USER MANUAL

Krypton 9000
INVERTER / CHARGER

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.

INTRODUCTION

This hybrid PV inverter can provide power to connected loads by utilizing PV power, utility power and battery power.

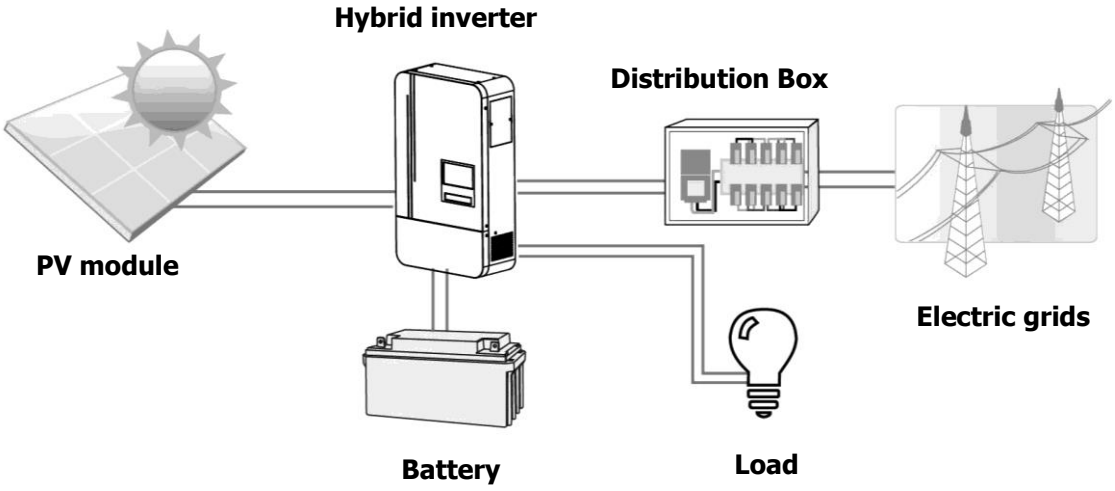
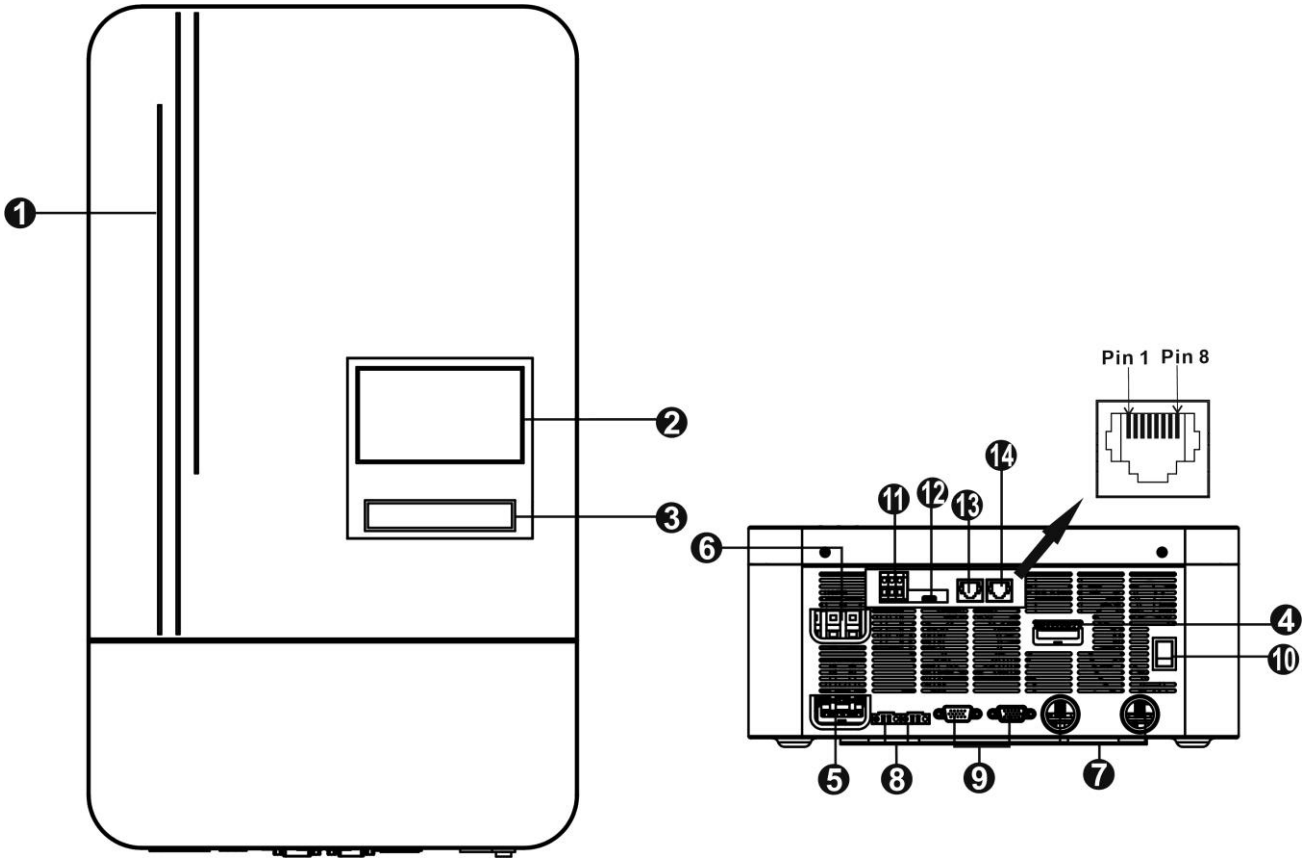


Figure 1 Basic hybrid PV System Overview

Depending on different power situations, this hybrid inverter is designed to generate continuous power from PV solar modules (solar panels), battery, and the utility. When MPP input voltage of PV modules is within acceptable range (see specification for the details), this inverter is able to generate power to feed the grid (utility) and charge battery. **Never connect the positive and negative terminals of the solar panel to the ground.** See Figure 1 for a simple diagram of a typical solar system with this hybrid inverter.

Product Overview



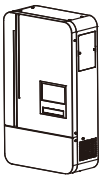
NOTE: For parallel installation and operation, please check *Appendix I.*

1. RGB LED ring (refer to LCD Setting section for the details)
2. LCD display
3. Function buttons
4. PV connectors
5. AC input connectors
6. AC output connectors (Load connection)
7. Battery connectors
8. Current sharing port
9. Parallel communication port
10. Power switch
11. Dry contact
12. USB port as USB communication port and USB function port
13. RS-232 communication port
14. BMS communication port: CAN, RS-485 or RS-232

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:


Inverter

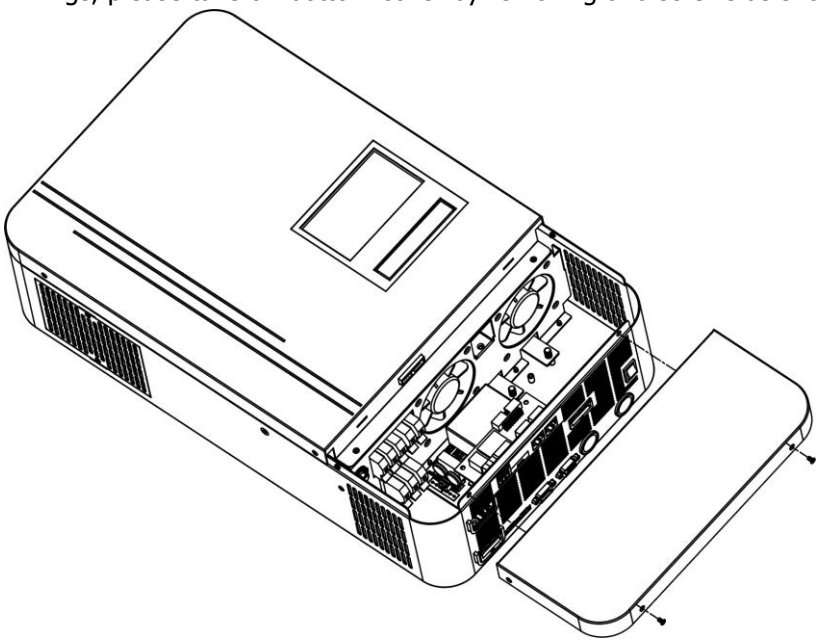

CD

User manual


Com. cable

Preparation

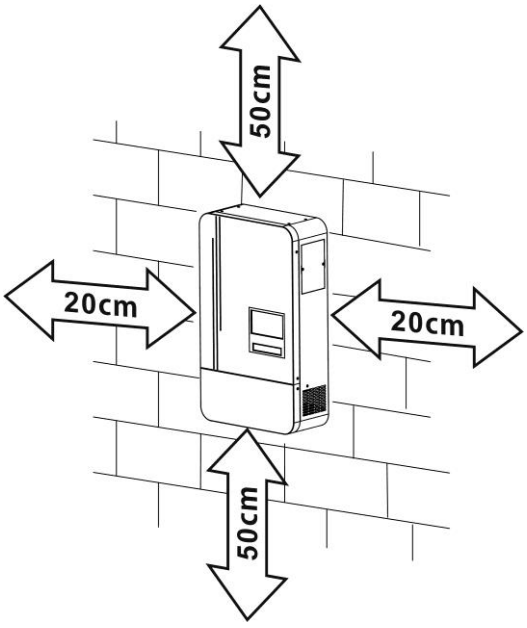
Before connecting all wirings, please take off bottom cover by removing two screws as shown below.



Mounting the Unit

Consider the following points before selecting where to install:

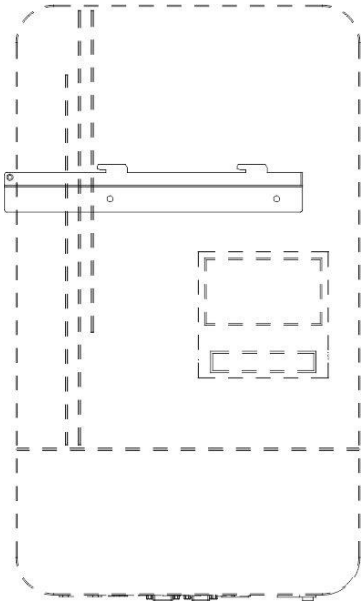
- Do not mount the inverter on flammable construction materials.
- Mount on a solid surface.
- Install this inverter at eye level in order to allow the LCD display to be read at all times.
- The ambient temperature should be between -10°C and 50°C to ensure optimal operation.
- The recommended installation position is to be adhered to the wall vertically.
- Be sure to keep other objects and surfaces as shown in the right diagram to guarantee sufficient heat dissipation and to have enough space for removing wires.



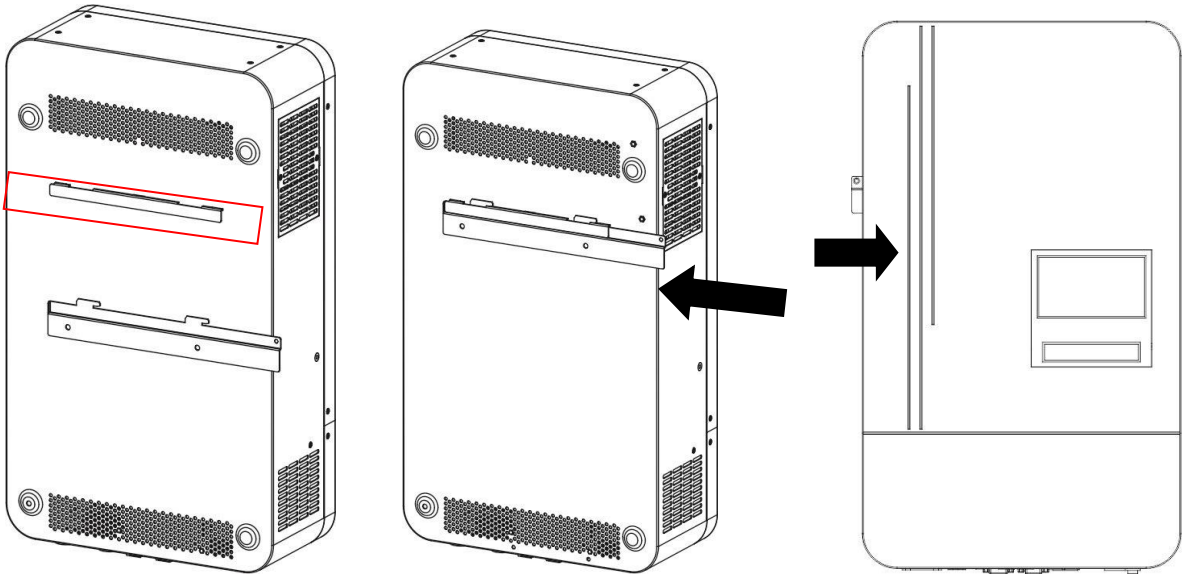
⚠ **SUITABLE FOR MOUNTING ON CONCRETE OR OTHER NON-COMBUSTIBLE SURFACE ONLY.**

Mount the unit to the wall

Step 1: Please fix the mounting bracket  on the wall with screws. Please refer to the dotted line diagram below for the actual installation position of the bracket.



Step 2: Align the groove on the rear side of the inverter with the bracket rail and slide the inverter along the groove direction to install the unit from left to right (follow the arrows below).

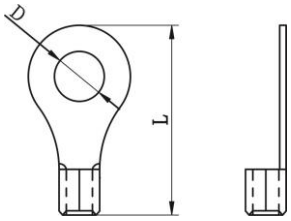


Groove on the rear side of the inverter. Front side of the inverter

Battery Connection

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

Ring terminal:



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

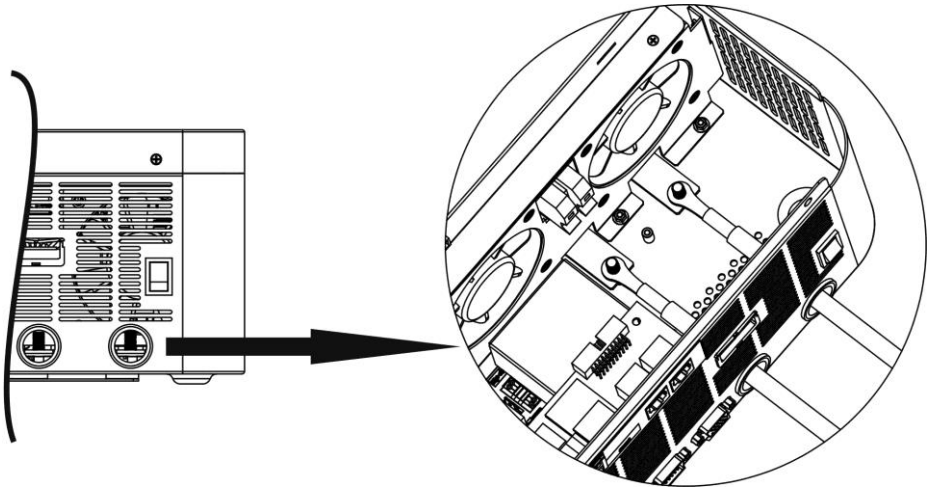
WARNING! It's very important for system safety and efficient operation to use appropriate cable for battery connection. To reduce risk of injury, please use the proper recommended cable and terminal size as below.

Recommended battery cable and terminal size:

Model	Typical Amperage	Battery Capacity	Wire Size	Ring Terminal			Torque Value
				Cable mm²	Dimensions		
					D (mm)	L (mm)	
6.2KW	142A	200AH	1*2AWG or 2*6AWG	28	6.4	42.7	2~3 Nm

Please follow below steps to implement battery connection:

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



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

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

AC Input/Output Connection

CAUTION!! Before connecting to AC input power source, please install a **separate** AC breaker 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.

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	Torque Value
6.2KW	10 AWG	1.2~ 1.6 Nm

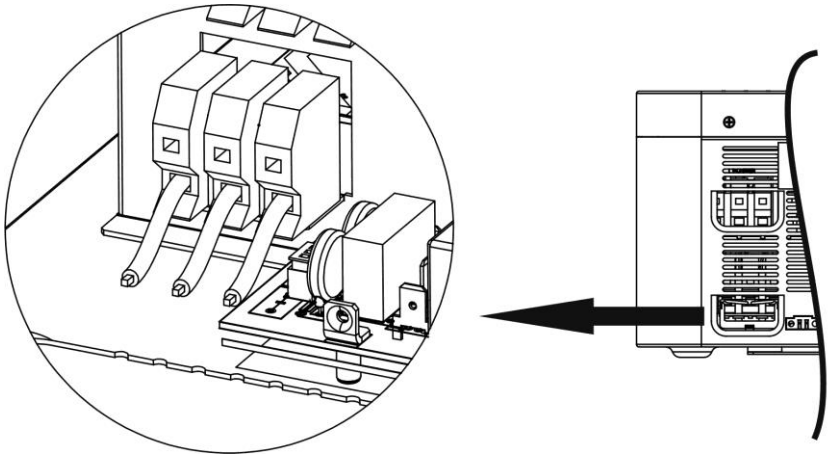
Please follow below steps to implement AC input/output connection:

1. Before making AC input/output connection, be sure to open DC protector or disconnector first.
2. Remove insulation sleeve 10mm for eight conductors. And shorten phase L and neutral conductor 3 mm.
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. Then, insert AC output wires according to polarities indicated on terminal block and tighten terminal screws. Be sure to connect PE protective conductor (⏚) first.

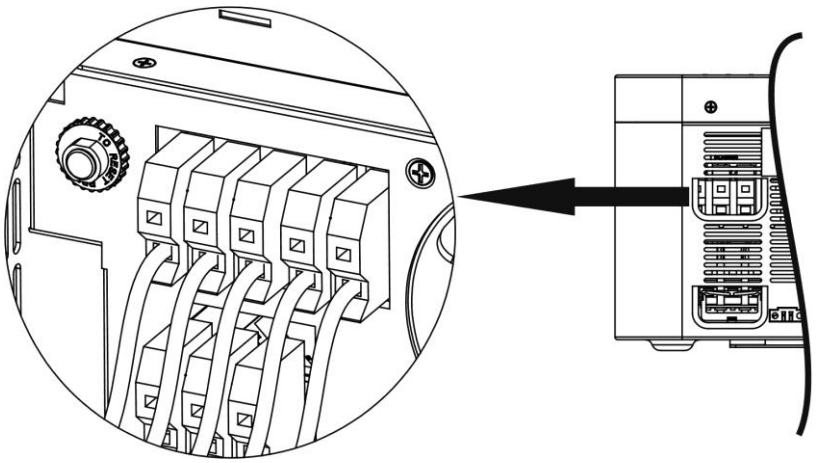
   ⏚**→Ground (yellow-green)**

   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: Important

Be sure to connect AC wires with correct polarity. If L and N wires are connected reversely, it may cause utility short-circuited when these inverters are worked in parallel operation.

CAUTION: Appliances such as air conditioner are required at least 2~3 minutes to restart because it's required to have enough time to balance refrigerant gas inside of circuits. If a power shortage occurs and recovers in a short time, it will cause damage to your connected appliances. To prevent this kind of damage, please check manufacturer of air conditioner if it's equipped with time-delay function before installation. Otherwise, this inverter/charger will trig overload fault and cut off output to protect your appliance but sometimes it still causes internal damage to the air conditioner.

PV Connection

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

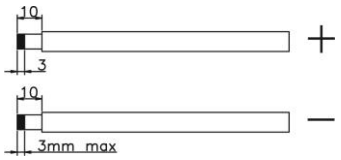
WARNING! All wiring must be performed by a qualified personnel.
WARNING: Please switch off the inverter before you connect PV modules. Otherwise, it will damage the inverter.
WARNING! It's very important for system safety and efficient operation to use appropriate cable for PV module connection. To reduce risk of injury, please use the proper recommended cable size as below.

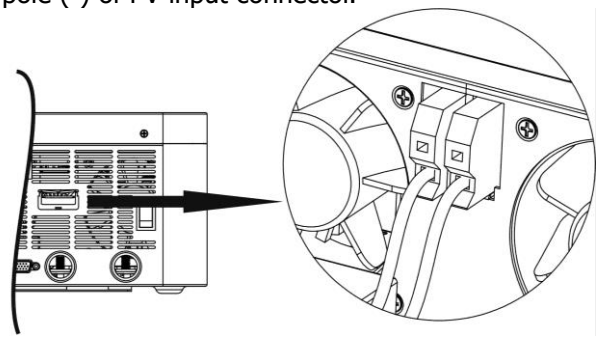
Model	Typical Amperage	Cable Size	Torque
6.2KW	30A	10AWG	2.0~2.4Nm

PV Module Selection:
When selecting proper PV modules, please be sure to consider below parameters:
1. Open circuit Voltage (Voc) of PV modules not exceeds max. PV array open circuit voltage of inverter.
2. Open circuit Voltage (Voc) of PV modules should be higher than min. battery voltage.

Solar Charging Mode	
Max. PV Array Open Circuit Voltage	500 Vdc
PV Array MPPT Voltage Range	120~430Vdc
MPP Number	1

Please follow below steps to implement PV module connection:
1. Remove insulation sleeve 10 mm for positive and negative conductors.
2. Check correct polarity of connection cable from PV modules and PV input connectors. Then, connect positive pole (+) of connection cable to positive pole (+) of PV input connector. Connect negative pole (-) of connection cable to negative pole (-) of PV input connector.



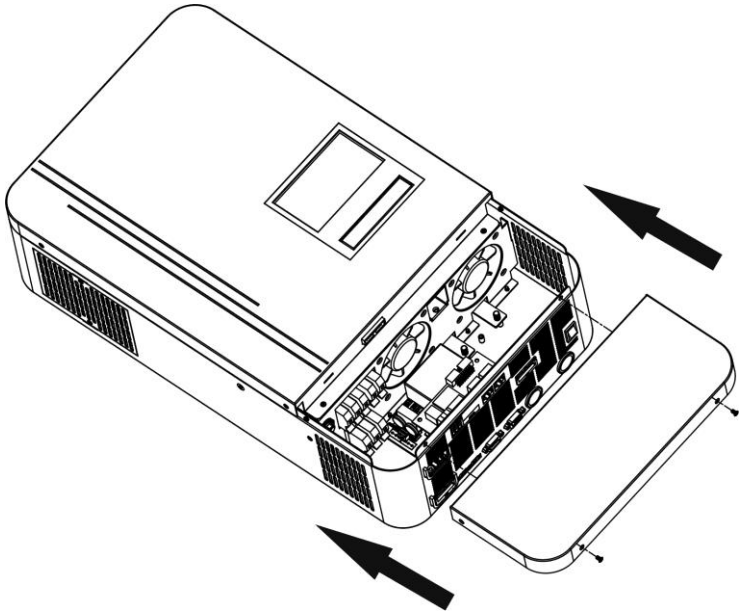


Recommended PV module Configuration

PV Module Spec. (reference) - 630Wp - Vmp: 44.78Vdc - Imp: 14.07A - Voc: 53.02Vdc - Isc: 15.07A	Total solar input power	Solar input	Q'ty of modules
	1260W	2 pieces in series	2pcs
	2520W	4 pieces in series	4pcs
	3150W	5 pieces in series	5pcs
	3780W	3 pieces in series 2 strings in parallel	6pcs
	5040W	4 pieces in series 2 strings in parallel	8pcs
	6300W	5 pieces in series 2 strings in parallel	10pcs
	7560W	6 pieces in series 2 strings in parallel	12pcs
	8820W	7 pieces in series 2 strings in parallel	14pcs
	10080W	8 pieces in series 2 strings in parallel	16pcs

Final Assembly

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



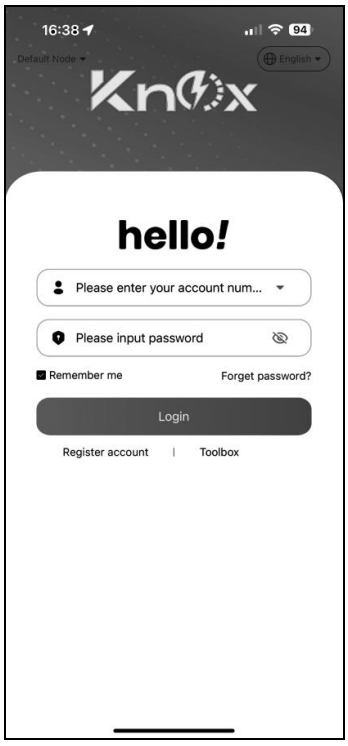
Communication Connection

Serial Connection

Please use supplied communication cable to connect to inverter and PC. Insert bundled CD into a computer and follow on-screen instruction to install the monitoring software. For the detailed software operation, please check user manual of software inside of CD.

Wi-Fi Connection

Wi-Fi module can enable wireless communication between hybrid inverters and monitoring platform. Users have complete and remote monitoring and controlling experience for inverters when combining Wi-Fi module with KNOXHYBRID APP, available for both iOS and Android based device. All data loggers and parameters are saved in iCloud. For quick installation and operation, please refer to Appendix III - The Wi-Fi Operation Guide for details.



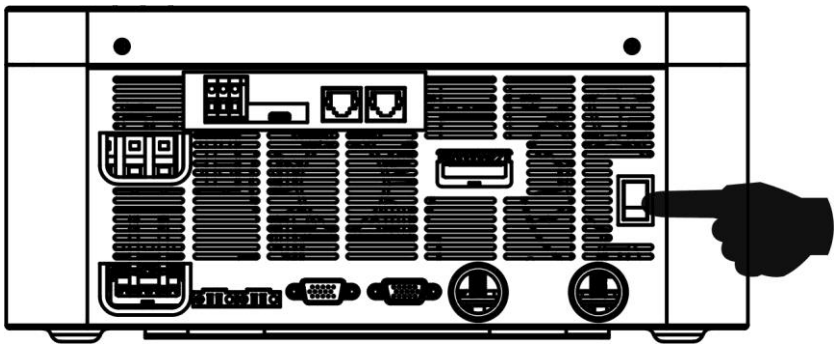
Dry Contact Signal

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			Dry contact port: 	
				NC & C	NO & C
Power Off	Unit is off and no output is powered.			Close	Open
Power On	Output is powered from Utility.			Close	Open
	Output is powered from Battery or Solar.	Program 01 set as SUB	Battery voltage < Low DC warning voltage	Open	Close
			Battery voltage > Setting value in Program 21 or battery charging reaches floating stage	Close	Open
		Program 01 is set as SBU	Battery voltage < Setting value in Program 20	Open	Close
			Battery voltage > Setting value in Program 21 or battery charging reaches floating stage	Close	Open

OPERATION

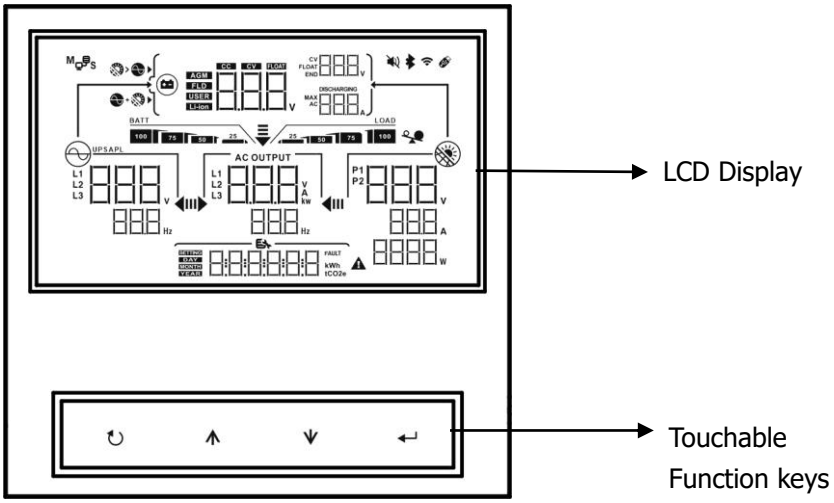
Power ON/OFF



Once the unit has been properly installed and the batteries are connected well, simply press On/Off switch to turn on the unit.

Operation and Display Panel

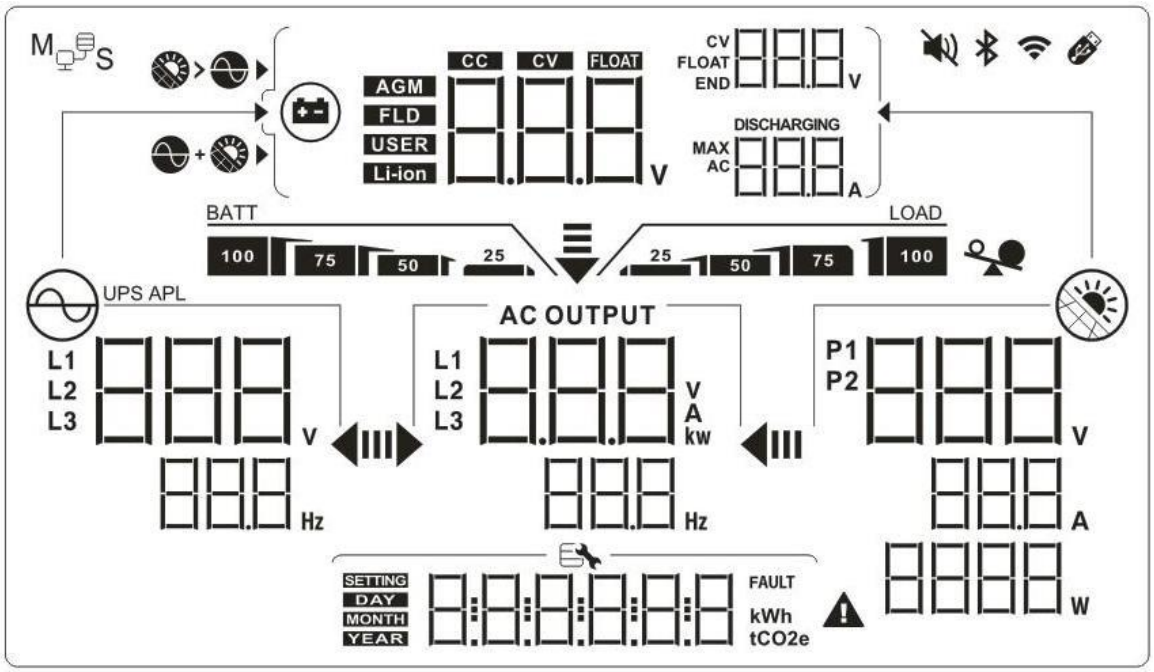
The operation and display panel, shown in below chart, is on the front panel of the inverter. It includes four touchable function keys and a LCD display, indicating the operating status and input/output power information.

