# User manual

## Solar Grid-tied Inverter

Product Model: SOFAR 75K~136KTL

Shenzhen SOFAR SOLAR Co., Ltd.

# 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.

**Copyright Declaration**

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## Shenzhen SOFARSOLAR Co., Ltd

Location:11/F., Gaoxinqi Technology Building, No.67 Area, Xingdong Community, Xin'an Sub-district, Bao'an District, Shenzhen City,China

Postcode: 518000

Company Website: www.sofarsolar.com

Email: service@sofarsolar.com

- **Outline**

This manual is an integral part of SOFARSOLAR 75KTL to 136KTL. 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 75KTL SOFAR 80KTL SOFAR 100KTL SOFAR 110KTL**

**SOFAR 100KTL-HV SOFAR 125KTL-HV SOFAR 136KTL-HV**

- **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 75~136KTL

**Symbols Instruction**

This section gives an explanation of all the symbols shown on the inverter and on the type label.

## 1.1. Requirement for Installation and Maintenance

Installation of SOFAR 75-136KTL 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.

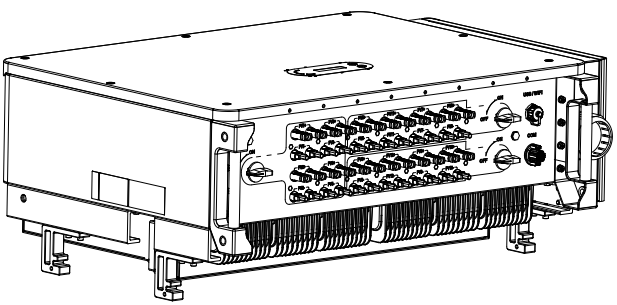
**Label and Symbols**

SOFAR 75~136KTL 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 75~136KTL 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. |
|  Warming | All operation must accomplish by certified electrical engineer<br>● Must be trained;<br>● 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!<br>Do not touch non-insulated cable ends, DC conductors and any live components of the inverter.<br>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.<br>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 centre. 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 |
| Warning | 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 75~136KTL 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 Euroeenne (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) The product complies with the requirements of the applicable Australian standards. |

# 2.Product Characteristics

## Outlines of this Chapter

**Product Dimensions**

Introduce the filed of use and the dimensions of the product

**Function Description**

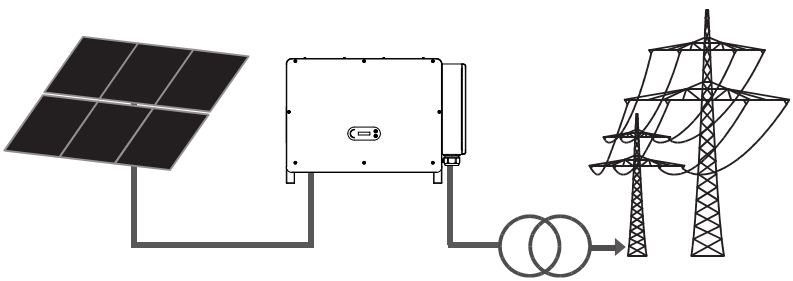
Introduce working principle and internal components

**Efficiency Curves**

Introduce the efficiency curves of the product

## 2.1. Intended Use

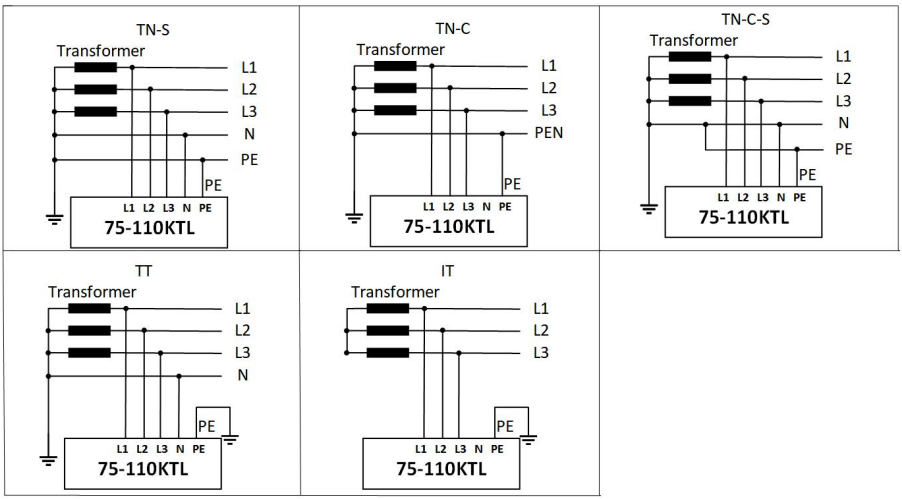
SOFAR 75~136KTL is a transformerless on grid PV inverter, that converters the direct current of the PV array to the grid-compliant, three-phase current and feeds into the utility grid.



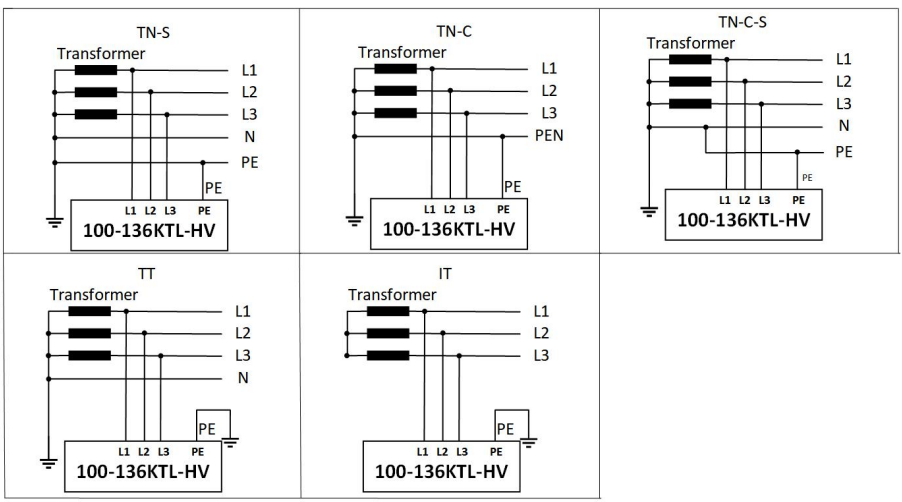
Figures 2-1PV Grid-Tied System

SOFAR 75~136KTL 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




**75-110KTL Supported grid type**




**100-136KTL-HV Supported grid type**

# 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 75~136KTL

  L×W×H=995.5*663.5*368mm

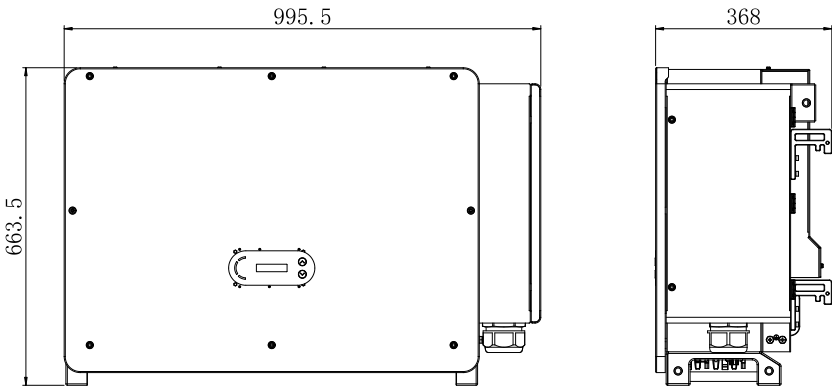
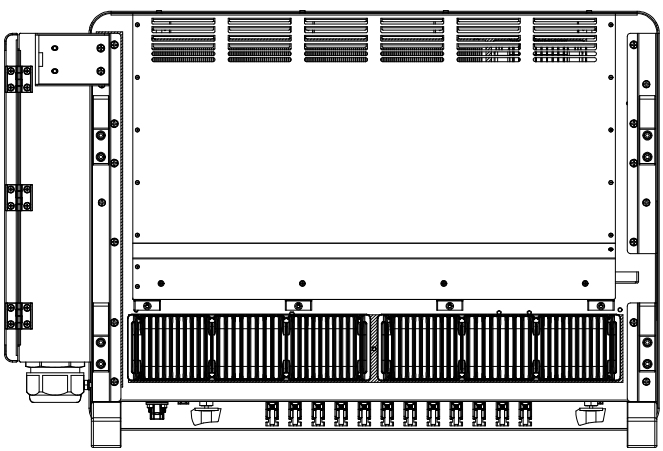



Figure 2-2 Product front view and left view dimensions



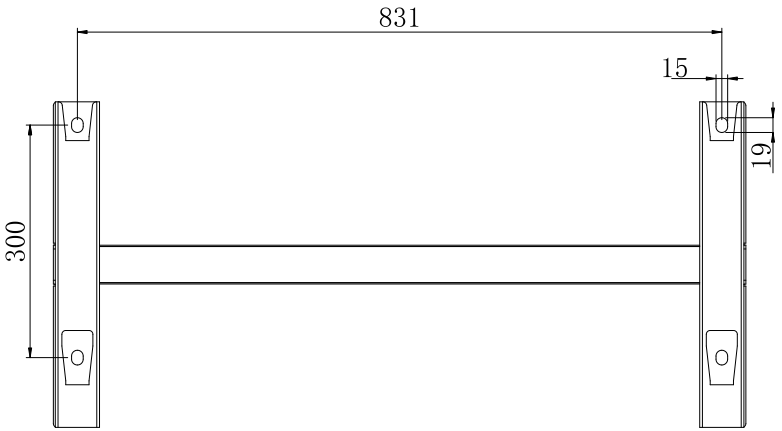



Figure 2-3 Product back view and bracket dimensions

◆ **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.

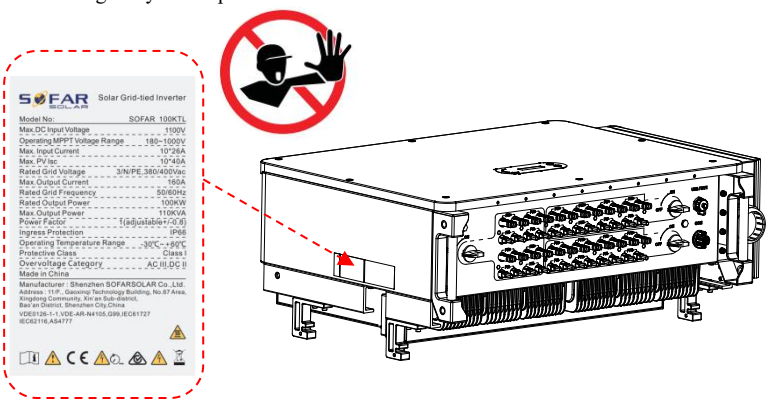



Figure 2-4 Product label

## 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 grid company through a RS485 interface.

**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 or a group of inverters can be monitored remotely through an advanced communication system based on RS485 interface or via Wi-Fi/GPRS/Ethernet.

**F. Software update**

USB interface for uploading the firmware, remotely uploading is available.

**G. Anti-PID （optional function）**

The PID effect can be recovered at night to protect the PV modules.

## 2.3. Electrical block diagram

SOFAR 75~136KTL has 16-24 DC input strings. 8-12 MPPT trackers that 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).

