SOFAR

# USER MANUAL

## SOFAR 60...80KTLX-G3


Shenzhen SOFARSOLAR Co.,Ltd.

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# Preface

## Notice

The products, services or features you purchased shall be subject to the company's commercial contracts and terms. All or part of the products and services described in this document may not within the scope of your purchase. Unless additional terms and conditions in your contract, the company does not make any statement or guarantee on the contents of this document.

## Save this Instruction

This manual must be considered as an integral part of the equipment. Customer can print the electronic version to hard copy and keeping properly for future reference. Anyone who operates the device at any time must operate in accordance with the requirements of this manual.

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## Outline

This manual is an integral part of SOFAR 60KTLX to 80KTLX-G3. It describes the assembly, installation, commissioning ,maintenance and failure of the product. Please read it carefully before operating.

## Scope of Validity

This manual contains important instructions for: SOFAR 60KTLX-G3、SOFAR 80KTLX-G3

## Target Group

This manual is for qualified electricians. The tasks described in this manual only can be performed by qualified electricians.

## Symbols Used

The following types of safety instruction and general information appear in this document as described below:

**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"indicates there are potential risks, if fail to prevent, may lead to equipment cannot normally or property damage

**NOTE**

"Note"provides additional information and tips that are valuable for the optimal operation of the product

# 1. Basic Safety Information

## Outlines of this Chapter

Please read the instruction carefully. Faulty operation may cause serious injury or death.

**NOTE**

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

## Safety Instruction

Introduce the safety instruction during installation and operation of SOFAR 60...80KTLX-G3.

## Symbols Instruction

This section gives an explanation of all the symbols shown on the SOFAR 60...80KTLX-G3 on-grid inverter and on the type label.

## 1.1 Requirement for Installation and Maintenance

- Installation of SOFAR 60...80KTLX-G3 on-grid inverter must conform with laws, regulations, codes and standards applicable in the jurisdiction.
- Before installing and adjusting the produce, please read all of instructions, cautions and warnings in this manual
- Before connecting the product to the electrical utility grid, contact the local utility company for allowance. Also, this connection must be made only by qualified electrician.
- If the failure persists, please contact the nearest authorized maintenance center. If you don't know which service center is closest to you, please contact your local distributor. Don't repair the product by yourself, which may lead serious injury or damage.

## Qualified Person

When inverter is working, it contains lethal voltages and went hot in some area. Improper installation or misoperation could cause serial damage and injury. To reduce the risk of personal injury and to ensure the safe installation and operation of the product, only a qualified electrician is allowed to execute transportation, installation, commissioning and maintenance. Shenzhen SOFARSOLAR Co, Ltd. does not take any responsibility for the property destruction and personal injury because of any incorrect use.

## Label and Symbols

SOFAR 60...80KTLX-G3 has type label attach the side of product which contact important information and technical data, the type label must permanent attached to the product.

SOFAR 60...80KTLX-G3 has warming symbol attache the product which contact information of safety operation. The warming symbol must permanent attached to the product.

## Installation location requirement

Please install the inverter according to the following section. Place inverter in an appropriate bearing capacity objects (such as solid brick wall, or strength equivalent mounting surface, etc.) and make sure inverter vertical placed. A proper installation location must have enough space for fire engine access in order for maintenance if faulty occur. Ensure the inverter is installed in a wall ventilated environment and have enough air cooling cycle. Air humidity should less than 90%.

## Transportation Requirement

Inverter is in the good electrical and physical condition when it ship out from factory. During transport, inverter must be placed in its original package or other proper package. Transportation company should responsible for any damage during transport period.

If you find any packing problems that may cause the damage of inverter or any visible damage, please notice the responsible transportation company immediately. You can ask your installer or SOFARSOLAR for help is necessary.

## Electrical Connection

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

**DANGER**

Before the electrical connection, use opaque material to cover the PV modules or disconnect PV string DC switch. PV arrays will produce dangerous voltage if it is exposure under sun.

**WARNING**

All operation must accomplish by certified electrical engineer

- Must be trained;
- Completely read the manual operation and understand all information.

**ATTENTION**

Must get permission by local utility company before connecting to grid and the connection must be done by certified electrical engineers.

## Operation

**DANGER**

Touching the utility grid or the terminal conductors can lead to lethal electric shock or fire!

Do not touch non-insulated cable ends, DC conductors and any live components of the inverter.

Attention to any electrical relevant instruction and document.

**ATTENTION**

Enclosure or internal components may get hot during operation. Do not touch hot surface or wear insulated gloves.

Keep it away from kids!

## Maintenance and repair

**DANGER**

Before any repair work, turn OFF the AC circuit breaker between the inverter and electrical grid first, then turn OFF the DC switch.

After turning OFF the AC circuit breaker and DC switch wait for at least 5 minutes before carry any maintenance or repair work.

**ATTENTION**

Inverter should not work again until removing all faults. If any repair work is required, please contact local authorized service center.
Should not open the inverter cover without authorized permit, SOFARSOALR does not take any responsibility for that.

## EMC/Noise Level

Electromagnetic compatibility (EMC) refers to that on 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 an electrical equipment.

- The inherent noise-immune character: immunity to internal electrical noise
- External noise immunity: immunity to electromagnetic noise of 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 20cm when inverter is working

## 1.2 Symbols and signs

**DANGER**

High voltage of inverter may be harmful to health!
Only certified engineer can operate the product;
Juveniles, Disable, should not use this product;
Keep this product out of the reach of children;

**CAUTION**

Caution of burn injuries due to hot enclosure!
Only touch the screen and pressing key of the inverter while it is working

**ATTENTION**

PV array should be grounded in accordance to the requirements of the local electrical grid company

**CAUTION**

Ensure the maximum DC voltage input is less than the maximum inverter DC voltage (including in low temperature condition). Any damage cause by overvoltage, SOFARSOLAR will not take the responsibility including warranty

### Signs on the Product and on the Type Label

SOFAR 60...80KTLX-G3 has some safety symbols on the inverter. Please read and fully understand the content of the symbols before installation.

| Symbols | Name | Explanation |
|---|---|---|
|  | This is a residual voltage in the inverter | After disconnect with the DC side, there is a residual voltage in the inverter, operator should wait for 5 minutes to ensure the capacitor is completely discharged. |
|  | Caution of high voltage and electric shock | The products operates at high voltages. Prior to performing any work on the product, disconnect the product from voltage sources. All work on the product must be carried out by qualified persons only. |

| | | |
|---|---|---|
|  | Caution of hot surface | The product can get hot during operation. Avoid contact during operation. Prior to performing any work on the product, allow the product to cool down sufficiently |
|  | Comply with the Conformite Europeenne (CE) Certification | The product comply with the CE Certification |
|  | Grounding Terminal | This symbol indicates the position for the connections of an additional equipment grounding conductor |
|  | Observe the documentation | Read all documentation supplied with the product before install |
|  | Positive pole and negative pole | Positive pole and negative pole of the input voltage (DC) |
|  | Temperature | Indicated the temperature allowance range |
|  | RCM logo | RCM (Regulatory Compliance Mark)<br>The product complies with the requirements of the applicable Australian standards. |

# 2. Product Characteristics

## Outlines of this Chapter

**Product Dimensions**
Introduce the field of use and the dimensions of the SOFAR 60...80KTLX-G3 on-grid inverter.

**Function Description**
Introduce working principle and internal components of the SOFAR 60...80KTLX-G3 on-grid inverter.

**Electrical block diagram**
Introduce the electrical block diagram of the product

## 2.1 Intended Use

The SOFAR 60...80KTLX-G3 on-grid inverter can transform a direct electric current (DC) coming from a photovoltaic generator (PV) into an alternating electric current (AC) Suitable for being fed into the utility grid.

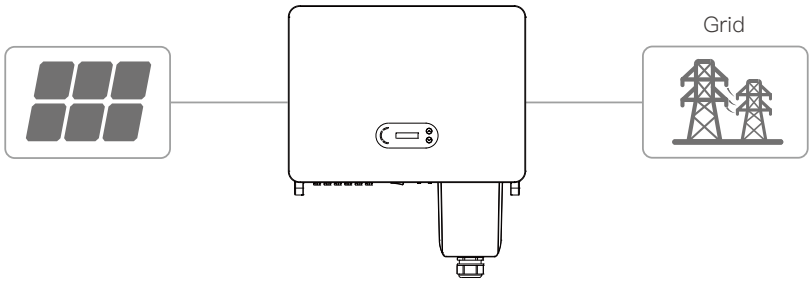



Figure 2-1 PV Grid-Tied System

The SOFAR 60...80KTLX-G3 on-grid inverter may only be operated with PV arrays (photovoltaic module and cabling) for on grid condition. Do not use this product for any other or additional purposes. Any damage or property loss due to any use of the product other than described in this section, SOFARSOLAR will not take the responsibility. DC input of the product must be PV module, other source such like DC sources, batteries will against the warranty condition and SOFARSOLAR will not take the responsibility.

**Supported grid types**

According to the SOFAR 60...80KTLX-G3 configurations, for the TT type of electricity grid, the voltage between neutral and earth should be less than 30V. Inverters are compatible with TN-S, TN-C, TN-C-S, TT, IT grid.

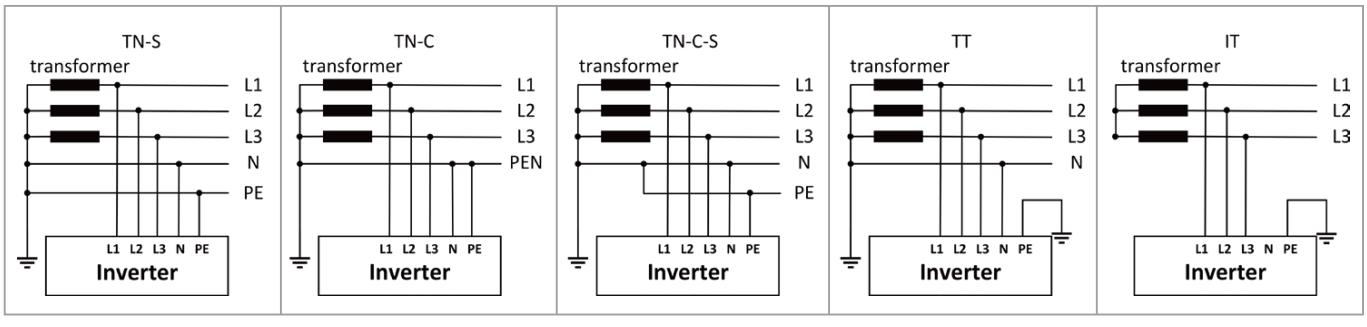



Figure2-2 Overview of the grid types

## Product Dimensions

The choice of optional parts of inverter should be made by a qualified technician who knows the installation conditions clearly.

## Dimensions Description

- SOFAR 60...80KTLX-G3
  L×W×H=687*561*275mm

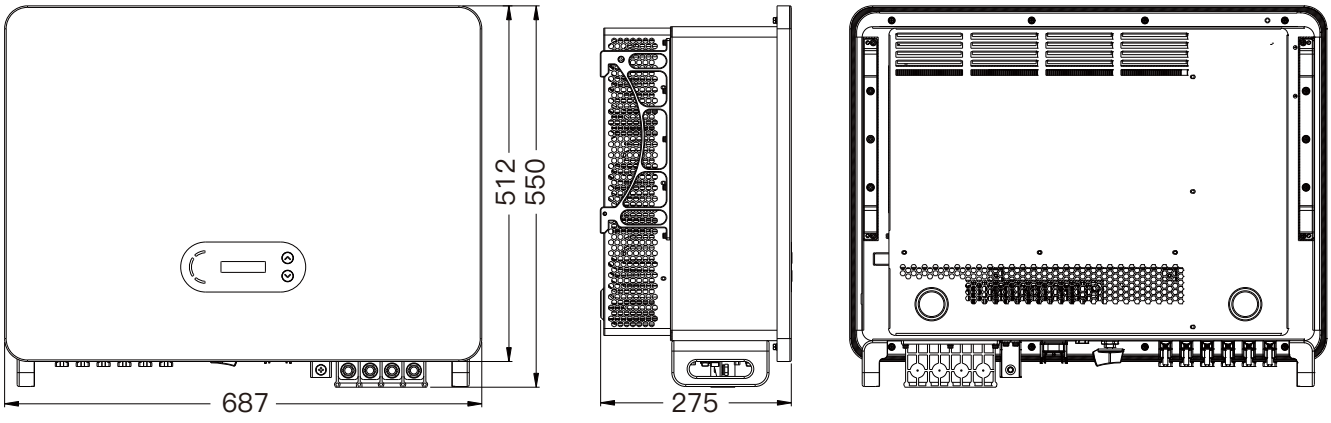



Figure 2-3 Front, side and back of the machine (80KW)

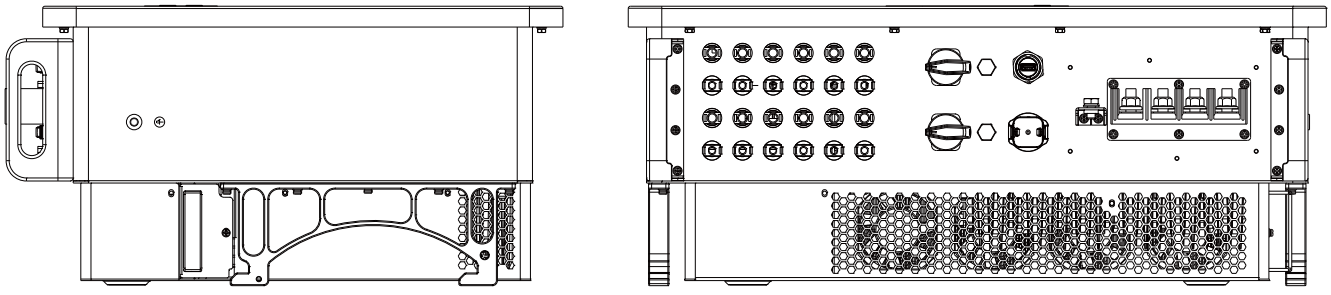


Figure 2-4 Bottom view of the machine (80KW)

## Function description of inverter box bottom

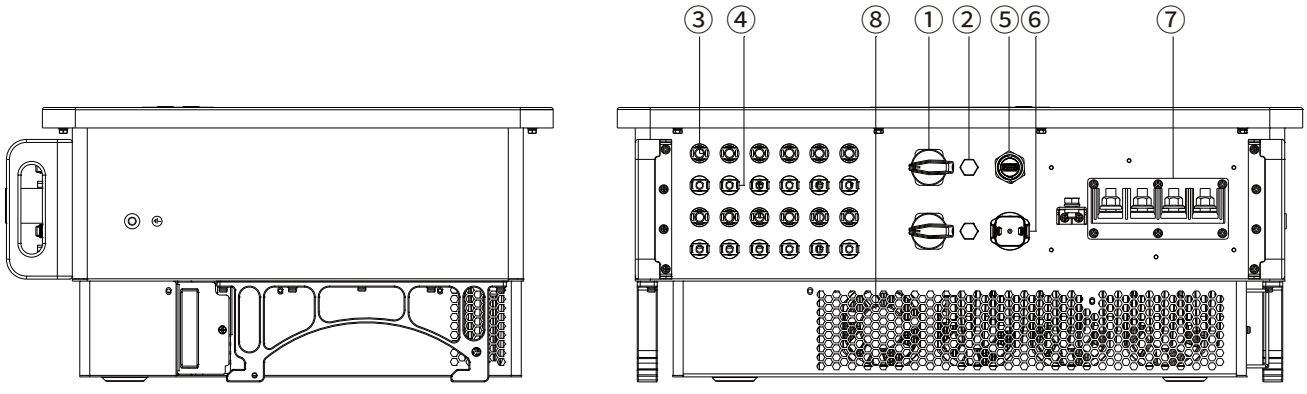



Figure 2-5 Bottom view of SOFAR 60...80KTLX-G3

① DC Switch
② Breather valve
③ DC positive poles connectors
④ DC negative poles connectors
⑤ USB Port (for WIFI communication)
⑥ COM Port (for RS485 communication)
⑦ AC output
⑧ Fans

### Labels on the equipment

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

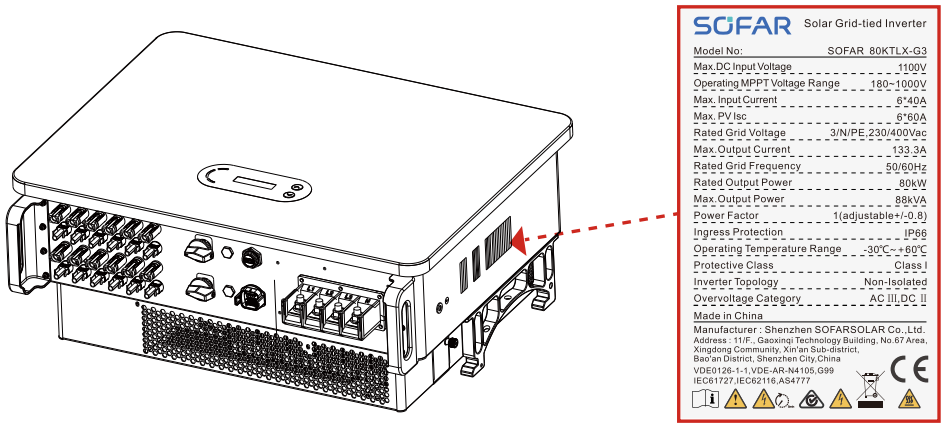



Figure 2-6 Product label

## 2.2 Function Description

DC power generated by PV arrays is filtered through Input Board then enter 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 abnormal operation conditions. At the same time, Control Board can trigger the replay to protect the internal components.

