PowMr

ALL-IN-ONE SOLAR INVERTER

User Manual

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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: All safety instructions in this document must be read, understood and followed.   Failure to follow these instructions will result in death or serious injury.**

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. One piece of 150A 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.
14. **WARNING:** Because this inverter is non-isolated, only three types of PV modules are acceptable: single crystalline, poly crystalline with class A-rated and CIGS modules. To avoid any malfunction, do not connect any PV modules with possible current leakage to the inverter. For example, grounded PV modules will cause current leakage to the inverter. When using CIGS modules, please be sure NO grounding.
15. **CAUTION:** It's requested to use PV junction box with surge protection. Otherwise, it will cause damage on inverter when lightning occurs on PV modules.

INTRODUCTION

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

Features

- Pure sine wave inverter
- Dual inputs and dual outputs
- Configurable input voltage ranges for home appliances and personal computers via LCD control panel
- Configurable battery charging current based on applications via LCD control panel
- Configurable AC/Solar Charger priority via LCD control panel
- Compatible to utility mains or generator power
- Smart battery charger design for optimized battery performance
- Optional WiFi with remote monitoring APP

Basic System Architecture

The following illustration shows basic application for this unit. It also required the following devices to have a complete running system:
- Generator or Utility mains.
- PV modules

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

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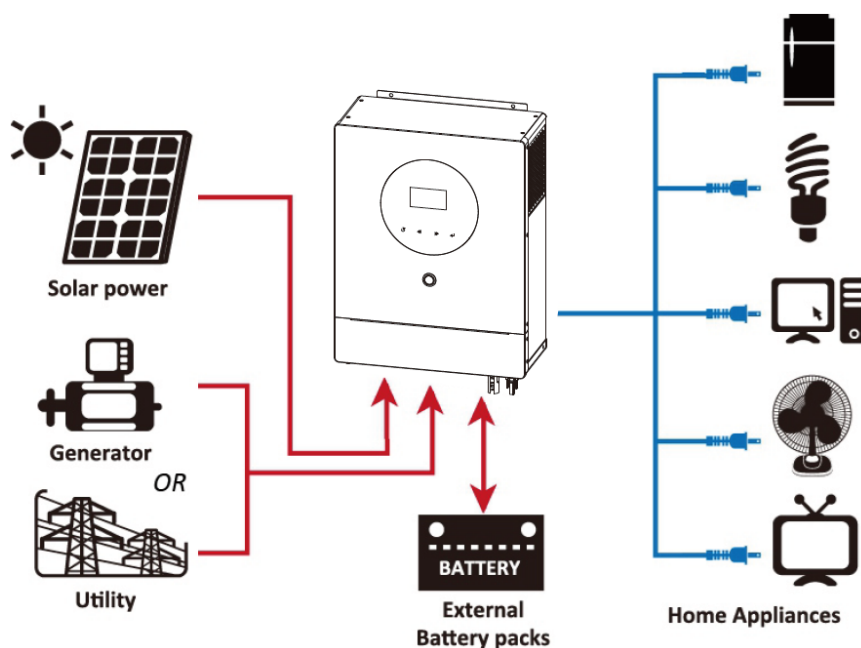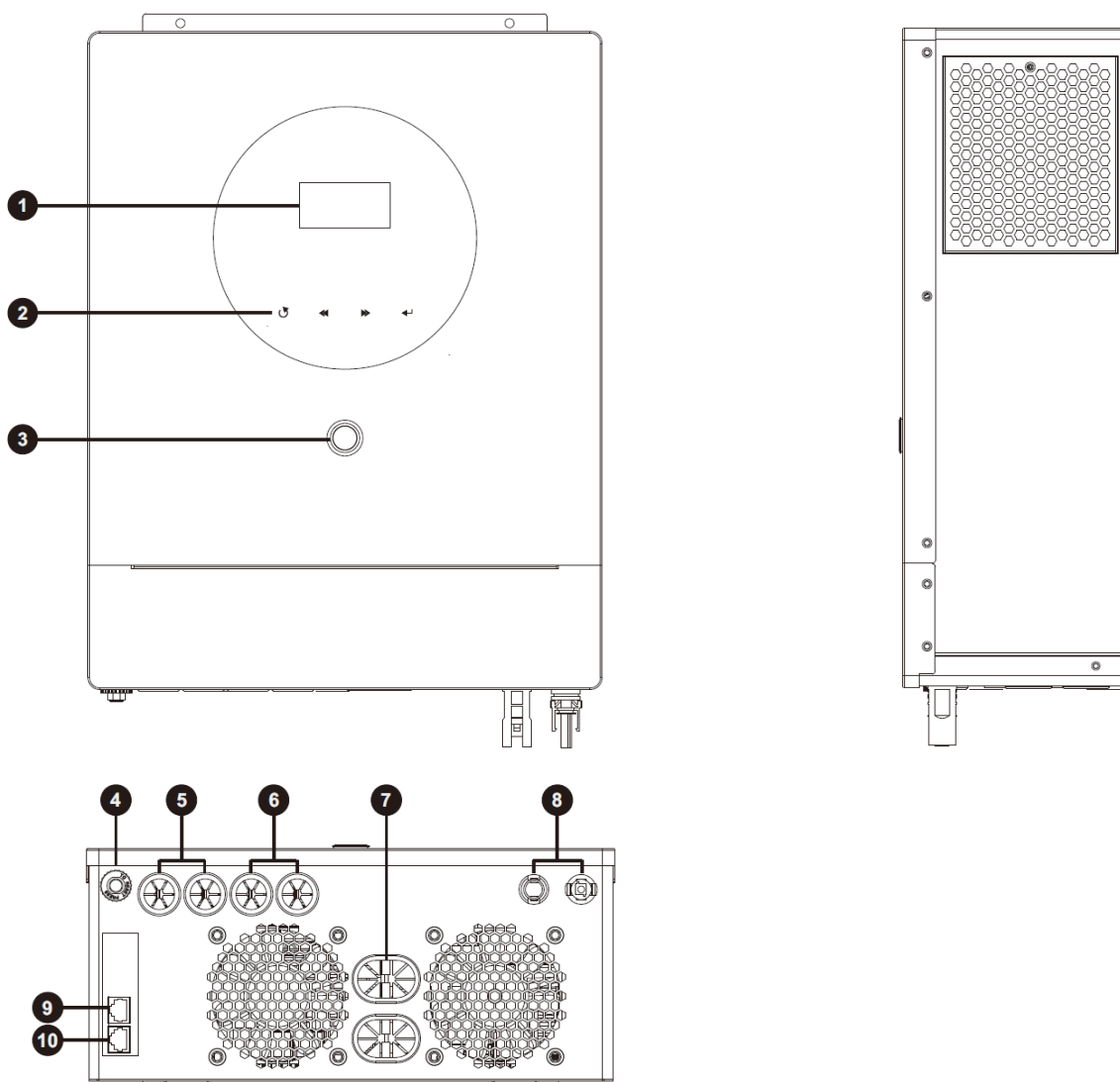

Figure 1 Hybrid Power System

Product Overview

1. LCD display
2. Function buttons with status indication
3. Power on/off switch
4. Circuit breaker
5. AC input (Input 1: Generator, Input 2: Grid)
6. AC output
7. Battery input
8. PV input
9. BMS communication port
10. RS-232 communication port

INSTALLATION

Unpacking and Inspection

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

- Inverter x 1
- User manual x 1
- RS232 Communication cable x 1
- Software CD x 1
- DC Fuse x 1
- PV connectors x 1 set

Preparation

Before connecting all wirings, please take off terminal cover first by removing one screw and bottom cover by removing four screws as shown below.
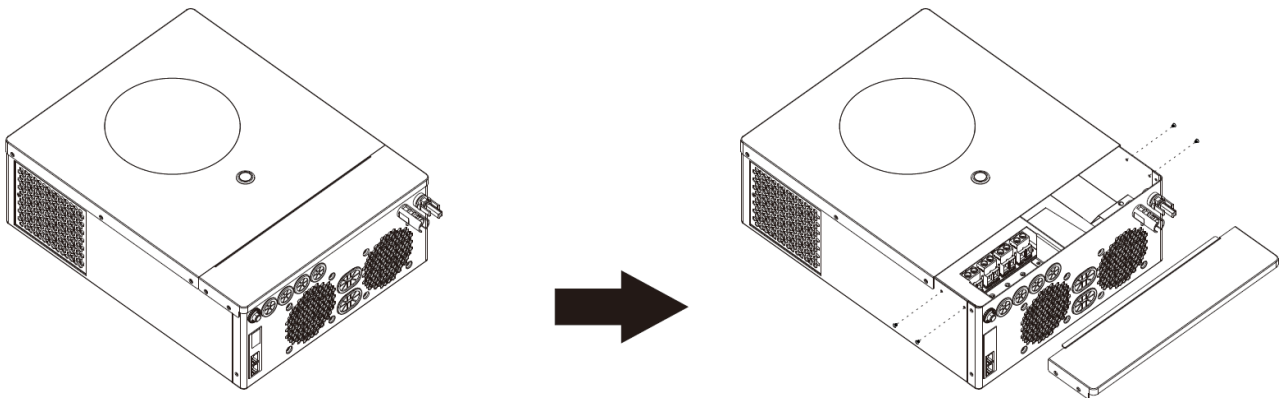

