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V1.0

R6 series

ROOFTOP SOLAR INVERTER user manual

R6-3~15K-T2-AUS

SAJ **ROOFTOP SOLAR INVERTER** USER MANUAL

TABLE OF contents

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

Please keep this manual all time 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 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! There might be residual currents in inverter because of large capacitors. Wait 5 minutes before you remove the front lid.
	Notice, danger! This is directly connected with electricity generators and public grid.
	Danger of hot surface The components inside the inverter will release a lot of heat during operation. Do not touch metal plate housing during operating.
	An error has occurred Please go to Chapter 6 “Troubleshooting” to remedy the error.
	This device SHALL NOT be disposed of in residential waste Please go to Chapter 7 “Recycling and Disposal” for proper treatments.
	CE Mark With CE mark & the inverter fulfills the basic requirements of the Guideline Governing Low-Voltage and Electro-magnetic Compatibility.
	CQC Mark The inverter complies with the safety instructions from China’s Quality Center.

1.2.3 Safety Instructions

DANGER

- There is possibility of dying 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, please 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 PV generator; you must wait for at least five minutes to let the energy storage capacitors completely discharged after disconnecting from 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 PV generator. Do not connect any other source of energy to the SAJ inverter.
- Be sure that the PV generator and inverter are well grounded in order to protect properties and persons.

CAUTION

- The solar inverter will become hot during operation. Please 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 AC power directly to the public utility power grid; do not connect 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, and the inverters are important components of grid-tied solar power systems.

The R6 inverter converts the DC generated by solar panels into AC which is in accordance with the requirements of public grid and send the AC into the grid, Figure 2.1 shows the structural diagram of the typical application system.

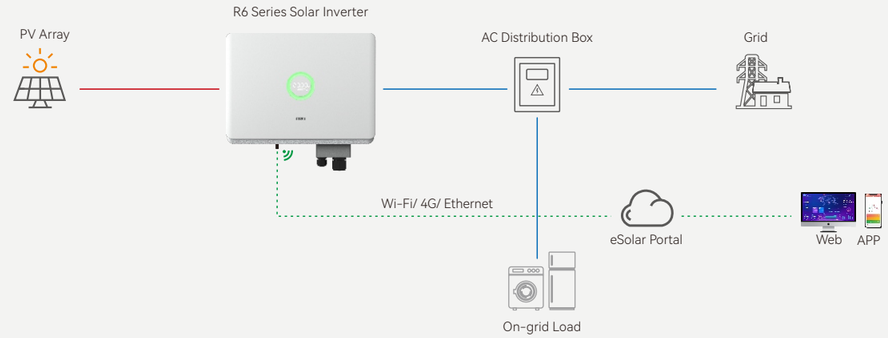


Figure 2.1
System overview

2.1 Specification for Product Model

R6 – XK – TX – AUS
① ② ③ ④

① R6 represents for product name.

② XK represents rated power XkW of inverter, for example 4K means 4kW.

③ T means three phase; X represents the inverter has the function of X MPP trackers.

④ AUS indicates this model is ONLY applicable to Australia.

2.2 Appearance

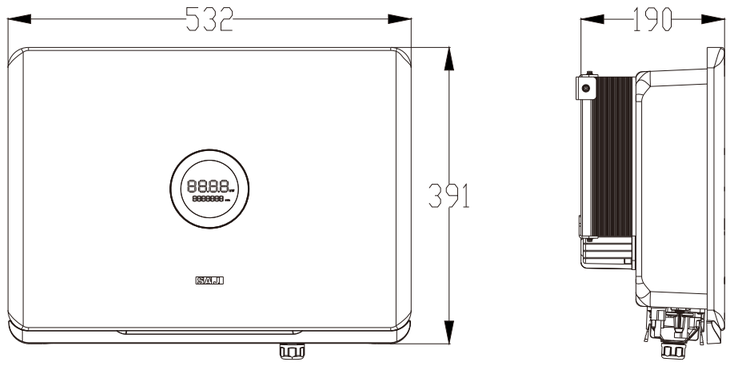


Figure 2.2
Dimensions of
products

2.3 Safe Handling

The R6-(3K-15K)-T2 series inverters have been designed and tested strictly according to international safety regulations. As an electrical and electronic equipment, the inverter must be installed, commissioned, operated, and maintained in strict accordance with related safety instructions. Incorrect operation or misuse of this device may cause personal injury or device damage. This will void the limit warranty and SAJ will not be responsible for the loss caused by those behaviors.

- The inverter must be installed and maintained by authorized technicians based on local laws and regulations.
- Before installing or maintaining the inverter, make sure that it is disconnected from the grid.
- When the inverter is working, do not plug in or out the cables.
- For the disposal or recycling, refer to section 7.2 “Recycling and Disposal”.

2.4 Datasheet

R6-3K/4K/5K/6K-T2-AUS

Model	R6-3K-T2-AUS	R6-4K-T2-AUS	R6-5K-T2-AUS	R6-6K-T2-AUS
Input (DC)				
Max. PV Array Power [Wp]@STC	4500	6000	7500	9000
Max. DC Voltage [V]	1100			
MPPT Voltage Range [V]	160-950			
Rated DC Voltage [V]	600			
Start-up Voltage [V]	180			
Min. DC Voltage [V]	150			
Max. DC Input Current [A]	16/16			
Max. DC Short-Circuit Current [A]	19.2/19.2			
Number of MPP Trackers	2			
Number of Strings per MPP Tracker	1/1			
DC Switch	Integrated			
Overvoltage Category (OVC)	II			
Output (AC)				
Rated AC Output Power [W]	3000	4000	5000	6000
Rated Apparent Power [VA]	3000	4000	5000	6000
Max. Apparent Power [VA]	3000	4000	5000	6000
Rated AC Output Current [A]	4.4	5.8	7.3	8.7
Max. AC Output Current [A]	4.4	5.8	7.3	8.7
Current Inrush [A]	60.0			
Max. AC Fault Current [A]	23.5			
Max. AC Over Current Protection [A]	28.4			
Nominal AC Voltage/Range [V]	3+N+PE, 220/380, 230/400, 240/415; 180-280/312-485			
Nominal AC Grid Frequency/ Range [Hz]	50, 60/45-55, 55-65			
Total Harmonic Distortion [THDi]	< 3%			
Power Factor [cos φ]	0.8 leading ~ 0.8 lagging			
Overvoltage Category (OVC)	III			
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			

Model	R6-3K-T2-AUS	R6-4K-T2-AUS	R6-5K-T2-AUS	R6-6K-T2-AUS
Grid Monitoring	Integrated			
AC Short Circuit Current Protection	Integrated			
AC Grounding Detection	Integrated			
DC Surge Protection	Integrated			
AC Surge Protection	Integrated			
Overheating Protection	Integrated			
Anti-islanding Protection	AFD			
AFCI Protection	Optional			
Interface				
AC Connection	Plug-in Connector			
DC Connection	MC4/D4			
Display	LED+APP			
Communication Port	RS232(USB)+RS485(RJ45)+DRM			
Communication Mode	Wi-Fi/Ethernet/4G(Optional)			
Load Monitoring	24/7 (Optional)			
General Parameters				
Topology	Non-isolated			
Consumption at Night [W]	<1			
Operating Temperature Range	-40℃ ~ +60℃ (45℃ to 60℃ with derating)			
Cooling Method	Natural Convection			
Ambient Humidity	0% ~ 100% non-condensing			
Max. Operating Altitude [m]	4000m (>3000m power derating)			
Noise [dBA]	<35			
Protective Class	Class I			
Ingress Protection	IP65			
Mounting	Wall Mounting			
Dimensions [H*W*D] [mm]	391*532*190			
Weight [kg]	15			
Warranty [Year]	Refer to the warranty policy			
Certifications	EN62109-1/2, EN61000-6-1/2/3/4, EN50438, EN50549, C10/11, IEC62116, IEC61727, RD1699, RD413, UNE 206006, UNE 206007, NTS, CEI 0-16, CEI O-021, AS/NZS 4777.2, NBR16149, NBR 16150 VDE-AR-N 4105, VDE 0126-1-1			

