

User Manual

for 4G Series Grid Inverter



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

<u>Applicable System</u> Single phase system

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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 the grid.

Solis single phase US series inverters contain 7 models which are listed below: Solis-1P6K-4G-US, Solis-1P7K-4G-US, Solis-1P7.6K-4G-US, Solis-1P8K-4G-US, Solis-1P8.6K-4G-US, Solis-1P9K-4G-US, Solis-1P10K-4G-US



1.2 Packaging

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



1.3 Storage

If the inverter is not 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 in a clean and dry place, free of dust and dirt. The storage temperature must be between 40~176°F and humidity should be between 0 to 95%, non-condensing.
- Do not stack more than four (4) inverters high on a single pallet.
- Keep the box(es) away from corrosive materials to avoid damage to the inverter enclosure.
- Inspect the packaging regularly. If packing is damaged (wet, pest damages, etc.), repackage the inverter immediately.
- Store inverters on a flat, hard surface -- not inclined or upside down.
- After 100 days of storage, the inverter and carton must be inspected for physical damage before installing. If stored for more than 1 year, the inverter needs to be fully examined and tested by qualified service or electrical personnel before using.
- Restarting after a long period of non-use requires the equipment be inspected and, in some cases, the removal of oxidation and dust that has settled inside the equipment will be required.

SAVE THESE INSTRUCTIONS – This manual contains important instructions for Models Solis-1P6K-4G-US, Solis-1P7K-4G-US, Solis-1P7.6K-4G-US, Solis-1P8K-4G-US, Solis-1P8.6K-4G-US, Solis-1P9K-4G-US, Solis-1P10K-4G-US that shall be followed during installation and maintenance of the inverter.

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:

Do not connect PV array positive(+) or negative(-) to ground, it may cause serious damage to the inverter.



WARNING:

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



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 $^\circ C$ (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

| POWER OPERATION ALARM |
|---------------------------------|
| |
| |
| ESC UP DOWN ENTER |
| Figure 2.4 Front Donal Disalou |
| Figure 3. I Front Paner 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 |
|-----------|----------|---|
| | ON | The inverter detects DC power. |
| POWER | OFF | No DC power or low DC power. |
| | ON | The inverter is operating properly. |
| OPERATION | OFF | The inverter has stopped to supply power. |
| | FLASHING | The inverter is initializing. |
| | ON | Alarm or fault condition is detected. |
| ALARM | OFF | No fault or alarm is detected. |
| | Tabl | e 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.

4.1 Select a Location for the Inverter

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

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.
- 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 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.



4. Installation

- 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 will be inhibited, and may result in power limiting.
- When one or more inverters are installed in one location, a minimum of 12 inches of clearance should be kept between each inverter or other objects. The bottom of the inverter should have 20 inches of clearance to the ground.



- 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:



Please see Figure 4.4 and Figure 4.5 for instruction on mounting the inverter to a wall.

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.





- 2.Ensure 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.



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 ensure the inverter is secure (see Figure 4.6)



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



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.



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 4.9, 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 (ID) conduit.

4. Installation

4.3.1 Terminal Connections



Strip the end of the wire ¼" 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.

4.3.2 Connect PV Side of Inverter



Warning:

Before connecting inverter, ensure 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 inverter cannot accept PV strings wired in parallel.



Before connection, ensure the PV array strings are correct polarity and match the proper "DC+" and "DC-" symbols you will connect them to.



Use qualified DC cable for PV system.

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

Table 4.1 DC cable size



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 4.9, The acceptable wire size range is from **12 AWG to 10 AWG**, copper conductors only; refer to local code for appropriate wire size.



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.

4.3.3 Connect Grid Side of Inverter

The Solis Single Phase inverters can be connected to a 208V or 240V grid.

The default setting is for a 240VAC single phase grid.

Ground must be connect to the PE terminal.

| Cable ture | Cross section | | |
|--------------------------------|----------------------|----------------------|--|
| Cable type | Range | Recommended value | |
| Industry generic grid cable | 4-25mm² (12-4AWG) | 10-25mm² (8-4AWG) | |

Table 4.2 Grid cable size

There are two cable connection point for each phase, one for grid, one for AC power of RSD.

| GRID STANDARD | | | N L2 | | | |
|-----------------------|-----|--------------------------|---------|-----|--------------------|----|
| | : | 208V~ 3PH-^-3W | | SI | 240V~ PLIT-PHAS | ŝE |
| TERMINAL | L1 | L2 | N | L1 | L2 | N |
| Connection requiement | Yes | Yes | No | Yes | Yes | No |

4.3.4 Ground Connection

Internal ground connection point

Please see figure 4.9. Both DC and AC ground cable can be connect to ground terminal above DC switch. The acceptable wire size for ground is **12AWG to 4 AWG**. The torque setting is 26 in-lbs (3 Nm).

4. Installation

4.3.4 Ground Connection

Internal ground connection point

Please see figure 4.10. Both DC and AC ground cable can be connect to ground terminal above DC switch. The acceptable wire size for ground is **12AWG to 4 AWG**. The torque setting is 26 in-lbs (3 Nm).



Figure 4.10 Grounding Terminal on Heat-Sink

External ground connection point

An external ground connection is provided at the right side of the inverter.

Prepare OT terminals: M4. Use proper tooling to crimp the lug to the terminal.

Connect the OT terminal with ground cable to the right side of the inverter.

The torque setting is 20 in-lbs (2Nm).



4.3.5 Max. Overcurrent Protection Device (OCPD)

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

| Inverter | Rated voltage(V) | Max. output current (A) | Current for protection device (A) |
|--------------------|---------------------|----------------------------|-----------------------------------|
| Solis-1P6K-4G-US | 240/208 | 25.0/28.8 | 40/40 |
| Solis-1P7K-4G-US | 240/208 | 29.2/33.7 | 40/40 |
| Solis-1P7.6K-4G-US | 240/208 | 31.7/36.5 | 40/50 |
| Solis-1P8K-4G-US | 240/208 | 33.3/38.5 | 40/50 |
| Solis-1P8.6K-4G-US | 240/208 | 35.8/41.3 | 50/50 |
| Solis-1P9K-4G-US | 240/208 | 37.5/43.3 | 50/50 |
| Solis-1P10K-4G-US | 240/208 | 41.7/43.3 | 50/60 |

4. Installation

4.3.6 Inverter Monitoring Connection

The inverter can be monitored via Wi-Fi or Cellular.

