



User manual

PV Grid-Connected Inverter

Product Model: Sunny Dog Series(1.1K-3KTL) Document Version 1.0(2014.07.20)

Product Name: PV Grid-Connected Inverter

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Shenzhen SOFARSOLAR Co., Ltd

Notice

This manual contains important safety instructions that must be followed during installation and maintenance of the equipment.

Save these instructions!

This manual must be considered as an integral part of the equipment, and must be available at all times to everyone who interacts with the equipment. The manual must always accompany the equipment, even when it is transferred to another user or field.

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Preface

Outline

Please read the product manual carefully before installation, operation or maintenance. This manual contains important safety instructions and installation instructions that must be followed during installation and maintenance of the equipment.

• Scope

This product manual describes the assembly, installation, commissioning, and maintenance of Sunny Dog series inverters.

SOFAR 1100TL SOFAR 1600TL SOFAR 2200TL SOFAR 2700TL SOFAR 3000TL

Keep this manual where it will be accessible at all times.

• Target Group

This manual is for qualified person (support person, service person are qualified mentioned in this manual).

• Symbols Used

This manual provides safety operation information and uses the symbol in order to ensure personal and property security and use the inverter efficiently when operating the inverter. You must understand these emphasize information to avoid the personal injury and property loss. Please read the following symbols which used in this manual carefully.

| | |
|---|---|
|  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, could result in death or serious injury. |
|  Caution | Caution indicates a hazardous situation which, if not avoided, could result in minor or moderate injury. |
|  Attention | Attention indicated potential risks which, if not avoided, may lead to equipment fault or property damage. |
|  Note | Note provides tips that are valuable for the optimal operation of the product. |

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Basic safety information

| | |
|---|--|
|  | If you have any question or problem when you read the following information, please contact Shenzhen SOFARSOLAR Co., Ltd . |
| Note | |

Outlines of this chapter

Safety instruction

It mainly introduce the safety instruction when install and operate the equipment.

Symbols and signs

It mainly introduce the safety symbols on the inverter.

1.1 Safety instructions

Read and understand the instruction of this manual ,and be familiar with relevant safety symbols in the paragraph, then start to install and debug the equipment.According to the national and state requirements, before connect the grid ,you must get power department permission, and perform the operation only by qualified electrical engineer.Before installing and maintaining the equipment, you should cut off the high voltage application of PV array. You can also open the switch of Solar Array Combiner to cut off the high voltage. Otherwise, serious injury may be caused.

Qualified persons

The customer must make sure the operator has the necessary skill and training to do his/her job. Staff in charge of using and maintaining the equipment must be skilled, aware and mature for the described tasks and must have the reliability to correctly interpret what is described in the manual. For safety reason only a qualified electrician, who has received training and / or has demonstrated skills and knowledge in construction and in operation of this unit, can install this inverter. Shenzhen SOFARSOLAR Co., Ltd does not take any responsibility for the property destruction and personal injury because of any incorrect use.

Assembly situation requirements

Please install and start inverter according to the following sections. Put the inverter in appropriate bearing capacity objects(such as wall and components and so on), to ensure that inverter vertical placed. Choose suitable place for installing electrical equipment. And assure enough fire exit space, convenience for maintenance. Maintain proper ventilation, and ensure that have the enough air cooling cycle.



Transport requirements

If you find packing problems that may cause the damage of the inverter, or find any visible damage, please immediately notice the responsible transportation company. You can ask solar equipment installation contractor or Shenzhen SOFARSOLAR Co.Ltd for help if necessary. Transport of the equipment, especially by road, must be carried out with by suitable ways and means for protecting the components (in particular, the electronic components) from violent shocks, humidity, vibration, etc.

Electric connection

Please comply with all the current electrical regulations about accident prevention in dealing with the current inverter.

| | | |
|---|------------------|--|
|  | Danger | Before the electrical connection, make sure to use opaque material to cover the PV modules or to disconnect PV array DC switch. Exposure to the sun, PV array will produce a dangerous voltage! |
|  | | All installation accomplished only by professional electrical engineer! |
|  | Warning | <ul style="list-style-type: none"> • must be trained; • Completely read the manual operation and understand relevant matters. |
|  | Attention | Only get permission by the local power department and complete all electrical connection by professional electrical engineer then connect inverter into grid! |
|  | Note | It's forbidden to remove the tamper evident label, and open the inverter. Otherwise Sofarsolar will not provide service and maintenance! |

Operation

| | |
|---|---|
|  | <p>Touching the power grid or the terminal of equipment may lead to die of electric shock or fire!</p> <ul style="list-style-type: none"> • Don't touch the terminal or conductor which connect to the power circuit; • Pay attention to anything about grid connection and security document. |
| Danger | |
|  | <p>Some internal components will be very hot when inverter is working. Please wear protective gloves!</p> |
| Attention | |

Maintenance and repair

| | |
|---|--|
|  | <ul style="list-style-type: none"> • Disconnected with the PV components array and electricity grid before any repair work; • After turn off AC breaker and DC switch for 5 minutes later, the maintenance or repair of the inverter can be carried out! |
| Danger | |
|  | <ul style="list-style-type: none"> • Inverter should work again after removing any faults. If you need any repair work, please contact with the local authorized service center; • Can't open the internal components of inverter without authorized. Shenzhen SOFARSOLAR Co., Ltd. does not take any responsibility for the losses from that. |
| Attention | |

EMC / noise level of inverter

Electromagnetic compatibility (EMC) refers to that one electrical equipment functions in a given electromagnetic environment without any trouble or error, and impose no unacceptable effect upon the environment. Therefore, EMC represents the quality characters of electrical equipment.

- The inherent noise-immune character: immunity to internal electrical noise.
- External noise immunity: immunity to electromagnetic noise in external system.
- Noise emission level: influence of electromagnetic emission upon environment.

| | |
|---|--|
|  | <p>Electromagnetic radiation from inverter may be harmful to health!</p> <ul style="list-style-type: none"> • Please do not continue to stay away from the inverter in less than 20 cm when inverter is working. |
| Danger | |

1.2 Symbols and signs

Safety symbols

| | |
|---|---|
|  | <p>Caution of burn injuries due to hot enclosure parts!</p> <ul style="list-style-type: none"> • During working only can touch the display and key parts of inverter. |
| Caution | |

| | |
|---|--|
|  | <p>PV array should be connected to the ground in accordance with requirements of local power department!</p> <ul style="list-style-type: none"> • To protect system and the personnel security, we suggest that PV array of border and inverter should be reliable grounding . |
| Attention | |
|  | <p>Ensure input DC voltage < Max.DC voltage .Over voltage may cause permanent damage to inverter or other losses, which will not be included in warranty!</p> |
| Warning | |

Signs on the inverter

There are some symbols which are related to security on the inverter. Please read and understand the content of the symbols, and then start the installation.

| | |
|---|---|
|  | There is residual voltage in the inverter! Before open the equipment, operator should wait for five minutes to ensure the capacitance discharge completely. |
|  | Be careful of high voltage. |
|  | Be careful of high temperature. |
|  | Conformity with European. |
|  | Point of connection for grounding. |
|  | Please read this manul before install Sunny Dog series. |
|  | This indicates the degree of protection of the equipment according to IEC standard 70-1 (EN 60529 June 1997). |
|  | Positive pole and negative pole of the input voltage (DC). |

2 Product characteristics

Outlines of this chapter

Product identification

It introduces the field of use, and how to identify different type of Sunny Dog series inverters.

Function description

It introduces how Sunny Dog series inverters work and the function modules inside.

Protection modules

It introduces the protection modules in the inverter.

2.1 Product identification

Field of use

The Sunny Dog series is a PV inverter which converts the DC current of a PV generator into AC current and feeds it into the public grid.

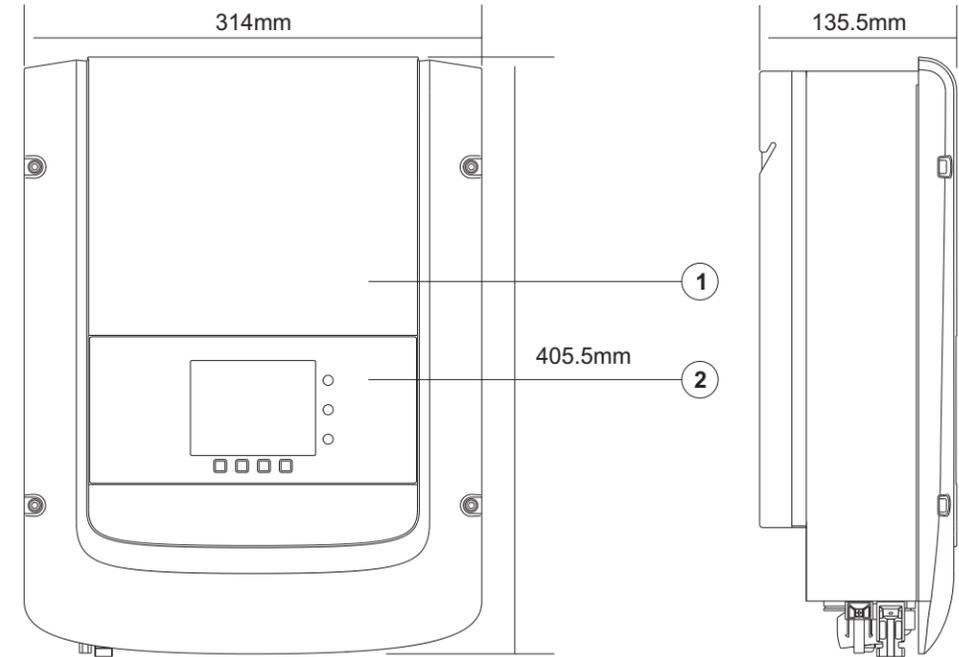
Figure2-1 PV Grid-tied System



Sunny Dog series inverters can be used only with photovoltaic modules that do not require one of the poles to be grounded. The operating current dispersed during normal operation must not exceed the limits specified in the technical specifications. Only one photovoltaic generator can be connected to the input of the inverter (do not connect batteries or other sources of power supply).

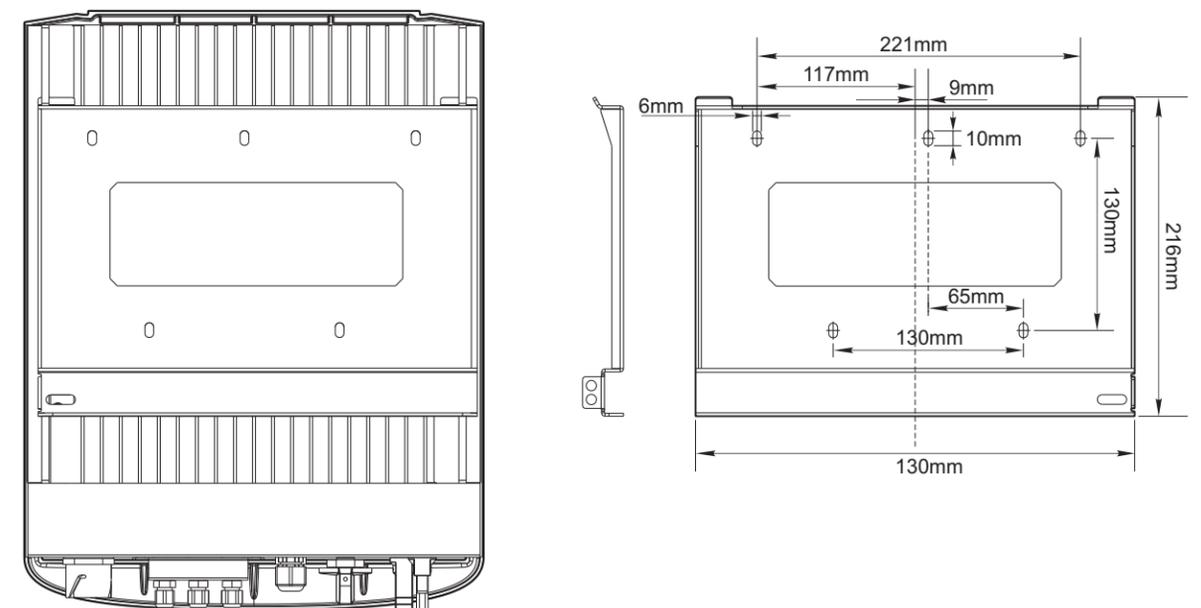
- The choice of model of inverter must be made by a qualified technician who knows about the installation conditions, the devices that will be installed outside the inverter and possible integration with an existing system.
- Overall dimensions: L×W×H=405.5mm×314mm×135.5mm.

Figure2-2 Front view and left view dimensions



1. Cabinet 2. Human Interface board

Figure2-3 Back view and Bracket dimensions



• Identification labels of the equipment :



2.2 Function description

DC power generated by PV array is filtered through Input Board before entering into Power Board. Input Board also offer functions such as insulation impedance detection and input DC voltage / current detection. DC power is converted to AC power by Power Board. AC power is filtered through Output Board then AC power is fed into the grid. Output Board also offer functions such as grid voltage / output current detection, GFCI and output isolation relay. Control Board provides the auxiliary power, controls the operation state of inverter and shows the operation status by Display Board. Display Board displays fault code when inverter is in abnormal operation conditions. At the same time, Control Board can trigger the relay so as to protect the internal components.

• Function module

A. Configurable relay

The inverter has a configurable switching relay that can be used in various operating conditions set in the dedicated menu. A typical application example is the closing of the contact when an alarm occurs.

B. Energy management unit

This control can be used to switch the inverter on/off through an external (remote) control.

C. Feeding reactive power into the grid

The inverter is able to produce reactive power and can therefore feed it into the grid through the setting of the phase shift factor. Feed-in management can be controlled directly by the grid company through a dedicated RS485 serial interface.

D. Limiting the active power fed into the grid

The inverter, if enabled can limit the amount of active power fed into the grid by the inverter to the desired value (Expressed as a percentage).

E. Self power reduction when grid over frequency

When the grid frequency is over limited value, inverter will reduce output power which does well to the grid stability.

F. Data transmission

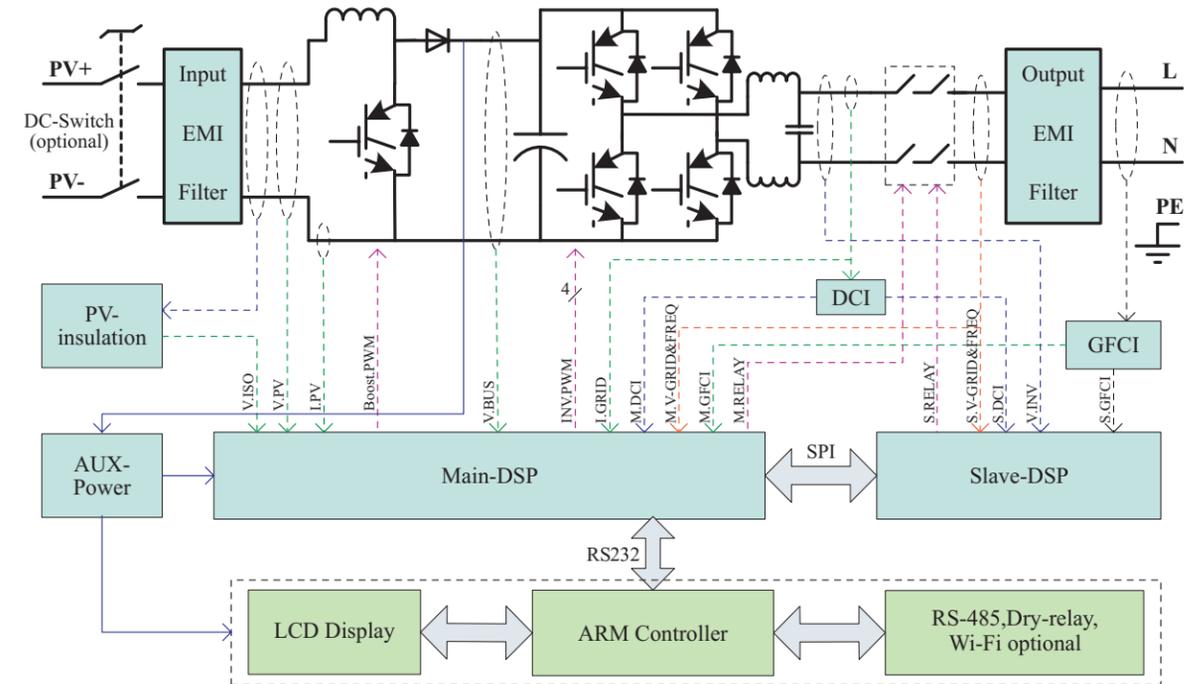
The inverter or a grid of inverters may be monitored remotely through an advanced communications system based on an RS-485 serial interface, or remotely via the WIFI.

G. Software update

SD card is used for updating the firmware.

