Solar Inverter

Version 0.1
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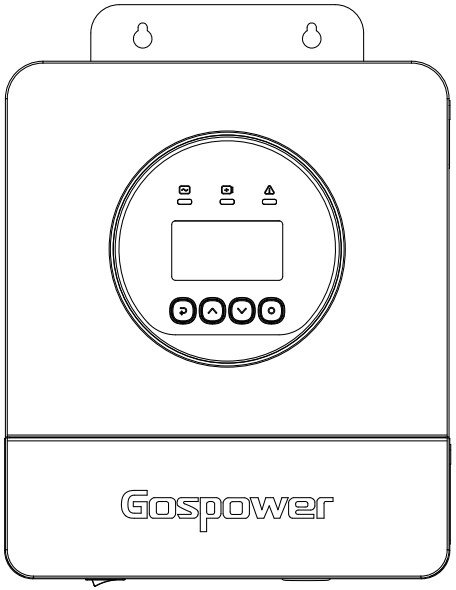
Gospower

USER GUIDE

Solar Inverter

GPEO-1K6L1-4V1



Contents

ABOUT THIS MANUAL

Purpose

This manual describes the assembly, installation, operation, warning code and fault code of this unit. Please read this manual carefully before installations and operations. Keep this manual for future reference.

Scope

This manual provides safety and installation guidelines as well as information on tools and wiring.

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 markings on the unit, the batteries and all appropriate sections of this manual.
2. **CAUTION** To reduce risk of injury, charge only deep-cycle lead acid type rechargeable batteries. Other types of batteries may burst, causing personal injury and damage.
3. 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.
4. To reduce risk of electric shock, disconnect all wirings before attempting any maintenance or cleaning. Turning off the unit will not reduce this risk.
5. **CAUTION** Only qualified personnel can install this device with battery.
6. **NEVER** charge a frozen battery.
7. For optimum operation of this inverter/charger, please follow required spec to select appropriate cable size. It's very important to correctly operate this inverter/charger.
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. 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.
10. Fuse is provided as over-current protection for the battery supply.
11. **GROUNDING INSTRUCTIONS** This inverter/charger 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. Do NOT connect to the mains when DC input short circuits.
13. **WARNING!!** Only qualified service persons are able to service this device. If errors still persist after following troubleshooting table, please send this inverter/charger back to local dealer or service center for maintenance.
14. **WARNING!!** This series of off-grid inverters provides a backfeed function without grid-tie protection. If enabled, implement protective measures prior to operation. The customer assumes full liability for any accidents resulting from the use of this function.

WARNING MARKS

Warning marks inform users of conditions which can cause serious physical injury or death, or damage to the device. They also tell users how to prevent the dangers. The warning marks used in this operation manual are shown below:

Mark	Name	Instruction	Abbreviation
Danger	Danger	Serious physical injury or even death may occur if not follow relevant requirements.	
Warning	Warning	Physical injury or damage to the device may occur if not follow relevant requirements.	
Forbid	Electrostatic sensitive	Damage may occur if relevant requirements are not followed.	
Hot	High temperature	Do not touch the base of the inverter as it will become hot.	
Note	Note	The procedures taken for ensuring proper operation.	Note

INTRODUCTION

This is a multi-function inverter/charger, combining functions of inverter, MPPT solar charger and battery charger to offer uninterruptible power support with portable size. Its comprehensive LCD display offers user-confiqurable and easy-accessible button operation such as battery charging current, AC/solar charger priority, and acceptable input voltage based on different applications.

Features

- Pure sine wave inverter
- Built-in MPPT solar charge controller
- Confiqurable input voltage range for home appliances and personal computers via LCD setting
- Configurable battery charging current based on applications via LCD setting
- Configurable AC/Solar Charger priority via LCD setting
- Auto restart while AC is recovering
- Overload / Over temperature / short circuit protection
- Inverter running without battery
- Lithium battery activation function
- Cold start function
- Intelligent fan control greatly reduces fan noise

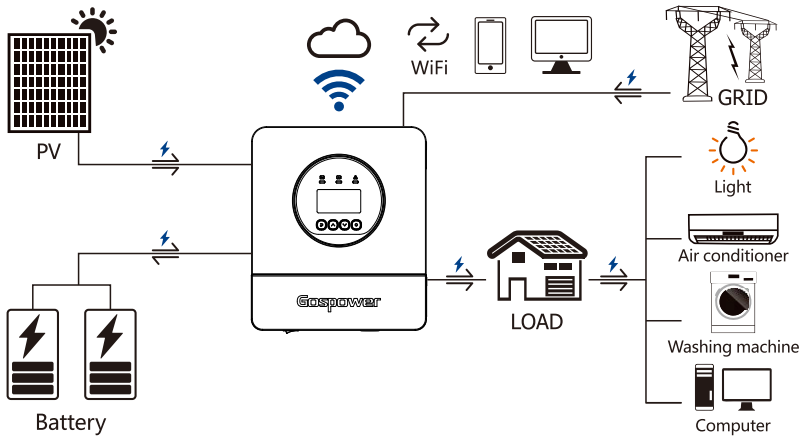
Basic System Architecture

The following illustration shows basic application for this inverter/charger. It also includes following devices to have a complete running system:

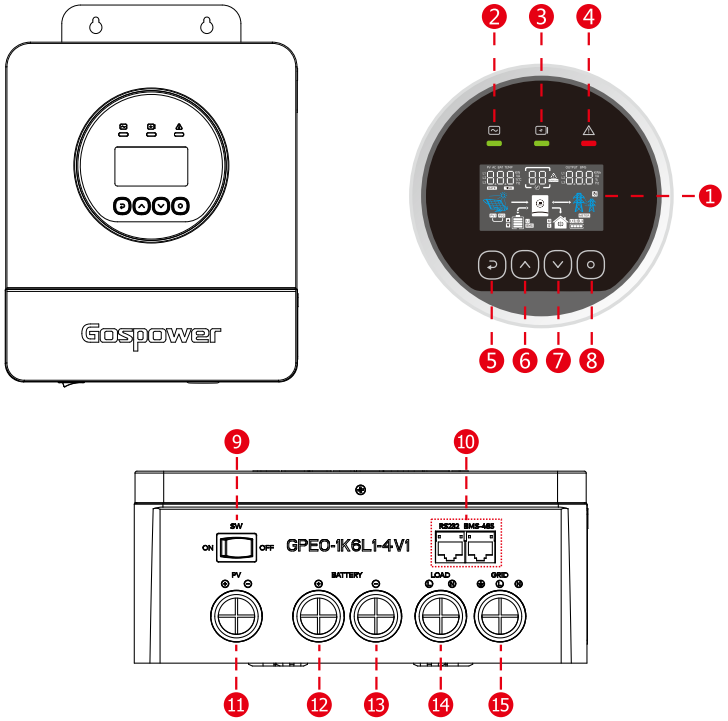
- PV modules (option)

Consult with your system integrator for other possible system architectures depending on your reguirements.

This inverter can power all kinds of appliances in home or office environment, including motor-type appliances such as tube light, fan, refrigerator and air conditioner.

