



NOVATM Series

NOVA MAX 3K

3KW 24V OFF-GRID HYBRID INVERTER

User Manual



MODEL: RS-H3024X

THIS MANUAL CONTAINS IMPORTANT SAFETY AND OPERATING INSTRUCTIONS FOR THE INVERTER. PLEASE READ THIS MANUAL AND FOLLOW THE INSTRUCTIONS EXACTLY.

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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. Fuse is provided as over-current protection for the battery supply.
11. **GROUNDING INSTRUCTIONS** -This inverter/charger should be connected to a permanent grounded wiring system. Be sure to comply with local requirements and regulation to install this inverter.
12. **NEVER** cause AC output and DC input short circuited. Do NOT connect to the mains when DC input short circuits.
13. **Warning!!** Only qualified service persons are able to service this device. If errors still persist after following troubleshooting table, please send this inverter/charger back to local dealer or service center for maintenance.

INTRODUCTION

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

Features

- Pure sine wave inverter
- Built-in MPPT solar charge controller
- Configurable input voltage range for home appliances and personal computers via LCD setting
- Configurable battery charging current based on applications via LCD setting
- Configurable AC/Solar Charger priority via LCD setting
- Compatible to mains voltage 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 shows basic application for this inverter/charger. It also includes following devices to have a complete running system:

- Generator or Utility
- PV modules (option)

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

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

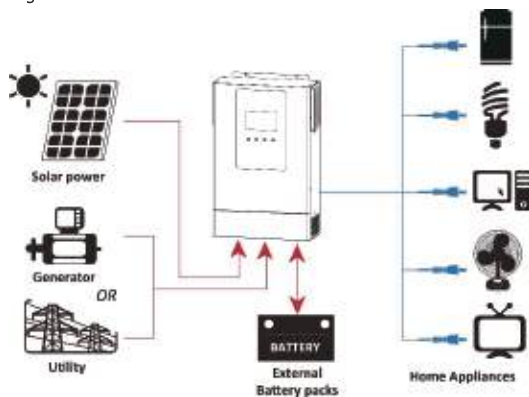
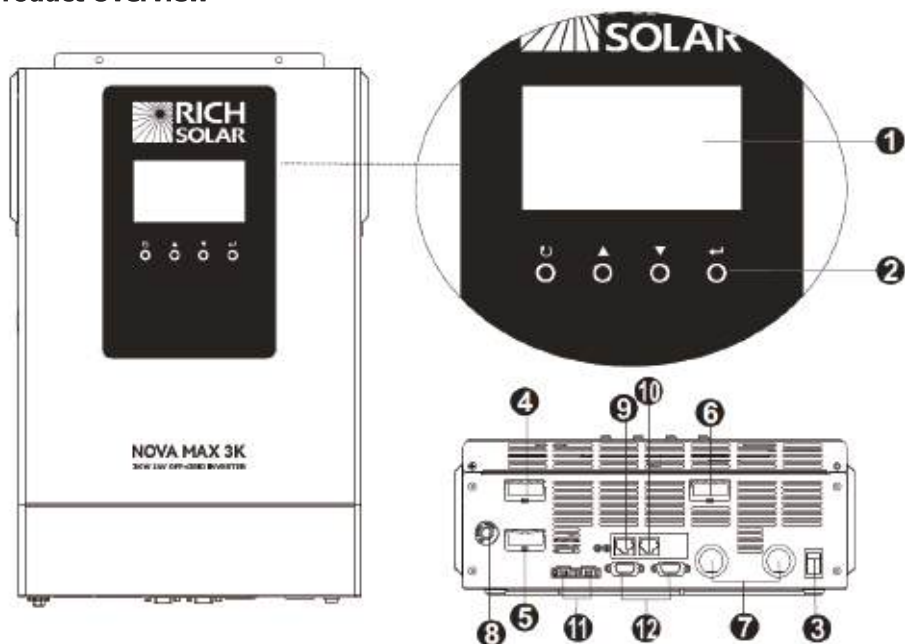


Figure 1 Off-Grid Power System

Product Overview



NOTE: For parallel installation and operation, please check the parallel installation guide for the details.

1. LCD display
2. Function buttons
3. Power on/off switch
4. AC input
5. AC output
6. PV input
7. Battery input
8. Circuit breaker
9. BMS port
10. Communication port
11. Current sharing port
12. Parallel communication port

INSTALLATION

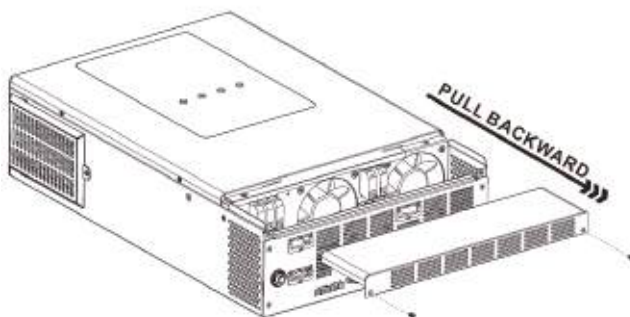
Unpacking and Inspection

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

- The unit x 1
- User manual x 1
- Communication cable x 1
- Software CD x 1

Preparation

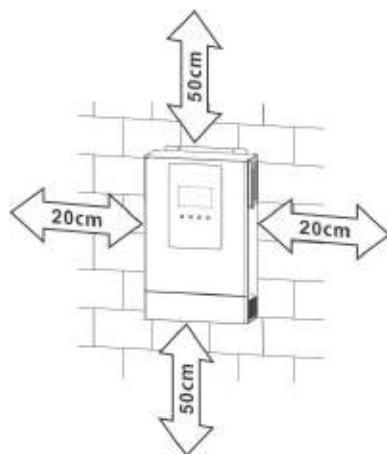
Before connecting all wirings, please take off bottom cover by removing two screws as shown below.



Mounting the Unit

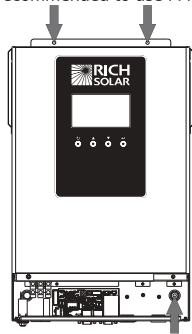
Consider the following points before selecting where to install:

- Do not mount the inverter on flammable construction materials.
- Mount on a solid surface.
- Install this inverter at eye level in order to allow the LCD display to be read at all times.
- The ambient temperature should be between 32 °F and 131°F to ensure optimal operation.
- The recommended installation position is to be adhered to the wall vertically.
- Be sure to keep other objects and surfaces as shown in the right diagram to guarantee sufficient heat dissipation and to have enough space for removing wires.



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

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



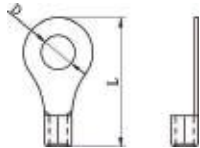
Battery Connection

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

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

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

Ring terminal:

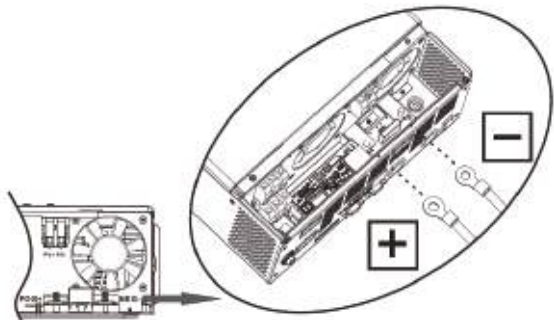


Recommended battery cable and terminal size:

Maximum Amperage	Battery Capacity	Cable Size	Ring Terminal			Torque
			Cable mm ²	Dimensions		
				D (mm)	L (mm)	
145A	200Ah	1/0 AWG	38	6.4	39.2	2~ 3 N·m

Please follow below steps to implement battery connection:

1. Assemble battery ring terminal based on recommended battery cable and terminal size.
2. Connect all battery packs as units requires. It's suggested to connect at least 200Ah capacity battery.
3. Insert the ring terminal of battery cable flatly into battery connector of inverter and make sure the bolts are tightened with torque of 2-3 N·m. Make sure polarity at both the battery and the inverter/charge is correctly connected and ring terminals are tightly screwed to the battery terminals.



**WARNING: Shock Hazard**

Installation must be performed with care due to high battery voltage in series.



CAUTION!! Do not place anything between the flat part of the inverter terminal and the ring terminal. Otherwise, overheating may occur.

CAUTION!! Do not apply anti-oxidant substance on the terminals before terminals are connected tightly.

CAUTION!! Before making the final DC connection or closing DC breaker/disconnector, be sure positive (+) must be connected to positive (+) and negative (-) must be connected to negative (-).

AC Input/Output Connection

CAUTION!! Before connecting to AC input power source, please install a **separate** AC breaker between inverter and AC input power source. This will ensure the inverter can be securely disconnected during maintenance and fully protected from over current of AC input. The recommended spec of AC breaker is 50A.

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

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

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

Suggested cable requirement for AC wires

Gauge	Torque
8 AWG	1.4~ 1.6 N·m

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

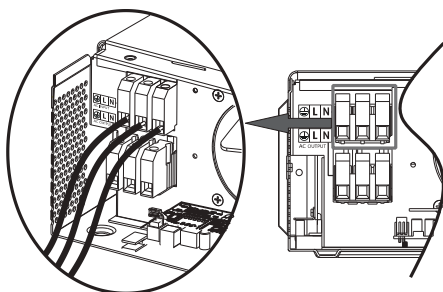
1. Before making AC input/output connection, be sure to open DC protector or disconnector first.
2. Remove insulation sleeve 10 mm for six conductors. And shorten phase L and neutral conductor N 3 mm.
3. Insert AC input wires according to polarities indicated on terminal block and tighten the terminal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



→ **Ground (yellow-green)**

L → **LINE (brown or black)**

N → **Neutral (blue)**

**WARNING:**

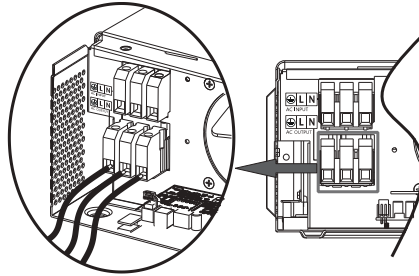
Be sure that AC power source is disconnected before attempting to hardwire it to the unit.

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

⏏→**Ground (yellow-green)**

L→**LINE (brown or black)**

N→**Neutral (blue)**



- Make sure the wires are securely connected.

CAUTION: Important

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

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

PV Connection

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

CAUTION: Please install surge protection device between inverter and PV modules and the recommended voltage is 500V.

WARNING! Do switch off the inverter before connecting to PV modules. Otherwise, it will cause inverter damage.

WARNING! Do NOT connect negative and positive terminal of PV modules to the ground.

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

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

Typical Amperage	Cable Size	Torque
22A	12 AWG	1.4~1.6 N·m

PV Module Selection:

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

- Open circuit Voltage (Voc) of PV modules not exceeds max. PV array open circuit voltage of inverter.
- Open circuit Voltage (Voc) of PV modules should be higher than min. battery voltage.

