

USER MANUAL

SOFAR 1-5KTL3-G3



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1 About This Manual

This Installation and user manual (hereinafter referred to as the manual) describes the installation, electrical connection, commissioning, maintenance and fault elimination procedures of the following products:

SOFAR 1.1KTL3-G3, SOFAR 1.6KTL3-G3, SOFAR 2.2KTL3-G3, SOFAR 2.7KTL3-G3, SOFAR 3KTL3-G3, SOFAR 3.3KTL3-G3, SOFAR 4KTL3-G3, SOFAR 5KTL3-G3.

- ▶ Carefully read this manual before use and retain it for future reference!
- ▶ Treat this manual as an integral component of the device.
- ▶ Please retain this manual in a readily accessible location for future reference.

This manual contains important safety information on the installation, operation and maintenance of the device.

- ▶ Read and observe all given safety information.

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.

1.1 Copyright declaration

The copyright of this manual is owned by SOFARSOLAR. It may not be copied – neither partially nor completely – by companies or individuals (including software, etc.) and must not be reproduced or distributed in any form, or with the appropriate means.

SOFARSOLAR reserves the right to final interpretation. This manual may be amended following feedback from users or customers.

Please consult our website at www.sofarsolar.com for the latest version.

1.2 Presentation of warnings

This manual contains information on safe operation and uses symbols to ensure the safety of persons and property as well as the efficient operation of the inverter.

- Read through the following symbol explanations carefully in order to prevent injury or property damage.

Warning symbol



The general danger symbol warns of risk of serious injury when used with the signal words CAUTION, WARNING, and DANGER.

Signal word

DANGER	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
WARNING	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
NOTICE	Indicates a danger that results in damage to or destruction of the inverter.

Sectional warnings

Sectional warnings refer to a complete section and are structured as follows:

 WARNING
Type and source of danger Consequences for non observance ► Avoiding the danger

Embedded warnings

Embedded warnings are part of an action sequence and are placed right before the dangerous step.

WARNING Combination of type/source of danger, consequences for non-observance and avoiding the danger.

1.3 Presentation of action instructions

This table shows the sequence of Action steps:

Symbol	Function
✓	This describes an action requirement
1. 2. 3.	This is the sequence of action steps that must be followed step by step
▶	This is a single-action step
↩	This describes the result of the action

1.4 Note

Notes are presented in a grey bar.

Provides tips essential to the optimal operation of the product.

2 Basic Safety Information



This chapter details the safety information pertaining to the installation and operation of the device.

If you have any questions or problems after reading the following information, please contact SOFARSOLAR.

Read and understand the instructions within this manual and familiarise yourself with the relevant safety symbols in this chapter before beginning with the installation of the device and eliminating any faults.

Before connecting to the power grid, you must obtain official authorisation from the local power grid operator in accordance with the corresponding national and state requirements. Furthermore, operation may only be carried out by qualified electricians.

Please contact the nearest authorised service centre if any maintenance or repairs are required.

- ▶ Please contact your dealer to obtain information about your nearest authorised service centre.
- ▶ Do NOT carry out repairs on the device yourself, this may lead to injury or property damage.
- ▶ Before installing the device or carrying out maintenance on it, you must turn off the DC switch in order to interrupt the DC voltage of the PV generator. You can also switch off the DC voltage by turning off the DC switch in the array junction box. Not doing this may result in serious injury.

2.1 Target group

This manual is intended for qualified electricians who are responsible for the installation and commissioning of the inverter in the PV system, as well as the PV system operators.

2.2 Qualified personnel

Personnel tasked with the operation and maintenance of the device must have the qualifications, competence and experience required to perform the described tasks, while also being capable of fully understanding all instructions contained within the manual. For safety reasons, this inverter may only be installed by a qualified electrician.

Requirements for qualified electricians:

- Personnel have received training on occupational safety, as well as the installation and commissioning of electrical systems.
- Personnel are familiar with the local laws, standards and regulations of the grid operator.

SOFARSOLAR assumes no responsibility for the destruction of property or any injuries to personnel caused by improper usage.

2.3 Installation requirements

Install the inverter according to the information contained in the following section.

- ▶ Choose a suitable place for the installation of electrical devices.
- ▶ Ensure that there is sufficient space for an emergency exit which is suitable for maintenance.
- ▶ Installation of the inverter must conform with laws, regulations, codes and standards applicable in the jurisdiction.
- ▶ Before connecting the product to the electrical utility grid, contact the local utility company for approval.

2.4 Transport requirements

The factory packaging is specifically designed to prevent transport damage, i.e. violent shocks, moisture and vibrations. However, the device must not be installed if it is visibly damaged. In this case, notify the responsible transport company immediately. If necessary, you can seek help from your photovoltaic system installer or SOFARSOLAR.

The stacking height of multiple inverters should not exceed the stacking limit indicated on the outer box.

If the inverter is stored for more than half a year, the inverter needs to be fully examined and tested by qualified service or technical personnel before use. For storage conditions see Technical Data.

2.5 Labelling on the device

The labels must NOT be concealed by items and foreign objects (rags, boxes, devices, etc.). They must be regularly cleaned and kept clearly visible at all times. See the chapter about the 3.4 Labelling on the inverter.

2.6 Electrical connection

Observe all applicable electrical regulations when working with the Solar inverter.

DANGER

Dangerous DC voltage

- Before establishing the electrical connection, cover the PV modules using opaque material or disconnect the PV generator from the inverter. Solar radiation will cause dangerous voltage to be generated by the PV generator!

DANGER

Danger through electric shock!

- All installations and electrical connections may only be carried out by trained electricians!

NOTICE

Authorisation for grid feed-in

- Obtain authorisation from the local power grid operator before connecting the inverter to the public power grid.

Do not open the inverter or remove any of the labels. Otherwise, SOFARSOLAR shall assume no guarantee.

2.7 Operation

DANGER

Electric shock

- ▶ Contact with the electrical grid or the device's terminals may result in an electric shock or fire!
- ▶ Do not touch the terminal or the conductor which is connected to the electrical grid.
- ▶ Follow all instructions and observe all safety documents that refer to the grid connection.

CAUTION

Burning due to hot housing

- ▶ While the inverter is being operated, several internal components will become very hot. Please wear protective gloves!
- ▶ Keep children away from the device!

2.8 Repair and maintenance

DANGER

Dangerous voltage!

- ▶ Before carrying out any repair work, first switch off the AC circuit breaker between the inverter and power grid, and then the DC switch.
- ▶ After switching off the AC circuit breaker and the DC switch, wait a minimum of 5 minutes before starting any maintenance or repair work.

NOTICE**Unauthorised repairs!**

- ▶ Following the elimination of any faults, the inverter should be fully functional once more. Should any repairs be required, please contact a local authorised service centre.
- ▶ The internal components of the inverter must NOT be opened without the relevant authorisation. SOFARSOLAR assumes no responsibility for any resulting losses or defects.

2.9 EMC / noise level of inverter

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

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

** DANGER****Electromagnetic radiation from the inverter may be harmful to health!**

- ▶ Please do not continue to stay around the inverter for less than 20 cm when the inverter is working.

2.10 Symbols and signs

** DANGER****Dangerous DC voltage**

- ▶ High voltage circuits of inverters can endanger life.

- ▶ All installations and electrical connections may only be carried out by trained electricians.
- ▶ Minors, individuals with disabilities, and those with mental health conditions are prohibited from using this product.
- ▶ This product should be installed out of the reach of children.

**WARNING****Damage due to overvoltage**

- ▶ Ensure that the input voltage does not exceed the maximum permissible voltage. Overvoltage may cause long-term damage to the inverter, as well as other damage that is not covered by the warranty.

**CAUTION****Beware of burning hazards due to the hot housing!**

- ▶ While the inverter is in operation, only touch the display and the buttons, as the housing can become hot.

NOTICE**Implement earthing!**

- ▶ The PV generator must be earthed in accordance with the requirements of the local power grid operator!
- ▶ For reasons of personal safety, we recommend that all PV module frames and inverters of the PV system are reliably earthed.

Symbols on the inverter

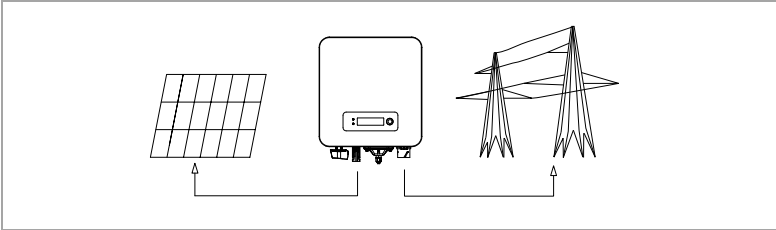
Several symbols pertaining to safety can be found on the inverter. Please read and understand the content of these symbols before starting the installation.

Symbol	Description
	Residual voltage is present in the inverter! Before opening the inverter, you should wait five minutes to ensure that the capacitor has been fully discharged.
	Caution! Danger through electric shock
	Caution! Hot surface
	The product is compliant with EU guidelines
	Earthing point
	Please read the manual before installing the inverter
IP	Device degree of protection according to EN 60529
+ -	Positive and negative poles of the DC input voltage
	The inverter must always be transported and stored with the arrows pointing upward
	Allowable operating temperature range.
	RCM (Regulatory Compliance Mark) The product meets the requirements of the applicable Australian standards.
	When the equipment is scrapped, it is disposed of following local laws and regulations or sent to the manufacturer.

3 Product Features

3.1 System description

SOFAR 1...5KTL3-G3 is a single MPPT grid-tied PV inverter which converts the DC power generated by PV arrays into sine wave single-phase AC power and feeds it to the public electrical grid, AC circuit breaker and DC switch used as disconnect device, and the disconnect device shall be easily accessible.



SOFAR 1...5KTL3-G3 inverters can only be used with photovoltaic modules that do not require one of the poles to be grounded. The operating current during normal operation must not exceed the limits specified in the technical specifications. Only the photovoltaic modules can be connected to the input of the inverter (do not connect batteries or other sources of power supply).

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

3.2 Product dimensions

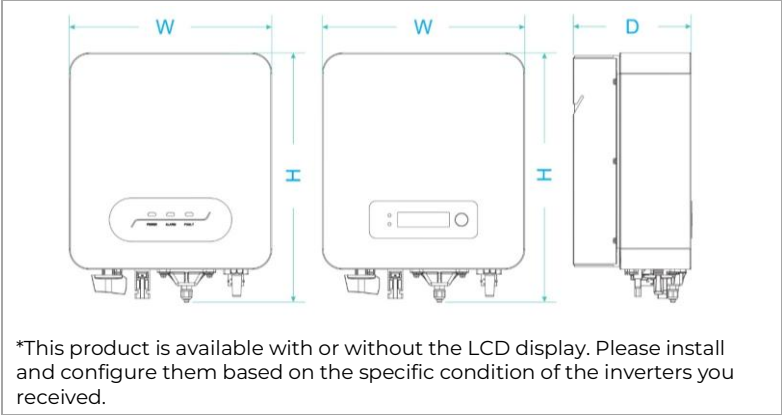
SOFAR 1...5KTL3-G3 has the following dimensions:

SOFAR 1.1...3.3KTL3-G3:

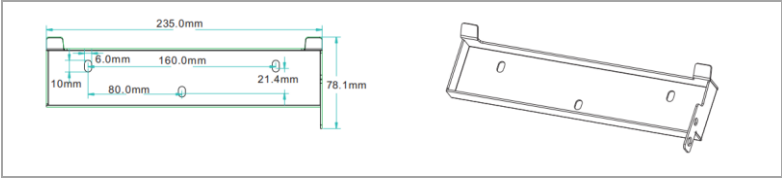
$W \times H \times D = 260.5 \times 321 \times 131.5 \text{ mm}$

SOFAR 4...5KTL3-G3:

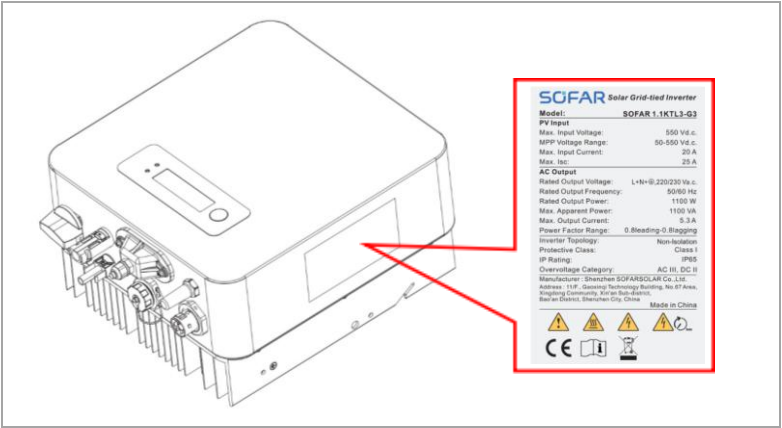
$W \times H \times D = 260.5 \times 321 \times 151.5 \text{ mm}$



Bracket dimensions of inverter:



3.3 Labelling on the inverter



The machine nameplate must not be obscured or broken by other objects (rags, cardboard boxes or other tools); the surface of the

machine nameplate must be kept clean and clear to ensure that the contents are clearly visible.

