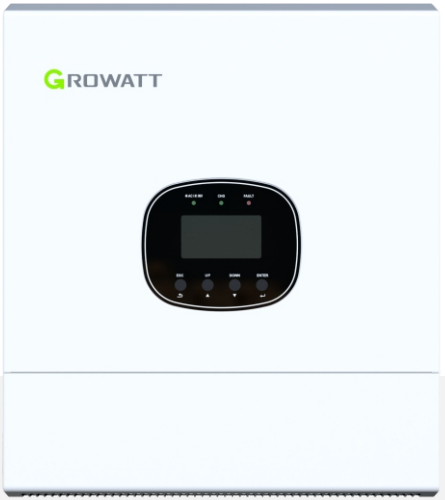
User Manual

GROWATT

PV Hybrid Inverter
SPE 3500TL HVM-24G2
SPE 5000TL HVM-G2



044.SK0019301

Version: 1.0

Contents

1. Information on this Manual 1
1.1 Validity 1
1.2 Scope 1
1.3 Target Group 1
1.4 Safety Instructions 1
2. Product Overview 2
2.1 Product Features 2
2.2 Panel and Port Definitions 3
3. Installation Instructions 4
3.1 Accessory list 4
3.2 Points for attention 4
3.3 Battery Connection 5
3.3.1 Wiring preparation 5
3.3.2 Battery power cable connection 5
3.3.3 Lithium battery communication cable connection 6
3.4 AC Connection 7
3.4.1 Connection preparation 7
3.4.2 AC Input/GEN/Output wires Connection 7
3.5 PV Connection 9
3.5.1 Connection preparation 9
3.5.2 PV cable Connection: 9
3.6 Communication Connection 10
3.7 Dry Contact Signal 10
3.8 CT Connection 10
3.9 Wiring system for inverter 11
4. Operation 12
4.1 Power ON/OFF 12
4.2 Display Panel Introduction 12
4.2.1 LCD Display Icons 13
4.2.2 Display Information 15
4.2.3 Operating Mode Description 19
4.3 LCD parameter setting 20
5. Fault Reference Code 41
5.1 Fault Reference Code 41
5.2 Warning Indicator 42
6. Specifications 43
6.1 AC Input Specifications 43
6.2 Inverter Mode Specifications 44
6.3 Smart Load Output Power Specifications 44
6.4 AC Charge Mode Specifications 45
6.5 MPPT Solar Charging Mode Specifications 45
6.6 Grid Feeding Specification 46
6.7 Physical Dimension 46
7. Appendix 47
Appendix I. Fault information and processing 47
Appendix II Restore factory settings 49
Appendix III Battery Equalization 49
Appendix IV Routine maintenance 51
Appendix V WIFI Monitoring 51

1. Information on this Manual

1.1 Validity

This manual is valid for the following devices:

- SPE 3500TL HVM-24G2
- SPE 5000TL HVM-G2

1.2 Scope

This manual describes the assembly, installation, operation and troubleshooting of this unit. Please read this manual carefully before installations and operations.

1.3 Target Group

This document is intended for qualified persons and end users. Tasks that do not require any particular qualification can also be performed by end users. Qualified persons must have the following skills:

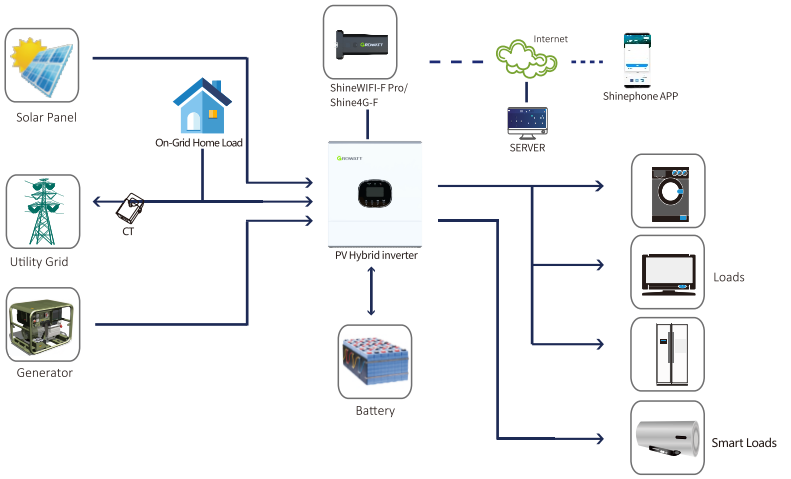
- Knowledge of how an inverter works and is operated
- Training in how to deal with the dangers and risks associated with installing and using electrical devices and installations
- Training in the installation and commissioning of electrical devices and installations
- Knowledge of the applicable standards and directives
- Knowledge of and compliance with this document and all safety information

1.4 Safety Instructions

⚠ **WARNING:** This chapter contains important safety and operating instructions.
Read and keep this manual for future reference.

1. Before using the unit, read all instructions and cautionary marking on the unit, the batteries and all appropriate sections of this manual. The company has the right not to quality assurance, if not according to the instructions of this manual for installation and cause equipment damage.
2. All the operation and connection please professional electrical or mechanical engineer.
3. All the electrical installation must comply with the local electrical safety standards.
4. When install PV modules in the daytime, installer should cover the PV modules by opaque materials, otherwise it will be dangerous as high terminal voltage of modules in the sunshine.
5. **CAUTION-**To reduce risk of injury, charge only deep-cycle lead-acid type rechargeable batteries and lithium batteries. Other types of batteries may burst, causing personal injury and damage.
6. Please be clear which kind of battery system you want, lithium battery system or lead-acid battery system, if you choose the wrong system, energy storage system can't work normally.
7. **NEVER** charge a frozen battery.
8. Be very cautious when working with metal tools on or around batteries. A potential risk exists to drop a tool to spark or short circuit batteries or other electrical parts and could cause an explosion.
9. For optimum operation of this inverter, please follow required spec to select appropriate cable size. It's very important to correctly operate this inverter.
10. Please strictly follow installation procedure when you want to disconnect AC or DC terminals. Please refer to INSTALLATION section of this manual for the details.
11. GROUNDING INSTRUCTIONS -This inverter should be connected to a permanent grounded wiring system. Be sure to comply with local requirements and regulation to install this inverter.
12. **NEVER** cause AC output and DC input short circuited. Don't connect to mains when DC input short circuits.
13. Make sure the inverter is completely assembled, before the operation.
14. Do not disassemble the unit. Take it to a qualified service center when service or repair is required. Incorrect re-assembly may result in a risk of electric shock or fire.
15. To reduce risk of electric shock, disconnect all wirings before attempting any maintenance or cleaning. Turning off the unit will not reduce this risk.

2. Product Overview



Hybrid Power System

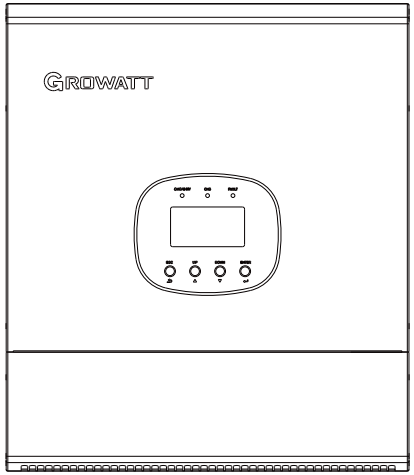
This is a multifunctional solar inverter, integrated with a MPPT solar charge controller, a high frequency pure sine wave inverter and a UPS function module in one machine, which is perfect for off grid backup power and self-consumption applications. This inverter can work with or without batteries.

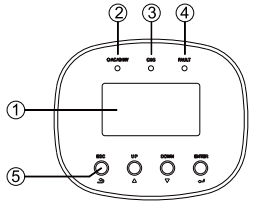
The whole system also need other devices to achieve complete running such as PV modules, generator, or utility grid. Please consult with your system integrator for other possible system architectures depending on your requirements. The WiFi / GPRS module is a plug-and-play monitoring device to be installed on the inverter. With this device, users can monitor the status of the PV system from the mobile phone or from the website anytime anywhere.

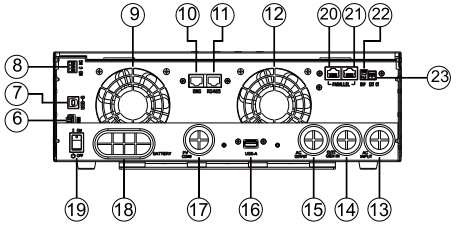
2.1 Product Features

- Built-in high-frequency sine wave inverter and MPPT solar controller;
- 170-280VAC (or 90-280VAC) mains input range can be selected;
- 50HZ/60HZ output frequency can be selected;
- Charging current can be adjusted from 0A-100A;
- Up to 200% output impact resistance;
- Automatically converts to inverter output when the mains power is abnormal;
- Built-in solar controller and standby power saving mode make the product more energy-saving and environmentally friendly;
- Three-stage mains charging mode and charging voltage and current can be adjusted Adjustment;
- Adopting high-speed and high-performance DSP control, the response speed of the system is improved;
- LED-LCD dual display;
- WIFI/GPRS function (optional);
- Output short circuit protection, output over-voltage and under-voltage protection (can be set according to safety regulations when connected to the grid), output over-frequency and under-frequency protection (can be set according to safety regulations when connected to the grid), output overcurrent protection; output overload protection;
- BUS over-voltage and under-voltage protection, over-temperature protection and derating, Relay fault detection; ISO insulation impedance detection, DCI protection; GFCI leakage current protection; NG detection;
- Grid connection function;
- Parallel operation up to 9 units (only with SPE 5000TL HVM-G2)
- Intelligent load management dual output;
- External CT anti-reverse flow function

2.2 Panel and Port Definitions







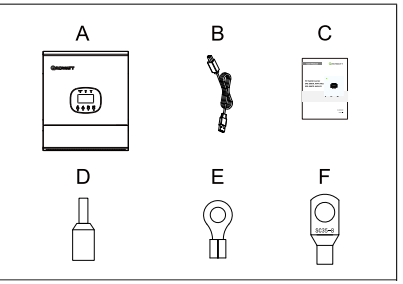
Panel operation	
1. LCD display	2. Status indicator
3. Charging indicator	4. Fault indicator
5. Function buttons	6. WiFi/GPRS communication port
7. USB communication port	8. Dry contact
9. Fan	10. BMS communication port (support CAN/RS485)
11. RS485 communication port (for expansion)	12. Fan
13. AC input	14. GEN IN or AC output2
15. AC output	16. WiFi/GPRS communication port
17. PV input	18. Battery input
19. Power on/off switch	20. Parallel communication port
21. Parallel communication port	22. DIP
23. EXT CT	

3. Installation Instructions

3.1 Accessory list

Before installation, please inspect the unit. Be sure that nothing inside the package is damaged. You should have received the following items in the package:

Part List			
Item	Item Name	3500 Num	5000 Num
A	The unit	1	1
B	Communication cable	1	1
C	User manual	1	1
D	Tubular terminal	8	8
E	R-type terminal	3	3
F	O-type terminal	2	2

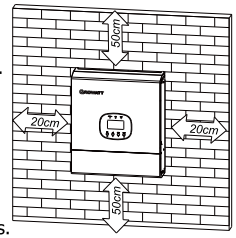


3.2 Points for attention

Consider the following points before selecting where to install:

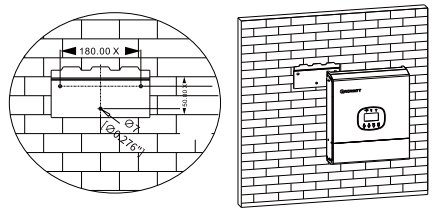
Install this inverter at eye level in order to allow the LCD display to be read at all times.

- The ambient temperature should be between 0°C and 55°C to ensure optimal operation.
- The recommended installation position is to be adhered to the wall vertically.
- Do not install in too narrow confined space and pay attention to ventilation.
- Be sure to keep other objects and surfaces as shown in the right diagram to guarantee sufficient heat dissipation and to have enough space for removing wires.



⚠ If the energy storage is installed in areas with salt damage, it will be corroded and may cause fire. Therefore, do not install it outdoors in areas with salt damage. The areas with salt damage are defined as the areas which are not 500m away from shore or will be affected by sea breezes. The areas affected by the sea breezes vary depending on meteorological conditions (e.g. typhoons, monsoons) or topographical conditions (dams, hills).

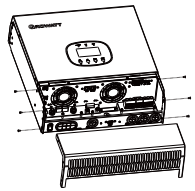
SUITABLE FOR MOUNTING ON CONCRETE OR OTHER NON-COMBUSTIBLE SURFACE ONLY.



Install the unit by screwing three screws. It's recommended to use M4 or M5 screws.

Preparation for wiring:

Before connecting all wiring, please take off bottom cover by removing four screws as shown below.



3.3 Battery Connection

⚠WARNING!

All wiring must be performed by a qualified person.

- Shock Hazard：Installation must be performed with care due to high battery voltage in series.
- Always disconnect all circuit breakers before making connections to the battery power cable.
- Make sure the battery power cable positive (+) must be connected to battery positive (+) , negative (-) must be connected to battery negative (-) .
- Do not place anything between the flat part of the inverter terminal and the ring terminal. Otherwise, a short circuit may occur, resulting in overheating and fire.
- Do not apply anti-oxidant substance on the terminals before terminals are connected tightly.

3.3.1 Wiring preparation

1. For safety operation and regulation compliance, it's requested to install a separate DC breaker (over-current protector) or disconnect device between battery and inverter. It may not be requested to have a disconnect device in some applications, however, it's still requested to have DC breaker installed. Please refer to typical amperage in below table as required breaker size.

Recommended DC breaker specification of battery for a single inverter:

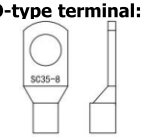
Model	1 unit*
SPE 3500TL HVM-24G2	200A / 30VDC
SPE 5000TL HVM-G2	150A / 60VDC

2. It's very important for system safety and efficient operation to use appropriate cable for battery connection. To reduce risk of injury, please use the proper recommended cable and terminal size as below.

