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R6 Series

SOLAR INVERTER USER MANUAL

R6-5~10K-S2-X R6-5~10K-S3

Preface

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

This manual includes information for installation, operation, maintenance, trouble shooting and safety. Please follow the instructions of this manual so that we can ensure delivery of our professional guidance and wholehearted service.

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

Please check for the latest version at www.saj-electric.com

Guangzhou Sanjing Electric Co., Ltd.



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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:

R6-5K-S2-X; R6-6K-S2-X; R6-7K-S2-X; R6-8K-S2-X; R6-9K-S2-X; R6-10K-S2-X

R6-5K-S3; R6-6K-S3; R6-7K-S3; R6-8K-S3; R6-9K-S3; R6-10K-S3

1.2 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.

1.3 Target Group

Only qualified electricians who have read and fully understood all safety regulations contained in this manual can install, maintain and repair the inverter. Operators must be aware of the high-voltage device.

1.

SAFETY PRECAUTIONS



2.

PREPARATION



2.1 Safety Instructions

 DANGER
· There is possibility of danger to life due to electrical shock and high voltage. · Do not touch non-insulated parts or cables. · Disconnect the inverter from voltage sources and make sure it cannot be reconnected before working on the device. · Do not disconnect the DC connector under load. · Do not touch the live parts and cables inside the inverter during operation, 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 disconnected. · 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.

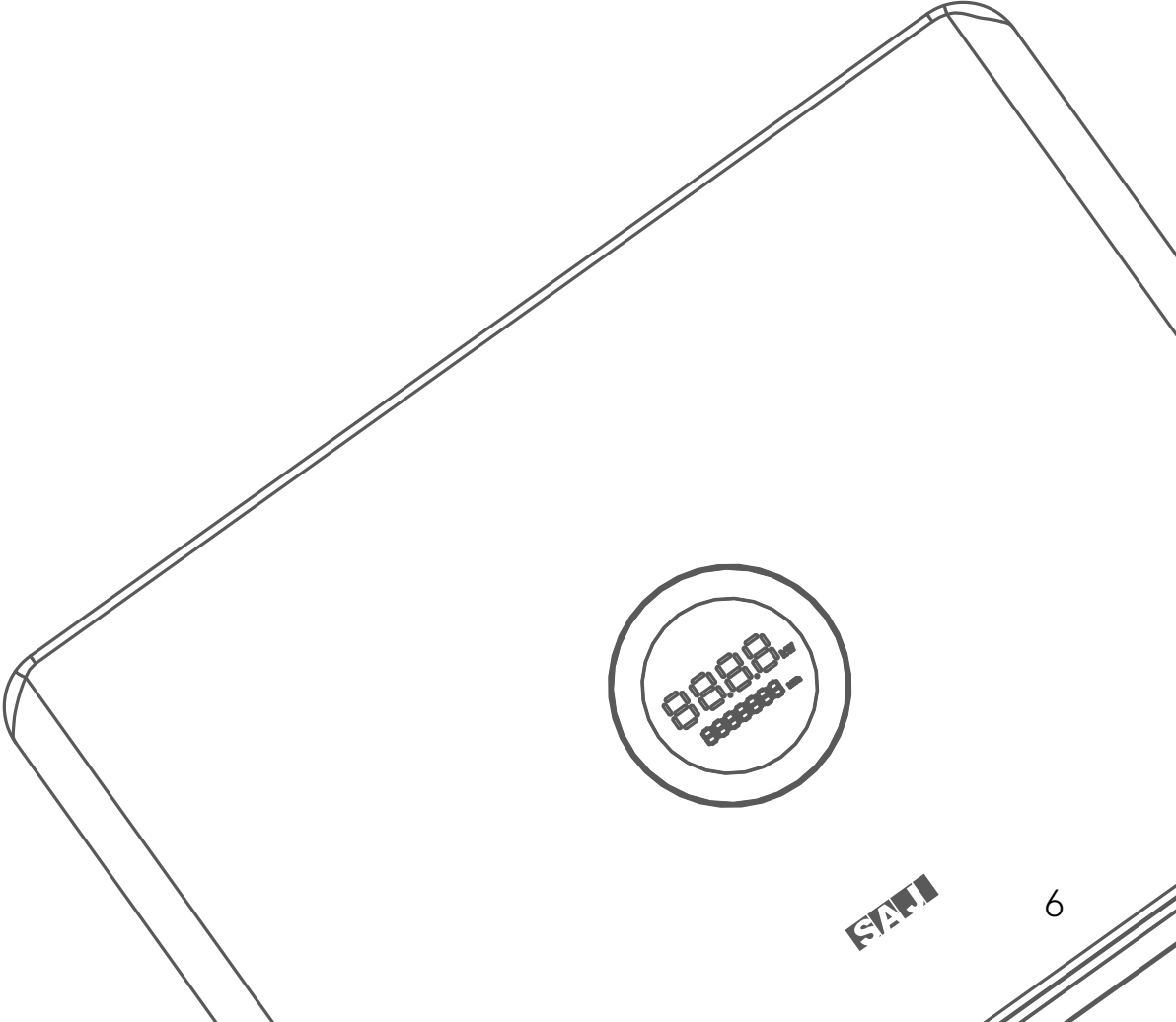
 WARNING
Danger to life due to fire or explosion · In the event of fault, do not conduct any direct action on the inverter. · Disconnect PV array from inverter via an external disconnection device. If there is no external disconnection device present, wait until no more DC power is applied to the inverter. · Disconnect the AC circuit breaker, or keep it disconnect if it is tripped, and secure it against reconnection. · Do not touch non-insulated parts or cables. · Do not touch non-insulated parts or cables. · 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 enclosure will become hot during operation. Please do not touch the heat sink or enclosure during 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.

2.2 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 for 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 7 “Troubleshooting” to remedy the error.
	This device shall not be disposed of in residential waste Please go to Chapter 8 “Recycling and Disposal” for proper treatments.
	CE Mark Equipment with the CE mark 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.



3.

PRODUCT INFORMATION



3.1 Application Scope of Products

R6 series product is grid-tied single phase inverter without transformer. The product 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 3.1 shows the structural diagram of the typical application system of R6 inverter.

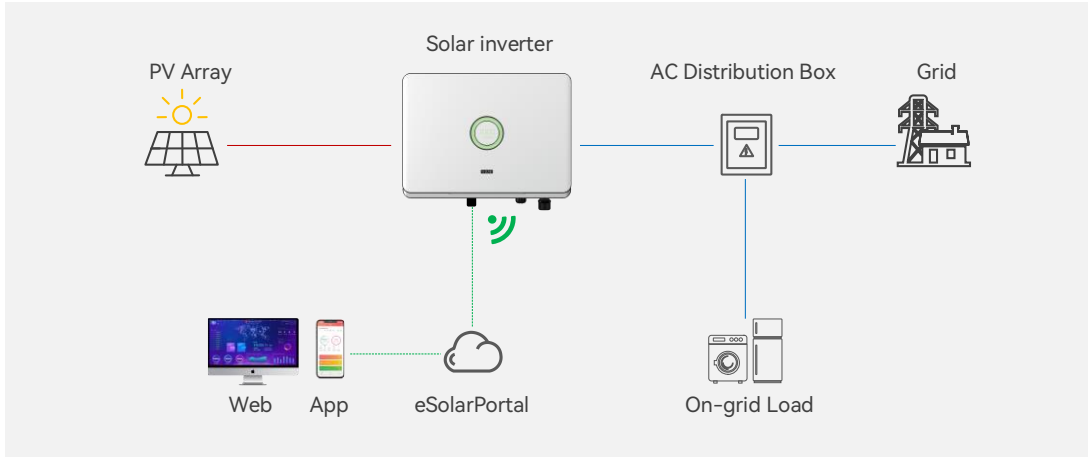


Figure 3.1
R6 series application

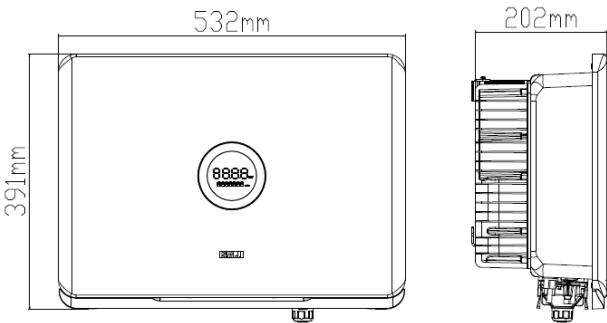
3.2 Specification for Product Model

R6 – XK – S3
① ② ③

- ① R6 represents for product name.
- ② XK represents rated power XkW of inverter, for example, 10K means 10kW.
- ③ S means single phase; 3 represents the inverter has the function of three MPPT.

