USER'S MANUAL

On-Grid PV Inverter

Residential Inverter :RISxK-(x=1,2,3,4,5,6,8)

USERS MANUAL

INSTALLATION, OPERATION AND REPAIR MANUAL

About Rotosol

Rotosol solar (Division of Rotomag Motors and Controls Pvt. Ltd., located Near Anand,Gujarat,India ., which is specialized in manufacturing of solar PV inverters.

Rotosol is dedicated to providing perfect power conversion and control solutions for solar power generation installations , manufacturing and marketing of solar PV inverters. Rotosol possesses the first-class production equipment . Rotosol provide all kinds of high-quality and reliable grid-connected solar inverters and energy system solutions to satisfy the consistently increasing demands for global energy. The newly designed PV Inverter features itself with full load high efficiency, high reliability and user-friendly interface. The maximum conversion efficiency of our inverter is up to 98%. A user-friendly installation & interface, professional industrial design, and design for reliability mechanism, give the Inverter Family a competitive edge for customers from all regions.

As a customer-oriented company, Rotosol is always trying to improve product and enhance customer satisfaction. High quality with customer satisfaction is the Goal of Rotosol , not just in product quality control, but also in quality of service and support. Rotosol is able to help customers reduce energy consumption and carbon dioxide emissions by leading green solutions.

CONTENTS

1. About This manual

1.1 Scope of Validity

This manual describes the installation, commissioning, operation and maintenance of the following on-grid PV inverters produced by Rotosol:

Residential Series(Single MPPT Tracking)

RIS1K **RIS2K**

Residential Series(Double MPPT Tracking)

RIS3K **RIS4K** **RIS5K** **RIS6K** **RIS8K**

Please keep this manual all time available in case of emergency.

1.2 Target Group

This manual is for qualified personnel. The tasks described in this manual must only be performed by qualified personnel.

1.3 Additional Information

For more information please go through the website **www.rotosol.solar**

2 Safety Instructions

2.1 Safety Precautions

1. All work on the Inverter must be carried out by qualified electricians. And ensure that children can not access to the equipment.
2. The device may only be operated with PV generators. Do not connect any other sources of energy to the device.
3. This PV generator and inverter must be connected to the ground in order to reach maximum protection for property and persons.
4. Do not touch cover until 3 minutes after disconnecting all sources of supply. This is because the charge stored in capacitors may result a risk of electric shock.
5. The enclosure of Inverter can become hot during operation. To reduce the risk of injury, do not

touch the cover, heat sink at the back of the PP-Inverter or nearby surfaces while Inverter is operating.

6. Do not use the equipment for purposes other than those described in this manual.
7. Both the Inverter and associated transport packaging are mainly made of recyclable raw materials. Please ensure that the used device and any relevant accessories are disposed of in accordance with applicable regulations.
8. Packed with damping EPE and carton, Rotosol inverter should be placed upwards and handled with care in delivery. Pay attention to waterproof.
9. Alternative uses, modifications to the inverter not recommended by Rotosol or the installation of components not sold by Rotosol void the warranty claims.

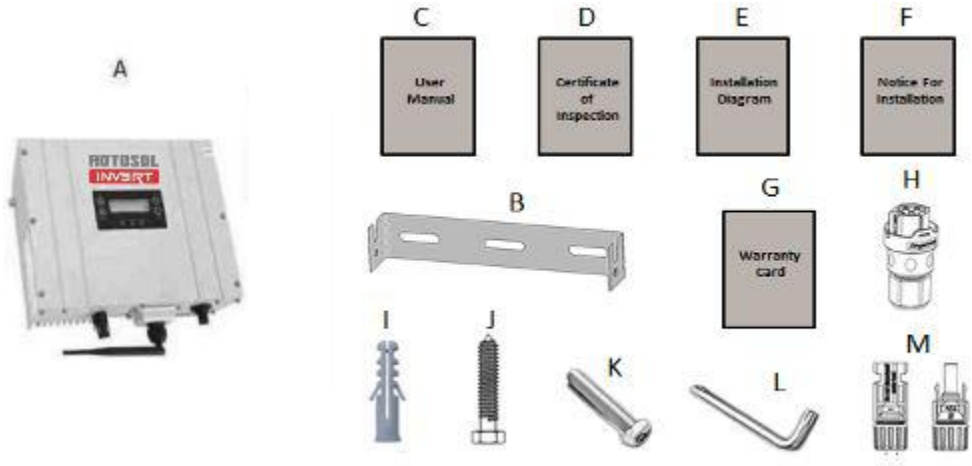
2.2 Explanations of Symbols

Symbol	Explanation
	Danger of Electric Shock. The inverter is directly connected with the public grid. All work on the inverter must be carried out by qualified personnel only.
	Beware of hot surface. The inverter can become hot during operation. Do not contact the device during operation.
	Caution, risk of electric shock Energy storage timed discharge, time to be indicated adjacent to the symbol.
	Caution, Danger. This device directly connected with electricity generators and public grid.
	Do not dispose of this device with the normal domestic waste.
	Without Transformer. This inverter does not use transformer for the isolation function.
	CE mark. The inverter complies with the requirements of the applicable EC guidelines.
	Regulatory compliance mark. The inverter complies with the requirements of Australian Communications Authority guidelines, safety and EMC guidelines.
	Notes, Important. Non-adherence to these instructions may adversely affect the operating convenience or functionality of the device.
	Refer to manual before service.

3 Unpacking

3.1 Assembly Parts

Please check the delivery for completeness and any visible external damage. Contact your dealer at once if anything is damaged or missing.



RISxK(x=1,2,3,4,5,6,8) assembly parts are as listed below:

Object	Quantity	Description	Object	Quantity	Description
A	1	Solar inverter	B	1	Wall mounting bracket
C	1	User manual	D	1	Certificate of inspection
E	1	Installation diagram	F	1	Notice for installation
G	1	Warranty card	H	1	AC connector
I	3	Plastic Expansion Tube	J	3	Tapping screw
K	1	Security screw	L	1	Screwdriver for security screw
M	1 set/ 2 sets	DC plug connector			

Applies to RISxK (x=3,4,5,6,8)

1set applies to RISxK (x=1,2)

2 sets applies to RISxK (x=3,4,5,6,8)

3.2 Identifying the Inverter

You can identify the Inverter by the type label. Information such as serial number (Serial No.) and model name of the Inverter, as well as the device's technical parameters are specified on the type label. The type label is on the right side of the enclosure.

4 Mounting

4.1 Safety

DANGER!

Danger to life due to potential fire or electric shock.

Do not install the Inverter near any inflammable or explosive items. The inverter will be directly connected with high voltage power generation device. The installation must be performed by qualified personnel only in compliance with national or local standards and regulations.

CAUTION!

Danger of burn injuries due to hot enclosure parts.

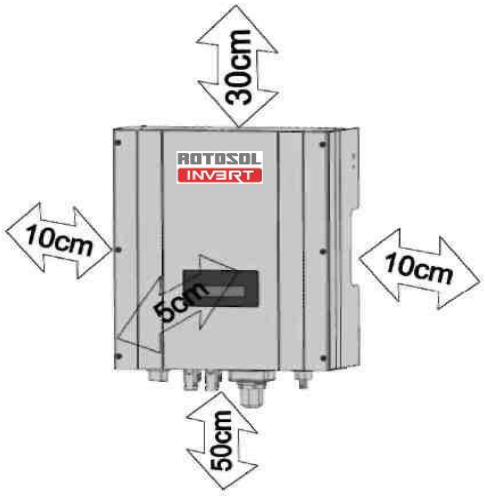
•Install the Inverter so that it cannot be touched inadvertently. Risk of injury due to the heavy weight of the Inverter.

• Take the inverter's weight into account for mounting. (Weight of inverter refers to chapter 9.)

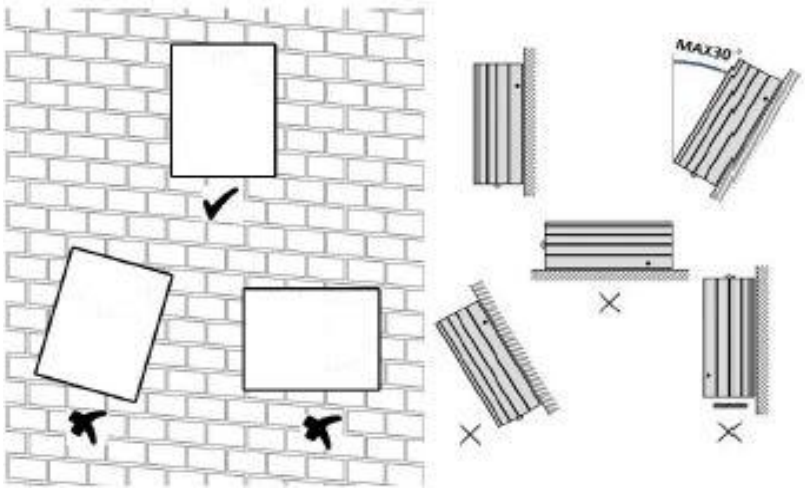
4.2 Selecting the Appropriate Mounting Location

Consider the following points when selecting where to install:

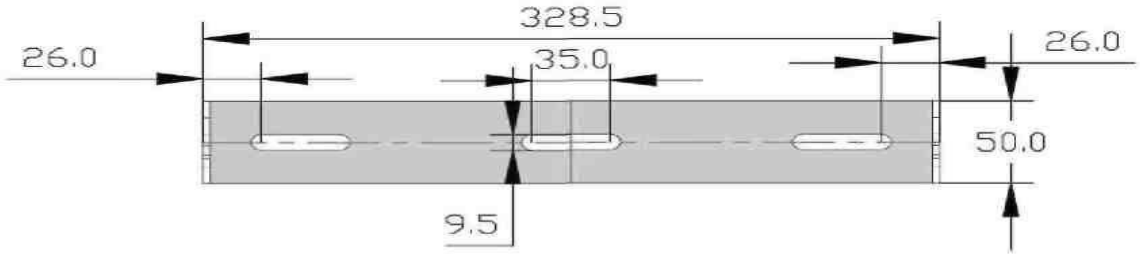
- The mounting method and location must be suitable for the inverter's weight and dimensions.
- The inverter must be installed in the solid walls ,such as brick walls or concrete walls in case of vibration noise or inverter falling off.
- The installation site should be clearly visible and can be safely into without aids such as scaffold.
- For the convenience of checking the LCD display and possible maintenance activities, please install the inverter at eye level.
- The altitude of installation site should be below 2000m,more than 2000m above the sea level will cause derating.
- The ambient temperature of installation site should be between -20 °C and +55 °C (between -4 °F and 131 °F).
- Install the inverter directly exposing to strong sunshine is not recommended, the excess heating might lead to power reduction.
- **Leave enough effective space around the inverter for better ventilation.**



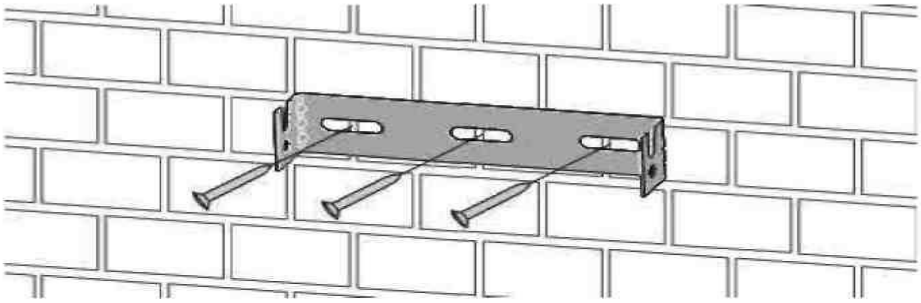
• Vertical installation, wiring area must be downside, lateral installation is not allowed; in backward tilted installation, tilt angle should not exceed 30 degrees; Forward tilted, horizontal or inverted installation is not allowed.



