User Manual

3024LV-MSD
SOLAR INVERTER / CHARGER

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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.
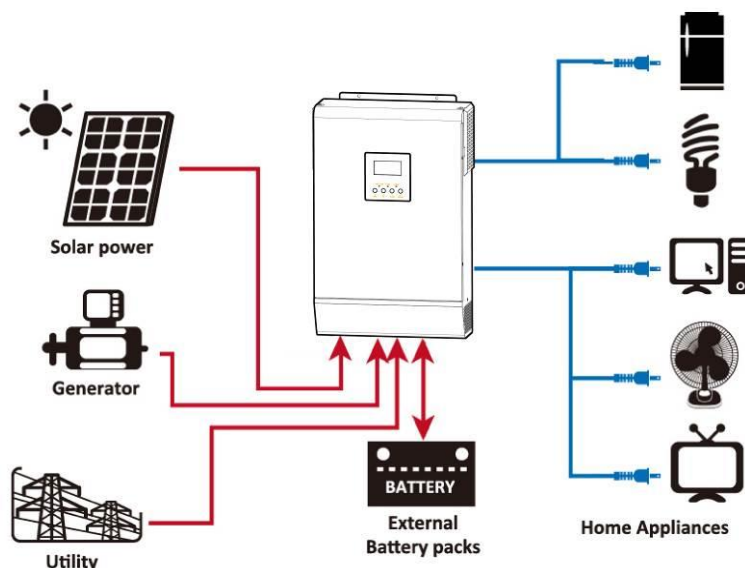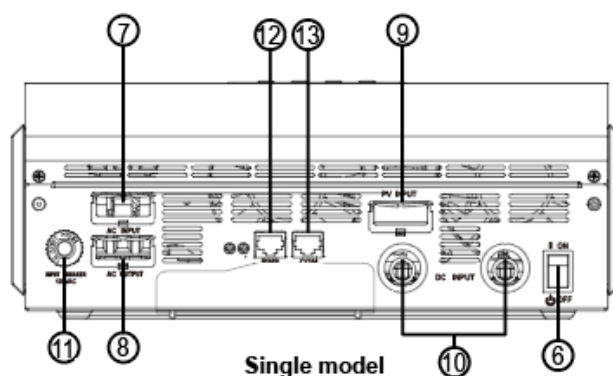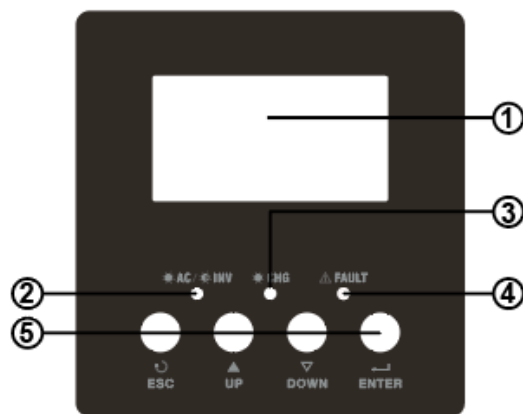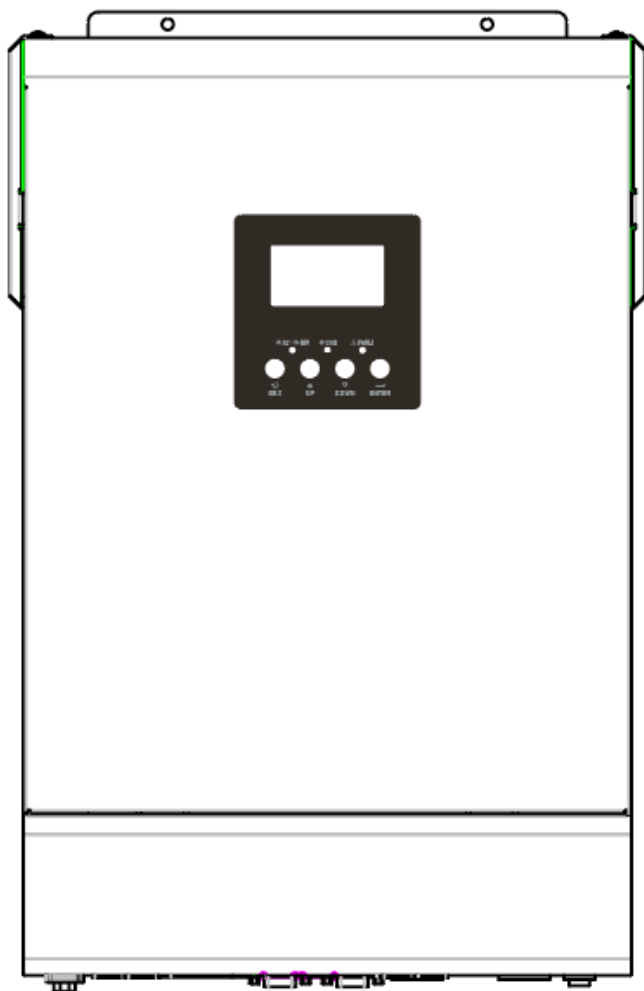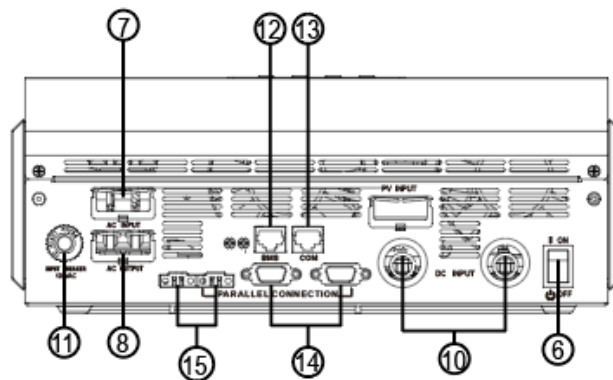

Figure 1 Hybrid Power System

Product Overview

1. LCD display
2. Status indicator
3. Charging indicator
4. Fault indicator
5. Function buttons
6. Power on/off switch
7. AC input
8. AC output
9. PV input
10. Battery input
11. Circuit breaker
12. BMS port
13. Communication port
14. Parallel communication port (only for parallel model)
15. Current sharing port (only for parallel model)

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

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.
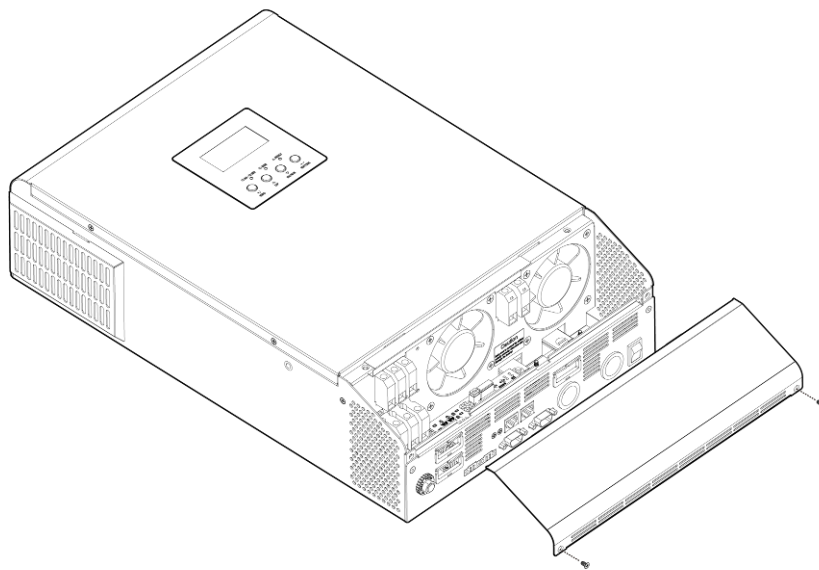
Mounting the Unit

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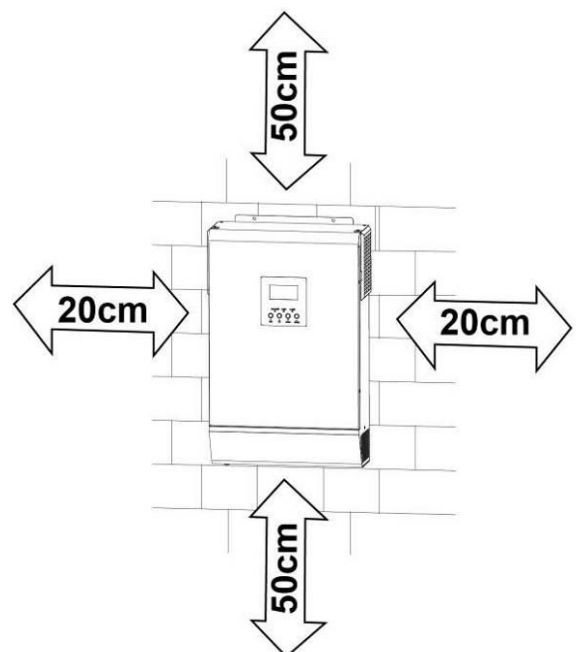
⚠ **SUITABLE FOR MOUNTING ON CONCRETE OR OTHER NON-COMBUSTIBLE SURFACE ONLY.**

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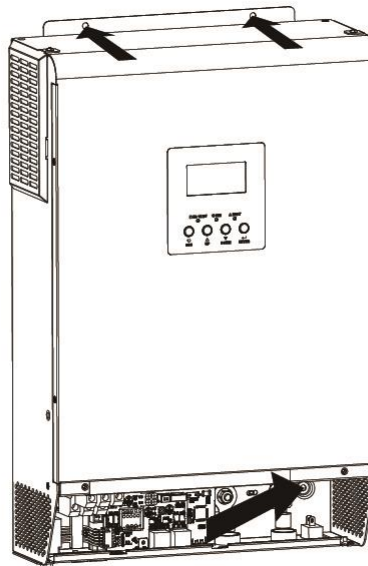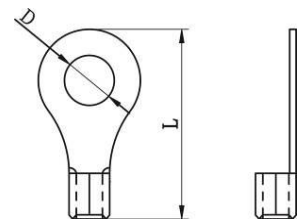

Battery Connection

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.

Ring terminal:

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

Recommended battery cable and terminal size:

Maximum Amperage	Battery capacity	Wire Size	Ring Terminal			Torque value
			Cable mm²	Dimensions		
				D (mm)	L (mm)	
145A	200AH	1*0AWG	38	6.4	39.2	2~ 3 Nm

Please follow below steps to implement battery connection:
1. Assemble battery ring terminal based on recommended battery cable and terminal size.
2. 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 Nm. Make sure polarity at both the battery and the inverter/charge is correctly connected and ring terminals are tightly screwed to the battery terminals.
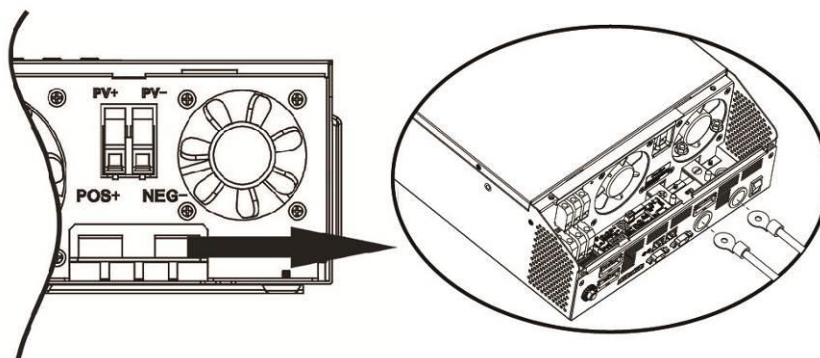
⚠	**WARNING: Shock Hazard**
	Installation must be performed with care due to high battery voltage in series.

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

AC Input/Output Connection

CAUTION!! Before connecting to AC input power source, please install a **separate** AC breaker between inverter and AC input power source. This will ensure the inverter can be securely disconnected during maintenance and fully protected from over current of AC input. 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 Value
8 AWG	1.4~ 1.6Nm

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

1. Before making AC input/output connection, be sure to open DC protector or disconnector first.
2. Remove insulation sleeve 10mm for 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)**
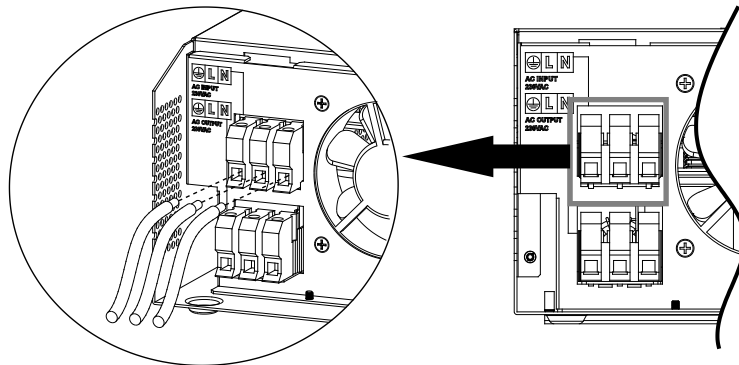
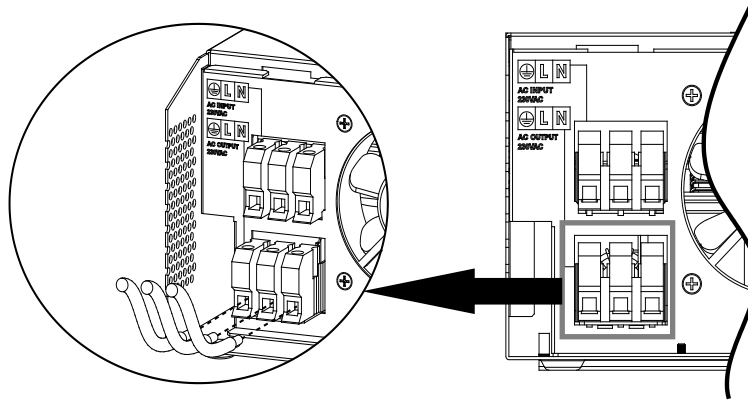| ⚠	**WARNING:**
	Be sure that AC power source is disconnected before attempting to hardwire it to the unit.

