

PV Grid Tie Inverter

Solis Three Phase Inverter

For model Solis-60K-4G, Solis-70K-HV-4G

Installation and Operation Manual



Ningbo Ginlong Technologies Co., Ltd.

No. 57 Jintong Road, Binhai Industrial Park, Xiangshan, Ningbo,
Zhejiang, 315712, P.R.China.

Tel: +86 (0)574 6578 1806

Fax: +86 (0)574 6578 1606

Email: info@ginlong.com

Web: www.ginlong.com

Please adhere to the actual products in case of any discrepancies in this user manual.

If you encounter any problem on the inverter, please find out the inverter S/N
and contact us, we will try to respond to your question ASAP.



© Ningbo Ginlong Technologies Co., Ltd

Important notes

- Product specifications are subject to change without notice. Every attempt has been made to make this document complete, accurate and up-to-date. Individuals reviewing this document and installers or service personnel are cautioned, however, that Ginlong Technologies reserves the right to make changes without notice and shall not be responsible for any damages, including indirect, incidental or consequential damages caused by reliance on the material presented including, but not limited to, omissions, typographical errors, arithmetical errors or listing errors in the material provided in this document.
- Ginlong Technologies accepts no liability for customers' failure to comply with the instructions for correct installation and will not be held responsible for upstream or downstream systems Ginlong's equipment has supplied.
- The customer is fully liable for any modifications made to the system; therefore, any hardware or software modification, manipulation, or alteration not expressly agreed with the manufacturer shall result in the immediate cancellation of the warranty.
- Given the countless possible system configurations and installation environments, it is essential to verify adherence to the following:
 - There is sufficient space suitable for housing the equipment.
 - Airborne noise produced depending on the environment.
 - Potential flammability hazards.
- Ginlong Technologies will not be held liable for defects or malfunctions arising from:
 - Improper use of the equipment.
 - Deterioration resulting from transportation or particular environmental conditions.
 - Performing maintenance incorrectly or not at all.
 - Tampering or unsafe repairs.
 - Use or installation by unqualified persons.
- This product contains lethal voltages and should be installed by qualified electrical or service personnel having experience with lethal voltages.

Content

1. Introduction	3
1.1 Product Description	3
1.2 Packaging List	4
2. Safety Instructions	5
2.1 Safety Symbols	5
2.2 General Safety Instruction	5
2.3 Notice For Use	6
3. Overview	7
3.1 Inverter Interface Instructions	7
3.2 LED Status Indicator Light	7
3.3 Keypad	8
3.4 LCD	8
4. Product handling and storage	9
4.1 Product Handling	9
4.2 Product Storage	10
5. Installation	11
5.1 Select a Location for the Inverter	11
5.2 Mounting the Inverter	13
5.3 Electrical Connections	15
5.3.1 Protective ground wire connection(PE)	16
5.3.2 DC side connection	18
5.3.3 AC side connection	20
5.3.4 Max. over current protection device (OCPD)	23
5.3.5 Inverter monitoring connection	23
5.3.5.1 RS485 Communication connection	24
6. Start and Stop	27
6.1 Start the Inverter	27
6.2 Stop the Inverter	27
7. General Operation	28
7.1 Main Menu	28
7.2 Information	28
7.2.1 Lock screen	30

Content

7.3 Setting	30
7.3.1 Setting Time	30
7.3.2 Setting Address	30
7.4 Advanced Info - Technicians Only	31
7.4.1 Alarm Message	31
7.4.2 Running Message	32
7.4.3 Version	32
7.4.4 Daily Energy	32
7.4.5 Monthly Energy and Yearly Energy	32
7.4.6 Daily Record	33
7.4.7 Communication Data	33
7.4.8 Warn Message	33
7.5 Advanced Settings - Technicians Only	34
7.5.1 Select Standard	34
7.5.2 Grid ON/OFF	35
7.5.3 Clear Energy	35
7.5.4 Reset Password	36
7.5.5 Power Control	36
7.5.6 Calibrate Energy	36
7.5.7 Special Settings	37
7.5.8 STD. Mode Settings	37
7.5.9 Restore Settings	38
7.5.10 HMI Updater	38
7.5.11 Restart HMI	38
7.5.12 Debug Parameter	39
7.5.13 Fan Test	39
7.5.14 Power Parameter	40
8. Maintenance	41
8.1 Fan Maintenance	41
9. Trouble Shooting	43
10. Specification	48

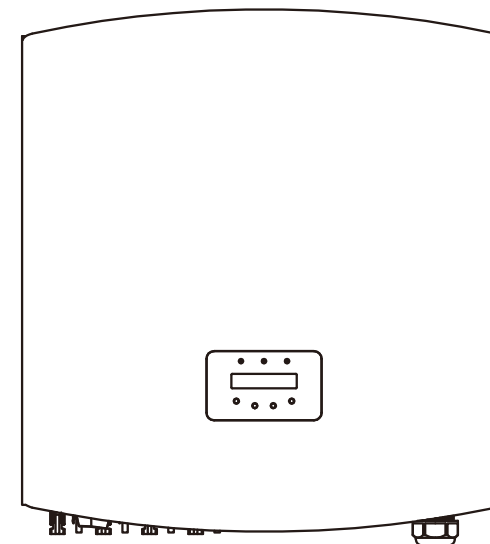
1. Introduction

1.1 Product Description

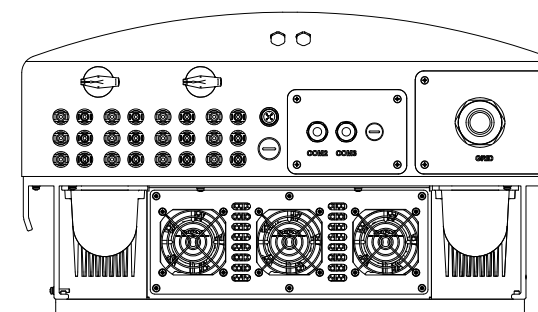
Solis three phase series PV inverters convert direct current (DC) power from the photovoltaic (PV) array into alternating current (AC) power to satisfy local loads as well as feed the power distribution grid.

There are 2 models for Solis three phase inverter:

Solis-60K-4G Solis-70K-HV-4G



▲ Figure 1.1 Front view

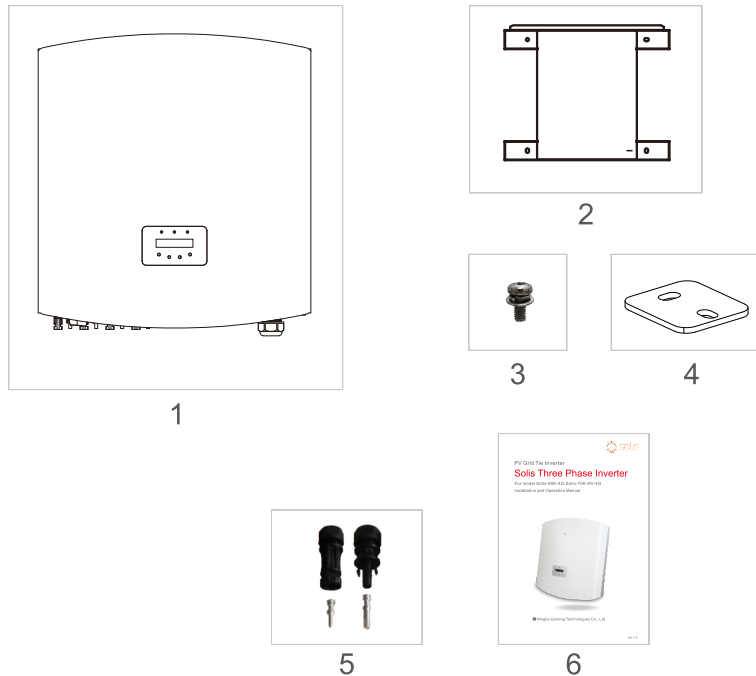


▲ Figure 1.2 Bottom view

1. Introduction

1.2 Packaging List

Please check according to following table, to see whether all the parts were included in the packaging:



Part NO.	Description	Number
1	PV grid tie Inverter	1
2	Wall mounting bracket	1
3	Locking screws	4
4	Locking sheet	2
5	DC connectors	12pairs
6	Manual	1

▲ Table 1.1 Material list

2. Safety Instructions

Improper use may result in potential electric shock hazards or burns. This manual contains important instructions that should be followed during installation and maintenance. Please read these instructions carefully before use and keep them for future reference.

2.1 Safety Symbols

Safety symbols used in this manual, which highlight potential safety risks and important safety information, are listed as follows:



WARNING:

WARNING symbol indicates important safety instructions, which if not correctly followed, could result in serious injury or death.



NOTE:

NOTE symbol indicates important safety instructions, which if not correctly followed could result in some damage or the destruction of the inverter.



CAUTION :

CAUTION, RISK OF ELECTRIC SHOCK symbol indicates important safety instructions, which if not correctly followed, could result in electric shock.



CAUTION:

CAUTION, HOT SURFACE symbol indicates safety instructions, which if not correctly followed, could result in burns.

2.2 General Safety Instructions



WARNING:

DC input and AC output must be electrically isolated before operation. DO NOT connect PV array positive (+) or negative (-) to the ground. To do so may cause serious damage to the inverter.



WARNING:

Electrical installations must be done in accordance with the local and national regulatory and electrical safety standards.

2. Safety Instructions



WARNING:

To reduce the risk of fire, over-current protective devices (OCPD) are required for circuits connected to the Inverter. The recommended rated trip current of OCPD is show in 5.3.4.



CAUTION:

Risk of electric shock. Do not remove cover. Refer maintenance servicing to qualified and accredited service technician.



