User Manual

8.2-11KW

SOLAR INVERTER / CHARGER

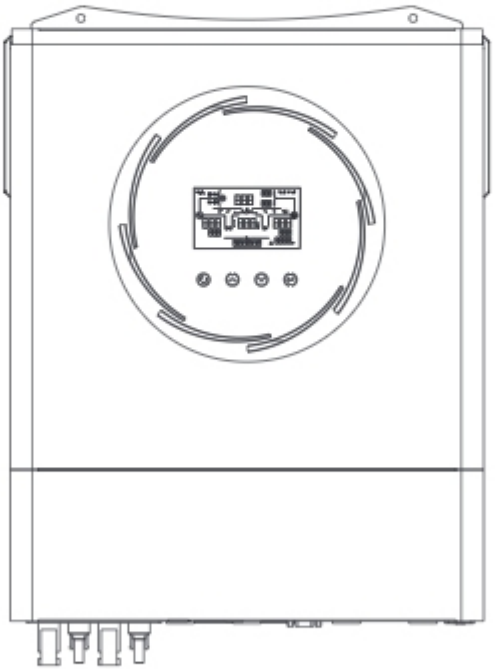


Table of Contents

ABOUT THIS MANUAL

Purpose

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

Scope

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

SAFETY INSTRUCTIONS

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

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

INTRODUCTION

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

Features

- Pure sine wave inverter
- Configurable color with the built-in RGB LED bar
- Touchable button with 5" colored LCD
- Built-in Wi-Fi for mobile monitoring (APP is required)
- Supports USB On-the-Go function
- Built-in anti-dusk kit
- LCD control module with multiple communication ports for BMS (RS485, CAN-BUS, RS232)
- Configurable input voltage ranges for home appliances and personal computers via LCD control panel
- Configurable AC/PV output usage timer and prioritization
- Configurable AC/Solar charger priority via LCD control panel
- Configurable battery charging current based on applications via LCD control panel
- Compatible to utility mains or generator power

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.

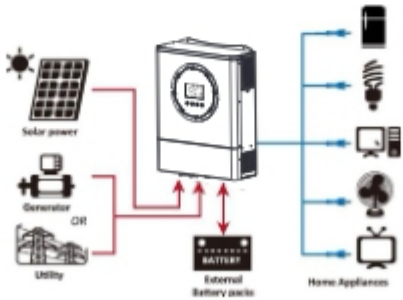
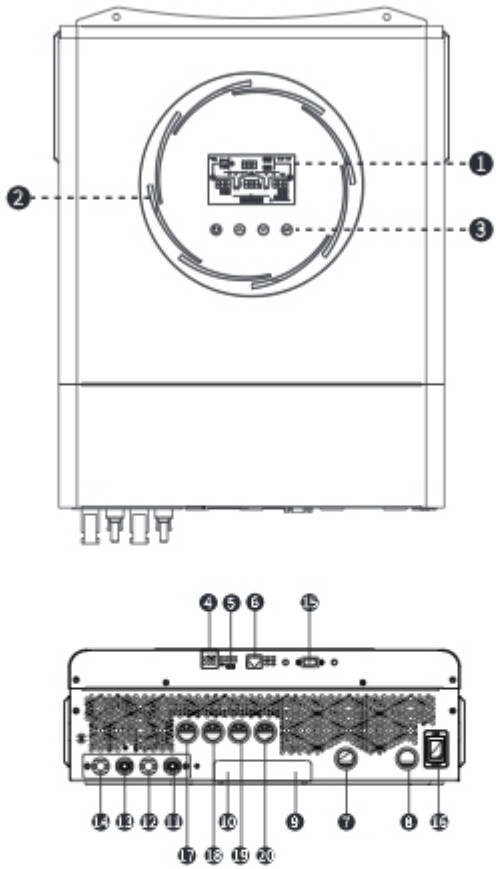


Figure 1 Basic hybrid PV System Overview

Product Overview



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

1. LCD display
2. RGB LED ring (refer to LCD Setting section for the details)
3. Function buttons
4. Generator dry contact
5. USB port
6. BMS Port(Reserved)
7. Battery positive
8. Battery negative
9. Parallel port
10. Current sharing port
11. PV1 negative connector
12. PV1 positive connector
13. PV2 negative connector
14. PV2 positive connector
15. RS 232 communication port
16. Power on/off switch
17. AC input generator
18. AC input grid
19. AC output master
20. AC putput slave

INSTALLATION

Unpacking and Inspection

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

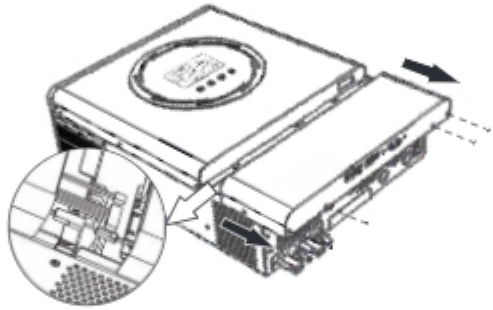
Inverter unit

Manual

RS-232 cable

Preparation

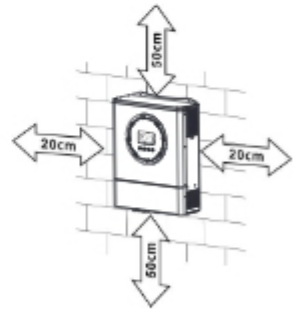
Before connecting all wirings, please take off bottom cover by removing five screws. When removing the bottom cover, be carefully to remove three cables as shown below.



Mounting the Unit

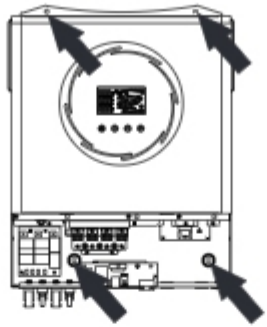
Consider the following points before selecting where to install:

- 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.**

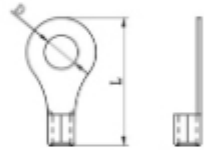
Install the unit by screwing four screws. It's recommended to use M4 or M5 screws.



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 req uested to have over-current protection installed. Please refer to typical amperage in below table as required fuse or b reaker size.

Ring terminal:



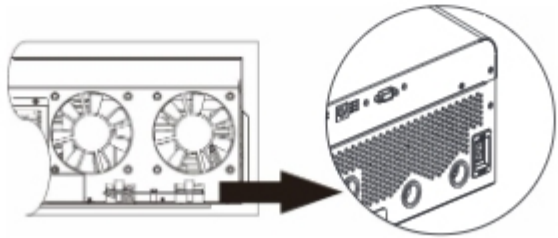
WARNING! All wiring must be performed by a qualified personnel.
WARNING! It's very important for system safety and effici ent operation to use appropriate cable for battery connection. To reduce risk of injury, please use the proper recommended cable and terminal size as below.

Recommended battery cable and terminal size :

Model	Typical Amperage	Battery capacity	Wire Size	Cable mm^2	Ring Terminal Dimensions		Torque value
					D (mm)	L (mm)	
8.2KW	188A	250AH	1*2/0AWG	67.4	8.4	54	5 Nm
11KW	228A	250AH	1*3/0AWG	85	8.4	54	5 Nm

Please follow below steps to implement battery connection:

1. Assemble battery ring terminal based on recommended battery cable and terminal size.
2. Fix two cable glands into positive and negative terminals.
3. Insert the ring terminal of battery cable flatly into battery connector of inverter and make sure the nuts are tightened with torque of 5 Nm. Make sure polarity at both the battery and the inverter/charge is correctly connected andring terminals are tightly screwed to the battery terminals.



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

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

AC Input / Output Connection

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

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

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

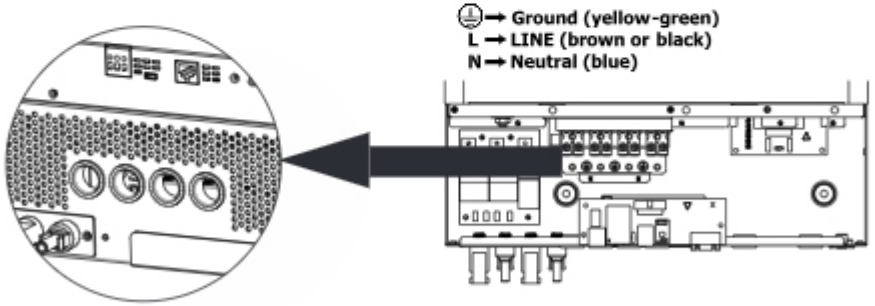
WARNING! It's very important for system safety and efficient operation to use appropriate cable for AC input connection. To reduce risk of injury, please use the proper recommended cable size as below.

Suggested cable requirement for AC wires

Model	Gauge	Torque Value
8.2KW	8 AWG	1.4~ 1.6Nm
11KW	6 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. Fix two cable glands into input and output sides.
4. Insert AC input wires according to polarities indicated on terminal block and tighten the terminal screws. Be sure to connect PE protective conductor (⏚) first.

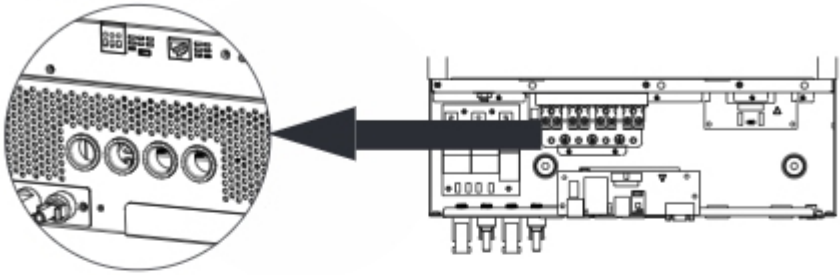


⚠	**WARNING:** Be sure that AC power source is disconnected before attempting to hardwire it to the unit.

5. This inverter is equipped with dual-output. There are four terminals(L1/N1,L2/N2) available on output port. It is set up through LCD program or monitoring software to turn on and off the second output .Refer to"LCD setting" section for the details.
   Before making wiring of second output, please remove knockout and install the cable gland first. Insert AC output wires according to polarities indicated on terminal block and tighten terminal screws. Be sure to connect PE protective conductor (⏚)first.

   ⏚ **Ground (yellow-green)**

L1 →LINE (brown or black)
N1 →Neutral (blue)
L2 →LINE (brown or black)
N2 →Neutral (blue)



6. Make sure the wires are securely connected.

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

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

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 18A.

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.

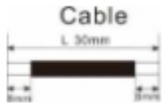
Step 3: Assemble provided PV connectors with PV modules by the following steps.
Components for PV connectors and Tools:

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.

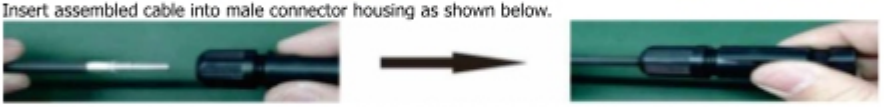


Insert striped cable into female terminal and crimp female terminal as shown below.

Insert assembled cable into female connector housing as shown below.

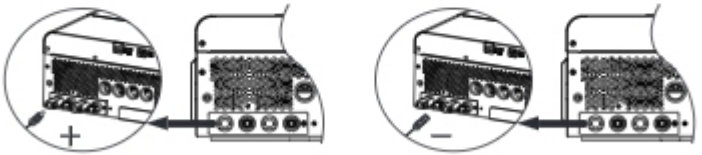
Insert striped cable into male terminal and crimp male terminal as shown below.

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.

Recommended Panel Configuration

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

1. Open circuit Voltage (Voc) of PV modules not to exceed maximum PV array open circuit voltage of the inverter.
2. Open circuit Voltage(Voc) of PV modules should be higher than the start-up voltage.