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

   ⏚→**Ground (yellow-green)**

L→LINE (brown or black)
N→Neutral (blue)

5. Make sure the wires are securely connected.

CAUTION: Important

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

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

PV Connection

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

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'' 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
18A	12 AWG	1.4~1.6 Nm

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

Solar Charging Mode	
Max. PV Array Open Circuit Voltage	250 V
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.
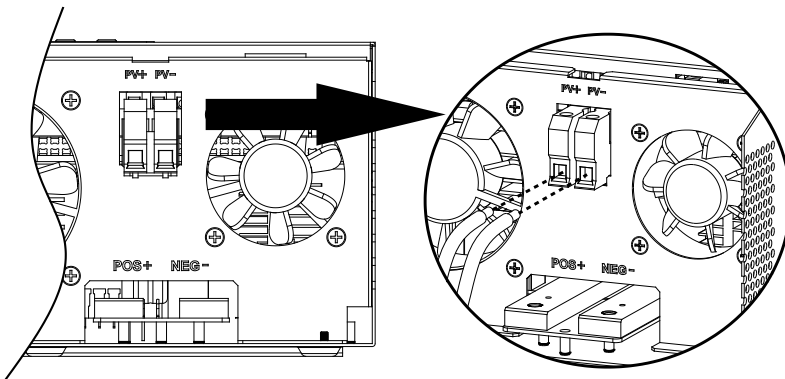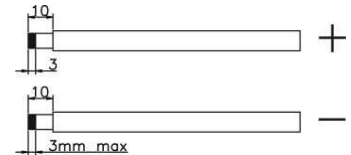
3. Make sure the wires are securely connected.

Final Assembly

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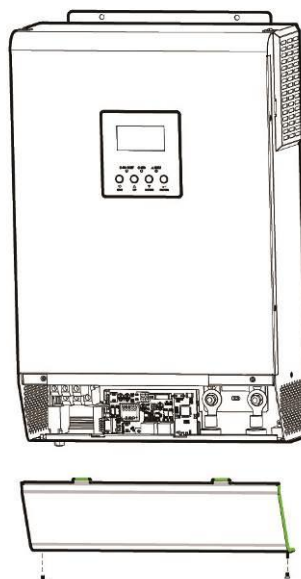
Communication Connection

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.

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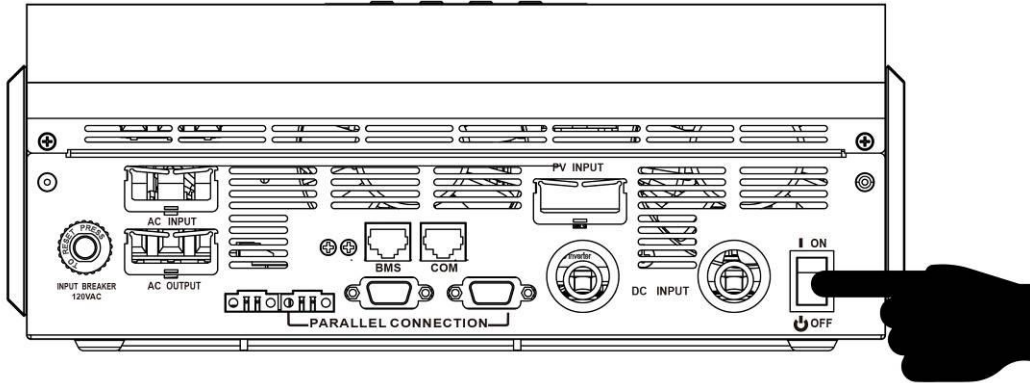
Once the unit has been properly installed and the batteries are connected well, simply press On/Off switch (located on the button of the case) to turn on the unit.

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.

LCD display

LED indicators
Function keys
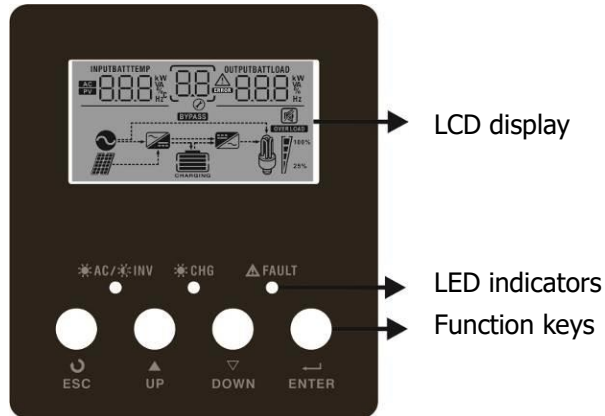
LED Indicator

LED Indicator			Messages
☀AC / ☀INV	Green	Solid On	Output is powered by utility in Line mode.
		Flashing	Output is powered by battery or PV in battery mode.
☀CHG	Green	Solid On	Battery is fully charged.
		Flashing	Battery is charging.
⚠FAULT	Red	Solid On	Fault occurs in the inverter.
		Flashing	Warning condition occurs in the inverter.

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
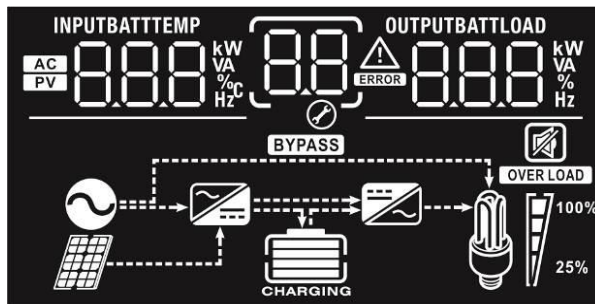
Icon	Function description
Input Source Information	
AC	Indicates the AC input.
PV	Indicates the PV input
INPUTBATT 888 kW VA %C Hz	Indicate input voltage, input frequency, PV voltage, battery voltage and charger current.
Configuration Program and Fault Information	
88	Indicates the setting programs.
88 ⚠ ERROR	Indicates the warning and fault codes. Warning: 88 ⚠ flashing with warning code. Fault: 88 ERROR lighting with fault code
Output Information	
OUTPUTBATTLOAD 888 kW VA % Hz	Indicate output voltage, output frequency, load percent, load in VA, load in Watt and discharging current.
Battery Information	
CHARGING	Indicates battery level by 0-24%, 25-49%, 50-74% and 75-100% in battery mode and charging status in line mode.

In AC mode, it will present battery charging status.

Status	Battery voltage	LCD Display
Constant Current mode / Constant Voltage mode	<2V/cell	4 bars will flash in turns.
	2 ~ 2.083V/cell	Bottom bar will be on and the other three bars will flash in turns.
	2.083 ~ 2.167V/cell	Bottom two bars will be on and the other two bars will flash in turns.
	> 2.167 V/cell	Bottom three bars will be on and the top 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%	< 1.717V/cell	
	1.717V/cell ~ 1.8V/cell	
	1.8 ~ 1.883V/cell	
	> 1.883 V/cell	
50%> Load > 20%	< 1.817V/cell	
	1.817V/cell ~ 1.9V/cell	
	1.9 ~ 1.983V/cell	
	> 1.983	
Load < 20%	< 1.867V/cell	
	1.867V/cell ~ 1.95V/cell	
	1.95 ~ 2.033V/cell	
	> 2.033	

Load Information

OVER LOAD	Indicates overload.

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

Mode Operation Information

	Indicates unit connects to the mains.
	Indicates unit connects to the PV panel.
BYPASS	Indicates load is supplied by utility power.
	Indicates the utility charger circuit is working.
	Indicates the DC/AC inverter circuit is working.

Mute Operation

	Indicates unit alarm is disabled.
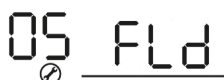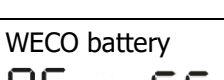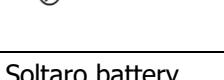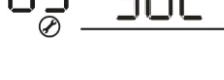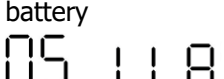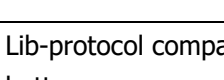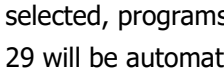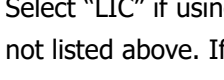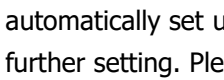
LCD Setting

After pressing and holding ENTER button for 3 seconds, the unit will enter setting mode. Press "UP" or "DOWN"

button to select setting programs. And then, press "ENTER" button to confirm the selection or ESC button to exit.

Setting Programs:

Progra m	Description	Selectable option	
00	Exit setting mode	Escape 00 ESC	
01	Output source priority: To configure load power source priority	Utility first (Default) 01 USb	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 01 SUb	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 01 SbU	Solar energy provides power to the loads as first priority. If solar energy is not sufficient to power all connected loads, battery energy will supply power to the loads at the same time. Utility provides power to the loads only when battery voltage drops to either low-level warning voltage or the setting point in program 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) 02 60 ᴬ	Setting range is from 10A to 80A. Increment of each click is 10A.
03	AC input voltage range	Appliances (default) 03 APL	If selected, acceptable AC input voltage range will be within 80-140VAC.
		UPS 03 UPS	If selected, acceptable AC input voltage range will be within 90-140VAC.
04	Power saving mode enable/disable	Saving mode disable (default) 04 SdS	If disabled, no matter connected load is low or high, the on/off status of inverter output will not be effected.

~~		~~Saving mode enable~~ ~~04 SEN~~	~~If enabled, the output of inverter will be off when connected load is pretty low or not detected.~~
05	Battery type	AGM (default) 05 AGn	Flooded 05 FLd
		User-Defined 05 USE	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 05 PYL	If selected, programs of 02, 26, 27 and 29 will be automatically set up. No need for further setting.
		WECO battery 05 uEC	If selected, programs of 02, 12, 26, 27 and 29 will be auto-configured per battery supplier recommended. No need for further adjustment.
		Soltaro battery 05 SOL	If selected, programs of 02, 26, 27 and 29 will be automatically set up. No need for further setting.
		LIA-protocol compatible battery 05 LI A	Select "LIA" if using Lithium battery compatible to CAN protocol. If selected, programs of 02, 26, 27 and 29 will be automatically set up. No need for further setting.
		Lib-protocol compatible battery 05 LI b	Select "Lib" if using Lithium battery compatible to RS485 protocol. If selected, programs of 02, 26, 27 and 29 will be automatically set up. No need for further setting.
		3rd party Lithium battery 05 LI C	Select "LIC" if using Lithium battery not listed above. If selected, programs of 02, 26, 27 and 29 will be automatically set up. No need for further setting. Please contact the battery supplier for installation procedure.
06	Auto restart when overload occurs	Restart disable (default) 06 Ltd	Restart enable 06 LtE
07	Auto restart when over temperature occurs	Restart disable (default) 07 ttd	Restart enable 07 ttE
08	Output voltage	110V 08 110v	120V (default) 08 120v

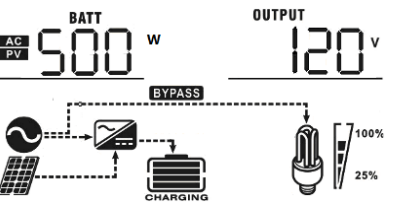|			
		127V **08 127**v	
09	Output frequency	50Hz **09 50**Hz	60Hz (default) **09 60**Hz
11	Maximum utility charging current Note: If setting value in program 02 is smaller than that in program in 11, the inverter will apply charging current from program 02 for utility charger.	30A (default) **Grd 11 30**A	
		Setting range is 2A, then from 10A to 80A. Increment of each click is 10A.	
12	Setting voltage point or SOC back to utility source when selecting "SBU priority" in program 01.	23V (default) **12 BATT 23**v	Setting range is from 22V to 25.5V. Increment of each click is 0.5V.
		SOC 10% (default for Lithium battery) **SOC 12 BATT 10**%	If any types of lithium battery is selected in program 05, setting value will change to SOC automatically. Adjustable range is from 5% to 95%. Increment of each click is 5%.
13	Setting voltage point or SOC back to battery mode when selecting "SBU priority" in program 01.	Battery fully charged **13 BATT FUL**	27V (default) **13 BATT 27**v
		Setting range is from 24V to 29V. Increment of each click is 0.5V.	
		SOC 80% (default for Lithium battery) **SOC 13 BATT 80**%	If any types of lithium battery is selected in program 05, setting value will change to SOC automatically. Adjustable range is from 10% to 100%. Increment of each click is 5%.
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 **16 CSO**	Solar energy will charge battery as first priority. Utility will charge battery only when solar energy is not available.
		Utility first **16 CUt**	Utility will charge battery as first priority. Solar energy will charge battery only when utility power is not available.

		Solar and Utility (default) `I6 SNU`	Solar energy and utility will charge battery at the same time.
		If this inverter/charger is working in Battery mode or Power saving mode, only solar energy can charge battery. Solar energy will charge battery if it's available and sufficient.	
18	Alarm control	Alarm on (default) `I8 bON`	Alarm off `I8 bOF`
19	Auto return to default display screen	Return to default display screen (default) `I9 ESP`	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 `I9 ⊢EP`	If selected, the display screen will stay at latest screen user finally switches.
20	Backlight control	Backlight on (default) `20 LON`	Backlight off `20 LOF`
22	Beeps while primary source is interrupted	Alarm on (default) `22 AON`	Alarm off `22 AOF`
23	Overload bypass: When enabled, the unit will transfer to line mode if overload occurs in battery mode.	Bypass disable (default) `23 bYd`	Bypass enable `23 bYE`
25	Record Fault code	Record enable `25 FEN`	Record disable (default) `25 FdS`
26	Bulk charging voltage (C.V voltage)	default setting: 28.2V `CU 26 28.2ᵥ BATT`	
		If self-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	default setting: 27.0V `FLU 27 27.0ᵥ BATT`	
		If self-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: 28 SIG (OUTPUT)	When the units are used in parallel with single phase, please select "PAL" in program 28.
		Parallel: 28 PAL (OUTPUT)	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 5-2 for detailed information. Please select "3P1" in program 28 for the inverters connected to L1 phase, "3P2" in program 28 for the inverters connected to L2 phase and "3P3" in program 28 for the inverters connected to L3 phase.
		L1 phase: 28 3P1 (OUTPUT)	
		L2 phase: 28 3P2 (OUTPUT)	
		L3 phase: 28 3P3 (OUTPUT)	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 5-2 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".
		L1 for split phase: 28 2P1	
		L2 for split phase: 120 28 2P2	
		L2 for split phase: 180 28 2P2	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.

