User Manual

IP52 8KW, 10KW
SOLAR INVERTER / CHARGER

Version: 1.1

Table of Contents

ABOUT THIS MANUAL 1

Purpose 1
Scope 1

SAFETY INSTRUCTIONS 1

INTRODUCTION 2

Features 2
Basic System Architecture 2
Product Overview 3

INSTALLATION 4

Unpacking and Inspection 4
Preparation 4
Mounting the Unit 4
Battery Connection 6
AC Input/Output Connection 7
PV Connection 9
Final Assembly 12
Communication Connection 13

OPERATION 15

Power ON/OFF 15
Operation and Display Panel 15
LCD Touchable Main Page 16
Battery Equalization Description 28
Fault Reference Code 30

SPECIFICATIONS 32

Table 1 Line Mode Specifications 32
Table 2 Inverter Mode Specifications 33
Table 3 Charge Mode Specifications 34
Table 4 ECO/Bypass specifications 35
Table 5 General Specifications 35
Table 6 Parallel Specifications 36

TROUBLE SHOOTING 37

Appendix I: Parallel function 39

Appendix II: BMS Communication Installation 50

Appendix III: The Wi-Fi Operation Guide 58

ABOUT THIS MANUAL

Purpose

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

Scope

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

SAFETY INSTRUCTIONS

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

1. Before using the unit, read all instructions and cautionary markings on the unit, the batteries and all appropriate sections of this manual.
2. **CAUTION** – To reduce risk of injury, charge only deep-cycle lead acid type rechargeable batteries. Other types of batteries may burst, causing personal injury and damage.
3. Do not disassemble the unit. Take it to a qualified service center when service or repair is required. Incorrect re-assembly may result in a risk of electric shock or fire.
4. To reduce risk of electric shock, disconnect all wirings before attempting any maintenance or cleaning. Turning off the unit will not reduce this risk.
5. **CAUTION** – Only qualified personnel can install this device with battery.
6. **NEVER** charge a frozen battery.
7. For optimum operation of this inverter/charger, please follow required spec to select appropriate cable size. It's very important to correctly operate this inverter/charger.
8. Be very cautious when working with metal tools on or around batteries. A potential risk exists to drop a tool to spark or short circuit batteries or other electrical parts and could cause an explosion.
9. Please strictly follow installation procedure when you want to disconnect AC or DC terminals. Please refer to INSTALLATION section of this manual for the details.
10. Fuses are provided as over-current protection for the battery supply.
11. GROUNDING INSTRUCTIONS -This inverter/charger should be connected to a permanent grounded wiring system. Be sure to comply with local requirements and regulation to install this inverter.
12. NEVER cause AC output and DC input short circuited. Do NOT connect to the mains when DC input short circuits.
13. **Warning!!** Only qualified service persons are able to service this device. If errors still persist after following troubleshooting table, please send this inverter/charger back to local dealer or service center for maintenance.
14. **WARNING:** Because this inverter is non-isolated, only three types of PV modules are acceptable: single crystalline, poly crystalline with class A-rated and CIGS modules. To avoid any malfunction, do not connect any PV modules with possible current leakage to the inverter. For example, grounded PV modules will cause current leakage to the inverter. When using CIGS modules, please be sure NO grounding.
15. **CAUTION:** It's required to use PV junction box with surge protection. Otherwise, it will cause damage on inverter when lightning occurs on PV modules.

INTRODUCTION

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

Features

- Pure sine wave inverter
- Zero transfer time
- Built-in Wi-Fi with APP for mobile monitoring
- Supports USB On-the-Go function
- LCD touchscreen with multiple BMS communication ports (RS485, CAN-BUS, RS232)
- Configurable input voltage ranges for home appliances and personal computers via LCD control panel
- Configurable AC/PV output usage timer and prioritization
- Configurable AC/Solar charger priority via LCD control panel
- Configurable battery charging current based on applications via LCD control panel
- Compatible to utility mains or generator power
- Auto restart while AC is recovering
- Overload / Over temperature / short circuit protection
- Smart battery charger design for optimized battery performance
- Cold start function

Basic System Architecture

The following illustration depicts a standard application for this unit. To ensure a fully operational system, the following external components are required:

- Grid Utility or Generator input
- PV modules

For alternative system architectures or configurations tailored to specific needs, please consult with a qualified system integrator.

This inverter is designed to power a wide range of residential and commercial appliances. It is fully compatible with inductive loads (motor-type appliances), including fluorescent tube lights, fans, refrigerators, and air conditioning units.

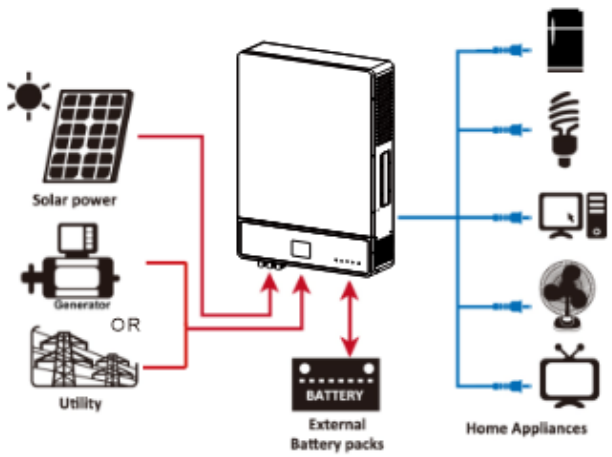
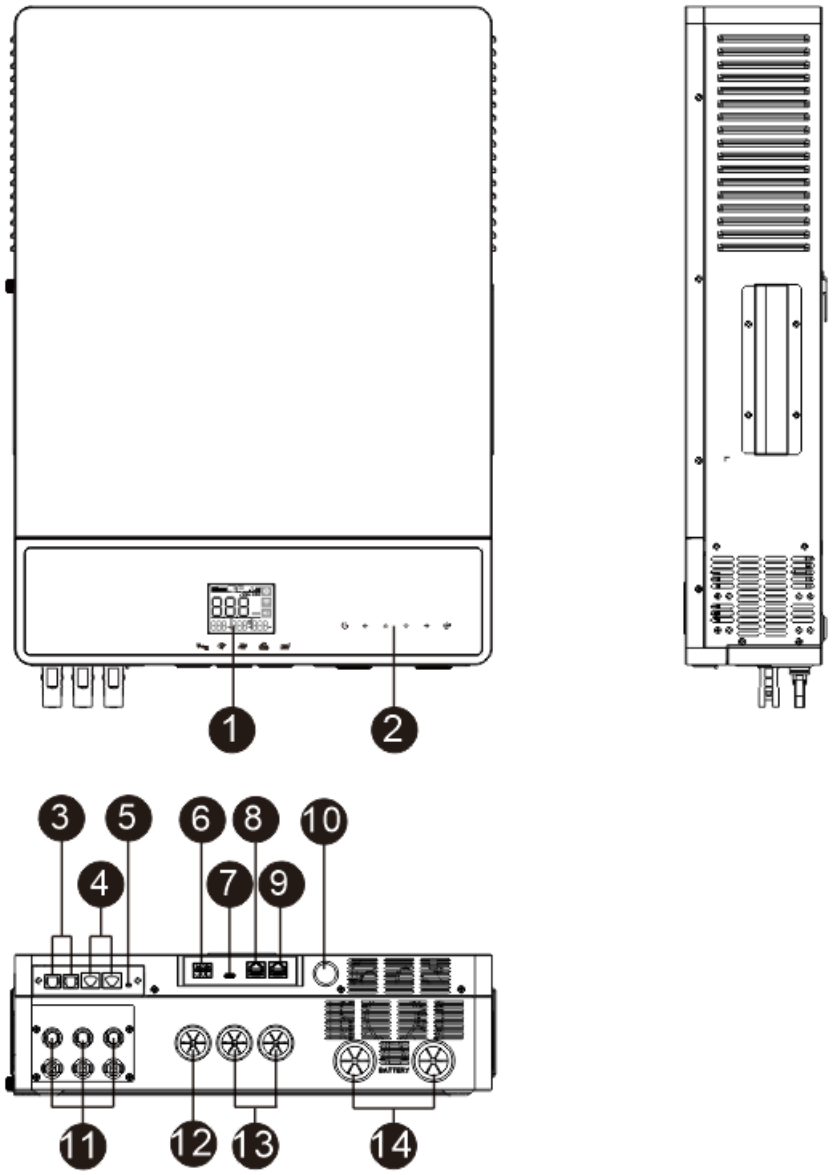


Figure 1 Basic PV System Overview

Product Overview



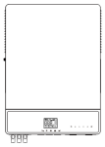
NOTE: For parallel installation and operation, please check *Appendix I.*

1. LCD display
2. Function buttons
3. Current sharing port
4. Parallel communication port
5. Terminator Selection
6. Dry contact
7. USB port as USB communication port and USB function port
8. BMS communication port: CAN, RS-485
9. Ext. Remote Box Connection
10. Power on/off switch
11. PV connectors (8KW, 2 inputs; 10KW, 3 inputs)
12. AC input connectors
13. AC output connectors (Load connection)
14. Battery connectors

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 unit



Manual



Parallel communication cable



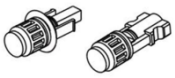
Current sharing cable



Mounting bracket



DC Fuse

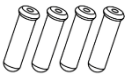


PV connectors

(8KW x 2 sets; 10KW x 3 sets)



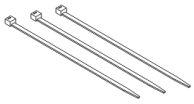
Thumb screw



Plastic conical anchors 4pcs



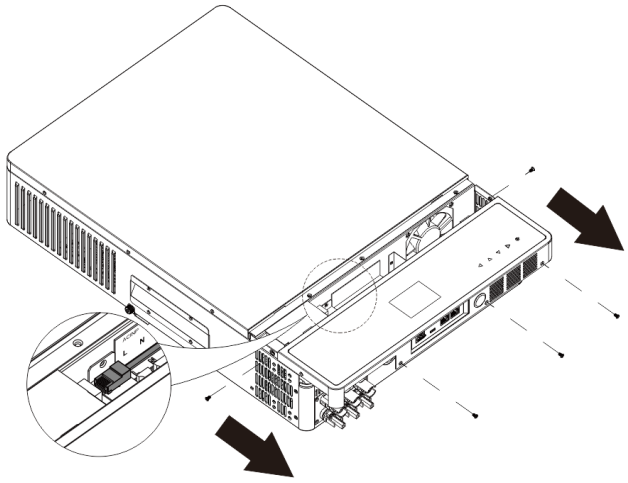
Screws M4x20 4pcs



Cable ties 3pcs

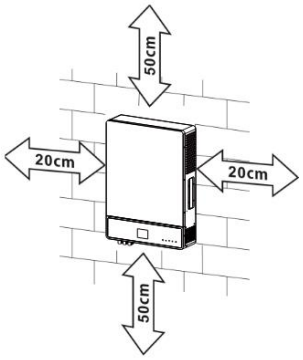
Preparation

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



Disconnect RJ45 cable.

Mounting the Unit



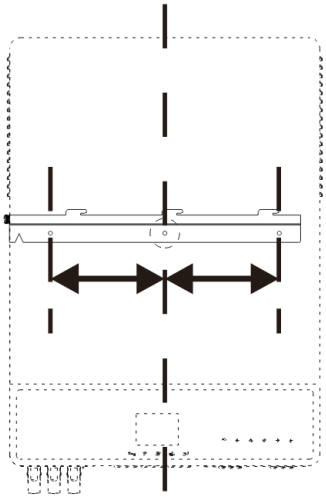
Consider the following points before selecting where to install:

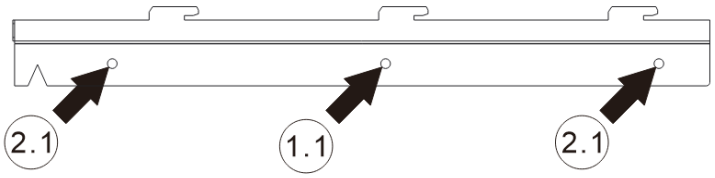
- Do not mount the inverter on flammable construction materials.
- Mount on a solid surface
- Install this inverter at eye level in order to allow the LCD display to be read at all times.
- The ambient temperature should be between 0°C and 55°C to ensure optimal operation.
- The recommended installation 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.**

Installation steps:

Step 1: Position the mounting bracket against the wall. Align the center screw with the desired mounting location for the inverter, as illustrated. Secure the bracket firmly using three M4 screws.

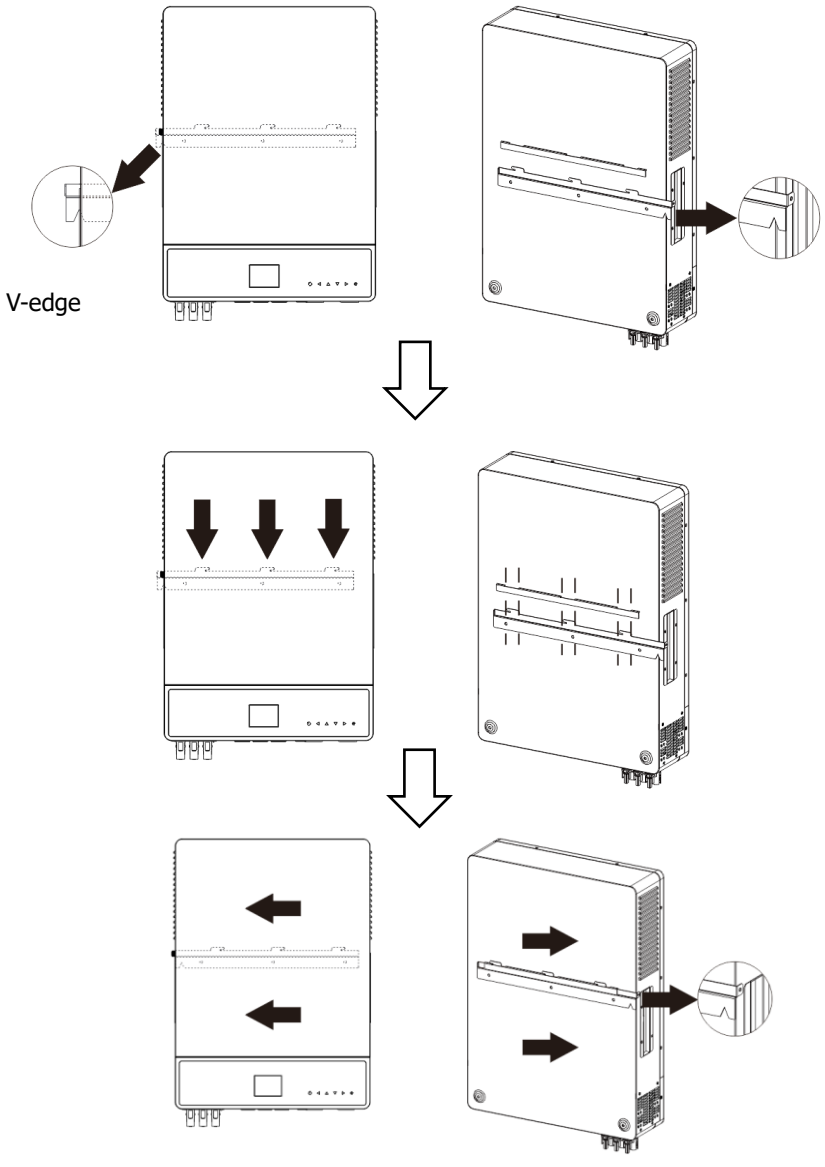




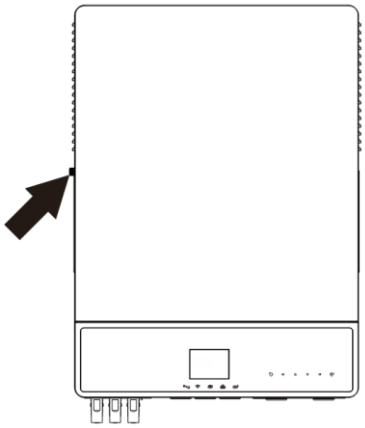
1.1: Secure the center screw first to establish the initial mounting point.

2.1: Adjust the bracket to ensure it is level, then fasten the remaining two outer screws. *(Fasteners: 3 x M4 screws)*

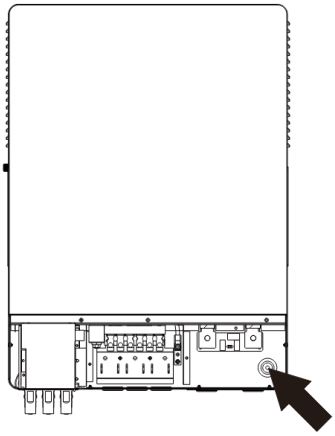
Step 2: Position the inverter above the mounting bracket, aligning the left side of the unit with the bracket's V-edge. Lower the inverter onto the bracket and slide it to the left until it is securely seated in its final position.



Step 3: Tighten the thumb screw on the bracket to lock the inverter in its final horizontal position.



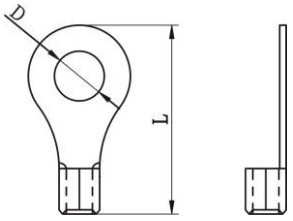
Step 4: Fasten the bottom screw on the terminal side to securely mount the inverter.



Battery Connection

CAUTION: To ensure operational safety and regulatory compliance, a dedicated DC over-current protector or disconnect device must be installed between the battery and the inverter. While certain applications may not strictly require a manual disconnect, over-current protection remains a mandatory requirement. Please consult the table below to select the appropriate fuse or circuit breaker size based on typical amperage ratings.

Ring terminal:



WARNING! All electrical wiring must be performed by qualified personnel only.
WARNING! For optimal system safety and efficient operation, it is critical to use the correct cable specifications for battery connections. To minimize the risk of personal injury, please strictly adhere to the recommended cable and terminal sizes provided in the table below.

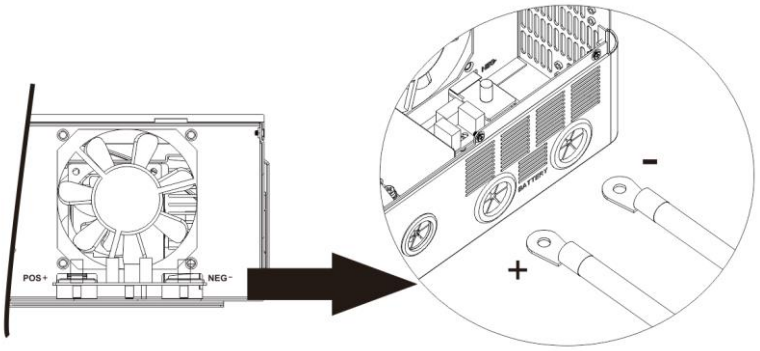
Recommended battery cable and terminal size:

Model	Typical Amperage	Battery capacity	Wire Size	Cable mm^2	Ring Terminal Dimensions		Torque value
					D (mm)	L (mm)	
8KW	162A	250AH	1*1/0AWG	50	8.4	54	5 Nm
10KW	202A	250AH	1*2/0AWG	67	8.4	54	5 Nm

Battery Connection Procedure:

1. **Prepare Terminals:** Assemble the battery ring terminals according to the recommended cable and terminal specifications.

2. **Secure Connections:** Insert the ring terminals flatly into the inverter's battery connectors. Ensure all nuts are tightened to a torque of 5 Nm.
3. **Verify Polarity:** Confirm that the polarity is correct at both the battery and the inverter/charger. Ensure all ring terminals are securely fastened to the battery terminals.



⚠	**WARNING: Shock Hazard** Exercise extreme caution during installation. High voltage may be present when batteries are connected 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!! To ensure safe maintenance and full protection against AC input over-current, a dedicated AC circuit breaker must be installed between the inverter and the AC input power source.

CAUTION!! The terminal blocks are divided into two groups marked "IN" and "OUT." To prevent equipment damage, ensure the input and output connectors are not transposed or misconnected.

WARNING! All electrical wiring must be performed exclusively by qualified personnel.

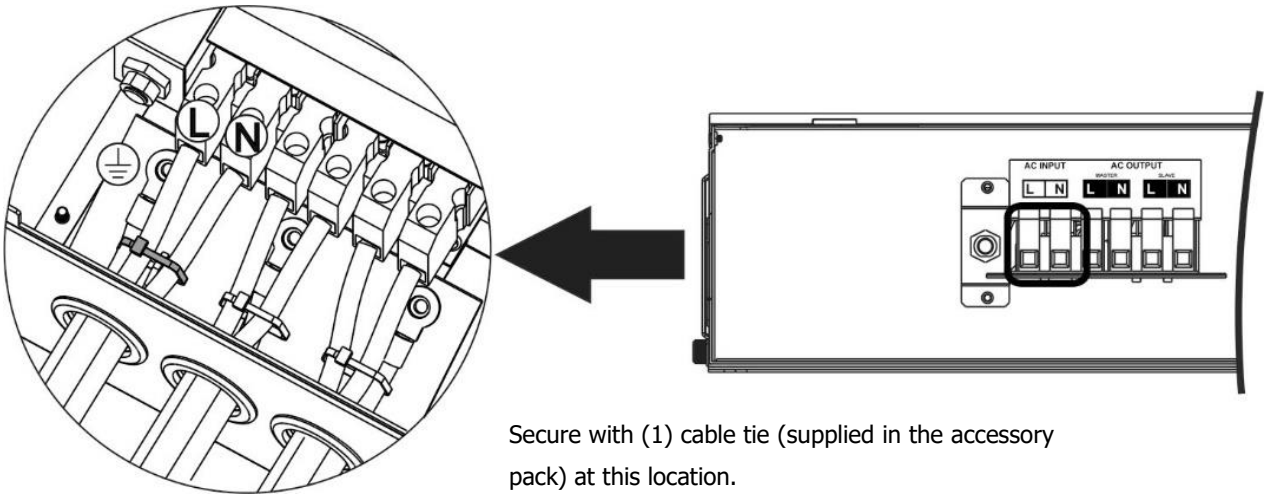
WARNING! To ensure system safety and optimal operational efficiency, the use of appropriately rated cabling for AC input connections is mandatory. To minimize the risk of personal injury, please strictly adhere to the recommended cable specifications provided in the table below.

Suggested cable requirement for AC wires

Model	Gauge	Torque Value
8KW, 10KW	8 AWG	1.4~ 1.6Nm

AC Input/Output Connection Procedure:

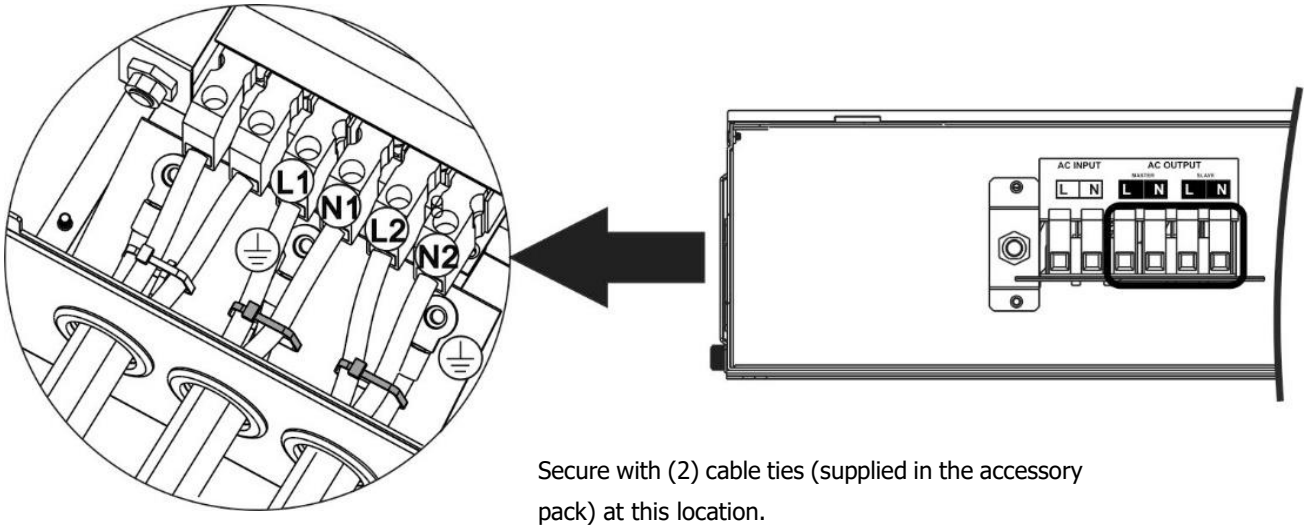
1. **Safety Preparation:** Ensure the DC protector or disconnect device is in the OPEN position before initiating any AC connections.
2. **Wire Preparation:** Strip 10 mm of insulation from the six conductors. Shorten the Phase (L) and Neutral (N) wires by 3 mm relative to the ground wire.
3. **AC Input Wiring:** Insert the AC input wires according to the polarity markings on the terminal block and tighten the screws securely. Note: The PE (⏚) conductor must be connected first.
   ⏚→**Ground (yellow-green)**
   L→LINE (brown or black)
   N→Neutral (blue)



Secure with (1) cable tie (supplied in the accessory pack) at this location.

⚠	**WARNING:** Ensure the AC power source is fully disconnected or isolated before attempting any hardwiring to the unit. Failure to do so may result in severe electric shock or equipment damage.

4. **Dual-Output Configuration:** This inverter features a dual-output design with four terminal positions (L1/N1 and L2/N2) on the output port. The second output can be enabled or disabled via the LCD configuration menu or monitoring software. For detailed instructions, please refer to the "LCD Setting" section.
   Insert the AC output wires according to the polarity markings on the terminal block and securely tighten all terminal screws. The PE (⏚) conductor must be connected first to ensure proper grounding.
   ⏚**→Ground (yellow-green)**
   L1→LINE (brown or black)
   N1→Neutral (blue)
   L2→LINE (brown or black)
   N2→Neutral (blue)



Secure with (2) cable ties (supplied in the accessory pack) at this location.

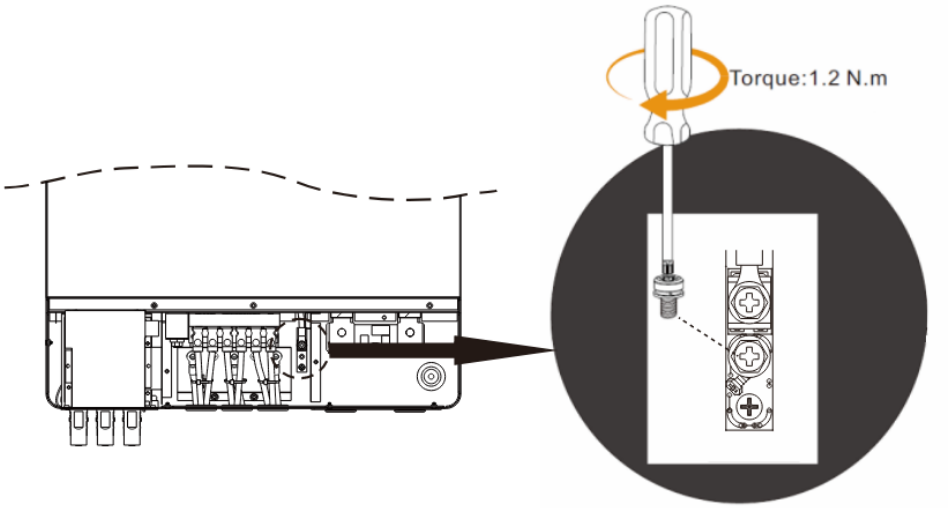
5. Make sure the wires are securely connected.

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

7. **Neutral-to-Ground Bonding:**

To ensure the proper operation of Ground Fault Circuit Interrupters (GFCIs), this inverter is designed to automatically bond the AC output Neutral (N) to the Safety Ground (PE) whenever the AC input source is disconnected. While this default configuration is standard for most applications, certain national or local electrical codes may prohibit neutral-to-ground bonding. If local regulations require the N-PE bond to be disabled, remove the M3x8 screw as indicated in the diagrams below.



The neutral-to-ground bonding feature in Inverter Mode can be enabled or disabled by adjusting the configuration of the M3x8 screw:

- **Enabled (Default)**: Keep the M3x8 screw installed in the designated position.
- **Disabled:** Remove the M3x8 screw to disconnect the bonding feature.