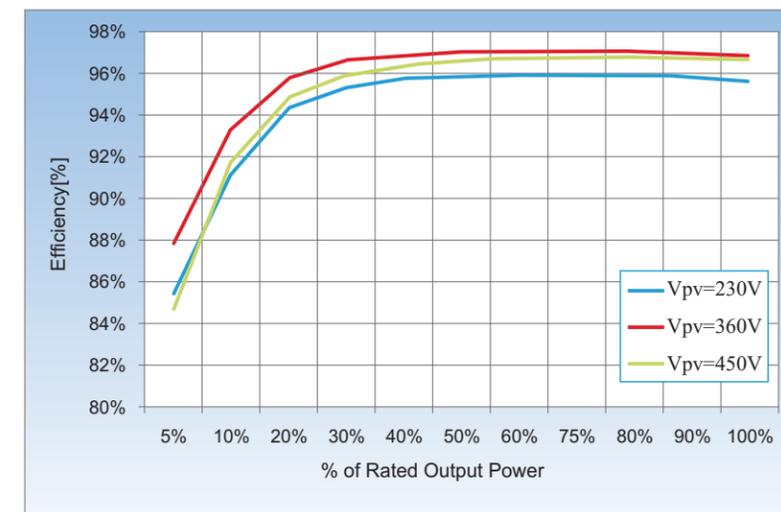
• Electrical block diagram

Figure2-4 Electrical block diagram



2.3 Efficiency curve

Efficiency curve of the SOFAR 3000TL



3 Installation

Outlines of this chapter

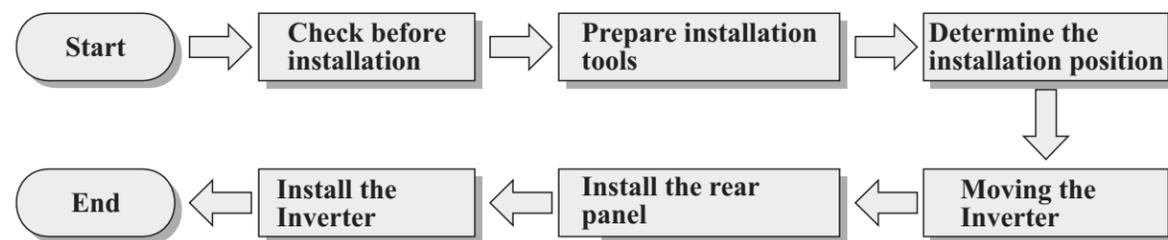
This topic describes how to install the Sunny Dog series inverter.

Installation notes

| | |
|---|--|
|  Danger | <ul style="list-style-type: none"> Do not install the Sunny Dog series on flammable building materials. Do not store the Sunny Dog series in areas with flammable or explosive materials. |
|  Caution | Do not install the Sunny Dog series in places prone to body contact because the Sunny Dog series shelf and heat sinks become hot during the inverter operating. |
|  Attention | <ul style="list-style-type: none"> Take the Sunny Dog series weight into consideration when transporting and moving the Sunny Dog series. Install the Sunny Dog series in an appropriate position and surface. |

3.1 Installation Process

Figure3-1 Installation flowchart



3.2 Checking Before Installation

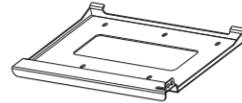
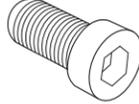
Checking Outer Packing Materials

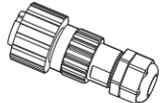
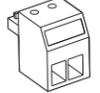
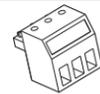
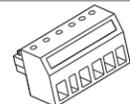
Packing materials and components may be damaged during transportation. Therefore, check the outer packing materials before installing the inverter. Check the outer packing materials for damage, such as holes and cracks. If any damage is found, do not unpack the Sunny Dog series and contact the dealer as soon as possible. You are advised to remove the packing materials within 24 hours before installing the Sunny Dog series inverter.

Checking Deliverables

After unpacking the inverter, check whether deliverables are intact and complete. If any damage is found or any component is missing, contact the dealer.

Table3-1 shows the components and mechanical parts that should be delivered

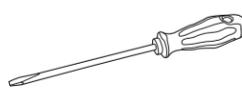
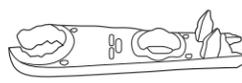
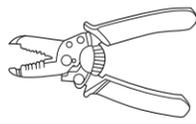
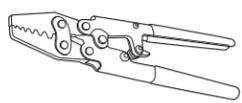
| No. | Pictures | Description | Quantity |
|-----|---|---|-------------------|
| 1 |  | Sunny Dog Series | 1 pcs |
| 2 |  | Rear panel | 1 pcs |
| 3 |  | PV+ input terminal | 1 pcs |
| 4 |  | PV-input terminal | 1 pcs |
| 5 |  | Metal terminals secured to PV+ input power cables | 1 pcs |
| 6 |  | Metal terminals secured to PV- input power cables | 1 pcs |
| 7 |  | M5 Hexagon screws | 2 pcs |
| 8 |  | Expansion bolts | 7 pcs(spare 2pcs) |
| 9 |  | Self-tapping screw | 5 pcs |
| 10 |  | Manual | 1 pcs |
| 11 |  | The warranty card | 1 pcs |
| 12 |  | Certificate | 1 pcs |

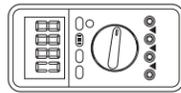
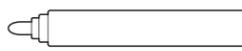
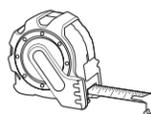
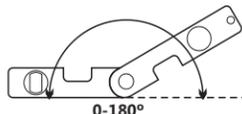
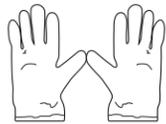
| No. | Pictures | Description | Quantity |
|-----|---|---------------------------|----------|
| 13 |  | AC output terminal | 1PCS |
| 14 |  | 485 terminal (2pin) | 1PCS |
| 15 |  | Dry relay terminal (3pin) | 1PCS |
| 16 |  | I/O terminal (6pin) | 1PCS |

3.3 Tools

Prepare tools required for installation and electrical connections.

Table3-2 shows the components and mechanical parts that should be delivered

| No. | Tool | Model | Function |
|-----|---|---|--|
| 1 |  | Hammer drill Recommend drill dia. 6mm | Used to drill holes on the wall |
| 2 |  | Screwdriver | wiring |
| 3 |  | Removal tool | Remove PV terminal |
| 4 |  | Wire stripper | Strip wire |
| 5 |  | M4 Hexagon socket | Turn the screw to connect rear panel with inverter |
| 6 |  | Crimping tools | Used to crimp power cables |

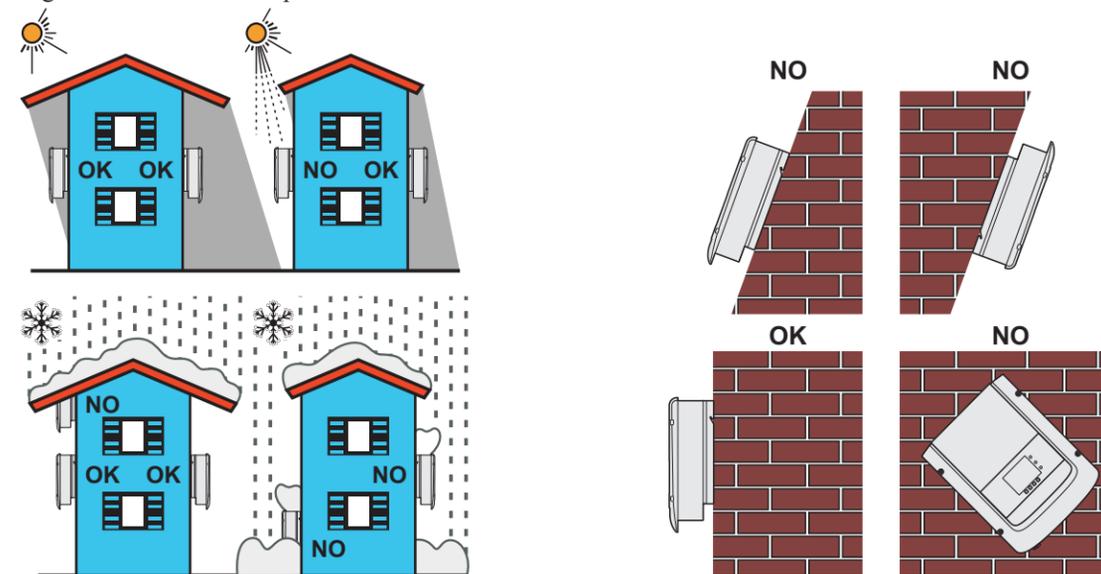
| No. | Tool | Model | Function |
|-----|---|----------------------|--|
| 7 |  | Multi-meter | Used to check grounding |
| 8 |  | Marker | Used to mark signs |
| 9 |  | Measuring tape | Used to measure distances |
| 10 |  | Level | Used to ensure that the rear panel is properly installed |
| 11 |  | ESD gloves | Operators wear |
| 12 |  | Safety goggles | Operators wear |
| 13 |  | Anti-dust respirator | Operators wear |

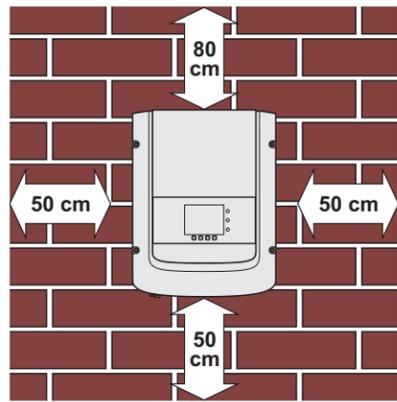
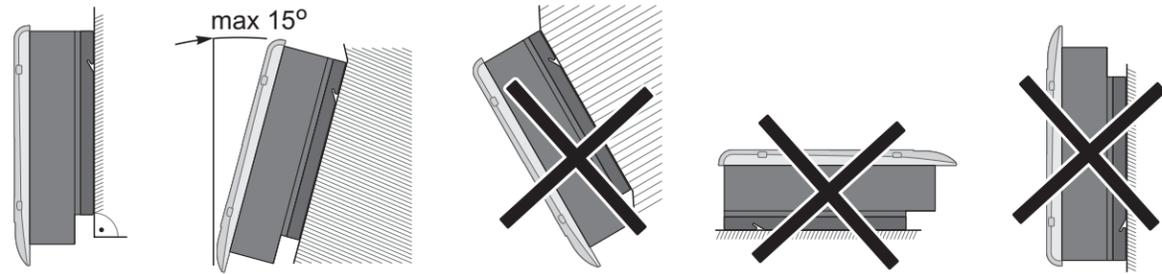
3.4 Determining the Installation Position

Determine an appropriate position for installing the Sunny Dog series inverter.

Comply with the following requirements when determining the installation position:

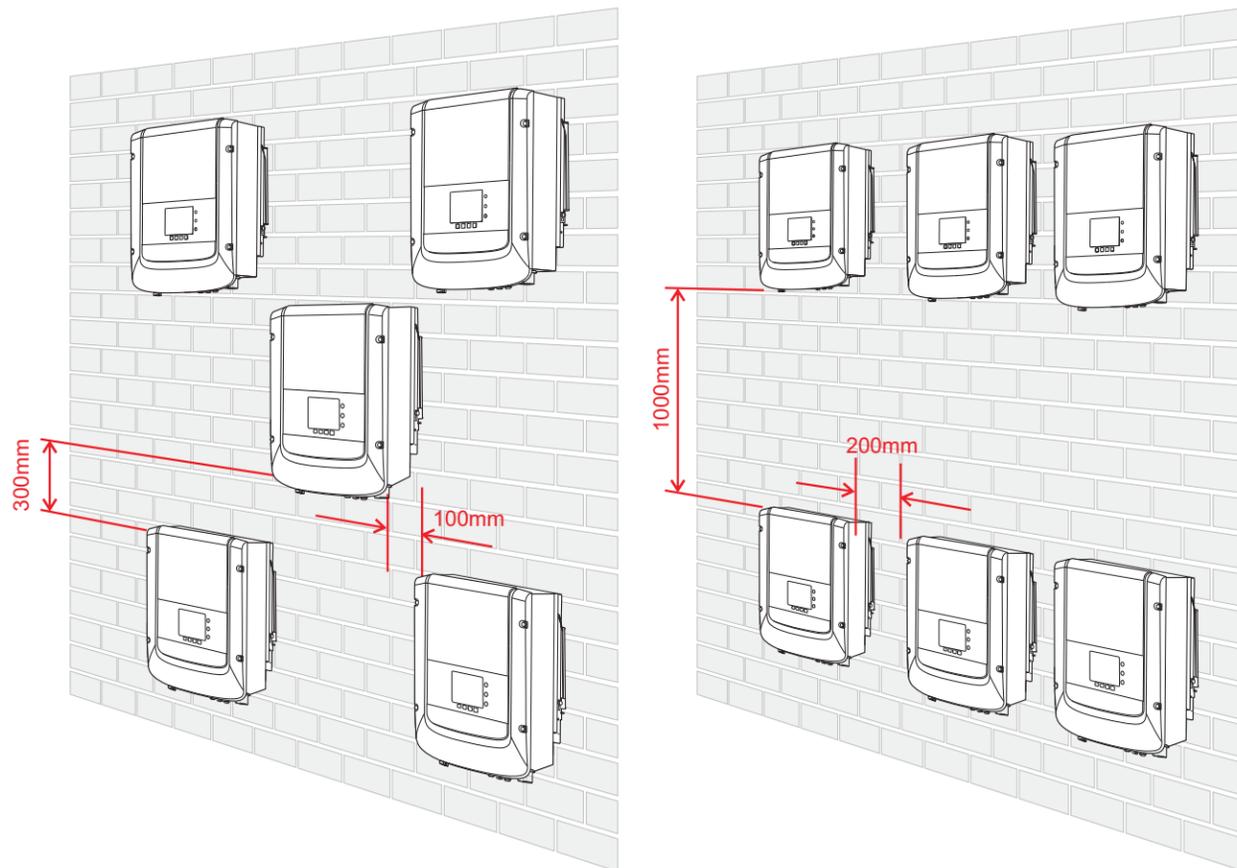
Figure3-2 Installation Requirements





Minimum installation distance for single Sunny Dog series

Many single Sunny Dog series installation



3.5 Moving the Sunny Dog series inverter

This topic describes how to move the Sunny Dog series to the installation position horizontally

Step 1 Opening the packing, insert hands into the slots on both sides of the Sunny Dog series and hold the handles, as shown in Figure 3-3 and Figure 3-4.

Figure 3-3 Moving the Sunny Dog series (1)

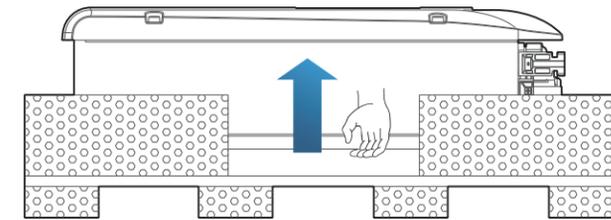
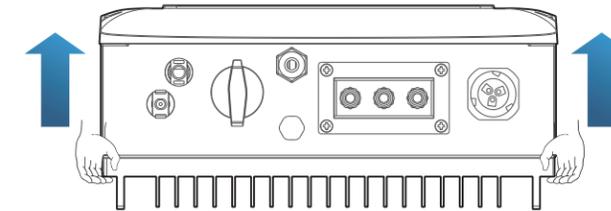


Figure 3-4 Moving the Sunny Dog series (2)



Step 2 Lift the Sunny Dog series from the packing case and move it to the installation position.

| | |
|--|--|
| | <ul style="list-style-type: none"> To prevent device damage and personal injury, keep balance when moving the Sunny Dog series because the Sunny Dog series is heavy. Do not put the Sunny Dog series with its wiring terminals contacting the floor because the power ports and signal ports are not designed to support the weight of the Sunny Dog series. Place the Sunny Dog series horizontally. When placing the Sunny Dog series on the floor, put foam or paper under the Sunny Dog series to protect its shell. |
|--|--|

Attention

--- End

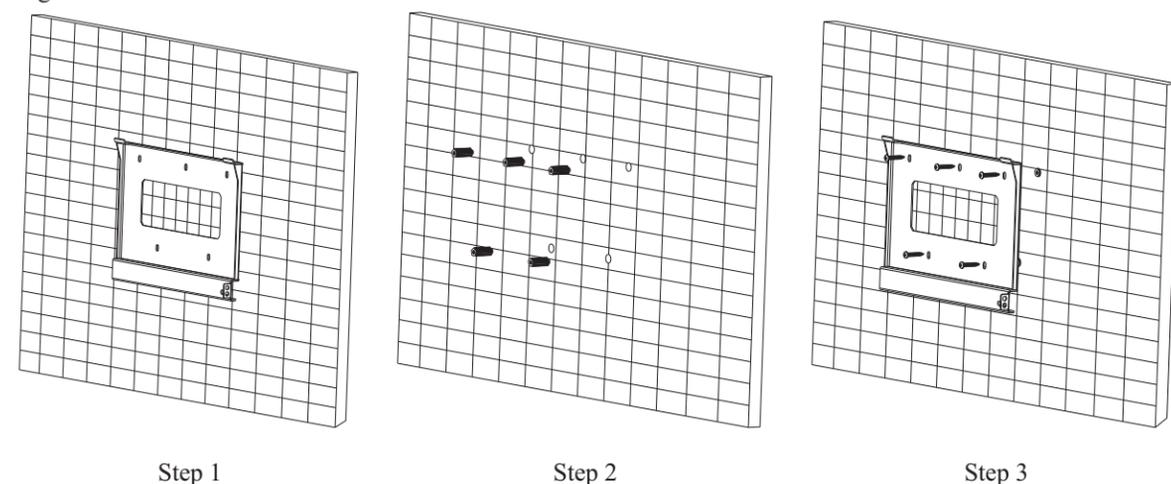
3.6 Installing Sunny Dog series inverter

Step 1 To determine the position for drilling holes, level hole positions, and then mark the hole position by using a marker, use the hammer drill to drill hole on the wall. Keeping the hammer perpendicular to the wall, do not shake when drilling, so as not to damage the walls. If the aperture errors, need to reposition.

