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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.

Solis Three Phase Inverter

S5-GC(50-70)K Installation and Operation Manual

Ver 1.2

Ginlong Technologies Co., Ltd.

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1.1 Product Description

Solis Three phase Inverters covert DC power from the photovoltaic(PV) array into alternating current(AC) power that can satisfy local loads as well as feed the power distribution grid.

This manual covers the three phase inverter model listed below:

S5-GC50K, S5-GC60K, S5-GC60K-HV, S5-GC70K-HV, S5-GC25K-LV, S5-GC30K-LV, S5-GC36K-LV

The following one model is specially supplied for Brazil market:

S5-GC37.5K-LV

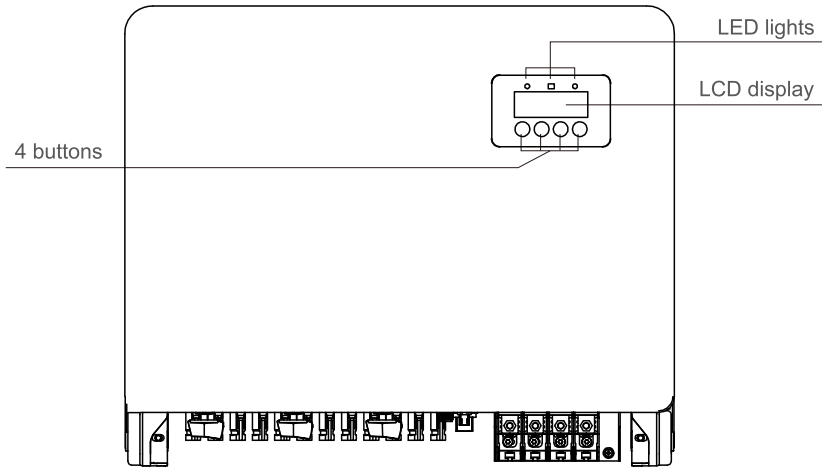


Figure 1.1 Front view

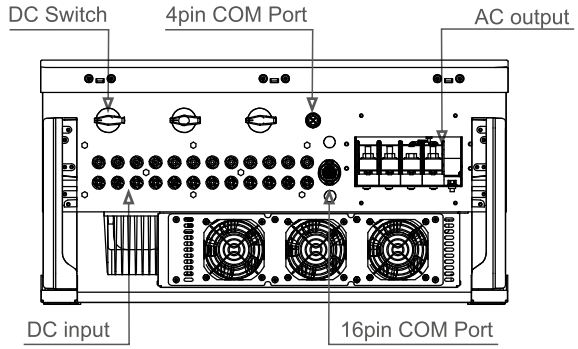
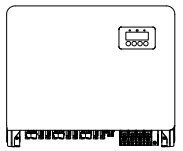


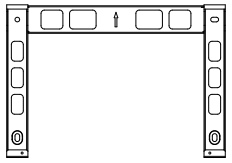
Figure 1.2 Bottom view

1.2 Unpacking and storage

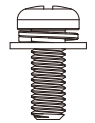
When you receive the inverter, please ensure that all the parts listed below are included:



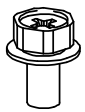
Inverter x1



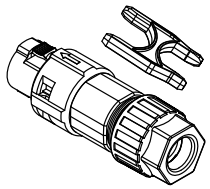
Back plate x1



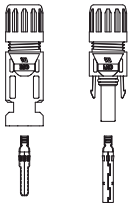
Cross screws(M4*14) x4



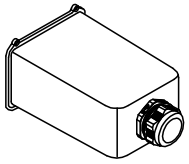
Cross Recessed Hexagon Bolt(M6*12) x2



16pin COM Connector x1
Unlocking tool x1



DC connectors
(25-37.5)K x8,50K x10,(60-70)K x12



AC terminal cover x1



User manual x1

If anything is missing, please contact your local Solis distributor.

1. Introduction

1.3 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℃ and 70℃ and the humidity should be between 0 and 95% 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.

2. Safety Instructions

Improper use may result in electric shock hazards or burns. This product manual contains important instructions that are required to be followed during installation and maintenance. Please read these instructions carefully before use and keep them in an easily locatable place for future reference.

2.1 Safety symbols

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



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



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



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



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

2.2 General safety instructions



WARNING
Do not connect PV array positive (+) or negative (-) to ground – doing so could cause serious damage to the inverter.



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



WARNING
To reduce the risk of fire, branch circuit over-current protective devices (OCPD) are required for circuits connected to the Inverter.



CAUTION
The PV array (solar panels) supplies a DC voltage when exposed to light.

CAUTION

Risk of electric shock from energy stored in the inverter's capacitors.
Do not remove cover until five (5) minutes after disconnecting all sources of supply have passed, and this can only be done by a service technician.
The warranty may be voided if any unauthorized removal of cover occurs.

CAUTION

The inverter's surface temperature can reach up to 75℃ . To avoid risk of burns, do not touch the surface when the inverter is operating.
Inverter must be installed out of the reach of children.

WARNING

The inverter can only accept a PV array as a DC input. Using any other type of DC source could damage the inverter.

2.3 Notice for use

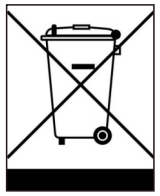
The inverter has been constructed according to applicable safety and technical guidelines.
Use the inverter in installations that meet the following requirements ONLY:

1). The inverter must be permanently installed.
2). The electrical installation must meet all the applicable regulations and standards.
3). The inverter must be installed according to the instructions stated in this manual.
4). The system design must meet inverter specifications.
5). The inverter is for industrail/commercial application only.

To start-up the inverter, the Grid Supply Main Switch (AC) must be turned on, BEFORE the DC Switch is turned on. To stop the inverter, the Grid Supply Main Switch (AC) must be turned off before the DC Switch is turned off.

2.4 Notice for Disposal

This product shall not be disposed of with household waste. They should be segregated and brought to an appropriate collection point to enable recycling and avoid potential impacts on the environment and human health. Local rules in waste management shall be respected .



3.1 Environmental considerations

3.1.1 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 mounting structure where the inverter is installed must be fireproof.

- The temperature of the inverter heat-sink can reach 75℃.
- The inverter is designed to work in an ambient temperature range between -25 to 60℃.
- If multiple inverters are installed on site, a minimum clearance of 500mm should be kept between each inverter and all other mounted equipment. The bottom of the inverter should be at least 500mm above of the ground or floor (see Figure 3.1).
- The LED status indicator lights and the LCD located on the inverter's front panel should not be blocked.
- Adequate ventilation must be present if the inverter is to be installed in a confined space.

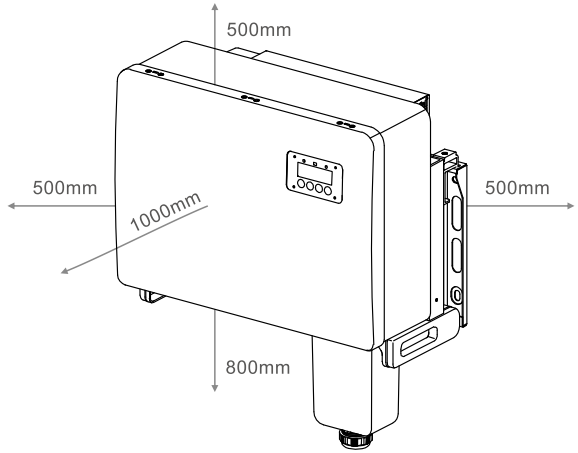


Figure 3.1 Distances required between inverters

NOTE

Nothing should be stored on or placed against the inverter.

3. Installation

3.1.1.1 Examples of correct and incorrect installations

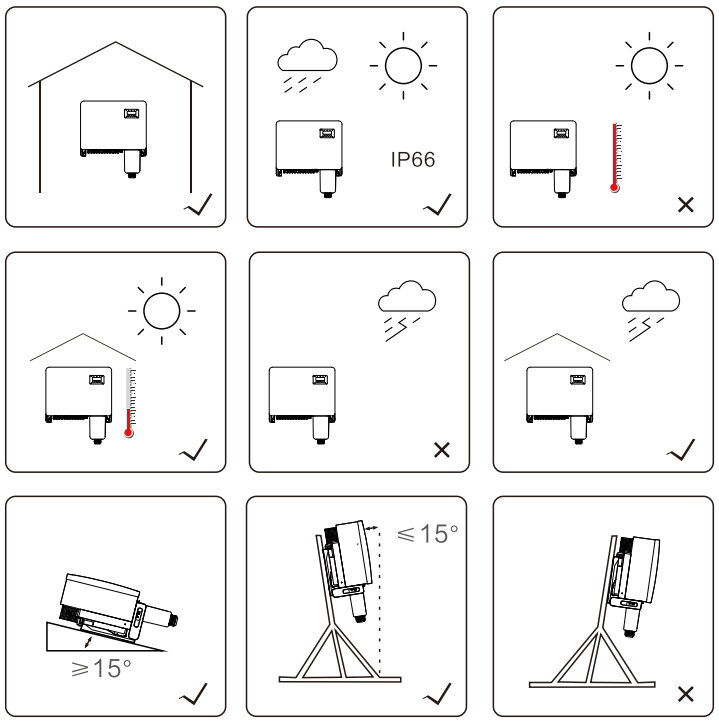


Figure 3.2 Recommended Installation locations

3.1.2 Other environmental considerations

3.1.2.1 Consult technical data

Consult the specifications section (section 10) for additional environmental conditions (protection rating, temperature, humidity, altitude, etc.).

3.1.2.2 Vertical wall installation

This model of Solis inverter should be mounted vertically (90 degrees or backwards 15 degrees) .

3.1.2.3 Avoiding direct sunlight

Installation of the inverter in a location exposed to direct sunlight should to be avoided.

Direct exposure to sunlight could cause:

- Power output limitation (with a resulting decreased energy production by the system).
- Premature wear of the electrical/electromechanical components.
- Premature wear of the mechanical components (gaskets) and user interface.

3.1.2.4 Air circulation

Do not install in small, closed rooms where air cannot freely circulate. To prevent overheating, always ensure that the air flow around the inverter is not blocked.

3.1.2.5 Flammable substances

Do not install near flammable substances. Maintain a minimum distance of three (3) meters (10 feet) from such substances.

3.1.2.6 Living area

Do not install in a living area where the prolonged presence of people or animals is expected. Depending on where the inverter is installed (for example: the type of surface around the inverter, the general properties of the room, etc.) and the quality of the electricity supply, the sound level from the inverter can be quite high.

3.2 Product handling

Please review the instruction below for handling the inverter:

1. The red circles below denote cutouts on the product package.
   Push in the cutouts to form handles for moving the inverter (see Figure 3.3).

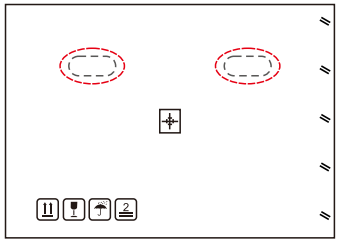


Figure 3.3 Handles used to move the inverter shown circled in red

2. Two people are required to remove the inverter from the shipping box. Use the handles integrated into the heat sink to remove the inverter from the carton (see Figure 3.4).

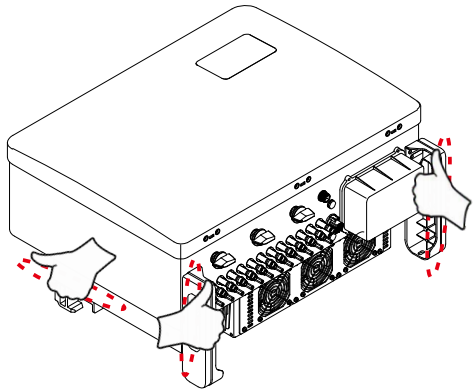


Figure 3.4 Inverter handles

WARNING

Due to the weight of the inverter, contusions or bone fractures could occur when incorrectly lifting and mounting the inverter. When mounting the inverter, take the weight of the inverter into consideration. Use a suitable lifting technique when mounting.