3.4 Functional features

The DC output generated by the PV generator is filtered by the input board before it reaches the power board. The input board also provides functions such as the detection of insulation impedance and the measurement of the DC current and voltage. The power board converts the DC current into AC current. The AC current is filtered by the output board and fed into the power grid. The output board also provides functions such as grid voltage and current measurement, earth fault protection and a disconnecting relay. The control board supplies the auxiliary energy, controls the operating state of the inverter and displays the operating status on the display board. An error code will appear on the display if the inverter is in an abnormal operating state. At the same time, the control board may trigger the relay to protect the internal components.

Functions

A Energy management unit

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

B Feeding reactive power into the grid

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

C Limiting the active power fed into the grid

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

D Self-power reduction when the grid is over frequency

When the grid frequency is higher than the limited value, the inverter will reduce output power, which is necessary for grid stability.

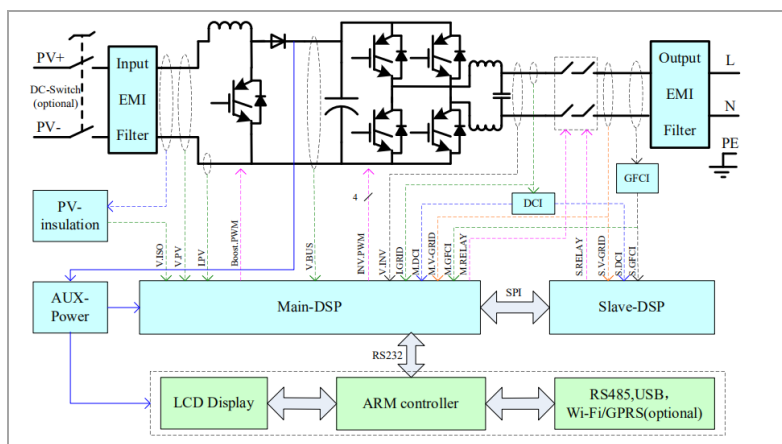
E Data transmission

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

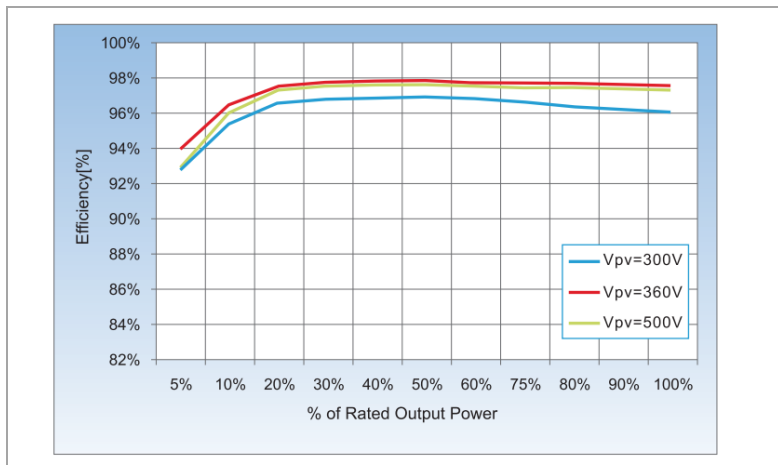
F Software update

Support USB flash drive local upgrade software and Wi-Fi/GPRS remote upgrade software.

3.5 Electrical block diagram



3.6 Efficiency curve



4 Inverter Storage

If the inverter is not installed immediately, storage conditions need to meet the below requirements:

Place the inverter in the original packing case with the desiccant inside.

Keep the storage temperature around -30°C to $+70^{\circ}\text{C}$, Relative humidity 5 to 95%, non-condensing.

In case of stacking storage, the number of stacking layers should never exceed the limit marked on the outer side of the packing case.

The packing case should be upright.

If the inverter needs to be transported again, pack it strictly before loading and transporting it.

Do not store the inverter in places susceptible to direct sunlight, rain, and strong electric field.

The inverter needs to be stored in a clean and dry place and protected from dust and moisture.

Inverters stored for half a year and above need to be inspected and tested by a professional before being put into use.

Please store the product in accordance with the storage requirements. Damage to the product caused by storage conditions that do not meet the requirements will not be covered by the warranty.

5 Installation

DANGER

Fire hazard

- ▶ Do NOT install the inverter on flammable material.
- ▶ Do NOT install the inverter in an area in which flammable or explosive material is stored.

CAUTION

Burning hazard

- ▶ Do NOT install the inverter in places where it can be accidentally touched. The housing and heat sink may become very hot while the inverter is being operated.

NOTICE

Handling Safety

- ▶ Consider the weight of the inverter when transporting and moving it.
- ▶ Choose a suitable installation location and surface.
- ▶ Commission a minimum of two persons for the installation of the inverter.
- ▶ Do not turn the inverter upside down.

5.1 Installation procedure

Mechanical installation is performed as follows:

1. Examine the inverter before installation
2. Prepare the installation
3. Select an installation location
4. Transport the inverter
5. Mount the rear panel
6. Install the inverter

5.2 Examination before installation

Before unpacking the inverter, check the external packaging material for damage, e.g. holes and cracks. If you discover any cases of damage, do not unpack the inverter and contact the transport company and/or dealer immediately.

Do not install the inverter if the packaging is damaged.

It is recommended that the packaging material should be removed within 24 hours before installing the inverter.

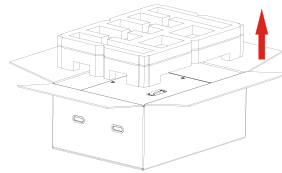
Keep the original packaging and use it whenever the inverter needs to be shipped or transported.

5.3 Unpacking the inverter

► Open the packaging and have at least two people grip underneath the inverter at both sides.

- 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.

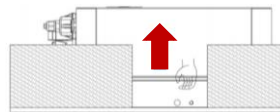
- When placing the inverter on the floor, put it above foam or paper to avoid the damage of the shell of the inverter.



CAUTION

Please handle the inverter carefully. Keep your balance when lifting the inverter.

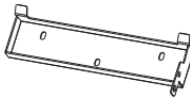
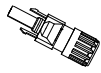
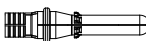
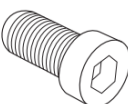
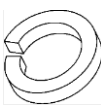
► Lift the inverter out of the packaging and move it to its installation position horizontally.

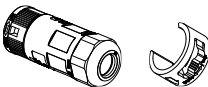
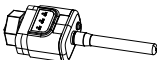


5.4 Checking the delivery scope

► Check that the delivery is intact and complete.

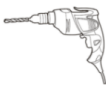
In the event of any damage or missing components, contact the wholesaler.

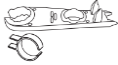
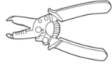
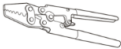
No.	Image	Description	Quantity
1		SOFAR 1...5KTL3-G3	1
2		Rear panel	1
3		PV+ input terminal	1
4		PV- input terminal	1
5		Metal terminals secured to PV+ input power cables	1
6		Metal terminals secured to PV- input power cables	1
7		M5 cross screw (For locking the rear panel)	2
8		Expansion bolts	3
9		M5 flat washer	5
10		Spring shim	5

No.	Image	Description	Quantity
11		Self-tapping screw	3
12		AC output terminal	1
13		485 terminal (2pin)	1
14		Stick Logger (optional)	1
15		Documents	1

5.5 Tools

Prepare tools required for installation and electrical connections.

No.	Tool	Model	Function
1		Hammer drill Recommend drill dia. 6mm	Used to drill holes on the wall.
2		Screwdriver	Wiring
3		Cross screwdriver	Remove and install AC terminal screws
4		Hammer	Install the expansion bolt

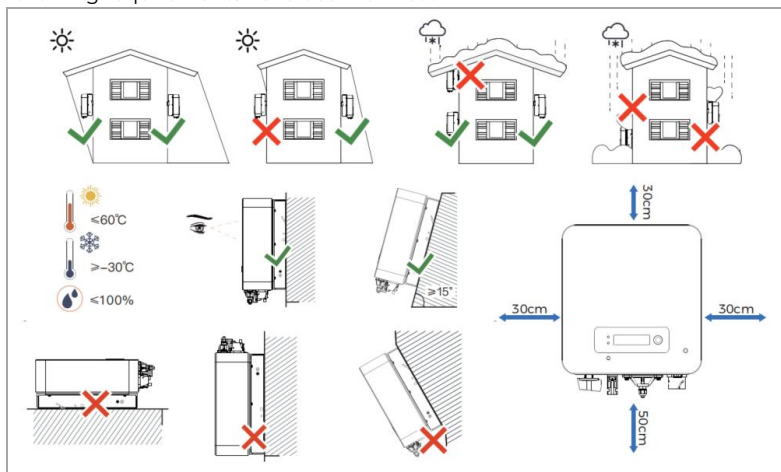
No.	Tool	Model	Function
5		Removal tool	Remove PV terminal
6		Wire stripper	Strip wire
7		5mm Allen Wrench	Turn the screw to connect rear panel with inverter.
8		Crimping tool	Used to crimp power cables
9		Multi-meter	Used to check grounding
10		Marker	Used to mark signs
11		Measuring tape	Used to measure distances
12		Level	Used to ensure that the rear panel is properly installed
13		ESD gloves	Operators wear
14		Safety goggles	Operators wear
15		Anti-dust respirator	Operators wear

5.6 Selecting an installation location

Requirements for install position:

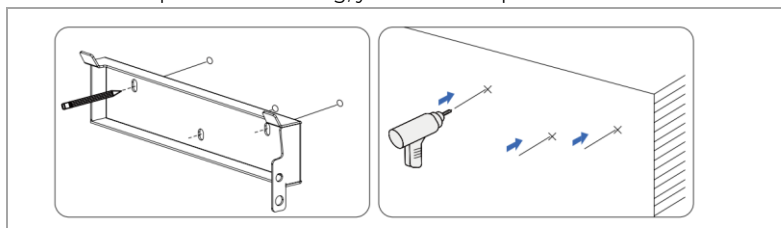
- ▶ Install position must not obstruct the disconnect of power.
- ▶ Place the inverter on an appropriate bearing capacity object.
- ▶ Location should be avoided touch by children.

Choose a suitable position for the installation of the inverter. Ensure that the following requirements have been fulfilled:

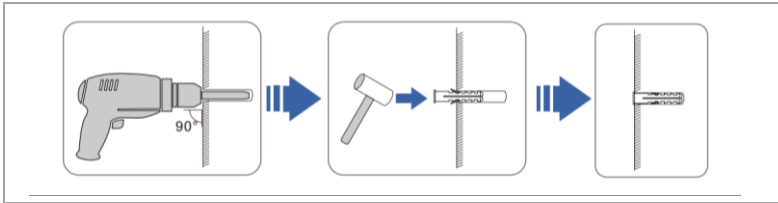


5.7 Installing the inverter

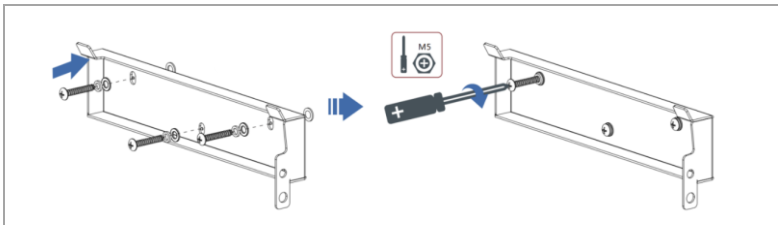
1. Determine the positions for drilling holes, ensure the hole positions are level, then mark the hole positions using a marker pen, use the hammer drill to drill holes on the wall. Keep the hammer drill perpendicular to the wall, do not shake when drilling, so as not to damage the wall. If the error of the hole positions is too big, you need to reposition.