Step 2 The expansion screw is vertically inserted into the hole, pay attention to expanding screw insertion depth (not too shallow).

Step 3 putting the rear panel on the wall, the rear panel is fixed by the nuts.

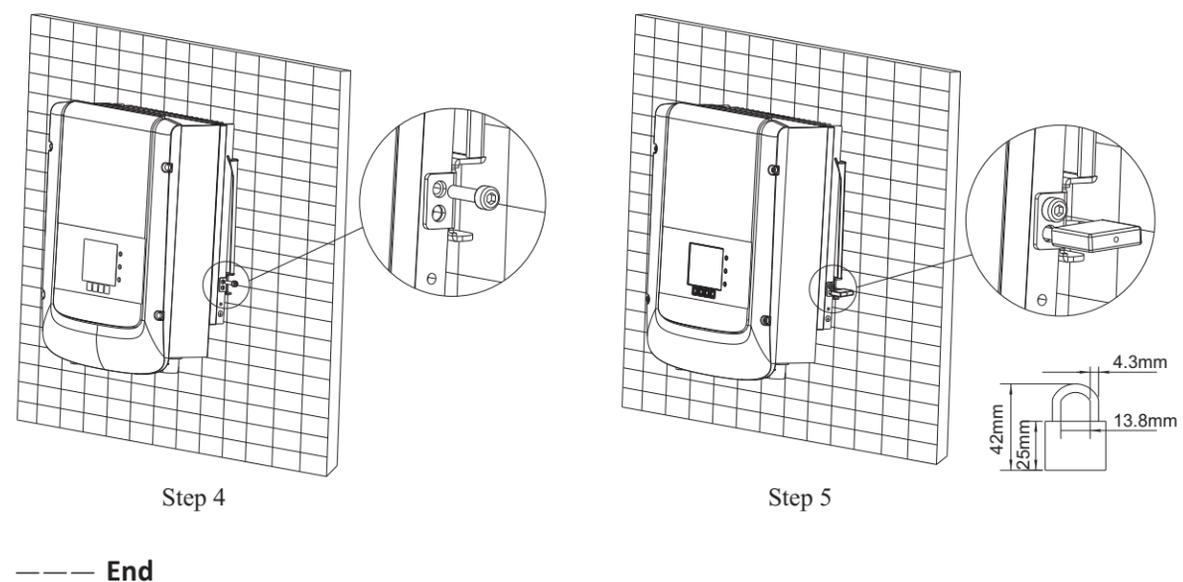
Figure 3-5



Step 4 putting the inverter hook on the rear panel. Using an M5 screw back and inverter bottom fastening, to ensure safety.

Step 5 Putting the rear panel and inverter to lock together, In order to ensure the safety (the user can select lock according to the actual situation).

Figure 3-6



--- End

4 Electrical Connections

Outlines of this chapter

This topic describes the Sunny Dog series inverter electrical connections. Read this part carefully before connecting cables.

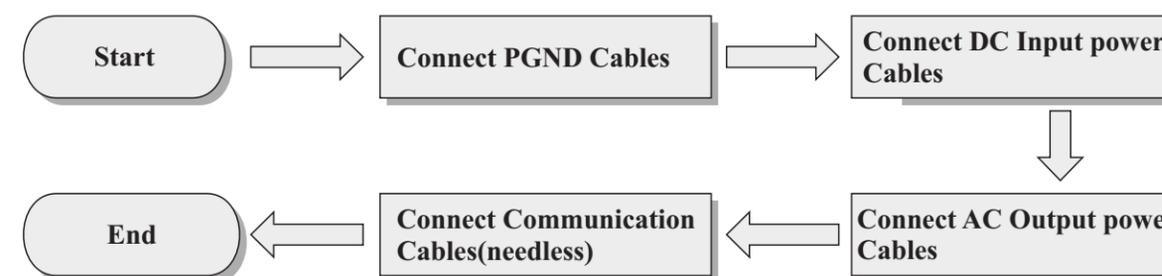
NOTE:

Before performing electrical connections, ensure that the DC switch is OFF. Since the stored electrical charge remains in a capacitor long after the DC switch is turned OFF. So it's necessary to wait for at least 5 minutes for the capacitor to be electrically discharged.

| | |
|---|--|
|  Attention | Installation and maintenance of inverter, must be operated by professional electrical engineer. |
|  Danger | PV modules generate electric energy when exposed to sunlight and can create an electrical shock hazard. Therefore, before connecting DC input power cable, cover PV modules using opaque cloth. |
|  Note | <ul style="list-style-type: none"> • Open-circuit voltage of module arrays connected in series must be $\leq 500V$. • The power of PV grid-tied system which contain by several the Sunny Dog Series inverters must be $< 3.68kw$ in Germany. |

4.1 Electrical connection

Figure4-1 Shows the flowchart for connecting cables to the Sunny Dog series



4.2 Connecting PGND Cables

Connect the Sunny Dog series to the grounding electrode using protection ground (PGND) cables for grounding purposes.

| | |
|---|--|
|  Attention | The inverter is transformer-less, Requires The positive pole and the negative pole of the PV array are not grounded, Otherwise it will cause inverter failure, In the PV power generation system, all non current carrying metal parts(such as: Bracket inverter shell) should be connected to earth. |
|---|--|

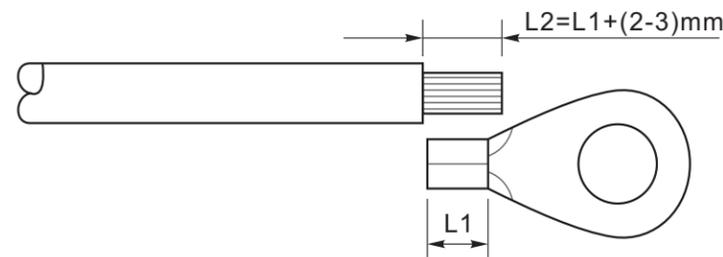
Prerequisites:

The PGND cables are prepared ($\geq 4\text{mm}^2$ outdoor power cables are recommended for grounding purposes),the color of cable should be yellow-green.

Procedure:

Step 1 Remove the insulation layer with an appropriate length using a wire stripper, as shown in Figure 4-2.

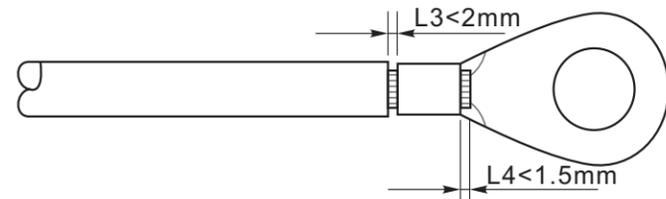
Figure4-2 Preparing a ground cable (1)



Note : L2 is 2 to 3mm longer than L1

Step 2 Insert the exposed core wires into the OT terminal and crimp them by using a crimping tool, as shown in Figure 4-3.

Figure4-3 Preparing a ground cable (2)

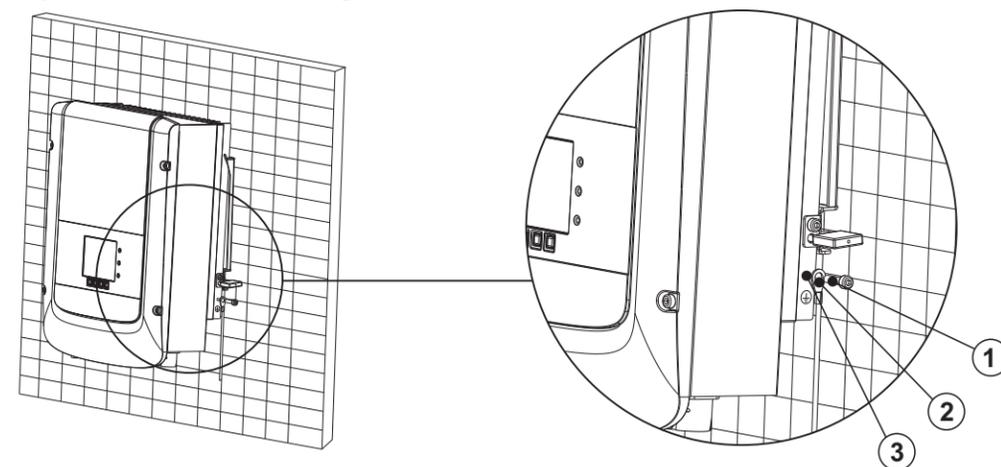


Note 1: L3 is the length between the insulation layer of the ground cable and the crimped part.L4 is the distance between the crimped part and core wires protruding from the crimped part.

Note 2: The cavity formed after crimping the conductor crimp strip shall wrap the core wires completely. The core wires shall contact the terminal closely.

Step 3 Install the crimped OT terminal, flat washer, and spring washer on the M5 welded stud, and tighten the nut to a torque of 3 N.m using a socket wrench.

Figure4-4 Ground terminal composition



1. M5 welded stud 2. OT Terminal 3. M5 Antiskid nut

--- End

4.3 Connecting DC Input Power Cables

Table 4-1 Recommended DC input cable specifications

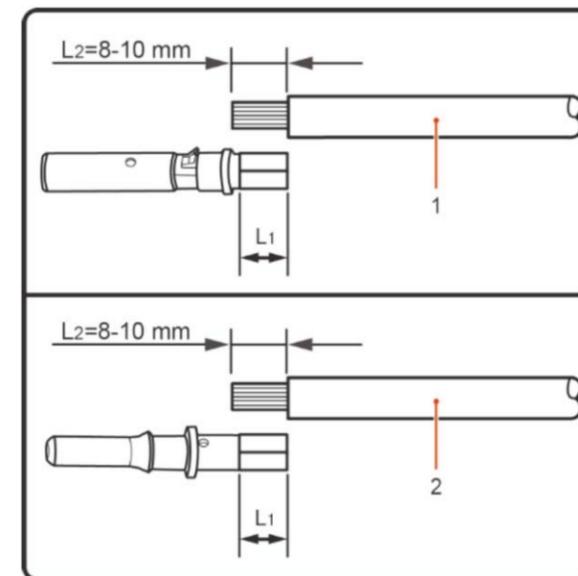
| Cross-Sectional Area (mm ²) | | External Cable Diameter(mm ²) |
|---|-------------------|---|
| Range | Recommended Value | |
| 4.0~6.0 | 4.0 | 4.5~7.8 |

Procedure

Step 1 Remove cable glands from the positive and negative connectors.

Step 2 Remove the insulation layer with an appropriate length from the positive and negative power cables by using a wire stripper as show in Figure 4-5.

Figure 4-5 Connecting DC input power cables



1. Positive power cable 2. Negative power cable



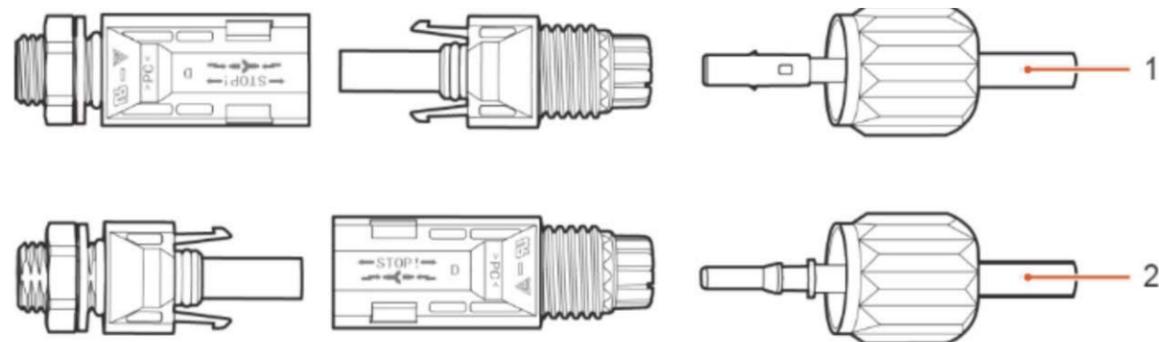
Note

L2 is 2 to 3 mm longer than L1.

Step 3 Insert the positive and negative power cables into corresponding cable glands.

Step 4 Insert the stripped positive and negative power cables into the positive and negative metal terminals respectively and crimp them using a crimping tool. Ensure that the cables are crimped until they cannot be pulled out by force less than 400 N, as shown in Figure 4-6.

Figure 4-6 Connecting DC input power cables



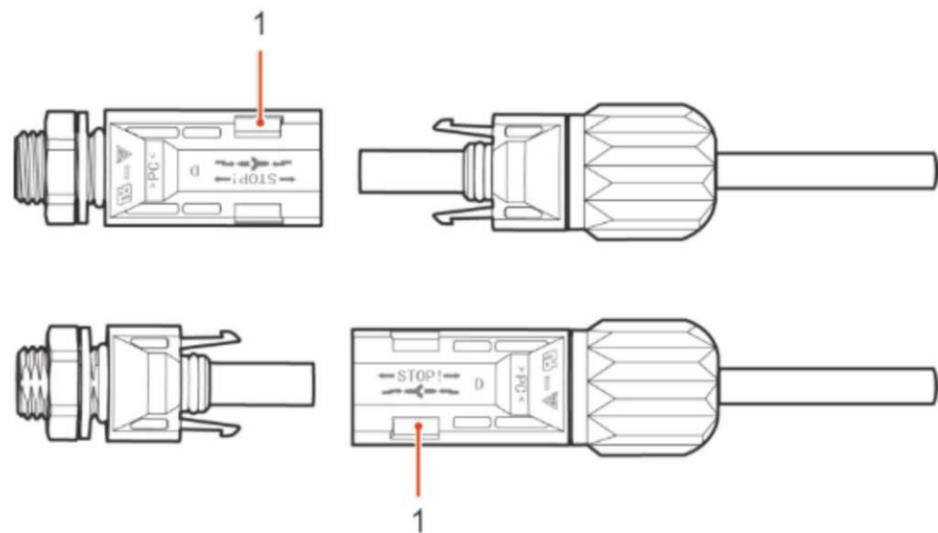
1. Positive power cable 2. Negative power cable

Step 5 Insert crimped power cables into corresponding housings until you hear a "click" sound. The power cables snap into place.

Step 6 Reinstall cable glands on positive and negative connectors and rotate them against the insulation covers.

Step 7 Insert the positive and negative connectors into corresponding DC input terminals of the Sunny Dog Series until you hear a "click" sound, as shown in Figure 4-7.

Figure 4-7 Connecting DC input power cables



1. Bayonet

— End

Follow-up Procedure

To remove the positive and negative connectors from the Sunny Dog Series, insert a removal wrench into the bayonet and press the wrench with an appropriate strength, as shown in Figure 4-8.

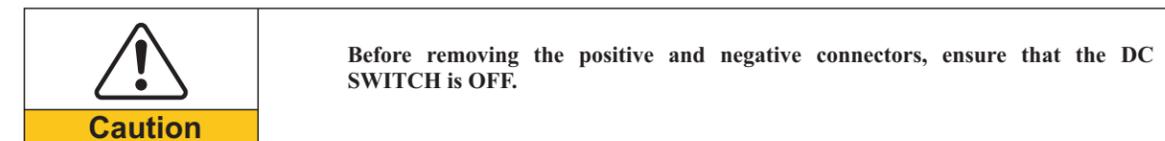
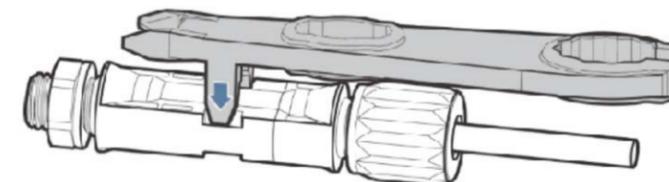
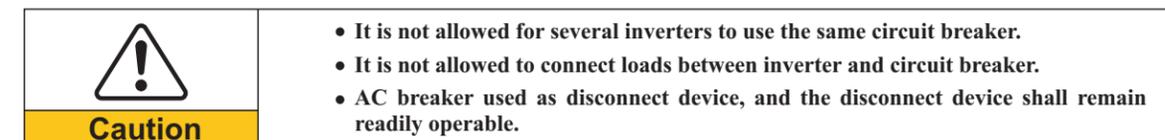


Figure 4-8 Removing a DC input connector



4.4 Connecting AC Output Power Cables

Connect the Sunny Dog Series to the AC power distribution frame (PDF) or power grid over AC input power cables.



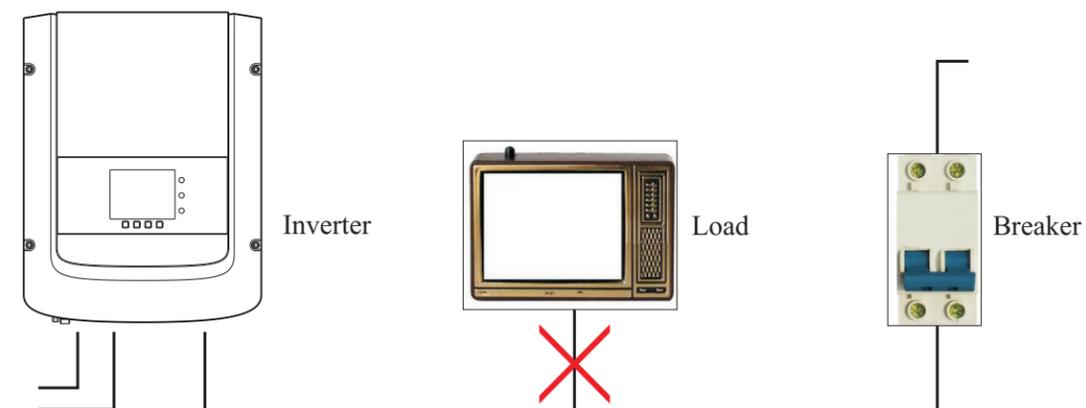
Context

All the AC output cables used for the inverters are outdoor three-core cables. To facilitate the installation, use flexible cables. Table 4-2 lists the recommended specifications for the cables.

