# User Manual

Swipower

## SRG-2200VA/SRG-3200VA

## INVERTER / CHARGER



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# ABOUT THIS MANUAL

## Purpose

This manual introduces the assembly, installation, operation and troubleshooting of inverter. Please read this manual carefully before installation and operation.

## Target Group

This manual is designed for professionals and end users. Operations that do not require any specific skills can also be handled by the end users themselves. Professionals must have the following skills:

- Understand how the inverter works and operates
- After training, someone knows that how to deal with crises and risks in the installation and use of electrical equipment and devices
- After training, someone knows that how to install and commission electrical equipment and fixtures
- Understand the applicable standards and directives
- Understand and abide by this manual and all safety knowledge

# SAFETY REGULATIONS

⚠ **Warning: This article contains important safety and operation instructions. Please read and save this manual for future reference.**

1. Please choose the corresponding setting according to whether to use lead-acid battery or lithium battery. If it is not set properly, the system may not operate normally.
2. Before using the unit , please read all the instructions and cautionary on the unit and understand all battery models and relevant chapters in this manual.
3. Never short-circuit AC output and DC input. Never connect the mains when the DC input is short-circuited.
4. Never charge a non-rechargeable battery.
5. Do not disassemble the unit. When maintenance or repair is needed, please send it to the professional technical service center. Incorrect reassembly may lead to electric shock or fire.
6. To reduce the risk of electric shock, disconnect all wiring before attempting any maintenance or cleaning. Turning off the device will not reduce this risk.
7. Be extra careful when using metal tools on or around the battery. Some potential risks, such as short circuit of batteries or other electronic components caused by sparks caused by falling tools, may lead to explosion.
8. In order to realize the optimal operation of this off grid solar inverter, please select the appropriate cable size according to the instruction. It is very important to operate the off grid solar inverter correctly.
9. When disconnecting AC or DC terminals, please strictly follow the installation procedure. For more details, please refer to "Installation" in this manual.
10. Grounding instruction this off grid solar inverter shall be connected to the permanent grounding wiring system. Be sure to comply with local requirements and regulations to install this inverter.
11. Provide a fuse that meets certain specifications for battery power supply as overcurrent protection.
12. **Warning! !** Only professional service personnel can repair this equipment. If there are still errors after troubleshooting, please send this off line solar inverter back to the local dealer or service center for maintenance.

# INTRODUCTION

This is a multifunctional off grid solar inverter, which integrates MPPT solar charging controller, high-frequency pure sine wave inverter and UPS function module, and is very suitable for off-grid backup power supply and spontaneous self-use system. The design of high-frequency transformer enables the machine to provide reliable power conversion in a small size.

The whole system also needs other equipment to achieve complete operation, such as photovoltaic modules, generator or utility grid. According to your requirements, please consult your system integrator to obtain other possible system components. WiFi module is a plug-and-play monitoring device installed on the inverter. With this device, users can monitor the running status of solar system anytime and anywhere through mobile phones or websites.

## Features

- Pure sine wave output inverter
- According to the requirements of load (household appliances/personal computers), the input voltage range of utility grid can be selected
- According to the battery requirements, the charging current can be set through LCD
- Solar energy and utility grid can power loads at the same time
- AC intput is compatible with mains and generator
- Automatic restart function when mains power is restored
- Overload/ Over temperature/ short circuit protection
- The intelligent charging design of battery makes the battery more fully utilized
- RS485 port Used for communication with BMS
- Cold start function
- Intelligent fan speed adjustment, which adjusts the fan speed according to temperature, load and charging current
- Built-in MPPT, operating voltage range 55V~430V, open circuit voltage 450Voc
- WIFI remote monitoring (optional)

## 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 mains electricity
- Solar module (optional)

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 a ir conditioner.

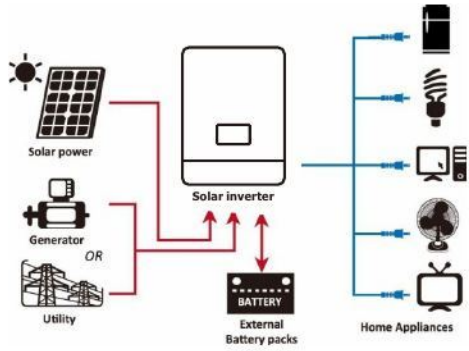
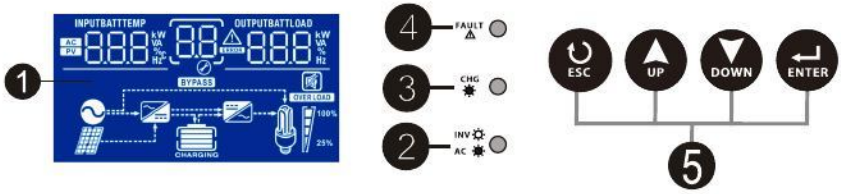
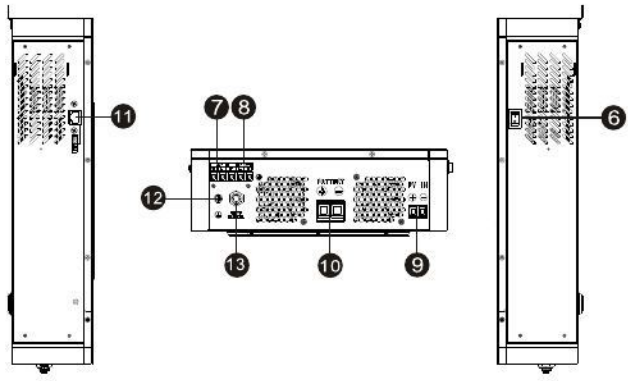



Figure 1 Hybrid Power System

# Product Overview




1. LCD screen
2. Status indicator
3. Charging indicator
4. Fault indicator
5. Function keys
6. Power on/off
7. AC input
8. AC output
9. PV input
10. Battery input
11. RS232/RS485 communication port
12. Ground wire terminal
13. Circuit breaker



# INSTALLATION

## Unpacking And Inspection

Unpack the inverter and make sure there are no damaged objects in the package. You should have received the following items inside of package:

- Machine x 1
- User manual x 1

## Preparation Before Installation

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

## Installation

Please consider the following points before installing the equipment:

1. Do not install the inverter on flammable building materials;
2. Install on a solid surface;
3. Install this inverter at eye level in order to allow the LCD display to be read at all times;
4. Leave a gap of 20-50 cm for ventilation and heat dissipation of the equipment;
5. The equipment working environment temperature should be 0-55°C;
6. It is the best to install it vertically down against the wall, leaving a certain space with the ground.

⚠ **SUITABLE FOR INSTALLATION ON CONCRETE OR OTHER NON-COMBUSTIBLE SURFACE ONLY**

Tighten the screws and fix the installation. Machine fixing screws: M4 or M5 screws are recommended.