PV Connection

CAUTION: For system safety and maintenance, a dedicated DC circuit breaker must be installed between the inverter and the PV modules prior to connection.

NOTE1: Please use 600VDC/30A circuit breaker for 8KW Model, 600VDC/50A circuit breaker for 10KW Model.

NOTE2: The overvoltage category of the PV input is II.

Please follow the steps below to implement PV module connection:

WARNING: Due to the non-isolated architecture of this inverter, only the following PV module types are compatible: single crystalline and poly crystalline with class A-rated and CIGS modules.
To prevent system malfunction or equipment damage, do not connect any PV modules with potential current leakage. Grounding of PV modules is strictly prohibited as it will cause leakage current to the inverter. If using CIGS modules, ensure they are NOT grounded.
CAUTION: The use of a PV junction box equipped with surge protection is mandatory. Failure to provide adequate surge protection may result in severe inverter damage in the event of a lightning strike on the PV modules.

Step 1: Check the input voltage of PV array modules. This system is applied with two strings of PV array. Please make sure that the maximum current load of each PV input connector is 40A.

CAUTION: Exceeding the maximum input voltage can destroy the unit!! Check the system before wire connection.

Step 2: Disconnect the circuit breaker and switch off the DC switch.

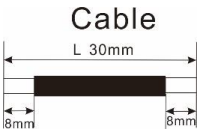
Step 3: Assemble the provided PV connectors with the PV module cables by following the detailed steps below.

Components for PV connectors and Tools:

Female connector housing	
Female terminal	
Male connector housing	
Male terminal	
Crimping tool and spanner	

Connector Assembly and Wiring:

Strip 8 mm of insulation from both ends of the cable. Exercise extreme care to avoid nicking or damaging the internal conductors.



Insert the stripped cable into the female terminal and crimp it securely using a professional crimping tool.



Insert the crimped female terminal into the female connector housing until it clicks into place.



Repeat the process by inserting the stripped cable into the male terminal and crimping accordingly.



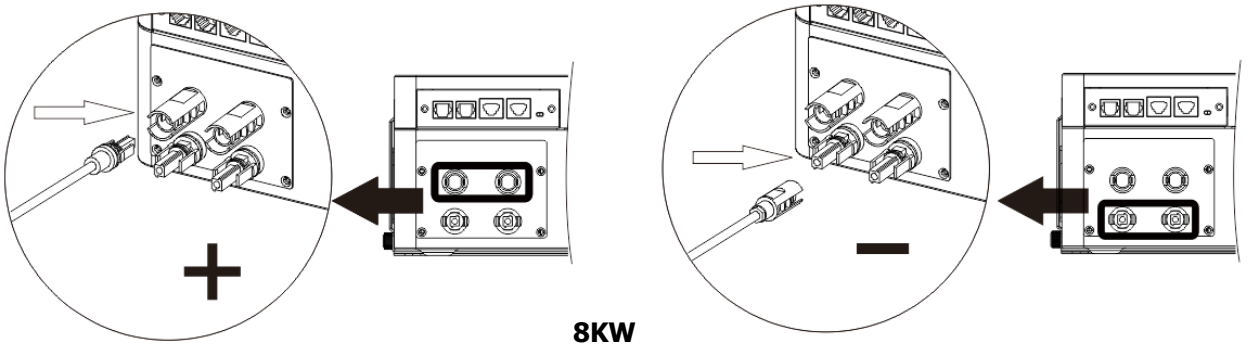
Insert the crimped male terminal into the male connector housing as illustrated below.



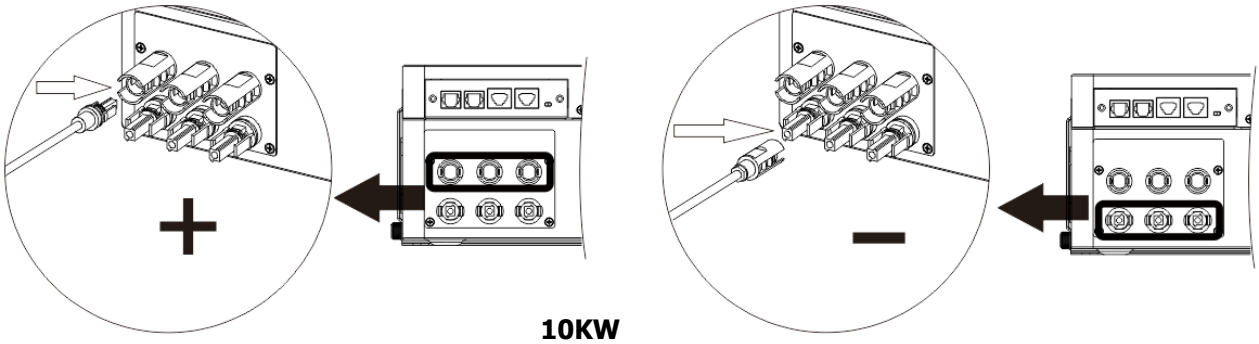
Using a PV spanner, firmly tighten the pressure dome onto both the female and male connectors to ensure a weatherproof seal.



Step 4: Prior to connection, use a multimeter to verify the correct polarity of the cables from the PV modules and the inverter's PV input connectors. Securely connect the positive pole (+) of the PV cable to the positive (+) input terminal. Securely connect the negative pole (-) of the PV cable to the negative (-) input terminal. Ensure both connectors are fully seated and locked with an audible "click."



8KW



10KW

WARNING! For optimal system safety and operational efficiency, it is critical to use appropriately rated cabling for all PV module connections. To minimize the risk of personal injury or equipment damage, please strictly adhere to the recommended cable specifications provided in the table below.

Conductor cross-section (mm^2)	AWG no.
4~6	10~12

CAUTION: Never touch the inverter terminals directly. These components carry high-voltage electrical current, and contact may result in lethal electric shock or severe injury.

Recommended PV Module Configuration

When selecting the appropriate PV modules, please ensure the following critical parameters are met:

1. The cumulative Open Circuit Voltage (Voc) of the PV array string must not exceed the inverter's rated Maximum PV Array Open Circuit Voltage.
2. The Open Circuit Voltage (Voc) of the PV array must be higher than the system's start-up voltage

INVERTER MODEL	8KW	10KW
Max. PV Array Power	12000W (8000W per tracking)	15000W (10000W per tracking)
Max. PV Array Open Circuit Voltage	500Vdc	
PV Array MPPT Voltage Range	90Vdc~450Vdc	
Number of Strings Per MPP Tracker	PV1: 1, PV2: 1	PV1: 1, PV2: 2
Max. Input Current	2*30A (MAX 45Amp)	30A/40A (MAX 60Amp)
Start-up Voltage (Voc)	80Vdc	

Using a 555Wp PV module as a reference, the following configurations are recommended to ensure compliance with the specified electrical parameters. Please refer to the table below for optimized string layouts.

Solar Panel Spec. (reference) - 555Wp - Imp: 17.32A - Voc: 38.46Vdc - Isc: 18.33A - Cells: 110	**SOLAR INPUT 1**	**SOLAR INPUT 2**	**Q'ty of panels**	**Total Input Power**
	Min in series: 3pcs per input **Max. in series: 12pcs per input**			
	3pcs in series	x	3pcs	1665W
	x	3pcs in series	3pcs	1665W
	7pcs in series	x	7pcs	3885W
	x	7pcs in series	7pcs	3885W
	7pcs in series	7pcs in series	14pcs	7770W
	8pcs in series	8pcs in series	16pcs	8880W
	10pcs in series	10pcs in series	20pcs	11100W
	11pcs in series	11pcs in series	22pcs	12210W
	12pcs in series*	12pcs in series*	24pcs	13320W
	9pcs in series*	9pcs in series, 2 strings*	27pcs	14985W

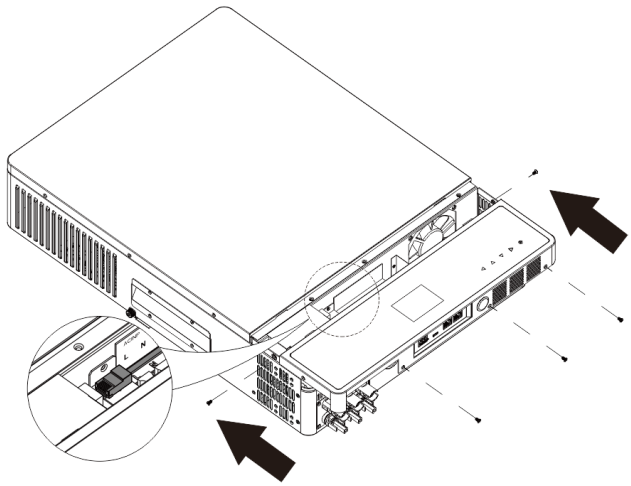
Using a 720Wp PV module as a reference, the following configurations are recommended to ensure compliance with the specified electrical parameters. Please refer to the table below for optimized string layouts.

Solar Panel Spec. (reference) - 720Wp - Vmp: 40.5Vdc - Imp: 17.44A - Voc: 49.4Vdc - Isc: 18.49A	**SOLAR INPUT 1**	**SOLAR INPUT 2**	**Q'ty of panels**	**Total Input Power**
	Min in series: 3pcs, per input **Max. in series: 10pcs, per input**			
	3pcs in series	x	3pcs	2160W
	x	3pcs in series	3pcs	2160W
	10pcs in series	x	10pcs	7200W
	x	10pcs in series	10pcs	7200W
	8pcs in series	8pcs in series	16pcs	11520W
	9pcs in series*	9pcs in series*	18pcs	12960W
	10pcs in series*	10pcs in series*	20pcs	14400W
	7pcs in series*	7pcs in series, 2 strings*	21pcs	15120W

*It's recommended for 10KW model.

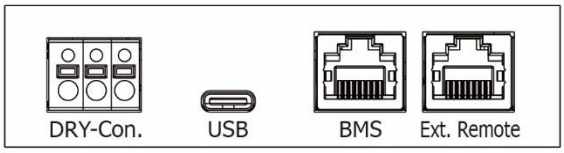
Final Assembly

After completing all wiring connections, reinstall the bottom cover by securing the five screws as illustrated below.



Ensure the RJ45 cable is securely connected.

Communication Connection



Ext. Remote Box Connection:

Pin assignment

PIN #	Definition	PIN #	Definition
PIN 1	GND	PIN 5	RXD to Inverter
PIN 2	+12V	PIN 6	TXD from Inverter
PIN 3	-12V	PIN 7	BAT
PIN 4	GND	PIN 8	SW
RS232 Baud rate = 38400			

* An optional HMI Remote Panel is available for the monitoring and control of the inverter system. For detailed installation and operational procedures, please consult the dedicated HMI Remote Panel User Manual.

Serial Connection: BMS port + COM port

Select a compatible lithium battery and configure the battery type in the LCD settings. For instructions on establishing inverter-to-BMS communication, please refer to the detailed information in APPENDIX I.

Pin assignment:

PIN #	Definition	PIN #	Definition
PIN 1	TXD from Inverter	PIN 5	RS485P
PIN 2	RXD to Inverter	PIN 6	CANH
PIN 3	RS485N	PIN 7	CANL
PIN 4	X	PIN 8	GND
RS232 Baud rate = 2400 RS485 Baud rate = 9600 CAN Baud rate = 100k(WECO), 500k(BYD, SOL, LIA), the remaining are 100k.			

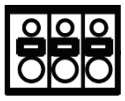
USB port (Type C)

Pin assignment:

PIN #	Definition	PIN #	Definition
PIN 1, 12	GND	PIN 5, 7	D-
PIN 2, 11	VBUS	PIN 6, 8	D+
PIN 3	X	PIN 9	X
PIN 4	CC1	PIN 10	CC2

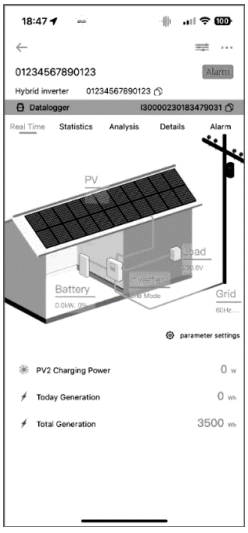
Dry Contact port

A dedicated dry contact (3A/250VAC) is located on the rear panel. It can be used to output a signal to external devices (such as a generator or alarm) when the battery voltage reaches a pre-defined warning threshold.

Unit Status	Condition			 NC C NO	
				NC & C	NO & C
Power Off	Unit is off and no output is powered.			Close	Open
Power On	Output is powered from Battery power or Solar energy.	Output source priority is set as USB (utility first)	Battery voltage < Low DC warning voltage	Open	Close
			Battery voltage > Setting value in Stop Re-Discharge Voltage or battery charging reaches floating stage	Close	Open
		Output source priority is set as SBU (SBU priority)	Battery voltage < Setting value in Stop Discharge Volt @ AC O.K.	Open	Close
			Battery voltage > Setting value in Stop Re-Discharge Voltage or battery charging reaches floating stage	Close	Open

Wi-Fi Connection

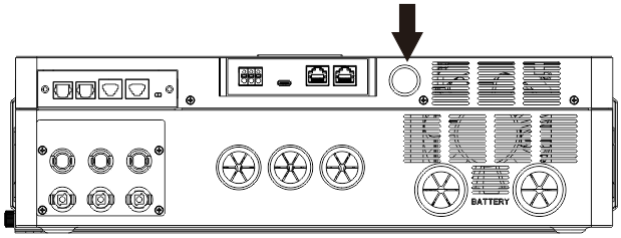
By integrating the Wi-Fi module with the Energy-Mate App, users can achieve comprehensive remote monitoring and control of their inverter systems. The App leverages dedicated Wi-Fi connectivity to provide cloud-based data services, enabling users to monitor daily performance, query real-time device parameters, and execute remote commands. This interface simplifies device management and ensures optimal system oversight from any location. The Energy-Mate App is compatible with both iOS and Android platforms.



OPERATION

Power ON/OFF

Once the unit has been properly installed and the battery connections are verified, press and hold the On/Off switch (located on bottom of the inverter) for 3 to 5 seconds to initialize the system.



Operation and Display Panel

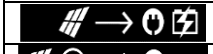
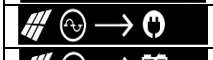
The Human Machine Interface (HMI) panel, illustrated in the diagram below, serves as the primary control center. It features six touch-sensitive function keys and a high-definition LCD, providing real-time data on system operating status and input/output power metrics.



Icons on the LCD

Operation Mode Info.					
Line /Bypass Mode	PV Mode	Battery Mode	Charge Mode	Standby Mode	Fault Mode
					

Energy Flow				
Grid	PV	Discharging	Charging	Load
				

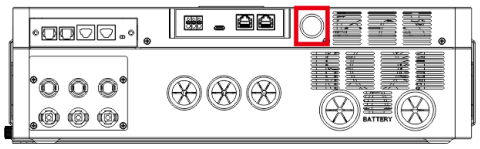
	Grid supply Load		Grid charging Battery
	PV supply Load		PV charging Battery
	Battery supply Load		
	Grid charging Battery and supply Load		
	PV supply Load and charging Battery		
	PV and Grid supply Load		
	PV and Grid charging Battery		
	PV and Battery supply Load		
	PV and Grid supply Load and charging Battery		
	Grid and Battery supply Load		
	PV, Grid and Battery supply Load		
AC OUTPUT	Flashing：Output Off Solid on：Output On		

	Cooling fan The display in the top-right corner indicates the fan speed from 0 to 10. "0" means the fan is stopped, while "1" through "10" represent 10% to 100% speed.
3:30	Flashing：Pending update

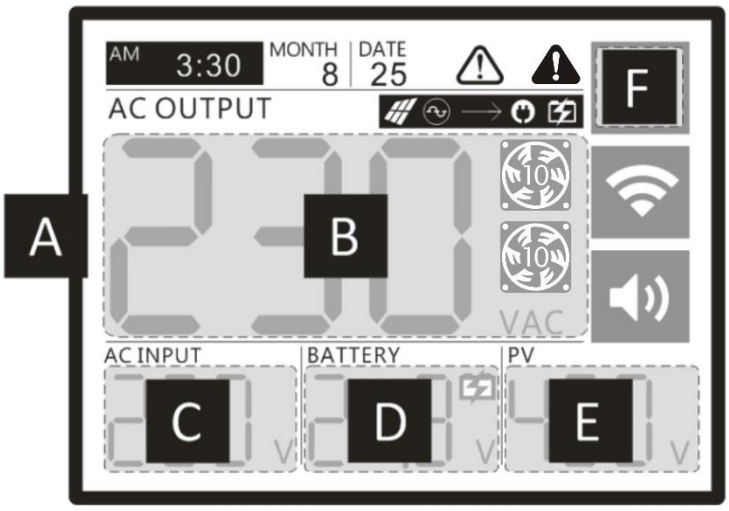
Audible Alarm

Buzzer	Messages
Beep 1time/1s	Heavy load, Temp issue, Fan issue, BMS lost
Beep continuously	All Fault modes

Status Indicator

Status	Color	Description	Remark
Normal	White	Inverter operating	Flashing indicates that data transmission is in progress with the central display. 
Warning	Blue	Warning event detected	
Fault	Red	Fault event detected	

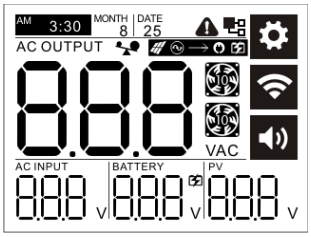
LCD Touchable Main Page



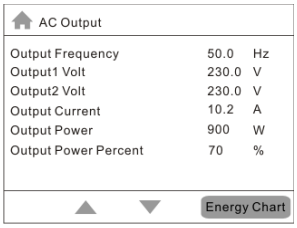
LCD Touchable Main Pages	
A	Starting / HOME
B	AC Output Information
C	AC Input Information
D	Battery Information, BMS Information
E	PV Information
F	Setting, Machine Information

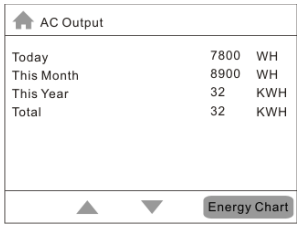
A Starting / HOME



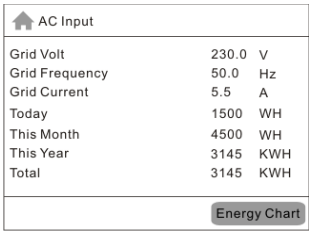


B AC Output Information

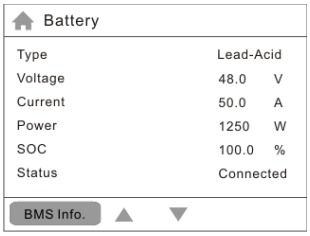


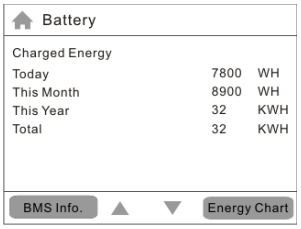


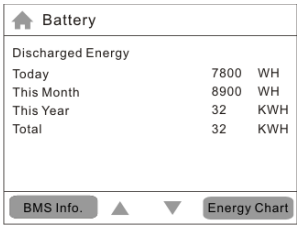
C AC Input Information

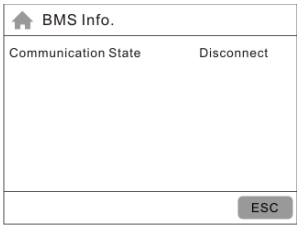


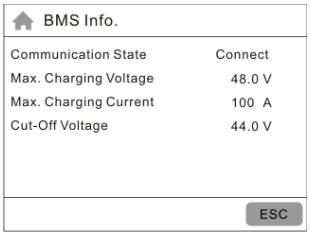
D Battery Information



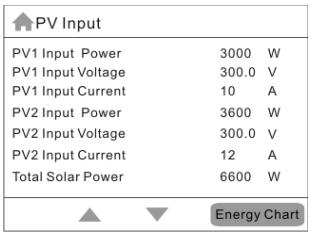


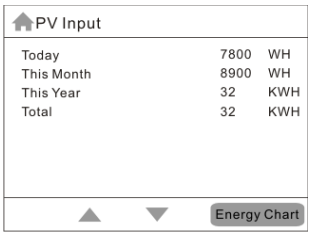


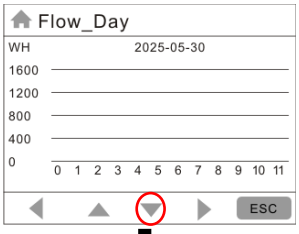
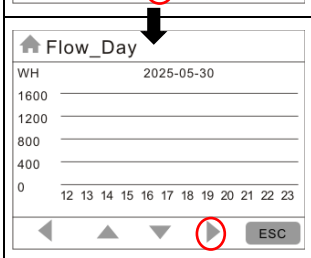
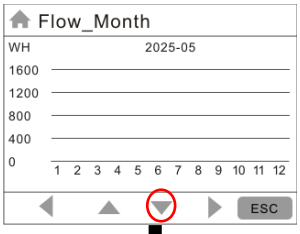
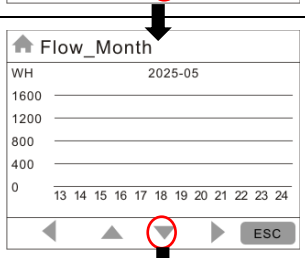
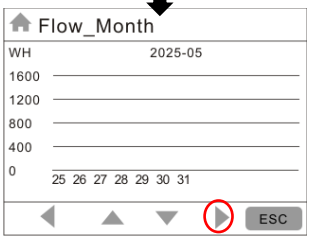
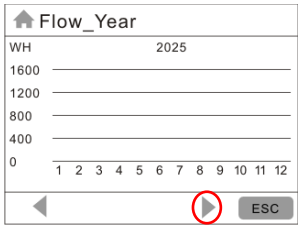
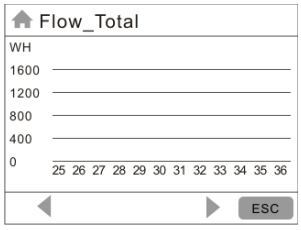




E PV Input Information

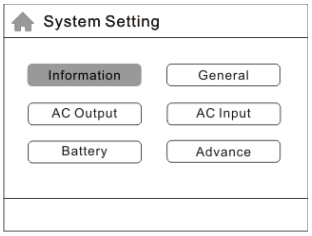


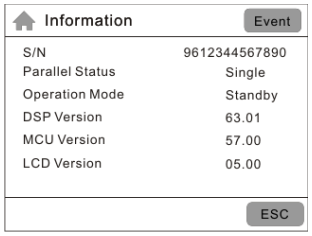


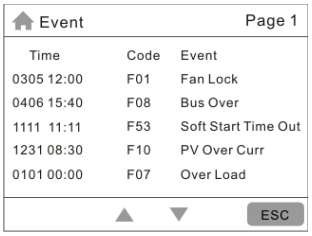
Energy Chart **(available in the AC output, AC input, Battery and PV input pages)**			
  Press " ▼ " to see next 12 hours in one day. Press " ▶ " to jump to "Monthly" page.	   Press " ▼ " to see next 12 days in one month. Press " ▶ " to jump to "Yearly" page.	 Press " ▶ " to jump to "Total" page. Press " ◀ " back to "Monthly" page.	 Press " ◀ " back to "Yearly" page.

F Setting

- Machine Information

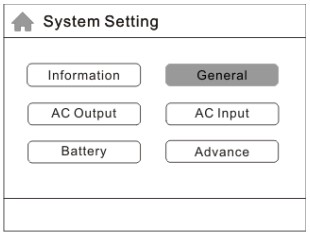






Click icon to access information page. It will also show "Event" details while clicking "Event" icon.

- General

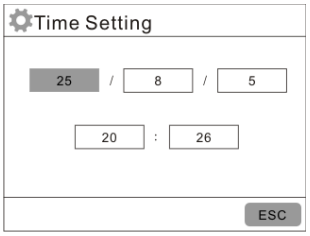


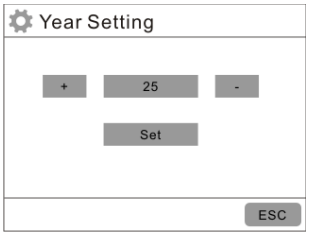


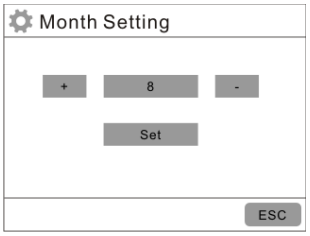
Page 1

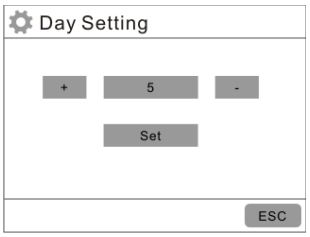
Simply click "+" to increase number and "-" to decrease number.

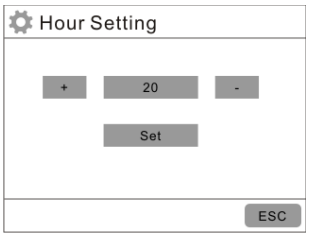
General – Time setting

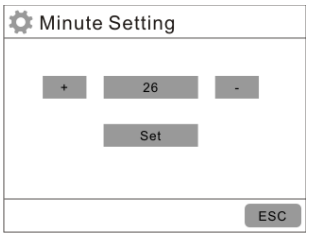




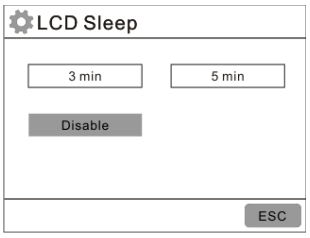




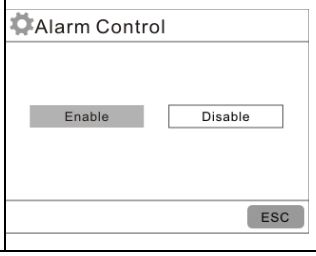




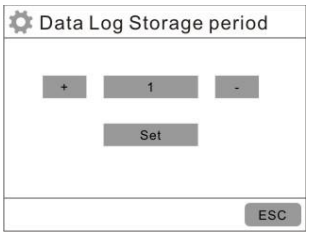
General – LCD Sleep



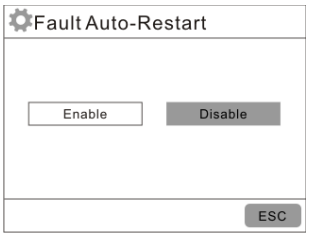
General – Alarm Control



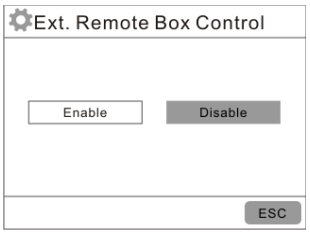
General – Data Log Storage period



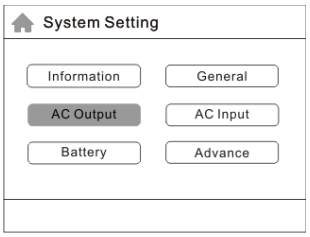
General – Fault Auto Restart

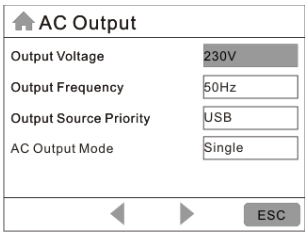


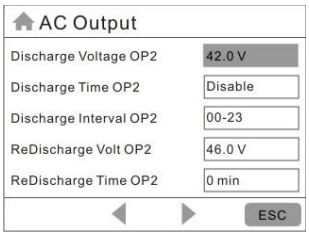
General – Ext. Remote Box Control

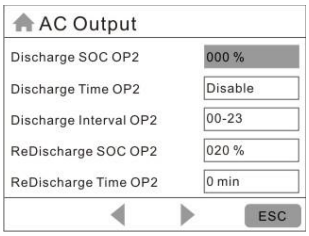


- **AC Output**



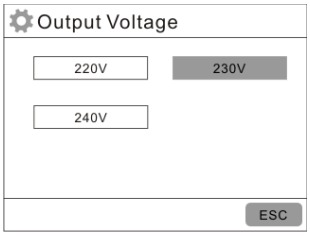




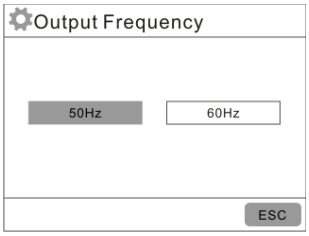


Page 1

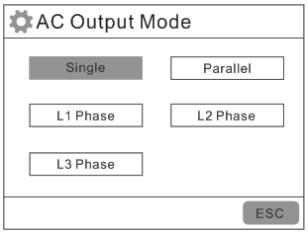
AC Output – Output Voltage



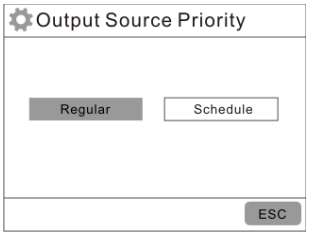
AC Output – Output Frequency

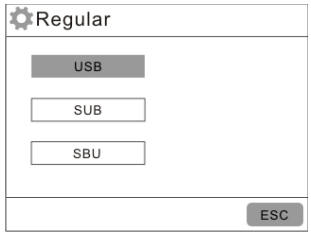


AC Output – AC Output Mode

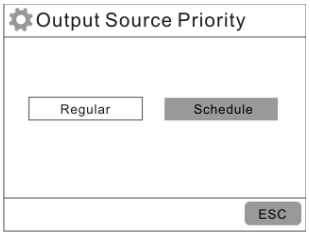


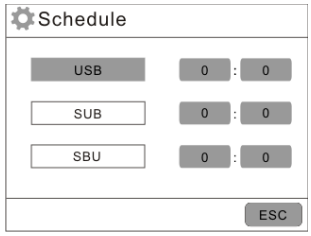
AC Output – Output Source Priority

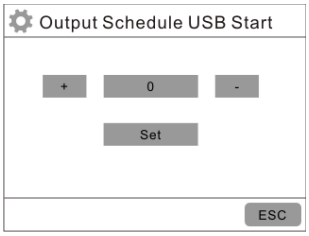


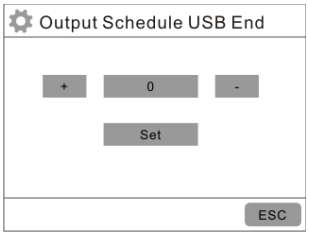


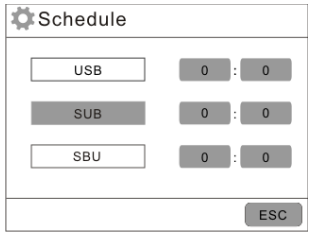
When "Regular" is selected, the outpur source priority will strictly follow the settings at all times. When "Schedule" is selected, the output source priority will automatically adjust based on a pre-configured time schedule.