Mounting the Unit

Consider the followings before selecting your placements:

- Do not mount the inverter on flammable construction materials.
- Mount on a solid surface
- Install the inverter at eye level in order to allow easy LCD display readout.
- For proper air circulation and heat dissipation, allow a clearance of approx. 20 cm to the side and approx. 50 cm above and below the unit.
- The ambient temperature should be between 0°C and 55°C to ensure optimal operation.
- The recommended orientation is to adhered to the wall vertically. Be sure to keep other objects and surfaces as shown in the diagram to guarantee sufficient heat dissipation and to have enough space for wirings.
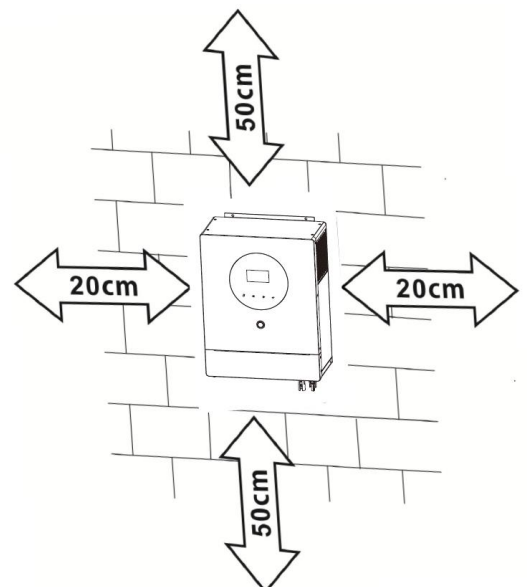
⚠️ **SUITABLE FOR MOUNTING ON CONCRETE OR OTHER NON-COMBUSTIBLE SURFACE ONLY.**

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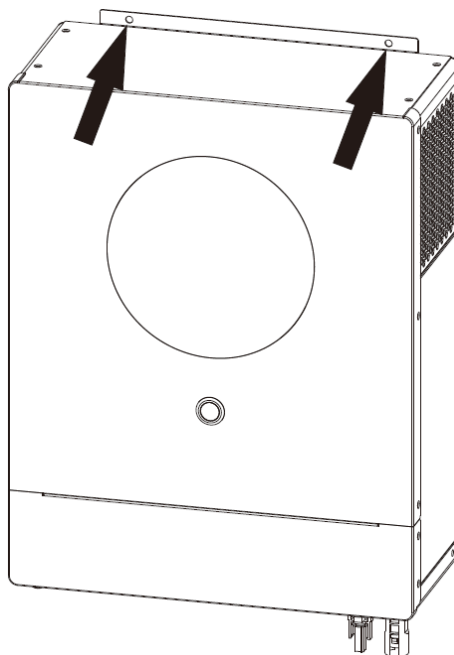
Battery Connection

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

Ring terminal:

WARNING! All wiring must be performed by a qualified electrical technician.

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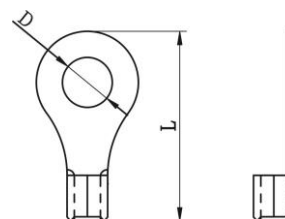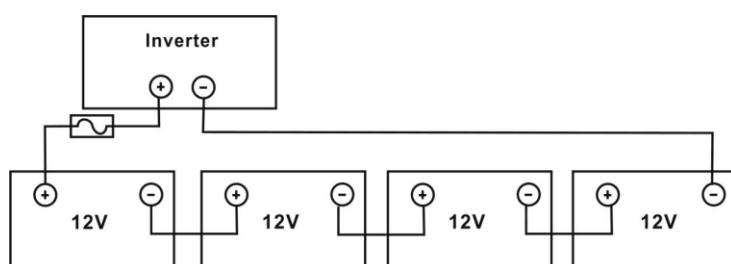
Recommended battery cable size:

| Model	Typical Amperage	Wire Size	Cable mm² (each)	Ring Terminal Dimensions		Torque Value
				D (mm)	L (mm)	
6.2KW	138.8A	1*2AWG	38	8.4	39.2	5 Nm
		2*4AWG	25	8.4	33.2	

Please follow below steps to implement battery connection:

1. This inverter supports 48VDC system. Connect all battery packs as below chart. It is recommend to connect minimum of 200Ah capacity battery.

2. Prepare four battery wires depending on cable size (refer to recommended cable size table). Apply ring terminals to your battery wires and secure it to the battery terminal block with the bolts properly tightened.

Refer to battery cable size for torque value. Make sure polarity at both the battery and the inverter is correctly connected and ring terminals are secured to the battery terminals.
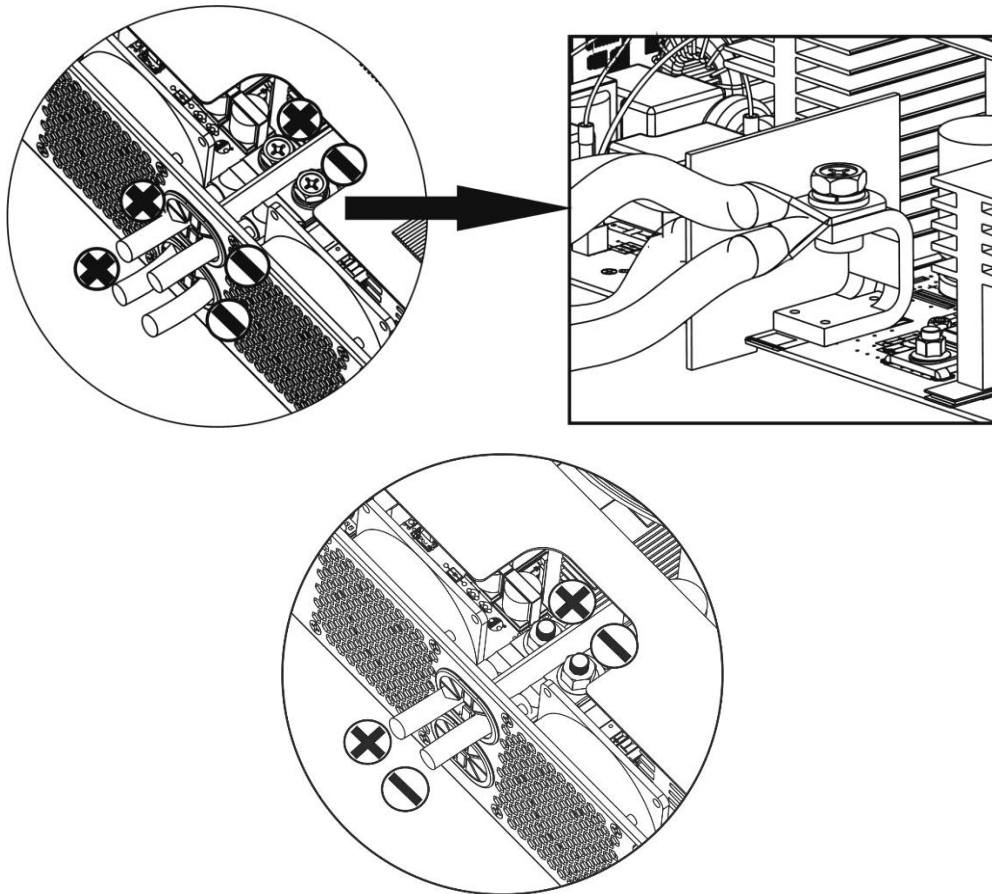
⚠	**WARNING: Shock Hazard** Installation must be performed with care due to high battery voltage in series.