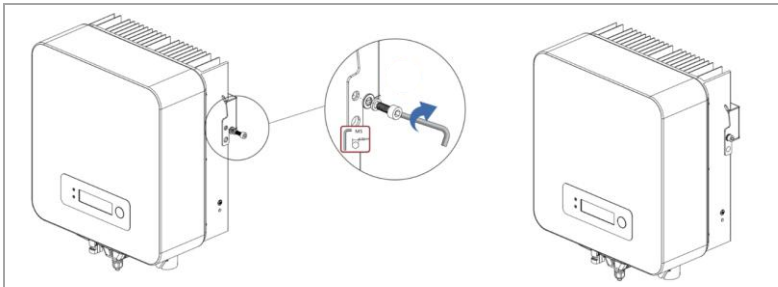
2. Insert the expansion bolt vertically into the hole, pay attention to the insertion depth of the expanding bolt (should be deep enough).



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



4. Hook the inverter to the rear panel. Using an M5screw to secure the inverter to the rear panel to ensure safety.



6 Electrical Connections

DANGER

Dangerous DC voltage

- ▶ Before establishing the electrical connection, cover the PV modules using opaque material or disconnect the PV generator from the inverter. Solar radiation will cause dangerous voltage to be generated by the PV generator.
- ▶ Before performing electrical connections, ensure that the DC switch is OFF.
- ▶ Reason is that the electrical charge remains in the capacitor after the DC switch has been switched off. Therefore, at least 5 minutes must lapse before the capacitor has been electrically discharged.

NOTICE

- ▶ Installation and maintenance of the inverter must be performed by professional electrical engineer.
- ▶ For SOFAR 1...4KTL3-G3, the open-circuit voltage (Voc) of module arrays connected in series must be $\leq 550V$; for SOFAR 5KTL3-G3, the open-circuit voltage (Voc) of module arrays connected in series must be $\leq 600V$
- ▶ The connected PV modules must have an IEC 61730 Class A rating.

Model	Isc (absolute maximum)	PV Maximum output over current protection
SOFAR 1.1KTL3-G3	25A	5.3A
SOFAR 1.6KTL3-G3	25A	7.7A
SOFAR 2.2KTL3-G3	25A	10.6A
SOFAR 2.7KTL3-G3	25A	13A
SOFAR 3KTL3-G3	25A	14.5A
SOFAR 3.3KTL3-G3	25A	16A

SOFAR 4KTL3-G3	25A	19.3A
SOFAR 5KTL3-G3	25A	24.1A

The decisive voltage class (DVC)

The DVC is the voltage of a circuit which occurs continuously between any two live parts in the worst-case rated operating condition when used as intended.

Interface	DVC
PV input interface	DVCC
AC output interface	DVCC
USB interface	DVCA
Com interface	DVCA

DC switch parameters

Rated-insulation voltage	1100V
Rated impulse withstand voltage	8KV
Rated operational current (Ie)	1100V/5A, 1000V/8A, 800V/12.5A, 500V/25A
PV utilization category	DC-PV2
Rated short time withstand current (Icw)	700A
Rated short-circuit making capacity (Icm)	4xIe
Rated breaking capacity	4xIe

PV terminal parameters

Rated-insulation voltage	1000V
Rated operational current	39A
Protection class	IP68
Maximum temperature limit	105°C

6.1 Connection sequence

Electrical installation is performed as follows:

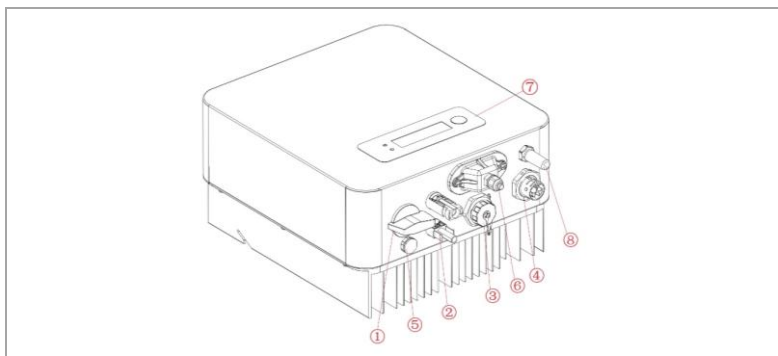
1. Connect PE cable
2. Connect DC input cable
3. Connect AC output power cable
4. Connect communication cable (optional)

6.2 Terminal connector

⚠ CAUTION

Pay attention to damage during transport

- Please carefully check that the product packaging and each connection terminal are intact before installation.



No.	Label
1	DC Switch (optional)
2	PV input terminals
3	Wi-Fi/GPRS/Ethernet (optional)
4	Grid connection port
5	Breather valve
6	USB/DRMs/RS485/CT
7	LCD

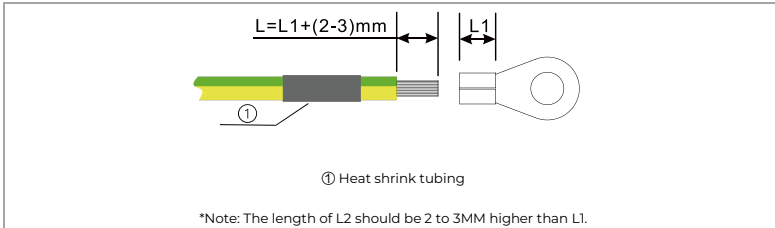
6.3 Connect grounding PE cable

Connect the inverter to the grounding electrode using protection ground (PGND) cables for grounding purpose.

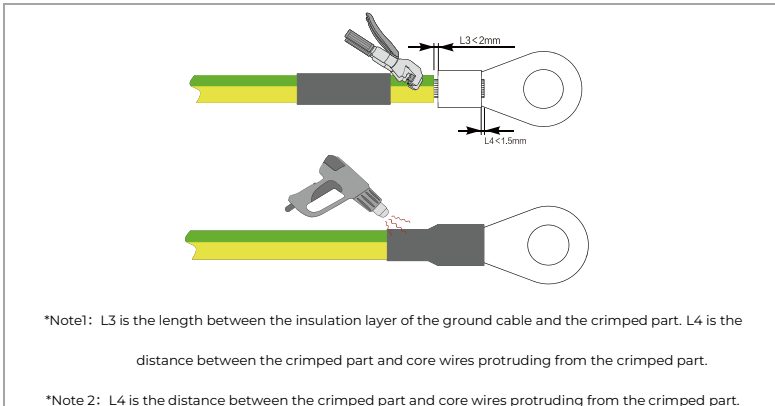
The inverter is transformer-less, requires the positive pole and negative pole of the PV array are NOT grounded. Otherwise, it will cause inverter failure. In the PV power system, all non-current carrying metal parts (such as PV module frame, PV rack, combiner box enclosure, and inverter enclosure) should be connected to the earth.

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

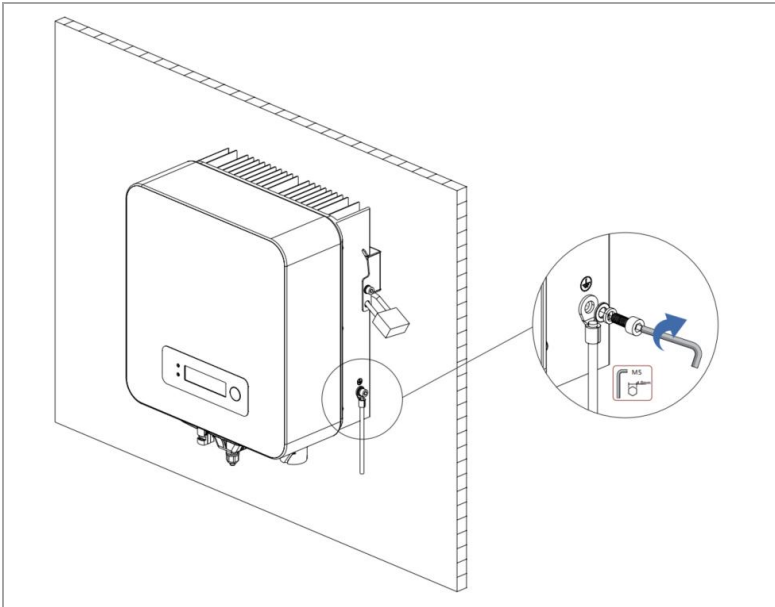
1. Remove the insulation of the cable.



2. Crimp the cable to the ring terminal.



3. Install the crimped OT terminal, flat washer using M5 screw, and tighten the screw to a torque of 3 N.m using an Allen wrench.



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

6.4 Connect grid side of inverter (AC-Output)

Connect the inverter to the AC power distribution frame or power grid using AC output power cables.

CAUTION

- ▶ Each inverter must have its own circuit breaker.
- ▶ Do not connect any consumers between the inverter and circuit breaker!
- ▶ The AC disconnecting device must be easily accessible.

NOTICE

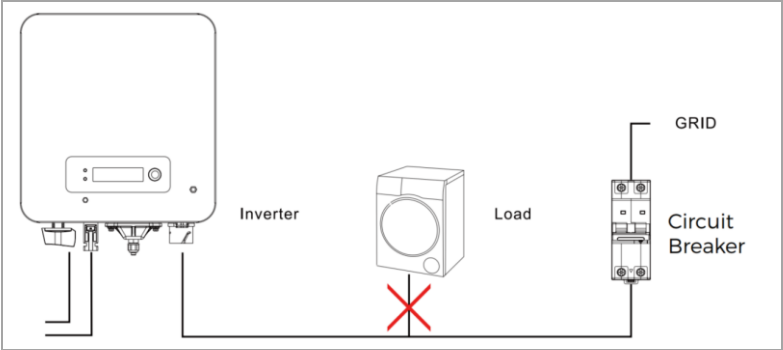
Obtaining permission to connect to the grid

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

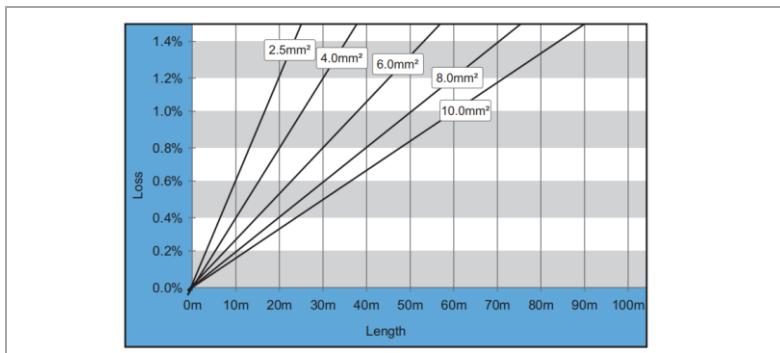
All the AC output cables used for the inverters are outdoor three-core cables.
To facilitate the installation, use flexible cables.

Item Model	SOFAR 1.1...1.6KTL3 -G3	SOFAR 2.2KTL3- G3	SOFAR 2.7...4KTL3 -G3	SOFAR 5KTL3-G3
Cable (Copper)	≥4mm ²	≥4mm ²	≥6mm ²	≥6mm ²
Breaker	16A/400V	25A/400V	25A/400V	30A/400V

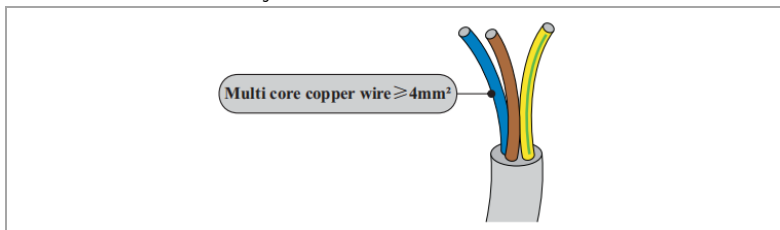
NOT allowed: connect loads between inverter and circuit breaker:



AC cable should be correctly sized to ensure the power loss in AC cable is less than 1% of the rated power. If the resistance of the AC cable is too high, it will cause a huge increase in the AC voltage, which may lead to a disconnection of the inverter from the electrical grid. The relationship between power loss in AC cable and wire length, wire cross sectional area is shown in the following figure:

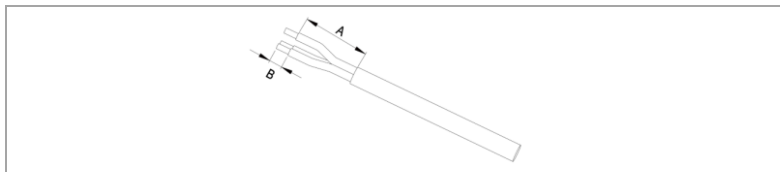


The AC output of this product is equipped with a 3-pole terminal block connector. The inverter is equipped with IP66 AC connector, and the AC output cable needs to be wired by the customer.