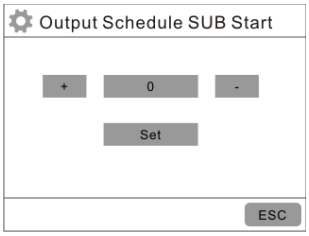


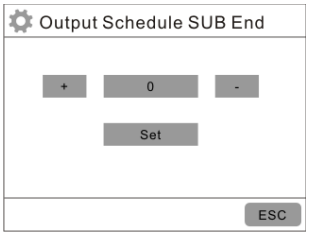


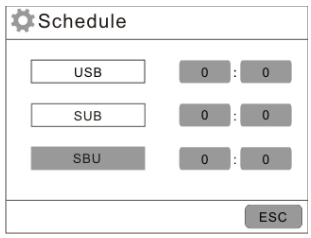


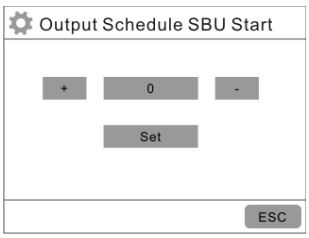


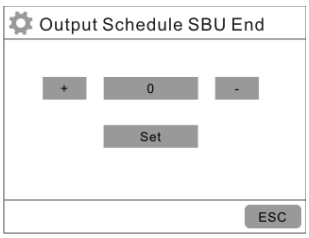




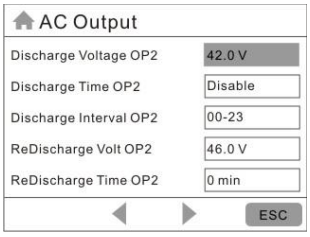


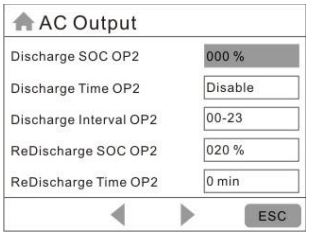




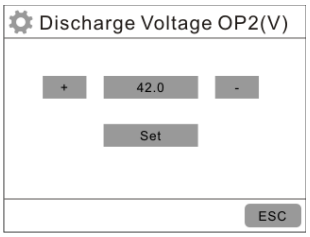
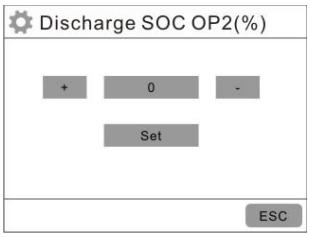
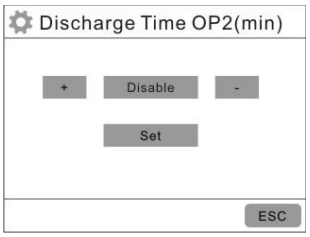
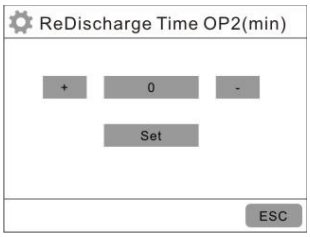
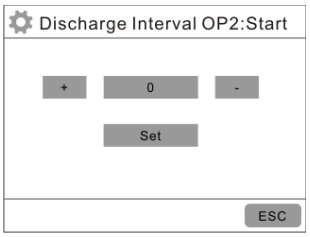
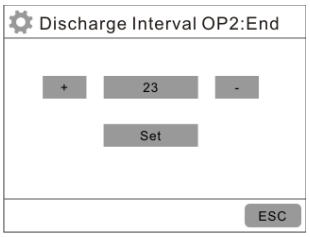
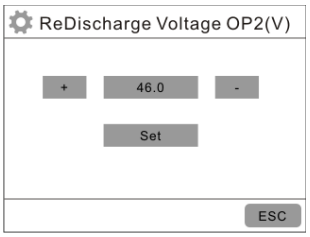
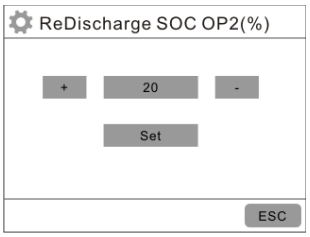


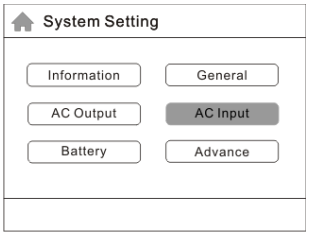
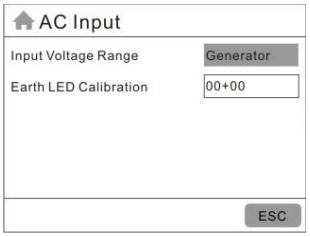
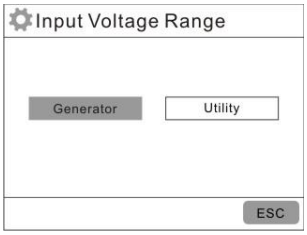
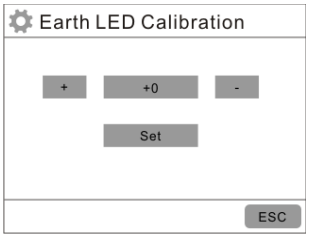
Page 2



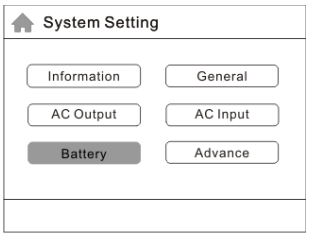


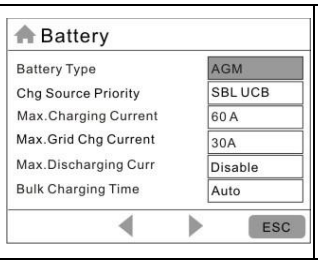
If any lithium battery type is selected in battery type setting, it will show SOC percentage in this section.

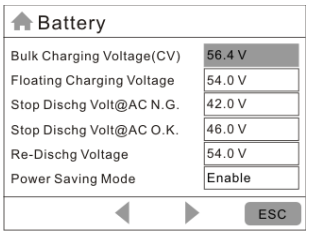
AC Output – Discharge Voltage / SOC OP2		AC Output – Discharge Time OP2	AC Output – ReDischarge Time OP2
			
AC Output – Discharge Interval OP2		**AC Output – ReDischarge Voltage / SOC OP2**	
			

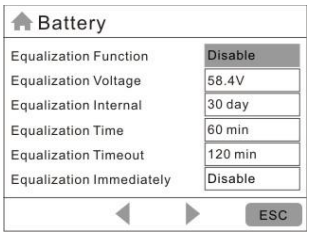
- **AC Input**	
	
AC Input – Input Voltage Range	**AC Input – Earth LED Calibration**
	

- **Battery**



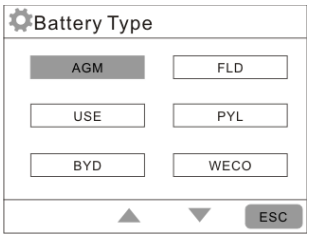


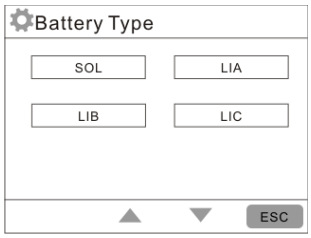




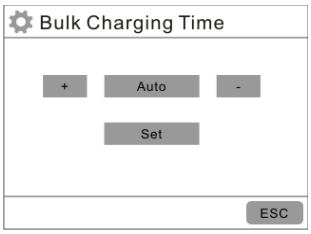
Page 1

Battery – Battery Type

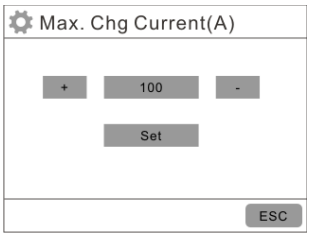




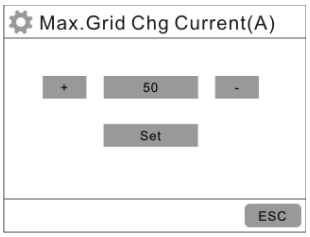
Battery –
Bulk Charging Time



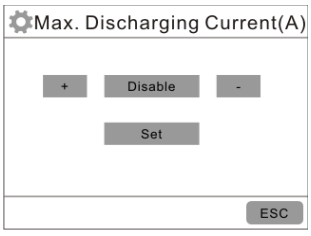
Battery –
Max. Charge Current



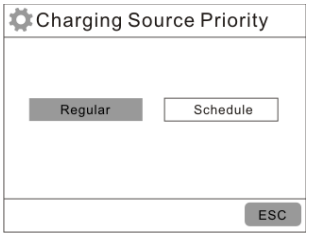
Battery –
Max. Grid Charge Current

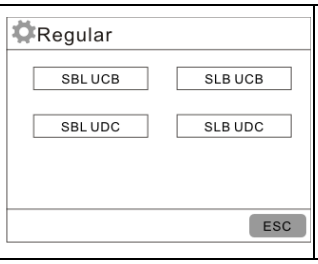


Battery –
Max.Discharging Curr

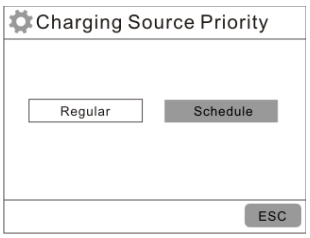


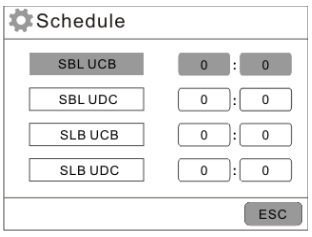
Battery – Charging Source Priority

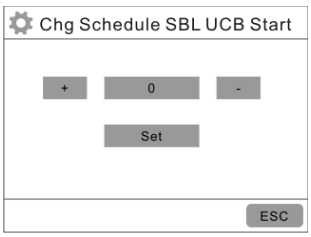


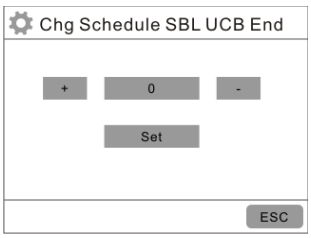


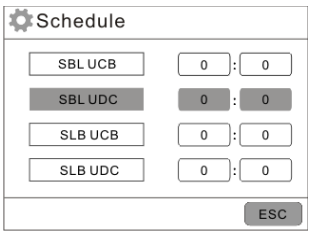
When "Regular" is selected, the charging source priority will strictly follow the settings at all times. When "Schedule" is selected, the charging source priority will automatically switch and operate according to the user-defined time schedule.

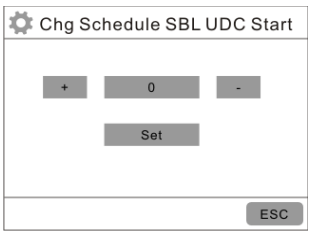


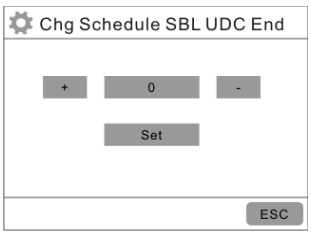


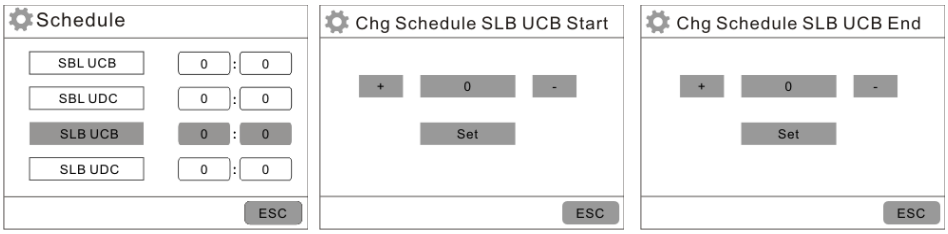


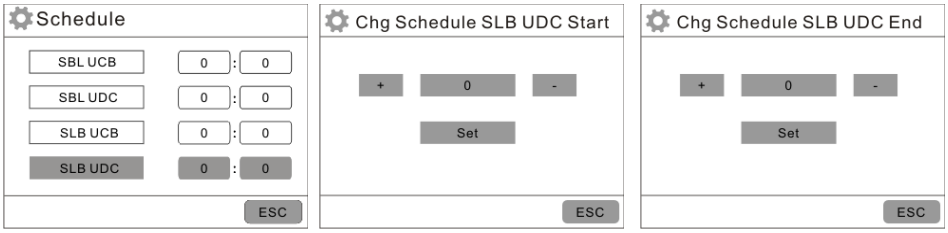




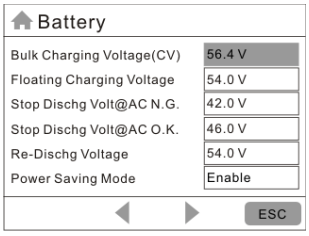


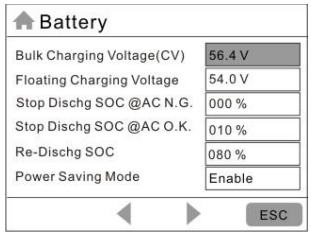






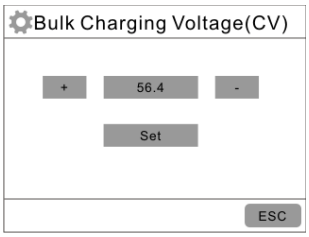
Page 2



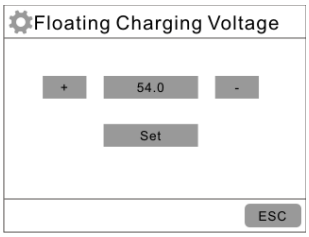


If any lithium battery type is selected in battery type setting, it will show SOC percentage in Stop Dischg items.

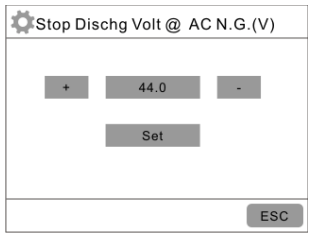
Battery – Charging Voltage

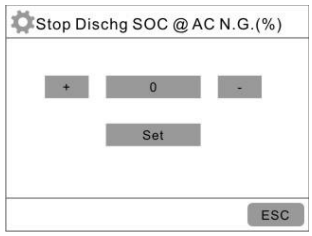


Battery – Floating Voltage

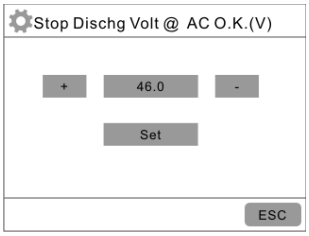


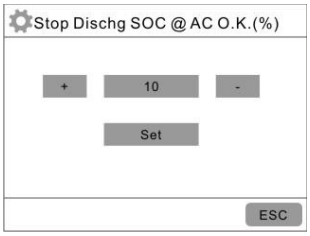
Battery – Stop Discharge Voltage / SOC @ AC N.G.



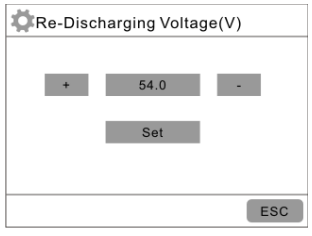


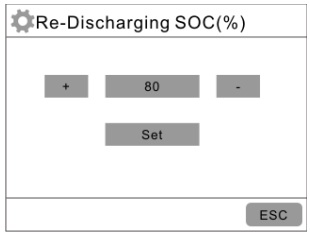
Battery – Stop Discharge Voltage / SOC @ AC O.K.



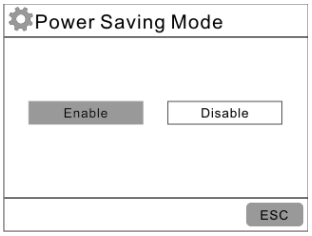


Battery – Re-Discharging Voltage / SOC

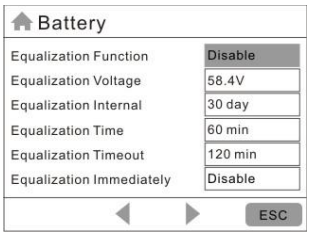




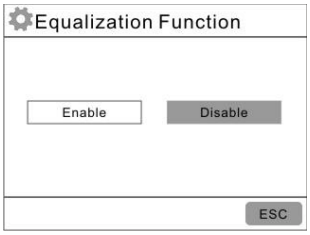
Battery – Power Saving Mode



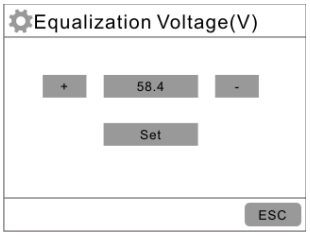
Page 3



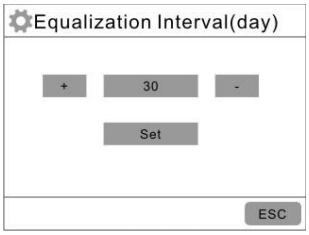
Battery – Equalization Function



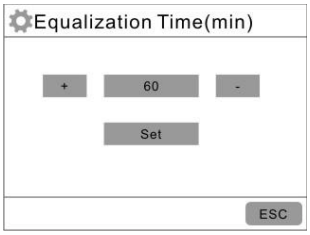
Battery – Equalization Voltage



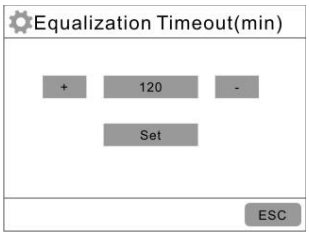
Battery – Equalization Interval



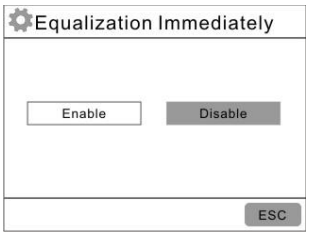
Battery – Equalization Time



Battery – Equalization Timeout

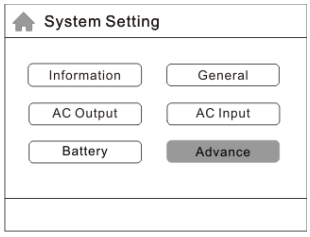


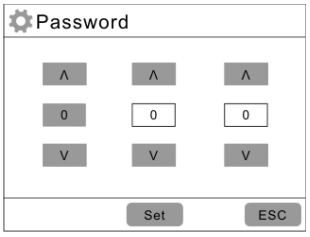
Battery – Equalization Immediately

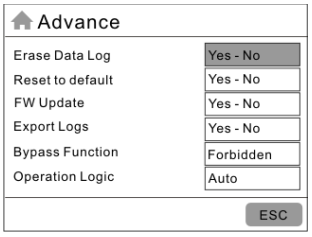


- **Advance**

It's requested to enter Password to access advance setting. The default password is "123".

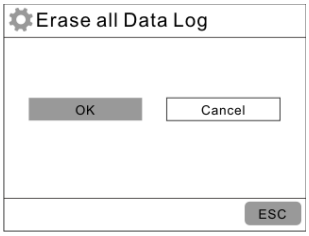




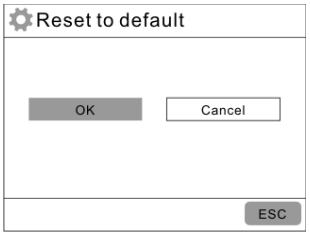




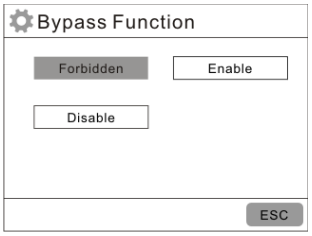
Advance – Erase Data Log



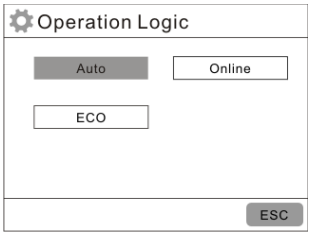
Advance – Reset to default



Advance – Bypass Function

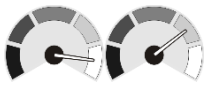
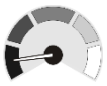


Advance – Operation Logic



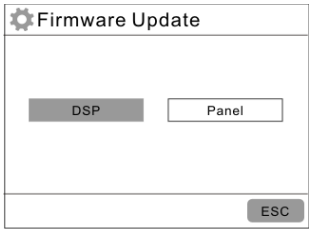
Advance – Firmware Update

The new firmware classified as five levels.

Level 1, 2 – Minor.	Level 3, 4 - Recommended.	Level 5 – Critical.
These updates include minor detection adjustments with no impact on core functionality. Installation is optional.	These updates provide enhancements to specific applications and features. Installation is highly recommended to improve performance.	This level includes essential corrections to system behaviors and critical functions. This update is mandatory for continued system stability and security.
		

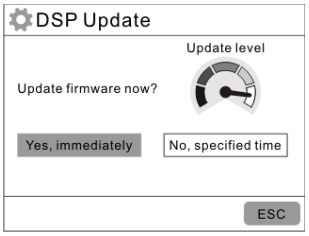
Step 1. Controller Selection

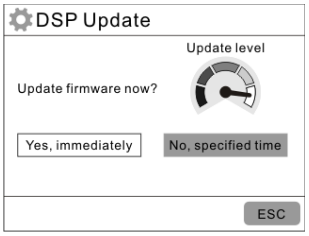
The unit contains two internal controllers. Select one controller to verify if it is running the latest firmware version.

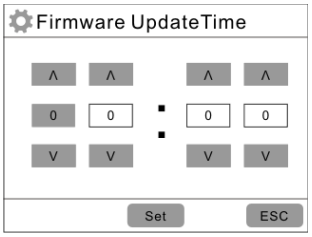


Step 2. Firmware Update Procedure

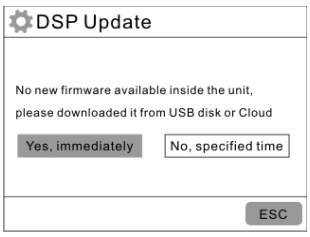
- **If the firmware is available and compatible:** Choose to **Update Immediately** or **Schedule a specific time** for the process to begin

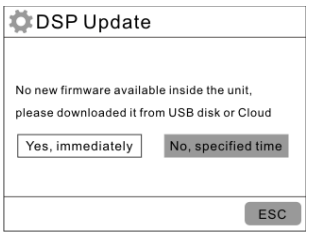


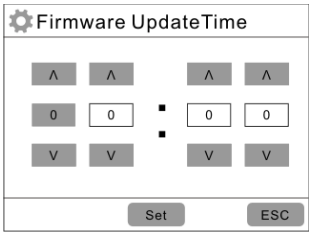




- **If the firmware is missing or incompatible:**
  - USB Method: Connect a USB drive containing the correct firmware. Select **Update Immediately** or **Schedule a specific time**; the unit will automatically pull the update from the USB drive.
  - Cloud Method: If a USB drive is unavailable, press **ESC** to exit. Download the required firmware from the Cloud (Web Portal) first, then return to Step 1.

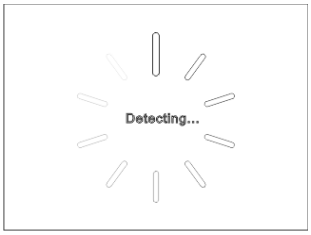






Step 3: USB Detection and Verification

The system will attempt to detect the USB drive. This process typically takes approximately 5 seconds.



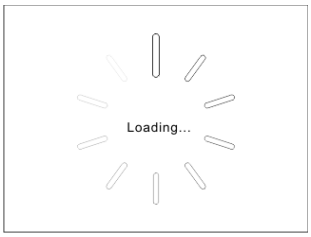
If detection exceeds 5 seconds, the process has timed out. Please contact your vendor to verify you have the correct firmware version and a compatible USB drive.



Step 4. Firmware Loading

Firmware will be uploaded from the USB drive (est. 20 seconds).

NOTE: This step is bypassed if the firmware was previously downloaded via the Cloud/Web interface.

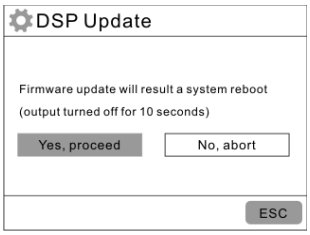


Potential Update Interruptions: The update process may be halted under the following conditions:

- Incompatibility: The firmware version does not match the hardware. Contact your vendor for the correct update file.
- Current Version Detected: The unit is already running the latest firmware. No further action is required.
- Reboot Confirmation: A notification will appear stating the unit must reboot to complete the update. Confirm this prompt to proceed or cancel to stay on the current version.

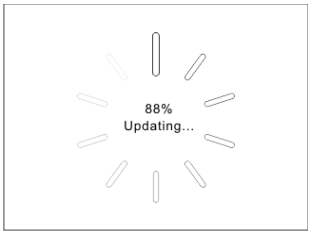


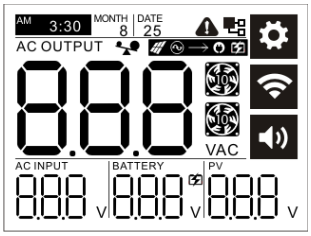




Step 5. Firmware Update Progress and Completion

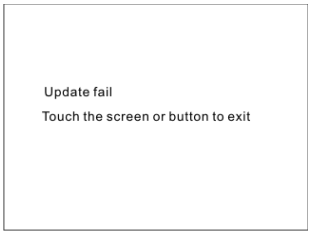
A progress bar will display the update percentage (XX% Updating) until the process is complete. Upon a successful update, the system will automatically return to the Main Page.

