User Manual

11KW

SOLAR INVERTER / CHARGER

Version: 1.0

Table Of Contents

1. About This 1
   1.1 Manual Purpose 1
   1.2 Scope 1
2. Safety Instructions 1
3. Introduction 1
   3.1 Features 1
   3.2 Basic System Architecture 1
   3.3 Product Overview 3
4. Installation 4
   4.1 Unpacking And Inspection 4
   4.2 Preparation 4
   4.3 Mounting The Unit 5
   4.4 Battery Connection 5
   4.5 AC Input/output Connection 7
   4.6 PV Connection 8
   4.7 Final Assembly 12
   4.8 RS232/USB Communication Connection 12
   4.9 Wi-Fi Connection(Optional) 12
   4.10 Dry Contact Signal 13
   4.11 Bluetooth Communication (Optional) 13
5. Operation 14
   5.1 Power ON/OFF 14
   5.2 Operation And Display Panel 14
   5.3 LCD Display Icons 15
   5.4 LCD Setting 18
   5.5 LCD Display 28
6. Parallel Installation Guide 35
   6.1Parallel Operation Cable 35
   6.2 Matters Needing Attention In Single-phase Parallel Operation 35
   6.3 Single-phase Parallel Operation Cable Connection 36
   6.4 Matters Needing Attention In Three-phase Parallel Operation 38
   6.5 Three-phase Parallel Operation Cable Connection 39
7. Faults Code 44
8. Warning Code 44
9. Parallel Faults Code 45
10. Trouble Shooting 46
11. Specifications 49
   11.1 Line Mode Specifications 49
   11.2 Inverter Mode Specifications 50
   11.3 Charge Mode Specifications 51
   11.4 General Specifications 51
12. Installation Dimension Drawing 52

1. About This

1.1 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.

1.2 Scope

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

2. Safety Instructions

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

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

3. 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.

3.1 Features

1. Off grid inverter
2. Pure sine wave inverter
3. External WIFI devices (APP is required)
4. Communication ports with BMS (RS485, CAN)
5. Support the selection of wide and narrow range of AC input
6. Configurable AC/Solar charger priority via LCD control panel
7. Configurable battery charging current based on applications via LCD control panel
8. Compatible to utility mains or generator power
9. Auto restart while AC is recovering
10. Overload / Over temperature / short circuit protection
11. Cold start function

3.2 Basic System Architecture

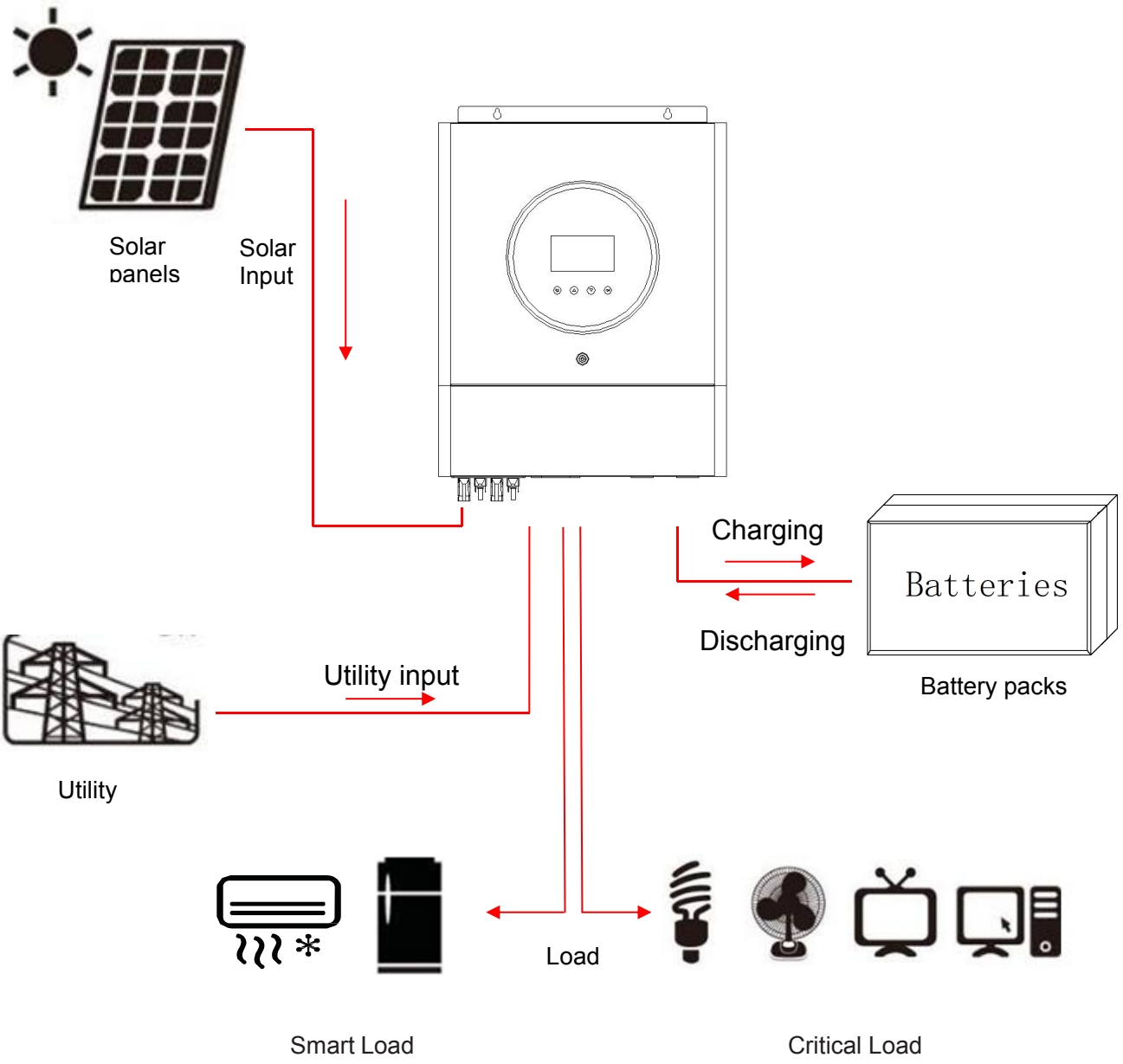
The following illustration shows basic application for this unit. It also required the following devices to have a complete running system:

- 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.

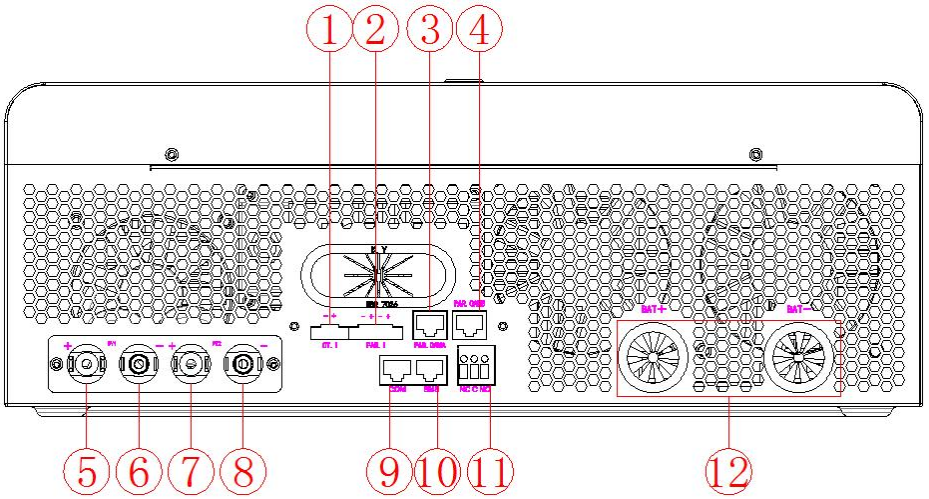
NOTE: The following picture is only a schematic diagram of the equipment .If the actual chassis does not conform to the schematic due to a structural upgrade, it is subject to prior notice.

Figure 1 Basic Off grid PV System Overview

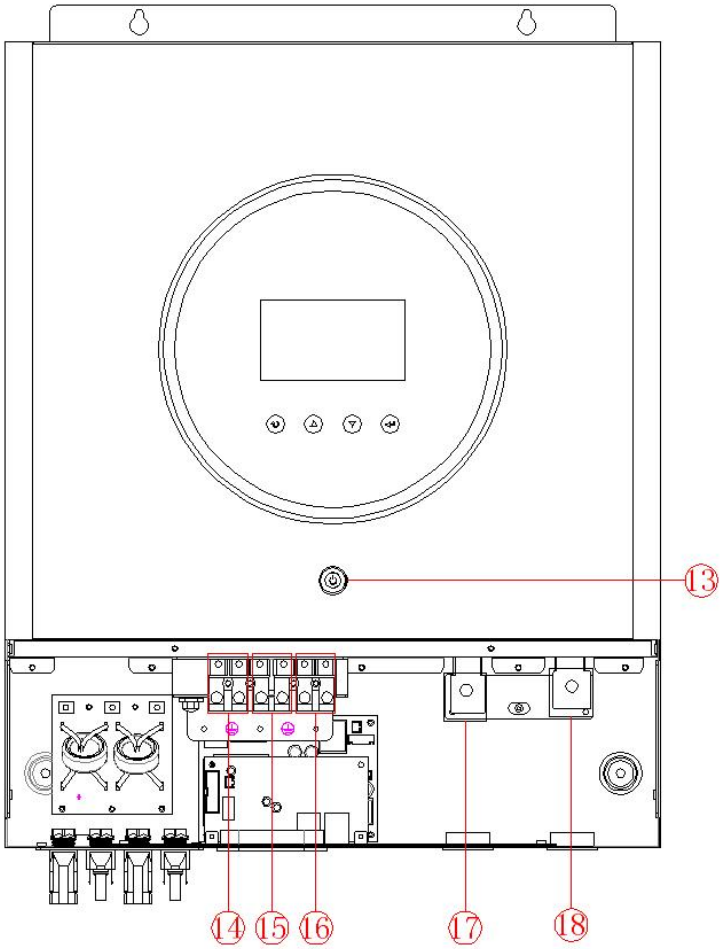


3.3 Product Overview

NOTE: The following picture is only a schematic diagram of the equipment .If the actual chassis does not conform to the schematic due to a structural upgrade, it is subject to prior notice.



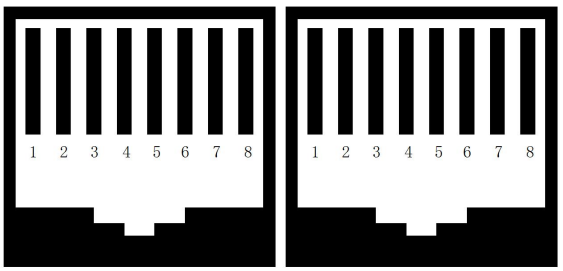
1: CT port (Optional)
2: Current sharing port
3: PAR.CANA
4: PAR.CANB
5: PV1 positive connector
6: PV1 negative connector
7: PV2 positive connector
8: PV2 negative connector
9: COMM port
10: BMS port
11:Generator dry contact
12:Battery terminals



13: Power on/off switch
14: AC input terminal
15: AC output terminal
16: Smart output
17: Battery positive
18: Battery negative

Note: RS232,RS485, CAN communication share the same port ,so it can't be used at the same time.
Communication port definition :

COMM: RS232	1: RXD, 2: TXD , 4: +VCC ,8: GND
BMS: RS485 CAN	1: 485-B , 2: 485-A, 4: CAN-H , 5: CAN-L ,



COMM **BMS**

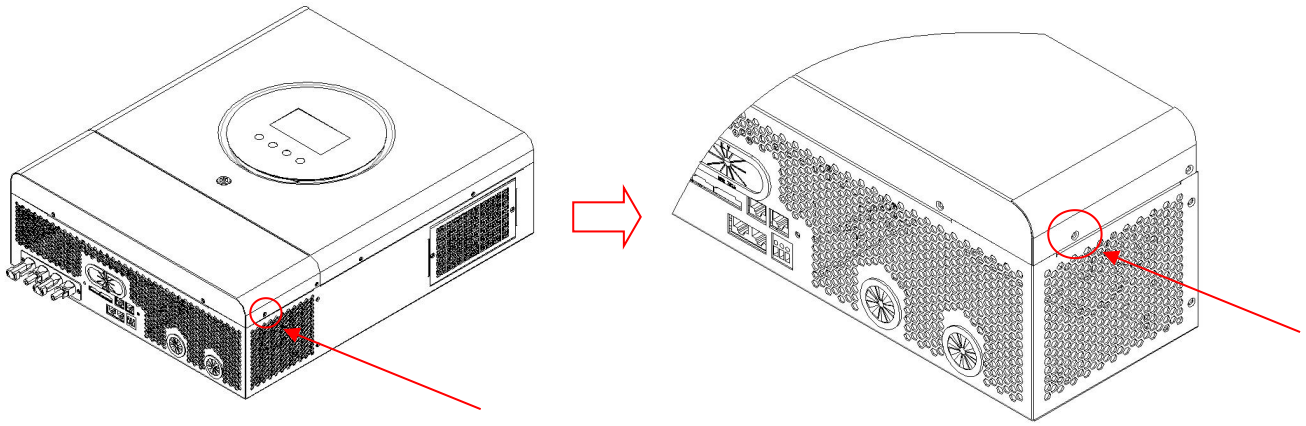
4. Installation

4.1 Unpacking And Inspection

Before installation, please inspect the unit. Be sure that nothing inside the package is damaged. You should have received the following items inside of package:
The inverter x1
User manual x 1
Parallel communication cable x 1(No parallel machine ,No need)
Current sharing cable x 1 (No parallel machine ,No need)
PV connectors x 2 sets

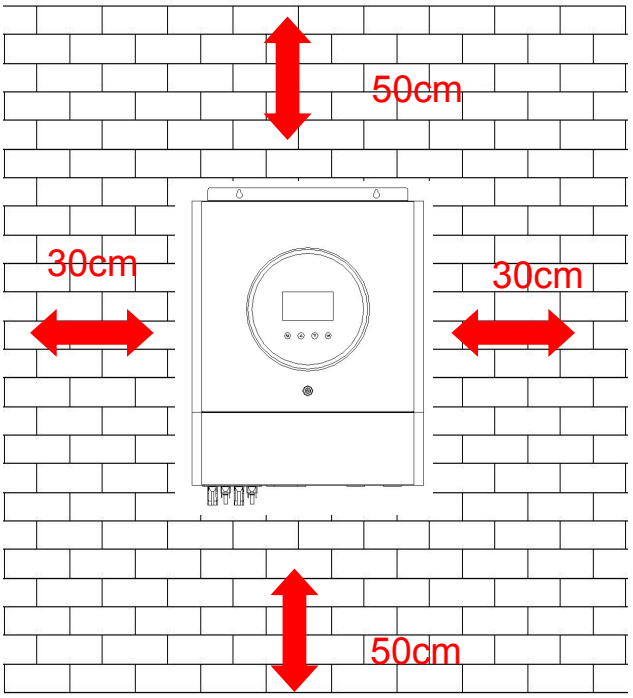
4.2 Preparation

Before connecting all wire, please take off bottom cover by removing two screws.
NOTE: The following picture is only a schematic diagram of the equipment .If the actual chassis does not conform to the schematic due to a structural upgrade, it is subject to prior notice.

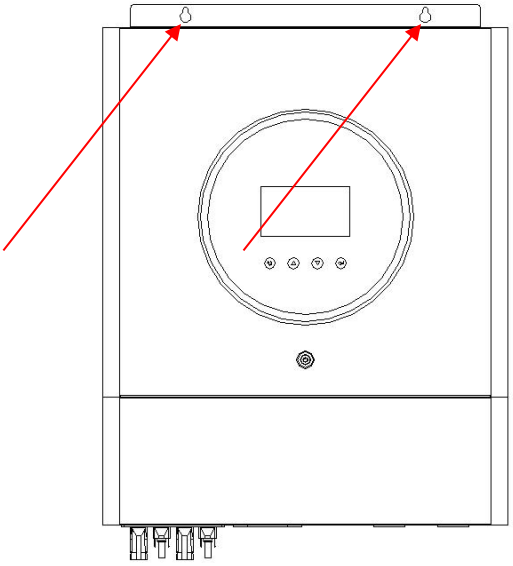


4.3 Mounting The Unit

Consider the following points before selecting where to install:
1.Do not mount the inverter on flammable construction materials.
2.Mount on a solid surface
3.Install this inverter at eye level in order to allow the LCD display to be read at all times.
4.The ambient temperature should be between -10°C and 50°C to ensure optimal operation.
5.The recommended installation position is to be adhered to the wall vertically.
6.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.
NOTE: The following picture is only a schematic diagram of the equipment .If the actual chassis does not conform to the schematic due to a structural upgrade, it is subject to prior notice.

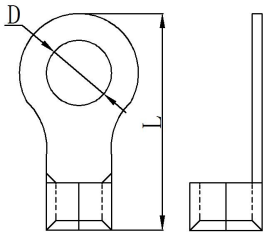


WARNING:SUITABLE FOR MOUNTING ON CONCRETE OR OTHER NON-COMBUSTIBLE SURFACE ONLY.
Install the unit by screwing four screws. It's recommended to use M4 or M5 screws.
NOTE: The following picture is only a schematic diagram of the equipment .If the actual chassis does not conform to the schematic due to a structural upgrade, it is subject to prior notice.



4.4 Battery Connection

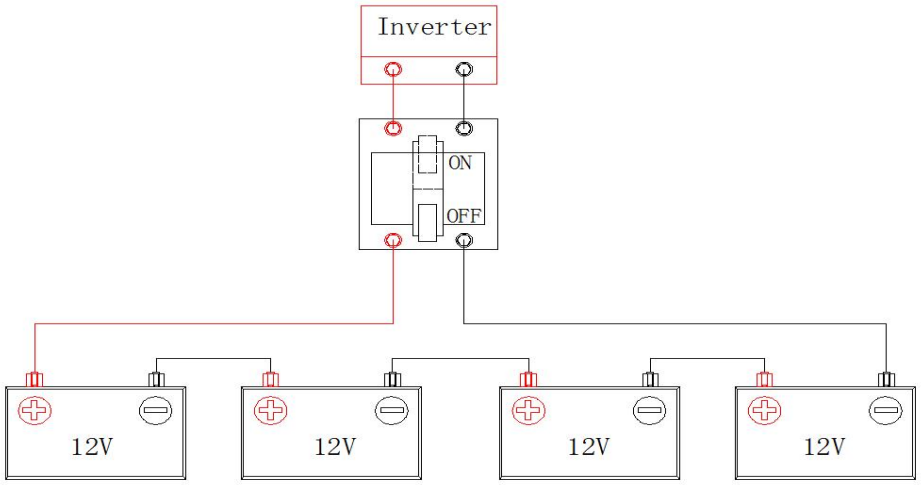
CAUTION: For safety operation and regulation compliance, it's requested to install a separate DC over-current protector or disconnect device between battery and inverter. It may not be requested to have a disconnect device in some applications, however, it's still requested to have over-current protection installed. Please refer to typical amperage in below table as required fuse or breaker size.
WARNING! All wiring must be performed by a qualified personnel.
WARNING! It's very important for system safety and efficient operation to use appropriate cable for battery connection. To reduce risk of injury, please use the proper recommended cable and terminal size as below.



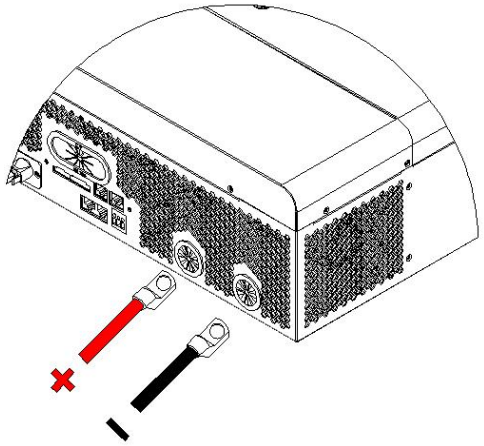
Recommended battery cable and terminal size:
Ring terminal:

Model	Typical Amperage	Battery capacity	Wire Size	Cable mm²	Ring Terminal Dimensions		Torque value	Length
					D (mm)	L (mm)		
11KW	190.5A	100AH	1AWG	50	8.4	51	5 Nm	1M
		200AH	1/0AWG	70				

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.
48VDC battery connection diagram



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 and ring terminals are tightly screwed to the battery terminals.
NOTE: The following picture is only a schematic diagram of the equipment .If the actual chassis does not conform to the schematic due to a structural upgrade, it is subject to prior notice.

