



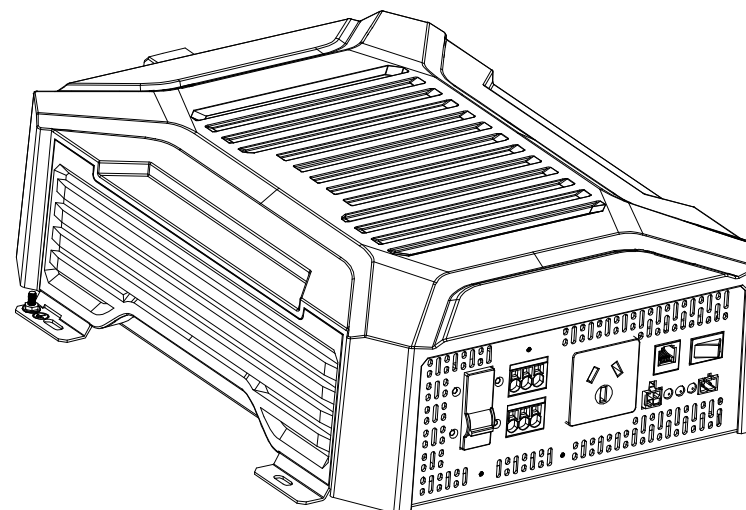
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# RIC-Series

## Pure Sine Wave High-frequency Inverter Charger User Manual



**Dear user:**

**Thank you for choosing our products!**

## **Important Safety Instructions**

Please keep this manual for future reference!

This manual contains all safety, installation, and operating instructions for the RIC series, frequency and pure sine wave high frequency charging inverter (here in after referred to as "the inverter charger"). Please read all instructions and precautions in the manual carefully before installation and use.

- ◆ Non-safety voltage exists inside the inverter charger. To avoid personal injury, users shall not disassemble the inverter charger themselves. Please contact our professional maintenance personnel for repair.
- ◆ Do not place the inverter charger within the reach of children.
- ◆ Do not install the inverter charger in harsh environments such as moist, oily, flammable or explosive, or heavily dusty areas.
- ◆ The AC output of the inverter charger is high voltage, so please do not touch the wiring terminals.
- ◆ The housing of the inverter charger is super hot when it is working. Do not touch it and keep away from materials or equipment affected by high temperature.
- ◆ Do not open the terminal protective cover when the inverter charger is working.
- ◆ Suitable fuse or circuit breaker is recommended to be mounted outside the inverter charger.

- ◆ Make sure to disconnect the fuse or circuit breaker near the terminals of the battery and AC output before installing and adjusting the wiring of the inverter charger.
- ◆ After installation, check whether all wiring is tightly connected to avoid the danger of heat accumulation due to loose connection.
- ◆ The inverter charger is off-grid. It is necessary to confirm that it is the only input device for load, and it is forbidden to use it in parallel with other input AC power to avoid damage.
- ◆ In order to ensure that users can protect their personal and property safety while using this product, relevant information is highlighted in the manual with following symbols. The following symbols in the manual indicate that you should read the relevant words carefully.



**Warning:** Electric shock that may damage devices or electrocution/injury if it is not avoided.



**Attention:** Potential dangers that may damage devices if they are not avoided.



**Note:** Important notices in operation that may trigger the device fault alarm if they are not performed.

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## 1. Introduction

### 1.1 Overview

The RIC series pure sine wave high frequency inverter charger integrates a pure sine wave inverter, battery charger, and utility bypass loading. Thanks to the full-digital intelligent control technology and voltage-current double closed-loop control algorithm adopted, the inverter charger has a fast dynamic response, high conversion efficiency, low harmonic component and stable operation;

Key components with high power density and long service life provide the inverter with continuous long-time and full-power output. And comprehensive electronic protections keep the entire system safer and more stable.

The RIC series inverter charger is specifically developed as an integrated inverter and charger for RV systems. Its strong load capacity can meet the load requirements of various types of household appliances, including air conditioner, electric kettle, hair dryer, induction cooker, coffee machine, etc, meeting the needs of household appliances in RV life.

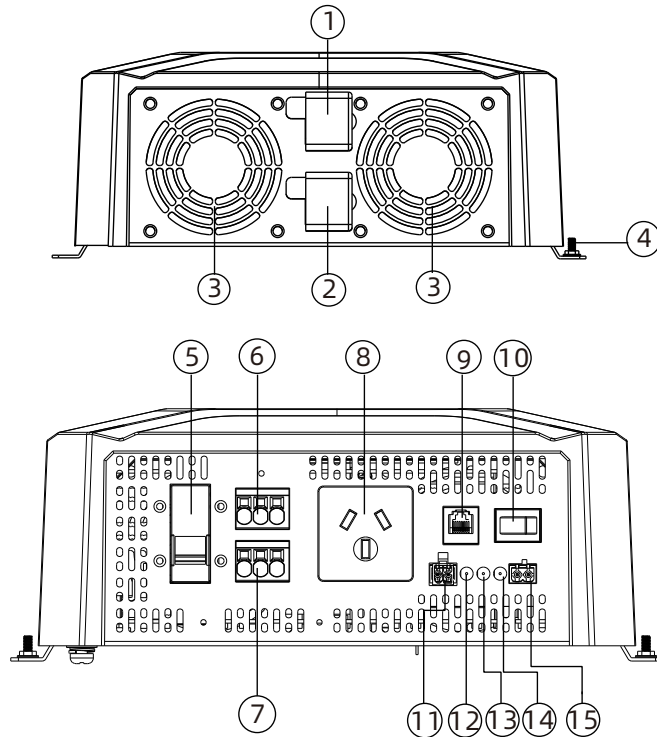
### 1.2 Features

- ◆ Full digital voltage-current double closed-loop control, in high response speed and reliability.
- ◆ Advanced SPWM technology, pure sine wave output, and low Total Harmonic Distortion (THD).
- ◆ Advanced wave-alter and current-limiting technology, with impact load such as large capacitive and inductive available.

