PV Grid Tie Inverter

Solis 4G Single Phase Inverter

-US version

Installation and Operation Manual

Solis-1P6K-4G-US, Solis-1P7K-4G-US, Solis-1P7.6K-4G-US, Solis-1P7.6K4-4G-US, Solis-1P8K-4G-US, Solis-1P8.6K-4G-US, Solis-1P9K-4G-US, Solis-1P10K-4G-US

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Please record the serial number of your inverter and quote this when you contact us.

Ver 1.0

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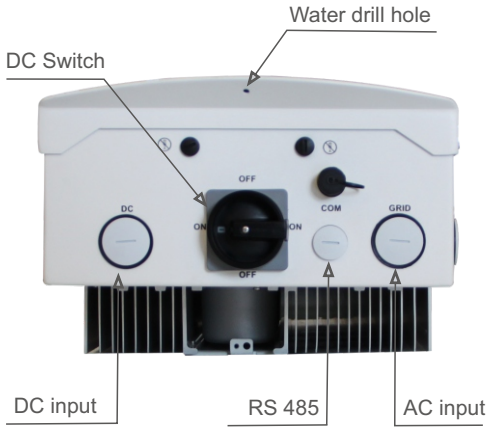
1. Introduction

1.1 Product Description

Solis single phase US series inverters can transfer DC power from PV panels into AC power and feed into grid.
Solis single phase US series inverters contain 8 models which are listed below:
Solis-1P6K-4G-US, Solis-1P7K-4G-US, Solis-1P7.6K-4G-US, Solis-1P7.6K4-4G-US, Solis-1P8K-4G-US, Solis-1P8.6K-4G-US, Solis-1P9K-4G-US, Solis-1P10K-4G-US

▲ Figure 1.1 Front side view



▲ Figure 1.2 Bottom side view

1. Introduction

1.2 Packaging

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

1

2

3

4

5

Part #	Description	Number
1	PV grid tie inverter	1
2	Wall mounting bracket	1
3	Locking screws	2
4	Grounding screw	1
5	Manual	1

▲ Table 1.1 Parts 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:
Please don't connect PV array positive(+) or negative(-) to ground, it could cause serious damage to the inverter.

WARNING:
Electrical installations must be done in accordance with the local and national 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 DC OCPD shall be installed per local requirements. All photovoltaic source and output circuit conductors shall have disconnects that comply with the NEC Article 690, Part II. All Solis single phase inverters feature an integrated DC switch.

CAUTION:
Risk of electric shock. Do not remove cover. There is no user serviceable parts inside. Refer servicing to qualified and accredited service technicians.

CAUTION:
The PV array (Solar panels) supplies a DC voltage when they are exposed to sunlight.

CAUTION:
Risk of electric shock from energy stored in capacitors of the Inverter. Do not remove cover for 5 minutes after disconnecting all power sources(service technician only). Warranty may be voided if the cover is removed without unauthorized .

CAUTION:
The surface temperature of the inverter can reach up to 75℃ (167 F).
To avoid risk of burns, do not touch the surface of the inverter while it's operating.
Inverter must be installed out of the reach of children.

2.3 Notice For Use

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

1.Permanent installation is required.

2.The electrical installation must meet all the applicable regulations and standards.

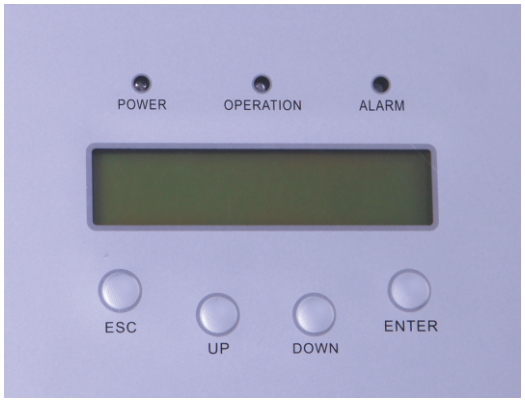
3.The inverter must be installed according to the instructions stated in this manual.

4.The inverter must be installed according to the correct technical specifications.

5.To startup the inverter, the Grid Supply Main Switch (AC) must be switched on, before the solar panel's DC isolator shall be switched on. To stop the inverter, the Grid Supply Main Switch (AC) must be switched off before the solar panel's DC isolator shall be switched off.

3. Overview

3.1 Front Panel Display



▲ Figure 3.1 Front Panel Display

3.2 LED Status Indicator Lights

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

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 to supply 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 Lights

3. Overview

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 DOWN keys);
- Access to modify the adjustable settings (the ESC and ENTER keys).

3.4 LCD

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

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

4. Installation

4.1 Select a Location for the Inverter

To select a location for the inverter, the following criteria should be considered:

- Do not install in small closed spaces where air can not circulate freely. To avoid overheating, always make sure the flow of air around the inverter is not blocked.
- Exposure to direct sunlight will increase the operational temperature of the inverter and may cause output power limiting. Ginlong Solis recommends inverter installed to avoid direct sunlight or raining.
- To avoid over heating ambient air temperature MUST be considered when choosing the inverter installation location. Ginlong recommends using a sun shade minimizing direct sunlight when the ambient air temperature around the unit exceeds 104°F/40°C.

