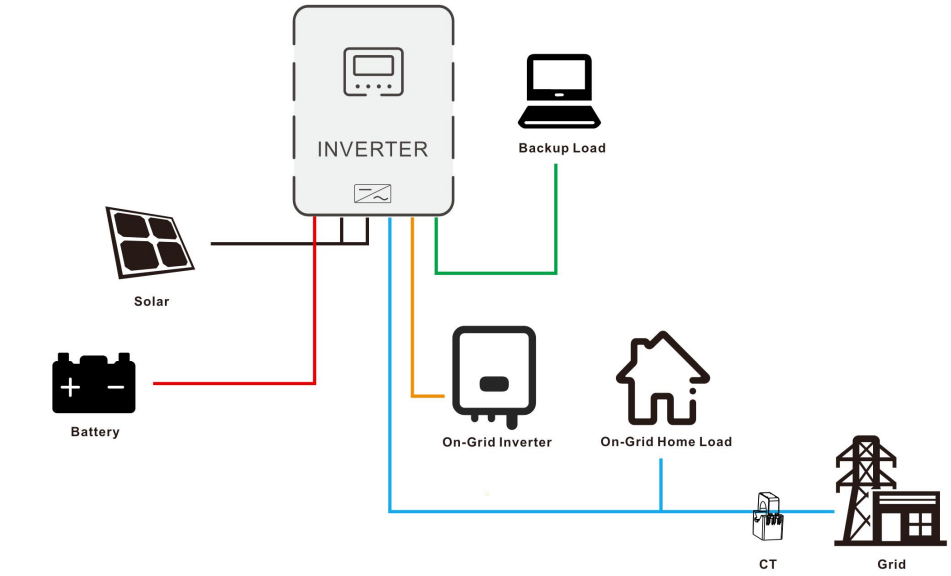
6.8 External CT Prot

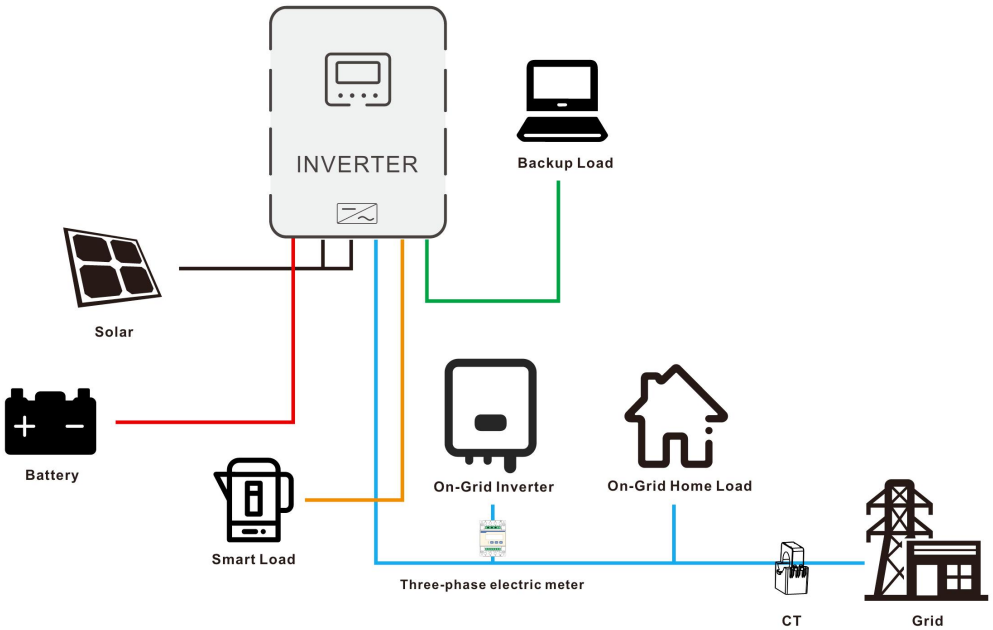
⚠ **Important Note:** CT1 is used for grid-side current monitoring and must be reliably connected to the main grid circuit to ensure matching with system electrical parameters; CT2 should be accurately connected to the AC output terminal of the micro-inverter for real-time monitoring of the inverter's current output status.

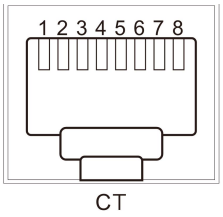
1. Split Core Current Transformer (CT) dimension: (mm)
2. Secondary output cable length is 4 m (157.48 in).