- ◆ Multiple types of output sockets forms are available to meet the needs of customers in different countries and regions.
- ◆ Supporting multiple battery charging such as sealed battery, gel battery, lithium battery, and maximizing energy saving.
- ◆ Provided with automatic activation function of lithium battery charging.
- ◆ 6-Stage battery charging management function, which can quickly charge the battery and effectively extend its service life.
- ◆ Maximum charging current and full cut-off current can be set, providing comprehensive care for the battery.
- ◆ Automatic energy distribution, which can automatically adjust the charging power according to the size of the load power.
- ◆ Input undervoltage/overvoltage protection, output overload/short circuit protection, equipment over-temperature protection, fan protection, etc.
- ◆ Provided with AC power bypass, inverter output automatic and uninterrupted switching power supply, and UPS function.
- ◆ Low no-load, low standby loss, low total harmonic distortion rate(THD), and high conversion efficiency.
- ◆ Intelligent air cooling control system, for detecting the output of fan blocked control.
- ◆ The output voltage of 220/230/240VAC and the output frequency of 50/60Hz can be set.
- ◆ The design of the AC output RCD leakage protection switch ensures the normal operation of the product.

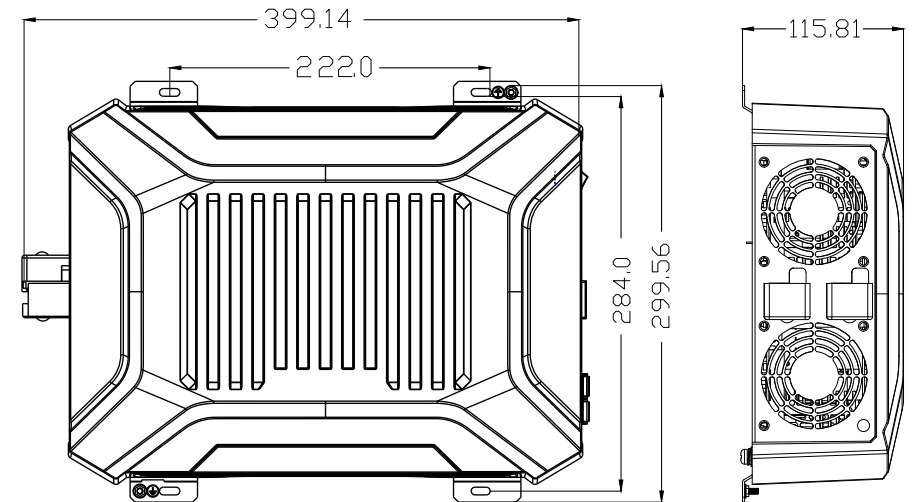
- ◆ Excellent EMC features and can be applied in scenarios with high requirements for power quality.
- ◆ Supporting Bluetooth communication, and view product operation state/real-time data and fault state through mobile app.
- ◆ Supporting RS485 and CAN communication interface of RV-C.
- ◆ The design of an external remote power switch contact switch allows for remote control of the inverter charger's power through an external mechanical switch or relay.
- ◆ Perfect hardware and software protection functions to ensure stable and reliable operation.

### 1.3 Appearance and interface description



| NO. | Name                                                                                                    | NO. | Name                              |
|-----|---------------------------------------------------------------------------------------------------------|-----|-----------------------------------|
| ①   | Battery input positive terminal                                                                         | ⑨   | RS485 communication interface     |
| ②   | Battery input negative terminal                                                                         | ⑩   | Operating mode switch             |
| ③   | Cooling fans                                                                                            | ⑪   | Communication interface -CAN      |
| ④   | Input ground terminal                                                                                   | ⑫   | Inverter indicator light          |
| ⑤   | Output AC RCD leakage protection switch                                                                 | ⑬   | Charging indicator light          |
| ⑥   | AC input terminal                                                                                       | ⑭   | Fault indicator                   |
| ⑦   | AC output terminal 1                                                                                    | ⑮   | External switch contact interface |
| ⑧   | AC output terminal 2(Australian standards can be formulated according to different national standards.) |     |                                   |

### 1.4 Dimension drawing



Product size: 400\*300\*116mm

Installation size: 222\*284mm

Hole size:  $\phi 5.5\text{mm}$

## 2. Technical Parameters

| Product model                        | RIC12-3KW                             | RIC24-3KW                       | RIC48-3KW                      |
|--------------------------------------|---------------------------------------|---------------------------------|--------------------------------|
| Inverter mode:                       |                                       |                                 |                                |
| Output rating                        | 3000W                                 |                                 |                                |
| Withstand instantaneous impact power | 6000W                                 |                                 |                                |
| Output power factor                  | 1.0                                   |                                 |                                |
| Output voltage                       | 220VAC/230VAC(default)/240VAC(±2%)    |                                 |                                |
| Output frequency                     | 50HZ(default)/60HZ(±0.1%)             |                                 |                                |
| Output wave                          | Pure sine wave                        |                                 |                                |
| Output harmonic component            | THDV<3%(pure resistance load)         |                                 |                                |
| Rated input voltage                  | 12VDC                                 | 24VDC                           | 48VDC                          |
| Input voltage range                  | 10.8~15.5V                            | 21.6~31.0V                      | 43.2~62.0V                     |
| Rated output efficiency              | >89.5%                                | >93.5%                          | >94%                           |
| Maximum output efficiency            | >93.5%                                | >95%                            | >96%                           |
| No-load loss                         | <20W                                  |                                 |                                |
| ECO energy-saving mode loss          | <3W                                   |                                 |                                |
| ECO starting power                   | <30W,30~100W adjustable               |                                 |                                |
| ECO interval time                    | 1min,30s~30min adjustable             |                                 |                                |
| N-G grounding                        | Supported, enabled by default         |                                 |                                |
| Charger mode:                        |                                       |                                 |                                |
| AC input voltage                     | Single phase 180VAC~265VAC            |                                 |                                |
| AC input frequency                   | 45~65HZ                               |                                 |                                |
| Rated charging current               | 200A(default)                         | 100A(default)                   | 50A(default)                   |
| Maximum charging current             | 0~200A is adjustable.                 | 0~100A is adjustable.           | 0~50A is adjustable.           |
| Full cut-off current                 | 0A(default)<br>0~20A adjustable       | 0A(default)<br>0~10A adjustable | 0A(default)<br>0~5A adjustable |
| Battery type                         | USE/FLD/GEL/LI/SLD                    |                                 |                                |
| Other parameters:                    |                                       |                                 |                                |
| AC in rated input current            | 16A                                   |                                 |                                |
| AC in maximum input current          | The default is 16A, 0 ~16A adjustable |                                 |                                |
| AC out1 rated current                | 15A                                   |                                 |                                |
| AC out2 rated current                | 16A                                   |                                 |                                |

