

User Manual

SOLAR INVERTER 5KW



wifi

APP



SmartESS(ios)



SmartESS(Android)

Table Of Contents

ABOUT THIS MANUAL	1
Purpose.....	1
Scope.....	1
SAFETY INSTRUCTIONS	1
INTRODUCTION	2
Features.....	2
Basic System Architecture.....	2
Product Overview.....	3
INSTALLATION	4
Unpacking and Inspection.....	4
Preparation.....	4
Mounting the Unit.....	4
Battery Connection.....	5
AC Input/Output Connection.....	7
PV Connection.....	8
Final Assembly.....	10
Communication Options.....	10
Dry Contact Signal.....	10
WiFi Connection.....	11
OPERATION	12
Power ON/OFF.....	12
Operation and Display Panel.....	12
LCD Display Icons.....	13
LCD Setting.....	15
Fault Reference Code.....	22
Warning Indicator.....	23
Operating State Description.....	24
Display Setting.....	25
SPECIFICATIONS	25
Table 1 Line Mode Specifications.....	25
Table 2 Inverter Mode Specifications.....	26
Table 3 Charge Mode Specifications.....	27
Table 4 General Specifications.....	28
TROUBLE SHOOTING	29
Appendix 1: Approximate Back-up Time Table	30
Appendix 2: Paralle function	31

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.

The following cases are not within the scope of warranty

1. Out of warranty.
2. Series number was changed or lost.
3. Battery capacity was declined or external damaged.
4. Inverter was damaged caused of transport shift, remissness, ect external factor
5. Inverter was damaged caused of irresistible natural disasters.
6. Not in accordance with the electrical power supply conditions or operate environment caused damage.

SAFETY INSTRUCTIONS



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

1. Before using the unit, read all instructions and cautionary markings on the unit the batteries and all appropriate sections of this manual.
2. CAUTION --To reduce risk of injury, charge only deep-cycle lead acid type rechargeable batteries. Other types of batteries may burst, causing personal injury and damage.
3. Do not disassemble the unit. Take it to a qualified service center when service or repair is required. Incorrect re-assembly may result in a risk of electric shock or fire.
4. To reduce risk of electric shock, disconnect all wirings before attempting any maintenance or cleaning. Turning off the unit will not reduce this risk.
5. CAUTION --Only qualified personnel can install this device with battery.
6. NEVER charge a frozen battery.
7. For optimum operation of this inverter/charger, please follow required spec to select appropriate cable size. It's very important to correctly operate this inverter/charger.
8. Be very cautious when working with metal tools on or around batteries. A potential risk exists to drop a tool to spark or short circuit batteries or other electrical parts and could cause an explosion.
9. Please strictly follow installation procedure when you want to disconnect AC or DC terminals. Please refer to INSTALLATION section of this manual for the details.
10. Fuses (1 piece of 150A, 63VDC for 2KW~ 5.5KW) 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.

INTRODUCTION

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

Features

- Pure sine wave inverter
- Configurable input voltage range for home appliances and personal computers via LCD setting
- Configurable battery charging current based on applications via LCD setting
- Configurable AC/Solar Charger priority via LCD setting
- Compatible to mains voltage or generator power
- Auto restart while AC is recovering
- Overload/ Over temperature/ short circuit protection
- Smart battery charger design for optimized battery performance
- Cold start function

Basic System Architecture

The following illustration shows basic application for this inverter/charger. It also includes following devices to have a complete running system:

- Generator or Utility.
- PV modules (option)

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

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

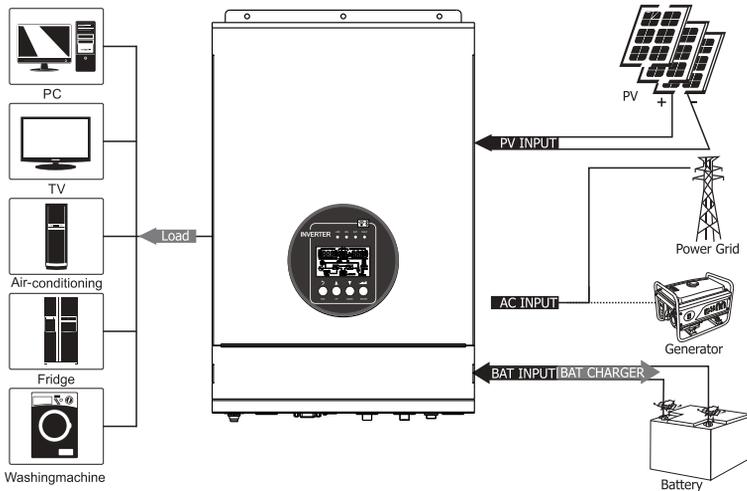
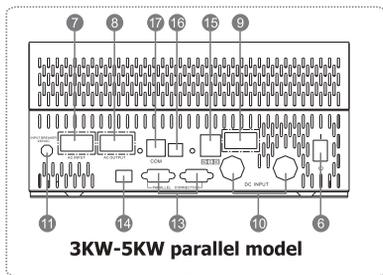
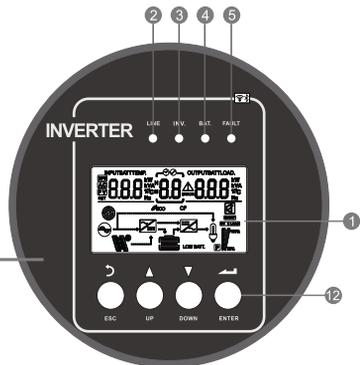
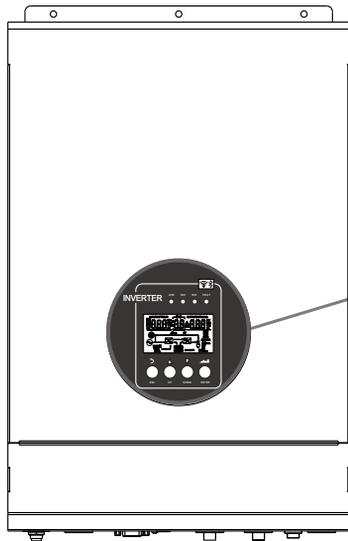
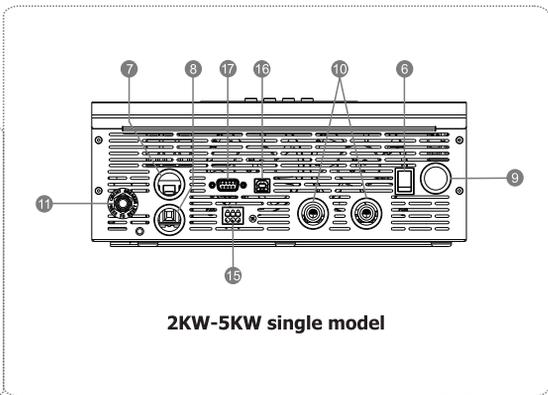


Figure 1 Hybrid Power System

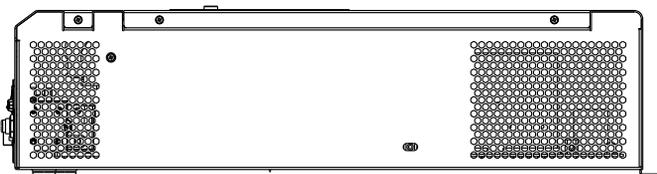
Product Overview



3KW-5KW parallel model



2KW-5KW single model



2KW-5KW parallel model

- | | | | |
|---|------------------------|---------------------|----------------------|
| 1. LCD display | 2. Line indicator | 3. INV indicator | 4. Battery indicator |
| 5. Fault indicator | 6. Power on/off switch | 7. AC input | 8. AC output |
| 9. PV input | 10. Battery input | 11. Circuit breaker | 12. Function buttons |
| 13. Parallel communication port (only for parallel model) | | | |
| 14. Parallel switch | 15. Dry contact | 16. USB | 17. RS232-port |

INSTALLATION

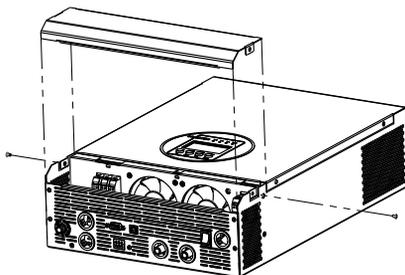
Unpacking and Inspection

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

- The unit x 1
- User manual x 1
- USB cable x 1 (Optional)
- Software CD x 1 (Optional)

Preparation

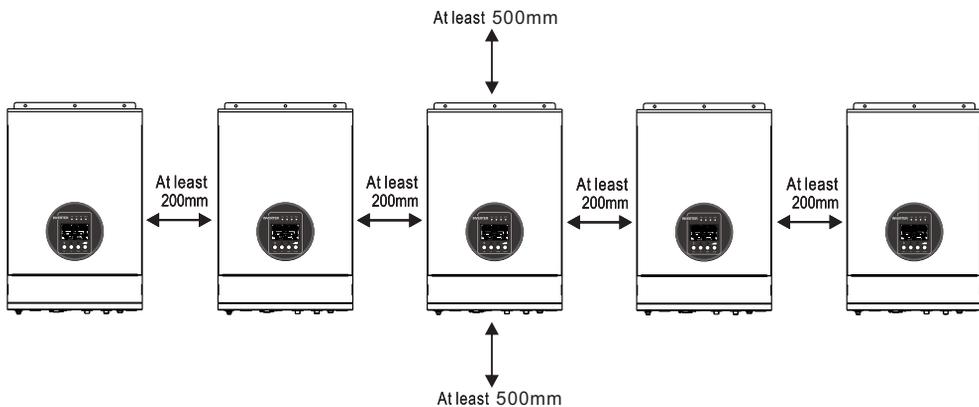
Before connecting all wirings, please take off bottom cover by removing two screws as shown below.