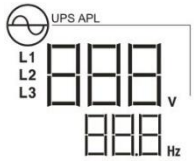
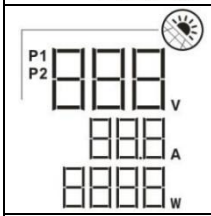
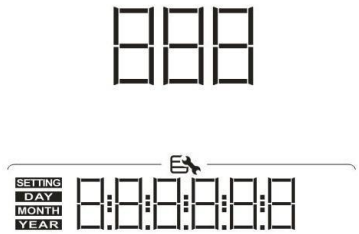
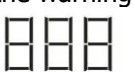


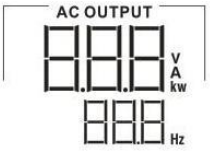
Touchable Function Keys

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

LCD Display Icons



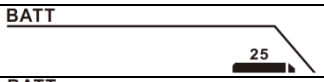
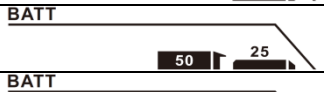
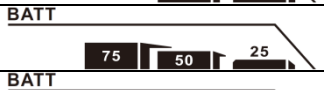
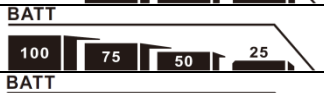
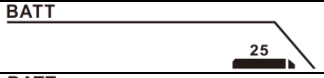
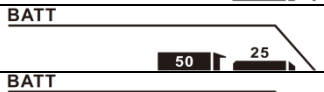
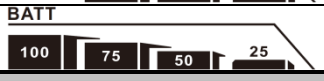
Icon	Function description
Input Source Information	
	Indicates the AC input voltage and frequency.
	Indicates the PV voltage, current and power.
	Indicates the battery voltage, charging stage, configured battery parameters, charging or discharging current.
Configuration Program and Fault Information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

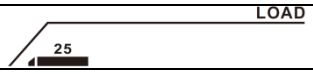
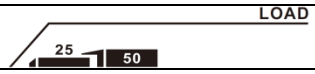
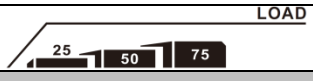
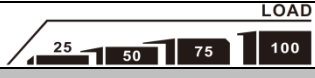
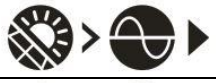
	Indicate the output voltage, load in VA, load in Watt and output frequency.
Battery Information	
	Indicates battery level in battery mode and charging status in line mode by 0-24%, 25-49%, 50-74% and 75-100%.

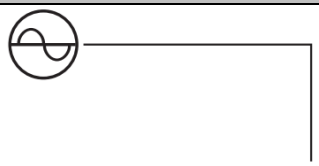
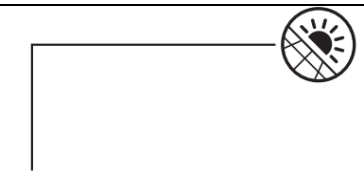
When battery is charging, it will present battery charging status.

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.

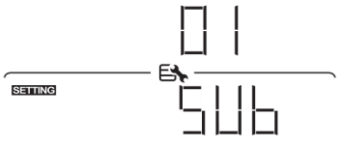
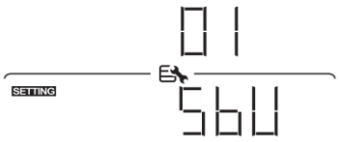
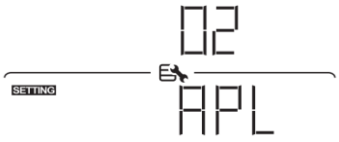
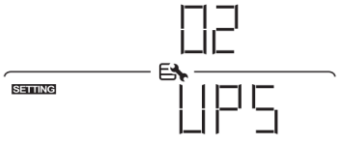
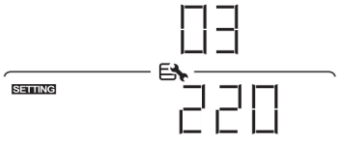
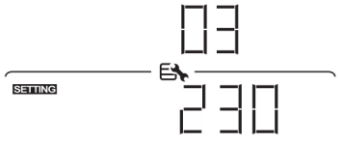
Load Percentage	Battery Voltage	LCD Display
Load >50%	< 1.85V/cell	
	1.85V/cell ~ 1.933V/cell	
	1.933V/cell ~ 2.017V/cell	
	> 2.017V/cell	
Load < 50%	< 1.892V/cell	
	1.892V/cell ~ 1.975V/cell	
	1.975V/cell ~ 2.058V/cell	
	> 2.058V/cell	

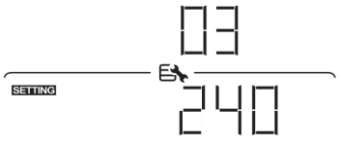
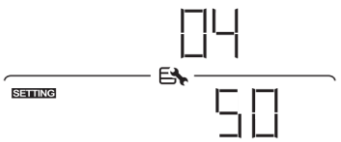
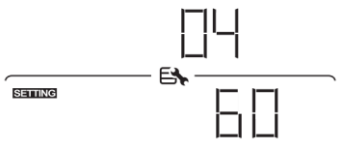
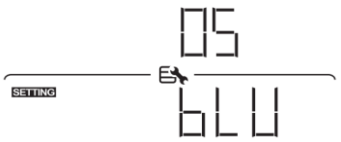
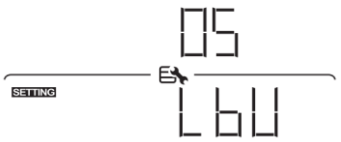
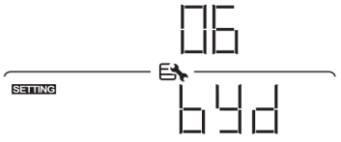
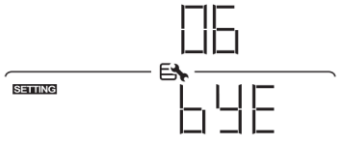
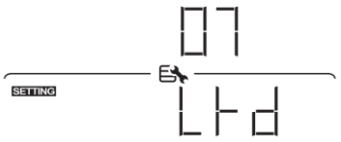
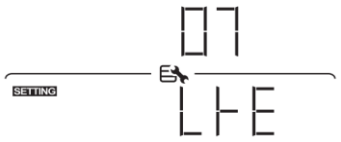
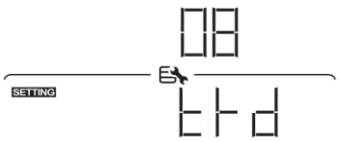
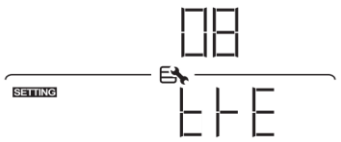
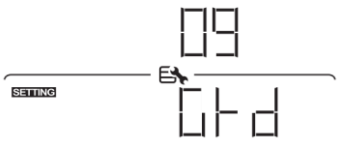
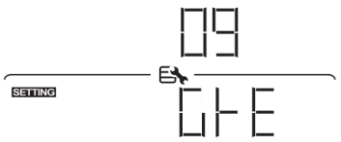
Load Information		
	Indicates overload.	
	Indicates the load level by 0-24%, 25-49%, 50-74% and 75-100%.	
	0%~24%	25%~49%
		
	50%~74%	75%~100%
		
Charger Source Priority Setting Display		
	Indicates setting program 10 "Charger source priority" is selected as "Solar first".	
	Indicates setting program 10 "Charger source priority" is selected as "Solar and Utility".	
	Indicates setting program 10 "Charger source priority" is selected as "Solar only".	

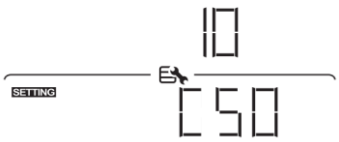
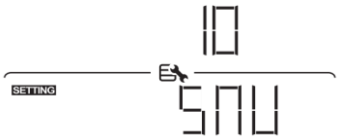
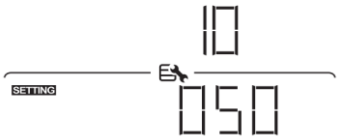
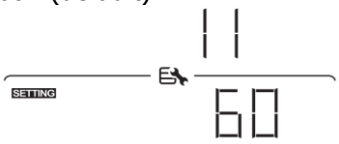
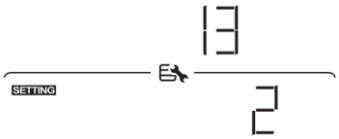
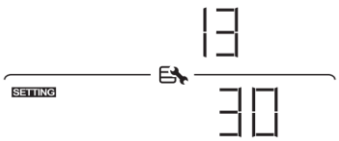
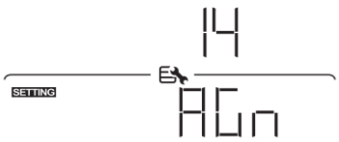
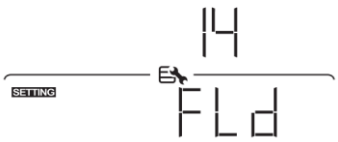
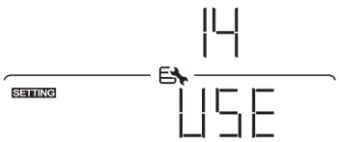
Output source priority setting display	
	Indicates setting program 01 "Output source priority" is selected as "SUB".
	Indicates setting program 01 "Output source priority" is selected as "SBU".
AC Input Voltage Range Setting Display	
UPS	Indicates setting program 02 is selected as "UPS". The acceptable AC input voltage range will be within 170-280VAC.
APL	Indicates setting program 02 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.
	Indicates battery type.
	Indicates parallel operation is working.
	Indicates unit alarm is disabled.
	Indicates Wi-Fi transmission is working.
	Indicates USB disk is connected.

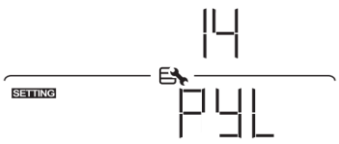
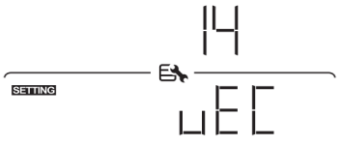
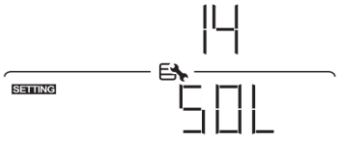
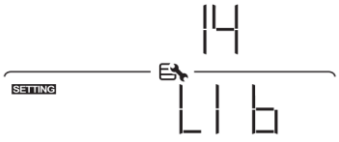
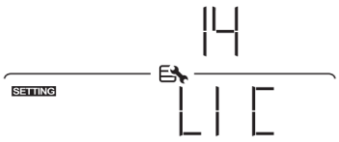
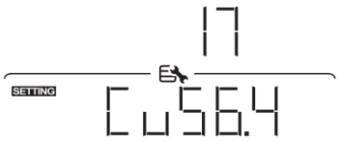
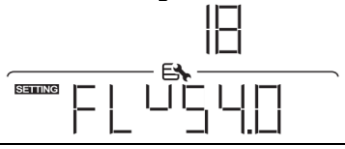
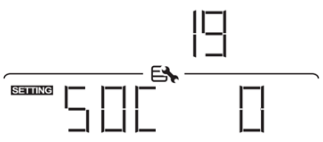
LCD Setting

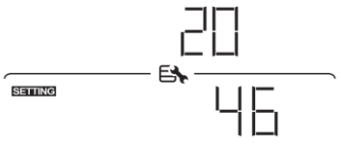
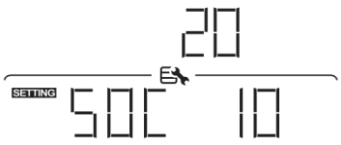
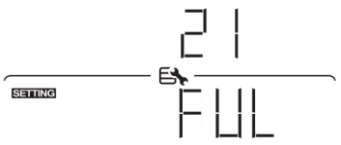
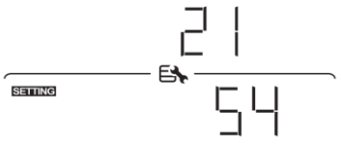
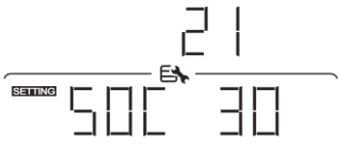
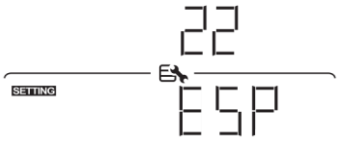
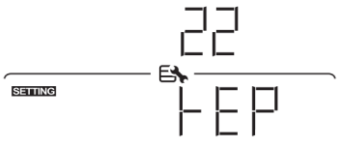
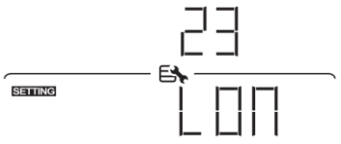
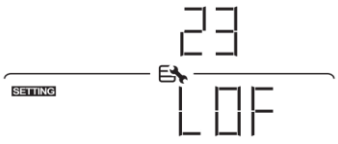
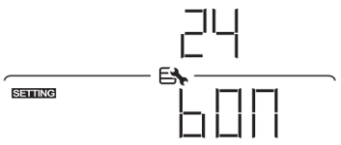
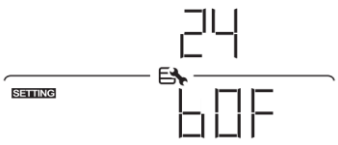
After pressing and holding ENTER button for 3 seconds, the unit will enter setting mode. Press "UP" or "DOWN" button to select setting programs. And then, press "ENTER" button to confirm the selection or ESC button to exit.

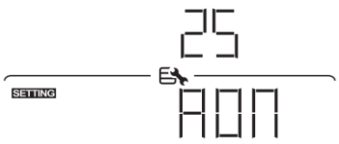
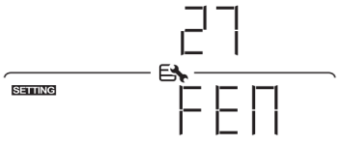
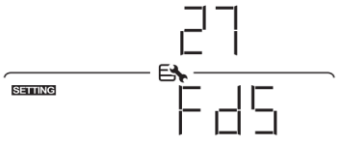
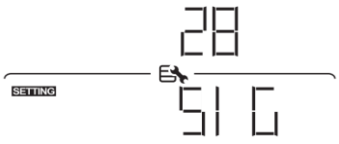
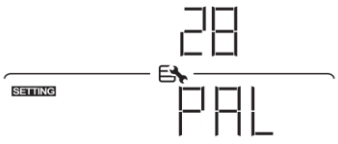
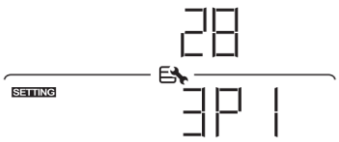
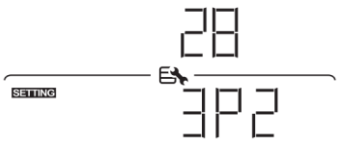
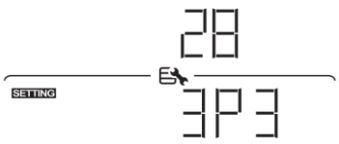
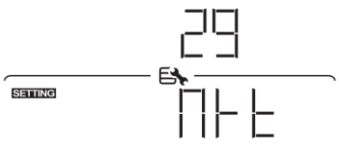
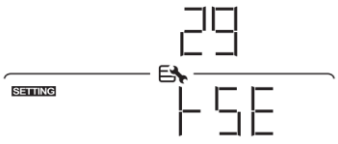
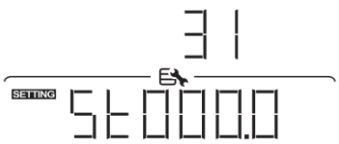
Program	Description	Selectable option	
00	Exit setting mode	Escape 	
01	Output source priority selection	SUB(default) 	Solar energy provides power to the loads as first priority. If solar energy is not sufficient to power all connected loads, Utility energy will supply power to the loads at the same time.
		SBU 	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 20 or solar and battery is not sufficient.
02	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.
03	Output voltage	220Vac 	230V (Default) 

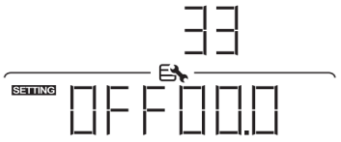
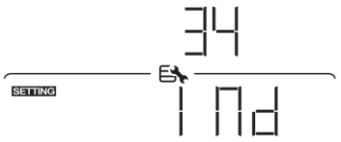
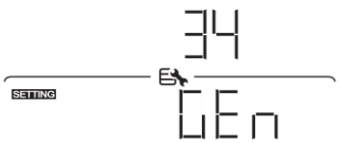
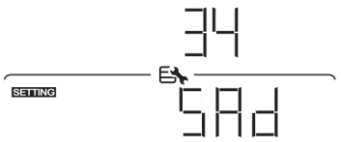
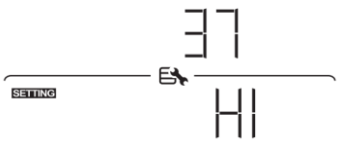
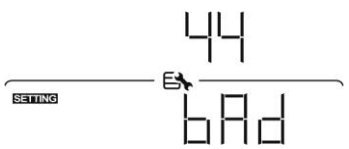
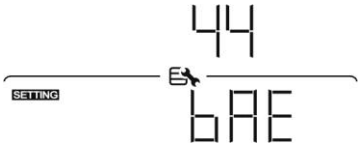
		240Vac 	
04	Output frequency	50Hz (default) 	60Hz 
05	Solar supply priority	Charge battery first (default) 	Solar energy provides power to charge battery as first priority.
		Power the loads first 	Solar energy provides power to the loads as first priority.
06	Overload bypass: When enabled, the unit will transfer to line mode if overload occurs in battery mode.	Bypass disable 	Bypass enable (default) 
07	Auto restart when overload occurs	Restart disable (default) 	Restart enable 
08	Auto restart when over temperature occurs	Restart disable (default) 	Restart enable 
09	Solar energy feed to grid configuration	Feed to grid disable (default) 	If selected, solar energy is not allowed to feed to the grid.
		Feed to grid enable 	If selected, solar energy is allowed to feed to the grid.

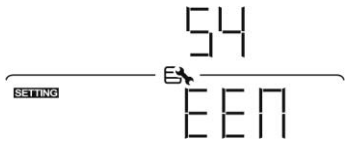
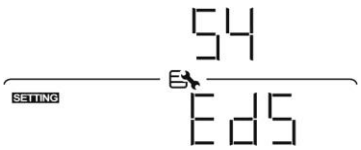
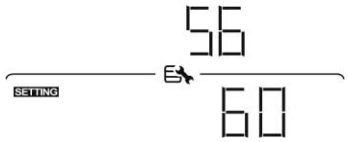
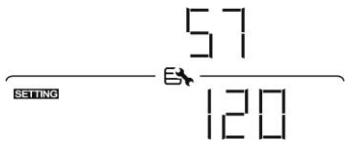
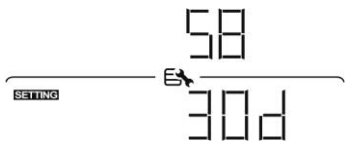
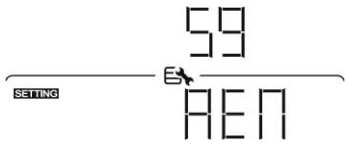
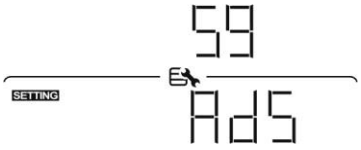
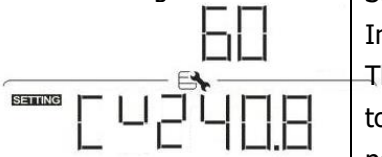
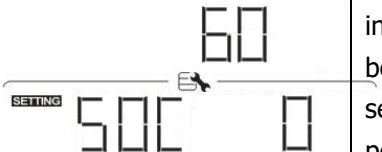
10	Charger source priority: To configure charger source priority	If this inverter/charger is working in Line, Standby or Fault mode, charger source can be programmed as below:	
		Solar first 	Solar energy will charge battery as first priority. Utility will charge battery only when solar energy is not 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.
11	Maximum charging current: To configure total charging current for solar and utility chargers. (Max. charging current = utility charging current + solar charging current)	60A (default) 	The setting range is from 10A to 120A. Increment of each click is 10A.
13	Maximum utility charging current	2A 	Setting range is 2A, then from 10A to 120A. Increment of each click is 10A.
		30A (default) 	
14	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 17, 18 and 19.

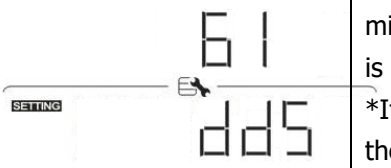
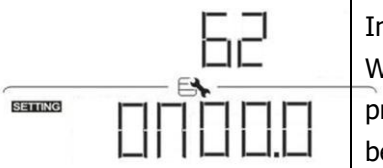
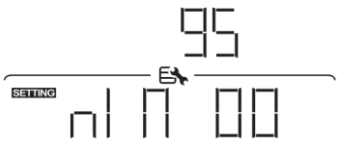
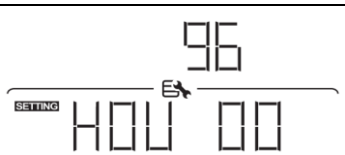
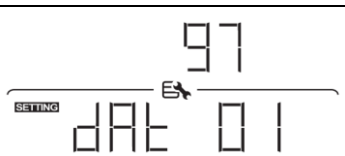
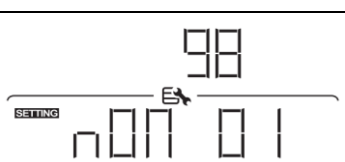
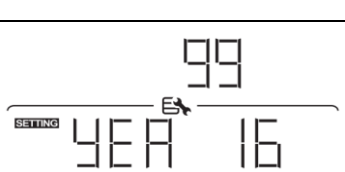
14	Battery type	Pylontech battery 	If selected, programs of 11, 17, 18 and 19 will be automatically set up. No need for further setting.
		WECO battery 	If selected, programs of 11, 17, 18, 19 and 20 will be auto-configured per battery supplier recommended. No need for further adjustment. Programs of 20 and 21 parameters refer to SOC of battery.
		Soltaro battery 	If selected, programs of 11, 17, 18 and 19 will be automatically set up. No need for further setting.
		LIb-protocol compatible battery 	Select "LIb" if using Lithium battery compatible to Lib protocol. If selected, programs of 11, 17, 18 and 19 will be automatically set up. No need for further setting.
		3rd party Lithium battery 	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.
17	Bulk charging voltage (C.V voltage)	Default setting: 56.4V 	If self-defined is selected in program 14, this program can be set up. Setting range is from 48.0V to 64.0V. Increment of each click is 0.1V.
18	Floating charging voltage	Default setting: 54.0V 	If self-defined is selected in program 14, this program can be set up. Setting range is from 48.0V to 64.0V. Increment of each click is 0.1V.
19	Low DC cut off battery voltage setting	Default setting: 40.8V 	If self-defined is selected in program 14, this program can be set up. Setting range is from 40.8V to 48.0V. 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 any type of lithium battery is selected in program 14, this program can be set up. Setting range is from 0% to 80%

20	Battery stop discharging voltage when grid is available	default setting: 46V 	Setting range is from 44V to 51V and increment of each click is 1V.
		10% (default) 	If any type of lithium battery is selected in program 14, this setting will change to SOC automatically. Adjustable range is from 5% to 95%.
21	Battery stop charging voltage when grid is available	Battery fully charged 	The setting range is FUL and then from 48V to 58V. Increment of each click is 1V.
		Default setting: 54V 	
		30% (default) 	If any lithium battery is selected in program 14, this parameter will refer to the SOC of battery and adjustable from 10% to 100%. Increment of each click is 5%.
22	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.
23	Backlight control	Backlight on (default) 	Backlight off 
24	Alarm control	Alarm on (default) 	Alarm off 

25	Beeps while primary source is interrupted	Alarm on (default) 	Alarm off 
27	Record Fault code	Record enable 	Record disable (default) 
28	AC output mode *This setting is only available when the inverter is in standby mode (Switch off).	Single: This inverter is used in single phase application. 	Parallel: This inverter is operated in parallel system. 
		L1 phase 	The inverter is operated in L1 phase in 3-phase application.
		L2 phase 	The inverter is operated in L2 phase in 3-phase application.
		L3 phase 	The inverter is operated in L3 phase in 3-phase application.
29	Reset PV energy storage	Not reset(Default) 	Reset 
30	Start charging time for AC charger	00:00 (Default) 	The setting range of start charging time for AC charger is from 00:00 to 23:00, increment of each click is 1 hour.
31	Stop charging time for AC charger	00:00 (Default) 	The setting range of stop charging time for AC charger is from 00:00 to 23:00, increment of each click is 1 hour.

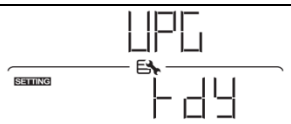
32	Scheduled time for AC output on	00:00 (Default) 	The setting range of scheduled Time for AC output on is from 00:00 to 23:00, increment of each click is 1 hour.
33	Scheduled time for AC output off	00:00(Default) 	The setting range of scheduled Time for AC output off is from 00:00 to 23:00, increment of each click is 1 hour.
34	Set country customized regulations	India(Default) 	If selected, acceptable feed-in grid voltage range will be 195.5~253VAC. Acceptable feed-in grid frequency range will be 49~51Hz.
		Germany 	If selected, acceptable feed-in grid voltage range will be 184~264.5VAC. Acceptable feed-in grid frequency range will be 47.5~51.5Hz.
		South America 	If selected, acceptable feed-in grid voltage range will be 184~264.5VAC. Acceptable feed-in grid frequency range will be 57~62Hz.
		High 	
43	Adjustment parameter for REVERSE LED	If unit is not in Line mode, it will show following. 	If unit is in Line mode, it will show following. (default) 
		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.	
44	Activate lithium battery when the device is powered on.	Activate lithium battery disable (default) 	Activate lithium battery enable 

54	Battery equalization	If "Flooded" or "User-Defined" is selected in program 05, this program can be set up.	
		Battery equalization (Default) 	Battery equalization disable 
55	Battery equalization voltage	58.4V (Default) 	Setting range is from 48V to 64V. Increment of each click is 0.1V.
56	Battery equalized time	60min (Default) 	Setting range is from 5min to 900min. Increment of each click is 5min.
57	Battery equalized timeout	120min (Default) 	Setting range is from 5min to 900 min. Increment of each click is 5 min.
58	Equalization interval	30days (Default) 	Setting range is from 0 to 90 days. Increment of each click is 1 day
59	Equalization activated immediately	Enable 	Disable (Default) 
		If equalization function is enabled in program 33, 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 shows "E9". If "Disable" is selected, it will cancel equalization function until next activated equalization time arrives based on program 37setting. At this time, "E9" will not be shown in LCD main page.	
60	Low DC cut off voltage on second output	Default setting: 40.8V 	Setting range is from 40.8V to 48.0V. Increment of each click is 0.1V. This low DC cut-off voltage will be fixed to setting value no matter what percentage of load is connected.
		0% (default) 	If any type of lithium battery is selected in program 14, 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%.
61	Setting discharge time on the 2nd output	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	Scheduled time for 2nd AC output on	00:00 (Default) 	Setting range is from 00:00 to 23:00. Increment of each click is 1 hour. Within scheduled on/off time setting in program 62 and 63, 2nd AC output will be turn off based on the setting value in program 60 or 61.
63	Scheduled time for 2nd AC output off	00:00 (Default) 	Setting range is from 00:00 to 23:00. Increment of each click is 1 hour. Within scheduled on/off time setting in program 62 and 63, 2nd AC output will be turn off based on the setting value in program 60 or 61.
95	Time setting – Minute		For minute setting, the range is from 00 to 59.
96	Time setting – Hour		For hour setting, the range is from 00 to 23.
97	Time setting– Day		For day setting, the range is from 00 to 31.
98	Time setting– Month		For month setting, the range is from 01 to 12.
99	Time setting – Year		For year setting, the range is from 16 to 99.

USB Function Setting

Follow below steps to upgrade firmware.

Procedure	LCD Screen
Step 1: Insert an USB disk into the USB port (⓭ in product overview). Press and hold "↻" button for 3 seconds to enter USB Function Setting Mode. It will show "✎" on the top right corner and "tdy" in LCD.	
Step 2: Press "↵" button to read the file from the USB disk. If there is no burning file, the LCD will alert "U01". Otherwise it will enter the next step.	
Step 3: ● Press "▲" button choose "yes" to start the control board firmware upgrade. ● Press "▼" button choose "yes" to start the control board firmware upgrade. ● press "↻" button to return to main screen.	
Step 4: If "yes" is select, it will start the firmware upgrade. If update the control board ,The LCD will display "YES" and complete progress in percentage on the right. "88" represents 88 completion progress. After update complete, the inverter will auto restart When updating Remote, the LCD will turn off the display, and after the update is complete, the LCD will automatically display	

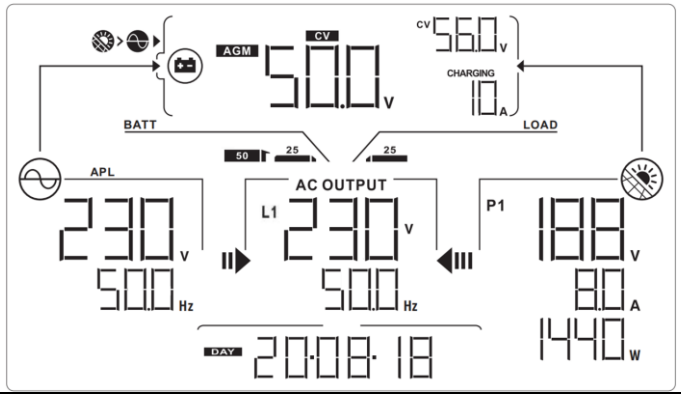
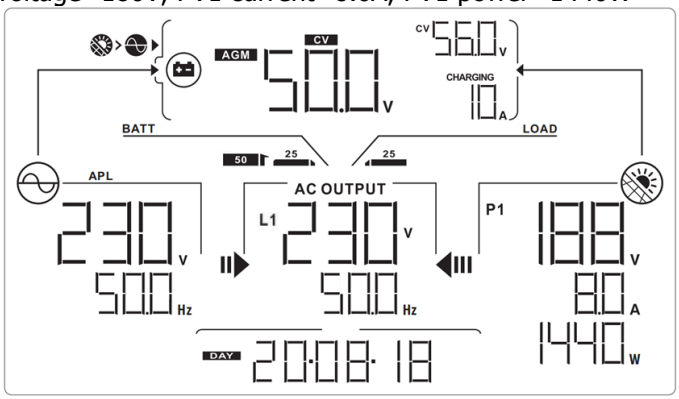
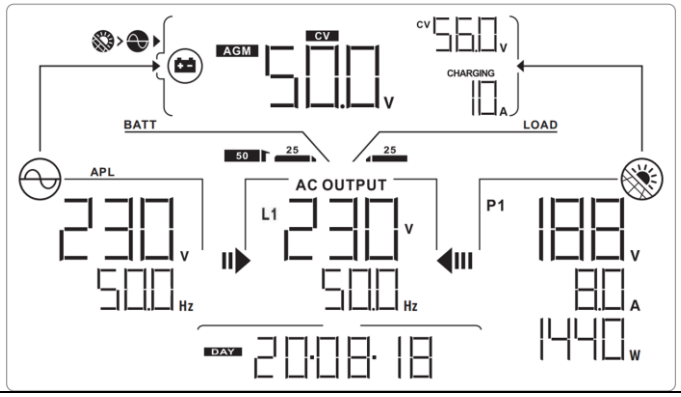
Error message for USB On-the-Go functions:

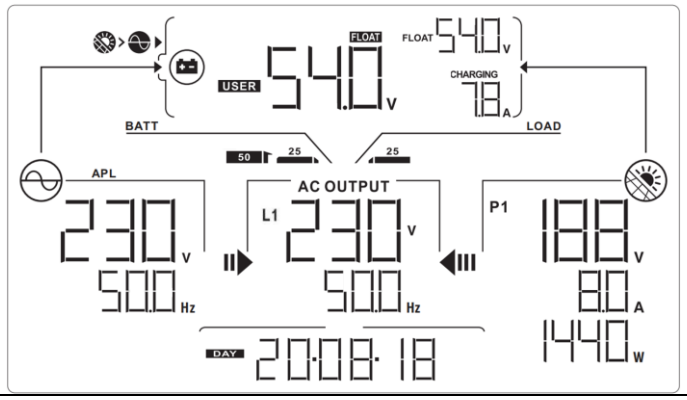
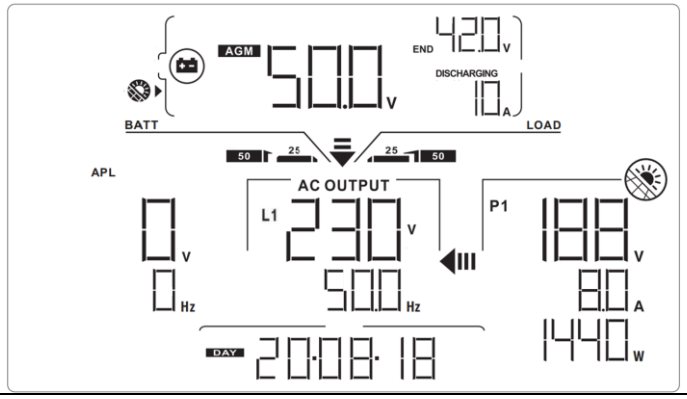
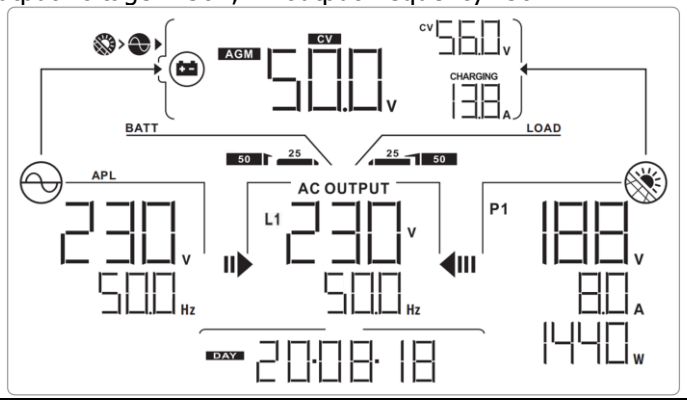
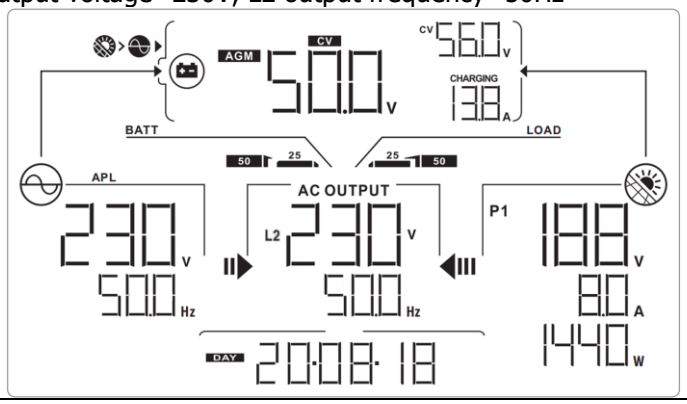
Error Code	**Messages**
U01	No USB disk is detected.