3.3 Overview of ProductsI

Figure 3.2
Dimensions of R6-5-10K-S3



3.4 Datasheet

Model	R6-5K-S3	R6-6K-S3	R6-7K-S3	R6-8K-S3	R6-9K-S3	R6-10K-S3
DC Input						
Max. PV Array Power [Wp]@STC	7500	9000	10500	12000	13500	15000
Max. DC Voltage [V]	600					
MPPT Voltage Range [V]	90-550					
Rated DC Voltage [V]	360					
Start Voltage [V]	100					
Min. DC Voltage [V]	80					
Max. DC Input Current [A]	16/16/16					
Max. DC Short Circuit Current [A]	19.2/19.2/19.2					
No. of Strings per MPPT	1/1/1					
No. of MPPT	3					
DC Switch integrated	Integrated					
AC Output [On-grid]						
Rated AC Power [W]	4999	6000	7000	8000	9000	10000
Rated Apparent Power [VA]	4999	6000	7000	8000	9000	10000
Max. Apparent Power [VA]	4999	6600	7700	8800	9900	10000
Max. AC Current [A]	21.7	30.0	35.0	40.0	45.0	45.5
Current Inrush [A]	30					
Max. AC Fault Current [A]	65		100			
Max. AC Over Current Protection [A]	53		76			
Rated AC Voltage	L+N+PE , 220, 230,240;180-280					
Rated Output Frequency [Hz]	50, 60 / 44-55, 54-65					
Power Factor [cos ϕ]	0.8leading ~ 0.8lagging					
Total Harmonic Distortion [THDi]	< 3%					
Efficiency						

Model	R6-5K-S3	R6-6K-S3	R6-7K-S3	R6-8K-S3	R6-9K-S3	R6-10K-S3
Max. Efficiency	98.2%	98.2%	98.2%	98.2%	98.2%	98.2%
Euro Efficiency	97.8%	97.8%	97.8%	97.8%	97.8%	97.8%
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					
DC Surge Protection	Type II					
AC Surge Protection	Type III (type II optional)					
Overheat Protection	Integrated					
Anti-islanding Protection	AFD					
AFCI Protection	Optional					
Interface						
AC Connection	Quick connector					
DC Connection	MC4/H4					
Display	LED+APP					
Communication Port	RS232+RJ45+DRM					
Communication	Wi-Fi/Ethernet/4G/PLC (optional)					
Load Monitoring	Whole day (optional)					
General Data						
Topology	Non-isolated					
Consumption at Night [W]	<1					
Consumption at Standby [W]	<8					
Operating Temperature Range	-40℃ ~ +60℃ (>45℃ derating)					
Cooling Method	Natural convection					
Ambient Humidity	0% ~ 100%					
Altitude	4000m (>3000m derating)					
Noise [dBA]	<35					
Ingress Protection	IP65					
Mounting	Wall mounting					
Dimensions [H*W*D] [mm]	391*532*202					
Weight [kg]	17.3	17.3	18	18	18	18
Warranty [Year]	5 (Standard) /10/15/20 (Optional)					
Applicable Standard	IEC/EN62109-1/2, EN61000-6-1/2/3/4, IEC61683, IEC60068-2, IEC62116, IEC61727, EA/MEA,VDE0126-1-1/A1, CEI 0-21, VDE-AR-N 4105, AS/NZS4777.2, CQC NB/T 32004, G98/G99, NBR 16149, NBR 16150, C10/11,RD1669,UNE206006, UNE206007,EN50438					

Model	R6-5K-S2-X	R6-6K-S2-X	R6-7K-S2-X	R6-8K-S2-X	R6-9K-S2-X	R6-10K-S2-X
DC Input						
Max. PV Array Power [Wp]@STC	7500	9000	10500	12000	12000	12000
Max. DC Voltage [V]	600					
MPPT Voltage Range [V]	90-550					
Rated DC Voltage [V]	360					
Start Voltage [V]	100					
Min. DC Voltage [V]	80					
Max. DC Input Current [A]	16/16					
Max. DC Short Circuit Current [A]	19.2/19.2					
No. of Strings per MPPT	1/1					
No. of MPPT	2					
DC Switch integrated	Integrated					
AC Output [On-grid]						
Rated AC Power [W]	4999	6000	7000	8000	9000	10000
Rated Apparent Power [VA]	4999	6000	7000	8000	9000	10000
Max. Apparent Power [VA]	4999	6600	7700	8800	9900	10000
Max. AC Current [A]	21.7	30.0	35.0	40.0	45.0	45.5
Current Inrush [A]	30					
Max. AC Fault Current [A]	65		100			
Max. AC Over Current Protection [A]	53		76			
Rated AC Voltage	L+N+PE , 220, 230,240;180-280					
Rated Output Frequency [Hz]	50, 60 / 44-55, 54-65					
Power Factor [cos ϕ]	0.8leading ~ 0.8lagging					
Total Harmonic Distortion [THDi]	< 3%					
Efficiency						
Max. Efficiency	98.2%	98.2%	98.2%	98.2%	98.2%	98.2%
Euro Efficiency	97.8%	97.8%	97.8%	97.8%	97.8%	97.8%
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	R6-5K-S2-X	R6-6K-S2-X	R6-7K-S2-X	R6-8K-S2-X	R6-9K-S2-X	R6-10K-S2-X
DC Surge Protection	Type II					
AC Surge Protection	Type III (type II optional)					
Overheat Protection	Integrated					
Anti-islanding Protection	AFD					
AFCI Protection	Optional					
Interface						
AC Connection	Quick connector					
DC Connection	MC4/H4					
Display	LED+APP					
Communication Port	RS232+RJ45+DRM					
Communication	Wi-Fi/Ethernet/4G/PLC (optional)					
Load Monitoring	Whole day (optional)					
General Data						
Topology	Non-isolated					
Consumption at Night [W]	<1					
Consumption at Standby [W]	<8					
Operating Temperature Range	-40℃ ~ +60℃ (>45℃ derating)					
Cooling Method	Natural convection					
Ambient Humidity	0% ~ 100%					
Altitude	4000m (>3000m derating)					
Noise [dBA]	<35					
Ingress Protection	IP65					
Mounting	Wall mounting					
Dimensions [H*W*D] [mm]	391*532*202					
Weight [kg]	16.5	16.5	17.3	17.3	17.3	17.3
Warranty [Year]	5 (Standard) /10/15/20 (Optional)					
Applicable Standard	IEC/EN62109-1/2, EN61000-6-1/2/3/4, IEC61683, IEC60068-2, IEC62116, IEC61727, EA/MEA,VDE0126-1-1/A1, CEI 0-21, VDE-AR-N 4105, AS/NZS4777.2, CQC NB/T 32004, G98/G99, NBR 16149, NBR 16150, C10/11,RD1669,UNE206006, UNE206007,EN50438					

4.

INSTRUCTIONS FOR INSTALLATION



4.1 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 performed by qualified personnel only in compliance with national and local standards and regulations.
 NOTICE
· This equipment meets the pollution degree II. · Inappropriate 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.

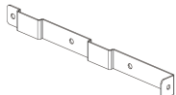
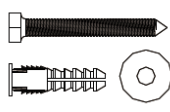
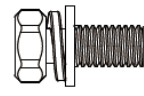
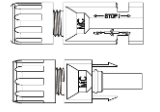
4.2 Pre-installation Check

4.2.1 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.

4.2.2 Scope of Delivery

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

			
Inverter*1	Wall mounting bracket*1	Documents	Communication module*1 (Optional)
			
Screw & expansion bolt & washer*3	M5*12 screw*1	AC connector set*1	PV connector R6-5-10K-S3*6 R6-5-10K-S2-X*4

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

4.3 Installation Method and Position

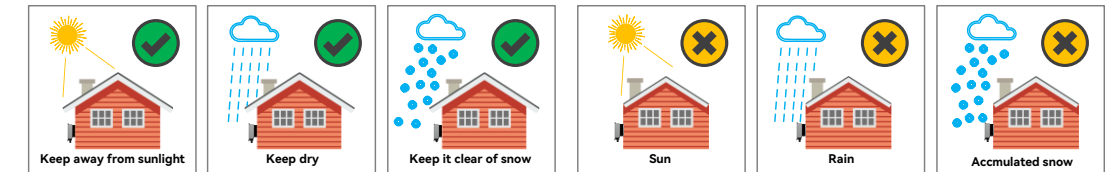
4.3.1 Installation Position and Clearance

DO NOT expose the inverter to direct solar irradiation as this could cause power derating due to overheating.

The ambient temperature should be between $-40^{\circ}\text{C} \sim +60^{\circ}\text{C}$ ($-40^{\circ}\text{F} \sim 140^{\circ}\text{F}$) to ensure optimum operation.

Choose locations with sufficient air exchange. Ensure additional ventilation, when necessary.

DO NOT install the inverter near any inflammable and explosive items.



