User manual

PV Grid-Connected Inverter

Product Model: SOFAR 1.1K-3KTL (2018.03.16)

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.

Symbol	Description
⚠ 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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1 Basic safety information

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

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!
Warning	All installation accomplished only by professional electrical engineer! • 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!

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Operation

Danger

Touching the power grid or the terminal of equipment may lead to die of electric shock or fire!
- Don't touch the terminal or conductor which connect to the power circuit;
- Pay attention to anything about grid connection and security document.

Attention

Some internal components will be very hot when inverter is working. Please wear protective gloves!

Maintenance and repair

Danger

- **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!**

Attention

- **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.**

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.

Danger

Electromagnetic radiation from inverter may be harmful to health!
- Please do not continue to stay away from the inverter in less than 20 cm when inverter is working.

1.2 Symbols and signs

Safety symbols

Caution

Caution of burn injuries due to hot enclosure parts!
- During working only can touch the display and key parts of inverter.

Attention

PV array should be connected to the ground in accordance with requirements of local power department!
- To protect system and the personnel security, we suggest that PV array of border and inverter should be reliable grounding .

Warning

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!

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.
	Caution, risk of electric shock
	Caution, hot surface
	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
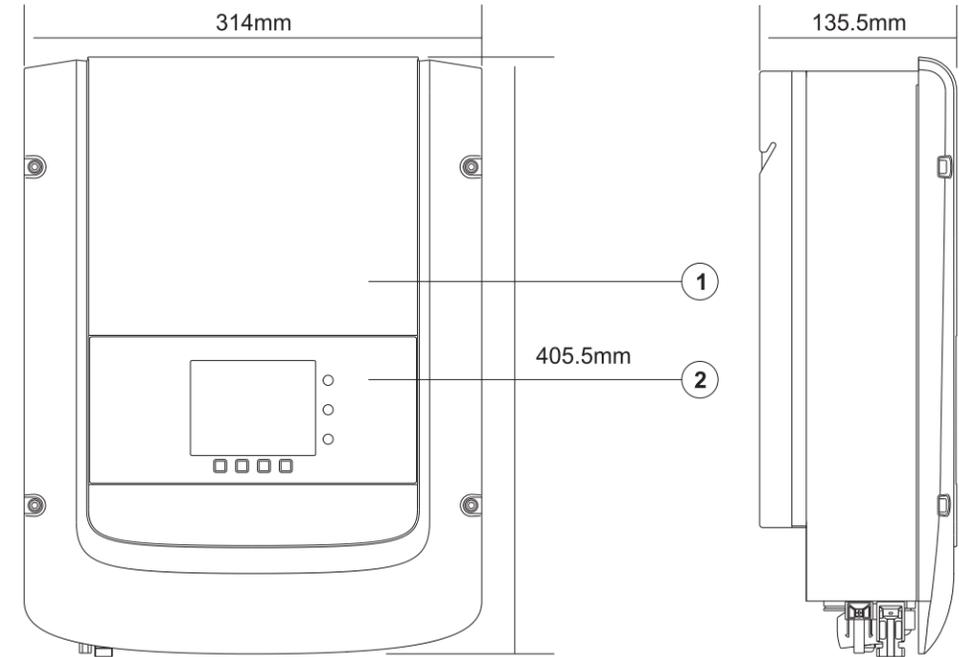
1. Cabinet   2. Human Interface board

Figure2-3 Back view and Bracket dimensions
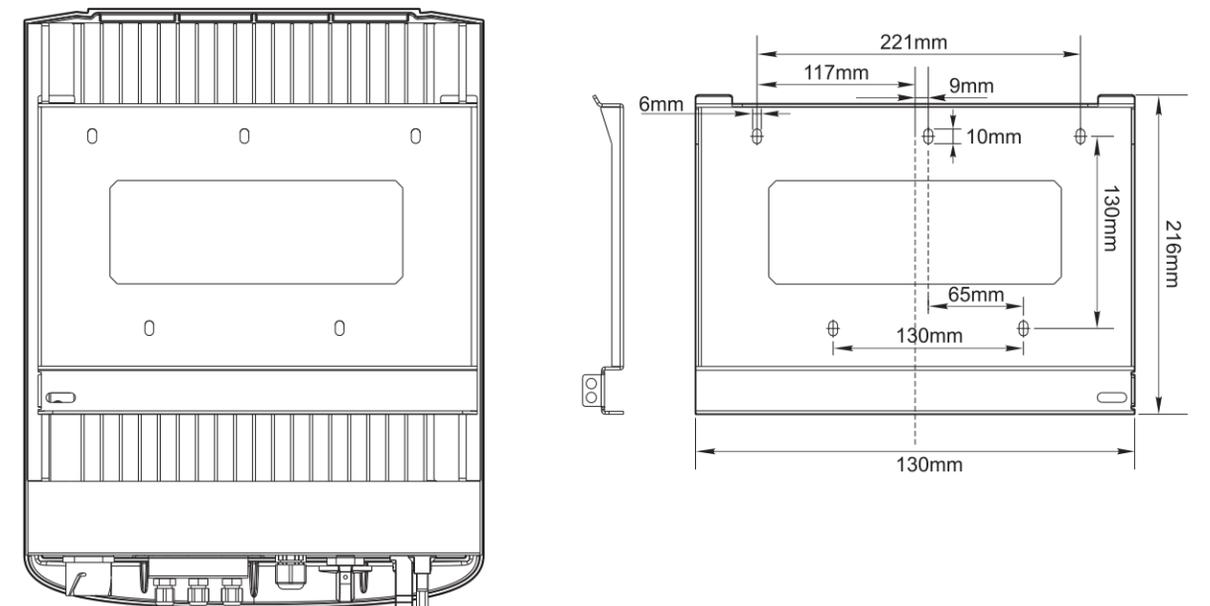
• Identification labels of the equipment：

SOFAR	PV Inverter
Model No.	SOFAR 1100TL
Vmax. DC input voltage	450V
DC input voltage range	90-400V
Imax. DC input current	10A
Isc(max.) DC current	12A
Nominal grid voltage	230V~
Nominal AC output current	4.5A
Nominal grid frequency	50Hz
Nominal output power	1000W
Power factor	1(adjustable+/-0.8)
Ingress protection	IP65
Operating temperature range	-25-+60℃
Protective class	Class I
Made in China	

Manufacturer: Shenzhen SOFARSOLAR Co., Ltd.
Address:5/F,Building 4,Antongda Industrial Park,NO.1,Liuxian Avenue,Xin'an Street,Bao'an District,Shenzhen City,Guangdong Province,P.R.China
SAA161894
VDE0126-1-1,VDE-AR-N-4105,G83/2,EN50438, C10/11,AS4777,RD1699,UTE C15-712-1

The labels must NOT be hidden with objects and extraneous parts (rags, boxes, equipment, etc.); they must be cleaned regularly and kept visible at all times.

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．**Energy management unit**

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

B．**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.

C．**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).

D．**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.

E．**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.

F．**Software update**

SD card is used for updating the firmware.

• **Electrical block diagram**

Figure2-4 Electrical block diagram
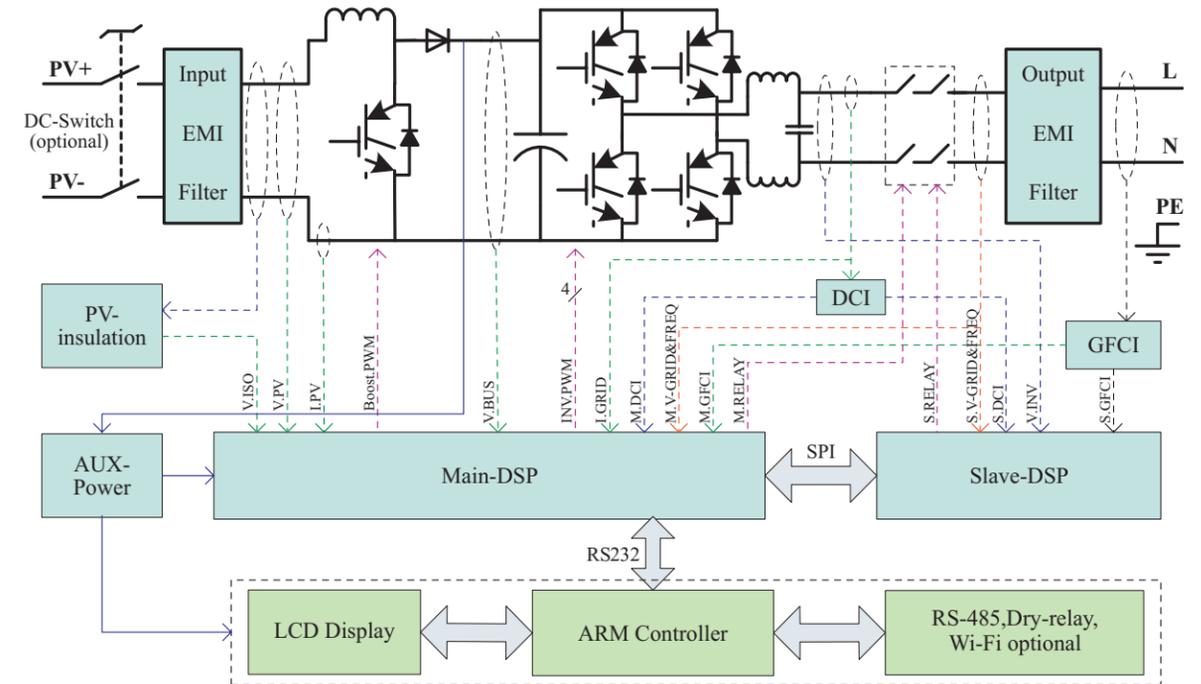
2.3 Efficiency curve

Efficiency curve of the SOFAR 3000TL
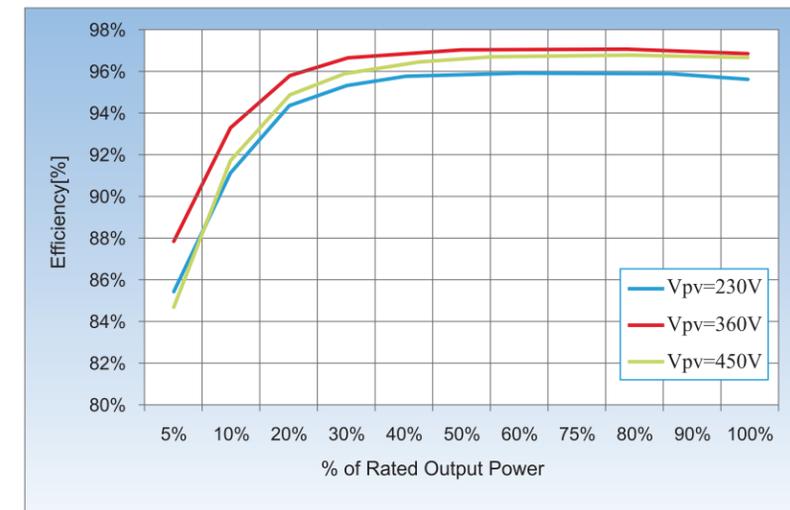
3 Installation

Outlines of this chapter

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

Installation notes

⚠ **Danger**	• 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**	• 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

Start → Check before installation → Prepare installation tools → Determine the installation position

