

STS-HYM-121015H 1.5KW PV Off-grid Inverter Manual



Table Of Contents

| | |
|--|-----------|
| ABOUT THIS MANUAL | 1 |
| Purpose | 1 |
| Scope | 1 |
| SAFETY INSTRUCTIONS | 1 |
| PRODUCT OVERVIEW | 2 |
| INSTALLATION | 3 |
| Unpacking and Inspection | 3 |
| Preparation | 3 |
| Mounting the Unit | 3 |
| Battery Connection | 4 |
| AC Input/Output Connection | 5 |
| PV Connection | 7 |
| Final Assembly | 8 |
| OPERATION | 9 |
| Power ON/OFF | 9 |
| Operation and Display Panel | 9 |
| LCD Setting | 10 |
| BATTERY EQUALIZATION | 16 |
| SETTING FOR LITHIUM BATTERY | 18 |
| Fault Reference Code | 20 |
| Warning Indicator | 21 |
| SPECIFICATIONS | 22 |
| Table 1 Line Mode Specifications | 22 |
| Table 2 Inverter Mode Specifications | 23 |
| Table 3 Charge Mode Specifications | 24 |
| Table 4 General Specifications | 24 |
| TROUBLE SHOOTING | 25 |

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.

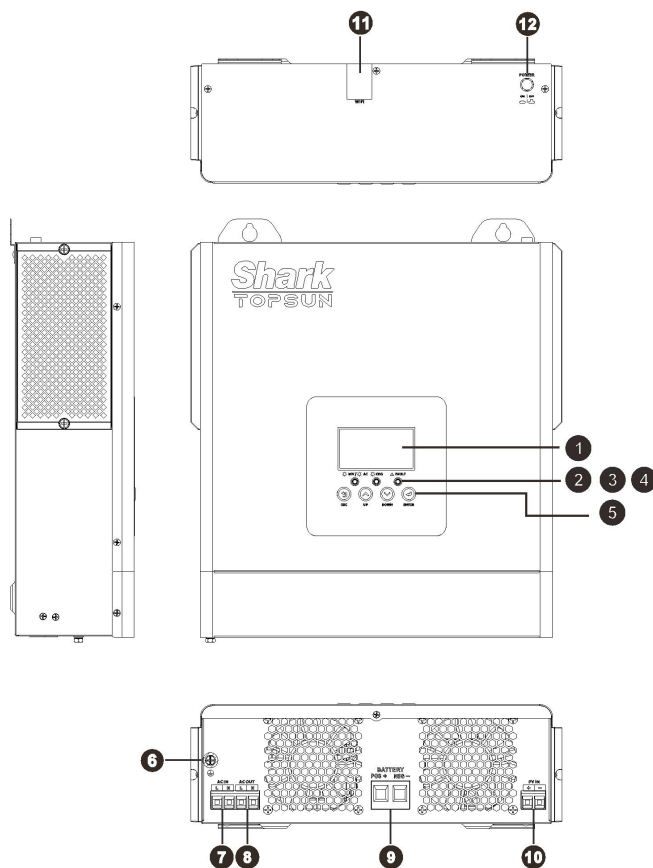
SAFETY INSTRUCTIONS



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. Fuse is 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.

PRODUCT OVERVIEW



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

INSTALLATION

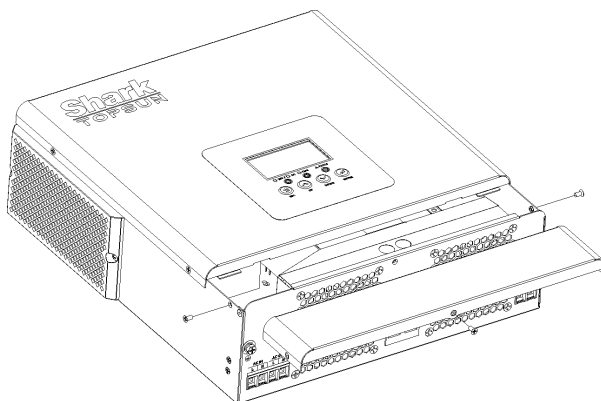
Unpacking and Inspection

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:

1. The unit x 1
2. User manual x 1
3. AC terminal (red x 2 / black x 2)
4. PV terminal (red x 1 / black x 1)

Preparation

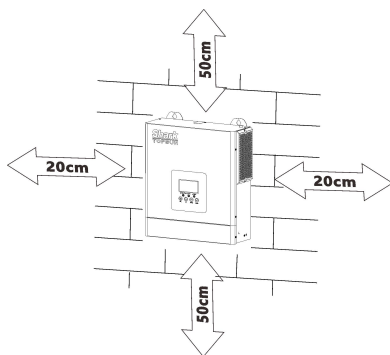
Before connecting all wirings, please take off bottom cover by removing three screws as shown below.