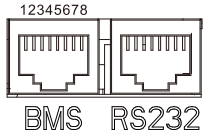


PRODUCT OVERVIEW



1. LCD display
2. Utility bypass/Inverter indicator
3. Charging indicator
4. Fault or warning indicator
5. ESC button
6. UP button
7. Down button
8. Enter button
9. Switch
10. Communication connection port*
11. PV input connection port
12. Battery+ connection port
13. Battery- connection port
14. AC output port
15. AC input port

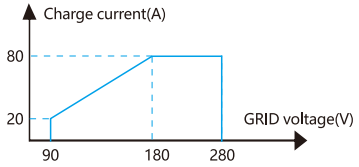
10 Definition of Communication connection port

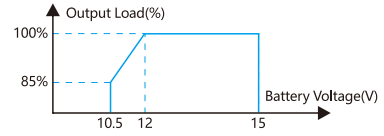
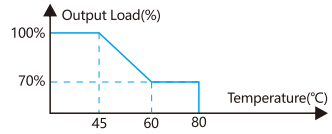


NO.	RS-232	BMS-485
1	RS232-TXD	RS485-B
2	RS232-RXD	RS485-A
3	VDD12V	NC
4	VSS	NC
5	NC	VDD12V
6	NC	VSS
7	NC	RS485-A
8	VSS	RS485-B

SPECIFICATIONS

Line Mode Specifications	
Model	**GPEO-1K6L1-4V1**
Rated Output Power	2000VA
	1600W
Nominal DC Input Voltage	12V
Input Voltage Waveform	Sinusoidal (utility or generator)
Nominal Input Voltage	230Vac
Low Line Voltage Disconnect	90Vac±3V(For Home Appliances: APL)170Vac±3V(For Computers: UPS)
Low Loss Voltage Re-connect	100Vac±3V(For Home Appliances: APL)180Vac±3V(For Computers: UPS)
High Line Voltage Disconnect	280Vac±3V
High Line Voltage Re-connect	270Vac±3V
Max AC Input Voltage	280Vac±3V
Nominal Input Frequency	50Hz/60Hz (Auto detection)
Low Line Frequency Disconnect	40±0.2Hz
Low Line Frequency Re-connect	42±0.2Hz
High Line Freguency Disconnect	65±0.2Hz
High Line Frequency Re-connect	63±0.2Hz
Output Voltage Waveform	As same as input waveform
Output Short Circuit Protection	Line mode: Circuit Breaker; Battery mode: Electronic Circuits
Max. Conversion Efficiency	≥94%
Transfer Time (Single unit)	10ms typical
Pass Through Without Battery	Yes
MAX.Bypass Overload Current	9.7A
MAX.Bypass Input Current	9.5A
Max. Inverter/Rectifier Current	9.1A/2000VA

Utility Charge Mode Specifications			
Model	**GPEO-1K6L1-4V1**		
Nominal Input Voltage	230Vac		
Input Voltage Range	90-280Vac		
Nominal Output Voltage	10.5-15Vdc		
Max. Grid Charge Current	80A		
Charge Current Regulation	5-80A (Adjustable unit is 1A)		
Over Charge Protection	Yes		
Grid charging Current Relationship between battery charging current and grid voltage. Battery voltage 12V			
Solar Charging & Grid Charging			
Max. PV Open Circuit Voltage	500V		
PV voltage range	35-450V		
Max. Input Power	3200W		
Max. Solar Charging Current	140A		
Max. Charging Current(PV+Grid)	140A		
Max.PV Input Current	20A		
Min. Startup Voltage	40V		
Charge Algorithm			
Algorithm	**Three stage:** Boost CC (Constant current stage)->Boost CV(Constant voltage stage)->Float FV(Constant voltage stage)		
Charging Curve			
Battery Type Setting	Battery Type	Boost CC/CV	Float
	AGM	14.1V	13.5V
	Flooded	14.6V	13.5V
	Self-defined	Adjustable, up to 15V	
	Lithium		

Inverter Mode Specifications	
Model	**GPEO-1K6L1-4V1**
Rated Output Power	2000VA
	1600W
Nominal DC Input voltage	12V
Output Voltage Waveform	Pure sine wave
Nominal Output Voltage	230Vac±5%
Nominal Output Frequency(Hz)	50±0.2Hz/60±0.2Hz (Adjustable)
Parallel capability	No
Peak Efficiency	92%
Over-Load Protection(SMPS load)	5s@≥150%load; 30s@110%~150%load
Surge Rating	2* rated power for 5s
Capable of Starting Electric	Yes
Output Short Circuit Protection	Yes
Cold Start Voltage	11.5V
Low DC Input Shut-down Load < 50%/@Load ≥ 50%	10.4V/10.6V
High DC Input Alarm & Fault	15.5V±0.2V
High DC Input Recovery	14.5V±0.2V
Battery Voltage Limitation When battery voltage is lower than 12Vdc, output power will be derated. The minimum AC output voltage is 180V.	
Temperature Limitation(Td) When ambient temperature is higher than 45℃, output power will be derated. The minimum AC output voltage is 180V.	
General Specifications	
Operating Temperature	-20C°~60C°
Range Storage Temperature	-25C°~60C°
Net Weight(kg)	3.95kg
Gross Weight(kg)	4.80kg
Product Size(D*W*H)	305.6x237x100.5mm
Package Dimension(D*W*H)	375x305x167mm

INSTALLATION

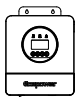
Safety Guidance

Warning marks inform users of conditions which can cause serious physical injury or death, or damage to the device. They also tell users how to prevent the dangers. The warning marks used in this operation manual are shown below:

	• After receiving this product, first confirm the product package is intact. If any question, contact the logistic company or local distributor immediately. • The installation and operation of inverter must be carried out by professional technicians who have received professional trainings and thoroughly familiar with all the contents in this manual and the safety requirements of the electrical system.
	• Do not carry out connection/disconnection, unpacking inspection and unit replacement operations on the inverter when power source is applied. Before wiring and inspection, users must confirm the breakers on DC and AC side of inverter are disconnected and wait for at least 5 minutes.
	• Ensure there is no strong electromagnetic interference caused by other electronic or electrical devices around the installation site. • Do not refit the inverter unless authorized. • All the electrical installation must conform to local and national electrical standards.
	• Do not touch the housing of the inverter or the radiator to avoid scald as they may become hot during operation.
	• Ground with proper technics before operation.
	• Do not open the surface cover of the inverter unless authorized. The electronic components inside the inverter are electrostatic sensitive. Do take proper anti-electrostatic measures during authorized operation.
	• The inverter needs to be reliably grounded.
	• Ensure that DC and AC side circuit breakers have been disconnected and wait at least 5 minutes before wiring and checking.

Unpacking and Inspection

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


Inverter unit x 1


Manual x 1

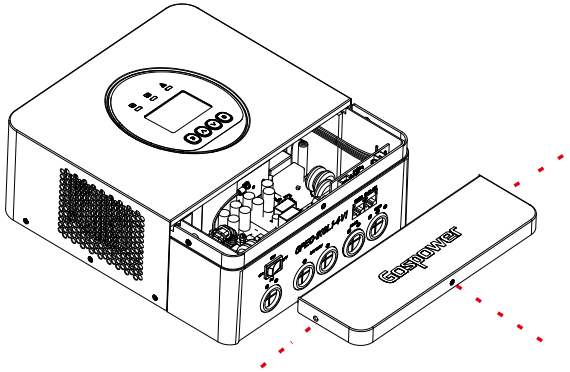

O-shaped terminal
RNB22-6L


Battery input screw


Self-tapping screw x 4

Preparation

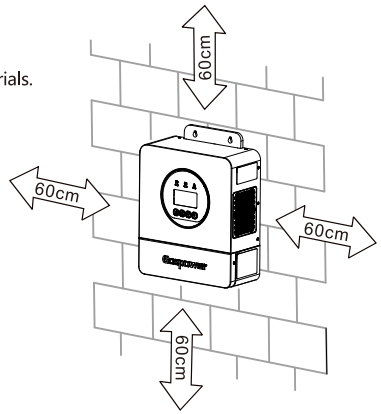
Before connecting all wirings, please take off bottom cover by removing three screws as shown below.