INVERTER MODEL	**8.2KW/11KW**
Max. PV Array Power	12000W
Max. PV Array Open Circuit Voltage	500Vdc
PV Array MPPT Voltage Range	90Vdc~450Vdc
Start-up Voltage (Voc)	80Vdc

Recommended solar panel configuration:

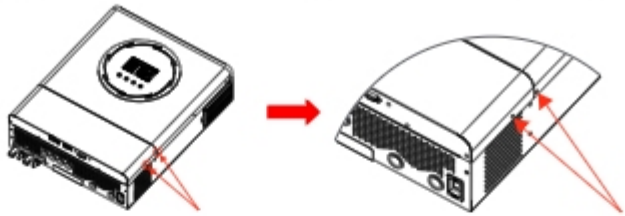
Solar Panel Spec. (reference)	**SOLAR INPUT 1**	**SOLAR INPUT 2**	**Q'ty of panels**	**Total Input Power**
	Min in series: 4pcs, per input **Max. in series: 12pcs, per**			
- 250Wp	4pcs in series	x	4pcs	1000W
-Vmp: 30.7Vdc	x	4pcs in series	4pcs	1000W
-Imp: 8.3A	12pcs in series	x	12pcs	3000W
-Voc: 37.7Vdc	x	12pcs in series	12pcs	3000W
-Isc: 8.4A	6pcs in series	6pcs in series	12pcs	3000W
-Cells: 60	6pcs in series, 2 strings	x	12pcs	3000W
	x	6pcs in series, 2 strings	12pcs	3000W
	8pcs in series, 2 strings	x	16pcs	4000W
	x	8pcs in series, 2 strings	16pcs	4000W
	10 pcs in series, 2 string	x	20pcs	5000W
	x	10pcs in series, 2 string	20pcs	5000W
	9pcs in series, 1 string	9pcs in series, 1 string	18pcs	4500W
	10pcs in series, 1 string	10pcs in series, 1 strings	20pcs	5000W
	12pcs in series, 1 string	12pcs in series, 1 strings	24pcs	6000W
	6pcs in series, 2 strings	6pcs in series, 2 strings	24pcs	6000W
	8pcs in series, 2 strings	8pcs in series, 2 strings	32pcs	8000W
	10pcs in series, 2 strings	10pcs in series, 2 strings	40pcs	10000W
	12pcs in series, 2 strings	12pcs in series, 2 strings	48pcs	12000W

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

Solar Panel Spec. (reference)	**SOLAR INPUT 1**	**SOLAR INPUT 2**	**Q'ty of panels**	**Total Input Power**
	Min in series: 4pcs, per input **Max. in series: 12pcs, per**			
- 555Wp	3pcs in series	x	3pcs	1665W
-Imp: 17.32A	x	3pcs in series	3pcs	1665W
-Voc: 38.46Vdc	7pcs in series	x	7pcs	3885W
-Isc: 18.33A	x	7pcs in series	7pcs	3885W
-Cells: 110	11pcs in series	x	11pcs	6105W
	x	11pcs in series	11pcs	6105W
	7pcs in series	7pcs in series	14 pcs	7770W
	11pcs in series	11pcs in series	22 pcs	12210W

Final Assembly

After connecting all wirings, re-connect three cables and then put bottom cover back by screwing five screws as shown below.



Communication Connection

Serial Connection

Please use the supplied serial cable to connect between the inverter and your PC. Install the monitoring software from the bundled CD and follow the on -screen instructlons to complete your installatlon. For detailed software operation, refer to the software user manual on the bundled CD.

Dry Contact Signal

There is one dry contact (3A/250VAC) available on the rear panel. It could be used to deliver signal to external device when battery voltage reaches warning level.

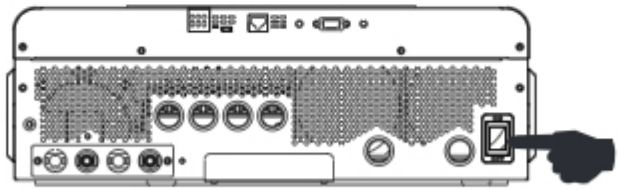
Unit Status	Condition			Dry contact port: 	
				NC & C	NO & C
Power Off	Unit is off and no output is powered.			Close	Open
Power On	Output is powered from Battery power or Solar energy.	Program 01 set as USB (utility first) or SUB (solar first)	Battery voltage < Low DC warning voltage	Open	Close
			Battery voltage > Setting value in Program 13 or battery charging reaches floating stage	Close	Open
		Program 01 is set as SBU (SBU priority)	Battery voltage < Setting value in Program 12	Open	Close
			Battery voltage > Setting value in Program 13 or battery charging reaches floating stage	Close	Open

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 to turn on the unit.

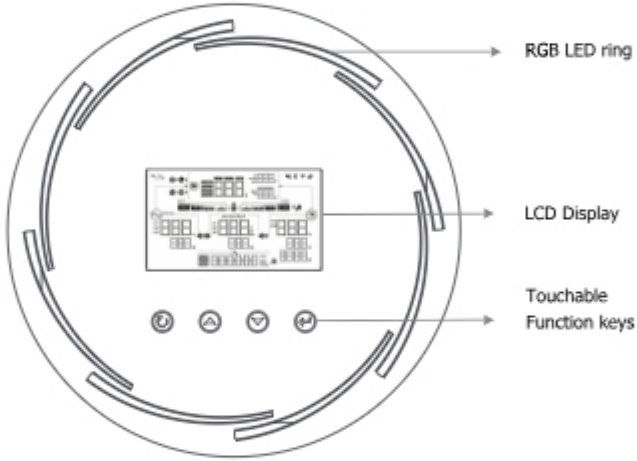
Inverter Turn -on

After this inverter is turned on, WELCOME light show will be started with RGB LED BAR. It will slowly cycle through entire spectrum of nine colors (Green, Sky blue, Royal blue, Violet, Pink, Red, Honey, Yellow, Lime yellow) about 10-15 seconds. After initialization, it will light up with default color.

RGB LED BAR can light up in different color and light effects based on the setting of energy priority to display the operation mode, energy source, battery capacity and load level. These parameters such as color, effects, brightness, speed and so on can be configured through the LCD panel. Please refer to LCD settings for the details.

Operation and Display Panel

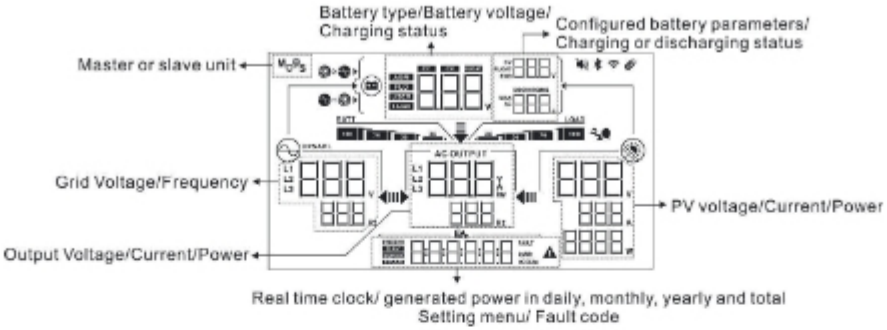
The operation and the LCD module, shown in the chart below, includes six indicators, six function keys, on/off switch and a LCD display to indicate the operating status and input/output power information.

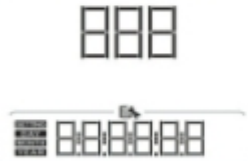
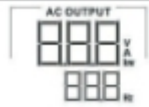


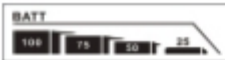
Touchable Function Keys

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

LCD Display Icons



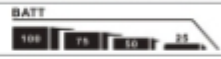
Icon	Function description
Input Source Information	
	Indicates the AC input voltage and frequency.
	Indicates the PV voltage, current and power.
	Indicates the battery voltage, charging stage, configured battery parameters, charging or discharging current.
Configuration Program and Fault Information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

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

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

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

In battery mode, it will present battery capacity.

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

Load Information

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

0%~24%	25%~49%
	
50%~74%	75%~100%
	

Charger Source Priority Setting Display

	Indicates setting program 16 "Charger source priority" is selected as "Solar first".
	Indicates setting program 16 "Charger source priority" is selected as "Solar and Utility".
	Indicates setting program 16 "Charger source priority" is selected as "Solar only".

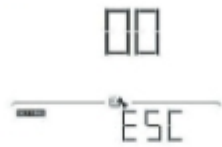
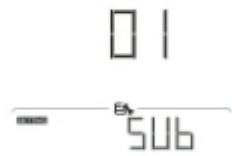
Output source priority setting display	
	Indicates setting program 01 "Output source priority" is selected as "Utility first".
	Indicates setting program 01 "Output source priority" is selected as "Solar first".
	Indicates setting program 01 "Output source priority" is selected as "SBU".
AC Input Voltage Range Setting Display	
UPS	Indicates setting program 03 is selected as "UPS". The acceptable AC input voltage range will be within 170-280VAC.
APL	Indicates setting program 03 is selected as "APL". The acceptable AC input voltage range will be within 90-280VAC.
Operation Status Information	
	Indicates unit connects to the mains.
	Indicates unit connects to the PV panel.
	Indicates battery type.
	Indicates parallel operation is working.
	Indicates unit alarm is disabled.
	Indicates Wi-Fi transmission is working.
	Indicates USB disk is connected.

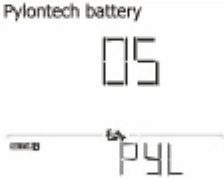
LCD Setting

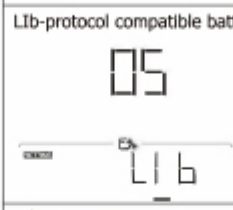
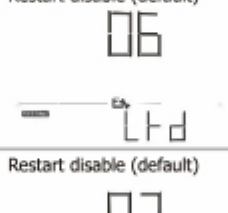
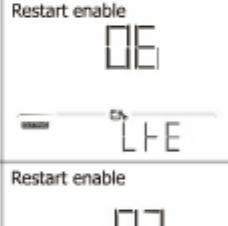
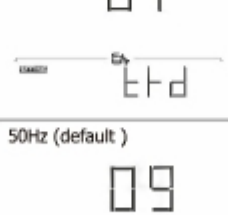
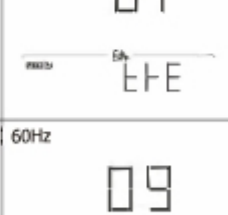
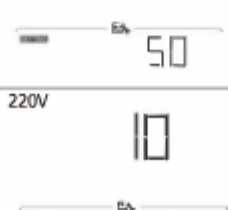
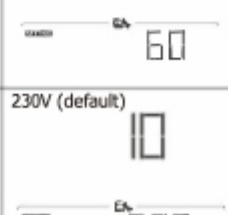
General Setting

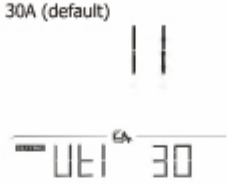
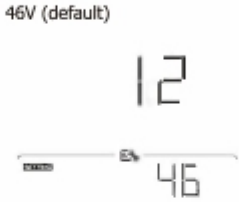
After pressing and holding "↵" button for 3 seconds, the unit will enter the Setup Mode. Press "▲" or "▼" button to select setting programs. Press "↵" button to confirm you selection or "↻" button to exit.

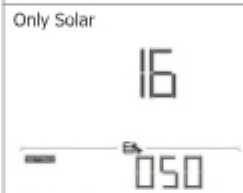
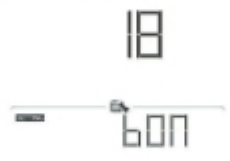
Setting Programs:

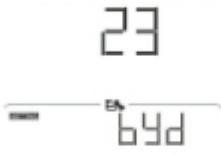
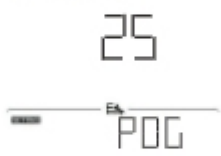
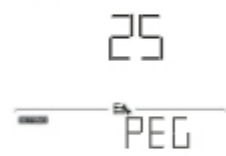
Program	Description	Selectable option	
00	Exit setting mode	Escape 	
01	Output source priority: To configure load power source priority	Utility first (default) 	Utility will provide power to the loads as first priority. Solar and battery energy will provide power to the loads only when utility power is not available.
		Solar first 	Solar energy provides power to the loads as first priority. If solar energy is not sufficient to power all connected loads, Utility energy will supply power to the loads at the same time.
		SBU priority 	Solar energy provides power to the loads as first priority. If solar energy is not sufficient to power all connected loads, battery energy will supply power to the loads at the same time. Utility provides power to the loads only when battery voltage drops to either low-level warning voltage or the setting point in program 12.
02	Maximum charging current: To configure total charging current for solar and utility chargers. (Max. charging current = utility charging current + solar charging current)	60A (default) 	Setting range is from 10A to 150A. Increment of each click is 10A.