RJ45	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
Definition	CT3+	CT3-	/	CT2+	CT2-	/	CT1+	CT1-

6.9 DIP Switch Configuration

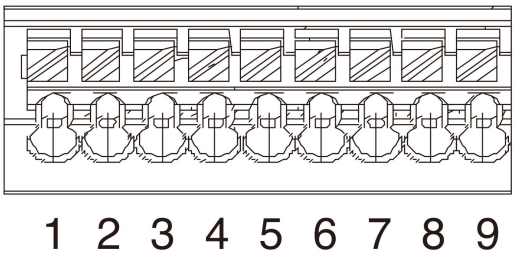


This DIP switch is a resistor matching switch for parallel communication. When performing parallel CAN communication, the first and last units in the parallel system must have DIP switches 1 and 2 set to the up position (ON).

6.10 Dry Contact Function

The dry contact port has 5 functions:

① Generator remote start/stop
② Temperature sampling (reserved)
③ RSD power supply
④ Remote signal transmission
⑤ Remote signal reception



Function	Definition
Remote start/stop of the generator	1-2: NC; 1-3: NO Remote generator shutdown: Pins 1 to 2 are normally closed; pins 1 to 3 are normally opened. 1. Without BMS communication: When the battery voltage drops below the **【Batt volt stop dischg in hybrid】** parameter or the **【Batt voltage low fault】** parameter, pin 1 to 2 is normally open (NO), and pin 1 to 3 is normally closed (NC). When the battery voltage recovers to the **【Batt volt restart dischg】** parameter, or after the battery is fully charged and returns to the inverter state, pin 1 to 2 is normally closed (NC), and pin 1 to 3 is normally open (NO). 2. With BMS communication:When the battery SOC drops below the **【Batt SOC stop dischg in hybrid】** parameter or the **【Batt SOC low fault】** parameter, pin 1 to 2 is normally open (NO), and pin 1 to 3 is normally closed (NC). When the battery SOC recovers to the **【Batt SOC restart dischg parameter】**, or after the battery is fully charged and returns to the inverter state, pin 1 to 2 is normally closed (NC), and pin 1 to 3 is normally open (NO).
Temperature sampling	Pins 9 and 5 can be used for battery temperature sampling compensation.

(reserved)	
RSD power supply	Pin 9 is GND, pin 4 is RSD 12V+.
Remote signal transmission	Pins 9 and 7/8: DSP internal signal transmission. When the battery voltage drops below the 【**Batt volt stop dischg in hybrid**】 parameter or the 【**Batt voltage low fault**】 parameter,the output voltage from pin 9 to 7/8 is 0V. When the battery voltage recovers to the 【**Batt volt restart dischg**】 parameter, or after the battery is fully charged and returns to the inverter state, the output voltage from pin 9 to 7/8 is 5V.
Remote signal reception	Pins 9 and 6: DSP internal signal reception.When pin 6 is connected to pin 9, the inverter cuts off the output; otherwise, the inverter restores the output.

⚠ *NOTICE*

If you need to use the remote start/stop function of the generator with dry contact, ensure that the generator has ATS and supports remote start/stop.

7. Fault and Remedy

7.1 Fault code

Fault Code	Fault Name	Whether it affects the output or not	Description
01	BatVoltLow	NO	Battery undervoltage alarm.
02	BatOverCurrSw	YES	Battery discharge average current overcurrent (software protection).
03	BatOpen	YES	Battery not-connected alarm.
04	BatLowEod	YES	Battery undervoltage stop discharge alarm.
05	BatOverCurrHw	YES	Battery overcurrent (hardware protection).
06	BatOverVolt	YES	Charging overvoltage protection.
07	BusOverVoltHw	YES	Bus overvoltage (hardware protection).
08	BusOverVoltSw	YES	Bus overvoltage (software protection).
09	PVVoltHigh	NO	PV overvoltage protection.
10	Arc Fault	YES	AFCI Arc fault.
11	PvBoostOCHw	NO	Boost overcurrent hardware protection.
12	SpiCommErr	YES	Master-slave SPI communication failure.
13	Overload Bypass	YES	Bypass overload protection.
14	Overload Inverter	YES	Inverter overload protection.
15	AcOverCurrHw	YES	Inverter overcurrent hardware protection.
16	AuxDSpReqOffPWM	YES	Slave chip OFF request fault.