Mounting the Unit

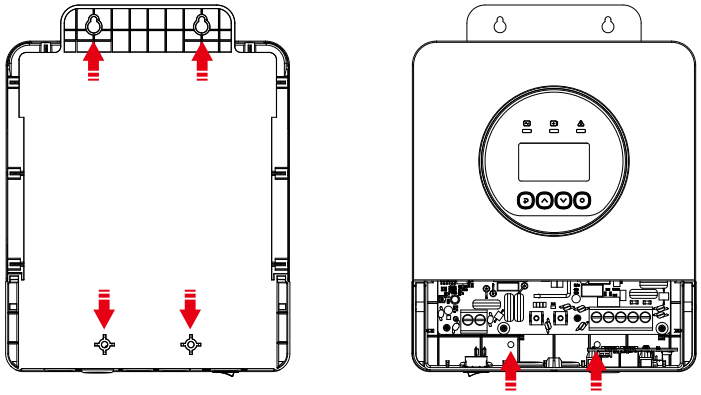
Consider the following points before selecting where to install:

- Do not mount the inverter on flammable construction materials.
- Mount on a solid surface.
- 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 -20°C and 60°C to ensure optimal operation.
- The recommended installation position is to be adhered to the wall vertically.
- 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.



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

Install the unit by screwing four screws. It's recommended to use M4 screws.



Battery Connection

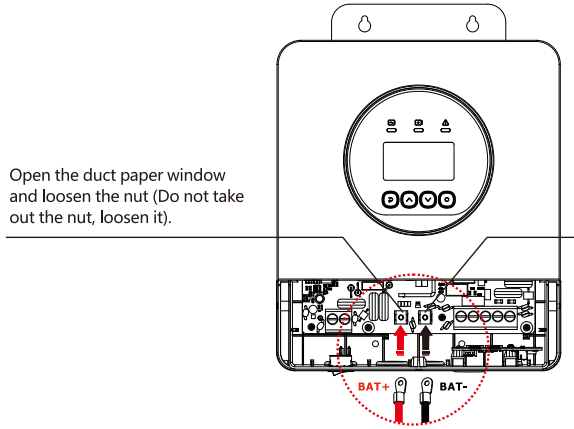
CAUTION: For safety operation and regulation compliance, it's requested to install a separate DC over-current protector or disconnect device between battery and inverter. It may not be requested to have a disconnect device in some applications, however, it's still requested to have over-current protection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

WARNING! All wiring must be performed by a qualified personnel.
WARNING! 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.

Model	Gauge	Cable(mm²)	Torque Value
2KVA	1*2AWG	35	2 Nm

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. It's suggested to connect at least 200Ah capacity battery.
3. Insert the ring terminal of battery cable flatly into battery connector of inverter and make sure the bolts are tightened with torque of 2 Nm. Make sure polarity at both the battery and the inverter/charge is correctly connected and ring terminals are tightly screwed to the battery terminals.



⚠	**WARNING: Shock hazard** Installation must be performed with care due to high battery voltage in series.

⚠	**CAUTION!!** Do not place anything between the flat part of the inverter terminal and the ring terminal. Otherwise, overheating may occur. **CAUTION!!** Do not apply anti-oxidant substance on the terminals before terminals are connected tightly. **CAUTION!!** Before making the final DC connection or closing DC breaker/disconnector, be sure positive (+) must be connected to positive (+) and negative (-) must be connected to negative (-).

AC Input/Output Connection

⚠ **CAUTION!!** Before connecting to AC input power source, please install a separate AC breaker ,a self resetting overvoltage and undervoltage protector and a SPD (Surge Protection Device) 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. The recommended spec of AC breaker is 16A for 2kVA.

⚠ **CAUTION!!** There are two terminal blocks with "IN" and "OUT" markings. Please do NOT mis-connect input and output connectors.
WARNING! All wiring must be performed by qualified personnel.
WARNING! It's very important for system safety and eficient operation to use appropriate cable for AC input connection. To reduce risk of injury, please use the proper recommended cable size as below.

Suggested cable requirement for AC wires:

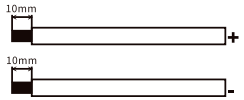
Model	Gauge	Cable (mm²)	Torque value
2KVA	13AWG	3	1.2Nm

Recommended circuit breaker type for AC input:

Model	Maximum bypass	Recommended circuit breaker
2KVA	9.5A	2P-20A

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

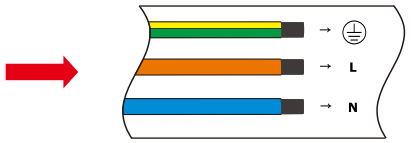
1. Before making AC inputloutput connection, be sure to open DC protector or disconnector firstly.
2. Remove insulation sleeve 10mm for three conductors. And shorten phase L and neutral conductor N by 3mm.



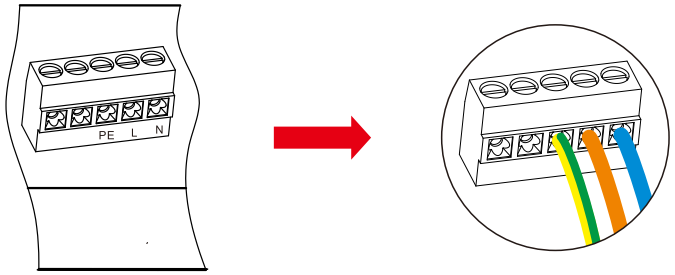
⏚ →Ground (yellow-green)

L→LINE (brown or black)

N→Neutral (blue)

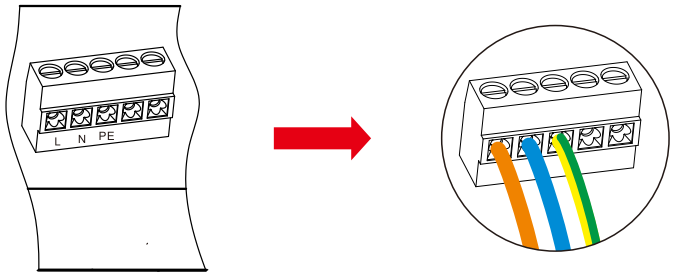


3. Insert AC input wires according to polarities indicated on terminal block and tighten the terminal screws. Be sure to connect PE protective conductor (⏚) first.



⚠	**WARNING!!** Be sure that AC power source is disconnected before attempting to hardwire it to the unit.

4. Then, insert AC output wires according to polarities indicated on terminal block and tighten terminal screws. Be sure to connect PE protective conductor (⏚) first.



5. Make sure the wires are securely connected.

CAUTION: Important 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.
CAUTION: 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 manufacturer of air conditioner if it's equipped with time-delay function before installation. Otherwise, this inverter/charger will trigger overload fault and cut off output to protect your appliance but sometimes it still causes internal damage to the air conditioner.

PV Connection

⚠ **CAUTION:** Before connecting to PV modules, please install separately a DC circuit breaker between inverter and PV modules.

WARNING! All wiring must be performed by qualified personnel.

