User Manual

High Voltage Hybrid Single Phase
Residential Energy Storage Inverter

Applicable Models:
S6-EH1P3.8K-H-US
S6-EH1P5K-H-US
S6-EH1P7.6K-H-S-US
S6-EH1P7.6K-H-US
S6-EH1P9.9K-H-US
S6-EH1P10K-H-US
S6-EH1P11.4K-H-US

Version 4.3 Release Date: 01/2024

Important Notes

- Product specifications are subject to change without notice. Every attempt has been made to make this document complete, accurate and up-to-date. Individuals reviewing this document and installers or service personnel are cautioned, however, that Solis reserves the right to make changes without notice and shall not be responsible for any damages, including indirect, incidental or consequential damages caused by reliance on the material presented including, but not limited to, omissions, typographical errors, arithmetical errors or listing errors in the material provided in this document.

- Solis accepts no liability for customers' failure to comply with the instructions for correct installation and will not be held responsible for upstream or downstream systems Solis equipment has supplied.

- The customer is fully liable for any modifications made to the system; therefore, any hardware or software modification, manipulation, or alteration not expressly approved by the manufacturer shall result in the immediate cancellation of the warranty.

- Given the countless possible system configurations and installation environments, it is essential to verify adherence to the following:
  - There is sufficient space suitable for housing the equipment.
  - Airborne noise produced depending on the environment.
  - Potential flammability hazards.

- Solis will not be held liable for defects or malfunctions arising from:
  - Improper use of the equipment.
  - Deterioration resulting from transportation or particular environmental conditions.
  - Performing maintenance incorrectly or not at all.
  - Tampering or unsafe repairs.
  - Use or installation by unqualified persons.

- This product contains lethal voltages and should be installed by qualified electrical or service personnel having experience with lethal voltages.

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1. Introduction

1.1 Inverter Description

The Solis S6 Hybrid series is designed for residential applications. The inverter can work with high-voltage lithium ion batteries to maximize self-consumption and provide backup power if the grid fails and there is not enough PV power to cover load demand.

This inverter can operate in both on-grid and off-grid applications.

The S6 hybrid series consists of the following inverter models: 3.8kW, 5kW, 7.6kW, 10kW, and 11.4kW. The 3.8-5K models are of a similar but different hardware platform than the 7.6-11.4K models. The inverter comes with an integrated rapid shutdown transmitter.

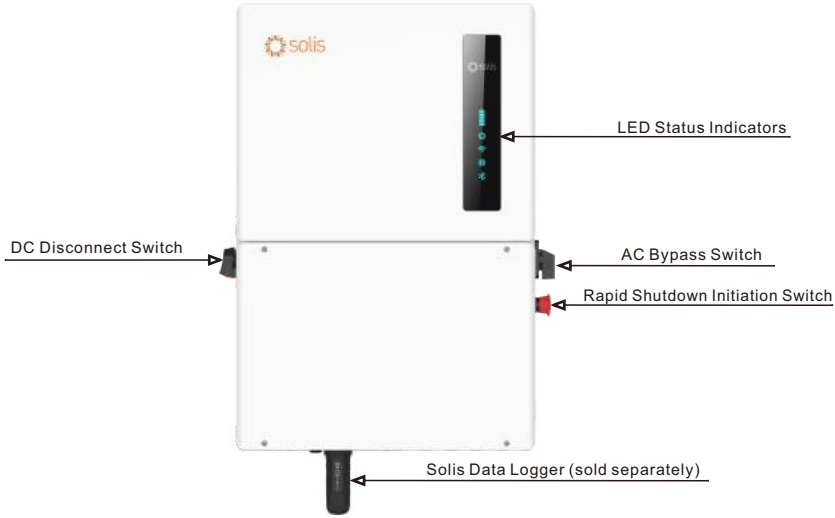


Figure 1.1 Frontal View

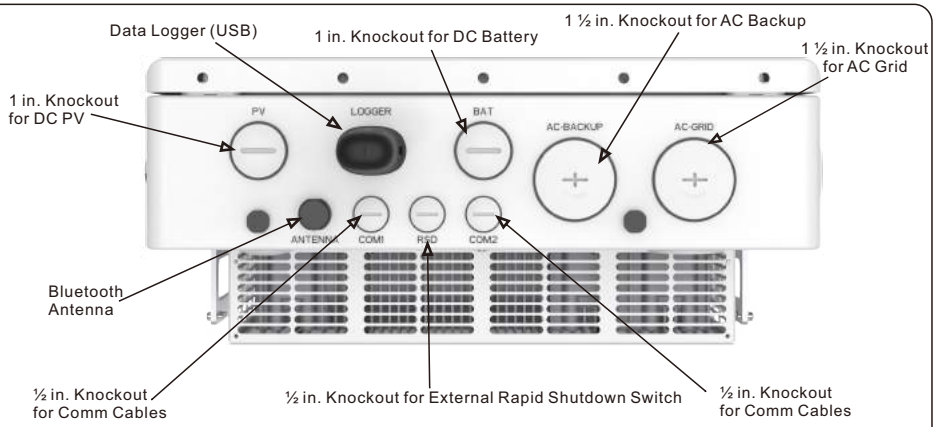


Figure 1.2 Bottom View (Wire Box)

1. Introduction

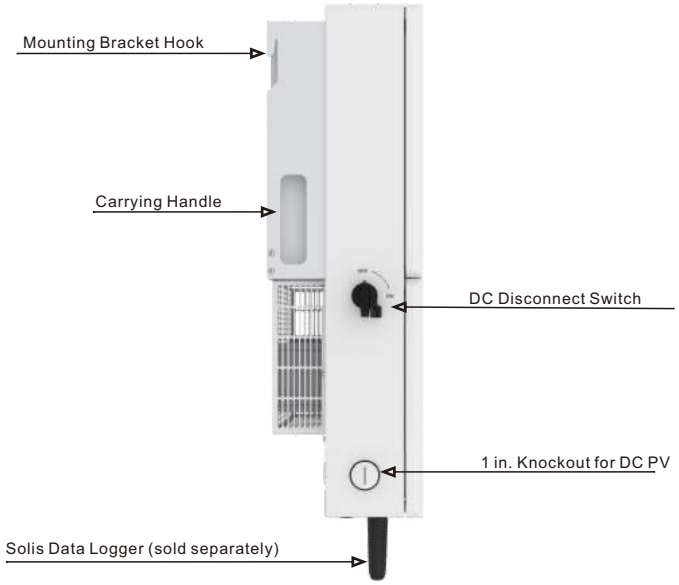


Figure 1.3 Right Side View

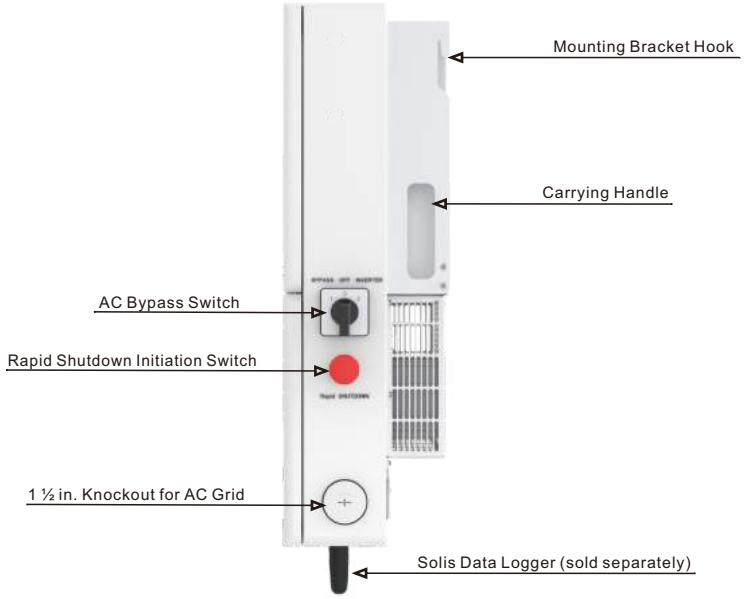


Figure 1.4 Left Side View

1. Introduction

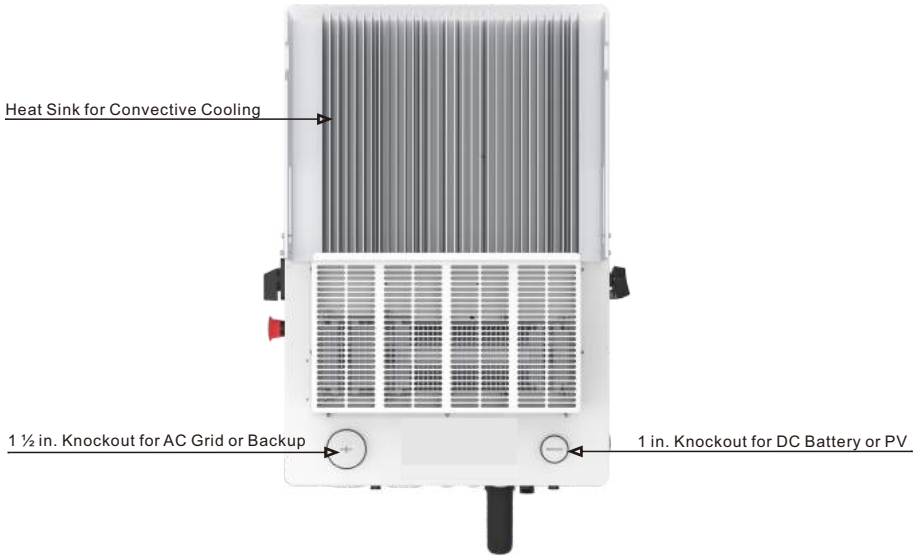


Figure 1.3 Back View

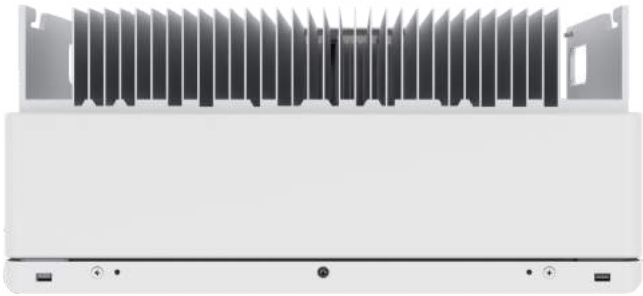


Figure 1.4 Top View

1.2 Components Included with the Inverter

If any of these items are missing, please contact your local Solis distributor or the Solis service team.


Inverter x1


Inverter Mounting Bracket x1


Stabilizing Set Screws x4


Install spare screws on the upper cover x2


Back mounting plate mounting screws x4


1/2 inch Cable Glands x3


External Energy Meter x1


Current Transformers x2


Terminal Pins x10


Terminal Pins x4


Torqx T20 Tool x1


RJ45 connector x3


Parallel communication Cable(2m) x1


Data loger x1 (Optional)

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

1.3 Tools Required for Inverter Installation


Technician Screwdriver


Torqx T20 Screwdriver


Wire Strippers 12AWG to 6AWG


Wire Strippers 20AWG to 10AWG


Torque Wrench Screwdriver


Channel Locks


Multimeter (AC/DC amps)


Drill and Impact Driver


Ratcheting Crimper


RJ45 Crimping Tool (for parallel inverter comms only)


Bubble Level


Smartphone (for commissioning)

1. Introduction

1.4 Inverter Storage

- If the inverter is not installed immediately, please abide by the storage instructions and environmental conditions listed 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 -40~158°F and humidity should be between 0 to 100%, non-condensing.
- Do not stack more than two (2) inverters high on a single pallet. Do not stack more than 2 pallets high.
- Keep the box(es) away from corrosive materials to avoid damage to the inverter enclosure.
- Inspect the packaging regularly. If packaging is damaged (wet, pest damages, etc.), repackage the inverter immediately.
- Store inverters on a flat, hard surface -- not inclined or upside down.
- Do not remove the desiccant packet that is included with the inverter. It is included to ensure that any residual moisture is absorbed quickly.
- 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.
- Perform an annual visual inspection of the inverter box for signs of damage
- If the inverter has been removed from the box and then replaced, put desiccant packets in the inverter wire box to ensure the internal components stay dry
- Do not store the inverter outside or in a place that does not have environmental controls.

2. Safety & Warning

2.1 Safety

The following types of safety instructions and general information appear in this document as described below:

DANGER

"Danger" indicates a hazardous situation which if not avoided, will result in death or serious injury.

WARNING

"Warning" indicates a hazardous situation which if not avoided, could result in death or serious injury.

CAUTION

"Caution" indicates a hazardous situation which if not avoided, could result in minor or moderate injury.

NOTE

"Note" provides tips that are valuable for the optimal operation of your product.

WARNING: Risk of fire

Despite careful construction, electrical devices can cause fires.

- Do not install the inverter in an area containing flammable materials or gases.
- Do not install the inverter in a potentially explosive atmosphere.

2.2 General Safety Instructions

WARNING

Only devices in compliance with SELV (EN 69050) may be connected to the RS485 and USB interfaces.

WARNING

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

WARNING

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

WARNING

Do not touch any internal parts until 5 minutes after disconnection from the utility grid, PV array, and battery.

WARNING

To reduce the risk of fire, over-current protective devices (OCPD) are required for all circuits connected to the inverter.
The DC OCPD shall be installed per local requirements. All photovoltaic source and output circuit conductors shall have isolators that comply with the NEC Article 690, Part II.
All Solis single phase inverters feature an integrated DC disconnect switch.

CAUTION

Risk of electric shock, do not remove the cover. There are no serviceable parts inside, refer servicing to qualified and accredited service technicians.

CAUTION

The PV conductors are energized with high voltage DC when the PV modules are exposed to sunlight.

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 is operating. The inverter must be installed out of direct sunlight exposure.

NOTE

PV modules used with inverter must have an IEC 61730 Class A rating.

WARNING

Operations must be accomplished by a licensed electrician or a person authorized by Solis.

WARNING

Installer must wear personal protective equipment during the entire installation process in case of electrical hazards.

WARNING

The AC Backup Port of the inverter cannot be connected to the grid.

WARNING

Please refer to the product manual of the battery before installation and configuration to the inverter.

Systems using this product shall be designed and built in accordance with the NEC & local electrical codes & standards.

2. Safety & Warning

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 be compliant with all local and national regulations & standards.

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

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

2.4 Notice for Disposal

This product shall not be disposed of with household waste.
It must be segregated and brought to an appropriate disposal facility to ensure proper recycling.

This it to be done in order to avoid negative impacts on the environment and human health.

Local waste management rules shall be observed and respected.

2.5 Protection Circuitry and Controls

To meet relevant codes and standards, the Solis U.S. single phase inverter line is equipped with protective circuitry and controls. These include Arc Fault Circuit Interrupter (AFCI) and Anti-Islanding Protection.

Arc Fault Circuit Interrupter AFCI:

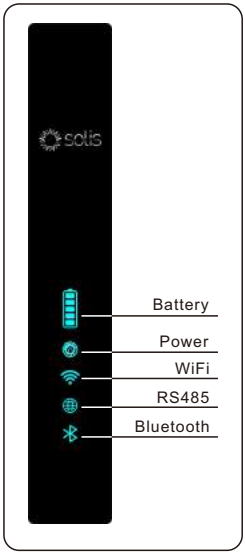
Edition 2011 of the National Electrical Code®, Section 690.11, requires that all PV plants attached to a building are fitted with a means of detecting and interrupting serial electric arcs in the PV wiring and array. An electric arc with a power of 300W or greater must be interrupted by the AFCI in the time specified by UL 1699B. After five arc fault detections in 24 hours, an AFCI-induced shutdown will be triggered. If this event occurs, the inverter must be manually reset. After clearing the source of the fault, the inverter can be powered back on and allowed to resume normal operation.

Anti-Islanding Protection:

Anti-Islanding is a condition where the inverter cease to produce power when the grid is not present. Circuitry, along with firmware, has been designed to determine if the grid is present by adjusting the output frequency of the inverter. In the case of a 60Hz resonant system where the inverter is partially isolated from the grid, the inverter programming can detect if there is a resonant condition or if the grid is actually present. It can also differentiate between inverters operating in parallel and the grid.

3.1 LED Indicator Lights

There are five indicator lights on the the Solis S6-EH1P(3.8-11.4)K-H-US Series Inverter: Battery, Inverter, Wi-Fi, RS485 and Bluetooth. These lights indicate the working status of the inverter.
The inverter creates a Bluetooth signal which is what the smart phone connects to so that the inverter interface page can be accessed. This is how commissioning and settings changes are performed.



Light	Status	Description
Battery	Blue Flashing every 3s	Battery discharging.
	Blue Flashing every 1.5s	Battery charging.
	Blue Solid ON	Idle.
	OFF	No Battery or not working.
Power	Blue Solid ON	Normally Operating.
	Yellow Solid ON	Warning.
	RedSolid ON or flashing every 3s	Alarm.
	OFF	No Battery or not working.
WiFi	Blue Solid ON	COM Port is using.
	OFF	COM Port is not used.
RS485	Blue Solid ON	RS485 Port is using.
	OFF	RS485 Port is not used.
Bluetooth	Blue Solid ON	Bluetooth Port is using.
	OFF	Bluetooth Port is not used.

Turning On the LED Indicator Lights

After a few minutes, the LED indicator lights will turn off to conserve power. To turn the lights back on, short-press the Inverter LED light.

Alarm State

When the inverter has an alarm, the Inverter LED light turns red and starts flashing. It is recommended to connect to the inverter with the Bluetooth tool. Then you can determine what the alarm code is.

NOTE:

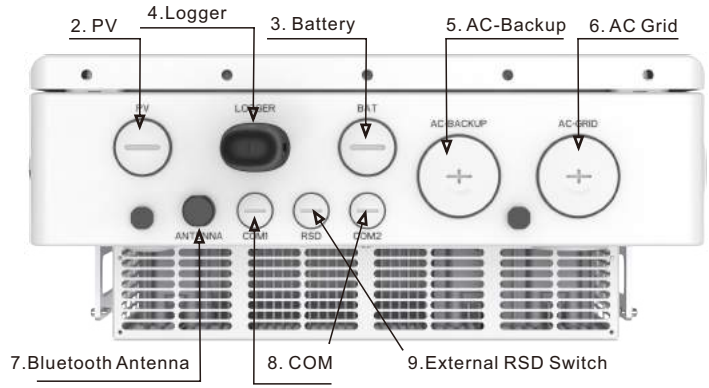
Battery/WiFi/Ethernet/Bluetooth indicators will automatically turn off after 1 minute. The Power indicator will remain on with lower brightness. Short press the Power indicator can wake up all indicators.

