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V0.0

# R6 Series

## ROOFTOP SOLAR INVERTER
## USER MANUAL

R6-(3K-15K)-T2

# Preface

Thank you for choosing SAJ products. We are pleased to provide you first-class products and exceptional service.

This manual provides information about installation, operation, maintenance, troubleshooting and safety. Please follow the instructions of this manual so that we can ensure delivery of our professional guidance and whole-hearted service.

Customer-orientation is our forever commitment. We hope this document proves to be of great assistance in your journey for a cleaner and greener world.

We make constant improvements on the products and their documentation. This manual is subject to change without notice; these changes will be incorporated in new editions of the publication. To access the latest documentation, visit the SAJ website at https://www.saj-electric.com/.

Guangzhou Sanjing Electric Co., Ltd.

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# 1.

# SAFETY
Precautions





## 1.1 Scope of Application

This User Manual describes instructions and detailed procedures for installing, operating, maintaining, and troubleshooting of the following SAJ on-grid inverters:

R6-3K-T2, R6-4K-T2, R6-5K-T2, R6-6K-T2, R6-8K-T2, R6-10K-T2, R6-12K-T2, R6-15K-T2

Always keep this manual available in case of emergency.

## 1.2 Safety

### 1.2.1 Safety Instructions

**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, can result in death or serious injury or moderate injury.

**CAUTION**

· CAUTION indicates a hazardous condition, which, if not avoided, can result in minor or moderate injury.

**NOTICE**

· NOTICE indicates a situation that can result in potential damage, if not avoided.

## 1.2.2 Explanations of Symbols

| Symbol | Description |
|---|---|
|  | Dangerous electrical voltage<br>This device is directly connected to public grid, thus all work to the inverter shall only be carried out by qualified personnel. |
|  | Danger to life due to high electrical voltage!<br>There might be residual currents in the inverter because of large capacitors. Wait for at least 5 minutes before you remove the front lid. |
|  | Notice, danger!<br>This is directly connected with electricity generators and the public grid. |
|  | Danger of hot surface<br>The components inside the inverter will release a lot of heat during operation. Do not touch the metal plate housing during operation. |
|  | An error has occurred<br>Refer to the Troubleshooting section to remedy the error. |
|  | This device SHALL NOT be disposed of in residential waste. |
|  | CE Mark<br>With CE mark & the inverter fulfills the basic requirements of the Guideline Governing Low-Voltage and Electro-magnetic Compatibility. |



## 1.2.3 Safety Instructions

**DANGER**

- Possible danger to life due to electrical shock and high voltage.
- Do not touch the operating component of the inverter; it might result in burning or death.
- To prevent risk of electric shock during installation and maintenance, make sure that all AC and DC terminals are plugged out.
- Do not touch the surface of the inverter while the housing is wet. Otherwise, it might cause electrical shock.
- Do not stay close to the inverter while there are severe weather conditions including storm, lighting, etc.
- Before opening the housing, the SAJ inverter must be disconnected from the grid and the PV generator. Wait for at least five minutes to let the energy storage capacitors discharge completely after being disconnected from the power source.

**WARNING**

- The installation, service, recycling and disposal of the inverters must be performed by qualified personnel only in compliance with national and local standards and regulations.
- Any unauthorized actions including modification of product functionality of any form may cause lethal hazard to the operator, third parties, the units or their property. SAJ is not responsible for the loss and these warranty claims.
- The SAJ inverter must only be operated with the PV generator. Do not connect any other source of energy to the SAJ inverter.
- Be sure that the PV generator and the inverter are well grounded in order to protect the properties and persons.

**CAUTION**

- The solar inverter will become hot during operation. Do not touch the heat sink or peripheral surface during or shortly after operation.
- Risk of damage due to improper modifications.

**NOTICE**

- Public utility only.
- The solar inverter is designed to feed the AC power directly to the public utility power grid. Do not connect the AC output of the inverter to any private AC equipment.

# 2.

# PRODUCT
Overview





## R6 series

R6 products are grid-tied three phase inverters without transformers. The inverters work as important components in the grid-tied solar power systems.

The R6 inverter converts the DC power generated by solar panels into AC electricity in accordance with the requirements of the public grid and sends the AC into the grid.

Figure 2.1 shows the structural diagram of the typical system application.

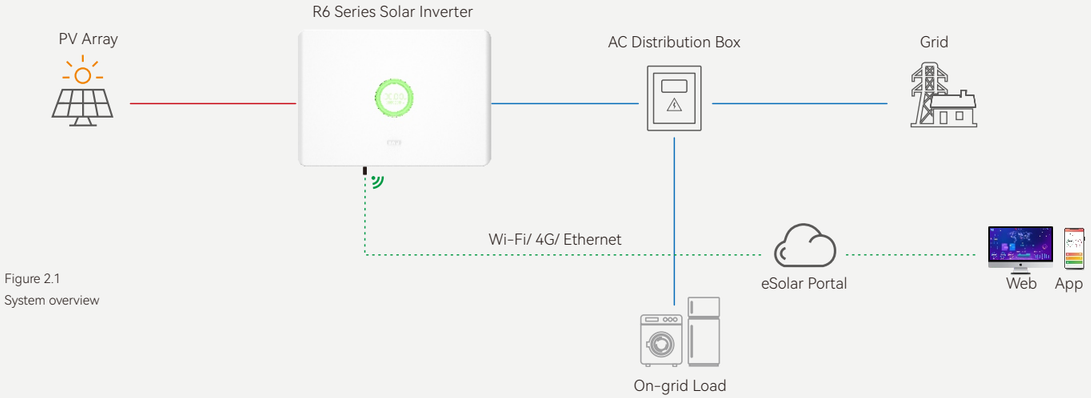



Figure 2.1
System overview

# 2.1 Specification of Product Model

R6 – xK – Tx
① ② ③

① R6 represents the product series.

② XK represents the rated power of the inverter in kW. For example, 5K means 5 kW.

③ T means three phases; X indicates that the inverter has the function of X number of MPP trackers.

# 2.2 Dimensions

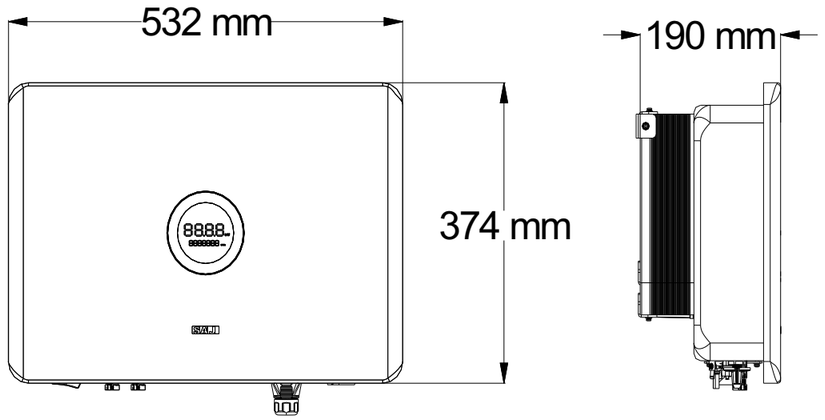
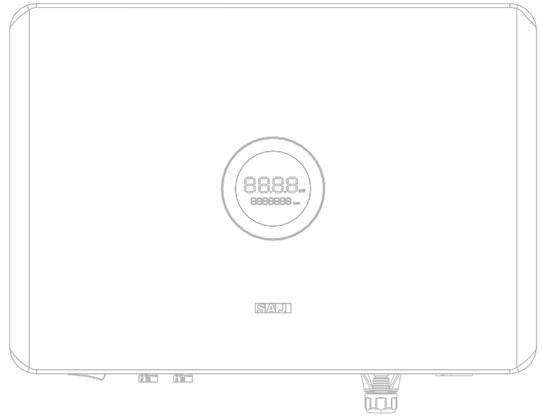



