

Grid-Hybrid Inverter
SPH/SPM 8000-10000TL-HU
User Manual

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1 Information on this Manual

1.1 Overview

This manual is intended to introduce the SPH 10000TL-HU/SPM 8000-10000TL-HU Inverters manufactured by Shenzhen Growatt New Energy Co, Ltd. (here in after referred to as Growatt) in terms of the installation, operation, commissioning, maintenance and troubleshooting. Please read this manual carefully before using the product, and keep it in a place that is easily accessible to installation, operation and maintenance personnel. The content is continually reviewed and amended as necessary. Growatt reserves the right to make changes to the material at any time and without notice.

1.2 Intended Audience

Only qualified electrical technicians are allowed to install SPH 10000TL-HU/SPM 8000-10000TL-HU Inverters. Reading through this manual and observing all the precautions, qualified electrical technicians will be able to properly install, troubleshoot and configure the SPH 10000TL-HU/SPM 8000-10000TL-HU Inverters. If any questions arise during installation, you can visit en.growatt.com and leave a message.

1.3 Safety Instructions

1. Please read this manual carefully before installation. Damages caused by failure to follow the instructions in the manual are beyond the warranty scope.
2. Only qualified and trained electrical technicians are allowed to perform operations on the Storage Inverter.
3. During installation, please do not touch other parts inside the equipment except wiring terminals.
4. Ensure that all electrical connections comply with local electrical standards.
5. For maintenance, please contact designated local installation and maintenance personnel.
6. Before operating the inverter in the on-grid mode, ensure that you have obtained any permission needed from the local electricity grid network operator.

DANGER	a. Electrical installation, repairs and conversions may only be carried out by electrically qualified persons. b. DO NOT connect the grid to the Load Output Breaker. c. DO NOT reverse the polarity of batteries. Damage WILL occur. d. The components in the inverter are live. Touching live components can result in serious injury or death. e. The inverter must only be opened by qualified service personnel. f. Beware of high PV voltage. Please turn-off the DC switch of PV Panel output before and during the installation to avoid electric shock.

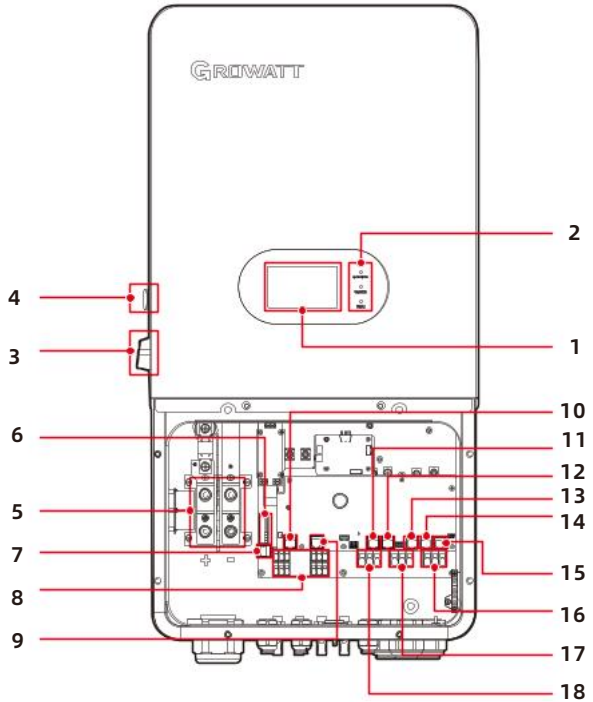
 **DANGER**	g. Beware of high grid voltage. Please turn-off the AC switch at the grid connection before and during the installation to avoid electric shock. h. Beware of large current of the battery output. Please turn-off the battery module before and during the installation to avoid electric shock.
 **WARNING**	a. Make all electrical connections (e.g. conductor termination, fuses, PE, connection, etc.) in accordance with prevailing regulations. When working with the inverter powered on, adhere to all prevailing safety regulations to minimize risk of accidents. b. Systems with inverters typically require additional control (e.g. switches, disconnects) or protective devices (e.g. fusing circuit breakers) depending upon the prevailing safety rules. c. ALL terminals/breakers including battery, MPPT, and AC breaker inputs should only have one conductor connecting to them. d. Whenever the inverter has been disconnected from the power network, use extreme caution as some components can retain charge sufficient to create a shock hazard; to minimize occurrence of such conditions, comply with all corresponding safety symbols and markings present on the unit and in this manual. e. Ensure all covers and doors are closed and secure during operation. All operations regarding transport, installation and start-up, including maintenance must be operated by qualified, trained personnel and in compliance with all prevailing codes and regulations. f. Although designed to meet all safety requirements, some parts and surfaces of Inverter are still hot during operation. To reduce the risk of injury, do not touch the heat sink at the back of the PV-Inverter or nearby surfaces while Inverter is operating.
 **NOTICE**	a. Read this manual carefully before performing any work on the inverter. Keep this manual in a accessible location for future reference. b. The qualified personnel Should be trained in the installation and commissioning of the electrical system as well as dealing with hazards, also they should have the knowledge of the manual and other related documents. As the installer or operator they are required to be familiar with local regulations and directives.

2 Product Introduction

2.1 Product Overview

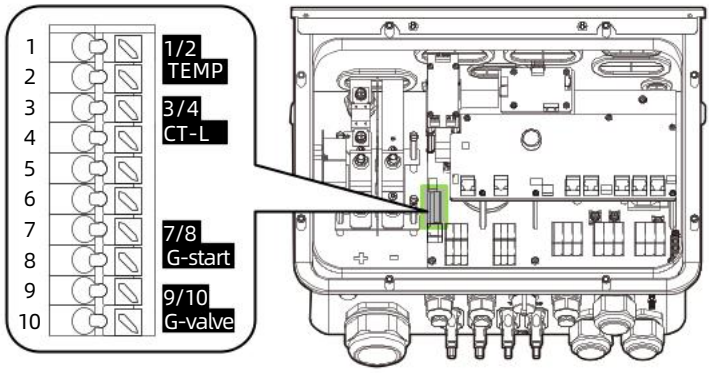
Images are for reference only; please refer to the actual product.

SPH/SPM 8000-10000TL-HU



No.	Description	No.	Description
1	LCD Display	10	DRMS Port
2	Inverter Status LEDs	11	BMS Port
3	PV Disconnect	12	Host Computer Port
4	Power ON/OFF button	13	Meter RJ45
5	Battery Input	14	Parallel-B Port
6	Function Port	15	Parallel-A Port
7	CT (RJ45)	16	Load Port
8	PV Input	17	Generator Input
9	Upgrading Port (USB) /External datalogger port	18	Grid Port

2.2 Function Port Definition



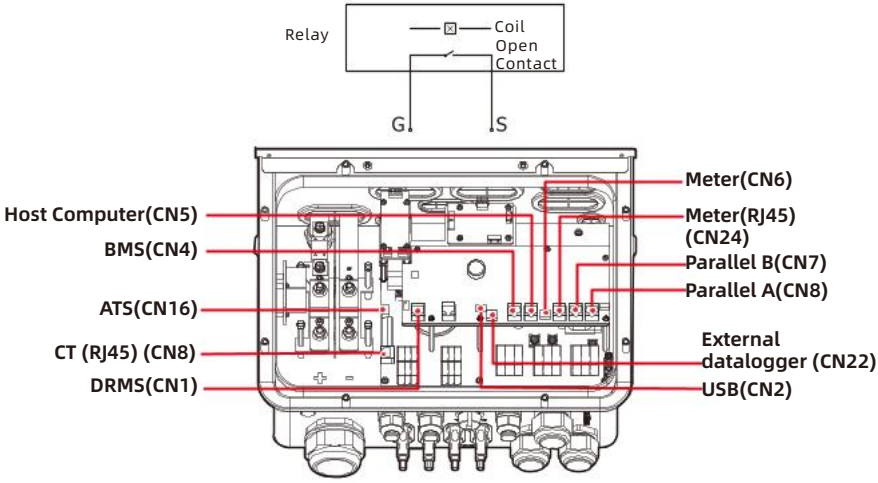
TEMP (1,2): Battery temperature sensor for lead acid battery. Pins 1 and 2 are inserted into the positive(red) and negative(black) ends of the Battery temperature sensor, respectively.

CT-L1 (3,4): Current transformer (CT) for "Export Limit to Home Load" mode clamps on L when in single phase system. Pins 3 and 4 are inserted into the positive(red/white) and negative(black/blue) ends of the CT, respectively.

G-start (7,8): Generator start signal should be connected to the CON board CN9 terminal 7/8 position, G-start nominal open circuit. If the user wants to start the generator, G-start ports should be closed.

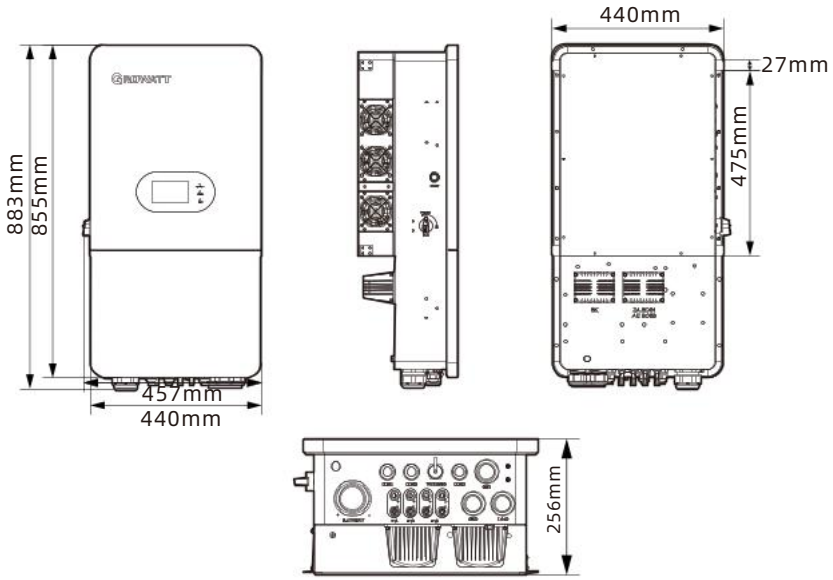
G-valve (9,10): Reserved.

2.3 Other Port Function



CT (RJ45) (CN8): Insert the CT with a network port (RJ45) connector.
ATS (CN16): 230V output port when inverter is on.
BMS (CN4): RS 485 (1B,2A),CAN (4H,5L) port for battery communication.
Parallel A (CN8): Parallel communication port 1 (CAN interface).
Parallel B (CN7): Parallel communication port 2 (CAN interface).
Meter (CN6): For energy meter communication.
External datalogger (CN22): External datalogger port(SPH 10000TL-HU (South Africa) does **NOT** have this function).
Host Computer (CN5): Upper Computer Port.
DRMS(CN1): Control the selling and charging power of inverters.
Meter(RJ45) (CN24): Insert the meter communication with a network port (RJ45) connector.

2.4 Product Size



2.5 Product Features

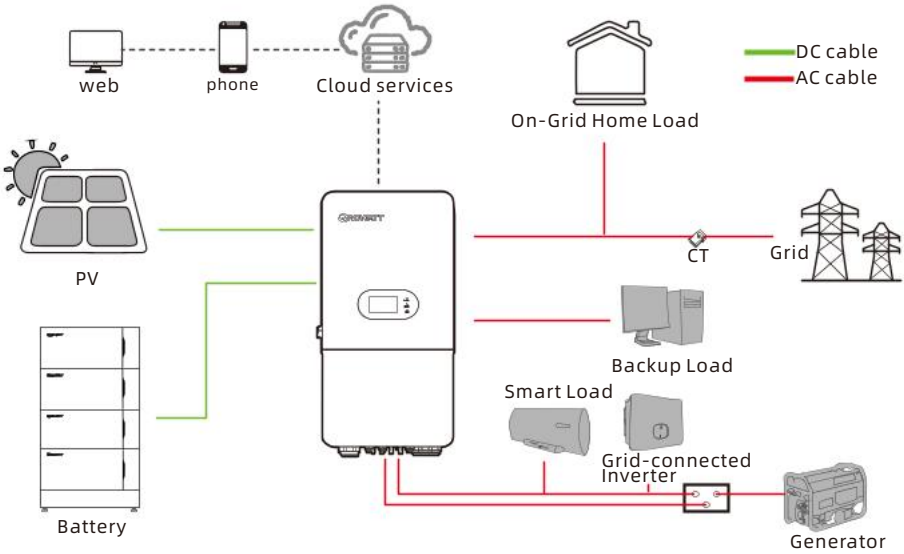
- Supports 230Vac Single Phase/230/400Vac Three Phase System.
- Configurable battery charging current/voltage via touchscreen setting.
- Configurable AC/Solar/Generator Charger priority via touch screen setting.
- Support parallel operation with grid or generator.
- Can be started by photovoltaic, grid or battery.
- Time of use function. Smart battery charging design for optimized battery performance.
- Supporting WiFi/ 4G/ Bluetooth monitoring.

- Smart settable three stages MPPT charging for optimized battery performance
- Overload/Over temperature/Short circuit protection.
- Grid bypass current maximum value can reach 75A(SPM 8000-10000TL-HU (AU): 63A;SPM 8000TL-HU (EU/UK):50A;SPM 10000TL-HU(EU/UK):63A).AC port has a 90A relay, and the software will trigger protection when it reaches maximum value.
- Programmable supply priority for battery or grid
- Programmable multiple operation modes: On Grid Mode, Export Limit to Backup Load, Export Limit to Home Load.

2.6 System Architecture

The following illustration shows basic application of this inverter.
It also includes following devices to have a complete running system.
- Generator or Utility
- PV modules
- Battery

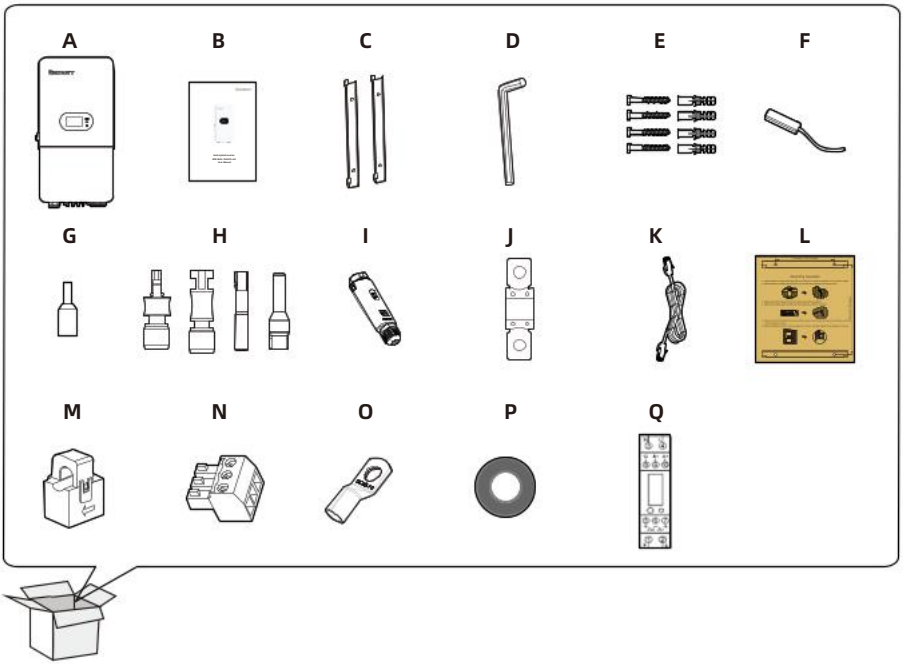
Consult with your installer or Growatt engineer for other possible system architectures depending on your requirements.
This inverter can power all kinds of appliances in home or office environment, including motor type appliances such as refrigerator and air conditioner.



3 Installation

3.1 Parts List

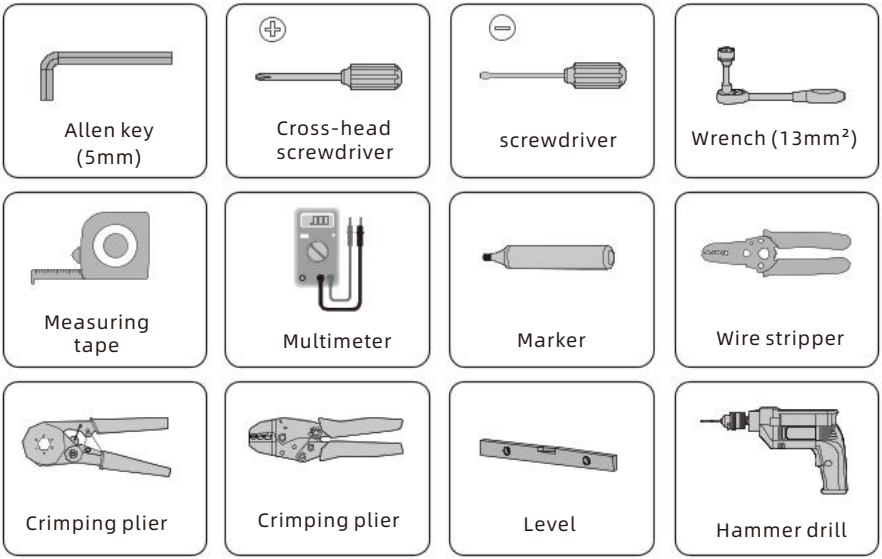
Check the package contents before installation. Ensure that no items are damaged and that all components listed below are included.