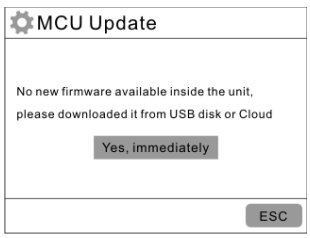




If the update fails, one of the following alerts will appear:

- DSP Update Failure: The DSP update was unsuccessful. Please manually abort the process and restart the update.
- MCU Update Failure: The MCU update failed. You must retry this update immediately to prevent HMI malfunction.

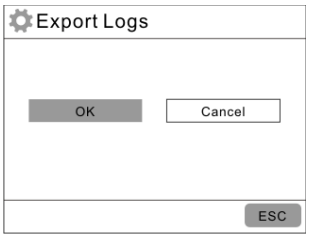




Advance – Export Logs

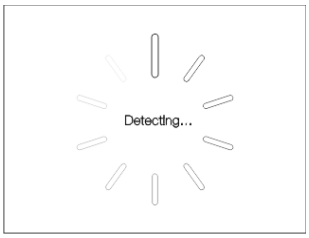
Step 1. Initiation

Select OK to begin the log export process. Select ESC or Cancel to exit the screen and return to the previous menu.

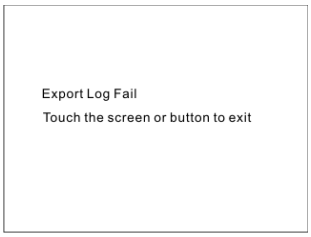


Step 2. USB Detection

The system will initialize the USB drive (approximately 5 seconds).



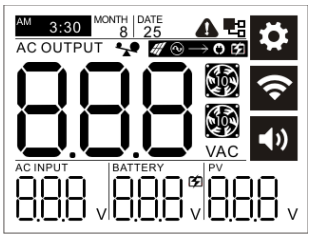
If detection exceeds 5 seconds, the process has failed. Please verify that the USB drive is using the correct file system format as specified by the vendor.



Step 3. Export Progress

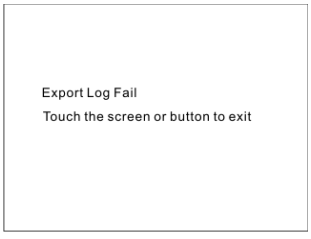
The screen will indicate that the log export is in progress. Upon successful completion, the system will automatically return to the Main Page.





If the export process is interrupted, refer to the following solutions:

- Write Protection Error: The USB drive is write-protected. Disable the protection switch or security settings on the drive and try again.
- Access Denied / File Error: The system cannot open the file or access the directory. Reformat the USB drive to a compatible format and restart the process.



Battery Equalization Description

Battery equalization function is built into the charge controller. It reverses the buildup of negative chemical effects such as 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 may have built up on the plates. If left unchecked, this condition, called sulfating, will reduce the overall capacity of the battery. Therefore, it's recommended to equalize the battery periodically.

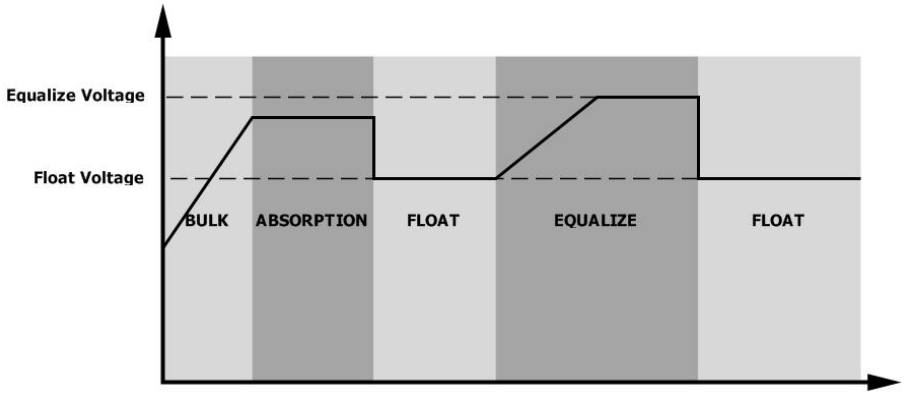
- **How to Activate Equalization Function**

You must enable battery equalization function in Battery Setting Page. You can then apply this function by either one of the following methods:

1. Setting equalization interval in Battery Setting Page.
2. Activate equalization immediately in Battery Setting Page.

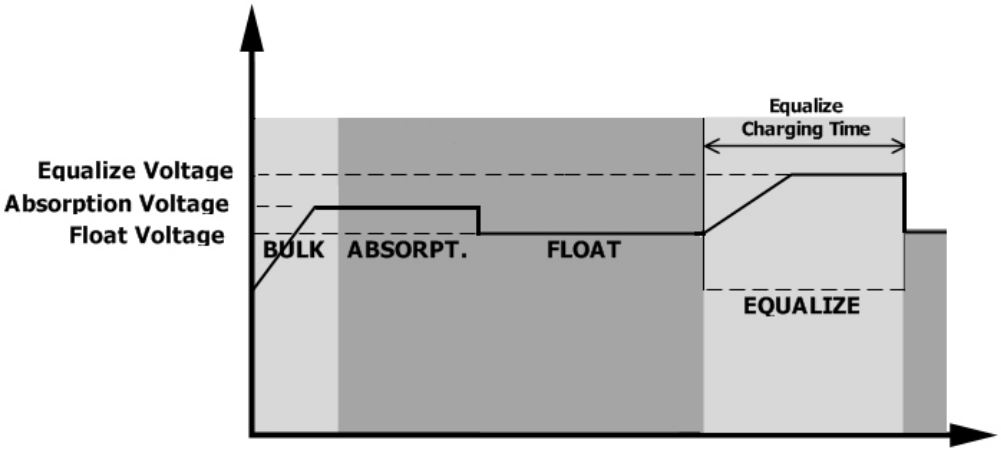
- **When to Equalize**

In floating charge stage, when setting the equalization interval (battery equalization cycle) is reached, or equalization is activated immediately, the controller will start to enter Equalize Mode.

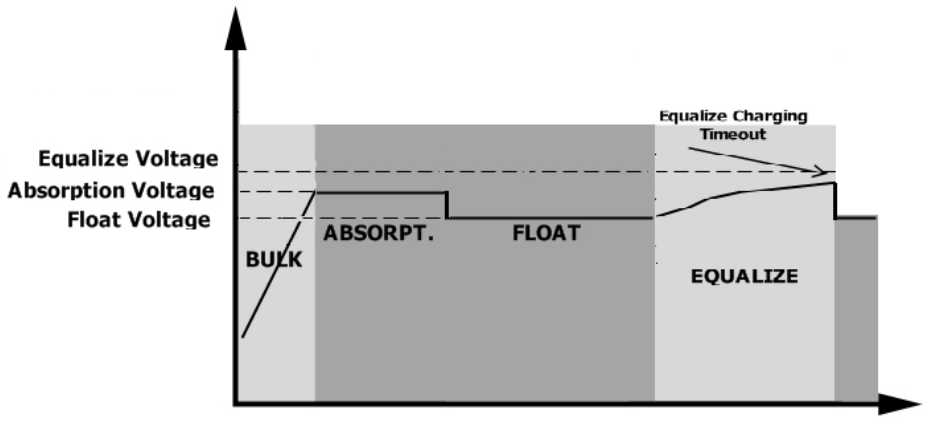


- **Equalize Charging and Timeout**

In Equalize Mode, the controller will supply power to charge battery as much as possible until battery voltage reach the equalization voltage. Then, constant-voltage regulation is applied to maintain battery voltage at the equalization level. The battery will remain in the Equalize Mode until the equalization timer runs out.



However, in Equalize Mode, if the battery equalization timer runs out and the battery voltage doesn't recover to the battery equalization voltage point, the charge controller will extend the battery equalized time until battery voltage achieves equalization voltage. If the battery voltage is still lower than equalization voltage when the extension runs out, the charge controller will stop equalization and return to the floating charging stage.



FAULT & WARNING CODE

System Operational Overview

This section outlines how the inverter reacts immediately following a warning or fault event, detailing automatic recovery protocols and output power behavior.

- **Warning Events:** No warning event will interrupt or stop the AC output of the inverter. The system continues to power connected loads normally.
- **Fault Events:** When the inverter enters **Fault Mode**, standard inverter operations cease, and the unit routes output power based on the recovery protocols and bypass configurations below.

When a fault occurs, the inverter determines its restart behavior based on the specific error code category:

Recovery Type	Fault Codes	Required Action / Recovery Condition
Time-Based Auto-Restart	F17, F34	Unit automatically restarts within 10 to 30 seconds.
Condition-Based Auto-Restart	F3	Restarts automatically when battery voltage returns to normal operational range.
	F8	Restarts automatically when DC bus voltage drops below 300 VDC.
	F13, F14, F18	Restarts automatically only if the Fault Auto-Restart setting is enabled.
	F22	Restarts automatically once parallel parameter configuration errors are corrected.
	F25	Restarts automatically once battery voltages on paralleled units match at the same level.
	F26	Restarts automatically once grid voltage/frequency on paralleled units match the same range.
	F28	Restarts automatically once parallel system settings are successfully synchronized.
Manual Restart	All Other Faults	Requires a manual system restart by the operator to clear the error state.

AC Output Behavior in Fault Mode

When the inverter is in Fault Mode, the availability of output power directly depends on **Bypass Function** configuration and Utility Grid availability:

Bypass Function Setting	Grid Availability	Inverter AC Output Behavior
Enabled	Grid is Available	**Bypass Active:** Utility grid power is bypassed directly to the output.
Disabled	Grid is Available	**Bypass Active:** Utility grid power is bypassed directly to the output.
Forbidden	Grid is Available	**No Output:** Inverter cuts off all output power, even if grid power is stable.

Fault Reference Code

Code Type	Code #	Event	Code Type	Code #	Event
Fault	F01	Fan fault	Fault	F16	Inv start fault
Fault	F02	High PV-volt	Fault	F17	High dc offset
Fault	F03	High bat-volt	Fault	F18	Over-load
Fault	F04	Low bat-volt	Fault	F19	Amp sense fault
Fault	F05	Output S.C.	Fault	F20	Backfeed fault
Fault	F06	High op-volt	Fault	F21	Firmware fault
Fault	F07	Low op-volt	Fault	F22	Par-CAN fault
Fault	F08	High bus-volt	Fault	F23	Par-host fault
Fault	F09	Low bus-volt	Fault	F24	Par-sync fault
Fault	F10	High PV-amp	Fault	F25	Par-bat fault
Fault	F11	High inv-amp	Fault	F26	Par-grid fault
Fault	F12	High bus-amp	Fault	F27	Par-opa fault
Fault	F13	High disc-amp	Fault	F28	Par-set fault
Fault	F14	Over temp.	Fault	F29	OP Circuit Fault
Fault	F15	Bus start fault	Fault	F34	PFC over current
Warning	W01	Grid not exist	Warning	W11	Comm. Lost
Warning	W02	PV not exist	Warning	W12	Par limited
Warning	W03	Pack not exist	Warning	W13	Ip CB trip
Warning	W04	Weak SoC	Warning	W14	EQ warning
Warning	W05	Weak PV-volt	Warning	W15	MCU comm. lost
Warning	W06	Power de-rate	Warning	W16	Disable CHG& DISCHG
Warning	W07	Heavy load	Warning	W17	Disable CHG
Warning	W08	Temp issue	Warning	W18	Disable DISCHG
Warning	W09	Fan issue	Warning	W19	Force CHG
Warning	W10	BMS lost			

SPECIFICATIONS

Table 1 Line Mode Specifications

MODEL	8KW	10KW
Input Voltage Waveform	Sinusoidal (utility or generator)	
Nominal Input Voltage	230Vac	
Low Loss Voltage	90Vac±7V	
Low Loss Return Voltage	100Vac±7V	
High Loss Voltage	280Vac±7V	
High Loss Return Voltage	270Vac±7V	
Max AC Input Voltage	300Vac	
Max AC Input Current	50A	
Max Output Current for 2nd output	60A	
Nominal Input Frequency	50Hz / 60Hz (Auto detection, 55Hz as boundary)	
Low Loss Frequency	46±1Hz @50Hz; 56±1Hz @60Hz(UPS) 40±1Hz @50Hz; 50±1Hz @60Hz (Appliances)	
Low Loss Return Frequency	46.5±1Hz @50Hz; 57±1Hz @60Hz 42±1Hz @50Hz; 55±1Hz @60Hz (Appliances)	
High Loss Frequency	54±1Hz @50Hz; 64±1Hz @60Hz(UPS) 60±1Hz @50Hz; 65±1Hz @60Hz (Appliances)	
High Loss Return Frequency	53±1Hz @50Hz; 63±1Hz @60Hz 55±1Hz @50Hz; 63±1Hz @60Hz (Appliances)	
Output Short Circuit Protection	Software detection	
Efficiency (Line Mode)	>93% (Rated R load, battery full charged)	
Input power factor	>0.98 @100%R Load	
Transfer Time: Line mode <-> battery mode Line mode <->Bypass mode Bypass mode to battery mode	 0ms 0ms 10ms typical, 12ms maximum @50Hz (UPS) 20ms typical, 25ms maximum @50Hz (Appliances)	

Table 2 Inverter Mode Specifications

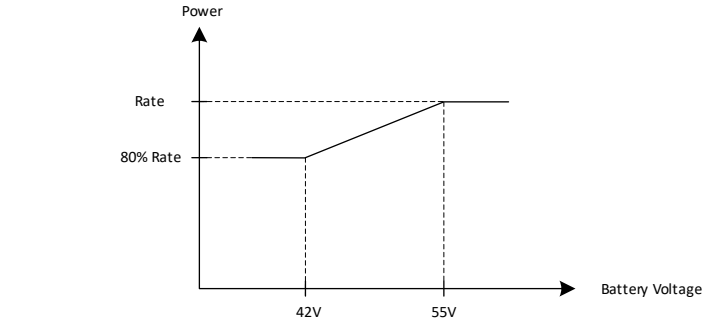
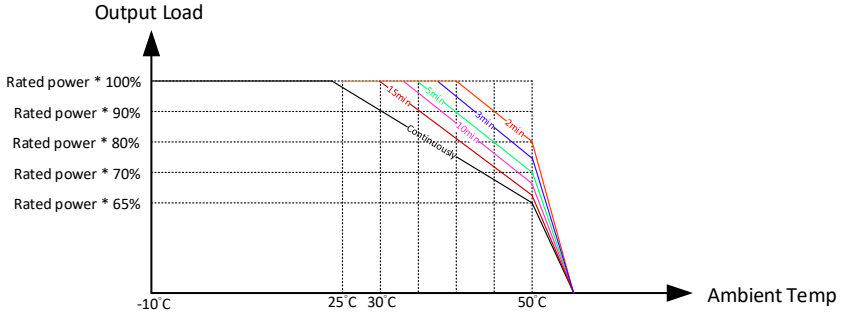
MODEL	8KW	10KW
Rated Output Power	8KW	10KW
Output Voltage Waveform	Pure Sine Wave	
Output Voltage Regulation	230Vac±5%	
Output Frequency	50Hz / 60Hz	
Peak Efficiency	>93%	
Overload Protection	10s@105%~110%; 5s@≥120%; 100ms @ ≥160%	
Low DC Warning Voltage @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	 46.0Vdc 42.8Vdc 40.4Vdc	
Low DC Warning Return Voltage @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	 48.0Vdc 44.8Vdc 42.4Vdc	
Low DC Cut-off Voltage @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	 44.0Vdc 40.8Vdc 38.4Vdc	
High DC Recovery Voltage	61Vdc	
High DC Cut-off Voltage	63Vdc	
DC Voltage Accuracy	+/-0.3V@ no load	
THDV	<3% for linear load,<5% for non-linear load @ 54V	
DC Offset	≦100mV	
Power Limitation When battery voltage is lower than 55Vdc, output power will be derated. If connected load is higher than this derated power, the AC output voltage will decrease until the output power reduces to this derated power. The minimum AC output voltage is output voltage setting – 10V.	 	

Table 3 Charge Mode Specifications

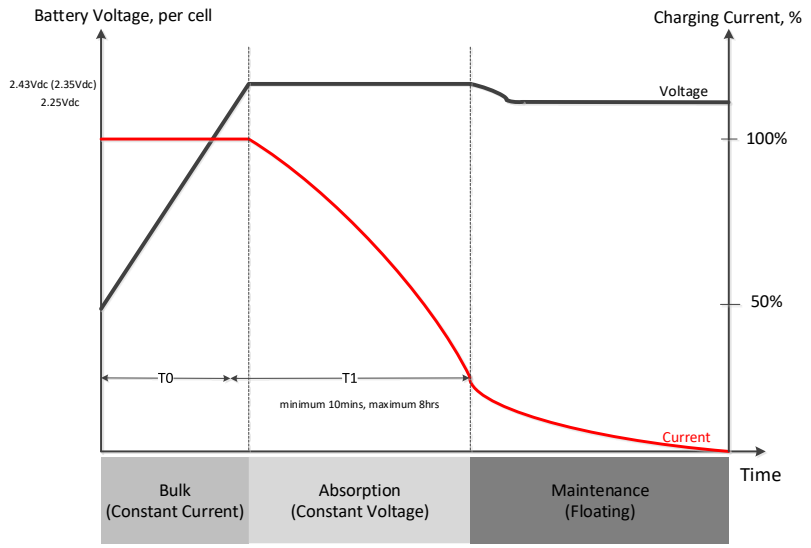
Utility Charging Mode			
MODEL		**8KW**	**10KW**
Charging Current (UPS) @ Nominal Input Voltage		120 Amp	150 Amp
Bulk Charging Voltage	**Flooded Battery**	58.4Vdc	
	AGM / Gel Battery	56.4Vdc	
Floating Charging Voltage		54Vdc	
Overcharge Protection		63Vdc	
Charging Algorithm		3-Step	
Charging Curve			
Solar Input			
MODEL		**8KW**	**10KW**
Rated Power		12000W (8000W max. per tracker)	15000W (10000W max. per tracker)
Max. PV Array Open Circuit Voltage		500Vdc	
PV Array MPPT Voltage Range		90Vdc~450Vdc	
Number of MPP Trackers		2	
Number of Strings Per MPP Tracker		PV1: 1, PV2: 2	
Max. Input Current		2*30Amp (MAX 45Amp)	30A/40A (MAX 60Amp)
Max. Charging Current		120Amp	150 Amp
Start-up Voltage		80V +/- 5Vdc	

Table 4 ECO/Bypass specifications

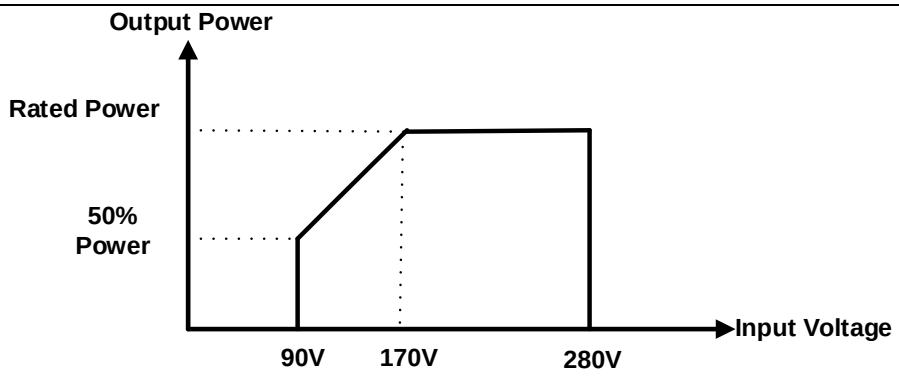
Bypass Mode		
Model	**8KW**	**10KW**
Input Voltage Waveform	Sinusoidal (utility or generator)	
Nominal Input Voltage	230Vac	
Low Loss Voltage	176Vac±7V(UPS); 90Vac±7V(Appliances)	
Low Loss Return Voltage	186Vac±7V(UPS); 100Vac±7V (Appliances)	
High Loss Voltage	280Vac±7V	
High Loss Return Voltage	270Vac±7V	
Max AC Input Voltage	300Vac	
Max AC Input Current	60A	
Nominal Input Frequency	50Hz / 60Hz (Auto detection, 55Hz as boundary)	
Low Loss Frequency	46±1Hz @50Hz; 56±1Hz @60Hz(UPS) 40±1Hz @50Hz; 50±1Hz @60Hz (Appliances)	
Low Loss Return Frequency	46.5±1Hz @50Hz; 57±1Hz @60Hz 42±1Hz @50Hz; 55±1Hz @60Hz (Appliances)	
High Loss Frequency	54±1Hz @50Hz; 64±1Hz @60Hz(UPS) 60±1Hz @50Hz; 65±1Hz @60Hz (Appliances)	
High Loss Return Frequency	53±1Hz @50Hz; 63±1Hz @60Hz 55±1Hz @50Hz; 63±1Hz @60Hz (Appliances)	
Efficiency	>99% (Rated R load, battery full charged)	
Output Short Circuit Protection	Circuit Breaker	
Power Limitation		

Table 5 General Specifications

MODEL	**8KW**	**10KW**
Safety Certification	CE	
Operating Temperature Range	-10°C to 50°C	
Storage temperature	-15°C~ 60°C	
Humidity	5% to 95% Relative Humidity (Non-condensing)	
Dimension (D*W*H), mm	147.4 x 432.5 x 553.6	
Net Weight, kg	18.4	

Table 6 Parallel Specifications

Model	**8KW**	**10KW**
Max parallel numbers	12	
Circulation Current under No Load Condition	Max 2A	
Power Unbalance Ratio	<5% @ 100% Load	
Parallel communication	CAN	
Transfer time in parallel mode	Max 50ms	
Parallel Kit	YES	

Note: Parallel feature will be disabled when only PV power is available.

TROUBLE SHOOTING

Phenomenon and/or Possible cause	What to do
No response while press the main switch.	
No Utility power and PV is applied.	Check whether the DC breaker tripped or has not yet turned on? If problem still exists, please contact the service center to repair it.
No response while pressing the main switch.	
Utility power or PV power exists.	Check whether the AC breaker tripped? Or PV voltage reaches to the operation level? If problem still exists, please contact the service center to repair it.
Output turned off, Buzzer beeps continuously.	
F01 shows. Fans abnormal stopped during startup sequence	Please contact service center to replace them.
F02 shows.	Configure the PV panels lower than 500V.
F03 shows.	Disconnect the Utility and PV power. Then, re-apply again. If over-voltage alarm still sounds, the internal charger might has some problem. Please contact with service center to repair it.
F05 shows.	Check and verify if there is any load with short circuit condition? Remove the load and restart the unit again. If problem still exists, please contact the service center to repair it.
F14 shows.	Keep the unit installed in a well ventilated environment.
F18 shows.	Reduce the applied load and restart the unit again.
F06, F07, F08, F09, F10, F11, F12, F13, F15, F16, F17, F19 or F20 shows.	Please restart the unit again. If problem still exists, please contact the service center to repair it.
F20 shows.	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. If the problem remains, please contact your installer.
F22, F23, or F24 shows.	1. Check if communication cables are connected well and restart the inverter. 2. If the problem remains, please contact your installer.
F25 shows.	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.

	If the problem still remains, please contact your installer.
F26 shows.	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. If the problem remains, please contact your installer.
F27 shows.	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. If the problem remains, please contact your installer.
F28 shows.	1. Switch off the inverter and check LCD setting AC output mode 2. For parallel system in single phase, make sure no 3P1, 3P2 or 3P3 is set. For upporting three-phase system, make sure no "PAL" is set on AC output mode setting 3. If the problem remains, please contact your installer.
F29 shows.	1. Check if sharing cables are connected well and restart the inverter. 2. If the problem remains, please contact your installer.
F34 shows.	1. Restart the inverter. 2. If the problem remains, please contact your installer.
Output powered but buzzer beeps per second.	
W07 shows.	Reduce load will release the warning.
W08 shows.	Keep the unit installed in a well ventilated environment.
W09 shows.	Fans abnormal stopped during operation. Please contact service center to replace them.
W10 shows.	BMS communication disconnected. Please contact service center to repair it.
Output powered but no buzzer. Only record on log	
W04 shows.	Charge the battery.
W05 shows.	Reduce the load.
W06 shows.	Utility voltage lower to a certain level, the output rating will be limited.
W11 shows.	Internal communication disconnected. Please contact service center to repair it.
W16, W17, W18 or W19 shows.	Check Battery status
WiFi mark is not displayed.	
Unit can't connect to the APP.	Check the Wi-Fi function enabled and icon available on the LCD then follow the Wi-Fi installation procedure to pair the Wi-Fi module with router and APP.

Appendix I: Parallel function

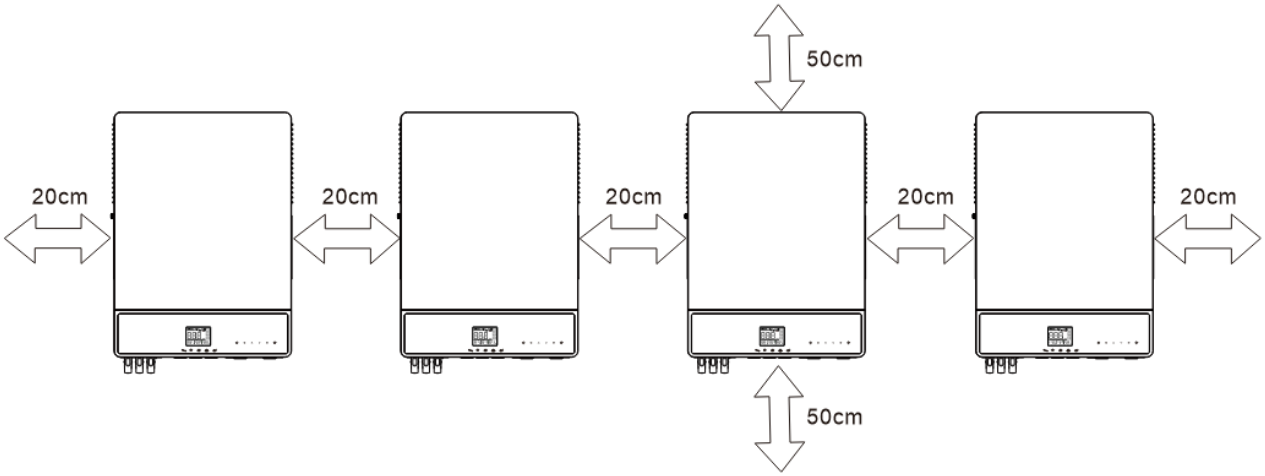
1. Introduction

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

1. The system supports single-phase parallel operation of up to 12 units, delivering a maximum output capacity of 120 kW / 120 kVA for the 10KW model and 96 kW / 96 kVA for the 8KW model.
2. For three-phase systems, up to 12 units can run in parallel, with a maximum of 10 units per phase.

2. Mounting the Unit

When installing multiple units, please refer to the configuration chart below for proper placement.



NOTE: To ensure adequate air circulation and effective heat dissipation, maintain a minimum clearance of approximately 20 cm from the sides and 50 cm above and below each unit. Furthermore, ensure all units are installed at the same horizontal level to maintain system uniformity.

3. Wiring Connection

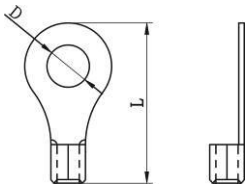
WARNING: For parallel operation, it is **mandatory** to have the battery system connected. The system will not function in parallel mode without a stable battery source.

Please refer to the table below for the required cable specifications for **each individual inverter**.

Recommended battery cable and terminal size:

Model	Wire Size	Cable mm^2	Ring Terminal Dimensions		Torque value
			D (mm)	L (mm)	
8KW	1*1/0AWG	50	8.4	54	5 Nm
10KW	1*2/0AWG	67	8.4	54	5 Nm

Ring terminal:



WARNING: For parallel configurations, it is **imperative** that all battery cables are of equal length. Any discrepancy in cable length will result in a voltage imbalance between the inverters and the battery pack, leading to synchronization failures or improper operation of the parallel system.