Recommended battery cable and terminal size:

Model	Wire Size		Torque value
SPE 3500TL HVM-24G2	1 * 2 AWG	33.6mm²	2-3 Nm
SPE 5000TL HVM-G2	1 * 3 AWG	26.7mm²	2-3 Nm

O-type terminal:



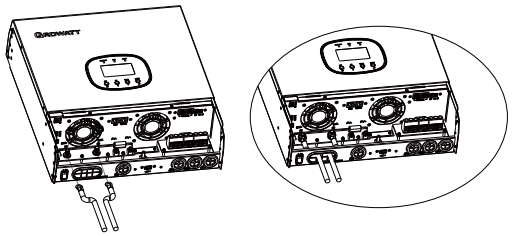
3. Battery Module Selection：Choose the appropriate battery according to the actual situation.

Battery Type	Recommended specifications
Lead-acid Battery	200Ah capacity battery
Lithium Battery	200Ah capacity battery

3.3.2 Battery power cable connection

Please follow below steps to implement battery connection:

1. Assemble battery ring terminal based on recommended battery cable and terminal size.
2. Connect all battery packs as units requires.
3. Insert the ring terminal of battery cable flatly into battery connector of inverter and make sure the bolts are tightened with torque of 2Nm. Make sure polarity at both the battery and the inverter/charge is correctly connected and ring terminals are tightly screwed to the battery terminals.

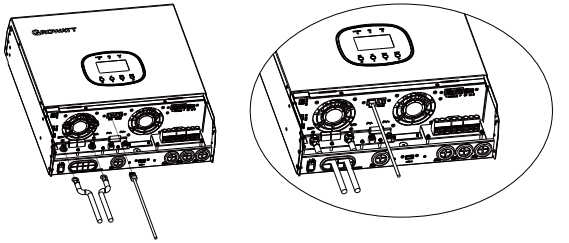


3.3.3 Lithium battery communication cable connection

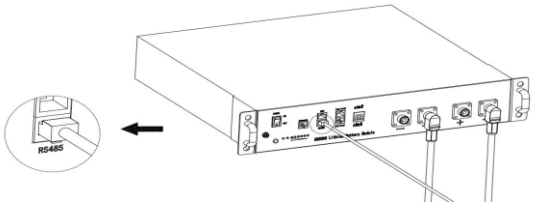
If used with lithium batteries, make sure to connect the BMS communication cable between the battery and the inverter. It is recommended to use lithium batteries that have been tested with our configuration.

Please follow below steps to implement BMS communication cable connection:

1. Connect one end of the battery's communication cable to the inverter's BMS communication port , which supports RS485 or CAN protocols.

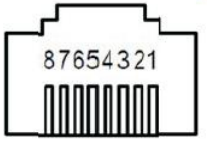


2. The other end of the battery communication cable plugs into the battery communication port (RS485 or CAN)



3. The inverter BMS port pin and RS485 port pin assignment shown as below:

Pin number	BMS port	RS485 port (for expansion)
1	RS485B	RS485B
2	RS485A	RS485A
3	--	--
4	CANH	--
5	CANL	--
6	--	--
7	--	--
8	--	--



Note: The RS485 port (for expansion) is used for communication expansion and connection to external devices.

Note: In order to ensure the normal communication of lithium battery BMS, please set the battery type as "Li" in program 5, and then LCD will automatically switch to program 36 to select the communication protocol. You can Choose RS485 communication protocol which is from L01 to L50, and you can also choose CAN Communication protocol which is from L51 to L99. （About the specific protocol address of the inverter ,please consult the dealer or manufacturer to choose which communication protocol to match the BMS.）

3.4 AC Connection

⚠ WARNING!

- All wiring must be performed by a qualified personnel.
- Shock Hazard: Be sure that AC power source is disconnected before attempting to wire it to the unit.
- Always disconnect all circuit breakers before making AC input/GEN/AC output connection.
- Be sure to connect AC wires with correct polarity. If L and N wires are connected reversely, it may cause utility short-circuited when these inverters are worked in parallel operation.
- There are three terminal blocks with "AC INPUT", "GEN"and "AC OUTPUT" markings. Please do NOT mis-connect input and output connectors.
- Appliances such as air conditioner are required at least 2~3 minutes to restart because it's required to have enough time to balance refrigerant gas inside of circuits. If a power shortage occurs and recovers in a short time, it will cause damage to your connected appliances. To prevent this kind of damage, please check with manufacturer of air conditioner that if it's equipped with time-delay function before installation. Otherwise, this off grid solar inverter will trig overload fault and cut off output to protect your appliance but sometimes it still causes internal damage to the air conditioner.

3.4.1 Connection preparation

1. Before connecting to AC input power source, please install a separate AC breaker between inverter and AC input power source. This will ensure the inverter can be securely disconnected during maintenance and fully protected from over current of AC input. Please refer to typical amperage in below table as required breaker size.

Recommended breaker specification of AC input for a single inverter:

Model	1 unit*
SPE 3500TL HVM-24G2	30A / 230VAC
SPE 5000TL HVM-G2	30A / 230VAC

2. It's very important for system safety and efficient operation to use appropriate cable for AC input connection and GEN connection. To reduce risk of injury, please use the proper recommended cable size as below.

Recommended AC wires size:

Model	Wire Size		Torque value
SPE 3500TL HVM-24G2	1 * 10 AWG	5.3mm²	1.2-1.6 Nm
SPE 5000TL HVM-G2	1 * 10 AWG	5.3mm²	1.2-1.6 Nm

3.4.2 AC Input/GEN/Output wires Connection:

Please follow the steps below to make AC output/AC input/GEN connections:

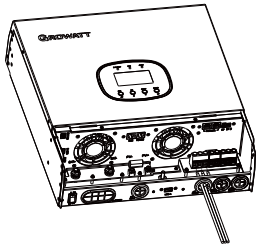
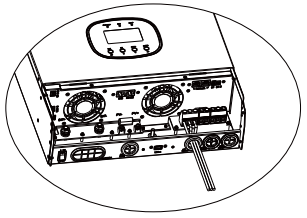
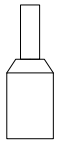
1. Remove the insulation covers of the seven wires.
2. Connect the PE protection line first, and then lock in the AC output line, AC input line, and GEN line in order. Corresponding polarity positions marked on the terminals.

Please refer to the following:

⏚ →Ground (yellow-green) L→LINE (brown or black) N→Neutral (blue)

1.First, insert AC output wires according to polarities indicated on terminal block and tighten terminal screws.

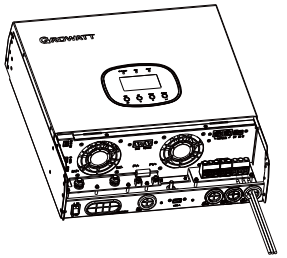
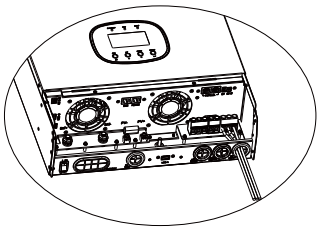
L→LINE (brown or black) N→Neutral (blue)

Tubular terminal

2.Second, insert AC input wires according to polarities indicated on terminal block and tighten terminal screws.

⏚ →Ground (yellow-green) L→LINE (brown or black) N→Neutral (blue)

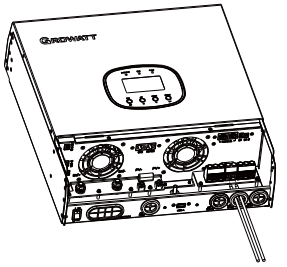
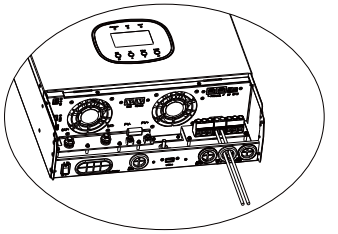




Tubular terminal

3.Last,insert GEN wires according to polarities indicated on terminal block and tighten the terminal screws.

The generator interface can be changed to the second output interface through 90 setting items.

L→LINE (brown or black) N→Neutral (blue)

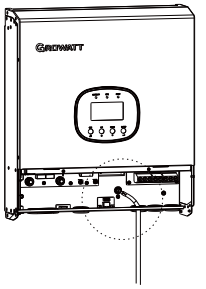
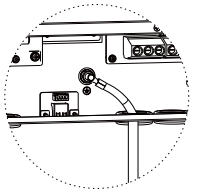
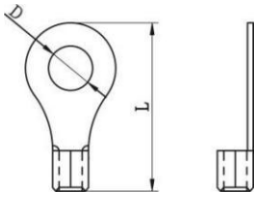




Tubular terminal

4.Make sure the inverter metal housing is grounded(Ground in the grid system).

⏚ →Ground (yellow-green) L→LINE (brown or black) N→Neutral (blue)

R-type terminal

Precautions:

1) Before performing the above operations, please ensure that your operating environment is: Non-energized environment.
2) After inserting the wire according to the polarity marked on the terminal, don't forget to check that the screw is tightened.
3) After you complete all wiring, please check again to confirm whether the corresponding wires are connected in the correct position to avoid misoperation that may cause the inverter to fail to work properly or damage your equipment.

These details that cannot be ignored ensure a good user experience to a certain extent.

3.5 PV Connection

⚠WARNING!

- All wiring must be performed by a qualified personnel.
- Shock Hazard：Operation with power on is strictly prohibited.
- Before connecting the PV input, be sure to turn off all circuit breakers and confirm that the machi ne is powered off.
- Be sure to connect PV cable with correct polarity.

3.5.1 Connection preparation

1. Before connecting to PV modules, please install separately a DC circuit breaker between inverter and PV modules.

Recommended breaker specification of PV input for a single inverter:

Model	1 unit (1 string)
SPE 3500TL HVM-24G2	30A / 500Voc
SPE 5000TL HVM-G2	30A / 500Voc

2. It' 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		Torque value
SPE 3500TL HVM-24G2	1 * 10 AWG	5.3mm²	1.2-1.6 Nm
SPE 5000TL HVM-G2	1 * 10 AWG	5.3mm²	1.2-1.6 Nm

3. PV Module Selection

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

1. Open circuit Voltage (Voc) of PV modules not exceeds max. PV array open circuit voltage of inverter. Exceeding the limit will cause damage to the inverter.

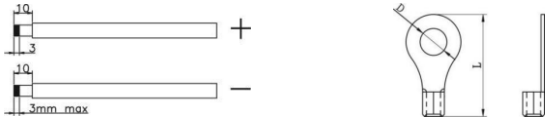
2.Open circuit Voltage (Voc) of PV modules should be higher than start-up voltage. Lower than will lead to insufficient photovoltaic.

INVERTER MODEL	SPE 3500TL HVM-24G2 SPE 5000TL HVM-G2
Max. PV Array Open Circuit Voltage	500Vdc
Start-up Voltage	80Vdc
PV Array MPPT Voltage Range	60Vdc~450Vdc（Recommend 380 Vdc ）
Quantity Of PV Panels	Recommend 3~9 photovoltaic panels

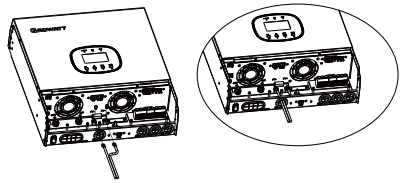
3.5.2 PV cable Connection:

Please follow below steps to implement PV module connection:

1.Remove insulation sleeve 10 mm for positive and negative conductors.



2. Then connect positive pole(+)of connection cable to positive pole(+)of PV input connector, connect negative pole(-)of connection cable to negative pole(-) of PV input connector.



3.6 Communication Connection

Please use supplied communication cable to connect to inverter and PC. Follow on-screen instruction to install the monitoring software. For the detailed software operation, please check user manual of software. The monitoring software is downloadable from our website www.ginverter.com

3.7 Dry Contact Signal

There is one dry contact(3A/250VAC) available on the rear panel. Dry contacts are used to connect generators. As shown in the table below. When the inverter meets the conditions on the left, it will perform the function on the right. It could be used to deliver signal to external device when battery voltage reaches warning level.

Unit Status	Condition			Dry contact port: NC C NO NC & C	NO & C
If **program 24** is set to **ATO** (default)					
Power Off	Unit is off and no output is powered			Close	Open
Power On	Output is powered from Utility			Close	Open
	Output is powered from Battery or Solar	Program 01 set as Utility first	Battery voltage (SOC)< Low DC warning voltage(SOC)	Open	Close
			Battery voltage(SOC) > Setting value in Program 13 or battery charging reaches floating stage	Close	Open
		Program 01 is set as SBU or Solar first	Battery voltage (SOC)< Setting value in Program 12	Open	Close
			Battery voltage (SOC)> Setting value in Program 13 or battery charging reaches floating stage	Close	Open
If **program 24** is set to **ENA**					
Power On	Output is powered from Battery or Solar	The dry contact always sends a power-on signal		Open	Close
If **program 24** is set to **DIS**					
Power On	Output is powered from Battery or Solar	The dry contact always sends a power-off signal		Close	Open

3.8 CT Connection

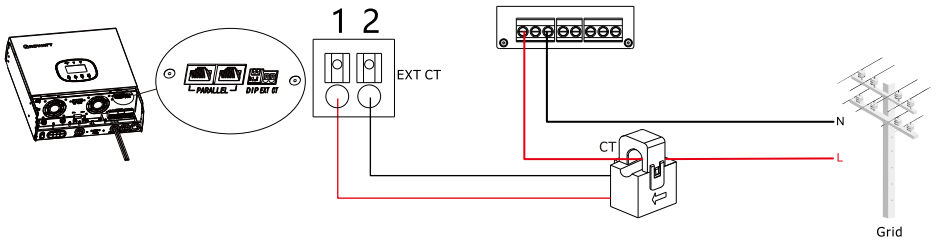
CT is an optional accessory. Adding CT can turn on the anti-reflux function of the inverter. The specific installation method is as follows.