WARNING! It's 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	Cable Size	Cable (mm²)	Torque
2KVA	10AWG	6	1.2Nm

PV Module Selection:

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

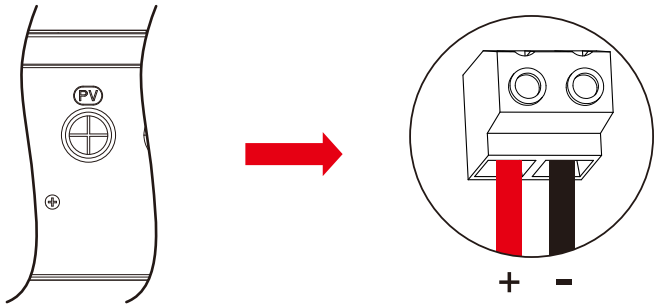
1. Open circuit Voltage (Voc) of PV modules not exceeds max. PV array open circuit voltage of inverter.
2. Max. power voltage (Vmp) should be during PV array MPPT voltage range.

Solar Charging Mode	
INVERTER MODEL	2KVA
Max. PV Array Open Circuit Voltage	500V
PV Array MPPT Voltage Range	35-450V

Please follow below steps to implement PV module connection:

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

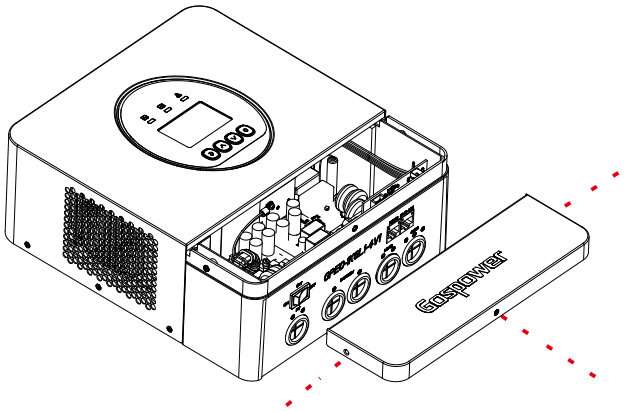
2. Check correct polarity of connection cable from PV modules and PV input connectors. Then, connect positive pole (+) of connection cable to positive pole (+) of PV input connector. Connect negative pole (-) of connection cable to negative pole (-) of PV input connector.



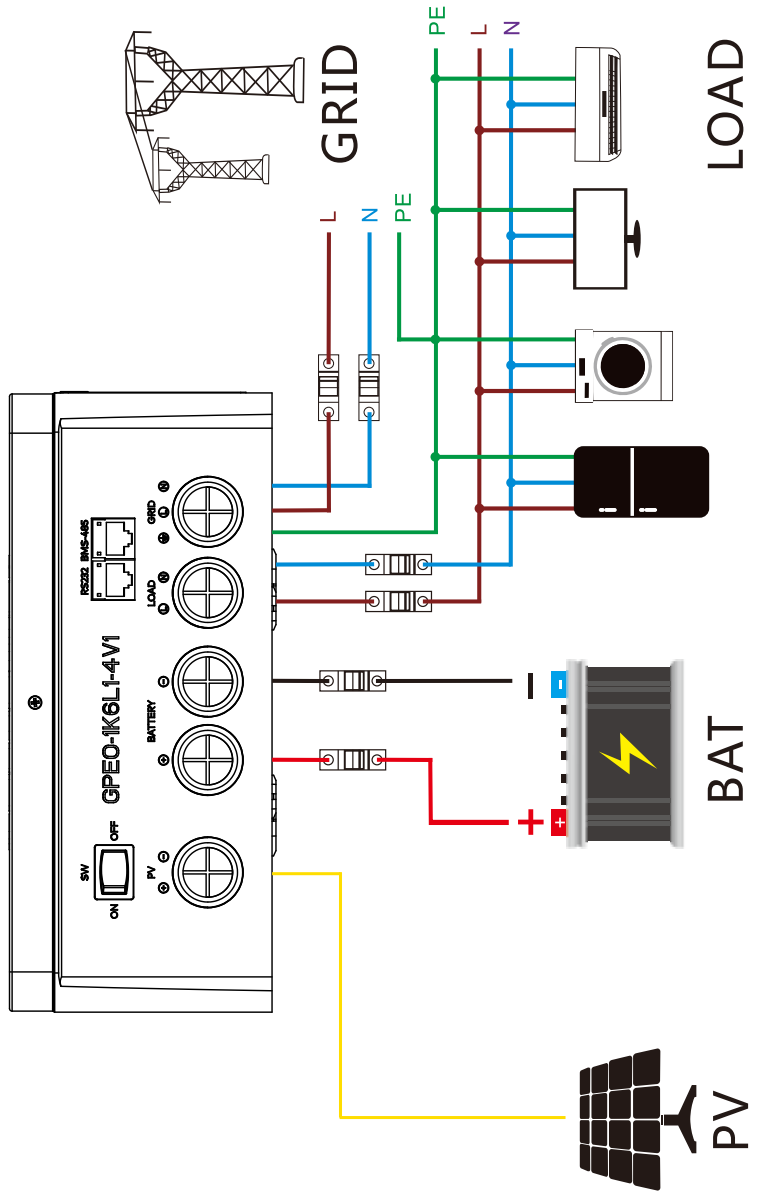
3. Make sure the wires are securely connected.

Final Assembly

After connecting all wirings, please put bottom cover back by screwing two screws as shown below.

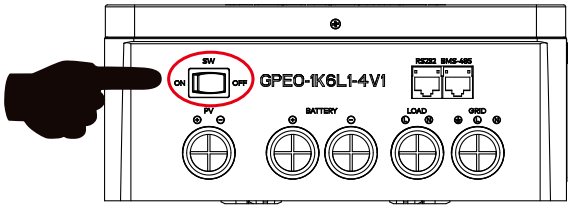


Wiring System for Inverter



OPERATION

Power ON/OFF



Once the unit has been properly installed and the batteries are connected well, simply press On/Off switch (located on the bottom of the case) to turn on the unit.

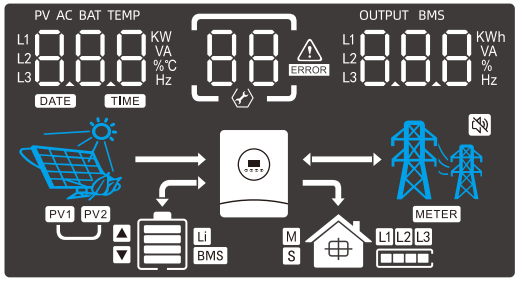
Operation and Display Panel

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

Function Key	Icon	Description
ESC		To previous page
UP		To go to previous selection
DOWN		To go to next selection
ENTER		To confirm the selection or go to next page

LED indicator	Icon	Description
Battery		Charging the battery, the LED light flash. If battery is full, the LED light will always-on. The battery is not charged, the LED light will go out.
Utility		Inverter running in utility mode, the LED will always-on.
Inverter		Inverter running in off-grid mode, the LED light will flash. Inverter is not running in off-grid mode, the LED light will go out.
Fault		If inverter in fault event, the LED light will always-on. If inverter in warning event, the LED light will flash. Inverter work normally, the LED light will go out.
Buzzer Information		
Buzzer beep		Press any button, the buzzer will last for 0.1s. Hold on the "ENTER" button. the buzzer will last for 3s. If in fault event, the buzzer will keep going. If in warning event, the buzzer will beep discontinuous (Check more information on the chapter of "Warning Code Table").