CAUTION:

The PV array (Solar panels) supplies a DC voltage when it is exposed to light.



CAUTION:

Risk of electric shock from energy stored in capacitors of the Inverter. Do not remove cover until 5 minutes after disconnecting all sources of supply. Service technician only. Warranty may be voided if any unauthorized removal of cover.



CAUTION:

The surface temperature of the inverter can exceed 75°C (167F). To avoid risk of burns, DO NOT touch the surface when inverter is operating. The inverter must be installed out of reach of children.

2.3 Notice For Use

The inverter was designed in accordance with relevant safety regulations to meet end user's demands. The usage of inverter and installation should meet the following requirement:

1. Secure inverter installation is required.
2. The inverter must be connected to a separate grounded AC group, to which no other electrical equipment is connected.
3. The electrical installation must meet all the applicable regulations and standards.
4. The inverter must be installed according to the instructions stated in this manual.

3. Overview

5. The inverter must be installed according to the correct technical specifications.
6. To startup the inverter, the Grid Supply Main Switch (AC) must be switched on, before the solar panel's DC isolator switched on. To stop the inverter, the Grid Supply Main Switch (AC) must be switched off before the solar panel's DC isolator switched off.
7. DC input voltage of inverter must less than its maximum input voltage of inverter.

3.1 Inverter Interface Instructions



▲ Figure 3.1 Front Panel Display

3.2 LED Status Indicator Lights

There are three LED status indicator lights on the front panel of the inverter. On the Left: POWER LED indicates the power status of the inverter. In the Middle: OPERATION LED (green) indicates the operation status. On the Right: ALARM LED (yellow) indicates the alarm status. Please see Table 3.1 for details.

3. Overview

Light	Status	Description
● POWER	ON	The inverter can detect DC power.
	OFF	No DC power or low DC power.
● OPERATION	ON	The inverter is operating properly.
	OFF	The inverter has stopped supplying power.
	FLASHING	The inverter is initializing.
● ALARM	ON	Alarm or fault condition is detected.
	OFF	The inverter is operating properly.

▲ Table 3.1 Status indicator

3.3 Keypad

There are four keys in the front panel of the Inverter(from left to right): ESC, UP, DOWN and ENTER keys. The keypad is used for:

- Scrolling through the displayed options (the Up and the Down keys).
- Access to modify the adjustable settings (the ESC and the ENTER keys).

3.4 LCD

The two-line Liquid Crystal Display (LCD) is located on the front panel of the Inverter, which displays the following information:

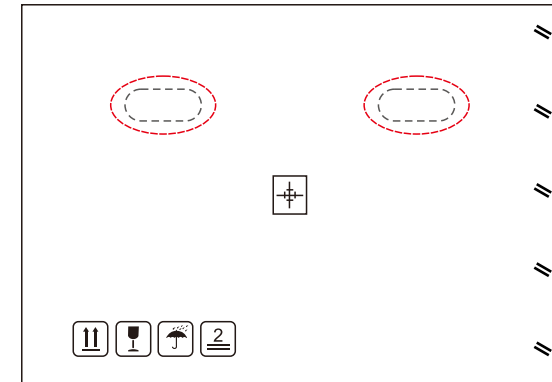
- 1. Inverter operation status and data;
- 2. Service messages for operator;
- 3. Alarm messages and fault indications.

4. Product handing and storage

4.1 Product handing

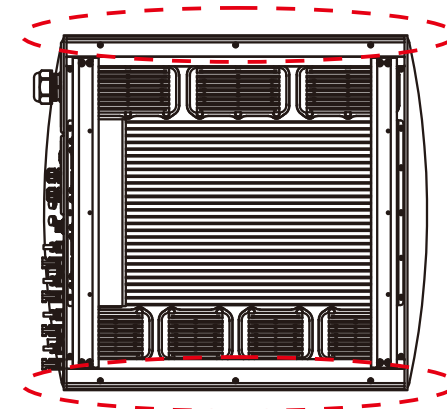
Refer to Figure 4.1 and below for instruction on handling the inverter.

1. The red marks below indicate perforations used to form handles for carrying the carton with the inverter. The inverter requires 2 people to lift and carry.



▲ Figure 4.1 move the inverter

2. Two people are required to remove the inverter from the carton. Handles are formed into the heatsink for ease of handling the inverter. See figure 4.2 below.



▲ Figure 4.2 Inverter handles

4. Installation

5. Installation

4.2 Product Storage

If the inverter is not to be installed immediately, storage instructions and environmental conditions are below:

- Use the original box to repackage the inverter, seal with adhesive tape with the desiccant inside the box.
- Store the inverter(s) in a clean and dry place, free of dust and dirt.
- Storage temperature must be between -40°C and 70°C and the humidity should be between 0 and 100% non-condensing.
- Stack no more than four (4) inverters high.
- Keep box(es) away from corrosive materials to avoid damage to the inverter enclosure.
- Inspect packaging regularly. If packaging is damaged(wet, pest damage, etc), repackage the inverter immediately.
- Store the inverter(s) on a flat, hard surface - not inclined or upside down.
- After long-term storage, the inverter needs to be fully examined and tested by qualified service or technical personnel before using.
- Restarting after a long period of non-use requires the equipment to be inspected and, in some cases, the removal of oxidation and dust that has settled inside the equipment will be required.

5.1 Select a Location for the Inverter

When selecting a location for the inverter, consider the following:



WARNING: Risk of fire

Despite careful construction, electrical devices can cause fires.

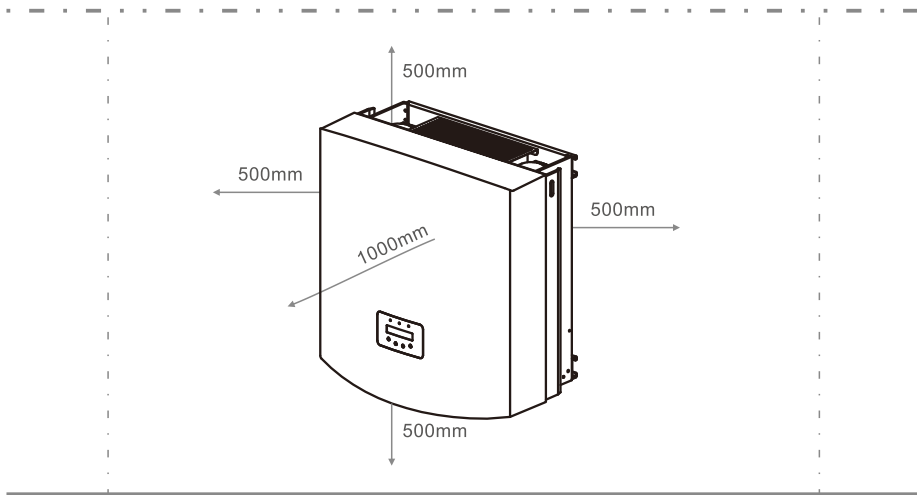
- Do not install the inverter in areas containing highly flammable materials or gases.
- Do not install the inverter in potentially explosive atmospheres.
- The temperature of the inverter heat sink can reach 75C.
- The inverter is designed to work in a temperature range of -25 – 60C ambient.
- If multiple inverters are installed on site, a minimum clearance of 500mm should be kept between each inverter and any other mounted equipment. The bottom of the inverter must be at least 500mm from the ground or floor. See figure 5.2.
- The LED status indicator lights and the LCD on the front panel should not be blocked.
- Adequate ventilation must be present if the inverter is installed in a confined space.
- Inverter is rated IP65. Choose the installation location accordingly.



▲ Figure 5.1 Recommended installation position

5. Installation

- A sun shade is recommended to minimise direct sun exposure where ambient temperature may exceed 40°C.
- Install on a vertical surface or structure capable of bearing the weight.
- Must install vertically within +/- 5. If the inverter is tilted from the vertical plane heat dissipation can be inhibited. This may reduce system performance or reduce service life of the inverter.



▲ Figure 5.2 Inverter mounting clearance

- A minimum of 500mm clearance is required top, bottom, left and right of the inverter (isolator enclosures excepted) for air flow and cooling.
- Visibility of the LED status indicator lights and LCD display screen should be considered.



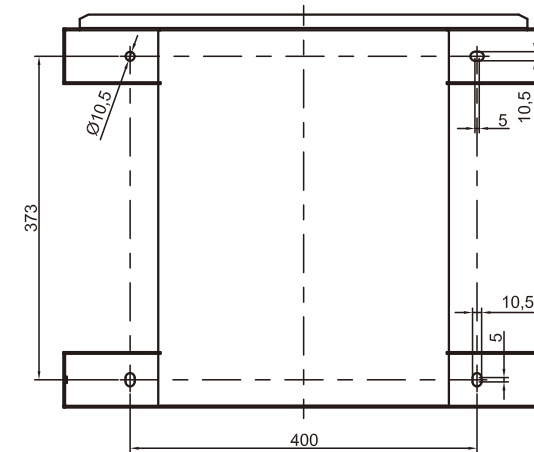
NOTE:

The inverter must be installed out of reach of children.

5. Installation

5.2 Mounting the Inverter

The inverter can be mounted to the wall or metal strut of module. The mounting holes should be consistent with the size of the bracket or the dimensions shows below.