|                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AC output priority                                                   | Mains priority (default)-access to mains for charging and bypass loading; Inverter priority-when the battery voltage is greater than a certain value, the access to the mains will give priority to inverter load; When the battery voltage is less than A certain value will be switched to mains charging and bypass loading, and then it will be converted to inverter output when the battery meets the requirement of constant voltage charging for 2 hours |
| Battery voltage of inverter to bypass when inverter takes precedence | <13.2V(12.0~14.0V )<br>*2,24V system; *4,48V system                                                                                                                                                                                                                                                                                                                                                                                                              |
| Inverter priority switching back conditions                          | Bypass output mode only (battery voltage > 14.2*N (where N denotes the system voltage level) maintained for 3 minutes) / Bypass with charging mode (constant voltage charging for 2 hours)                                                                                                                                                                                                                                                                       |
| Transfer time                                                        | <10ms                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| RCD switch                                                           | 240V/16A 30mA RCBO switch                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Communication function                                               | Bluetooth, RS485, and CAN (RV-C)                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Remote power ON/OFF interface                                        | Supported                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| RTC real-time clock                                                  | Supported                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Power assist                                                         | Supported                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Indicator                                                            | Green-inverter indication; Yellow-charging indication; Red-Fault indication                                                                                                                                                                                                                                                                                                                                                                                      |
| Protection function                                                  | DC input over-voltage/ over-discharge protection, AC output overload/short-circuit protection, AC input over-voltage/ under-voltage protection, device over-temperature protection, fan stall protection, RCD Protection                                                                                                                                                                                                                                         |
| Operating ambient temperature                                        | -20°C~+65°C                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Storage ambient temperature                                          | -35°C~80°C                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Relative humidity                                                    | 5%~95%                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Protection level                                                     | IP20                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Heat-dissipating method                                              | Natural heat dissipation + intelligent air cooling                                                                                                                                                                                                                                                                                                                                                                                                               |
| Noise                                                                | ≤60dB                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Product dimension                                                    | 400x300x116mm                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Installation dimension                                               | 222x284φ5.5mm                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Net weight                                                           | 8.7kg                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

## 3. Function Introduction

### 3.1 Charging curve

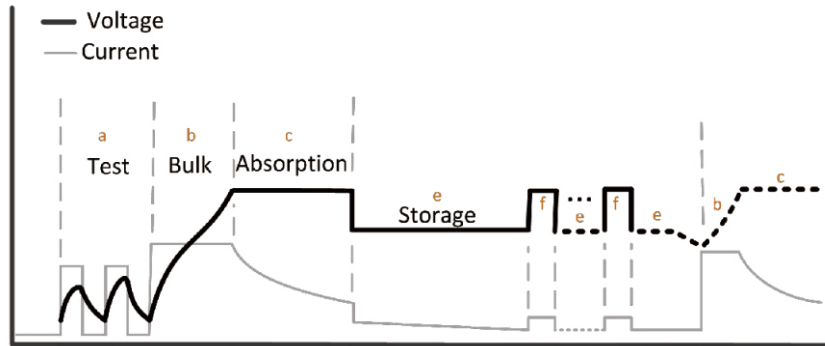


Figure 1 Charging curve of lithium battery

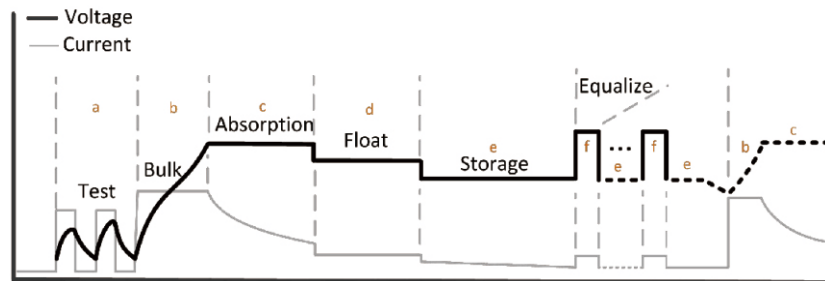


Figure 2 Charging curve of lead-acid battery

### 3.2 Charging stage description

Corresponding to the charging curve in 3.1 above, explain each charging stage:

#### 3.2.1 Stage A--Precharge--Test

Lead-acid batteries or lithium batteries are deeply discharged or not charged for a long time, resulting in a very low battery voltage, even down to 0V. After the charger is connected, the charging current will be limited to 8% of the set charging current and the battery will be pre-charged by pulse voltage. When the battery voltage is charged above  $11.0V \times N$ , it will enter "Bulk" charging.

#### 3.2.2 Stage B--High current charging--Bulk

When the battery voltage is less than the constant charging voltage, the charger charges the battery quickly with the set charging current. When the battery voltage is charged to the constant-voltage charging voltage, it will enter "Absorption" charging.

#### 3.2.3 Stage C--Absorption charging--Absorption

At the end of "Bulk" charging, the battery voltage rises to the "Absorption" voltage, and the charger will maintain the "Absorption" voltage to charge the battery at constant voltage.

In the lead-acid battery mode, keep the "Absorption" voltage for 2 hours (or a user-defined time), and then enter the "Float" charging;

In the lithium battery mode, if the charging current is less than 5% of the set charging current after charging at the "Absorption" voltage for 2 hours (or a user-defined time), it will enter the "Storage" charging; If the charging current is greater than 5% of the set charging current, it will continue to be charged in "Absorption", and after more than 48 hours, it will also be charged in "Storage" to further reduce the charging voltage.

### 3.2.4 Stage D--Floating charge--Float

In lead-acid battery mode, after "Absorption" charging for 2 hours, the charging voltage will be further reduced to enter the "Float" charging stage. After "Float" charging is maintained for 2 hours, if the charging current is greater than 5% of the set charging current, it will continue to be charged in floating charge, and after more than 48 hours, it will also be charged in "Storage" to further reduce the charging voltage. Lithium batteries have no "Float" charging stage.

### 3.2.5 Stage E--Storage charging--Storage

After the battery is fully charged, the charger is always connected, which will further reduce the charging voltage, store and charge the battery, supplement the battery's own loss, and keep the battery fully charged.