R6-8K/10K/12K/15K-T2-AUS

Model	R6-8K-T2-AUS	R6-10K-T2-AUS	R6-12K-T2-AUS	R6-15K-T2-AUS
Input (DC)				
Max. PV Array Power [Wp]@STC	12000	15000	18000	22500
Max. DC Voltage [V]	1100			
MPPT Voltage Range [V]	160-950			
Rated 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			
DC Switch	Integrated			
Overvoltage Category (OVC)	II			
Output (AC)				
Rated AC Output Power [W]	8000	9999	12000	15000
Rated Apparent Power [VA]	8000	9999	12000	15000
Max. Apparent Power [VA]	8000	9999	12000	15000
Rated AC Output Current [A]	11.6	14.5	17.4	21.8
Max. AC Output Current [A]	11.6	14.5	17.4	21.8
Current Inrush [A]	60.0			
Max. AC Fault Current [A]	37.8		51.3	
Max. AC Over Current Protection [A]	45.4		61.5	
Nominal AC Voltage/Range [V]	3+N+PE, 220/380, 230/400, 240/415; 180-280/312-485			
Nominal AC Grid Frequency/ Range [Hz]	50, 60/45-55, 55-65			
Total Harmonic Distortion [THDi]	< 3%			
Power Factor [cos φ]	0.8 leading ~ 0.8 lagging			
Overvoltage Category (OVC)	III			
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			

Model	R6-8K-T2-AUS	R6-10K-T2-AUS	R6-12K-T2-AUS	R6-15K-T2-AUS
Grid Monitoring	Integrated			
AC Short Circuit Current Protection	Integrated			
AC Grounding Detection	Integrated			
DC Surge Protection	Integrated			
AC Surge Protection	Integrated			
Overheating Protection	Integrated			
Anti-islanding Protection	AFD			
AFCI Protection	Optional			
Interface				
AC Connection	Plug-in connector			
DC Connection	MC4/D4			
Display	LED+APP			
Communication Port	RS232(USB)+RS485(RJ45)+DRM			
Communication Mode	Wi-Fi/Ethernet/4G(Optional)			
Load Monitoring	24/7 (Optional)			
General Data				
Topology	Non-isolated			
Consumption at Night [W]	<1			
Operating Temperature Range	-40℃ ~ +60℃ (45℃ to 60℃ with derating)			
Cooling Method	Natural Convection			
Ambient Humidity	0% ~ 100% non-condensing			
Max. Operating Altitude [m]	4000m (>3000m power derating)			
Noise [dBA]	<35			
Protective Class	Class I			
Ingress Protection	IP65			
Mounting	Wall Mounting			
Dimensions [H*W*D] [mm]	391*532*190			
Weight [kg]	15			
Warranty [Year]	Refer to the warranty policy			
Certifications	EN62109-1/2, EN61000-6-1/2/3/4, EN50438, EN50549, C10/11, IEC62116, IEC61727, Rd1699, RD413, UNE 206006, UNE 206007, NTS, CEI 0-16, CEI O-021, AS/NZS 4777.2, NBR16149, NBR 16150 VDE-AR-N 4105, VDE 0126-1-1			

3.

INSTALLATION
instruction

3.1 Safety Instructions

DANGER

- Dangerous 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 perfor med 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.

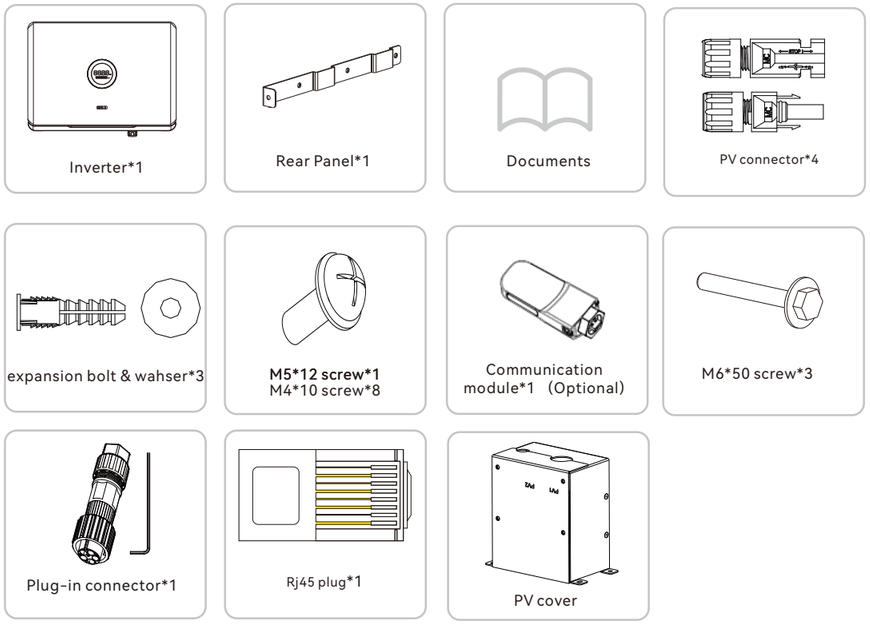
3.2 Pre-installation Check

3.2.1 Check the Package

Although SAJ's inverters have thoroughly tested and checked before delivery, it is uncertain that the inverters may suffer damages during transportation. Please 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

Please contact after sales if there is missing or damaged components.



The documents include the user manual, quick installation guide and packaging list.

3.3 Determine the 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.

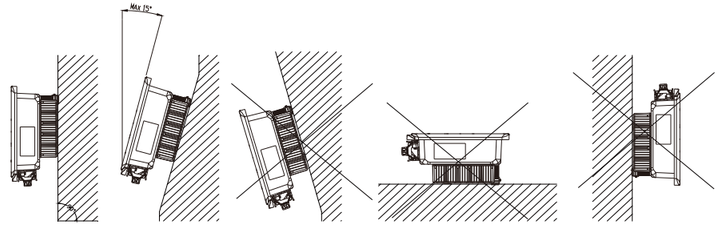


Figure 3.1
Mounting Method

(3)Considering convenience for maintenance, please install the equipment at eye level.

(4) When mounting the inverter, please consider the solidity of wall for inverter, including accessories, make sure the wall has enough strength to hold the screws and bear the weight of products. Please ensure the mounting bracket mounted tightly.

Ensure air circulation at the installation point. If several units are installed in the same area, the installation clearance requirements as shown in Figure 3.2 should be followed in order to provide suitable air circulation conditions for the unit.

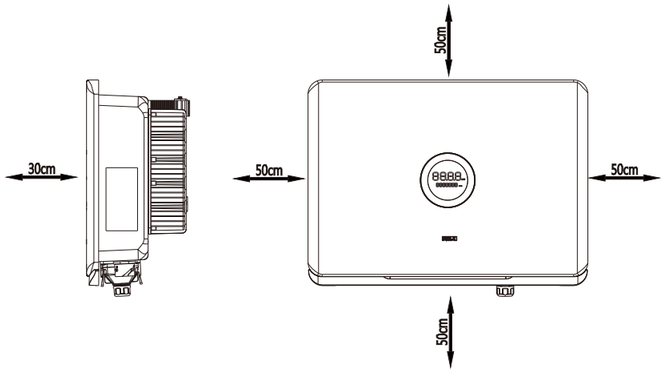


Figure 3.2
Mounting Clearance

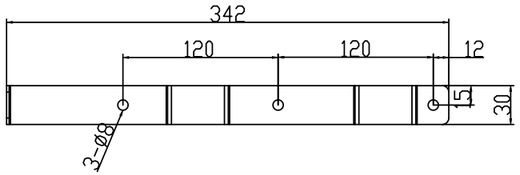
Installation Environment Requirements

- The installation environment must be free of inflammable or explosive materials.
- Install the device away from heat source.
- 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, lounge, living room, study, toilet, bathroom, theater and attic.
- When installing the device at the garage, please keep it away from drive way.
- Keep the device from water sources such as taps, sewer pipes and sprinklers to prevent water seepage.
- The product is to be installed in a high traffic area where the fault is likely to be seen.