Mounting the Unit

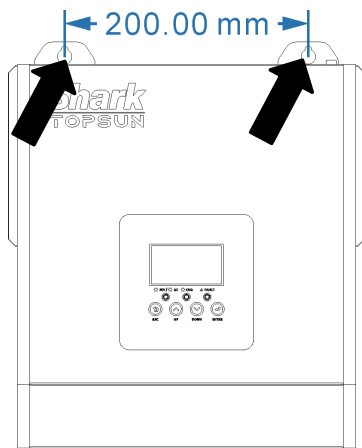
Consider the following points before selecting where to install:

1. Do not mount the inverter on flammable construction materials.
2. Mount on a solid surface
3. Install this inverter at eye level in order to allow the LCD display to be read at all times.
4. The ambient temperature should be between 0°C and 55°C to ensure optimal operation.
5. The recommended installation position is to be adhered to the wall vertically.
6. Be sure to keep other objects and surfaces as shown in the right diagram to guarantee sufficient heat dissipation and to have enough space for removing wires.



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

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



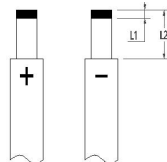
Battery Connection

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

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

WARNING! It's very important for system safety and efficient operation to use appropriate cable for battery connection. To reduce risk of injury, please use the proper recommended cable 、stripping length(L2) and tinning length(L1) as below.

Stripping Length:

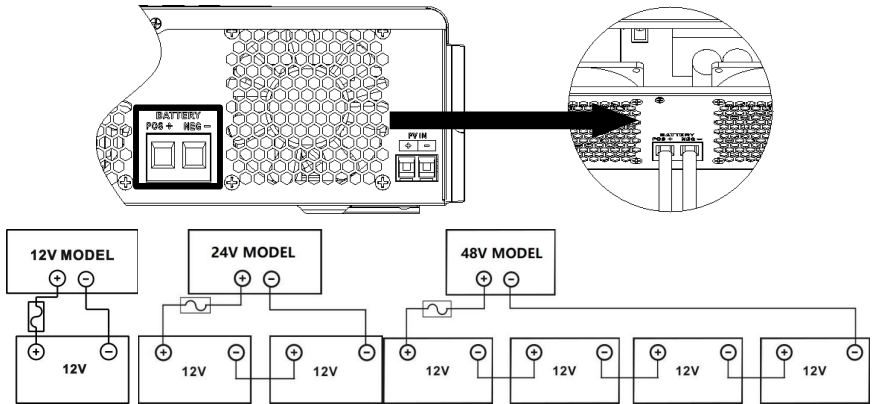


Recommended battery cable 、stripping length (L2) and tinning length(L1):

| Model | Maximum Amperage | Battery capacity | Wire Size | Cable mm ² | L1 (mm) | L 2 (mm) | Torque value |
|--------------|------------------|------------------|-----------|-----------------------|---------|----------|--------------|
| 1500W-24 | 70A | 100AH | 6AWG | 13.3 | 3 | 18 | 2~ 3 Nm |
| 2500W-24 | 100A | 100AH | 4AWG | 21.15 | 3 | 18 | 2~ 3 Nm |
| Other Models | 140A | 100AH | 2AWG | 38 | 3 | 18 | 2~ 3 Nm |

Please follow below steps to implement battery connection:

1. Remove insulation sleeve 18 mm for positive and negative cables based on recommended stripping length.
2. Connect all battery packs as units requires. It's suggested to use recommended battery capacity.
3. Insert battery cable flatly into battery connector of inverter and make sure the bolts are tightened with torque of 2-3 Nm. Make sure polarity at both the battery and the inverter/charge is correctly connected and battery cables are tightly screwed to the battery connector.



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. 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 50A.

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

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

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

Suggested cable requirement for AC wires

| Model | Gauge | Torque Value |
|------------|-------|--------------|
| 1.5KW | 12AWG | 1.4~ 1.6Nm |
| 2.5KW/3.5W | 10AWG | 1.4~ 1.6Nm |
| 5.5KW | 8 AWG | 1.4~ 1.6Nm |

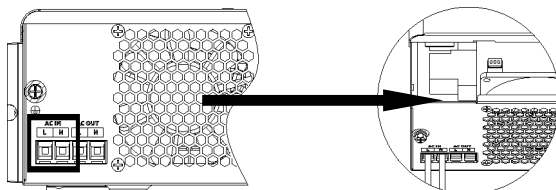
Please follow below steps to implement AC input/output connection:

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

⊕→**Ground (yellow-green)**

L→LINE (brown or black)

N→Neutral (blue)



WARNING:

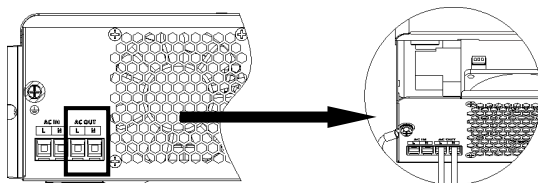
Be sure that AC power source is disconnected before attempting to hardwire it to the unit.