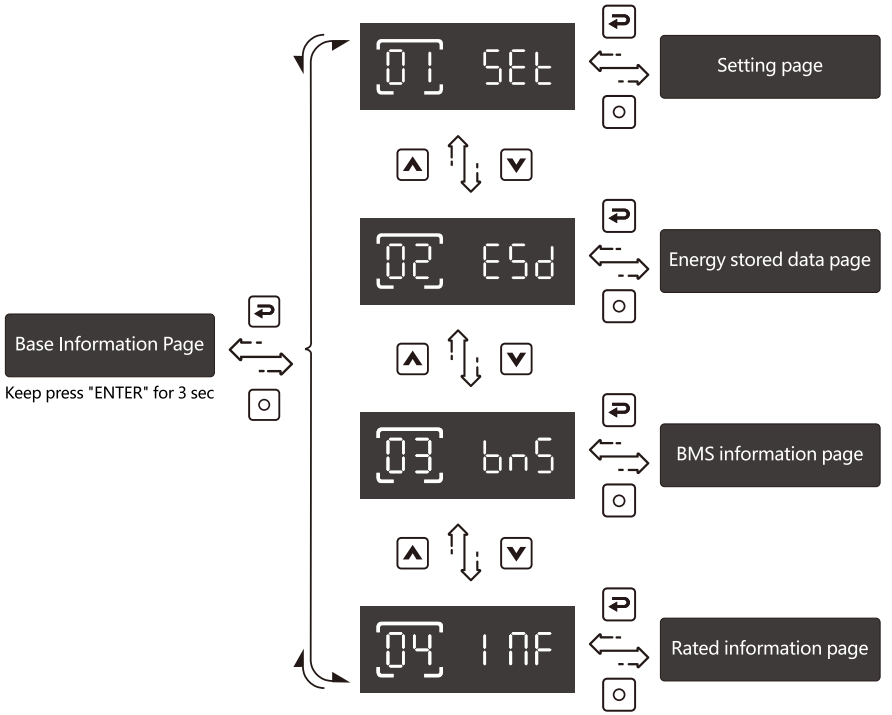
LCD display Icons



Icon	Function description
Input Source Information	
PV AC BAT TEMP L1 L2 L3 KW VA %°C Hz	Indicate AC input power, AC input voltage, AC input frequency, PV input voltage, PV input power, battery voltage, apparent power, output frequency, output current, BMS temperature, battery charge and discharge power.
Configuration Program and Fault Information	
	Indicates the setting programs.
ERROR	Indicates the warning and fault codes. Warning: flashing with warning code. Fault: lighting with fault code.

Output Information	
OUTPUT BMS L1 L2 L3 888 Kwh VA % Hz	Indicate output voltage, output frequency, load percent, load in VA, load in Watt and discharging current.
Battery Information	
	Indicates battery level by 0-24%,25-49%,50-74% and 75-100%. The battery is connected normally, this icon is always on.
	If the inverter is in the process of lithium battery activation, or the battery is not connected, or the inverter is not connected to the grid and the battery voltage is low, this icon will flash.
Li	Indicates Lithium battery type.
BMS	BMS Indicates communication is built between inverter and BMS. ▲ Indicates BMS allows battery discharge. ▼ Indicates BMS allows battery charge. Force charge occurs if icon flash.
Mode Operation Information	
	Indicates load is supplied by utility directly.
	Indicates the utility charger circuit is working.
	Indicates the inverter/charger is working.
	Indicates PV MPPT is working to power load.
	Indicates PV MPPT is working to charge battery.
	Indicates battery is discharging to load.
Mute Operation	
	Indicates unit alarm is disabled.

LCD operation flow chart



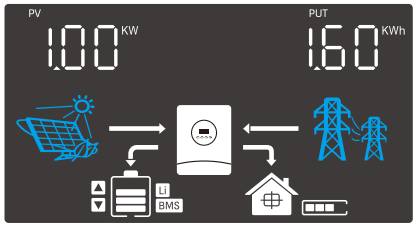
On base information page, pressing and holding "ENTER" key for 3 sec, the unit will enter parameters page. Press "UP" or "DOWN" key to switch the selection and press "ENTER" key to enter selected page. Press "ESC" key to back to previous page.

Base information Page

The base information will be switched by pressing "UP" or "DOWN" key. The selectable information is switched as below order.

PV power / Output voltage (Main interface information)

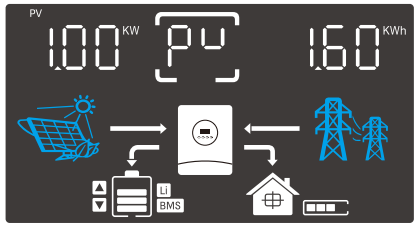
PV power is 1.00kW, output power is 1.60kW



PV power / PV daily power generation

PV power is 1.00kW, PV daily power generation is 1.60kWh

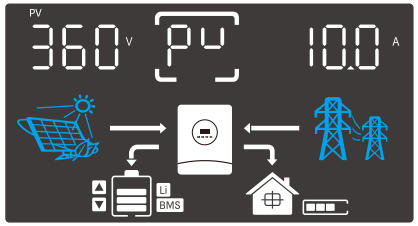
Middle: PV indicates that the PV displays information.



PV voltage / PV current

PV voltage is 360V, PV current is 10.0A

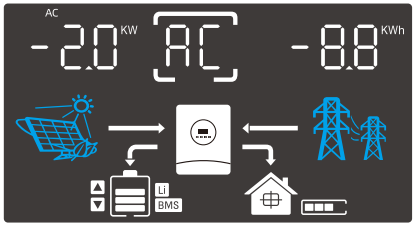
Middle: PV indicates that the PV displays information.



Grid power / Grid daily consume power (use electricity is "+", feed to grid is "-")

Grid power is -2.0kW, Grid daily consume power is -8.8kWh

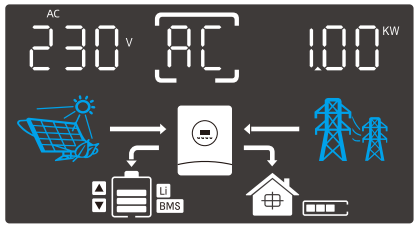
Middle: AC Indicates that the grid displays information.



Grid voltage / Grid power (use electricity is "+", feed to grid is "-")

Grid voltage is 230V, Grid power is 1.00kW

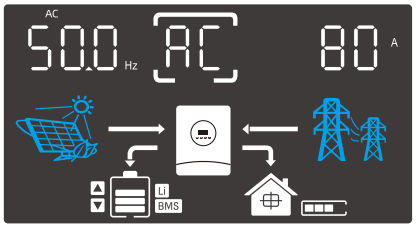
Middle: AC Indicates that the grid displays information.



Grid frequency / Grid current

Grid frequency is 50.0Hz, Grid current is 8.0A

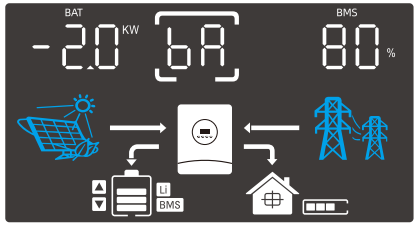
Middle: AC Indicates that the grid displays information.



Battery power (charging is "+"; discharging is "-") **/ Battery SOC** (displaying the battery voltage when without BMS)

Battery power is -2.0kW, Battery SOC is 80%

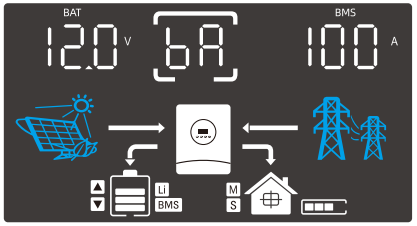
Middle: bA Indicates that the battery displays information.



Battery voltage / Battery charge-discharge currtent (charge-discharge to display by means of the energy direction.)

Battery voltage is 12.0V, Battery current is 100A

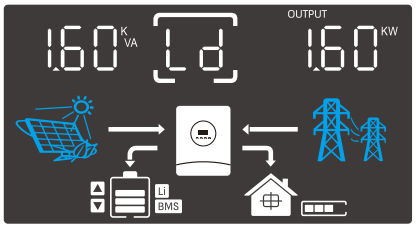
Middle: bA Indicates that the battery displays information.