In the "Storage" charging stage, if one of the following conditions is met, the "Storage" charging will be exited:

- 1) When the charging current is greater than 5% of the set charging current for about 10 seconds, exit "Storage" charging and enter a new charging cycle.
- 2) When the battery voltage is lower than "'Storage' charging voltage minus  $0.3V \times N$ " for about 10 seconds, exit "Storage" charging and enter a new charging cycle.

### 3.2.6 Stage F--Balanced charging--Equal

When the battery is in the "Storage" charging state for a long time, the battery is charged evenly every 7 days. The battery benefits from regular "Equalize" balanced charging, which can stir the electrolyte, vaporize the electrolyte, balance the battery voltage, complete the chemical reaction, and effectively prolong the battery life. At this stage, the charging voltage of lead-acid battery is balanced charging voltage, and the charging voltage of lithium battery is absorption charging voltage.

### 3.2.7 Full

In the constant voltage charging stage (as shown in "c/d" stage of Figure 1 and Figure 2), the charging current is less than "full cut-off current" for 1 minute, and the charger will stop charging. If the battery voltage is lower than the storage voltage of  $-0.3V \times N$ , it will enter a new charging cycle again.

## 3.3 Battery parameter table

| Battery type<br>Parameter item   | Sealed lead-acid (SLD) (default) | Gel battery (GEL) | Flooded battery (FLD) | Lithium battery (LI) | Customized (USE)                  |
|----------------------------------|----------------------------------|-------------------|-----------------------|----------------------|-----------------------------------|
| Over-voltage disconnect voltage  | 15.5V                            | 15.5V             | 15.5V                 | 15.5V                | 10.8~15.5V                        |
| Over-voltage recovery voltage    | 14.5V                            | 14.5V             | 14.5V                 | 14.5V                | 10.8~14.5V                        |
| Limited charging voltage         | 15.2V                            | 15.2V             | 15.2V                 | --                   | 10.8~15.2V                        |
| Equalizing voltage               | 14.6V                            | --                | 14.8V                 | --                   | 10.8~15.2V                        |
| Absorption voltage               | 14.4V                            | 14.2V             | 14.6V                 | 14.4V                | 10.8~15.2V                        |
| Float voltage                    | 13.8V                            | 13.8V             | 13.8V                 | --                   | 10.8~15.2V                        |
| Storage voltage                  | 13.2V                            | 13.2V             | 13.2V                 | 13.5V                | 10.8~15.2V                        |
| Over-discharge voltage           | 11.1V                            | 11.1V             | 11.1V                 | 11.1V                | 10.8~15.2V                        |
| Over-discharge restoring voltage | 12.6V                            | 12.6V             | 12.6V                 | 12.6V                | 10.8~15.2V                        |
| Equalizing charging interval     | 7days                            | --                | 7days                 | --                   | 0~60days<br>(0 indicates off)     |
| Equalizing charging time         | 60min                            | --                | 60min                 | --                   | 0~60min                           |
| Absorption voltage time          | 120min                           | 120min            | 120min                | 120min               | 10~600min                         |
| Float voltage time               | 120min                           | 120min            | 120min                | --                   | Equal to increasing charging time |

The above parameters apply at 25°C/12V. For system voltages of **Note:** 12V/24V/36V/48V, the corresponding voltage points are automatically multiplied by N= 1/2/3/4, N association full text.

## 4. Description Of Interface Function

### 4.1 RS485 & CAN communication

#### ◆ RS485 communication:

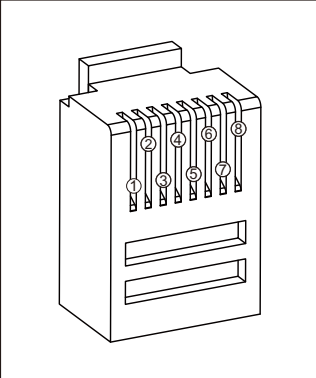
The default baud rate is 9600bps; Parity: None; Data bit: 8bit; Stop bit: 1bit

Interface type: RJ45, and matching resistance is 120R.

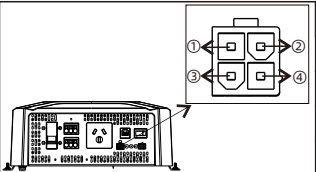
#### ◆ CAN communication

CAN 2.0B mode, extend frame, baud rate of 250kbps, support RV-C protocol, and there is no terminal resistance.

#### ◆ Interface communication line sequence definition:

|  | No. | Definition            |
|------------------------------------------------------------------------------------|-----|-----------------------|
|                                                                                    | ①   | CAN_L                 |
|                                                                                    | ②   | CAN_H                 |
|                                                                                    | ③   | NC                    |
|                                                                                    | ④   | NC                    |
|                                                                                    | ⑤   | Ground/signal ground  |
|                                                                                    | ⑥   | B/D-                  |
|                                                                                    | ⑦   | A/D+                  |
|                                                                                    | ⑧   | Power supply positive |

|  | No. | Definition |
|-------------------------------------------------------------------------------------|-----|------------|
|                                                                                     | ①   | NC         |
|                                                                                     | ②   | NC         |
|                                                                                     | ③   | CAN_L      |
|                                                                                     | ④   | CAN_H      |

### 4.2 Bluetooth communication

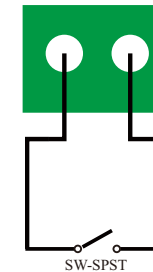
Built-in Bluetooth communication function, real-time monitoring of inverter charger operation data, fault status and adjustment of inverter charger operation parameters through mobile phone APP.

You can scan the following QR code to download the APP:

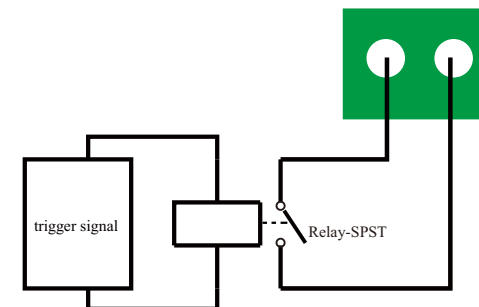


### 4.3 Remote ON/OFF interface of remote switch

2P switch interface: Inverter charger can work when the interface is short-circuited; inverter charger fails to work when the interface is open. The interface can be connected to a mechanical switch or relay to control the inverter charger to start/stop (this application requires keeping the inverter charger power supply in the I position) in practical application.