Serial number	CT specification	Recommender system	Property
013.SK0000500	100A-50mA/ 2000:1 / 4m	Single system or 2 Pcs Single phase parallel system or 3 Pcs three-phase parallel system	Additional purchase
013.SK0002800	250A-62.5mA/ 4000:1 / 10m	3-6 Pcs Single phase parallel system or 6 Pcs three-phase parallel system	Additional purchase
013.SK0002900	500A-66.7mA/ 7500:1 / 10m /	6-9 Pcs Single phase parallel system or 9 Pcs three-phase parallel system	Additional purchase

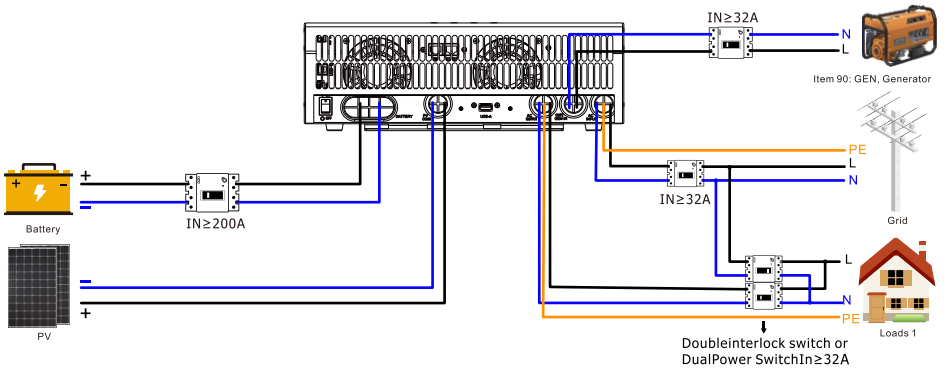
The specific installation method is as follows:

1. The L line passes through the CT, and the arrow on the CT indicates the current direction points to the inverter.
2. Connect the two signal wires coming out of the CT to the terminal marked EXT CT.

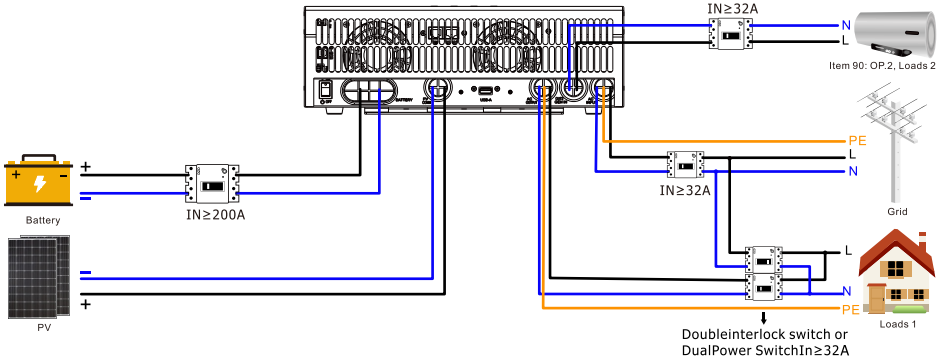
White line - No.1 Signal Terminal(CT-L-I+), Black line – Mo.2 Signal Terminal (CT-L-I-)



3.9 Wiring system for inverter



If item 90 is set to GEN, the smart load interface of the machine must be connected to the generator, and the working logic of the generator refers to the dry contact function.

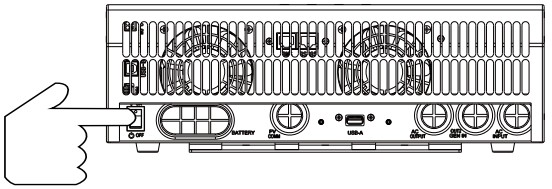


If item 90 is set to OP.2, the smart load interface of the machine must be connected to the second output load and cannot be connected to the generator, otherwise the generator may be damaged.

Note: The smart load interface of the machine can only be connected to one type at the same time, and cannot be connected to the generator and the second output at the same time, otherwise the machine and generator may be damaged.

4. Operation

4.1 Power ON/OFF

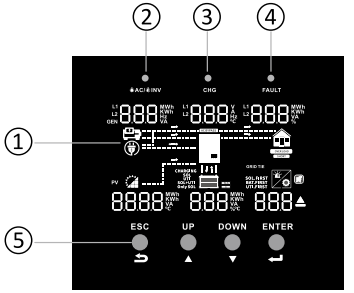


After correct installation, switch on the battery switch, switch on the inverter switch, wait about 30s,inverter output.

4.2 Display Panel Introduction

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

1. LCD display
2. Status indicator
3. Charging indicator
4. Fault indicator
5. Function buttons



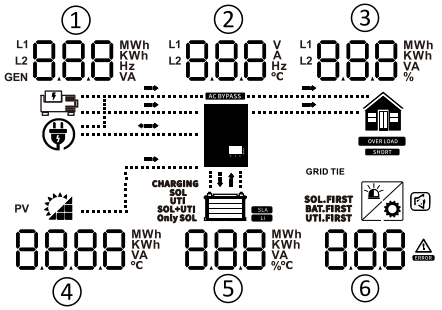
LED Indicator

LED Indicator			Messages
AC / INV	Green	Solid On	Output is powered by utility in Line mode.
		Flashing	Output is powered by battery or PV in battery mode.
CHG	Green	Solid On	Battery is fully charged.
		Flashing	Battery is charging.
⚠ FAULT	Red	Solid On	Fault occurs in the inverter.
		Flashing	Warning condition occurs in the inverter.

Function Buttons

Button	Description
ESC	To exit setting mode
UP	To go to previous selection
DOWN	To go to next selection
ENTER	To confirm the selection in setting mode or enter setting mode

4.2.1 LCD Display Icons



Icon	Description
AC Input Information	
	AC input icon
	Genetator icon
①	Indicate AC input power, AC input voltage, AC input frequency, AC input current
AC BYPASS	Indicate AC power loads in bypass
PV Input Information	
PV	PV input icon
④	Indicate PV power, PV voltage, PV current, etc
Output Information	
	Inverter icon
②	Indicate output voltage, output current, output frequency, inverter temperature
Load Information	
	Load icon
③	Indicate power of load, power percentage of load
OVER LOAD	Indicate overload happened
SHORT	Indicate short circuit happened
Battery Information	
	Indicate battery level by 0-24%, 25-49%, 50-74% and 75-100% in battery mode and charging status in line mode.
⑤	Indicate battery voltage, battery percentage, battery current
SLA	Indicate SLA battery
Li	Indicate lithium battery
CHARGING SOL SOL+UTI Only SOL	Indicate charging source priority: solar first, solar and utility, or only solar

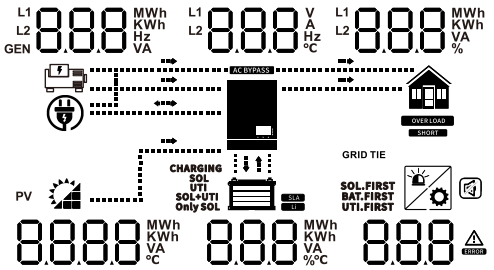
Other Information	
SOL.FIRST BAT.FIRST UTI.FIRST	Indicate output source priority: solar first, utility first, SBU mode or SUB mode
⑥	Indicate warning code or fault code
	Indicate a warning or a fault is happening
	Indicate it's during setting values
	Indicate the alarm is disabled
GRID TIE	Indicate the grid is feeding

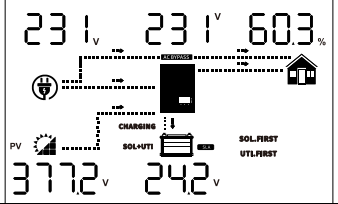
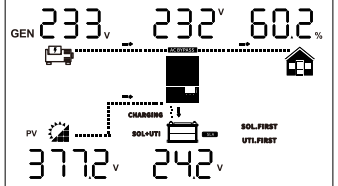
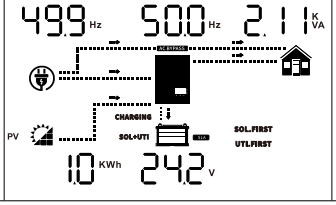
In battery charge mode, battery icon will present Battery Charging Status			
Status	Battery voltage		LCD Display
	3500	5000	
Constant Current mode / Constant Voltage mode	<24V	<48V	4 bars will flash in turns.
	24 ~ 25V	48 ~ 50V	Bottom bar will be on and the other will flash in turns.
	25 ~ 26V	50 ~ 52V	Bottom two bars will be on and the other will flash in turns.
	> 26V	> 52V	Bottom three bars will be on and the top bar will flash.
Floating mode. Batteries are fully charged.			4 bars will be on.

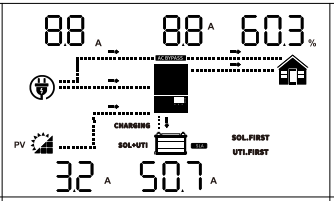
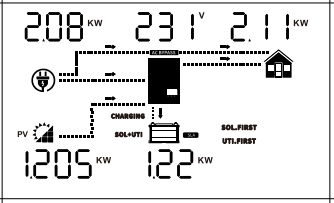
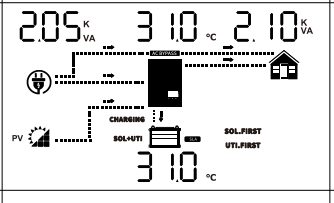
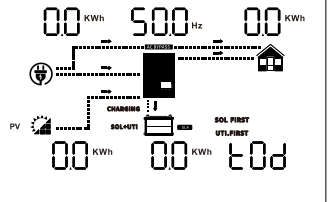
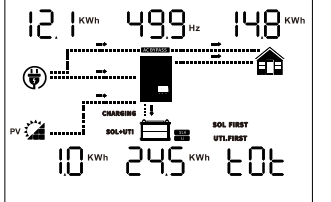
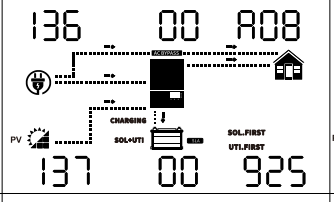
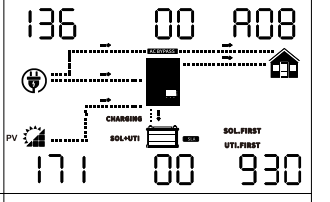
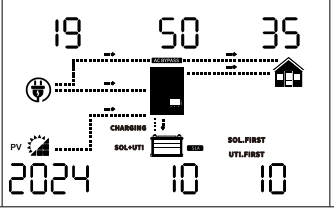
In battery discharge mode, battery icon will present Battery Capacity			
Load Percentage	Battery Voltage		LCD Display
	3500	5000	
Load >50%	< 20.6V	< 41.2V	
	20.6~21.6V	41.2~43.2V	
	21.6~22.6V	43.2~45.2V	
	> 22.6V	> 45.2V	
50%> Load > 20%	< 21.8V	< 43.6V	
	21.8~22.8V	43.6~45.6V	
	22.8~23.8V	45.6~47.6V	
	> 23.8V	> 47.6V	
Load < 20%	< 22.4V	< 44.8V	
	22.4~23.4V	44.8~46.8V	
	23.4~24.4V	46.8~48.8V	
	> 24.4V	> 48.8V	

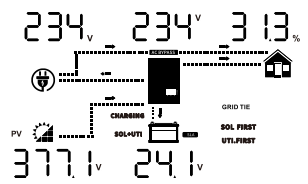
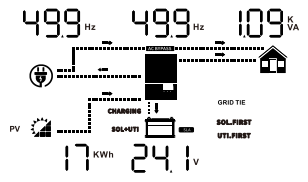
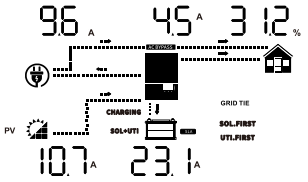
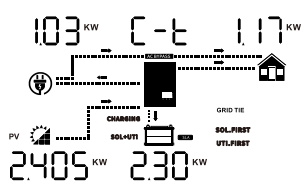
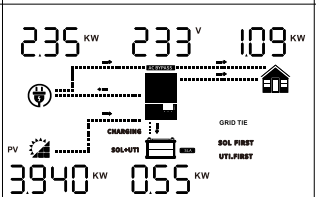
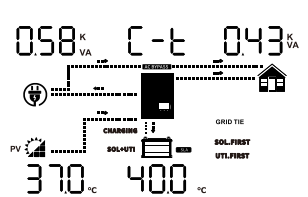
4.2.2 Display Information

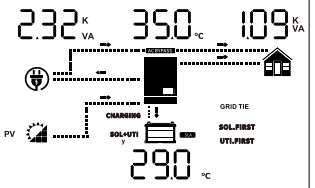
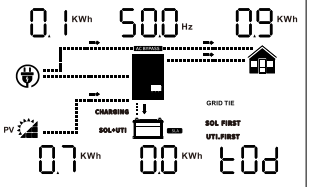
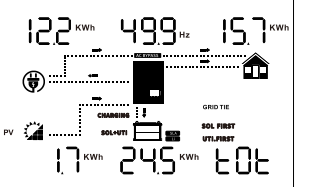
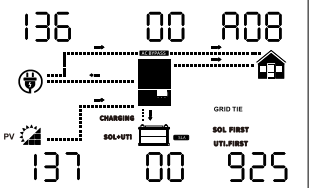
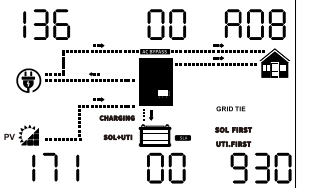
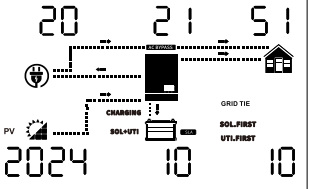
The LCD display information will be switched in turns by pressing "UP" or "DOWN" key. The selectable information is switched as below order: voltage, frequency, current, power, firmware version.



