

**SAJ**

# User Manual

## SAJ Solar Inverter Sununo Plus Series



[www.saj-electric.com](http://www.saj-electric.com)



## **Preface**

Thank you for choosing a SAJ solar inverter. We are pleased to provide you with first-class products and exceptional service.

This manual includes information for installation, operation, maintenance, trouble shooting and safety. Please follow the instructions of this manual so that we can ensure delivery of our professional guidance and wholehearted service.

Customer-orientation is forever our commitment. We hope this document proves to be of great assistance in your journey for a cleaner and greener world.

Please check for the latest version at [www.saj-electric.com](http://www.saj-electric.com)

Guangzhou Sanjing Electric Co., Ltd.

**Building e-Energy management solution provider**

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# Chapter 1 Safety Precautions

## 1.1 Scope of Application

This User Manual describes instructions and detailed procedures for installing, operating, maintaining, and troubleshooting of the following SAJ grid-tied inverters:

Sununo Plus 1K, Sununo Plus 1.5K, Sununo Plus 2K, Sununo Plus 2.5K,

Sununo Plus 3K, Sununo Plus 3.6K, Sununo Plus 3K-M,

Sununo Plus 4K-M, Sununo Plus 5K-M, Sununo Plus 6K-M

Please keep this manual all time available in case of emergency.

## 1.2 Safety Instructions



### DANGER

· DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.



### WARNING

· WARNING indicates a hazardous situation which, if not avoided, can result in death or serious injury or moderate injury.



### CAUTION

· CAUTION indicates a hazardous condition which, if not avoided, can result in minor or moderate injury.



### NOTICE

· NOTICE indicates a situation that can result in potential damage, if not avoided.

### **1.3 Target Group**

Only qualified electricians who have read and fully understood all safety regulations contained in this manual can install, maintain and repair the inverter. Operators must be aware of the high-voltage device.

## Chapter 2 Preparation

### 2.1 Safety Instructions



#### DANGER

- There is possibility of duing to electrical shock and high voltage.
- Do not touch the operating component of the inverter, or it might result in burning or death.
- To prevent risk of electric shock during installation and maintenance, please make sure that all AC and DC terminals are plugged out.
- Do not touch the surface of the inverter while the housing is wet, or it might lead to electrical shock.
- Do not stay close to the inverter while there are severe weather conditions including storm, lightning, etc.
- Before opening the housing, the SAJ inverter must be disconnected from the grid and PV generator; you must wait for at least five minutes to let the energy storage capacitors fully be discharged after disconnecting from power source.



#### WARNING

- The installation,service, recycling and disposal of the inverters must be performed by qualified personnel only in compliance with national and local standards and regulations.
- Any unauthorized actions including modification of product functionality of any form may cause lethal hazard to the operator, third parties, the units or their property. SAJ is not responsible for the loss and these warranty claims.
- The SAJ inverter must only be operated with PV generator. Do not connect any other source of energy to the SAJ inverter.
- Be sure that the PV generator and inverter are well grounded in order to protect safety of people's life and property.



#### CAUTION

- The PV inverter will become hot during operation. Please do not touch the heat sink or peripheral surface during or shortly after operation.
- Risk of damage due to improper modifications.



#### NOTICE

- Public utility only.
- The PV inverter is designed to feed AC power directly to the public utility power grid; do not connect AC output of the inverter to any private AC equipment.

## 2.2 Explanations of Symbols

| Symbol  | Description  |
|---|--|
|    | <b>Dangerous electrical voltage</b><br>This device is directly connected to public grid, thus all work to the inverter shall only be carried out by qualified personnel.               |
|     | <b>DANGER to life due to high electrical voltage!</b><br>There might be residual currents in inverter because of large capacitors. Wait for 5 MINUTES before you remove the front lid. |
|    | <b>NOTICE, danger!</b><br>This is directly connected with electricity generators and public grid.  |
|    | <b>Danger of hot surface</b><br>The components inside the inverter will release a lot of heat during operation. Do not touch metal plate housing during operating.                     |
|    | <b>An error has occurred</b><br>Please go to Chapter 9 “Troubleshooting” to remedy the error.  |
|    | <b>This device SHALL NOT be disposed of as residential waste</b><br>Please go to Chapter 8 “Recycling and Disposal” for proper treatments.   |
|    | <b>Without Transformer</b><br>This inverter does not use transformer for the isolation function.   |
|    | <b>Security Certificate</b><br>The inverter complies with European product safety instructions.  |
|  | <b>CE Mark</b><br>Equipment with the CE mark fulfills the basic requirements of the Guideline Governing Low-Voltage and Electro-magnetic Compatibility.                                |
|  | <b>SAA Mark</b><br>The inverter complies with the requirement of Equipment and Product Safety Act in Australia.  |

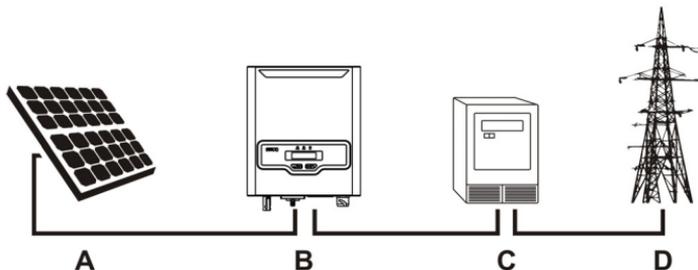
|  |   |
|--|---|
|   | <p><b>CQC Mark</b><br/>The inverter complies with the safety instructions from China's Quality Center.</p>  |
| <p><b>ATTENTION</b> </p> <p>Risk of electric shock! Only authorized operations are allowed to do disassembly, modification or maintenance. Any resulting defect or damage (device/person) is not covered by SAJ guaranty.</p> | <p><b>No unauthorized operations or modifications</b><br/>Any unauthorized operations or modifications are strictly forbidden, if any defect or damage(device/person) occurs, SAJ shall not take any responsibility for it.</p> |

## Chapter 3 Product Information

### 3.1 Application Scope of Products

Sununo Plus series products are grid-tied single phase inverters without transformers, and the inverters are important components of grid-tied solar power systems.

The Sununo Plus inverters change the DC generated by solar panels into AC which is in accordance with the requirements of public grid and send the AC into the grid, Table 3.1 shows the structural diagram of the typical application system of Sununo Plus inverters.



| Name | Description        | Remarks   |
|------|--------------------|---|
| A    | Solar panels       | Monocrystalline or polycrystalline silicon, and thin-film PV modules with II protection and need no ground connection |
| B    | Inverters          | Sununo Plus 1K/1.5K/2K/2.5K/3K/3.6K/3K-M/4K-M/5K-M/6K-M   |
| C    | Metering equipment | Standard metering tool for measuring the output electric power of inverters   |
| D    | Power grid         | TT, TN-C, TN-S, TN-C-S  |

Table 3.1 Systematic Configuration Diagram

### 3.2 Specification for Product Model

Sununo Plus    XK    -M

①

②

③

- ① Sununo Plus represents for product name.
- ② XK represents rated power XkW of inverter, for example 1.5K means 1.5kW.
- ③ -M represents the inverter has the function of dual MPPT.

### 3.3 Overview and Dimensions of products

The dimensions of Sununo Plus series products is shown in Figure 3.2.