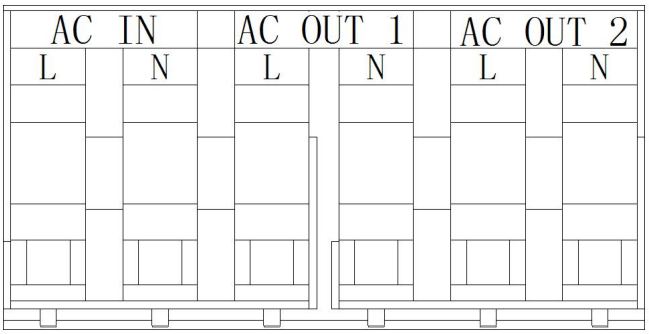


WARNING: Shock Hazard
Installation must be performed with care due to high battery voltage in series
CAUTION!! Do not place anything between the flat part of the inverter terminal and the ring terminal. Otherwise, overheating may occur.
CAUTION!! Do not apply anti-oxidant substance on the terminals before terminals are connected tightly.
CAUTION!! Before making the final DC connection be sure positive (+) must be connected to positive (+) and negative (-) must be connected to negative(-).

4.5 AC Input/output Connection

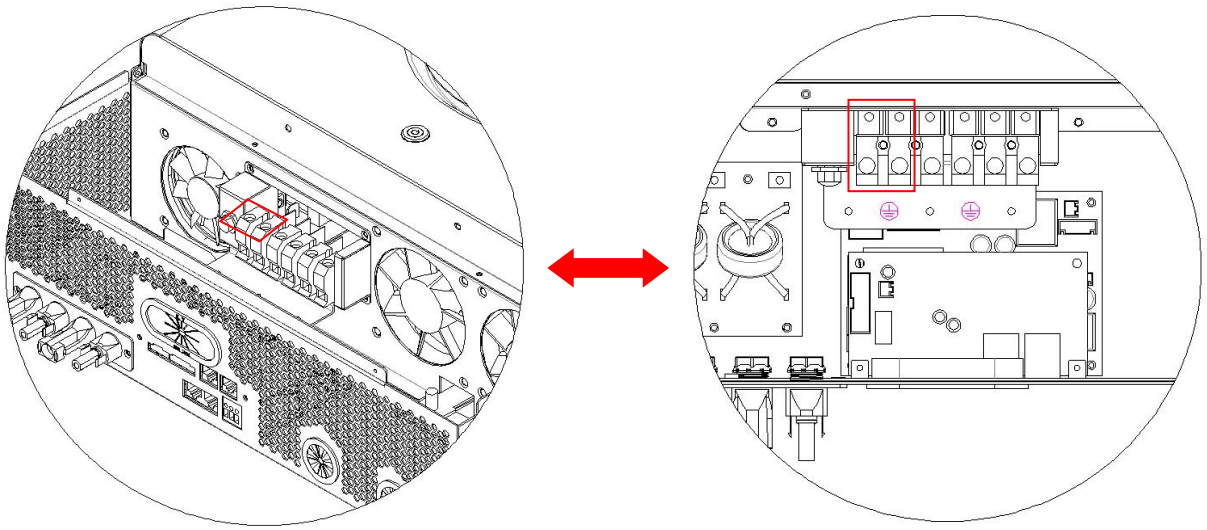
CAUTION!! Before connecting to AC input power source, please install a separate AC breaker between inverter and AC input power source. This will ensure the inverter can be securely disconnected during maintenance and fully protected from over current of AC input.
CAUTION!! Please refer to the input and output screen on the machine before wiring, make sure correct wiring.
CAUTION!! High touch current, earth connection essential before connection supply.
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
11KW	6 AWG	1.4~ 1.6Nm

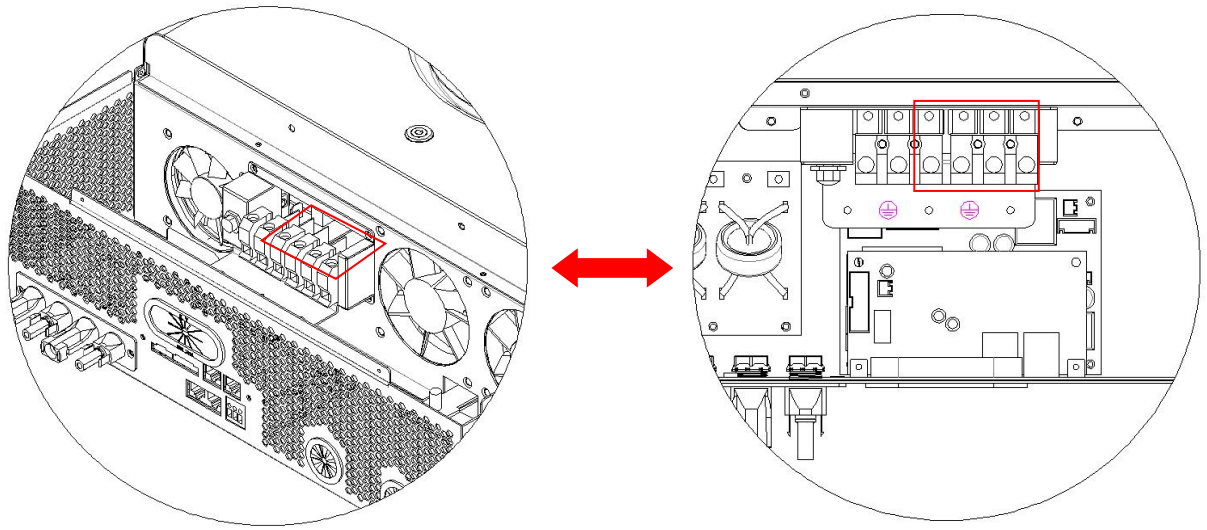


Please follow below steps to implement AC input/output connection:
1. Before making AC input/output connection, be sure to protector disconnected first.
2. Remove insulation sleeve 10mm for six conductors. And shorten phase L and neutral conductor N 3 mm.
3. Fix two cable glands into input and output 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.

⏚**→Ground (yellow-green)**
L→LINE (brown or black)
N→Neutral (blue)
NOTE: The following picture is only a schematic diagram of the equipment .If the actual chassis does not conform to the schematic due to a structural upgrade, it is subject to prior notice.



WARNING:
Be sure that AC power source is disconnected before connect wire to the unit.
5. Then, insert AC output wires according to polarities indicated on terminal block and tighten terminal screws. Be sure to connect PE protective conductor (⏚) first.
⏚**→Ground (yellow-green)**
L→LINE (brown or black)
N→Neutral (blue)
NOTE: The following picture is only a schematic diagram of the equipment .If the actual chassis does not conform to the schematic due to a structural upgrade, it is subject to prior notice.



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.

4.6 PV Connection

CAUTION: Before connecting to PV modules, please install separately DC circuit breakers between inverter and PV modules.
CAUTION: It is forbidden for inverter to share the same solar panel group.
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.

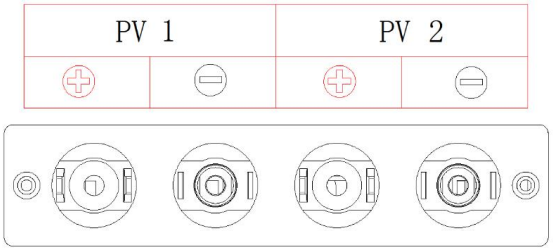
Insert striped cable into female terminal and crimp female terminal as shown below.

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.

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.

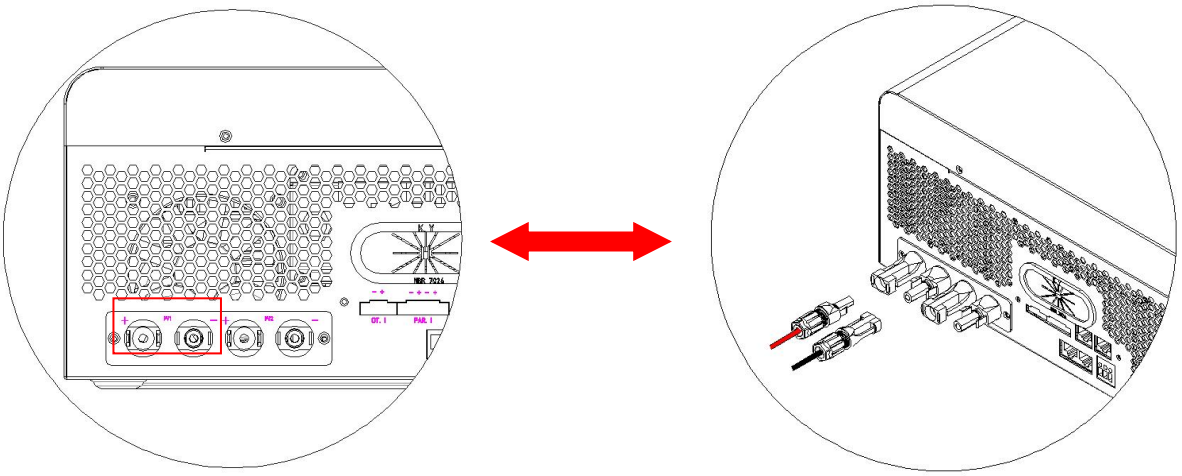


WARNING! For safety and efficiency, it's very important to use appropriate cables for PV module connection. To reduce risk of injury, please use the proper cable size as recommended below.

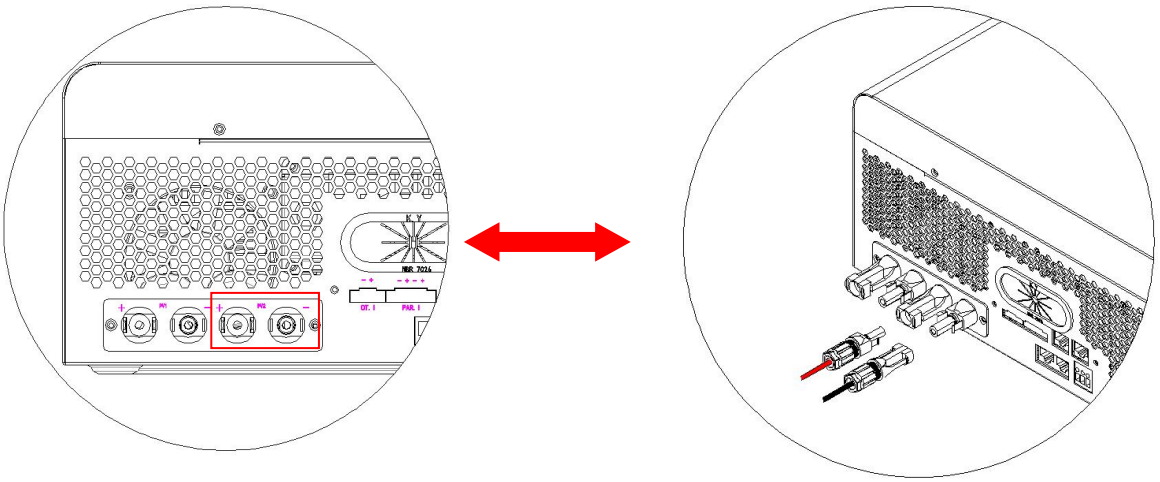
Model	Cable (mm^2)	AWG	Torque value(max)
11KW	4	12	1.2-1.6 Nm

CAUTION: Never directly touch the terminals of inverter. It might cause lethal electric shock.
NOTE: The following picture is only a schematic diagram of the equipment .If the actual chassis does not conform to the schematic due to a structural upgrade, it is subject to prior notice.

PV1 Connection



PV2 Connection



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	11KW
Max. PV Array Power	5500W*2
Max. PV Array Open Circuit Voltage	500Vdc
PV Array MPPT Voltage Range	60Vdc~450Vdc

Recommended solar panel configuration 1:

	SOLAR INPUT 1	SOLAR INPUT 2	Q'ty of panels	Total Input Power
	Min. in series: 5 pcs, per input Max. in series: 12 pcs, per input			
Solar Panel Spec. (reference) - 250Wp - Vmp: 30.7Vdc - Imp: 8.3A - Voc: 37.7Vdc - Isc: 8.4A	6pcs in series	X	6pcs	1500W
	X	6pcs in series	6pcs	1500W
	6pcs in series	6pcs in series	12pcs	3000W
	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, 2strings	16pcs	4000W
	10pcs in series, 1 string	10pcs in series, 1 string	20pcs	5000W
	12pcs in series,1 string	12pcs in series, 1 string	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
	11pcs in series, 2 strings	11pcs in series, 2 strings	44pcs	11000W

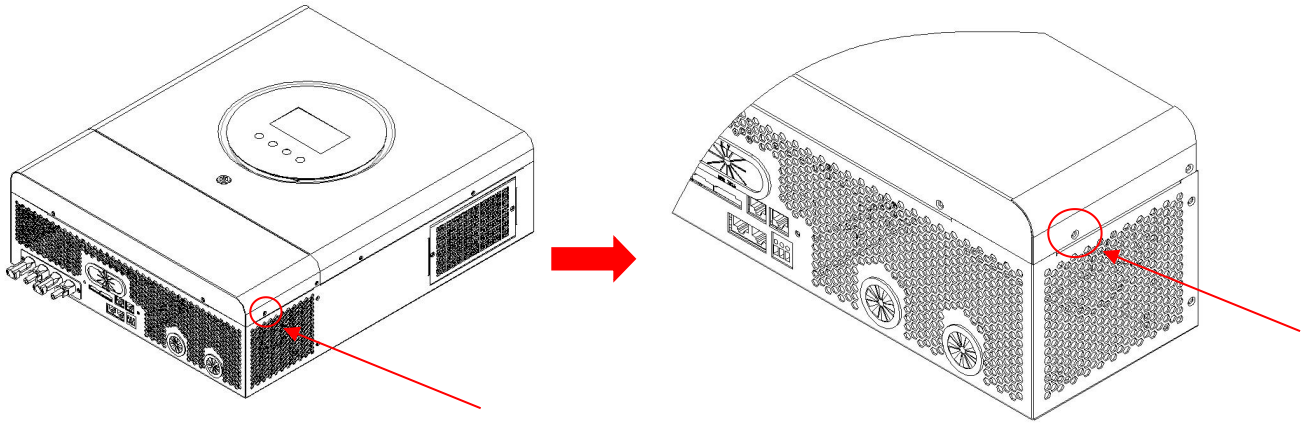
Recommended solar panel configuration 2:

	SOLAR INPUT 1	SOLAR INPUT 2	Q'ty of panels	Total Input Power
	Min. in series: 2pcs, per input Max. in series: 8 pcs, per input			
Solar Panel Spec. (reference) - 550Wp - Vmp:41.96Vdc - Imp: 13.11A - Voc: 49.9Vdc - Isc: 14A	4pcs in series	X	4pcs	2200W
	X	4pcs in series	4pcs	2200W
	8pcs in series	X	8pcs	4400W
	X	8pcs in series	8pcs	4400W
	6pcs in series, 1 string	6pcs in series, 1 string	12pcs	6600W
	8pcs in series, 1 string	8pcs in series, 1 string	16pcs	8800W
	5pcs in series, 2 string	5pcs in series, 2 string	20pcs	11000W

4.7 Final Assembly

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

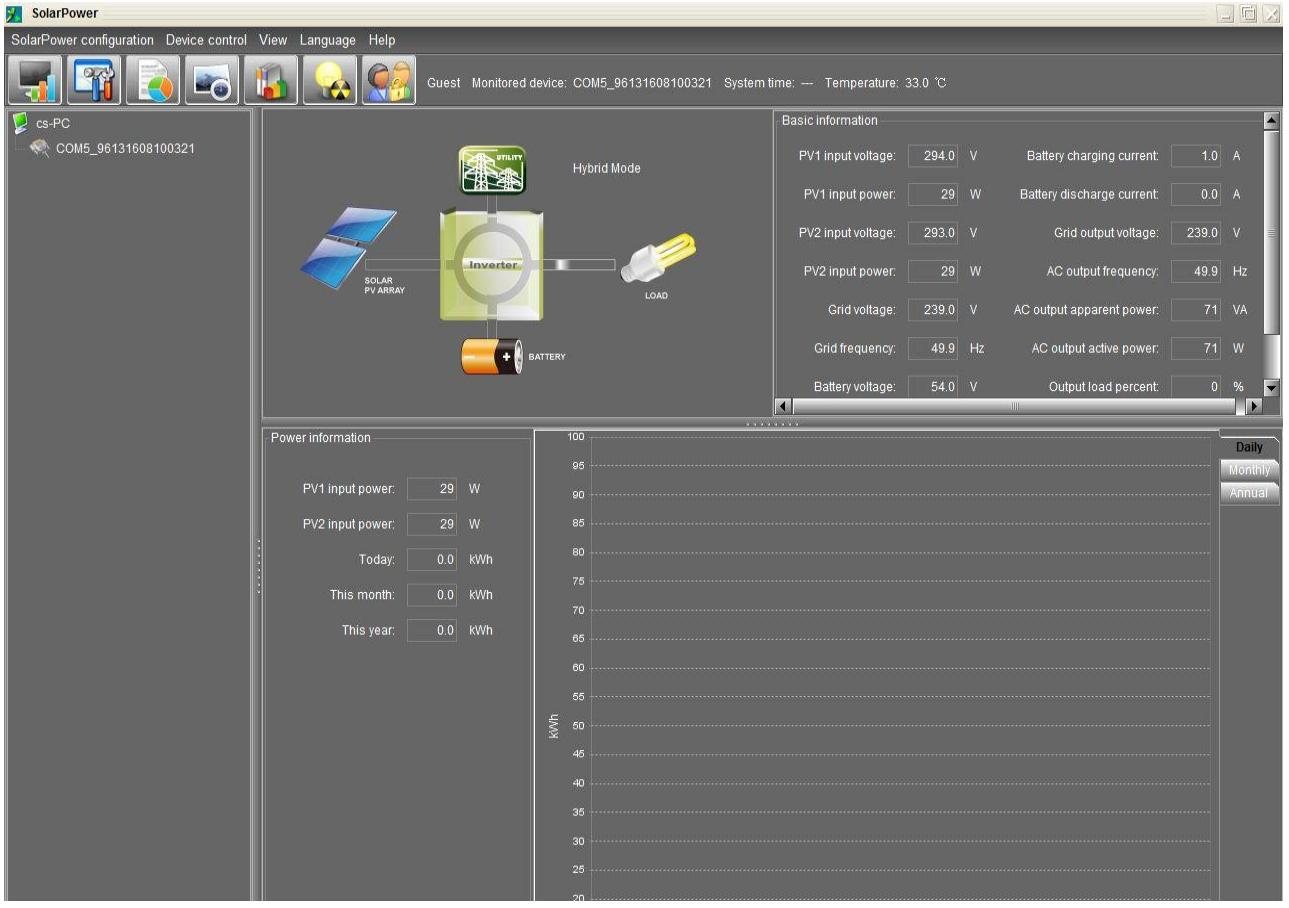
NOTE: The following picture is only a schematic diagram of the equipment .If the actual chassis does not conform to the schematic due to a structural upgrade, it is subject to prior notice.



4.8 RS232/USB Communication Connection

Please download software “SolarPower” from the official website. When the inverter is connected to the computer, the following interface will be displayed.

Note: The following dates are for reference only.



4.9 Wi-Fi Connection(Optional)

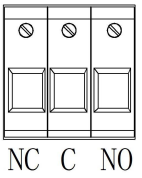
1.The device has its own standard WIFI port, if users need to monitor the status and information of the device through WIFI, they must connect to the WIFI collector.

2.Users can download ”**SmartEss**” WIFI monitoring software from the app store on their phone.