To make sure the installation spot is suitably ventilated, if multiple SAJ on-grid solar inverters are installed at the same area, the safety clearance should be followed for proper ventilation conditions.

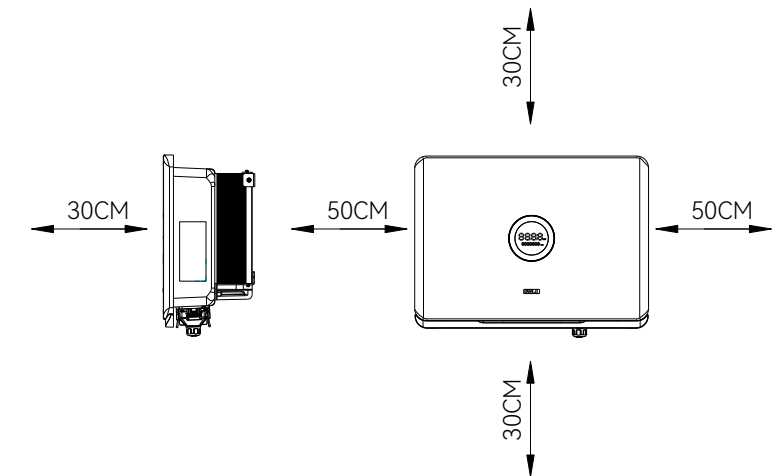


Figure 4.1
Installation clearance

4.3.2 Mounting Method

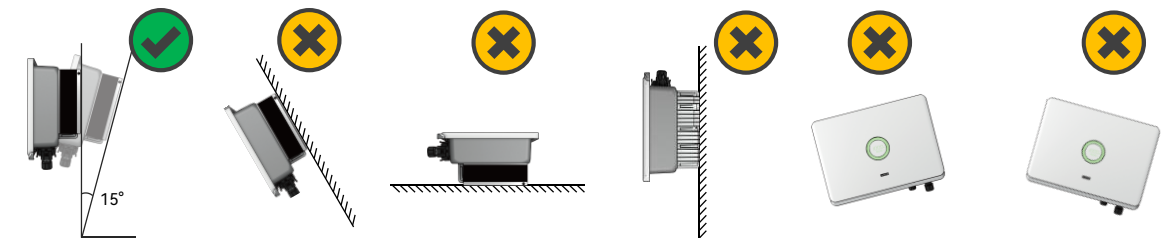


Figure 4.2
Mounting method

- 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.

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.

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 areas, 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.

4.4 Mounting Procedure

4.4.1 Installation Tools

Installation tools include but are not limited to the following recommended ones. Please use other auxiliary tools on site if necessary.



4.4.2 Mark the Positions of the Drill Holes of the Mounting Bracket

The mounting position should be marked as below.

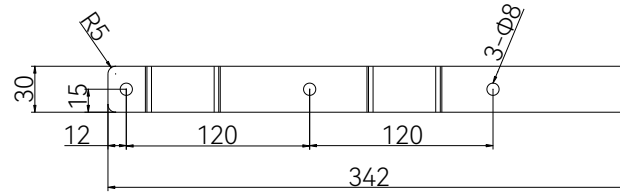


Figure 4.3
Dimensions of mounting bracket
(Dimensions in mm)

4.4.3 Drill Holes and Place the Expansion Tubes

Follow the given guides, drill 3 holes in the wall (in conformity with position marked in Figure 4.4), and then place expansion tubes in the holes using a rubber mallet.

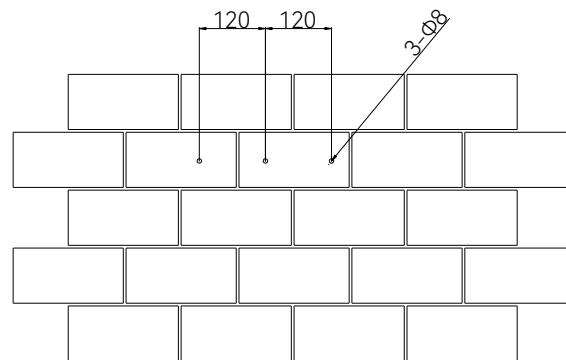


Figure 4.4
Drill holes' dimensions
(Dimensions in mm)

4.4.4 Mount the Screws and the Mounting Bracket

The brackets should be mounted in the mounting position by screws as below.

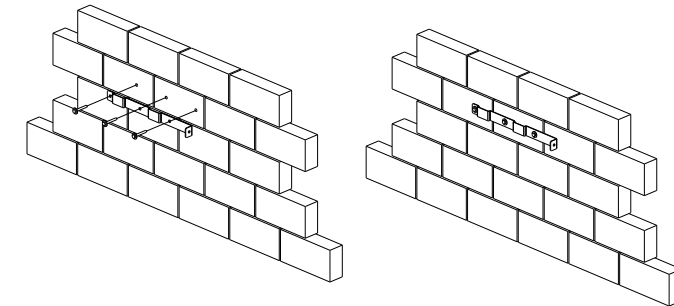


Figure 4.5
Mount the mounting bracket

4.4.5 Mount the Screws and the Mounting Bracket

Carefully mount the inverter to the mounting bracket. Make sure that the rear part of the equipment is closely mounted to the mounting bracket.

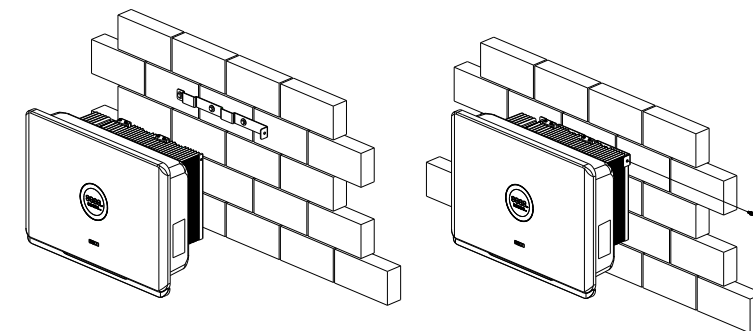


Figure 4.6
Mount inverter

5.1 Safety Instruction

Electrical connection must only be operated 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.

- The PV panel string will produce lethal high voltage when exposed to sunlight.
- Disconnect DC and AC circuit breakers before starting electrical connections.
- Ensure all the cables have no voltage before conducting cable connection

 **WARNING**

- Any improper operations during cable connection can cause device damage or personal injury.
- All cables must be undamaged, firmly attached, properly insulated and adequately dimensioned.

 **NOTICE**

- When power-on, the equipment should be 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.

5.2 Specifications for Electrical Interface

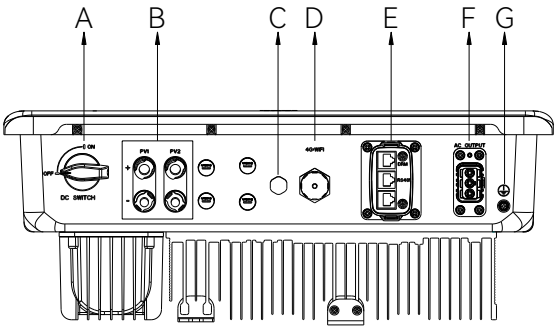


Figure 5.1
Electrical terminals of R6-5~10K-S2-X

5.