NOTE:

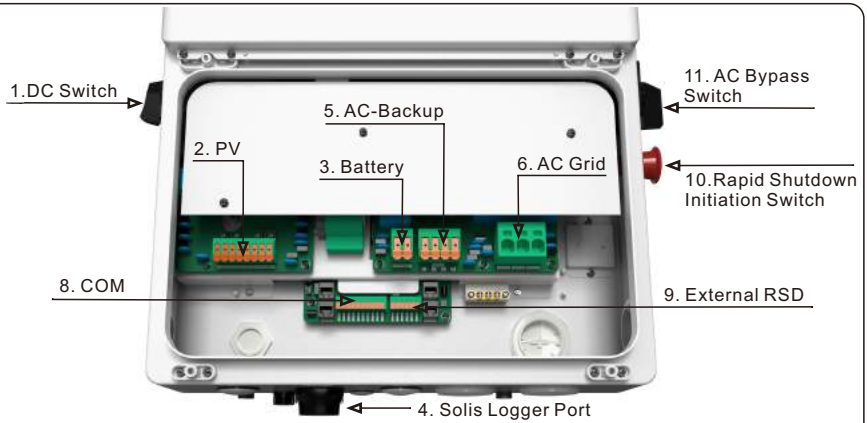
Long press the Power button for 5 seconds to reset the bluetooth connection passwords. If the reset is successful, the Power button will be flashing in Blue color and in 0.5s interval for 3s. If the reset is failed, the Power button will be flashing in Yellow color and in 0.5s interval for 3s.
If the reset is not successful, please contact the after-sales engineer for assistance in resetting the password.

3. Overview

3.2 Inverter Wire Box and Connection Points



Name	Description
1. DC Switch	This is the DC disconnect switch for the inverter
2. PV	Conduit and PV conductors should be connected here
3. Battery	Conduit for battery conductors should be connected here
4. Solis Logger Port	Solis USB data loggers are to be connected here
5. AC-Backup	Conduit for AC conductors to backup loads panel should be connected here
6. AC-Grid	Conduit for AC conductors to the main service panel should be connected here
7. Bluetooth Antenna	Extends the range of the inverter Bluetooth signal (for system commissioning)
8. COM1/COM2	RS 485 and CAN communication cables should use these knockouts and terminals
9. External RSD	An external RSD switch can be added and connected to the inverter here
10. Rapid Shutdown Switch	Turns off the internal transmitter which initiates module level rapid shutdown
11. AC Bypass Switch	Allows the inverter to pass power through from the grid (main service panel) to the backup loads directly in the event of an inverter failure.



4. Operating Modes

4.1 PV-Only

4.1.1 Grid-Tie PV String Inverter

The S6 hybrid can function as a grid-tie PV string inverter with no battery. It will use PV power to supply the home loads while the grid is active. The inverter does have export power control so it can be programmed to sell the excess power back to the grid. Whenever there is not enough PV power to cover the load demand, power will be imported from the utility to cover the deficit. If the grid fails or is inactive, the inverter will not be able to supply any PV power to the home loads.

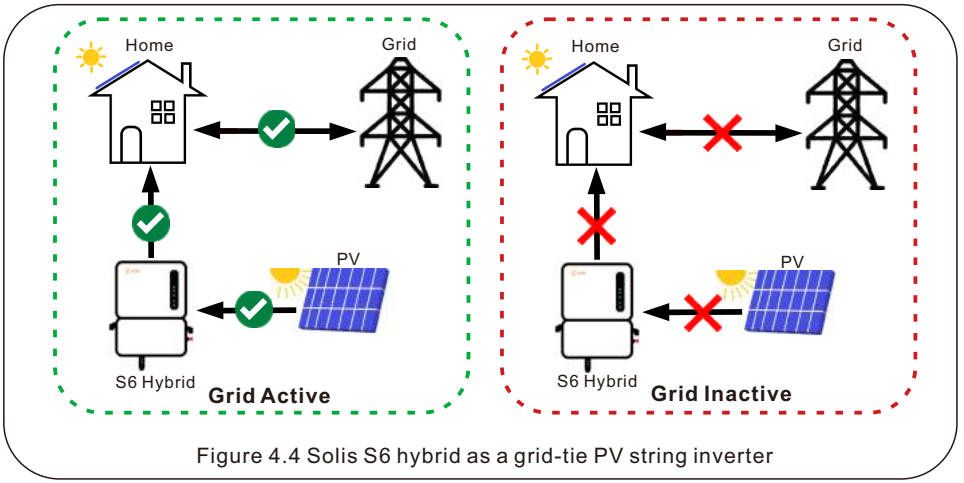


Figure 4.4 Solis S6 hybrid as a grid-tie PV string inverter

4.1.2 Export Power Control

The inverter offers the ability to manage export power. During the system commissioning process, export power control can be enabled. An export power limitation can then be set to the desired kW value. The inverter will then regulate how much power gets sold back to the utility company.

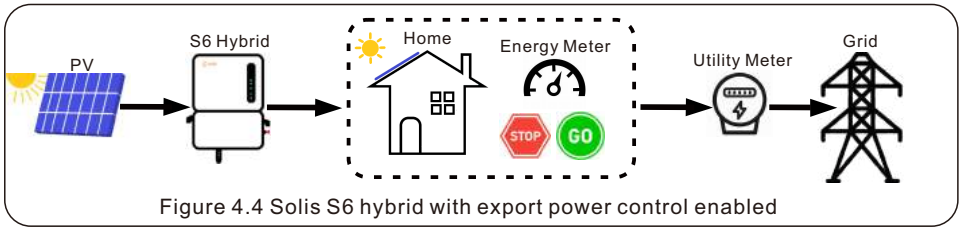


Figure 4.4 Solis S6 hybrid with export power control enabled

Each Solis S6 hybrid comes with an energy meter, which gets installed externally to the inverter. The energy meter uses two CTs, which measure the power being consumed by the home. The hybrid uses the data from this meter to determine whether or not it needs to curtail the PV power to meet the export power limitation. Export power control can be enabled with or without a battery installed.

Zero-Net Export

The inverter can be set to not export any power to the utility. This does not end up being zero export as there is some power that leaks back to the utility each time there is a change in load demand. However, the *net import/export* will be near zero kWh each day when programmed for zero export.

4. Installation

4.2 Energy Storage

4.2.1 Overview of Energy Storage Modes

The S6 hybrid is capable of providing AC power to home loads using PV and battery power in the event of a grid failure. This is known as **backup power**. The amount of backup power that each S6 hybrid model can provide is equal to the amount of on-grid power that it can provide. For example, an 11.4K model can provide up to 11.4K of continuous backup power.

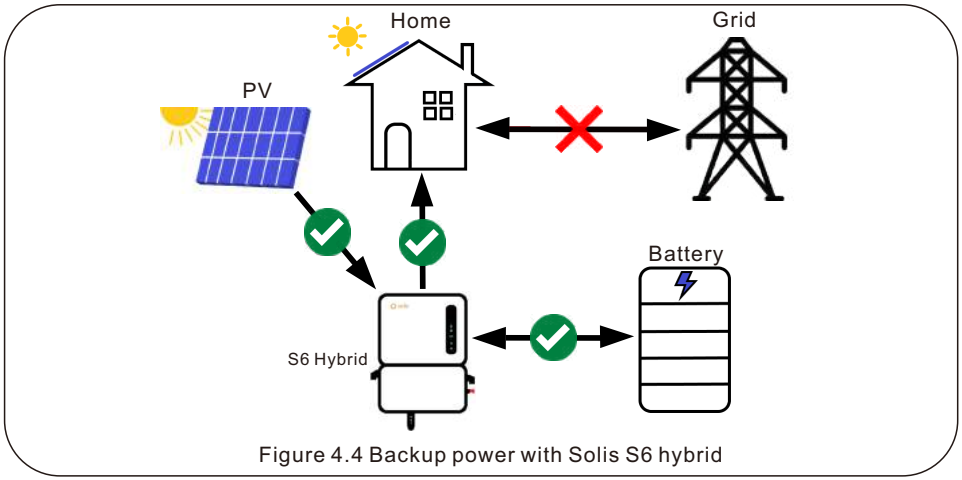


Figure 4.4 Backup power with Solis S6 hybrid

If the primary purpose of the energy storage system is to store as much of the PV power as possible so that it can be used later to offset the usage of grid power, this is known as energy arbitrage. *Time-of-use*, *self-consumption*, and *peak-shaving* are all examples of **energy arbitrage.** Typically, the battery will cycle daily as it charges with PV and discharges to cover home load demand.

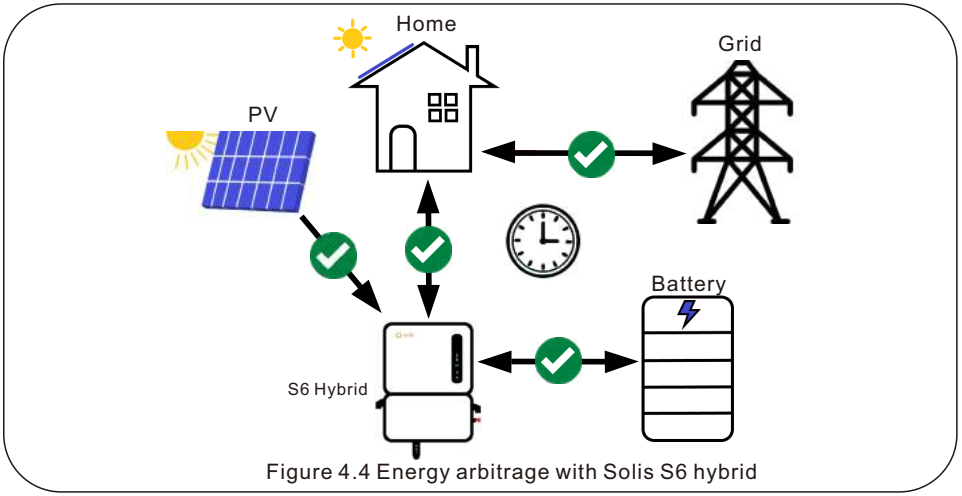


Figure 4.4 Energy arbitrage with Solis S6 hybrid

4. Installation

The S6 hybrid can also operate in an entirely remote system where there is no grid present at all. This is called **off-grid** and it is very similar to backup in that the inverter will supply AC power to the loads with PV and battery power only. However, backup mode is only for grid-connected systems. The inverter is not able to provide off-grid/backup power with only PV, a battery is required.

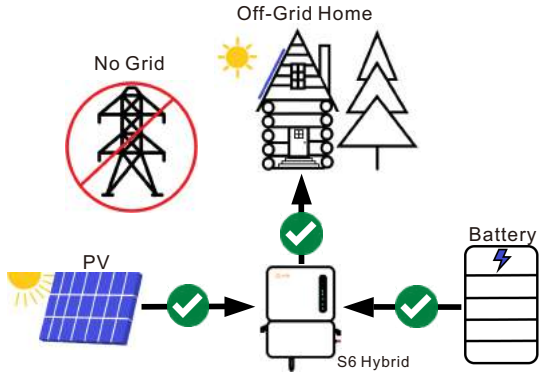


Figure 4.4 Off-grid power with Solis S6 hybrid

4.2.2 Backup Power

This inverter is capable of providing AC power to home loads using PV and battery power in the event of a grid failure. When the inverter senses that the grid power has been lost, it automatically opens the relay connecting itself to the grid. It keeps the relay closed for the backup side, allowing it to supply AC power to the home loads as long as power is available. The loads that are to be backed up will need to be located in a load center that is electrically isolated from the utility point-of--connection to ensure that the anti-islanding requirement remains unviolated. The inverter will automatically reconnect to the grid once it senses that power is restored.

Partial-home backup systems should only have the ***light loads*** backed up. This ensures that the battery does not deplete too quickly, allowing the PV power generated to balance the load demand. Light loads include lights, TVs, computers, routers, and most things that can plug into an outlet.

Whole-home backup systems can have all home loads backed up, including the ***heavy loads***. However, enough PV, battery, and (or) generator power must be available to meet the high current demand of the heavy loads. It is recommended to oversize the system for the needs of the owner.

NOTE:

IG follow is turned off by default, and the switching time can reach 10ms when turned on.

Step: Tool-local configuration - connect with Bluetooth - select the inverter - Advanced setting - Special Functions Setting 1- Ig follow - enable

4. Installation

The homeowner will need to be consulted to understand why they are installing a battery. It should also be determined how much power is consumed, how much power the PV will generate, how much storage power there will be, and which loads are to be backed up in the event of a power outage (grid failure). If the homeowner says that they want mostly everything backed up, this is considered **whole-home backup**. If they are willing to live with just a few key things such as the fridge, lights, and outlets, this is **partial-home backup**. Examples are shown in the pages ahead.

For a whole-home backup system, the average daily power consumed should be less than or equal to the average daily PV power produced over the span of a year. Otherwise, it is suggested to add additional PV or exercise load control (load shedding).

4.2.3 Energy Arbitrage

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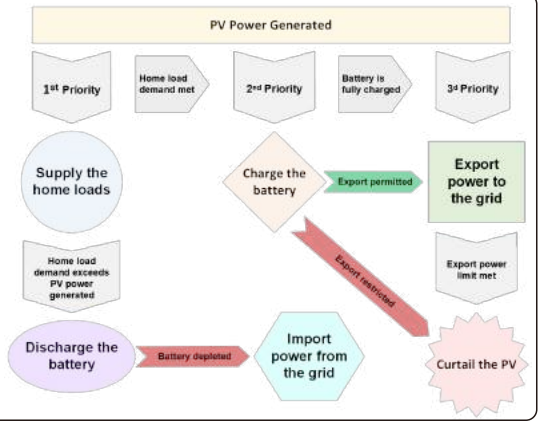
The S6 hybrid inverter has multiple operating modes which can be programmed so that the performance of the system is tailored to the specific needs of each individual system owner. The backup power function of the inverter can be enabled or disabled independently of the energy arbitrage modes. The inverter provides three operating modes for energy arbitrage:
(1) Self-Use (2) Peak-Shaving (3) Feed-in-Priority

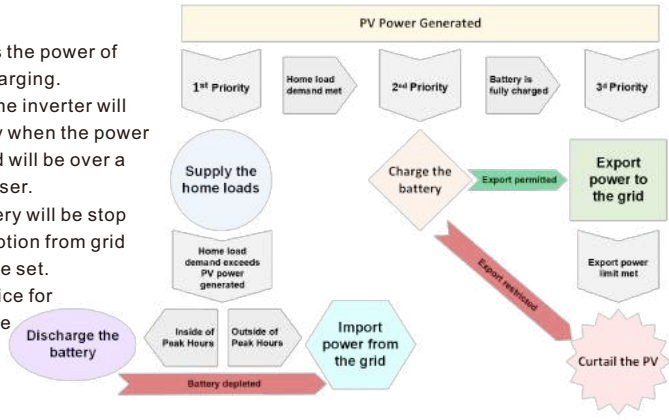
Self-Use

Self-Use is the default mode for this inverter. The system will first supply the home loads. Any excess PV power gets stored in the battery. If the battery is fully charged, the remaining power can be exported if the system is configured to allow it. Self-consumption is optimal for those who want independence from the grid and to be as self-sufficient as possible. Adequate PV and storage should be installed for this mode to be most effective.



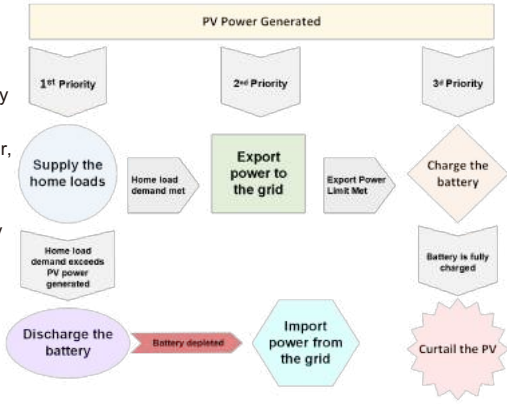
Peak-Shaving

Peak-shaving Mode limits the power of grid and the battery discharging.
With this working mode, the inverter will discharge the battery only when the power consumption from the grid will be over a certain value, set by the user.
The discharge of the battery will be stop any time the power absorption from grid will be lower than the value set.
This mode is the best choice for those who want to stabilize the amount of electricity from the grid and save electricity costs.



Feed-in-Priority

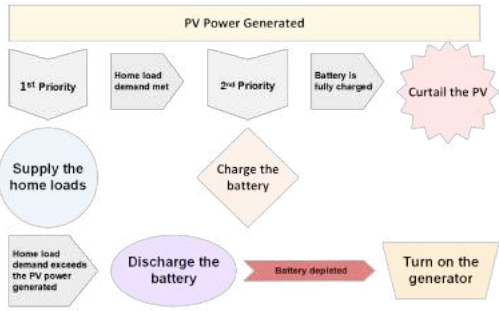
This mode can be thought of as export priority mode. The system will first supply the home loads with PV power and then it will seek to export the excess PV power, up to the set limit. Once the limit is reached, the remaining power will be stored in the battery. If the battery is fully charged, the PV will at that point be curtailed. This mode is for those who receive an equal rate for power exported or who have a much higher ratio of PV power generated to power consumed.



4.2.4 Off-Grid

There is a dedicated mode specifically for off-grid remote systems which are not electrically connected to the grid at all, such as a cabin in the woods. This mode is not to be confused with backup mode,which occurs only for grid-connected systems.

The logic for Off-Grid mode is the same as Self-Use mode. However, there is no export power control and a generator is often used in place of the grid to supplement the PV and batteries. When the generator is turned on by the generator, the PV production is temporarily suspended as to not backfeed the generator. The inverter will use generator power to supply loads and recharge the battery.



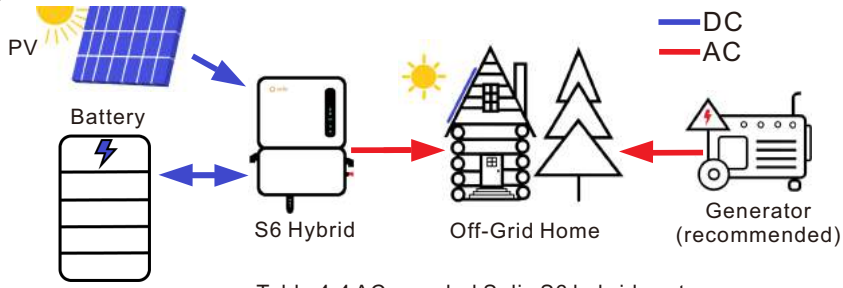


Table 4.4 AC-coupled Solis S6 hybrid system

4.2.5 AC-Coupling

The Solis S6 hybrid can be AC-coupled or DC-coupled to a home. AC-coupled means that the energy storage is connected to the AC-side of the system. Typically, the battery and inverter pair are connected in parallel with an existing PV system. The battery will charge with PV power that gets converted from DC, to AC, and then back to DC again. When AC-coupling with the S6 hybrid, new PV can either be added or not be added to the S6 hybrid, it is up to the system designer. The hybrid would just need to be installed with a compatible high-voltage battery and then be connected to the home load center in parallel with the existing PV system.