↓

End ← Install the Inverter ← Install the rear panel ← Moving the Inverter
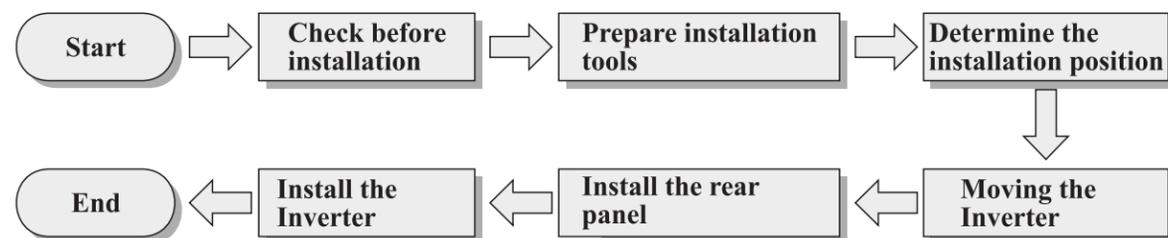
3.2 Checking Before Installation

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
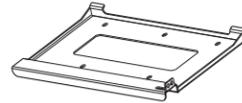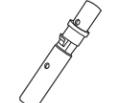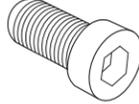
No.	Pictures	Description	Quantity
13		AC output terminal	1PCS
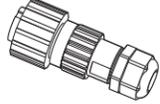
3.3 Tools

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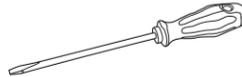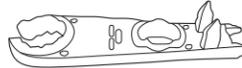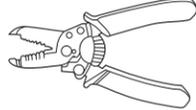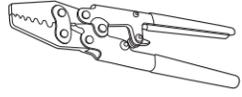
No.	Tool	Model	Function
7		Multi-meter	Used to check grounding
8		Marker	Used to mark signs
9		Measuring tape	Used to measure distances
10		Level	Used to ensure that the rear panel is properly installed
11		ESD gloves	Operators wear
12		Safety goggles	Operators wear
13		Anti-dust respirator	Operators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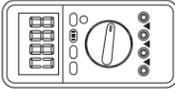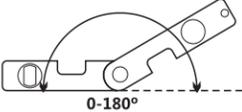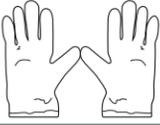
3.4 Determining the Installation Position

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
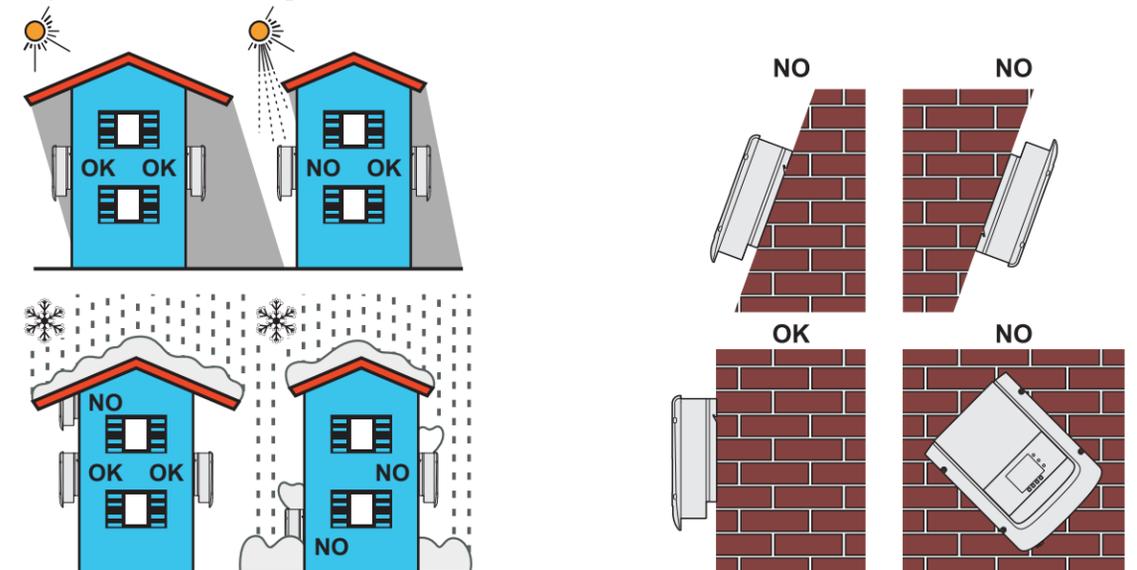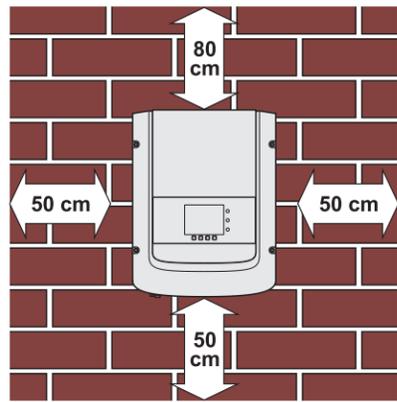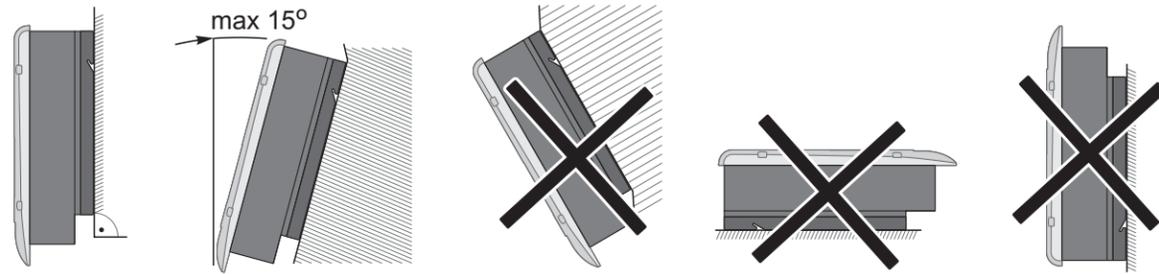
Minimum installation distance for single Sunny Dog series

Many single Sunny Dog series installation
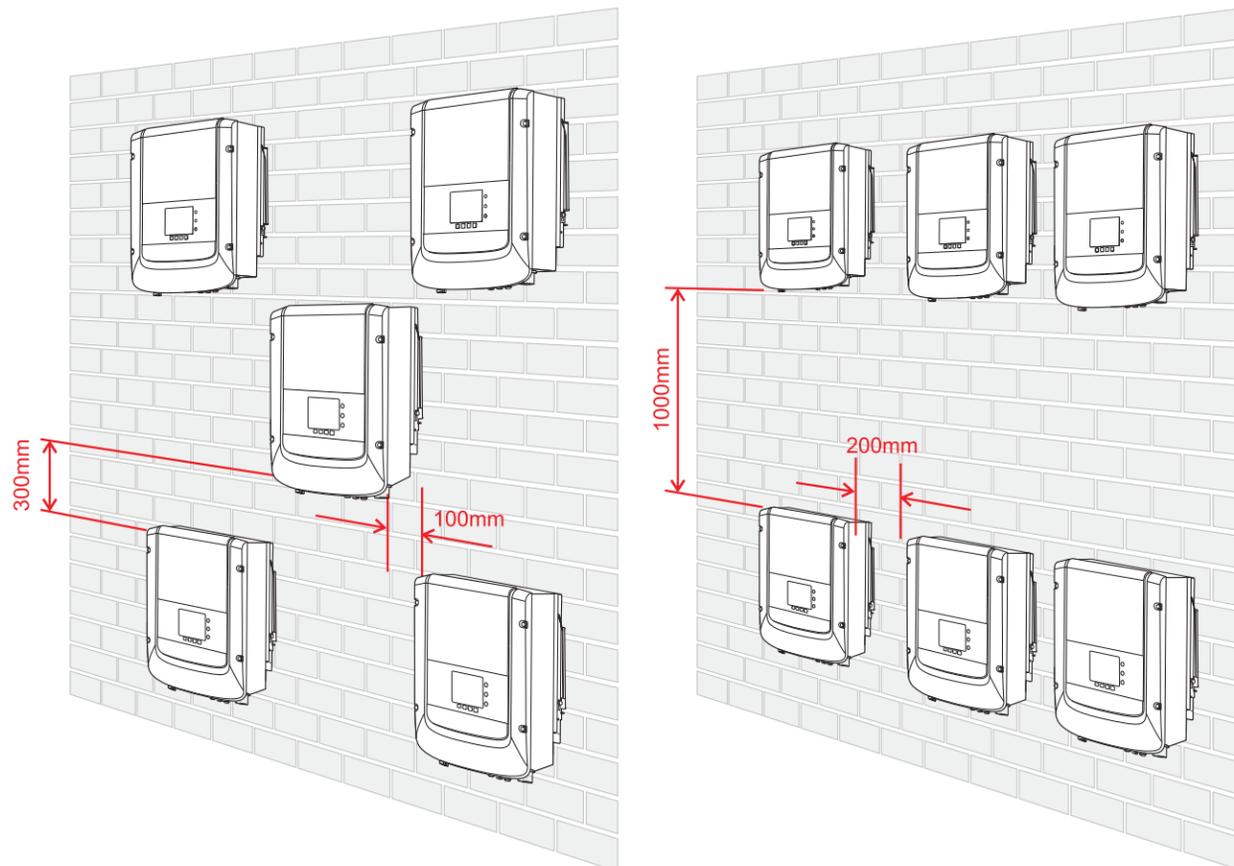
3.5 Moving the Sunny Dog series inverter

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)
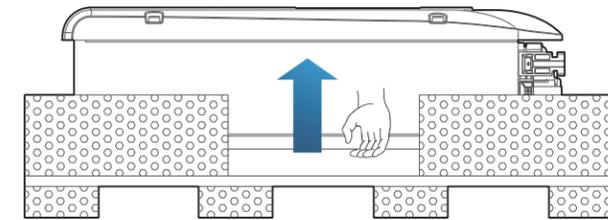
Figure 3-4 Moving the Sunny Dog series (2)
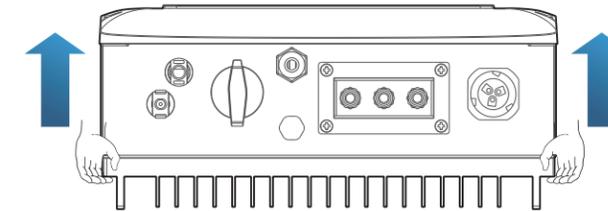
Step 2 Lift the Sunny Dog series from the packing case and move it to the installation position.

⚠	• To prevent device damag 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.
Attention	• When placing the Sunny Dog series on the floor, put foam or paper under the Sunny Dog series to protect its shell.