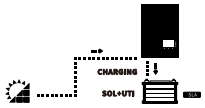
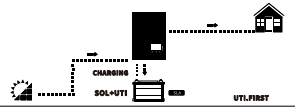
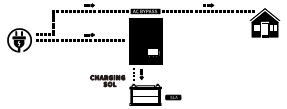
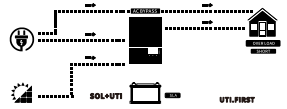
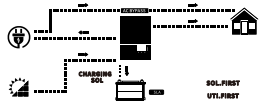
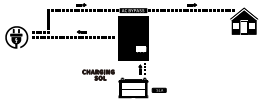
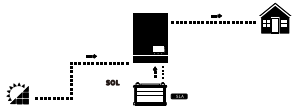
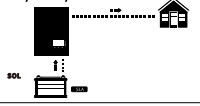
Setting Information(Off grid)	LCD display	
① AC Input voltage(grid input) ② Output voltage ③ Load percentage ④ PV input voltage ⑤ Battery voltage		/
① AC Input voltage (generator input) ● (If the AC input is only generator input, it means that what is displayed at this time is the input voltage of the generator. The current, power and frequency displayed after turning the page are also the input parameters of the generator, which will not be explained below.) ② Output voltage ③ Load percentage ④ PV input voltage ⑤ Battery voltage		/
① AC Input frequency ② Output frequency ③ Load VA power ④ PV energy sum ⑤ Battery percentage or voltage		/

① AC Input current ② Output current ③ Load percentage ④ PV input current ⑤ Battery charging current		/
① AC input power ② Output voltage ③ Load power ④ PV input power ⑤ Battery charging power		/
① AC input VA power ② Inverter temperature ③ Load VA power ④ llc temperature		/
① Left: Today's AC input energy Right: Total AC input energy ② Output frequency ③ Left: Today's load energy Right: Total load energy ④ Left: Today's PV energy Right: Total PV energy ⑤ Left:Today's battery discharge energy Right: Total battery discharge energy ⑥ Indicate today's energy or total energy .		
Firmware version INV: 136-00-A08 LLC: 137-00-925 COM: 171-00-930		
Time (19:50:35, October 10, 2024)		/

Setting Information(On grid)	LCD display	
① Feed to Grid voltage ② Output voltage ③ Load percentage (Home Load+OP Load) ④ PV input voltage ⑤ Battery voltage		/
① Feed to Grid frequency ② Output frequency ③ Load VA power(OP Load) ④ PV energy sum ⑤ Battery percentage or Voltage		/
① Feed to Grid current ② Output current ③ Load percentage(OP Load) ④ PV input current ⑤ Battery charging current		/
① CT power ② CT active power screen ③ Load power (Home Load+OP Load) ④ PV input power ⑤ Battery charging power		/
① Feed to Grid power ② Output voltage ③ Load power(OP Load) ④ PV input power ⑤ Battery charging power		/
① CT power ② CT active power screen ③ Load power (Home Load+OP Load) ④ Inverter temperature ⑤ llc temperature		/

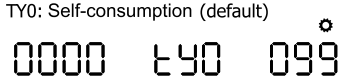
① Feed to Grid VA power ② Inverter temperature ③ Load VA power ④ llc temperature		/
① Left: Today's AC input energy Right: Total AC input energy ② Output frequency ③ Left: Today's load energy Right: Total load energy ④ Left: Today's PV energy Right: Total PV energy ⑤ Left: Today's battery discharge energy Right: Total battery discharge energy ⑥ Indicate today's energy or total energy.		
Firmware version INV: 136-00-A08 LLC: 137-00-925 COM: 171-00-930		
Time (20:21:51, October 10, 2024)		/

4.2.3 Operating Mode Description

Operation mode	Description	LCD display	
Standby mode / Power saving mode Note: Standby mode: The inverter is not turned on yet but at this time, the inverter can charge battery without AC output. Power saving mode: If enabled, the output of inverter will be off when connected load is pretty low or not detected.	No output is supplied by the unit but it still can charge batteries.	Charging by PV energy 	No charging 
Line Mode	The unit will provide output power from the mains. It can also charge the battery at line mode.	Charging by PV energy 	
		Charging by utility 	
		No battery connected 	
Feeds to the grid	Solar feeds to the grid or battery feeds to the grid	PV energy charges battery, PV energy provides power to the load and feeds remaining energy to the grid. 	
			
Battery Mode	The unit will provide output power from battery and PV power.	Power from battery and PV energy 	
		Power from battery only 	

4.3 LCD parameter setting

After pressing and holding ENTER button for 3 seconds, the unit will enter setting mode. Press "UP" or "DOWN" button to select setting programs. Then press "ENTER" button to confirm the selection or ESC button to exit.

Program	Description	Setting Option
99	Quick Settings After setting TY1, TY2, or TY3, the initial default values of some settings will be changed. Users can set them based on actual usage, which can help users quickly set the inverter seetings.	TY0: Self-consumption (default)  This shortcut setting item indicates that all of the following setting items are default values, and users need to change the setting items according to actual needs. If you switch back to TY0 from TY1, TY2, and TY3, TY0 will also have corresponding default values, which are: 01 items - SBU, 03 items - APL, 14 items - CSO, 55 items - LBU, 67 items - DIS, 69 items - 3.5KW/5KW, 71 items - DIS, 76 items - DIS, 78 items - 0, 79 items - DIS, 80 items - 7KW/10KW.
		TY1: Load first  Change the default values of the following settings as follows:

Program	Default	Setting Option
01	SUB	SUB
03	UPS	UPS
14	SNU	SNU
55	LBU	BLU,LBU,LUB
67	ENA	ENA, DIS
69	3.5KW	0--3.5KW
	5KW	0--5.0KW
71	ENA	ENA, DIS
76	ENA	ENA, DIS
78	3.5KW	0--3.5KW
	5KW	0--5.0KW
79	DIS	ENA, DIS
80	7KW	0--7KW
	10KW	0--10.0KW

The values of these settings represent a brief description:

Solar energy can be feed into the power grid, default is the certification standard of the South African power grid, and the maximumpower feed into the power grid is 3.5KW or 5.0KW.

The specific priorities are as follows:

1. Load priority setting:

When there is solar energy: solar energy is prioritized to supply power to the loads, and excess power is charged to the battery; when there is iinsufficient solar energy, solar energy and utility supply power to the loads together;when there is insufficient solar energy and no utility, the batteery will discharge. When there is no solar energy, utility prioritizes supplying power to the load. When utility is not available, the battery only supplies power to the loads.

2.Charging priority setting:

Solar energy and utility jointly charge the battery, and utility charging time is executed according to the program 75 setting time.

3. Solar priority setting:

BLU : Solar energy prioritizes charging the battery, excess energy is used to power the load, and finally the remaining energy is feed to the grid.

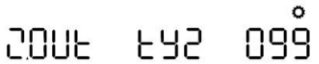
LBU (default): Solar energy is prioritized to power the load, excess energy is charged to the battery, and finally the remaining energy is feed to the grid.

LUB: Solar energy is prioritized to power the load, excess energy is feed to the grid, and finally there is surplus energy to charge the battery.

4. Battery energy priority:

The battery can be discharged only when there is no utility.

TY2: Battery first



Change the default values of the following settings as follows:

Program	Default	Setting Option
01	SUB	SUB
03	UPS	UPS
14	SNU	SNU
55	BLU	BLU,LBU,LUB
67	ENA	ENA, DIS
69	3.5KW	0--3.5KW
	5KW	0--5.0KW
71	ENA	ENA, DIS
76	ENA	ENA, DIS
78	3.5KW	0—3.5KW
	5KW	0--5.0KW
79	DIS	ENA, DIS
80	7KW	0--7KW
	10KW	0--10.0KW

The values of these settings represent a brief description:

Solar and battery energy can be feed into the power grid, default is the certification standard of the South African power grid, and the maximum power feed into the power grid is 3.5KW or 5.0KW. At the same time, the anti-backflow power is 0 KW.

The specific priorities are as follows:

1. Load priority setting:

When there is solar energy: when there is sufficient solar energy, the solar energy is prioritized to supply power to the load, and then feed into the grid,and the excess is used to charge the battery; when there is insufficient photovoltaic energy, during the battery feeding time (Program 74),the solar energy and the battery supply power to the load and the grid together; when not during the battery feeding time (Program 74), the solar energy and utility supply power to the load together.When there is no solar energy: during the battery feeding time (program 74),the battery supplies power to the load and feeds the grid; outsidethe battery feeding time (program 74), utility supplies power to the load.

2.Charging priority setting:

When there is solar energy, the solar energy charges the battery with excess energy after loading and feeding the grid; when there is no solar enerrgy,utility sets the charging time according to program 75.

3. Solar priority setting:

BLU : Solar energy prioritizes charging the battery, excess energy is used to power the load, and finally the remaining energy is feed to the grid

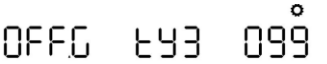
LBU: Solar energy is prioritized to power the load, excess energy is charged to the battery, and finally the remaining energy is feed to the grid.

LUB (default): Solar energy is prioritized to power the load, excess energy is feed to the grid, and finally there is surplus energy to charge the battery.

4. Battery energy priority:

When there is sufficient solar energy, the excess solar energy charges the battery.When the solar energy is insufficient, the battery is allowed to discharge during the feeding period according to program 74.

TY3: Export Limit Mode



Change the default values of the following settings as follows:

Program	Default	Setting Option
01	SUB	SUB
03	UPS	UPS
14	SNU	SNU
55	LBU	BLU,LBU,LUB
67	ENA	ENA, DIS
69	3.5KW	0--3.5KW
	5KW	0--5.0KW
71	ENA	ENA, DIS
76	ENA	ENA, DIS
78	0	0—3.5KW
	0	0--5.0KW
79	DIS	ENA, DIS
80	7KW	0--7KW
	10KW	0--10.0KW

The values of these settings represent a brief description:

Grid connection is not enabled, enter off grid mode .

The specific priorities are as follows:

1. Load priority setting:

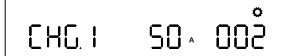
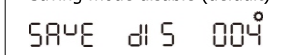
When there is utility: during the output time of program 50, utility bypasses to supply power to the load; outside the output time of utility,the battery and photovoltaic supply power to the load.When there is no utility: battery and solar energy provide power to the load.

2. Charging priority setting:

Prioritize solar energy to charge the battery.

When there is solar energy, solar energy charges the battery.

When there is no solar energy, utility charges the battery during the program 50 grid output time and the program 49 utility charging time.

01	Output source priority: To configure load power source priority. After program 67 are enabled, this program is fixed SUB and cannot be set.	Solar first  Solar energy provides power to the loads as first priority. If solar energy is not sufficient to power all connected loads, battery energy will supply power the loads at the same time. Utility provides power to the loads only when any one condition happens: Solar energy is not available Battery voltage drops to either low-level warning voltage or the setting point in program 12.
		Utility first  Utility will provide power to the loads as first priority. Solar and battery energy will provide power to the loads only when utility power is not available.
		SBU priority (default)  Solar energy provides power to the loads as first priority. If solar energy is not sufficient to power all connected loads, battery will supply power to the loads at the same time. Utility provides power to the loads only when battery voltage drops to either low-level warning voltage or the setting point in program 12.
		SUB priority  Solar energy provides power to the loads as first priority. If solar energy is not sufficient to power all connected loads, solar and utility will power loads at the same time. Battery provides power to the loads only when solar energy is not sufficient and there is no utility.
02	Maximum charging current: set total charging current for solar and utility chargers.	 3500: Default 50A,0A~100A Settable 5000: Default 50A,0A~100A Settable Max. charging current = utility charging current + solar charging current If LI is selected in Program 5, this program can't be set up.
03	AC input voltage range After program 67 are enabled, this program is fixed UPS and cannot be set.	Appliance (default)  If selected, acceptable AC input voltage range will be within: 90~280VAC
		UPS  If selected, acceptable AC input voltage range will be within: 170~280VAC
04	Power saving mode enable/disable	Saving mode disable (default)  If disabled, no matter connected load is low or high, the on/off status of inverter output will not be effected.
		Saving mode enable  If enabled, the output of inverter will be off when connected load is pretty low or not detected.

05 Battery type

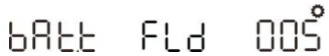
AGM (default)—Suitable for lead-acid battery



Items that cannot be set	19	20	21
Default: 3500	28.2V	27V	21V
Default: 5000	56.4V	54V	42V

Items that can be set:	default	Set range	Set requirements
02	50A	3500: 0A~100A 5000: 0A~100A	
11	30A	0A~100A	
12	3500: 23V 5000: 46V	3500: 22~25.6V 5000: 44~51.2V	<13 setting value
13	3500: 27V 5000: 54V	3500: 24~29.0V 5000: 48~58.0V	

Flooded—Suitable for lead-acid battery or flood battery

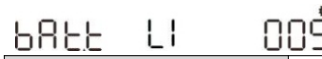


Items that cannot be set	19	20	21
Default: 3500	29.2V	28V	21V
Default: 5000	58.4V	56V	42V

Items that can be set:	default	Set range	Set requirements
02	60A	3500: 0A~100A 5000: 0A~100A	
11	30A	0A~100A	
12	3500: 24V 5000: 48V	3500: 22~25.6V 5000: 44~51.2V	<13 setting value
13	3500: 28V 5000: 56V	3500: 24~29.0V 5000: 48~58.0V	

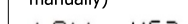
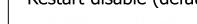
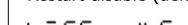
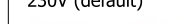
Lithium

(only suitable when communicated with BMS communication)



Items that cannot be set:	02	19	20
Default: 3500		27V	27V
Default: 5000		54V	54V

Items that can be set:	default	Set range	Set requirements
11	20A	0A~100A	
12	50%	10%~95%	<13 setting value
13	95%	15%~100%	
21	20%	5%~50%	<12 setting value

<table>
<tr><td></td><td></td><td>User-Defined—Suitable for lead-acid battery, battery parameters can be set manually
<table>
<tr><th>Items that can be set:</th><th>default</th><th>Set range</th><th>Set requirements</th></tr>
<tr><td>02</td><td>50A</td><td>3500: 0A~100A
5000: 0A~80A</td><td></td></tr>
<tr><td>11</td><td>30A</td><td>0A~100A</td><td></td></tr>
<tr><td>12</td><td>3500: 23V
5000: 46V</td><td>3500: 22~25.6V
5000: 44~51.2V</td><td><13 setting value</td></tr>
<tr><td>13</td><td>3500: 27V
5000: 54V</td><td>3500: 24~29.0V
5000: 48~58.0V</td><td></td></tr>
<tr><td>19</td><td>3500: 28.2V
5000: 56.4V</td><td>3500: 24~29.2V
5000: 48~58.4V</td><td></td></tr>
<tr><td>20</td><td>3500: 27V
5000: 54V</td><td>3500: 24~29.2V
5000: 48~58.4V</td><td></td></tr>
<tr><td>21</td><td>3500: 21V
5000: 42V</td><td>3500: 20~24.0V
5000: 40~48.0V</td><td><12 setting value</td></tr>
</table>
User-Defined 2
(suitable when lithium battery without BMS communication or communication protocol not matched with the inverter, battery parameters can be set manually)
 