3.3 Mounting the Inverter

The inverter can be mounted to the wall or metal array racking. The mounting holes should be consistent with the size of the bracket or the dimensions shown in Figure 3.5.

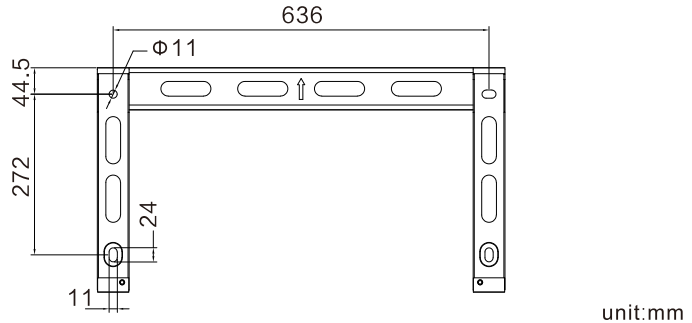


Figure 3.5 Inverter wall mounting

3.3.1 Wall mounting

Refer to figure 3.6 and figure 3.7 Inverter shall be mounted vertically.
The steps to mount the inverter are listed below.

1. Refer to Figure 3.6, drill holes for expansion bolt(M10*90) based on the hole diameter of bracket using a precision drill keeping the drill perpendicular to the wall. Max depth is 90mm.
2. Make sure the bracket is horizontal. And the mounting holes (in Figure 3.6) are marked correctly. Drill the holes into wall at your marks.
3. Use the suitable mounting screws to attach the bracket on the wall.

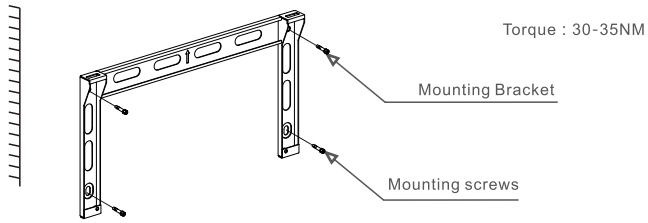


Figure 3.6 Inverter wall mounting

4. Lift the inverter and hang it on the bracket, and then slide down to make sure they match perfectly.

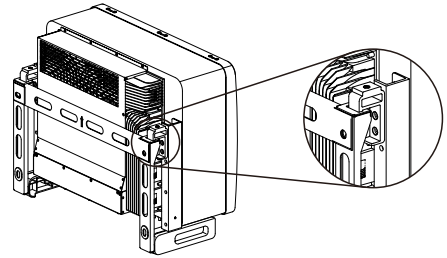


Figure 3.7 Install the inverter

5. Use screws in the packaging to fix the inverter to the mount bracket.

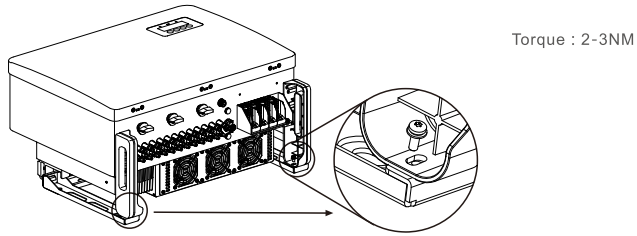


Figure 3.8 Fix the inverter

3.3.2 Rack mounting

The steps to mounted to the rack are listed below:

1. Select a location for the inverter

- With an IP66 protection rating,the inverter can be installed both outdoors and indoors.
- When the inverter is running, the temperature of the chassis and heat sink will be higher, Do not install the inverter in a location that you accidentally touch.
- Do not install the inverter in a place where it is stored in a flammable or explosive material.

2. Installation angle

Please install the inverter vertically. If the inverter cannot be mounted vertically, it may be tilted backward to 15 degrees from vertical.

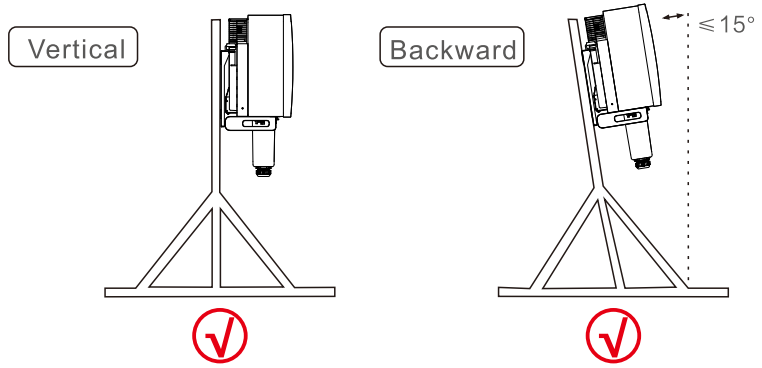


Figure 3.9 Correct installation Angle

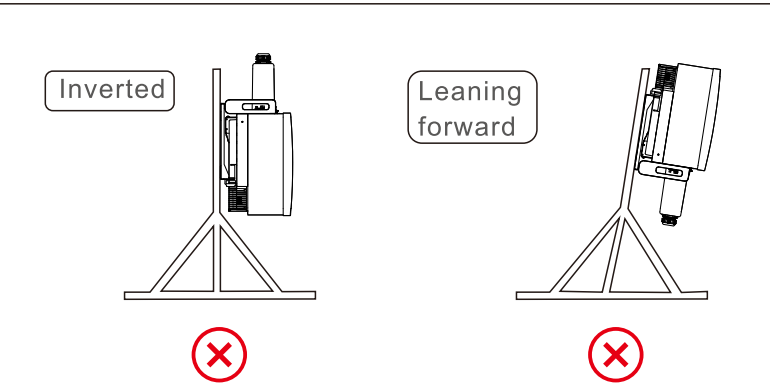


Figure 3.10 Wrong installation Angle

3. Install mounting plate

1) Remove the bracket and fasteners from the packaging. Mark the position for hole, drilling according to the hole positions of the bracket.

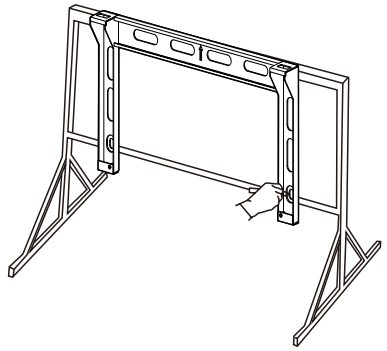


Figure 3.11 Mark the position for hole

2) Drill the marked holes. It is recommended to apply anti-corrosive paint at the hole for corrosion protection.

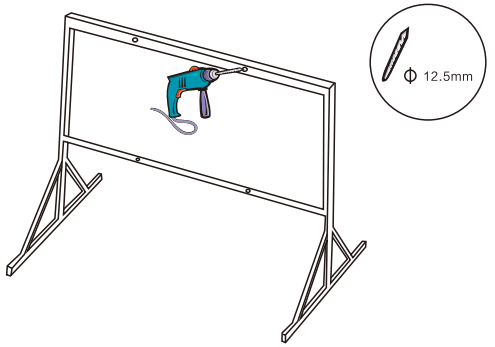


Figure 3.12 Drill hole

3) Align the mounting plate with the holes, Insert the hexagon bolt (M10X40)through the mounting plate into the hole. Secure the bracket to the metal frame firmly.
Torque the nut to 36FT-LB (35NM).

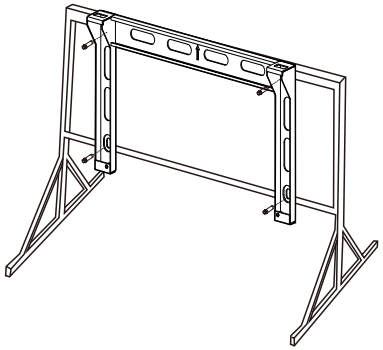


Figure 3.13 Construction bolt

4) Lift the inverter above the bracket and then slide down to make sure they match perfectly.

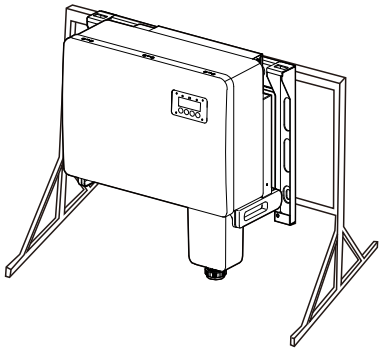


Figure 3.14 Mount the inverter

3. Installation

3.4 Electrical Connections

Inverter design uses PV style quick-connect terminal. The top cover needn't be opened during DC electrical connection. The labels located the bottom of the inverter are described below in table 3.1. All electrical connections are suitable for local or national standard.

Parts	Connection	Cable size	Torque
DC terminal	PV strings	4-6mm²	NA
Ground terminal	AC ground	25-50mm²	5-6N.m
Grid terminal	Grid	35-70mm²	10-20N.m
16pin COM Port	Communication cable	0.75-3mm²	0.4-0.6N.m
4pin COM Port	Datalogging Stick	NA	NA

Table 3.1 Electrical connection symbols

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

1. Switch the Grid Supply Main Switch (AC) OFF.
2. Switch the DC Isolator OFF.
3. Connect the inverter to the grid.
4. Assemble PV connector and connect to the Inverter.

3.4.1 Grounding

To effectively protect the inverter, two grounding methods must be performed.
Connect the AC grounding cable (Please refer to section 3.4.3)
Connect the external grounding terminal.

To connect the grounding terminal on the heat sink, please follow the steps below:

1) Prepare the grounding cable: recommend to use the outdoor copper-core cable. The grounding wire should be at least half size of the hot wires.

2) Prepare OT terminals: M10.

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.

3) Strip the ground cable insulation to a suitable length(see Figure 3.15).

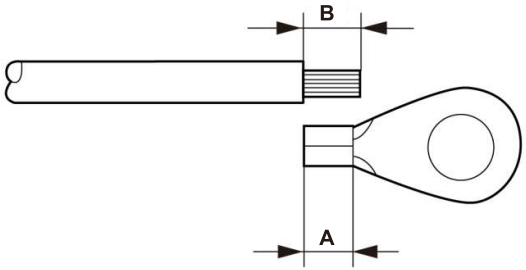


Figure 3.15 Suitable length

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

4) Insert the stripped wire into the OT terminal crimping area and use the hydraulic clamp to crimp the terminal to the wire (see Figure 3.16).

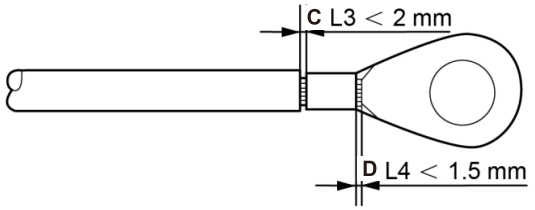


Figure 3.16 Strip wire

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) Connect the grounding cable to the grounding point on the heat sink, and tighten the grounding screw, Torque is 5-6Nm(see figure 3.17).

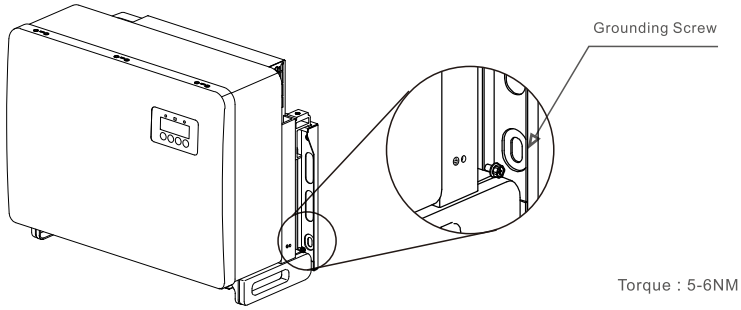


Figure 3.17 Fixed cable

Important:
For improving anti-corrosion performance,
after ground cable installed, apply silicone or paint.

3.4.2 Connect PV side of inverter

WARNING
Before connecting the inverter, make sure the PV array open circuit voltage is within the limit of the inverter. Otherwise, the inverter could be damaged.

WARNING
DO NOT connect the PV array positive or PV array negative cable to ground. This can cause serious damage to the inverter!

WARNING
MAKE SURE the polarity of the PV array output conductors matches the DC- and DC+ terminal labels before connecting these conductors to the terminals of the inverter.