# Battery Connection

## Lead-Acid Battery Connection

**WARNING:** In order to operate safely and comply with laws and regulations, it is required to install an independent DC overcurrent protector or disconnect device between the battery and the inverter.

**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 as below.

Recommended battery cable specifications:

| Model | Wire specification | | Torque value |
|---|---|---|---|
| 2.2KVA-12V | 1 * 4 AWG | 22mm2 | 2-3 Nm |
| 3.2KVA-24V | 1 * 6 AWG | 13mm2 | 2-3 Nm |

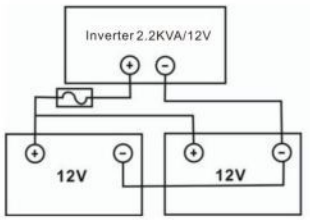
**Note: The recommended charging current of lead-acid battery is 0.2C (C is battery capacity).**

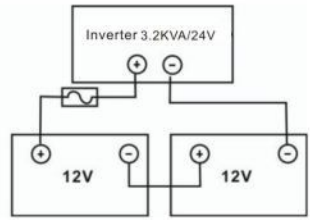
Please follow below steps to implement battery connection:

1. Connect the battery according to the recommended battery cable specifications.
2. Connect all battery packs as needed.
3. Insert the ring terminal of the battery cable into the battery connector of the inverter flatly, and ensure that the bolts are tightened with a torque of 2-3 Nm. Make sure that the polarities of the battery and inverter are connected correctly, and tighten the ring terminal with the battery terminal.

| | |
|---|---|
| ⚠ | **WARNING:** Shock Hazard<br>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,It may cause short circuit or overheating. |
| ⚠ | **CAUTION! !** Do not apply antioxidant to the terminal before it is tightly connected. |
| ⚠ | **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(-). |

4. Connect all battery packs in the following table.



## Lithium Battery Connection

If choosing lithium battery for the inverter, only lithium batteries that have been matched with BMS communication protocol are allowed.

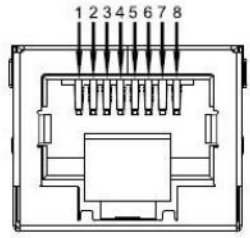
1. Connect the battery according to the recommended battery cable specifications.
2. Insert the ring terminal of the battery cable into the battery connector of the inverter flatly, and ensure that the bolts are tightened with a torque of 2-3 Nm. Make sure that the polarities of the battery and inverter are connected correctly, and that the ring terminal is tightened with the battery terminal.
3. Connect one side of RJ45 cable to the BMS communication port of inverter.
4. Insert the other side of RJ45 cable into RS485 communication port on lithium battery.

**Note:** If you choose a lithium battery, please make sure to connect the battery and inverter with BMS communication cable, and select the battery type as "LIB" mode.

## Communication And Setting Of Lithium Battery

1. Connect the RJ45 communication cable between inverter and battery. Please confirm that the lithium battery BMS port's PIN is correspond with the inverter BMS communication port. The inverter BMS port's PIN definition as below:

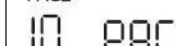
| Pin number | Port definitions |
|---|---|
| 1 | TX |
| 2 | RX |
| 3 | VCC |
| 4 | VCC |
| 5 | RS485A |
| 6 | RS485B |
| 7 | GND |
| 8 | GND |




Communication port pin definition

2. In order to communicate with the lithium battery BMS, you should press the "ENTER" button for a long time, and set the battery type as "LIB" in program 05. Then select the matching battery protocol in Program 10 .

| | | |
|---|---|---|
| 05 | Battery type | AGM (default)<br>05 AGn |
| | | Flooded<br>05 FLd |
| | | User Defined<br>05 USE |
| | | Lithium battery mode<br>05 Lib |

| | | |
|---|---|---|
| 10 | Lithium battery protocol | PYLON<br><br>PACE<br> |

3. In "LIB" mode, press and hold the "ESC" button to view the information of the lithium battery, and the inverter display screen will enter the following screen (the initial interface shows the total battery voltage and remaining battery capacity).
Press the "DOWN" button to display the following data in turn.

| | |
|---|---|
| Battery voltage | The remaining battery capacity |
| Battery charging current | Battery discharge current |
| The rated capacity of the battery | Cycle charge and discharge times |
| BMS board temperature | MOS temperature |
| The maximum voltage of single battery cell | The minimum voltage of single battery cell |
| The maximum temperature of single battery | The minimum temperature of single battery |

## Battery Alarm Code

| Alarm code | Alarm event | Icon flashing |
|---|---|---|
| 21 | Battery Cell Over Voltage |  |
| 22 | Battery Cell Under Voltage |  |
| 23 | Battery Pack Over Voltage |  |
| 24 | Battery Pack Under Voltage |  |
| 25 | Charging Over Current |  |
| 26 | Discharging Over Current |  |
| 27 | Charging Cell Over Temperature |  |
| 28 | Discharging Cell Over Temperature |  |
| 29 | Charging Cell Under Temperature |  |
| 30 | Discharging Cell Under Temperature |  |
| 34 | Battery capacity is too low |  |
| 44 | Battery Cell Voltage Imbalance |  |
| 45 | Battery Cell Temperature Imbalance |  |
| 46 | Internal Communication Alarm |  |

## Battery fault code

| Fault code | Fault event | The icon is long and bright |
|---|---|---|
| 21 | Battery Cell Over Voltage |  |
| 22 | Battery Cell Under Voltage |  |
| 23 | Battery Pack Over Voltage |  |
| 24 | Battery Pack Under Voltage |  |
| 25 | Charging Over Current |  |
| 26 | Discharging Over Current |  |
| 27 | Charging Cell Over Temperature |  |
| 28 | Discharging Cell Over Temperature |  |
| 29 | Charging Cell Under Temperature |  |
| 30 | Discharging Cell Under Temperature |  |
| 31 | Ambient Over Temperature |  |
| 32 | Ambient Under Temperature |  |
| 33 | MOS Over Temperature |  |
| 35 | Battery Short Circuit |  |
| 36 | Charge Overvoltage |  |
| 37 | System Failure |  |
| 39 | Charging MOS Fault |  |
| 40 | Discharge MOS Fault |  |
| 41 | Temperature Sensor Fault |  |
| 42 | Battery Cell Fault |  |
| 43 | Sampling Communication Failure |  |
| 61 | Communication Failure |  |

# AC Input/Output Connection

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

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

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

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

Suitable cable specifications for AC wires

| Model | Wire Gauge | Torque Value |
|---|---|---|
| 2.2KVA-12V | 1 * 12 AWG | 1.2-1.6 Nm |
| 3.2KVA-24V | 1 * 10 AWG | 1.2-1.6 Nm |

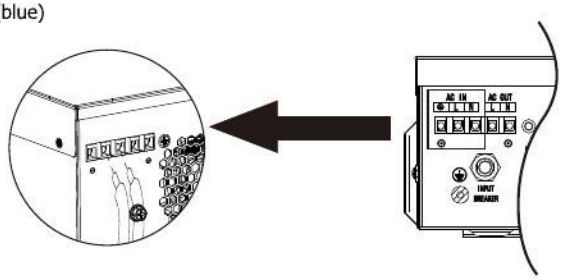
Please follow below steps to implement AC input/output connection:

1. Before making AC input/output connection, be sure to open DC protector or disconnector first.
2. Remove insulation sleeve 10mm for six conductors. 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.