———— **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 1   Step 2   Step 3
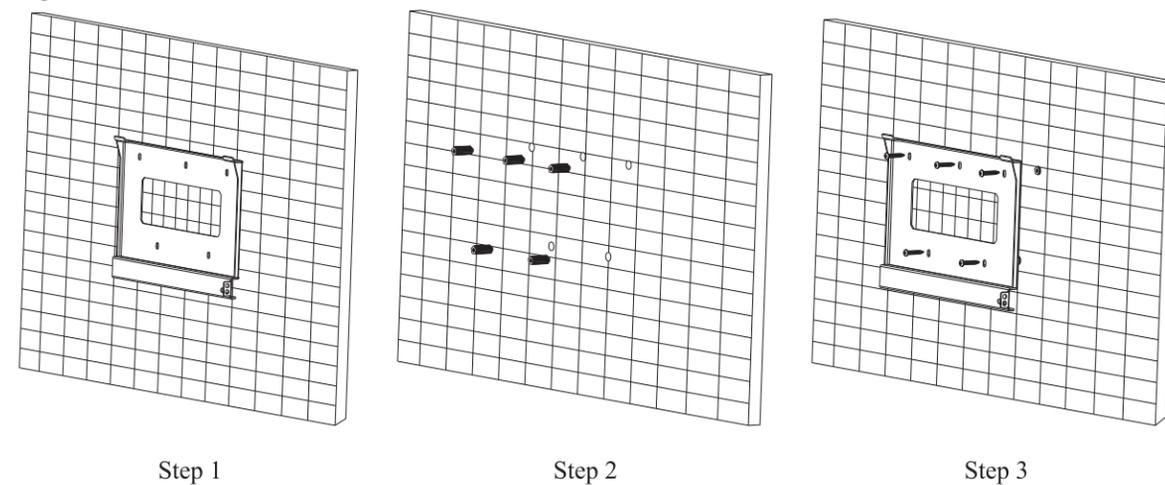
Step 4 putting the inverter hook on the rear panel. Using an M5 screw back and inverter bottom fastening, to ensure safety.

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

Step 4   Step 5
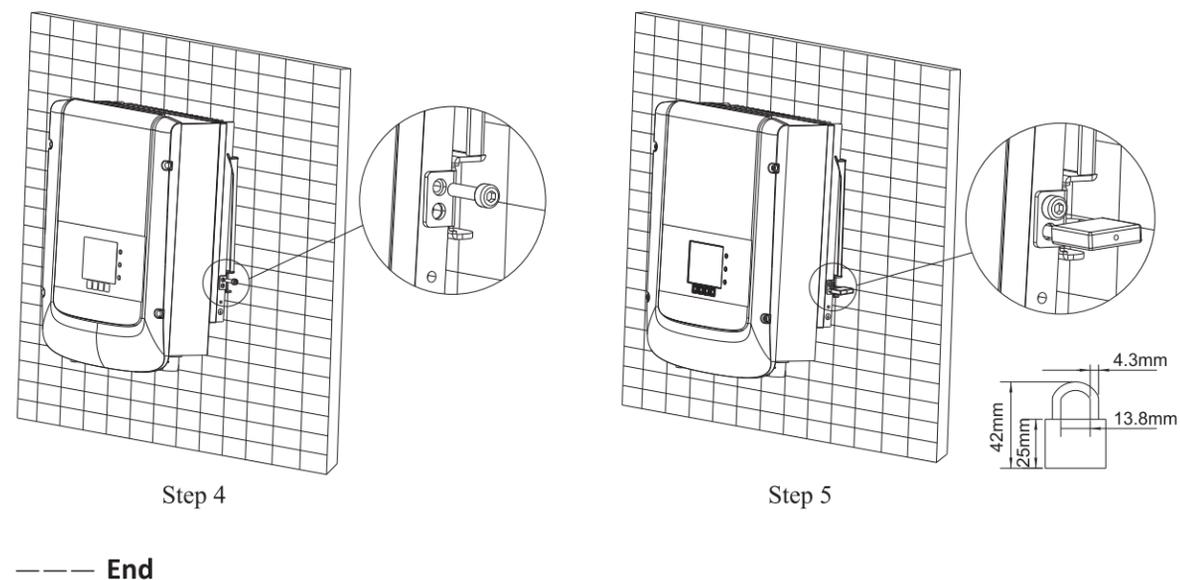
——— **End**

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**	• Open-circuit voltage of module arrays connected in series must be≤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
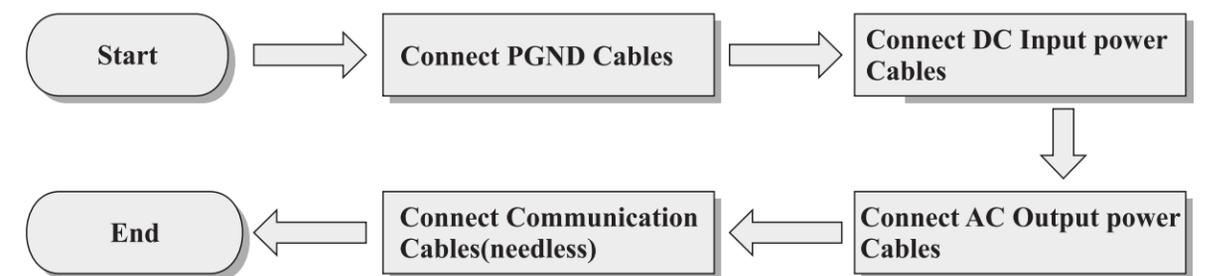
4.2 Connecting PGND Cables

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 (≥4mm² 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)

$L2=L1+(2-3)mm$

$L1$
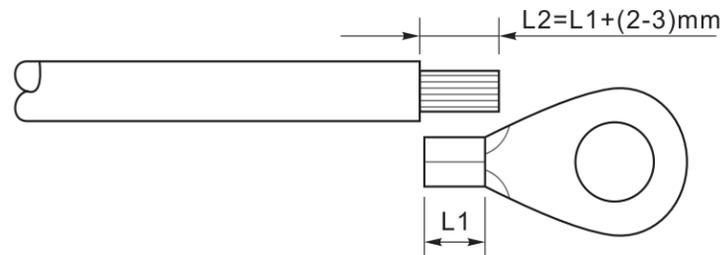
Note： L2 is 2 to 3mm longer than L1

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)

$L3<2mm$

$L4<1.5mm$
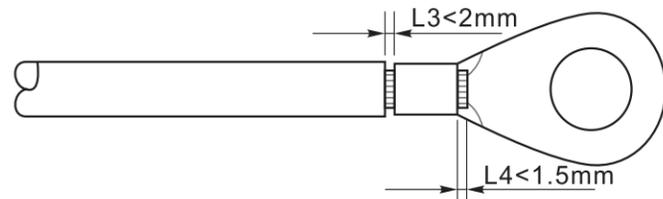
Note 1: L3 is the length between the insulation layer of the ground cable and the crimped part.L4 is the distance between the crimped part and core wires protruding from the crimped part.

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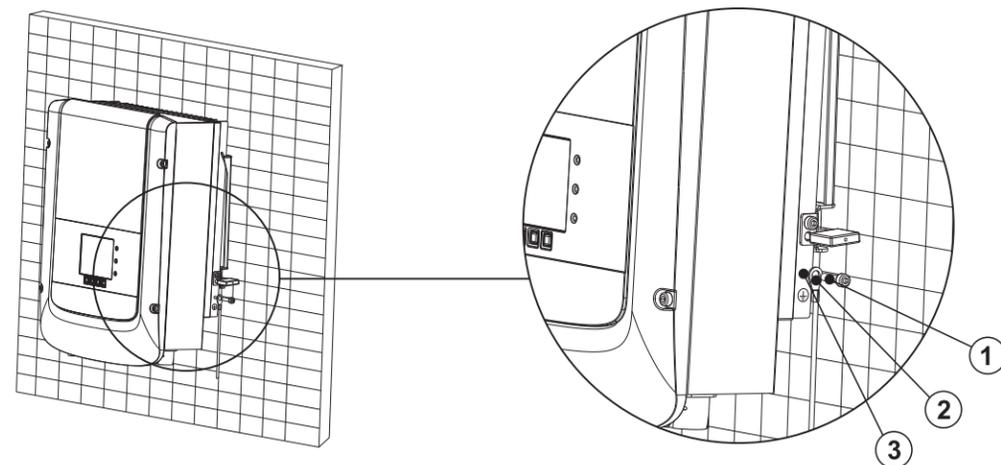
1. M5 welded stud   2. OT Terminal   3. M5 Antiskid nut

——— **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

$L2=8-10\ mm$

$L1$

$L2=8-10\ mm$

$L1$
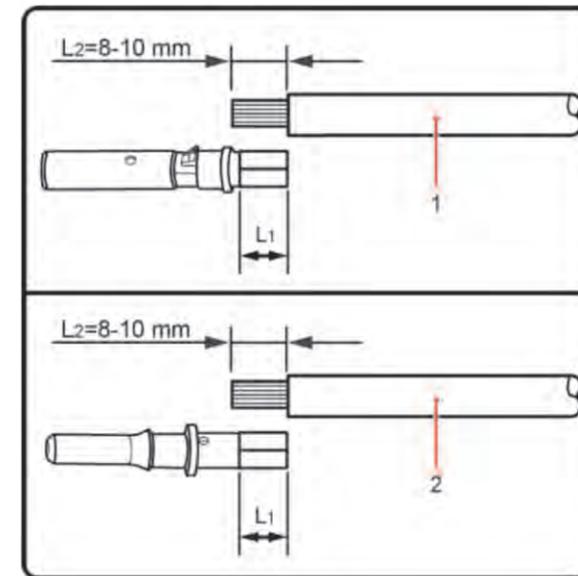
1. Positive power cable   2. Negative power cable

⚠ **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 clamping tool. Ensure that the cables arecrimped 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
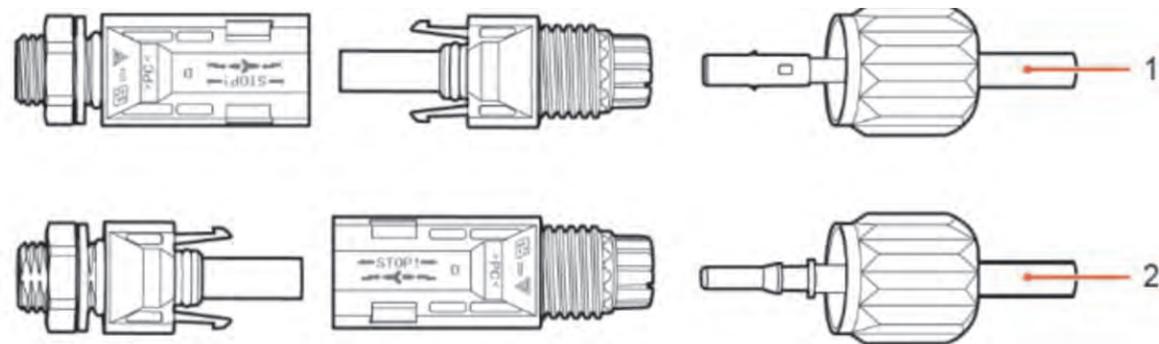
1. Positive power cable   **2.** Negative power cable

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
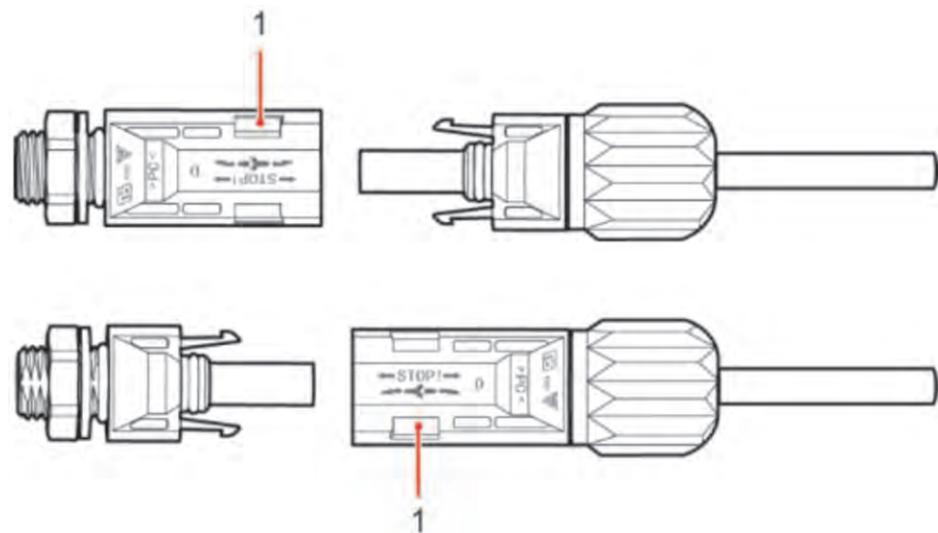
1. Bayonet

———— **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.