4.3 Mounting the Inverter with Wall Mounting Bracket



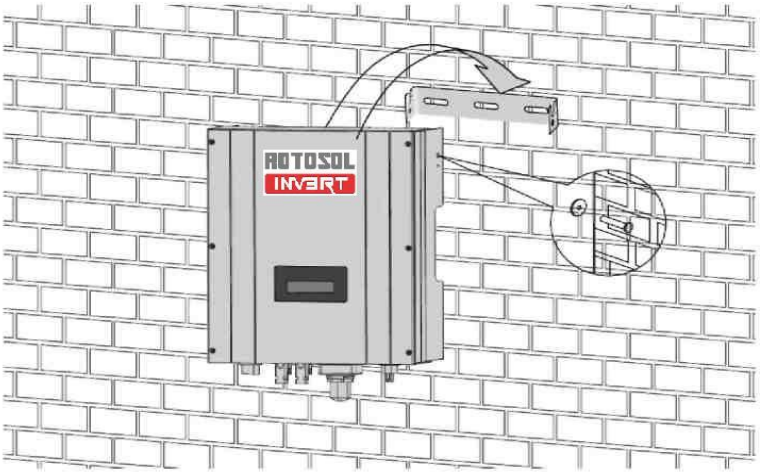
2. Fix the wall mounting bracket with the equipped self-tapping screw.



1. **Use the wall mounting bracket mark the drilling position and drill the holes for the screws.**

3. Hang the inverter to the mounting bracket and ensure the slot is fitted on the bracket.

4. Check to ensure the inverter is correctly seated. Make sure to lock it with the security screws. (See the figure below.)

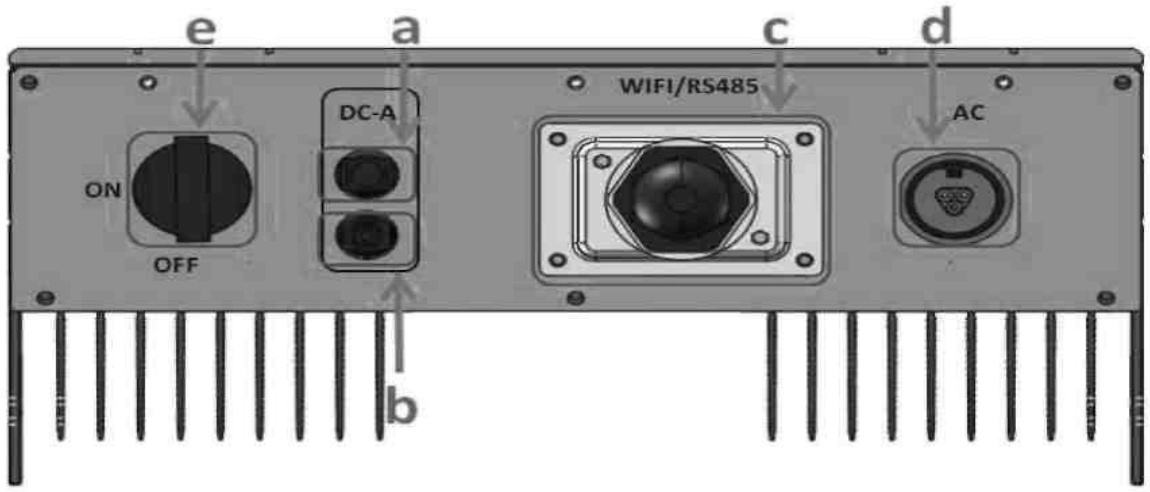


5 Electrical Connection

Notes:

1. Electrical installation & maintenance shall be conducted by licensed electrician and shall comply with local Wiring Rules.
2. After the inverter has been installed in its fixed position, the electrical connection to the unit can be established.
3. Make sure Max. Open Voltage and short-circuit current of the each PV strings accord with the Spec.
4. Choose the appropriate cable width for AC/DC wire. The cross sectional area of DC input conductor lead should be 4mm^{2}PV wire, that of AC output conductor should also be 4mm^{2}cooper wire, and that of external ground conductor should be 4mm^{2}cooper wire.
5. On both sides of inverter to the grid and PV array, there must be between circuit breaker and surge protector, and during inverter electrical connections, circuit breakers on both sides should be disconnected to prevent electric shock.
6. Before connecting the inverter to PV arrays and public grid, make sure the polarity is correct.

5.1 Overview of the Connection Area



The following figures show the assignment of the individual connection areas on the bottom of the inverter.

Residential Series (Single MPPT Tracker): RISxK-(x=1,2)

Object	Description
a	DC connectors (+) for connecting the PV strings
b	DC connectors (-) for connecting the PV strings
c	Junction box for RS485 connection and AC connection
d	AC connection
e	DC Switch(optional)

Small Commercial Series(Double MPPT Trackers): RISxK(x=5,6,8)

Object	Description
a	DC connectors (+) for connecting the PV strings
b	DC connectors (-) for connecting the PV strings
c	Junction box for RS485 connection and AC connection
d	Waterproof Junction Box, AC connection
e	DC Switch

5.2 Connection to the Public Grid (AC)

5.2.1 Conditions for Connection

CAUTION!

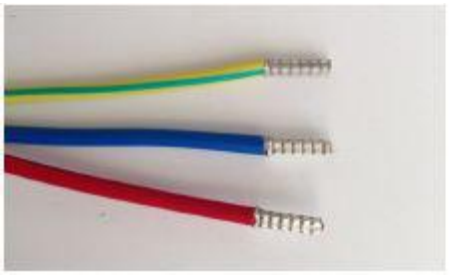
Unit Disconnection From Load

Disconnect the circuit breakers and switches of inverters AC and DC sides.

5.2.2 Residential(Single-phase) Connection to Public Grid (AC)

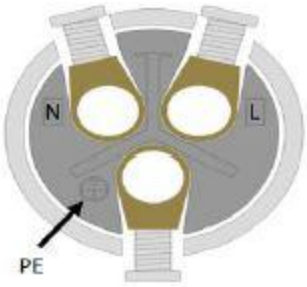
Measure the grid voltage to make sure within the permissible range. Disconnect the circuit breaker between the inverter and the grid.

1. AC assembly line, sectional area is 4mm^2, stripping length is 7mm for Residential Series



2. AC line goes through AC terminal waterproof head and cap

3. Connect AC line, Live line (L), Neutral line (N) and Ground Wire (PE) according to polarity.



4. Tighten the screws to ensure a solid connection.

Guarantee not to fall off if pulling.

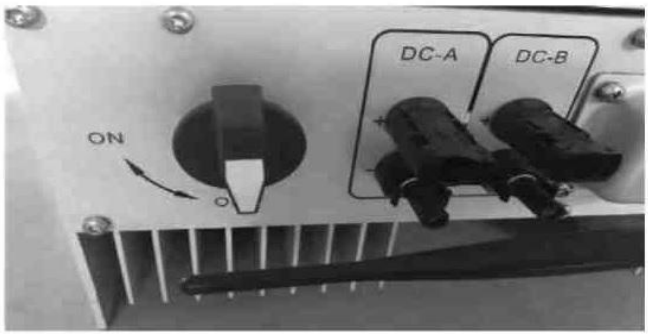
5. Connect AC terminals and waterproof head, tighten the cap,make sure they clip closely together.	6.Connect AC connector to AC terminal of the inverter. Ensure firm insertion.

5.2.3 Commercial (Three-phase) Connection to Public Grid (AC)

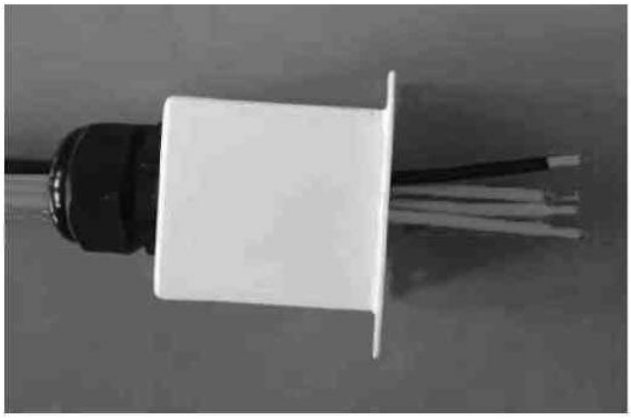
Measure the grid voltage to make sure within the permissible range. Disconnect the circuit breaker between the inverter and the grid.

1. Connecting area at the bottom of the inverter.

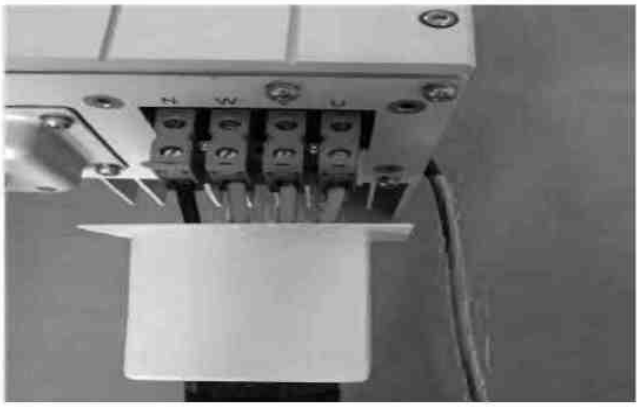
2. Disconnect the DC and AC breaker, DC switch in the"OFF"state.



3. Assembly yellow-green Ground wire RV5.5-6	4. Diameter of AC wire is 4mm2, Stripping length is 10±0.5mm, keep stripping wires cross junction box



5.Insert black wire in to “N” block shot after the screws are loosened,use screwdriver to tighten the screw.	6.Insert all wires into line bar according to the sketch map,tighten them.



5.3 Connection to the PV Generator (DC)

CAUTION!

Unit Disconnection From Load

Disconnect circuit breakers and switches on both AC and DC sides

5.3.1 Conditions for the DC Connection

The connected PV modules must meet following requirements

-Same type

-Same model

-Identical alignment

- Identical tilt

The following limit values at the DC input of the inverter must not be exceeded (connecting to a higher voltage will destroy the device):

Type	**Maximum input voltage [V d.c]**	**Maximum input current [A d.c]**
Residential Series (Single MPPT Tracker)		
RIS1K	450	10
RIS2K	500	12
Residential Series (Double MPPT Tracker)		
RIS3K	550	12X2
RIS4K	550	16x2
RIT5K	550	18x2
RIT6K	550	18x2
RIT8K	580	18x2

5.3.2 Assembling the DC Plug Connector

In order to connect to the inverter, all connection cables of the PV modules must be equipped with the DC plug connectors provided. You will find the necessary DC plug connector for DC connection in the package. To assemble the DC plug connectors, proceed as detailed below. Ensure the plug connectors have the correct polarity.

The plug connector in DC side includes male and female as blow.

Please note that the sizes of metal connecting tubes are different. The bigger one is for female connector and the smaller one is for male connector.

Assembly Instructions:

♦ Prepare the DC wire to connect the positive and negative DC arrays. Stripping length is 12~15mm, sectional area is 4 mm^2 as below.

♦ Insert the DC wire to metal connecting tube. Make sure all line heads are in the connecting tube as picture blow.

♦ Use crimping pliers to fasten the metal connecting tube and copper wire. Make sure the harness will not fall off, see picture below.

♦ Insert the assembled cable into male/female connector. A "chick" sound can be heard when connecting correctly. Then tighten the cap. Refer to the picture below.

5.3.3 Connecting the PV Generator (DC)

DANGER!

Danger to life due to high voltage in the inverter.

• Before connecting the PV generator, ensure that the AC&DC circuit breaker is switched off.

Notes:

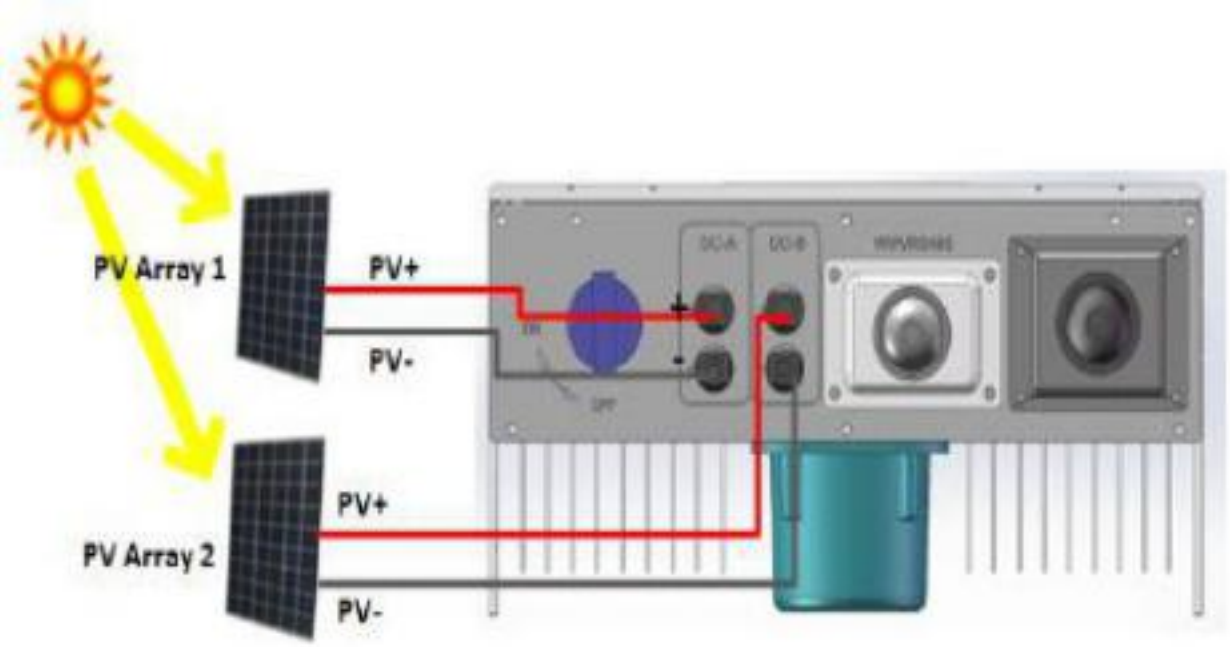
1. Make sure that you have disconnected circuit breakers and switches on both DC and AC sides.
2. Check the connection cables of the PV modules for correct polarity and that the maximum input voltage of the inverter is not exceeded.
3. Check the DC plug connector for correct polarity and well connected.