### Function Module

**A. Energy management unit**

Remote control to start/ shunt down inverter through an external control.

**B. Feeding reactive power into the grid**

The inverter is able to produce reactive power, thus to feed it into the grid through the setting of the phase shift factor. Feed-in management can be controlled directly by the APP, or through a RS485 interface.(Optional)

**C. Limited the active power fed into grid**

If enable the limited of active power function, inverter can limit the amount of active power fed into the grid to the desired value (expressed as percentage).

**D. Self-power reduction when grid is over frequency**

If grid frequency is higher than the limited value, inverter will reduce the output power to ensure the grid stability.

**E. Data transmission**

Inverter can be monitored remotely through an USB stick logger(WIFI) or software Storage Monitor(optional) which is based on RS485 interface.

**F. Software update**

USB interface for uploading the firmware, remotely uploading is available through an USB stick logger(WIFI)

## 2.3 Electrical block diagram

SOFAR 60...80KTLX-G3 has 12 DC input strings, 6 MPPT trackers to tracking the maximum power point, then converters the direct current of PV array to grid-compliant, three phase current and feeds in into the utility grid. Both DC and AC side has Surge Protection Device (SPD).

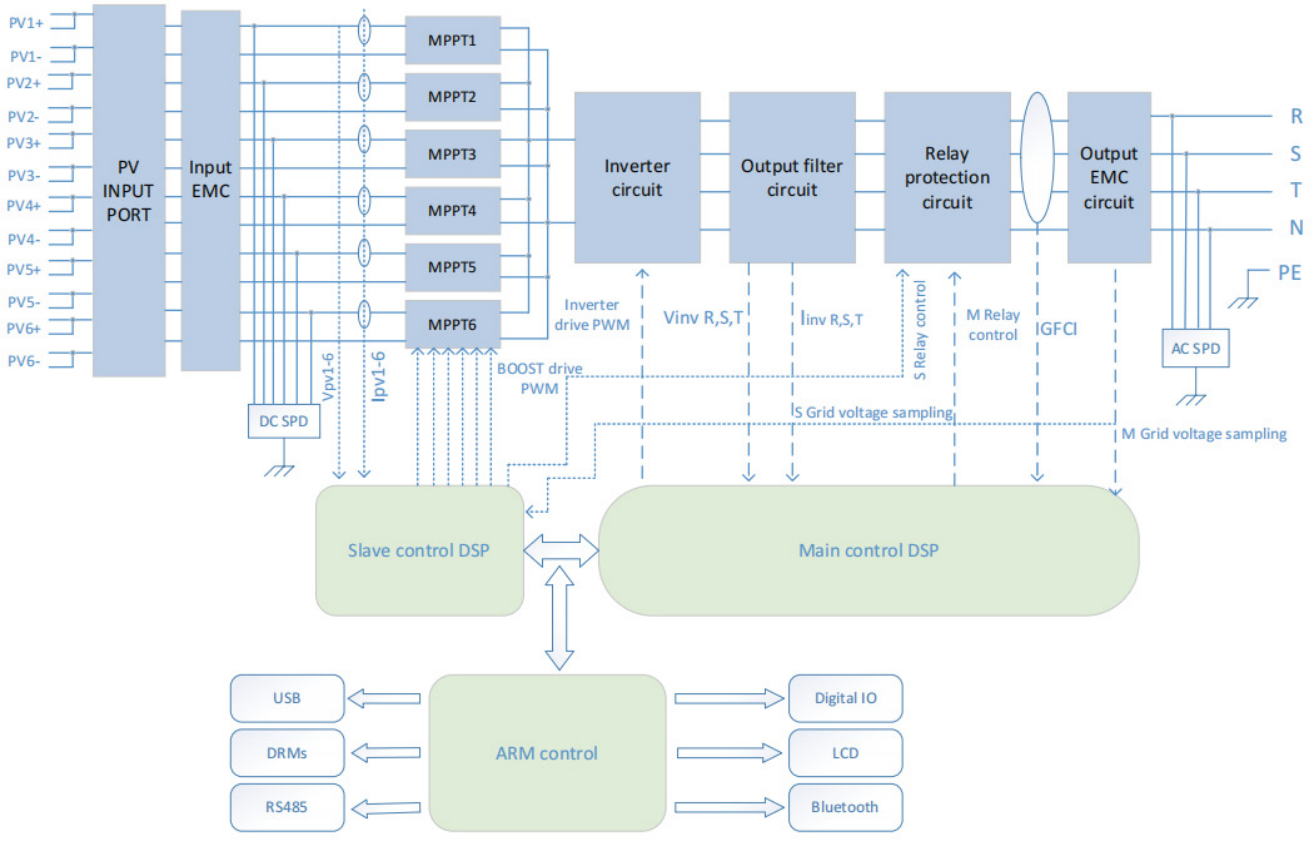



Figure 2-7 Main circuit structure

## 2.4 Efficiency curve

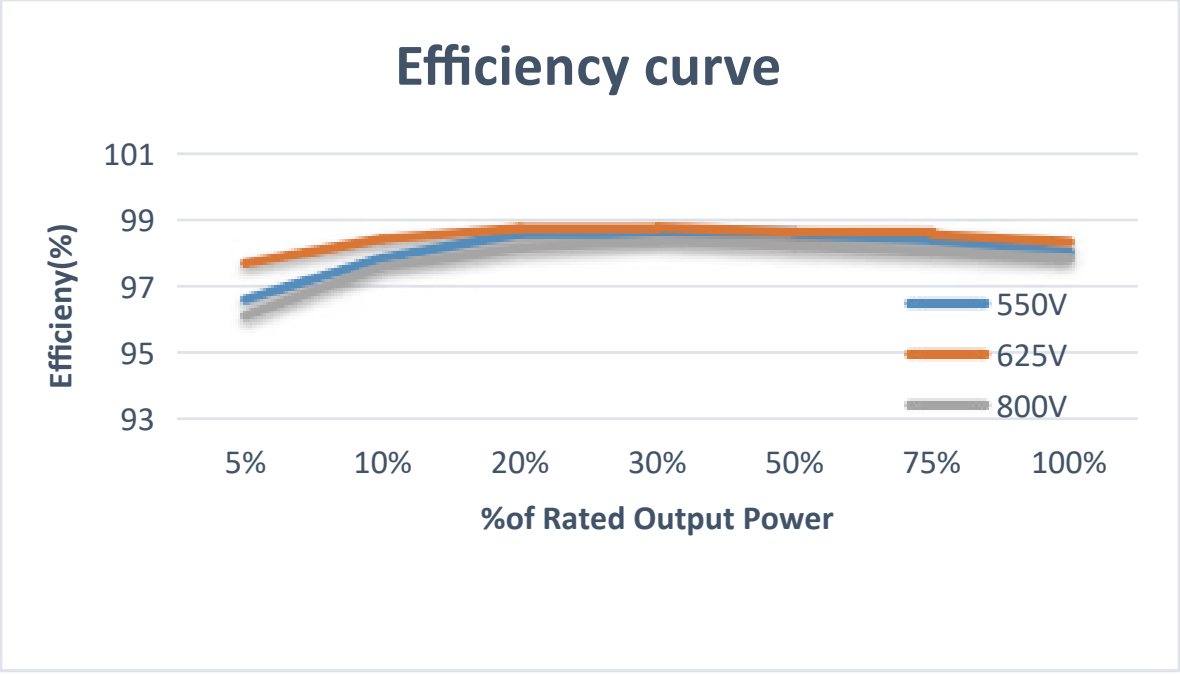



Figure 2-8 Power efficiency curve(take 80KW for example)

# 3. Inverter Storage

If inverter is not installing immediately, storage condition need meet below requirements:

- Place inverter into the original package and leave desiccant inside, sealed tight with taps.
- Keep the storage temperature around -40℃～70℃, Relative humidity 5～95%, no condensation

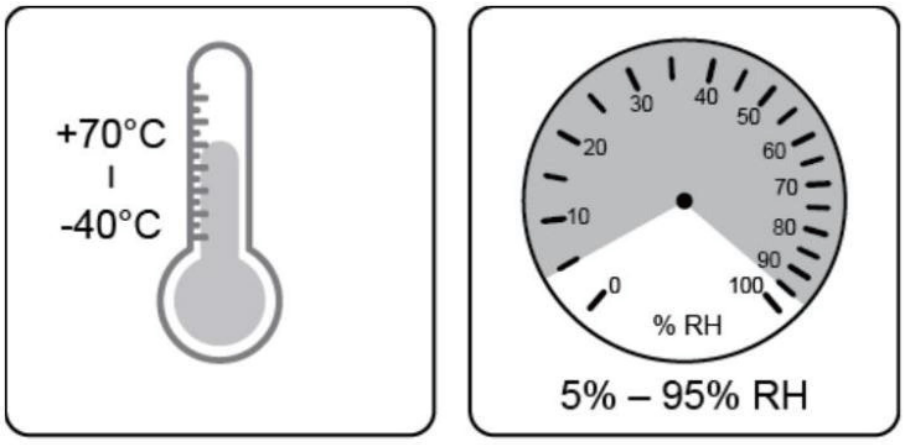



Figure 3-1 Storage temperature and humidity

- The maximum stacking layer number cannot exceed 4 layers.
- If the inverter be storage for more than half years, the inverter needs to be fully examined and tested by qualified service or technical personnel before using.

# 4. Installation

## Outlines of this Chapter

This topic describes how to install this product, please read carefully before install.

**DANGER**

Do not install the product on flammable material.
Do not store this product in potentially explosive atmospheres.

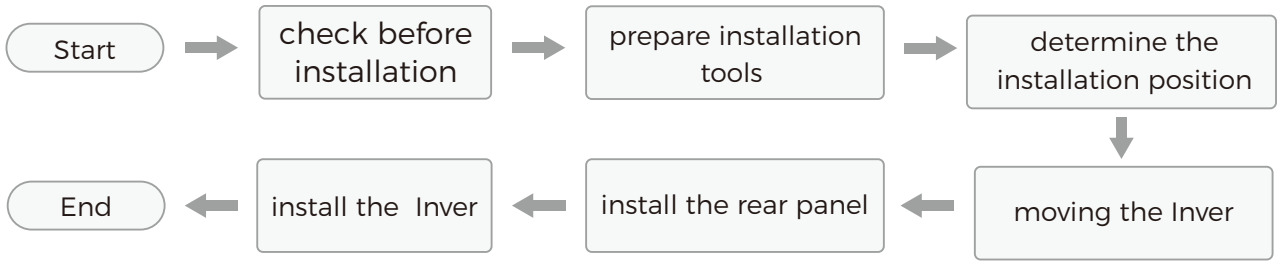
**CAUTION**

The enclosure and heat sink will get hot during operation, please do not mount the product at a easy to reach location.

**ATTENTION**

Consider the weight of this product when doing transport and moving.
Choose an appropriate mounting position and surface.
At least two persons for installation.

## 4.1 Installation Process




## 4.2 Checking Before Installation

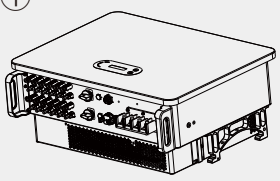
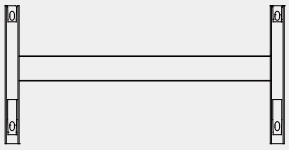
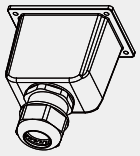
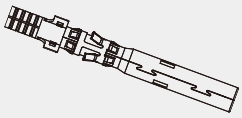
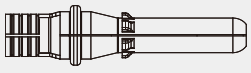
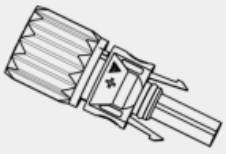
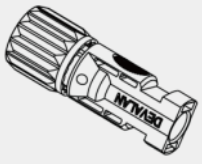
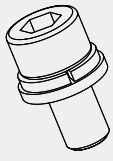
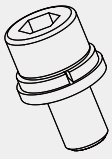
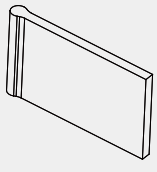
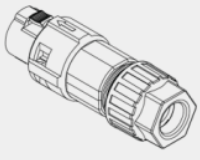
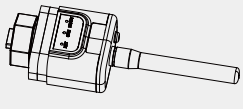
### Checking Outer Packing Materials

Before unpacking, please check the condition of the outer package materials if any damaged found, such as holes, cracks, please not unpack the product, contact your distributor immediately. Recommend installing the product within 24 hours after unpacking the package.

### Checking Deliverable

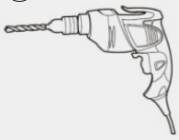
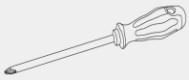
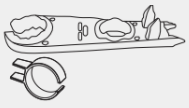
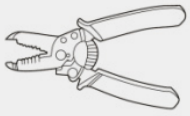
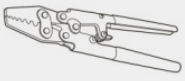
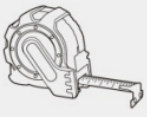
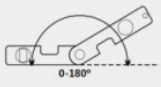
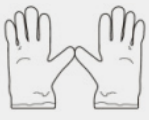
After unpacking, please check according to following table, to see whether all the parts were included in the packing, please contact your distributor immediately if anything missing or damage.

Figure 4-1Components and mechanical parts that inside the package

| | | | |
|---|---|---|---|
| ①  | SOFAR 60KTLX-G3<br>×1 | ②  | Rear Panel<br>×1 |
| ③  | AC waterproof cover<br>×1 | ④  | M8*80 expansion bolt<br>×4 |
| ⑤  | PV+ metal pin<br>×12 | ⑥  | PV- metal pin<br>×12 |
| ⑦  | PV+ input connector<br>×12 | ⑧  | PV- input connector<br>×12 |
| ⑨  | M4 cross screw (For locking the waterproof cover)<br>×6 pcs | ⑩  | M6*30 Hexagon screws (For locking the Rear Panel)<br>×2 |
| ⑪  | M6*12 Hexagon screws (For Grounding)<br>×1 pcs | ⑫  | Documents<br>×3 |
| ⑬  | Quality Certificate<br>×1 | ⑭  | AC terminal insulation partition<br>×5 |
| ⑬  | COM connector<br>×1 | ⑭  | USB WiFi Stick Logger<br>×1 |

## 4.3 Tools

Prepare tools required for installation and electrical connection as following table:
Table 4-2 Installation tools

| | | | |
|---|---|---|---|
| ①  | **Description:** Hammer Drill Recommend drill @ 10mm<br>**Function:** Used to drill holes on the wall | ②  | **Description:** Screwdriver<br>**Function:** Use to tighten and loosen screws when installing AC power cable Use to remove AC connectors from the product |
| ③  | **Description:** Removal Tool<br>**Function:** Remove PV Connector | ④  | **Description:** Wire Stripper<br>**Function:** Used to peel cable |
| ⑤  | **Description:** With an open end of larger than or greater than 32 mm<br>**Function:**<br>Used to tighten expansion bolts | ⑥  | **Description:** Rubber Mallet<br>**Function:** Used to hammer expansion bolts into holes |
| ⑦   | **Description:** M6<br>**Function:** M6 use to uninstall and install the front top cover and down cover | ⑧  | **Description:** Torque wrench<br>**Function:** Connect AC connector |
| ⑨  | **Description:** Crimping Tool<br>**Function:** Use to crimp cable on grid side, load side and CT extensive cable | ⑩  | **Description:** Multimeter<br>**Function:**Check grounding cable, PV positive and negative pole |
| ⑪  | **Description:** Marker<br>**Function:** Mark signs | ⑫  | **Description:** Measuring Tape<br>**Function:** Measure distance |
| ⑬   | **Description:** Level<br>**Function:** Ensure the rear panel is properly installed | ⑭  | **Description:** ESD gloves<br>**Function:** Installer wear when installing product |
| ⑮  | **Description:** Safety goggles<br>**Function:** Installer wear when installing product | ⑯  | **Description:** Mask<br>**Function:** Installer wear when installing product |

## 4.4 Determining the Installation Position

Select a appropriate location to install the product to make sure the inverter can work in a high efficiency condition. When selecting a location for the inverter, consider the following:
**Note:** Install vertical or backward tilt within 0–15°, Do not install forward or upside down!