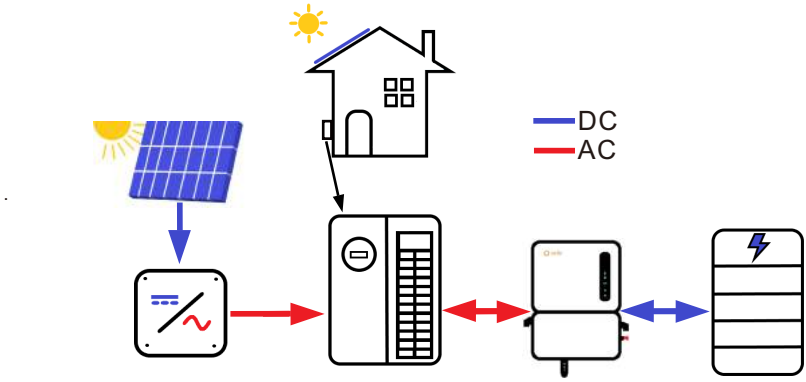


Table 4.4 AC-coupled Solis S6 hybrid system

AC-Coupling for Energy Arbitrage (No Backup Power)

The inverter with a compatible battery can be installed on a home with or without an existing PV system. The system can be programmed to charge during the day with AC power from the PV and then during peak hours or whenever there is not enough PV, the battery will discharge to cover the load demand and reduce the amount of power imported from the utility. In this case, the backup and PV functions of the inverter would not be used. Additional PV can be added to the home and then connected to the S6 hybrid inverter, but it is not required for this type of AC-coupled application.

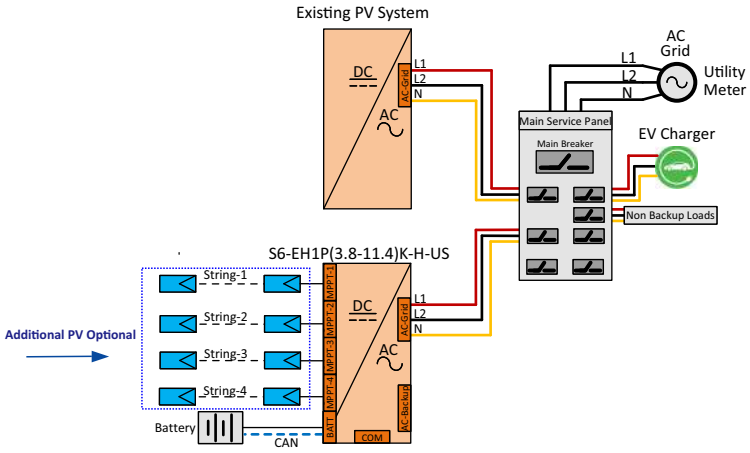


Figure 4.17 AC-coupling with an existing PV system and no backup power

4. Installation

AC-Coupling for Backup Power & Energy Arbitrage

The S6 hybrid is able to provide backup power when AC-coupled. However, an additional load center will need to be installed and connected to the backup ports of the S6 hybrid. Then, loads will be need to be relocated from the existing main load center into the backup load center. *The backup ports of the S6 hybrid cannot be connected to the main service panel because this would violate the anti-islanding requirement*. Please see the diagram on page **27** for more details. In this case, the system will perform energy arbitrage and provide backup power if grid power is lost.

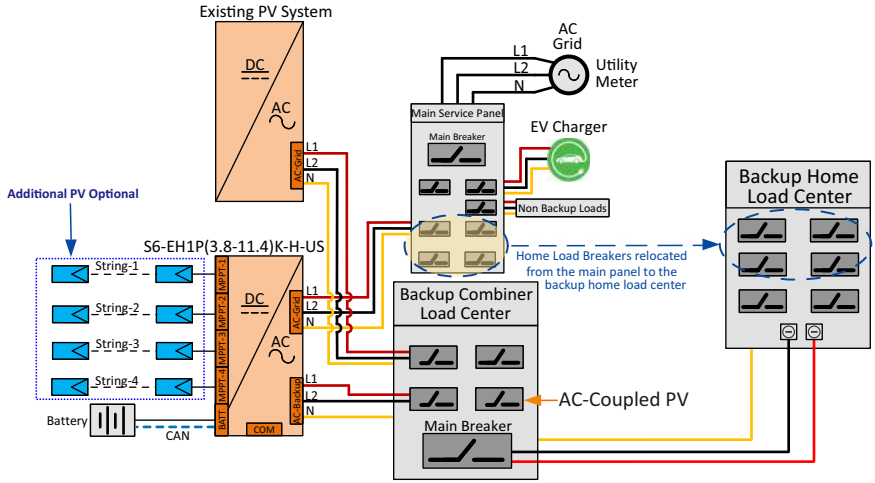
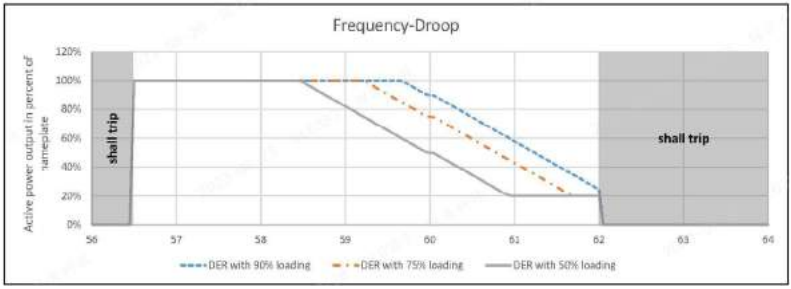


Figure 4.18 AC-coupling with an existing PV system for backup power & energy arbitrage

Frequency-Watt Shifting

Another PV system can be AC-coupled in parallel on the backup side. If the grid fails, the S6 hybrid will act as the grid to keep the AC-coupled PV system operating. If the amount of available PV power exceeds the amount of power consumed in backup mode, the S6 hybrid will shift the AC frequency just enough to turn off the AC-coupled PV system. This is frequency-watt shifting.

The inverter uses frequency-watt shifting in order to modulate the output power of AC-coupled PV systems. **The frequency derating (droop) curve is based on the IEEE 1547-2018 standard**. The AC-coupled PV system must also support frequency-watt shifting based on IEEE 1547-2018. If the AC-coupled PV system cannot or does not support this function, then the system will shut off as the Solis S6 hybrid shifts the frequency.



4. Installation

4.2.6 DC Coupling

DC-coupling is the recommended configuration for this inverter. This is because DC-coupling allows the full potential of this inverter to be utilized, maximizing the efficiency of the PV-to-battery charging.

In a DC-coupled system, the PV also gets connected to the inverter in addition to the battery. The inverter will charge the battery directly with DC power from the PV. Typically, DC-coupling is done when additional PV is being added or when the system is new and being installed with energy storage.

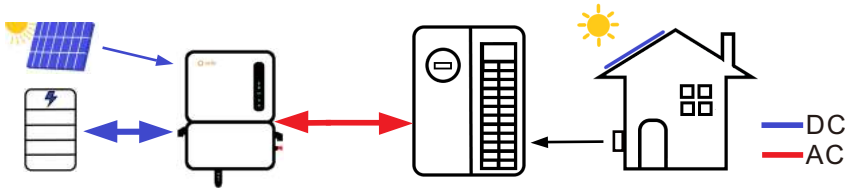
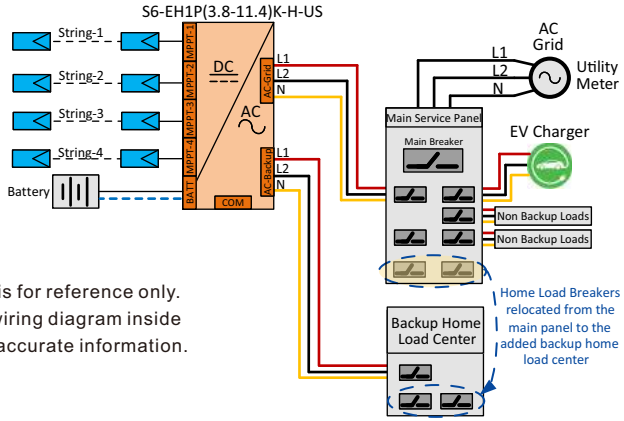


Table 4.5 DC-coupled Solis S6 hybrid system

Whole-home and partial-home back up can be achieved with DC Coupling. Depending on the battery model, the S6 hybrid can connect with between 10 and 150kWh of stored power to provide in backup mode or for energy arbitrage. It is recommended to determine how much average PV power will be available and what the average power consumption is to understand how long the battery will last in the event of a grid outage. The battery discharge power can be limited to ensure the battery drains more slowly. If the backup power demanded exceeds what is available, the inverter will display an alarm code and will shut down for a few minutes.



NOTE:

The diagram above is for reference only. Please refer to the wiring diagram inside the junction box for accurate information.

Figure 4.16 Partial-home backup with one S6 hybrid inverter

Warranty Warning:

Installations that fail to comply with the wiring method shown in wiring box will void the Solis US warranty and any damage caused by improper wiring will not be covered.

Whole-Home Backup

To achieve whole-home backup, the system must be configured such that all of the home loads are backed up in the event of a grid failure. It must be determined what the maximum continuous current should be in order to meet the needs of the home. Two S6 hybrid inverters can be installed in parallel with PV and batteries to provide even more continuous backup power. This may be enough for whole-home backup but it might not be, every home will have different needs.
A generator can also be added in order to supplement power and so can an AC-coupled PV system. All of the home load breakers will need to be located in a load center that is electrically isolated from the grid-side of the system. This may mean relocating breakers into a new load center.

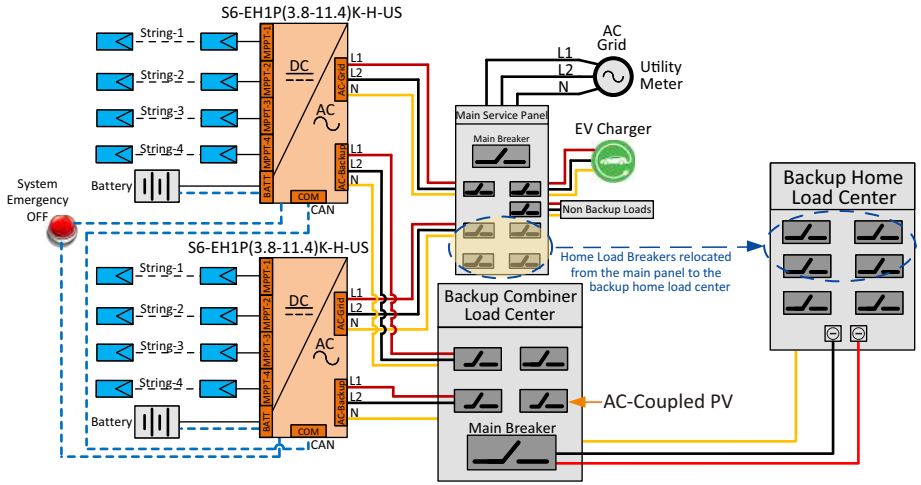


Figure 4.17 Whole-home backup with multiple inverters and a generator

Retrofitting an Existing PV System for Energy Storage

The S6 hybrid inverter could be used to retrofit an older PV system with energy storage. The old PV inverter would need to first be removed. The Solis S6 hybrid would then be installed in place of the old inverter. The PV would connect to the S6 inverter directly, provided the specifications of the PV strings are within the tolerance ranges of the Solis S6 hybrid inverter.

Overcurrent protection device and load center sizing shall be done in accordance with the NEC and local electrical codes and standards.

Backup Power with PV Only:

A battery is required for backup power. If only PV is installed, this inverter is not able provide backup power when the grid is down. However, the inverter is able to supply backup power with a battery only and no PV. The inverter with a battery can be AC-coupled to an existing system without directly connecting any PV to the inverter. The inverter can serve as the grid to keep the existing PV system operating, only if paralleled on the backup side.

5.1 Select a Location to Install the Inverter

When selecting a location for the inverter, the following criteria should be considered:

- Exposure to direct sunlight may cause output power derating due to overheating
  It is recommended to avoid installing the inverter in direct sunlight. The ideal location is one where the ambient temperature does not exceed 40°C (140°F)
- It is also recommended to install the inverter somewhere the rain and snow will not land directly on it. The ideal installation location is on a north-facing wall under an eave.

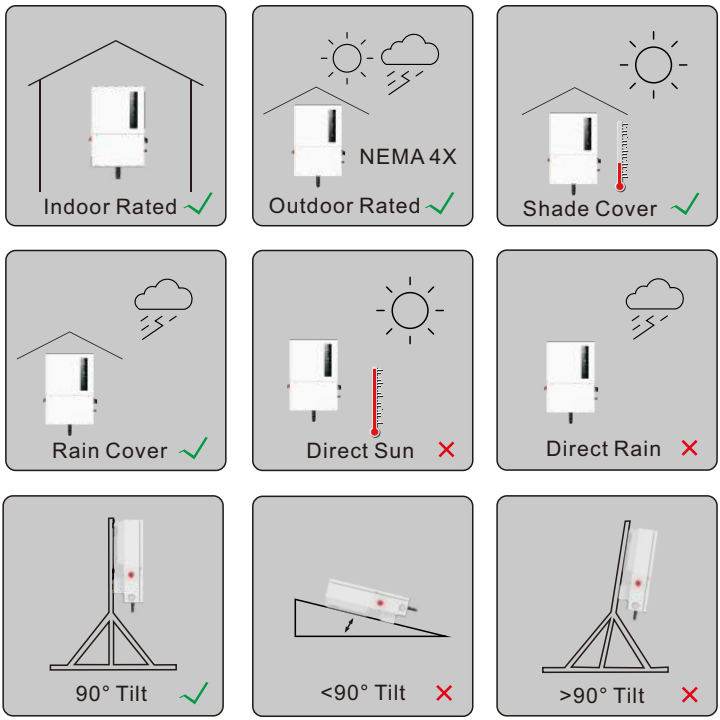


Figure 5.1 Recommended Installation locations

WARNING: Risk of fire

Despite careful installation, electrical equipment can cause fires.

- Do not install the inverter in an area containing flammable materials or gases.
- Do not install the inverter in a potentially explosive environment.
- The structure where the inverter is being mounted must be fireproof.

5. Installation

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

WARNING: Risk of fire

Despite careful construction, electrical devices can cause fires.

- Do not install the inverter in areas containing highly flammable materials or gases. Keep the inverter out of reach of children if children may be present.
- Do not install the inverter in potentially explosive environments.

CAUTION: Hot Surface

- The temperature of the inverter heat sink can reach 167°F. Do not touch the heat sink while the inverter is operating.

The ambient temperature and relative humidity of the installation environment should meet the following requirements:

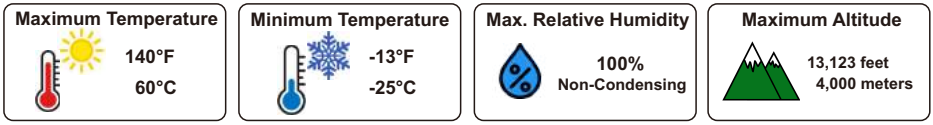


Figure 4.2 Installation environment conditions

Load bearing structure requirements:

Made of nonflammable materials

Max. load bearing capacity ≥ 4 times of inverter weight

Figure 4.3 Load bearing structure

5.1.1 Clearances

- If multiple inverters are installed on site, a minimum clearance of 12 inches should be kept between each inverter and all other mounted equipment. The bottom of the inverter should be at least 20 inches above of the ground or floor (see Figure 4.5 on page 12).
- The LED status indicator lights located on the inverter's front panel should not be blocked
- Adequate ventilation must be present if the inverter is to be installed in a confined space.

5.1.2 Consult technical data

- Consult the technical specifications sections at the end of this manual for additional environmental condition requirements (temperature range, altitude, etc.)

5.1.3 Angle of installation

- This model of Solis inverter must be mounted vertically (90° degrees not greater or less than 90° degrees straight up).

5.1.4 Avoiding direct sunlight

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

Direct exposure to sunlight could cause:

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

5.1.5 Air circulation

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

5.1.6 Flammable substances

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

5.1.7 Living area

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

5.2 Product Handling

Please review the instruction below for handling the inverter:

1. The red circle below denotes the carrying handle cutout on the inverter box. Push in the cutouts on both ends of the box to form handles for moving the inverter (see Figure 4.4).

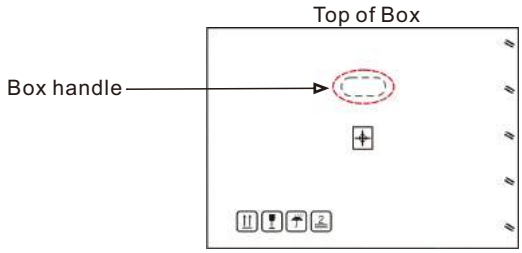


Figure 4.4 Handles for moving the inverter shown circled in red - one per side

2. Two people are required to carry and move the inverter while it is in the box.

3. When removing the inverter from the box, two people must use the handles integrated into the heat sink. (see Figures 1.3 and 1.4 on page 2)

4. When setting the inverter down, do it slowly and gently. This ensures that the internal components and the outer chassis do not take any damage.

4. Installation

5.3 Mounting the Inverter

- Mount the inverter on a wall or structure capable of bearing the weight of the machine
- The inverter must be mounted upright on a vertical structure with a tilt of 90°. A tilt greater or less than 90° may cause the inverter output power to derate.
- To prevent overheating, be sure that the inverter has adequate air flow around it. A minimum clearance of 12 inches (305mm)should be kept between inverter & other equipment. 20 inches (508mm) of clearance between the bottom of the inverter and the ground.

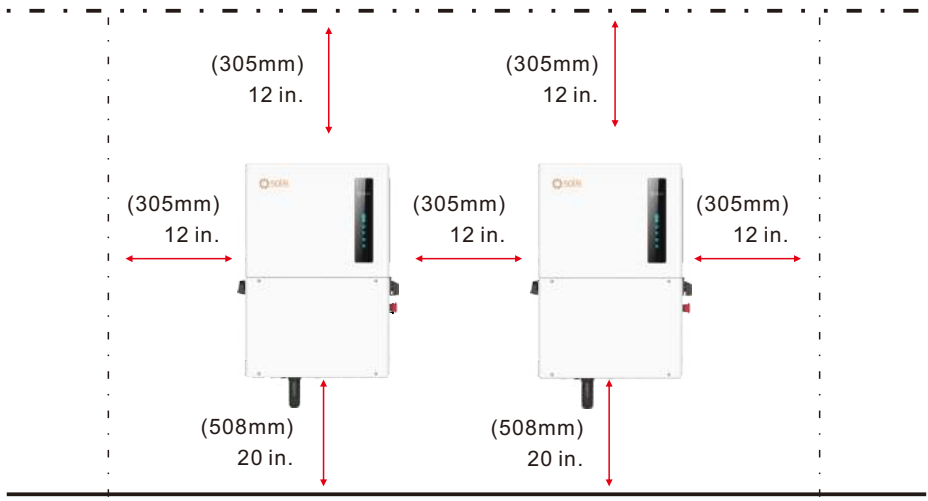


Figure 4.5 Inverter Mounting Clearances

- Visibility of the LED indicator lights should be considered. Ideally, the indicator light should be at eye-level.
- Adequate ventilation around the inverter must be provided.