Plug the DC plug connectors into DC terminals on inverter.

Residential Series(Single-phase)

Commercial Series(Three-phase)

Double MPPT trackers model: RITxK(x=3,5,6,8,10). The device is equipped with 2 groups of DC(DC-A and DC-B) of connecting sockets for DC input, and each group contains a pair of connecting sockets (DC+ and DC-). Group A and B are respectively connected to two DC arrays as picture below. Connect PV+ and PV- in PV Array 1 to the positive and negative poles of DC-A and those of PV2 to those of DC-B.



6 Electrical Connection—RISxK(x=3-8)

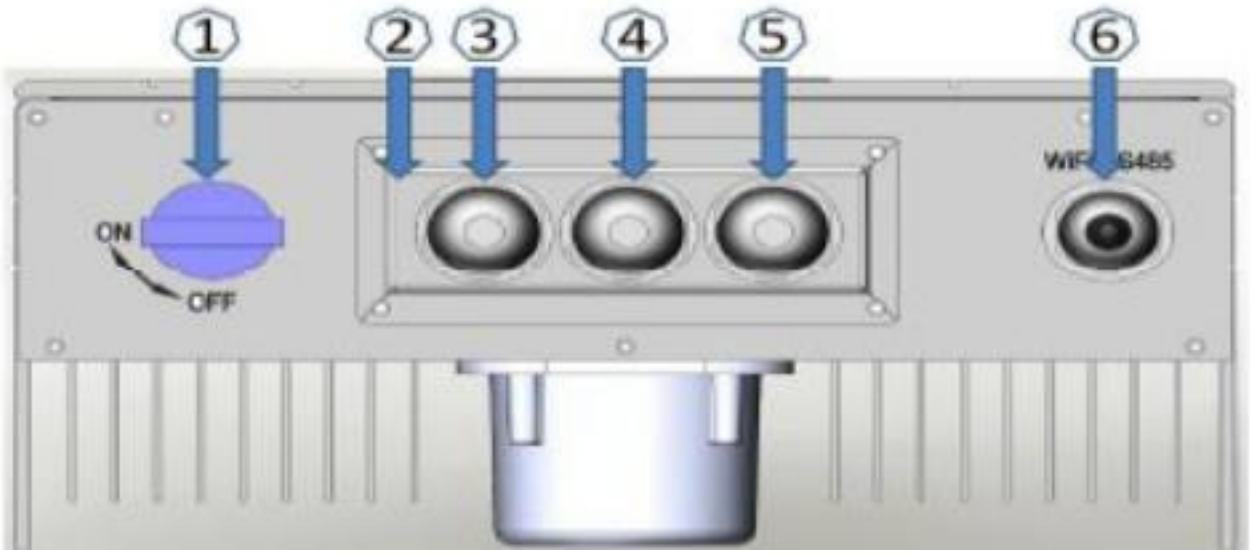
RISxK(x= 3,3.6,4,5,6, 7, 8)

Notes:

1. After the inverter has been installed in its fixed position, the electrical connection to the unit can be established.
2. Make sure Max. Open Voltage and short-circuit current of the each PV strings accord with the Spec.
3. Choose the appropriate cable width for AC/DC wire. The cross sectional area of DC input conductor lead should be 4mm^2PV wire, that of AC output conductor should also be 6mm^2cooper wire, and that of external ground conductor should be 6mm^2cooper wire.
4. On both sides of inverter to the grid and PV array, there must be between circuit breaker and surge protector, and during inverter electrical connections, circuit breakers on both sides should be disconnected to prevent electric shock.
5. Before connecting the inverter to PV arrays and public grid, make sure the polarity is correct.

6.1 Overview of the Connection Area

The following figures show the assignment of the individual connection areas on the bottom of the inverter.



Item	Description
1	DC Circuit breaker
2	Junction box
3	DC Side, waterproof connector
4	DC Side, waterproof connector
5	AC Side, waterproof connector
6	Communication waterproof connector for mounting antenna wireless monitoring module

The following limit values at the DC input of the inverter must not be exceeded (connecting to a higher voltage will destroy the device):

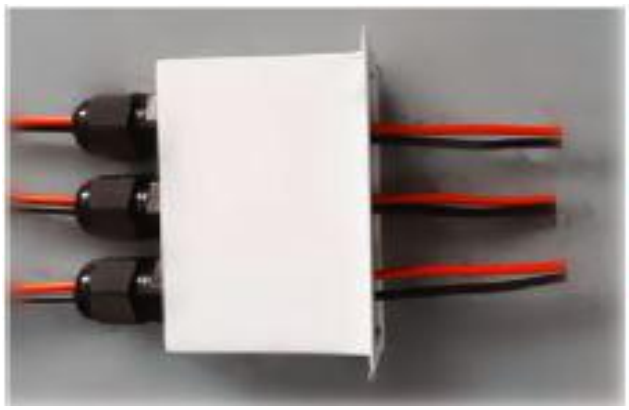
Type	Maximum input voltage [Vd.c]	Maximum input current [Ad.c]
RIS3K	550	12x2
RIS4K	550	16x2
RIS5K	550	18x2
RIS6K	550	18x2
RIS7K	550	18x2
RIS8K	550	18x2

6.2 DC, AC& Ground connection

Measure the voltage at grid side and make sure it is within permissible range(Vac), in the meanwhile, disconnect the circuit breaker between the inverter and grid.

1. Disconnect both DC and AC circuit breakers, DC switch is off.

2. Insert wire into junction box, DC wires 04mm2, AC wires 06mm2, Stripping length is 13 +0.5mm.



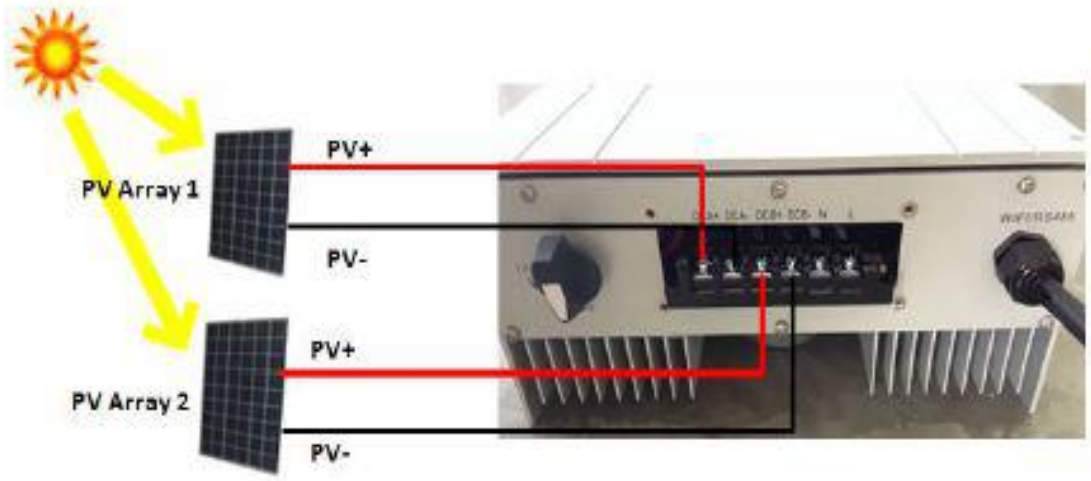
3. Unscrew row seat screws and insert wires into the inner cap, then screw tightly.

4. Connect wires according to wire connection marks, screw correctly and tightly; Tight junction box with four stainless steel screws.

5. Tighten the gland nut clockwise; yellow-green ground wire crimp supplied terminal, and connected to the ground terminal randomly beneath the left and right sides of machine.

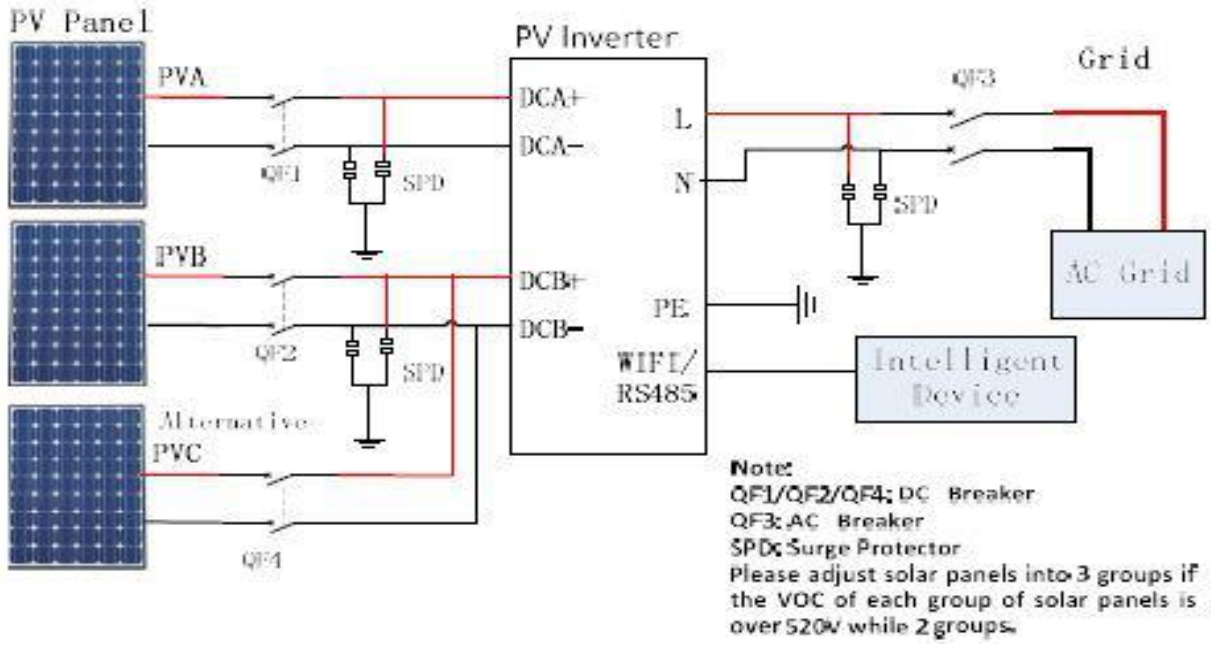
DC side has two DC terminal rows (group A and B), each includes a pair of DC connectors (DC + and DC-). Ensure installation in group A and B are separately connected with two PV arrays, you can not connect to only one PV array.

As shown below, PV array 1 has PV + and PV-respectively connecting with group A positive and negative connections, PV array 2 has PV + and PV-respectively connecting with group B positive and negative connections.


PV Array 1
PV+
PV-
PV Array 2
PV+
PV-

7 System Diagram

The typical connection diagram for the entire PV system is shown in the following figure.



1. PV Panel: Provide DC power to inverter
2. Inverters: Converts DC (Direct Current) power from PV panel(s) to AC (Alternating Current) power. Because Inverter is grid-connected, it controls the current amplitude according to the PV Panel power supply. Inverter always tries to convert the maximum power from the PV array.
3. **QF1/QF2 Breaker: The current per DC string does not exceed 25A.**
4. QF3 Breaker: Refer to the following table to choose the AC breaker.

Refer to the following table to choose the AC breaker.