<table>
<tr><th>Items that can be set:</th><th>default</th><th>Set range</th><th>Set requirements</th></tr>
<tr><td>02</td><td>20A</td><td>3500: 0A~100A
5000: 0A~80A</td><td></td></tr>
<tr><td>11</td><td>20A</td><td>0A~100A</td><td></td></tr>
<tr><td>12</td><td>3500: 24V
5000: 48V</td><td>3500: 22~25.6V
5000: 44~51.2V</td><td><13 setting value</td></tr>
<tr><td>13</td><td>3500: 26V
5000: 52V</td><td>3500: 24~29.0V
5000: 48~58.0V</td><td></td></tr>
<tr><td>19</td><td>3500: 27V
5000: 54V</td><td>3500: 24~29.2V
5000: 48~58.4V</td><td></td></tr>
<tr><td>20</td><td>3500: 27V
5000: 54V</td><td>3500: 24~29.2V
5000: 48~58.4V</td><td></td></tr>
<tr><td>21</td><td>3500: 23V
5000: 46V</td><td>3500: 20~24.0V
5000: 40~48.0V</td><td><12 setting value</td></tr>
</table></td><td></td><td></td></tr>
<tr><td>06</td><td>Auto restart when overload occurs</td><td>Restart disable (default)
  </td><td>Restart enable
</td></tr>
<tr><td>07</td><td>Auto restart when over temperature occurs</td><td>Restart disable (default)
  </td><td>Restart enable
</td></tr>
<tr><td>08</td><td>Output voltage</td><td>230V (default)
 
240V
  </td><td>220V

208V
</td></tr>
</table>

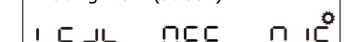
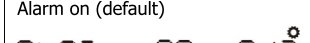
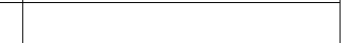
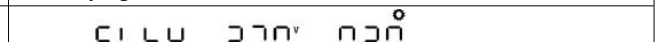
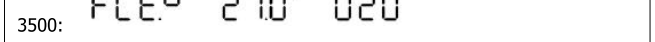
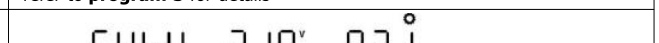
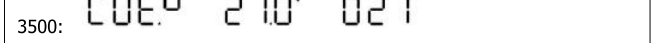
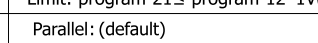
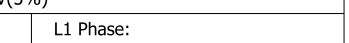
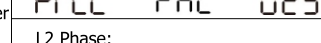
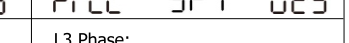
<table>
<tr><td>09</td><td>Output frequency</td><td>50Hz (default)
</td><td>60Hz
</td></tr>
<tr><td>11</td><td>Maximum utility & Generator charging current</td><td colspan="2">

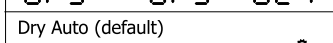
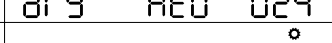
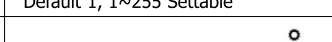
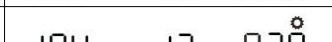
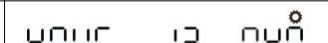
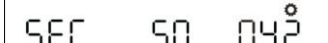
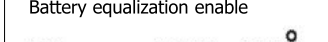
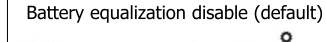
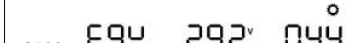
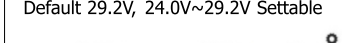
Default 30A/20A, 0A~80A Settable
Note: If setting value in Program 02 is smaller than that in Program 11, the inverter will apply charging current from Program 02 for utility charger</td></tr>
<tr><td>12</td><td>Setting voltage point back to utility source when selecting “SBU priority” or “Solar first” in program 01</td><td colspan="2">3500:
5000:
The default value and adjustable range vary in different Battery type, please refer to program 5 for details
Limit: program 21 +1V≤ program 12 ≤ program 13 -1V
Limit: program 21 +5%≤ program 12 ≤ program 13 -5%</td></tr>
<tr><td>13</td><td>Setting voltage point back to battery mode when selecting “SBU priority” or “Solar first” in program 01</td><td colspan="2">3500:
5000:
The default value and adjustable range vary in different Battery type, please refer to program 5 for details
Limit: program 12 +1V ≤ program 13
Limit: program 12 +5% ≤ program 13</td></tr>
<tr><td>14</td><td>Charger source priority:
To configure charger source priority.
After program 67 are enabled, this program is fixed SUN and cannot be set.</td><td colspan="2">If this inverter is working in Line, Standby or Fault mode, charger source can be programmed as below:
Solar first (default)

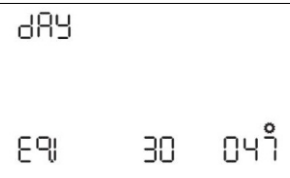
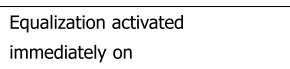
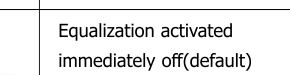
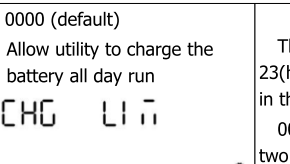
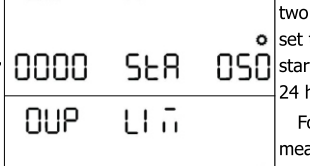
Solar energy will charge battery as first priority. Utility will charge battery only when solar energy is not available.
Solar and Utility

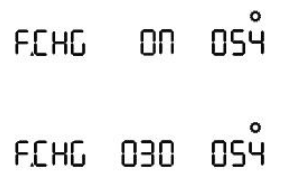
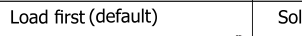
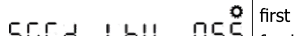
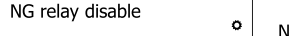
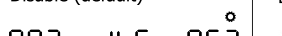
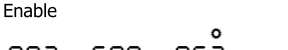
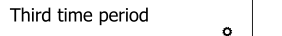
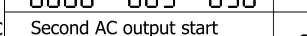
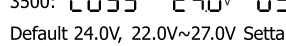
Solar energy and utility will both charge battery.
Only Solar

Solar energy will be the only charger source no matter utility is available or not.
If this inverter is working in Battery mode or Power saving mode, only solar energy can charge battery. Solar energy will charge battery if it's available and sufficient.</td></tr>
<tr><td>15</td><td>Alarm control</td><td>Alarm on (default)
</td><td>Alarm off
</td></tr>
</table>

16	Backlight control	Backlight on 	Backlight off (default) 
17	Beeps while primary source is interrupted	Alarm on (default) 	Alarm off 
18	Overload bypass: When enabled, the unit will transfer to line mode if overload occurs in battery mode.	Bypass disable (default) 	Bypass enable 
19	C.V. charging voltage.	3500:  5000:  The default value and adjustable range vary in different Battery type, please refer to **program 5** for details	
20	Floating charging voltage.	3500:  5000:  The default value and adjustable range vary in different Battery type, please refer to **program 5** for details	
21	Low DC cut-off voltage.	3500:  5000:  The default value and adjustable range vary in different Battery type, please refer to **program 5** for details **Note:** The low voltage alarm point is （program 21）+1V. When this value is reached, the machine reports 04. When reach Low DC cut-off voltage: 1) If battery power is only power source available, inverter will shut down. 2) If PV energy and battery power are available, inverter will charge battery without AC output. 3) If PV energy, battery power and utility are all available, inverter will transfer to line mode and provide output power to loads, and charge the battery at the same time. Limit: program 21≤ program 12–1V(5%)	
23	AC output mode *This setting is only available when the inverter is in standby mode (Switch off). **Note:** Parallel operation can only work when battery connected	Parallel: (default) 	L1 Phase: 
		L2 Phase: 	L3 Phase: 
		When the units are used in parallel with single phase or alone, please select "PAL" in program 23.	

	Note: Only 5K models can be paralleled.	It requires 3 inverters to support three-phase equipment, 1 inverter in each phase. Please select "3P1" in program 23 for the inverters connected to L1 phase, "3P2" in program 23 for the inverters connected to L2 phase and "3P3" in program 23 for the inverters connected to L3 phase.	
24	Dry control	Dry off: NC  Dry Auto (default) 	Dry on: NO 
28	Address setting for expansion	 Default 1, 1~255 Settable	
37	Real time setting---Year		Range 2000~2099
38	Real time setting---Month		Range 01~12
39	Real time setting---Date		Range 01~31
40	Real time setting---Hour		Range 00~23
41	Real time setting---Minute		Range 00~59
42	Real time setting---Second		Range 00~59
43	Battery equalization	Battery equalization enable 	Battery equalization disable (default) 
		If "Flooded" or "User-Defined" is selected in program 05, this program can be set up.	
44	Battery equalization voltage	3500:  Default 29.2V, 24.0V~29.2V Settable 5000:  Default 58.4V, 48.0V~58.4V Settable	
45	Battery equalized time		Default 60min, 5min~900min Settable

46	Battery equalized timeout		Default 120min, 5min~900min Settable
47	Equalization interval		Default 30days, 1 days~90 days Settable
48	Equalization activated immediately	Equalization activated immediately on 	Equalization activated immediately off(default) 
		If equalization function is enabled in program 43, this program can be setup. If "On" is selected in this program, it's to activate battery equalization immediately and LCD main page will shows "E9". If "Off" is selected, it will cancel equalization function until next activated equalization time arrives based on program 47 setting. At this time, "E9" will not be shown in LCD main page.	
49	Utility charging time This program can only be set when program 67 are disabled	0000 (default) Allow utility to charge the battery all day run 	The start time can be set in the range: 00-23(hour),00-59(min).The end time can be set in the range: 00-23 (hour),00-59 (min). 0000 defaults to 4 digits in total, the first two digits set the hour, and the last two digits set the minute. Set the same number from start to end time indicating that it is valid for 24 hours. For example: Sta2300-End2000, which means the allowed mains charging time range is from 23:00 to 20:00 of the next day
50	Utility output time This program can only be set when program 67 are disabled	0000 (default) Allow utility to power the battery all day run 	The start time can be set in the range: 00-23(hour),00-59(min).The end time can be set in the range: 00-23 (hour),00-59 (min). 0000 defaults to 4 digits in total, the first two digits set the hour, and the last two digits set the minute. Set the same number from start to end time indicating that it is valid for 24 hours. For example: Sta2300-End2000, which means the allowed mains outputting time range is from 23:00 to 20:00 of the next day Program 01 take effect if it is set to UTI

54	Lithium battery strong charging execution cycle time. If program 05 is set to Li and set to ON, it means that the lithium battery is periodically forced to charge to SOC of 100%. OFF indicates that the function is not enabled	OFF : Turn off periodic strong charging (default) 	ON : Turn on periodic strong charging .Default 30days, 1 days~90 days Settable 
55	Setting solar energy supply priority Only selecting enable in program 67 and disable in program71, program 55 can work	Charge first 	Solar energy provides power to charge battery as first priority. Solar energy provides power to feed to grid as second priority.
		Load first (default) 	Solar energy provides power to the loads as first priority. Solar energy provides power to the charge battery as second priority.
		Load first 	Solar energy provides power to the loads as first priority. Solar energy provides power to feed to grid as second priority.
56	NG relay enable setting	NG relay enable (default) 	Grounding in inverter operation mode, ungrounded in grid operation mode
		NG relay disable 	No grounding in any mode
57	The power grid mode allows the second AC output to remain on	Disable (default) 	Enable 
58	Setting of the second AC output time period	First time period 	Second time period 
		Third time period 	
		Second AC output start time 	Second AC output shutdown time
		The time setting consists of 4 digits, with the first two digits representing hours and the last two digits representing minutes. For example, Sta2300-End2059 represents the second AC output time range from 23:00 to 20:59 the next day.	
59	The cut-off battery voltage point/SOC setting for the second AC output	3500:  Default 24.0V, 22.0V~27.0V Settable Lithium battery mode: Default 60%, 20%~70% Settable 5000:  Default 48.0V, 44.0V~54.0V Settable Lithium battery mode: Default 60%, 20%~70% Settable	

60	Recovery battery voltage point/SOC setting for the second AC output	3500: bACt 26.5V 060 Default 26.5V, 24.0V~29.0V Settable Lithium battery mode: Default 90%, 25%~100% Settable 5000: bACt 53.0V 060 Default 53.0V, 48.0V~58.0V Settable Lithium battery mode: Default 90%, 25%~100% Settable	
61	Setting of PV power value for the second AC output to be turned on	PuL 0.0KW 061 3500: Default 0KW, 0KW~3.5KW Settable 5000: Default 0KW, 0KW~ 5 KW Settable	
62	Menu Return Settings	Disable (default) menu dis 062	Display screen page remains stuck
		Enable menu ena 062	Automatically return to the main page after no human-machine interface operation within five minutes
65	Generator run time	Gen run ti n HOUr 00 065	Default 0, range 0~23 The time allows Generator to work. Use 2 digits to represent the time period, which set range from 0 to 23. Eg: 04 represents the time allows Generator to run for 4 hours.
66	BMS Communication Loss	Enable (default) bmSE ENA 066	When BMS Communication Loss, the inverter's 04 and 20 warning Icon flash and enable to work for original status.
		Disable bmSE dis 066	When BMS Communication Loss, the inverter's 04 and 20 warning Icon flash an d disable to work. (cut off the output and can't charge)
67	Feed to grid configuration	Feed to grid disable(default) FEEd dis 067	Solar energy feed to grid disable.
		Feed to grid enable FEEd ENA 067	Solar energy feed to grid enable.
68	Set country customized Regulations This setting is only available by typing 815	South Africa(Default) Frnq SAF 068	If selected, acceptable feed-in grid voltage range will be195.5~253VAC. Acceptable feed-in grid frequency range will be 49.0~51.0Hz.
		Pakistan Frnq PAr 068	If selected, acceptable feed-in grid voltage range will be195.5~253VAC. Acceptable feed-in grid frequency range will be 47.0~51.5Hz.
		Asia Frnq ASA 068	If selected, acceptable feed-in grid voltage range will be195.5~253VAC. Acceptable feed-in grid frequency range will be 47.0~51.5Hz.