Please see table 3.1 for acceptable wire size for DC connections.Wire must be copper only.
The steps to assemble the DC connectors are listed as follows:

1. Strip off the DC wire for about 7mm, Disassemble the connector cap nut.
2. Insert the wire into the connector cap nut and contact pin.

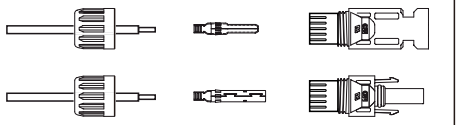


Figure 3.18 Disassemble the Connector Cap nut

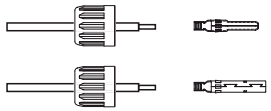


Figure 3.19 Insert the Wire into the Connector Cap nut and contact pin

3. Crimp the contact pin to the wire using a proper wire crimper.
4. Insert metal connector into top of connector, and tighten nut with torque 3-4 Nm.

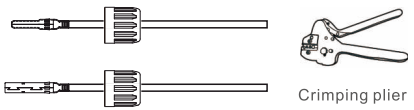


Figure 3.20 Crimp the contact pin to the wire

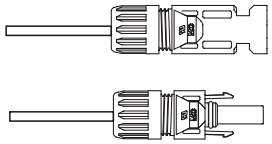


Figure 3.21 Connector with Cap nut Screwed on

5. Measure PV voltage of DC input with multimeter, verify DC input cable polarity (see figure 3.22), and ensure each string voltage is in range of inverter operation. Connect DC connector with inverter until hearing a slight clicking sound indicating successful connection. (see figure 3.23)

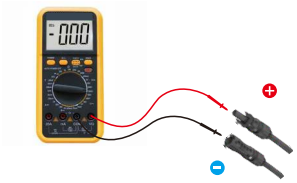


Figure 3.22 Multimeter measurement

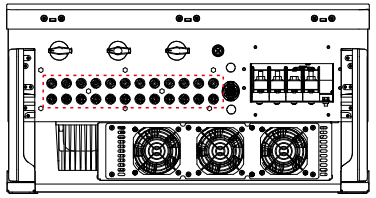


Figure 3.23 Connect the DC Connectors to the Inverter

Cable type	Traverse area（mm²）		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

CAUTION
If DC inputs are accidently reversely connected or inverter is faulty or not working properly, it is NOT allowed to turn off the DC switch. Otherwise it may cause DC arc and damage the inverter or even lead 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.
* In order to completely eliminate the possibility of failure, please disconnect the PV strings after turning off the DC switch to aviod secondary failures due to continuous PV energy on the next day.
Please note that any damages due to wrong operations are not covered in the device warranty.

Requirements for the PV modules per MPPT input:

- All PV modules must be of the same type and power rating.
- Please ensure the PV strings are evenly connected to the inverter and try to utilize all the MPPT trackers.
- All PV modules must be aligned and tilted identically.
- The open-circuit voltage of the PV array must never exceed the maximum input voltage of the inverter, even at the coldest expected temperature. (see section 10 “Specifications” for input current and voltage requirements)
- Each string connected to a single MPPT must consist of the same number of series-connected PV modules.

3.4.2.1 DC connection high voltage danger notice

CAUTION
RISK OF ELECTRIC SHOCK

Do not touch an energized DC conductor. There are high voltages present when PV modules are exposed to light causing a risk of death due to an electric shock from touching a DC conductor!
Only connect the DC cables from the PV module to the inverter as described in this manual.

CAUTION
POTENTIAL DAMAGE TO THE INVERTER DUE TO OVERVOLTAGE

The DC input voltage of the PV modules must not exceed the maximum rating of the inverter. (see section 10 “Specifications”)
Check the polarity and the open-circuit voltage of the PV strings before connecting the DC cables to the inverter.
Confirm proper string length and voltage range before connecting DC cable to the inverter.

3.4.3 Connect grid side of inverter

WARNING
An over-current protection device must be used between the inverter and the grid.

1). Connect the three (3) AC conductors to the three (3) AC terminals marked “L1”, “L2” and “L3”.Refer to local code and voltage drop tables to determine the appropriate wire size and type.
2). Connect the grounding conductor to the terminal marked “PE” (protective earth, the ground terminal).

Over-Current Protection Device (OCPD) for the AC side
To protect the inverter's AC connection line, we recommend installing a device for protection against over-current and leakage, with the following characteristics noted in Table 3.2:

NOTE
Use AL-CU transfer (bi-metallic) terminal or anti-oxidant grease with aluminum cables and terminals.

3. Installation

Inverter	Rated voltage(V)	Rated output current (Amps)	Current for protection device (A)
S5-GC50K	220/380,230/400	76.0/72.2	100
S5-GC60K	220/380,230/400	91.2/86.6	125
S5-GC60K-HV	480	72.2	100
S5-GC70K-HV	480	84.2	100
S5-GC25K-LV	220	65.6	100
S5-GC30K-LV	220	78.7	100
S5-GC36K-LV	220	94.5	125
S5-GC37.5K-LV	220	98.4	125

Table 3.2 Rating of grid OCPD

3.4.3.1 Connecting the inverter to the utility grid

All electrical installations must be carried out in accordance with the local standards and the National Electrical Code® ANSI/NFPA 70 or the Canadian Electrical Code® CSA C22.1.
The AC and DC electric circuits are isolated from the enclosure. If required by section 250 of the National Electrical Code®, ANSI/NFPA 70, the installer is responsible for grounding the system.
The grid voltage must be within the permissible range. The exact operating range of the inverter is specified in section 10 “Specifications”.

3.4.3.2 Wiring procedure

CAUTION
RISK OF ELECTRIC SHOCK. Prior to starting the wiring procedure, ensure that the three-pole circuit breaker is switched off and cannot be reconnected.

NOTE
Damage or destruction of the inverter's electronic components due to moisture and dust intrusion will occur if the enclosure opening is enlarged.

3. Installation

CAUTION

Risk of fire if two conductors are connected to one terminal. If a connection of two conductors to a terminal is made, a fire can occur. NEVER CONNECT MORE THAN ONE CONDUCTOR PER TERMINAL.

NOTE

Use M8 crimp terminals(M6 for PE) to connect to the inverter AC terminals.

Cable specification		Copper-cored cable
Traverse cross sectional area (mm^2)	Range	10~70
	Recommended	35
Cable outer diameter (mm)	Range	37~44
	Recommended	40

1) Strip the end of AC cable insulating jacket about 300mm then strip the end of each wire.

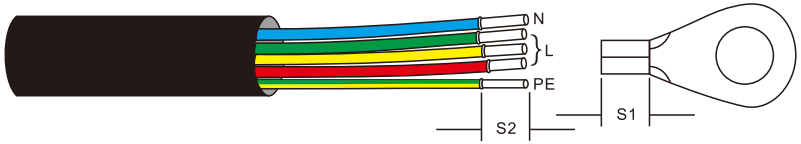


Figure 3.24 Strip AC cable

NOTE

S2 (insulation stripping length) is 2mm-3mm longer than S1. (OT cable terminal crimping area)

2) Strip the insulation of the wire past the cable crimping area of the OT terminal, then use a hydraulic crimp tool to crimp the terminal. The crimped portion of the terminal must be insulated with heat shrinkable tube or insulating tape.

NOTE:

If chosing aluminum alloy cable, you must use copper aluminum transfer terminal in order to avoid direct contact between copper bar and Aluminum alloy cable. (Please select a copper aluminum transfer terminal based on your cable specification).

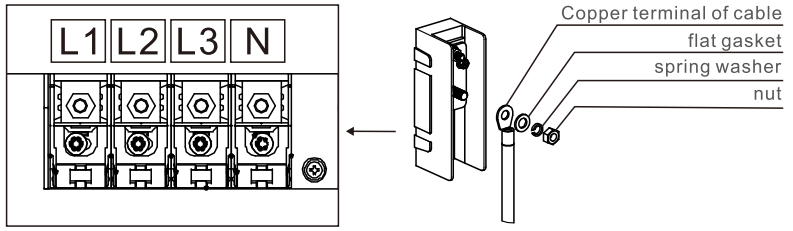


Figure 3.25 Copper aluminum transfer terminal

3) Leave the AC breaker disconnected to ensure it does not close unexpectedly.

4) Remove the 4 screws on the inverter junction box and remove the junction box cover.

5) Insert the cable through the nut, sheath, and AC terminal cover. Connect the cable to the AC terminal block in turn, using a socket wrench. Tighten the screws on the terminal block. The torque is 10~20Nm.

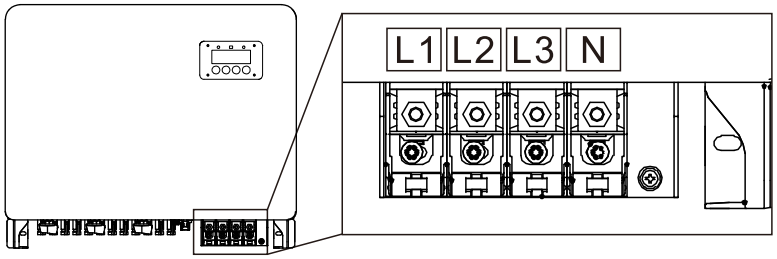


Figure 3.27 wiring with Neutral

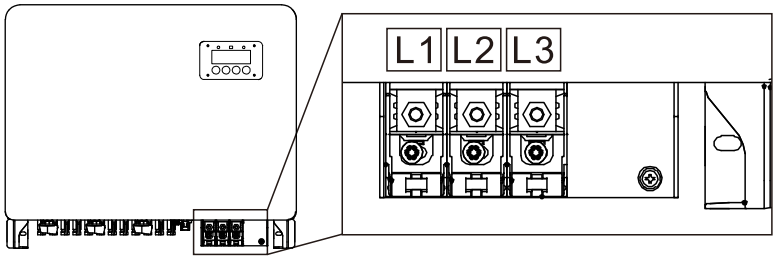
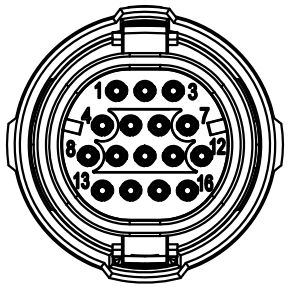


Figure 3.28 wiring without Neutral

There are 2 communication ports on the inverter.
One is a 4-Pin COM port and the other is a 16-Pin COM port.
The 4-Pin COM port is used to connect Solis datalogging sticks
(Please refer to manuals of Solis datalogging sticks for details).
The 16-Pin COM port is used for multiple inverter daisy chain connection/DRM connection/ Logic Interface Connection/Meter connection.

The inverter package will include a 16-Pin COM connector to be used on this 16-Pin COM port. The Pin definition is shown below. Facing the connector, Pin 1 is on the left of the first row. The rest polarity is showing in below diagram.



Pin	Definition	Pin	Definition
1	Meter RS485-A	9	DRM1/5
2	Meter RS485-B	10	DRM 2/6
3	COM1 485-A	11	DRM 3/7
4	COM1 485-B	12	DRM 4/8
5	\	13	RefGen
6	COM2 485-A	14	Com/DRM0
7	COM2 485-B	15	V+, 12V
8	\	16	V-, GND

Figure 4.1 16pin COM Connector

The following is the assembly diagram of the 16-Pin COM connector.

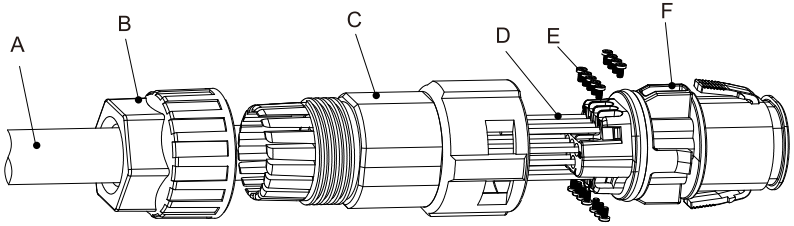


Figure 4.2

A-Main cable (Diameter: 4-6mm)
B-Locking Nut (Torque: 3.5-4N.m)
C- Sleeve
D-COM Wire (Dimension: 0.75-3mm², stripping length: 10-12mm)
E-Locking Screw (Torque: 0.4-0.6N.m)
F-Connector

Connect Steps:
1. Lead the main cable through the locking nut and the sleeve.
2. Strip the COM wires and insert into corresponding pin terminals.
Then fasten the locking screws for the pin terminals.
3. Push the sleeve onto the connector and fasten the locking nut on the end of the sleeve.
4. Connect the connector to the 16-Pin COM port at the bottom of the inverter.