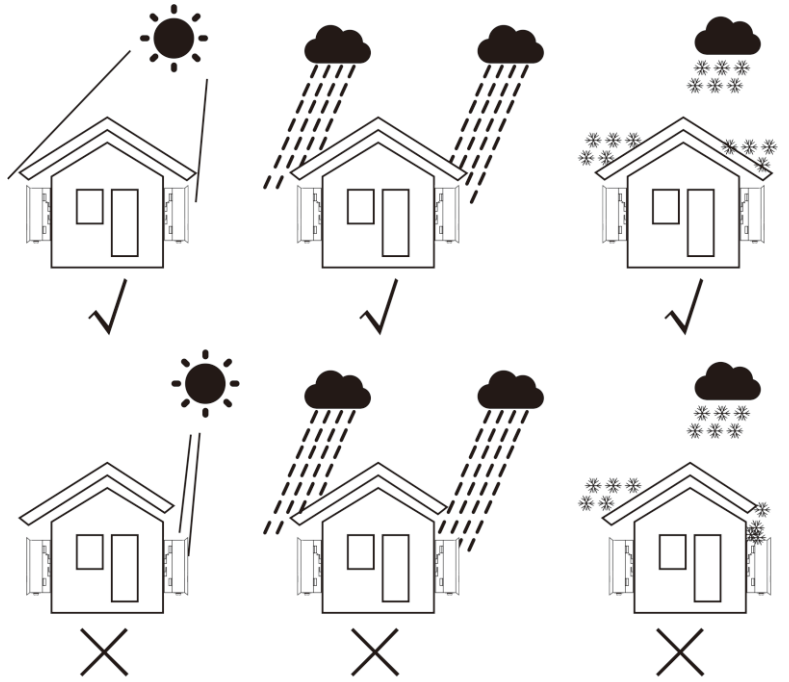
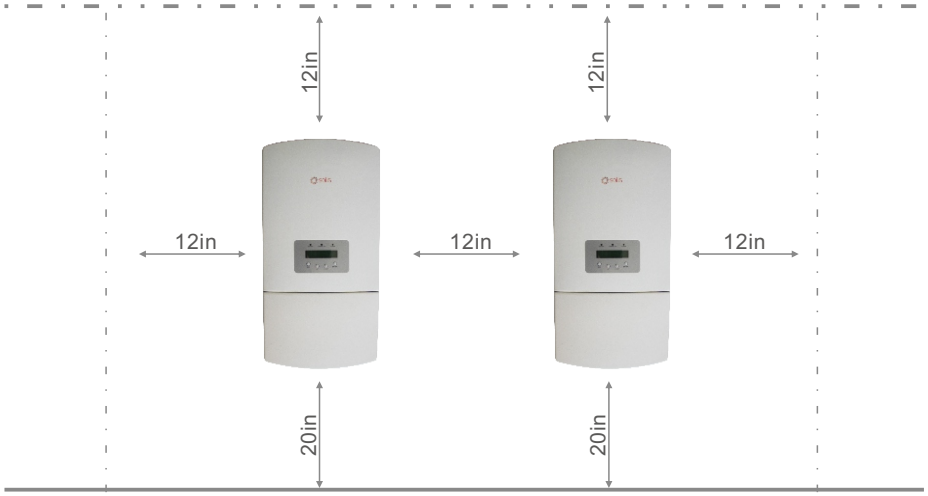


Figure 4.1 Recommended Installation locations

- Install on a wall or strong structure capable of bearing the weight.
- Install vertically with a maximum incline of +/- 5° . If the mounted inverter is tilted to an angle greater than the maximum noted, heat dissipation can be inhibited, and may result in less than expected output power.
- When 1 or more inverters are installed in one location, a minimum 12inchs clearance should be kept between each inverter or other object. The bottom of the inverter should be 20inchs clearance to the ground.



▲ Figure 4.2 Inverter Mounting clearance

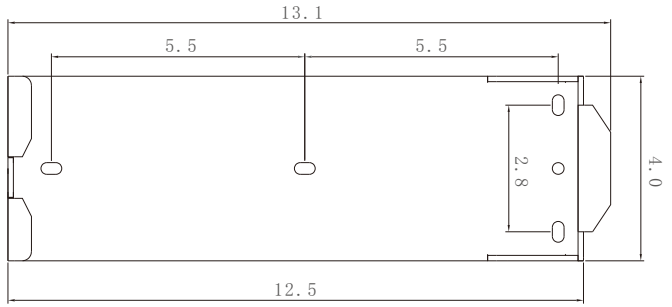
- Visibility of the LED status indicator lights and the LCD located at the front panel of the inverter should be considered.
- Adequate ventilation must be provided if the inverter is to be installed in a confined space.

NOTE:
Nothing should be stored on or placed against the inverter.