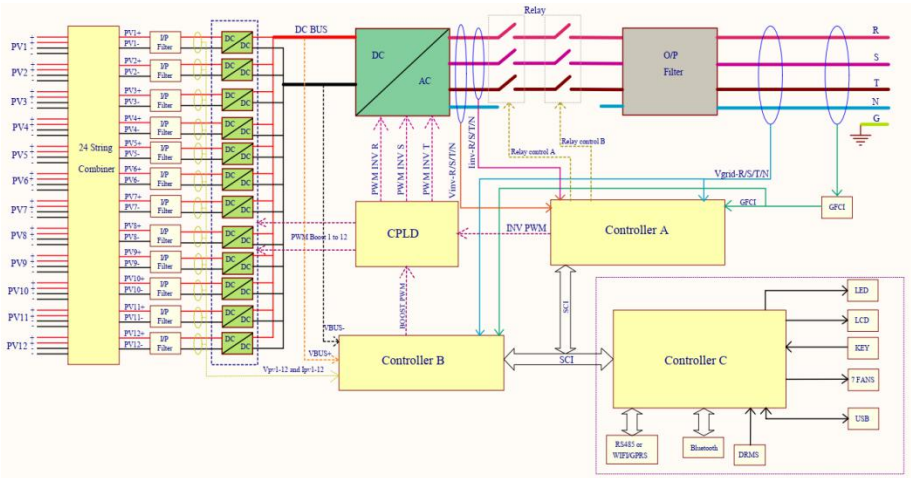



Figure 2-4 Schematic diaram

For SOFAR 75KTL/SOFAR 80KTL/SOFAR 100KTL/SOFAR 110KTL

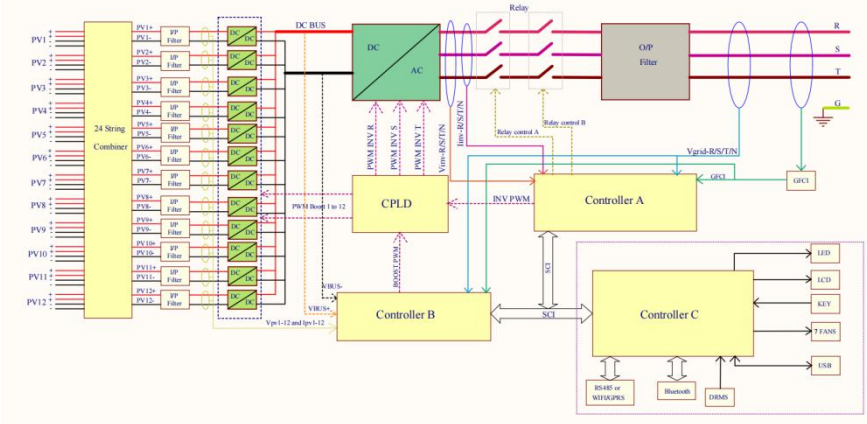
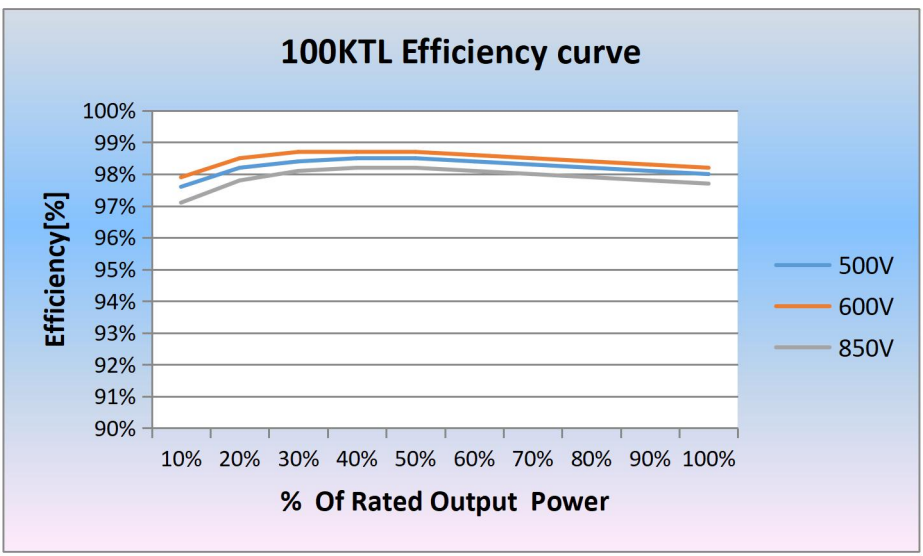
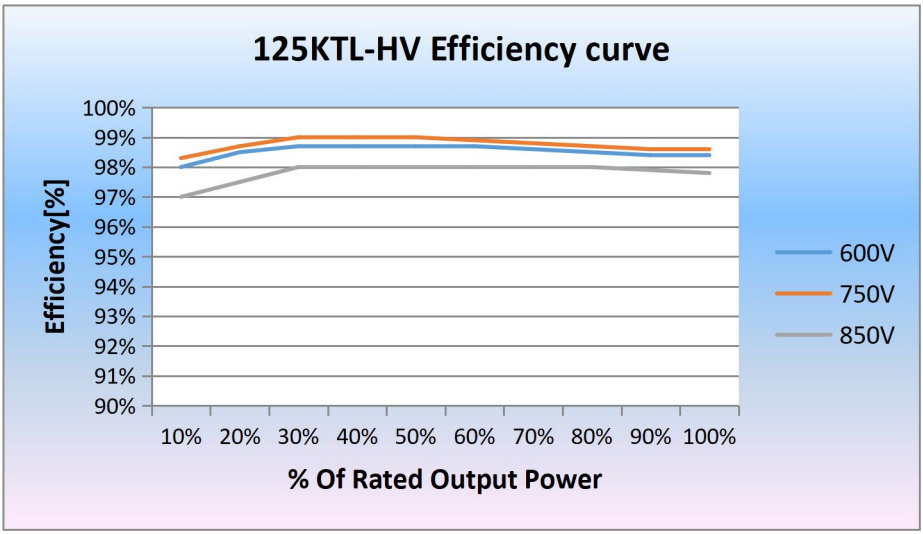


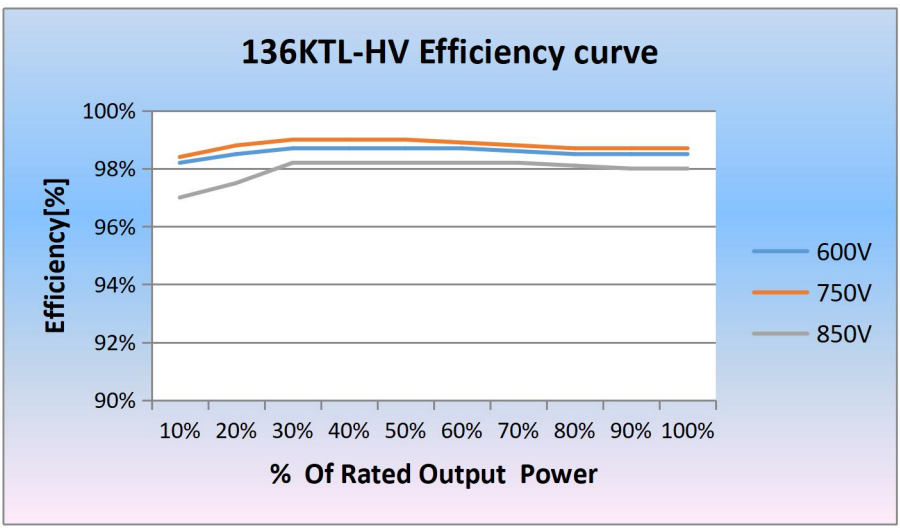

Figure 2-5 Schematic diaram (without N line)

For SOFAR 100KTL-HV SOFAR 125KTL-HV SOFAR 136KTL-HV

## 2.4. Efficiency and derating curve






## 2.5. Others

● Initial short-circuit AC current is 756.7A-peak

- As indicated in VDE-AR-N 4105:2018-11, section 6 (Construction of the power generation system/network and system protection (NS protection), the requirements for the network and system protection differ depending on the maximum apparent power($SAmax^{\Sigma SAmax}$) of the generating and storage units connected to the same network connection point.
- For installations with $SAmax^{\Sigma SAmax} \leq 30kVA$, the NS protection can either be

■ a central NS protection at the central meter panel or decentralized in a sub-distribution; or
■ integrated NS protection

- The equipment models covered by this manual are all below this limit and both of these options can be chosen.
- For installations with $SAmax^{\Sigma SAmax} > 30kVA$, the NS protection must be accomplished by a central NS protection device at the central meter panel.

In the case, taking into account the equipment covered by this user manual, this situation will happen when several units are connected to the same network connection point.
Note: the NS protection shall meet that a single fault shall not lead to a loss of the protective function (single fault tolerance). The output is switched off redundant by the high power switching bridge and two relay in series. This assures that the opening of the output circuit will also operate in case of one error. AC Relay Model HF167F-200, 830Vac/200A.
All models have been performed without an additional relay connected during VDE4105:2018 certification, to check the internal protection of the equipment.

# 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 0～95%, no condensation

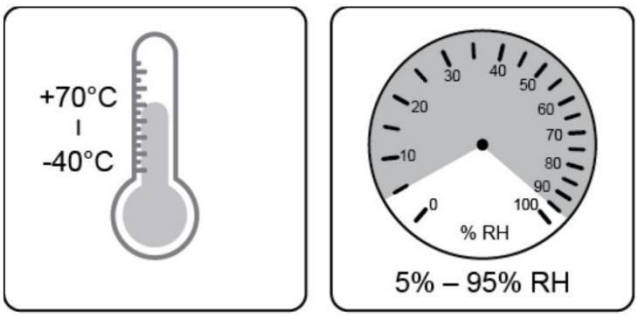



Figure 3-1 Storage temperature and humidity

- 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

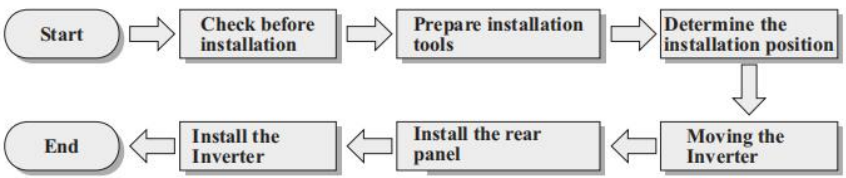
# 4.Installation

## Outlines of this Chapter

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

| | |
|---|---|
| Dangers | Do NOT install the product on flammable material.<br>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.<br>Choose an appropriate mounting position and surface.<br>At least two persons for installation. |

## 4.1. Installation Process




## 4.2. Checking Before Installation

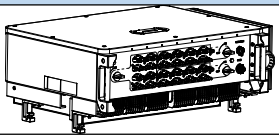
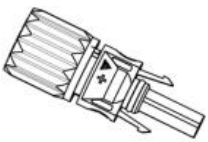
**Checking Outer Packing Materials**

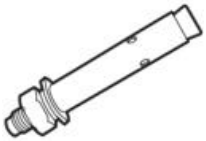
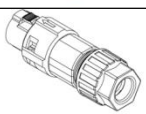
Before unpacking, please check the condition of the outer package materials if any damaged found, such as holes, cracks, please not unpack the product, contact your distributor immediately. Recommend installing the product within 24 hours after unpacking the package.

**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

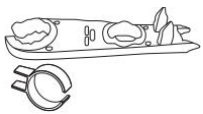
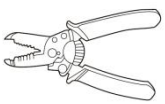
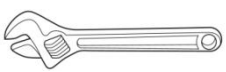
| No | Pictures | Description | Quantity |
|---|---|---|---|
| 1 |  | SOFAR 75-136KTL | 1 pcs |
| 2 |  | Rear Panel | 1 pcs |
| 3 |  | PV+ input connector | 75KTL 16 pcs<br>80KTL 16 pcs<br>100KTL 20 pcs<br>110KTL 20 pcs<br>125KTL 20 pcs<br>136KTL 24pcs |
| 4 |  | PV- input connector | 75KTL 16 pcs<br>80KTL 16 pcs<br>100KTL 20 pcs<br>110KTL 20 pcs<br>125KTL 20 pcs<br>136KTL 24 pcs |
| 5 |  | PV+ metal pin | 75KTL 16 pcs<br>80KTL 16 pcs<br>100KTL 20 pcs<br>110KTL 20 pcs<br>125KTL 20 pcs<br>136KTL 24 pcs |
| 6 |  | PV- metal pin | 75KTL 16 pcs<br>80KTL 16 pcs<br>100KTL 20 pcs<br>110KTL 20 pcs<br>125KTL 20 pcs<br>136KTL 24 pcs<br>136KTL 24 pcs |

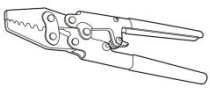
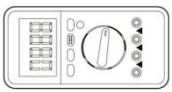
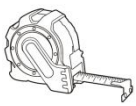
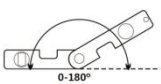
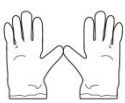
| | | | |
|---|---|---|---|
| 7 |  | M10*90Hexagon screws | 4 pcs |
| 8 |  | M6*30 Hexagon screws | 2 pcs |
| 9 |  | Manual | 1 pcs |
| 10 |  | Warranty Card | 1 pcs |
| 11 |  | Outgoing inspection report | 1 pcs |
| 12 |  | Quality Certificate | 1 pcs |
| 13 |  | COM 16pin connector | 1 pcs |

## 4.3. Tools

Prepare tools required for installation and electrical connection as following table:

Figure 4-2 Installation tools

| No | Tool | Description | Function |
|---|---|---|---|
| 1 |  | Hammer Drill Recommend drill @ 10mm | Used to drill holes on the wall |
| 2 |  | Screwdriver | Use to tighten and loosen screws when installing AC power cable<br>Use to remove AC connectors from the product |
| 3 |  | Removal Tool | Remove PV Connector |
| 4 |  | Wire Stripper | Used to peel cable |
| 5 |  | With an open end of larger than or greater than 32 mm | Used to tighten expansion bolts |
| 6 |  | Rubber Mallet | Used to hammer expansion bolts into holes |

| | | | |
|---|---|---|---|
| 7 |  | M6 | M6 use to uninstall and install the front top cover and down cover |
| 8 |  | Torque wrench | Connect AC connector |
| 9 |  | Crimping Tool | Use to crimp cable on grid side, load side and CT extensive cable |
| 10 |  | Multimeter | Check grounding cable, PV positive and negative pole |
| 11 |  | Marker | Mark signs |
| 12 |  | Measuring Tape | Measure distance |
| 13 |  | Level | Ensure the rear panel is properly installed |
| 14 |  | ESD gloves | Installer wear when installing product |

| | | | |
|---|---|---|---|
| 15 |  | Safety goggles | Installer wear when installing product |
| 16 |  | Mask | 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 0-75°, Do not install forward or upside down!