Mounting the Unit

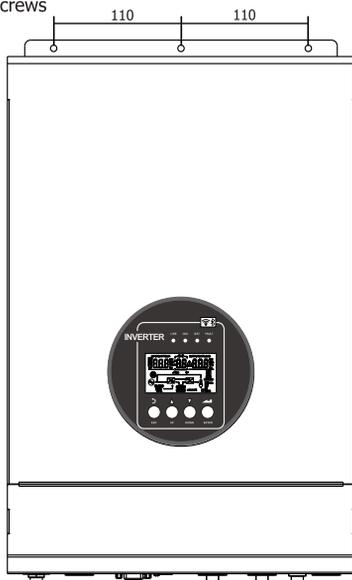
Consider the following points before selecting where to install:

- Do not mount the inverter on flammable construction materials.
- Mount on a solid surface.
- Install this inverter at eye level in order to allow the LCD display to be read at all times.
- For proper air circulation to dissipate heat, allow a clearance of approx. 200 mm to the side and approx. 300 mm above and below the unit.
- 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 diagram to guarantee sufficient heat dissipation and to have enough space for removing wires



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

Install the unit by screwing three screws



Battery Connection

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

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

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

Ring terminal:

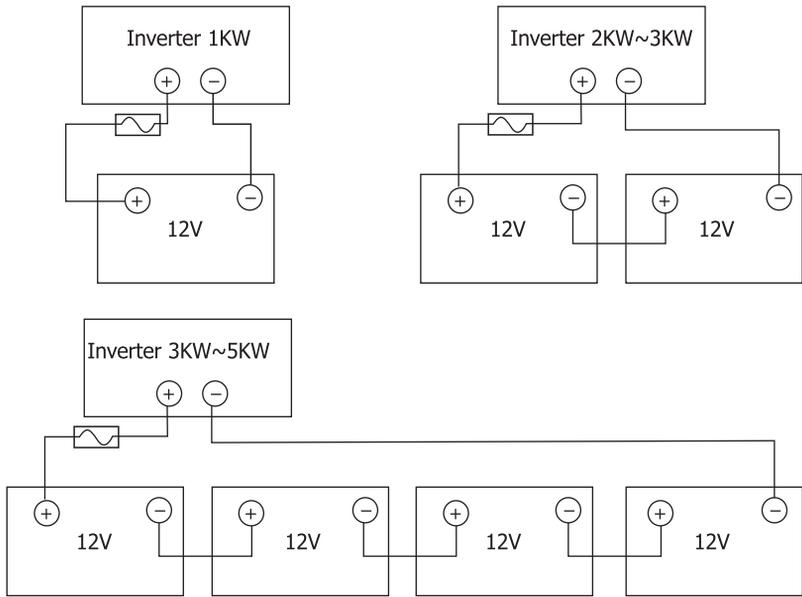


Recommended battery cable and terminal size:

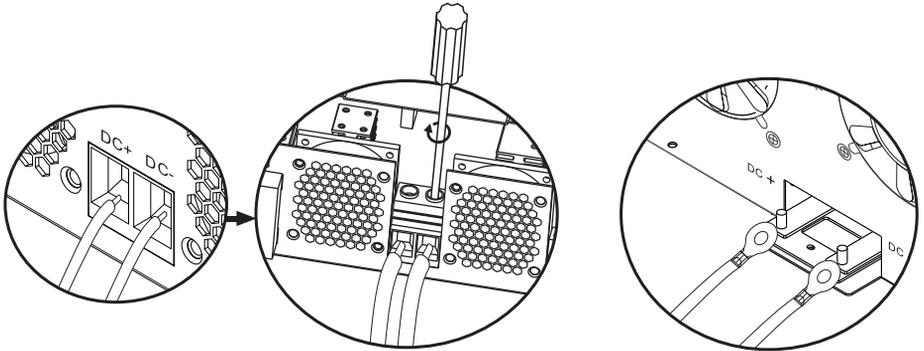
Model	Typical Amperage	Wire Size	Cable mm ²	Ring Terminal		Torque Value
				Dimensions		
				D (mm)	L (mm)	
1KW DC12V	35A	1*10AWG	6	N/A		2 Nm
2KW DC24V	35A	1*10AWG	6			
3KW DC24V	118A	1*2AWG	38	8.4	39.2	5 Nm
3KW DC48V	71A	1*6AWG	14	8.4	39.2	
5KW DC48V	118A	1*2AWG	38	8.4	39.2	

Please follow below steps to implement battery connection:

1. Assemble battery ring terminal based on recommended battery cable and terminal size.
2. Connect all battery packs as units requires. It's suggested to connect at least 200Ah capacity battery for 3KW~5KW model.; at least 100Ah capacity battery for 1KW~3KW.



3. Insert the ring terminal of battery cable flatly into battery connector of inverter and make sure the bolts are tightened with torque of 2-3 Nm. Make sure polarity at both the battery and the inverter/charge is correctly connected and ring terminals are tightly screwed to the battery terminals.



WARNING: Shock Hazard

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



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

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

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

AC Input/Output Connection

CAUTION!! Before connecting to AC input power source, please install a separate AC breaker between inverter and AC input power source. This will ensure the inverter can be securely disconnected during maintenance and fully protected from over current of AC input. The recommended spec of AC breaker is 10A for 1KW,20A for 2KW,32A for 3KW and 50A for 5KW.

CAUTION!! There are two terminal blocks with "IN" and "OUT" markings. Please do NOT-misconnect 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
1KW DC12V	16 AWG	0.8~ 1.0Nm
2KW DC24V	14 AWG	1.2~ 1.6Nm
3KW DC24V	12 AWG	1.2~ 1.6Nm
3KW DC48V	12 AWG	1.4~ 1.6Nm
5KW DC48V	10 AWG	1.4~ 1.6Nm

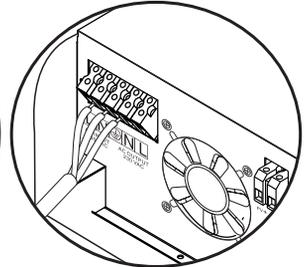
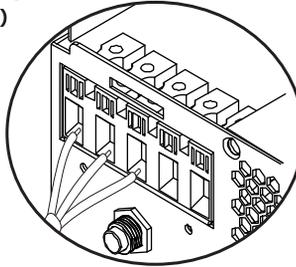
Please follow below steps to implement AC input/output connection:

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

⊕ → **Ground (yellow-green)**

L → **LINE (brown or black)**

N → **Neutral (blue)**



WARNING:

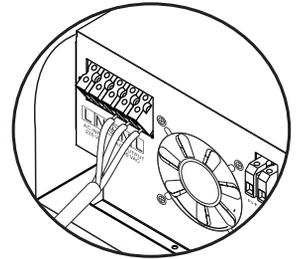
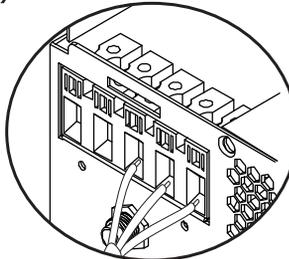
Be sure to that AC power source is disconnected before attempting to hardwire it to the unit.

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

⊕ → **Ground (yellow-green)**

L → **LINE (brown or black)**

N → **Neutral (blue)**



5. Make sure the wires are securely connected.

CAUTION: Important

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

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

PV Connection

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

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

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

Model	Typical Amperage	Cable Size	Torque
1KW~2KW	40A	12AWG	1.4~1.6 Nm
3KW~5KW	60A/80A	8AWG	2.0~2.4 Nm

PV Module Selection:

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

1. Open circuit Voltage (Voc) of PV modules not exceeds max. PV array open circuit voltage of inverter.
2. Open circuit Voltage (Voc) of PV modules should be higher than min. battery voltage.
3. Max. Power Voltage (Vmpp) of PV modules should be close to best Vmp of inverter or within Vmp range to get best performance. If one PV module can not meet this requirement, it's necessary to have several PV modules in series connection. Refer to below table.

Note:* Vmp: panel max power point voltage.

The PV charging efficiency is maximized while PV system voltage is close to Best Vmp.

Maximum PV module numbers in Series: Vmpp of PV module*X pcs = Best Vmp of Inverter or Vmp range

PV module numbers in Parallel: Max. charging current of inverter/Imp

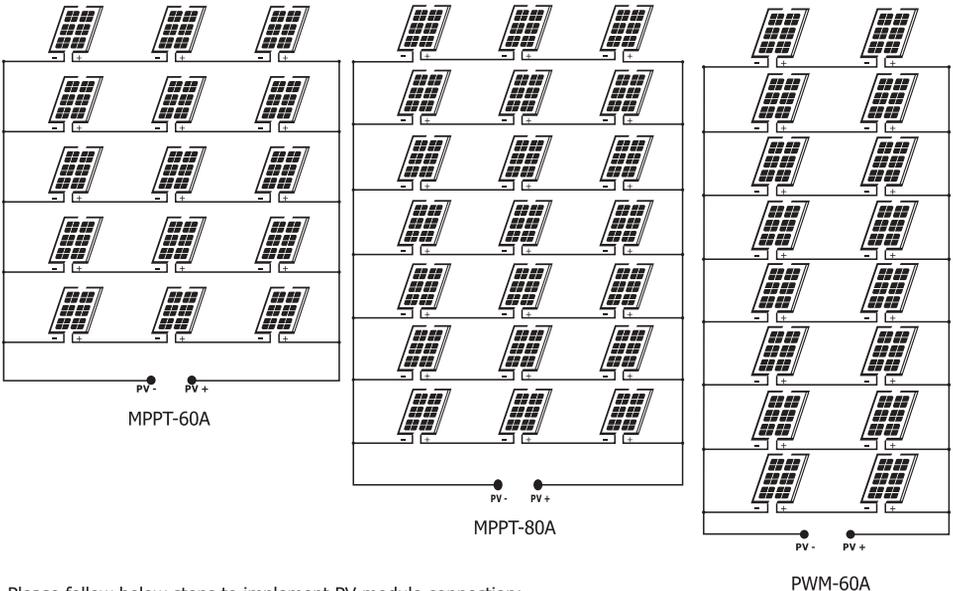
Total PV module numbers=maximum PV module numbers in series*PV module numbers in parallel

Solar Charging Mode			
INVERTER MODEL	1KW DC12V	2KW~3KW DC24V	3KW~5KW DC48V
Rated Power	1000W	2000W 3000W	3000W 5000W
MPPT charger			
solar charging current	40A	40A 60A	60A 80A
Max. PV Array Open Circuit Voltage	145Vdc		450Vdc
PV Array MPPT Voltage Range	17~80Vdc	30~80Vdc	30~115Vdc
Min. battery voltage for PV charge	17Vdc	30Vdc	
AC INPUT charger			
AC charging current	40A	60A	60A 80A
AC Voltage Range	90~280Vac		
Max AC Input Voltage	300Vac		

Recommended PV module configuration

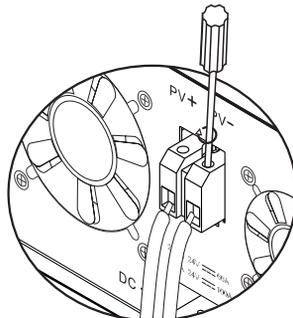
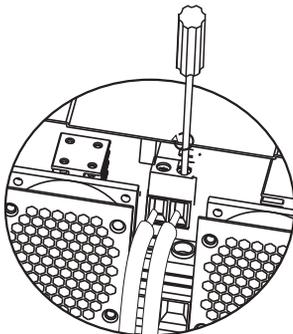
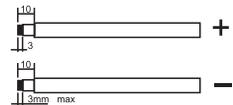
Maximum Power (PmaxI)	250W	Max. PV module numbers in series 2~30.9 x 2 =56~72
Max. Power Voltage Vmpp(V)	30.9V	
Max. Power Current Impp(A)	8.42A	PV module numbers in parallel 8~ 60 A/8.42 Total PV module numbers 2x8=16
Open Circuit Voltage Voc(V)	37.7V	
Short Circuit Current Isc(A)	8.89A	

Solar panel installation schematic



Please follow below steps to implement PV module connection:

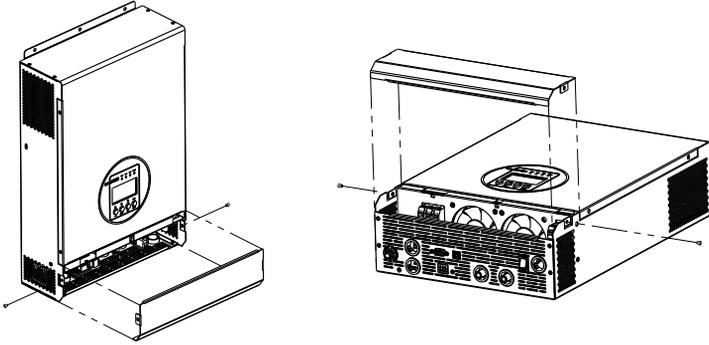
1. Remove insulation sleeve 10 mm for positive and negative conductors
2. Check correct polarity of connection cable from PV modules and PV input connectors. Then, connect positive pole (+) of connection cable to positive pole (+) of PV input connector. Connect negative pole (-) of connection cable to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



3. Make sure the wires are securely connected.

Final Assembly

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



Communication Connection

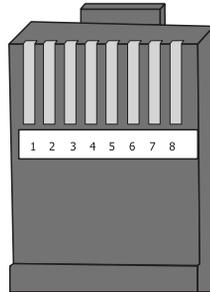
Please use supplied communication cable to connect to inverter and PC. Insert bundled CD into a computer and follow on-screen instruction to install the monitoring software. For the detailed software operation, please check user manual of software inside of CD.