Figure 2.2
Dimensions of the inverter



# 2.3 Datasheet

## R6-(3K, 4K, 5K, 6K)-T2

| Model | R6-3K-T2 | R6-4K-T2 | R6-5K-T2 | R6-6K-T2 |
|---|---|---|---|---|
| **Input (DC)** | | | | |
| Max. PV Array Power [Wp]@STC | 4500 | 6000 | 7500 | 9000 |
| Max. Input Voltage [V] | 1100 | | | |
| MPP Voltage Range [V] | 160-950 | | | |
| Nominal Input Voltage [V] | 600 | | | |
| Start-up Voltage [V] | 180 | | | |
| Min. Input Voltage [V] | 150 | | | |
| Max. Input Current [A] | 16/16 | | | |
| Max. Short-Circuit Current [A] | 19.2/19.2 | | | |
| Number of MPP Trackers | 2 | | | |
| Number of Strings per MPP Tracker | 1/1 | | | |
| **Output (AC)** | | | | |
| Rated Output Power [W] | 3000 | 4000 | 5000 | 6000 |
| Max. Apparent Power [VA] | 3300 | 4400 | 5500 | 6600 |
| Rated Output Current [A]@230 V AC | 4.4 | 5.8 | 7.3 | 8.7 |
| Max. Output Current [A] | 5.0 | 6.7 | 8.4 | 10.0 |
| Nominal Voltage/ Range [V] | 3L+N+PE, 220/380, 230/400, 240/415; 180-280/312-485 | | | |
| Nominal Grid Frequency/ Range [Hz] | 50: 45-55; 60: 55-65 | | | |
| Total Distortion Harmonic [THDi] | < 3% | | | |
| Power Factor | 0.8 leading to 0.8 lagging | | | |
| Feed-in Phases/AC Connection Phases | 3/3 | | | |
| **Efficiency** | | | | |
| Max. Efficiency | 98.2% | 98.5% | 98.5% | 98.5% |
| Euro Efficiency | 97.8% | 98.2% | 98.2% | 98.2% |
| **Protection** | | | | |
| Overvoltage Protection | Integrated | | | |
| DC Insulation Resistance Detection | Integrated | | | |
| DCI Monitoring | Integrated | | | |
| GFCI Monitoring | Integrated | | | |
| Grid Monitoring | Integrated | | | |
| AC Short Circuit Current Protection | Integrated | | | |
| AC Grounding Detection | Integrated | | | |



| Model | R6-3K-T2 | R6-4K-T2 | R6-5K-T2 | R6-6K-T2 |
|---|---|---|---|---|
| DC Surge Protection | Integrated | | | |
| AC Surge Protection | Integrated | | | |
| Overheating Protection | Integrated | | | |
| Anti-islanding Protection | AFD | | | |
| AFCI Protection | Integrated | | | |
| **Interface** | | | | |
| AC Connection | Plug-in connector | | | |
| DC Connection | D4 | | | |
| Display | LED+App | | | |
| Communication Port | RS232 (USB) + RS485 (RJ45) + DRM (RJ45) | | | |
| Communication Mode | Wi-Fi, Ethernet, 4G (optional) | | | |
| **General Data** | | | | |
| Topology | Non-isolated | | | |
| Consumption at Night [W] | <1 | | | |
| Operating Temperature Range | -40℃ to +60℃ (45℃ to 60℃ with derating) | | | |
| Cooling Method | Natural convection | | | |
| Ambient Humidity | 0% to 100% non-condensing | | | |
| Max. Operating Altitude [m] | 4000 (>3000 with power derating) | | | |
| Noise [dBA] | <35 | | | |
| Ingress Protection | IP65 | | | |
| Mounting | Wall mounting | | | |
| Dimensions [H*W*D] [mm] | 374*532*190 | | | |
| Weight [kg] | 15 | | | |
| Warranty [Year] | Refer to the warranty policy | | | |
| Certifications | EN62109-1/2, EN61000-6-1/2/3/4, EN50549, C10/11, IEC62116, IEC61727, RD1699, RD413, UNE 206006, UNE 206007, NTS, CEI 0-16, CEI O-021, AS4777.2, NBR16149, NBR 16150, VDE-AR-N 4015, VDE 0126-1-1 | | | |

# 2.3 Datasheet

## R6-(8K, 10K, 12K, 15K)-T2

| Model | R6-8K-T2 | R6-10K-T2 | R6-12K-T2 | R6-15K-T2 |
|---|---|---|---|---|
| **Input (DC)** | | | | |
| Max. PV Array Power [Wp]@STC | 12000 | 15000 | 18000 | 22500 |
| Max. Input Voltage [V] | 1100 | | | |
| MPP Voltage Range [V] | 160-950 | | | |
| Nominal Input Voltage [V] | 600 | | | |
| Start-up Voltage [V] | 180 | | | |
| Min. Input Voltage [V] | 150 | | | |
| Max. Input Current [A] | 16/16 | | | |
| Max. Short-Circuit Current [A] | 19.2/19.2 | | | |
| Number of MPP Trackers | 2 | | | |
| Number of Strings per MPP Tracker | 1/1 | | | |
| **Output (AC)** | | | | |
| Rated Output Power [W] | 8000 | 10000 | 12000 | 15000 |
| Max. Apparent Power [VA] | 8800 | 11000 | 13200 | 15000 |
| Rated Output Current [A]@230 V AC | 11.6 | 14.5 | 17.4 | 21.8 |
| Max. Output Current [A] | 13.4 | 16.7 | 20.0 | 22.8 |
| Nominal Voltage/ Range [V] | 3L+N+PE, 220/380, 230/400, 240/415; 180-280/312-485 | | | |
| Nominal Grid Frequency/ Range [Hz] | 50: 45-55; 60: 55-65 | | | |
| Total Distortion Harmonic [THDi] | < 3% | | | |
| Power Factor | 0.8 leading to 0.8 lagging | | | |
| Feed-in Phases/AC Connection Phases | 3/3 | | | |
| **Efficiency** | | | | |
| Max. Efficiency | 98.6% | 98.6% | 98.6% | 98.6% |
| Euro Efficiency | 98.3% | 98.3% | 98.4% | 98.4% |
| **Protection** | | | | |
| Overvoltage Protection | Integrated | | | |
| DC Insulation Resistance Detection | Integrated | | | |
| DCI Monitoring | Integrated | | | |
| GFCI Monitoring | Integrated | | | |
| Grid Monitoring | Integrated | | | |
| AC Short Circuit Current Protection | Integrated | | | |
| AC Grounding Detection | Integrated | | | |



| Model | R6-8K-T2 | R6-10K-T2 | R6-12K-T2 | R6-15K-T2 |
|---|---|---|---|---|
| DC Surge Protection | Integrated | | | |
| AC Surge Protection | Integrated | | | |
| Overheating Protection | Integrated | | | |
| Anti-islanding Protection | AFD | | | |
| AFCI Protection | Integrated | | | |
| **Interface** | | | | |
| AC Connection | Plug-in connector | | | |
| DC Connection | D4 | | | |
| Display | LED+App | | | |
| Communication Port | RS232 (USB) + RS485 (RJ45) + DRM (RJ45) | | | |
| Communication Mode | Wi-Fi, Ethernet, 4G (optional) | | | |
| **General Data** | | | | |
| Topology | Non-isolated | | | |
| Consumption at Night [W] | <1 | | | |
| Operating Temperature Range | -40℃ to +60℃ (45℃ to 60℃ with derating) | | | |
| Cooling Method | Natural convection | | | |
| Ambient Humidity | 0% to 100% non-condensing | | | |
| Max. Operating Altitude [m] | 4000 (>3000 with power derating) | | | |
| Noise [dBA] | <35 | | | |
| Ingress Protection | IP65 | | | |
| Mounting | Wall mounting | | | |
| Dimensions [H*W*D] [mm] | 374*532*190 | | | |
| Weight [kg] | 15 | | | |
| Warranty [Year] | Refer to the warranty policy | | | |
| Certifications | EN62109-1/2, EN61000-6-1/2/3/4, EN50549, C10/11, IEC62116, IEC61727, RD1699, RD413, UNE 206006, UNE 206007, NTS, CEI 0-16, CEI O-021, AS4777.2, NBR16149, NBR 16150, VDE-AR-N 4015, VDE 0126-1-1 | | | |

# 3.

# INSTALLATION
Instructions





## 3.1
## Safety Instructions

**DANGER**

· Danger to life due to potential fire or electricity shock.
· Do not install the inverter near any inflammable or explosive items.
· This inverter will be directly connected with HIGH VOLTAGE power generation device; the installation must be performed by qualified personnel only in compliance with national and local standards and regulations.

**NOTICE**

· This equipment meets the pollution degree III.
· Inappropriate or the harmonized installation environment may jeopardize the life span of the inverter.
· Installation directly exposed under intensive sunlight is not recommended.
· The installation site must be well ventilated.