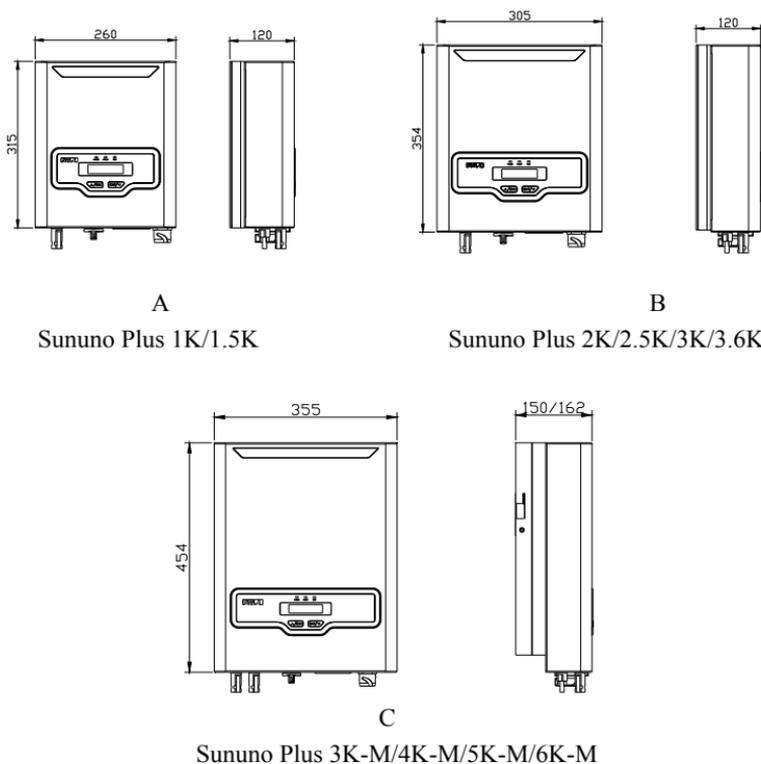


Figure 3.2 Dimensions of Sununo Plus series Products

### 3.4 Datasheet

#### Sununo Plus 1K/1.5K

| Type                                  | Sununo Plus 1K             | Sununo Plus 1.5K |
|---------------------------------------|----------------------------|------------------|
| <b>Input (DC)</b>                     |                            |                  |
| Max. DC Power [W]                     | 1200                       | 1800             |
| Max. DC Voltage [V]                   | 450                        |                  |
| MPPT Voltage range [V]                | 60-425                     |                  |
| Nominal DC Voltage [V]                | 360                        |                  |
| Start Voltage [V]                     | 70                         |                  |
| Min. DC Voltage [V]                   | 50                         |                  |
| Max. DC Input Current [A]             | 11                         |                  |
| Number of DC Connection Sets per MPPT | 1                          |                  |
| Number of MPPT                        | 1                          |                  |
| DC Switch                             | Integrated                 |                  |
| <b>Output (AC)</b>                    |                            |                  |
| Rated AC Power [W]                    | 1000                       | 1500             |
| Max. AC Power [W]                     | 1100                       | 1650             |
| Rated AC Current [A]                  | 4.3                        | 6.5              |
| Max. AC Current [A]                   | 5.3                        | 7.9              |
| Nominal AC voltage/ range             | 220V, 230V, 240V/180V-280V |                  |
| Grid frequency/ range                 | 50Hz, 60Hz/ $\pm$ 5Hz      |                  |
| Power factor [cos $\phi$ ]            | >0.99(full load)           |                  |
| Total Harmonic Distortion [THDi]      | < 3%                       |                  |
| Feed in                               | 1L+N+PE                    |                  |
| <b>Efficiency</b>                     |                            |                  |
| Max. Efficiency                       | 97.1%                      | 97.2%            |
| Euro Efficiency [at 360Vdc]           | 96.6%                      | 96.7%            |
| MPPT Accuracy                         | >99.5%                     |                  |
| <b>Protection</b>                     |                            |                  |
| Internal Over-voltage Protection      | Integrated                 |                  |
| DC Insulation Monitoring              | Integrated                 |                  |
| DCI Monitoring                        | Integrated                 |                  |
| GFCI Monitoring                       | Integrated                 |                  |
| Grid Monitoring                       | Integrated                 |                  |
| AC Short Circuit Current Protection   | Integrated                 |                  |
| Thermal Protection                    | Integrated                 |                  |

|                                   |  |
|-----------------------------------|--|
| Anti-island protection monitoring | AFD  |
| <b>Interface</b>                  |  |
| AC Connection                     | Plug-in connector  |
| DC Connection                     | MC4/H4   |
| LCD/LED Display                   | LCD (16x2 Characters, Backlight) & LED (3 Lights)  |
| Display Language                  | English  |
| Datalogger & Communication        | RS232 (Standard)/WiFi (Optional)   |
| <b>General Data</b>               |  |
| Topology                          | Transformerless  |
| Consumption at Night [W]          | <0.2   |
| Consumption at Standby [W]        | 6  |
| Operating Temperature Range       | -25°C to +60°C (45°C to 60°C with derating)  |
| Cooling Method                    | Natural Convection   |
| Ambient Humidity                  | 0% to 100% Non-condensing  |
| Altitude                          | Up to 2000m (without derating)   |
| Noise [dBA]                       | <15  |
| Ingress Protection                | IP65 (Indoor & Outdoor Installation)   |
| Mounting                          | Rear Panel   |
| Dimensions (H*W*D) [mm]           | 315*260*120  |
| Net Weight [kg]                   | 5.6  |
| Standard Warranty [Year]          | 5 (Standard)/10/15/20/25 (Optional)  |
| Certificates                      | IEC62109-1/2, IEC61000-6-2/3, IEC61683, IEC60068-2, IEC62116, IEC61727, PEA/MEA, NRS 097-2-1, UTE-C-15-712-1, VDE0126-1-1/A1, VDE-AR-N 4105, AS4777.2, AS4777.3, C-TICK, CQC NB/T 32004, G83-2, NBR 16149, NBR 16150, TF 3.2.1, C10/11 |

## Sununo Plus 2K/2.5K/3K/3.6K

| Type                                     | Sununo Plus<br>2K          | Sununo Plus<br>2.5K | Sununo Plus<br>3K | Sununo Plus<br>3.6K |
|--|----------------------------|---------------------|-------------------|---------------------|
| <b>Input (DC)</b>                        |                            |                     |                   |                     |
| Max. DC Power [W]                        | 2400                       | 3000                | 3630              | 4420                |
| Max. DC Voltage [V]                      | 500                        |                     | 550               | 600                 |
| MPPT Voltage range [V]                   | 60-450                     |                     | 60-500            |                     |
| Nominal DC Voltage [V]                   | 360                        |                     |                   |                     |
| Start Voltage [V]                        | 70                         |                     |                   |                     |
| Min. DC Voltage [V]                      | 50                         |                     |                   |                     |
| Max. DC Input Current [A]                | 11                         |                     |                   |                     |
| Number of DC Connection Sets<br>per MPPT | 1                          |                     |                   |                     |
| Number of MPPT                           | 1                          |                     |                   |                     |
| DC Switch                                | Integrated                 |                     |                   |                     |
| <b>Output (AC)</b>                       |                            |                     |                   |                     |
| Rated AC Power [W]                       | 2000                       | 2500                | 3000              | 3680                |
| Max. AC Power [W]                        | 2200                       | 2750                | 3300              | 3680                |
| Rated AC Current [A]                     | 8.7                        | 10.9                | 13.0              | 16.0                |
| Max. AC Current [A]                      | 10.6                       | 13.3                | 15.9              | 17.6                |
| Nominal AC voltage/ range                | 220V, 230V, 240V/180V-280V |                     |                   |                     |
| Grid frequency/ range                    | 50Hz, 60Hz/ $\pm 5$ Hz     |                     |                   |                     |
| Power factor [cos $\phi$ ]               | $>0.99$ (full load)        |                     |                   |                     |
| Total Harmonic Distortion<br>[THDi]      | $< 3\%$                    |                     |                   |                     |
| Feed in                                  | 1L+N+PE                    |                     |                   |                     |
| <b>Efficiency</b>                        |                            |                     |                   |                     |
| Max. Efficiency                          | 97.4%                      | 97.5%               | 97.6%             | 97.6%               |
| Euro Efficiency [at 360Vdc]              | 96.9%                      | 97.0%               | 97.1%             | 97.1%               |
| MPPT Accuracy                            | $>99.5\%$                  |                     |                   |                     |
| <b>Protection</b>                        |                            |                     |                   |                     |
| Internal Over-voltage Protection         | Integrated                 |                     |                   |                     |
| DC Insulation Monitoring                 | Integrated                 |                     |                   |                     |
| DCI Monitoring                           | Integrated                 |                     |                   |                     |
| GFCI Monitoring                          | Integrated                 |                     |                   |                     |
| Grid Monitoring                          | Integrated                 |                     |                   |                     |
| AC Short Circuit Current<br>Protection   | Integrated                 |                     |                   |                     |
| Thermal Protection                       | Integrated                 |                     |                   |                     |

|                                   |  |     |     |
|-----------------------------------|--|-----|-----|
| Anti-island protection monitoring | AFD  |     |     |
| <b>Interface</b>                  |  |     |     |
| AC Connection                     | Plug-in connector  |     |     |
| DC Connection                     | MC4/H4   |     |     |
| LCD/LED Display                   | LCD (16x2 Characters, Backlight) & LED (3 Lights)  |     |     |
| Display Language                  | English  |     |     |
| Datalogger & Communication        | RS232 (Standard)/WiFi (Optional)   |     |     |
| <b>General Data</b>               |  |     |     |
| Topology                          | Transformerless  |     |     |
| Consumption at Night [W]          | <0.2   |     |     |
| Consumption at Standby [W]        | 6  |     |     |
| Operating Temperature Range       | -25°C to +60°C (45°C to 60°C with derating)  |     |     |
| Cooling Method                    | Natural Convection   |     |     |
| Ambient Humidity                  | 0% to 100% Non-condensing  |     |     |
| Altitude                          | Up to 2000m (without derating)   |     |     |
| Noise [dBA]                       | <25  |     |     |
| Ingress Protection                | IP65 (Indoor & Outdoor Installation)   |     |     |
| Mounting                          | Rear Panel   |     |     |
| Dimensions (H*W*D) [mm]           | 354*305*120  |     |     |
| Net Weight [kg]                   | 7.8  | 8.3 | 8.4 |
| Standard Warranty [Year]          | 5 (Standard)/10/15/20/25 (Optional)  |     |     |
| Certificates                      | IEC62109-1/2, IEC61000-6-2/3, IEC61683, IEC60068-2, IEC62116, IEC61727, PEA/MEA, NRS 097-2-1, UTE-C-15-712-1, VDE0126-1-1/A1, VDE-AR-N 4105, AS4777.2, AS4777.3, C-TICK, CQC NB/T 32004, G83-2, NBR 16149, NBR 16150, TF 3.2.1, C10/11 |     |     |