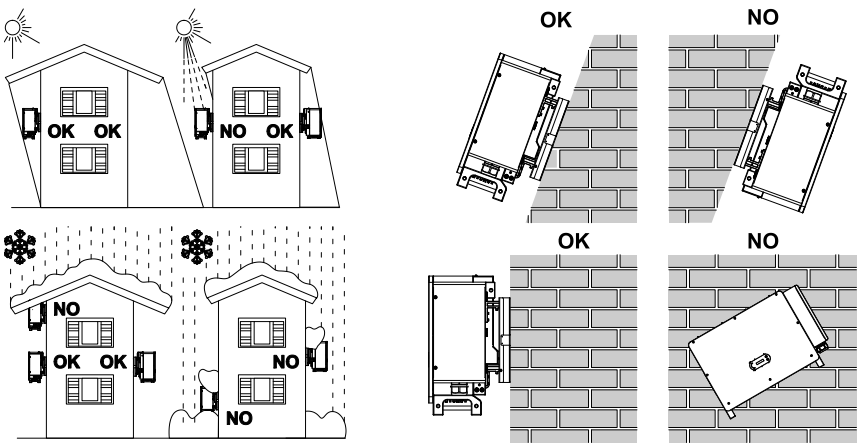



Figure 4-1 Installation Position Selection

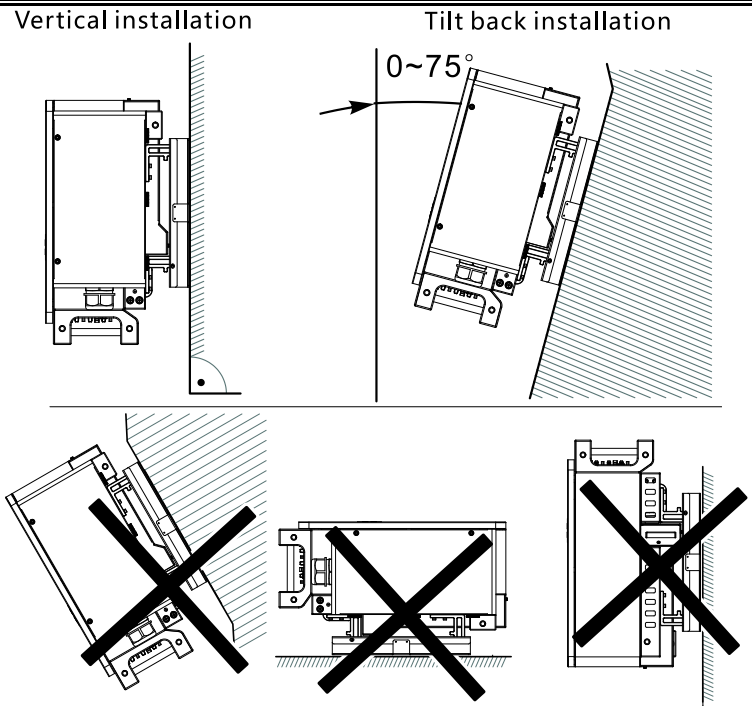
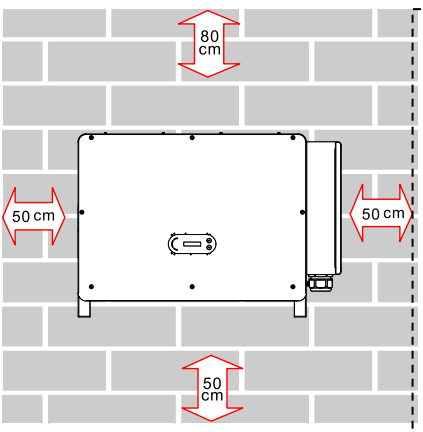



Figure 4-2 Clearance for single inverter




Note:

Other requirement for install position:

- Install position should obstruct the disconnect of power
- Place inverter in an appropriate bearing capacity objects
- Location should be avoid touch by children

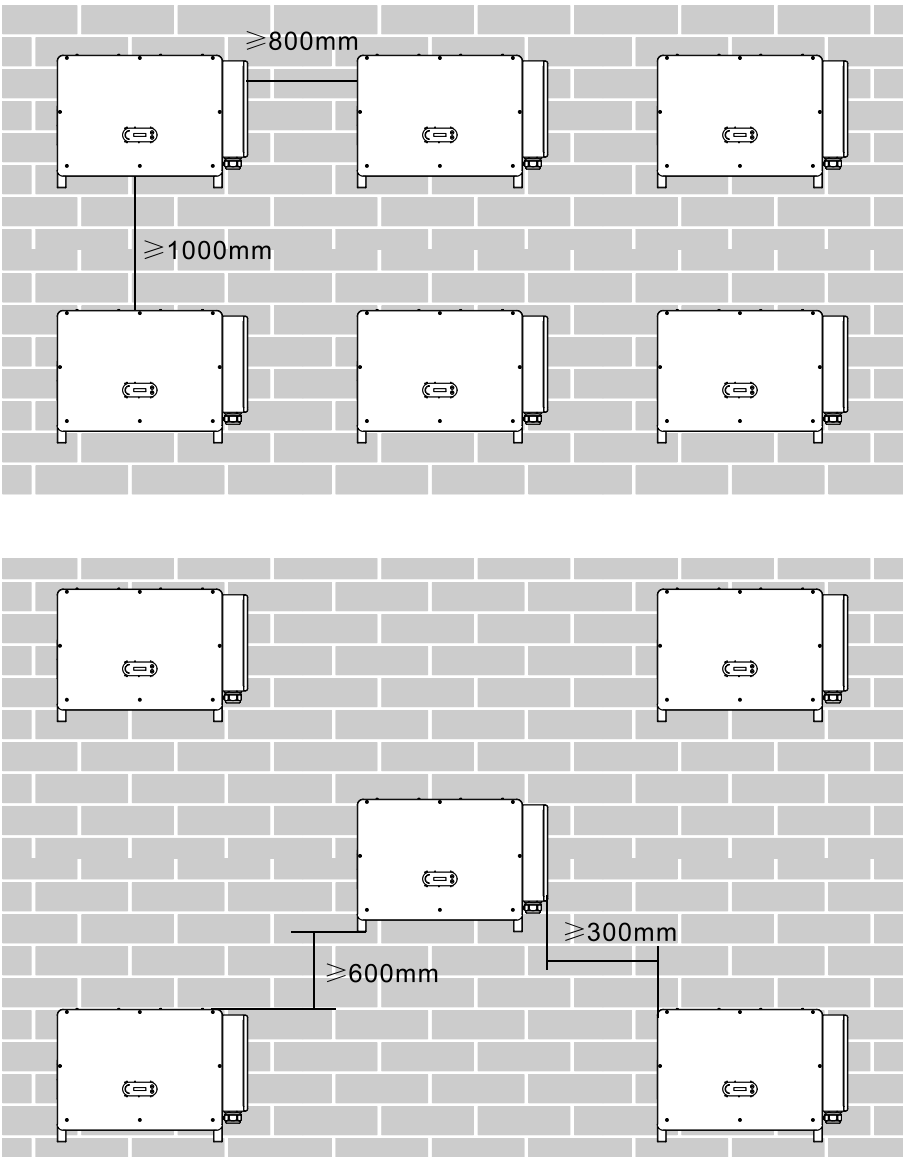



Figure 4-3 Clearance for multiple inverters

# 4.5. Moving of inverter

## 4.5.1 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.

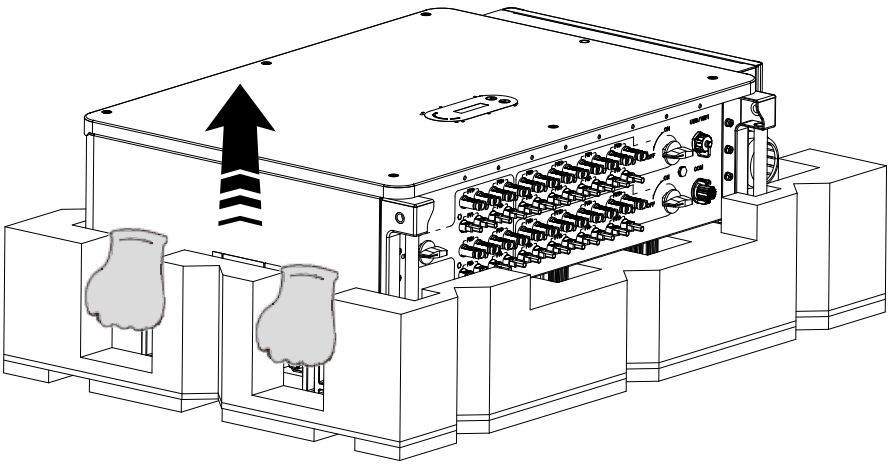


Figure 4-4 Move inverter from package

| | |
|---|---|
| Attention | Keep the balance when lift the inverter. Required at least two operators for lifting or use forklift. Inverter is heavy, dropped while being transported may cause injuries.<br>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.<br>When place inverter on the floor, put it above foam or paper to avoid the damage of the shell of inverter<br>Use auxiliary handle inside the package for moving the inverter. After use, keep it well for future usage. |

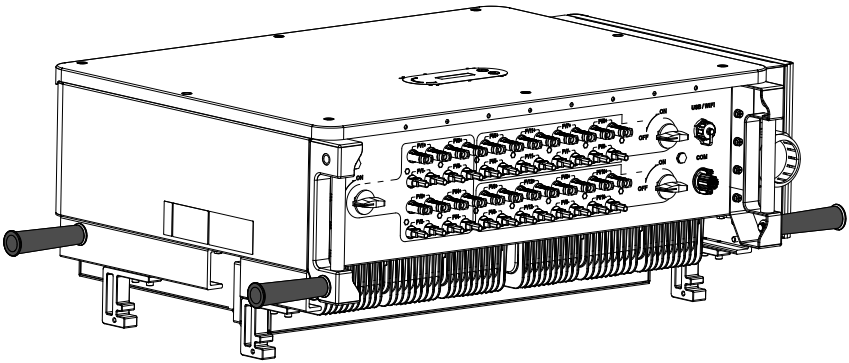


Figure 4-5 auxiliary handle position

## 4.5.2 Lifting Equipment

1. Tighten the screws of two M12 rings into the inverter sides according to the instruction diagram below (Note: M12 rings need self-preparation).

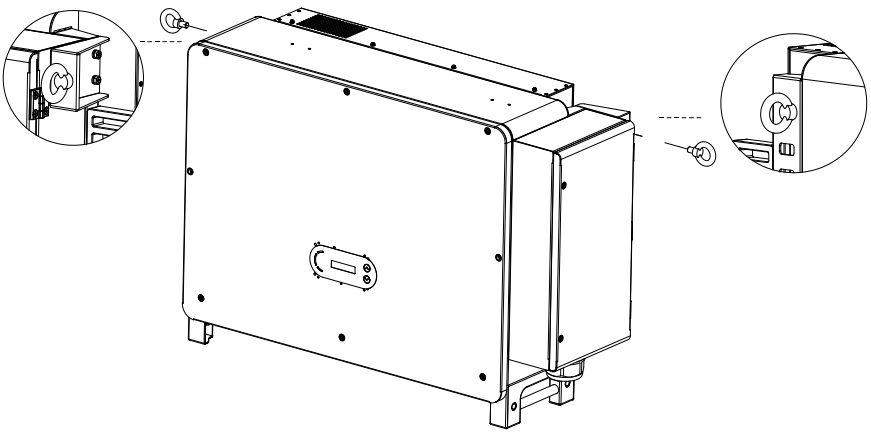
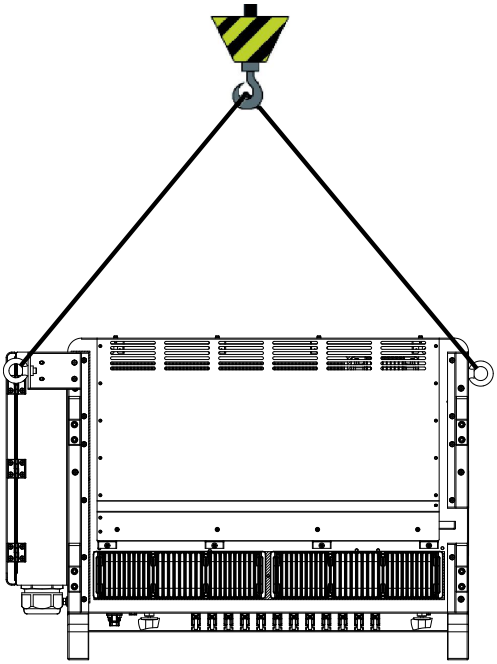


Figure 4-6 Installation of Rings

2. Fastened and tied the rope through two rings. Lifting inverter 50mm above ground by using lifting equipment, check the tightening device of the hoisting ring and rope. After confirming that the binding connection is secure, lift the inverter to the destination.



| | |
|---|---|
| Attention | Keep balance when lifting the inverter, avoid to crash on wall or other objective<br>Stop working in bad weather condition such as raining, heavy fog, winding |