Solar Charging Mode

Max. PV Array Open Circuit Voltage

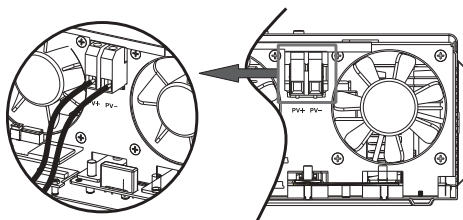
250V

PV Array MPPT Voltage Range

90Vdc~230Vdc

Please follow below steps to implement PV module connection:

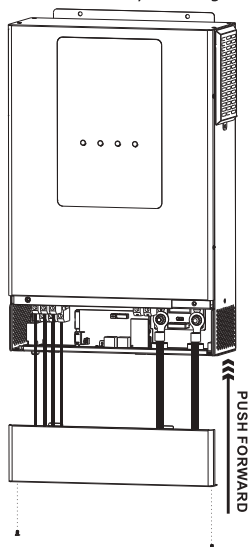
1. Remove insulation sleeve 10 mm for positive and negative conductors.
2. Check correct polarity of connection cable from PV modules and PV input connectors. Then, connect positive pole (+) of connection cable to positive pole (+) of PV input connector. Connect negative pole (-) of connection cable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



3. Make sure the wires are securely connected.

Final Assembly

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



Communication Connection

Serial Connection

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

Wi-Fi Connection

This unit is equipped with a Wi-Fi transmitter. Wi-Fi transmitter can enable wireless communication between off-grid inverters and monitoring platform. Users can access and control the monitored inverter with downloaded APP. You may find "WatchPower" APP from the Apple® Store or "WatchPower Wi-Fi" in Google® Play Store. All data loggers and parameters are saved in iCloud. For quick installation and operation, please check Appendix III.

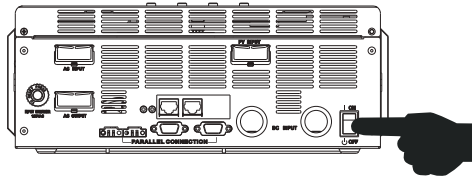


BMS Communication

It is recommended to purchase a special communication cable if you are connecting to Lithium-Ion battery banks. Please refer to Appendix II- BMS Communication Installation for details.

OPERATION

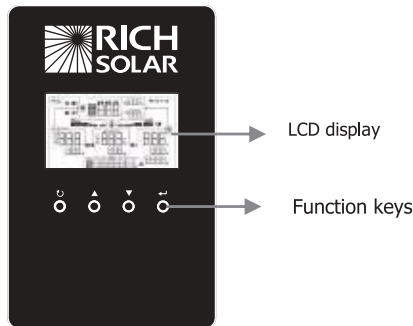
Power ON/OFF



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

Operation and Display Panel

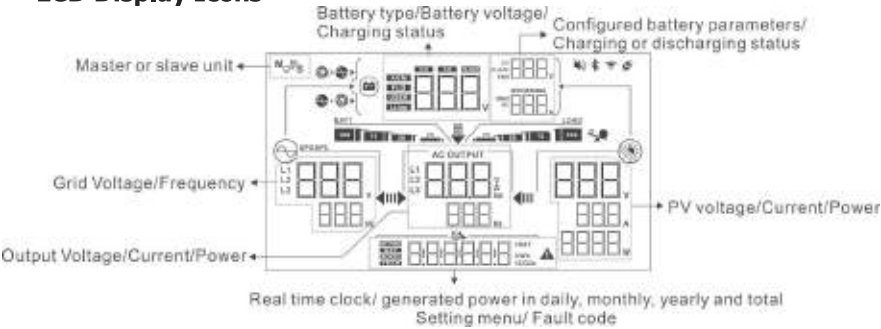
The operation and display panel, shown in below chart, is on the front panel of the inverter. It includes three indicators, four function keys and a LCD display, indicating the operating status and input/output power information.



Function Keys

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

LCD Display Icons



Battery Information



Indicates battery level by 0-24%, 25-49%, 50-74% and 75-100% in battery mode and charging status in line mode.

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

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

In battery mode, it will present battery capacity.

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

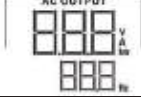
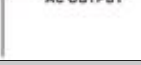
Load Information



Indicates overload.



Indicates the load level by 0-24%, 25-49%, 50-74% and 75-100%.

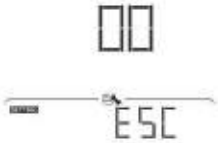
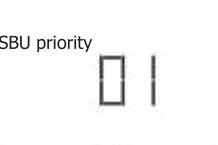
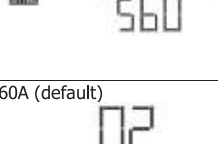
Charger Source Priority Setting Display		
		
		
		
Output Source Priority Setting Display		
		
		
		
		
AC Input Voltage Range Setting Display		
UPS		Indicates setting program 03 is selected as "UPS". The acceptable AC input voltage range will be within 90-140VAC.
APL		Indicates setting program 03 is selected as "APL". The acceptable AC input voltage range will be within 80-140VAC.
Output Information		
		Indicate the output voltage, load in VA, and load in Watt and output frequency.
		The ICON flashing indicates the unit with AC output and setting programs 60, 61 or 62 different from default setting.
Operation Status Information		
		Indicates unit connects to the mains.
		Indicates unit connects to the PV panel.
		Indicates battery type.
		Indicates parallel operation is working.
		Indicates unit alarm is disabled.
		Indicates Wi-Fi transmission is working.

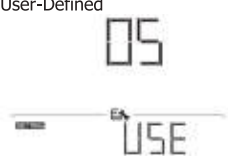
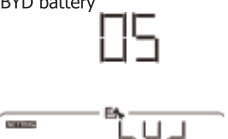
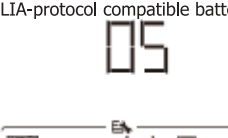
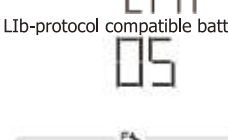
LCD Setting

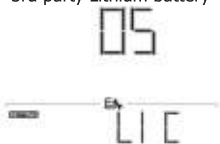
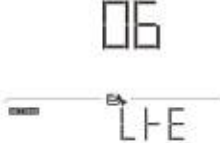
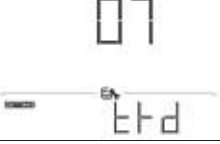
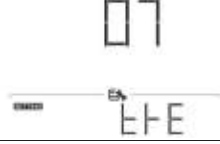
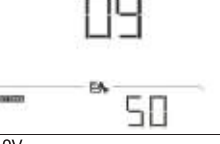
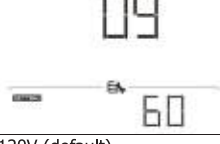
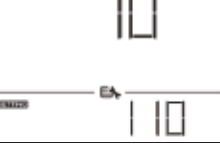
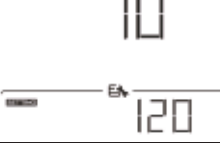
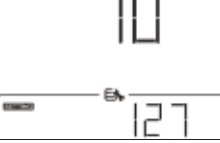
General Setting

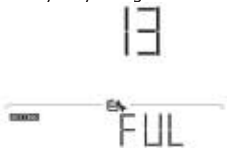
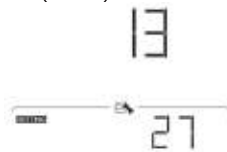
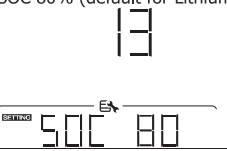
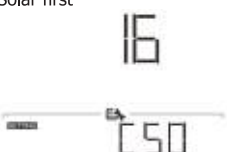
After pressing and holding “←” button for 3 seconds, the unit will enter the Setup Mode. Press “▲” or “▼” button to select setting programs. Press “←” button to confirm your selection or “↺” button to exit.

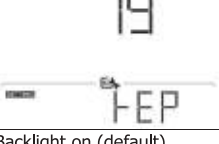
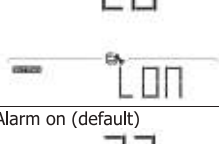
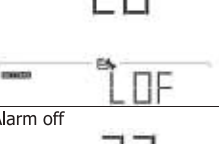
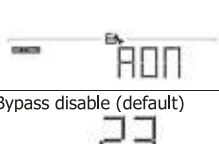
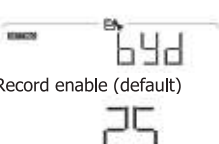
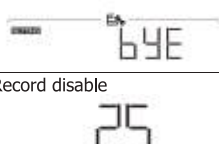
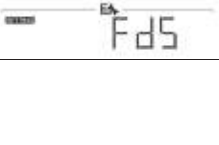
Setting Programs:

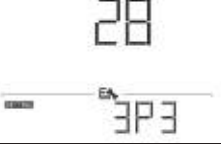
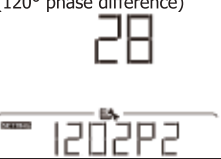
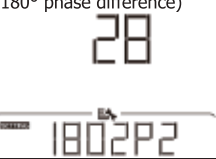
Program	Description	Selectable option	
00	Exit setting mode	Escape 	
01	Output source priority: To configure load power source priority	Utility first (default) 	Utility will provide power to the loads as first priority. Solar and battery energy will provide power to the loads only when utility power is not available.
		Solar first 	Solar energy provides power to the loads as first priority. If solar energy is not sufficient to power all connected loads, Utility energy will supply power to the loads at the same time.
		SBU priority 	Solar energy provides power to the loads as first priority. If solar energy is not sufficient to power all connected loads, battery energy will supply power to the loads at the same time. Utility provides power to the loads only when battery voltage drops to either low-level warning voltage or the setting point in program 12.
02	Maximum charging current: To configure total charging current for solar and utility chargers. (Max. charging current = utility charging current + solar charging current)	60A (default) 	Setting range is from 10A to 80A. Increment of each click is 10A.

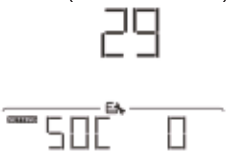
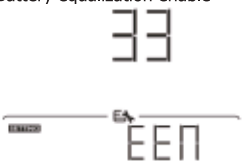
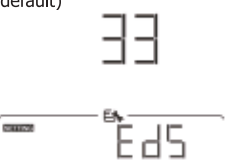
03	AC input voltage range	Appliances (default) 	If selected, acceptable AC input voltage range will be within 80-140VAC.
		UPS 	If selected, acceptable AC input voltage range will be within 90-140VAC.
05	Battery type	AGM (default) 	Flooded 
		User-Defined 	If "User-Defined" is selected, battery charge voltage and low DC cut-off voltage can be set up in program 26, 27 and 29.
		Pylontech battery 	If selected, programs of 02, 26, 27 and 29 will be automatically set up. No need for further setting.
		BYD battery 	If selected, programs of 02, 26, 27 and 29 will be automatically set up. No need for further setting.
		LIA-protocol compatible battery 	Select "LIA" if using Lithium battery compatible to Lia protocol. If selected, programs of 02, 26, 27 and 29 will be automatically set up. No need for further setting.
		Lib-protocol compatible battery 	Select "Lib" if using Lithium battery compatible to Lib protocol. If selected, programs of 02, 26, 27 and 29 will be automatically set up. No need for further setting.