3.Inverters come equipped with factory-integrated Wi-Fi capability which makes it very easy to integrate into a home network (Wi-Fi Dongle is Optional)This makes it ideal for local monitoring via the inverter's own wireless home network or for online monitoring platforms.

4.10 Dry Contact Signal

There is one dry contact (3A250VAC) available on the rear panel. It could be used to deliver signal to external device when battery reaches warning level.

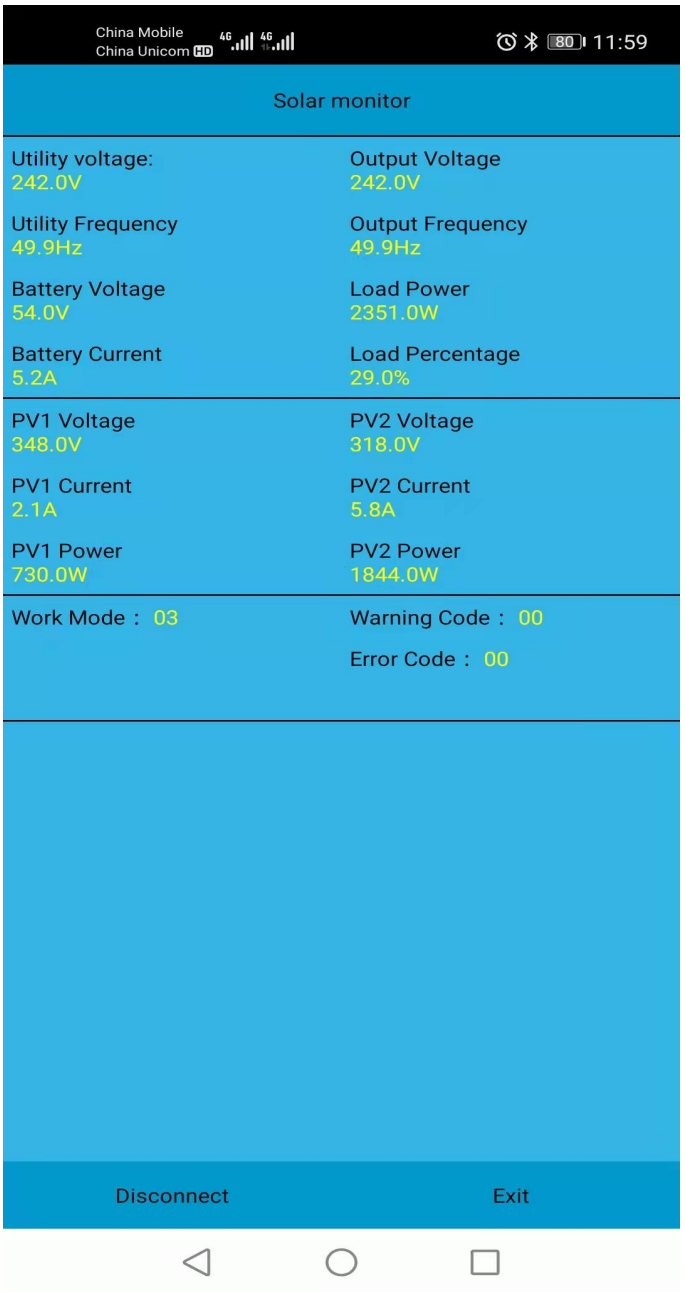
Unit Status	Condition		
		NC & C	C & NO
Power Off	Unit is off and no output is powered	Open	Close
Power On	Battery voltage <Setting the voltage in program 12	Close	Open
	Battery voltage >Setting the voltage in program 13	Open	Close

4.11 Bluetooth Communication (Optional)

This unit is equipped with a Bluetooth transmitter. download “RevoMonitor” APP from Google Play . Once the APP is download, you may connect “RevoMonitor” APP to your inverter with the pairing password “1234”. The communication distance is roughly 6 ~ 7 meters.

Note:1.the following date are for reference only.

2.Bluetooth APP only supports Android phone users.



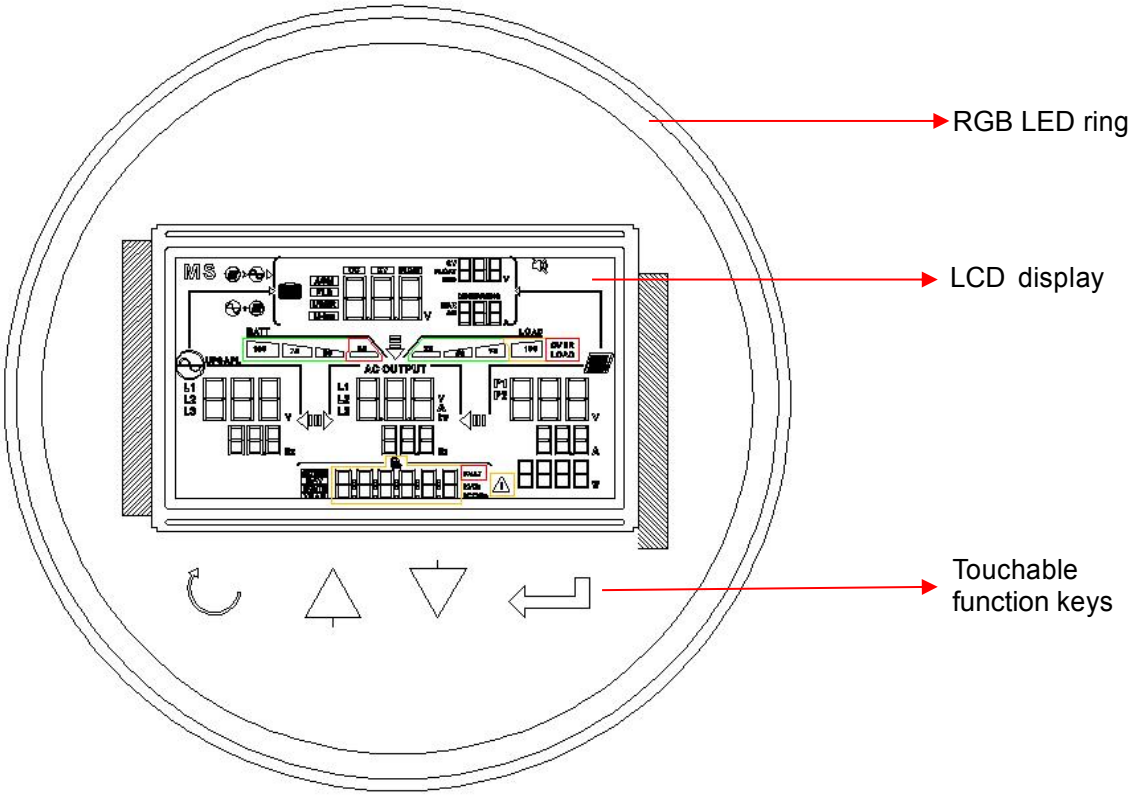
5. Operation

5.1 Power ON/OFF

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

5.2 Operation And Display Panel

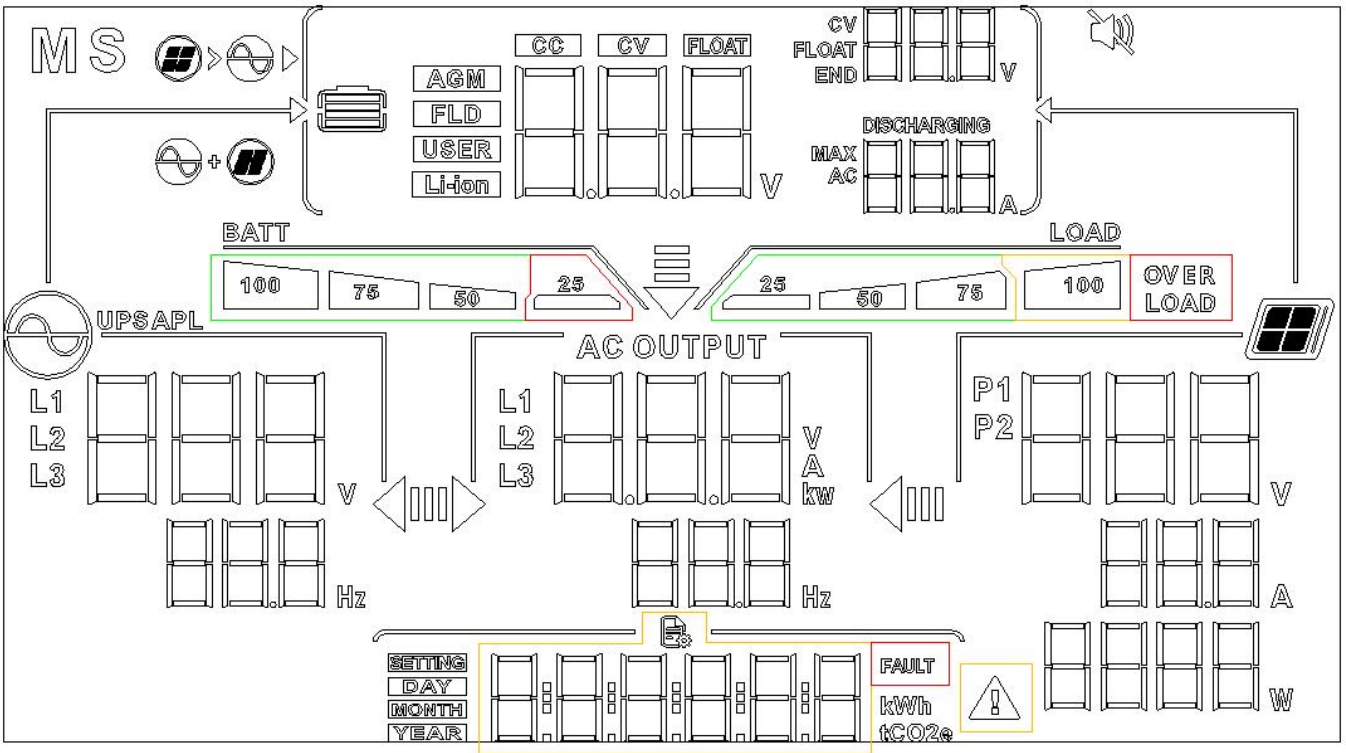
The operation LCD panel, shown in the chart below, includes one RGB LED ring, four touchable function keys and a LCD display to indicate the operating status and input/output power information.

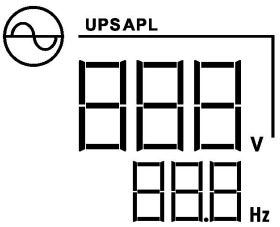
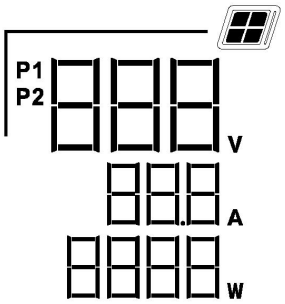
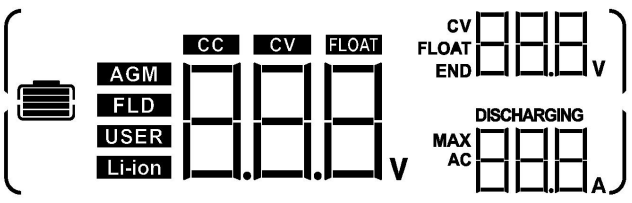


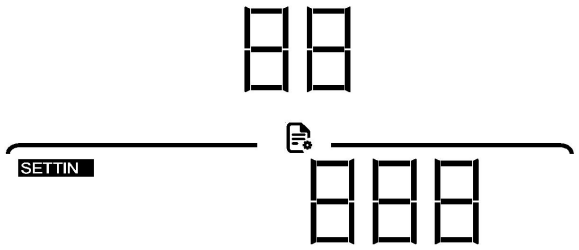
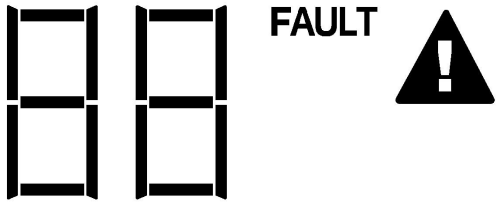
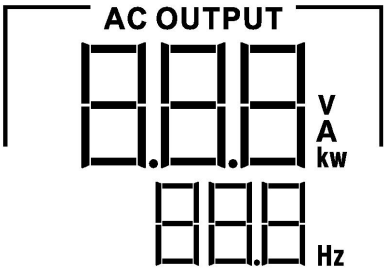
Touchable Function Keys

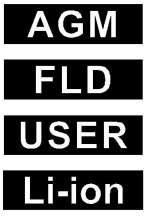
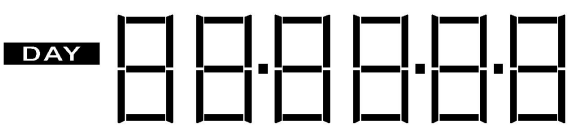
Function Key		Description
↻	ESC	To exit the setting
▲	Up	To last selection
▼	Down	To next selection
↵	Enter	To confirm/enter the selection in setting mode

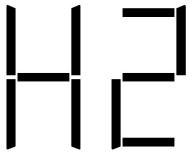
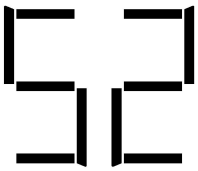
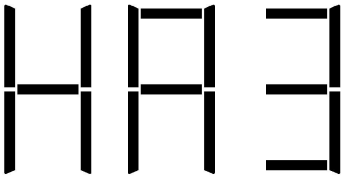
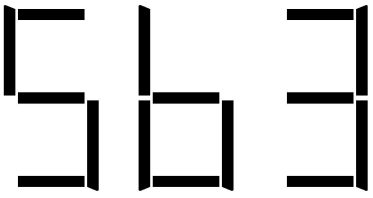
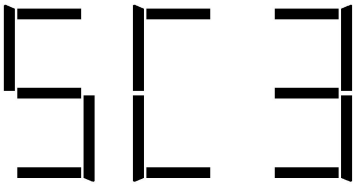
5.3 LCD Display Icons



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	
	1.Indicates battery level by 1-25%, 26-49%, 51-75% and 76-100% in battery mode and charging status in line mode. 2.When battery is charging, it will present battery charging status. 3.Floating mode. Batteries are fully charged.4 bars will be on.
Load Information	
	Indicates overload.
	Indicates the load level by 0-25%, 26-50%, 51-75% and 76-100%.

	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	
	The acceptable AC input voltage range will be within 90-280VAC.
	The acceptable AC input voltage range will be within 170-280VAC.
Operation Status Information	
	Indicates unit connects to the mains.
	Indicates unit connects to the PV panel.
	Indicates battery type.
	Date:Day,Month,Year
	Power generation

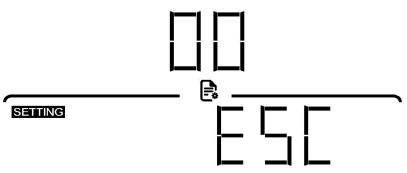
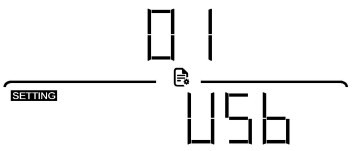
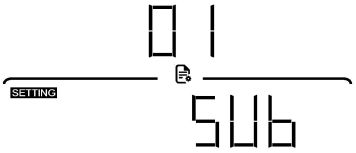
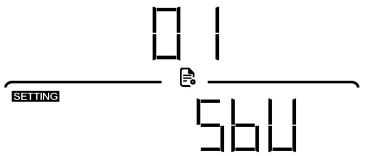
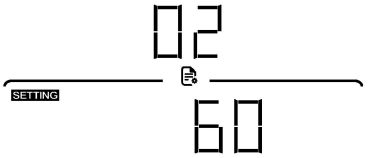
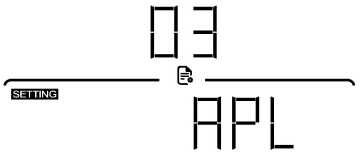
	CT detection power
	Indicates unit alarm is disabled.
	“H”: Master unit . “2”: there are two parallel machines in single phase
	“S”: Slave unit. “2”:there are two parallel machines in single phase
	“H”: Master unit “A”: A-phase “3”:there are three parallel machines in three phase
	“S”: Slave unit “B”: B-phase “3”:there are three parallel machines in three phase
	“S”: Slave unit “C”: C-phase “3”:there are three parallel machines in three phase

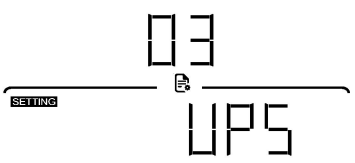
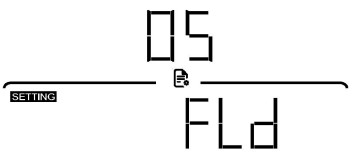
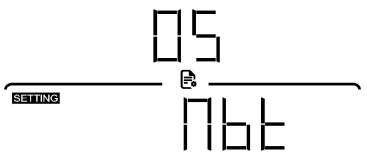
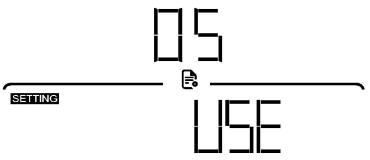
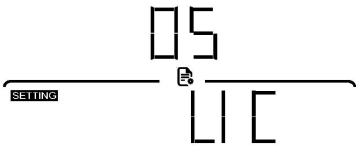
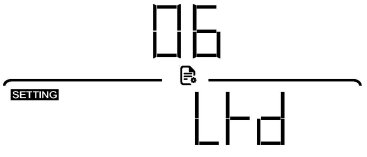
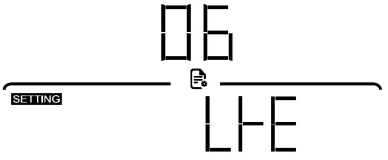
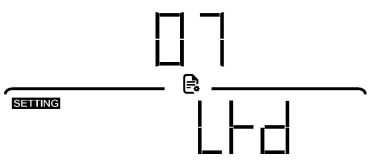
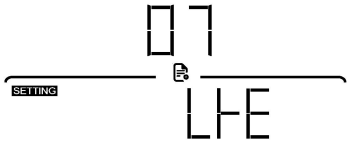
5.4 LCD Setting

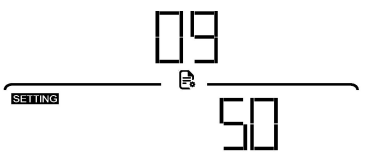
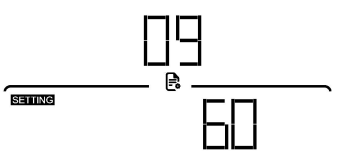
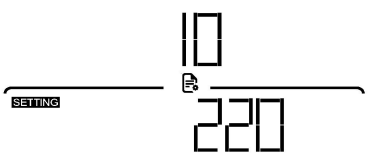
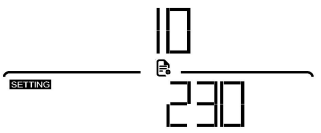
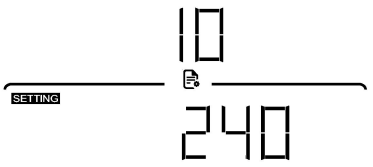
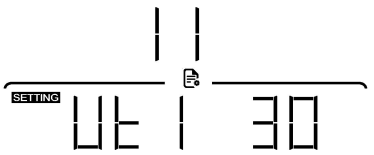
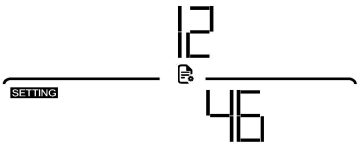
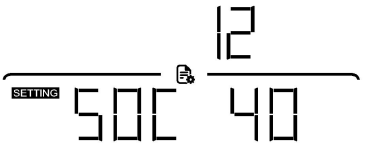
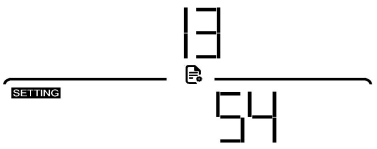
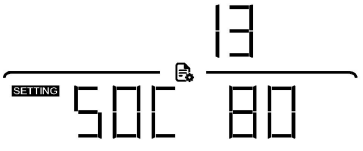
After pressing and holding ENTER button for 3 seconds, the unit will enter setting mode. Press “UP” or “DOWN” button to select setting programs. And then, press “ENTER” button to confirm the selection or ESC button to exit.