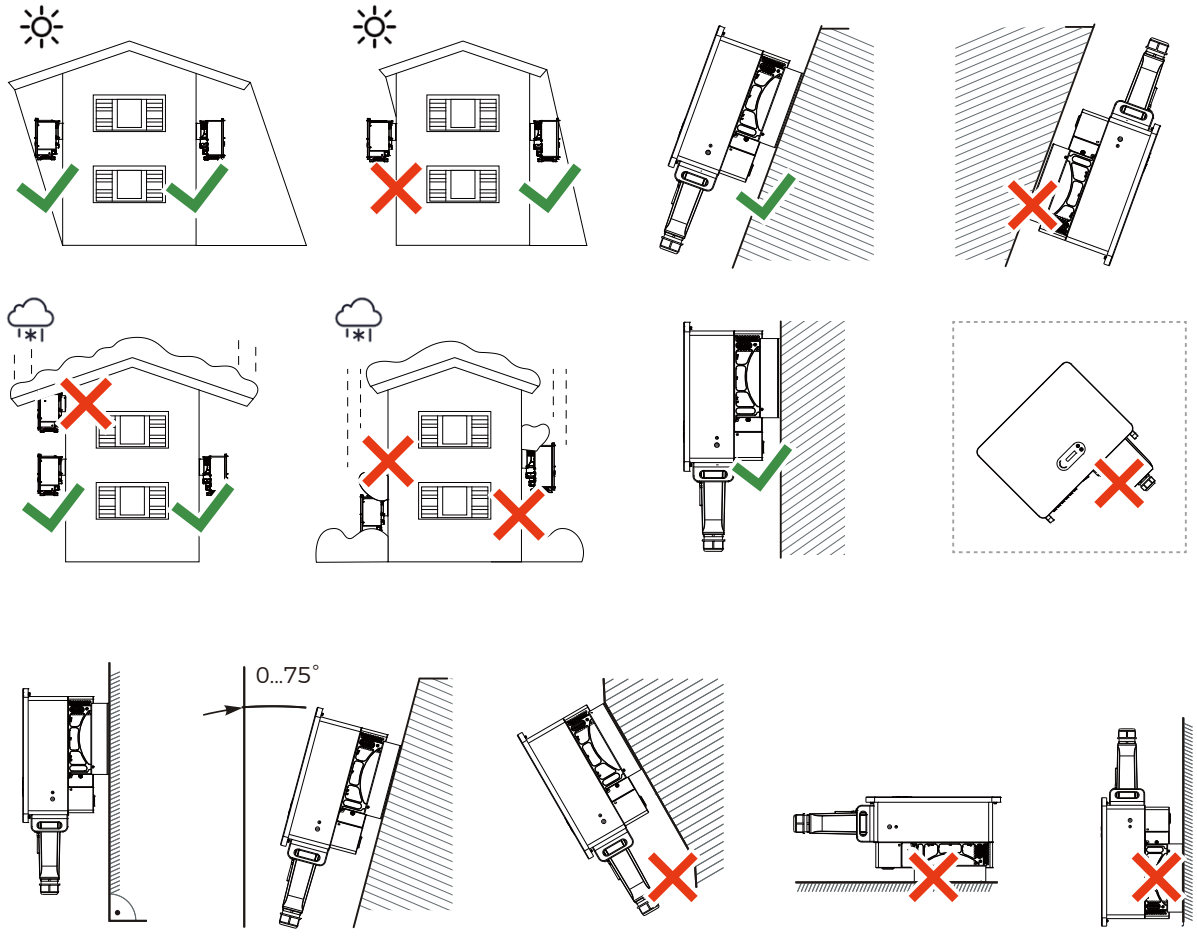



Figure 4-1 Installation Position Selection

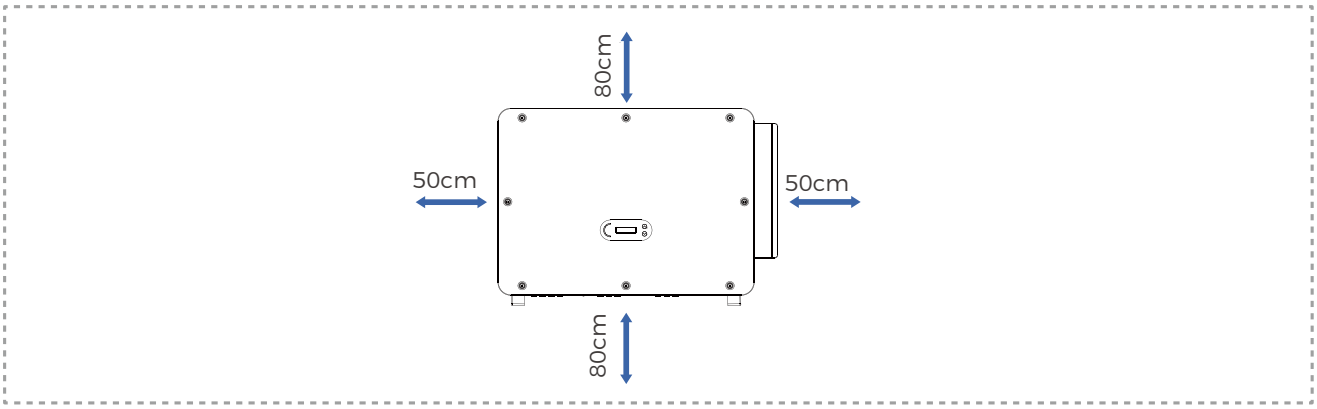



Figure 4-2 Clearance for single inverter

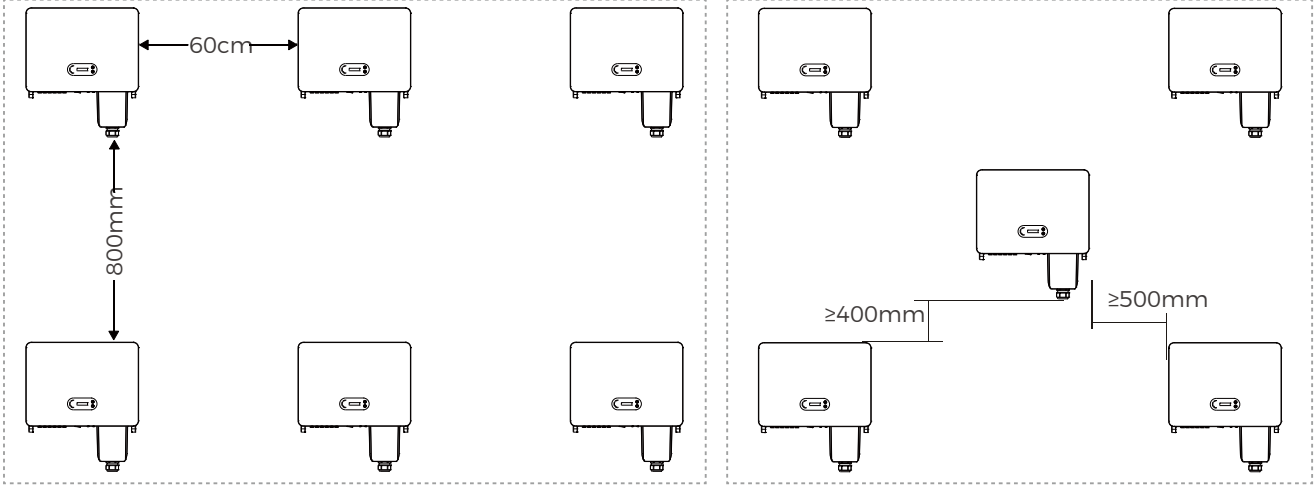



Figure 4-3 Clearance for multiple 60...80KTL-G3 inverters

## 4.5 Moving of inverter

### Manual handling

Unload the inverter from package, horizontally move to the install position. When open the package, at least two operator insert the hands into the slots on both side of the inverter and hold the handles.

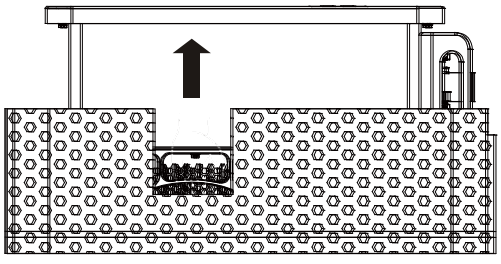


Figure 4-4 Move inverter from package

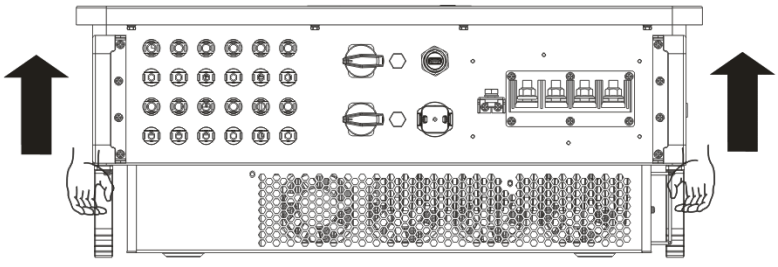


Figure 4-5 Move inverter from package(2)

**ATTENTION**

Inverter is heavy, attention to keep the balance when lift the inverter.

Dropped while being transported may cause injuries.

Do not put the inverter with wiring terminals contacting the floor because the power ports and signal ports are not designed to support the weight of the inverter

When place inverter on the floor, put it above foam or paper to avoid the damage of the shell of inverter.

# 4.6 Installation

## Installed on wall

**Step 1**: Placed the rear panel on the mounting wall, determine the mounting height of the bracket and mark the mounting poles accordingly. Drilling holes by using Hammer Drill, keep the hammer drill perpendicular to the wall and make sure the position of the holes should be suitable for the expansion bolts.

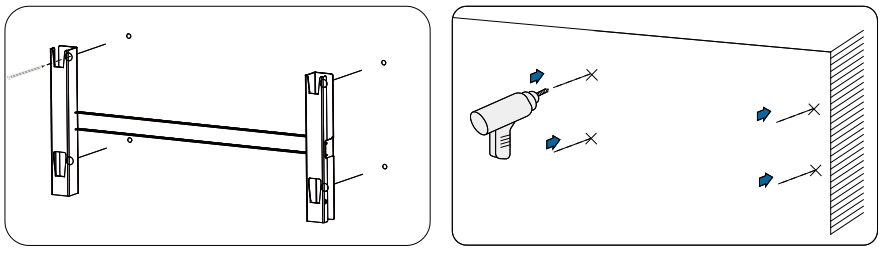


Figure 4-6 Drilling holes on the mounting wall

**Step 2**: Insert the expansion bolt vertically into the hole.

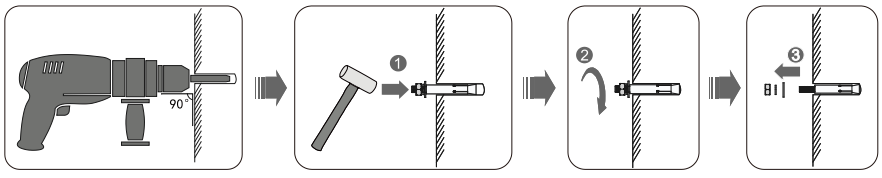



Figure 4-7 Screws into the holes

**Step 3**: Align the rear panel with the hole positions, fix the rear panels on the wall by tightening the expansion bolt with the nuts.

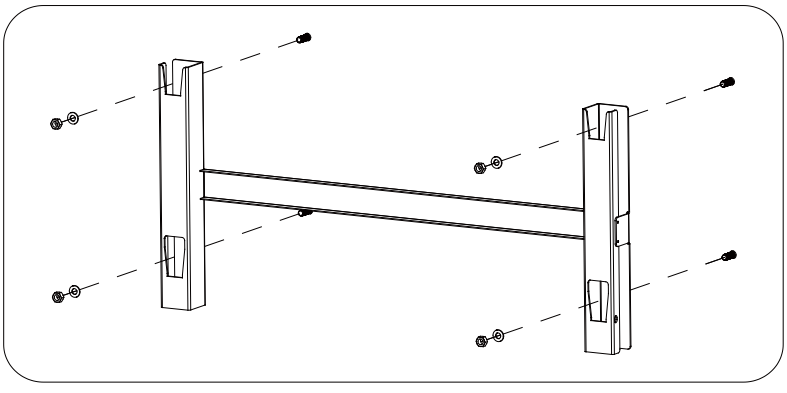


Figure 4-8 Install rear panel

**Step 4:** Lift the inverter and hang it on the rear panel, and fixing both side of inverter with M6 screw (accessories).

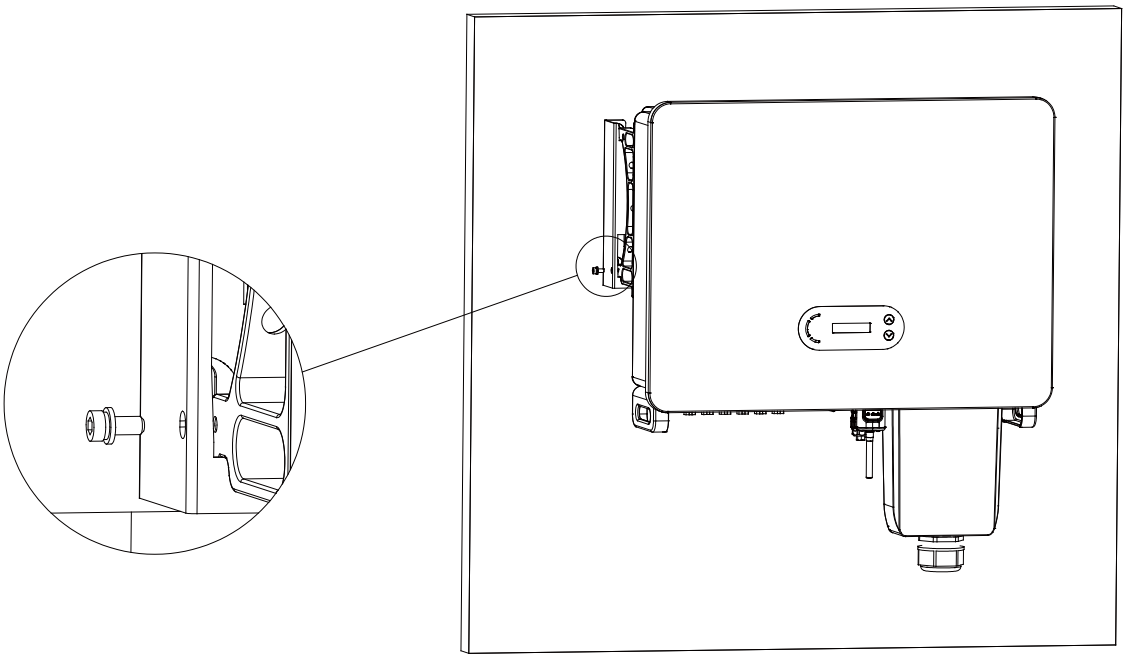


Figure 4-9 Fix inverter

# 5. Electrical Connection

## Outlines of this Chapter

This section introduces the electrical connection for the product. Please read the information carefully, it may helpful to understand the grounding wiring, DC input connection, AC output connection and communication connection.

## Caution:

Before performing electrical connections, ensure the DC switch is OFF and AC circuit breaker is OFF. Waiting 5 minutes for the capacitor to be electrically discharged.

**ATTENTION**

Installation and maintenance should be done by certified electrical engineer

**DANGER**

Before the electrical connection, use opaque material to cover the PV modules or disconnect PV string DC switch. PV arrays will produce dangerous voltage if it is exposure under sun

**NOTE**

For this product, the open circuit voltage of PV strings should not greater 1100V

The connected panel must meet the standard IEC61730A.

| Item / Model | IscPV(Maximum) | Maximum output current |
|---|---|---|
| SOFAR 60KTLX-G3 | 6*50A | 6*32A |
| SOFAR 80KTLX-G3 | 6*60A | 6*40A |

## 5.1 Electrical Connection

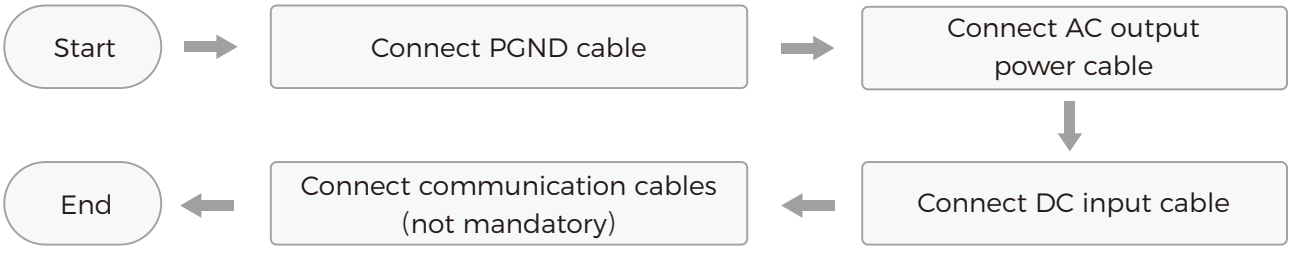



Figure 5-1 Flowchart for connecting cables to the inverter

## 5.2 Grounding Connection (PE)

Connect the inverter to the grounding electrode using ground cable.

**NOTE**

SOFAR 60...80KTLX-G3 is a transformerless inverter which requires the positive pole and negative pole of the PV array are NOT grounded. Otherwise, it will cause inverter failure. In the PV system, all non-current-carrying metal parts (such as mounting frame, combiner box enclosure, etc.) should be connected to earthed.

**Preparation: prepare the grounding cable (recommend 16mm² yellow-green outdoor cable and M8 OT Terminal)**

Procedure:

**Step 1:** Remove the insulation layer with an appropriate length using a wire stripper shown as figure 5-2

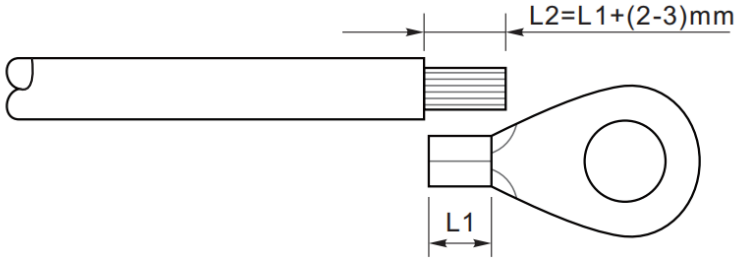



Figure 5-2 Grounding connection instruction (1)

**Note:** the length of L2 should 2...3mm higher than L1.

**Step 2:** Insert the exposed core wires into the OT terminal and crimp them by using a crimping tool, as shown as figure 5.3. Recommend using OT terminal: OT M6, Cable: ≥ 6mm².