   ⏚→Ground (yellow-green)

   **L**→ LINE (brown or black)

   **N**→ Neutral (blue)

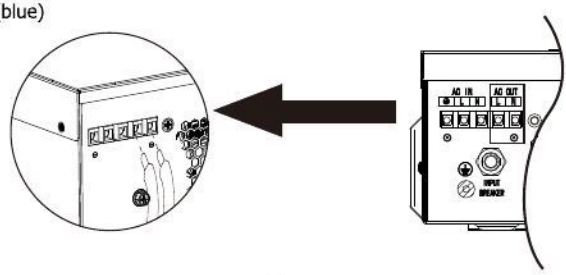



| | |
|---|---|
| ⚠ | **WARNING:**<br>**Be sure that AC power source is disconnected before attempting to hardwire it to the unit.** |

4. Then, insert the AC output conductor according to the polarity identification at the terminal, and tighten the screw.

   **L**→ LINE (brown or black)

   **N**→ Neutral (blue)



5. Make sure the wires are firmly connected.

| | |
|---|---|
|  | **CAUTION:** Please ensure that all AC cables are connected correctly according to the corresponding polarity. |
|  | **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 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 the PV module, please install separately a DC circuit breaker between the inverter and PV module.
**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 | Wire Gauge | Torque Value |
|---|---|---|
| 2.2KVA-12V | 1 * 16 AWG | 1.2-1.6 Nm |
| 3.2KVA-24V | 1 * 16 AWG | 1.2-1.6 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.

| Model | 2.2KVA-12V | 3.2KVA-24V |
|---|---|---|
| **PV open circuit voltage** | 450Vdc | |
| **MPPT operating voltage range** | 55Vdc~430Vdc | |

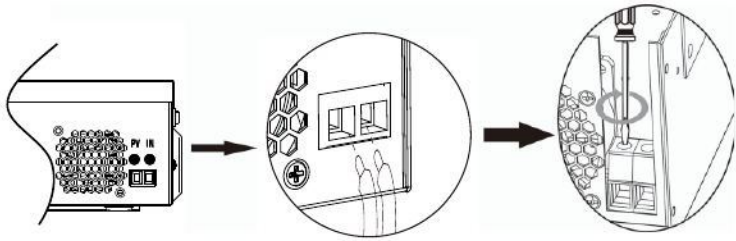
Take 250Wp PV module as an example. After considering above two parameters, the recommended module configurations are listed as below table:

| Solar panel parameters<br>-250Wp<br>-Vmp: 30.1Vdc<br>-Imp: 8.3A<br>-Voc: 37.7Vdc<br>-Isc: 8.4A<br>-Cells: 60 | Solar Input<br>Range (Min in serial: 6 pcs, max in serial: 11 pcs) | Q'ty of panels | Total Input |
|---|---|---|---|
| | 3 pcs in serial | 3 | 750W |
| | 4 pcs in serial | 4 | 1000W |
| | 5 pcs in serial | 5 | 1250W |
| | 6 pcs in serial | 6 | 1500W |
| | 8 pcs in serial | 8 | 2000W |
| | 11 pcs in serial | 11 | 2750W |

3. Equipment Assembly

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.



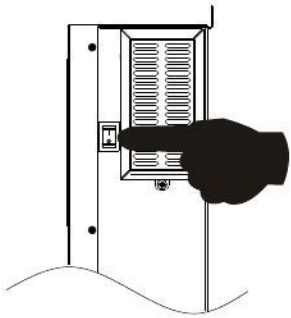

## Final Assembly

After connecting all the wires, put the bottom cover back and screw the screws.

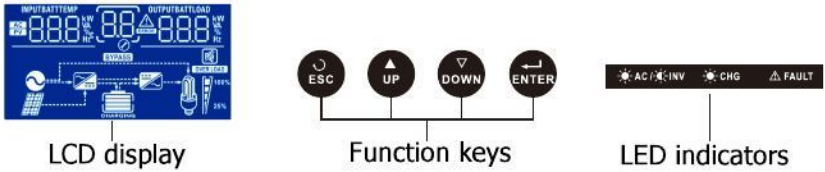
# OPERATION

## Power On/Off

After installing the machine correctly and connecting the battery correctly, just press the On/Off switch to turn on the machine.



## Operation And Display




The operation and display panel is shown in the following figure, which is located on the front panel of the inverter. It includes four function keys and an LCD screen for indicating operationstatus and input/output power information.

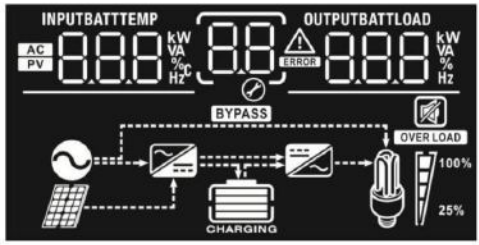
## LED Indicator

| LED Indicator | | | Messages |
|---|---|---|---|
| AC/INV | Green | Solid On | Output is powered by utility in Line mode. |
| | | Flashing | Output is powered by battery or PV in battery mode. |
| CHG | Green | Solid On | Battery is fully charged. |
| | | Flashing | Battery is charging. |
| ⚠ FAULT | Red | Solid On | Fault occurs in the inverter. |
| | | Flashing | Warning condition occurs in the inverter. |