▲ Figure 5.3 The dimensions of the mounting bracket (in mm)

The inverter should be mounted in a vertical position. The steps of mounting are as follows:

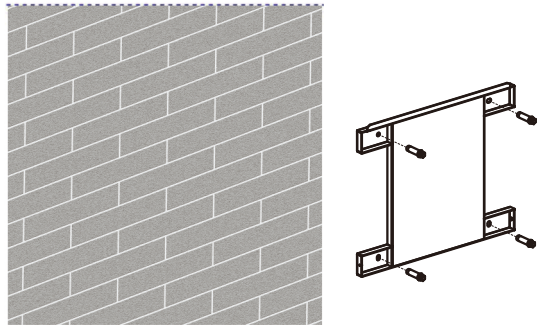
1. According to the figure 5.2, select the mounting height of the bracket and mark the mounting holes. For brick walls, the position of the holes should be suitable for the expansion bolts.
2. MAKE SURE the bracket is horizontal and the mounting holes A, B, and C (in Figure 5.3) are in the correct points. Drilling the holes on the wall according the marks.
3. Using the expansion bolts to fix the bracket to the wall (as shown as Figure 5.4).



WARNING:

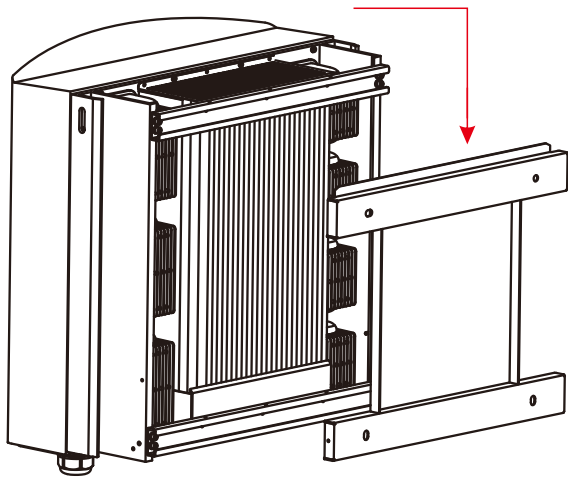
The inverter must be mounted vertically on a vertical wall. Use suitable expansion screws of bolts to attach the bracket to the wall or rack as shown in figure 5.4.

5. Installation



▲ Figure 5.4 Fix the bracket to the wall

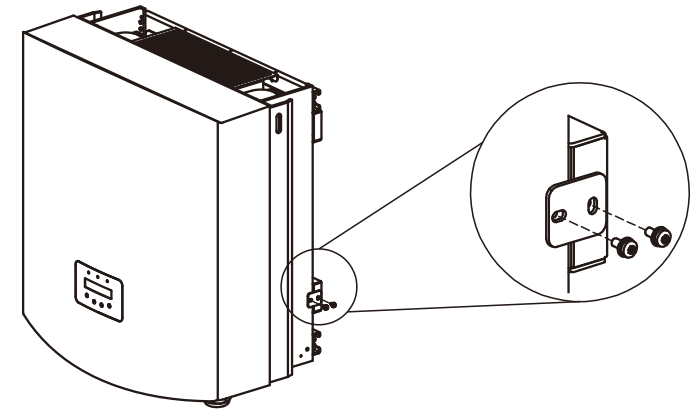
4. Lift up the inverter, and make the slot on the back bracket of inverter align to the lip on the mounting bracket. Then lower the inverter onto the bracket slowly until it is stable (in figure 5.5).



▲ Figure 5.5 Attach the inverter to the bracket

5. Installation

Use screws in the packaging to fix the inverter to the mount bracket (in Figure 5.6).



▲ Figure 5.6 Fix the inverter

5.3 Electrical Connections

The Inverter is designed with quick-connect terminal port for electrical connection without removing the cover. The meanings of the symbols at the bottom of the inverter (see figure 1.2) are listed in Table 5.1. All electrical installations must be in accordance with all local and national standards.

+	Positive DC input terminal
-	Negative DC input terminal
DC 1- DC4	DC input terminal
DC SWITCH	Switch of DC input terminals (optional)
COM1	Communication port for Wi-Fi or GPRS stick
COM2、 COM3	Rj45 and terminal block for RS485 communication port
GRID	Connecting terminal of the Grid

▲ Table 5.1 Electrical connection symbols

The electrical connection of the inverter must follow the steps listed below:

1. Switch the Grid Supply Main Switch (AC) OFF. Switch the DC Switch OFF.
2. Connect the inverter to PV array.
3. Connect the inverter to the grid.

5. Installation

5. Installation

5.3.1 Protective ground wire connection(PE)

Solis recommends 2 ground protection methods: Through grid terminal connection and external heat sink connection.

If AC terminal is used to connect ground, please refer to the contents of 5.3.3.

If the heat sink is used to connect the ground, please follow the steps below:

- 1) Prepare the grounding cable: recommend to use the 16~35mm² outdoor copper-core cable.
- 2) Prepare OT terminals: M6.



Important:

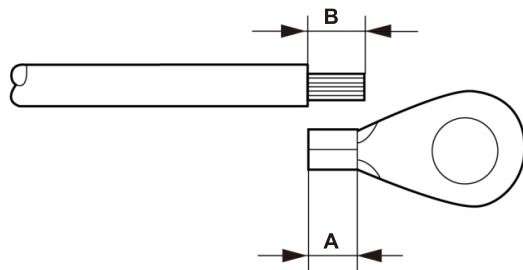
For multiple inverters in parallel, all inverters should be connected to the same ground point to eliminate the possibility of a voltage potential existing between inverter grounds.



Warning:

No matter what kind of grounding connection is adopted, it is strictly forbidden to connect the ground of the inverter with the lightning protection of the building, otherwise Solis will not be responsible for any damage caused by lightning.

- 3) Strip the grounding cable insulation to the suitable length as shown as Figure 5.7.



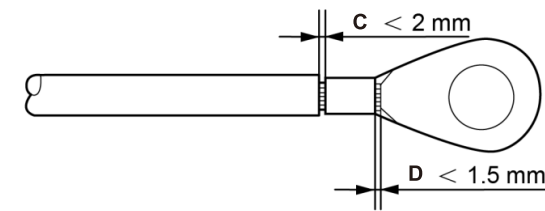
▲ Figure5.7 suitable length



Important:

B (insulation stripping length) is 2mm~3mm longer than A (OT cable terminal crimping area) 2mm~3mm.

- 4) Insert the stripped wire into the OT terminal crimping area, and use the hydraulic clamp to crimp the terminal to the wire (as shown as Figure 5.8).



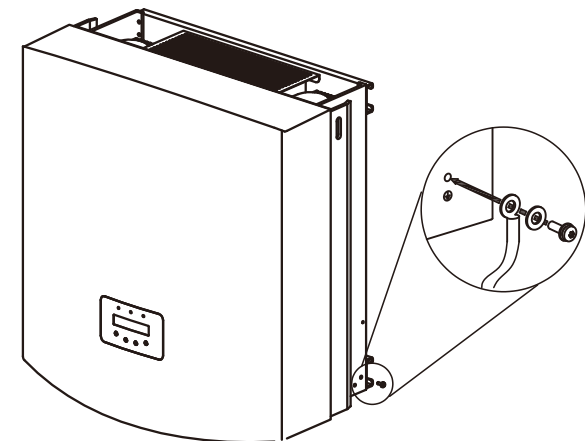
▲ Figure5.8 strip wire



Important:

After crimping the terminal to the wire, inspect the connection to ensure the terminal is solidly crimped to the wire.

- 5) Remove the screw from the heat sink ground point.
- 6) Use the screw of the ground point to attach the grounding cable. Tighten the screw securely. Torque is 3Nm (as shown as in Figure 5.9).



▲ Figure5.9 fix the cable



Important:

In order to improve the corrosion resistance of the grounding terminal, we recommend that the External grounding terminal should be coated with silica gel or paint for protection after the installation of the grounding cable.

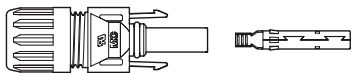
5. Installation

5. Installation

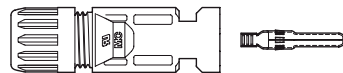
5.3.2 DC side connection

A) Please make sure the polarity of the output voltage of PV array matches the “DC+” and “DC-” symbols.

B) Connect the “DC+” and “DC-” to the input terminals; see Figure 5.10 and Figure 5.11.



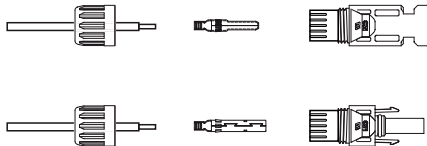
▲ Figure 5.10 DC+ Connector (MC4)



▲ Figure 5.11 DC- Connector (MC4)

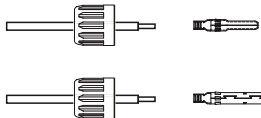
The steps of assembling the DC connectors are listed as follows:

i) Strip the DC wire about 7mm, Disassemble the connector cap nut .



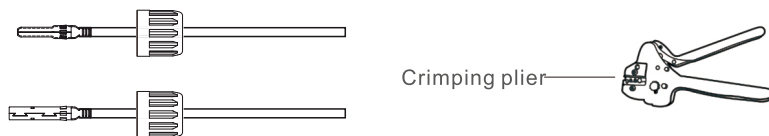
▲ Figure 5.12 Disassemble the Connector Cap nut

ii) Insert the wire into the connector cap nut and contact pin as shown in Figure 4.12.



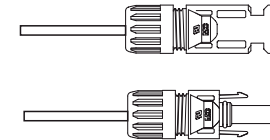
▲ Figure 5.13 Insert the Wire into the Connector Cap nut and contact pin

iii) Crimp the contact pin to the wire using a proper wire crimp tool as shown in Figure 5.14.



