OPTI-Solar

GREEN POWER

User Manual

1KVA/ 2KVA/ 3KVA
INVERTER / CHARGER

www.opti-solar.com

CONTENTS

ABOUT THIS MANUAL

Purpose

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

Scope

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

SAFETY INSTRUCTIONS

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

1. Before using the unit, read all instructions and cautionary markings on the unit, the batteries and all appropriate sections of this manual.
2. **CAUTION** --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 (40A, 32VDC *4pcs for 1KVA/2KVA and *6pcs for 3KVA) 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.

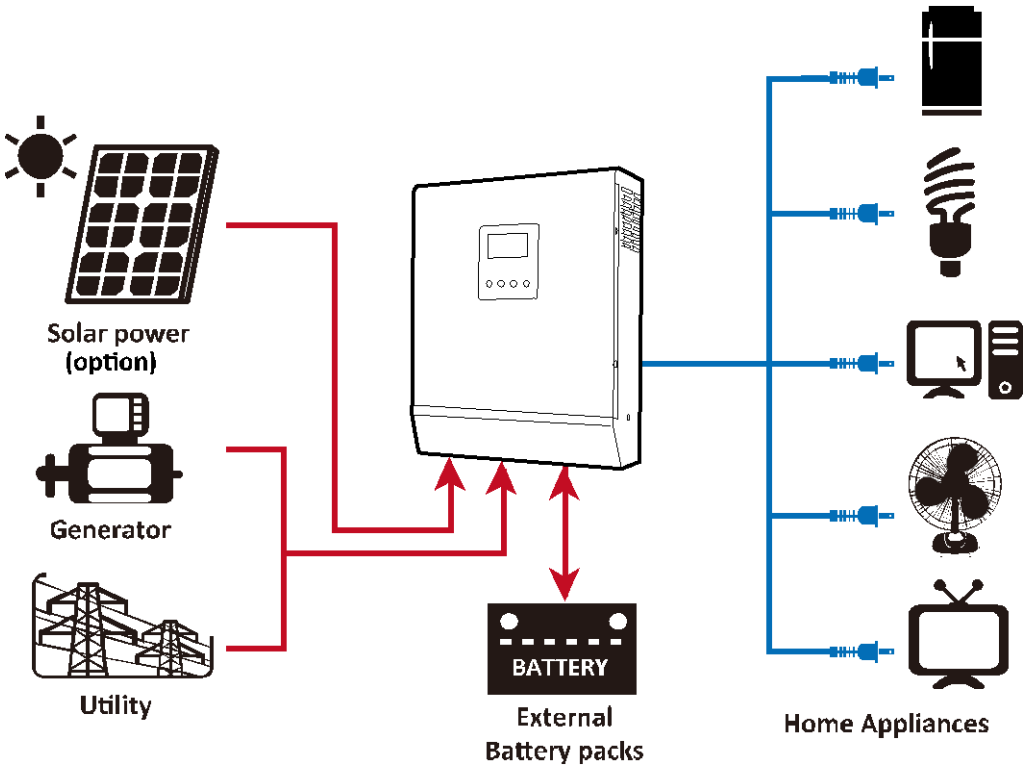
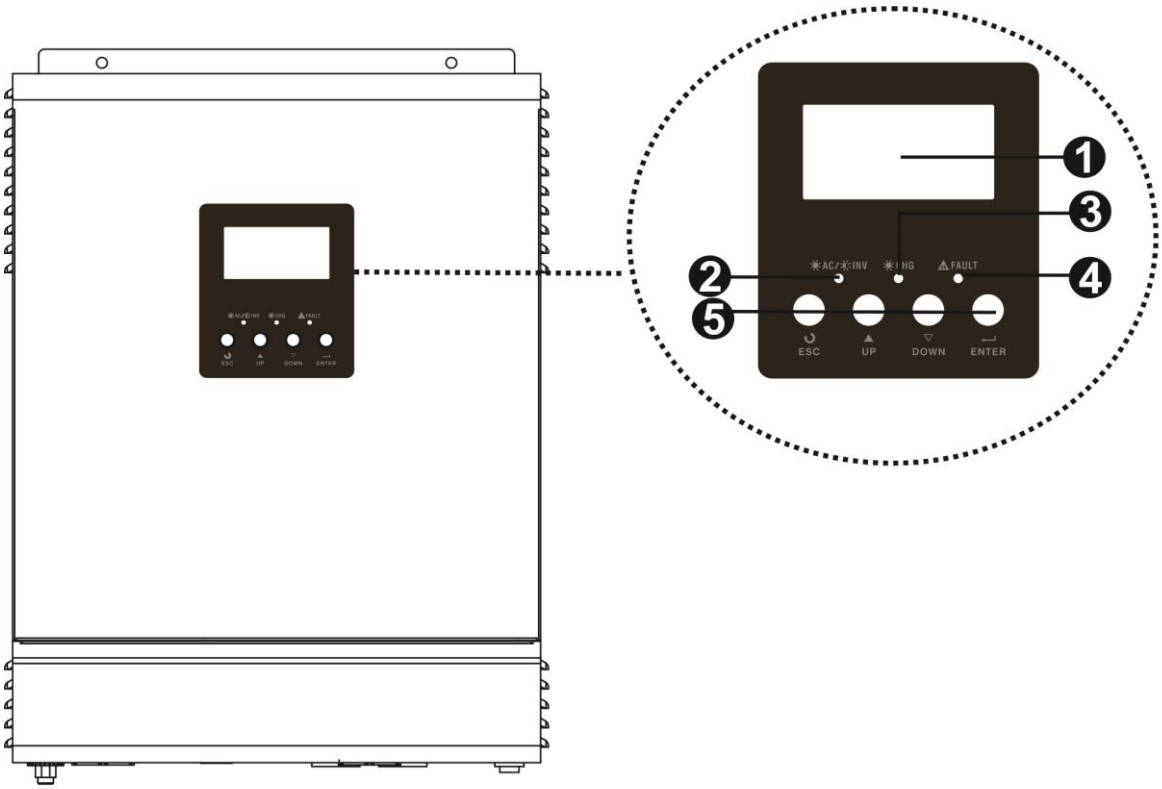
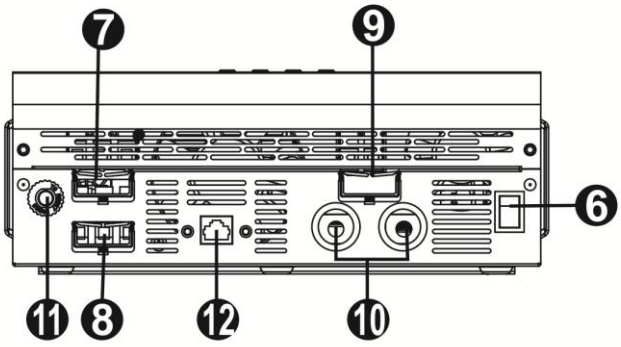


Figure 1 Hybrid Power System

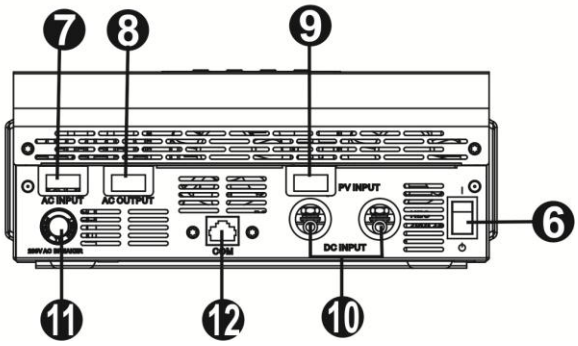
Note: Appliances like air conditioner need at least 2~3 minutes to restart because it's required to have enough time to balance refrigerant gas inside of circuits. If a power shortage occurs and recovers in a short time, it will cause damage to your connected appliances. To prevent this kind of damage, 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.