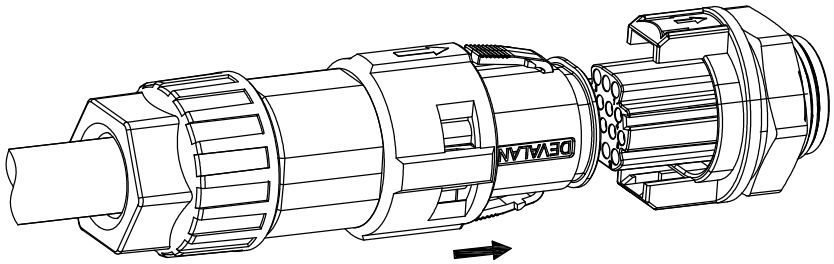


Figure 4.3

Disconnect Steps:
1. Press the button on both sides of the connector and pull the connector to disconnect from the COM port.

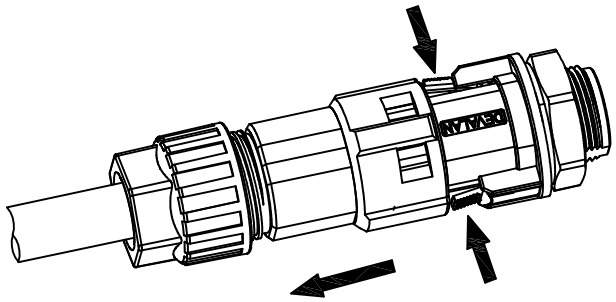


Figure 4.4

2. Use the unlock tool to insert into the groove on the sleeve and pull the sleeve to disconnect from the connector.

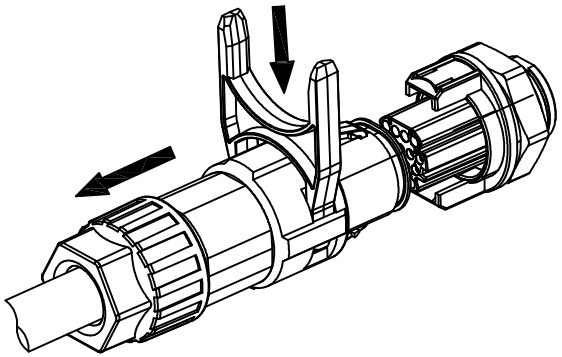


Figure 4.5

4.1 Inverter monitoring connection

Solis can provide optional accessories such as one-to-one datalogging sticks including WiFi stick, GPRS stick and LAN stick for the monitoring of a single inverter or one-to-multiple datalogging boxes including WiFi box and GPRS Box for the monitoring of multiple inverters. Please refer to corresponding manuals for details.

4.1.1 Monitoring for a single inverter

Every inverter can connect a Solis one-to-one datalogging stick for remote monitoring purpose. The datalogging stick should be directly connected to the 4-pin COM port at the bottom of the inverter. It is a simple plug and play design with fast installation time. Details and the rest configuration process please refer to the datalogging stick manual.

4.1.2 Monitoring for multiple inverters

When multiple inverters need to run daisy chain communication together, Pin3/4 and Pin6/7 of the 16-Pin COM Port can be used.

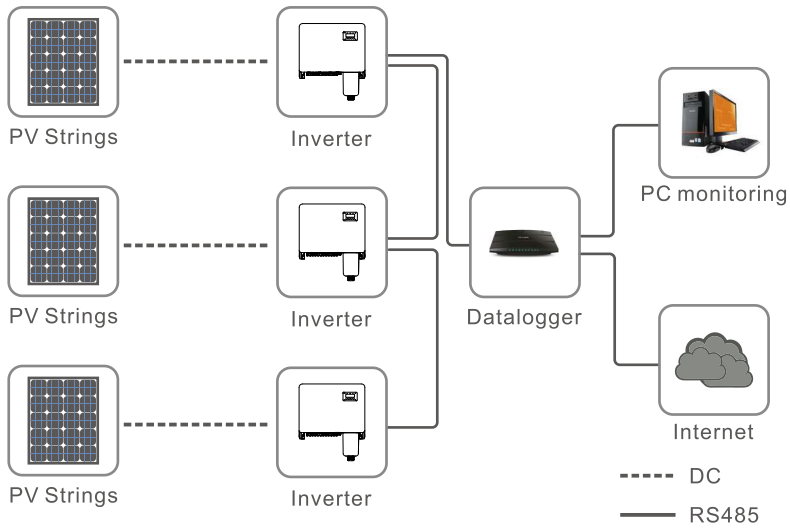
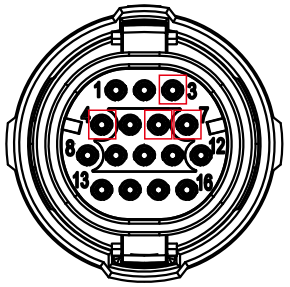


Figure 4.6 Multiple inverter monitoring system(RS485)



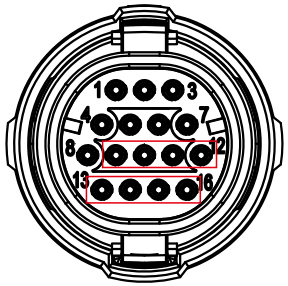
Pin	Definition	Description
3	COM1 485-A	RS485 IN A
4	COM1 485-B	RS485 IN B
6	COM2 485-A	RS485 OUT A
7	COM2 485-B	RS485 OUT B

Figure 4.7

The bus RS485 cable can run into a Solis one-to-multiple datalogging box or any compatible 3rd party monitoring devices, PPC or plant SCADA.

4.2 DRM Connection/ Logic Interface Connection

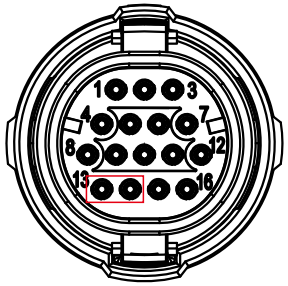
The AS/NZS 4777.2:2015 requires inverters to support demand response modes (DRM). Solis Australian version inverters fully comply with the DRM requirements in AS/NZS 4777 .2:2015. The pin definition is showing below. For details on the working logic, please refer to the standard document of AS/NZS 4777.2:2015. The DRM controlling device is not in the scope of supply of Solis.



Pin	Definition	Pin	Definition
9	DRM1/5	13	RefGen
10	DRM 2/6	14	Com/DRM0
11	DRM 3/7	15	V+, 12V
12	DRM 4/8	16	V-, GND

Figure 4.8

Some European countries may require a simply logic interface relay or contactor switch to operate the RUN/STOP of inverters. For Solis European version inverters, the Pin 13 and Pin 14 can be used to perform the control logic (Not available in South Africa).
The logic interface relay or contactor switch is not in the scope of supply of Solis.
When the relay is closed (Short between Pin13 and Pin14), the inverter can operate normally.
When the relay is opened (Open between Pin13 and Pin14), the inverter will reduce its output power to zero within 5s.



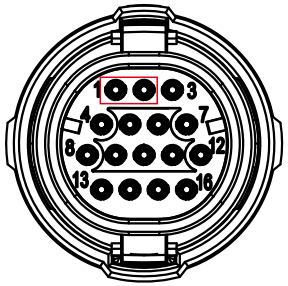
Pin	Definition
13	RefGen
14	Com/DRM0

Figure 4.9

After wiring connection of DRM or Logic interface, please refer to section 7.5.8.1 to enable the DRM/Logic interface function..

4.3 Meter Connection

The inverter can work with a three phase smart meter to achieve Export Power Management function and/or 24hour consumption monitoring function.
The Pin 1 and Pin 2 of the 16-Pin COM port are used for Meter RS485 communication.



Pin	Definition
1	Meter RS485-A
2	Meter RS485-B

Figure 4.10

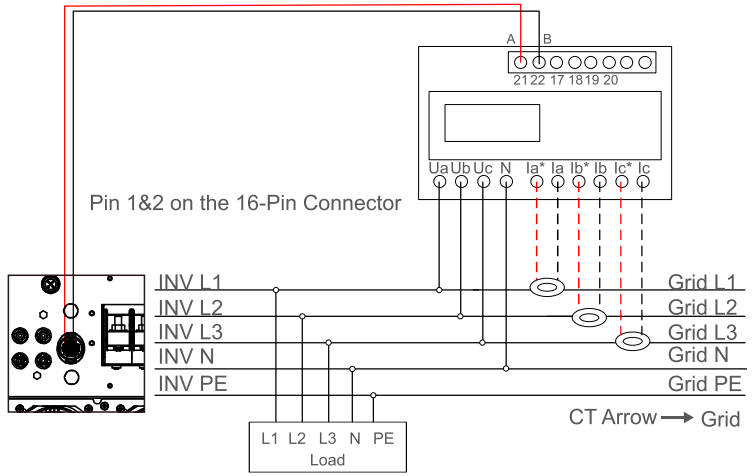


Figure 4.11 External CT Type Meter - “Meter in Grid”

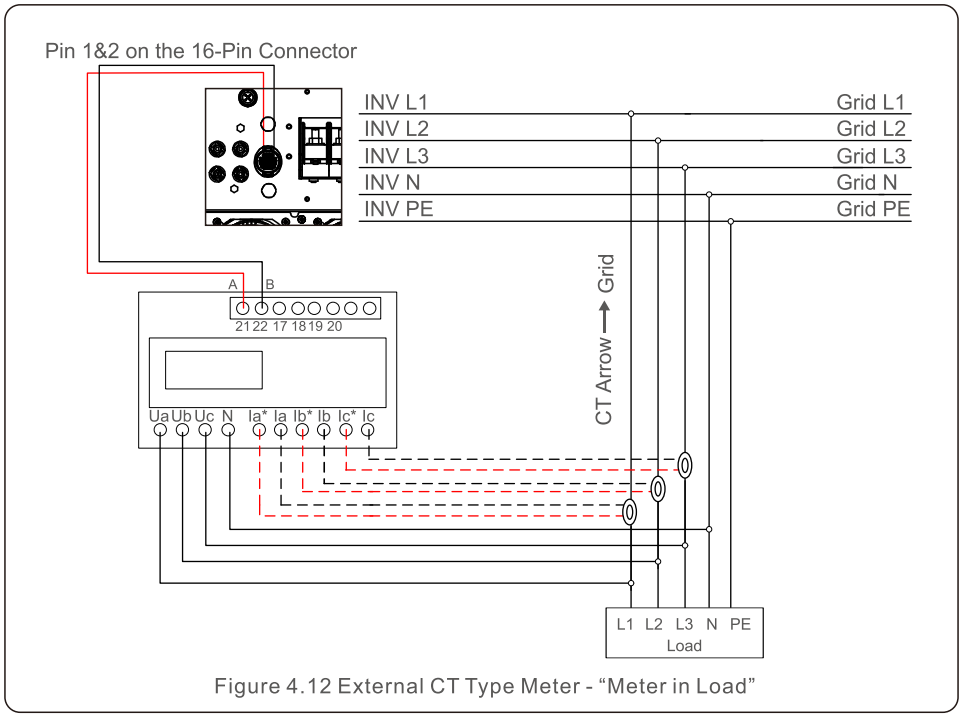


Figure 4.12 External CT Type Meter - “Meter in Load”

5.1 Selecting the appropriate grid standard

5.1.1 Verifying grid standard for country of installation

Solis inverters are used worldwide and feature preset standards for operating on any grid. Although the grid standard is set at the factory, it is essential the grid standard be verified for the country of installation before commissioning.

The menu for changing the grid standard or for creating a custom standard is accessible as described in Section 6.7 and below.