4. Installation

4.2 Mounting the Inverter

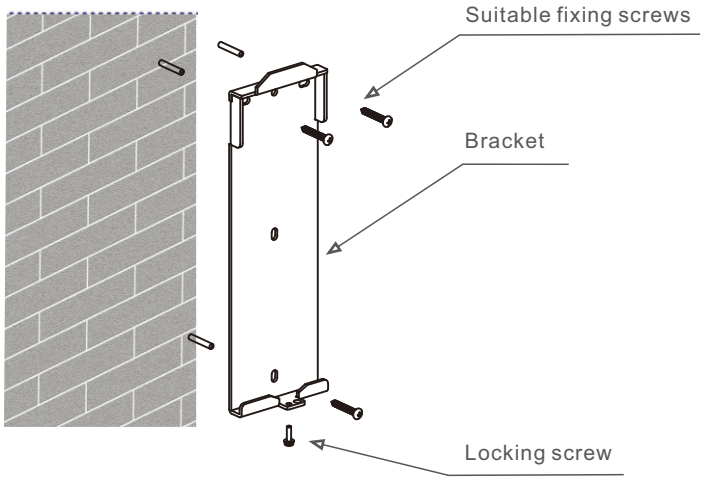
Dimensions of mounting bracket:



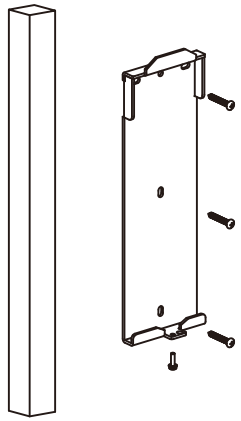
▲ Figure 4.3 Inverter wall mounting

Please see Figure 4.4 and Figure 4.5 for instruction on mounting the inverter to a wall or pillar. The inverter shall be mounted vertically. The steps to mount the inverter are listed below:

1. According to the figure 4.2, 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.



▲ Figure 4.4 Inverter wall mounting



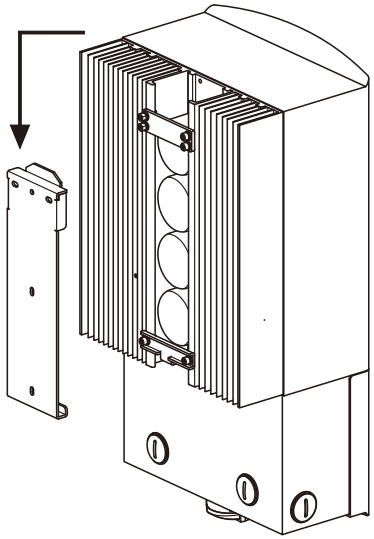
▲ Figure 4.5 Inverter pillar mounting

2.Make sure the bracket is horizontal and the mounting holes (in Figure 4.4 and Figure 4.5) are marked correctly. Drill the holes into the wall or pillar at your marks.

3.Use the suitable screws to fix the bracket to the wall.

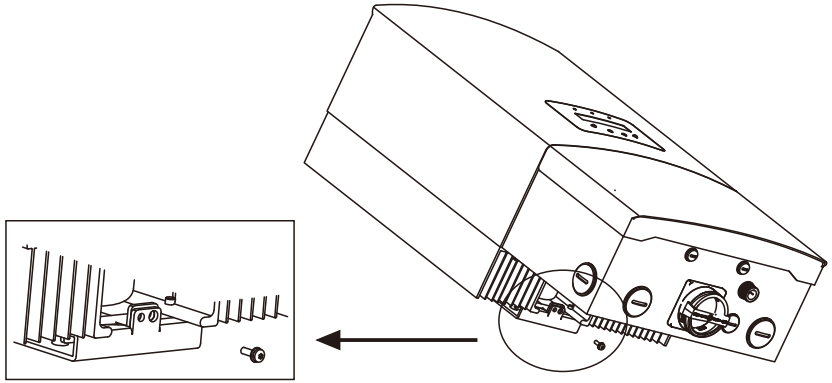
WARNING:
The inverter must be mounted vertically.

4.Lift up the inverter (be careful to avoid body strain), and align the back bracket on the inverter with the convex section of the mounting bracket. Hang the inverter on the mounting bracket and make sure the inverter is secure (see Figure 4.6)



▲ Figure 4.6 Wall Mount Bracket

5. Use M4*9 screws to fix the bottom of the inverter to the mount bracket.



▲ Figure 4.7 Fix the inverter

The are two holes at the bottom of bracket, one to fix the inverter, another for the lock. **The diameter of the lock should be less than 0.27in (7mm).**

4. Installation

4.3 Electrical Connections

Before marking wire connections, unscrew the four screws on both sides of the wiring box, then remove the cover

Press on the wiring box cover while loosening the screws. This action will help to avoid damaging the screw threads.

▲Figure 4.8 Bottom side of inverter

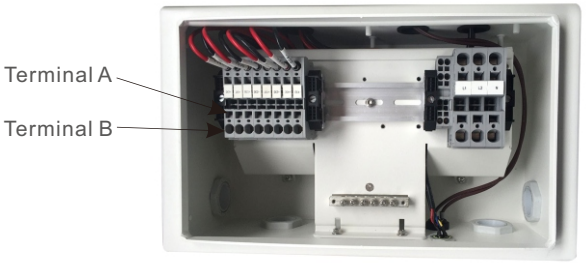
Before making electrical connections, double check to ensure the steps below are strictly followed:

a. Switch the Grid Supply Main Switch (AC) OFF.

b. Switch the DC Switch OFF.

Please see figure 4.6,there are four knockouts in the wiring box. The two knockouts on the left (bottom and side) are for the DC conduit entry. The two knockouts on the right (bottom and side) are for the AC conduit entry. All knockouts in the wiring box can accept trade size 1 inch or 1¼ inch (ID) conduit..