## 4.6. Installation

### 4.6.1 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.

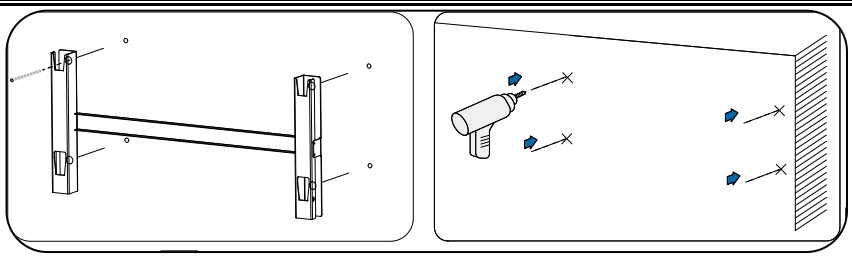


Figure 4-8 Drilling holes on the mounting wall

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

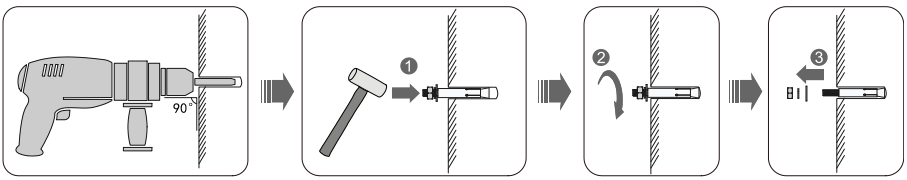



Figure 4-9 Screws into the holes

**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

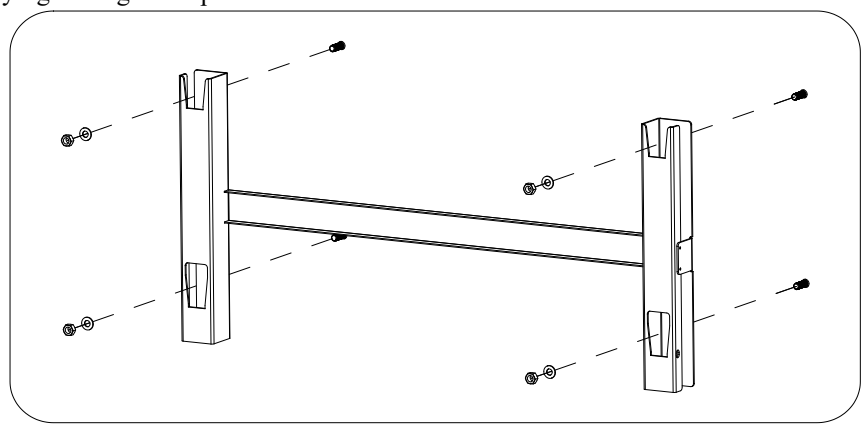


Figure 4-10 Install rear panel

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

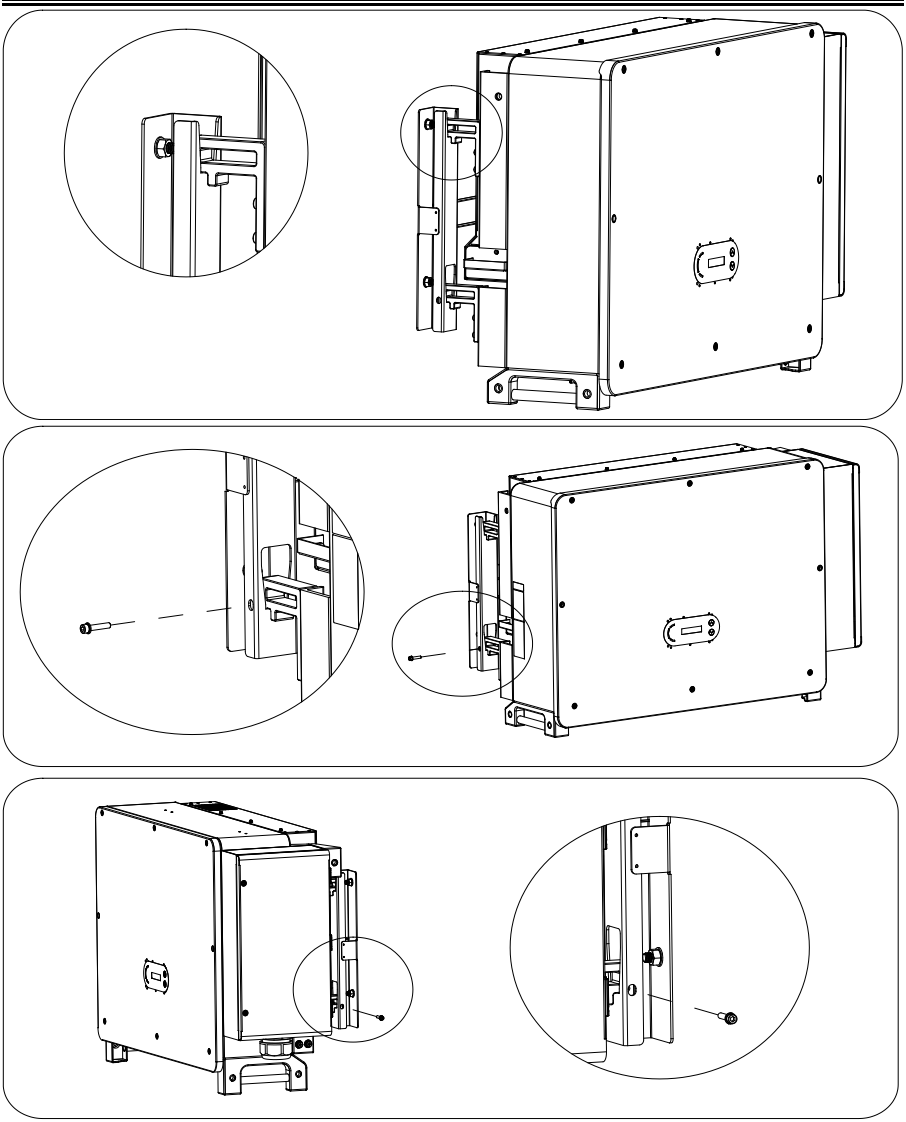


Figure 4-11 Fix inverter

## 4.6.2 Bracket Installation：

**Step 1:** Use wall mount bracket, ensure the pole position are in same level by using level rule and take a mark with maker.

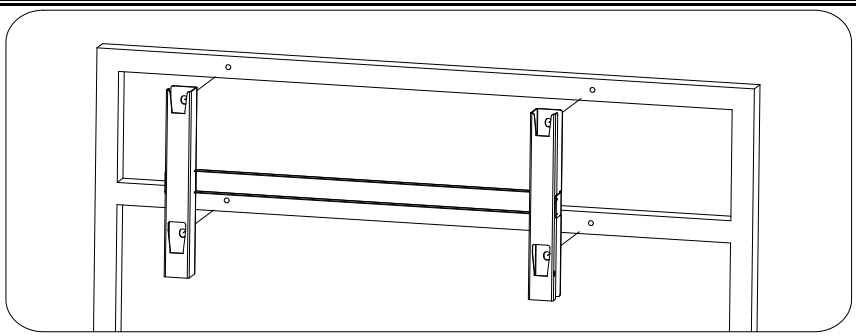


Figure 4-12 Ensure hole position

**Step 2:** Drilling hole by using Hammer Drill, recommend to do a stain proofing

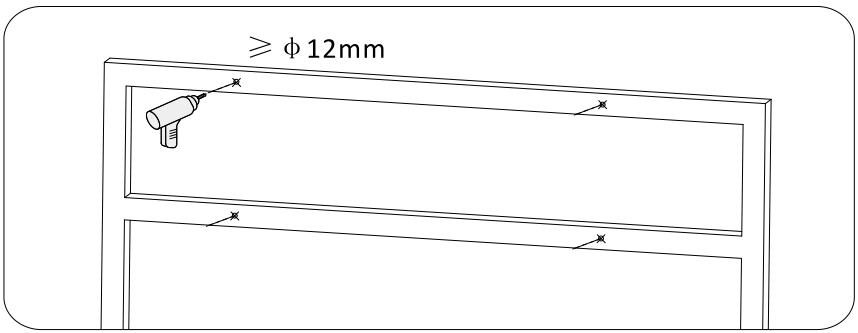



Figure 4-13 Drilling holes

**Step 3:** Use M10 screw and M10 flat washer to secure the wall bracket（Note：M10*50 screw and M10 flat washer need self-preparation）

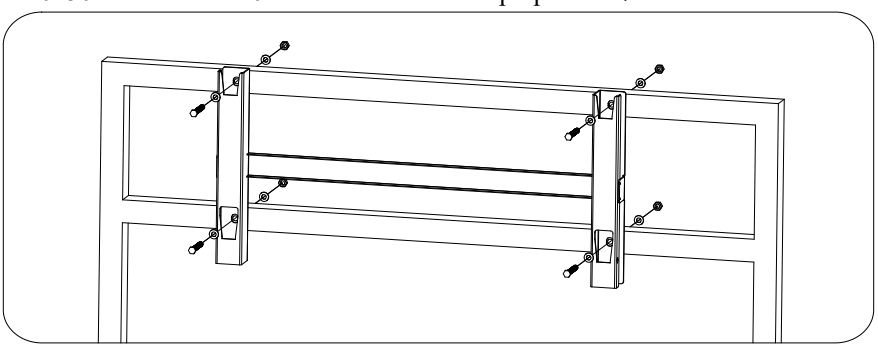
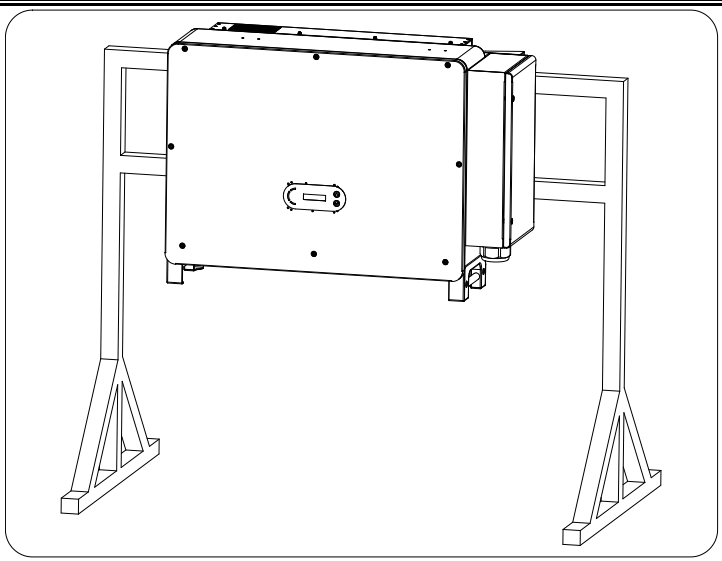


Figure 4-14 Fix wall bracket

**Step 4**: Lift the inverter and hang it on the wall bracket,and fixing both side of inverter with M6 screw .（repeat 4.6.1step 4）。



Note: If height between ground and bracket is less than 1.3m, use auxiliary handle for installation. Otherwise, use lifting equipment.

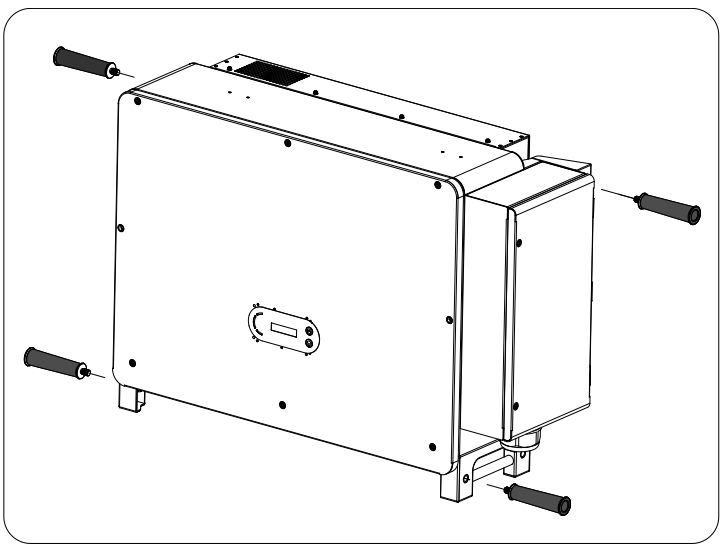


Figure 4-15 Installation position of auxiliary handle

# 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 |

5.1 Electrical Connection

Introduce the electrical connection process.

5.2 Terminal Port

Introduce inverter terminal port layout.

5.3 Grounding Protection (PE)

Connect PE line for grounding protection.

5.4 Connect AC output（AC-Output)

Connect AC output for feeding generated electrical into the utility grid. Must meet the requirement of local utility grid company.

5.5 DC input connection

Connect PV array with inverter by DC cable.

5.6 Communication Connection

Introduce the propose WIFI/USB, COM and how to connect WIFI/USB port.

5.7 Safety check

Before operate inverter, check the PV array, inverter DC side safety connection and AC side safety connection.

## 5.1. Electrical Connection

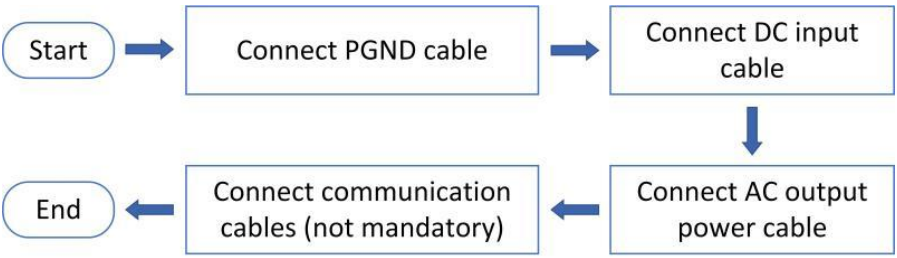
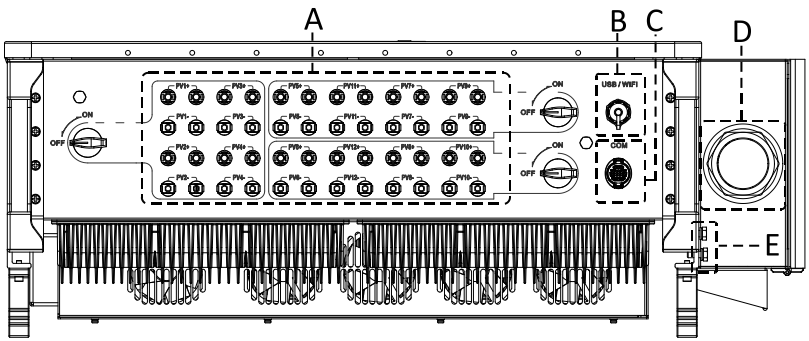



Figure 5-1flowchart for connecting cables to the inverter

## 5.2. Terminal Connector

Connector description as below:




*Take picture as reference

| No | Name | | Description |
|---|---|---|---|
| A | DC input terminals | PVX+/PVX- | PV connector |
| B | USB/WIFI port | USB/WIFI | For WIFI, GPRS Communication |

| | | | |
|---|---|---|---|
| C | RS485 Modbus/DRMs | RS485/DRMs | RS485 Communication port/DRMs port |
| D | AC output terminals | | AC output terminal |
| E | Grounding | ⏚ | Connecting terminal of the ground, choose at least one for grounding connection |

## 5.3. Grounding Connection (PE)

Connect the inverter to the grounding electrode using ground cable.

| | |
|---|---|
| Note | SOFAR 75-136kW 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.

