USER MANUAL

Krypton 6000/Krypton 6500
SOLAR INVERTER / CHARGER

Version: 1.1

Table of Contents

ABOUT THIS MANUAL

Purpose

This manual describes the assembly, installation, operation and troubleshooting 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. Fuses are 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:** Because this inverter is non-isolated, only three types of PV modules are acceptable: single crystalline, poly crystalline with class A-rated and CIGS modules. To avoid any malfunction, do not connect any PV modules with possible current leakage to the inverter. For example, grounded PV modules will cause current leakage to the inverter. When using CIGS modules, please be sure NO grounding.
15. **CAUTION:** It's required to use PV junction box with surge protection. Otherwise, it will cause damage on inverter when lightning occurs on PV modules.

INTRODUCTION

This is a multi-function inverter, combining functions of inverter, solar charger and battery charger to offer uninterruptible power support in a single package. The comprehensive LCD display offers user-configurable and easy-accessible button operations such as battery charging current, AC or solar charging priority, and acceptable input voltage based on different applications.

Features

- Pure sine wave inverter
- Customizable status with RGB lights
- Touchable button with 4.3" colored LCD
- Built-in Wi-Fi for mobile monitoring (APP is required)
- Supports USB On-the-Go function
- Built-in anti-dusk kit
- Reserved communication ports for BMS (RS485, CAN-BUS, RS232)
- Configurable input voltage ranges for home appliances and personal computers via LCD control panel
- Configurable output usage timer and prioritization
- Configurable charger source priority via LCD control panel
- Configurable battery charging current based on applications via LCD control panel
- Compatible to utility mains or generator power

Basic System Architecture

The following illustration shows basic application for this unit. It also required the following devices to have a complete running system:

- Generator or Utility mains.
- PV modules

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

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

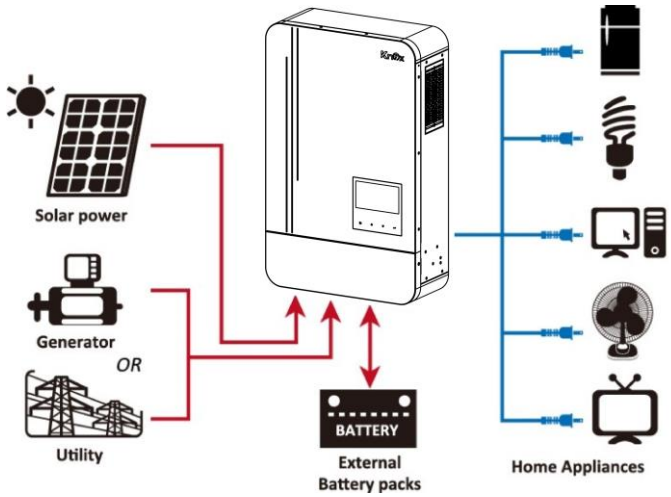
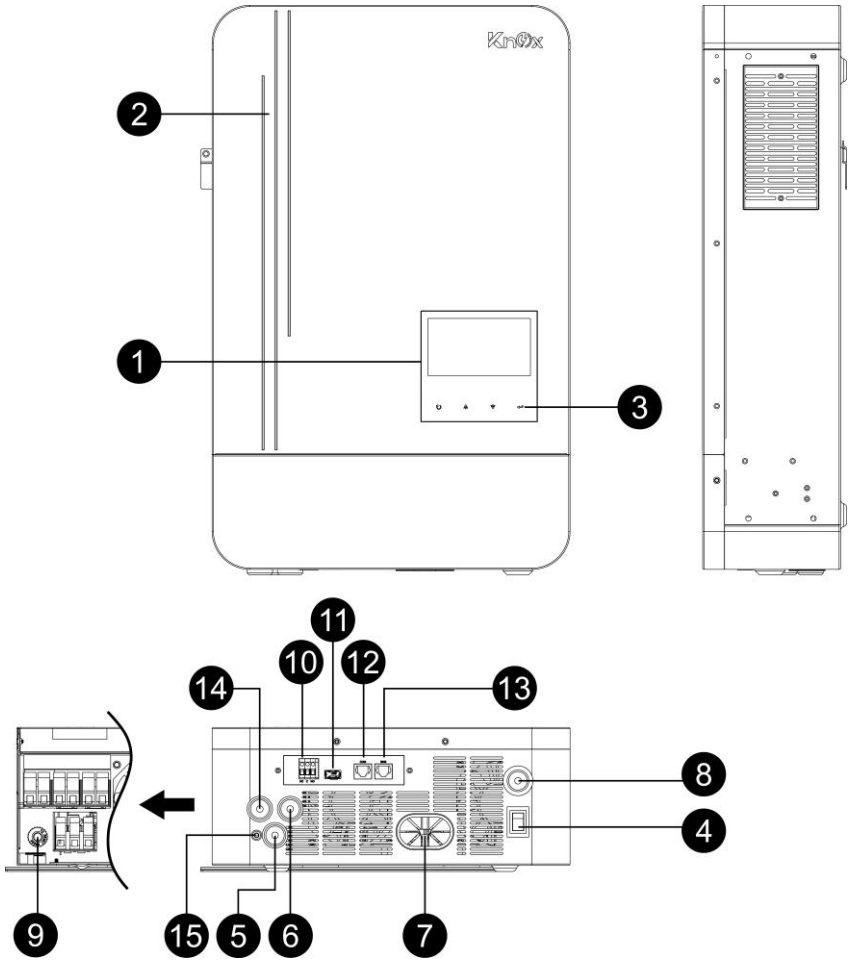


Figure 1 Basic PV System Overview

Product Overview

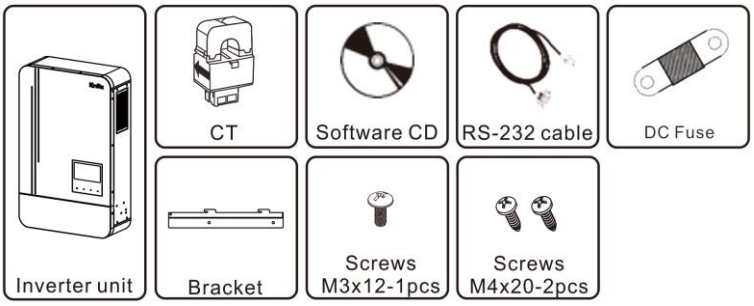


1. LCD display
2. RGB LED (refer to LCD Setting section for the details)
3. Touchable function keys
4. Power on/off switch
5. AC input port
6. AC output port
7. Battery input port
8. PV input ports
9. Circuit breaker
10. Dry contact
11. USB port as USB communication port and USB function port
12. RS-232 communication port
13. BMS communication port: CAN, RS-485 or RS-232
14. AC output port
15. External CT input port

INSTALLATION

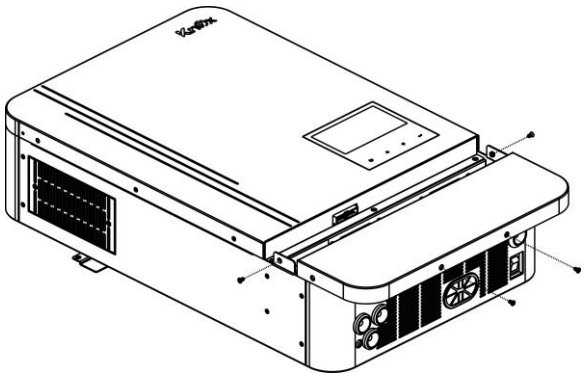
Unpacking and Inspection

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:



Preparation

Before connecting all wirings, please take off bottom cover by removing four screws.

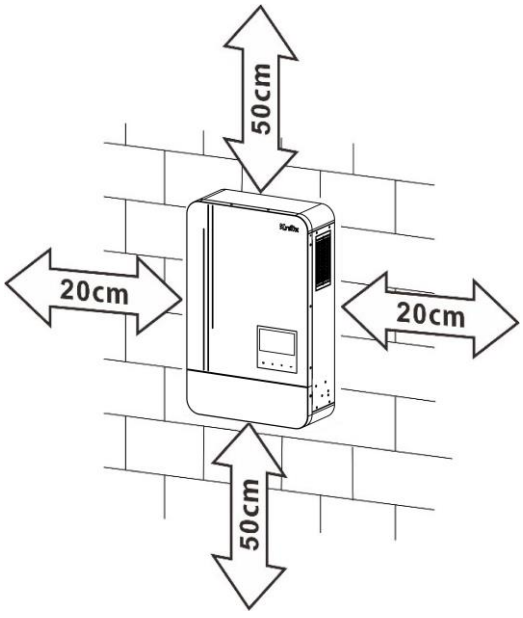


Mounting the Unit

Consider the followings before selecting your placements:

- Do not mount the inverter on flammable construction materials.
- Mount on a solid surface
- Install the inverter at eye level in order to allow easy LCD display readout.
- For proper air circulation and heat dissipation, allow a clearance of approx. 20 cm to the side and approx. 50 cm above and below the unit.
- The ambient temperature should be between 0°C and 55°C to ensure optimal operation.
- The recommended orientation is to adhered to the wall vertically.

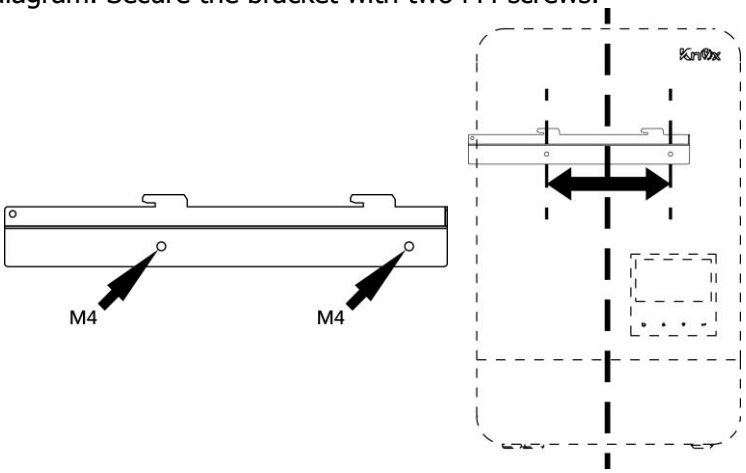
  Be sure to keep other objects and surfaces as shown in the diagram to guarantee sufficient heat dissipation and to have enough space for wirings.



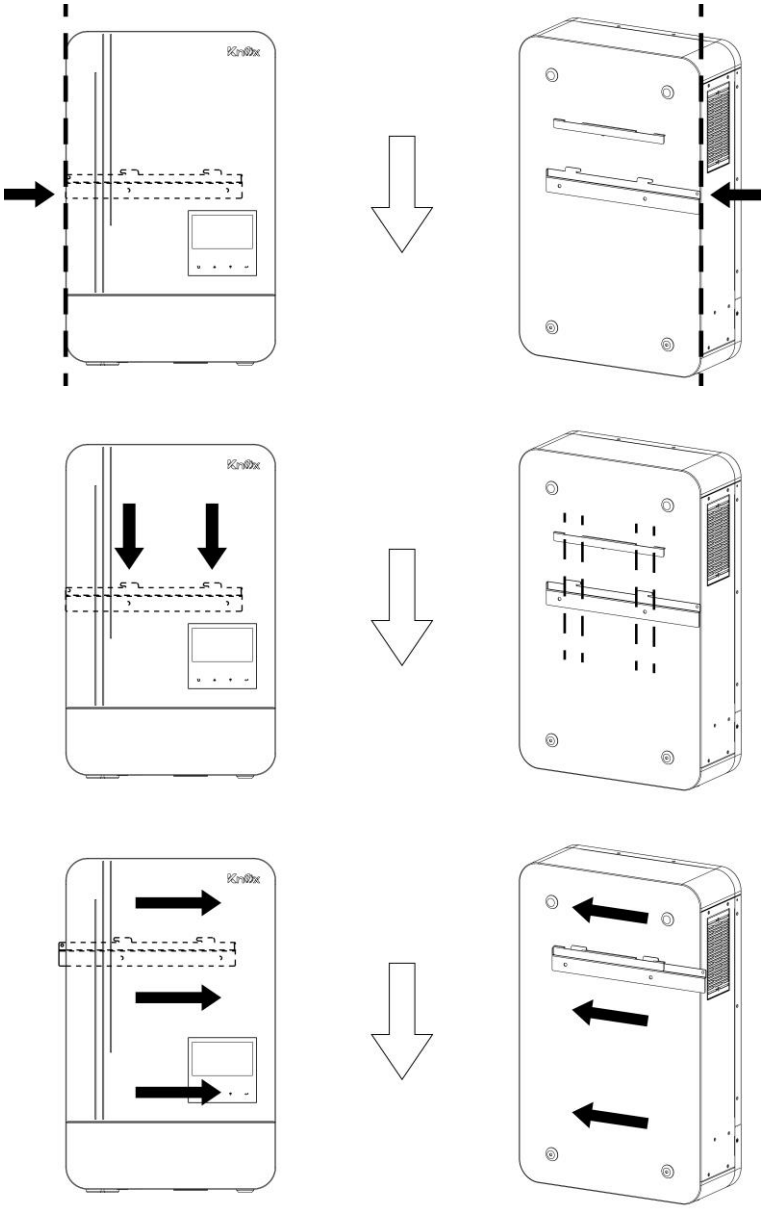
⚠ **SUITABLE FOR MOUNTING ON CONCRETE OR OTHER NON-COMBUSTIBLE SURFACE ONLY.**

Installation steps:

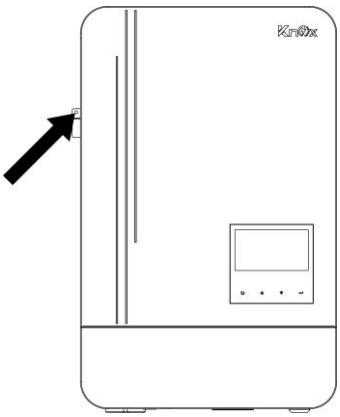
- Step 1: First, position the bracket on the wall. Mount the inverter in the center of the two screws, as shown in the diagram. Secure the bracket with two M4 screws.



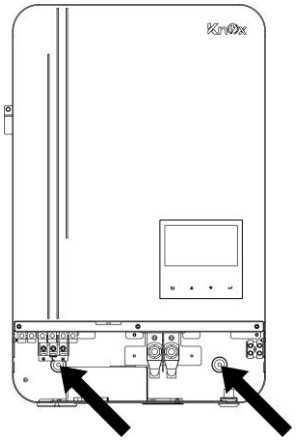
- Step 2: Move the inverter above the bracket, aligning its left side with its edge. Lower the inverter onto the bracket. Then, slide the inverter to the right until it's properly positioned.



- Step 3: Secure the edge screw on the bracket to ensure the inverter is horizontally aligned.



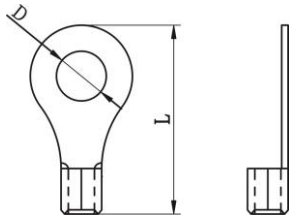
- Step 4: Secure the two screws on the terminal side to firmly mount the inverter.



Battery Connection

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

Ring terminal:



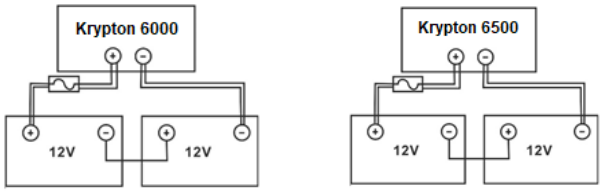
WARNING! All wiring must be performed by a qualified personnel.
WARNING! It's very important for system safety and efficient operation to use appropriate cable for battery connection. To reduce risk of injury, please use the proper recommended cable and terminal size as below.

Recommended battery cable and terminal size:

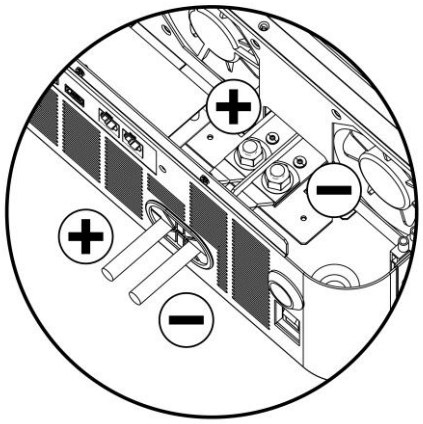
Model	Typical Amperage	Wire Size	Cable mm²	Ring Terminal Dimensions		Torque Value
				D (mm)	L (mm)	
Krypton 6000	185.2A	1*2/0AWG	67.4	8.4	54	5 Nm
Krypton 6500	208.4A	1*2/0AWG	67.4	8.4	54	

Please follow below steps to implement battery connection:

1. Krypton 6000/Krypton 6500 model supports 24VDC system. Connect all battery packs as below chart. It is recommend to connect minimum of 100Ah capacity battery for Krypton 6000/Krypton 6500 model



2. Prepare four battery wires for Krypton 6000/Krypton 6500 model depending on cable size (refer to recommended cable size table). Apply ring terminals to your battery wires and secure it to the battery terminal block with the bolts properly tightened. Refer to battery cable size for torque value. Make sure polarity at both the battery and the inverter is correctly connected and ring terminals are secured to the battery terminals.



Krypton 6000/6500

⚠	**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 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 32A for Krypton 6000/Krypton 6500.

CAUTION!! There are two terminal blocks with "IN" and "OUT" markings. Please do NOT mis-connect input and output connectors.

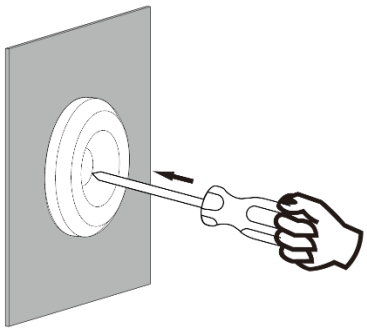
WARNING! All wiring must be performed by a qualified personnel.

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

Suggested cable requirement for AC wires

Model	Gauge	Cable (mm^2)	Torque Value
Krypton 6000	12 AWG	4	1.2 Nm
Krypton 6500	12 AWG	4	1.2 Nm

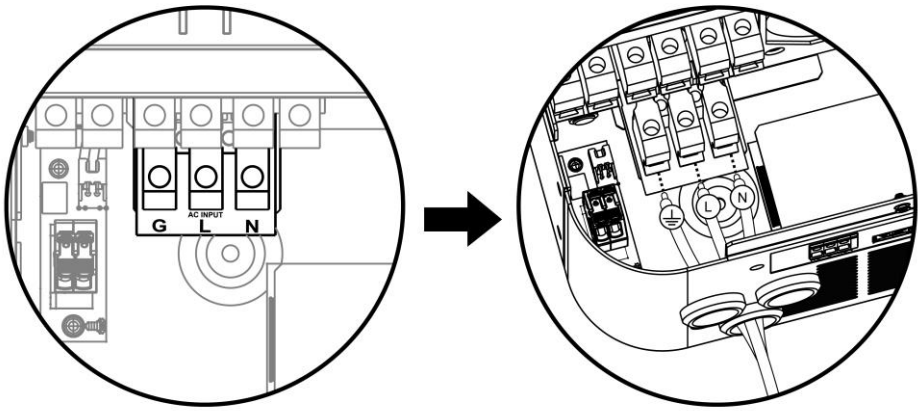
Before connecting the wires, please use a sharp object to puncture the waterproof grommet.



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

1. Before making AC input/output connection, be sure to open DC protector or disconnector first.
2. Remove insulation sleeves for about 10mm for the five screw terminals.
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.

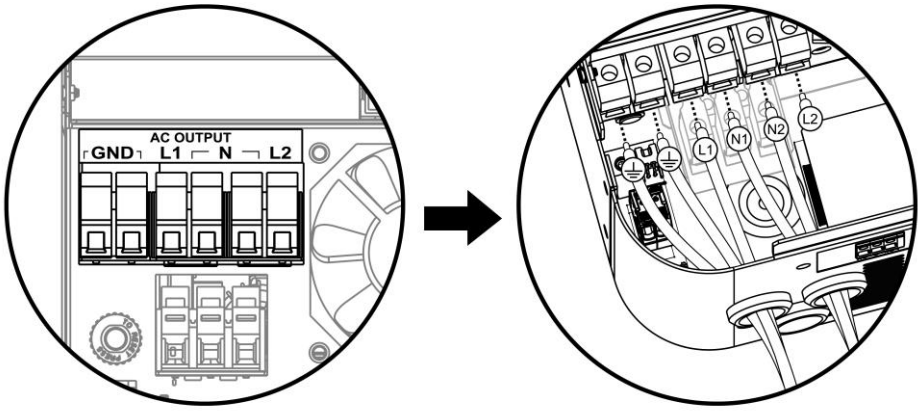
   ⏚**→Ground (yellow-green)**
   L→LINE (brown or black)
   N→Neutral (blue)



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

4. This inverter is equipped with dual-output. There are four terminals (L1/N1, L2/N2) available on output port. It's set up through LCD program or monitoring software to turn on and off the second output. Refer to "LCD setting" section for the details.
   Insert AC output wires according to polarities indicated on terminal block and tighten terminal screws. Be sure to connect PE protective conductor (⏚) first.

   ⏚**→Ground (yellow-green)**
   L1→LINE (brown or black)
   N1→Neutral (blue)
   L2→LINE (brown or black)
   N2→Neutral (blue)



5. Make sure the wires are securely connected.

CAUTION: Appliances such as air conditioner requires 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 be 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** DC circuit breakers between inverter and PV modules.

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 shown below.

Model	Wire Size	Cable (mm^2)	Torque value (max)
Krypton 6000/Krypton 6500	1 x 10AWG	4	1.2 Nm

WARNING: Because this inverter is non-isolated, are accepted: single crystalline, poly crystalline with class A-rated and CIGS modules. To avoid any malfunctions, do not connect any PV modules with possible current leakage to the inverter. For example, grounded PV modules will cause current leakage to the inverter. When using CIGS modules, please be sure NO grounding connection.

CAUTION: It's requested to use PV junction box with surge protection. Otherwise, it will cause damage on inverter when lightning occurs on PV modules.

PV Module Selection:

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

1. Open circuit Voltage (Voc) of PV modules not to exceeds maximum PV array open circuit voltage of the inverter.
2. Open circuit Voltage (Voc) of PV modules should be higher than the start-up voltage.

INVERTER MODEL	Krypton 6000	Krypton 6500
Max. PV Array Power	6000W	6500W
Max. PV Array Open Circuit Voltage	500Vdc	
PV Array MPPT Voltage Range	60Vdc~450Vdc	
Start-up Voltage	60Vdc +/- 10Vdc	
Max. PV Current	40A	

Recommended solar panel configuration:

Solar Panel Spec. (reference)	SOLAR INPUT Min in series: 2 pcs, max. in series: 9pcs.	Q'ty of panels	Total input power
-500Wp -Vmp: 42.8V -Imp: 11.69A -Voc: 51.7Vdc -Isc: 12.28A -Cells: 150	2pcs in series	2 pcs	1000W
	5 pcs in series	5 pcs	2500W
	9 pcs in series	9 pcs	4500W
	5 pcs in series, 2 sets in parallel	10 pcs	5000W
	6 pieces in series, 2 sets in parallel	12pcs	6000W
	7 pieces in series, 2 sets in parallel	14pcs	7000W

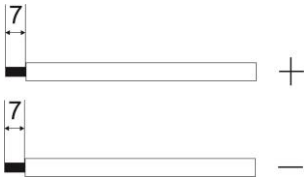
Take 580Wp PV module as an example. After considering above two parameters, the recommended module configurations are listed as below table.

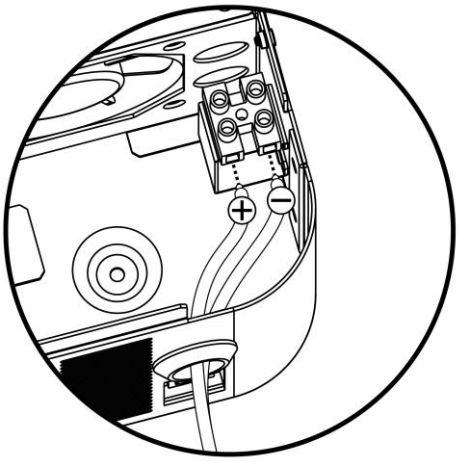
Solar Panel Spec. (reference)	SOLAR INPUT Min in series: 2 pcs, max. in series: 9pcs.	Q'ty of panels	Total input power
- 580Wp - Vmp: 44.78Vdc - Imp: 12.96A - Voc: 53.3Vdc - Isc: 13.5A - Cells: 156	2pcs in series	2 pcs	1160W
	5 pcs in series	5 pcs	2900W
	8 pcs in series	8 pcs	4640W
	9 pcs in series	9 pcs	5220W
	5 pcs in series, 2 sets in parallel	10 pcs	5800W
	6 pieces in series, 2 sets in parallel	12 pcs	6960W

PV Module Wire Connection

Please take the following to implement PV module connection:

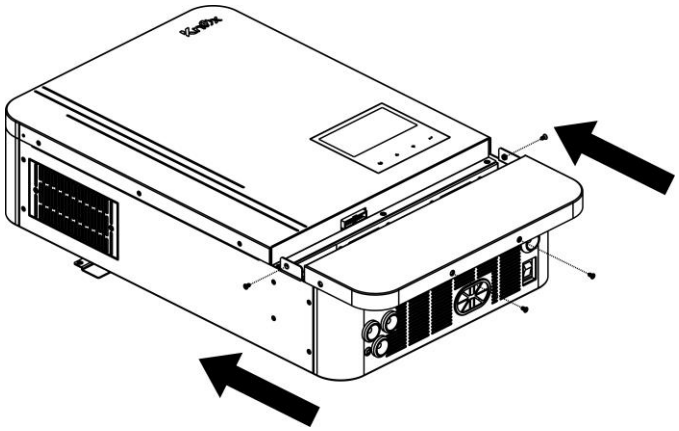
1. Remove insulation sleeve for about 7 mm on your positive and negative wires.
2. We recommend using bootlace ferrules on the wires for optimal performance.
3. Check polarities of wire connections from PV modules to PV input screw terminals. Connect your wires as illustrated below.
   Recommended tool: 4mm blade screwdriver





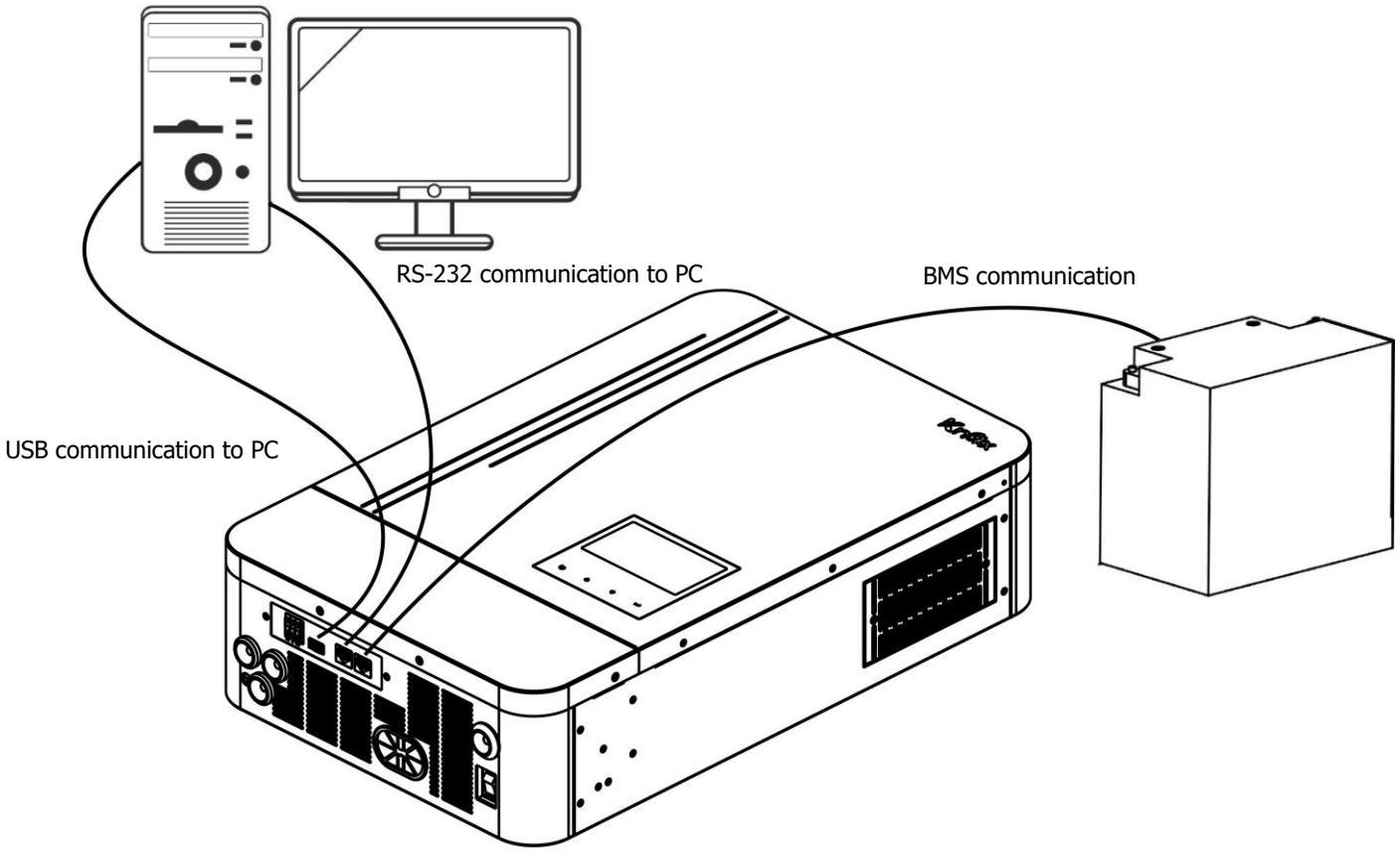
Final Assembly

After connecting all wirings, re-connect one cable and then put bottom cover back by screwing two screws as shown below.