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.	default setting: 21.0V COᵛ 29 21.0ᵥ BATT	If self-defined is selected in program 5, this program can be set up. Setting range is from 21.0V to 24.0V. Increment of each click is 0.1V. Low DC cut-off voltage will be fixed to setting value no matter what percentage of load is connected.
		SOC 0% (default for Lithium) SOC 29 0% BATT	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	Battery equalization	Battery equalization 30 EEn	Battery equalization disable (default) 30 EdS
		If "Flooded" or "User-Defined" is selected in program 05, this program can be set up.	
31	Battery equalization voltage	default setting: 29.2V Eᵛ 31 29.2ᵥ BATT	Setting range is from 25.0V to 31.5V. Increment of each click is 0.1V.
33	Battery equalized time	60min (default) 33 60	Setting range is from 5min to 900min. Increment of each click is 5min.
34	Battery equalized timeout	120min (default) 34 120	Setting range is from 5min to 900 min. Increment of each click is 5 min.
35	Equalization interval	30days (default) 35 30d	Setting range is from 0 to 90 days. Increment of each click is 1 day
36	Equalization activated immediately	36 AEn Enable	Disable (default) 36 AdS
		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 shows "Eq". If "Disable" is selected, it will cancel equalization function until next activated equalization time arrives based on program 35 setting. At this time, "Eq" will not be shown in LCD main page.	
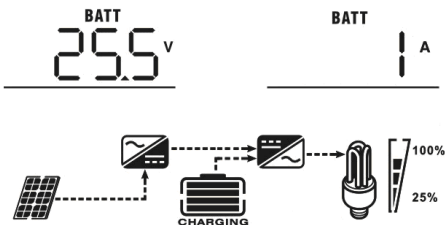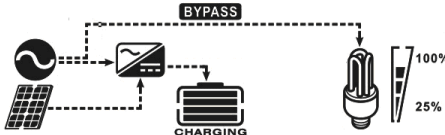
Display Setting

The LCD display information will be switched in turns by pressing "UP" or "DOWN" key. The selectable information is switched as below order: input voltage, input frequency, PV voltage, MPPT charging current, MPPT charging power, charging current, charging power, battery voltage, output voltage, output frequency, load percentage, load in VA, load in Watt, DC discharging current, main CPU Version and second CPU Version.

Selectable information	LCD display
Input voltage/Output voltage (Default Display Screen)	Input Voltage=120V, output voltage=120V
Input frequency	Input frequency=60Hz
PV voltage	PV voltage=260V
PV current	PV current = 2.5A
PV power	PV power = 500W

Charging Current	AC and PV charging current=50A PV charging current=50A
Charging current	AC charging current=50A
Charging power	AC and PV charging power=500W PV charging power=500W AC charging power=500W
Battery voltage and output voltage	Battery voltage=25.5V, output voltage=230V
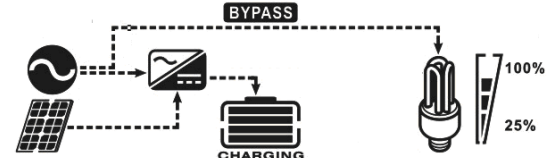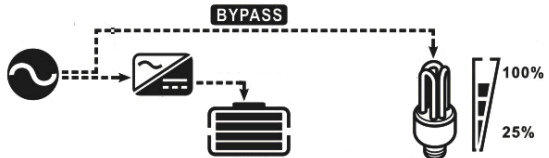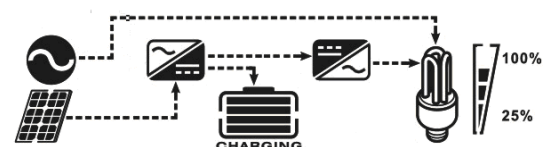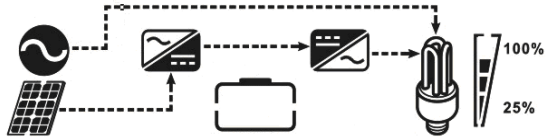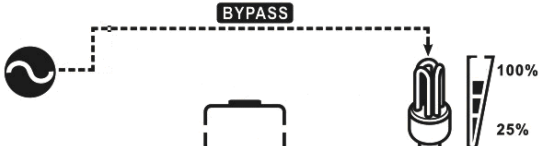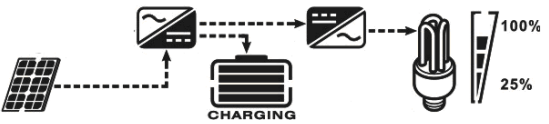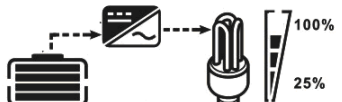
Output frequency	Output frequency=50Hz
Load percentage	Load percent=70%
Load in VA	When connected load is lower than 1kVA, load in VA will present xxxVA like below chart. When load is larger than 1kVA (≥1KVA), load in VA will present x.xkVA like below chart.
Load in Watt	When load is lower than 1kW, load in W will present xxxW like below chart. When load is larger than 1kW (≥1KW), load in W will present x.xkW like below chart.
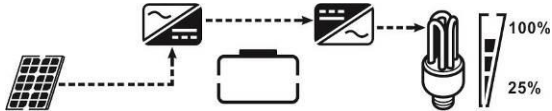
	Battery voltage=25.5V, discharging current=1A
Battery voltage/DC discharging current	
Main CPU version checking	Main CPU version 00014.04

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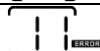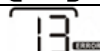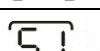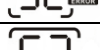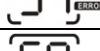
| Operation mode	Description	LCD display
Standby mode **Note:** *Standby mode: The inverter is not turned on yet but at this time, the inverter can charge battery without AC output.	No output is supplied by the unit but it still can charge batteries.	Charging by utility and PV energy.
		Charging by utility.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

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 "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 "solar first" is selected as output source priority and battery is not connected, solar energy and the utility will provide the loads.
		Power from utility.
Battery Mode	The unit will provide output power from battery and PV power.	Power from battery and PV energy.
		PV energy will supply power to the loads and charge battery at the same time.
		Power from battery only.

	The unit will provide output power from battery and PV power.	Power from PV energy only.
Battery Mode		

Fault Reference Code

Fault Code	Fault Event	Icon on
01	Fan is locked when inverter is off.	01 ERROR
02	Over temperature	02 ERROR
03	Battery voltage is too high	03 ERROR
04	Battery voltage is too low	04 ERROR
05	Output short circuited.	05 ERROR
06	Output voltage is too high.	06 ERROR
07	Overload time out	07 ERROR
08	Bus voltage is too high	08 ERROR
09	Bus soft start failed	09 ERROR
10	PV over current	10 ERROR
11	PV over voltage	11 ERROR
12	DCDC over current	12 ERROR
13	Battery discharge over current	13 ERROR
51	Over current	51 ERROR
52	Bus voltage is too low	52 ERROR
53	Inverter soft start failed	53 ERROR
55	Over DC voltage in AC output	55 ERROR
57	Current sensor failed	57 ERROR
58	Output voltage is too low	58 ERROR

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⚠
03	Battery is over-charged	Beep once every second	03⚠
04	Low battery	Beep once every second	04⚠
07	Overload	Beep once every 0.5 second	07⚠ 100% 25% OVER LOAD
10	Output power derating	Beep twice every 3 seconds	10⚠
15	PV energy is low	Beep twice every 3 seconds	15⚠
E9	Battery equalization	None	E9⚠
bP	Battery is not connected	None	bP⚠

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.
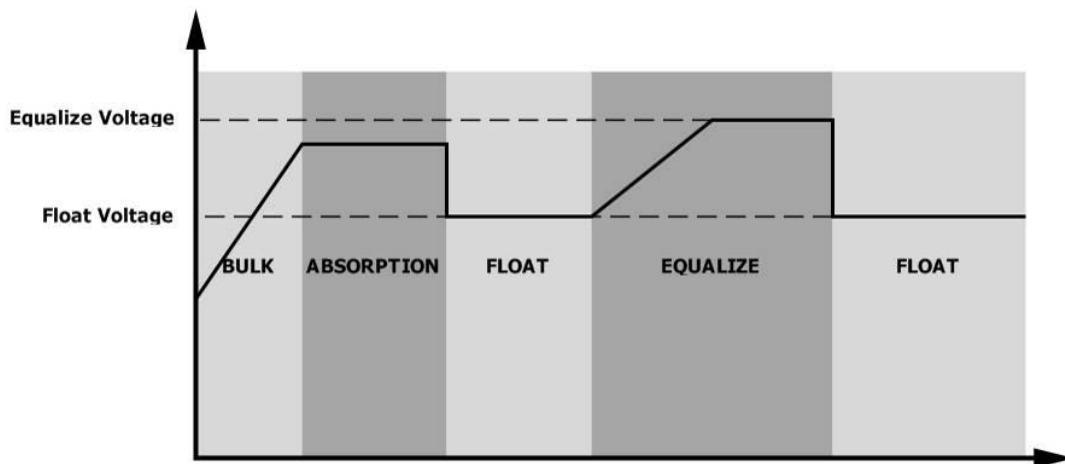
- **Equalize charging time and timeout**

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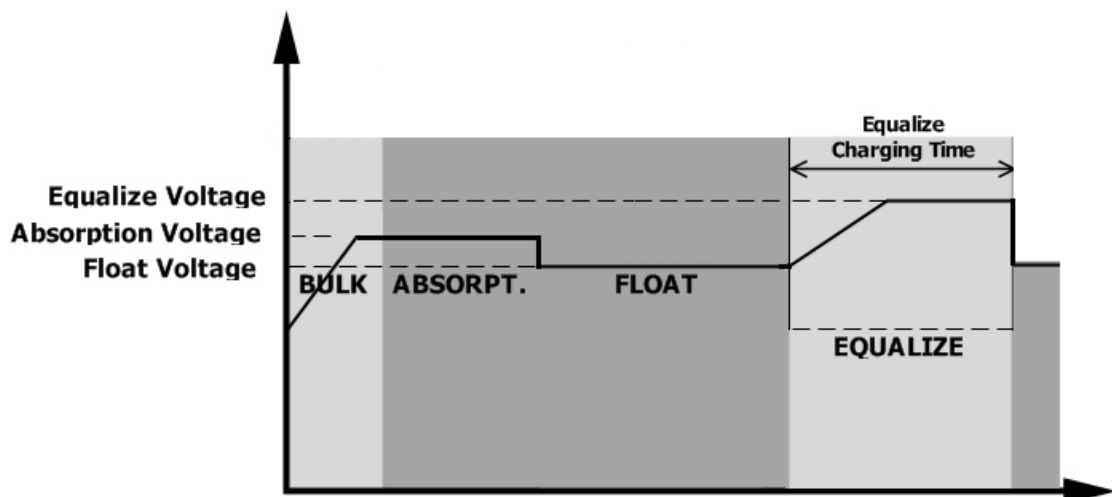
However, in Equalize stage, when battery equalized time is expired and battery voltage doesn't rise to battery equalization voltage point, the charge controller will extend the battery equalized time until battery voltage achieves battery equalization voltage. If battery voltage is still lower than battery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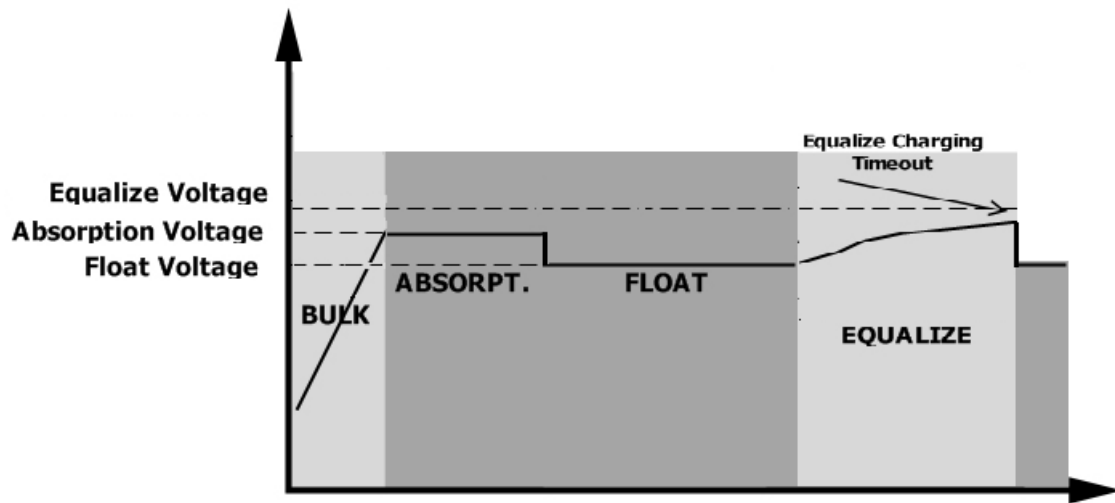
SPECIFICATIONS

Table 1 Line Mode Specifications

MODEL	3024LV-MSD
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 full charged)
Transfer Time	10ms typical (UPS); 20ms typical (Appliances)
Output power derating	

Table 2 Inverter Mode Specifications

MODEL	3024LV-MSD
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% @ 20% ≤ load < 50% @ load ≥ 50%	23.0Vdc 21.4Vdc 20.2Vdc
Low DC Warning Return Voltage @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	24.0Vdc 22.4Vdc 21.2Vdc
Low DC Cut-off Voltage @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	22.0Vdc 20.4Vdc 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.	Output Load; Rate Power; Rate Power -600; 18.8Vdc; 25Vdc; Battery Voltage

Table 3 Charge Mode Specifications

Utility Charging Mode	
MODEL	**3024LV-MSD**
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	**3024LV-MSD**
Rated Power	3000W
Max. PV Array Open Circuit Voltage	250Vdc
PV Array MPPT Voltage Range	90Vdc~230Vdc
Max. Input Current	18A
Start-up Voltage	80V +/- 5Vdc