▲ Figure 5.14 Crimp the contact pin to the wire

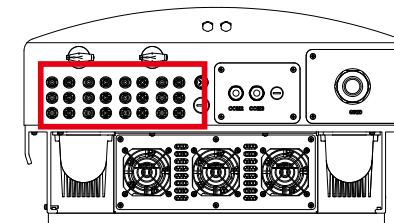
iv) Insert the contact pin to the connector housing until it locks in place. Screw up the cap nut to the connector housing. Torque to 2.5-3Nm (as shown in Figure 5.15).



▲ Figure 5.15 Connector with Cap nut Screwed on

Cable type	Traverse area (mm ²)		Outside diameter of cable (mm)
	Range	Recommended value	
Industry generic PV cable (model:PV1-F)	4.0~6.0 (12~10AWG)	4.0 (12AWG)	5.5~9.0

v) Connect the finished DC cables to the inverter. A small click will confirm connection as shown by the red area in Figure 5.16).



▲ Figure 5.16 Connect the DC Connectors to the Inverter



Caution:

If DC inputs are accidentally reversely connected or inverter is faulty or not working properly, it is NOT allowed to turn off the DC switch as it will damage the inverter and even leads to a fire disaster.

The correct actions are:

*Use a clip-on ammeter to measure the DC string current

*If it is above 0.5A, please wait for the solar irradiance reduces until the current decreases to below 0.5A.

*Only after the current is below 0.5A,

you are allowed to turn off the DC switches and disconnect the PV strings. Please note that any damages due to wrong operations are not covered in the device warranty.

5. Installation

5. Installation

5.3.3 AC side connection

For all AC connections, 16-35mm² 105 °C cable is accept to be used.

Please make sure the resistance of cable is lower than 1.5 ohm. If the wire is longer than 20m, it's recommended to use 25-35mm cable. Refer to local electrical codes for wire sizing.

NOTE:

Solis three phase inverters integrate neutral connection point. However, with or without neutral connected won't affect the normal operation of inverter itself. Please refer to the local grid requirement for if need neutral cable connected. The ground wire can be connected to the grounding hole on the right side of the inverter heat sink.



Cable specification		Copper-cored cable	Copper clad aluminum / Aluminum Alloy cable
Traverse cross sectional area (mm ²)	Range	16~35	25~35
	Recommended	25	35
Cable outer diameter (mm)	Range	22~32	
	Recommended	27	

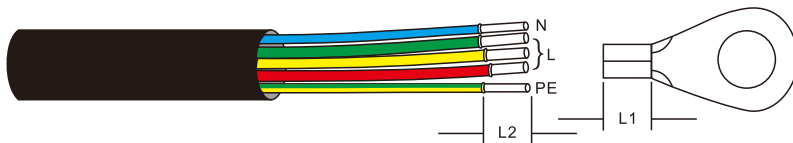


NOTE:

Prepare M6 OT terminals.

The steps to assemble the AC grid terminals are listed as follows:

A) Strip the end of AC cable insulating jacket about 90mm then strip the end of each wire . (as shown in figure 5.17)



▲ Figure 5.17 Strip AC cable



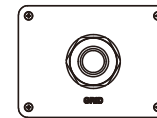
NOTE:

L2 (insulation stripping length) is 2mm-3mm longer than L1 (OT cable terminal crimping area)

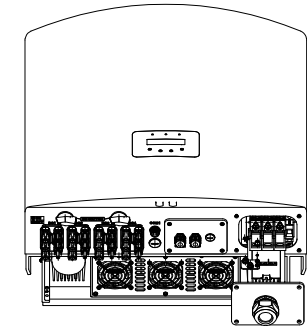
B) Strip the insulation of the wire core, insert into the cable crimping area of the OT terminal, then use a hydraulic crimp tool to crimp it firmly. The wire must be covered with heat shrinkable tube or insulating tape . When using the heat shrinkable tube sleeve the heat shrinkable tube over the wire before crimping the OT terminal.

C) Remove the 4 screws on the AC terminal cover and remove the cover (in figure 5.18).

Remove the screw under terminal slide and pull out the terminal (in figure 5.19).

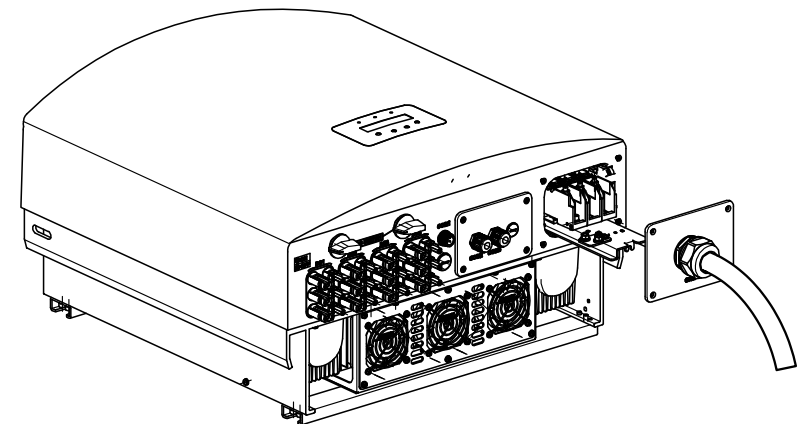


▲ Figure 5.18 Cover



▲ Figure 5.19 Disassemble AC terminal cover

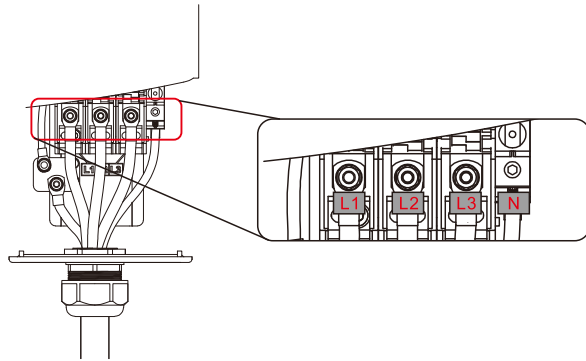
D) Insert the cable through cap nut, water proof bushing and AC terminal cover into the AC terminal and use a socket wrench to tight the screws. The torque is 4-6Nm (as shown in figure 5.20a and 5.20b).



▲ Figure 5.20a Connect cable to AC terminal

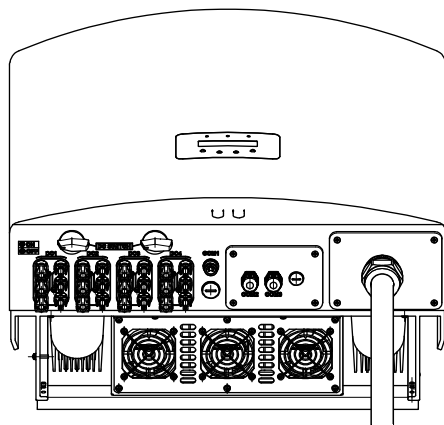
5. Installation

5. Installation



▲ Figure 5.20b Connect cable to AC terminal

E) Push the AC terminals along the rail to the inside of the inverter then tighten the screw under rack. Tighten the 4 screws of AC terminal cover and tighten the AC entry cap nut (as shown in figure 5.21).



▲ Figure 5.21 Tighten the AC terminal



NOTE:

After connecting, please check the correctness and firmness of the connection. After confirmation, use a suitable material to seal all cable connections.

5.3.4 Max. over current protection device (OCPD)

To protect the inverter's AC grid connection conductors, Solis recommends installing breakers that will protect against overcurrent. The following table defines OCPD ratings for the Solis 60-70kW Three phase inverters.

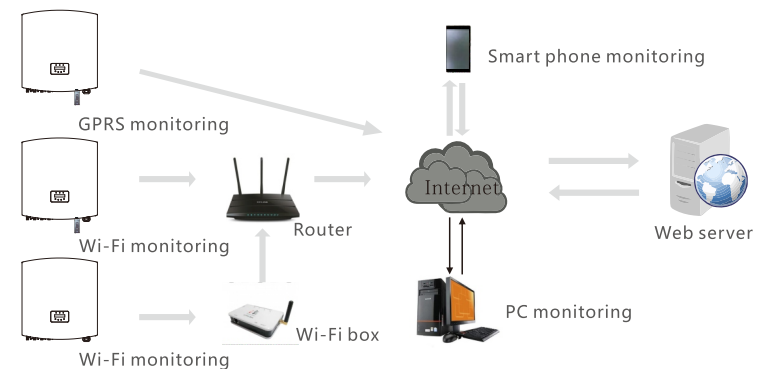
Inverter	Rated voltage(V)	Rated output power (kW)	Current for protection device (A)
Solis-60K-4G	400	60	125
Solis-70K-HV-4G	480	70	125

▲ Table 5.2 Rating of grid OCPD

5.3.5 Inverter monitoring connection

There are 3 communication terminals for Solis 60-70kW inverter. COM1-COM3 are all for RS485 communication. COM1 is a 4-pin connector which matches with the Wi-Fi or GPRS wireless communication products. COM2 and COM3 are RJ-45 and terminal block for RS485 connection between inverter and datalogger.

Figure 5.22 is the internet monitoring solution. Please refer to related instructions of communication products.



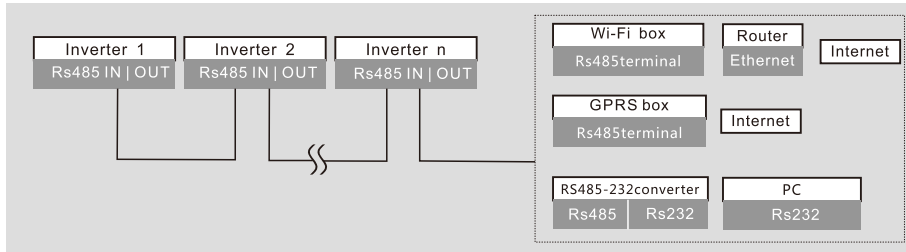
▲ Figure 5.22 monitoring solution

5. Installation

5. Installation

Monitoring system for multiple inverters

Multiple inverters can be monitored by RS-485 daisy chain configuration. (See figure 5.23).