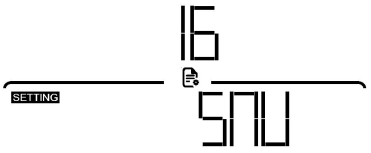
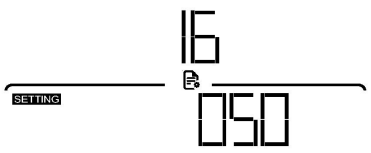
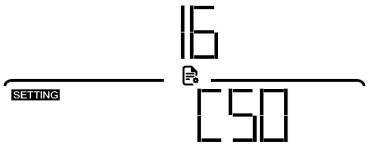
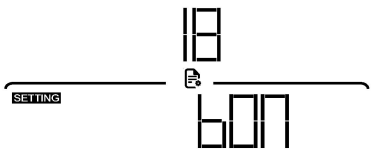
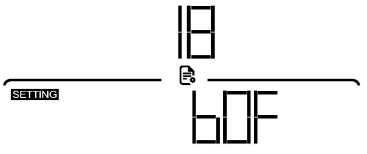
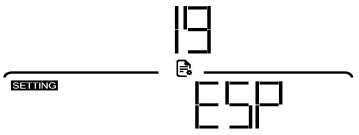
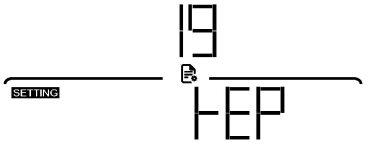
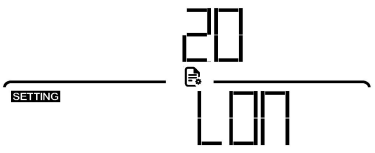
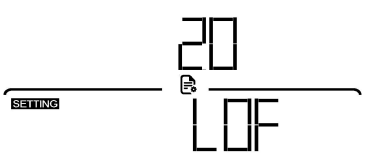
Note: All settings must be modified in battery mode and must be rebooted to be valid.

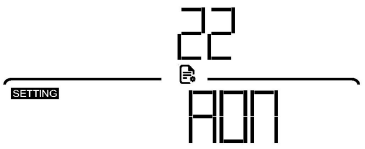
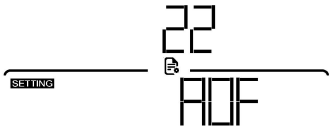
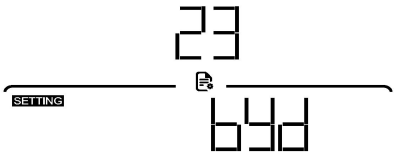
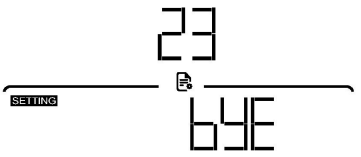
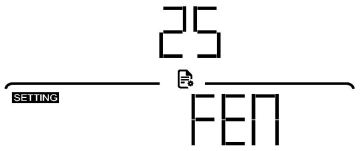
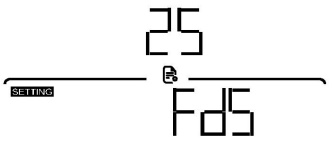
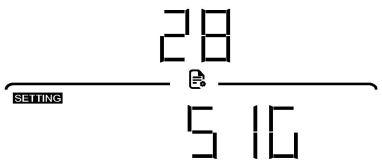
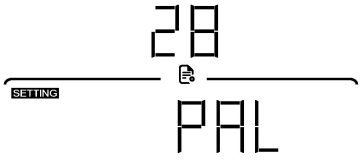
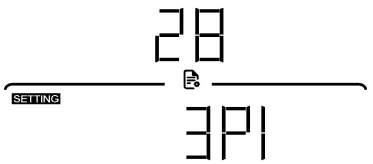
Setting Programs:

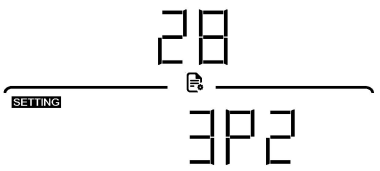
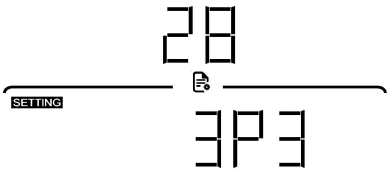
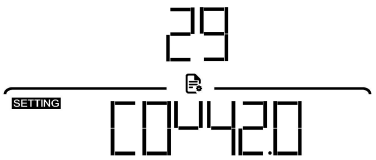
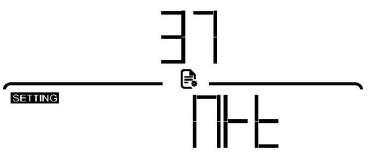
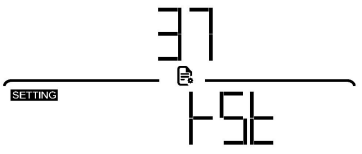
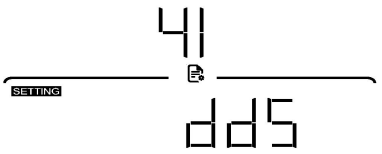
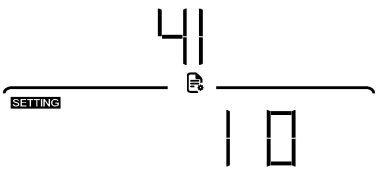
Program	Description	Selectable option	
00	Exit setting mode	Escape 	
01	Output source priority: To configure load power source priority	Utility first (default) 	Utility will provide power to the loads as first priority. solar and battery energy will provide power to the loads only when utility power 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: (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.

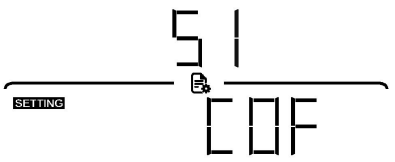
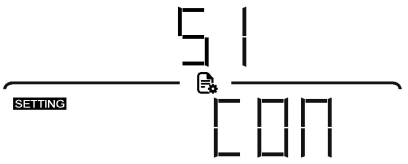
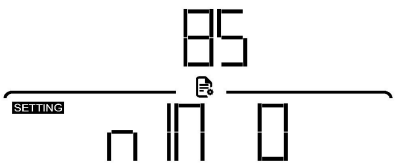
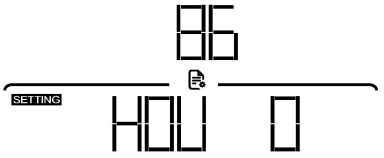
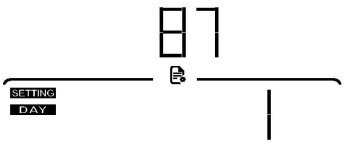
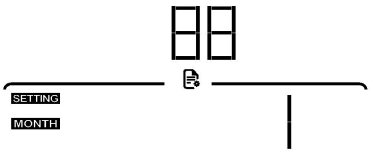
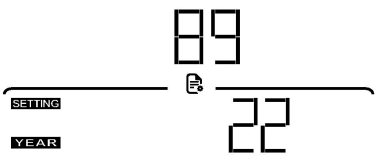
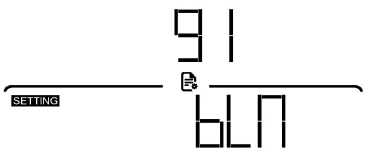
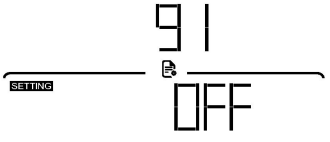
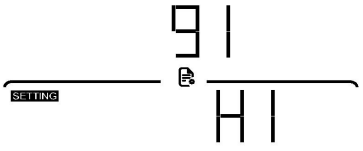
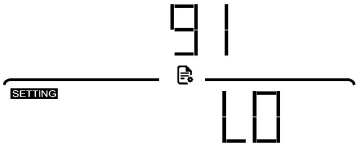
03	AC input voltage range	UPS 	If selected, acceptable AC input voltage range will be within 170-280VAC.
05	Battery type	AGM (default) 	Flooded 
		No battery 	
		User-Defined 	If “User-Defined” is selected, battery charge voltage and low DC cut-off voltage can be set up in program 26, 27 and 29.
		3rd party Lithium battery (CAN) 	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. **Note**: if you have a lithium battery, you can choose this option. When you plug in BMS communications, screen will show “LIC”.
		3rd party Lithium battery（RS485） LI1; LI2; LI3; LI4; LI5	
06	Auto restart when overload occurs	Restart disable (default) 	Restart enable 
07	Auto restart when over temperature occurs	Restart disable (default) 	Restart enable 

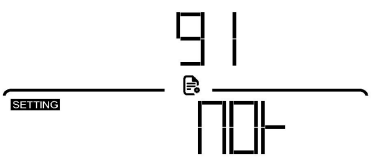
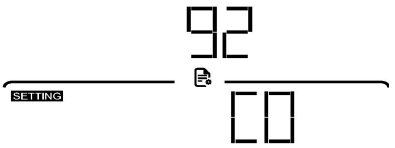
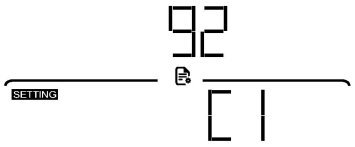
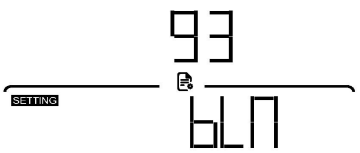
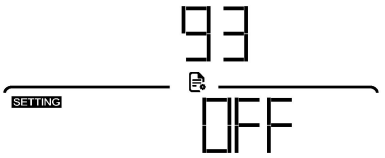
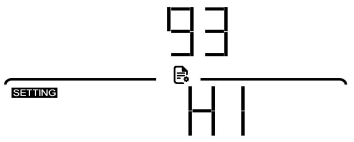
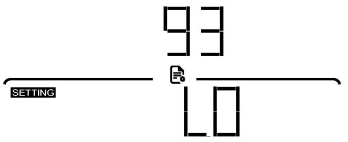
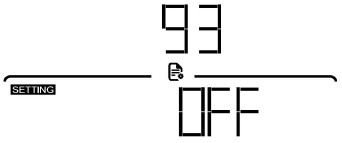
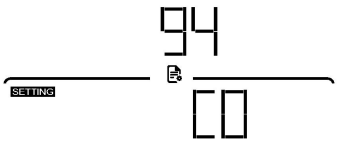
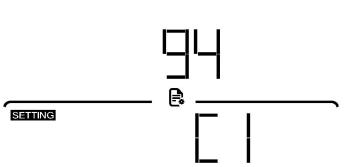
09	Output frequency	50Hz (default) 	60Hz 
10	Output voltage	220V 	230V (default) 
		240V 	
11	Maximum utility charging current Note: If setting value in program 02 is smaller than that in program in 11, the inverter will apply charging current from program 02 for utility charger.	30A (default) 	Setting 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 51V. Increment of each click is 1V.
		SOC 40%(defalt for Lithium) 	If any types of lithium battery is selected in program 05,setting value will change to SOC automatically.Adjustable range is 10%to 80%.
13	Setting voltage point back to battery mode when selecting “SBU” (SBU priority) in program 01.		54V (default) Setting range is from 48V to 58V. Increment of each click is 1V.
		SOC 80%(defalt for Lithium) 	If any types of lithium battery is selected in program 05,setting value will change to SOC automatically.Adjustable range is 50%to 100%.Increment of each click is 5%

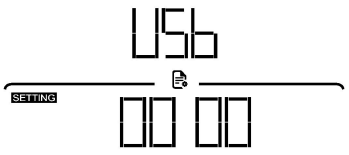
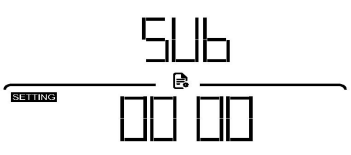
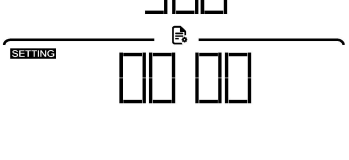
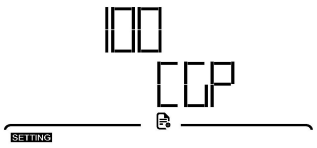
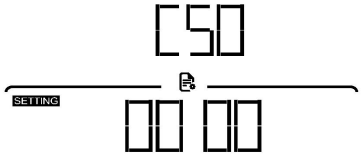
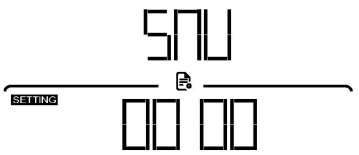
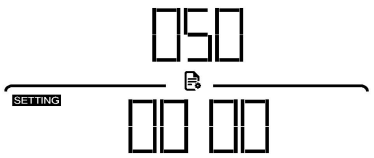
<table>
<tr><td rowspan="4">16</td><td rowspan="4">Charger source priority:
To configure charger source priority</td><td colspan="2">If this inverter/charger is working in Line, Standby or Fault mode, charger source can be programmed as below:</td></tr>
<tr><td>Solar and Utility (default)
  </td><td>Solar energy and utility will charge battery at the same time.</td></tr>
<tr><td>Only Solar
  </td><td>Solar energy will be the only charger source no matter utility is available or not.</td></tr>
<tr><td>Solar first
  </td><td>Solar energy will charge battery as first priority.
Utility will charge battery only when solar energy is not available.</td></tr>
<tr><td>18</td><td>Alarm control</td><td>Alarm on (default)
  </td><td>Alarm off
  </td></tr>
<tr><td rowspan="2">19</td><td rowspan="2">Auto return to default display screen</td><td>Return to default display screen (default)
  </td><td>If selected, no matter how users switch display screen, it will automatically return to default display screen after no button is pressed for 1 minute.</td></tr>
<tr><td>Stay at latest screen
  </td><td>If selected, the display screen will stay at latest screen user finally switches.</td></tr>
<tr><td>20</td><td>Backlight control</td><td>Backlight on
  </td><td>Backlight off
  </td></tr>
</table>

22	Beeps while primary source is interrupted	Alarm on (default) 	Alarm off 
23	Overload bypass: When enabled, the unit will transfer to line mode if overload occurs in battery mode.	Bypass disable (default) 	Bypass enable 
25	Record Fault code	Record enable (default) 	Record disable 
26	Bulk charging voltage (C.V voltage)	Available options for 48V model: 56.4V (default) 	If user-defined is selected in program 5, this program can be set up. Setting range is from 48.0V to 61.0V. Increment of each click is 0.1V.
27	Floating charging voltage	Available options for 48V model: 54.0V (default) 	If user-defined is selected in program 5, this program can be set up. Setting range is from 48.0V to 61.0V. Increment of each click is 0.1V.
28	Single and Parallel setting	default 	Single enable
		single-phase parallel 	single-phase parallel enable
		A phase 	A-phase parallel enable

28	Single and Parallel setting	B phase 	B-phase parallel enable
		C phase 	C-phase parallel enable
		Please note: 1.when three-phase parallel,make sure that A-phase is the host; 2.after the parallel parameters are modified,the device must be restarted to be effective. 3. All inverters must share the same battery pack when paralleling 4. This setting is only available when the inverter is in standby mode (Switch off).	
29	Low DC cut-off voltage	Available options for 48V model: 42.0V (default) 	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.
37	Reset all stored data for PV generated power and output load energy	Not reset(Default) 	Reset 
41	Discharge limited current		discharge current limited disable
			setting range :10A to 200A setting increase or decrease of 10A. NOTE:1. if you work in “SUB mode” or “SBU mode”, when the loads is greater than the current limiting point, it will automatically switch to utility mode. 2.if it only works in battery mode, when the load is greater than the current limiting point ,the inverter will shut down immediately.

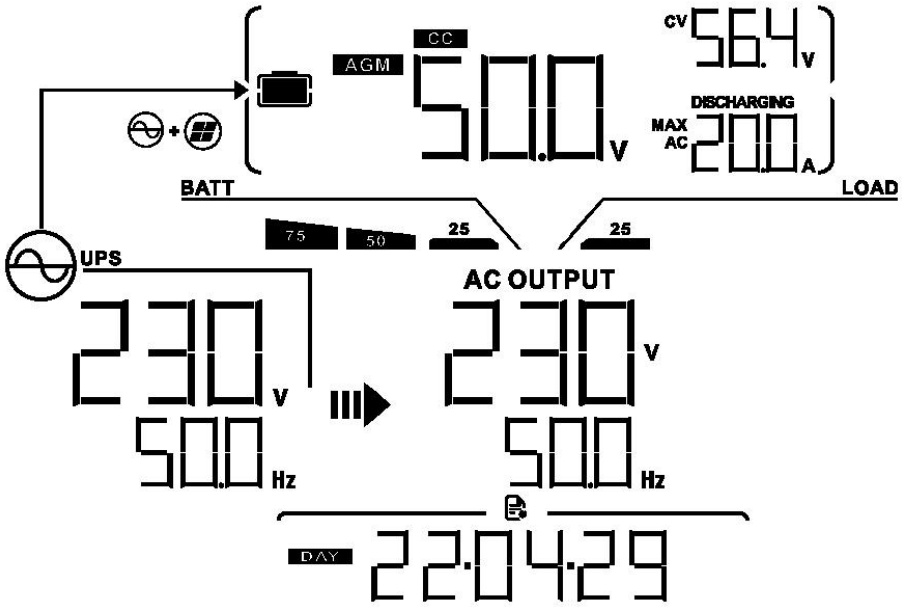
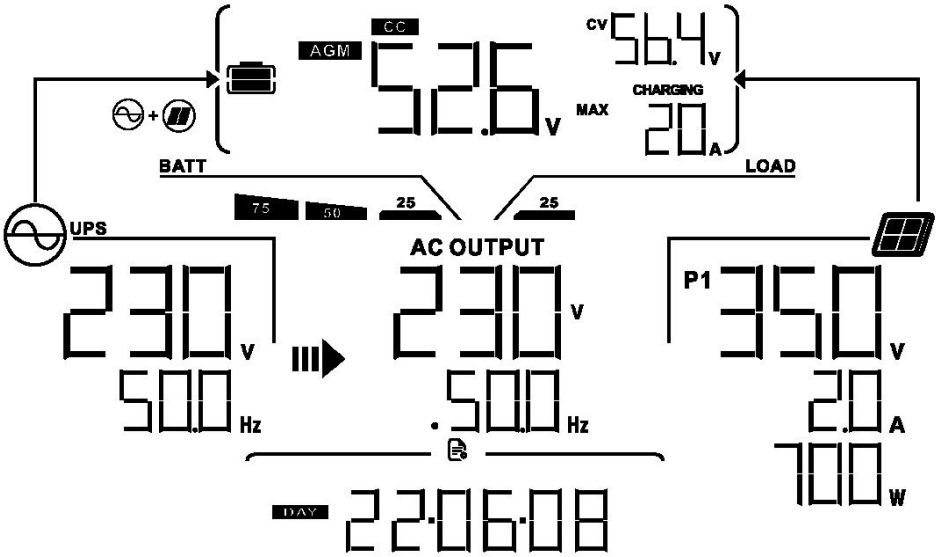
51	CT enable	OFF(Default) 	ON 
85	Time setting – Minute		For minute setting, the range is from 0 to 59.
86	Time setting – Hour		For hour setting, the range is from 0 to 23.
87	Time setting– Day		For day setting, the range is from 1 to 31.
88	Time setting– Month		For month setting, the range is from 1 to 12.
89	Time setting – Year		For year setting, the range is from 17 to 99.
91	Surround RGB brightness	Default: 	Default: Breathing light effect disabled 
		On/Off control for RGB LED,It's necessary to enable this setting to activate RGB LED lighting function.	
		Brightness of RGB LED: high 	Brightness of RGB LED: low 