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

AC Input/Output Connection

CAUTION!! Before connecting to AC input power source, please install a **separate** AC breaker between the inverter and the AC input power source. This will ensure that the inverter can be safely disconnected during maintenance and fully protected from over-current.   The recommended spec of AC breaker is 32A

CAUTION!! There are two power terminal blocks with "IN" (Input) and "OUT" (Output) markings. DO NOT mistakenly connect to the wrong 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 size 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	Cable (mm²)	Torque Value
10 AWG	6	1.2 Nm

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

1. Before making AC input/output connection, be sure to enable DC protector or disconnector first.
2. Remove insulation sleeves for about 10mm for the five screw terminals.
3. Insert all AC input wires through terminal cover and connect to terminals according to polarities indicated on terminal block. Tighten the terminal screws. Be sure to connect the grounding wire (⏚) first.
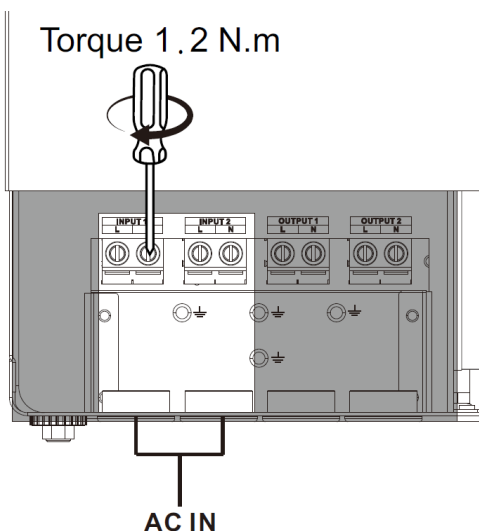
    ⏚ **→Ground (yellow-green)**
    L1→Generator (brown or black)
    N1→Neutral (blue)
    L2→LINE (brown or black)
    N2→Neutral (blue)

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

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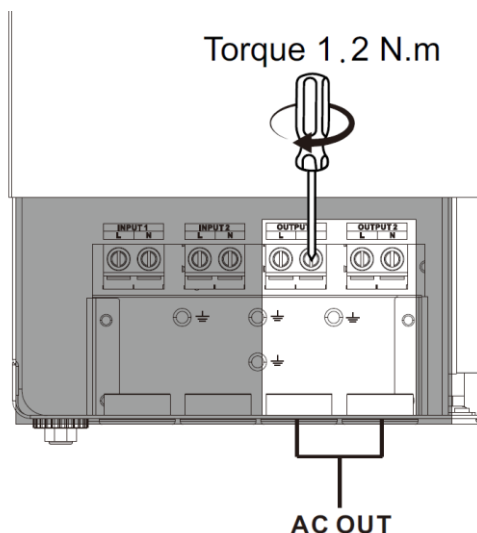
    ⏚ **→Ground (yellow-green)**
    L1→LINE (brown or black)
    N1→Neutral (blue)
    L2→LINE (brown or black)
    N2→Neutral (blue)

Torque 1.2 N.m

AC OUT

5. Make sure the wires are securely connected.

> **CAUTION:** Appliances such as air conditioner required at least 2~3 minutes to spool up because it needs to have enough time to balance refrigerant gas inside of circuits. If a power shortage occurs and recovers in a short period of time, it may cause damage to your connected appliances. To prevent this from happening, please check with manufacturer of air conditioner if it has time-delay function before installation. Otherwise, this inverter will trigger overload fault and cut off output to protect your appliance but sometimes it may still causes damage to the air conditioner.

PV Connection

CAUTION: Before connecting to PV modules, please install **separately** DC circuit breakers between inverter and PV modules.
NOTE1: Please use 600VDC/30A circuit breaker.
NOTE2: The overvoltage category of the PV input is II.
Please follow the steps below to implement PV module connection:

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

Step 1: Check the input voltage of PV array modules. This system is applied with two strings of PV array. Please make sure that the maximum current load of each PV input connector is 27A.

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

**Step 2:** Disconnect the circuit breaker and switch off the DC switch.
Step 3: Assemble provided PV connectors with PV modules by the following steps.
Components for PV connectors and Tools:

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

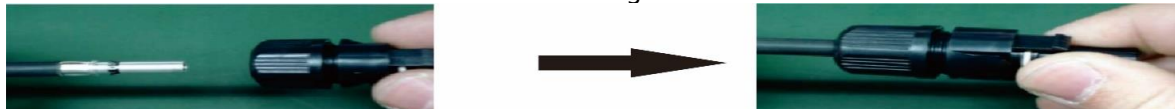**Prepare the cable and follow the connector assembly process:**

Strip one cable 8 mm on both end sides and be careful NOT to nick conductors.
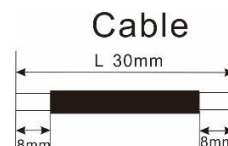
Cable
L 30mm
8mm   8mm

Insert striped cable into female terminal and crimp female terminal as shown below.

Insert assembled cable into female connector housing as shown below.

Insert striped cable into male terminal and crimp male terminal as shown below.

Insert assembled cable into male connector housing as shown below.

Then, use spanner to screw pressure dome tightly to female connector and male connector as shown below.

Step 4: 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.
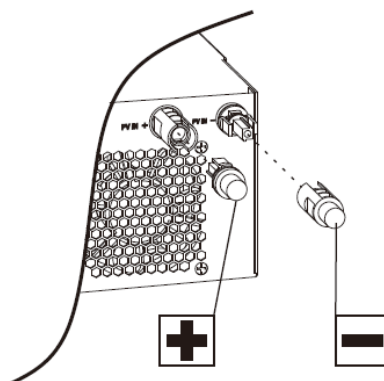
WARNING! For safety and efficiency, it's very important to use appropriate cables for PV module connection. To reduce risk of injury, please use the proper cable size as recommended below.

Conductor cross-section (mm²)	AWG no.
4~6	10~12

CAUTION: **Never** directly touch the terminals of inverter. It might cause lethal electric shock.

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. start-up voltage.

Max. PV Array Power	6000W
Max. PV Array Open Circuit Voltage	500Vdc
PV Array MPPT Voltage Range	60Vdc~450Vdc
Start-up Voltage	60Vdc +/- 10Vdc
Max. PV Current	27A

Take 250Wp PV module as an example. After considering above two parameters, the recommended module configurations are listed as below table.

Solar Panel Spec. (reference) - 250Wp - Vmp: 30.1Vdc - Imp: 8.3A - Voc: 37.7Vdc - Isc: 8.4A - Cells: 60	SOLAR INPUT Min in series: 6 pcs, max. in series: 12 pcs.	Q'ty of panels	Total input power
	6 pcs in series	6 pcs	1500W
	8 pcs in series	8 pcs	2000W
	12 pcs in series	12 pcs	3000W
	8 pieces in series and 2 sets in parallel	16 pcs	4000W
	10 pieces in series and 2 sets in parallel	20 pcs	5000W
	11 pieces in series and 2 sets in parallel	22 pcs	5500W
	12 pieces in series and 2 sets in parallel	24 pcs	6000W

Take 555Wp PV module as an example. After considering above two parameters, the recommended module configurations are listed as below table.

Solar Panel Spec. (reference) -555Wp -Imp: 17.32A -Voc: 38.46Vdc -Isc: 18.33A -Cells: 110	SOLAR INPUT Min in series: 2 pcs, max. in series: 11 pcs.	Q'ty of panels	Total input power
	2pcs in series	2 pcs	1110W
	4pcs in series	4 pcs	2220W
	6 pcs in series	6 pcs	3330W
	8 pcs in series	8 pcs	4440W
	9 pcs in series	9 pcs	4995W
	10 pcs in series	10 pcs	5550W
	11 pcs in series	11 pcs	6000W

Final Assembly

After connecting all wirings, put the bottom cover back by fixing four screws as shown below.
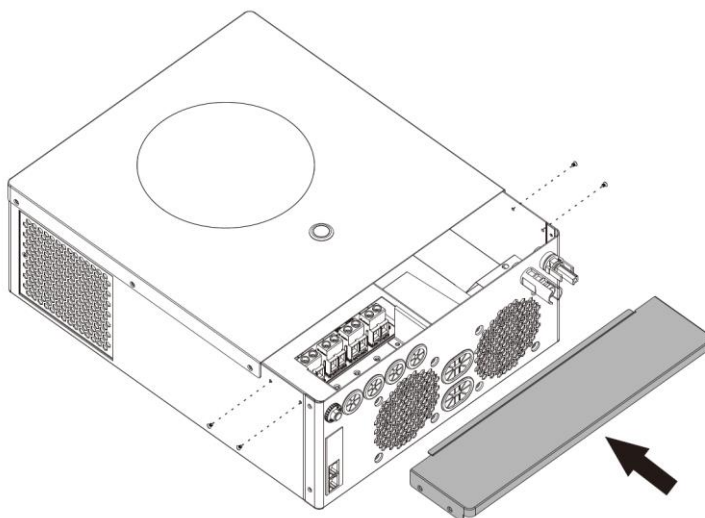
Communication Connection

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 I- BMS Communication Installation for details.