ELECTRICAL CONNECTION



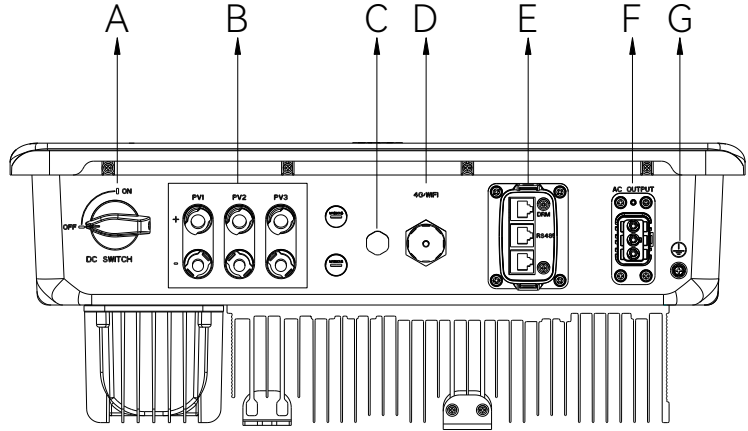


Figure 5.2
Electrical terminals of R6-5~10K-S3

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

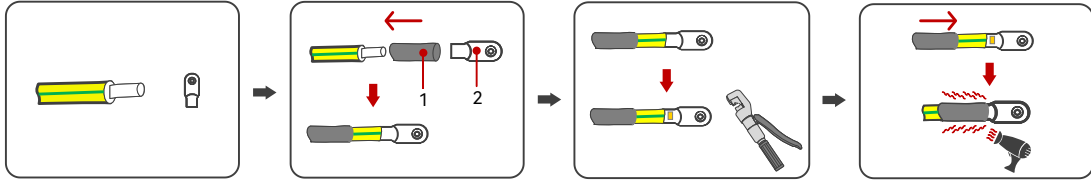
Specifications for interface

5.3 Connection of Additional Grounding

**WARNING**

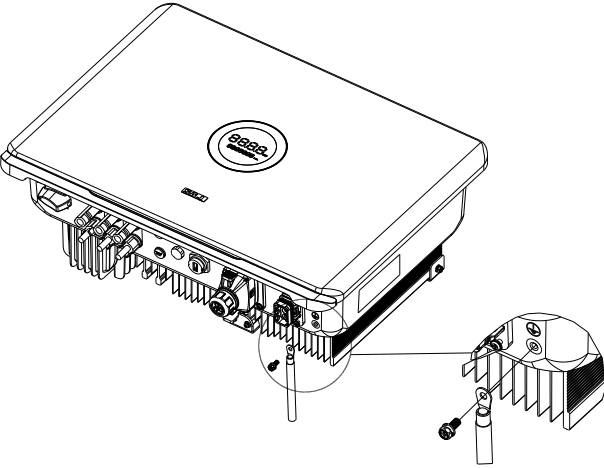
- The ground connection of this additional grounding connection cannot replace the AC cable PE terminal connection.
- Connect this additional grounding cable before AC cable connection, DC cable connection and communication cable connection.

Note: The additional cable and OT/DT terminal should be prepared by user themselves.



1. Heat shrink tubing 2. OT/DT terminal

Figure 5.3
Preparing additional grounding cable



Note: Recommended conductor cross-sectional area of additional grounding cable is 6~16mm².

Remove the screw of grounding terminal and secure the additional grounding cable by insert a screw into the screw hole in the OT/DT terminal.

Figure 5.3
Preparing additional grounding cable

5.4 AC Side Electrical Connection

Table 5.2
Recommended AC cable specification

Conductor cross-sectional area of cables (mm ²)		External cable diameter (mm)	Conductor material
Scope	Recommended value	14~20	Copper
6~16	10		

Note: If the grid-connection distance is too far, please select an AC cable with larger diameter as per the actual condition. Mutli-core cable is recommended if cross-sectional area is less than 10mm², otherwise single-core cable is recommended. Copper core cable is recommended.

The higher grid impedance of the AC cable makes it easier to disconnect from the grid due to excessive voltage at the feed-in point. The maximum cable lengths depend on the conductor cross-section as follows:

Conductor cross-sectional area (mm ²)	Maximum cable length (m)		
	R6-5/6K-S2-X; R6-5/6K-S3	R6-7/8K-S2-X; R6-7/8K-S3	R6-9/10K-S2-X; R6-9/10K-S3
8	15	11	9
10	18	14	11

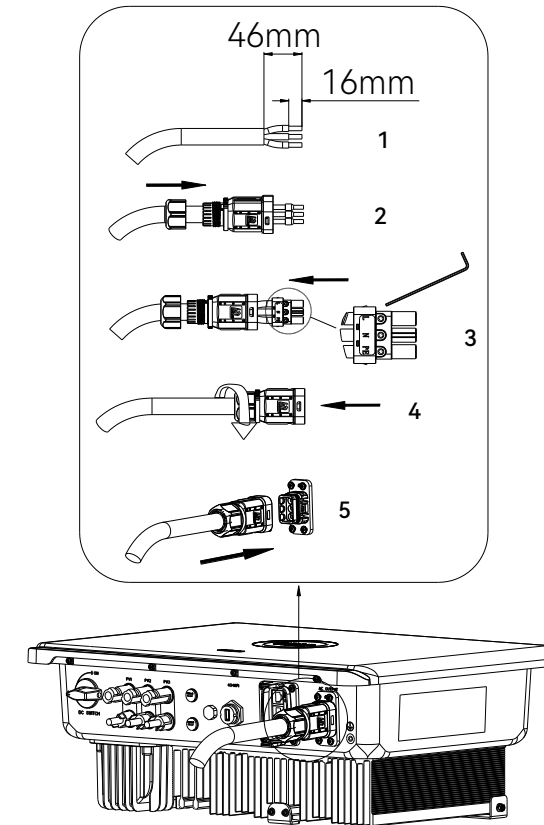


Figure 5.5
Connecting AC cable

- 1.Strip off 16mm of wire insulation skin and 46mm of AC cable insulation skin
- 2.Insert the cable through waterproof cable gland and housing
- 3.Insert the conductors into the corresponding ports and fix it with screws
- 4.Secure the cable gland by fastening sealing nut
- 5.Plug the AC connector into the AC connector port of inverte

5.4.1 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.

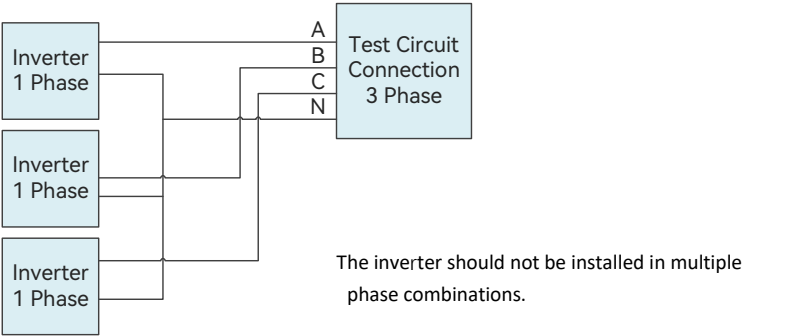
5.4.2 External AC Circuit Breaker and Residual Current Device

Please install a two pole circuit breaker to ensure the inverter is able to disconnect from grid safely. 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. The inverter does not require an external residual current device, as it has integrated with a RCMU. If local regulations require the application of external residual current device, either type A or type B RCD is compatible with the inverter. The action current of external residual current device should be 300mA.

Inverter type	Recommended breaker specification
R6-5K-S2-X,R6-5K-S3	32A
R6-6K-S2-X,R6-6K-S3	40A
R6-7-8K-S2-X,R6-7-8K-S3	50A
R6-9-10K-S2-X,R6-9-10K-S3	63A
Notice: Do not connect multiple inverters to one AC circuit breaker.	

Table 5.3
Recommended circuit breaker specification

5.4.3 Multiple Inverter Combinations



5.5 DC Side Connection

 **WARNING**

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

Conductor cross-sectional area of cables (mm²)		External cable diameter (mm)	Conductor material
Scope	Recommended value	6~9	Outdoor multi-core copper wire cable, complying with 600Vdc
4~6	5.26		

Table5.4
Recommended specifications of DC cable

5.5.1 PV Connector Assembly

 **WARNING**

Dangerous to life due to electric shock when live components or DC cables are touched.
· The PV panel string will produce lethal high voltage when exposed to sunlight. Touching live DC cables results in death or lethal injuries.
· DO NOT touch non-insulated parts or cables
· Disconnect inverter from voltage sources.
· DO NOT disconnect DC connectors under load.
· Wear suitable personal protective equipment for all work.

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



Figure 5.6
Positive connector
& 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.

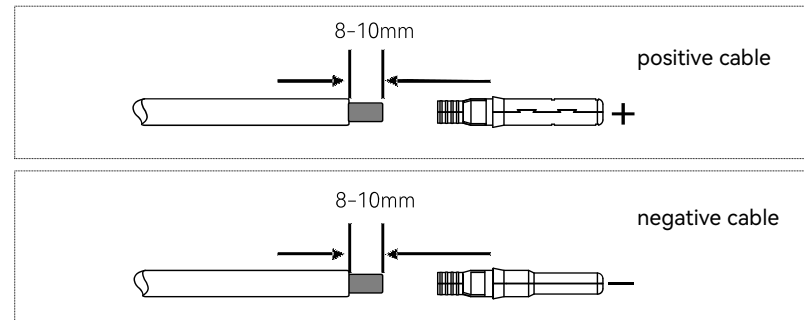


Figure 5.8
Stripping off the insulation skin of cables

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

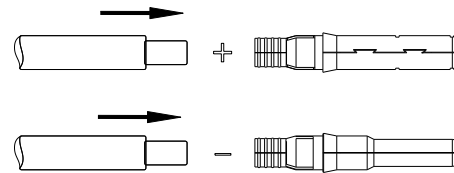


Figure 5.9
Inserting cables to lock screws

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

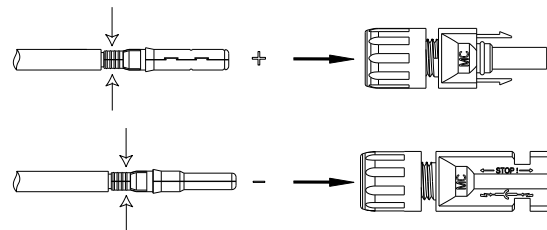


Figure 5.10
Inserting crimped cables to connectors

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

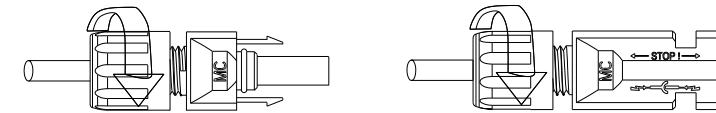


Figure 5.11
Securing the connectors

6. Make sure the DC switch is at OFF position

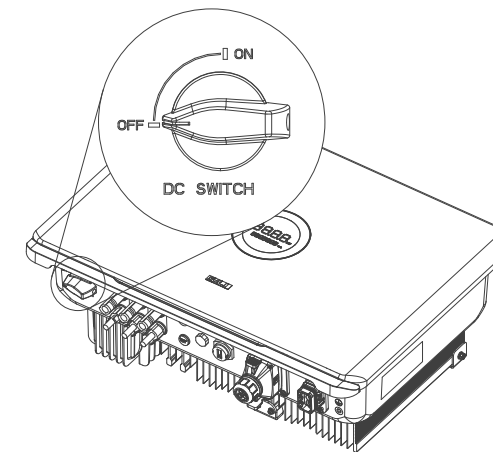


Figure 5.12
DC switch

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.