Product Overview





2KVA/3KVA Model



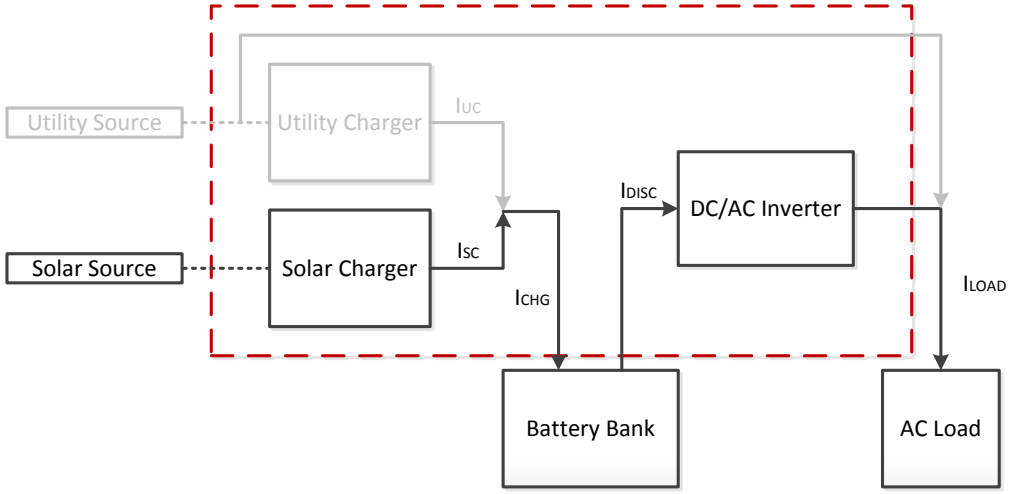
1KVA Model

1. LCD display
2. Status indicator
3. Charging indicator
4. Fault indicator
5. Function buttons
6. Power on/off switch
7. AC input
8. AC output
9. PV input
10. Battery input
11. Circuit breaker
12. Communication port

Operation Diagrams and work conditions

Abbreviation:
I_{UC}, charging current from AC charger
I_{SC}, charger current from solar charger
I_{CHG}, total charging current of battery
I_{DISC}, discharging current from battery
I_{LOAD}, output current of AC load

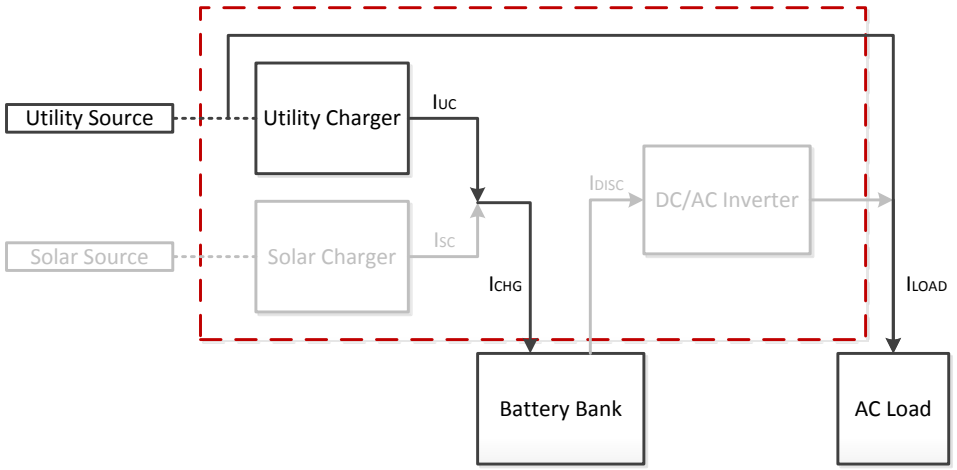
1) When utility source is not present, I_{UC}=0, battery charged from solar source, I_{CHG}=I_{SC}, load powered from solar and battery power, the Max. I_{SC} goes up to 50Amp if solar panel with enough energy.



Priority Setting Combinations:

Charger Priority	Output Source Priority
solar	solar
utility	utility
solar	utility
solar and utility	utility
solar and utility	solar

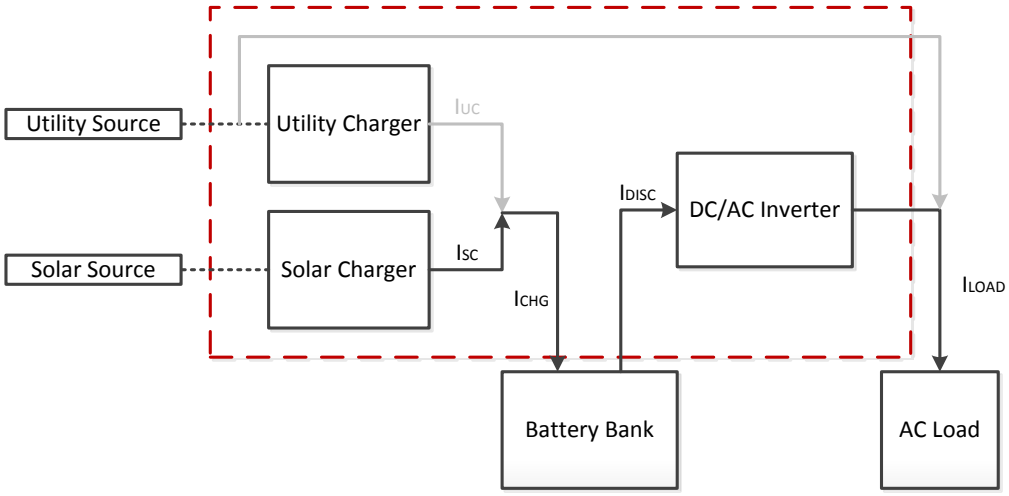
2) When solar source is not present, I_{SC}=0, battery charged from utility source, I_{CHG}=I_{UC}, load powered from utility, the Max. I_{UC} limited at 20Amp for 1KVA, and 30Amp for 2KVA/3KVA.



Priority Setting Combinations:

Charger Priority	Output Source Priority
solar	solar
utility	utility
solar	utility
solar and utility	utility
solar and utility	solar

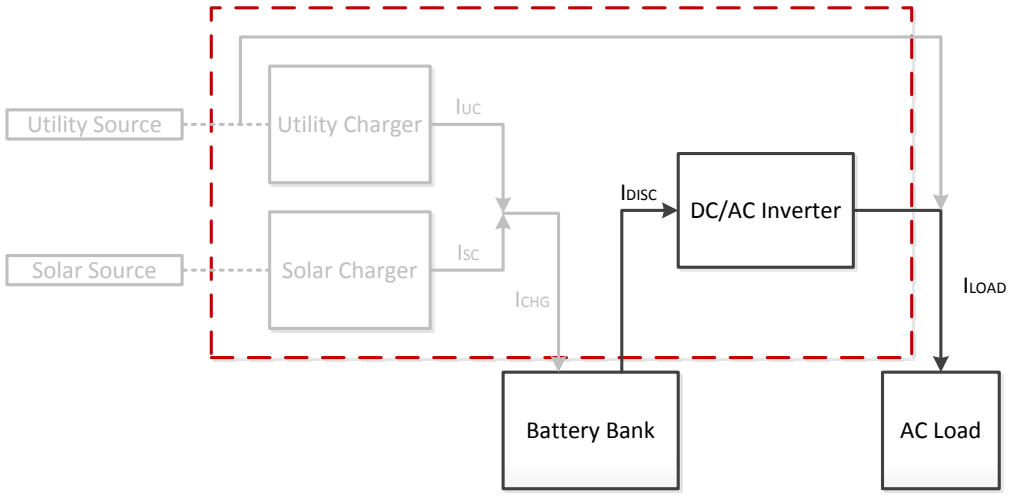
3) When utility and solar are presented, battery charged from solar source, I_{CHG}=I_{SC}, load powered from solar and battery, the Max. I_{SC} goes up to 50Amp if solar panel with enough energy. Output source and charger source will be turned to utility side in case solar panel without enough energy and battery voltage down to pre-alarm level.