Application drawing 1: external mechanical switch



Application drawing 2: external relay switch

## 4.4 Operating mode switch power

Using a 3-position rocker switch, with the Remote ON/OFF interface in the closed state, the inverter has three operating modes: OFF, I, and II.

| Switch position | Definition of mode | Description of mode                                                                                                                 |
|-----------------|--------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| OFF             | OFF mode           | The device is in off state, not working, and has no loss                                                                            |
| I               | Normal mode        | The device is in normal operating condition and can provide inverter output or charged based on the battery and AC input conditions |
| II              | Charging mode only | The device is only used for charging or bypass loading and will not operate in inverter mode                                        |

## 4.5 LED indicator

◆ Inverter indicator-green; Charging indicator-yellow; Fault indicator-red.

◆ Indicators are defined as follows:

| Indicator | Color  | State        | State description                                                             |
|-----------|--------|--------------|-------------------------------------------------------------------------------|
| Inverter  | Green  | Normally on  | Inverter output                                                               |
|           |        | Slow flash   | Inverter ECO output                                                           |
|           |        | OFF          | Inoperative inverter                                                          |
| Charger   | Yellow | Normally on  | Battery is fully charged or AC in access is not charged/or only bypass output |
|           |        | Slow flash   | Absorption charge                                                             |
|           |        | Single flash | Float charging/float or storage charging/storage                              |
|           |        | Fast flash   | Equalizing charging/equalize                                                  |
|           |        | Double flash | Current-limited charging/bulk/test                                            |
|           |        | OFF          | No AC in connected                                                            |

| Indicator                         | Color                                         | State        | State description                                                                   |
|-----------------------------------|-----------------------------------------------|--------------|-------------------------------------------------------------------------------------|
| Fault                             | Red                                           | Normally on  | System fault                                                                        |
|                                   |                                               | Single flash | Stand-by, no inverter or not charging                                               |
|                                   |                                               | OFF          | Normal system                                                                       |
| Definition of indicator flashing: |                                               |              |                                                                                     |
| Slow flash                        | 1s ON, 1s OFF in 2s                           |              |  |
| Single flash                      | 0.1s ON, 1.9s OFF in 2s                       |              |  |
| Double flash                      | 0.1s ON, 0.1s OFF, 0.1s ON and 1.7s OFF in 2s |              |  |
| Fast flash                        | 1s ON, 0.1s OFF in 0.2s                       |              |  |

## 5. Installation Instructions

### 5.1 Installation precautions

Please read this manual carefully before installation to be familiar with the installation steps.

- ◆ Be careful when installing battery. Wear safety goggles when installing a lead-acid liquid battery. Once coming into contact with the battery acid, rinse with clean water timely.
- ◆ Keep away from metal objects to prevent short-circuit of battery.
- ◆ The battery may produce acid gas when charging. Make sure that the ambient environment is well-ventilated.
- ◆ When installing the cabinet, there must be enough space around the inverter charger for heat dissipation; Do not install the inverter charger and lead-acid battery in the same cabinet to avoid corrosion by acid gas generated during battery operation.
- ◆ As false connections and corroded cables may cause extreme heat to melt the cable insulation, burn surrounding materials and even cause a fire it is necessary to ensure that the connections are tightened, and the cables are fixed with ties to avoid loose connections due to shaking of cable on the move.

- ◆ The system connection cables selected shall have a current density  $\leq 5\text{A/mm}^2$ .
- ◆ During outdoor installation, direct sunlight and rainwater infiltration shall be avoided.
- ◆ After the power switch is turned off, there is still high voltage inside the inverter charger. Do not turn on or touch the internal devices. Carry out relevant operations after the capacitor is discharged.
- ◆ Do not install the inverter charger in harsh environments such as moist, oily, flammable or explosive, or heavily dusty areas.
- ◆ Polarity at the battery input terminal of this product shall not be reversed. Otherwise, it may damage the device or cause unpredictable danger.
- ◆ The AC output is a high voltage, so please do not touch the wiring.
- ◆ Do not touch the working fan to prevent injury.
- ◆ It is necessary to confirm that the inverter charger is the only input device for load, and it is forbidden to use it in parallel with other input AC power to avoid damage.

## 5.2 Wiring specifications and circuit breaker selection

Wiring and installation must comply with national and local electrical codes.

- ◆ Battery input wiring specifications and circuit breaker selection

| Model     | Rated input current | Battery input wiring specifications | Circuit breaker selection |
|-----------|---------------------|-------------------------------------|---------------------------|
| RIC12-3KW | 291A                | 70mm <sup>2</sup> /(2AWG*2)         | DC-2P-315A                |
| RIC24-3KW | 145A                | 35mm <sup>2</sup> /2AWG             | DC-2P-160A                |
| RIC48-3KW | 74A                 | 17mm <sup>2</sup> /5AWG             | DC-2P-100A                |

- ◆ AC output wiring specifications and circuit breaker selection

| Model     | Rated output current | AC output wiring specifications | Circuit breaker selection |
|-----------|----------------------|---------------------------------|---------------------------|
| RIC12-3KW | 13A                  | 4mm <sup>2</sup> /12AWG         | AC-2P-20A                 |
| RIC24-3KW | 13A                  | 4mm <sup>2</sup> /12AWG         | AC-2P-20A                 |
| RIC48-3KW | 13A                  | 4mm <sup>2</sup> /12AWG         | AC-2P-20A                 |

- ◆ AC input wiring specifications and circuit breaker selection

| Model     | Rated input current | AC output wiring specifications | Circuit breaker selection |
|-----------|---------------------|---------------------------------|---------------------------|
| RIC12-3KW | 16A                 | 5mm <sup>2</sup> /10AWG         | AC-2P-32A                 |
| RIC24-3KW | 16A                 | 5mm <sup>2</sup> /10AWG         | AC-2P-32A                 |
| RIC48-3KW | 16A                 | 5mm <sup>2</sup> /10AWG         | AC-2P-32A                 |

**Attention:** The above are reference specifications. Please select the appropriate specification and model according to actual situation.



**Attention:** The wiring diameter is for reference only. If the distance between the inverter charger and improve system performance.

**Attention:** The above only recommended wiring diameter and circuit breaker. Please select the appropriate wiring and diameter and circuit breaker to actual situations.