Type	Max AC Current [A]	Rated current of AC breaker[A]
Residential Series(Single MPPT tracker)		
RIS1K	**6**	9
RIS2K	**12**	20
RIS3K	15	25
Residential Series(Double MPPT trackers)		
RIS3K	15	25

RIS4K	20	32
RIS5K	23	32
RIS6K	**28**	40
RIS8K	33	50

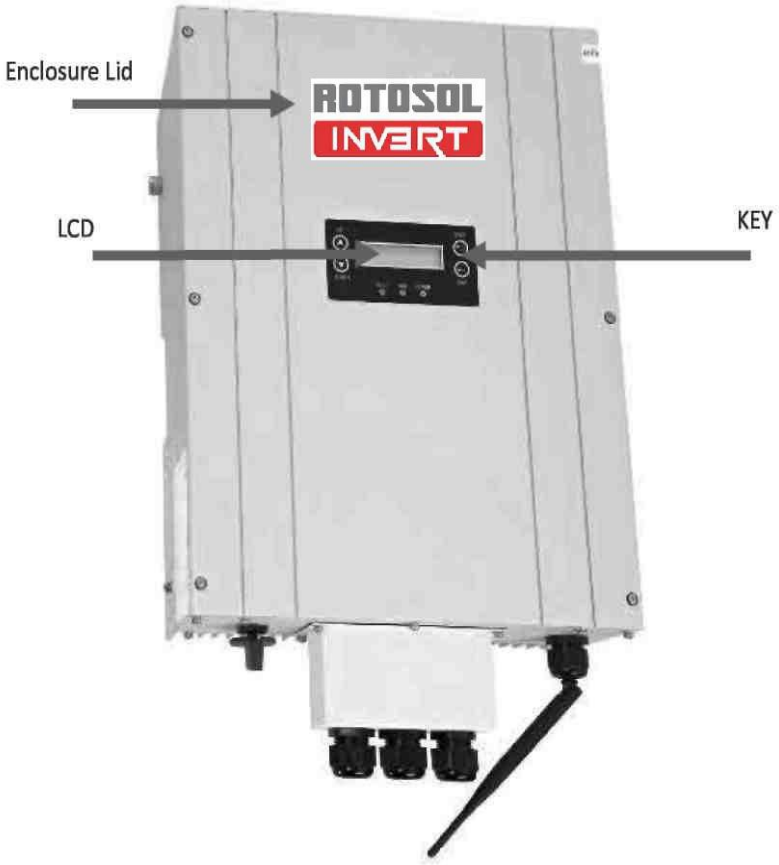
5. SPD: Lightning protection system, refer to the fol owing options:
   AC side, nominal discharge current 20KA, second grade lightning protection, protection voltage 2.5KV DC side, nominal discharge current 20KA, second grade lightning protection, protection voltage 3.2KV

6. The wiring distance between the inverter and the distribution box should be at least 5 meters.

7.Utility: Referred to as "grid" in this manual, i.e. the media your electric power company provides power to your place. Please note that Inverter can only be connected to low-voltage systems (namely, 220/230Vac, 50/60Hz).

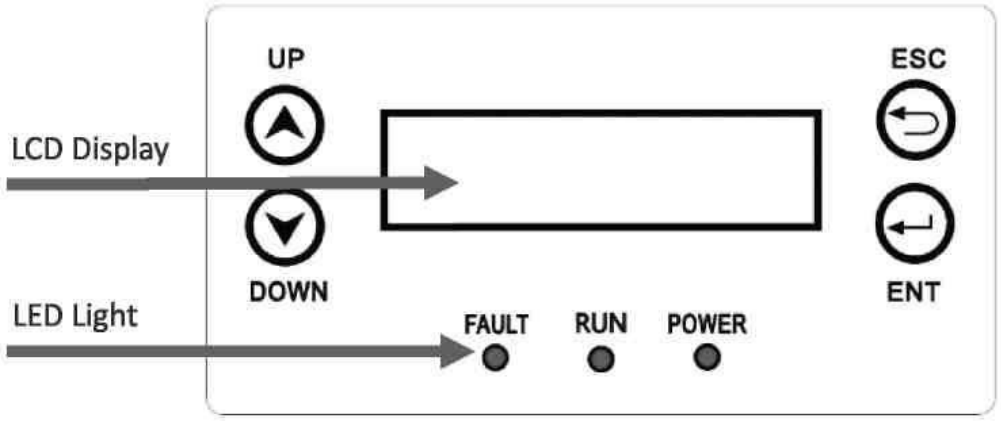
8 Operation

Product Overview



8.1 Residential Series Operation

8.1.1 Residential Series Overview of Controls and Displays



There are four function keys on the front panel: UP, DOWN, ESC, ENT.The keypad is used for:

Up and Down keys: Scrolling the displayed parameter, or modify the adjustable parameters; Esc and Ent keys: Cancel or Enter.

8.1.2 Residential Series Commissioning

After completing of the mechanical and electrical installation, the inverter could be put into operation.

1. Switch off DC and AC side circuit breakers and switches.
2. Wait until the screen is on and set up grid connection standard. (Please refer to 8.1.4.1 for specific operations)
3. The inverter starts up and feed into the utility grid automatically when all the necessary conditions of normal operation for the inverter is fulfilled.
4. Check whether the display and LEDs are indicating a normal operating state.

Sign	Color	Instructions
POWER	Green	On: Normal Operation
RUN	Yellow	On: Normal Grid-connection
FAULT	Red	Flash: Check wiring

8.1.3 Residential Series LED Display

Three LED lights are assembled on the inverter, RUN, POWER, and FAULT. POWER turns on when inverter starts up. When FAULT turns on, it means there is faulty in the system or inverter and the faulty code will be shown on LCD screen. When RUN turns on, it means inverter is grid-connected operating.

POWER LED (Green)

POWER LED turns on when DC voltage reaches the start-up voltage and turns off when it falls below a certain value. POWER LED is on represents inverter is active and so is the inverter control system. If POWER LED is off, inverter cannot be normally started up.

Under normal operation conditions, when light is sufficient, inverter connects to the grid and generates in the morning and stops after dark. This procedure may repeat several times in one day, especially in morning and at night. It is a normal working phenomenon but not a wrong signal.

FAULT LED (Red)

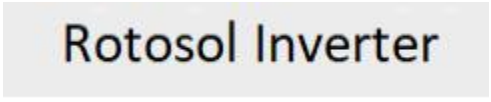
Red FAULT LED turns on means the on-grid generation is stopped due to some faults. Please wait 10 minutes to be sure whether the fault is temporary. If yes, inverter will automatically restart again. If not, contact after-sales personnel.

RUN LED Flashes (Yellow)

When situation is satisfied for inverter to connect grid, RUN LED will turn on. If the yellow RUN LED doesn't turn on, it means the inverter doesn't connect to grid.

8.1.4 Residential Series LCD Display

Inverter will start up automatically with enough DC voltage provided by PV array. When starting up (POWER LED is on), it shows "Rotosol" on LCD in front of the inverter.

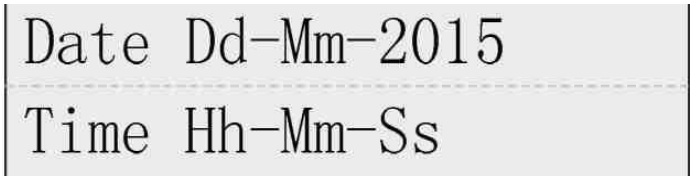


8.1.4.1 First Boot Setting

First turned on power, the inverter will delay 1 second and automatically jump to the reminder interface to set country.

Press Ent to country and standard setting interface. Press UP and DOWN to show countries. Choose corresponding country and standard and press Ent.**For example installed in India, please choose**

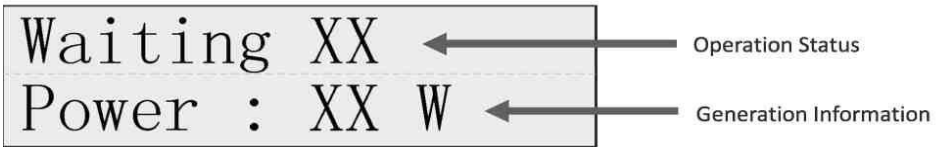
Country setting completed, system will automatically jump to the reminder interface to set time.



Press Ent to time setting interface. Press UP and DOWN to adjust number and press Ent. Set year, month, day, hour, minute and second one by one according to local time.

8.1.4.2 Main Interface

When time setting is completed, press Ent to exit and system will enter into the main interface as below. Starting second time, LCD will enter main interface directly in five seconds after initialization. Operation status and generation information of inverter will be shown on the main interface.



The operation status will be displayed in the first line of the main interface

Display	Description
Waiting	Countdown to start up
Normal	Normal Operation
Error	Faulty in inverter

Generation information interface scrolls every 15 seconds. UP and DOWN also can be used to select.

Items of generation information are as follows:

Display	Description
Power	Current Output Power
EToday	Total Generation Capacity today
ETotal	Total Generation Capacity
EChlDay/ECh2Day	Total Generation Capacity today in PV1/ PV2
VPV1 /VPV2	DC Input Voltage in PV1/PV2 channel
IPV1/IPV2	DC Input Current in PV1/PV2 channel
VAC	AC Output Voltage
IAC	AC Output Current

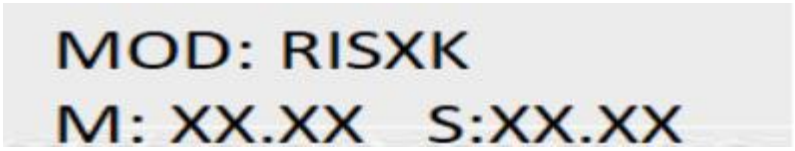
FAC	AC Output Frequency

8.1.4.3 Query Interface

Press Ent on main interface for related information in query interface. Five choosing items on the query interface: Inverter Info, Wifi Info, Error Record, Date Time and Set. Press UP and DOWN to select the query item,press Ent to get in and Esc back to main interface.

Inverter Info

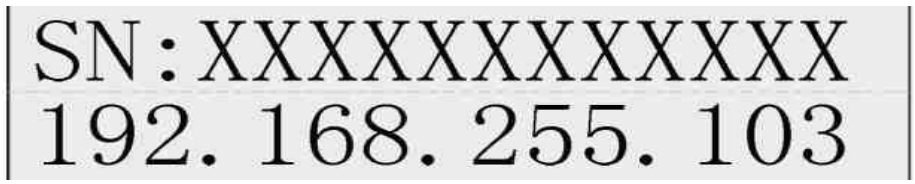
In Inverter Info interface, it shows the inverter model type, version of master CPU (M), slave CPU (S), version of DISP and SN No. of the inverter.



Wifi Info

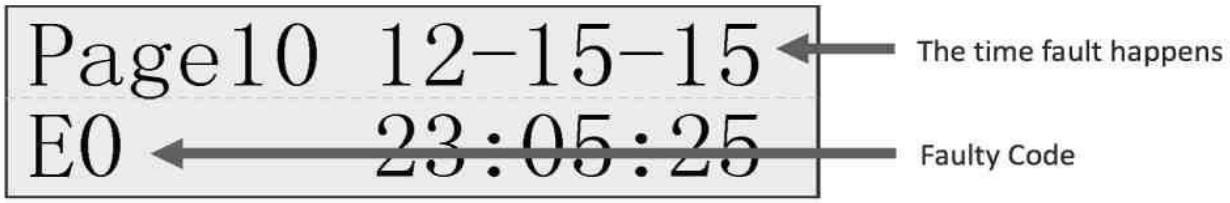
In Wifi Info, it shows SN No. of monitoring module and Internet IP address. Press Esc back to main interface.

Attention: SN in the WIFI Info interface means the SN of monitoring module, therefore the SN in the inverter Info interface is the SN of the inverter. Please do not get them mixed up.



Error Record

In Error Record, it shows fault series number, the time fault happens, faulty code and error display. When fault happens, FAULT LED turns on. "Trouble Shooting" in Chapter 10 is for users to refer to investigate and solve the faults. Please contact after-sales if the problem still exists.



Date Time

It shows current date and time. Press Esc back to query interface.

Set

Set interface is as follows.