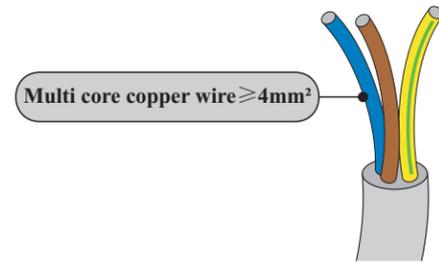
Table 4-2 Recommended AC output cable specifications

| Type | Sofar 1100TL | Sofar 1600TL | Sofar 2200TL | Sofar 2700TL | Sofar 3000TL |
|---------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Cable(Copper) | ≥ 4mm ² |
| Breaker | 16A/400V | 16A/400V | 25A/400V | 25A/400V | 25A/400V |

Figure 4-9 NOT allowed: connect loads between inverter and circuit breaker

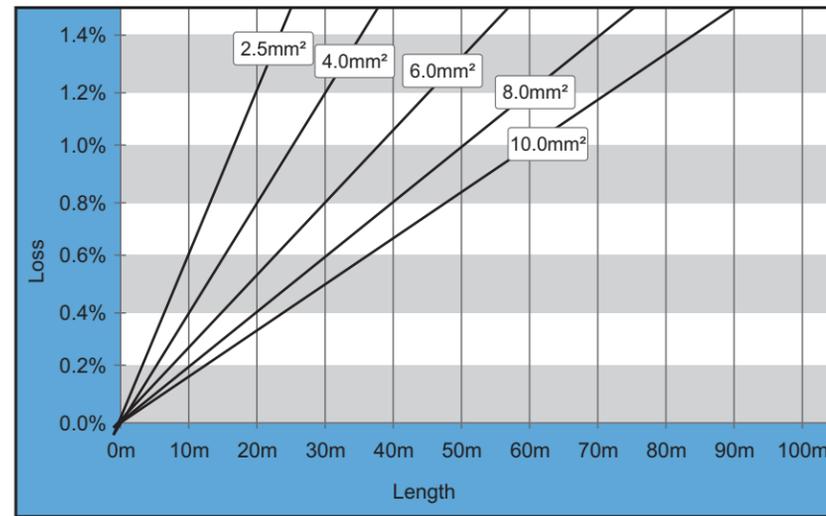


Multi core copper wire



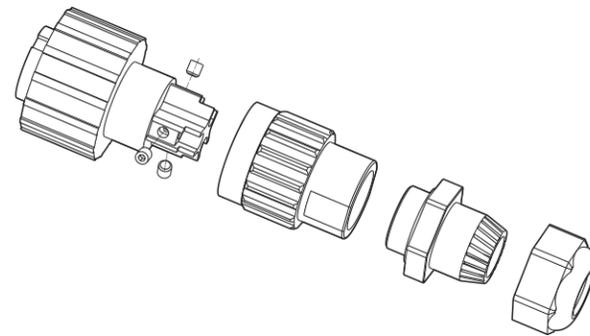
Impedance of inverter and grid contact must be less than 2Ω , In order to ensure the reliability of anti islanding function, should choose the PV cable and ensure line loss less than power 1%, From the inverter to the grid, the cable length should not exceed 150m. Below chart is cable .

Figure 4-10 length, section area and wire loss



SOFAR inverter is equipped with IP66 AC output connector dedicated for PV inverter, customer need to make AC output cable connections by himself, and the appearance of the AC connector is shown below:

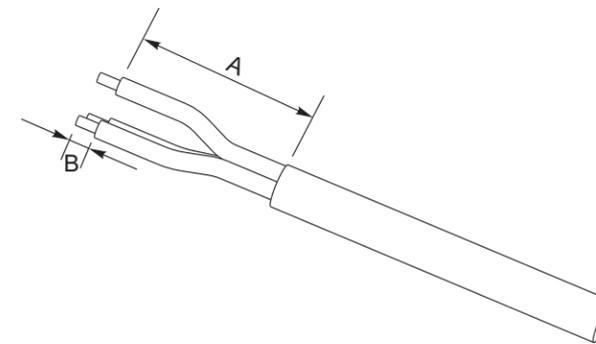
Figure 4-11 AC output connector



AC wire connections procedure:

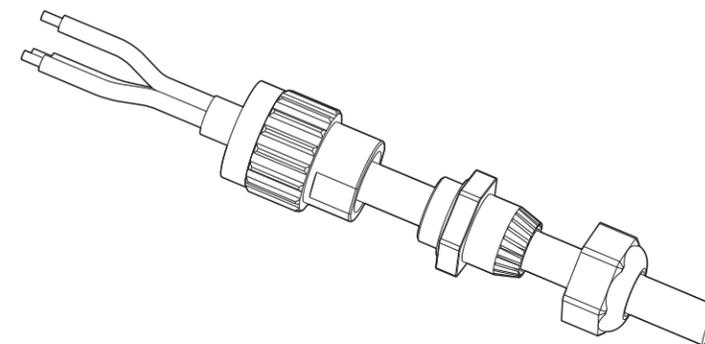
Step 1 Select appropriate cables according to Table 4-2, Remove the insulation layer of the AC output cable using a wire stripper according to the figure shown below: A: 30~50mm B: 6~8mm;

Figure 4-12



Step 2 Disassemble the AC connector according to the figure shown below: insert the AC output cable (with its insulation layer stripped according to step 1) through the waterproof locking cable gland;

Figure 4-13

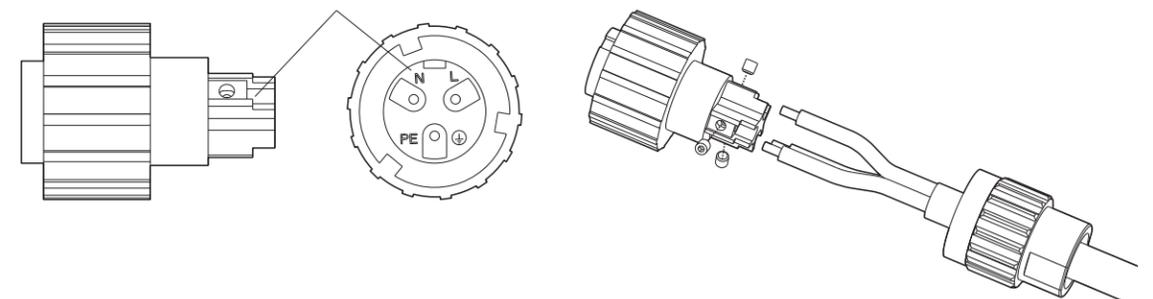


Step 3 Connect AC output cable as per the following requirements:

- Connect the yellow-green wire to the hole labeled 'PE', fasten the wire using an Allen wrench;
- Connect the brown wire to the hole labeled 'L', fasten the wire using an Allen wrench;
- Connect the blue wire to the hole labeled 'N', fasten the wire using an Allen wrench;

Figure 4-14

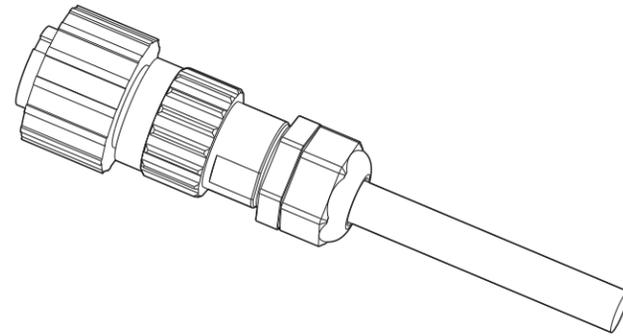
L--brown, N--blue, PE--yellow/green



Step 4 Secure the locking cable gland clockwise, shown as below: make sure that all the wires are securely connected;

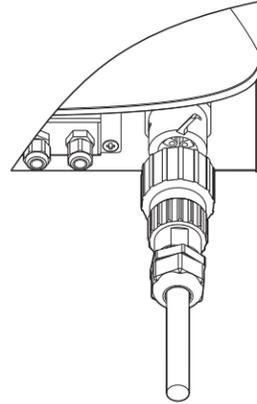
Step 5 Connect the AC output connector to the output wiring terminal of SOFAR inverter, rotate the AC connector clockwise until the fastener reaches its designated position, as shown below:

Figure 4-15



Step 4

Figure 4-16



Step 5

4.5 Connecting Communications Cables

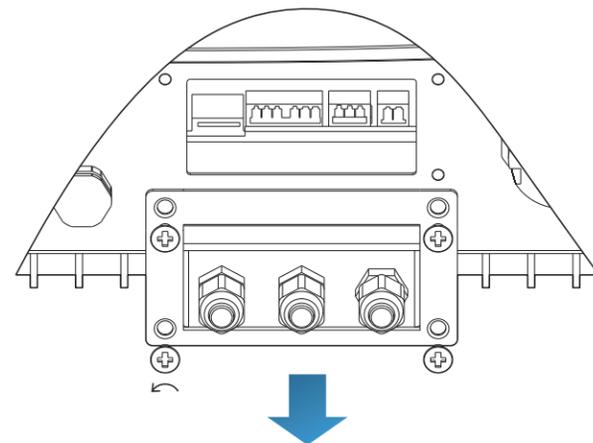
The wiring methods are the same for RS485, dry contact and I/O, this part describes their wiring methods all together:

Table4-3 Recommended communication cable sizes are shown below

| Communication function | RS485 | Dry contact | I/O |
|------------------------|------------------------|------------------------|------------------------|
| Cable size | 0.5~1.5mm ² | 0.5~1.5mm ² | 0.5~1.5mm ² |
| Outside diameter | 2.5~6mm | 2.5~6mm | 2.5~6mm |

Step 1 Remove the communication waterproof cover using a screwdriver;

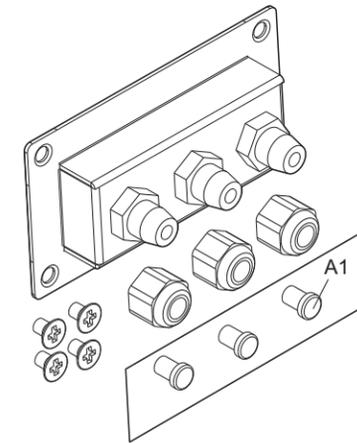
Figure 4-17



Step 2 Unlock the waterproof cable gland, remove the stopper in the waterproof connector;

Figure 4-18

A1: Waterproof stopper

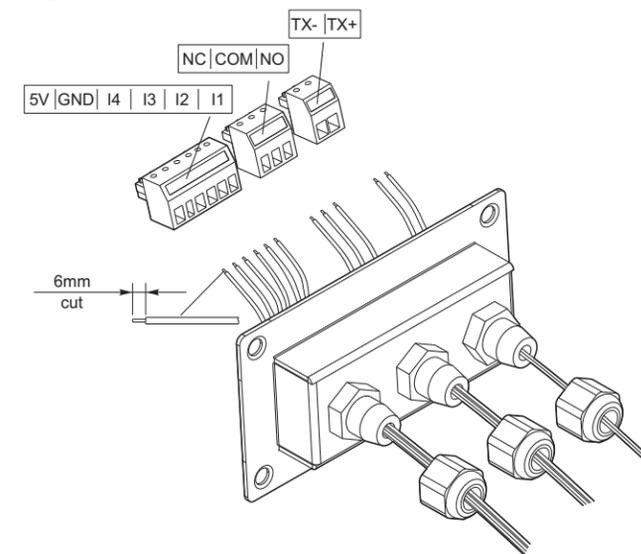


Note:

The waterproof connectors correspond to: I/O, dry contact, RS485 from left to right. Unlock the waterproof connectors according to the communication functions you are using. Do NOT unlock the unused connectors.

Step 3 Select appropriate cable according to Table 4-2, remove the insulation layer using a wire stripper, the length of the wire core is about 6mm, insert the cable through the cable gland and waterproof cover, as shown in the figure below:

Figure 4-19



Step 4 Choose the terminal according to Table 4-4, connect the wires as per the labels, and secure the wires using a slotted screwdriver.



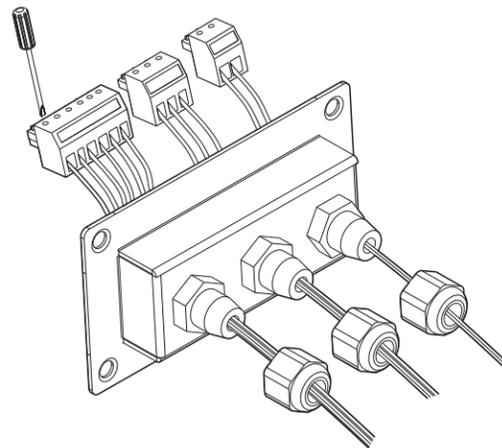
Note:

keep the unused terminals for future use.

Table4-4 functional description of the communication terminals

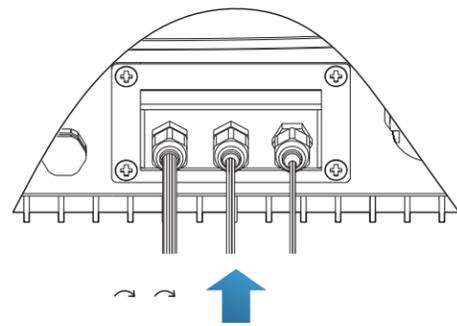
| Type | I/O | | | | | | Dry contact | | | RS485 | |
|-----------|--------|--------|---------|---------|---------|---------|-----------------|---------------|---------------|----------------------------|----------------------------|
| connector | | | | | | | | | | | |
| label | 5V | GND | I4 | I3 | I2 | I1 | NC | COM | NO | TX- | TX+ |
| function | source | ground | Input 4 | Input 3 | Input 2 | Input 1 | Normally closed | Common ground | Normally open | RS485 differential signal- | RS485 differential signal+ |

Figure 4-20



Step 5 Insert the terminal as per the printed label, and then tighten the screws to fix the waterproof cover, rotate the cable gland clockwise to fasten it securely.

Figure 4-21



※ If users need to connect multiple inverters via RS485 wires, refer to the figure shown below:

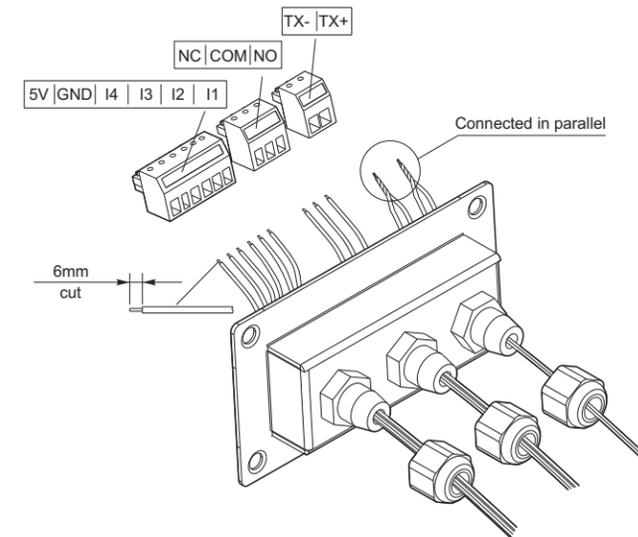
Rs485 wires are connected in parallel, so 4 wires may be required. First connect the two 485+ (TX+) wires in parallel, then connect the two 485-(TX-) wires in parallel, then insert them into the terminal and tighten the screws using a slotted screwdriver.



Note:

We recommend using two different colors of wires to connect TX-(485-) and TX+ (485+). Wires of the same color are connected together to avoid wrong wire connections.

Figure 4-22



4.6 Communication method

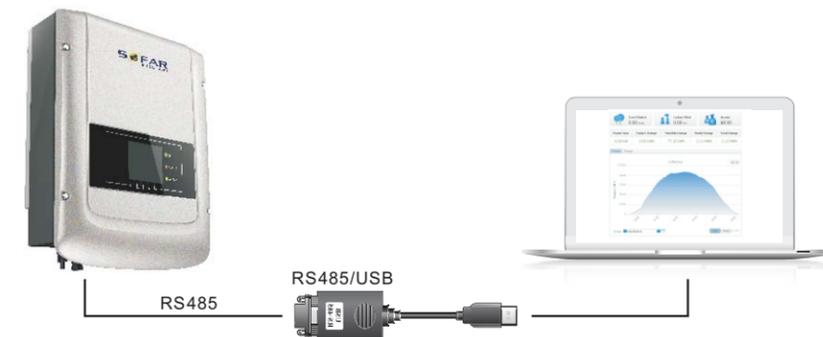
Sunny Dog Series grid-connected inverters offer RS485 (standard) and Wi-Fi (optional) communication modes:

A. Communication between one inverter and one PC:

1. RS485

Refer to the figure shown below, connect the TX+ and TX- of the inverter to the TX+ and TX- of the RS485→USB adapter, and connect the USB port of the adapter to the computer.(NOTE1)

Figure 4-23



2. WI-FI

Refer to the figure shown below: (wireless function required for the PC).(NOTE4)

Figure 4-24



The operation information (generated energy, alert, operation status) of the inverter can be transferred to PC or uploaded to the server (e.g. via S-WE01S) via Wi-Fi. You can register on the website: (refer to section 9)

http://www.solarmanpv.com/portal/Register/Regi_Pub.aspx

Using the Wi-Fi S/N number(NOTE3), then you can login the website:

<http://www.solarmanpv.com/portal/LoginPage.aspx> to remote monitors the inverter.