Recommended AC input and output cable size for each inverter:

AWG no.	Torque
8 AWG	1.4~ 1.6 Nm

Use a common bus-bar or high-current connector as a junction point to unify the battery cables before connecting to the battery pack. To ensure safety and performance, the cable gauge from the junction point to the battery must be X times the cross-sectional area specified in the individual inverter tables (where "X" represents the total number of inverters in parallel).

Apply the same scaling principle for all AC input and output wiring to accommodate the combined current of

the parallel system.

CAUTION!! Dedicated circuit breakers must be installed at both the battery bank and the AC input source. This configuration is mandatory to ensure the system can be safely isolated during maintenance and remains fully protected against over-current conditions from either the battery or the AC grid.

Recommended breaker specification of battery for each inverter:

Model	1 unit*
8KW	200A/70VDC
10KW	250A/70VDC

* If a single circuit breaker is used to protect the entire battery system, its rated current (amperage) must be X times the recommended rating for a single unit. In this context, "X" represents the total number of inverters connected in parallel

Recommended breaker specification of AC input with single phase:

Model	2	3	4	5	6	7	8	9	10	11	12
8KW, 10KW	120A 230VAC	180A 230VAC	240A 230VAC	300A 230VAC	360A 230VAC	420A 230VAC	480A 230VAC	540A 230VAC	600A 230VAC	660A 230VAC	720A 230VAC

Note 1: Also, you can use 60A breaker with only 1 unit and install one breaker at its AC input in each inverter.

Note 2: 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	10	11	12
Battery Capacity	400 AH	600 AH	800 AH	1000 AH	1200 AH	1400 AH	1600 AH	1800 AH	2000 AH	2200 AH	2400 AH

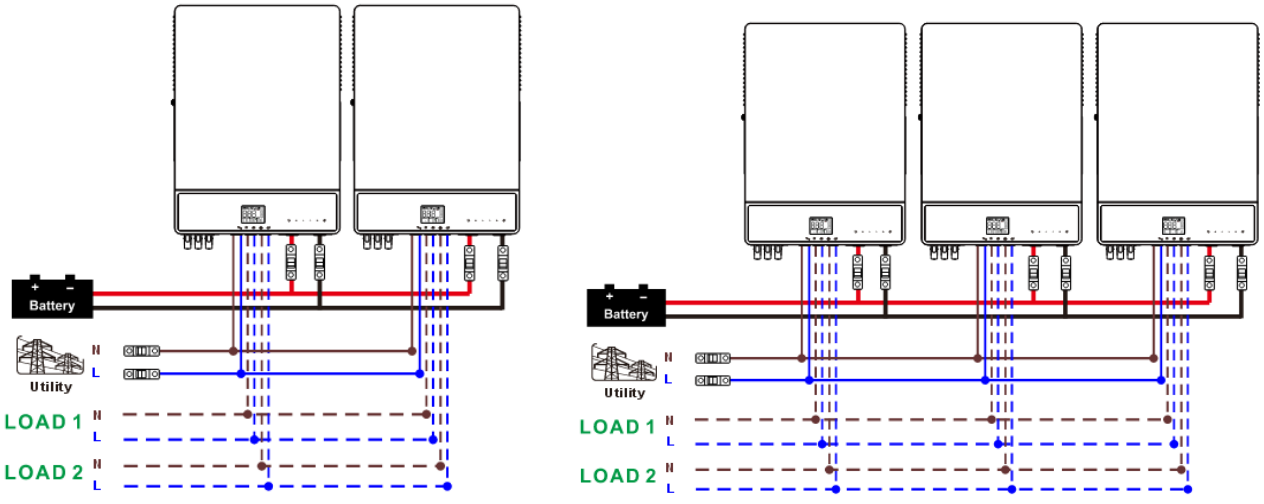
WARNING! In a parallel system, all inverters must share the same battery bank. Failure to maintain a common battery source will cause the inverters to trigger a fault mode and cease operation.

4. Parallel Connection

4-1. Parallel Operation in Single phase

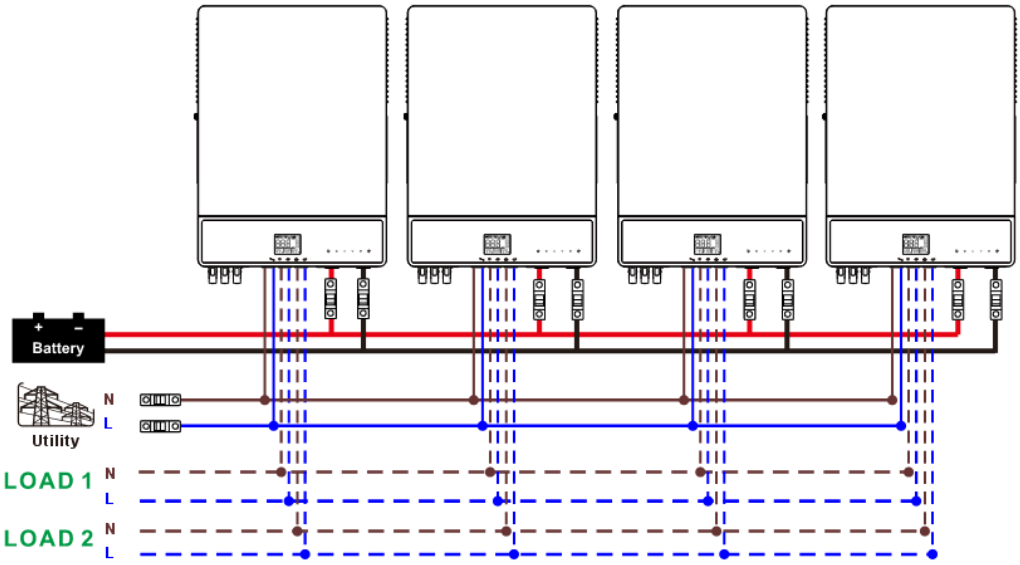
Two and three inverters in parallel:

Power Connection



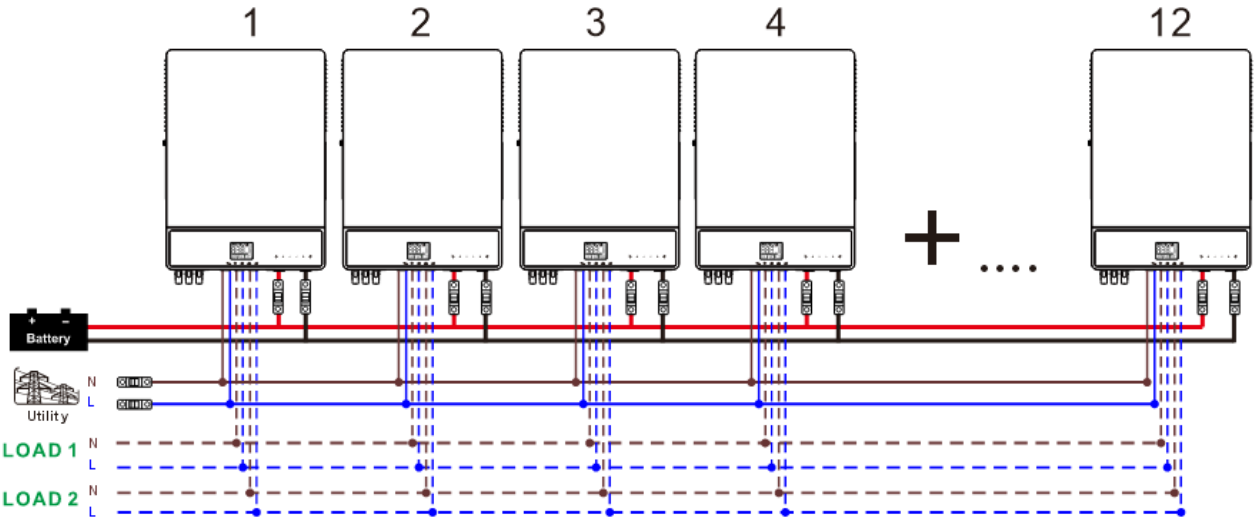
Four inverters in parallel:

Power Connection



Up to twelve inverters in parallel:

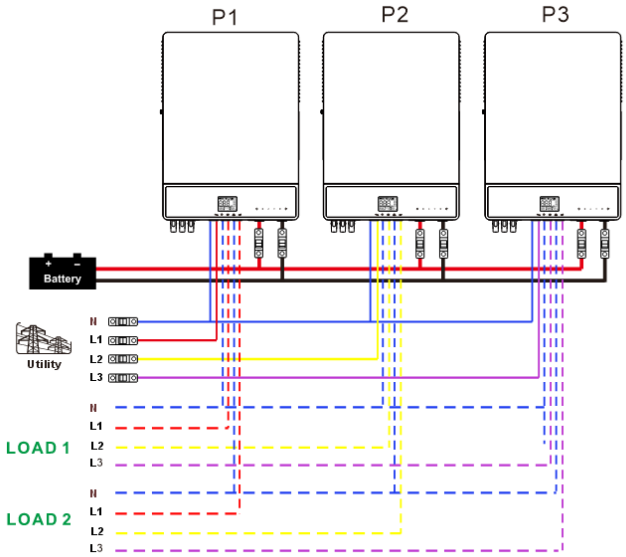
Power Connection



4-2. Support 3-phase equipment

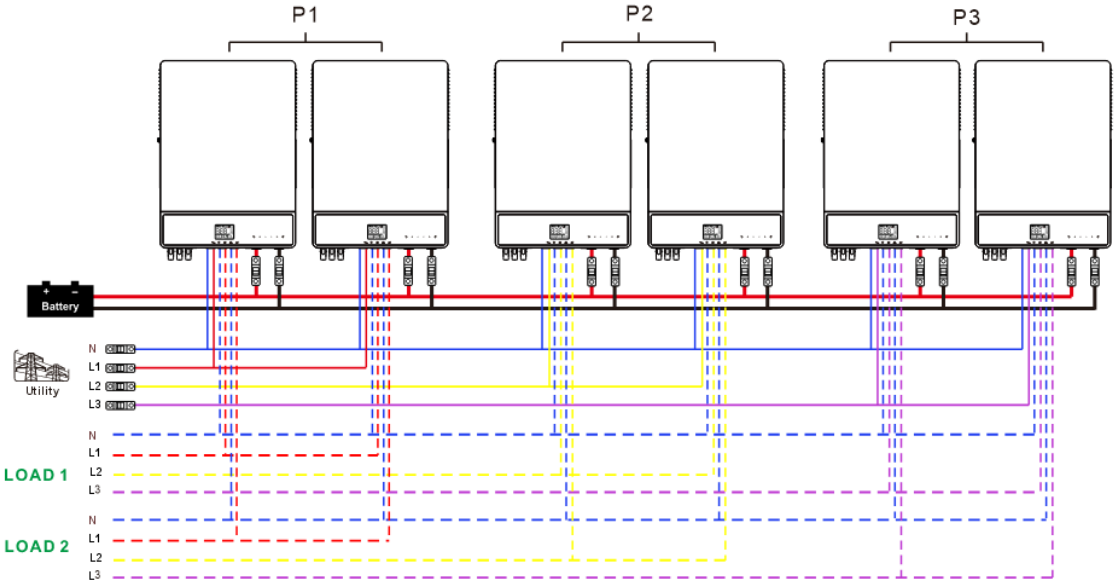
One inverter in each phase:

Power Connection



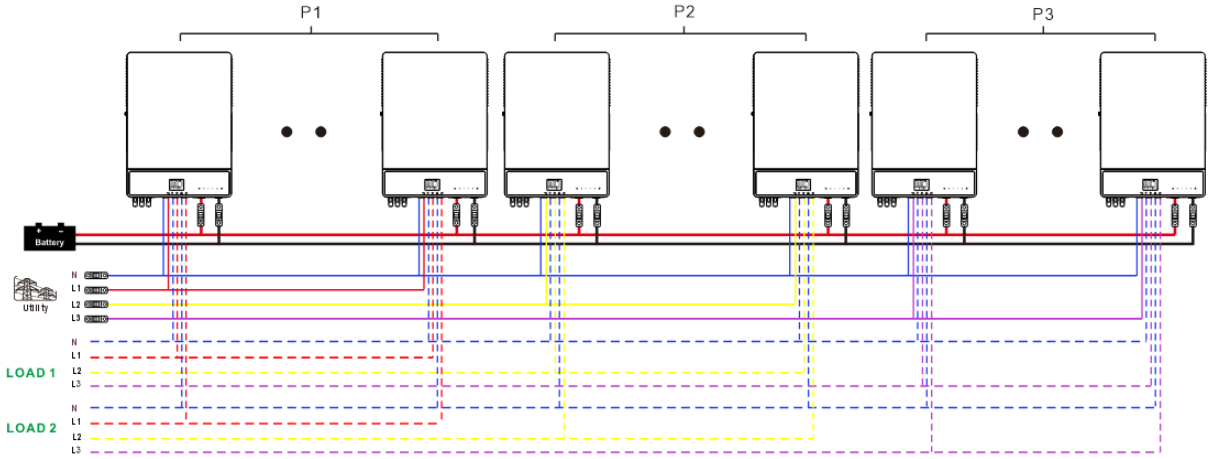
Two inverters in each parallel:

Power Connection



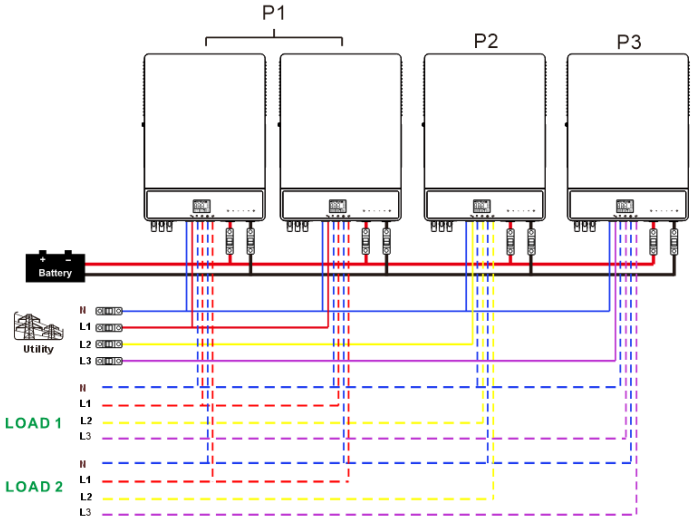
Three to four inverters in each phase:

Power Connection



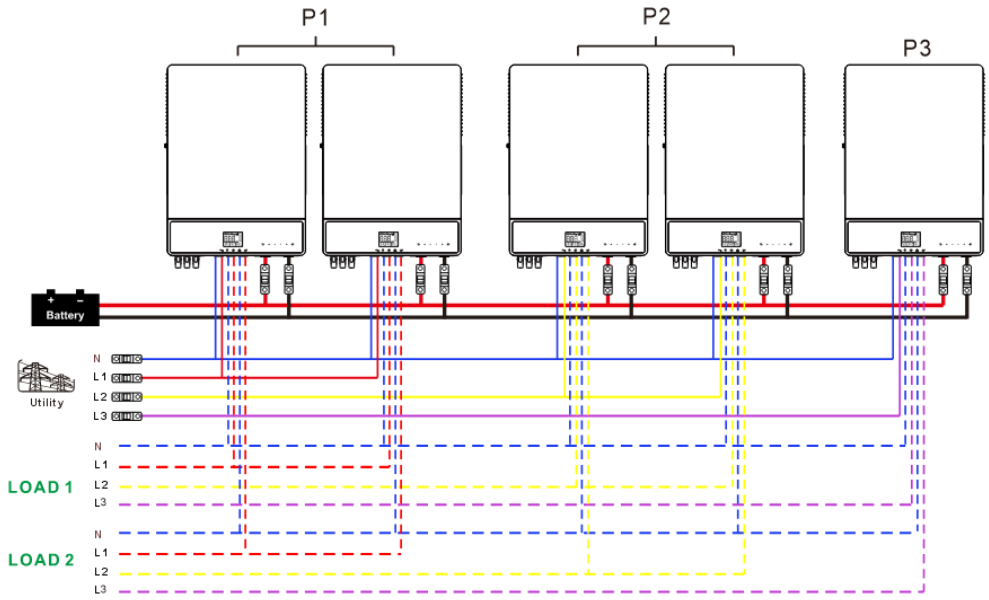
Two inverters in one phase and only one inverter for the remaining phases:

Power Connection



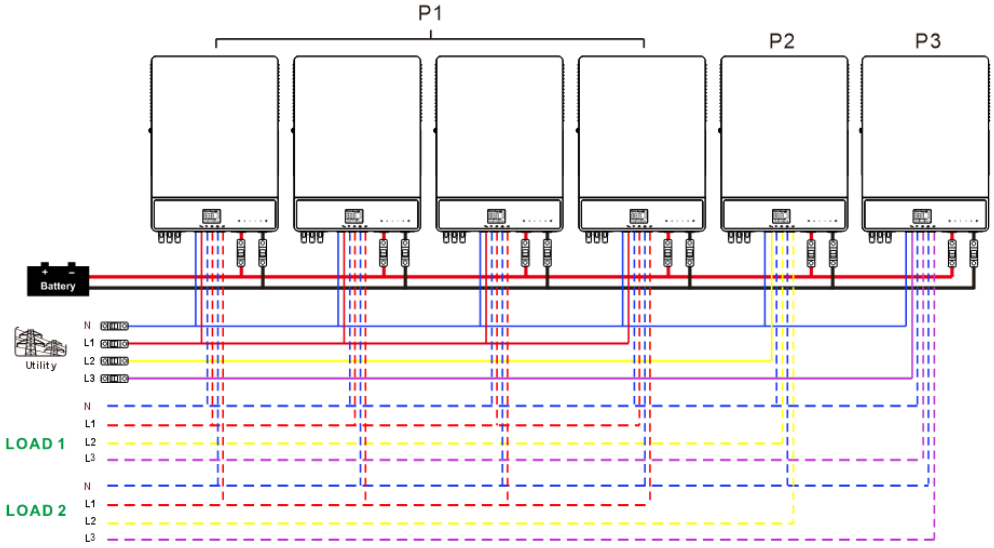
Two inverters in two phase and only one inverter for the remaining phase:

Power Connection



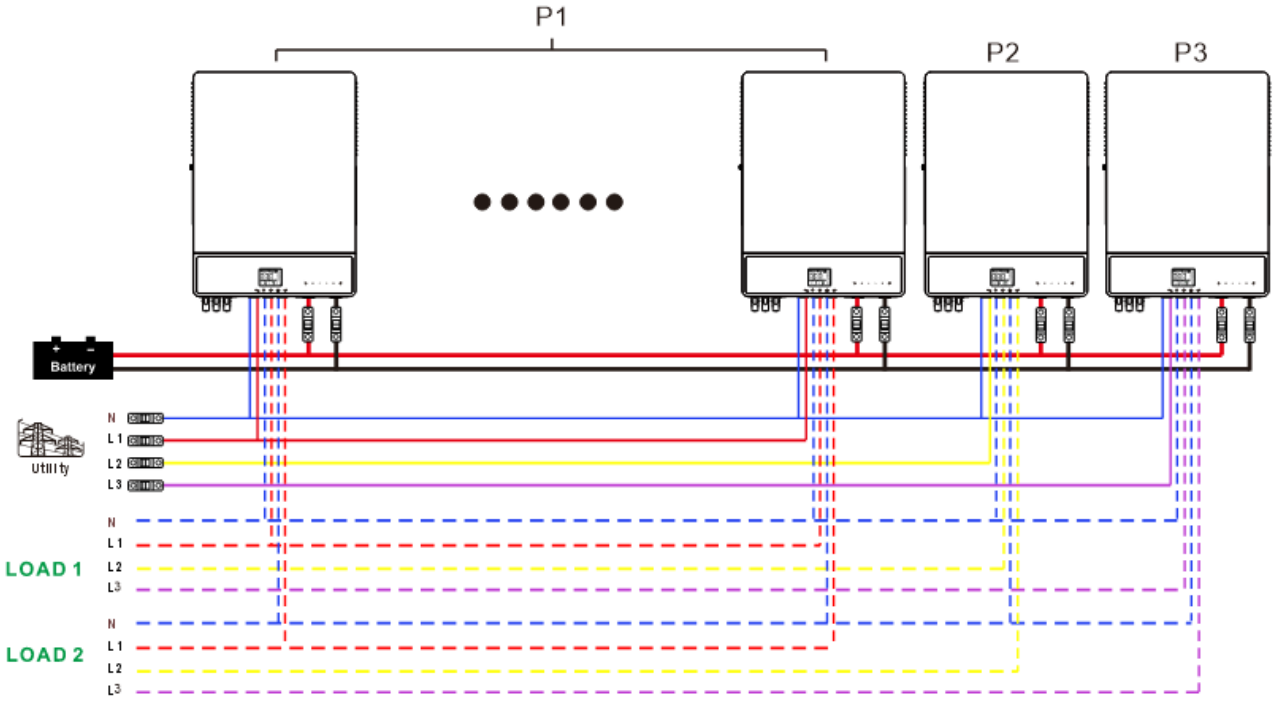
Four inverters in one phase and one inverter for the other two phases:

Power Connection



Five to ten inverters in one phase and one inverter for the other two phases:

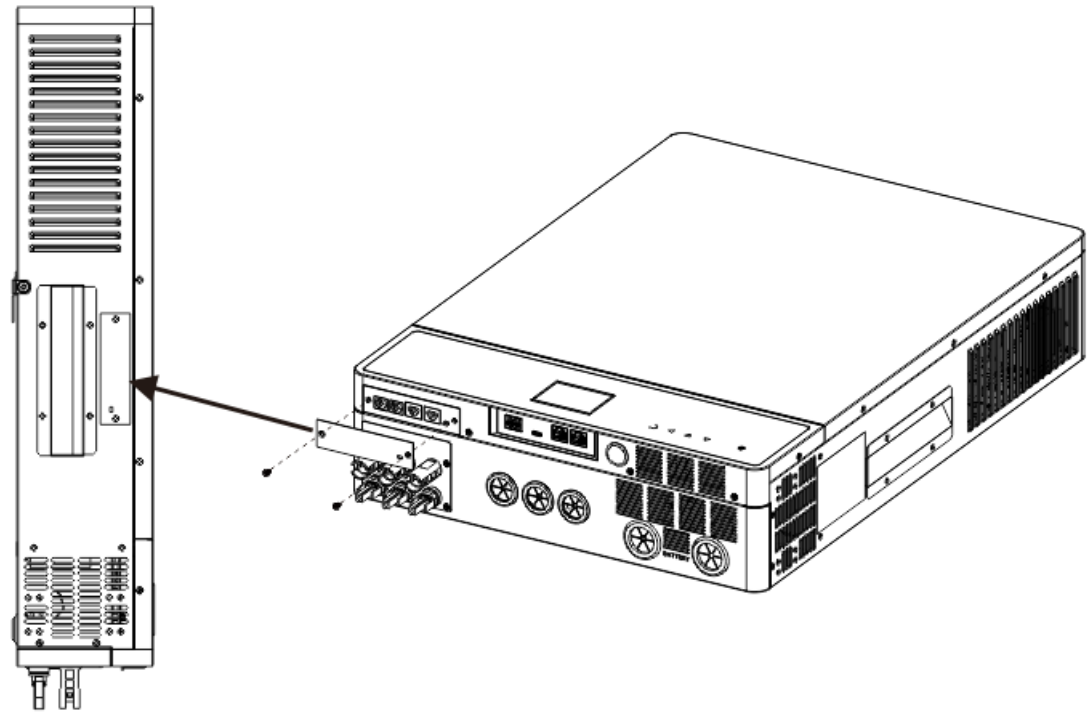
Power Connection



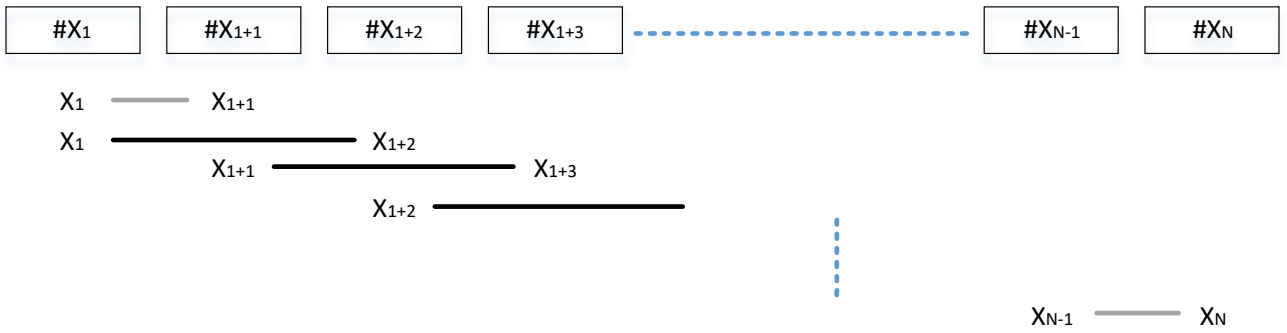
Guide for Parallel and Current Sharing Cable Connection

- When inverters are installed on the same phase, the connection method for the parallel cable and the current sharing cable is identical.
- **NEVER connect the current sharing cable between inverters operating on different phases.**

Before connecting the parallel cable, remove the two screws from the parallel port cover. To prevent loss, the cover can be secured to the designated mounting holes on the left side of the unit

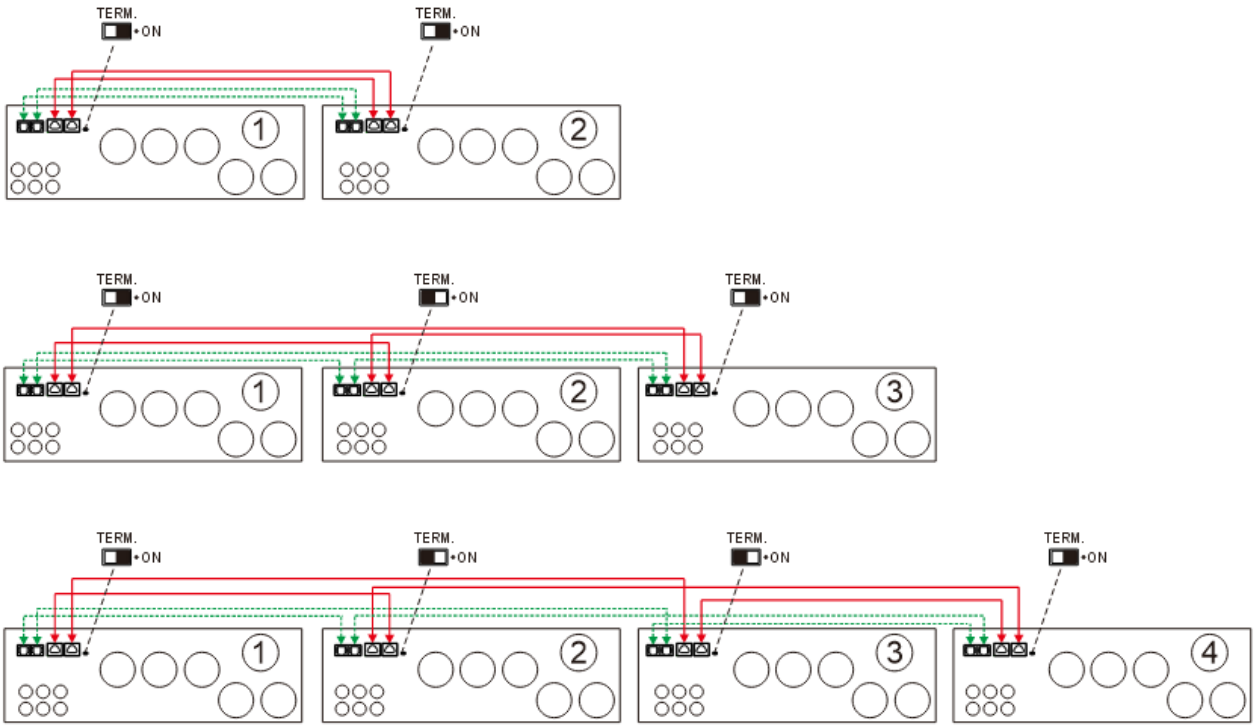


- Illustration of cable connections:



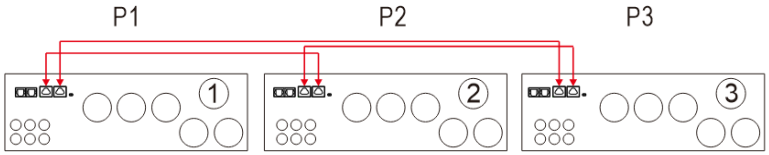
N=2	#1 - #2									
N=3	#1 - #2	#1 - #3	#2 - #3							
N=4	#1 - #2	#1 - #3	#2 - #4	#3 - #4						
N=5	#1 - #2	#1 - #3	#2 - #4	#3 - #5	#4 - #5					
N=6	#1 - #2	#1 - #3	#2 - #4	#3 - #5	#4 - #6	#5 - #6				
N=7	#1 - #2	#1 - #3	#1 - #4	#3 - #5	#4 - #6	#5 - #7	#6 - #7			
N=8	#1 - #2	#1 - #3	#2 - #4	#3 - #5	#4 - #6	#5 - #7	#6 - #8	#7 - #8		
N=9	#1 - #2	#1 - #3	#1 - #4	#3 - #5	#4 - #6	#5 - #7	#6 - #8	#7 - #9	#8 - #9	
N=10	#1 - #2	#1 - #3	#2 - #4	#3 - #5	#4 - #6	#5 - #7	#6 - #8	#7 - #9	#8 - #10	#9 - #10
N=11	#1 - #2	#1 - #3	#2 - #4	#3 - #5	#4 - #6	#5 - #7	#6 - #8	#7 - #9	#8 - #10	#9 - #11	#10 - #11
N=12	#1 - #2	#1 - #3	#2 - #4	#3 - #5	#4 - #6	#5 - #7	#6 - #8	#7 - #9	#8 - #10	#9 - #11	#10 - #12	#11 - #12

Examples of 2, 3, and 4 units paralleled in a single-phase system.