▲ Figure 5.23 Multiple inverter monitoring system

5.3.5.1 RS485 Communication connection

RS-485 connection through terminal block.

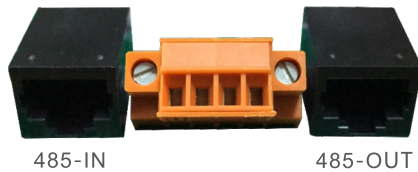
RS-485 communication supports two connections on the terminal board. (See figure 5.23).

The cross sectional area of the cable wire for terminal board connection should be 0.2-1.5mm.

The outer diameter of the cable may be 5mm-10mm.

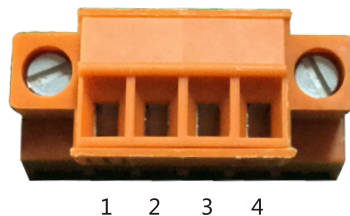
RJ45 port connection (See figure 5.29).

CAT 5E outdoor rated (cable outer diameter < 9mm, internal resistance $\leq 1.5 \Omega / 10m$) and shielded RJ45 connectors are recommended.



▲ Figure 5.24 RJ45 port and Terminal board

Steps for connecting the RS-485 cable.



▲ Figure 5.25

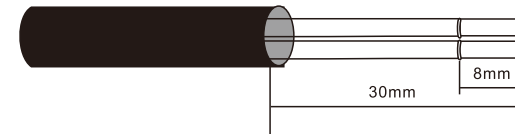
NO.	Port definition	Description
1	RS485A ₁ IN	RS485A ₁ , RS485 differential signal+
2	RS485B ₁ IN	RS485B ₁ , RS485 differential signal-
3	RS485A ₂ OUT	RS485A ₂ , RS485 differential signal+
4	RS485B ₂ OUT	RS485B ₂ , RS485 differential signal-

▲ Table 5.3 Port definition

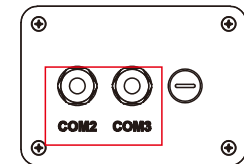
Connection of Terminal board.

a. Strip the insulation and shield to a suitable length. Use diagram below as a guide. (in Figure 5.26).

b. Remove the cap nut from the waterproof cable glands labeled COM2 and COM3 at the bottom of the inverter. Remove the plug from the fitting. (in Figure 5.27).



▲ Figure 5.26

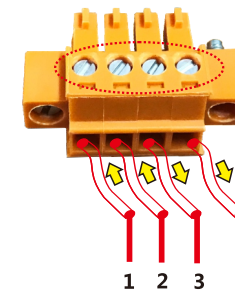


▲ Figure 5.27

c. Pass the cable through the cap nut for each port. COM2(RS485 IN) COM3(RS485 OUT).

d. Pull down the terminal block on user interface board (See Figure 5.25).

e. Firstly insert cable into terminal board, then tighten the screws (dotted area) clockwise with slotted screwdriver; if user need to pull out cable, screws rotate anticlockwise with slotted screwdriver (See Figure 5.28).



- 1 RS485A₁ IN (RS485+)
- 2 RS485B₁ IN (RS485-)
- 3 RS485A₂ OUT (RS485+)
- 4 RS485B₂ OUT (RS485-)

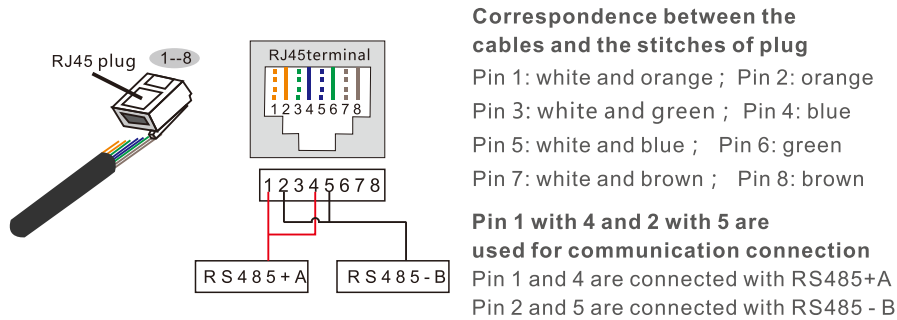
▲ Figure 5.28 Strip the insulation and connect to RS485

f. Please insert terminal board into terminal block, then it will be clamped automatically.

5. Installation

Steps for using RJ45 connections for RS485 Communications.

- a. Use the network wire stripper to strip the insulation layer off the communication cable. Using the standard wire sequence referenced in TIA/EIA 568B, separate the wires in the cable. Use a network cable tool to trim the wire. Flatten the wire in the order shown in figure 5.29.



▲ Figure 5.29 Strip the insulation layer and connect to RJ45 plug

- b. Insert the wire into the RJ45 connector then crimp the connector with the crimping tool.
- c. Unscrew the cap nut from the COM2/3 cable glands and remove the plugs.
- d. Insert the RJ45 connector into the RJ45 port in the inverter maintenance chamber.
- e. Replace the cap nuts for COM2/3 and tighten firmly.



NOTE:

After connecting, check the correctness and firmness of the connection. After confirmation, seal the connector and cable with a suitable sealant.

6. Start & Stop

6.1 Start the Inverter

To start up the Inverter, it is important that the following steps are strictly followed:

1. Switch the grid supply main Switch (AC) ON first.
2. Switch the DC switch ON. If the voltage of PV arrays are higher than start up voltage, the inverter will turn on. The red LED power will light.
3. When both the DC and the AC sides supply to the inverter, it will be ready to generate power. Initially, the inverter will check both its internal parameters and the parameters of the AC grid, to ensure that they are within the acceptable limits. At the same time, the green LED will flash and the LCD displays INITIALIZING.
4. After 30-180 seconds (depending on local requirement), the inverter will start to generate power. The green LED will be on continually and the LCD displays GENERATING.



WARNING:

Do not touch the surface when the inverter is operating. It may be hot and cause burns.

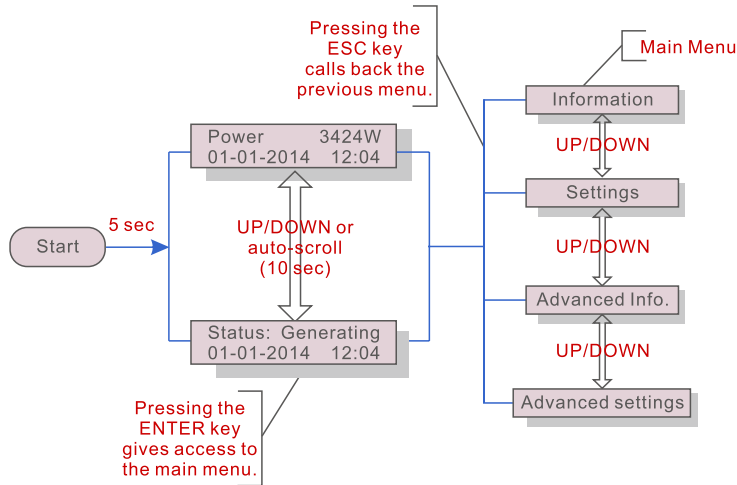
6.2 Stop the Inverter

To stop the Inverter, the following steps must be strictly followed:

1. Switch the Supply Main Switch (AC) OFF.
2. Wait 30 seconds. Switch the DC Switch OFF. Alter approximately one minute, all LEDs will turn off.
3. If removing the inverter, disconnect the input and output cables after 5 minutes.

7. Operation

During normal operation, the display alternately shows the power and the operation status with each screen lasting for 10 seconds (see Figure 7.1). Screens can also be scrolled manually by pressing the UP and DOWN keys. Press the ENTER key to access to the Main Menu.



▲ Figure 7.1 Operation Overview

7.1 Main Menu

There are four submenus in the Main Menu (see Figure 7.1):

1. Information.
2. Settings.
3. Advanced Info.
4. Advanced Settings.

7.2 Information

The inverter main menu provides access to operational data and access to operational information. The information is displayed by selecting "Information" from the menu and then by scrolling up or down.

7. Operation

Display	Duration	Description
V_DC1 350.8V I_DC1 5.1A	10 sec	V_DC1: Shows input 01 voltage value. I_DC1: Shows input 01 current value.
V_DC4 350.8V I_DC4 5.1A	10 sec	V_DC4: Shows input 02 voltage value. I_DC4: Shows input 02 current value.
V_A 230.4V I_A 8.1A	10 sec	V_A: Shows the grid's voltage value. I_A: Shows the grid's current value.
V_C 230.4V I_C 8.1A	10 sec	V_C: Shows the grid's voltage value. I_C: Shows the grid's current value.
Status: Generating Power: 1488W	10 sec	Status: Shows instant status of the Inverter. Power: Shows instant output power value.
Grid Frequency F_Grid 50.06Hz	10 sec	F_Grid: Shows the grid's frequency value.
Total Energy 0258458 kwh	10 sec	Total generated energy value.
This Month: 0123kwh Last Month: 0123kwh	10 sec	This Month: Total energy generated this month. Last Month: Total energy generated last month.
Today: 15.1kwh Yesterday: 13.5kwh	10 sec	Today: Total energy generated today. Yesterday: Total energy generated yesterday.
Inverter SN 00000000000000	10 sec	Display series number of the inverter.
Work Mode: NULL DRM Number: 08	10 sec	Work Mode: The work mode of inverter. DRM Number: Show the number 01-08.