Table 4 General Specifications

MODEL	**3024LV-MSD**
Safety Certification	UL
Operating Temperature Range	-10°C to 40°C
Storage temperature	-15°C~ 60°C
Humidity	5% to 95% Relative Humidity (Non-condensing)
Dimension (D*W*H), mm	142.4x 307.8 x477.6
Net Weight, kg	12

TROUBLE SHOOTING

Problem	LCD/LED/Buzzer	Explanation / Possible cause	What to do
Unit shuts down automatically during startup process.	LCD/LEDs and buzzer will be active for 3 seconds and then complete off.	The battery voltage is too low (<1.91V/Cell)	1. Re-charge battery. 2. Replace battery.
No response after power on.	No indication.	1. The battery voltage is far too low. (<1.4V/Cell) 2. Battery polarity is connected reversed.	1. Check if batteries and the wiring are connected well. 2. Re-charge battery. 3. Replace battery.
Mains exist but the unit works in battery mode.	Input voltage is displayed as 0 on the LCD and green LED is flashing.	Input protector is tripped	Check if AC breaker is tripped and AC wiring is connected well.
	Green LED is flashing.	Insufficient quality of AC power. (Shore or Generator)	1. Check if AC wires are too thin and/or too long. 2. Check if generator (if applied) is working well or if input voltage range setting is correct. (UPS→Appliance)
	Green LED is flashing.	Set "Solar First" as the priority of output source.	Change output source priority to Utility first.
When the unit is turned on, internal relay is switched on and off repeatedly.	LCD display and LEDs are flashing	Battery is disconnected.	Check if battery wires are connected well.
Buzzer beeps continuously and red LED is on.	Fault code 07	Overload error. The inverter is overload 110% and time is up.	Reduce the connected load by switching off some equipment.
	Fault code 05	Output short circuited.	Check if wiring is connected well and remove abnormal load.
		Temperature of internal converter component is over 120°C. (Only available for 1-3KVA models.)	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 100°C.	
	Fault code 03	Battery is over-charged.	Return to repair center.
		The battery voltage is too high.	Check if spec and quantity of batteries are meet requirements.
	Fault code 01	Fan fault	Replace the fan.
	Fault code 06/58	Output abnormal (Inverter voltage below than 190Vac or is higher than 260Vac)	1. Reduce the connected load. 2. Return to repair center
	Fault code 08/09/53/57	Internal components failed.	Return to repair center.
	Fault code 51	Over current or surge.	Restart the unit, if the error happens again, please return to repair center.
	Fault code 52	Bus voltage is too low.	
	Fault code 55	Output voltage is unbalanced.	
	Fault code 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. three units support one phase maximum. The supported maximum output power is 18KW/18KVA and one phase can be up to 9KW/9KVA.

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

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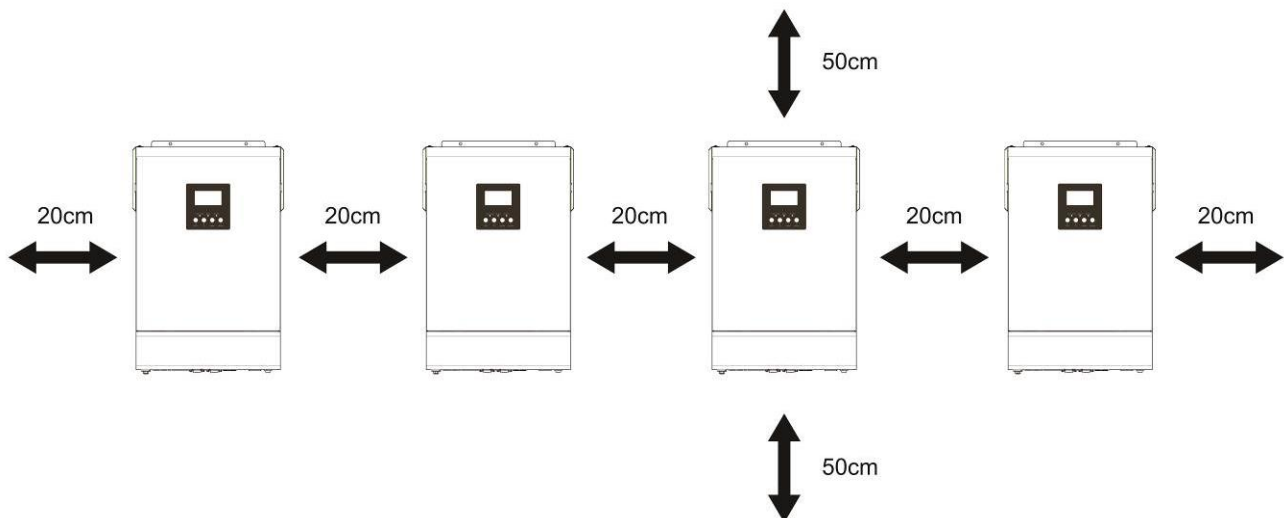
NOTE: For proper air circulation to dissipate heat, allow a clearance of approx. 20 cm to the side and approx. 50 cm above and below the unit. Be sure to install each unit in the same level.

3. Wiring Connection

The cable size of each inverter is shown as below:

**Recommended battery cable and terminal size for each inverter:**

Ring terminal:

| Model | Wire Size | Ring Terminal | | | Torque value |
| | | Cable mm² | Dimensions | | |
			D (mm)	L (mm)	
3KW	1*6AWG	14	6.4	33.2	2~ 3 Nms

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
14 AWG	0.8~ 1.0 Nm
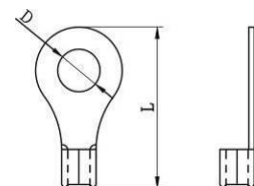
You need to connect the cables of each inverter together. Take the battery cables for example: You need to use

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 spe	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
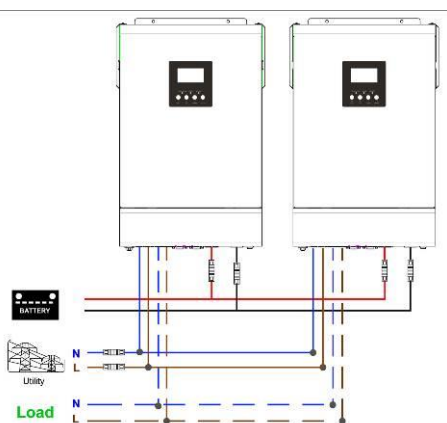
Recommended battery capacity

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.

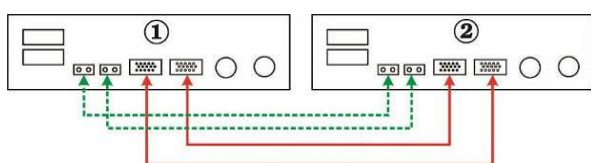## 5-1. Parallel Operation in Single phase

Two inverters in parallel:

Power Connection
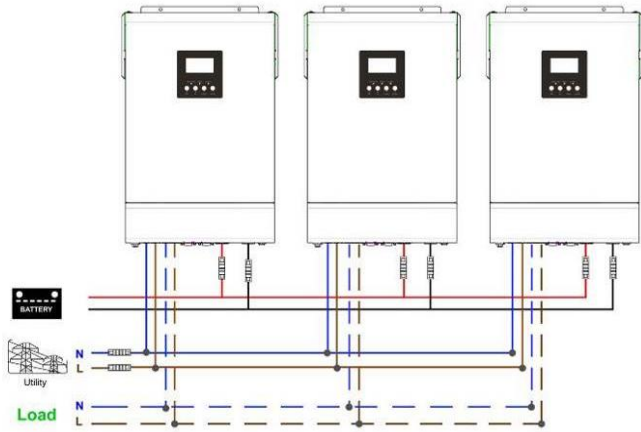

Communication Connection
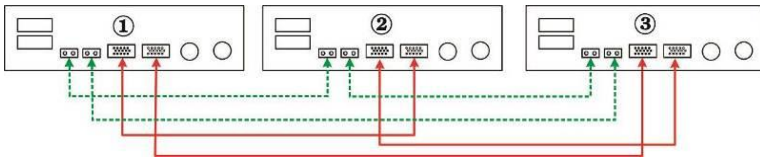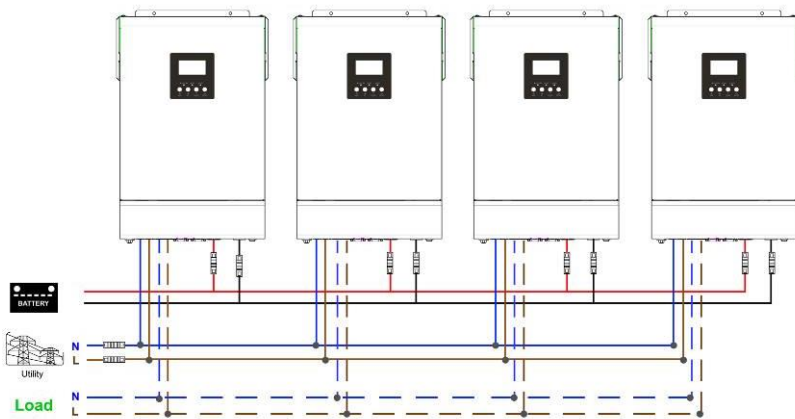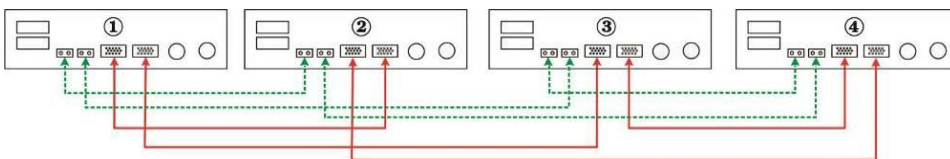

Three inverters in parallel:

Power Connection

Communication Connection

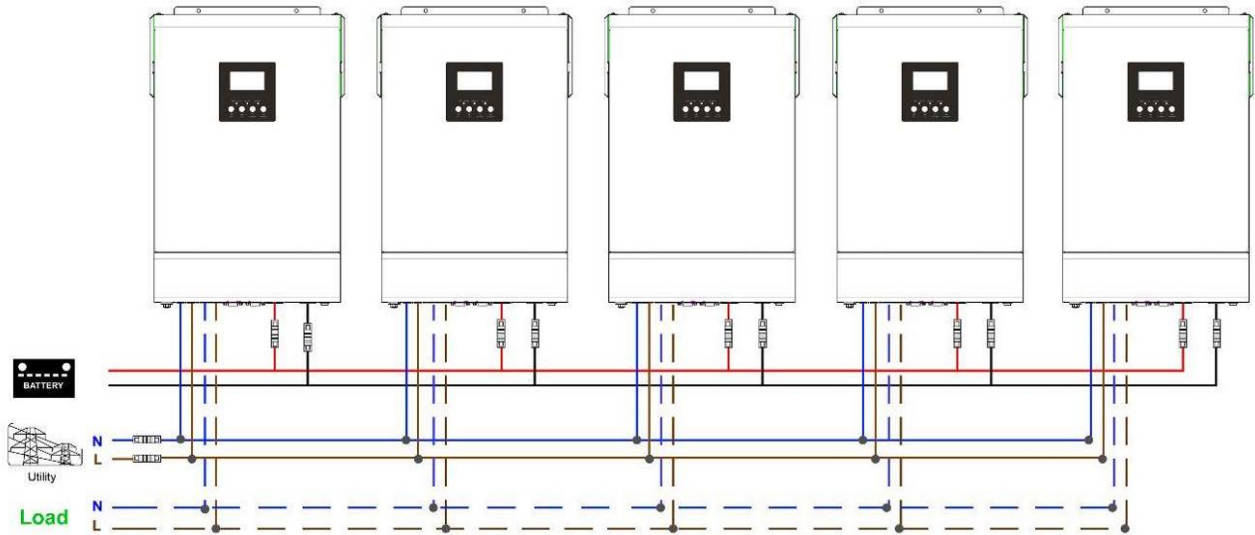Four inverters in parallel:

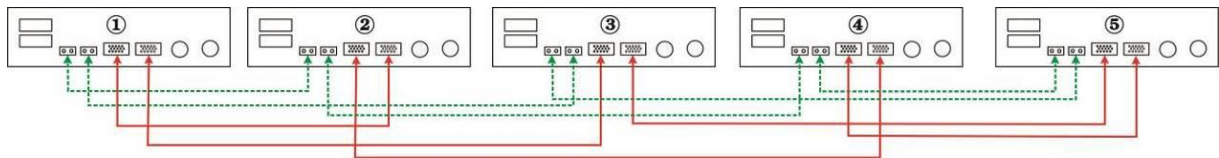## Power Connection

Communication Connection

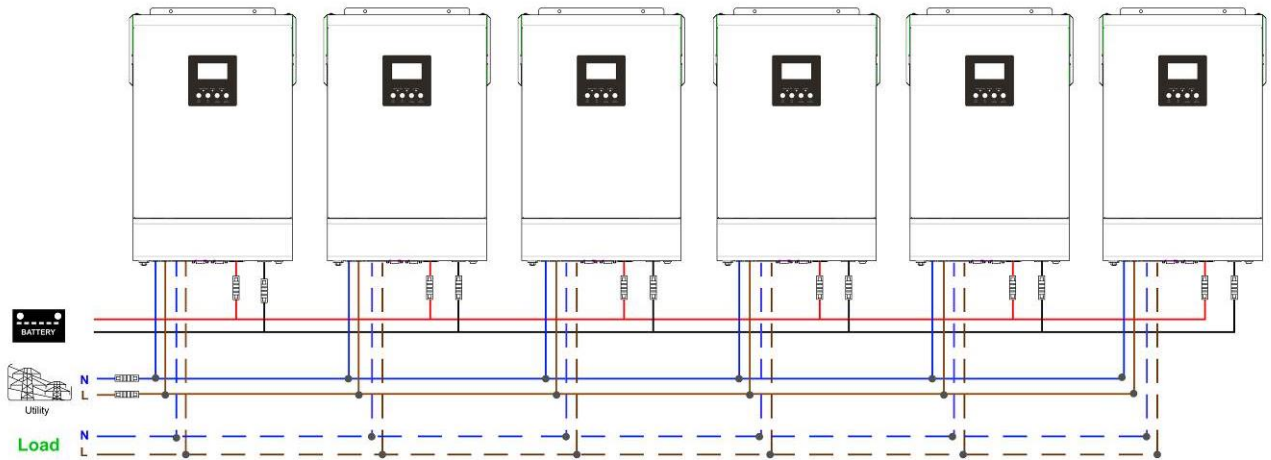Five inverters in parallel:

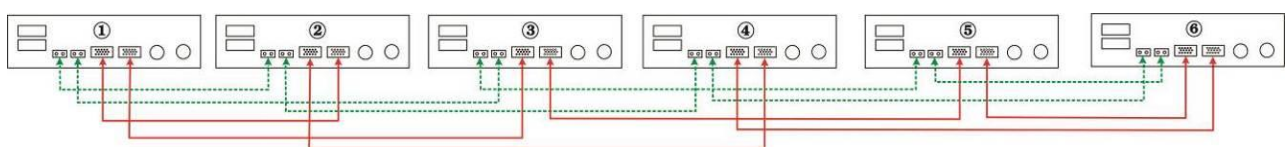**Power Connection**

Communication Connection

Six inverters in parallel:
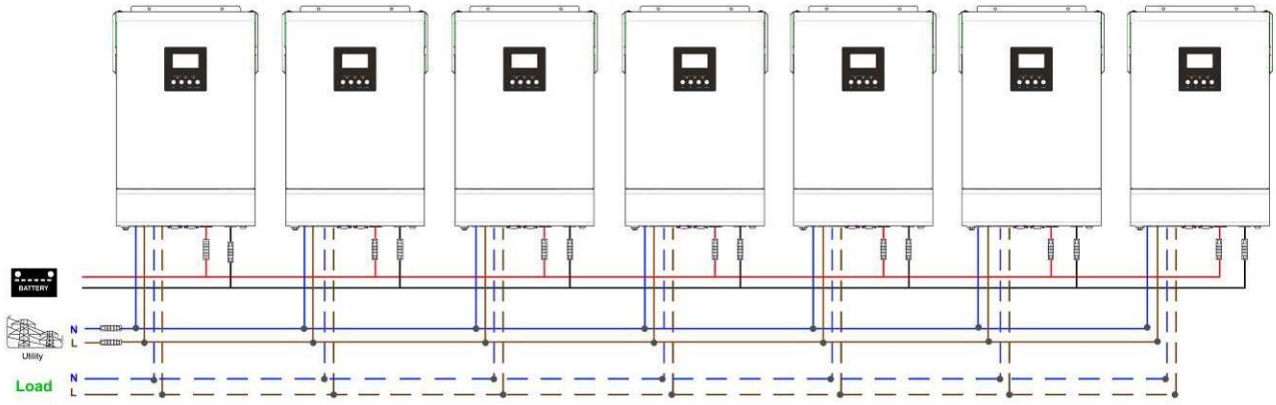
Power Connection
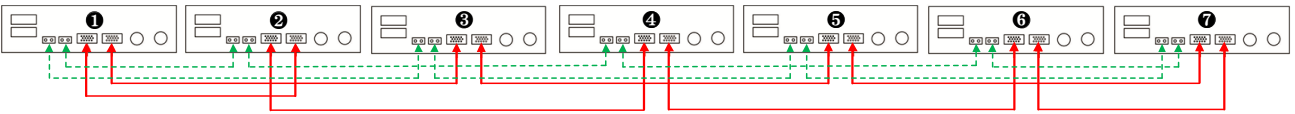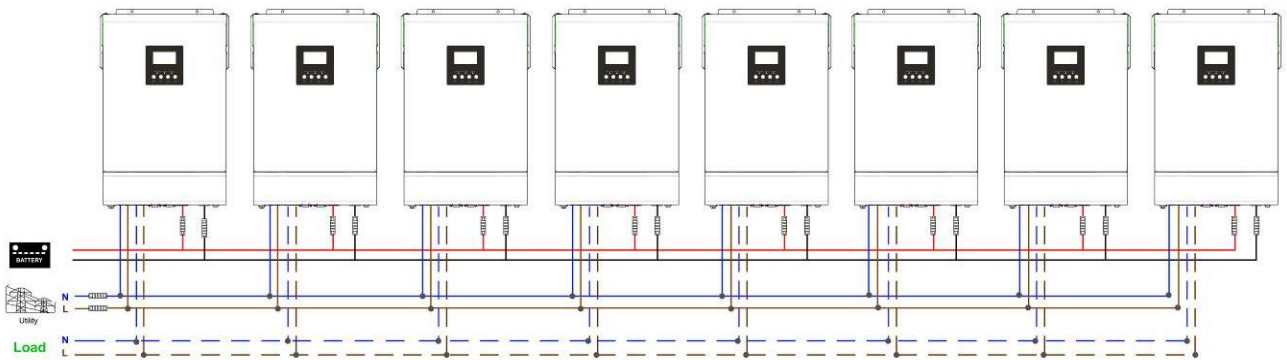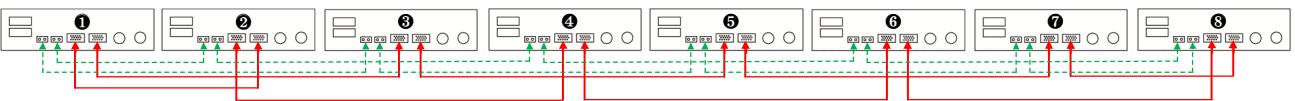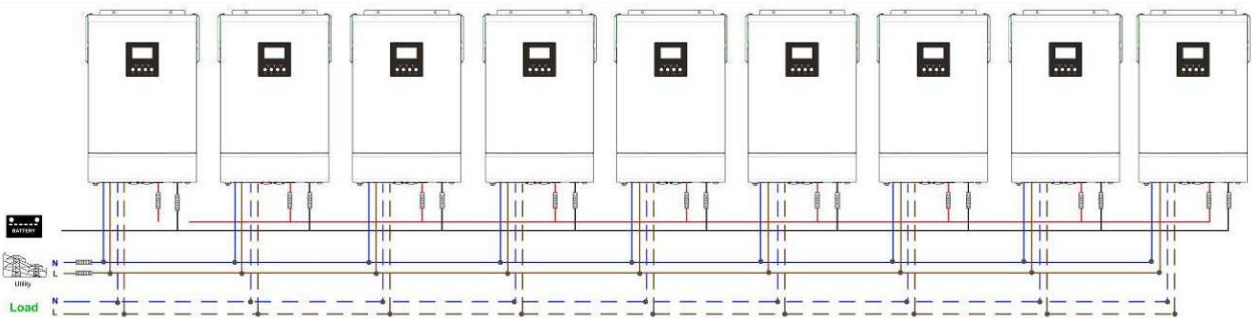

Communication Connection

Seven inverters in parallel:

Power Connection

Communication Connection

Eight inverters in parallel:

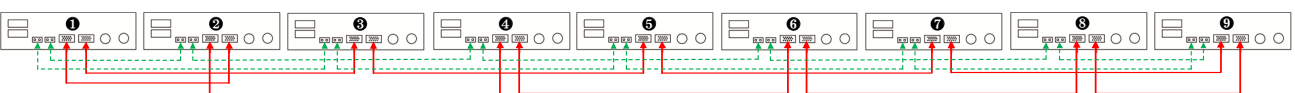**Power Connection**

Communication Connection

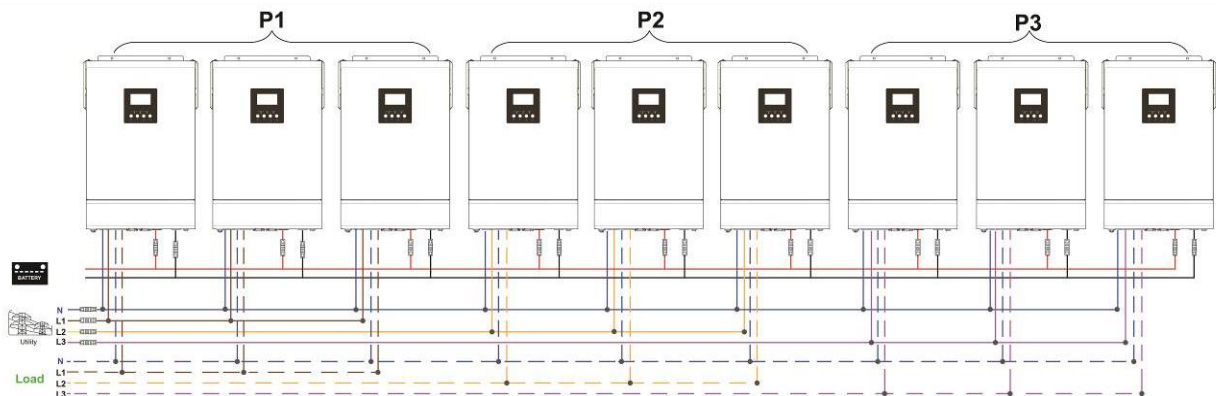

Nine inverters in parallel:

Power Connection
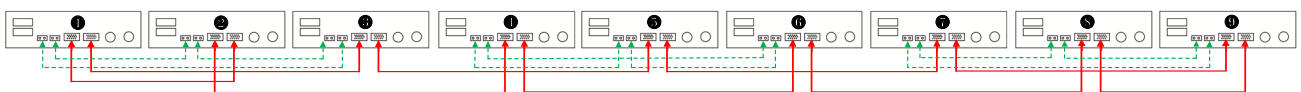

Communication Connection

5-2. Support 3-phase equipment

Three inverters in each phase:

Power Connection
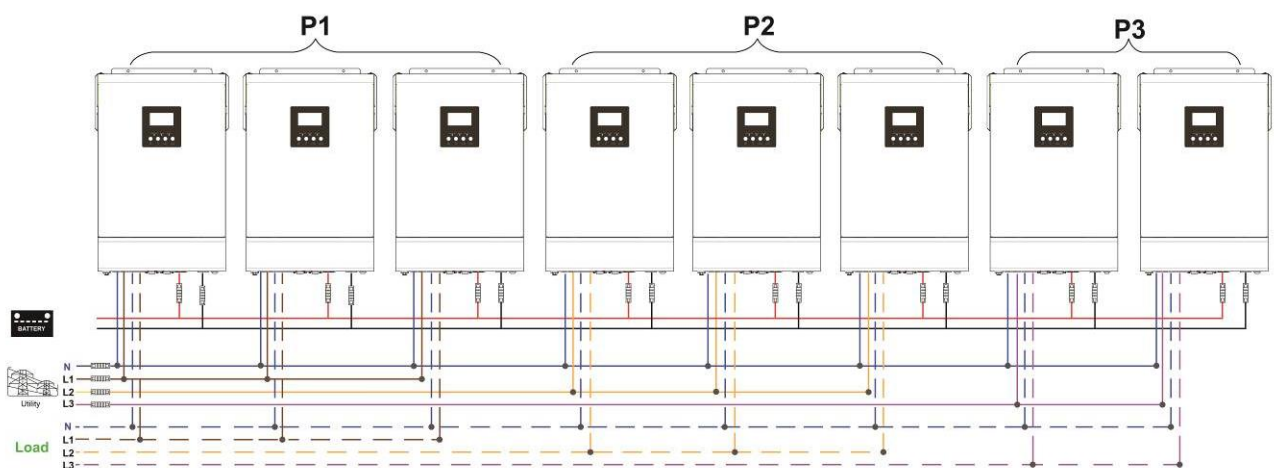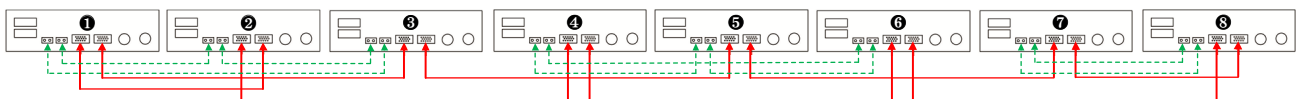

Communication Connection

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

Power Connection

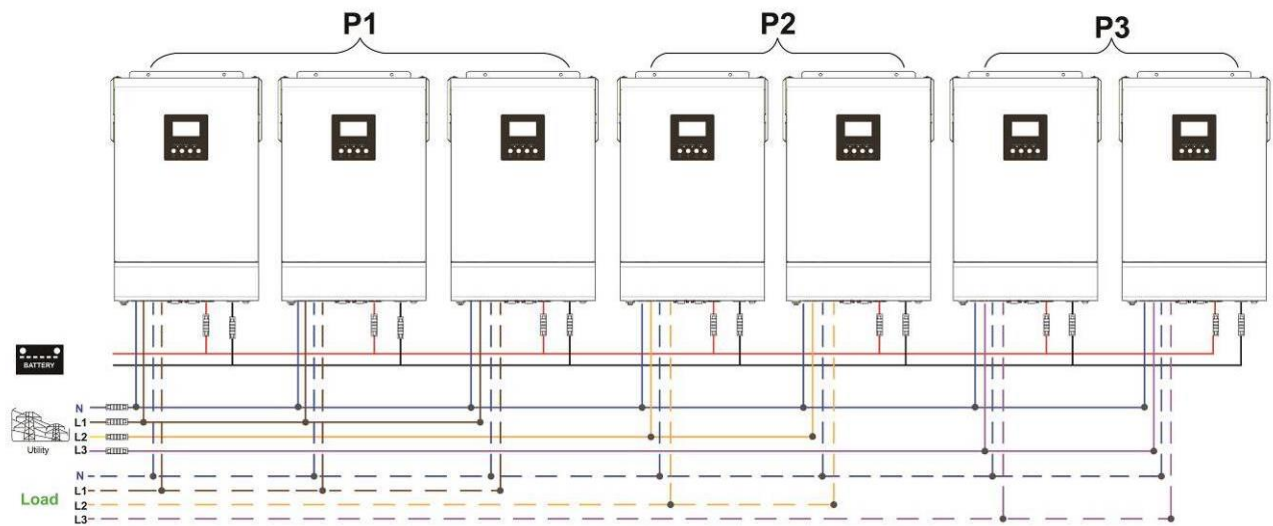**Communication Connection**

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:

38

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
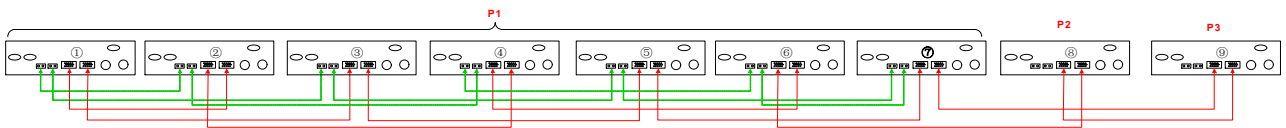
Note: If there is only one unit in one phase, this unit doesn't need to connect the current sharing cable.
Or you connect it like as below:
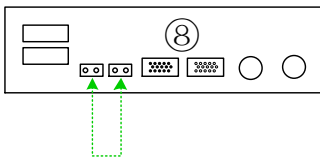
Four inverters in one phase and one inverter for the other two phases:

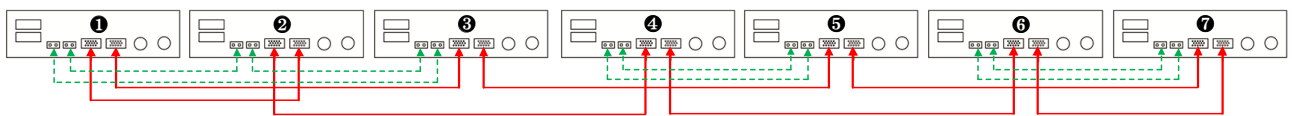**Power Connection**
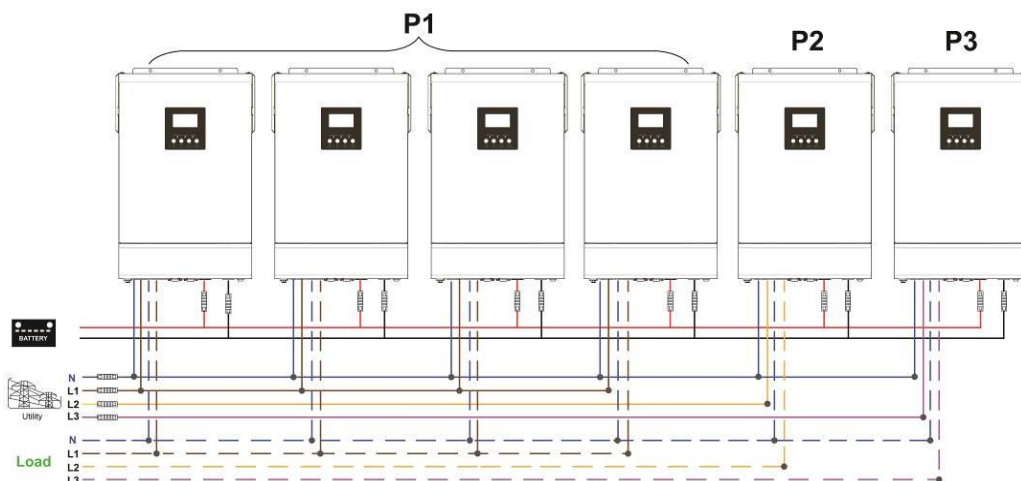
Communication Connection
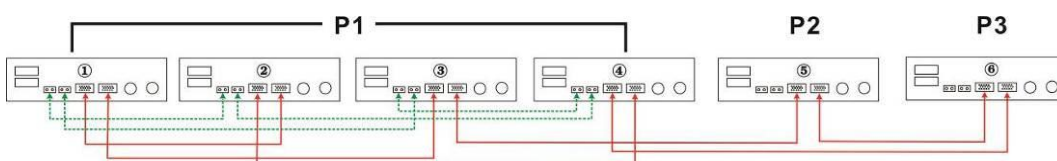
Three inverters in one phase, two inverters in second phase and one inverter for the third phase:
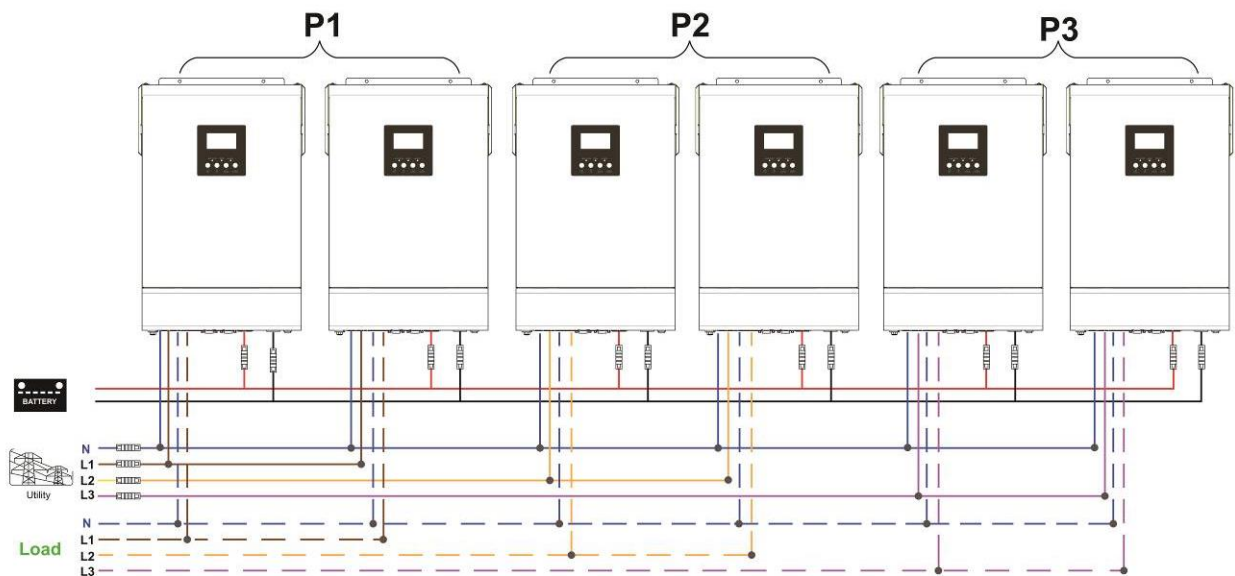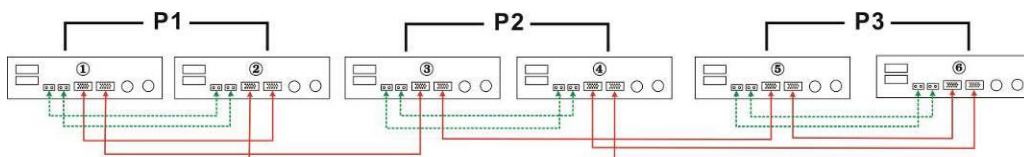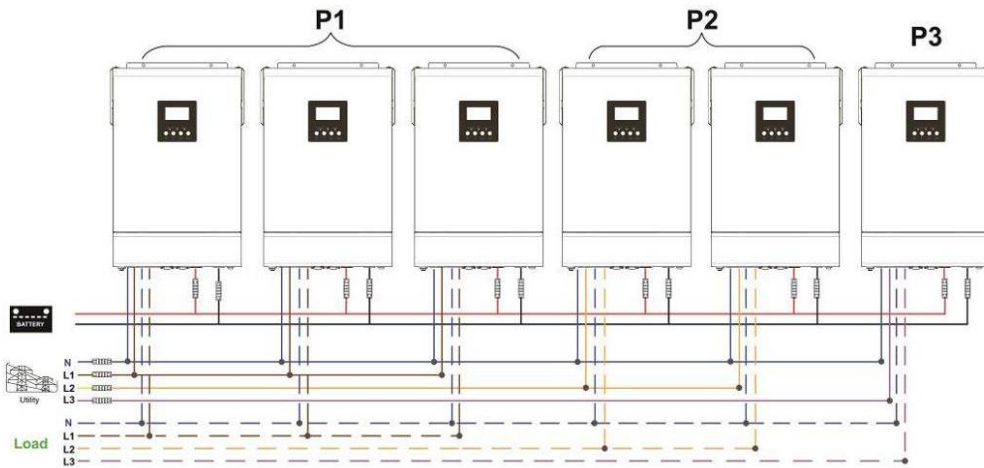
Power Connection

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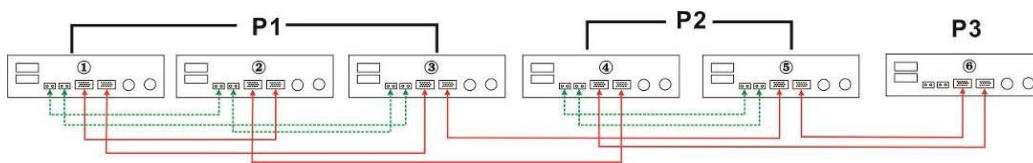
Three inverters in one phase and only one inverter for the remaining two phases:

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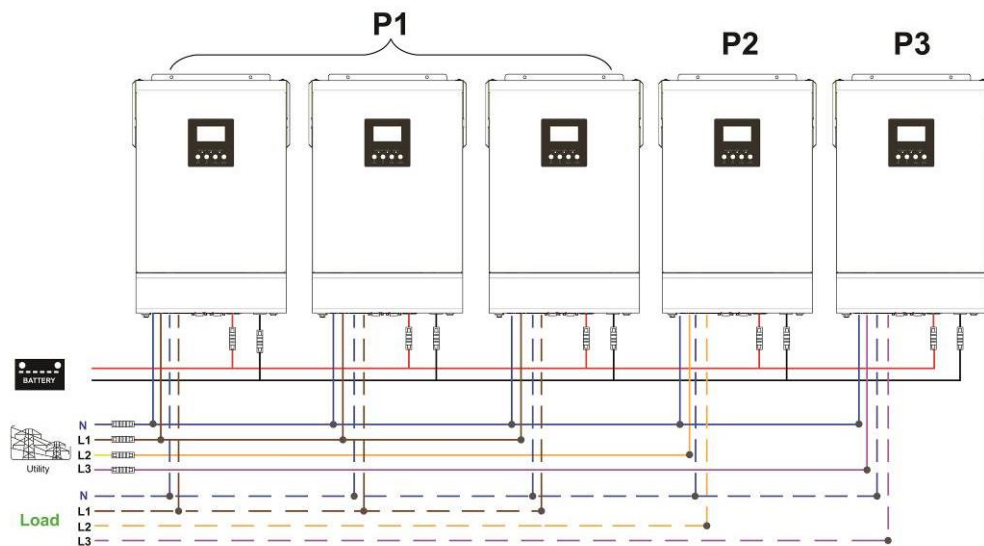
Communication Connection
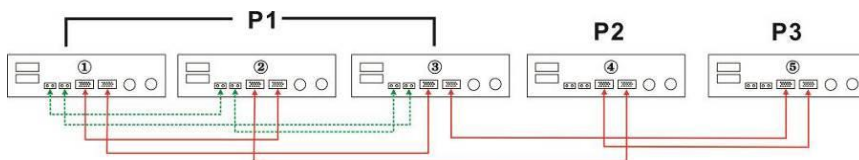
Two inverters in two phases and only one inverter for the remaining phase:

Power Connection
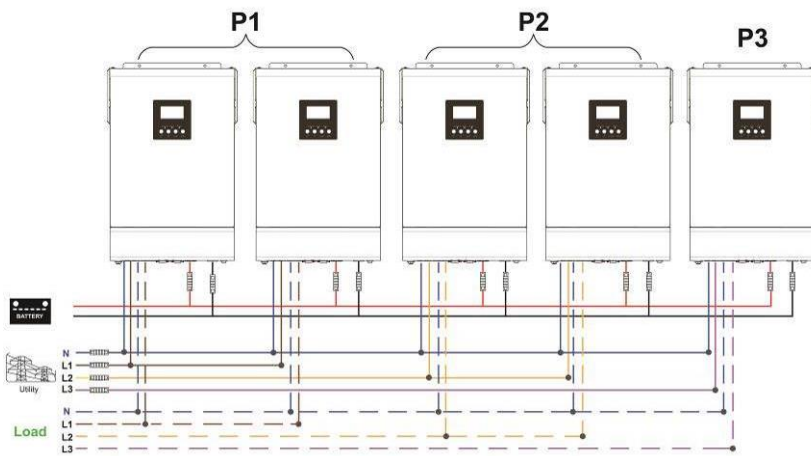
Communication Connection
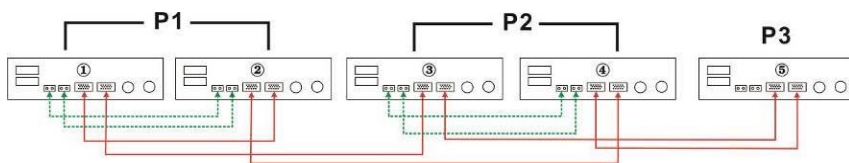
Two inverters in one phase and only one inverter for the remaining phases:
Power Connection
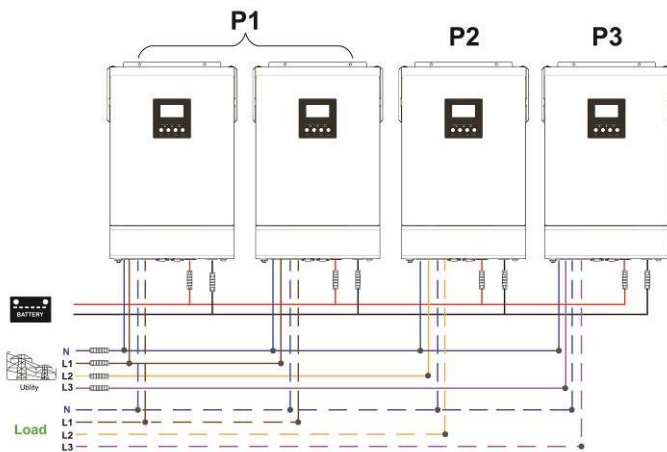
Communication Connection
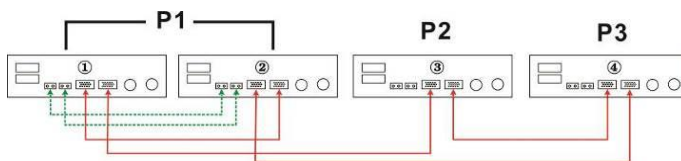
One inverter in each phase:
Power Connection

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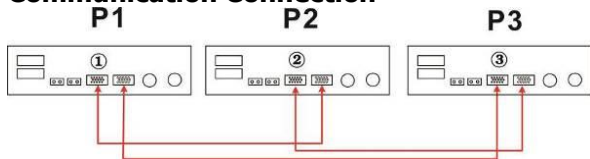
WARNING: Do not connect the current sharing cable between the inverters which are in different phases. Otherwise, it may damage the inverters.