All Solis communication devices are optional (Figure 4.12).

For connection instructions, please refer to the Solis Monitoring Device installation manuals.



4.3.7 Module Level Rapid Shutdown (Optional)

For systems that are required to meet NEC 2017 NEC 690.12, Solis has an optional Module Level Rapid Shutdown. This product provides a panel level shutdown feature that brings the panel voltage to a safe level in case of a disaster situation. This function is vital for the safety of firefighters and relevant personnel.



NOTE:

The Solis Transmitter inside the inverter is compatible with any module level rapid shutdown devices that comply with the Sunspec requirements. The detailed installation please refer to the user manual of module level rapid shutdown devices.

If Tigo transmitter is installed inside the inverter wiring box, customer must install corresponding Tigo module level rapid shutdown devices. Please consult Tigo for detailed instructions.

4. Installation

4.3.8 Meter Connection(optional)

The inverter can work with a split phase smart meter to achieve Export Power Management function.

Below is the connection diagram.

Detailed settings please refer to Section 6.5.11.



5. Start & Stop

5.1 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 switches ON one at a time. If the PV array (DC) voltage is higher than the inverter 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 flashand 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 $75^{\circ}C$ ($167^{\circ}F$). 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.

5.2 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.

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.



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_DC2 350.8V I_DC2 5.1A | 10 sec | V_DC2: Shows input 02 voltage value. I_DC2: 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 0000000000000 | 10 sec | Display series number of the inverter. |
| Export_P: +0000W Export_I: 00.0A | 10 sec | Power of ERM. Current of EPM. |
| Work Mode: NULL DRM Number: 08 | 10 sec | Work Mode:The work mode of inverter. DRM Number:Show the number 01-08. |
| Meter EnergyP 0000000. 00kWh | 10 sec | Meter EnergyP: The active power. |
| | Та | ble 6.1 Information list |

6.2.1 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.



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> 01-01-2020 00:00

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".

The default address number of Solis S6 Mini Single Phase Inverter is "01".

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
- 9. Warning Message

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: 00-00 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

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: 2020-01-01

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.

> 2020-01-01: 051.3kWh 2020-01-01: 061.5kWh

Figure 6.9 Daily energy

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

6.4.5 Monthly Energy

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



Figure 6.10 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.

> 2020-02: 0510kWh 2020-01: 0610kWh

Figure 6.11 Month energy

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

6.4.6 Yearly Energy

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



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 6.13 Yearly energy

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

6.4.7 Daily Record

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

6.4.8 Communication Data

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

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

Figure 6.14 Communication Data

6.4.9 Warning Message

The display shows the 100 latest warn messages (see Figure 6.15). Screens can be scrolled manually by pressing the UP/ DOWN keys. Press the ESC key to return to the previous menu.

Msg000: T: 00-00 00:00 D:0000

Figure 6.15 Warning Message

6.5 Advanced Settings - Technicians Only

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

- 1.Select Standard
- 2.Grid ON/OFF
- 3.Clear Energy
- 4. Reset Password
- 5. Power Control
- 6.Calibrate Energy
- 7.Special settings
- 8. STD. Mode Settings
- 9. Restore settings
- 10. HMI Update
- 11. Internal EPM Set
- 12. Export Power Set
- 13. Restart HMI
- 14. Debug Parameter
- 15. DSP Update
- 16. Compensation Set



NOTE:

This area is for fully qualified and accredited technicians only. Please follow 6.4 to enter password to access this menu.

6.5.1 Selecting Standard

This function is used to select the grid's reference standard (see Figure 6.16).

YES=<ENT> NO=<ESC> Standard:G59/3

Figure 6.16

Press the UP/DOWN keys to select the standard (UL-240V-18, UL-208V-18, R21P3-240, R21P3-208, ISONE240, ISONE208, MEX-CFE, User-Def, etc.).

Press the ENTER key to confirm the setting.

Press the ESC key to cancel changes and returns to previous menu.

There are 6 settings for US market, UL-240V-18, UL-208V-18, R21P3-240, R21P3-208, ISONE240, ISONE208.



NOTE:

The default setting is 240V single phase "UL-240V-18", otherwise, refer to local requirements.



NOTE:

This function is for technicians use only.

Selecting the "User-Def" menu will access to the following submenu (see Figure 6.17).



Figure 6.17



NOTE:

The "User-Def" function can be only used by the service engineer and must be allowed by the providing utility.

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

| OV-G-V1: 220300V | OV-G-F1: 50.2-53Hz(60.2-63Hz) | | | |
|---------------------------------------|-------------------------------|--|--|--|
| OV-G-V1-T: 0.19S | OV-G-F1-T: 0.190S | | | |
| OV-G-V2: 220300V | OV-G-F2: 51-53Hz(61-63Hz) | | | |
| OV-G-V2-T: 0.11S | OV-G-F2-T: 0.19S | | | |
| UN-G-V1: 110210V | UN-G-F1: 47-49.5Hz(57-59.5Hz) | | | |
| UN-G-V1-T: 0.19S | UN-G-F1-T: 0.19S | | | |
| UN-G-V2: 110210V | UN-G-F2: 47-49Hz(57-59Hz) | | | |
| UN-G-V2-T: 0.11S | UN-G-F2-T: 0.19S | | | |
| Startup-T: 10-600S Restore-T: 10-600S | | | | |
| Table 6.2 Setting rar | nges for User-Def (L-N) | | | |

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 exit to save and send changes or cancel changes and return to the Advanced Settings Menu.

6.5.2 Grid ON/OFF

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



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 the inverter.

6.5.4 Reset Password

This function is used to set the new password for menu "Advanced info." and "Advanced information" (see Figure 6.19).

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

Figure 6.19 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

This section is for setting the active and reactive power. Within this section there are five functions:

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

Functions 1-4 are used to set inverter output power and reactive power. With restore means the change will not revert to default after restart. The default setting for functions 1-4 are 100% for output power and 0 for reactive power.

Function 5 "select PF curve" will set a custom power factor curve for different grid standards. 00 is null. 01 is the PF Curve for VDE4105, 02 is the PF Curve for Brazil. Other selections are reserved. The default setting is 00.



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 to revise the value of total energy to the same value as before. If the monitoring website is used the data will be synchronize with this setting automatically.