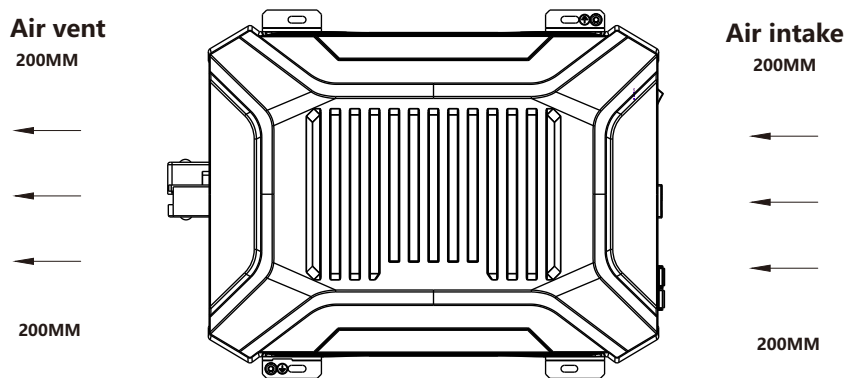
## 5.3 Installation and wiring

### Installation steps:

Step 1: Please read the user manual carefully.

Step 2: Determine the installation position and the space for heat dissipation

Determine the installation position (wall-mounted or horizontal installation method can be adopted): when installing the inverter charger, confirm that there is enough space of at least 200mm reserved between the air vent and air intake of the inverter to facilitate air circulation.



**Attention:** If the device is installed in a closed box, ensure that heat dissipation is allowed through the container. Otherwise, derate to use the device.

### Step 3: Wiring



**Warning:** The AC device shall be determined based on the inverter charger's continuous output power instantaneous impact power. Otherwise, the inverter charger may be damaged.

**Attention:** Before wiring, switch the inverter charger to the OFF.

**Attention:** Do not close the circuit breaker or fuse during wiring, and check if the electrode leads of each component are properly connected.

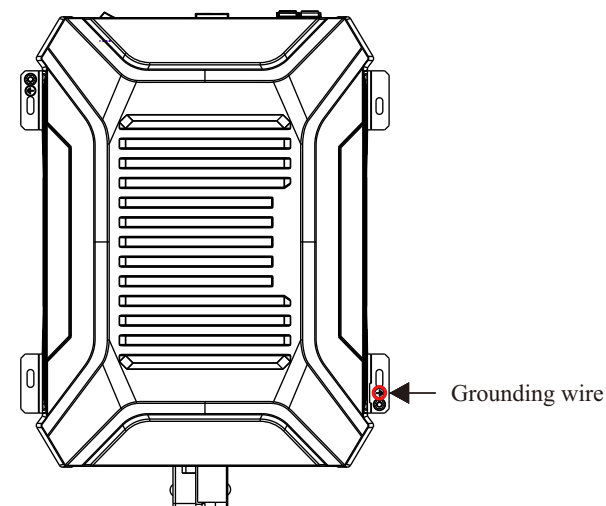


**Attention:** A fuse must be installed at the battery terminal, selected at 2 to 5 times the rated input current of the inverter charger, and the fuse position should be no more than 150mm from the battery terminal.

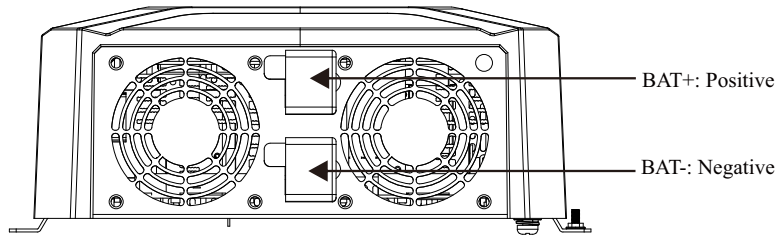
**Attention:** There is no reverse connection protection for the input, check if the Positive and Negative are connected correctly before connecting.

Wiring sequence:

3.1 Ground wire



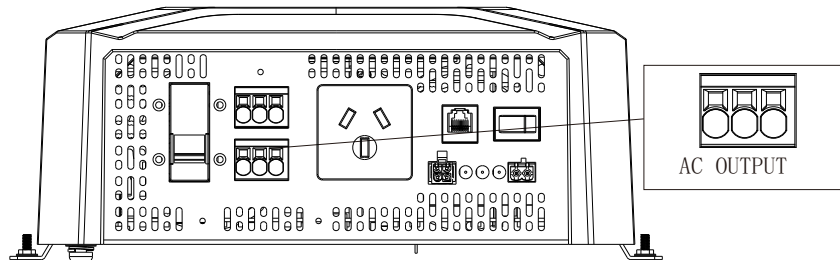
### 3.2 Positive/Negative wires of storage battery



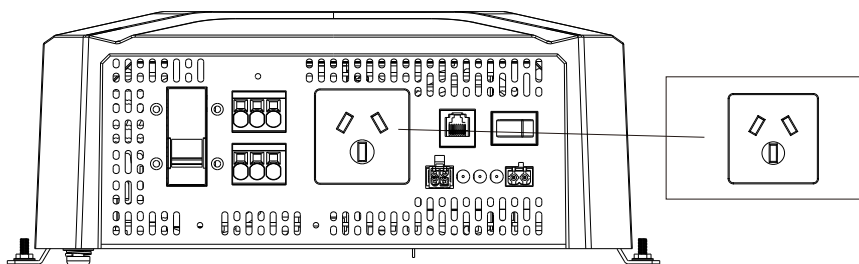
**Attention:** There is no reverse connection protection for the input, check if the Positive and Negative are connected correctly before connecting, or the inverter charger may be damaged!

### 3.3 AC equipment

- ◆ The inverter charger has two AC output interfaces. If the current of a single load device is greater than 15A, the load device needs to be connected to the following 3P terminal (AC OUTPUT), which is defined as follows:

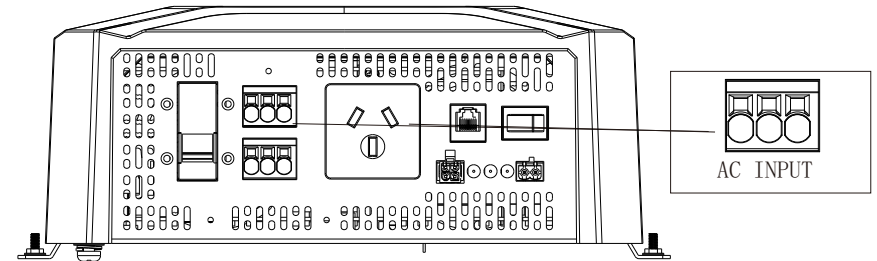


- ◆ The inverter charger is equipped with a standard output terminal, as shown in the following figure. The maximum current capacity of the terminal is 15A.