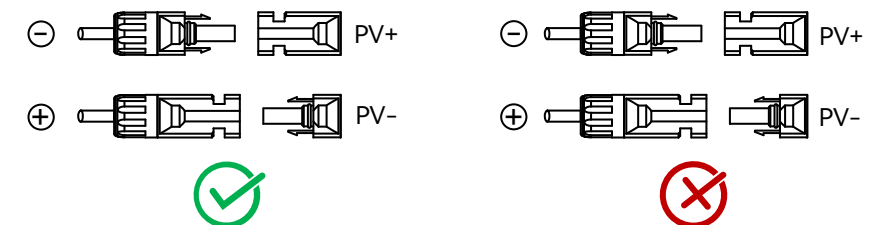


Figure 5.13
Plug in PV connectors

5.6 Communication Connection

5.6.1 RS485 Communication

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

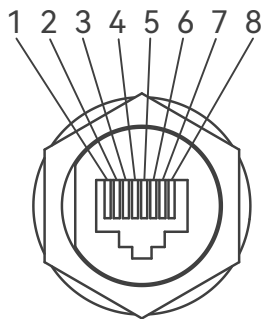


Figure5.14
RS485 pin and DRM pin

Pin Number	Wire color	Function1
1	White-orange	NC
2	Orange	GND_W
3	White-green	+5V_W
4	Blue	NC
5	White-blue	NC
6	Green	NC
7	White-brown	RS485-A
8	Brown	RS485-B

Table 5.5
RS485 pin port definition

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.

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

Table 5.6
Demand Response Modes (DRM)

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

Table 5.7
DRM0 mode

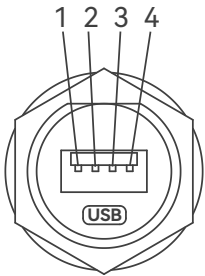


Figure5.15
RS232 pin

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

Table 5.8
USB pin port definition

5.6.2 RS485 Communication Connection

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.

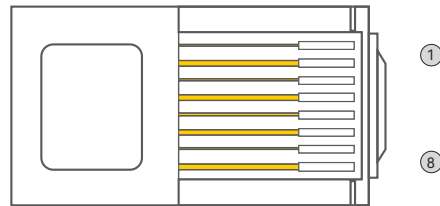


Figure 5.16
RJ45 plug

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

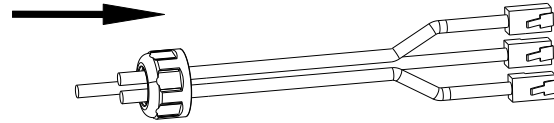


Figure 5.17
Inserting cables

3. Install the rubber seal onto cables

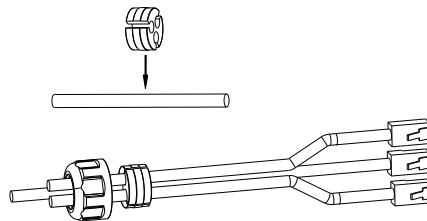


Figure 5.18
Inserting rubber seal

4. Insert the RJ45 cables into the corresponding ports

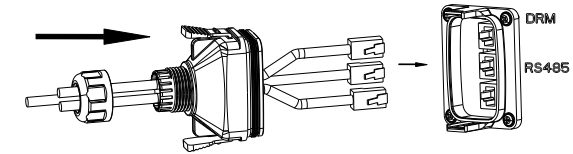


Figure 5.19
Inserting RJ45 cables

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

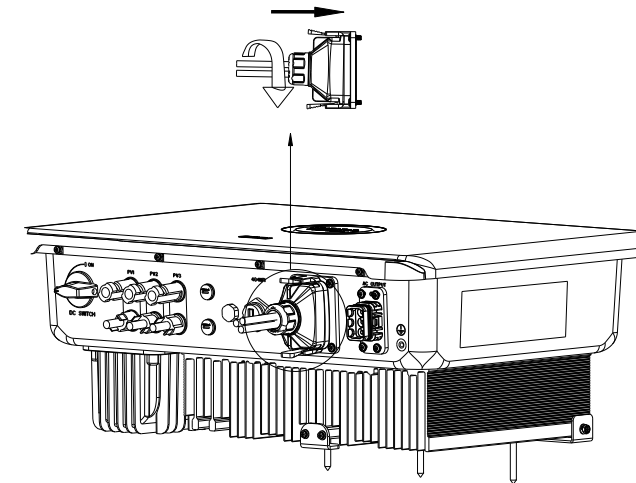


Figure 5.20
Securing sealing nut

5.6.3 Communication Module Connection

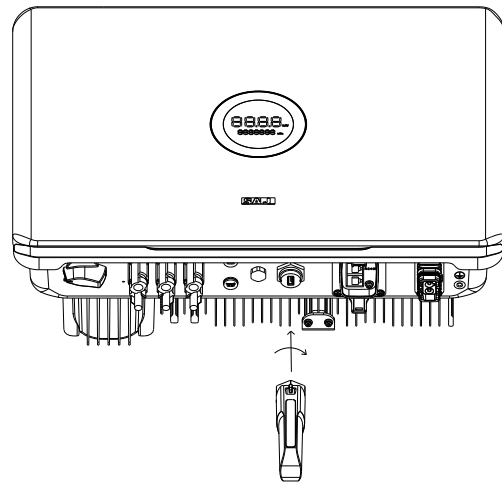


Figure 5.21
Installing communication module

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 4G module, for operation in details please refer to eSolar 4G module Quick Installation Guide in <https://www.saj-electric.com/>.
2. 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/>.
3. 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/>.

5.7 Start up and Shut down Inverter

5.7.1 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 count grid code through the APP, (please contact your local grid operator for which region to select). Inverter will be in self-testing mode, if inverter has met all the grid connecting condition, inverter will connect to grid and generate power automatically.

5.7.2 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.

5.8 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.

6.

COMMISSIONING



6.1 Introduction of Human-computer Interface

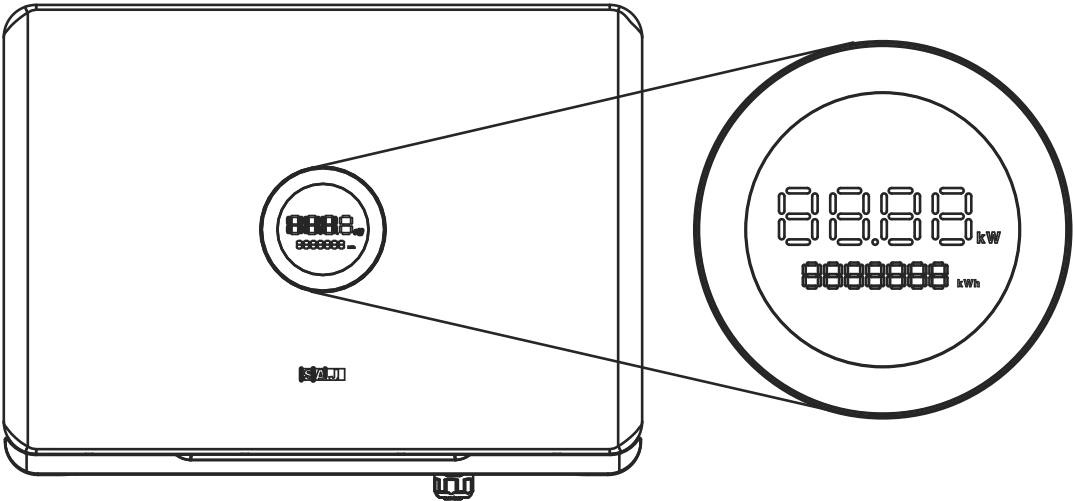


Figure 6.1
Human-computer interface

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			Current power (kW) / Error code
LED Panel 2			Total yield (kWh)

Table 6.1
Interface description

6.2 Monitoring Operation

There is no LCD display screen in R6 series products and they could be monitored through eSAJ APP.