NOTE:
Nothing should be stored directly on top, underneath, or against the inverter.

- When the inverter is mounted on the wall, it sticks out approximately 9.5 inches. Keep this in mind when selecting the installation location for the inverter.
- The exact dimensions of the inverter and the mounting bracket are on the next page.

NOTE:
The inverter does not come with any fasteners. You must provide your own hardware for securing the mounting bracket to the mounting structure.

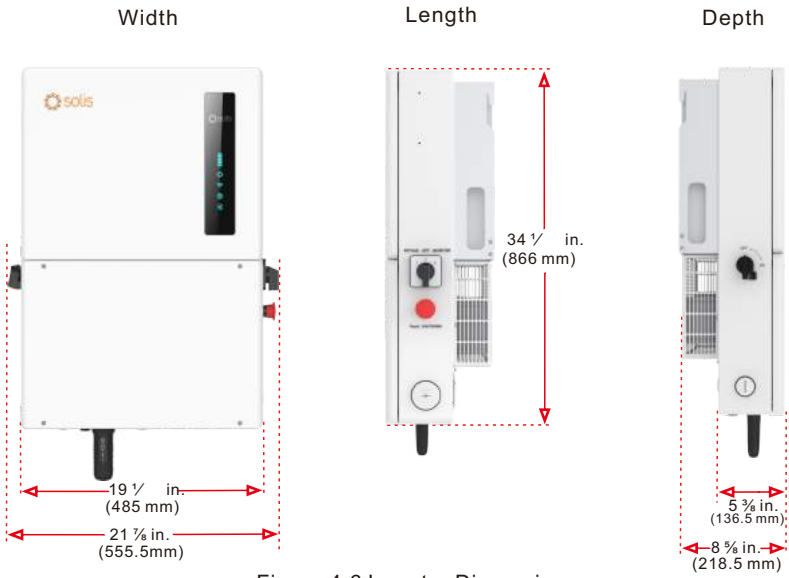


Figure 4.6 Inverter Dimensions

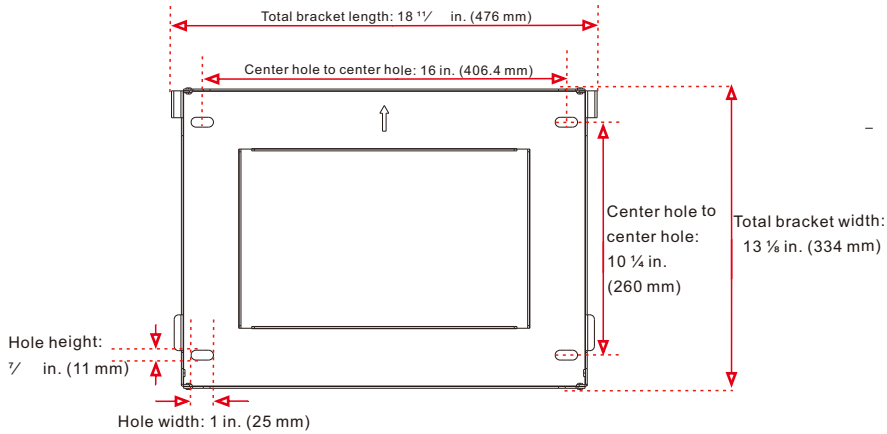


Figure 4.7 Inverter Bracket Dimensions

Once a suitable location has been found according to 4.2 and 4.3, use figures 4.6 and 4.7 to mount the bracket to the wall. You may drill additional holes in the bracket if you need to. The steps to mount the inverter are listed below:

1. Place the bracket on the wall and use a bubble level to make sure it is level. The arrow in the middle of the bracket points up. With a pencil or marker, mark the mounting holes. Use a drill to prepare the holes for fasteners. Fasten the bracket to the wall.

5. Installation

NOTE:
The inverter must be mounted vertically at a 90° angle.
Four fasteners must be used to ensure the bracket does not come off the wall. At least two must embed in a wall stud to bear the inverter weight.

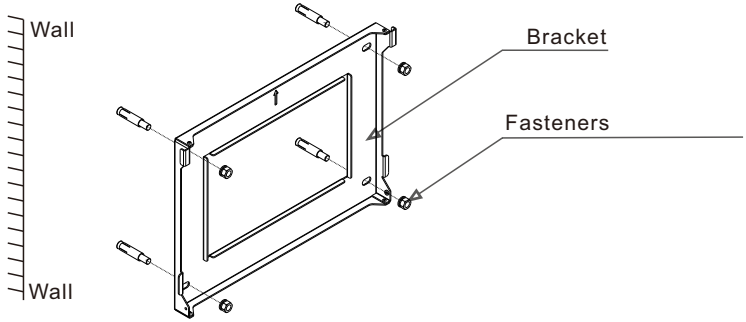


Figure 4.8 Fix the bracket to the wall

2. Lift up the inverter and align the back two hooks on the heat sync with the two tabs on the inverter mounting bracket. Lower the inverter hooks down onto the mounting bracket tabs and ensure the hooks have a solid bite before releasing the inverter. Then install the two set screws that are included with the inverter for stabilization. (see Figure 4.9)

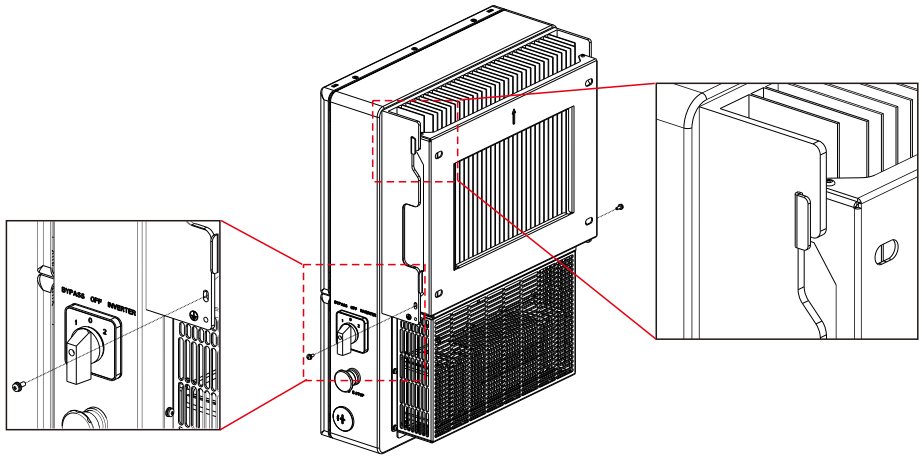


Figure 4.9 Inverter on mounting bracket and set screws

WARNING:
The inverter is very heavy. Please use proper lifting techniques to avoid potential injury. It is recommended that two people lift the inverter.

5.4 Inverter Wiring Overview

	Purpose	Connection Points
PV Cables	PV DC connection to the inverter	From the PV array to the DC+ and DC- terminals in the inverter
Battery Cables	Battery DC connection to the inverter	From the battery (+) and (-) terminals to the inverter BAT+ and BAT- terminals
AC Grid Cables	Inverter AC connection to the main service panel	From the OCPD in the main service panel to the AC-GRID L1 and L2 terminals
AC Backup Cables	Inverter AC connection to the backup subpanel	From the backup loads subpanel OCPD to the inverter AC-BACKUP L1 and L2 terminals
Ground Cables	Grounding conductors for the system	From the main service panel ground bar to the ground bar inside the inverter wire box
Meter RS 485 cable	Communication between inverter & meter	From meter to terminal Meter_A and Meter_B. For more details, refer to figure 4.2.2 Installing the energy meter
Battery CAN cable	Communication between the inverter & the battery	From battery to terminal CAN-L and CAN-H. For more details, refer to figure 4.2.3 Installing the battery
Data Logger (Optional)	Monitoring of the system on SolisCloud	USB COM port at the bottom of the inverter (For more details, please refer to the Solis data logger product manual)

Table 4.1 System Cable Connections

Conductor, conduit, and overcurrent protection device sizing shall be done in accordance with the NEC and local electrical codes & standards.

The Appendix section of this manual contains single-line wire diagrams that show how the equipment interconnects. Please use the single-line diagram when planning the conduit paths and determining the wire requirements.

5. Installation

5.5 External Grounding

An optional external ground connection point is available on the right side of inverter.
The internal ground bar is grounded to the inverter chassis.

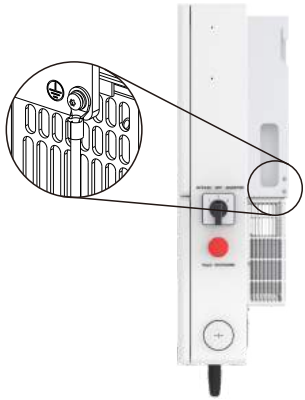


Figure 4.10 External Grounding Conductor Terminal Location

To connect the grounding terminal on the heat sink, please follow the steps below:
1. It is recommended to use copper wire for the chassis ground. Either solid conductor or stranded wire is acceptable. Refer to local code standard for wire sizing.
2. Strip ½ inch of insulation off the end of the ground cable (see Figure 4.7)

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

3. Crimp a ring terminal onto the ground cable with a ratcheting crimp tool
4. Connect the cable to the ground terminal screw and then tighten it with a torque wrench screwdriver to 2N.m.

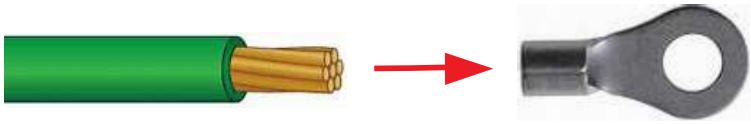


Figure 4.11 External Grounding Conductor Ring Terminal

5.6 PV Cable Installation

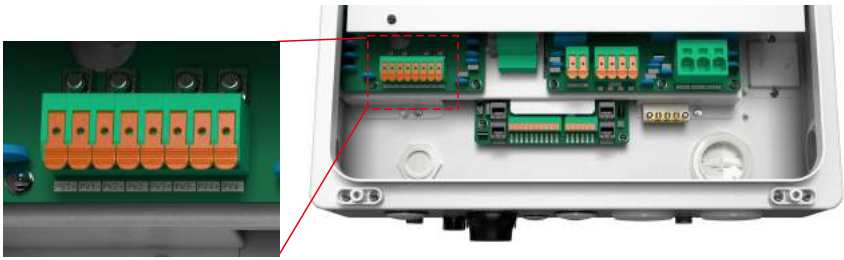
DANGER:

Before installing the PV cables, be sure that the PV array is disconnected. Use a multimeter to verify that the PV string voltages are 0V before proceeding. If rapid shutdown is being used, then under 30Vdc per string is safe.

Please verify the following before connecting the PV strings to the inverter:

- Ensure the DC voltage of the PV strings will not exceed the maximum DC input voltage (600Vdc). Violating this condition will void the inverter warranty.
- Ensure the polarity of the PV strings are correct (ex: positive is positive).
- Ensure the DC-switch, battery, AC-BACKUP, and AC-Grid OCPDs are all off.
- Ensure the PV resistance to ground is higher than 20K ohms.
- Ensure that the Isc of the strings will not exceed the maximum DC input current.

Note: Each PV string input is a separate MPPT



1. Strip ½ inch of sheath off the ends of each PV cable.
2. Pull up on the orange lever above the PV terminal, this opens the terminal gate.
3. Insert the end of the PV cable into the now open terminal.
4. Release the orange level and the terminal gate will clamp down on the PV cable.
5. Give the PV cable a gentle tug test to ensure that the connection is tight.
6. If the connection feels loose, repeat steps 1-5 again but push the cable deeper into the terminal before releasing the lever.

Figure 4.12 PV Cable Connection

CAUTION:

If the DC conductors are accidently connected in reverse or if the inverter is not working properly, do NOT turn off the DC switch. Otherwise, it may cause a DC arc and damage to the inverter or a fire.

The steps for corrective actions are as follows:

*Use a DC amp clamp multimeter to measure the DC string current.

*If the current is above 0.5A, please wait for the irradiance on the PV array to diminish until the current drops below 0.5A.

*Once the current is below 0.5A, you are allowed to open the DC switch and and then disconnect the PV strings from the inverter.

* In order to completely eliminate the potential for failure, leave the PV strings disconnected until the cause of the reverse polarity is corrected.

5.7 Rapid Shutdown

5.7.1 Integrated Rapid Shutdown

Important Note

The inverter comes (optional) with an internal rapid shutdown transmitter. This transmitter brand must match the receivers that are being installed with the PV modules. **Not abiding by this will void the inverter warranty.**

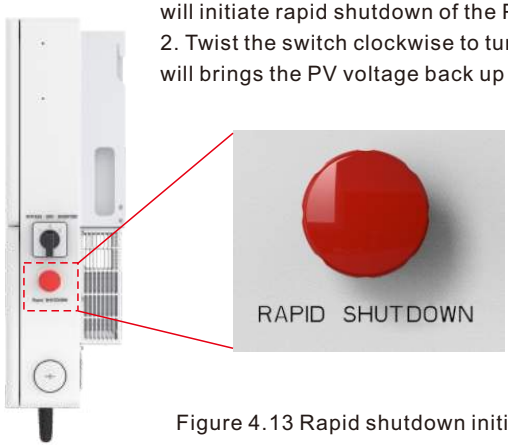
How the inverter achieves module-level rapid shutdown:

The internal transmitter generates a PLC signal when it receives AC power. This signal travels up the PV strings to the receivers that are connected to the PV modules. When the receivers get this signal, they turn on and allow the string voltage to ramp up. When the receivers lose this signal, they turn off. When the receivers are off, each PV module only puts out around 0.6Vdc.

The red "Rapid Shutdown (RSD E-Stop) switch disables the internal transmitter

Rapid Shutdown Initiation Process

1. Press the switch button in to turn off the internal transmitter. This will initiate rapid shutdown of the PV (ramps the PV voltage down)
2. Twist the switch clockwise to turn the transmitter back on. This will brings the PV voltage back up to normal.



Note:

Rapid shutdown will only initiate if receivers have been installed on the PV modules.
Without the receivers, rapid shutdown is not possible.

Figure 4.13 Rapid shutdown initiation switch and process

Additional Details About Rapid Shutdown

1. With rapid shutdown receivers installed, the PV string voltages should be very low. Depending on the receiver type, you should be measure between 0.6 and 0.7Vdc per module. Example: x10 modules = 6V-7V for the whole string
2. If the PV string voltages are low, check that the AC breaker is turned on so that the inverter is getting AC voltage and that the rapid shutdown switch is popped out. Give the switch a twist clockwise to verify that is popped out.
3. The DC switch does not have to be turned on for the receivers to receive the PLC signal from the internal transmitter. However, if an external DC switch is installed, ensure that it is turned on or else the receivers will not be able to get the PLC signal from the transmitter.

Please see the Compatibility Sheet for details on which internal transmitter options are currently available for the Solis S6 hybrid inverter.

5.7.2 External Rapid Shutdown

If the inverter is being installed where it is inaccessible to first responders, an external rapid shutdown switch must be installed somewhere it is accessible.

Steps for Installing an External Rapid Shutdown Initiation Switch

1. Install the external RSD switch and run two wires between it and the inverter
2. Remove the red jumper from the RSD_IN and RSD_OUT terminals (see Figure 4.14)
3. Connect one end of the two wires to the RSD_IN and RSD_OUT terminals
4. Connect the other end of the two wires to the external RSD switch

Note: the RSD switch on the inverter wire box will still initiate rapid shutdown. Be sure the transmitter is on by giving the switch a clockwise twist when you are ready to energize the system.

The external rapid shutdown initiation switch is sold separately. Please contact your local supplier for help with procurement

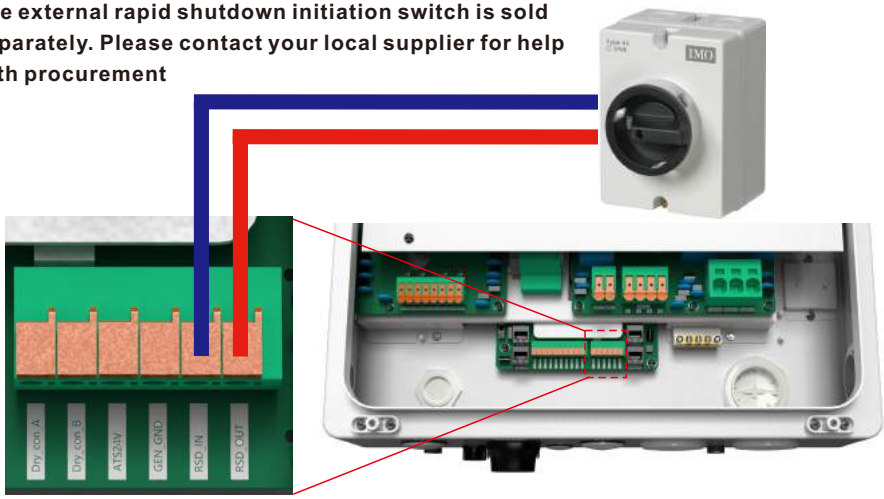


Figure 4.14 External RSD Initiation Switch

External Rapid Shutdown Transmitter Guidance

An external transmitter can be installed, but the internal transmitter must be disabled so there is no cross-talk between the two transmitters. And, the transmitter must have PVRSS with S6 hybrid.

1. Disable the internal transmitter by removing the red jumper (see Figure 4.14)
2. Install the external rapid shutdown transmitter in accordance with the transmitter user manual
3. For the PV to generate power in backup mode, the external transmitter must get power from the inverter backup circuit. You can also take the 12Vdc from the internal transmitter.

Note: the red jumper completes the 12Vdc circuit by closing the positive + side

Please consult the RSD user manuals when installing any RSD components

5. Installation

5.8 Battery Installation

DANGER:
Before installing the battery cables, be sure that the battery is turned off.
Use a multimeter to verify that the battery voltage is 0Vdc before proceeding.
Consult the battery product manual for instructions on how to turn it off.

1. The battery (+) and (-) cables shall only be connected to the inverter BAT terminals.
2. Run the cables into the wire box. Strip ½ inch off the ends of each cable.
3. Insert a technician screwdriver into the slots of the squares below the BAT terminals
4. Push in with the screwdriver, insert the cable, and release the screwdriver
5. Give the battery a gentle tug test to ensure the connection is tight
6. If the connection feels loose, repeat steps 1-5

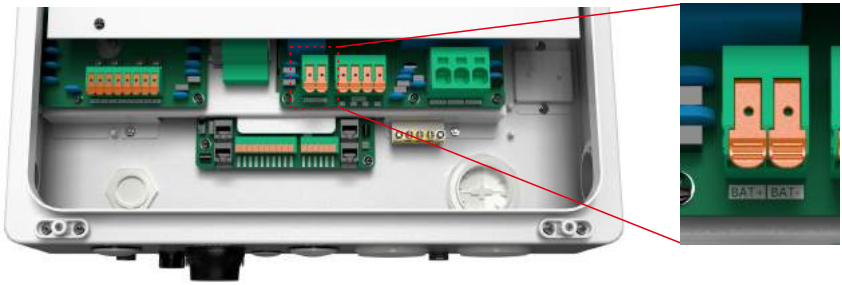


Figure 4.15 Battery Cable Connection

Additional Notes on Batteries:
For instructions on how to turn the battery on, please consult the battery user manual and be sure to wait until the system is fully installed before turning the battery on.