## Sununo Plus 3K-M/4K-M/5K-M/6K-M

| Type                                     | Sununo Plus<br>3K-M        | Sununo Plus<br>4K-M     | Sununo Plus<br>5K-M     | Sununo Plus<br>6K-M |
|--|----------------------------|-------------------------|-------------------------|---------------------|
| <b>Input (DC)</b>                        |                            |                         |                         |                     |
| Max. DC Power [W]                        | 3630                       | 4840                    | 6050                    | 7200                |
| Max. DC Voltage [V]                      | 600                        |                         |                         |                     |
| MPPT Voltage range [V]                   | 90-550                     |                         |                         |                     |
| Nominal DC Voltage [V]                   | 360                        |                         |                         |                     |
| Start Voltage [V]                        | 100                        |                         |                         |                     |
| Min. DC Voltage [V]                      | 80                         |                         |                         |                     |
| Max. DC Input Current [A]                | 11/11                      |                         |                         |                     |
| Number of DC Connection Sets<br>per MPPT | 1/1                        |                         |                         |                     |
| Number of MPPT                           | 2                          |                         |                         |                     |
| DC Switch                                | Integrated                 |                         |                         |                     |
| <b>Output (AC)</b>                       |                            |                         |                         |                     |
| Rated AC Power [W]                       | 3000                       | 3680 <sup>1</sup> /4000 | 4600 <sup>2</sup> /5000 | 6000                |
| Max. AC Power [VA]                       | 3300                       | 3680/4400               | 4600/5500               | 6000                |
| Rated AC Current [A]                     | 13.0                       | 16.0/17.4               | 20.0/21.7               | 26.1                |
| Max. AC Current [A]                      | 15.9                       | 16.0/21.0               | 22.2/26.7               | 28.7                |
| Nominal AC voltage/ range                | 220V, 230V, 240V/180V-280V |                         |                         |                     |
| Grid frequency/ range                    | 50Hz, 60Hz/±5Hz            |                         |                         |                     |
| Power factor [cosφ]                      | 0.8 leading~0.8 lagging    |                         |                         |                     |
| Total Harmonic Distortion<br>[THDi]      | < 3%                       |                         |                         |                     |
| Feed in                                  | 1L+N+PE                    |                         |                         |                     |
| <b>Efficiency</b>                        |                            |                         |                         |                     |
| Max. Efficiency                          | 97.6%                      | 97.8%                   | 97.9%                   | 97.9%               |
| Euro Efficiency [at 360Vdc]              | 97.1%                      | 97.4%                   | 97.5%                   | 97.5%               |
| MPPT Accuracy                            | >99.5%                     |                         |                         |                     |
| <b>Protection</b>                        |                            |                         |                         |                     |
| Internal Over-voltage Protection         | Integrated                 |                         |                         |                     |
| DC Insulation Monitoring                 | Integrated                 |                         |                         |                     |
| DCI Monitoring                           | Integrated                 |                         |                         |                     |
| GFCI Monitoring                          | Integrated                 |                         |                         |                     |
| Grid Monitoring                          | Integrated                 |                         |                         |                     |

|                                     |   |             |
|-------------------------------------|---|-------------|
| AC Short Circuit Current Protection | Integrated  |             |
| Thermal Protection                  | Integrated  |             |
| Anti-island protection monitoring   | AFD   |             |
| <b>Interface</b>                    |   |             |
| AC Connection                       | Plug-in connector   |             |
| DC Connection                       | MC4/H4  |             |
| LCD/LED Display                     | LCD (16x2 Characters, Backlight) & LED (3 Lights)   |             |
| Display Language                    | English   |             |
| Datalogger & Communication          | RS232 (Standard)/WiFi (Optional)  |             |
| <b>General Data</b>                 |   |             |
| Topology                            | Transformerless   |             |
| Consumption at Night [W]            | <0.2  |             |
| Consumption at Standby [W]          | 6   |             |
| Operating Temperature Range         | -25°C to +60°C (45°C to 60°C with derating)   |             |
| Cooling Method                      | Natural Convection  |             |
| Ambient Humidity                    | 0% to 98% Non-condensing  |             |
| Altitude                            | Up to 2000m (without derating)  |             |
| Noise [dBA]                         | <25   |             |
| Ingress Protection                  | IP65 (Indoor & Outdoor Installation)  |             |
| Mounting                            | Rear Panel  |             |
| Dimensions (H*W*D) [mm]             | 454*355*150   | 454*355*162 |
| Net Weight [kg]                     | 14.8  | 15.8        |
| Standard Warranty [Year]            | 5 ( Standard ) /10/15/20/25 ( Optional )  |             |
| Certificates                        | IEC62109-1/2, IEC61000-6-2/3, IEC61683, IEC60068-2, IEC62116, IEC61727, PEA/MEA, NRS 097-2-1, UTE-C-15-712-1, VDE0126-1-1/A1, VDE-AR-N 4105, AS4777.2, AS4777.3, C-TICK, CQC NB/T 32004, G83-2, G59-3, NBR 16149, NBR 16150, TF 3.2.1, C10/11 |             |

Remark:

1. Meet the grid standard that AC current per phase not exceeding 16A.
2. Meet the VDE - ARN - N 4105 that biggest apparent power of single-phase is 4600 VA.

## Chapter 4 Instructions for installation

### 4.1 Safety Instructions



#### DANGER

- Dangerous to life due to potential fire or electricity shock.
- Do not install the inverter near any inflammable or explosive items.
- This inverter will be directly connected with HIGH VOLTAGE power generation device; the installation must be performed by qualified personnel only in compliance with national and local standards and regulations.



#### NOTICE

- This equipment is suitable for the pollution degree II.
- Inappropriate or unharmonized installation environment may jeopardize the life span of the inverter.
- Installation directly exposed under intensive sunlight is not recommended.
- The installation site must be well ventilated.

### 4.2 Pre-installation Check

#### 4.2.1 Check the Package

Although SAJ's inverters have surpassed stringent testing and are checked before they leave the factory, it is uncertain that the inverters may suffer damages during transportation. Please check the package for any obvious signs of damage, and if such evidence is present, do not open the package and contact your dealer as soon as possible

#### 4.2.2 Check the Assembly Parts

Please refer to the Packing List inside the package container.

## 4.3 The Determination of the Installation Method and Position

### 4.3.1 Mounting Method

Please mount the inverter correctly as shown in Figure 4.1 below.

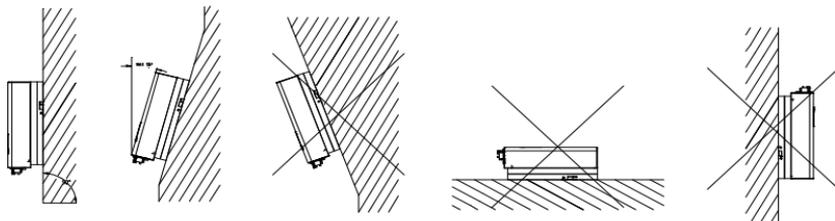


Figure 4.1 Mounting Method

(1)The equipment employs natural convection cooling, and it can be installed indoor or outdoor.

(2)Please install the equipment under the guidance of Figure4.1. Vertical installation on floor level is recommended. Mount vertically or tilted backwards by max. 15°. Never install the inverter tilted forwards, sideways, horizontally or upside down.

(3) Install the inverter at eye level for convenience when checking the LCD display and possible maintenance activities.

(4)When mounting the inverter, please consider that disassembly for service work may be required.

### 4.3.2 Installation Position

Do not expose the inverter to direct solar irradiation as this could cause power derating due to overheating. The ambient temperature should be between  $-25^{\circ}\text{C} \sim +60^{\circ}\text{C}$  ( $-13^{\circ}\text{F} \sim 140^{\circ}\text{F}$ ) to ensure optimum operation. Choose locations with sufficient air exchange. Ensure additional ventilation, if necessary.

To make sure the installation spot is suitably ventilated, if multiple SAJ grid-tied

solar inverters are installed same area, the following safety clearance in Figure 4.2 Shall be followed for proper ventilation conditions.

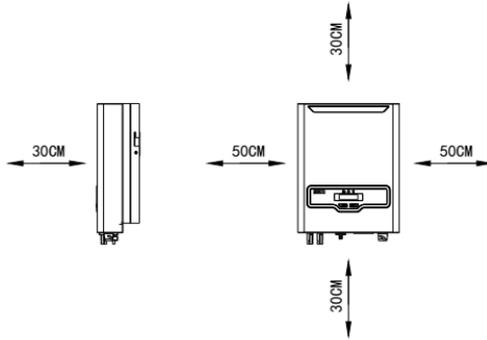


Figure 4.2 Minimum Clearance

## 4.4 Mounting Procedure

### 4.4.1 Mark the Positions of the Drill Holes of the Rear Panel

The mounting position should be marked as shown in Figure 4.3, Figure 4.4 & Figure 4.5.

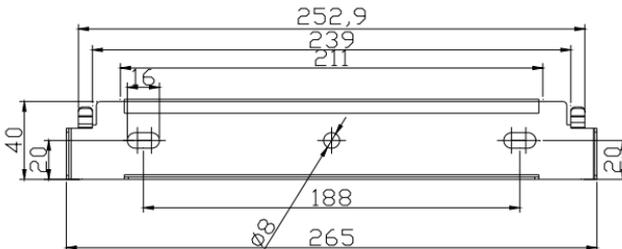


Figure 4.3 Dimensions of rear panel of Sununo Plus 1K/1.5K

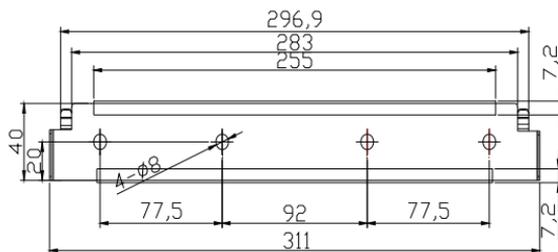


Figure 4.4 Dimensions of rear panel of Sununo Plus 2K/2.5K/3K/3.6K

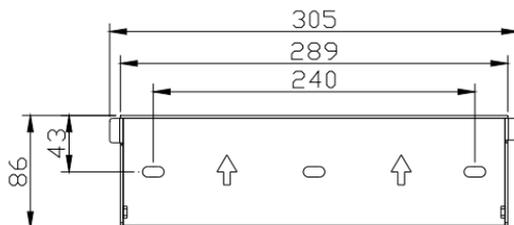


Figure 4.5 Dimensions of rear panel of Sununo Plus 3K-M/4K-M/5K-M/6K-M

#### 4.4.2 Drill Holes and Place the Expansion Tubes

According to the guides, drill 3 holes in the wall (in conformity with position marked in Figure 4.6, 4.7, 4.8), and then place expansion tubes in the holes using a rubber mallet.