WARNING

Failure to set the correct grid standard could result in improper operation of the inverter, inverter damage or the inverter not operating at all.

5.2 Changing the grid standard

5.2.1 Procedure to set the grid standard

NOTE

This operation is for service technicians only. The inverter is customized according to the local grid standard before shipping. There should be no requirement to set the standard.

NOTE

The “User-Def” function can only be used by the service engineer. Changing the protection level must be approved by the local utility.

1). From the main screen on the display, select ENTER. There are 4 sub-menu options, use the UP/DOWN arrows to highlight ADVANCED SETTINGS. Press enter to select.



Figure 5.1

2). The screen will show that a password is required. The default password is "0010", press the DOWN key to move cursor, press the UP key to change the highlighted digit.

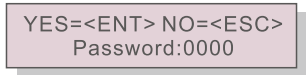


Figure 5.2

3). Use the UP/DOWN keys to highlight the SELECT STANDARD option. Press enter to select.



Figure 5.3

4). Select the grid standard for the country of installation.



Figure 5.4

Press the UP or DOWN key to select the standard. Press the ENTER key to confirm the setting. Press the ESC key to cancel changes and return to the previous menu.

5.3 Setting a custom grid standard

WARNING

- Failure to set the correct grid standard could result in improper operation of the inverter, inverter damage or the inverter not operating at all.
- Only certified personnel should set the grid standard.
- Only set the grid configuration that is approved by your location and national grid standards.

1). Please refer to section 6.7 “Advanced Settings” for procedures to create a custom grid configuration for User-Def menu option.

5. Commissioning

5.4 Preliminary checks

WARNING
High Voltage.
AC and DC measurements should be made only by qualified personnel.

5.4.1 DC Connections

Verify DC connections.

1). Lightly tug on each DC cable to ensure it is fully captured in the terminal.
2). Visually check for any stray strands that may not be inserted in the terminal.
3). Check to ensure the terminal screws are the correct torque.

5.4.2 AC Connections

Verify AC connections.

1). Lightly tug on each AC cable to ensure it is fully captured in the terminal.
2). Visually check for any stray strands that may not be inserted in the terminal.
3). Check to ensure the terminal screws are the correct torque.

5.4.3 DC configuration

Verify DC configuration by noting the number of panels in a string and the string voltage.

5.4.3.1 VOC and Polarity

Measure VOC, and check string polarity. Ensure both are correct and VOC is in specification.

WARNING
Input voltages higher than the maximum value accepted by the inverter (see “Specifications” in section 10) may damage the inverter.
Although Solis inverters feature reverse polarity protection, prolonged connection in reverse polarity may damage these protection circuits and/or the inverter.

5.4.3.2 Leakage to ground

Measure leakage to ground to check for a DC ground fault.

5.4.3.2.1 Detection of leakage to ground

Solis inverters are transformer-less and do not have an array connection to ground. Any measurement of a fixed voltage between ground and either the positive or negative string wiring indicates a leakage (ground fault) to ground and must be corrected prior to energizing the inverter or damage to the inverter may result.

5.4.4 AC configuration

Verify AC configuration.

5.4.4.1 Measure Vac and frequency

Measure VAC and verify voltage is within local grid standards.

1). Measure each phase to ground (L-G).

2). Measure phases to the other phases in pairs (L-L). PH A to PH B, PH B to PH C and PH C to PH A.

3). If the meter is equipped, measure the frequency of each phase to ground.

4). Ensure each measurement is within local grid standards and the inverter specifications as noted in section 10 “Specifications”.

5.4.4.2 Phase rotation test

A phase rotation test is recommended to ensure the phases have been connected in the appropriate order. Solis inverters do not require a specific phase rotation connection. However, the local utility may require a specific phase rotation or a record of the phase configuration of the installation.

6.1 Start-up procedure

To start-up the inverter, it is mandatory that the steps below are followed in the exact order outlined.

1. Ensure the commissioning checks in Section 5 have been performed.
2. Switch the AC switch ON.
3. Switch the DC switch ON. If the PV array (DC) voltage is higher than the inverter's start-up voltage, the inverter will turn on. The red DC POWER LED and LCD will be continuously lit.
4. Solis inverters are powered from the DC side. When the inverter detects DC power that is within start-up and operating ranges, the inverter will turn on. After turn-on, the inverter will check internal parameters, sense and monitor AC voltage, hertz rate and the stability of the supply grid. During this period, the green OPERATION LED will flash and the LCD screen will show INITIALIZING. This tells the operator that the inverter is preparing to generate AC power.
5. After the locally mandated delay (300 seconds for IEEE-1547 compliant inverters), the inverter will start generating AC power. The green OPERATION LED will light continuously and the LCD screen will show GENERATING.



CAUTION

The inverter's surface temperature can reach up to 75℃ (167⁰ F). To avoid risk of burns, do not touch the surface when the inverter is in the operational mode. Additionally, the inverter must be installed out of the reach of children.

6.2 Shutdown procedure

To stop the inverter, it is mandatory that the steps below are followed in the exact order outlined.

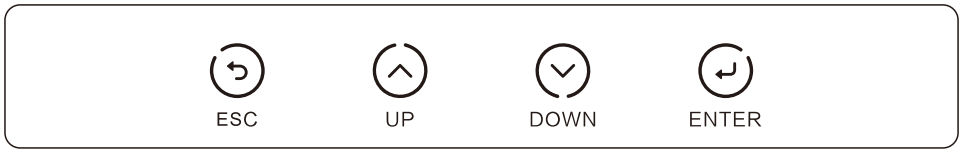
1. Select "Grid Off" in the Advanced Setting of Inverter LCD.
2. Turn off the AC Switch between Solis inverter and Grid.
3. Wait approximately 30 seconds (during this time, the AC side capacitors are dissipating energy). If the inverter has DC voltage above the start-up threshold, the red POWER LED will be lit. Switch the DC switch OFF.
4. Confirm all LED's switch OFF (~one (1) minute).



CAUTION

Although the inverter DC disconnect switch is in the OFF position and all the LED's are OFF, operators must wait five (5) minutes after the DC power source has been disconnected before opening the inverter cabinet. DC side capacitors can take up to five (5) minutes to dissipate all stored energy.

In normal operation, LCD screen alternatively shows inverter power and operation status (see Figure 7.1). The screen can be scrolled manually by pressing the UP/DOWN keys. Pressing the ENTER key gives access to Main Menu.



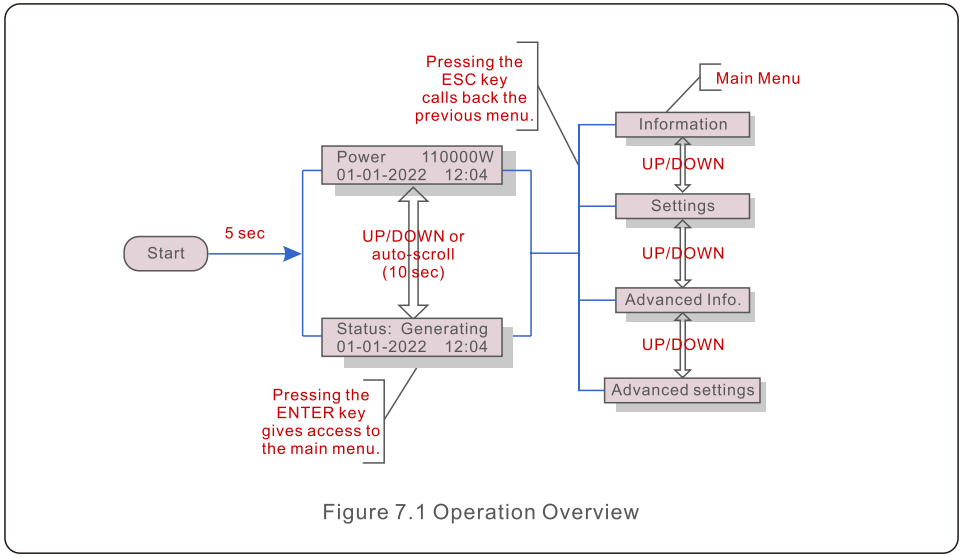


Figure 7.1 Operation Overview

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

Display	Duration	Description
V_DC01: 0000.0A I_DC01: +000.0A . . . V_DC06: 0000.0A I_DC06: +000.0A	10 sec	V_DC: Shows input DC voltage. I_DC: Shows input DC current.
V_A: 000.0V I_A: 000.0A . . . V_C: 000.0V I_C: 000.0A	10 sec	V_A(B,C): Shows the grid's voltage value. I_A(B,C): Shows the grid's current value.
Status: Generating Power: 0000W	10 sec	Status: Shows instant status of the Inverter. Power: Shows instant output power value.
Rea_Power: 0000Var App_Power: 0000VA	10 sec	Rea_Power: Shows the reactive power of the inverter. App_Power: Shows the apparent power of the inverter.
Grid Frequency F_Grid 00.00Hz	10 sec	F_Grid: Shows the grid's frequency value.
Total Energy 0000000 kwh	10 sec	Total generated energy value.
This Month: 0000kwh Last Month: 0000kwh	10 sec	This Month: Total energy generated this month. Last Month: Total energy generated last month.
Today: 00.0kwh Yesterday: 00.0kwh	10 sec	Today: Total energy generated today. Yesterday: Total energy generated yesterday.
Inverter SN 00000000000000	10 sec	Display series number of the inverter.
Export_P:NULL Export_I:NULL	10 sec	Power of EPM. Current of EPM.
Work Mode: NULL DRM NO.:08	10 sec	Work Mode: Shows current working mode. DRM NO.: Shows DRM Number.
I_DC01: +05.0A I_DC02: +04.9A . . . I_DC12: +05.2A	10 sec	I_DC01 : Shows input 01 current value. I_DC02 : Shows input 02 current value. … I_DC12 : Shows input 12 current value.

Table 7.1 Information list

7.2.1 Unlock Screen

The screen will automatically lock in one minute if there is no further operation.
Press and hold the ESC and ENTER keys at the same time for about ten seconds to unlock.



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 date. 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 muti inverters are connected to three monitor. 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. Normal operation

7.4 Advanced Info - Technicians Only

NOTE:
To access to this area is for fully qualified and accredited technicians only.
Enter menu “Advanced Info.” and “Advanced settings” (need 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 select the number.
After enter the correct password the Main Menu will display a screen and be able to access to the following information.

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

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.

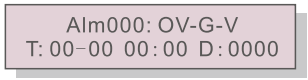


Figure 7.6 Alarm Message

7.4.2 Running Message

This function is for maintaince person to get running message such as internal temperature, Standard No.1,2,etc.
Screens can be scrolled manually by pressing the UP/DOWN keys.
Press UP/DOWN key to move one date from another.

7.4.3 Version

The screen shows the model version of the inverter. And the screen will show the software ver by pressing the UP and DOWN at the same time.(see Figure 7.7).



Figure 7.7 Model Version and Software Version

7.4.4 Daily Energy

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



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.

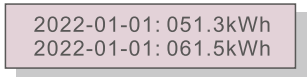


Figure 7.9 Daily energy

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

7.4.5 Monthly Energy

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

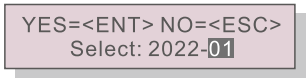


Figure 7.10 Select month for monthly energy

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

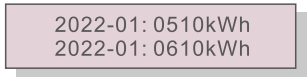


Figure 7.11 Month energy

7.4.6 Yearly Energy

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



Figure 7.12 Select year for yearly energy

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

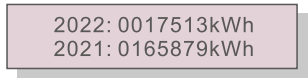


Figure 7.13 Yearly energy

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

7.4.7 Daily Records

The screen shows history of changing settings. Only for maintance personel.

7.4.8 Communication Data

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

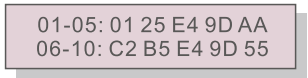


Figure 7.14 Communication Data

7.4.9 Warning Message

The display shows the 100 latest warn messages (see Figure 7.15). Screens can be scrolled manually by pressing the UP/ DOWN keys. Press the ESC key to return to the previous menu.