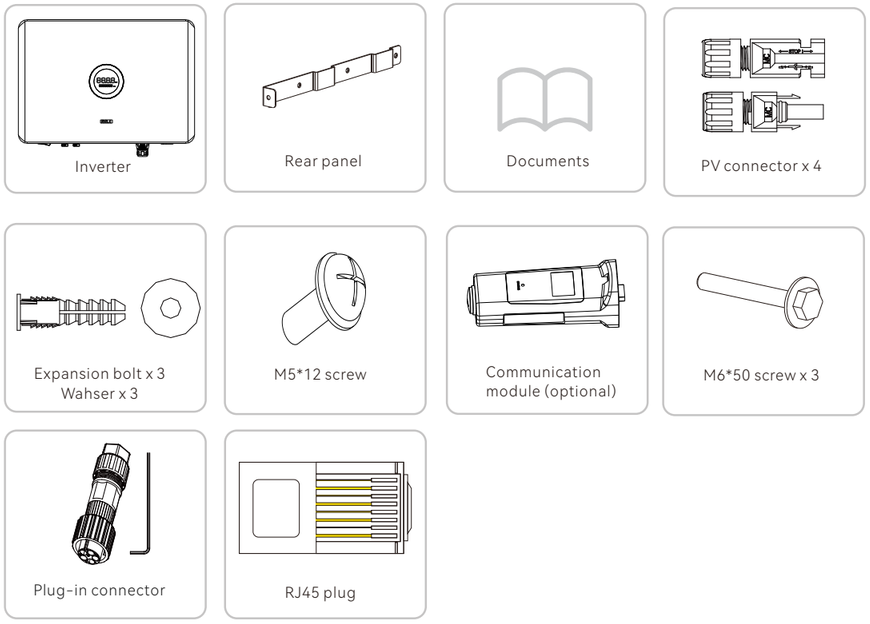
## 3.2
## Pre-installation Check

### 3.2.1
### Check the Package

Although SAJ's inverters are thoroughly tested and checked before delivery, the inverters may suffer damages during transportation. Check the package for any obvious signs of damage, and if such evidence is present, do not open the package and contact your dealer as soon as possible.

### 3.2.2
### Scope of Delivery

Contact after-sales if there are missing or damaged components.






## 3.3 Installation Method and Position

(1) The equipment employs natural convection cooling, and it can be installed indoor or outdoor.

(2) Mount vertically or tilted backwards by max. 15°. Never install the inverter tilted forwards, sideways, horizontally, or upside down.

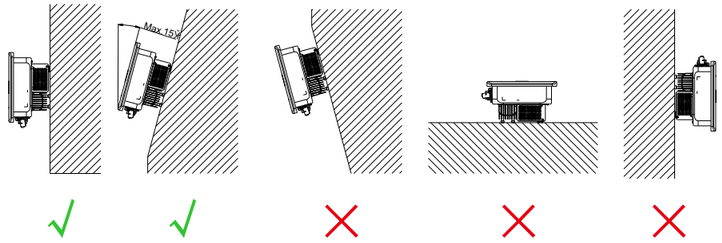



Figure 3.1
Mounting Method

(3) Install the equipment at eye level for maintenance convenience.

(4) Choose a solid and smooth wall to ensure that the inverter can be installed securely on the wall. Make sure that the wall can bear the weight of the inverter and accessories.

(5) Reserve enough clearance around the inverter to ensure a good air circulation at the installation area, especially when multiple inverters need to be installed in the same area.

Ensure air circulation at the installation point. When several units are installed in the same area, follow the installation clearance requirements as shown in Figure 3.2 to ensure sufficient air circulation.

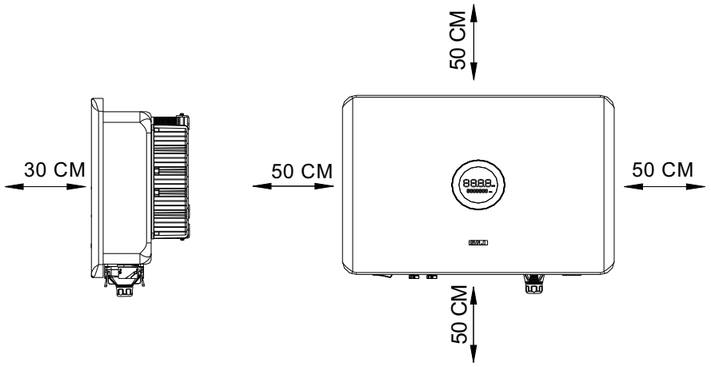



Figure 3.2
Mounting Clearance

### Installation Environment Requirements

- The installation environment must be free of inflammable or explosive materials.
- Install the device away from heat sources.
- Do not install the device at a place where the temperature changes extremely.
- Keep the device away from children.
- Do not install the device at daily working or living arears, including but not limited to the following areas: bedroom, toilet, or bathroom.
  When installing the device at the garage, keep it away from the driveway.
- Keep the device from water sources such as taps, sewer pipes and sprinklers to
- prevent water seepage.
  Install the device in a location with easy access and fault monitoring.
-

  Note: When installed outdoors, install the device at the height that can prevent the device from soaking in water. The specific height can be determined according to the actual environment.



# 3.4 Mounting Procedure

Step 1. Mark the drilling positions on the wall with the rear panel. The measurement unit is mm.

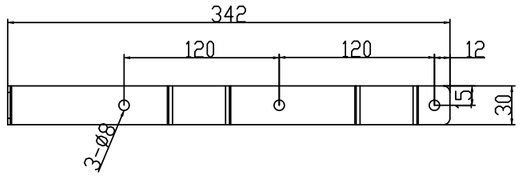



Figure 3.3
Marking drilling positions

Step 2. Drill three holes on the wall and place the expansion tubes in the holes using a rubber mallet.

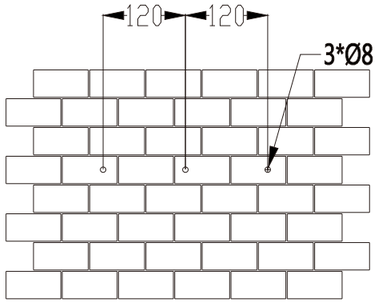



Figure 3.4
Drilling holes

Step 3. Secure the rear panel to the wall with the M6*50 hexagon screws.

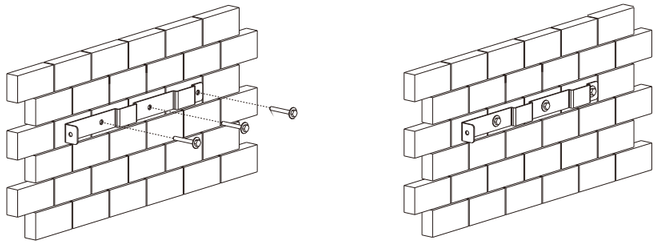


Figure 3.5
Securing the rear panel

Step 4. Carefully mount the inverter to the rear panel. Make sure that the rear part of the equipment is closely mounted to the rear panel.

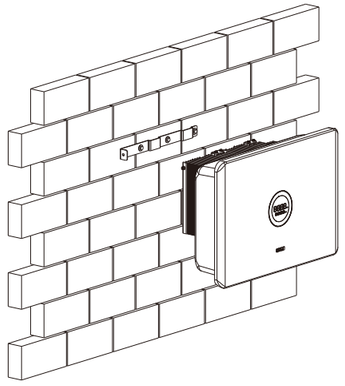


Figure 3.6
Mounting the inverter



Step 5. Secure the inverter to the rear panel with a M5*12 external hexagon screw.

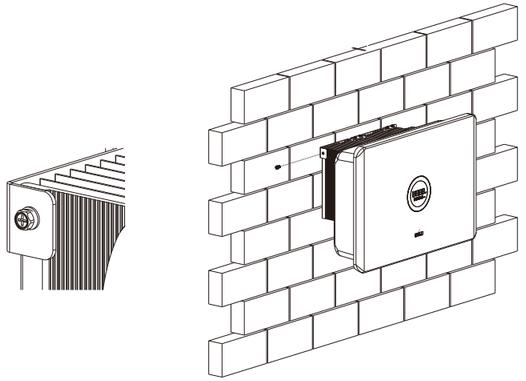


Figure 3.7
Securing the inverter

# 4.

# ELECTRICAL
# Connection





## 4.1
## Safety Instruction

Electrical connection must only be operated on by professional technicians. Before connection, wear necessary protective equipment including insulating gloves, insulating shoes and safety helmet.

**DANGER**

- Danger to life due to potential fire or electricity shock.
- When power-on, the equipment should run in conformity with national rules and regulations.
- The direct connection between the inverter and high voltage power systems must be operated by qualified technicians in accordance with local and national power grid standards and regulations.
- The PV arrays will produce lethal high voltage when exposed to sunlight.

**NOTICE**

- Electrical connection should be in conformity with proper stipulations, such as stipulations for cross-sectional area of conductors, fuse and ground protection.