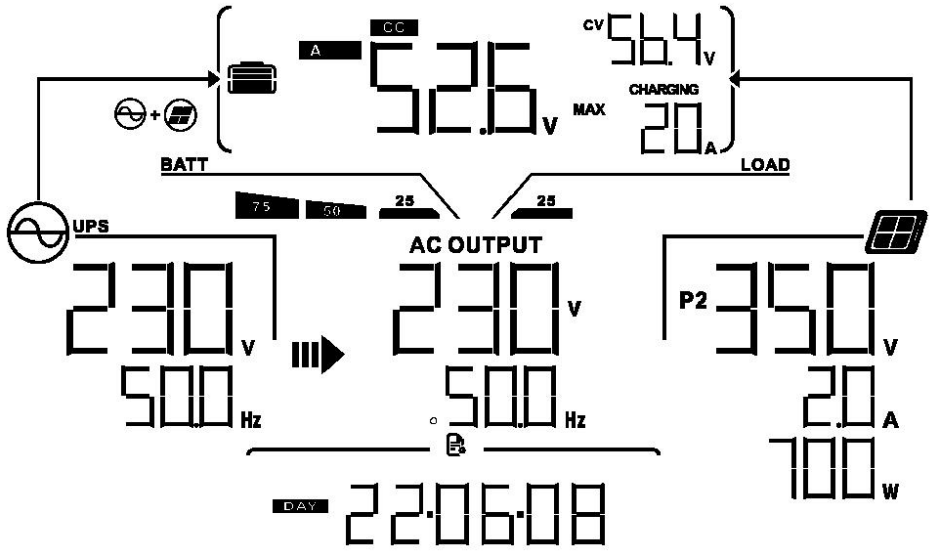
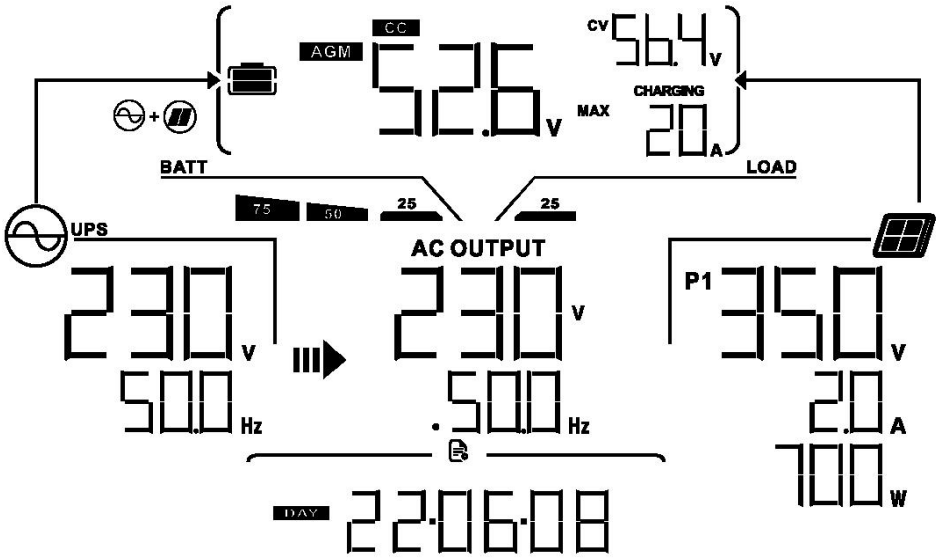
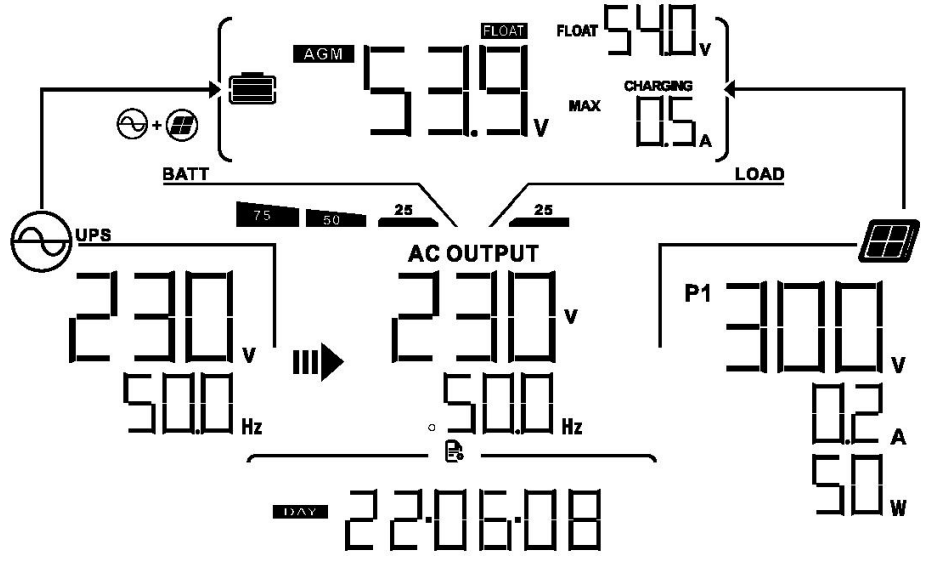
91	Surround RGB brightness	Brightness of RGB LED: normal 	
92	Surrounding the RGB LED lighting color	Default: 	The cycle of seven kinds of color.
		Low 	“ C1 ” to “ C7 ” can be used in one of the colors
93	The Logo of brightness of RGB LED	Default: enabled 	Disabled 
		High 	Low 
		Normal 	
94	The Logo color of RGB LED		The cycle of seven kinds of color.
			C1 ” to “ C7 ” can be used in one of the colors
99	Timer Setting for Output source Priority 	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 confirm all setting.	

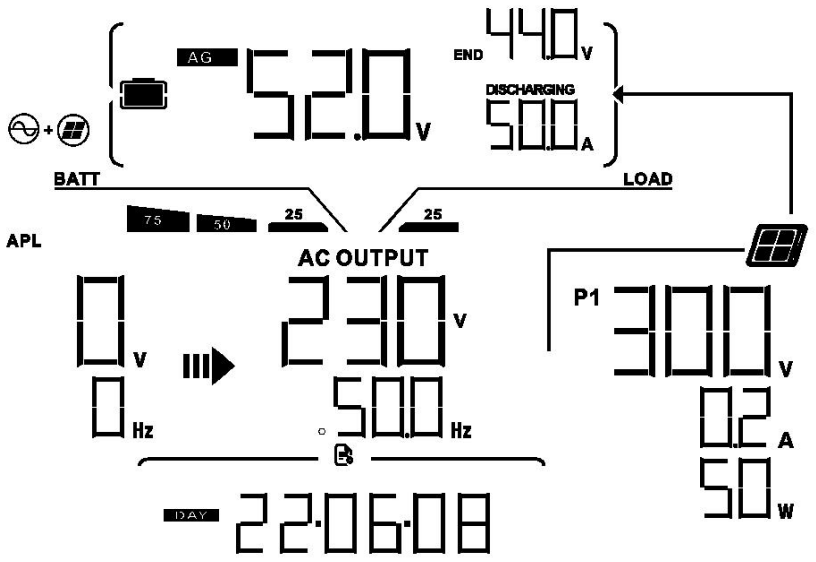
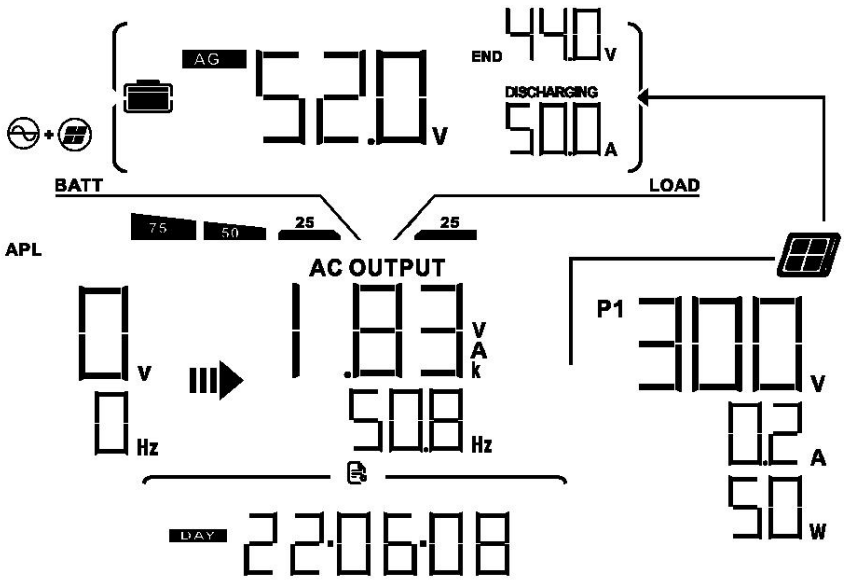
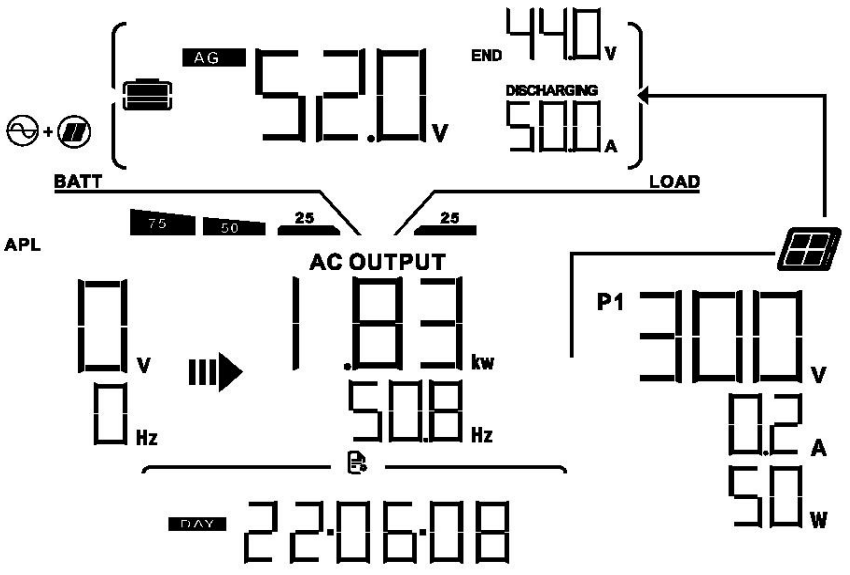
<table>
<tr><td rowspan="2">99</td><td rowspan="2">Timer Setting for Output source Priority
 </td><td>Utility first timer
  </td><td>Solar first timer
  </td></tr>
<tr><td>SBU priority timer
  </td><td></td></tr>
<tr><td rowspan="3">100</td><td rowspan="3">Timer Setting for Charger Source Priority
  </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 confirm all setting.</td></tr>
<tr><td>Solar first
  </td><td>Solar and utility
  </td></tr>
<tr><td>Only solar
  </td><td></td></tr>
</table>

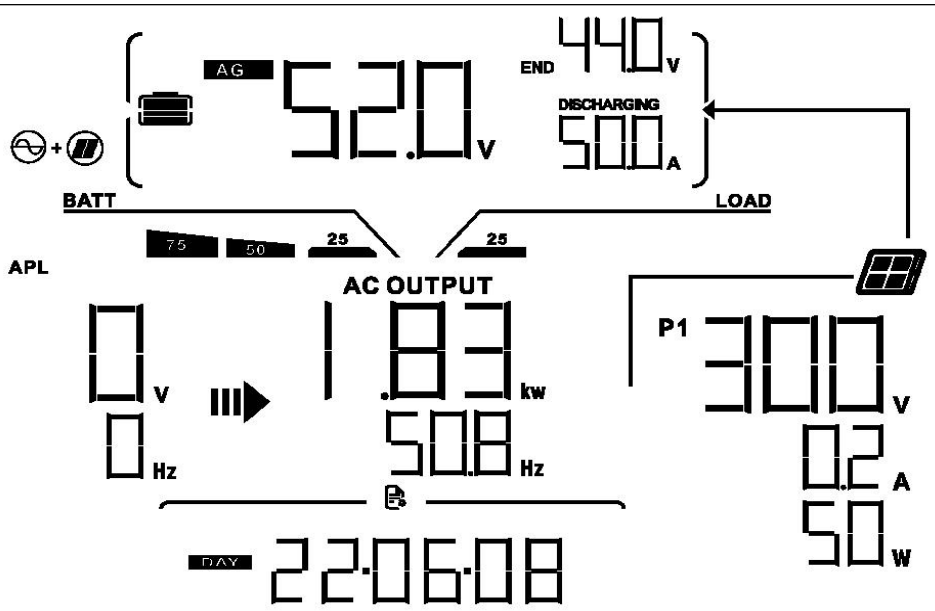
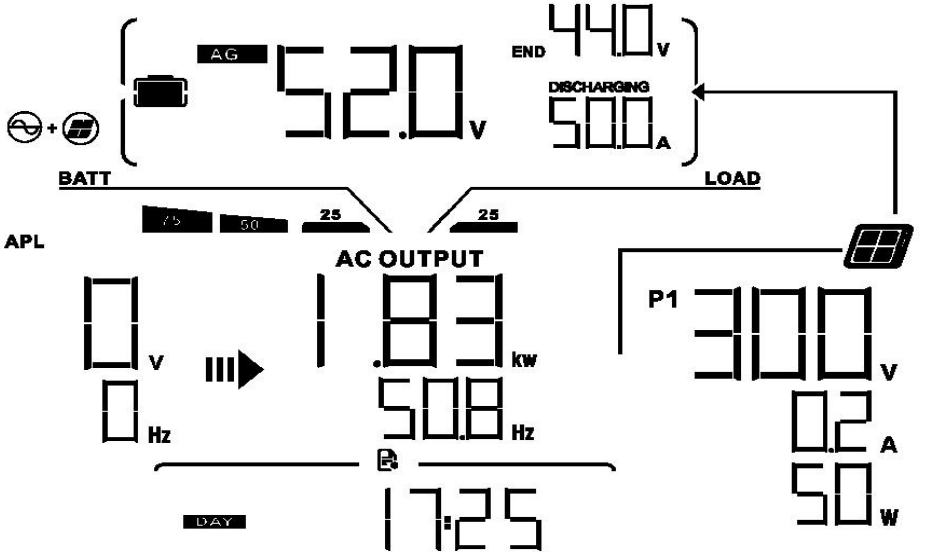
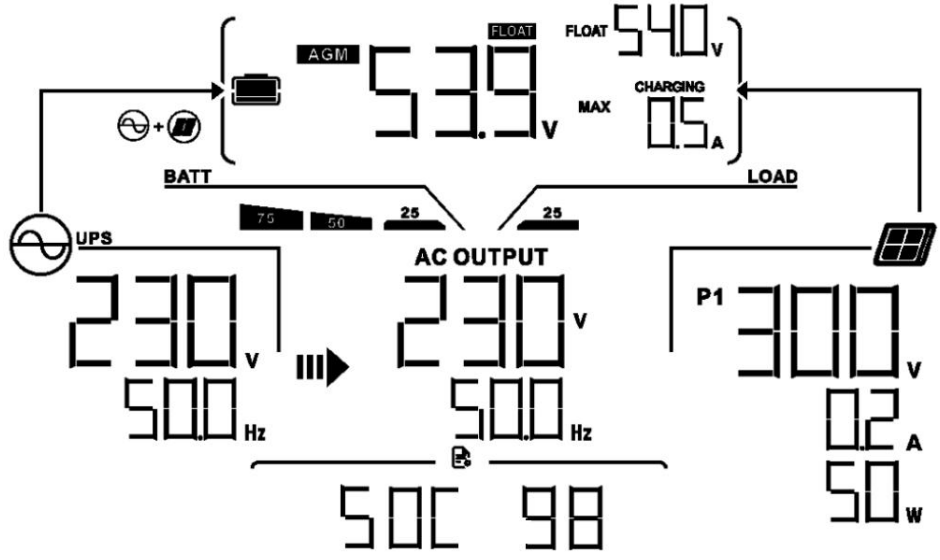
5.5 LCD Display

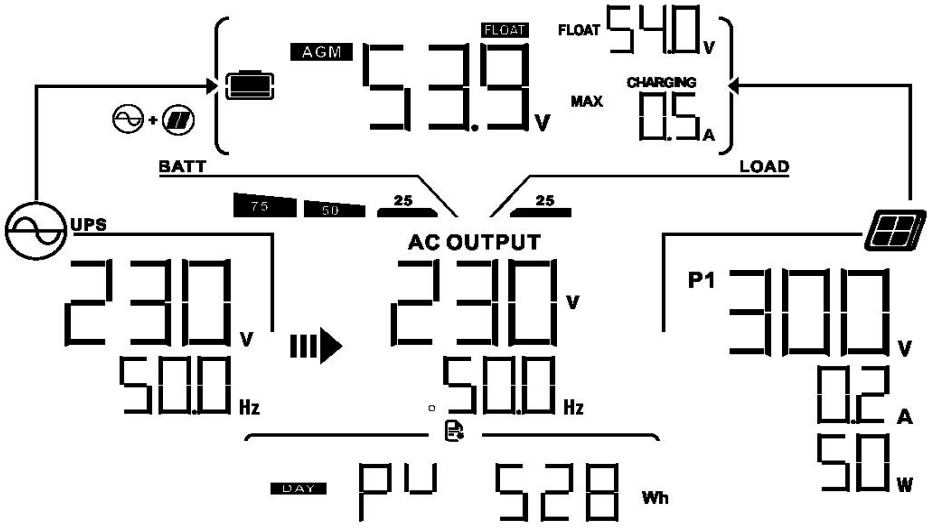
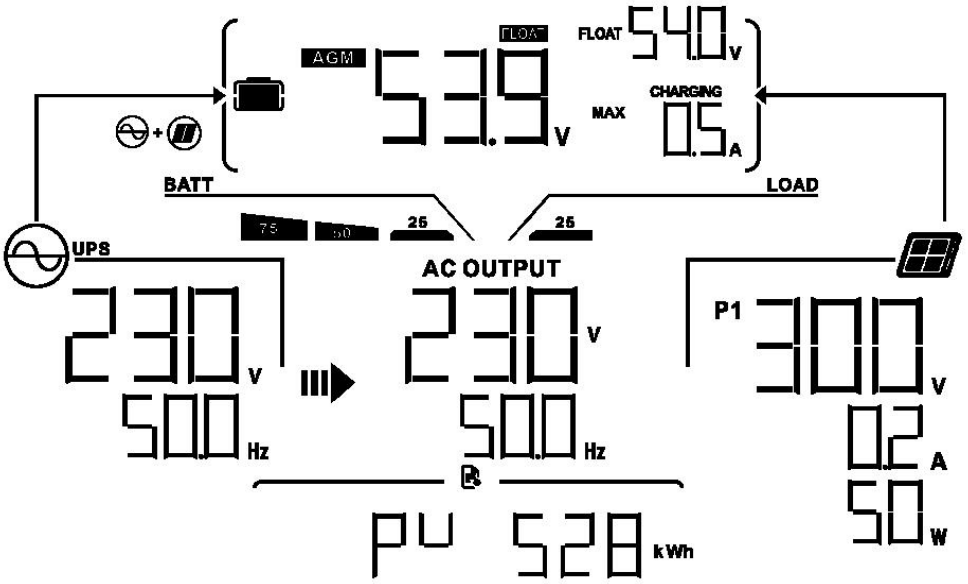
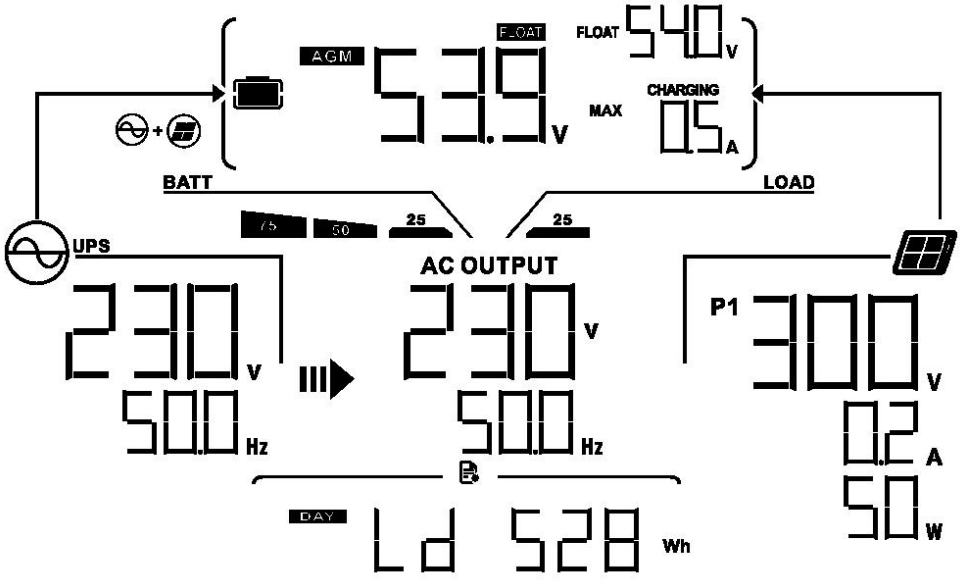
The LCD display information will be switched in turn by pressing the "▲" or "▼" button. The selectable information is switched as the following table in order.