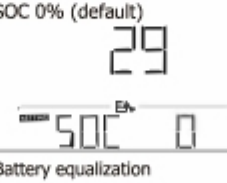
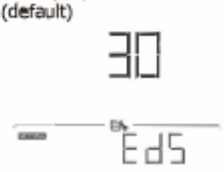
03	AC input voltage range	Appliances (default) 	If selected, acceptable AC input voltage range will be within 90-280VAC
		UPS 	If selected, acceptable AC input voltage range will be within 170-280VAC
05	Battery type	AGM (default) 	Flooded 
		User-Defined 	If "User-Defined" is selected, battery charge voltage and low DC cut-off voltage can be set up in program 26, 27 and 29.
		Pylontech battery 	If selected, programs of 02, 26, 27 and 29 will be automatically set up. No need for further setting.
		WECO battery 	If selected, programs of 02, 12, 26, 27 and 29 will be auto-configured per battery supplier recommended. No need for further adjustment.

05	Battery type	Soltaro battery 	If selected, programs of 02, 26, 27 and 29 will be automatically set up. No need for further setting.
		LIb-protocol compatible battery 	Select "LIb" if using Lithium battery compatible to Lib protocol. If selected, programs of 02, 26, 27 and 29 will be automatically set up. No need for further setting.
		3rd party Lithium battery 	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) 	Restart enable 
07	Auto restart when over temperature occurs	Restart disable (default) 	Restart enable 
09	Output frequency	50Hz (default) 	60Hz 
10	Output voltage	220V 	230V (default)

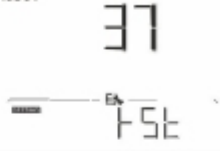
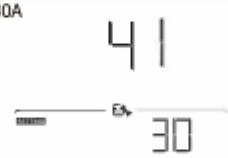
		240V 	
11	Maximum utility charging current Note: If setting value in program 02 is smaller than that in program in 11, the inverter will apply charging current from program 02 for utility charger.	30A (default) 	Setting range is 2A, then from 10A to 150A. Increment of each click is 10A.
12	Setting voltage point back to utility source when selecting "SBU" (SBU priority) in program 01.	46V (default) 	Setting range is from 44V to 56V. Increment of each click is 1V.
		SOC10% (default) 	If the battery type (#05) set as lithium, this setting will change to SOC automatically. Adjustable range is 5% to 95%. Increment of each click is 5%.
13	Setting voltage point back to battery mode when selecting "SBU" (SBU priority) in program 01.	Setting range is from 48V to 62V. Increment of each click is1V.	
		Battery fully charged 	54V (default) 
		SOC 30% (default) 	If any types of lithium battery is selected in program 05, setting value will change to SOC automatically. Setting range is 10% to 100%.

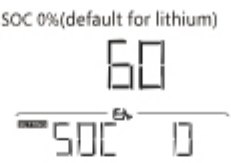
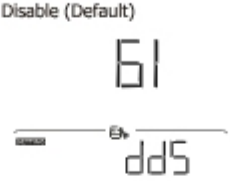
16	Charger source priority: To configure charger source priority	If this inverter/charger is working in Line, Standby or Fault mode, charger source can be programmed as below:	
		Solar first 	Solar energy will charge battery as first priority. Utility will charge battery only when solar energy is not available.
		Solar and Utility (default) 	Solar energy and utility will charge battery at the same time.
		Only Solar 	Solar energy will be the only charger source no matter utility is available or not.
18	Alarm control	Alarm on (default) 	Alarm off 
19	Auto return to default display screen	Return to default display screen (default) 	If selected, no matter how users switch display screen, it will automatically return to default display screen (Input voltage /output voltage) after no button is pressed for 1 minute.
		Stay at latest screen 	If selected, the display screen will stay at latest screen user finally switches.

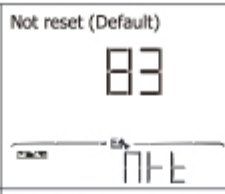
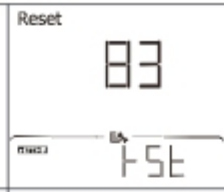
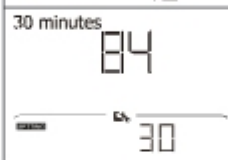
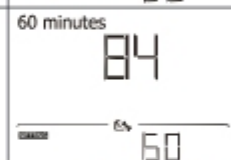
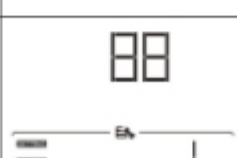
20	Backlight control	Backlight on (default) 	Backlight off 
22	Beeps while primary source is interrupted	Alarm on (default) 	Alarm off 
23	Overload bypass: When enabled, the unit will transfer to line mode if overload occurs in battery mode.	Bypass disable (default) 	Bypass enable 
25	Extemal CT function	Disable (default) 	Enable 
26	Bulk charging voltage (C.V voltage)	56.4 (default) 	If user-defined is selected in program 5, this program can be set up. Setting range Is from 48.0V to 62.0V. Increment of each click is 0.1V.
27	Floating charging voltage	54V (default) 	If user-defined Is selected In program 5, this program can be set up. Setting range Is from 48.0V to 62.0V. Increment of each dick is 0.1V.

<table>
<tr><td rowspan="4">28</td><td rowspan="4">AC output mode
*This setting is only available when the inverter is in standby mode (Switch off).</td><td>Single: This Inverter is used In single phase application.
  </td><td>Parallel: This Inverter Is operated In parallel system.
  </td></tr>
<tr><td colspan="2">When the Inverter is operated in 3-phase application, set up inverter to be operated in specific phase.</td></tr>
<tr><td>L1 phase:
  </td><td>L2 phase:
  </td></tr>
<tr><td>L3 phase:
  </td><td></td></tr>
<tr><td rowspan="2">29</td><td rowspan="2">Low DC cut-off voltage:
● If battery power is only power source available, inverter will shut down.
● If PV energy and battery power are available, inverter will charge battery without AC output.
If PV energy, battery power and utility are all available, inverter will transfer to line mode</td><td>44V (default)
  </td><td>If user-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.</td></tr>
<tr><td>SOC 0% (default)
  </td><td>If the battery type(#05) set as lithium,The setting will change to SOC automatically. Setting range is from 0% to 90%. Increment of each click is 5%.</td></tr>
<tr><td rowspan="2">30</td><td rowspan="2">Battery equalization</td><td>Battery equalization
  </td><td>Battery equalization disable (default)
  </td></tr>
<tr><td colspan="2">If "Flooded" or "User-Defined" is selected in program 05, this program can be set up.</td></tr>
</table>

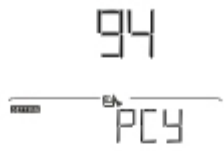
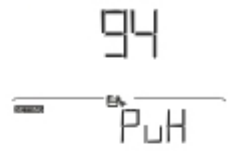
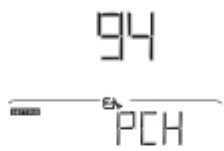
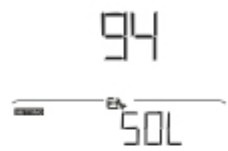
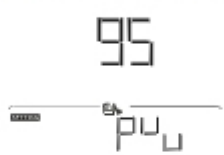
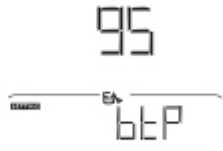
31	Battery equalization voltage	58.4V (default) 	Setting range is from 48.0V to 62.0V. Increment of each click is 0.1V.
33	Battery equalized time	60min (default) 	Setting range is from 5min to 900min. Increment of each click is 5min.
34	Battery equalized timeout	120min (default) 	Setting range is from 5min to 900 min. Increment of each click is 5 min.
35	Equalization interval	30days (default) 	Setting range is from 0 to 90 days. Increment of each click is 1 day
36	Equalization activated immediately	Enable 	Disable (default) 

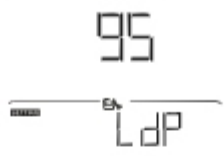
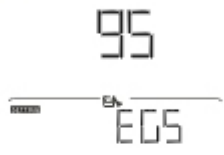
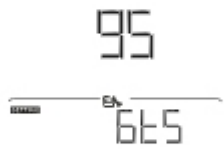
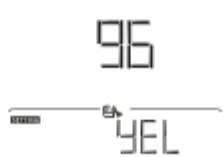
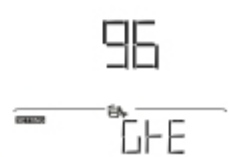
		If equalization function is enabled in program 30, this program can be set up. If "Enable" is selected in this program, it's to activate battery equalization immediately and LCD main page will show "E9". If "Disable" is selected, it will cancel equalization function until next activated equalization time arrives based on program 35 setting. At this time, "E9" will not be shown in LCD main page.	
37	Reset all stored data for PV generated power and output load energy	Not reset(Default) 	Reset 
38	Solar energy feed to grid configuration (It is requested to enter password)	Solar energy feed to grid disable (Default) 	Solar energy feed to grid enable 
41	Maximum battery discharging current	disable (default) 	If selected, battery discharge protection is disabled.
		30A 	The setting range is from 30A to 150A.Increment of each click is 10A. If discharging current is higher than setting value, battery will stop discharging. At this time,if the utility is available, the inverter will operate in bypass mode. If no utility is available,the inverter will shut down after 5-minute operation in battery mode.
60	Setting cut-off voltage point or SOC on the second output(L2)	default setting:42.0V 	If"User-defined" is selected in program 05,this setting range is from 42.V to 61.0V for 48V model. Increment of each click is 0.1V.

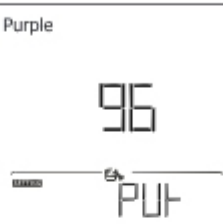
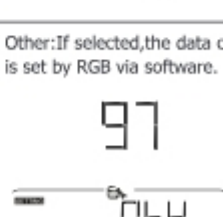
		SOC 0%(default for lithium) 	If any type of lithium battery is selected in program 05,this parameter value will be displayed in percentage and value setting is based on battery capacity percentage. Setting range is from 0% to 95%, Increment of each click is 5%.
61	Setting discharge time on the second output (L2)	Disable (Default) 	Setting range is disable and then from 0min to 990 min. Increment of each click is 5min. *If the battery discharge time achieves the setting time in program 61 and the program 60 function is not triggered, the output will be turned off.
62	Setting discharge time on the second output (L2)	00~23((Default,second output always on) 	Setting range is from 00 to 23. Increment of each click is 1 hour. If setting range is from 00 to 08, the second output will be turned on until 09:00. During this period, it will be turned off if any setting value in program 60 or 61 is reached.
63	Setting voltage point or SOC to restart on the secondoutput (L2)	Default setting:46.0V 	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 o ffdue to setting in program 60, second output (L2) will restart according to setting in program 63.
		SOC: 20% (default forlithiumbattery) 	If any type of lithium battery is selected in program 05, this parameter value will be displayed in percentage and value setting is based on battery capacity percentage. Setting range is from 5% to 100%, Increment of each click is 5%. *If second output is cuto ffdue to setting in program 60, second output (L2) will restart according to setting in program 63.
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.		Setting range is from 0 min to 990 min. Increment of each clickis 5 min. *If second output is cut o ffdue to setting in program 61, second output (L2) will restart according to setting in program 64.

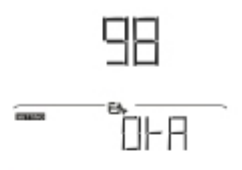
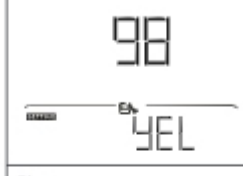
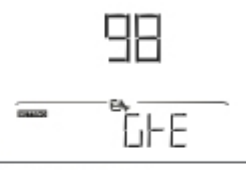
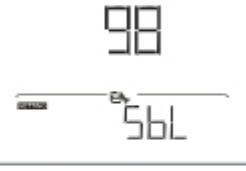
83	Erase all data log	Not reset (Default) 	Reset 
84	Data log recorded interval *The maximum data log number is 1440. If it's over 1440, it will re-write the first log.	3 minutes 	5 minutes 
		10 minutes (default) 	20 minutes 
		30 minutes 	60 minutes 
85	Time setting – Minute		For minute setting, the range is from 0 to 59.
86	Time setting – Hour		For hour setting, the range is from 0 to 23.
87	Time setting– Day		For day setting, the range is from 1 to 31.
88	Time setting– Month		For month setting, the range is from 1 to 12.