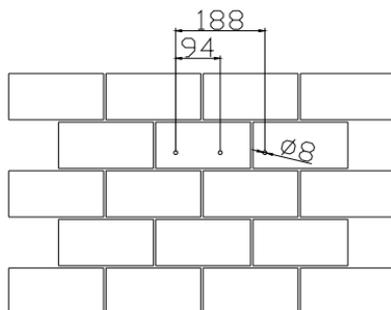


Figure 4.6 Drill holes' dimensions of Sununo Plus 1K/1.5K

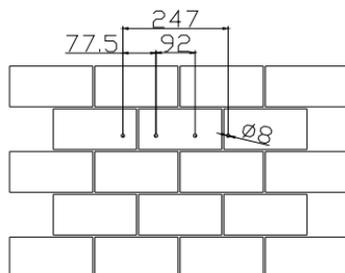


Figure 4.7 Drill holes' dimensions of Sununo Plus 2K/2.5K/3K/3.6K

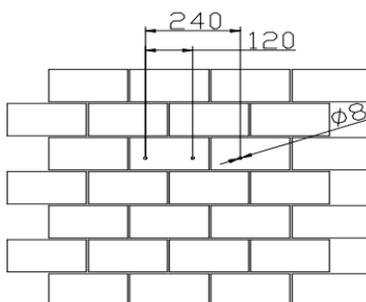


Figure 4.8 Drill holes' dimensions of Sununo Plus 3K-M/4K-M/5K-M/6K-M

#### 4.4.3 Mount the Screws and the Rear Panel

The panels should be mounted in the mounting position by screws as shown in Figure 4.9, Figure 4.10 and Figure 4.11.

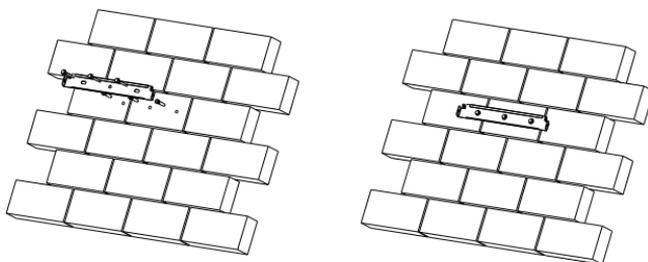


Figure 4.9 Mount the Rear Panel of Sununo Plus 1K/1.5K

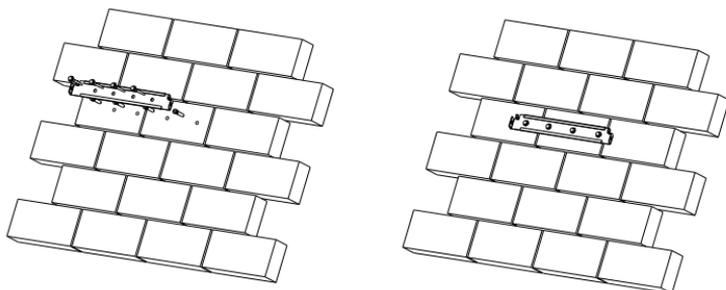


Figure 4.10 Mount the Rear Panel of Sununo Plus 2K/2.5K/3K/3.6K

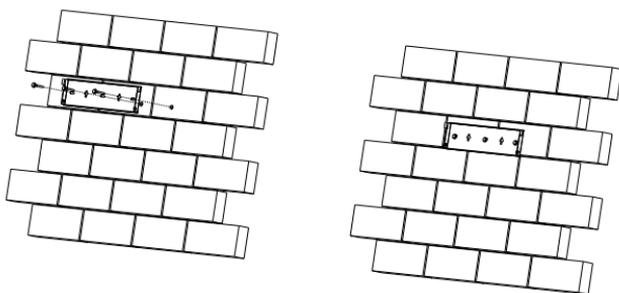


Figure 4.11 Mount the Rear Panel of Sununo Plus 3K-M/4K-M/5K-M/6K-M

#### 4.4.4 Mount the Inverter

Carefully mount the inverter to the rear panel as shown in Figure 4.12, Figure 4.13, Figure 4.14. Make sure that the rear part of the equipment is closely mounted to the rear panel.

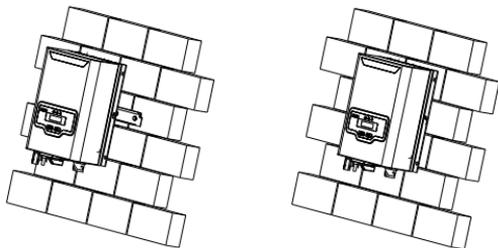


Figure 4.12 Mount Sununo Plus 1K/1.5K inverter

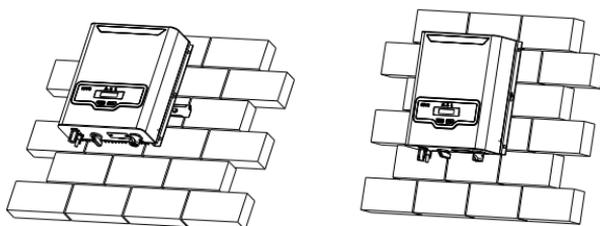


Figure 4.13 Mount Sununo Plus 2K/2.5K/3K/3.6K inverter

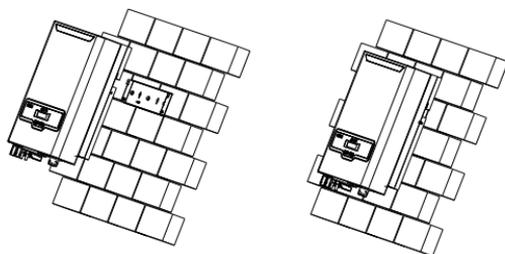


Figure 4.14 Mount Sununo Plus 3K-M/4K-M/5K-M/6K-M inverter

## Chapter 5 Electrical Connection

### 5.1 Safety Instruction for Hot-line Job

Electrical connection must only be operated on by professional technicians. Please keep in mind that the inverter is a bi-power supply equipment. Before connection, necessary protective equipment must be employed by technicians including insulating gloves, insulating shoes and safety helmet.



#### **DANGER**

- Dangerous to life due to potential fire or electricity shock.
- When power-on, the equipment should be in conformity with national rules and regulations.
- The direct connection between the converter and high voltage power systems must be operated by qualified technicians in accordance with local and national power grid standards and regulations.



#### **WARNING**

- When the photovoltaic array is exposed to light, it supplies a d.c voltage to the inverter.



#### **NOTICE**

- Electrical connection should be in conformity with proper stipulations, such as stipulations for cross-sectional area of conductors, fuse and ground protection.
- The overvoltage category on DC input port is II, and that on AC output port is III.

## 5.2 Specifications for Electrical Interface

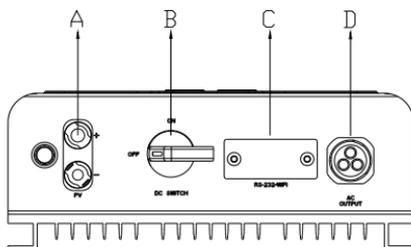


Figure 5.1 Electrical Interface of Sununo Plus 1K/1.5K/2K/2.5K/3K/3.6K

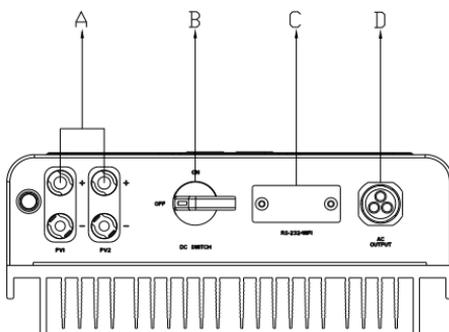


Figure 5.2 Electrical Interface of Sununo Plus 3K-M/4K-M/5K-M/6K-M

| Code | Name                 |
|------|----------------------|
| A    | DC Input             |
| B    | DC Switch (optional) |
| C    | RS232 /Wi-Fi Port    |
| D    | AC Plug Terminal     |

Table 5.1 Specifications for Interface

### 5.3 AC Side Connection

| Cross-sectional Area of Cables (mm <sup>2</sup> ) |                   | Outside Diameter of the Cables (mm) |
|---|-------------------|-------------------------------------|
| Scope   | Recommended Value |                                     |
| 4.0-6.0   | 4.0               | 4.2~5.3                             |