No.	Description	Qty	No.	Description	Qty
A	Hybrid inverter	1	J	Spare Fuse	1
B	User manual	1	K	Parallel communication cable	2
C	Wall Bracket	2	L	Mounting template	1
D	L-type Hexagon wrench	1	M	CT	1
E	Stainless steel anti-collision bolt	4	N	ATS terminal	2
F	Battery temperature sensor	1	O	Battery terminal	2
G	Tubular terminal:6AWG,10AWG	1	P	Magnetic ring	1
H	MC4 terminal	5+5	Q	Energy meter(Only available as standard in the UK)	1
I	Monitoring equipment (Except for South Africa)	1			

3.2 Installation Tools

The following tools are required to install the system:



Please wear the following safety gears:



3.3 Precautions for Inverter Transportation and handling

Lift the inverter out of the packing box and transport it to designated installation location.

Transportation Precautions

1. Shock and Drop Prevention: The inverter must be fixed in place throughout transportation to avoid severe shocks or drops, which could damage or displace internal components and affect the normal function of the equipment.
2. Environmental Protection: Maintain a dry transportation environment to prevent rainwater or moisture from entering the equipment. Keep it away from high temperatures and corrosive substances to avoid damage to the outer casing and internal parts.

Unpacking and Handling Precautions

1. **Personnel and Operation Requirements: The inverter is heavy and must be lifted by 2 people together.** Lifting it alone is strictly prohibited to prevent personal injury (such as falls or being hit) caused by the heavy weight.

2. Placement Rules: After taking out the inverter, do not place it directly on the ground. Instead, place it on a soft and flat buffer (such as a foam board or anti-slip mat) to prevent scratches and wear on the equipment surface.
3. Handle with Care: Move slowly and steadily during handling, avoiding collisions or shaking. This prevents displacement of internal parts and ensures the equipment can be normally inspected and used after handling.

3.4 Mounting Instructions

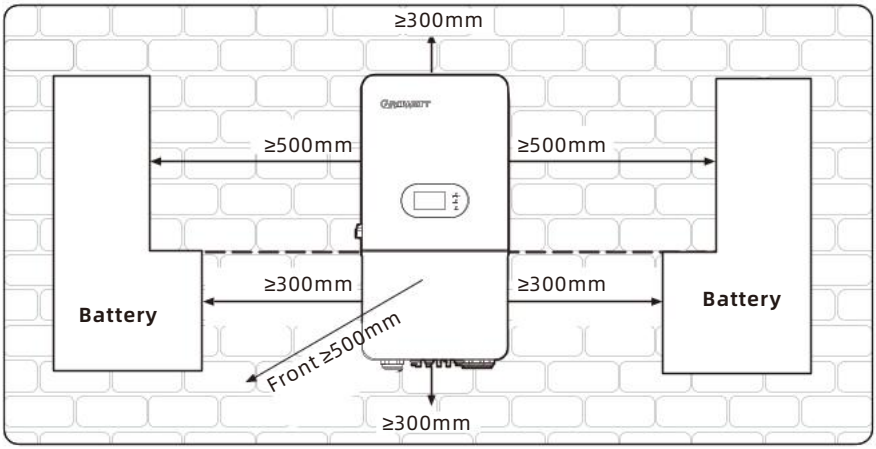
Installation Precaution

This Hybrid inverter is designed for outdoor use(IP65), Please make sure the installation site meets below conditions:

- Not in direct sunlight.
- Not in areas where highly flammable materials are stored.
- Not in potential explosive areas.
- Not in the Cold air directly.
- Not near the television Antenna or antenna cable.
- Not higher than altitude of about 2000 meters above sea level.
- Not in environment of precipitation or humidity(>95%).

Considering the following before selecting where to install:

- Please select a vertical wall with load-bearing capacity for installation, suitable for installation on concrete or other non-flammable surfaces, installation is shown below.
- Install this inverter at eye level in order to allow touch screen display to be read at all times.
- The ambient temperature should be between -25~60°C to ensure optimal operation.
- Keep the inverter at a distance from other objects and surfaces as shown below.

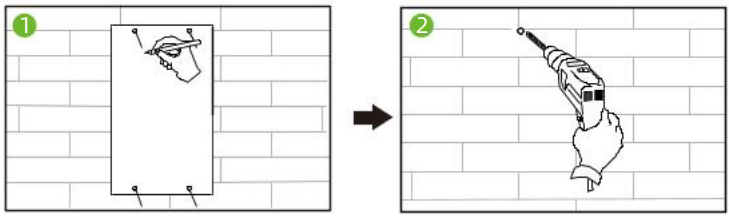


- For proper air circulation to dissipate heat, allow a clearance of approx.500mm to the side and approx.500mm above and below the unit. And 1000mm to the front.
- If using CTs included in the package ,takes the length of the CTs into consideration. CTs included in the package are 5m(16.4feet) long. (SPM 8-10KTL-HU(AU):20m).

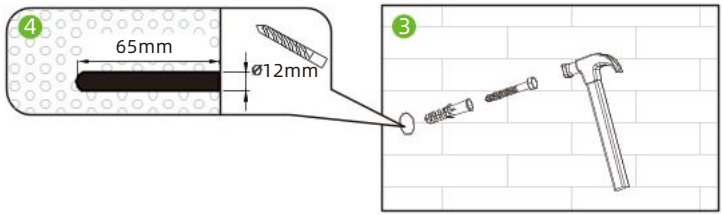
Mounting the inverter

Remember that this inverter is heavy! Caution when lifting out from the package.

1. Please make sure that the thickness of the wall for inverter installation is more than 70mm.
2. Place the mounting template horizontally on the wall and use a level to confirm alignment.

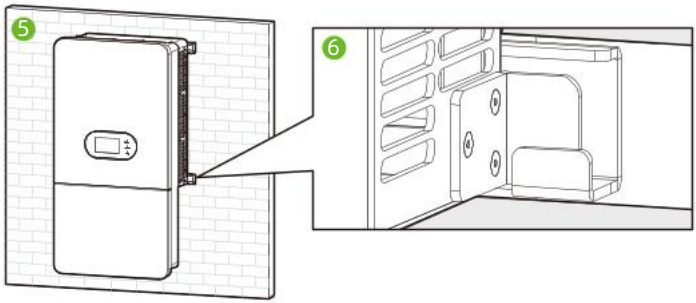


3. Please mark the holes in the 4 mounting holes of hole pattern.
4. Drill a hole with a depth of 65mm at the mark with a drill of 12mm



5.Please knock the expansion screw rubber sleeve into the hole on the wall, and then screw on the expansion screw.

6.Please hang the inverter on the expansion screws, and then tighten the expansion screws.

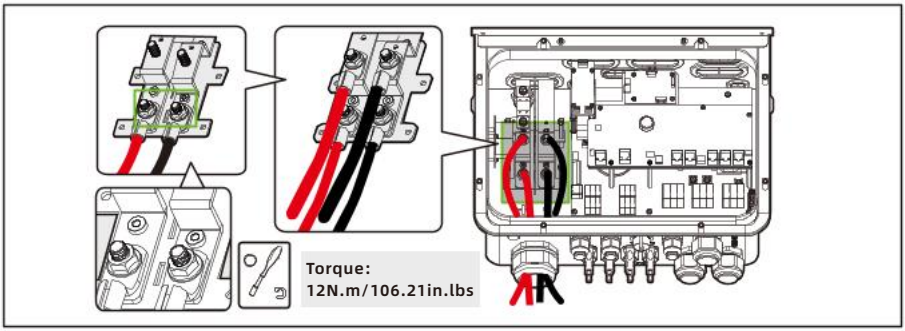


3.5 Battery Connection

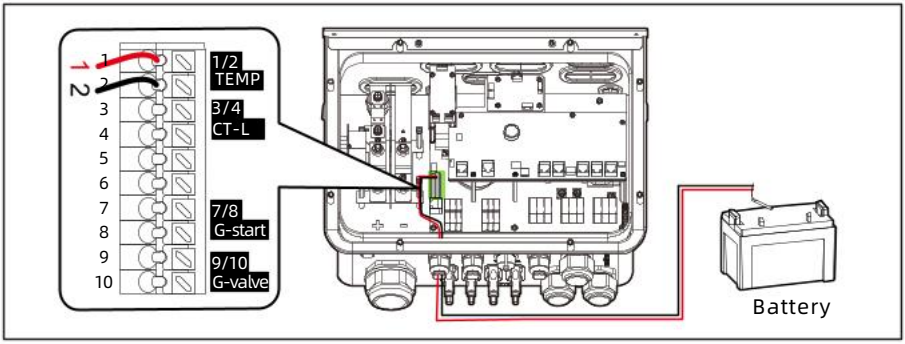
For safe operation and compliance, a separate DC over-current protector or disconnect device is required between the battery and the inverter. In some applications, disconnect switch may not be required but over-current protectors are still required.

Model	Wire Size
SPH 10000TL-HU	00AWG*1 or 2AWG*2 or 4AWG*3
SPM 8000-10000TL-HU	

WARNING	All wiring must be performed by a professional person. Connecting the battery with a suitable cable is important for safe and efficient operation of the system. To reduce the risk of injury, refer to chart for recommended cables. Installers are reminded that adherence to local electrical codes and regulations is mandatory. Installers are encouraged to exercise caution, seek professional advice when necessary, and undertake installations with due diligence and in accordance with established electrical standards and regulations.



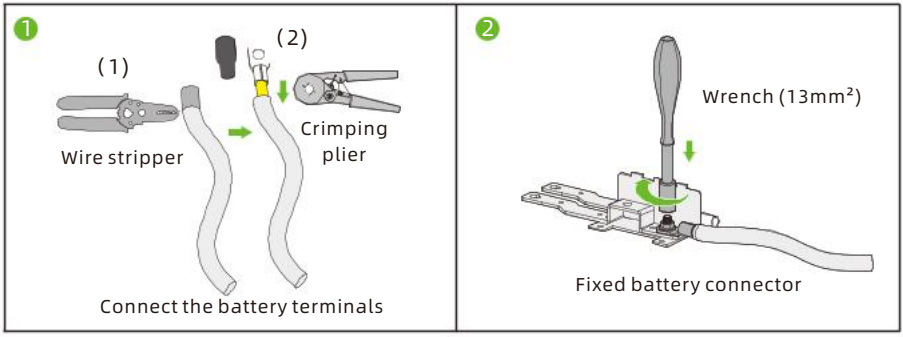
Temperature sensor connection for lead-acid battery.



The SPH/SPM 8000-10000TL-HU has two battery input ports and supports connection of one or two battery clusters.

Please follow below steps to implement battery connection:
Note: Make sure polarity at both the battery and inverter is correctly connected.

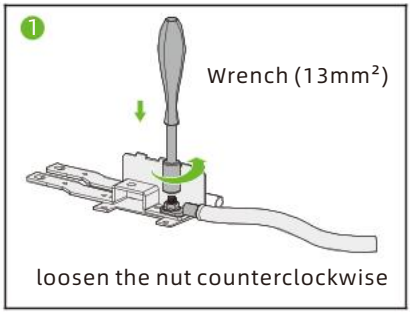
Connect



STEP1: Please choose a suitable battery cable with correct connector which fits into the battery terminals.

STEP2: Use a sleeve to unscrew the nuts and fit the battery connectors in, then fasten the nuts by the sleeve, make sure the nuts are tightened in clockwise direction.

Disconnect

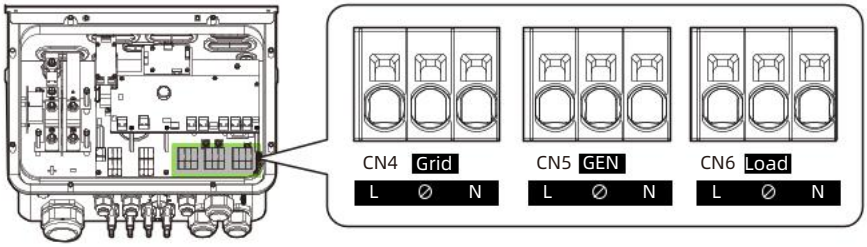


STEP1: Use a socket to loosen the nut counterclockwise.

3.6 Grid Connection and Backup Load Connection

Before connecting to grid, please install a separate AC breaker between inverter and grid. Also, it is recommended to install an AC breaker between backup load and inverter. This will ensure the inverter can be securely disconnected during maintenance and fully protected from over current.
There are three terminal blocks with "Grid" "Load" and "GEN" markings. Please do not confuse input and output connectors.

WARNING	All wiring must be performed by qualified personnel. It is very important for system safety and efficient operation to use appropriate cable for AC input connection. To reduce risk of injury, please use the proper recommended cable as below.



Model	Wire Size
SPH 10000TL-HU	6AWG
SPM 8000-10000TL-HU	

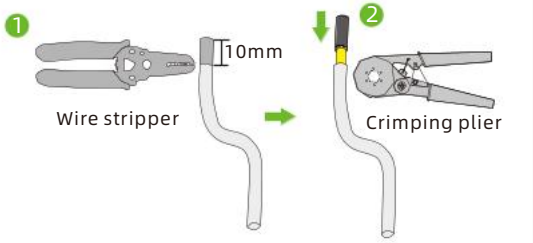
L	N	L	N	L	N
Grid		GEN		Load	
CN4		CN5		CN6	

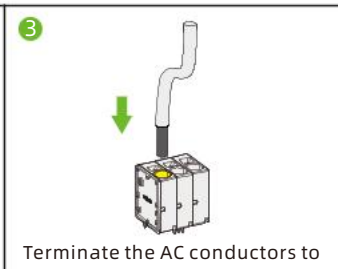
NOTICE	Be sure that AC power source is disconnected before attempting to wire it to the unit.

Please follow below steps to implement AC input/output connection:

Note: Before making Grid, load and Gen port connection, be sure to turn off AC breaker first.

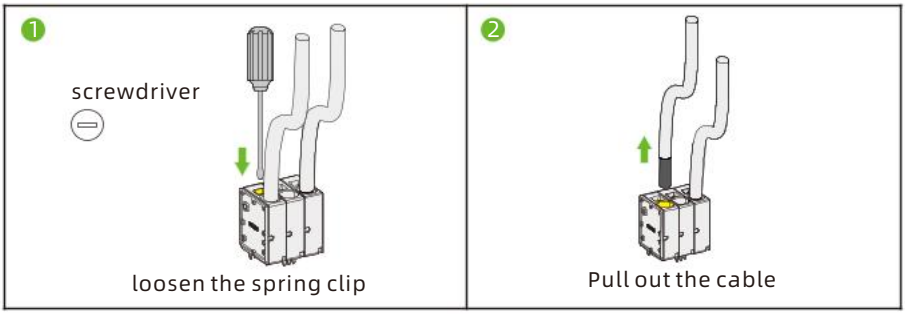
Connect





Step1: Remove insulation sleeve 10 mm for positive and negative conductors
Step2: Use crimping pliers to press the 6AWG cable onto the attached tubular terminal to form a square.
Step3: Install the AC conduit to the AC grid output opening (Grid, Gen, Load). Use appropriate conduit fittings and bond where necessary.Terminate the AC conductors to the appropriate terminal.

Disconnect



Step1: Insert a flat-blade screwdriver into the upper hole to loosen the spring clip of the cable clip.
Step2: Pull out the cable.
Appliances such as air conditioner are required at least 2-3 minutes to restart because it is required to have enough time to balance refrigerant gas inside of circuit. If a power shortage occurs and recovers in short time, it will cause damage to your connected appliances. To prevent this kind of damage, please check manufacturer of air conditioner if it is equipped with time-delay function before installation. Otherwise, this inverter will trigger overload fault and cutoff output to protect your appliance but sometimes it still causes internal damage to the air conditioner.

3.7 PV Connection

Before connecting to PV modules, please install a separate DC circuit breaker between inverter and PV modules. It is very important for system safety and efficient operation to use appropriate cable for PV module connection. To reduce risk of injury, please use the proper recommended cable size as below.

Model	Wire Size
SPH 10000TL-HU	10AWG
SPM 8000-10000TL-HU	

WARNING	To avoid any malfunction, do not connect any PV modules with possible current leakage to the inverter. For example, grounded PV modules will cause current leakage to the inverter. When using PV modules, please be sure NO grounding. It is requested to use PV junction box with surge protection. Otherwise, it will cause damage on inverter when lightning occurs on PV modules.

3.7.1 PV Module Selection

When selecting proper PV modules, please be sure to consider below parameters

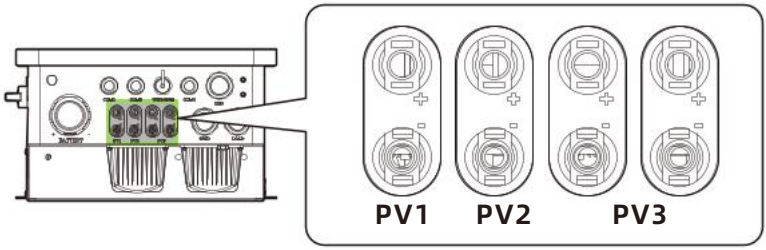
1.Open circuit Voltage (Voc) of PV modules should not exceed max PV array open circuit voltage of inverter.

2.Open circuit Voltage (Voc) of PV modules should be higher than min start voltage.