69	Feed grid power settings	FEEd 3.5KW 069 The maximum feed grid power can be set 3500: Default 3.5KW, 0KW~3.5KW Settable 5000: Default 5 KW, 0KW~ 5 KW Settable	
70	Battery feed current	L99A 165A 070 3500: Default 165A, 0A~165A Settable 5000: Default 115A, 0A~120A Settable If **Program 05** is set to Li mode. The value LXXX in the lower left corner of the LCD is the maximum allowable discharge current of the lithium battery. The middle value is to set the maximum allowable discharge current value of the battery. The smaller of the two is the current limit value of the battery feed grid.	
71	Battery feed enable	Feed to grid Diable (default) FEEd dis 071	Battery energy feed to grid disable.
		Feed to grid enable FEEd ENA 071	Battery energy feed to grid enable.
72	Battery feed loss point	3500: LOSS 23.0V 072 Lithium battery mode: Default 40%, 30%~90% Settable The other battery mode: Default23.0V, 23.0V~26.0V Settable 5000: LOSS 46.0V 072 Lithium battery mode: Default 40%, 30%~90% Settable The other battery mode: Default46.0V, 46.0V~52.0V Settable	
73	Battery feed back point	3500: bACt 27.0V 073 Lithium battery mode: Default 80%, 40%~100% Settable The other battery mode: Default 27.0V, 24.0V~27.0V Settable 5000: bACt 54.0V 073 Lithium battery mode: Default 80%, 40%~100% Settable The other battery mode: Default 54.0V, 48.0V~54.0V Settable	
74	Battery feed time	First time period 0800 001 074	Second time period 1200 002 074
		Third time period 1800 003 074	
		Battery feed start time 0800 StA 074	Battery feed shutdown time 1159 End 074

		There are three time periods for battery feeding that can be set, which can be achieved by setting the start feeding time and the ending feeding time. The time setting consists of 4 digits, with the first two digits representing hours and the last two digits representing minutes. For example, Sta2300-End2059 represents battery feeding time range from 23:00 to 20:59 the next day. **Note:** When time period 1 is set to 0000, it means that feed can be done during the entire time period; charging takes priority over power feeding.	
75	Grid charging time (The setting is only valid when **program 67** is enabled)	First time period 2000 001 075 Third time period 0600 003 075	Second time period 0000 002 075
		Grid charging start time 2000 StA 075	Grid charging shutdown time 2359 End 075
		There are three time periods for grid charging that can be set, which can be achieved by setting the start feeding time and the ending feeding time. The time setting consists of 4 digits, with the first two digits representing hours and the last two digits representing minutes. For example, Sta2300-End2059 represents grid charging time range from 23:00 to 20:59 the next day. **Note:** When time period 1 is set to 0000, it means that charging can be done during the entire time period; charging takes priority over power feeding.	
76	External CT	Disable (default) EtCt dIS 076	Disable external CT Anti-backflow function
		Enable EtCt ENA 076	Enable external CT Anti-backflow function
77	External CT sampling ratio	2000 Ctr 077 Default 2000, 1000~9999 Settable. For example, 2000 means the sampling ratio is 1:2000	
78	Anti-backflow power The setting is only valid when **program 76** is enabled.	E1iP 000kW 078 3500: Default 0kW, 0~3.5kW Settable 5000: Default 0kW, 0~5 kW Settable	
79	Grid peak cutting	Disable (default) Grid dIS 079	Enable Grid ENA 079
80	Grid peak cutting power The setting is only valid when **program 79** is enabled	Grid 7.0kW 080 3500: Default 7.0kW, 0~7.0kW Settable 5000: Default 10.0kW, 0~10.0kW Settable	
90	Smart load settings	GEN (default) SmAP GEN 090	OP.2: OUTPUT2 SmAP OP2 090

5. Parallel Installation Guide

Introduction

Only SPE 5000TL HVM-G2 can be used in parallel with two different operation modes.

1. Parallel operation in single phase with up to 9 units.
2. Maximum 9 units work together to support 3-phase equipment. 7 units support 1-phase maximum.

5.1 Parallel accessories

Parallel communication cable



5.2 Points of Attention for Parallel

Ensure that all breakers in the line on the load side are disconnected.

Be sure the length of all battery cables is the same. Otherwise, there will be voltage difference between inverter and battery to cause parallel inverters not working.

Be sure that all inverters will share the same battery bank. Otherwise, inverters will transfer to fault mode.

Each inverter in the parallel system can only be connected to a separate PV string, and it is prohibited for multiple PV ports to share the same string, and there is a risk of blowing up the inverter.

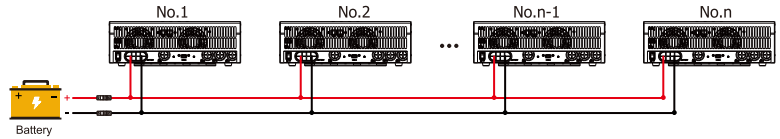
Recommended battery capacity

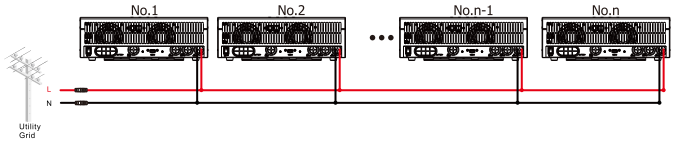
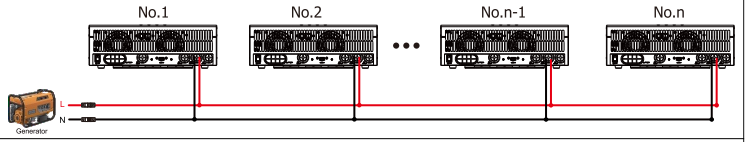
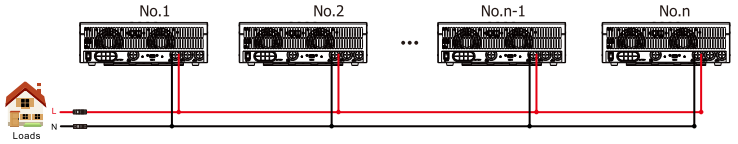
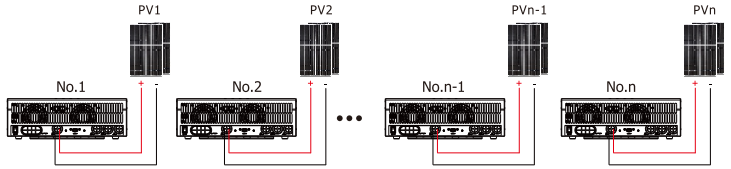
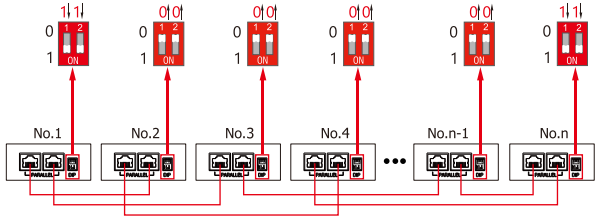
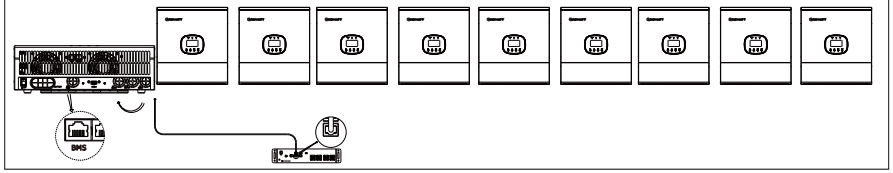
Inverter parallel numbers	2	3	4	5	6	7	8	9
Battery Capacity	400AH	600AH	800AH	1000AH	1200AH	1400AH	1600AH	1800AH

5.3 Wire Connections

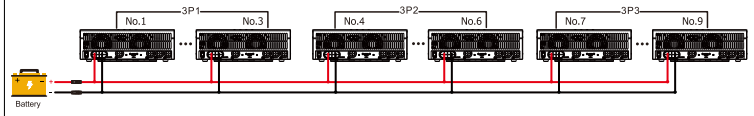
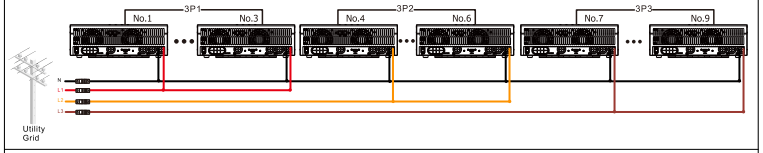
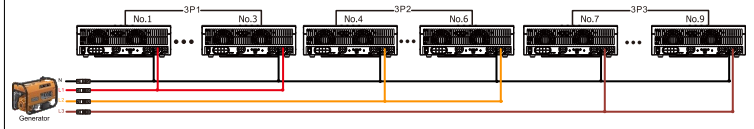
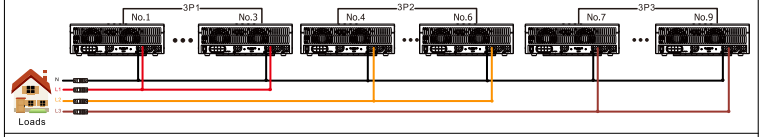
5.3.1 Single-phase parallel wire connection

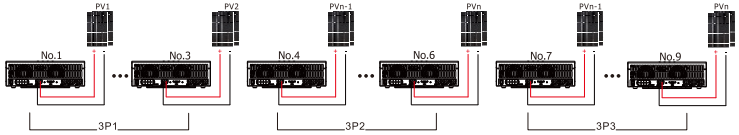
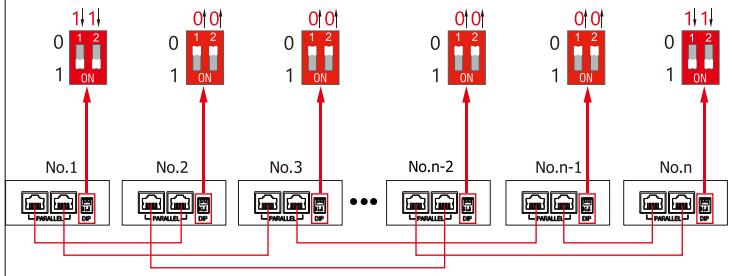
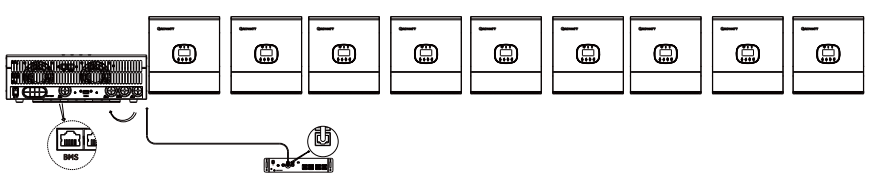
Note: Only 5K models can be paralleled.

Parallel mode / Port	Charts and descriptions
DC Input left-positive, right-negative	When the inverters are connected in parallel, the + wires are connected together and the - wires are connected together at the DC input .(chart below) 
	In the inverter parallel system, each inverter battery needs to be connected to a DC circuit breaker, single access circuit breaker specifications recommended 400 A. If you choose to access the total circuit breaker at the system end, the recommended access circuit breaker specifications 400 A * the number of parallel (eg: four inverter system access to the total circuit breaker, the recommended access circuit breaker specifications 1600A)

AC Input	When the inverters are connected in parallel, the N wires are connected together and the L wires are connected together at the AC input.(chart below)  In an inverter-parallel system, an AC circuit breaker is required to be connected to the utility for each inverter, and a single access circuit breaker size of 70A is recommended.
Generator	When the inverters are connected in parallel, the N wires are connected together and the L wires are connected together at the generator input.（chart below） 
AC Output	When the inverters are connected in parallel, the N wires are connected together and the L wires are connected together at the AC output.（chart below）  In an inverter-parallel system, an AC circuit breaker is required to be connected to the load for each inverter, and a single access circuit breaker size of 70A is recommended.
PV Input	Each inverter in the system is individually connected to the PV string（chart below） 
Parallel communication port	Please put the CAN communication DIP to on status for the first and the end inverter. 
Lithium BMS Communication port	Make sure to connect the BMS communication cable between the battery and one inverter of the parallel system. It's recommended to connect to the master inverter of the parallel system.
	

5.3.2 Three-phase parallel wire connection

parallel / mode / Port	Charts and descriptions
DC Input left-positive, right-negative	When the inverters are connected in parallel, the + wires are connected together and the - wires are connected together of the DC input.（chart below）  In the inverter parallel system, each inverter battery needs to be connected to a DC circuit breaker, single access circuit breaker specifications recommended 400 A. If you choose to access the total circuit breaker at the system end, the recommended access circuit breaker specifications 400 A * the number of parallel (eg: four inverter system access to the total circuit breaker, the recommended access circuit breaker specifications 1600A)
AC Input	After the inverter is connected in parallel, at the AC input, the N wires are connected together and the L wires are connected together of each phase（chart below）.  In an inverter-parallel system, an AC circuit breaker is required to be connected to the utility for each inverter, and a single access circuit breaker size of 70A is recommended.
Generator	After the inverter is connected in parallel, at the generator input, the N wires are connected together and the L wires are connected together of each phase（chart below）. 
AC Output	After the inverter is connected in parallel, at the AC output, the N wires are connected together and the L wires are connected together of each phase（chart below）.  In an inverter-parallel system, an AC circuit breaker is required to be connected to the utility for each load, and a single access circuit breaker size of 70A is recommended.

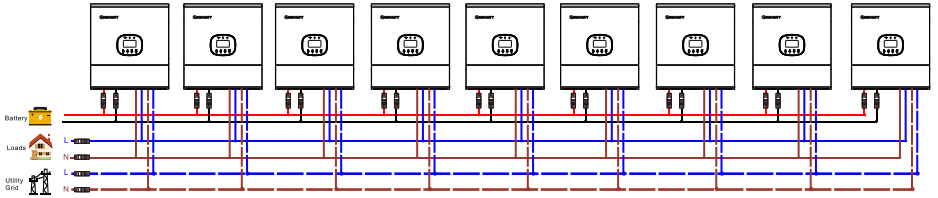
PV Input	Each inverter in the system is individually connected to the PV string （chart below） 
Parallel communication port	Please put the CAN communication DIP to on status for the first and the end inverter. 
Lithium BMS Communica-tion port	Make sure to connect the BMS communication cable between the battery and one inverter of the parallel system. It's recommended to connect to the master inverter of the parallel system.
	