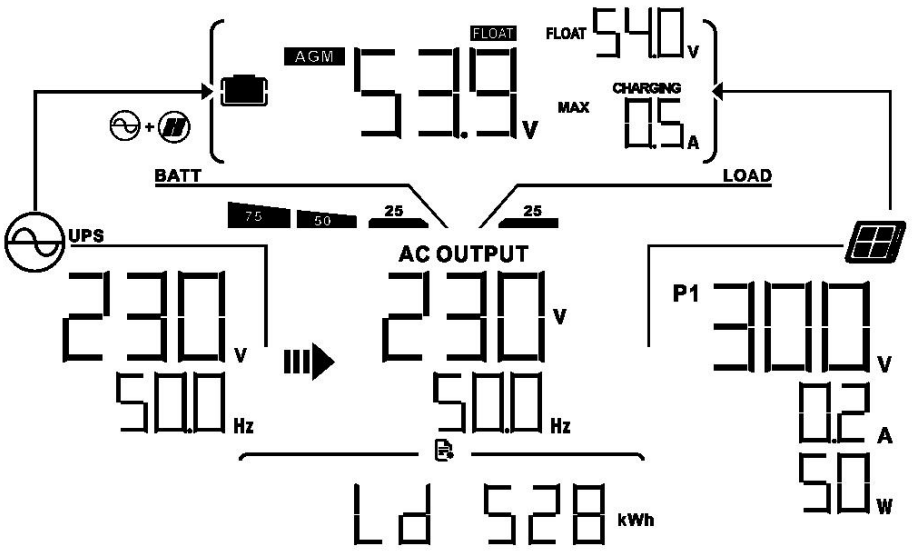
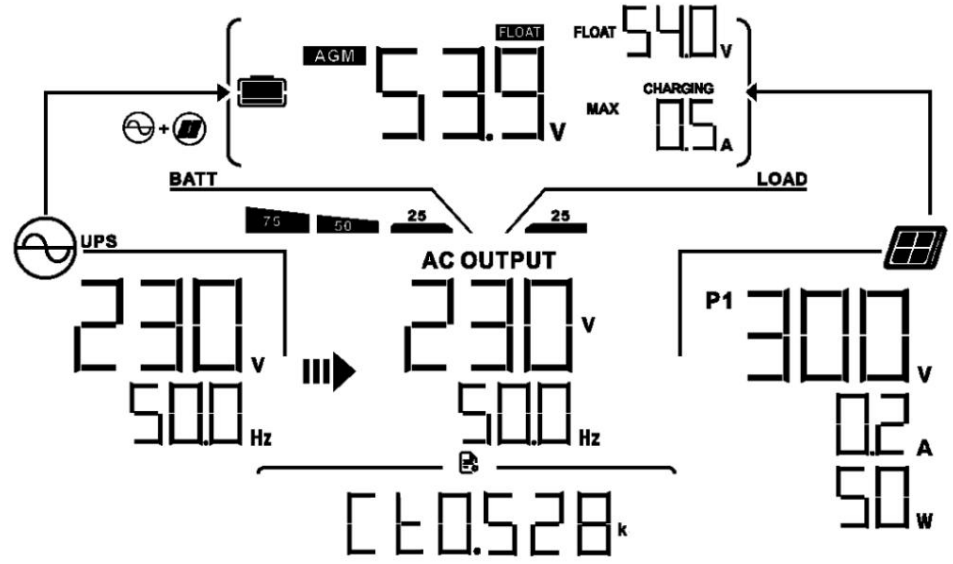
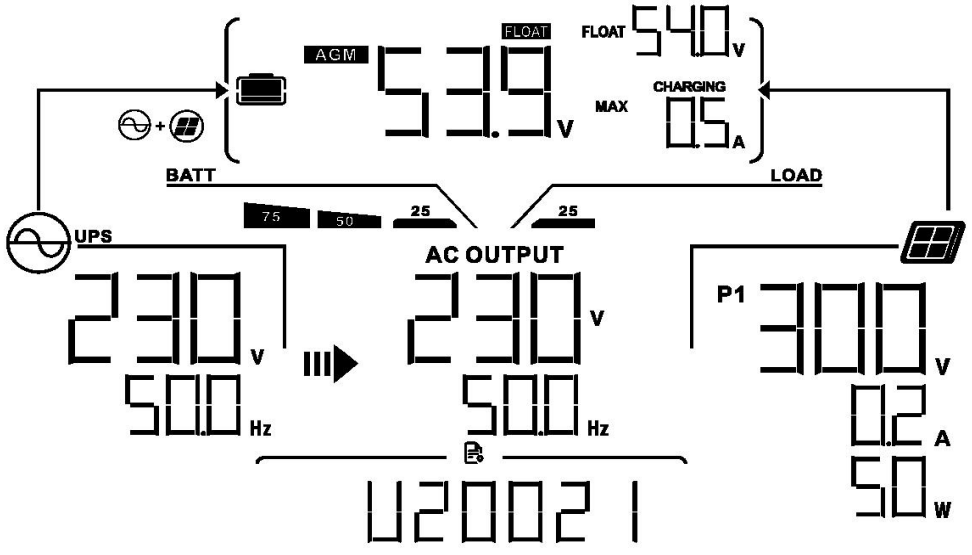
Selectable information	Default LCD display
Utility voltage=230Vac Utility frequency=50.0Hz Output voltage=230Vac Frequency=50.0Hz	
PV1 voltage=350V PV1 current=2.0A PV1 power=700W (PV1 and PV2 switch every 5 seconds)	

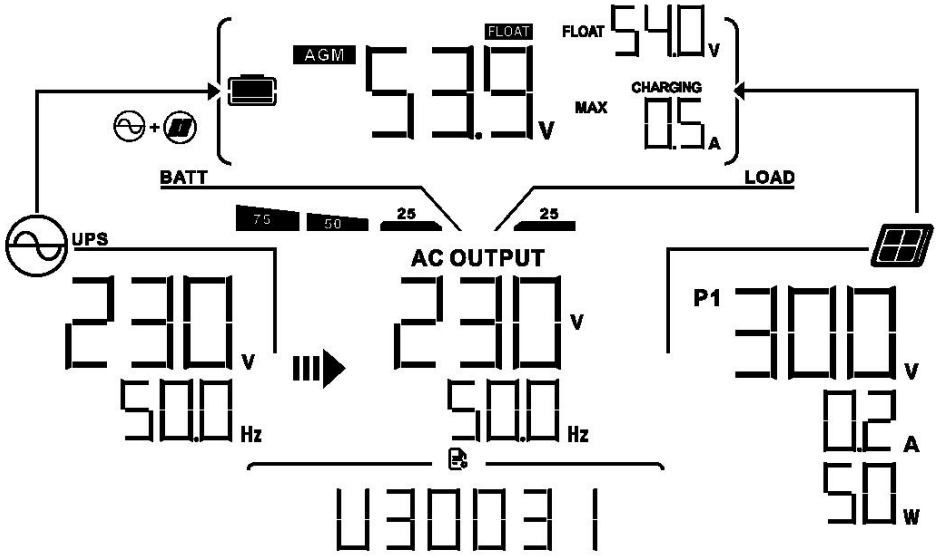
PV2 voltage=350V PV2 current=2.0A PV2 power=700W (PV1 and PV2 switch every 5 seconds)	
Battery voltage=52.6Vdc Bulk charging voltage=56.4Vdc Charging current=20A	
Battery voltage=53.9V Floating charging voltage=54.0 Charging current=0.5A	

Low DC cut-off voltage=44.0V, Discharging current=50.0A	
Output power=1.83KVA Note: Output voltage, load in KVA, load in Watt switch every 5 second	
Output power=1.83KW Note: Output voltage, load in KVA, load in Watt switch every 5 second	

Date: June 8, 2022	
Real time 17:25.	
SOC：98%	

PV energy generation today =528Wh.	
Total PV energy generation	
Load output energy today =528Wh.	

Total load energy =528KWH	
CT power:0.528kW External(Optional)	
Display control board software version:0021	

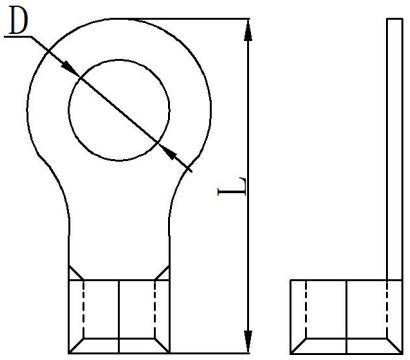
Inverter control board software version:0031	

6. Parallel Installation Guide

6.1Parallel Operation Cable

1. Recommended battery cable and terminal size for each inverter:

Model	Typical Amperage	Battery capacity	Wire Size	Cable mm2	Ring Terminal Dimensions		Torque value
					D	L	
11KW	228A	250AH	1*3/0AWG	85	8.4	54	5 Nm



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**.**

2. Recommended breaker specification of battery for each inverter:

Model	**1 unit*X**
11KW	250A70Vdc

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.

3. Recommended AC input and output cable size for each inverter

Model	Gauge	Torque Value
11KW	6 AWG	1.4~ 1.6Nm

Model	2 units	3 units	4 units	5 units	6units
11KW	140A/230VAC	210A/230VAC	280A/230VAC	350A/230VAC	420A/230VAC

Note 1: Also, you can use 70A breaker with only 1 unit and install one breaker at its AC input in each inverter.

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

WARNING: Regarding AC input and output, please also follow the same principle. should be compatible with the phase current limitation from the phase with maximum units.

6.2 Matters Needing Attention In Single-phase Parallel Operation

1. Parallel operation in single phase with up to 6 units.
2. **WARNING:** It's required to connect battery for parallel operation, it is forbidden to use parallel without batteries
3. **WARNING:** It is forbidden for inverter to share the same solar panel group.
4. **WARNING:** Make sure all cables are of the same length, Otherwise, there will be voltage difference between inverter and battery to cause parallel inverters not working.
5. Set the parameters of each inverter separately (working mode, single - phase parallel function).

Warning: When working in parallel, the working mode of each inverter must be the same working mode, output frequency.

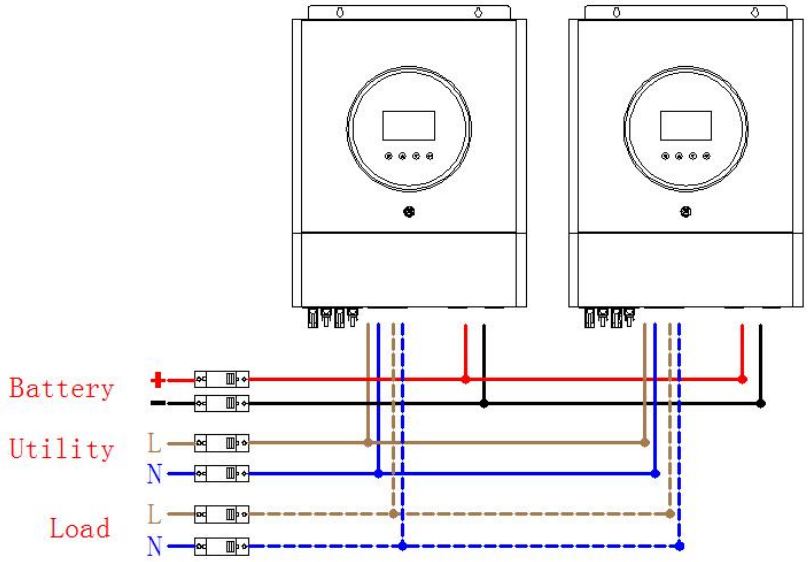
6. After setting the parameters, turn on each inverter in turn.
7. **WARNING:** When running in parallel, all inverters must share the battery pack.

6.3 Single-phase Parallel Operation Cable Connection

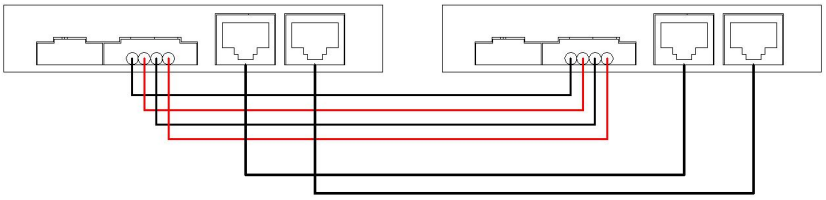
1.Two inverters in parallel：

Power Connection:

NOTE: The following picture only for your reference. It is subject to actual goods to be received.



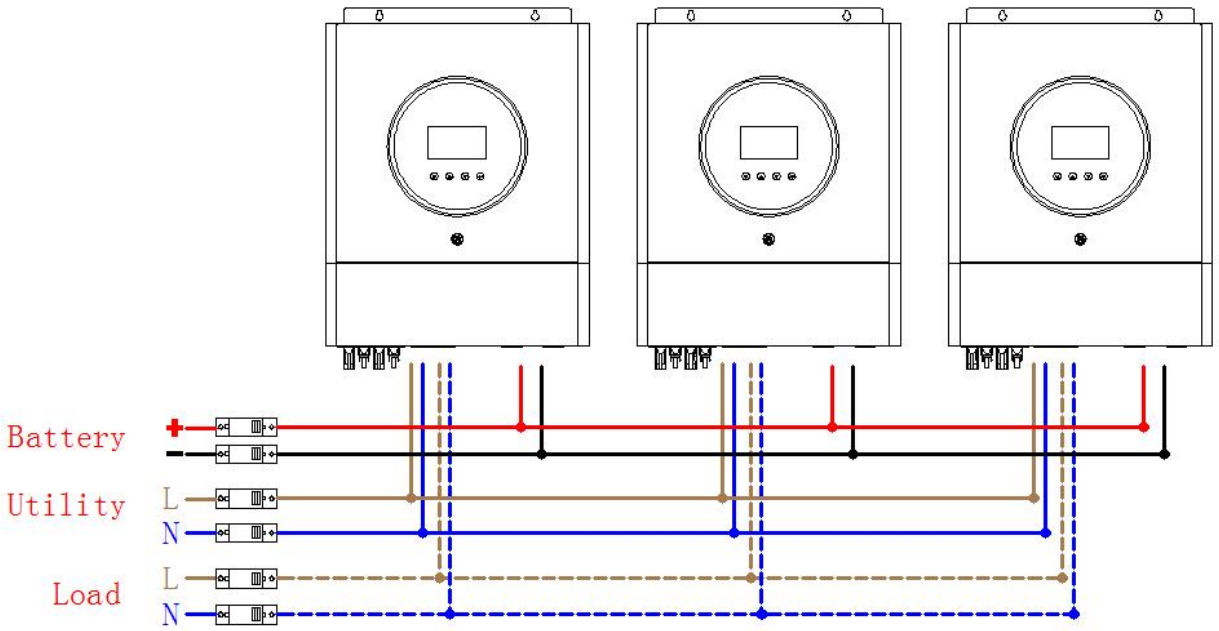
Communication Connection



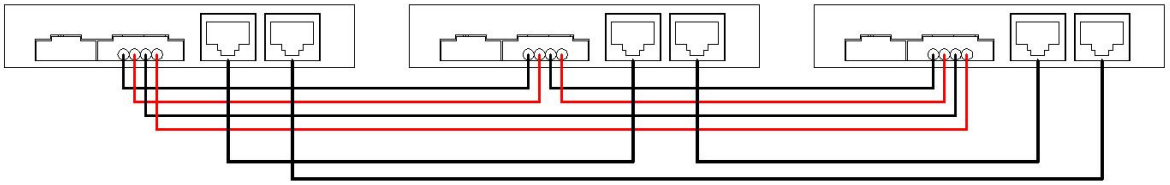
2.Three inverters in parallel：

Power Connection:

NOTE: The following picture only for your reference. It is subject to actual goods to be received.



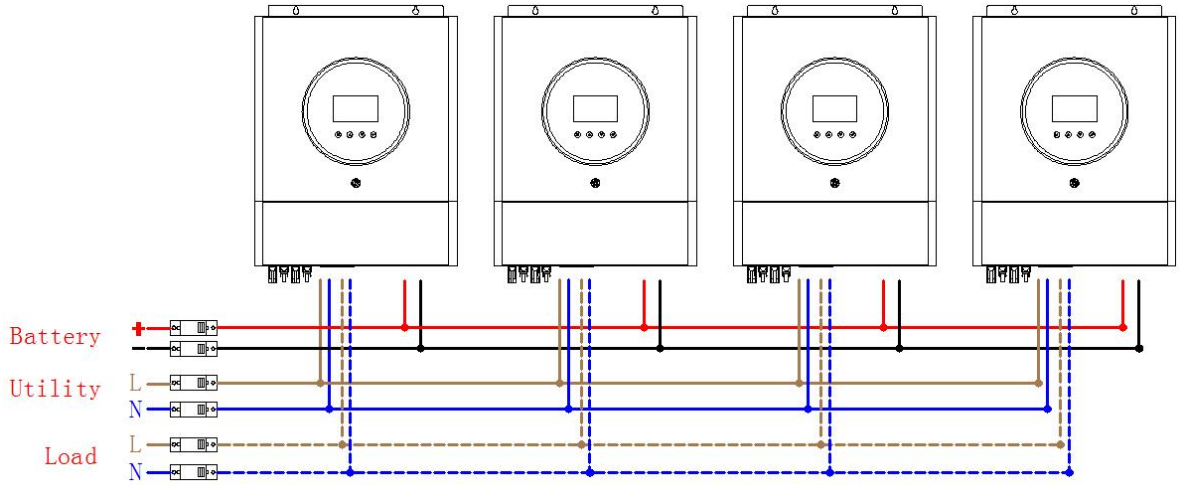
Communication Connection



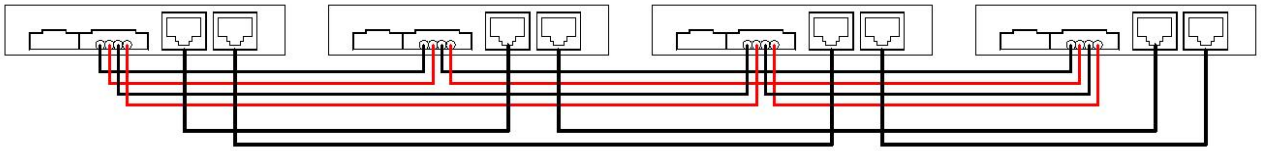
3.Four inverters in parallel：

Power Connection:

NOTE: The following picture only for your reference. It is subject to actual goods to be received.