6.2.1 Installer APP Installation

eSAJ Home could achieve communication with the equipment via Bluetooth, 4G 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.

6.2.2 Local connection

Step 1: Open eSAJ APP and click on the dot icon on the top right corner

Step 2: Select “Local Connection”

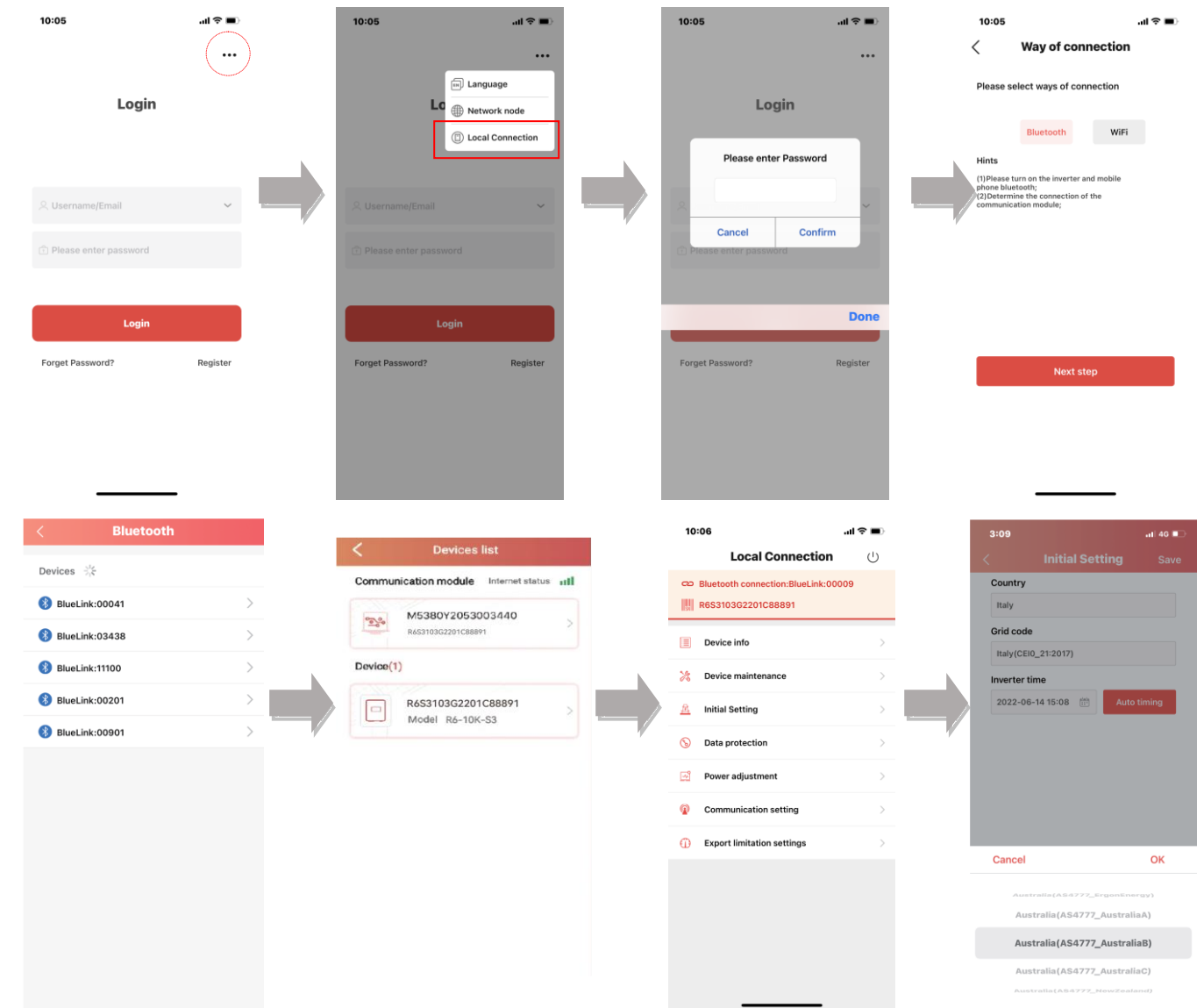
Step 3: Enter password “123456”

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



6.2.3 Account Login

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

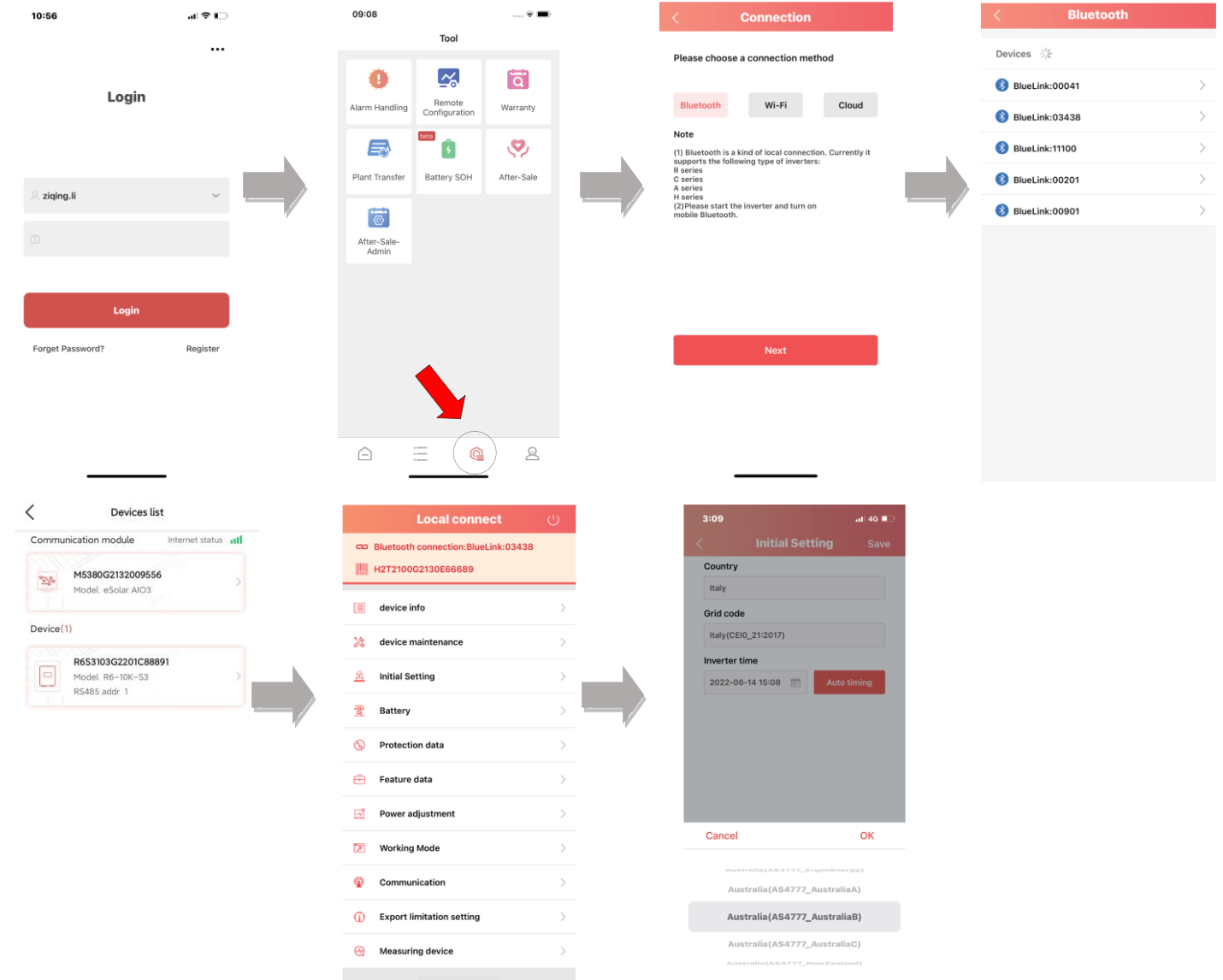
Step 2: Go to the “Tool” interface and select “Remote Configuration”