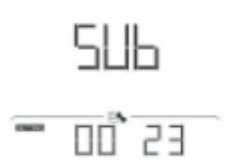
89	Time setting – Year		For year setting, the range is from 17 to 99.
91	On/O ffcontrol for RGB LED *It's required to enable this setting to actvate RGB LED lighting function.	Enabled (default) 	Enabled (default) 
92	Brightness of RGB LED	Low 	Normal (default) 
		High 	
93	Lighting speed of RGB LED	Low 	Normal (default) 
		High 	

94	RGB LED effects	Power cycling 	Power wheel 
		Power chasing 	Solid on (Default) 
95	Data Presentation of data color *Energy source (Grid-PV-Battery) and battery charge/discharge status only available when RGB LED effects is set to Solid on.	Soler input power in watt 	LED lighting portion will be changed by the percentage of solar input power and nominal PV power. If"Sold on s selected in #94, LED ring will light up with background color setting in #96. If "Power wheel is selected in #94, LED ring will light up in4 levels. If"cycling" or "chasing" is selected in #94, LED ring will light up in 12 levels.
		Battery capaity percentage (Default) 	LED lighting portion will be changed by battery capacity percentage. If "Solid on" is selected in #94, LED ring will light up with background color setting in #96. If "Power wheel" is selected in #94, LED ring will light up in4 levels. If "cycling" or "chasing" is selected in #94, LED ring will light up in 12 levels.

<table>
<tr><td rowspan="3">95</td><td rowspan="3">Data Presentation of data color
*Energy source (Grid-PV-Battery) and battery charge/discharge status only available when RGB LED effects is set to Solid on.</td><td>Load percentage.
  </td><td>LED lighting portion will be changed by load percentage.
If "Solid on" is selected in #94, LED ring will light up with background color setting in #96.
If "Power wheel" is selected in #94, LED ring will light up in4 levels.
If "cycling" or "chasing" is selected in #94, LED ring will light up in 12 levels.</td></tr>
<tr><td>Energy source(Grid-PV-Battery)
  </td><td>If selected, the LED color will be background color setting in #96 in AC mode. If PV power is active, the LED color will be data color setting in #97. If the remaining status occur, the LED color will be set in #98.</td></tr>
<tr><td>Battery charge/discharge status
  </td><td>If selected, the LED color will be background color setting in #96 in battery charging status, the LED color will be data color setting in #97 in battery discharging status.</td></tr>
<tr><td rowspan="2">96</td><td rowspan="2">Background color of RGB LED</td><td>Pink
  </td><td>Orange
  </td></tr>
<tr><td>Yellow
  </td><td>Green
  </td></tr>
</table>

96	Background color of RGB LED	Blue 	Sky blue(Default) 
		Purple 	Other:If selected,the background color is set by RGB via software. 
97	Data Color for RGB LED	Pink 	Orange 
		Yellow 	Green 
		Blue 	Sky blue 
		Purple 	Other:If selected,the data color is set by RGB via software. 

98	Background color of RGB LED *Only available when data Presentation of data color is set to Energy source (Grid-PV-Battery).	Pink 	Orange 
		Yellow 	Green 
		Blue 	Sky blue(Default) 
		Purple 	Other:If selected,the background color is set by RGB via software. 

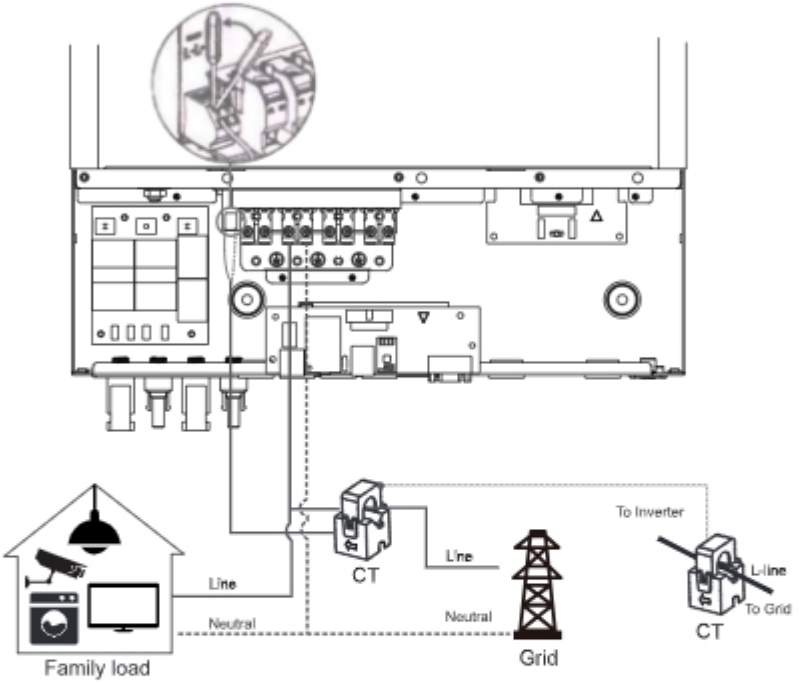
<table>
<tr><td rowspan="3">99</td><td rowspan="3">Timer Setting for Output Source Priority
</td><td colspan="2">Once access this program, it will show "OPP" in LCD. Press "↵" button to select timer setting for output source priority. There are three timers to set up. Press "▲" or "▼" button to select specific timer option. Then, press "↵" to confirm timer option. Press "▲" or "▼" button to adjust starting time first and the setting range is from 00 to 23. Increment of each click is one hour. Press "↵" to confirm starting time setting.Next, the cursor will jump to right column to set up end time. Once end time is set completely, press "↵" to confirmall setting.</td></tr>
<tr><td>Utility first timer
  </td><td>Solar first timer
  </td></tr>
<tr><td>SBU priority timer
  </td><td></td></tr>
<tr><td rowspan="3">100</td><td rowspan="3">Timer Setting for Charger Source Priority
  </td><td colspan="2">Once access this program, it will show "CGP" in LCD. Press "↵" button to select timer setting for charger source priority. There are three timers to set up. Press "▲" or "▼" button to select specific timer option. Then, press "↵" to confirm timer option. Press "▲" or "▼" button to adjust starting time first and the setting range is from 00 to 23. Increment of each click is one hour. Press "↵" to confirm starting time setting.Next, the cursor will jump to right column to set up end time. Once end time is set completely, press "↵" to confirmall setting.</td></tr>
<tr><td>Solar first
  </td><td>Sloar and utility
  </td></tr>
<tr><td>Only solar
  </td><td></td></tr>
</table>

The CT Operation Guide

With, CT connected, hybrid inverter can be easily integrated into the existing household system. It's to arrange self-cnnsumption via CT to control power generation and battery charging of the inverter.

1. Single commissioning

Step 1: Power off the inverter and connect the exteral CT by using the tool accessory to install on the spring teminal block., Be noted the mark of current fiow direction on the CT should point to the Inverter and the polarity on connecting CT wires on the terminal block shouild be followed as "L+" vs red wire and "L-" vs white wire.

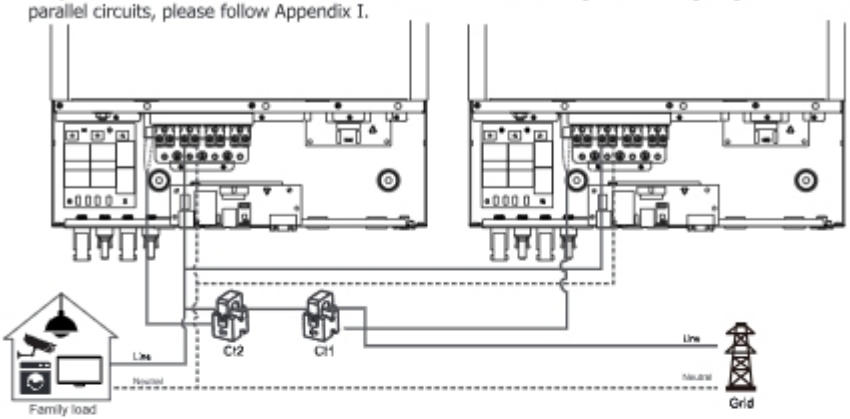


Step 2: Power on the inverter
Step 3: Enter LCD setting on the inverter with CT sensor connected and set CT function to "enable".

	Disable (default)	Enable
Extemal CT function		

2. Parallel commissioning

Step 1: Power off the inverter and connect the CT sensor according to the wiring diagram below. For other parallel circuits, please follow Appendix I.

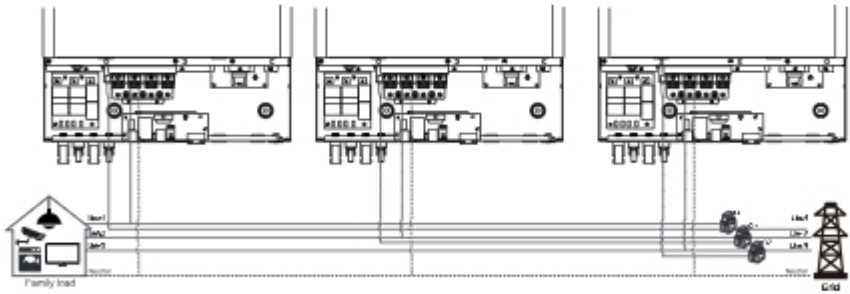


Step 2: Power on each inverter.

Step 3: Enter LcD setting on the inverter with CT sensor connected and set CT function to "enable". Same as singie phase setting

3. Three-phase commissioning

Step 1: Power off the inverter and connect the CT sensor according to the wiring diagram below. For other parallel circuits, please follow Appendix I.



Step 2: Power on each inverter.

Step 3: Enter LCD seting on the inverter with CT sensor connected and set CT function to "enable". Same as single phase setting

IMPORTANT ATTENTION:

If applying CT function during parallel operation, it only needs one inverter from parallel system connected to CT sensor. Be sure to enable LCD external CT function on the one inverter with CT connected and set up "Disable" on the remaining inverters. Otherwise, it will cause CT function not working during parallel operation.

USB Function Setting

There are three USB function setting such as firmware upgrade,data log export and internal parameter re-write from the USB disk. Please follow below procedure to execute selected USB function setting.

Procedure	LCD Screen
Step1: Insert an OTG USB disk into the USB port (2)	
Step2: Press" ↻ " button to enter USB function setting.	

Step3: Please select setting program by following the procedure.

Program#	Operation Procedure	LCD Screen
Upgrade firmware	After entering USB function setting, press" ↵ " button to enter "upgrade firmware" function. This function is to upgrade inverter firmware. If firmware upgrade is needed, please check with your dealer or installer for detail instructions.	
Re-write internal parameters	After entering USB function setting, press " ▼ " button to switch to "Re-write internal parameters" function. This function is to over-write all parameter settings (TEXT file) with settings in the USB disk from a previous setup or to duplicate inverter settings. Please check with your dealer or installer for detail instructions.	
Export data log	After entering USB function setting, press ' ▼ 'button twice to switch to "export data log" function and it will show "LOG" in the LCD. Press " ↵ "buttonto confirm the selection for export data log.	
	If the selected function is ready, LCD will display "rdy ".Press " ↵ " buttonto confirm the selection again.	
	Press " ▲ " button to select "Yes" to export data log. "YES" will disappear after this action is complete. Then, press " ↻ " button to return to main screen. Or press " ▼ " button to select "No" to return to main screen.	

If no button Is pressed for 1 minute, it will automatically return to main screen.

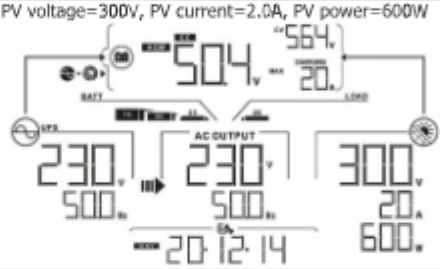
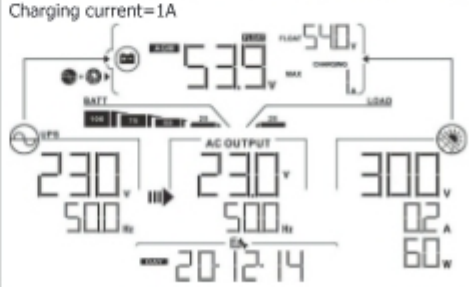
Error Messages

Error Code	Messages
	No USB disk is detected.
	USB disk is protected from copy.
	Document inside the USB disk with wrong format.