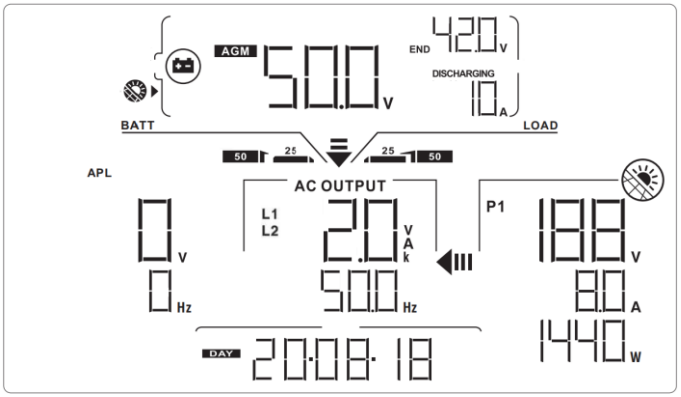
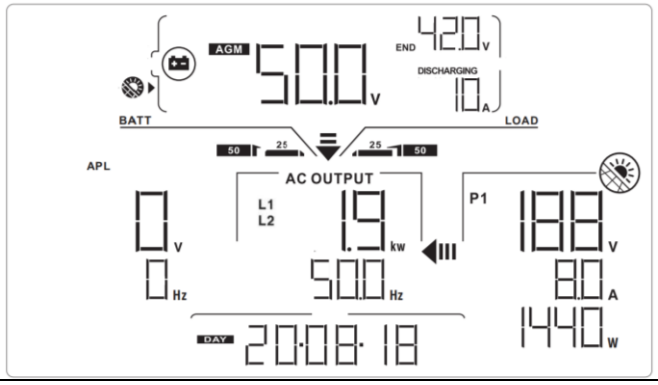
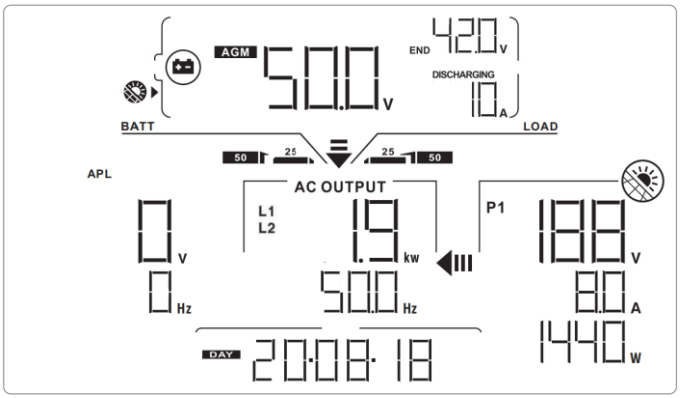
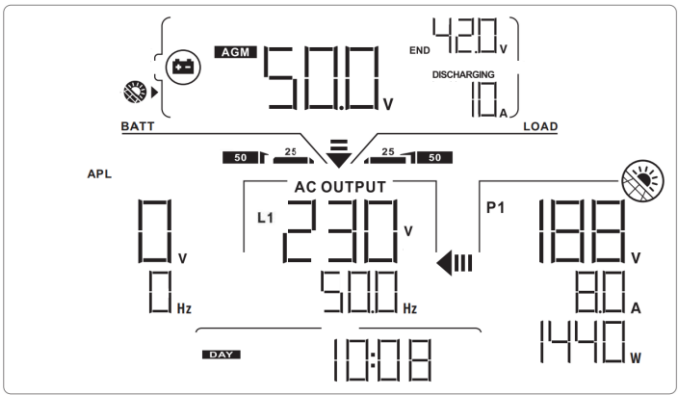
If any error occurs, error code will only show 3 seconds. After 3 seconds, it will automatically return to display screen.

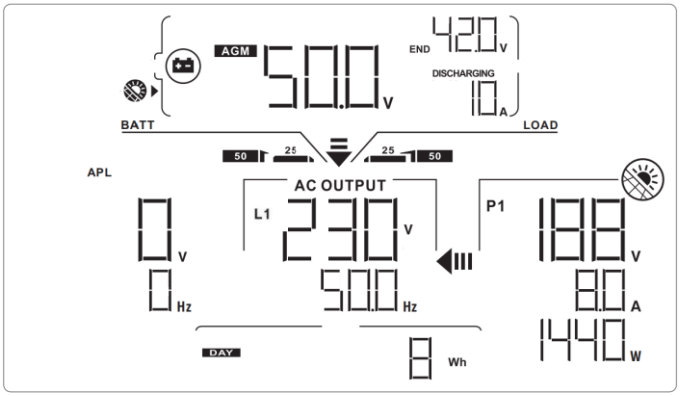
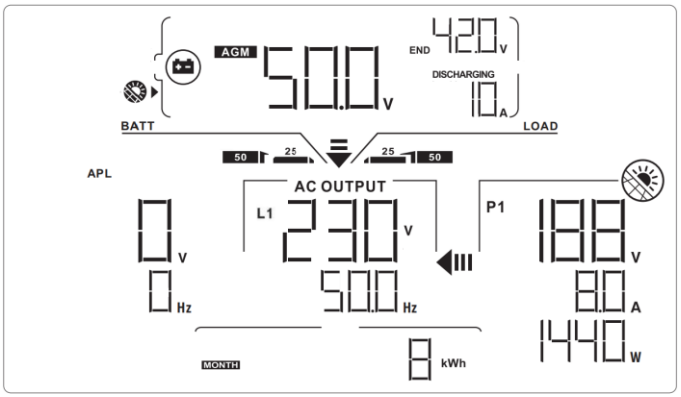
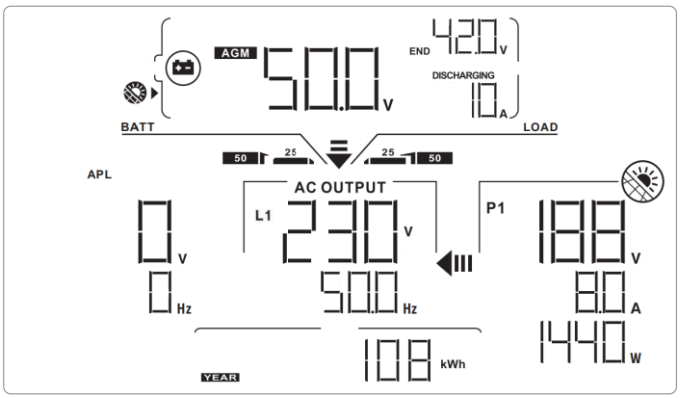
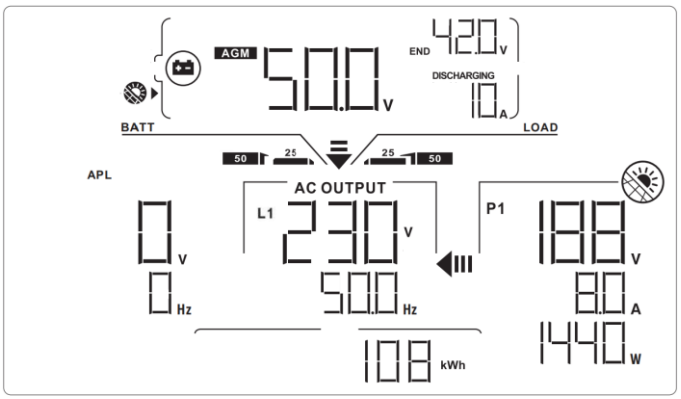
Display Setting

The LCD display information will be switched in turns by pressing "▲" or "▼" key. 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	PV1 voltage=180V, PV1 current=8.0A, PV1 power=1440W 
	Battery voltage, charging stage/ Configured battery parameters/ Charging or discharging current	Battery voltage=50.0V, Bulk charging voltage=56.0V, Charging current=10A 

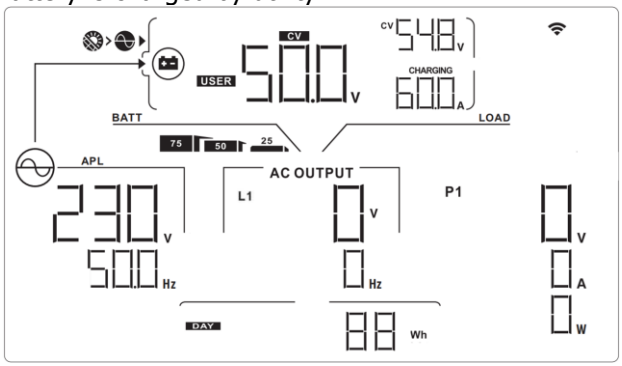
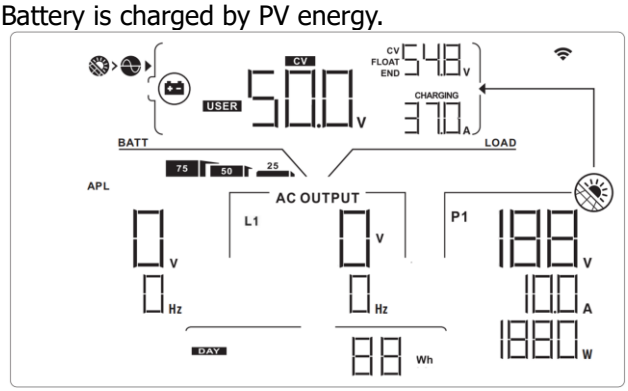
Selectable information		LCD display
Default Display Screen	Battery voltage, charging stage/ Configured battery parameters/ Charging or discharging current	Battery voltage=54.0V, Floating charging voltage=54.0V, Charging current=7.8A 
		Battery voltage=50.0V, Low DC cut-off voltage=42.0V, Discharging current=10A 
	L1 output voltage/output frequency, L2 output voltage/output frequency, load in VA, load in Watt switch every 5 second	L1 output voltage=230V, L1 output frequency=50Hz 
		L2 output voltage=230V, L2 output frequency=50Hz 

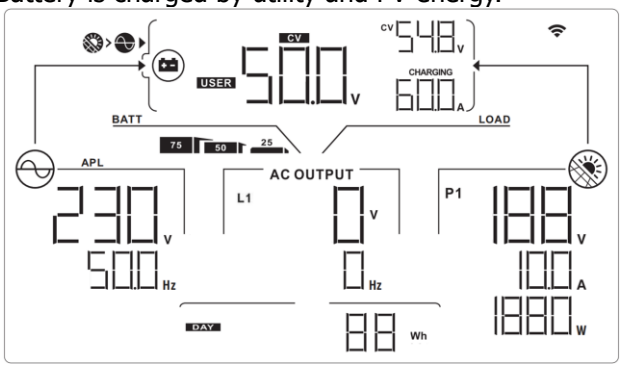
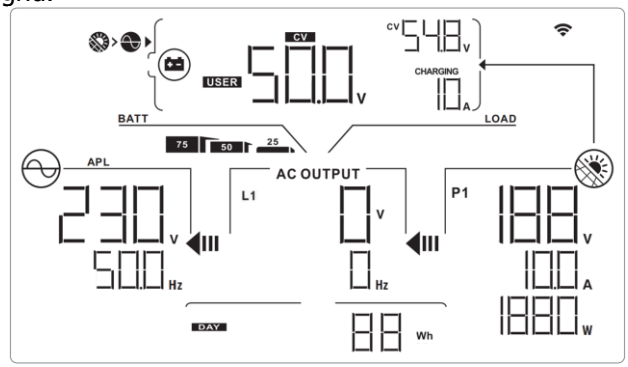
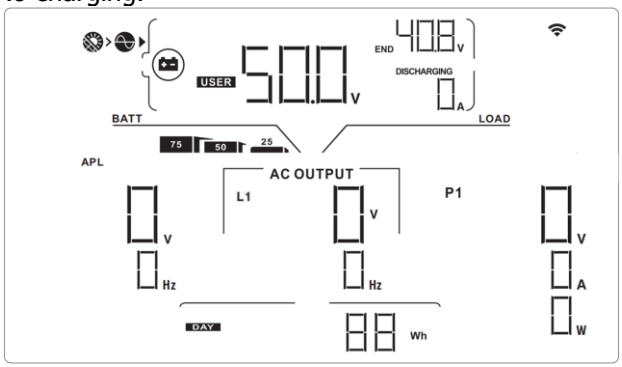
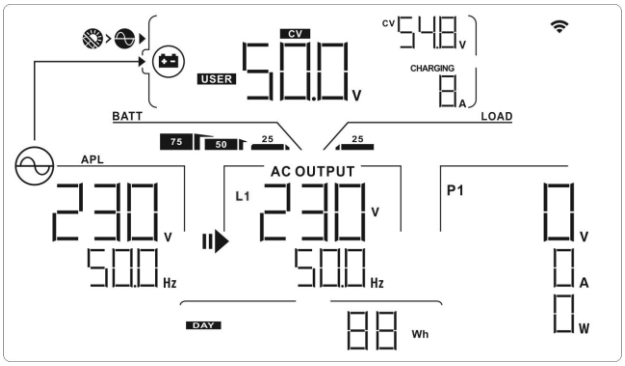
Selectable information		LCD display
Default Display Screen	L1 output voltage/output frequency, L2 output voltage/output frequency, load in VA, load in Watt switch every 5 second	Total load in VA=2.0KVA, L1 output frequency=50Hz 
		Total load in Watt=1.9KW, L1 output frequency=50Hz 
	Real date.	Real date 2020-08-18. 
Real time.		Real time 10:08. 

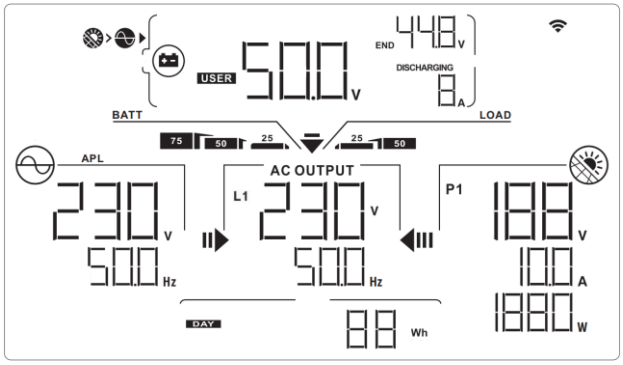
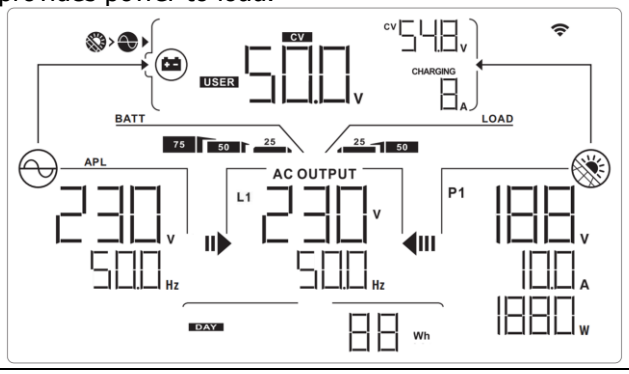
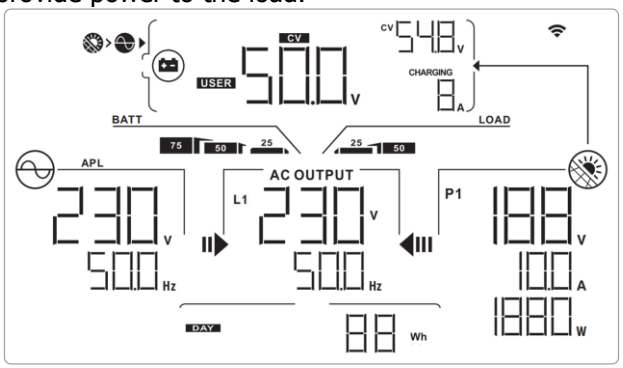
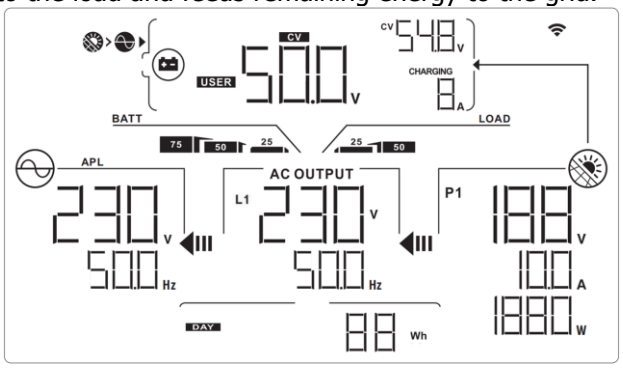
Selectable information	LCD display
PV energy generated today	PV energy generated today =8Wh. 
PV energy generated this month	PV energy generated this month = 8kWh. 
PV energy generated this year	PV energy generated this year = 108kWh, 
Total PV energy generation	Total PV energy generation = 108kWh. 

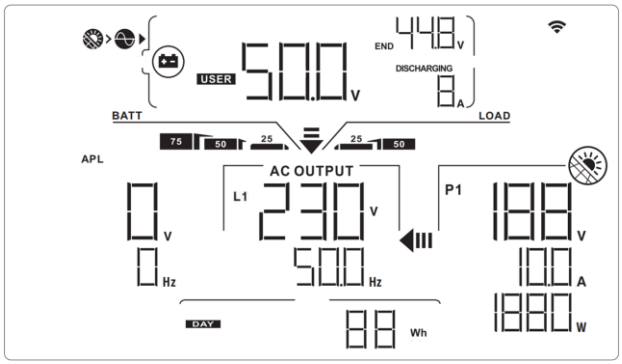
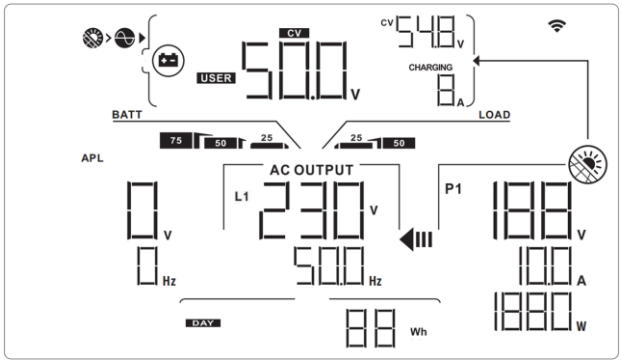
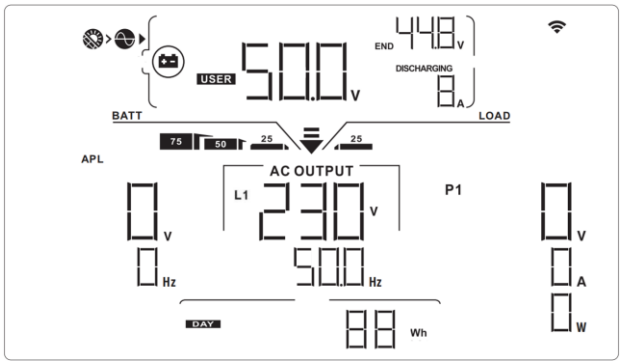
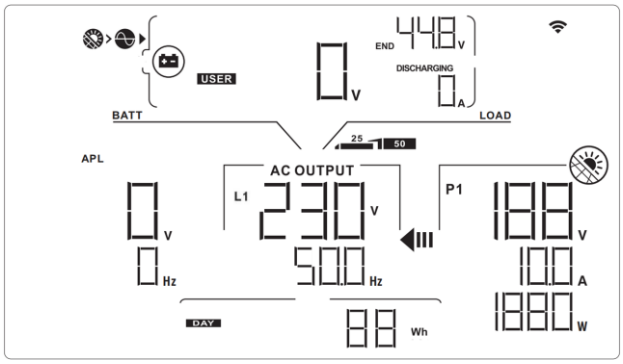
Selectable information	LCD display
Main CPU version checking.	Main CPU version 00050.72. 
Secondary CPU version checking.	Secondary CPU version 00022.01. 

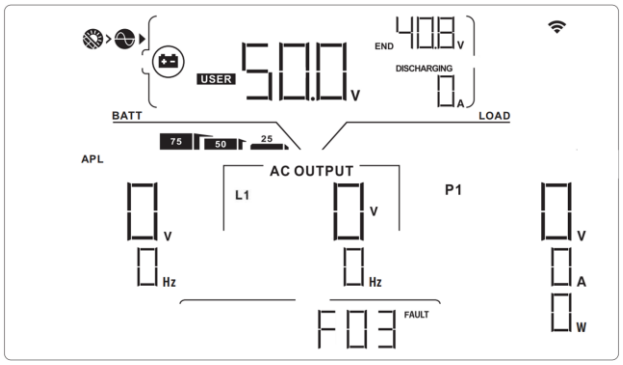
Operating Mode Description

Operating mode	Behaviors	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 power, solar or utility charger available	Battery is charged by utility.  Battery is charged by PV energy. 

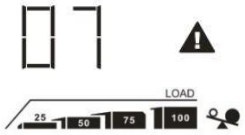
Standby mode **Note:** *Standby mode: The inverter is not turned on yet but at this time, the inverter can charge battery without AC output.	No output power, solar or utility charger available	Battery is charged by utility and PV energy. 
		Battery is charged by PV energy and feed PV energy to grid. 
		No charging. 
Line mode	Output power from utility. Charger is available	Utility charges battery and provides power to load. 

Line Mode	Output power from utility. Charger is available	PV energy, battery power and utility provide power to load. 
		PV energy and utility charge battery, and utility provides power to load. 
		PV energy charges battery, utility and PV energy provide power to the load. 
		PV energy charges battery, PV energy provides power to the load and feeds remaining energy to the grid. 

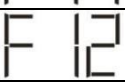
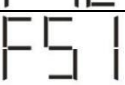
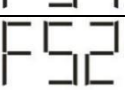
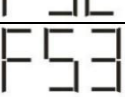
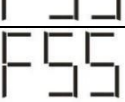
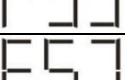
Battery mode	Output power from battery or PV	PV energy and battery energy supply power to the load. 
		PV energy charges battery and provides power to the load. 
		Battery provides power to the load. 
Only PV mode	Output power from PV	PV provides power to the load. 

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 output, no charging.	No charging. 

Warning Indicator

Warning Code	Warning Event	Icon flashing
01	Fan locked	
02	Over temperature	
03	Battery over charged	
04	Low battery	
07	Overload	
10	Inverter power derating	
bP	Battery is not connected	
32	Communication lost between com. port and control board	

Faults Reference Code

Fault Code	Fault Event	Icon on
01	Fan is locked.	
02	Over temperature	
03	Battery voltage is too high.	
05	Output is short circuited.	
06	Output voltage is abnormal.	
07	Overload time out.	
08	Bus voltage is too high.	
09	Bus soft start failure.	
10	PV current is over.	
11	PV voltage is over.	
12	Charge current is over.	
51	Over current or surge	
52	Bus voltage is too low.	
53	Inverter soft start failure.	
55	Over DC offset in AC output	
57	Current sensor failure.	
58	Output voltage is too low.	

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.

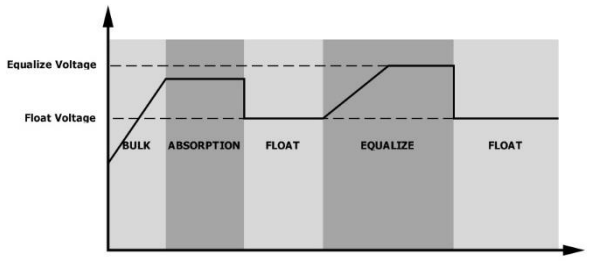
- **How to Apply Equalization Function**

You must enable battery equalization function in monitoring LCD setting program 54 first. Then, you may apply this function in device by either one of following methods:

1. Setting equalization interval in program 58.
2. Active equalization immediately in program 59.

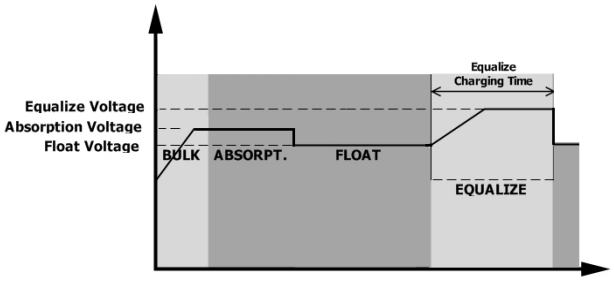
- **When to Equalize**

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.

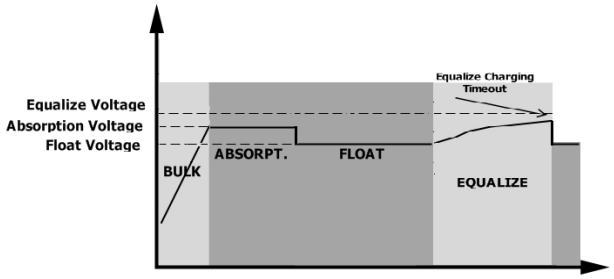


- **Equalize charging time and timeout**

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.



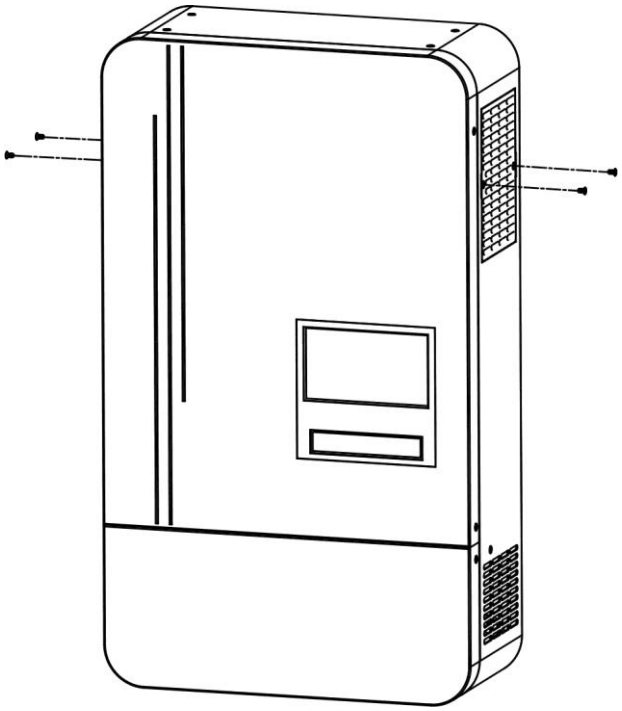
CLEARANCE AND MAINTENANCE FOR ANTI-DUST KIT

Overview

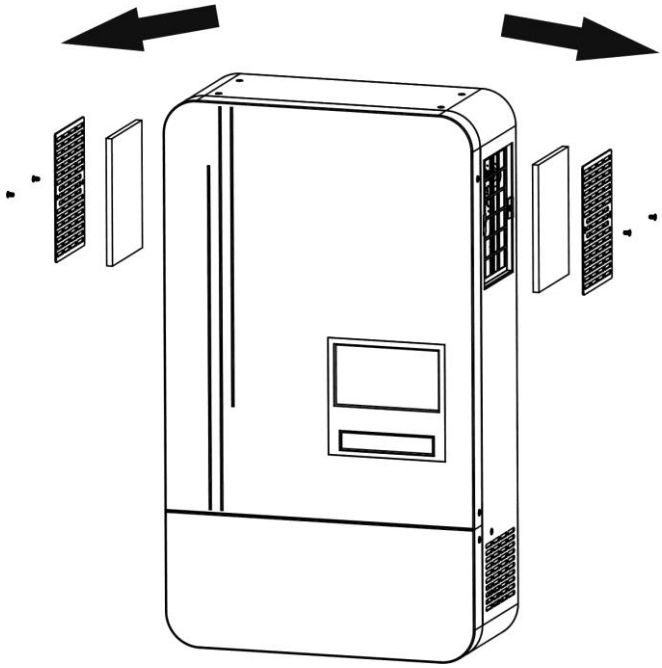
Every inverter is already installed with anti-dusk kit from factory. This kit also keeps dusk from your inverter and increases product reliability in harsh environment.

Clearance and Maintenance

Step 1: Remove the screws on the two 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.