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

⊕→**Ground (yellow-green)**

L→LINE (brown or black)

N→Neutral (blue)



5. Make sure the wires are securely connected.

CAUTION: Important

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

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

PV Connection

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

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

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

| Model | Typical Amperage | Cable Size | Torque |
|-------------|------------------|------------|------------|
| 1.5KW-3.5KW | 15A | 12 AWG | 1.4~1.6 Nm |
| 5.5KW | 18A | 12 AWG | 1.4~1.6 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.

| Solar Charging Mode | | |
|------------------------------------|--------------|--------------|
| INVERTER MODEL | 1.5KW-3.5KW | 5.5KW |
| Max. PV Array Open Circuit Voltage | 500DC | |
| PV Array MPPT Voltage Range | 30VDC~500VDC | 60VDC~500VDC |
| Max. PV INPUT CURRENT | 15A | 18A |

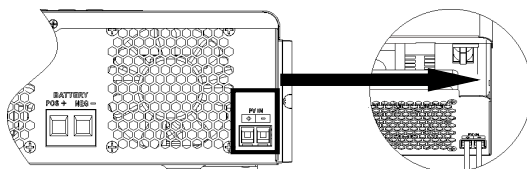
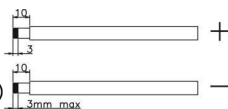
Take the 450Wp and 550Wp PV module as an example. After considering above two parameters, the recommended module configurations are listed in the table below.

| Solar Panel Spec. (reference) - 450Wp - Vmp: 34.67Vdc - Imp: 13.82A - Voc: 41.25Vdc - Isc: 12.98A | SOLAR INPUT | Q'ty of panels | Total input power | Inverter Model |
|---|---|----------------|-------------------|----------------|
| | 1 pcs in serial | 1 pcs | 450 W | 1.5KW-5.5KW |
| | 2 pcs in serial | 2 pcs | 900 W | 1.5KW-5.5KW |
| | 3 pcs in serial | 3 pcs | 1,350 W | 1.5KW-5.5KW |
| | 4 pcs in serial | 4 pcs | 1,800 W | 1.5KW-5.5KW |
| | 5 pcs in serial | 5 pcs | 2,250 W | 2.5KW-5.5KW |
| | 6 pcs in serial | 6 pcs | 2,700 W | 2.5KW-5.5KW |
| | 7 pcs in serial | 7 pcs | 3,150 W | 2.5KW-5.5KW |
| | 8 pcs in serial | 8 pcs | 3,600 W | 3.5KW-5.5KW |
| | 9 pcs in serial | 9 pcs | 4,050 W | 3.5KW-5.5KW |
| | 10 pcs in serial | 10 pcs | 4,500 W | 5.5KW |
| | 11 pcs in serial | 11 pcs | 4,950 W | |
| | 12 pcs in serial | 12 pcs | 5,400 W | |
| | 6 pieces in serial and 2 sets in parallel | 12 pcs | 5,400 W | |
| Solar Panel Spec. (reference) - 550Wp - Vmp: 42.48Vdc - Imp: 12.95A - Voc: 50.32Vdc - Isc: 13.70A | SOLAR INPUT | Q'ty of panels | Total input power | Inverter Model |
| | 1 pcs in serial | 1 pcs | 550 W | 1.5KW-5.5KW |
| | 2 pcs in serial | 2 pcs | 1,150 W | 1.5KW-5.5KW |
| | 3 pcs in serial | 3 pcs | 1,650 W | 1.5KW-5.5KW |
| | 4 pcs in serial | 4 pcs | 2,200 W | 2.5KW-5.5KW |
| | 5 pcs in serial | 5 pcs | 2,750 W | 2.5KW-5.5KW |
| | 6 pcs in serial | 6 pcs | 3,300 W | 3.5KW-5.5KW |
| | 7 pcs in serial | 7 pcs | 3,850 W | 3.5KW-5.5KW |
| | 8 pcs in serial | 8 pcs | 4,400 W | 5.5KW |
| | 9 pcs in serial | 9 pcs | 4,950 W | |
| | 4 pieces in serial and 2 sets in parallel | 8 pcs | 4,400 W | |
| | 5 pieces in serial and 2 sets in parallel | 10 pcs | 5,500 W | |

PV Module Wire Connection:

Please follow below steps to implement PV module connection:

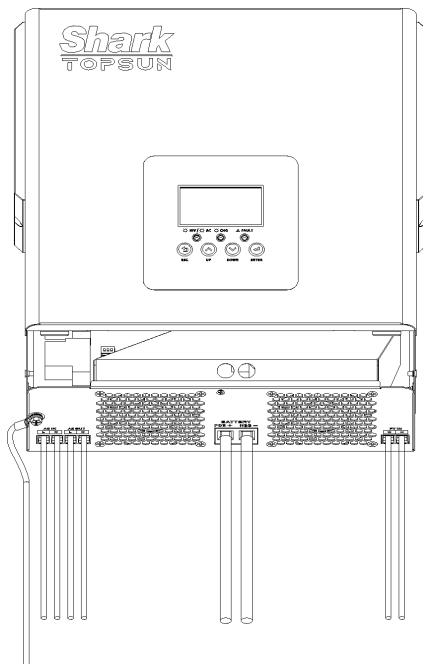
1. Remove insulation sleeve 10 mm for positive and negative conductors.
2. Check correct polarity of connection cable from PV modules and PV input connectors. Then, connect positive pole (+) of connection cable to positive pole (+) of PV input connector. Connect negative pole (-) of connection cable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