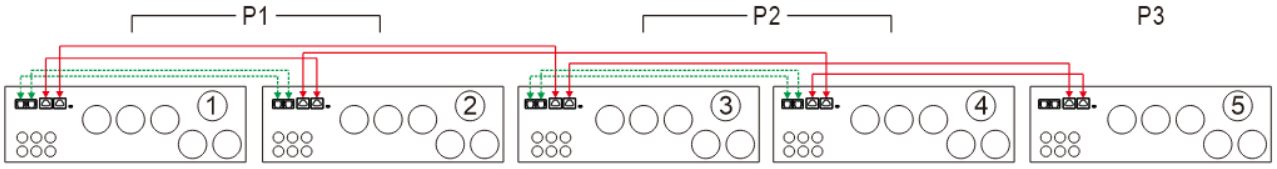


NOTE: Set the **"Terminator Selection"** toggle switch to "**ON"** on the first and last inverters. Do not enable the switch on the other inverters.

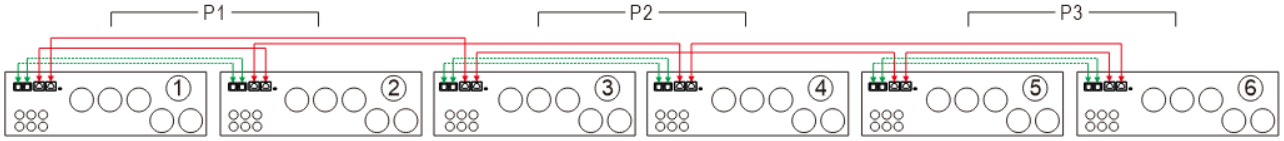
Exampe of 3, 5 and 6 units parallelled in a three phase system.
(1 unit for P1, 1 unit for P2, 1 unit for P3)



(2 units for P1, 2 units for P2, 1 unit for P3)



(2 units for P1, 2 units for P2, 2 units for P3)



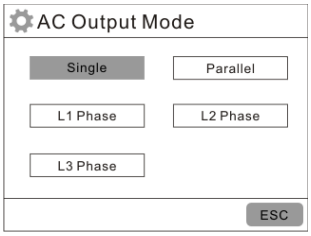
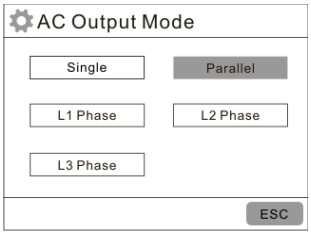
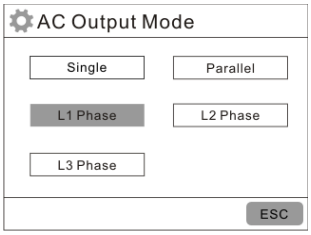
5. PV Connection

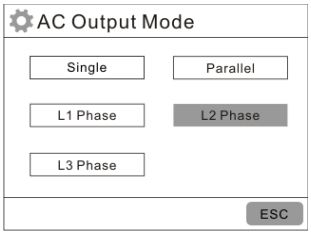
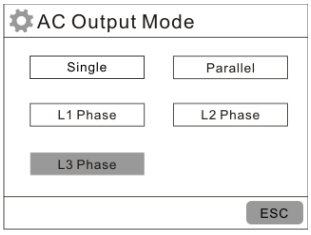
Please refer to user manual of single unit for PV Connection.

CAUTION: Each inverter should connect to PV modules separately.

6. LCD Setting and Display

Setting Program:

<table>
<tr><th>Description</th><th colspan="2">Selectable option</th></tr>
<tr><td rowspan="4">AC output mode
*This setting is able to set up only when the inverter is in standby mode. Be sure that on/off switch is in "OFF" status.</td><td>Single

</td><td>When the unit is operated alone, please select "Single"</td></tr>
<tr><td>Parallel

</td><td>When the units are used in parallel for single phase application, please select "Parallel". Please refer to 4-1 for detailed information.</td></tr>
<tr><td>L1 phase:

</td><td rowspan="3">When the units are operated in 3-phase application, please choose phase to define each inverter.
It is required to have at least 3 inverters or maximum 12 inverters to support three-phase equipment. It's required to have at least one inverter in each phase or it's up to 10 inverters in one phase. Please refers to 4-2 for detailed information.
Please select "L1 phase" for the inverters connected to L1 phase, "L2 phase" for the inverters connected to L2 phase and "L3 phase" 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.</td></tr>
<tr><td>L2 phase:

</td></tr>
<tr><td>L3 phase:

</td></tr>
</table>

Code Reference:

Description	Icon on
Unidentified unit master or slave	
Master unit	
Slave unit	
L1 phase	
L2 phase	
L3 phase	

7. Commissioning

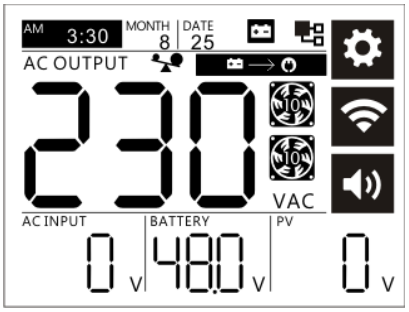
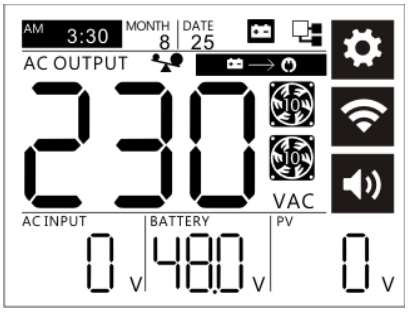
Parallel in single phase

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.

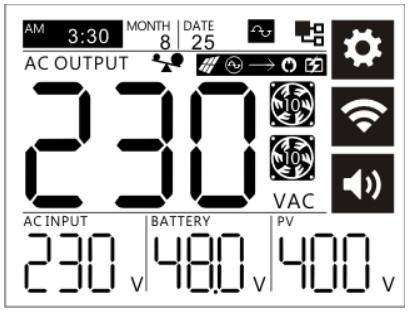
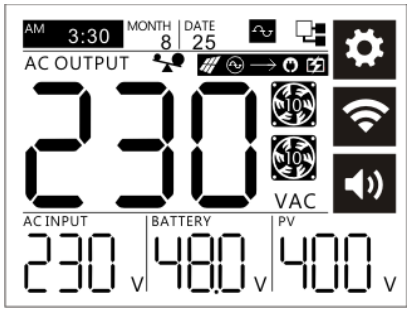
Step 2: Turn on each unit and set "PAL" in LCD setting of each unit. And then shut down all units.
NOET: It's necessary to turn off switch when setting LCD program. Otherwise, the setting cannot be programmed.

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

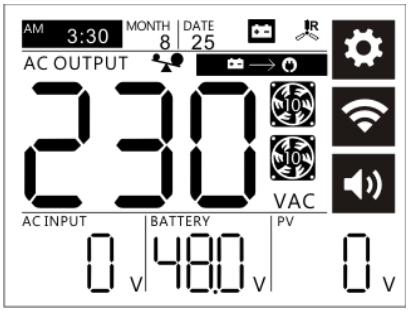
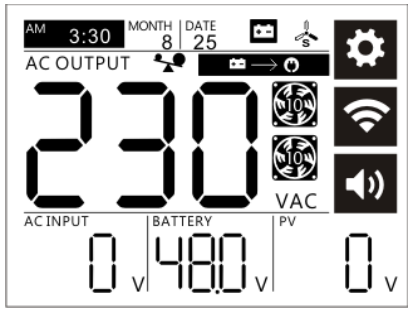
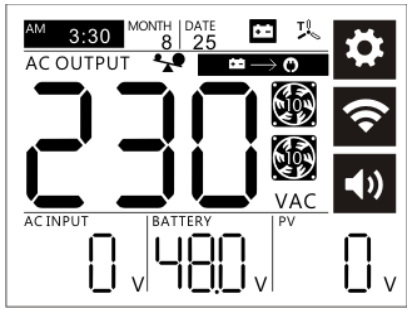
Step 1: Check the following requirements before commissioning:

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

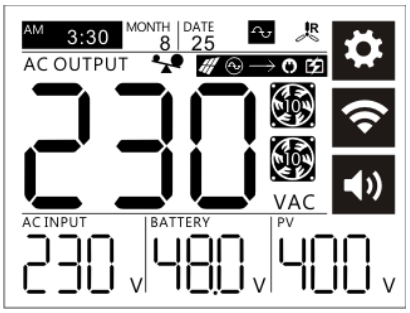
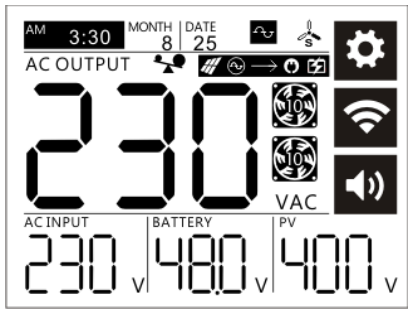
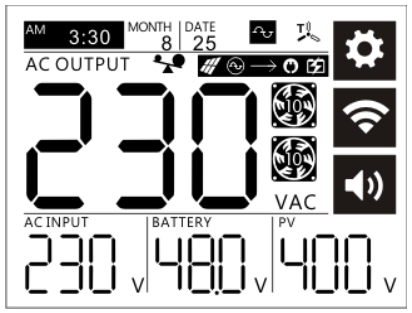
Step 2: Turn on all units and configure AC output mode as P1, P2 and P3 sequentially. And then shut down all units.

NOET: It's necessary to turn off switch when setting LCD program. Otherwise, the setting cannot 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, 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.

Appendix II: BMS Communication Installation

1. Introduction

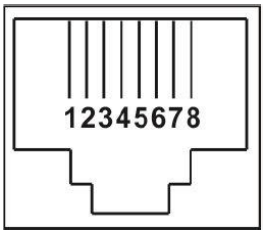
If connecting to lithium battery, it is recommended to purchase a custom-made RJ45 communication cable. Please check with your dealer or integrator for details.

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.

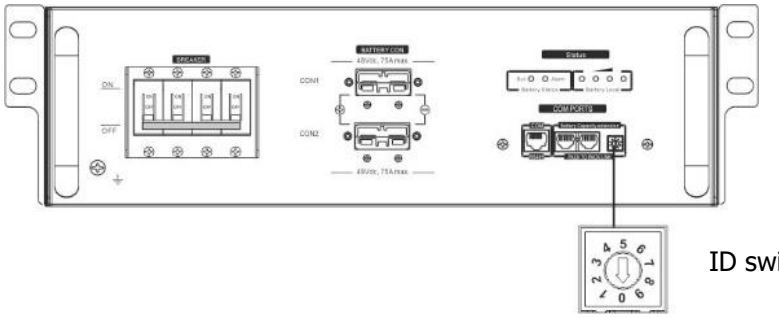
2. Pin Assignment for BMS Communication Port

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

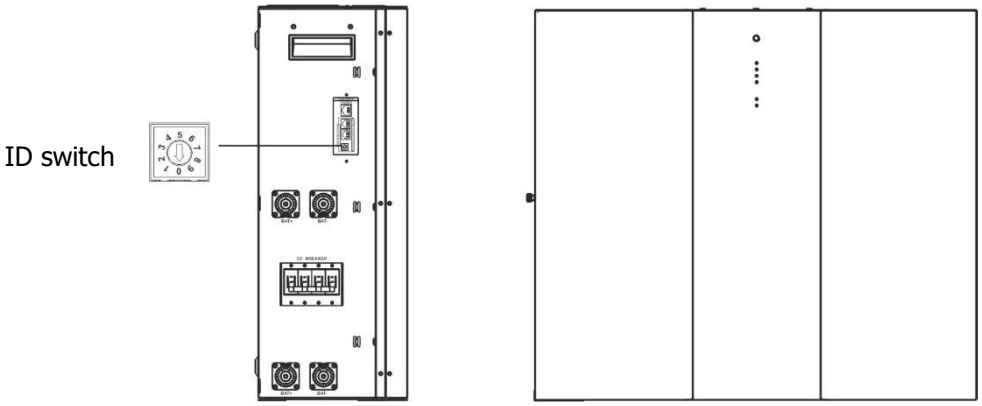


1. Lithium Battery Communication Configuration

LIO-4810-150A

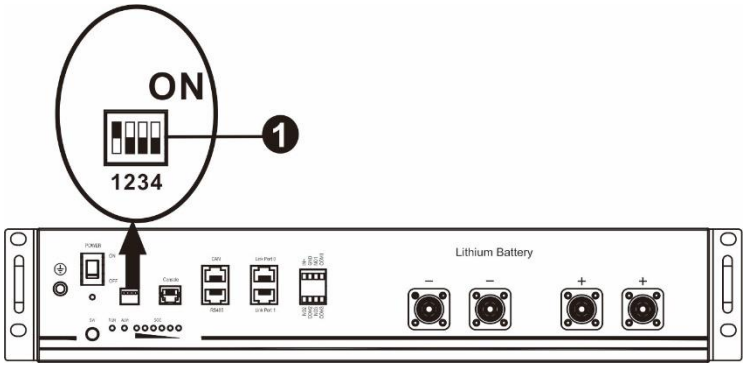


ESS LIO-I 4810



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



①Dip 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 reserved for 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 required to set up master battery with this setting and slave batteries are unrestricted.
	1	0	0	Multiple group condition. It's required 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 required 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 required 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 required to set up master battery on the fourth group with this setting and slave batteries are unrestricted.
	1	0	1	Multiple group condition. It's required to set up master battery on the fifth group with this setting and slave batteries are unrestricted.

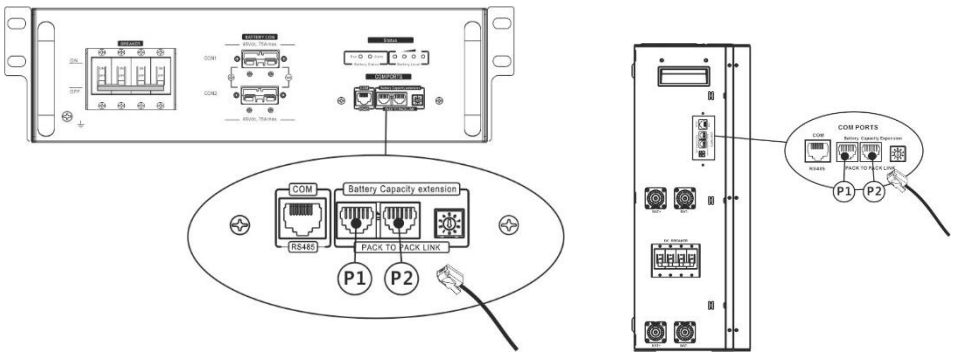
NOTE: The maximum groups of lithium battery is 5 and for maximum number for each group, please check with battery manufacturer.

2. Installation and Operation

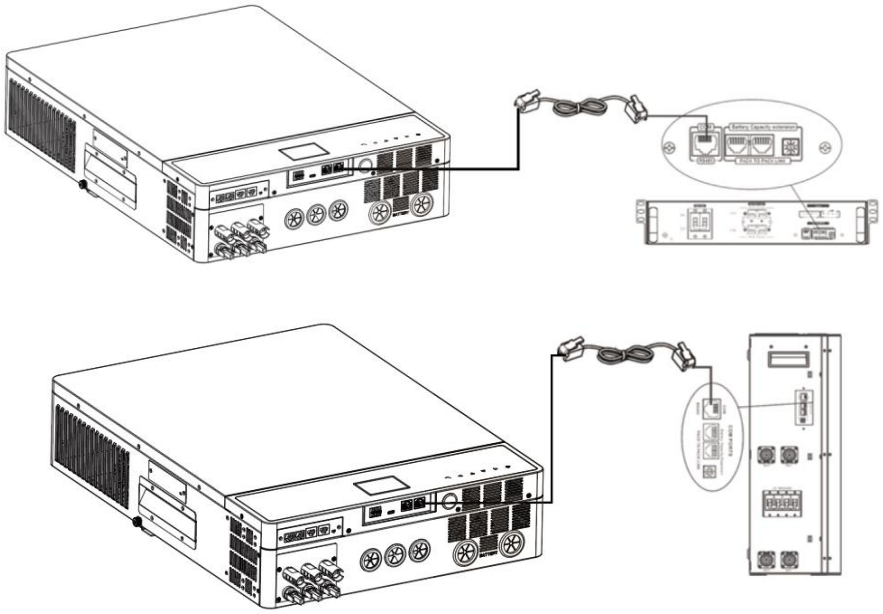
LIO-4810-150A/ESS LIO-I 4810

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.

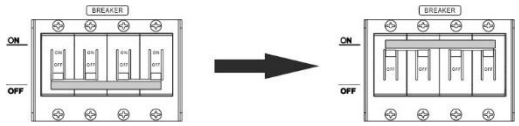


*** For multiple battery connection, please check battery manual for the details.**

Note for parallel system:

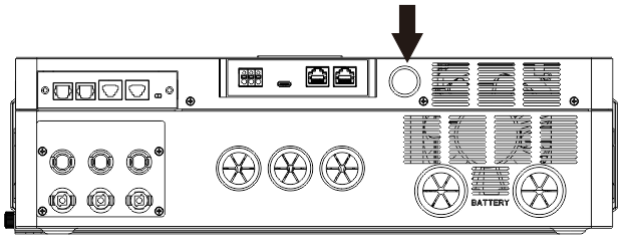
1. Only support common battery installation.
2. Use custom-made RJ45 cable to connect any inverter (no need to connect to a specific inverter) and Lithium battery. Simply set this inverter battery type to "LIB" in LCD Battery type. Others should be "USE".

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

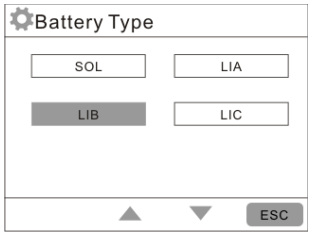


Step 4: Press Power on/off button on battery module for 5 secs, the battery module will start up.
*If the manual button cannot be approached, just simply turn on the inverter module. The battery module will be automatically turned on.

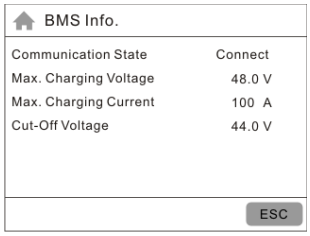
Step 5: Turn on the inverter.



Step 6. Be sure to select battery type as “LIB” in LCD Battery type.



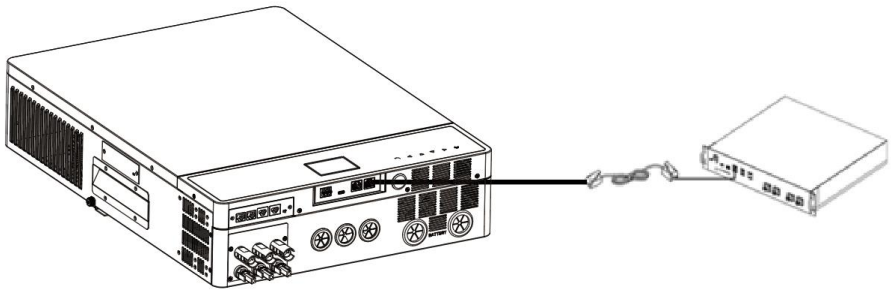
If communication between the inverter and battery is successful, the communication status will show “Connect” in the BMS Info. Please note that establishing this connection typically requires at least one minute.



PYLONTECH

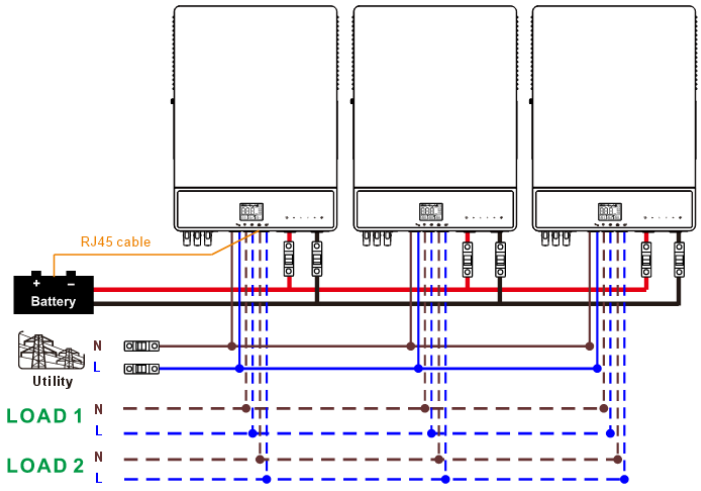
After configuration, please install LCD panel with inverter and Lithium battery with the following steps.

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

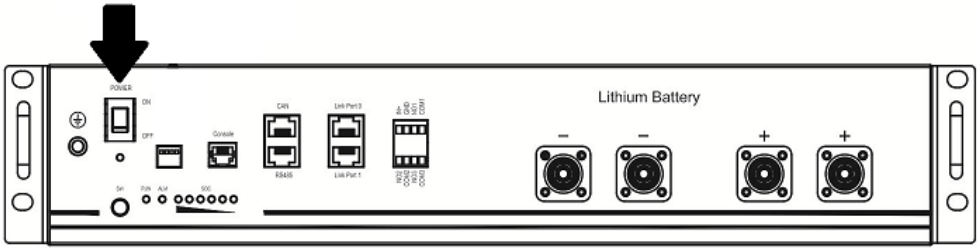


Note for parallel system:

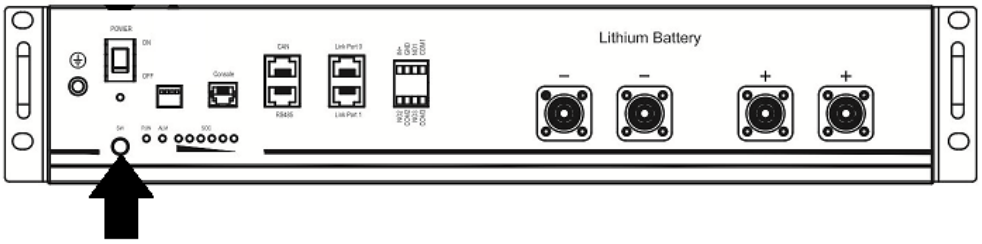
1. Only support common battery installation.
2. Use custom-made RJ45 cable to connect any inverter (no need to connect to a specific inverter) and Lithium battery. Simply set this inverter battery type to “PYL” in LCD Battery type. Others should be “USE”.



Step 2. Switch on Lithium battery.

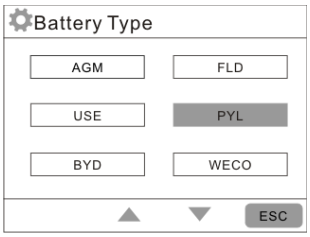


Step 3. Press more than three seconds to start Lithium battery, power output ready.

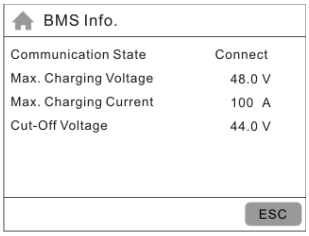


Step 4. Turn on the inverter.

Step 5. Be sure to select battery type as "PYL".



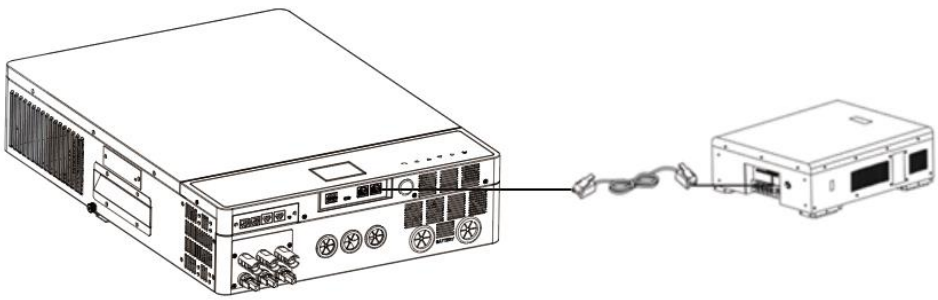
If communication between the inverter and battery is successful, the communication status will show "Connect" in the BMS Info. Please note that establishing this connection typically requires at least one minute.



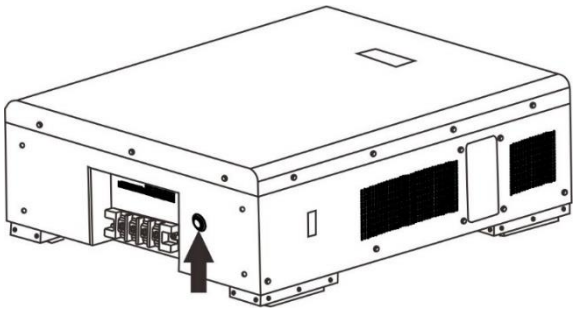
This function is to activate lithium battery automatically while commissioning. After battery wiring and commissioning is successfully, if battery is not detected, the inverter will automatically activate battery if the inverter is powered on.

WECO

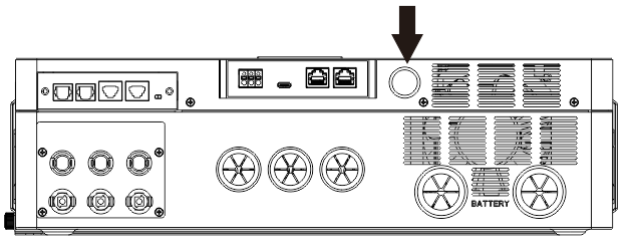
Step 1. Use a custom-made RJ45 cable to connect inverter and Lithium battery.



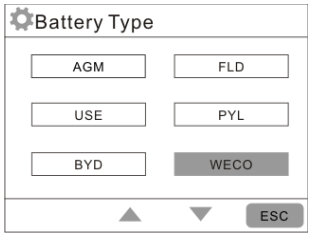
Step 2. Switch on Lithium battery.



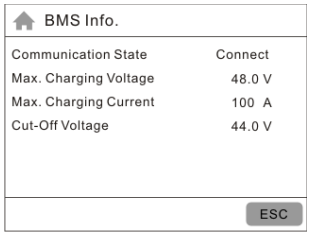
Step 3. Turn on the inverter.



Step 4. Be sure to select battery type as "WECO".