⚠ **Caution**	Before removing the positive and negative connectors, ensure that the DC SWITCH is OFF.

Figure 4-8 Removing a DC input connector
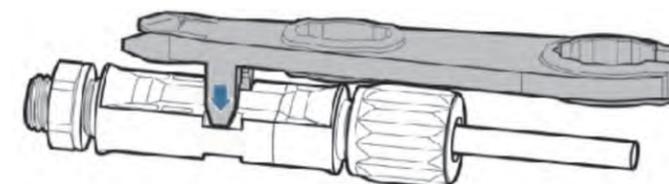
4.4 Connecting AC Output Power Cables

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

⚠ **Caution**	• It is not allowed for several inverters to use the same circuit breaker. • It is not allowed to connect loads between inverter and circuit breaker. • AC breaker used as disconnect device, and the disconnect device shall remain readily operable.

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.

Table4-2 Recommended AC output cable specifications

Type	Sofar 1100TL	Sofar 1600TL	Sofar 2200TL	Sofar 2700TL	Sofar 3000TL
Cable(Copper)	≥4mm²	≥4mm²	≥4mm²	≥4mm²	≥4mm²
Breaker	16A/400V	16A/400V	25A/400V	25A/400V	25A/400V

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

Inverter   Load   Breaker

Multi core copper wire
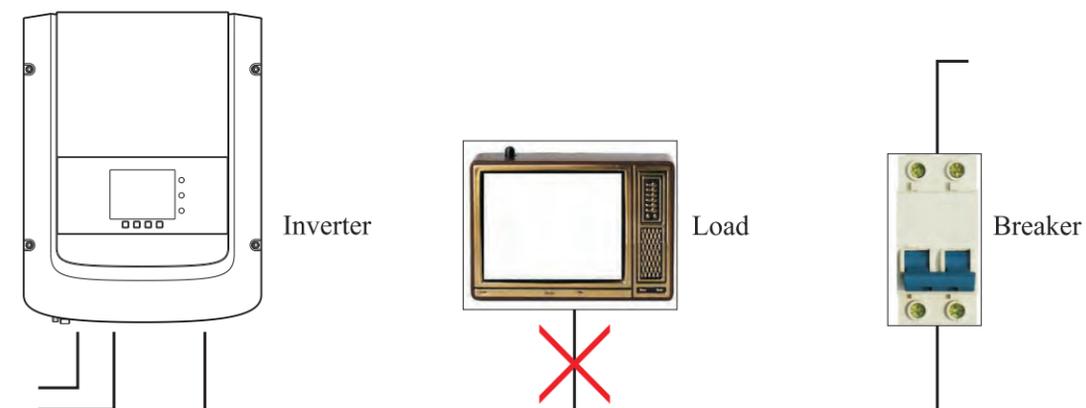
Multi core copper wire≥4mm²
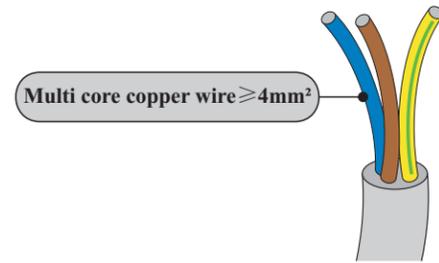
Impedance of inverter and grid contact must be less than 2Ω, In order to ensure the reliability of anti islanding function, should choose the PV cable and ensure line lossless than power 1%, From the inverter to the grid, the cable length should not exceed 150m.Below chart is cable .

Figure 4-10 length, section area and wire loss
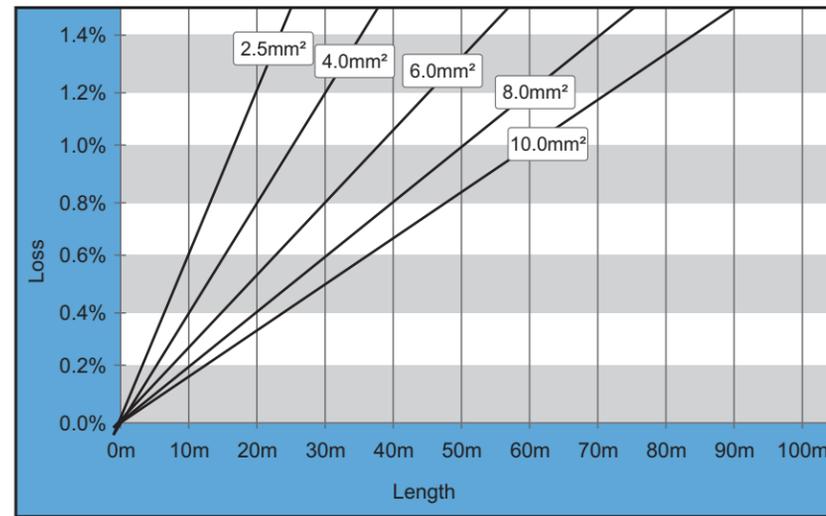
SOFAR inverter is equipped with IP66 AC output connector dedicated for PV inverter, customer need to make AC output cable connections by himself, and the appearance of the AC connector is shown below:

Figure 4-11 AC output connector
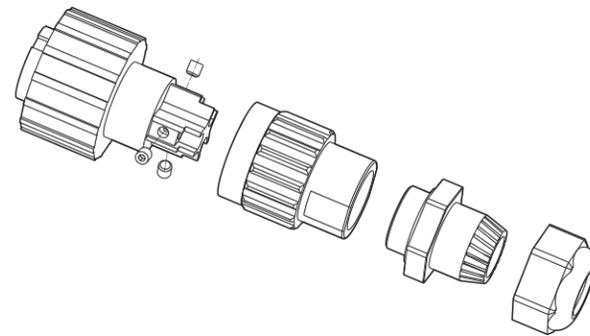
AC wire connections procedure:

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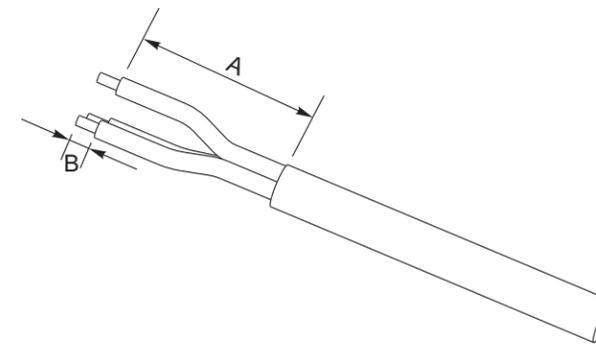
Step 2 Disassemble the AC connector according to the figure shown below: insert the AC output cable (with its insulation layer stripped according to step 1) through the waterproof locking cable gland;

Figure 4-13
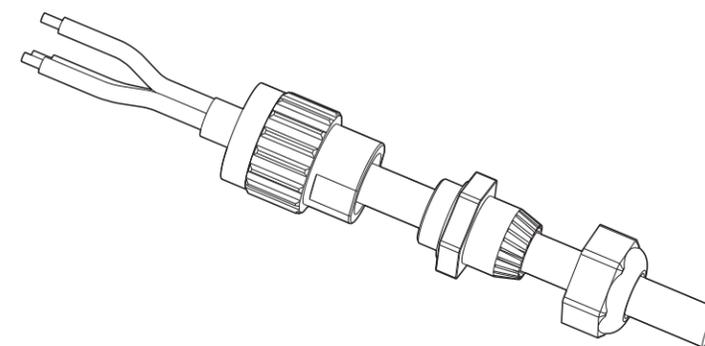
Step 3 Connect AC output cable as per the following requirements:

- 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--bule, PE--yellow/green
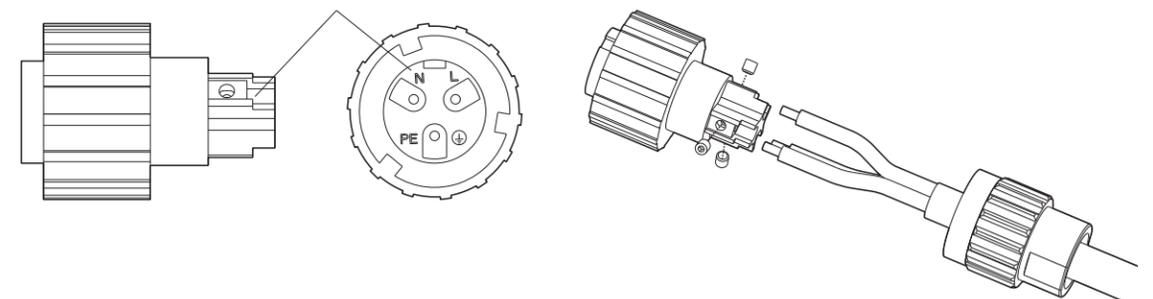
Step 4 Secure the locking cable gland clockwise, shown as below: make sure that all the wires are securely connected;

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   Figure 4-16
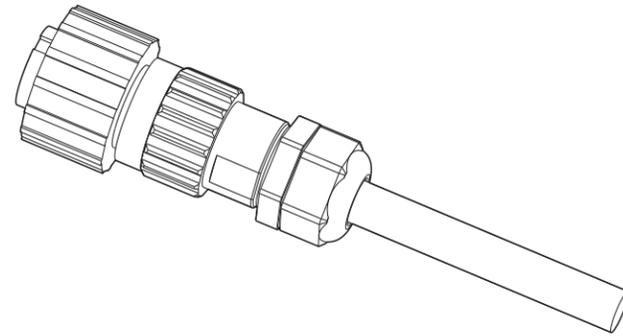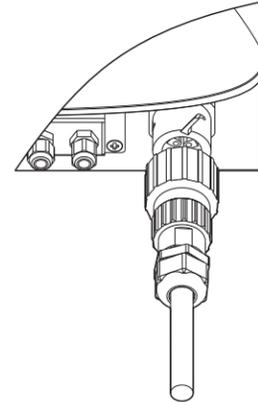
Step 4   Step 5

4.5 Connecting Communications Cables

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

Table4-3 Recommended communication cable sizes are shown below

Communication function	RS485	I/O	CT
Cable size	0.5~1.5mm²	0.5~1.5mm²	0.5~1.5mm²
Outside diameter	2.5~6mm	2.5~6mm	2.5~6mm

Step 1 Remove the communication waterproof cover using a screwdriver;

Figure 4-17
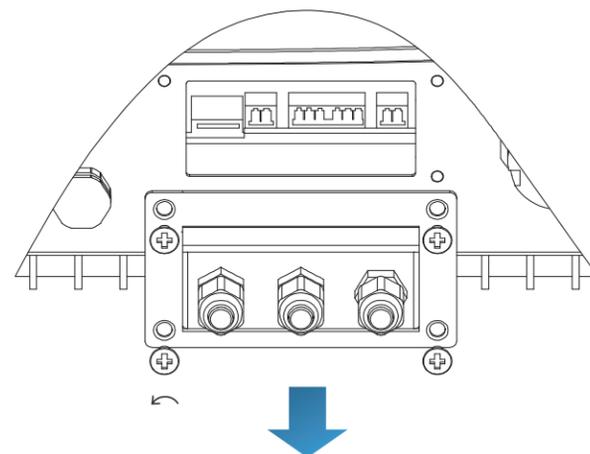
Step 2 Unlock the waterproof cable gland, remove the stopper in the waterproof connector;

Figure 4-18

A1：Waterproof stopper

A1
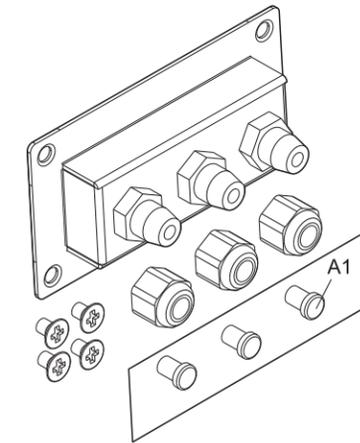
Note:
The waterproof connectors correspond to: I/O, dry contact, RS485 from left to right. Unlock the waterproof connectors according to the communication functions you are using. Do NOT unlock the unused connectors.