Terminal connections:



▲Figure 4.9 Connection area of inverter

Strip the end of the wire ¾" minimum to 1" maximum. Use a slotted (flat-blade) screwdriver, insert the screwdriver in Terminal A (top) and insert the wire into Terminal B (bottom) of the Rapid Termination wiring block. While holding the wire in place, remove the screwdriver and the Rapid Termination spring terminal block will fix the wire in place. Use the labels on the Rapid Termination wiring block to ensure proper polarity.

Connect PV side of inverter:

Warning

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

DO NOT connect the PV array positive or negative to Ground.
This can cause serious damage to the inverter.

The MPPT's cannot be wired in parallel. The inverter will not operate properly if this is done.

Before connection, please make sure the polarity of the output voltage of PV array matches the "DC+" and "DC-" symbols.

Please use qualified DC cable for PV system.

Cable type	Cross section	
	Range	Recommended value
Industry generic PV cable (model:PV1-F)	4.0~6.0 (12~10AWG)	4.0 (12AWG)

4. Installation

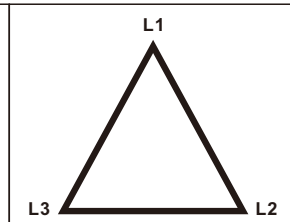
Damage to the DC Disconnect due to enlarged knockouts.
Enlarged knockouts enable moisture to penetrate the DC Disconnect which could damage electronic components in the DC Disconnect.

Please refer to Figure 4.5 when connecting PV string conductors to the DC1 and DC2 terminals inside the wiring box. Connect the array mounting structure bonding conductor to the "PE" (Protective Earth) terminal block on the DC side of the inverter.

Connect grid side of inverter:

The Ginlong Solis 6-10kW Single Phase inverters can be connected to a 208V or 240V grid. The default setting is for a 240VAC single phase grid. Since the inverter monitors voltage between L1 and L2, the Neutral conductor can be connected or not connected when tying the inverter to a 240V grid. Ground must be connect to the PE terminal.

Cable type	Cross section	
	Range	Recommended value
Industry generic PV cable (model:PV1-F)	4.0~6.0 (12~10AWG)	4.0 (12AWG)

GRID STANDARD						
	208V~ 3PH-△-3W			240V~ SPLIT-PHASE		
TERMINAL	L1	L2	N	L1	L2	N
Connection requiement	Yes	Yes	No	Yes	Yes	Optional

▲Table 4.1 Grid terminal connection

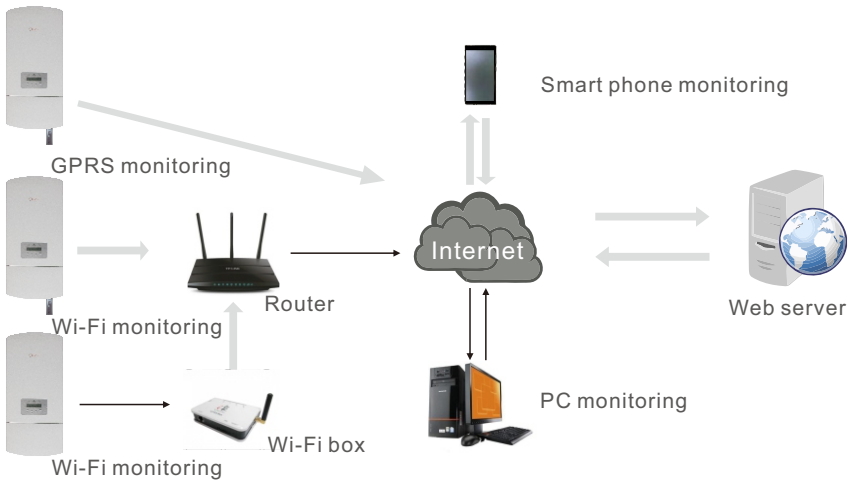
Maximum AC side over current protection device (OCPD).

To protect the inverter's AC grid connection conductors, Ginlong Solis recommends installing breakers that will protect against overcurrent and leakage. The following table defines OCPD ratings for the Ginlong Solis 6-10kW single phase inverters.

Inverter	Rated voltage(V)	Rated output power (kW)	Current for protection device (A)
Solis-1P6K-4G-US	240V/208V	6/6	40/40
Solis-1P7K-4G-US	240V/208V	7/7	40/40
Solis-1P7.6K-4G-US	240V/208V	7.6/7.6	40/50
Solis-1P7.6K4-4G-US	240V/208V	7.6/7.6	40/50
Solis-1P8K-4G-US	240V/208V	8/7.6	40/50
Solis-1P8.6K-4G-US	240V/208V	8.6/8.2	50/50
Solis-1P9K-4G-US	240V/208V	9/8.6	50/50
Solis-1P10K-4G-US	240V/208V	10/9.5	50/60

Inverter monitoring Connection:

1.The inverter can be monitored via Wi-Fi or GPRS. All Ginlong Solis communication devices are optional (Figure 4.9). For connection instructions, please refer to the Ginlong Solis Monitoring Device installation manuals.



▲ Figure4.10 Wi-Fi communication function

5. Start & Stop

5.1 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, and the LCD shows the company's name and the inverter model.

▲ Figure 5.1 Company Name and Inverter Model on LCD

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 the information of INITIALIZING.