Table 5.2 Recommended Specifications of AC Cables

#### 5.3.1 Feed the AC cable through the AC waterproof hole.

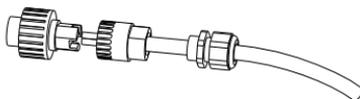


Figure 5.3 Thread the cables

#### 5.3.2 Connect the cables according to connection marks of L, N and PE.

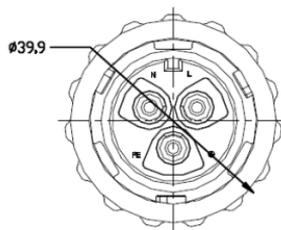


Figure 5.4 Connect the Cables

#### 5.3.3 Secure all parts of the AC connector tightly.

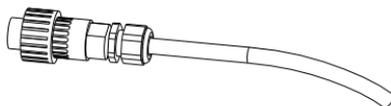


Figure 5.5 Screw the Connector

**5.3.4 Connect the AC connector to the equipment securely, ensuring the pins are connected directly. Then the connection of AC cable is complete.**

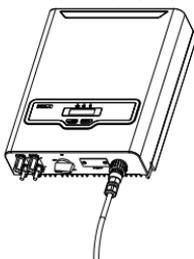


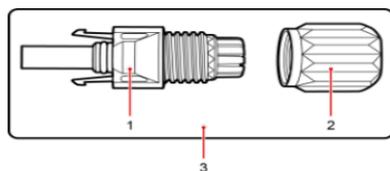
Figure 5.6 Connect the Inverter

## 5.4 DC Side Connection

| Cross-sectional Area of Cables (mm <sup>2</sup> ) |                   | Outside Diameter of the Cables (mm) |
|---|-------------------|-------------------------------------|
| Scope   | Recommended Value |                                     |
| 4.0-6.0   | 4.0               | 4.2~5.3                             |

Table5.3 Recommended Specifications of DC Cables

DC connector is made up of the positive connector and the cathode connector

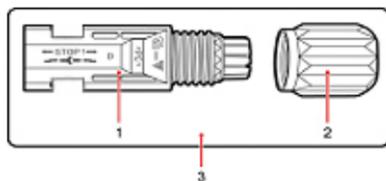


1. Insulated Enclosure

2. Lock Screw

3. Cathode Connector

Figure 5.7 Positive Connector



1. Insulated Enclosure

2. Lock Screw

3. Cathode Connector

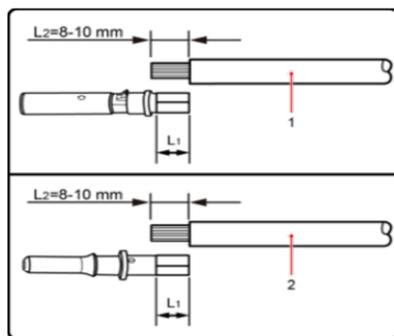
Figure 5.8 Cathode Connector

**!** NOTICE

- Please place the connector separately after unpacking in order to avoid confusion for connection of cables.
- Please connect the positive connector to the positive side of the solar panels, and connect the cathode connector to the cathode side of the solar side. Be sure to connect them in right position.

### Connecting Procedures:

- (1) Tighten the lock screws on positive and cathode connector.
- (2) Use specified strip tool to strip the insulated enclosure of the positive and cathode cables with appropriate length.



1. Positive Cable

2. Cathode Cable

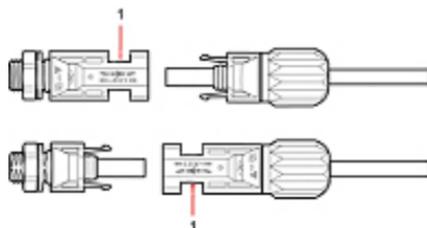
Figure 5.9 Connecting Cables

- (3) Feed the positive and cathode cables into corresponding lock screws.
- (4) Put the metal positive and cathode terminals into positive cable and cathode cable whose insulated enclosure has been stripped, and crimp them tightly with a wire crimper. Make sure that the withdrawal force of the pressed cable is bigger than 400N.
- (5) Plug the pressed positive and cathode cables into relevant insulated enclosure, a “click” should be heard or felt when the contact cable assembly is

seated correctly.

(6) Fasten the lock screws on positive and negative connectors into respondent insulated enclosure and make them tight.

(7) Connect the positive and cathode connectors into positive and negative DC input terminals of the inverter, a“click” should be heard or felt when the contact cable assembly is seated correctly.



#### 1. Connection Port

Figure 5.10 Connect the Inverter



#### NOTICE

· Before inserting the connector into the DC input terminal of the inverter, please make sure that the DC switch of the inverter is OFF.

## 5.5 Communication Connection

Sununo Plus 1K/1.5K/2K/2.5K/3K/3.6K/3K-M/4K-M/5K-M/6K-M is equipped with a RS232 interface.

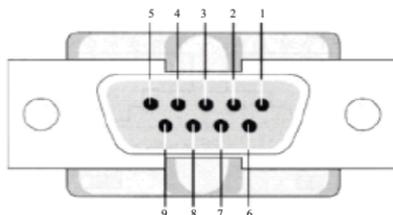


Figure 5.11 Pins of Nine Serial Port Cable

| Pin No. | Name                      |
|---------|---------------------------|
| 1       | DCD (Data Carrier Detect) |
| 2       | RxD (Received Data)       |
| 3       | TxD (Transmitted Ready)   |
| 4       | DTR (Data Terminal)       |
| 5       | GND (Signal Ground)       |
| 6       | DSR (Data Send Ready)     |
| 7       | RTS (Request To Send)     |
| 8       | CTS(Clear To Send)        |
| 9       | RI(Ring Indicator)        |

Table 5.5 Instruction of Nine Serial Port Pins

(1) RS232 can externally connect with Wi-Fi module. For more details, please refer to the operating manual of Wi-Fi module.

(2) RS232 can externally connect with Wi-Fi module. For more details, please refer to the operating manual of Ethernet module.

(3) RS232 can externally connect with Wi-Fi module. For more details, please refer to the operating manual of GPRS module.

## Chapter 6 Debugging Instructions

### 6.1 Introduction of Human-computer Interface

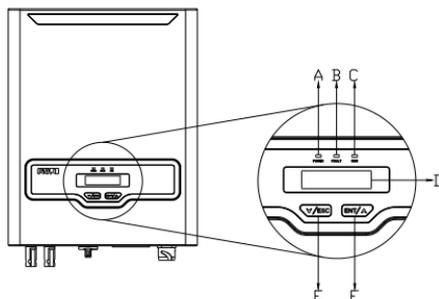


Figure 6.1 Human-computer Interface

| Object | Description   |
|--------|---|
| A      | Yellow LED light = Power - After the equipment is powered on, the yellow LED light will go on                                     |
| B      | Red LED light = Error - The red LED light will go on when an Error occurs, it will go off automatically after Errors are resolved |
| C      | Green LED light = operation - The green LED light will go on when the equipment is in normal operation.                           |
| D      | The LCD shows the operational data, recorded information and parameters   |
| E      | ▼ Exit button   |
| F      | ▲ Enter button  |

Table 6.1 Instructions of the Interface

The inverter provides two buttons for inquiry of operational information and parameters, these two buttons can be used repeatedly.

| Name of the button | Operation                        | Description  |
|--------------------|----------------------------------|--|
| ▼/ESC              | Press time shorter than 1 second | Move down the cursor to enter into the sub-menu, or reduce the setting value.      |
|                    | Press time longer than 1 second  | Return to the previous menu or cancel the present order.                           |
| ▲/ENT              | Press time shorter than 1 second | Move up the cursor to enter into the superior menu, or increase the setting value. |
|                    | Press time longer than 1 second  | Enter into the sub-menu, or confirm order.   |

Table 6.2 Instructions for buttons

## 6.2 First Run Setup

### 6.2.1 Set the Country

When the solar inverter begins to run for the first time, please configure the country of usage, and the inverter LCD will display as below:

Please Set The  
Country First

Figure 6.2 Set The Country

Please press the "ENT" button, LCD will show the countries for option. Users can press "▼" or "▲" to move the cursor to select the correct country and press "ENT" button to confirm the selection.

**Note:** The configuration of the country of usage must be set before inverter starts to run for its first time, otherwise the inverter will not operate correctly. The User can enter the menu of "Inverter-Info->Grid Compliance" to check whether the setting is correct.

If users can not locate the corresponding country, please abort the setting and contact the after sales for confirmation.

### 6.2.2 State

If the country has been set the LCD shows the machine type when the inverter is started up, then it automatically displays the inverter operation status: Normal, Wait, Fault, Update.

| Data name | Explanation                                 |
|-----------|---|
| Normal    | The inverter in normal (function) operation |
| Wait      | The inverter in stand-by state              |
| Fault     | A fault occurs during operation             |
| Update    | The state of updating firmware              |

Turn on the AC switch, the LCD begins to count seconds backward, after this, the inverter begins to connect the grid.