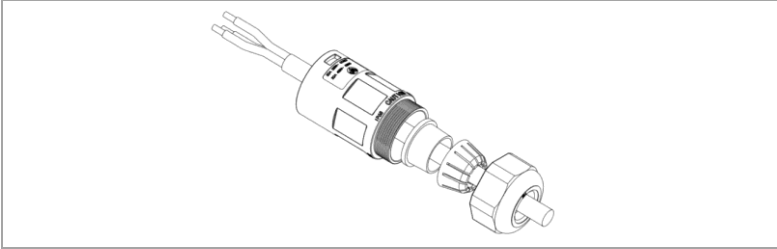


Wiring Procedure:

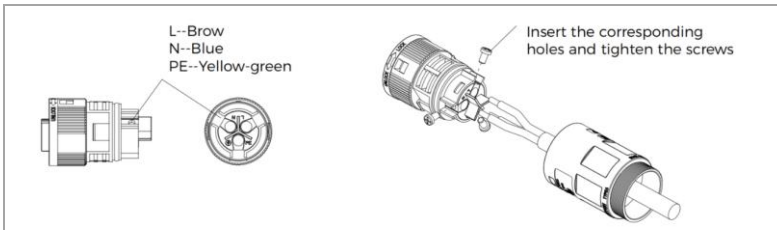
1. Select appropriate cables. Remove the insulation layer of the AC output cable using a wire stripper according to the figure shown below: A:15-25mm, B:6~8mm.



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

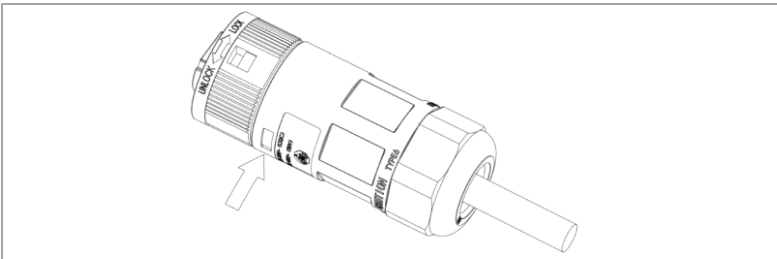


3. Connect AC output cable as per the following requirements:
- Connect the yellow-green wire to the hole labelled "PE", and fasten the wire using a Cross screwdriver;
- Connect the brown wire to the hole labelled "L", and fasten the wire using a Cross screwdriver;
- Connect the blue wire to the hole labelled "N", and fasten the wire using a Cross screwdriver.

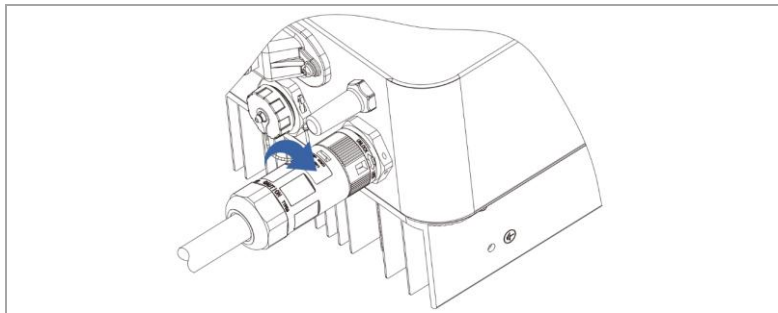


Note: When using aluminium wire, you need to use a copper-aluminium transfer terminal. The copper terminal is included in the package.

4. Insert the AC connector and hear "click", then tighten the waterproof nut, to ensure that the cable is firmly connected:

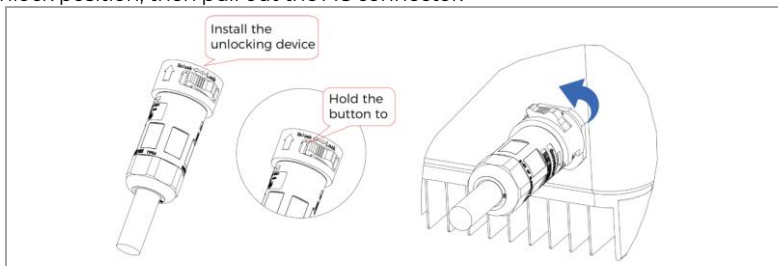


5. Connect the AC connector to the inverter



Removing the AC connector

- ▶ Hold the button to unlock and rotate the knob counterclockwise to the unlock position, then pull out the AC connector.



⚠ CAUTION

- ▶ Make sure the grid is disconnected before removing the AC connector.

6.5 Connect PV side of inverter (DC-Input)

Connecting PV strings into inverter must follow the below procedure. Any faulty cause by inappropriate operation will be not included in the warranty.

⚠ WARNING

- ▶ Before connecting the PV array to the inverter, make sure that the PV array is well insulated to ground.
- ▶ Make sure that the voltage and the maximum short-circuit current of each PV string are within the permissible range of the inverter, see 'Technical Data' for details.

- ▶ Ensure that the 'DC switch' is in the OFF position.
- ▶ Before connecting the DC connector to the inverter, please check the positive and negative polarity of the PV string and make sure it is correct before plugging the DC connector into the corresponding DC terminal.
- ▶ Do not connect the same PV string to more than one inverter, otherwise it may cause damage to the inverter.

NOTICE

- ▶ Ensure the PV positive connector connects to the inverter positive pole, the negative connector connects to the inverter negative pole. Use the connectors in the accessories bag. The damage caused by incorrect is not included in the warranty.
- ▶ Ensure the same PV string must have the same structure, including: same model, same number of panels, same direction, same azimuth.

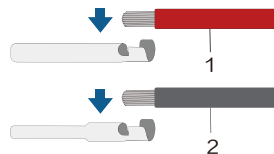
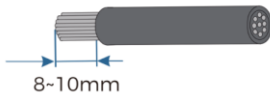
Recommended DC input cable size

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

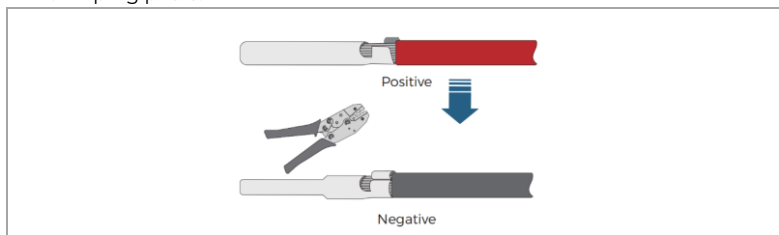
1. Use the metal contact pins from the accessories bag. Connect the cable according to the diagram (1. Positive cable, 2. Negative cable).
2. Insert the positive and negative DC cables into the corresponding contact pins.

CAUTION

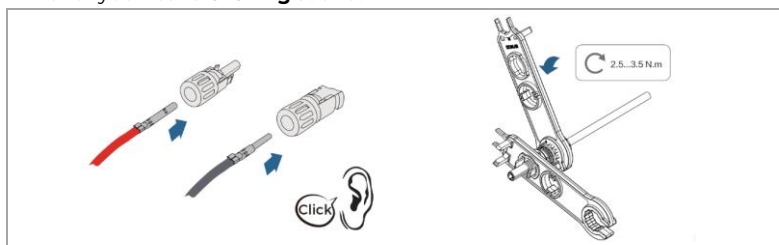
Danger of reverse polarity, use the corresponding contact pins, ensure that the polarity is correct before plugging into the DC connections!



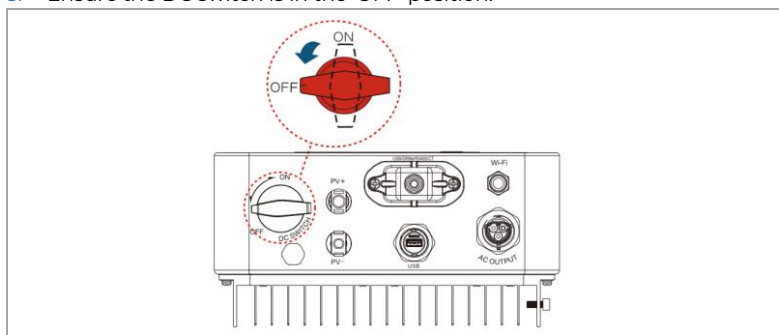
3. Crimp the PV metal contact pin to the striped cable using proper crimping pliers.



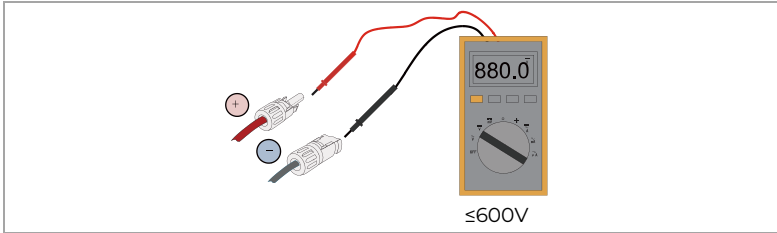
4. Insert the crimped DC cables into the corresponding connector housing until you hear a **clicking** sound.



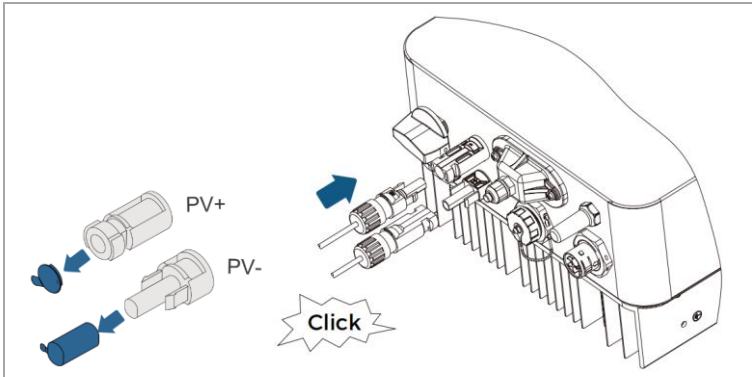
5. Ensure the DC switch is in the 'OFF' position.



6. Check the polarity of the DC input cable by measuring the PV voltage at the DC input with a multimeter. Ensure that the open circuit voltage does not exceed the inverter input limit of 600V under any circumstances.



7. Connect the DC connector to the inverter.



For unconnected PV ports, do not remove the connector plug to prevent water.

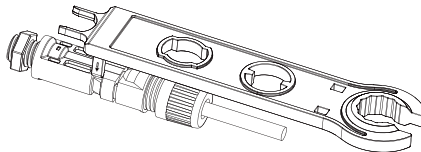
Removing the DC connector:

If need to remove the PV connector from the inverter side, use the Removal Tool as shown below figure, move the connector gently.

- ▶ Insert a removal key into the locking and press on the key with the adequate force.

CAUTION

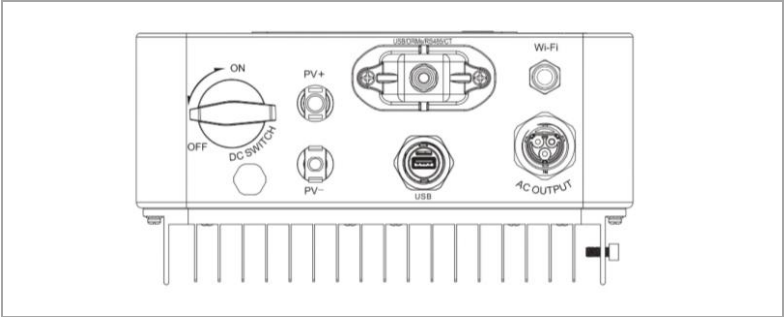
Danger of DC arcing. Set the DC switch to OFF before removing the plus and minus connector.



6.6 Communication connection

When layout the cable routing, separate the communication wiring and power wiring because the signal can be affected.