## 4.2
## Specifications of Electrical Interfaces

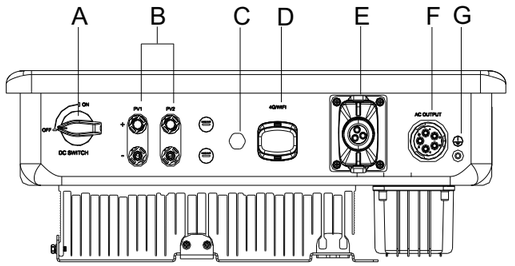



Figure 4.1
Electrical interfaces

| Callout | Name |
|---|---|
| A | DC switch |
| B | DC input |
| C | Relief valve |
| D | RS232 communication (4G/Wi-Fi) |
| E | RS485 communication + DRM |
| F | AC output |
| G | Grounding port |

Table 4.1
Electrical interfaces

# 4.3 AC-side Electrical Connection

Install a 4P circuit breaker to ensure that the inverter can be disconnected from the grid safely.

The inverter is integrated with a RCMU. However, an external RCD is needed to protect the system from tripping. Either type A or type AC RCD is compatible with the inverter.

The integrated leakage current detector of the inverter can detect the real time external current leakage. When a leakage current detected exceeds the limitation, the inverter will be disconnected from the grid quickly. When an external leakage current device is connected, the action current should be 300 mA or higher.

Table 4.2
Recommended AC circuit breaker specification

| Model | Rate current of AC circuit breaker (A) |
|---|---|
| R6-(3K,4K,5K,6K)-T2 | 16 |
| R6-(8K,10K)-T2 | 20 |
| R6-(12K,15K)-T2 | 32 |

Table 4.3
Recommended AC cable specification

| Model | Cross-sectional area of cables ($mm^2$) | |
|---|---|---|
| | Value Range | Recommended value |
| R6-(3K-6K)-T2 | 2.5-6.0 | 5.0 |
| R6-(8K-15K)-T2 | 4.0-6.0 | 5.0 |

If the grid-connection distance is large, select the AC cable with larger diameter according to the actual condition.

## Procedure

Step 1. For the grounding protection of the inverter, insert the M5*12 mm outer hexagon screw clockwise through the OT terminal of the grounding cable into the grounding port of the inverter shell, and tighten the screw.

The recommended conductor cross-sectional area of the grounding cable is 6-10 $mm^2$.



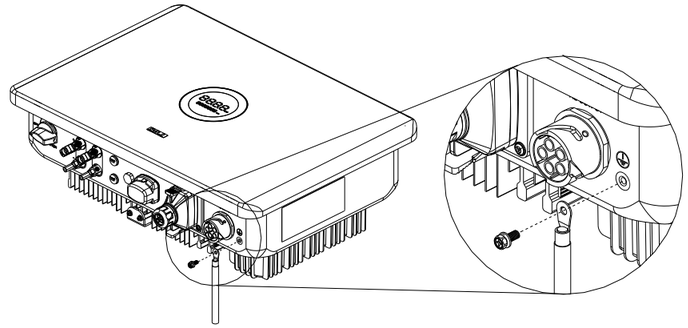


Figure 4.2
Connecting ground protection

Step 2. Peel off the insulation of the outdoor five-core cable by 50 mm, and expose 10 mm of each single-strand core. Insert the AC cable through the AC waterproof sheath.

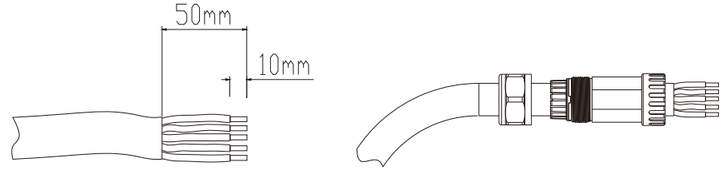



Figure 4.3
Assembling the AC cables

Step 3. Tighten the AC cables to the AC connectors with a hex wrench according to the wiring labels L1, L2, L3, N, and PE.

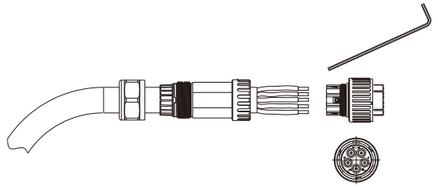


Figure 4.4
Connecting the AC cables

Step 4. Connect the AC connector to the AC OUTPUT port, and tighten the waterproof gland of the AC connector.

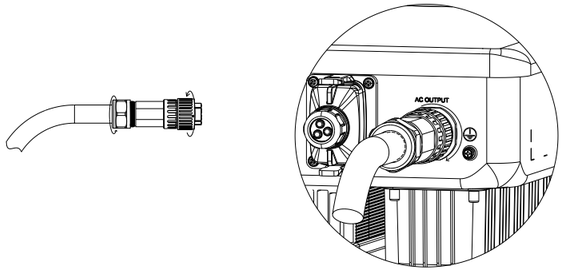



Figure 4.5
Connecting AC connector

## 4.4
## DC-side Connection

**WARNING**

· Make sure the PV array is well insulated to the ground before connecting it to the inverter.

NOTICE

· Place the connector separately after unpacking in order to avoid confusion for connection of cables.
· Connect the positive connector to the positive side of the solar panels, and connect the negative connector to the negative side of the solar side. Be sure to connect them in the right position.
· Only install with the original terminals.

| Cross-sectional area of cables ($mm^2$) | | Outside diameter of cables (mm) |
|---|---|---|
| Value Range | Recommended value | |
| 4.0–6.0 | 4.0 | 4.2–5.3 |

Table 4.4
Recommended specifications of DC cables

Step 1. Loosen the lock screws on the positive and negative connectors.

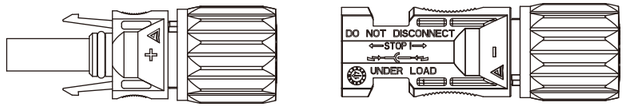



Figure 4.6
Loosening the PV connectors



Step 2. Use a 3-mm wide-bladed screwdriver to strip off the insulation by 8 to 10 mm from one end of each cable.

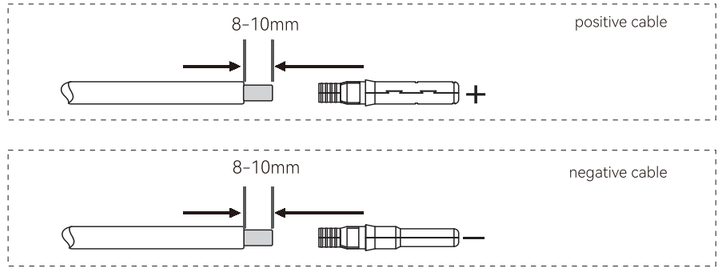



Figure 4.7
Striping off the insulation skin of cables

Step 3. Insert the cable ends to the sleeves. Use a crimping plier to assembly the cable ends.

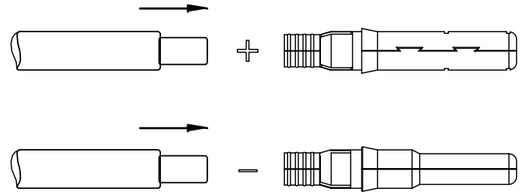


Figure 4.8
Inserting cables to lock screws

Step 4. Insert the assembled cable ends into the blue positive and negative PV connectors. Gently pull the cables backwards to ensure firm connection.

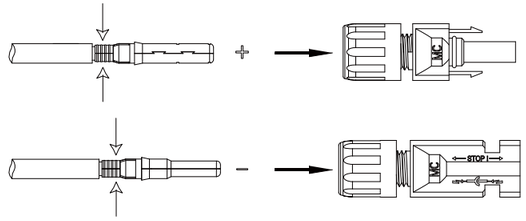



Figure 4.9
Inserting crimped cables to connectors

Step 5. Tighten the lock screws on the positive and negative cable connectors.

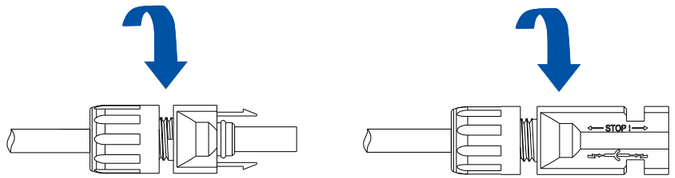



Figure 4.10
Securing the connectors

Step 6. Make sure the DC switch is at the OFF position.

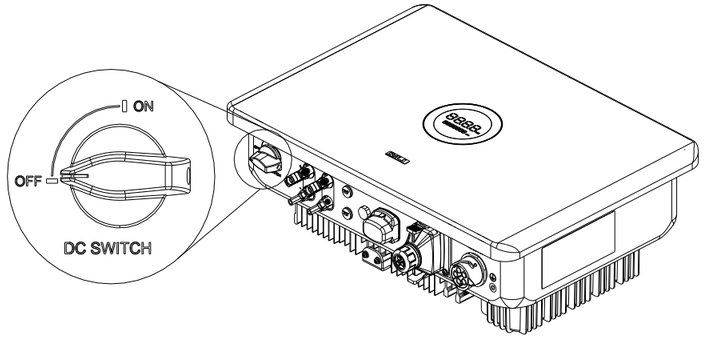



Figure 4.11
Turning off the DC switch

Step 7. Insert the positive and negative cable connectors into the positive and negative PV ports on the inverter until you hear a “click” sound to ensure firm connection.