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

CT+ CT-

5V GND I4 I3 I2 I1

TX- TX+

6mm cut
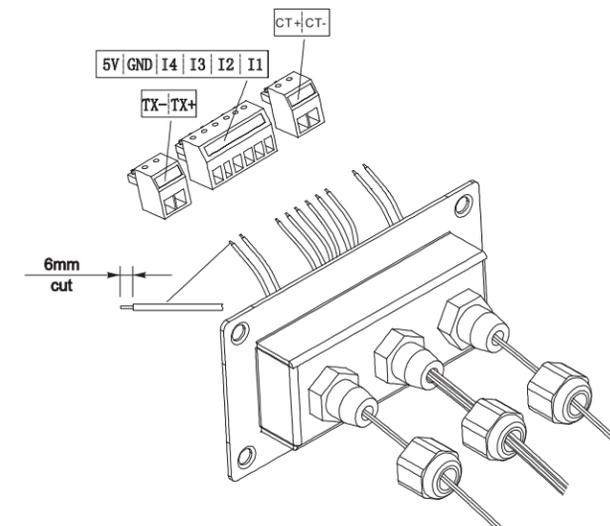
Step 4 Choose the terminal according to Table 4-4, connect the wires as per the labels, and secure the wires using a slotted screwdriver.

Note:
keep the unused terminals for future use.

SOFAR（1.1K~3KTL）
User manual
Electrical Connections

SOFAR（1.1K~3KTL）
User manual
Electrical Connections

Table4-4 functional description of the communication terminals

Type	RS485		I/O					CT	
connector									
label	TX-	TX+	5V	GND	I4	I3	I2	I1	CT+	CT-
function	RS485 differential signal-	RS485 differential signal+	source	ground	Input 4	Input 3	Input 2	Input 1	CT+	CT-

Figure 4-20
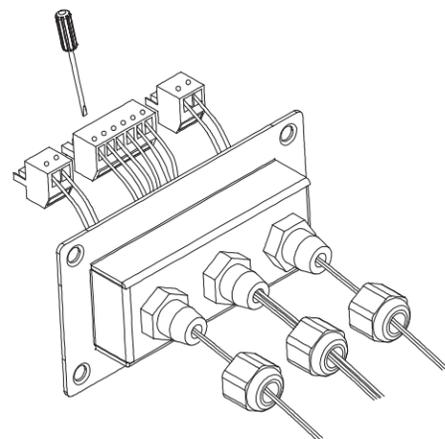
Step 5 Insert the terminal as per the printed label, and then tighten the screws to fix the waterproof cover, rotate the cable gland clockwise to fasten it securely.

Figure 4-21
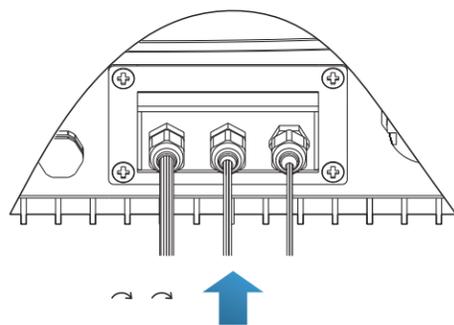
※ **If users need to connect multiple inverters via RS485 wires, refer to the figure shown below:**

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

Connected in parallel

6mm cut
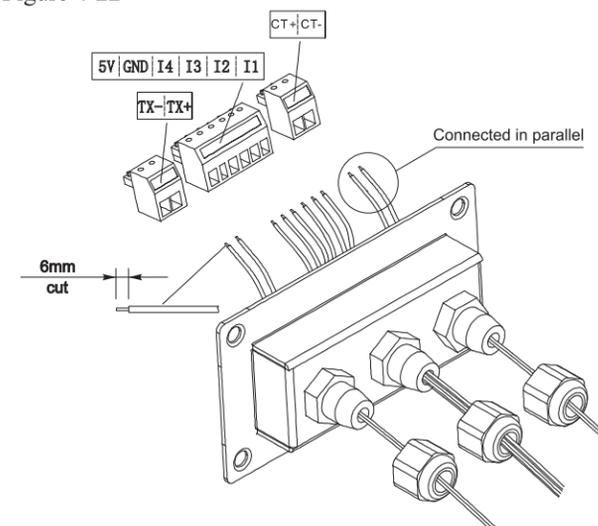
4.6 Communication method

Sunny Dog Series gird-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
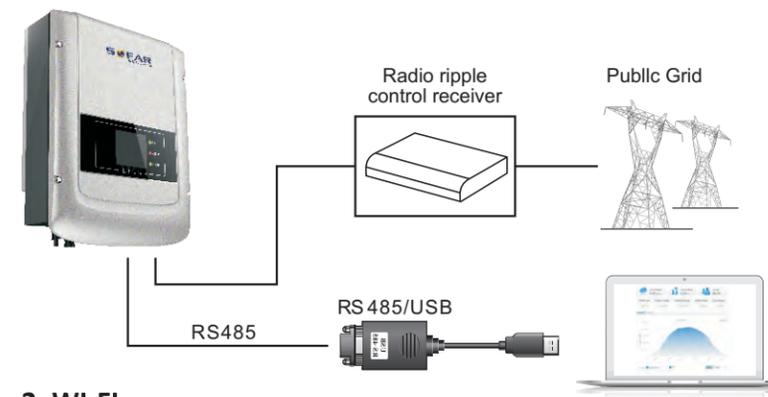
Radio ripple control receiver

Publlc Grid

RS485

RS485/USB

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
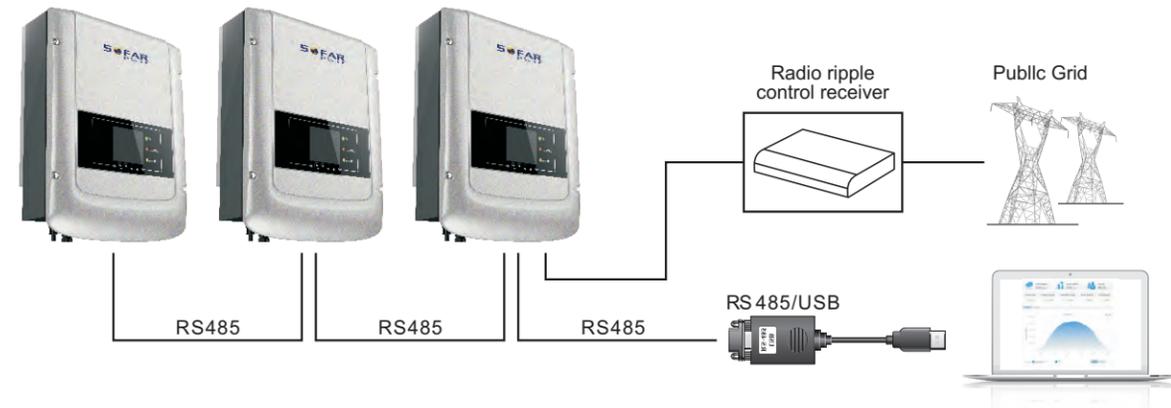
2. WI-FI

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
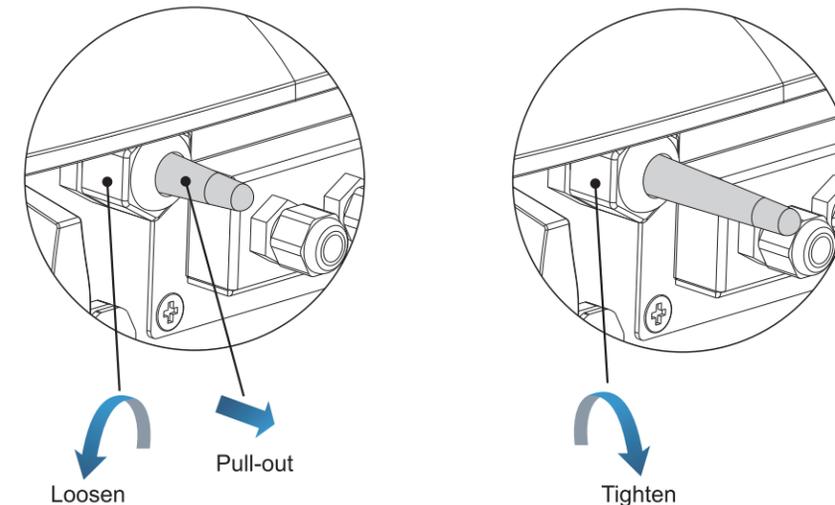
5 Commissioning of inverter

5.1 Safety inspection before commissioning

⚠️ **Attention**	Ensure that DC and AC voltages are within the range permitted by the inverter.

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.

Step 3: Choose the correct country code. (refer to section 6.3 of this manual)

Notice: Different distribution network operators in different countries have different requirements regarding grid connections of PV grid connected inverters.

Therefore, it's very important to make sure that you have selected the correct country code according to requirements of local authority.

Please consult qualified electrical engineer or personnel from electrical safety authorities about this.

Shenzhen SOFARSOLAR Co., Ltd. is not responsible for any consequences arising out of incorrect country code selection.

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
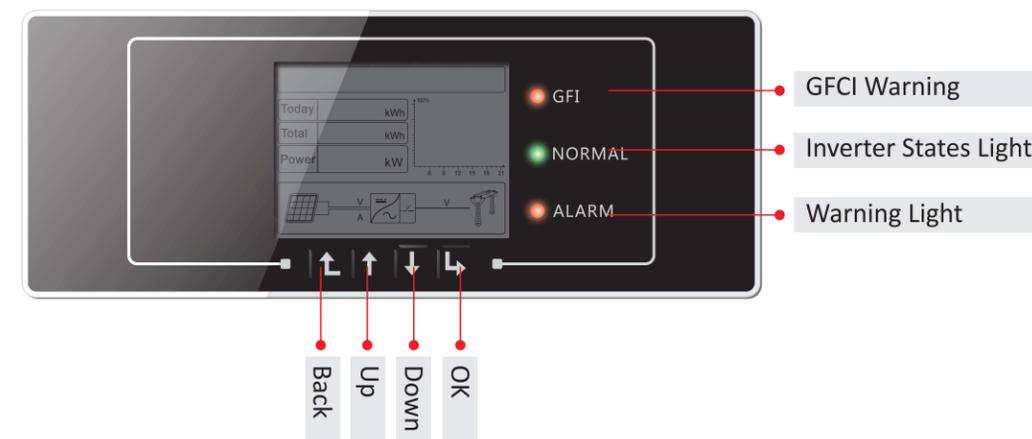
Key-button:

• 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

• Alarm 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.
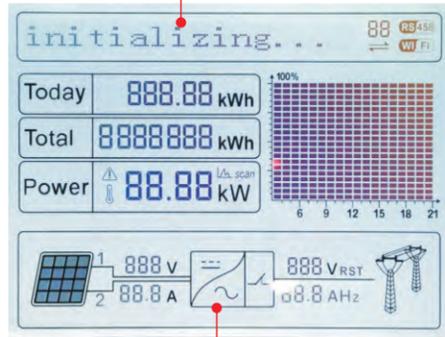
LCD displays the updates of inverter energy、 power、 input information、 warning information etc

A1 - Indicates modbus communication address.。
A2 - RS485 communicating

A4 - WIFI communicating
A3 - Light ON for RS485 communicating

A5 - Light flashes to warn over frequency and power derating. Light ON to warn remote derating
A6 - Indicates today's energy
A7 - Indicates the total energy

A10 - MPPT SCAN function is activated (not available)
A9 - Indicates real time output power
A8 - Light ON warning for inverter high temperature

A11 - Light ON when input voltage over 100V
A12 - Indicates real time input voltage and current channel
A13 - Indicates the input voltage and current of phase 1&2 and displays in turns in every three seconds
A14 - Light ON when the state is normal

A16 - Indicates grid current or frequency and displays in turns in every three seconds
A15 - Indicates grid voltage

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

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

Initializing…

when control board successfully connected with communication board, the LCD display the current state of the inverter, display as shown in the figure below.