3. Make sure the wires are securely connected.

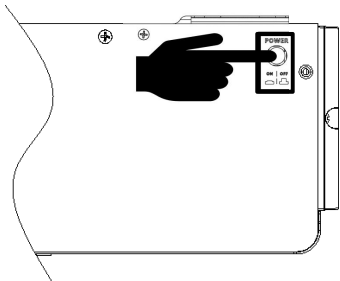
Final Assembly

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



OPERATION

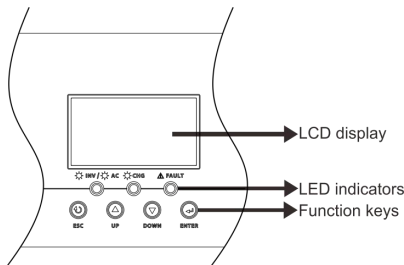
Power ON/OFF



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 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. |



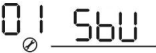
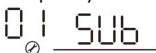
Function Keys

| 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 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.





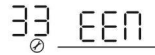
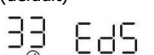
Setting Programs:

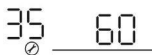
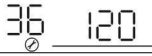







| Program | Description | Selectable option |
|---------|---|--|
| 01 | Output source priority: To configure load power source priority | Utility first (default)  |
| | | Solar first  |
| | | SBU priority  |
| | | SUB priority  |

| | | | |
|----|---|--|--|
| | | <p>SUF priority</p> <p>01 <u>SUF</u></p> | <p>If solar energy is sufficient to all connected loads and charge battery, the solar energy could feedback to the grid</p> <p>If solar energy is not sufficient to power all connected loads, utility energy will supply power to the loads at the same time.</p> |
| 02 | Maximum charging current: To configure total charging current for solar and utility chargers. (Max. charging current = utility charging current + solar charging current) | <p>60A (default)</p> <p>02 <u>60</u>^A</p> | <p>If selected, acceptable charging current range will be from Max. AC charging current to Max. charging current of SPEC, but it shouldn't be less than the AC charging current (program 11)</p> |
| 03 | AC input voltage range | <p>Appliances (default)</p> <p>03 <u>APl</u></p> | <p>If selected, acceptable AC input voltage range will be within 90-280VAC.</p> |
| | | <p>UPS</p> <p>03 <u>UPS</u></p> | <p>If selected, acceptable AC input voltage range will be within 170-280VAC.</p> |
| | | <p>Generator</p> <p>03 <u>GNt</u></p> | <p>If selected, acceptable AC input voltage range will be within 90-280VAC and compatible with generators.</p> <p>Note: Because generators are unstable, maybe the output of inverter will be unstable too.</p> |
| 05 | Battery type | <p>AGM (default)</p> <p>05 <u>AGn</u></p> | <p>Flooded</p> <p>05 <u>FLd</u></p> |
| | | <p>User-Defined</p> <p>05 <u>USE</u></p> | <p>If "User-Defined" is selected, battery charge voltage and low DC cut-off voltage can be set up in program 26, 27 and 29.</p> |
| | | <p>Lithium battery without communication</p> <p>05 <u>Li b</u></p> | <p>If "LIB" is selected, the battery default value is fit for lithium battery without communication battery charge voltage and low DC cut-off voltage can be set up in program 26, 27 and 29.</p> |
| 06 | Auto restart when overload occurs | <p>Restart disable</p> <p>06 <u>Lfd</u></p> | <p>Restart enable (default)</p> <p>06 <u>LFE</u></p> |

| | | | |
|----|--|---|--|
| 07 | Auto restart when over temperature occurs | Restart disable 07 <u>tt d</u> | Restart enable (default) 07 <u>tt E</u> |
| 08 | Output voltage | 220V 08 <u>220</u> ^v | 230V (default) 08 <u>230</u> ^v |
| | | 240V 08 <u>240</u> ^v | |
| 09 | Output frequency | 50Hz (default) 09 <u>50</u> ^{Hz} | 60Hz 09 <u>60</u> ^{Hz} |
| 10 | Auto bypass When selecting "auto", if the mains power is normal, it will automatically bypass, even if the switch is off. | manual(default) 10 <u>nnL</u> | auto 10 <u>AtO</u> |
| 11 | Maximum utility charging current | 30A (default) 11 <u>30A</u> If selected, acceptable charging current range will be within 2-Max. AC charging current of SPEC. | |
| 12 | Setting voltage point back to utility source when selecting "SBU priority" or "Solar first" in program 01. | 48V models: 46V (default) Setting range is from 44.0V to 57.2V for 48v model, but the max setting value must be less than the value of program13 and the minimum setting value must be more than the value of 29. | |
| | | 24V models: 23V (default) Setting range is from 22.0V to 28.6V for 24v model, but The max setting value must be less than the value of program13 and the minimum setting value must be more than the value of 29. | |
| | | 12V models: 11.5V (default) Setting range is from 11.0V to 14.3V for 12v model, but The max setting value must be less than the value of program13 and the minimum setting value must be more than the value of 29. | |
| 13 | Setting voltage point back to battery mode when selecting "SBU priority" or "Solar first" in program 01. | Battery fully charged (default) 13 <u>FUL</u> ^{BATT} | 48V models: Setting range is from 48V to full (the value of program26-0.4V), but the max setting value must be more than the value of program12. 24V models: Setting range is from 24V to full (the value of program26-0.4V), but the max setting value must be more than the value of program12. 12V models: Setting range is from 12V to full (the value of program13-0.4V), but the max setting value must be more than the value of program12. |