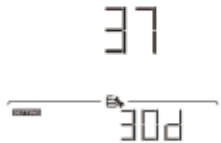
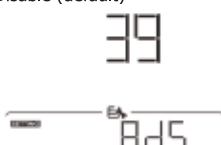
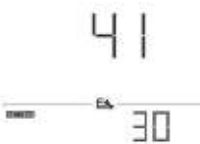
		3rd party Lithium battery 	If selected, programs of 02, 26, 27 and 29 will be automatically set up. No need for further setting. Please contact the battery supplier for installation procedure.
06	Auto restart when overload occurs	Restart disable (default) 	Restart enable 
07	Auto restart when over temperature occurs	Restart disable (default) 	Restart enable 
09	Output frequency	50Hz 	60Hz(default) 
10	Output voltage	110V 	120V (default) 
		127V 	
11	Maximum utility charging current Note: If setting value in program 02 is smaller than that in program in 11, the inverter will apply charging current from program 02 for utility charger.	30A (default) 	Setting range is 2A, then from 10A to 80A. Increment of each click is 10A.

12	Setting voltage point back to utility source when selecting "SBU" (SBU priority) in program 01.	23V (default) 	Setting range is from 22V to 25.5V. Increment of each click is 1V.
		SOC 10% (default for Lithium) 	If any types of lithium battery is selected in program 05, setting value will change to SOC automatically. Adjustable range is 5% to 95%. Increment of each click is 5%.
13	Setting voltage point back to battery mode when selecting "SBU" (SBU priority) in program 01.	Battery fully charged 	27V (default) 
		Setting range is from 24V to 29V. Increment of each click is 0.5V. SOC 80% (default for Lithium) 	If any types of lithium battery is selected in program 05, setting value will change to SOC automatically. Setting range is 10% to 100%.
16	Charger source priority: To configure charger source priority	If this inverter/charger is working in Line, Standby or Fault mode, charger source can be programmed as below:	
		Solar first 	Solar energy will charge battery as first priority. Utility will charge battery only when solar energy is not available.
		Solar and Utility (default) 	Solar energy and utility will charge battery at the same time.
		Only Solar 	Solar energy will be the only charger source no matter utility is available or not.

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

26	Bulk charging voltage (C.V. voltage)	28.8V (default) 	If user-defined is selected in program 5, this program can be set up. Setting range is from 25.0V to 31.5V. Increment of each click is 0.1V.
27	Floating charging voltage	27.6V (default) 	If user-defined is selected in program 5, this program can be set up. Setting range is from 25.0V to 31.5V. Increment of each click is 0.1V.
28	AC output mode *This setting is only available when the inverter is in standby mode (Switch off).	Single: This inverter is used in single phase application. 	Parallel: This inverter is operated in parallel system. 
		L1 phase: 	L2 phase: 
		L3 phase: 	L1 for split phase: 
		L2 for split phase: (120° phase difference) 	L2 for split phase: (180° phase difference) 
29	Low DC cut-off voltage: - If battery power is only power source available, inverter will shut down. - If PV energy and battery power are available, inverter will charge battery without AC output. If PV energy, battery power and utility are all available,	22.0V (default) 	If self-defined is selected in program 5, this program can be set up. Setting range is from 18.8V to 27.0V. Increment of each click is 0.1V. Low DC cut-off voltage will be fixed to setting value no matter what percentage of load is connected.

	inverter will transfer to line mode	SOC 0% (default for Lithium) 	If any types of lithium battery is selected in program 05, setting value will change to SOC automatically. Adjustable range is 0% to 90%. Increment of each click is 5%.
30	Low DC cut-off re-discharge voltage	27.1V (default) 	If self-defined is selected in program 5, this program can be set up. Setting range is from 20.9V to 31.5V. Increment of each click is 0.1V. Low DC cut-off re-discharge voltage cannot higher than floating charging voltage -0.5V and cannot lower than low DC cut-off voltage +4V.
		SOC 50% (default for Lithium) 	If any types of lithium battery is selected in program 05, setting value will change to SOC automatically. Adjustable range is 10% to 100%. Increment of each click is 5%.
33	Battery equalization	Battery equalization enable 	Battery equalization disable (default) 
		If "Flooded" or "User-Defined" is selected in program 05, this program can be set up.	
34	Battery equalization voltage	29.2V (default) 	Setting range is from 25.0V to 31.5V. Increment of each click is 0.1V.
35	Battery equalized time	60 min (default) 	Setting range is from 5 min to 900 min. Increment of each click is 5 min.

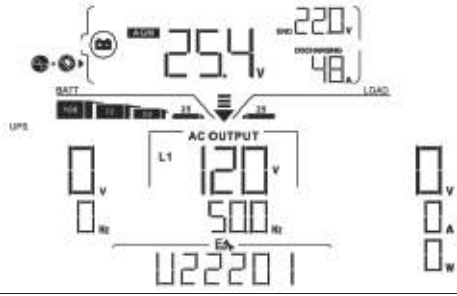
36	Battery equalized timeout	120 min (default) 	Setting range is from 5 min to 900 min. Increment of each click is 5 min.
37	Equalization interval	30 days (default) 	Setting range is from 0 to 90 days. Increment of each click is 1 day.
39	Equalization activated immediately	Enable 	Disable (default) 
		If equalization function is enabled in program 30, this program can be set up. If "Enable" is selected in this program, it's to activate battery equalization immediately and LCD main page will show "E9". If "Disable" is selected, it will cancel equalization function until next activated equalization time arrives based on program 35 setting. At this time, "E9" will not be shown in LCD main page.	
41	Maximum battery discharging current	Disable (Default) 	If selected, battery discharge protection is disabled.
		30A 	The setting range is from 30A to 150A. Increment of each click is 10A. Setting to limit maximum discharge current. If more current is required, the inverter will by-pass (like overload by-pass) or if no AC source is available then shut down for 5 minutes.

LCD Display

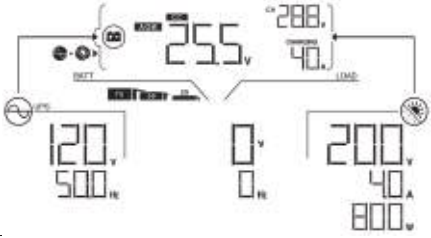
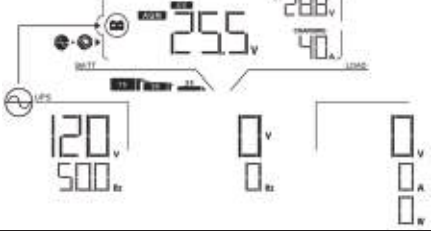
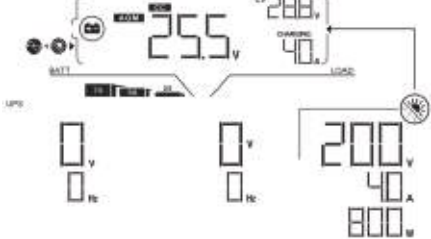
The LCD display information will be switched in turn by pressing the “▲” or “▼” button. The selectable information is switched as the following table in order.

Selectable information	LCD display
Utility voltage/ Utility frequency	Input Voltage=120V, Input frequency=50Hz 
PV voltage/ PV current/ PV power	PV voltage=200V, PV current=0.3A, PV power=60W 
Battery voltage, charging stage/ Configured battery parameters/ Charging or discharging current	Battery voltage=26.7V, Bulk charging voltage=28.8V, Charging current=20A  Battery voltage=28.7V, Floating charging voltage=28.8V, Charging current=1A 

	Battery voltage, charging stage/ Configured battery parameters/ Charging or discharging current	Battery voltage=25.4V, Low DC cut-off voltage=22.0V, Discharging current=48A 
Default Display Screen		Output voltage=120V, Output frequency=50Hz 
	Output voltage, load in VA, load in Watt switch every 5 second/ Output frequency	Load in VA=2.4kVA, Output frequency=50Hz 
		Load in Watt=2.4kW, Output frequency=50Hz 

Main CPU version checking	Main CPU version 00050.72.  The display shows the Main CPU version 00050.72. It features a large digital readout of 254 V, a 220 V AC output indicator, and a 48 A load indicator. The BATT status is shown as 'BATT' with a battery icon. The UPS status is shown as 'UPS' with a battery icon. The AC OUTPUT section shows 120 V, 500 Hz, and a 15072 EA (Energy Accumulated) value. The display also shows V, Hz, and W indicators on the right side.
Secondary CPU version checking	Secondary CPU version 00022.01.  The display shows the Secondary CPU version 00022.01. It features a large digital readout of 254 V, a 220 V AC output indicator, and a 48 A load indicator. The BATT status is shown as 'BATT' with a battery icon. The UPS status is shown as 'UPS' with a battery icon. The AC OUTPUT section shows 120 V, 500 Hz, and a 22201 EA (Energy Accumulated) value. The display also shows V, Hz, and W indicators on the right side.