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

Figure 6.20 Calibrate Energy

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

6.5.7 Special Settings

There are 11 settings in this menu:

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



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

6.5.7.1 Grid Filter Set

Press the ENTER key to show the submenu of Grid Filter Set. Press the UP/DOWN key to select the value.

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



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

6.5.7.2 Relay_Protect Set



This function is for maintenance personnel only, wrong operation could disable inverter important function.

6.5.7.3 ILeak_Protect Set



This function is for maintenance personnel only, wrong operation could disable inverter important function.

6.5.7.4 GROUND_Protect Set



This function is for maintenance personnel only, wrong operation could disable inverter important function.

6.5.7.5 GRID INTF.02 Set



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

6.5.7.6 MPPT Parallel Mode

This is used for parallel strings into different inverter MPPTs.

Press enter and press up or down to change the settings(see Figure 6.21).



Figure 6.21 MPPT Parallel Set

Selecting RUN will enable parallel strings setup.Both MPPT channels will operate in parallel.

Selecting STOP disables parallel string setup.Both MPPT channels will operate separately.

The default setting is STOP (disabled).



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

6.5.7.7 Cnst. Voltage Mode

This function is used for fixed input voltage(see Figure 6.22).

CV Mode: STOP Voltage: 600V

Figure 6.22 Cnst. Voltage Set

Selecting RUN will enable fixed input voltage. The inverter will not operate if the input voltage is lower than the set voltage. Selecting STOP will disable this function.

The default setting is STOP (disabled).



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

6.5.7.8 V/FRT Set

There are 5 option under this setting:

1.LVRT_CQC 2.LVRT.GN 3.LVRT-BAR are not used for the US,

The function VRT_US (voltage ride through) and FRT_US (frequency ride through) two operation is used for UL1741SB (see Table 6.2, Table 6.3).

Selecting the setting to RUN will enable the inverter grid protection limits of UL 1741 SB requirements. Selecting the STOP setting will enable the inverter grid protection limits of IEEE 1547 requirements. The default setting is STOP.

| Voltage range (p.u.) | Operating mode/response | Minimum ride-through time(s) (design criteria) | Minimum response time(s) (design criteria) |
|-------------------------|-------------------------|--|--|
| V > 1.20 | Cease to Energize | N/A | 0.16 |
| 1.10 < V≤1.20 | Monmentary Cessation | 12 | 0.083 |
| 0.88 < V≤1.10 | Continuous Operation | Infinite | N/A |
| 0.70 < V≤0.88 | Mandatory Operation | 20 | N/A |
| 0.50 < V≤0.70 | Mandatory Operation | 10 | N/A |
| V≤0.50 | Momentary Cessation | 1 | 0.083 |

Table 6.3 Frequency ride through

| Defaults | | settings | Ranges of allowable settings | |
|------------------------|-------------------|----------------------|------------------------------|----------------------|
| Shall trip function | Frequency (Hz) | Clearing time (s) | Frequency (Hz) | Clearing time (s) |
| OF2 | 62.0 | 0.16 | 61.8-66.0 | 0.16-1000.0 |
| OF1 | 61.2 | 300.0 | 61.0-66.0 | 180.0-1000.0 |
| UF1 | 58.5 | 300.0 | 50.0-59.0 | 180.0-1000 |
| UF2 | 56.5 | 0.16 | 50.0-57.0 | 0.16-1000 |

Table 6.4 Voltage ride through

The voltage and frequency ride through limit is fixed.

VRT_US:STOP FRT_US:STOP

Figure 6.23 V/FRT Set

6.5.7.9 IgZero_COMP.Set



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

6.5.7.10 PI Set



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

6.5.7.11 IgADCheckPRO Set



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

6.5.8 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
- 8. Freq-Watt

6.5.8.1 Working Mode Set

There are TWO situations with different grid standards selected.

6.5.8.1.1 With UL Standard selected



NOTE:

The following modes are for "UL-240-18".

Solis US version inverters have Seven working modes:

- 1. NULL
- 2. Volt-watt
- 3. Volt-Var
- 4. Fixed-PF
- 5. Reac-power
- 6. Power-PF
- 7. P-Q Mode

1.NULL

Description: Inverter is not under any working mode.

2. Volt-Watt

Description: Inverter will change the active output power based on voltage change. Note: This is the Volt-Watt Setting for UL1741SB Standards.



| Setting Parameter | Default Value | Range |
|-------------------|---------------|-----------------|
| V1 | 1.06 Un | 1.05 Un~1.09 Un |
| P1 | Prated | N/A |
| V2 | 1.1 Un | 1.06 Un~1.1 Un |
| P2 | 0.2 Prated | 0- Prated |
| Response time | 10 s | 0.5 s-60 s |

3. Volt-Var

Description: Inverter will change the reactive output power based on voltage change.



| Un / sf-0.08Un (0~60%)Sn/+44%Sn sf-0.02Un (~60%~60%)Sp/0 |
|--|
| ef-0.08Un (0~60%)Sn/+44%Sn |
| f_0_02Un (_60%~60%)Sn/0 |
| (-00% 00%)61//0 |
| f+0.02Un (-60%~60%)Sn/0 |
| f60.08Un (-60%~0)Sn/-44%Sn |
| 2 |

4.Fixed-PF

Description: Inverter will output power with fixed power factor. Setting Range: -0.8 to +0.8 Default value is PF = 1



5. Reac-Power

Description: Inverter will generate reactive power based on changing output power. Range: -60%~+60% Default: 0%

6. P-Factor

Description: Inverter will change power factor based on changing output power. Note: This Setting is NOT required by UL1741SB Standards.



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

7. P-Q Mode

Description: Inverter will change reactive power based on active power output.



| Setting Point | Active Power Default | Active Power range | Reactive Power Default | Reactive power Range |
|---------------|----------------------|-----------------------|------------------------|----------------------|
| P/Q 1 | 0.2 Prated | 0~0.7 Prated | 0 | -60%Sn~60%Sn |
| P/Q 2 | 0.5 Prated | 0.4 Prated~0.8 Prated | 0 | -60%Sn~60%Sn |
| P/Q 3 | Prated | 0.5 Prated~Prated | -44%Sn | -60%Sn~60%Sn |
| Table 6.7 | | | | |

6.5.8.1.2 With Rule21 Standard selected



NOTE:

The following modes are for "R21P3-480", "R21P3-48A".