| | | | |
|----|---|---|---|
| 16 | Charger source priority: To configure charger source priority | If this inverter/charger is working in Line, Standby or Fault mode, charger source can be programmed as below: | |
| | | Solar first 16 <u>CS0</u> ⌚ | Solar energy will charge battery as first priority. Utility will charge battery only when solar energy is not available. |
| | | Solar and Utility (default) 16 <u>SNU</u> ⌚ | Solar energy and utility will charge battery at the same time. |
| | | Only Solar 16 <u>OS0</u> ⌚ | Solar energy will be the only charger source no matter utility is available or not. |
| | | If this inverter/charger is working in Battery mode, only solar energy can charge battery. Solar energy will charge battery if it's available and sufficient. | |
| 18 | Buzzer mode | Mode1 BU2 18 nd1 ⌚ | Buzzer mute |
| | | Mode2 BU2 18 nd2 ⌚ | The buzzer sounds when the input source changes or there is a specific warning or fault |
| | | Mode3 BU2 18 nd3 ⌚ | The buzzer sounds when there is a specific warning or fault |
| | | Mode4(default) BU2 18 nd4 ⌚ | The buzzer sounds when there is a fault |
| 19 | Auto return to default display screen | Return to default display screen (default) 19 <u>ESP</u> ⌚ | 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 19 <u>UEP</u> ⌚ | If selected, the display screen will stay at latest screen user finally switches. |
| 20 | Backlight control | Backlight on (default) 20 <u>LON</u> ⌚ | Backlight off 20 <u>LOF</u> ⌚ |
| 23 | Overload bypass: When enabled, the unit will transfer to line mode if overload occurs in battery mode. | Bypass disable 23 <u>bYd</u> ⌚ | Bypass enable(default) 23 <u>bYE</u> ⌚ |

| | | | |
|----|-------------------------------------|--|---|
| 25 | Modbus ID Setting | Modbus ID Setting Range : 001(default)~247  | |
| 26 | Bulk charging voltage (C.V voltage) | If self-defined is selected in program 5, this program can be set up. But the setting value must be more than or equal the value of program27. Increment of each click is 0.1V. 12V models: Default 14.1V, setting range is from 12.0V to 15.5V, 24V models: Default 28.2V, setting range is from 24.0V to 30.0V , 48V models: Default 56.4V, setting range is from 48.0V to 62.0V. | |
| 27 | Floating charging voltage | If self-defined is selected in program 5, this program can be set up. 12V models default setting: 13.5V Setting range is from 12.0V to the value of program 26 24V models default setting: 27.0V Setting range is from 24.0V to the value of program 26 48V models default setting: 54.0V Setting range is from 48.0V to the value of program 26 | |
| 29 | Low DC cut-off voltage | If self-defined is selected in program 5, this program can be set up. The setting value must be less than the value of program12. 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. 12V models default setting: 10.5v Setting range is from 10.0V to 13.5V 24V models default setting: 21.0v Setting range is from 20.0V to 27.0V 48V models default setting: 42.0V Setting range is from 40.0V to 54.0V | |
| 32 | Bulk charging time (C.V stage) | Automatically (Default):  | If selected, inverter will judge this charging time automatically. |
| | | 5 min  | The setting range is from 5 min to 900 min. Increment of each click is 5 min. |
| | | 900 min  | |
| | | If "USE" is selected in program 05, this program can be set up. | |
| 33 | Battery equalization | Battery equalization  | Battery equalization disable (default)  |
| | | If "Flooded" or "User-Defined" is selected in program 05, this program can be set up. | |

| | | | |
|----|---|--|---|
| 34 | Battery equalization voltage | 12V models default setting is 14.6V. Setting range is from floating voltage ~ 15.5V. Increment of each click is 0.1V. 24V models default setting is 29.2V. Setting range is from floating voltage ~ 30V. Increment of each click is 0.1V. 48V models default setting is 58.4V. Setting range is from floating voltage ~ 62V. Increment of each click is 0.1V. | |
| 35 | Battery equalized time | 60min (default)  | Setting range is from 0 min to 900min. |
| 36 | Battery equalized timeout | 120min (default)  | Setting range is from 0min to 900 min. |
| 37 | Equalization interval | 30days (default)  | Setting range is from 1 to 90 days. |
| 39 | Equalization activated immediately | <div> <div> Enable  </div> <div> Disable (default)  </div> </div> <p>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 main page will shows "E9". If "Disable" is selected, it will cancel equalization function until next activated equalization time arrives based on program 37 setting. At this time, "E9" will not be shown in LCD main page..</p> | |
| 41 | Automatic activation for lithium battery. Note: This function is just available for supporting lithium battery activation models. other models are reserve setting item |  | Disable automatic activation (default) |
| | |  | When Program05 is selected "LIx" or "User-Defined "as lithium battery and when the battery is not detected, the unit will activate automatically the lithium battery at a time. If you want to activate automatically the lithium battery, you must restart the unit. |
| 42 | Manual activation for lithium battery. Note: This function is just available for supporting lithium battery activation models. other models are reserve setting item |  | Default: disable activation |
| | |  | When Program05 is selected "LIx" as lithium battery, when the battery is not detected, If you want to activate the lithium battery at a time, you could selected it. |