Note: When installing outdoors, the height of the device from the ground should be considered to prevent the device from soaking in water. The specific height is determined by the site environment.

3.4 Mounting Procedure

(1) The mounting position should be marked as below.



Unit: mm

Figure 3.3
Hanging plate size

(2) Drill holes and fix screw fixing seat

Follow the given guides, drill 3 holes in the wall (in conformity with position marked in Figure3.4), and then place expansion tubes in the holes using a rubber mallet.

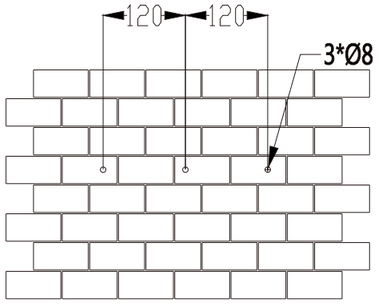


Figure 3.4
Drilling holes position

(3) Fix screw and hanging plate

Fix the hanging plate in the installation position with M6*50mm hexagon screw as shown in Figure 3.5.

Unit: mm

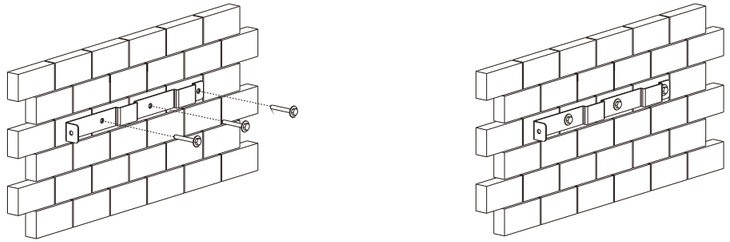


Figure 3.5
Securing the plate

(4) Mount the inverter

Carefully mount the inverter to the mounting bracket. Make sure that the rear part of the equipment is closely mounted to the mounting bracket.
Then fix the inverter and hanging plate with M5*12mm external hexagon screw.

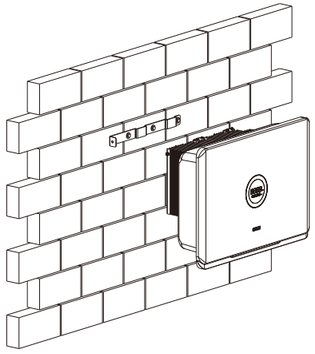


Figure 3.6
Mounting inverter

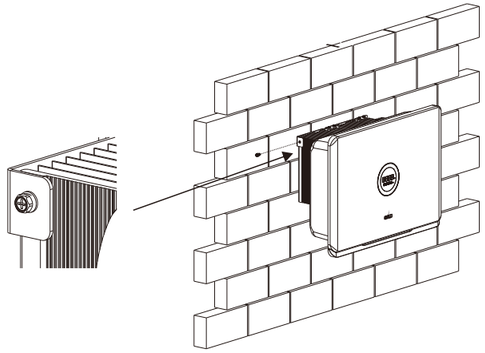


Figure 3.7
Securing the screws

4.

ELECTRICAL
connection

4.1 Safety Instruction

Electrical connection must only be operated on by professional technicians. Please keep in mind that the inverter is a bi-power supply equipment. Before connection, necessary protective equipment must be employed by technicians including insulating gloves, insulating shoes and safety helmet.

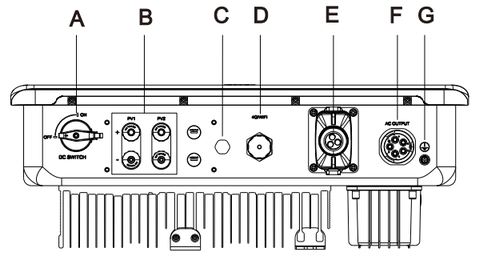
DANGER

- Dangerous to life due to potential fire or electricity shock.
- When power-on, the equipment should 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 in conformity with proper stipulations, such as stipulations for cross-sectional area of conductors, fuse and ground protection.
- The overvoltage category on DC input port is II, on AC output port is III.
- When connecting or disconnecting any connectors, make use to use appropriate tools to avoid damage.

4.2 Specifications for Electrical Interface



Code	Name
A	DC Switch
B	DC Input
C	Relief Valve
D	RS232 Communication (Wi-Fi/ 4G)
E	RS485 Communication+ DRM
F	AC Output
G	Grounding port

Table 4.1
Interface specification

4.3 AC side electrical connection

Please install a 4P circuit breaker to ensure the inverter is able to disconnect from 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 B RCD is compatible with the inverter.
The integrated leakage current detector of inverter is able to detect the real time external current leakage. When a leakage current detected exceeds the limitation the inverter will be disconnected from grid quickly, if an external leakage current device is connected, the action current should be 300mA or higher.

Table 4.2
AC circuit breaker specifications are recommended

Type	AC circuit breaker specifications
R6-3K/4K/5K/6K-T2-AUS	16A
R6-8K/10K-T2-AUS	20A
R6-12K/15K-T2-AUS	32A

Table 4.3
Recommended AC cable specification

Type	Cross-sectional area of cables (mm^2)	
	Scope	Recommended value
R6-3-15K-T2-AUS	4.0-6.0	6.0

If the grid-connection distance is too far, please select AC cable with larger diameter as per the actual condition.

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

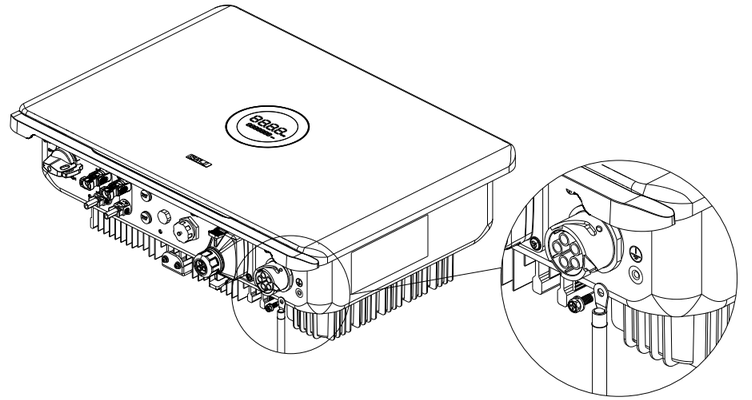


Figure 4.2
Inverter ground protection

Note: Recommended conductor cross-sectional area of additional grounding cable is 6-10mm^2.

(2) Take the outdoor five-core cable, peel off 50mm of the outer skin, and expose 10mm of the single-strand core. Then pass the AC wire through the AC waterproof sheath.

Figure 4.3
AC Cable Connection

(3) When connecting cables, the AC cables should be tightened and fixed with a hex wrench according to the wiring labels L1, L2, L3, N and PE .

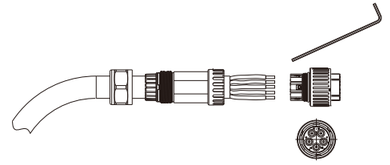


Figure 4.4
Connect AC cables to AC connectors

(4) After checking the wiring, tighten the waterproof gland of AC connector respectively.