Output load power VA / Output load power Watt

Output load power is 1.60kVA, output load watt is 1.60kW

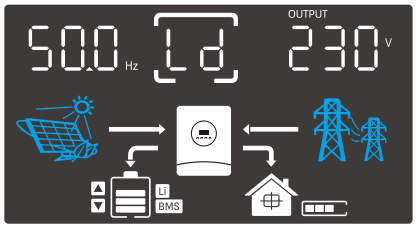
Middle: Ld Indicates that the output load displays information.



Output frequency / Output voltage

Output frequency is 50.0Hz, Output voltage is 230V

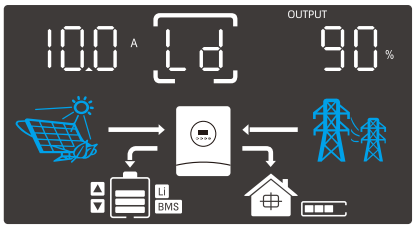
Middle: Ld Indicates that the output load displays information.



Output current / Percentage of output power

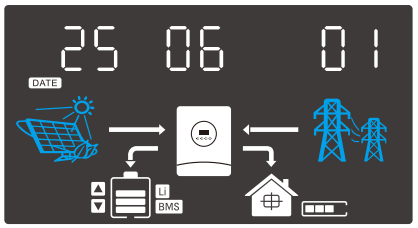
Output current is 10.0A, percentage of output power is 90%

Middle: Ld Indicates that the output load displays information.



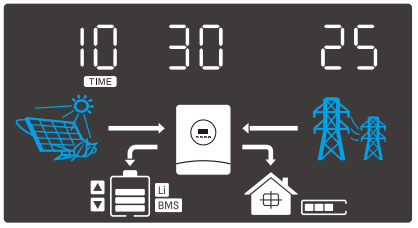
Date

25-06-01



Time

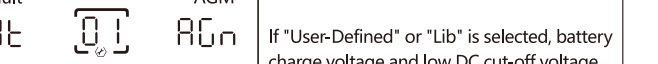
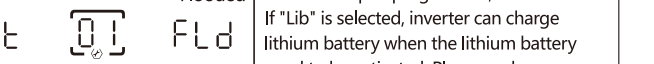
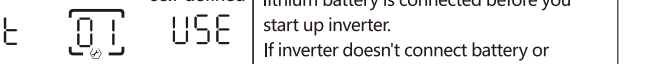
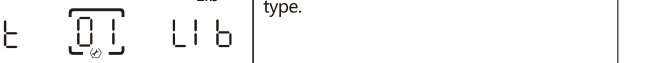
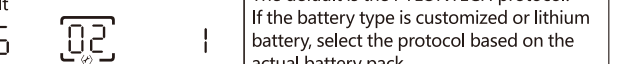
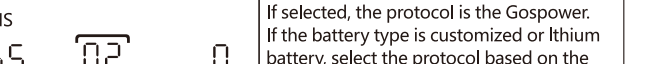
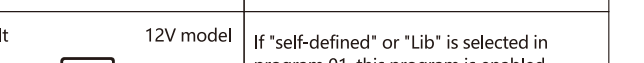
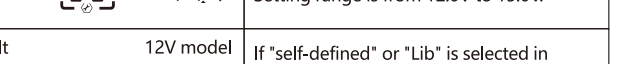
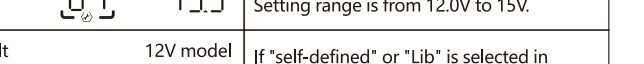
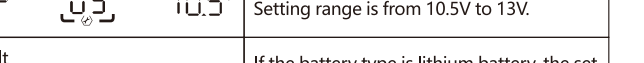
10 : 30 : 25

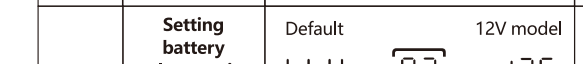
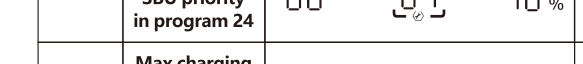


Setting Page

Press "UP" or "DOWN" button to select setting programs. And then, press "ENTER" button to confirm the selection or ESC button to exit. Keep pressing "UP" or "DOWN" button after 1.5 seconds, it will increase or decrease setting value fastly.

Setting items

		Selectable option	
00	Exit setting		
01	Battery type setting	Default  AGM	If "User-Defined" or "Lib" is selected, battery charge voltage and low DC cut-off voltage can be set up in program 03 , 04 and 05. If "Lib" is selected, inverter can charge lithium battery when the lithium battery need to be activated. Please make sure lithium battery is connected before you start up inverter. If inverter doesn't connect battery or lithium battery, do not select "Lib" battery type.
		 Flooded	
		 self-defined	
		 Lib	
02	BMS type	Default 	The default is the PYLONTECH protocol. If the battery type is customized or lithium battery, select the protocol based on the actual battery pack.
		BMS 	If selected, the protocol is the Gospower. If the battery type is customized or lthium battery, select the protocol based on the actual battery pack.
03	Bulk charging voltage setting (CV voltage)	Default  12V model	If "self-defined" or "Lib" is selected in program 01, this program is enabled. Setting range is from 12.0V to 15.0V.
04	Floating charging voltage	Default  12V model	If "self-defined" or "Lib" is selected in program 01, this program is enabled. Setting range is from 12.0V to 15V.
05	Low DC cut-off voltage or SOC	Default  12V model	If "self-defined" or "Lib" is selected in program 01, this program is enabled. Setting range is from 10.5V to 13V.
		Default 	If the battery type is lithium battery, the set value will change to SOC. Setting range is from 0% to 90%.

06	Setting battery voltage or SOC point back to utility when selecting "SBU priority" in program 24	Default  12V model	Setting range is from 11.0V to 13.5V. Increment of each click is 0.1V.
		Default 	If the battery type is lithium battery, the set value will change to SOC. Setting range is from 5% to 90%.
07	Setting battery voltage point back to battery mode when selecting "SBU priority" in program 24	Default  12V model	Setting range is from 12.0V to 15V. Increment of each click is 0.1V.
		Default 	If the battery type is lithium battery, the set value will change to SOC.Setting range is from 10% to 100%.
09	Max charging current (Utility charge current +PV charging current)	Default  40A	Setting range is from 5A to 140A. Increment of each click is 1A.
10	Max utility charging current setting	Default  40A	Setting range is from 5A to 80A. Increment of each click is 1A.
21	Output voltage setting	Default  230V	Output voltage configuration.
		 220V	
		 240V	
22	Output frequency setting	Default  50Hz	Output frequency configuration.
		 60Hz	
23	Utility input range setting	Default  Appliance mode	The APL mode is suitable for ordinary household electrical loads. UPS mode is suitable for computer loads. When the effect is not satisfactory, it is recommended to adjust to APL.
		 UPS mode	

NOTE: The setting value of item "07" should be larger than the setting value of item "06".