Wait 10s	→ Waiting States, Countdown 10S (depends an country code ,some are 60s)
Check	→ Checking
Normal	→ Normal Power Generation
Fault	→ Regular error state
Permanent	→ Unrecoverable error state

Inverter states includes: wait、 check、 normal、 fault and permanent

Wait ： Inverter is waiting to Check State at the end of reconnection time. In this state, the PV voltage is more than 100V, grid voltage value is between the max and min limits and so on; If not, Inverter will go to Fault State or Permanent State.

Check: Inverter is checking isolation resistor, relays, and other safety requirements. It also does self-test to ensure inverter software and hardware are functional. Inverter will go to Fault State or Permanent State if any error or fault occurs.

Normal ： Inverter enter to Normal State, it is feeding power to the grid; inverter will go to Fault State or Permanent state if any error or fault occurs.

Fault ： Fault State: Inverter has encountered recoverable error. It should recover if the errors disappear. If Fault State continues; 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 control board and communication board connection fails, the LCD display interface as shown in the figure below.

DSP communicate fail

6.3 Main Interface

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

| Normal | ●── Press "Back" |

| 1. Enter Setting |
| 2. EventList |
| 3. SystemInfo |
| 4. Display Time |
| 5. Software Update |

(A) "Enter Setting" Interface as below:

| 1.Enter Setting |

1. Set time	13. Safety Frequency
2. Clear Energy	14. Insulation Resistance
3. Clear Events	15. Relay Test
4. Set Country	16. Reactive Power
5. On-Off control	17. Power Derate
6. Relay Command	18. Reflux Power
7. Enable Set Country	19. DRMs0 Control
8. Set Energy	20. Autotest Fast
9. Set Mod-Bus Address	21.Autotest STD
10. Set Language	22.Set P(f)
11. Start Parameter	23.Set Q(v)
12. Safety Voltage	24.Control 81.S1

◆ **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. User can check current country code in SystemInfo >>5. Country.
Note: Country code changing will take effect after inverter reboot.

Table6-1 country code setting

code	country	code	country	code	country
00	Germany VDE AR-N4105	12	Poland	24	Cyprus
01	CEI0-21 Internal	13	Germany BDEW	25	India
02	Australia	14	Germany VDE 0126	26	Philippines
03	Spain RD1699	15	Italy CEI0-16	27	NewZealand
04	Turkey	16	UK-G83	28	Brazil
05	Denmark	17	Greece island	29	Slovakia VSD
06	Greece Continent	18	EU EN50438	30	Slovakia SSE
07	Netherland	19	IEC EN61727	31	Slovakia ZSD
08	Belgium	20	Korea	32	CEI0-21 In Areti
09	UK-G59	21	Sweden	33-49	Reserved
10	China	22	Europe General		
11	France	23	CEI0-21 External		

◆ On-Off Control

Users press ''Back'' button to enter ''1.Enter Setting'' interface,Press ''OK'' button to enter main setting interface.Enter ''5.On-Off Control'' by pressing ''UP'' button or ''Down'' button.Press ''OK'' button and enter On-Off Control interface,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 ''Dwon'' 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.It will enter into ''Power on&Power off'' interface if the passwords is correct,then you can select ''Power on'' or ''Power off'' by pressing ''Up'' button or ''Down'' button and press ''OK'' button to finish the setting successfully.If you select ''Power off'',need to set how many days you want the inverter to power off,increase or decrease value though pressing ''Up'' button or ''Down'' button. After you set ''Power off'' successfully,you need to contact manufacturer to supply passwords to re-power on this inverter.

◆ Enable Set Country

Users press "Back" button to enter "1.Enter Setting" interface, Press "OK" button to enter main setting interface.Enter "7.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 Address

Users press "Back" button to enter "1.Enter setting" interface, Press "OK" button to enter main setting interface. Enter "9. Set Address" by pressing "Up" button or "Down" button. Press "OK" button and enter setting interface "Success" or "fail" is displayed after setting.

◆ Set Language

Users press "Back" button to enter "1.Enter setting" interface, Press "OK" button to enter main setting interface. Enter "10. Set Language" 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.

◆ Set StartPara

User can change the start parameter by the LCD. First the User need to copy the. TXT file which is used to change the start parameter to the SD card .

Users press Back button to enter "1.Enter setting" interface, Press OK button to enter main setting interface. Enter "11. Set StartPara" 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.

◆ Set SafetyVolt

User can change the Voltage protection point by the LCD. First the User need to copy the. TXT file which is used to change the Voltage protection point to the SD card .

Users press Back button to enter "1.Enter setting" interface, Press OK button to enter main setting interface. Enter "12. Set SafetyVolt" 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.

◆ Set SafetyFreq

User can change the Frequency protection point by the LCD. First the User need to copy the. TXT file which is used to change the Frequency protection point to the SD card .

Users press Back button to enter "1.Enter setting" interface, Press OK button to enter main setting interface. Enter "13. Set SafetyFreq" 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.

◆ **Set Insulation**

User can change the Insulation protection point by the LCD. First the User need to copy the. TXT file which is used to change the Insulation protection point to the SD card .

Users press Back button to enter "1.Enter setting" interface, Press OK button to enter main setting interface. Enter "14. Set Insulation" 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.

◆ **Relay Test**

Users press Back button to enter "1.Enter setting" interface, Press OK button to enter main setting interface. Enter "15. Relay Test" by pressing "Up" button Or "Down" button, then press "OK" button and start test relay. "Success" will be displayed if setting successfully.

(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.Event List" interface.

Press"OK" button to get the total event numbers, show as below:

Events TotalNum:02

Press "OK" button again; user can check each event ID number and happening time, see below:

2.EventList	Key"OK"
Events AllNum:02	Key"OK"
ID91	● EventID NO. Key"OK"
2013-10-31 16:42	● Happening time Key"OK"
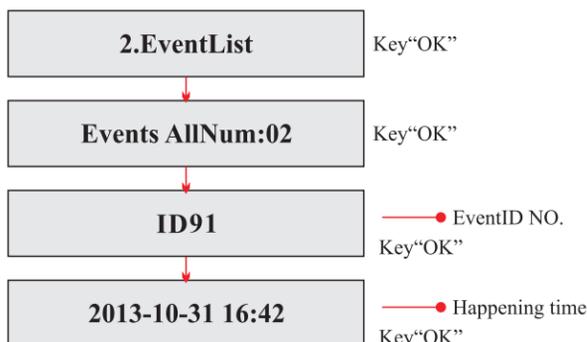
(C) "SystemInfo" Interface as below:

3.SystemInfo		
	1.Inverter Type	7. Power Factor
	2.Serial Number	8. Safety Paras
	3.SoftVersion	9.Reflux Power
	4.HardVersion	10.P(f)
	5.Country	11.Q(v)
	6.Relay Command	

1. 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.

2. 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.

3. 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.

4. 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.

5. 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.

6. Input Mode

Press "Back" button and "Up" or "Down" button to enter "3. System Info" interface, then Press "OK" button to enter into system information checking interface, then press "Up" or "Down" button enter into "6. Input Mode", then press "OK" button, the Input Mode will be displayed.

7. Relay Command

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 "7. Relay Command",then press "OK" button，the Relay Command Mode will be displayed.

8.Power Factor

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 "8. Power Factor",then press "OK" button，the Power Factor will be displayed.

9. Reflux Power

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 "9. Reflux Power",then press "OK" button，the Reflux Power will be displayed.

10.P(f)

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 "10.P(f)",then press "OK" button，the P(f) will be displayed.

11.Q(v)

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 "11.Q(v)",then press "OK" button，the Q(v) will be displayed.

(D) System Time

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

(E) Software Update

User can update software by LCD . Sofarsolar will provide the new update software for user if it is nessary.User needs to copy the firmware file to SD card and connect SD card to inverter,then update the software in following steps and details in 6.4 . 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 0715),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. User can check the current software version in SystemInfo>>3. SoftVersion.

Note: Sofarsolar does not provide SD card for 1~3kW since April 2017.

6.4 Update Software online

Sunny Deer 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，I/O，CT）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
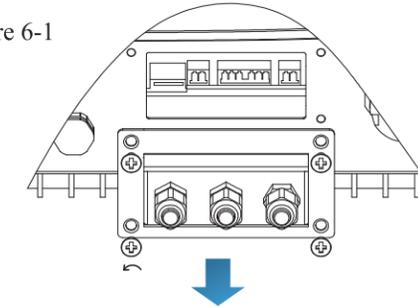
Step 2 Remove the waterproof cover, Press SD card inside in the position marked SD card. Then the SD card will automatically pop up.

Figure 6-2
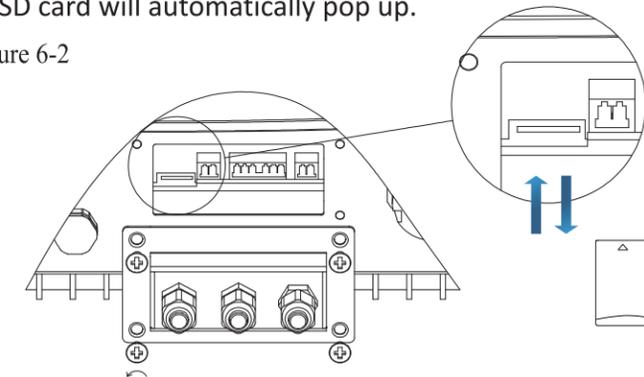
Step 3 The SD card reader must be ready by the users, so that SD card so easy to establish the connection with the computer.

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 0715.

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. User can check the current software version in SystemInfo>>3. SoftVersion

7 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 theSunny 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	• 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.
ID02	GridUVP	The power grid voltage is too low	• 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.
ID03	GridOFP	The power grid frequency is too high	• 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.
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	• Please turn off AC and DC break, • Check the surrounding equipment on the AC side.
ID14	HwBoostOCP	Ihe input current is too high,and has happen 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 happen 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	Ihe 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 communicationis fault	
ID55	RelayTestFail	The relays fault	
ID56	PvIsoFault	The insulation resistance is too low	Check the insulation resistance between the PV array and earth(ground), if a short circuit occurs, rectify the fault.