Inverter Model	SPM 8000-10000TL-HU	SPH 10000TL-HU
PV Input Voltage	370V(130V-550V)	370V(130V-525V)
PV Array MPPT Voltage Range	150V-550V	150V-450V
No. of MPPT Trackers	3	
No. of Strings per MPP Tracker	2+2+2	

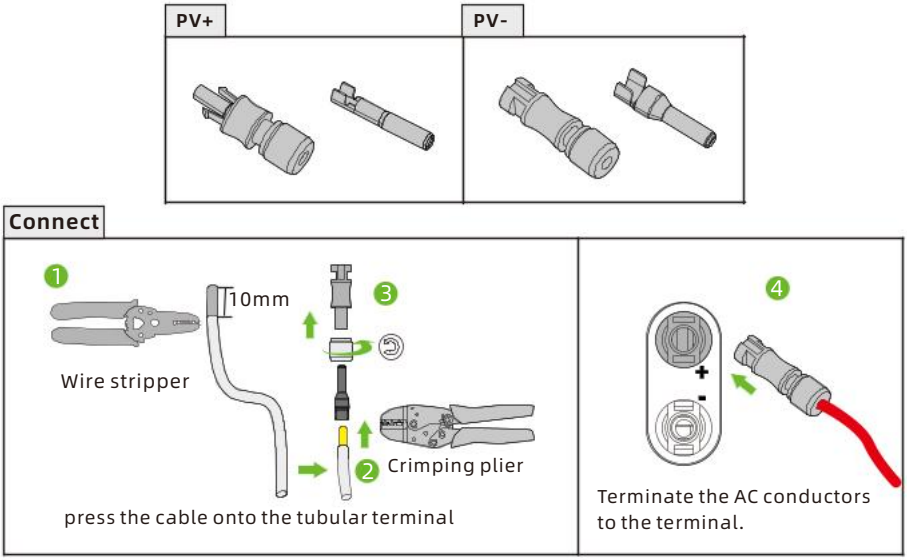
3.7.2 PV Module Wire Connection

NOTICE	Make sure the wire is tight and secure.



Please follow below steps to implement PV module connection:

Note: Terminate the PV strings to the appropriate terminal.

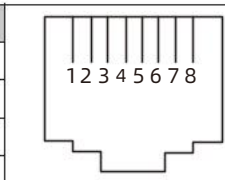


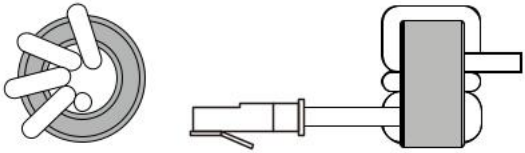
Step1: Remove insulation sleeve 10 mm for positive and negative conductors.
Step2: Use a crimping tool to secure the wire to the terminal.
Step3: Insert the wire and terminal into the connector, and tighten the nut.
Step4: Insert the connector into the corresponding PV port.

3.8 Other Communication Connection

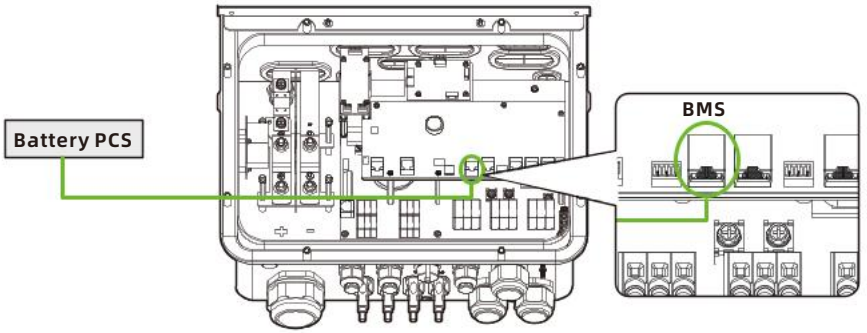
3.8.1 BMS Connection

NO.	BMS	NO.	BMS
1	RS485B	5	CAN-L
2	RS485A	6	GND
3	/	7	/
4	CAN-H	8	/

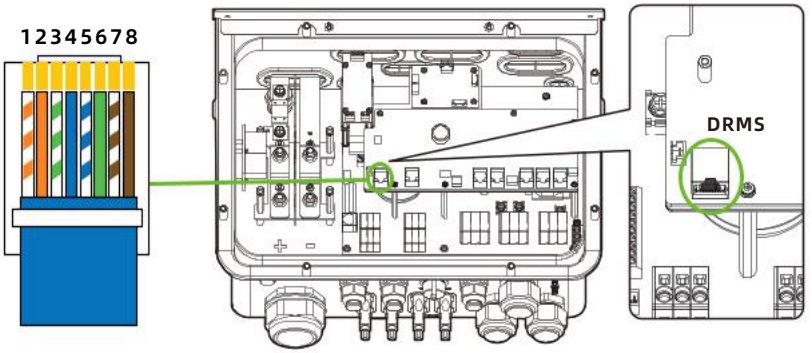




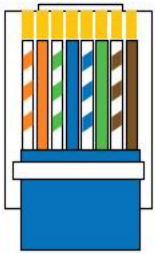
1. Pass the BMS communication cable through the magnetic ring and wrap it around the magnetic ring four times. Additionally, the magnet ring must be placed inside the inverter case.
2. Please use the BMS communication cable provided by the corresponding battery manufacturer.



3.8.2 DRMs Connection & introduction



Silk screen	DRMS	Silk screen	DRMS
Pin	Definition	Pin	Definition
1	DRM1/5	5	REF
2	DRM2/6	6	COM/DRM0
3	DRM3/7	7	PIN7-PIN8 shorting
4	DRM4/8	8	PIN7-PIN8 shorting



LAN 1-8 color code
Pin 1: White/Orange
Pin 2: Orange
Pin 3: White/Green
Pin 4: Blue
Pin 5: White/Blue
Pin 6: Green
Pin 7: White/Brown
Pin 8: Brown

Mode	Socket asserted by shorting pins		Function
DRM 0	REF	COM/DRM0	Operate the disconnection device.
DRM 1	DRM1/5	COM/DRM0	Do not consume power.
DRM 2	DRM2/6	COM/DRM0	Do not consume at more than 50 % of rated power.

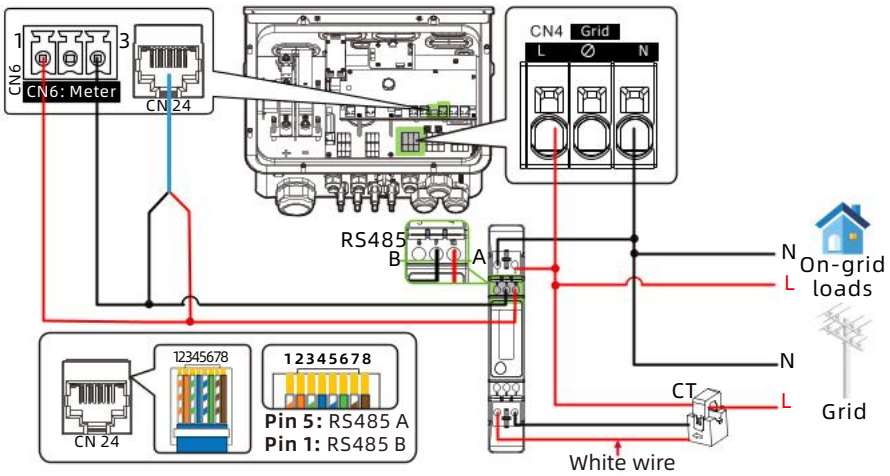
Mode	Socket asserted by shorting pins		Function
DRM 3	DRM3/7	COM/DRM0	Do not consume at more than 75 % of rated power AND supply reactive power if capable
DRM 4	DRM4/8	COM/DRM0	Increase power consumption (subject to constraints from other active DRMs)
DRM 5	DRM1/5	REF	Do not generate power
DRM 6	DRM2/6	REF	Do not generate at more than 50 % of rated power
DRM 7	DRM3/7	REF	Do not generate at more than 75 % of rated power AND absorb reactive power if capable
DRM 8	DRM4/8	REF	Increase power generation (subject to constraints from other active DRMs)

3.9 Meter or CT Connection

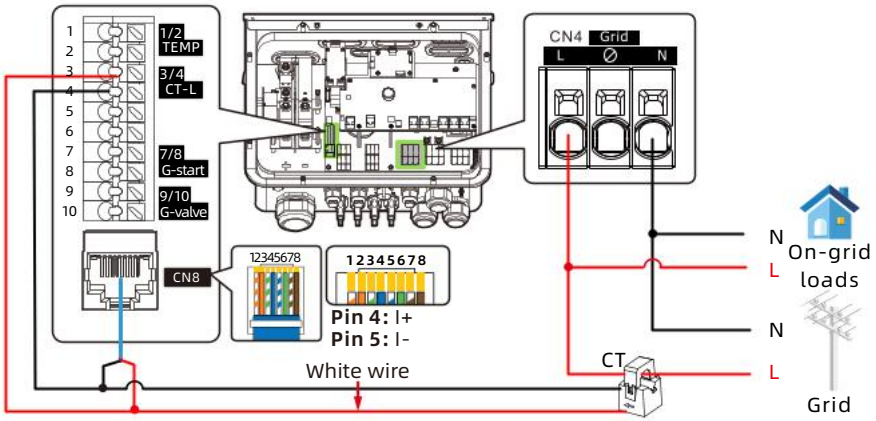
To meet the export limit function in Chapter 6 of the AS/NZS 4777.2:2020 and 2:2024 standard, it is necessary to use it with an external electric meter.There are two ways to connect the meter and CT: wired connection and network cable interface. You can choose either connection method according to the meter and CT you are using.

Model	Compatible Meter
SPH 10000TL-HU	SDM120CT;SDM230-Modbus; SDM630MCT
SPM 8000-10000TL-HU	SDM120CT;SDM230-Modbus; SDM630MCT; DDSU666; DTSU666

Meter Connection



CT Connection



3.10 Earth Connection

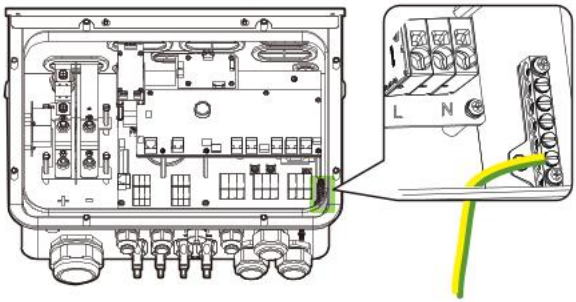
Ground cable shall be connected to ground plate to prevents electric shock.

Model	Wire Size
SPH 10000TL-HU	12AWG
SPM 8000-10000TL-HU	

Please follow below steps to implement Ground cable connection:

1.Remove insulation sleeve 10 mm for wire.

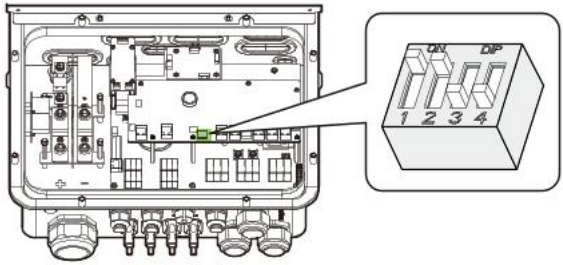
2.Loosen the screw, insert the ground wire and then tighten the screw. Please make sure that the ground cable is firmly connected to the ground bar.



When a ground fault occurs, the third LED on the inverter indicator will flash red, the inverter will disconnect output, and W93,W70 or W90 will be displayed in the upper left corner of the display. At this time, check the grounding, disconnect all external power sources, and restart the inverter to clear the alarm.

3.11 Dip Switch Status

Working condition	Switch status
USB upgrade/External datalogger	1/2:ON;3/4-OFF 
Datalogger	1/2:OFF;3/4→ON 

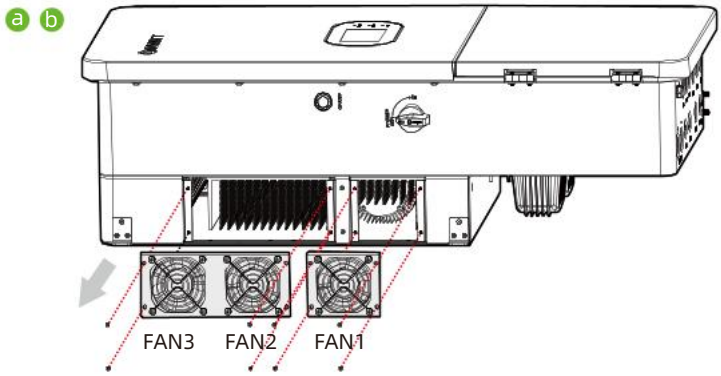


3.12 Fan Replacement

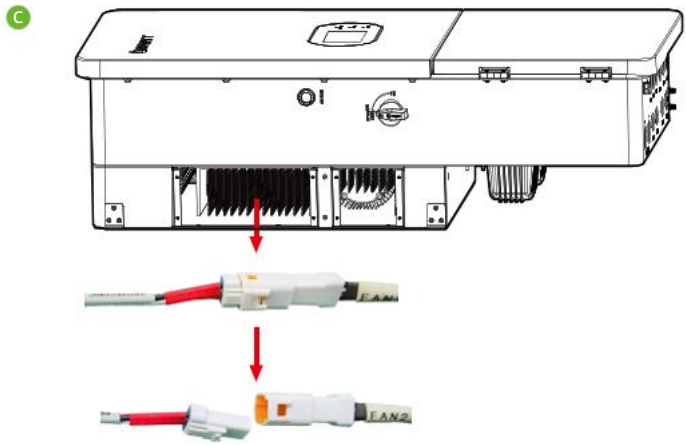
Please check and clean the fans regularly. The recommended period is 6 months Please replace the fan following up the below diagram if there is problem with the fans. Turn off the system and wait for more than 5 minutes before disassembling the machine.

a. Loosen the screws and remove them.

b. Remove the fan fixing.



c. If you want to replace the broken fan, Then you need to press the buckle of the fan, untie the buckle of the fan, and then replace it.As the picture shows. Pull out the fan bracket completely, and use a soft brush to clean the fan or replace a damaged fan.

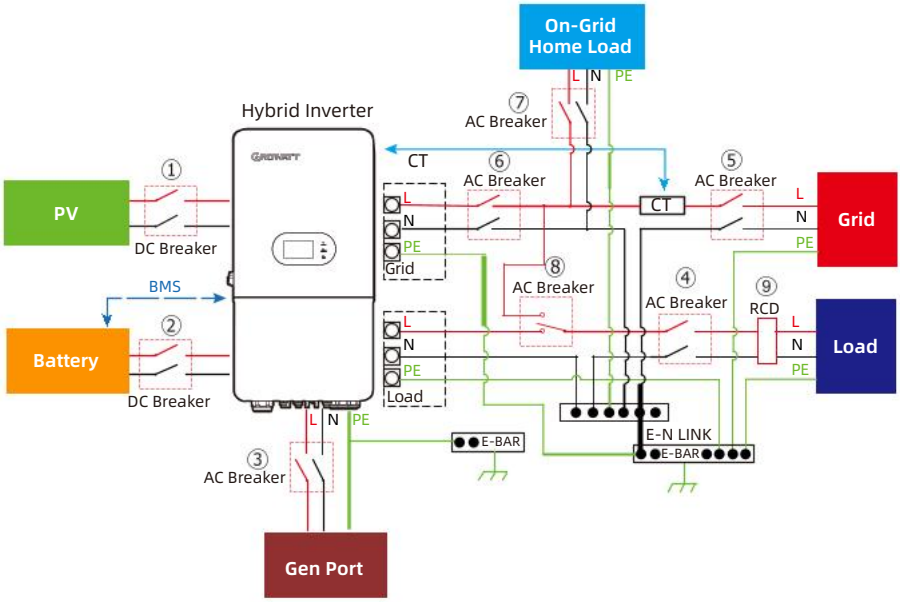


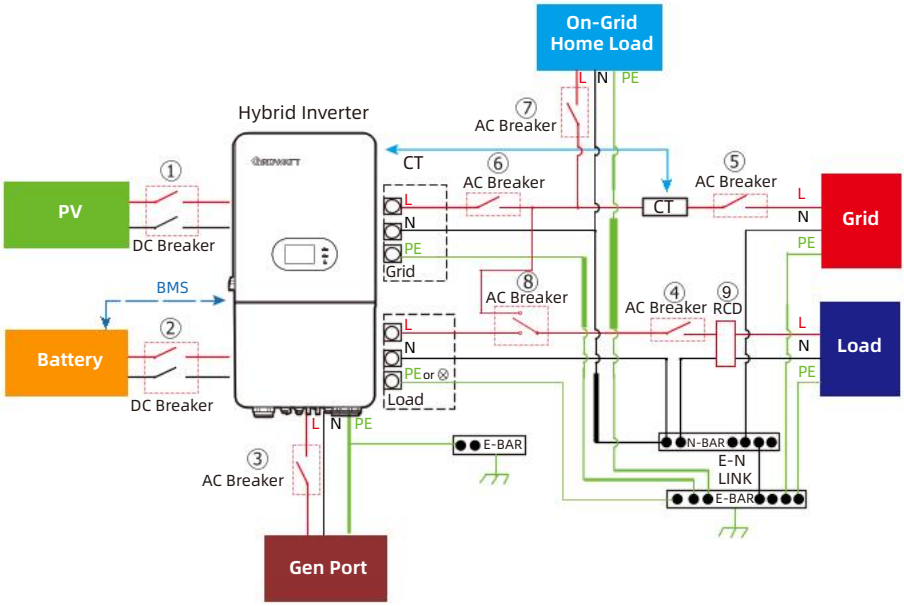
d. Remove the fan and replace it.

e. After the fan is installed, follow the steps just now to push back and assemble it back.