# Function Keys

| Function Key | Description |
|---|---|
| ESC | To exit setting mode |
| UP | To go to previous selection |
| DOWN | To go 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 | Indicate input voltage, input frequency, PV voltage, battery voltage and charger current. | |
| Configuration Program and Fault Information | | |
| | Indicates the setting programs. | |
| | Flashing with warning code. | |
| | Lighting with fault code | |
| Output Information | | |
| OUTPUTBATTLOAD | Indicate output voltage, output frequency, load percent, load in VA, load in Watt and discharging current. | |
| Battery Information | | |
| CHARGING | Indicates battery level by 0-24%, 25-49%, 50-74% and 75-100% in battery mode and charging status in line mode. | |
| In AC mode, it will present battery charging status. | | |
| Status | Battery voltage | LCD Display |
| Constant Current mode/ Constant Voltage mode | <2V/cell | 4 bars will flash in turns. |
| | 2 ~ 2.083V/cell | Bottom bar will be on and the other three bars will flash in turns. |
| | 2.083 ~ 2.167V/cell | Bottom two bars will be on and the other two bars will flash in turns. |
| | > 2.167 V/cell | Bottom three bars will be on and the |

| | | |
|---|---|---|
| | | top bar will flash. |
| Floating mode. Batteries are fully charged. | | 4 bars will be on. |
| In battery mode, it will present battery capacity. | | |
| Load Percentage | Battery Voltage | LCD Display |
| Load >50% | < 1.717V/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 |  |
| | > 1.983V/cell |  |
| Load< 20% | < 1.867V/cell |  |
| | 1.867V/cell ~ 1.95V/cell |  |
| | 1.95 ~ 2.033V/cell |  |
| | > 2.033 V/cell |  |

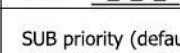
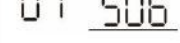
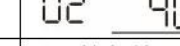
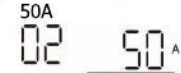
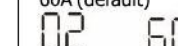
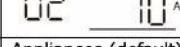
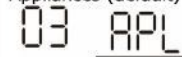
| Load Information | | | | |
|---|---|---|---|---|
| OVER LOAD | Indicates overload. | | | |
|   | Indicates the load level by 0-24%, 25-50%, 50-74% and 75-100%. | | | |
| | 0~24% | 25~50% | 50%~75% | 75%-100% |
| |  |  |  |  |

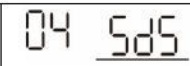
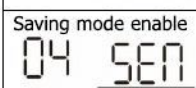
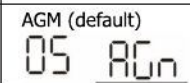
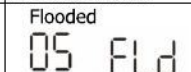
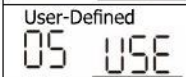
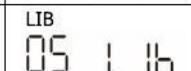
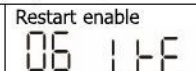
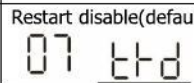
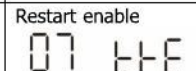
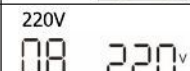
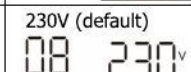
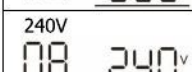
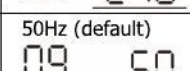
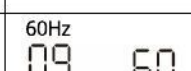
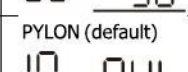
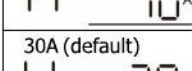
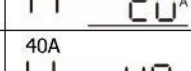
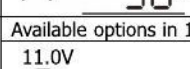
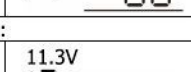
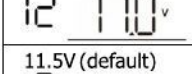
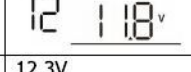
| Mode Operation Information | |
|---|---|
|  | Indicates unit connects to the mains. |
|  | Indicates unit connects to the PV panel. |
| BYPASS | Indicates load is supplied by utility power. |
|  | Indicates the utility charger circuit is working. |
|  | Indicates the DC/AC inverter circuit is working. |
|  | Indicates unit alarm is disabled. |

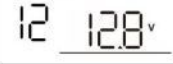
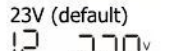
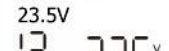
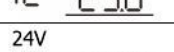
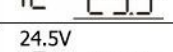
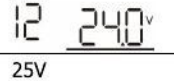
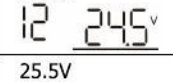
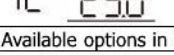
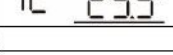
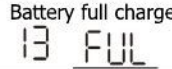
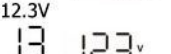
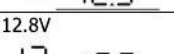
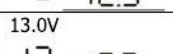
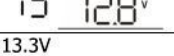
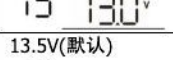
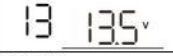
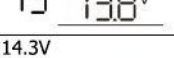
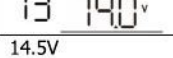
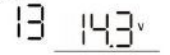
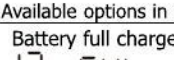
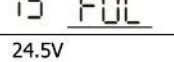
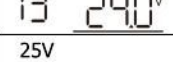
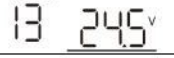
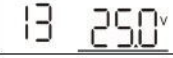
# LCD Setting

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.

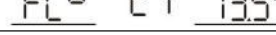
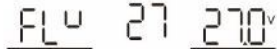
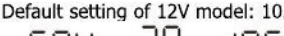
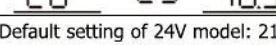
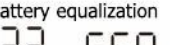
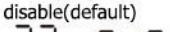
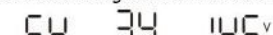
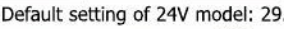
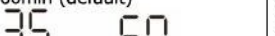
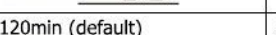
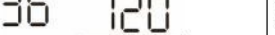
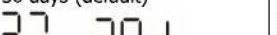
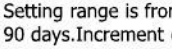
**Setting Programs:**

| Option | Describe | Optional Item | |
|---|---|---|---|
| 00 | Exit setting mode | Escape  | |
| 01 | Output source priority: To configure load power source priority | SUB priority (default)  | Solar energy gives priority to supplying power to the load. If solar energy can't effectively provide all connected loads, Utility will provide power to the loads at the same time. |
| | | SBU priority  | Solar energy gives priority to supplying power to the load. If solar energy cannot effectively provide all connected loads, the battery will supply power to the loads at the same time.Utility provides power to the loads only when battery voltage drops to either low-level warning voltage or the setting point in program 12. |
| 02 | Maximum charging current: To configure total charging current for solar and utility chargers. | 10A  | 20A  |
| | | 30A  | 40A  |
| | | 50A  | 60A (default)  |
| | | 70A  | 80A  |
| 03 | Ac input voltage range | Appliances (default)  | If selected, acceptable AC input voltage range will be within 90-280VAC. |
| | | UPS  | If selected, acceptable AC input voltage range will be within 170-280VAC. |
| | | Saving mode disable(default) | If disabled, no matter connected load is low or |

| | | | |
|---|---|---|---|
| 04 | Power saving mode enable/disable |  | high, the on/off status of inverter output will not be effected. |
| | | Saving mode enable  | If enabled, the output of inverter will be off when connected load is pretty low or not detected. |
| 05 | Battery type | AGM (default)  | Flooded  |
| | | User-Defined  | LIB  |
| | | If USE or LIB is selected, battery charge voltage and low DC cut-off voltage can be set up in program 26, 27 and 29. | |
| 06 | Auto restart when overload occurs | Restart disable(default)  | Restart enable  |
| 07 | Auto restartwhen over temperature occurs | Restart disable(default)  | Restart enable  |
| 08 | Output voltage | 220V  | 230V (default)  |
| | | 240V  | |
| 09 | Output frequency | 50Hz (default)  | 60Hz  |
| 10 | Lithium battery protocol | PYLON (default)  | PACE  |
| 11 | Maximum Utility charging current | 10A  | 20A  |
| | | 30A (default)  | 40A  |
| | | 50A  | 60A  |
| 12 | Setting voltage point back to utility source when selecting"SBU priority" | Available options in 12V models: | |
| | | 11.0V  | 11.3V  |
| | | 11.5V (default)  | 11.8V  |
| | | 12.0V  | 12.3V  |