Communication Connection

Follow below chart to connect all communication wiring.



Serial Connection: BMS port

Please select compatible lithium battery module, setup battery type on the LCD setting and then build communication between inverter and BMS. Related information could refer to APPENDIX I.

Pin assignment

PIN #	Definition	PIN #	Definition
PIN 1	X	PIN 5	RS485P
PIN 2	X	PIN 6	CANH
PIN 3	RS485N	PIN 7	CANL
PIN 4	X	PIN 8	GND

Serial Connection

Please use the supplied serial cable to connect between the inverter and your PC. Install the monitoring software from the bundled CD and follow the on-screen instructions to complete your installation. For detailed software operation, refer to the software user manual on the bundled CD.

Pin assignment

PIN #	Definition	PIN #	Definition
PIN 1	TXD from Inverter	PIN 5	X
PIN 2	RXD to Inverter	PIN 6	X
PIN 3	X	PIN 7	X
PIN 4	X	PIN 8	GND

USB port (Type A)

This port could be used either connection with PC to communicate with monitoring software or USB disk to export inverter data log and OTA firmware. Detailed information please refer to the LCD setting section.

Pin assignment

PIN #	Definition	PIN #	Definition
PIN 1	VCC	PIN 3	D+
PIN 2	D-	PIN 4	GND

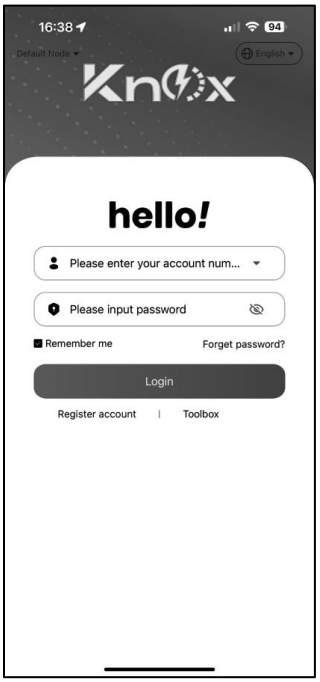
Dry Contact port

There is one dry contact (3A/250VAC) available on the rear panel. It could be used to deliver signal to external device when battery voltage reaches warning level.

Unit Status	Condition				
				NC & C	NO & C
Power Off	Unit is off and no output is powered.			Close	Open
Power On	Output is powered from Battery power or Solar energy.	Program 01 set as USB (utility first)	Battery voltage < Low DC warning voltage	Open	Close
			Battery voltage > Setting value in Program 13 or battery charging reaches floating stage	Close	Open
		Program 01 is set as SBU (SBU priority)	Battery voltage < Setting value in Program 12	Open	Close
			Battery voltage > Setting value in Program 13 or battery charging reaches floating stage	Close	Open

Wi-Fi Connection

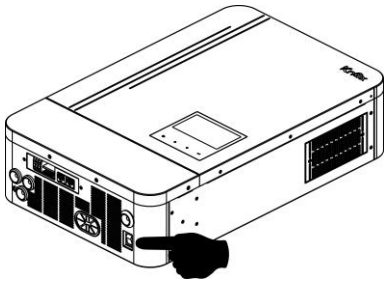
Wi-Fi module can enable wireless communication between solar inverters and the monitoring platform. Users can remotely monitor and control their inverters when they combine the Wi-Fi module with KNOXHYBRID APP. The App uses the Wi-Fi chip to provide remote monitoring data services, which is beneficial for the daily data monitoring of the inverter, querying the real-time data in the device, sending commands from the device, and operating the device remotely. The app is available for both iOS and Android.



OPERATION

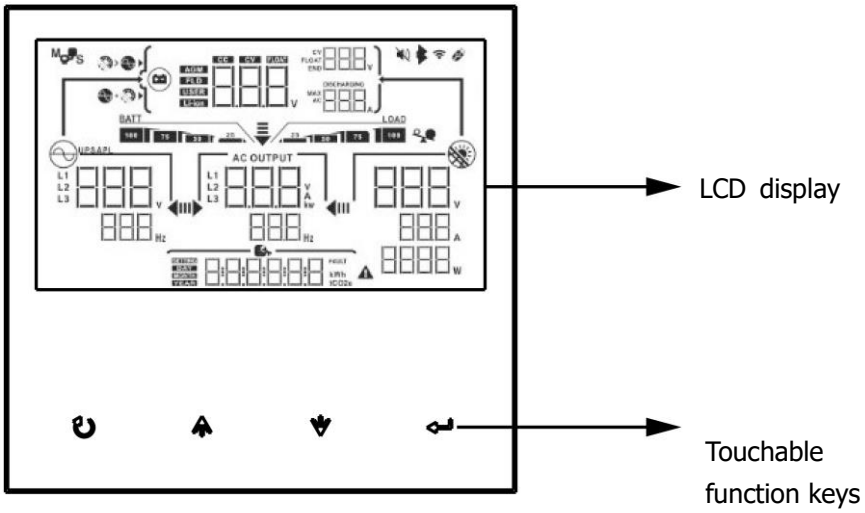
Power ON/OFF

Once the unit has been properly installed and the batteries are connected, press the power button to turn on the unit.



Operation and Display Panel

The operation LCD panel, shown in the chart below, four touchable function keys and a LCD display to indicate the operating status and input/output power information.

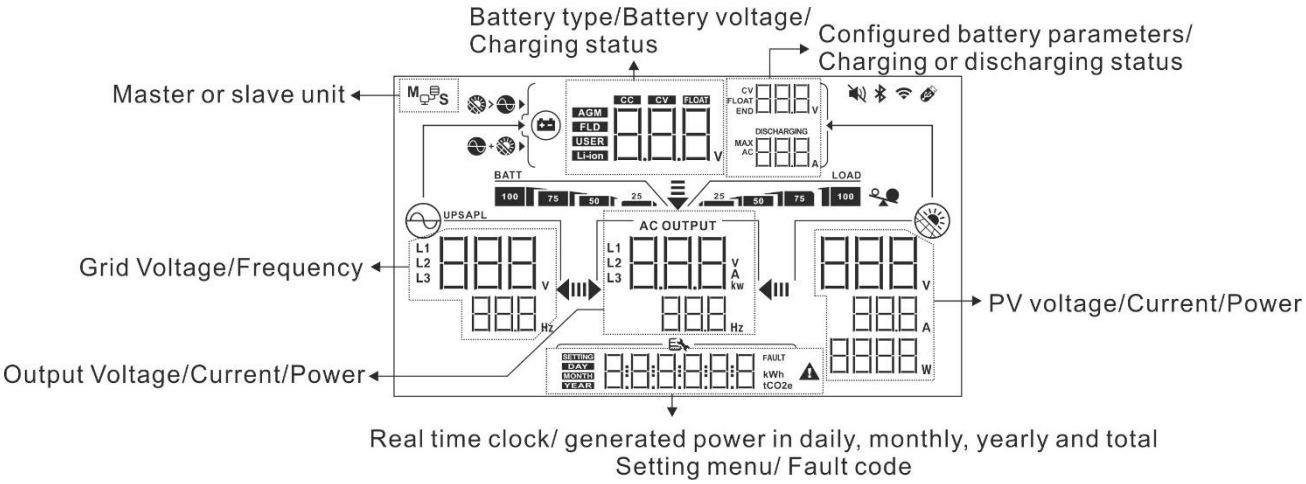


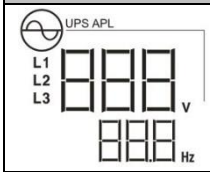
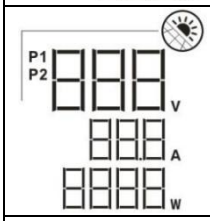
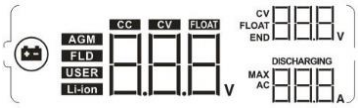
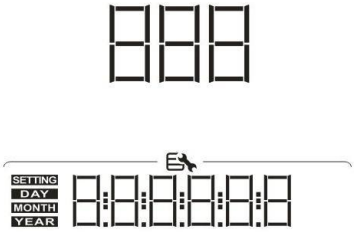
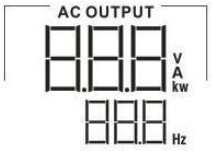
Touchable Function Keys

Function Key		Description
↻	ESC	To exit the setting
	Access USB setting mode	To enter USB setting mode
▲	Up	To last selection
▼	Down	To next selection
↵	Enter	To confirm/enter the selection in setting mode

RGB LED Indicator		Description
Sky blue (according #92 setting)	Solid On	Line mode or Charge mode
Purple (according #93 setting)	Solid On	Battery Mode
	Flashing	Battery Low
Red	Solid On	Fault mode
	Flashing	Warning mode
Without LED	Standby mode	Without LED

LCD Display Icons



Icon	Function description
Input Source Information	
	Indicates the AC input voltage and frequency.
	Indicates the PV voltage, current and power.
	Indicates the battery voltage, charging stage, configured battery parameters, charging or discharging current.
Configuration Program and Fault Information	
	Indicates the setting programs.
	Indicates the warning and fault codes. Warning:  flashing with warning code. Fault:  lighting with fault code.
Output Information	
	Indicate the output voltage, load in VA, and load in Watt and output frequency.

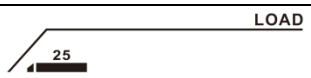
	The ICON flashing indicates the unit with AC output and setting programs 60, 61 or 62 different from default setting.
Battery Information	
	Indicates battery level by 0-24%, 25-49%, 50-74% and 75-100% in battery mode and charging status in line mode.

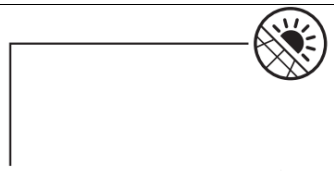
When battery is charging, it will present battery charging status.

Status	Battery voltage	LCD Display
Constant Current mode / Constant Voltage mode	<2V/cell	4 bars will flash in turns.
	2 ~ 2.083V/cell	The right bar will be on and the other three bars will flash in turns.
	2.083 ~ 2.167V/cell	The right two bars will be on and the other two bars will flash in turns.
	> 2.167 V/cell	The right three bars will be on and the left bar will flash.
Floating mode. Batteries are fully charged.		4 bars will be on.

In battery mode, it will present battery capacity.

Load Percentage	Battery Voltage	LCD Display
Load >50%	< 1.85V/cell	
	1.85V/cell ~ 1.933V/cell	
	1.933V/cell ~ 2.017V/cell	
	> 2.017V/cell	
Load < 50%	< 1.892V/cell	
	1.892V/cell ~ 1.975V/cell	
	1.975V/cell ~ 2.058V/cell	
	> 2.058V/cell	

Load Information		
	Indicates overload.	
	Indicates the load level by 0-24%, 25-49%, 50-74% and 75-100%.	
	0%~24%	25%~49%
		
	50%~74%	75%~100%
		
Charger Source Priority Setting Display		
	Indicates setting program 16 "Charger source priority" is selected as "Solar first".	
	Indicates setting program 16 "Charger source priority" is selected as "Solar and Utility".	

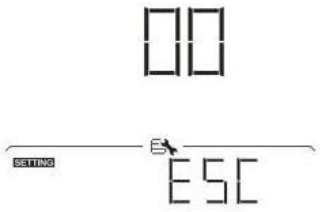
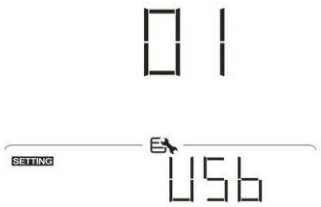
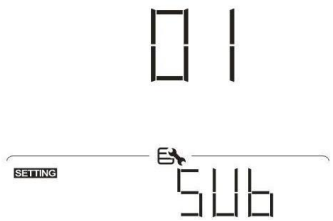
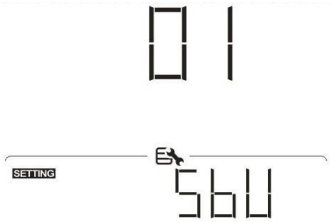
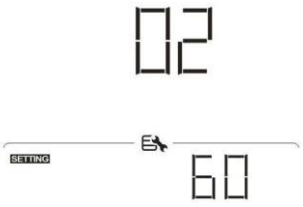
	Indicates setting program 16 "Charger source priority" is selected as "Solar only".
Output source priority setting display	
	Indicates setting program 01 "Output source priority" is selected as "Utility first".
	Indicates setting program 01 "Output source priority" is selected as "Solar first".
	Indicates setting program 01 "Output source priority" is selected as "SBU".
AC Input Voltage Range Setting Display	
UPS	Indicates setting program 03 is selected as "UPS". The acceptable AC input voltage range will be within 170-280VAC.
APL	Indicates setting program 03 is selected as "APL". The acceptable AC input voltage range will be within 90-280VAC.
Operation Status Information	
	Indicates unit connects to the mains.
	Indicates unit connects to the PV panel.
AGM FLD USER Li-ion	Indicates battery type.
M S	Indicates parallel operation is working.
	Indicates unit alarm is disabled.
	Indicates Wi-Fi transmission is working.
	Indicates USB disk is connected.

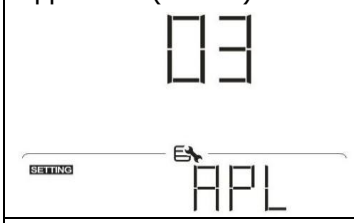
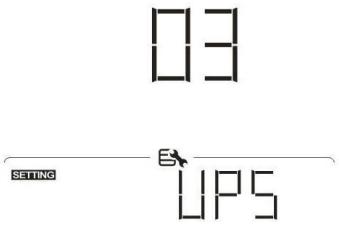
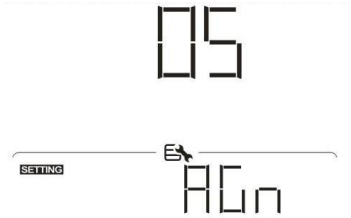
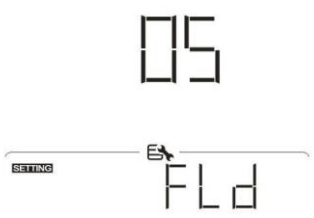
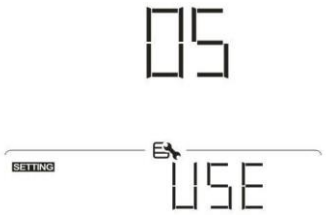
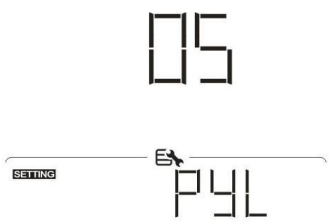
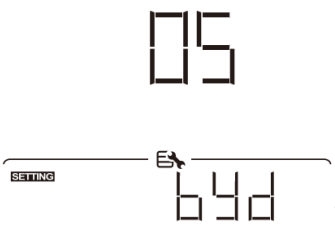
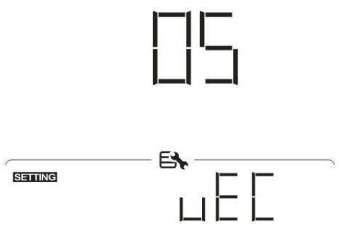
LCD Setting

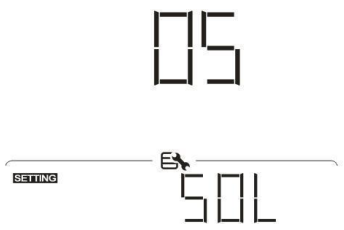
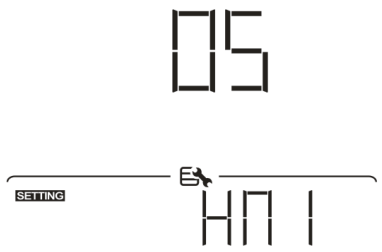
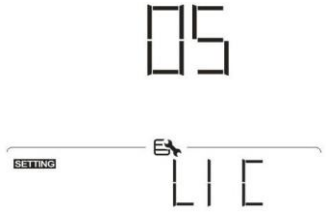
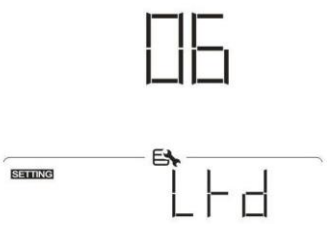
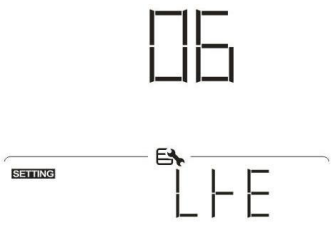
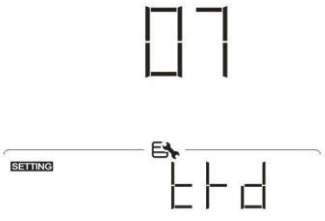
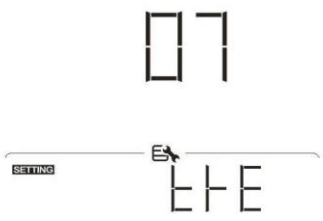
General Setting

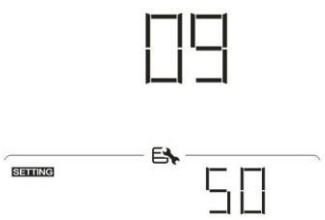
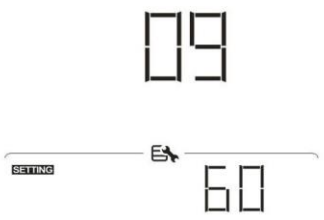
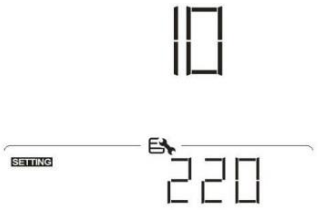
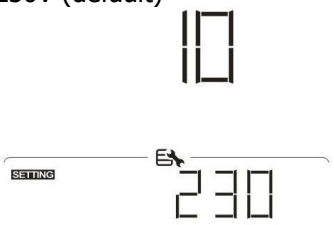
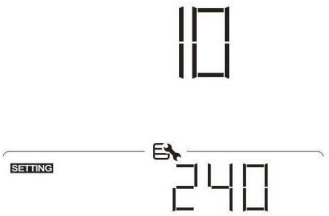
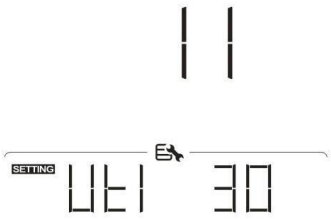
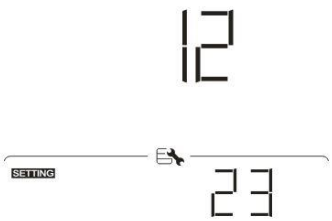
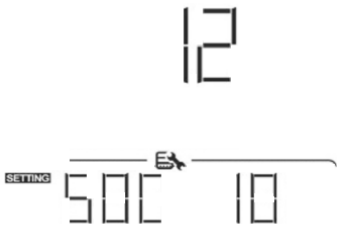
After pressing and holding "↵" button for 3 seconds, the unit will enter the Setup Mode. Press "▲" or "▼" button to select setting programs. Press "↵" button to confirm you selection or "↺" button to exit.

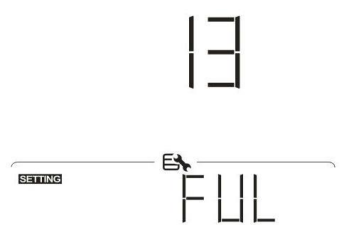
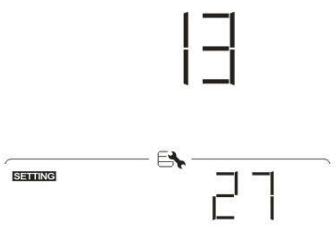
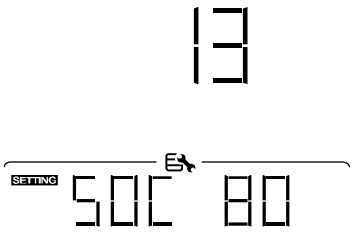
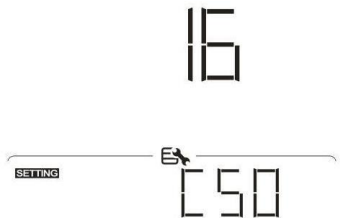
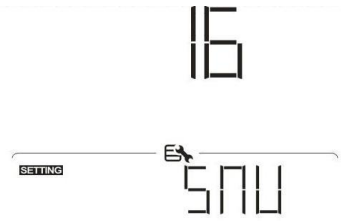
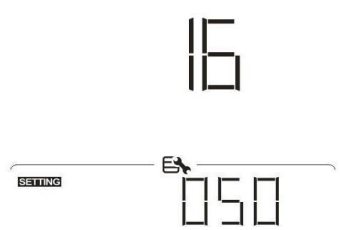
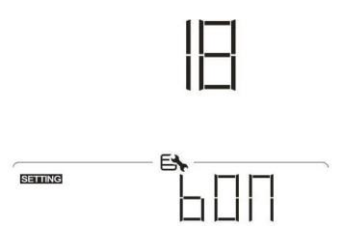
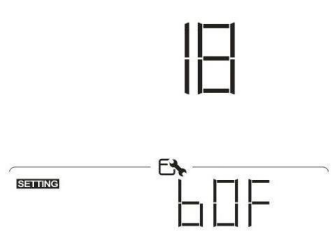
Setting Programs:

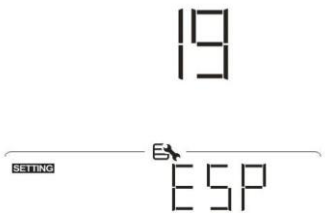
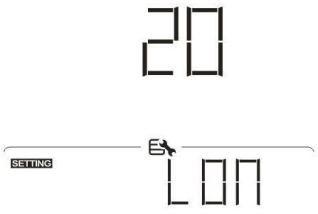
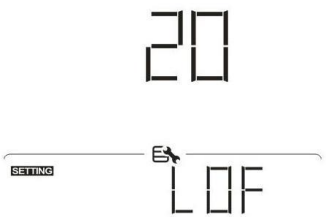
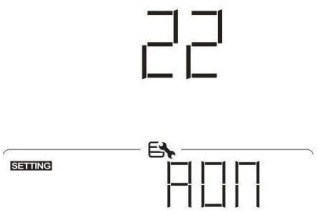
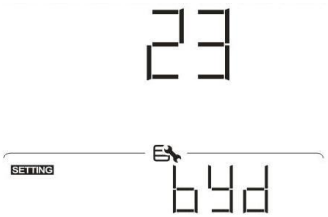
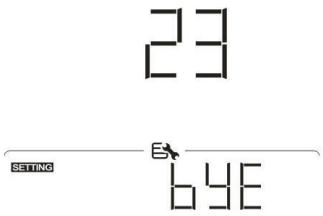
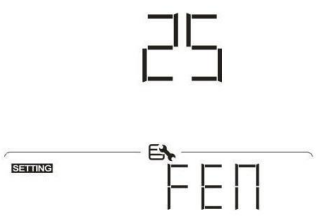
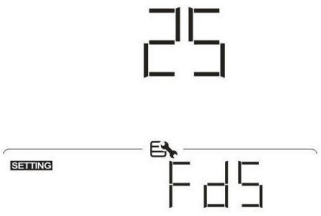
Program	Description	Selectable option	
00	Exit setting mode	Escape 	
01	Output source priority: To configure load power source priority	Utility first (default) 	Utility will provide power to the loads as first priority. Solar and battery energy will provide power to the loads only when utility power is not available.
		Solar first 	Solar energy provides power to the loads as first priority. If solar energy is not sufficient to power all connected loads, Utility energy will supply power to the loads at the same time.
		SBU priority 	Solar energy provides power to the loads as first priority. If solar energy is not sufficient to power all connected loads, battery energy will supply power to the loads at the same time. Utility provides power to the loads only when battery voltage drops to either low-level warning voltage or the setting point in program 12.
02	Maximum charging current: To configure total charging current for solar and utility chargers. (Max. charging current = utility charging current + solar charging current)	60A (default) 	Setting range is from 10A to 120A. Increment of each click is 10A.