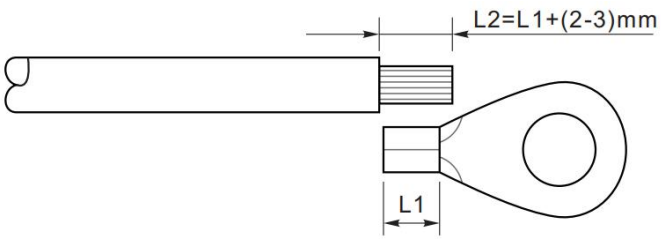



Figure 5-2 Grounding connection instruction（1）

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: ≥6mm$^2$.

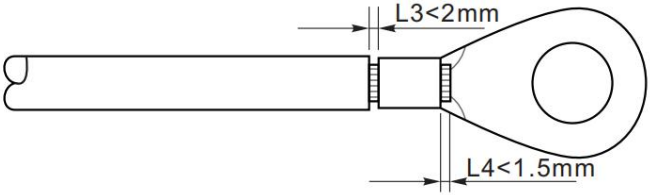
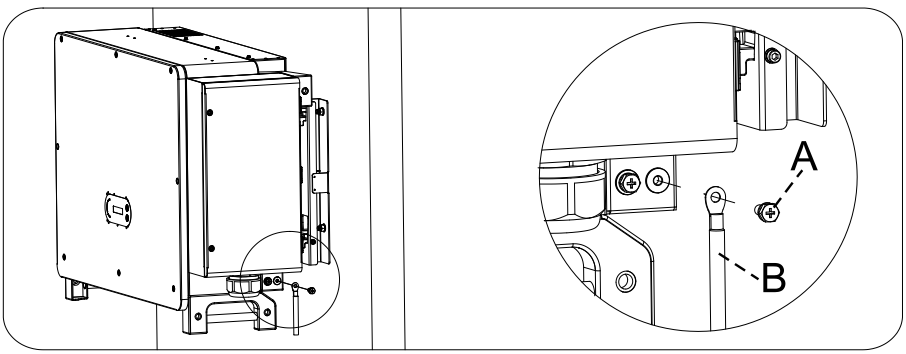



Figure 5-3 Grounding connection instruction（2）

**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:** Remove the screw from the bottom side of inverter (Shown as figure 5-4), connect the grounding cable to the grounding point and tighten the grouping screw. Torque is 6-7N.m.




A.M8 hexagon screw B. grounding cable

Figure 5-4 Inverter external grounding instruction diagram

**Note:** For improving anti-corrosion performance, after ground cable installed, apply silicone or paint is preferred to protect.

## 5.4. Connect grid side of inverter(AC-Output)

For Belgium, one of the following links is required for external AC relay.

http://www.synergrid.be/download.cfm?fileId=C10-21_DecouplingRelays_NF_202

00515.pdf

Inverter has a standard and integrated residual current monitoring unit (RCMU), when inverter detected leakage current excess 300mA, it will cut off with utility grid for protection. For external Residual Current Device (RCD), the rated residual current shall be 300mA or higher.

Precondition：

Inverter AC side should connect a three phase circuit current to ensure inverter can be cut off with utility grid for abnormal condition.

The AC cable need to meet the requirement of local grid operator.

### 5.4.1 Open the wiring box

**Note：**

- Forbid to open then main board cover of inverter.
- Before open the wiring box, please ensure there is not DC and AC connection.
- If open the wiring box on snowing or raining day, please take protective measures to avoid the snow and rain enter wiring box. Otherwise, should not open the wiring box.
- Please do not unused screw in the wiring box.

**Step 1:** Use M6 driver to unscrew the two screws on the wiring box.

**Step 2:** Open wiring box cover.

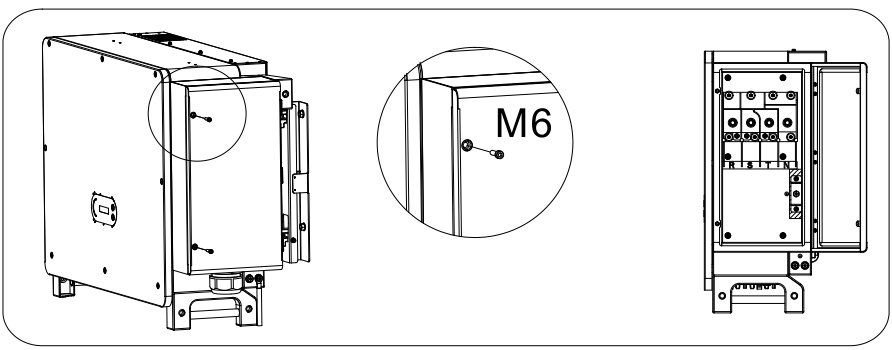



Figure 5-5 Open wiring box

## 5.4.2 Wiring Terminal and Precautions

**Note:**

- Before connect to grid, please ensure the grid voltage and frequency of local grid meet the requirement of inverter , any question please seek local grid company for help.
- Inverter can only connect to grid after get the permission from local grid company.
- Should not connect any loads between inverter and AC circuit breaker.
- 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.

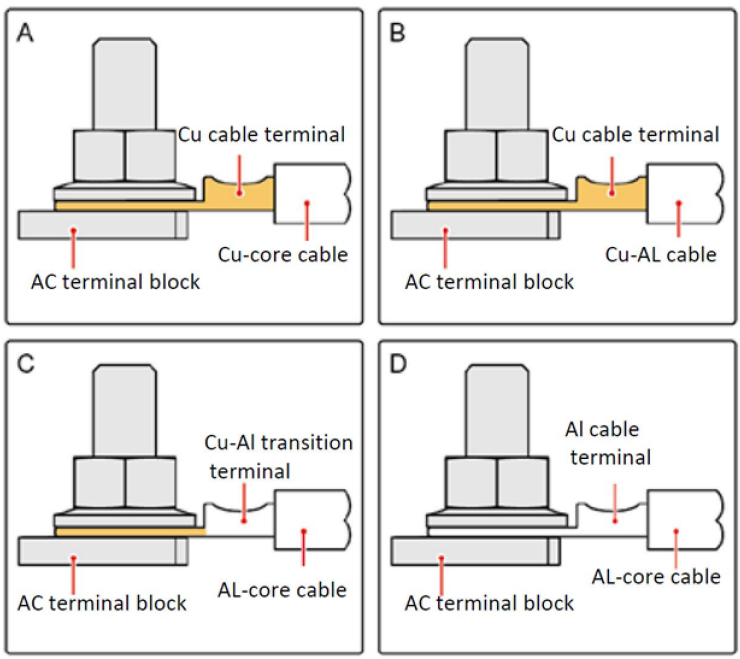



Figure 5-6 OT/DT Requirement for terminal connection

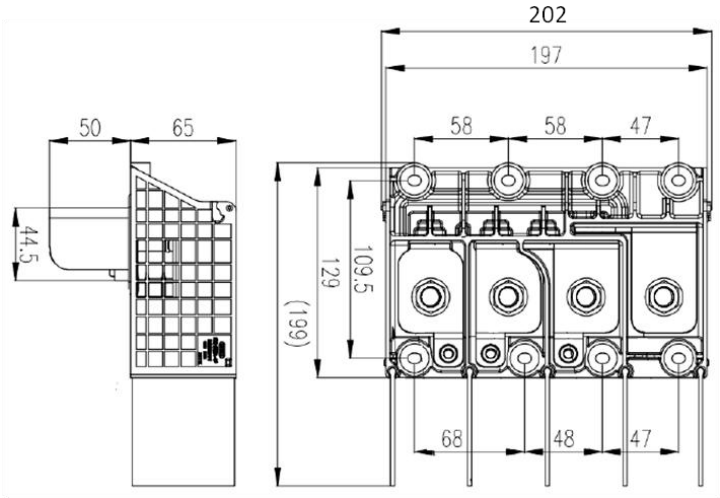



Figure 5-7 AC Terminal size

## 5.4.4 Wring Procedure

The section will use a five core wire as a sample, four core wire has same connection process

Figure 5-1 Recommend AC cable size

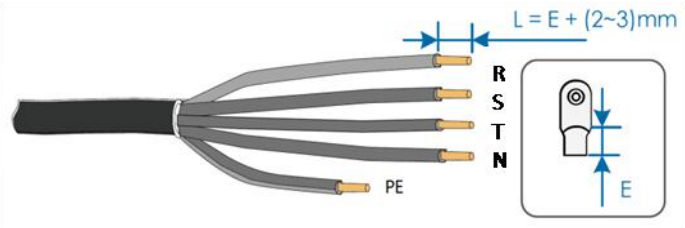
| Name | Type | Area(mm²) |
|---|---|---|
| AC Cables | Recommended：Outdoor four-core/five-core copper or aluminum wire | Copper Wire: 95~185;<br>Aluminum Wire: 120~240;<br>PE Wire: reference 5.3 |

**Step 1：** Open the cover, refers to section 5.3.1.

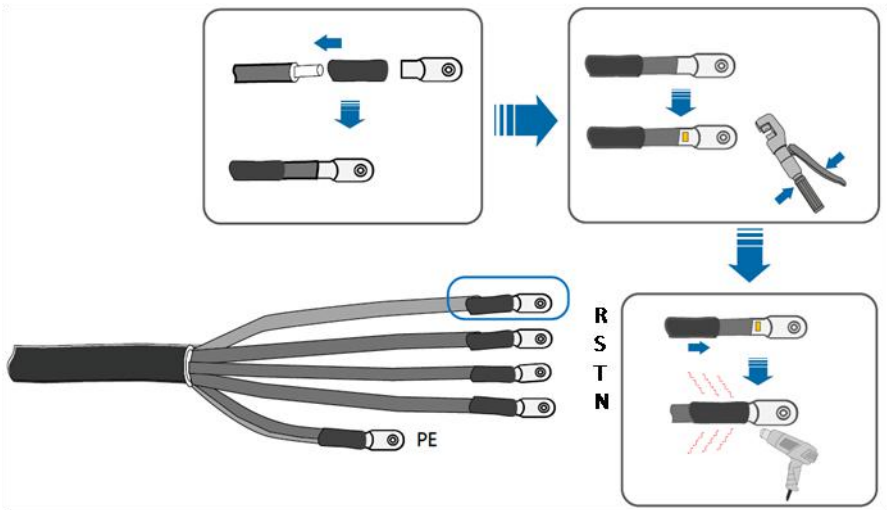
**Step 2：** Turn OFF the AC circuit breaker and secure against reconnection.

**Step 3：** Unscrew the nut of the AC terminal block and select the sealing ring according to the outer diameter of the cable. Insert the nut, sealing ring into the cable in sequence.

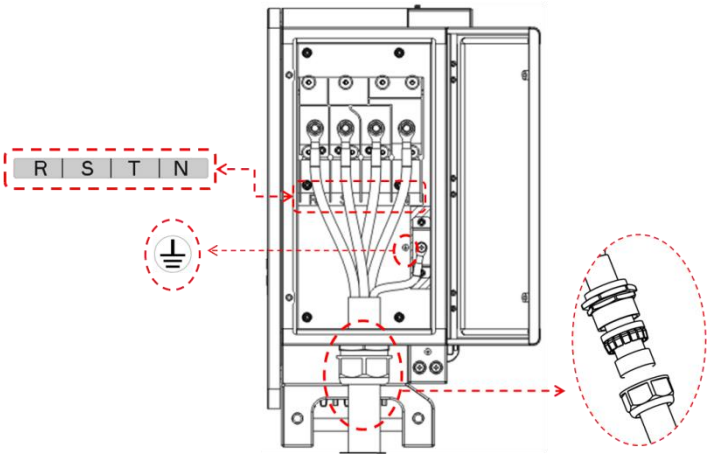
**Step 4：** Remove the insulation layer of an appropriate length according to figure below.




**Step 5:** Crimp the Terminal.

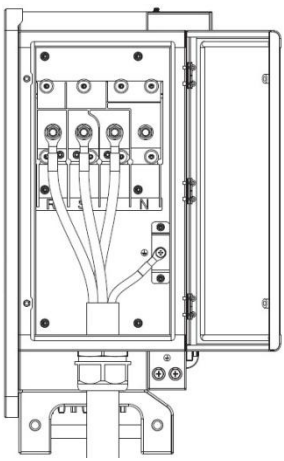



**Step 6:** Depending on the grid configuration, connect L1, L2, L3 and N to the terminals according to the label and tighten the screw on the terminal using a screwdriver.