Solis US version inverters have Ten working modes:

- 1.NULL
- 2.Volt-watt
- 3.Volt-Var
- 4.Fixed-PF
- 5.Reac-power
- 6.Power-PF
- 7.VgWatt-UL

Based on Rule21, working mode 1,2,3,4 can be used by grid operator.



NOTE:

The other three working mode"P1-V-Watt","P1-V-Var" and "P1-V-P&V-Q" are NOT applicable for settings.

1.NULL (Mode Reset)

Description: Inverter is not under any working mode.

2. Volt-Watt

Description: Inverter will change the active output power based on voltage change. Note: This is the Volt-Watt Setting for Rule21 Standards.



Default Settings for Rule21 Standards:

Rated 240V Grid V1:less than Vstart V2 (Vstart): (240-288V) Default 254V V3 (Vstop): (240-288V) Default 264V V4: larger than Vstop P1:100% P2:100% P3: 0% P4:0% Rated 208V Grid V1:less than Vstart V2 (Vstart): (208-250V) Default 221V V3 (Vstop): (208-250V) Default 229V V4: larger than Vstop P1:100% P2:100% P3:0% P4:0%

3. Volt-Var

Description: Inverter will change the reactive output power based on voltage change.



Default Settings for Rule21 Standard:

| Q1: (0-60%) Default +30% | Q4: (-60%-0%) Default -30% |
|----------------------------|-----------------------------|
| Rated 240V Grid | |
| V1:(192-264V) Default 220V | V2: (192-264V) Default 232V |
| V3:(240-288V) Default 248V | V4: (240-288V) Default 256V |
| Rated 208V Grid | |
| V1:(166-229V) Default 191V | V2: (166-229V) Default 201V |
| V3:(208-250V) Default 215V | V4: (208-250V) Default 223V |
| | |

Voltage1:221V Voltage2:232V

Figure 6.31 Volt-VAR

4.Fixed-PF

Description: Inverter will output power with fixed power factor. Setting Range: -0.8 to +0.8 Default value is PF = 1



5. Reac-Power (Not Required)

Description: Inverter will generate reactive power based on changing output power. Note: This Setting is NOT required by Rule21 Standards.



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

6. P-Factor (Not Required)

Description: Inverter will change power factor based on changing output power. Note: This Setting is NOT required by Rule21 Standards.



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

7.VgWatt-UL (Not Required)

Description: Inverter will change the active output power based on voltage change. Note: This Setting is NOT required by Rule21 Standards.



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

8. Enable both Volt-Var and Volt-Watt modes

Description: Rule21 requires both Volt-var and Volt-watt modes can be enabled.

To set both modes (Volt-var in high priority)

Step 1: Select and set Volt-watt mode at first.

Step 2: Enter "Working Mode" again and select and set Volt-var mode then.

Step 3: To check the priority, a new mode will appear as "V-Q & V-P" which

indicates (Q) Volt-var is in high priority.

YES=<ENT> NO=<ESC> Work Mode : V-Q & V-P

Figure 6.34 Work Mode

To set both modes (Volt-watt in high priority)

Step 1: Select and set Volt-var mode at first.

Step 2: Enter "Working Mode" again and select and set Volt-watt mode then.

Step 3: To check the priority, a new mode will appear as "V-P & V-Q" which

indicates (P) Volt-watt is in high priority.

YES=<ENT> NO=<ESC> Work Mode : V-P & V-Q

Figure 6.35 Work Mode

To reset dual-mode or exit the dual-mode situation

Step 1: Select "Null" mode at first.

Step 2: Enter "Working Mode" again. Redo above dual-mode setting steps to

reset OR set other modes to exit dual-mode situation.



NOTE:

To check the Volt-watt and Volt-var priority, simply enter the working modes.

V-Q&V-P indicates Volt-Var First V-P&V-Q indicates Volt-Watt First

6.5.8.2 Power Rate Limit

This function is used for changing power ramp up rate. When the inverter initializes or string MPPT changes, the ramp up rate is limited.

The default setting is stop (disable).

The setting range is from 10% to 600%, This will change the power change rate per minute. If these values are changed the inverter may not conform to UL 1741 SB or IEEE 1547 standard.

Power Rate:016% RateP_Sts-US:STOP

Figure 6.36 Power Rate Limit

6.5.8.3 Freq Derate Set

This setting is applicable when UL Standards are selected.

There are five frequency derate modes in this menu when UL-208/240 grid standard is selected. Modes 00 – 03 are disabled. Mode 04 is used for UL 1741 SB frequency derating settings. Within this mode the user can set the frequency start and stop points. **The default setting is 00(disabled).**



Over frequency load shedding F start range is 59.936-60.036Hz.

The default setting is 60.036Hz.

Descending rate: 5%Pn/0.1Hz.

F stop range: 61-64Hz. Default setting is 62Hz. Recovery rate: 5%Pn/0.1Hz.

Press the Enter key to select the mode or frequency.

 $\ensuremath{\mathsf{Press}}\xspace$ Up/Down to set. Press ESC to save the settings.

6.5.8.4 10mins Voltage Set

This function is disabled and not used for the US.



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

6.5.8.5 Power Priority

This setting is used to determine the priority between Active Power Control (Watt) and Reactive Power Control (Var).

YES=<ENT> NO=<ESC> Select: Var First

Figure 6.39 Power Priority

Two options are available: Watt First and Var First.

This setting determines the priority when both Volt-Watt and Volt-Var modes are enabled.



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

6.5.8.6 Initial Settings

This setting will allow the working modes from 6.5.8.1 to 6.5.8.4 to be set back to default.

Work Mode Default Power Rate Default

Figure 6.40 Initial Settings

6.5.8.7 Voltage PCC Set

Set the voltage at the PCC point. This setting is required by RULE 21 requirements. PCC: Point of Common Coupling, the point where a Local EPS is connected to an Area EPS.



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

6.5.8.8 Freq-Watt

This setting is used to control real power based on the frequency excursion This setting is applicable when Rule21 Standards are selected.



Figure 6.41 Freq-Watt (1)

Start Freq: This is the frequency that active power reduction starts.

WGradient: This is the active power reduction rate in terms of the frequency.

Stop Freq: This is the frequency that stops the correction cycle.