4. After 30-300 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.

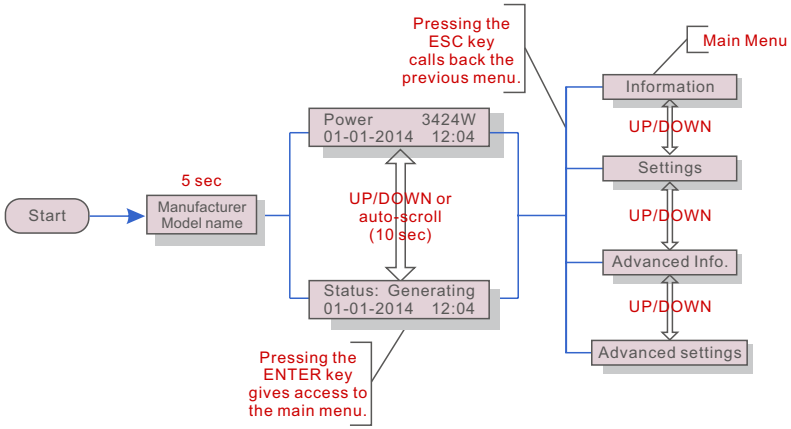
5.2 Stop the Inverter

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. All the LEDs of the inverter will be off in one minute.

6. Operation

During normal operation, the display alternately shows the power and the operation status with each screen lasting for 10 seconds (see Figure 6.1). Screens can also be scrolled manually by pressing the UP and DOWN keys. Press the ENTER key to access to the Main Menu.



▲ Figure 6.1 Operation Overview

6.1 Main Menu

There are four submenus in the Main Menu (see Figure 6.1):

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

6.2 Information

The Solis Single 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_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_Grid 230.4V I_Grid 8.1A	10 sec	V_Grid: Shows the grid's voltage value I_Grid: 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 60.06Hz	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
M_Power: 0015.1W M_Energy: 0013.5kWh	10 sec	Information about Wi-Fi connection status Please see 6.2.1 for details.

▲ Table 6.1 Information list

6. Operation

6.2.2 Lock screen

Pressing the ESC key returns to the Main Menu. Pressing the ENTER key locks (Figure 6.2(a)) or unlocks (Figure 6.2 (b)) the screen.

(a) (b)

▲ Figure 6.2 Locks and Unlocks the Screen of LCD

6.3 Settings

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

1.Set Time

2.Set Address

6.3.1 Set Time

This function allows time and date setting. When this function is selected, the LCD will display a screen as shown in Figure 6.3.

NEXT=<ENT> OK=<ESC>
01-01-2010 16:37

▲ Figure 6.3 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.

6.3.2 Set Address

This function is used to set the address when muti inverters are connected to single monitor. The address number can be assigned from “01”to “99”(see Figure 6.4). The default address number of Solis Single Phase Inverter is “01”.

6. Operation

YES=<ENT> NO=<ESC>
Set Address: 01

▲ Figure 6.4 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.

6.4 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

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

▲ Figure 6.5 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 Record 8.Communication Data

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 return to the Main Menu.

6.4.1 Alarm Message

The display shows the 100 latest alarm messages (see Figure 6.6). Screens can be scrolled manually by pressing the UP/ DOWN keys. Press the ESC key to return to the previous menu.

Alarm001: OV-G-V
Time: 27-11 Data: 7171

▲ Figure 6.6 Alarm Message

6.4.2 Running message

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

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

6.4.3 Version

The screen shows the model version and the software version of the Inverter (see Figure 6.7).

Model: 08
Software Version: D20001

▲ Figure 6.7 Model Version and Software Version

6.4.4 Daily Energy

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

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

▲ Figure 6.8 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 6.9 Daily energy

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

6.4.5 Monthly Energy and Yearly Energy

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

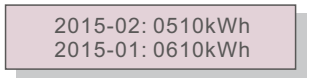
YES=<ENT> NO=<ESC>
Select: 2015-02

▲ Figure 6.10 Select month for monthly energy

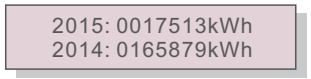
YES=<ENT> NO=<ESC>
Select: 2015

▲ Figure 6.11 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.



▲ Figure 6.12 Month energy



▲ Figure 6.13 Yearly energy

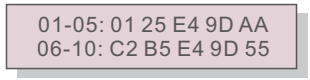
Press UP/DOWN key to move one date from another.

6.4.6 Daily record

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

6.4.7 Communication Data

The screen shows the internal data of the Inverter (see Figure 6.14), which is for service technicians only.



▲ Figure 6.14 Communication Data

6.5 Advanced Settings - Technicians Only

NOTE:
To access to this area is for fully qualified and accredited technicians only. Please follow 6.4 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. New Password 5. Power Control 6.Calibrate Energy

6.5.1 Selecting Standard

This function is used to select the grid's reference standard (see Figure 6.11).

▲ Figure 6.15

Press the UP/DOWN keys to select the standard (AS4777, VDE4105, VDE0126, UL-240V-A, UL-208V-A, UL-240V, UL-208V, MEX-CFE, G83/2 (for 1-3.6kW models), G59/3 (for 4-5kW models), EN50438 DK, EN50438 IE, EN50438 NL and “User-Def” function). Press the ENTER key to confirm the setting. Press the ESC key to cancel changes and returns to previous menu.