**Note:**

- Phase lines use M12 terminal connector, PE line use M8 terminal connector. The position of"PE"Line and "N"Line should not be opposite. Opposite position may cause inverter permanently faulty.
- As shown in the figure below ,for HV model ,the N-wire does not need to be connected. (HV model:100KTL-HV,125KTL-HV,136KTL-HV)



**Step 7:** Closed wiring box cover, and tighten the screw.

# 5.5. 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

| Copper cable cross section area（$mm^2$） | | Cable OD(mm) |
|---|---|---|
| Range | Recommend | |
| 4.0~6.0 | 4.0 | 4.5~7.8 |

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

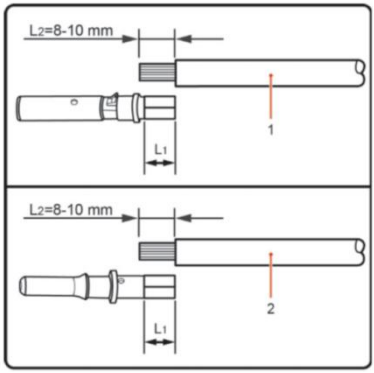
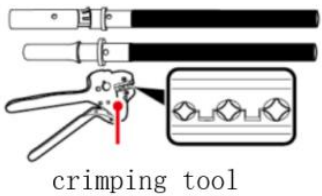
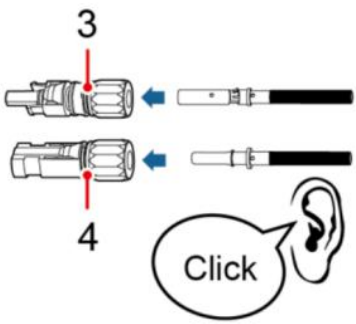



Figure 5-8 DC cable connection（1）

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




**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);




**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.

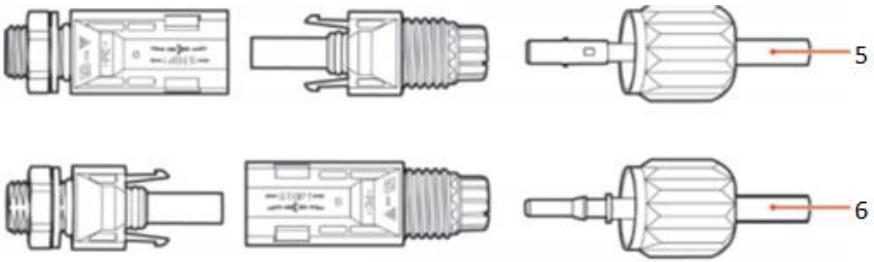
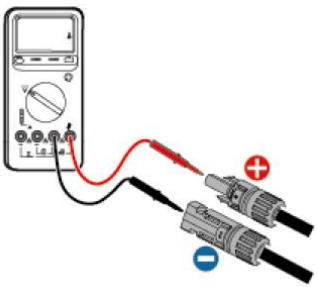



Figure 5-9DC cable connection



**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. |

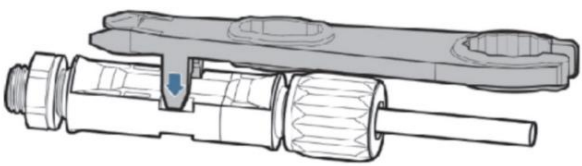


Figure 5-10 Removal DC connector

# 5.6. Communication Connection

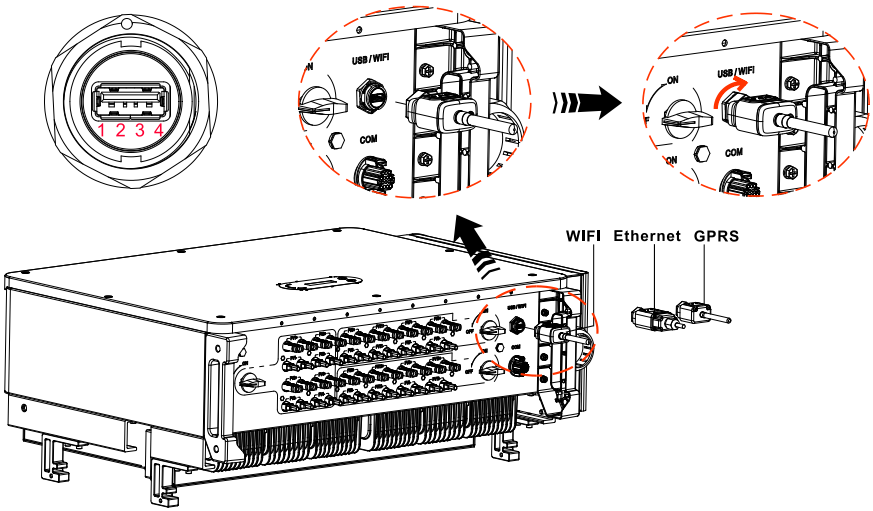
**Note：** When layout the wiring diagram, please separate the communication wiring and power wiring in case the signal be affected.

## 5.6.1 USB/WIFI Port

Port Description：

| | | |
|---|---|---|
| USB/WIFI port | USB：USB PORT | Use for updating the software |
| | WIFI：WIFI PORT | Use for connect Wi-Fi/GPRS/Ethernet for data transmission |

Procedure：




### WIFI/GPRS/Ethernet

By the USB acquisition stick (WIFI/GPRS/Ethernet), transfer the inverter power output information, alarm information, operation state to the PC terminal or local data acquisition device, then uploaded to the server. Register remote monitoring of

SOFAR 75-136KTL at its relevant website or APP according to monitoring device SN.

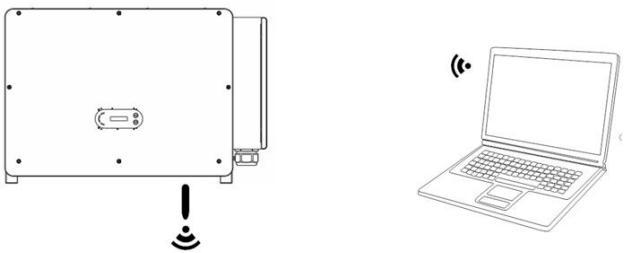


Figure 4-20 Connect one USB acquisition stick (WIFI version) to wireless router

## 5.6.2 COM—Multi function communication port

Figure 5-3 Recommend com cable size

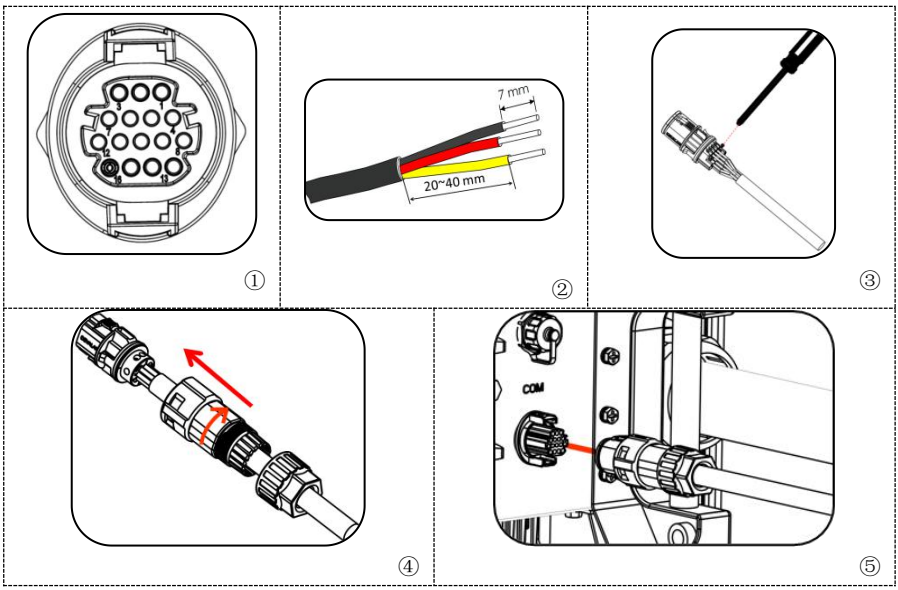
| Name | Type | Outer diameter(mm) | Area($mm^2$) |
|---|---|---|---|
| RS485 Communication Wire | Outdoor shielded twisted pair meets local standards | 3core：4~8 | 0.25~1 |

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+ | Wire connection Electric meter |
| 6 | Electric meter RS485B | Electric meter RS485 signal- | |
| 7 | GND.S | RS485 signal ground | |
| 8 | DRM0 | Remote shunt down | DRMS port |
| 9 | DRM1/5 | | |
| 10 | DRM2/6 | | |
| 11 | DRM3/7 | | |
| 12 | DRM4/8 | | |
| 13 | GND.S | Communication | |

| | | | |
|---|---|---|---|
| | | Ground | |
| 14-16 | Blank PIN | N/A | N/A |

Procedure:




# Communications Port Description

## Logic interface

(a) Logic interface for AS/NZS 4777.2:2020, also known as inverter demand response modes (DRMs).

The inverter will detect and initiate a response to all supported demand response commands within 2 s. The inverter will continue to respond while the mode remains asserted.

Table 4-3 Function description of the DRMs terminal

| Pin NO. | Function |
|---|---|
| 9 | DRM1/5 |
| 10 | DRM2/6 |
| 11 | DRM3/7 |
| 12 | DRM4/8 |
| 13 | GND |

| | |
|---|---|
| 8 | DRM0 |

NOTE: Supported DRM command: DRM0, DRM5, DRM6, DRM7, DRM8.

(b) Logic interface for VDE-AR-N 4105:2018-11, is in order to control and/or limit the inverter's output power.

The inverter can be connected to a RRCR (Radio Ripple Control Receiver) in order to dynamically limit the output power of all the inverters in the installation.

Figure 4-14 Inverter – RRCR Connection

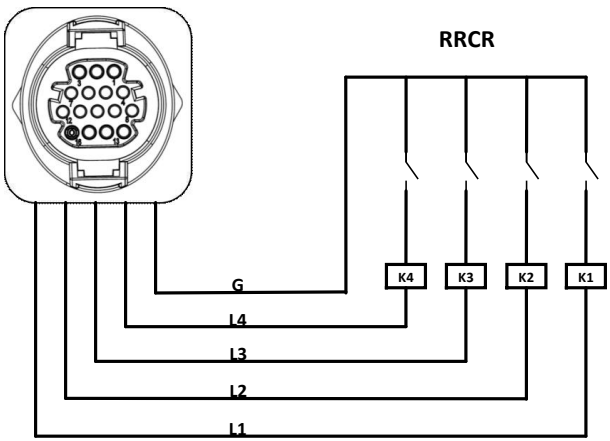



Table 4-4 Function description of the terminal

| Pin NO. | Pin name | Description | Connected to (RRCR) |
|---|---|---|---|
| 9 | L1 | Relay contact 1 input | K1 - Relay 1 output |
| 10 | L2 | Relay contact 2 input | K2 - Relay 2 output |
| 11 | L3 | Relay contact 3 input | K3 - Relay 3 output |
| 12 | L4 | Relay contact 4 input | K4 - Relay 4 output |
| 13 | G | GND | Relays common node |

Table 4-5 The inverter is preconfigured to the following RRCR power levels

Relay status: close is 1, open is 0

| L1 | L2 | L3 | L4 | Active Power | cos(ϕ) |
|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0% | 1 |
| 0 | 1 | 0 | 0 | 30% | 1 |
| 0 | 0 | 1 | 0 | 60% | 1 |
| 0 | 0 | 0 | 1 | 100% | 1 |

(c) Logic interface for EN50549-1:2019, is in order to cease active power output within five seconds following an instruction being received at the input interface.

Figure 4-15 Inverter – RRCR Connection

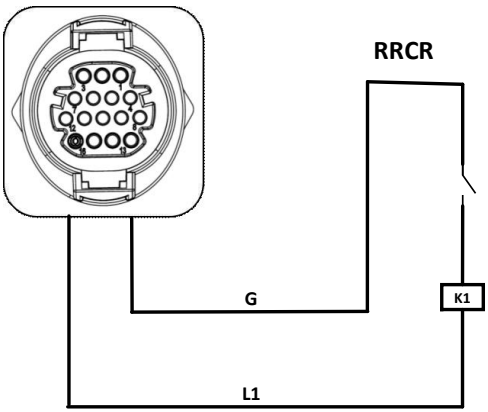



Table 4-6 Function description of the terminal

| Pin NO. | Pin name | Description | Connected to (RRCR) |
|---|---|---|---|
| 9 | L1 | Relay contact 1 input | K1 - Relay 1 output |
| 13 | G | GND | K1 - Relay 1 output |

Table 4-7 The inverter is preconfigured to the following RRCR power levels.

Relay status: close is 1, open is 0

| L1 | Active Power | Power drop rate | Cos(ϕ) |
|---|---|---|---|
| 1 | 0% | ＜5 seconds | 1 |
| 0 | 100% | / | 1 |

## RS485

By RS485 interface, transfer the inverter power output information, alarm information, operation state to the PC terminal or local data acquisition device, then uploaded to the server.

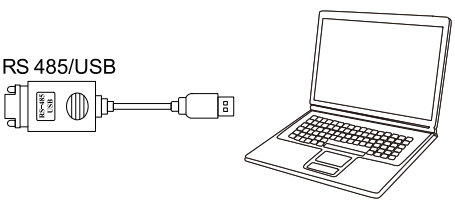


Figure 5-11 Picture of the RS485/USB converter and PC terminal

If only one SOFAR 75-136KTL is used, use a communication cable, refer to **section 5.6.2** for COM pin definition, and choose either of the two RS485 ports.