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

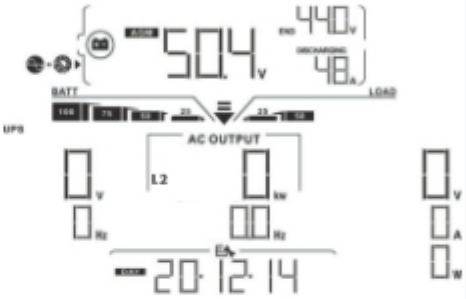
LCD Display

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

Selectable information		LCD display
Default Display Screen	Utility voltage/ Utility frequency	Input Voltage=230V, Input frequency=50Hz 
	PV voltage/ PV current/ PV power	PV voltage=300V, PV current=2.0A, PV power=600W 
	Battery voltage, charging stage/ Configured battery parameters/ Charging or discharging current	Battery voltage=50.4V, Bulk charging voltage=56.4V, Charging current=20A 
		Battery voltage=53.9V, Floating charging voltage=54.0V, Charging current=1A 

Default Display Screen	Battery voltage, charging stage/ Configured battery parameters/ Charging or discharging current	Battery voltage=50.4V, Low DC cut-off voltage=44.0V, Discharging current=48A 
	L1 output voltage/output frequency, load in VA, load in watt, L2 output voltage/output frequency switch every 5 second	Output voltage=230V, Output frequency=50Hz 
		Load in VA=2.4kVA, Output frequency=50Hz 
		Load in Watt=2.4kW, Output frequency=50Hz 

<table>
<tr>
<td rowspan="2">Default Display Screen</td>
<td>L1 output voltage/output frequency, load in VA, load in watt, L2 output voltage/output frequency switch every 5 second</td>
<td>L2 output voltage=230V, L2 output frequency=50Hz
 

2nd output is off.
L2 output voltage=0, L2 output frequency=0Hz
 
</td>
</tr>
<tr>
<td>Output voltage, load in VA, load in Watt switch every 5 second/ Output frequency</td>
<td>Load in Watt=2.4KW, Ooutput frequency=50Hz
 
</td>
</tr>
</table>

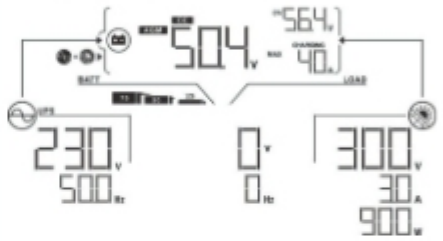
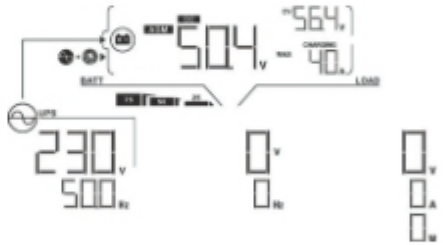
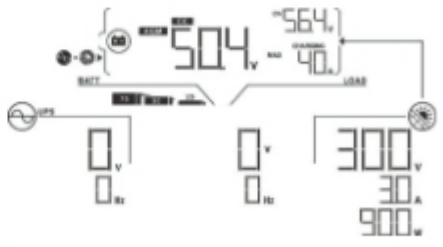
Default Display Screen	Real date	Real date Dec 14, 2020. 
Real time		Real time 11:38. 
PV energy generation today		PV energy generation today =888Wh. 
PV energy generation this month		PV energy generation this month =8.88kWh. 

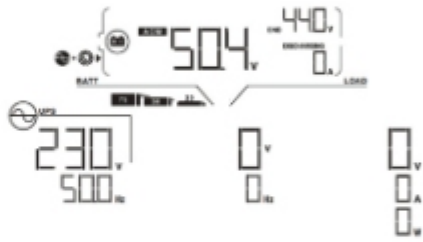
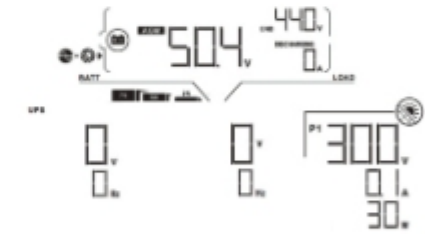
PV energy generation this year	PV energy generation this year =88.8kWh. 
Total PV energy generation	Total PV energy generation =888kWh. 
Load output energy today	Load output energy today =888Wh. 
Load output energy this month	Load output energy this month =8.88kWh. 

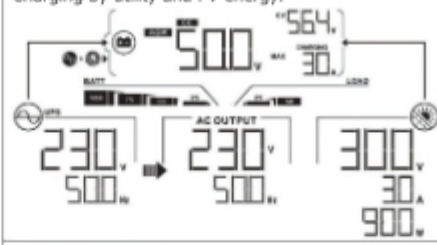
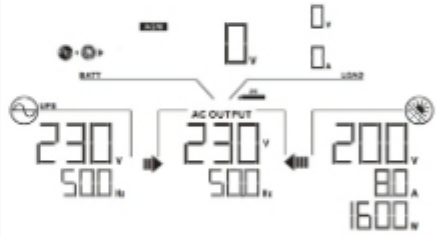
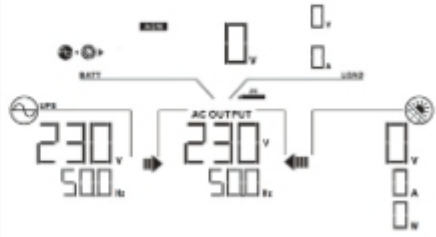
Load output energy this year	Load output energy this year =88.8kWh. 
Total load output energy	Total load output energy=888kWh. 
Main CPU version checking	Main CPU version 00050.72. 
Secondary CPU version checking	Secondary CPU version 00022.01. 

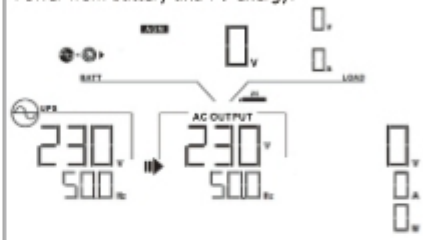
Wi-Fi version checking	Wi-Fi version 00088.88. 

Operating Mode Description

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

Operation mode	Description	LCD display
Standby mode	No output is supplied by the unit but it still can charge batteries.	No charging. 
Fault mode **Note:** *Fault mode: Errors are caused by inside circuit error or external reasons such as over temperature, output short circuited and so on.	No charging at all no matter if grid or PV power is available.	Grid and PV power are available. 
		Grid is available. 
		PV power is available. 
		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 "SUB" (solar first) is selected as output source priority and solar energy is not sufficient to provide the load, solar energy and the utility will provide the loads and charge the battery at the same time. 
		If either "SUB" (solar first) or "SBU" is selected as output source priority and battery is not connected, solar energy and the utility will provide the loads. 

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

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

Faults Reference Code

Code Type	Code #	Event
Fault	F01	Fan fault
Fault	F02	High PV-volt
Fault	F03	High bat-volt
Fault	F04	Low bat-volt
Fault	F05	Output S.C.
Fault	F06	High op-volt
Fault	F07	Low op-volt
Fault	F08	High bus-volt
Fault	F09	Low bus-volt
Fault	F10	High PV-amp
Fault	F11	High inv-amp
Fault	F12	High bus-amp
Fault	F13	High disc-amp
Fault	F14	Over temp.
Fault	F15	Bus start fault
Fault	F16	Inv start fault
Fault	F17	High dc offset
Fault	F18	Over-load
Fault	F19	Amp sense fault
Fault	F20	Backfeed fault
Fault	F21	Firmware fault
Fault	F22	Par-CAN fault
Fault	F23	Par-host fault
Fault	F24	Par-sync fault
Fault	F25	Par-bat fault
Fault	F26	Par-grid fault
Fault	F27	Par-opa fault
Fault	F28	Par-set fault
Fault	F29	OP Circuit Fault

Warning Indicator

Warning	W01	Grid not exist
Warning	W02	PV not exist
Warning	W03	Pack not exist
Warning	W04	Weak SoC
Warning	W05	Weak PV-volt
Warning	W06	Power de-rate
Warning	W07	Heavy load
Warning	W08	Temp issue
Warning	W09	Fan issue
Warning	W10	BMS lost
Warning	W11	Comm. lost
Warning	W12	Par limited
Warning	W13	Ip CB trip
Warning	W14	EQ warning
Warning	W15	MCU comm. lost
Warning	W16	Disable CHG& DISCHG
Warning	W17	Disable CHG
Warning	W18	Disable DISCHG
Warning	W19	Force CHG

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.

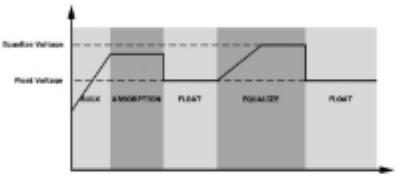
- **How to Apply Equalization Function**

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.

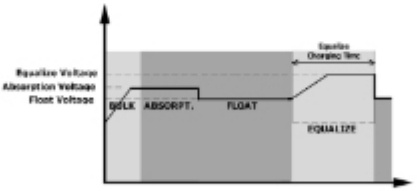
- **When to Equalize**

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.

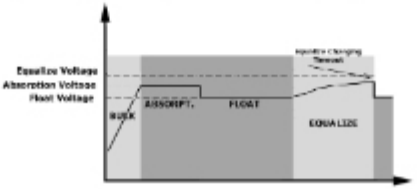


- **Equalize charging time and timeout**

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

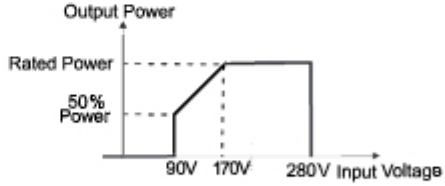
MODEL	8.2KW	11KW
Input Voltage Waveform	Sinusoidal (utility or generator)	Sinusoidal (utility or generator)
Nominal Input Voltage	230Vac	230Vac
Low Loss Voltage	170Vac±7V (UPS) 90Vac±7V (Appliances)	170Vac±7V (UPS) 90Vac±7V (Appliances)
Low Loss Return Voltage	180Vac±7V (UPS); 100Vac±7V (Appliances)	180Vac±7V (UPS); 100Vac±7V (Appliances)
High Loss Voltage	280Vac±7V	280Vac±7V
High Loss Return Voltage	270Vac±7V	270Vac±7V
Max AC Input Voltage	300Vac	300Vac
Max AC Input Current	60A	60A
Max 2nd Output Current	40A	60A
Nominal Input Frequency	50Hz / 60Hz (Auto detection)	50Hz / 60Hz (Auto detection)
Low Loss Frequency	40± 1Hz	40± 1Hz
Low Loss Return Frequency	42± 1Hz	42± 1Hz
High Loss Frequency	65± 1Hz	65± 1Hz
High Loss Return Frequency	63± 1Hz	63± 1Hz
Output Short Circuit Protection	Linemode: Circuit Breaker(70A) Battery mode: Electronic Circuits	
Efficiency (Line Mode)	>95% (Rated R load, battery full charged)	
Transfer Time	10ms typical (UPS); 20ms typical (Appliances)	
Output power de-rating: When AC input voltage under 170V the output power will be de-rated.		

Table 2 Inverter Mode Specifications

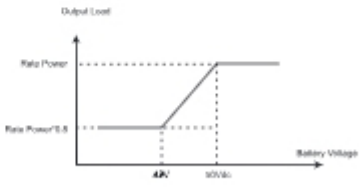
MODEL	8.2KW	11KW
Rated Output Power	8200W	11000W
Output Voltage Waveform	Pure Sine Wave	Pure Sine Wave
Output Voltage Regulation	230Vac±5%	230Vac±5%
Output Frequency	60Hz or 50Hz	60Hz or 50Hz
Peak Efficiency	93%	93%
Overload Protection	100ms@≥205% load;5s@≥1 50% load ; 10s@110% ~150% load	
Surge Capacity	2* rated power for 5 seconds	
Low DC Warning Voltage		
@ load < 20%	46.0Vdc	46.0Vdc
@ 20% ≤ load < 50%	42.8Vdc	42.8Vdc
@ load ≥ 50%	40.4Vdc	40.4Vdc
Low DC Warning Return Voltage		
@ load < 20%	48.0Vdc	48.0Vdc
@ 20% ≤ load < 50%	44.8Vdc	44.8Vdc
@ load ≥ 50%	42.4Vdc	42.4Vdc
Low DC Cut-off Voltage		
@ load < 20%	44.0Vdc	44.0Vdc
@ 20% ≤ load < 50%	40.8Vdc	40.8Vdc
@ load ≥ 50%	38.4Vdc	38.4Vdc
High DC Recovery Voltage	61Vdc	61Vdc
High DC Cut-off Voltage	63Vdc	63Vdc
DC Voltage Accuracy	+/-0.3V@ no load	+/-0.3V@ no load
THDV	<5% for linear load,<10% for non-linear load @ nominal voltage	
DC Offset	≤100mV	
Power Limitation When battery voltage is lower than 55Vdc, output power will be derated. If connected load is higher than this derated power, the AC output power reduces to this derated power. The minimum AC output voltage is output voltage setting-10V.		