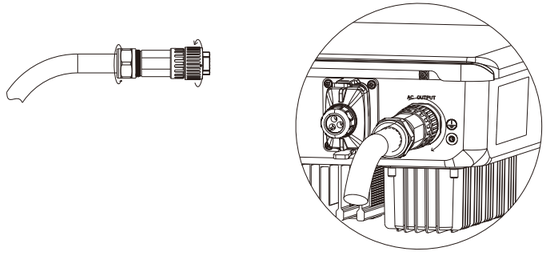


Figure 4.5
AC connector installation

4.3.1 Earth Fault Alarm

This inverter complies with IEC 62109-2 clause 13.9 for earth fault alarm monitoring. If an Earth Fault Alarm occurs, the ring light will be lit up in red and error code <31> will be displayed on LED panel 1 until the error being solved and inverter functioning properly.
Note: The inverter cannot be used with functionally earthed PV Arrays.

4.3.2 Multiple Inverter Combinations

Section Multi-inverter combinations. A maximum of 10 inverters can be paralleled. If such multiple inverter combination is not tested, it should not be used or external devices should be used in accordance with the requirements of AS/NZS 4777.1

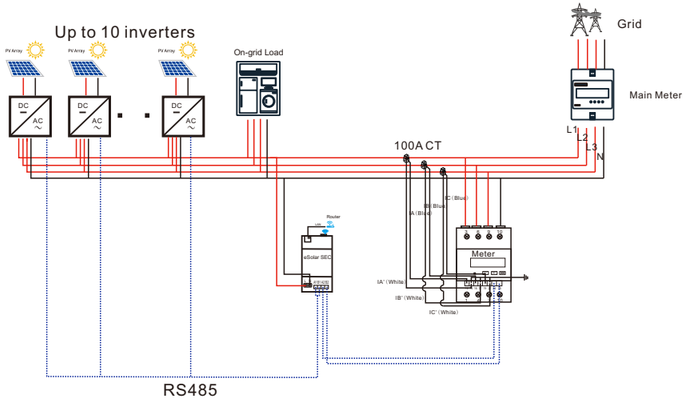


Figure 4.6
Multiple Inverter Combinations

4.4 DC Side Connection

WARNING

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

Table 4.4
Recommended specifications of DC cables

Cross-sectional area of cables（mm²）		Outside diameter of the cables（mm）
Scope	Recommended value	
4.0~6.0	4.0	4.2~5.3

DC connector is made up of one positive connector and one negative connector

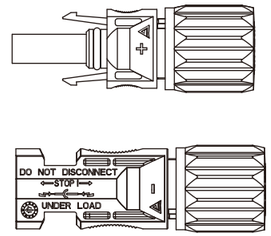


Figure 4.7
Positive /Negative connector

NOTICE

· Please place the connector separately after unpacking in order to avoid confusion for connection of cables.
· Please 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 right position.

Connecting Procedures:

1. Loosen the lock screws on positive and negative connector.
2. Strip the insulation of the positive and negative cables with 8-10mm length.

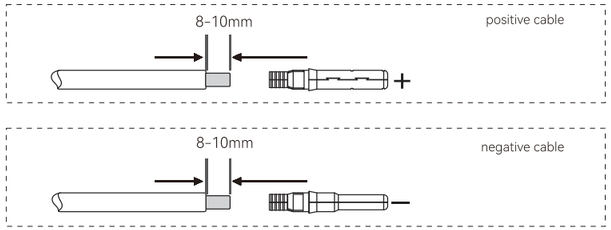


Figure 4.8
Striping off the insulation skin of cables

3.Assembly the positive and negative cables with corresponding crimping pliers.

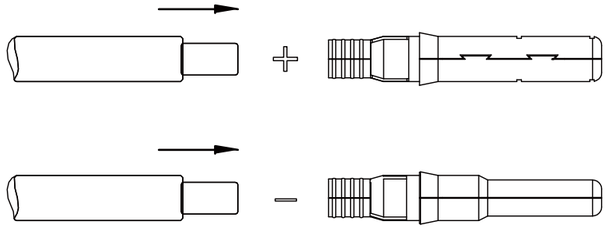


Figure 4.9
Inserting cables to lock screws

4.Insert the positive and negative cable into positive and negative connector. Gently pull the cables backward to ensure firm connection.

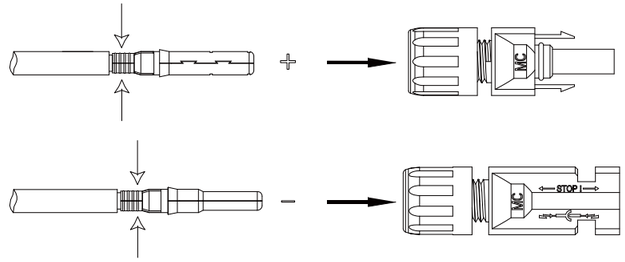


Figure 4.10
Inserting crimped cables to connectors

5. Fasten the lock screws on positive and negative connectors.

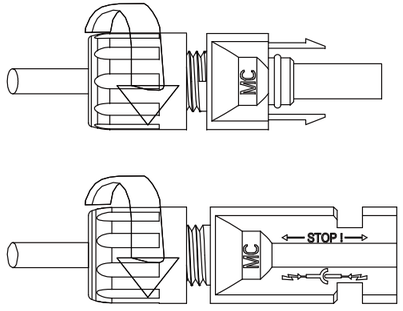


Figure 4.11
Securing the connectors

6.Make sure the DC switch is at OFF position. For further safety consideration, it is suggested that a reliable tool (such as a lock with a key) be used to lock the switch and make sure that others cannot unlock it easily.

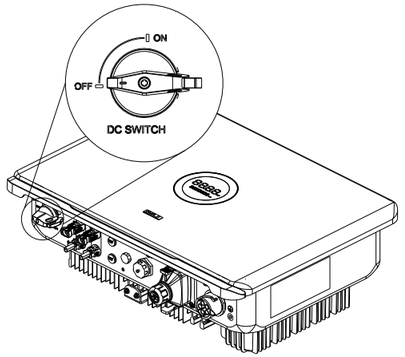


Figure 4.12
DC switch

7.Connect the positive and negative connectors into positive and negative DC input terminals of the inverter, a “click” should be heard or felt when the contact cable assembly is seated correctly.

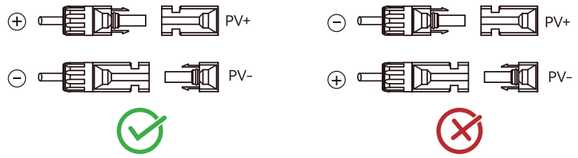


Figure 4.13
Plug in PV connectors

NOTICE

· Before insert the connector into DC input terminal of the inverter, please make sure that the DC switch of the inverter is OFF.
· Please use the original terminal to install.

4.5 Communication Connection

R6 inverter is standardly equipped with a RS485 interface, a DRM interface and a RS232 interface

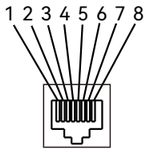


Figure 4.9
RS485 pin

Table 4.6
RS485 pin port definition

Pin Number	Description	Effect
1	NC	
2	NC	
3	NC	
4	NC	
5	NC	
6	NC	
7	RS485-A	Transmission RS485 differential signal
8	RS485-B	Transmission RS485 differential signal

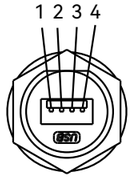


Figure 4.10
RS232 pin

Table 4.5
USB pin port definition

Pin Number	Description	Effect
1	+5V	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. A RJ45 plug is being used as the inverter DRED connection.

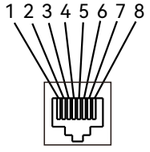


Figure 4.11
DRM pin

Table 4.6
Demand Response Modes (DRM)

Pin NO.	Name
1	NC
2	NC
3	NC
4	NC
5	REF GEN
6	COM LOAD
7	NC
8	NC

Table 4.7
DRM0 mode

Mode	Corresponding pins	Requirement
DRM0	5 & 6	The inverter is on standby mode

Proceed as follow to connect the RS485 cables to the inverter
1.(Optional) The RS485 cable is prepared by user. It is recommended to strip the RS485 cable and Ethernet wire insulation. Insert the stripped Ethernet wires in correct order into the RJ45 plug (please refer to fig 5.14 and table 5.5 for order) and crimp it with a crimper.