SPECIFICATIONS

MODEL	**6.2KW**
RATED OUPUT POWER	6200W
PV INPUT (DC)	
Max. PV Power	9000W
Max. PV Array Open Circuit Voltage	500 VDC
PV Input Voltage Range	120 VDC~500 VDC
MPPT Range @ Operating Voltage	120 VDC~430 VDC
Max. PV Array Short Circuit Current	30A
Number of MPP Tracker	1
GRID-TIE OPERATION	
GRID OUTPUT (AC)	
Nominal Output Voltage	220/230/240 VAC
Feed-in Grid Voltage Range	195.5~253 VAC @India regulation 184 ~ 264.5 VAC @Germany regulation 184 ~ 264.5 VAC @South America regulation
Feed-in Grid Frequency Range	49~51Hz @India regulation 47.5~51.5Hz @Germany regulation 57~62Hz @South America
Nominal Output Current	28.27A
Power Factor Range	>0.99
Maximum Conversion Efficiency (DC/AC)	96%
OFF-GRID, HYBRID OPERATION	
GRID INPUT	
Acceptable Input Voltage Range	90 - 280 VAC or 170 - 280 VAC
Frequency Range	50 Hz/60 Hz (Auto sensing)
Transfer Time	< 10ms (For UPS) < 20ms (For Home Appliances) < 50ms (For parallel operation)
Rating of AC Transfer Relay	40A
BATTERY MODE OUTPUT (AC)	
Nominal Output Voltage	220/230/240 VAC
Output Waveform	Pure Sine Wave
Nominal Output Current	27A
Efficiency (DC to AC)	93%
BATTERY & CHARGER	
Nominal DC Voltage	48 VDC
Maximum Charging Current (from Grid)	120A
Maximum Charging Current (from PV)	120A
Maximum Charging Current	120A
GENERAL	
Dimension, D X W X H (mm)	138 x 320 x 550
Net Weight (kgs)	13.7
INTERFACE	
Parallel-able	Yes
External Safety Box (Optional)	Yes
Communication	RS232/Dry-Contact/WiFi
ENVIRONMENT	
Humidity	0 ~ 90% RH (No condensing)
Operating Temperature	-10°C to 50°C

TROUBLE SHOOTING

Problem	LCD/LED/Buzzer	Explanation / Possible cause	What to do
Unit shuts down automatically during startup process.	LCD/LEDs and buzzer will be active for 3 seconds and then complete off.	The battery voltage is too low (<1.91V/Cell)	1. Re-charge battery. 2. Replace battery.
No response after power on.	No indication.	1. The battery voltage is far too low. (<1.4V/Cell) 2. Battery polarity is connected reversed.	1. Check if batteries and the wiring are connected well. 2. Re-charge battery. 3. Replace battery.
Mains exist but the unit works in battery mode.	Input voltage is displayed as 0 on the LCD and green LED is flashing.	Input protector is tripped	Check if AC breaker is tripped and AC wiring is connected well.
	Green LED is flashing.	Insufficient quality of AC power. (Shore or Generator)	1. Check if AC wires are too thin and/or too long. 2. Check if generator (if applied) is working well or if input voltage range setting is correct. (UPS→Appliance)
	Green LED is flashing.	Set "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 and LEDs are 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 10	Surge	Restart the unit, if the error happens again, please return to repair center.
	Fault code 12	DC/DC over current or surge.	
	Fault code 51	Over current or surge.	
	Fault code 52	Bus voltage is too low.	
	Fault code 55	Output voltage is unbalanced.	
	Fault code 56	Battery is not connected well or fuse is burnt.	If the battery is connected well, please return to repair center.
	Fault code 11	Solar input voltage is more than 500V.	Solar input voltage is more than 500V.

Appendix I: Parallel function

1. Introduction

This inverter can be used in parallel with two different operation modes.

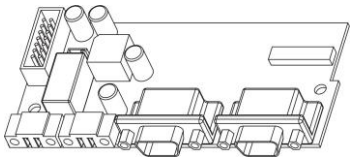
1. Parallel operation in single phase is with up to 9 units. The supported maximum output power is 54KW/54KVA.
2. Maximum 9 units work together to support three-phase equipment. Maximum seven units support one phase.

NOTE: If this unit is bundled with share current cable and parallel cable, this inverter is default supported parallel operation. You may skip section 3. If not, please purchase parallel kit and install this unit by following instruction from professional technical personnel in local dealer.

WARNING: Please make sure all output N wires of each inverter should be connected always. Otherwise, it will cause fault in error #72.

2. Package Contents

In parallel kit, you will find the following items in the package:



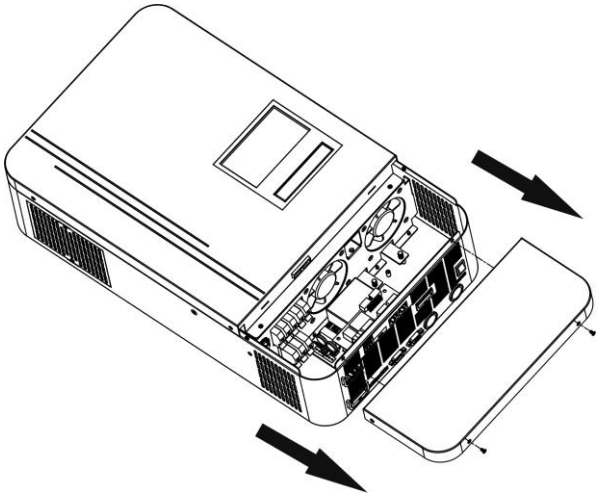
Parallel board

Parallel communication cable

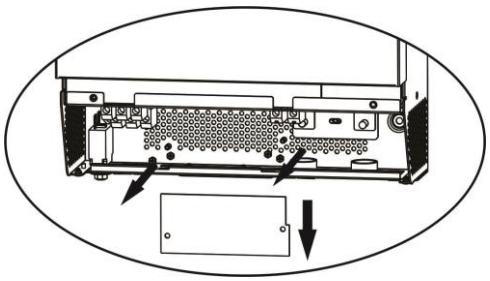
Current sharing cable

3. Parallel board installation

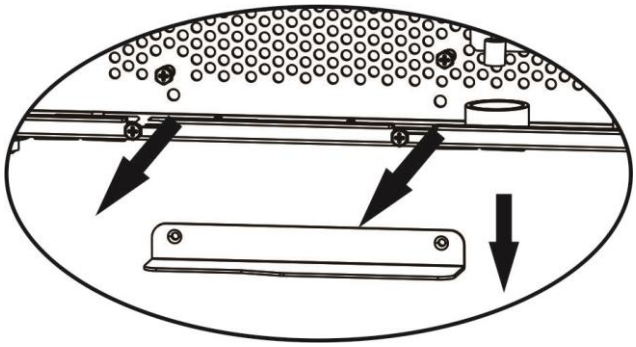
Step 1: Remove wire cover by unscrewing all screws.



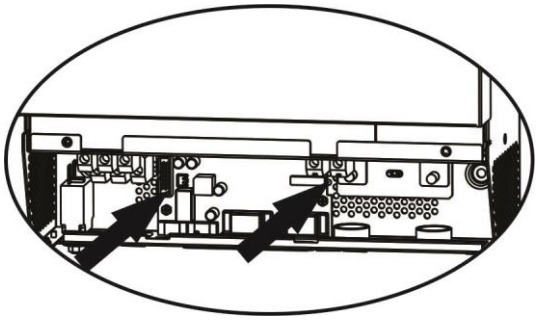
Step 2: Remove two screws as below chart and remove 2-pin and 14-pin cables. Take out the board under the communication board.



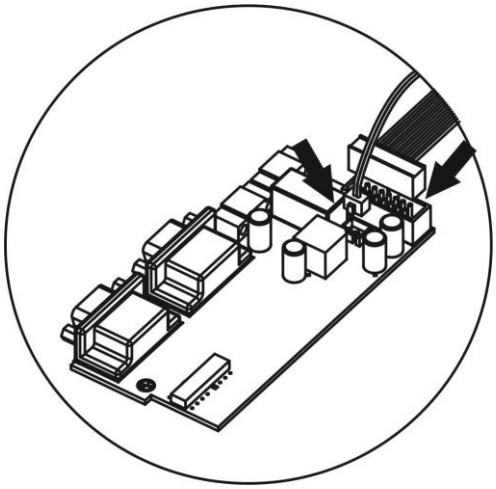
Step 3: Remove two screws as below chart to take out cover of parallel communication.



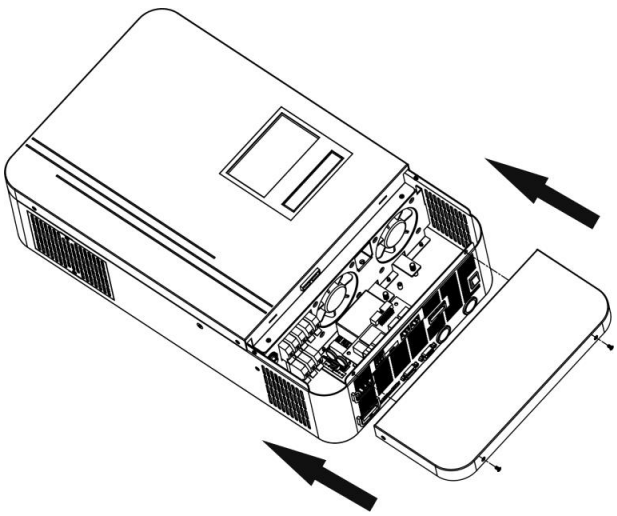
Step 4: Install new parallel board with 2 screws tightly.



Step 6: Connect 2-pin to original position.



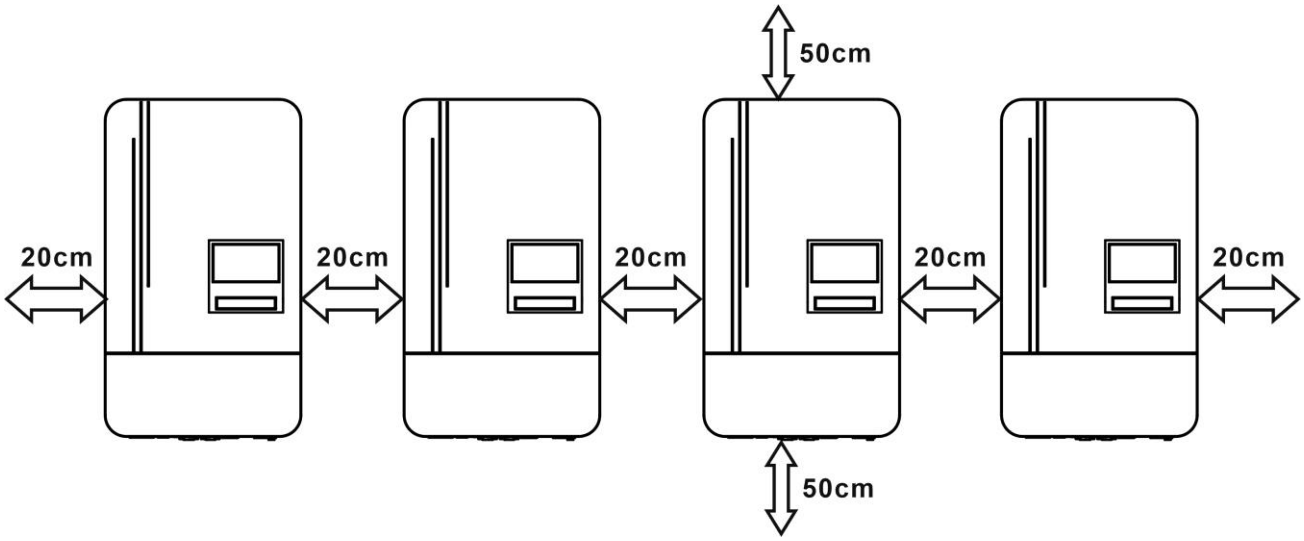
Step 7: Put communication board back to the unit.



Step 8: Put wire cover back to the unit. Now the inverter is providing parallel operation function.

4. Mounting the Unit

When installing multiple units, please follow below chart.



NOTE: For proper air circulation to dissipate heat, allow a clearance of approx. 20 cm to the side and approx. 50 cm above and below the unit. Be sure to install each unit in the same level.

5. Wiring Connection

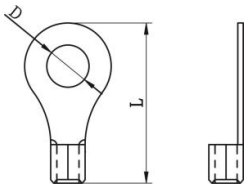
NOTICE: It's requested to connect to battery for parallel operation.

The cable size of each inverter is shown as below:

Recommended battery cable and terminal size for each inverter:

Model	Wire Size	Ring Terminal			Torque value
		Cable mm^2	Dimensions		
			D (mm)	L (mm)	
6.2KW	1*2AWG or 2*6AWG	28	6.4	42.7	2~ 3 Nm

Ring terminal:



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

Recommended AC input and output cable size for each inverter:

Model	AWG no.	Torque
6.2KW	10 AWG	1.2~1.6Nm

You need to connect the cables of each inverter together. Take the battery cables for example: You need to use a connector or bus-bar as a joint to connect the battery cables together, and then connect to the battery terminal. The cable size used from joint to battery should be X times cable size in the tables above. "X" indicates the number of inverters connected in parallel.
Regarding AC input and output, please also follow the same principle.

WARNING!! Make sure all output N wires of each inverter must be connected all the time. Otherwise, it will cause inverter fault in error code #72.

CAUTION!! Please install the breaker at the battery and AC input side. This will ensure the inverter can be securely disconnected during maintenance and fully protected from over current of battery or AC input. The recommended mounted location of the breakers is shown in the figures in 5-1 and 5-2.

Recommended breaker specification of battery for each inverter:

Model	1 unit*
6.2KW	180A/70VDC

*If you want to use only one breaker at the battery side for the whole system, the rating of the breaker should be X times current of 1 unit. "X" indicates the number of inverters connected in parallel.

Recommended breaker specification of AC input with single phase:

Model	2 units	3 units	4 units	5 units	6 units	7 units	8 units	9 units
6.2KW	80A/ 230VAC	120A/ 230VAC	160A/ 230VAC	200A/ 230VAC	240A/ 230VAC	280A/ 230VAC	320A/ 230VAC	360A/ 230VAC

Note1: Also, you can use 50A for only 1 unit and install one breaker at its AC input in each inverter.
Note2: Regarding three-phase system, you can use 4-pole breaker directly and the rating of the breaker should be compatible with the phase current limitation from the phase with maximum units

Recommended battery capacity

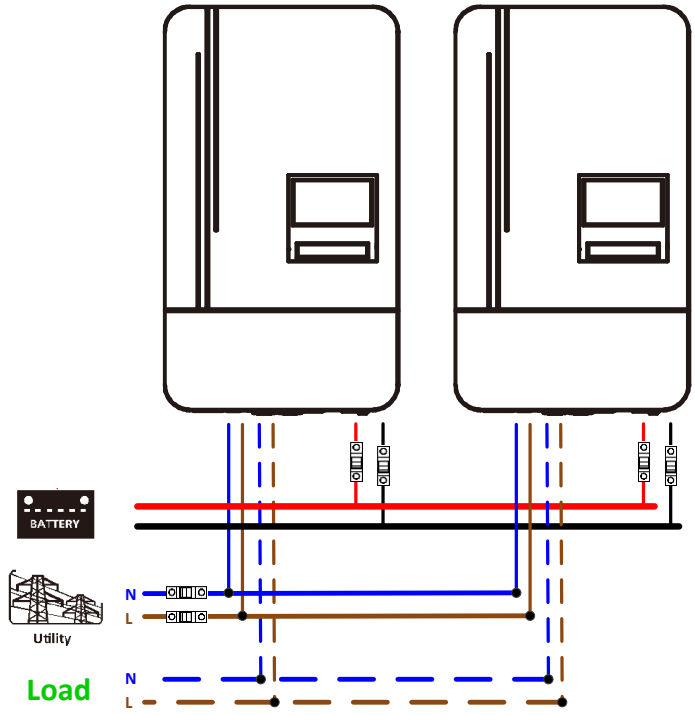
Inverter parallel numbers	2	3	4	5	6	7	8	9
Battery Capacity	400AH	600AH	800AH	1000AH	1200AH	1400AH	1600AH	1800AH

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

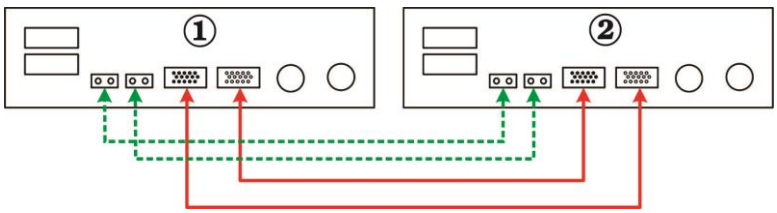
5-1. Parallel Operation in Single phase

Two inverters in parallel:

Power Connection

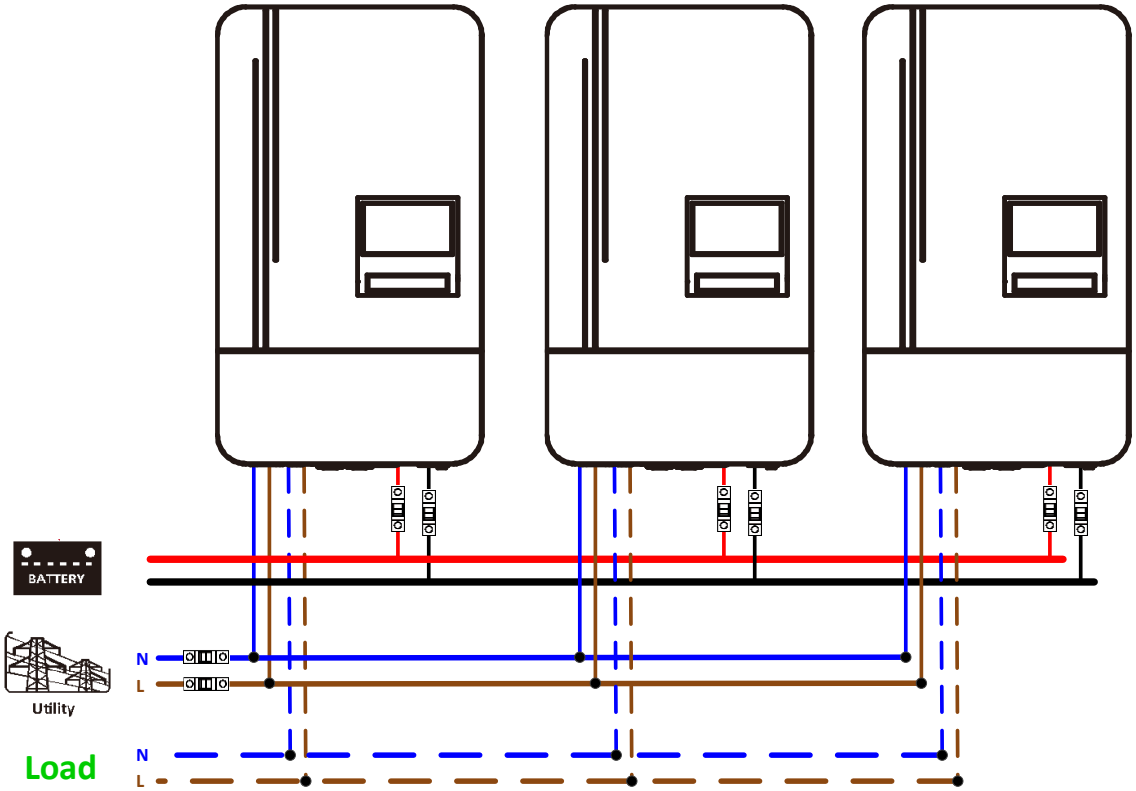


Communication Connection

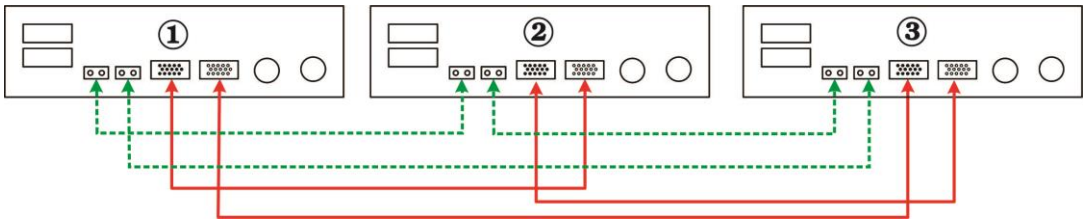


Three inverters in parallel:

Power Connection

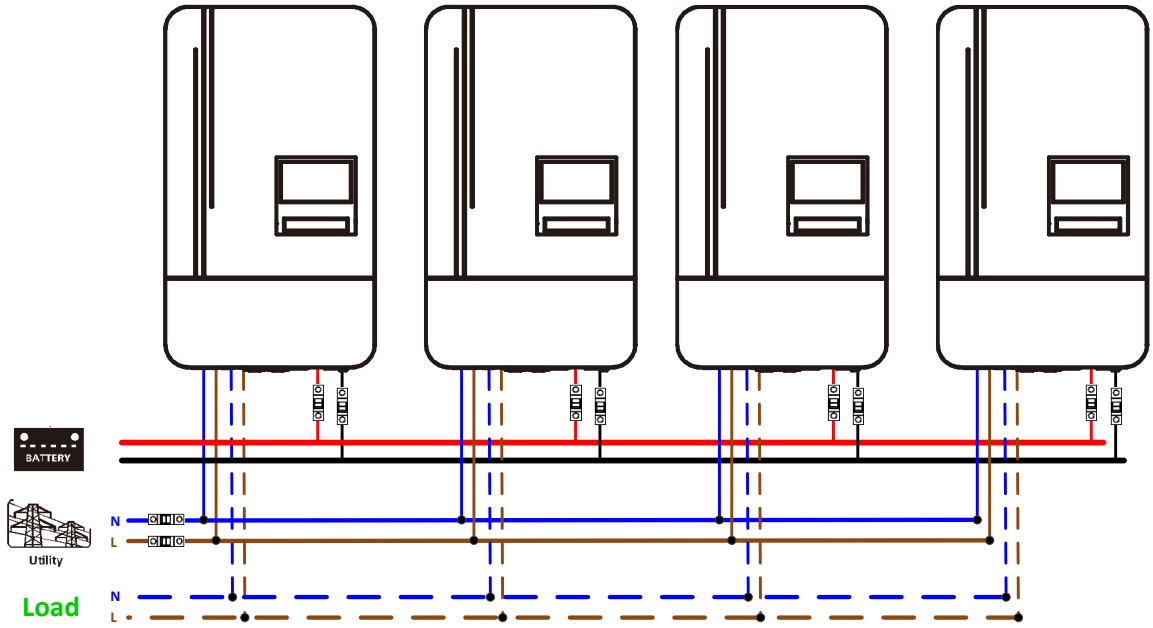


Communication Connection

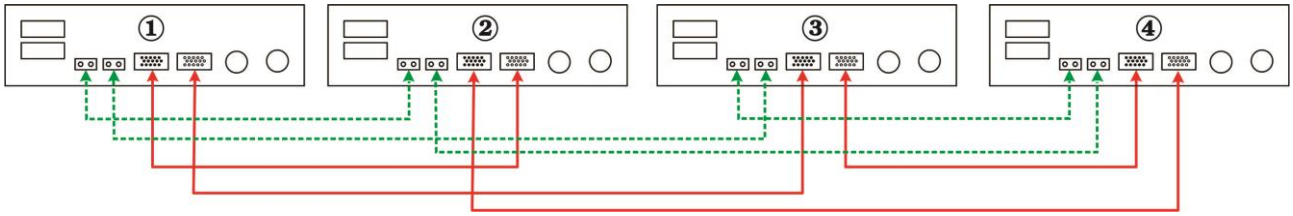


Four inverters in parallel:

Power Connection

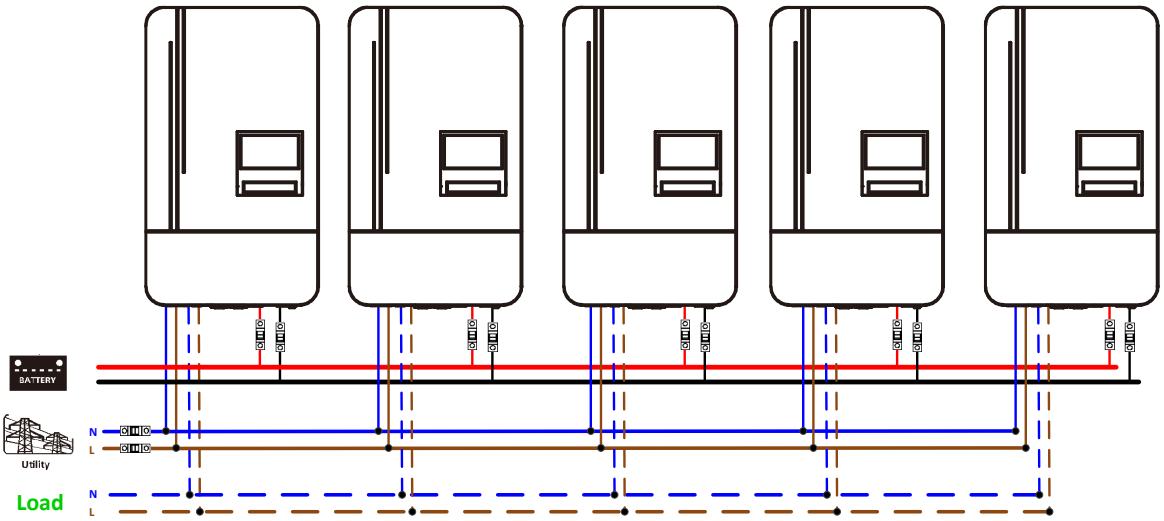


Communication Connection

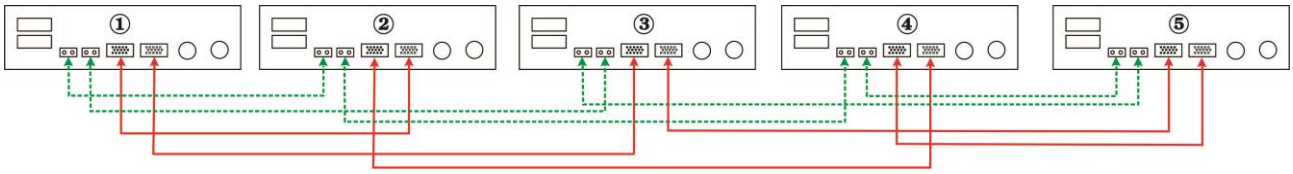


Five inverters in parallel:

Power Connection

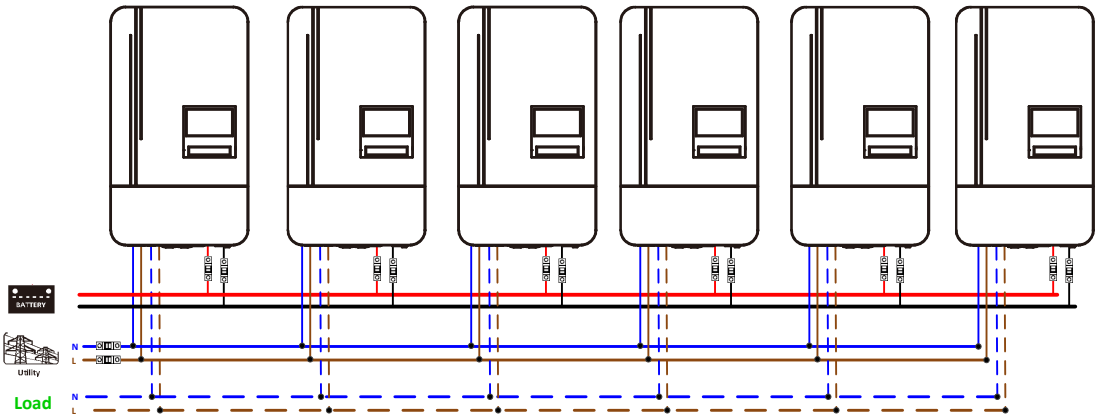


Communication Connection

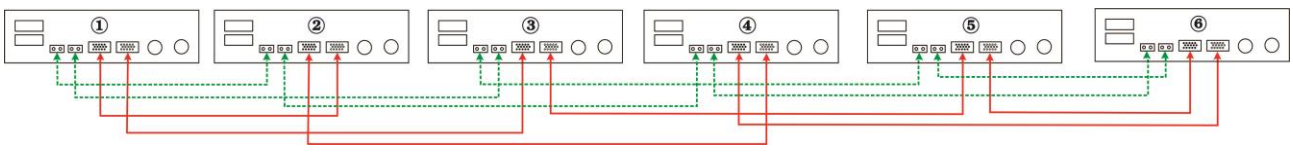


Six inverters in parallel:

Power Connection

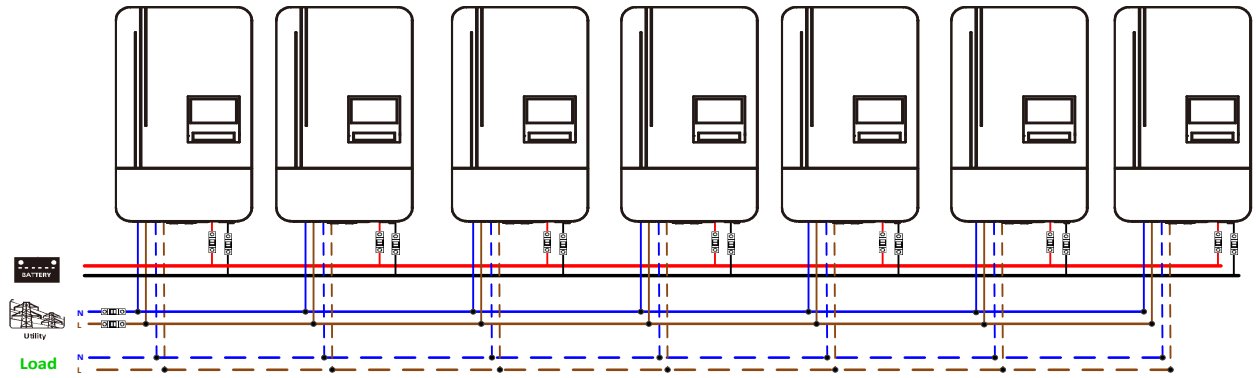


Communication Connection

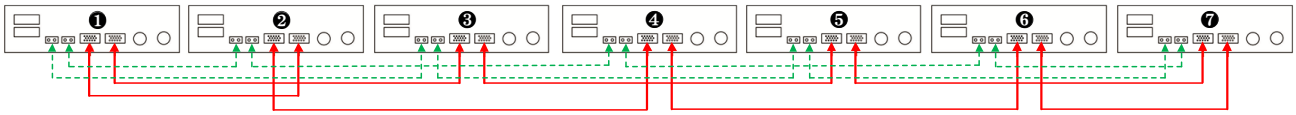


Seven inverters in parallel:

Power Connection

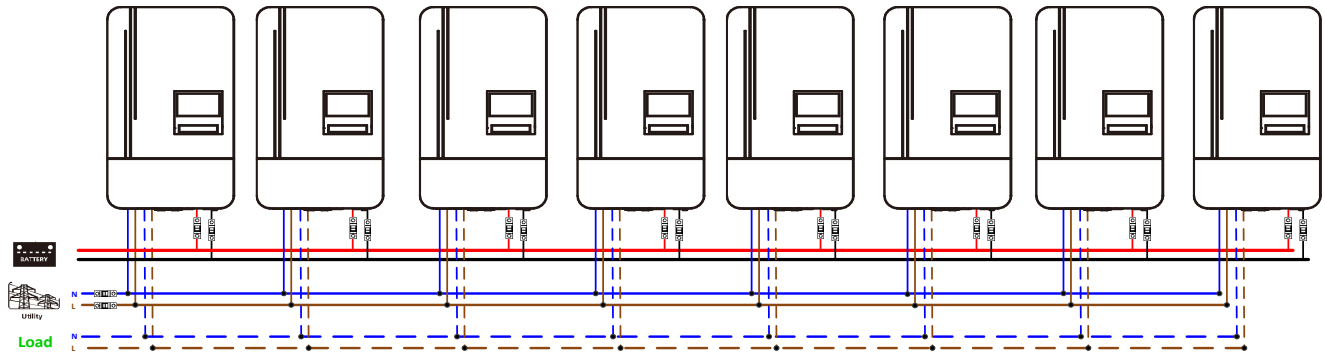


Communication Connection

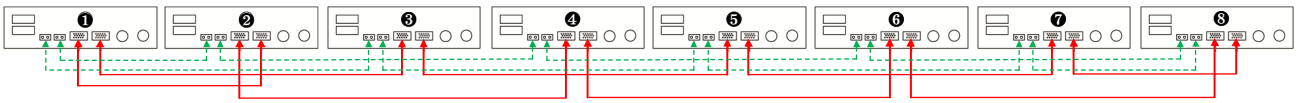


Eight inverters in parallel:

Power Connection

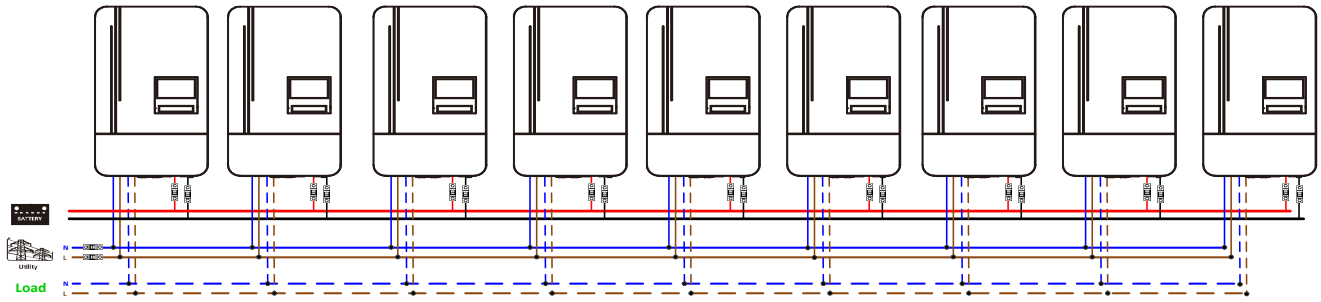


Communication Connection

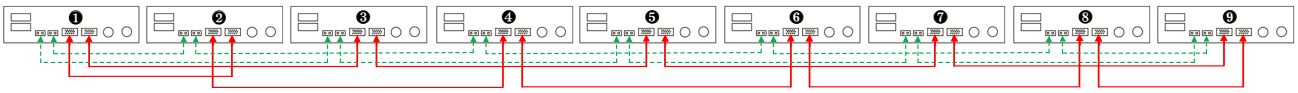


Nine inverters in parallel:

Power Connection



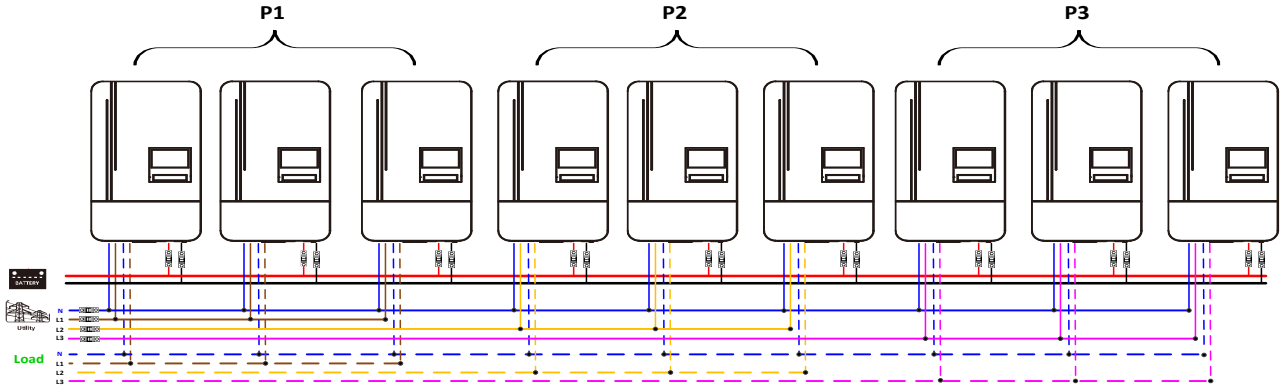
Communication Connection



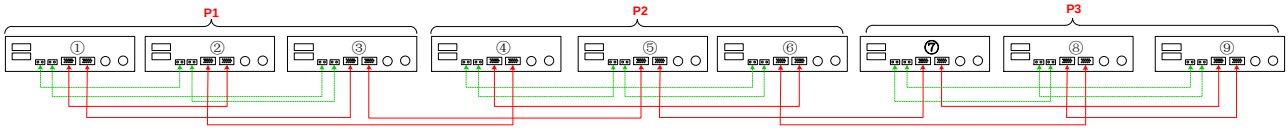
5-2. Support 3-phase equipment

Three inverters in each phase:

Power Connection

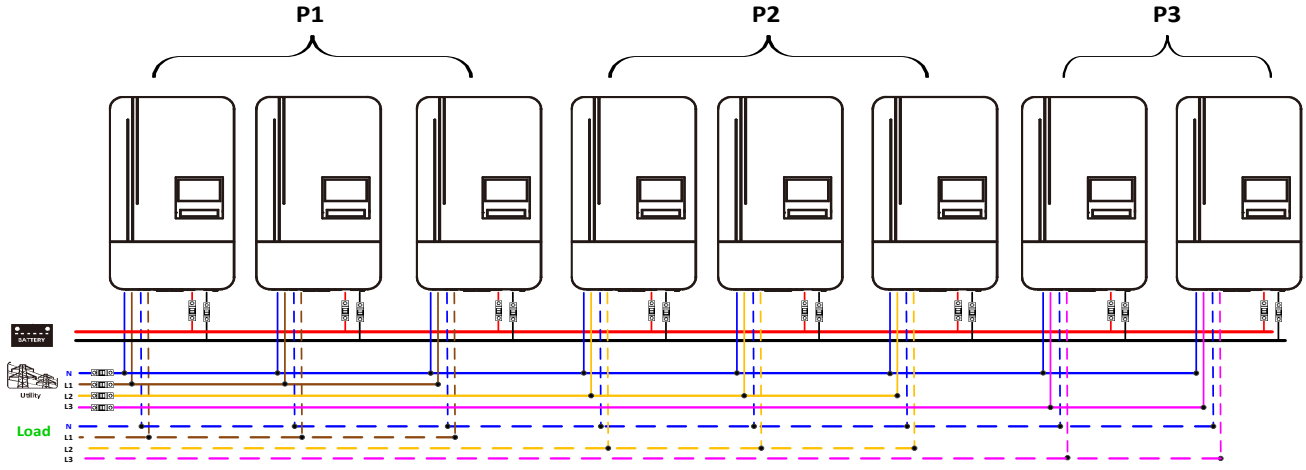


Communication Connection

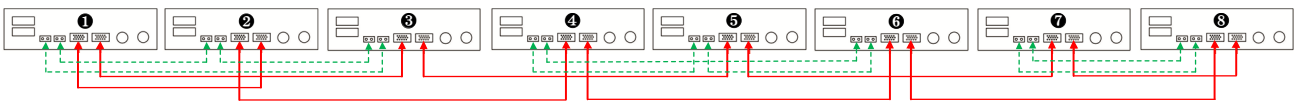


Three inverters in one phase, three inverters in second phase and two inverter for the third phase:

Power Connection

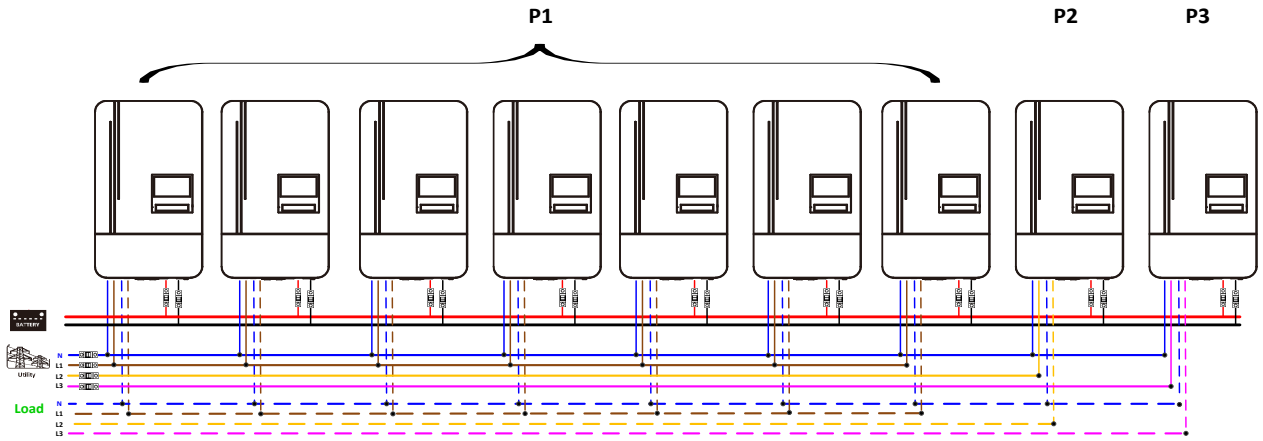


Communication Connection



Seven inverters in one phase and one inverter for the other two phases:

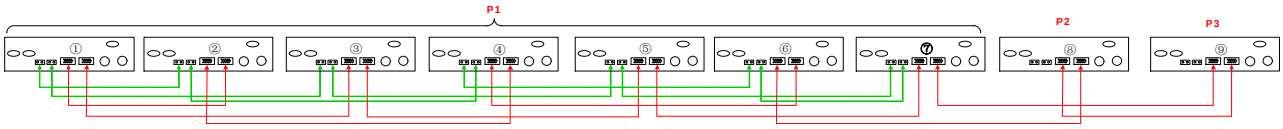
Power Connection



Note: It's up to customer's demand to pick 7 inverters on any phase.

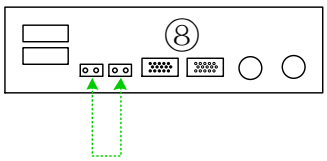
P1: L1-phase, P2: L2-phase, P3: L3-phase.

Communication Connection



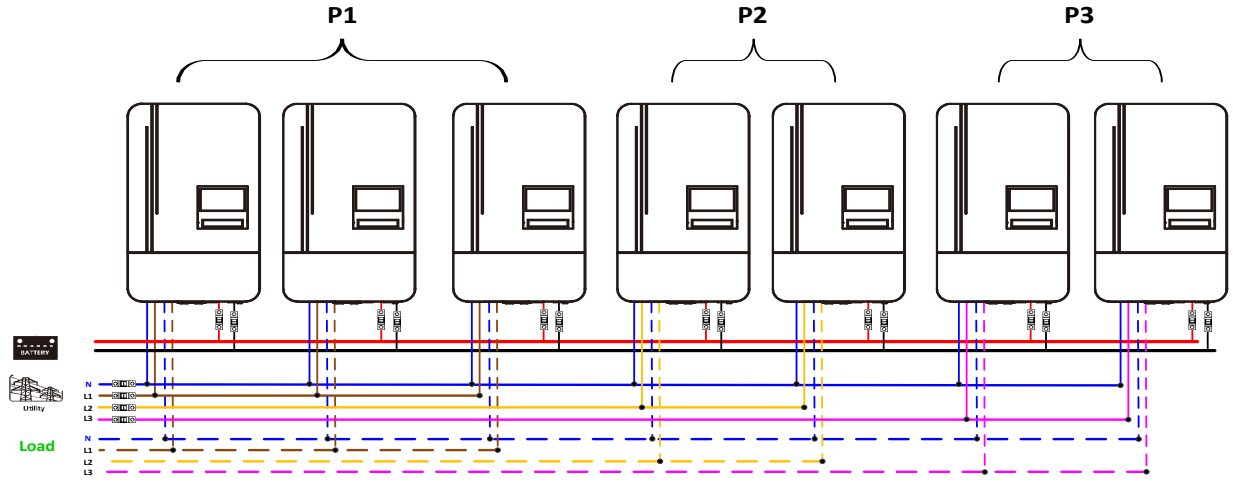
Note: If there is only one unit in one phase, this unit doesn't need to connect the current sharing cable.

Or you connect it like as below:

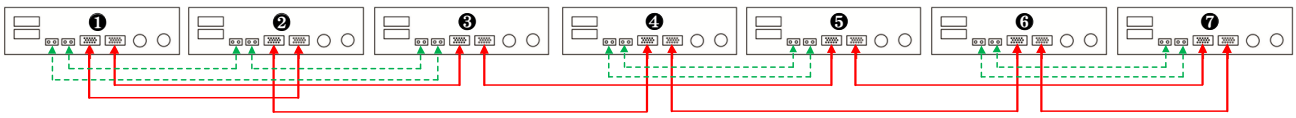


Three inverters in one phase, two inverters in second phase and two inverters for the third phase:

Power Connection

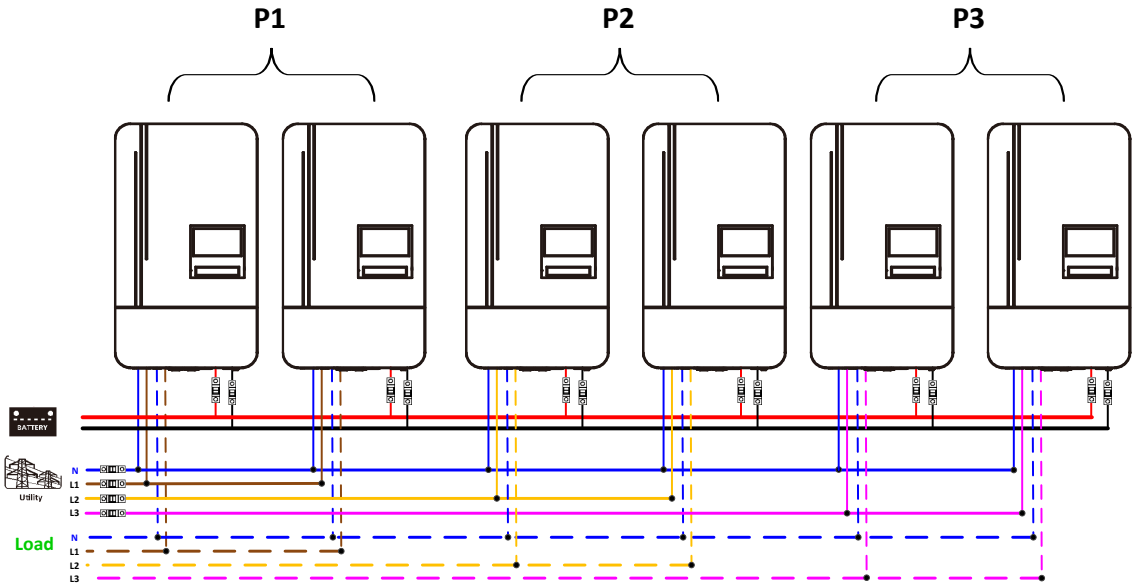


Communication Connection

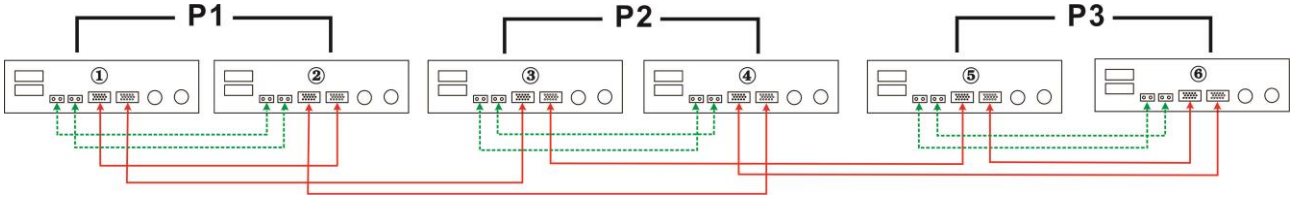


Two inverters in each phase:

Power Connection

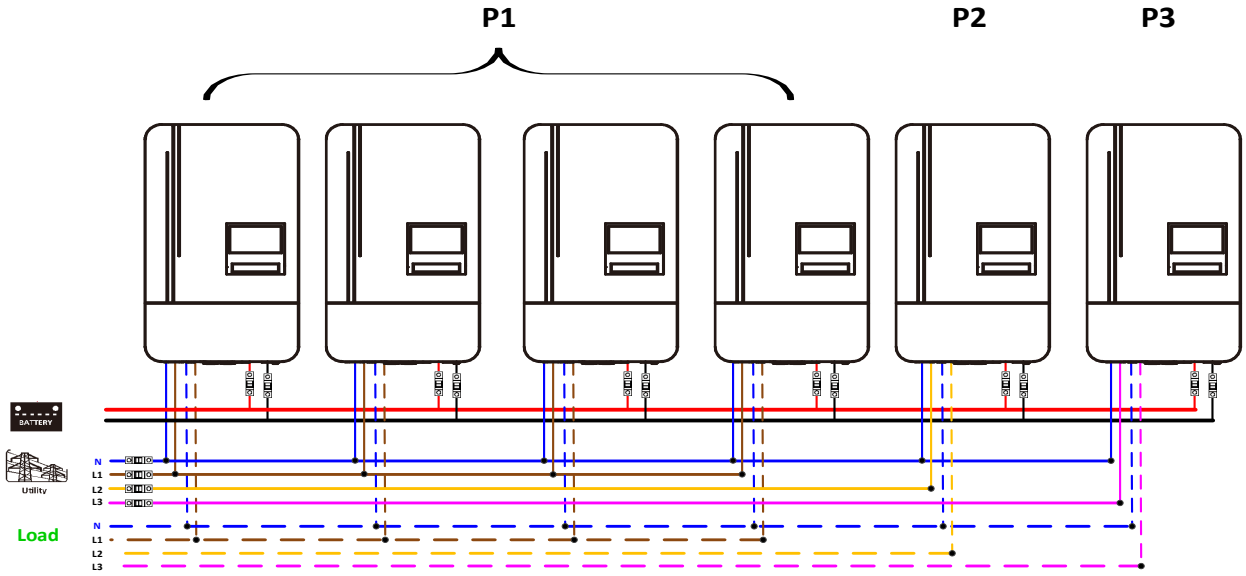


Communication Connection

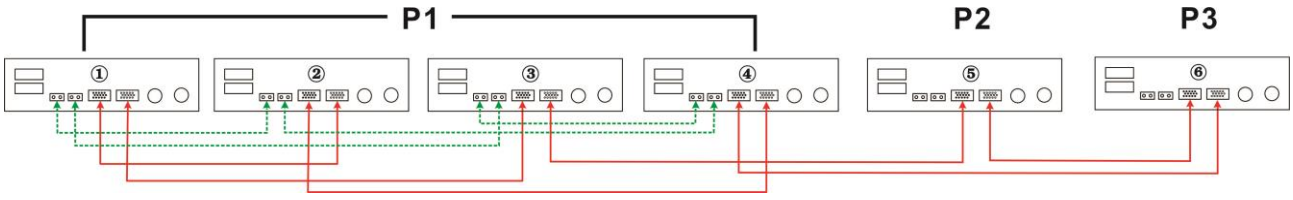


Four inverters in one phase and one inverter for the other two phases:

Power Connection

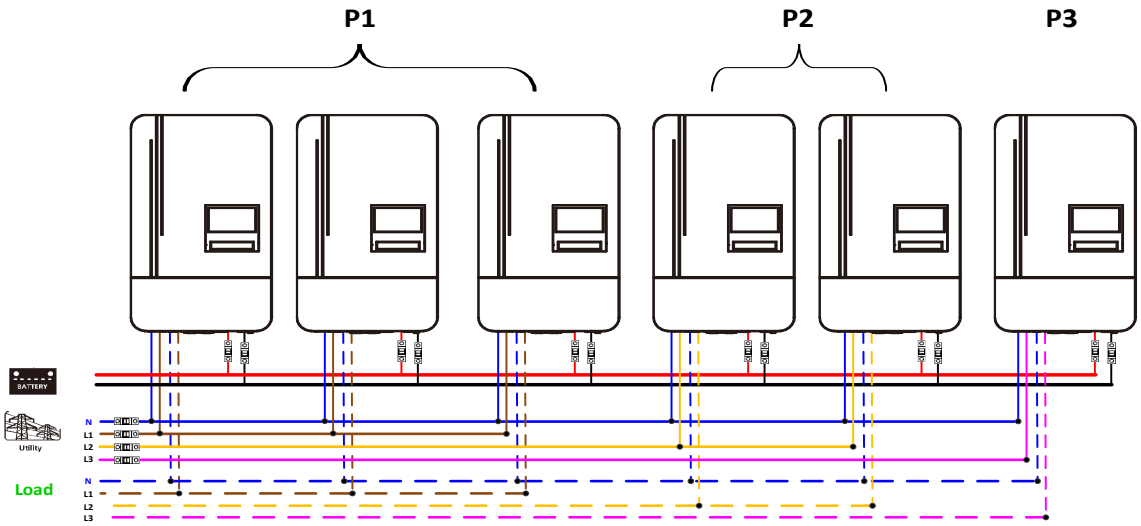


Communication Connection

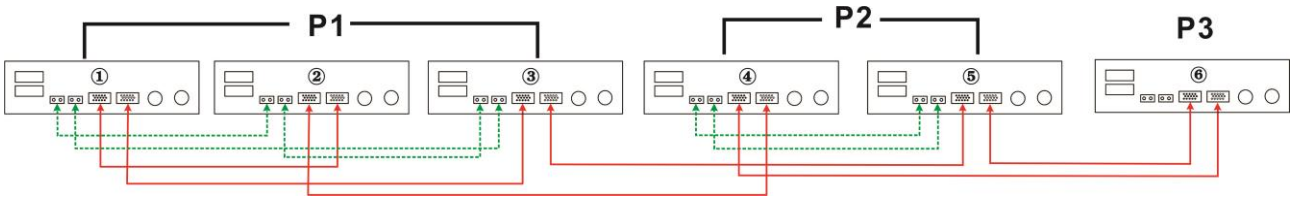


Three inverters in one phase, two inverters in second phase and one inverter for the third phase:

Power Connection

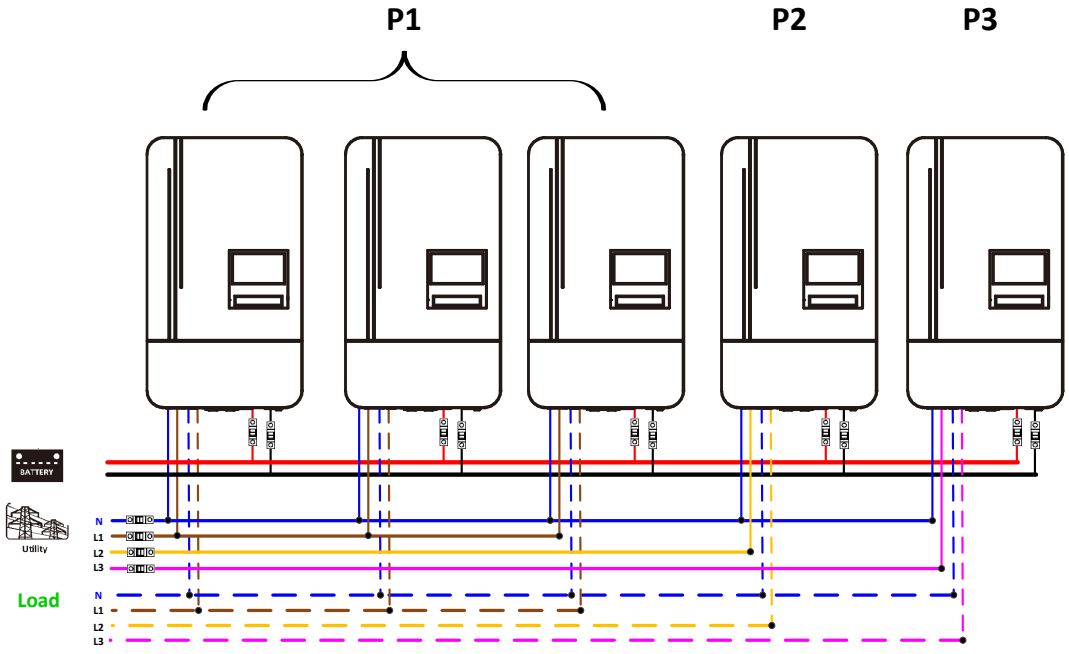


Communication Connection

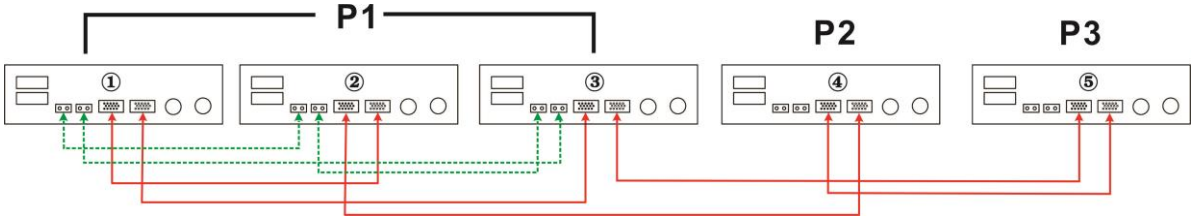


Three inverters in one phase and only one inverter for the remaining two phases:

Power Connection

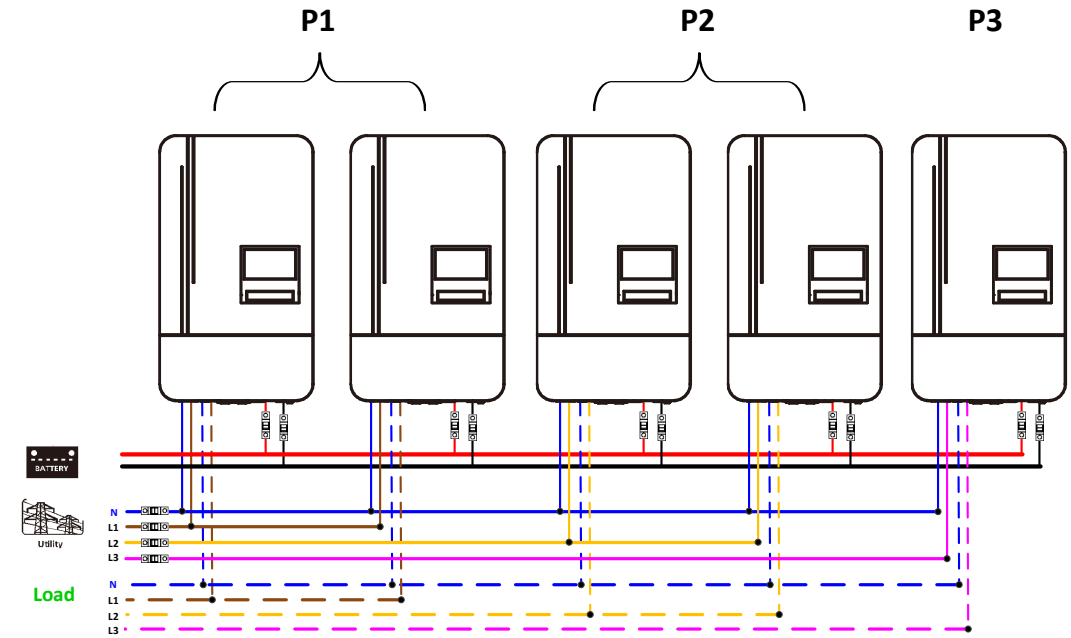


Communication Connection

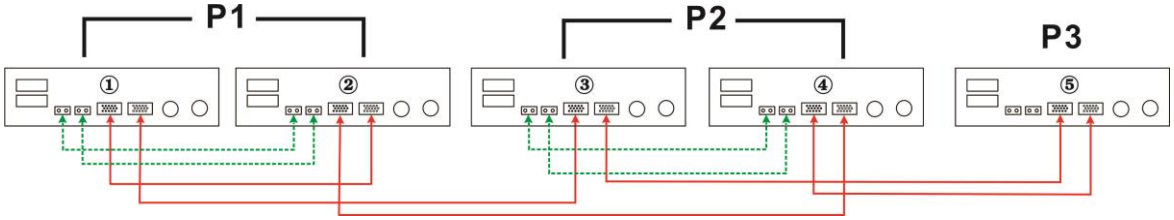


Two inverters in two phases and only one inverter for the remaining phase:

Power Connection

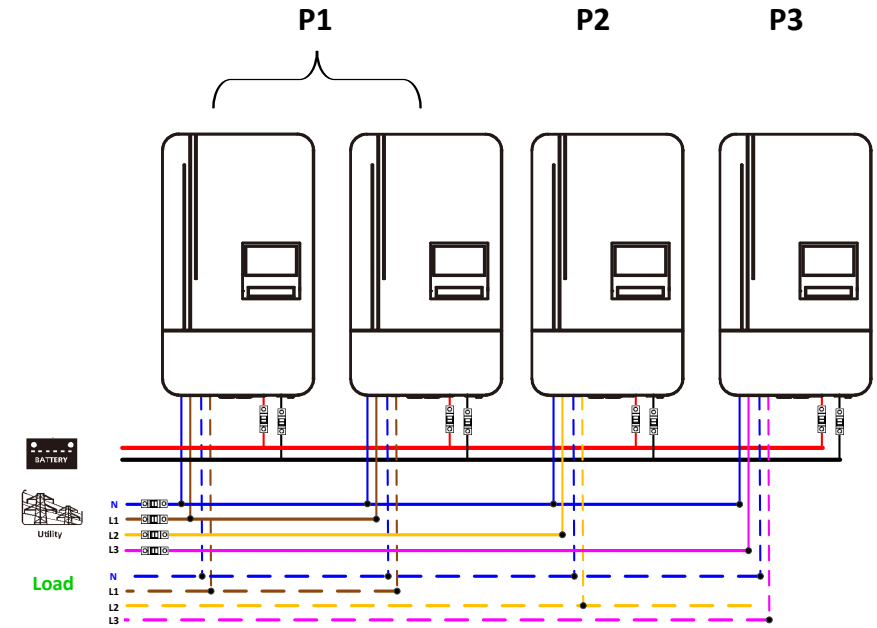


Communication Connection

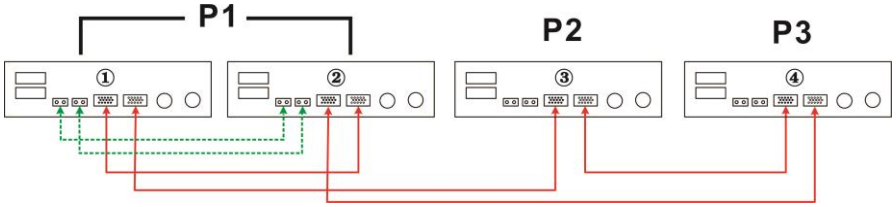


Two inverters in one phase and only one inverter for the remaining phases:

Power Connection

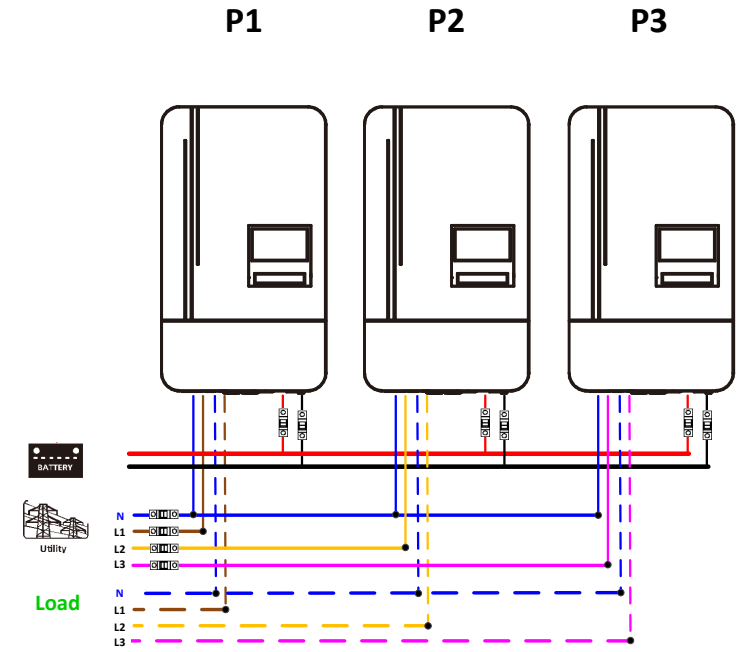


Communication Connection

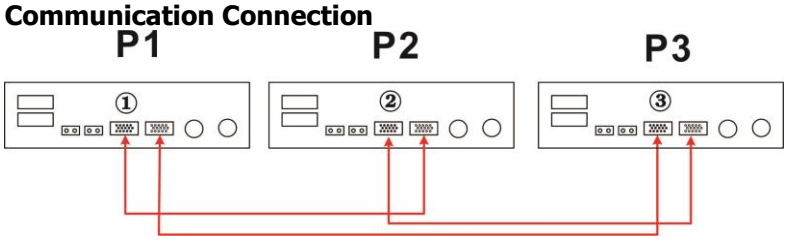


One inverter in each phase:

Power Connection



Communication Connection



WARNING: Do not connect the current sharing cable between the inverters which are in different phases. Otherwise, it may damage the inverters.