OPERATION

Power ON/OFF
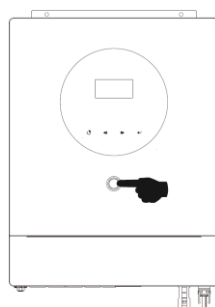
Once the unit has been properly installed and the batteries are connected well, simply long press the On/Off switch for 5 seconds to turn on the unit.

Operation and Display Panel

The operation and the LCD module, shown in the chart below, includes four touchable buttons with status indication and a LCD display, indicating the operating status and input/output power information.
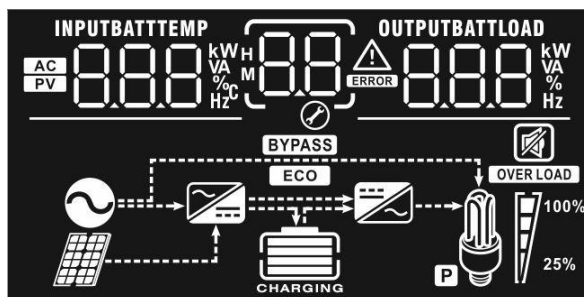

LCD display

Touchable operation buttons with status indication. Buttons will light up different color to display operation status.
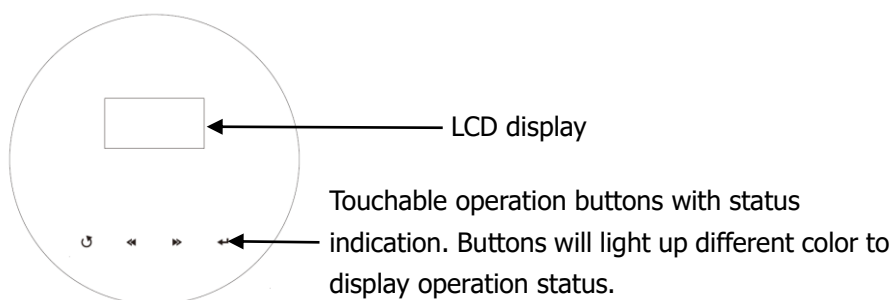
Touchable buttons with indication

Function Key	Description
↻	To exit setting mode
◀◀	To go to previous selection
▶▶	To go to next selection
↵	To confirm the selection in setting mode or enter setting mode

LED Indicator	Color	Solid/Flashing	Messages
	Green	Solid On	Unit is working normally (without any warning or fault codes and charging).
	Green/Yellow	Alternatively flashing	Battery is charging.
	Yellow	Solid On	Warning code appears.
	Red	Solid On	Fault mode.

LCD Display Icons

Icon	Function description
Input Source Information	
AC	Indicates the AC input.
PV	Indicates the PV input
INPUTBATT kW VA %C Hz	Indicate input voltage, input frequency, PV voltage, charger current, charger power, battery voltage.
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 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%	< 1.85V/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

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.
P	Indicates second output 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.
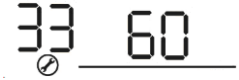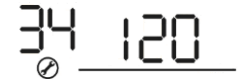
Setting Programs:

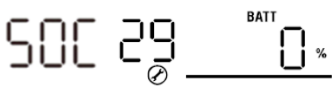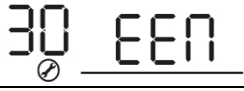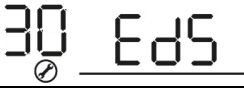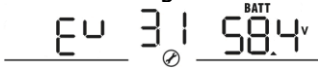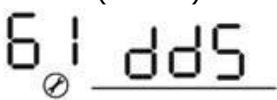| Program	Description	Selectable option	
00	Exit setting mode	Escape 00 ESC	
01	Output source priority: To configure load power source priority	Utility first (default) 01 USb	Utility will provide power to the loads as first priority. Solar and battery energy will provide power to the loads only when 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 120A. 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 90-280VAC.
		UPS 03 UPS	If selected, acceptable AC input voltage range will be within 170-280VAC.
05	Battery type	AGM (default) 05 AGn	Flooded 05 FLd

05	Battery type	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 Lrd	Restart enable 06 LrE
07	Auto restart when over temperature occurs	Restart disable (default) 07 trd	Restart enable 07 trE
09	Output frequency	50Hz (default) 09 50 Hz	60Hz 09 60 Hz
10	Output voltage	220V 10 220 v	230V (default) 10 230 v

10	Output voltage	240V `ID 240ᵥ` ⊘	
11	Maximum utility charging current Note: If setting value in program 02 is smaller than that in program in 11, the inverter will apply charging current from program 02 for utility charger.	Utility charging current: 30A (default) `Ltd II 30ᴬ` ⊘	Generator charging current: 30A (default) `LEN II 30ᴬ` ⊘
		Setting range is 2A, then from 10A to 100A. Increment of each click is 10A.	
12	Setting voltage point or SOC back to utility source when selecting "SBU priority" in program 01.	46V (default) `I2 46ᵥ` BATT ⊘	Setting range is from 44V to 51V. Increment of each click is 1V.
		SOC 10% (default for Lithium battery) `SOC I2 10%` BATT ⊘	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 `I3 FUL` BATT ⊘	54V (default) `I3 540ᵥ` BATT ⊘
		Setting range is from 48V to 58V. Increment of each click is 1V.	
		SOC 80% (default for Lithium battery) `SOC I3 80%` BATT ⊘	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 `I6 CSO` ⊘	Solar energy will charge battery as first priority. Utility will charge battery only when solar energy is not available.
		Solar and Utility (default) `I6 SNU` ⊘	Solar energy and utility will charge battery at the same time.
		Only Solar `I6 OSO` ⊘	Solar energy will be the only charger source no matter utility is available or not.
		If this inverter/charger is working in Battery mode, only solar energy can charge battery. Solar energy will charge battery if it's available and sufficient.	

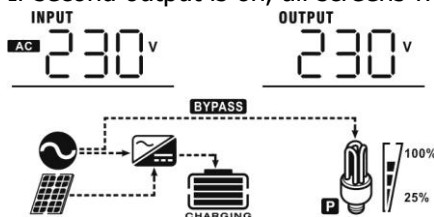| 18	Alarm control	Alarm on (default) 18 bON	Alarm off 18 bOF
19	Auto return to default display screen	Return to default display screen (default) 19 ESP	If selected, no matter how users switch display screen, it will automatically return to default display screen (Input voltage /output voltage) after no button is pressed for 1 minute.
		Stay at latest screen 19 ⊦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 (default) 25 FEN	Record disable 25 FdS
26	Bulk charging voltage (C.V voltage)	default setting: 56.4V Cᵛ 26 56.4ᵥ BATT	
		If self-defined is selected in program 5, this program can be set up. Setting range is from 48.0V to 61.0V. Increment of each click is 0.1V.	
27	Floating charging voltage	default setting: 54.0V FLᵛ 27 54.0ᵥ BATT	
		If self-defined is selected in program 5, this program can be set up. Setting range is from 48.0V to 61.0V. Increment of each click is 0.1V.	
29	Low DC cut-off voltage or SOC: • 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: 42.0V COᵛ 29 42.0ᵥ BATT	If self-defined is selected in program 5, this program can be set up. Setting range is from 42.0V to 48.0V. Increment of each click is 0.1V. Low DC cut-off voltage will be fixed to setting value no matter what percentage of load is connected.