Priority Setting Combinations:

Charger Priority	Output Source Priority
solar	solar

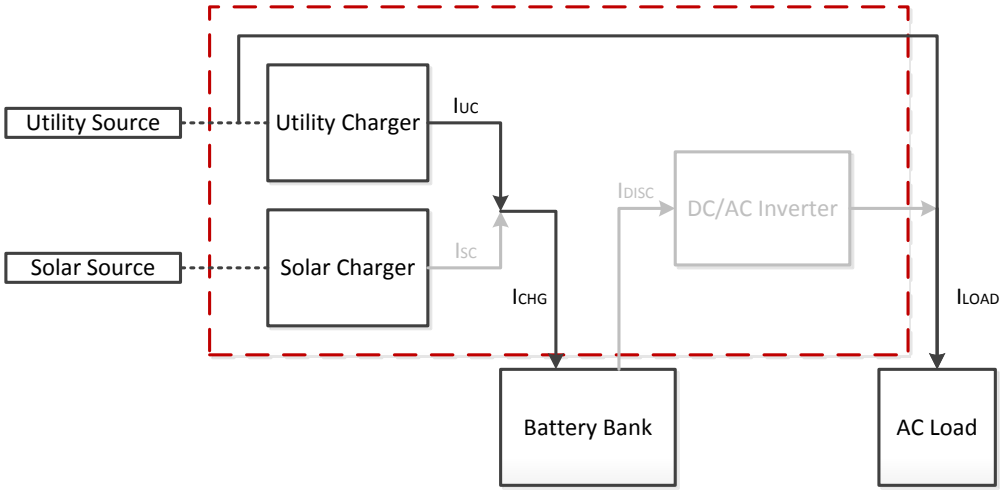
4) When utility and solar are not present, $I_{UC}=I_{SC}=0$, connected load will be powered from battery.



Priority Setting Combinations:

Charger Priority	Output Source Priority
solar	solar
utility	utility
solar	utility
solar and utility	solar
solar and utility	utility

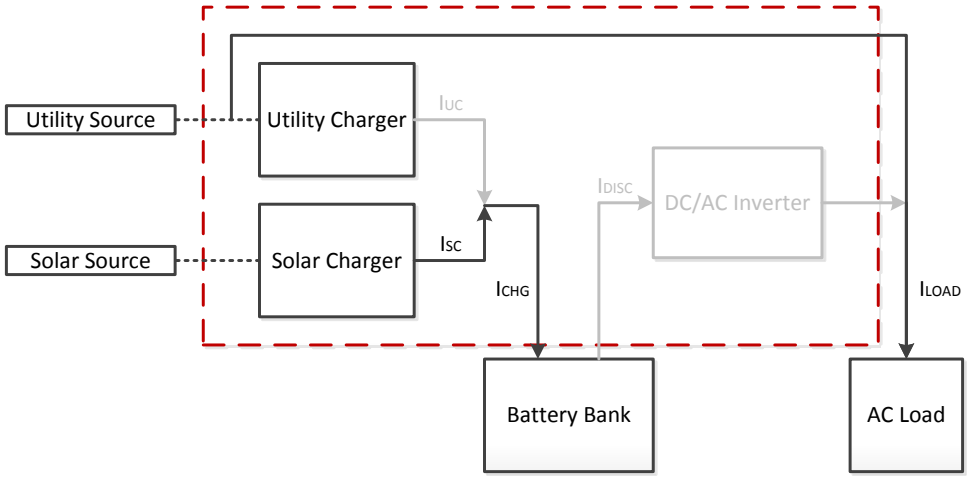
5) When utility and solar are presented, battery charged from utility, $I_{CHG}=I_{UC}$, load powered from utility, the Max. I_{UC} limited at 20Amp for 1KVA, 30Amp 2KVA and 3KVA.



Priority Setting Combinations:

Charger Priority	Output Source Priority
utility	utility

6) When utility and solar are presented, battery charged from solar, $I_{CHG}=I_{SC}$, load powered from utility, Max. I_{SC} goes up to 50Amp if solar panel with enough energy. Charger source will be turned to utility side in case solar panel without enough energy.



Priority Setting Combinations:

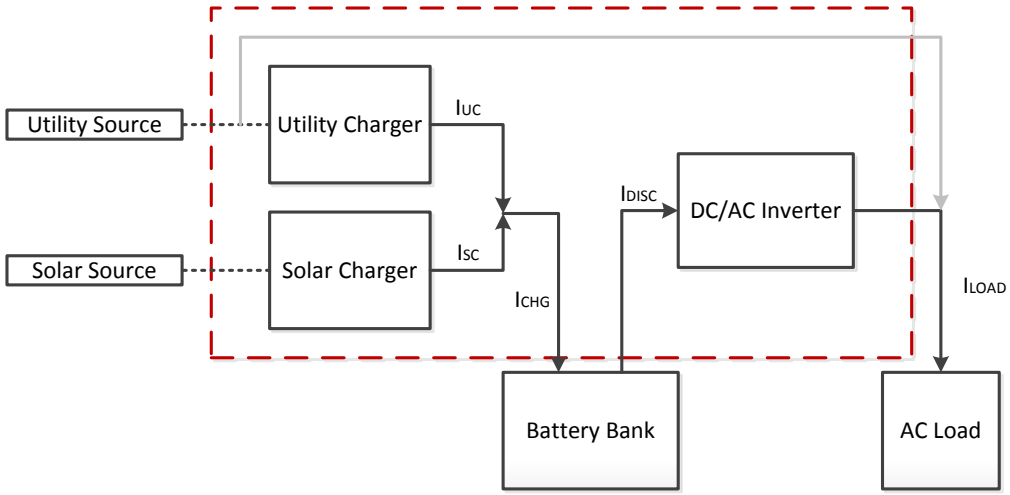
Charger Priority	Output Source Priority
solar	utility

7) When utility and solar are presented, battery charged from both solar and utility, $I_{CHG}=I_{SC}+I_{UC}$, load powered from solar and battery. Output source will be turned to utility side in case battery voltage down to pre-alarm level.

Ex. 3KVA Model, AC Load = 2000W

i.e. $I_{LOAD} \approx 8.7$Amp and $I_{DISC} \approx 92$Amp

Max. I_{CHG} = 50Amp, it means battery always stay in discharge situation since the required power of AC load is larger than charging. Once battery down to pre-alarm level, AC load will be powered from utility then I_{DISC} become zero.



Priority Setting Combinations:

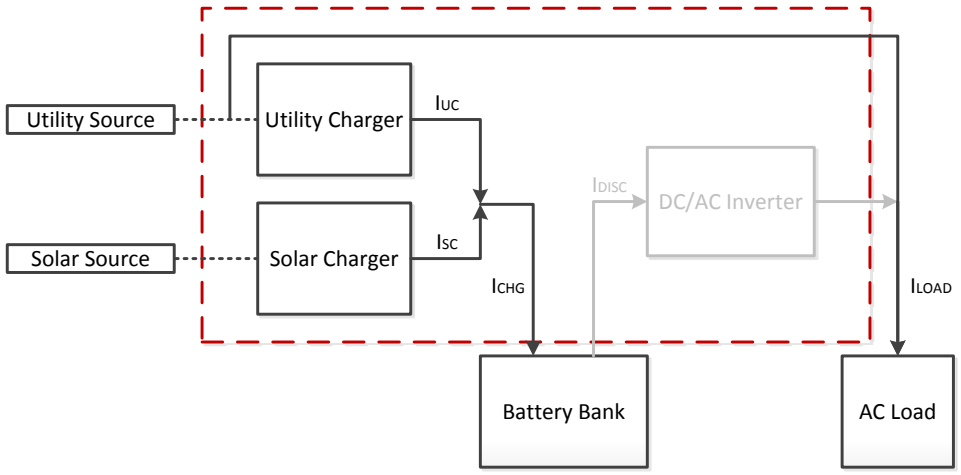
Charger Priority	Output Source Priority
solar and utility	solar

8) When utility and solar are presented, battery charged from both solar and utility, $I_{CHG}=I_{SC}+I_{UC}$, load powered from utility.

Ex. 3KVA Model, AC Load = 2000W

i.e. $I_{LOAD} \approx 8.7Amp$, $I_{DISC} = 0$

Battery always charged by the max. power from both utility and solar source.