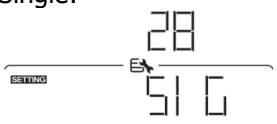
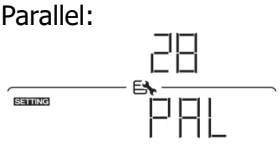
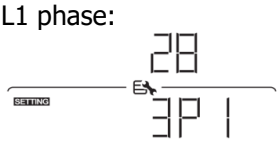
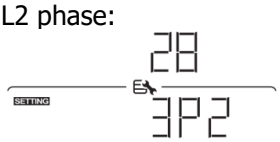
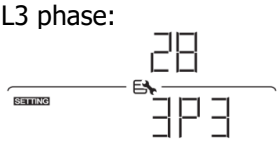
6. PV Connection

Please refer to user manual of single unit for PV Connection.

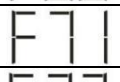
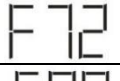
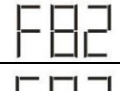
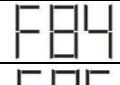
CAUTION: Each inverter should connect to PV modules separately.

7. LCD Setting and Display

Setting Program:

Program	Description	Selectable option	
28	AC output mode *This setting is only available when the inverter is in standby mode (Switch off).	Single: 	When the units are used in parallel with single phase, please select "PAL" in program 28. It is required to have at least 3 inverters or maximum 9 inverters to support three-phase equipment. It's required to have at least one inverter in each phase or it's up to four inverters in one phase. Please refers to 5-2 for detailed information. Please select "3P1" in program 28 for the inverters connected to L1 phase, "3P2" in program 28 for the inverters connected to L2 phase and "3P3" in program 28 for the inverters connected to L3 phase. Be sure to connect share current cable to units which are on the same phase. Do NOT connect share current cable between units on different phases.
		Parallel: 	
		L1 phase: 	
		L2 phase: 	
		L3 phase: 	

Fault code display:

Fault Code	Fault Event	Icon on
60	Power feedback protection	
71	Firmware version inconsistent	
72	Current sharing fault	
80	CAN fault	
81	Host loss	
82	Synchronization loss	
83	Battery voltage detected different	
84	AC input voltage and frequency detected different	
85	AC output current unbalance	
86	AC output mode setting is different	

Code Reference:

Code	Description	Icon on
NE	Un-identified unit for master or slave	
HS	Master unit	
SL	Slave unit	

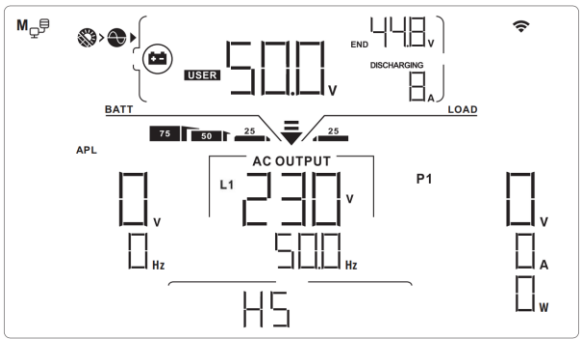
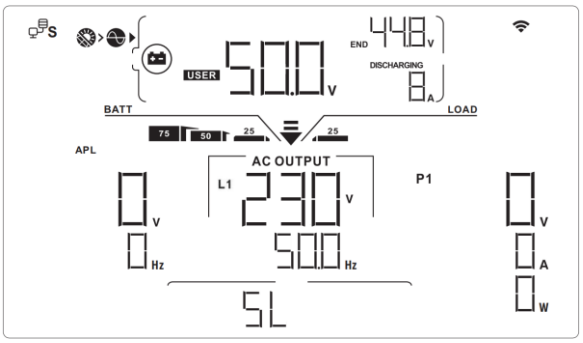
8. Commissioning

Parallel in single phase

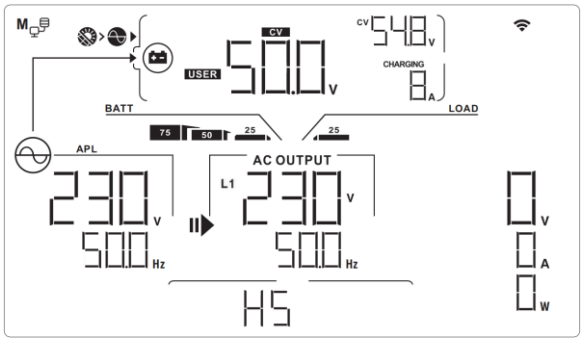
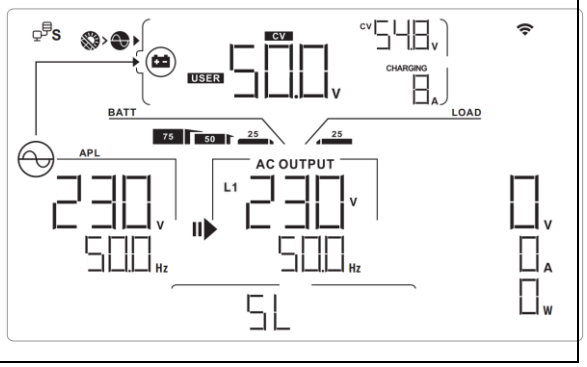
Step 1: Check the following requirements before commissioning:

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

Step 2: Turn on each unit and set "PAL" in LCD setting program 28 of each unit. And then shut down all units.
NOET: It's necessary to turn off switch when setting LCD program. Otherwise, the setting can not be programmed.
Step 3: Turn on each unit.

LCD display in Master unit	LCD display in Slave unit
	

NOTE: Master and slave units are randomly defined. Step 4: Switch on all AC breakers of Line wires in AC input. It's better to have all inverters connect to utility at the same time. If not, it will display fault 82 in following-order inverters. However, these inverters will automatically restart. If detecting AC connection, they will work normally.

LCD display in Master unit	LCD display in Slave unit
	

Step 5: If there is no more fault alarm, the parallel system is completely installed.
Step 6: Please switch on all breakers of Line wires in load side. This system will start to provide power to the load.

Support three-phase equipment

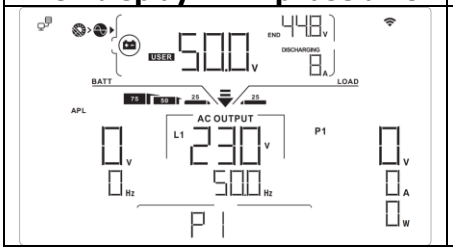
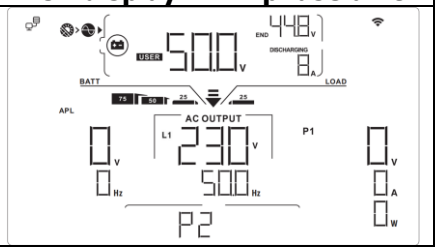
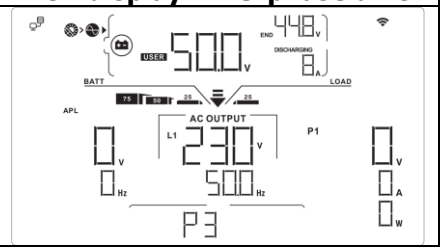
Step 1: Check the following requirements before commissioning:

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

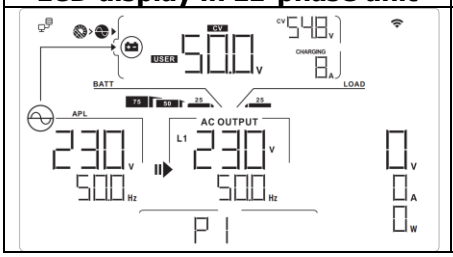
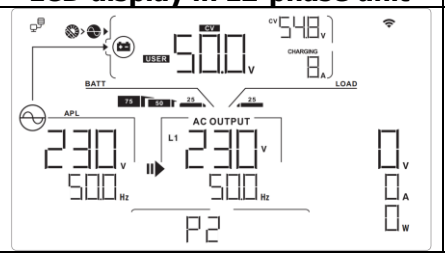
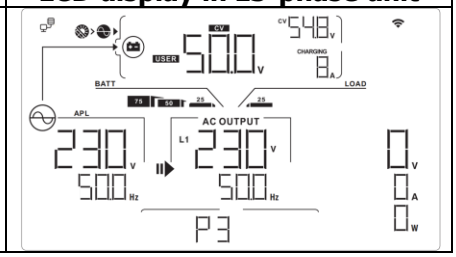
Step 2: Turn on all units and configure LCD program 28 as P1, P2 and P3 sequentially. And then shut down all units.

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

Step 3: Turn on all units sequentially.

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

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

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

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

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

Note 1: To avoid overload occurring, before turning on breakers in load side, it's better to have whole system in operation first.

Note 2: Transfer time for this operation exists. Power interruption may happen to critical devices, which cannot bear transfer time.

9. Trouble shooting

Situation		Solution
Fault Code	Fault Event Description	
60	Current feedback into the inverter is detected.	1. Restart the inverter. 2. Check if L/N cables are not connected reversely in all inverters. 3. For parallel system in single phase, make sure the sharing are connected in all inverters. For supporting three-phase system, make sure the sharing cables are connected in the inverters in the same phase, and disconnected in the inverters in different phases. 4. If the problem remains, please contact your installer.
71	The firmware version of each inverter is not the same.	1. Update all inverter firmware to the same version. 2. Check the version of each inverter via LCD setting and make sure the CPU versions are same. If not, please contact your instraller to provide the firmware to update. 3. After updating, if the problem still remains, please contact your installer.
72	The output current of each inverter is different.	1. Check if sharing cables are connected well and restart the inverter. 2. If the problem remains, please contact your installer.
80	CAN data loss	1. Check if communication cables are connected well and restart the inverter. 2. If the problem remains, please contact your installer.
81	Host data loss	
82	Synchronization data loss	
83	The battery voltage of each inverter is not the same.	1. Make sure all inverters share same groups of batteries together. 2. Remove all loads and disconnect AC input and PV input. Then, check battery voltage of all inverters. If the values from all inverters are close, please check if all battery cables are the same length and same material type. Otherwise, please contact your installer to provide SOP to calibrate battery voltage of each inverter. 3. If the problem still remains, please contact your installer.
84	AC input voltage and frequency are detected different.	1. Check the utility wiring conncetion and restart the inverter. 2. Make sure utility starts up at same time. If there are breakers installed between utility and inverters, please be sure all breakers can be turned on AC input at same time. 3. If the problem remains, please contact your installer.
85	AC output current unbalance	1. Restart the inverter. 2. Remove some excessive loads and re-check load information from LCD of inverters. If the values are different, please check if AC input and output cables are in the same length and material type. 3. If the problem remains, please contact your installer.
86	AC output mode setting is different.	1. Switch off the inverter and check LCD setting #28. 2. For parallel system in single phase, make sure no 3P1, 3P2 or 3P3 is set on #28. For supporting three-phase system, make sure no "PAL" is set on #28. 3. If the problem remains, please contact your installer.

Appendix II: BMS Communication Installation

1. Introduction

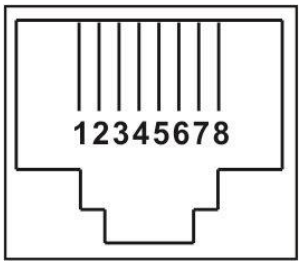
If connecting to lithium battery, it is recommended to purchase a custom-made RJ45 communication cable. Please check with your dealer or integrator for details.

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.

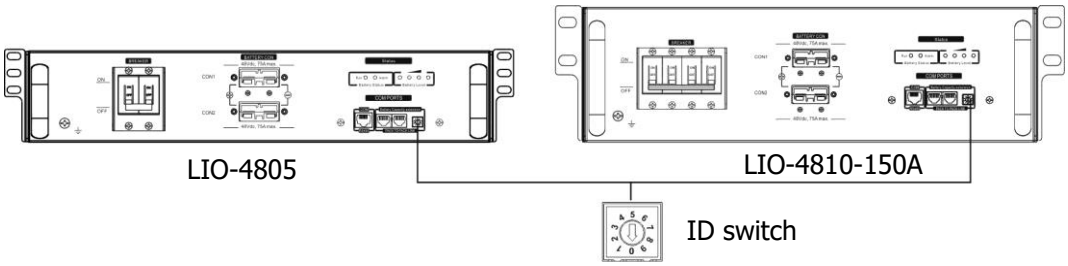
2. Pin Assignment for BMS Communication Port

	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

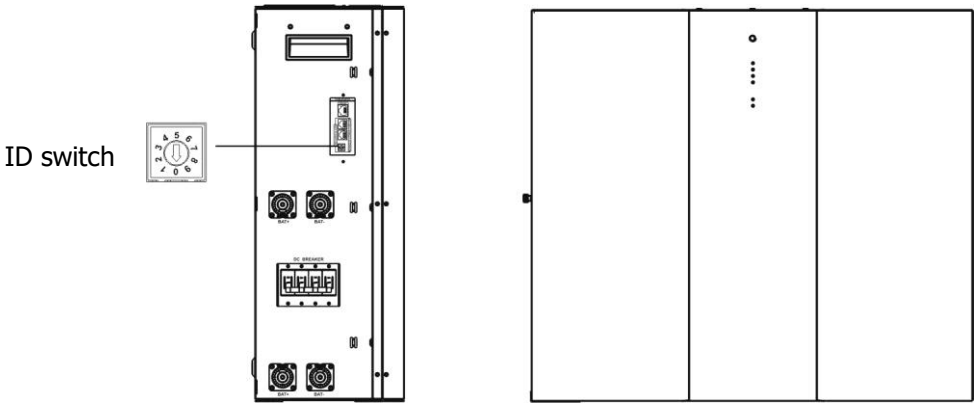


3. Lithium Battery Communication Configuration

LIO-4805/LIO-4810-150A

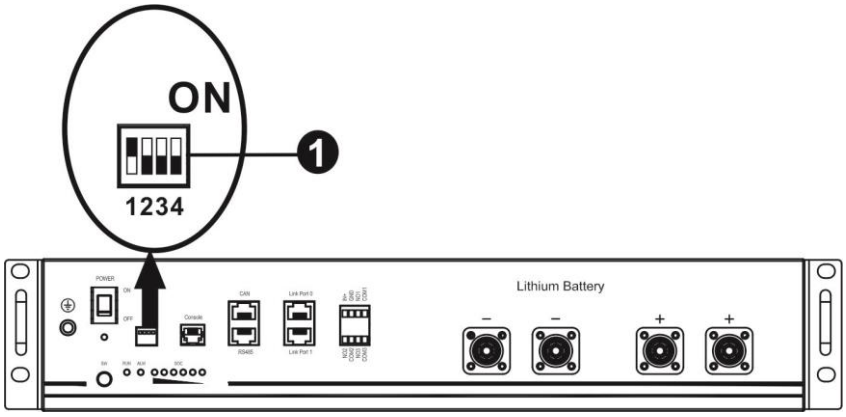


ESS LIO-I 4810



ID Switch indicates the unique ID code for each battery module. It's required to assign a unique ID to each battery module for normal operation. We can set up the ID code for each battery module by rotating the PIN number on the ID switch. From number 0 to 9, the number can be random; no particular order. Maximum 10 battery modules can be operated in parallel.

PYLONTECH



Dip Switch: There are 4 Dip Switches that sets different baud rate and battery group address. If switch position is turned to the "OFF" position, it means "0". If switch position is turned to the "ON" position, it means "1".

Dip 1 is "ON" to represent the baud rate 9600.
Dip 2, 3 and 4 are to set up battery group address.
Dip switch 2, 3 and 4 on master battery (first battery) are to set up or change the group address.

NOTE: "1" is upper position and "0" is bottom position.

Dip 1	Dip 2	Dip 3	Dip 4	Group address
1: RS485 baud rate=9600 **Restart to take effect**	0	0	0	Single group only. It's necessary to set up master battery with this setting and slave batteries are unrestricted.
	1	0	0	Multiple group condition. It's necessary to set up master battery on the first group with this setting and slave batteries are unrestricted.
	0	1	0	Multiple group condition. It's necessary to set up master battery on the second group with this setting and slave batteries are unrestricted.
	1	1	0	Multiple group condition. It's necessary to set up master battery on the third group with this setting and slave batteries are unrestricted.
	0	0	1	Multiple group condition. It's necessary to set up master battery on the forth group with this setting and slave batteries are unrestricted.
	1	0	1	Multiple group condition. It's necessary to set up master battery on the fifth group with this setting and slave batteries are unrestricted.

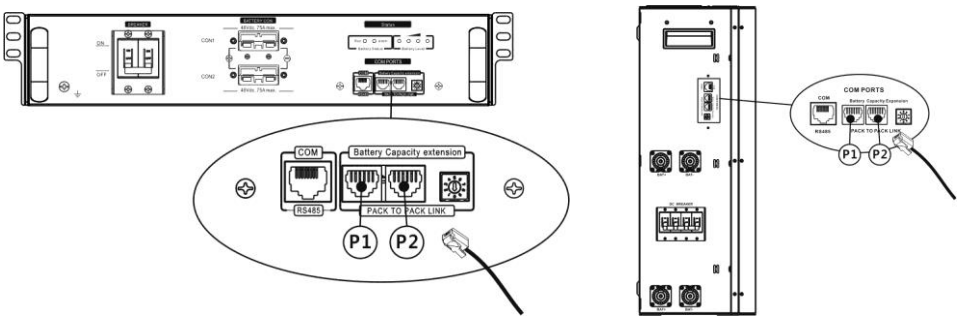
NOTE: The maximum groups of lithium battery is 5 and for maximum number for each group, please check with battery manufacturer.

4. Installation and Operation

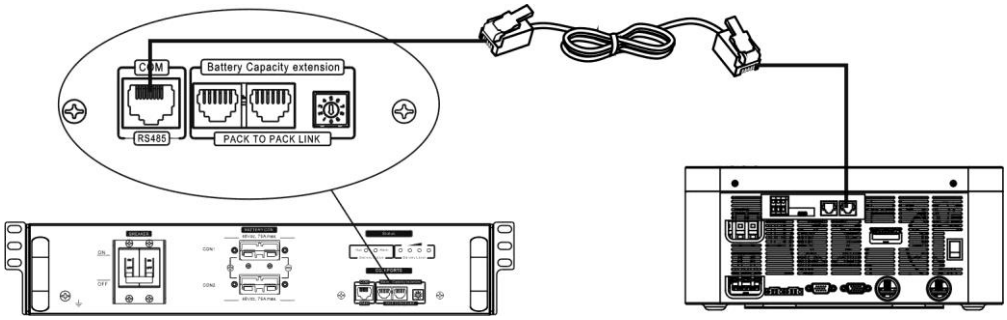
LIO-4805/LIO-4810-150A/ESS LIO-I 4810

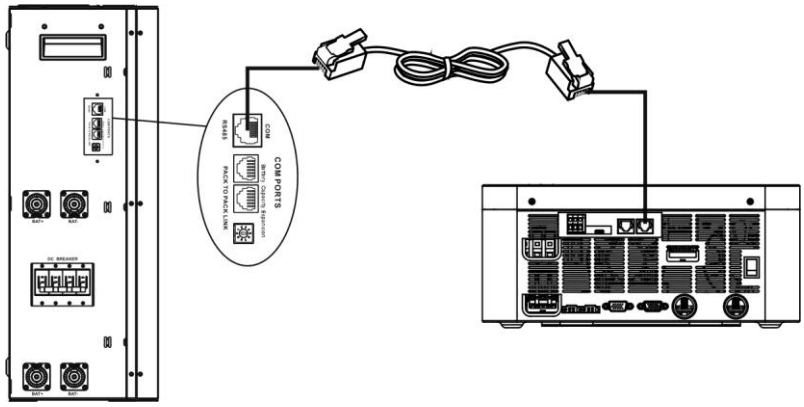
After ID no. is assigned for each battery module, please set up LCD panel in inverter and install the wiring connection as following steps.

Step 1: Use supplied RJ11 signal cable to connect into the extension port (P1 or P2).



Step 2: Use supplied RJ45 cable (from battery module package) to connect inverter and Lithium battery.



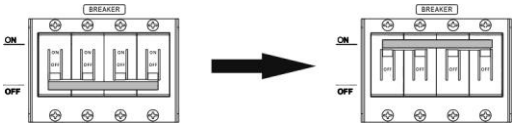


*** For multiple battery connection, please check battery manual for the details.**

Note for parallel system:

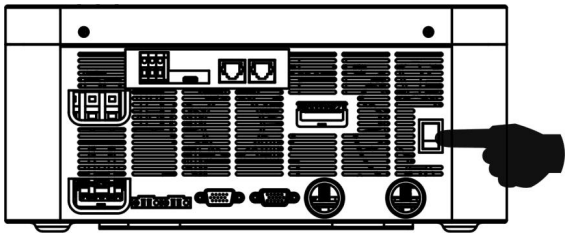
1. Only support common battery installation.
2. Use custom-made RJ45 cable to connect any inverter (no need to connect to a specific inverter) and Lithium battery. Simply set this inverter battery type to "LIB" in LCD program 14. Others should be "USE".

Step 3: Turn the breaker switch "ON". Now, the battery module is ready for DC output.

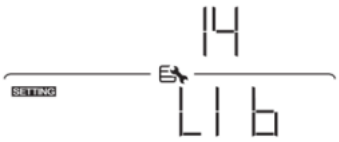


Step 4: Press Power on/off button on battery module for 5 secs, the battery module will start up.
*If the manual button cannot be approached, just simply turn on the inverter module. The battery module will be automatically turned on.

Step 5: Turn on the inverter.



Step 6. Be sure to select battery type as "LIB" in LCD program 14.

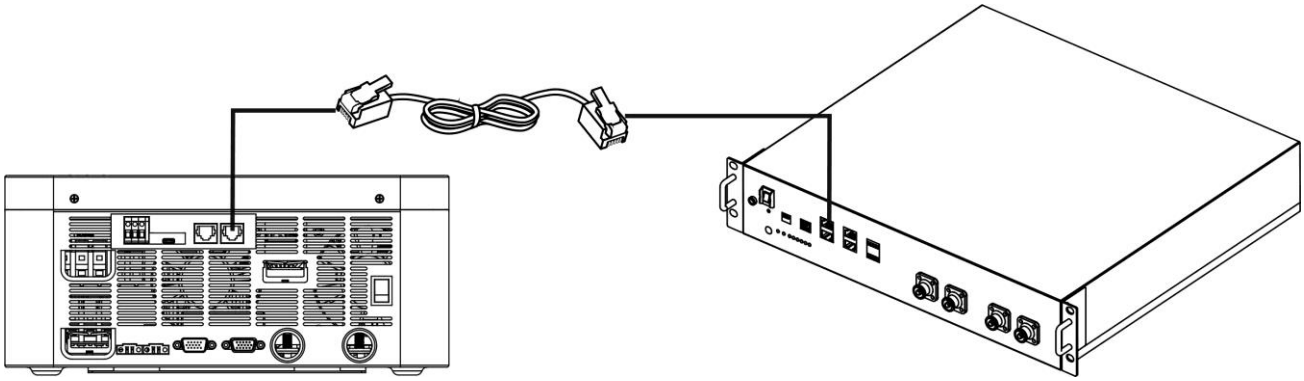


If communication between the inverter and battery is successful, the battery icon on LCD display will flash. Generally speaking, it will take longer than 1 minute to establish communication.

PYLONTECH

After configuration, please set up LCD panel in inverter and make wiring connection to Lithium battery as the following steps.

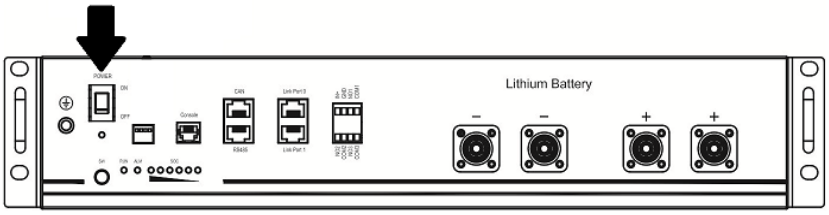
Step 1. Use custom-made RJ45 cable to connect inverter and Lithium battery.



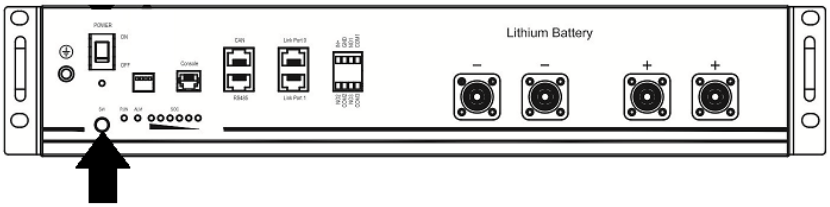
Note for parallel system:

3. Only support common battery installation.
4. Use custom-made RJ45 cable to connect any inverter (no need to connect to a specific inverter) and Lithium battery. Simply set this inverter battery type to "PYL" in LCD program 14. Others should be "USE".

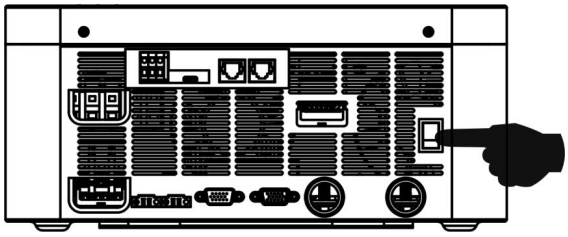
Step 2. Switch on Lithium battery.



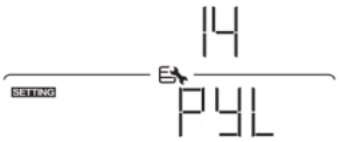
Step 3. Press more than three seconds to start Lithium battery, power output ready.



Step 4. Turn on the inverter.

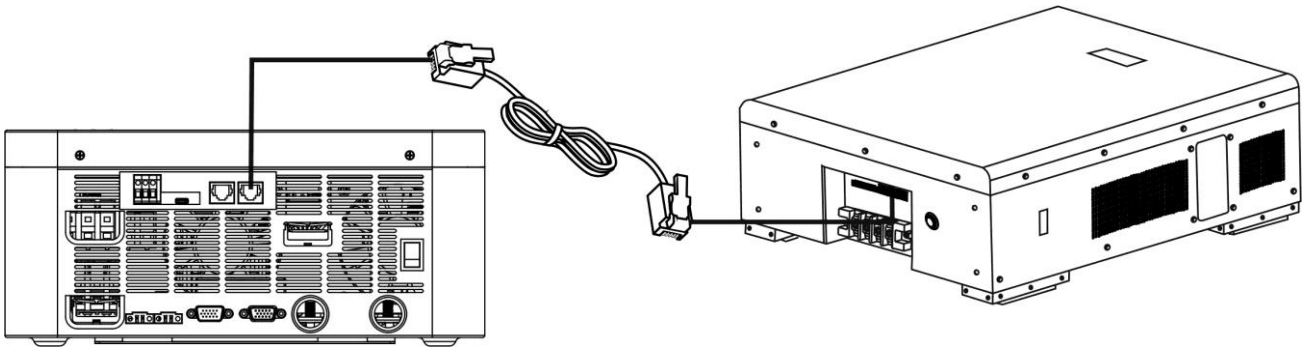


Step 5. Be sure to select battery type as "PYL" in LCD program 14.



WECO

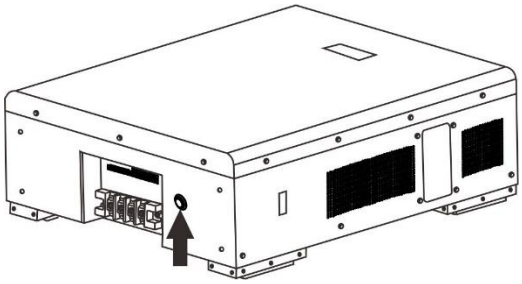
Step 1. Use custom-made RJ45 cable to connect inverter and Lithium battery.



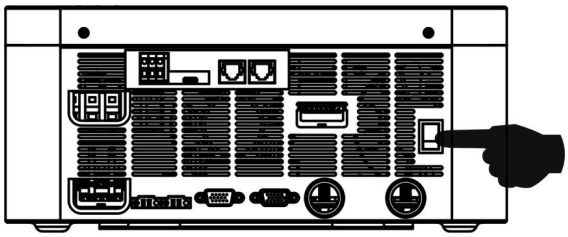
Note for parallel system:

1. Only support common battery installation.
2. Use custom-made RJ45 cable to connect any inverter (no need to connect to a specific inverter) and Lithium battery. Simply set this inverter battery type to "WEC" in LCD program 14. Others should be "USE".

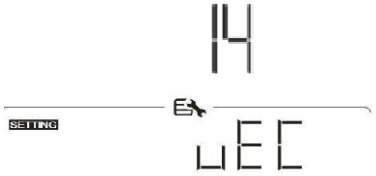
Step 2. Switch on Lithium battery.



Step 3. Turn on the inverter.

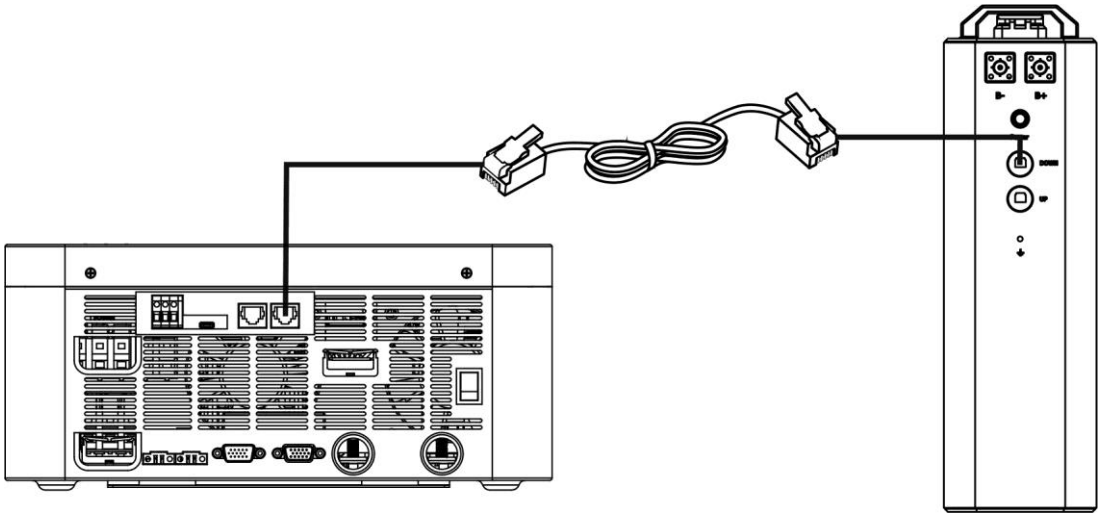


Step 4. Be sure to select battery type as "WEC" in LCD program 14.