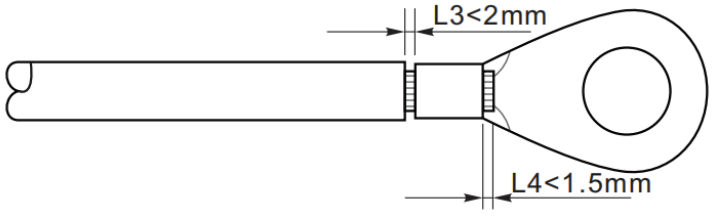



Figure 5-3 Grounding connection instruction (2)

**Note 1:** L3 is the length between the insulation layer of the ground cable and 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:** Tighten the OT terminal by using M6 screw. Recommend torque is 5-7N.m.

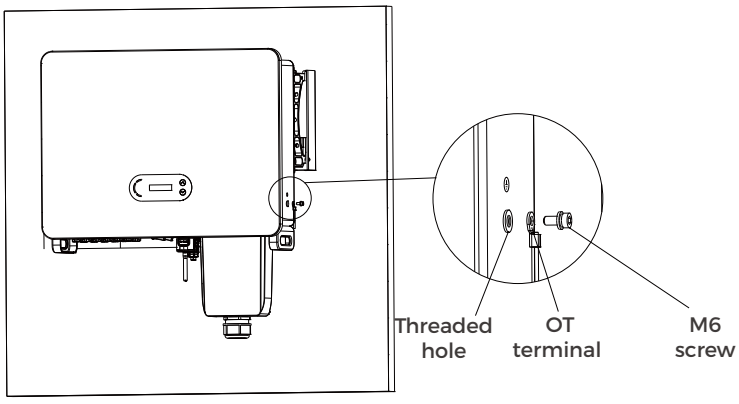



Figure 5-4 Inverter external grounding instruction diagram

## 5.3 Connect grid side of inverter(AC-Output)

SOFAR 60...80KTLX-G3 connect to utility grid by using AC power cable. The AC connection must meet the requirement of local grid operator.

**Caution**

Ban multiple Inverters use one circuit breaker
Ban connect loads between inverter and circuit breaker

Must use five core outdoor cable, the recommend AC cable and Residual current breaker (RCB) as below table 5-1:

| Item / Model | L/N Cross section area of Cu or Al cable ($mm^2$) | PE Cross section area of Cu or Al cable ($mm^2$) | Muti-core outdoor cable diameter (mm) | AC Circuit Breaker specification |
|---|---|---|---|---|
| SOFAR 60KTLX-G3 | 50...70 | 16...25 | ＜63 | 120A/380V/3P I△N=0.3A |
| SOFAR 80KTLX-G3 | 70...95 | 16...25 | ＜63 | 150A/380V/3P I△N=0.3A |

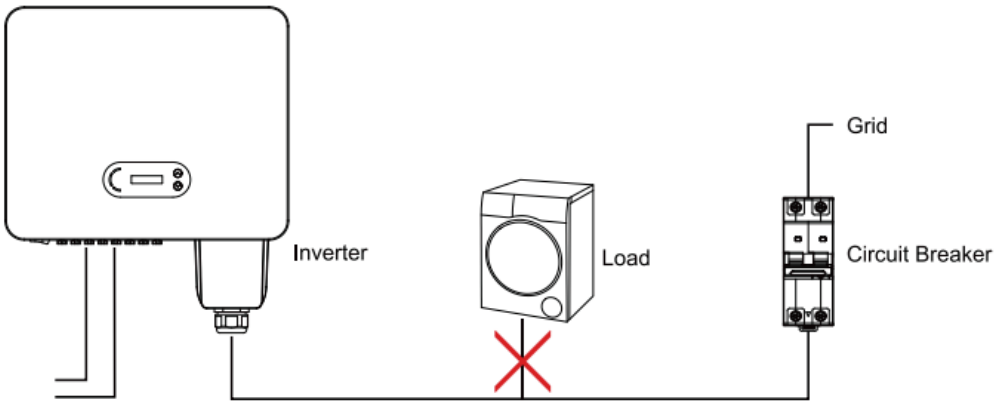



Figure 5-5 Incorrect connection between load and inverter

The resistance at connection point must less than 2Ω. In case to have a properly anti-islanding function, please choose the high-quality PV cable and ensure the power loss is less than 1%. Meanwhile, the inverter AC side to grid connection point must less than 100m. the relation between cable length, cross section area and power loss as below:

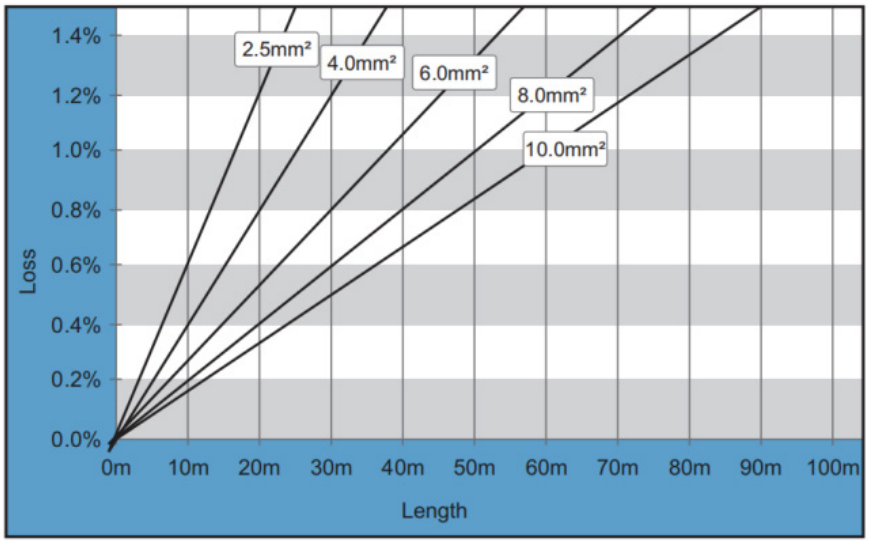



Figure 5-6 relation between cable length, cross section area and power loss

The AC output terminal of this product is equipped with high current 5-core terminal block and customized AC output waterproof cover, which can meet the IP65 level requirements after installation. AC cable need customer self connect:

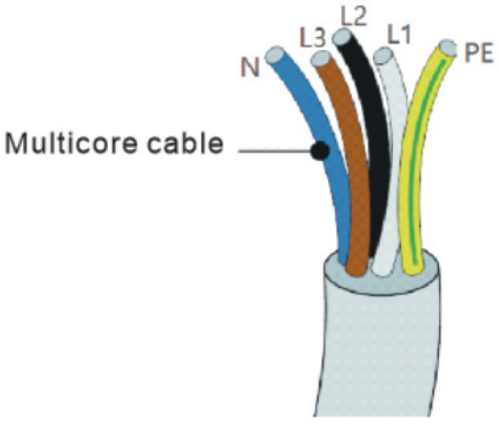



Figure 5-7 The equipment Multi-core Cable

**Wiring Procedure as following:**

**Step 1:** Remove the AC waterproof cover screw with a screwdriver, and take out the stopper in the PG waterproof joint.

**Step 2:** Select the appropriate cable diameter according to table 5-1, process the cable according to the following picture size requirements, and then pass through PG waterproof joint; The PE wire is connected to the grounding position of the container. External PE refer to Figure 5-4 Inverter external grounding instruction diagram.

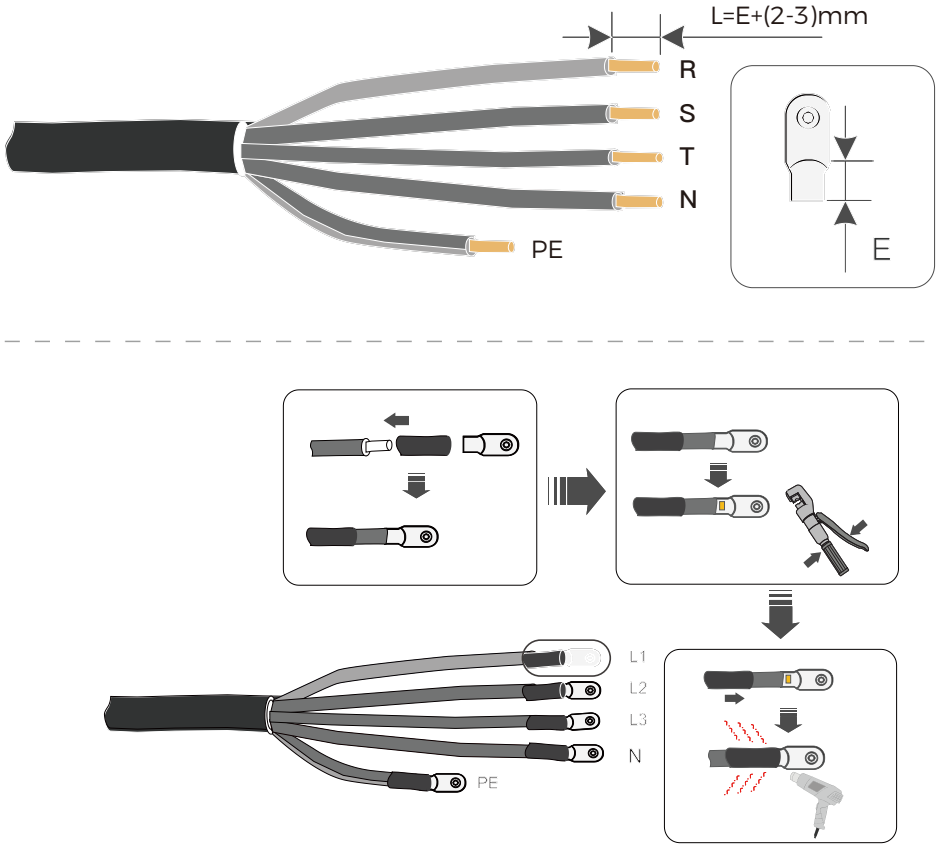



Figure 5-8 AC cable connection instruction diagram (1)

**Step 3:** After assembling the PG waterproof connector, connect the cable to the AC terminal block L1, L2, L3, N, PE contacts, and fasten them (8...12 N · m). Take out the AC terminal insulation partition, clamp the AC output wiring cover and screw on the AC wiring terminal (2...3 N · m).

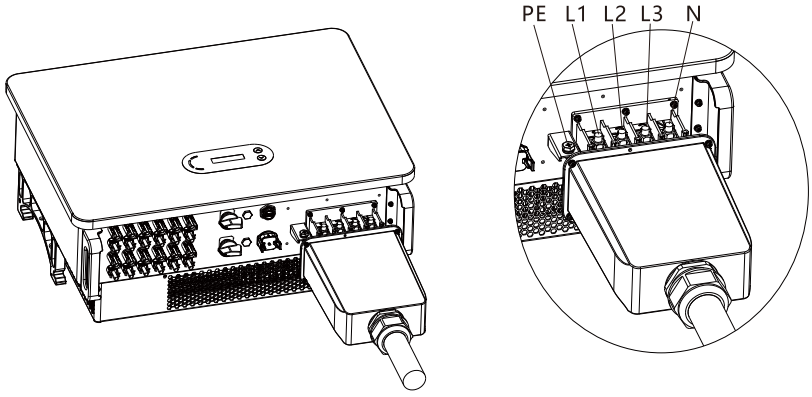



Figure 5-9 AC cable connection instruction diagram (2)

**OT/DT Requirement:**

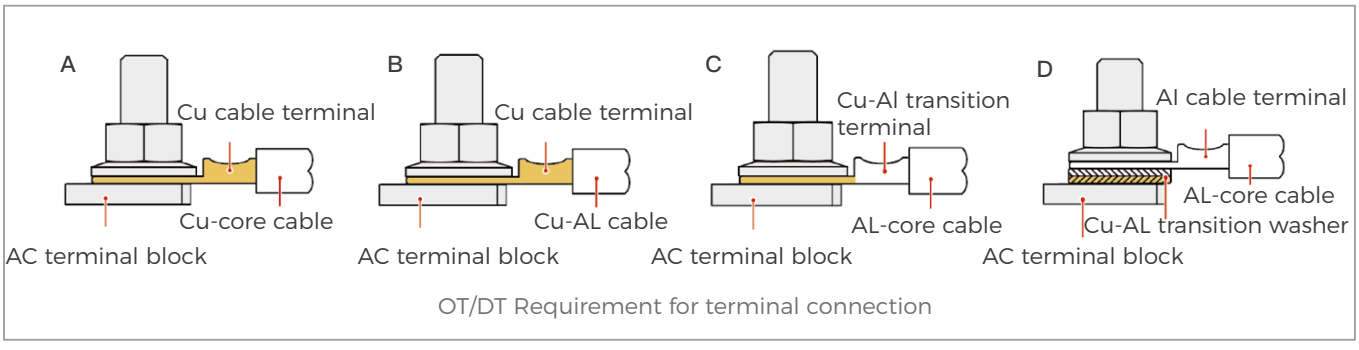
- When use copper core cable, please use copper terminal connector.
- When use copper clad aluminum cable, please use copper terminal connector.
- When use aluminum core cable, please use Copper and aluminum transition terminal connector or aluminum terminal connector.

**Note:**

It is strictly forbidden to connect the aluminum terminal block directly to the terminal block, otherwise it will cause electrochemical corrosion and affect the reliability of the cable connection.

When using copper-aluminum transition terminals, or aluminum terminal blocks with copper-aluminum transition gaskets, IEC61238-1 requirements are required.

When using copper-aluminum transition gaskets, pay attention to the front and back sides, ensure that the aluminum side of the gasket is in contact with the aluminum terminal block, and the copper side is in contact with the terminal block.




OT/DT Requirement for terminal connection

## 5.4 Connect PV side of inverter (DC-Input)

**Note:**

- Connecting PV strings into inverter must following the below procedure. Otherwise, any faulty cause by inappropriate operation will be including in the warranty case.
- Ensure the maximum short circuit current of PV strings should less than the maximum inverter DC current input. And three “DC switch” is in OFF position. Otherwise, it may cause high voltage and electric shock.
- Ensure PV array have good insulation condition in any time.
- Ensure same PV string should have the same structure, including: same model, same number of panels, same direction, same azimuth.
- Ensure PV positive connector connect to inverter positive pole, negative conenctor connect to inverter negative pole
- Please use the connectors in the accessories bag. The damage cause by incorrect is not including in the warranty.

Figure 5-2 Recommend DC cable size (maximum tolerance voltage >= 1100V PV cable)

| Copper cable cross section area ($mm^2$) | Cable OD (mm) |
|---|---|
| 2.5...6.0 | 6.0...9.0 |

**Step 1:** Find the metal contact pins in the accessories bag, connect the cable according below diagram (1.Positive cable, 2. negative cable);

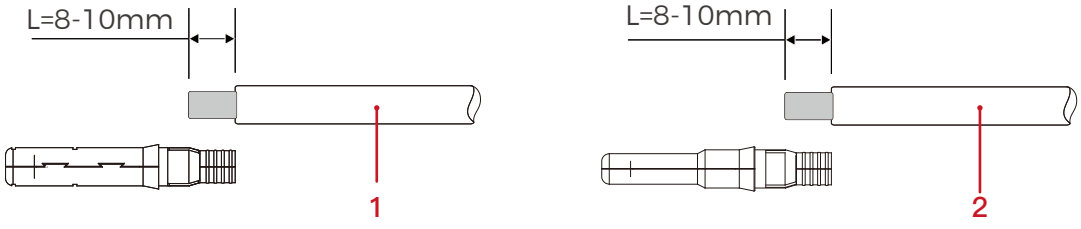



Figure 5-10 DC cable connection（1）

**Step 2:** Crimp the PV metal contact pin to the striped cable using a proper crimping pliers;

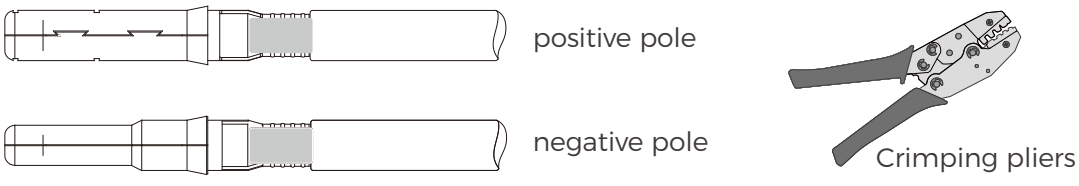



Figure 5-11 DC cable connection(2)

**Step 3:** Insert wire into the connector cap nut and assemble into the back of male or female plug, When you heard a "click", the pin tact assembly is seated correctly. (3. Positive connector, 4. Negative connector);

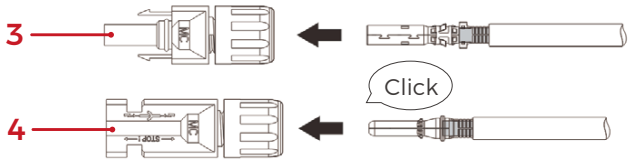



Figure 5-12 DC cable connection(3)

**Step 4:** Measure PV voltage of DC input with multimeter, verify DC input cable polar and connect DC connector with inverter until hearing a slight sound indicated connection succeed(5. Positive cable, 6. Negative cable).