| | | | |
|----|--------------------------------------|-------------------------|--|
| 46 | Maximum discharge current protection | ndC 46 OFF | Default OFF Disable current discharge current protection function |
| | | ndC 46 100 ^A | Only available in Single model. When utility is available, it turns to utility model and battery discharge stops after the battery discharge current exceeded the setting value. When utility is unavailable, warning occurs and battery discharge lasts after the battery discharge current exceeded the setting value. The setting range is from 20A to 500A. |

BATTERY EQUALIZATION

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

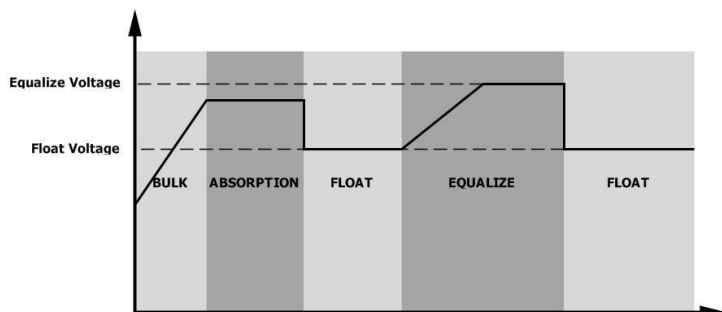
● How to Apply Equalization Function

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

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

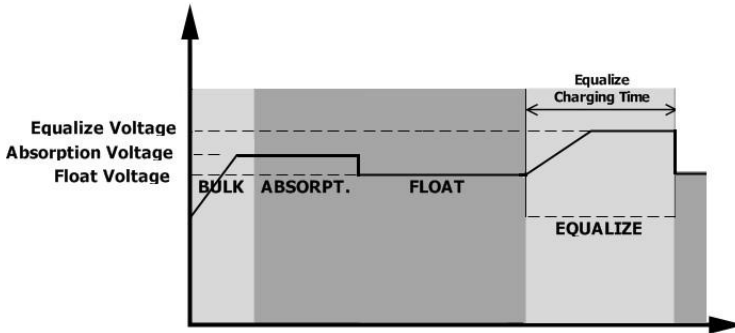
● When to Equalize

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

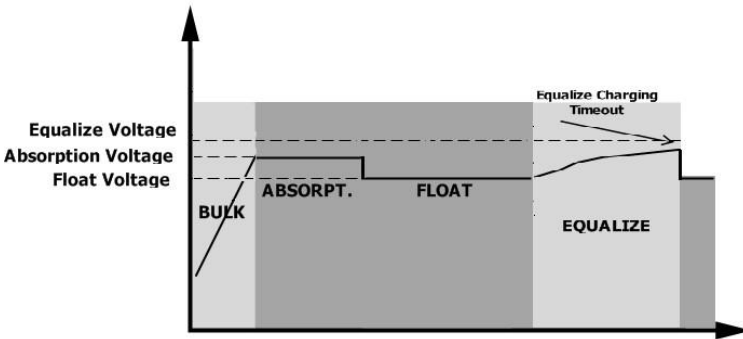


- **Equalize charging time and timeout**

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



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



SETTING FOR LITHIUM BATTERY

Setting for lithium battery without communication

This suggestion is used for lithium battery application and avoid lithium battery BMS protection without communication, please finish the setting as follow:

1.Before starting setting, you must get the battery BMS specification:

- A. Max charging voltage
- B. Max charging current
- C. Discharging protection voltage

2.Set battery type as"LIB"

| | | | |
|----|--------------|---|---|
| 05 | Battery type | AGM (default) 05 AGM | Flooded 05 FLD |
| | | User-Defined 05 USE | If "User-Defined" is selected, battery charge voltage and low DC cut-off voltage can be set up in program 26, 27 and 29. |
| | | Lithium battery without communication 05 LIB | If "LIB" is selected, the battery default value is fit for lithium battery without communication battery charge voltage and low DC cut-off voltage can be set up in program 26,27 and 29. |

3. Set C.V voltage as Max charging voltage of BMS-0.5V.

| | | |
|----|-------------------------------------|--|
| 26 | Bulk charging voltage (C.V voltage) | If self-defined is selected in program 5, this program can be set up. But the setting value must be more than or equal the value of program27. Increment of each click is 0.1V. 12V models: Default 14.1V, setting range is from 12.0V to 15.5V, 24V models: Default 28.2V, setting range is from 24.0V to 30.0V , 48V models: Default 56.4V, setting range is from 48.0V to 62.0V. |
|----|-------------------------------------|--|