▲ Table 7.1 Information list

7. Operation

7. Operation

7.2.1 Lock screen

Pressing the ESC key returns to the Main Menu. Pressing the ENTER key locks (Figure 7.2(a)) or unlocks (Figure 7.2 (b)) the screen.



▲ Figure 7.2 Locks and Unlocks the Screen of LCD

7.3 Settings

The following submenus are displayed when the Settings menu is selected:

1. Set Time.
2. Set Address.

7.3.1 Set Time

This function allows time and date setting. When this function is selected, the LCD will display a screen as shown in Figure 7.3.



▲ Figure 7.3 Set Time

Press the UP/DOWN keys to set time and data. Press the ENTER key to move from one digit to the next (from left to right). Press the ESC key to save the settings and return to the previous menu.

7.3.2 Set Address

This function is used to set the address when multiple inverters are connected to single datalogger.

The address number can be assigned from "01" to "99"(see Figure 7.4). The default address number of Solis Three Phase Inverter is "01".



▲ Figure 7.4 Set Address

Press the UP/DOWN keys to set the address. Press the ENTER key to save the settings. Press the ESC key to cancel the change and return to the previous menu.

7.4 Advanced Info - Technicians Only



NOTE:

Access to this menu is for fully qualified and accredited technicians only. Entrance to "Advanced Info" and "Advanced Settings" requires a password.

Select "Advanced Info." from the Main Menu. The screen will require the password as below.



▲ Figure 7.5 Enter password

The default password is "0010". Please press "down" to move the cursor, press "up" to change the digit.

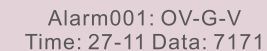
After entering the correct password a menu will be displayed allowing access to the following information:

1. Alarm Message
2. Running message
3. Version
4. Daily Energy
5. Monthly Energy
6. Yearly Energy
7. Daily Record
8. DSP Communication Data
9. Warning Message

The screen can be scrolled manually by pressing the UP/DOWN keys. Pressing the ENTER key gives access to a submenu. Press the ESC key to returns to the Main Menu.

7.4.1 Alarm Message

The display shows the 100 latest alarm messages (see Figure 7.6). Screens can be scrolled manually by pressing the UP/ DOWN keys. Press the ESC key to return to the previous menu.



▲ Figure 7.6 Alarm Message

7. Operation

7. Operation

7.4.2 Running Message

This function is for maintenance personnel to get running message such as internal temperature, Standard NO. etc.

Screens can be scrolled manually by pressing the UP/DOWN keys.

7.4.3 Version

The screen shows the model version and the software version of the Inverter (see Figure 7.7).



Model: 08
Software Version: D20001

▲ Figure 7.7 Model Version and Software Version

7.4.4 Daily Energy

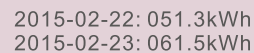
The function is for checking the energy generation for selected day.



YES=<ENT> NO=<ESC>
Select: 2015-02-23

▲ Figure 7.8 Select date for daily energy

Press DOWN key to move the cursor to day, month and year, press UP key to change the digit. Press Enter after the date is fixed.



2015-02-22: 051.3kWh
2015-02-23: 061.5kWh

▲ Figure 7.9 Daily energy

Press UP/DOWN key to move one date from another.

7.4.5 Monthly Energy and Yearly Energy

The two functions are for checking the energy generation for selected month and Year.



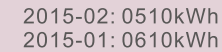
YES=<ENT> NO=<ESC>
Select: 2015-02



YES=<ENT> NO=<ESC>
Select: 2015

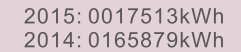
▲ Figure 7.10 Select month for monthly energy ▲ Figure 7.11 Select year for yearly energy

Press DOWN key to move the cursor, press UP key to change the digit. Press Enter after the month/year is fixed.



2015-02: 0510kWh
2015-01: 0610kWh

▲ Figure 7.12 Month energy



2015: 0017513kWh
2014: 0165879kWh

▲ Figure 7.13 Yearly energy

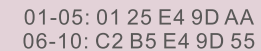
Press UP/DOWN key to move one date from another.

7.4.6 Daily Record

The screen shows history of changing settings. Only for maintenance personnel.

7.4.7 Communication Data

The screen shows the internal data of the Inverter (see Figure 7.14), which is for service technicians only.



01-05: 01 25 E4 9D AA
06-10: C2 B5 E4 9D 55

▲ Figure 7.14 Communication Data

7.4.8 Warn Message

The screen shows the internal data of the Inverter (see Figure 7.15), which is for service technicians only.



Message00:
T: 27-11 D: 7171

▲ Figure 7.15 Warning message

7.5 Advanced Settings - Technicians Only



NOTE:

Access to this area is for fully qualified and accredited technicians only. Please follow 7.4 to enter password to access this menu.

Select Advanced Settings from the Main Menu to access the following options:

1. Select Standard
2. Grid ON/OFF
3. Clear Energy
4. Reset Password
5. Power Control
6. Calibrate Energy
7. Special Settings
8. STD. Mode Settings
9. Restore Settings
10. HMI Updater
11. Restart HMI
12. Debug Parameter
13. Fan Test
14. Power Parameter

7.5.1 Select Standard

This function is used to select the grid's reference standard (see Figure 7.16).

YES=<ENT> NO=<ESC>
Standard:AUS-Q-0.8

▲ Figure 7.16

Selecting the "User-Def" menu will access to the following submenu (see Figure 7.17).

– OV-G-V1: 260V
OV-G-V1-T: 1S

▲ Figure 7.17



These two functions are applicable by maintenance personnel only, wrong operation will prevent the inverter from working properly.



NOTE:

The " User-Def" function can be only used by the service engineer and must be allowed by the local energy supplier.



NOTE:

For different countries, the grid standard needs to be set as different according to local requirements. If there is any doubt, please consult Solis service technicians for details.

Below is the setting range for "User-Def". Using this function, the limits can be changed manually.

OV-G-V1: 236---335V	OV-G-F1: 50.2-53Hz(60.2-63Hz)
OV-G-V1-T: 0.1---9s	OV-G-F1-T: 0.1---9s
OV-G-V2: 248---341V	OV-G-F2: 51-53Hz(61-63Hz)
OV-G-V2-T: 0.1---1s	OV-G-F2-T: 0.1---9s
UN-G-V1: 173---236V	UN-G-F1: 47-49.5Hz(57-59.5Hz)
UN-G-V1-T: 0.1---9s	UN-G-F1-T: 0.1---9s
UN-G-V2: 132---219V	UN-G-F2: 47-49Hz(57-59Hz)
UN-G-V2-T: 0.1---1s	UN-G-F2-T: 0.1---9s

Press the UP/DOWN keys to scroll through items. Press the ENTER key to edit the highlighted item. Press the UP/DOWN keys again to change the setting. Press the ENTER key to save the setting. Press the ESC key to cancel changes and returns to the previous menu.

7.5.2 Grid ON/OFF

This function is used to start up or stop the power generation of the inverter. (see Figure 7.18).

– Grid ON
Grid OFF

▲ Figure 7.18 Set Grid ON/OFF

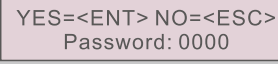
Screens can be scrolled manually by pressing the UP/DOWN keys. Press the ENTER key to save the setting. Press the ESC key to return to the previous menu.

7.5.3 Clear Energy

Clear Energy resets the energy yield history of the inverter.

7.5.4 Reset Password

This function is used to set a new password for menus “Advanced info.” and “Advanced information” (see Figure7.19).



```
YES=<ENT> NO=<ESC>
Password: 0000
```

▲ Figure 7.19 Reset password

Enter the current password before setting a new password. Press the DOWN key to move the cursor, Press the UP key to change the digit. Press the ENTER key to execute the setting. Press the ESC key to return to the previous menu.

7.5.5 Power Control

Active and reactive power can be set through this menu.

There are 5 item for this sub menu:

1. Set output power
2. Set Reactive Power
3. Out_P With Restore
4. Rea_P With Restore
5. Select PF Curve



This function is applicable for maintenance personnel only, wrong settings will prevent the inverter from reaching maximum power.

7.5.6 Calibrate Energy

Maintenance or replacement could clear or cause a different value for total energy. Use this function to allow user to revise the value of total energy to the same value as before. If the monitoring website is used the data will be synchronous with this setting automatically. (see Figure 7.20).



```
YES=<ENT> NO=<ESC>
Energy:0000000kWh
```

▲ Figure 7.20 Calibrate energy

Press the DOWN key to move the cursor, Press the UP key to revise the value. Press the ENTER key to execute the setting. Press the ESC key to return to the previous menu.

7.5.7 Special Settings



This function is applicable by maintenance personnel only.

Special settings have the submenu shown below:

1. Grid Filter Set
2. Relay_Protect Set
3. ILeak_Protect Set
4. GROUND_Protect Set
5. GRID INTF.02 Set
6. MPPT Parallel Mode
7. Cnst. Voltage Mode
8. L/FRT Set
9. IgZero_COMP. Set
10. PI Set
11. IgADCheckPRO Set
12. NoSmallPulse Set

7.5.8 STD. Mode Settings



This function is applicable by maintenance personnel only.

STD. Mode Settings have the submenu shown below:

1. Working Mode Set
2. Power Rate Limit
3. Freq Derate Set
4. 10mins Voltage Set
5. Initial Settings

7. Operation

7. Operation

7.5.9 Restore Settings



This function is applicable to maintenance personnel only.

Restore Settings resets the inverter to factory defaults. Selecting will show the screen below:

```
Are you sure?  
YES=<ENT> NO=<ESC>
```

▲ Figure 7.21

Press the ENTER key to save the setting. Press the ESC key to return to the previous menu.