Fault Code	Fault Name	Whether it affects the output or not	Description
17	InvShort	YES	Inverter short-circuit protection.
18	Bus soft failed	YES	Bus soft-start failure.
19	OverTempTrans	YES	Transformer radiator over-temperature protection.
20	OverTempInv	YES	Inverter radiator over-temperature protection.
21	FanFail	YES	Fan failure.
22	EEPROM	YES	Memory failure.
23	Model NumErr	YES	Model setting error.
24	Busdiff	YES	Positive and negative bus voltage imbalance.
25	BusShort	YES	Bus short circuit.
26	Rlyshort	YES	Inverter AC output backfeed to bypass AC output.
27	Line Phase Loss	YES	Grid input phase loss.
28	LinePhaseErr	YES	Grid input phase error.
29	BusVoltLow	YES	Low bus voltage protection.
30	BatCapacityLow1	NO	Alarm given when battery capacity rate is lower than 10% (setting BMS to enable validity).
31	BatCapacityLow2	NO	Alarm given when battery capacity rate is lower than 5% (setting BMS to enable validity).
32	BatCapacityLowStop	YES	The inverter stops when the battery capacity is low (setting the BMS to enable validity).
33	ControlCanFault	YES	Control CAN fault in parallel operation.
34	CanCommFault	YES	CAN communication fault in parallel operation.
35	ParaAddrErr	YES	Parallel ID（communication address) setting error.
36	Balance currentOC	YES	Balanced bridge arm overcurrent fault.
37	ParaShareCurrErr	YES	Current distribution fault in parallel operation.
38	ParaBattVoltDiff	YES	Large battery voltage difference in parallel mode.
39	ParaAcSrcDiff	YES	Inconsistent AC input source in parallel mode.
40	ParaHwSynErr	YES	Hardware synchronization signal error in parallel mode.
41	InvDcVoltErr	YES	Inverter DC voltage error.
42	SysFwVersionDiff	YES	Inconsistent system firmware version in parallel mode.
43	ParaLineContErr	YES	Parallel line connection error in parallel mode.
44	Serial number error	YES	No serial number set at factory.
45	Error setting of split-phase mode	YES	Item “Parallel” setting error.
49	Grid overvoltage	YES	Grid voltage too high.
50	Grid undervoltage	YES	Grid voltage too low.
51	Grid over Frequency	YES	Grid frequency too high.
52	Grid under	YES	Grid frequency too low.

Fault Code	Fault Name	Whether it affects the output or not	Description
	Frequency		
53	Grid loss	YES	Grid voltage loss.
54	Grid DC current over	YES	Excessive DC component in grid current.
55	Grid standard un init	YES	Grid-Connection standard micro-initialization.
56	Low insulation resistance fault	NO	PV1+, PV2+, PV3+, PV- impedance to ground abnormally low.
57	Leakage current overload fault	YES	System leakage current exceeds the standard.
58	BMSComErr	NO	BMS communication error.
60	BMSUnderTem	NO	BMS low temperature alarm (effective after successful BMS communication).
61	BMSOverTem	YES	BMS over-temperature alarm (effective after successful BMS communication).
62	BMSOverCur	YES	BMS overcurrent alarm (effective after successful BMS communication).
63	BMSUnderVolt	NO	BMS undervoltage alarm (effective after successful BMS communication).

7.2 Troubleshooting

Fault Code	Meaning	Causes	Remedy
/	No screen display	No power input, or the switch on the bottom of the unit is not switched on.	Check whether the battery air circuit breaker or PV air circuit-breaker is turned on. Check if the switch is "ON". Press any button on the screen to exit the screen sleep mode.
01	Battery undervoltage protection	Battery voltage is lower than the parameter setting value.	Wait until the battery charge is restored to above the low voltage disconnection recovery voltage.
03	Battery not connected	The battery is not connected, or the BMS is in discharge protection state.	Check that the battery is reliably connected. Check that the battery circuit-breaker is off. Ensure that the BMS is able to communicate properly.
04	Battery over-discharge protection voltage	The battery voltage is lower than the value set in 【Battery Setup】- 【Battery Discharge】- 【Batt. voltage low fault】.	Manual reset: Turn off and restart. Automatic reset: Charge the battery so that the battery voltage is higher than the voltage set in the parameter item 【Battery Setup】- 【Battery Discharge】- 【Battery Recovery Voltage】.
06	Battery over-voltage when charging	The battery is in an over-voltage condition.	Manually power off and restart. Check to see if the battery voltage exceeds the limit. If it exceeds, the battery needs to be discharged until the voltage is below the