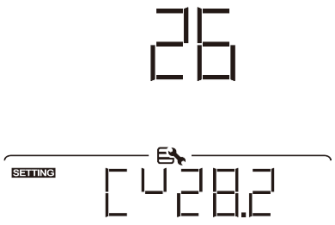
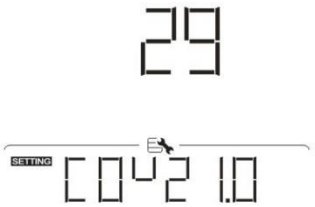
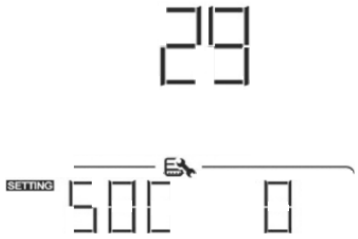
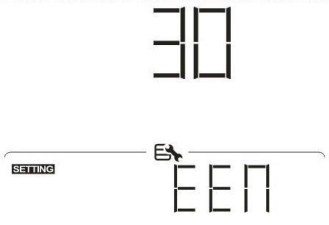
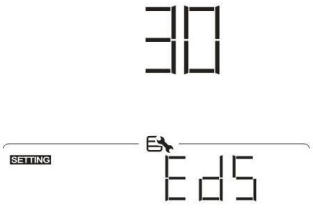
03	AC input voltage range	Appliances (default) 	If selected, acceptable AC input voltage range will be within 90-280VAC.
		UPS 	If selected, acceptable AC input voltage range will be within 170-280VAC.
05	Battery type	AGM (default) 	Flooded 
		User-Defined 	If "User-Defined" is selected, battery charge voltage and low DC cut-off voltage can be set up in program 26, 27 and 29.
		Pylontech battery 	If selected, programs of 02, 26, 27 and 29 will be automatically set up. No need for further setting.
		BYD battery 	If selected, programs of 02, 26, 27 and 29 will be automatically set up. No need for further setting.
		WECO battery 	If selected, programs of 02, 12, 26, 27 and 29 will be auto-configured per battery supplier recommended. No need for further adjustment.

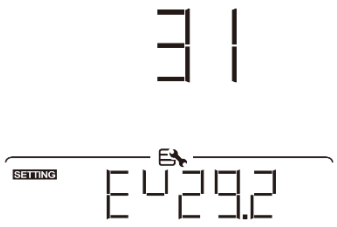
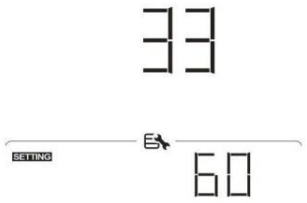
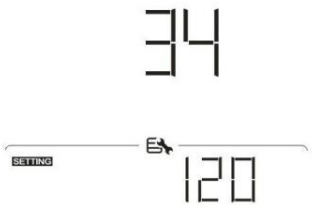
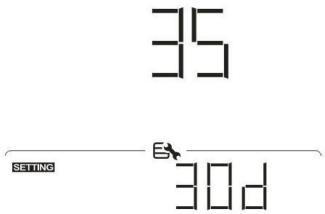
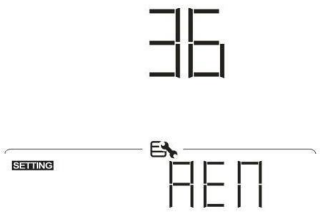
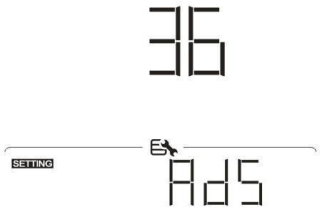
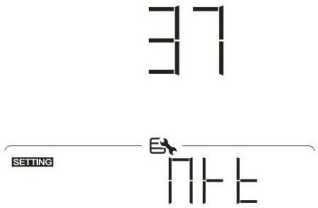
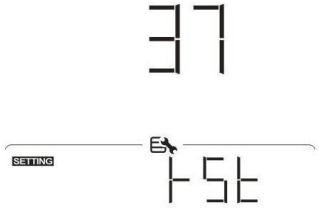
05	Battery type	Soltaro battery 	If selected, programs of 02, 26, 27 and 29 will be automatically set up. No need for further setting.
		LIA-protocol compatible battery 	Select "LIA" if using Lithium battery compatible to Lib protocol. If selected, programs of 02, 26, 27 and 29 will be automatically set up. No need for further setting.
		KN1-protocol compatible battery 	Select "KN1" if using Lithium battery compatible to Lib protocol. If selected, programs of 02, 26, 27 and 29 will be automatically set up. No need for further setting.
		3rd party Lithium battery 	Select "LIC" if using Lithium battery not listed above. If selected, programs of 02, 26, 27 and 29 will be automatically set up. No need for further setting. Please contact the battery supplier for installation procedure.
06	Auto restart when overload occurs	Restart disable (default) 	Restart enable 
07	Auto restart when over temperature occurs	Restart disable (default) 	Restart enable 

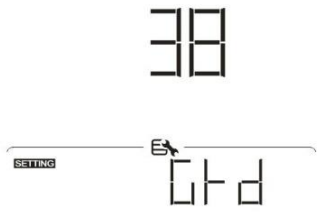
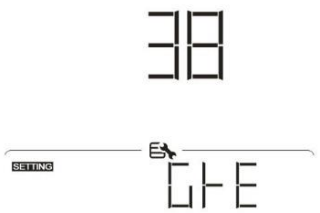
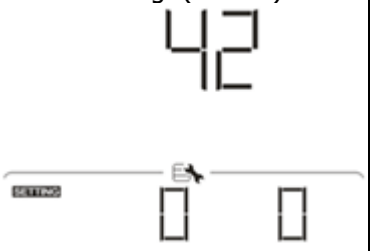
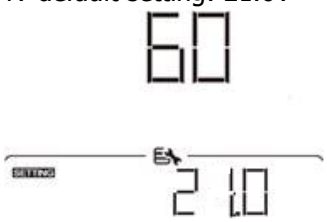
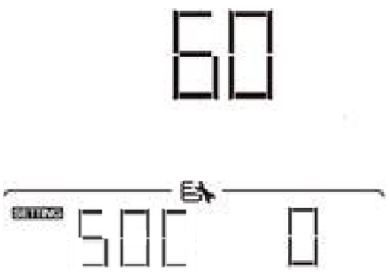
09	Output frequency	50Hz (default) 	60Hz 
10	Output voltage	220V 	230V (default) 
		240V 	
11	Maximum utility charging current Note: If setting value in program 02 is smaller than that in program in 11, the inverter will apply charging current from program 02 for utility charger.	30A (default) 	Setting range is 2A, then from 10A to 100A. Increment of each click is 10A.
12	Setting voltage point or SOC percentage back to utility source when selecting "SBU" (SBU priority) in program 01.	23V 	Setting range is from 22V to 25.5V. Increment of each click is 0.5V.
		SOC 10% (default) 	If any types of lithium battery is selected in program 05, setting value will change to SOC automatically. Adjustable range is 5% to 95%.

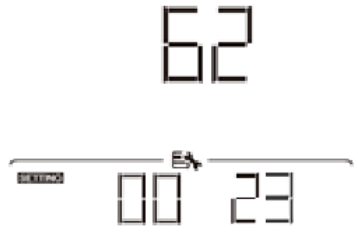
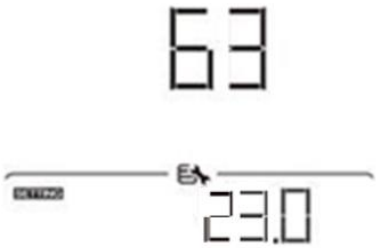
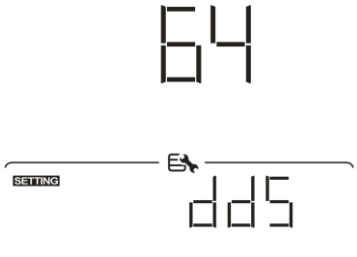
13	Setting voltage point or SOC percentage back to battery mode when selecting "SBU" (SBU priority) in program 01.	Battery fully charged 	27V (default) 
		SOC 80% (default for Lithium) 	If any types of lithium battery is selected in program 05, setting value will change to SOC automatically. Setting range is 10% to 100%.
16	Charger source priority: To configure charger source priority	If this inverter/charger is working in Line, Standby or Fault mode, charger source can be programmed as below:	
		Solar first 	Solar energy will charge battery as first priority. Utility will charge battery only when solar energy is not available.
		Solar and Utility (default) 	Solar energy and utility will charge battery at the same time.
		Only Solar 	Solar energy will be the only charger source no matter utility is available or not.
18	Alarm control	Alarm on (default) 	Alarm off 

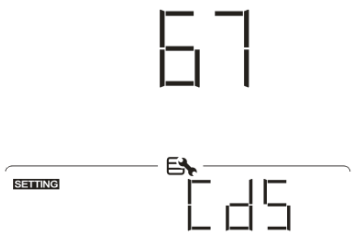
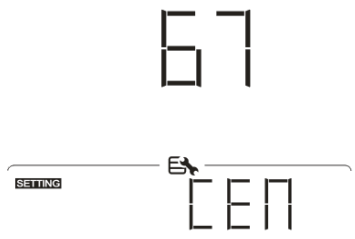
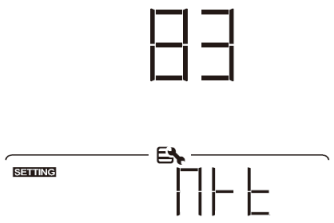
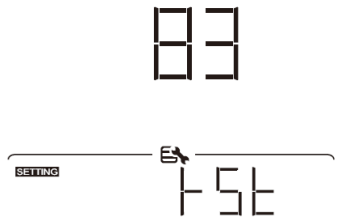
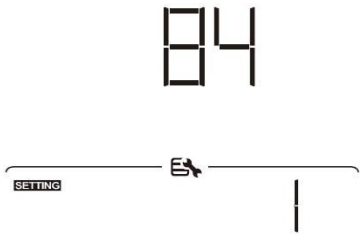
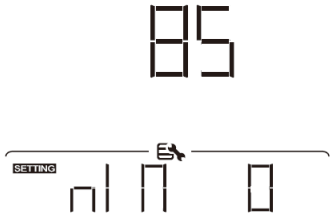
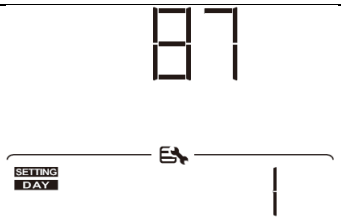
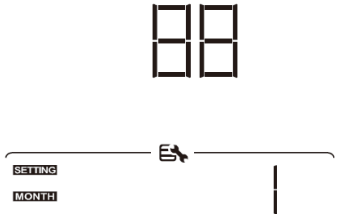
19	Auto return to default display screen	Return to default display screen (default) 	If selected, no matter how users switch display screen, it will automatically return to default display screen (Input voltage /output voltage) after no button is pressed for 1 minute.
		Stay at latest screen 	If selected, the display screen will stay at latest screen user finally switches.
20	Backlight control	Backlight on (default) 	Backlight off 
22	Beeps while primary source is interrupted	Alarm on (default) 	Alarm off 
23	Overload bypass: When enabled, the unit will transfer to line mode if overload occurs in battery mode.	Bypass disable (default) 	Bypass enable 
25	Record Fault code	Record enable (default) 	Record disable 
26	Bulk charging voltage	Available options for 24V model:	

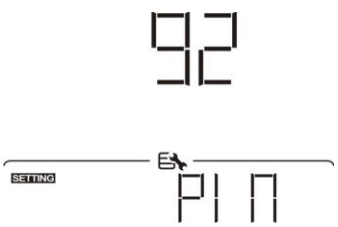
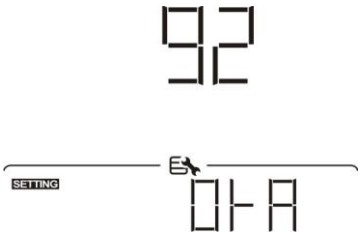
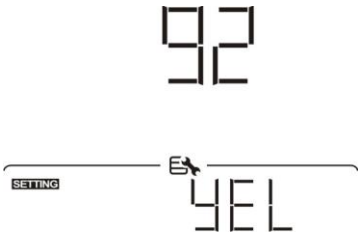
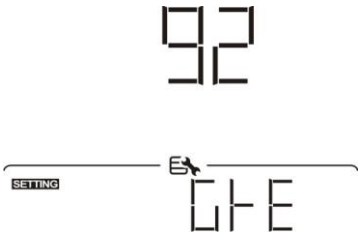
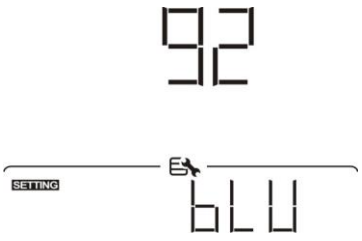
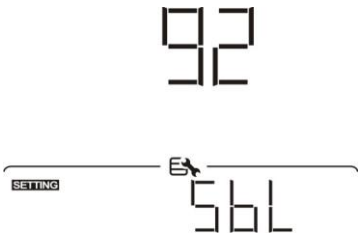
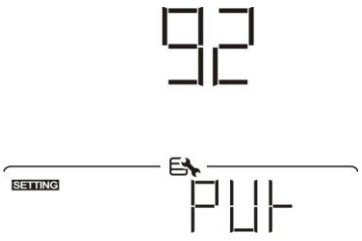
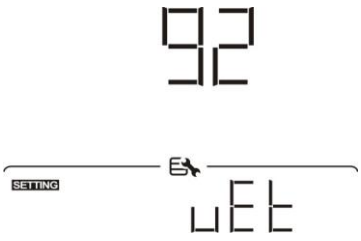
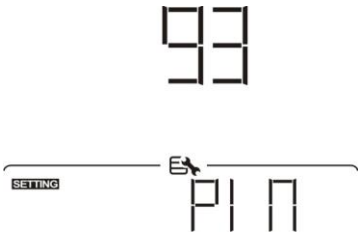
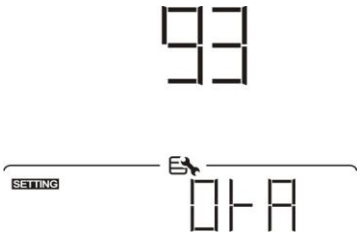
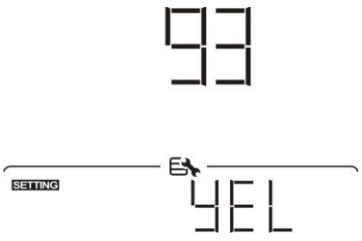
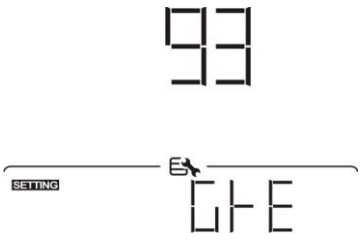
	(C.V voltage)	28.2V (default) 	If user-defined is selected in program 5, this program can be set up. Setting range is from 25.0V to 31.5V. Increment of each click is 0.1V.
27	Floating charging voltage	27V (default) 	If user-defined is selected in program 5, this program can be set up. Setting range is from 25.0V to 31.5V. Increment of each click is 0.1V.
29	Low DC cut-off voltage or SOC percentage: ● If battery power is only power source available, inverter will shut down. ● If PV energy and battery power are available, inverter will charge battery without AC output. If PV energy, battery power and utility are all available, inverter will transfer to line mode	21.0V (default) 	If user-defined is selected in program 5, this program can be set up. Setting range is from 21.0V to 24.0V. Increment of each click is 0.1V. Low DC cut-off voltage will be fixed to setting value no matter what percentage of load is connected.
		SOC 0% (default) 	If Lithium battery is selected in program 5, setting value will change to SOC automatically. Setting range is from 0% to 90%.
30	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.	
31	Battery equalization voltage		

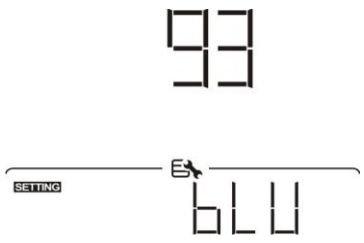
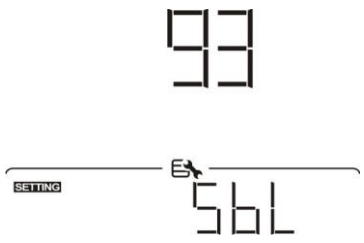
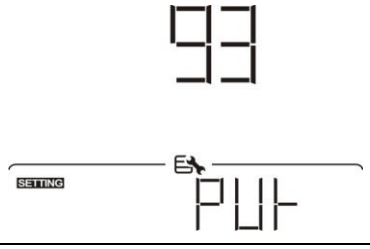
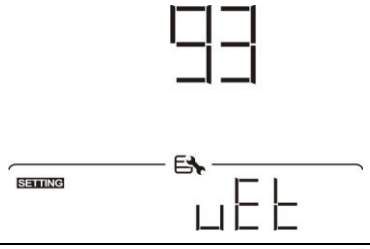
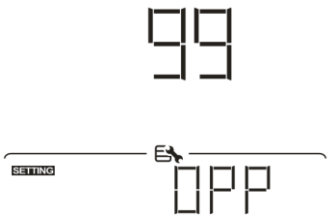
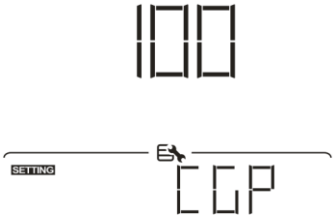
		29.2V (default) 	Setting range is from 25.0V to 31.5V. Increment of each click is 0.1V.
33	Battery equalized time	60min (default) 	Setting range is from 5min to 900min. Increment of each click is 5min.
34	Battery equalized timeout	120min (default) 	Setting range is from 5min to 900 min. Increment of each click is 5 min.
35	Equalization interval	30days (default) 	Setting range is from 0 to 90 days. Increment of each click is 1 day
36	Equalization activated immediately	Enable 	Disable (default) 
		If equalization function is enabled in program 30, this program can be set up. If "Enable" is selected in this program, it's to activate battery equalization immediately and LCD main page will show "E9". If "Disable" is selected, it will cancel equalization function until next activated equalization time arrives based on program 35 setting. At this time, "E9" will not be shown in LCD main page.	
37	Reset all stored data for PV generated power and output load energy	Not reset(Default) 	Reset 

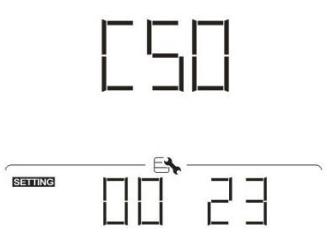
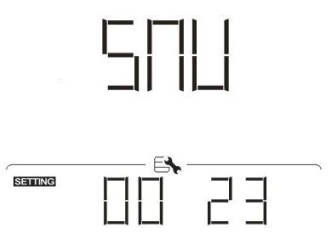
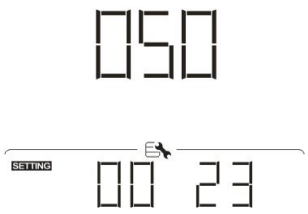
<table>
<tr><td>38</td><td>Solar energy feed to grid configuration
(It's requested to enter password)</td><td>Solar energy feed to grid disable (default)
  </td><td>Solar energy feed to grid enable.
  </td></tr>
<tr><td>42</td><td>Adjustment parameter for EARTH LED</td><td>If unit is not in Line mode, it will show nothing.
  </td><td>If unit is in Line mode, it will show following. (default)
  </td></tr>
<tr><td colspan="3">If EARTH LED of meter is on, it can be off by adjusting the parameter. If the unit is in Line mode, this program can be set up. Setting range is from -30 to 30. Increment of each click is 1. The condition of program changed automatically.</td></tr>
<tr><td>43</td><td>Adjustment parameter for REVERSE LED</td><td>If unit is not in Line mode, it will show following.
  </td><td>If unit is in Line mode, it will show following. (default)
  </td></tr>
<tr><td colspan="3">If REVERSE LED of meter is on, it can be off by adjusting the parameter. If the unit is in Line mode, this program can be set up. Setting range is from 0 to 300. Increment of each click is 10.</td></tr>
<tr><td>60</td><td>Low DC cut off voltage or SOC percentage on second output (L2)</td><td>24V default setting: 21.0V
  </td><td>If "User-defined" is selected in program 05, this setting range is from 21.0V to 31.0V for 24V model. Increment of each click is 0.1V.</td></tr>
<tr><td></td><td></td><td>0% (default)
  </td><td>If any type of lithium battery is selected in program 05, this parameter value will be displayed in percentage and value setting is based on battery capacity percentage. Setting range is from 0% to 95%. Increment of each click is 5%.</td></tr>
</table>

61	Setting discharge time on the second output (L2)	Disable (Default) 	Setting range is disable and then from 0 min to 990 min. Increment of each click is 5 min. *If the battery discharge time achieves the setting time in program 61 and the program 60 function is not triggered, the output will be turned off.
62	Setting time interval to turn on second output (L2)	00~23 (Default, second output always on) 	Setting range is from 00 to 23. Increment of each click is 1 hour. If setting range is from 00 to 08, the second output will be turned on until 09:00. During this period, it will be turned off if any setting value in program 60 or 61 is reached.
63	Setting voltage point or SOC to restart on the second output (L2)	default setting: 23.0V 	If "User-defined" is selected in program 05, this setting range is from 21.5V to 31.5V. Increment of each click is 0.1V. *If second output is cut off due to setting in program 60, second output (L2) will restart according to setting in program 63.
63	Setting voltage point or SOC to restart on the second output (L2)	SOC: 20% (default for lithium battery) 	If any type of lithium battery is selected in program 05, this parameter value will be displayed in percentage and value setting is based on battery capacity percentage. Setting range is from 5% to 100%. Increment of each click is 5%. *If second output is cut off due to setting in program 60, second output (L2) will restart according to setting in program 63.
64	Setting waiting time to turn on the second output (L2) when the inverter is back to Line Mode or battery is in charging status	Disable(Default) 	Setting range is from Disable, 0 min to 990 min. Increment of each click is 5 min. *If second output is cut off due to setting in program 61, second output (L2) will restart according to setting in program 64.

67	External CT function	CT disable(Default) 	CT enable 
83	Erase all data log	Not reset (Default) 	Reset 
84	Data log recorded interval *The maximum data log number is 6550. If it's over 6550, it will re-write the first log.	1 minute (default) 	1, 2, 3~6 minutes, default 1 minute
85	Time setting – Minute		For minute setting, the range is from 0 to 59.
86	Time setting – Hour		For hour setting, the range is from 0 to 23.
87	Time setting– Day		For day setting, the range is from 1 to 31.
88	Time setting– Month		For month setting, the range is from 1 to 12.

89	Time setting – Year		For year setting, the range is from 17 to 99.
92	Line mode RGB LED	Pink 	Orange 
		Yellow 	Green 
		Blue 	Sky blue(Default) 
		Purple 	White 
93	Battery mode RGB LED	Pink 	Orange 
		Yellow 	Green 

<table>
<tr><td></td><td></td><td>Blue
  </td><td>Sky blue(Default)
  </td></tr>
<tr><td></td><td></td><td>Purple
  </td><td>White
  </td></tr>
<tr><td rowspan="3">99</td><td rowspan="3">Timer Setting for Output Source Priority
  </td><td colspan="2">Once access this program, it will show “OPP” in LCD. Press “↵” button to select timer setting for output source priority. There are three timers to set up. Press “▲” or “▼” button to select specific timer option. Then, press “↵” to confirm timer option. Press “▲” or “▼” button to adjust starting time first and the setting range is from 00 to 23. Increment of each click is one hour. Press “↵” to confirm starting time setting.Next, the cursor will jump to right column to set up end time. Once end time is set completely, press “↵” to confirmall setting.</td></tr>
<tr><td>Utility first timer
  </td><td>Solar first timer
  </td></tr>
<tr><td>SBU priority timer
  </td><td></td></tr>
<tr><td>100</td><td>Timer Setting for Charger Source Priority
  </td><td colspan="2">Once access this program, it will show “CGP” in LCD. Press “↵” button to select timer setting for charger source priority. There are three timers to set up. Press “▲” or “▼” button to select specific timer option. Then, press “↵” to confirm timer option. Press “▲” or “▼” button to adjust starting time first and the setting range is from 00 to 23. Increment of each click is one hour. Press “↵” to confirm starting time setting.Next, the cursor will jump to right column to set up end time. Once end time is set completely, press “↵” to confirmall setting.</td></tr>
</table>

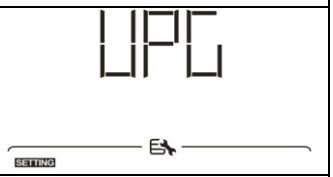
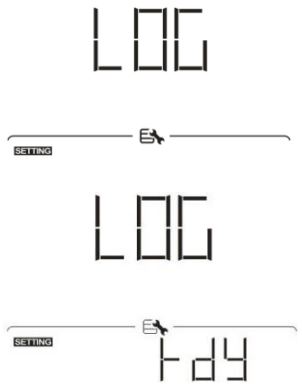
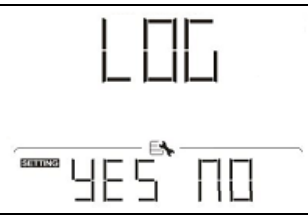
		Solar first 	Sloar and utility 
		Only solar 	

USB Function Setting

There are three USB function setting such as firmware upgrade, data log export and internal parameter re-write from the USB disk. Please follow below procedure to execute selected USB function setting.

Procedure	**LCD Screen**
Step 1: Insert an OTG USB disk into the USB port (L).	
Step 2: Press "↻" button to enter USB function setting.	

Step 3: Please select setting program by following the procedure.

Program#	Operation Procedure	LCD Screen
Upgrade firmware	After entering USB function setting, press "↵" button to enter "upgrade firmware" function. This function is to upgrade inverter firmware. If firmware upgrade is needed, please check with your dealer or installer for detail instructions.	
Re-write internal parameters	After entering USB function setting, press "▼" button to switch to "Re-write internal parameters" function. This function is to over-write all parameter settings (TEXT file) with settings in the USB disk from a previous setup or to duplicate inverter settings. Please check with your dealer or installer for detail instructions.	
Export data log	After entering USB function setting, press "▼" button twice to switch to "export data log" function and it will show "LOG" in the LCD. Press "↵" button to confirm the selection for export data log. If the selected function is ready, LCD will display "rdy". Press "↵" button to confirm the selection again.	
	• Press "▲" button to select "Yes" to export data log. "YES" will disappear after this action is complete. Then, press "↻" button to return to main screen. • Or press "▼" button to select "No" to return to main screen.	

If no button is pressed for 1 minute, it will automatically return to main screen.