5-3. Support split-phase equipment

Three inverters in each phase:

Communication Connection
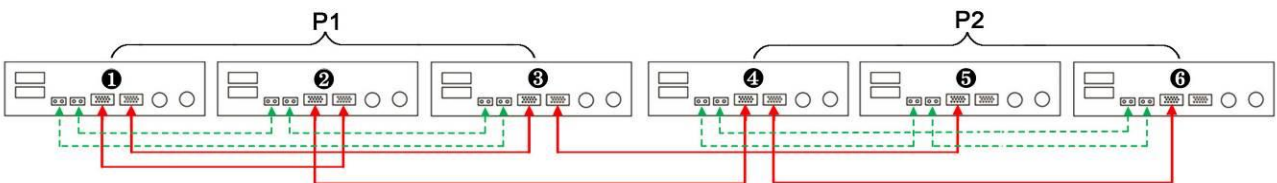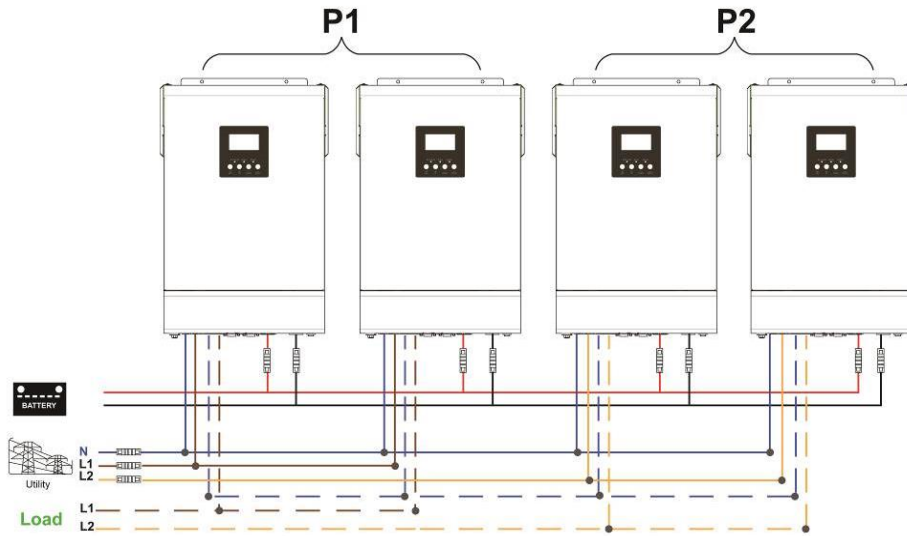
Two inverters in each phase:
Power Connection

Communication Connection
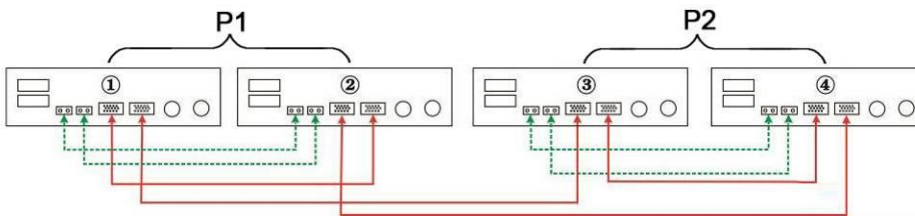
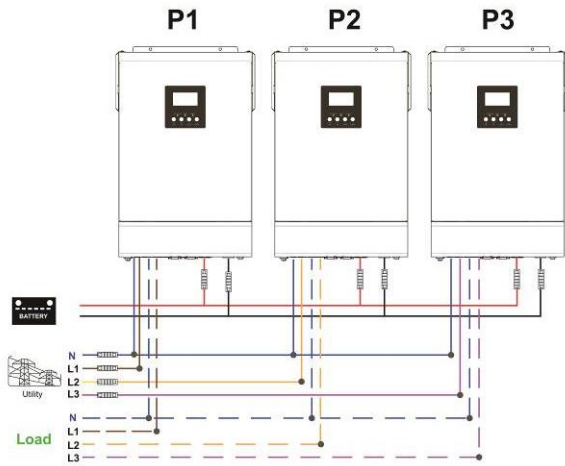
One inverter in each phase:
Power Connection
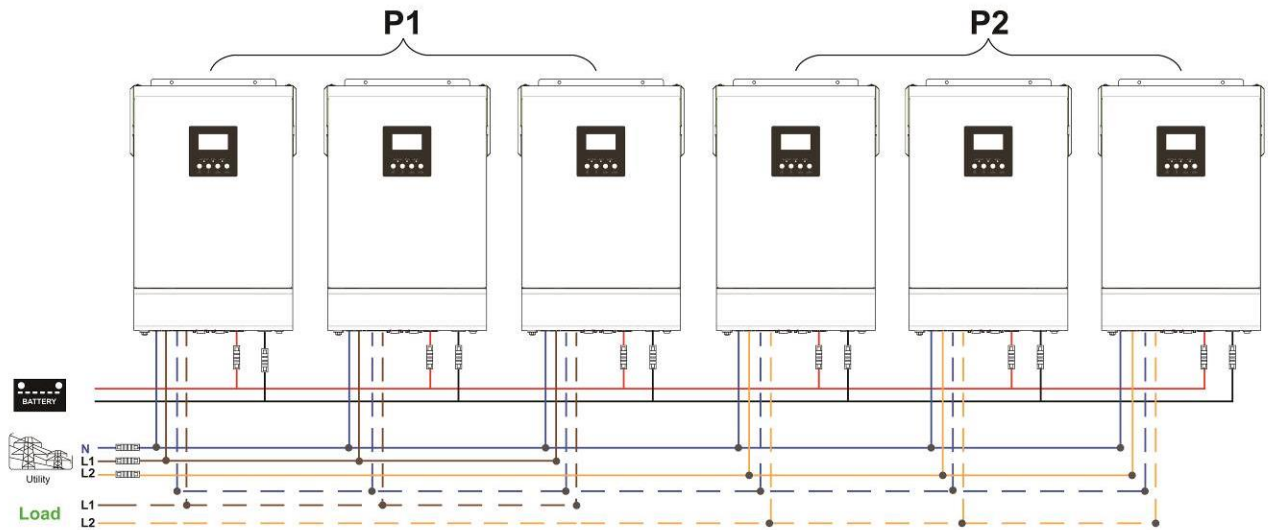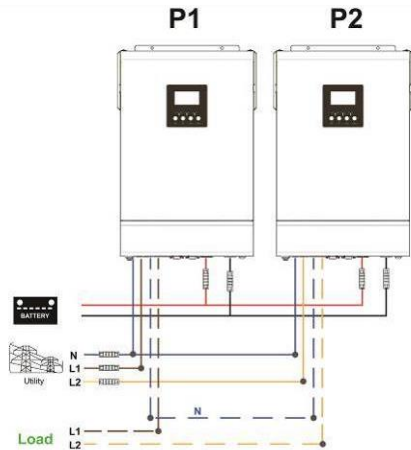

Communication Connection
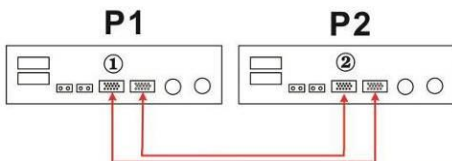
6. PV Connection

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 only available when the inverter is in standby mode (Switch off).	Single: `28  SIG` OUTPUT	When the units are used in parallel with single phase, please select "PAL" in program 28. It is required to have at least 3 inverters or maximum 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 5-2 for detailed information. Please select "3P1" in program 28 for the inverters connected to L1 phase, "3P2" in program 28 for the inverters connected to L2 phase and "3P3" in program 28 for the inverters connected to L3 phase. 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 5-2 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". Be sure to connect share current cable to units which are on the same phase. Do NOT connect share current cable between units on different phases.
		Parallel: `28  PAL` OUTPUT	
		L1 phase: `28  3P1` OUTPUT	
		L2 phase: `28  3P2` OUTPUT	
		L3 phase: `28  3P3` OUTPUT	
		L1 for split phase: `28  2P1`	
		L2 for split phase: `120  28  2P2`	
		L2 for split phase: `180  28  2P2`	

Fault code display:

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

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.

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
INPUT AC 0v HS OUTPUT 120v 100% 25%	INPUT AC 0v SL OUTPUT 120v 100% 25%

NOTE: Master and slave units are randomly defined.

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

LCD display in Master unit	LCD display in Slave unit

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

Support three-phase equipment

Step 1: Check the following requirements before commissioning:
● Correct wire connection
● Ensure all breakers in Line wires of load side are open and each Neutral wires of each unit are connected together.
Step 2: Turn on all units and configure LCD program 28 as 3P1, 3P2 and 3P3 sequentially. And then shut down all units.
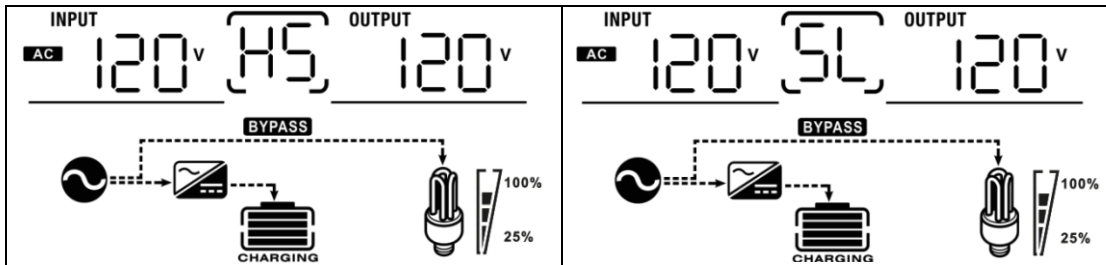**NOET:** It's necessary to turn off switch when setting LCD program. Otherwise, the setting can not be programmed.
Step 3: Turn on all units sequentially.

LCD display in L1-phase unit	LCD display in L2-phase unit	LCD display in L3-phase unit
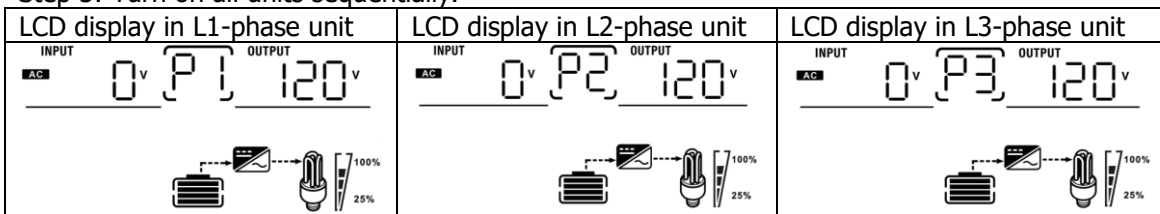
Step 4: Switch on all AC breakers of Line wires in AC input. If AC connection is detected and three phases are matched with unit setting, they will work normally. Otherwise, the AC icon ⬤ will flash and they will not work in line mode.

LCD display in L1-phase unit	LCD display in L2-phase unit	LCD display in L3-phase unit
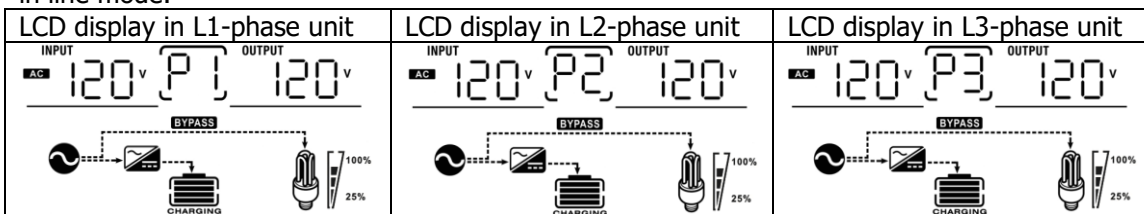
Step 5: If there is no more fault alarm, the system to support 3-phase equipment is completely installed.
Step 6: Please switch on all breakers of Line wires in load side. This system will start to provide power to the load.

Note 1: To avoid overload occurring, before turning on breakers in load side, it's better to have whole system in operation first.
Note 2: Transfer time for this operation exists. Power interruption may happen to critical devices, which cannot bear transfer time.

Support split-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 2P1 and 2P2 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

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

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

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

Note 1: To avoid overload occurring, before turning on breakers in load side, it's better to have whole system in operation first.
Note 2: Transfer time for this operation exists. Power interruption may happen to critical devices, which cannot bear transfer time.