WARNING: It's forbidden to use network cable as the communication cable to directly communicate with the PC port. Otherwise, the internal components of the controller will be damaged.

WARNING: RJ45 interface is only suitable for the use of the company's supporting products or professional operation.

Below chart show RJ45 Pins definition

Pin	Define
1	RS-485-B
2	RS-485-A
3	GND
4	
5	CANL
6	CANH
7	
8	



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.

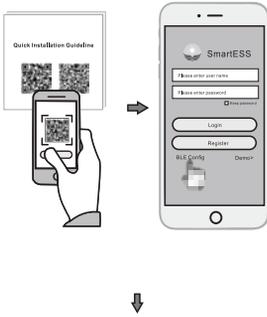
Unit status	Condition	Dry contact port: 		
		NC&C	NO&C	
Power Off	Unit is off and no output is powered. output is powered from Utility	Close	Open	
		Close	Open	
Power On	Output is powered from Battery or Solar.	Program 01 set as utility Battery voltage<Low DC warning voltage	Open	Close
		Battery voltage>Setting value in Program 21 or battery charging reaches floating stage	Close	Open
	Program 01 is set as SBU SUB, solar first	Battery voltage<Setting value in Program 20	Open	Close
		Battery voltage>Setting value in Program 21 or battery charging reaches floating stage	Close	Open

WiFi Connection

1. Wireless Router Connection

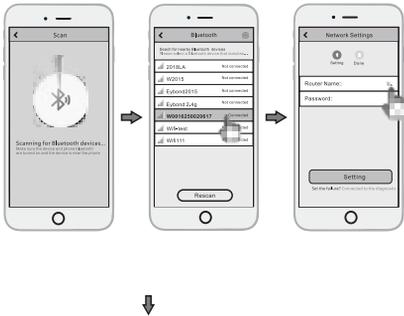
1.1 Download APP and wifi connection

- ① Scan the QR Code from the cover of this guideline and download the APP.
- ② Open the APP and select "BLE Config" on the login interface.



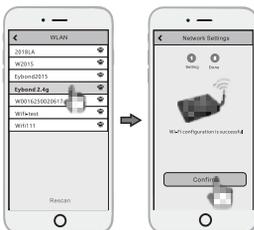
1.2 wifi Config

- ① Wait for the APP to scan for nearby bluetooth devices, and select the bluetooth device with the same PN number as the WFBLE-RTU.Kit for pairing and connection.
- ② After the connection is successful, go to "Network Settings".



1.3 Network Setting

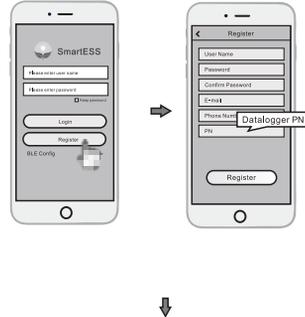
- ① On the "Network Settings" page, select a Wi-Fi router and password that can access the Internet, and click "Settings" to complete the network settings.
- ② After the datalogger is restarted successfully, and shows that "the Wi-Fi configuration is successful", click the confirm button.



2. Create Account And Datalogger

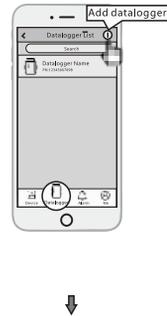
2.1 Create Account

- ① Open the APP, tap the **Register** button.
- ② According to the prompt information, complete creating an account.

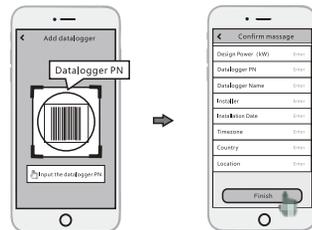


2.2 Add Datalogger

- ① Login the account and click the list button on the bottom of the home page.
- ② Tap the "+" button on the top-right corner of the list page.

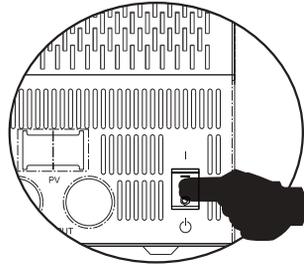
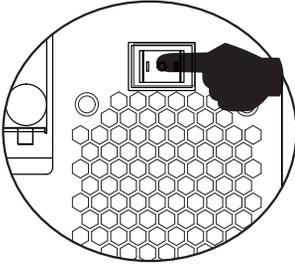


- ③ Scan the datalogger PN on the Wi-Fi Kit, or input it manually.
- ④ According to the prompts, type in the information to finish add datalogger.



OPERATION

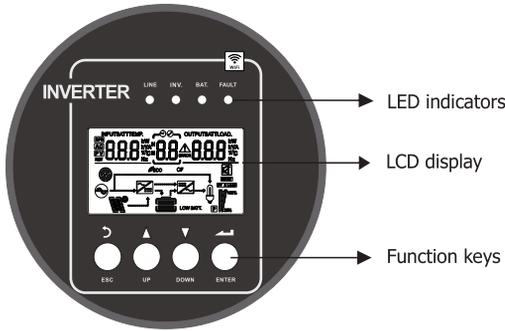
Power ON/OFF



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

Operation and Display Panel

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



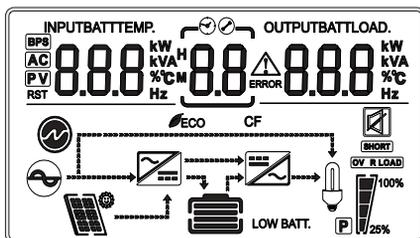
LED Indicator

LED Indicator		Messages	
LINE	Green	On	Line is normal and working Line mode.
		Flash	Line is normal, but Line mode is not working.
		Off	Line is abnormality.
INV.	Yellow	On	Battery mode working.
		Off	Other mode.
BAT.	Yellow	On	Battery is floatin charge.
		Flash	Battery is constant pressure charge.
		Off	Other mode.
FAULT	Red	On	Fault mode.
		Flash	Warning mode.
		Off	Other mode.

Function Keys

Function Keys	Description
ESC	Return to previous level.
UP	Increase the setting data.
DOWN	Decrease the setting data.
ENTER	Enter setting mode and Confirm the selection in setting mode go to next selection.

LCD Display Icons



Icon	Function description														
Input Source Information and Output Information															
	Indicates the AC information														
	Indicates the DC information														
	Indicate input voltage, input frequency, PV voltage, battery voltage and charger current. Indicate output voltage, output frequency, load in VA, load in Watt and 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.														
Battery Information															
	Indicates battery level by 0-24%, 25-49%, 50-74% and 75-100% in battery mode and charging status in line mode.														
In AC mode, it will present battery charging status.															
<table border="1"> <thead> <tr> <th>Status</th> <th>Battery voltage</th> <th>LCD Display</th> </tr> </thead> <tbody> <tr> <td rowspan="4">Constant Current mode/Constant Voltage mode</td> <td><2V/cell</td> <td>4 bars will flash in turns</td> </tr> <tr> <td>2v/cell~2.083v/cell</td> <td>Bottom bar will be on and the other three bars will flash in turns.</td> </tr> <tr> <td>2.083v/cell~2.167v/cell</td> <td>Bottom two bars will be on and the other two bars will flash in turns.</td> </tr> <tr> <td>>2.167V/cell</td> <td>Bottom three bars will be on and the top bar will flash.</td> </tr> <tr> <td colspan="2">Batteries are fully charged.</td> <td>4 bars will be on.</td> </tr> </tbody> </table>	Status	Battery voltage	LCD Display	Constant Current mode/Constant Voltage mode	<2V/cell	4 bars will flash in turns	2v/cell~2.083v/cell	Bottom bar will be on and the other three bars will flash in turns.	2.083v/cell~2.167v/cell	Bottom two bars will be on and the other two bars will flash in turns.	>2.167V/cell	Bottom three bars will be on and the top bar will flash.	Batteries are fully charged.		4 bars will be on.
Status	Battery voltage	LCD Display													
Constant Current mode/Constant Voltage mode	<2V/cell	4 bars will flash in turns													
	2v/cell~2.083v/cell	Bottom bar will be on and the other three bars will flash in turns.													
	2.083v/cell~2.167v/cell	Bottom two bars will be on and the other two bars will flash in turns.													
	>2.167V/cell	Bottom three bars will be on and the top bar will flash.													
Batteries are fully charged.		4 bars will be on.													

In battery mode, it will present battery capacity.				
Load Percentage	Battery Voltage		LCD Display	
Load > 50%	<1.717V/cell			
	1.717V/cell~1.8V/cell			
	1.8V/cell~1.883V/cell			
	>1.883 V/cell			
50%> Load> 20%	<1.817V/cell			
	1.817V/cell~1.9V/cell			
	1.9 V/cell ~1.983V/cell			
	>1.983 V/cell			
Load<20%	<1.867V/cell			
	1.867V/cell~1.95V/cell			
	1.95V/cell~2.033V/cell			
	>2.033 V/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%
				
Mode Operation Information				
	Indicates unit connects to the mains.			
	Indicates unit connects to the PV panel.			
BYPASS	Indicates load is supplied by utility power.			
	Indicates the solar charger circuit is working.			
	Indicates the DC/AC inverter circuit is working.			
Mute Operation				
	Indicates unit alarm is disabled.			

LCD Setting

After pressing and holding "ENTER" button for 2 seconds, the unit will enter setting mode.

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

Setting Programs:

Program	Description	Selectable option	
01	Output voltage NOTE: When the output voltage is set to 208V, the output needs to be derated to 90%.	208V OPU 01 208 ^v	220V OPU 01 220 ^v
		230V (default) OPU 01 230 ^v	240V OPU 01 240 ^v
02	Output frequency	50Hz (default) OPF 02 50 ^{Hz}	60Hz OPF 02 60 ^{Hz}
03	Output source priority : To configure load power source priority	(default) OPP 03 Utd	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.
		OPP 03 PU	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.
		OPP 03 Pbc	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 15.
04	AC input voltage range	(default) nOd 04 APP	If selected, acceptable AC input voltage range will be within 90-280VAC.
		nOd 04 UPS	If selected, acceptable AC input voltage range will be within 170-280VAC.