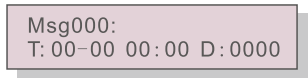


Figure 7.15 Warning Message

7.5 Advanced Settings - Technicians Only

NOTE:
To 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. Switch 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 Update
11. Internal EPM set
12. External EPM set
13. Restart HMI
14. Fan Test
15. DSP Update
16. Compensation Set
17. I/V Curve

7.5.1 Selecting Standard

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



Figure 7.16

Selecting the “User-Def” menu will access to the following submenu (see Figure 7.17),



Figure 7.17

Below is the setting range for “User-Def”. Using this function, the limits can be changed manually. (These voltage values are the phase voltage)

OV-G-V1: 220---374V	OV-G-F1: 50.1-65Hz
OV-G-V1-T: 0.01---300S	OV-G-F1-T: 0.01---300S
OV-G-V2: 220---374V	OV-G-F2: 50.1-65Hz
OV-G-V2-T: 0.01---300S	OV-G-F2-T: 0.01---300S
UN-G-V1: 110---277V	UN-G-F1: 45-59.9Hz
UN-G-V1-T: 0.01---300S	UN-G-F1-T: 0.01---300S
UN-G-V2: 110---277V	UN-G-F2: 45-59.9Hz
UN-G-V2-T: 0.01---300S	UN-G-F2-T: 0.01---300S
Startup-T: 10-600S	Restore-T: 10-600S

Table 7.2 Setting ranges for User-Def (L-N)

NOTE
The initial value of the User-Def standard is for reference only. It does not represent a correct value suitable for use.

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.

7.5.2 Switch ON/OFF



Figure 7.18 Switch ON/OFF

7.5.2.1 Grid ON/OFF

This function is used to start up or stop the power generation of Solis Three Phase Inverter.

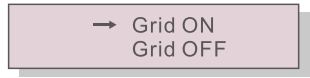


Figure 7.19 Set Grid ON/OFF

7.5.2.2 24H Switch

This function controls the 24H hours consumption function enable or disable.



Figure 7.20 Set 24H ON/OFF

NOTE:
When this is enabled, the inverter LCD will still be alive at night with the power LED light on. If the grid is in malfunction at night, the system can't recover even after the grid is back to normal but the consumption data will still be recorded in the meter. Until the sunrise, the system will start to work again while the meter data can be uploaded to the Solis monitoring system to calibrate the load consumption data.

7.5.3 Clear Energy

Clear Energy can reset the history yield of inverter

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

7.5.4 Reset Password

This function is used to set the new password for menu "Advanced info." and "Advanced information" .

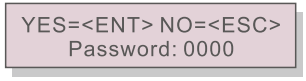


Figure 7.21 Set new password

Enter the right password before set new password. 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. Normal operation

7.5.5 Power Control

Active and reactive power can be set through power setting button.
There are 4 item for this sub menu:

1. Set output power
2. Set Reactive Power
3. Out_P With Restore
4. Rea_P With Restore

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

7.5.6 Calibrate Energy

Maintenance or replacement could clear or cause a different value of total energy. Use this function could 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.

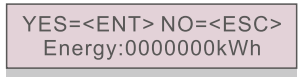


Figure 7.22 Calibrate energy

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, wrong operation will prevent the inverter from reaching maximum power.

7.5.8 STD Mode Settings

Selecting “STD Mode. Settings” displays the sub-menu shown below:

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

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

7.5.8.1 Enable DRM/Logic Interface Settings

Please follow below settings to enable the DRM/Logic Interface function.
The setting is "OFF" by default. If the setting is set to "ON", but the external DRM controlling device or logic interface relay is not connected or logic interface relay is opened, the inverter will display "LimbyDRM" and the inverter output power will be limited to zero.
1. Select "**Initial Settings**"
2. Select "**DRM" and set it to "ON**"

7.5.9 Restore Settings

There are 5 items in initial setting submenu.
Restore setting could set all item in 7.5.7 special setting to default.
The screen shows as below:



Figure 7.23 Restore Settings

Press the Enter key to save the setting after setting grid off.
Press the ESC key to return the previous mean.

7.5.10 HMI Update

This section is applicable to maintenance personnel only.

Selecting “Updater” displays the sub-menu shown below:



Figure 7.24

Updater is for updating LCD firmware. Press the ENTER key to start the process.
Press the ESC key to return to the previous menu.

7.5.11 Internal EPM Set

NOTE:
This section includes two functions related to the smart meter.
Please refer to section 4.3 for detailed connection diagrams.
Function 1: Internal Export Power Management Function
Inverters can work with a smart meter to dynamically limit the export power of the system. Zero injection can be achieved.
Smart meter can be installed either on the grid side OR the load side.
Function 2: 24 Hour Consumption Monitoring Function
Only applicable if Solis monitoring system is used.
Inverters can work with a smart meter to monitor the load consumption data for the whole day and the data will be displayed on the Solis monitoring system.
Smart meter can only be installed on the grid side.

NOTE:

Please refer to below instructions for different user scenarios.

Scenario 1. Only Function 1 is required

Step 1: Refer to Section 4.3 to connect the smart meter on the grid side or load side.

Step 2: Select the Section 7.5.11.1 Mode Select as Option 2(Meter in Load) or Option 3 (Meter in Grid) accordingly.

Step 3: Configure the Section 7.5.11.2 to set the allowed backflow power.

Step 4: Configure the Section 7.5.11.3 to enable the failsafe function (If necessary).

Step 5: Configure the Section 7.5.11.4 to modify the work mode (If necessary).

Scenario 2. Both Function 1 and 2 are required

Using a Smart Meter:

Step 1: Refer to Section 4.3 to connect the smart meter on the grid side.

Step 2: Select the Section 7.5.11.1 Mode Select as Option 3(Meter in Grid).

Step 3: Select the Section 7.5.2.2 24H Switch as "Enable".

Step 4: Configure the Section 7.5.11.2 to set the allowed backflow power.

Step 5: Configure the Section 7.5.11.3 to enable the failsafe function (If necessary).

Step 6: Configure the Solis monitoring system (Please refer to the manual of monitoring device).

If customer does not want to enable the export power control function, please change the "backflow power" to the max output power of the inverter in Step 4 OR simply select the mode as "consumption monitor" in Step 2 and skip Step 4-5.

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

1. Mode Select 2. Backflow Power 3. Fail safe ON/OFF 4. Backflow Work Mode

7.5.11.1 Mode Select

There are 4 settings in this menu as below:

1. OFF 2. Meter in Load 3. Meter in Grid 4.Consumption Monitor

OFF: Functions are disabled

Meter in Load: Solis Smart Meter is connected in the load branch circuit.

Meter in Grid: Solis Smart Meter is connected in the grid connection point (The backflow power is default as 0W).

Consumption Monitor: Solis Smart Meter is connected in the grid connection point (The backflow power setting is not applicable).

7.5.11.2 Backflow Power

The setting is used to define the allowed export power into the grid.
The setting range is between 00000W to 29900W.

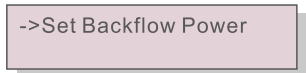


Figure 7.25 Set the backflow power



Figure 7.26

Press the UP/DOWN keys to set data.Press the ENTER key to set backflow power.
Then press DOWN keys to move the cursor, press UP to change the number.
Press the ESC key to save the settings and return to the previous menu.

7.5.11.3 Fail safe ON/OFF

This setting is used to give out an alarm (stop inverter generation as well) when the Meter connection is lost during operation.
It can prevent potential backflow power into the grid when the system loses control.



Figure 7.27 Set the Fail Safe ON/OFF

It is only mandatory to turn on this function when the inverter is installed in UK due to the G100 regulation. For other regions,customers can enable or disable the function as they desire.

NOTE:

When the failsafe function is ON and CT/Meter is disconnected somehow, the inverter will stop generation and give "Failsafe" alarm on the LCD.
When the failsafe function is OFF and CT/Meter is disconnected somehow, the inverter will keep the output power as the last moment when the CT/Meter is still connected. After a restart, the inverter will output at full power without limit.

7.5.11.4 Backflow Work Mode

This submenu is used for set backflow work mode: 01, 02. “01” is the default mode.

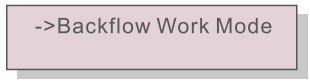


Figure 7.28 Set the Backflow work mode



Figure 7.29

Mode “01”, As shown in the figure 7.30, the average limiting mode, the output power of each phase is the average of the three-phase load power, and it is more than the phase of the lowest power in three phases.

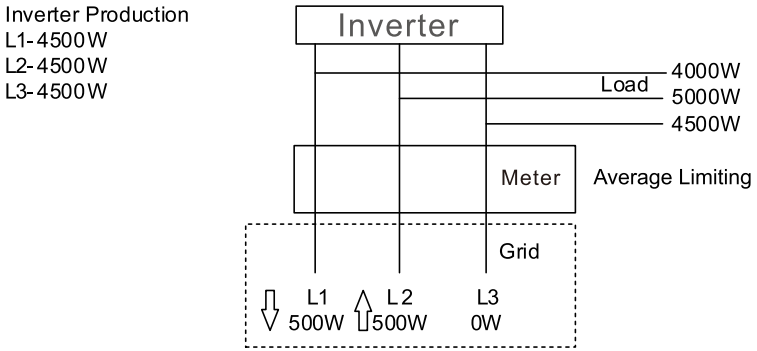


Figure 7.30

Mode “02”, As shown in the figure 7.31 the per phase limiting mode, the inverter only generate the power that equals to one of three-phase load power that is the lowest load power of a certain phase.

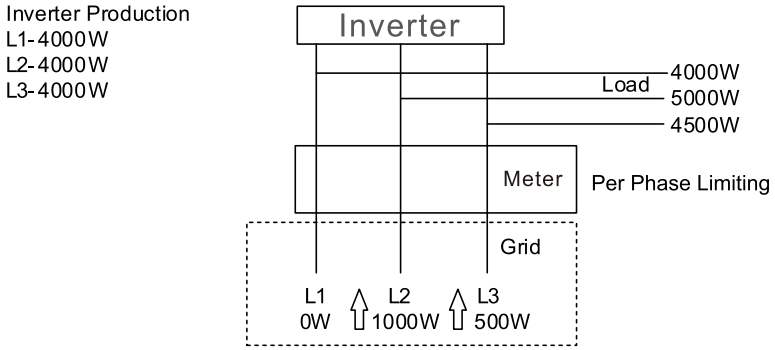


Figure 7.31

7.5.12 External EPM Set

This setting should only be turned on when Solis external EPM device is used.
Two options are available：5G-EPM and Others-EPM.

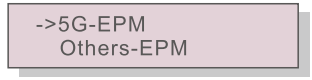


Figure 7.32

5G-EPM Failsafe Option should be turned ON when 5G series EPM device is used
Others-EPM Failsafe Option should be turned ON when 2G series EPM device is used
Only one option can be activated each time.

7.5.13 Restart HMI

The function is used for restart the HMI.

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

7.5.14 FAN Test

This section is applicable to maintenance personnel only.

Selecting “Fan Test” displays the sub-menu shown below:

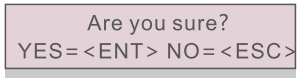


Figure 7.33

Fan Test is a factory test function. Press the ENTER key to start the test.

Press the ESC key to return to the previous menu.

7.5.15 DSP Update

The function is used for update the DSP.



Figure 7.34 DSP Update

7.5.16 Compensation Set

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

Two sections are included: Power Parameter and Voltage Parameter.

The screen shows:



Figure 7.35 Voltage Parameter

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 operators, do not change this setting unless specifically instructed to.

7. Normal operation

7.5.17 I/V Curve

This function is used to scan the I/V characteristic curves of each PV strings.

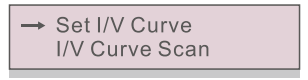


Figure 7.36 I/V Curve

7.5.17.1 Set I/V Curve

This setting can set the scanning voltage start point and the voltage interval.

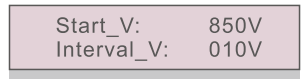


Figure 7.37 Set I/V Curve

Start_V: The start voltage of the I/V scan. (Adjustable from 100V-1100V)
Interval_V: The scanning voltage interval.(Adjustable from 001V-100V)
In total, 60 data points can be scanned.