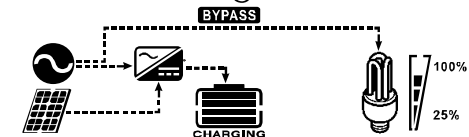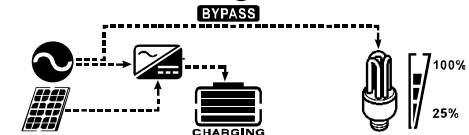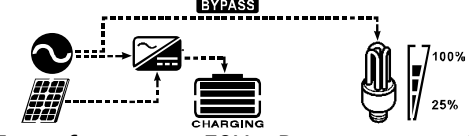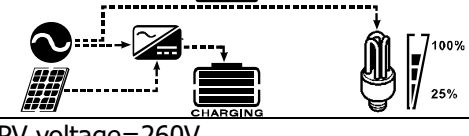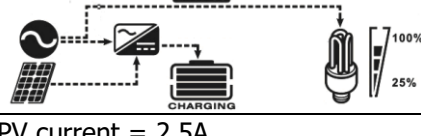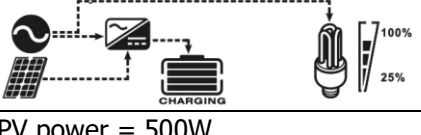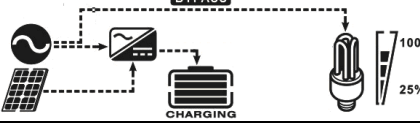|			
29	Low DC cut-off voltage or SOC: ● If battery power is only power source available, inverter will shut down. ● If PV energy and battery power are available, inverter will charge battery without AC output.	SOC 0% (default for lithium battery) SOC 29　　0 %	If any type of lithium battery is selected in program 05, setting value will change to SOC automatically. Adjustable range is from 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: 58.4V EU 31 58.4v	Setting range is from 48.0V to 61.0V. 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	Enable 36 AEn	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 "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.	
60	Low DC cut-off voltage or SOC on second output	default setting: 42.0V 60　42.0v	If "User-defined" is selected in program 05, this setting range is from 42.0V to 60.0V. Increment of each click is 0.1V.
		SOC 0%(default for lithium battery) SOC 60　　0 %	If any type of lithium battery is selected in program 05, setting value will change to SOC automatically. The selectable options are 0%, 5%, and from 10% to 95%.

61	Setting discharge time on the second output	Disable (Default) 6.1 $dd5$	Setting range is disable and then from 0 min to 990 min. Increment of each click is 5 min. *If the battery discharge time achieves the setting time in program 61 and the program 60 function is not triggered, the second output will be turned off.
63	Setting voltage point or SOC to restart on the second output (L2)	default setting: 46.0V **BATT** 63 46.0 v	If "User-defined" is selected in program 05, this setting range is from 43.0V to 61.0V. Increment of each click is 0.1V. *If second output is cut off due to setting in program 60, second output (L2) will restart according to setting in program 63.
		SOC 20% (default for lithium battery) **BATT** $50C$ 63 20 %	If any type of lithium battery is selected in program 05, setting value will change to SOC automatically. The selectable options are 0%, 5%, and from 10% to 95%.
64	Setting waiting time to turn on the second output (L2) when the inverter is back to Line Mode or battery is in charging status	0 min (Default) 64 0	Setting range is from 0 min to 990 min. Increment of each click is 5 min. *If second output is cut off due to setting in program 61, second output (L2) will restart according to setting in program 64.

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, charging current, charging power, battery voltage, output voltage, output frequency, load percentage, load in Watt, load in VA, load in Watt, DC discharging current, main CPU Version.
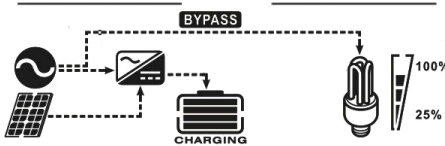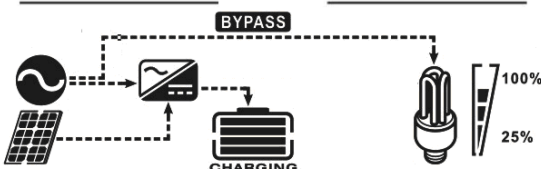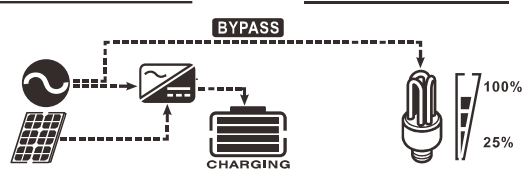
If second output is on, all screens will show "P" icon in the screen.

Selectable information	LCD display
Input voltage/Output voltage (Default Display Screen) **NOTE:** If any warning or fault occurs, it will show warning/fault code first.	Input Voltage=230V, output voltage=230V Power source= Utility Input Voltage=230V, output voltage=230V Power source= Generator
Input frequency **NOTE:** If any warning or fault occurs, it will show warning/fault code first.	Input frequency=50Hz, Power source= Utility Input frequency=50Hz, Power source= Generator
PV voltage	PV voltage=260V
PV current	PV current = 2.5A
PV power	PV power = 500W

Selectable information	LCD display
Charging Current	AC and PV charging current=50A BATT 50 A OUTPUT 230 V AC/PV BYPASS CHARGING 100% / 25% PV charging current=50A BATT 50 A OUTPUT 230 V PV BYPASS CHARGING 100% / 25%
Charging current	AC charging current=50A BATT 50 A OUTPUT 230 V AC BYPASS CHARGING 100% / 25%
Charging power	AC and PV charging power=500W BATT 500 W OUTPUT 230 V AC/PV BYPASS CHARGING 100% / 25% PV charging power=500W BATT 500 W OUTPUT 230 V PV BYPASS CHARGING 100% / 25%
Charging power	AC charging power=500W BATT 500 W OUTPUT 230 V AC BYPASS CHARGING 100% / 25%
Battery voltage and output voltage	Battery voltage=55.5V, output voltage=230V BATT 55.5 V OUTPUT 230 V BYPASS CHARGING 100% / 25%
Output frequency	Output frequency=50Hz BATT 55.5 V OUTPUT 50.0 Hz BYPASS CHARGING 100% / 25%

Selectable information	LCD display
Load percentage	Load percent=70% BATT **55.5** V LOAD **70** % BYPASS 100% 25%
Load in VA	When connected load is lower than 1kVA, load in VA will present xxxVA like below chart. BATT **55.5** V LOAD **350** VA BYPASS 100% 25% When load is larger than 1kVA (≥1KVA), load in VA will present x.xkVA like below chart. BATT **55.5** V LOAD **1.50** kVA BYPASS 100% 25%
Load in Watt	When load is lower than 1kW, load in W will present xxxW like below chart. BATT **55.5** V LOAD **270** W BYPASS 100% 25% When load is larger than 1kW (≥1KW), load in W will present x.xkW like below chart. BATT **55.5** V LOAD **1.20** kW BYPASS 100% 25%
Battery voltage/DC discharging current	Battery voltage=25.5V, discharging current=1A BATT **55.5** V BATT **1** A 100% 25%

23

Selectable information	LCD display
Main CPU version checking	Main CPU version 00014.04
Second CPU version checking	Second CPU version 00014.04
Third CPU version checking	Third CPU version 00001.02

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.	No charging.	No charging.

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 "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. Power from PV energy only.

Battery Equalization Description

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

● **How to Activate Equalization Function**

You must enable battery equalization function in LCD setting Program 30 first. You can then apply this function by either one of the following methods:

1. Setting equalization interval in Program 35.
2. Activate equalization immediately in Program 36.

● **When to Equalize**

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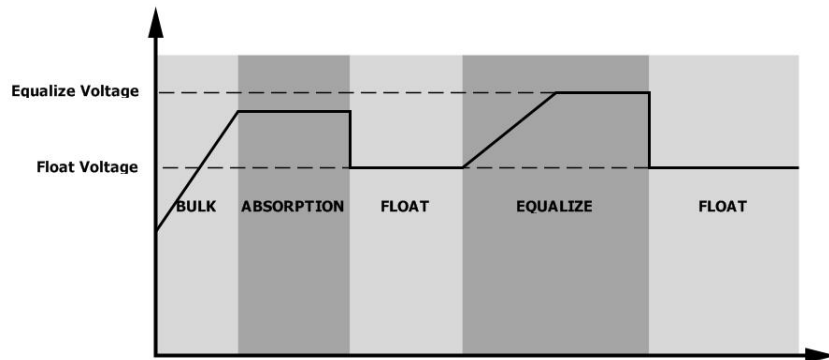