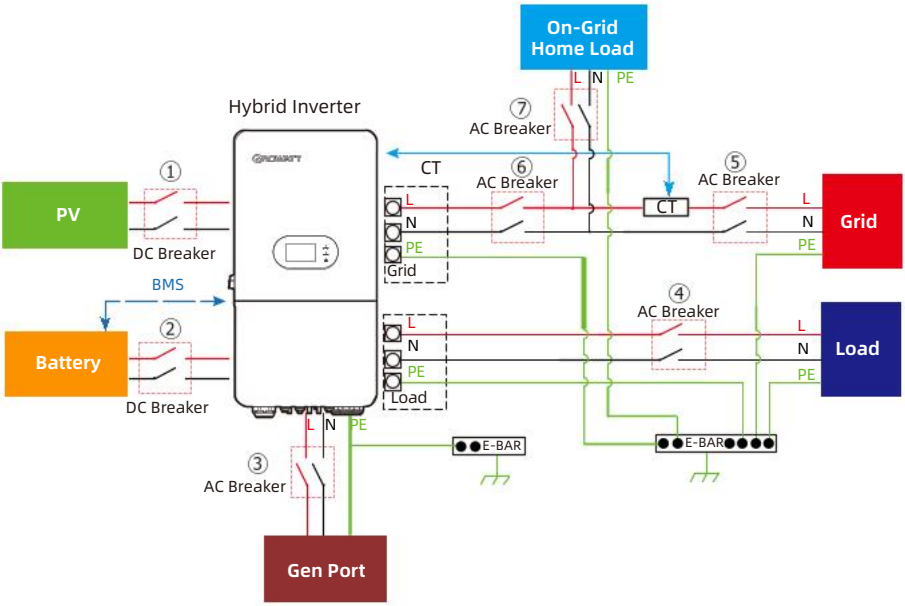
3.13 Wiring System for Inverter

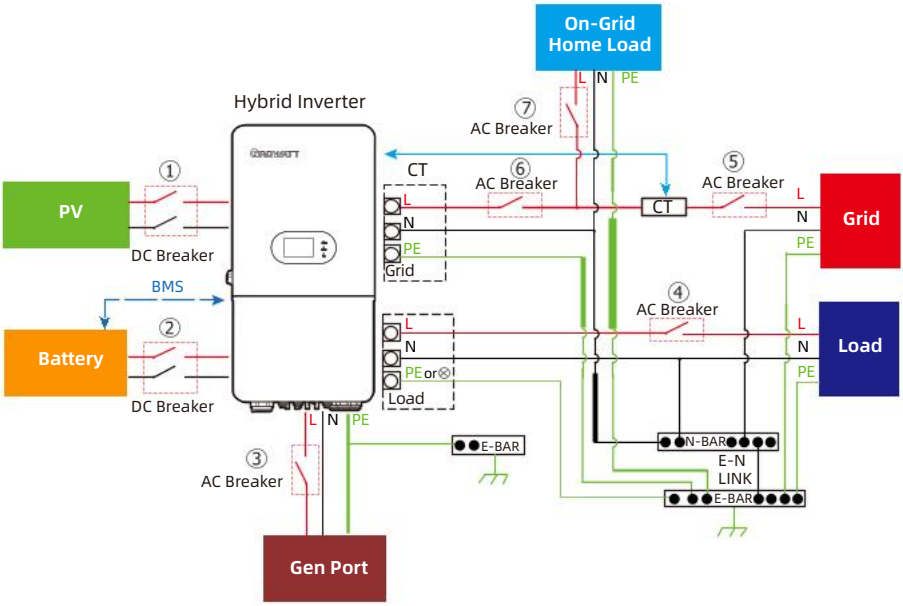
SPM 8000-10000TL-HU (AU)





SPM 8000-10000TL-HU (EU/UK)
SPH 10000TL-HU





Note: The inverter has a GFCI detection circuit inside, so there is no need to add an external RCD device.

If for some special reason, it must be installed between the inverter output and the grid. Please install a type B leakage protection switch above 300mA.

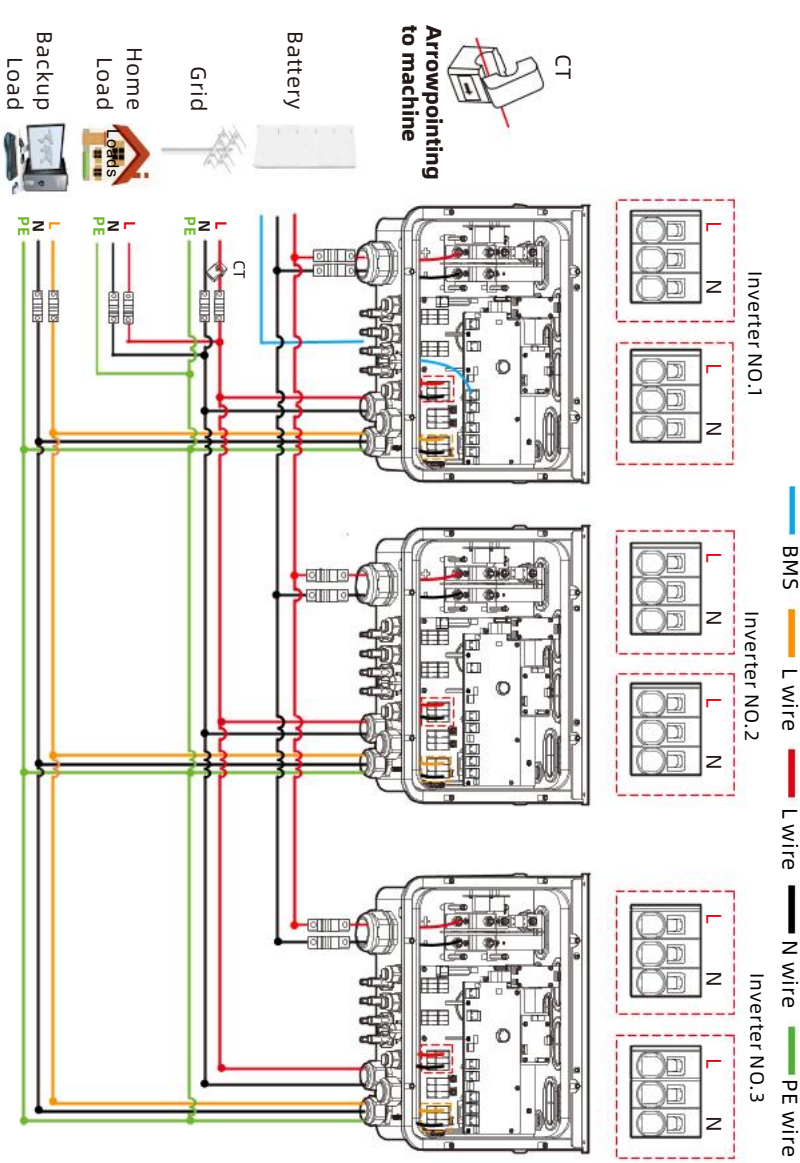
When multiple leakage protection switches are installed in the system, it is forbidden to share the neutral line, otherwise the leakage protection function may be triggered by mistake and cause the switch to trip.

Breakers selection recommendation for both DC and AC.

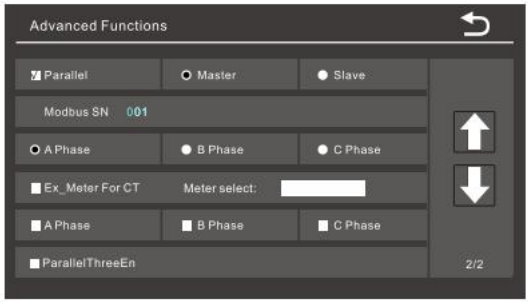
Inverter Model	SPH/SPM 10000TL-HU	SPM 8000TL-HU
PV Breakers(①)	600V/24A (PV3 600V/40A)	
Battery Breaker(②)	80V/250A	80V/200A
Generator breaker(③)	230V/63A	230V/52A
Load Breaker(④)	230V/63A	230V/52A
AC Breaker(⑤)	230V/100A	230V/80A
AC Breaker(⑥)	230V/63A	230V/52A
On-Grid Home Load Breaker(⑦)	240V/100A	230V/80A
AC Breaker(⑧)	230V/63A	
RCD(⑨)	B 1P+N 300mA	

3.14 Single Phase 230Vac Parallel Connection

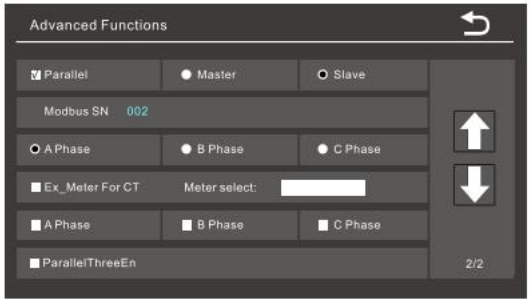
For additional details on how to parallel multiple SPH/SPM systems, please refer to: Parallel Solutions technical white paper available at: community.growatt.com/white-paper



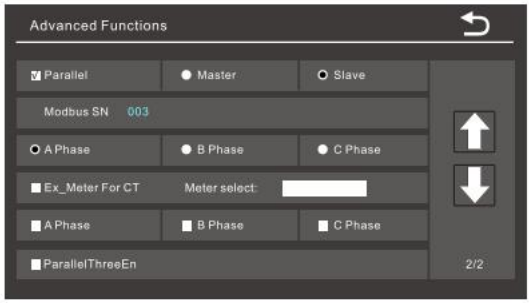
Inverter NO.1



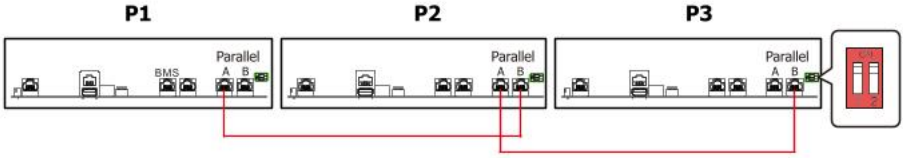
Inverter NO.2



Inverter NO.3



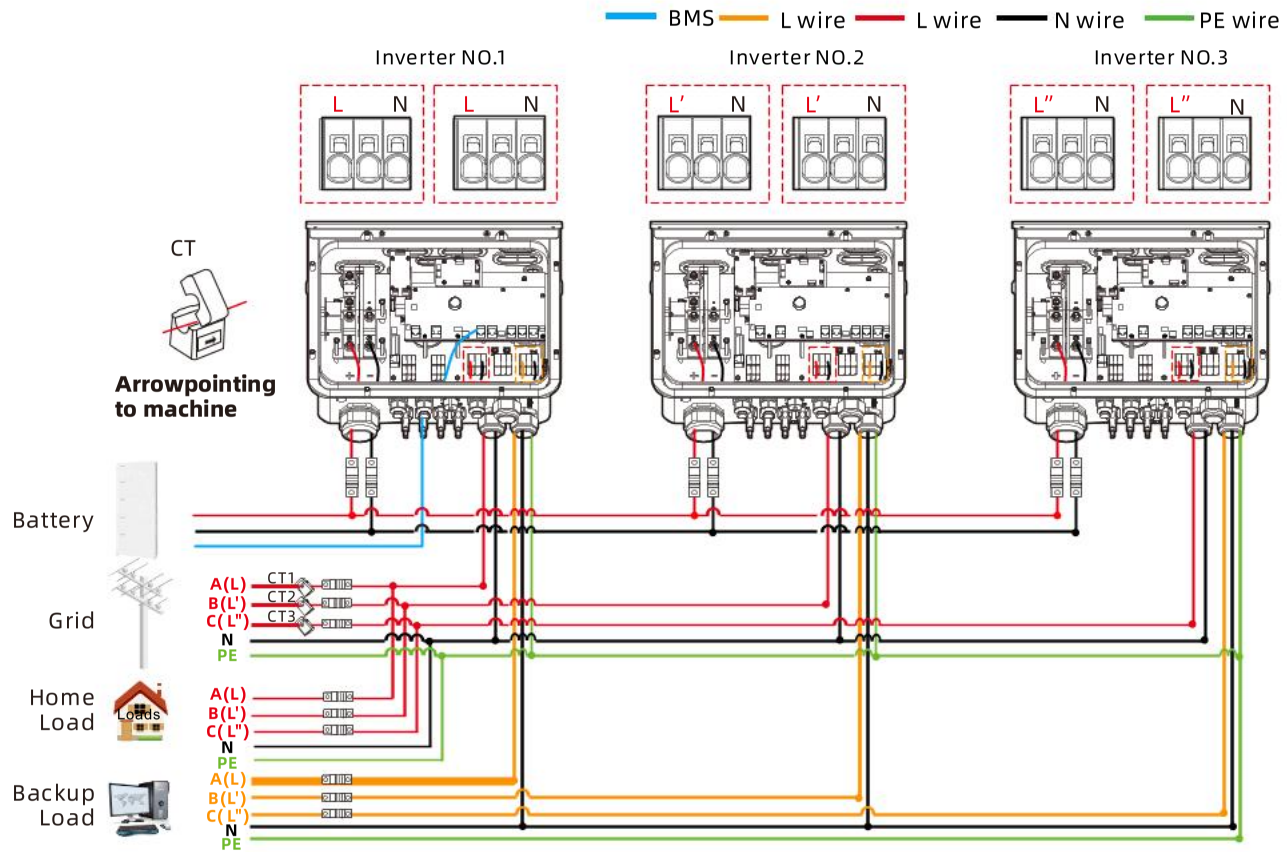
Communication Connection



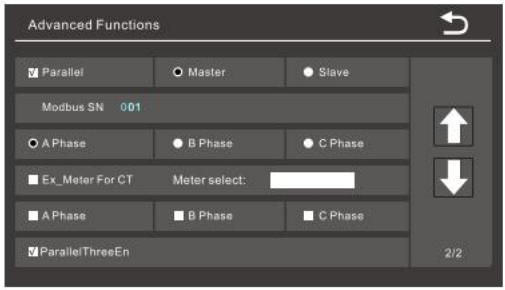
Modbus SN: This feature is currently not being used.
The status of the **PARALLEL Dip Switch** needs to be fully turned on.
CT1: Connect pins 3 and 4 of L (Inverter NO.1).
Up to 6 inverters can be connected in parallel.

3.15 3Pcs Parallel Connection for 230/400Vac Three Phase

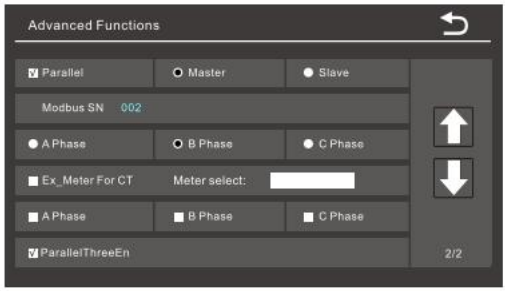
Three inverters in parallel three-phase:



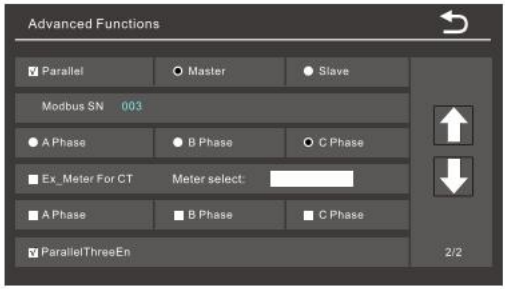
Inverter NO.1



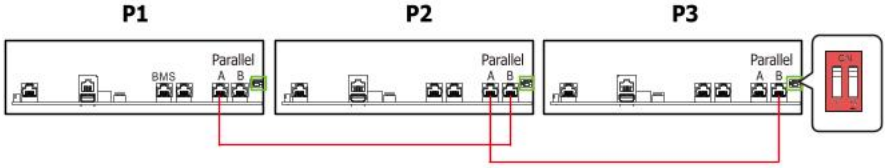
Inverter NO.2



Inverter NO.3



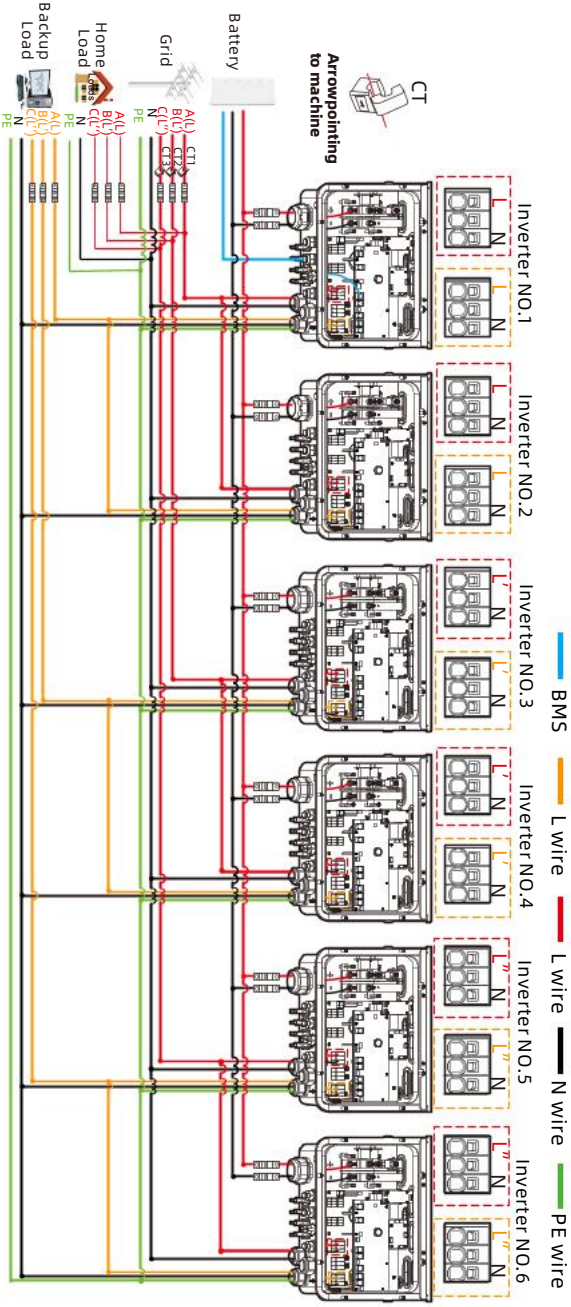
Communication Connection



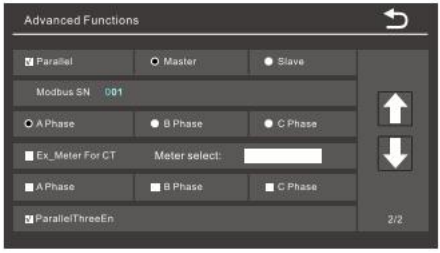
Modbus SN: This feature is currently not being used.
The status of the **PARALLEL Dip Switch** needs to be fully turned on.
CT1: Connect pins 3 and 4 of L (Inverter NO.1).
CT2: Connect pins 3 and 4 of L' (Inverter NO.2).
CT3: Connect pins 3 and 4 of L" (Inverter NO.3).