Items in set interface are as follows

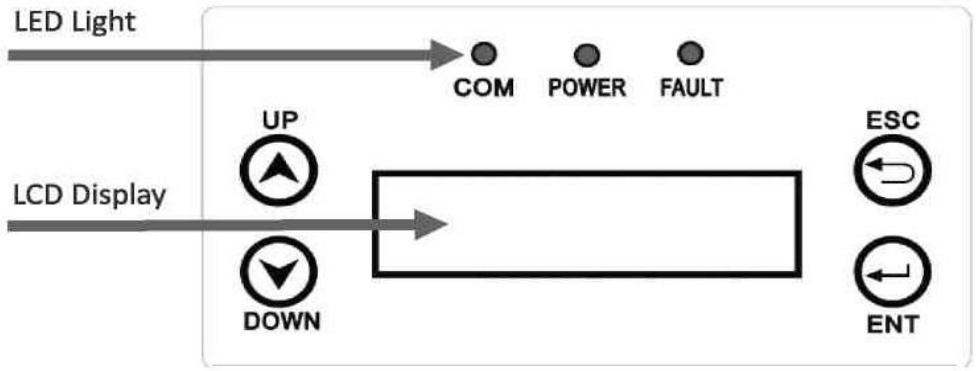
Display	Description
Date Time	Date and time setting
Safety	Country and standard setting
Energy K	Coefficient set of power generation correction
Freq Range	Frequency limit setting
Volt Range	Voltage limit setting
Clr ErrRcd	Fault Clearing
ClrAllRcd	All data clearing

To set time and country,please refer to fist boot setting in 8.1.4.1. Press Esc when finishing.

Passwords are needed for the other items setting, which only can be operated by after sales to make sure the safety and normal operation of the inverter.

8.2 Small Commercial Series Operation

Small Commercial Series Overview of Controls and Displays



There are four function keys on the front panel: UP, DOWN, ESC, ENT.The keypad is used for: Scrolling the displayed parameter :Up and Down keys, or modify the adjustable parameters; Cancel or Enter: Esc and Ent keys.

8.2.2 Small Commercial Series Commissioning

After completing of the mechanical and electrical installation, the inverter could be put into operation.

1. Switch off DC and AC side circuit breakers and switches
2. Wait until the screen is on and set up grid connection standard. (Please refer to 8.2.4.1 for specific operations)

The inverter starts up and feed into the utility grid automatically when all the necessary conditions of normal operation for the inverter is fulfilled.

3. Check whether the display and LEDs are indicating a normal operating state.

Sign	Color	Instructions
POWER	Green	On: Power On
COM	Green	On: Normal Operation and feed into the utility grid
FAULT	Red	Flash: Check wiring

8.2.3 Small Commercial Series LED Display

Three LED lights are assembled on the inverter, COM, POWER, FAULT. When DC and AC power are normal and the inverter starts up,the POWER LED turns on.When the inverter is operating and feed electricity into the utility grid normally, the COM LED turns on. When there is faulty in the PV system or inverter, the FAULT. LED flashes, and the faulty code will be shown on LCD screen.

POWER LED (Green)

POWER LED turns on when DC voltage reaches the start-up voltage and turns off when it falls below a certain value. POWER LED is on represents inverter is active and so is the inverter control system. If POWER LED is off, inverter cannot be normally started up.

Under normal operation conditions, when sun light is sufficient, inverter start up generates electricity in the morning and stops after dark. This procedure may repeat several times in one day, especially in morning and at night. It is a normal working phenomenon but not a wrong signal.

COM LED (Green)

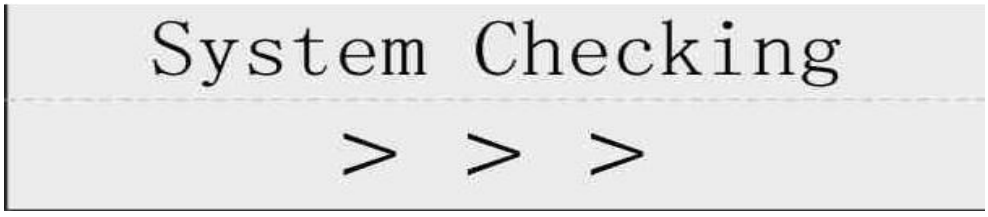
The COM LED turns on when the inverter start to feed electricity into grid. And the COM LED is off when the inverter is standby.

FAULT LED Flashes (Red)

Red FAULT LED flashes means the on-grid generation is stopped due to some faults. Please wait 10 minutes to be sure whether the fault is temporary. If yes, inverter will automatically restart again. If not, contact after-sales personnel.

8.2.4 Small Commercial Series LCD Display

inverter will start up automatically with enough DC voltage provided by PV array. When starting up (POWER LED is on), it shows "Rotosol" on LCD in front of the inverter.The inverter will delay 1 second and automatically jump to the System Checking interface

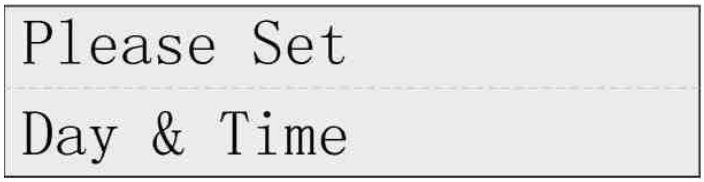


8.2.4.1 First Boot Setting

When first time turned on the power, the inverter will automatically jump to the reminder interface to set country.

Press Ent to country and standard setting interface. Press UP and DOWN to show countries. Choose corresponding country and standard and press Ent.

Country setting completed, system will automatically jump to the reminder interface to set time.

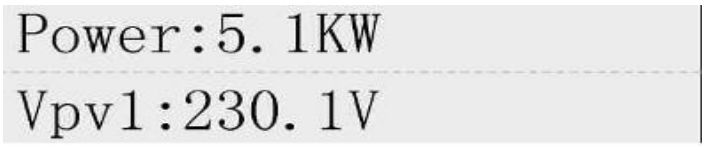


Press Ent to time setting interface. Press UP and DOWN to adjust number and press Ent. Set year, month, day, hour, minute and second one by one according to local time.

8.2.4.2 Main Interface

When time setting is completed, press Ent to exit and system will enter into the main interface as below. The LCD will automatically enter into the main interface after system checking when the inverter starts up next time. Operation status and generation information of inverter will be shown on the main interface(Display Info), the current time will be shown in the last line.

Generation information interface scrolls every 3 seconds. UP and DOWN also can be used to select.



8.2.4.3 Query Interface

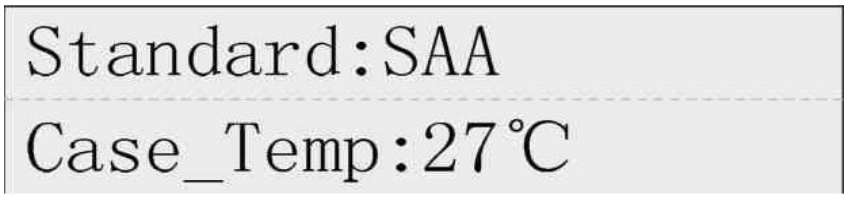
Press Ent on main interface to view related information in query interface. Eight choosing items on the query interface: System Info, Error Record, SET Clear Record, Data & Time SET, RS485 Address, SN Number, GridpowerCtrl. Press UP and DOWN to select the query item,press Ent to get in and Esc back to main interface.

BUS+/BUS-	Voltage of BUS+/BUS-	BUS+/BUS-
Ia/Ib/Ic	AC Output Current per phase	Ia/Ib/Ic
Ua/Ub/Uc	AC Output Voltage per phase	Ua/Ub/Uc
Fac	AC Output Frequency	Fac
Etoday	Total Generation Capacity Today	Etoday
Etotal	Total Generation Capacity	Etotal
ETPV1/ETPV2	Total Generation Capacity today in MPPT One/Two	ETPV1/ETPV2
RunTim	Total Running Time Today	RunTim
SumTim	Total Running Time	SumTim

System Info

System information shows current country standard and operating parameters.

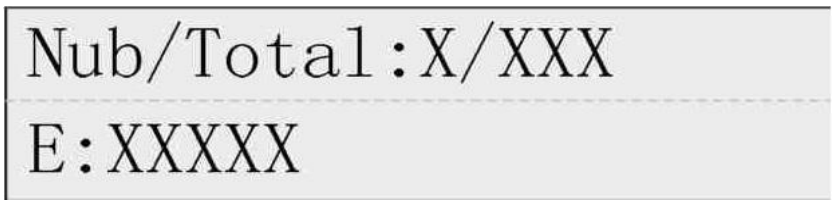
UP and DOWN could be used to show the items of System Info as follows:



Display	Description
Standard	Country and standard setting
Case Temp	Chasis temperature
ModleTemp	Power module temperature
ScreenTemp	LCD temperature
Rated Power	Inverter rated output power
PGIlrnp	The insulation resistance of positive pole in PV1
NGIlrnp	The insulation resistance of negative pole in PV1
PG2lmp	The insulation resistance of positive pole in PV2
NG2lmp	The insulation resistance of negative pole in PV

Error Record

Error record shows error information and happened time. When inverter has fault, FAULT LED turns on. Users can



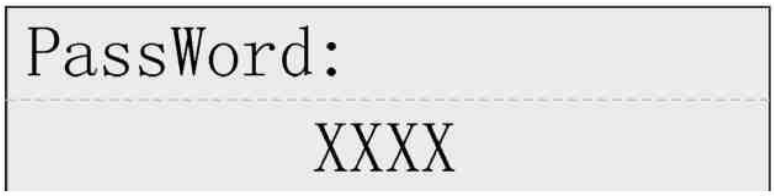
check and solve faults referring chapter 10 "trouble shooting" . Please contact after-sales if fault still exits.

Error Record shows:

Error Record shows:	
Display	Description
Nub/Total	Fault sequence/ Total faults number
E	Fault code
ST	Fault starting time
ET	Fault ending time

SET

Reset the inverter parameters by selecting SET Passwords are needed for the setting, which only can be operated by after sales personnel to make sure the safety and normal operation of the inverter.



Clear Record

Clear inverter's Error record and Run records. Passwords are needed for the setting, which only can be operated by after sales personnel to make sure the safety and normal operation of the inverter.

Date & Time SET

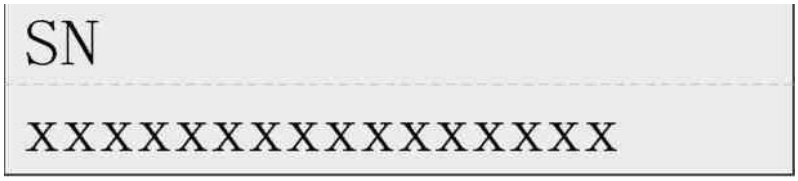
Press Ent to Date and Time setting interface. Press UP and DOWN to adjust number and press ESC go to next step. Set year, month, day, hour and minute one by one according to local time. Press ENT save and back to main interface.

RS485 Setting

485 address shows communication address and baud rate. Press ENT to enter communication address setting interface; press UP and DOWN to change values; Press ENT to confirm.

SN

It shows inverter's serial number.



Set Power Ctrl

This item is for setting grid-connecting power limitation. Press ENT to enter control selection interface. Press UP and DOWN to choose start-up or use forbidden, then press ENT to confirm; Press ENT to enter

8.3 LCD Back light Control

The back light of LCD will automatically turn off after 5 minutes, and LCD will automatically turn off after 10 minutes to electricity-saving mode. Press any key to turn on the LCD.

9 Trouble Shooting

In most situations, the inverter requires very little service. However, if inverter is not able to work perfectly, we recommend the following solutions for quick troubleshooting.