Program	Description	Selectable option	
05	Charger source priority: To configure charger source priority	(default) CHP 05 PNC	Solar energy and utility will charge battery at the same time.
		CHP 05 OPV	Solar energy will be the only charger source no matter utility is available or not.
		CHP 05 Ut-d	Utility will charge battery as first priority. Solar energy charge battery only when utility is not available.
		CHP 05 PV	Solar energy will charge battery as first priority. Utility will charge battery only when solar energy is not available.
06	Maximum utility charging current 1/2KVA:1-40A 3/5KVA:1-60A	ACC 06 60	Note: If setting value in program 07 is smaller than that in program in 06, the inverter will apply charging current from program 07 for utility charger.
07	Maximum charging current: To configure total charging current for solar and utility chargers.	ACC 07 120	Max. charging current = utility charging current + solar charging current. 1KW 12VDC/ 2KW 24VDC/ 3KW 24VDC: 2/10/20/30/40/50/60/70/80/90/100/110/120A can set. 3KW 48VDC/ 5KW 48VDC: 2/10/20/30/40/50/60/70/80A can set.
08	Auto return to default display screen	ON (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. ndF 08 0N	OFF : If selected, the display screen will stay at latest screen user finally switches. ndF 08 OFF
09	Auto restart when overload occurs	Restart disable LTS 09 OFF	Restart enable(default) LTS 09 0N
10	Auto restart when over temperature occurs	Restart disable LTS 10 OFF	Restart enable(default) LTS 10 0N
11	Beeeps while primary source is interrupted	Alarm on (default) nIP 11 0N	Alarm off nIP 11 OFF
12	Low power power saving	Power Saving OFF (default) PUS 12 OFF	Power Saving ON PUS 12 0N

Program	Description	Selectable option	
13	Overload bypass: When enabled, the unit will transfer to line mode if overload occurs in battery mode.	Bypass disable (default) 	Bypass enable
14	Buzzer mute setting	Buzzer on (default) 	Buzzer off
15	Low DC cut-off voltage: <ul style="list-style-type: none"> 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 and provide output power to loads. 	1KW 12VDC default setting : 11.5V Set Range : 11-13V 	2KW 24VDC/3KW 24VDC default setting : 23.0V Set Range : 22-26V
		3KW 48VDC/5KW 48VDC default setting : 46.0V Set Range : 44-52V 	When the battery definition mode is CUS (customer set type) mode: the setting point in program 17.
		1KW 12VDC default setting : 11.5V Set Range : 11-13V 	2KW 24VDC/3KW 24VDC default setting : 23.0V Set Range : 22-26V
		3KW 48VDC/5KW 48VDC default setting : 46.0V Set Range : 44-52V 	When the battery definition mode is AGM (lead-acid battery type), FLD (water injection battery type) mode:the setting point in program 17.
		1KW 12VDC default setting : 11.5V Set Range : 10-12.5V 	2KW 24VDC/3KW 24VDC default setting : 23.8V Set Range : 20-25V
		3KW 48VDC/5KW 48VDC default setting : 47.6V Set Range : 40-50V 	When the battery definition mode is LIB (lithium battery type) mode: the setting point in program 17.

Program	Description	Selectable option	
16	Setting voltage point back to battery mode when selecting "OPP" (OPP priority) in program 03.	1KW 12VDC default setting : 13V Set Range : 12-14.5V 	2KW 24VDC/3KW 24VDC default setting : 26.0V Set Range : 24-29V 
		3KW 48VDC/5KW 48VDC default setting : 54.0V Set Range : 48-58V 	When the battery definition mode is CUS (customer set type) mode: the setting point in program 17.
		1KW 12VDC default setting : 13V Set Range : 12-14.5V 	2KW 24VDC/3KW 24VDC default setting : 26.0V Set Range : 24-29V 
		3KW 48VDC/5KW 48VDC default setting : 52.0V Set Range : 48-58V 	When the battery definition mode is AGM (lead-acid battery type), FLD (water injection battery type) mode:the setting point in program 17.
		1KW 12VDC default setting : 13.6V Set Range : 11.5-14.5V 	2KW 24VDC/3KW 24VDC default setting : 27.2V Set Range : 23-29V 
		3KW 48VDC/5KW 48VDC default setting : 54.4V Set Range : 46-58V 	When the battery definition mode is LIB (lithium battery type) mode: the setting point in program 17.
17	Battery Type	Lead-acid batteries (default) : "AGM" 	Water-filled battery : "FLD" 
		Lithium battery : "LIB" 	Customer Setup Type : "CUS" 

Program	Description	Selectable option	
18	Battery low voltage alarm point	1KW 12VDC default setting : 11V Set Range : 10.5-13.5V 	2KW 24VDC/3KW 24VDC default setting : 22.0V Set Range : 21-27V 
		3KW 48VDC/5KW 48VDC default setting : 44.0V Set Range : 42-54V 	When the battery definition mode is CUS (customer set type) mode: the setting point in program 17.
		1KW 12VDC default setting : 11.9V Set Range : 10.3-12.5V 	2KW 24VDC/3KW 24VDC default setting : 23.8V Set Range : 20.6-25V 
		3KW 48VDC/5KW 48VDC default setting : 47.6V Set Range : 41.2-50V 	When the battery definition mode is LIB (lithium battery type) mode: the setting point in program 17.
19	Battery low voltage shutdown point	1KW 12VDC default setting : 10.5V Set Range : 9.8-12V 	2KW 24VDC/3KW 24VDC default setting : 21.0V Set Range : 20-24V 
		3KW 48VDC/5KW 48VDC default setting : 42.0V Set Range : 40-48V 	When the battery definition mode is CUS (customer set type) mode: the setting point in program 17.
		1KW 12VDC default setting : 11.5V Set Range : 10-12V 	2KW 24VDC/3KW 24VDC default setting : 23.0V Set Range : 20-24V 
		3KW 48VDC/5KW 48VDC default setting : 46.0V Set Range : 40-48V 	When the battery definition mode is LIB (lithium battery type) mode: the setting point in program 17.

Program	Description	Selectable option	
20	Battery Constant Voltage	1KW 12VDC default setting : 14.1V Set Range : 14-14.5V 	2KW 24VDC/3KW 24VDC default setting : 28.2V Set Range : 28-29V 
		3KW 48VDC/5KW 48VDC default setting : 56.4V Set Range : 48-60V 	When the battery definition mode is CUS (customer set type) mode: the setting point in program 17.
		1KW 12VDC default setting : 14.1V Set Range : 12.5-14.5V 	2KW 24VDC/3KW 24VDC default setting : 28.2V Set Range : 25-29V 
		3KW 48VDC/5KW 48VDC default setting : 56.4V Set Range : 48-56V 	When the battery definition mode is LIB (lithium battery type) mode: the setting point in program 17.
21	Floating Charging Voltage	1KW 12VDC default setting : 13.8V Set Range : 13.3-13.9V 	2KW 24VDC/3KW 24VDC default setting : 27.6V Set Range : 26.6-27.8V 
		3KW 48VDC/5KW 48VDC default setting : 54.0V Set Range : 48-60V 	When the battery definition mode is CUS (customer set type) mode: the setting point in program 17.
		1KW 12VDC default setting : 13.8V Set Range : 12-14V 	2KW 24VDC/3KW 24VDC default setting : 27.6V Set Range : 24-28V 
		3KW 48VDC/5KW 48VDC default setting : 55.2V Set Range : 50-58V 	When the battery definition mode is LIB (lithium battery type) mode: the setting point in program 17.

Program	Description	Selectable option	
22	Line Low Voltage	The setting point in program 04 APP mode default setting : 154V Set Range : 90-154V 	The setting point in program 04 UPS mode default setting : 185V Set Range : 170-200V 
23	Line High Voltage	The setting point in program 04 APP mode default setting : 264V Set Range : 264-280V 	The setting point in program 04 UPS mode default setting : 264V Fixed value, cannot be changed.
24	Low Watt Discharge	Default setting : 8 Hours Set Range : 1-8 Hours When the battery voltage exceeds 13.2V (single cell voltage) for more than 30s, this discharge time will be reset. 	In battery mode, after the continuous discharge time exceeds this set value, the battery voltage shutdown point will be modified to 11V (single cell voltage) before reaching the battery shutdown point. Alarm for 1 minute and then shut down.
25	Soft Relay Enable	OFF(default) When set to OFF, the output switch will not be closed until the inverter voltage rises to the rated output. 	ON When set to ON, the inverter output gradually increases from 0 to the target voltage value. 
26	Set Default (Reset all settings to default values)	Before setting, this interface is displayed as OFF, when it is set to ON, the system will restore the default settings. After the setting is completed, this interface will display OFF again. 	Setting conditions: It can be set in mains mode and standby (StandBy: no output but bright screen state). It cannot be set in battery mode.

Fault Reference Code

Fault: The inverter enters the fault mode, the LED red light is always on, and the LCD displays the fault code.

The alarm code ALA flashes and the buzzer beeps for 1s and stops for 1 minute. The fault indicator code is always on, the buzzer stops after 10S long beeping, the fault is eliminated after the stop, try to restart the machine, if it fails to restart three times, it will continue in the fault state. A complete power off (screen off) is required before the machine can be restarted.

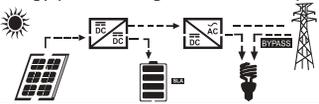
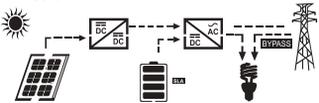
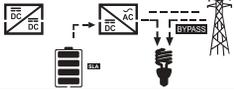
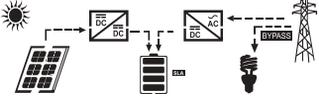
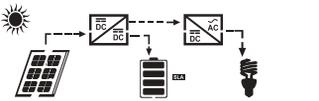
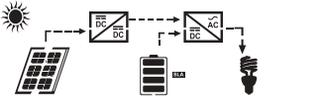
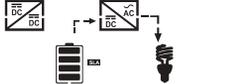
Fault Code	Fault Cause	LCD Indication
1	Bus soft start failed	ALA 1
2	Bus high	ALA 2
3	Bus low	ALA 3
5	Inverter transformer over temperature	ALA 5
6	Battery voltage is too high	ALA 6
7	Bus soft failed	ALA 7
8	Bus short Fault	ALA 8
9	INV short Fault	ALA 9
10	INV over voltage	ALA 10
11	INV under voltage	ALA 11
12	INV short	ALA 12
13	Negative power	ALA 13
14	Over load fault	ALA 14
15	Model fault	ALA 15
16	No boot loader	ALA 16

Warning Indicator

(Warning) Alarm: The inverter does not enter the fault mode, the red LED flashes, and the LCD displays the alarm code.