There are 4 settings for USA and CSA market, UL-240V and UL-208V are the settings for inverter without AFCI module, UL-240V-A and UL-208V-A are the settings for inverter integrate with AFCI module. **The default grid setting is 240V.**

NOTE:
The default setting is 240V split phase “UL-240V” or “UL-240V-A”, if it’s different please select 208V single phase “UL-208V” or “UL-208V-A” or 220V split phase “MEX-CFE”. Other standards are for 50Hz grid, please don’t select.

NOTE:
This function is for technicians use only.

Selecting the “User-Def” menu will access to the following submenu (see Figure 6.16),

▲ Figure 6.16

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

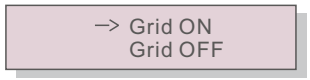
Below is the setting range for “User-Def”. Using this function, the limits can be changed manually.

OV-G-V1: 220---290V	OV-G-F1: 50.2-53Hz(60.2-64Hz)
OV-G-V1-T: 0.1---9S	OV-G-F1-T: 0.1---9S
OV-G-V2: 220---290V	OV-G-F2: 50.2-53Hz(60.2-64Hz)
OV-G-V2-T: 0.1---1S	OV-G-F2-T: 0.1---9S
UN-G-V1: 90---210V	UN-G-F1: 47-49.5Hz(56-59.8Hz)
UN-G-V1-T: 0.1---9S	UN-G-F1-T: 0.1---9S
UN-G-V2: 90---210V	UN-G-F2: 47-49Hz(56-59.8Hz)
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.

6.5.2 Grid ON/OFF

This function is used to start up or stop the power generation of Solis Single Phase Inverter (see Figure 6.17).



▲ Figure 6.17 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.

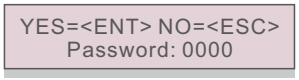
6.5.3 Clear Energy

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.

6.5.4 New Password

This function is used to set the new password for menu “Advanced info.” and “Advanced information” (see Figure 6.18).



▲ Figure 6.18 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.

6.5.5 Power control

Active and reactive power can be set through power setting button.

There are 5 item for this sub menu:

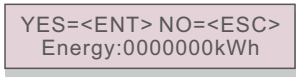
1. Set output power 2. Set Reactive Power 3. Out_P With Restore
4. Rea_P With Restore 5. Select PF Curve

6. Operation

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

6.5.6 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. (see Figure 6.19).



▲ Figure 6.19 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.

6.6 Arc fault(for AFCI version)

Solis Single Phase Inverter can integrate with AFCI module which can detect the arc in DC circuit. If arc fault happen, it can only be removed manually.

During start up inverter will check AFCI module. If the check is OK, inverter will start normally. If the check is fail, LCD will show below:

▲ Figure 6.20 AFCI check fail

Press <ESC> for 3 seconds, the inverter will restart. If the fault happen again, please turn off inverter to restart. If the fault still happen, please contact us.

During normal operation, If arc fault happen in DC circuit, the inverter will stop output and LCDshow below:

▲ Figure 6.21 Arc fault

Please check DC cables and connections to identify the source of possible arcing. Then **press <ESC> for 3 seconds**, the inverter will restart.

7.Maintenance

Solis Single 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 5.2) and wait for a cool-down period before 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. 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 8.1:

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.
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	
GROUND-FAULT 01/02	Ground fault	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.

8. Trouble Shooting

Alarm Message	Failure description	Solution
ILeak-FAULT 01/02/03/04	High Grid leakage current	1.Check AC and DC connection 2.Check inverter inside cable connection.
Relay-FAULT	Relay check fault	1.Restart inverter or contact installer.
DCinj-FAULT	High DC injection current	1.Restart inverter or contact installer.
AFCI Check FAULT	AFCI module self check fault	1.Restart inverter or contact installer.
ARC-FAULT	ARC detected in DC circuit	1.Check if there's arc in PV connection and restart inverter.

▲ Table 8.1 Fault message and description

NOTE:
If the inverter displays any alarm message as listed in Table 8.1; 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 keep ready with you the following information before contacting us.

1. Serial number of Solis Single Phase Inverter;
2. The distributor/dealer of Solis Single 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.