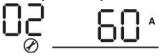
4. Set floating charging voltage as C.V voltage.

| | | |
|----|---------------------------|--|
| 27 | Floating charging voltage | If self-defined is selected in program 5, this program can be set up. 12V models default setting: 13.5V Setting range is from 12.0V to the value of program 26 24V models default setting: 27.0V Setting range is from 24.0V to the value of program 26 48V models default setting: 54.0V Setting range is from 48.0V to the value of program 26 |
|----|---------------------------|--|

5. Set Low DC cut-off voltage \geq discharging protection voltage of BMS+2V.

| | | |
|----|------------------------|---|
| 29 | Low DC cut-off voltage | <p>If self-defined is selected in program 5, this program can be set up. The setting value must be less than the value of program12. 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. 12V models default setting: 10.5v Setting range is from 10.0V to 13.5V 24V models default setting: 21.0v Setting range is from 20.0V to 27.0V 48V models default setting: 42.0V Setting range is from 40.0V to 54.0V</p> |
|----|------------------------|---|

6. Set Max charging current which must be less than the Max charging current of BMS.

| | | | |
|----|--|--|---|
| 02 | <p>Maximum charging current: To configure total charging current for solar and utility chargers. (Max. charging current = utility charging current + solar charging current)</p> | <p>60A (default)</p>  | <p>If selected, acceptable charging current range will be within 1- Max. charging current of SPEC, but it shouldn't be less than the AC charging current (program 11)</p> |
|----|--|--|---|






















7. Setting voltage point back to utility source when selecting "SBU priority" or "Solar first" in program 01.The setting value must be \geq Low DC cut-off voltage+1V, or else the inverter will have a warning as battery voltage low.

| | | |
|----|--|--|
| 12 | Setting voltage point back to utility source when selecting "SBU priority" or "Solar first" in program 01. | <p>48V models:46V (default) Setting range is from 44.0V to 57.2V for 48v model, but the max setting value must be less than the value of program13.</p> |
| | | <p>24V models:23V (default) Setting range is from 22.0V to 28.6V for 24v model, but The max setting value must be less than the value of program13.</p> |
| | | <p>12V models:11.5V (default) Setting range is from 11.0V to 14.3V for 12v model, but The max setting value must be less than the value of program13.</p> |











Remark:

- 1.you'd better to finish setting without turn on the inverter(just let the LCD show, no output);
- 2.when you finish setting, please restart the inverter.

Fault Reference Code

| Fault Code | Fault Event | Icon on |
|------------|-------------------------------------|---|
| 01 | Over temperature of inverter module |  |
| 02 | Over temperature of DCDC module |  |
| 03 | Battery voltage is too high |  |
| 04 | Over temperature of PV module |  |
| 05 | Output short circuited. |  |
| 06 | Output voltage is too high. |  |
| 07 | Overload time out |  |
| 08 | Bus voltage is too high |  |
| 09 | Bus soft start failed |  |
| 10 | PV over current |  |
| 11 | PV over voltage |  |
| 12 | DCDC over current |  |
| 13 | Over current or surge |  |
| 14 | Bus voltage is too low |  |
| 15 | Inverter failed (Self-checking) |  |
| 18 | Op current offset is too high |  |
| 19 | Inverter current offset is too high |  |
| 20 | DC/DC current offset is too high |  |
| 21 | PV current offset is too high |  |
| 22 | Output voltage is too low |  |
| 23 | Inverter negative power |  |

Warning Indicator

| Warning Code | Warning Event | Audible Alarm | Icon flashing |
|--------------|---|-------------------------------|---|
| 02 | Temperature is too High | Beep three times every second |  |
| 04 | Low battery | Beep once every second |  |
| 07 | Overload | Beep once every 0.5 second |  |
| 10 | Output power derating | Beep twice every 3 seconds |  |
| 14 | Fan blocked | None |  |
| 15 | PV energy is low | Beep twice every 3 seconds |  |
| 19 | Lithium Battery communication is failed | Beep once every 0.5 second |  |
| 21 | Lithium Battery over current | None |  |
| E9 | Battery equalization | None |  |
| bP | Battery is not connected | None |  |

SPECIFICATIONS

Table 1 Line Mode Specifications

| INVERTER MODEL | 1.5KW | 1.5KW | 2.5KW | 3.5KW | 5.5KW |
|--|--|-------|-------|-------|-------|
| 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 | Battery mode: Electronic Circuits | | | | |
| Efficiency (Line Mode) | >95% (Rated R load, Battery full charged) | | | | |
| Transfer Time | 10ms typical (UPS); 20ms typical (Appliances) | | | | |
| Output power derating: When AC input voltage drops to 95V or 170V depending on models, the output power will be derated. | | | | | |