Priority Setting Combinations:

Charger Priority	**Output Source Priority**
solar and utility	utility

INSTALLATION

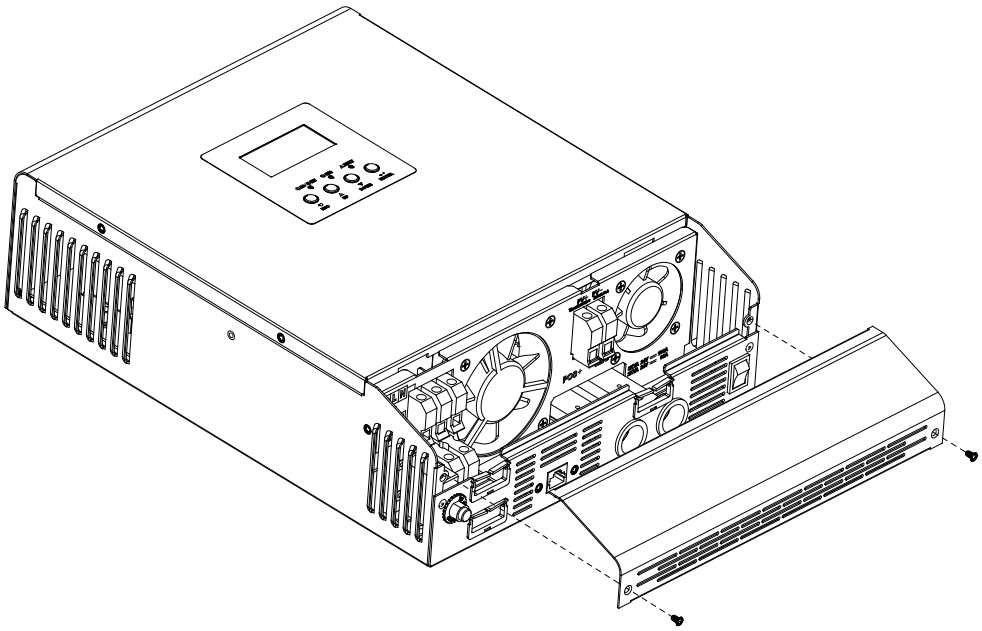
Unpacking and Inspection

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's manual x 1
- Communication cable x 1

Preparation

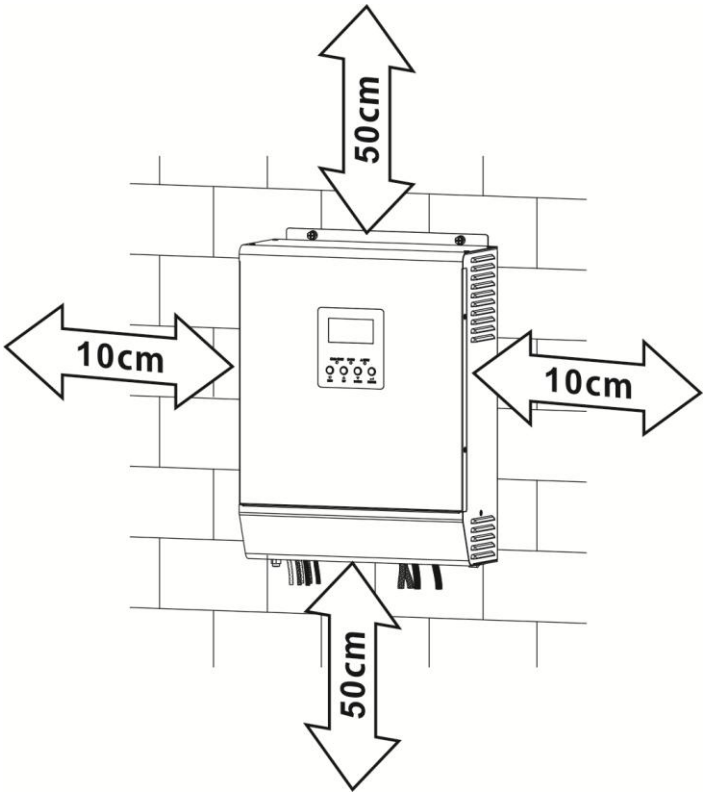
Before connecting all wirings, please take off bottom cover by removing two screws as shown below.



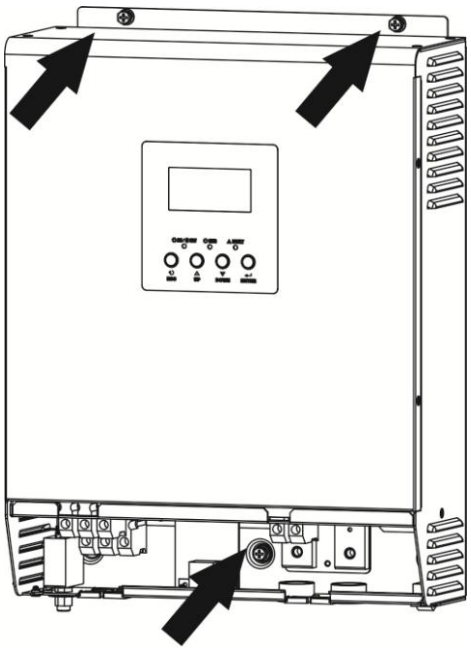
Mounting the Unit

Consider the following points before selecting where to install:

- Do not mount the inverter on flammable construction materials.
- Mount on a solid surface
- Install this inverter at eye level in order to allow the LCD display to be read at all times.
- For proper air circulation to dissipate heat, allow a clearance of approx. 10 cm to the side and approx. 50 cm above and below the unit.
- The ambient temperature should be between 0°C and 55°C to ensure optimal operation.
- The recommended installation position is to be adhered to the wall vertically.
- Be sure keep other objects and surfaces as shown in the below diagram to guarantee sufficient heat dissipation and to have enough space for removing wires.



Install the unit by screwing three screws.



Battery Connection

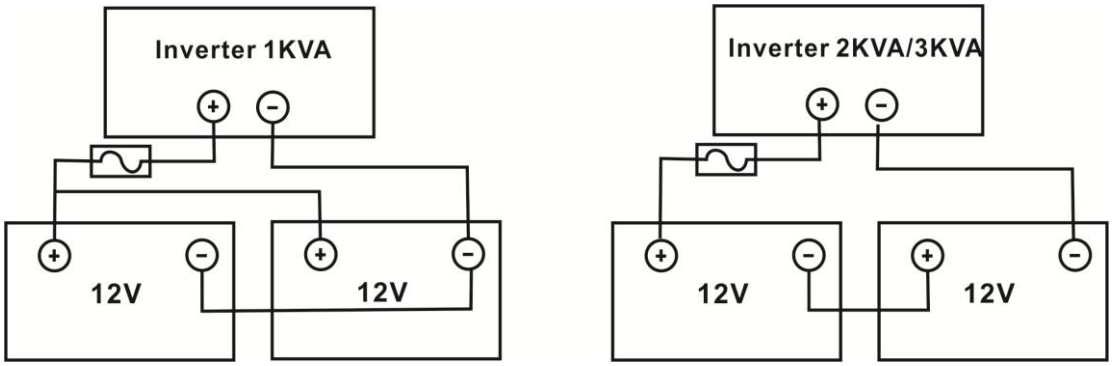
CAUTION: To safety operation and regulation compliance, it's requested to install a separate DC over-current protector or disconnect device between battery and inverter. It may not be requested to have a disconnect device in some applications, however, it's still requested to have over-current protection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

Model	Typical Amperage	Battery capacity	1~3 m one-way	Ring Type for Cable Terminal	Torque value
1KVA/2KVA	66A	100AH	1*6AWG	KST: RNBS14-6	2~ 3 Nm
			2*10AWG	KST: RNBS8-6	
3KVA	100A	100AH 200AH	1*4AWG	KST: RNBS22-6	2~ 3 Nm
			2*8AWG	KST: RNBS14-6	

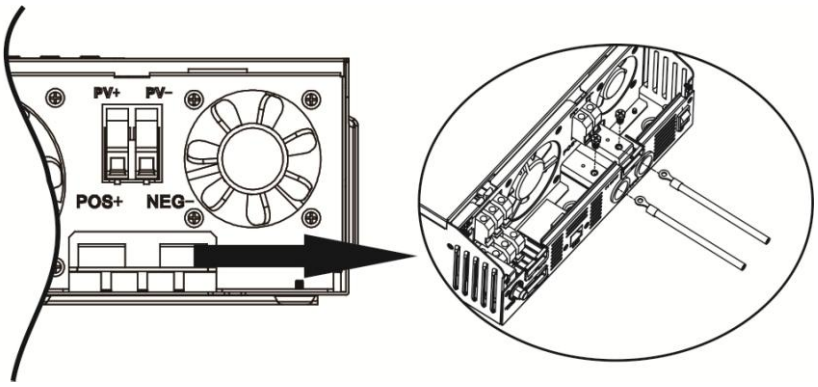
Please follow below steps to implement battery connection:

1. Assemble battery ring terminal based on recommended battery cable and terminal size.
2. 1KVA model supports 12VDC system and 2KVA/3KVA model supports 24VDC system. Connect all battery packs as below chart. It's suggested to connect at least 100Ah capacity battery for each.