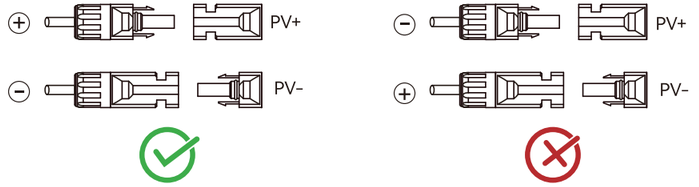



Figure 4.12
Plugging in PV connectors



# 4.5 Communication Connection

R6 inverter is standardly equipped with an RS485 interface, a demand response mode (DRM) interface and an RS232 interface.

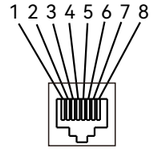



Figure 4.13
RS485 pin

Table 4.5
RS485 pin definition

| Pin | Name | Function |
|---|---|---|
| 1 | NC | NC |
| 2 | NC | NC |
| 3 | NC | NC |
| 4 | NC | NC |
| 5 | NC | NC |
| 6 | NC | NC |
| 7 | RS485-A | Transmission RS485 differential signal |
| 8 | RS485-B | Transmission RS485 differential signal |

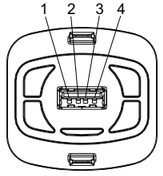



Figure 4.14
RS232 pin

Table 4.6
USB pin definition

| Pin | Name | Function |
|---|---|---|
| 1 | +5 V | Power supply |
| 2 | RS-232 TX | Send data |
| 3 | RS-232 RX | Receive data |
| 4 | GND | Ground wire |

To comply with Australian and New Zealand safety requirements, the DRMs terminals should be connected. DRM0 is supported. An RJ45 plug is being used as the inverter DRED connection.

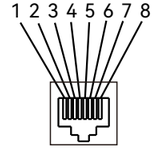



Figure 4.15
DRM pin

Table 4.7
Demand Response Modes (DRM)

| Pin | Name |
|---|---|
| 1 | NC |
| 2 | NC |
| 3 | NC |
| 4 | NC |
| 5 | REF GEN |
| 6 | COM LOAD |
| 7 | NC |
| 8 | NC |

Table 4.8
DRM0 mode

| Mode | Corresponding pins | Function |
|---|---|---|
| DRM0 | 5 & 6 | The inverter is on the standby mode. |

The RS485 cable is prepared by the user.

To connect the communication cables and communication module to the inverter:

Step 1. Strip off the insulation of the RS485 and the Ethernet cables.

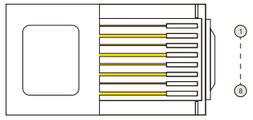



Figure 4.16
RJ45 plug

Step 2. Insert the cable through the sealing nut of the cable gland.

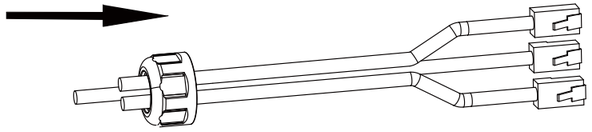


Figure 4.17
Inserting cables

Step 3. Install the rubber seal onto the cables.

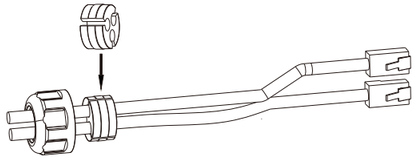


Figure 4.18
Inserting rubber seal



Step 4. Insert the RJ45 cables into the corresponding ports.

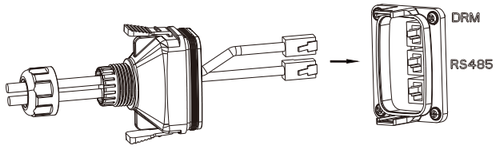



Figure 4.19
Inserting RJ45 cables

Step 5. Secure the cable gland by rotating the sealing nut and connect the cable gland to the communication port of the inverter.

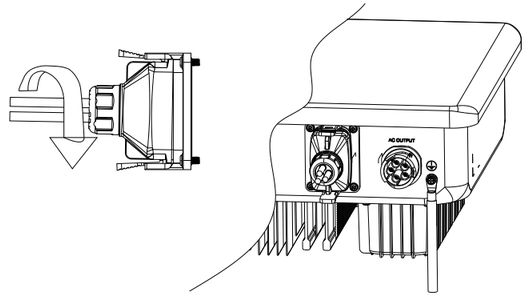



Figure 4.20
Inserting RJ45 cables

Step 6. Remove the dust-proof cover from the 4G/WiFi port and insert the communication module.

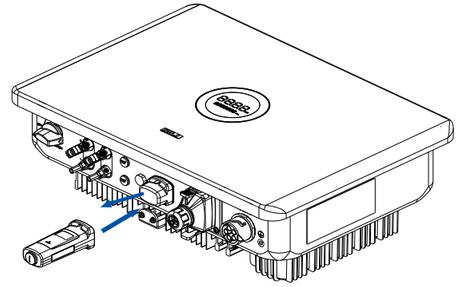


Figure 4.21
Installing communication module

# 4.6 Start up and Shut down Inverter

## 4.6.1 Start Up the Inverter

Step 1. Follow the installation standard from previous chapter strictly to connect the photovoltaic panels and AC power grid to inverter.
Step 2. Use a multimeter to check whether the AC side and DC side voltages have met the inverter start voltage requirement.
Step 3. Turn ON the DC switch (if applicable). The LED indicators will light up.
Step 4. Select the country grid code at the Elekeeper App. Contact your local grid operator about which region to select. The inverter will start the self-testing. When the inverter has met all the grid connecting requirements, the inverter will connect to the grid and generate power automatically.

## 4.6.2 Shut Down the Inverter

When the solar light intensity is not strong enough or the output voltage of the photovoltaic system is less than the minimum input power of the inverter, the inverter will shut down automatically.

To shut down the inverter manually, disconnect the AC side circuit breaker first. When multiple inverters are connected, disconnect the minor circuit breaker first, and then disconnect the main circuit breaker. Disconnect the DC switch after the inverter reports the grid connection lost alarm.



# 4.7 AFCI

The inverter is equipped with an arc-fault circuit interrupter (AFCI). With AFCI protection, when there is an arc signal on the DC side due to aging of the cable or loose contact, the R6 series inverters can quickly detect it and cut off the power to prevent fire and ensure the safety of the PV system.

# 5.

# COMMISSIONING
Instructions





## 5.1
## Introduction of LED Panel

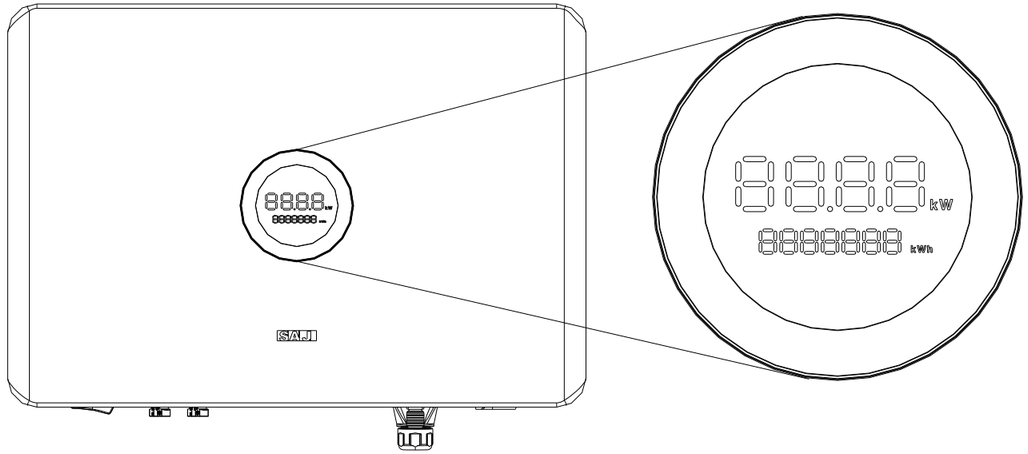



Figure 5.1
LED panel

| Display | Status | | Description |
|---|---|---|---|
| Ring Light |  | Solid Green | The inverter is in normal on-grid state |
| | | Breathing Mode | The inverter is in the initialization or waiting state |
| |  | Solid Red | An error occurs |
| | | Breathing Mode | Software is upgrading in the inverter |
| |  | OFF | Power off |
| LED Panel 1 |  | | Current power (kW) / Error code |
| LED Panel 2 |  | | Total yield (kWh) |

Talbe 5.1
LED indicators

# 5.2 Monitoring Operation

The Elekeeper App can be used for both nearby and remote monitoring.
Depending on the communication module used, it supports Bluetooth/4G or Bluetooth/Wi-Fi to communicate with your energy storage system (ESS).