7.5.17.2 I/V Curve Scan

Press “ENT” to start the I/V curve scan.

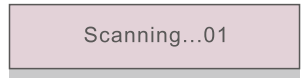


Figure 7.38 I/V Curve Scan (1)

After it is completed, the screen will display “Scan OK” and then enter the following section.



Figure 7.39 I/V Curve Scan (2)

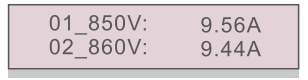


Figure 7.40 I/V Curve Scan (3)

7.6 AFCI function

Solis inverters have the built-in AFCI function which can detect the arc fault on the DC circuit and shut down the inverter to prevent a fire disaster.

7.6.1 Enable the AFCI function

The AFCI function can be enabled in the following.
Path: Advanced Setting -> Password: 0010 ->Special Settings -> AFCI Set ->
AFCI ON/OFF -> ON

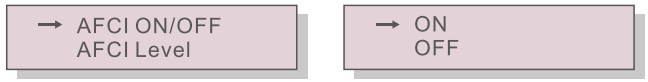


Figure 7.41 Set AFCI

Warning:
The "AFCI Level" is reserved for Solis technicians ONLY. Do not change the sensitivity otherwise it will lead to frequent false alarms or malfunctions. Solis is not responsible for any further damages caused by unauthorized modifications.

NOTE:
The setting corresponds to the current status as well which can be used to inspect the ON/OFF state of the AFCI function.

7.6.2 Arc Fault

During the normal operation, if an DC arc is detected, the inverter will shut down and give out the following alarm:



Figure 7.42 Arc Fault

Installer needs to thoroughly inspect the DC circuit to ensure all the cables are correctly fastened.
Once the DC circuit issue has been fixed or it is confirmed to be OK, press “ESC” for 3s and wait for the inverter to restart.

Solis Three Phase 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 6.2) 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 Night Time PID-Recovery Function

Solis Three phase Inverters integrates optional Night Time PID-Recovery module and it can recover the PID effect during night thus protect the PV system from degradation.

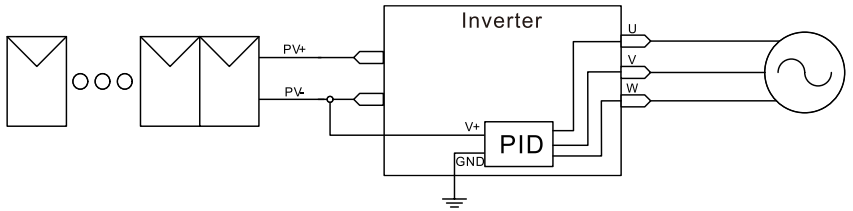


Figure 8.1

The Night Time PID-Recovery module repairs the PID effect of the PV model at night. When operating, the inverter LCD screen displays " PID-repairing " information, and the red light is on. The Night Time PID-Recovery function is always ON when AC is applied. If maintenance is required and turn off the AC switch can disable the Night Time PID-Recovery function.

WARNING :
Due to the similar functional logic, when the night time PID-Recovery function is integrated, the night time var compensation function can not be used. Also, the negative grounding option is not available for inverters with night time PID-Recovery function.

8. Maintenance

WARNING :
The PID function is automatic. When the DC bus voltage is lower than 50Vdc, the PID module will start creating 450 Vdc between PV- and ground.
No need any control or settings

NOTE:
If you need to maintain the inverter at night, please turn off the AC switch first, then turn off the DC switch, and wait 5 minutes before you do other operations.

8.2 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. Turn off the “Grid ON/OFF” switch on the inverter LCD.
2. Disconnect the AC power.
3. Turn the DC switch to "OFF" position.
4. Wait for 15 minutes at least.
5. Remove the 8 screws on the fan plate and pull out the fan assembly slowly.

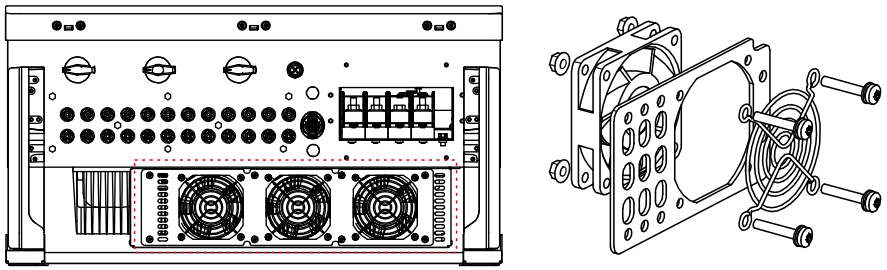


Figure 8.2

6. Disconnect the fan connector carefully and take out the fan.
7. Clean or replace the fan. Assemble the fan on the rack.
8. Connect the electrical wire and reinstall the fan assembly. Restart the inverter.

9. Troubleshooting

The inverter is designed in accordance with the most important international grid-tied standards and 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:

Alarm Message	Failure description	Solution
No power	Inverter no power on LCD	1.Check PV input connections 2.Check DC input voltage (single phase >120V, three phase >350V) 3.Check if PV+/− is reversed
LCD show initializing all the time	Can not start-up	1.Check if the connector on main board or power board are fixed. 2.Check if the DSP connector to power board are fixed.
OV-G-V01/02/03/04	Over grid voltage	1.Resistant of AC cable is too high. Change bigger size grid cable 2.Adjust the protection limit if it's allowed by electrical company.
UN-G-V01/02	Under grid voltage	1.Use user define function to adjust the protection limit if it's allowed by electrical company.
OV-G-F01/02	Over grid frequency	
UN-G-F01/02	Under grid frequency	
G-IMP	High grid impedance	
NO-GRID	No grid voltage	1.Check connections and grid switch. 2.Check the grid voltage inside inverter terminal.
OV-DC01/02/03/04	Over DC voltage	1.Reduce the module number in series
OV-BUS	Over DC bus voltage	1.Check inverter inductor connection 2.Check driver connection
UN-BUS01/02	Under DC bus voltage	
GRID-INTF01/02	Grid interference	1.Restart inverter 2.Change power board
OV-G-I	Over grid current	
IGBT-OV-I	Over IGBT current	
DC-INTF OV-DCA-I	DC input overcurrent	1.Restart inverter 2.Identify and remove the string to the fault MPPT 2.Change power board
IGFOL-F	Grid current tracking fail	1.Restart inverter or contact installer.
IG-AD	Grid current sampling fail	
OV-TEM	Over Temperature	1.Check inverter surrounding ventilation. 2.Check if there's sunshine direct on inverter in hot weather.

9. Troubleshooting

Alarm Message	Failure description	Solution
INI-FAULT	Initialization system fault	1.Restart inverter or contact installer.
DSP-B-FAULT	Comm. failure between main and slave DSP	
12Power-FAULT	12V power supply fault	
PV ISO-PRO 01/02	PV isolation protection	1.Remove all DC input, reconnect and restart inverter one by one. 2.Identify which string cause the fault and check the isolation of the string.
ILeak-PRO 01/02/03/04	Leakage current protection	1.Check AC and DC connection 2.Check inverter inside cable connection.
RelayChk-FAIL	Relay check fail	1.Restart inverter or contact installer.
DCinj-FAULT	High DC injection current	
AFCI self-detection (model with AFCI module)	AFCI module self-detect fault	1.Restart inverter or connect technician.
Arcing protection (model with AFCI module)	Detect arc in DC circuit	1. Check inverter connection whether arc exists and restart inverter.
Reve-DC	One of the DC string is reversely connected	1. Please check the inverters' PV string polarity, if there are strings reversely connected wait for the night when the solar irradiance is low and the PV string current down below 0.5A. Turn off the two DC switchs and fix the polarity issue.
Screen OFF with DC applied	Inverter internally damaged	1.Do not turn off the DC switches as it will damage the inverter. 2.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. 3.Please note that any damages due to wrong operations are not covered in the device warranty.

Table 9.1 Fault message and description

NOTE

If the inverter displays any alarm message as listed in Table 9.1, please turn off the inverter (refer to Section 6.2 to stop your inverter) and wait for 15 minutes before restarting it (refer to Section 6.1 to start your inverter). If the failure persists, please contact your local distributor or the service center. Please keep ready with you the following information before contacting us.

1. Serial number of Solis Three Phase Inverter;
2. The distributor/dealer of Solis Three Phase Inverter (if available);
3. Installation date.
4. The description of 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 6.2) 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.

Model	S5-GC50K
Max. DC input voltage (Volts)	1100
Rated DC voltage (Volts)	600
Start-up voltage (Volts)	195
MPPT voltage range (Volts)	180...1000
Max. input current (Amps)	5*32
Max short circuit input current (Amps)	5*40
MPPT number/Max input strings number	5/10
Rated output power (Watts)	50000
Max. output power (Watts)	55000
Max. apparent output power (VA)	55000
Rated grid voltage (Volts)	3/N/PE, 220/380, 230/400
Rated grid output current (Amps)	76.0/72.2
Max. output current (Amps)	83.6
Power Factor (at rated output power)	0.8leading~0.8lagging
THDi (at rated output power)	<3%
Rated grid frequency (Hertz)	50/60
Max.efficiency	98.7%
EU efficiency	98.3%
Dimensions (W*H*D)	691*578*338mm
Weight	54.5kg
Topology	Transformerless
Self consumption (night)	< 1W
Operating ambient temperature range	-25℃. . . +60℃
Relative humidity	0~100%
Ingress protection	IP66
Cooling concept	Intelligent redundant cooling
Max.operation altitude	4000m
Grid connection standard	VDE-AR-N 4105, VDE V 0124, VDE V 0126-1-1, UTE C15-712-1, NRS 097-1-2, G98, G99, EN 50549-1/-2, RD 1699, UNE 206006, UNE 206007-1, IEC61727,DEWA
Safty/EMC standard	IEC 62109-1/-2, IEC62116 &IEC 61000-6-1/-2/-3/-4
DC connection	MC4 connector
AC connection	OT Terminal (max 70 mm²)
Display	LCD, Capacitive touch buttons
Communication connections	RS485/USB, Optional: Wi-Fi, GPRS
Warranty	5 years (extand to 20 years)

Model	S5-GC60K
Max. DC input voltage (Volts)	1100
Rated DC voltage (Volts)	600
Start-up voltage (Volts)	195
MPPT voltage range (Volts)	180...1000
Max. input current (Amps)	6*32
Max short circuit input current (Amps)	6*40
MPPT number/Max input strings number	6/12
Rated output power (Watts)	60000
Max. output power (Watts)	66000
Max. apparent output power (VA)	66000
Rated grid voltage (Volts)	3/N/PE, 220/380, 230/400
Rated grid output current (Amps)	91.2/86.6
Max. output current (Amps)	100.3
Power Factor (at rated output power)	0.8leading~0.8lagging
THDi (at rated output power)	<3%
Rated grid frequency (Hertz)	50/60
Max.efficiency	98.7%
EU efficiency	98.3%
Dimensions (W*H*D)	691*578*338mm
Weight	54.5kg
Topology	Transformerless
Self consumption (night)	< 1W
Operating ambient temperature range	-25℃. . . +60℃
Relative humidity	0~100%
Ingress protection	IP66
Cooling concept	Intelligent redundant cooling
Max.operation altitude	4000m
Grid connection standard	VDE-AR-N 4105, VDE V 0124, VDE V 0126-1-1, UTE C15-712-1, NRS 097-1-2, G98, G99, EN 50549-1/-2, RD 1699, UNE 206006, UNE 206007-1, IEC61727,DEWA
Safty/EMC standard	IEC 62109-1/-2, IEC62116 &IEC 61000-6-1/-2/-3/-4
DC connection	MC4 connector
AC connection	OT Terminal (max 70 mm²)
Display	LCD, Capacitive touch buttons
Communication connections	RS485/USB, Optional: Wi-Fi, GPRS
Warranty	5 years (extand to 20 years)