7.5.10 HMI Updater



This function is applicable by maintenance personnel only.

HMI Updater have the submenu shown below:

```
HMI Current Ver.: 02  
YES=<ENT> NO=<ESC>
```

▲ Figure 7.22

Press the ENTER key to save the setting.

Press the ESC key to return to the previous menu.

7.5.11 Reset HMI

This function is using to reset HMI.

7.5.12 Debug Parameter



This function is applicable to maintenance personnel only.

Debug Parameter as shown as below:

```
- U16DAT1: +0000  
U16DAT2: +0000  
U16DAT3: +0000  
U16DAT4: +0000  
U16DAT5: +0000  
U16DAT6: +0000  
U16DAT7: +0000  
U16DAT8: +0000
```

▲ Figure 7.23

Press the UP/DOWN keys to scroll through items. Press the ENTER key to set ,
Press the DOWN key to scroll and press the UP key to change the value.
Then press the ENTER key to save the setting. Press the ESC key to cancel
changes and returns to the previous menu.

7.5.13 Fan Test



This function is applicable to maintenance personnel only.

Fan Test have the submenu shown below:

```
Are you sure?  
YES=<ENT> NO=<ESC>
```

▲ Figure 7.24

Press the ENTER key to save the setting.

Press the ESC key to return to the previous menu.

7. Operation

7.5.14 Power Parameter

This function is used for calibrate inverter output energy. It will not impact the energy count for inverter with RGM.

The screen shows :



▲ Figure 7.25 Power Rate Limit

Press the Down key to move the cursor.

Press the Up key to change the digit.

Please press the Enter to save the setting and press the ESC key to return to the previous menu.



This setting is used for grid operator, don't change setting under this manual.

8. Maintenance

The fan and filter should be regularly cleaned so as to improve the heat dissipation efficiency. Clean with a soft brush.

The other parts of Solis Inverter does not require any regular maintenance.

However, cleaning the dust on heat-sink will help the inverter to dissipate the heat and increase its life time. The dust can be removed with a soft brush.



CAUTION:

Do not touch the inverter's surface when it is operating. Some parts of the inverter may be hot and cause burns. Turn off the inverter (refer to Section 5.2) and wait for a cool-down period before any maintenance or cleaning operation.

The LCD and the LED status indicator lights can be cleaned with a damp cloth if they are too dirty to be read.



NOTE:

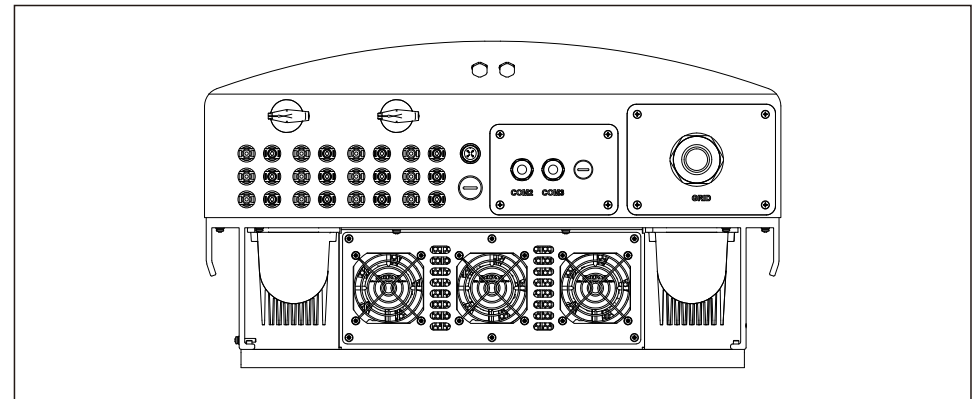
Never use any solvents, abrasives or corrosive materials to clean the inverter.

8.1 Fan Maintenance

If the fan does not work properly, the inverter will not be cooled effectively. and it may affect the effective operation of the inverter .

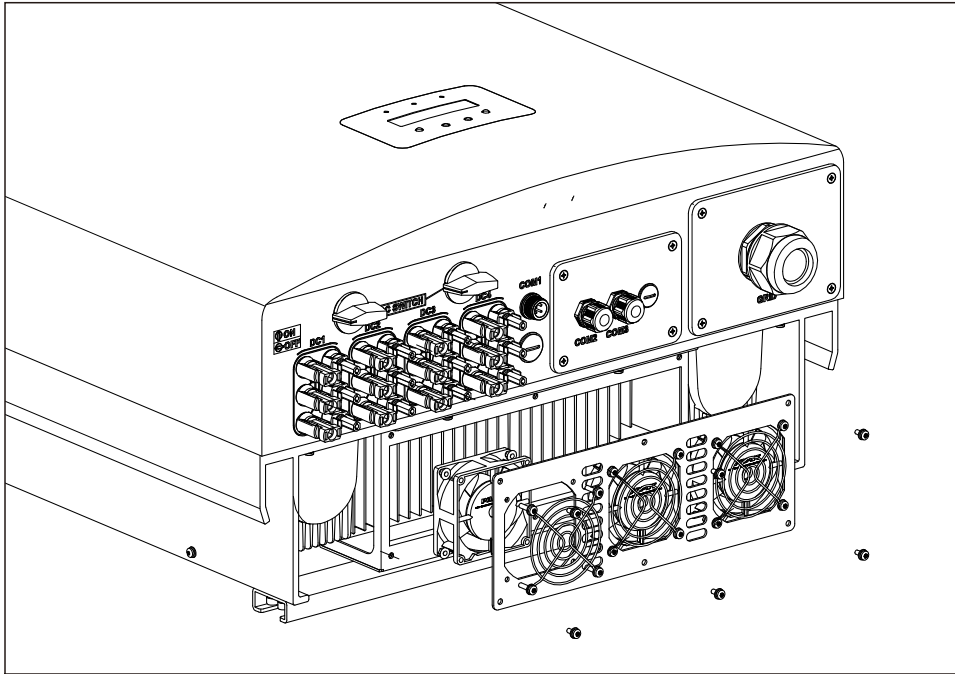
Therefore, it is necessary to clean or replace a broken fan as follows:

1. Disconnect the AC power.
2. Turn the DC switch to "OFF" position.
3. Wait for 10 minutes at least.

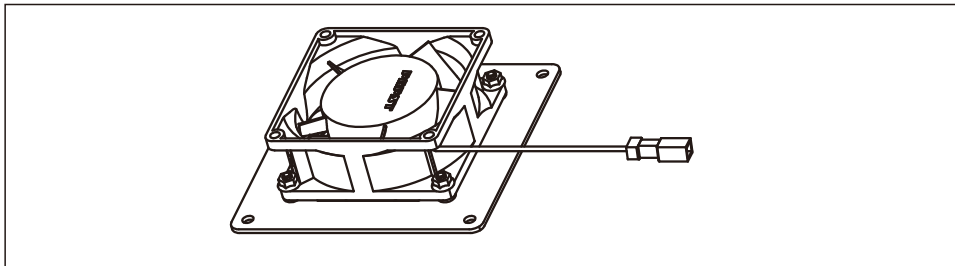


8. Maintenance

4. Remove the 4 screws on the fan plate and pull out the fan assembly slowly.

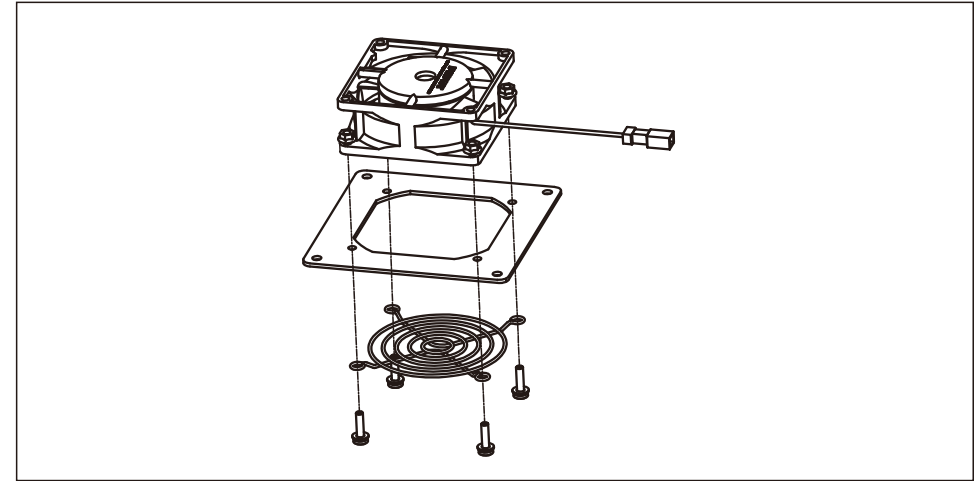


5. Disconnect the fan connector carefully and take out the fan.



8. Maintenance

6. Clean or replace the fan. Assemble the fan on the rack.



7. Connect the electrical wire and reinstall the fan assembly. Restart the inverter.

9. Troubleshooting

The inverter is designed in accordance with the relevant international grid-tie standards along with safety and electromagnetic compatibility requirements. Before delivering to the customer, the inverter has been subjected to several tests to ensure its optimal operation and reliability.