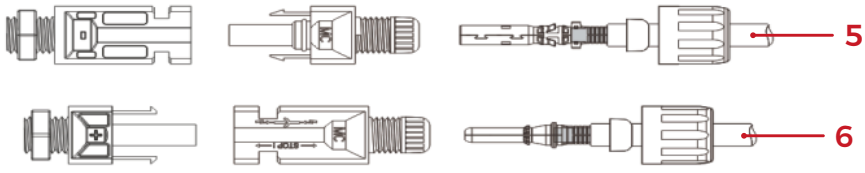



Figure 5-13 DC cable connection(4)

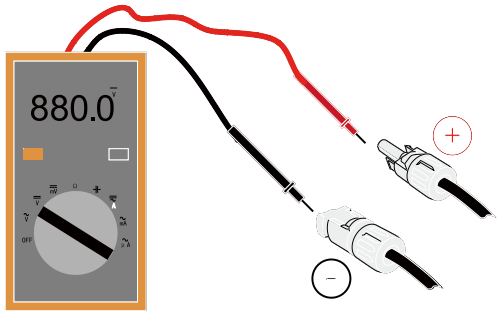



Figure 5-14 Use a multimeter to check the positive and negative electrodes

**Note:** Please use multimeter to make sure the PV array positive pole and negative pole!

**Dealing:** If need to remove the PV connector from inverter side, please use the Removal Tool as below diagram, move the connector gently.

| | |
|---|---|
| ⚠ Note | Before, moving the positive and negative connector, please make sure "DC Switch" is on OFF position. |

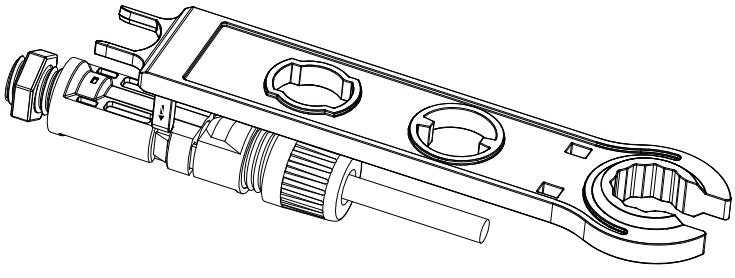


Figure 5-15 Removal DC connector

## 5.5 Wiring method recommended

The inverter has a total of 20 DC input terminals, of which the branch route of MPPT1...MPPT4 is controlled by DC SWITCH 1, the branch route of MPPT5...MPPT7 is controlled by DC SWITCH 2 and the branch route of MPPT8...MPPT10 is controlled by DC SWITCH 3.

It is recommended that all PV input terminals be evenly distributed on MPPT1...MPPT10 branches, and the maximum current of each MPPT is controlled at 40 A, and the maximum current of each MPPT branch is 20 A.

When the maximum current of each MPPT branch is 20 A, in order to give full play to the power generation capacity of the photovoltaic string and extend the service life of the inverter, when the number of input strings is 12...20 strings, the recommended connection method of DC input terminals is as follows:

| Enter the number of strings | Terminal selection |
|---|---|
| Six | MPPT1/MPPT2/MPPT3/MPPT4/MPPT5/MPPT6 are each connected to a string |
| Seven | MPPT1 is connected to two strings<br>MPPT2/MPPT3/MPPT4/MPPT5/MPPT6 are each connected to a string |
| Eight | MPPT1/MPPT2 are connected to two strings<br>MPPT3/MPPT4/MPPT5/MPPT6 are each connected to a string |
| Nine | MPPT1/MPPT2/MPPT3 are connected to two strings<br>MPPT4/MPPT5/MPPT6 are each connected to a string |
| Ten | MPPT1/MPPT2/MPPT3/MPPT4 are connected to two strings<br>MPPT5/MPPT6 are each connected to a string |
| Eleven | MPPT1/MPPT2/MPPT3/MPPT4/MPPT5 are connected to two strings<br>MPPT6 is connected to a string |
| Twelve | MPPT1/MPPT2/MPPT3/MPPT4/MPPT5/MPPT6 are connected to two strings |

**Notes:** PV1/PV2 two string voltages should be as consistent as possible, PV3/PV4、PV5/PV6、PV7/PV8、PV9/PV10、PV11/PV2、PV13/PV14、PV15/PV16、PV17/PV18、PV19/PV20 is the same.

## 5.6 Communication Connection

**Note:** When layout the wiring diagram, please separate the communication wiring and power wiring in case the signal be affected.

When layout the wiring diagram, please separate the communication wiring and power wiring in case the signal be affected.

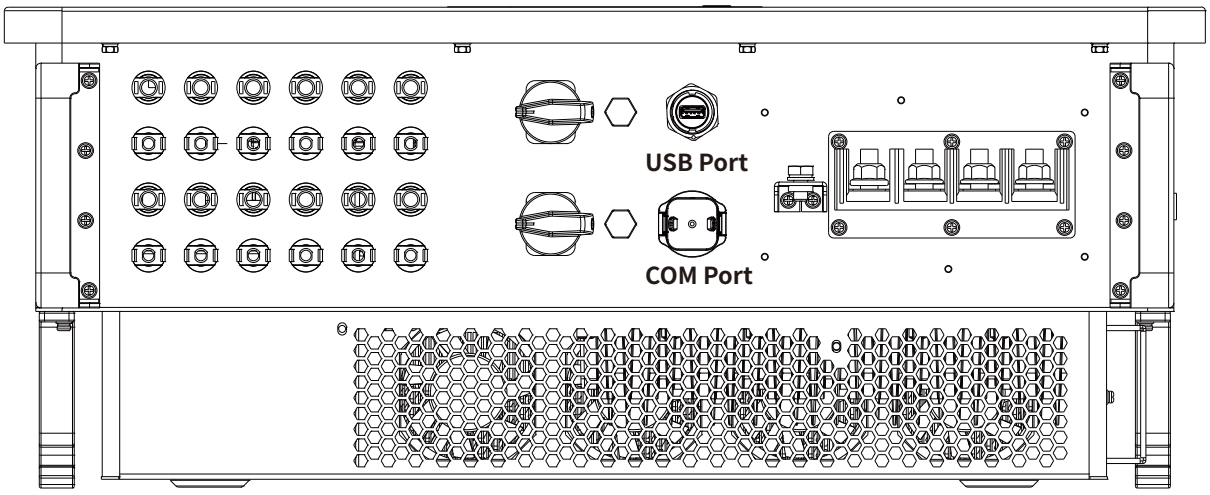


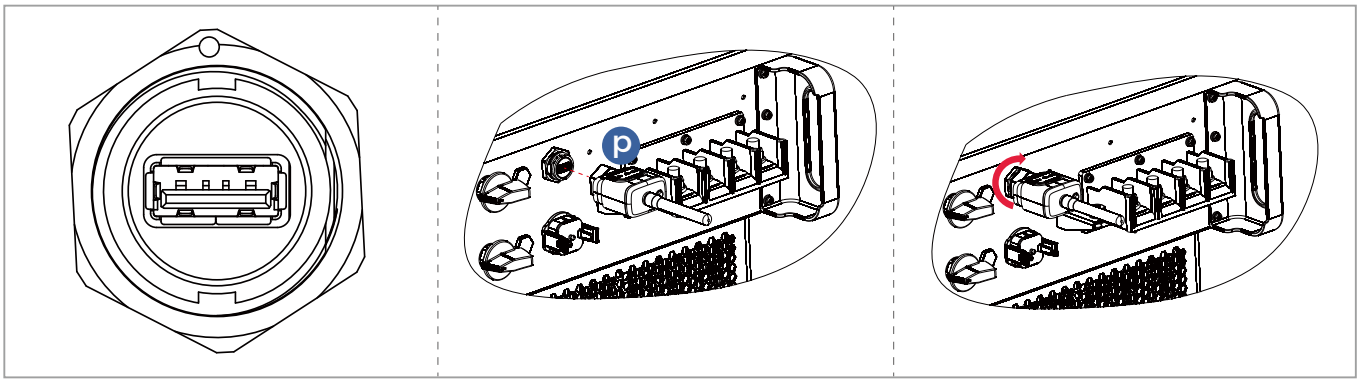

Figure 5-16 Communication connection Port

### 5.7.1 USB/WIFI Port

Port Description:

| | | |
|---|---|---|
| **USB port** | USB flash disk access | Use for updating the software and fault recording |
| | USB stick logger access | Use for remote data acquisition and upgrading of inverter |

**Procedure:**



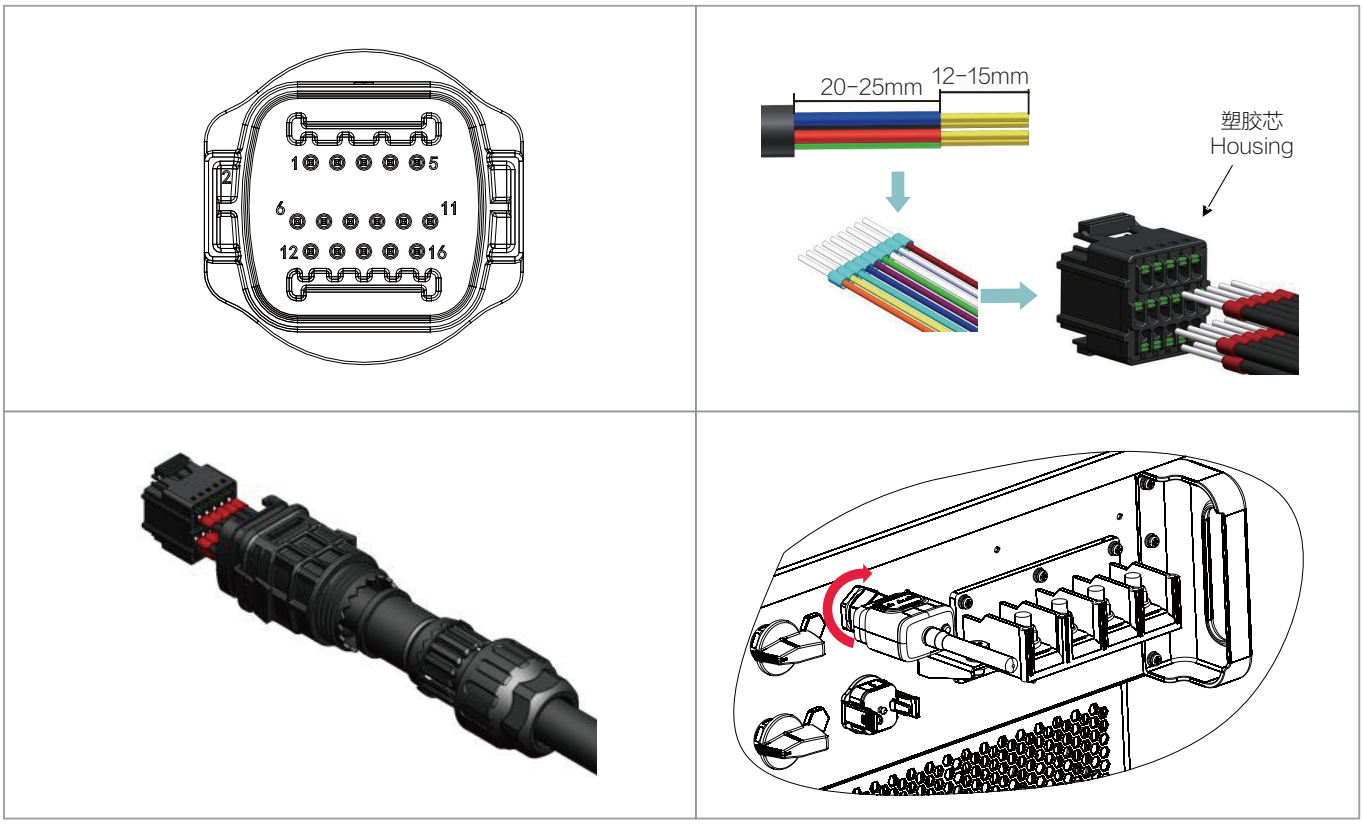
For details, please refer to the user manual of USB stick logger.

### 5.6.2 COM—Multi function communication port

**Port Description**:

| PIN | Define | Function | Note |
|---|---|---|---|
| 1 | RS485A | RS485 signal+ | Wire connection monitoring or multiple inverter monitoring |
| 2 | RS485A | RS485 signal+ | |
| 3 | RS485B | RS485 signal- | |
| 4 | RS485B | RS485 signal- | |
| 5 | Electric meter RS485A | Electric meter RS485 signal+ | |
| 6 | Electric meter RS485B | Electric meter RS485 signal- | |
| 7 | GND.S | Communication | |
| 8 | DRM0 | ground | DRMS port |
| 9 | DRM1/5 | Remote shunt down | |
| 10 | DRM2/6 | | |
| 11 | DRM3/7 | | |
| 12 | DRM4/8 | | |
| 13-16 | Blank PIN | N/A | DRMS port |

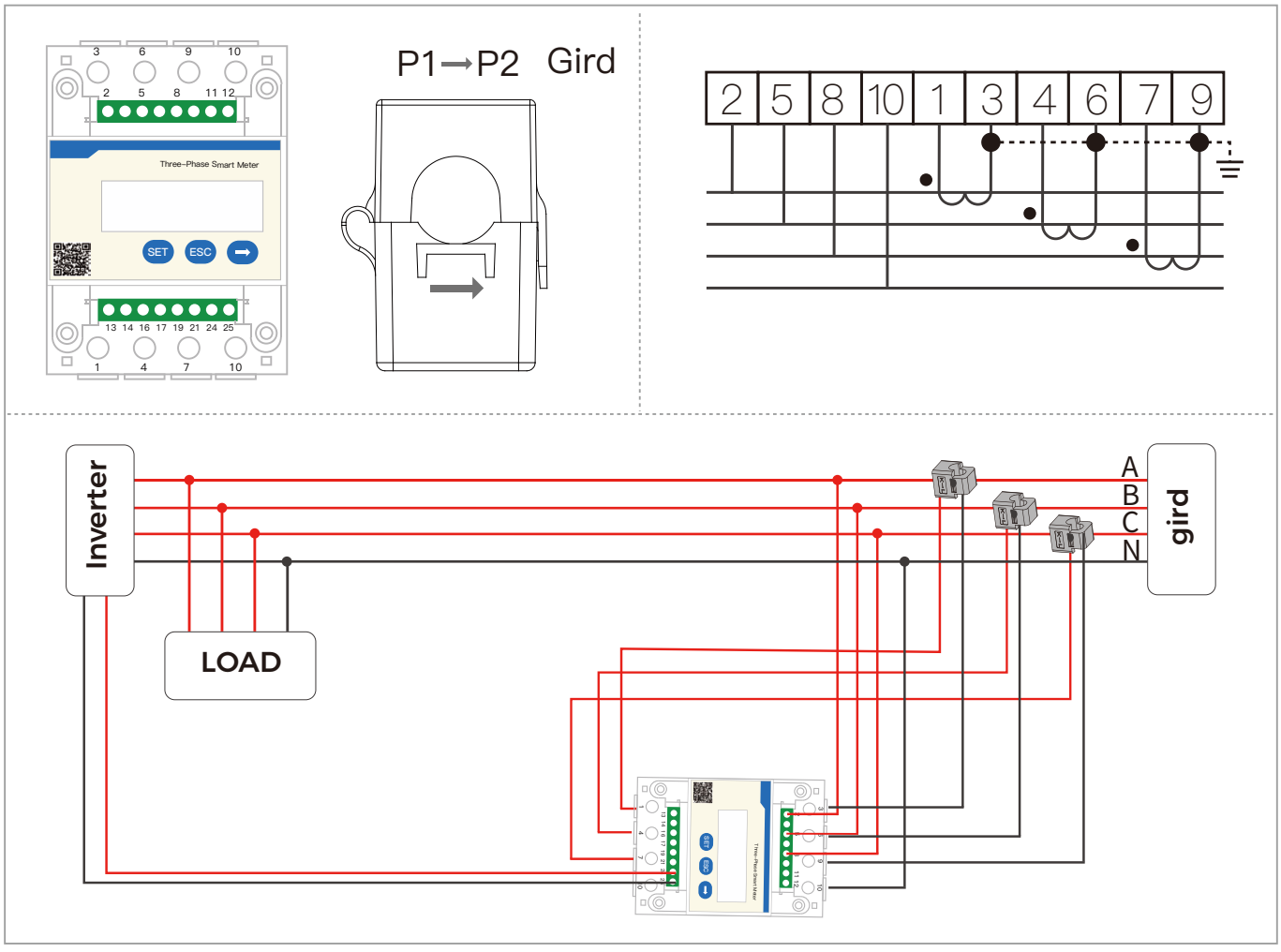
Procedure:



## 5.7 Feed-in limitation connecting line

With this function, one single inverter can dynamically limit its output power to keep the feed-in power at the point of common coupling (PCC) below a defined setpoint.
To use the feed-in limitation function, an external SmartMeter has to be connected to measure the power flow at the PCC:

The arrow of the CT's must point to the grid.