5.4 Parallel Example

Parallel Operation in Single Phase

Single-phase parallel master and slave do not need to be set, the system automatically assigns the master and slave according to the order of start-up, the first one to start is the master, and the rest are the slaves. Be sure to confirm that the wiring is correct, the wiring is shown in the following figure, parallel less than nine wires in order to reduce. Nine inverters in parallel:

Power Connection



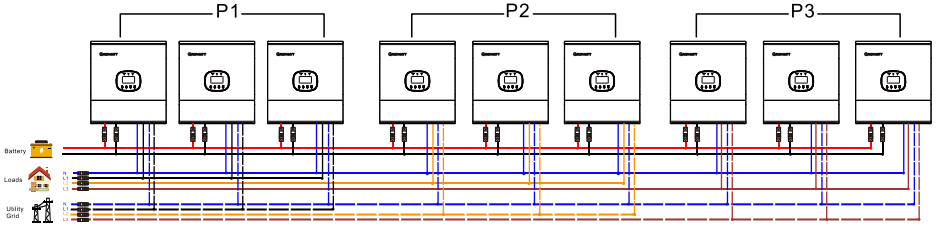
Parallel Operation in Three Phase

Try to connect to the utility at the same time after three-phase parallel connection.

When setting up three-phase parallel, you need to define the master and the slave, see the 5.5 for the specific setting method. Be sure to confirm that the wiring is correct, the wiring method is shown in the table below. The following chart is an example of （3+3+3) (4+3+2)

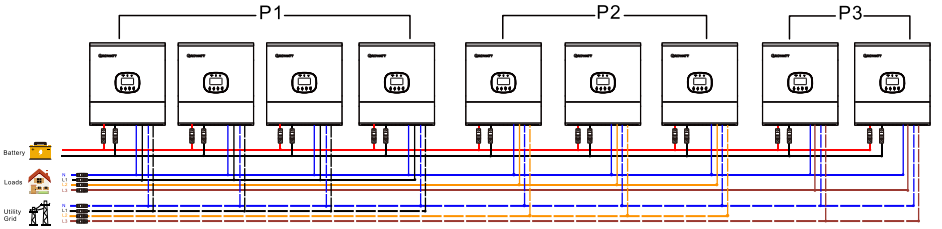
（3+3+3)Three inverters in one phase, three inverters in second phase and three inverters for the third phase:

Power Connection



(4+3+2)Four inverters in one phase, three inverters in second phase and two inverters for the third phase:

Power Connection



5.5 Parallel setup and display

Parallel in Single Phase

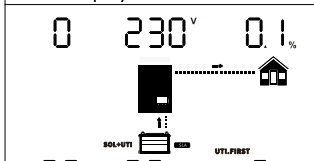
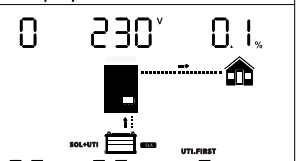
Step 1: Check the following requirements before commissioning:

- Correct wire connection
- Ensure all breakers in Line wires of load side are open and each Neutral wires of each unit are connected together.

Step 2: Turn on each unit and set "PAL" in LCD setting program 23 of each unit. And then shut down all units.

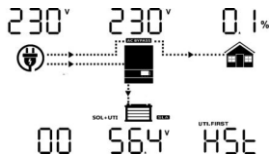
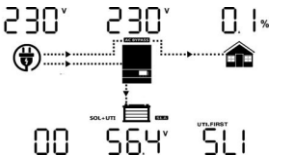
Note: It's necessary to turn off switch when setting LCD program. Otherwise, the setting can not be programmed.

Step 3: Turn on each unit.

LCD display in Master unit	LCD display in Slave unit
	

Note: Master and slave units are randomly defined.

Step 4: Switch on all AC breakers of Line wires in AC input. It's better to have all inverters connect to utility at the same time. If not, it will display warning 15.

LCD display in Master unit	LCD display in Slave unit
	

Step 5: If there is no more fault alarm, the parallel system is completely installed.

Step 6: Please switch on all breakers of Line wires in load side. This system will start to provide power to the load.

Parallel in Three Phase

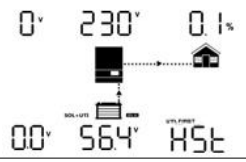
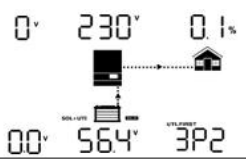
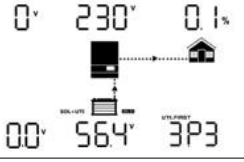
Step 1: Check the following requirements before commissioning:

- Correct wire connection
- Ensure all breakers in Line wires of load side are open and each Neutral wires of each unit are connected together.

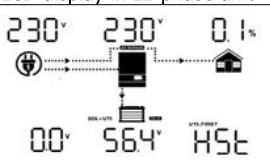
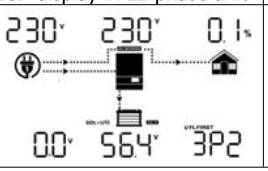
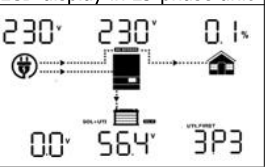
Step 2: Turn on all units and configure LCD program 23 as P1, P2 and P3 sequentially. Then shut down all units.

Note: It's necessary to turn off switch when setting LCD program. Otherwise, the setting can not be programmed.

Step 3: Turn on all units sequentially. Please turn on HOST inverter first, then turn on the rest one by one.

LCD display in L1-phase unit	LCD display in L2-phase unit	LCD display in L3-phase unit
		

Step 4: Switch on all AC breakers of Line wires in AC input. If AC connection is detected and three phases are matched with unit setting, they will work normally. Otherwise, theywill display warning 15/16 and will not work in the line mode.

LCD display in L1-phase unit	LCD display in L2-phase unit	LCD display in L3-phase unit
		

Step 5: If there is no more fault alarm, the system to support 3-phase equipment is completely installed.

Step 6: Please switch on all breakers of Line wires in load side. This system will start to provide power to the load.

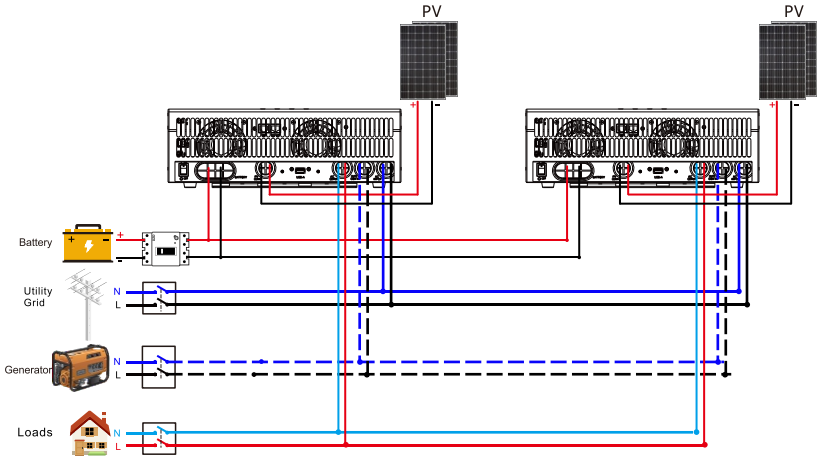
Note 1: If there's only one inverter in L1-phase, the LCD will show as "HST". If there is more than one inverter in L1-phase, the LCD of the HOST inverter will show as "HST", the rest of L1-phase inverters will show as "3P1".

Note 2: To avoid overload occurring, before turning on breakers in load side, it's better to have whole system in operation first.

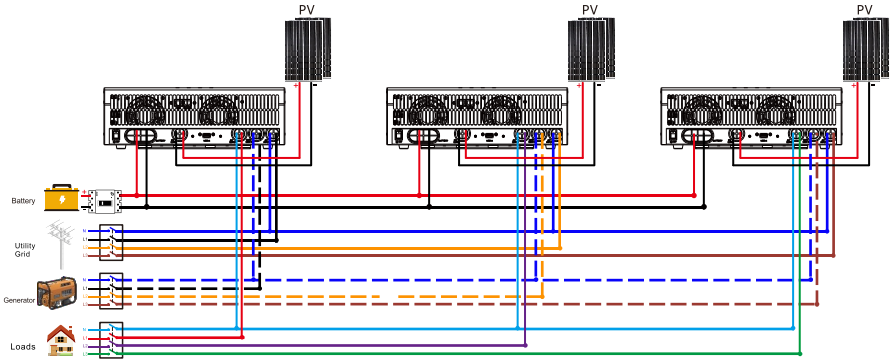
Note 3: Transfer time for this operation exists. Power interruption may happen to critical devices, which cannot bear transfer time.

5.6 Example of a parallel system diagram

Single-phase parallel wire connection:



Three-phase parallel wire connection:



6. Fault Reference Code

6.1 Fault Reference Code

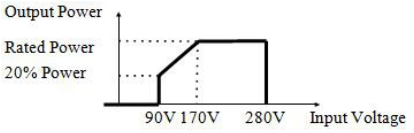
Fault Code	Fault Event	Icon on
02	Over temperature	
03	Battery voltage is too high	
05	Output short circuited	
06	Output voltage is too high.	
07	Overload time out	
08	Bus voltage is too high	
09	Bus soft start failed	
11	The AC relay failed	
12	The INV relay failed	
18	LLC Over current or surge	
50	IGBT Over current or surge	
51	INV Over current or surge	
52	Bus voltage is too low	
53	Inverter soft start failed	
58	Output voltage is too low	
60	Negative power fault	
61	PV voltage is too high	
62	Internal communication error	
66	GFCI is too high	
67	DCI failed	
70	LLC and INV communication error	
80	CAN fault	

6.2 Warning Indicator

Warning Code	Warning Event	Audible Alarm	Icon flashing
02	Over temperature	Beep once every second	
03	Battery is over-charged	Beep once every second	
04	Low battery	Beep once every second	
07	Overload	Beep once every 0.5 second	
10	Output power derating	Beep twice every 3 seconds	
13	Solar charger stops due to high PV voltage	Beep once every second	
14	Solar charger stops due to overload	Beep once every second	
15	Parallel input utility grid different	Beep once every second	
16	Parallel input phase error	Beep once every second	
17	Parallel output phase loss	Beep once every second	
19	Battery disconnect	No beep	
20	BMS communication error	Beep once every second	
21	PV power insufficient	Beep once every second	
22	Parallel forbidden without battery	Beep once every second	
23	The parallel version is different	Beep once every second	
25	Parallel inverters' capacity different	Beep once every second	
26	ISO detection failed	Beep once every second	
28	GFCI error	Beep once every second	
36	Li battery total over voltage	Beep once every second	
37	Li battery total under voltage	Beep once every second	
38	Li battery discharge over voltage	Beep once every second	
39	Li battery charge over voltage	Beep once every second	
40	Li battery discharge over temperature	Beep once every second	
41	Li battery charge over temperature	Beep once every second	
81	Host loss	Beep once every second	

7. Specifications

7.1 AC Input Specifications

INVERTER MODEL	SPE 3500TL HVM-24G2	SPE 5000TL HVM-G2
Nominal Input Voltage	230Vac±2%	
Input Voltage Range	170~280Vac(UPS), 90~280Vac(APL)	
Low Loss Voltage	170Vac±7V (UPS), 90Vac±7V (APL)	
Low Loss Return Voltage	180Vac±7V (UPS), 100Vac±7V (APL)	
High Loss Voltage	> 280Vac±7V	
High Loss Return Voltage	< 270Vac±7V	
Nominal Input Frequency	50Hz / 60Hz (Auto detection)	
Low Loss Frequency	40±1Hz	
Low Loss Return Frequency	42±1Hz	
High Loss Frequency	65±1Hz	
High Loss Return Frequency	63±1Hz	
Overload Protection	AC Bypass: load≤110%, normal; 110% < load < 150%, 07 warning load > 150%: 5s AC Input Circuit ﹥30A: 10s	
Output Short Circuit Protection	Circuit Breaker	
MAX Bypass Circuit	30A±1A	
Transfer Time	10ms typical, RCD 20ms Max@ Single	
Output power derating: When AC input voltage drops to 170V, the output power will be derated.		