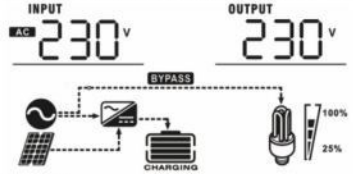
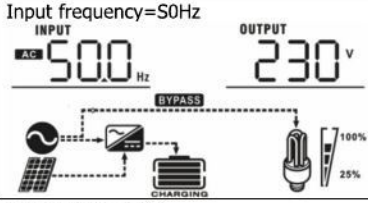
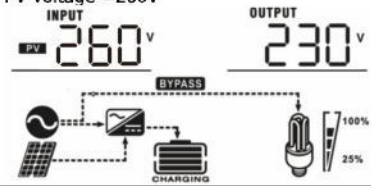
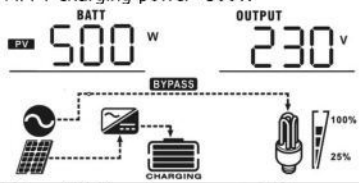
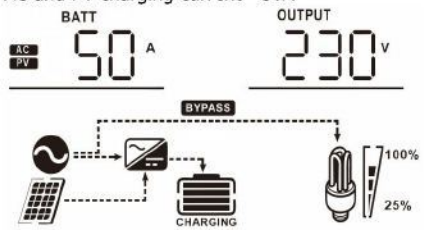
| | | | |
|---|---|---|---|
| | | 12.5V  | 12.8V  |
| | | Available options in 24V models: | |
| | | 22V  | 22.5V  |
| | | 23V (default)  | 23.5V  |
| | | 24V  | 24.5V  |
| | | 25V  | 25.5V  |
| 13 | Setting voltage point back to battery mode when selecting "SBU priority" in program 01 | Available options in 24V models: | |
| | | Battery full charged  | 12.0V  |
| | | 12.3V  | 12.5V  |
| | | 12.8V  | 13.0V  |
| | | 13.3V  | 13.5V(默认)  |
| | | 13.8V  | 14.0V  |
| | | 14.3V  | 14.5V  |
| | | Available options in 24V models: | |
| | | Battery full charged  | 24V  |
| | | 24.5V  | 25V  |
| | | 25.5V  | 26V  |
| | | 26.5V  | 27V (default)  |
| | | 27.5V  | 28V  |
| | | 28.5V | 29V |

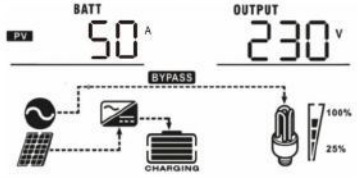
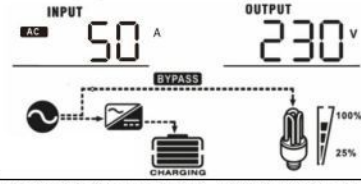
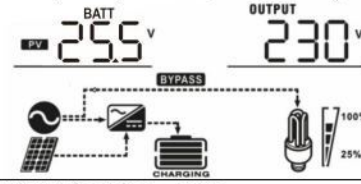
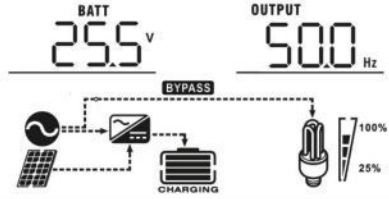
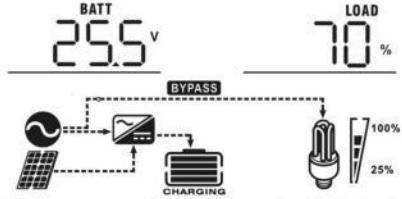
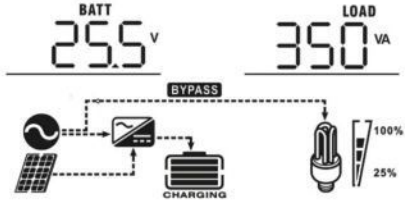
| | | | |
|---|---|---|---|
| | | 13 28.5V | 13 29.0V |
| 16 | Charger source priority:<br>To configure charger source priority | If this inverter/charger is working in Line,Standby or Fault mode, charger source can be programmed as below: | |
| | | Solar first<br>16 CSO | Solar energy will charge battery as first priority. Utility will charge battery only when solar energy is not available. |
| | | Solar and Utility(default)<br>16 SNU | Solar energy and utility will charge battery at the same time. |
| | | Only Solar<br>16 OSO | Solar energy will be the only charger source no matter utility is available or not. |
| | | If this inverter/charger is working in Battery mode or Power saving mode, only solar energy can charge battery. Solar energy will charge battery if it's available and sufficient. | |
| 18 | Alarm control | Alarm on (default)<br>18 bON | Alarm off<br>18 bOF |
| 19 | Auto return to default display screen | Return to default display screen(default)<br>19 ESP | If selected, no matter how users switch display screen, it will automatically return to default display screen (Input voltage /output voltage) after no button is pressed for 1 minute. |
| | | Stay at latest screen<br>19 tEP | If selected, the display screen will stay at latest screen user finally switches. |
| 20 | Backlight control | Backlight on(default)<br>20 LON | Backlight off<br>20 LOF |
| 22 | Beeps while primary source is interrupted | Alarm on (default)<br>22 AON | Alarm off<br>22 AOF |
| 23 | Overload bypass: When enabled, the unit will transfer to line mode if overload occurs in battery mode. | Bypass disable (default)<br>23 byd | Bypass enable<br>23 byE |
| 25 | Record fault code | Record enable<br>25 FEN | Record disable(default)<br>25 FdS |
| 26 | Bulk charging voltage<br>(C.V voltage) | Default setting of 12V model: 14.1V<br>CV 26 14.1V | |
| | | Default setting of 24V model: 28.2V<br>CV 26 28.2V | |
| | | If USE or LIB is selected in program 5, this program can be set up. Set voltage range, 12V model: from 12V to 14.6V; 24V model: from 24V to 29.2V, and each press increases by 0.1V. | |