The communication interface location of the SOFAR 1...5KTL3-G3 is shown in the figure below:

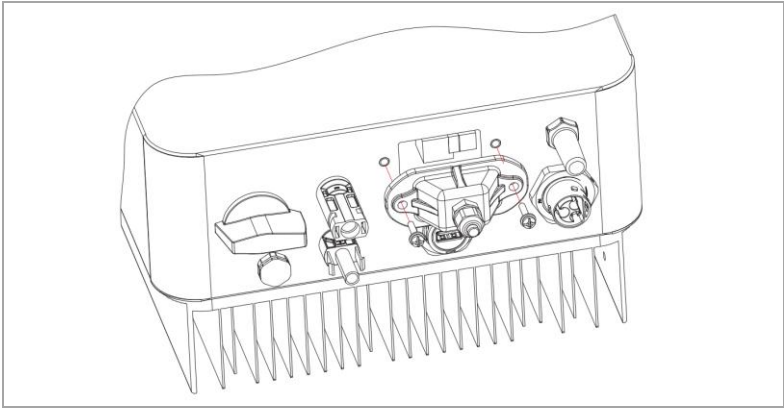


RS485, CT, inverter logic interface connection

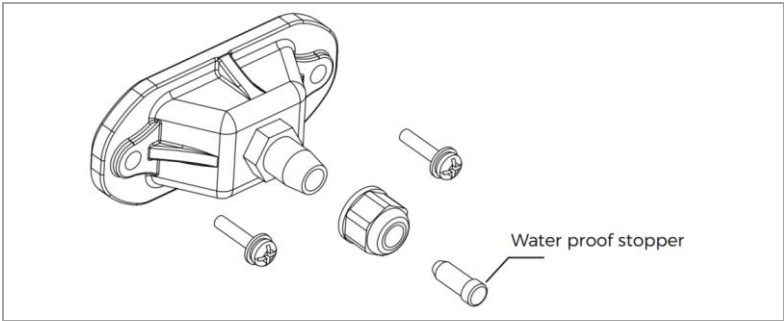
Recommended communication cable size are shown below. The wiring methods are the same for RS485 and CT, this part describes their wiring methods and logic interface wiring method.

Communication function	RS485	CT
Cable size	0.5...1.5mm ²	0.5~1.5mm ²
Outside diameter	2.5~6mm	2.5~6mm

1. Connect the DC connector to the inverter;



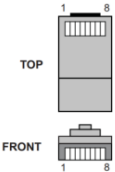
2. Unlock the waterproof cable gland, and remove the stopper in the waterproof connector;

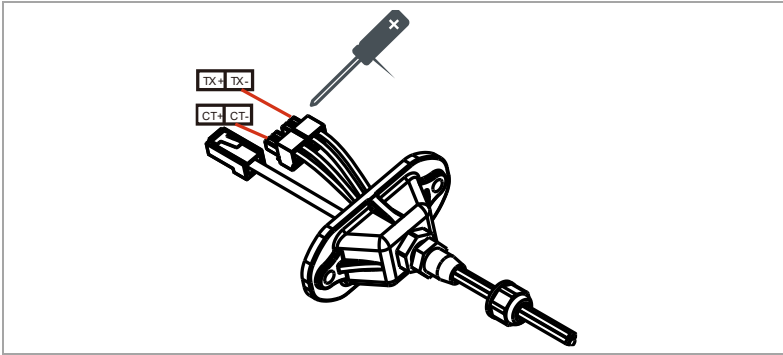


3. Select a suitable cable according to the recommended AC output cable, and remove the insulation layer using a wire stripper, the length of the wire core is about 6mm, insert the cable through the cable gland and waterproof cover, according to the below table, connect the wires as per the labels, and secure the wire using a slotted screwdriver.

Function Description of the communication terminals:

Type	RS485	CT	Logic interface
------	-------	----	-----------------

conn ector					
Label	TX-	TX+	CT-	CT+	The following table
Func tion	RS485 differen tial signal-	RS485 differenti al signal+	CT-	CT+	



The logic interface pin definitions and circuit connections are as follows:

The function of the logical interface needs to be set on the display screen, please refer to the operation steps in section 9.1.

A. Logic interface pins are defined according to different standard requirements. Logic interface for AS/NZS 4777.2:2015, also known as inverter demand response modes (DRMs).

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

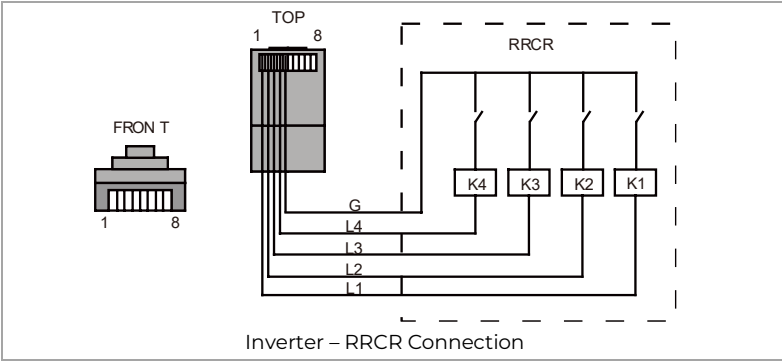
Function description of the DRMs terminal:

Pin No.	Color	Function
1	White and orange	DRM1/5
2	Orange	DRM2/6
3	White and green	DRM3/7
4	Blue	DRM4/8
5	White and blue	RefGen
6	Green	DRM0
7	White and brown	Pin7&Pin8 short internal
8	Brown	

NOTE: Supported DRM commands: 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 an RRCR (Radio Ripple Control Receiver) in order to dynamically limit the output power of all the inverters in the installation.



Function description of the terminal

Pin No.	Pin name	Description	Connected to (RRCR)
1	L1	Relay contact 1 input	K1 - Relay 1 output
2	L2	Relay contact 2 input	K2 - Relay 2 output
3	L3	Relay contact 3 input	K3 - Relay 3 output
4	L4	Relay contact 4 input	K4 - Relay 4 output
5	G	GND	Relays common node
6	NC	Not Connected	Not Connected
7	NC	Not Connected	Not Connected
8	NC	Not Connected	Not Connected

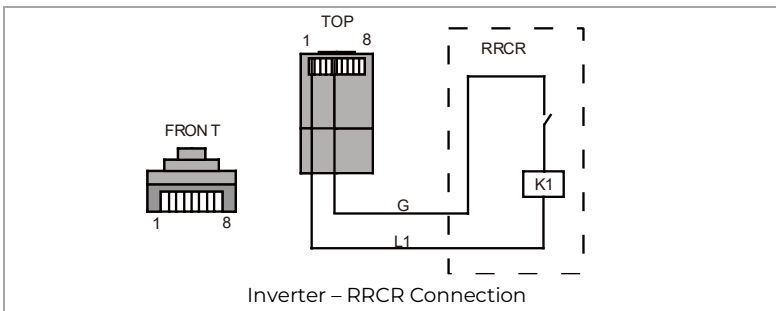
The inverter is preconfigured to the following RRCR power levels

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.



Function description of the terminal

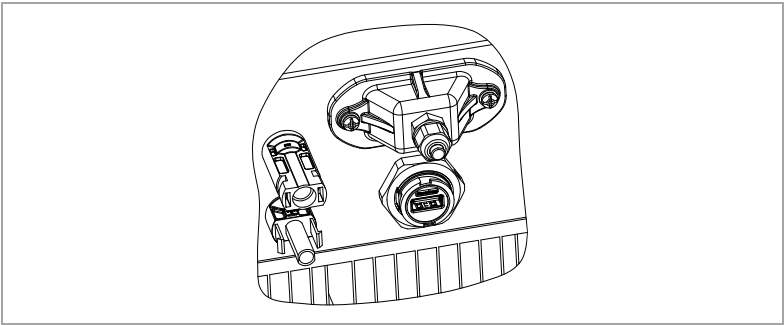
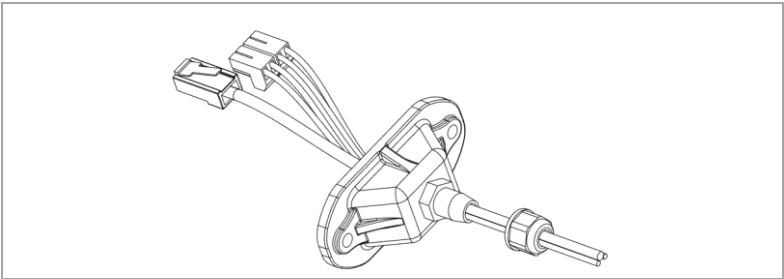
Pin No.	Pin name	Description	Connected to (RRCR)
1	L1	Relay contact 1 input	K1 - Relay 1 output
2	NC	Not Connected	Not Connected
3	NC	Not Connected	Not Connected
4	NC	Not Connected	Not Connected
5	G	GND	K1 - Relay 1 output
6	NC	Not Connected	Not Connected
7	NC	Not Connected	Not Connected
8	NC	Not Connected	Not Connected

The inverter is precon figured to the following RRRC power levels.

Relay status: close is 1, open is 0

L1	L2	L3	L4
1	0%	< 5 seconds	1
0	100%	/	1

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

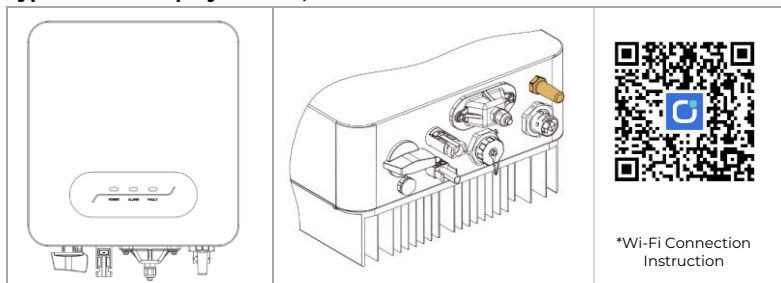


WIFI/GPRS module installation procedure

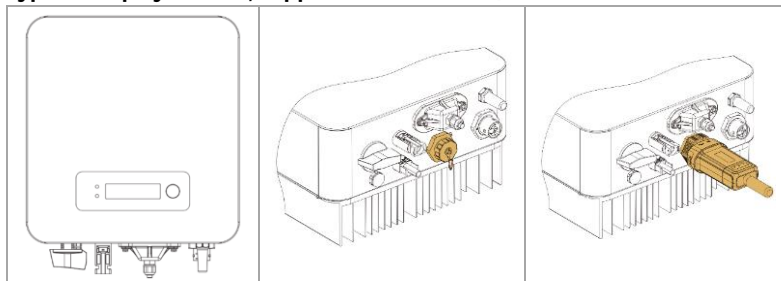
The data collector transmits the power output information, alarm information and operation status of the inverter to the PC or local data collection device,

and then uploads them to the server. According to the monitoring device SN, remote monitoring of the inverter is carried out on the relevant website or APP. There are two types of data collection methods, so please proceed according to the products received

Type A: Non-display version, built-in Bluetooth



Type B: Display version, supports external WiFi/GPRS module



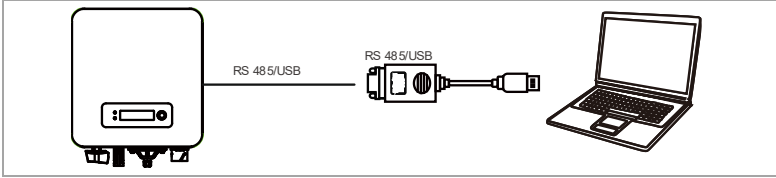
Communication method

SOFAR 1...5KTL3-G3 grid-connected inverters offer RS485 (standard) and Wi-Fi (optional) communication modes

A. Communication between one inverter and one PC:

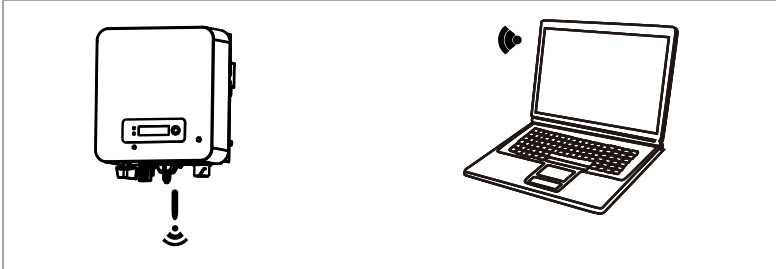
1. RS-485

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



2. WI-FI

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



The operation information (generated energy, alert, operation status) of the inverter can be transferred to PC or uploaded to the server via Wi-Fi. You can register on the website.

<https://eu.sofarcloud.com/plants/plantList>

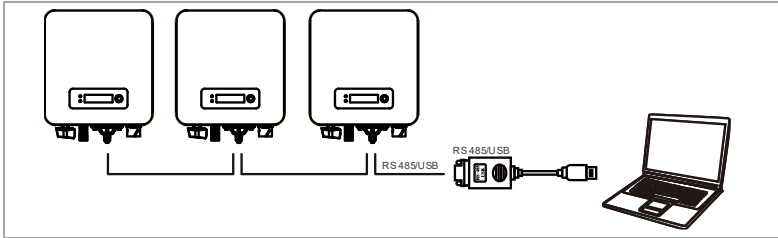
Using the Wi-Fi S/N number (NOTE3), then you can login the website:

<https://eu.sofarcloud.com/plants/plantList> to remote monitors the inverter.