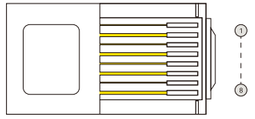


Figure 4.12
RJ45 plug

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

Figure 4.13
Inserting cables

3.Install the rubber seal onto cables

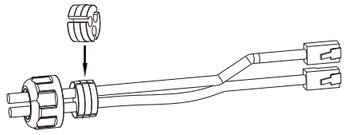


Figure 4.14
Inserting rubber seal

4.Insert the RJ45 cables into the corresponding ports

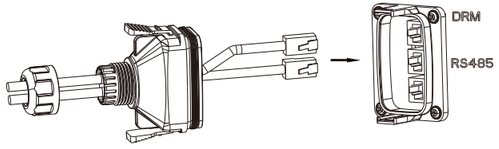
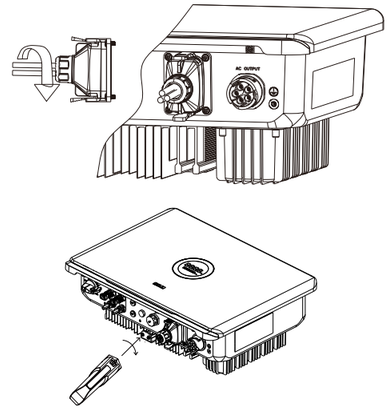


Figure 4.15
Inserting RJ45 cables

Figure 4.16
Inserting RJ45 cables

Figure 4.17
Installing communication module

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



Plug in the communication module to 4G/WIFI port and secure the module by rotating the nut.

1. USB interface could be externally connected with eSolar AIO3 module, for operation in details please refer to eSolar AIO3 module Quick Installation Guide in https://www.saj-electric.com/.

2. USB interface could be externally connected with eSolar 4G module, for operation in details please refer to eSolar 4G module Quick Installation Guide in https://www.saj-electric.com/.

3. USB interface could be externally connected with eSolar WiFi module, for operation in details please refer to eSolar WiFi module Quick Installation Guide in https://www.saj-electric.com/.

Install the PV cover on the PV port, secure it with screws.

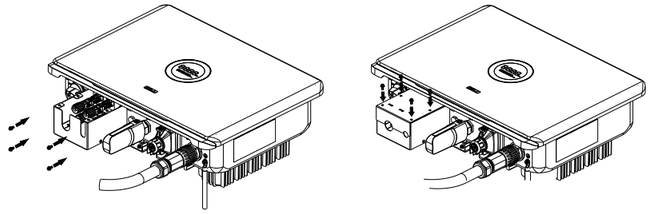


Figure 4.18
Installing the PV cover

4.6 Start up and Shut down Inverter

4.6.1 Start Up the Inverter

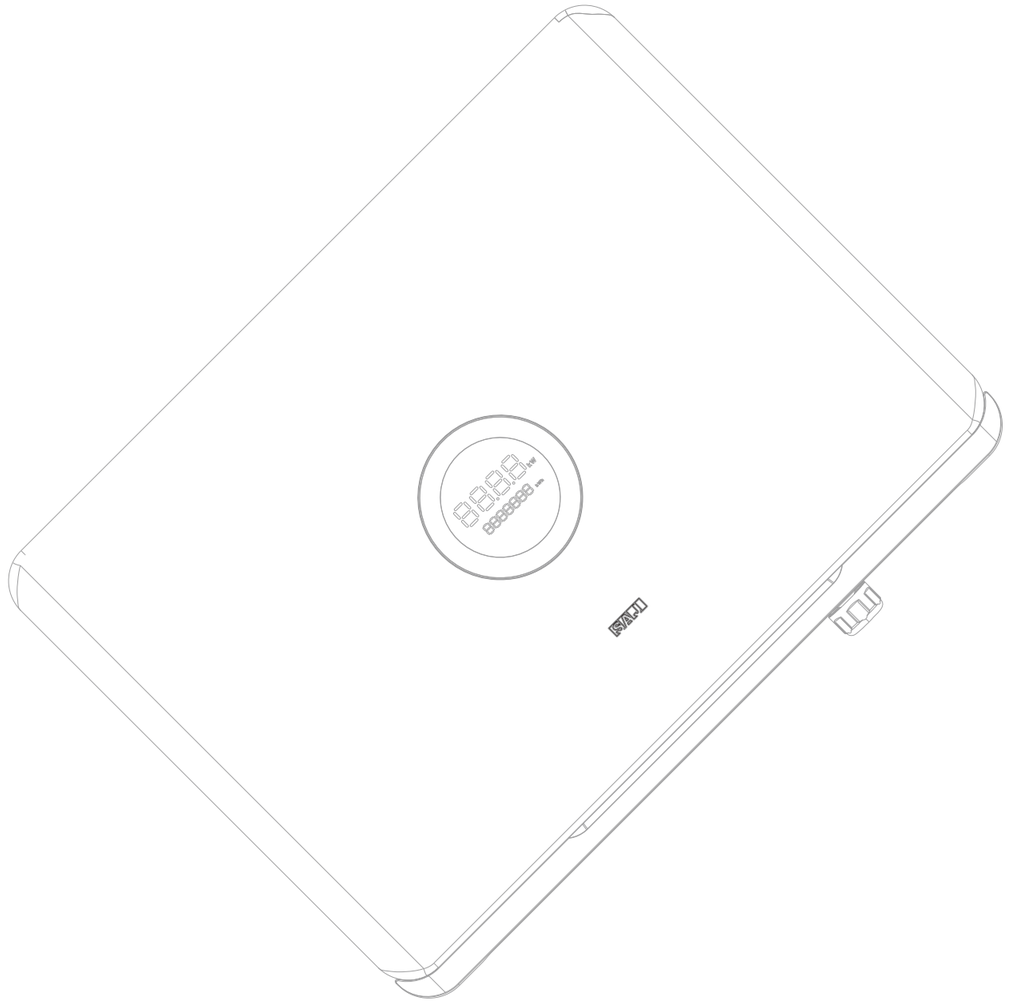
1. Follow the installation standard from previous chapter strictly to connect the photovoltaic panels and AC power grid to inverter.
2. Using multimeter to check whether AC side and DC side voltage have met the inverter start voltage.
3. Turn ON DC switch (if applicable), LED indicators will be lit up.
4. Select country grid code through the APP（See Chapter 5 Monitoring Operations）, please contact your local grid operator for which region toselect. Inverter will be in self-testing , if inverter has met all the grid connecting condition, inverter will connect to grid and generate power automatically.

4.6.2 Shut Down the Inverter

1. Automatically shut down, when the solar light intensity is not strong enough during sunrise and sunset or the output voltage of photovoltaic system is less than the minimum input power of inverter, inverter will shut down automatically.
2. Shut down manually, disconnect AC side circuit breaker first, if multiple inverters are connected, disconnect the minor circuit breaker prior to disconnection of main circuit breaker. Disconnect the DC switch after inverter has reported grid connection lost alarm.

4.7 AFCI (Optional)

The inverter is equipped with 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, R6 series can quickly detect and cut off the power to prevent fire, making the PV system run more safely.



5.