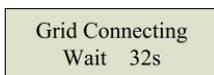
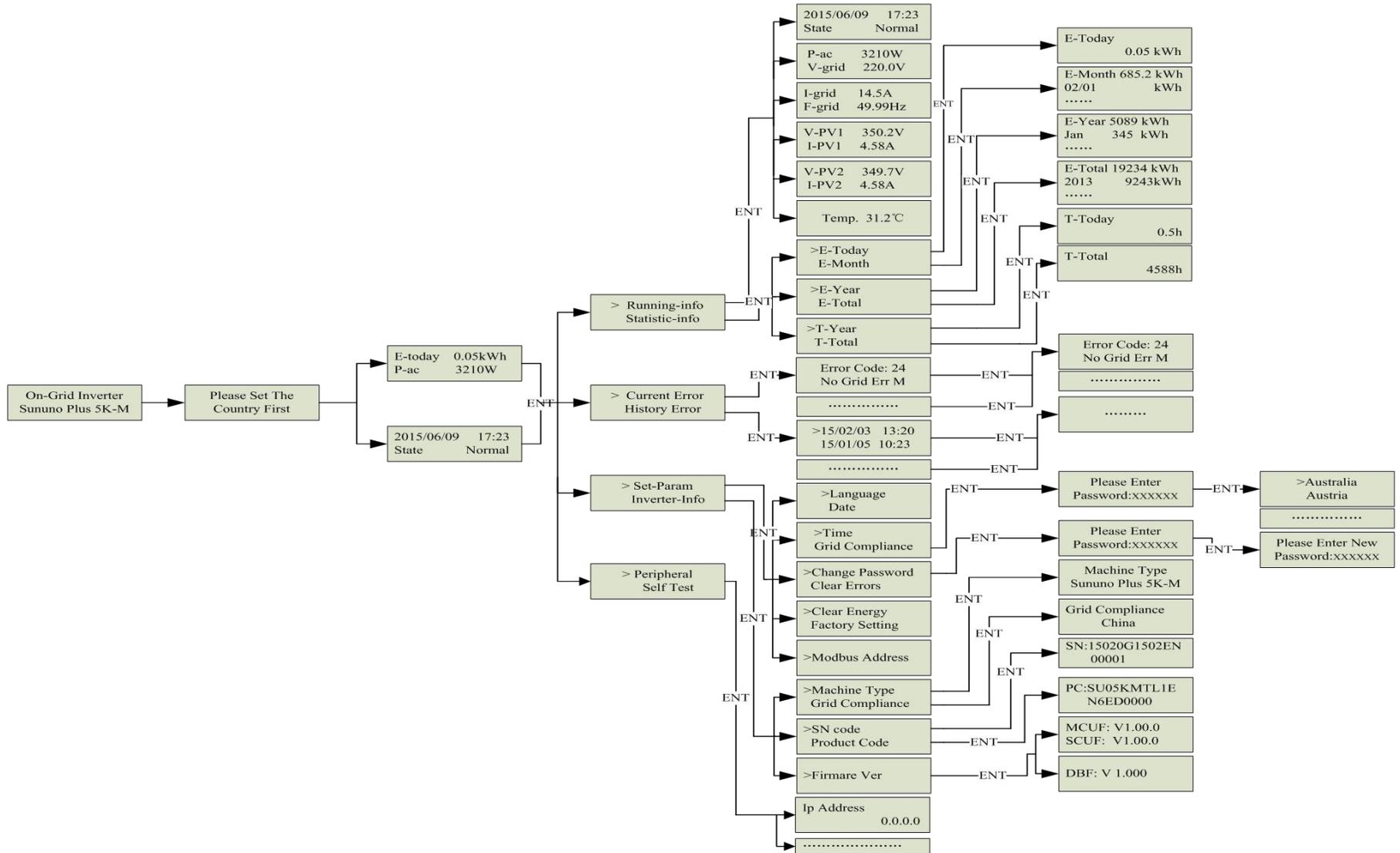
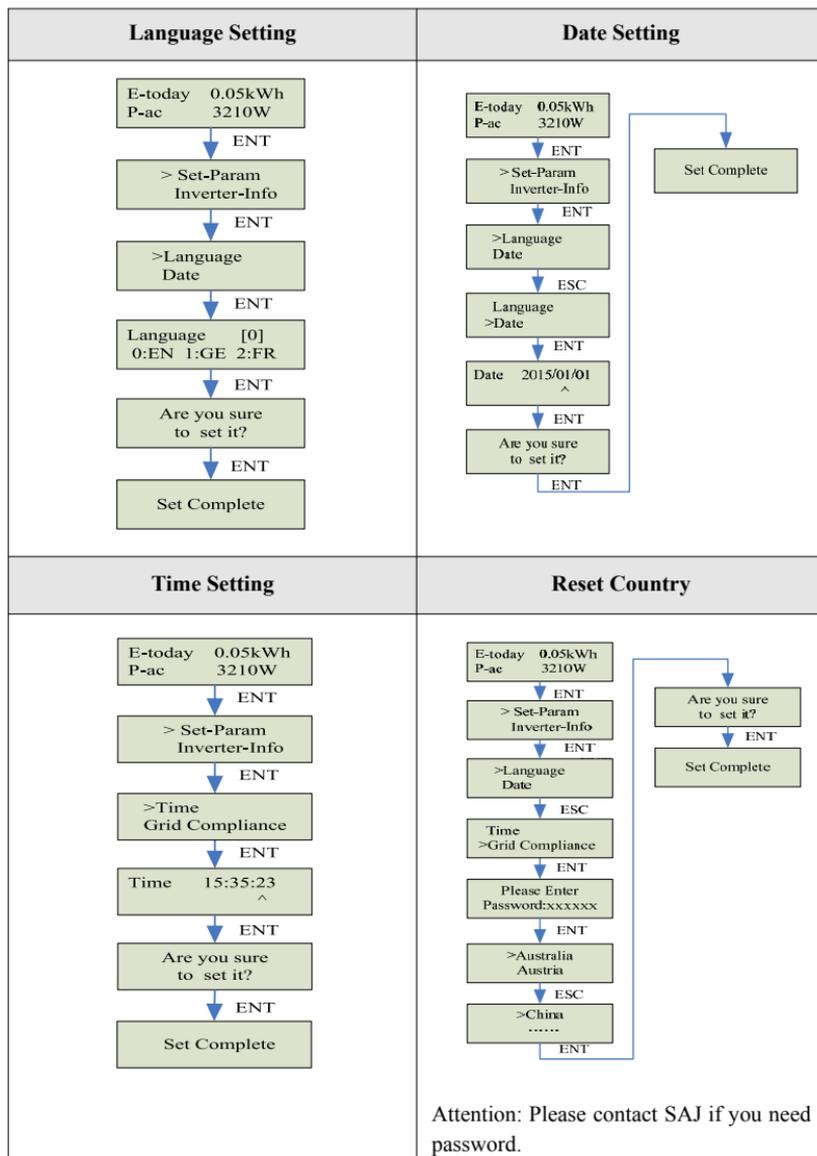


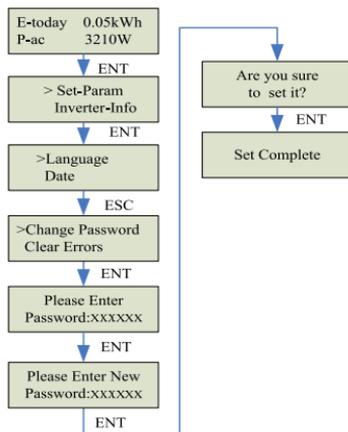
Figure 6.3 Count down Seconds

6.2.3 LCD menu is shown as below

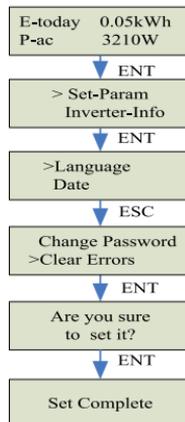
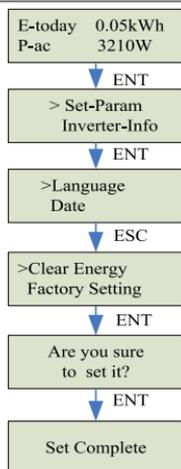
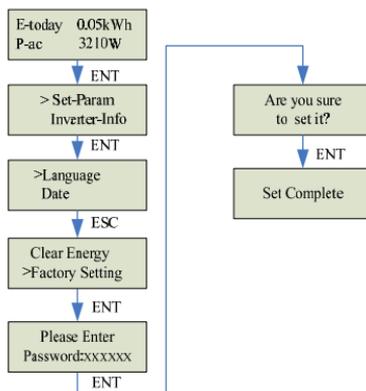