NOTE: Please only use sealed lead acid battery or sealed GEL/AGM lead-acid battery.

3. Insert the ring terminal of battery cable flatly into battery connector on the inverter and make sure the bolts are tightened to a 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 1KVA, 20A for 2KVA, 32A for 3KVA.

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

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

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

Suggested cable requirement for AC wires

Model	AWG no.	Torque
1KVA	16 AWG	0.5~ 0.6 Nm
2KVA	14 AWG	0.8~ 1.0 Nm
3KVA	12 AWG	1.2~ 1.6 Nm

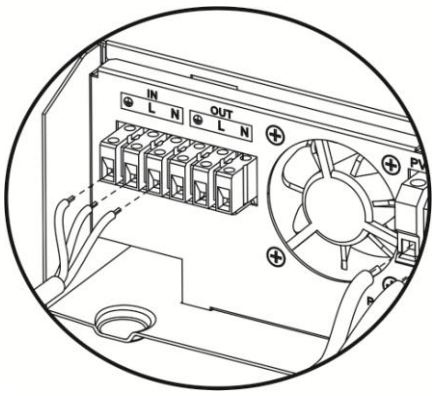
Please follow below steps to implement AC input/output connection:

1. Before making AC input/output connection, be sure to open DC protector or disconnector first.
2. Remove insulation sleeve 6mm for six conductors of 1KVA and 10mm for 2K/3KVA. And shorten phase L and neutral conductor N 3 mm.
3. Insert AC input wires according to polarities indicated on terminal block and tighten the terminal screws. Be sure to connect PE protective conductor (⏚) first.

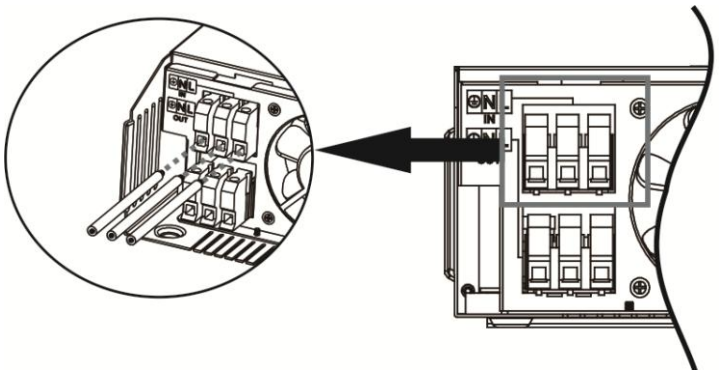
   L→LINE (brown or black)

   ⏚→Ground (yellow-green)

   N→Neutral (blue)



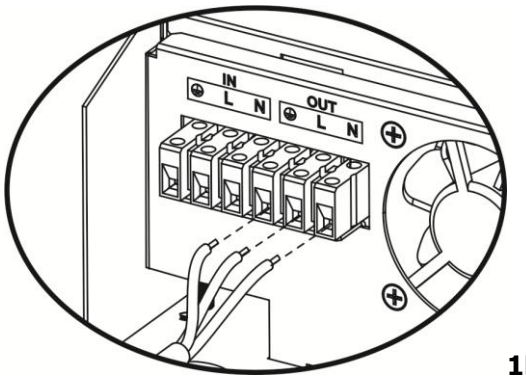
1KVA



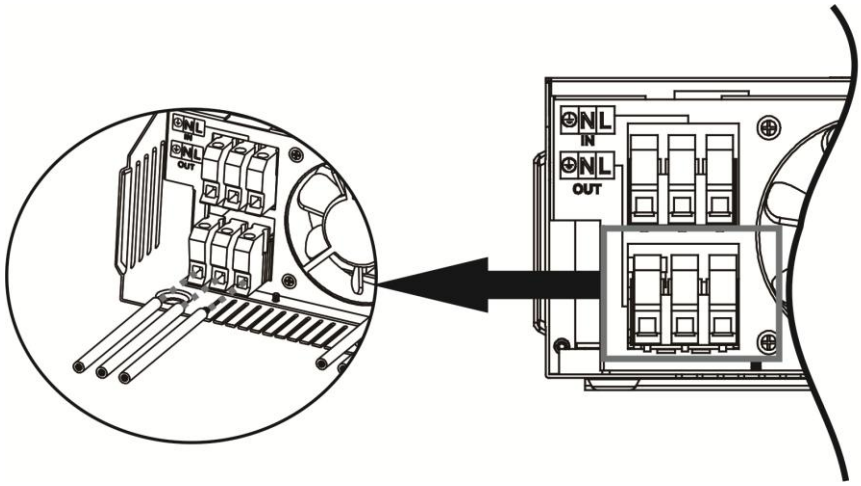
2KVA/3KVA

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

4. Then, insert AC output wires according to polarities indicated on terminal block and tighten terminal screws. Be sure to connect PE protective conductor (⏚) first.
   L→LINE (brown or black)
   ⏚**→Ground (yellow-green)**
   N→Neutral (blue)



1KVA



2KVA/3KVA

5. Make sure the wires are securely connected.

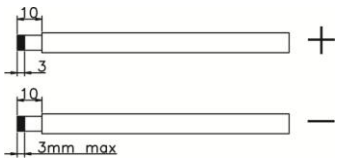
PV Connection (Only apply for the model with solar charger)

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

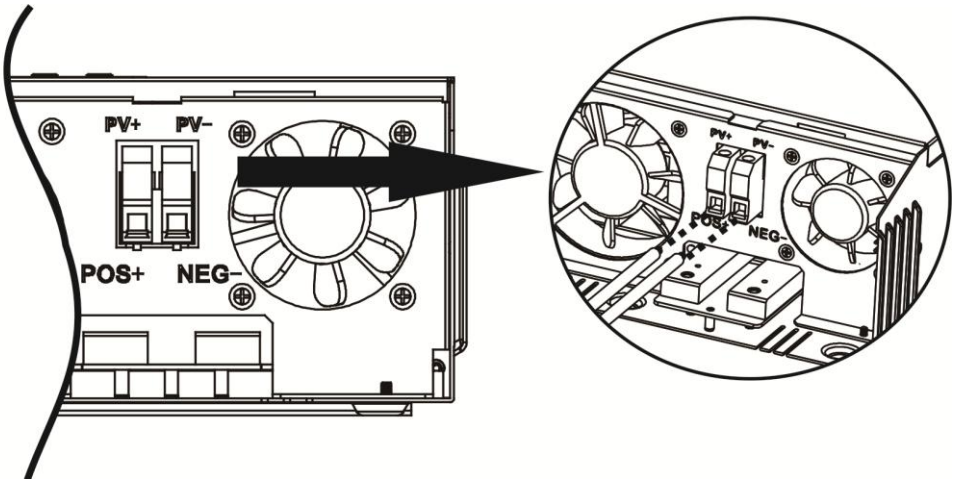
WARNING! All wiring must be performed by a qualified personnel.
WARNING! It's very important for system safety and efficient operation to use appropriate cable for PV module connection. To reduce risk of injury, please use the proper recommended cable size as below.