Residential Series

Error display	Possible causes	Corresponding measures
GFCI Device Fault	Leakage current sensor fault	Please contact with local dealer if error remains the same after several reset.
		1.Disconnect the input/output switch, check the AC-side wiring
Bus High Fault	1.AC side incorrect wiring 2.Machine failure	and reset the plug to rule out bad contact. 2.Please contact with local dealer if error remains the same after several reset.
		1.Disconnect the input/output switch, check the AC-side wiring
	1.AC side incorrect wiring	and reset the plug to rule out bad contact.
	2.Trip, switching capacity on	2.Replace switch;
No Utility	grid-side is too small3 -.	3.After electricity grid returns to normal, the machine will
	Electricity grid abnormal	automatically restart;
	4.Machine failure	4.Please contact with local dealer if error remains the same after several reset.
		1.Check PV(+) and PV(-) ground impedance , make
Ground	1.PV(+) or PV(-)	sure impedance is more than 2MOhm ;

Current	earthing	
Fault	2.Machine failure	2.Please contact with local dealer if error remains the same after several reset.
		1.Disconnect the input/output switch, check the AC-side wiring
Bus Fault	AC side incorrect wiring	and reset the plug to rule out bad contact.
	Machine failure	2.Please contact with local dealer if error remains the same
		after several reset.
		1.Disconnect the input/output switch, check the AC-side wiring
Over Current	1..AC side incorrect wiring 2.Electricity grid abnormal 3.Machine failure	and reset the plug to rule out bad contact. 2.After electricity grid returns to normal, the machine will automatically restart; 3.Please contact with local dealer if error remains the same after several reset.
	1.The machine is exposed to	
	sun.	1. Lower machine surrounding temperature or move it to a
Over Temperature	2.the ambient temperature is	lower temperature place.
Fault	too high 3% Machine failure	2.Please contact with local dealer if error remains the same after several reset.
	1.Start-up voltage of panels	1 Adjust the panel configuration to lower the input voltage.
PV Over Fault	is too high	2.Please contact with local dealer if error remains the same
	2.Machine failure	after several reset.
M Grid Volt Fault	1.AC side incorrect wiring 2.Electricity grid abnormal 3.Machine failure	1.Disconnect the input/output switch, check the AC-side wiring and reset the plug to rule out bad contact. 2.After electricity grid returns to normal, the machine will automatically restart; 3.Please contact with local dealer if error remains the same after several reset.
Isolation Fault	1.PV(+) or PV(-) earthing	1..Check PV(+) and PV(-) ground impedance , make sure impedance is more

	2.Lightening 3.Machine failure	than 2M& ; 2.Please contact with after-sales if error remains the same after several reset.
Current DC Offset	1.AC side incorrect wiring 2.Electricity grid abnormal 3.Machine failure	1.Disconnect the input/output switch, check the AC-side wiring and reset the plug to rule out bad contact. 2.After electricity grid returns to normal, the machine will automatically restart; 3.Please contact with local dealer if error remains the same after several reset.
ENS Grid F Fault	1.AC side incorrect wiring 2.Grid frequency abnormal 3.Machine failure	1.Disconnect the input/output switch, check the AC-side wiring and reset the plug to rule out bad contact. 2.After electricity grid returns to normal, the machine will automatically restart; 3.Please contact with local dealer if error remains the same after several reset.
ENS Grid V Fault	1.AC side incorrect wiring 2.Grid voltage abnormal 3.Machine failure	1.Disconnect the input/output switch, check the AC-side wiring and reset the plug to rule out bad contact. 2.After electricity grid returns to normal, the machine will automatically restart; 3.Please contact with local dealer if error remains the same after several reset.
Relay 1/2 Fault	1.Machine failure	1.Please contact with local dealer if error remains the same after several reset.
M Grid Freq Fault	1.Electricity grid fluctuations 2.Electricity grid Frequency out of range 3.Machine failure	1.After electricity grid returns to normal, the machine will automatically restart; 2.Please contact with local dealer if error remains the same after several reset.
Manual Reset: disconnect the input / output switch in turn ,wait until the display and LED do not light up,then turn on and off input /output switch. turn, wait until the display and LED do not light up, then turn on		

Small Commercial Series

Error display	Possble causes	Corresponding measures

EepromErr	1.Unstable PV Input voltage 2. Machine Failure	1.After PV input voltage is stabilized, the machine will automatically restart. 2. Please contact with local dealer if error remains the same after several reset.
GFCI.Err	1.PV(+) or PV(-) earthing 2.Machine Failure	1.Check PV(+) and PV(-)ground impedance, make sure impedance is more than 2M Q. 2.Please contact with local dealer if error remains the same after several reset.
GridF.OutLim	Electricity grid fluctuations	1. After electricity grid returns to normal,the machine will automatically restart.
	Electricity grid Frequency out of range	2.Please contact with local dealer if error remains the same after several reset.
	Machine failure	
GridV.OutLim	1. Off Phase	1.Disconnect the input/output switch, check the AC-side wiring and reset the plug to rule out bad contact.
	2.Electricity grid Phase/line voltage	
	overload	2.After electricity grid returns to normal, the machine will automatically restart.
	3.electricity grid Voltage unbalance	3.Please contact with local dealer if error remains the same after several reset.
IntFaultA	Machine failure	Please contact with local dealer if error remains the same after several reset.
IntFaultB	1.PV input voltage is too high	1..Adjust the panel configuration to lower the input voltage.
	2.Electricity grid abnormal	2.After electricity grid returns to normal, the machine will automatically restart.
	3.Bus hardware overvoltage fault	3.Please contact with local dealer if error remains the same after several reset.
IntFaultC	Electricity grid abnormal	1.After electricity grid returns to normal, the machine will
	Unbalanced current fault	automatically restart. 2.Please contact with local dealer if error remains the same after several reset.
IntFaultD	1.Electricity grid abnormal	1.After electricity grid returns to normal, the machine will
	2.Software over current fault	automatically restart. 2.Please contact with local dealer if error remains the

		same after several reset.
IntFaultE	1.Electricity grid abnormal	1.After electricity grid returns to normal, the machine will automatically restart.
	2.Hardware over current fault	2.Please contact with local dealer if error remains the same after several reset.
IntFaultG	1.Electricity grid abnormal	1.After electricity grid returns to normal, the machine will automatically restart.
	2.DCI too high	2.Please contact with local dealer if error remains the same after several reset.
IntFaultJ	Relay failure	Please contact with local dealer if error remains the same after several reset.
IntFaultK	1.Electricity grid abnormal	1.After electricity grid returns to normal, the machine will automatically restart.
	2.Bus differential fault	2.Please contact with local dealer if error remains the same after several reset.
IntFaultL	1.Electricity grid abnormal	1.After electricity grid returns to normal, the machine will automatically restart.
	2.Low Bus voltage fault	2.Please contact with local dealer if error remains the same after several reset.
IntFaultM	1.Electricity grid abnormal	1.After electricity grid returns to normal, the machine will automatically restart.
	2.High Bus voltage fault	2.Please contact with local dealer if error remains the same after several reset.
IntFaultN	Internal hardware fault	Please contact with local dealer if error remains the same after several reset.
IntProtectA	Offset current protection	Please contact with local dealer if error remains the same after several reset.
IntProtectB	Relay protection	Please contact with local dealer if error remains the same after several reset.
IntProtectC	Over current protection	Please contact with local dealer if error remains the same after several reset.
IntProtectD	I.PVside high current	1.Adjust the panel configuration to lower the input current.
	2.Boost over current protection	2.Please contact with local dealer if error remains the same after several reset.
IntProtectE	1.Electricity grid abnormal	1.After electricity grid returns to normal, the machine will automatically restart.
	2.Soft start overtime protection	2.Please contact with local dealer if error remains the same after several reset.
IntProtectF	When direct current is	Please contact with local dealer if error remains the

	at low	same after several reset.
	voltage, Soft start overtime protection.	
IntProtectG	Bus voltage differential protection	Please contact with local dealer if error remains the same after several reset.
IntProtectH	Low Bus voltage protection	Please contact with local dealer if error remains the same after several reset.
IntProtectI	High Bus voltage protection	Please contact with local dealer if error remains the same after several reset.
IntProtectI	Inverter bridge protection	Please contact with local dealer if error remains the same after several reset.
IntProtectK	Bus hardware overvoltage	Please contact with local dealer if error remains the same after several reset.
	protection	
IntProtectL	Power module protection	Please contact with local dealer if error remains the same after several reset.
IntProtectM	1.electricity grid unbalance	1.After electricity grid returns to normal, the machine will automatically restart.
	2.Unbalanced current protection	2.Please contact with local dealer if error remains the same after several reset.
IntProtectN	1.Electricity grid abnormal	1.After electricity grid returns to normal, the machine will automatically restart.
	2.Hardware	
	overcurrentprotection	2.Please contact with local dealer if error remains the same after several reset.
IntProtectO	MCU protection	Please contact with local dealer if error remains the same after several reset.
IntProtectP	Frequency fault protection	Reset grid frequency in accordance to local grid standard
IntProtectQ	DCI too high protection	Please contact with local dealer if error remains the same after several reset.
IntProtectR	DCI offset protection	Please contact with local dealer if error remains the same after several reset.
IntProtectS	Voltage offset protection	Please contact with local dealer if error remains the same after several reset.
IntProtectT	PV over current protection	Please contact with local dealer if error remains the same after several reset.
IntProtectU	Internal hardware abnormal	Please contact with local dealer if error remains the same after several reset.

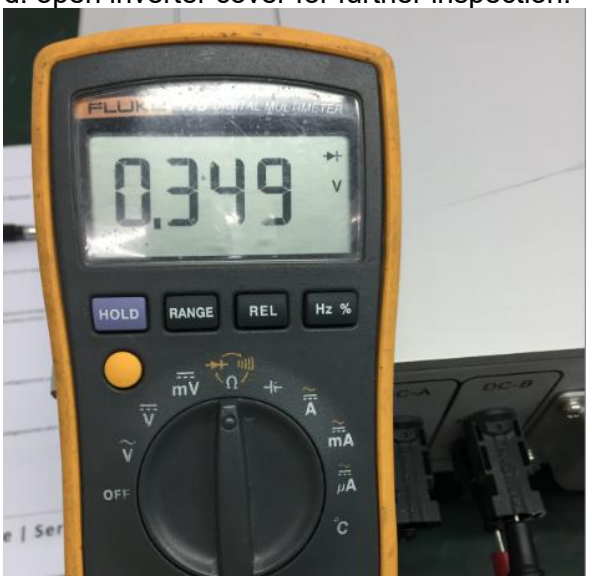
	protection	
IsolationErr	1.PV(+) or PV(-) earthing 2.Lightening 3.Machine failure	1.Check PV(+) and PV(-) ground impedance, make sure impedance is more than 2MQ.
		2.Please contact with after-sales if error remains the same after several reset.
PV. Reverse	1.PV polarity reverse protection	1.Turn off input/output switch,check if pv polarity is correct or
	2.Machine failure	not, for troubleshooting. 2.Please contact with after-sales if error remains the same after several reset.
PWoltOver	PV The input voltage is too high	1. Adjust the panel configuration to lower the input voltage. 2.Please contact with local dealer if error remains the same after several reset.
SPICommErr	SPI communication error	Please contact with local dealer if error remains the same after several reset.
TempOver	1.The machine is exposed to sun.	1. Lower machine surrounding temperature or move it to a lower
	2.the ambient temperature is too	temperature place.
	high	2. Remove foreign matter.
	3. The heat sink or fan blocked by	3.Please contact with local dealer if error remains the same after several reset.
	Foreign matter 4.Machine failure	
TempSensorErr	Abnormal temperature sensor	Please contact with local dealer if error remains the same after several reset.
ExtFanErr	1.Fan blocked by foreign matter	1.Remove foreign matter.
	2.Machine failure	2.Please contact with local dealer if error remains the same after several reset.
IntFanErr	Internal fan fault	Please contact with after-sales if error remains the same after several reset.

- Restart: Disconnect input and output switches in order, reconnect them after LCD and indicating lights go off.
- If there is no display on the LCD, please check both AC and DC wiring.
- If the input DC voltage is higher than start up voltage, the inverter still doesn't work, please call local service.
- If it is intended to replace the cable or open the enclosure lid, please call our service.
- Under the low light conditions, the inverter may continuously start up and shut down. It is due to insufficient power generated to operate the control circuits.

10 Inverter Inspection and Repair

10.1 LCD cannot Display

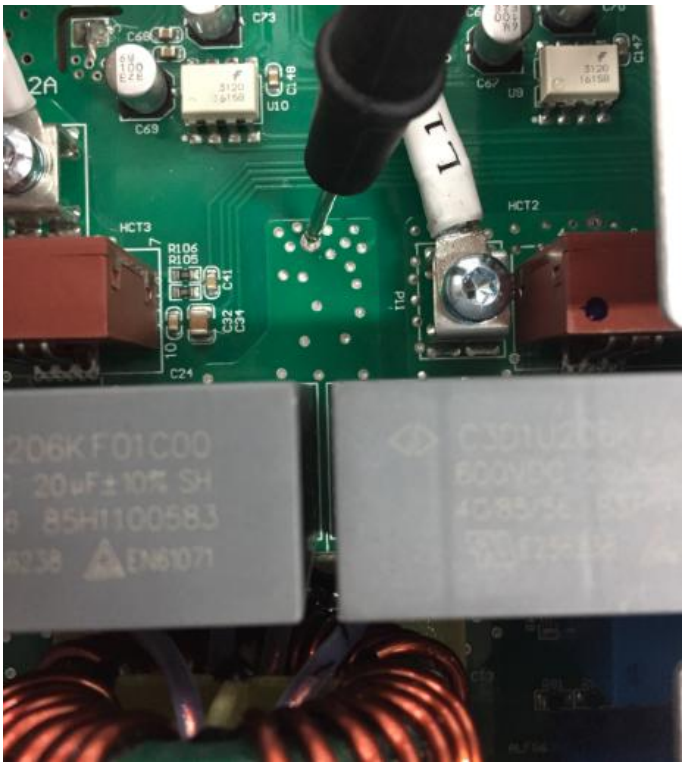
For the 5th generation models(DC side power supply)
a. check DC switch is at 'ON' position;
b. check if short-circuit between DC input '+' and '-' connector;
c. measure the diode value between DC input '+' and '-' connector within normal range(0.34~0.4V);
d. open inverter cover for further inspection.