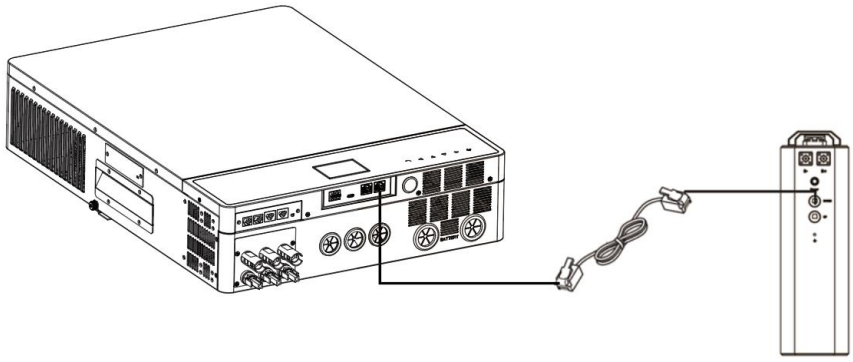


If communication between the inverter and battery is successful, the communication status will show "Connect" in the BMS Info. Please note that establishing this connection typically requires at least one minute.

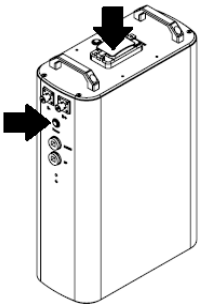


SOLTARO

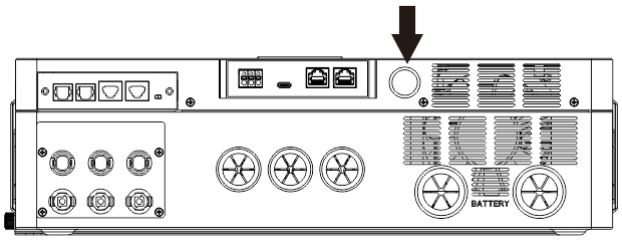
Step 1. Use a custom-made RJ45 cable to connect inverter and Lithium battery.



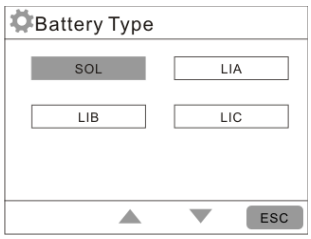
Step 2. Open DC isolator and switch on Lithium battery.



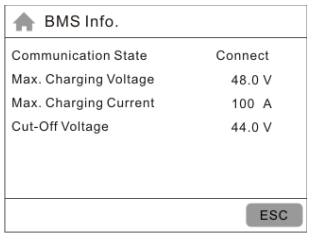
Step 3. Turn on the inverter.



Step 4. Be sure to select battery type as "SOL".



If communication between the inverter and battery is successful, the communication status will show "Connect" in the BMS Info. Please note that establishing this connection typically requires at least one minute.



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

Event Code	Description
W10	BMS communication lost (This warning is active only when the battery type is configured as Lithium-Ion) ● Initial Connection: If no communication signal is detected within 3 minutes of battery connection, the buzzer will sound. If the loss persists for 10 minutes, the inverter will suspend all charging and discharging to protect the battery. ● Operational Interruption: If communication is lost after a successful initial connection, the buzzer will alarm immediately.
W16	If the Battery Management System (BMS) flags a status that prohibits active charging or discharging, the inverter will display W16 and immediately suspend all battery operations.
W17	If the BMS transmits a "charge prohibited" command, the inverter will display W17 and immediately suspend all charging operations.
W18	If the BMS transmits a "discharge prohibited" command, the inverter will display W18 and immediately suspend all discharging operations.
W19	When the BMS detects a critically low state of charge (SOC) or voltage level, it will transmit a "mandatory charge" command. The inverter will display W19 and prioritize charging the battery to prevent cell damage from over-discharge.

Appendix III: The Wi-Fi Operation Guide

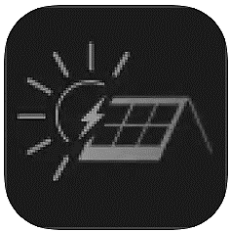
1. Introduction

By integrating the Wi-Fi module with the Energy-Mate App, users can achieve comprehensive remote monitoring and control of their inverter systems. The App leverages dedicated Wi-Fi connectivity to provide cloud-based data services, enabling users to monitor daily performance, query real-time device parameters, and execute remote commands. This interface simplifies device management and ensures optimal system oversight from any location. The Energy-Mate App is compatible with both iOS and Android platforms.

2. Energy-Mate App

2-1. Download and install APP

Please find "Energy-Mate" 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 Energy-Mate App.

(Android system)

(iOS system)

2-2. Initial Setup

You can choose local Wi-Fi or Bluetooth to configure the Wi-Fi module network through Energy-mate APP.

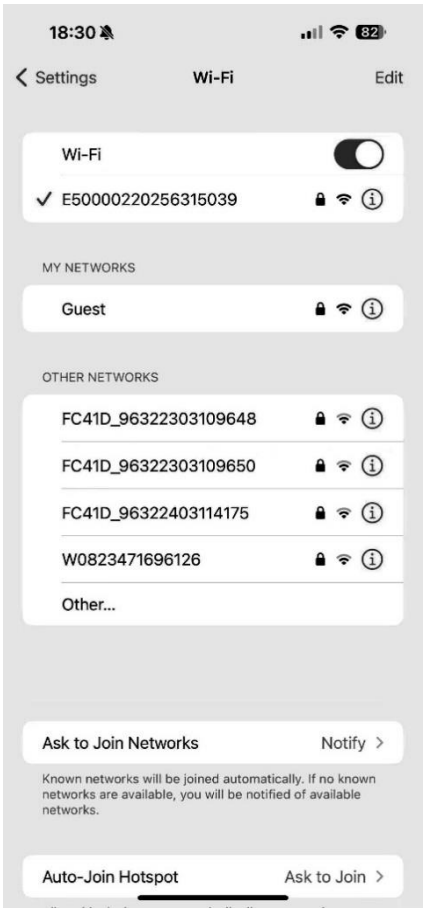
Local Wi-Fi Configuration

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

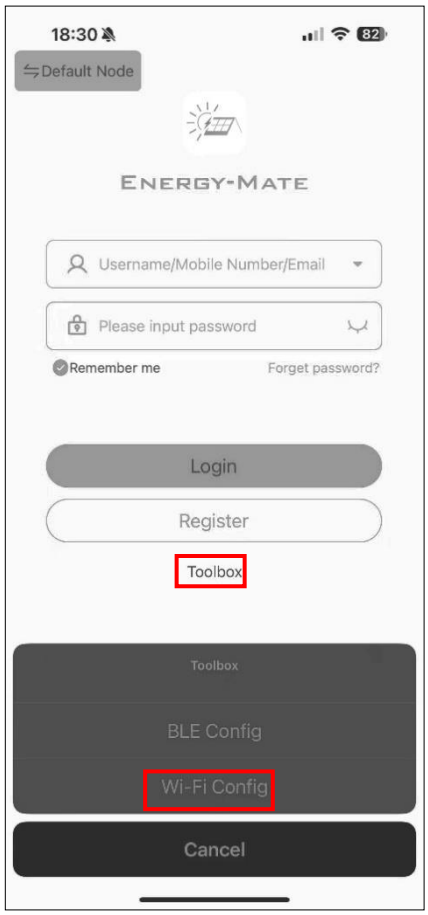
- Turn on the unit.
- Open the Wi-Fi settings from your smart phone.
- Connect your smart phone to the Wi-Fi module. The Wi-Fi module PN number is 18 digits.
- Default password for the Wi-Fi module is: 12345678.



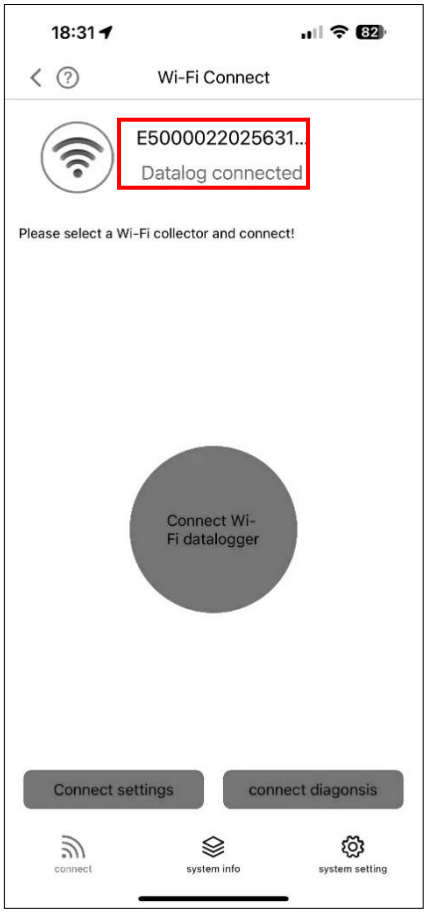
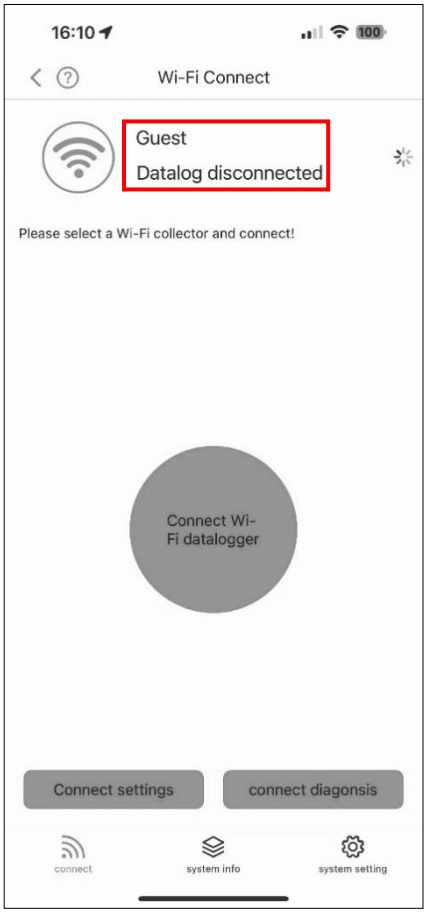




- Once the Wi-Fi connection is successful, click the Energy-Mate APP installed in the phone to enter the login page. Then, click the "Toolbox" and choose "Wi-Fi Config" to enter the Wi-Fi configuration page.

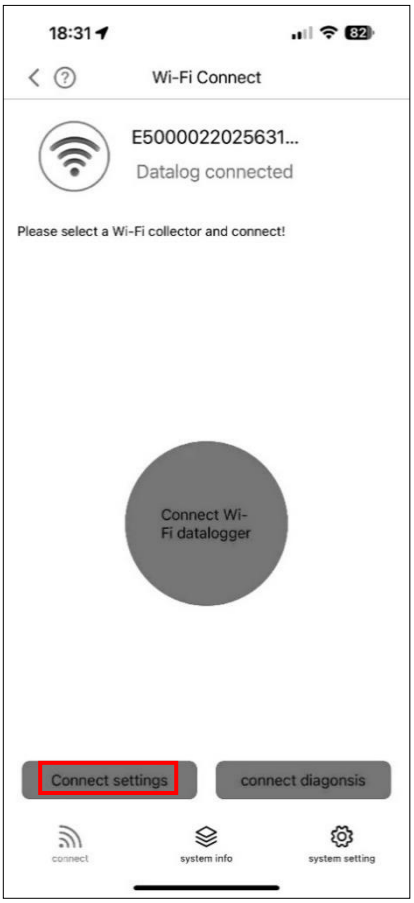


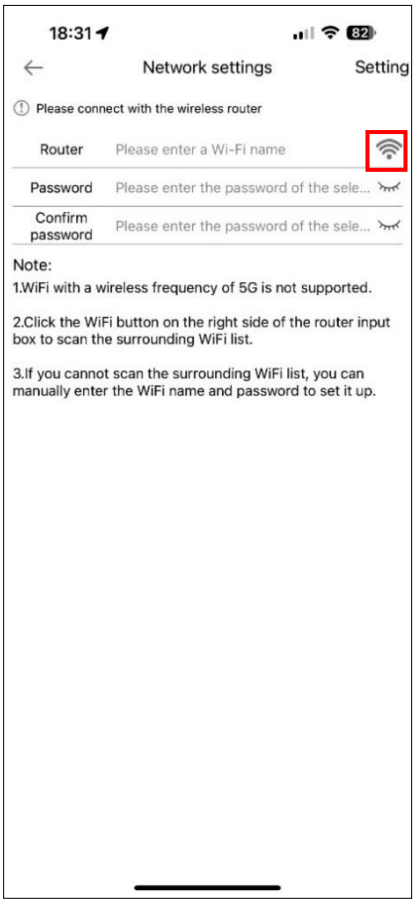
- After entering the Wi-Fi configuration page, please note that the connected Wi-Fi name **must** be the **same as your Wi-Fi module PN number**, and the status **must** be **connected**. If not, please return to the login page, connect your smart phone to the Wi-Fi module, and re-enter the Wi-Fi configuration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

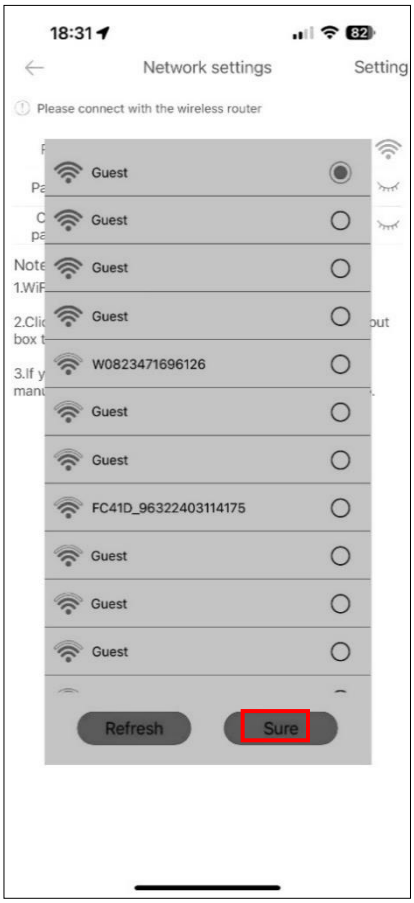
The Wi-Fi module connection is **successfully**	The Wi-Fi module connection **failed**
You can proceed to the next step to configure the network. 	Please return to the login page, connect your smart phone to the Wi-Fi module, and re-enter the Wi-Fi configuration page. 

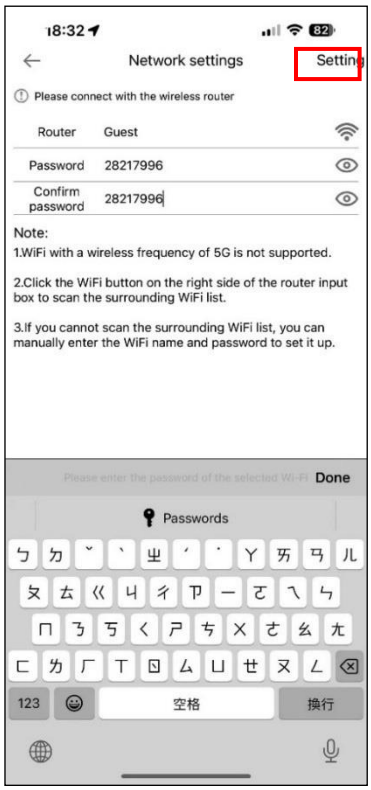
- Click "Connect settings" to manually enter the router name or click  to choose the router name. Then, enter the router password and click the "Setting" to complete the setting.

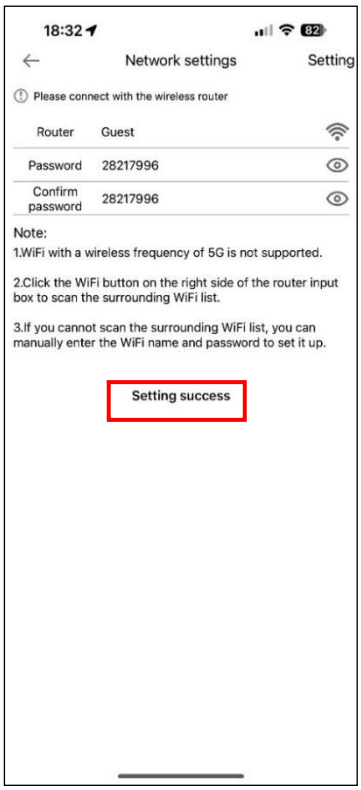
  The Wi-Fi module only could connect the router at **2.4GHz**.



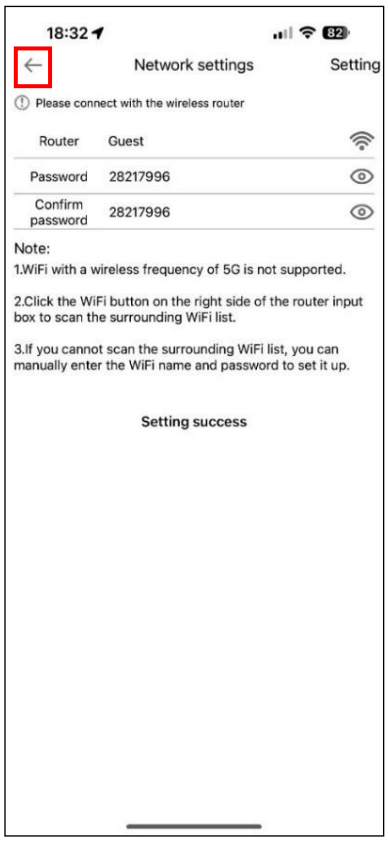


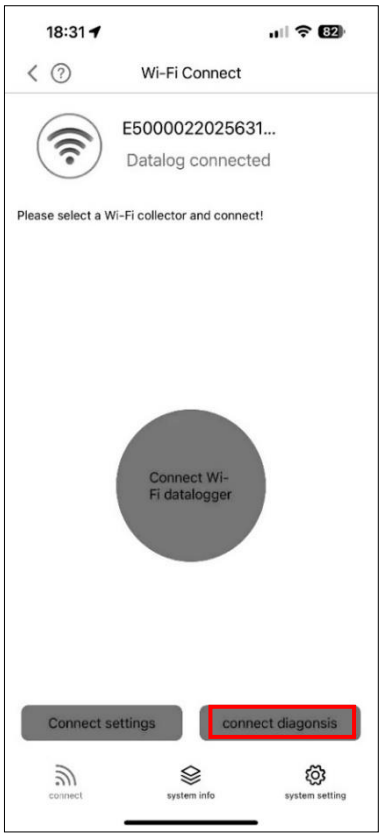


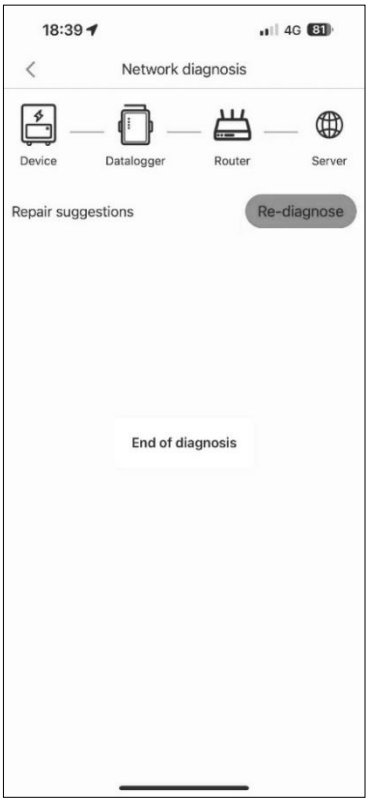
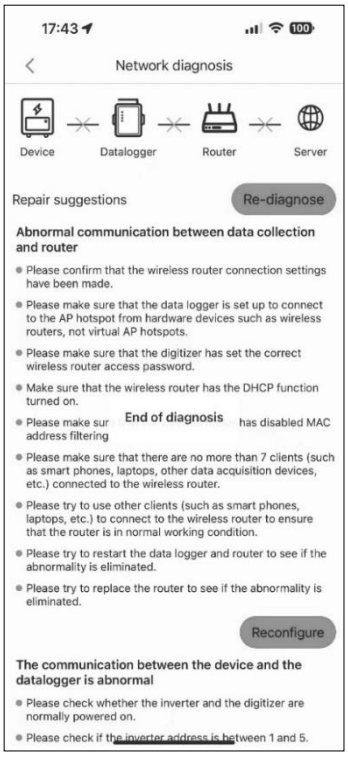




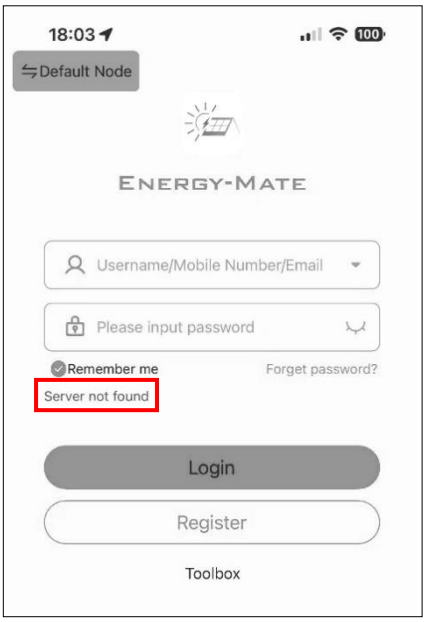
- Click  to return to the Wi-Fi configuration page. Click "Connect diagnosis" to check the connection status.





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. 

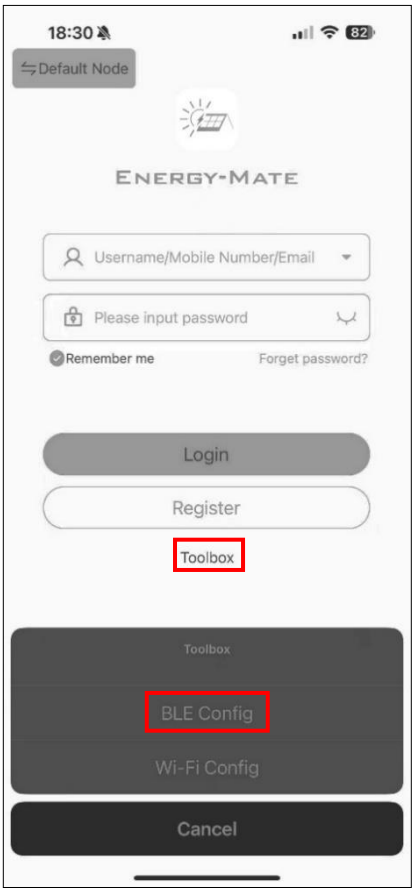
- After Wi-Fi configuration, please **forget** the Wi-Fi module of the Wi-Fi connection on the smartphone to avoid automatic connection and unable to access the network. The login page will prompt "Server not found".



Bluetooth Configuration

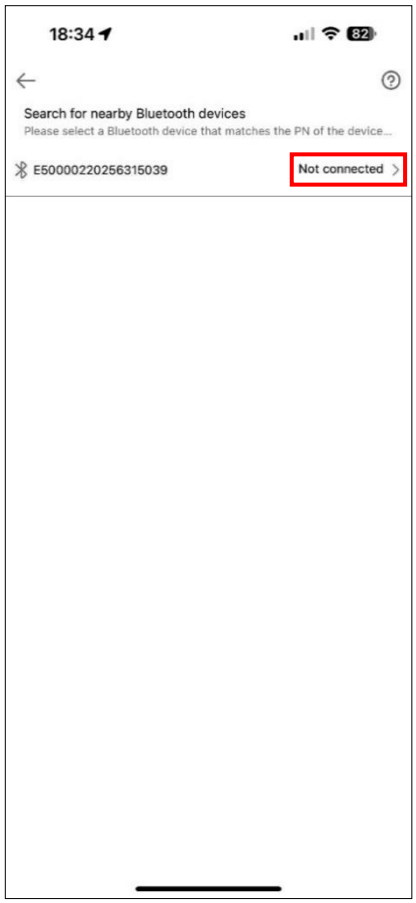
If you have configured the network through Wi-Fi, please skip this section.

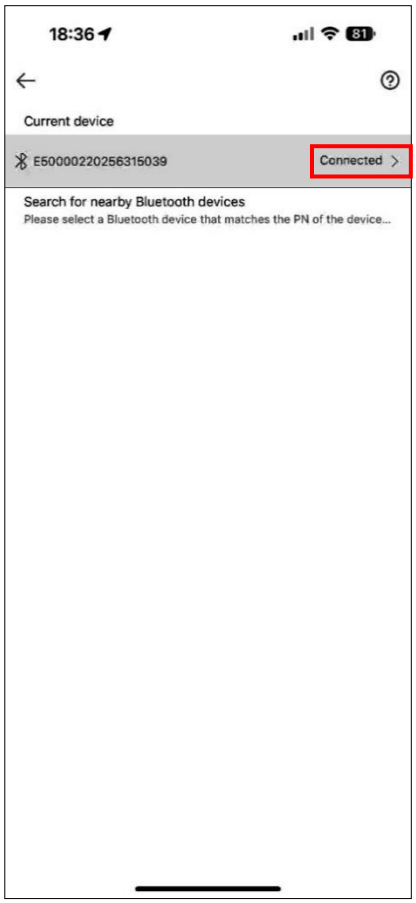
- Turn on the unit.
- Open the Bluetooth from your smart phone.
- Click the Energy-Mate APP installed in the phone to enter the login page. Then, click the "Toolbox" and choose "BLE Config" to enter the Bluetooth configuration page.





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



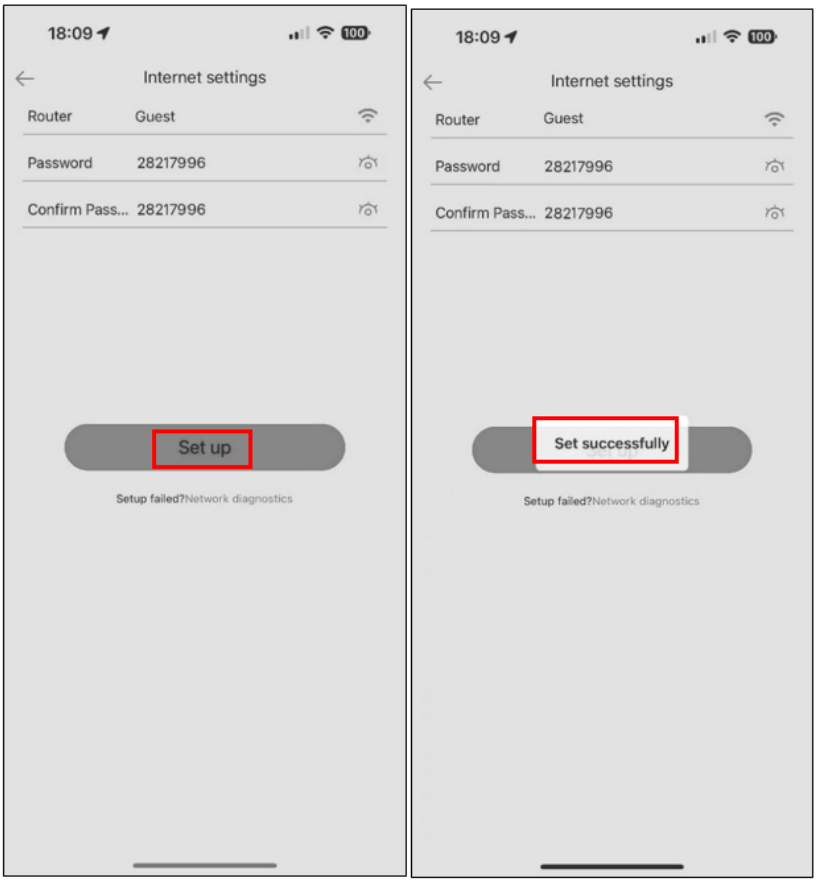


- Manually enter the router name or click  to choose the router name, enter the router password, and then click the "Setting" to complete the setting.