Model	Typical Amperage	Cable Size	Torque
1KVA/2KVA/3KVA	50A	8 AWG	1.4~1.6 Nm

Please follow below steps to implement PV module connection:



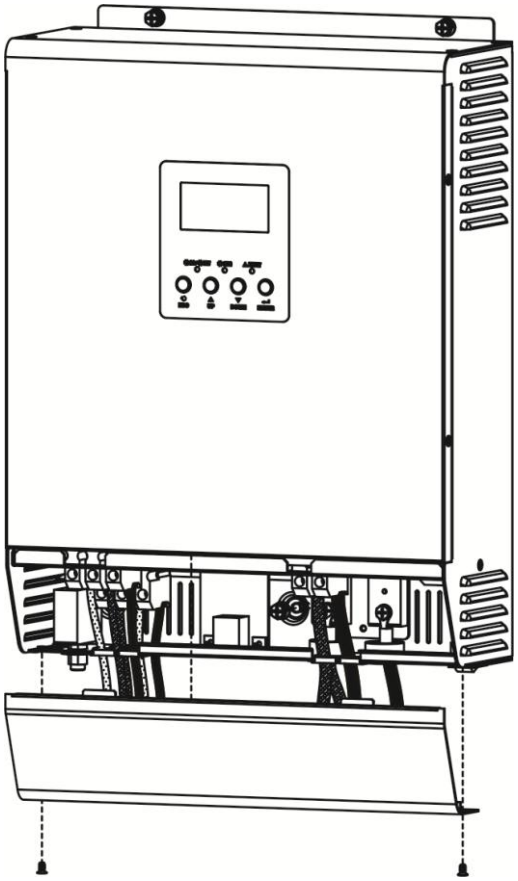
1. Remove insulation sleeve 10 mm for positive and negative conductors.
2. Check correct polarity of connection cable from PV modules and PV input connectors. Then, connect positive pole (+) of connection cable to positive pole (+) of PV input connector. Connect negative pole (-) of connection cable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

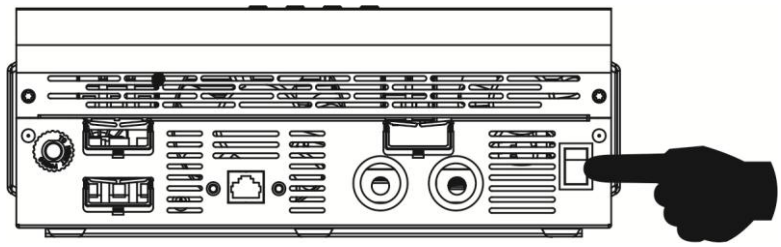


Communication Connection

This inverter/charger is equipped with a communication port to communicate with a PC with corresponding software. Please use supplied communication cable to connect to communication port of this inverter and RS-232 port of the PC. For the detailed software operation, please check user manual of bundled software.

OPERATION

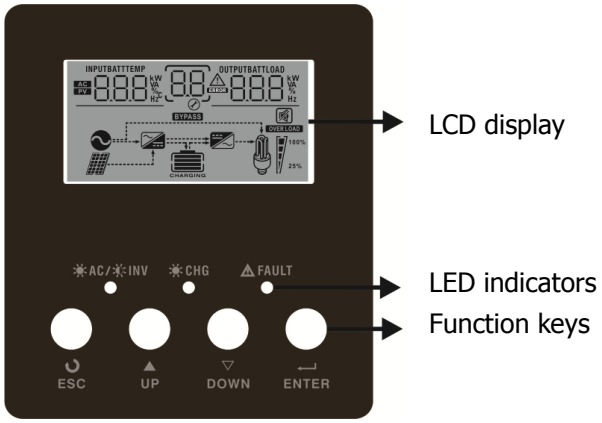
Power ON/OFF



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.



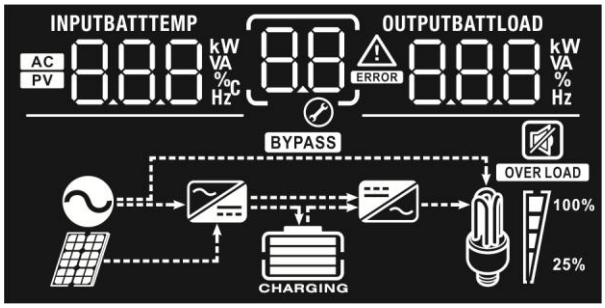
LED Indicator

LED Indicator			Messages
AC / INV	Green	Solid On	Output is available in bypass mode
		Flashing	Output is powered by battery in inverter mode
CHG	Green	Solid On	Battery is fully charged
		Flashing	Battery is charging.
⚠ FAULT	Red	Solid On	Fault mode
		Flashing	Warning mode

Function Keys

Function Key	Description
ESC	Exit setting mode
UP	To previous selection
DOWN	To next selection
ENTER	To confirm the selection in setting mode or enter setting mode

LCD Display Icons



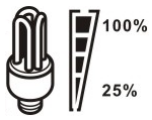
Icon	Function description
Input Source Information	
AC	Indicates the AC input.
PV	Indicates the PV input
INPUTBATT 888 kW VA %°C Hz	Indicate input voltage, input frequency, PV voltage, battery voltage and charger current.
Configuration Program and Fault Information	
88	Indicates the setting programs.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

In AC mode, it will present battery charging status.

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

In battery mode, it will present battery capacity.

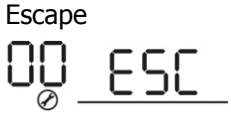
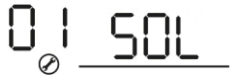
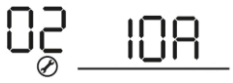
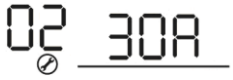
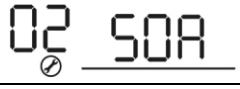
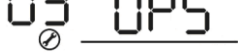
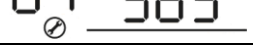
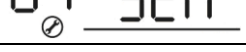
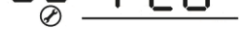
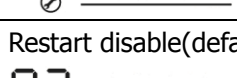
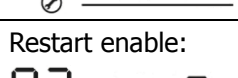
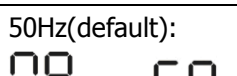
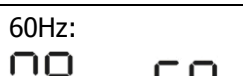
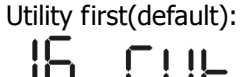
Load Percentage	Battery Voltage	LCD Display
Load >50%	< 1.717V/cell	
	1.717V/cell ~ 1.8V/cell	
	1.8 ~ 1.883V/cell	
	> 1.883 V/cell	
50%> Load > 20%	< 1.817V/cell	
	1.817V/cell ~ 1.9V/cell	
	1.9 ~ 1.983V/cell	
	> 1.983	
Load < 20%	< 1.867V/cell	
	1.867V/cell ~ 1.95V/cell	
	1.95 ~ 2.033V/cell	
	> 2.033	

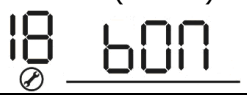
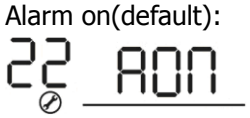
Load Information				
OVER LOAD	Indicates overload.			
	Indicates the load level by 0-24%, 25-50%, 50-74% and 75-100%.			
	0%~25%	25%~50%	50%~75%	75%~100%
				
Mode Operation Information				
	Indicates unit connects to the mains.			
	Indicates unit connects to the PV panel.			
BYPASS	Indicates load is supplied by utility power.			
	Indicates the utility charger circuit is working.			
	Indicates the DC/AC inverter circuit is working.			
Mute Operation				
	Indicates unit alarm is disabled.			