B. Communication between multiple inverters and one PC:

1. RS485

Refer to the following figure: RS485 wires are connected in parallel between inverters, refer to section 4.5 of this manual for wire connection methods. Connect the TX+ and TX- of the inverter to the TX+ and TX- of the RS485→USB adapter; connect the USB port of the adapter to the computer. A maximum of 31 inverters can be connected in one daisy chain.(NOTE2)

Figure 4-25



2. WI-FI

Refer to the figure shown below: (wireless function required for the PC).(NOTE4)

Figure 4-26



The operation information (generated energy, alert, operation status) of the inverter can be transferred to PC or uploaded to the server (e.g. via S-WE01S) via Wi-Fi. You can register on the website:(refer to section 9)

http://www.solarmanpv.com/portal/Register/Regi_Pub.aspx

Using the Wi-Fi S/N number(NOTE3), then you can login the website:

<http://www.solarmanpv.com/portal/LoginPage.aspx> to remote monitors the inverter.



Note1:

The length of the RS485 communication cable should be less than 1000 m.



Note2:

When multiple inverters are connected via RS485 wires, set mod-bus address need to differentiate the inverters. Refer to section 6.3 for RS485 address setting.



Note3:

S/N number of the Wi-Fi module is located under the label on the side of the inverter.

Figure 4-27

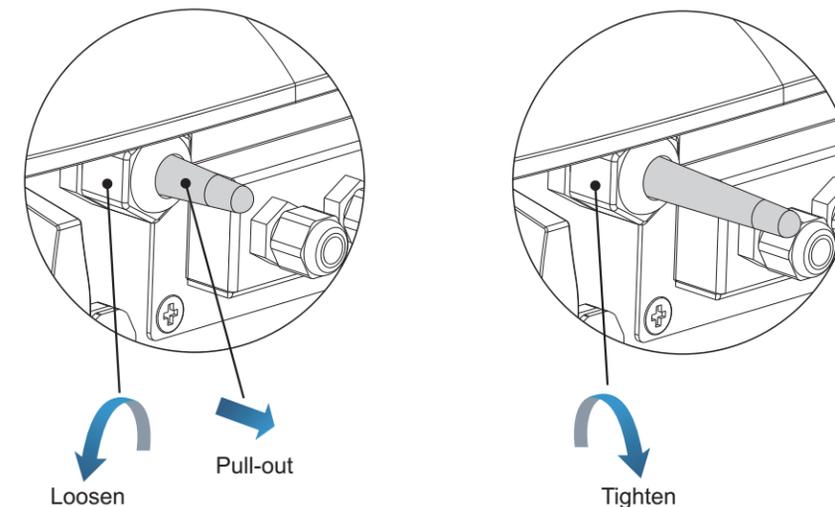


Note4:

Customer can enhance the Wi-Fi signal in order to make the data transmission more stably using the method shown below:

- Step 1** Loosen the cable gland of Wi-Fi antenna;
- Step 2** Pull-out the Wi-Fi antenna from the cable gland about 50~60mm length;
- Step 3** Tighten the cable gland of Wi-Fi antenna.

Figure 4-28



5 Commissioning of inverter

5.1 Safety inspection before commissioning

| | |
|---|---|
|  | <p>Ensure that DC and AC voltages are within the range permitted by the inverter.</p> |
| Attention | |

5.2 Start inverter

Step 1: Turn on DC switch.(optional)

Step 2: Turn on AC switch.

When the solar arrays generate adequate power, the inverter will startup automatically. Display showing “normal” indicates correct operation.

If the inverter indicates any other fault, please refer to part 7——error messages for help.

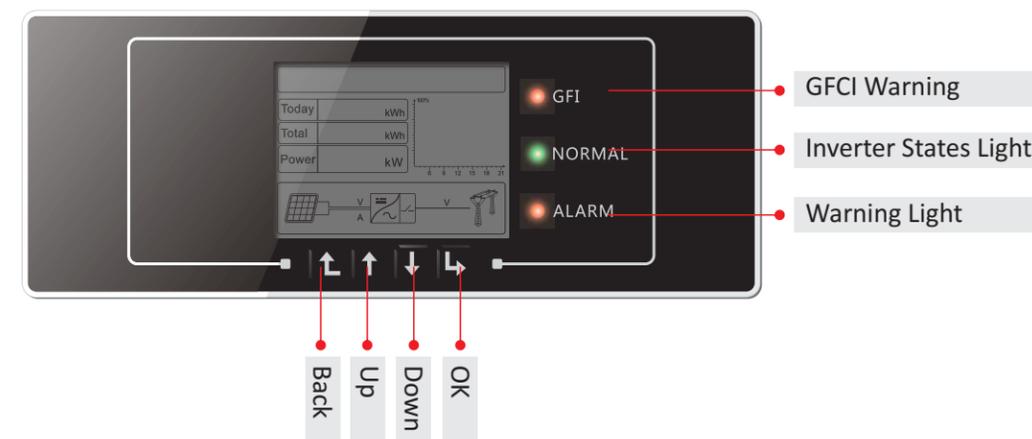
6 Operation interface

Outlines of this chapter

Introduce the display、operation、 buttons and LED light of Sunny Dog Series Inverter.

6.1 Operation and Display Panel

- Buttons and Indicator lights



Key-button:

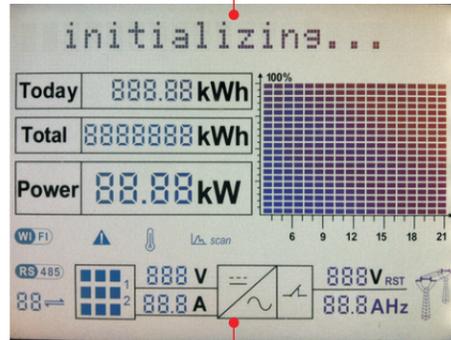
- Back : to return or enter into main interface at standard interface states
- Up : to move up or increase value
- Down : to move down or decrease value
- Enter : to confirm selection

Indicator Lights:

- States Light(GREEN)
 - Flashing: Waiting or checking state
 - ON: Normal operation
 - OFF: Fault or permanent state
- Warning Light (RED)
 - ON: Fault or permanent state
 - OFF: Normal operation
- GFCI Warning Light (RED)
 - ON: GFCI fault or GFCI device fault warning
 - OFF: GFCI normal

6.2 Standard Interface

LCD standard interface is used to display inverter states, information and parameter setting etc.



LCD displays the updates of inverter energy, power, input information, warning information etc

A1 - WIFI communicating

A2 - RS485 communicating

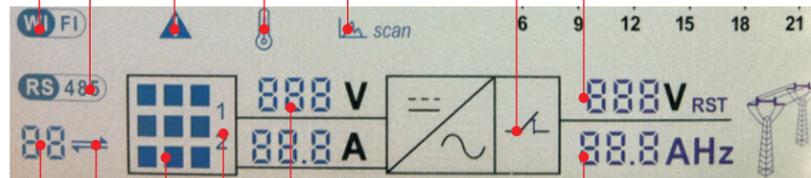
A3 - Light flashes to warn over frequency and power derating. Light ON to warn remote power derating

A4 - Light ON warning for inverter high temperature

A5 - MPPT SCAN function is activated (not available)

A6 - Light ON when the state is normal

A7 - Indicates grid voltage



A8 - Indicates grid current or frequency

A9 - Indicates PV voltage and current

A10 - Indicates real time input voltage and current channel

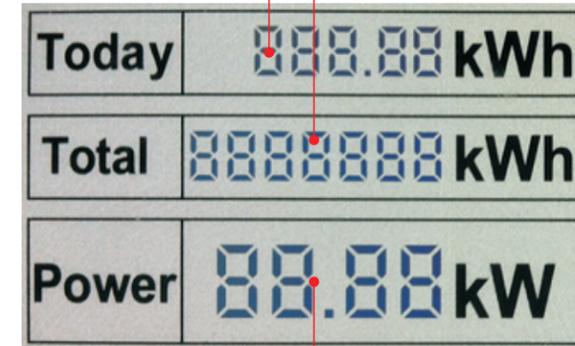
A11 - Light ON when input voltage over 100V

A12 - Light ON for RS485 communicating

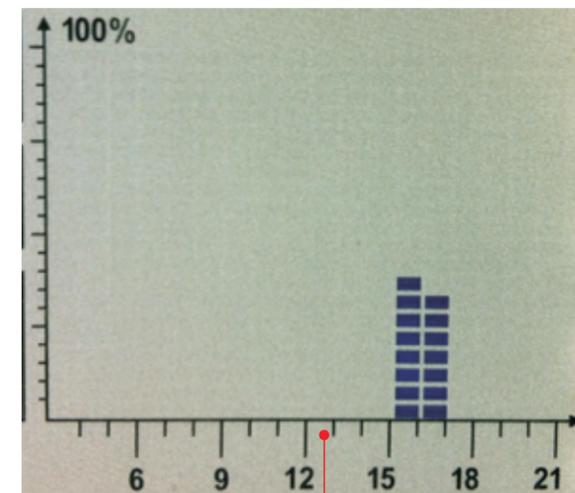
A13 - Indicates modbus communication address.

A14 - Indicates today's energy

A15 - Indicates the total energy



A16 - Indicates real time output power



A17 - Indicates the energy from 3:00am-21:00pm in the day

* When power-on, LCD interface displays INITIALIZING, refer below picture.

Initializing...

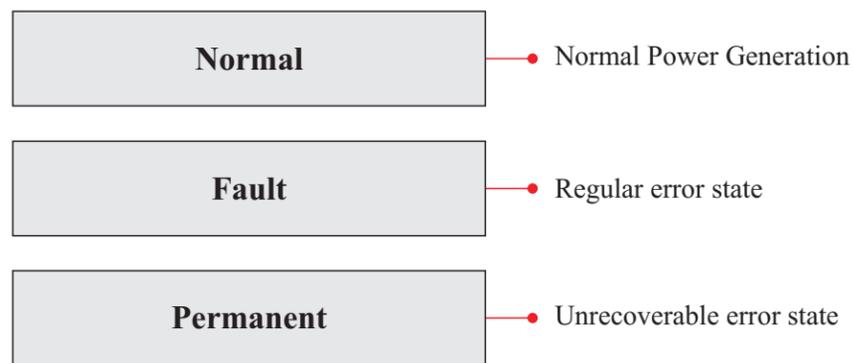
* When the inverter internal communication successfully, the LCD displays the current state of the inverter, display as shown in the figure below:

Wait 10s

Waiting States, Countdown 10S

Check

Checking



Inverter states include: wait, check, normal, fault and permanent

Wait: Inverter is waiting to Check State at the end of reconnection time.

Check: Inverter is checking isolation resistor, relays, and other safety requirements. It also does self-test to ensure inverter software and hardware is functional.

Normal: Inverter enter to Normal State,it is feeding power to the grid.

Fault: Inverter has encountered recoverable error. It will recover if the errors disappear. If not, please check the inverter according error code.

Permanent: Inverter has encountered unrecoverable error, we need maintainer debug this kind of error according to error code.

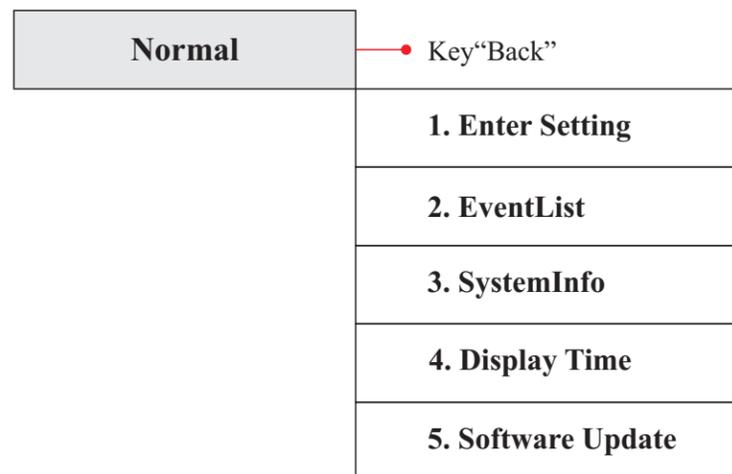
* When the inverter internal communication fail, the LCD displays the state of the inverter as shown in the figure below:



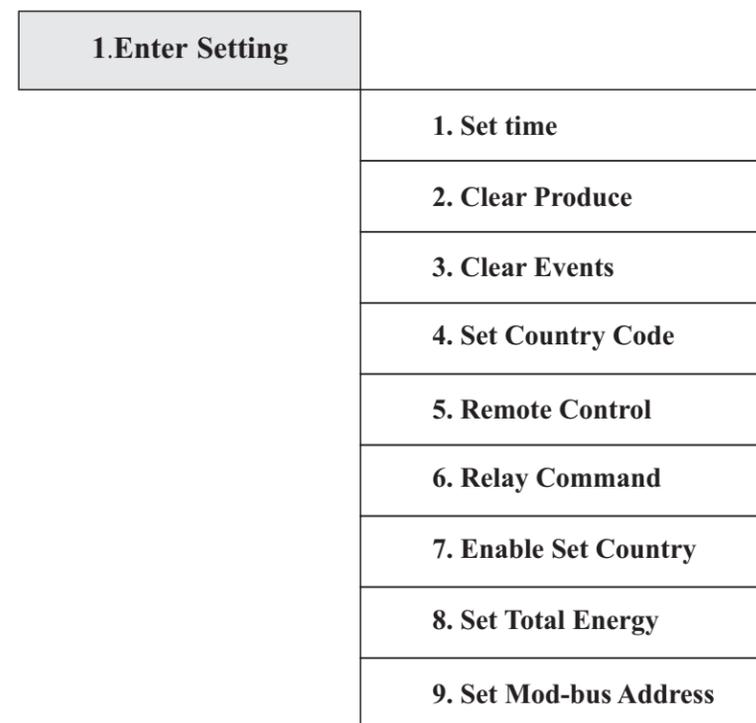
If this state is on, please restart the inverter, or call SOFARSOLAR.

6.3 Main Interface

Press "Back" button under standard interface to enter into main interface, including:



(A) "Enter Setting" Interface as below:



◆ **Set Time**

Users press "Back" button to enter "1.Enter Setting" interface, Press "OK" button to enter main setting interface. Enter "1. Set Time" by pressing"Up" button or "Down" button, then press"OK"button and start to set up time.

Time set from year, month, day, minutes, and seconds in turns, "Up" button or "Down"button to choose different value to set each date. Set each value is need to press "OK" button to confirm setting. "success" is displayed if the setting time is correct, "fail" means failure settings.

◆ **Clear Produce**

Users press "Back" button to enter "1.Enter Setting" interface, Press "OK" button to enter main setting interface. Then Enter "2.Clear Produce" by pressing "Up" button or "Down" button, press "OK" button and start to clear produce. "success" is displayed after settings.

◆ **Clear Events**

Users press "Back" button to enter "1.Enter Setting" interface, Press "OK" button to enter main setting interface.Enter "3. Clear Events" by pressing "Up" button or "Down" button. Press "OK" button and start to clear events. "success" is displayed after settings.

◆ **Set Country Code**

Users press “Back” button to enter “1.Enter setting” interface, Press OK button to enter main setting interface. Enter “4.Set Country Code” by pressing “Up” button Or “Down” button, press “OK” button and enter “Input Password” Setting interface. If it's shown "set disable" on the screen, then you can NOT choose the operating country, you should enable country setting through "7. Enable Set Country" interface. If it's shown "set Country code?" on the screen, then press Confirm button to start country setting. "Success" will be shown on the screen after a successful country setting.

Table6-1 country code setting

| code | country | code | country | code | country | code | country |
|------|----------------------|------|------------------|------|--------------|------|---------------|
| 00 | Germany VDE AR-N4105 | 05 | Denmark | 10 | China | 15 | Italy CEI0-16 |
| 01 | Italy CEI0-21 | 06 | Greece Continent | 11 | France | 16 | UK-G83 |
| 02 | Australia | 07 | Netherland | 12 | Poland | 17 | Greece island |
| 03 | Spain Rd1699 | 08 | Belgium | 13 | Germany BDEW | 18 | EU EN50438 |
| 04 | Turkey | 09 | UK-G59 | 14 | Germany 0126 | 19 | IEC EN61727 |

◆ **Remote Control**

Users press “Back” button to enter“1.Enter setting” interface, Press OK button to enter main setting interface. Enter “4. Remote Control” by pressing “Up” button or “Down” button. Press “OK” button and enter Remote Control Switch on & off interface. Choose “1.Enable”or “2.Disable” by pressing “Up” button or “Down” button, press “OK” button, then communication board start to transmit control signals to control board. “Success” is displayed after setting success; otherwise it will show “fail”.