In case of failure, the LCD screen will display an alarm message. In this case, the inverter may stop feeding into the grid. The failure descriptions and their corresponding alarm messages are listed in Table 9.1:

9. Troubleshooting

Alarms	Cause	Solution
No Information (Blank Screen)	<ul style="list-style-type: none"> • Input voltage low/missing • Polarity reversed • Main board damaged 	<p>Test – DC switch OFF</p> <ul style="list-style-type: none"> • Check PV connections • Check polarity • Check voltage >120V Single, >350V three <p>Test – DC Switch ON</p> <ul style="list-style-type: none"> • Check voltage >120V Single, >350V three • If DC voltage is “0” replace inverter
Initializing (Inverter stuck in this mode)	<ul style="list-style-type: none"> • Inverter is waiting for driving signal 	<p>Test – DC switch OFF</p> <ul style="list-style-type: none"> • Check PV connections • Check polarity • Check voltage >120V Single, >350V three <p>Test – DC Switch ON</p> <ul style="list-style-type: none"> • Check voltage >120V Single, >350V three • A cable may have been damaged or loosened in shipping replace inverter
OV-G-V: Over Grid Voltage	<ul style="list-style-type: none"> • Inverter detects grid voltage as too high 	<p>Test – DC switch OFF</p> <ul style="list-style-type: none"> • Check AC at the inverter • If AC measures high, adjust upper limit with permission from utility <p>Test – DC Switch ON, full power</p> <ul style="list-style-type: none"> • Check AC at inverter test points • Compare with LCD • If AC measures high, cables between inverter and interconnect are too small • Check ampacity and voltage drop calculations
UN-G-V: Under Grid Voltage	<ul style="list-style-type: none"> • Inverter detects grid voltage as too low 	<p>Test – DC switch OFF</p> <ul style="list-style-type: none"> • Check AC at the inverter test points • If AC measures low, adjust lower limit with permission from utility • Check LCD voltage reading, may be a bad measurement circuit <p>Test – DC Switch ON</p> <ul style="list-style-type: none"> • Check grid standard • Replace inverter

9. Troubleshooting

Alarms	Cause	Solution
OV-G-F: Over Grid Frequency	<ul style="list-style-type: none"> • Inverter detects grid Frequency as too high 	<p>Test – DC switch OFF</p> <ul style="list-style-type: none"> • Check frequency at the inverter test points • If Frequency measures high, adjust upper limit with permission from utility • Check LCD reading, may be a bad measurement circuit <p>Test – DC Switch ON</p> <ul style="list-style-type: none"> • Check grid standard • Replace inverter
NO-GRID	<ul style="list-style-type: none"> • Inverter does not detect the grid 	<p>Test – DC switch OFF</p> <ul style="list-style-type: none"> • Check AC at the inverter test points • L-L, L-GND • Do NOT tell me 240VAC • Check LCD reading, may be a bad measurement circuit <p>Test – DC Switch ON</p> <ul style="list-style-type: none"> • Check grid standard • Replace inverter
OV-DC: DC voltage is too high	<ul style="list-style-type: none"> • Inverter detects High DCV 	<p>Test – DC switch OFF</p> <ul style="list-style-type: none"> • Check DC at the inverter test points • If DCV is high, too many panels in the string <p>Test – DC Switch ON</p> <ul style="list-style-type: none"> • Check LCD reading, may be a bad measurement circuit • Replace inverter
OV-BUS: DC BUS voltage is too high	<ul style="list-style-type: none"> • Inverter detects High DCV on internal bus 	<p>Test</p> <ul style="list-style-type: none"> • Measure DC and AC voltages • Compare with LCD • Replace Inverter • Internal damage • Wire came loose during shipping
UN-BUS: DC BUS voltage is too low	<ul style="list-style-type: none"> • Inverter detects low DCV on internal bus 	<p>Test</p> <ul style="list-style-type: none"> • Measure DC and AC voltages • Compare with LCD • Replace Inverter • Internal damage • Wire came loose during shipping

9. Troubleshooting

9. Troubleshooting

Alarms	Cause	Solution
GRID-INTF: Grid unstable	<ul style="list-style-type: none"> Inverter detects grid instability, internal fault current high 	<p>Test – With DC Switch OFF</p> <ul style="list-style-type: none"> Measure AC voltage Test AC line for THD Test – With DC Switch ON <p>Test AC line for THD</p> <ul style="list-style-type: none"> Multiple inverters/turn one off Impedance matching adjustment or box Internal damage Wire came loose in shipping
INI-PRO: Initialization Protection	<ul style="list-style-type: none"> Master and Slave DSP have different values 	<p>Reset Inverter</p> <ul style="list-style-type: none"> DC switch OFF Wait until all lights/LCD turn off DC switch ON Replace inverter
TEM-PRO: Temperature Protection	<ul style="list-style-type: none"> Inverter detects high ambient temperature >60C 	<p>Inspect installation</p> <ul style="list-style-type: none"> Check heatsink for obstructions/ventilation Is inverter in direct sunshine Measure ambient temperature near inverter If temp is in range replace inverter
GROUND-PRO: Ground Protection	<ul style="list-style-type: none"> Inverter detects low DC insulation resistance 	<p>Inspect installation</p> <ul style="list-style-type: none"> Reset inverter Note weather conditions when alarm occurs Measure insulation resistance If normal, measure in SAME weather as alarm Physically check cables Replace inverter
Screen OFF with DC applied	<ul style="list-style-type: none"> Inverter internally damaged 	<ul style="list-style-type: none"> Do not turn off the DC switches as it will damage the inverter. Please wait for the solar irradiance reduces and confirm the string current is less than 0.5A with a clip-on ammeter and then turn off the DC switches. Please note that any damages due to wrong operations are not covered in the device warranty.

Table 9.1 Fault messages and descriptions



NOTE:

If the inverter displays any alarm message as listed in Table 9.1; please turn off the inverter (refer to Section 5.2 to stop your inverter) and wait for 5 minutes before restarting it (refer to Section 5.1 to start your inverter). If the failure persists, please contact your local distributor or the service center. Please have ready the following information before contacting us.

1. Serial number of inverter.
2. The distributor/dealer of Solis Three Phase Inverter (if available);
3. Installation date.
4. Description of the problem (i.e. the alarm message displayed on the LCD and the status of the LED status indicator lights. Other readings obtained from the Information submenu (refer to Section 7.2) will also be helpful.);
5. The PV array configuration (e.g. number of panels, capacity of panels, number of strings , etc.);
6. Your contact details.

10. Specification

Model	Solis-60K-4G
Max. DC input power (Watts)	72000
Max. DC input voltage (Volts)	1100
Rated DC voltage (Volts)	600
Startup voltage (Volts)	200
MPPT voltage range (Volts)	200...1000
Max. input current (Amps)	28.5+28.5+28.5+28.5
Max short circuit input current (Amps)	44.5+44.5+44.5+44.5
MPPT number/Max input strings number	4/12
Rated output power (Watts)	60000
Max. output power (Watts)	66000
Max. apparent output power (VA)	66000
Rated grid voltage (Volts)	3/N/PE~400
Grid voltage range (Volts)	304...460
Rated output current (Amps)	86.6
Power Factor (at rated output power)	0.8leading~0.8lagging
THDi (at rated output power)	<3%
Rated grid frequency (Hertz)	50/60
Operating frequency range (Hertz)	47...52 or 57...62
Max. efficiency	99.0%
EU efficiency	98.5%
MPPT efficiency	>99.5%
Dimensions	630W*700H*357D (mm)
Weight	63kg
Topology	Transformerless
Operating ambient temperature range	-25°C . . . 60°C
Ingress protection	IP65
Noise emission (typical)	<60 dBA
Cooling concept	Intelligent redundant fan-cooling
Max. operation altitude	4000m
Designed lifetime	>20 years
Grid connection standard	En50438, G83/2, G98, G99, AS4777.2:2015, VDE0126-1-1, IEC61727, VDE N4105
Operating surroundings humidity	0...100% Condensing
Connention	Mc4 connector and Ip67 rated plug
Display	LCD, 2×20 Z.
Communication connections	4 pins RS485 connector, 2 RJ45 connector, 2 group of terminal block
Monitoring	WiFi or GPRS
Warranty Terms	5 Years STD (Extendable to 20 Years)

10. Specification

Model	Solis-70K-HV-4G
Max. DC input power (Watts)	84000
Max. DC input voltage (Volts)	1100
Rated DC voltage (Volts)	720
Startup voltage (Volts)	200
MPPT voltage range (Volts)	200...1000
Max. input current (Amps)	28.5+28.5+28.5+28.5
Max short circuit input current (Amps)	44.5+44.5+44.5+44.5
MPPT number/Max input strings number	4/12
Rated output power (Watts)	70000
Max. output power (Watts)	77000
Max. apparent output power (VA)	77000
Rated grid voltage (Volts)	3/PE~480
Grid voltage range (Volts)	384...576
Rated output current (Amps)	84.2
Power Factor (at rated output power)	0.8leading~0.8lagging
THDi (at rated output power)	<3%
Rated grid frequency (Hertz)	50/60
Operating frequency range (Hertz)	47...52 or 57...62
Max. efficiency	99.0%
EU efficiency	98.5%
MPPT efficiency	>99.5%
Dimensions	630W*700H*357D (mm)
Weight	63kg
Topology	Transformerless
Operating ambient temperature range	-25°C . . . 60°C
Ingress protection	IP65
Noise emission (typical)	<60 dBA
Cooling concept	Intelligent redundant fan-cooling
Max. operation altitude	4000m
Designed lifetime	>20 years
Grid connection standard	En50438, G83/2, G98, G99, AS4777.2:2015, VDE0126-1-1, IEC61727, VDE N4105
Operating surroundings humidity	0...100% Condensing
Connention	Mc4 connector and Ip67 rated plug
Display	LCD, 2×20 Z.
Communication connections	4 pins RS485 connector, 2 RJ45 connector, 2 group of terminal block
Monitoring	WiFi or GPRS
Warranty Terms	5 Years STD (Extendable to 20 Years)