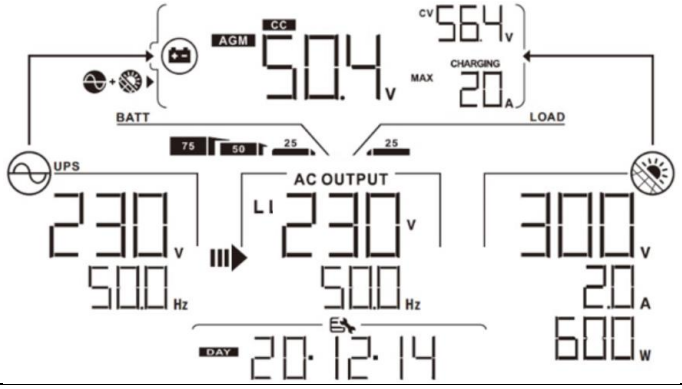
Error message:

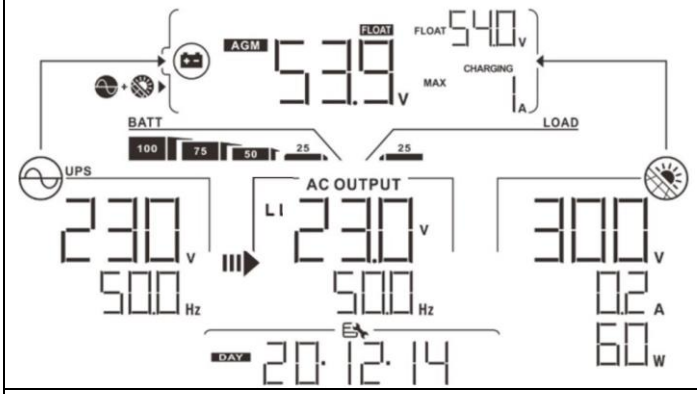
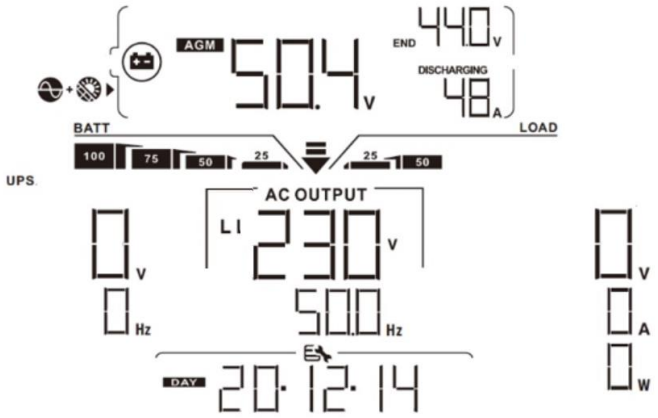
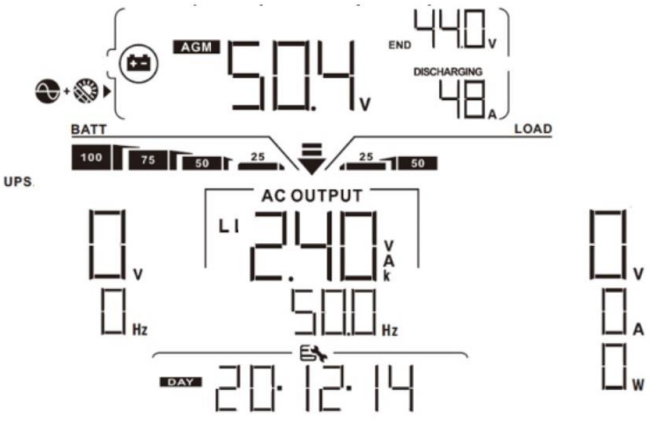
Error Code	Messages
	No USB disk is detected.
	USB disk is protected from copy.
	Document inside the USB disk with wrong format.

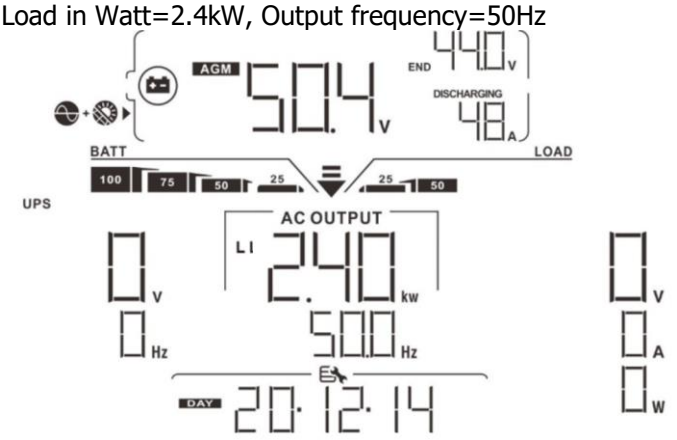
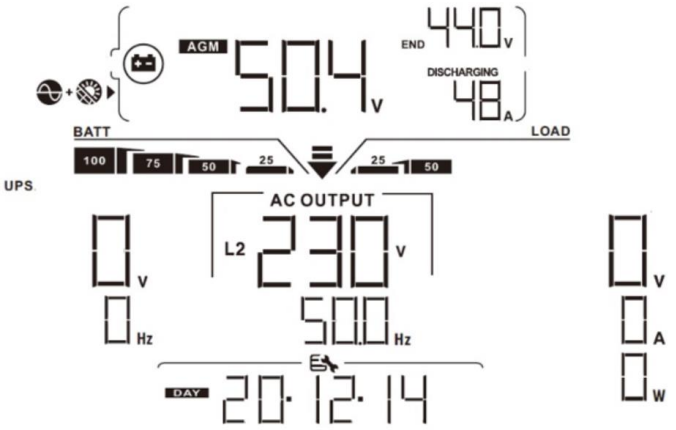
If any error occurs, error code will only show 3 seconds. After 3 seconds, it will automatically return to display screen.

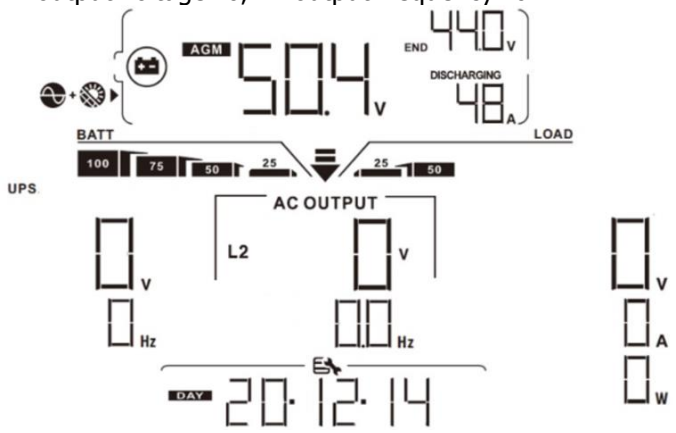
LCD Display

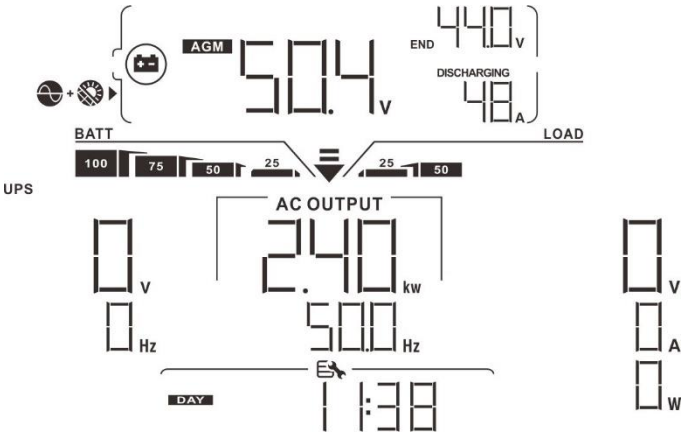
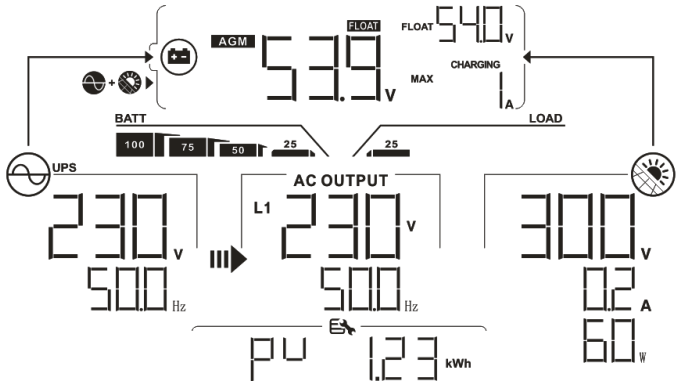
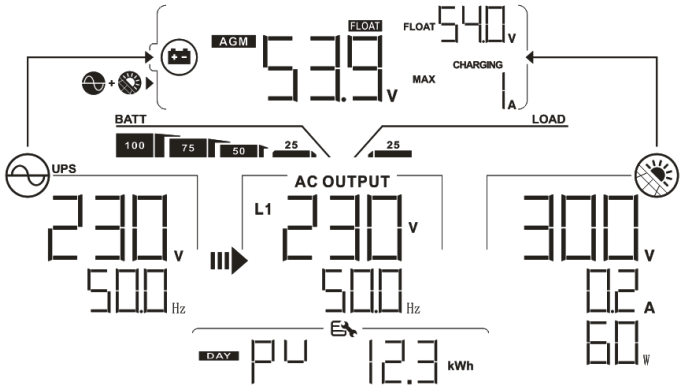
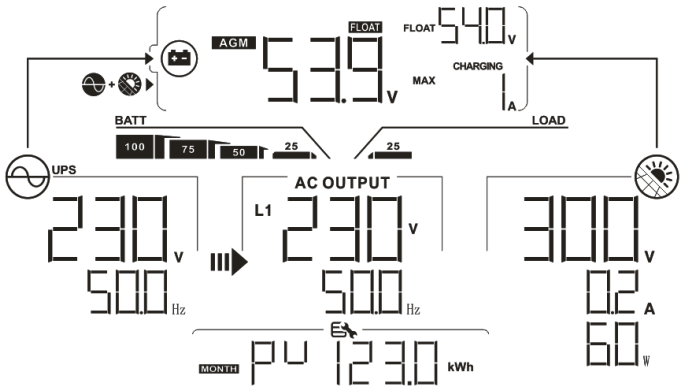
The LCD display information will be switched in turn by pressing the "▲" or "▼" button. The selectable information is switched as the following table in order.

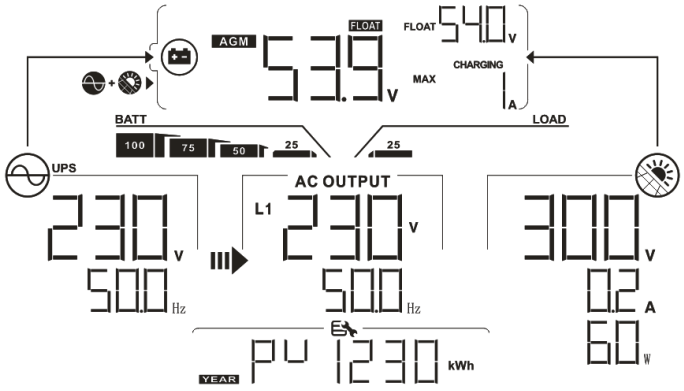
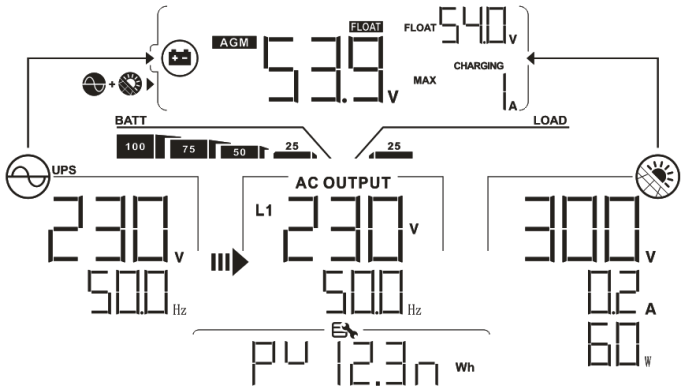
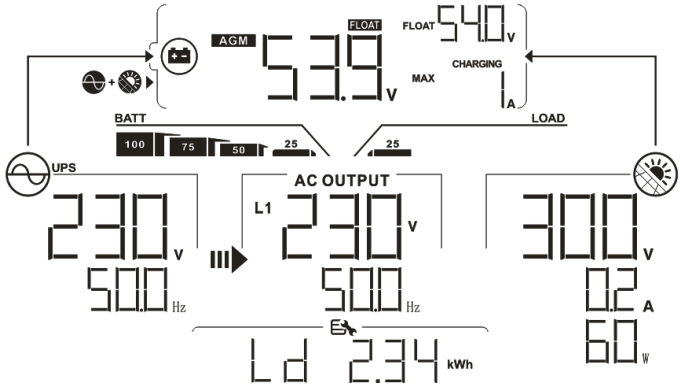
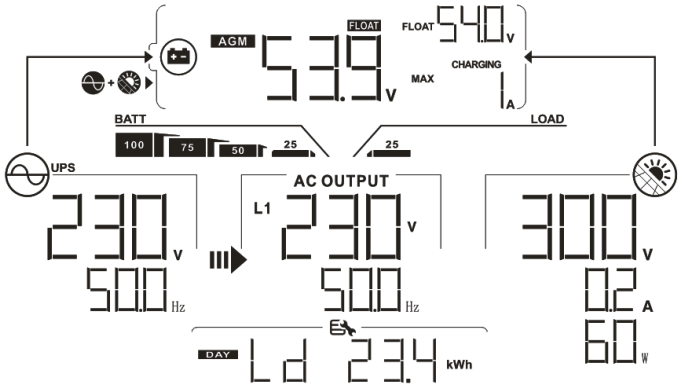
Selectable information		LCD display
Default Display Screen	Utility voltage/ Utility frequency	Input Voltage=230V, Input frequency=50Hz 
	PV voltage/ PV current/ PV power	PV voltage=300V, PV current=2.0A, PV power=600W 
	Battery voltage, charging stage/ Configured battery parameters/ Charging or discharging current	Battery voltage=50.4V, Bulk charging voltage=56.4V, Charging current=20A 

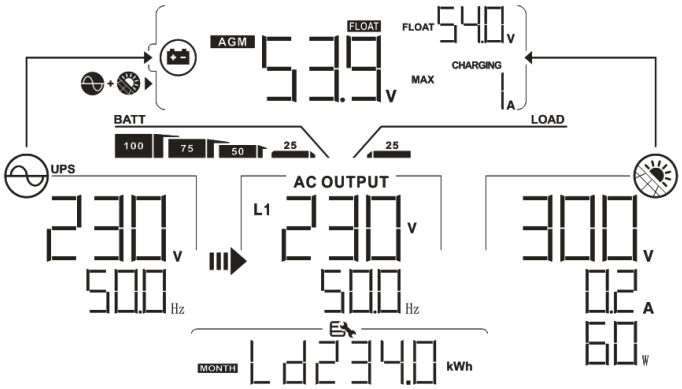
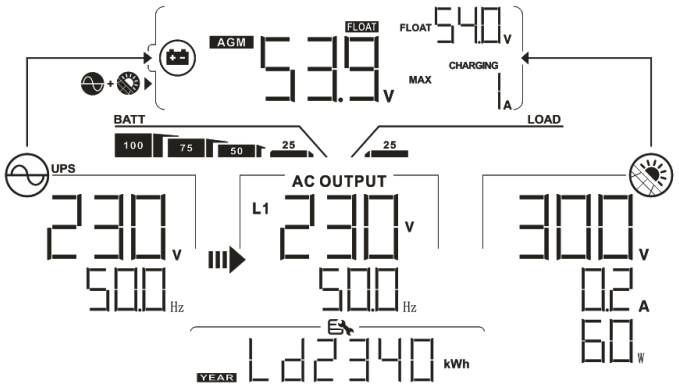
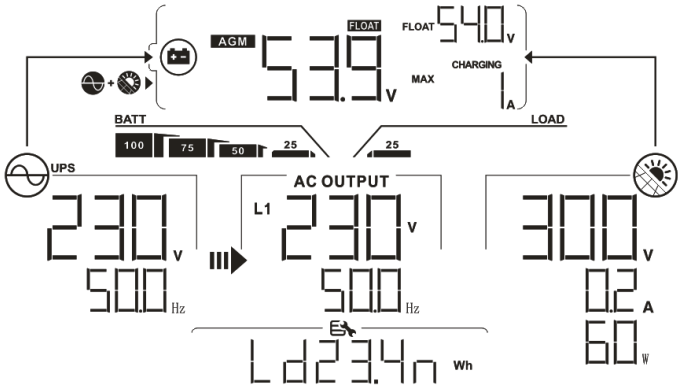
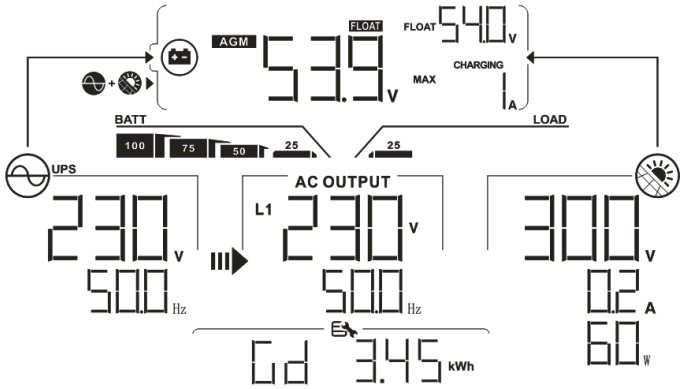
<table>
<tr><td rowspan="3">Default Display Screen</td><td rowspan="1">Battery voltage, charging stage/ Configured battery parameters/ Charging or discharging current</td><td>Battery voltage=53.9V, Floating charging voltage=54.0V, Charging current=1A
 
</td></tr>
<tr><td>Battery voltage=50.4V, Low DC cut-off voltage=44.0V, Discharging current=48A
 
</td></tr>
<tr><td>L1 output voltage/output frequency, load in VA, load in Watt, L2 output voltage/output frequency switch every 5 second</td><td>L1 output voltage=230V, L1 output frequency=50Hz
 
</td></tr>
<tr><td>Load in VA=2.4kVA, Output frequency=50Hz
 
</td></tr>
</table>

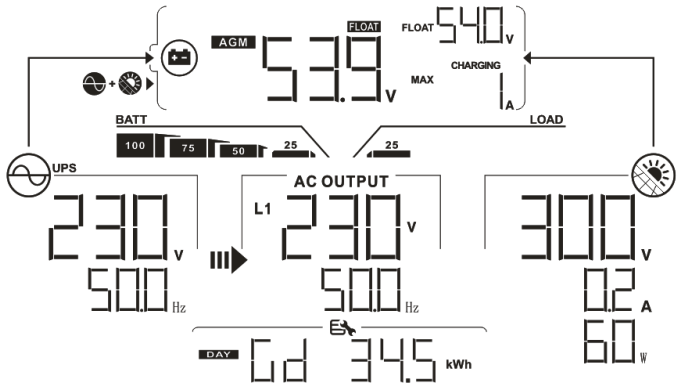
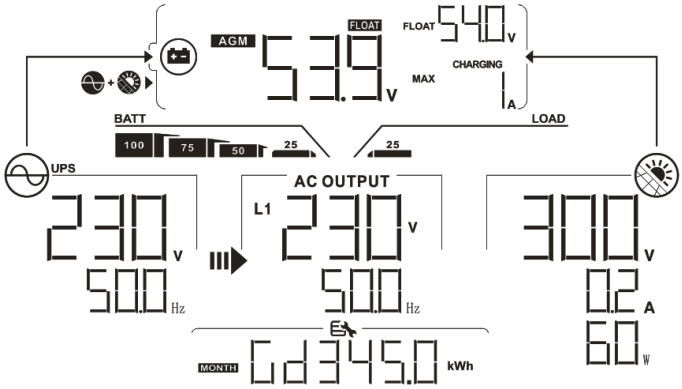
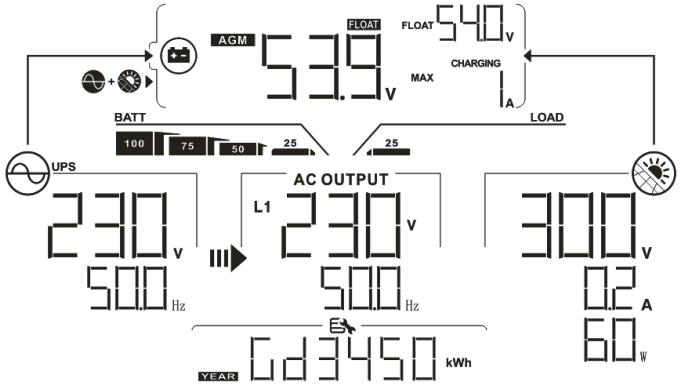
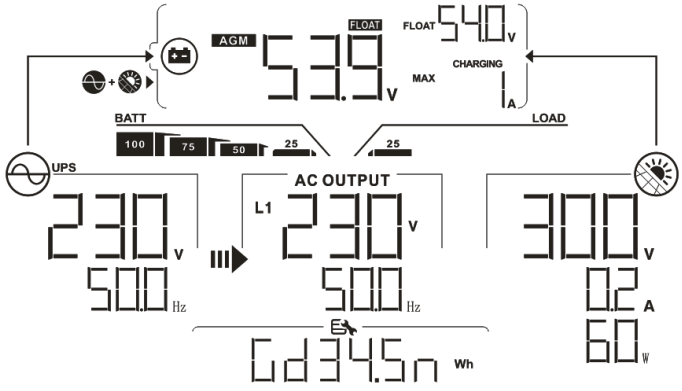
<table>
<tr><td rowspan="3">Default Display Screen</td><td rowspan="2">L1 output voltage/output frequency, load in VA, load in Watt, L2 output voltage/output frequency switch every 5 second</td><td>Load in Watt=2.4kW, Output frequency=50Hz
 
</td></tr>
<tr><td>L2 output voltage=230V, L2 output frequency=50 Hz
 

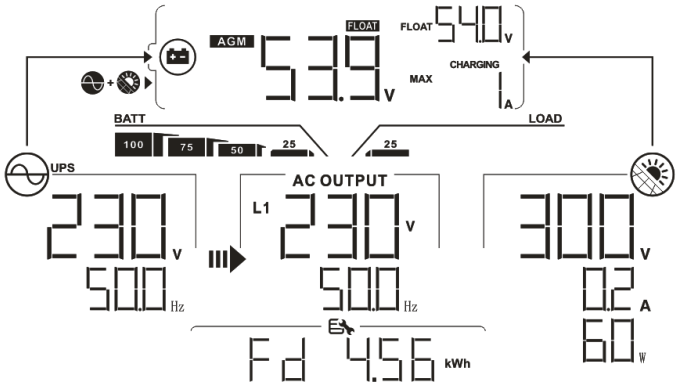
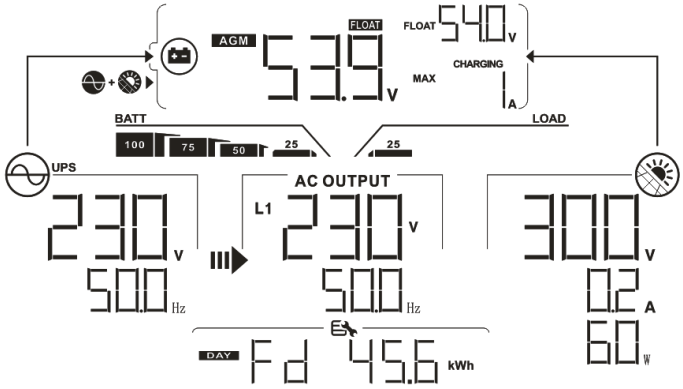
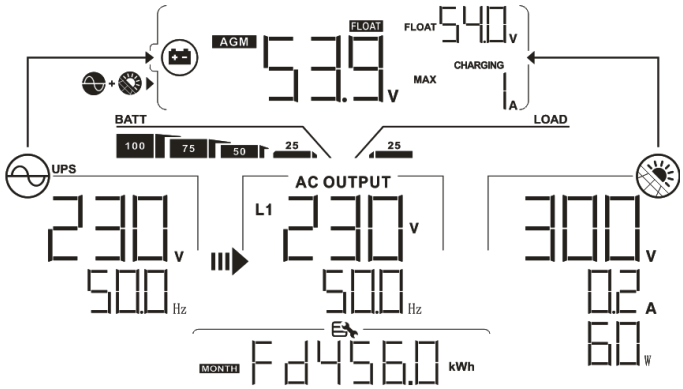
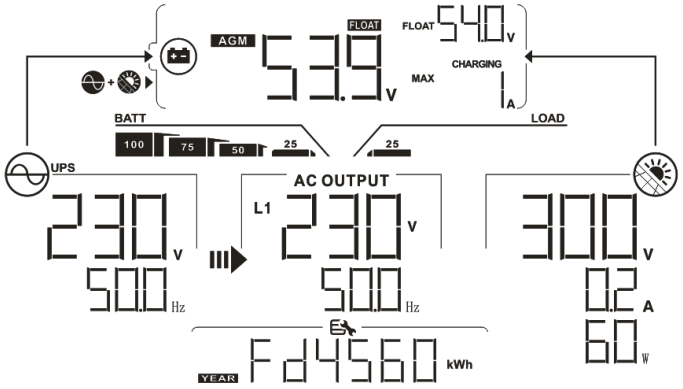
2nd output is off.
L2 output voltage=0, L2 output frequency=0 Hz
 
</td></tr>
<tr><td>Real date</td><td>Real date Dec 14, 2020.
 
</td></tr>
</table>

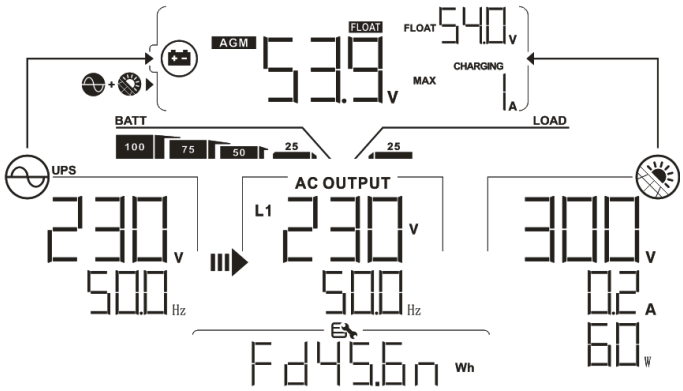
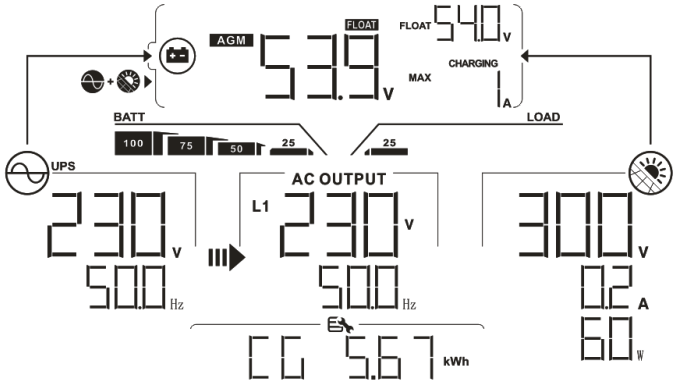
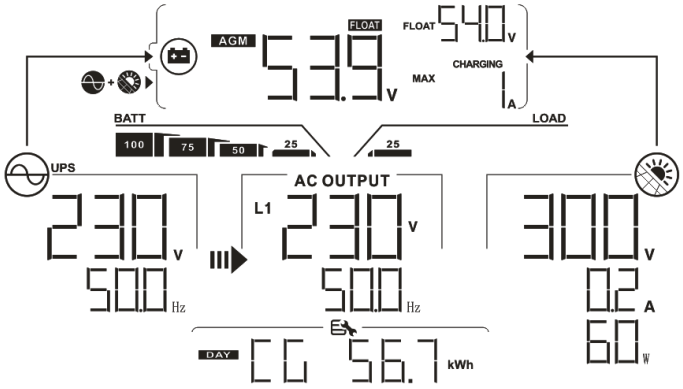
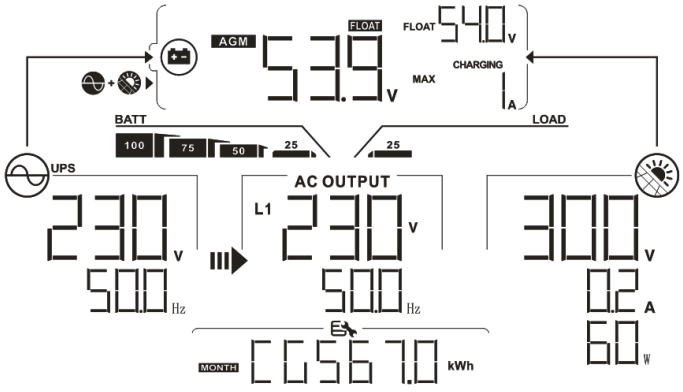
Real time	Real time 11:38. 
PV energy generation this hour	PV energy generation this hour=1.23kWh. 
PV energy generation today	PV energy generation today=12.3kWh. 
PV energy generation this month	PV energy generation this month=123.0kWh. 