DEBUGGING
instructions

5.1 Introduction to man-machine Interface

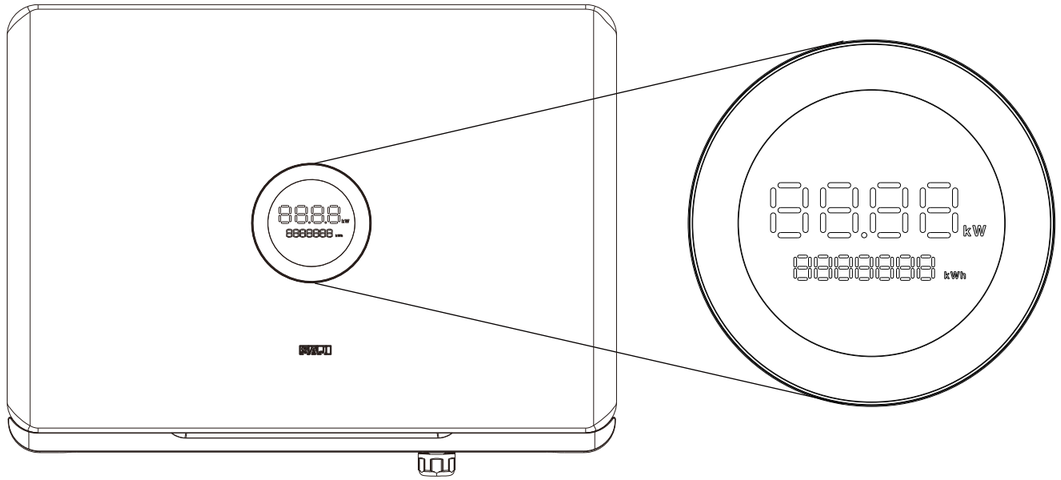


Figure 5.1
Human-Machine Interface

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	8888.w / E036		Current power (kW) / Error code
LED Panel 2	8888888 kWh		Total yield (kWh)

Talbe 5.1
Interface description

5.2 Monitoring Operation

- R6 series products could be monitored through eSolar APP.
- This equipment is standardly equipped with a USB interface which could transfer AIO3/4G module and Wi-Fi module to monitor running state of the equipment.

5.2.1 APP Introduction

eSAJ Home could achieve communication with the equipment via Bluetooth, Ethernet, Cellular network and Wi-Fi and it is an APP for nearby and remote monitoring.

Download eSAJ Home APP

iOS system: search for "eSAJ Home" in App Store and download this App..

Android system: search for "eSAJ Home" in Google play and download this App.

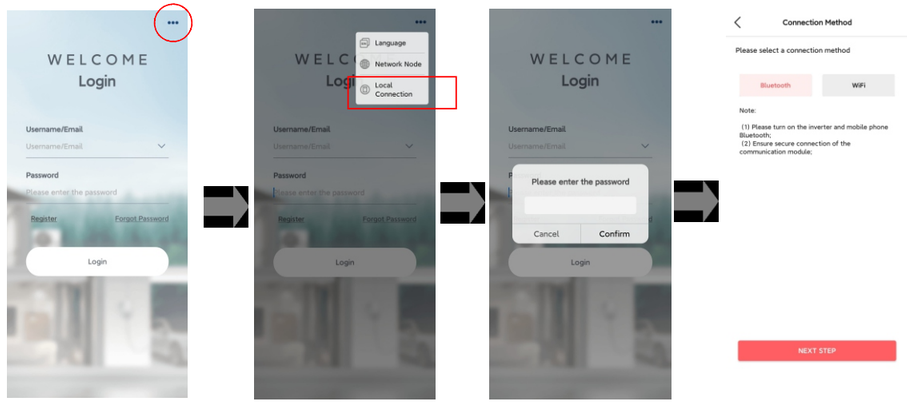
Account---Please use the installer account to login.

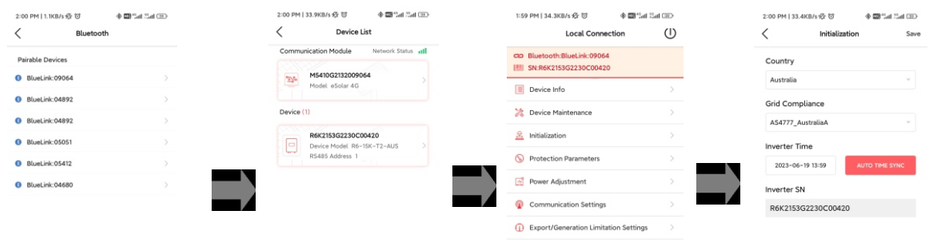
5.2.2 Local connection

Bluetooth connection

After installing the eSolar AIO3/4G/WiFi module, the mobile phone could be directly connected with the inverter via Bluetooth.

Step 1: Open eSAJ APP and click on the dot icon on the top right corner
Step 2: Select "Local Connection"
Step 3: Enter password "123456"
Step 4: Click on "Bluetooth" and activate the Bluetooth function on your phone, then click on "Next"
Step 5: Choose your inverter according to your inverter SN's tail numbers
Step 6: Click on the inverter to enter inverter setting
Step 7: Select the corresponding country and grid code for





5.2.3 Account Login

Step 1: Log in to eSAJ Home, if you do not have an account, please register first.

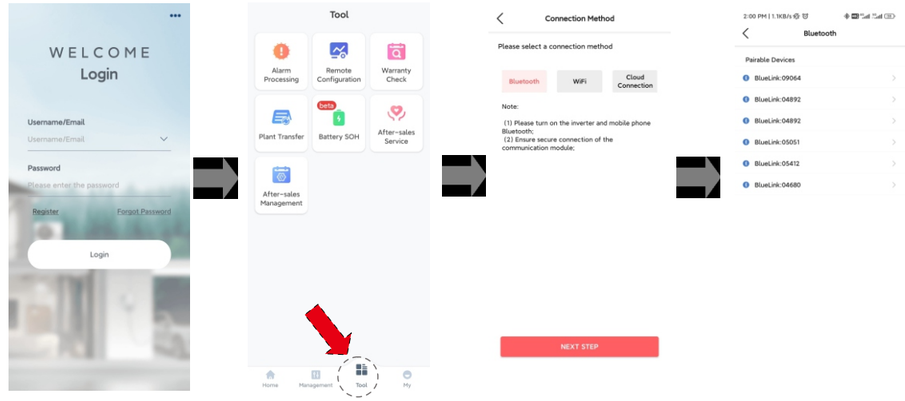
Step 2: Go to the “Tool” interface and select “Remote Configuration”

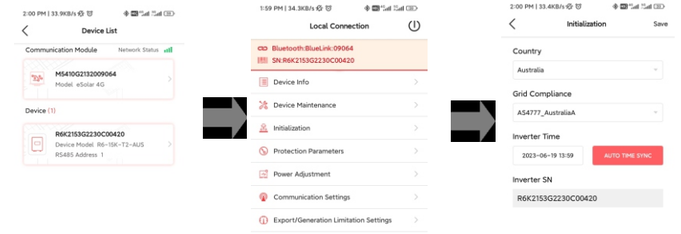
Step 3: Click on “Bluetooth” and activate the Bluetooth function on your phone, then click on “Next”

Step 4: Choose your inverter according to your inverter SN's tail numbers

Step 5: Click on the inverter to enter inverter setting

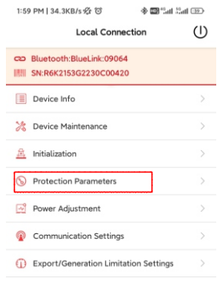
Step 6: Select the corresponding country and grid code for

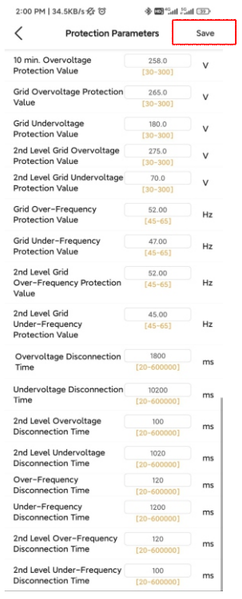


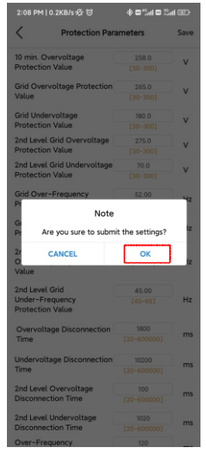


5.2.4 Protection Parameter Setting

Corresponding modification of protection parameter will take effect only after saving.