# 6. Commissioning of inverter

### Outlines this Chapter

Introduce SOFAR 60...80KTLX-G3 safety inspection and start processing

## 6.1 Cable Connection Inspection

**ATTENTION**

For first time operation, check the AC voltage and DC voltage are within the acceptable range

**AC grid connection**
Use multimeter to confirm that three lines and PE line are connect correctly.

**DC PV connection.**
Use multimeter to confirm that positive pole and negative pole of PV strings, and the Voc of each string is lower than the inverter max DC input.

## 6.2 Start Inverter

**Step 1:** Turn ON the DC switch.

**Step 2:** Turn ON the AC circuit breaker.

**Step 3:** Set the PV input mode. Parallel mode needs to be set via the LCD when there is a parallel connection of MPPTs or when a PV busbar is used.

When the DC power generated by the solar array is enough, the SOFAR 60...80KTLX-G3 inverter will start automatically. Screen showing"normal"indicates correct operation.

**NOTE 1:** Choose the correct country safety code.

**NOTE 2:** 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 fault, please refer to Section 9.1 of this manual —— trouble shooting for help.

# 7.SOFAR monitor APP

## Overview

SOFAR Monitor is a new efficient, safe and fast intelligent photovoltaic monitoring software that completes near-end debugging and remote monitoring settings. From the creation of the power station to the operation and maintenance and management to achieve integrated services, it is easy to grasp the power station information. In the power station information, not only can the monitored data information be displayed through digital and dynamic flow diagrams, but also real-time alarm notification of faults, bringing a simpler and more convenient management experience.

## 7.1 Software Downloads

①Download and install through the App Market.

Android mobile phone users: Search for "SOFAR Monitor" in the Android application market (Pea Pod, Baidu, etc.).

iPhone users search for "SOFAR Monitor" in the APP Store to download and install.

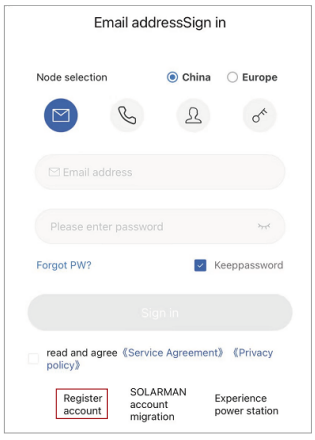
②You can also download "SOFAR Monitor" by scanning the QR code below.

SOFAR Monitor download

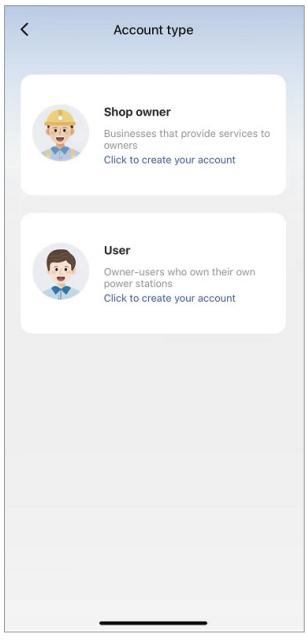
## 7.2 Account registration and login

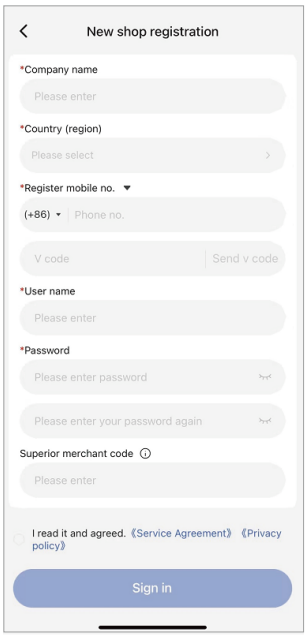
### 7.2.1 Registered

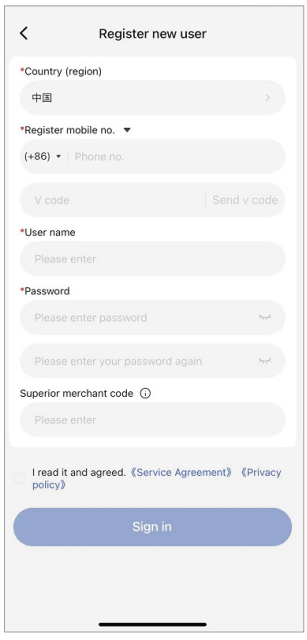
If you do not have an account with SOFAR  Monitor, please click {Register Account} at the bottom of the login screen to register.



On the "Account Type" screen, click "I am a merchant", and then follow the prompts to complete the user account registration.



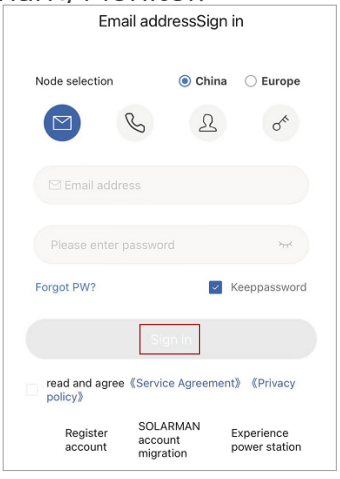

At present, mobile phone number or email account is supported for account registration; Please follow the prompts to correctly enter your mobile phone number or email account, set a login password and verify it;

After successful verification, please check the box in the agreement column to indicate that you have agreed to the Service Agreement and Privacy Agreement;

Note!For account security reasons, passwords should be 8-25 digits plus letters, no spaces, and no username. After you fill in the information correctly, click the "Register Now" button to automatically log in to the account.

## 7.2.2 login

If you already have a SOFAR Monitor account, log in directly on the login page. You can log in by mobile phone number, email address, and username. After logging in successfully, go to the homepage of Shouhang Monitor.



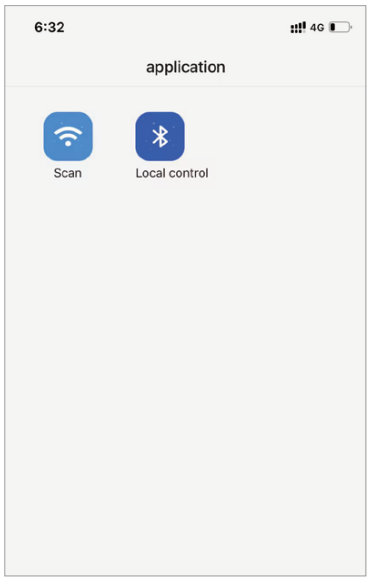
## 7.3 Local Monitoring

Please turn on your phone's Bluetooth in advance before using this function.

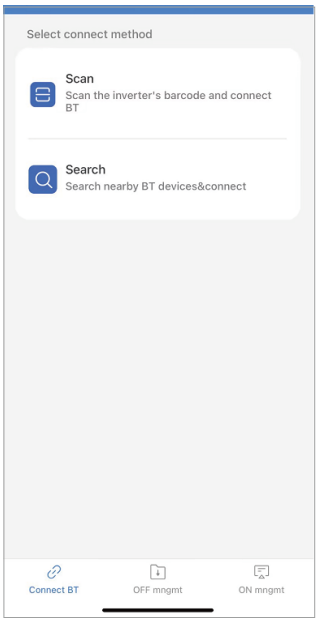
### 7.3.1 Bluetooth connection

Selection of connection method

**1:** Entering the application interface, enter the sidebar, and click [Local Control], in the page, you can connect the mobile phone and the inverter through Bluetooth communication to realize near-field operation and maintenance, debugging, upgrade and safety import and other functions.




**2:** Enter the "Connect Bluetooth" interface, there are two ways to connect, namely scan and search.

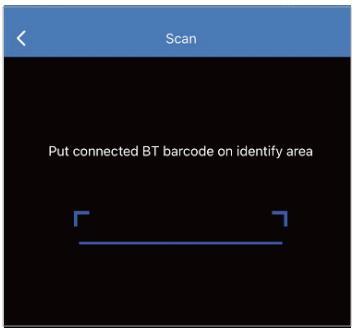


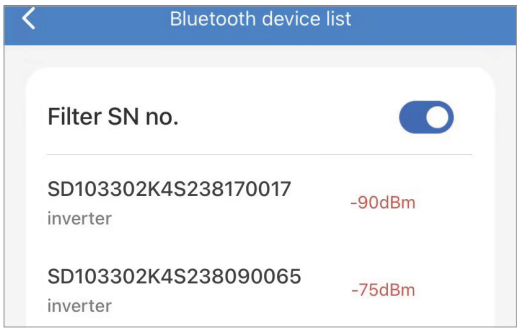
**①Sweep:**

Click [Scan] will prompt you to turn on the camera on the phone, scan the SN number barcode on the inverter to start searching for the Bluetooth of the machine, and automatically connect and enter the home page after searching for the Bluetooth.

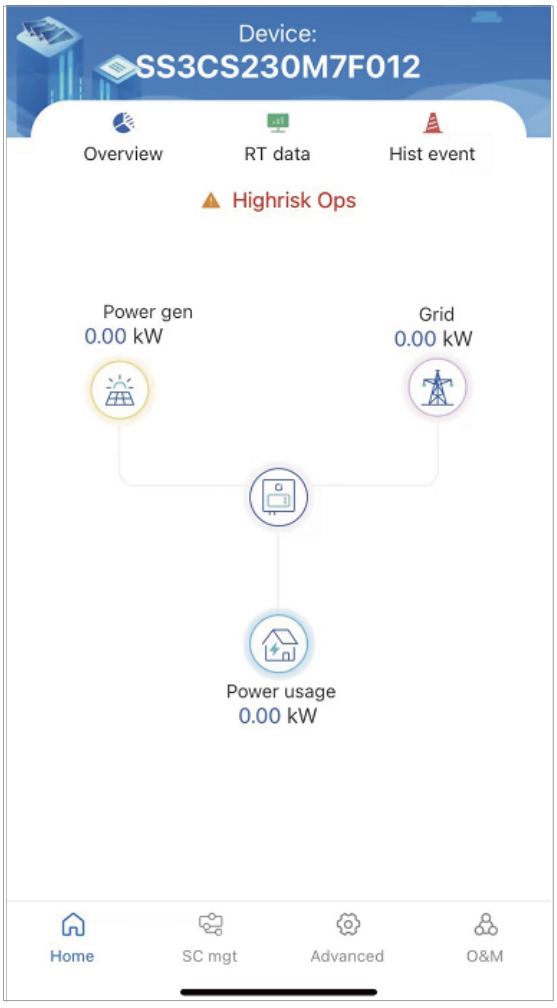
**②Search:**

After clicking [Search], it will jump to the list of Bluetooth devices and start searching for nearby available Bluetooth devices, and select the device that needs to be connected according to the serial number of the inverter.



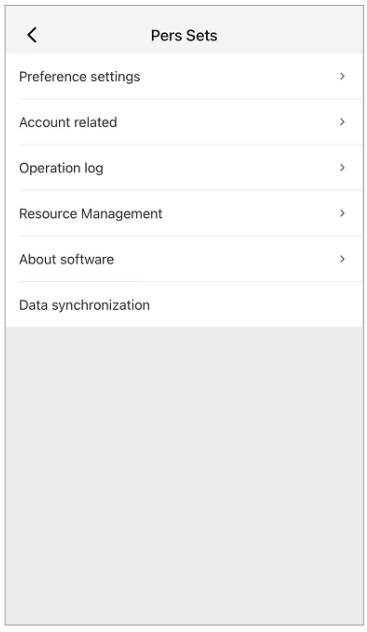



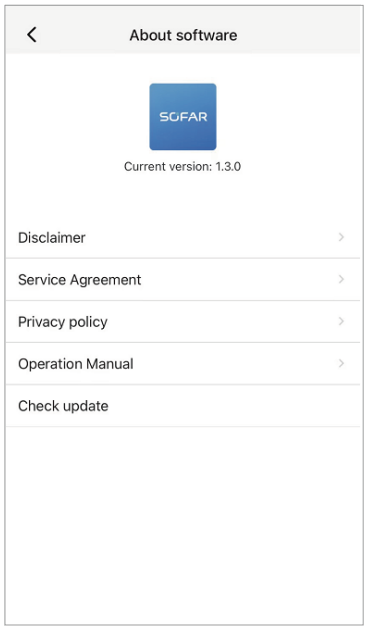

After successfully connecting the device, enter the Bluetooth homepage.



## 7.4 APP operation manual

For APP function introduction and specific operation, please click [≡] in the upper left corner of the page, enter the sidebar, and click [Personal Settings]>> [About Software] >> [Operation Manual] to view detailed operation information.



# 8. Operation interface

## Outlines of this chapter

This section introduces the display, operation, buttons and LED indicator lights of SOFAR 60...80KTLX-G3 Inverter.

## 8.1 Operation and Display Panel

**Buttons and Indicator lights**


**Button:**

"∧" Short press UP button = go up; "∧" Long press UP button = exit current interface;
"v" Short press DOWN button = go down; "v"Long press DOWN button = enter current interface

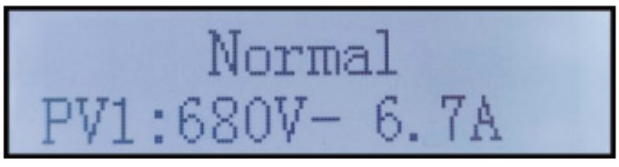
**Indicator Lights:**

"GFI" Red light ON = GFCI faulty; "Normal" Green light flashing = counting down or checking
"Normal" Green light ON = Normal; "Alarm" Red light ON= recoverable or unrecoverable faulty

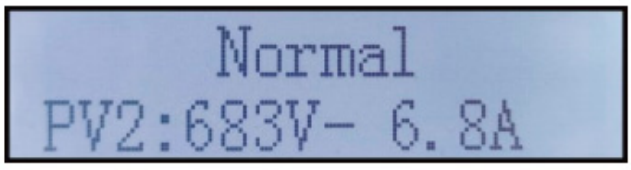
## 8.2 Standard Interface

LCD interface indicated inverter status, alarm information, communication connection, PV input current and voltage, grid voltage,current and frequency, today generation, total generation.

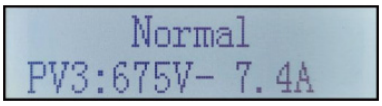
1.Inverter working status, PV 1 input voltage and current



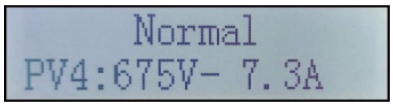

2.Inverter working status, PV 2 input voltage and current



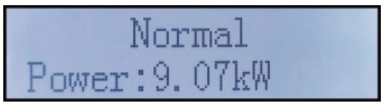
3. Inverter working status, PV 3 input voltage and current



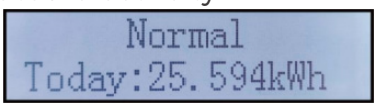

4.Inverter working status, PV 4 input voltage and current



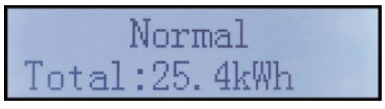

5.Inverter working status, PV generated power



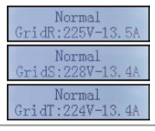

6.Inverter working status, today generated electricity



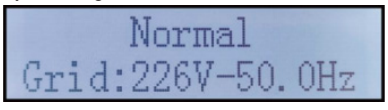

7.Inverter working status, total generated electricity



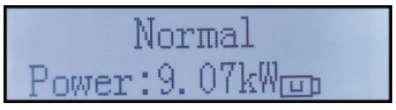

8.Inverter working status, grid voltage and current



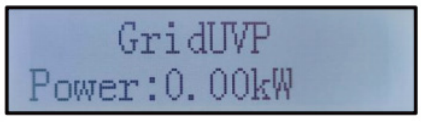

9.Inverter working status, grid voltage and frequency



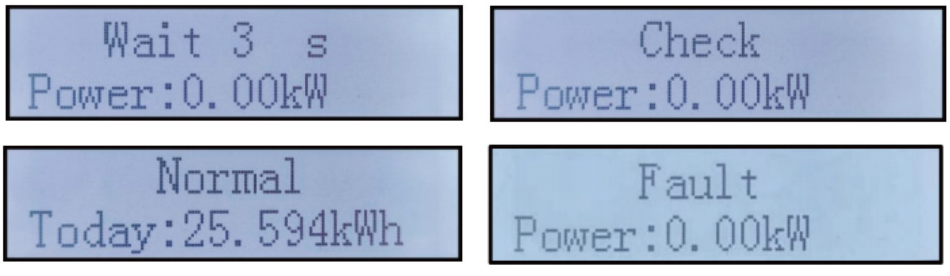

10.Inverter working status, USB status




11.Inverter faulty alarm




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




Inverter states includes: wait, check, normal and fault

**Wait:** Inverter is waiting to Check State when reconnect the system. In this state, 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 well 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.

11.When the control board and communication board connection fails, the LCD display interface as shown in the figure below.


## 8.3 Main Interface

Long press the down button under standard interface to enter into main interface, Main interface including below information:

| | Long press DOWN button |
|---|---|
| Normal | 1.Enter Setting |
| | 2.Event List |
| | 3.SystemInfo |
| | 4.Display Time |
| | 5.Software Update |

**A.Enter setting Interface as below:**

| | Long press DOWN button | | |
|---|---|---|---|
| Enter Setting | 1.Set time | 8.Set Inputmode | 17.SetSafety |
| | 2.Clear Energy | 9.Set Language | |
| | 3.Clear Events | 12.IV Curve Scan | |
| | 4.Set Safety Para | 13.Set Power Derate | |
| | 5.On-Off Control | 14.PCC Select | |
| | 6.Set Energy | 15.Reflux Mode | |
| | 7.Set Address | 16.InputSafety | |

Long press the button to Enter the main interface of "1.Enter Setting" and long press to enter the setting menu. You can select the content you want to set by short pressing the button.