9. Specifications

9.1 Technical data

Model	Solis-1P6K-4G-US	Solis-1P7K-4G-US
Max power per MPPT (Watts)	4000	
Max voltage (Volts)	600	
Startup voltage (Volts)	120	
Full power MPPT voltage range (Volts)	200-500	233-500
Operating MPPT voltage range (Volts)	100-500	
Max usable input current per MPPT (Amps)	10	
Max short circuit input current (Amps)	15.6	
Number of MPPT	3	
Inputs per MPPT	1	
Nominal output power 240V grid (Watts)	6000	7000
Max. continous ouput power 240V grid (Watts)	6600	7700
Nominal grid voltage (Volts)	240/208	
Operating voltage range (Volts)	183-228(for 208V rated)/211-264(for 240V rated)	
Max. overcurrent protection device 240/208V(Amps)	40/40	
Max.output current for 208V grid (Amps)	28.8	33.7
Max.output current for 240V grid (Amps)	25	29.2
Output power factor	0.8leading~0.8lagging	
Grid current THD	<3%	
Nominal grid frequency (Hertz)	60	
Operating frequency range (Hertz)	59.5-60.5	
Peak efficiency	97.8%	
CEC weighted efficiency	97.2%	
MPPT efficiency	>99%	
Integrated AFCI(DC arc-fault circuit protection)	Yes	
Rapid shutdown	Optional	
Dimensions(inch / cm)	13.3*22.4H*9.3in / 33.8*56.8*23.5cm	
Weight(lbs / kg)	33.7lb (15.3kg)	
Topology	Transformerless	
Ambient operating temperature range	-25℃~60℃/-13℉-140℉	
Enclosure type	NEMA 4X	
Noise emission (typical)	<30 dBA	
Cooling type	Natural convection	
Max. operating altitude without derating	13120ft (4000m)	
Designed lifetime	>20 years	
Comliance	UL 1741, UL 1998, UL 1699B, IEEE 1547, FCC Part 15 (Class A & B), CAN/CSA C22.2 107.1-1	
Operating surroundings humidity	0~100%	
Conduit connention	2 knockout for 1" and 1 1/4" conduit at bottom, side and back	
Display	LCD, 2×20 Z.	
Interface	RS 485, WIFI/GPRS (optional)	
Warranty Terms	10 years	

9. Specifications

Model	Solis-1P7. 6K-4G-US	Solis-1P7. 6K4-4G-US
Max power per MPPT (Watts)	4000	
Max voltage (Volts)	600	
Startup voltage (Volts)	120	
Full power MPPT voltage range (Volts)	253-500	190-500
Operating MPPT voltage range (Volts)	100-500	
Max usable input current per MPPT (Amps)	10	
Max short circuit input current (Amps)	15.6	
Number of MPPT	3	4
Inputs per MPPT	1	
Nominal output power 240V grid (Watts)	7600	
Max. continous ouput power 240V grid (Watts)	8360	
Nominal grid voltage (Volts)	240/208	
Operating voltage range (Volts)	183-228(for 208V rated)/211-264(for 240V rated)	
Max. overcurrent protection device 240/208V(Amps)	40/50	
Max.output current for 208V grid (Amps)	36. 5	
Max.output current for 240V grid (Amps)	31. 7	
Output power factor	0.8leading~0.8lagging	
Grid current THD	<3%	
Nominal grid frequency (Hertz)	60	
Operating frequency range (Hertz)	59.5-60.5	
Peak efficiency	97.8%	
CEC weighted efficiency	97.2%	
MPPT efficiency	>99%	
Integrated AFCI(DC arc-fault circuit protection)	Yes	
Rapid shutdown	Optional	
Dimensions(inch / cm)	13.3*22.4H*9.3in / 33.8*56.8*23.5cm	
Weight(lbs / kg)	33.7lb (15.3kg)	
Topology	Transformerless	
Ambient operating temperature range	-25℃~60℃/-13℉-140℉	
Enclosure type	NEMA 4X	
Noise emission（typical）	<30 dBA	
Cooling type	Natural convection	
Max. operating altitude without derating	13120ft (4000m)	
Designed lifetime	>20 years	
Comliance	UL 1741, UL 1998, UL 1699B, IEEE 1547, FCC Part 15 (Class A & B), CAN/CSA C22.2 107.1-1	
Operating surroundings humidity	0~100%	
Conduit connention	2 knockout for 1" and 1 1/4" conduit at bottom, side and back	
Display	LCD, 2×20 Z.	
Interface	RS 485, WIFI/GPRS (optional)	
Warranty Terms	10 years	

9. Specifications

Model	Solis-1P8K-4G-US	Solis-1P8.6K-4G-US
Max power per MPPT (Watts)	4000	
Max voltage (Volts)	600	
Startup voltage (Volts)	120	
Full power MPPT voltage range (Volts)	200-500	250-500
Operating MPPT voltage range (Volts)	100-500	
Max usable input current per MPPT (Amps)	10	
Max short circuit input current (Amps)	15.6	
Number of MPPT	4	
Inputs per MPPT	1	
Nominal output power 240V grid (Watts)	8000	8600
Max. continous ouput power 240V grid (Watts)	8800	9460
Nominal grid voltage (Volts)	240/208	
Operating voltage range (Volts)	183-228(for 208V rated)/211-264(for 240V rated)	
Max. overcurrent protection device 240/208V(Amps)	40/50	50/50
Max.output current for 208V grid (Amps)	36. 6	39.4
Max.output current for 240V grid (Amps)	33.3	35.8
Output power factor	0.8leading~0.8lagging	
Grid current THD	<3%	
Nominal grid frequency (Hertz)	60	
Operating frequency range (Hertz)	59.5-60.5	
Peak efficiency	97.8%	
CEC weighted efficiency	97.2%	
MPPT efficiency	>99%	
Integrated AFCI(DC arc-fault circuit protection)	Yes	
Rapid shutdown	Optional	
Dimensions(inch / cm)	13.3*22.4H*9.3in / 33.8*56.8*23.5cm	
Weight(lbs / kg)	39.3lb (17.8kg)	
Topology	Transformerless	
Ambient operating temperature range	-25℃~60℃/-13℉-140℉	
Enclosure type	NEMA 4X	
Noise emission（typical）	<30 dBA	
Cooling type	Natural convection	
Max. operating altitude without derating	13120ft (4000m)	
Designed lifetime	>20 years	
Comliance	UL 1741, UL 1998, UL 1699B, IEEE 1547, FCC Part 15 (Class A & B), CAN/CSA C22.2 107.1-1	
Operating surroundings humidity	0~100%	
Conduit connention	2 knockout for 1" and 1 1/4" conduit at bottom, side and back	
Display	LCD, 2×20 Z.	
Interface	RS 485, WIFI/GPRS (optional)	
Warranty Terms	10 years	