3.16 6Pcs Parallel Connection for 230/400Vac Three Phase

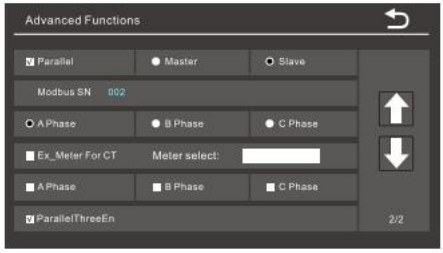
Six inverters in parallel three-phase:



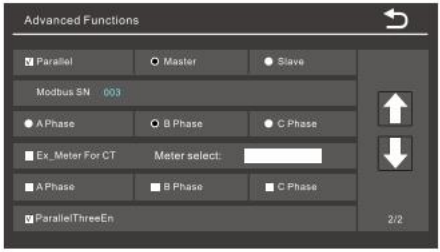
Inverter NO.1



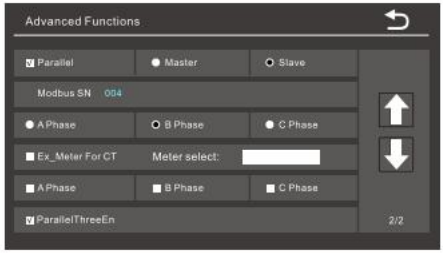
Inverter NO.2



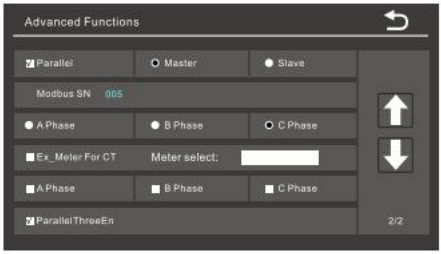
Inverter NO.3



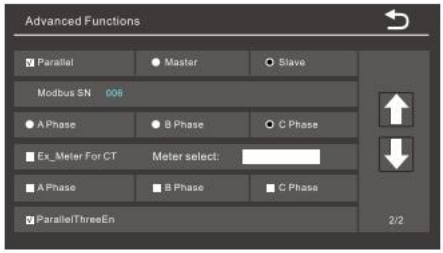
Inverter NO.4



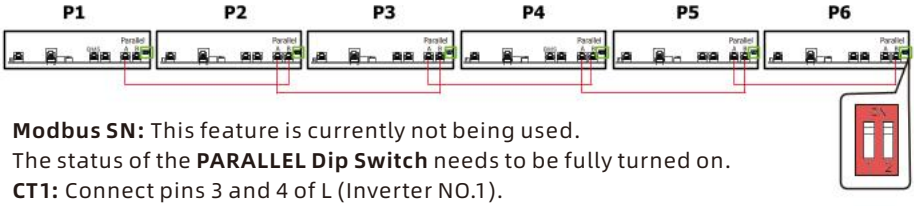
Inverter NO.5



Inverter NO.6



Communication Connection



Modbus SN: This feature is currently not being used.
The status of the **PARALLEL Dip Switch** needs to be fully turned on.
CT1: Connect pins 3 and 4 of L (Inverter NO.1).
CT2: Connect pins 3 and 4 of L' (Inverter NO.3).
CT3: Connect pins 3 and 4 of L" (Inverter NO.5).

Operation 4

4.1 Power ON/OFF

Once the unit has been properly installed and the batteries are connected well, simply press On/Off button(located on the left side of the case) to turn on the unit. When one of the grid or PV is connected the screen will still light up even if the battery is not connected. In the off-grid state, if this button is not pressed, the inverter will not supply off-grid loads. If it is grid-connected, this button will not affect the power supply of the backup loads. If there is no battery, you can carry off-grid loads after selecting the No Battery Mode.

4.2 Operation and Display Panel

The operation and display panel, shown in below chart, is on the front panel of the inverter. It includes three indicators and a touch screen display, indicating the operating status and input/output power information.

LED Indicator			Messages
AC/INV	GREEN	Light	Powered by AC
		Flashing	Powered by DC
CHARGE	GREEN	Light	Full battery
		Flashing	Charging
FAULT	RED	Light	Error
		Flashing	Warning

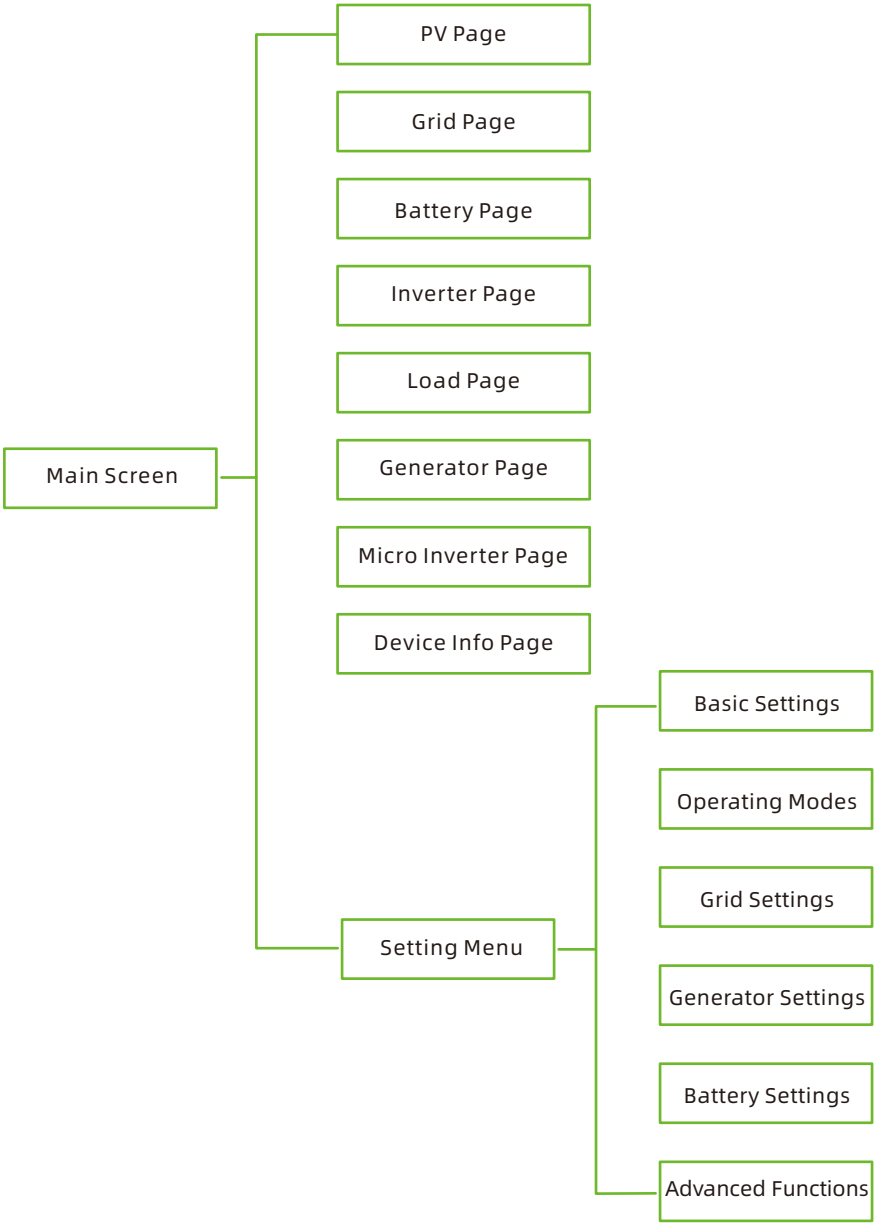
4.3 Maintenance

1. This manual contains important information about your operating system. Please read the manual carefully before operation. Follow all instructions in the manual strictly, otherwise it may cause device damage, personal injury and property loss, or void the product warranty. Keep the manual handy for maintenance and repair;
2. Use appropriate measuring equipment when connecting or testing the system to ensure the electrical parameters comply with requirements. Be sure to connect and use matching specifications to prevent arcing or shock. Ensure that the whole system has been reliably grounded;
3. Do not repair or maintain the equipment in wet weather. Do not touch the SPH\SPM system with wet hands;
4. It is strictly prohibited to disassemble the SPH\SPM system without permission. If the equipment requires maintenance, please contact your local designated system installation and maintenance personnel. Only qualified and trained personnel are allowed to repair, replace or maintain the SPH\SPM system;
5. Before installation, replacement and maintenance, please remove all metal objects that may cause short circuits, such as watches, rings, etc.;

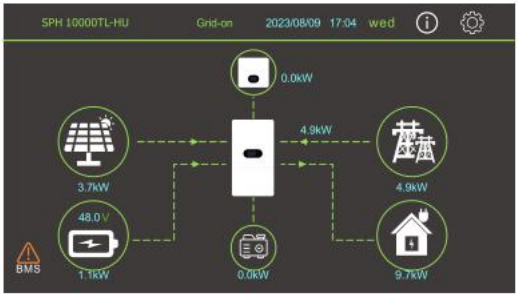
6. Do not crush, drop or puncture the battery pack and SPH inverter;
7. Comply with local safety regulations when disposing of the batteries.
8. When storing and transporting the SPH system, do not stack them without packaging boxes. When stacking the battery packages, observe the stacking requirements on the outer packaging;
9. Handle the battery carefully to avoid leakage. Leaked electrolyte is toxic and harmful to skin and eyes;
10. Do not use damaged, faulty or deformed batteries. These batteries may release flammable gases, causing fire or other safety hazards;
11. Ensure that the correct battery type (lithium or lead-acid) is selected. If the wrong battery type is selected, SPH will fail to work properly;
12. All electrical installations must comply with local electrical safety standards;
13. Ensure that you have obtained approval from the utility company before connecting equipment to the power grid;
14. Turn off the PV switch when installing PV modules during the day; otherwise the voltage of the module terminal would be too high under sunlight, leading to safety hazards.

Main Screen 5

5.1 Touchscreen Operation Flow Chart



5.2 Main Screen

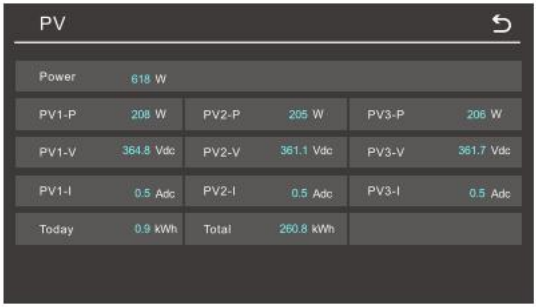


Icon	Description	Icon	Description
	PV		Generator
AC Port Power	Export(negative), Import(positive)		Micro Inverter
	Load		Device Info Page
	Setting Menu	BMS	BMS communication error
	Grid: Grid Power , Export(negative), Import(positive)		
48.0V	Battery: Battery Power, Charge(negative), Discharge(positive)		
	Inverter		

1. The "Grid-on" at the top of the home screen indicates that the system is Normal operation. If "Fault: F17-64 or Alarm: W01-W96" appears in the upper left corner of the screen, a communication error or other error has occurred in the inverter. F17-F64 faults and W01-W96 alarms, detailed information can be found in the exclamation mark in the upper right corner of the main screen.
2. At the top of the screen is the time.
3. System Setup Icon, press this Settings icon, you can enter into the system setup screen which including Basic Settings, Operating Modes, Grid Settings, Generator Settings, Battery Settings and Advanced Functions.

4. The main screen showing the info including Solar, Grid, Load and Battery. Its also displays the energy flow direction by arrow.
   - PV power and Load power always keep positive.
   - Grid power negative means sell to grid, positive means get from grid.
   - Battery power negative means charge, positive means discharge.
5. When there is an abnormal BMS communication, a BMS alarm icon will appear in the bottom left corner of the screen. After this alarm occurs, the lithium battery mode automatically switches to lead-acid battery mode, but cannot be charged.

PV Detail Page



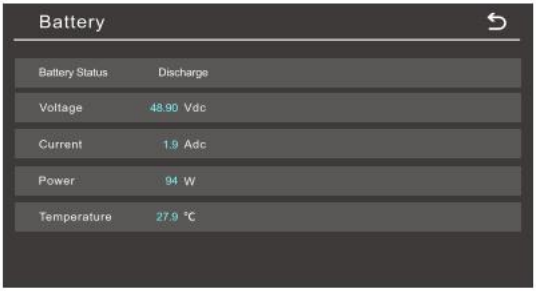
Solar Panel Generation.
Power, Voltage, Current for each MPPT.
Solar panel energy for Day and Total.

Grid Detail Page



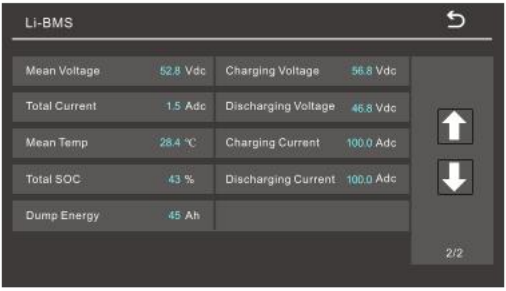
By clicking on the Grid icon, you can access the grid details screen. In this screen, you can see the current status of the grid(Stand-by, Import From Grid and Export To Grid), which includes power and frequency.
L-V: Grid voltage.
CT: External current sensor grid power.
L-P: Internal current sensor grid power.
Import From Grid: Today and total grid output power.
Export To Grid: Grid power sold today and in total.

Battery Detail Page



The image on the left shows the display screen when using voltage to measure the
remaining power of the battery and make settings.





If you use Lithium Battery, you can enter 1-2 page.

Inverter Detail Page

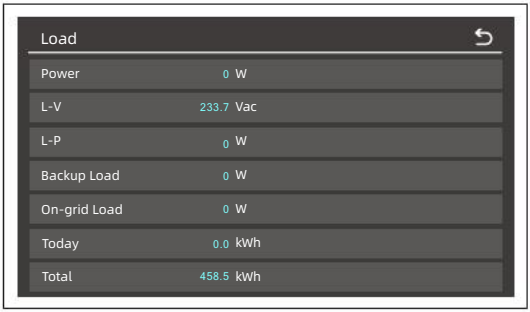


Inverter Generation Power and Frequency. Voltage, Current, Power fo each phase.

AC-Tem: Temperature of Heat-sink.

DC-Temp: Temperature of DC-DCmodule.

Load Detail Page



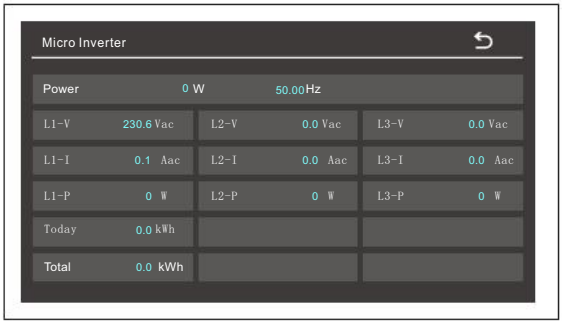
In this screen, you can see the voltage, power, daily consumption and total consumption of the load.

Generator Detail Page



Generator Power, Voltage and Frequency.
Generator exportation for Total.

Micro Inverter Detail Page



Micro Inverter Power, Voltage Current and Frequency.
Micro Inverter exportation for Today and Total.

5.3 Device Info.



Inverter ID:
This is the ID of the inverter.
HMI/M1/M2 Ver:
This is the software version number of the inverter.
LCD Ver: LCD Version.
Clear Record:
Clear error alarm messages.

5.4 Setting Menu



This is Setting menu detail page.

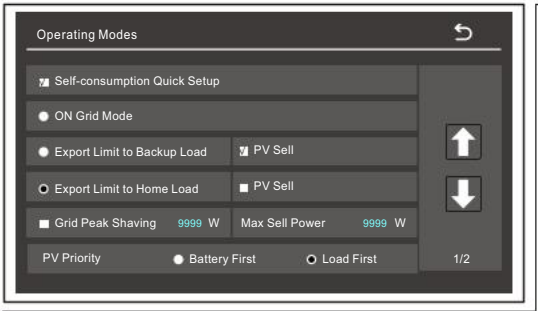
5.5 Basic Settings



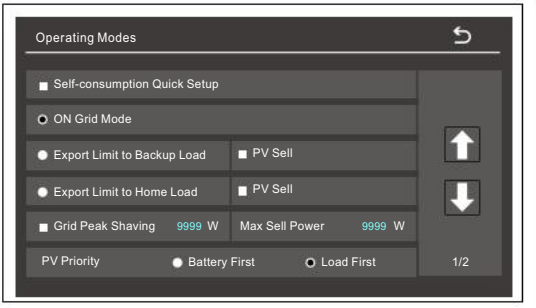


Factory Reset:
Reset all parameters of the Inverter.
Lock Out All Changes:
Enable this function, the setting will be fixed and can not be changed until this item is disabled.
The password for factory reset and lockout all changes are both 9999.