B. Communication between multiple inverters and one PC:

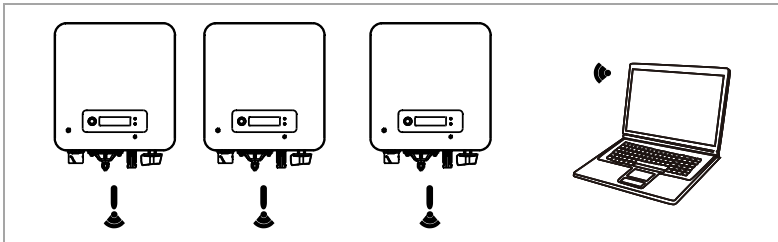
1. RS-485

Refer to the following figure: RS-485 wires are connected in parallel between inverters. Refer to section 4.5 of this manual for wire connection methods. Connect the TX+ and TX- of the inverter to the TX+ and TX- of the RS485→USB adapter; connect the USB port of the adapter to the computer. A maximum of 31 inverters can be connected in one daisy chain. (NOTE2)



2. WI-FI

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



The operation information (generated energy, alert, operation status) of the inverter can be transferred to PC or uploaded to the server via Wi-Fi. You can register on the website.

<https://eu.sofarcloud.com/plants/plantList>

Using the Wi-Fi S/N number (NOTE3), you can log in to the website:

<https://eu.sofarcloud.com/plants/plantList> to remotely monitor the inverter.

NOTE

1. The length of the RS-485 communication cable should be less than 1000 m.
2. When multiple inverters are connected via RS485 wires, set the modbus address to differentiate the inverters.
3. The S/N number of the Wi-Fi module is located on the side

7 Commissioning

NOTICE

Pre-commissioning checks

- ▶ Before starting up the device for the first time, all operations performed on the device should be thoroughly checked.
- ▶ Ensure that DC and AC voltages are within the acceptable range of the inverter.

7.1 Starting the inverter

1. Switch on the DC switch.
2. Switch on the AC circuit breaker.

↳ When the DC output generated by the solar system is at a sufficient level, the inverter starts automatically. A correct operation is indicated by the screen displaying **Normal**.

- ▶ Different distribution network operators in different countries have different requirements regarding grid connections of PV grid connected inverters.
- ▶ Choose the correct country code. If in doubt, consult a qualified electrical engineer or an electrical safety officer.
- ▶ SOFARSOLAR is not responsible for any consequences arising out of incorrect country code selection.
- ▶ The inverter can monitor the power grid in real time. The protection can be realized when the power grid is abnormal, so that the inverter is separated from the power grid.

If the inverter displays an error message, consult chapter 10.1 Troubleshooting.

8 SofarCloud APP

SofarCloud is a platform for the full lifecycle management of renewable energy plants. It is designed for distributors/installers and end users of residential PV and storage systems as well as commercial and industrial PV and storage systems. Customers can monitor their systems both locally and remotely via the web interface or mobile app, effectively helping them to stay informed about the real-time operation of their plants, enabling refined management, efficient maintenance, transparent operation, and maximised benefits.

Web portal: <https://eu.sofarcloud.com>

8.1 Download and Install the App

1. Android device users can download the APP through major Android application markets such as Google Play.
2. IOS device users can search for “SofarCloud” in the App Store and download the app.
3. You can also download the “SofarCloud” by scanning the QR code below.



8.2 Register on APP

As the APP is updated periodically, the operation methods shown in this manual are for reference only. Please refer to the actual app interface for the most up-to-date instructions.

If you have any questions, please consult the SofarCloud Web and App User Manual or contact SOFARSOLAR for assistance

Before logging into the app, please ensure the following conditions are met:

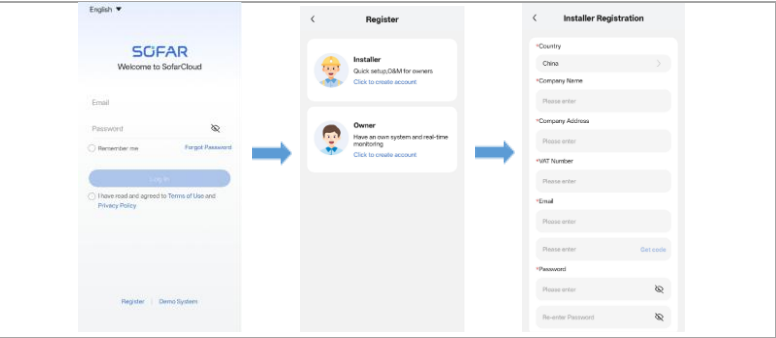
- The inverter's AC and DC sides are powered on.
- The distance between your mobile phone and the inverter is within 5 meters with no obstacles in between.
- The Bluetooth function on your mobile phone is enabled

Register

If you do not have a SofarCloud account, please click [Register] at the bottom of the login page.

On the registration page, select either [Installer] or [Owner], then follow the on-screen instructions to complete the account registration.

Once your account is successfully registered, you can log in to SofarCloud using your registered username and password.



Currently, account registration supports either a mobile phone number or an email address.

Please follow the on-screen instructions to correctly enter your mobile phone number or email address, set a login password, and complete the verification process.

After successful verification, please tick the checkbox to indicate that you agree to the **Terms of Use** and **Privacy Policy**.

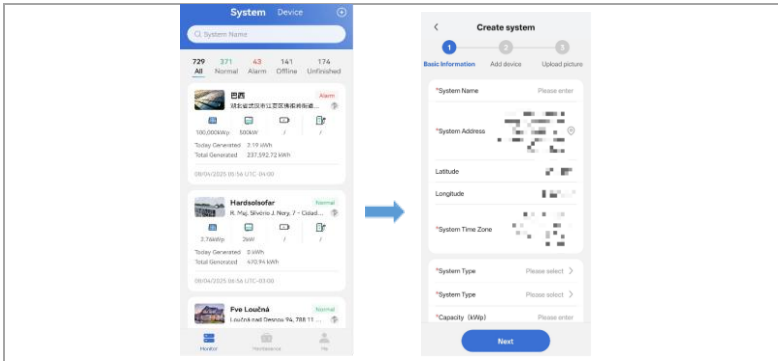
If you already have a SofarCloud account, you can log in directly.

For account security purposes, the password must be a combination of numbers and letters, 6 to 32 characters in length, and must not contain spaces.
After correctly entering all required information, click the [Register] button to automatically log in to your account.

8.3 Add a device

Method 1: Add a device via "Create system"

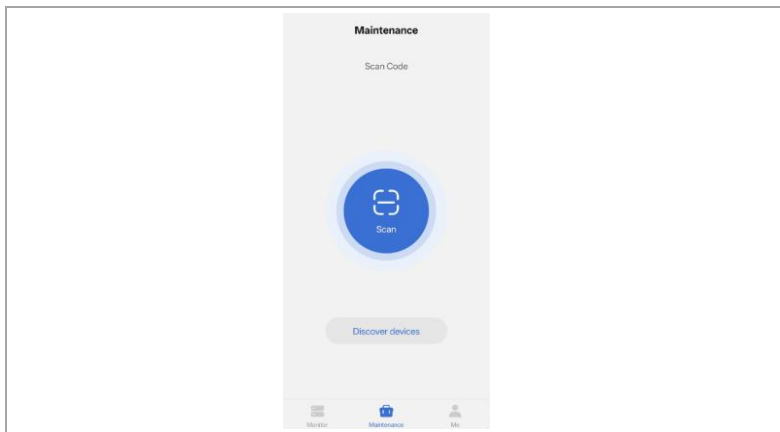
1. On the Home > Monitor tab, click the button at the top right corner to enter the "Create system" interface.
2. After completing the basic information as prompted, click the [Add] button under the "Add Device" section.



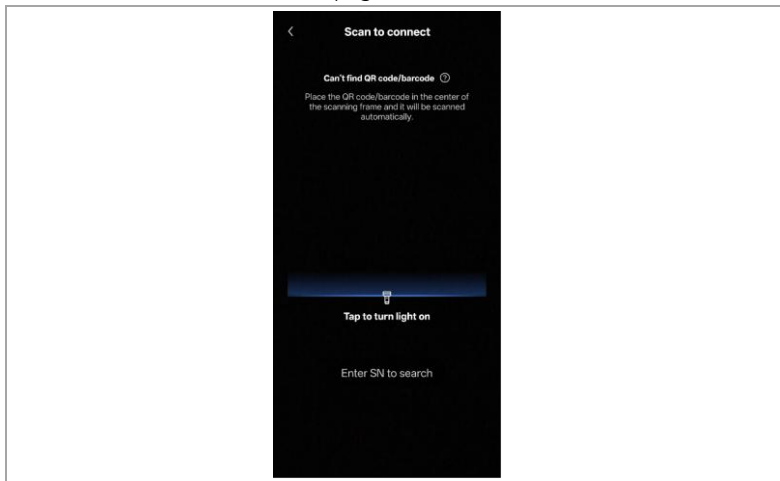
3. Scan the QR code or barcode of the device to obtain the SN number. Alternatively, you can manually enter the SN number and optionally enter a device name.
4. After clicking the [Confirm] button to complete the device addition, click [Next > Submit] to proceed.

Method 2: Add a device directly

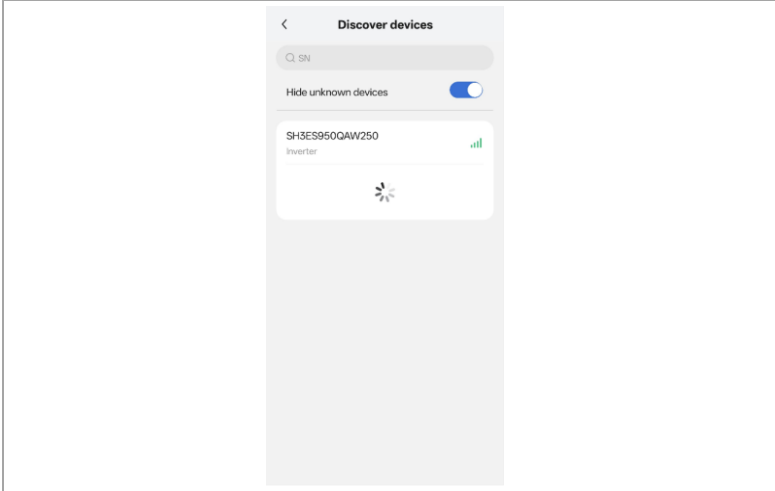
1. After logging into the app, go to the **Home > Maintenance** tab.
2. Tap [Scan] to quickly recognise and connect by scanning the device's barcode, or tap [Discover Devices] to select and connect to the target device from the list of Bluetooth-discovered devices



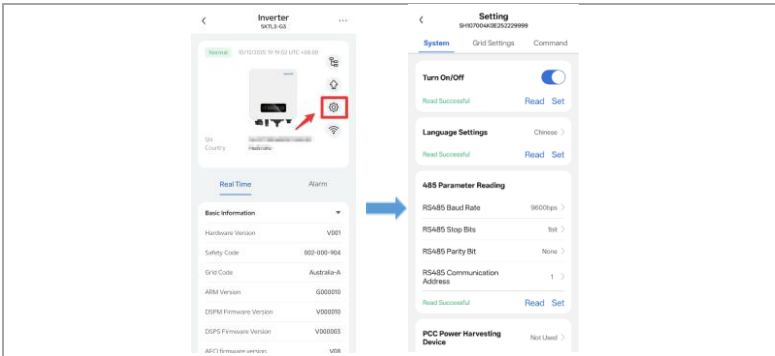
- **Scan:** Tap [Scan] to prompt the phone's camera to open. Scan the barcode of the inverter's SN number to start searching for the device's Bluetooth. Once the Bluetooth is found, it will automatically connect and return to the home page



- **Discover Devices:** After tapping [Discover devices], the app will navigate to the Bluetooth device list and start searching for nearby available Bluetooth devices. Select the device to connect to based on the inverter's serial number.



- After successfully connecting the device, go to the device page. Through the [Quick Setup] section, you can configure the language, time, and safety code.