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

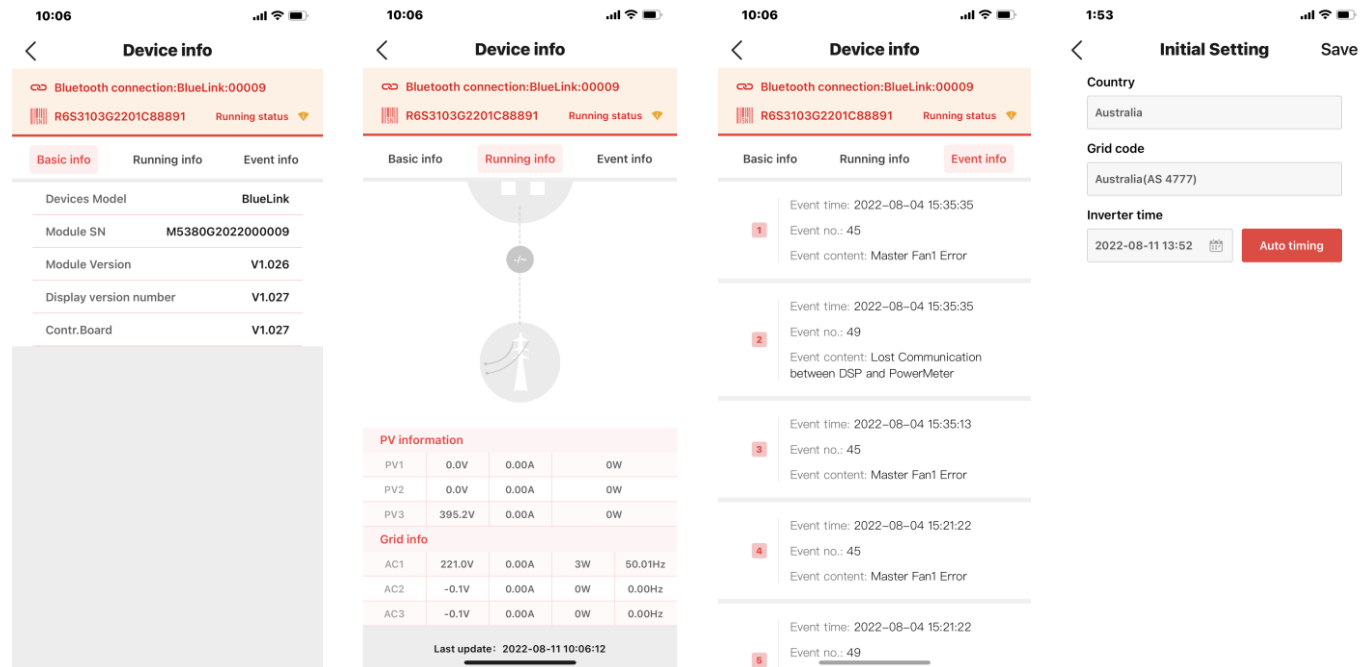
Step 6: Select the corresponding country and grid code for



6.2.4 Inverter Setting Review

After commissioning, the device info including device basic info, running info and event info can be viewed.

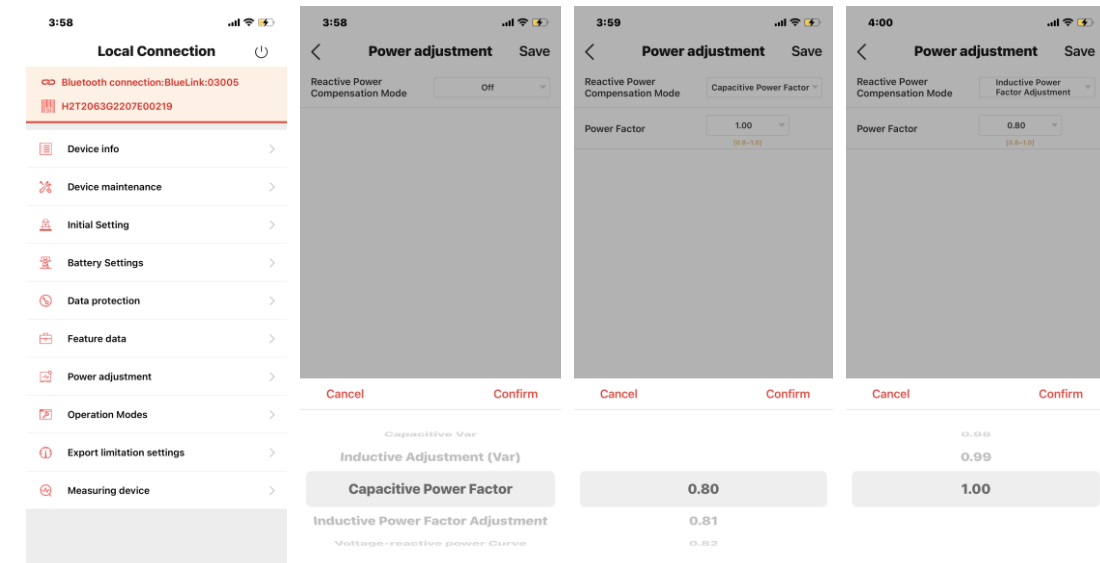
Country and grid code can be viewed from initial setting.



6.3 Setting Reactive Power Control (For Australia)

6.3.1 Setup Fixed Power Factor Mode & Fixed Reactive Power Mode

Fixed Power Factor Mode



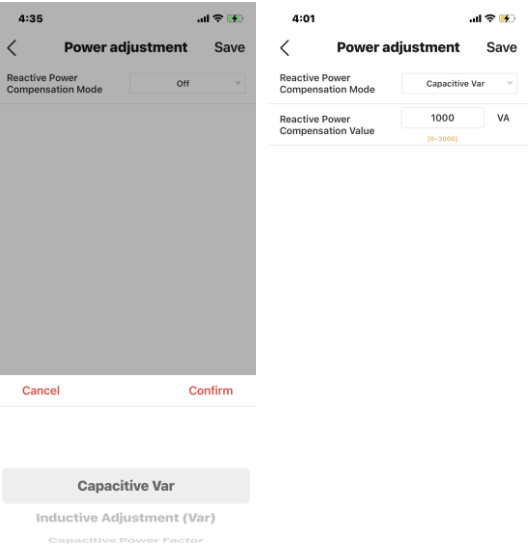
Step 1: Select Power Adjustment and enter password “201561”.

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.

6.2.5 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.

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.

6.3.2 Setup V-Watt and Volt-Var Mode

This inverter complies with AS/NZS 4777.2: 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 6.4&6.5.

Figure 6.4
Curve for a Volt-Watt response mode (AS4777 Series)

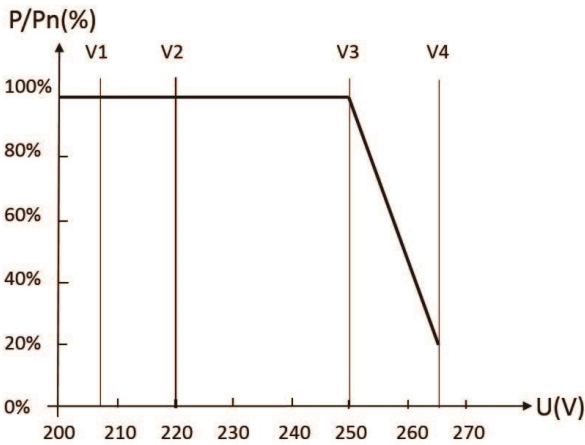
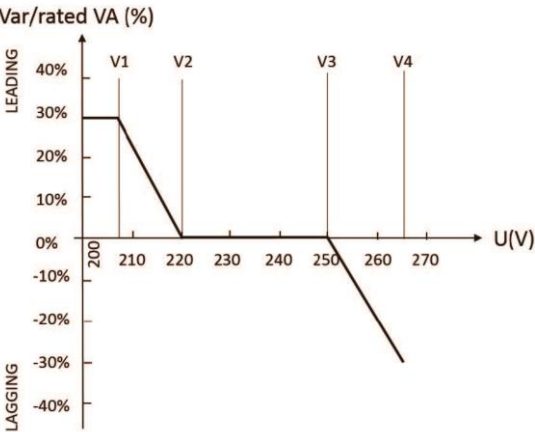


Figure 6.5
Curve for a Volt-Var control mode (AS4777 Series)



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 6.2 for Monitoring Operation.
3. Click "V-Watt/V-Var" to enter DNSPs settings, choose a suitable state regulation from the drop down list.

Local Connection

Wifi connection: Inverter
R6S3103G2201C88891

Device maintenance

Initial Setting

Over-voltage Derating

Protection data

Feature data

Power adjustment

Communication setting

DRM Setting

V-Watt/V-Var

Export limitation setting

Initial Setting

Country
Australia

Grid code
Australia(AS4777_AustraliaB)

Inverter time
2021-12-06 15:03 Auto timing

Cancel Confirm

Australia(AS4777_AustraliaA)
Australia(AS4777_AustraliaB)
Australia(AS4777_AustraliaC)
Australia(AS4777_NewZealand)
Austria(E8001)

AS4777_AustraliaA

V-Watt Enabled

V1 207 V

V2 220 V

V3 253 V

V4 260 V

%P1 100%

%P2 100%

%P3 100%

%P4 20%

V-Var Enabled

V1 207 V

V2 220 V

V3 240 V

V4 258 V

%VAR1 22% Leading

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.