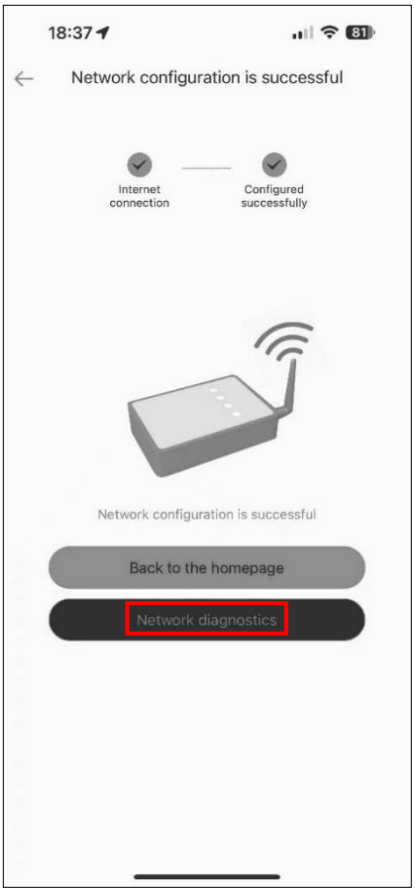
  The Wi-Fi module only could connect the router at **2.4GHz**.

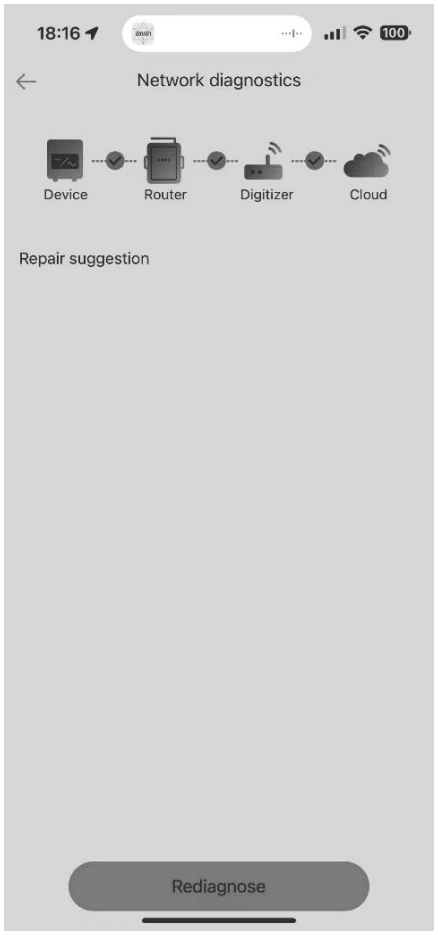
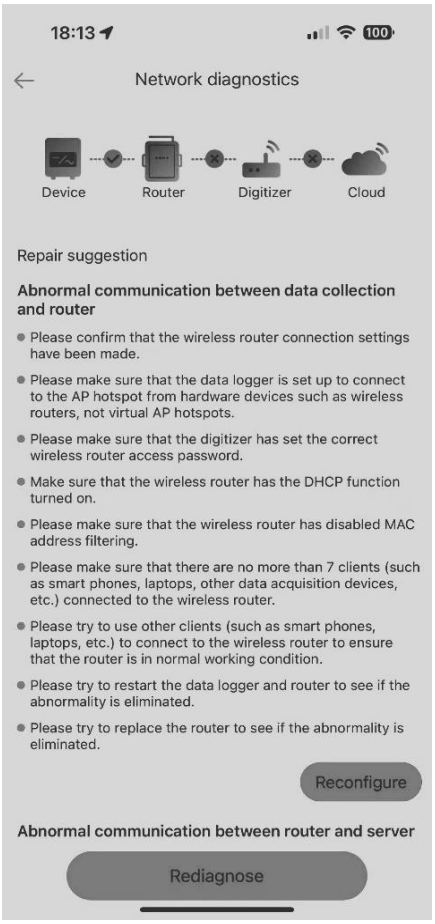




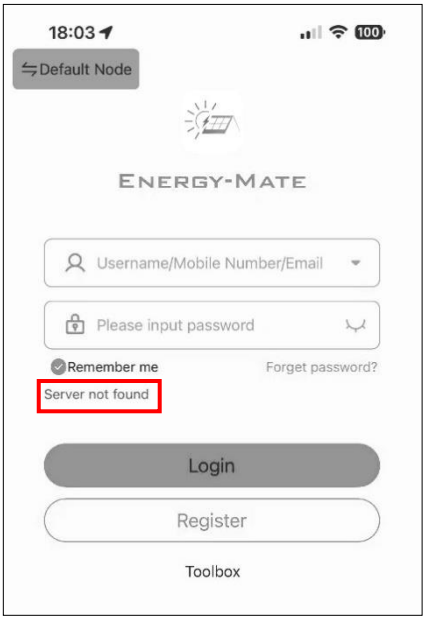


- Click “Network diagnosis” to check the connection status.



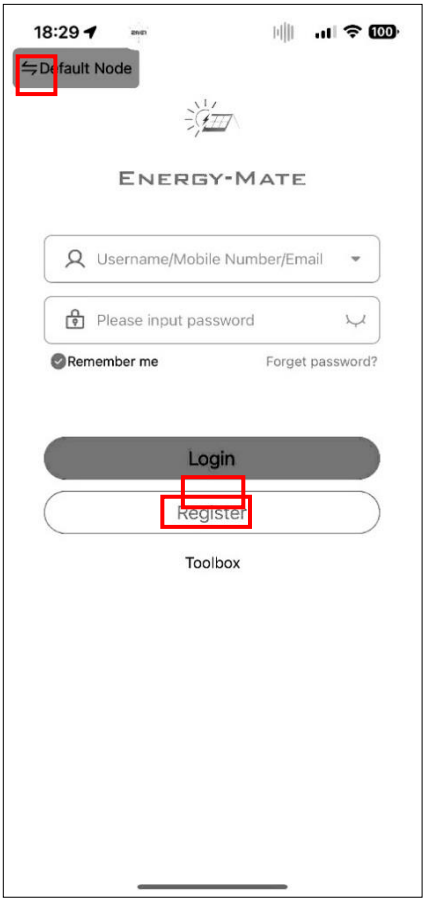
The configuration is **successfully**	The configuration **failed**
Green lines between device, data logger, router, and server. 	Red crosses between device, data logger, router, and server. Please refer to APP instructions to reconfigure. 

- After Bluetooth configuration, please **disconnect** the Wi-Fi module of the Bluetooth connection on the smartphone to avoid automatic connection and unable to access the network. The login page will prompt "Server not found".

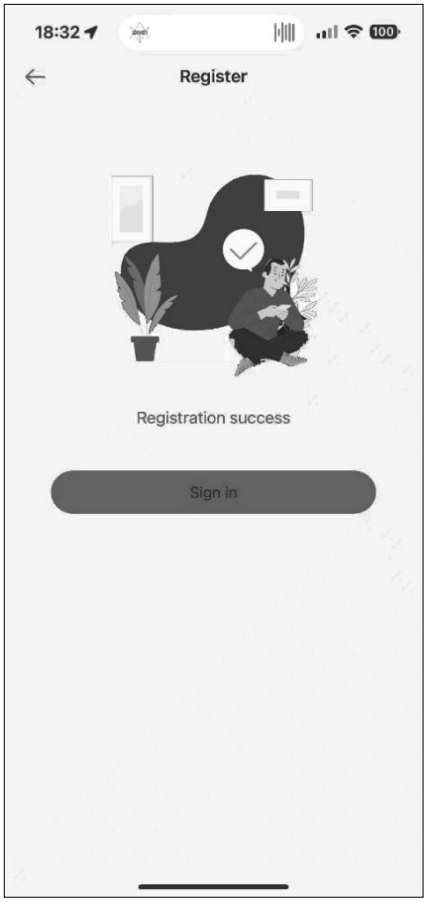


2-3 Registration and login

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







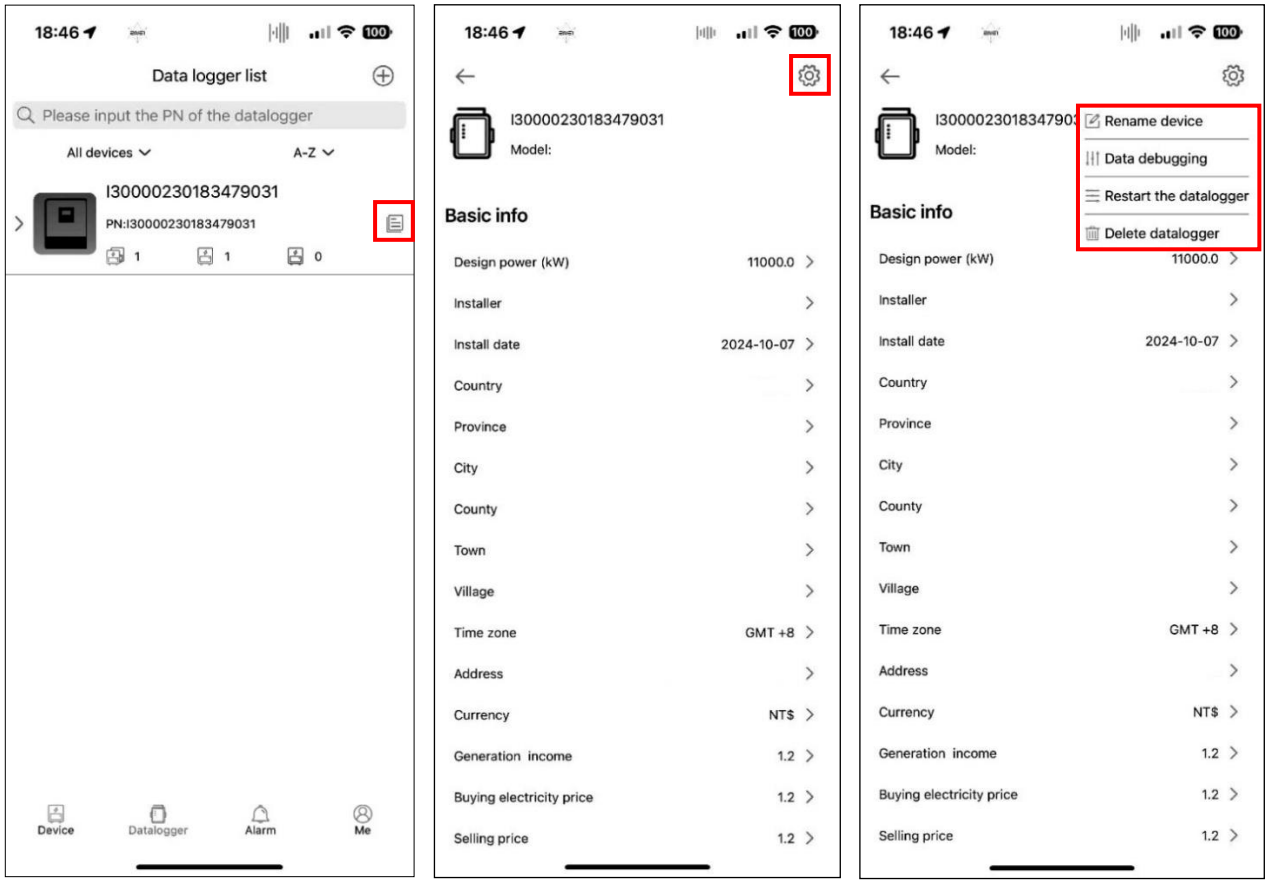
2-4 Datalogger

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



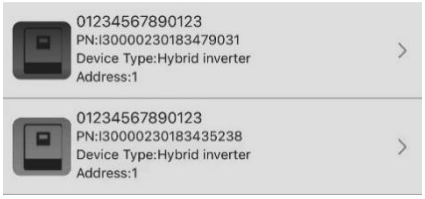
- Click  to see the Wi-Fi module information.
- Click  to rename device, data debugging, restart the datalogger, and delete datalogger.

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

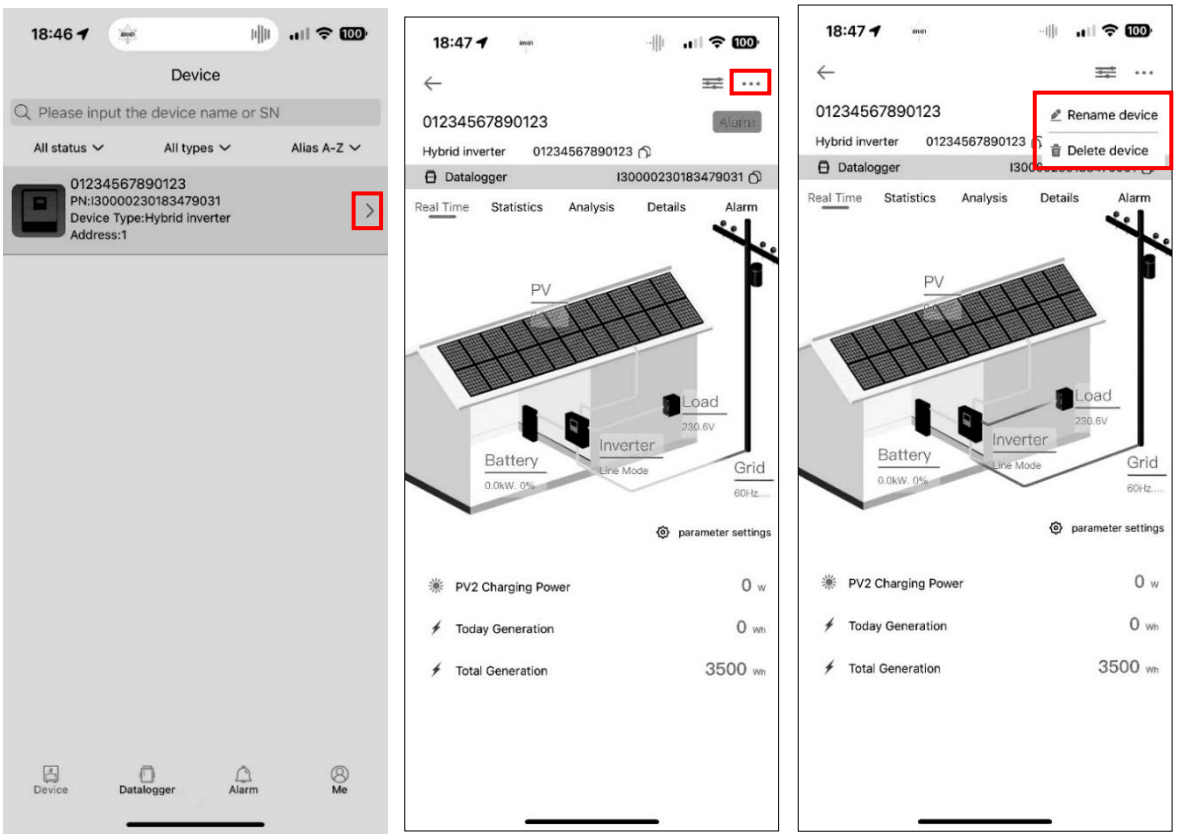


2-5 Device

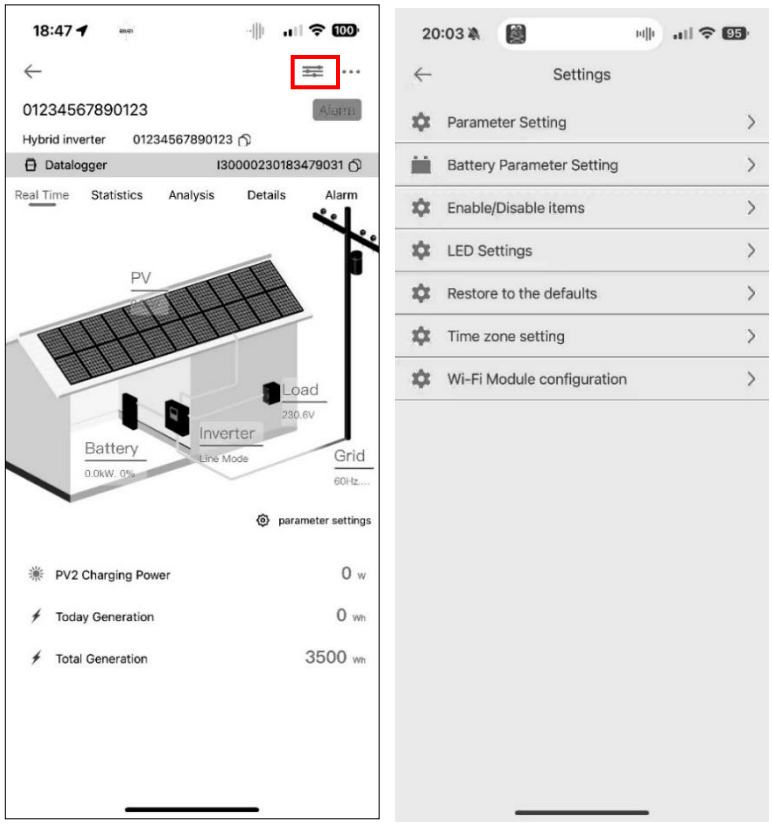
- Choose Device page to see the inverter list.
  - Gray icon means inverter is offline.
  - Green icon means inverter is online and no warnings and faults.
  - Yellow icon means inverter is online and has a warning.
  - Red icon means inverter is online and has a fault.



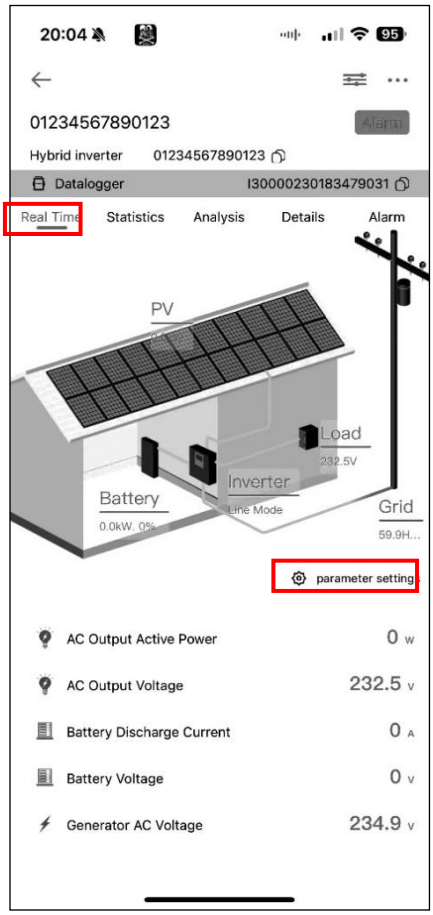
- Click  to see the inverter information.
- Click  to rename device and delete device.
  - Rename device: rename the inverter name.
  - Delete device: delete the inverter. The Wi-Fi module information in the datalogger page will **not be deleted**. Even if deleted, you **cannot** add Wi-Fi module under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

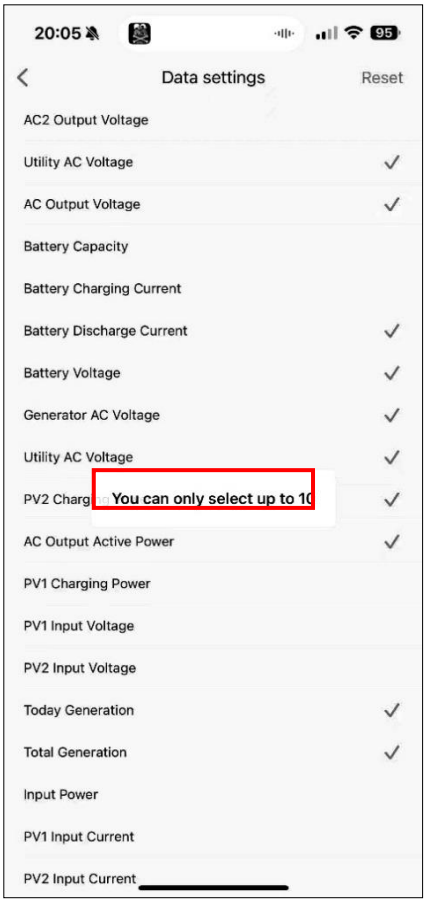


- Click  to enter setting parameters page. The setting items on the parameter page will be different based on different models.



- Click "Real Time" 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**.





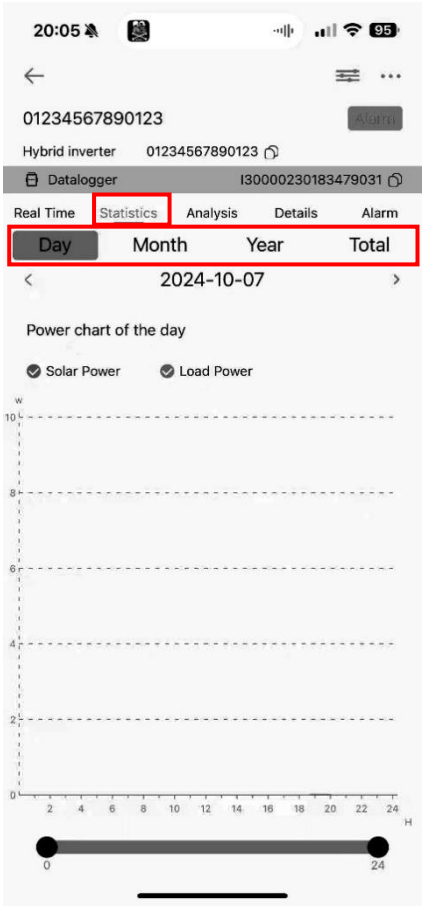
- Click "Statistics" to see the inverter solar power per hour, day, month and year.

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

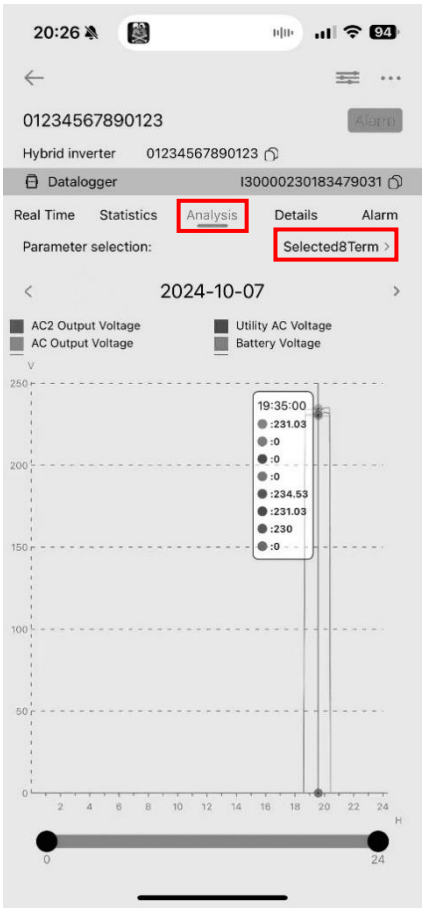
  Month: Click the button to query the daily power generation data of the current month.

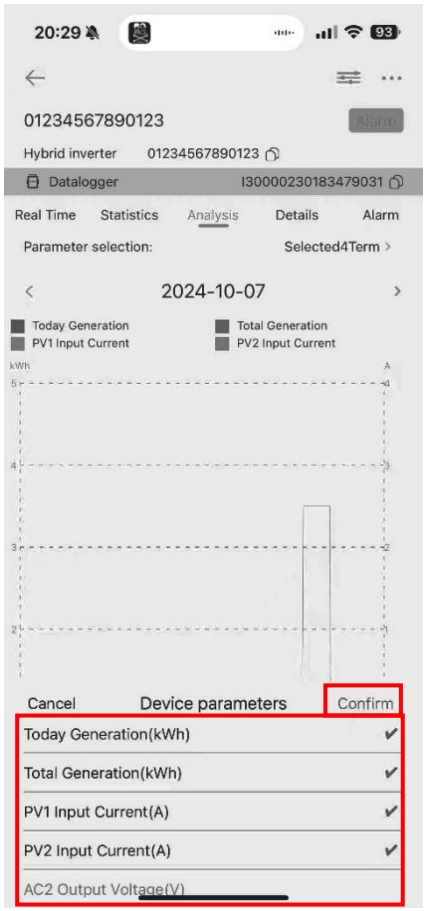
  Year: Click the button to query the monthly power generation data of the current year.

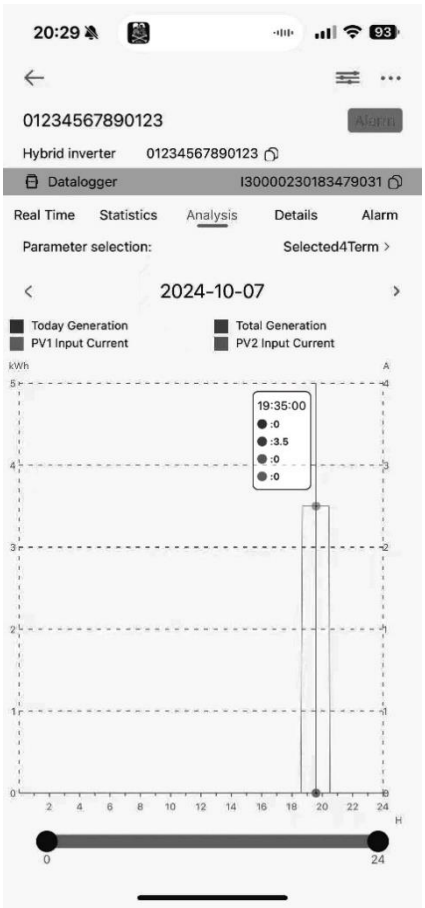
  Total: Click the button to query the annual power generation data.



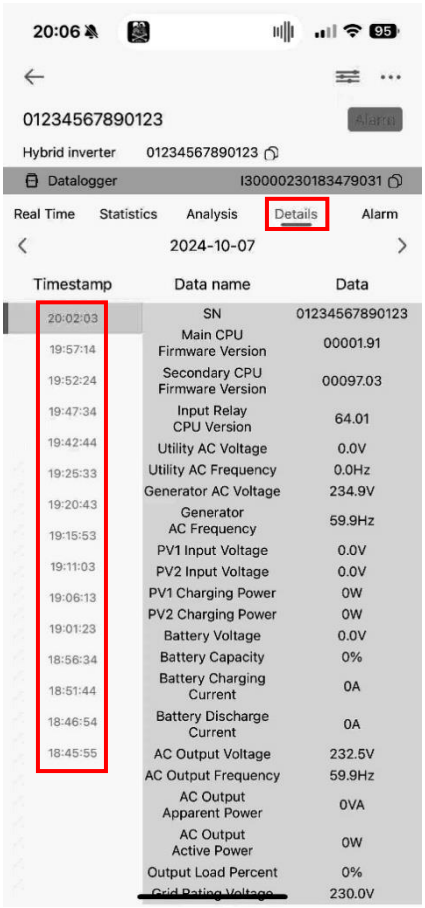
- Click "Analysis" to see the inverter data per hour. Click "SelectedXTerm" to choose the data you want to compare. You can choose up to **2 different units** such as energy (kWh) and current (A).



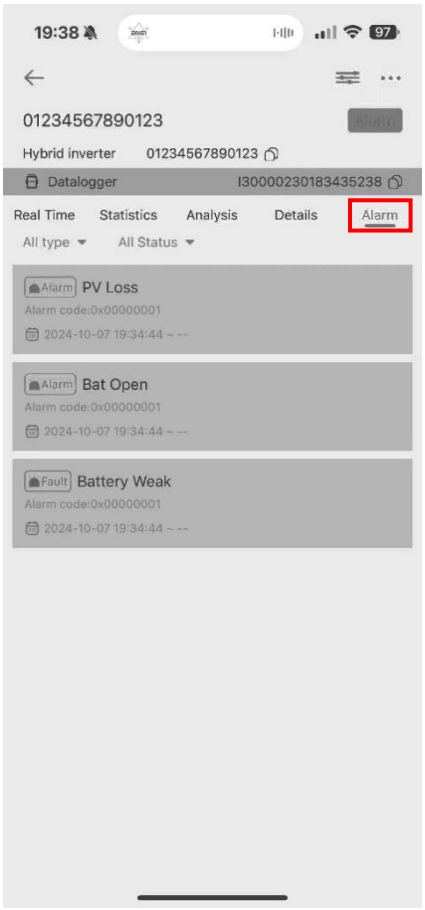




- Click “Details” to see the inverter history.



- Click “Alarm” 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.