Operating Mode Description

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

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

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

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

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

Faults Reference Code

Fault Code	Fault Event	Icon on
01	Fan is locked when inverter is off	F01
02	Over temperature	F02
03	Battery voltage is too high	F03
04	Battery voltage is too low	F04
05	Output short circuited	F05
06	Output voltage is too high	F06
07	Overload time out	F07
08	Bus voltage is too high	F08
09	Bus soft start failed	F09
10	PV over current	F10
11	PV over voltage	F11
12	DC/DC over current	F12
13	Battery discharge over current	F13
51	Over current	F51
52	Bus voltage is too low	F52
53	Inverter soft start failed	F53
55	Over DC voltage in AC output	F55
57	Current sensor failed	F57
58	Output voltage is too low	F58

Warning Indicator

Warning Code	Warning Event	Audible Alarm	Icon flashing
01	Fan is locked when inverter is on	Beep three times every second	01 
02	Over temperature	None	02 
04	Low battery	Beep once every second	04 
07	Overload	Beep once every 0.5 second	07  
10	Output power derating	Beep twice every 3 seconds	10 
15	PV energy is low	Beep twice every 3 seconds	15 
32	Communication failure between inverter and display panel	None	32 
E9	Battery equalization	None	E9 

BATTERY EQUALIZATION

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

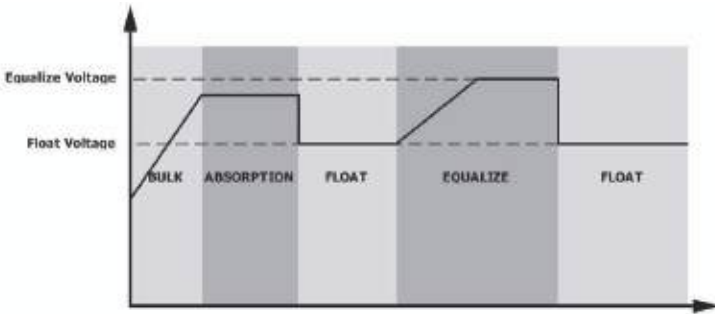
- **How to Apply Equalization Function**

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

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

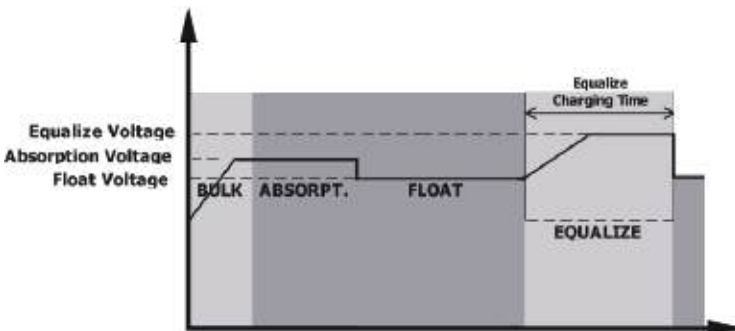
- **When to Equalize**

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

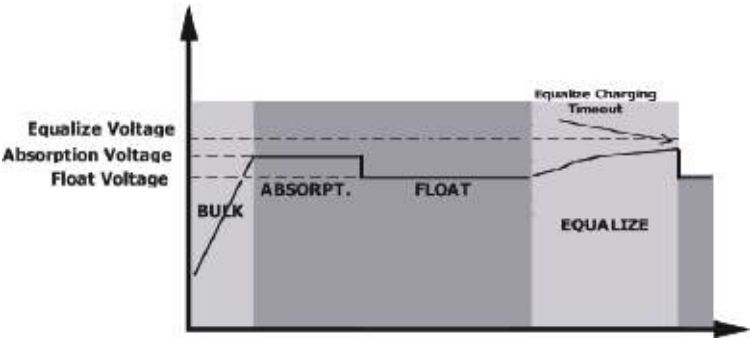


- **Equalize Charging Time and Timeout**

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



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



SPECIFICATIONS

Table 1 Line Mode Specifications

MODEL	RS-H3024X
Input Voltage Waveform	Sinusoidal (utility or generator)
Nominal Input Voltage	120Vac
Low Loss Voltage	90Vac±7V (UPS) 80Vac±7V (Appliances)
Low Loss Return Voltage	100Vac±7V (UPS); 90Vac±7V (Appliances)
High Loss Voltage	140Vac±7V
High Loss Return Voltage	135Vac±7V
Max AC Input Voltage	150Vac
Nominal Input Frequency	50Hz / 60Hz (Auto detection)
Low Loss Frequency	40±1Hz
Low Loss Return Frequency	42±1Hz
High Loss Frequency	65±1Hz
High Loss Return Frequency	63±1Hz
Output Short Circuit Protection	Line mode: Circuit Breaker Battery mode: Electronic Circuits
Efficiency (Line Mode)	>95% (Rated R load, battery fully charged)
Transfer Time	10ms typical (UPS); 20ms typical (Appliances)
Output Power Derating	The graph illustrates the output power derating characteristics of the device. The vertical axis represents Output Power, with markers for 50% Power and Rated Power. The horizontal axis represents Input Voltage, with markers at 80V, 90V, and 140V. The power is zero for input voltages below 80V. At 80V, the power rises to 50% of the rated power. Between 80V and 90V, the power increases linearly to reach the full rated power. From 90V to 140V, the device maintains its full rated output power. Beyond 140V, the power drops to zero.

Table 2 Inverter Mode Specifications

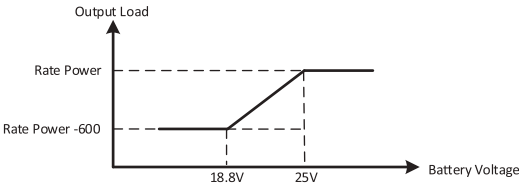
MODEL	RS-H3024X
Rated Output Power	3kVA/3kW
Output Voltage Waveform	Pure Sine Wave
Output Voltage Regulation	120Vac±5%
Output Frequency	60Hz or 50Hz
Peak Efficiency	91%
Overload Protection	100ms@≥205% load; 5s@≥150% load; 10s@110%~150% load
Surge Capacity	2* rated power for 5 seconds
Nominal DC Input Voltage	24Vdc
Cold Start Voltage	23.0Vdc
Low DC Warning Voltage	
@ load < 20%	23.0Vdc
@ 20% ≤ load < 50%	21.4Vdc
@ load ≥ 50%	20.2Vdc
Low DC Warning Return Voltage	
@ load < 20%	24.0Vdc
@ 20% ≤ load < 50%	22.4Vdc
@ load ≥ 50%	21.2Vdc
Low DC Cut-off Voltage	
@ load < 20%	22.0Vdc
@ 20% ≤ load < 50%	20.4Vdc
@ load ≥ 50%	19.2Vdc
High DC Recovery Voltage	32Vdc
High DC Cut-off Voltage	33Vdc
DC Voltage Accuracy	+/-0.3%V@ no load
THDV	<5% for linear load, <10% for non-linear load @ nominal voltage
DC Offset	≤100mV
Power Limitation	If the output load is high than de-rate power. The AC output voltage will be decrease until the output power reduce to de-rate power. The lower limit of AC output voltage is 95V. 

Table 3 Charge Mode Specifications

Utility Charging Mode		
MODEL		RS-H3024X
Charging Current (UPS) @ Nominal Input Voltage		80A
Bulk Charging Voltage	Flooded Battery	29.2
	AGM / Gel Battery	28.8
Floating Charging Voltage		27.6Vdc
Overcharge Protection		33Vdc
Charging Algorithm		3-Step
Charging Curve		
Solar Input		
MODEL		RS-H3024X
Rated Power		3000W
Max. PV Array Open Circuit Voltage		250Vdc
PV Array MPPT Voltage Range		90Vdc~230Vdc
Max. Input Current		22A
Start-up Voltage		80V +/- 5Vdc

Table 4 General Specifications

MODEL	RS-H3024X
Operating Temperature Range	14°F to 104°F
Storage Temperature	5°F to 140°F
Humidity	5% to 95% Relative Humidity (Non-condensing)
Dimension (D*W*H), inch	5.61 x 12.12 x 18.80
Net Weight, lb	26.5

TROUBLESHOOTING

Problem	LCD/LED/Buzzer	Explanation / Possible cause	What to do
Unit shuts down automatically during startup process.	LCD/LEDs and buzzer will be active for 3 seconds and then complete off.	The battery voltage is too low. (<1.91V/Cell)	1. Re-charge battery. 2. Replace battery.
No response after power on.	No indication.	1. The battery voltage is far too low. (<1.4V/Cell) 2. Battery polarity is connected reversed.	1. Check if batteries and the wiring are connected well. 2. Re-charge battery. 3. Replace battery.
Mains exist but the unit works in battery mode.	Input voltage is displayed as 0 on the LCD.	Input protector is tripped.	Check if AC breaker is tripped and AC wiring is connected well.
When the unit is turned on, internal relay is switched on and off repeatedly.	LCD display is flashing.	Battery is disconnected.	Check if battery wires are connected well.
Buzzer beeps continuously	Fault code 07	Overload error. The inverter is overload 110% and time is up.	Reduce the connected load by switching off some equipment.
	Fault code 05	Output short circuited.	Check if wiring is connected well and remove abnormal load.
		Temperature of internal converter component is over 248°F.	Check whether the air flow of the unit is blocked or whether the ambient temperature is too high.
	Fault code 02	Internal temperature of inverter component is over 212°F.	
	Fault code 03	Battery is over-charged.	Return to repair center.
		The battery voltage is too high.	Check if spec and quantity of batteries are meet requirements.
	Fault code 01	Fan fault.	Replace the fan.
	Fault code 06/58	Output abnormal (Inverter voltage below than 80Vac or is higher than 147Vac).	1. Reduce the connected load. 2. Return to repair center.
	Fault code 08/09/53/57	Internal components failed.	Return to repair center.
	Fault code 51	Over current or surge.	Restart the unit, if the error happens again, please return to repair center.
	Fault code 52	Bus voltage is too low.	
	Fault code 55	Output voltage is unbalanced.	
	Fault code 56	Battery is not connected well or fuse is burnt.	If the battery is connected well, please return to repair center.

Appendix I: Parallel Function

1. Introduction

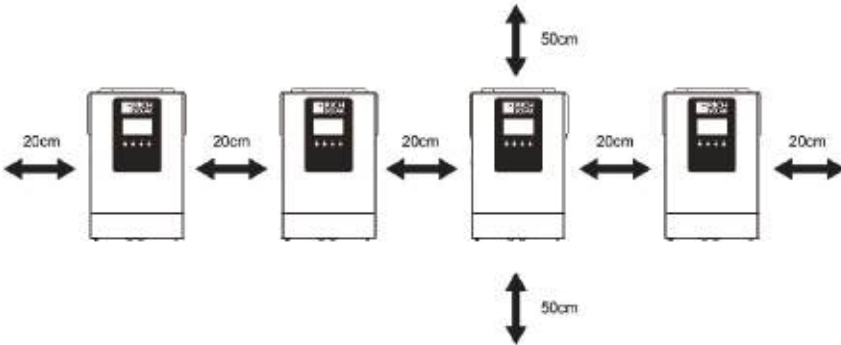
This inverter can be used in parallel with two different operation modes.

1. Parallel operation in single phase with up to 9 units. The supported maximum output power is 27kW/27kVA.
2. Maximum nine units work together to support three-phase equipment. Seven units support one phase maximum. The supported maximum output power is 27kW/27kVA and one phase can be up to 21kW/21kVA.
3. Maximum nine units work together to support split-phase equipment. Eight units support one phase maximum. The supported maximum output power is 27kW/27kVA and one phase can be up to 24kW/24kVA .

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

The inverter can't turn on when PV source only.

2. Mounting the Unit



NOTE: For proper air circulation to dissipate heat, allow a clearance of approx. 20 cm (7.9 in) to the side and approx. 50 cm (19.7 in) above and below the unit. Be sure to install each unit in the same level.