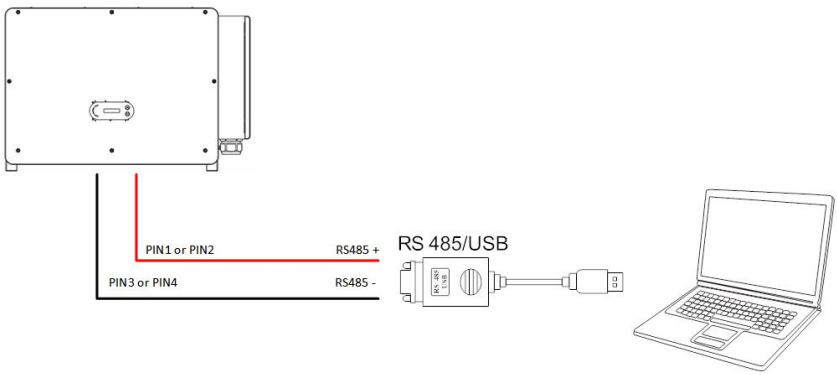



Figure 5-12 A single SOFAR 75-136KTL connecting communications

| | |
|---|---|
| Note | ● The length of the RS485 communication cable should be less than 1000 m.<br>● The length of the WIFI communication cable should be less than 100 m. |

# 6.Commissioning of inverter

## Outlines this Chapter

Introduce SOFAR 75-136KTL 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.

When the DC power generated by the solar array is enough, the SOFAR 75~136KTLinverter will start automatically. Screen showing“normal”indicates correct operation.

**NOTE 1:** Choose the correct country code. (refer to section 7.3 of this manual)

**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 8.1 of this manual —— trouble shooting for help.

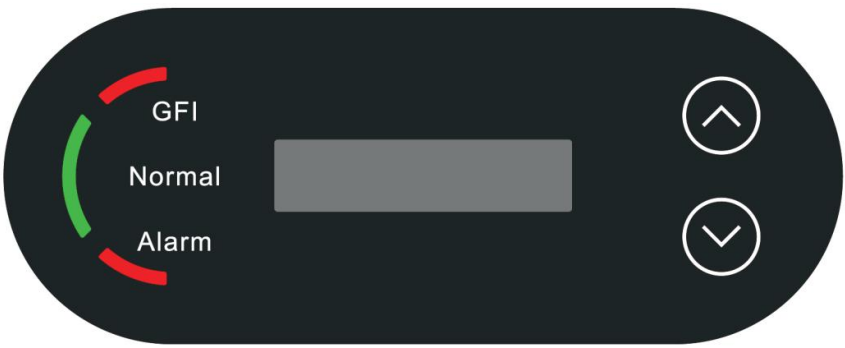
# 7.Operation interface

## Outlines of this chapter

This section introduces the display, operation, buttons and LED indicator lights of SOFAR 75~136KTL Inverter.

## 7.1. 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

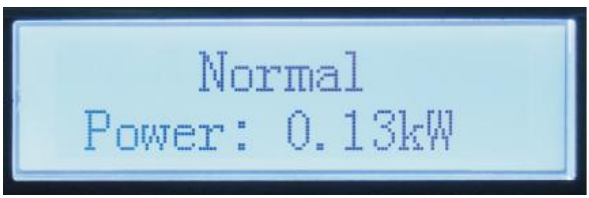
"Alarm" Red light ON= recoverable or unrecoverable faulty

## 7.2. 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.

Inverter working status, PV 1 -12 PV input voltage and current


Inverter working status, PV generated power

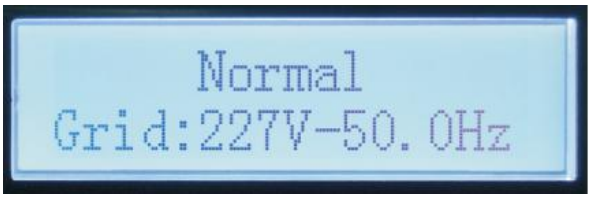



Inverter working status, today generated electricity


Inverter working status, total generated electricity

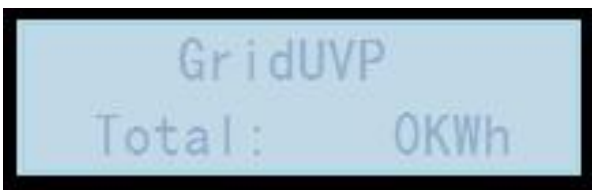

Inverter working status, grid voltage and current


Inverter working status, grid voltage and frequency



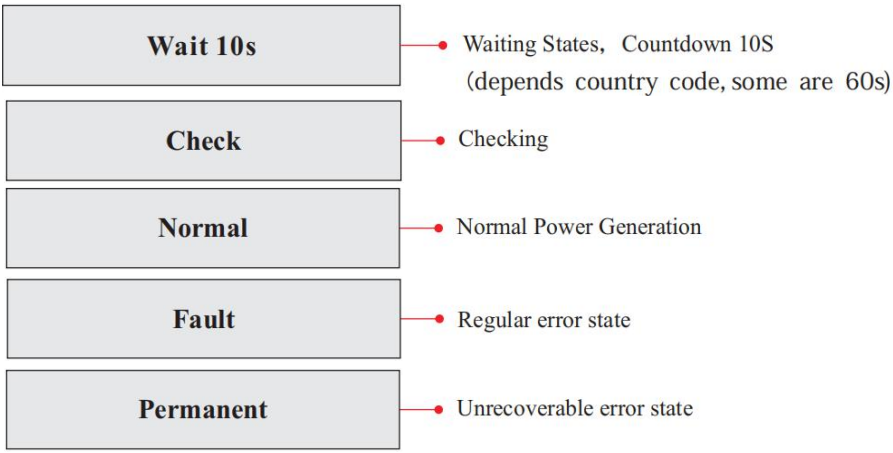

Inverter working status, Wi-Fi/ RS485 status


Inverter faulty alarm




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


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, fault and permanent

**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.

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

## 7.3. Main Interface

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

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

(A)Enter setting Interface as below:

| 1.Enter Setting | --------Long press DOWN button | |
|---|---|---|
| | **1.Set time** | **8.Set Input mode** |
| | **2.Clear Energy** | **9.Set Language** |
| | **3.Clear Events** | **10.Set RefluxP** |
| | **4.Country Country** | **11.Logic Interface** |
| | **5.On-Off Control** | **12.IV Curve Scan** |
| | **6.Set Energy** | **13.PID** |
| | **7.Set Address** | |

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. Country Country**

Long press button, enter interface, save the specific file into USB and insert USB into inverter communication port.

**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 75~136KTL has 8-12 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 RefluxP**

Long-press the down button to enter the RefluxP enable selection interface (enter the default password: 0001), and then Long-press the down button to enter the reverse-current power setting interface, and you can enter the reverse-current power percentage. Long press the up button to exit the setting interface

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. PID**

Enable or disable PID function. When the PID module is enabled(enter the default password: 0001),it will work between 0 a.m. and 4 a.m.

（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<br>(Display the event sequence number, event ID number, and event occurrence time ) |

(A) **“SystemInfo” Interface as below**

| **3.SystemInfo** | ------Long press DOWN button | |
|---|---|---|
| | **1.Inverter Type** | **7.Input Mode** |
| | **2.Serial Number** | **8.Remote State** |
| | **3.General Soft Version** | **9.Reflux Power** |
| | **4.General Hard Version** | **10.DRMs0** |
| | **5.Country** | **11.DRMn** |
| | **6.Modbus Address** | **12.IV Curve Scan** |

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.

**(B) 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.

**(C) 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.

## 7.4. Updating Inverter Software

SOFAR 75~136KTL inverter offer software upgrade via USB flash drive to maximizeinverter 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.

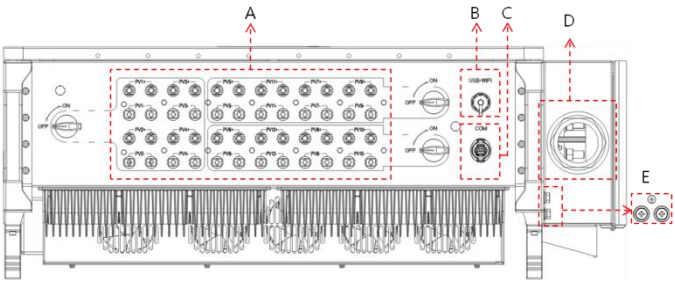



Figure 7-1Remove communication broad cover

**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 Systemlnfo>>3.SoftVersion.

# 8. Trouble shooting and maintenance

## 8.1. 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)

Figure 8-1 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 |
| ID002 | GridUVP | The grid voltage is too low | |
| ID003 | GridOFP | The grid frequency is too high | |
| ID004 | GridUFP | The grid frequency is too low | |

| | | | |
|---|---|---|---|
| | | | after obtaining approval from the local electrical grid operator. |
| 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, under-frequency protection points after obtaining approval from the local electrical grid operator. |
| 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 | |
| ID011 | VGridLineFault | Power grid line voltage error | |
| 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. 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 | |
| ID025 | HwADErrDCI(DC) | \ | |
| ID026 | HwADErrIdcBranch | \ | |
| ID029 | ConsistentGFCI | Leakage current consistency error | |
| ID030 | ConsistentVg | Grid voltage | |

| | | | |
|---|---|---|---|
| | rid | 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 | |
| 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. |
| ID043 | PEConnectFault | Ground fault | Check ac output PE wire for grounding. |
| ID044 | PvConfigError | Error setting input mode | Check the input mode (parallel/independent mode) Settings for the inverter. If not, change the input mode. |
| ID050 | TempErrHeatSink1 | Radiator 1 temperature protection | For Inner BMS battery, make sure that the battery NTC cable is properly connected. Make sure the inverter is installed where there is no direct sunlight.<br>Please ensure that the inverter is installed in a cool/well ventilated place.<br>Ensure the inverter is installed vertically and the ambient temperature is below the inverter temper ature limit. |
| ID051 | TempErrHeatSink2 | Radiator 2 temperature protection | |
| ID052 | TTempErrHeatSink3 | Radiator 3 temperature protection | |
| ID053 | TempErrHeatSink4 | Radiator 4 temperature protection | |
| ID054 | TempErrHeatSink5 | Radiator 5 temperature protection | |
| ID055 | TempErrHeatSink6 | Radiator 6 temperature protection | |
| ID057 | TempErrEnv1 | Ambient temperature 1 protection | |
| ID058 | TempErrEnv2 | Ambient temperature 2 protection | |

| | | | |
|---|---|---|---|
| ID059 | TempErrInv1 | Module 1 temperature protection | |
| ID060 | TempErrInv2 | Module 2 temperature protection | |
| ID061 | TempErrInv3 | Module 3 temperature protection | |
| ID062 | TempDiffErrInv | Inverter Module Temperature Difference is too large | |
| 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. If no, please contact technical support. |
| ID066 | BusInstUnbalance | The transient value of bus voltage is unbalanced | |
| ID068 | BusZVP | Bus voltage low | |
| ID069 | PVOVP | PV over-voltage | Check whether the PV series voltage (Voc) is higher than the maximum input voltage of the inverter. If so, adjust the number of PV modules in series and reduce the PV series voltage to fit the input voltage range of the inverter. After correction, the inverter will automatically return to its normal state. |
| ID071 | LLCBusOVP | LLC BUS overvoltage protection | Internal faults of inverter, switch OFF inverter, wait for 5 minutes, then switch ON inverter. Check whether the problem is solved. If no, please contact technical support. |
| ID072 | SwBusRmsOVP | Inverter bus voltage RMS software overvoltage | |
| ID073 | SwBusIOVP | Inverter bus voltage instantaneous value software overvoltage | |
| ID082 | DciOCP | Dci overcurrent protection | |
| ID083 | SwIOCP | Output instantaneous current protection | |
| ID084 | SwBuckBoostOCP | BuckBoost software flow | |
| ID085 | SwAcRmsOCP | Output effective value current protection | |
| ID086 | SwPvOCPIns | PV overcurrent | |

| | | | |
|---|---|---|---|
| | tant | software protection | |
| ID087 | IpvUnbalance | PV flows in uneven parallel | |
| ID088 | IacUnbalance | Unbalanced output current | |
| ID091 | SwAcCBCFault | Software AC Over Current Protection | |
| ID098 | HwBusOVP | Inverter bus hardware overvoltage | |
| ID099 | HwBuckBoostOCP | BuckBoosthardware overflows | |
| ID102 | HwPVOCP | PV hardware overflows | |
| ID103 | HwACOCP | Ac output hardware overflows | |
| ID105 | MeterCommFault | Meters communication fault | Check whether the meters wiring is correct. |
| ID113 | OverTempDerating | Internal temperature is too high. | Make sure the inverter is installed where there is no direct sunlight.<br>Please ensure that the inverter is installed in a cool/well ventilated place.<br>Ensure the inverter is installed vertically and the ambient temperature is below the inverter temperature limit. |
| ID114 | FreqDerating | AC frequency is too high | Please make sure the grid frequency and voltage is within the acceptable range. |
| ID115 | FreqLoading | AC frequency is too low | |
| ID116 | VoltDerating | AC voltage is too high | |
| ID117 | VoltLoading | AC voltage is too low | |
| ID129 | PermHwAcOCP | Output hardware overcurrent permanent failure | Internal faults of inverter, switch OFF inverter, wait for 5 minutes, then switch ON inverter.<br>Check whether the problem is solved.<br>If no, please contact technical support. |
| ID130 | PermBusOVP | Permanent Bus overvoltage failure | |
| ID131 | PermHwBusOVP | Permanent Bus hardware overvoltage failure | |
| ID132 | PermIpvUnbalance | PV uneven flow permanent failure | |
| ID134 | PermAcOCPInstant | Output transient overcurrent | |