Hysteresis: This indicates whether hysteresis is enabled.





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

6.5.9 Restore Settings

Restore settings will set all items in 6.5.7 special settings to default.

The screen shows as below:



Press the Enter key to save the setting after setting grid off.

Press the ESC key to return the previous mean.

6.5.10 HMI Update

This function is used for update the LCD program.



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

6.5.11 Internal EPM Set

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

- 1. Mode Select
- 2. Set Backflow Power
- 3. Fail safe ON/OFF

6.5.11.1 Mode Select

There are 3 settings in this menu as below:

- 1. EPM OFF
- 2. Meter in Load
- 3. Meter in Grid

EPM 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).

6.5.11.2 Backflow Power

The setting is used to define the allowed export power into the grid.



Positive values indicate the amount of power is allowed to export to the grid.

Negative values indicate a more strict control to limit the export power in advance thus ensuring exact no power is feeding into the grid.

6.5.11.3 Fail safe ON/OFF

This setting is used to give out an alarm (stop inverter generation as well) when the CT/Meter connection is lost during operation.

It can prevent potential backflow power into the grid when the system loses control.

YES=<ENT> NO=<ESC> Fail Safe Set:ON

Figure 6.45 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.

6.5.12 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.



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.

6.5.13 Restart HMI

The function is used for restart the HMI.



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

6.5.14 Debug Parameter

This function is used for manufacturer maintenance personnel only.

6.5.15 DSP Update

The function is used for update the DSP.



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

6.5.16 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:

YES=<ENT> NO=<ESC> Power para: 1.000

Figure 6.47 Power Rate Limit

Press the Down key to move the cursor.

Press the Up key to change the digit.

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



This setting is used for grid operators, do not change this setting unless specifically instructed to.

6.6 Arc fault (AFCI version)

Solis single phase inverters have a built-in AFCI function which can detect an arc fault within the DC circuit. If the arc fault happens, it can only be removed manually.

During normal operation, if arc fault happens in the DC circuit, the inverter will stop output and the LCD will show:

ARC-FAULT Restart Press ESC 3s

Figure 6.48 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.

Solis single phase inverter does not require any regular maintenance. However, cleaning the dust on the heat sink will help the inverter to dissipate heat and increase its life expectancy. 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.

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:

| Alarms | Cause | Solution |
|--|--|--|
| No Information (Blank Screen) | Input voltage low/missing Polarity reversed Main board damaged | Test – DC switch OFF • Check PV connections • Check polarity • Check voltage >120V Single, >350V three Test – DC Switch ON • Check voltage >120V Single, >350V three • If DC voltage is "0" replace inverter |
| Initializing (Inverter stuck in this mode) | • Inverter is waiting for driving signal | Test – DC switch OFF • Check PV connections • Check polarity • Check voltage >120V Single, >350V three Test – DC Switch ON • Check voltage >120V Single, >350V three • A cable may have been damaged or loosened in shipping replace inverter |
| OV-G-V: Over Grid Voltage | • Inverter detects grid voltage as too high | Test – DC switch OFF Check AC at the inverter If AC measures high, adjust upper limit with permission from utility Test – DC Switch ON, full power Check AC at inverter test points Compare with LCD If AC measures high, cables between inverter and interconnect are too small Check ampacity and voltage drop calculations Verify appropriate Grid Standard |

| Alarms | Cause | Solution |
|-------------------------------------|--|---|
| UN-G-V: Under Grid Voltage | • Inverter detects grid voltage as too low | Test – DC switch OFF Check AC at the inverter test points If AC measures low, adjust lower limit with permission from utility Check LCD voltage reading, may be a bad measurement circuit Test – DC Switch ON Verify appropriate Grid Standard Replace inverter |
| OV-G-F: Over Grid Frequency | • Inverter detects grid Frequency as too high | Test – DC switch OFF • Check frequency at the inverter test points • If Frequency measures high, adjust upper limit with permission from utility • Check LCD reading, may be a bad measurement circuit Test – DC Switch ON • Verify appropriate Grid Standard • Replace inverter |
| UN-G-F: Under Grid Frequency | • Inverter detects grid Frequency as too low | Test – DC switch OFF • Check frequency at the inverter test points • If Frequency measures low, adjust lower limit with permission from utility • Check LCD reading, may be a bad measurement circuit Test – DC Switch ON • Verify appropriate Grid Standard • Replace inverter |
| NO-GRID | • Inverter does not detect the grid | Test – DC switch OFF • Check AC at the inverter test points • L-L, L-GND • Do NOT tell me 240VAC • Check LCD reading, may be a bad measurement circuit Test – DC Switch ON • Check grid standard • Replace inverter |
| OV-DC: DC voltage is too high | • Inverter detects High DCV | Test – DC switch OFF • Check DC at the inverter test points • If DCV is high, too many panels in the string Test – DC Switch ON • Check LCD reading, may be a bad measurement circuit • Replace inverter |

| Alarms | Cause | Solution |
|--|---|--|
| OV-BUS: DC BUS voltage is too high | • Inverter detects High DCV on internal bus | Test • Measure DC and AC voltages • Compare with LCD • Replace inverter • Internal damage • Wire came loose during shipping |
| UN-BUS: DC BUS voltage is too low | • Inverter detects low DCV on internal bus | Test • Measure DC and AC voltages • Compare with LCD • Replace inverter • Internal damage • Wire came loose during shipping |
| GRID-INTF: Grid unstable | • Inverter detects grid instability, internal fault current high | Test – With DC Switch OFF • Measure AC voltage • Test AC line for THD • Test – With DC Switch ON Test AC line for THD • Multiple inverters/turn one off • Impedance matching adjustment or box • Internal damage • Wire came loose in shipping |
| INI-FAULT: Initialization Protection | • Master and Slave DSP have different values | Reset Inverter • DC switch OFF • Wait until all lights/LCD turn off • DC switch ON • Replace inverter |
| OV-TEM: Temperature Protection | Inverter detects high ambient temperature >60C | Inspect installation • Check heatsink for obstructions/ventilation • Is inverter in direct sunshine • Measure ambient temperature near inverter • If temp is in range replace inverter |
| PV ISO-PRO 01/02: Ground Protection | Inverter detects low DC insulation resistance | Inspect installation • Reset inverter • Note weather conditions when alarm occurs • Measure insulation resistance • If normal, measure in SAME weather as alarm • Physically check cables • Replace inverter |

| Alarms | Cause | Solution |
|-------------------------------|---|--|
| AFCI Check FAULT | • AFCI module self check fault | Reset Inverter • DC switch OFF • Wait until all lights/LCD turn off • DC switch ON • Replace inverter |
| ARC-FAULT | • Inverter detects arc in DC circuit | Inspect installation • Check cable with string tester • Physically check cables • Inspect panel junction boxes • Inspect cable connections • Reset inverter • Replace inverter |
| Screen OFF with DC applied | • Inverter internally damaged | Do not turn off the DC switches as it will damage the inverter. Please wait for the solar irradiance reduces and confirm the string current is less than 0.5A with a clip-on ammeter and then turn off the DC switches. Please note that any damages due to wrong operations are not covered in the device warranty. |