Table 2 Inverter Mode Specifications

| INVERTER MODEL | 1.5KW | 1.5KW | 2.5KW | 3.5KW | 5.5KW |
|--|-------------------------------|-------------------------------|--------------|--------------|-------------------------------|
| Rated Output Power | 1.5KVA/1.5KW | | 2.5KVA/2.5KW | 3.5KVA/3.5KW | 5.5KVA/5.5KW |
| Output Voltage Waveform | Pure Sine Wave | | | | |
| Output Voltage Regulation | 230Vac±5% | | | | |
| Output Frequency | 50Hz or 60Hz | | | | |
| Peak Efficiency | 94% | | | | |
| Surge Capacity | 2* rated power for 5 seconds | | | | |
| Nominal DC Input Voltage | 12Vdc | 24Vdc | | | 48Vdc |
| Cold Start Voltage | 11.0Vdc | 23.0Vdc | | | 46.0Vdc |
| Low DC Warning Voltage Just for AGM and Flooded @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50% | 11.0Vdc 10.7Vdc 10.1Vdc | 22.0Vdc 21.4Vdc 20.2Vdc | | | 40.4Vdc 42.8Vdc 44.0Vdc |
| Low DC Warning Return Voltage Just for AGM and Flooded @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50% | 11.5Vdc 11.2Vdc 10.6Vdc | 23.0Vdc 22.4Vdc 21.2Vdc | | | 46.0Vdc 44.8Vdc 42.4Vdc |
| Low DC Cut-off Voltage Just for AGM and Flooded @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50% | 10.5Vdc 10.2Vdc 9.6Vdc | 21.0Vdc 20.4Vdc 19.2Vdc | | | 42.0Vdc 40.8Vdc 38.4Vdc |

Table 3 Charge Mode Specifications

| Utility Charging Mode | | | | | | |
|--|-------------------|---|---------|--------|--------|--------------|
| INVERTER MODEL | | 1.5KW | 1.5KW | 2.5KW | 3.5KW | 5.5KW |
| Max Charging Current (PV+AC) (@ VI/P=230Vac) | | 100Amp | 60Amp | 100Amp | 100Amp | 100Amp |
| Max Charging Current (AC)(@ VI/P=230Vac) | | 60Amp | | | | |
| Bulk Charging Voltage | Flooded Battery | 14.6Vdc | 29.2Vdc | | | 58.4Vdc |
| | AGM / Gel Battery | 14.1Vdc | 28.2Vdc | | | 56.4Vdc |
| Floating Charging Voltage | | 13.5Vdc | 27Vdc | | | 54Vdc |
| Overcharge Protection | | 16.5 Vdc | 32Vdc | | | 63Vdc |
| Charging Algorithm | | 3-Step | | | | |
| Charging Curve | | <p>The graph illustrates the 3-step charging process. The left y-axis represents Battery Voltage per cell, with markers at 2.20Vdc and 2.43Vdc (2.35Vdc). The right y-axis represents Charging Current in percent, with markers at 50% and 100%. The x-axis represents Time, divided into three phases: Bulk (Constant Current), Absorption (Constant Voltage), and Maintenance (Floating). The voltage rises linearly in the Bulk phase, remains constant in the Absorption phase, and then slightly decreases in the Maintenance phase. The current remains at 100% in the Bulk and Absorption phases and drops to 0% in the Maintenance phase. Time intervals T0, T1, and T2 = 10⁴ T0 (minimum 10mins, maximum 6hrs) are indicated.</p> | | | | |
| Solar Input | | | | | | |
| INVERTER MODEL | | 1.5KW | 1.5KW | 2.5KW | 3.5KW | 5.5KW |
| Rated Power | | 2000W | 2000W | 3000W | 4000W | 5500W |
| Max. PV Array Open Circuit Voltage | | 500Vdc | | | | |
| PV Array MPPT Voltage Range | | 30Vdc~500Vdc | | | | 60Vdc~500Vdc |
| Max. Input Current | | 15A | 15A | 15A | 15A | 18A |
| Max. Charging Current(PV) | | 100A | 60A | 100A | 100A | 100A |

Table 4 General Specifications

| INVERTER MODEL | 1.5KW | 1.5KW | 2.5KW | 3.5KW | 5.5KW |
|-----------------------------|--|-------|-------|-------|-------------|
| Operating Temperature Range | -10°C to 55°C | | | | |
| Storage temperature | -15°C~ 60°C | | | | |
| Humidity | 5% to 95% Relative Humidity (Non-condensing) | | | | |
| Dimension(D*W*H), mm | 330x278x98 | | | | 438x295x105 |
| Net Weight, kg | 4.0 | | 4.4 | | 8.2 |

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. Re-charge battery. 2. Replace battery. |
| No response after power on. | No indication. | 1. The battery voltage is far too low. 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 if input voltage range setting is correct. (UPS→Appliance) |
| | Green LED is flashing. | Set "Solar First" 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 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 is over 100°C. | 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 06/22 | Output abnormal (Inverter voltage below than 190Vac or is higher than 260Vac) | 1. Reduce the connected load. 2. Return to repair center |
| | Fault code 08/09/15 | Internal components failed. | Return to repair center. |
| | Fault code 13 | Over current or surge. | Restart the unit, if the error happens again, please return to repair center. |
| | Fault code 14 | Bus voltage is too low. | |
| | Another fault code | | If the wires is connected well, please return to repair center. |