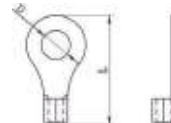
3. Wiring Connection

The cable size of each inverter is shown as below:

Recommended battery cable and terminal size for each inverter:

Model	Cable Size	Ring Terminal			Torque
		Cable mm ²	Dimensions		
			D (mm)	L (mm)	
3kW	1/0 AWG	38	6.4	39.2	2~ 3 N·m

Ring terminal:



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

Recommended AC input and output cable size for each inverter:

AWG no.	Torque
8 AWG	1.4~ 1.6 N·m

You need to connect the cables of each inverter together. Take the battery cables for example: You need to use

a connector or bus-bar as a joint to connect the battery cables together, and then connect to the battery terminal. The cable size used from joint to battery should be X times cable size in the tables above. "X" indicates the number of inverters connected in parallel.

Regarding AC input and output, please also follow the same principle.

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

Recommended breaker specification of battery for each inverter:

1 unit*
150A/40Vdc

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

Recommended breaker specification of AC input with single phase:

Inverter parallel numbers	2 units	3 units	4 units	5 units	6 units	7 units	8 units	9 units
Breaker spec	90A/ 120Vac	120A/ 120Vac	150A/ 120Vac	180A/ 120Vac	210A/ 120Vac	240A/ 120Vac	270A/ 120Vac	300A/ 120Vac

Note1: Also, you can use 50A breaker for only 1 unit and install one breaker at its AC input in each inverter.

Note2: Regarding three-phase system, you can use 4-pole breaker directly and the rating of the breaker should be compatible with the phase current limitation from the phase with maximum units.

Recommended battery capacity

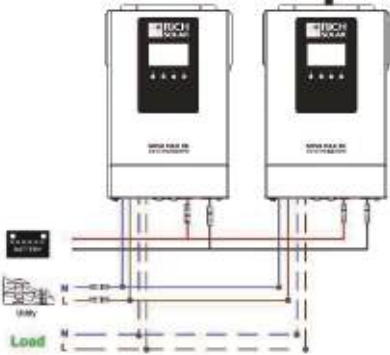
Inverter parallel numbers	2	3	4	5	6	7	8	9
Battery Capacity	200Ah	400Ah	400Ah	600Ah	600Ah	800Ah	800Ah	1000Ah

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

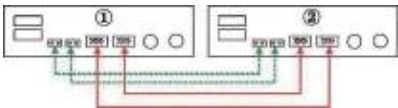
5-1. Parallel operation in single phase

Two inverters in parallel:

Power Connection

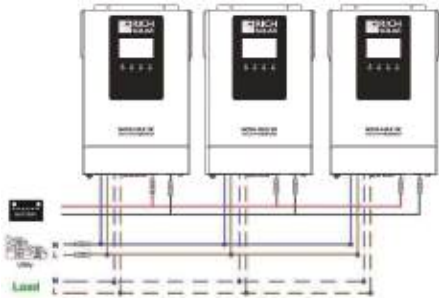


Communication Connection

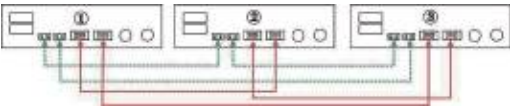


Three inverters in parallel:

Power Connection

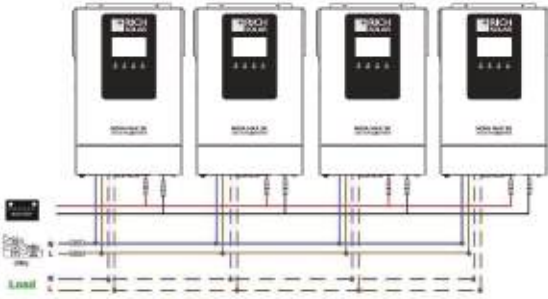


Communication Connection

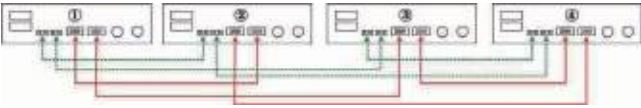


Four inverters in parallel:

Power Connection

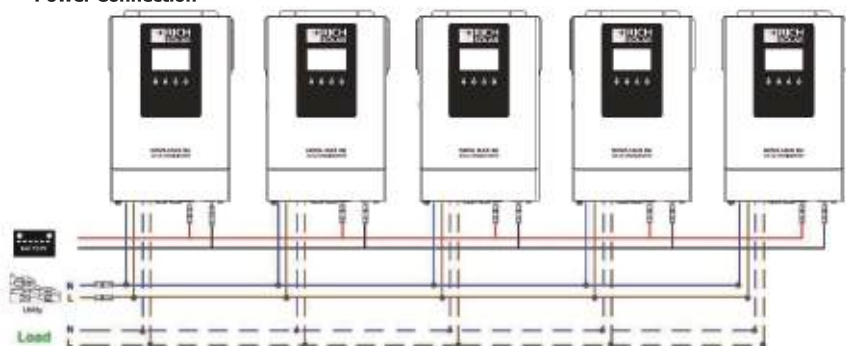


Communication Connection



Five inverters in parallel:

Power Connection

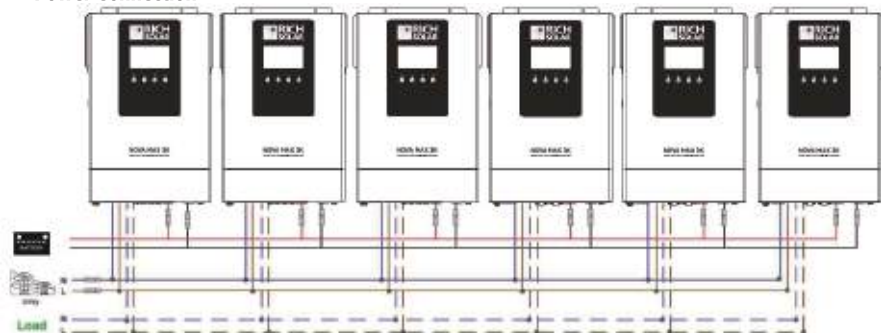


Communication Connection

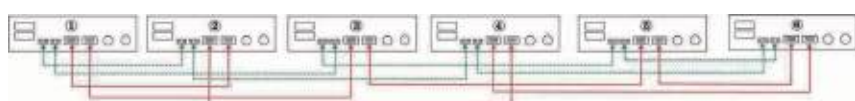


Six inverters in parallel:

Power Connection

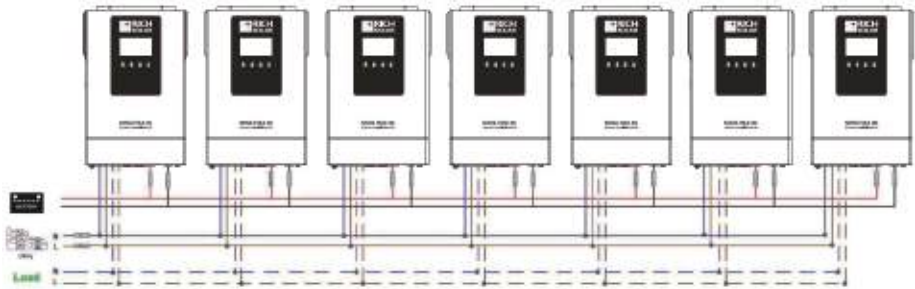


Communication Connection



Seven inverters in parallel:

Power Connection

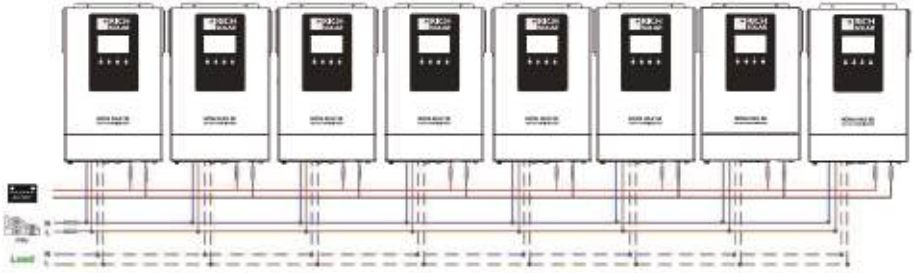


Communication Connection



Eight inverters in parallel:

Power Connection



Communication Connection



Nine inverters in parallel:

Power Connection



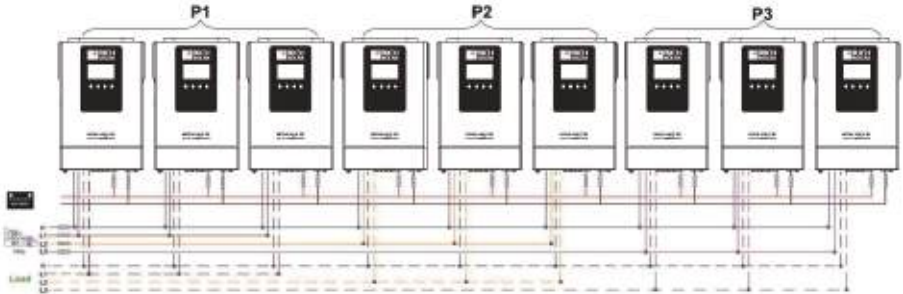
Communication Connection



5-2. Support 3-phase equipment

Three inverters in each phase:

Power Connection

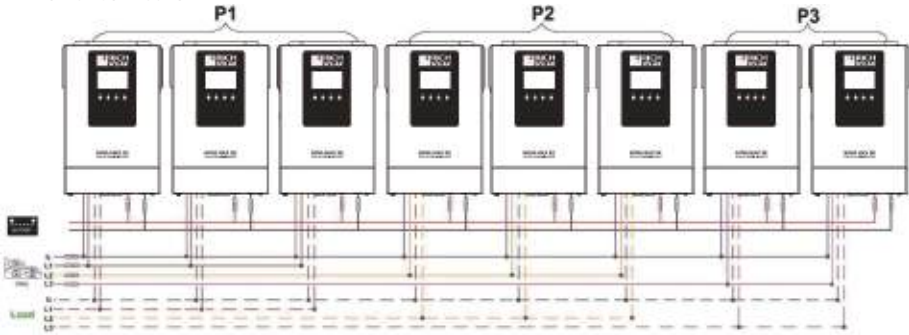


Communication Connection



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

Power Connection

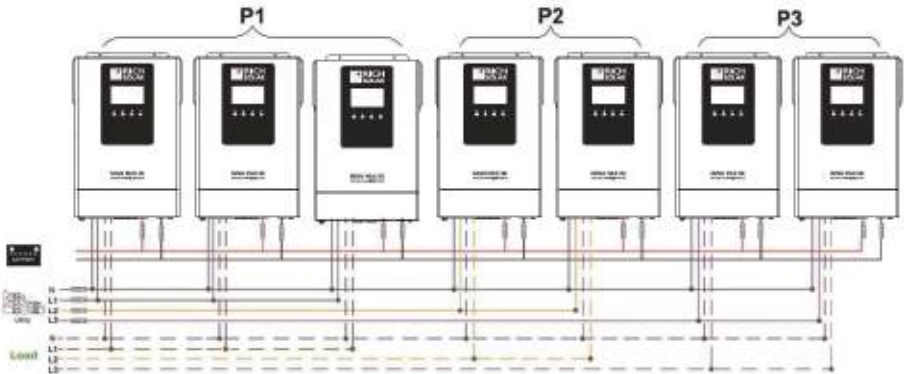


Communication Connection



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

Power Connection

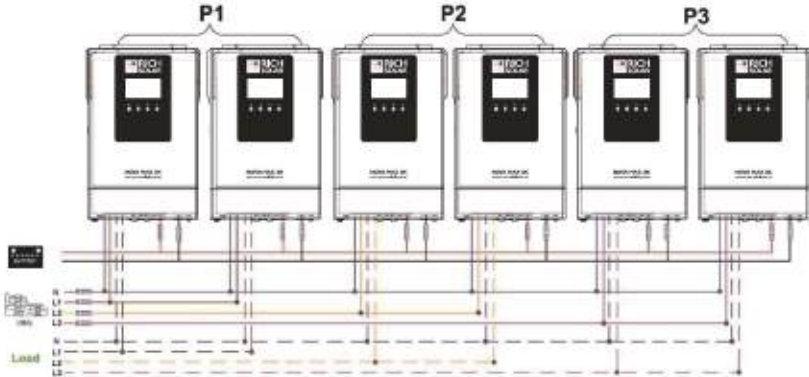


Communication Connection

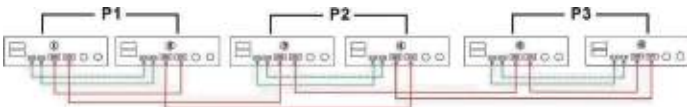


Two inverters in each phase:

Power Connection

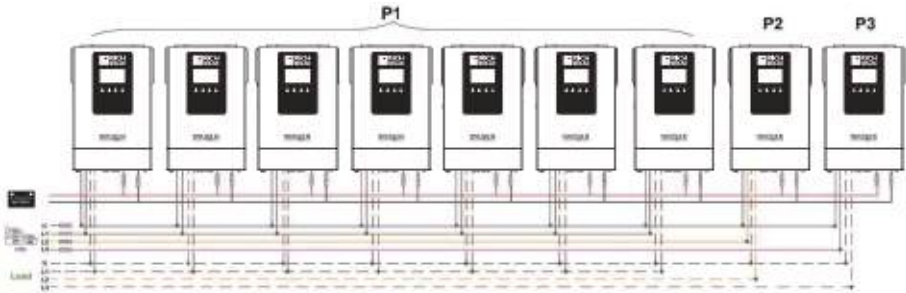


Communication Connection



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

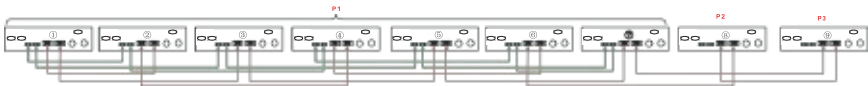
Power Connection



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

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

Communication Connection



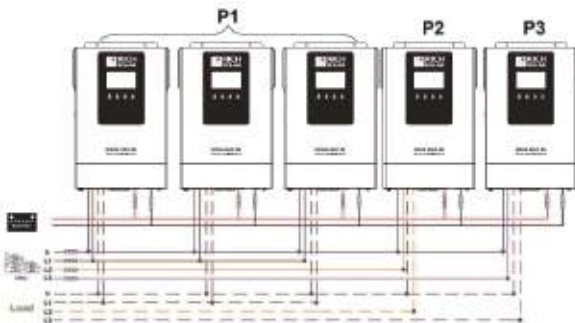
Note: If there is only one unit in one phase, this unit doesn't need to connect the current sharing cable.

Or you connect it like as below:

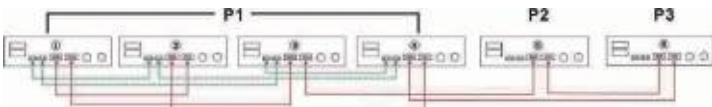


Four inverters in one phase and one inverter for the other two phases:

Power Connection

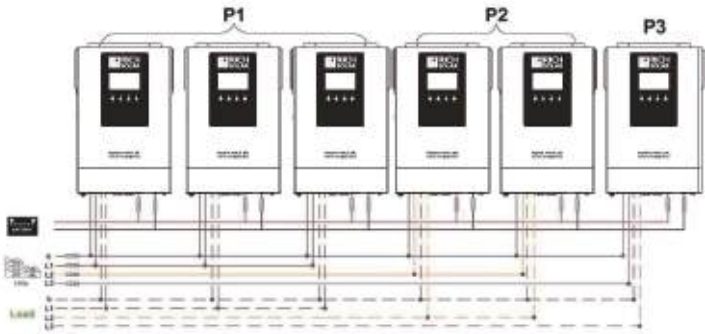


Communication Connection

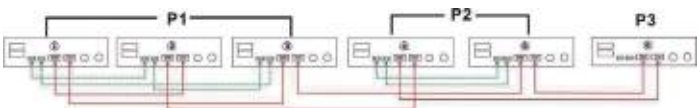


Three inverters in one phase, two inverters in second phase and one inverter for the third phase:

Power Connection

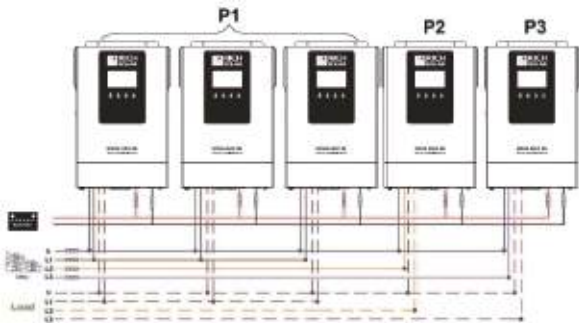


Communication Connection



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

Power Connection

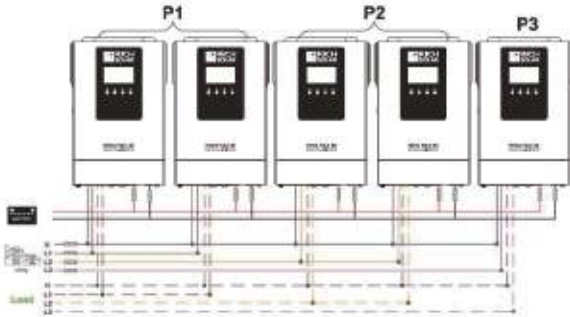


Communication Connection

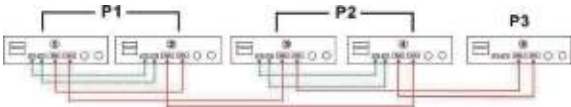


Two inverters in two phases and only one inverter for the remaining phase:

Power Connection

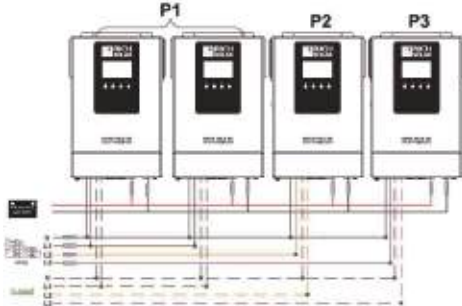


Communication Connection



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

Power Connection

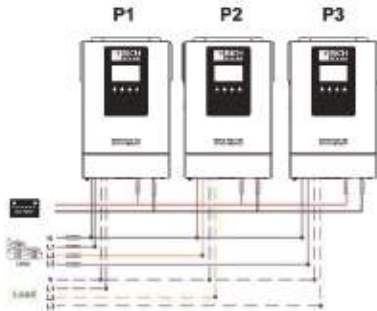


Communication Connection

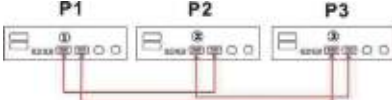


One inverter in each phase:

Power Connection



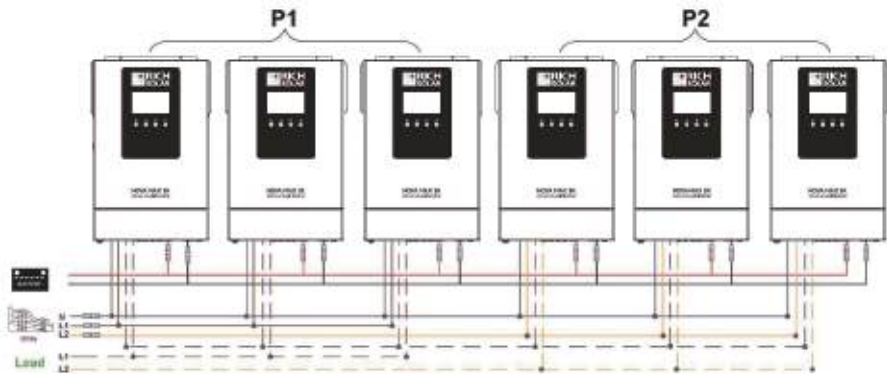
Communication Connection



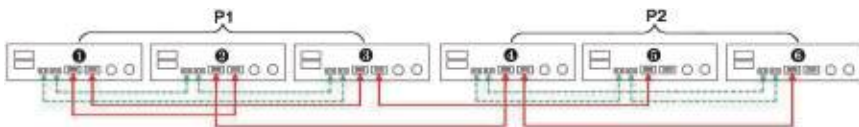
WARNING: Do not connect the current sharing cable between the inverters which are in different phases. Otherwise, it may damage the inverters.

5-3. Support split-phase equipment

Three inverters in each phase:

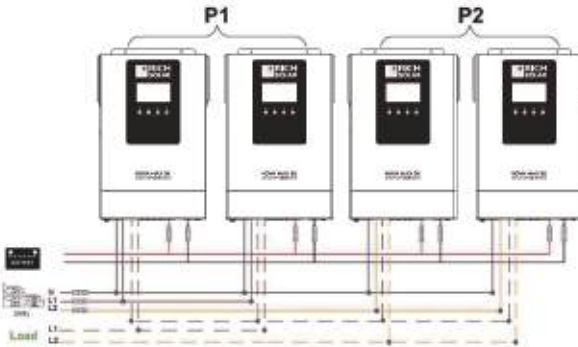


Communication Connection

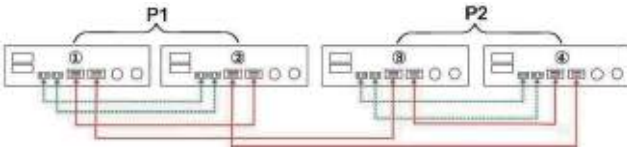


Two inverters in each phase:

Power Connection



Communication Connection



One inverter in each phase:



Power Connection

Communication Connection



6. PV Connection

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

CAUTION: Each inverter should connect to PV modules separately.