LCD Setting

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

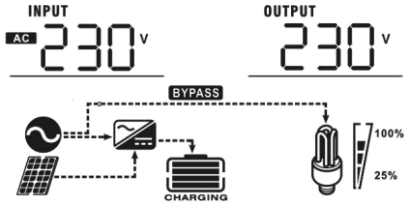
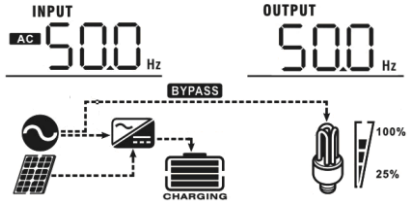
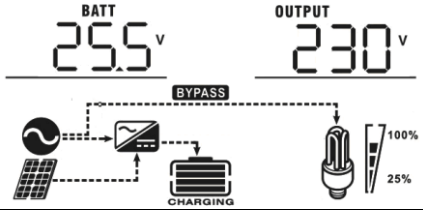
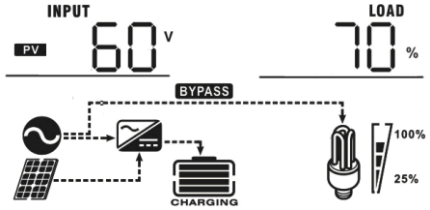
Setting Programs:

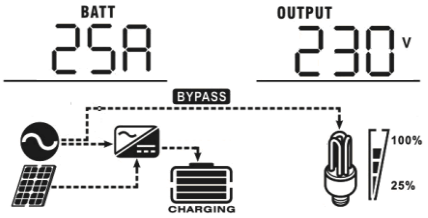
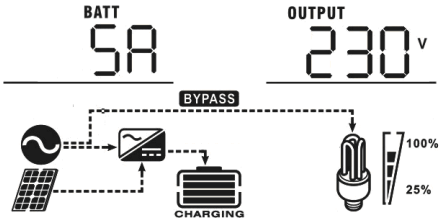
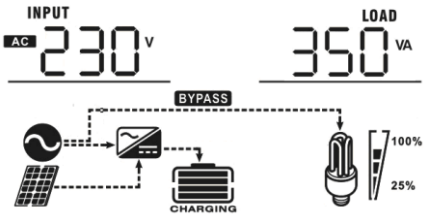
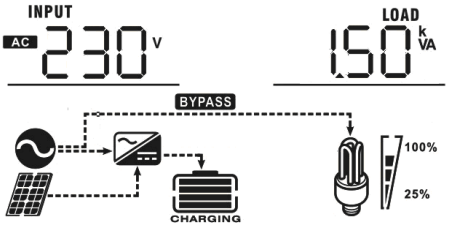
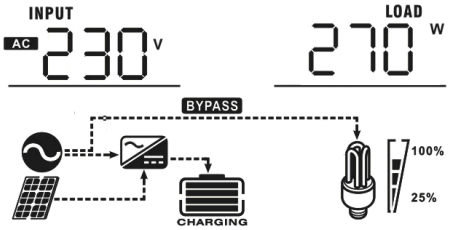
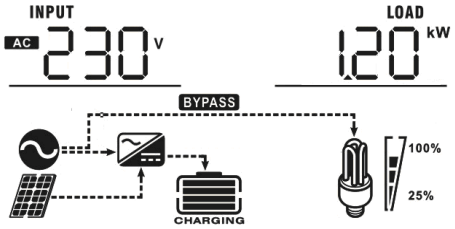
Program	Description	Selectable option	
00	Exit setting mode	Escape 	
01	Output source priority	Solar first: 	Utility first (default): 
02	Maximum charging current	10A: 	20A: 
		30A: 	40A: 
		50A (default): 	
03	AC input voltage range	Appliances(default): 	UPS: 
04	Power saving mode	Saving disable(default): 	Saving mode enable: 
05	Battery type	AGM(default): 	Flooded: 
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: 
16	Charger source priority	Solar first: 	Utility first(default):
		Solar and Utility: 	

18	Alarm control	Alarm on(default): 	Alarm off: 
20	Backlight control	Backlight on(default): 	Backlight off: 
22	Beeps while primary source is interrupted	Alarm on(default): 	Alarm off: 
25	Record Fault code	Record enable: 	Record disable(default): 

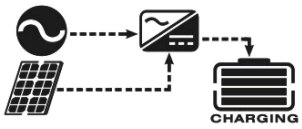
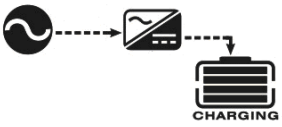
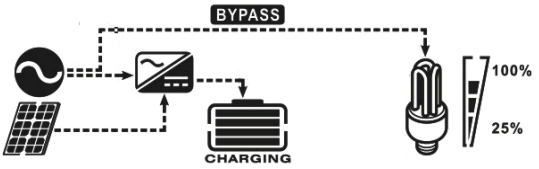
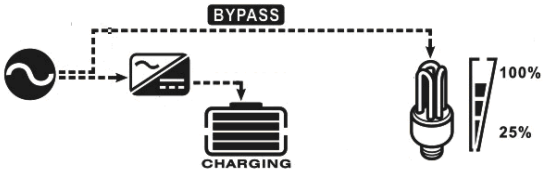
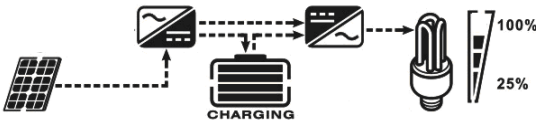
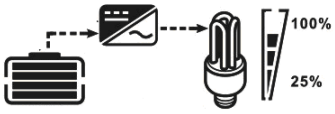
Display Setting

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

Selectable information	LCD display
Input voltage/Output voltage (Default)	Input Voltage=230V, output voltage=230V 
Input frequency/Output frequency	Input frequency=50Hz, Output frequency=50Hz 
Battery voltage/Output voltage	Battery voltage=25.5V 
PV voltage/Load percentage	PV voltage=60V, Load percent=70% 

Charging current/Output voltage	Current ≧ 10A  Current < 10A 
Input voltage/Load in VA	When load is lower than 1kVA, load in VA will presents 350V as below.  When load is larger than 1kVA (≧1KVA), load in VA will presents 1.5kVA as below: 
Input voltage/Load in Watt	When load is lower than 1kW, load in W will present 270W as below:  When load is larger than 1kW (≧1KW), load in W will present 1.2kW as below. 

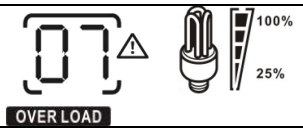
Operating Mode Description

Operation mode	Description	LCD display
Standby mode/ Fault mode/ Power saving mode	No output is supplied by the unit but it still can charge batteries.	Charging by utility and PV 
		Charging by utility 
		Charging by PV 
		No charging 
Line Mode	The unit will provide output power from the mains. It will also charge the battery at line mode.	Charging by utility and PV 
		Charging by utility 
Battery Mode	The unit will provide output power from battery and PV power.	Power from battery and PV power. 
		Power from battery only. 

Fault Reference Code

Fault Code	Fault Event	Icon on
01	Fan is locked	
02	Over temperature	
03	Battery voltage is too high	
04	Battery voltage is too low	
05	Output short circuited or Over temperature	
06	Output voltage is abnormal	
07	Over load time out	
08	Bus voltage is too high	
09	Bus soft start failed	
11	Main relay failed	

Warning Indicator

Warning Code	Warning Event	Audible Alarm	Icon flashing
01	Fan is locked	Beep three times every second	
03	Battery is over charged	Beep once every 1second	
04	Low battery	Beep once every 1 second	
07	Overload	Beep once every 0.5 second	
10	Power limitation	Beep twice every 3 seconds	

SPECIFICATIONS

Table 1 Line Mode Specifications

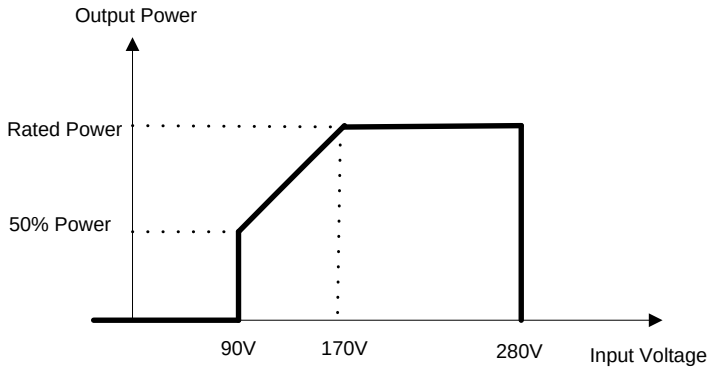
INVERTER MODEL	1KVA	2KVA	3KVA
Input Voltage Waveform	Sinusoidal (utility or generator)		
Nominal Input Voltage	230Vac		
Low Loss Voltage	170Vac±7V (UPS); 90Vac±7V (Appliances)		
Low Loss Return Voltage	180Vac±7V (UPS); 100Vac±7V (Appliances)		
High Loss Voltage	280Vac±7V		
High Loss Return Voltage	270Vac±7V		
Max AC Input Voltage	300Vac		
Nominal Input Frequency	50Hz / 60Hz (Auto detection)		
Low Loss Frequency	40±1Hz		
Low Loss Return Frequency	42±1Hz		
High Loss Frequency	65±1Hz		
High Loss Return Frequency	63±1Hz		
Output Short Circuit Protection	Circuit Breaker		
Efficiency (Line Mode)	>95% (Rated R load, battery full charged)		
Transfer Time	10ms typical (UPS); 20ms typical (Appliances)		
Power Limitation			