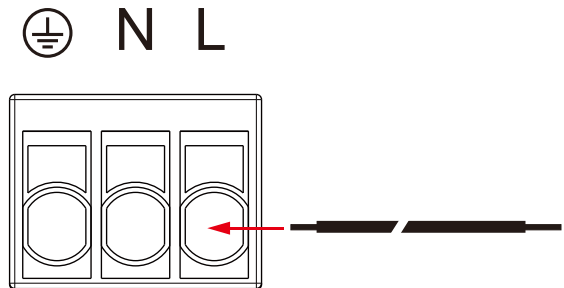


### 3.4 AC input connect

The AC input line to the 3P terminal block (AC INPUT) as shown below.

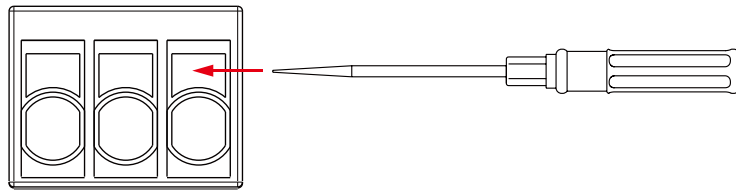


- ◆ It is recommended to use copper wire with a cross-sectional area of 8mm<sup>2</sup> or larger, and the wire gauge may be increased as needed based on actual requirements;
- ◆ If you choose multi-strand wires, you need to add solder to the connecting wires to make them one piece and insert them into the corresponding holes;
- ◆ Please connect the ground wire first, then the live wire L and the neutral wire N.



- ◆ When removing the connection wire, first stop the inverter charger from working, then insert a sharp tool into the small hole above the interface and pull out the connection wire with force.

⊕ N L



#### Step 4: Start the inverter charger

- 4.1 Close the circuit breaker at the DC input end of the inverter charger or the fuse at the battery end;
- 4.2 Short-circuit the external switch contact interface of the inverter charger (the factory default is short-circuited);
- 4.3 Set the inverter charger mode switch to ON position to start the inverter charger output: the running indicator light is green and the inverter charger outputs AC power normally;
- 4.4 Close the circuit breaker on the AC load line, turn on the AC loads one by one, and check the operating status of the inverter charger and loads;
- 4.5 If the fault indicator turns red and the buzzer sounds after starting the inverter charger, please turn off the load and inverter charger and refer to "Common Problems and Solutions" for troubleshooting. After troubleshooting follow the above steps again.

## 6. Protection Function

### 6.1 DC input overvoltage protection

When the battery voltage is greater than the input over-voltage protection voltage, turn off the AC output, fault indicator lamp and buzzer; When the battery voltage is less than the input over-voltage protection voltage of  $-1V \times N$ , AC output will be restored.

**Attention:** Although the inverter charger has the function of DC input over-voltage protection, the input voltage of 12V system should not be higher than  $20V \times N$ .

### 6.2 DC input low voltage protection

When the battery voltage is less than the input low-voltage protection voltage, turn off the AC output, fault indicator and buzzer; When the battery voltage is greater than the input output, fault indicator and buzzer; When the battery voltage is greater than the input low-voltage t low-voltage protection recovery voltage, AC output is restored.

### 6.3 Output of overload protection

When the AC load is greater than the rated output power, corresponding protection shall be made according to different overload levels, as follows:

| Load power                  | Possible duration |
|-----------------------------|-------------------|
| $102\% \leq P_o \leq 120\%$ | 1min              |
| $120\% < P_o \leq 150\%$    | 30s               |
| $P_o > 150\%$               | 10s               |

**Attention:** When the inverter charger has overload protection, the AC output has three automatic recovery functions (the first delay is 5s, the second delay is 10s, and the third delay is 15s). It will not recover automatically for the fourth time. Check the equipment and restart the inverter charger after troubleshooting to recover the AC output.

### 6.4 AC output short circuit protection

When the AC output L/N is short-circuited, the inverter charger automatically turns off the AC output, and the fault indicator lamp and buzzer prompt.



**Attention:** When the inverter charger is short-circuit protected, the AC output has three automatic recovery functions (the first delay of 5s, the second delay of 10s and the third delay of 15s). It won't recover automatically for the fourth time, and the AC output can only be recovered after restarting the inverter charger after troubleshooting.

## 6.5 AC input overcurrent protection

When the AC input current of AC in is greater than 16A, the inverter charger will automatically disconnect the AC input, fault indicator light and buzzer.



**Attention:** When the inverter charger has AC input over-current protection, the AC output has three automatic recovery functions (the first delay is 5s, the second delay is 10s, and the third delay is 15s). It will not recover automatically for the fourth time. Check the equipment and restart the inverter charger after troubleshooting to recover the AC output.

## 6.6 AC input overvoltage protection

When the AC input voltage is greater than 265VAC, the AC input will be automatically disconnected.

## 6.7 AC input undervoltage protection

When the AC input voltage is less than 180VAC, the AC input will be automatically disconnected.

## 6.8 Inverter N-G grounding protection

In the inverter mode, the relay inside the inverter charger controls the zero line to be connected with the ground line and the zero line of the analog mains transformer is grounded. At this time, the with the ground line and the zero line of the analog mains transformer is external leakage protection can work normally and play a protective role in case of leakage.

When the mains bypass is loaded, the neutral line controlled by the relay inside the inverter charger is not connected with the ground line. Because the neutral line on the mains transformer side has been grounded, the leakage protection can work normally at this time, which plays a protective role in case of leakage. If the customer connects the zero line to the ground without authorization, it will cause the leakage protection to accidentally trigger the cut-off circuit.



**Attention:** It is forbidden for customers to connect the neutral wire and the ground wire by themselves, which may lead to mis-operation, danger and equipment damage.