This inverter only works with specific battery models. Please consult the Battery Compatibility sheet for specifics on which battery models this inverter will support.

NOTE:
The battery fuse in the inverter wire box is replaceable.
The replacement can only be done by a technician authorized by Solis.
Fuse specification: 750V, 63A.

NOTE:
Before connecting the battery, please carefully read the product manual of the battery and perform the installation exactly as the battery manufacturer specifies in the manual

5.9 AC Wiring

5.9.1 AC Terminals

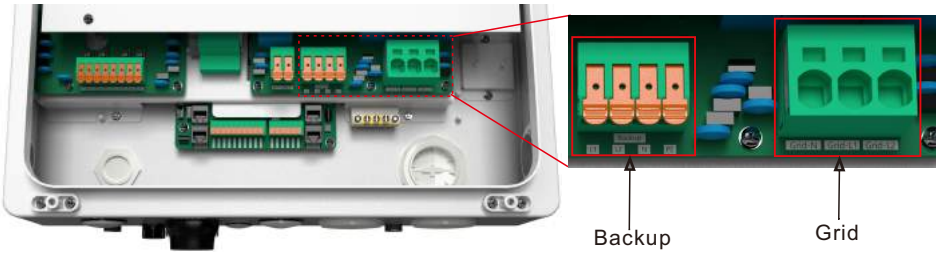


Figure 4.15 AC output terminals

The inverter has two AC outputs: (1) to a backup service panel and (2) to the main service panel which is connected to the utility grid. When utility power is lost, the Grid-side of the inverter shuts off. The Backup-side of the inverter stays energized as long as there is enough PV and battery power to support the loads on the Backup-side. The inverter can be connected to other S6 hybrids in parallel to provide additional support to the backup loads. Generator support will be available in Summer 2023.

Model	S6-EH1P(3.8-5)K-H	S6-EH1P(7.6-11.4)K-H
AC Grid Cable Max. Wire Size Accepted by Terminal	6 AWG	4 AWG
AC Backup Cable Cross Sectional Area	8 AWG	6 AWG

Table 4.3 AC cable size limitations

Over-Current Protection Device (OCPD) for the AC sides

To protect the inverter, we recommend installing a device for protection against over-current and leakage, based on the following current ratings noted in Table 4.4:

Inverter Model	Grid Max Output Current	Grid Max Input Current	Backup Rated Output Current	Backup Max Output Current (10 sec)
S6-EH1P3.8K-H-US	15.8A	23.8A	15.8A	25.4A
S6-EH1P5K-H-US	20.8A	31.2A	20.8	33.3A
S6-EH1P7.6K-H-S-US	31.7A	47.6A	31.7A	50.7A
S6-EH1P7.6K-H-US	31.7A	47.6A	31.7A	50.7A
S6-EH1P9.9K-H-US	41.3A	61.9A	41.3A	50.7A
S6-EH1P10K-H-US	41.7A	62.6A	41.7A	66.7A
S6-EH1P11.4K-H-US	47.5A	71.3A	47.5A	76A

Table 4.4 Current ratings for sizing the OCPD

5.9.2 Installing the AC cables

WARNING:
Conductors terminated in the backup ports of the inverter must be connected to an isolated load center that is not directly connected to the utility. This ensures that the system complies with anti-islanding requirements.

Steps for installing the AC grid and backup conductors

1. Bring the AC cables for the backup loads panel (backup) and the main service panel (grid) into the inverter wire box. The backup loads panel should not be directly connected to the main service panel.
2. Strip ½ inch of insulation from the ends of each cable
3. Insert a technician screwdriver into the small hole above the wire terminal
4. Push in with the screwdriver and insert the wire into the terminal
5. Release the screwdriver and the terminal clamp will bite down on the wire 6
6. Give the wire a gentle tug test to ensure it is tight
7. If the wire feels loose, repeat steps 3-6
8. Connect the other ends of the AC cables in the main service panel to a breaker and neutral bus
9. Connect the other ends of the AC cables in the backup service panel to the panel lugs or to a breaker
10. Keep the breakers and AC bypass switch OFF for now, turn them on when doing commissioning.

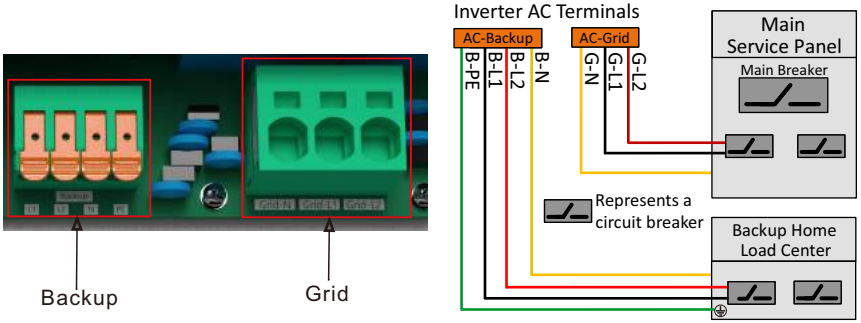


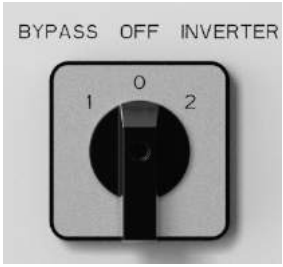
Figure 4.18 Simplified AC wiring diagram

5.9.3 Steps for Installing the Backup Home Load Center

1. Once you have determined which breakers supply power to the things that are to be backed up, mark the breakers so that you will be able to identify them once the panel cover is off.
2. Shut off power to the house so that it is safe to work inside of the main panel (or subpanel).
3. Remove the panel cover, use a multimeter to verify that the panel is deenergized.
4. Turn off the breakers that are to be relocated, remove the wires from them and then cap off the wires for now. Remove the breakers and then install them into the backup loads panel.
5. Run separate wires from the main panel (or subpanel) to the backup loads panel. You will need to run one wire for each breaker that you are relocating.
6. In the main panel, connect the cables that you ran to the backup loads panel to the circuit cables that you capped off earlier. This can be done with wire nuts or something similar.
7. In the backup panel, terminate the wires in the breakers that you moved from the main panel.
8. Be sure to label the breakers in the backup loads panel so that they can be identified.

5.9.4 AC Bypass Switch

This failsafe switch determines the power source for the inverter backup circuit. If the inverter fails or has a critical alarm, the backup circuit will shut off. Should this occur, the switch set to 1 allows power to pass through the inverter to the backup from the grid.



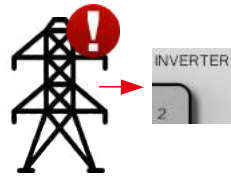
The switch settings operate as follows:
BYPASS (1) the backup circuit is powered by the grid directly. If the inverter fails, the backed up loads will shut lose power. The bypass switch should be set to (1) until the issue is resolved.
OFF (0) the backup circuit is disconnected from the inverter. Switching to OFF will de-energize the backed up loads
INVERTER (2) the backup circuit is powered by the inverter directly. If the grid fails, the inverter will continue to supply the backed up loads with power from the PV and battery This is the setting for normal operation.

NOTE:
The AC bypass switch is not the AC disconnect switch for the inverter.
The backup circuit will be isolated from the inverter on the OFF position.

Unstable Grid

Systems that experience frequent grid blackouts, or have an overall unstable grid in general should the Inverter (2) setting of the bypass switch. This ensures that the backed up loads remain energized regardless of the grid quality and presence.

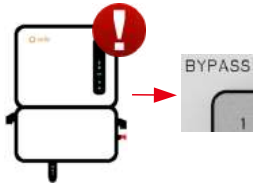
- Supports backup power
- Supports faulting equipment



Unstable Equipment

For systems that have problematic equipment resulting in shutdowns, the Bypass (1) setting should be used. When set to Bypass (1), the inverter will pass power through to the backed up loads from the grid directly even if it cannot produce power itself with PV and battery.

- Supports backup power
- Supports faulting equipment



Pass-Through Power

The S6 hybrid is able to pass-through 57A.Do not use Bypass when overload faults occur on the load side. Avoid excessive current that may cause the switch to burn out.

NOTE:
If the breaker of the distribution panel trips, do not use BYPASS, first troubleshoot the on-site fault.

5.9.5 Paralleling Multiple Hybrid Inverters

Up to ***Three*** S6 hybrid inverters can be installed together in parallel on the backup side of the system. The backup ports of each inverter would terminate in separate overcurrent protection devices within the backup load center. The two inverters are connected together with a CAT5 cable.

Backup Combiner Load Center

In the diagrams of this manual a Backup Combiner Load Center is often shown that is additional to the Backup Home Load Center. The Combiner is not required, but it does provide additional breaker slots to host multiple inveter breakers and a generator breaker if one is installed.

A single backup load center can be installed if there is adequate space to host all of the home load breakers in addition to the inverter breakers, provided that it is compliant with the NEC.

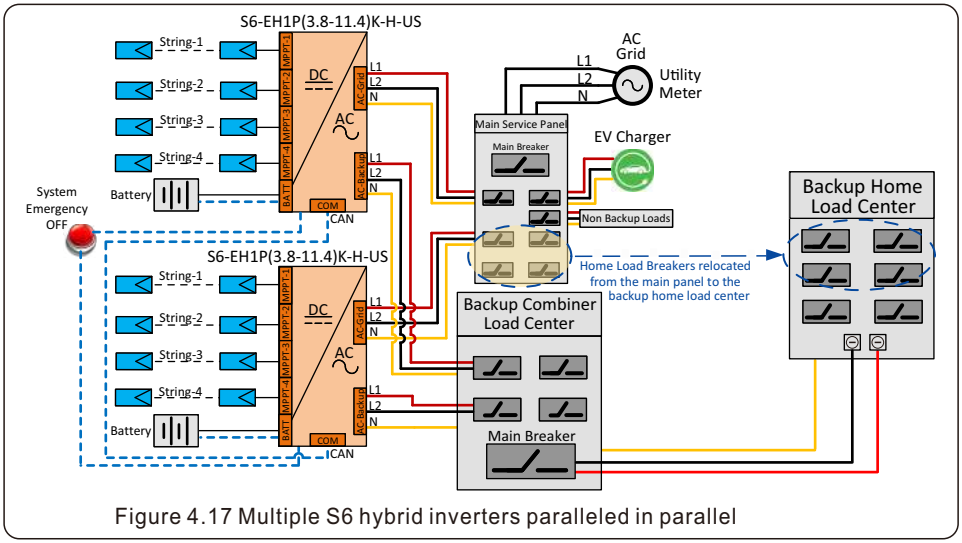


Figure 4.17 Multiple S6 hybrid inverters paralleled in parallel

During the commissioning, one inverter gets designated as the master. The two inverters will then operate in tandem, with each one modulating the output power to match the home loads demand. If one inverter stops, the other one will continue to operate normally. The maximum backup output current is the sum of the two inverters together. For example, two 11.4K inverters could provide up to 95A (47.5A x 2) of continuous backup power with up to 152A of surge current for ten seconds.

NOTE:
Every inverter requires a data logger.

SolisHub

Solis also makes a microgrid interconnect device (MID), called the SolisHub. The SolisHub allows for a streamlined whole-home backup solution that provides load shedding control and 200A of pass-through power. Please see the manual for the SolisHub for additional details on how to design and install a whole-homebackup system using SolisHub.

The SolisHub is not required for whole-home backup. However, it does serve as both a combiner box for the inverters, generator, and loads. This allows the number of boxes and load centers to be reduced. The SolisHub is PCS-certified and has the ability to shed loads intelligently.

5.9.6 AC-Coupled PV for Backup

An existing PV system can be AC-coupled to the backup side so that it can be supported when the grid is down. The acronym “ACPV” will be used to generically describe any existing PV system that will be AC-coupled with the energy storage and backup. This is to distinguish it from “PV”, which is connected on the DC-side of the S6 energy storage system alternatively. The breaker for the ACPV system will need to be relocated into the backup load center so that it can remain energized during a grid outage.

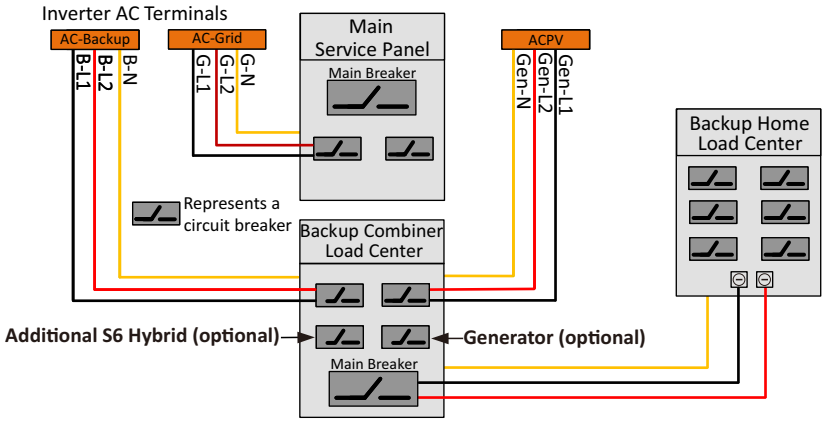


Figure 4.18 Backup with an AC-Coupled PV System

There is no direct communication between the Solis S6 hybrid and the AC-coupled PV system. The inverter uses frequency-shifting to modulate the output of the ACPV system. The inverter uses the frequency-watt curve outlined in the IEEE 1547-2018 standard. When in backup mode, the S6 hybrid will begin to shift the AC frequency when it detects that the power supplied by all of the PV, including the ACPV, is greater than the power demanded (consumed). This change in frequency will be detected by the ACPV system. If the ACPV system also supports the IEEE 1547-2018 frequency-watt curve, then its output power will reduce according to that curve. If the ACP system does not support frequency-watt, then it will shut off as the frequency shifts and then turn back on once the S6 hybrid corrects the frequency.

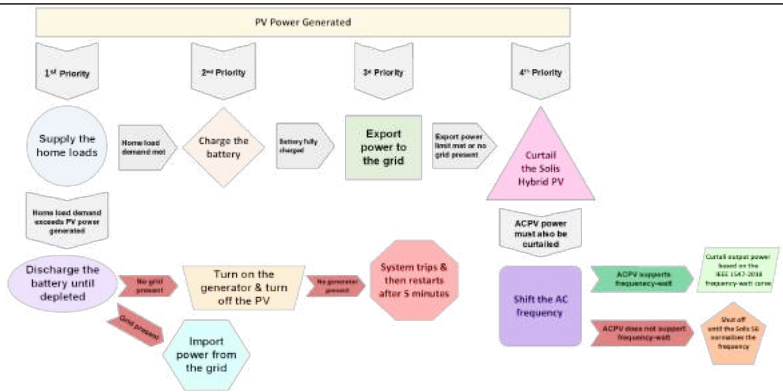


Figure 4.19 Logic table of system operation with ACPV

5.10 Inverter Communication

5.10.1 Communication Terminals Overview

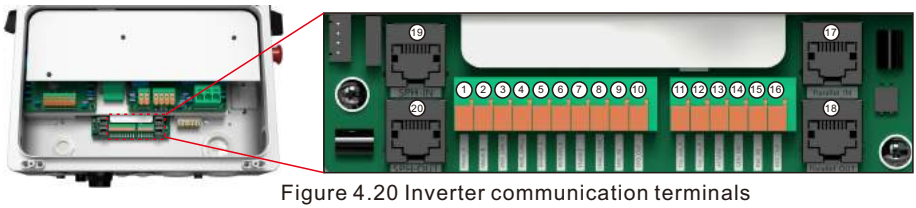


Figure 4.20 Inverter communication terminals

The inverter communication terminal block consists of 16 ports.
From left to right, the chart below explains what purpose of each port is.

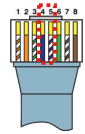
NO.	Port	Function	Acceptable Wire Size Range
1	Meter_A	Used for RS485 communication between the inverter and the external energy meter. This is required in order to have full functionality of the hybrid inverter.	22-16 AWG
2	Meter_B		
3	BMS_CAN_H	Used for CAN communication between the inverter and a compatible battery.	
4	BMS_CAN_L		
5	BMS485_A	Used for RS485 communication with compatible batteries that use it and not CAN.	
6	BMS485_B		
7	ENABLE		
8	Enable_GND		
9	EPO_IN	Emergency Power Off signal	
10	EPO_OUT		
11	Dry con_A	Dry contact for generator connection (Reserved)	
12	Dry con_B		
13	ATS24V	For Supplementary ATS connection (Reserved)	
14	GEN GND		
15	RSD_IN	For each side of the external rapid shutdown initiation switch (optional)	
16	RSD_OUT		
17	Parallel_IN	For parallel S6 hybrid daisy-chaining	RJ45
18	Parallel_OUT		
19	SPH-IN	1.For connecting the Solis Power Hub	
20	SPH-OUT	2.For connecting external communication devices or S6 hybrid parallel daisy-chain	

Table 4.5 Inverter communication terminals explained

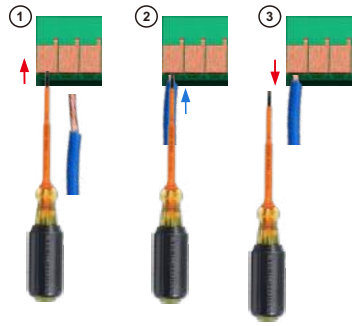
Note:
COM1 and COM2 conduit knockouts are for ½ inch cable glands or conduit fittings. Please be sure to not run com cables in the same conduit as high voltage conductors. Doing this could cause communication issues.

5. Installation

Note:
RS485A on Pin 4: Blue.
RS485B on Pin 5: Blue/White.



Installing the communication wires:
First, strip ¼ inch off the end of the com wire.
1. Insert a technician screwdriver into the slot the orange tab and gently pull up with it.
2. Insert the stripped com wire into the terminal
3. Remove the screwdriver and the terminal will clamp down on the wire.
4. Finally, give the cable a gentle tug to ensure that it is firmly secured. If it is not, repeat steps 2-5 but push the wire deeper into the terminal before releasing.



5.10.2 External Energy Meter Communication

The Acrel AGF-AE-D energy meter comes with the inverter. Please use the diagram below to connect the meter RS485 communication wires to the Meter_A and Meter_B pins on the inverter communication terminal block.