24	**Output source priority**	Default PV >> Utility >> Battery 	PV provides power to the loads first. If PV is not sufficient, utility will supply power the loads at the same time. Battery will provide power to loads only when utility is not available.
		Utility >> PV >> Battery 	Utility provides power to the loads first. PV and battery will provide power to loads only when utility is not available.
		PV >> Battery >> Utility 	PV provides power to the loads first. If PV is not sufficient, battery will supply power to the loads at the same time. Utility provides power to the loads only when battery voltage drops to the setting point in program 6.
		Intelligent output source priority 	The intelligent priority can use more solar energy and save electricity bills. It is applicable to South Asia (such as Pakistan) and Africa. In this priority mode, the PV provides power to the loads first. If PV is not sufficient, battery or utility will supply power to the loads at the same time. If the energy storage system is not installed with solar panels, do not choose this priority mode.
25	**Charger priority**	**If inverter is working in utility mode, charger priority can be set as below. However, when inverter is working in battery mode, only PV can charge battery.**	
		Default PV and Utility 	PV and utility will charge battery together.
		PV First 	PV will charge battery first. Utility will charge battery only when PV is unavailable.
		PV Only 	Only PV can charge the battery.
26	**Feeding power to grid**	Default Disable 	If selected, inverter is not allowed to feed exceeding solar power to grid.
		Enable 	If selected, inverter is allowed to feed exceeding solar power to grid.
27	**Overload bypass function**	Default Enable 	If it is enabled, the inverter will switch to utility mode if overload happens in battery mode.
		Disable 	

28	**Overload restart function**	Default Enable 	If it is enabled, the inverter will auto restart when overload occurs.
		Disable 	
29	**Over temperature restart function**	Default Enable 	If it is enabled, the inverter will auto restart when over temperature occurs.
		Disable 	
30	**Power -Voltage curve**	Default Enable 	It is used to adjust the inverter active power according to the grid voltage. When the grid voltage exceeds 250V, the inverter begins to reduce active power.
		Disable 	
31	**Zero Export Power**	Default 	Regulate the input power of the Grid while in SBU Mode. Setting range is from -90W to 90W. Increment of each click is 10W.
33	**TOU (Time of Use) Mode**	Default Disable 	When disabled, the inverter operates solely according to its local/default settings.
		Enable 	When enabled, you can set up to 6 time periods for charging and discharging the inverter through the APP. During the configured TOU periods, the inverter follows the APP settings. Outside of these periods, it reverts to its local/default settings.
40	**Backlight of LCD**	Default Disable 	If selected, LCD backlight will be off after no button is pressed for 60s.
		Enable 	If selected, LCD backlight will be always-on.
41	**Auto return to the first page of display screen**	Default Enable 	If selected, it will automatically return to the first page of display screen (Default interface) after no button is pressed for 60s.
		Disable 	If selected, the display screen will stay at latest screen user finally switches.
42	**Buzzer alarm**	Default Enable 	If selected, buzzer is allowed to beep.

		bEP 42	Disable dIS	If selected, buzzer is not allowed to beep.
44	Reset default	Default rSt 44	Disable dIS	If selected, default initial settings page.
		rSt 44	Enable ENA	If selected, enabling the function will restore all settings except for the parallel settings and time settings. Output mode setting item (20) to their initial values.
46	Failure recovery	Default FrS 46	Disable dIS	If selected, when the inverter enter the fault state, the inverter will not exit the fault state or start up again.
		FrS 46	Enable ENA	If selected, when the inverter enter the fault state, the inverter will exit the fault state and start up again.
50	Time setting-Year	Year YEA 50	23	Setting range is from 23 to 99.
51	Time setting-Month	Month nON 51	8	Setting range is from 1 to 12.
52	Time setting-Day	Day dAY 52	20	Setting range is from 1 to 31.
53	Time setting-Hour	Hour HOU 53	21	Setting range is from 0 to 23.
54	Time setting-Minute	Minute n IN 54	43	Setting range is from 0 to 59.
55	Time setting-Second	Second SEC 55	50	Setting range is from 0 to 59.
67	Scheduled time for AC charge on	Default ACO 67	0	Setting range is from 0~23 hour. If the time achieves the setting vaule, AC charge will be allowed/not allowed. If the setting time for AC charge on and off are the same, the AC charge will be allowed always.
68	Scheduled time for AC charge off	Default ACF 68	0	

Energy stored data Page

The energy stored data will be switched by pressing "UP" or "DOWN" key. The selectable information is switched as below order:

PV generated energy today
88 kWh

PV generated energy this month
88 kwh

PV generated energy this year
89 kwh

PV generated energy current in total
348 kWh

Load consumed energy today
78 kWh

Load consumed energy this month
78 kWh

Load consumed energy this year
80 kWh

Load consumed energy in total
272 kWh

BMS information Page

The BMS information will be switched by pressing "UP" or "DOWN" key. The selectable information is switched as below order:

Battery pack number / mean SOC
Connected battery pack number is 4, mean SOC is 97%

BMS voltage / SOC
BMS voltage is 12.5V, SOC is 99% on battery pack of address 1

BMS voltage / current
BMS voltage is 12.5V, current is 1A on battery pack of address 1

Charge voltage limit /charge current limit
Charge voltage is 12.5V, charge current is 100A on battery pack of address 1

Discharge voltage limit /discharge current limit
Discharge voltage is 12.5V, discharge current is 145A on battery pack of address 1

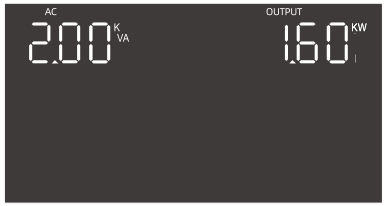
BMS highest temperature /lowest temperature
BMS highest temperature is 25°C, lowest temperature is 20°C on battery pack of address 1

BMS fault code / flag
BMS fault code is 0, flag is 000 on battery pack of address 1

Rated information Page

The rated information will be switched by pressing "UP" or "DOWN" key. The selectable information is switched as below order:

Rated VA / WATT
Rated VA is 2kVA, WATT is 1.60kW



Rated battery voltage / Max. charge current
Rated battery voltage is 12.0V, Max.charge current is 140A

Firmware version
Firmware version is 1400

WARNING CODE TABLE

When fault event happens, the fault LED is flashing. At the same time, warning code, icon ⚠ is shown on the LCD screen.

Warning Code	Warning Information	Audible Alarm	Trouble shooting
01	Overload	Beep twice every second	Reduce the loads.
03	Fan is locked	Beep three time every second	Check if the Fans wiring connected well. Replace the fan.
04	Grid over voltage warning	No buzzer alarm	Check whether the grid voltage exceeds the allowable range of the inverter.
06	Remote shutdown warning	No buzzer alarm	Check if remote shutdown is enabled via WIFI. Disable the enable or restart the inverter.
08	BMS communication failure	No buzzer alarm	Check whether the inverter 01 setting item is selected for Li battery. If item 01 is set to lithium battery mode, check whether the communication line between the battery pack and the inverter is properly connected.
11	Abnormal battery voltage	No buzzer alarm	Check whether the battery has any abnormal faults or if the battery power is insufficient to support the current load. If the battery power is insufficient, please reduce the load usage. If there is any abnormality with the battery, please contact the repair center to troubleshoot the issue.

FAULT CODE TABLE

When fault event happens, inverter will cut off output, and the fault LED is solid on. At the same time, fault code, icon ⚠ and ERROR are shown on the LCD screen.

Fault Code	Fault information	Trouble Shooting
01	Bus voltage is too high	AC Surge or internal components failed. Restart the unit, if the error happens again, please return to repair center.
02	Bus voltage is too low	Restart the unit, if the error happens again, please return to repair center.
03	Bus soft start fail	Internal components failed. Restart the unit, if the error happens again, please return to repair center.
10	Inverter soft start fail	Internal components failed. Restart the unit, if the error happens again, please return to repair center.
11	Over current or surge detected by Software	Restart the unit, if the error happens again, please return to repair center.
12	Over current or surge detected by hardware	Restart the unit, if the error happens again, please return to repair center.