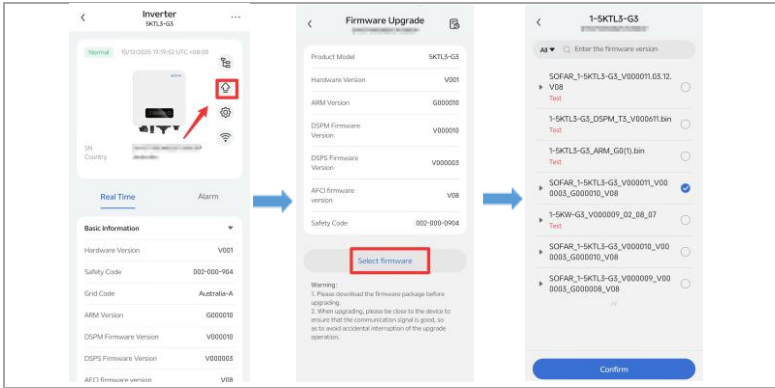


The available safety codes may vary depending on the device and software version. Please refer to the actual interface for details.

8.4 Device upgrade

- Tap the [Upgrade] button, and follow the on-screen instructions to download the firmware package in advance.

2. Tap [Select Firmware], choose the target firmware, and then tap [Confirm] at the bottom.



1. During the upgrade process, the system will sequentially send commands, download the firmware, verify the firmware, and upgrade the device based on the selected firmware, until the upgrade reaches 100% completion.
2. If the upgrade fails, the failure reason will be displayed at the point of failure. You can either tap [Cancel] in the lower-left corner to exit the upgrade, or tap [Retry] in the lower-right corner to attempt the upgrade again.

9 Operation

This chapter describes the display, operation, buttons and LED indicators related to the inverter. Some of the products are not equipped with LCD display, please refer to the actual products received.

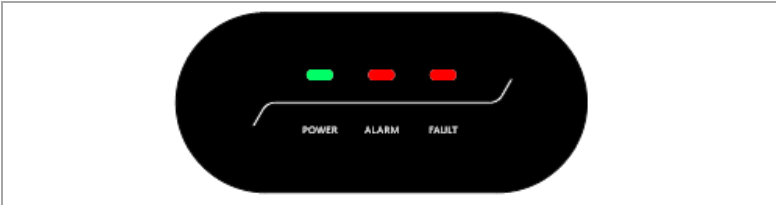
9.1 Control panel and display

Buttons and display lights

LCD



LED display



Button

Button	Description
Long press	Enter the next menu or confirm the selection
Short press	Achieve the next page turning function

LED

LED			Description
POWER	Green	Light up	Normal state
		Flashes	Wait or Check state

LED			Description
FAULT	Red	Light up	GFCI ground leakage fault or low insulation resistance alarm
ALARM	Red	Light up	Recoverable fault or permanent fault state

9.2 Standard interface

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

This shows a rolling status display:

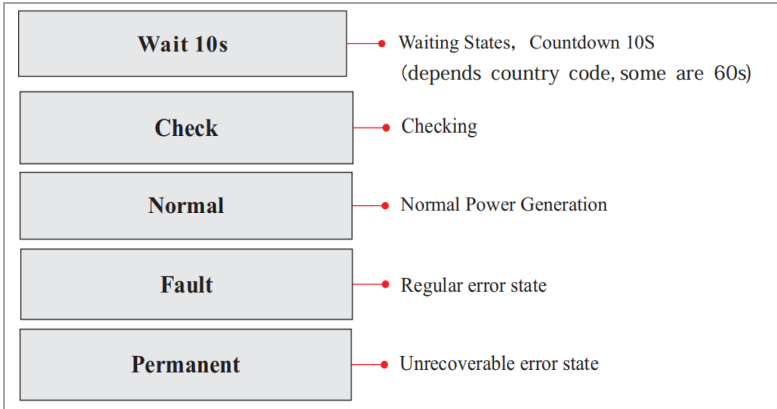
1. PV 1 input voltage and current
2. PV generated power
3. Today generated electricity
4. Total generated electricity
5. Grid voltage and current
6. Grid voltage and frequency
7. Wi-Fi/RS-485 status
8. Inverter faulty alarm

Normal PV1:193V- 0.3A	Normal Grid:227V- 0.6A
Normal Power: 0.13kW	Normal Grid:227V-50.0Hz
Normal Today: 0.06kWh	Normal  Power: 0.14kW
Normal Tot: 74kWh	GridUVP Total: 0KWh

When powered on, the LCD interface displays INITIALIZING, refer picture below.

Initializing...

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



9.3 Status display

The following table displays the various statuses and their meanings:

Status	Description
Wait	The inverter is waiting to Check State when reconnecting the system. In this state, the 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	The inverter is checking isolation resistors, relays, and other safety requirements. It also does self-test to ensure inverter software and hardware are well-functional. The inverter will go to Fault State or Permanent State if any error or fault occurs.
Normal	The inverter enters to Normal State, feeding power to the grid; the inverter will go to a Fault State or Permanent state if any error or fault occurs.

Status	Description
Fault	The inverter has encountered a recoverable error. It should recover if the errors disappear. If the Fault State continues; please check the inverter according to the error code.
Permanent	The inverter has encountered an unrecoverable error, we need maintainer debug this kind of error according to the error code. When the control board and communication board connection fails, the LCD display interface as shown in the figure below: DSP communicate fail

9.4 Menu structure

- ▶ Long press the button under the standard interface to enter into main interface, including.

Main

Sub menu	What can do here
1. Enter Setting	Change device settings
2. Event list	Display the current event list and the event history
3. SystemInfo	Display system information
4. System time	Display the current system time
5. Software update	Perform a software update

Enter Setting

Long press the button to enter the main interface of "1. Enter Setting" and long press the button to enter the setting menu.

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

Note 1: 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.

Menu	Description
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. Enset Country	Enable this option before setting the country. Attention: when the inverter is working for power generation over 24h, country setting is forbidden; it can only be set after LCD setting. Key in passwords for country setting through LCD (default: 0001), country setting can be set in 24h after keying in the correct passwords, over 24h, set through LCD again
5. Set Country	Set up the safety regulation country that meet the current use conditions and requirements. Before setting this item, ensure that the "Enset Country" option is enabled. Please refer to " 4. Enset Country " for details.
6. On-Off Control	Inverter on-off local control.
7. Set Energy	Set the total power generation. You can modify the total power generation through this option.
8. Set address	Set the address (when you need to monitor multiple inverters simultaneously). Default 01.
9. Set Input mode	The input modes of the SOFAR inverter are divided into parallel mode and independent mode (when multi-channel MPPT is input). Since SOFAR 1-5KTL3-G3 has only one group

Menu	Description
	of MPPT input, the input modes are not distinguished.
10. Set Language	Set the inverter display language.
11. Set Start Parameter	Set relevant parameters according to requirements.
12. Set Safety Voltage	Set relevant parameters according to requirements.
13. Set Safety Frequency	Set relevant parameters according to requirements.
14. Set Insulation	User can modify the above 4 parameters of the machine through the SD card, and the user needs to copy the parameter information that needs to be modified into the SD card in advance. Note: To enable this feature, please contact the SOFARSOLAR technical support.
15. Set Reactive	Enable or disable reactive functions.
16. Set Power Derate	Enable or disable the power derate function of the inverter, and set the derate ratio
17. Set RefluxP	Enable or disable the anti-reflux function of the inverter, and set the reflux power. This function needs to be used with external CT, please refer to this manual 4.5 RS485, CT, inverter logic interface connection for details.
18. MPPT 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.
19. Start Time	Startup time and recovery reconnection time can be set.
20. Set ElecMeter	Enable or disable meter functions.
21. Hard Reflux	If the power exceeds the anti backflow setting, the machine will be disconnected from the grid.

Menu	Description
22. Input Safety	After inserting the USB drive, update the safety parameter file inside the USB drive.
23. LogicInterfac	Enable or disable logical interfaces. Please refer to this manual 4.5 RS485, CT, inverter logic interface connection for details. Set the generation ratio.

Setting of country codes

Code	Country	Code	Country
000	000 Germany VDE4105	018	000 EU EN50438
	001 Germany BDEW		001 EU EN50549
	002 Germany VDE0126	019	000 IEC EN61727
001	000 Italia CEI-021 Internal	020	000 Korea
	001 Italia CEI-016 Italia	021	000 Sweden
	002 Italia CEI-021 External	022	000 Europe General
	003 Italia CEI0-21 In Areti	024	000 Cyprus
002	000 Australia	025	000 India
	001 Australia AU-WA	026	000 Philippines
	002 Australia AU-SA	027	000 New Zealand
	003 Australia AU-VIC	028	000 Brazil
	004 Australia AU-QLD		001 Brazil LV
	005 Australia AU-VAR		002 Brazil 230
	006 Australia AUSGRID		003 Brazil 254
	007 Australia Horizon	029	000 Slovakia VSD
003	000 Spain RD1699		001 Slovakia SSE
004	000 Turkey		002 Slovakia ZSD
005	000 Denmark	033	000 Ukraine
	001 Denmark TR322	035	000 Mexico LV
006	000 Greece Continent	038	000 Wide-Range-60Hz
	001 Greece island	039	000 Ireland EN50438

Code		Country	Code		Country
007	000	Netherland	040	000	Thailand PEA
008	000	Belgium		001	Thailand MEA
009	000	UK G59/G99	042	000	LV-Range-50Hz
	001	UK G83/G98	044	000	South Africa
010	000	China	046	000	Dubai DEWG
	001	China Taiwan		001	Dubai DEWG MV
011	000	France	107	000	Croatia
	001	France FAR Arrete23	108	000	Lithuania
012	000	Poland			

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 the happening time. User can enter Event List interface through the main interface to check details of real-time event records. Events will be listed by the happening time, and recent events will be listed at the front.

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

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

System Information

SystemInfo	Long press the button	
	1. Inverter Type	8. Power Factor
	2. Serial Number	9. Reflux Power
	3. Soft Version	10. Safety Paras
	4. Hard Version	11. Hard RefluxP
	5. Country	12. MPPT Scan
	6. Modbus Address	13. Service Code
	7. Input Mode	

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.

Software update

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

9.5 Update Software online

Inverters offer a software upgrade via USB flash drive to maximise inverter performance and avoid inverter operation errors caused by software bugs.

1. Switch the DC and AC switches off, and then remove the communication cover. If an RS-485 line has been connected, ensure that the nut is loosened. Ensure that the communication line is not energised. Remove the cover to prevent the connected communications connector from becoming loose.
2. Insert the USB stick into the computer.

3. SOFARSOLAR service team will send the firmware update to the user.
4. Unzip the file and copy the original file to a USB stick. Attention: The firmware update file must be in the "firmware" subfolder.
5. Insert the USB flash drive into the USB interface of the inverter.
6. Switch on the DC switch and go to menu item "5. Software update" on the LCD display.
7. Enter the password (the standard password is 0715).
8. The system will then successively update the main DSP, slave DSP and ARM processors. Pay attention to the displays. If the main DSP update is successful, the LCD will display "Update DSP1 Success", otherwise display "Update DSP1 Fail"; If the slave DSP update success, the LCD will display "Update DSP2 Success", otherwise display "UpdateDSP2 Fail"
9. If an error message appears, switch off the DC switch and wait until the LCD screen goes out. Then, switch the DC switch back on and proceed with the update from step 5.
10. After the update is complete, switch the DC switch off and wait until the LCD screen goes out.
11. Re-establish a watertight communication connection.
12. Switch the DC and AC circuit breaker back on.
13. You can check the current software version in item "Software version" of the "SystemInfo" menu.

10 Troubleshooting and Maintenance

10.1 Troubleshooting

This section contains information and procedures pertaining to the remedying of potential problems with the inverter.

As the content of this chapter involves software version updates, the differences may exist among different versions of the software. If you have any questions, please contact the SOFARSOLAR technical team.

To carry out troubleshooting, proceed as follows:

1. Check the warnings, error messages or error codes displayed on the screen of the inverter.
2. If no error information is displayed on the screen, check whether the following requirements have been fulfilled:
 - ✓ Has the inverter been set up in a clean, dry, well-ventilated area?
 - ✓ Is the DC switch set to ON?
 - ✓ Are the cables sufficiently dimensioned and short enough?
 - ✓ Are the input connections, output connections and wiring all in good condition?
 - ✓ Are the configuration settings for the relevant installation correct?

Please proceed as follows to display the recorded problems: Hold the button down to bring up the main menu of the standard interface. Select “2. Event list” and hold the button down to bring up the event list.

Earth fault alarm

This inverter is compliant with IEC 62109-2 Clause 13.9 for earth fault protection. If an earth fault alarm occurs, the error is displayed on the LCD screen, the red light illuminates and the error can be found in the error history log.

In the case of devices equipped with a stick logger, the alarm information can be viewed on the monitoring portal and retrieved via the smartphone app.

Event list

The error codes and troubleshooting methods of the inverter are detailed in the following table. The models you purchased may only contain some of the fault information listed therein. When the inverter malfunctions, you can query the fault information through the LCD display of the device or the mobile App.