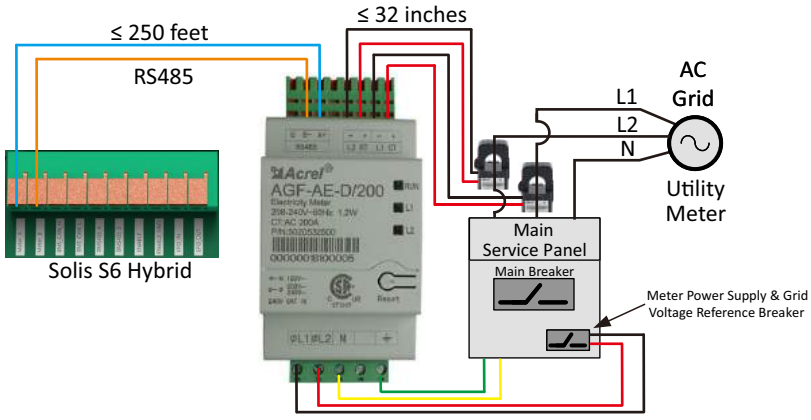


Figure 4.21 Acrel Meter Wiring Diagram (Acrel AGF-AE-D)

The Acrel meter must be installed in order to have a fully-functioning system. If the meter is not installed, key functions such as export power control and default energy storage modes will not be available. It is possible for the system to function without the meter. In the meter-select menu choose “No Meter”.

Please use the provided Acrel meter manual for instructions on how to install it.

5.10.3 Battery Communication

- **CAN Communication**
  Connect a CAT5 cable to the battery CAN port and run the cable to the inverter. Split the cable at the inverter end, then connect the blue wire (pin #4) to BMS_CAN_H and the blue-white wire to BMS_CAN_L (pin #5)
- **RS485 Communication (LG batteries only)**
  Run a CAT5 cable between the battery and the inverter. Split the cable at both ends and then use the diagram in Figure 4.22 to connect the four wires on both the battery and inverter ends.

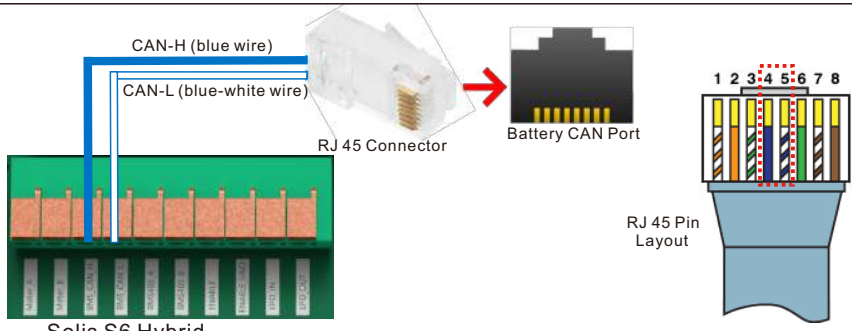


Figure 4.22 Battery CAN Communication

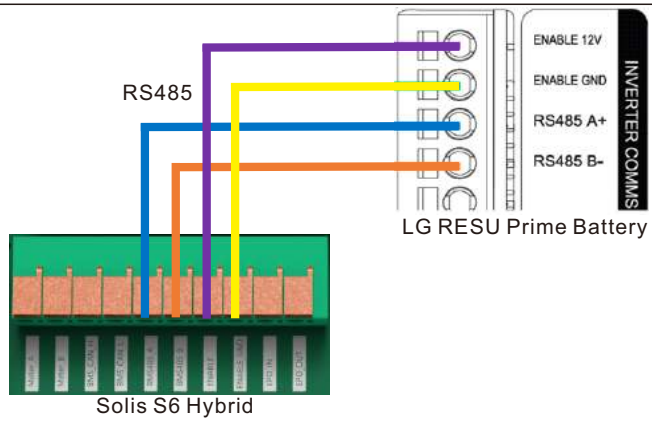


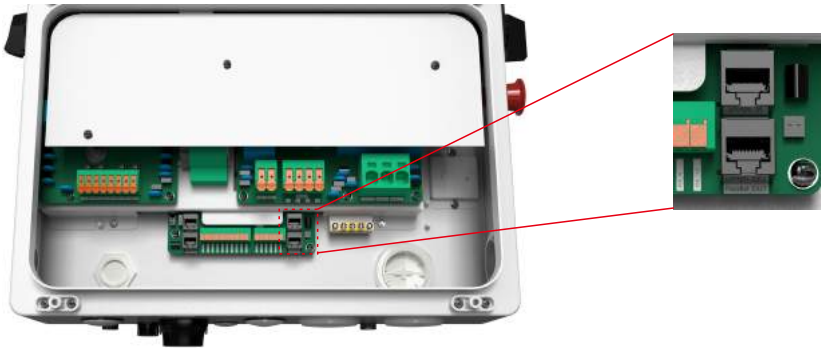
Figure 4.23 Battery RS 485 Communication

Note:
Some alarm codes are being relayed from the battery. These alarms are caused by an issue with the battery itself. The troubleshooting section of this manual explains how to diagnose and treat each alarm. If the alarm says the battery is having a malfunction, please contact the battery manufacturer.

5. Installation

5.10.4 Parallel Inverter Communication

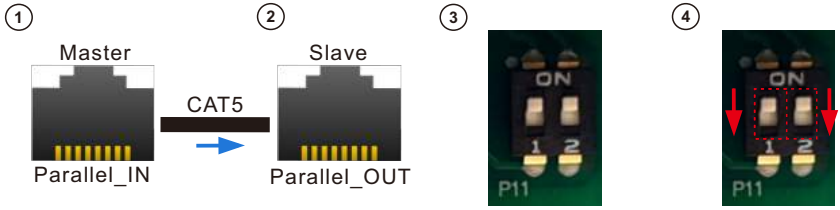
There are two RJ45 ports reserved for communication between Solis S6 hybrids only. The communication is CAN and is the ports are not able to be used for any other purpose besides daisy-chaining Solis S6 hybrids together.



Steps for connecting daisy-chaining two inverters together:

Use a double-ended CAT5 networking cable with a reinforced shielding layer.

1. Plug one end of the cable into the Parallel_IN port of the master inverter
2. Plug the other end of the cable into the Parallel_OUT port of the slave inverter
3. Set both of the DIP switches 1 and 2 to ON (up position) for the master inverter
4. Set both of the DIP switches 1 and 2 to OFF (down position) for the slave inverter



Before operating both inverters, it is recommended to first finish the system commissioning steps including checking all connections, polarities, and voltages. This helps to avoid anomalies caused by individual inverter parameter settings.

Note:

The master inverter will manage the output power of the slave inverter. If the master inverter has a fault, the slave inverter will automatically take over as the master so that it can continue to operate. When the master is restored, the slave will automatically revert back to being a slave.

5.10.5 Emergency Power Off (EPO)

An external emergency power off switch can be added to the system. There are two pins on the communication terminal block designated for such a switch.
When this switch is engaged, the inverter will shut off battery and AC backup in addition to initiating rapid shutdown for the PV. The AC grid power to the inverter can only be shut off by opening an external AC disconnect such as a breaker or knife switch Install the switch by a cable between it and the EPO_IN and EPO_OUT ports. Use the same method as before to open the terminal, insert the wire, and then release.

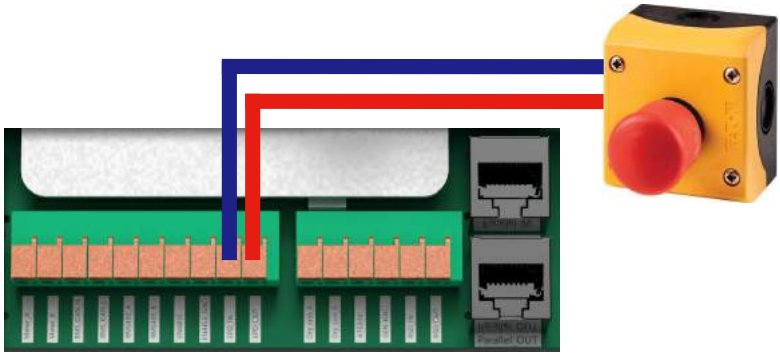


Figure 4.24 External emergency power off switch

5.10.6 Inverter Bluetooth Network

The Solis S6 hybrid generates a Bluetooth network which allows technicians to directly interface with the inverter using a smart phone or tablet. The accessory kit will include a Bluetooth antenna. Remove the black protective cap from the “Antenna” port on the bottom of the inverter. Attach the Bluetooth antenna to the port by rotating it *counter-clockwise* until it feels tight. Please note, the antenna simply extends the range of the inverter Bluetooth network, but it is not required for the Bluetooth network to function normally. The range with the antenna is about ten feet and the range without the antenna is about three feet.

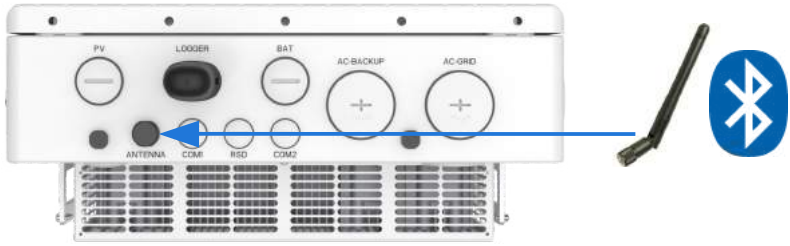


Figure 4.25 External emergency power off switch

6. Commissioning

6.1 Pre-Commissioning Steps

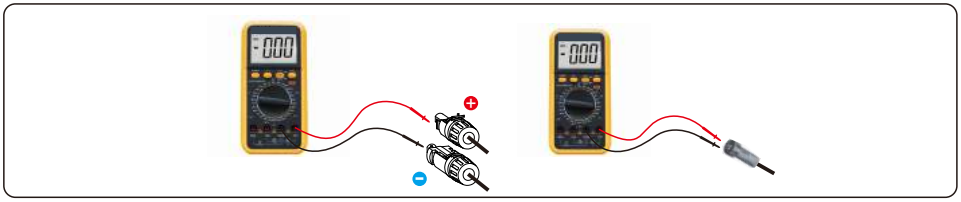
- Visually inspect each piece of equipment in the system closely.
- Check all conduit and cable connection points to ensure they are tight.
- Verify that all system components have adequate space for ventilation.
- Follow each cable to ensure that they are all terminated in the proper places.
- Ensure that all warning signs and labels are affixed on the system equipment.
- Verify that the inverter is secured to the wall and is not loose or wobbly.
- Prepare a multimeter that can do both AC and DC amps
- Have an Android or Apple mobile phone with Bluetooth capability
- Install the Soliscloud app on the mobile phone if you do not have it already
  There are three ways to download and install the latest app:
  1. You can visit **www.soliscloud.com**
  2. You can search "**Soliscloud**" in Google Play or App Store.
  3. You can scan this QR code to download **Soliscloud**.
- Register a new account with SolisCloud if you have not done so already. There are two account types available:

Organization: for installers, technicians, and any third-party that is not the direct owner of the home where the system is installed. This is for fleet management.

Owner: for homeowners who typically only have a small number of sites and are only looking to monitor their systems

6.2 Commissioning Procedure

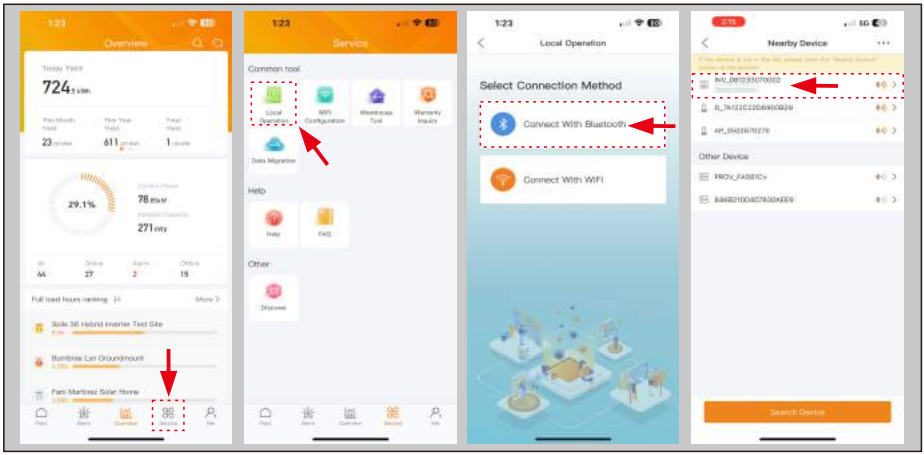
Step 1: With the DC switch off, energize the PV strings and then measure DC voltage of the PV strings to verify that the voltage and polarity are correct. Turn on the battery and check the battery voltage and polarity as well. If RSD is being used, the PV strings will be at safety voltage (~0.6-0.6Vdc per module in the string).



Step 2: Turn on the OCPD for the system and then measure the AC voltages line to line and line to neutral. The backup side of the system will be off until commissioning is complete. Turn the OCPD back off for now.

Step 3: Turn the DC switch on and then the OCPD (AC breaker) for the system. If you are using rapid shutdown, the voltage should increase after a few seconds. If it does not, give the rapid shutdown initiation switch a clockwise turn so that it pops out.

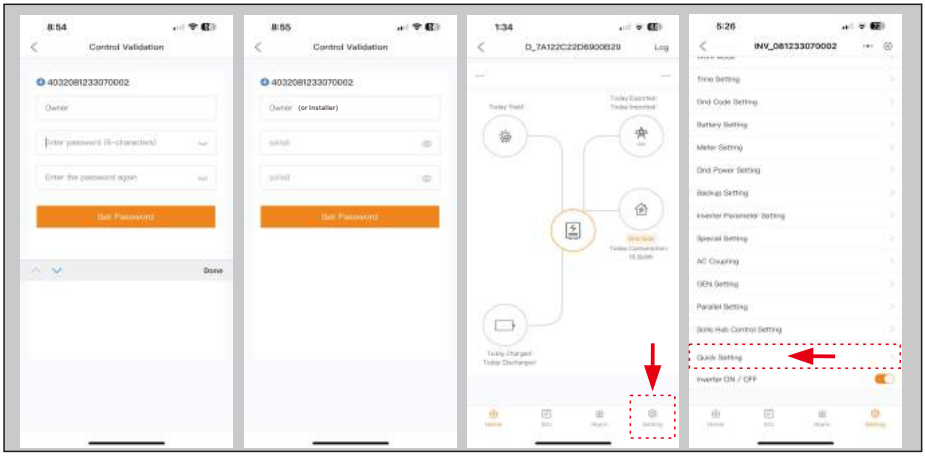
Step 4: Turn your phone Bluetooth on and then open the SolisCloud app. Tap “Service”, then tap “Local Operation”, and then tap ”Connect with Bluetooth”.



The name of the inverter Bluetooth network will display as “INV_” and then the inverter serial number. Tap on inverter in order to connect to it. The next screen will prompt you to create a six-character password. The password must be exactly six characters. Once you set the password, tap Set Password. It is highly recommended to save this password in case anyone comes back to the site in the future, they will need it. You should then see the message “Connection succeeded’ and then be taken to the main interface page.

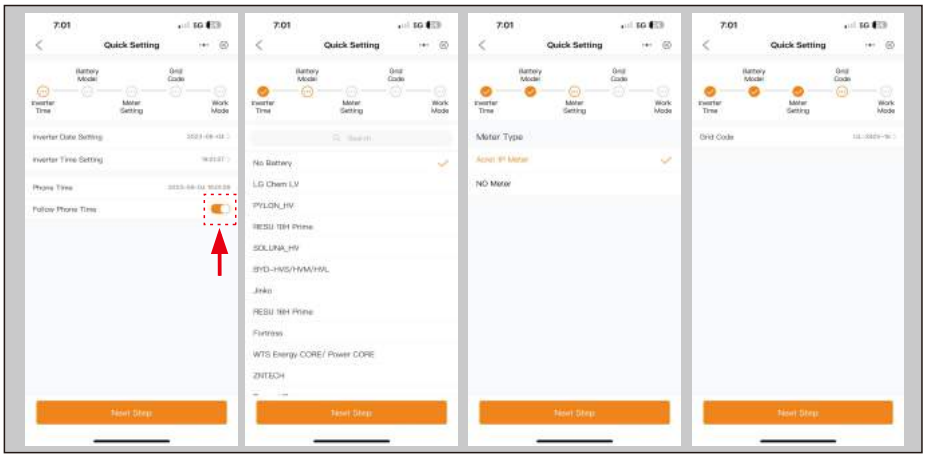
NOTE:
If the password is forgotten, it can be reset by pressing and holding the Inverter LED down for ten seconds.

Step 5: Tap on Setting in the bottom right corner and then tap Quick Setting at the bottom.

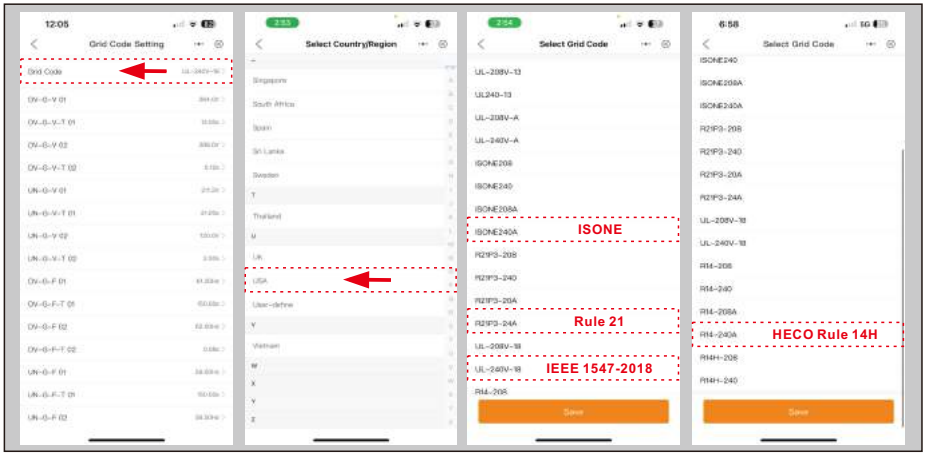


6. Commissioning

Tap the toggle switch for Follow Phone Time to match the inverter time to your phone time or manually set the time yourself, then tap Next Step. **Select** the battery that is installed, and if no battery is installed, then tap No Battery.Tap Next step, and then verify that Acrel 1P Meter is selected. If a meter is not installed, tap NO meter and then tap Next Step.