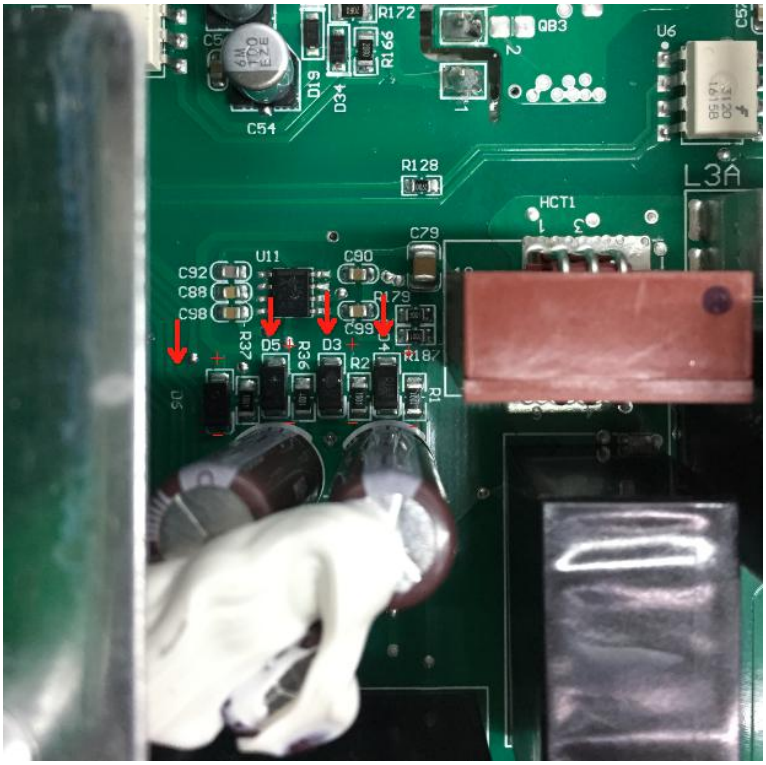


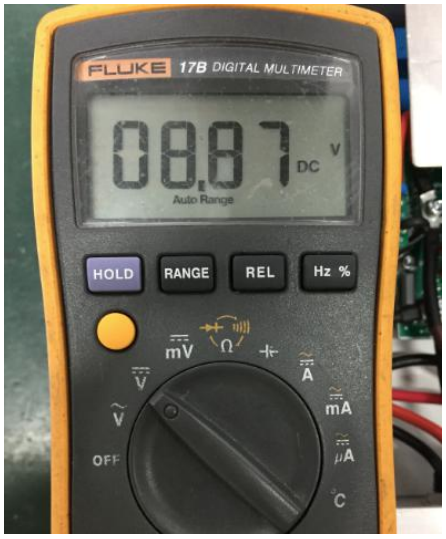
10.2 LCD display Fault Codes

10.2.1 Frequently report E12 Fault code(Over Current)
a. open inverter cover for visual inspection, check if the hardware have obviously damage;
b. if the hardware have no obviously damage, upgrade the firmware to the latest version;
c. connect the DC and AC for operation test.
10.2.2 E24(Relay Fault) Report
For the 5th generation models
Measure the power supply of relay,

a. for single MPPT model, diode position number, D35, D36, D37 and D38;
b. for dual MPPT model, diode position number, D3, D4, D5 and D6;
c. hold the probe(black) at the position below, and use the other probe(red) to measure the diode's positive(+) separately as per below picture. The normal value is 8V;
d. hold the probe(black) at the position below, and use the other probe(red) to measure the diode's negative(-) separately as per below picture. The normal value is 15V.







Relay function test
Power the pin of rely with 12Vdc source to see if the rely could work.

10.2.3 Others Fault Report
LCD display abnormal
Replace the LCD module.

10.2.4 WiFi Cannot Upload data
connect inverter's WIFI with smart-phone, and go to 10.10.100.254 website via smart-phone's explorer.
a. reset the WiFi module to the default setting;
b. connect the WiFi of inverter and setting the connection with wireless router;
c. check if the inverter's WIFI card have been assigned IP address;
b. check the inverter's power generation date or serial information displayed through the web page.
c. check the WIFI signal is strong enough.

10.3 Check list of Visual Inspection

10.3.1 wiring connection check
a. flat cable and connector well connected;
b. connector and socket well connected;
c. connection points of DC and AC well connected;
d. DC switch pins well connected;
e. PV connector inside conductor at right position.

10.3.2 PCB or components check
a. if has flavour of short-circuit;
b. if has mark of short-circuit;
c. if the capacitor has liquid leakage or bulge;
d. other abnormal;

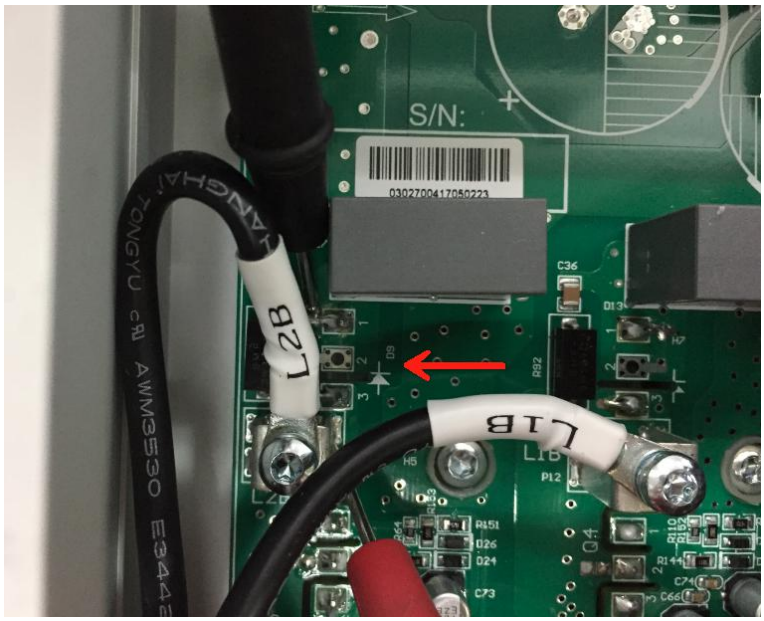
10.4 Power Components Inspection(without DC power supply)

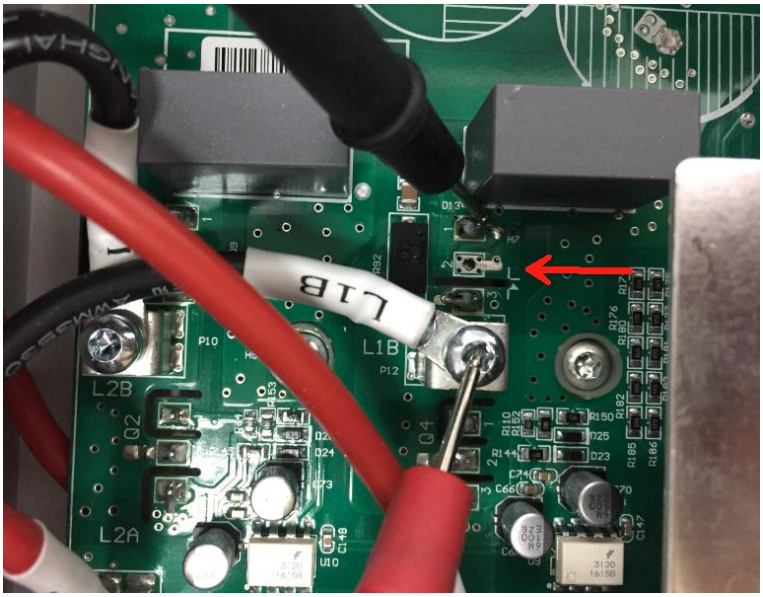
10.4.1 Power diode
a. single diode

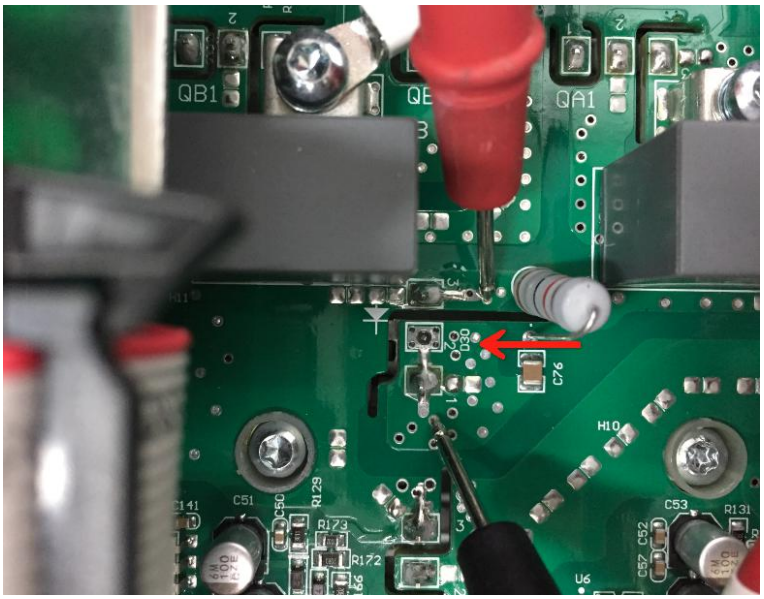
b. dual-diode

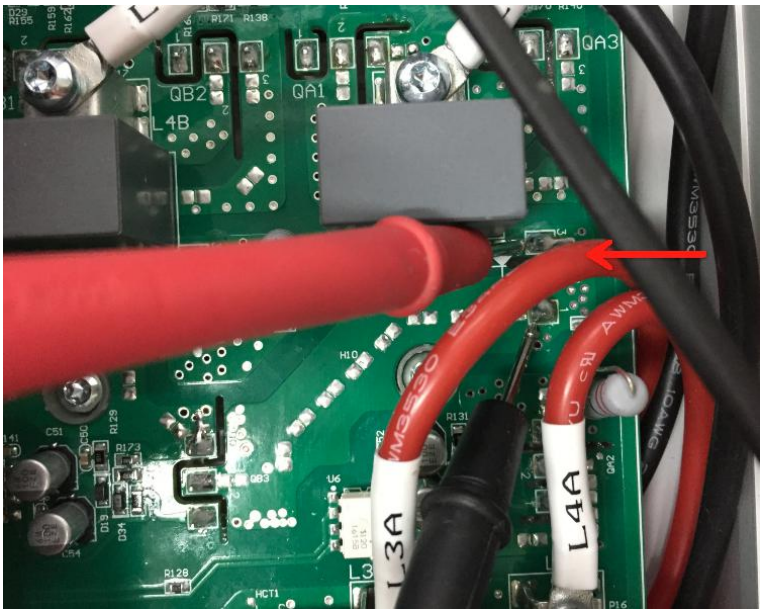
Switch to the diode position of multimeter, please notice the '+' and '-'. The normal value is 0.33~0.37V('+' with '-'), ∞ ('-' with '+'). And specific value could compare with normal inverter. Value close to the zero or bigger than normal range stands the diode is damaged.