Table 8.1 Fault messages and descriptions



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.

| Model | Solis-1P6K-4G-US |
|---|--|
| Max. input voltage | 660V |
| Rated voltage | 330V |
| Start-up voltage | 120V |
| MPPT voltage range | 100-500V |
| Full load MPPT voltage range | 200-500V |
| Max. input current | 14A/14A/14A |
| Max. short circuit current | 22A/22A/22A |
| MPPT number / Max. input strings number | 3/3 |
| Rated output power | 6kW |
| Max. apparent output power | 6kVA |
| Max. output power | 6kW |
| Rated grid voltage | 1Φ/PE, 240 V / 208 V |
| Grid voltage range | 211.2-264 V (for 240 V rated) / 183-228.8 V (for 208 V rated) |
| Grid frequency | 60 Hz |
| Grid frequency range | 58.5-61.2 Hz |
| Max. output current for 240V grid | 25A |
| Max. output current for 208V grid | 28.8A |
| Power Factor | >0.99 (0.8 leading - 0.8 lagging) |
| THDi | <3% |
| DC injection current | <0.5% In |
| Max. efficiency | 97.8% |
| CEC efficiency | 97.5% |
| MPPT efficiency | >99.5% |
| Dimensins (W*H*D) | 13.1*25.8*9.8in (333*655*249mm) |
| Weight | 43.2 lbs (19.6 kg) |
| Тороlоду | Transformerless |
| Self consumption (Night) | <1 W |
| Relative humidity | 0-100% |
| Operating ambient temperature range | −13 °F ~ 140 °F (-25 °C ~ 60 °C) |
| Storage environment | −13 °F ~ 176 °F (-25 °C ~ 80 °C) |
| Ingress protection | TYPE 4X |
| Cooling concept | Natural convection |
| Max. operating altitude | 13120 ft (4000 m) |
| | Conform to UL Std. 1741, UL1741 Supplement B, |
| Compliance | UL 1699B; Conform to CSA Std. |
| | C22.2 NO. 107.1-16; Conform to IEEE I547-2018, |
| | IEEE 1547a-2020 and IEEE I547.1-2020 |

| Model | Solis-1P6K-4G-US |
|----------------|--|
| DC connection | 2 knockout for 1" and 11/4" conduit at bottom, side and back, Screw clamp terminal |
| AC connection | 2 knockout for 1" and 11/4" conduit at bottom, side and back, OT terminal |
| Display | LCD, 2×20 Z. |
| Commiunication | Rs485, Optional: Cellular, Wi-Fi |
| Warranty | 10 years (Extand to 20 years) |

| Model | Solis-1P7K-4G-US |
|---|--|
| Max. input voltage | 660V |
| Rated voltage | 330V |
| Start-up voltage | 120V |
| MPPT voltage range | 100-500V |
| Full load MPPT voltage range | 233-500V |
| Max. input current | 14A/14A/14A |
| Max. short circuit current | 22A/22A/22A |
| MPPT number / Max. input strings number | 3/3 |
| Rated output power | 7kW |
| Max. apparent output power | 7kVA |
| Max. output power | 7kW |
| Rated grid voltage | 1Φ/PE, 240 V / 208 V |
| Cridualtaga ranga | 211.2-264 V (for 240 V rated) / 183-228.8 V |
| | (for 208 V rated) |
| Grid frequency | 60 Hz |
| Grid frequency range | 58.5-61.2 Hz |
| Max. output current for 240V grid | 29.2A |
| Max. output current for 208V grid | 33.7A |
| Power Factor | >0.99 (0.8 leading - 0.8 lagging) |
| THDi | <3% |
| DC injection current | <0.5% In |
| Max. efficiency | 97.8% |
| CEC efficiency | 97.5% |
| MPPT efficiency | >99.5% |
| Dimensins (W*H*D) | 13.1*25.8*9.8in (333*655*249mm) |
| Weight | 43.2 lbs (19.6 kg) |
| Тороlоду | Transformerless |
| Self consumption (Night) | <1 W |
| Relative humidity | 0-100% |
| Operating ambient temperature range | −13 °F ~ 140 °F (-25 °C ~ 60 °C) |
| Storage environment | −13 °F ~ 176 °F (-25 °C ~ 80 °C) |
| Ingress protection | TYPE 4X |
| Cooling concept | Natural convection |
| Max. operating altitude | 13120 ft (4000 m) |
| | Conform to UL Std. 1741, UL1741 Supplement B, |
| Compliance | UL 1699B; Conform to CSA Std. |
| | C22.2 NO. 107.1-16; Conform to IEEE I547-2018, |
| | IEEE 1547a-2020 and IEEE 1547.1-2020 |

| Model | Solis-1P7K-4G-US |
|----------------|--|
| DC connection | 2 knockout for 1" and 11/4" conduit at bottom, side and back, Screw clamp terminal |
| AC connection | 2 knockout for 1" and 11/4" conduit at bottom, side and back, OT terminal |
| Display | LCD, 2×20 Z. |
| Commiunication | Rs485, Optional: Cellular, Wi-Fi |
| Warranty | 10 years (Extand to 20 years) |