13	Output voltage is too low	Reduce the connected load. Restart the unit, if the error happens again, please return to repair center.
14	Output voltage is too high	Restart the unit, if the error happens again, please return to repair center.
15	Output short circuited	Check if wiring is connected well and remove abnormal load.
16	Inverter current sensor failed	Restart the unit, if the error happens again, please return to repair center.
17	Current feedback into the inverter is detected.	1. Restart the inverter. 2. Check if L/N cables are not connected reversely in all inverters. 3. For parallel system in single phase, make sure the sharing cables are connected in all inverters. For supporting three-phase system, make sure the sharing cables are connected in the inverters in the same phase, and disconnected in the inverters in different phases. 4. If the problem remains, please contact your installer.
20	Overload time out	Reduce the connected load by switching off some equipment.
21	OP current sensor failed	Restart the unit, if the error happens again, please return to repair center.
23	The AC input and output wires are inversely connected	1. Please check AC input and output wires are connected correctly. 2. If this error happens during parallel installation, please check wires connection. If they are connected correctly, please funish parallel installation first, and then restart inverters. 3. If the problem remains, please contact your installer.
24	The output relay exception	Restart the unit, if the error happens again, please return to repair center.
25	output sample IC failed	Restart the unit, if the error happens again, please return to repair center.
30	Battery voltage is too high	Check if spec and quantity of batteries are meet requirements.
35	Over current happen at DC/DC circuit detected by hardware	Restart the unit, if the error happens again, please return to repair center.
36	Over current happen at LLC circuit	Restart the unit, if the error happens again, please return to repair center.
40	PV voltage is too high	Reduce the number of PV modules in series.
41	Short circuited happen at PV port	Check if wiring is connected well.
42	PV power abnormally	Restart the unit, if the error happens again, please return to repair center.
43	Over current happen at PV port	Restart the unit, if the error happens again, please return to repair center.
44	PV current sensor failed	Restart the unit, if the error happens again, please return to repair center.
45	PV1 high input power	Reduce the connected load. Restart the unit, if the error happens again, please return to repair center.
50	Fan is locked	Check if wiring is connected well. Replace the fan.

51	Over temperature happen at PV circuit	The temperature of internal PV component is over the limitation. Check whether the air flow of the unit is blocked or whether the ambient temperature is too high.
52	Over temperature happen at INV circuit	The temperature of internal INV component is over the limitation. Check whether the air flow of the unit is blocked or whether the ambient temperature is too high.
53	Over temperature happen at Convert L circuit	The temperature of Convert L battery converter component is over the limitation. Check whether the air flow of the unit is blocked or whether the ambient temperature is too high.
54	Over temperature happen at Convert H circuit	The temperature of internal Convert H component is over the limitation. Check whether the air flow of the unit is blocked or whether the ambient temperature is too high.
55	Over temperature happen at LLC TX	The temperature of internal DC/DC TX is over the limitation. Check whether the air flow of the unit is blocked or whether the ambient temperature is too high.

APP User Guide

For you to monitor the inverter and check production & consumption data online

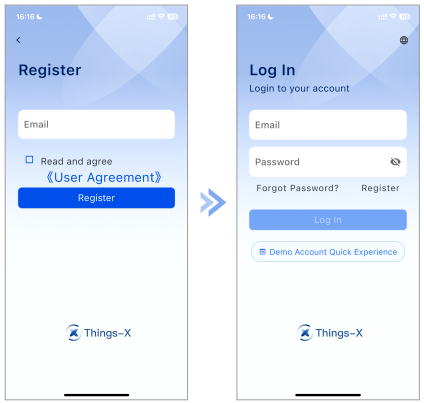
1.0 WIRELESS WIFI CONFIGURATION

1.1 APP Download

Method 1: Scan the QR code on the right with your mobile device to download the app.
Method 2: Search for "Things-X" in the App Store or Google Play Store to download the app.

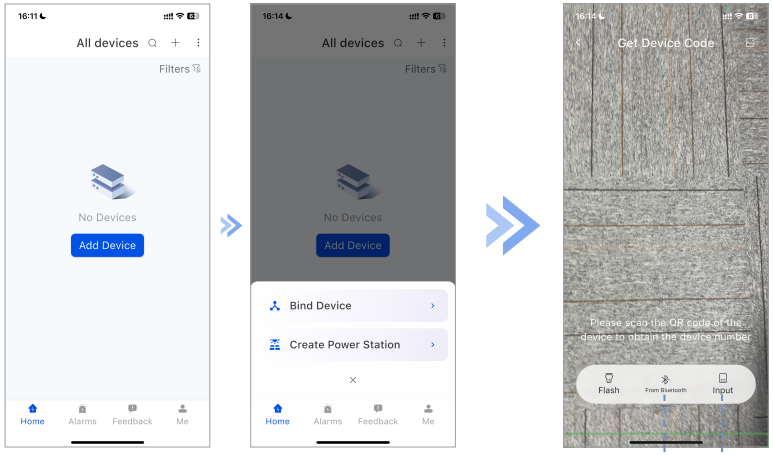
1.2 Registration and Login

On the app's login page, click the "Register" button and fill in the required information.
The system will send an account activation link to your email.
Click the link and set your password to complete the registration process.



2.0 ADDING DEVICES AND NETWORK CONFIGURATION

Click the "+" button in the upper right corner or the "Add Device" button in the center, then select the "Bind Device" button.



Method 1: Scan the QR code

Scan the QR code on the device and click "Bind Device" to bind the device.

Method 2: Bluetooth Binding

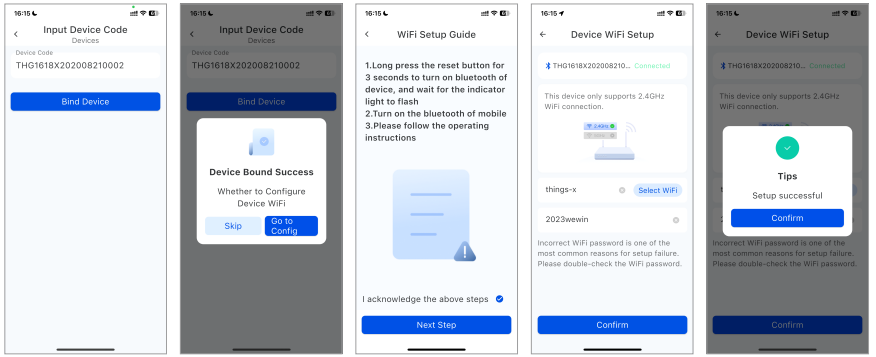
Click "from Bluetooth", and select the corresponding Bluetooth device.

Method 3: Enter Device Code to Bind

Click "Input", input the device code, click "Bind Device".

On the configuration page, follow the instructions, click "Go to Config", and enter the Device WiFi Setup page. After connecting via Bluetooth, enter the WiFi username and password, then click "Confirm" . The page will indicate a successful configuration.

Note: When performing network configuration, ensure the app has camera permissions and that your phone's Bluetooth is turned on.



3.0 COMMUNICATION FAULT ANALYSIS AND INDICATOR LIGHT STATUS

Fault inspection:

① If the network configuration fails, verify that the WiFi username and password are correct and available.

② If the mobile phone cannot use the QR code scanner, check if the app has been granted authorization.

Indicator Light Status:

① READY: Steady light indicates the communication stick is powered on.

② COM: Flashes when the communication stick is trans-mitting data with the device.

③ NET: Network indicator light.

Other Operational Notes:

① Press and hold the Reload button for 5 seconds until the COM LED blinks rapidly, then release to reset the communication.