◆ **Relay Command**

Users press “Back” button to enter “1.Enter setting” interface, Press “OK” button to enter main setting interface. Enter “5. Relay Command” by pressing “Up” button or “Down” button, press “OK ” button and enter “Relay Command setting “interface. Choose corresponded setting items by pressing “Up” button or “Down” button, then press “OK” button. “Success” or “fail” is displayed after setting.

| | |
|------------------------|------------------------------|
| 5.Relay Command | 1.Production |
| | 2.Alarm |
| | 3.Alarm (alarmconfig) |
| | 4.Relay Disable |

Relay Command Definition:

| | |
|----------------------------|--|
| Production | <p>the relay switches whenever a connection to (and therefore a disconnection from) the grid occurs.</p> <p>If the relay contractor is in normally open (close) mode, the contact will stay open (or closed) until the inverter is connected to the grid; once the inverter connects to the grid and starts to export power, the relay switches state and therefore closes (or opens).</p> <p>When the inverter disconnects from the grid, the relay contact returns to its position of rest, namely open (or closed).</p> |
| Alarm | <p>The relay switches whenever there is an alarm on the inverter (Error). No switching occurs when there is a Warning.</p> <p>If the relay contractor is in normally open(close)mode, the contact will stay open (or closed) until the inverter reports an error; once the inverter reports an error, the relay switches state and therefore closes (or opens).The contact remains switched from its rest condition until normal operation is restored.</p> |
| Alarm (alarmconfig) | <p>the relay switches whenever there is an alarm (Error) or a Warning, which have been previously selected by the user through the PC. the contact will stay open (or closed) until the inverter reports an error or a warning out of those selected from the menu; once the inverter displays an error or a warning out of those selected, the relay switches state and therefore closes (or opens) the contact. The relay remains switched from its rest condition until the alarm or warning has disappeared.</p> |
| Relay Disable | Control function is forbidden |

◆ **Enable Set Country**

Users press Back button to enter “1.Enter setting” interface, Press OK button to enter main setting interface. Enter “6.Enable Set Country” by pressing “Up” button Or “Down” button, press “OK” button and enter “Input Password” Setting interface. Press “Back” button to set passwords (default: 0001), increase or decrease value though pressing “Up” button or “Down” button, press “OK” button to next value setting. “Error!” Try again” will be displayed for wrong passwords. Press “Back” button and rekey in the correct passwords. “Success” will be displayed if setting successfully.

Attention: when inverter working for power generation over 24h, country setting is forbidden, it can only be set after LCD setting. Key in passwords for country setting through LCD (default: 0001), country setting can be set in 24h after keying in the correct passwords, over 24h, set through LCD again.

◆ **Set Total Energy**

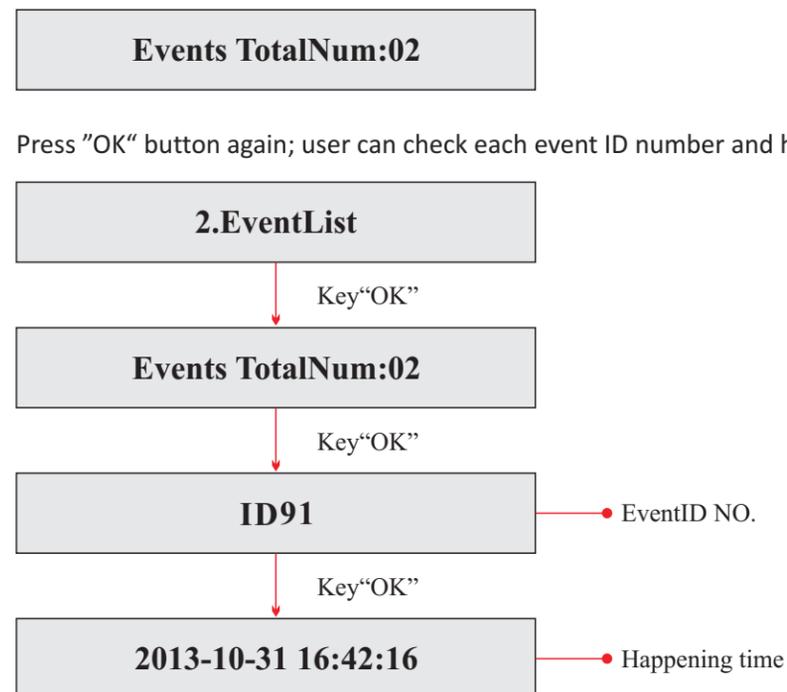
Users press Back button to enter “1.Enter setting” interface, Press OK button to enter main setting interface. Enter “7. Set Total Energy” by pressing “Up” button or “Down” button , then press “OK” button and enter “Input Password” Setting interface. Press “OK” button to set passwords (default: 0001), increase or decrease value though pressing “Up” button or “Down” button, press “OK” button to confirm the value and to next value setting. “Error! Try again” will be displayed for wrong passwords. Press “Back” button and rekey in the correct passwords then set total energy. “Success” or “fail” is displayed after setting.

◆ **Set mod-bus address**

Users press “Back” button to enter “1.Enter setting” interface, Press “OK” button to enter main setting interface. Enter “9. Set mod-bus address” by pressing “Up” button or “Down” button. Press “OK” button and enter setting interface. Choose corresponded setting items by pressing “Up” button or “Down” button, then press “OK” button. “Success” or “fail” is displayed after setting.

(B) “Event List” Interface as below:

Event List is used to display the real-time event records, including the total number of events and each specific ID No. and happening time. User can enter Event List interface through main interface to check details of real-time event records, Event will be listed by the happening time, and recent events will be listed in the front. Please refer to below picture: Users press “Back” button and “Down” button in standard interface, then enter into 2.EventList” interface.



(C) “SystemInfo” Interface as below:

| | |
|---------------------|------------------------|
| 3.SystemInfo | |
| | 1.Inverter Type |
| | 2.Serial Number |
| | 3.SoftVersion |
| | 4.HardVersion |
| | 5.Country |
| | 6.Relay Command |

◆ **Inverter Type**

Users press “Back” button and “Up” button or “Down” button enter “3. SystemInfo” interface, Press “OK” button to enter enter into system information checking interface,then press “Up” button or “Down” button enter into “1. Inverter Type”,then press “OK” button , the Inverter Type will be displayed.

◆ **Serial Number**

Users press “Back” button and “Up” button or “Down” button to enter “3. SystemInfo” interface, Press “OK” button to enter enter into system information checking interface,then press “Up” button or “Down” button enter into “2. Serial Number”,then press “OK” button ,the serial number will be displayed.

◆ **SoftVersion**

Users press “Back” button and “Up” button or “Down” button to enter “3. SystemInfo” interface, then Press “OK” button to enter enter into system information checking interface,then press “Up” button or “Down” button enter into “3. SoftVersion”,then press “OK” button , the SoftVersion will be displayed.

◆ **HardVersion**

Users press “Back” button and “Up” button or “Down” button to enter “3. SystemInfo” interface, then Press “OK” button to enter enter into system information checking interface,then press “Up” button or “Down” button enter into “4. HardVersion”,then press “OK” button , the HardVersion will be displayed.

◆ **Country**

Users press “Back” button and “Up” button or “Down” button to enter “3. SystemInfo” interface, then Press “OK” button to enter enter into system information checking interface,then press “Up” button or “Down” button enter into “5. Country”,then press “OK” button , the Country will be displayed.

◆ **Relay Command**

Users press “Back” button and “Up” button or “Down” button to enter “3. SystemInfo” interface, then Press “OK” button to enter into system information checking interface, then press “Up” button or “Down” button enter into “6. Relay Command”, then press “OK” button, the Relay Command will be displayed.

(D) Display Time

Press the “Back” button and “Up” button or “Down” key in the standard user interface to enter into “4. Display Time”, then press “OK” button to display the current system time.

(E) Software Update

Press the “Back” button and “Up” button or “Down” button in the standard user interface to enter into “5. Software Update”, then press “OK” button to enter into the “input password” interface, now press the “OK” button to input the password (initial passwords is 0001), Press the “Up” and “Down” button to change the value, then press “OK” button to confirm the current value of input and enter the next set of value. When set over, if the password is wrong, the LCD will display “Error! Try again”, at this time, you should re-enter your password. If the password is correct, then begin the update process.

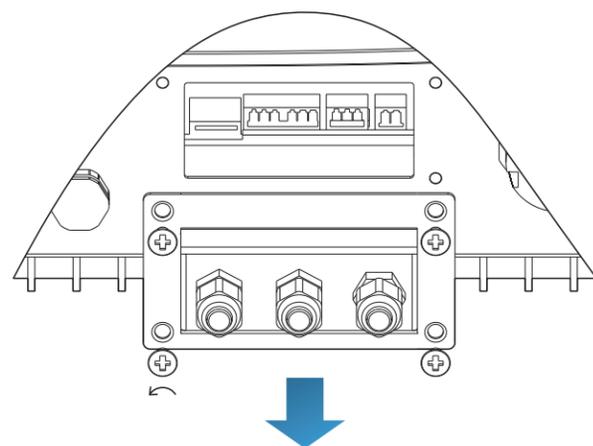
6.4 Update Software online

Sunny Dog series inverters offer software upgrade via SD card to maximize inverter performance and avoid inverter operation error caused by software bugs.

Procedure:

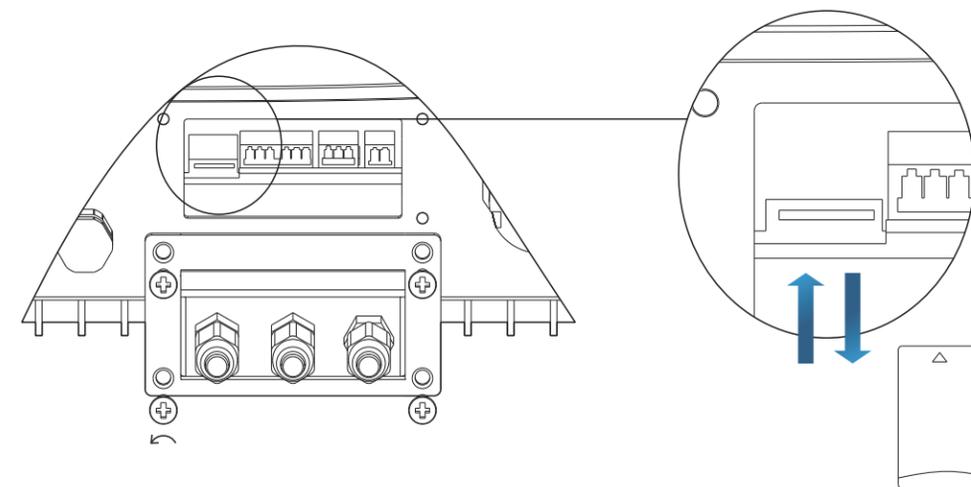
Step 1 first, turn off the DC and AC breaker, and then remove the communication waterproof cover as the following picture. If the communication lines (RS485, Relays, I/O) has been connected, Be sure to release the waterproof nut, Make sure the communication line is no longer the force. Then remove the waterproof cover, In order to avoid loosening the communication plug which has been connected.

Figure 6-1



Step 2 Remove the waterproof cover, Press SD card inside in the position marked SD card. Then the SD card will automatically pop up.

Figure 6-2



Step 3 The SD card reader must be ready by the users, so that SD card so easy to establish the connection with the computer.

Step 4 SOFAR SOLAR will send the Software code to the user who needs to update. After user receive the file, please decompressing file and cover the original file in SD card.

Step 5 Insert the SD card into the SD card slot, there will be a faint clicking sound typically, indicating that has stuck.

Step 6 Then turn on DC switch and enter into the online upgrade to the main menu “5. Software Update” in the LCD display program [6.3(E)]. The method to enter the menu can refer to operation interface of LCD.

Step 7 Input the password, if password is correct, and then begin the update process, the original password is 0001.

Step 8 System update main DSP、slave DSP and ARM in turns. If main DSP update success, the LCD will display “Update DSP1 Success”, otherwise display “Update DSP1 Fail”; If slave DSP update success, the LCD will display “Update DSP2 Success”, otherwise display “Update DSP2 Fail”

Step 9 If Fail, please turn off the DC breaker, wait for the LCD screen extinguish, then turn on the DC breaker again, then Continue to update from step 6.

Step 10 After the update is completed, turn off the DC breaker, wait for the LCD screen extinguish, then recover the communication waterproof and then turn on the DC breaker and AC breaker again, the inverter will enters the running state.

Trouble shooting and maintenance

Outlines of this chapter

This topic describes how to perform daily maintenance and troubleshooting to ensure long term proper operation of the Sunny Dog series inverter.

7.1 Trouble shooting

This section contains information and procedures for solving possible problems with Sunny Dog series inverter.

☉ **In case of problem with inverter, check the following tips.**

- Check the warning fault messages or Fault codes on the inverter information panel. Record it before doing anything further.
- If inverter does not display any Fault, please check the following lists.
 - Is the inverter located in a clean, dry, adequately ventilated place?
 - Is the DC switch turned ON?
 - Are the cables adequately sized and short enough?
 - Are the input and output connections and wiring in good condition?
 - Are the configuration settings correct for the particular installation?
 - Are the display panel and the communications cable properly connected and undamaged?

Follow the steps below to view recorded problems:

Press “ESC” to enter the main menu in the normal interface. In the interface screen select “Event List”, then press “OK” to enter events.

☉ **EventList information**

Table 7-1 Eventlist

| EventList NO. | EventList Name | EventList description | solution |
|---------------|----------------|--------------------------------------|--|
| ID01 | GridOVP | The power grid voltage is too high | <ul style="list-style-type: none"> • If the alarm occurs occasionally, the possible cause is that the electric grid is abnormal occasionally. SOFAR inverter automatically returns to normal operating status when the electric grid's back to normal. • If the alarm occurs frequently, check whether the grid voltage/frequency is within the acceptable range. If no, contact SOFAR technical support. If yes, check the AC circuit breaker and AC wiring of the SOFAR inverter. • If the grid voltage/frequency is within the acceptable range and AC wiring is correct, while the alarm occurs repeatedly, contact SOFAR technical support to change the grid over-voltage, under-voltage, over-frequency, under-frequency protection points after obtaining approval from the local electrical grid operator. |
| ID02 | GridUVP | The power grid voltage is too low | |
| ID03 | GridOFP | The power grid frequency is too high | |
| ID04 | GridUFP | The power grid frequency is too low | |

| | | | |
|------|-----------------------|---|--|
| ID09 | PvOVP | The input voltage is too high | Check whether too many PV modules are series connected in a PV string, thus the voltage(Voc) of the PV string is higher than the maximum input voltage of SOFAR inverter. If yes, adjust the number of series connected PV modules to decrease the voltage of the PV string to fit the input voltage range of SOFAR inverter. SOFAR inverter automatically returns to normal operating status after correct adjustments. |
| ID12 | GFCIFault | GFCI Fault | <ul style="list-style-type: none"> • Please turn off AC and DC break, • Check the surrounding equipment on the AC side. |
| ID14 | HwBoostOCP | The input current is too high, and has happened hardware protection | Check whether the input current is higher than the maximum input current of SOFAR inverters, then check the input wiring, if both are correct, please contact SOFAR technical support. |
| ID15 | HwAcOCP | The grid current is too high, and has happened hardware protection | ID15-ID22 are internal faults of SOFAR inverter, turn OFF the “DC switch”, wait for 5 minutes, then turn ON the “DC switch”. Check whether the fault is rectified. If no, please contact SOFAR technical support. |
| ID16 | AcRmsOCP | The grid current is too high | |
| ID20 | GFCIDeviceFault | The GFCI sampling error | |
| ID22 | HwAuxPowerFault | The auxiliary voltage error | |
| ID26 | BusOVP | The bus voltage is too high | ID26 are internal faults of SOFAR inverter, turn OFF the “DC switch”, wait for 5 minutes, then turn ON the “DC switch”. Check whether the fault is rectified. If no, please contact SOFAR technical support. |
| ID28 | DciOCP | The Dci is too high | Turn OFF the “DC switch”, wait for 5 minutes, then turn ON the “DC switch”. Check whether the fault is rectified. If no, please contact SOFAR technical support. |
| ID29 | SwOCPInstant | The grid current is too high | Internal faults of SOFAR inverter, turn OFF the “DC switch”, wait for 5 minutes, then turn ON the “DC switch”. Check whether the fault is rectified. If no, please contact SOFAR technical support. |
| ID30 | SwBOCPInstant | The input current is too high | Check whether the input current is higher than the maximum input current of SOFAR inverters, then check the input wiring, if both are correct, please contact SOFAR technical support. |
| ID49 | ConsistentFault_VGrid | The grid voltage sampling value is not consistent | ID49-ID55 are internal faults of SOFAR inverter, turn OFF the “DC switch”, wait for 5 minutes, then turn ON the “DC switch”. Check whether the fault is rectified. If no, please contact SOFAR technical support. |
| ID50 | ConsistentFault_FGrid | The grid frequency sampling value is not consistent | |
| ID51 | ConsistentFault_DCI | The DCI sampling value is not consistent | |
| ID52 | ConsistentFault_GFCI | The GFCI sampling value is not consistent | |
| ID53 | SpiCommLose | The spi communication is fault | |
| ID54 | SciCommLose | The Sci communication is fault | |
| ID55 | RelayTestFail | The relays fault | |
| ID56 | PvIsoFault | The insulation resistance is too low | |

| | | | |
|-------------|----------------------------------|--|--|
| ID58 | OverTempFault_Boost | The Boost temp is too high | <ul style="list-style-type: none"> Ensure the installation position and installation method meet the requirements of Section 3.4 of this user manual. Check whether the ambient temperature of the installation position exceeds the upper limit. If yes, improve ventilation to decrease the temperature. |
| ID59 | OverTempFault_Env | The environment temp is too high | |
| ID65 | UnrecoverHwAcOCP | The grid current is too high, and has cause unrecoverable hardware fault | |
| ID66 | UnrecoverBusOVP | The bus voltage is too high | |
| ID70 | UnrecoverOCPIstant | The grid current is too high | |
| ID74 | UnrecoverIPVInstant | The input current is too high | ID74-ID77 are internal faults of SOFAR inverter, turn OFF the “DC switch”, wait for 5 minutes, then turn ON the “DC switch”. Check whether the fault is rectified. If no, please contact SOFAR technical support. |
| ID75 | UnrecoverWRITEEEPROM | The EEPROM is unrecoverable | |
| ID76 | UnrecoverREADEEPROM | The EEPROM is unrecoverable | |
| ID77 | UnrecoverRelayFail | Relay has happen permanent fault | |
| ID81 | OverTempDerating | the inverter has derated because of the temperature is too high | <ul style="list-style-type: none"> Ensure the installation position and installation method meet the requirements of Section 3.4 of this user manual. Check whether the ambient temperature of the installation position exceeds the upper limit. If yes, improve ventilation to decrease the temperature. |
| ID82 | OverFreqDerating | the inverter has derated because of the grid frequency too high | |
| ID95 | Communication board EEPROM fault | Communication board EEPROM fault | ID95-ID96 are internal faults of SOFAR inverter, turn OFF the “DC switch”, wait for 5 minutes, and then turn ON the “DC switch”. Check whether the fault is rectified. If no, please contact SOFAR technical support. |
| ID96 | RTC clock chip anomaly | RTC clock chip anomaly | |
| ID98 | SD fault | The SD card is fault | |
| | | | Please replace the SD card. |

7.2 Maintenance

Inverters generally do not need any daily or routine maintenance. Cooling fan should not be blocked by dust or any other items.