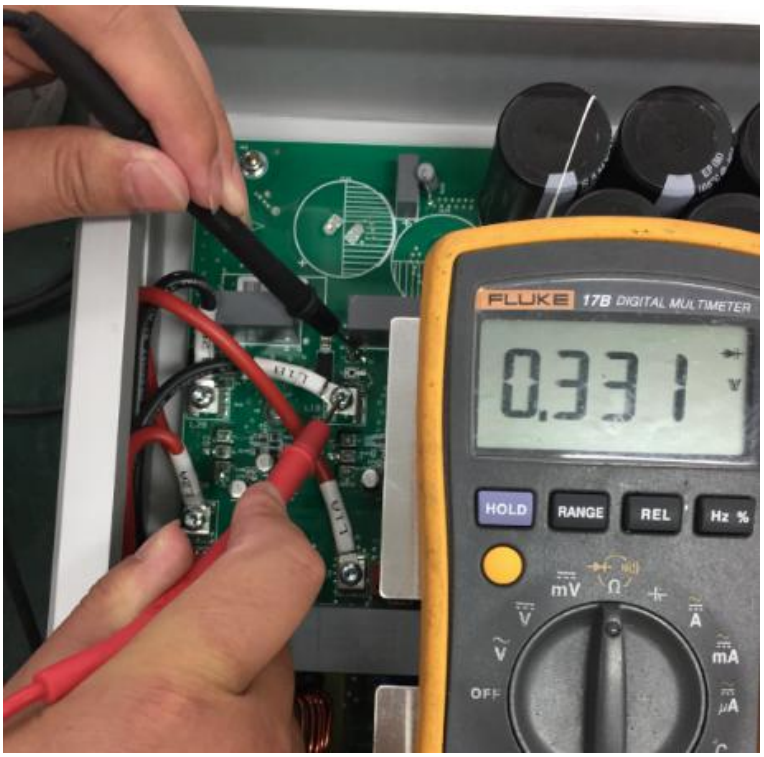
For the 5th generation models(total 4 measure positions)


S/N:
L2B
L1B


L1B
L2B
L1B
L2A

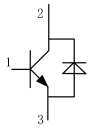

QB1
QA1
H10
C51
C53
R129
R173
R172
U6


QA3
QB2
QA1
L4B
H10
L3A
L4A
U6



10.4.2 IGBT / MOSFET

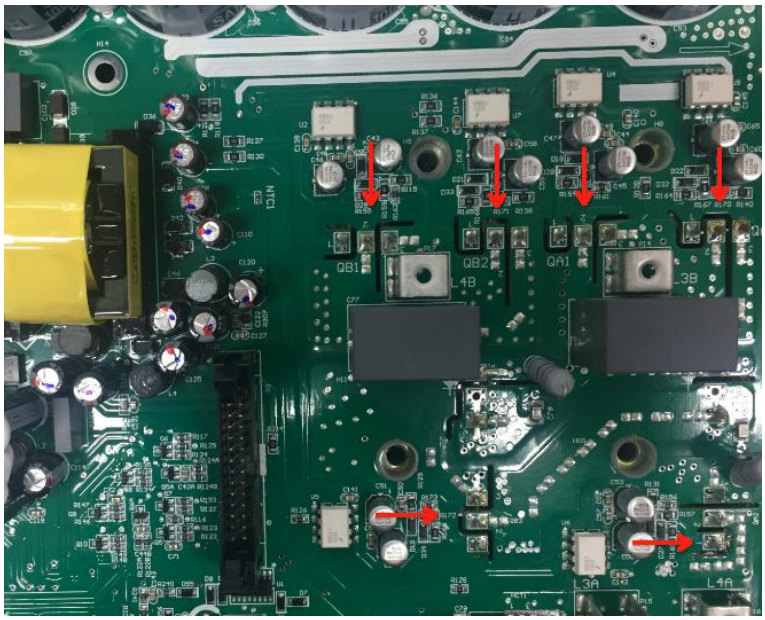
a. IGBT

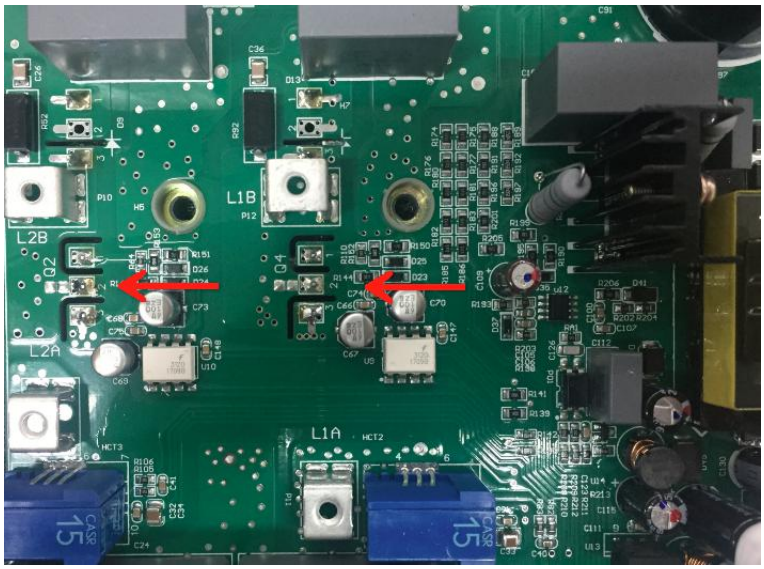


b. MOSFET

a. switch to the diode position of multimeter, and measure the value between Pin 3 and Pin 2, normal value is 0.3~0.4V. Value close to the zero stands the component is damaged;
b. the normal resistance between Pin 2 and Pin 3 should be infinity(∞), value close to the zero stands the component is damaged;
c. check if the short-circuit between Pin 1 and Pin 2, Pin 2 and Pin 3.

For the 5th generation models(total 8 measure positions)



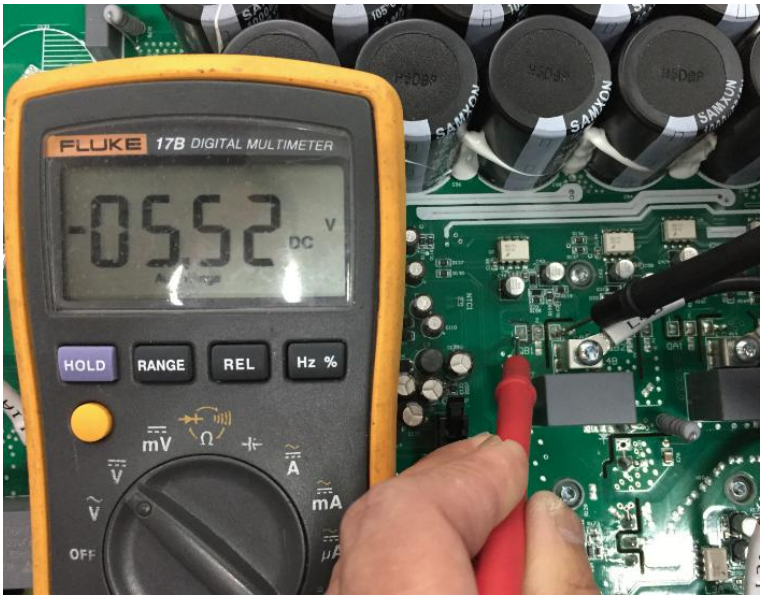


10.4.3 Component Position Number

Power Diode Position Number
5th Generation Single MPPT
D1
5th Generation Dual-MPPT
D9, D13, D30, D31
IGBT/MOSFET Position Number
5th Generation Single MPPT
Q2, QA1, QA2, QA3, QB1, QB2, QB3
5th Generation Dual-MPPT
Q2, Q4, QA1, QA2, QA3, QB1, QB2, QB3

10.5 MOSFET Driver Inspection(for 5th generation models)

Remove the control board and control board mounting pad. Power the inverter with 100Vdc source and wait about 15 seconds. Measure the voltage of all of the MOSFET Pin 1 and Pin 3 separately, the normal driver voltage is -5Vdc. If the voltage abnormal, it stands the power PCB is damaged.



10.6 Grid-connection Test

10.6.1 Input DC voltage set lower than grid connection start threshold, with AC connected. And check the voltage signals on the display board is normal.

10.6.2 Input DC voltage set at 200Vdc, with AC connected. And check the analog signals on the display board is normal.

10.7 Inverter Frequently Tripping Due to Grid Fluctuation

10.7.1 Check the grid voltage with multimeter if voltage range goes below or beyond of -20% to +10% then check the Vmin and Vmax setting in inverter by selecting SET menu as mention below.

10.7.2 Press enter key for two time and menu is open which shows Inverter Info (Fig.1)and by up-down key select the SET menu (Fig.2).

Fig.1

Fig. 2

10.7.3 Select the SET menu by enter key and you will get the display as mention in Fig. 3 and by up-down key select the VOLTAGE RANGE menu as shown in fig 4.

Fig.3

Fig.4

10.7.4 Select the VOLTAGE RANGE menu by enter key and enter the password as shown in Fig.5.

Fig. 5

10.7.5 Adjust the voltage range of Vmin and Vmax by up-down key and set it at Vmax:270V and Vmin:180V as shown in Fig.6.

Fig.6

11 Contact

Please do not hesitate to contact us for any technical problems you have. Please be sure to provide the following information in order to obtain necessary assistance:

- Inverter type
- Inverter serial number
- Inverter SN Number
- Customer Information

The contents of this manual are subject to change without further notice. For Rotosol latest product information, please visit our website **www.rotosol.solar**

Rotosol Solar(Division of Solar – Rotomag motors and controls pvt ltd.)

www.rotosol.solar

ADD: 2102/3 & 4 ,Vitthal Udhyognagar

Near Anand, Gujarat – 388121 , India

Phone : +91-9227110023/24/25

E-MAIL: invert@rotosol.solar

Website : www.rotosol.solar

Annex Warranty Terms (Overseas)

Rotosol Solar(Division of Solar – Rotomag motors and controls pvt ltd.) Product Warranty Terms

1.Product Quality Standards and Warranty

Rotosol inverters comply with local safety regulations related to the national grid and grid standards. The inverter warranty is decided by Rotosol and its distributor.

Spare parts warranty is valid 3 months (beginning from the date of shipment), during the warranty period, Rotosol is responsible for the replacement.

Spare Parts	
NO.	Item
1	DC PV Connector (MC4)
2	AC Connector
3	Fuse
4	Enclosure

The monitoring module warranty is valid for 12 months (beginning from the date of shipment).
After the products leaving the factory, the appearance damage (scratches, rust, chemical damage) is beyond warranty.

2.Warranty Exceptions

Damage or lose to inverter or accessory caused by logistics.

Inverter failure caused by non-compliance with national utility grid standard which lead to eg. abnormal grid voltage, grid frequency etc.

Inverter malfunction or damage caused by non-professional or non-qualified personnel

Failure to observe the user manual, the installation guide, and the maintenance regulations

Remove or damage warranty seal

Change or remove specification label, serial number (SN)

Product malfunction or damage due to disobey to relevant laws and regulations or technical requirements in power plant design, construction or installation works

Solar panels' input parameters exceed the inverter's allowed range

Product malfunction or damage due to installation on movable device or in vibration occasions

Failure or damage caused by corrosion, lightning and other natural damage or force majeure

Unauthorized alteration or disassembly of the product

Damage or malfunction caused by other facilities eg. Surge damage caused by switching on/off high power generator

Low electricity generation because of inverter self-protection caused by environmental reasons (such as the installation environment, natural environment, grid environment, etc.) is not a quality problem.

3.Repair and Replacement

3.1 When a failure occurs, the user should check and record from the screen display the error code, DC voltage, AC voltage data or phenomena ect., then contact your local dealer.

When the dealer or Rotosol confirm that it is the product quality problem ,the faulty product will be replaced.

For the product has been replaced or repaired, the remaining warranty entitlement will be transferred to the replacement or repaired device

Rotosol is only responsible for the company's products troubleshooting, repair and replacement, but doesn't assume any other special damages, consequential damages, incidental damages (including loss of profits, loss of goodwill, loss of business reputation loss or delay, etc.).

This warranty does not affect the customer's enjoyment of any other rights laws and regulations relating to sales of consumer goods provided for in the host country or region.

4.Service Contact

Customers could contact local dealer or distributor to discuss how to proceed. Please visit www.rotosol.solar for dealer/installer's contact details. Of course, customers may also contact Rotosol f they need help or advice.

5. Force Majeure

Force majeure is not artificially unavoidable and insurmountable objective conditions. In addition, it is the loss that even if the use of methods of prevention and attention, cannot prevent. It includes the following:

earthquakes, floods, fires, storms and other natural disasters.
war, invasion, blockade and other hostile armed actors.
revolution, rebellions, riots.
strike.
collection, prohibition, and other provisions of the government's actions.
infectious diseases.
third-party negligence and wrongdoing which Manufacturers cannot
control h) others

6. For above, Rotosol will not bear any responsibility. Please be noted.

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Objective of this Manual:

The objective of this manual is to educate the user for proper installation and the system to be use