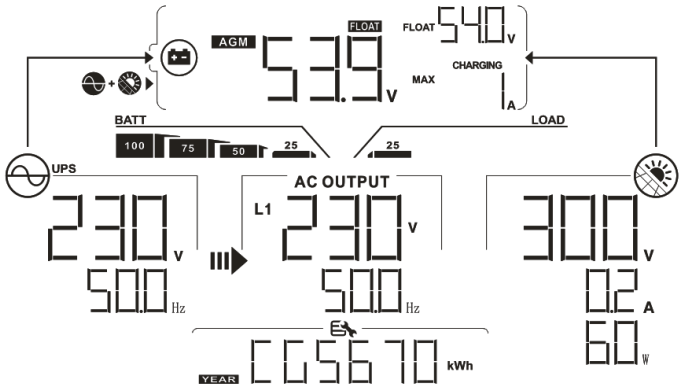
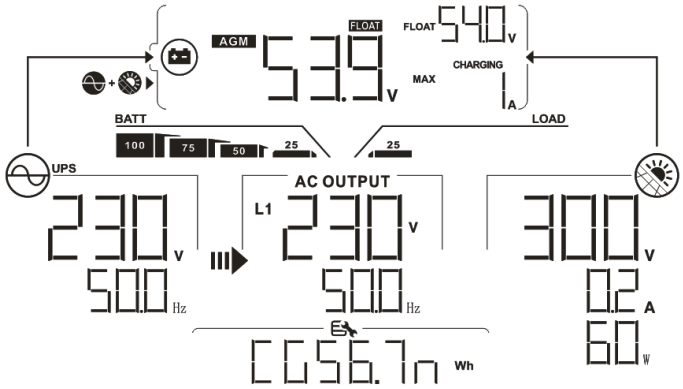
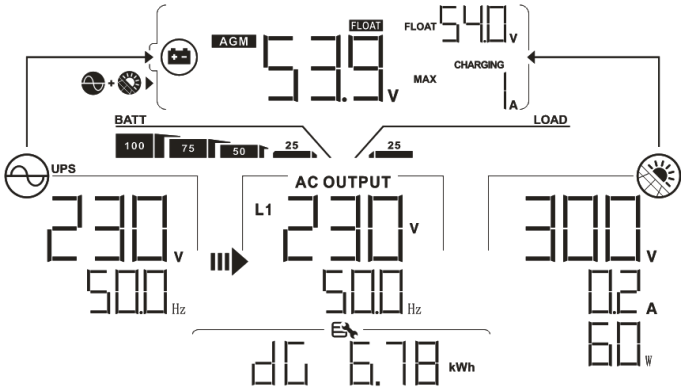
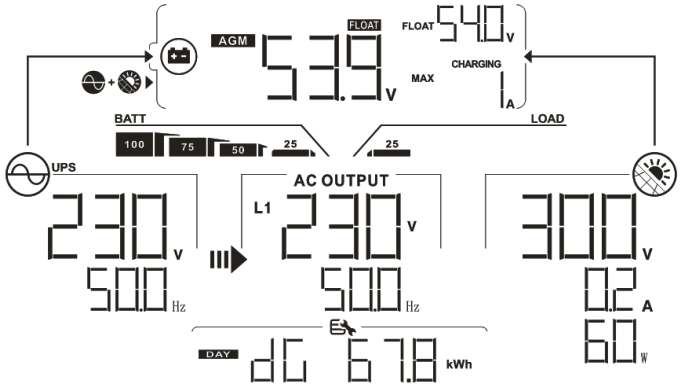
PV energy generation this year	PV energy generation this year=1230kWh. 
Total PV energy generation	Total PV energy generation=12.3mWh. 
Load output energy this hour	Load output energy this hour=2.34kWh. 
Load output energy today	Load output energy today=23.4kWh. 

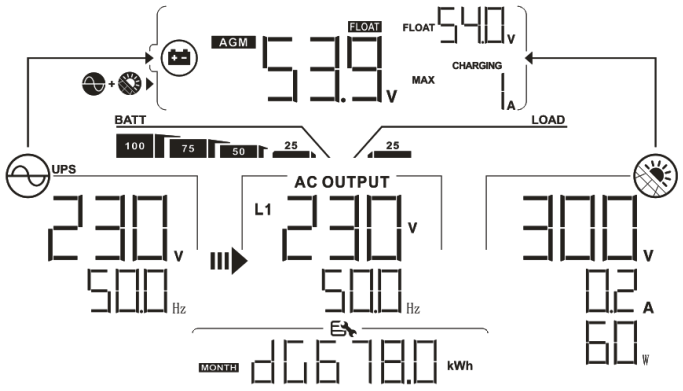
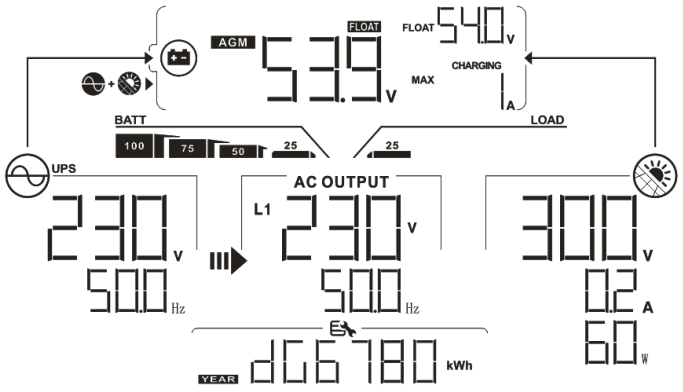
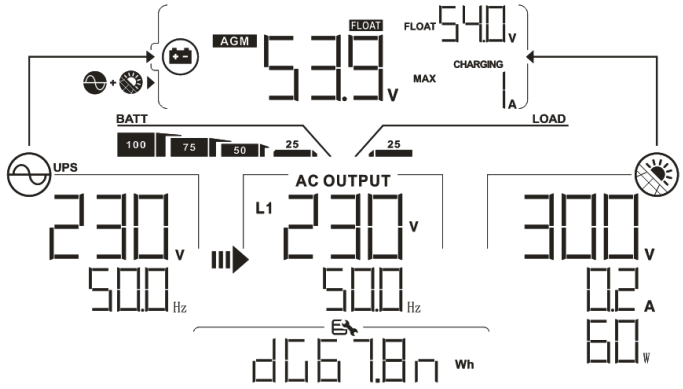
Load output energy this month	Load output energy this month=234.0kWh. 
Load output energy this year	Load output energy this year=2340kWh. 
Total load output energy	Total load output energy=23.4mWh. 
Grid input energy this hour	Grid input energy this hour=3.45kWh. 

Grid input energy today	Grid input energy today=34.5kWh. 
Grid input energy this month	Grid input energy this month=345.0kWh. 
Grid input energy this year	Grid input energy this year=3450kWh. 
Total grid input energy	Total grid input energy=34.5mWh. 

Grid output energy this hour	Grid output energy this hour=4.56kWh. 
Grid output energy today	Grid output energy today=45.6kWh. 
Grid output energy this month	Grid output energy this month=456.0kWh. 
Grid output energy this year	Grid output energy this year=4560kWh. 

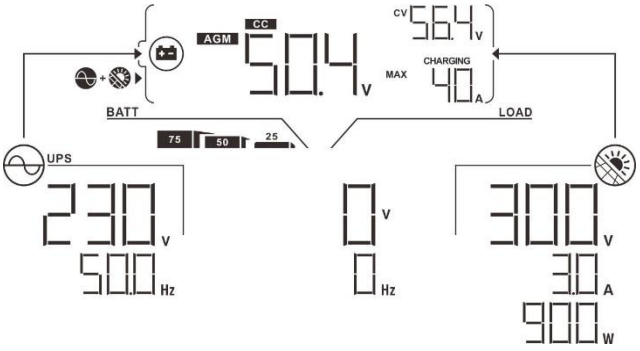
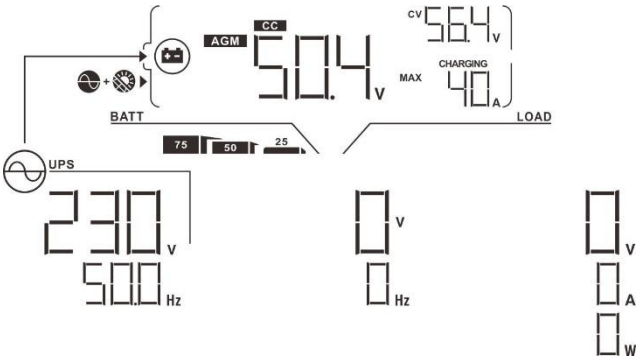
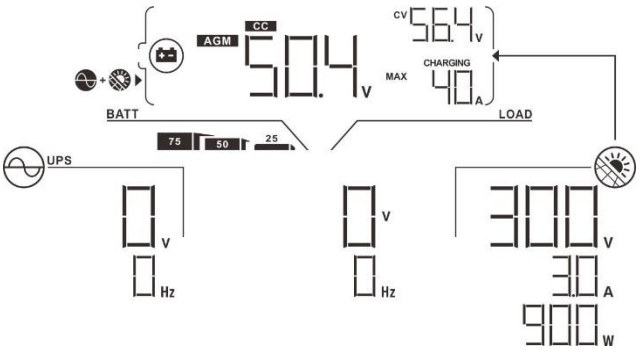
Total grid output energy	Total grid output energy=45.6mWh. 
Battery charging energy this hour	Battery charging energy this hour=5.67kWh. 
Battery charging energy today	Battery charging energy today=56.7kWh. 
Battery charging energy this month	Battery charging energy this month=567.0kWh. 

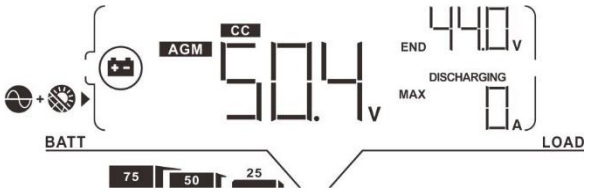
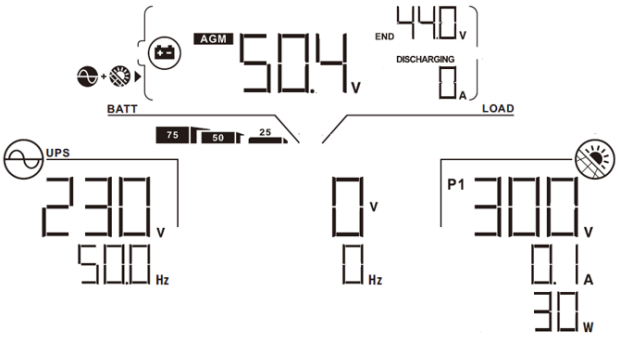
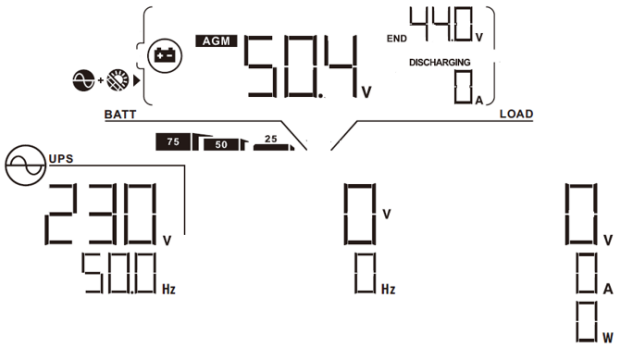
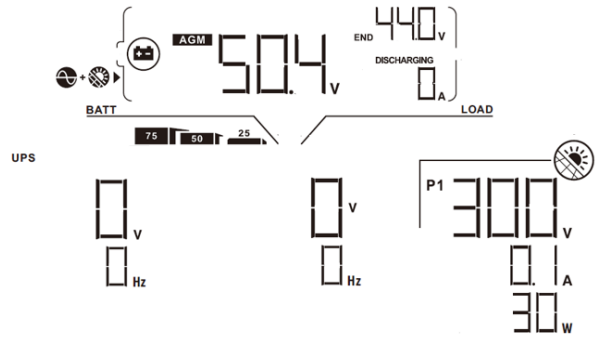
Battery charging energy this year	Battery charging energy this year=5670kWh. 
Total battery charging energy	Total battery charging energy=56.7mWh. 
Battery discharging energy this hour	Battery discharging energy this hour=6.78kWh. 
Battery discharging energy today	Battery discharging energy today=67.8kWh. 

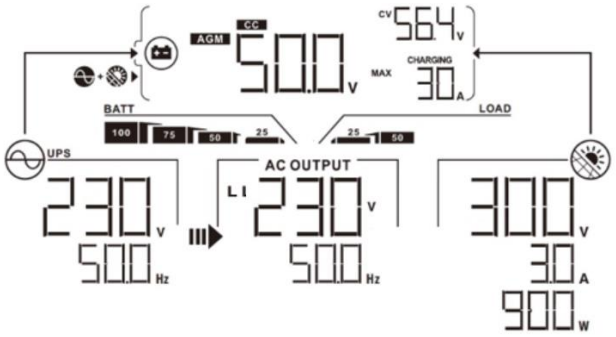
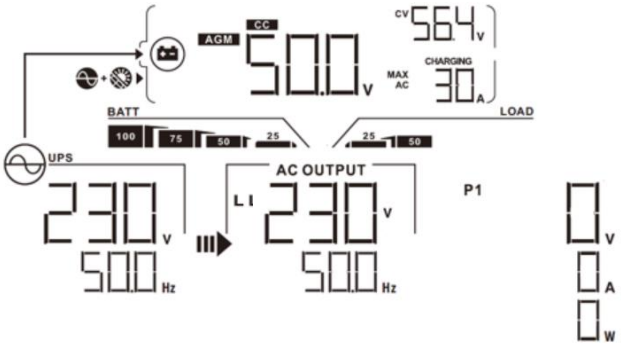
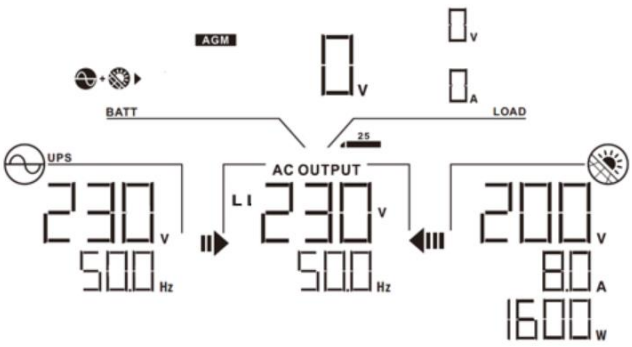
Battery discharging energy this month	Battery discharging energy this month=678.0kWh. 
Battery discharging energy this year	Battery discharging energy this year=6780kWh. 
Total battery discharging energy	Total battery discharging energy=67.8mWh. 
Main CPU version checking	Main CPU version 00050.72. 

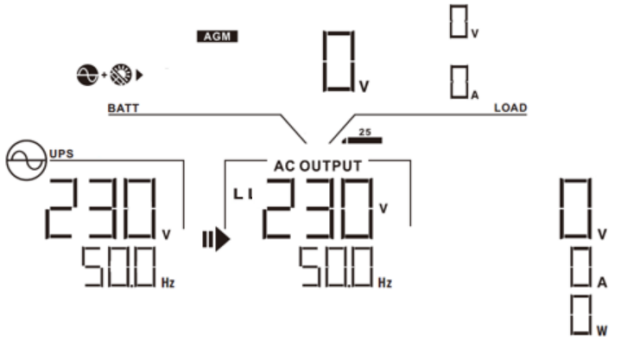
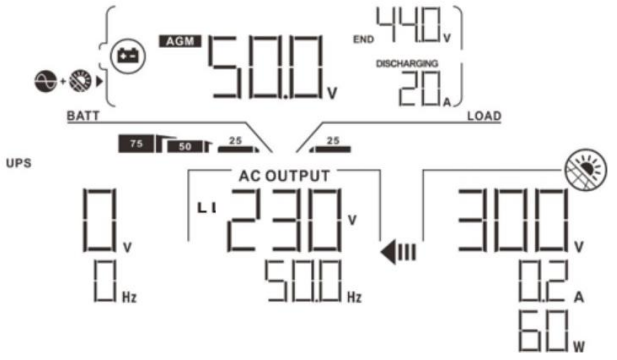
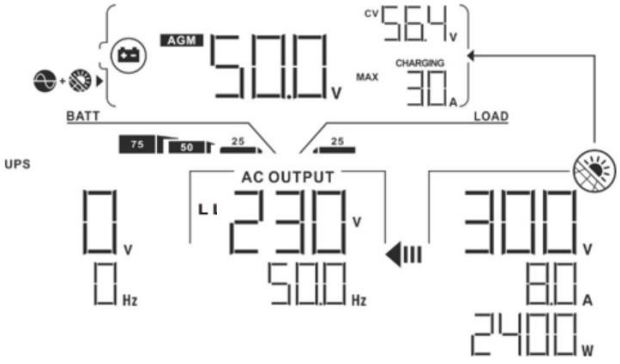
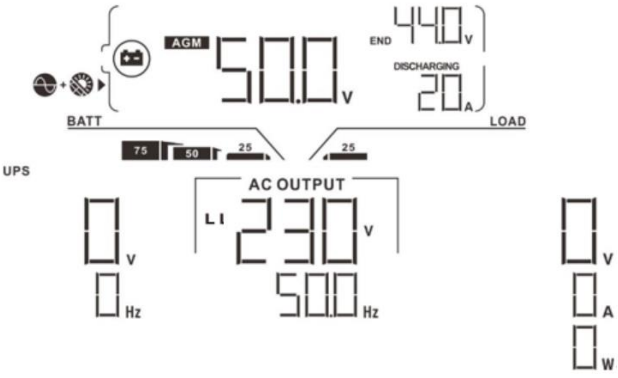
Secondary CPU version checking	Secondary CPU version 00022.01. 
Wi-Fi version checking	Wi-Fi version 00088.88. 

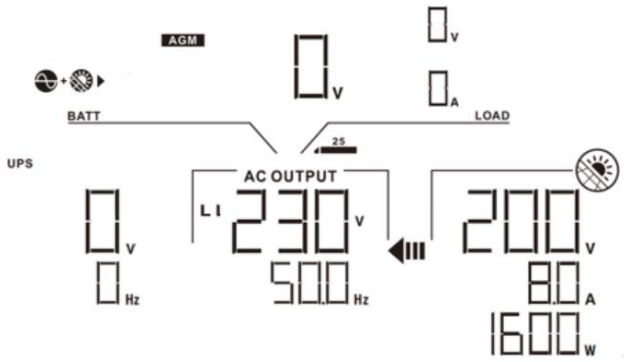
Operating Mode Description

Operation mode	Description	LCD display
Standby mode **Note:** *Standby mode: The inverter is not turned on yet but at this time, the inverter can charge battery without AC output.	No output is supplied by the unit but it still can charge batteries.	Charging by utility and PV energy. 
		Charging by utility. 
		Charging by PV energy. 

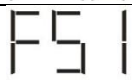
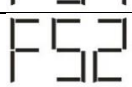
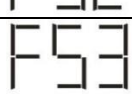
Operation mode	Description	LCD display
Standby mode	No output is supplied by the unit but it still can charge batteries.	No charging. 
Fault mode Note: *Fault mode: Errors are caused by inside circuit error or external reasons such as over temperature, output short circuited and so on.	No charging at all no matter if grid or PV power is available.	Grid and PV power are available. 
		Grid is available. 
		PV power is available. 

Operation mode	Description	LCD display
Line Mode	The unit will provide output power from the mains. It will also charge the battery at line mode.	Charging by utility and PV energy. 
		Charging by utility. 
		If "SUB" (solar first) is selected as output source priority and solar energy is not sufficient to provide the load, solar energy and the utility will provide the loads and charge the battery at the same time. 
		If either "SUB" (solar first) or "SBU" is selected as output source priority and battery is not connected, solar energy and the utility will provide the loads. 

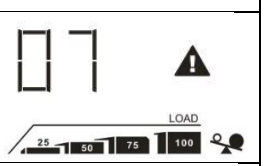
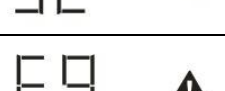
Operation mode	Description	LCD display
Line Mode	The unit will provide output power from the mains. It will also charge the battery at line mode.	Power from utility 
Battery Mode	The unit will provide output power from battery and/or PV power.	Power from battery and PV energy. 
		PV energy will supply power to the loads and charge battery at the same time. No utility is available. 
		Power from battery only. 

Operation mode	Description	LCD display
Battery Mode	The unit will provide output power from battery and/or PV power.	Power from PV energy only. 

Faults Reference Code

Fault Code	Fault Event	Icon on
01	Fan is locked when inverter is off.	
02	Over temperature	
03	Battery voltage is too high	
04	Battery voltage is too low	
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	
10	PV over current	
51	Over current	
52	Bus voltage is too low	
53	Inverter soft start failed	
55	Over DC voltage in AC output	
57	Current sensor failed	
58	Output voltage is too low	
59	PV voltage is beyond the acceptable range	

Warning Indicator

Warning Code	Warning Event	Audible Alarm	Icon flashing
01	Fan is locked when inverter is on.	Beep three times every second	
02	Over temperature	None	
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	
15	PV energy is low.	Beep twice every 3 seconds	
16	High AC input (>280VAC) during BUS soft start	None	
32	Communication failure between inverter and display panel	None	
E9	Battery equalization	None	

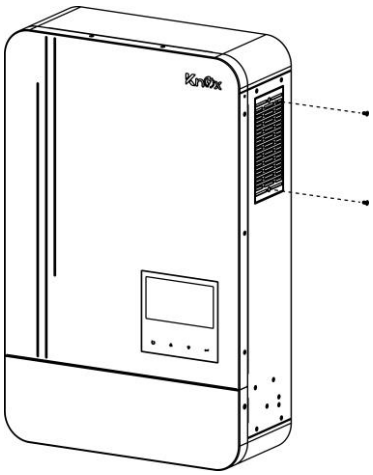
CLEARANCE AND MAINTENANCE FOR ANTI-DUST KIT

Overview

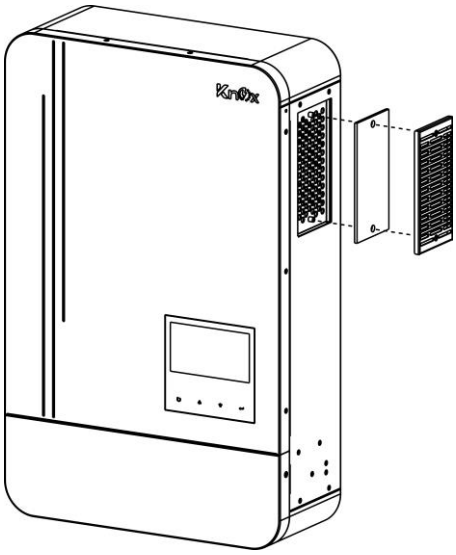
Every inverter is already installed with anti-dusk kit from factory. This kit also keeps dusk from your inverter and increases product reliability in harsh environment.

Clearance and Maintenance

Step 1: Please remove the screws on the sides of the inverter.



Step 2: Then, dustproof case can be removed and take out air filter foam as shown in below chart.



Step 3: Clean air filter foam and dustproof case. After clearance, re-assemble the dust-kit back to the inverter.

NOTICE: The anti-dust kit should be cleaned from dust every one month.

BATTERY EQUALIZATION

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. Equalization also 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.

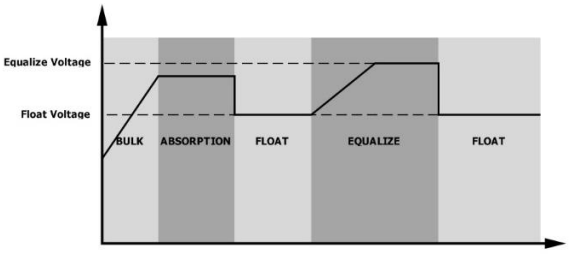
- **How to Apply Equalization Function**

You must enable battery equalization function in monitoring LCD setting program 33 first. Then, you may apply this function in device by either one of following methods:

1. Setting equalization interval in program 37.
2. Active equalization immediately in program 39.

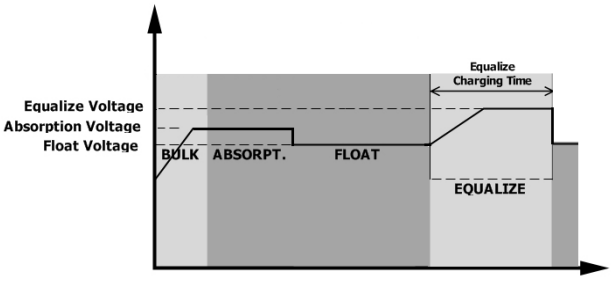
- **When to Equalize**

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.

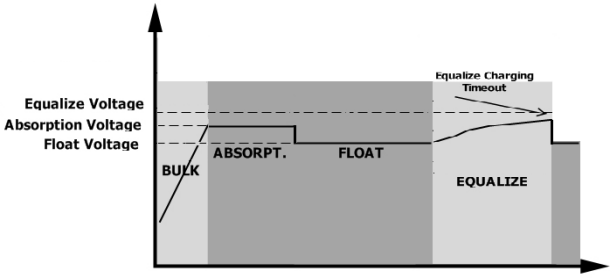


- **Equalize charging time and timeout**

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.



SPECIFICATIONS

Table 1 Line Mode Specifications

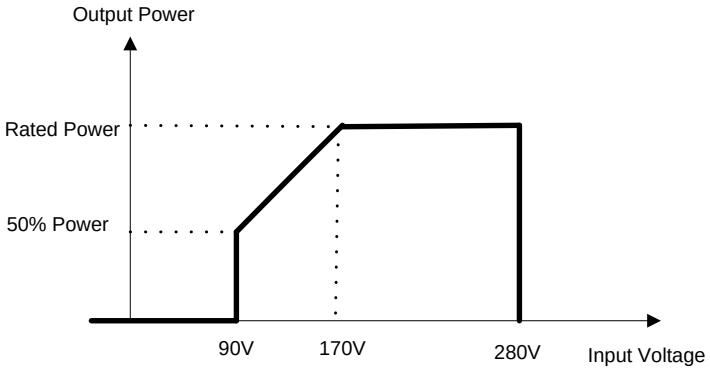
MODEL	Krypton 6000	Krypton 6500
Input Voltage Waveform	Sinusoidal (utility or generator)	
Nominal Input Voltage	230Vac	
Low Loss Voltage	170Vac±7V (UPS); 90Vac±7V (Appliances)	
Low Loss Return Voltage	180Vac±7V (UPS); 100Vac±7V (Appliances)	
High Loss Voltage	280Vac±7V	
High Loss Return Voltage	270Vac±7V	
Max AC Input Voltage	300Vac	
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	
Output Short Circuit Protection	Circuit Breaker	
Efficiency (Line Mode)	>95% (Rated R load, battery full charged)	
Transfer Time	10ms typical (UPS); 20ms typical (Appliances)	
Output power derating: When AC input voltage drops to 170V, the output power will be derated.		