Fault Code	Meaning	Causes	Remedy
			battery over-voltage recovery point.
13	Bypass overload (software detection)	Bypass output power or output current overload for a period of time.	Reduce the load power and restart the device.
14	Inverter overload (software detection)	Inverter output power or output current overload for a period of time.	
19	Heat sink of PV input over-temperature (software detection)	Heat sink of PV input temperature exceeds 90℃ for 3s.	Normal charging and discharging is resumed when the temperature of the heat sink cools below the over-temperature recovery temperature.
20	Heat sink of inverter output over-temperature (software detection)	Heat sink of inverter output temperature exceeds 90℃ for 3s.	
21	Fan failure	Hardware detects fan failure.	Manually toggle the fan after powering off the machine to check for foreign matter blockage.
26	AC input relay short-circuit	Relay for AC input sticking.	Manually turn off and restart the machine. If the fault reappears after restarting, you need to contact the after-sales service to repair the machine.
28	Utility input phase fault	AC input phase does not match AC output phase.	Make sure that the phase of the AC input is the same as the phase of the AC output.

8. Protection and Maintenance

8.1 Protection features

No.	Protection Functions	Description
1	PV input current limiting protection	When the charging current or power of the PV array configured exceeds the PV input rated value, the inverter will limit the input power and charge at the rated.
2	PV input overvoltage	If the PV voltage exceeds the maximum value allowed by the hardware, the machine reports a fault and stops PV boosting to output a sinusoidal AC waveform.
3	Anti-reverse charge protection at night	At night, the battery will be prevented from discharging to the PV module because the battery voltage is greater than the PV module voltage.
4	AC input over-voltage protection	When the mains phase voltage exceeds 140 Vac, mains charging will stop and the inverter will switch to output mode.
5	AC input undervoltage protection	When the mains phase voltage falls below 90Vac, mains charging will stop and the inverter will switch to output mode.
6	Battery over-voltage	When the battery voltage reaches the over-voltage disconnection voltage

No.	Protection Functions	Description
	protection	point, it will automatically stop the PV and mains charging of the battery to prevent over-charging and damage to the battery.
7	Battery under-voltage protection	When the battery voltage reaches the low-voltage disconnection voltage point, it will automatically stop discharging the battery to prevent the battery from being over-discharged and damaged.
8	Battery over-current protection	When the battery current exceeds the range allowed by hardware, the machine will turn off output and stop discharging the battery.
9	AC output short-circuit protection	When a short-circuit fault occurs at the load, the AC output voltage will be switched off immediately and output again after 1 min. If the output load is still short-circuited after 3 attempts, the short-circuit fault of the load must be eliminated first and then manually re-powered in order to restore the normal output.
10	Heat sink over-temperature protection	When the internal temperature of the inverter is too high, the inverter will stop charging and discharging; when the temperature returns to normal, the inverter will resume charging and discharging.
11	AC output reverse	Prevents backfeeding of battery inverter AC to bypass AC inputs.
12	Bypass overcurrent protection	Built-in AC input overcurrent protection circuit breaker.
13	Bypass phase inconsistency protection	When the phase of the two bypass inputs is different from the phase of the inverter phase split, the machine will prohibit cutting into the bypass to prevent the load from dropping out or short-circuiting when cutting into the bypass.
14	Arc fault circuit interrupter protection (AFCI)	Its primary function is to detect whether electric arcs occur in the wires between the PV modules and the inverter, as well as between PV modules themselves, due to aging or other factors. This protection mechanism prevents fire hazards caused by electric arcs; once an arc is detected, the inverter will immediately shut down its operation to activate protective measures.
15	Anti-Islanding protection	It serves as a safety switch for the power system. When the grid suffers a sudden power outage, it will quickly disconnect the inverter from the grid, preventing the formation of an island and ensuring the safety of maintenance personnel as well as the normal operation of the equipment.

8.2 Maintenance

To maintain optimum and long-lasting working performance, we recommend that the following items are checked twice a year.

- Ensure that the airflow around the inverter is not blocked and remove any dirt or debris from the radiator.
- Check that all exposed conductors are not damaged by sunlight, friction with other surrounding objects, dry rot, insect or rodent damage, etc. The conductors need to be repaired or replaced if necessary.
- Verify that the indications and displays are consistent with the operation of the equipment,

note any faults or incorrect displays, and take corrective action if necessary.

- Check all terminals for signs of corrosion, insulation damage, high temperatures, or burning/discoloration, and tighten terminal screws.
- Check for dirt, nesting insects, and corrosion; clean as required. Clean the insect screen regularly.
- If the lightning arrester has failed, replace the failed arrester in time to prevent lightning damage to the inverter or other equipment of the user.

DANGER

Make sure that the inverter is disconnected from all power sources and that the capacitors are fully discharged before carrying out any checks or operations to avoid the risk of electric shock.