SOLTARO

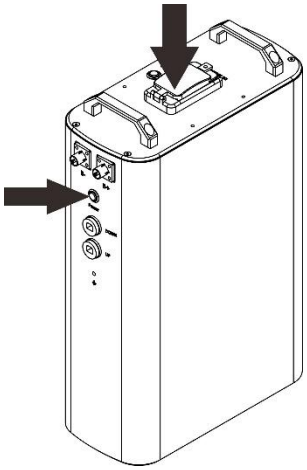
Step 1. Use custom-made RJ45 cable to connect inverter and Lithium battery.



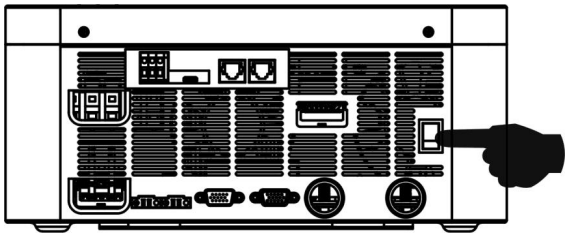
Note for parallel system:

1. Only support common battery installation.
2. Use custom-made RJ45 cable to connect any inverter (no need to connect to a specific inverter) and Lithium battery. Simply set this inverter battery type to "SOL" in LCD program 14. Others should be "USE".

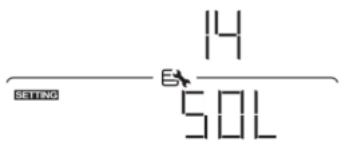
Step 2. Open DC isolator and switch on Lithium battery.



Step 3. Turn on the inverter.



Step 4. Be sure to select battery type as "SOL" in LCD program 14.



4. LCD Display Information

Press "UP" or "DOWN" key to switch LCD display information. It will show battery pack and battery group number before "Main CPU version checking" as below screen.

Selectable information	LCD display
Battery pack numbers & Battery group numbers	Battery pack numbers = 3, battery group numbers = 1 

5. Code Reference

Related information code will be displayed on LCD screen. Please check inverter LCD screen for the operation.

Code	Description
60	If battery status is not allowed to charge and discharge after the communication between the inverter and battery is successful, it will show code 60 to stop charging and discharging battery.
61	Communication lost (only available when the battery type is setting as "Pylontech Battery" or "WECO Battery" or "Soltaro Battery") ● After battery is connected, communication signal is not detected for 3 minutes, buzzer will beep. After 10 minutes, inverter will stop charging and discharging to lithium battery. ● Communication lost occurs after the inverter and battery is connected successfully, buzzer beeps immediately.
69	If battery status is not allowed to charge after the communication between the inverter and battery is successful, it will show code 69 to stop charging battery.
70	If battery status must to charge after the communication between the inverter and battery is successful, it will show code 70 to charge battery.
71	If battery status is not allowed to discharge after the communication between the inverter and battery is successful, it will show code 71 to stop discharge battery.

Appendix III: 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)

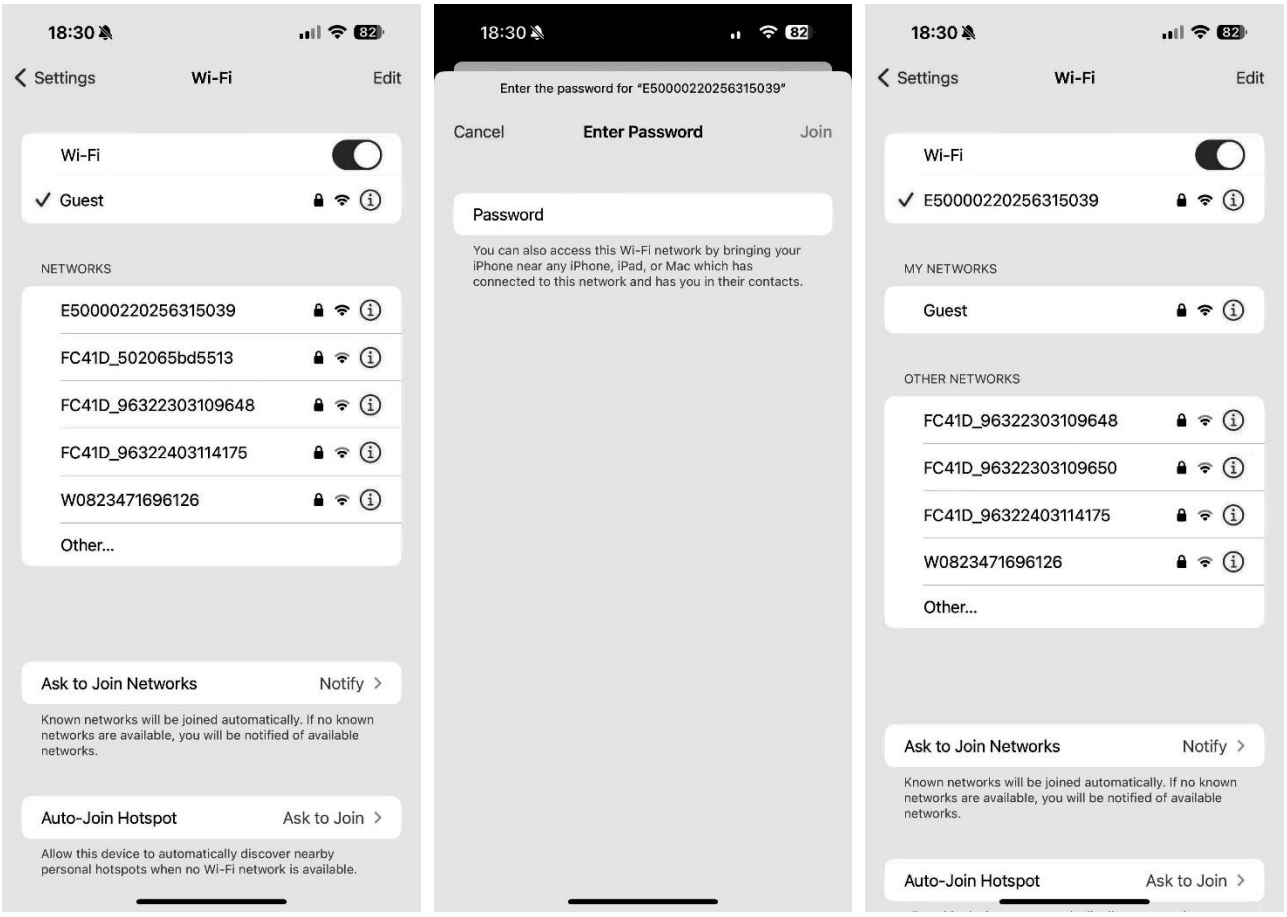
2-2. Initial Setup

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

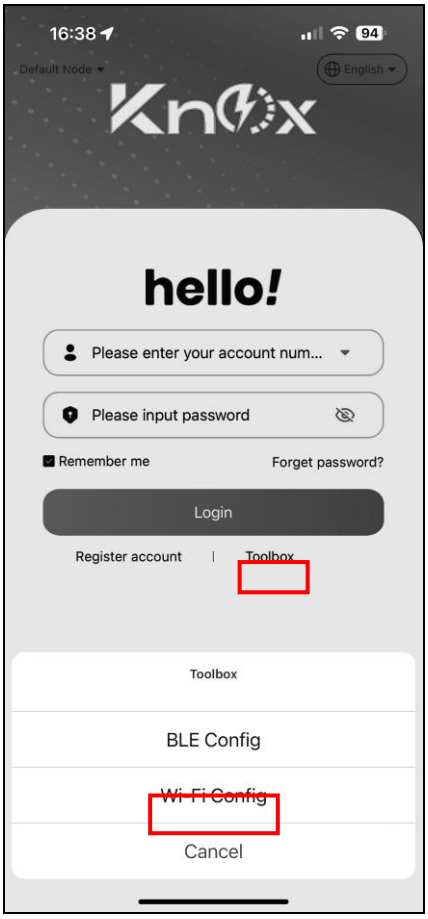
Local Wi-Fi Configuration

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

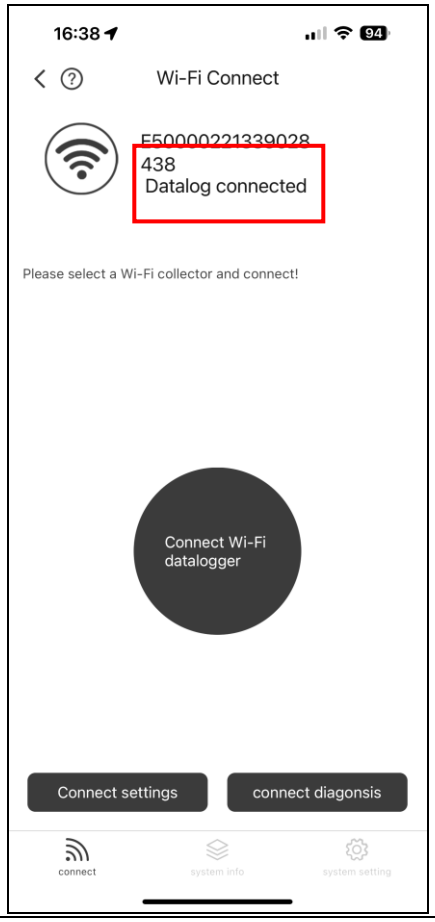
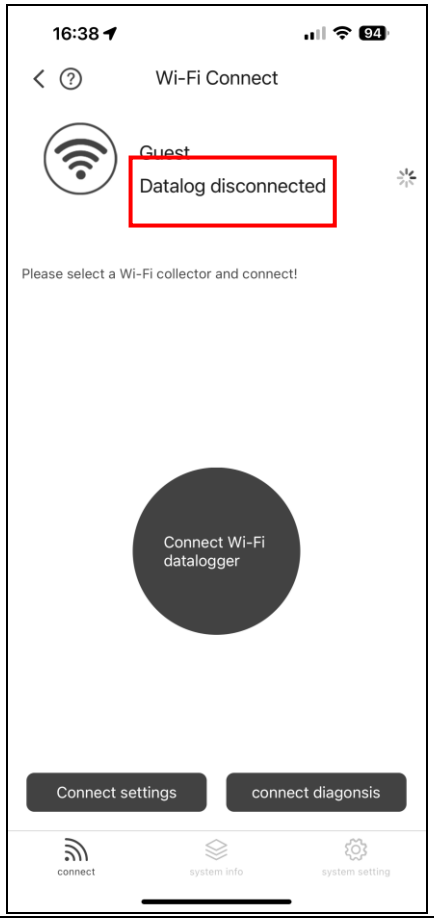
- Turn on the unit.
- Open the Wi-Fi settings on your smartphone.
- Connect your smartphone to the Wi-Fi module (the module's PN number is 18 digits).
- The default password is 12345678



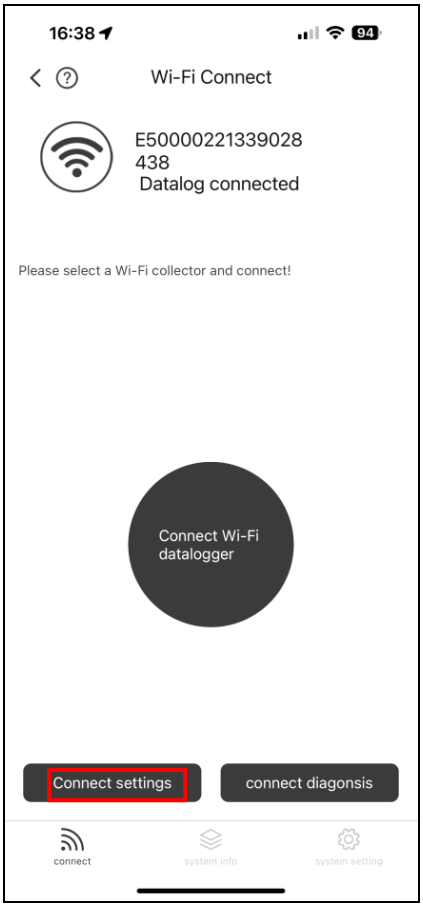
- After a successful Wi-Fi connection, open the KNOXHYBRID app on your phone. On the login page, select "Toolbox," then "Wi-Fi Config" to access the Wi-Fi configuration settings.

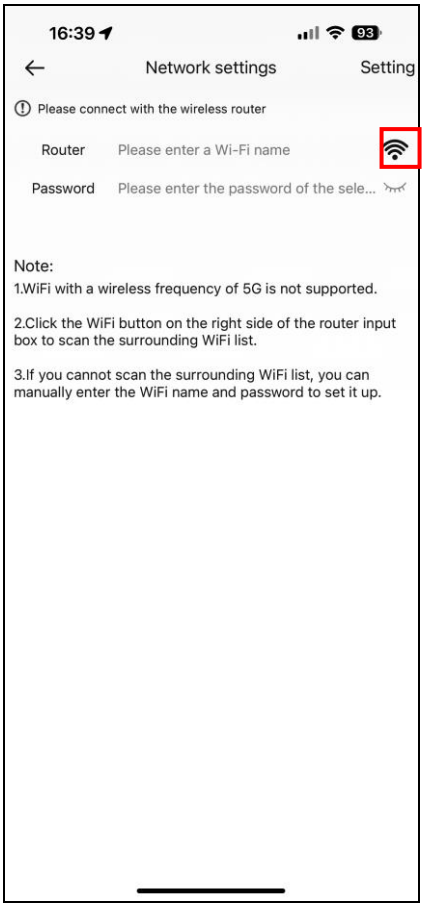


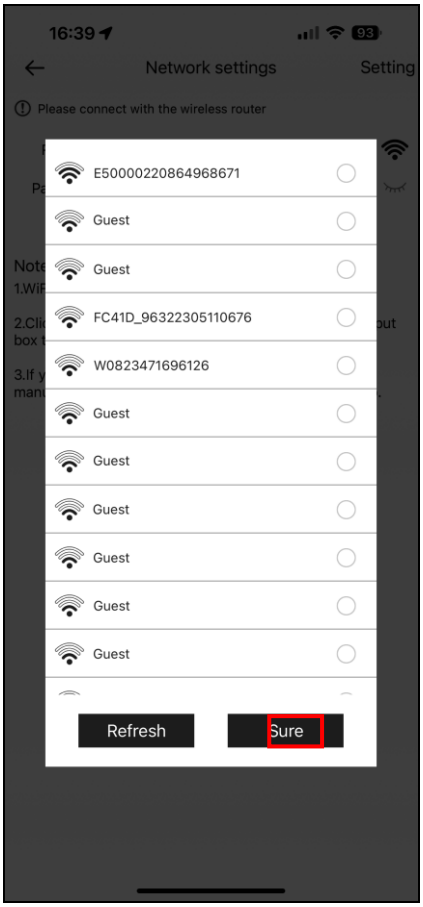
- After entering the Wi-Fi configuration page, please note that the connected Wi-Fi name **must** be the **same as your Wi-Fi module PN number**, and the status **must** be **connected**. If not, please return to the login page, connect your smart phone to the Wi-Fi module, and re-enter the Wi-Fi configuration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

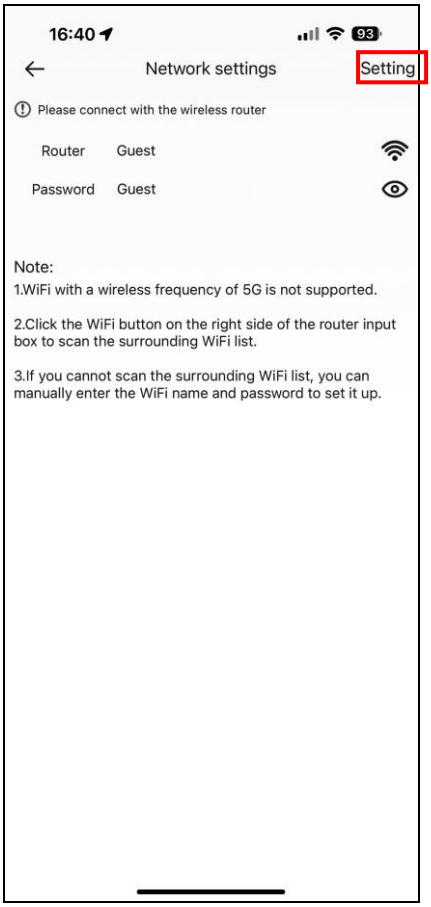
The Wi-Fi module connection is **successfully**	The Wi-Fi module connection **failed**
You can proceed to the next step to configure the network.	Please return to the login page, connect your smart phone to the Wi-Fi module, and re-enter the Wi-Fi configuration page.
	

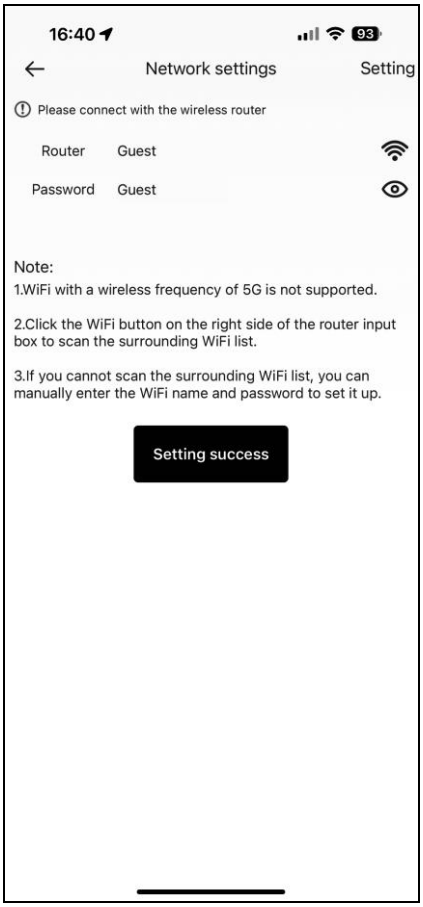
- Click "Connect settings" to manually enter the router name or click to choose the router name. Then, enter the router password and click the "Setting" to complete the setting.
  The Wi-Fi module only could connect the router at **2.4GHz**.



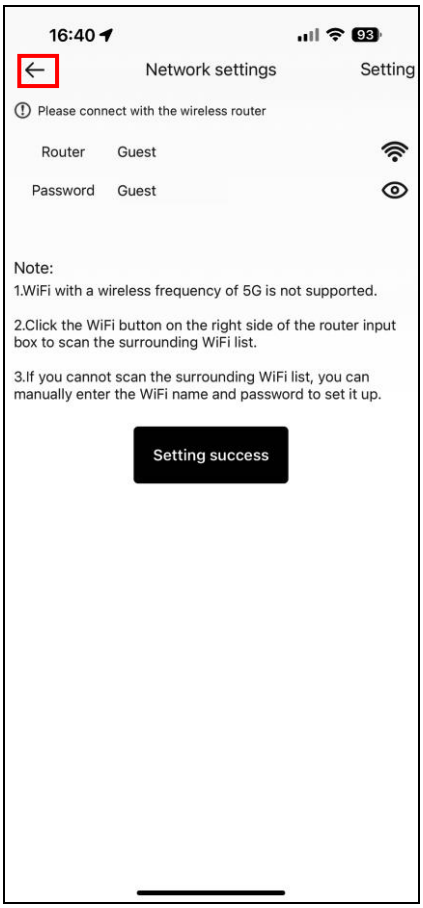


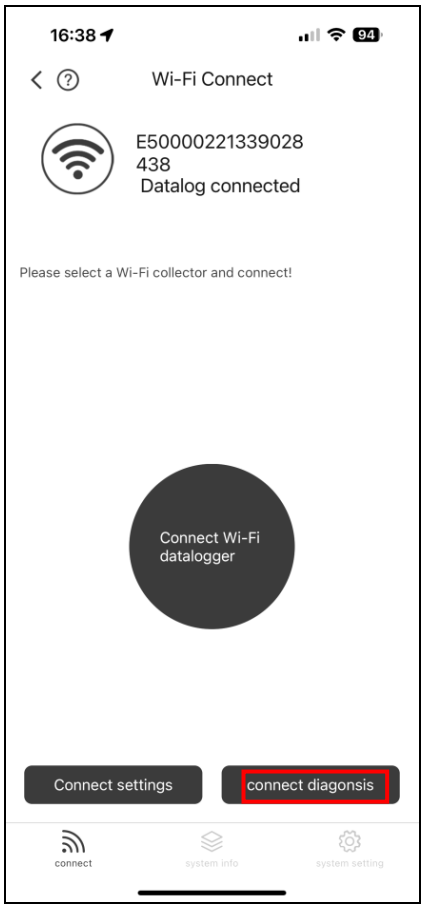




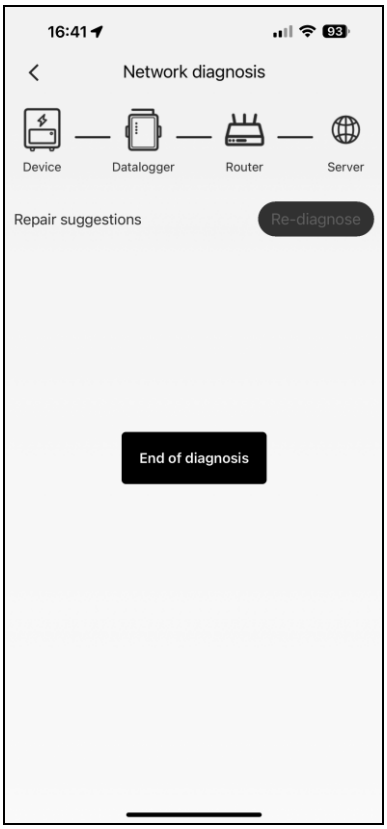


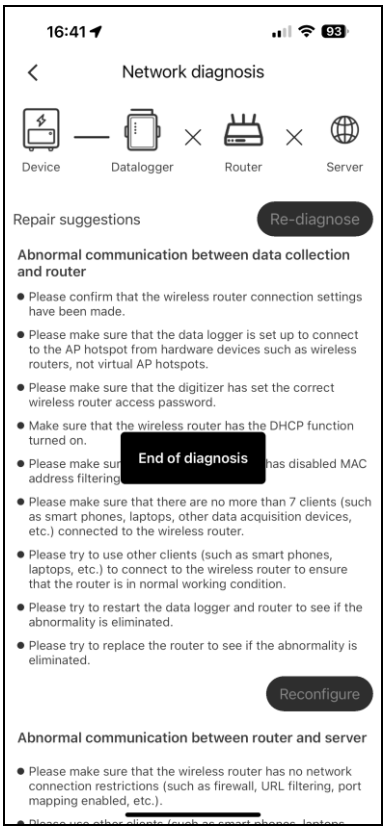
- Click ← to return to the Wi-Fi configuration page. Click "Connect diagnosis" to check the connection status.



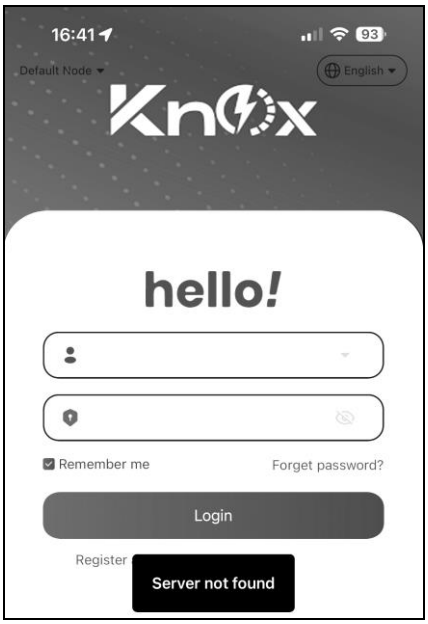


The configuration is **successfully**	The configuration **failed**
Green lines between device, datalogger, router, and server.	Red crosses between device, datalogger, router, and server. Please refer to APP instructions to re-configure.





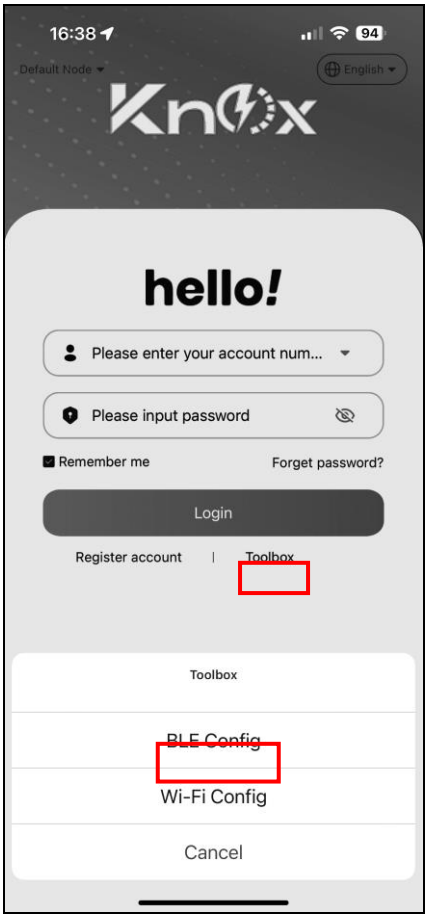
- After configuring Wi-Fi, please **forget** the Wi-Fi module on your smartphone to avoid automatic reconnection and unable to access the network. The login page will prompt "Server not found".



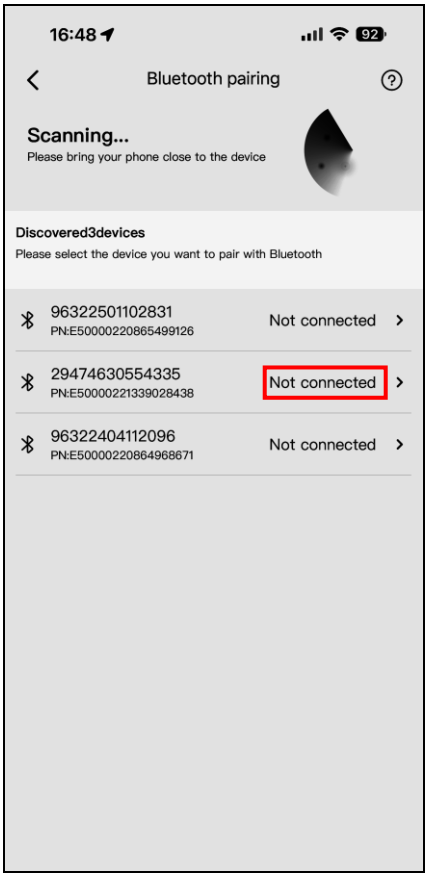
Bluetooth Configuration

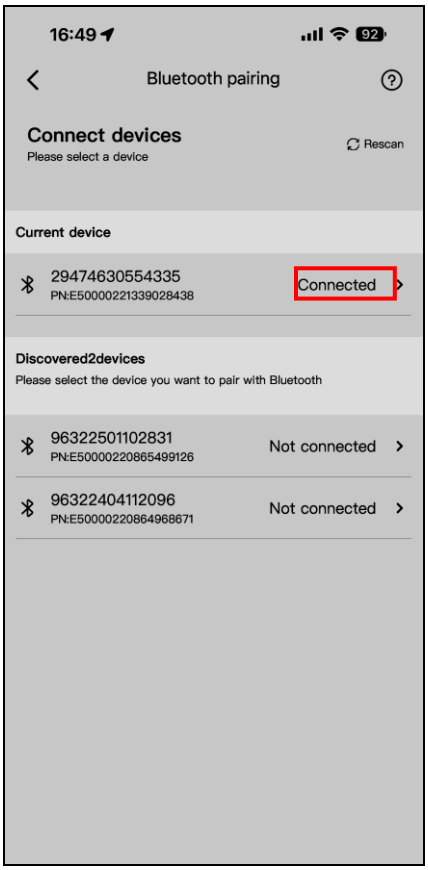
If you have configured the network through Wi-Fi, please skip this section.

- 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.

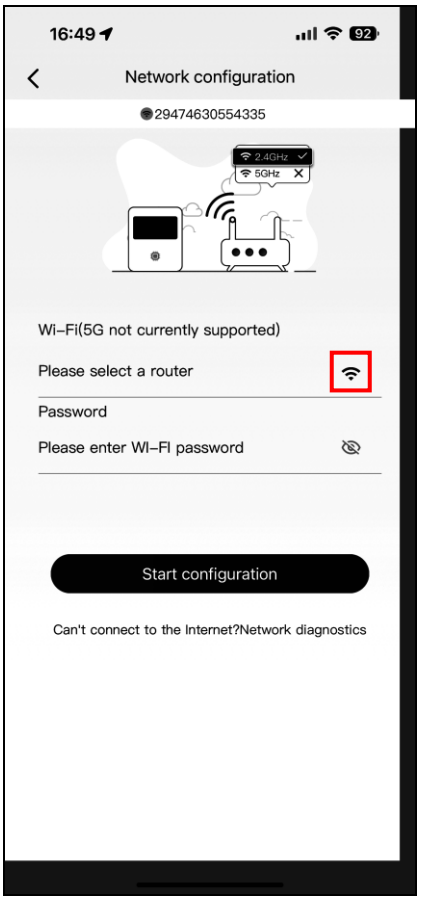


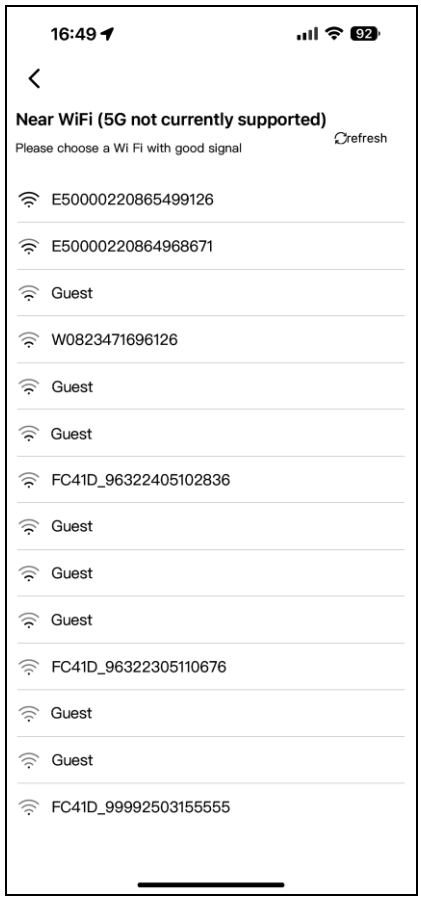
- Connect your smartphone to the Wi-Fi module through Bluetooth.