Table 2 Invert Mode Specifications

INVERTER MODEL	1KVA	2KVA	3KVA
Rated Output Power	1KVA/0.8KW	2KVA/1.6KW	3KVA/2.4KW
Output Voltage Waveform	Pure Sine Wave		
Output Voltage Regulation	230Vac±5%		
Output Frequency	50Hz		
Peak Efficiency	90%		
Overload Protection	5s@≥150% load; 10s@110%~150% load		
Surge Capacity	2* rated power for 5 seconds		
Nominal DC Input Voltage	12Vdc	24Vdc	
Cold Start Voltage	11.5Vdc	23.0Vdc	
Low DC Warning Voltage @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	 11.0Vdc 10.7Vdc 10.1Vdc	 22.0Vdc 21.4Vdc 20.2Vdc	
Low DC Warning Return Voltage @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	 11.5Vdc 11.2Vdc 10.6Vdc	 23.0Vdc 22.4Vdc 21.2Vdc	
Low DC Cut-off Voltage @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	 10.5Vdc 10.2Vdc 9.6Vdc	 21.0Vdc 20.4Vdc 19.2Vdc	
High DC Recovery Voltage	14Vdc	29Vdc	
High DC Cut-off Voltage	15Vdc	30Vdc	
No Load Power Consumption	<15W	<20W	
Saving Mode Power Consumption	<5W	<10W	

Table 3 Charge Mode Specifications

INVERTER MODEL	1KVA	2KVA	3KVA
Charging Algorithm	3-Step		
Utility Charging Mode			
Charging Current (UPS)	10/20Amp	20/30Amp (@$V_{I/P}$=230Vac)	
Charging Floating Voltage	13.5Vdc	27Vdc	
Solar Charging Mode			
Charging Current (PWM)	50Amp		
System DC Voltage	12Vdc	24Vdc	
Max. PV Array Open Circuit Voltage	125Vdc		
Standby Power Consumption	1W	2W	
DC Voltage Accuracy	+/-0.3%		

Table 4 General Specifications

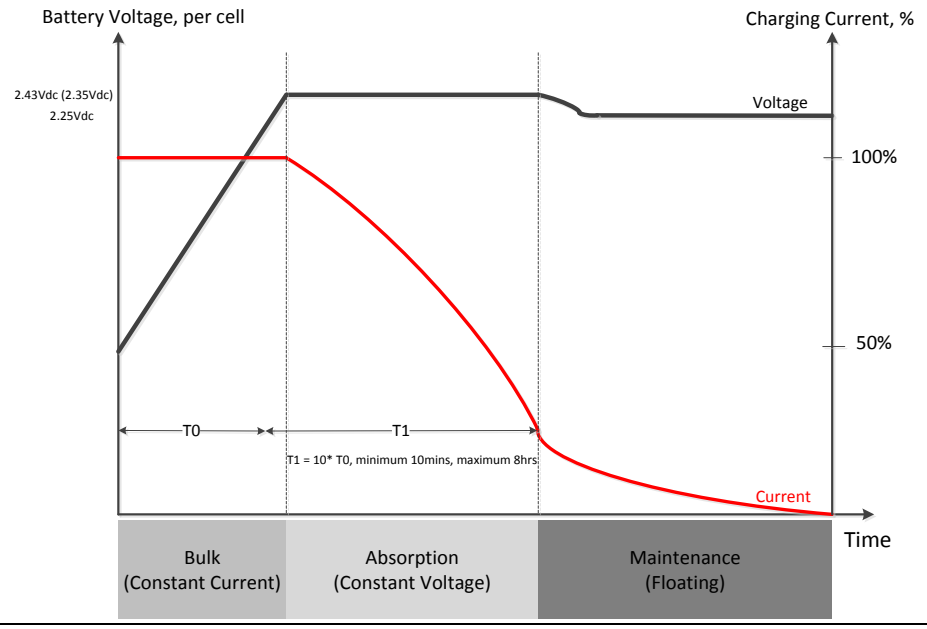
INVERTER MODEL	1KVA	2KVA	3KVA
Safety Certification	CE		
Operating Temperature Range	0°C to 55°C		
Storage temperature	-15°C~ 60°C		
Dimension (D*W*H), mm	95 x 240 x 316	100 x 272 x 355	
Net Weight, kg	5.0	6.35	6.85

Charging Controls

Voltage Setting

Battery Type	Boost CC, CV	Float
	12/24	12/24
Flooded	14.6/29.2	13.5/27.0
AGM / Gel	14.1/28.2	13.5/27.0

Charging Curve



TROUBLE SHOOTING

Problem	LCD/LED/Buzzer	Explanation / Possible cause	What to do
Unit shuts down automatically during startup process.	LCD/LEDs and buzzer will be active for 3 seconds and then complete off.	The battery voltage is too low (<1.91V/Cell)	1. Re-charge battery. 2. Replace battery.
No response after power on.	No indication.	1. The battery voltage is far too low. (<1.4V/Cell) 2. Battery polarity is connected reversed.	1. Check if batteries and the wiring are connected well. 2. Re-charge battery. 3. Replace battery.
Mains exist but the unit works in battery mode.	Input voltage is displayed as 0 on the LCD and green LED is flashing.	Input protector is tripped	Check if AC breaker is tripped and AC wiring is connected well.
	Green LED is flashing.	Insufficient quality of AC power (Shore or Generator)	1. Check if AC wires are too thin and/or too long. 2. Check if generator (if applied) is working well, or check if input voltage range setting is correct (UPS→Appliance)
	Green LED is flashing.	Set Solar power as the priority of output source	Change output source priority to Utility first.
When the unit is turned on, internal relay is switched on and off repeatedly.	LCD display and LEDs are flashing.	Battery is disconnected.	Check if battery wires are connected well.
Buzzer beeps continuously and red LED is on.	Fault code 07.	Overload error. The inverter is loaded with more than 110% load and time is up	Reduce the connected load by switching off some equipment.
	Fault code 05.	Output short circuited.	Check if wiring is connected well and remove abnormal load.
		Temperature of internal converter component is over 120°C.	Check whether the air flow of the unit is blocked or whether the ambient temperature is too high.
	Fault code 02.	Internal Inverter component over 100°C	
	Fault code 03.	Battery is over charged.	Return to repair center.
		The battery voltage is too high.	Check if spec and quantity of batteries are meet requirements.
	Fault code 01.	Fan fault	Replace the fan.
	Fault code 06.	Output abnormal (Inverter voltage below than 190Vac or is higher than 260Vac)	1. Reduce the connected load. 2. Return to repair center
	Fault code 08.	Internal components failed.	Return to repair center
	Fault code 09.		

Appendix: Approximate Back-up Time Table

Model	Load (VA)	Backup Time @ 12Vdc 100Ah (min)	Backup Time @ 12Vdc 200Ah (min)
1KVA	100	766	1610
	200	335	766
	300	198	503
	400	139	339
	500	112	269
	600	95	227
	700	81	176
	800	62	140
	900	55	125
	1000	50	112

Model	Load (VA)	Backup Time @ 12Vdc 100Ah (min)	Backup Time @ 12Vdc 200Ah (min)
2KVA	200	766	1610
	400	335	766
	600	198	503
	800	139	339
	1000	112	269
	1200	95	227
	1400	81	176
	1600	62	140
	1800	55	125
	2000	50	112

Model	Load (VA)	Backup Time @ 12Vdc 100Ah (min)	Backup Time @ 12Vdc 200Ah (min)
3KVA	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

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.