5.6 Operating Modes



Self-consumption Quick Setup: after the setting, the mode is automatically set to Export Limit to Home Load mode→ Enable PV Sell →PV Priority (Load First)→ enable Time of Use Time period (24 hours a day)→ battery discharge power (equal to the rated power of the inverter)→ SOC10%→Grid Charge to make sure maximize solar power self-consumption, the battery will discharge to power the load before importing the grid power if PV power is in sufficient.

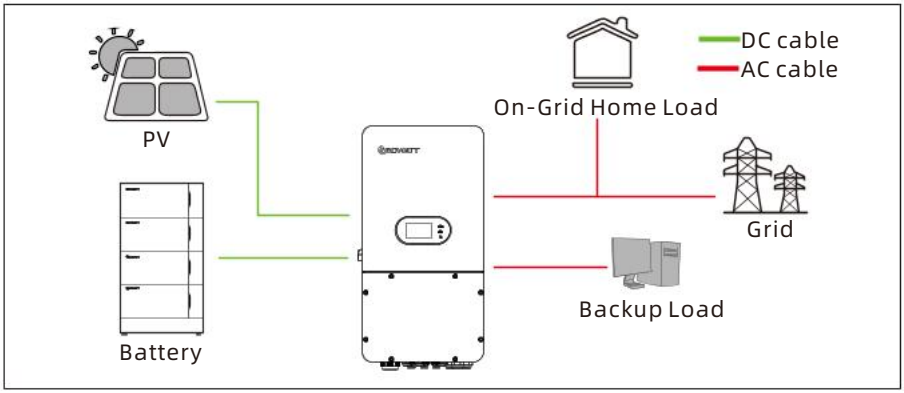


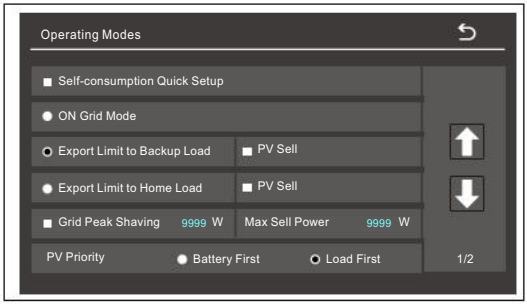
On Grid Mode:
The inverter will sell any excess power produced by the solar panels back to the grid. If you enables the"time of use" function, the battery energy can also be sold into grid. The PV energy will be used to power the load and charge the battery and then excess energy will flow to grid.
The backup loads and on-grid loads have different priorities. If load first is enabled, the PV will power the backup load first, then charge the battery. If there is excess power being exported to the grid, the on-grid home loads will be powered during this process. Power source priority for the load is as follows:

1.Solar Panels.
2.Grid.
3.Battery.

General description:

a. The inverter will measure all power from the "GRID" terminal as sell power.
b. External CT/Meter is not required for this mode. Even if the CT/Meter is connected, the inverter will not use its data.
c. Enable "ON Grid Mode" function - and set the "Max Sell Power"(KW).





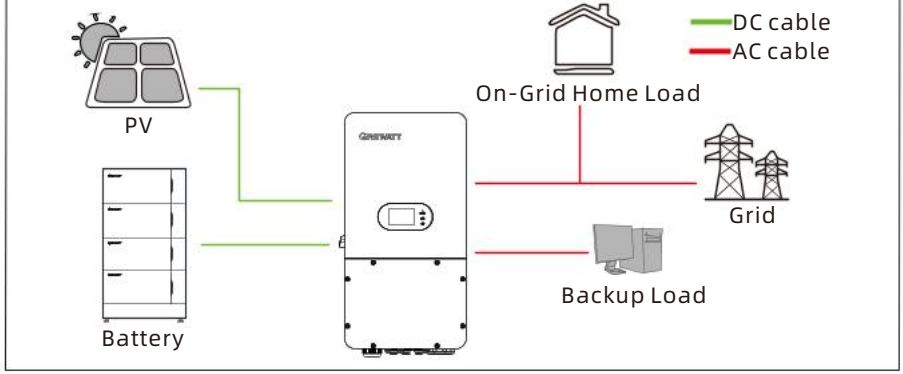
Export Limit to Backup Load: Hybrid inverter will only provide power to the backup load connected. The hybrid inverter will neither provide power to the home load nor sell power to grid. The built-in meter will detect power flowing back to the grid and will reduce the power of the inverter only to supply the local load and charge the battery. Enable "PV Sell",it can sell electricity to the power grid.

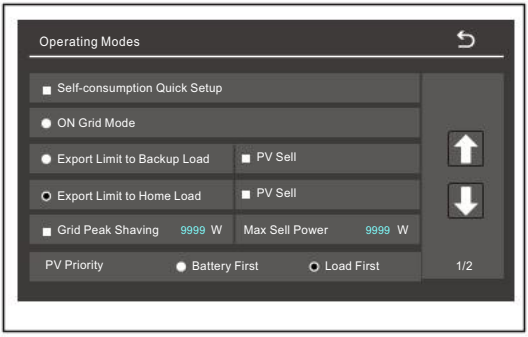
General description not select "PV Sell":

a. The inverter will only cover the loads connected to the "Backup LOAD" terminal.

b. This work mode will not provide power to the "GRID" terminal.

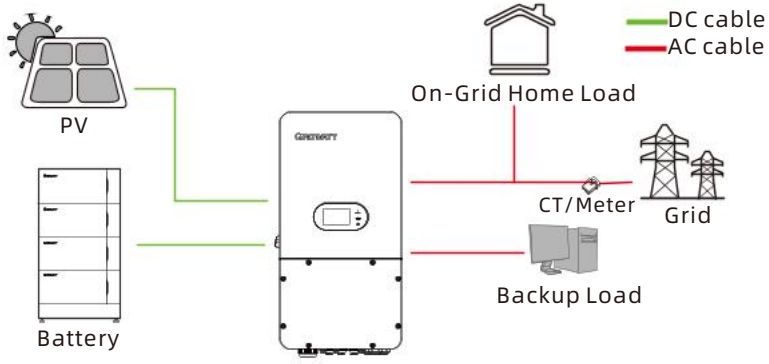
C. This system work mode is recommended for off-grid applications.





Export Limit to Home Load: Hybrid inverter will not only provide power to the backup load connected but also provide to the home load connected. The backup loads and on-grid home loads share the same priority. If PV power is insufficient, it will take grid energy as supplement unless TOU or grid peak shaving is set. The hybrid inverter will not sell power to grid. In this mode, a meter/CT is needed. The installation method of the meter please refer to chapter3.8 Meter or CT connection, The external meter will detect power flowing back to the grid and will reduce the power of the inverter only to supply the local load, charge battery and home load. Enable "PV Sell" it can sell electricity to the power grid. General description "PV sell" disabled:

a. Power is delivered to the whole home without selling the excess solar back to the grid.
b. External CT/Meter required for this system work mode. (How to install and set CT/Meter, please refer to 3.9 and 7.10)
c. Enable "Grid Peak-Shaving" and set "Peak-shaving power(KW)"which is used to set the maximum power that the inverter will draw from its grid power.



PV Sell: "PV sell" is for Export limit to backup load mode or Export limit to home load mode: When this item is selected, the surplus energy can be sold back to grid. PV Power source priority usage is as follows: load consumption and charge battery and feed into grid.

Max Sell Power: Allowed the maximum output power to flow to grid.

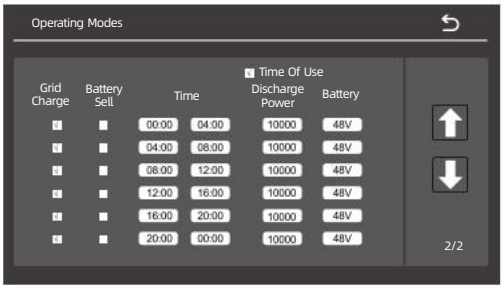
PV Priority: PV Power source priority.

Battery First: PV power is firstly used to charge the battery and then used to power the load. If PV power is insufficient, grid will make supplement for battery and load simultaneously.

Load First: PV power is firstly used to power the load and then used to charge the battery. If PV power is insufficient, grid will make supplement for battery and load simultaneously.

Grid Peak Shaving:

when it is selected, grid output power will be limited within the set value. If the load power exceeds the allowed value, it will take PV energy and battery as supplement, If still can't meet the load requirement, grid power will increase to meet the load needs. Under this working condition, only "Load First" can be selected.(This function can only take effect in Export limit to home load mode):The minimum setting value is 1000W.



Time Of Use:

It is used to program when to use grid or generator to charge the battery, and when to discharge the battery to power the load. Only tick "Time Of Use"then the follow items (Grid Charge, Gen Time, Power, Battery) will take effect. This mode allows the battery to be charged from the grid/ generator or discharged according to the configured time periods.

General description:

a. During the setting hours the system will discharge the batteries to deliver power charge the batteries from the external AC power. All time intervals are automatically enabled.

b. Enable "Time of Use" function and set the Forced discharge time to discharge the batteries to deliver power.

Note: when in ON Grid Mode and click time of use, the battery power can be sold into grid

Grid Charge: Utilize grid to charge the battery in a time period.

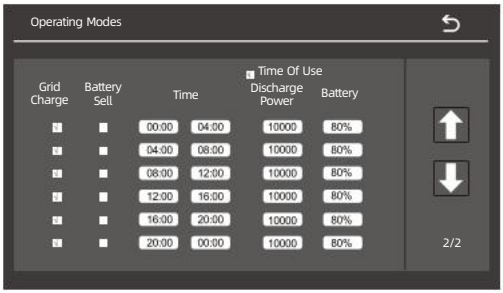
Time: The time displayed on the inverter, range of 00:00-23:59.

Power: Max discharge power of battery allowed.

Battery(V or SOC %):

Battery SOC % or voltage at when the action is to happen. The setting range is 41 to 54V or 21% to 100%. This setting needs to be greater than the LBCO alarm into the battery settings.

Battery Sell: When this option is selected, the battery is permitted to sell electricity back to the grid. (Note: Under standard "Export Limit to Backup/ Home Load" mode, the battery is typically not permitted to sell electricity back to the grid.)

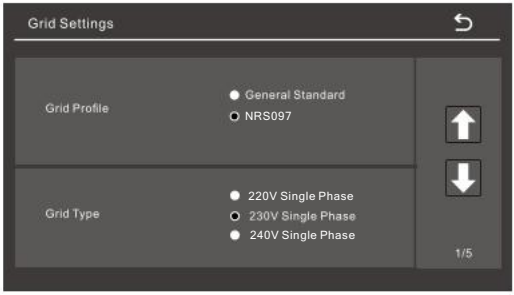
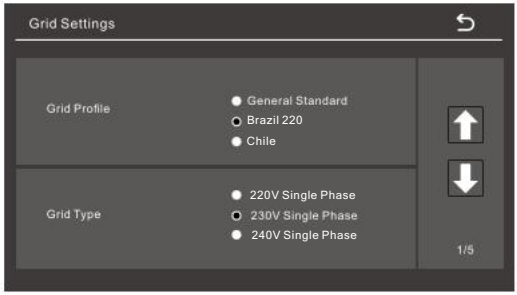


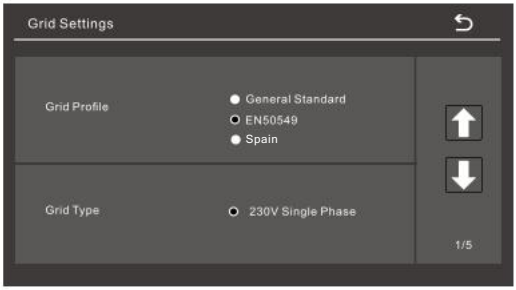
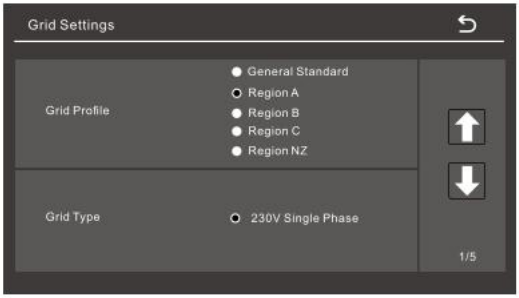
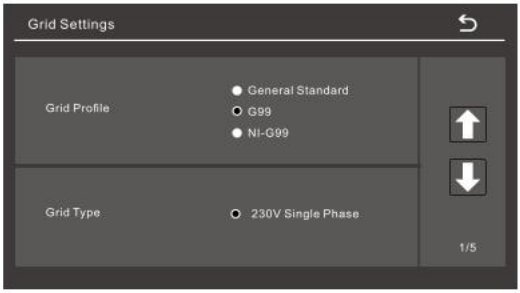
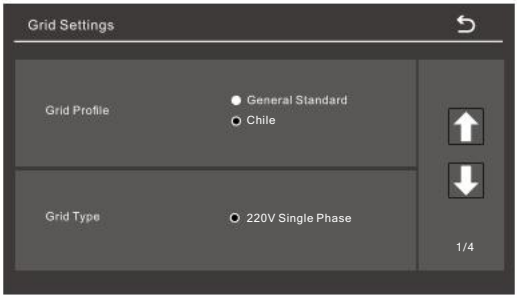
For example:
During 09:00-18:00, when battery SOC is lower than 80% it will use grid to charge the battery until battery SOC reaches 80%.During 18:00-09:00,when battery SOC is higher than 80%,hybrid inverter will discharge the battery until the SOC reaches 80%.When "Battery Sell" is selected, the battery is permitted to sell electricity back to the grid.

Battery: The setting range is 21% to 100%.

5.7 Grid Settings

Grid Mode:
Please follow the local grid code and then choose the corresponding grid standard.
Grid Type: Set the Grid Type.

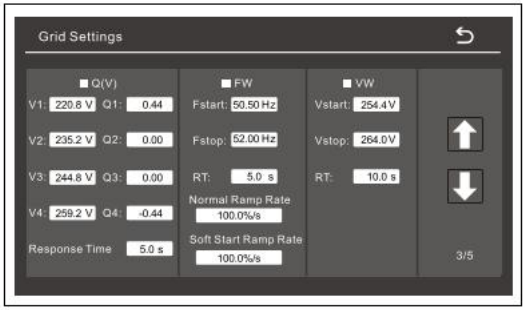
SPH 10000TL-HU (South Africa)	
SPH 10000TL-HU(Brazil)	

SPM 8000/10000TL-HU (EU)	
SPM 8000/10000TL-HU (AU)	
SPM 8000/10000TL-HU (UK)	
SPM 8000/10000TL-HU (Chile)	



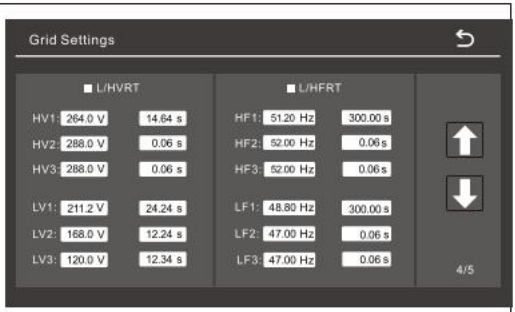
Grid Frequency:
Set the grid frequency.
Reconnection time:
The waiting time period for the inverter to connect the grid again.
PF: This is used to adjust the inverter's reactive power.
Enter Service Frequency/Voltage:
Grid-connected voltage frequency range.

Grid Freqency/ Voltage Range: Grid voltage frequency protection range.

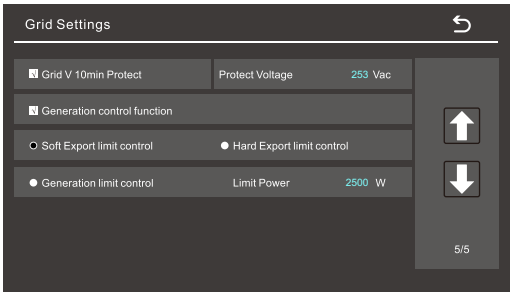


Q(V): It adjusts the inverter reactive power according to the set grid voltage. This function adjusts inverter output (active and reactive) power when grid voltage changes.
FW: This series inverter is able to adjust inverter output power according to grid frequency.

VW: It adjusts the inverter active power according to the set grid voltage.

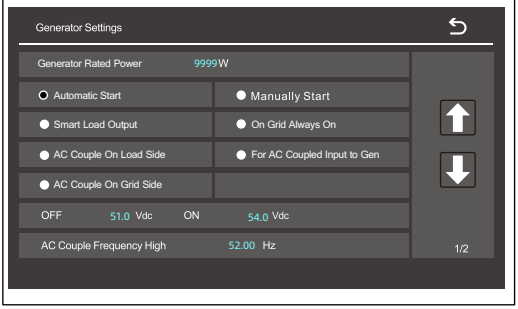


HV1: Level 1 overvoltage protection point.
HV2: Level 2 overvoltage protection point.
HV3: Reserved.
LV1: Level 1 undervoltage protection point.
LV2: Level 2 undervoltage protection point.
LV3: Reserved.
HF1: Level 1 over frequency protection point.
HF2: Level 2 over frequency protection point.
HF3: Reserved.
LF1: Level 1 under frequency protection point.
LF2: Level 2 under frequency protection point.
LF3: Reserved.
14.64s: Trip time.