7. LCD Setting and Display

Setting Program:

Program	Description	Selectable option	
28	AC output mode *This setting is able to set up only when the inverter is in standby mode. Be sure that on/off switch is in "OFF" status.	Single 	When the unit is operated alone, please select "SIG" in program 28.
		Parallel 	When the units are used in parallel for single phase application, please select "PAL" in program 28. Please refer to 5-1 for detailed information.
		L1 phase: 	When the units are operated in 3-phase application, please choose "3PX" to define each inverter. It is required to have at least 3 inverters or maximum 6 inverters to support three-phase equipment. It's required to have at least one inverter in each phase or it's up to four inverters in one phase. Please refers to 4-2 for detailed information. Please select "3P1" in program 28 for the inverters connected to L1 phase, "3P2" in program 28 for the inverters connected to L2 phase and "3P3" in program 28 for the inverters connected to L3 phase.
		L2 phase: 	
		L3 phase: 	
		L1 for split phase: 	When the units are operated in split phase application, please choose "2PX" to define each inverter. It is required to have at least 2 inverters or maximum 6 inverters to support split-phase equipment. It's required to have at least one inverter in each phase or it's up to three inverters in one phase. Please refers to 4-3 for detailed information. Please select "2P1" in program 28 for the inverters connected to L1 phase, "2P2" in program 28 for the inverters connected to L2 phase. And it can choose 120° or 180° phase difference for "2P2".
		L2 for split phase: (120° phase difference) 	
		L2 for split phase: (180° phase difference) 	

Fault Code Display:

Fault Code	Fault Event	Icon On
60	Power feedback protection	F60
71	Firmware version inconsistent	F71
72	Current sharing fault	F72
80	CAN fault	F80
81	Host loss	F81
82	Synchronization loss	F82
83	Battery voltage detected different	F83
84	AC input voltage and frequency detected different	F84
85	AC output current unbalance	F85
86	AC output mode setting is different	F86

Code Reference:

Code	Description	Icon On
NE	Unidentified unit master or slave	NE
HS	Master unit	HS
SL	Slave unit	SL

8. Commissioning

Parallel in single phase

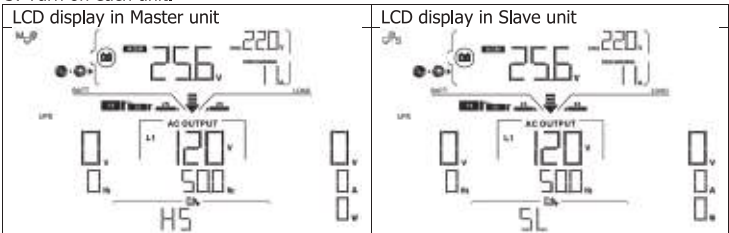
Step 1: Check the following requirements before commissioning:

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

Step 2: Turn on each unit and set "PAL" in LCD setting program 28 of each unit. And then shut down all units.

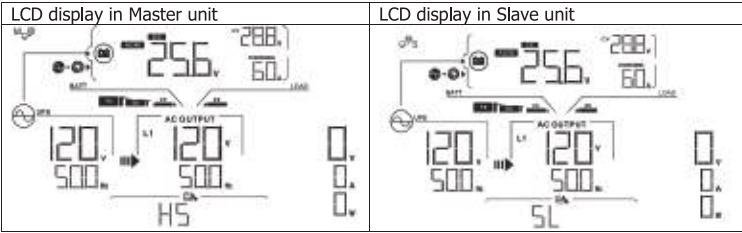
NOTE: It's necessary to turn off switch when setting LCD program. Otherwise, the setting cannot be programmed.

Step 3: Turn on each 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.



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

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

Support three-phase equipment

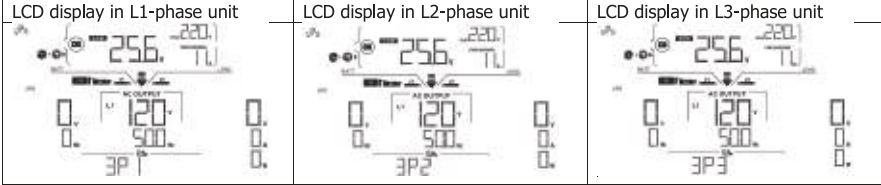
Step 1: Check the following requirements before commissioning:

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

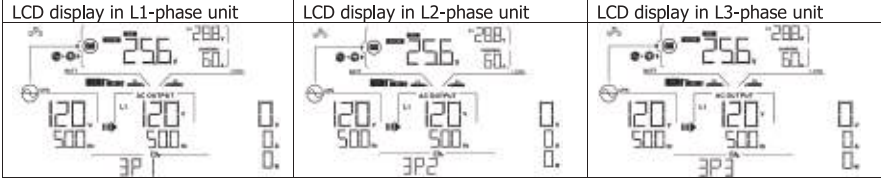
Step 2: Turn on all units and configure LCD program 28 as P1, P2 and P3 sequentially. And then shut down all units.

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

Step 3: Turn on all units sequentially.



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



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

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

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

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

9. Troubleshooting

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

Appendix II: BMS Communication Installation

1. Introduction

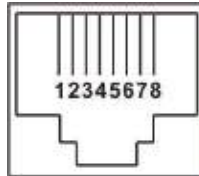
If connecting to Lithium battery, it is recommended to purchase a custom-made RJ45 communication cable. Please check with your dealer or integrator for details.

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

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

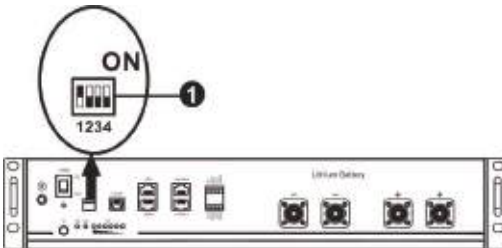
2. Pin Assignment for BMS Communication Port

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



3. Lithium Battery Communication Configuration

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.

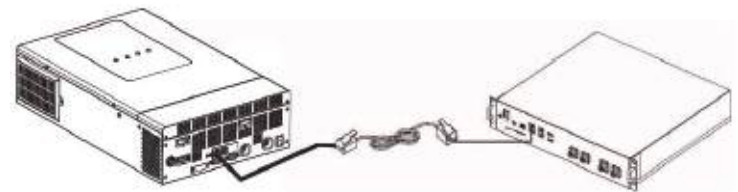
Dip 1	Dip 2	Dip 3	Dip 4	Group address
1: RS485 baud rate=9600	0	0	0	Single group only. It's required to set up master battery with this setting and slave batteries are unrestricted.
	1	0	0	Multiple group condition. It's required to set up master battery on the first group with this setting and slave batteries are unrestricted.

Restart to take effect	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.

4. Installation and Operation

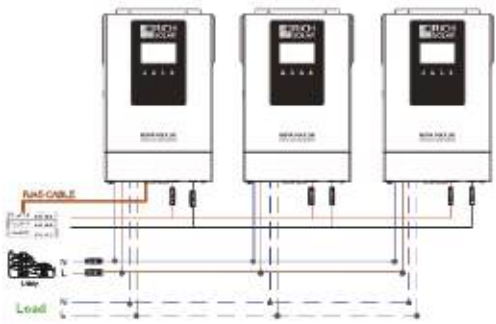
PYLONTECH



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:

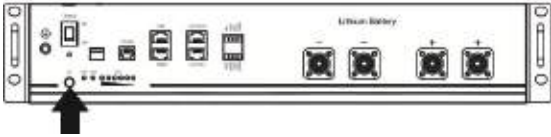
1. Only support common battery installation.
2. Use custom-made RJ45 cable to connect any inverter (no need to connect to a specific inverter) and Lithium battery. Simply set this inverter battery type to "PYL" in LCD program 5. Others should be "USE".



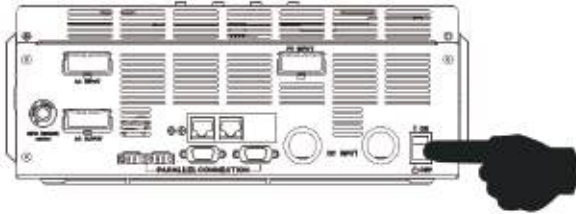
Step 2. Switch on Lithium battery.



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



Step 4. Turn on the inverter.



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



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

Active Function

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.

5. LCD Display Information

Press "▲" or "▼" button to switch LCD display information. It will show battery pack and battery group number before "Main CPU version checking" as shown below.

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

6. Code Reference

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

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

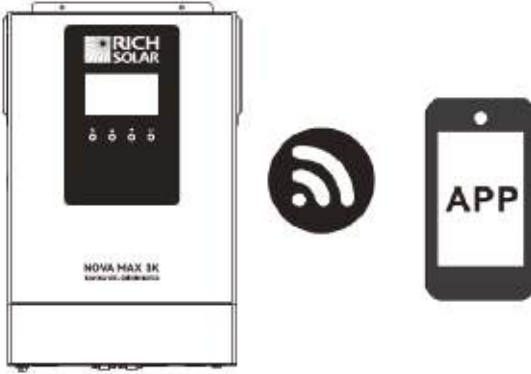
Appendix III: The Wi-Fi Operation Guide

1. Introduction

Wi-Fi module can enable wireless communication between off-grid inverters and monitoring platform. Users have complete and remote monitoring and controlling experience for inverters when combining Wi-Fi module with WatchPower APP, available for both iOS and Android based device. All data loggers and parameters are saved in iCloud.

The major functions of this APP:

- Delivers device status during normal operation.
- Allows to configure device setting after installation.
- Notifies users when a warning or alarm occurs.
- Allows users to query inverter history data.



2. WatchPower APP

2-1. Download and install APP

Operating system requirement for your smartphone:

🍏 iOS system supports iOS 9.0 and above

🤖 Android system supports Android 5.0 and above

Please scan the following QR code with your smartphone and download WatchPower APP.



Android
system



iOS system

Or you may find "WatchPower" APP from the Apple® Store or "WatchPower Wi-Fi" in Google® Play Store.



2-2. Initial Setup

Step 1: Registration at first time

After the installation, please tap the shortcut icon  to access this APP on your mobile screen. In the screen, tap "Register" to access "User Registration" page. Fill in all required information and scan the Wi-Fi module PN by tapping  icon. Or you can simply enter PN directly. Then, tap "Register" button.