## 6.2.4 Settings of General Parameters of the Inverter



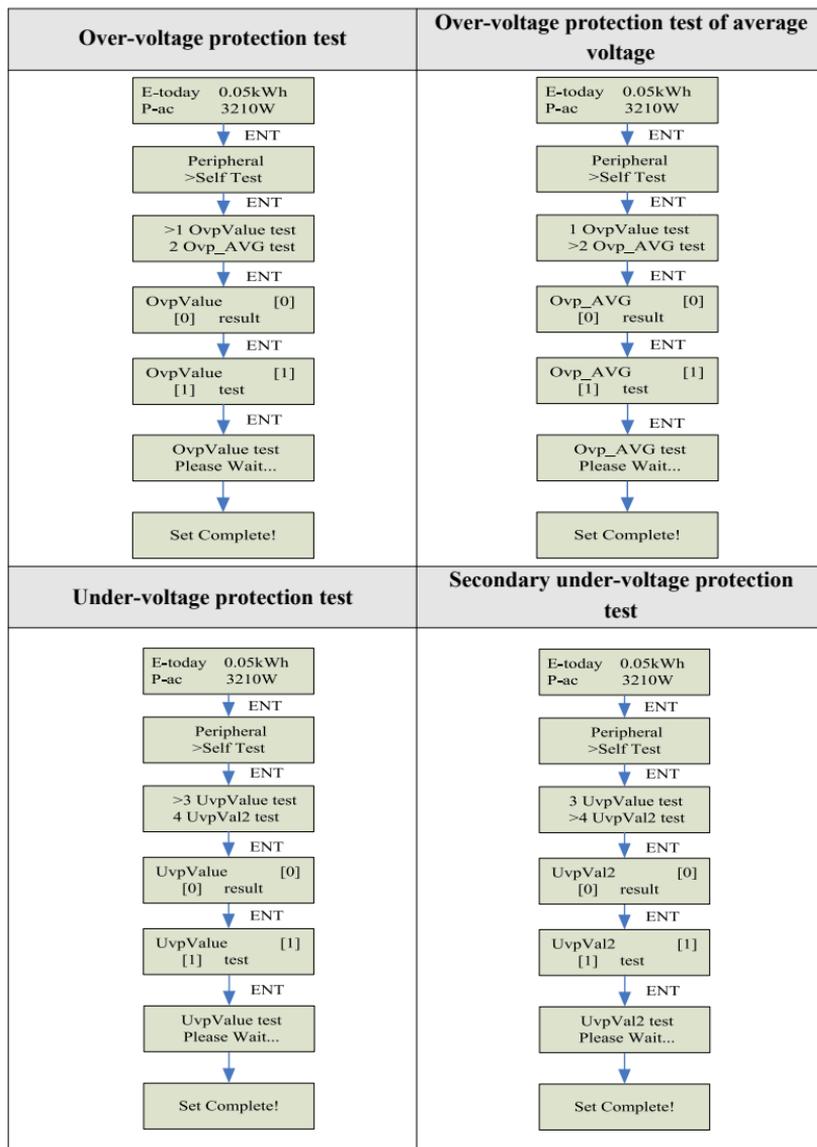
**Reset Password**

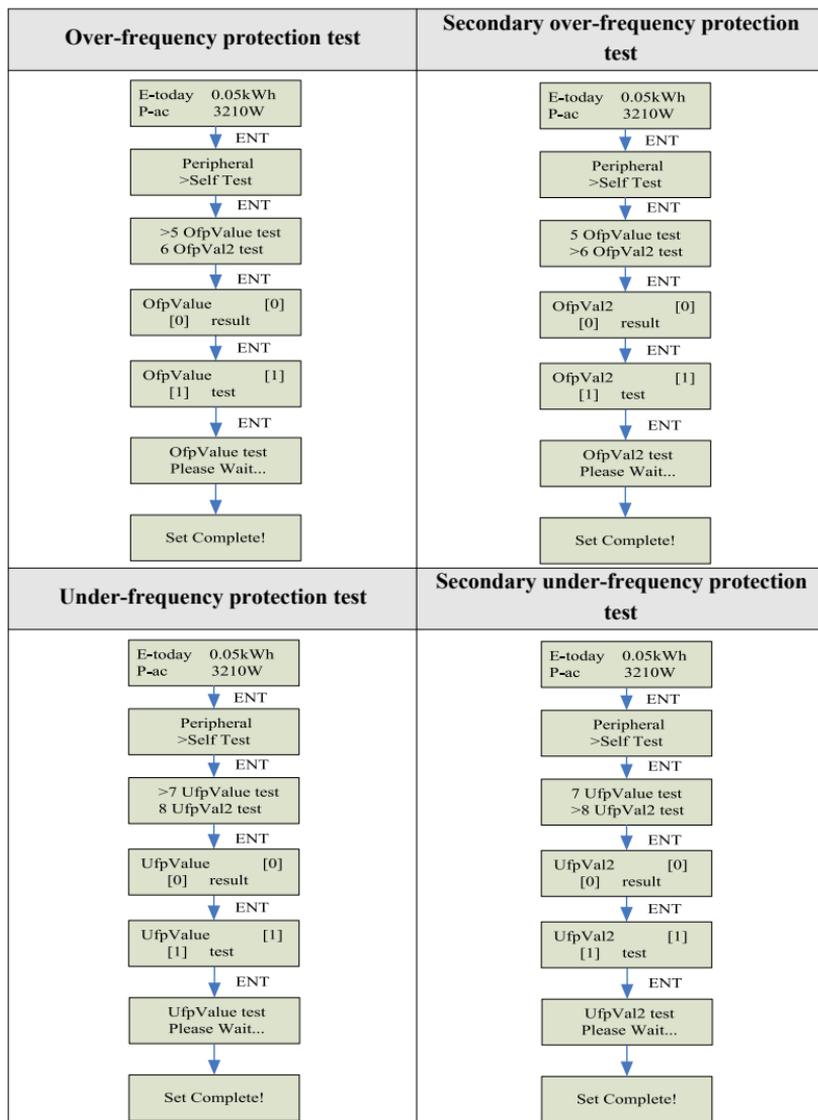
Attention: Please contact SAJ if you need password.

**Clear Fault Records****Clear Energy****Factory Setting**

Attention: Please contact SAJ if you need password.

## 6.2.5 Self test of the Inverter

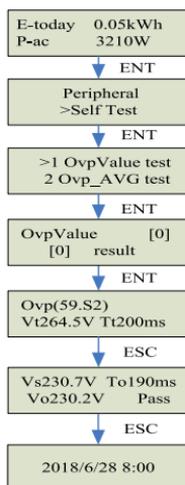




Note:

1. This setting only appears when the country selects Italy.

2. This setting shall be operated when the inverter is under normal grid-connected state.
3. If self test or normal operation under grid-connected state is needed after successful setting, the inverter shall be restarted.
4. The self test information could be reviewed after successful setting, taking reviewing of the “over-voltage protection test” information as example:



## 6.3 Monitoring Operation

The equipment is equipped with a RS232 interface, and the RS232 interface can be connected to Wi-Fi module, Ethernet module, GPRS module which can be used in the monitoring of the operation status.

① The equipment can be connected to local internet via a Wi-Fi module and the Wi-Fi web server which is embedded in the machine; following this, the operational status of the inverter can be monitored.

② By connecting the Internet through Wi-Fi module and uploading the inverter data to the server, users can monitor the operational information of the inverter by web version web portal or mobile APP (please download the mobile APP from SAJ official website) remotely.

③ The equipment can be connected to local internet via Ethernet module and the Wi-Fi web server which is embedded in the machine; following this, the operational status of the inverter can be monitored.

④ By connecting the Internet through Ethernet module and uploading the inverter data to the server, users can monitor the operational information of the inverter by web version web portal or mobile APP (please download the mobile APP from SAJ official website) remotely.

⑤ By connecting the Internet through GPRS module and uploading inverter data to the server, users can monitor the operational information of the inverter by web version web portal or mobile APP (please download the mobile APP from SAJ official website) remotely.

## Chapter 7 Fault Code and Troubleshooting

| Error Code | Fault Information  | Explanation                               |
|------------|--------------------|---|
| 1          | Relay Error M      | Relay Error Master                        |
| 2          | Eeprom Error M     | Storer Error Master                       |
| 3          | Temp. High Err M   | High Temperature Master                   |
| 4          | Temp. Low Err M    | Low Temperature Master                    |
| 5          | Lost Com. M<->S M  | Lost Interior Communication Master        |
| 6          | GFCI Dev Err M     | GFCI Devices Error Master                 |
| 7          | DCI Dev Err M      | DCI Devices Error Master                  |
| 8          | Cur Sensor Err M   | Current Sensor Master                     |
| 9          | Grid Volt High M   | Grid Voltage High Master                  |
| 10         | Grid Volt Low M    | Grid Voltage Low Master                   |
| 15         | Volt 10m High M    | Average voltage of 10 minutes High Master |
| 18         | Freq High M        | Frequency High Master                     |
| 19         | Freq Low M         | Frequency LowMaster                       |
| 24         | No Grid Err M      | Grid Lost Error Master                    |
| 27         | GFCI Error M       | GFCI Error Master                         |
| 28         | DCI Error M        | DCI Error Master                          |
| 31         | ISO Error M        | Insulation Error Master                   |
| 33         | Bus Volt High M    | Bus Voltage High Master                   |
| 35         | Current High M     | Current High Master                       |
| 38         | HW Bus Volt High M | Bus Voltage High Of Hardware Master       |
| 39         | HW PV1 Curr High M | PV1 Current High of Hardware Master       |
| 40         | HW PV2 Curr High M | PV2 Current High of Hardware Master       |
| 41         | HW Curr High M     | Current High of Hardware of Grid Master   |
| 50         | Lost Com. M<->S S  | Lost interior communication Slave         |
| 51         | Volt Consis Err S  | Data Consistency of Voltage Error Slave   |
| 54         | Freq Consis Err S  | Data Consistency of Frequency Error Slave |

|    |                   |   |
|----|-------------------|---|
| 57 | GFCI Consis Err S | Data Consistency of GFCI Slave                                  |
| 61 | Voltage High S    | Grid Voltage High Slave   |
| 62 | Voltage Low S     | Grid Voltage Low Slave  |
| 67 | Freq High S       | Frequency High Slave  |
| 68 | Freq Low S        | Frequency Low Slave   |
| 73 | No Grid Err S     | No Grid Error Slave   |
| 76 | PV1 Volt High M   | PV1 Voltage High Master   |
| 77 | PV2 Volt High M   | PV2 Voltage High Master   |
| 81 | Lost Com.D<->C M  | Lost Communication Between Display board & Control board Master |
| 85 | DRM0Error M       | DRM0 Error Master   |