Table 3 Charge Mode Specifications

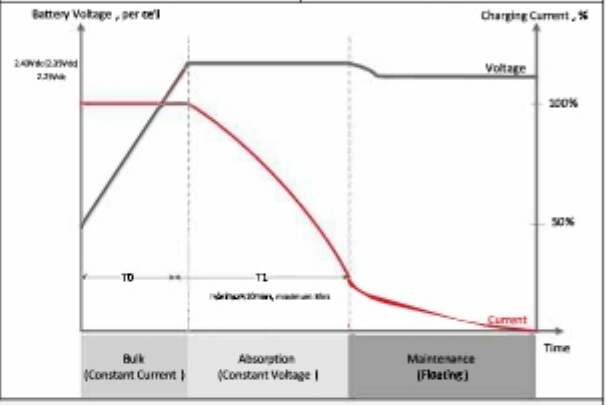
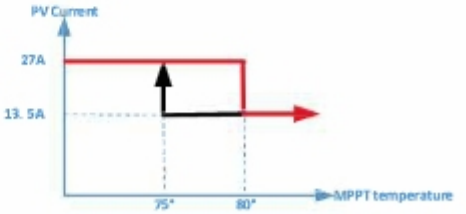
Utility Charging Mode			
MODEL		**8.2 KW**	**11KW**
Charging Current (UPS) @ Nominal Input Voltage		150A	150A
Bulk Charging Voltage	**Flooded Battery**	58.4Vdc	58.4Vdc
	AGM / Gel Battery	56.4Vdc	56.4Vdc
Floating Charging Voltage		54Vdc	54Vdc
Overcharge Protection		63Vdc	63Vdc
Charging Algorithm		3-Step	3-Step
Charging Curve			
Solar Input			
MODEL		**8.2 KW**	**11KW**
Rated Power		12000W	12000W
Max. PV Array Open Circuit Voltage		500Vdc	500Vdc
PV Array MPPT Voltage Range		90Vdc~450Vdc	90Vdc~450Vdc
Max. Input Current		27A x 2(MAX 40A)	27A x 2(MAX 40A)
Max. Charging Current		150Amp	150Amp
Start-up Voltage		80V +/- 5Vdc	80V +/- 5Vdc
Power Limitation			

Table 4 General Specifications

MODEL	8.2KW	11KW
Safety Certification	CE	
Operating Temperature Range	-10℃ to 50℃	
Storage temperature	-15℃~ 60℃	
Humidity	5% to 95% Relative Humidity (Non-condensing)	
Dimension (D*W*H), mm	452*153*610.5	
Net Weight, kg	21	

Table 5 Parallel Specifications

Max parallel numbers	6
Circulation Current under No Load Condition	Max 2A
Power Unbalance Ratio	<5% @ 100% Load
Parallel communication	CAN
Transfer time in parallel mode	Max 50ms
Parallel Kit	YES

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

TROUBLE SHOOTING

Phenomenon and/or Possibie cause	What to do
No response while press the main switch.	
No Utility power and PV is applied.	Check whether the DC breaker tripped or has not yet turned on? If problem still exists, please contact the service center to repair it.
No response while pressing the main switch.	
Utility power or PV power exists.	Check whether the Ac breaker tripped? Or PV voltage reaches to the operation level? If problem stil exists, please contact the service center to repalr it.
Output turned off, Buzzer beeps continuously, RED LED solid on	
F01 shows. Fans abnormal stopped during startup sequence	Piease contact service center to replace them.
F03 shows.	Configure the PV panels lower than 450V.
F03 shows.	Disconnect the Utility and pV power. Then, re-apply again. If over-voltage alarm still sounds, the internal charger might has some problem. Piease contact with service center to repair it.
F05 shows.	Check and verify if there is any load with short circuit condition? Remove the load and restart the unit again. If problem still exists, please contact the service center to repair it.
F14 shows.	Cean the anti-dust fiter and keep the unit installed in a well ventilated environment.
F18 shows.	Reduce the applied load and restart the unit again.
F06,FO7,F08,F09,F10,F11,F12,F13,F15,F16, F17, F19 or F20 shows.	Please restart the unit again. If problem still exists, please contact the service center to repair it.
F20 shows.	1.Restart the inverter. 2.Check if L/N cables are not connected reversely in all inverters. 3.For parallel system in single phase, make sure the sharing are connected in all inverters. For supporting three-phase system, make sure the sharing cables are connected in the inverters in the same phase, and disconnected in the inwerters in different phases. If the problem remains, please contact your installer.
F22, F23 or F24 shows.	1.Check if communication cables are connected well and restart the inverter. 2.If the problem remains, please contact your installer.
F25 shows.	1.Make sure all inverters share same groups of batteries together. 2.Remove all loads and disconnect AC input and PV input. Then, check battery voltage of all inverters. If the values from all inverters are cose, please check if all battery cables are the same length and same material type. Otherwise, please contact your installer to provide SOP to calibrate battery voltage of each inverter

	If the problem still remains, please contact your installer.
F26 shows.	1.Check the utility wiring conncetion and restart the inverter. 2.Make sure utility starts up at same time. If there are breakers installed between utility and inverters, please be sure all breakers can be turned on AC input at same time. If the problem remains, please contact your installer
F27 shows.	1.Restart the inverter. 2.Remove some excessive loads and re-check load information from LCD of inverters. If the values are different, please check if Ac input and output cables are in the same length and material type. If the problem remains, please contact your installer.
F28 shows.	1.Switch off the inverter and check LcD setting AC output mode 2.For parallel system in singie phase, make sure no 3P1, 3P2 or 3P3 is set. For upporting three-phase system, make sure no "PAL" is set on AC output mode setting 3.If the problem remains, please contact your installer.
F29 shows.	1.Check if sharing cables are connected well and restart the inverter. 2.If the problem remains, please contact your installer
Output powered but buzzer beeps per second, RED LED flashing	
W07 shaws.	Reduce load will release the warning
W08 shaws.	Clean the anti-dust fiter and keep the unit installed in a well ventiated envronment.
W09 shaws.	Fans abnormal stopped during operation. Please contact service center to replace them.
W10shaws.	BMS communicaton disconnected. Please contact service center to repair it
Output powered but no buzzer LED flashing. Only record on log	
W04 shaws.	Charge the battery.
W05 shaws.	Reduce the load.
W06 shaws.	Utility voltage lower to a certain level, the output rating will be limited.
W11 shaws.	Internal communicaton disconnected. Piease contact service center to repair it.
W16, W17, W18 or W19 shaws.	Check Battery status
WiFi mark is not displayed	
Unit can't connect to the APP.	Check the Wi-Fi function enabled and icon available on the LcD then follow the Wi-Fi installation procedure to pair the Wi-Fi module with router and APP.
No function on USB charger ports	
No power from the USB charger ports.	Check whether the USB charger function is enabled.

Appendix I: Parallel function

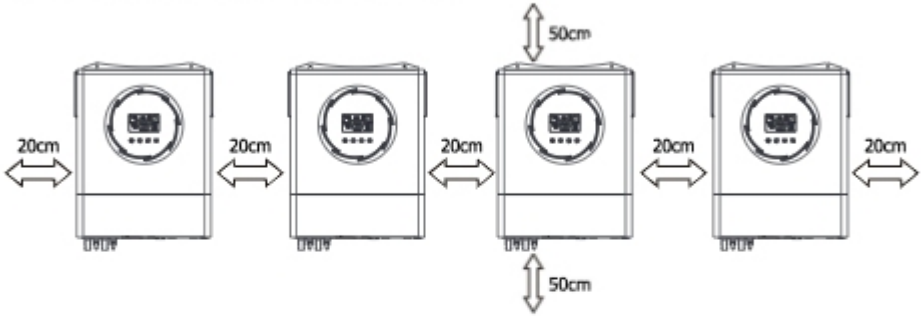
1. Introduction

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

1. Parallel operation in single phase is with up to 6 units. The supported maximum output power is 49.2KW/49.2KVA for 8.2KW ; 66KW/66KVA for 11KW.
2. Maximum six units work together to support three-phase equipment. Maximum four units support one phase.

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

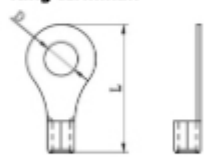
WARNING: It's REQUIRED to connect battery for parallel operation.

The cable size of each inverter is shown as below:

Recommended battery cable and terminal size for each inverter:

Model	Wire Size	Cable mm^2	Ring Terminal Dimensions		Torque value
			D(mm)	L(mm)	
8.2KW	1*2/0AWG	67.4	8.4	47	5 Nm
11KW	1*3/0AWG	85	8.4	54	5 Nm

Ring terminal:



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

Recommended AC input and output cable size for each inverter:

Model	AWG no.	Torque
8.2KW	8AWG	1.4~1.6Nm
11KW	6AWG	1.4~1.6Nm

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

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

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.

Recommended breaker specification of battery for each inverter:

Model	1 unit*
8.2/11KW	250A/70VDC

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

Recommended breaker specification of AC input with single phase:

Model	2 units	3 units	4 units	5 units	6 units
8.2/11KW	120A/230VAC	180A/230VAC	240A/230VAC	300A/230VAC	360A/230VAC

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

Note 2: Regarding three-phase system, you can use 4-pole breaker directly and the rating of the breaker should be compatible with the phase current limitation from the phase with maximu m units

Recommended battery capacity

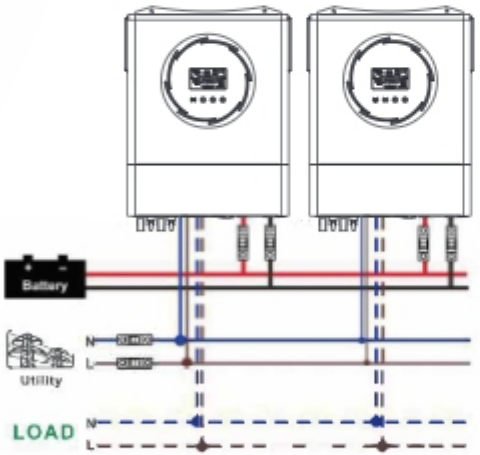
Inverter parallel numbers	2	3	4	5	6
Battery Capacity	200AH	400AH	400AH	600AH	600AH

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

4-1. Parallel Operation in Single phase

Two inverters in parallel:

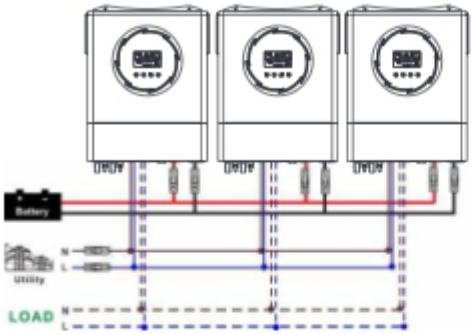
Power Connection



Communication Connection

Three inverters in parallel:

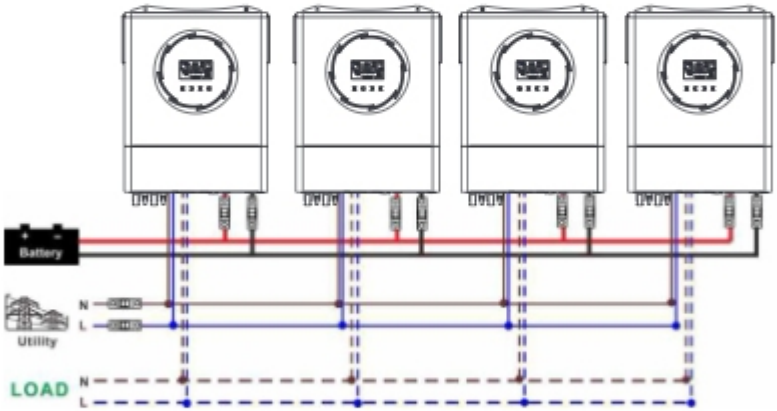
Power Connection



Communication Connection

Four inverters in parallel:

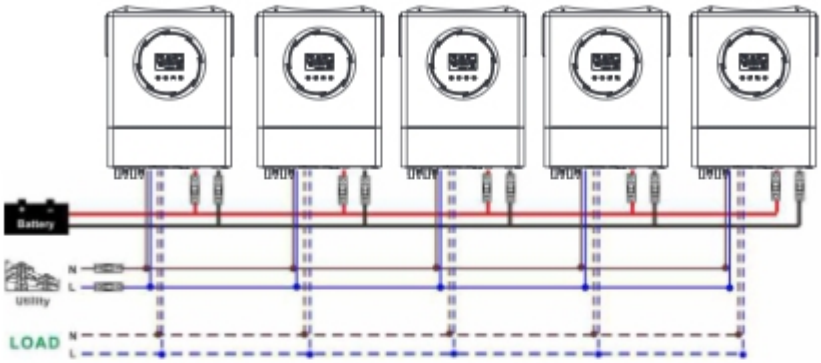
Power Connection



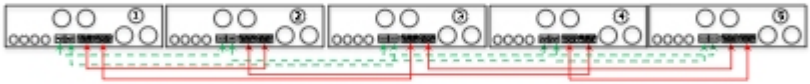
Communication Connection

Five inverters in parallel:

Power Connection

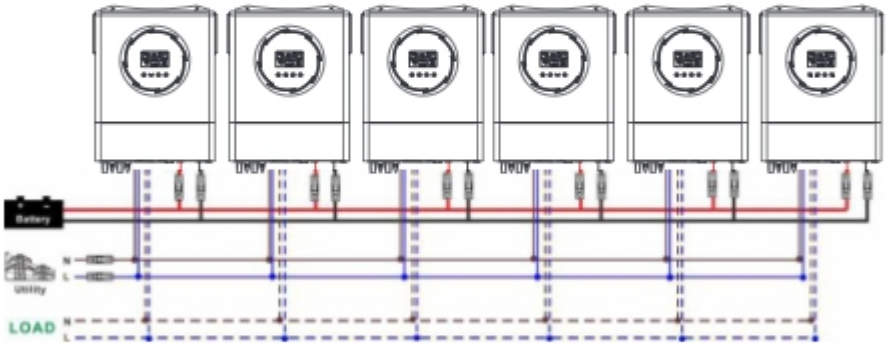


Communication Connection



Six inverters in parallel:

Power Connection

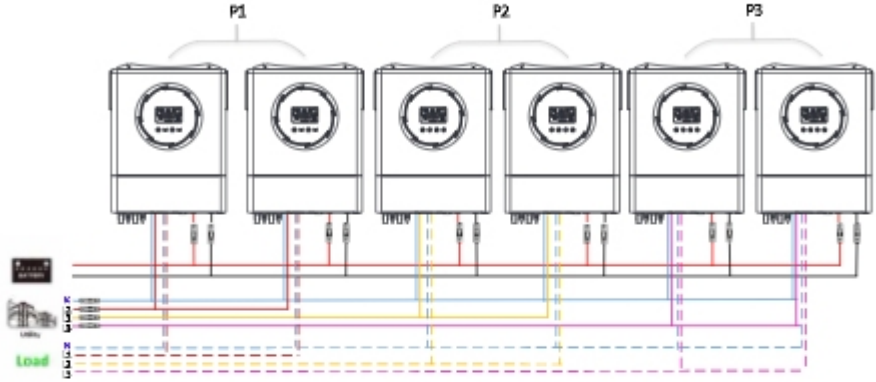


Communication Connection

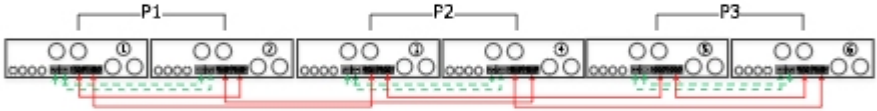
4-2. Support 3 -phase equipment

Two inverters in each phase:

Power Connection

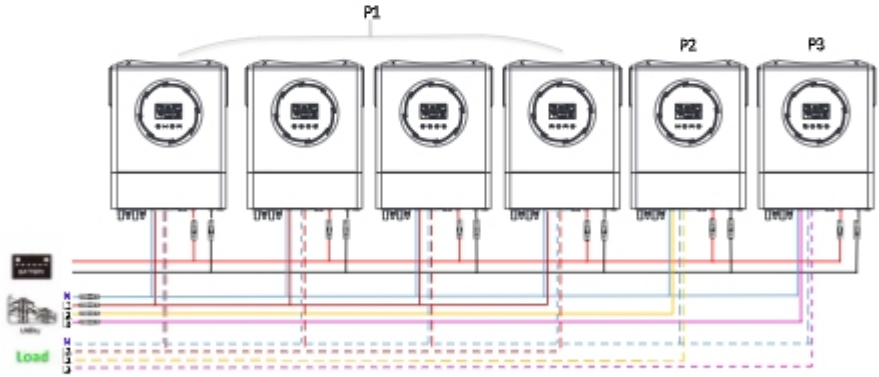


Communication Connection

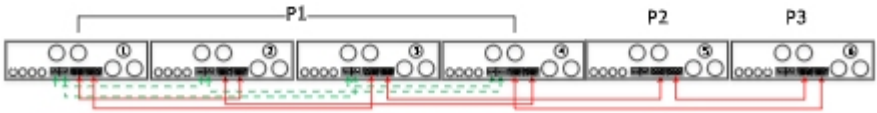


Four inverters in one phase and one inverter for the other two phases:

Power Connection

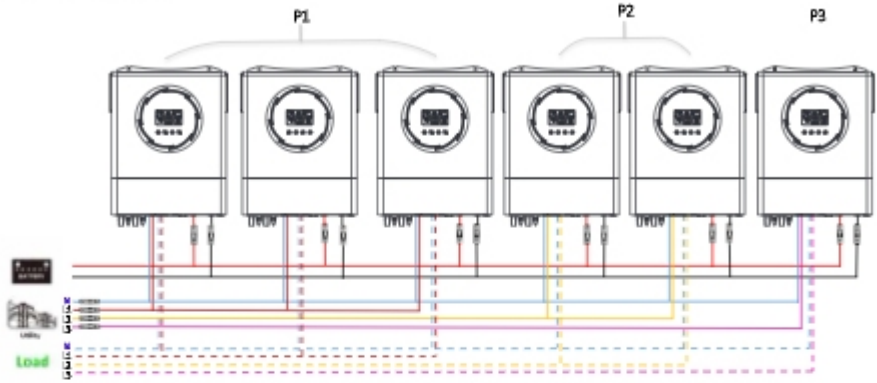


Communication Connection

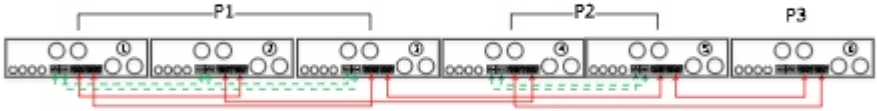


Three inverters in one phase, two inverters in second phase and one inverter for the third phase:

Power Connection

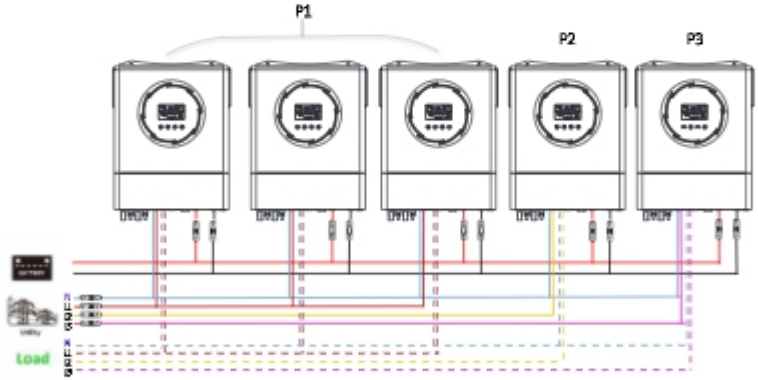


Communication Connection

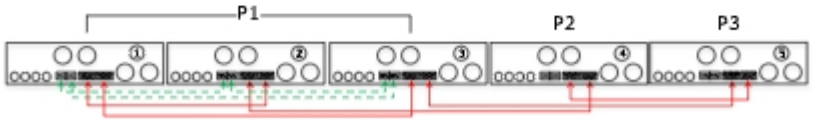


Three inverters in one phase and only one inverter for the remaining two phases:

Power Connection

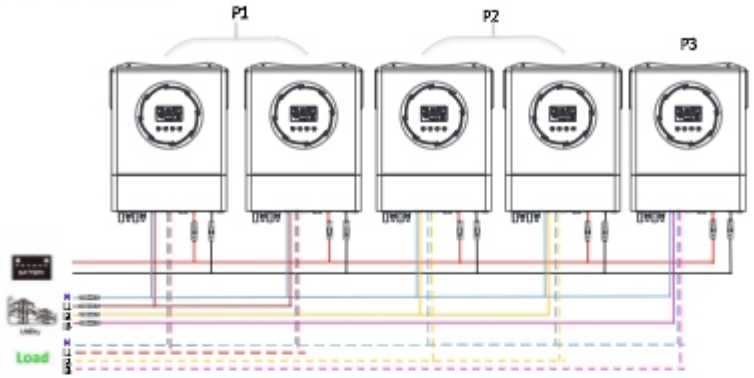


Communication Connection

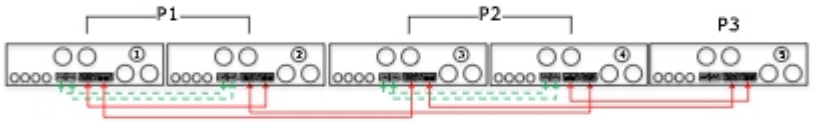


Two inverters in two phases and only one inverter for the remaining phase:

Power Connection

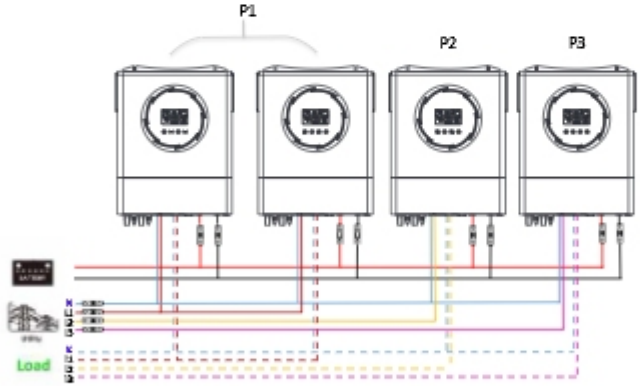


Communication Connection

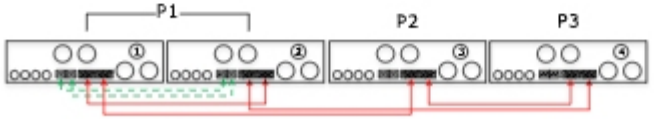


Two inverters in one phase and only one inverter for the remaining phases:

Power Connection

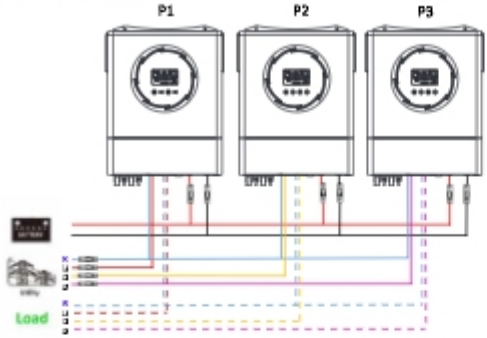


Communication Connection

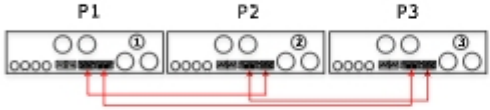


One inverter in each phase:

Power Connection



Communication Connection



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

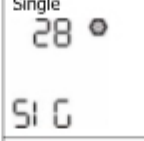
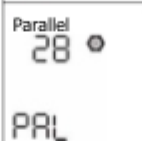
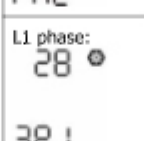
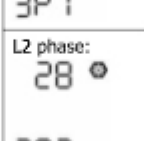
5. PV Connection

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

CAUTION: Each inverter should connect to PV modules separately.