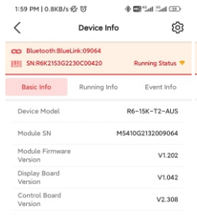


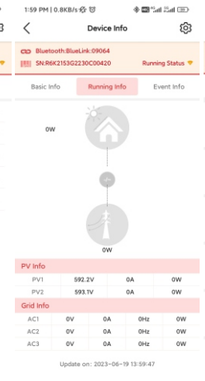


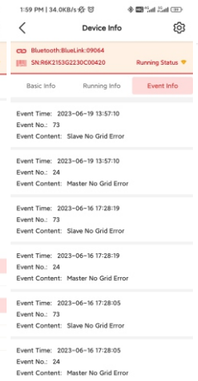


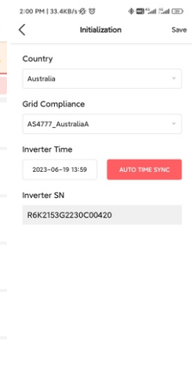
5.2.5 Inverter Setting Review

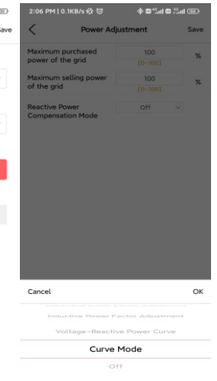
After commissioning, the device info including device basic info, running info and event info can be viewed. Country and grid code can be viewed from initial setting.











5.2.6 Remote Monitoring

Connect the internet via the eSolar/4G/WiFi module, and upload the inverter data onto the server and customers could monitor running information of the inverter remotely via the eSolar Web Portal or their mobile customer terminals.

5.3 Export Limit Setting

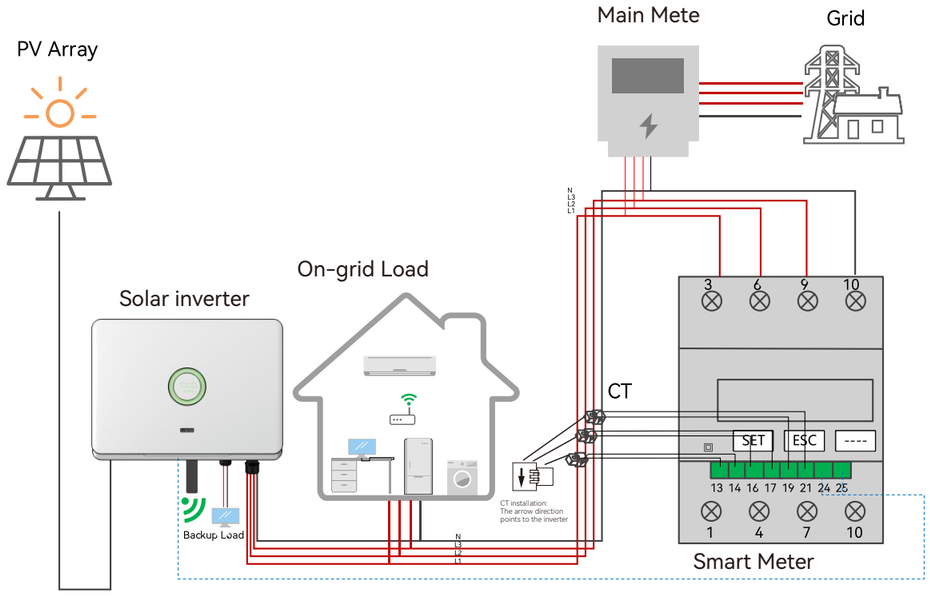
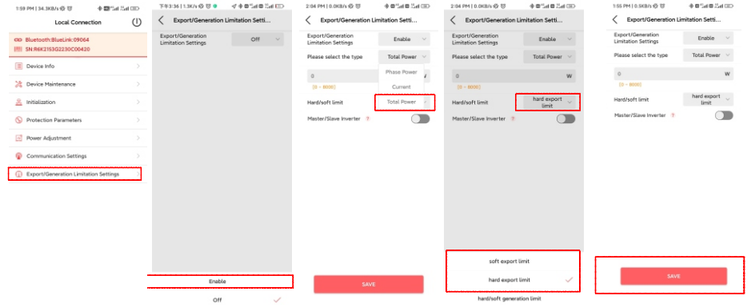


Figure 5.4
Export limit wiring schematic

5.3.1 APP Setting

Enter the main page of local connection and click on Export limitation setting, enter the password “201561”.



Step 1: click Export/Generation Limitation Settings.
Step 2: Enable Export Limit.
Step 3: choose "Total Power"
Step 4: click Hard/soft Limit Select control mode.
Step 5: Click "SAVE" Save Settings.

5.4 Self-test

(For Italy)

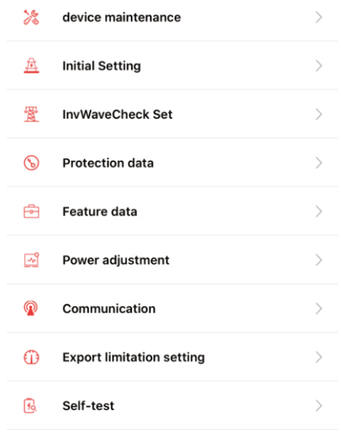
Italian Standard CEI0-21 requires a self-test function for all inverter that connected to utility grid. During the self-testing time, inverter will check the reaction time for over frequency,under frequency, overvoltage and undervoltage. This self-test is to ensure the inverter is able to disconnect from grid when required. If the self-test fails, the inverter will not able to feed into the grid.

Step 1:

Connect a communication module (Wi-Fi/ 4G/ Ethernet) with inverter (connection procedure can refer to eSolar Module Quick Installation Manual)

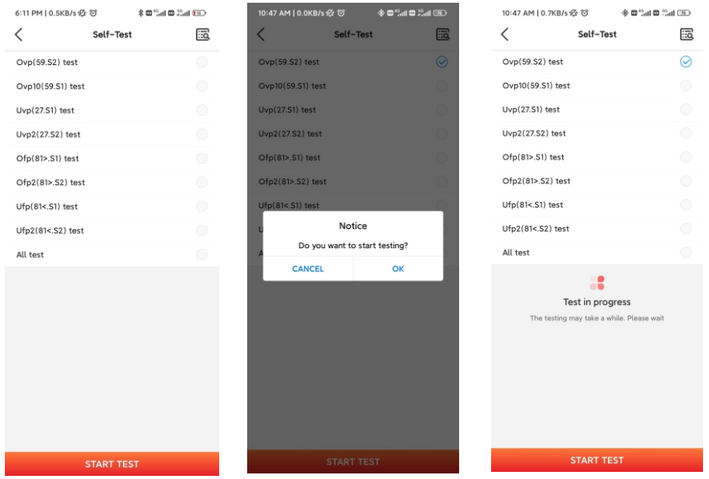
Step 2:

Select Italy for Country and choose your corresponding Grid Code from Initial Setting.



Step 3:Start Self-test

You can choose self-test item required. Individual self-test time is approx. 5 minutes. All self-test time is approx. 40 minutes. After the self-test is completed, you can save the test report. If self-test is failed, please contact with SAJ or your inverter supplier.