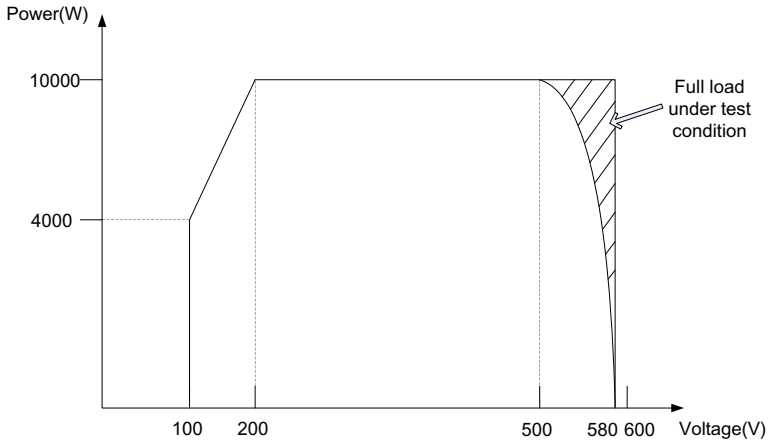
Model	Solis-1P9K-4G-US	Solis-1P10K-4G-US
Max power per MPPT (Watts)	4000	
Max voltage (Volts)	600	
Startup voltage (Volts)	120	
Full power MPPT voltage range (Volts)	250-500	
Operating MPPT voltage range (Volts)	100-500	
Max usable input current per MPPT (Amps)	10	
Max short circuit input current (Amps)	15.6	
Number of MPPT	4	
Inputs per MPPT	1	
Nominal output power 240V grid (Watts)	9000	10000
Max. continous ouput power 240V grid (Watts)	9900	10000
Nominal grid voltage (Volts)	240/208	
Operating voltage range (Volts)	183-228(for 208V rated)/211-264(for 240V rated)	
Max. overcurrent protection device 240/208V(Amps)	50/50	50/60
Max.output current for 208V grid (Amps)	41.3	45.9
Max.output current for 240V grid (Amps)	37.5	41.7
Output power factor	0.8leading~0.8lagging	
Grid current THD	<3%	
Nominal grid frequency (Hertz)	60	
Operating frequency range (Hertz)	59.5-60.5	
Peak efficiency	97.8%	
CEC weighted efficiency	97.2%	
MPPT efficiency	>99%	
Integrated AFCI(DC arc-fault circuit protection)	Yes	
Rapid shutdown	Optional	
Dimensions(inch / cm)	13.3*22.4H*9.3in / 33.8*56.8*23.5cm	
Weight(lbs / kg)	39.3lb (17.8kg)	
Topology	Transformerless	
Ambient operating temperature range	-25℃~60℃/-13℉-140℉	
Enclosure type	NEMA 4X	
Noise emission（typical）	<30 dBA	
Cooling type	Natural convection	
Max. operating altitude without derating	13120ft (4000m)	
Designed lifetime	>20 years	
Comliance	UL 1741, UL 1998, UL 1699B, IEEE 1547, FCC Part 15 (Class A & B), CAN/CSA C22.2 107.1-1	
Operating surroundings humidity	0~100%	
Conduit connention	2 knockout for 1" and 1 1/4" conduit at bottom, side and back	
Display	LCD, 2×20 Z.	
Interface	RS 485, WIFI/GPRS (optional)	
Warranty Terms	10 years	

9. Specifications

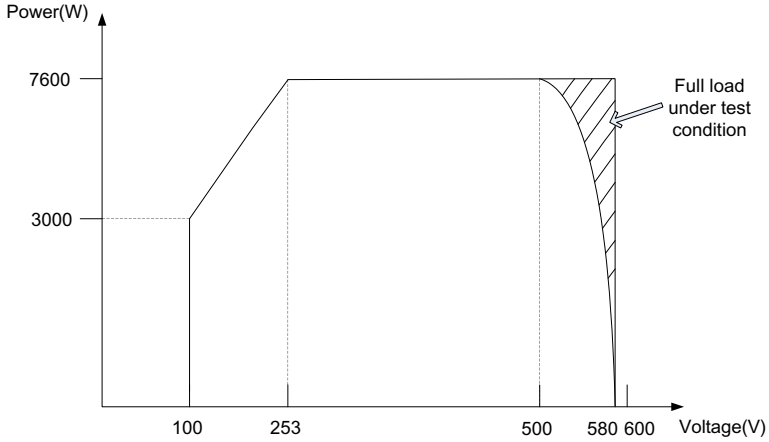
9.2 Power Derating

Power derating due to input voltage change.

P/V curve for Solis-1P10K-4G-US



P/V curve for Solis-1P7.6K-4G-US



Comments:
There will be DC over voltage alarm when DC input voltage between 580-600V. Inverter could be damaged when the input voltage higher than 600V.

9. Specifications

Power derating due to ambient temperature condition