6. LCD Setting and Display

Setting Program:

Program	Description	Selectable option	
28	AC output mode *This setting is able to set up only when the inverter is in standby mode. Be sure that on/off switch is in "OFF" status.	Single 	When the unit is operated alone, please select "SIG" in program 28.
		Parallel 	When the units are used in parallel for single phase application, please select "PAL" in program 28. Please refer to 5-1 for detailed information.
		L1 phase: 	When the units are operated in 3-phase application, please choose "3PX" to define each inverter. It is required to have at least 3 inverters or maximum 6 inverters to support three-phase equipment. It's required to have at least one inverter in each phase or it's up to four inverters in one phase. Please refers to 5-2 for detailed information. Please select "3P1" in program 28 for the inverters connected to L1 phase, "3P2" in program 28 for the inverters connected to L2 phase and "3P3" in program 28 for the inverters connected to L3 phase. Be sure to connect share current cable to units which are on the same phase. Do NOT connect share current cable between units on different phases.
		L2 phase: 	
		L3 phase: 	

Code Reference:

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

7. Commissioning

Parallel in single phase

Step1: 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.

Step2: Turn on each unit and set "PAL" in LCD setting program 28 of each unit. And then shut down all units.

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

Step 3: Turn on each unit

LCD display in Master unit	LCD display in Slave unit
	

NOTE: Master and slave units are randomly defined.

Step4: Switch on all AC breakers of line wires in AC input. It is 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 Master unit
	

Step 5: If there is on 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

Step1: Check the following requirements before commissioning:

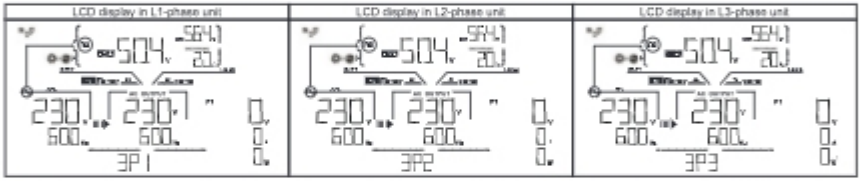
- Correct wire connection
- Ensure all breakers in Line wires of load side are open and each Neutral wires of each unit are connected together.

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

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

Step 3: Turn on all units sequentially.

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



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

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

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

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

Appendix II: BMS Communication Installation

1. Introduction

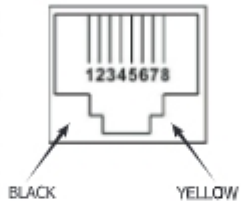
If connecting to lithium battery, it is recommended to purchase a custom-made RJ45 communication cable. Please check with your dealer or integrator for details.

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

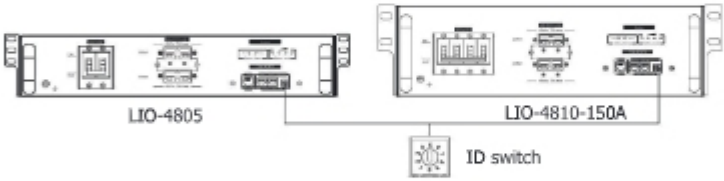
BLACK	Definition
PIN 1	RS232TX
PIN 2	RS232RX
PIN 3	RS485B
PIN 4	NC
PIN 5	RS485A
PIN 6	CANH
PIN 7	CANL
PIN 8	GND



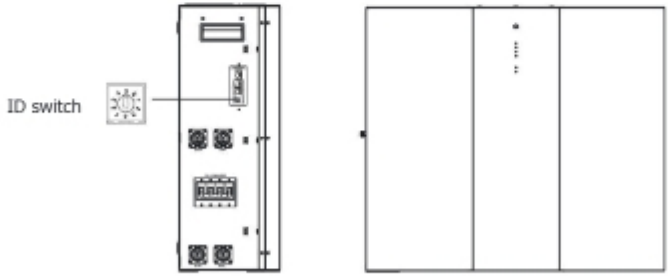
YELLOW	Definition
PIN 1	RS485B
PIN 2	RS485A
PIN 3	NC
PIN 4	CANH
PIN 5	CANL
PIN 6	GND
PIN 7	RS485A
PIN 8	RS485B

3. Lithium Battery Communication Configuration

LIO-4805/LIO-4810-150A

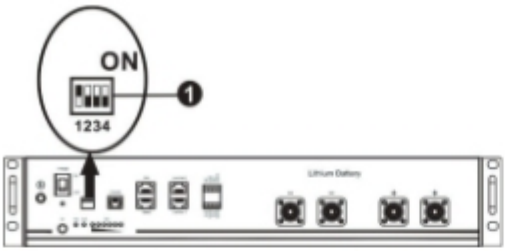


ESS LIO-I 4810



ID Switch indicates the unique ID code for each battery module. It's required to assign 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.

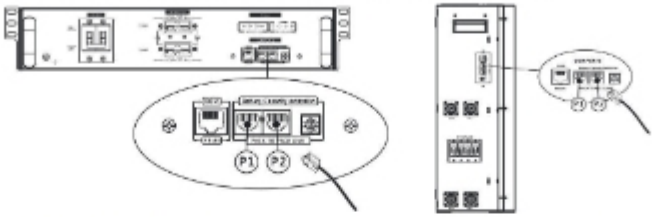
NOTE: The maximum groups of lithium battery is 5 and for maximum number for each group, please check with battery manufacturer.

4. Installation and Operation

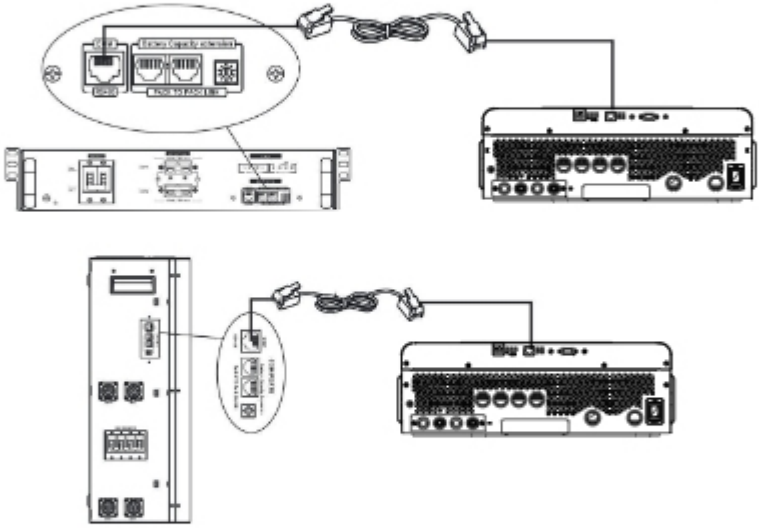
LIO-4805/LIO-4810-150A/ESS LIO-I 4810

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.



Note for parallel system:

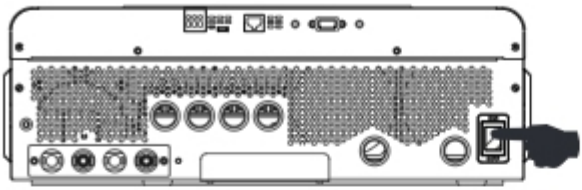
1. Only support common battery installation.
2. Use custom-made RJ45 cable to connect any inverter (no need to connect to a specific inverter) and Lithium battery. Simply set this inverter battery type to "LIB" in LCD program 5. Others should be "USE".

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

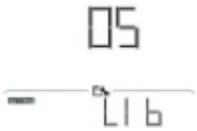
Step 4: Press Power on/off button on battery module for 5 secs, the battery module will start up.

*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.



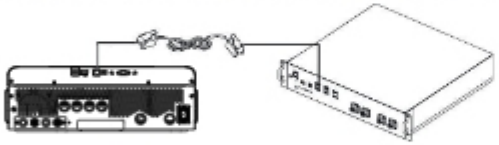
Step 6. Be sure to select battery type as "LIB" in LCD program 5.



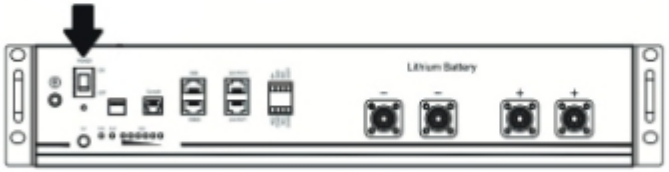
If communication between the inverter and battery is successful, the battery icon on LCD display will flash. Generally speaking, it will take longer than 1 minute to establish communication.

PYLONTECH

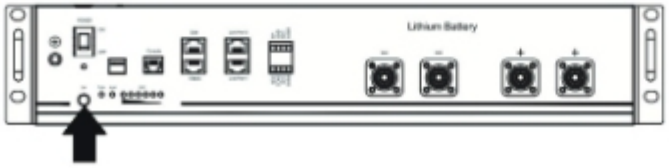
Step 1. Use custom-made RJ45 cable to connect inverter and Lithium battery.



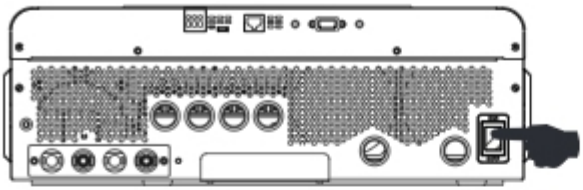
Step 2. Switch on Lithium battery.



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

4. 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 

5. Code Reference

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

Warning Code	Description
W10	Communication lost (anly available when the battery type is not setting as "AGM""Flooded" or "User-Defined".) • After battery is connected, communication signal is not detected for 3 minutes, buzzer will beep. After 10 minutes, inverter wil stop charging and discharging to lithium battery. Communication lost occurs after the inverter and battery is connected successfully, buzzer beeps immediately.
W16	If battery status is not allowed to charge and discharge after the communication between the inverter and battery is successful.
W17	If battery status is not allowed to charge after the communication between the inverter and battery is successful.
W18	If battery status must to be charged after the communication between the inverter and battery is successful.
W19	If battery status is not allowed to discharge after the communication between the inverter and battery is successful.

1. Wireless Wi-Fi Distribution Network

1.1 APP Download

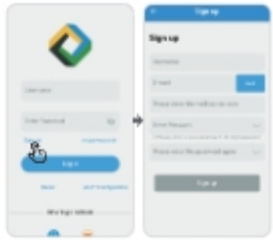
Method 1
Scan the QR code on the right, download the app.

Method 2
Scan the QR code of the film on the collector.

Method 3
Search in the application market to download the APP named "Solar of Things" for download.

1.2 Registered Account

① On the App home page, click the "Sign Up" button, fill in the relevant information according to the prompt, and complete the registration.



2. Supporting Network And Adding Device

2.1 Wi-Fi Collector Connection Router

1. After the PWR indicator on the collector is on, turn on the mobile phone Bluetooth and Solar of Things App, click the "Wi-Fi Configuration" button to enter the "Searching" page, and the page will automatically display the nearby Bluetooth device.

1. Select the collector that needs to be distributed, enter the matching webpage, and click the search icon. You can choose the Wi-Fi hotspot name.

2.2 Add Device

Method 1
① Enter the homepage of the APP, click "+" in the upper right corner, enter the device to add the page, close the mobile phone close to the device, and the app scan the device automatically.
2. After scanning to the device, select the ID that is consistent with the ID of the collector tag, and click "Add".

Note: Please confirm the collector ID before scanning. If the ID information is not found on the surface of the machine, you can view the ID on the matching page.

Method 2 "Manually Add", complete the adding device according to the interface prompt manual output collector ID, name and other information.

Method 3 "Scan Add", scan the QR code ID number of the collector film, and perform the device with the corresponding collector.

3. Collector Fault Diagnose And Indicator Light Judgment

3.1 Collector Fault Diagnose

1. After the device distribution network is completed or failed, you can make a failure diagnosis by clicking on the upper right "Diagnose".

3.2 Collector Indicator Status

PWR (power indicator light):
On: normal power supply
Off: abnormal power supply

COM (serial port transmission indicator):
Off: Number of data interaction
Off for 0.3 seconds, on for 0.9 seconds: serial output data
Off for 0.3 seconds, on for 0.3 seconds: serial port receiving data
On: Two-way receiving and receivin

Net (network status indicator):
Off for 0.3 seconds, on for 3 seconds: STA mode connects the upper router
Off for 0.3 seconds, on for 0.3 seconds: STA is not connected to the upper router

SRV (server connection indicator):
On: Has been connected to the server
Off: Uninterrupted to the server