● **Equalize Charging and Timeout**

In Equalize Mode, the controller will supply power to charge battery as much as possible until battery voltage reach the equalization voltage. Then, constant-voltage regulation is applied to maintain battery voltage at the equalization level. The battery will remain in the Equalize Mode until the equalization timer runs out.
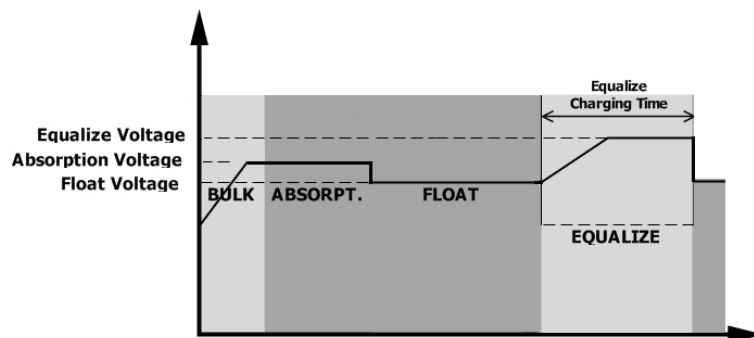
However, in Equalize Mode, if the battery equalization timer runs out and the battery voltage doesn't recover to the battery equalization voltage point, the charge controller will extend the battery equalized time until battery voltage achieves equalization voltage. If the battery voltage is still lower than equalization voltage when the extension runs out, the charge controller will stop equalization and return to the floating charging stage.
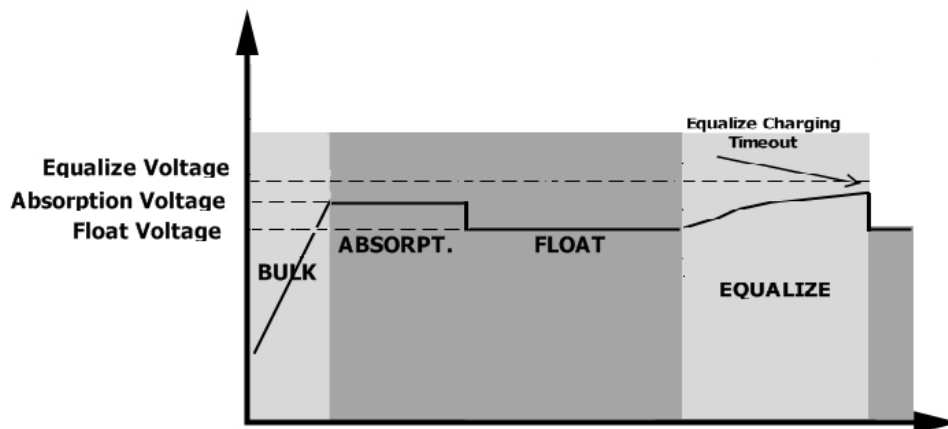
Fault Reference Code

Fault Code	Fault Event	Icon on
01	Fan is locked when inverter is off.	01
02	Over temperature or NTC is not connected well.	02
03	Battery voltage is too high	03
04	Battery voltage is too low	04
05	Output short circuited or over temperature is detected by internal converter components.	05
06	Output voltage is too high.	06
07	Overload time out	07
08	Bus voltage is too high	08
09	Bus soft start failed	09
51	Over current or surge	51
52	Bus voltage is too low	52
53	Inverter soft start failed	53
55	Over DC voltage in AC output	55
57	Current sensor failed	57
58	Output voltage is too low	58
59	PV voltage is over limitation	59

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 OVER LOAD
10	Output power derating	Beep twice every 3 seconds	10
15	PV energy is low.	Beep twice every 3 seconds	15
16	High AC input (>280VAC) during BUS soft start	None	16
30	Internal communication lost	None	30
32	Communication lost	None	32
E9	Battery equalization	None	E9
bP	Battery is not connected	None	bP

# CLEARANCE AND MAINTENANCE FOR ANTI-DUST KIT

Overview

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

Clearance and Maintenance

Step 1: Please loosen the screw on the side of the inverter.
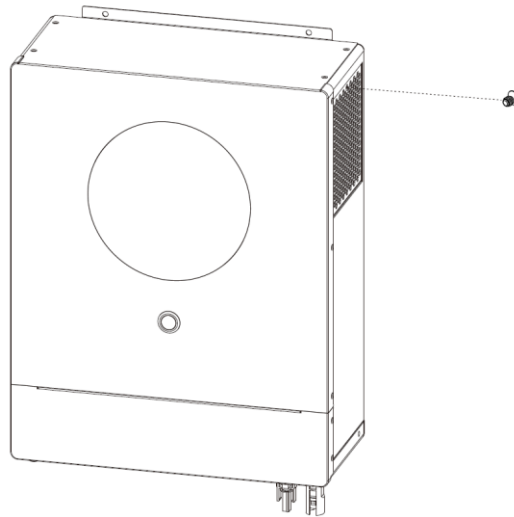
Step 2: Then, dustproof case can be removed and take out air filter foam as shown in below chart.
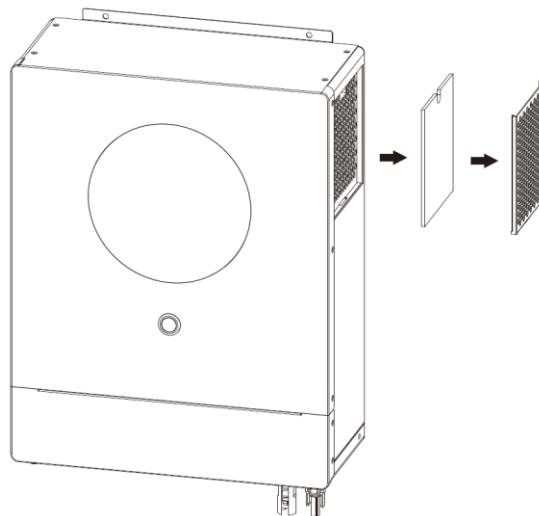
Step 3: Clean air filter foam and dustproof case. After clearance, re-assemble the dust-kit back to the inverter.

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

SPECIFICATIONS

Table 1 Line Mode Specifications

MODEL	6.2KW
Input Voltage Waveform	Sinusoidal (utility or generator)
Nominal Input Voltage	230Vac
Low Loss Voltage	170Vac±7V (UPS); 90Vac±7V (Appliances)
Low Loss Return Voltage	180Vac±7V (UPS); 100Vac±7V (Appliances)
High Loss Voltage	280Vac±7V
High Loss Return Voltage	270Vac±7V
Max AC Input Voltage	300Vac
Nominal Input Frequency	50Hz / 60Hz (Auto detection)
Low Loss Frequency	40±1Hz
Low Loss Return Frequency	42±1Hz
High Loss Frequency	65±1Hz
High Loss Return Frequency	63±1Hz
Output Short Circuit Protection	Circuit Breaker
Efficiency (Line Mode)	>95% (Rated R load, battery full charged)
Transfer Time	10ms typical (UPS); 20ms typical (Appliances)
Power Limitation	
AC Charger Power Limitation	

Table 2 Inverter Mode Specifications

MODEL	6.2KW
Rated Output Power	6.2KVA/6.2KW
Output Voltage Waveform	Pure Sine Wave
Output Voltage Regulation	230Vac±5%
Output Frequency	50Hz
Peak Efficiency	93%
Overload Protection	5s@≥130% load; 10s@105%~130% load
Surge Capacity	2* rated power for 5 seconds
Nominal DC Input Voltage	48Vdc
Cold Start Voltage	46.0Vdc
Low DC Warning Voltage	
@ load < 50%	46.0Vdc
@ load ≥ 50%	44.0Vdc
Low DC Warning Return Voltage	
@ load < 50%	47.0Vdc
@ load ≥ 50%	46.0Vdc
Low DC Cut-off Voltage	
@ load < 50%	43.0Vdc
@ load ≥ 50%	42.0Vdc
High DC Recovery Voltage	62Vdc
High DC Cut-off Voltage	63Vdc
No Load Power Consumption	<55W
Power Limitation	

Table 3 Charge Mode Specifications
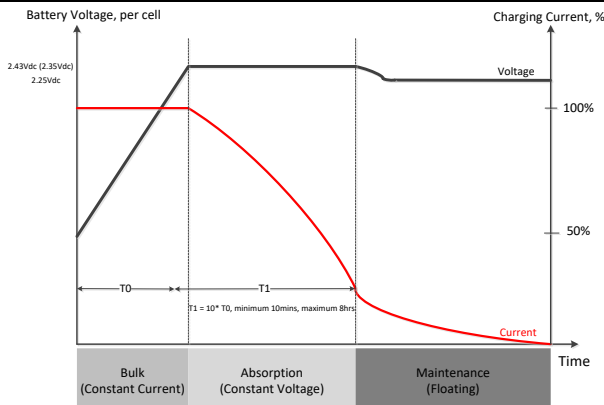
Utility Charging Mode		
MODEL		**6.2KW**
Charging Current (UPS) @ Nominal Input Voltage		100Amp(@$V_{I/P}$=230Vac)
Bulk Charging Voltage	**Flooded Battery**	58.4Vdc
	AGM / Gel Battery	56.4Vdc
Floating Charging Voltage		54Vdc
Charging Algorithm		3-Step
Charging Curve		
Solar Input		
MODEL		**6.2KW**
Max. PV Array Power		6000W
Max. PV Current		27A
Nominal PV Voltage		360Vdc
Start-up Voltage		60Vdc +/- 10Vdc
PV Array MPPT Voltage Range		60~450Vdc
Max. PV Array Open Circuit Voltage		500Vdc
Max Charging Current (AC charger plus solar charger)		120Amp