ID58	OverTempFault_Boost	The Boost temp is too high	• 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	ID65-ID70 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.
ID66	UnrecoverBusOVP	The bus voltage is too high	
ID70	UnrecoverOCPInstant	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	• 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 hig	SOFAR inverter automatically reduce the output power when the frequency of electrical grid is 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]	1200	1800	2400	2900	3300
Max. input DC voltage [V]	450			500	
Start-up input voltage [V]	100			120	
Operating input voltage Range [V]	90-400			100-480	
MPPT voltage [V]	110-450	165-450	170-500	200-500	200-500
Max. input MPPT current[A]	10			13	
Max Isc [A]	12			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%				
Max. Output current [A]	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]	47~53/57~63 (adjustable, must meet local grid requirements)				
THD	<3%(full load at nominal voltage)				
Power factor	1				

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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%	97.2%
Weighted eff. (EU)	95.2%	95.9%	96.1%	96.4%	96.5%
MPPT efficiency	>99.9%				
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), I/O				
Cooling	Nature				
Ambient temperature range	-25 ~ +60℃				
Relative humidity	0~100%				
Altitude	2000m				
Noise	<25dB @ 1 m				
Degree of Protection	IP65				
Dimension	405*314*135mm				
Weight	11kg		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:

Setp1: Click on ▮▮;

Setp2: Connect with your personal internet access point (AP) or WLAN.

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

Setp3: 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

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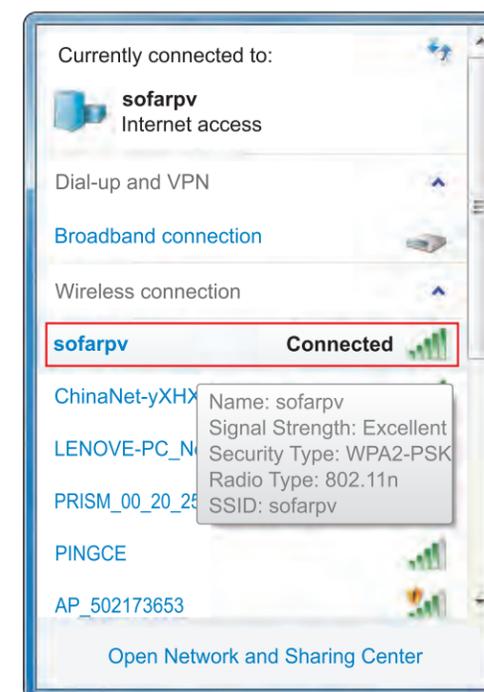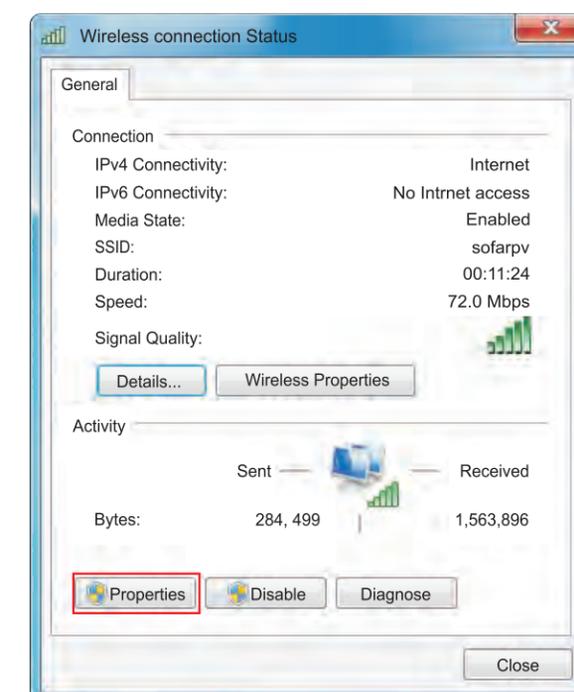
Setp4: Double click on internet Protocol Version 4 (TCP/IPv4). Click on General > Obtain an IP address automatically > OK to finish the setup. See Figure 9-3, 9-4:

Figure 9-3
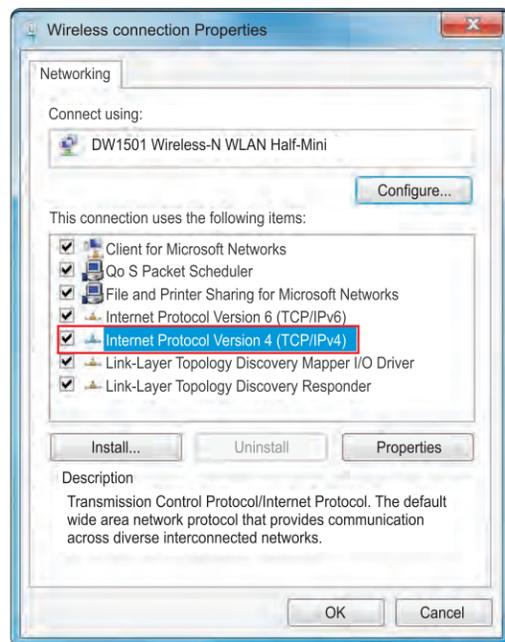
Figure 9-4
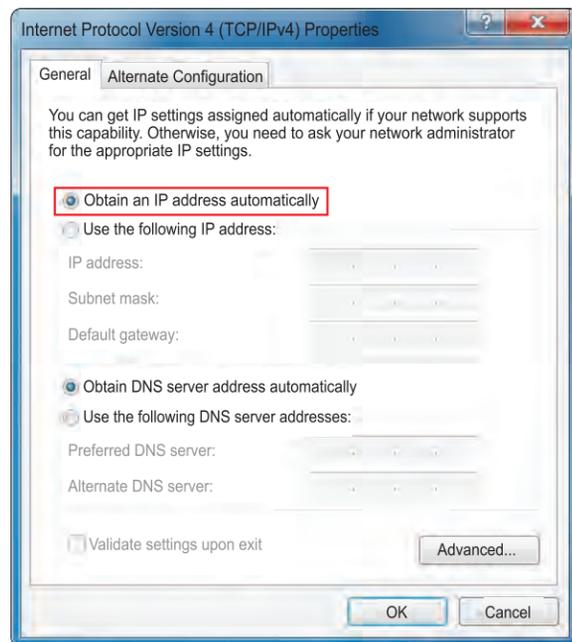
3. SOFAR inverter Wi-Fi module setup

Procedure:

Setp1: Click on [icon];

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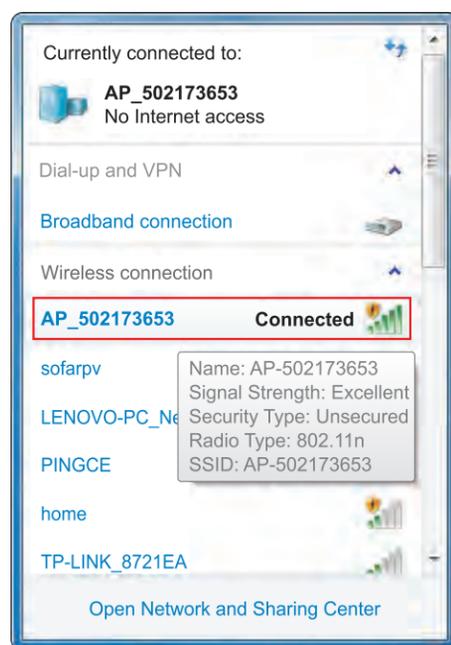
Setp3: When connected, open browser, head to http://10.10.100.254/, and fill in user name and password which all defaulted as admin for the first time. See Figure 9-7

Figure 9-7

[hand icon]	Browsers like internet Explorer 8+. chrome 15+ and Firefox 10+ are recommended.
Note	

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

Figure 9-8

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

Figure 9-9

Staus
Wizard
Wireless
Cable
Advanced
Account
Update
Restart
Reset

Dear users:

Thank you for choosing our device.
Next, you can follow the setup wizard to
complete the network setting step by steep;
or you can select the left menu for detailed
setting.

★ Note: Before setting, please make sure that
your wireless or cable network is working.

[Start]

1　2　3　4　5　6　7
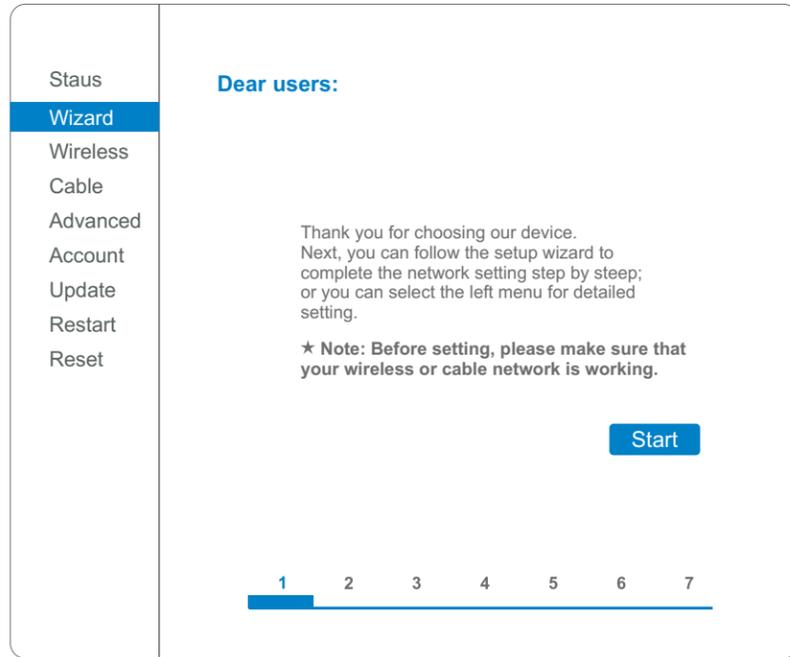
Setp6: Select Wireless connection, and click Next.

Figure 9-10

Staus
Wizard
Wireless
Cable
Advanced
Account
Update
Restart
Reset

Connection Settings:

◉ Wireless connection
○ Cable connection　　　　Wireless [Enabled ▾]

[Back]　[Next]

1　2　3　4　5　6　7
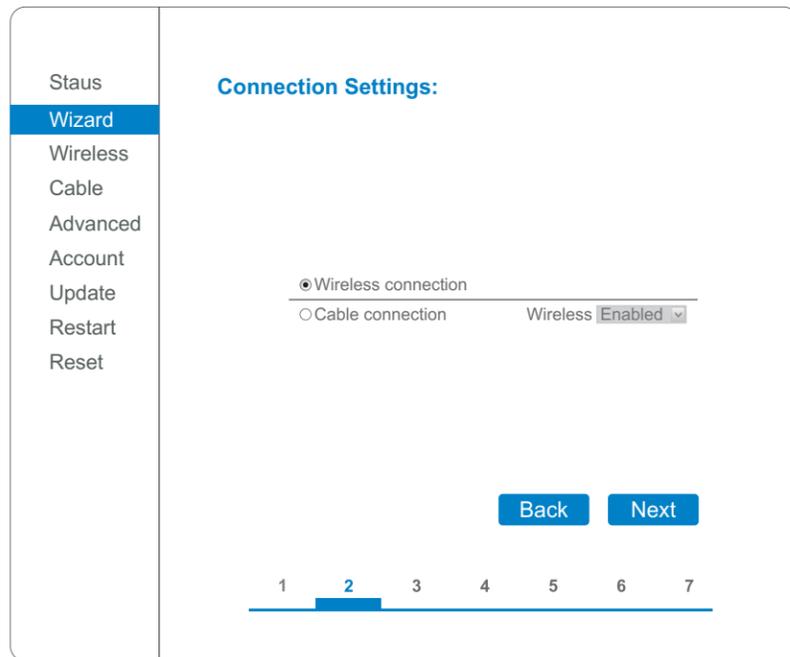
Note

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

Staus
Wizard
Wireless
Cable
Advanced
Account
Update
Restart
Reset

Please select your current wireless network:

○	SZKTZ	5e:ac:0a:2c:bc:3f	10%	1
○	TP-LINK_3B	4e:ac:0a:2c:bc:3b	10%	1
○	YDS-WIFI	4c:ac:0a:2b:04:9f	76%	1
○	PRISM_00_20_25	5e:ac:0a:26:8b:fe	10%	1
○	ChinaNet-EWtw	5e:ac:0a:2b:04:9f	70%	1
○	ChinaNet-kwza	4c:ac:0a:26:8b:fe	26%	1
◉	sofarpv	e0:05:c5:b2:7b:5a	81%	2
○	360WIFI-99FA	90:94:e4:3c:61:1c	26%	2
○	SCJ	00:21:27:46:c5:98	29%	3
○	TP-LINK_2.4GHz_F2BC95	ac:cf:23:ff:02:9c	100%	3
○	PINGCE	ec:6c:9f:04:b3:2c	96%	6
○	yba	00:21:27:5c:06:98	5%	6

★ Note: When RSSI of the selected WIFI network is lower
than 15%, the connection may be unstable, please select
other available network or shorten the distance between the
device and router.