Warning Code	Warning Event	Icon flashing
50	Battery terminal	ALA 50
51	Battery under	ALA 51
52	Battery low	ALA 52
53	Battery charge short	ALA 53
55	Battery over charge	ALA 55
57	Over temperature	ALA 57
58	Fan fault	ALA 58
59	EEPROM Fault	ALA 59
60	Over load warning	ALA 60
62	PV energy weak	ALA 62

Operating State Description

Operating State	Description	LCD display
<p>Match load state</p> <p>Note: DC power produced from your solar array is converted by the inverter into AC power, which is then sent to your main electrical panel to be used by your household appliances. Any excess power generated is not sold back to the grid, but stored in battery.</p>	<p>PV energy is charger into the battery or converted by the inverter to the AC load</p>	<p>PV energy power is larger than inverter power</p> 
	<p>PV energy power is smaller than inverter power</p>	
	<p>PV is off</p>	
<p>Charge state</p>	<p>PV energy and grid can charge batteries.</p>	
<p>Bypass state</p>	<p>Error are caused by inside circuit error or external reasons such as over temperature, output short circuited and so on.</p>	
<p>Off-Grid state</p> <p>The inverter will provide output power from battery and PV power.</p>		<p>Inverter power loads from PV energy.</p> 
		<p>Inverter power loads from battery and PV energy.</p> 
		<p>Inverter power loads from battery only.</p> 
<p>Stop mode</p>	<p>The inverter stop working if you turn off the inverter by the soft key or error has occurred in the condition of no arid.</p>	

Display Setting

The LCD display information will be switched in turns by pressing "UP" or "DOWN" key. The selectable information is switched as below order: battery voltage, battery current, inverter voltage, inverter current, grid voltage, grid current, load in Watt, load in VA, grid frequency, inverter frequency, PV voltage, PV charging power, PV charging output voltage, PV charging current.

Selectable information	LCD display	
Battery voltage/DC discharging current	^{BATT} 520 ^V	480 ^A
Inverter output voltage/Inverter output current	229 ^V	^{INV} 130 ^A
Grid voltage/Grid current	229 ^V	^{GRID} 80 ^A
Load in Watt	100 ^{KW}	^{LOAD} 120 ^{KVA}
Grid frequency/Inverter frequency	^{INPUT} 500 ^{Hz}	^{INV} 500 ^{Hz}
PV voltage and power	^{PV} 120 ^V	200 ^{KW}
PV charger output voltage and PV charging current	^{PV} 510 ^V	^{OUTPUT} 400 ^A

SPECIFICATIONS

Table 1 Line Mode Specifications

INVERTER MODEL	1KW~5KW
Input Voltage Waveform	Sinusoidal (utility or generator)
Nominal Input Voltage	230Vac
Low Loss Voltage	90Vac±7V(APP); 170Vac±7V(UPS);
Low Loss Return Voltage	100Vac±7V(APP); 180Vac±7V(UPS);
High Loss Voltage	280Vac±7V(UPS,APP)
High Loss Return Voltage	270Vac±7V(UPS,APP)
Max AC Input Voltage	300Vac
Nominal Input Frequency	50HZ/60HZ(Auto detection)
Low Loss Frequency	40HZ±1HZ(UPS,APP),50HZ; 50HZ±1HZ(UPS,APP),60HZ;
Low Loss Return Frequency	43.5HZ±1HZ(UPS),40.5HZ±1HZ(APP),50HZ; 53.5HZ±1HZ(UPS),50.5HZ±1HZ(APP),60HZ;
High Loss Frequency	60HZ±1HZ(UPS),70HZ±1HZ(APP),50HZ; 70HZ±1HZ(UPS),70HZ±1HZ(APP),60HZ;
High Loss Return Frequency	56.5HZ±1HZ(UPS),69.5HZ±1HZ(APP),50HZ; 66.5HZ±1HZ(UPS),69.5HZ±1HZ(APP),60HZ;

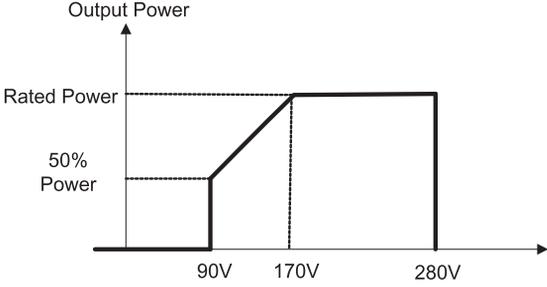
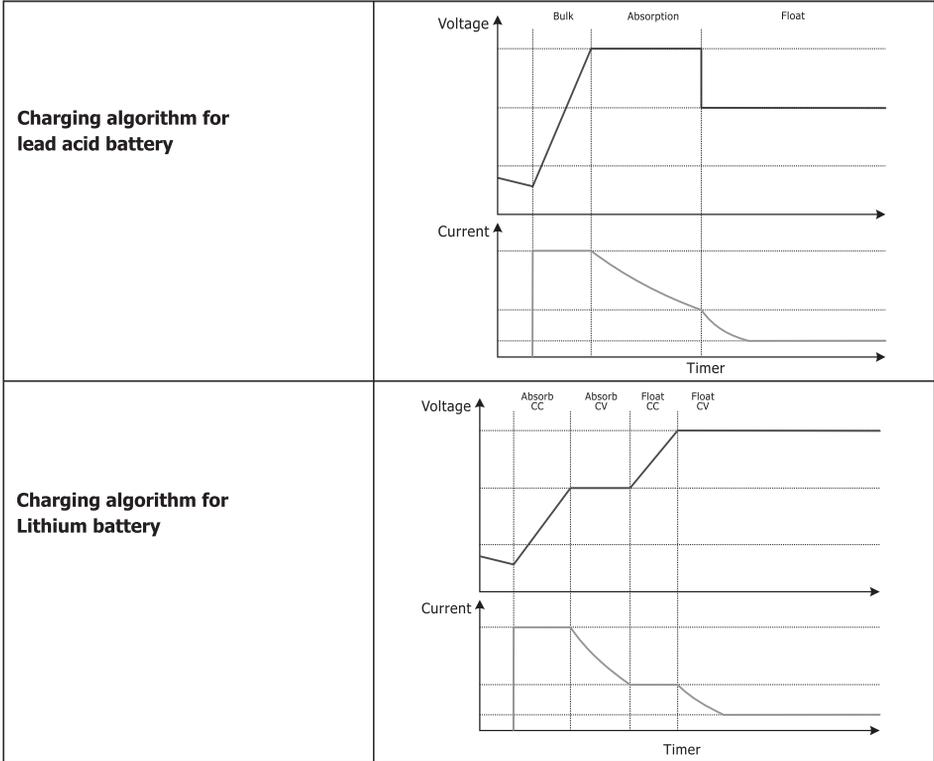
Output Short Circuit Protection	Line mode: Circuit Breaker Battery mode: Electronic Circuits
Efficiency (Line Mode)	>99%(Rated R load, battery full charged),Line Mode
Transfer Time	10ms typical (UPS,APP)
Output power derating: When AC input voltage drops to 95V or 170V depending on models, the output power will be derated.	230Vac model: 

Table 2 Inverter Mode Specifications

INVERTER MODEL	1KW DC12V	2KW~3KW DC24V	3KW~5KW DC48V
Rated Output Power	1000W	2000W~3000W	3000W~5000W
Output Voltage Waveform	Pure Sine Wave		
Output Voltage Regulation	230Vac±5%		
Output Frequency	60Hz or 50Hz		
Peak Efficiency	>93%		
Overload Protection	60S@102%~110% load; 10S@110%~130% load; 3s@130%~150 load; 200ms@≥150% load;		
Surge Capacity	2 x rated power for 5 seconds		
Nominal DC Input Voltage	12Vdc	24Vdc	48Vdc
Cold Start Voltage	11.5Vdc	23.0Vdc	46.0Vdc
Low DC Warning Voltage	11.0Vdc	22.0Vdc	44.0Vdc
Low DC Cut-off Voltage	10.5Vdc	21.0Vdc	42.0Vdc
High DC Recovery Voltage	13.5Vdc	27Vdc	58Vdc
High DC Cut-off Voltage	15Vdc	32Vdc	61Vdc

Table 3 Charge Mode Specifications

Charge Mode Specifications				
INVERTER MODEL		1KW DC12V	2KW~3KW DC24V	3KW~5KW DC48V
Charging Current @ Nominal Input Voltage		1~40A	2KW:1~40A 3KW:1~50A	3KW:1~60A 5KW:1~80A
Absorption Voltage	AGM / FLD/LIB/CUS Battery	12.5Vdc	25Vdc	50Vdc
	Flooded battery	12.5Vdc	25Vdc	50Vdc
Floating charging voltage	AGM / FLD/LIB/CUS Battery	13.8Vdc	27.4Vdc	54.8Vdc
	Flooded battery	13.8Vdc	27.4Vdc	54.8Vdc
Bulk charging voltage (C.V voltage)	AGM / FLD/LIB/CUS Battery	14.1Vdc	28.8Vdc	57.6Vdc
	Flooded battery	14.1Vdc	28.4Vdc	56.8Vdc
Charging Algorithm		17-Step(Battery Type , AGM/FLD/LIB/CUS Battery)		
Solar Charging Mode				
INVERTER MODEL		1KW DC12V	2KW~3KW DC24V	3KW~5KW DC48V
Rated Power		1000W	2000W 3000W	3000W 5000W
MPPT charger				
solar charging current		40A	40A 50A	60A 80A
Max.PV Array Open Circuit Voltage		102Vdc max	102Vdc max 145Vdc max	450Vdc max
PV Array MPPT Voltage Range		17~80Vdc	30~80Vdc 30~110Vdc	120~430Vdc
Min battery voltage for PV charge		17Vdc	17Vdc	34Vdc
Standby Power Consumption			2W	
Line mode charger				
charging current		40A	40A 50A	60A 80A
Line Voltage Range		90~280VAC(APP mode);170~280VAC(UPS mode);		
Battery Voltage Accuracy		+/-0.3%		
Voltage Accuracy		+/-2V		
Charging Algorithm		17-Step(Battery Type , AGM/FLD/LIB/CUS Battery)		



Joint Utility and Solar Charging			
INVERTER MODEL	1KW DC12V	2KW~3KW DC24V	3KW~5KW DC48V
	MPPT		
Max Charging Current	80A	80A 100A	120A
Default Charging Current	40A	60A 80A	60A

Table 4 General Specifications

INVERTER MODEL	1KW DC12V	2KW~3KW DC24V	3KW~5KW DC48V
Safety Certification	CE		
Operating Temperature Range	-10°C to 50°C		
Storage temperature	-15°C~ 60°C		
Dimension (D*W*H), mm	420 x 288 x 122	450 x 300 x 115	450 x 300 x 115
Net Weight, kg	5.0	7.0	9.0

TROUBLE SHOOTING

Problem	LCD/LED/Buzzer	Explanation / Possible cause	What to do
Unit shuts down automatically during startup process.	LCD/LEDs and buzzer will be active for 3 seconds and then complete off.	The battery voltage is too low (< 1.91V/Cell)	1. Re-charge battery. 2. Replace battery.
No response after power on.	No indication.	1. The battery voltage is far too low (<1.4V/Cell) 2. Battery polarity is connected reversed. Input protector is tripped	1. Check if batteries the wiring are connected and well. 2. Re-charge battery. 3. Replace battery.
Mains exist but the unit works in battery mode.	Input voltage is displayed as 0 on the LCD and green LED is flashing.	Input protector is tripped	Check if AC breaker is tripped and AC wiring is connected well.
	Green LED is flashing.	Insufficient quality of AC power (Shore or Generator)	1. Check if AC wires are too thin and/or too long. 2. Check if generator (if applied) is working well or if input voltage range setting is correct.(Appliance=>wide)
When the unit is turned on, internal relay is switched on and off repeatedly.	LCD display and LEDs are flashing	Battery is disconnected.	Check if battery wires are connected well.
Buzzer beeps continuously and red LED is on.	Fault code 14	Overload error. The inverter is overload 110% and time is up.	Reduce the connected load by switching off some equipment.
	Fault code 12	Output short circuited.	Check if wiring is connected well and remove abnormal load.
	Fault code 5	Internal temperature of inverter component is over 90°C.	Check whether the air flow of the unit is blocked or whether the ambient temperature is too high.
	Fault code 6	Battery is over-charged.	Return to repair center.
		The battery voltage is too high.	Check if spec and quantity of batteries are meet requirements.
	Fault code 10/11	Output abnormal (Inverter voltage below than 202Vac or is higher than 253Vac)	1. Reduce the connected load. 2. Return to repair center
	Fault code 1/7/8/9/15/16	Internal components filed.	Return to repair center
	Fault code 51	Over current or surge	Restart the unit, if the error happens again, please return to repair center.
Fault code 2/3	Bus voltage is too high/too low		
Buzzer beeps and red LED is flashing.	Fault code 15	Model fault	
	Fault code 58	Fan fault	Fan fault
	Fault code 50/51/52	Battery is not connected well or fuse is burnt.	If the battery is connected well, please return to repair center.