| Model | Solis-1P7.6K-4G-US |
|---|--|
| Max. input voltage | 660V |
| Rated voltage | 330V |
| Start-up voltage | 120V |
| MPPT voltage range | 100-500V |
| Full load MPPT voltage range | 253-500V |
| Max. input current | 14A/14A/14A |
| Max. short circuit current | 22A/22A/22A |
| MPPT number / Max. input strings number | 3/3 |
| Rated output power | 7.6kW |
| Max. apparent output power | 7.6kVA |
| Max. output power | 7.6kW |
| Rated grid voltage | 1Φ/PE, 240 V / 208 V |
| Cridualtara ranga | 211.2-264 V (for 240 V rated) / 183-228.8 V |
| | (for 208 V rated) |
| Grid frequency | 60 Hz |
| Grid frequency range | 58.5-61.2 Hz |
| Max. output current for 240V grid | 31.7A |
| Max. output current for 208V grid | 36.5A |
| Power Factor | >0.99 (0.8 leading - 0.8 lagging) |
| THDi | <3% |
| DC injection current | <0.5% In |
| Max. efficiency | 97.8% |
| CEC efficiency | 97.5% |
| MPPT efficiency | >99.5% |
| Dimensins (W*H*D) | 13.1*25.8*9.8in (333*655*249mm) |
| Weight | 43.2 lbs (19.6 kg) |
| Тороlоду | Transformerless |
| Self consumption (Night) | <1 W |
| Relative humidity | 0-100% |
| Operating ambient temperature range | −13 °F ~ 140 °F (-25 °C ~ 60 °C) |
| Storage environment | −13 °F ~ 176 °F (-25 °C ~ 80 °C) |
| Ingress protection | TYPE 4X |
| Cooling concept | Natural convection |
| Max. operating altitude | 13120 ft (4000 m) |
| Compliance | Conform to UL Std. 1741, UL1741 Supplement B, |
| | UL 1699B; Conform to CSA Std. |
| | C22.2 NO. 107.1-16; Conform to IEEE I547-2018, |
| | IEEE 1547a-2020 and IEEE I547.1-2020 |

| Model | Solis-1P7.6K-4G-US |
|----------------|--|
| DC connection | 2 knockout for 1" and 11/4" conduit at bottom, side and back, Screw clamp terminal |
| AC connection | 2 knockout for 1" and 11/4" conduit at bottom, side and back, OT terminal |
| Display | LCD, 2×20 Z. |
| Commiunication | Rs485, Optional: Cellular, Wi-Fi |
| Warranty | 10 years (Extand to 20 years) |

| Model | Solis-1P8K-4G-US |
|---|--|
| Max. input voltage | 660V |
| Rated voltage | 330V |
| Start-up voltage | 120V |
| MPPT voltage range | 100-500V |
| Full load MPPT voltage range | 200-500V |
| Max. input current | 4*14A |
| Max. short circuit current | 4*22A |
| MPPT number / Max. input strings number | 4/4 |
| Rated output power | 8kW |
| Max. apparent output power | 8kVA |
| Max. output power | 8kW |
| Rated grid voltage | 1Φ/PE, 240 V / 208 V |
| | 211.2-264 V (for 240 V rated) / 183-228.8 V |
| Grid voltage range | (for 208 V rated) |
| Grid frequency | 60 Hz |
| Grid frequency range | 58.5-61.2 Hz |
| Max. output current for 240V grid | 33.3A |
| Max. output current for 208V grid | 38.5A |
| Power Factor | >0.99 (0.8 leading - 0.8 lagging) |
| THDi | <3% |
| DC injection current | <0.5% In |
| Max. efficiency | 97.8% |
| CEC efficiency | 97.5% |
| MPPT efficiency | >99.5% |
| Dimensins (W*H*D) | 13.1*25.8*9.8in (333*655*249mm) |
| Weight | 43.7 lbs (19.8 kg) |
| Тороlоду | Transformerless |
| Self consumption (Night) | <1 W |
| Relative humidity | 0-100% |
| Operating ambient temperature range | −13 °F ~ 140 °F (-25 °C ~ 60 °C) |
| Storage environment | −13 °F ~ 176 °F (-25 °C ~ 80 °C) |
| Ingress protection | TYPE 4X |
| Cooling concept | Natural convection |
| Max. operating altitude | 13120 ft (4000 m) |
| Compliance | Conform to UL Std. 1741, UL1741 Supplement B, |
| | UL 1699B; Conform to CSA Std. |
| | C22.2 NO. 107.1-16; Conform to IEEE I547-2018, |
| | IEEE 1547a-2020 and IEEE I547.1-2020 |

| Model | Solis-1P8K-4G-US |
|----------------|--|
| DC connection | 2 knockout for 1" and 11/4" conduit at bottom, side and back, Screw clamp terminal |
| AC connection | 2 knockout for 1" and 11/4" conduit at bottom, side and back, OT terminal |
| Display | LCD, 2×20 Z. |
| Commiunication | Rs485, Optional: Cellular, Wi-Fi |
| Warranty | 10 years (Extand to 20 years) |

| Model | Solis-1P8.6K-4G-US |
|---|---|
| Max. input voltage | 660V |
| Rated voltage | 330V |
| Start-up voltage | 120V |
| MPPT voltage range | 100-500V |
| Full load MPPT voltage range | 215-500V |
| Max. input current | 4*14A |
| Max. short circuit current | 4*22A |
| MPPT number / Max. input strings number | 4/4 |
| Rated output power | 8.6kW |
| Max. apparent output power | 8.6kVA |
| Max. output power | 8.6kW |
| Rated grid voltage | 1Φ/PE, 240 V / 208 V |
| Grid voltage range | 211.2-264 V (for 240 V rated) / 183-228.8 V (for 208 V rated) |
| Grid frequency | 60 Hz |
| Grid frequency range | 58.5-61.2 Hz |
| Max. output current for 240V grid | 35.8A |
| Max. output current for 208V grid | 41.3A |
| Power Factor | >0.99 (0.8 leading - 0.8 lagging) |
| THDi | <3% |
| DC injection current | <0.5% In |
| Max. efficiency | 97.8% |
| CEC efficiency | 97.5% |
| MPPT efficiency | >99.5% |
| Dimensins (W*H*D) | 13.1*25.8*9.8in (333*655*249mm) |
| Weight | 43.7 lbs (19.8 kg) |
| Тороlоду | Transformerless |
| Self consumption (Night) | <1 W |
| Relative humidity | 0-100% |
| Operating ambient temperature range | −13 °F ~ 140 °F (-25 °C ~ 60 °C) |
| Storage environment | −13 °F ~ 176 °F (-25 °C ~ 80 °C) |
| Ingress protection | TYPE 4X |
| Cooling concept | Natural convection |
| Max. operating altitude | 13120 ft (4000 m) |
| Compliance | Conform to UL Std. 1741, UL1741 Supplement B, |
| | UL 1699B; Conform to CSA Std. |
| | C22.2 NO. 107.1-16; Conform to IEEE I547-2018, |
| | IEEE 1547a-2020 and IEEE I547.1-2020 |