## 6.9 Equipment over-temperature protection

Multi-channel temperature detection is provided inside the equipment, and any temperature greater than the over-temperature protection value of the equipment will automatically turn off the AC output, and the fault indicator lamp and buzzer will prompt; When the temperature is less the recovery value of equipment over-temperature protection, the AC output will be automatically than restored.



**Attention:** In order to ensure that the inverter charger can run reliably and stably at full power for a long time, please ensure a good ventilation environment.

## 6.10 Fan Fault Protection

When the fan is blocked or cannot operate for other reasons:

(1) The inverter output power of the inverter charger can only operate at up to 30% of the rated power. If the load power exceeds 30% of the rated power, the AC output and input will shut down.

(2) The inverter charger supports AC charging up to 70% of the rated charging current; if this limit is exceeded, the AC output will shut down.



**Attention:** When the load power is greater than 30% of the rated power, the AC output will be turned off, and the AC output has the function of automatic recovery for three times (each delay is 60s). It will not recover automatically for the fourth time. Check the equipment and restart the inverter charger after troubleshooting to recover the AC output.



**Attention:** In order to ensure that the inverter charger can run reliably and stably at full power for a long time, please ensure a good installation environment, avoid oil stains, wires and other blocking fans, and check whether the fans are running regularly.

## 7. Common Problems And Solutions

| No. | Phenomenon                                                                  | Cause                           | Possible cause                                                                              | Solutions                                                                                                                                                                                                                               |
|-----|-----------------------------------------------------------------------------|---------------------------------|---------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | Red light always on, green/ yellow off, buzzer buzzing, light no AC output  | Over-low battery input voltage  | 1.Excessive voltage drop due to over-small battery wiring diameter.<br>2.Low battery power. | 1.Choose the suitable wires.<br>2.Timely charge the battery until the low voltage recovery voltage can self-restore the output.                                                                                                         |
| 2   | Red light always on, green/ yellow light off, buzzer buzzing, no AC output  | Over-high battery input voltage | Mismatch between battery voltage and device system voltage                                  | Measure the positive and negative terminal voltage of the device with a determine whether they are voltmeter to determine whether they are higher than the over-voltage protection voltage, and recover by adjusting the input voltage. |
| 3   | Red/green light always on, yellow light off, buzzer buzzing, With AC output | Overload                        | Power of load device higher than rated output power                                         | Check whether the AC load is within the rated power range of the inverter charger.                                                                                                                                                      |

| No. | Phenomenon                                                                           | Cause                  | Possible cause                                                                           | Solutions                                                                                                                                                                              |
|-----|--------------------------------------------------------------------------------------|------------------------|------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4   | Red light always on, green/yellow light off, buzzer buzzing, no AC output            | Overload               | Power of load device higher than rated output power                                      | Check whether the AC load is within the rated power range of the inverter charger; and eliminate the load overload fault and restart the inverter charger to restore normal operation. |
| 5   | Red light always on, green/yellow light off, buzzer buzzing, no AC output            | Load short-circuited   | 1.AC output of the inverter charger short-circuited.<br>2.AC device L/N short-circuited. | Check whether the AC load wiring is short-circuited. Clear the load short-circuit fault, and restart the inverter charger to restore normal operation.                                 |
| 6   | Red light always on, green/yellow light off, buzzer buzzing, no AC output, no charge | AC input Over-voltage  | Connected AC voltage exceeded the maximum input voltage of the device by 265V.           | Check whether the connection voltage AC is within the range of 180~265V.                                                                                                               |
| 7   | Red light always on, green/yellow light off, buzzer buzzing, no AC output, no charge | AC input Under-voltage | Connected AC voltage lower than the minimum input voltage of the device by 180V.         | Check whether the AC connection voltage is within the range of 180~265V.                                                                                                               |

| No. | Phenomenon                                                                           | Cause                        | Possible cause                                                                                                                                      | Solutions                                                                                                                                                                                                           |
|-----|--------------------------------------------------------------------------------------|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 8   | Red light always on, green/yellow light off, buzzer buzzing, no AC output, no charge | Over-high device temperature | Internal temperature of device higher than the set over-temperature protection.                                                                     | Improve the quality of ventilation, clear the vent, reduce the temperature around the inverter charger, and restart the device after the temperature is reduced. Please derate the amount if troubleshooting fails. |
| 9   | Red light always on, green/yellow light off, buzzer buzzing, no AC output, no charge | Fan fault                    | The fan is blocked by foreign matter.                                                                                                               | Check whether the fan works properly.                                                                                                                                                                               |
| 10  | Red light Single flash, green/yellow light off, no AC output, no charge              | misemploy                    | 1.AC-in is not connected, but the equipment switch is in II (Charge only) mode.<br>2. Lead-acid battery mode but equipment electricity Pool missed. | 1.Turn the equipment switch to I mode.<br>2.Set the correct battery type or the battery is damaged.                                                                                                                 |

## 8. System Maintenance

In order to maintain the best long-term performance, it is recommended to conduct following checks twice a year.

- ◆ Make sure that the airflow around the inverter charger is smooth and remove any dirt or debris from the heat sink.
- ◆ Check whether all exposed wires are damaged by exposure to sunlight, friction with other objects around them, dryness, bite by insects or rodents, etc. The wires shall be repaired or replaced if necessary.
- ◆ Verify for the consistency of indicator and display with the operation of the device. Please pay attention to any faults or errors, and take corrective actions if necessary.
- ◆ Check all wiring terminals for corrosion, insulation damage, signs of high temperature or burning/discoloration, and tighten the screws.
- ◆ Check for dirt, nesting insects and corrosion, and clean up as required.
- ◆ The arrester failed shall be replaced in time against lightning damage to the inverter charger or even other device of the user.



**Warning:** Danger of electric shock! Make sure that the inverter charger power is disconnected and the power in the capacitor is discharged before carrying out the corresponding checks or operations!

The Company does not assume any liability for damage caused by:

- ◆ Improper use or use in improper site.
- ◆ Current, voltage and power of the load exceeding the limit of the inverter charger.
- ◆ Arcing, fire and explosion caused by failure to follow inverter charger markings or manual instructions.
- ◆ Disassemble and repair the inverter charger without permission.
- ◆ Force majeure.
- ◆ Damage that occurs in transportation or handling of the inverter charger.
- ◆ Damage to the machine caused by using the product outside the parameters.