Table 4 General Specifications

MODEL	**6.2KW**
Operating Temperature Range	-10°C to 50°C
Storage temperature	-15°C~ 60°C
Humidity	5% to 95% Relative Humidity (Non-condensing)
Dimension (D*W*H), mm	136 x 323.6 x 449.3
Net Weight, kg	10.3

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. Internal fuse tripped.	1. Contact repair center for replacing the fuse. 2. Re-charge battery. 3. Replace battery.
Mains exist but the unit works in battery mode.	Input voltage is displayed as 0 on the LCD.	Input protector is tripped	Check if AC breaker is tripped and AC wiring is connected well.
	No indication.	Insufficient quality of AC power. (Shore or Generator)	1. Check if AC wires are too thin and/or too long. 2. Check if generator (if applied) is working well or if input voltage range setting is correct. (UPS→Appliance)
	No indication.	Set "SUB" (solar first) as the priority of output source.	Change output source priority to "USB" (utility first).
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 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.
		If PV input voltage is higher than specification, the output power will be derated. At this time, if connected loads is higher than derated output power, it will cause overload.	Reduce the number of PV modules in series or the connected load.
	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.	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 59	PV input voltage is beyond the specification.	Reduce the number of PV modules in series.

Appendix I: BMS Communication Installation

1. Introduction

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

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

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

2. Pin Assignment for BMS Communication Port

	Definition
PIN 1	RS232TX
PIN 2	RS232RX
PIN 3	RS485B
PIN 4	NC
PIN 5	RS485A
PIN 6	CANH
PIN 7	CANL
PIN 8	GND
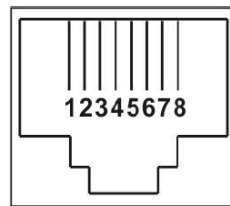
3. Lithium Battery Communication Configuration
LIO-4805/LIO-4810

LIO-4805   LIO-4810
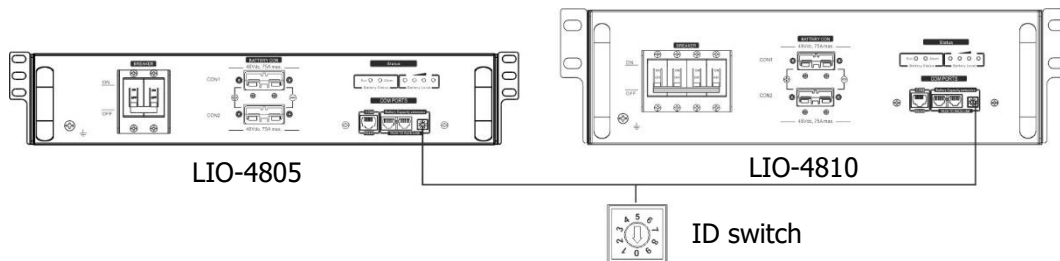
ID switch

LIO II-4810
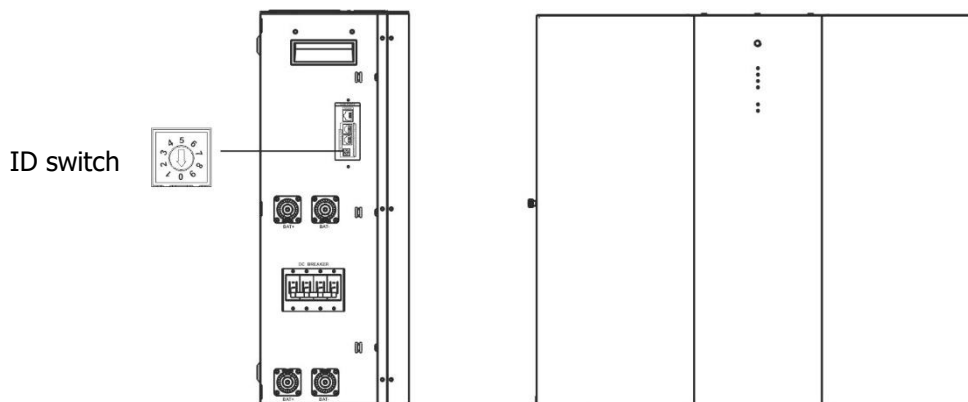
ID switch

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

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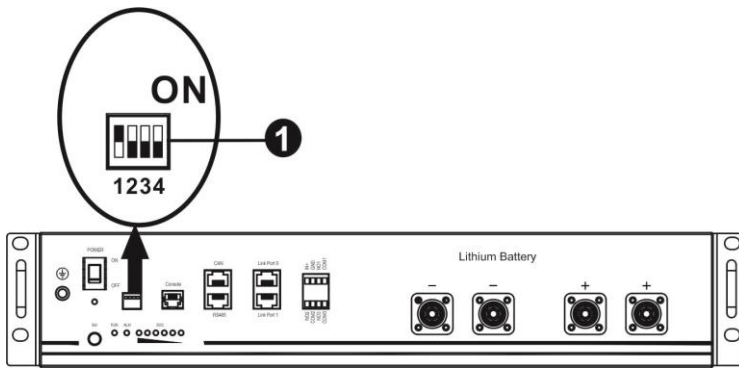
☐ Dip Switch: There are 4 Dip Switches that sets different baud rate and battery group address. If switch position is turned to the "OFF" position, it means "0". If switch position is turned to the "ON" position, it means "1".

Dip 1 is "ON" to represent the baud rate 9600.

Dip 2, 3 and 4 are 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-4805/LIO-4810/ESS LIO II-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).
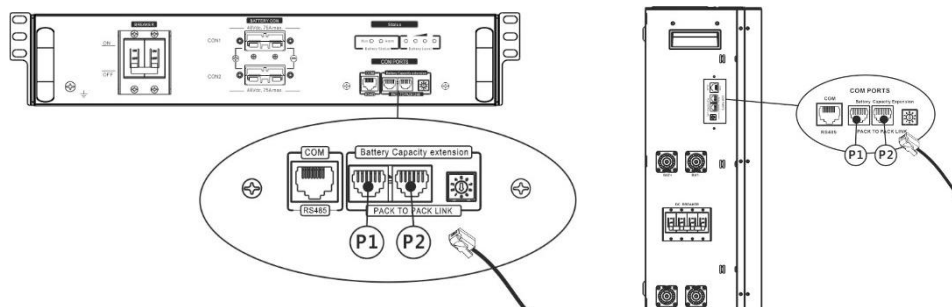
Step 2: Use supplied RJ45 cable (from battery module package) to connect inverter and Lithium battery.
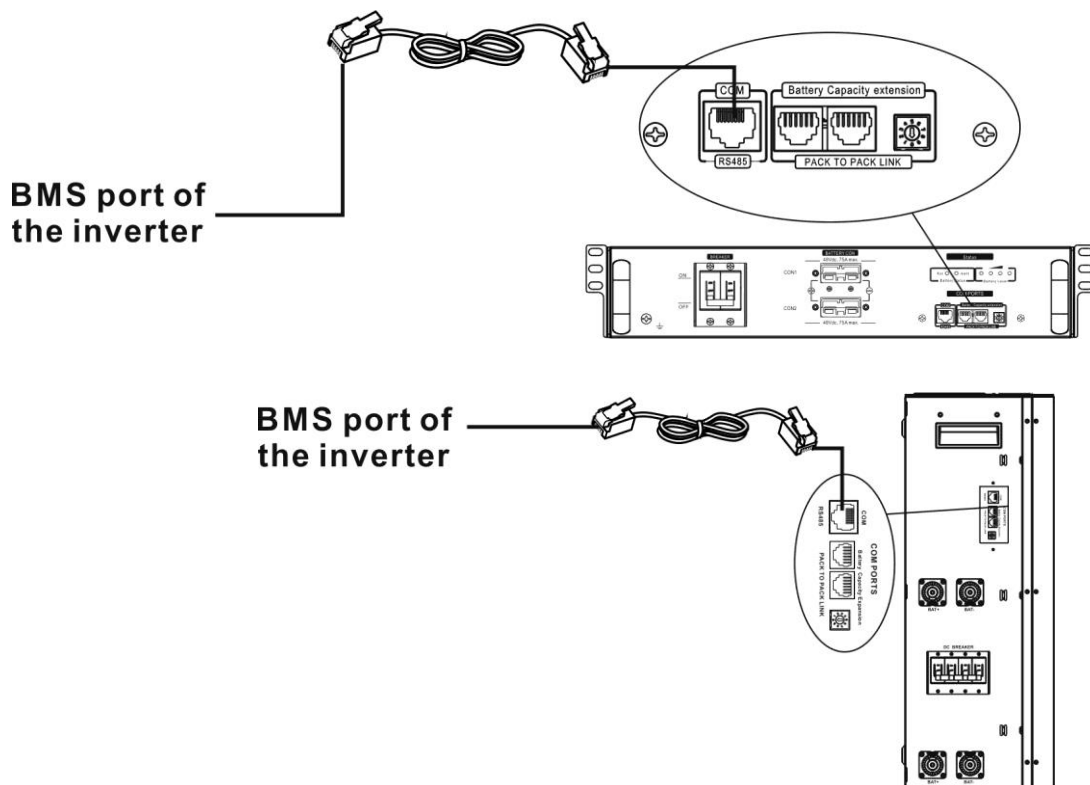
Note for parallel system:

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".