| Model | Solis-1P8.6K-4G-US |
|----------------|--|
| DC connection | 2 knockout for 1" and 11/4" conduit at bottom, side and back, Screw clamp terminal |
| AC connection | 2 knockout for 1" and 11/4" conduit at bottom, side and back, OT terminal |
| Display | LCD, 2×20 Z. |
| Commiunication | Rs485, Optional: Cellular, Wi-Fi |
| Warranty | 10 years (Extand to 20 years) |

| Model | Solis-1P9K-4G-US |
|---|--|
| Max. input voltage | 660V |
| Rated voltage | 330V |
| Start-up voltage | 120V |
| MPPT voltage range | 100-500V |
| Full load MPPT voltage range | 225-500V |
| Max. input current | 4*14A |
| Max. short circuit current | 4*22A |
| MPPT number / Max. input strings number | 4/4 |
| Rated output power | 9kW |
| Max. apparent output power | 9kVA |
| Max. output power | 9kW |
| Rated grid voltage | 1Φ/PE, 240 V / 208 V |
| | 211.2-264 V (for 240 V rated) / 183-228.8 V |
| Grid voltage range | (for 208 V rated) |
| Grid frequency | 60 Hz |
| Grid frequency range | 58.5-61.2 Hz |
| Max. output current for 240V grid | 37.5A |
| Max. output current for 208V grid | 43.3A |
| Power Factor | >0.99 (0.8 leading - 0.8 lagging) |
| THDi | <3% |
| DC injection current | <0.5% In |
| Max. efficiency | 97.8% |
| CEC efficiency | 97.5% |
| MPPT efficiency | >99.5% |
| Dimensins (W*H*D) | 13.1*25.8*9.8in (333*655*249mm) |
| Weight | 43.7 lbs (19.8 kg) |
| Тороlоду | Transformerless |
| Self consumption (Night) | <1 W |
| Relative humidity | 0-100% |
| Operating ambient temperature range | −13 °F ~ 140 °F (-25 °C ~ 60 °C) |
| Storage environment | −13 °F ~ 176 °F (-25 °C ~ 80 °C) |
| Ingress protection | TYPE 4X |
| Cooling concept | Natural convection |
| Max. operating altitude | 13120 ft (4000 m) |
| Compliance | Conform to UL Std. 1741, UL1741 Supplement B, |
| | UL 1699B; Conform to CSA Std. |
| | C22.2 NO. 107.1-16; Conform to IEEE I547-2018, |
| | IEEE 1547a-2020 and IEEE I547.1-2020 |

| Model | Solis-1P9K-4G-US |
|----------------|--|
| DC connection | 2 knockout for 1" and 11/4" conduit at bottom, side and back, Screw clamp terminal |
| AC connection | 2 knockout for 1" and 11/4" conduit at bottom, side and back, OT terminal |
| Display | LCD, 2×20 Z. |
| Commiunication | Rs485, Optional: Cellular, Wi-Fi |
| Warranty | 10 years (Extand to 20 years) |

| Model | Solis-1P10K-4G-US |
|---|---|
| Max. input voltage | 660V |
| Rated voltage | 330V |
| Start-up voltage | 120V |
| MPPT voltage range | 100-500V |
| Full load MPPT voltage range | 250-500V |
| Max. input current | 4*14A |
| Max. short circuit current | 4*22A |
| MPPT number / Max. input strings number | 4/4 |
| Rated output power | 10kW |
| Max. apparent output power | 10kVA |
| Max. output power | 10kW |
| Rated grid voltage | 1Φ/PE, 240 V / 208 V |
| Grid voltage range | 211.2-264 V (for 240 V rated) / 183-228.8 V (for 208 V rated) |
| Grid frequency | 60 Hz |
| Grid frequency range | 58.5-61.2 Hz |
| Max. output current for 240V grid | 41.7A |
| Max. output current for 208V grid | 43.3A |
| Power Factor | >0.99 (0.8 leading - 0.8 lagging) |
| THDi | <3% |
| DC injection current | <0.5% In |
| Max. efficiency | 97.8% |
| CEC efficiency | 97.5% |
| MPPT efficiency | >99.5% |
| Dimensins (W*H*D) | 13.1*25.8*9.8in (333*655*249mm) |
| Weight | 43.7 lbs (19.8 kg) |
| Тороlоду | Transformerless |
| Self consumption (Night) | <1 W |
| Relative humidity | 0-100% |
| Operating ambient temperature range | −13 °F ~ 140 °F (-25 °C ~ 60 °C) |
| Storage environment | −13 °F ~ 176 °F (-25 °C ~ 80 °C) |
| Ingress protection | TYPE 4X |
| Cooling concept | Natural convection |
| Max. operating altitude | 13120 ft (4000 m) |
| Compliance | Conform to UL Std. 1741, UL1741 Supplement B, |
| | UL 1699B; Conform to CSA Std. |
| | C22.2 NO. 107.1-16; Conform to IEEE I547-2018, |
| | IEEE 1547a-2020 and IEEE I547.1-2020 |

| Model | Solis-1P10K-4G-US |
|----------------|--|
| DC connection | 2 knockout for 1" and 11/4" conduit at bottom, side and back, Screw clamp terminal |
| AC connection | 2 knockout for 1" and 11/4" conduit at bottom, side and back, OT terminal |
| Display | LCD, 2×20 Z. |
| Commiunication | Rs485, Optional: Cellular, Wi-Fi |
| Warranty | 10 years (Extand to 20 years) |

Manufacturer: Ginlong Technologies Co.,Ltd., Ningbo, Zhejiang, P.R.China US Office: 565 Metro PI. S. Suite 3214, Dublin OH 43017, USA Toll-free: 866.438.8408 I Email: sales@ginlong.com I ussales@ginlong.com Web: www.ginlong.com

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



SunSpec Certified



Comply with CA Rule 21/ Certified to UL 1741 SB