6.4 Export Limit Setting

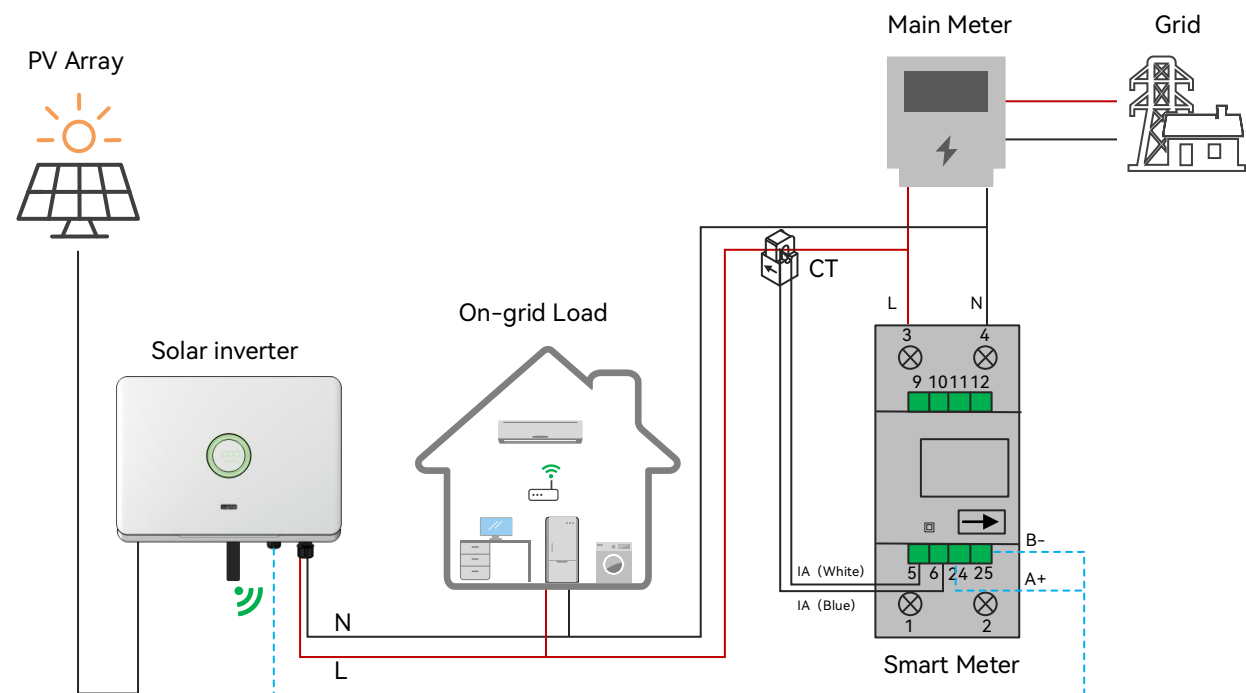
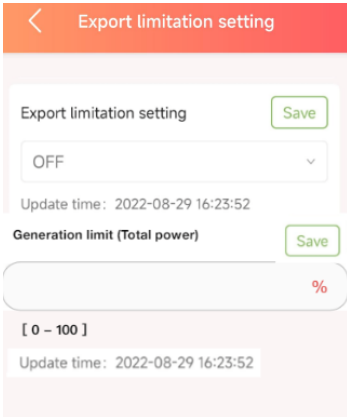
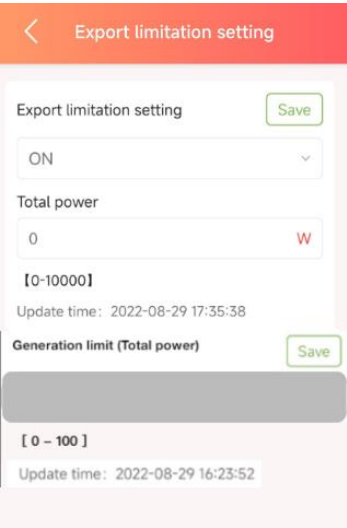
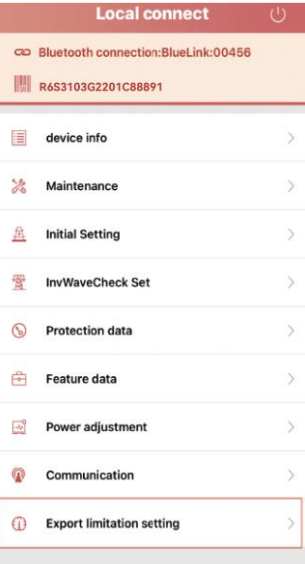


Figure 6.4
Export limit wiring schematic

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

6.4.1 APP Setting



There are two methods to control the export limit, the two methods are alternative to each other.

Method 1: Export limitation setting is to control the export electricity to the grid.

Method 2: Generation limit is to control the electricity generated by the inverter.

6.5 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.

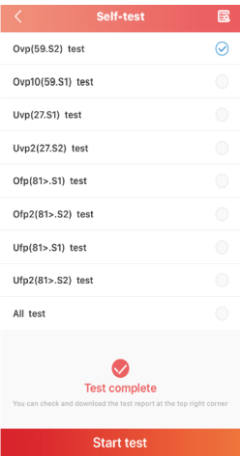
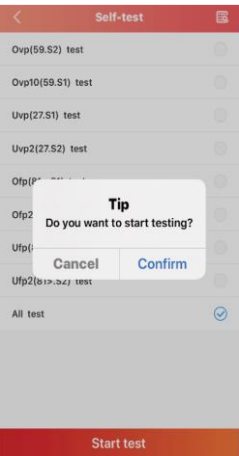
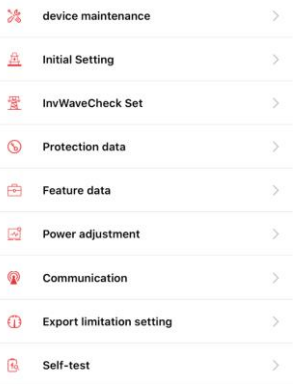
The steps of running Self-test are as followed:

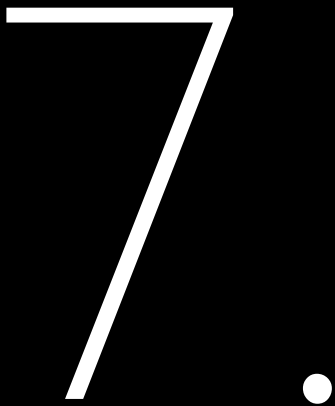
Step 1: Connect a communication module (Wi-Fi/ 4G/ Ethernet) with inverter (connection procedure can refer to eSolar Module Quick Installation Manual)

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.





FAULT CODE AND TROUBLESHOOTING

Error Code	Explanation
E001	Master Relay Error
E002	Master EEPROM Error
E003	Master Temperature High Error
E004	Master Temperature Low Error
E005	Lost Communication M<->S
E006	GFCI Device Error
E007	DCI Device Error
E009	Master Phase1 Voltage High
E010	Master Phase1 Voltage Low
E015	Grid Voltage 10Min High
E018	Master Grid Frequency High
E019	Master Grid Frequency Low
E024	Master No Grid Error
E027	GFCI Error
E028	Phase1 DCI Error
E031	ISO Error
E033	Master Bus Voltage High
E034	Master Bus Voltage Low
E036	Master PV Voltage High Error
E038	Master HW Bus Voltage High
E039	Master HW PV Current High
E041	Master HW Inv Current High
E044	Master Grid NE Voltage Error
E045	Master Fan1 Error
E049	Lost Communication between Master and Meter
E050	Lost Communication between M<->S
E051	Lost Communication between inverter and SEC
E052	HMI EEPROM Error
E053	HMI RTC Error
E061	Slave Phase1 Voltage High
E062	Slave Phase1 Voltage Low
E067	Slave Frequency High
E068	Slave Frequency Low
E073	Slave No Grid Error

Table 7.1
Error Code

Error Code	Explanation
E081	Lost Communication D<->C
E083	Master Arc Device Error
E084	Master PV Mode Error
E086	DRM0 Error
E087	Master Arc Error
E088	Master SW PV Current High

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.
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.
GFCI Device Error	If this error occurs frequently, please contact your distributor or call SAJ technical support.
DCI Device Error	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 Master	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.
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.

Table 7.2
Troubleshooting

Fault Information	Troubleshooting
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.

8.

ROUTINE MAINTENANCE



Inverter Cleaning

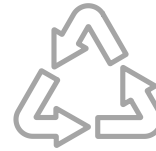
Clean the enclosure lid and LED indicator of the inverter with moistened cloth with clear water only. Do not use any cleaning agents as it may damage the components.

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.

9.

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.