Model	S5-GC60K-HV
Max. DC input voltage (Volts)	1100
Rated DC voltage (Volts)	720
Start-up voltage (Volts)	195
MPPT voltage range (Volts)	180...1000
Max. input current (Amps)	6*32
Max short circuit input current (Amps)	6*40
MPPT number/Max input strings number	6/12
Rated output power (Watts)	60000
Max. output power (Watts)	66000
Max. apparent output power (VA)	66000
Rated grid voltage (Volts)	3/PE, 480
Rated grid output current (Amps)	72.2
Max. output current (Amps)	79.4
Power Factor (at rated output power)	0.8leading~0.8lagging
THDi (at rated output power)	<3%
Rated grid frequency (Hertz)	50/60
Max.efficiency	98.7%
EU efficiency	98.4%
Dimensions (W*H*D)	691*578*338mm
Weight	54.5kg
Topology	Transformerless
Self consumption (night)	< 1W
Operating ambient temperature range	-25℃. . . +60℃
Relative humidity	0~100%
Ingress protection	IP66
Cooling concept	Intelligent redundant cooling
Max.operation altitude	4000m
Grid connection standard	VDE-AR-N 4105, VDE V 0124, VDE V 0126-1-1, UTE C15-712-1, NRS 097-1-2, G98, G99, EN 50549-1/-2, RD 1699, UNE 206006, UNE 206007-1, IEC61727,DEWA
Safty/EMC standard	IEC 62109-1/-2, IEC62116 &IEC 61000-6-1/-2/-3/-4
DC connection	MC4 connector
AC connection	OT Terminal (max 70 mm²)
Display	LCD, Capacitive touch buttons
Communication connections	RS485/USB, Optional: Wi-Fi, GPRS
Warranty	5 years (extand to 20 years)

10. Specifications

Model	S5-GC70K-HV
Max. DC input voltage (Volts)	1100
Rated DC voltage (Volts)	720
Start-up voltage (Volts)	195
MPPT voltage range (Volts)	180...1000
Max. input current (Amps)	6*32
Max short circuit input current (Amps)	6*40
MPPT number/Max input strings number	6/12
Rated output power (Watts)	70000
Max. output power (Watts)	77000
Max. apparent output power (VA)	77000
Rated grid voltage (Volts)	3/PE, 480
Rated grid output current (Amps)	84.2
Max. output current (Amps)	92.6
Power Factor (at rated output power)	0.8leading~0.8lagging
THDi (at rated output power)	<3%
Rated grid frequency (Hertz)	50/60
Max.efficiency	98.7%
EU efficiency	98.4%
Dimensions (W*H*D)	691*578*338mm
Weight	54.5kg
Topology	Transformerless
Self consumption (night)	< 1W
Operating ambient temperature range	-25℃. . . +60℃
Relative humidity	0~100%
Ingress protection	IP66
Cooling concept	Intelligent redundant cooling
Max.operation altitude	4000m
Grid connection standard	VDE-AR-N 4105, VDE V 0124, VDE V 0126-1-1, UTE C15-712-1, NRS 097-1-2, G98, G99, EN 50549-1/-2, RD 1699, UNE 206006, UNE 206007-1, IEC61727,DEWA
Safty/EMC standard	IEC 62109-1/-2, IEC62116 &IEC 61000-6-1/-2/-3/-4
DC connection	MC4 connector
AC connection	OT Terminal (max 70 mm²)
Display	LCD, Capacitive touch buttons
Communication connections	RS485/USB, Optional: Wi-Fi, GPRS
Warranty	5 years (extand to 20 years)

10. Specifications

Model	S5-GC25K-LV
Max. DC input voltage (Volts)	1100
Rated DC voltage (Volts)	360
Start-up voltage (Volts)	195
MPPT voltage range (Volts)	180...1000
Max. input current (Amps)	4*32
Max short circuit input current (Amps)	4*40
MPPT number/Max input strings number	4/8
Rated output power (Watts)	25000
Max. output power (Watts)	27500
Max. apparent output power (VA)	27500
Rated grid voltage (Volts)	3/(N)/PE, 220
Rated grid output current (Amps)	65.6
Max. output current (Amps)	72.2
Power Factor (at rated output power)	0.8leading~0.8lagging
THDi (at rated output power)	<3%
Rated grid frequency (Hertz)	50/60
Max.efficiency	98.4%
EU efficiency	98.0%
Dimensions (W*H*D)	691*578*338mm
Weight	54.5kg
Topology	Transformerless
Self consumption (night)	< 1W
Operating ambient temperature range	-25℃. . . +60℃
Relative humidity	0~100%
Ingress protection	IP66
Cooling concept	Intelligent redundant cooling
Max.operation altitude	4000m
Grid connection standard	VDE-AR-N 4105, VDE V 0124, VDE V 0126-1-1, UTE C15-712-1, NRS 097-1-2, G98, G99, EN 50549-1/-2, RD 1699, UNE 206006, UNE 206007-1, IEC61727,DEWA
Safty/EMC standard	IEC 62109-1/-2, IEC62116 &IEC 61000-6-1/-2/-3/-4
DC connection	MC4 connector
AC connection	OT Terminal (max 70 mm²)
Display	LCD, Capacitive touch buttons
Communication connections	RS485/USB, Optional: Wi-Fi, GPRS
Warranty	5 years (extand to 20 years)

10. Specifications

Model	S5-GC30K-LV
Max. DC input voltage (Volts)	1100
Rated DC voltage (Volts)	360
Start-up voltage (Volts)	195
MPPT voltage range (Volts)	180...1000
Max. input current (Amps)	4*32
Max short circuit input current (Amps)	4*40
MPPT number/Max input strings number	4/8
Rated output power (Watts)	30000
Max. output power (Watts)	33000
Max. apparent output power (VA)	33000
Rated grid voltage (Volts)	3/(N)/PE, 220
Rated grid output current (Amps)	78.7
Max. 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
Max.efficiency	98.4%
EU efficiency	98.0%
Dimensions (W*H*D)	691*578*338mm
Weight	54.5kg
Topology	Transformerless
Self consumption (night)	< 1W
Operating ambient temperature range	-25℃. . . +60℃
Relative humidity	0~100%
Ingress protection	IP66
Cooling concept	Intelligent redundant cooling
Max.operation altitude	4000m
Grid connection standard	UL 1741, IEEE 1547, NBR 16149, NBR 16150, C10-11, REN 342
Safty/EMC standard	IEC 62109-1/-2, IEC62116 &IEC 61000-6-1/-2/-3/-4
DC connection	MC4 connector
AC connection	OT Terminal (max 70 mm²)
Display	LCD, Capacitive touch buttons
Communication connections	RS485/USB, Optional: Wi-Fi, GPRS
Warranty	5 years (extand to 20 years)

10. Specifications

Model	S5-GC36K-LV
Max. DC input voltage (Volts)	1100
Rated DC voltage (Volts)	360
Start-up voltage (Volts)	195
MPPT voltage range (Volts)	180...1000
Max. input current (Amps)	4*32
Max short circuit input current (Amps)	4*40
MPPT number/Max input strings number	4/8
Rated output power (Watts)	36000
Max. output power (Watts)	36000
Max. apparent output power (VA)	36000
Rated grid voltage (Volts)	3/(N)/PE, 220
Rated grid output current (Amps)	94.5
Max. output current (Amps)	94.5
Power Factor (at rated output power)	0.8leading~0.8lagging
THDi (at rated output power)	<3%
Rated grid frequency (Hertz)	50/60
Max.efficiency	98.4%
EU efficiency	98.0%
Dimensions (W*H*D)	691*578*338mm
Weight	54.5kg
Topology	Transformerless
Self consumption (night)	< 1W
Operating ambient temperature range	-25℃. . . +60℃
Relative humidity	0~100%
Ingress protection	IP66
Cooling concept	Intelligent redundant cooling
Max.operation altitude	4000m
Grid connection standard	UL 1741, IEEE 1547, NBR 16149, NBR 16150, C10-11, REN 342
Safty/EMC standard	IEC 62109-1/-2, IEC62116 &IEC 61000-6-1/-2/-3/-4
DC connection	MC4 connector
AC connection	OT Terminal (max 70 mm²)
Display	LCD, Capacitive touch buttons
Communication connections	RS485/USB, Optional: Wi-Fi, GPRS
Warranty	5 years (extand to 20 years)

10. Specifications

Model	S5-GC37.5K-LV
Max. DC input voltage (Volts)	1100
Rated DC voltage (Volts)	360
Start-up voltage (Volts)	195
MPPT voltage range (Volts)	180...1000
Max. input current (Amps)	4*32
Max short circuit input current (Amps)	4*40
MPPT number/Max input strings number	4/8
Rated output power (Watts)	37500
Max. output power (Watts)	37500
Max. apparent output power (VA)	37500
Rated grid voltage (Volts)	3/(N)/PE, 220
Rated grid output current (Amps)	98.4
Max. output current (Amps)	98.4
Power Factor (at rated output power)	0.8leading~0.8lagging
THDi (at rated output power)	<3%
Rated grid frequency (Hertz)	50/60
Max.efficiency	98.4%
EU efficiency	98.0%
Dimensions (W*H*D)	691*578*338mm
Weight	54.5kg
Topology	Transformerless
Self consumption (night)	< 1W
Operating ambient temperature range	-25℃. . . +60℃
Relative humidity	0~100%
Ingress protection	IP66
Cooling concept	Intelligent redundant cooling
Max.operation altitude	4000m
Grid connection standard	UL 1741, IEEE 1547, NBR 16149, NBR 16150, C10-11, REN 342
Safty/EMC standard	IEC 62109-1/-2, IEC62116 &IEC 61000-6-1/-2/-3/-4
DC connection	MC4 connector
AC connection	OT Terminal (max 70 mm²)
Display	LCD, Capacitive touch buttons
Communication connections	RS485/USB, Optional: Wi-Fi, GPRS
Warranty	5 years (extand to 20 years)

11.1 Grid standard selection guide

NOTE:
Please check if the grid code setting comply with local requirement.

For different countries and regions, corresponding grid code needs to be selected in the inverter LCD to meet the requirements of local network provider.
This instruction indicates how to change the grid code and what code should be selected in different places.

This following list illustrates the grid standard options in the inverter which are subject to change. It is for your reference only. If customer has any doubts or uncertainty, please consult Solis service department for confirmation.

To set the correct grid code, please enter the following path:
Advanced Settings -> Password:0010 -> Select Standard

Detailed protection limits can be viewed when choosing the code.
Please select "Save&Send" to enforce the code.

NO.	Code in LCD	Country/Region	Comments
1	VDE4015	Germany	For German Low Voltage Grid.
2	EN50549 PO	Poland	For Polish Low Voltage Grid
3	EN50549 NL	Netherland	For Dutch Low Voltage Grid
4	EN50438 L	-	General EN50438 Requirement. Possible to be used in Austria, Cyprus, Finland, Czech Republic, Slovenia, etc.
5	EIFS- SW	Sweden	For Swedish Low Voltage Grid
6	France	France	For French Low Voltage Grid
7	C10/11	Belgium	For Belgian Low Voltage Grid
8	NRS097	South Africa	For South African Low Voltage Grid
9	CEI0-21	Italy	For Italian Low Voltage Grid
10	EN50549L (EN50549-1)	-	General EN50549-1 requirement which meets local requirements of most European countries
11	G98	UK	For UK Low Voltage Grid <16A
12	G99	UK	For UK Low Voltage Grid >16A

11. Appendix

NO.	Code in LCD	Country/Region	Comments
13	G98 NI	North Ireland	For North Ireland Low Voltage Grid <16A
14	G99 NI	North Ireland	For North Ireland Low Voltage Grid >16A
15	User-define	-	Customized Protection Limits
16	Gen50	-	Generator Connected, Frequency-Derating, 50Hz
17	Gen 60	-	Generator Connected, Frequency-Derating, 60Hz
18	DK1	East Denmark	For East Danish low voltage grid
19	DK2	West Denmark	For West Danish low voltage grid
20	50438IE	Ireland	For Irish low voltage grid
21	RD1699	Spain	For Spanish low voltage grid
22	EN50549	-	General EN50549 Requirement. Possible to be used in Cyprus, Finland, Czech Republic, Slovenia,Jamaica