Table 2 Inverter Mode Specifications

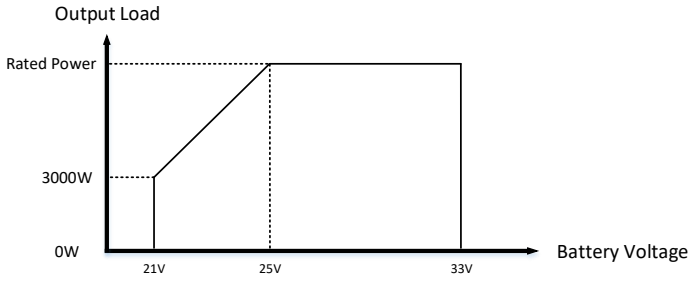
MODEL	Krypton 6000	Krypton 6500
Rated Output Power	4KVA/4KW	4.5KVA/4.5KW
Output Voltage Waveform	Pure Sine Wave	
Output Voltage Regulation	230Vac±10%	
Output Frequency	50Hz	
Peak Efficiency	93%	
Overload Protection	5s@≥110% load; 10s@105%~110% load	
Surge Capacity	2* rated power for 5 seconds	
Max. AC Output Current	**30Amp**	
Nominal DC Input Voltage	24Vdc	
Cold Start Voltage	23.0Vdc	
Low DC Warning Voltage		
@ load < 50%	23.0Vdc	
@ load ≥ 50%	22.0Vdc	
Low DC Warning Return Voltage		
@ load < 50%	23.5Vdc	
@ load ≥ 50%	23.0Vdc	
Low DC Cut-off Voltage		
@ load < 50%	21.5Vdc	
@ load ≥ 50%	21.0Vdc	
High DC Recovery Voltage	32Vdc	
High DC Cut-off Voltage	33Vdc	
No Load Power Consumption	<40W	
Power Limitation When battery voltage is lower than 25V, output power will be de-rated. If connected output load is higher than minimum output rated power 3KW at the same time, the AC output voltage will drop until the output power reduce to minimum power. The lowest AC output voltage is 225V when setting output voltage is 240V and 215V when setting output voltage is 220V or 230V.		

Table 3 Charge Mode Specifications

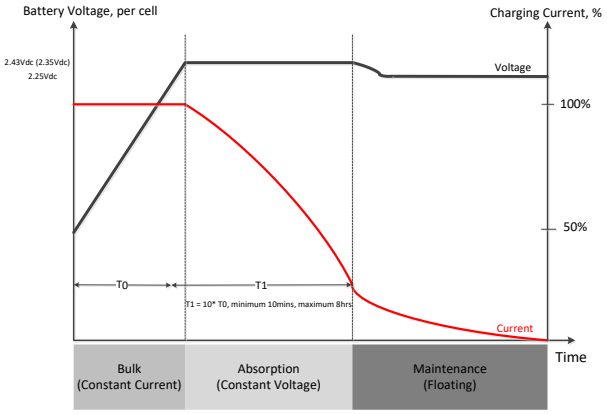
Utility Charging Mode			
MODEL		**Krypton 6000**	**Krypton 6500**
Charging Current (UPS) @ Nominal Input Voltage		100Amp(@$V_{I/P}$=230Vac)	
Bulk Charging Voltage	**Flooded Battery**	29.2	
	AGM / Gel Battery	28.2	
Floating Charging Voltage		27Vdc	
Charging Algorithm		3-Step	
Charging Curve			
Solar Input			
MODEL		**Krypton 6000**	**Krypton 6500**
Max. PV Array Power		6000W	6500W
Max. PV Current		40A	
Nominal PV Voltage		160Vdc	170Vdc
Start-up Voltage		60Vdc +/- 10Vdc	
PV Array MPPT Voltage Range		60Vdc~450Vdc	
Max. PV Array Open Circuit Voltage		500Vdc	
Max Charging Current **(AC charger plus solar charger)**		120Amp	

Table 4 General Specifications

MODEL	**Krypton 6000**	**Krypton 6500**
Operating Temperature Range	-10°C to 50°C	
Storage temperature	-15°C~ 60°C	
Humidity	5% to 95% Relative Humidity (Non-condensing)	
Protective class	class I	class I
Dimension (D*W*H), mm	119 x 313.6 x 457.5	
Net Weight, kg	10	12

TROUBLE SHOOTING

Problem	LCD /Buzzer	Explanation / Possible cause	What to do
Unit shuts down automatically during startup process.	LCD 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 displayed as 0 on the LCD.	Input protector is tripped	Check if AC breaker is tripped and AC wiring is connected well.
	No indication.	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)
		Set "Solar First" as the priority of output source.	Change output source priority to Utility first.
When the unit is turned on, internal relay is switched on and off repeatedly.	LCD display flashing	Battery is disconnected.	Check if battery wires are connected well.
Buzzer beeps continuously and red LED is on.	Fault code 07	Overload error. The inverter is overload 110% and time is up.	Reduce the connected load by switching off some equipment.
	Fault code 05	Output short circuited.	Check if wiring is connected well and remove abnormal load.
	Fault code 02	Internal temperature of inverter component is over 100°C.	Check whether the air flow of the unit is blocked or whether the ambient temperature is too high.
	Fault code 03	Battery is over-charged.	Return to repair center.
		The battery voltage is too high.	Check if spec and quantity of batteries are meet requirements.
	Fault code 01	Fan fault	Replace the fan.
	Fault code 06/58	Output abnormal (Inverter voltage below than 190Vac or is higher than 260Vac)	1. Reduce the connected load. 2. Return to repair center
	Fault code 08/09/53/57	Internal components failed.	Return to repair center.
	Fault code 51	Over current or surge.	Restart the unit, if the error happens again, please return to repair center.
	Fault code 52	Bus voltage is too low.	
	Fault code 55	Output voltage is unbalanced.	
	Fault code 59	PV voltage is beyond the acceptable range	Reduce the number of PV modules in series.

Appendix I: BMS Communication Installation

1. Introduction

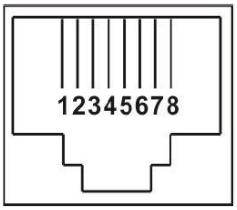
If connecting to lithium battery, it is recommended to purchase a custom-made RJ45 communication cable. Please check with your dealer or integrator for details.

This custom-made RJ45 communication cable delivers information and signal between lithium battery and the inverter. These information are listed below:

- Re-configure charging voltage, charging current and battery discharge cut-off voltage according to the lithium battery parameters.
- Have the inverter start or stop charging according to the status of lithium battery.

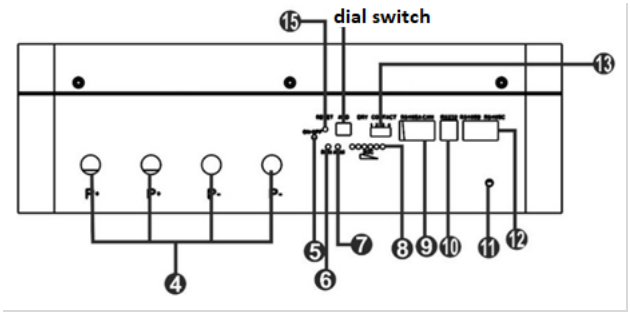
2. Pin Assignment for BMS Communication Port

	Definition
PIN 1	RS232TX
PIN 2	RS232RX
PIN 3	RS485B
PIN 4	NC
PIN 5	RS485A
PIN 6	CANH
PIN 7	CANL
PIN 8	GND



3. Lithium Battery Communication Configuration

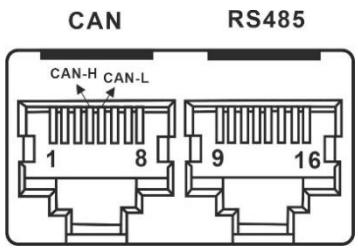
LIO II-2410E



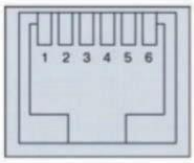
1. ADD: It indicates the unique ADD code for each battery module. It's required to assign a unique ID to each battery module for parallel operation. Maximum 15 battery modules can be operated in parallel. The explanation of its dial switch as shown in below table.

Address Code				ADD	PACK Definition	Address Code				ADD	PACK Definition
1	2	3	4			1	2	3	4		
ON	OFF	OFF	OFF	1	PACK1	ON	OFF	OFF	ON	9	PACK9
OFF	ON	OFF	OFF	2	PACK2	OFF	ON	OFF	ON	10	PACK10
ON	ON	OFF	OFF	3	PACK3	ON	ON	OFF	ON	11	PACK11
OFF	OFF	ON	OFF	4	PACK4	OFF	OFF	ON	ON	12	PACK12
ON	OFF	ON	OFF	5	PACK5	ON	OFF	ON	ON	13	PACK13
OFF	ON	ON	OFF	6	PACK6	OFF	ON	ON	ON	14	PACK14
ON	ON	ON	OFF	7	PACK7	ON	ON	ON	ON	15	PACK15
OFF	OFF	OFF	ON	8	PACK8						

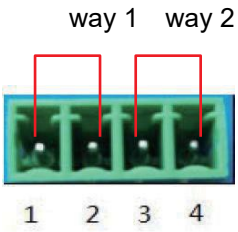
2. CAN & RS485: CAN Communication Terminal:(RJ45port) follow CAN protocol, for output battery information.

CAN Using 8P8C vertical RJ45 socket		RS485 Using 8P8C vertical RJ45 socket		
RJ45 Pin	Definition description	RJ45 Pin	Definition description	
1, 3, 6, 7, 8	NC	9, 16	RS485-B1	
4	CAN-H	10, 15	RS485-A1	
5	CAN-L	11, 14	GND	
2	GND	12, 13	NC	

3. RS232 port: (RJ11 port) follow RS232 protocol, for manufacturer or professional engineer to debug or service.

 RS232 port	RS232 Use 6P6C vertical R11 socket	
	RJ11 pin	Definition description
	2	NC
	3	TX
	4	RX
	5	GND

4. Dry contact: Dry Contact Terminal: provided 2 ways input and 2 ways output dry contact signal.



Appendix II: The Wi-Fi Operation Guide

1. Introduction

Wi-Fi module can enable wireless communication between solar inverters and the monitoring platform. Users can remotely monitor and control their inverters when they combine the Wi-Fi module with KNOXHYBRID APP. The App uses the Wi-Fi chip to provide remote monitoring data services, which is beneficial for the daily data monitoring of the inverter, querying the real-time data in the device, sending commands from the device, and operating the device remotely. The app is available for both iOS and Android.

2. Knox APP

2-1. Download and install APP

Please find "KNOXHYBRID" app from Apple® store or Google® Play Store. Install this app in your mobile phone.

Or scan the following QR code with your smart phone and download KNOXHYBRID App.

(Android system)

(iOS system)

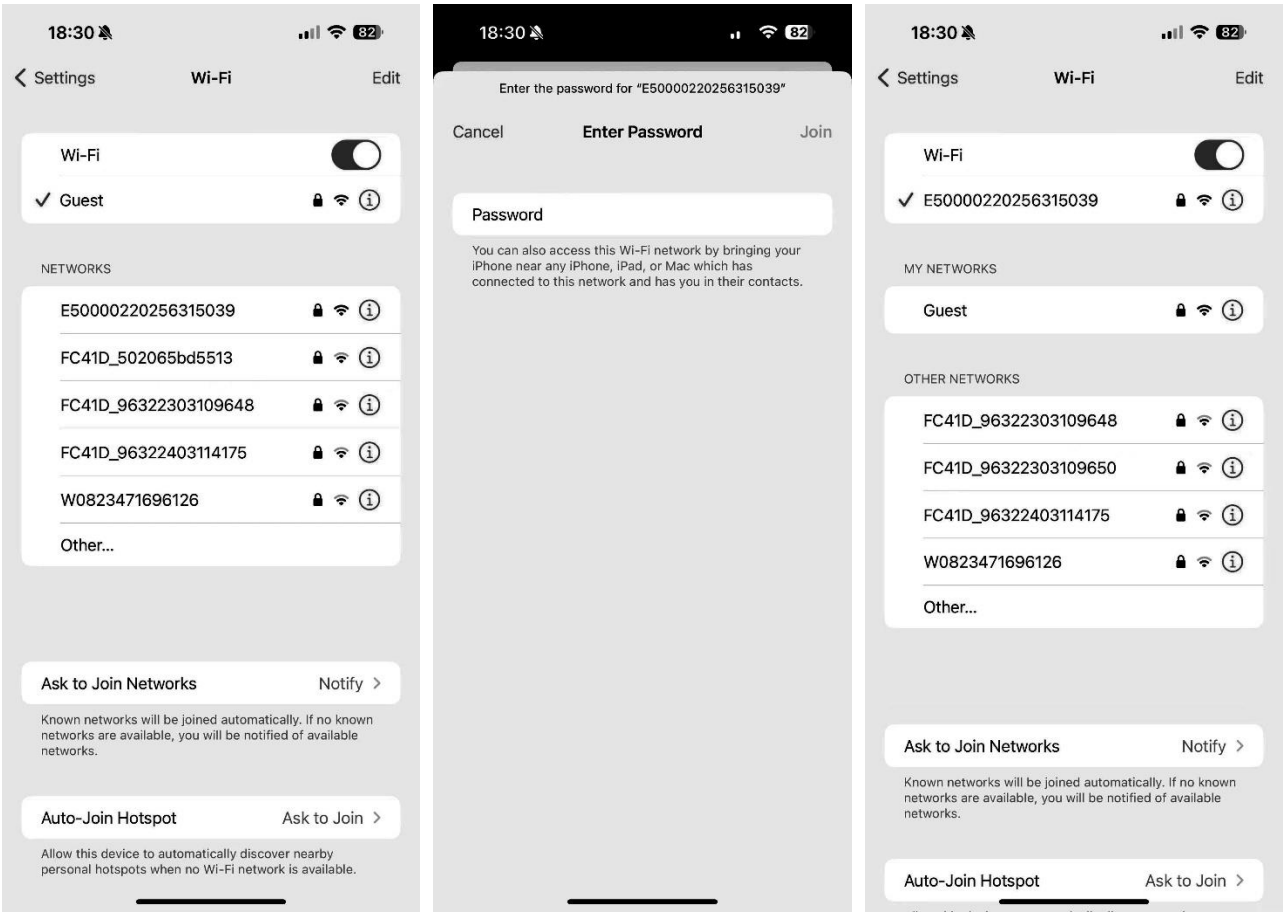
2-2. Initial Setup

Use the KNOXHYBRID app to configure the Wi-Fi module's network via local Wi-Fi or Bluetooth.

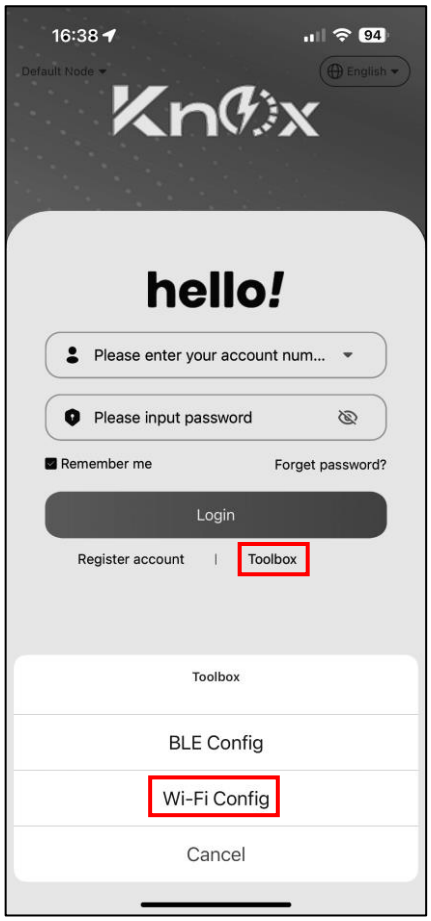
Local Wi-Fi Configuration

If you have configured the network through Bluetooth, please skip this section.

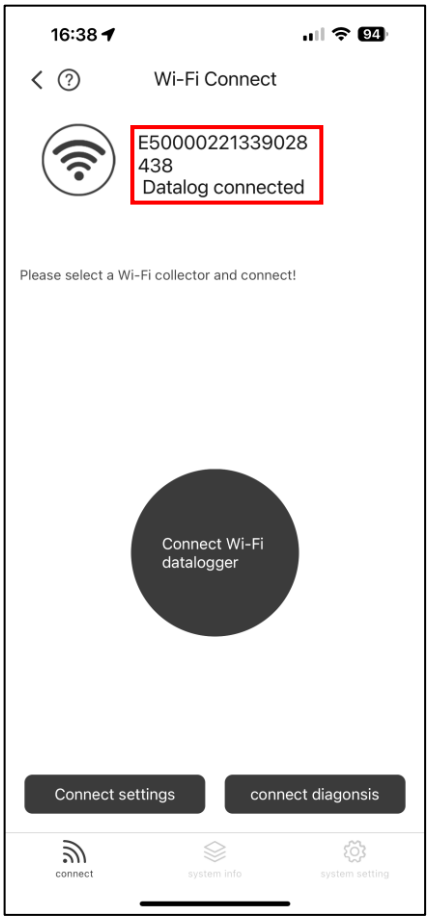
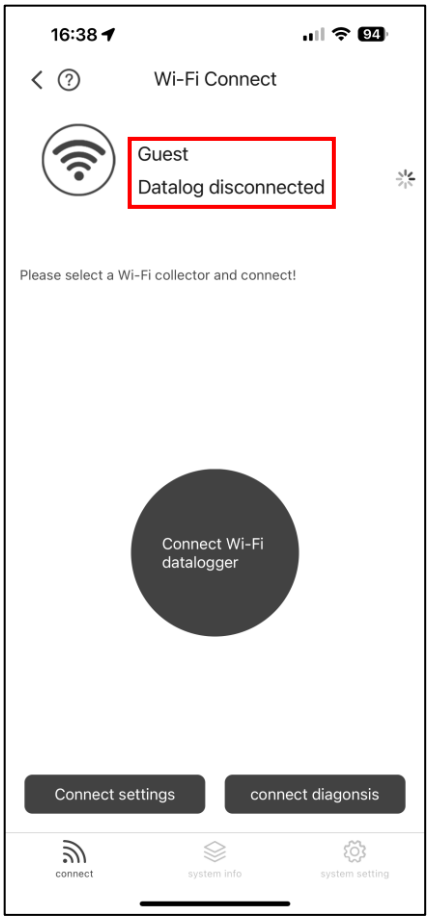
- Turn on the unit.
- Open the Wi-Fi settings on your smartphone.
- Connect your smartphone to the Wi-Fi module (the module's PN number is 18 digits).
- The default password is 12345678



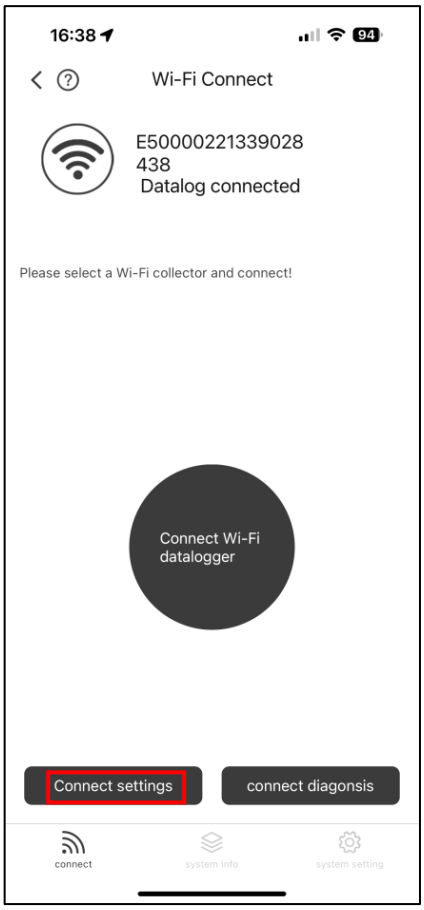
- After a successful Wi-Fi connection, open the KNOXHYBRID app on your phone. On the login page, select "Toolbox," then "Wi-Fi Config" to access the Wi-Fi configuration settings.

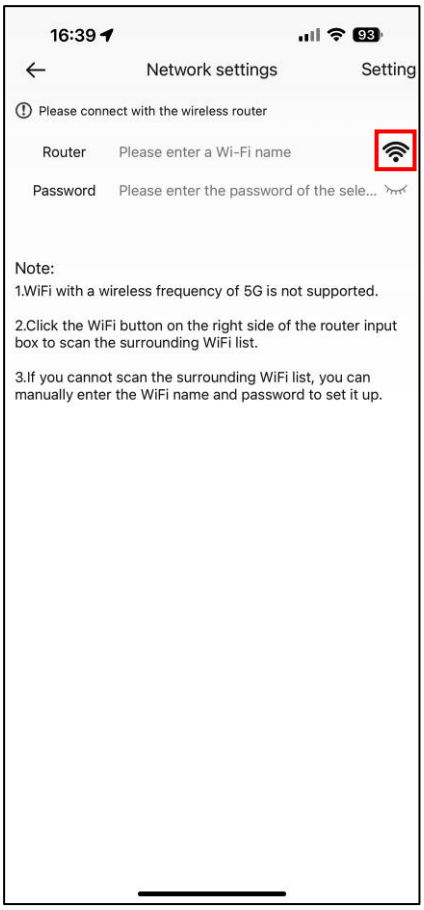


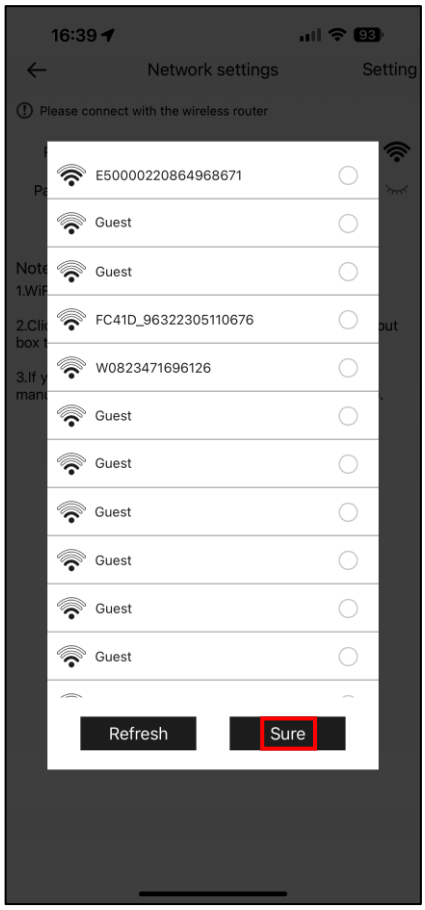
- After entering the Wi-Fi configuration page, please note that the connected Wi-Fi name **must** be the **same as your Wi-Fi module PN number**, and the status **must** be **connected**. If not, please return to the login page, connect your smart phone to the Wi-Fi module, and re-enter the Wi-Fi configuration page.

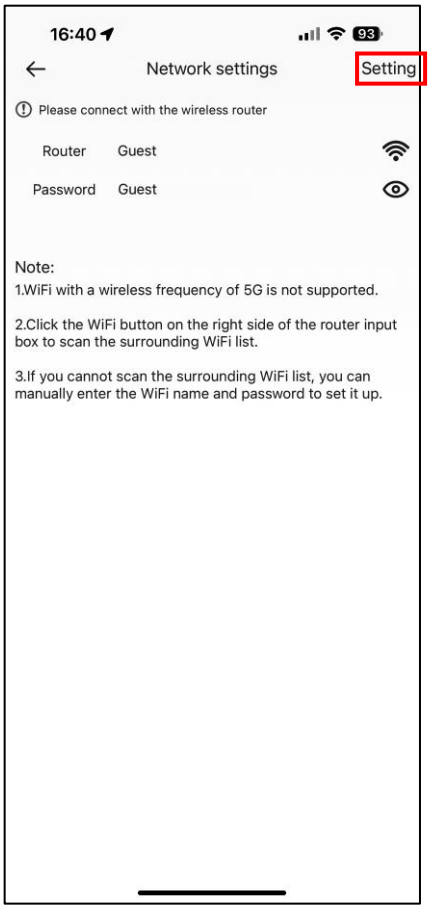
The Wi-Fi module connection is **successfully**	The Wi-Fi module connection **failed**
You can proceed to the next step to configure the network. 	Please return to the login page, connect your smart phone to the Wi-Fi module, and re-enter the Wi-Fi configuration page. 

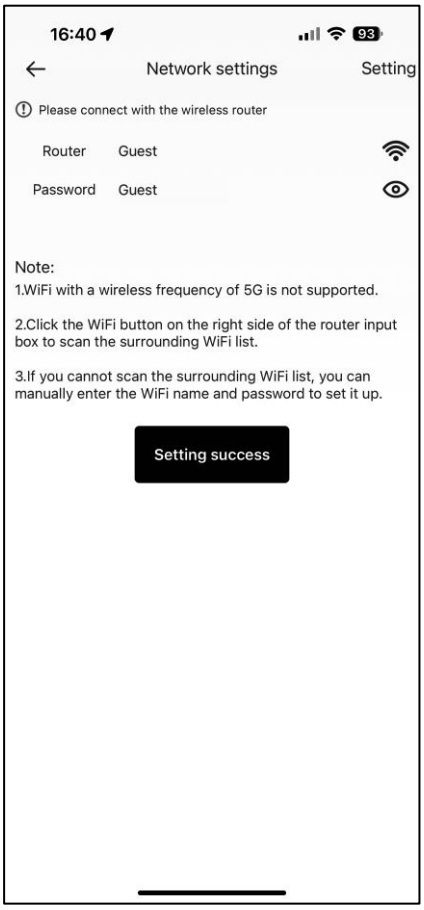
- Click "Connect settings" to manually enter the router name or click to choose the router name. Then, enter the router password and click the "Setting" to complete the setting.
  The Wi-Fi module only could connect the router at **2.4GHz**.