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.
ID002	GridUVP	The grid voltage is too low	
ID003	GridOFP	The grid frequency is too high	
ID004	GridUFP	The grid frequency is too low	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. 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.
ID005	PVUVP	The input voltage is too low	Check whether too few PV modules are series connected in a PV string, thus the voltage (Vmp) of the PV string is lower than the minimum operating voltage of inverter. If yes, adjust the number of series connected PV modules to increase the voltage of the PV string to fit the input voltage range of inverter. inverter automatically returns to normal operating

Code	Name	Description	Solution
			status after correct adjustments.
ID06	Vlvrtlow	LVRT function is faulty	Check whether the grid voltage fluctuates greatly.
ID07	Vovrthigh	OVRT function is faulty	
ID09	PVOVP	The input voltage is too high	Check whether too many PV modules are series connected in a PV string, thus the voltage (Voc) of the PV string is higher than the maximum input voltage of inverter. If yes, adjust the number of series connected PV modules to decrease the voltage of the PV string to fit the input voltage range of inverter. inverter automatically returns to normal operating status after correct adjustments.
ID10	I _{pv} Unbalance	Input current is not balanced	Check the input mode (parallel mode/ independent mode) setting of the inverter according to Section 6.3 (C) 6. Input Mode of this user manual. If it's incorrect, change it according to Section 6.3 (A) 10.Set Input mode of this manual.
ID11	Pv Config Fault	Incorrect input mode	
ID12	GFCI Fault	GFCI Fault	If the fault occurs occasionally, the possible cause is that the external circuits are abnormal occasionally. inverter automatically returns to normal operating status after the fault is rectified. If the fault occurs frequently and lasts a long time, check whether the insulation resistance between the PV array and earth (ground) is too low, then check the insulation conditions of PV cable.
ID14	HwBoost OCP	The input current is too high, and has happen hardware protection	Check whether the input current is higher than the maximum input current of inverters, then check the input wiring, if both are correct, please contact technical support.

Code	Name	Description	Solution
ID15	HwAc OCP	The grid current is too high, and has happen hardware protection	ID15-ID24 are internal faults of inverter, turn OFF the "DC switch", wait for 5 minutes, then turn ON the "DC switch". Check whether the fault is rectified. Ifno, please contact technical support.
ID16	AcRms OCP	The grid current is too high	
ID17	HwAD Fault IGrid	The grid current sampling error	
ID18	HwAD FaultDCI	The DCI sampling error	
ID19	HwAD Fault VGrid	The grid voltage sampling error	
ID20	GFCI Device Fault	The GFCI sampling error	
ID21	MChip_Fault	The master chip fault	
ID22	Hw Aux Power Fault	The auxiliary voltage error	
ID23	Bus Volt Zero Fault	The bus voltage sampling error	
ID24	HwADErrI dc	Dc input current sampling error	
ID25	Bus UVP	The bus voltage Is too low	If the PV array configuration is correct (no ID05 fault), the possible cause is that the solar irradiance is too low. inverter automatically returns to normal operating status after the solar irradiance returns to normal level.
ID26	Bus OVP	The bus voltage Is too high	ID26-ID27 are internal faults of inverter, turn OFF the "DC switch", wait for 5 minutes, then turn ON the "DC switch". Check whether the fault is rectified. If no, please contact technical support.
ID27	VbusUnbalance	The bus voltage is not balanced	
ID28	Dci OCP	The Dci is too high	Check the input mode (parallel mode/ independent mode) setting of inverter according to Section 6.3 (C) 6.Input Mode

Code	Name	Description	Solution
			of this user manual, If it's incorrect, change it according to Section 6.3 (A)
ID29	SwOCP Instant	The grid current is too high	Internal faults of inverter, turn OFF the "DC switch", wait for 5 minutes, then turn ON the "DC switch". Check whether the fault is rectified. If no, please contact technical support.
ID30	Consistent Vgrid	The input current is too high	Check whether the input current is higher than the maximum input current of inverters, then check the input wiring, if both are correct, please contact technical support.
ID33	GridPhase	Grid voltage consistency error	The phase of the grid voltage has changed
ID53	Spi Comm Lose	The spi communication between the master DSP and slave DSP is fault	
ID54	Sci Comm Lose	The Sci communication	
ID55	Relay Test Fail	The relays fault	
ID56	Pv Iso Fault	The insulation resistance is too low	Check the insulation resistance between the PV array and earth (ground) , if a short circuit occurs, rectify the fault.
ID58	Over Temp-Boost	The Boost temp is too high	Ensure the installation position and installation method meet the requirements of Section 3.4 of this user manual.
ID59	Over Temp-Env	The environment temp is too high	Check whether the ambient temperature of the installation position exceeds the upper limit. If yes, improve ventilation to decrease the temperature.
ID63	Overload	Too much power is flowing into the grid	When hard counter-current is enabled, when PCC power is greater than hard counter-current power, overload protection is reported

Code	Name	Description	Solution
ID64	MeterCommunicationLoss	Meter communication error	After receiving the meter communication exception bit sent
ID65	HwAcOCP1	The grid current is too high, and has caused unrecoverable hardware fault	ID65-ID70 are internal faults of inverter, turn OFF the "DC switch", wait for 5 minutes, then turn ON the "DC switch". Check whether the fault is rectified. If no, please contact technical support.
ID66	BusOV1	The bus voltage is too high, and has caused unrecoverable fault	
ID67	IacRmsUnbalance1	The grid current is unbalanced, and has caused an unrecoverable fault	
ID68	IpvUnbalance1	The input current is unbalanced, and has caused an unrecoverable fault	
ID69	VbusUnbalance1	The bus voltage is unbalanced, and has caused the unrecoverable fault	
ID70	OCPInstant1	The grid current is too high, and has caused an unrecoverable fault	
ID74	IPVInstant1	The input current is too high, and has caused an unrecoverable fault	ID74-ID77 are internal faults of inverter, turn OFF the "DC switch", wait for 5 minutes, then turn ON the "DC switch". Check whether the fault is rectified. If no, please contact technical support.
ID77	RelayFail1	Relay has happened permanent fault	
ID81	OverTempDerating	The inverter has been derated because the temperature is too high	Ensure the installation position and installation method meet the requirements of Section 3.4 of this user manual. Check whether the ambient temperature of the

Code	Name	Description	Solution
			installation position exceeds the upper limit. If yes, improve ventilation to decrease the temperature.
ID82	Over Freq Derating	The inverter has been derated because the grid frequency is too high	Inverter automatically reduce the output power when the frequency of electrical grid is too high. Please make sure the grid frequency is within the acceptable range.
ID83	Remote Derating	The inverter has been derated by the Remote control	Inverter records ID83 in case of remote power derating operation. Check the wiring of remote input and output control signal port on the communication board according to Section 4.5 of this user manual.
ID85	Under Frequency Derating	The inverter is derated because the grid frequency is too low	Inverter automatically reduce the output power when the frequency of electrical grid is too low. Please make sure the grid frequency is within the acceptable range.
ID93	SPD Alarm	The lightning protection tripped	Please check if the machine is damaged and contact the technician for help.
ID94	SW version Fault	The software in the control board and the communication board is not consistent	Contact technical support to upgrade software.
ID95	Comm EEPROM Fault	The communication board EEPROM is faulty	ID95~ID96 are internal faults of inverter, turn OFF the "DC switch", wait for 5 minutes, then turn ON the "DC switch". Check whether the fault is rectified. If no, please contact technical support.
ID96	RTC Fault	RTC clock chip is faulty	
ID97	Invalid Country	The country is invalid	Check the country setting according to Section 6.3 (C) 5. Country of this user manual, if it's incorrect, change it according to Section 6.3 (A) 4. Set Country Code of this manual.
ID98	SD fault	The SD card is faulty	Please replace the SD card.

If the handling methods recommended in the "Solution" column fail to help you, please contact the dealer or SOFARSOLAR.

10.2 Maintenance

Inverters do not generally require daily or routine maintenance. Before carrying out cleaning, ensure that the DC switch and AC circuit breaker between the inverter and power grid have been switched off. Wait at least 5 minutes before carrying out cleaning.

Cleaning the inverter

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 the 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. Please 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.

11 Technical Data

Technical Data	SOFAR 1.1KTL3 -G3	SOFAR 1.6KTL 3-G3	SOFAR 2.2KTL 3-G3	SOFAR 2.7KTL 3-G3	SOFAR 3KTL3- G3	SOFAR 3.3KTL 3-G3	SOFAR 4KTL3- G3	SOFAR 5KTL3- G3
Input (DC)								
Recommended Max. PV input power	1500W p	2200W p	3000W p	3700W p	4100W p	4500W p	5400W p	6800W p
Number of MPP trackers	1							
Number of DC input	1							
Max. input voltage	550V							600V
Start-up voltage	70V							
Rated input voltage	360V							
MPPT operating voltage range	50-550V							50-600V
Max. Input MPPT current	20A							
Max. Input short circuit current per MPPT	25A							
Output (AC)								
Rated output power	1100W	1600W	2200W	2700W	3000W	3300W	4000W	5000W
Max. output power	1100VA	1600VA	2200V A	2700V A	3000V A	3300V A	4000V A	5000V A
Rated output current	4.8A	7A	9.6A	11.8A	13A	14.3A	17.4A	21.7A
Max. output current	5.3A	7.7A	10.6A	13A	14.5A	16A	19.3A	24.1A
Nominal grid voltage	L/N/PE, 220Vac, 230Vac							
Grid voltage range	180-276Vac							
Nominal grid frequency	50Hz/60Hz							
Grid frequency range	45~55Hz/54~66Hz (According to local grid standard)							
Active power adjustable range	0~100%							
THDi	<3%							
Power factor	0.8 leading – 0.8 lagging							
Efficiency								

Max efficiency	≥97.2%	
European efficiency	≥96.8%	
Protection		
DC reverse polarity protection	Yes	
Anti-islanding protection	Yes	
Leakage current protection	Yes	
Ground fault monitoring	Yes	
PV-array string fault monitoring	Yes	
DC switch	Yes	
AFCI	Optional	
SPD	PV: Type III, AC: Type III	
General Data		
Ambient temperature range	-30℃ to +60℃	
Self-consumption at night	<1W	
Topology	Transformerless	
Degree of protection	IP65	
Allowable relative humidity range	0-100%	
Max. operating altitude	4000m (>2000m derating)	
Cooling	Natural	
Dimension (W×H×D)	321×260.5×131.5mm	321×260.5×151.5mm
Weight	≤7kg	≤7.3kg
Display	LCD & Bluetooth +APP	
Communication	RS485 / Wi-Fi	
Standard	IEC/EN 62109-1/2, IEC/EN 61000-6-2/4, IEC62116, IEC61727, PORTARIA INMETRO N° 140, ABNT NBR 16149/16150, ANATEL*	

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

12 Quality Assurance

If a product fault occurs during the warranty period, SOFARSOLAR will provide free repair service or replace the product with a new one, subject to the warranty terms and conditions.

Required Proof for Service

During the warranty period, customers must provide a valid purchase invoice and proof of the purchase date. Additionally, the product's trademark must remain intact and legible. Otherwise, SOFARSOLAR reserves the right to decline warranty service.

Conditions

- If a replacement is provided, the faulty product will be handled by SOFARSOLAR.
- Customers must allow SOFARSOLAR a reasonable period to repair the faulty device.

Limitations and Exclusions

SOFARSOLAR reserves the right to refuse warranty service in the following cases:

- The product's warranty period has expired.
- Damage occurred during transportation.
- The device was improperly installed, modified, or used.
- The device was operated in conditions beyond those specified in this manual.
- The fault or damage was caused by unauthorised installation, repair, modification, or disassembly by personnel not authorised by SOFARSOLAR.

- The fault or damage resulted from the use of non-standard or non-SOFARSOLAR components or software.
- The installation and operating conditions do not comply with relevant international standards.
- The device was damaged due to unforeseen natural disasters or force majeure.

For faulty products under the above conditions, customers may request repair services, which may be subject to additional costs based on SOFARSOLAR's assessment.

Contact Us

If the purchased product encounters a fault, customers can quickly contact us through the following methods, and we will respond as soon as possible. Customers may also reach out to our authorised local service providers or distributors for assistance.

We need the following information to provide you the best assistance:

- Model of the device
- Serial number of the device
- Error code/name
- Purchase invoice and warranty card
- The device was damaged due to unforeseen natural disasters or force

For more detailed information, please email service@sofarsolar.com or visit WWW.SOFARSOLAR.COM.

Version 1.0



ENERGY TO POWER YOUR LIFE

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