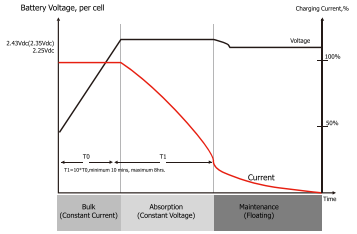
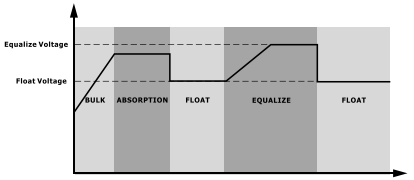
7.2 Inverter Mode Specifications

INVERTER MODEL	SPE 3500TL HVM-24G2	SPE 5000TL HVM-G2
Output Voltage Waveform	Pure Sine Wave	
No Load Power Consumption	< 30W	< 35W
Rated Output Power	3.5KVA/3.5KW	5KVA/5KW
Nominal Output Current	15.2A	21.8A
Output Voltage Regulation	230Vac±2%	
Output Frequency	50Hz/60Hz±0.3Hz	
Output Voltage THDV	Linear Load < 3%, No linear Load < 5%	
INV Efficiency	95% MAX	
Overload Protection	Inverter: 101%< load <150%: 10s; load > 150%: 5s	
Nominal DC Input Voltage	24.0Vdc	48.0Vdc
Cold Start Voltage(Lead-Acid Mode)	23.0Vdc	46.0Vdc
Low DC Cut-off Voltage (Lead-Acid Mode)	21.0Vdc @ load < 20% 20.4Vdc @ 20% ≤ load < 50% 19.2Vdc @ load ≥ 50%	42.0Vdc @ load < 20% 40.8Vdc @ 20% ≤ load < 50% 38.4Vdc @ load ≥ 50%
Low DC Warning Voltage (Lead-Acid Mode)	Low DC Cut-off SOC + 1Vdc	Low DC Cut-off SOC + 2Vdc
Low DC Warning Return Voltage (Lead-Acid Mode)	Low DC Cut-off SOC + 2Vdc	Low DC Cut-off SOC + 4Vdc
Low DC Cut-off SOC (Li Mode)	10%	
Cold Start SOC(Li Mode)	Low DC Cut-off SOC + 10%	
Low DC Warning SOC (Li Mode)	Low DC Cut-off SOC +5%	
Low DC Warning Return SOC (Li Mode)	Low DC Cut-off SOC +10%	
High DC Recovery Voltage	28.2Vdc±0.5V	56.4Vdc±0.5V
High DC Cut-off Voltage	31.0Vdc±0.5V AGM:31V, FLD:32V, USE MODE: CV+2V	62.0Vdc±0.5V AGM:62V, FLD:64V, USE MODE: CV+4V
Transfer Time	10ms typical, RCD 20ms Max@ Single	

7.3 Smart Load Output Power Specifications

INVERTER MODEL	SPE 3500TL HVM-24G2	SPE 5000TL HVM-G2
Full Load Output Power	3500W	5000W
Maximum main Load	3500W	5000W
Maximum smart Load	3500W	5000W

7.4 AC Charge Mode Specifications

INVERTER MODEL		SPE 3500TL HVM-24G2	SPE 5000TL HVM-G2
Charging Algorithm		3-Step or Equalizing Charging	
Max. AC Charging Current		80A	
Bulk Charging Voltage	Flooded Battery	29.2Vdc	58.4Vdc
	AGM / Gel Battery	28.2Vdc	56.4Vdc
Floating Charging Voltage		27Vdc	54Vdc
Charging Curve		3-Step Charging 	
		Eq Charging 	

7.5 MPPT Solar Charging Mode Specifications

INVERTER MODEL	SPE 3500TL HVM-24G2	SPE 5000TL HVM-G2
Max. PV Array Power	4000W	5000W
Max. PV Input Current	22A±1A	
Start-up Voltage	80Vdc±5Vdc	
PV Array MPPT Voltage Range	60Vdc~450Vdc±5Vdc	
Max. PV Array Open Circuit Voltage	500Vdc	
Nominal PV Voltage	380Vdc	
PV Array Voltage High Loss	510Vdc±5Vdc fault （500Vdc warning）	
PV Array Voltage High Comeback	490Vdc±5Vdc	
Efficiency	94.5% MAX	
Number of MPP Trackers	1	
Charging Algorithm	3-Step or Equalizing Charging	

7.6 Grid Feeding Specification

Model	SPE 3500TL HVM-24G2	SPE 5000TL HVM-G2
Nominal output voltage	230Vac	
Nominal output frequency	50Hz / 60Hz (Auto detection)	
Max feeding power	3500W	5000W
Output voltage range	195.5~253VAC (±3%)@Asia regulation 195.5~253VAC (±3%)@Pakistan regulation 195.5~253VAC (±3%)@South Africa regulation	
Output voltage comeback value	205~243VAC (±3%)@Asia regulation 194~254.5VAC (±3%)@Pakistan regulation 195.5~253VAC (±3%)@South Africa regulation	
Operational frequency range	49~51Hz (±0.1Hz)@Asia regulation 47.5~51.5Hz (±0.1Hz)@Pakistan regulation 47.0Hz~51.5Hz (±3%)@South Africa regulation	
Output frequency comeback value	49.5~50.5Hz (±0.1Hz)@Asia regulation 48~51Hz (±0.1Hz)@Pakistan regulation 47~51.5Hz (±0.1Hz)@ South Africa regulation	
Output current	15.2A	21.8A
O/P current distortion	<5%	
O/P current DC component	<76mA	<109mA
Power Factor	0.8 leading to 0.8 lagging	
Max. Conversion Efficiency(PV/AC)	96% MAX	96.5% MAX
European Efficiency @Vnominal(PV/AC)	96% MAX	95.5% MAX

7.7 Physical Dimension

INVERTER MODEL	SPE 3500TL HVM-24G2	SPE 5000TL HVM-G2
Inverter dimension(L*W*H),mm	430*370*125	430*370*125
Packaging dimension(L*W*H),mm	565*485*220	565*485*220
colour	White	White
Net Weight (KG)	10.4	10. 8
Rough Weight (KG)	13.2	13. 6

8. Appendix

Appendix I. Fault information and processing

The energy storage inverter is designed according to the off-grid connected operation standard and meets the safety requirements and electromagnetic compatibility requirements. Before leaving the factory, the inverter undergoes several rigorous tests to ensure that the inverter can operate reliably.

If any of the fault messages listed in Table 6-1 appear on your inverter and the fault has not been removed after restarting, please contact your local dealer or service center. You need to have the following information ready.

1. Inverter serial number.
2. The problem description (including the fault code and indicator status displayed on the LCD, or specific fault video and picture) is as detailed as possible.
3. Basic system component information (such as batteries, photovoltaic panels, load usage and specifications).
4. Your contact information.

In order to give you a clearer understanding of the inverter's fault information, we will list all possible fault codes and their descriptions when the inverter is not working properly.

error code	Description	Solutions
F02	Internal temperature of component is over 100°C.	Check whether the air flow of the unit is blocked or whether the ambient temperature is too high.
F03	Battery is over-charged.	Restart the unit.
	The battery voltage is too high	1.Measure battery voltage in DC input.(Check battery SOC in LCD when use Li battery). 2.Adjust the charging current to less than 0.2C. 3.Check if spec and quantity of batteries are meet requirements.
W04	Battery voltage is too low	1.Measure battery voltage in DC input.(Check battery SOC in LCD when use Li battery). 2.Recharge the battery.
F05	Output short circuited	1.Disconnect load and restart the unit. 2.Check if wiring is connected well and remove abnormal load.
F07	Overload time out	Reduce the connected load by switching off some equipment.
F08	Bus voltage is too high	1. If you connect to a lithum battery without communication, check whether the voltage points of the program 19 and 21 are too high for the lithum battery. 2. Restart the unit.
F09/53/57	Bus soft start failed	Restart the unit.
W15	The input status is different in parallel system.	Check if AC input wires of all inverters are connected well.
W16	Input phase is not correct.	Change the input phase S and T wiring.
W17	The output phase not correct in parallel.	1.Make sure the parallel setting are the same system (sigle or parallel; 3P1,3P2,3P3). 2.Make sure all phases inverters are power on.
W19	lead acid battery disconnect	Check if spec and quantity of batteries are meet requirements.
	Lithium battery disconnect	1. Check BMS communication cable connection. 2. Check setup parameters.
W20	BMS communication error	1. Check whether communication line is correct connection between inverter and battery. 2. Check whether BMS protocol type is correct setting.
F51	Over current or surge	Restart the unit.
F52	Bus voltage is too low	
F55	Output voltage is unbalanced	
F61	PV voltage is too high	1. Measure whether the PV voltage in the DC input is consistent with the value displayed on the LCD screen. 2. If consistent, standardize the parallel connection method of PV panels.
F62	Internal communication error	Restart the unit.
F80	CAN fault	1. Check whether the parallel communication cables are connected well. 2. Check whether Program 23 settings are right for the parallel system.
F81	Host loss	

Other Problem	LCD/LED/Buzzer	Explanation	What to do
Unit shuts down Automatically during Startup process.	LCD/LEDs and buzzer will be active for 3 seconds and then complete off.	The battery voltage is too low, (<1.91V/Cell).	1. Re-charge battery. 2. Replace battery.
No response after power on.	No indication.	1.The battery voltage is far too low. (<1.4V/Cell). 2.Battery polarity is connected reversed.	1. Check if batteries and the wiring are connected well. 2. Re-charge battery. 3. Replace battery.
Mains exist but the unit works in battery mode.	Input voltage is 0 on the LCD and green LED is flashing.	Input protector is tripped.	Check if AC breaker is tripped and AC wiring is connected well.
	Green LED is flashing.	Insufficient quality of AC power (Shore or Generator).	1. Check if AC wires are too thin and/or too long. 2. Check if generator (if applied) is working well or if input voltage range setting is correct. (UPS→Appliance).
	Green LED is flashing.	Set "Battery First" or "Solar First" as the priority of output source.	Change output source priority to Utility first.
When it's turned on, internal relay is switching on and off repeatedly.	LCD display and LEDs are flashing.	Battery is disconnected.	Check if battery wires are connected well.

Note: To restart the inverter, all power sources need to be disconnected. After the LCD screen light is off, only use the battery to boot.

Appendix II Restore factory settings

After pressing and holding UP and DOWN buttons at the same time for 3 seconds, the unit will enter PASS mode. Change the middle three numbers 000 to 305. Then press "ENTER" button to confirm the selection and Wait about 7 seconds. Press "ESC" to return and the setting is completed.

NOTE: When inverters are used in parallel, every inverter needs to disconnect parallel communication cable and restore alone

Program	Setting Option
PASS	PASS 305 000

Appendix III Battery Equalization

43	Battery equalization	Battery equalization enable E9 ENA 043	Battery equalization disable (default) E9 dIS 043
		If "Flooded" or "User-Defined" is selected in program 05, this program can be set up.	
44	Battery equalization voltage	E9U 29.2 044 or E9U 58.4 044 3500: Default 29.2V, 24.0V~29.2V Settable 5000: Default 58.4V, 48.0V~58.4V Settable	
45	Battery equalized time	MIN E9t 60 045	Default 60min, 5min~900min Settable
46	Battery equalized timeout	MIN E9t0 120 046	Default 120min, 5min~900min Settable
47	Equalization interval	dAY E9i 30 047	Default 30days, 1 days~90 days Settable
48	Equalization activated immediately	Equalization activated immediately on E9 ON 048	Equalization activated immediately off(default) E9 OFF 048
		If equalization function is enabled in program 43, this program can be setup. If "On" is selected in this program, it's to activate battery equalization immediately and LCD main page will shows "E9". If "Off" is selected, it will cancel equalization function until next activated equalization time arrives based on program 47setting. At this time, "E9" will not be shown in LCD main page.	

Equalization function is added into charge controller. It reverses the buildup of negative chemical effects like stratification, a condition where acid concentration is greater at the bottom of the battery than at the top. Equalizationalso helps to remove sulfate crystals that might have built up on the plates. If left unchecked, this condition, called sulfation, will reduce the overall capacity of the battery. Therefore, it's recommended to equalize battery periodically.

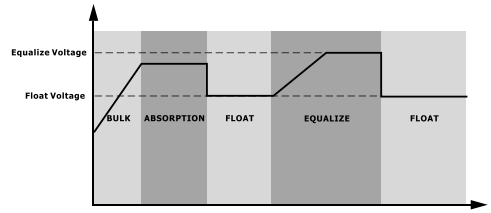
- How to Apply Equalization Function

You must enable battery equalization function in monitoring LCD setting program 43 first. Then, you may apply this function in device by either one of following methods:

1. Setting equalization interval in program 47.
2. Active equalization immediately in program 48.

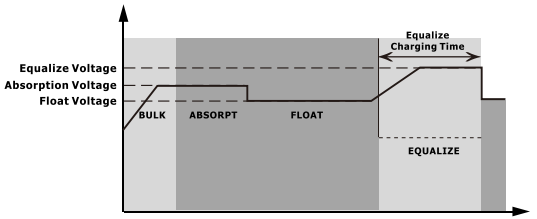
- When to Equalize

In float stage, when the setting equalization interval (battery equalization cycle) is arrived, or equalization is active immediately, the controller will start to enter Equalize stage.

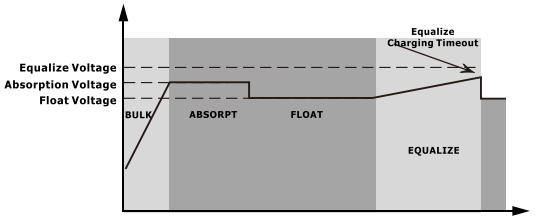


- Equalize charging time and timeout

In Equalize stage, the controller will supply power to charge battery as much as possible until battery voltage raises to battery equalization voltage. Then, constant-voltage regulation is applied to maintain battery voltage at the battery equalization voltage. The battery will remain in the Equalize stage until setting battery equalized time is arrived.



However, in Equalize stage, when battery equalized time is expired and battery voltage doesn't rise to battery equalization voltage point, the charge controller will extend the battery equalized time until battery voltage achieves battery equalization voltage. If battery voltage is still lower than battery equalization voltage when battery equalized timeout setting is over, the charge controller will stop equalization and return to float stage.



Appendix IV Routine maintenance

To ensure the long-term and good operation of the energy storage system, it is recommended to performthe routine maintenance as described in this section (Cleaning and maintenance of the inverter must be carried out with the power supply disconnected to ensure personal safety).

Items	Methods	Maintenance interval
System cleanliness for inverter	Regularly check the surface of the inverter for dust or other debris and clean it with a dust sponge.	Once every six months to one year
	Regularly check that radiators and vents are not covered with dust and clean them with a soft brush or compressed air.	Once every 3 months.
Electrical connection	Check if any cable connection is off or loose.	Half a year after first debugging and testing, and once every six months to one year thereafter.
	Check if any cable is damaged, and especially if there are cuts on the sheath where the cable contacts with the metal surface.	
	Check the internal circuit boards and components of the inverter for abnormalities, such as damage, discoloration, etc., and repair and replace them in a timely manner.	
Grounding reliability	Check if the grounding cable is grounded reliably.	
normal operation	Periodically check the input voltage. output voltage and current of the inverter to ensure that it is operating within its rated range.	
	Regularly check the operating status and performance parameters of the inverter via the inverter's monitoring system or display.	
Other Maintenance	Ensure that the inverter is installed in a dry, well-ventilated environment, protected from humidity, heat or excessive dust.	

Appendix V WIFI Monitoring

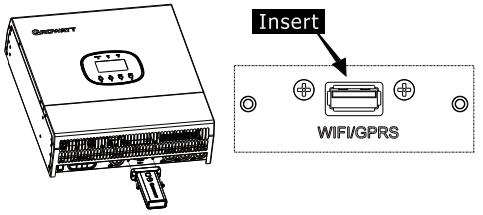
Plug cube WIFI into the WIFI/4G port.

Scan the QR code below to download ShinePhone, also you can search ShinePhone in iOS or Google Play Store, download and install it.

Note:

1.Make sure you download the latest version.

2.For further information please visit server. growatt.com



【Android & iOS】