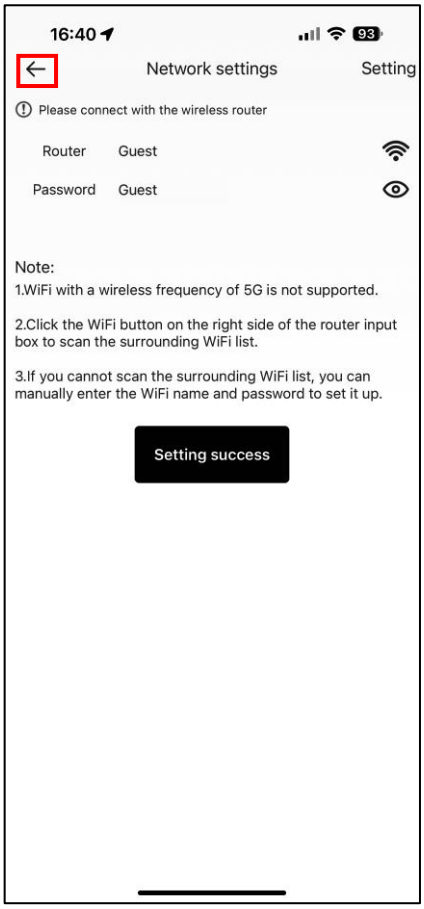


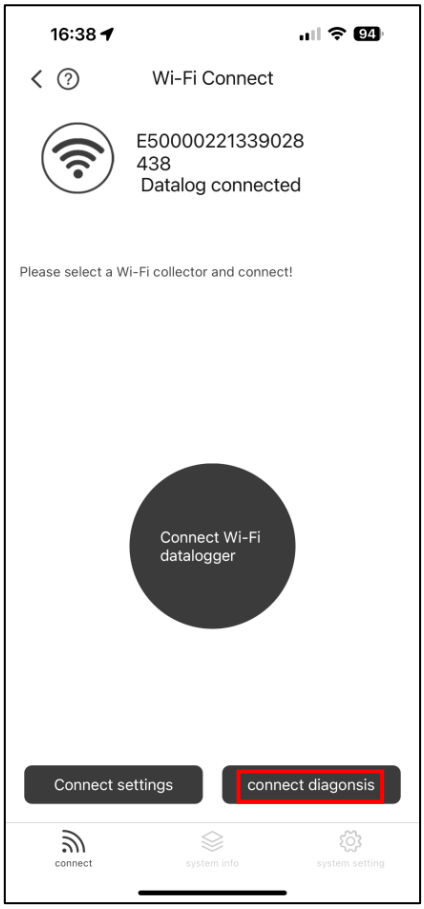




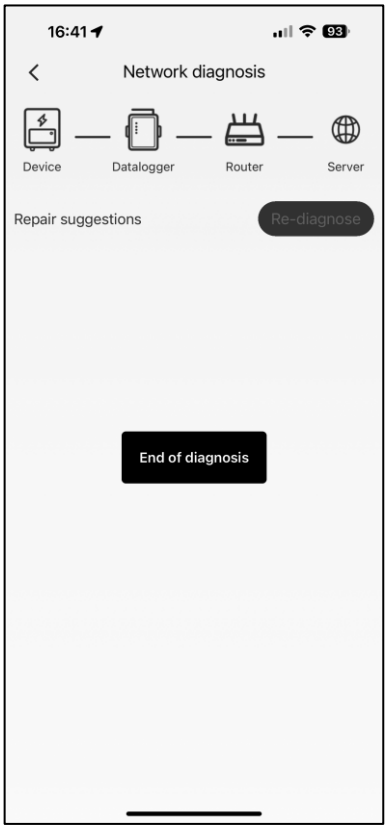


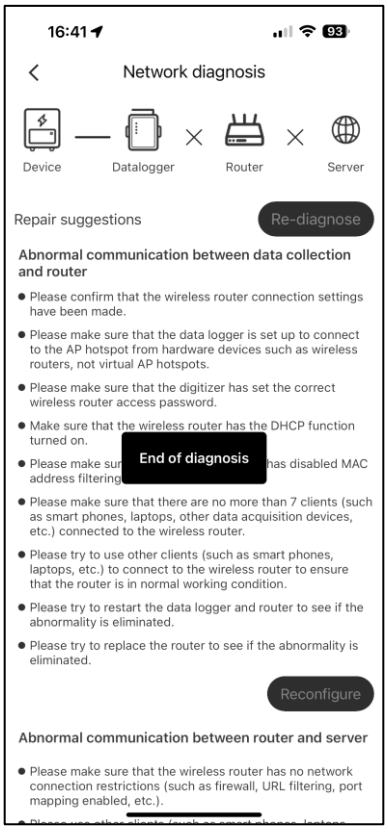
- Click ← to return to the Wi-Fi configuration page. Click "Connect diagnosis" to check the connection status.



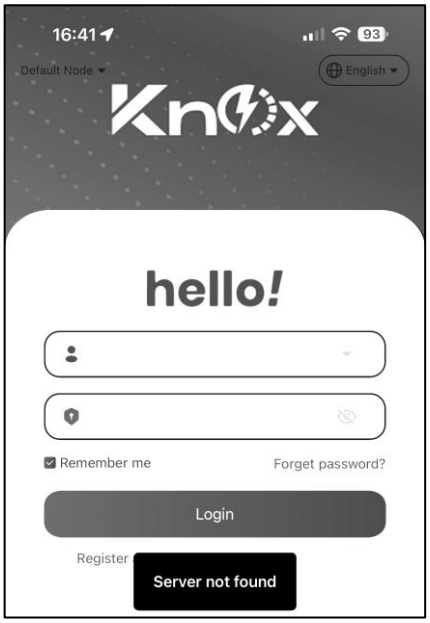


The configuration is **successfully**	The configuration **failed**
Green lines between device, datalogger, router, and server.	Red crosses between device, datalogger, router, and server. Please refer to APP instructions to re-configure.





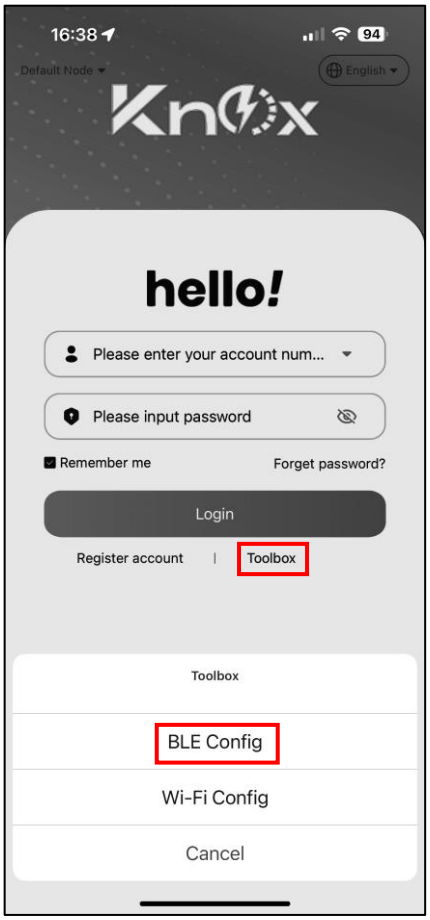
- After configuring Wi-Fi, please **forget** the Wi-Fi module on your smartphone to avoid automatic reconnection and unable to access the network. The login page will prompt "Server not found".



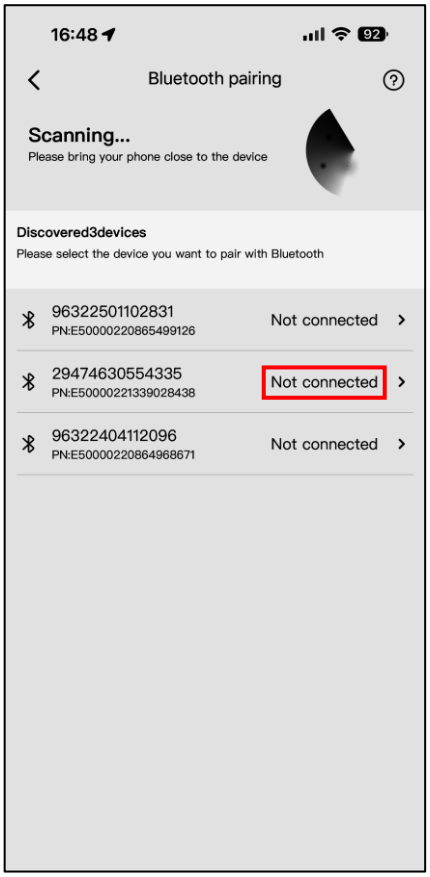
Bluetooth Configuration

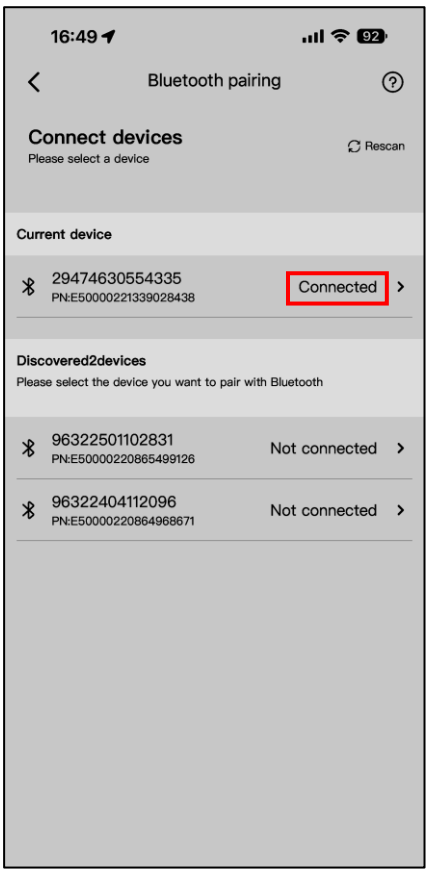
If you have configured the network through Wi-Fi, please skip this section.

- Turn on the unit.
- Open the Bluetooth from your smart phone.
- Click the KNOXHYBRID APP installed in the phone to enter the login page. Then, click the "Toolbox" and choose "BLE Config" to enter the Bluetooth configuration page.

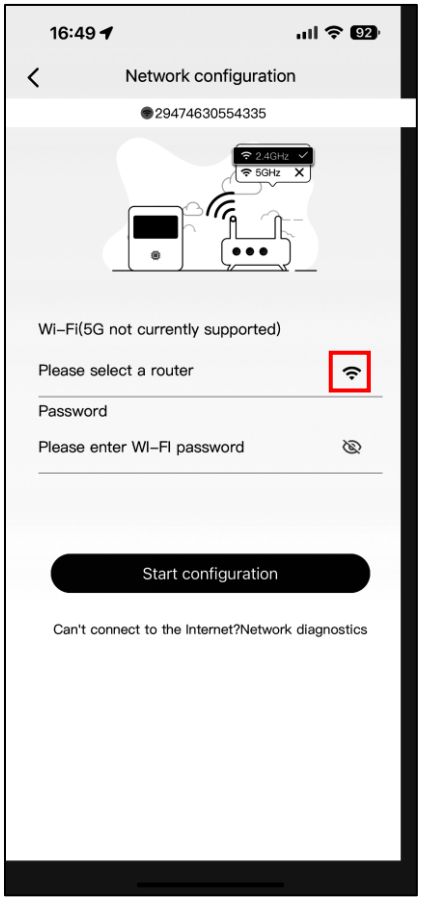


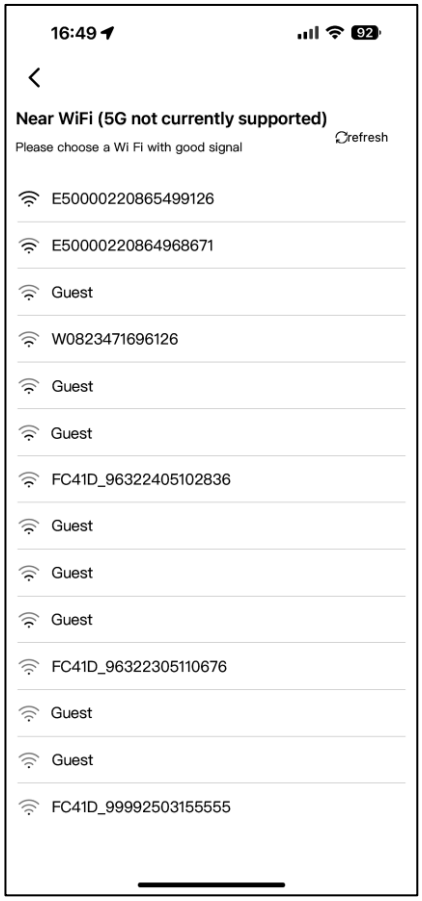
- Connect your smart phone to the Wi-Fi module through Bluetooth.

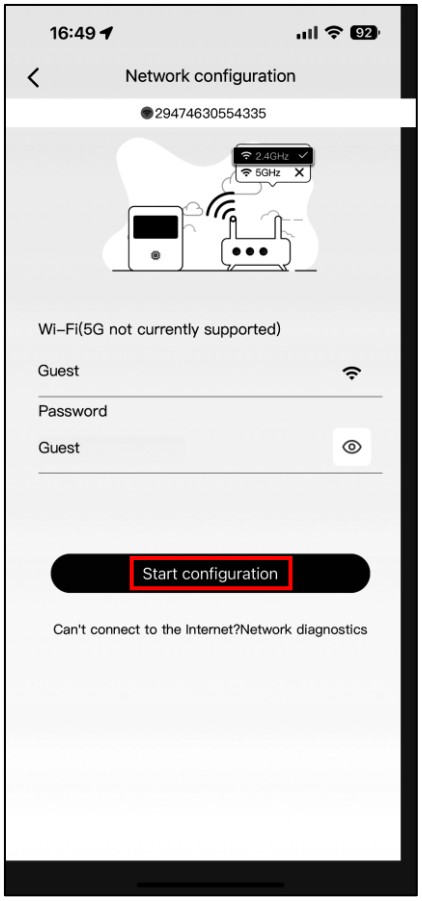


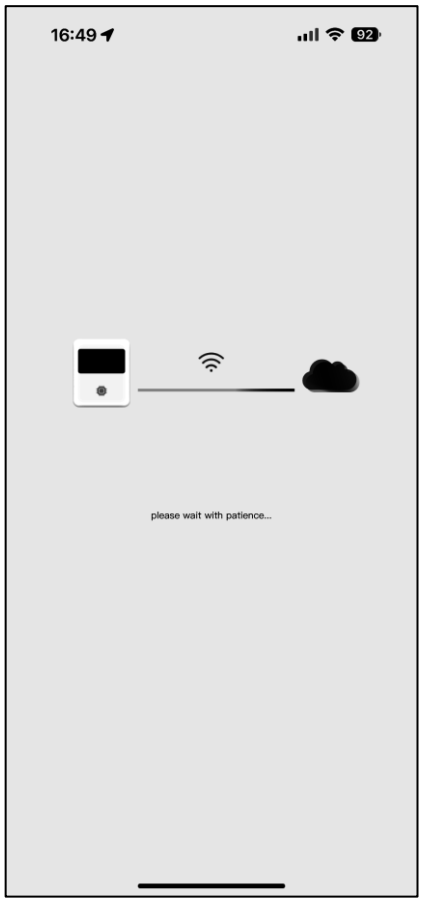


- Manually enter the router name or click  to choose the router name, enter the router password, and then click the "Setting" to complete the setting. Click “Start configuration” to check the connection status. The Wi-Fi module only could connect the router at **2.4GHz**.

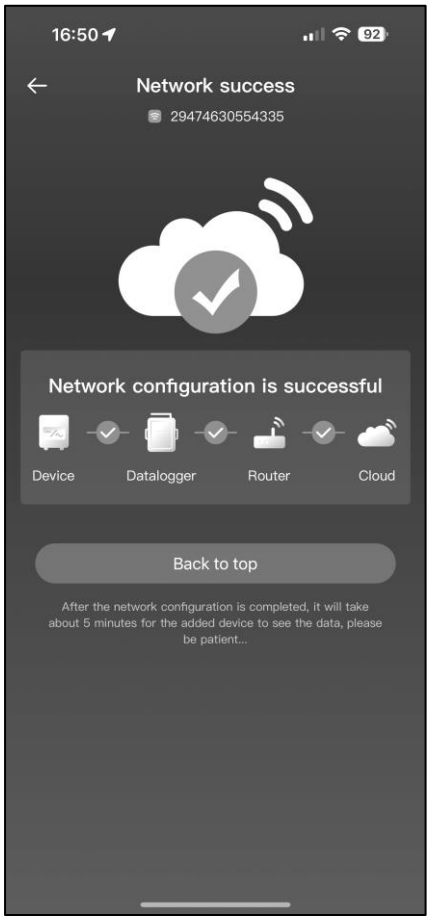


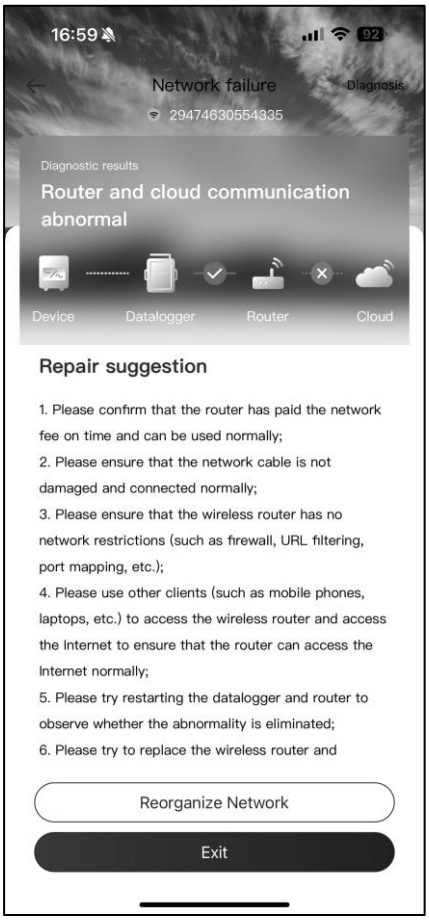




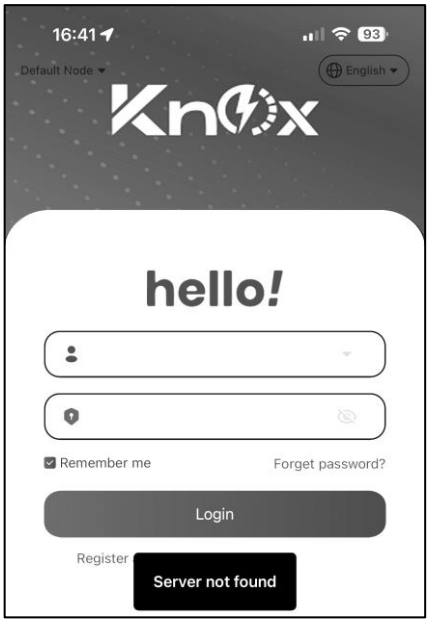


The configuration is **successfully**	The configuration **failed**
Green lines between device, datalogger, router, and server.	Red crosses between device, datalogger, router, and server. Please refer to APP instructions to reconfigure.



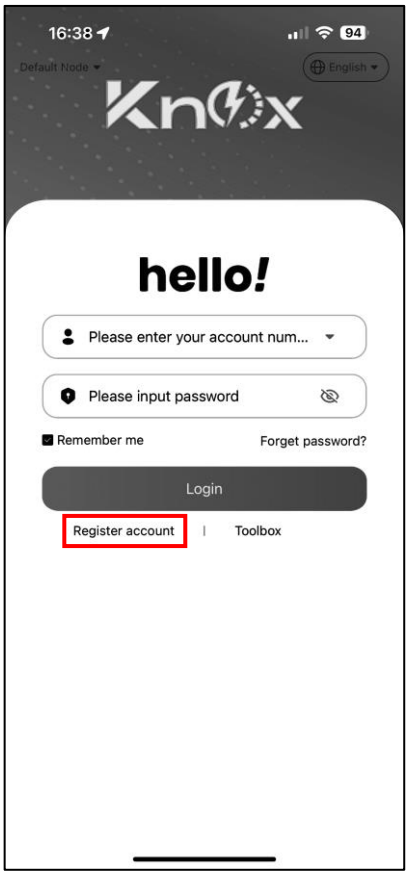


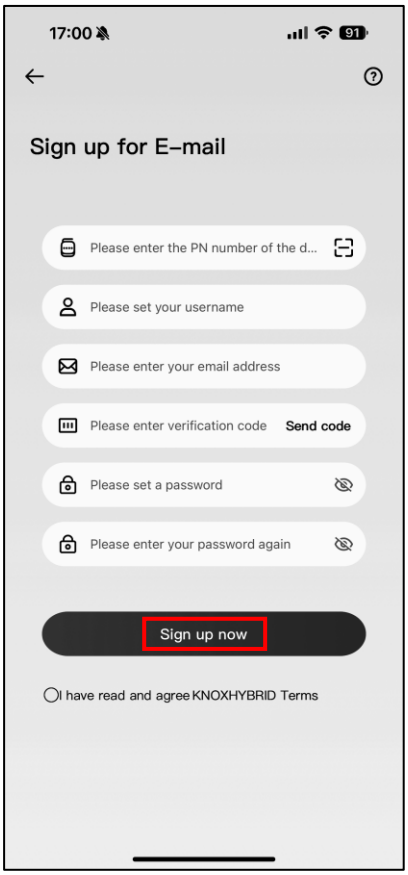
- After configuring Bluetooth, please **disconnect** the Wi-Fi module from your smartphone's Bluetooth settings to prevent automatic reconnection and unable to access the network. The login page will prompt "Server not found".

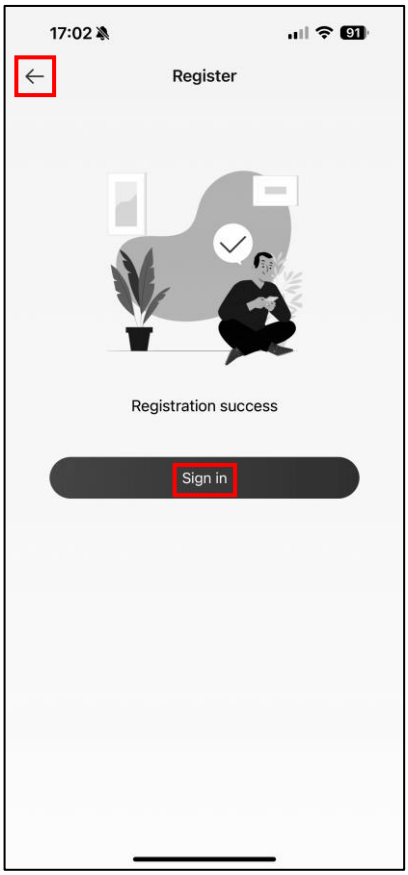


2-3 Registration and login

- Connect your smart phone to the router.
- Registration at first time.
- Click the "Register" to enter registration page and fill in the information. Once registration is complete, click "Sign in" or click ← to return to the home page. Then, enter the registered username and password to log in.

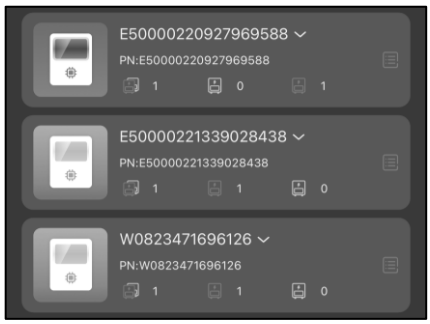






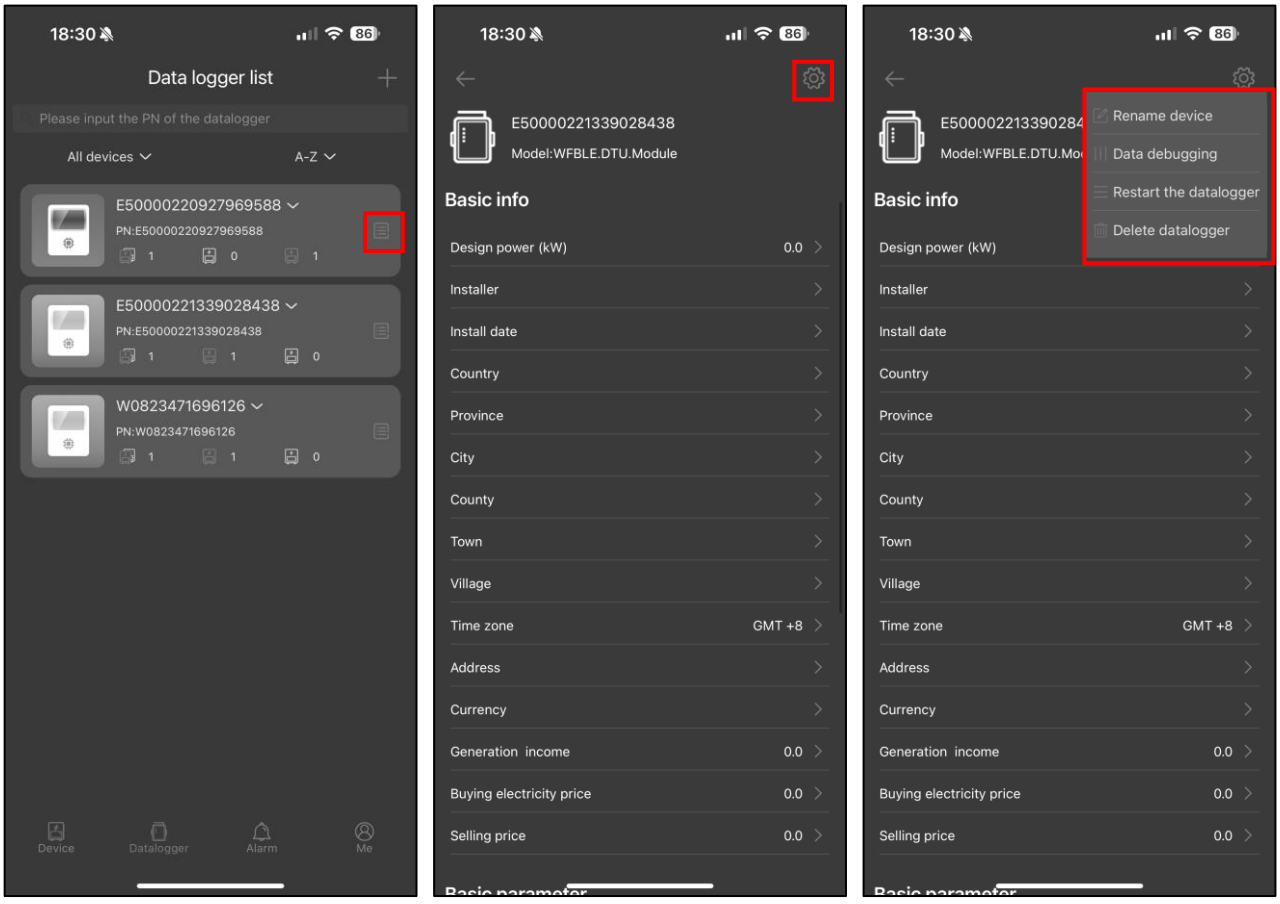
2-4 Datalogger

- After login, the default Home page will appear.
- Choose Datalogger page to see the Wi-Fi module list.
  - Gray icon means Wi-Fi module is offline. Please refer to 2-2 Initial Setup to choose local Wi-Fi or Bluetooth configure Wi-Fi module network.
  - Green icon means Wi-Fi module is online.



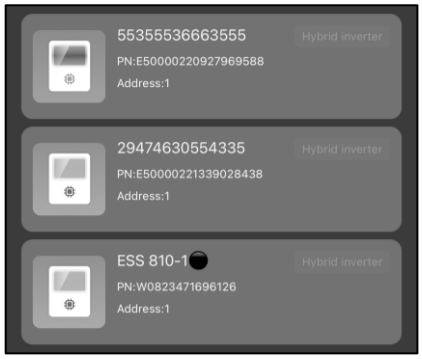
- Click  to see the Wi-Fi module information.