**Note1:** Some settings need to enter the password (the default password is 0001), when

entering the password, short press to change the number, long press to confirm the current number, and long press after entering the correct password.If "password error, try again" appears, you will need to re-enter the correct password.

**1.Set Time**
Set the system time for the inverter.

**2.Clear Energy**
Clean the inverter of the total power generation.

**3.Clear Events**
Clean up the historical events recorded in the inverter.

**4.Set Safety Para**
The SafeCode refers to clause 17 and can skip this step directly. Long press button, enter interface, save the specific file into USB and insert USB into inverter communication port.

**5.5.On-Off Control**
Inverter on-off local control.

**6.Set Energy**
Set the total power generation. You can modify the total power generation through this option.

**7.Set address**
Set the address (when you need to monitor multiple inverters simultaneously), Default 01.

**8.Set Input mode**
SOFAR 60~80KTLX-G3 has 6 MPPTs, these MPPTs can work interdependently, or divided into parallel mode. User can change the setting according to the configuration.

**9.Set Language**
Set the inverter display language.

**10.Set Anti Reflux**
Enable or disable Reflux. If disabled, the output will be the rated power. If enable, continue to set the Reflux power, the maximum power is the rated power. And continue to select PCC sampling points.
The reflux power value set by the anti-reflux function is the maximum power value allowed to be transmitted to the grid.

**11.Logic interface**
Enable or disable logical interfaces. It is use for below standard Australia (AS4777), Europe General (50549), German(4105).

**12.IV Curve Scan**
Shadow scanning, when the component is blocked or abnormal, causing multiple power peaks, by enabling this function, the peak point of maximum power can be tracked.

**13.Set Power Derate**
Enable or disable the power derate function of the inverter, and set the derate ratio.

**14.PCC Select**
Select the parallel network sampling method.

**15.Reflux Mode**
Select reflux mode.

**16.InputSafety**
To upgrade the InputSafety, perform this step, if you do not upgrade, skip this step. Put the safety library upgrade file "60-80KW-G3_SAFETY.bin" in the root directory/ firmware folder of the USB flash drive and insert the USB flash drive into the inverter. The upgrade will take place automatically after the inverter is enabled.

**17.SetSafety**
Press the up and down keys to select the safety standard region, press and hold the down key to enter the standard selection under the region, and then turn the page to select the safety standard.

**（B）Event List：**

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. Long press the button and short press the button to turn the page in standard interface, then enter into “2.Event List” interface.

| 2.Event List | |
|---|---|
| 1. Current event | 2. History event |
| Fault information | 001 ID04 06150825(Display the event sequence number, event ID number, and event occurrence time ) |

(C)“SystemInfo” Interface as below

| | Long press DOWN button | | |
|---|---|---|---|
| SystemInfo | 1.Inverter Type | 8.Modbus Address | 15.MPPT Scan |
| | 2.Serial Number | 9.Input Mode | 16.Force Control |
| | 3.General Soft Version | 10.Remote State | 17.Power Derate |
| | 4.General Hard Version | 11.Reflux Enable | 18.PCC Select |
| | 5.Country Code | 12.Reflux Power | 19.Reflux Mode |
| | 6.Safety Software Version | 13.DRM0 | |
| | 7.Safety Hardware Version | 14.DRMn | |

The user enters the main menu by long pressing the DOWN button, short press and turns the page to select menu contents, then long press the button to enter "3. SystemInfo". Turning the page down can select the system information to view.

**D.Display Time**

Long press the button and short press the button to turn the page in the standard user interface to enter into “4.Display Time”,then long press the button to display the current system time.

**E.Software Update**

User can update software by USB flash drive , SOFARSOLAR will provide the new update software called firmware for userif it is necessary,The user needs to copy the upgrade file to the USB flash drive.

## 8.4 Updating Inverter Software

SOFAR 60...80KTLX-G3 inverter offer software upgrade via USB flash drive to maximize inverter performance and avoid inverter operation error caused by software bugs.

**Step 1:** Turn off AC circuit breaker and DC switch, remove the communication board cover as below figure. If the RS485 line has been connected, please release the waterproof nut first and make sure the communication line is no longer the force. Then remove the waterproof cover.

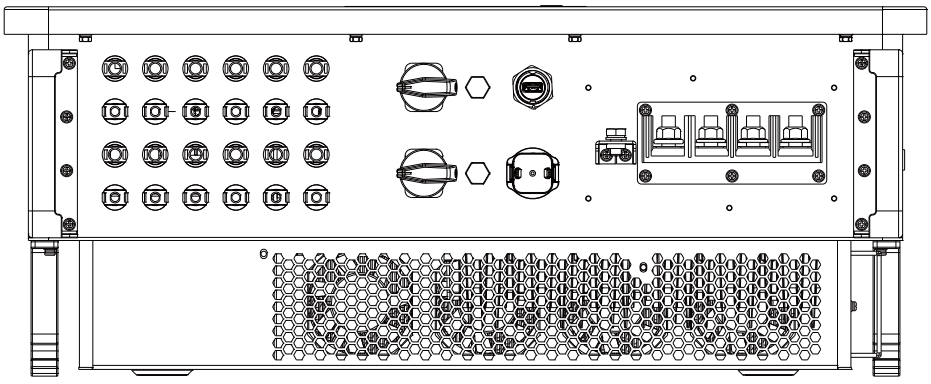


Figure 8-1 Remove communication broad cover

**Step 2:** Insert USB into computer;

**Step 3:** SOFARSOLAR service team will send the software code to user, After user receive the file, please decompressing file and cover the original file in USB flash drive.

**Step 4:** Insert USB drive into the USB port of inverter;

**Step 5:** 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 6:** Input the password,if password is correct,and then begin the update process,the original password is 0715.

**Step 7:** 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"UpdateDSP2 Fail".

**Step 8:** If Fail,please turn off the DC switch, wait for the LCD screen turn off, then turn on the DC switch again,then Continue to update from step 5.

**Step 9:** 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.

# 9. Trouble shooting and maintenance

## 9.1 Troubleshooting

This section describes the potential errors for this product. Please read carefully for the following tips when doing the troubleshooting:

1)Check the warning message or faulty codes on the inverter information panel

2)If not any error code display on the panel, please check the following lists:

- Is inverter be installed in a clean, dry, ventilated environment?
- Is the DC switch turn off?
- Are the cable cross section area and length meet the requirement?
- Are the input and output connection and wiring in good condition?
- Are the configuration settings correctly for the particular installation?

This section contains the potential errors, resolution steps, and provide users with troubleshooting methods and tips

The process to check the event list can refers to Manual Chapter 7.3 (B)

Table 9-1 Even list

| Code | Name | Description | Solution |
|---|---|---|---|
| ID001 | GridOVP | The grid voltage is too high | If the alarm occurs occasionally, the possible cause is that the electric grid is abnormal occasionally. Inverter will automatically return to normal operating status when the electric grid's back to normal.<br>If the alarm occurs frequently, check whether the grid voltage/frequency is within the acceptable range. If yes, please check the AC circuit breaker and AC wiring of the inverter.<br>If the grid voltage/frequency is NOT within the acceptable range and AC wiring is correct, but the alarm occurs repeatedly, contact 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. |
| ID002 | GridUVP | The grid voltage is too low | |
| ID003 | GridOFP | The grid frequency is too high | |
| ID004 | GridUFP | The grid frequency is too low | |
| ID005 | GFCI | Charge Leakage Fault | Check for inverter and wiring. |
| ID006 | OVRT | OVRT function is faulty | If the alarm occurs occasionally, the possible cause is that the electric grid is abnormal occasionally. Inverter will automatically return to normal operating status when the electric grid's back to normal.<br>If the alarm occurs frequently, check whether the grid voltage/frequency is within the acceptable range. If yes, please check the AC circuit breaker and AC wiring of the inverter.<br>If the grid voltage/frequency is NOT within the acceptable range and AC wiring is correct, but the alarm occurs repeatedly, contact technical support to change the grid over-voltage, under-voltage, over-frequency, |
| ID007 | LVRT | LVRT function is faulty | |
| ID008 | IslandFault | Island protection error | |
| ID009 | GridOVPInstant1 | Transient overvoltage of grid voltage 1 | |
| ID010 | GridOVPInstant2 | Transient overvoltage of grid voltage 2 | |

| Code | Name | Description | Solution |
|---|---|---|---|
| ID011 | VGridLineFault | Power grid line voltage error | under-frequency protection points after obtaining approval from the local electrical grid operator. |
| ID012 | InvVoltFault | Inverter voltage error | Internal faults of inverter, switch OFF inverter, wait for 5 minutes, then switch ON inverter. Check whether the problem is solved.<br>If no, please contact technical support. |
| ID017 | HwADErrIGrid | Power grid current sampling error | |
| ID018 | HwADErrDCI(AC) | Wrong sampling of dc component of grid current | |
| ID019 | HwADErrVGrid(DC) | Power grid voltage sampling error (DC) | |
| ID020 | HwADErrVGrid(AC) | Power grid voltage sampling error (AC) | |
| ID021 | HwGFCIFault(DC) | Leakage current sampling error(DC) | |
| ID022 | HwGFCIFault(AC) | Leakage current sampling error(AC) | |
| ID024 | HwADErrIdc | Dc input current sampling error | |
| ID029 | ConsistentGFCI | Leakage current consistency error | |
| ID030 | ConsistentVgrid | Grid voltage consistency error | |
| ID031 | ConsistentDCI | DCI consistency error | |
| ID033 | SpiCommFault(DC) | SPI communication error (DC) | |
| ID034 | SpiCommFault(AC) | SPI communication error (AC) | |
| ID035 | SChip_Fault | Chip error (DC) | |
| ID036 | MChip_Fault | Chip error (AC) | |
| ID037 | HwAuxPowerFault | Auxiliary power error | |
| ID041 | RelayFail | Relay detection failure | Internal faults of inverter, switch OFF inverter, wait for 5 minutes, then switch ON inverter. Check whether the problem is solved.<br>If no, please contact technical support. |
| ID042 | IsoFault | Low insulation impedance | Check the insulation resistance between the photovoltaic array and ground (ground), if there is a short circuit, the fault should be repaired in time. If not solved, please contact SOFARSOLAR technical support. |

| Code | Name | Description | Solution |
|---|---|---|---|
| ID043 | PEConnectFault | Ground fault | Check ac output PE wire for grounding. If not solved, please contact SOFARSOLAR technical support. |
| ID044 | PvConfigError | Error setting input mode | Check the input mode (parallel/independent mode) Settings for the inverter. If not solved, please contact SOFARSOLAR technical support. |
| ID045 | CDTisconnect | CT Fault | Please check the wiring of input, output and communication according to the user's manual. If the use method is not ruled out, please contact SOFARSOLAR technical support.. |
| ID046 | ReversalCon nection | Input reverse connection error | |
| ID047 | ParallelFault | Paralle lFault | |
| ID048 | SNTypeFault | SN doesn't match Type | It is internal fault of inverter. |
| ID049 | Reserved | Reserved | |
| ID050 | TempErrHeatSink1 | Radiator 1temperature protection | Ensure the installation position and installation method meet the requirements 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. Check whether the inverter has dust and dust, whether there are foreign matters blocking the fan at the air inlet. If so, please improve the ventilation and heat dissipation of the environment. It is recommended that the inverter should be cleaned once every half year or one year. |
| ID051 | Reserved | Reserved | |
| ID052 | Reserved | Reserved | |
| ID053 | Reserved | Reserved | |
| ID054 | Reserved | Reserved | |
| ID055 | Reserved | Reserved | |
| ID057 | TempErrEnv1 | Ambient temperature 1 protection | |
| ID058 | Reserved | Reserved | |
| ID059 | TempErrInv1 | Module 1temperature protection | |
| ID060 | Reserved | Reserved | |
| ID061 | Reserved | Reserved | |

| Code | Name | Description | Solution |
|---|---|---|---|
| ID065 | BusRmsUnbalance | Unbalanced bus voltage RMS | Internal faults of inverter, switch OFF inverter, wait for 5 minutes, then switch ON inverter. Check whether the problem is solved.<br>If not, please contact SOFARSOLAR technical support. |
| ID066 | BusInstUnbalance | The transient value of bus voltage is unbalanced | |
| ID067 | BusUVP | Bus undervoltage during grid connection | If the configuration of the PV array is correct,could be the sun irradiation is too low. Once sun irradiation back to normal, inverter will work back normal |
| ID068 | BusZVP | Bus voltage low | Internal faults of inverter, switch OFF inverter, wait for 5 minutes, then switch ON inverter. Check whether the problem is solved.<br>If no, please contact technical support. |
| ID069 | PVOVP | PV over-voltage | |
| ID070 | Reserved | Reserved | |
| ID071 | LLCBusOVP | LLC BUS overvoltage protection | |
| ID072 | SwBusRmsOVP | Inverter bus voltage RMS software overvoltage | |
| ID073 | SwBusInstantOVP | Inverter bus voltage instantaneous value software overvoltage | |
| ID081 | Reserved | Reserved | |
| ID082 | DciOCP | Dci overcurrent protection | |
| ID083 | SwOCPInstant | Output instantaneous current protection | |
| ID084 | SwBuckBoostOCP | BuckBoost software flow | |
| ID085 | SwAcRmsOCP | Output effective value current protection | |
| ID086 | SwPvOCPInstant | PV overcurrent software protection | |
| ID087 | IpvUnbalance | PV flows in uneven parallel | |
| ID088 | IacUnbalance | Unbalanced output current | |
| ID097 | HwLLCBusOVP | LLC hardware overvoltage | |

| Code | Name | Description | Solution |
|---|---|---|---|
| ID098 | HwBusOVP | Inverter bus hardware overvoltage | |
| ID099 | HwBuckBoostOCP | BuckBoosthardware overflows | |
| ID100 | Reserved | Reserved | |
| ID102 | HwPVOCP | PV hardware overflows | |
| ID103 | HwACOCP | Ac output hardware overflows | |
| ID105 | MeterCommFault | Meters communication fault | Internal faults of inverter, switch OFF inverter, wait for 5 minutes, then switch ON inverter. Check whether the problem is solved.<br>If not, please contact SOFARSOLAR technical support. |
| ID106 | SNMachineFault | Serial number model error | |
| ID110 | Overload1 | Reserved | |
| ID111 | Overload2 | Reserved | |
| ID112 | Overload3 | Reserved | |
| ID113 | OverTempDerating | Overtemperature derating | Ensure the installation position and installation method meet the requirements 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. Check whether the inverter has dust and dust, whether there are foreign matters blocking the fan at the air inlet. If so, please improve the ventilation and heat dissipation of the environment. It is recommended that the inverter should be cleaned once every half year or one year. |
| ID114 | FreqDerating | Frequency derating | |
| ID115 | FreqLoading | Frequency loading | |
| ID116 | VoltDerating | Voltage derating | |
| ID117 | VoltLoading | Volatge loading | |

| Code | Name | Description | Solution |
|---|---|---|---|
| ID121 | SpdFail(DC) | Lightning protection fault(DC) | |
| ID122 | SpdFail(AC) | Lightning protection fault(AC) | |
| ID124 | Reserved | Reserved | Internal faults of inverter, switch OFF inverter, wait for 5 minutes, then switch ON inverter. Check whether the problem is solved.<br>If not, please contact SOFARSOLAR technical support. |
| ID125 | Reserved | Reserved | |
| ID129 | unrecoverHwAcOCP | Output hardware overcurrent permanent failure | |
| ID130 | unrecoverBusOVP | Permanent Bus overvoltage failure | |
| ID131 | unrecoverHwBusOVP | Busovervoltage hardware permanent fault | |
| ID132 | unrecoverIpv Unbalance | PV unbalance current permanent fault | |
| ID134 | unrecoverAc OCPInstant | Output transient overcurrent permanent failure | |
| ID135 | unrecoverIac Unbalance | Output current imbalance permanent fault | |
| ID137 | unrecoverPv ConfigError | Input mode setting error permanent failure | Internal faults of inverter, switch OFF inverter, wait for 5 minutes, then switch ON inverter. Check whether the problem is solved.<br>If not, please contact SOFARSOLAR technical support. |
| ID138 | unrecoverPV OCPInstant | Input overcurrent permanent fault | |
| ID139 | unrecoverHwPVOCP | Input hardware overcurrent permanent failure | |
| ID140 | unrecoverRelayFail | Relay permanent fault | |
| ID141 | unrecoverVbus Unbalance | Bus Unbalanced permanent fault | |
| ID142 | LightningProtection FaultDC | DC SPD failure | |
| ID143 | LightningProtection FaultAC | AC SPD failure | |
| ID145 | USBFault | USB fault | |

| Code | Name | Description | Solution |
|---|---|---|---|
| ID146 | WifiFault | Wifi fault | Internal faults of inverter, switch OFF inverter, wait for 5 minutes, then switch ON inverter. Check whether the problem is solved.<br>If not, please contact SOFARSOLAR technical support. |
| ID147 | BluetoothFault | Bluetooth fault | |
| ID148 | RTCFault | RTC clock failure | |
| ID149 | CommEEPROMFault | Communication board EEPROM error | |
| ID150 | FlashFault | Communication board FLASH error | |
| ID152 | SafetyVerFault | The software version is inconsistent with the safety version | |
| ID153 | SciCommLose(DC) | SCI communication error (DC) | |
| ID154 | SciCommLose(AC) | SCI communication error (AC) | |
| ID155 | SciCommLose(Fuse) | SCI communication error (Fuse) | |
| ID156 | SoftVerError | Inconsistent software versions | |
| ID161 | ForceShutdown | Force shutdown | |
| ID162 | RemoteShutdown | Remote shutdown | |
| ID163 | Drms0Shutdown | Drms0 shutdown | |
| ID165 | RemoteDerating | Remote derating | |
| ID166 | LogicInterfaceDerating | Logic interface derating | |
| ID167 | AlarmAntiReflux | Anti refluxderating | |

| Code | Name | Description | Solution |
|---|---|---|---|
| ID169 | FanFault1 | Fan 1 fault | Check whether the inverter has dust and dust, whether there are foreign matters blocking the fan at the air inlet. If so, please improve the ventilation and heat dissipation of the environment. It is recommended that the inverter should be cleaned once every half year or one year. |
| ID170 | FanFault2 | Fan 2fault | |
| ID171 | FanFault3 | Fan 3 fault | |
| ID172 | FanFault4 | Fan 4 fault | |
| ID173 | FanFault5 | Fan 5 fault | |
| ID174 | FanFault6 | Fan 6 fault | |
| ID193-ID224 | StringFuse_Fault0-31 | String fuse open ircuit alarm | Internal faults of inverter, switch OFF inverter, wait for 5 minutes, then switch ON inverter. Check whether the problem is solved. If not, please contact SOFARSOLAR technical support. |
| ID225-ID240 | Reserved | Reserved | / |

# 10. Fan maintenance and replacing

Inverters generally do not need any daily or routine maintenance. But ensure heat sink should not be blocked by dust, dirt or any other items.Before the cleaning, make sure that the DC SWITCH is turned OFF and the circuit breaker between inverter and electrical grid is turned OFF. Wait at least for 5 minutes before the Cleaning.