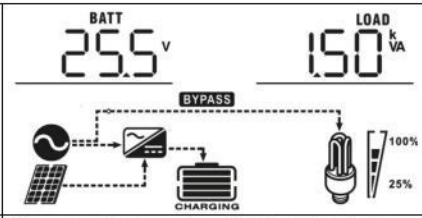
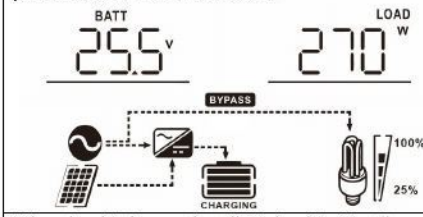
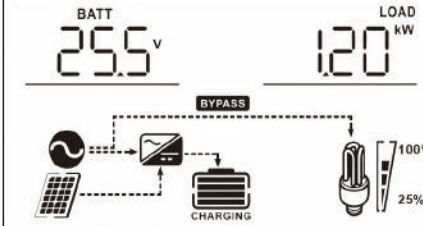
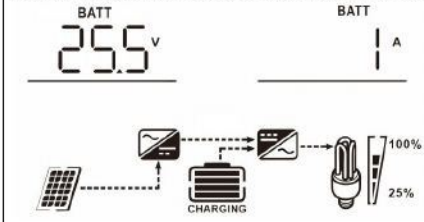
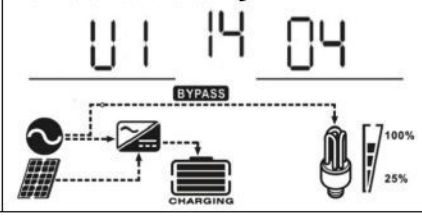
<table>
<tr><td rowspan="3">27</td><td rowspan="3">Floating charging voltage</td><td colspan="2">Default setting of 12V model: 13.5V<br></td></tr>
<tr><td colspan="2">Default setting of 24V model: 27.0V<br></td></tr>
<tr><td colspan="2">If USE or LIB is selected in program 5, this program can be set up. Set voltage range, 12V model: from 12V to 14.6V; 24V model: from 24V to 29.2V, and each press increases by 0.1V.</td></tr>
<tr><td rowspan="3">29</td><td rowspan="3">Low DC cut-off voltage</td><td colspan="2">Default setting of 12V model: 10.5V<br></td></tr>
<tr><td colspan="2">Default setting of 24V model: 21.0V<br></td></tr>
<tr><td colspan="2">If USE or LIB is selected in program 5, this program can be set up. set voltage range, 12V model: from 10V to 12V; 24V model: from 20V to 24V, Increment of each click is 0.1V. Low DC cut-off voltage will be fixed to setting value no matter what percentage of load is connected.</td></tr>
<tr><td rowspan="2">33</td><td rowspan="2">Battery equalization</td><td>Battery equalization<br></td><td>Battery equalization disable(default)<br></td></tr>
<tr><td colspan="2">If "Flooded"or "User-Defined"is selectedin program 05, this program can be set up.</td></tr>
<tr><td rowspan="3">34</td><td rowspan="3">Battery equalization voltage</td><td colspan="2">Default setting of 12V model: 14.6V<br></td></tr>
<tr><td colspan="2">Default setting of 24V model: 29.2<br></td></tr>
<tr><td colspan="2">The setting range of 12V model is from 12.5V to 14.7V, and 24V model is from 25.0V to 29.5V . Increase by 0.1V per press.</td></tr>
<tr><td>35</td><td>Battery equalized time</td><td>60min (default)<br></td><td>Setting range is from 5 min to 900min.Increment of each click is 5min.</td></tr>
<tr><td>36</td><td>Battery equalized timeout</td><td>120min (default)<br></td><td>Setting range is from 5min to 900 min.Increment of each click is 5min.</td></tr>
<tr><td>37</td><td>Equalization interval</td><td>30 days (default)<br></td><td>Setting range is from 0 to 90 days.Increment of each click is 1 day</td></tr>
<tr><td rowspan="2">39</td><td rowspan="2">Equalization activated immediately</td><td>Enable<br></td><td>Disable(default)<br></td></tr>
<tr><td colspan="2">If equalization function is enabled in program 33, this program can be set up.If "Enable" is selected in this program, it's to activate battery equalization immediately and LCD mainpage will shows "Eq".If "Disable" is selected, it will cancel equalization function until next activated equalization time arrives based on program 37setting. At this time, ""will not be shown in LCD main page.</td></tr>
</table>

# Display Setting

The LCD display information will be switched in turns by pressing "UP" or "DOWN" key. The selectable information is switched as below order: input voltage, input frequency, PV voltage, MPPT charging current,MPPT charging power, battery voltage, output voltage, output frequency, load percentage, load in VA,load in Watt, DC discharging current, main CPU Version and second CPU Version.

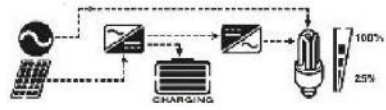
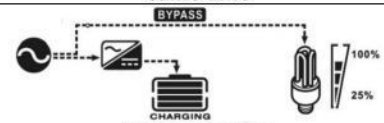
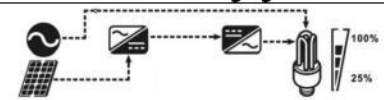
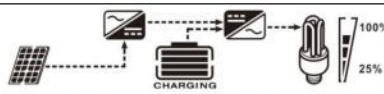
| Selectable information | LCD display |
|---|---|
| Input voltage/Output voltage (Default Display Screen) | Input Voltage=230V, output voltage=230V   |
| Input frequency | Input frequency=S0Hz   |
| PV voltage | PV voltage =260V   |
| MPPT Charging current | MPPT charging power=500W   |
| Charging current | AC and PV charging current=50A   |

| | |
|---|---|
| | PV charging current=50A<br><br> |
| | AC charging current=50A<br><br> |
| Battery voltage/ Output voltage | Battery voltage=25.5V, Output voltage=230V<br><br> |
| Output frequency | Output frequency =50Hz<br><br> |
| Load percentage | Load percentage =70%<br><br> |
| Load in VA | When connected load is lower than lkVA, load in VA will present xxxVA like below chart.<br><br> |
| | When load is larger than lkVA, load in VA will present x.xkVA like below chart. |

| | |
|---|---|
| |  |
| Load in Watt | When load is lower than lkW, load in W will present xxxW like below chart.<br><br>When load is larger than lkW, load in W will present x.xkW like below chart.<br> |
| Battery voltage/ DC discharging current | Battery voltage=25.5V, discharging current= 1A<br> |
| Main CPU version checking | Main CPU version checking<br> |