- Click  to rename device, data debugging, restart the datalogger, and delete datalogger.
  - Rename device: rename the Wi-Fi module name.
  - Data debugging: send RS232 commands to the inverter in hexadecimal format.
  - Restart the datalogger: restart the Wi-Fi module.
  - Delete datalogger: delete the Wi-Fi module. The inverter information in the device page will **also be deleted**. Once deleted, you **can** add datalogger under another account.



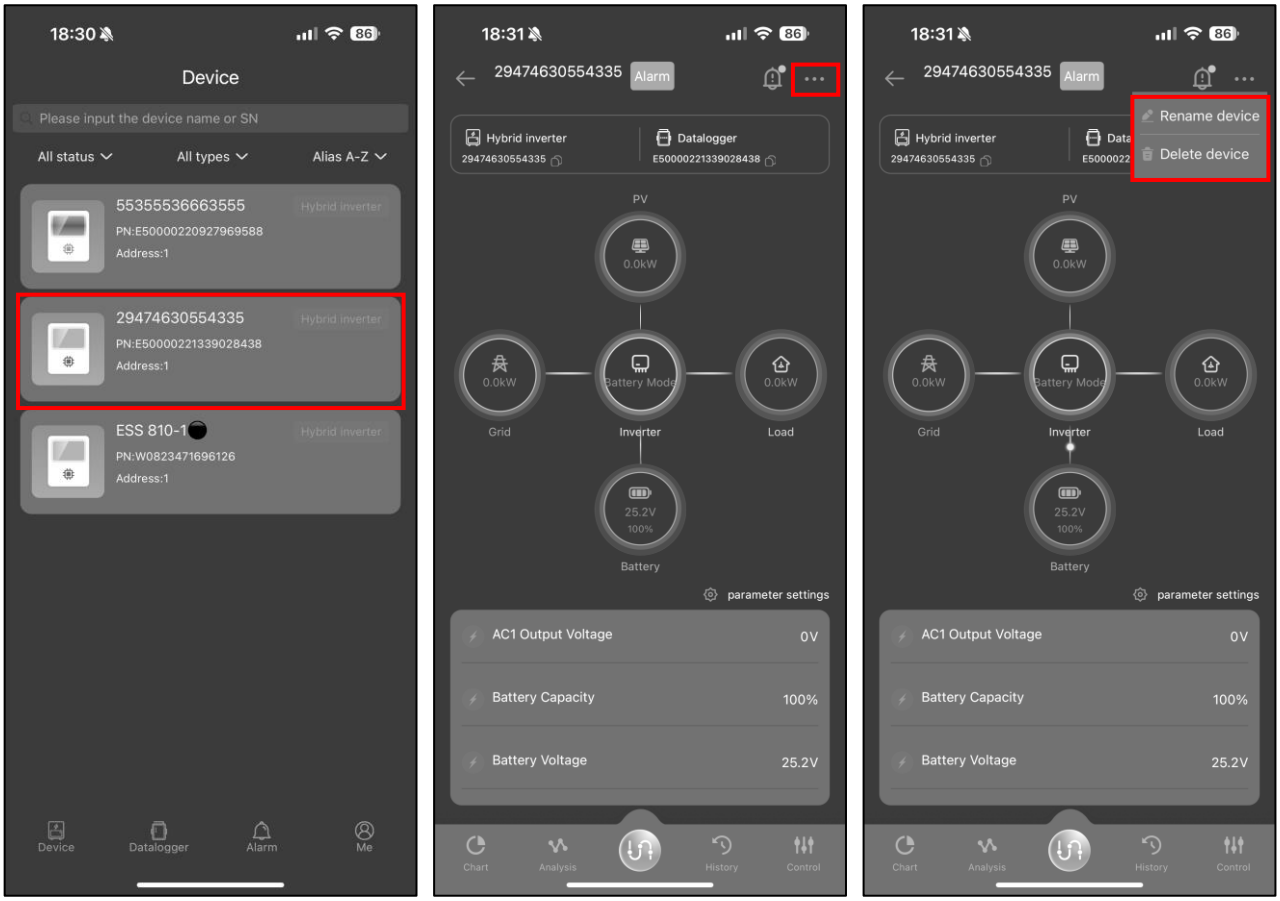
2-5 Device

- Choose Device page to see the inverter list.
  - Gray icon means inverter is offline.
  - Green icon means inverter is online and no warnings and faults.
  - Yellow icon means inverter is online and has a warning.
  - Red icon means inverter is online and has a fault.

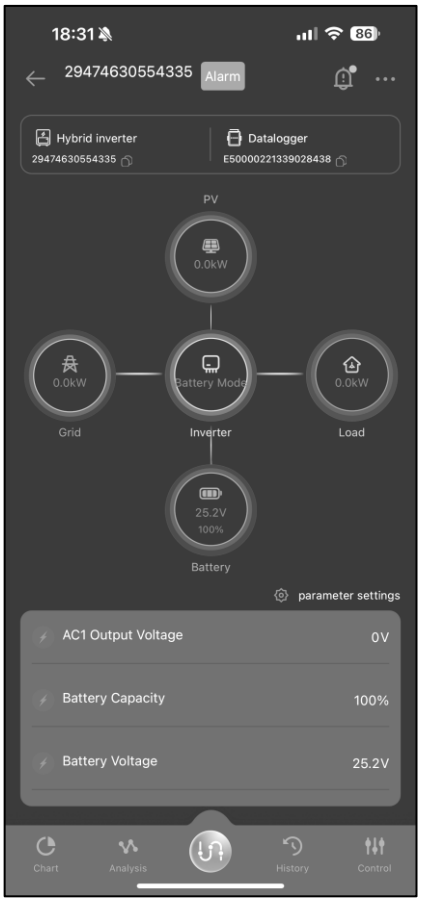


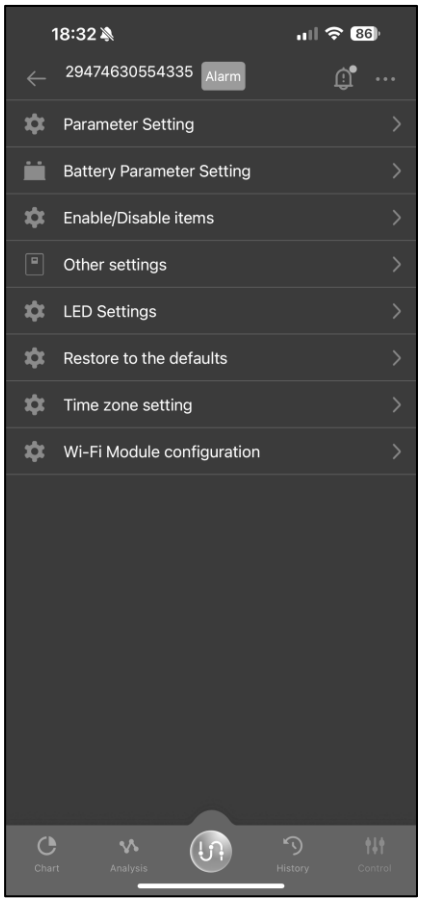
- Click  to see the inverter information.

- Click  to rename device and delete device.
  - Rename device: rename the inverter name.
  - Delete device: delete the inverter. The Wi-Fi module information in the datalogger page will **not be deleted**. Even if deleted, you **cannot** add Wi-Fi module under another account.

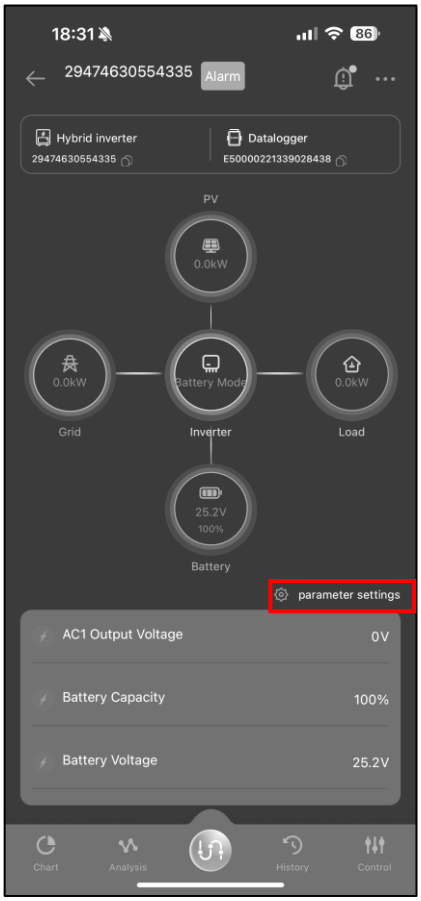


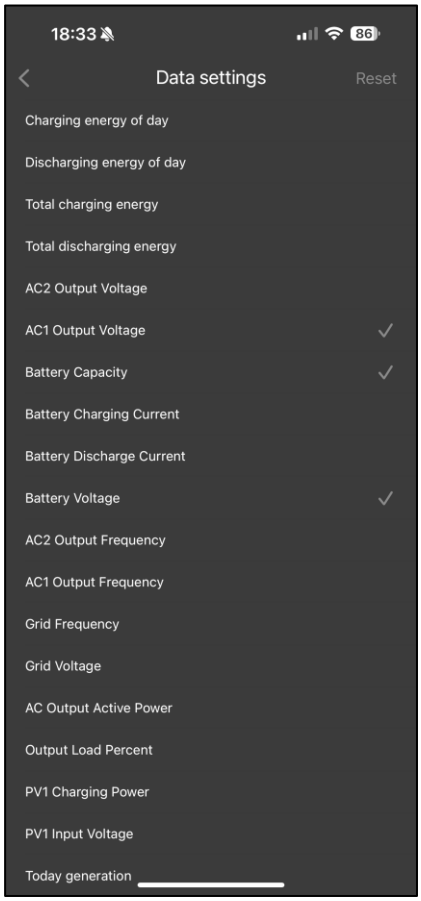
- Click "Control" to enter setting parameters page. The setting items on the parameter page will be different based on different models.

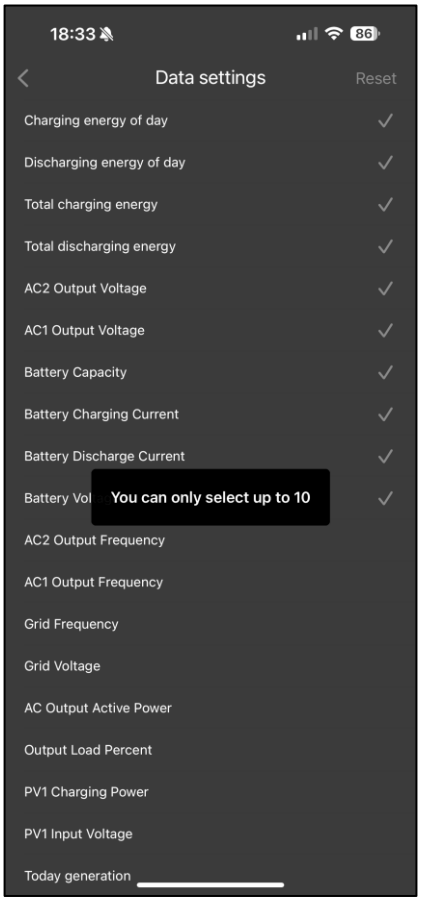




- Click "  " to see the inverter real-time data. Click "parameter settings" to choose data you want to see on the real time page. You can choose up to **10 data**.







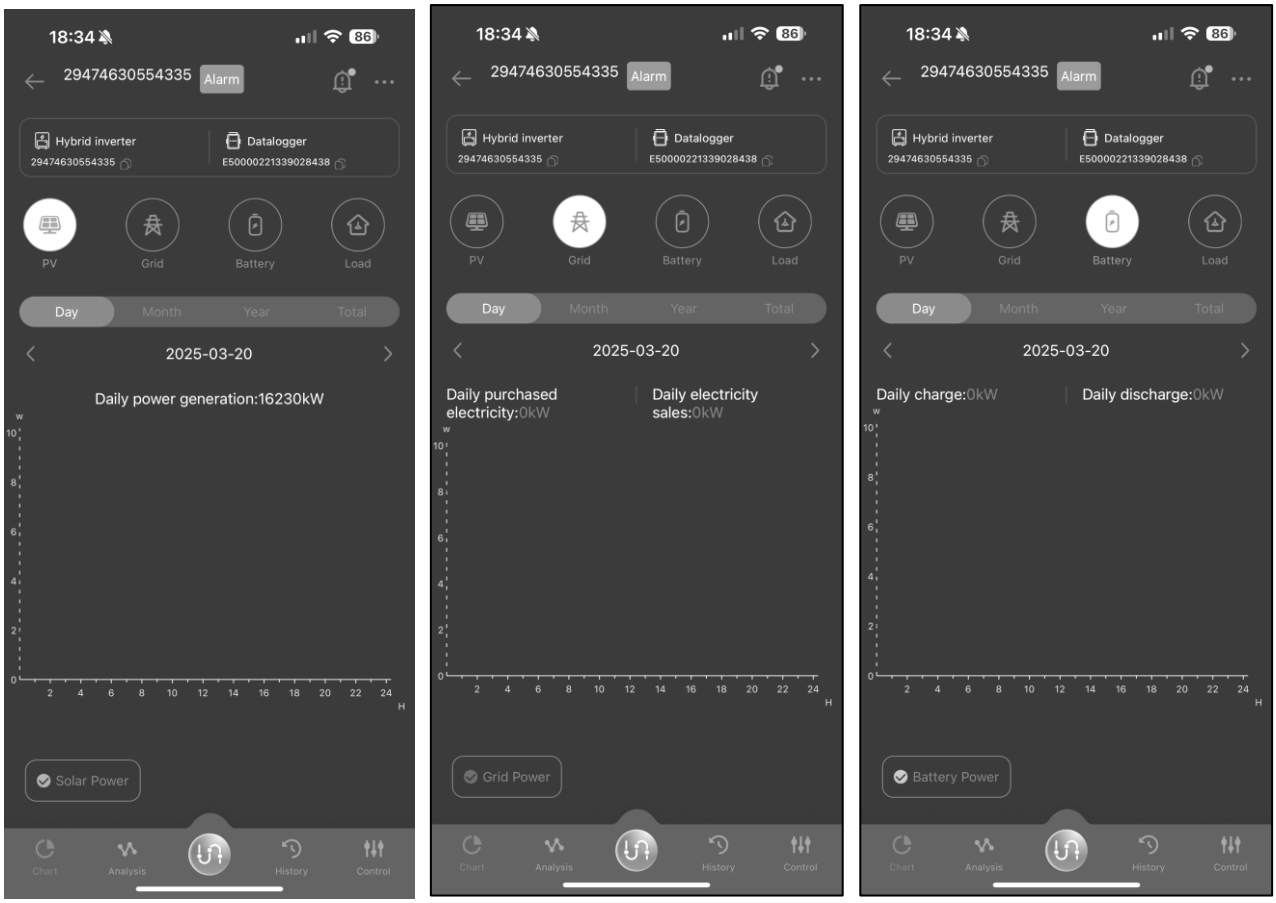
- Click “Chart” to see the inverter solar, grid, battery and load power per hour, day, month and year.

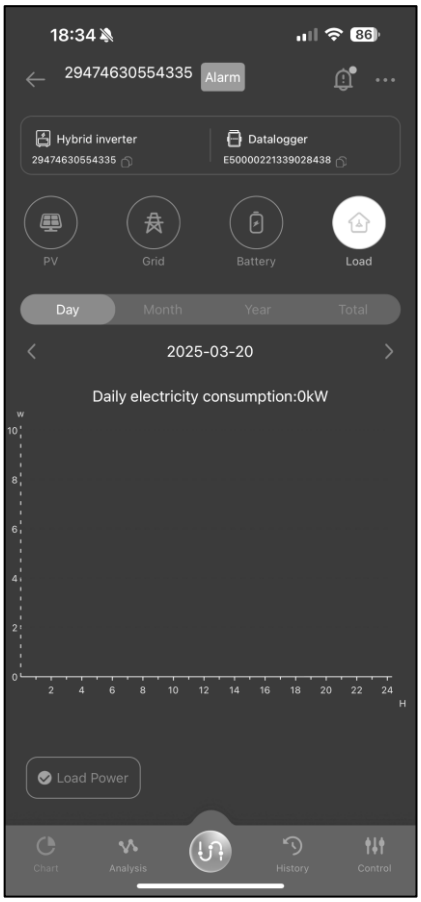
  Day: Click the button to query the hourly power generation data of the current day.

  Month: Click the button to query the daily power generation data of the current month.

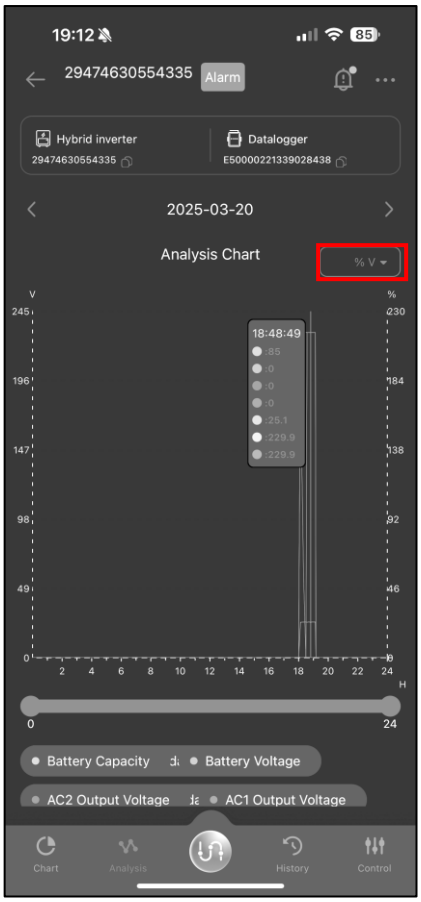
  Year: Click the button to query the monthly power generation data of the current year.

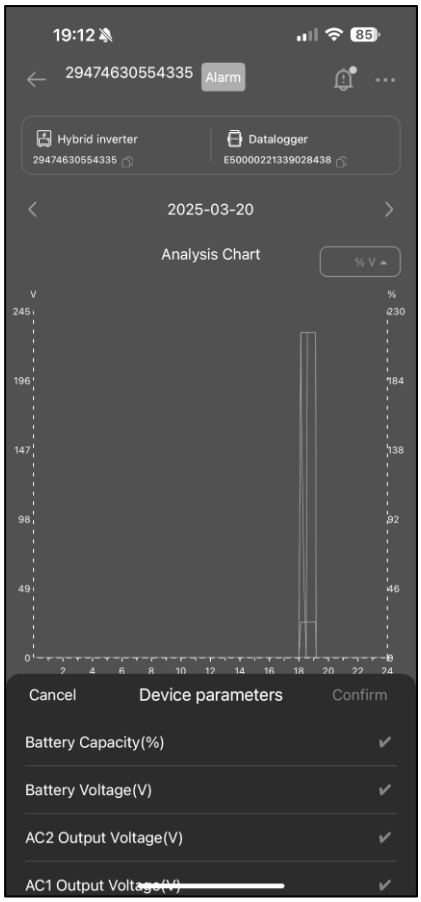
  Total: Click the button to query the annual power generation data.



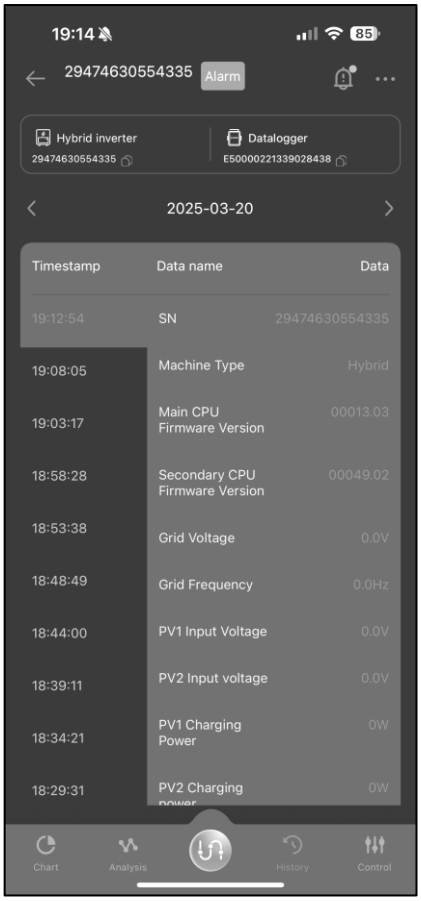


- Click "Analysis" to see the inverter data per hour. Click "SelectedXTerm" to choose the data you want to compare. You can choose up to **2 different units** such as energy (kWh) and current (A).

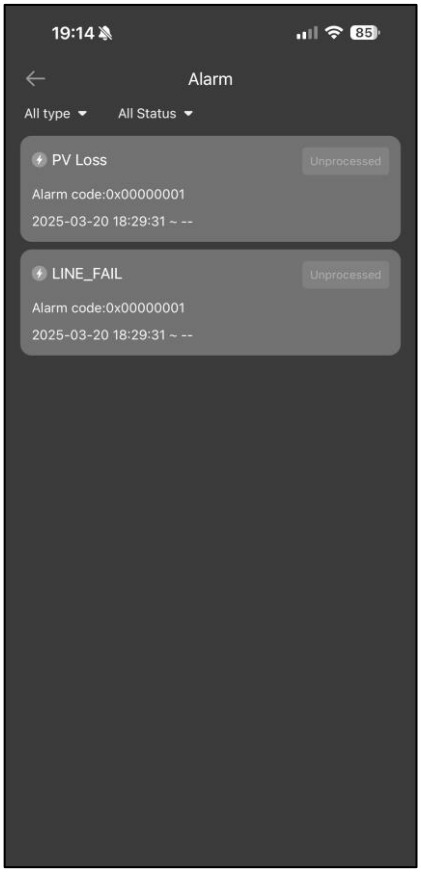




- Click “History” to see the inverter history.



- Click “  ” to see the inverter warning and fault.

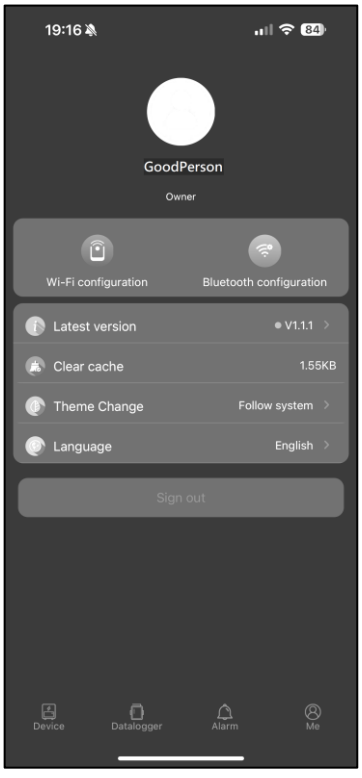


2-6 Alarm

- Choose Alarm page to see the warning and fault list of all inverters.

2-7 Me

- Choose Me page to see account information and app version.
- Click "Username" to modify nick name and password, and check if the mail has been bound. If the mail is bound, you can retrieve password through mail.
- Click "Theme Change" to modify app background, "Language" to change language and check app is the latest version.

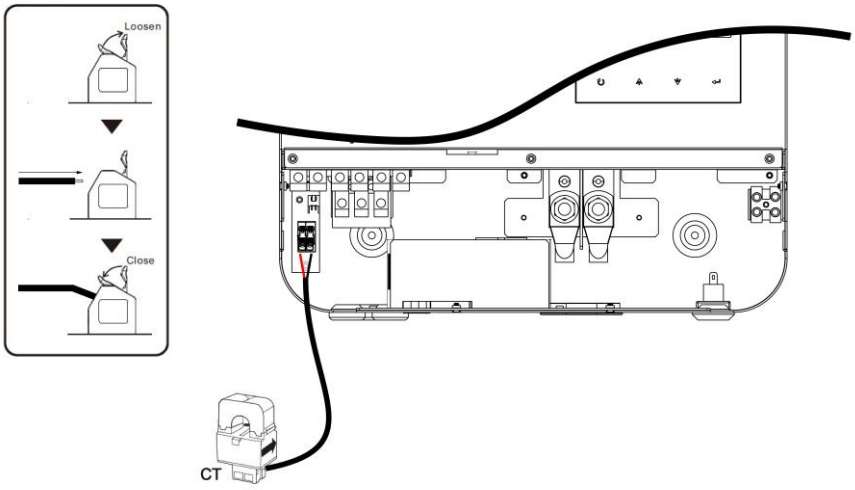


Appendix III: The CT Operation Guide

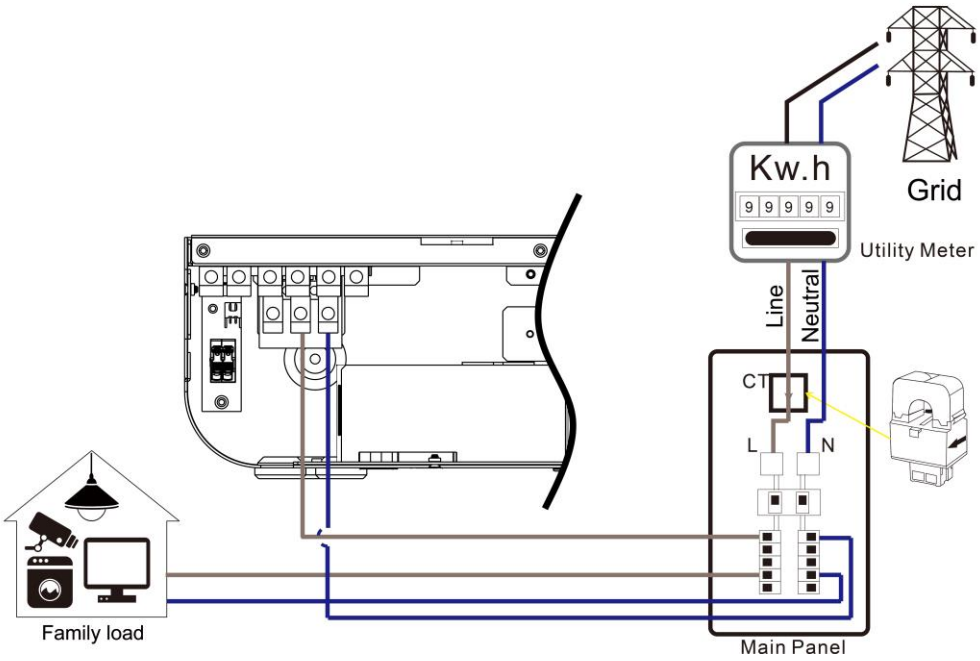
With External CT connected, solar inverter can be easily integrated into the existing household system. It's to arrange self-consumption via CT to control power generation and battery charging of the inverter.

1. CT Connection

Step 1. Power off the inverter and connect the external CT install on the spring terminal block. Be noted the mark of current flow direction on the CT should point to the Inverter and the polarity on connecting CT wires on the terminal block should be followed as "L+" vs red wire and "L-" vs white wire.

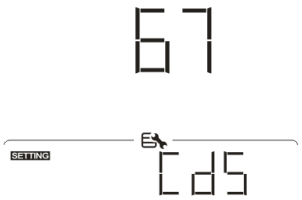


1-1 Connection diagram



Step 2: Power on all inverters, wake up the LCD and modify the Settings.

Step 3: Enter LCD setting on the inverter with CT sensor connected and change External CT function to "Enable".

External CT function	Disable (default) 	Enable