| | | | |
|---|---|---|---|
| | | permanent failure | |
| ID135 | PermIacUnbalance | Permanent failure of unbalanced output current | |
| ID137 | PermInCfgError | Input mode setting error permanent failure | Check the PV input mode (parallel/independent mode) Settings for the inverter. If not, change the PV input mode. |
| ID138 | PermDCOCPInstant | Input overcurrent permanent fault | |
| ID139 | PermHwDCOCP | Input hardware overcurrent permanent failure | Internal faults of inverter, switch OFF inverter, wait for 5 minutes, then switch ON inverter. Check whether the problem is solved. If no, please contact technical support. |
| ID140 | PermRelayFail | Permanent relay failure | |
| ID141 | PermBusUnbalance | Bus voltage unbalanced permanent failure | |
| ID142 | PermSpdFail(DC) | PV surge protection | |
| ID143 | PermSpdFail(AC) | Grid surge protection | |
| ID145 | USBFault | USB fault | Check the USB port of the inverter |
| ID146 | WifiFault | Wifi fault | Check the Wifi port of the inverter |
| ID147 | BluetoothFault | Bluetooth fault | Check the bluetooth connection of the inverter |
| ID148 | RTCFault | RTC clock failure | Internal faults of inverter, switch OFF inverter, wait for 5 minutes, then switch ON inverter. Check whether the problem is solved. If no, please contact technical support. |
| ID149 | CommEEPROMFault | Communication board EEPROM error | |
| ID150 | FlashFault | Communication board FLASH error | |
| ID152 | SafetyVerFault | The software version is inconsistent with the safety version | |
| ID153 | SCILose(DC) | SCI communication error (DC) | |
| ID154 | SCILose (AC) | SCI communication error (AC) | |
| ID155 | SCILose (Fuse) | SCI communication error (Fuse) | |
| ID156 | SoftVerError | Inconsistent software versions | Contact for technical support and software upgrades. |
| ID161 | ForceShutdown | Force shutdown | The inverter is performed a forced shutdown |
| ID162 | RemoteShutd | Remote shutdown | The inverter is performed a remote shutdown. |

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|---|---|---|---|
| | own | | |
| ID163 | Drms0Shutdown | Drms0 shutdown | The inverter is performed with a Drms0 shutdown. |
| ID165 | RemoteDerating | Remote derating | The inverter is performed for remote load reduction. |
| ID166 | LogicIfDerating | Logic interface derating | The inverter is loaded by the execution logic interface. |
| ID167 | AlarmAntiReflux | Anti refluxderating | The inverter is implemented to prevent countercurrent load drop. |
| ID169 | FanFault1 | Fan 1 fault | Please check whether the fan 1 of inverter is running normally. |
| ID170 | FanFault2 | Fan 2fault | Please check whether the fan 2 of inverter is running normally. |
| ID171 | FanFault3 | Fan 3 fault | Please check whether the fan 3 of inverter is running normally. |
| ID172 | FanFault4 | Fan 4 fault | Please check whether the fan 4 of inverter is running normally. |
| ID173 | FanFault5 | Fan 5 fault | Please check whether the fan 5 of inverter is running normally. |
| ID174 | FanFault6 | Fan 6 fault | Please check whether the fan 6 of inverter is running normally. |
| ID175 | FanFault7 | Fan 7 fault | Please check whether the fan 7 of inverter is running normally. |
| ID176 | MeterCommLose | Meters communication fault | Check whether the meters wiring is correct. |
| ID189 | AFCICommLose | AFCI module communication is lost | Check whether the meters wiring is correct |
| ID190 | DCArcingAlarm | Dc arc fault | |
| ID191 | PID_Output_Fail | PID function is failed | |
| ID192 | PLC_Com_Fail | PLC communication is lost | Check whether the meters wiring is correct |

## 8.2. Maintenance

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**

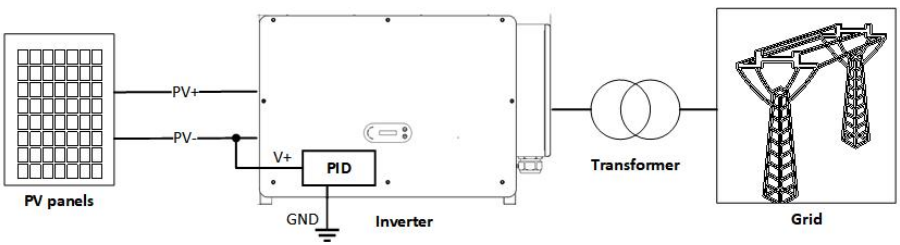
Please clean the inverter with an air blower, a dry & soft cloth or a soft bristle brush. Do NOT clean the inverter with water, corrosive chemicals, detergent, etc.

✧ **Heat sink cleaning**

For the long-term proper operation of 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.

## 8.3. Anti-PID

When the inverter is running, the PID function module increases the potential between the negative pole of the photovoltaic array and the ground to a positive value to suppress the PID effect.




**Note**

1. Before enabling the PID recovery function, ensure that the polarity of the pv module's ground voltage meets requirements. If in doubt, please contact the pv module manufacturer or read their corresponding user manual.
2. If the voltage scheme of the PID protection/recovery function does not meet the requirements of the corresponding PV module, the PID function cannot work properly or may even damage the PV module.
3. Before enabling the reverse PID function, ensure that the inverter has been applied to the IT system.

4. When the inverter is not running, the PID module will apply reverse voltage to the photovoltaic module to restore the degraded module.
5. If the PID recovery function is enabled, the PID works only at night.
6. After the PID recovery function is enabled, the PV series voltage to ground is 500Vdc by default. You can change the default value through the App.

# 9. Technical Data

## Outlines of this Chapter

This topic lists the technical specifications for SORFAR 80-136KTL inverter

## 9.1. Input parameters (DC)

| Parameter | SOFAR 75KTL | SOFAR 80KTL | SOFAR 100KTL | SOFAR 110KTL | SOFAR 100KTL -HV | SOFAR 125KTL -HV | SOFAR 136KTL -HV |
|---|---|---|---|---|---|---|---|
| Max input current | 26A*8 | | 26A*10 | | | | 26A*12 |
| Max DC input short circuit current per MPPT | 40A*8 | | 40A*10 | | | | 40A*12 |
| Max input voltage | 1100V | | | | | | |
| Start voltage | 200V | | | | | | |
| Rated input voltage | 625V | | | | 725V | | 785V |
| MPPT operating voltage range | 180V-1000V | | | | | | |
| Full power MPPT voltage range | 500V-850V | | | | 550V-850V | | |
| MPPT/ strings per MPPT | 8/2 | 8/2 | 10/2 | 10/2 | 10/2 | 10/2 | 12/2 |
| Connector | MC4/H4 | | | | | | |

# 9.2. Output Parameter (AC)

| Parameter | SOFAR 75KTL | SOFAR 80KTL | SOFAR 100KTL | SOFAR 110KTL | SOFAR 100KTL -HV | SOFAR 125KTL -HV | SOFAR 136KTL -HV |
|---|---|---|---|---|---|---|---|
| Rated Power | 75KW | 80KW | 100KW | 110KW | 100KW | 125KW | 136KW |
| Max AC power | 75KVA | 88KVA | 110KVA | 121KVA | 110KVA | 137KVA | 150KVA |
| Rated output current | 108A | 116A | 145A | 159A | 115A | 144A | 145A |
| Max output current | 113A | 128A | 160A | 175A | 128A | 160A | 160A |
| Short circuit Current (Peak) | 756.7A | | | | | | |
| Short circuit Current (RMS) | 378A | | | | | | |
| Nominal grid voltage | 3/N/PE, 230V/400Vac, 220V/380Vac | | | | 3/PE,500Vac | | 3/PE,540Vac |
| Grid voltage range | 310Vac-480Vac | | | | 400Vac-575Vac | | 432~621 Vac |
| Nominal frequency | 50Hz/60Hz | | | | | | |
| Grid frequency range | 45Hz-55Hz/54Hz-66Hz (According to local standard) | | | | | | |
| THDi | <3% | | | | | | |
| Power Factor | 1 default ( adjustable+/-0.8) | | | | | | |

# 9.3. Performance Parameter

| Parameter | SOFAR 75KTL | SOFAR 80KTL | SOFAR 100KTL | SOFAR 110KTL | SOFAR 100KTL -HV | SOFAR 125KTL -HV | SOFAR 136KTL -HV |
|---|---|---|---|---|---|---|---|
| Max efficiency | 98.60% | 98.60% | 98.70% | 98.75% | 98.80% | 99.00% | 99.00% |
| European Weighted efficiency | 98.20% | 98.20% | 98.30% | 98.30% | 98.50% | 98.50% | 98.51% |
| MPPT efficiency | >99.9% | | | | | | |
| Safety Protection | Anti-Islanding, DC switch, RCMU, Ground fault monitoring, level II SPD | | | | | | |
| Certification | AS/NZS 4777, VDE V 0124-100, V0126-1-1, VDE-AR-N 4105, CEI 0-21/CEI 0-16, EN50438/EN50549, G83/G59/G98/G99, UTE C15-712-1, UNE206 007-1 | | | | | | |
| Protection level | LevelI | | | | | | |
| External environment pollution degree | Degree3 | | | | | | |
| Overvoltage category | PV:OVC II, AC mains:OVC III | | | | | | |

# 9.4. General Data

| Parameter | SOFAR 75KTL | SOFAR 80KTL | SOFAR 100KTL | SOFAR 110KTL | SOFAR 100KTL -HV | SOFAR 125KTL -HV | SOFAR 136KTL-HV |
|---|---|---|---|---|---|---|---|
| Topology | Transformless | | | | | | |
| Operation Temperature | -30～60℃ | | | | | | |
| Relative humidity | 0%～100% | | | | | | |
| DC Switch | Yes | | | | | | |
| Cooling | Smart forced air cooling | | | | | | |
| Altitude | 2000m | | | | | | |
| Dimension | 995.5*663.5*368mm | | | | | | |
| Display | LCD+ Bluetooth +APP | | | | | | |
| Mounting | Wall mount | | | | | | |
| Communication | WiFi /GPRS /RS485/PLC（optional） | | | | | | |
| Weight | 88KG | 88KG | 90KG | 90KG | 90KG | 90KG | 92KG |
| Protection degree | IP66 | | | | | | |

# 10. Quality Assurance

**Standard warranty period**

The standard warranty period of inverter is 60 months (5 years).There are two calculation methods for the warranty period:

Purchase invoice provided by the customer: the first flight provides a standard warranty period of 60 months (5 years) from the invoice date;

The customer fails to provide the invoice: from the production date (according to the SN number of the machine), Our company provides a warranty period of 63 months (5.25 years).

In case of any special warranty agreement, the purchase agreement shall prevail.

**Extended warranty period**

Within 12 months of the purchase of the inverter (based on the purchase invoice) or within 24 months of the production of the inverter(SN number of machine, based on the first date of arrival),Customers can apply to buy extended warranty products from the company's sales team by providing the product serial number, Our company may refuse to do not conform to the time limit extended warranty purchase application.Customers can buy an extended warranty of 5, 10, 15 years.

If the customer wants to apply for the extended warranty service, please contact the sales team of our company. to purchase the products that are beyond the purchase period of extended warranty but have not yet passed the standard quality warranty period. Customers shall bear different extended premium.

During the extended warranty period, PV components GPRS, WIFI and lightning protection devices are not included in the extended warranty period. If they fail during the extended warranty period, customers need to purchase and replace them from the our company.

Once the extended warranty service is purchased, our company will issue the

extended warranty card to the customer to confirm the extended warranty period.

**Invalid warranty clause**

Equipment failure caused by the following reasons is not covered by the warranty:

1) The "warranty card" has not been sent to the distributor or our company;

2) Without the consent of our company to change equipment or replace parts;

3) Use unqualified materials to support our company 's products, resulting in product failure;

4) Technicians of non-company modify or attempt to repair and erase the product serial number or silk screen;

5) Incorrect installation, debugging and use methods;

6) Failure to comply with safety regulations (certification standards, etc.);

7) Damage caused by improper storage by dealers or end users;

8) Transportation damage (including scratches caused by internal packaging during transportation).Please claim directly from the transportation company or insurance company as soon as possible and obtain damage identification such as container/package unloading;

9) Failure to follow the product user manual, installation manual and maintenance guidelines;

10) Improper use or misuse of the device;

11) Poor ventilation of the device;

12) The product maintenance process does not follow relevant standards;

13) Failure or damage caused by natural disasters or other force (such as earthquake, lightning strike, fire, etc.)

SOFAR SOLAR

Product Name: PV Grid-Connected Inverter

Company Name: Shenzhen SOFARSOLAR Co., Ltd.

ADD:11/F., Gaoxinqi Technology Building, No.67 Area, Xingdong Community, Xin'an Sub-district, Bao'an District, Shenzhen City,China
Email: service@sofarsolar.com
Tel: 0510-6690 2300
Web: www.sofarsolar.com

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