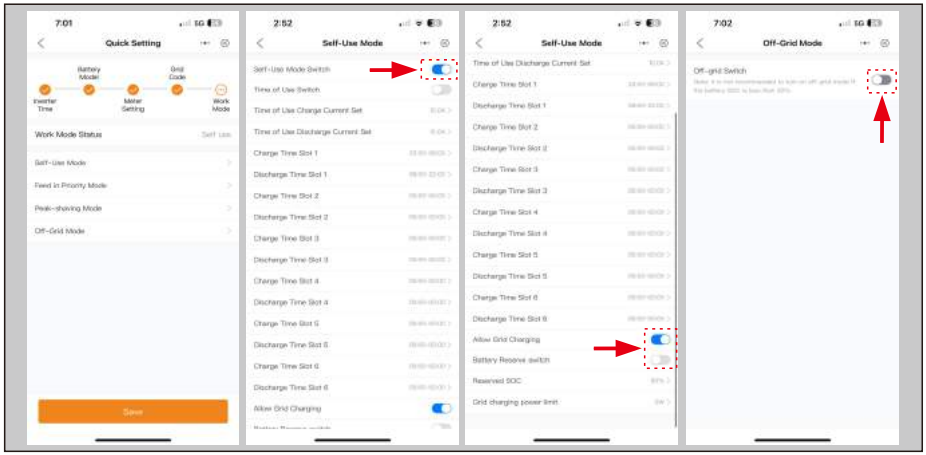


The inverter Grid Code is the grid interconnection profile by which the inverter will operate when it is connected to the grid. For systems installed in the United States, the base (default) profile is **UL-240V-18**. This grid profile is based on the IEEE 1547-2018 standard and is compliant with UL 1741 SA/SB. The grid profile for California Rule 21 is **R21P3-24A**, the ISONE240A profile is for ISONE, and the R14H-240A profile is for Hawaii's HECO Rule 14H. Tap the standard at the top first to bring up the list of regions. Scroll to the bottom and then tap USA. Then select the standard you would like before tapping Save. Upon saving the standard, the main grid profile parameters will be displayed Tap Next Step to go to the final step of the Quick Settings, the Work Mode..



The Work Mode is the energy storage operating mode of the inverter. Please see the logic tables on pages XX through XX for explanations on how the modes operate to determine which one you should select for each system. Upon selecting the mode, you will need to toggle the on switch for that mode. If backup is being installed with the system, then you will need to decide if the Reserve SOC should be set or not.

Toggling on the Battery Reserve switch and then setting a **Reserve SOC** ensures that the battery never discharges below the Reserve SOC. The battery will cycle between 100% full charge and the Reserve SOC %. This guarantees that the battery will have the Reserve SOC to carry the home through a potential grid failure.



Time of Use Switch is for customizing when the battery is allowed to charge and discharge power and at what rate, established by a current (amperage) setting. If this slider switch is turned on, the inverter will only use this schedule to determine when to charge and discharge the battery. If **Allow Grid Charging** is turned on, the inverter will use grid power to charge the battery only under two circumstances: (1) the battery drains to the Force Charge SOC and (2) Time of Use is enabled and there is not enough available PV power during the charge window to meet the current rate that is established.

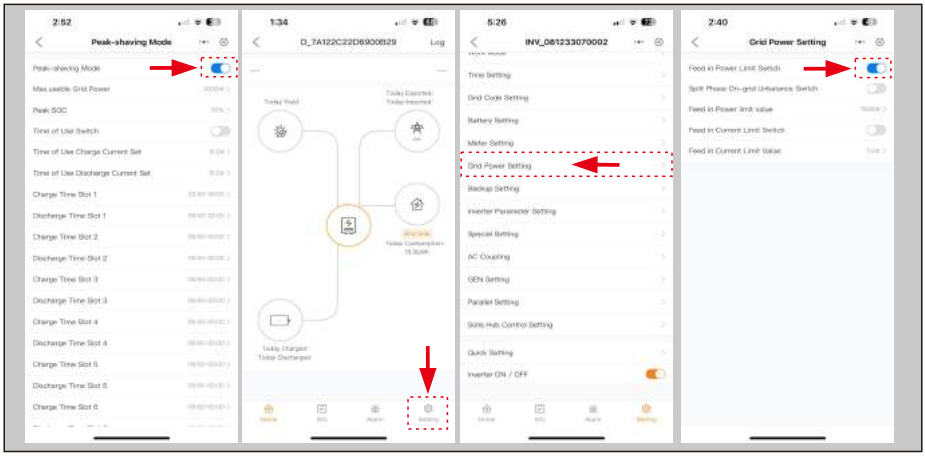
Note: Time of Use is for manual control of the battery charging/discharging. If Time of Use is turned off, charging/discharging is automatically regulated by the inverter.

Off-Grid mode should only be enabled for systems that are perpetually isolated from the grid such as a cabin in the woods. Do not enable this mode otherwise.

NOTE:
Allow Grid Charging should be enabled for every system. The inverter will only use a small amount of grid power to float the battery when there is not enough PV power available. This ensure the battery never drains past the point-of-no-return SOC.

6. Commissioning

The Peak-shaving Mode has additional settings for **Max. useable Grid Power** and **Peak SOC**. Max. useable Grid Power is the most amount of power that the inverter can import from the grid to cover load demand. The Peak SOC is the target state-of-charge percentage that the system will try to reach by the time the peak window starts. The system will import power to cover load demand in excess of PV power generation outside of the established peak window.



Step 6: Once you complete the Quick Settings, you will be at the main screen. To finish commissioning, tap Setting in the bottom right corner. Tap Grid Power Setting, which is the export power management setting for the system. If you would like to regulate export power, toggle on the **Feed in Power Limit Switch**. Leaving this setting off will result in the system exporting as much as it can depending on which work mode has been set.

After toggling the switch to on, set the **Feed in Power Limit Value** (kWh) to the maximum amount of power that the system is to be permitted to export (sell) back to the utility.

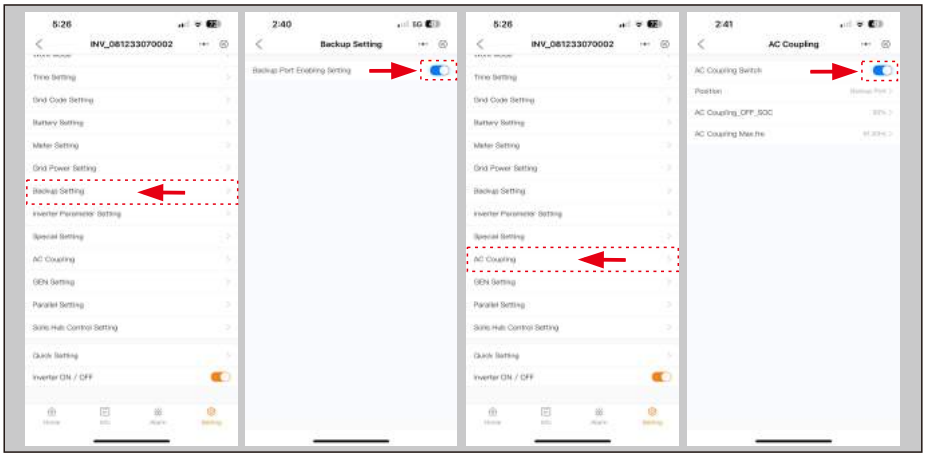
Alternatively, the **Feed in Current Limit Value** (A) can be set as the limiting value for power being exported. If values are entered into both the Feed in Current Limit Value and the Feed in Power Limit Value, the system will enforce the lower of the two values

Turning on the Split-Phase On-Grid Unbalance Switch allows the system to support up to 100% phase-imbalance. It is recommended to toggle this mode on if there are heavy 120V loads such as air conditioners, heaters, pumps that all plug into a standard outlet.

NOTE:
The external Acrel energy meter must be installed in order for the system to be able to perform export power management. If it is not possible to install the Acrel meter for whatever reason, please keep the Feed in Power Limit Switch set to the off position.

6. Commissioning

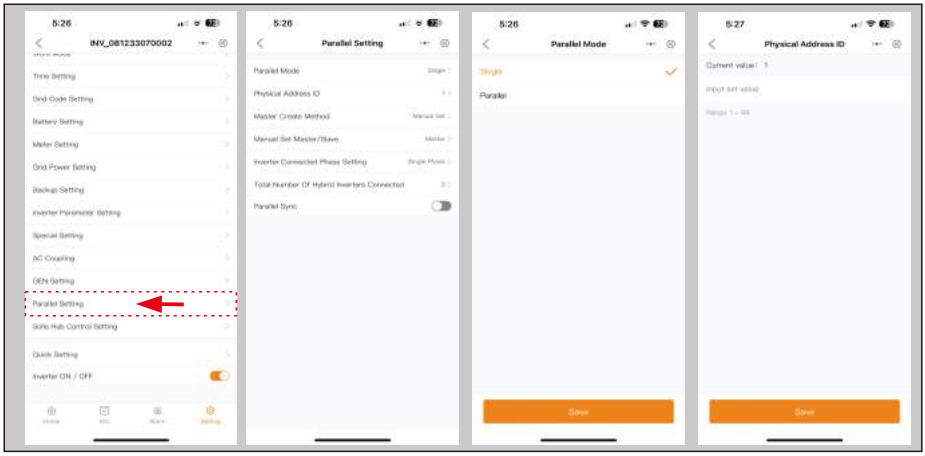
Step 7: Next, tap Backup Setting from the main Setting menu. If Backup is being installed, toggle on the Backup Port Enabling Setting switch. Keep this setting turned off if there is not going to be any backup for this system.



Step 8: If there is an existing PV system being AC-coupled to the Solis S6, please follow this next step, and if not then skip this step. Tap AC Coupling in the main Setting menu. Toggle on the **AC Coupling Switch**. Then set whether the other PV system is being connected to the backup-side or the grid-side of the inverter. This comes down to where the breaker for the existing PV system is going to be located.
The **AC Coupling_OFF_SOC** is the battery state-of-charge % at which the Solis S6 will shut off the existing PV system using AC frequency-shifting. The max AC-coupling frequency can be set as well as.

6. Commissioning

Step 9: If there are multiple Solis S6 hybrid inverters connected in parallel, please follow this step. If there is only one hybrid in the system, this step can be skipped. Tap Parallel Setting and then tap Parallel Mode. Change this from Single to Parallel, then tap Save. Next, change the **Physical Address ID** of the slave inverter(s) to 2, 3,.. etc. but leave the address of the master inverter set to 1.

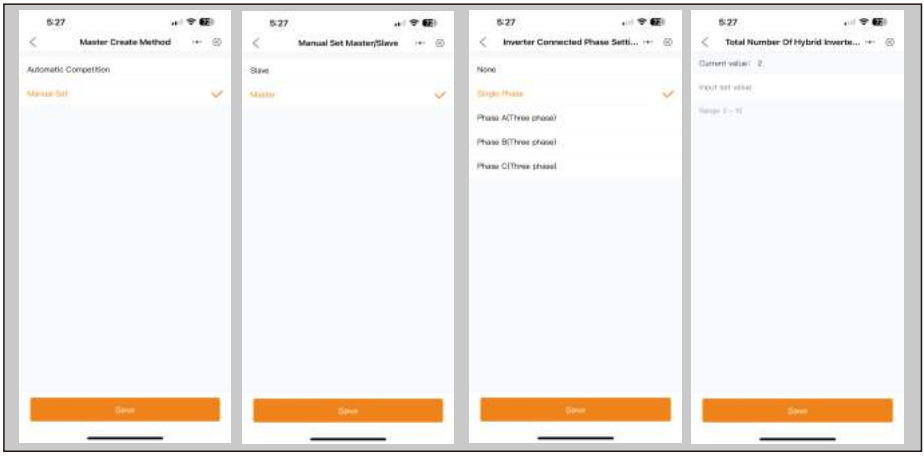


Manual Set/Master Slave allows you to manually determine which slave inverter becomes the master in the event that the original master has a fault. Set to Automatic Competition, the inverter will do this automatically.

If three inverters are being connected in a high-leg delta configuration, the **Inverter Connected Phase Setting** will allow each inverter to be set as a phase. The **Total Number of Hybrid inverters Connected** should be set to reflect the number of Solis S6 hybrids installed in the system.

The **Parallel Sync** toggle switch should be enabled as the final step of the process.

At this point, all of the main settings should now be configured. Please verify that all of the inverter settings are correct before proceeding any further.



6. Commissioning

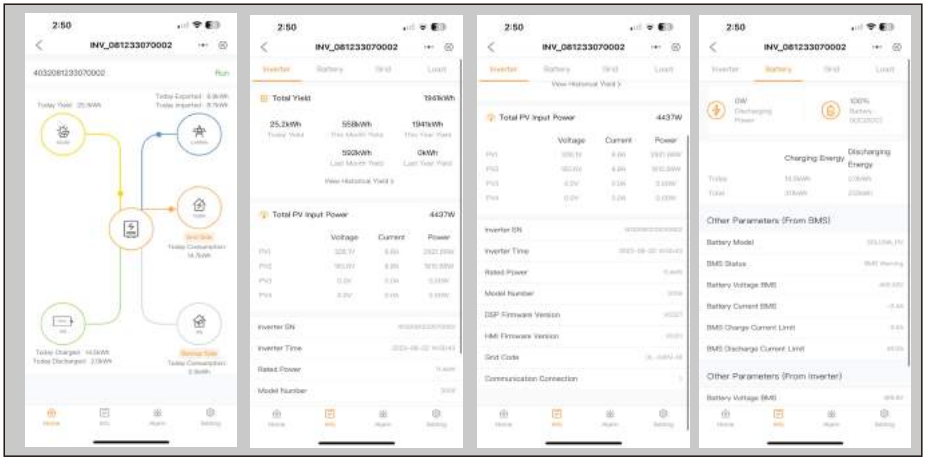
Step 10: Now that the settings are done, the system will begin to generate after about five minutes. The main screen, or homepage provides an overview of the system. It can quickly be determined if the battery is communicating normally or not and what the SOC is. The image below explains what each icon represents. At the bottom of the page are four submenus: Home, Info, Settings, and More. The Info page breaks down into four categories: Inverter, Battery, Grid, and Load.

Inverter: inverter power production history, PV voltages and currents, inverter information (serial number, model number, and firmware version), grid code, and alarm code history

Battery: battery model and status, battery voltage and current

Grid: power imported and exported, AC grid voltage, frequency, and amperage

Load: power being consumed by the home loads and backup loads



Step 11: It is recommended to check the alarm history as the final step of the commissioning process, excluding creating a site on SolisCloud for the system. Tap Alarm and then tap Historical Alarm to view the full alarm history. Each alarm will have a date and time stamp as well as a suggestion on how to handle the alarm. The next section goes over troubleshooting and you can always contact Solis USA technical support with any questions or concerns.

The inverter commissioning process has now been completed. It is recommended to monitor the system closely over the next week to ensure that everything is working as it should. Please refer to the Solis data logger manual for assistance with registering a new plant on SolisCloud.

7. Troubleshooting

If the inverter is having an issue, it will show it in one of the following ways: (1) the Inverter (circle) LED indicator light will flash orange. (2) the inverter status will be an alarm code (3) an alarm code will display on SolisCloud or (4) the inverter will simply be off. The next several pages explain how to troubleshoot each alarm code. If it is suspected that the issue is coming from the DC side of the system, it is recommended to turn the inverter off so that the PV strings can be more safely tested.

Inverter Shutdown Procedure

Step 1. Turn off the AC breaker or AC disconnect switch to disable AC power to the inverter
Step 2. Push in the RSD Initiation Switch and then turn off the DC switch of the inverter
Step 3. Turn off the battery breaker on the BMS
Step 4. Use a multimeter to verify that the battery and AC voltages are 0V. If RSD is being used, the voltages should be at safety levels

Inverter Maintenance

Solis S6 hybrid inverter does not require any regular maintenance. However, keeping the heatsink clean will ensure the inverter is able to dissipate heat, increasing the life span of the inverter. Any grease smudges on the inverter chassis can be cleaned off with soap and water.

CAUTION:
Do not touch the surface of the inverter it is operating. Some parts may be hot and could cause a minor burn. Turn off the inverter (refer to Section 6.2) and let it cool down before you do any maintenance or cleaning of it.

The LED status indicator lights can be cleaned with 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 has been designed in accordance with international standards for safety and electromagnetic compatibility requirements. Before being shipped from the manufacturing center, the inverter is subjected to multiple tests to ensure operation reliability.

If you are not able to resolve the alarm code using the troubleshooting steps, or if the alarm code you are seeing is not listed, please contact Solis US Technical support. Use the Bluetooth tool, go to the Info page and then to the Inverter tab. Scroll down and tap Alarm History and then screen shot or write down the alarms as well as the dates and times the alarms were recorded.
Please also take note of the inverter model number, serial number, and internal transmitter type.

Solis US Technical Support Phone Number: +1(866)438-8408
Solis US Technical Support Email: usservice@solisinverters.com

7. Troubleshooting

Alarm Message	Failure description	Solution
ARC-FAULT	ARC detected in DC circuit	1. Check if there is an arc in the PV connection and restart inverter.
AFCI Check FAULT	AFCI module self check fault	1. Restart inverter or contact installer.
DCinj-FAULT	High DC injection current	1. Restart inverter or contact installer.
DSP-B-FAULT	Comm. failure between main and slave DSP	1. Restart inverter or contact installer.
DC-INTF	DC input overcurrent	1. Restart inverter. 2. Identify and remove the string related to the faulty MPPT. 3. Change power board.
G-IMP	High grid impedance	1. User design function allows the protection limit to be adjusted if it is allowed by electrical company.
GRID-INTF01/02	Grid interference	1. Restart inverter. 2. Change power board.
IGBT-OV-I	Over IGBT current	
IGFOL-F	Grid current tracking fail	1. Restart inverter or contact installer.
IG-AD	Grid current sampling fail	
ILeak-PRO 01/02/03/04	leakage current protection	1. Check AC and DC connection. 2. Check inverter inside cable connection.
INI-FAULT	Initialization system fault	1. Restart inverter or contact installer.
LCD show initializing all the time	Can not start-up	1. Check if the connectors on the main board or power board are secure. 2. Check if the DSP connection to the power board is secure.
NO-Battery	Unconnected battery	1. Ensure the battery is connected properly. 2. Verify the output battery voltage is correct.
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.
NO-GRID	No grid voltage	1. Check connections and grid switch. 2. Verify the grid voltage is correct on the AC Terminals inside the inverter wiring box.
OV-BUS	Over DC bus voltage	1. Check inverter inductor connection. 2. Check driver connection.

7. Troubleshooting

Alarm Message	Failure description	Solution
OV-DC01/02/03/04	Over DC voltage	1. Reduce the module number in series.
OV-DCA-I	DC input overcurrent	1. Restart inverter. 2. Identify and remove the string of the faulted MPPT. 3. Change power board.
OV-G-V01/02/03 /04/05	Over grid voltage	1. Resistance of AC Cable is too high. Increase the gauge of grid cables. 2. Adjust the protection limit if it is permitted by electrical company.
OV-G-I	Over grid current	1. Restart inverter. 2. Change power board.
OV-G-F01/02	Over grid frequency	1. User design function allows the protection limit to be adjusted if it is permitted by electrical company.
OV-IgTr	AC side transient overcurrent	1. Restart inverter. 2. Return-factory repair.
OV-ILLC	LLC hardware overcurrent	
OV-VBackup	Backup overvoltage fault	
OV-TEM	Over Temperature	1. Check inverter surrounding ventilation. 2. Determine if there is direct sunlight on the inverter during hot weather.
OV-Vbatt1	The detection of battery overvoltage	1. Verify the protection point for over voltage is set correctly. 2. Restart inverter.
OV-Vbatt-H	Battery overvoltage hardware fault	1. Check if any part of the battery input circuit is tripped, ie. battery fuses, battery circuit breaker. 2. Restart inverter.
Over-Load	Backup overload fault	1. Check the load of Backup port is over rating output power or not. 2. Reduce the load of Backup port, then restart inverter.
PV ISO-PRO01/02	PV isolation protection	1. Remove all DC input, reconnect and restart inverter one by one. 2. Identify which string cause the fault and check the isolation of the string.
RelayChk-FAIL	Relay check fail	1. Restart inverter or contact installer.