Appendix1 : Approximate Back-up Time Table

Model	Load(W)	Backup Time@12Vdc 100Ah(min)	Backup Time@12Vdc 200Ah(min)
1KW	200	355	766
	400	139	503
	600	95	227
	800	62	140
	1000	50	112

Model	Load(W)	Backup Time@24Vdc 100Ah(min)	Backup Time@24Vdc 200Ah(min)
2KW	200	766	1610
	400	355	766
	600	198	503
	800	139	339
	1000	112	269
	1200	95	227
	1400	81	176
	1600	62	140
	1800	55	125
3KW	2000	50	112
	300	449	1100
	600	222	525
	900	124	303
	1200	95	227
	1500	68	164
	1800	56	126
	2100	48	108
	2400	35	94
2700	31	74	
3000	28	67	

Model	Load(W)	Backup Time@48Vdc 100Ah(min)	Backup Time@48Vdc 200Ah(min)
3KW	300	1054	2107
	600	491	1054
	900	291	668
	1200	196	497
	1500	159	402
	1800	123	301
	2100	105	253
	2400	91	219
	2700	71	174
5KW	3000	63	155
	500	613	1288
	1000	268	613
	1500	158	402
	2000	111	271
	2500	90	215
	3000	76	182
	3500	65	141
	4000	50	112
4500	44	100	
5000	40	90	

Note: Backup time depends on the quality of the battery, age of battery and type of battery. Specifications of batteries may vary depending on different manufacturers.

Appendix 2: Paralle function

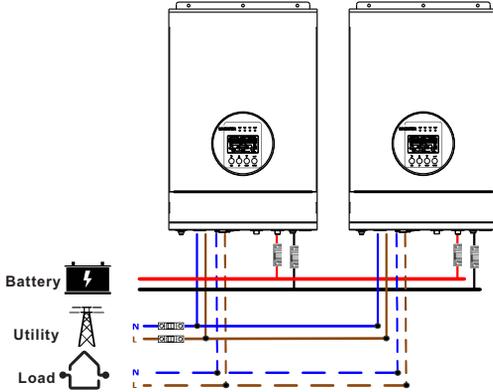
Note: The cable indicated in charts “Communication Connection” represents as below:
the “full line” means the “Parallel communication cable”.



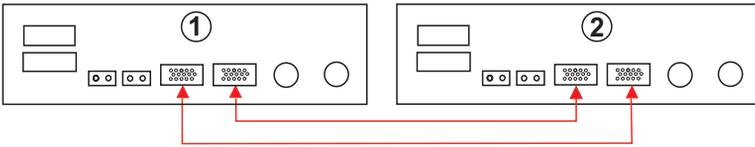
Parallel Operation in single phase

Two inverters in parallel:

Power Connection

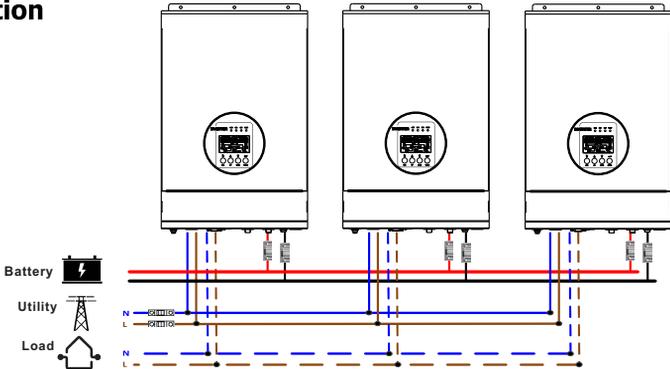


Communication Connection

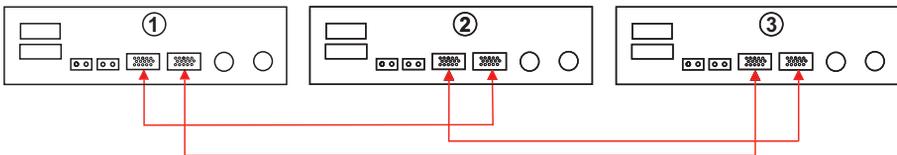


Three inverters in parallel:

Power Connection

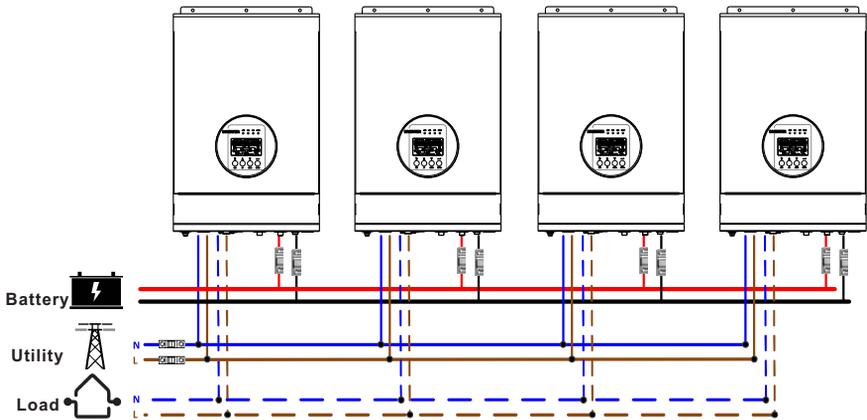


Communication Connection

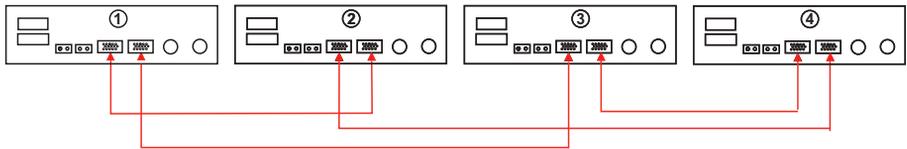


Four inverters in parallel:

Power Connection

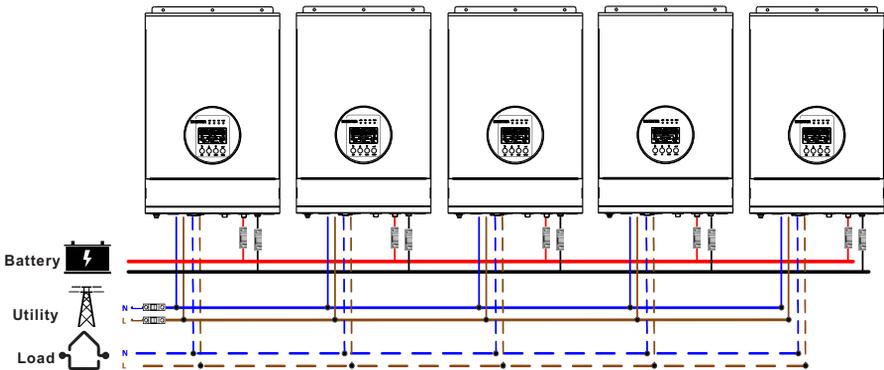


Communication Connection

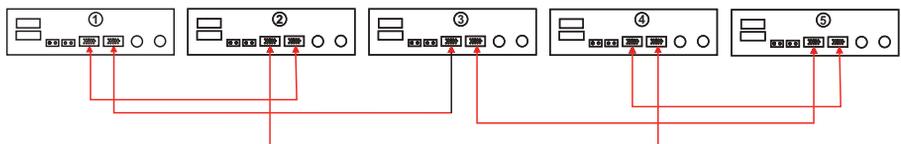


Five inverters in parallel:

Power Connection

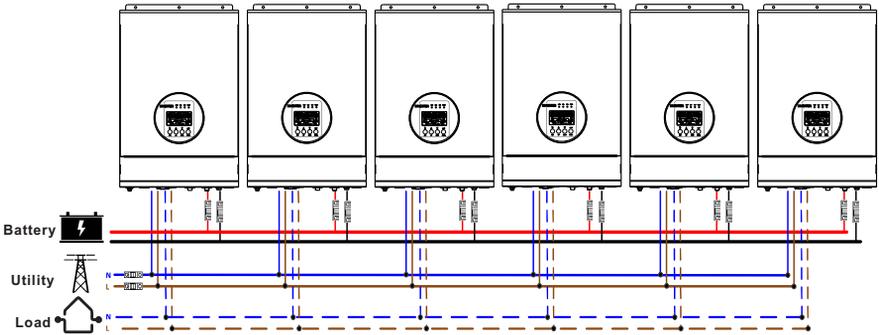


Communication Connection

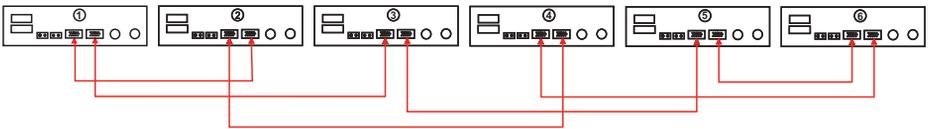


Six inverters in parallel:

Power Connection

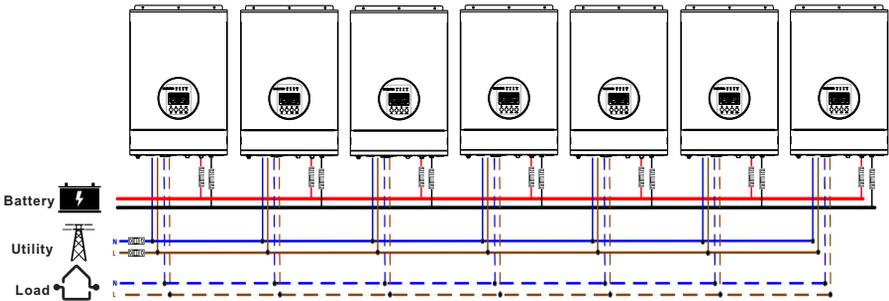


Communication Connection

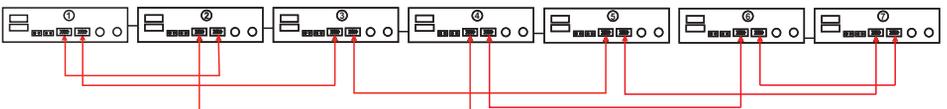


Seven to nine inverters in parallel:

Power Connection

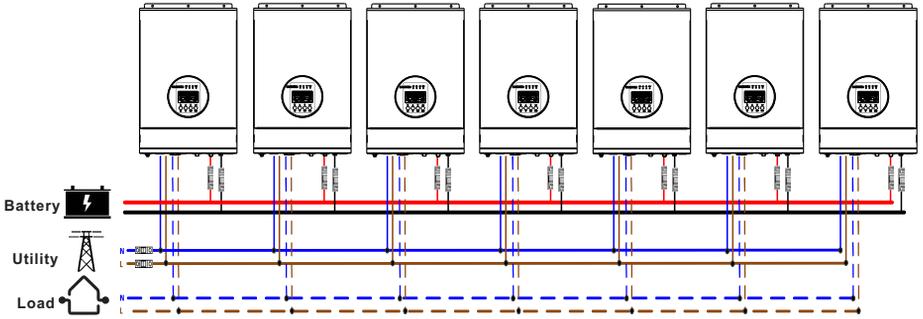


Communication Connection

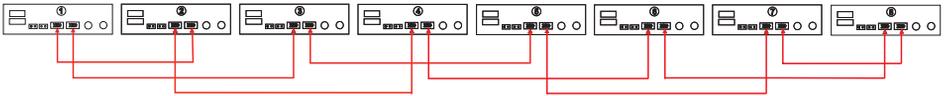


Eight to nine inverters in parallel:

Power Connection

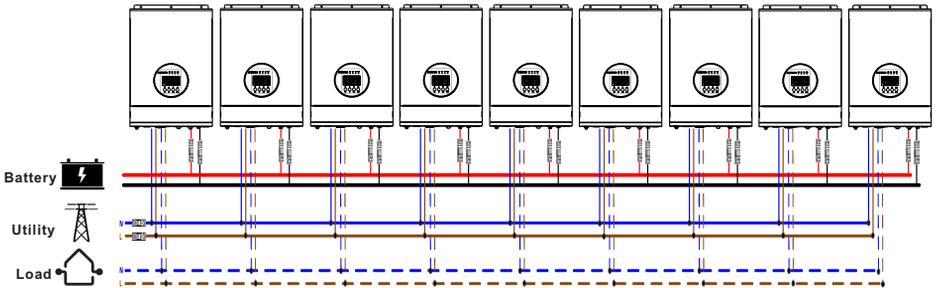


Communication Connection

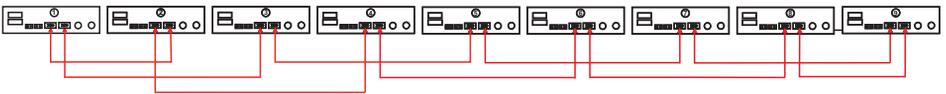


Nine to nine inverters in parallel:

Power Connection



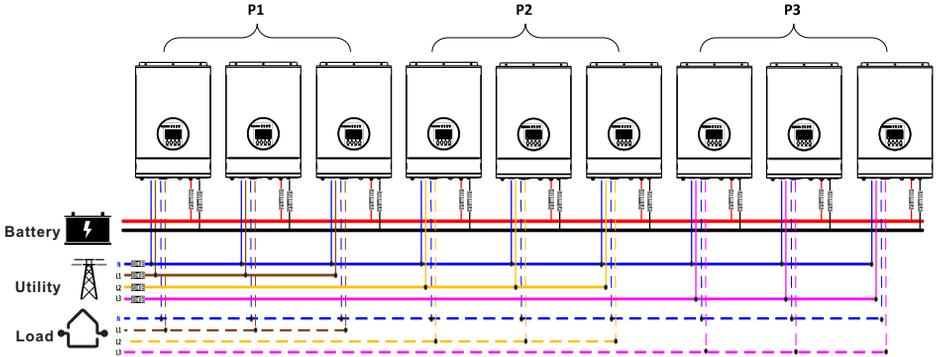
Communication Connection



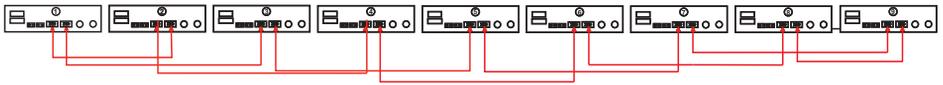
Support 3-phase equipment

Three inverters in each phase:

Power Connection

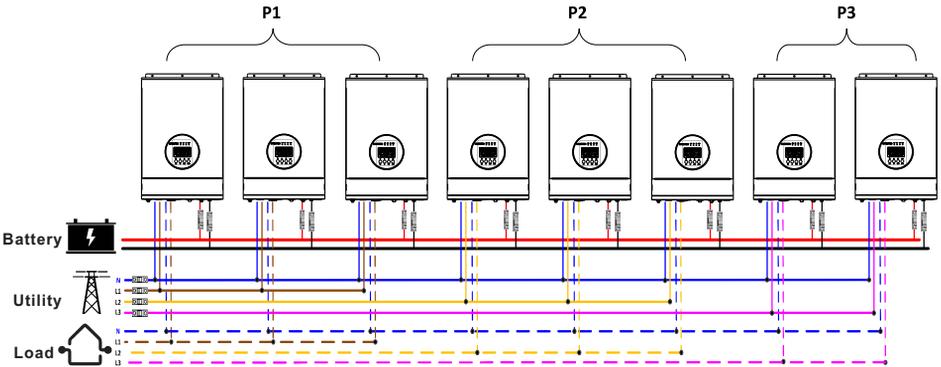


Communication Connection

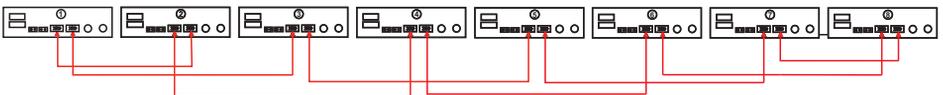


Three inverters in one phase, three inverters in second phase and two inverters for the third phase:

Power Connection

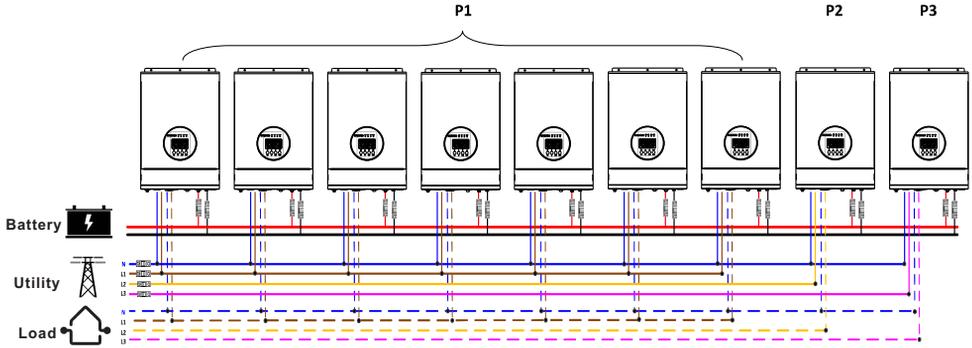


Communication Connection



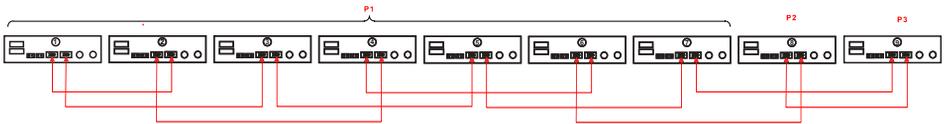
Seven inverters in one phase and one inverter for the other two phases:

Power Connection



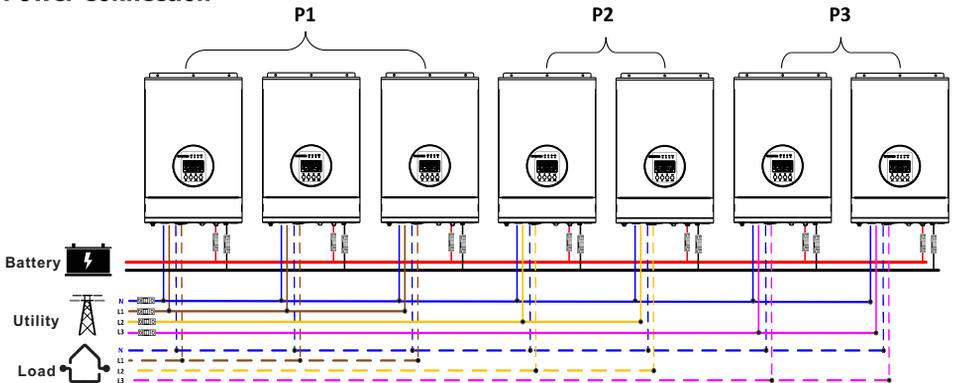
Note: It's up to customer's demand to pick 7 inverters on any phase. P1: L1-phase, P2: L2-phase, P3: L3-phase.

Communication Connection

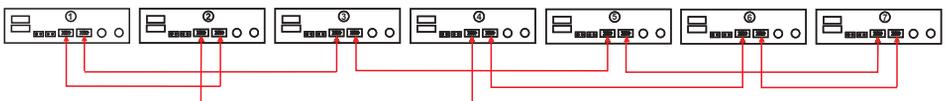


Three inverters in one phase, two inverters in second phase and two inverters for the third phase:

Power Connection

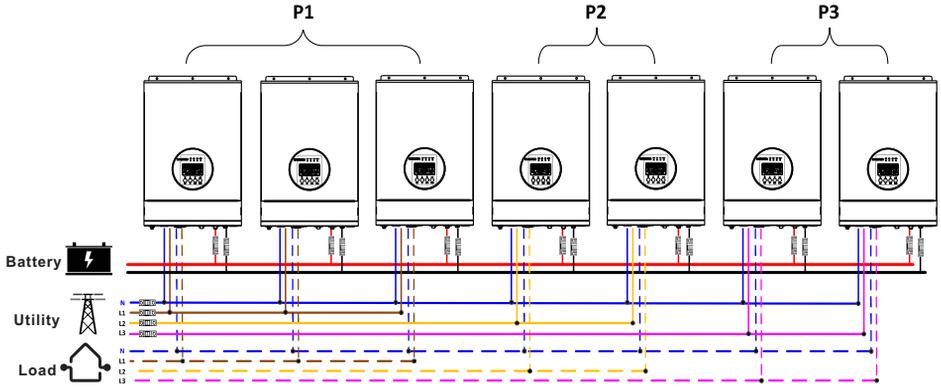


Communication Connection

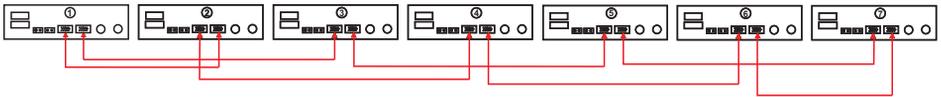


Two inverters in each phase:

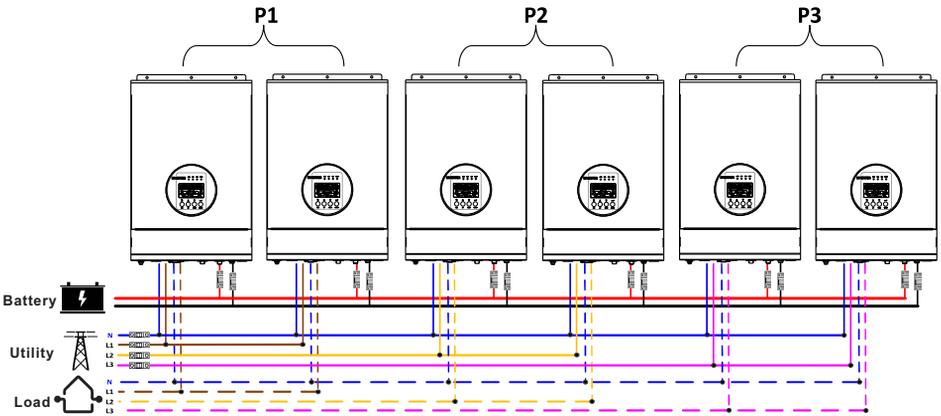
Power Connection



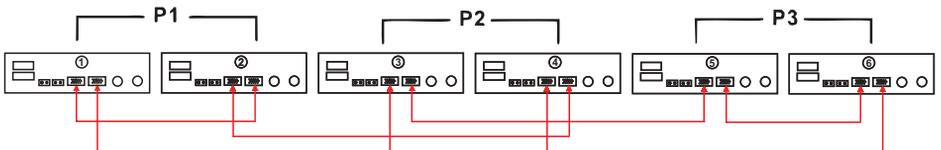
Communication Connection



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

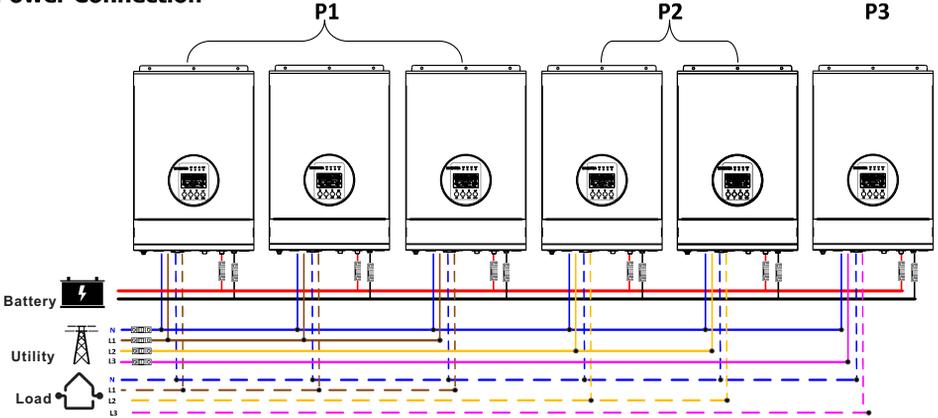


Communication Connection

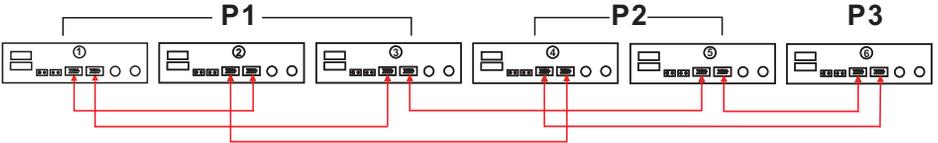


Three inverters in one phase, two inverters in second phase and one inverter for the third phase:

Power Connection

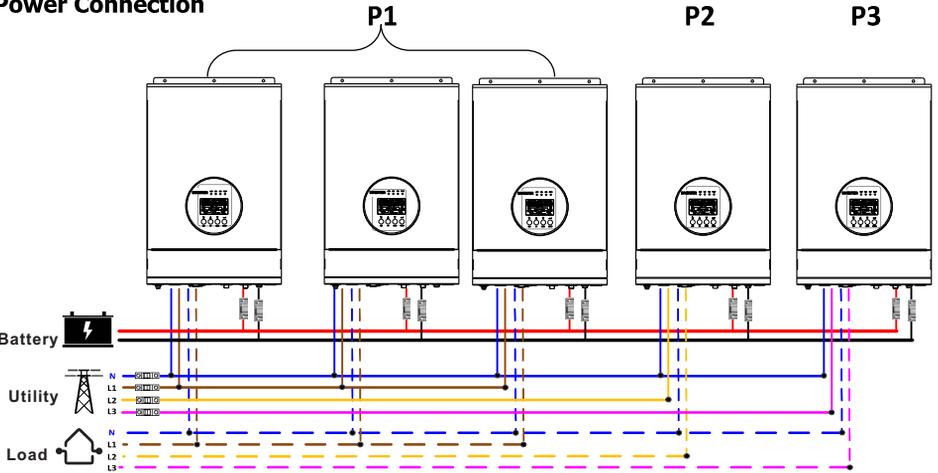


Communication Connection

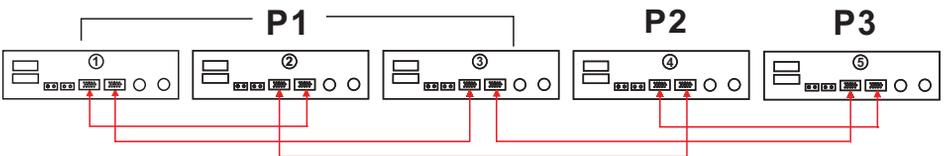


Three inverters in one phase and only one inverter for the remaining two phases:

Power Connection

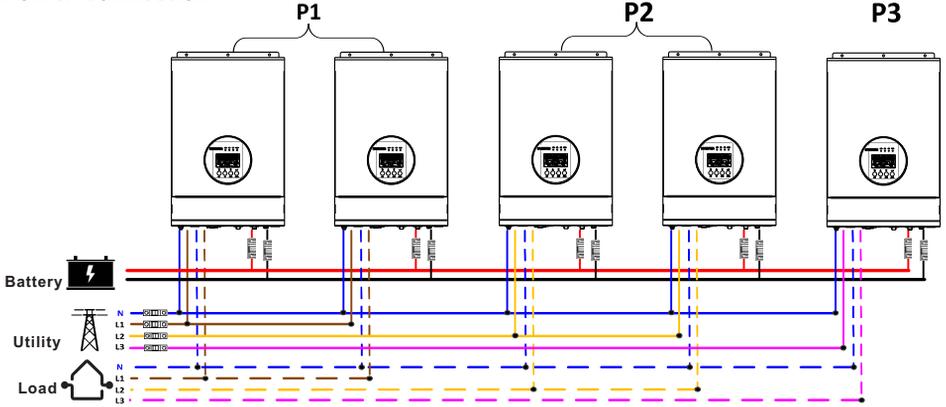


Communication Connection

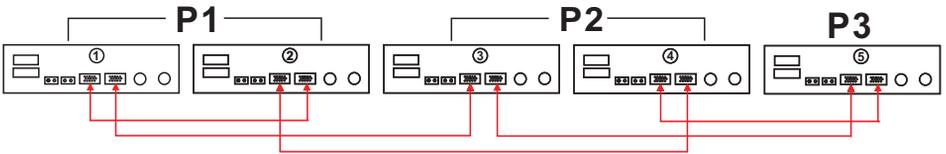


Two inverters in two phases and only one inverter for the remaining phase:

Power Connection

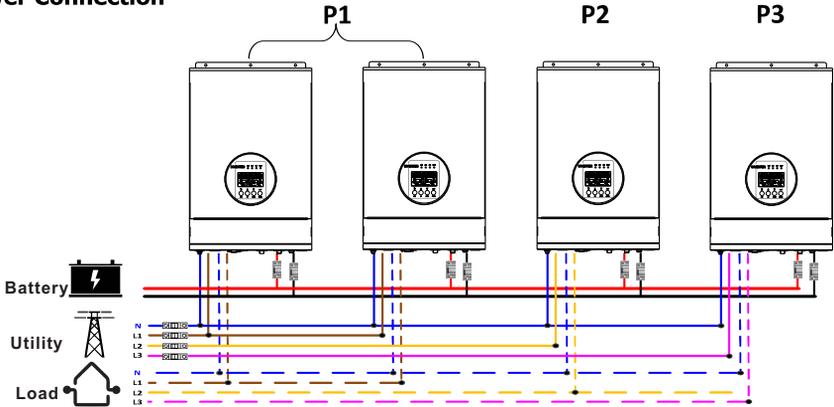


Communication Connection

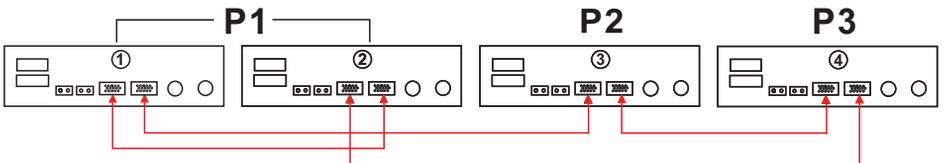


Two inverters in one phase and only one inverter for the remaining phases:

Power Connection

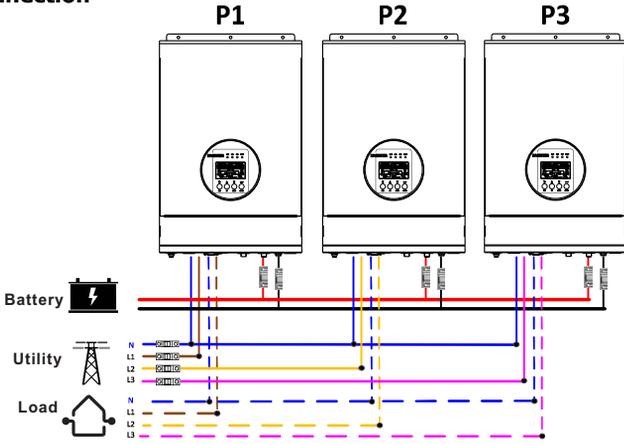


Communication Connection

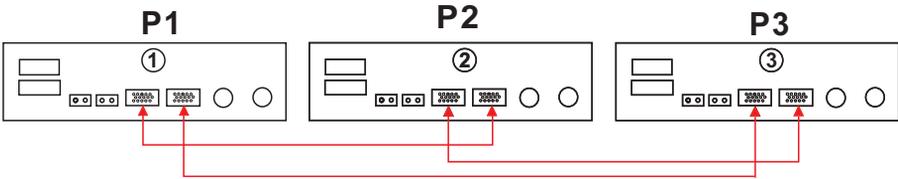


One inverter in each phase:

Power Connection



Communication Connection



USER'S MANUAL

SOLAR INVERTER