# Operating Mode Description

| Operation mode | Description | LCD display |
|---|---|---|

| | | |
|---|---|---|
| Standby mode / Power saving mode<br>Note:<br>*Standby mode: The inverter is not turned on yet but at this time, the inverter can charge battery without AC output.<br>*Power saving mode: If enabled, the output of inverter will be off when connected load is pretty low or not detected. | No output is supplied by the unit but it still can charge batteries. | <br>**Charging by utility and PV energy.** |
| | | <br>**Charging by utility.** |
| | | <br>**Charging by PV energy.** |
| Line Mode | The unit will provide output power from the mains. It will also charge the battery at line mode. | <br>**solar and mains supply power to loads at the same time** |
| | | <br>**Mains charging** |
| | | <br>**Without Battery Mode** |
| Battery Mode | The unit will provide output power from battery and PV power. | <br>**Battery and Solar supply power to loads at the same time** |
| | | <br>**Battery supply power to loads** |

# Fault Code

| Fault Code | Fault Event | Icon on |
|---|---|---|
| 01 | Fan is locked when the inverter is turned off. |  |
| 02 | Over temperature |  |

| | | |
|---|---|---|
| 03 | Battery voltage is too high |  |
| 04 | Battery voltage is too low |  |
| 05 | Output short circuit or over temperature. |  |
| 06 | Output voltage is too high |  |
| 07 | Exceeding overload time |  |
| 08 | BUS voltage is too high |  |
| 09 | BUS soft start failed. |  |
| 13 | PV voltage is too high |  |
| 51 | Over current and surge |  |
| 52 | BUS voltage is too low |  |
| 53 | Inverter soft start failed. |  |
| 55 | Over DC voltage in AC output |  |
| 56 | Battery is disconnected |  |
| 57 | Current sensor failed. |  |
| 58 | Output voltage is too low |  |

## Warning code

| Warning Code | Warning Event | Automatic Alarm | Icon flashing |
|---|---|---|---|
| 01 | Fan is locked when inverter is on. | Beep three times every second |  |
| 03 | Battery overcharge | Beep once every second |  |

| | | | |
|---|---|---|---|
| 04 | Battery low voltage | Beep once every second |  |
| 07 | Overload | Beep once every 0.5 second |  |
| 10 | Output power is derating | Beep twice every 3 seconds |  |
| 15 | PV energy is weak | No Beep |  |
| EQ | Battery equalization | No Beep |  |
| bP | Battery is not connected. | No Beep |  |

# BATTERY EQUALIZATION

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

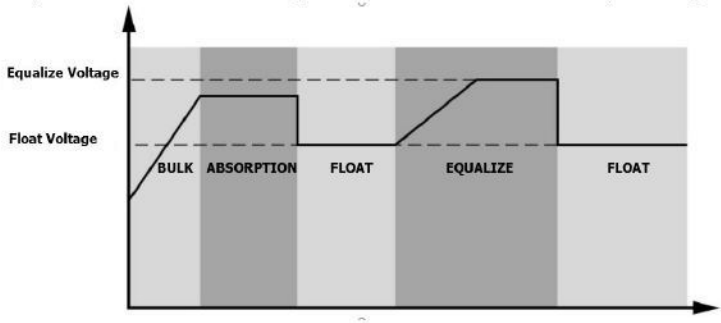
- How to Apply Equalization Function

You must enable battery equalization function in monitoring LCD setting program 33 first. Then, you may apply this function in device by either one of following methods:

1. Setting equalization interval in program 37.
2. Active equalization immediately in program 39.

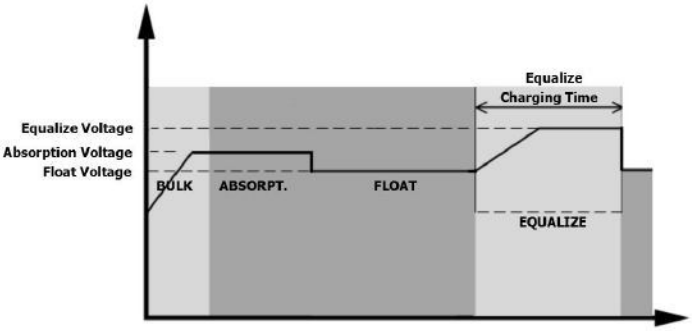
- When to Equalize

In float stage, when the setting equalization interval (battery equalization cycle) is arrived, or equalization is active immediately, the controller will start to enter Equalize stage.

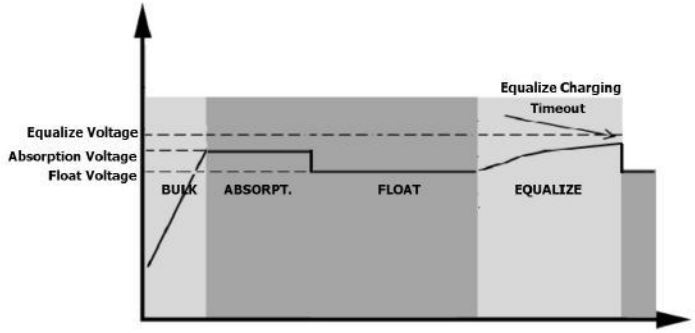



- Equalize charging time and time out

In equalize stage, the controller will supply power to charge battery as much as possible until battery voltage raise s to battery equalization voltage. Then, constant voltage regulation is applied to maintain battery voltage at the battery e qualization voltage. The battery will remain in the Equalize stage until setting battery equalized time is arrived.




However, in Equalize stage, when battery equalized time is expired and battery voltage doesn't rise to battery equalization voltage point, the charge controller will extend the battery equalized time until battery voltage achieves battery equalization voltage. If battery voltage is still lower than battery equalization voltage when battery equalized time out setting is over, the charge controller will stop equalization and return to float stage.



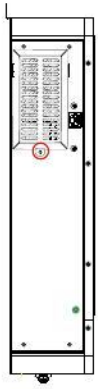
# CLEARANCE AND MAINTENANCE FOR ANTI - DUST KIT (Optional)

## Overview

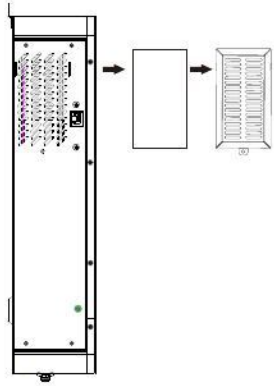
Every inverter is already installed with anti-dusk kit from factory. Inverter will automatically detect this kit and activate internal thermal sensor to adjust internal temperature. This kit also keeps dusk from your inverter and increases product reliability in harsh environment.

## Clearance and Maintenance(option)

Step 1: Please remove screws as below.



Step 2: Then, dustproof case can be removed and take out air filter foam as shown in below chart.