8.3 Storage

If the inverter is not to be put into use immediately, the following requirements shall be met for storage:

- Do not remove the original packaging of the inverter.
- The storage temperature shall be maintained at -40 ~ +70℃ (−40 ~ 158°F); the relative humidity shall be maintained at 5% ~ 95% RH.
- Store in a clean and dry place to protect against dust and moisture erosion.
- Maximum stacking height: 4 layers. When stacking, place the inverters with care to prevent tipping over, which may cause personal injury or equipment damage.
- Conduct regular inspections during storage (recommended once every three months). Replace the packaging materials in a timely manner if moth damage, rat bites, or packaging damage is found.
- If the storage period is 2 years or longer, the inverter must be inspected and tested by professional personnel before being put into use.

9. Datasheet

Models	SGS-16K25MAX	SGS-18K28MAX	Adjustable
AC Output (Load)			
Rated Output Power	16000 W	18000 W	
Max. Peak Power (off-grid)	32000 VA	36000 VA	
Rated Output Voltage	120/240 Vac (single-phase); 120/208 Vac (three-phase)		√
Output Voltage Error	± 5%		
Rated Frequency	50/60 Hz ±0.3 Hz		√
Waveform	Pure sine wave		
Switch Time	10ms (Typical)		
AC Output (On-grid)			
Rated Output Power	16000 W	18000 W	
Max. Apparent Power	17600 VA	19800 VA	
Power Factor	0.8 leading to 0.8 lagging		
Motor Load Capacity	8 HP	9 HP	
Locked Rotor Current (LRA)	188 A		
Rated Output Voltage	120/240 Vac (L1+L2+N+PE)		
Rated AC Output Frequency	50/60 Hz		
Rated AC Output Current	66.7 Aac	75 Aac	
THD	<3%		
Battery Data			
Battery Type	Lithium-ion Battery / Lead-acid Battery / User-defined		√
Rated Battery Voltage	48 Vdc		
Battery Voltage Range	40-60 Vdc		
Max. Generator Charging Current	340 Adc	380 Adc	√
Max. Grid Charging Current	340 Adc	380 Adc	√
Max. Hybrid Charging Current	340 Adc	380 Adc	√
Charging Strategy for Li-ion Battery	Self-adaptation to BMS		
PV Input			
No. of MPPT Trackers	3		
No. of Strings MPPT Tracker	2+2+2		
Max. PV Access Power	32000 W	36000 W	
Max. PV Input Power	25600 W	28800 W	
Max. PV Input Current	42 A / 42 A / 42 A		
Max. Input Short-Circuit Current	63 A / 63 A / 63 A		
Max. PV Input Voltage	600 V		
MPPT Operating Voltage Range	120 V ~ 500 V		
Grid/Generator Input			
Input Voltage Range	Phase Voltage: 90 V~140 V; Line Voltage: 180 V~280 V		
Input Frequency Range	40-70 Hz		
Max. Bypass Overload Current	200 A		

(Grid)		
Efficiency		
MPPT Tracking Efficiency	99.9%	
Max. Efficiency	≥97.5%	
European Efficiency	97%	
Protection		
PV Input Lightning Protection	Yes	
Anti-islanding Protection	Yes	
PV Input Reverse Polarity Protection	Yes	
Insulation Resistor Detection	Yes	
Residual Current Monitoring Unit	Yes	
Output Overcurrent Protection	Yes	
Output Shorted Protection	Yes	
Arc fault circuit interrupter protection (AFCI)	Yes	
Surge Protection	DC type II/AC type II	
Overvoltage Category	DC type II/AC type III	
Certification		
Certificate	DC Arc-Fault Circuit Protection UL 1699B:2018, CSA C22.2#107.1, CALIFORNIA Rule 21, IEEE 1547:2018, IEEE 1547.1:2020, UL 1741 SB, Hawaiian HECO SRD-IEEE-1547.1:2020 Ed.2.0, Interconnection of Distributed Energy Resources and Electricity Supply Systems [CSA C22.3#9:2020 Ed.2], FCC 15 Class B, UL 1741:2021 Ed.3+R	
General Data		
Parallel Capacity	9	
Operating Temperature	−40 ~ 140 ℉, >113 ℉ derated	
Humidity Range	0～100%	
Noise	<55dB	
Protection Degree	IP65	
Cooling Method	Heat sink + intelligent air cooling	
Standby Power Consumption	70W	
Dimensions	33.86×18.90×12.32 in	
Weight	142.64 lbs	
Communication Interface	RS485 / CAN / USB / Dry contact	√
External Modules	Wi-Fi / 4G Stick (Optional)	√



CONTACT US

(833)761-6080

support@sungoldpower.com