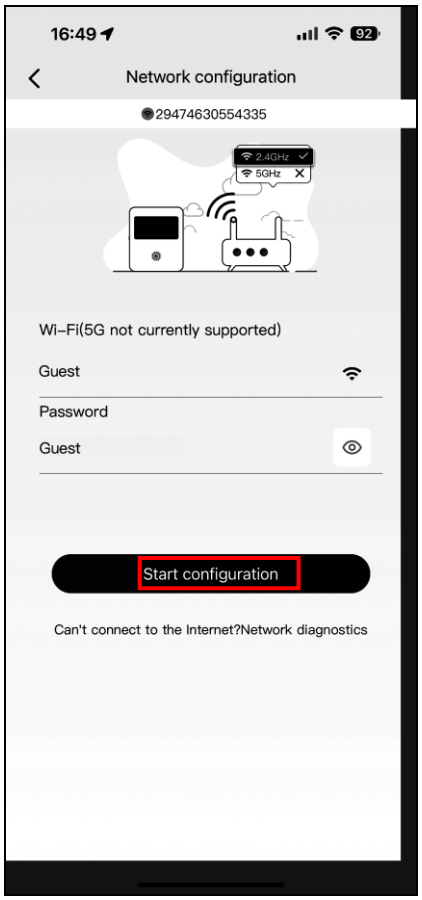


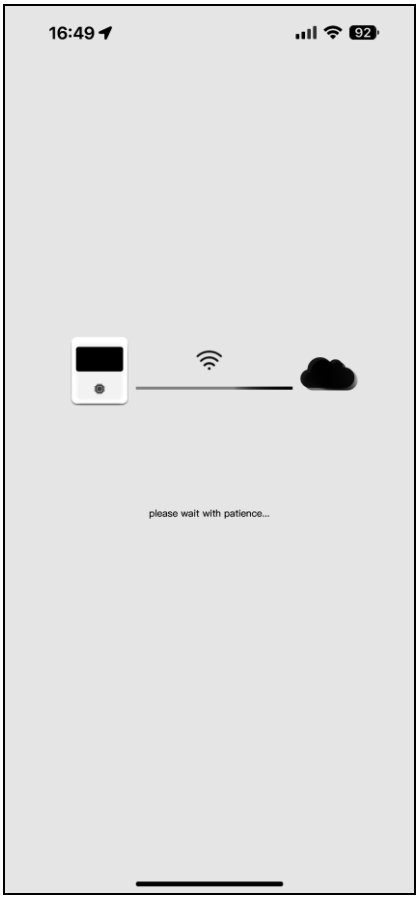


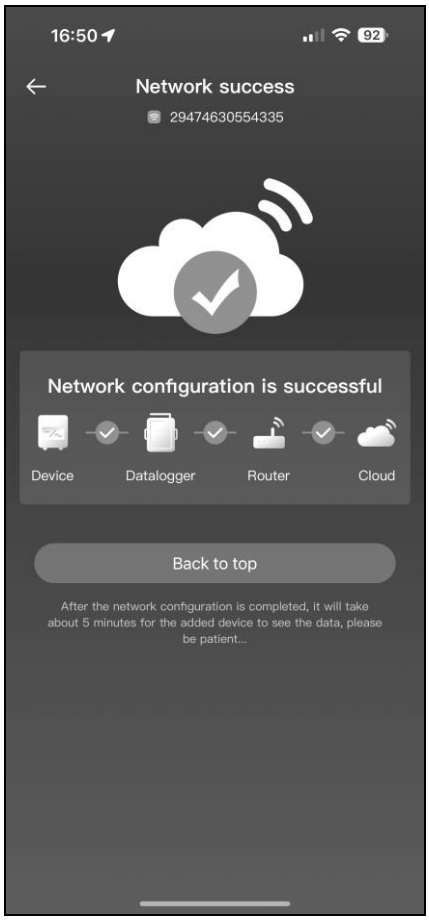
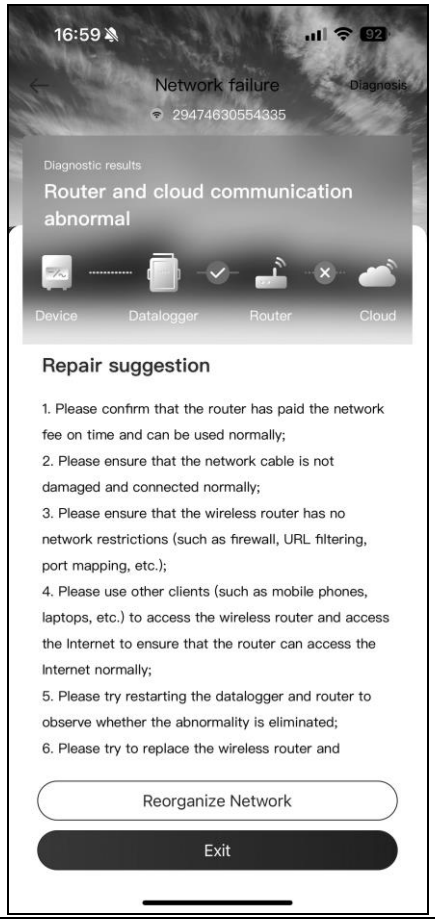
- Manually enter the router name or click  to choose the router name, enter the router password, and then click the "Setting" to complete the setting. Click “Start configuration” to check the connection status. The Wi-Fi module only could connect the router at **2.4GHz**.



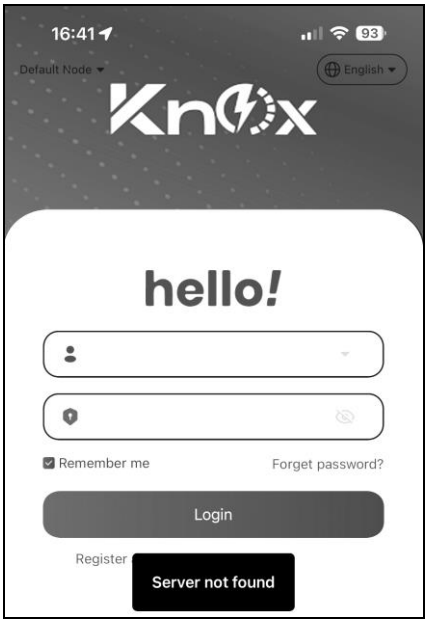






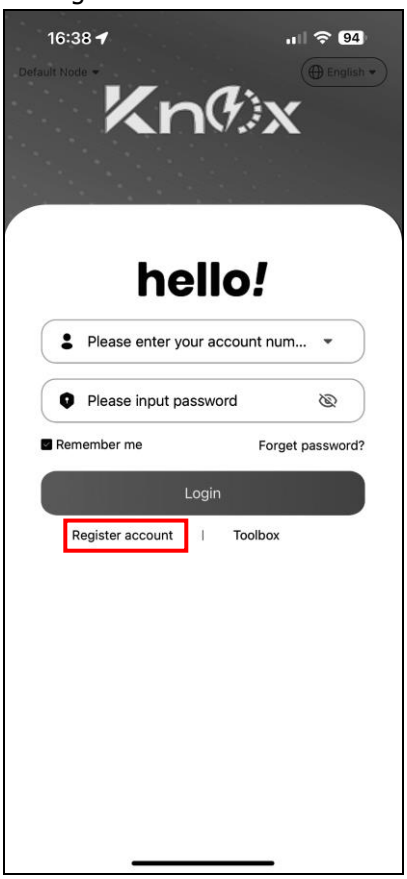
The configuration is **successfully**	The configuration **failed**
Green lines between device, datalogger, router, and server. 	Red crosses between device, datalogger, router, and server. Please refer to APP instructions to reconfigure. 

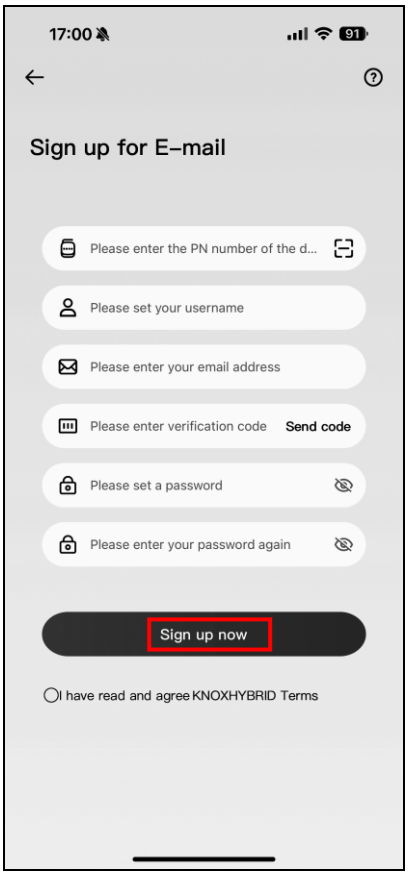
- After configuring Bluetooth, please **disconnect** the Wi-Fi module from your smartphone's Bluetooth settings to prevent automatic reconnection and unable to access the network. The login page will prompt "Server not found".

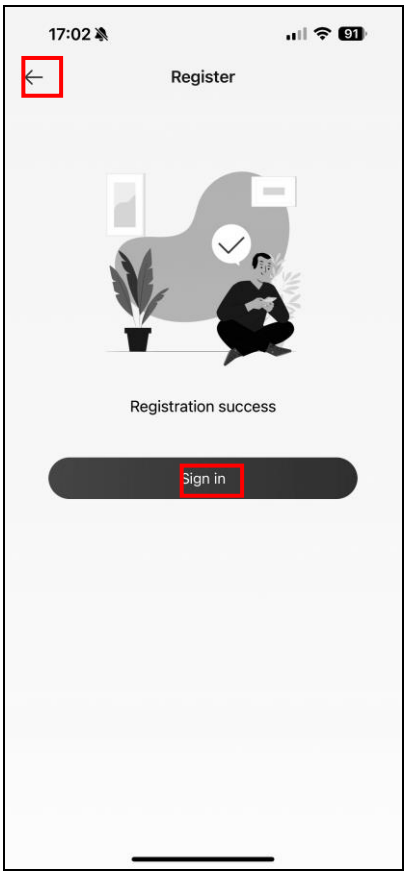


2-3 Registration and login

- 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.

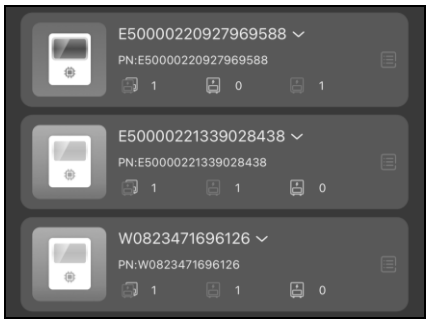






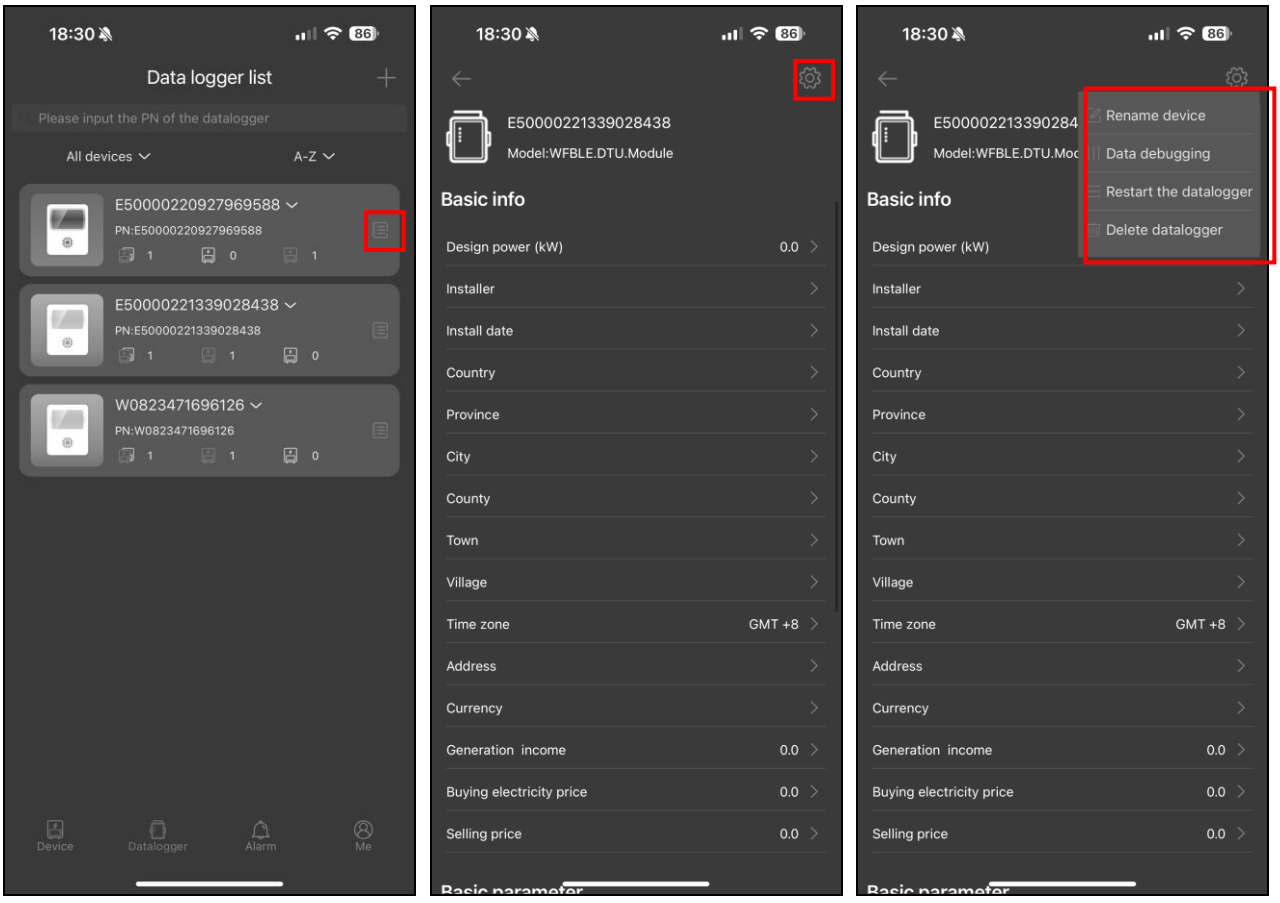
2-4 Datalogger

- 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.



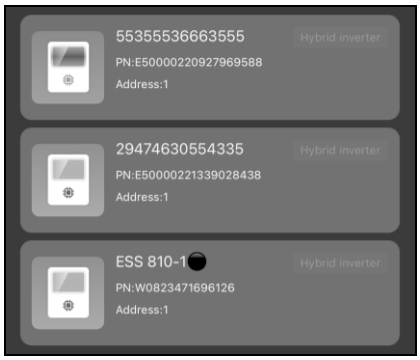
- Click  to see the Wi-Fi module information.

- 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.



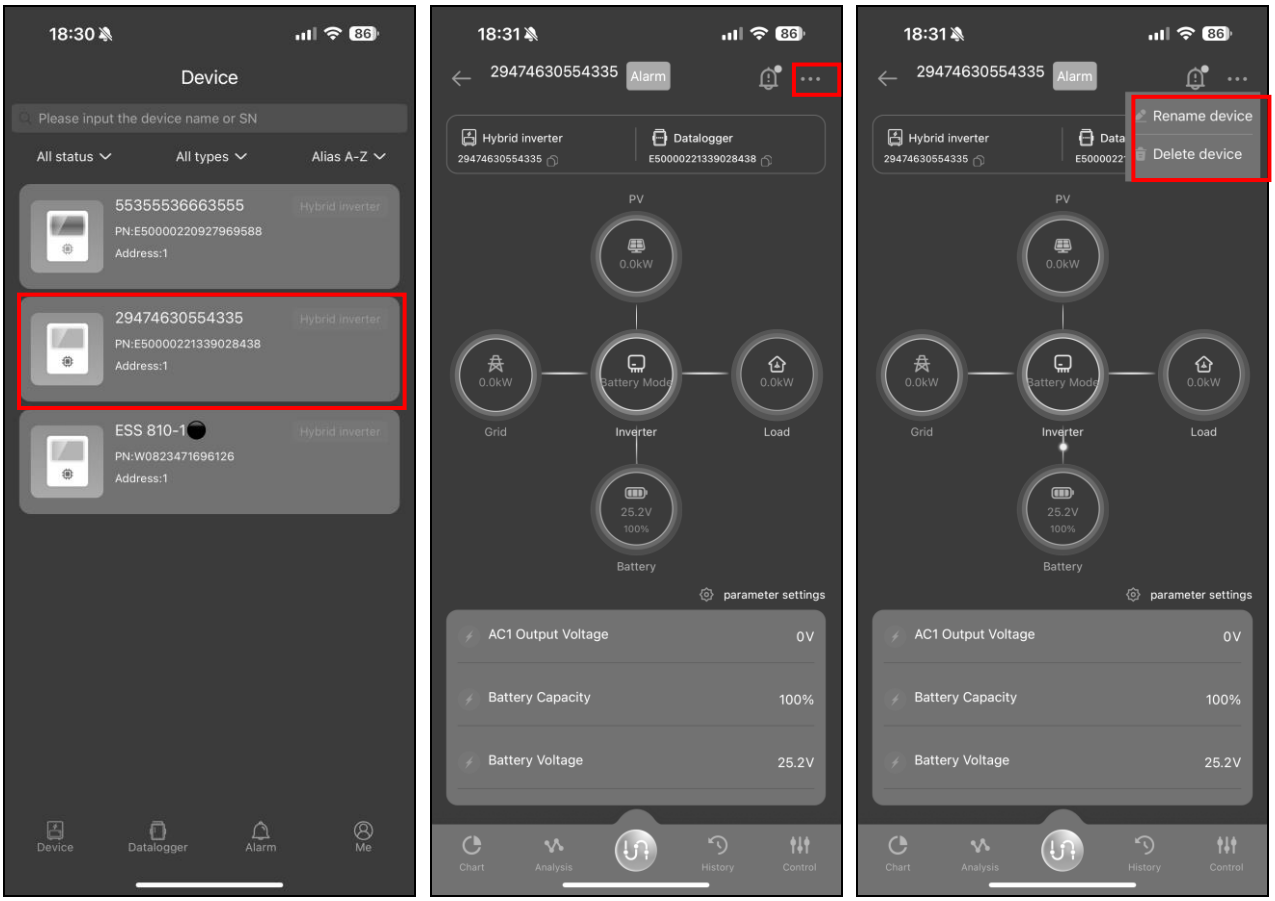
2-5 Device

- 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.

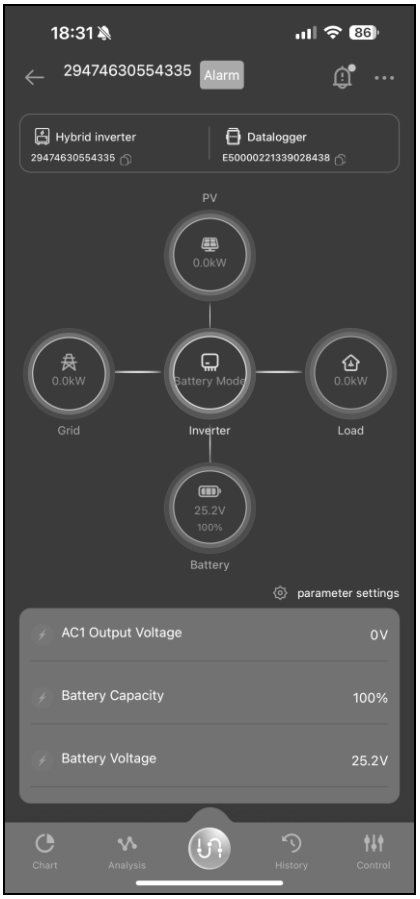


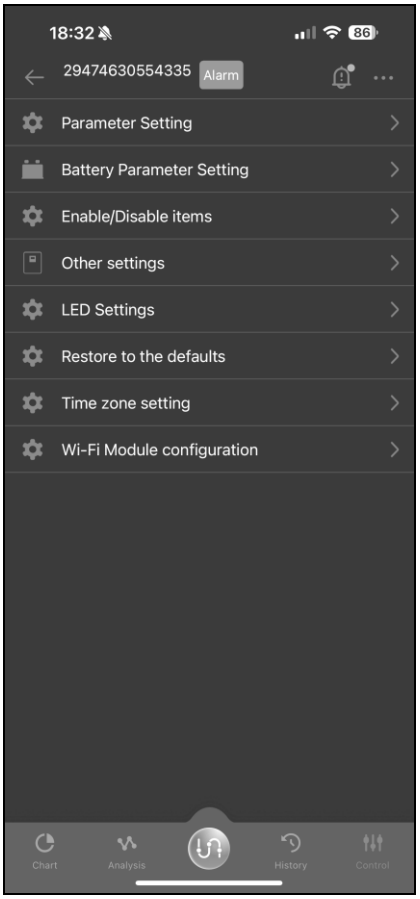
- Click  to see the inverter information.

- Click  to rename device or 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.

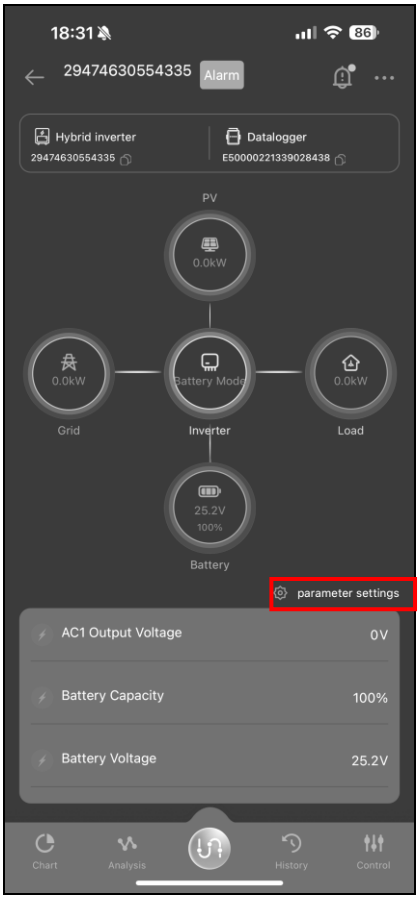


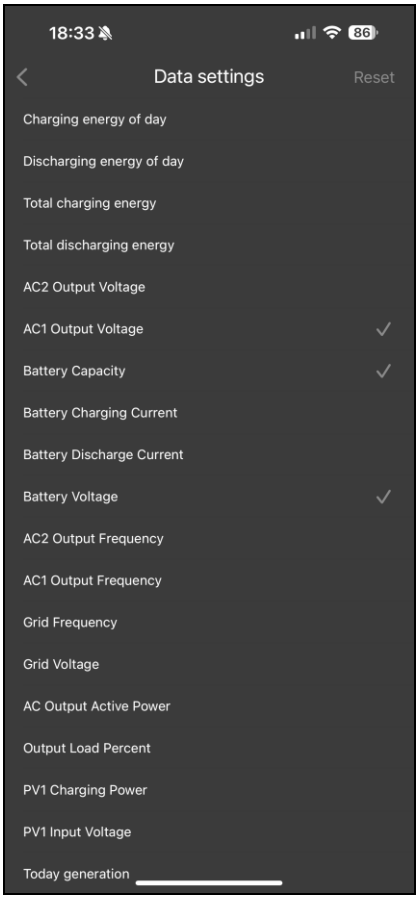
- Click "Control" to enter setting parameters page. The setting items on the parameter page will be different based on different models.

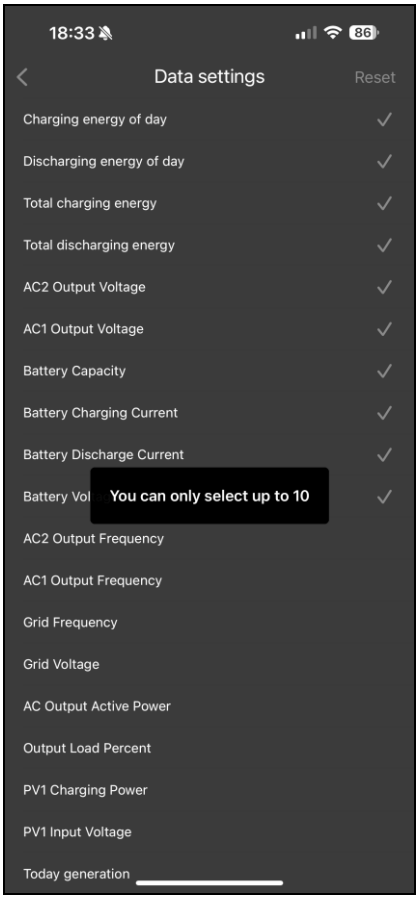




- Click "  " to see the inverter real-time data. Click "parameter settings" to choose data you want to see on the real time page. You can choose up to **10 data**.







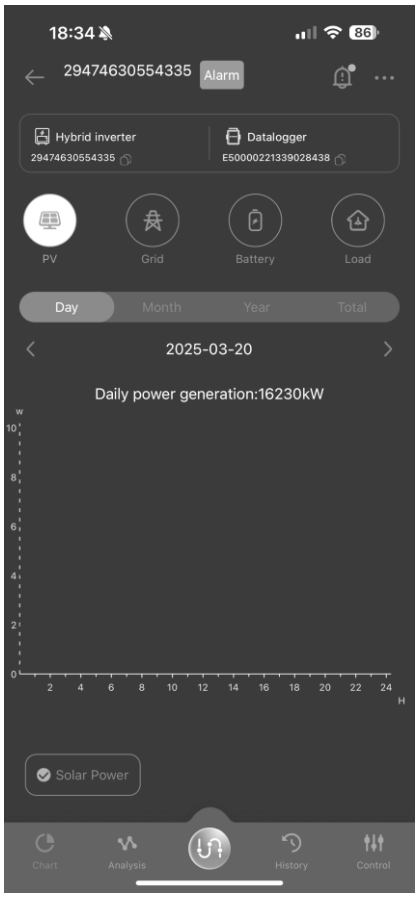
- Click “Chart” to see the inverter solar, grid, battery and load power per hour, day, month and year.

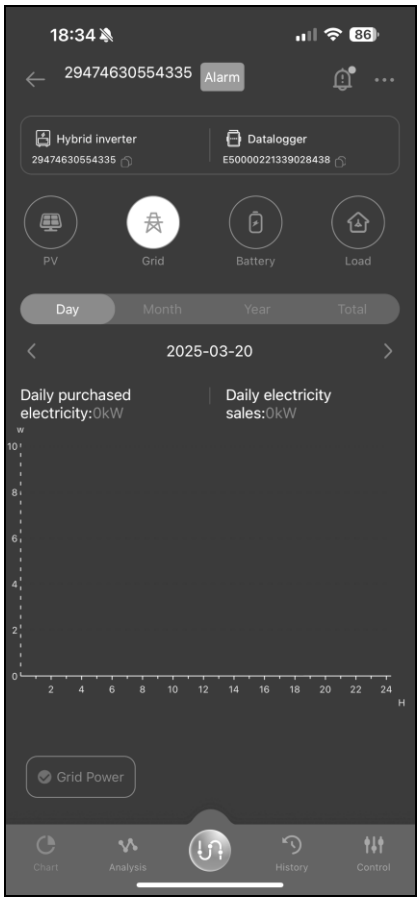
  Day: Click the button to query the hourly power generation data of the current day.

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

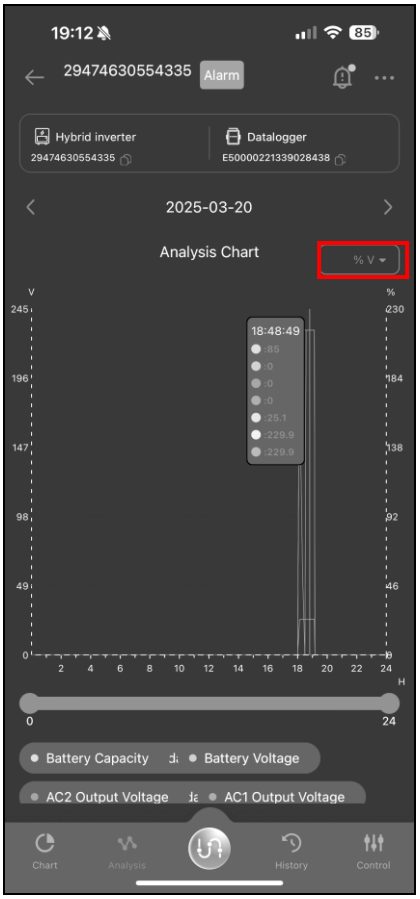
  Year: Click the button to query the monthly power generation data of the current year.

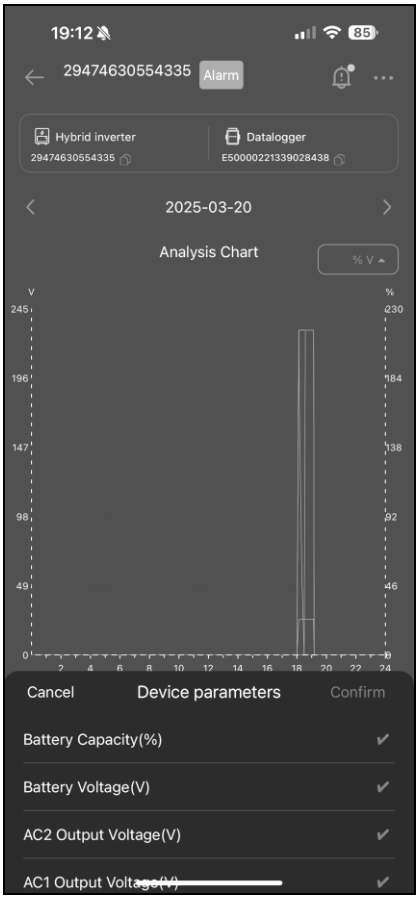
  Total: Click the button to query the annual power generation data.



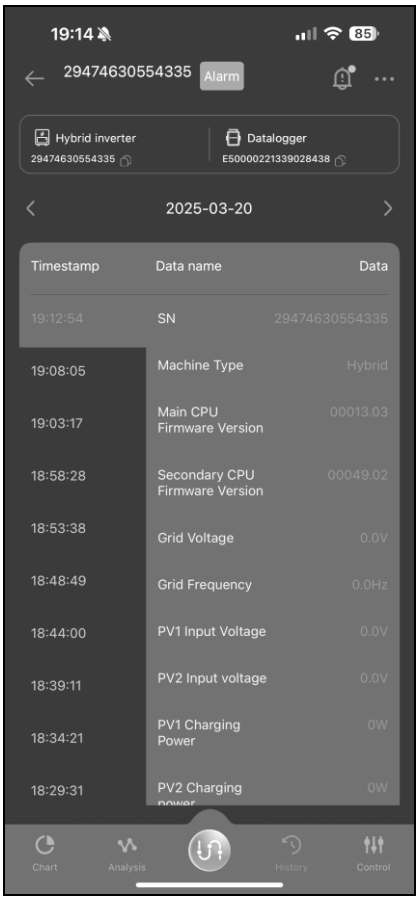


- Click “Analysis” to see the inverter data per hour. Click “SelectedXTerm” to choose the data you want to compare. You can choose up to **2 different units** such as energy (kWh) and current (A).

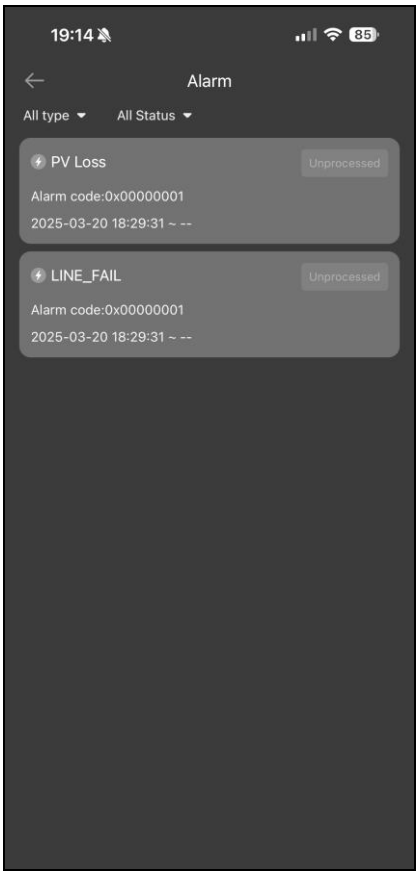




- Click “History” to see the inverter history.



- 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.