**Inverter cleaning**

Clean the inverter using an air blower and a dry, soft cloth or a soft bristle brush. Do NOT clean the inverter with water, corrosive chemicals, cleaning agents etc.

**Cleaning the heat sink**

In order to help guarantee correct long-term operation of the inverter, make sure that there is sufficient space for ventilation around the heat sink. Check the heat sink for blockages (dust, snow etc.) and remove them if present. Clean the heat sink using an air blower and a dry, soft cloth or a soft bristle brush. Do NOT clean the heat sink with water, corrosive chemicals, cleaning agents etc.

**Fan maintenance**

Fans must be cleaned and maintained regularly for both performance and safety concerns.

**NOTE**

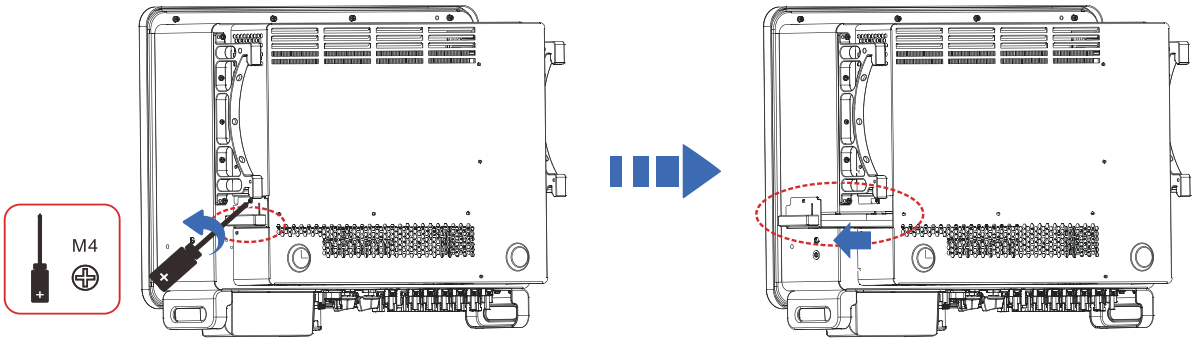
Defective or dirty fans can reduce the performance of the inverter Broken or faulty fans may cause cooling issues, which may lead to limited Broken or faulty fans may cause cooling issues, which may lead to limited.
lead to limited▶ Clean fans regulary.

## 10.1 Fan maintenance

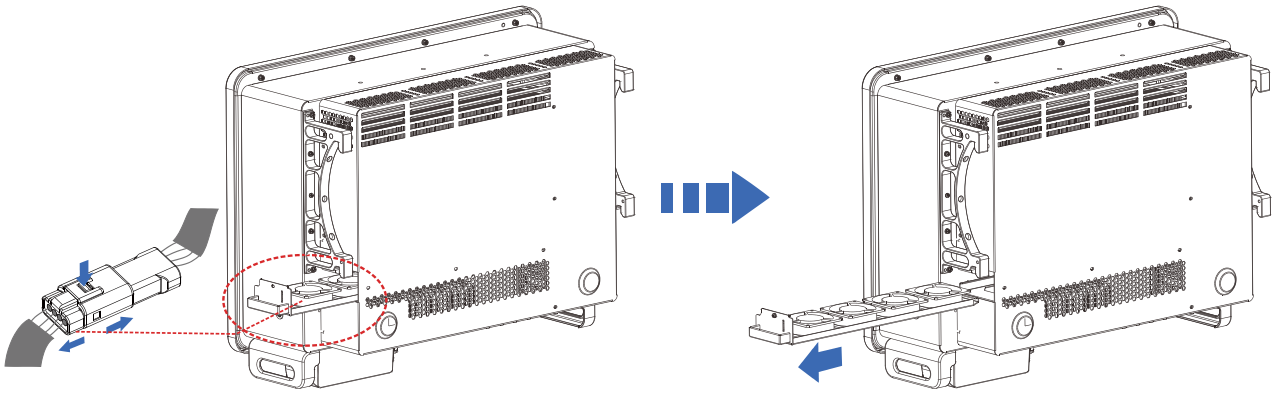
**Follow below steps for maintenance:**

1. Before replacing a fan, power f the inverter.
2. When replacing a fan, use insulation tools and wear personal protective devices.

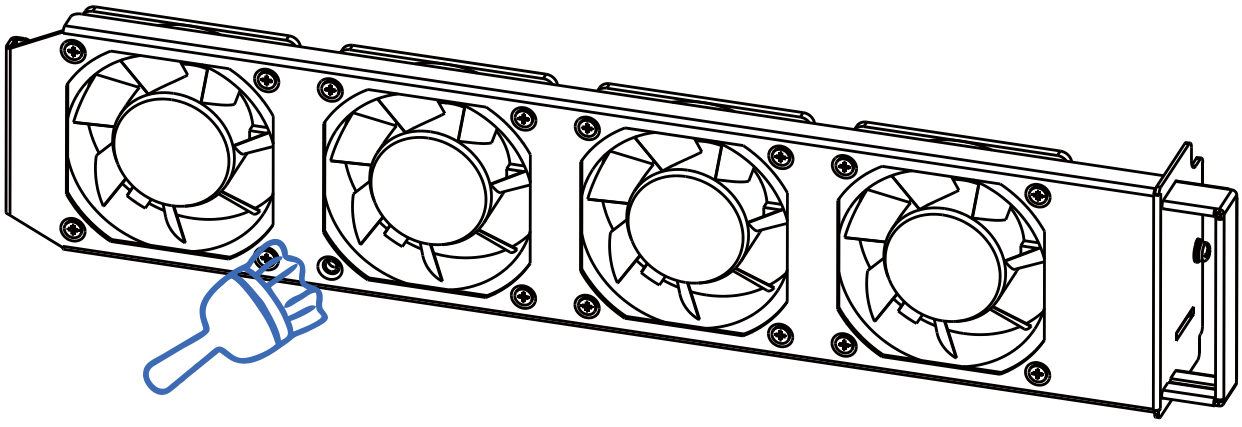
**Step 1:** Remove the screw on the fan tray and save it, Extract the fan bracket about 5-10cm.



**Step 2:** Cut the ties holding the fan cable, unplug the connection terminals, and pull out the fan bracket.



**Step 3:** Use a soft-bristled brush or vacuum cleaner to clean dust and debris from the surface of the fan.



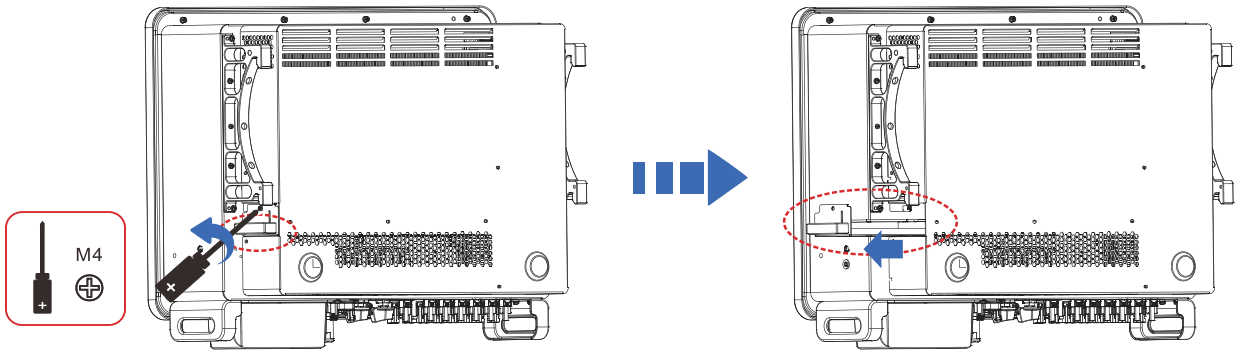
**Step 4:** Follow step 2 to align the fan bracket with the mounting position, push in the fan bracket and connect the connection terminals.

## 10.2 Replacing a Fan

**Follow below steps for maintenance:**

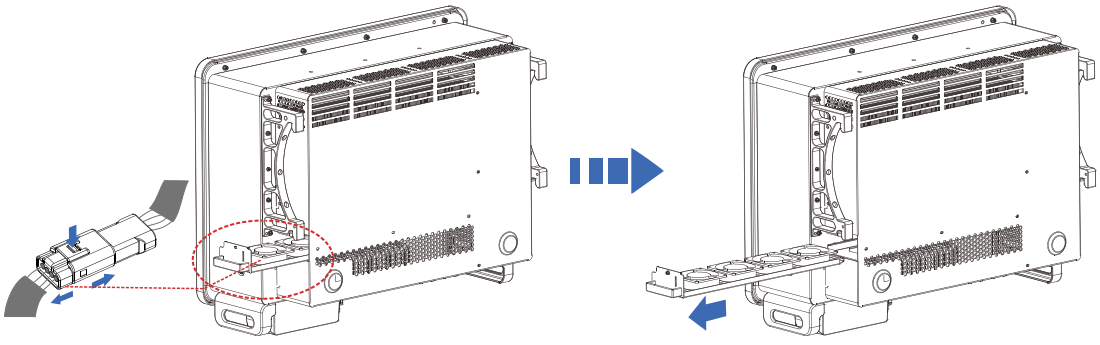
1. Before replacing a fan, power f the inverter.
2. When replacing a fan, use insulation tools and wear personal protective devices.

**Step 1:** Remove the screw on the fan tray and save it, Extract the fan bracket about 5-10cm.

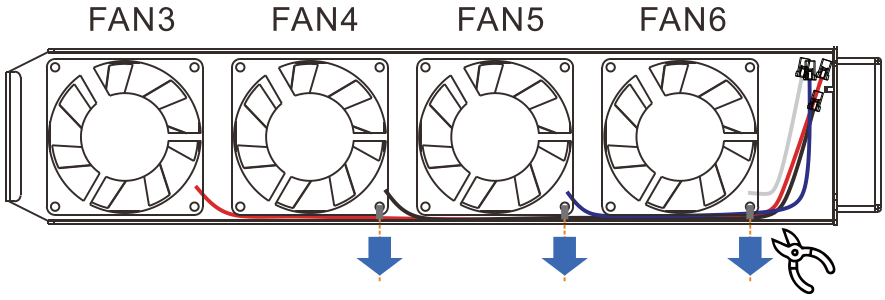



**Step 2:** Cut the ties holding the fan cable, unplug the connection terminals, and pull out the fan bracket.

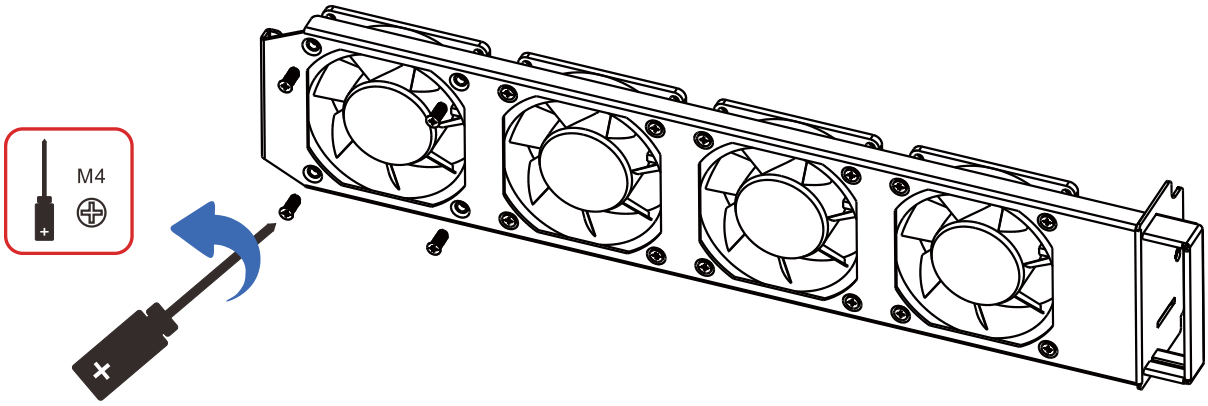
**Note:** You can't use brute force to pull out the terminal, you can use your fingernail (tweezersor a small screwdriver is recommended) to press down on the movable buckle, and then do the pulling and inserting.



**Step 3:** Cut the cable ties of the faulty fan (fan 3 is used as an example below, other fans work in the same way).



**Step 4:** Remove the faulty fan.




**Step 5:** Install the new fan, following the order of steps 4,3.

**Step 6:** Follow step 2 to align the fan bracket with the mounting position, push in the fan bracket and connect the connection terminals.

Table 10-1 Comparison table of fan failure messages

| Name of the fan | FAN 3 | FAN 4 | FAN 5 | FAN 6 |
|---|---|---|---|---|
| Color | Red | black | Blue | White |
| Corresponding PCBA port | CN7 | CN9 | CN16 | CN4 |
| Code | FanFault3 | FanFault4 | FanFault5 | FanFault6 |

# 11. Technical Data

### Outlines of this Chapter

This topic lists the technical specifications for SOFAR 60...80KTLX-G3 inverter.

## 11.1 Parameter Table:

| Datasheet | SOFAR 60KTLX-G3 | SOFAR 80KTLX-G3 |
|---|---|---|
| **Input (DC)** | | |
| Max. input voltage | 1100V | |
| Rated input voltage | 620V | |
| Start-up voltage | 200V | |
| MPPT operating voltage range | 180V...1000V | |
| Number of MPP trackers | 6 | |
| Number for DC inputs | 2 for each MPPT | |
| Max. input MPPT current | 6×32A | 6×40A |
| Max. input short circuit current | 6×50A | 6×60A |
| **Output(AC)** | | |
| Rated output power | 60000W | 80000W |
| Max. apparent power | 66000VA | 88000VA |
| Max. Output current | 100A | 133.3A |
| Rated output voltage | 3/N/PE or 3/PE,230/400Vac | |
| Output voltage range | 310Vac-480Vac (According to local standard) | |
| Rated output frequency | 50/60Hz | |
| Output frequency range | 45Hz-55Hz/55Hz-65Hz (According to local standard) | |
| Active power adjustable range | 0...100% | |
| THDi | <3% | |
| Power factor | 1 (adjustable+/-0.8 ) | |
| **Efficiency** | | |
| Max efficiency | 98.7% | |
| European efficiency | 98.2% | |

| **Protection** | |
|---|---|
| DC reverse polarity protection | Yes |
| Anti-islanding protection | Yes |
| Leakage current protection | Yes |
| Ground fault monitoring | Yes |
| PV-array string fault monitoring | Yes |
| Zero export function | Yes |
| DC switch | Optional |
| SPD | PV:Type II standard,Type I optional;<br>AC:Type III standard,Type I optional |
| **General Data** | |
| Ambient temperature range | -30℃...+60℃ |
| Self-consumption at night | <2W |
| Topology | Transformerless |
| Degree of protection | IP66 |
| Allowable relative humidity range | 0...100% |
| Max. operating altitude | 4000m |
| Cooling | Fan |
| Dimension(W×H×D) | 687×561×275mm |
| Weight | 50kg |
| Display | LCD, App via Bluetooth |
| Communication | RS485/Bluetooth, Optional:WiFi/Ethernet |

Note: the product may be upgraded in the future. The above parameters are for reference only. Please refer to the real product.

Version 2.3

ENERGY TO POWER YOUR LIFE

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