9. Trouble shooting

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

# Appendix II: BMS Communication Installation

1. Introduction

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

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

- Re-configure charging voltage, charging current and battery discharge cut-off voltage according to the lithium battery parameters.
- Have the inverter start or stop charging according to the status of lithium battery.
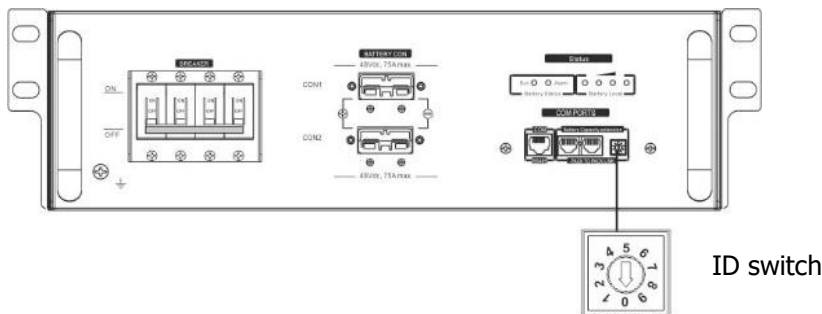
2. Pin Assignment for BMS Communication Port

	Definition
PIN 1	RS232TX
PIN 2	RS232RX
PIN 3	RS485B
PIN 4	NC
PIN 5	RS485A
PIN 6	CANH
PIN 7	CANL
PIN 8	GND
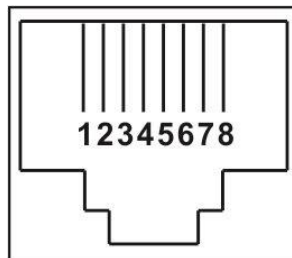
3. Lithium Battery Communication Configuration

LIO-4810-150A

ID switch

ESS LIO-I 4810
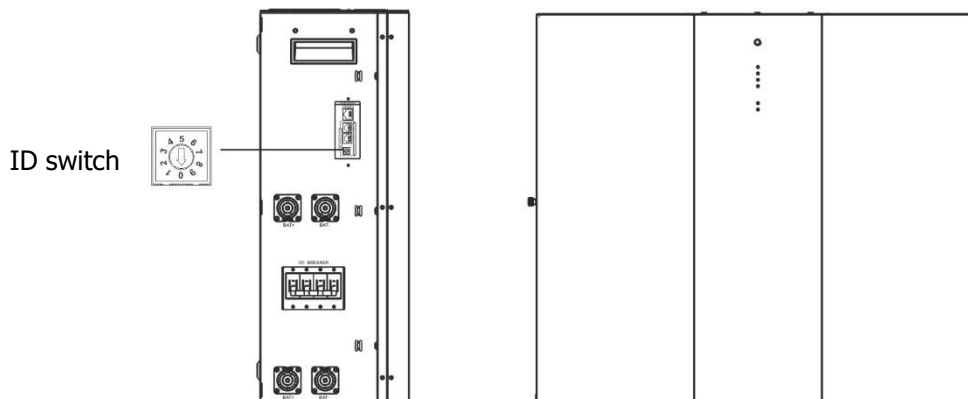
ID switch

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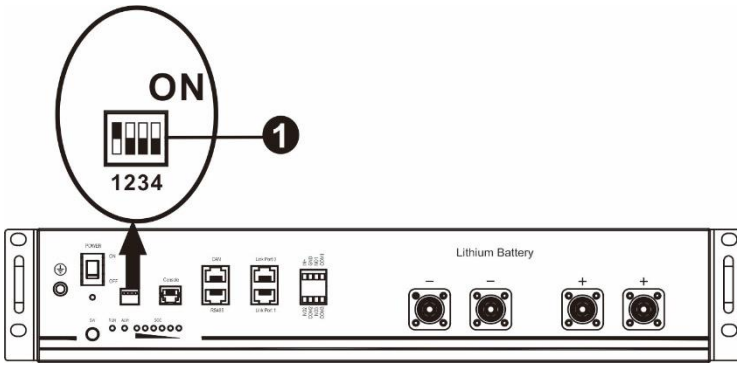
①Dip Switch: There are 4 Dip Switches that sets different baud rate and battery group address. If switch position is turned to the "OFF" position, it means "0". If switch position is turned to the "ON" position, it means "1".

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.

4. 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).
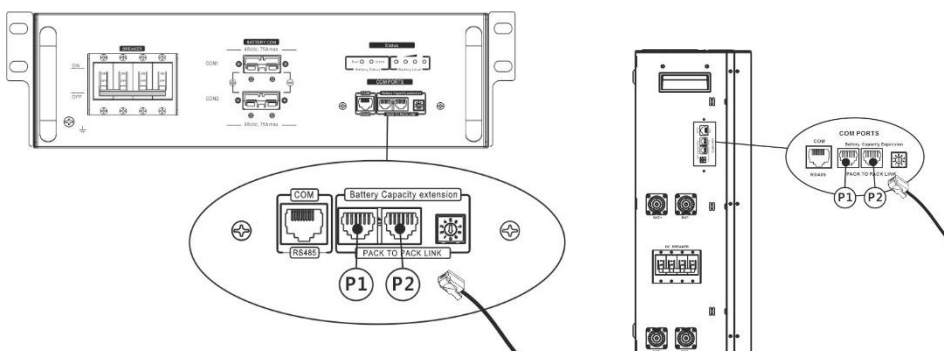
Step 2: Use supplied RJ45 cable (from battery module package) to connect inverter and Lithium battery.
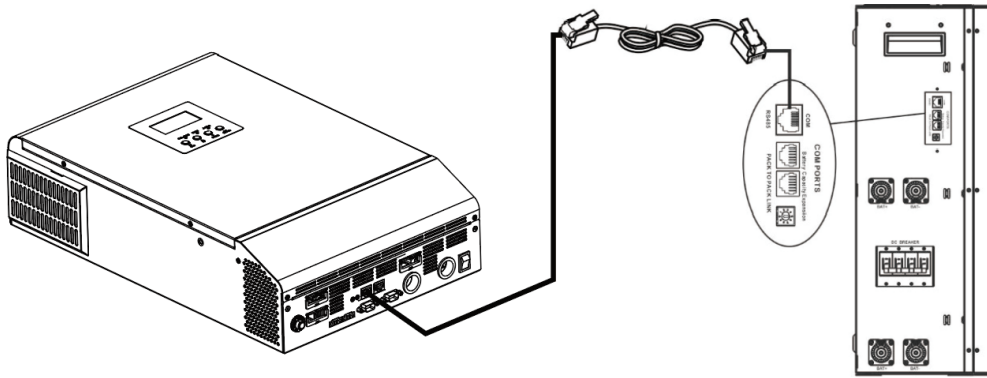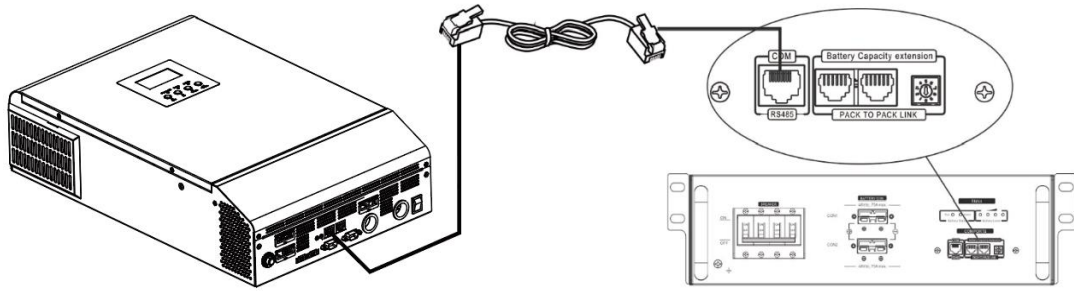
* For multiple battery connection, please check battery manual for the details.

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 program 5. Others should be "USE".
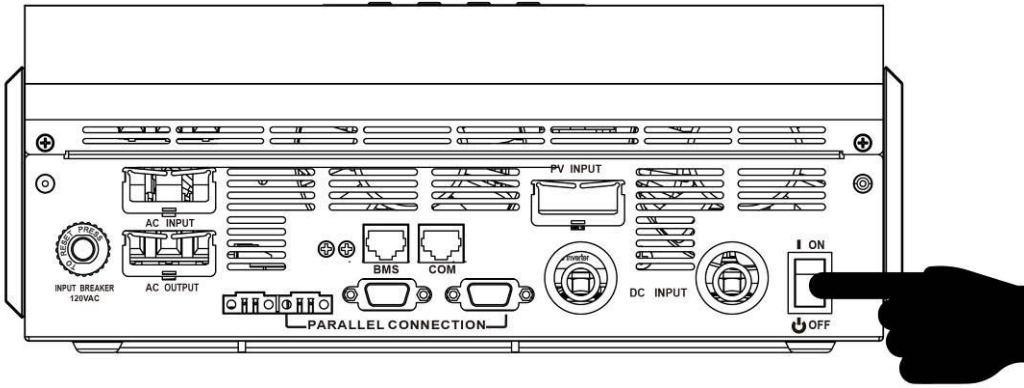
Step 3: Turn the breaker switch "ON". Now, the battery module is ready for DC output.
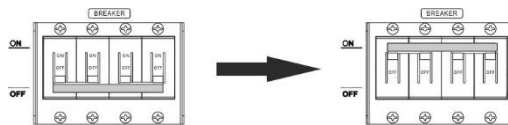
Step 4: Press Power on/off button on battery module for 5 secs, the battery module will start up.
*If the manual button cannot be approached, just simply turn on the inverter module. The battery module will be automatically turned on.

Step 5: Turn on the inverter.

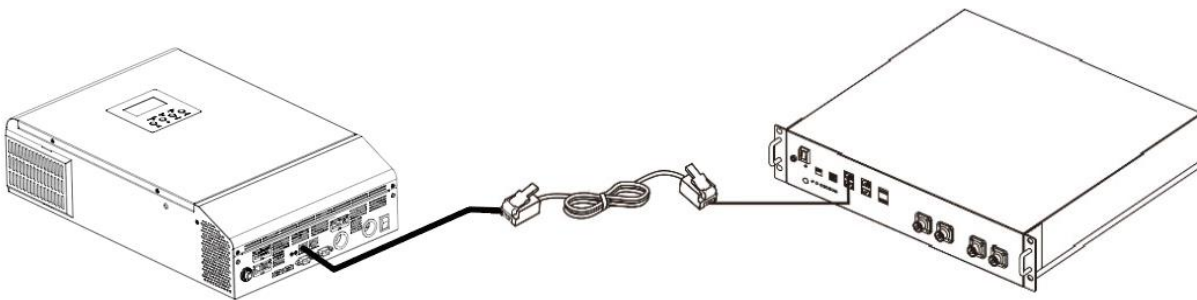Step 6. Be sure to select battery type as "LIB" in LCD program 5.

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.

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".
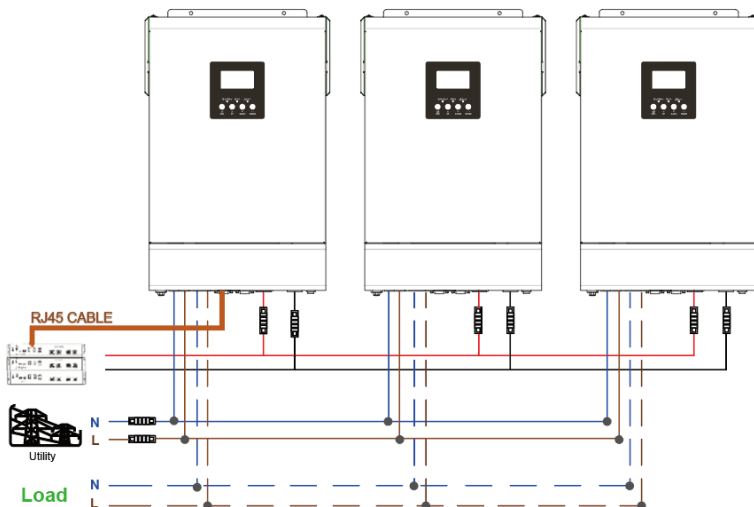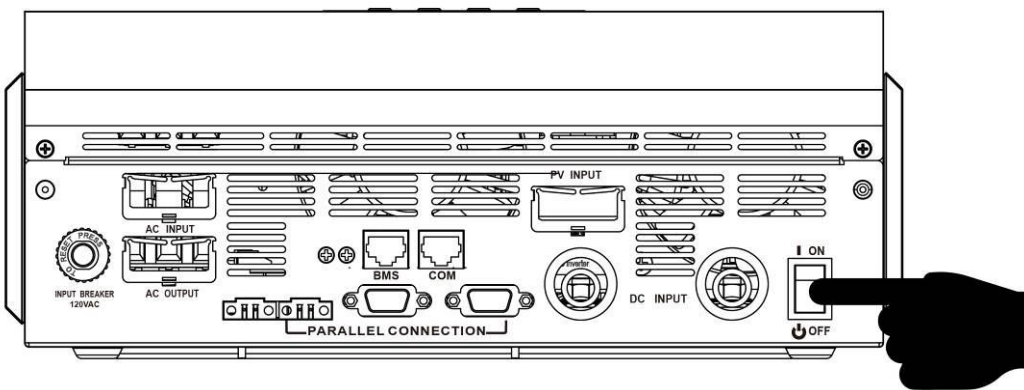

Step 2. Switch on Lithium battery.
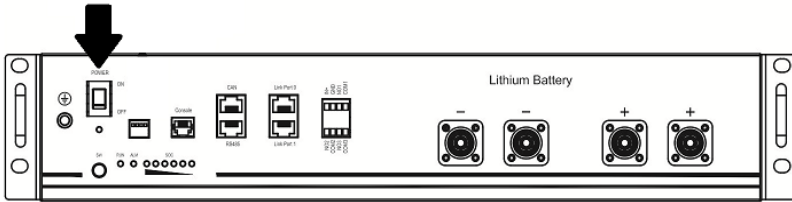
Step 3. Press more than three seconds to start Lithium battery, power output ready.
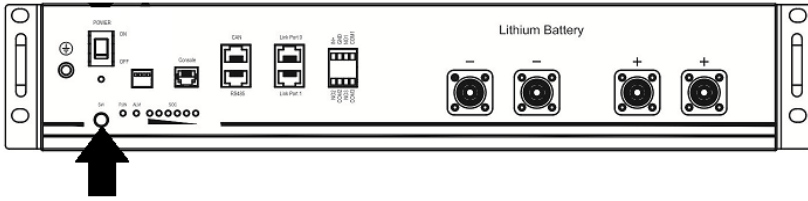
Step 4. Turn on the inverter.

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	Action
60 ⚠	If battery status is not allowed to charge and discharge after the communication between the inverter and battery is successful, it will show code 60 to stop charging and discharging battery.	
61 ⚠	Communication lost (only available when the battery type is setting as any type of lithium-ion battery.) ● After battery is connected, communication signal is not detected for 3 minutes, buzzer will beep. After 10 minutes, inverter will stop charging and discharging to lithium battery. ● Communication lost occurs after the inverter and battery is connected successfully, buzzer beeps immediately.	
62 ⚠	Battery number is changed. It probably is because of communication lost between battery packs.	Press "UP" or "DOWN" key to switch LCD display until below screen shows. It will have battery number re-checked and 62 warning code will be clear. bn5 P3 G01
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.	