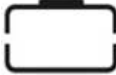Step 3: Turn the breaker switch "ON". Now, the battery module is ready for DC output.
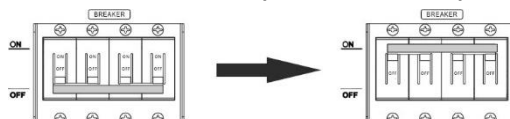
Step 4: Press Power on/off button on battery module for 5 secs, the battery module will start up.
*If the manual button cannot be approached, just simply turn on the inverter module. The battery module will be automatically turned on.

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.
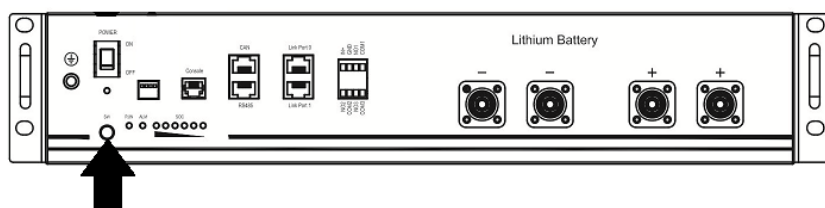
Step 1. Use custom-made RJ45 cable to connect inverter and Lithium battery.
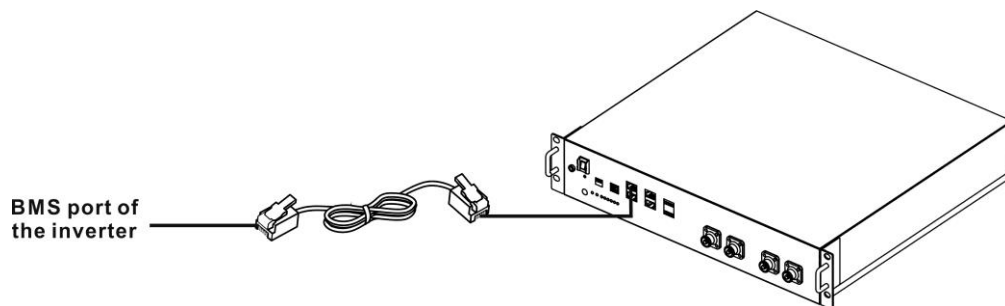
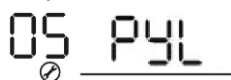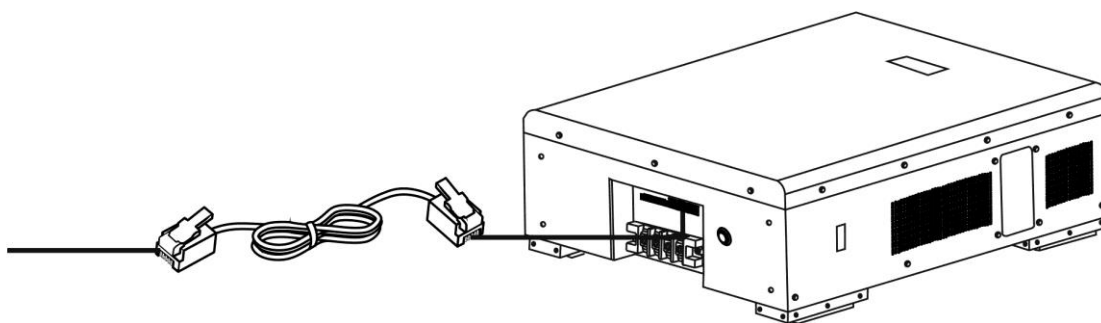Step 2. Switch on Lithium battery.
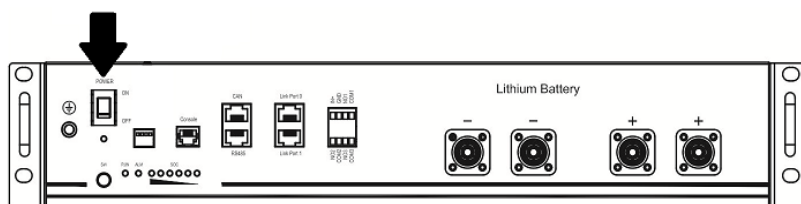
Step 3. Press more than three seconds to start Lithium battery. Output power is ready.

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.

WECO

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

BMS port of the inverter

Step 2. Switch on Lithium battery.
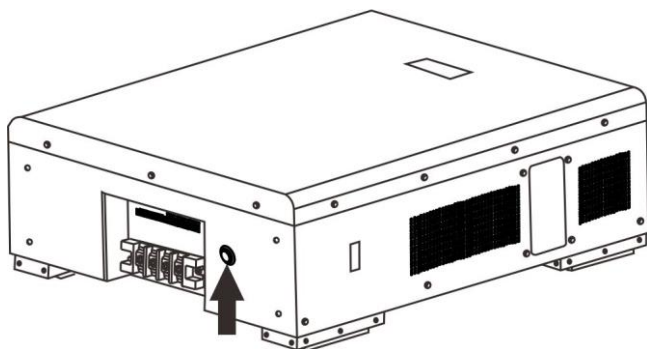
Step 3. Turn on the inverter.

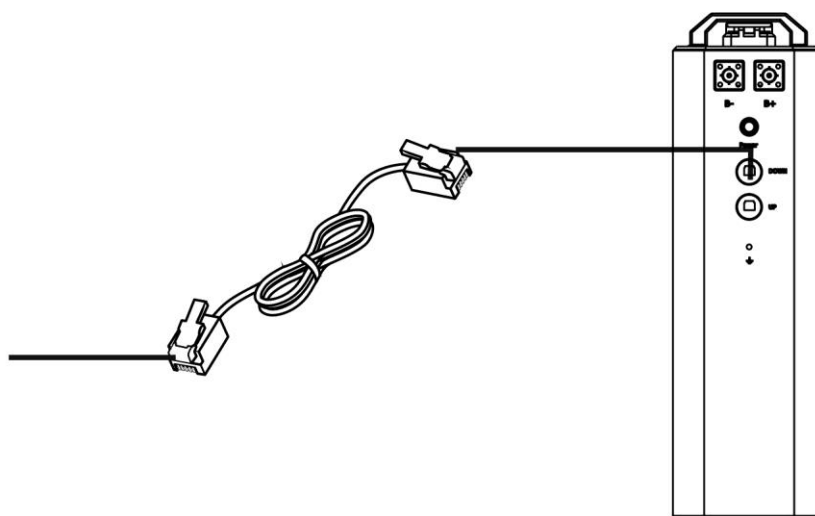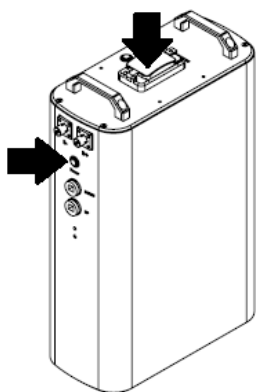Step 4. Be sure to select battery type as "WEC" in LCD program 5.

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.

SOLTARO

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

BMS port of the inverter

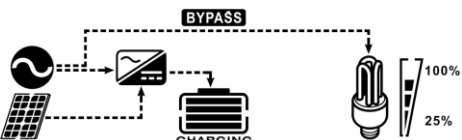Step 2. Open DC isolator and switch on Lithium battery.

Step 3. Turn on the inverter.

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

5. LCD Display Information

Press "UP" or "DOWN" button to switch LCD display information. It will show battery pack and battery group number before "Main CPU version checking" as shown below.
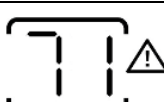
Selectable information	LCD display
Battery pack numbers & Battery group numbers	Battery pack numbers = 3, battery group numbers = 1

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.

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 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. Please check the cables between the batteries.
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 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.

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