Grid V 10min Protect:
When the average voltage of the mains power exceeds the set protection value for 10 minutes, the inverter will be disconnected from the grid for protection. This feature is available only in the Australian and European versions.
Soft Export limit control:
When the soft limit is exceeded, the apparent power of the inverter will decrease to less than the soft limit within 15 seconds. This feature is available only in Australia.
Hard Export limit control:
f the soft limit does not limit the mains power to below the limit value within 15 seconds, the hard limit will provide offline protection within 5 seconds. This feature is available only in Australia.
Generation limit control:
Set power limits according to the city power supply, use an electricity meter to detect the mains power and adjust the selling power of the inverter within 15 seconds. This feature is available only in Australia.

5.8 Generator Settings



Generator Rated Power:
Allowed Max. power from diesel generator.
Automatic Start : In this mode, the inverter will automatically turn on the generator when the Recharge value is lower than the Battery Settings-Page 2.When the grid is present or the Maximum Run Time set on the Generator Setting-Page 2 is reached, the generator will be turned off. When using this function, make sure that the generator has an automatic start (ATS) function.
Manually Start : When this function is checked, the generator will be forced to start. When using this function, make sure that the generator has the automatic start (ATS) function.
Smart Load: Allows load to be connected to this port as Smart Load. The inverter will shut off the power supply of the smart load when the battery use.

will shut off the power supply of the smart load when the battery SOC/voltage drops to the OFF value, and the power supply will resume when the battery SOC/voltage reaches the ON value. If On Grid Always ON is enabled, the inverter will always provide power to the smart load if the grid is connected.

For AC Coupled Input to Gen:

Allows other PV inverter to be connected to the generator port. In this mode, the OFF value represents the voltage/SOC when the AC Couple function is turned off, and the ON value represents the voltage/SOC when the AC Couple function is turned on

AC Couple Frequency high:

represents the highest frequency that the inverter can increase when the AC Couple function is turned on. It is recommended to be the same as the first-order grid-off frequency specified in the current grid regulations.

On Grid Always On:

In Smart Load mode, when this setting is set, the generator port can power the smart load continually when the inverter is in on-grid condition, regardless of the current battery charge.

AC Couple on Load Side: Reserved.

AC Couple On Grid Side:

In this mode, AC COUPLE is allowed on the grid side. When using this mode, a DDSU666 (single-phase 2CT)/DTSU666 (three-phase 6CT) meter and "Export Limit to Home Load" mode must be used. Refer to the meter's wiring manual for detailed wiring instructions.

The following are some precautions when using the AC couple function:

1. When charging with micro-inverter (not connected to the grid), try not to carry load, because the frequency fluctuates. When over-frequency is cut off, the machine inverter is in a high-frequency state.
2. The selling power increase rate of micro-inverter must be ≤1%/s. If it is still unstable, it can be set to the recommended value: 0.3%/s to ensure relatively stable charging, rather than micro-inverter switching back and forth.
3. The AC Couple Frequency high value of SPH/SPM 8K/10K series models must be greater than or equal to the micro-inverter over-frequency protection value. The micro-inverter over-frequency protection value is recommended to be equal to the AC COUPLE HighFre value of the energy storage machine.
4. The first-order over-frequency grid exit time of micro-inverter must be ≥10s.
5. Make sure that the corresponding grid regulations have an over-frequency derating function. For example, IEEE1547-2003 does not have an over-frequency derating function and cannot be used!
6. The over-frequency load reduction response time of micro-inverter is recommended to be set to 1s. If it is too long, charging will be unstable and disconnected frequently.

7. The maximum power of a single inverter is 10kW, and the maximum power of a parallel inverter is N*10kW. The diesel engine ports can be connected in a combined or separate manner.The total power of the micro-inverter cannot exceed the limit value. If it exceeds the limit, the inverter may be damaged.

On Grid Always On:

When click "on Grid always on" the smart load will switch on when the grid is present.



High/Low Voltage Limit: Generator-connected voltage range.

High/Low Frequency Limit: Generator-connected frequency range.

Warmup Time: After startup, the amount of time the generator runs(no-load) before the inverter is connected to the generator. The setting range is between 10 and 600s.

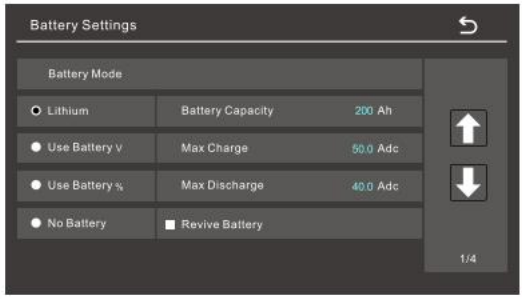
Cooldown Time:

The amount of time the generator runs (no load after the shutdown command is issued before the generator is actually shut down.The setting range is between 10 and 600s.

Maximum Run Time:

When automatically started, the cumulative time allowed for continuous operation of the generator within 24 hours. The generator can be operated manually for any length of time.

5.9 Battery Settings



Lithium: Choose Lithium for Battery Mode if lithium battery is used.

Battery Capacity: Enter the size of the battery bank connected to the system.

Use Battery V: When using lead-acidbattery, choose Use Battery V if you want to use voltage as the unit of actual battery capacity and do the setup.

Use Battery %: When using lead-acidbattery, choose Use Battery %, if you want

to use % as the unit of actual battery capacity on the main screen. Please note that you will still need to use battery voltage as the unit to do the setup.

Max Charge/Discharge: Set the max charge/discharge rate for the batteries.

No Battery: Tick this item if no battery is connected to the system.

Revive Battery: If lithium battery is used but the inverter and the battery are incompatible in communication, please enable the Revive Battery function to wake up the battery. If the lithium battery is compatible with the inverter in communication, then the inverter is able to wake the lithium battery when PV or grid is connected whether the Revive Battery function is enabled or not.



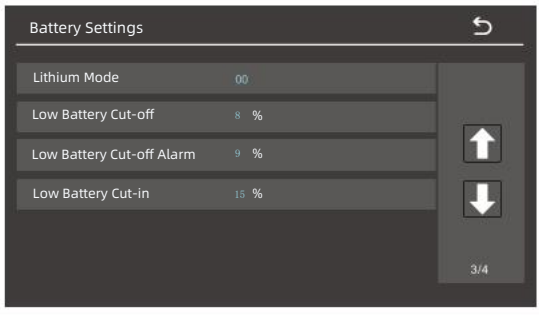
Recharge (Left): When Automatic Start for generator is enabled and the actual battery capacity is lower than the recharge value, the generator will automatically start and charge the battery.

Charge Rate=40 Adc(left): The maximum generator charging current is 40A.

Gen Charge: Enable this to allow generator to charge the battery.

Charge Rate = 40 Adc (right):The maximum grid charging current is 40A.

Grid Charge: Enable this to allow grid to charge the battery.



Lithium Mode:
The communication protocol used between the inverter and lithium battery. Please set this according to the website address: https://community.growatt.com/upload/file/Growatt_Approved_LV_Battery_List.pdf?raw=Growatt_Approved_LV_Battery_List.pdf

Low Battery Cut-off:
The default value is 10%.The minimum value that can be set is 8%.The set value must match Low Battery Cut-off< Low Battery Cut-off alarm< Low Battery Cut-in, otherwise the setting will not be successful. The inverter will shut off its AC output if the actual battery capacity is lower than this value. The backup load can still be

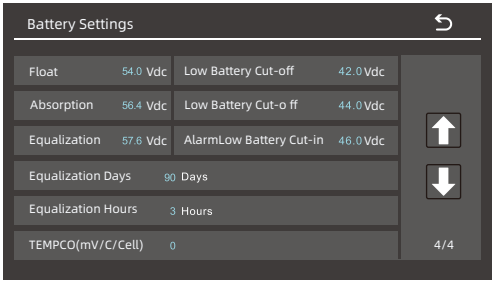
powered by the grid.

Low Battery Cut Off Alarm:

The inverter will send alarm if the actual battery value reaches this value. The default value is 9%. The minimum value can be set is 10%. The set value must match Low Battery Cut Off< Low Battery Cut Off alarm< Low Battery Cut-in, otherwise the setting will not be successful.

Low Battery Cut-in:

The inverter AC output will resume if actual battery capacity reaches this value. The default value is 15%. The minimum value can be set is 15%. The set value must match Low Battery Cut Off< Low Battery Cut Off alarm< Low Battery Cut-in, otherwise the setting will not be successful.



Float, Absorption, Equalization are three stages of charging the battery.

Low Battery Cut Off:

The inverter will shutdown if the voltage below this value.

Low Battery Cut Off Alarm :

The inverter will alarm if the voltage below this value.

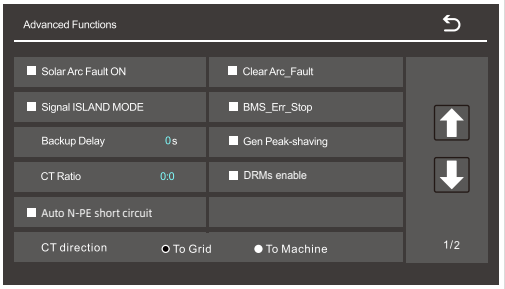
Low Battery Cut-in :

After the battery low voltage alarm, the alarm information above this value.

This is for professional installers, you can keep it if you do not know Recommended battery settings:

Battery Type	Absorption	Float	Equalization
AGM(or PCC)	14.4V(57.6V)	13.5V(53.6V)	14.4(57.6V)
Gel	14.1V(56.4V)	13.5V(54.0V)	
Wet	14.7V(59.0V)	13.7V(55.0V)	14.7(59.0V)
Lithium	Follow its BMS voltage parameters		

5.10 Advanced Functions



The password for entering this pages is 7777.

Solar Arc Fault ON:

This is AFCI function enable setting.

Clear Arc Fault:

Enabling this option when an AFCI error is triggered will clear the error. Alternatively, contact

after-sales personnel to remotely write 1 to bit 10 of register 10210.

Signal ISLAND MODE:

when the inverter connects grid, the ATS port will output 240Vac and it is used to cuts off Earth-Neutral (load port N line) bond via connect external relay. When the inverter disconnects from the grid, ATS port voltage will be 0 and the Earth-Neutral bond keeps on, More details, please refer to above picture.

BMS_Err_Stop:

When the Battery Mode is Lithium

a) enable this function, the inverter will disconnect its output and send BMS error if the battery communication is abnormal. The output will be resumed after the communication is restored

b) disable this function, the Battery Mode will be changed to Use Batt V if the battery communication is abnormal, and the battery can only be discharged, not be charged.

Backup Delay: Reserved.

Gen Peak-shaving: Reserved.

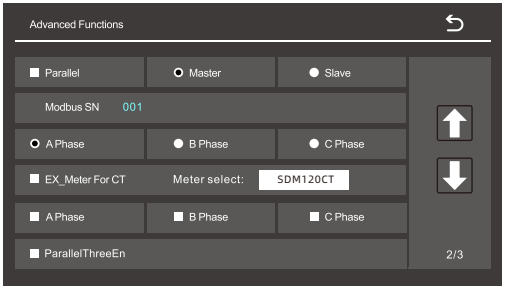
DRMs enable: This is DRMs function enable setting.This function is available only in Australia.Please refer to chapter 3.8.2 for instruction on how to use this function.

Auto N-PE short circuit:

When this option is enabled, the machine will internally close the N-PE relay when disconnected from the grid and disconnect it when connected to the grid. N-PE relay: When closed, it connects the N of the LOAD and PE lines.

CT Ratio: The supported CT of inverter range is between 100:1 and 10000:1. The CT ratio is setted according to the actual CT used. For example, if 100A/50mA is marked on the CT, it means the CT ratio is 2000:1.

CT direction: Section of CT direction.



Parallel:

This is the inverter's parallel function setting.

Ex_Meter For CT:

This is the Meter setting for the inverter. To use the meter, you need to enable this option and select the correct meter model.

ParallelThreeEn:

This model enables the three-phase function of the group by setting specific grid regulations. This setting is not applicable.

Modbus SN: If use smart meter to do the grid side sampling, please select the meter that is being used.

Meter Select: Selection of electric meter.

6 Maintenance

6.1 Troubleshooting

Error codes are divided into Warning codes and fault codes.
Warning codes identify the current statues of the inverter,it codes not affect the normal running of the inverter When a numeric warning appears on the Main Screen , it can usually be cleared through orderly shutdown/re-set or self-corrective action performed by the inverter. Fault codes identify the possible equipment failure. incorrect setting or configuration of the inverter, all attempts to clear the fault code must be performed by qualified personnel.
Typically, error codes can be cleared. Some of error code as table shows below.

Auditing routine	Error Code	Description	Solutions
About PV	W83	PV Volt Over Warning	1.Check whether the PV voltage is greater than 525V. 2.If alarm message still exists, contact manufacturer.
	W89	PV Over Load	1.Check whether the single-channel PV power exceeds 11 KW. 2.If alarm message still exists, contact manufacturer.
	F33	PV Current Over	1.Check the connection between the PV module and the battery module. 2.Reduce the number of load connections in off-grid mode. 3.If the fault persists, contact the manufacturer.
	F39	Self Check Fault	1.Restart the inverter. 2.If the fault persists, contact the manufacturer.
	F40	PV Voltage Over	1. Check whether the actual PV voltage is consistent with the Main Screen. 2.Check whether the PV string voltage (Voc) is higher than the maximum input voltage of the inverter. If yes, adjust the number of PV modules in series to reduce the PV series voltage. 3.If the fault persists, contact the manufacturer.
About Grid、Generator	W68	Grid Relay Warning	1.Restart the inverter. 2.If alarm message still exists, contact manufacturer.
	W71	Gen Overload warning	1.Check whether the generator power exceeds 10 kW. 2.If alarm message still exists, contact manufacturer.
	F26	Grid Type Fault	1.Restart the inverter. 2.If the fault persists,contact the manufacturer.

Auditing routine	Error Code	Description	Solutions
About inverter	W01	Fan lock warning	1. Check fan wiring after shutdown. 2.If alarm message still exists, contact manufacturer.
	W03	LCD Connect warning	1.Check LCD wiring after shutdown. 2.If alarm message still exists, contact manufacturer.
	W10	RSD Stop Press Alarm	1. Check if the emergency stop button is pressed. 2.If alarm message still exists, contact manufacturer
	W12	MDSP update alarm	1.Check if the machine is in the process of upgrading. 2.If alarm message still exists, contact manufacturer.
	W13	SDSP update alarm	
	W67	Inverter Relay Warning	1.Restart the inverter. 2.If alarm message still exists, contact manufacturer
	W70	GFCI Warning	1.Restart the inverter. 2.If alarm message still exists, contact manufacturer.
	W73	MDSP-METER Connect warning	1.Check meter wiring after shutdown 2.If alarm message still exists, contact manufacturer.
	W88	AFCI Curr Over Warning	1.Shut down and check for poor contact or tearing of PV component wires. 2.If the fault persists,contact the manufacturer.
	W90	Insulation Low	1.After shutdown,check if the panel shell is reliably grounded 2.If alarm message still exists, contact manufacturer
	W91	AFCI Communicati on fail	1.After shutdown, check if the AFCI line inside the machine has fallen off 2.If the fault still exists,please contact us for help.
	W92	AFCI selftest fail	1.Restart inverter. 2.If the fault persists, contact the manufacturer.
	W93	N-PE Connect Fault	1.Check whether the inverter is properly grounded. 2.If alarm message still exists,contact manufacturer.

Auditing routine	Error Code	Description	Solutions
About inverter	F18	Inverter Over Curr Fault	1. Check if the load is within the power range. 2.Restart the inverter. 3.If the fault persists, contact the manufacturer.
	F19	MSDSP Connect Fault	1.Restart the inverter. 2.If the fault persists, contact the manufacturer.
	F24	Inverter Voltage Fault	1. Test if the actual output inverter voltage is consistent.1.Restart the inverter. 2.If the fault persists, contact the manufacturer.
	F27	GFCI Fault	1.Restart the inverter. 2.If the fault persists, contact the manufacturer.
	F34	Bus Volt Over	1.Restart the inverter. 2.If the fault persists, contact the manufacturer.
	F35	Bus Volt Unbalance	
	F34	Bus Volt Over	
	F41	Heat Sink High Temperature Failure	1. Check that the inverter is not installed in a place where the sunshines, and ensure that the inverter is installed in a cool and ventilated place. 2.Check whether the working temperature is too high, and make sure that the inverter is installed vertically 3.Turn off the inverter for 10 minutes, then restart the inverter 4.If the fault persists, contact the manufacturer
	F42	Transfer Temperature Over	
	F45	BUS Start Error	1. Restart the inverter. 2.If the fault persists, contact the manufacturer.
	F47	Fan 1 Fault	Replace Fan1.See chapter 3.12.
	F48	Fan 2 Fault	Replace Fan2.See chapter 3.12.
	F49	M3MDSP Connect Fault	1.Shut down and check whether the communication line is firmly connected. 2. Restart the inverter 3.If the fault persists, contact the manufacturer.
	F53	Version Different	1.Restart the inverter. 2.If the fault persists, contact the manufacturer.
	F61	Fan 3 Fault	Replace Fan3.See chapter 3.12.