## 5.2.1 Download the App

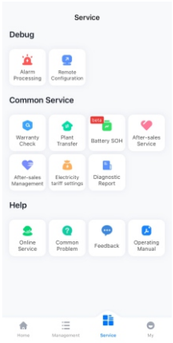
On your mobile phone, search for “Elekeeper” in the App store and download the App.

Alternatively, you can scan the following QR code to download the App.

## 5.2.2 Set up Bluetooth Connection

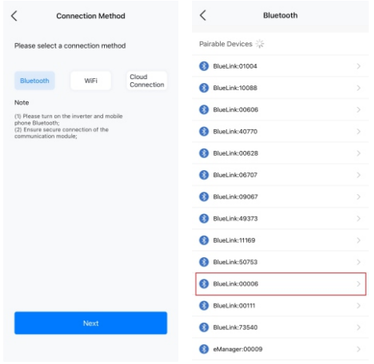
Step 1. Activate the Bluetooth connection on your phone.

Step 2. Log in to the Elekeeper App, tap **Service** on the bottom menu and select **Remote Configuration**.

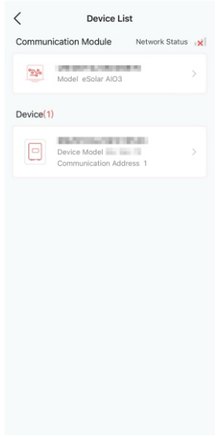



Step 3. Tap **Bluetooth** > **Next**, and select the BlueLink of the device from the **Pairable Devices**.

The BlueLink is named with the last five numbers of the communication module SN. For example, 00006.



Step 4. Select either the inverter under **Device** to set the inverter parameters or the module under **Communication Module** to configure the parameters of the communication module.

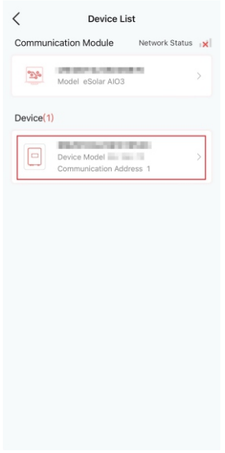


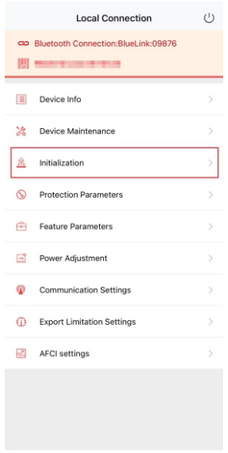

## 5.2.3 Perform Initialization

To set the initialization parameters:

Step 1. Log in to the Elekeeper App and connect to the inverter through Bluetooth connection.

Step 2. On the **Device List** page, select the inverter under **Device**, and tap **Initialization**. For example:

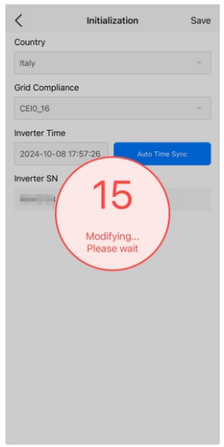


Step 3. Set the following parameters:

- **Country**: The country where the inverter is installed.
- **Grid Compliance**: Select the applicable compliance of the country.
- **Inverter Time**: Tap **Auto Time Sync** to synchronize the inverter time with the time on your mobile phone. The default time is factory-set.


Step 4. Tap **Save**, and wait for a few seonds for the initialization to finish.






## 5.2.4 Check Inverter Status

The customers can check the following device information at the Elekeeper App:

- **Basic Info**: The basic device information, such as the device model and serial number.
- **Running Info**: The power input and output status, such as the running current of DC input.
- **Event Info**: The error or faulty events of the inverter.

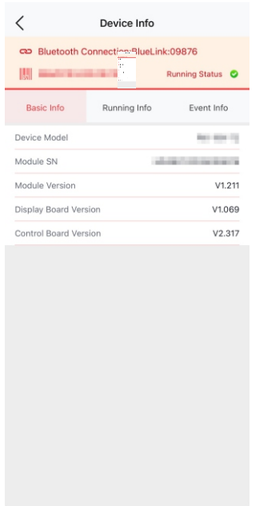
To view the inverter status:

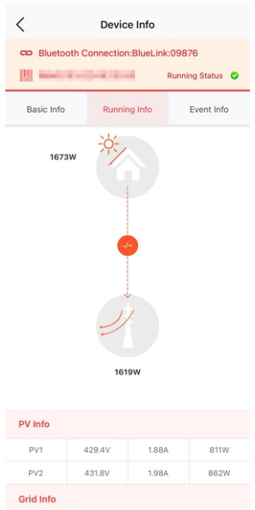
Step 1. Log in to the Elekeeper App and connect to the inverter through Bluetooth connection.

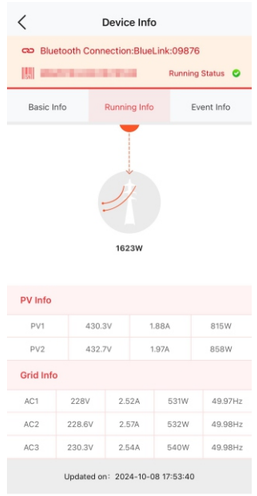
Step 2. On the **Device List** page, select the inverter under **Device**, and tap **Device Info**.

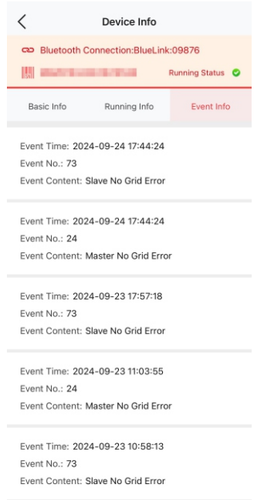
Step 3. Check the detailed inverter information.

For example:



# 5.3 Export Limit Setting

The export limit function controls the maximum power that the inverter exports to the grid. For this function to take effect, the user needs to prepare a meter and connect the meter to the inverter as the figure shows:

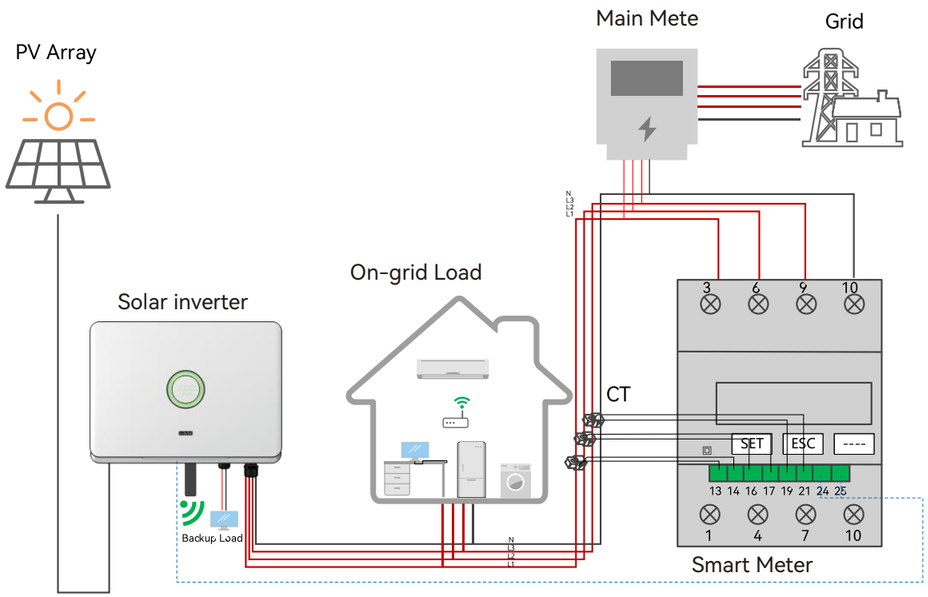



Figure 5.4
Export limit wiring schematic



## 5.3.1 Set Export Limit

To enable the export limit function:

Step 1. Log in to the Elekeeper App and connect to the inverter through Bluetooth connection.