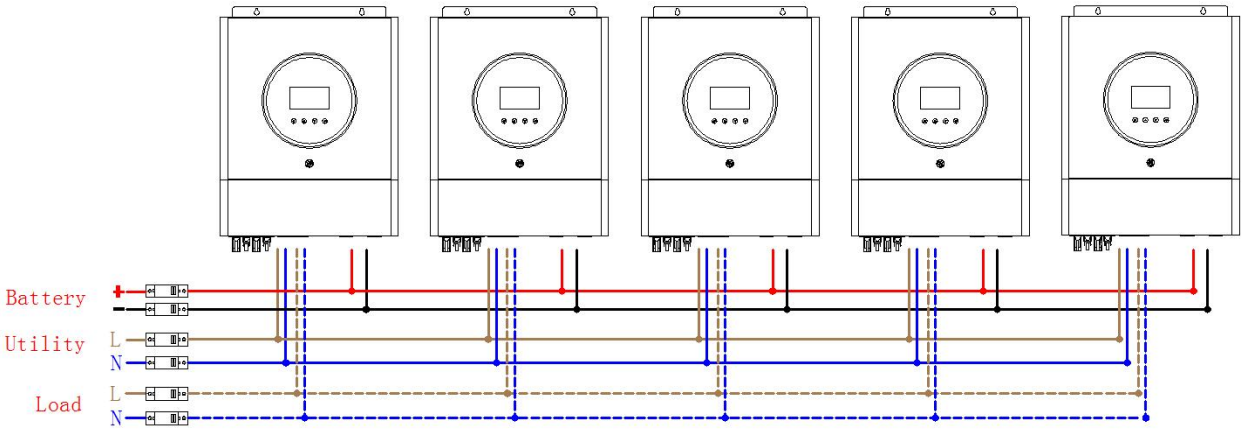
Communication Connection



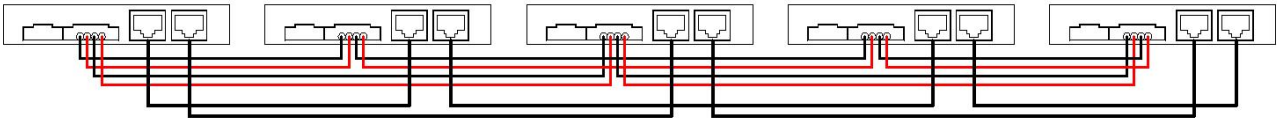
4.Five inverters in parallel：

Power Connection:

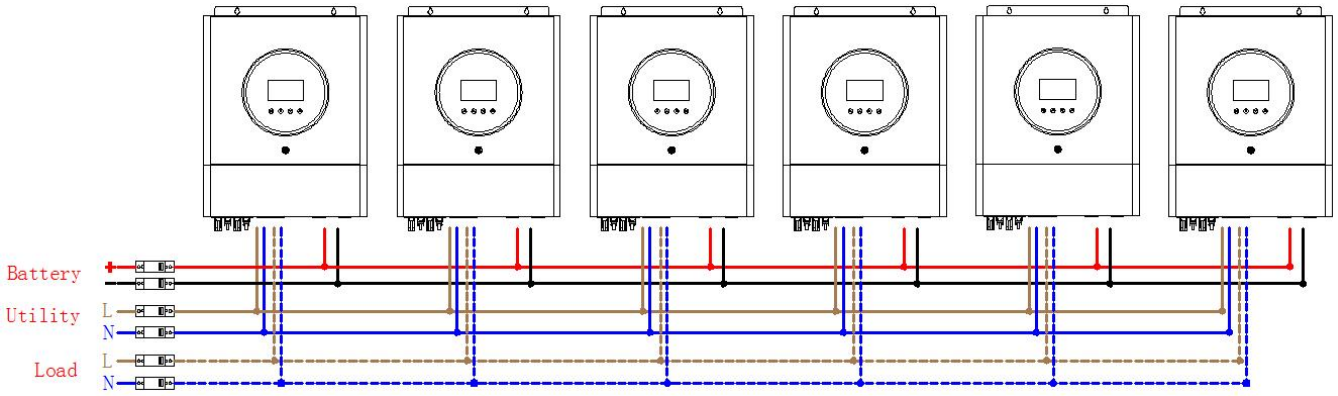
NOTE: The following picture only for your reference. It is subject to actual goods to be received.



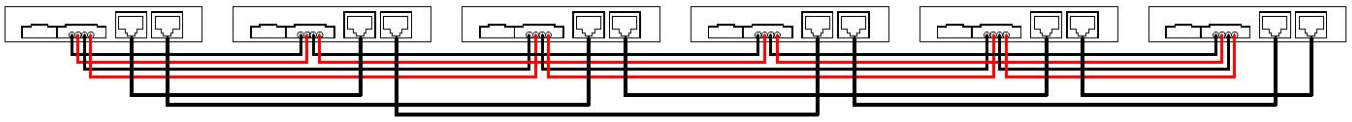
Communication Connection



5.Six inverters in parallel :
Power Connection:
NOTE: The following picture only for your reference. It is subject to actual goods to be received.



Communication Connection



6.4 Matters Needing Attention In Three-phase Parallel Operation

1. Parallel operation in Three phase with up to 6 units.
2. **WARNING:** It's required to connect battery for parallel operation, it is forbidden to use parallel without batteries
3. **WARNING:** It is forbidden for inverter to share the same solar panel group.
4. **WARNING:** Make sure all cables are of the same length, Otherwise, there will be voltage difference between inverter and battery to cause parallel inverters not working.
5. Set the parameters of each inverter independently (working mode, three-phase parallel function and set A/B/C phase sequence).

WARNING: When working in parallel, the working mode of each inverter must be the same working mode, output frequency.

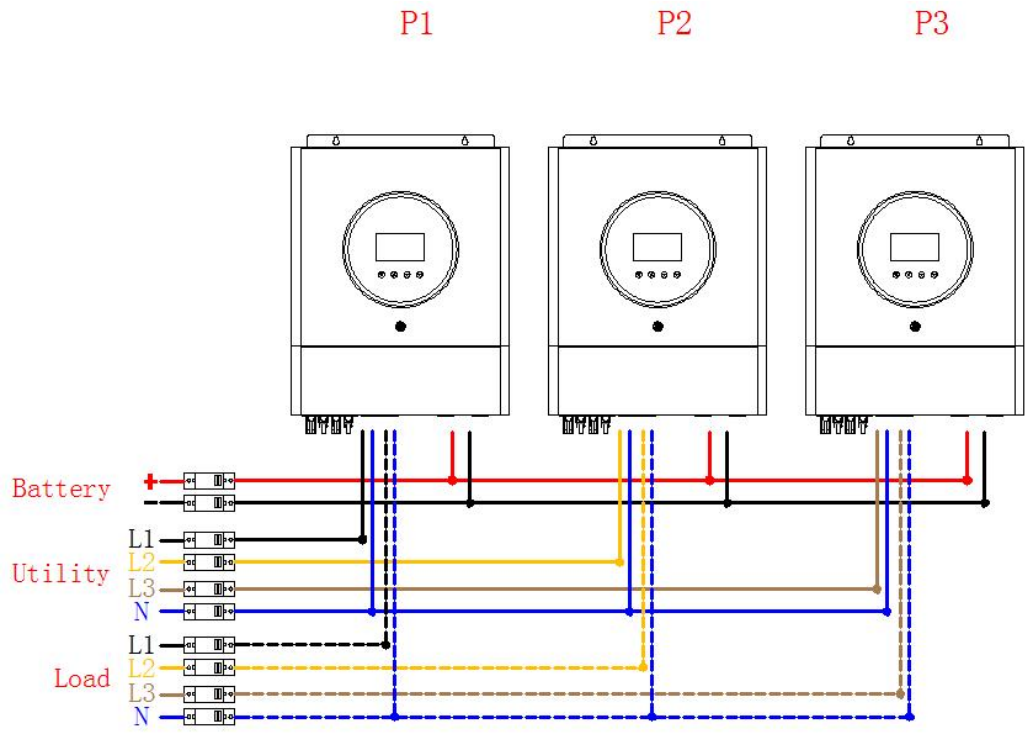
6. After setting the parameters, turn on each inverter in turn.
7. **WARNING:** When running in parallel, all inverters must share the battery pack.
8. **WARNING:**Do not connect the current sharing cable between the inverters which are in different phase. Otherwise ,it may damage inverters .

6.5 Three-phase Parallel Operation Cable Connection

1. One inverters in each phase:

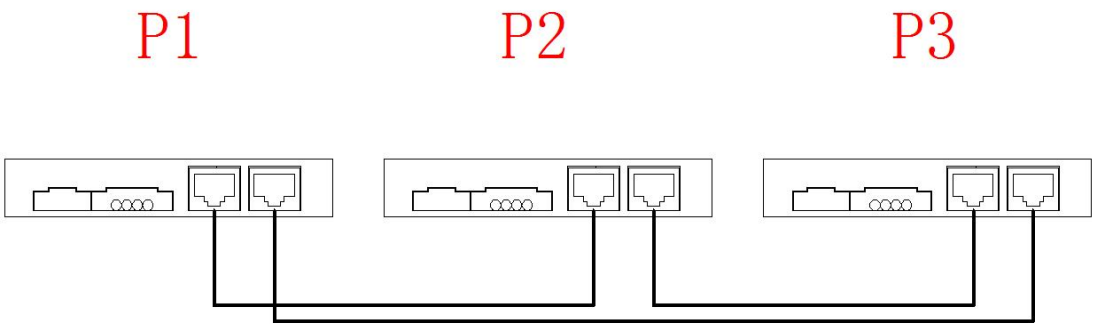
Power Connection:

NOTE: The following picture only for your reference. It is subject to actual goods to be received.

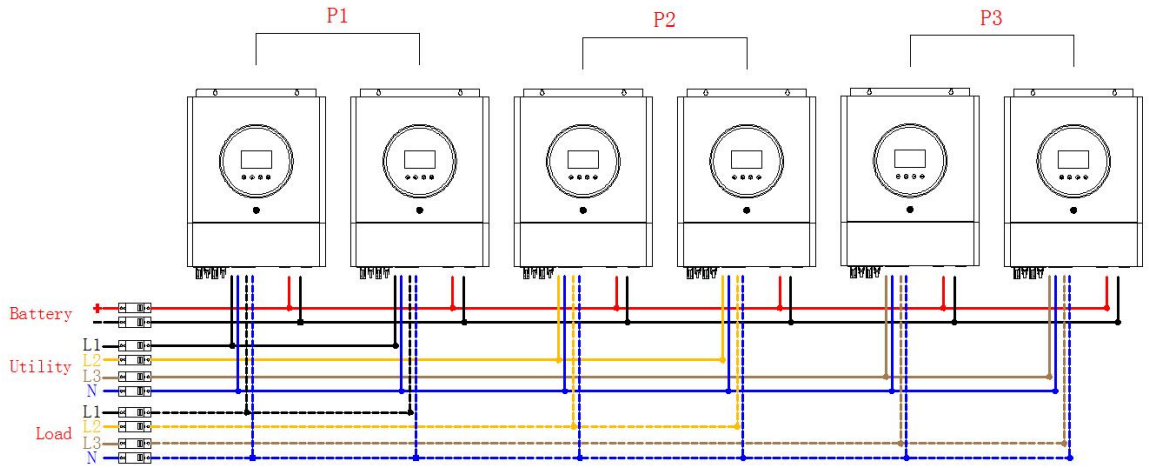


NOTE:P1: A-phase, P2: B-phase, P3: C-phase.

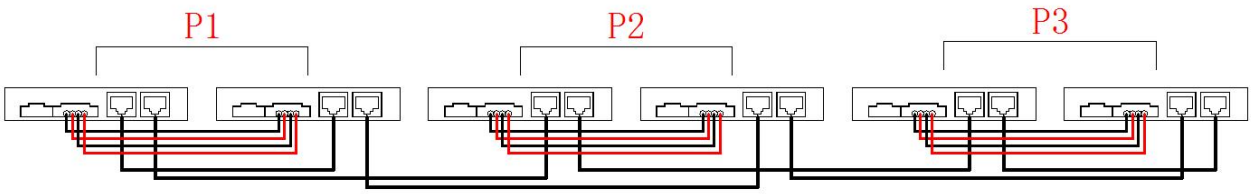
Communication Connection



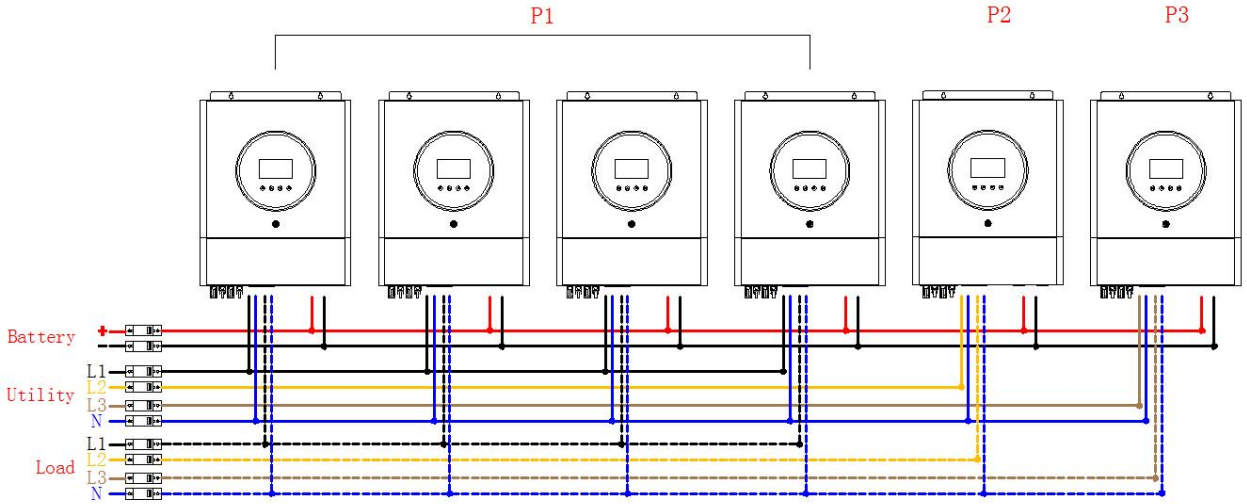
2. Two inverters in each phase:
Power Connection:
NOTE: The following picture only for your reference. It is subject to actual goods to be received.



NOTE:P1: A-phase, P2: B-phase, P3: C-phase.
Communication Connection

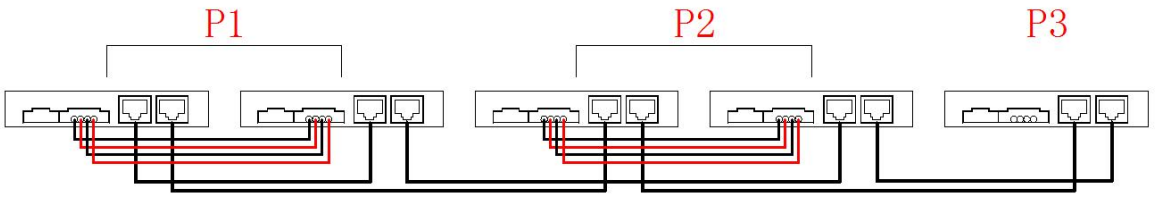


3. Four inverters in one phase and one inverter for the other two phases:
Power Connection:
NOTE: The following picture only for your reference. It is subject to actual goods to be received.

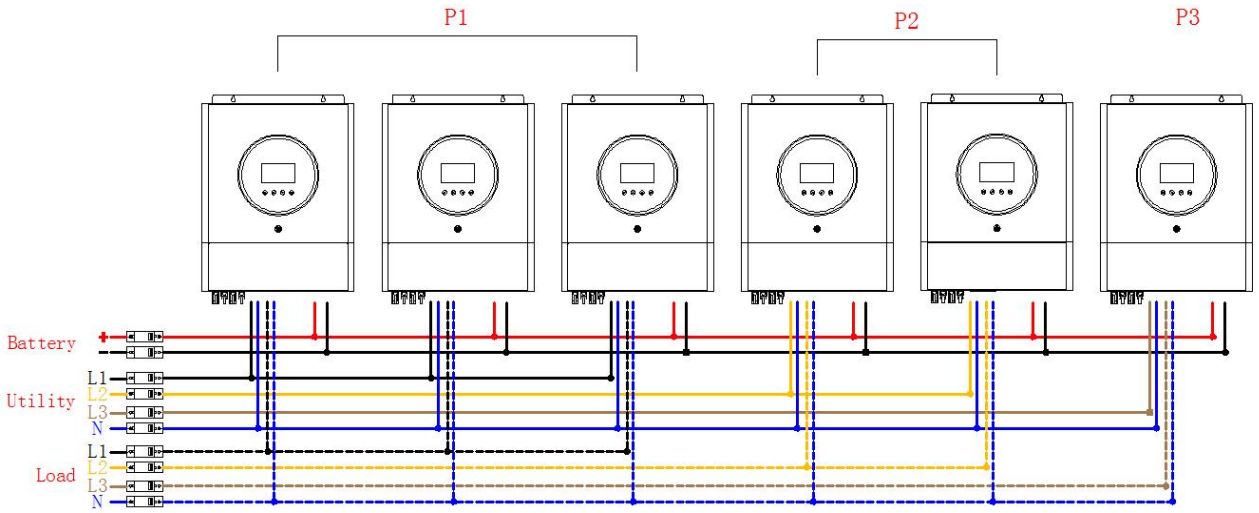


NOTE:P1: A-phase, P2: B-phase, P3: C-phase.

Communication Connection

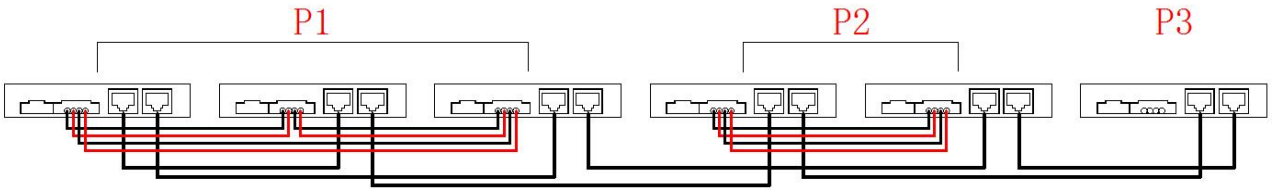


4.Three inverters in one phase, two inverters in second phase and one inverter for the third phase:
Power Connection:
NOTE: The following picture only for your reference. It is subject to actual goods to be received.

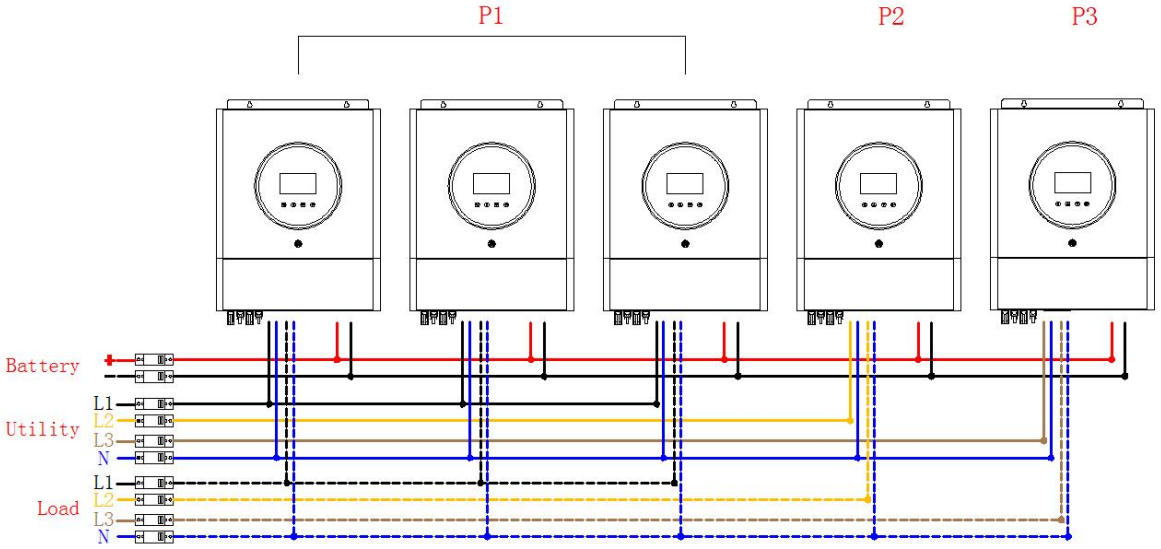


NOTE:P1: A-phase, P2: B-phase, P3: C-phase.