Table 7.1 Error Code

| Fault Information      | Troubleshooting  |
|------------------------|--|
| Relay Error            | If this error occurs frequently, please contact your distributor or phone SAJ.   |
| Storer Error           | If this error occurs frequently, please contact your distributor or phone SAJ.   |
| Temperature High Error | Check whether the radiator is blocked, whether the inverter is in too high or too low temperature, if the above mentioned are in normal, please contact your distributor or phone SAJ.   |
| GFCI Device Error      | If this error occurs frequently, please contact your distributor or phone SAJ.   |
| DCI Device Error       | If this error occurs frequently, please contact your distributor or phone SAJ.   |
| Current Sensor Error   | If this error occurs frequently, please contact your distributor or phone SAJ.   |
| AC Voltage Error       | <ul style="list-style-type: none"> <li>·Check the volt of the grid</li> <li>·Check the connection between the inverter and the grid.</li> <li>·Check the settings of the on-grid standards of the inverter.</li> <li>·If the volt of the grid is higher than the volt regulated by local grid, please inquire the local grid workers whether they can adjust the volt at the feed point or change the value of the regulated volt.</li> <li>·If the volt of the grid is in regulated range as allowed and LCD</li> </ul> |

|                    |  |
|--------------------|--|
|                    | still in this error, please contact your distributor or phone SAJ.   |
| Frequency Error    | Check the set of country and check the frequency of the local grid, if the above mentioned are in normal, please contact your distributor or phone SAJ.  |
| No Grid Error      | Check the connection status between the AC side of the inverter and the grid, if the above mentioned are in normal, please contact your distributor or phone SAJ.  |
| GFCI Error         | Check the insulation resistance of the positive side and cathode side of the solar panel; check whether the inverter is in wet environment; check the grounding of the inverter. If the above mentioned are in normal, please contact your distributor or phone SAJ.                         |
| DCI Error          | If this error exists always, please contact your distributor or phone SAJ.   |
| ISO Error          | Check the insulation resistance of the positive side and cathode side of the solar panel; check whether the inverter is in wet environment; check whether the grounding of the inverter is loose or not. If the above mentioned are in normal, please contact your distributor or phone SAJ. |
| Current High       | Check the connection status between the inverter and the grid and test whether the volt of the grid is stable or not, if the above mentioned are in normal, please contact your distributor or phone SAJ.  |
| Bus Voltage High   | Check the settings of the solar panel. SAJ designer can help you. If the above mentioned are in normal, please contact your distributor or phone SAJ.  |
| PV Current High    | If this error exists always, please contact your distributor or phone SAJ.   |
| PV Voltage Fault   | Check the settings of the solar panel. SAJ designer can help you. If the above mentioned are in normal, please contact your distributor or phone SAJ.  |
| Lost Communication | Check the connection of communication cables between control board and display board. If the above mentioned are in normal, please contact your distributor or phone SAJ.  |

Table 7.2 Troubleshooting

## **Chapter 8 Recycling and Disposal**

This device should not be disposed as residential waste. An Inverter that has reached the end of its life and is not required is to be returned to your dealer or you must find an approved collection and recycling facility in your area.

## **Chapter 9 Guarantee Service**

Please refer to the warranty card.

## Chapter 10 Contact SAJ

### **Guangzhou Sanjing Electric Co., Ltd.**

SAJ Innovation Park, No.9, Lizhishan Road, Guangzhou Science City, Guangdong, P.R.China.

Postcode: 510663

Web: <http://www.saj-electric.com>

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Fax: +86 20 6660 8589

E-mail: [service@saj-electric.com](mailto:service@saj-electric.com)

### **International Sales**

Tel: 86-20-66608618/66608619/66608588/66600086

Fax: 020-66608589

E-mail: [info@saj-electric.com](mailto:info@saj-electric.com)

### **Domestic Sales**

Tel: 020-66600058/66608588

Fax: 020-66608589

## **SAJ Warranty Policy**

### **Standard Warranty Period**

Guangzhou Sanjing Electric, Co., Ltd (“SAJ”) grants a standard warranty period of 66 months (5.5 years) for the Sununo-TL Series inverters & Suntrio-TL Series inverters and Sununo Plus Series inverters & Suntrio Plus Series inverters, starting from the date of shipment from SAJ factory or 60 months (5 years) starting from the date of purchased invoice marked (whichever is longer).

### **Extension of Warranty**

The purchaser of SAJ inverters (Sununo-TL Series inverters & Suntrio-TL Series inverters and Sununo Plus Series inverters & Suntrio Plus Series inverters) should extend the warranty period in 18 months from the date of settlement or 30 months from the date of shipment from SAJ by providing the serial number of the unit and purchased receipt (whichever is shorter). You can purchase the warranty extension for 10 years, 15 years, 20 years or 25 years but do not apply the extension beyond the specified date, or else your application will be unacceptable. Please refer to the Warranty Extension Order Form for more details.

Once the purchase of the warranty extension goes into effect, SAJ will send the warranty extension certificate to the customer for confirming the extended warranty period.

### **Warranty Conditions**

If your inverter gets fault and requires troubleshooting, please contact your distributor or dealer directly. Alternatively, feedback briefly to SAJ service hotline for logging and send your warranty card to our service department by fax/email to process the warranty claim.

During the Warranty Period, SAJ covers all costs for replacing any product or parts

of the product proved to be defective in design or manufacture. To claim the warranty under the warranty policy of SAJ, you need to supply us with the following information and documentation regarding the faulty inverter:

1. Product Model No.(e.g. Sununo Plus 3K) and serial number  
(e.g.13020G1141EN00014).
2. Copy of the invoice and warranty certificate of the inverter.
3. Copy of the installation report and installation date.
- 4.Error message on LCD screen (if available) or any information which would be helpful to determine the defect
- 5.Detailed information about the entire system (modules, circuits, etc.).
- 6.Documentation of previous claims/exchanges (if applicable).

**After receiving above information, SAJ will decide how to proceed the service**

- 1.Repaired by SAJ factory, or SAJ authorized service center overhaul.
- 2.Repaired on-site by SAJ Service Center.
3. Offer a replacement device of equivalent value according to model and age.

In the case of an exchange, the remaining portion of the original warranty period will be transferred to the replacement device. You will not receive a new certificate, as your entitlement is documented at SAJ.

If the inverter needs to be replaced following assessment, SAJ will send a replacement unit immediately. The defective inverter should be sent back to the closest SAJ Service Center by packing in its original package if possible.

### Service after warranty expiration

If the inverters for maintenance are out of warranty, SAJ charges an on-site service fee, parts, labor cost and logistic fee to end-user. Detailed standard refers to the listed table.

| Item                      | Return Factory Maintenance                      | On-site Maintenance                    |
|---------------------------|---|--|
| Without parts replacement | Labor + Logistic fee<br>(to & from SAJ)         | Labor + On-site attendance fee         |
| With parts replacement    | Labor + Parts + logistic fee<br>(to & from SAJ) | Labor + On-site attendance fee + Parts |

■ On-site attendance fee: Cost of travel and time for the technician in attending on-site.

■ Parts: Cost of replacement parts (including any shipping/admin fee that may apply).

■ Labor: Labor time fee charged for the technician, who is repairing, maintaining, installing (hardware or software) and debugging the faulty product.

■ Logistic fee: Cost of delivery, tariff and other derived expense when defective products are sent from user to SAJ or/and repaired products are sent from SAJ to user.

### Exclusion of Liability

Any defect caused by the following circumstances will not be covered by the manufacturer's warranty (the Dealers or Distributors are responsible and authorized by SAJ for the following investigation):

- ◆ “Warranty Card” not being sent back to Distributor/Dealer or SAJ;
- ◆ Product modified, parts replaced or attempt to maintain;
- ◆ Changes, or attempted repairs and erasing of series number or seals by non SAJ

technician;

- ◆ Incorrect installation or commissioning;
- ◆ Failure to comply with the safety regulations (VDE standards, etc.);
- ◆ The inverter has been improperly stored and damaged while being stored by the Dealer or the end user;
- ◆ Transport damage (including scratch caused by movement inside packaging during shipping).A Claim should be made directly to shipping company/insurance Company as soon as the container/packaging is unloaded and such damage is identified;
- ◆ Failure to follow any / all of the user manual, the installation guide and the maintenance regulations;
- ◆ Improper use or misuse of the inverter;
- ◆ Insufficient ventilation of the inverter;
- ◆ Influence of foreign objects and force majeure (lightning, grid overvoltage, severe weather, fire, etc.)
- ◆ For further information on SAJ warranty regulation and reliability, please visit our website: [www.saj-electric.com](http://www.saj-electric.com).

## Warranty Card

The installer should fill in the second form while installing the inverter. For warranty claim, please complete the below forms and send this page to SAJ attached with the Customer's invoice.

### For Customer to fill in

|       |          |         |
|-------|----------|---------|
| Name: |          |         |
| City: | Country: | Zip:    |
| Tel:  | Fax:     | E-mail: |

### Information on Device

|                                  |                      |
|----------------------------------|----------------------|
| Device type:                     | Serial No.(S/N):     |
| Invoice No:                      | Commissioning date:: |
| Fault time:                      |                      |
| Error message (Display reading): |                      |
| Brief fault description & photo: |                      |
| Signature: _____ Date: _____     |                      |

**For Installer to fill in**

|                              |                            |         |
|------------------------------|----------------------------|---------|
| Modules Used:                |                            |         |
| Modules Per String:          | No. of String:             |         |
| Installation Company:        | Contractor License Number: |         |
| Company:                     |                            |         |
| City:                        | Country:                   | Zip:    |
| Tel:                         | Fax:                       | E-mail: |
| Signature: _____ Date: _____ |                            |         |



## **Guangzhou Sanjing Electric CO., LTD.**

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