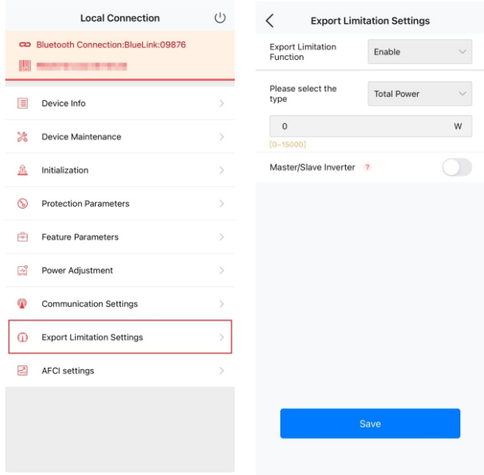
Step 2. On the **Device List** page, select the inverter under **Device**, and tap **Export Limitation Settings**.

Step 3. Tap the icon to enable the export limitation function, and wait for a few seconds for the change to take effect.

Step 4. Select the following limit control type and set the value:

- **Total power**: The inverter controls the maximum power that is exported to the grid. Set the value within the range of 0 to the rated power of the current inverter in W. For example, value 5000 (W) indicates that the overall export power limit is 5000 W from the inverter.

**Note**: Control types **Phase Power** and **Phase Current** are not applicable for this inverter series.



# 5.4 Self-test

(For Italy)

Italian Standard CEI0-21 requires a self-test function for all the inverters that connect to the utility grid. During the self-testing, the inverter will check the reaction time for over-frequency, under-frequency, over-voltage and under-voltage. The self-test function ensures that the inverter can disconnect from the grid when required. If the self-test fails, the inverter will not feed into the grid.

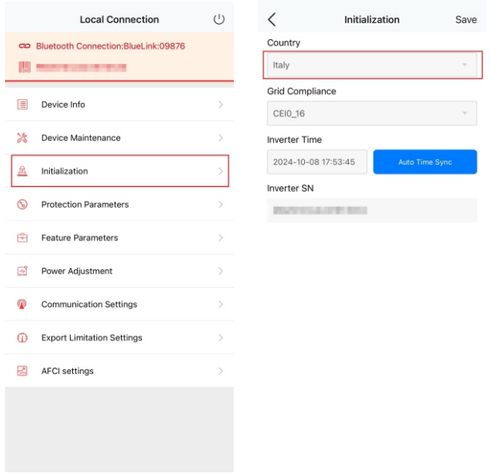
To run the self-test:

Step 1. Make sure that the communication module is connected to the inverter.

Step 2. Log in to the Elekeeper App and connect to the inverter through Bluetooth connection.

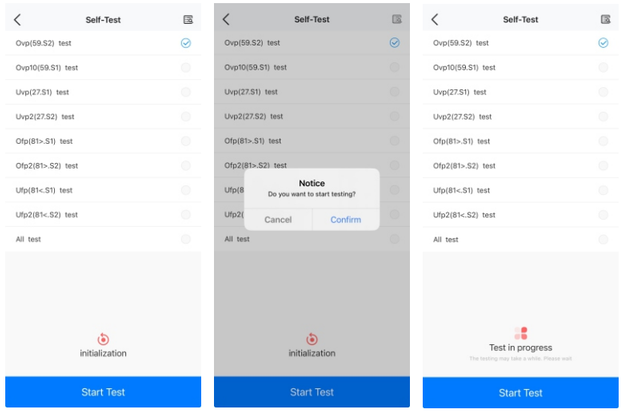
Step 3. On the **Device List** page, select the inverter under **Device**, and tap **Initialization**.

Step 4. Select **Italy** as the country.

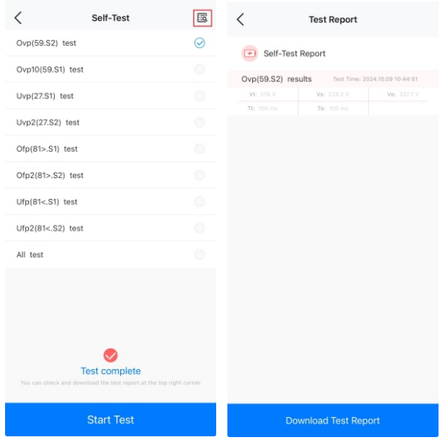



Step 5. On the **Device List** page, tap **Self-test**.

Step 6. Choose the self-test items as required. It takes around 5 minutes to complete each item, and around 40 minutes to complete all the items.



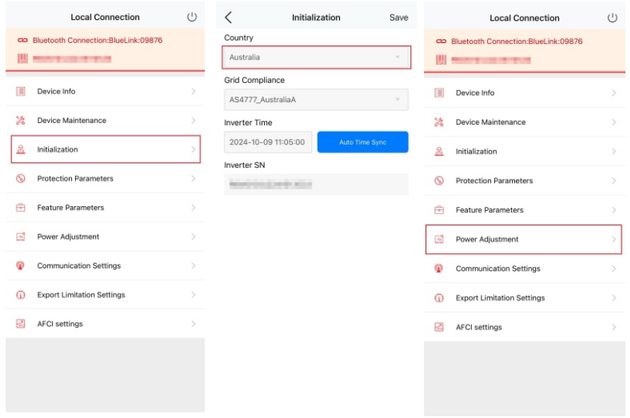

Step 7. After the self-test is completed, tap the search icon on the top right corner to check the test report. Download the test report if the self-test fails and contact SAJ or your inverter supplier.



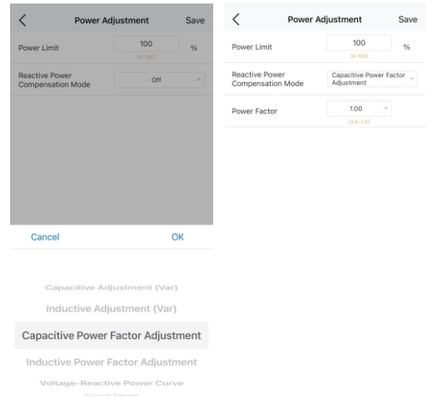
# 5.5 Set Reactive Power Control (For Australia)

## 5.5.1 Set Fixed Power Factor and Fixed Reactive Power Modes

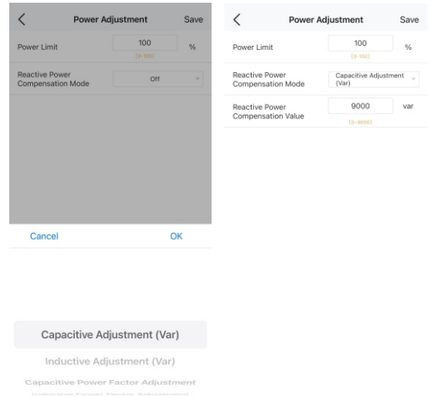
Step 1. Log in to the Elekeeper App and connect to the inverter through Bluetooth connection.
Step 2. On the **Device List** page, select the inverter under **Device**, and tap **Initialization**.
Step 3. Select **Australia** as the country and the corresponding grid compliance.
Step 4: On the **Device List** page, select **Power Adjustment**.




**To set the fixed power factor mode:**
Step 1: Select **Capacitive Power Factor Adjustment** or **Inductive Power Factor Adjustment** according to your local grid regulation. The power factor range is from 0.8 leading to 0.8 lagging.
Step 2: Tap **Save** for the changes to take effect.




**To set the fixed reactive power mode:**
Step 1: Select **Inductive Adjustment (Var)** or **Capacitive Adjustment (Var)** according to your local grid regulation. The power range is from -60%Pn to 60%Pn.
Step 2: Tap **Save** for the changes to take effect.



## 5.5.2 Set V-Watt and Volt-Var Mode

This inverter complies with AS/NZS 4777. 2020 for power quality response modes. The inverter satisfies different regions of DNSPs' grid connection rules requirements for volt-watt and volt-var settings. For example, AS4777 series setting as Fig 5.5 and 5.6 show.