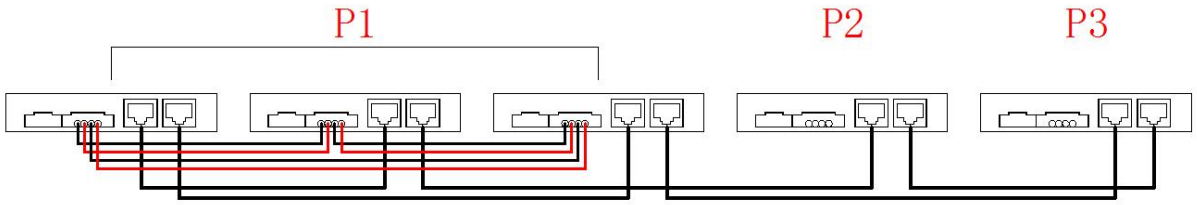
Communication Connection



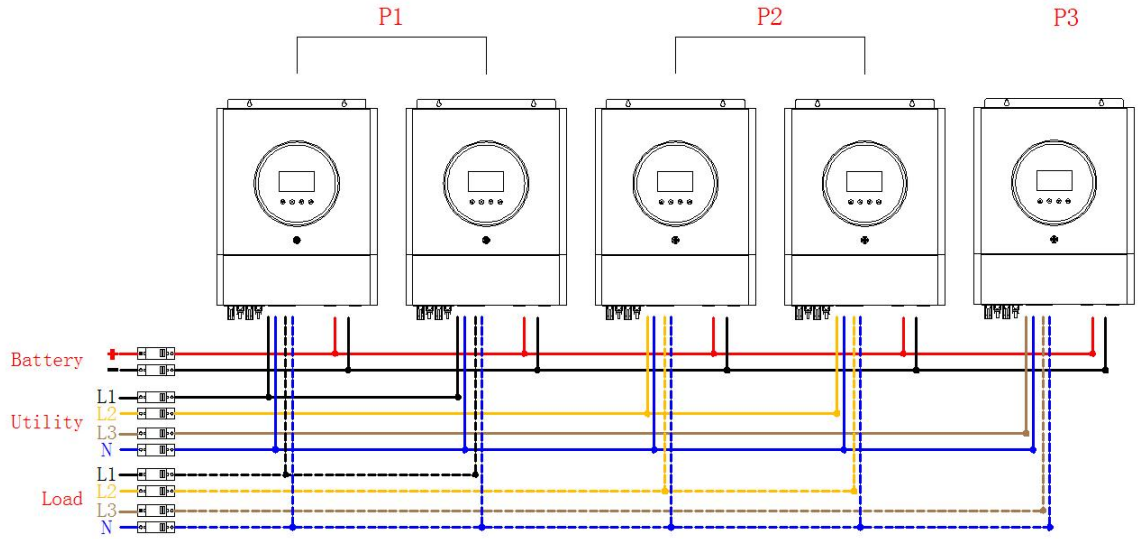
5. Three inverters in one phase and only one inverter for the remaining two phases:
Power Connection:
NOTE: The following picture only for your reference. It is subject to actual goods to be received.



NOTE:P1: A-phase, P2: B-phase, P3: C-phase.
Communication Connection

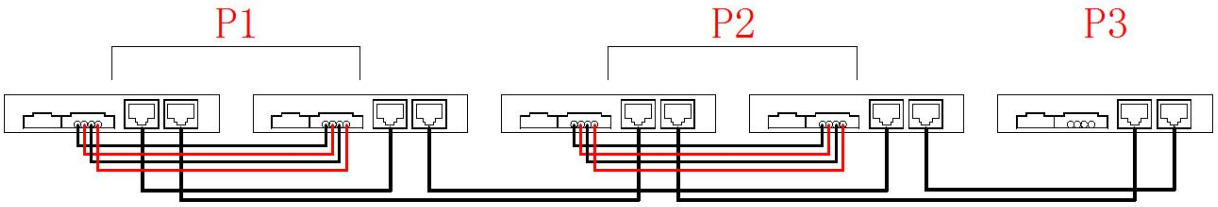


6.Two inverters in two phases and only one inverter for the remaining phase:
Power Connection:
NOTE: The following picture only for your reference. It is subject to actual goods to be received.

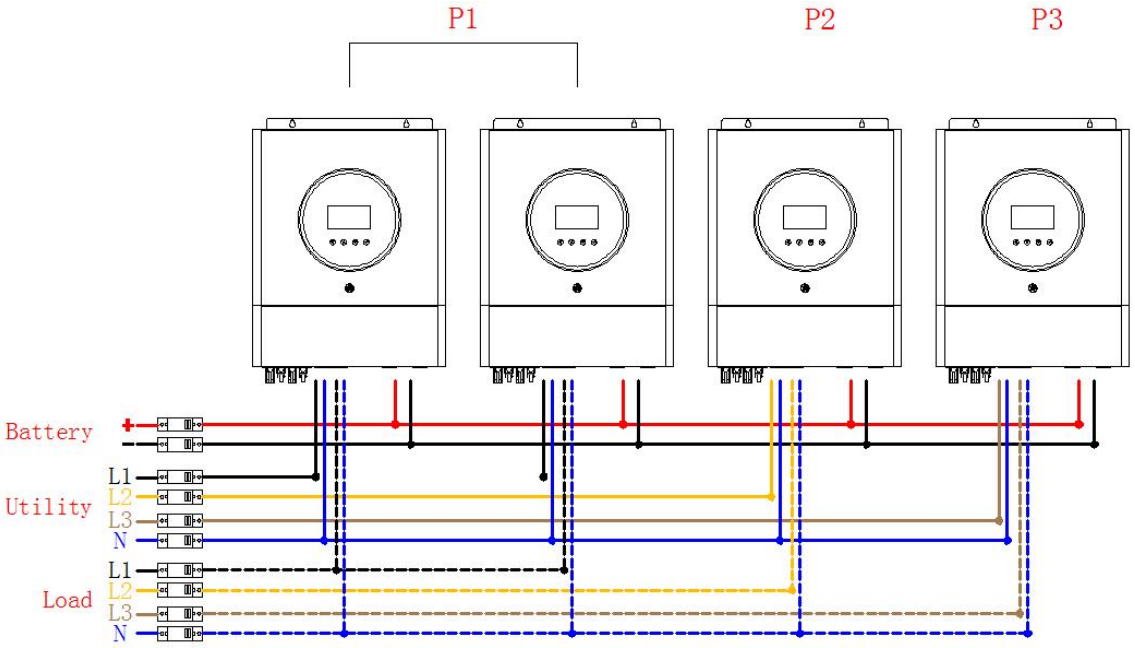


NOTE:P1: A-phase, P2: B-phase, P3: C-phase.

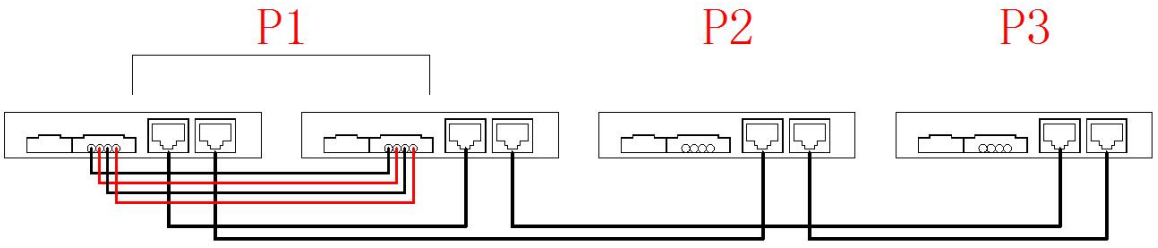
Communication Connection



7.Two inverters in one phase and only one inverter for the remaining phases:
Power Connection:
NOTE: The following picture only for your reference. It is subject to actual goods to be received.



NOTE:P1: A-phase, P2: B-phase, P3: C-phase.
Communication Connection



7. Faults Code

Fault Code	Fault Event
01	Fan is locked
02	Over temperature
03	Battery voltage is too high
04	Battery voltage is too low
05	Output short circuited.
06	Output voltage is too high.
07	Overload time out
08	Bus voltage is too high
09	Bus soft start failed
24	PV over temperature
52	Bus voltage is too low
53	Inverter soft start failed
55	Over DC voltage in AC output
57	Current sensor failed
58	Output voltage is too low

8. Warning Code

Warning Code	Warning Event
01	Fan is locked
02	Over temperature
03	Battery is over-charged
04	Low battery
07	Overload
10	Output power derating
08	Discharge over current
15	PV energy is low
16	High AC input (>280VAC) during BUS soft start
21	PV low voltage
22	PV over voltage

9. Parallel Faults Code

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

10. Trouble Shooting

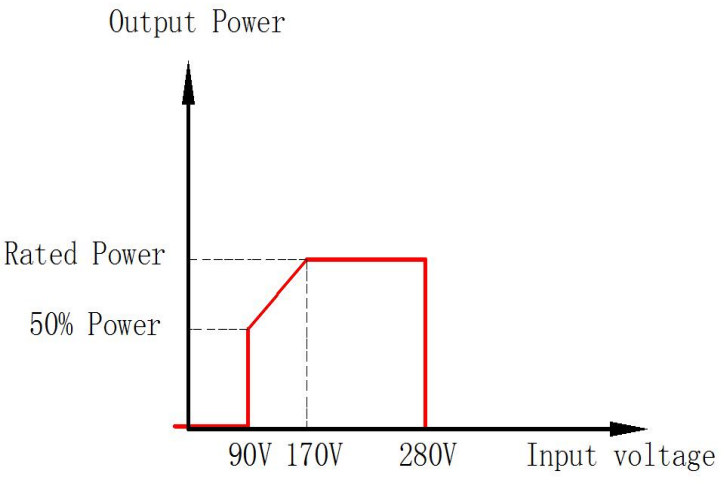
Problem	LCD/LED/Buzzer	Possible cause	What to do
Unit shuts down automatically during start up process	LCD/LED and buzzer will be active then complete off	The battery voltage is too low	1.Re-charge battery. 2. Replace battery
No response after power on	No indication	1.The battery voltage is too low. 2. Internal fuse tripped	1.Contact repair center for replacing the fuse. 2. Re-charge battery. 3. Replace battery.
Mains exist but the unit works in battery mode	Input voltage is displayed as '0' on the LCD and green LED is flashing	Input protector is triggered	Check if AC breaker is turned on and AC wiring is connected well.
	LED is flashing	Insufficient quality of AC power(grid or generator)	1. Check if AC wires are too thin and/or too long. 2. Check if generator (if applied) is working well or if input voltage range setting is correct.
When the unit is turned on, internal relay is switched on and off repeatedly	LCD display and LED flashing	Set "Solar First" as the priority of output source.	Change output source priority to utility first.
Buzzer beeps continuously and red LED is on	Fault code 01	Fan fault	Replace the fan
	Fault code 02	Internal temperature of inverter component is over 85°C	Check whether the environment around the equipment well ventilated
	Fault code 03	The battery voltage is too high	Check if spec and quantity of batteries are meet requirements
		battery is over charged	Return to repair center
	Fault code 04	The battery voltage is too low	1.The battery is dead, please charge the battery immediately 2.Check the battery for damage
	Fault code 05	Output short circuited	1.Check that the output cable is connected 2.Return to the maintenance center
	Fault code 06/58	Output abnormal (Inverter voltage range 180-260VAC)	Return to the maintenance center
	Fault code 07	Overload error , the inverter is overload 110% and overload time reaches the upper limit	Reduce load

Buzzer beeps continuously and red LED is on	Fault code 08/09/12/53/57	Internal fault of inverter	Return to the maintenance center
	Fault code 10	Over current or surge	Remove abnormal load or check PV input
	Fault code 11	The configuration of the solar panel is higher than the PV input voltage required by the inverter	Remove the excess solar panels
	Fault code 13	Battery discharge over current	Please check whether the discharge current of Item 40 is lower than the discharge current of the inverter
	Fault code 52/55	Internal fault of inverter	Return to the maintenance center
	Fault code 60	Power feedback protection	1.Restart the inverter. 2.Check if L/N cables are not connected reversely in all inverters. 3.For parallel system in single phase ,make sure the sharing are connected in all inverters. for supporting three-phase system, make sure the sharing cables are connected in the inverters in the same phase. and disconnected in the inverters in different phase.
	Fault code 71	Firmware version inconsistent	1.Update all inverter firmware to the same version 2.If the problem remains ,please contact your installer.
	Fault code 72	The output current of each inverter is different	1.check if sharing cables are connected well and restart the inverter. 2.if the problem remains ,please contact your installer.
	Fault code 73	AC output voltage setting is different	Check whether the output voltage of each inverter are set the same

Buzzer beeps continuously and red LED is on	Fault code 80	CAN data loss	1.Check if communication cables are connected well and restart the inverter 2. If the problem remains, please contact your installer.
	Fault code 81	Host data loss(only for three-phase parallel)	
	Fault code 82	Synchronization data loss	
	Fault code 83	The battery voltage of each inverter is not the same.	1.Make sure all inverters share same groups of batteries together. 2. Remove all loads and disconnect AC input and PV input. Then, check battery voltage of all inverters. If the values from all inverters are close, please check if all battery cables are the same length and same material type. Otherwise, please contact your installer to provide SOP to calibrate battery voltage of each inverter. 3.If the problem still remains, please contact your installer.
	Fault code 84	AC input voltage and frequency detected different	Check whether the input voltage and frequency of each inverter are set the same
	Fault code 85	AC output current unbalance	1.Restart the inverter 2.Remove some excessive loads and re-check load information from LCD of inverters. If the values are different, please check if AC input and output cables are in the same length and material type.
	Fault code 86	AC output mode setting is different.	1.Check whether it is set to parallel mode 2. Return to the maintenance center

11. Specifications

11.1 Line Mode Specifications

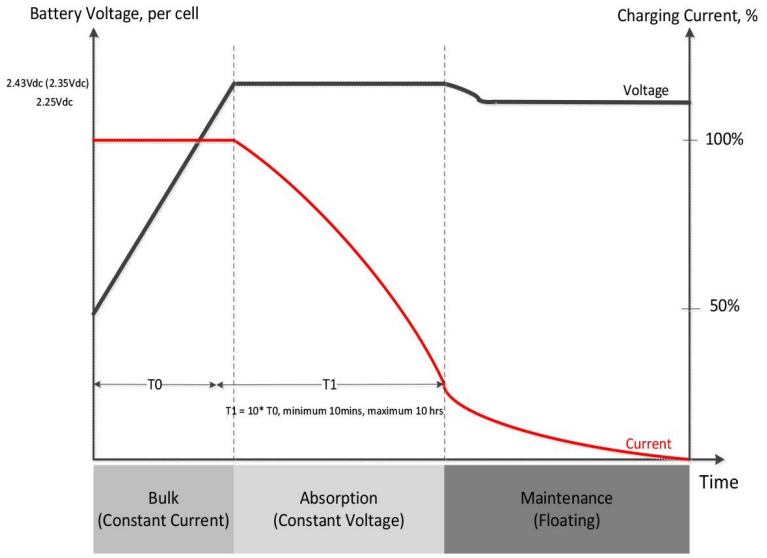
MODEL	11KW48Vdc
Input Voltage Waveform	Sinusoidal (utility or generator)
Nominal Input Voltage	230Vac
Low Loss Voltage	170Vac±7Vac (narrow range) 90Vac±7Vac (wide range)
Low Loss Return Voltage	180Vac±7Vac (narrow range) 100Vac±7Vac (wide range)
High Loss Voltage	280Vac±7Vac
High Loss Return Voltage	270Vac±7Vac
Max AC Input Voltage	300Vac
Max AC Input Current	70A
Nominal Input Frequency	50Hz / 60Hz (Auto detection)
Low Loss Frequency	40±1Hz
Low Loss Return Frequency	42±1Hz
High Loss Frequency	65±1Hz
High Loss Return Frequency	63±1Hz
Output Short Circuit Protection	Line mode: Circuit Breaker (70A) Battery mode: Electronic Circuits
Efficiency (Line Mode)	>95% (Rated R load, battery full charged)
Transfer Time	10ms typical (narrow range) 20ms typical (wide range)
Output power de-rating: When AC input voltage under 170V the output power will be de-rated.	

11.2 Inverter Mode Specifications

MODEL	11KW48Vdc
Rated Output Power	1100W
Output Voltage Waveform	Pure Sine Wave
Output Voltage Regulation	230Vac±5%
Output Frequency	60Hz or 50Hz
Max. peak Efficiency	93%
Overload Protection	5s@≥150% load; 10s@110%~150% load
Surge Capacity	2* rated power for 5 seconds
Low DC Cut-off Voltage	42Vdc
Nominal DC Input Voltage	48Vdc
Cold Start Voltage	46.0Vdc
Low DC Warning Voltage @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	 44.0Vdc 42.8Vdc 40.4Vdc
Low DC Warning Return Voltage @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	 48.0Vdc 44.8Vdc 42.4Vdc
Low DC Cut-off Voltage @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	 44.0Vdc 40.8Vdc 38.4Vdc
High DC Recovery Voltage	61Vdc
High DC Cut-off Voltage	63Vdc
Communication	RS232 or RS485 or CAN ,WIFI(option) and Bluetooth(option)

Note:1. RS232,RS485,CAN communication share the same port ,so it can't be used at the same time.
2. WIFI needs to be equipped with a data logger before it can be used.
3. Bluetooth function needs to be configured with Bluetooth module before it can be used.

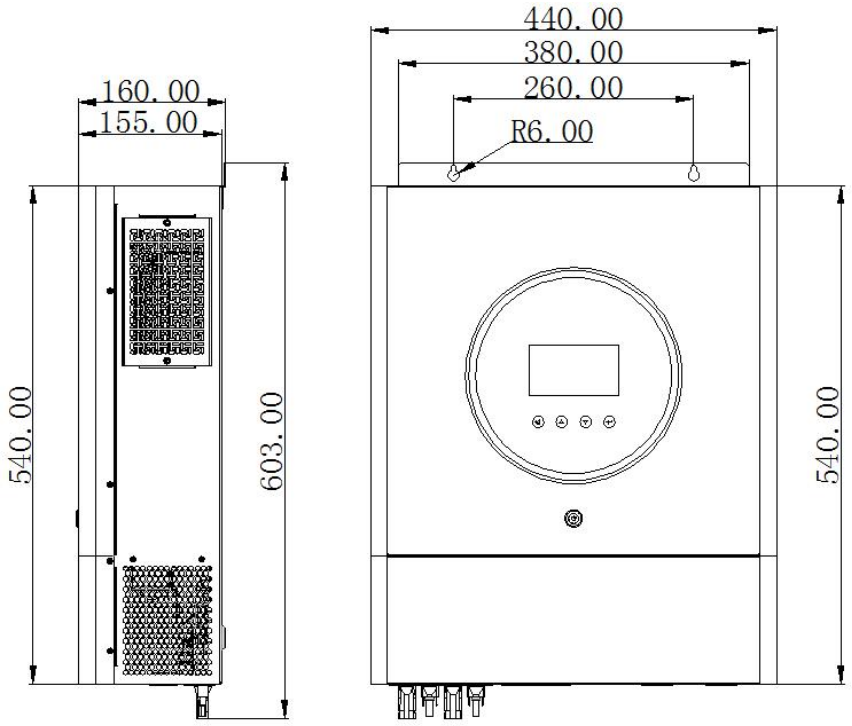
11.3 Charge Mode Specifications

Utility Charging Mode		
MODEL		11KW48Vdc
Charging Current @ Nominal Input Voltage		150A
Bulk charging Voltage	Flooded Battery	58.4Vdc
	AGM / Gel Battery	56.4Vdc
Floating Charging Voltage		54.0Vdc
Overcharge Protection		63.0Vdc
Charging Algorithm		3-Step
Charging Curve		
Solar Input		
MODEL		11KW
Max. PV Array Power		5500W*2
Max. PV Array Open Circuit Voltage		500Vdc
Nominal PV Voltage		340Vdc
PV Array MPPT Voltage Range		60Vdc~450Vdc
Max. Input Current		（One way）27A or （Dual channel）20A*2

11.4 General Specifications

MODEL	11KW48Vdc
Safety Certification	CE
Operating Temperature Range	-10°C to 50°C
Storage temperature	-15°C~ 60°C
Humidity	5% to 95% Relative Humidity (Non-condensing)
Dimension (L*W*H), mm	540*440*155
Net Weight, kg	18.5

12. Installation Dimension Drawing

(unit:mm)

NOTE: The following picture is only a schematic diagram of the equipment. If the actual machine structure does not conform to this drawing due to structural upgrades, it may not be notified in time.