[Refresh]

Add wireless network manually:

Network name(SSID)
(Note: case sensitive)　　[sofarpv]
Encryption method　　　　[WPA2PSK ▾]
Encryption algorithm　　　[TKIP ▾]

[Back]　[Next]

1　2　3　4　5　6　7

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

Staus
Wizard
Wireless
Cable
Advanced
Account
Update
Restart
Reset

Please enter the wireless network password:

Password(1-32 bytes)　　[••••••]
(Note: case sensitive)
Re-enter password　　　[••••••]
☐ Show Password

[Back]　[Next]

1　2　3　4　5　6　7
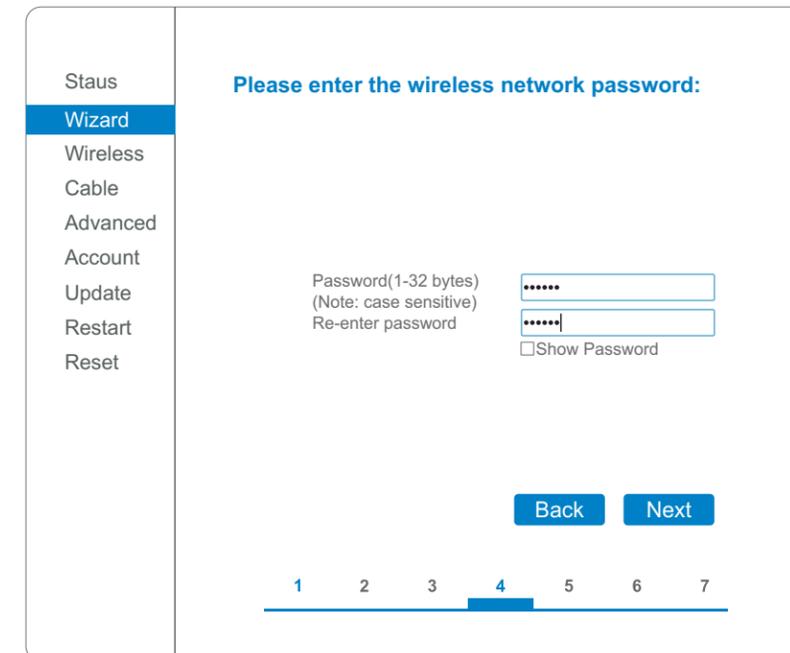
Setp9: Select Enable > Next to obtain IP address automatically.

Figure 9-13

Setp10: Click Next.

Figure 9-14

Setp11: Click OK to wait for setting complete.

Figure 9-15

Figure 9-16

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
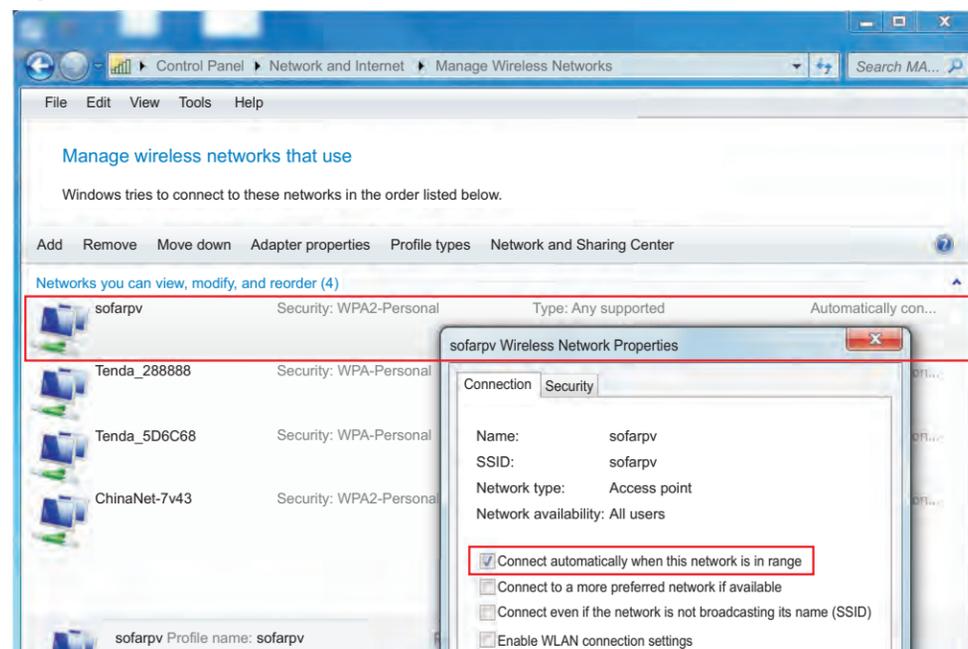
Setp13: Connect with your personal wireless network or WLAN.

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

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

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Setp3: Fill in details to complete the registration.

Figure 9-21

Setp4: 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
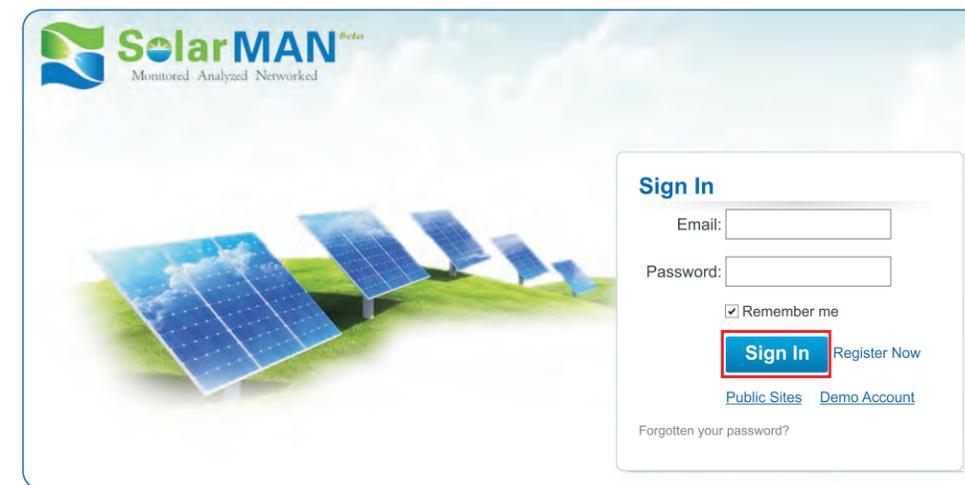
In order to make sure your solar system is being well monitored by our SolarMAN monitoring system, please click the Real Time label to see if there is real time data within 15 minutes. If so, your SolarMAN network setup is successful. If not, please re-check the above procedure.

Note

Figure 9-23

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Quality Assurance

★ 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
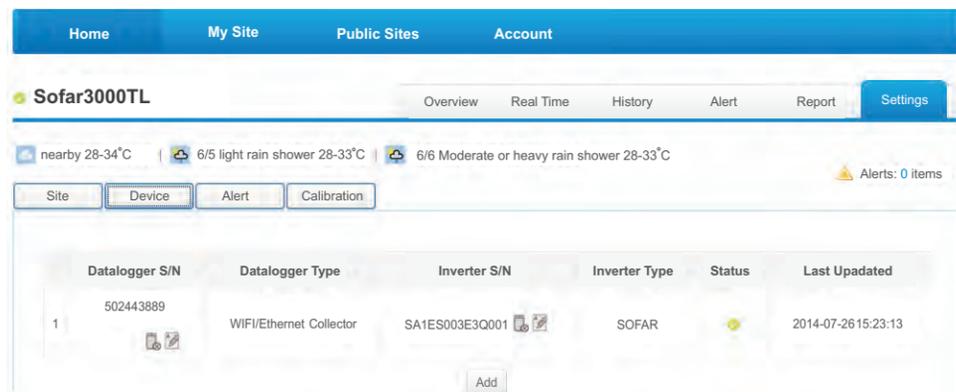
Figure 9-25
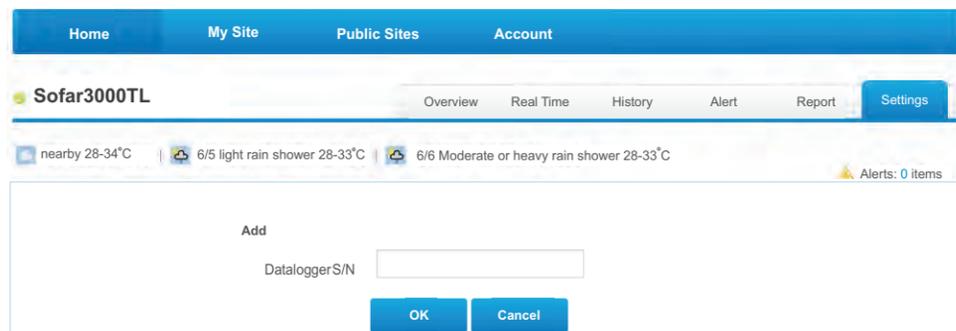
★ Alert notification setup

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
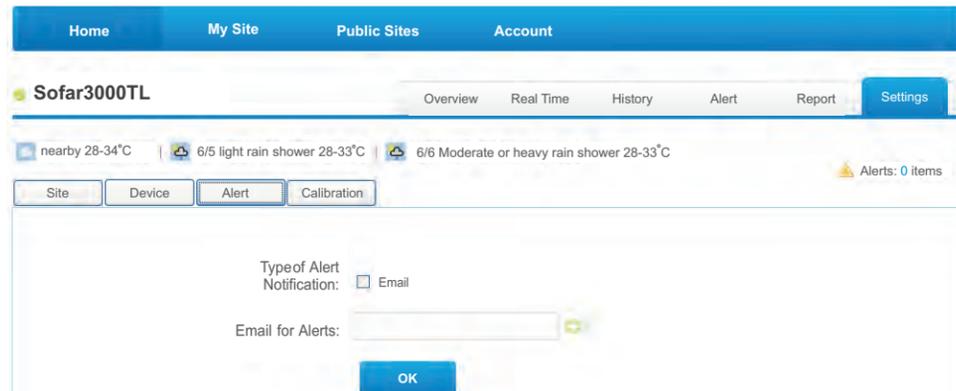
10 Quality Assurance

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);