☉ Inverter cleaning

Please use hand blower, soft dry cloth or brush to clean inverters. Water, corrosive chemical substances or intense cleaning agent should not be used for cleaning the cooling fan or inverter. Switch off AC and DC power supply to inverter before undertaking any cleaning activity.

☉ Cooling fin cleaning

For the long-term proper operation of SOFAR inverters, ensure there is enough space around the heat sink for ventilation, check the heat sink for blockage (dust, snow, etc.) and clean them if they exist. Please clean the heat sink with an air blower, a dry & soft cloth or a soft bristle brush. Do NOT clean the heat sink with water, corrosive chemicals, detergent, etc.

8 Technical data

Outlines of this chapter

This topic lists the technical specifications for all Sunny Dog series inverters.

8.1 Input parameter (DC)

| Parameter | SOFAR 1100TL | SOFAR 1600TL | SOFAR 2200TL | SOFAR 2700TL | SOFAR 3000TL |
|--|--------------|--------------|--------------|--------------|--------------|
| Max. input power[W] | 1100 | 1600 | 2200 | 2700 | 3000 |
| Max. input DC voltage [V] | 450 | 450 | 500 | 500 | 500 |
| Start-up input voltage [V] | 80 | | | | |
| Stop working voltage [V] | 40 | | | | |
| Operating input voltage Range [V] | 90-400 | | 100-480 | | |
| MPPT voltage [V] | 110-380 | 165-380 | 170-450 | 210-450 | 230-450 |
| Max. input MPPT current[A] | 10 | 10 | 13 | 13 | 13 |
| Input short circuit current for each MPPT[A] | 12 | 12 | 15 | 15 | 15 |
| Number of DC input | 1/1 | | | | |

8.2 Output parameter (AC)

| Parameter | SOFAR 1100TL | SOFAR 1600TL | SOFAR 2200TL | SOFAR 2700TL | SOFAR 3000TL |
|-------------------------------|--|--------------|--------------|--------------|--------------|
| Rated power[VA] | 1000 | 1500 | 2000 | 2500 | 2800 |
| Max. AC power[VA] | 1000 | 1500 | 2000 | 2500 | 2800 |
| Active power adjustable range | 0%~100% | | | | |
| MPPT voltage [V] | 4.5 | 7 | 9.5 | 11.5 | 13 |
| Rated Grid voltage [V] | 230/one-phase | | | | |
| Grid voltage range[V] | 180~270 (adjustable, must meet local grid requirements) | | | | |
| Rated Grid frequency [Hz] | 50/60 | | | | |
| Grid frequency range[Hz] | 44~55 /54~66 (adjustable, must meet local grid requirements) | | | | |
| THD | <3%(full load at nominal voltage) | | | | |
| Power factor | 1 | | | | |

8.3 Efficiency, Safety and Protection

| Parameter | SOFAR 1100TL | SOFAR 1600TL | SOFAR 2200TL | SOFAR 2700TL | SOFAR 3000TL |
|---|---|--------------|--------------|--------------|--------------|
| Max efficiency | 97.0% | 97.0% | 97.0% | 97.1% | 97.1% |
| Weighted eff. (EU) | 96.0% | 96.0% | 96.0% | 96.2% | 96.3% |
| MPPT efficiency | >99.5% | | | | |
| Self-consumption at night | <1w | | | | |
| Safety protection | Anti islanding, RCMU, Ground fault monitoring | | | | |
| Certification | AS4777,VDE0126-1-1,G83/2,C10/11,RD1699, UTEC15-712-1,EN50438,VDE-AR-N4105 | | | | |
| Protective class | Class I | | | | |
| External environment pollution degree | Degree 3 | | | | |
| Overvoltage category | PV: OVC II, AC mains: OVC III | | | | |
| Max inverter Back-feed current to the array | 0A | | | | |
| Output short circuit current and duration | 200A/1us | | | | |
| Output inrush current and duration | 0.8A/2us | | | | |

8.4 General Data

| Parameter | SOFAR 1100TL | SOFAR 1600TL | SOFAR 2200TL | SOFAR 2700TL | SOFAR 3000TL |
|---------------------------|---|--------------|--------------|--------------|--------------|
| Topology | Transformer-less | | | | |
| DC switch | Optional | | | | |
| Communication | RS 485, Wi-Fi (option), Multi-function relay, I/O | | | | |
| Cooling | Nature | | | | |
| Ambient temperature range | -25 ~ +60°C | | | | |
| Relative humidity | 0~100% | | | | |
| Altitude | 2000m | | | | |
| Noise | <35db @ 1 m | | | | |
| Degree of Protection | IP65 | | | | |
| Dimension | 405*314*135mm | | | | |
| Weight | 11kg | 11kg | 11kg | 12kg | 12kg |
| Warranty | 5 years | | | | |

9) Sofar SolarMAN Quick_Setup Manual (Wi-Fi Optional)

Outlines of this chapter

This quick guide is intended to assist users in quick configuration and start of Embedded Wi-Fi module.

9.1 Network setting

Note

The setting hereinafter is operated with Windows7 for reference only. If other operating systems are used, please follow the corresponding procedures.

1. Prepare a computer or device, e.g. tablet PC and smart phone that enables Wi-Fi.
2. Obtain an IP address automatically.

Procedure:

Step1: Click on ;

Step2: Connect with your personal internet access point (AP) or WLAN.

Example: "sofarpv" in this case. See Figure 9-1

Step3: Right click on your connected AP, click on Status > Properties to open the wireless network property setup window. See Figure 9-2

Figure 9-1

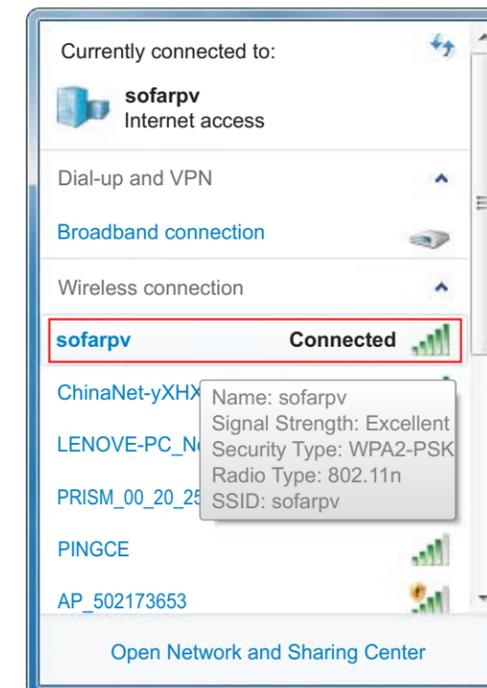
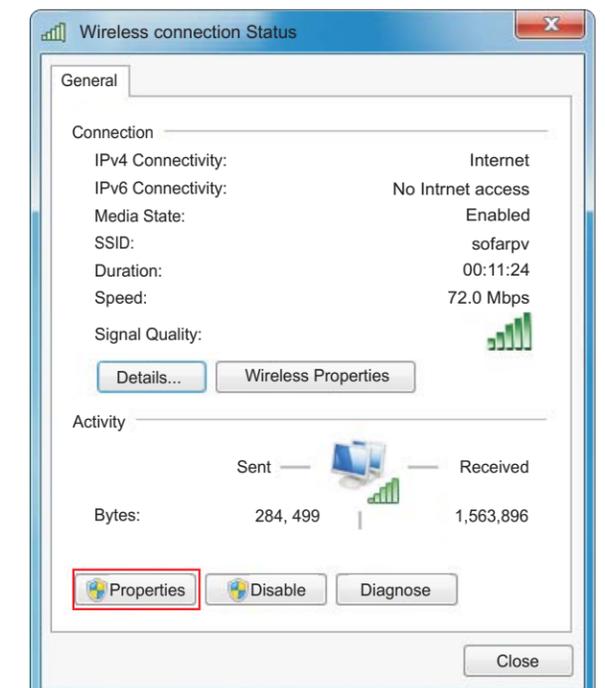


Figure 9-2



Setp4: Double click on internet Protocol Version 4 (TCP/IPv4). Click on General > Obtain an IP address automatically > OK to finish the setup. See Figure 9-3, 9-4:

Figure 9-3

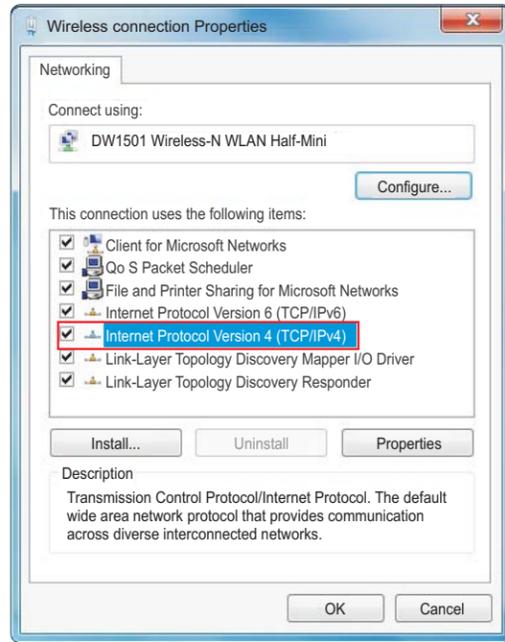
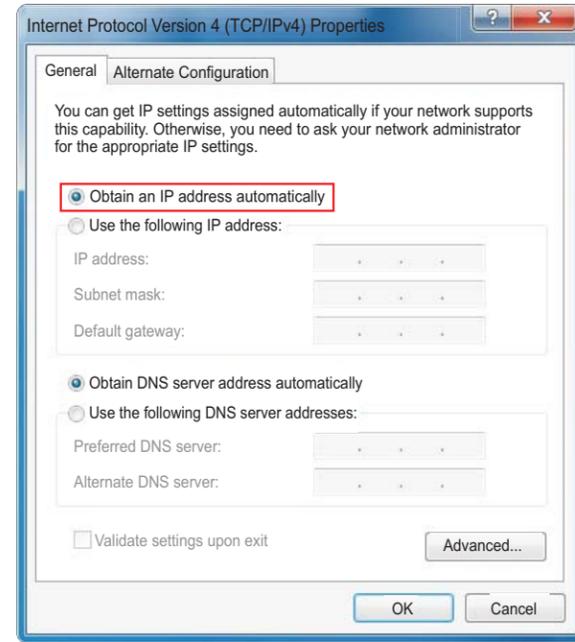


Figure 9-4



3. SOFAR inverter Wi-Fi module setup

Procedure:

Setp1: Click on ;

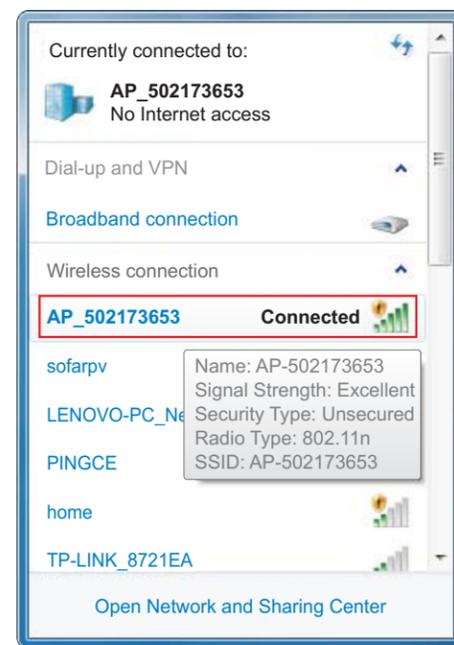
Setp2: Connect with SOFAR inverter Wi-Fi module, defaulted with no password and its name started as AP_ and a following 9-digit Wi-Fi serial number. See Figure 9-5, 9-6.

Example: AP_50217365

Figure 9-5

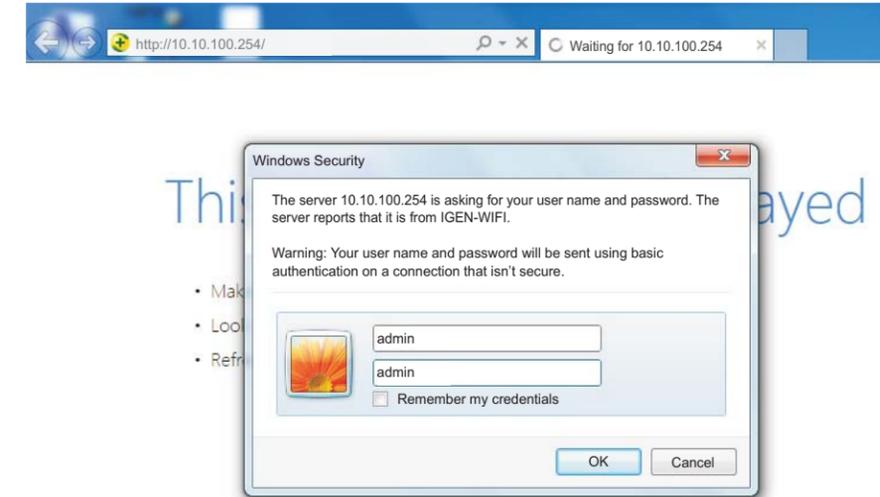


Figure 9-6



Setp3: When connected, open browser, head to <http://10.10.100.254/>, and fill in user name and password which all defaulted as admin for the first time. See Figure 9-7

Figure 9-7



Note

Browsers like internet Explorer 8+, chrome 15+ and Firefox 10+ are recommended.

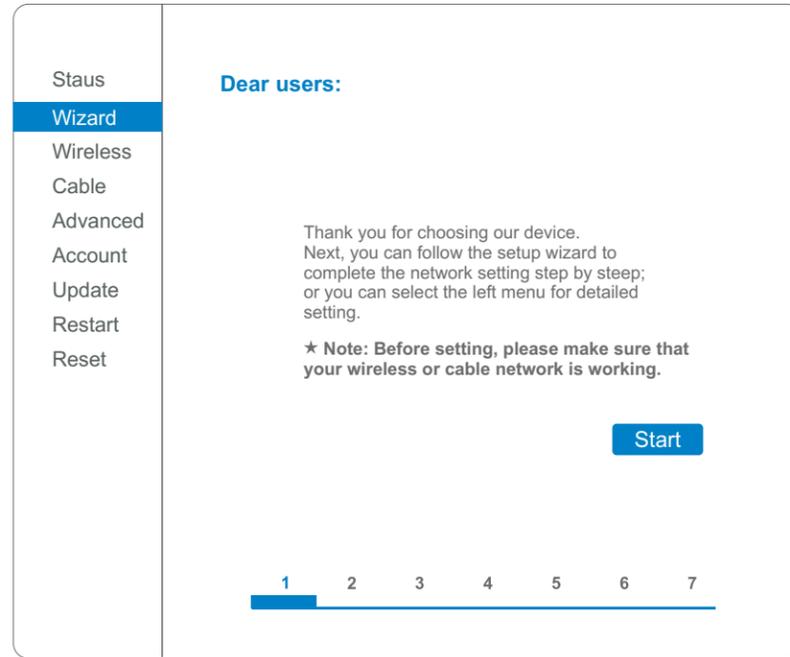
Setp4: When successfully logged in, users can find basic information on their inverter Wi-Fi module.