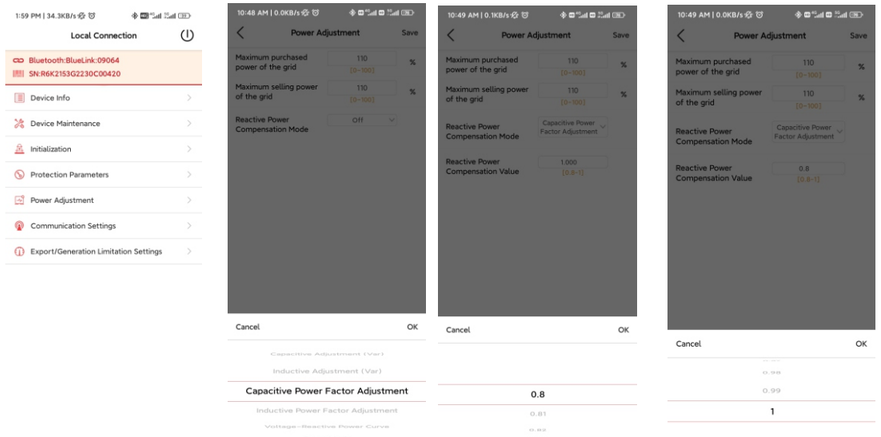


5.5 Setting Reactive Power Control

(For Australia)

5.5.1 Setup Fixed Power Factor Mode & Fixed Reactive Power Mode

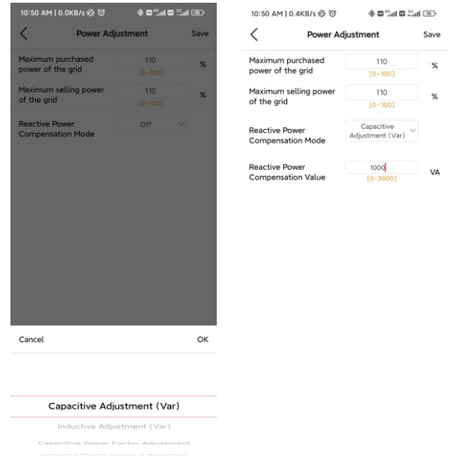
Fixed Power Factor Mode



Step 1: Select Power Adjustment and enter password “201561”.

Step 2: Select Capacitive Power Factor or Inductive Power Factor according to your local grid regulation.The power factor range is from 0.8 leading ~ 0.8 lagging.

Fixed Reactive Power Mode



Step 1: Select Inductive Adjustment Var or Capacitive Var according to your local grid regulation.

The power range is from -60%Pn~60%Pn.

5.5.2 Setup 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. e.g.: AS4777 series setting as below Fig 5.5&5.6.

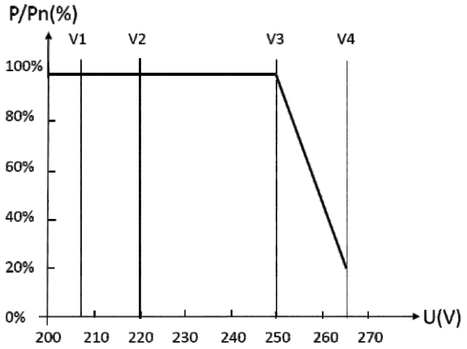


Figure 5.5
Curve for a Volt-Watt response mode (AS4777 Series)

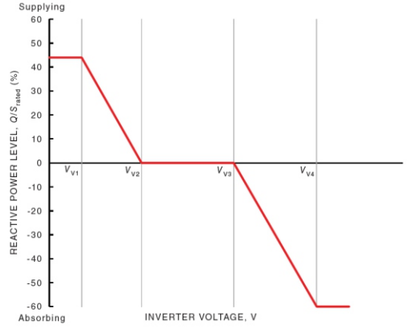
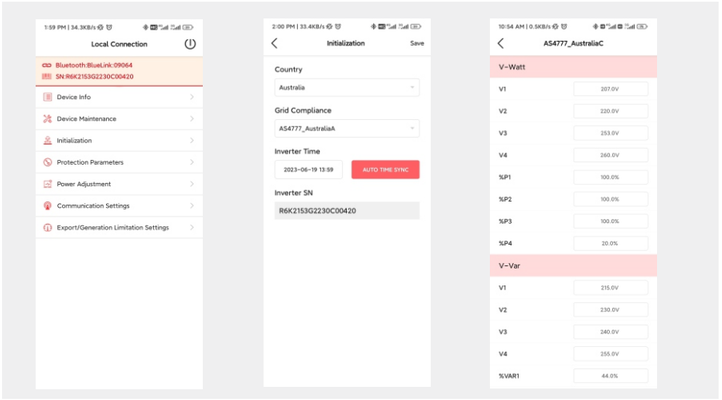


Figure 5.6
Curve for a Volt-Var control mode (AS4777 Series)

Setting procedure:

1.AS4777 grid compliance has been set during production, please select corresponding grid compliance according to state regulation during installation. You can choose a state regulation compliance with your local grid via eSAJ Home.

2. Log in to eSAJ Home , click “Local Connection”, for connection procedure please refer to chapter 5.2.2 Nearby monitoring.
3. Click “V-Watt/V-Var” to enter DNSPs settings, choose a suitable state regulation from the drop down list.



Note:

With regard to the Power rate limit mode, SAJ sets the product WGra to 16.67%Pn by default in the following cases according to the requirements of 3.3.5.2 as 4777.2: 2020.

1. Soft ramp up after connect.
2. Reconnect or soft ramp up/down following a response to frequency disturbance.

6.

Fault Code
& Troubleshooting

Troubleshooting

Code	Fault Information
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	Fault Information
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 Grid Meter
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	Slave PV Input Mode Error
75	Slave HW PV Curr High
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

Talbe 6.1
Error Code

Code	Fault Information
85	Authority expires
86	DRM0 Error
87	Master Arc Error
88	Master SW PV Current High

Please contact your supplier for troubleshooting and remedy

General troubleshooting methods for inverter are as follows:

Fault Information	Troubleshooting
Relay Error	If this error occurs frequently, please contact your distributor or call SAJ technical support.
Storer Error	If this error occurs frequently, please 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 is in normal, please contact your distributor or call SAJ technical support.
Master Lost Communication	If this error occurs frequently, please contact your distributor or call SAJ technical support.
GFCI Devices Error	If this error occurs frequently, please contact your distributor or call SAJ technical support.
DCI Devices Error	If this error occurs frequently, please contact your distributor or call SAJ technical support.
Current Sensor Error	If this error occurs frequently, please contact your distributor or call SAJ technical support.
AC Voltage Error	· Check the volt. of the grid · Check the connection between the inverter and the grid. · Check the settings of the on-grid standards of the inverter. · If the volt. of the grid is higher than the volt. regulated by local grid, please inquire the local grid workers whether they can adjust the volt. at the feed point or change the value of the regulated volt. · If the volt. of the grid is in regulated range as allowed and LCD still in this error, please contact your distributor or call SAJ technical support.

Talbe 6.2
Troubleshooting

Fault Information	Troubleshooting
Frequency Error	Check the setting of country and check the frequency of the local grid. If the above mentioned are in normal, please 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 above mentioned are in normal, please 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 in normal, please contact your distributor or call SAJ technical support.
DCI Error	If this error exists always, please 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. If the above mentioned are in normal, please 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. SAJ designer can help you. If the above mentioned are in normal, please contact your distributor or call SAJ technical support.
PV Overcurrent	If this error always exists, please contact your distributor or call SAJ technical support.
PV Voltage Fault	Check the settings of the solar panel. SAJ designer can help you. If the above mentioned are in normal, please contact your distributor or call SAJ technical support.
Lost Communication	Check the connection of communication cables between control board and display board. If the above mentioned are in normal, please 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 content mentioned as above is normal, please contact your distributor or call SAJ technical support.

7.

Transportation & Disposal

7.1 Transportation

Take care of the product during transportation and storage, keep less than 7 cartons of inverter in one stack.

7.2 Recycling and Disposal

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

8.

ROUTINE MAINTENANCE

Inverter Cleaning

Clean the enclosure lid and LED indicator of the inverter with moistened cloth with clear water only. Do not use any cleaning agents as it may damage the components.

Heat Sink Cleaning

Clean the heat sinks with dry cloth or air blower. Do not clean the heat sink with water or cleaning agents. Make sure there is enough space for ventilation of inverter.