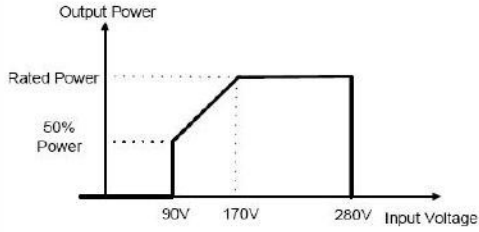


Step 3: Clean air filter foam and dustproof case. After clearance, re-assemble the dust-kit back to the inverter.

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

# SPECIFICATIONS

## Table 1 Specification of LINE Mode

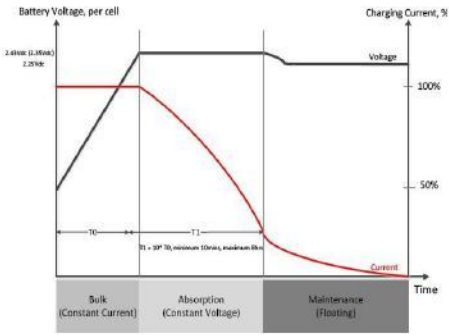
| INVERTER MODEL | 2.2KVA-12V | 3.2KVA-24V |
|---|---|---|
| **Input Voltage Waveform** | Sinusoidal (utility or generator) | |
| **Nominal Input Voltage** | 230Vac | |
| **Low Loss Voltage** | 170Vac±7V (UPS)<br>90Vac±7V (Appliances) | |
| **Low Loss Return Voltage** | 180Vac±7V (UPS);<br>100Vac±7V (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** | Battery mode: Electronic Circuits | |
| **Efficiency (Line Mode)** | >95% ( Rated R load, battery full charged ) | |
| **Transfer Time** | 10ms typical(UPS);<br>20m stypical(Appliances) | |
| **Output power derating:**<br>When AC input voltage drops to 95V or 170V depending on models, the output power will be derated. |  | |

# Table 2 Specification of Inverter Mode

| INVERTER MODEL | 2.2KVA-12V | 3.2KVA-24V |
|---|---|---|
| Rated Output Power | 2200VA/1800W | 3200VA/3000W |
| Output Voltage Waveform | Pure Sine Wave | |
| Output Voltage Regulation | 230Vac±5% | |
| Output Frequency | 60Hz or 50Hz | |
| Peak Efficiency | 94% | |
| Overload Protection | 5s@≥150% load;10s@110%~150% load | |
| Surge Capacity | 2* rated power for 5 seconds | |
| Nominal DC Input Voltage | 12 Vdc | 24Vdc |
| Cold Start Voltage | 11.5 Vdc | 23.0Vdc |
| Low DC Warning Voltage | | |
| @ Load < 50% | 11.0Vdc | 22.0Vdc |
| @ Load ≥ 50% | 10.5Vdc | 21.0Vdc |
| Low DC Warning Return Voltage | | |
| @ Load < 50% | 11.5Vdc | 23.0Vdc |
| @ Load ≥ 50% | 11.0Vdc | 22.0Vdc |
| Low DC Cut-off Voltage | | |
| @ Load < 50% | 10.5Vdc | 21.0Vdc |
| @ Load ≥ 50% | 10Vdc | 20.0Vdc |
| High DC Cut-off Voltage | 16 Vdc | 31Vdc |
| No Load Power Consumption | <35W | |
| Saving Mode Power Consumption | <10W | <15W |

# Table 4 Specification of Charging Mode

| Utility Charging Mode | | | |
|---|---|---|---|
| INVERTER MODEL | | 2.2KVA-12V | 3.2KVA-24V |
| Charging Current(UPS) @Nominal Input Voltage | | 60A | |
| Bulk Charging Voltage | Flooded Battery | 14.6 | 29.2 |
| | AGM / Gel Battery | 14.1 | 28.2 |
| Floating Charging Voltage | | 13.5Vdc | 27Vdc |
| Charging Algorithm | | 3-Step | |

| | |
|---|---|
| **Charging Curve** |  |

| **Solar Charging Mode** | | |
|---|---|---|
| **INVERTER MODEL** | 2.2KVA-12V | 3.2KVA-24V |
| **Rated Power** | 2000W | 3000W |
| **Rated Solar Voltage** | 300V | |
| **PV Array MPPT Voltage Range** | 55V-430V | |
| **Max. PV Array Open Circuit Voltage** | 450V | |
| **Max Charging Current** | 80A | |

# Table 5 General specifications

| **INVERTER MODEL** | 2.2KVA-12V | 3.2KVA-24V |
|---|---|---|
| **Operating Temperature Range** | 0°C to 55°C | |
| **Storage temperature** | -15°C~ 60°C | |
| **Dimension (D*W*H), mm** | 405*286*96.2 | |
| **Net Weight, kg** | 5 | 5.5 |

# TROUBLE SHOOTING

| Problem | LCD/Buzzer | Explanation / Possible cause | What to do |
|---|---|---|---|
| Unit shuts down automatically during startup process. | LCD and buzzer will be active for 3 seconds and then complete off. | Battery voltage is too low | 1. Re-charge battery.<br>2. Replace battery. |
| No response after power on. | No indication. | 1. The battery voltage is far too low.<br>2. Battery polarity is connected reversed. | 1. Check if batteries and the wiring are connected well.<br>2. Re-charge battery.<br>3. Replace battery. |
| Mains exist but the unit works in battery mode. | Input voltage is displayed as 0 on the LCD | Input protector is tripped | Check if AC breaker is tripped and AC wiring is connected well. |
| | The power-on icon of LCD flashes, and the status indicator icon flashes. | Insufficient quality of AC power. (Shore or Generator) | 1. Check if AC wires are too thin and/or too long.<br>2. Check if generator (if applied) is working well or if input voltage range setting is correct. (UPS→ Appliance) |
| Buzzer beeps continuously and the status indicator icon is always on. | Fault code 07 | Overload error. The inverter is overload 110% 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. |
| | Fault code 02 | Internal temperature of inverter component are over heated. | Check whether the air flow of the unit is blocked or whether the ambient temperature is too high. |
| | Fault code 03 | Battery is over-charged. | Return to repair center. |
| | | The battery voltage is too high. | Check if spec and quantity of batteries are meet requirements. |
| | Fault code 01 | Fan fault | Replace the fan |
| | Fault code 06/58 | Output abnormal | 1. Reduce the connected load.<br>2. Return to repair center |
| | Fault code 08/09/53/57 | Internal components failed. | Return to repair center. |
| | Fault code 51 | Over current or surge. | Restart the unit, if the error happens again, please return to repair center. |
| | Fault code 52 | Bus voltage is too low. | |
| | Fault code 55 | Output voltage is unbalanced. | |