Auditing routine	Error Code	Description	Solutions
About inverter	F62	Fan 4 Fault	Replace Fan4.See chapter 3.12.
	F63	Fan 5 Fault	Replace Fan5.See chapter 3.12.
About Load	W65	Output Short Warning	1.Output is short circuit. 2.Shut down and restart to check whether the machine can work normally 3.If alarm message still exists, contact manufacturer.
	W66	Output Overload Warning	1.Check whether the output is short-circuited. 2.Shut down and restart to check whether the machine can work normally 3.If alarm message still exists, contact manufacturer.
	F20	DC Weight High	1. Restart the inverter. 2.If thefault persists, contact the manufacturer.
	F21	Output Short	1. Check if the load is short circuited. 2. Restart the inverter. 3.If the fault persists, contact the manufacturer.
	F22	Output Over Load	1. Check if the load is within the power range.2.Restart the inverter.3.If the fault persists, contact the manufacturer.
	F23	Output Over Curr	1. Restart the inverter. 2.If the fault persists, contact the manufacturer.
About Battery	W14	BMS update alarm	1. Check if the machine is in the process of upgrading. 2.If alarm message still exists, contact manufacturer.
	W16	BMS update parameter alarm	1.Pleaseset the 'Lithium Mode' to 01 in the Battery Settings on the LCD, then proceed with the battery upgrade. 2.If alarm message still exists, contact manufacturer

Auditing routine	Error Code	Description	Solutions
About Battery	W69	Bat Energy Warning	1.Please charge for 10 minutes before inverter. 2.If alarm message still exists, contact manufacturer.
	W82	Bat Volt Low Warning	1. Check if the battery voltage is too low 2.If alarm message still exists, contact manufacturer.
	W87	Battery Missing Warning	1.There is no electric voltage at the input end of the machine battery. 2.After confirming that the battery voltage is normal, turn on the machine to check whether it can work normally. 3.If alarm message still exists, contact manufacturer.
	F36	Battery Voltage Over	1.Check whether the actual connected battery voltage is consistent with the display. 2.If the battery voltage is too low, use photovoltaic on commercial power to charge the battery. If the battery voltage is too high, please connect to a battery within the required range. 3.If the fault persists, contact the manufacturer.
	F37	Bat Charge Current Over	1. Check whether the actual battery current is consistent with the display. 2.Restart the inverter. 3.If the fault persists, contact the manufacturer.
	F38	Bat DisCharge Current Over	
	F51	M3BMS Connect Fault	1.Shut down and check whether the communication line is firmly connected. 2.Restart the invert. 3.If the fault persists, contact the manufacturer.
	F57	BMS Fault	1.Restart the inverter. 2.If the fault persists, contact the manufacturer.
	F58	Battery Mode Fault	
About Parallel	W05	Parallel Grid different	1.After shutting down the inverter, check if the grid power supply cables are correctly connected. 2.If the warn persists, contact the manufacturer.

Auditing routine	Error Code	Description	Solutions
About Parallel	W06	Parallel Phase Error	1.After disconnecting the grid power supply from the inverter, check whether the grid connection phase sequence matches the parallel operation settings on the Main Screen. 2.Restart the inverter. 3.If the warn persists, contact the manufacturer.
	W07	Op Phase Loss Error	1. Check if the parallel operation parameters settings on the inverter's LCD interface are correct. 2.Restart the inverter. 3.If error message still exists, contact manufacturer.
	W08	Parallel Version Different	Please contact the manufacturer
	W09	Capacity Different	If the warn still exists,please contact us for help.
	F29	Parallel Setting Fault	1.Check if the master-slave settings in the parallel operation settings on the LCD interface of the inverter are correct. 2.Restart the inverter. 3.If error message still exists, contact manufacturer.
	F31	Parallel CN-AC Phase Order	1.Restart the inverter. 2.1f error message still exists, contact manufacturer.
	F54	Can Fault	1.After shutting down the inverter, check if the parallel communication cables are securely and correctly connected. 2. Restart the inverter. 3.If error message still exists, contact manufacturer
	F55	Host Loss	1.Restart the inverter. 2.If error message still exists, contact manufacturer.
	F59	Parallel BMS Connect Error	1.Connect the BMS communication cable to the 'Master Phase A port of the inverter. 2. Restart the inverter. 3.If error message still exists, contact manufacturer

6.2 Decommissioning

6.2.1 Preparation

- Prepare safety gloves, a cross-head screwdriver, socket wrench, and other tools.
- Power off the SPH/SPM 8K/10K system.

1. If the battery system is powered on, press the power button once to turn it off. Before performing maintenance on the battery, ensure to turn off the circuit breaker and confirm again that the battery system is powered off. Follow the installation and wiring procedures described above.
2. Turn off the circuit breaker that connects the inverter to the grid.
3. Turn off the PV-side isolation switch.
4. Ensure that SPH/SPM 8K/10K is completely powered off, with the LCD screen turned off.

- Disconnect the wires in the system.

6.2.2 Remove the Inverter

1. Power off the system.
2. Disconnect all cables connected to the SPH/SPM 8K/10K.
3. Remove screws securing the SPH/SPM 8K/10K.
4. Remove the SPH/SPM 8K/10K.

Note:
After powering off the SPH/SPM 8K/10K inverter, do not open the cover until 5 minutes later as residual voltage exists, and it takes about 20 minutes for the inverter to cool down.

6.2.3 Pack the Inverter

Please handle the SPH/SPM 8K/10K inverter and the battery with care during transportation. Keep them level and try to keep the batteries at approximately 50% SOC (State of Charge) during handling.

6.2.4 Dispose of the Inverter



Do not dispose of the SPH/SPM 8K/10K inverter together with the household waste but in accordance with the disposal regulations for electronic waste applicable at the installation site.

Data Sheet 7

Specifications \ Model	SPH 10000TL-HU	SPH 10000TL-HU (Brazil)	SPH 10000TL-HU (Chile)
PV Input Data			
Max Recommended PV Power	15000W		
DC/AC Ratio	1.5		
PV Input Voltage(V)	370V(130V-525V)		
MPPT Range(V)	150V-450V		
Start-up Voltage(V)	130V		
PV Input Current(A)	22A+22A+22A		
No. of MPPT Trackers	3		
No. of PV strings per MPP trackers	2/2/2		
Battery Data			
Battery Type	Lead-acid or Li-ion		
Nominal Voltage(V)	48V		
Battery Voltage Range(V)	40-60V		
Max Charging Current(A)	200A		
Max Discharging Current(A)	200A		
Output Data(On Grid)			
Rated Voltage	220/230/240Va.c.(single phase)		
Continuous Power Output(W)	10000W		
Nominal Output Current(A)	43.5A		
Max. AC Current(A)	50A		
Power Factor	0.8 leading to 0.8 lagging		
Output Frequency	50/60Hz		
Grid Type	Single phase		
THDI	<3%		
Backup Power(Off Grid)			
Rated Voltage	220/230/240Va.c. (single phase)		
Maximum Grid Bypass Current	75A	63A	

Specifications \ Model	SPH 10000TL-HU	SPH 10000TL-HU(Brazil)	SPH 10000TL-HU(Chile)
AC Nominal Output Power(W)	10000W		
Peak Power(grid off)	1.2 times of rated power, 5s		
AC Output Rated Current(A)	43.5A		
AC Output Rated Current(A)	43.5A		
Output Frequency	50/60Hz		
Switch Time	<10ms		
Efficiency			
Max Efficiency	98.10%		
Euro Efficiency	97.60%		
MPPT Efficiency	99.90%		
Protection			
PV Switch	Yes		
BAT reverse protection	Yes		
Output over current protection	Yes		
AC short-circuit protection	Yes		
PV Input Lightning Protection	Yes		
Anti-islanding Protection	Yes		
PV String Input Reverse Polarity Protection	Yes		
Insulation Resistance Monitoring	Yes		
Residual Current Monitoring Unit	Yes		
AFCI protection	No	Yes	
Surge Protection	DC Type II / AC Type II		
Certifications and Standards			
Compliance	**SPH 10000TL-HU:**IEC62109-1, IEC62109 -2, NRS097, ICASA **SPH 10000TL-HU(Brazil):**Brasil 220, IEC62109-1, IEC62109-2, IEC63027, EN61000-6-1, EN61000-6-3 **SPH 10000TL-HU(Chile):**IEC62109-1, IEC62109-2, IEC63027, IEC 62116, EN 61000-6-1,EN 61000-6-3		

Specifications \ Model	SPH 10000TL-HU	SPH 10000TL-HU(Brazil)	SPH 10000TL-HU(Chile)
Output Data(On Grid)			
General Data	-25~60℃, >45℃ Derating		
Operating Temperature Range(℃)	Smart cooling		
Cooling	<60dB		
Noise(dB)	RS485/CAN		
Communication with BMS	42.5		
Weight(kg)	883.0H*457.2W*255.6D		
Size(mm)	IP65		
Protection Level	Wall-mounted		
Installation Style	10 years		

Model / Specifications	SPM 10000TL-HU(AU)	SPM 10000TL-HU(EU)	SPM 10000TL-HU(UK)	SPM 8000TL-HU(AU)	SPM 8000TL-HU(EU)	SPM 8000TL-HU(UK)
PV Input Data						
Max Recommended PV Power	20000W	20000W	20000W	16000W	16000W	16000W
DC/AC Ratio	2					
PV Input Voltage(V)	370V(130V-550V)					
MPPT Range(V)	150V-500V					
MAX PV Input Voltage	600Vd.c. (Access only)					
Start-up Voltage(V)	130V					
PV Input Current(A)	16A+16A+32A				16A+16A+16A	
Max. PV Short Circuit Current	22A+22A+40A					
No. of MPPT Trackers	3					
No. of PV strings per MPPT trackers	2/2/2					
Battery Data						
Battery Type	Lead-acid or Li-ion					
Nominal Voltage(V)	48V					
Battery Voltage Range(V)	40-60V					
Max. Charging Current(A)	200A			190A	165A	
Max. Discharging Current(A)	200A			190A	165A	
Max.Battery Short Circuit Current	400A					
output Data (On Grid)						
Rated Voltage	230Va.c.(single phase)					
Continuous power output(W)	9999W	10000W		8000W		
Rated apparent power(VA)	9999VA	10000VA		8000VA		
Nominal Output Current(A)	43.5A			34.8A		

Model / Specifications	SPM 10000TL-HU(AU)	SPM 10000TL-HU(EU)	SPM 10000TL-HU(UK)	SPM 8000TL-HU(AU)	SPM 8000TL-HU(EU)	SPM 8000TL-HU(UK)
Max. AC Current(A)	50A			40A		
Max. AC Short Circuit Current	100A					
Power Factor	0.8 leading to 0.8 lagging					
Output Frequency	50Hz					
Grid Type	Single phase					
Maximum Grid Bypass Current	63A					
THDI	<3%					
Backup Power (Off Grid)						
Rated Voltage	230Va.c.(single phase)					
AC Nominal Output Power(W)	9999W	10000W		8000W		
Rated apparent power(VA)	9999VA	10000VA		8000VA		
Peak Power (grid off)	1.2 times of rated power, 5s					
AC Output Rated Current(A)	43.5A			34.8A		
Output Frequency	50Hz					
Max. AC Output Short Circuit Current	100A					
Switch Time	<10ms					
Efficiency						
Max. Efficiency	98.10%					
Euro Efficiency	97.60%					
MPPT Efficiency	99.90%					
Protection						
PV Switch	Yes					
BAT reverse protection	Yes					

Model / Specifications	SPM 10000TL-HU(AU)	SPM 10000TL-HU(EU)	SPM 10000TL-HU(UK)	SPM 8000TL-HU(AU)	SPM 8000TL-HU(EU)	SPM 8000TL-HU(UK)
Output over current protection	Yes					
AC short-circuit protection	Yes					
PV Input Lightning Protection	Yes					
Anti-islanding Protection	Yes					
PV String Input Reverse Polarity Protection	Yes					
Insulation Resistance Monitoring	Yes					
Residual Current Monitoring Unit	Yes					
AFCI protection	Yes					
Surge Protection	DC Type II / AC Type II					
Environmental Category	Outdoor					
Protective Class	Class Ⅰ					
Overvoltage Category	BAT&PV:OVC Ⅱ, Mains:OVC Ⅲ					
Inverter Topology	Non-Isolation					
Active anti-islanding method	Frequency shift					
Certifications and Standards						
Compliance	**SPM 10000TL-HU (AU):** AS4777.1:2024, AS609473, CSIP-AUS EN IEC61000-6-2,ENIEC61000-6-4,EN62109-1,EN62109-2 **SPM 10000TL-HU (EU):** EN50549-1/10,IEC62109-1,IEC62109-2,EN61000-6-1,EN61000-6-3 **SPM 10000TL-HU (UK):** G99,NI-G99,IEC62109-1,IEC62109-2,EN61000-6-1,EN61000-6-3 **SPM 8000TL-HU (AU):**AS4777.1:2024,AS609473,CSIP-AUS,EN IEC61000-6-2,ENIEC61000-6-4,EN62109-1,EN62109-2 **SPM 8000TL-HU (EU):**EN50549-1/10,IEC62109-1,IEC62109-2,EN61000-6-1,EN61000-6-3 **SPM 8000TL-HU (UK):**G99,NI-G99,IEC62109-1,IEC62109-2,EN61000-6-1,EN61000-6-3					

Model / Specifications	SPM 10000TL-HU(AU)	SPM 10000TL-HU(EU)	SPM 10000TL-HU(UK)	SPM 8000TL-HU(AU)	SPM 8000TL-HU(EU)	SPM 8000TL-HU(UK)
Operating Temperature Range(°C)	-25~60°C , >45°C Derating					
Cooling	Smart cooling					
Noise(dB)	<60 dB					
Communication with BMS	RS485/ CAN					
Weight(kg)	42.5					
Size(mm)	440W*855H*255.6D					
Protection Level	IP65					
Installation Style	Wall-mounted					
Warranty	10 years					
Place of Production	Made in China					

8 Appendix

Appendix I

Approved battery brand from Growatt.

Brand	Model	RS485 or CAN	Inverter Setup
GROWATT	ALP	CAN	01
	AXE	CAN	05
	HOPE 5.5	RS485	00
		CAN	01
Enersys	OGHB 1548-Li	CAN	02
TOPBAND	TB48100F-T110AD	RS485	03
PYLON	US2000B/ US3000/ US2000C/ US3000C/ UP5000/ US5000/ Force L1/ Force L2	CAN	04
Dyness	DYNESS LV	RS485	00
Raystech	RT5427	CAN	01

Please check the complete battery matching list on the official website, official website link:
https://community.growatt.com/upload/file/Growatt_Approved_LV_Battery_List.pdf?raw=Growatt_Approved_LV_Battery_List.pdf

Appendix II

CT installation recommendation

CT model	CT ratio	CT aperture	Property	Recommendation system
100A	2500:1	17mm	Standard configuration	single-phase system 3PCS three-phase parallel systems
200A	5000:1	37mm	Purchase from Growatt	2-3PCS single-phase parallel systems 6PCS three-phase parallel systems
500A	12500:1	37mm	Purchase from Growatt	4-6PCS split-phase parallel systems

Appendix III

Meter installation recommendation

Meter type	Property	Recommendation system
TPM-CT-E-EU(250ACT)	Purchase from Growatt	3-6 PCS three-phase parallel systems
SPM-CT-E(100A)	Purchase from Growatt	Single-phase system
SPM-CT-E (200A)	Purchase from Growatt	2 PCS single-phase parallel systems
SPM-CT-E (500A)	Purchase from Growatt	3-6 PCS single-phase parallel systems
DDSU666(100A)	Purchase from Growatt	Single-phase system
DTSU666(100A)	Purchase from Growatt	3PCS three-phase parallel system
DTSU666(250A)	Purchase from Growatt	6PCS three-phase parallel system

Appendix IV

Certificates

With the appropriate settings, the unit will comply with the requirements specified in the following standards and directives (dated: Aug./2024):

Model	Certificates
SPH 10000TL-HU	IEC 62116,IEC 61727,NRS097,ROHS、IEC61683,IEC 60068,CE,CE-RED,ICASA,IEC 63027
SPM 8000-10000TL-HU (AU)	AS4777.1.2024,AS609473,CSIP-AUS,EN IEC61000-6-2,EN IEC651000-6-4,EN62109-1,EN62109-2
SPM 8000-10000TL-HU (EU)	EN50549-1/10,IEC62109-1,IEC62109-2,EN61000-6-1,EN61000-6-3
SPM 8000-10000TL-HU (UK)	G99, NI-G99,IEC62109-1,IEC62109-2,EN61000-6-1,EN61000-6-3

Appendix V

IEC63027 Standard Declaration:

SPH 10000TL-HU complies with the IEC63027 standard.

Arc detection and protection function	
Standard	IEC63027
Scope of protection	Full coverage

Arc detection and protection function	
Implementation method	Integration
The function	Arc Detection and Cutting (AFPE)
The chain monitored by the entrance door	1
The input port of each monitored channel	3
Channel monitoring	1
Reconnection method	Automatic reconnection

Appendix VI

Note:
Check the equipment manual to understand the correct method for electrical installation and whether the equipment is needed Additional electrical protection.

Monitoring Equipment 9 Configuration Guide

Download the configuration guide.

ShineWilan-X2

ShineWiFi-X2

Shine4G-X

Growatt New Energy

Download
Manual

Shenzhen Growatt New Energy Co., Ltd.

4-13/F, Building A, Sino-German (Europe) Industrial Park,
Hangcheng Blvd, Bao'an District, Shenzhen, China

E service@growatt.com

W en.growatt.com

For local customer support, please visit https://en.growatt.com/support/contact

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