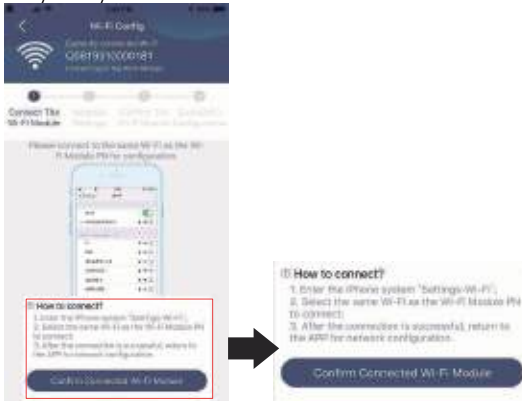


Then, a "Registration success" window will pop up. Tap "Go now" to continue setting local Wi-Fi network connection.



Step 2: Local Wi-Fi Module Configuration

Now, you are in "Wi-Fi Config" page. There are detailed setup procedure listed in "How to connect?" section and you may follow it to connect Wi-Fi.



Enter the "Settings→ Wi-Fi" and select connected Wi-Fi name. The connected Wi-Fi name is the same to your Wi-Fi PIN number and enter default password "12345678".



Then, return to WatchPower APP and tap "Confirm Connected Wi-Fi Module" button when Wi-Fi module is connected

Step 3: Wi-Fi Network settings

Tap  icon to select your local Wi-Fi router name (to access the internet) and enter password.



Step 4: Tap "Confirm" to complete the Wi-Fi configuration between the Wi-Fi module and the Internet.



If the connection fails, please repeat Step 2 and 3.



Diagnose Function

If the module is not monitoring properly, please tap "Diagnose" on the top right corner of the screen for further details. It will show repair suggestion. Please follow it to fix the problem. Then, repeat the steps in the chapter 4.2 to re-set network setting. After all setting, tap "Rediagnosis" to re-connect again.



2-3. Login and APP Main Function

After finishing the registration and local Wi-Fi configuration, enter registered name and password to login.

Note: Tick "Remember Me" for your login convenience afterwards.



Overview

After login is successfully, you can access "Overview" page to have overview of your monitoring devices, including overall operation situation and Energy information for Current power and Today power as below diagram.



Devices

Tap the  icon (located on the bottom) to enter Device List page. You can review all devices here by adding or deleting Wi-Fi Module in this page.

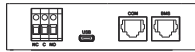
Add device



Delete device



Tap  icon on the top right corner and manually enter part number to add device. This part number label is pasted on the bottom of inverter. After entering part number, tap "Confirm" to add this device in the Device list.



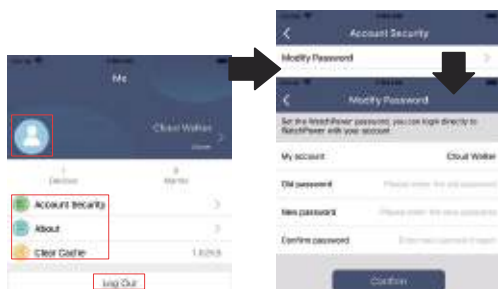
Part number label is pasted on the bottom of inverter.



For more information about Device List, please refer to the section 2.4.

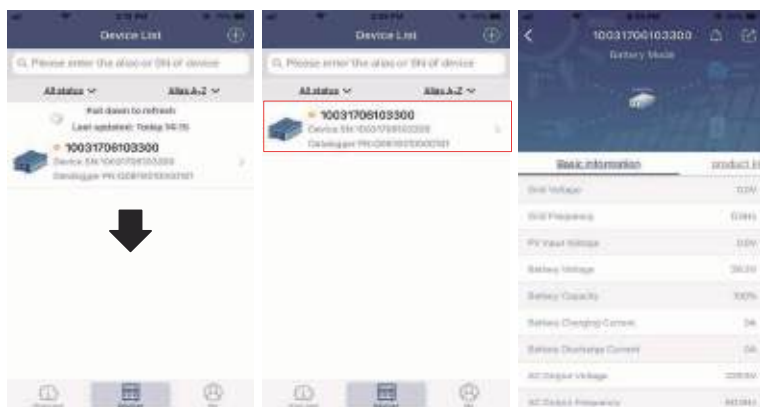
ME

In ME page, users can modify "My information", including **【User's Photo】** , **【Account security】** , **【Modify password】** , **【Clear cache】** , and **【Log-out】** , shown as below diagrams.



2-4. Device List

In Device List page, you can pull down to refresh the device information and then tap any device you want to check up for its real-time status and related information as well as to change parameter settings. Please refer to the parameter setting list.



Device Mode

On the top of screen, there is a dynamic power flow chart to show live operation. It contains five icons to present PV power, inverter, load, utility and battery. Based on your inverter model status, there will be **【Standby Mode】** , **【Line Mode】** , **【Battery Mode】** .

【Standby Mode】 Inverter will not power the load until “ON” switch is pressed. Qualified utility or PV source can charge battery in standby mode.



【Line Mode】 Inverter will power the load from the utility with or without PV charging. Qualified utility or PV source can charge battery.

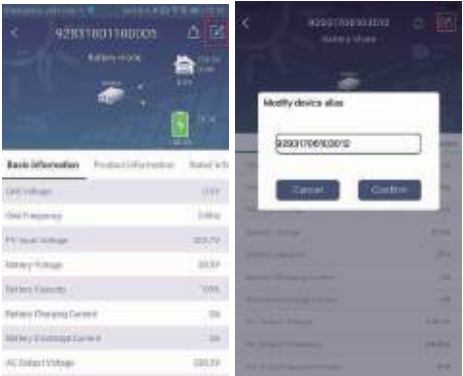


【Battery Mode】 Inverter will power the load from the battery with or without PV charging. Only PV source can charge battery.



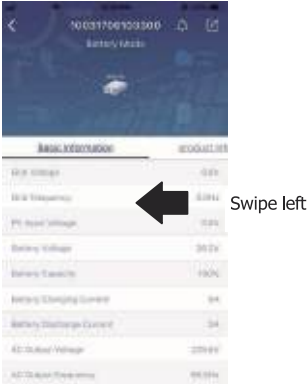
Device Alarm and Name Modification

In this page, tap the  icon on the top right corner to enter the device alarm page. Then, you can review alarm history and detailed information. Tap the  icon on the top right corner, a blank input box will pop out. Then, you can edit the name for your device and tap "Confirm" to complete name modification.



Device Information Data

Users can check up **【Basic Information】** , **【Product Information】** , **【Rated Information】** , **【History】** , and **【Wi-Fi Module Information】** by swiping left.



【Basic Information】 displays basic information of the inverter, including AC voltage, AC frequency, PV input voltage, Battery voltage, Battery capacity, Charging current, Output voltage, Output frequency, Output apparent power, Output active power and Load percent. Please slide up to see more basic information.

【Production Information】 displays Model type (Inverter type), Main CPU version, Bluetooth CPU version and secondary CPU version.

【Rated Information】 displays information of Nominal AC voltage, Nominal AC current, Rated battery voltage, Nominal output voltage, Nominal output frequency, Nominal output current, Nominal output apparent power and Nominal output active power. Please slide up to see more rated information.

【History】 displays the record of unit information and setting timely.

【Wi-Fi Module Information】 displays of Wi-Fi Module PN, status and firmware version.

Parameter Setting

This page is to activate some features and set up parameters for inverters. Please be noted that the listing in "Parameter Setting" page in below diagram may differ from the models of monitored inverter. Here will briefly highlight some of it, 【Output Setting】 , 【Battery Parameter Setting】 , 【Enable/ Disable items】 , 【Restore to the defaults】 to illustrate.



There are three ways to modify setting and they vary according to each parameter.

- a) Listing options to change values by tapping one of it.
- b) Activate/Shut down functions by clicking "Enable" or "Disable" button.
- c) Changing values by clicking arrows or entering the numbers directly in the column.

Each function setting is saved by clicking "Set" button.

Please refer to below parameter setting list for an overall description and be noted that the available parameters may vary depending on different models. Please always see the original product manual for detailed setting instructions.

Parameter setting list:

Item		Description
Output setting	Output source priority	To configure load power source priority.
	AC Input Range	When selecting "UPS", it's allowed to connect personal computer. Please check product manual for details.
		When selecting "Appliance", it's allowed to connect home appliances.
	Output Voltage	To set output voltage.
	Output Frequency	To set output frequency.
	AC Output mode	To set inverter to single, parallel, 3P1, 3P2, 3P3, 2P1, 2P2. Please see product manual on Appendix I: Parallel function.
Battery Parameters Setting	Battery Type	To set connected battery type.
	Battery Cut-off Voltage/Capacity	To set the battery stop discharging voltage or SOC. Please see product manual for the recommended voltage or SOC range based on connected battery type.
	Battery Cut-off Return Voltage/Capacity	To set the battery re-start discharging voltage or SOC. Please see product manual for the recommended voltage or SOC range based on connected battery type.
	Bulk Charging Voltage	It's to set up battery charging parameters. The selectable values in different inverter model may vary. Please see product manual for the details.
	Float Charging Voltage	It's to set up battery charging parameters. The selectable values in different inverter model may vary. Please see product manual for the details.
	Max. Charging Current	
	Max. AC Charging Current	
	Maximum Battery Discharge Current	To set Maximum discharging current.
	Charging Source Priority	To configure charger source priority.
	Battery Equalization	Enable or disable battery equalization function.
	Real-time Activate Battery Equalization	It's real-time action to activate battery equalization.
	Battery Equalization Time Out	To set up the duration time for battery equalization.
	Battery Equalization Time	To set up the extended time to continue battery equalization.
	Equalization Period	To set up the frequency for battery equalization.
	Equalization Voltage	To set up the battery equalization voltage.
	Back to Grid Voltage/ Capacity	When "SBU" is set as output source priority and battery voltage is lower than this setting voltage or SOC, unit will transfer to line mode and the grid will provide power to load.
	Back to Discharge Voltage/Capacity	When "SBU" is set as output source priority and battery voltage is higher than this setting voltage or SOC, battery will be allowed to discharge.

Enable/Disable Functions	LCD Auto-return to Main screen	If enable, LCD screen will return to its main screen after one minute automatically.
	Fault Code Record	If enabled, fault code will be recorded in the inverter when any fault happens.
	Backlight	If disabled, LCD backlight will be off when panel button is not operated for 1 minute.
	Bypass Function	If enabled, unit will transfer to line mode when overload happened in battery mode.
	Beeps While Primary Source Interrupt	If enabled, buzzer will alarm when primary source is abnormal.
	Over Temperature Auto Restart	If disabled, the unit won't be restarted after over-temperature fault is solved.
	Overload Auto Restart	If disabled, the unit won't be restarted after overload occurs.
	Buzzer	If disabled, buzzer won't be on when alarm/fault occurred.
Restore to the Default	This function is to restore all settings back to default settings.	

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