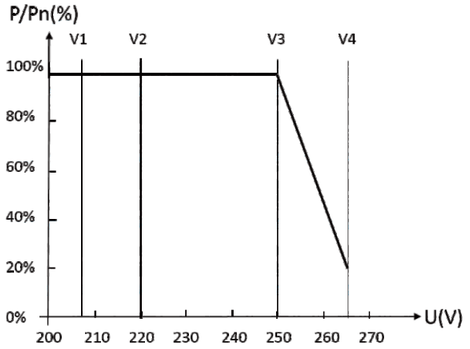



Figure 5.5
Curve for a Volt-Watt response mode (AS4777 Series)

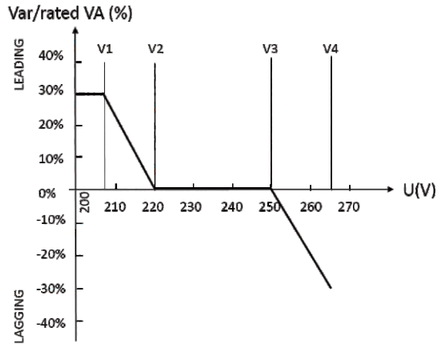


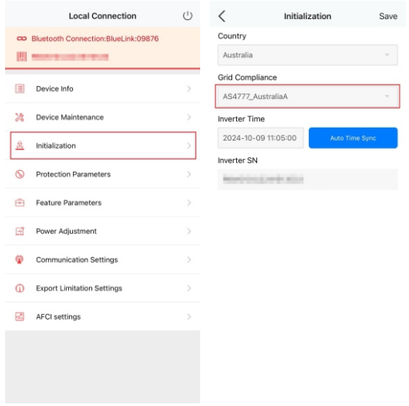

Figure 5.6
Curve for a Volt-Var control mode (AS4777 Series)



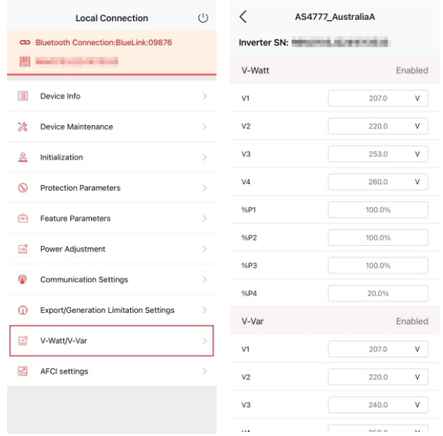
Step 1. Log in to the Elekeeper App and connect to the inverter through Bluetooth connection.

Step 2. On the **Device List** page, select the inverter under **Device**, and tap **Initialization**.

Step 3. Make sure that the corresponding AS4777 grid compliance is selected.




Step 4. On the **Device List** page, tap **V-Watt/V-Var** to enter the DNSP settings, and set the corresponding values as required.



# 6.

# Error Code
# & Troubleshooting





## Troubleshooting

For any errors reported as below, contact the after-sales for service support. The operations and maintenance must be performed by authorized technicians. The following table lists the error codes and corresponding messages:

| Code | Error message |
|---|---|
| 1 | Master Relay Error |
| 2 | Master EEPROM Error |
| 3 | Master Temperature High Error |
| 4 | Master Temperature Low Error |
| 5 | Lost Communica tion M<->S |
| 6 | GFCI Device Error |
| 7 | DCI Device Error |
| 8 | Current Sensor Error |
| 9 | Master Phase1 Voltage High |
| 10 | Master Phase1 Voltage Low |
| 11 | Master Phase2 Voltage High |
| 12 | Master Phase2 Voltage Low |
| 13 | Master Phase3 Voltage High |
| 14 | Master Phase3 Voltage Lo w |
| 15 | Grid Voltage 10Min High |
| 16 | OffGrid Output Voltage Low |
| 17 | OffGrid Output Short Circuit |
| 18 | Master Grid Frequency High |
| 19 | Master Grid Frequency Low |
| 21 | Phase1 DCV High |
| 22 | Phase2 DCV High |
| 23 | Phase3 DCV High |
| 24 | Master No Grid Error |
| 27 | GFCI Error |
| 28 | Phase1 DCI Error |
| 29 | Phase2 DCI Error |
| 30 | Phase3 DCI Error |
| 31 | ISO Error |
| 32 | Bus Voltage Balance Error |
| 33 | Master Bus Voltage High |
| 34 | Master Bus Voltage Low |
| 35 | Master Grid Phase Lost |
| 36 | Master PV Voltage High |
| 37 | Master Islanding Error |
| 38 | Master HW Bus Voltage High |
| 39 | Master HW PV Current High |

| Code | Error message |
|---|---|
| 40 | Master Self-Test Failed |
| 41 | Master HW Inv Current High |
| 42 | Master AC SPD Error |
| 43 | Master DC SPD Error |
| 44 | Master Grid NE Voltage Error |
| 45 | Master Fan1 Error |
| 46 | Master Fan2 Error |
| 47 | Master Fan3 Error |
| 48 | Master Fan4 Error |
| 49 | Lost Communication between Master and Meter |
| 50 | Lost Communication between M< ->S |
| 51 | Lost Communication between inverter and SEC |
| 52 | HMI EEPROM Error |
| 53 | HMI RTC Error |
| 54 | BMS Device Error |
| 55 | BMS Lost.Conn |
| 56 | CT Device Err |
| 57 | AFCI Lost Err |
| 58 | Lost Com. H< ->S Err |
| 61 | Slave Phase1 Voltage High |
| 62 | Slave Phase1 Voltage Low |
| 63 | Slave Phase2 Voltage High |
| 64 | Slave Phase2 Voltage Low |
| 65 | Slave Phase3 Voltage High |
| 66 | Slave Phase3 Voltage Low |
| 67 | Slave Frequency High |
| 68 | Slave Frequency Low |
| 73 | Slave No Grid Error |
| 74 | PVInputModeFault |
| 75 | HWPVCurrHighFault |
| 76 | Slave PV Voltage High |
| 77 | Slave HW Bus Volt High |
| 81 | Lost Communication D< ->C |
| 83 | Master Arc Device Error |
| 84 | Master PV Mode Error |

| Code | Error message |
|---|---|
| 85 | Authority expires |
| 86 | DRM0 Error |
| 87 | Master Arc Error |
| 88 | Master SW PV Current High |

Table 6.1
Error Code

Contact your supplier for troubleshooting and error remedy.

General troubleshooting methods for the inverters are as follows:

| Error message | Troubleshooting |
|---|---|
| Relay Error | If this error occurs frequently, contact your distributor or call SAJ technical support. |
| Storer Error | If this error occurs frequently, contact your distributor or call SAJ technical support. |
| High Temperature Error | Check whether the radiator is blocked, whether the inverter is in too high or too low temperature. If the above mentioned are normal, contact your distributor or call SAJ technical support. |
| Master Lost Communication | If this error occurs frequently, contact your distributor or call SAJ technical support. |
| GFCI Devices Error | If this error occurs frequently, contact your distributor or call SAJ technical support. |
| DCI Devices Error | If this error occurs frequently, contact your distributor or call SAJ technical support. |
| Current Sensor Error | If this error occurs frequently, contact your distributor or call SAJ technical support. |
| AC Voltage Error | · Check the voltage of the grid.<br>· Check the connection between the inverter and the grid.<br>· Check the settings of the on-grid standards of the inverter.<br>· If the voltage of the grid is higher than the voltage regulated by local grid, inquire the local grid service whether they can adjust the voltage at the feed point or change the value of the regulated voltage.<br>· If the voltage of the grid is in regulated range as allowed and LCD still in this error, contact your distributor or call SAJ technical support. |



| Error message | Troubleshooting |
|---|---|
| Frequency Error | Check the setting of country and check the frequency of the local grid. If the above mentioned are normal, contact your distributor or call SAJ technical support. |
| Grid Lost Error | Check the connection status between the AC side of the inverter and the grid. If the connection is normal, contact your distributor or call SAJ technical support. |
| GFCI Error | Check the insulation resistance of the positive side and negative side of the solar panel; check whether the inverter is in wet environment; check the grounding of the inverter. If the above mentioned are normal, contact your distributor or call SAJ technical support. |
| DCI Error | If this error persists, contact your distributor or call SAJ technical support. |
| ISO Error | Check the insulation resistance of the positive side and negative side of the solar panel; check whether the inverter is in wet environment; check whether the grounding of the inverter is loose or not.<br>If the above mentioned are normal, contact your distributor or call SAJ technical support. |
| Overcurrent | Check the connection status between the inverter and the grid and test whether the volt. of the grid is stable or not, if the above mentioned are in normal, please contact your distributor or call SAJ technical support. |
| Over Bus Voltage | Check the settings of the solar panel with the help of SAJ technical support. If the settings are normal, contact your distributor or call SAJ technical support. |
| PV Overcurrent | If this error persists, contact your distributor or call SAJ technical support. |
| PV Voltage Fault | Check the settings of the solar panel with the help of SAJ technical support. If the settings are normal, contact your distributor or call SAJ technical support. |
| Lost Communication | Check the connection of communication cables between the control board and the display board. If the connections are normal, contact your distributor or call SAJ technical support. |
| Null line-to-earth voltage fault | Check if connection of the AC output grounding terminal is stable and reliable. If the connection is normal, contact your distributor or call SAJ technical support. |

Table 6.2
Troubleshooting

# 7.

# Appendix





## 7.1 Recycling and Disposal

This device should not be disposed as a residential waste.
The device that has reached the end of its operation life is not required to be returned to your dealer; instead, it must be disposed by an approved collection and recycling facility in your area.

## 7.2 Warranty

Check the product warranty conditions and terms on the SAJ website: https://www.saj-electric.com/

## 7.3 Contacting Support

Guangzhou Sanjing Electric Co., Ltd.
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## 7.4 Trademark

SAJ is the trademark of Sanjing.