Figure 9-8

| Status | Device information | |
|----------|----------------------|---------------------------------------|
| Wizard | Device serial number | 502173653 |
| Wireless | Firmware version | H4.01.43Y4.0.01W1.0.13(2014-07-161-S) |
| Cable | Wireless SP mode | Enable |
| Advanced | SSID | AP_502173653 |
| Account | IP address | 10.10.100.254 |
| Update | MAC address | 00:95:69:1A:33:30 |
| Restart | Wireless STA mode | Enable |
| Reset | Router SSID | sofarsolar |
| | Signal Quality | 0% |
| | IP address | 0.0.0.0 |
| | MAC address | 00:95:69:1A:33:31 |
| | Cable mode | Enable |
| | IP address | 0.0.0.0 |
| | MAC address | 00:95:69:1A:33:31 |
| | Connected Inverter | |

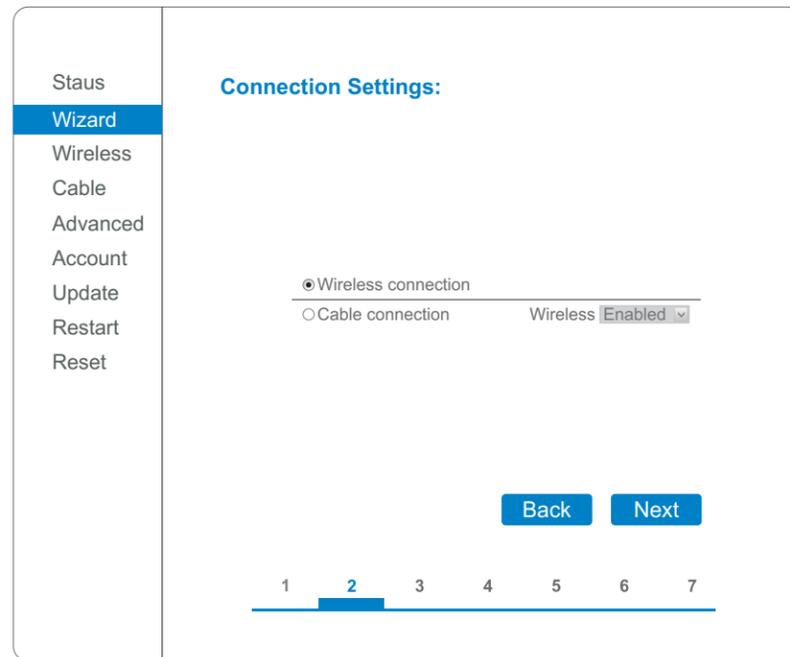
Setp5: Please click on Wizard > Start to start the detailed setup on your inverter Wi-Fi module.

Figure 9-9



Setp6: Select Wireless connection, and click Next.

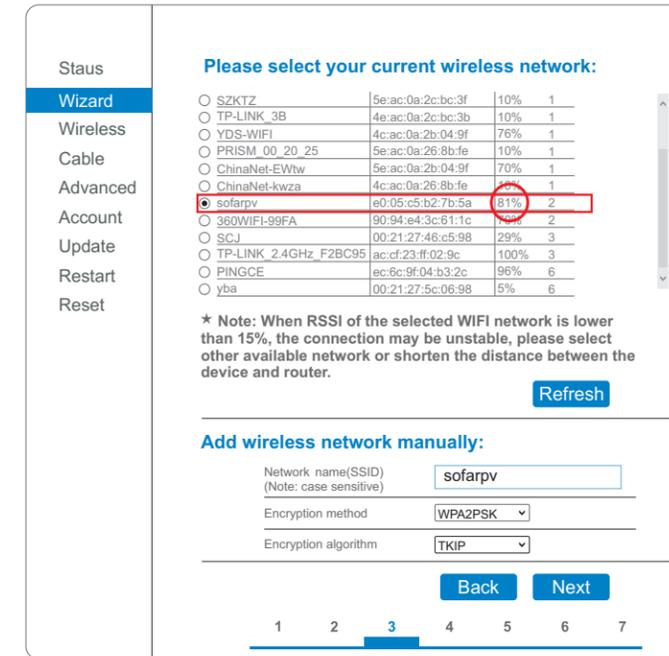
Figure 9-10



Note If the signal strength (RSSI) of your selected internet access point (AP) is lower than 15%, the connection may be unstable, please select other available network or shorten the distance between the device and the router, or reference section 4.6 Figure 4-28.

Setp7: Select your personal wireless network. This can be done by refreshing your wireless network or add it manually. See Figure 9-11

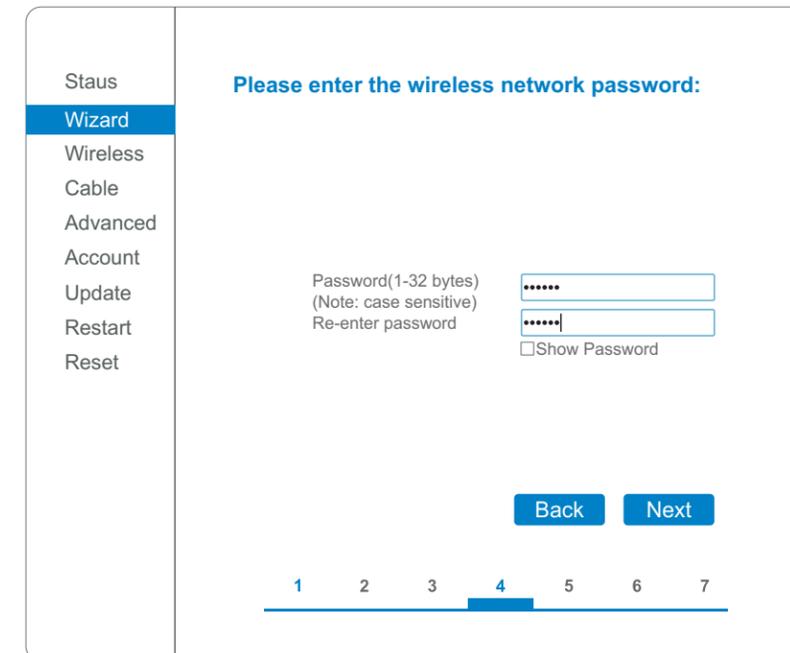
Figure 9-11



Note If you choose to add your wireless network manually, please keep encryption method and encryption algorithm the same as your home router's setup.

Setp8: Please enter your personal wireless network password. Then click Next.

Figure 9-12



Setp9: Select Enable > Next to obtain IP address automatically.

Figure 9-13

Staus

Wizard

Wireless

Cable

Advanced

Account

Update

Restart

Reset

Please fill in the following information:

Obtain an IP address automatically:

IP address:

Subnet mask:

Gateway address:

DNS server address:

Back Next

1 2 3 4 5 6 7

Setp10: Click Next.

Figure 9-14

Staus

Wizard

Wireless

Cable

Advanced

Account

Update

Restart

Reset

Enhance Security

You can enhance your system security by choosing the following methods

Hide AP

Change the encryption mode for AP

Change the user name and password for Web server

Back Next

1 2 3 4 5 6 7

Setp11: Click OK to wait for setting complete.

Figure 9-15

Staus

Wizard

Wireless

Cable

Advanced

Account

Update

Restart

Reset

Setting complete!

Click OK, the settings will take effect and the system will restart immediately.

If you leave this interface without clicking OK, the settings will be ineffective.

Back OK

1 2 3 4 5 6 7

Figure 9-16

Staus

Wizard

Wireless

Cable

Advanced

Account

Update

Restart

Reset

Setting complete! Please close this page manually!

Please login our management portal to monitor and manage your PV system.(Please register an account if you do not have one.)

Re-login the configuration interface, please make sure that your computer or smart phone and our device are in the same network segment, and enter the new IP address of the device to access the interface.

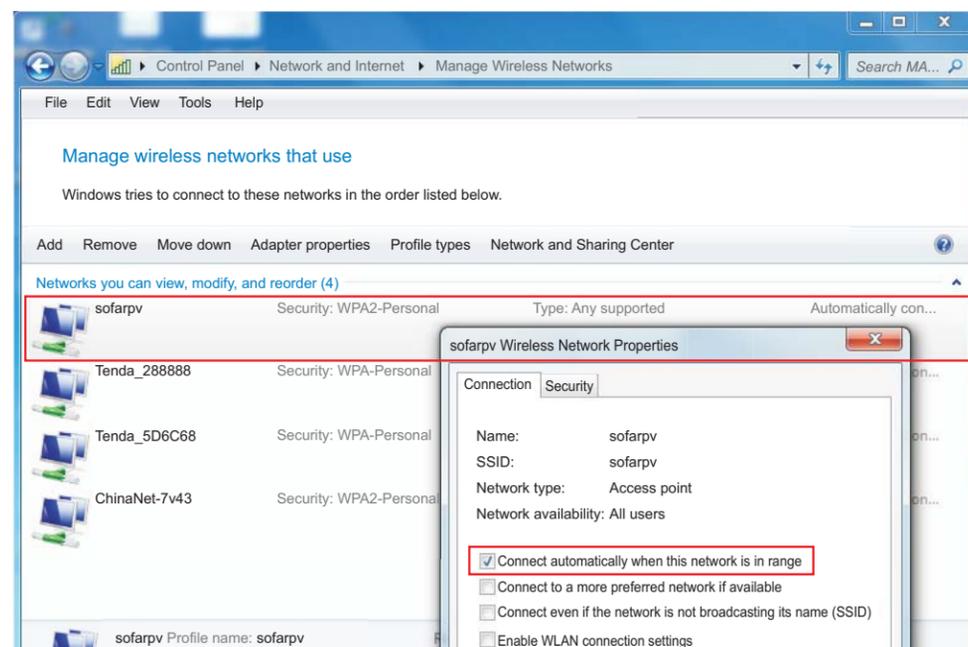
1 2 3 4 5 6 7

Setp12: Setup of wireless network connection priority and connection mode.

Open Control panel > Network and sharing center > Manage wireless networks. Set your home router's access point as default to connect with your personal computer automatically. Make sure it has the highest priority. To the device Wi-Fi module, set its AP as default to connect with your personal computer manually.

Example: make sure "sofarpv" wireless network connection priority is the highest.

Figure 9-17



Setp13: Connect with your personal wireless network or WLAN.

Figure 9-18



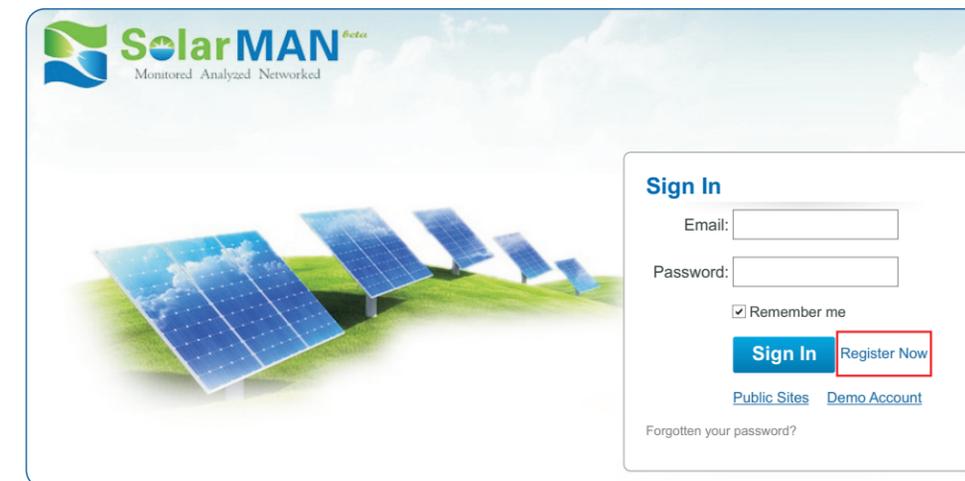
9.2 Register on SolarMAN Portal

Launch your browser, open SolarMAN portal website: <http://www.solarmanpv.com/portal/>

Procedure:

Step1: Click on Register now if you do not have an account.

Figure 9-19



Step2: Fill in basic registration information upon request.

Figure 9-20



Note

Browsers like internet Explorer 8+, chrome 15+ and Firefox 10+ are recommended.

Step3: Fill in details to complete the registration.

Figure 9-21

Step4: If registration is successful, the above page will display. Click OK to return to the homepage of the portal.

Figure 9-22



9.3 Log in SolarMAN Portal to manage power station

After successful registration, open the login page of SolarMAN Portal, and input your E-mail and password to access the monitoring system and start monitoring and management of power plants.

Figure 9-22



Note

In order to make sure your solar system is being well monitored by our SolarMAN monitoring system, please click the Real Time label to see if there is real time data within 15 minutes. If so, your SolarMAN network setup is successful. If not, please re-check the above procedure.

Figure 9-23

| No. | Inverter S/N | DC Input | | | AC Output | | | | Total Energy(kWh) | Temperatu |
|-----|--------------------|----------|------------|------------|-----------|------------|------------|----------|-------------------|-----------|
| | | Channel | Voltage(V) | Current(A) | Phase | Voltage(V) | Current(A) | Power(W) | | |
| 1 | SA1ES003E3Q 001 | PV1 | 352.2 | 1.2 | L1 | 227.6 | 1.8 | 420 | 717 | 45.0 |
| | | PV2 | 0.0 | 0.0 | L2 | 0.0 | 0.0 | 0 | | |

★ Add more inverters on SOFAR SolarMAN monitoring system

Click Setting > Device > Add to enter the 9-digit serial number (SN), and then click OK to complete the setting of adding a new inverter.

Figure 9-24

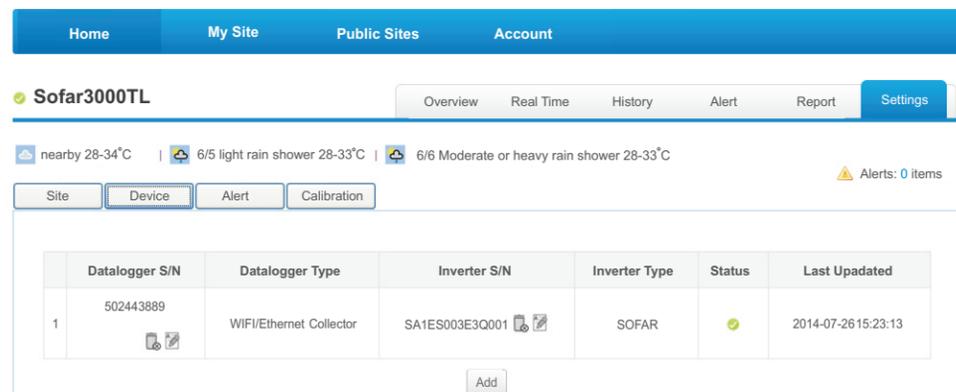
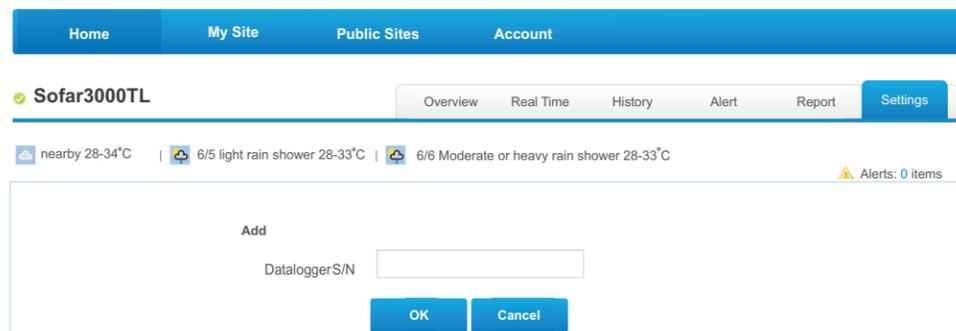


Figure 9-25

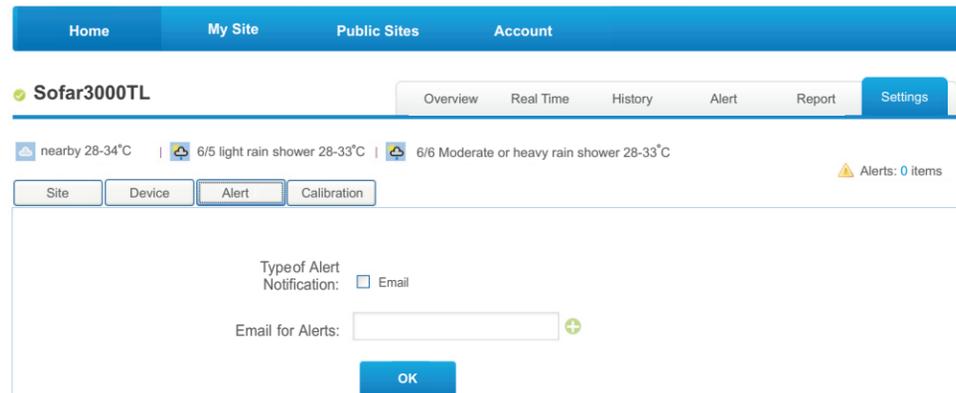


★ Alert notification setup

When any abnormal situation happened to the device, an error message would be sent automatically to your designated email account in second.

Please fill in below your personal email account to complete the setup of your alert notification.

Figure 9-26



10 Quality Assurance

Shenzhen SOFARSOLAR Co., Ltd offers 5 years product warranty for Sunny Dog series inverters from date of installation. However the warranty period can't exceed 66 months from the date of delivery of the inverter. During the warranty period, Shenzhen SOFARSOLAR Co., Ltd guarantees normal operation of the inverter. If during the warranty period, the inverter develops fault, please contact your installation contractor or supplier. In case of faults falling within manufacturers' responsibility, Shenzhen SOFARSOLAR Co., Ltd will provide service and maintenance free of any charge.

Disclaimer:

- Use of Sunny Dog series inverters for any other purpose than intended;
- Faulty system design or installation;
- Improper operation;
- Use wrong protection settings on the inverter;
- Carry out unauthorized modification on the inverter.
- Damage because of external factors or the majeure force (such as lightning, over-voltage, bad weather, fire, earthquake, tsunami etc);