Alarm Message	Failure description	Solution
UN-BUS01/02	Under DC bus voltage	1. Check inverter inductor connection. 2. Check driver connection.
UN-G-F01/02	Under grid frequency	1. Use user define function to adjust the protection limit if it's allowed by electrical company.
UN-G-V01/02	Under grid voltage	
12Power-FAULT	12V power supply fault	1. Restart inverter or contact installer.

Table 6.1 Fault message and description

NOTE:
If the inverter displays any alarm messages listed in Table 7.1, please turn off the inverter and wait for 5 minutes before restarting it . If the alarm persists, please contact Solis after-sales service +1(866)438-8408 or email usservice@solisinverters.com

If you have any technical problems with the hybrid system, please contact Solis after-sales service. We recommend gathering the following information before making contact in order to get a quicker resolution.

Item	Supplemental Information
Inverter serial number (SN)	Serial number can be found on the spec label
Inverter Firmware Version	A six character number that can be found in the information section of the inverter interface page - requires Bluetooth connection
Alarm history	Codes found in the Inverter section of the interface
DC voltages	Use a multimeter to measure the voltages
Detailed description of the problem	Frequency of the occurrence and any other relevant details about the issue
Battery serial number and Firmware version	Consult the battery product manual to determine how to collect this information
Is the system reporting to SolisCloud?	Yes/No - if yes, what is the site ID?
Take pictures showing all the cable connections in the system (Videos preferred)	If this is possible, it will help us to troubleshoot

8. Specifications

Technical Data	S6-EH1P3.8K-H-US	S6-EH1P5K-H-US
Input DC (PV side)		
Recommended max. PV power	6,080W	8,000W
Max. input voltage	600V	
Rated voltage	380V	
Start-up voltage	80V	
MPPT voltage range	80-520V	
Full load MPPT voltage range	140-450V	
Max. input current per string	16A	
Max. short circuit current per string	25.6A	
Number of MPPTs/Number of strings per MPPT	2/1	3/1
Energy Storage		
Battery type	Lithium-ion	
Battery voltage range	120 - 500V	
Maximum charge/discharge current	25A	
Battery Communication	CAN/RS485	
Number of batteries per inverter	See the Compatibility List	
AC Output (Grid)		
Rated output power	3.8kW	5kW
Max. apparent output power	3.8kW	5kW
Rated output voltage	220V*/240V	
Rated frequency	60 Hz	
Rated output current	17.3A*/15.8A	22.7A*/20.8A
Max. output current	17.3A*/15.8A	22.7A*/20.8A
THDi	<3%	
AC Input (Grid)		
Input voltage range	193.6-242V*/211-264V	
Max. input current	25.9A*/23.8A	34.1A*/31.2A
Frequency range	59.5-60.5Hz*/58.8-61.2Hz	

8. Specifications

Technical Data	S6-EH1P3.8K-H-US	S6-EH1P5K-H-US
AC Output (Backup and Off-grid)		
Rated output power	3.8kW	5kW
Max. apparent output power	6.1 kVA, 10 sec	8 kVA, 10 sec
Back-up switch time	< 10 ms	
Phase Power	220V*/240V Split-Phase	
Rated output voltage(L1-L2)/(L1/L2-N)	220V*/240V	
AC output voltage range	193.6-242V*/211-264V	
Rated grid frequency	60 Hz	
Rated AC output current (continuous)	17.3A*/15.8A	22.7A*/20.8A
Max. output current for 10 seconds	27.7A*/25.4A	36.4A*/33.3A
Max. output current for 300 milliseconds	28.62A	37.44A
Max. allowable phase imbalance	100%	
Backup support configurations	Dedicated loads and whole-home	
Power Factor	>0.99 (0.8 leading - 0.8 lagging)	
THDv(@linear load)	<3%	
Efficiency		
PV Max. efficiency	97.0%	
PV CEC efficiency	96.5%	
BAT charged by PV Max. efficiency	98.5%	
BAT charged/discharged to AC Max. efficiency	97.0%	
Protection		
Ground fault detection	Yes	
Residual (leakage) current detection	Yes	
Integrated AFCI (DC arc-fault protection)	Yes	
DC reverse-polarity protection	Yes (PV only)	
Rapid Shutdown NEC 2017	Integrated SunSpec-certified Transmitter	
Compatible Rapid Shutdown Receivers	See the Compatibility List	
Protection class/Over voltage category	I/II	

8. Specifications

Technical Data	S6-EH1P3.8K-H-US	S6-EH1P5K-H-US
General data		
Dimensions(H/W/D)	28.35*19.21*8.66 in (720*490*220mm)	
Weight	52.43 lbs (23.78 kg)	
Topology	Transformerless	
Operation temperature range	-25~+60 ℃/-31~+140 ℉	
Ingress protection	TYPE 4X(IP66)	
Noise emission (Typical)	<30 dB (A)	
Cooling method	Natural convection	
Max. operating altitude	13120 ft (4000 m)	
Compliance	UL 1741 SB, UL 1741 SA, IEEE1547.1-2020,UL 1699B, UL 1998,FCC Part 15 Class B, California Rule 21, HECO Rule 14H (pending), NEC 690.12-2020,CAN/CSA C22.2107.1-1	
Generator support	Yes; up to 25 kW (with a Solis Power Hub)	
Features		
DC connection	1 in. knockouts for conduit (x2) on the side and bottom; Spring clamp terminals	
AC connection	1.5 in. knockouts for conduit (x3) on the side and bottom; Spring clamp terminals	
Interface	LED indicator lights, Bluetooth/Phone app	
Monitoring Platform	SolisCloud (modbus map and API sharing available upon request)	
Communication	RS485, Optional: Cellular, Wi-Fi, LAN	
Warranty	10 years standard (Extendable to 20 years)	

8. Specifications

Technical Data	S6-EH1P7.6K-H-S-US	S6-EH1P7.6K-H-US
Input DC (PV side)		
Recommended max. PV power	12160W	
Max. input voltage	600V	
Rated voltage	380V	
Start-up voltage	80V	
MPPT voltage range	80-550V	
Full load MPPT voltage range	175-450V	
Max. input current per string	16A	
Max. short circuit current per string	25.6A	
Number of MPPTs/Number of strings per MPPT	3/1	4/1
Energy Storage		
Battery type	Lithium-ion	
Battery voltage range	120 - 500V	
Maximum charge/discharge current	25A	50A
Battery Communication	CAN/RS485	
Number of batteries per inverter	See Battery Compatibility Sheet	
AC Output (Grid)		
Rated output power	7.6kW	
Max. apparent output power	7.6kW	
Rated output voltage	220V*/240V	
Rated frequency	60 Hz	
Rated output current	34.5A*/31.7A	
Max. output current	34.5A*/31.7A	
THDi	<3%	
AC Input (Grid)		
Input voltage range	193.6-242V*/211-264V	
Max. input current	51.8A*/47.6A	
Frequency range	59.5-60.5Hz*/58.8-61.2Hz	

8. Specifications

Technical Data	S6-EH1P7.6K-H-S-US	S6-EH1P7.6K-H-US
AC Output (Backup and Off-grid)		
Rated output power	7.6kW	
Max. apparent output power	12.2 kVA, 10 sec	
Back-up switch time	< 10 ms	
Phase Power	220V*/240V Split-Phase	
Rated output voltage(L1-L2)/(L1/L2-N)	220V*/240V	
AC output voltage range	193.6-242V*/211-264V	
Rated grid frequency	60 Hz	
Rated AC output current (continuous)	34.5A*/31.7A	
Max. output current for 10 seconds	55.5A*/50.7A	
Max. output current for 300 milliseconds	57.06A	
Max. allowable phase imbalance	100%	
Backup support configurations	Dedicated loads and whole-home	
Power Factor	>0.99 (0.8 leading - 0.8 lagging)	
THDv(@linear load)	<3%	
Efficiency		
PV Max. efficiency	97.0%	97.6%
PV CEC efficiency	96.5%	97.0%
BAT charged by PV Max. efficiency	98.5%	
BAT charged/discharged to AC Max. efficiency	97.0%	
Protection		
Ground fault detection	Yes	
Residual (leakage) current detection	Yes	
Integrated AFCI (DC arc-fault protection)	Yes	
DC reverse-polarity protection	Yes (PV only)	
Rapid Shutdown NEC 2017	Integrated SunSpec-certified Transmitter	
Compatible Rapid Shutdown Receivers	See MLRSD compatibility sheet	
Protection class/Over voltage category	I/II	

8. Specifications

Technical Data	S6-EH1P7.6K-H-S-US	S6-EH1P7.6K-H-US
General data		
Dimensions(H/W/D)	28.35*19.21*8.66 in (720*490*220mm)	29.53*22.05*8.66 in (750*560*220mm)
Weight	52.43 lbs (23.78 kg)	71.74 lbs (32.54 kg)
Topology	Transformerless	
Operation temperature range	-25~+60℃/-31~+140℉	
Ingress protection	TYPE 4X(IP66)	
Noise emission (Typical)	<30 dB (A)	
Cooling method	Natural convection	
Max. operating altitude	13,120 ft (4000 m)	
Compliance	UL 1741 SB, UL 1741 SA, IEEE1547.1-2020,UL 1699B, UL 1998,FCC Part 15 Class B, California Rule 21, HECO Rule 14H (pending), NEC 690.12-2020,CAN/CSA C22.2107.1-1	
Generator support	Yes; up to 25 kW (with a Solis Power Hub)	
Features		
DC connection	1 in. knockouts for conduit (x2) on the side and bottom; Spring clamp terminals	
AC connection	1.5 in. knockouts for conduit (x3) on the side and bottom; Spring clamp terminals	
Interface	LED indicator lights, Bluetooth/Phone app	
Monitoring Platform	SolisCloud (modbus map and API sharing available upon request)	
Communication	RS485, Optional: Cellular, Wi-Fi, LAN	
Warranty	10 years standard (Extendable to 20 years)	

8. Specifications

Technical Data	S6-EH1P8K-H-US	S6-EH1P9.9K-H-US
Input DC (PV side)		
Recommended max. PV power	12,800W	16,000W
Max. input voltage	600V	
Rated voltage	380V	
Start-up voltage	80V	
MPPT voltage range	80-550V	
Full load MPPT voltage range	185-450V	230-450V
Max. input current per string	16A	
Max. short circuit current per string	25.6A	
Number of MPPTs/Number of strings per MPPT	4/1	
Energy Storage		
Battery type	Lithium-ion	
Battery voltage range	120 - 500V	
Maximum charge/discharge current	50A	
Battery Communication	CAN/RS485	
Number of batteries per inverter	See Battery Compatibility Sheet	
AC Output (Grid)		
Rated output power	8kW	9.99kW
Max. apparent output power	8kW	9.99kW
Rated output voltage	220V*/240V	
Rated frequency	60 Hz	
Rated output current	36.4A*/33.3A	45.5A*/41.7A
Max. output current	36.4A*/33.3A	45.5A*/41.7A
THDi	<3%	
AC Input (Grid)		
Input voltage range	193.6-242V*/211-264V	
Max. input current	54.4A*/49.9A	68.2A*/62.6A
Frequency range	59.5-60.5Hz*/58.8-61.2Hz	

8. Specifications

Technical Data	S6-EH1P8K-H-US	S6-EH1P9.9K-H-US
AC Output (Backup and Off-grid)		
Rated output power	8kW	9.99kW
Max. apparent output power	12.8 kVA, 10 sec	16 kVA, 10 sec
Back-up switch time	< 10 ms	
Phase Power	220V*/240V Split-Phase	
Rated AC output voltage	220V*/240V	
AC output voltage range	193.6-242V*/211-264V	
Rated frequency	60 Hz	
Rated AC output current (continuous)	36.4A*/33.3A	45.5A*/41.7A
Max. output current for 10 seconds	58.2A*/53.3A	72.7A*/66.7A
Max. output current for 300 milliseconds	59.94A	70.3A
Max. allowable phase imbalance	100%	
Backup support configurations	Dedicated loads and whole-home	
Power Factor	>0.99 (0.8 leading - 0.8 lagging)	
THDv(@linear load)	<3%	
Efficiency		
PV Max. efficiency	97.6%	
PV CEC efficiency	97.0%	
BAT charged by PV Max. efficiency	98.5%	
BAT charged/discharged to AC Max. efficiency	97.0%	
Protection		
Ground fault detection	Yes	
Residual (leakage) current detection	Yes	
Integrated AFCI (DC arc-fault protection)	Yes	
DC reverse-polarity protection	Yes (PV only)	
Rapid Shutdown NEC 2017	Integrated SunSpec-certified Transmitter	
Compatible Rapid Shutdown Receivers	See the Compatibility List	
Protection class/Over voltage category	I/II	

8. Specifications

Technical Data	S6-EH1P8K-H-US	S6-EH1P9.9K-H-US
General data		
Dimensions(H/W/D)	29.53*22.05*8.66 in (750*560*220mm)	
Weight	71.74 lbs (32.54 kg)	
Topology	Transformerless	
Operation temperature range	-25~+60 ℃/-31~+140 ℉	
Ingress protection	TYPE 4X (IP66)	
Noise emission (Typical)	<30 dB (A)	
Cooling method	Natural convection	
Max.operation altitude	13,120 ft (4000 m)	
Compliance	UL 1741 SB, UL 1741 SA, IEEE1547.1-2020,UL 1699B, UL 1998,FCC Part 15 Class B, California Rule 21, HECO Rule 14H (pending), NEC 690.12-2020,CAN/CSA C22.2107.1-1	
Generator support	Yes; up to 25 kW (with a Solis Power Hub)	
Features		
DC connection	1 in. knockouts for conduit (x2) on the side and bottom; Spring clamp terminals	
AC connection	1.5 in. knockouts for conduit (x3) on the side and bottom; Spring clamp terminals	
Interface	LED indicator lights, Bluetooth/Phone app	
Monitoring Platform	SolisCloud (modbus map and API sharing available upon request)	
Communication	RS485, Optional: Cellular, Wi-Fi, LAN	
Warranty	10 years standard (Extendable to 20 years)	

8. Specifications

Technical Data	S6-EH1P10K-H-US	S6-EH1P11.4K-H-US
Input DC (PV side)		
Recommended max. PV power	16,000W	18,240W
Max. input voltage	600V	
Rated voltage	380V	
Start-up voltage	80V	
MPPT voltage range	80-550V	
Full load MPPT voltage range	230-450V	245-450V
Max. input current per string	16A	
Max. short circuit current per string	25.6A	
Number of MPPTs/Number of strings per MPPT	4/1	
Energy Storage		
Battery type	Lithium-ion	
Battery voltage range	120 - 500V	
Maximum charge/discharge current	50A	
Battery Communication	CAN/RS485	
Number of batteries per inverter	See Battery Compatibility Sheet	
AC Output (Grid)		
Rated output power	10kW	11.4kW
Max. apparent output power	10kW	11.4kW
Rated output voltage	220V*/240V	
Rated frequency	60 Hz	
Rated output current	45.5A*/41.7A	51.8A*/47.5A
Max. output current	45.5A*/41.7A	51.8A*/47.5A
THDi	<3%	
AC Input (Grid)		
Input voltage range	193.6-242V*/211-264V	
Max. input current	68.2A*/62.6A	77.7A*/71.3A
Frequency range	59.5-60.5Hz*/58.8-61.2Hz	

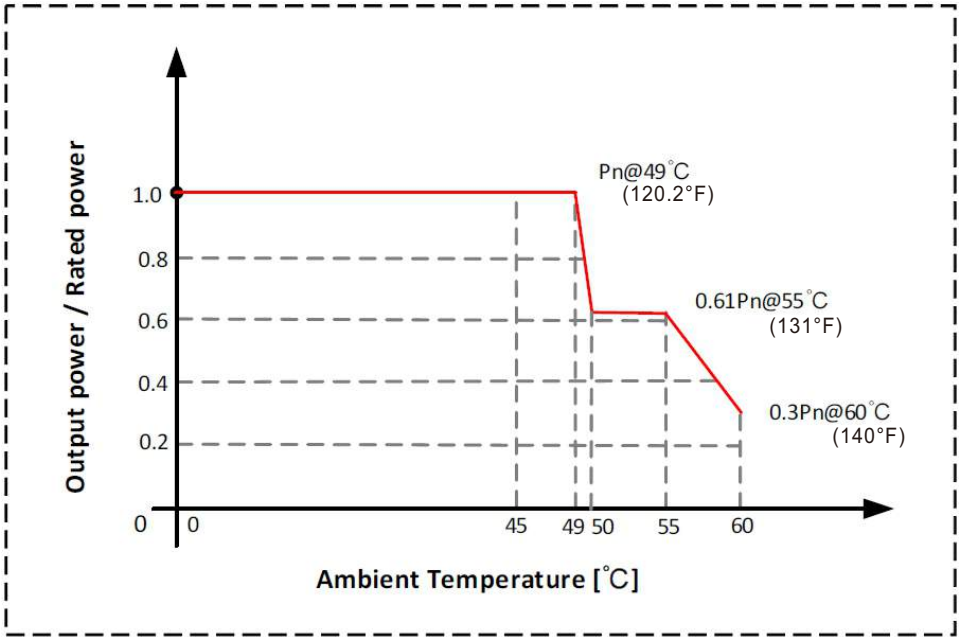
8. Specifications

Technical Data	S6-EH1P10K-H-US	S6-EH1P11.4K-H-US
AC Output (Backup and Off-grid)		
Rated output power	10kW	11.4kW
Max. apparent output power	16 kVA, 10 sec	18.2 kVA, 10 sec
Back-up switch time	< 10 ms	
Phase Power	220V*/240V Split-Phase	
Rated AC output voltage	220V*/240V	
AC output voltage range	193.6-242V*/211-264V	
Rated frequency	60 Hz	
Rated AC output current (continuous)	45.5A*/41.7A	51.8A*/47.5A
Max. output current for 10 seconds	72.7A*/66.7A	82.7A*/76.0A
Max. output current for 300 milliseconds	75.06A	85.5A
Max. allowable phase imbalance	100%	
Backup support configurations	Dedicated loads and whole-home	
Power Factor	>0.99 (0.8 leading - 0.8 lagging)	
THDv(@linear load)	<3%	
Efficiency		
PV Max. efficiency	97.6%	
PV CEC efficiency	97.0%	
BAT charged by PV Max. efficiency	98.5%	
BAT charged/discharged to AC Max. efficiency	97.0%	
Protection		
Ground fault detection	Yes	
Residual (leakage) current detection	Yes	
Integrated AFCI (DC arc-fault protection)	Yes	
DC reverse-polarity protection	Yes (PV only)	
Rapid Shutdown NEC 2017	Integrated SunSpec-certified Transmitter	
Compatible Rapid Shutdown Receivers	See the Compatibility List	
Protection class/Over voltage category	I/II	

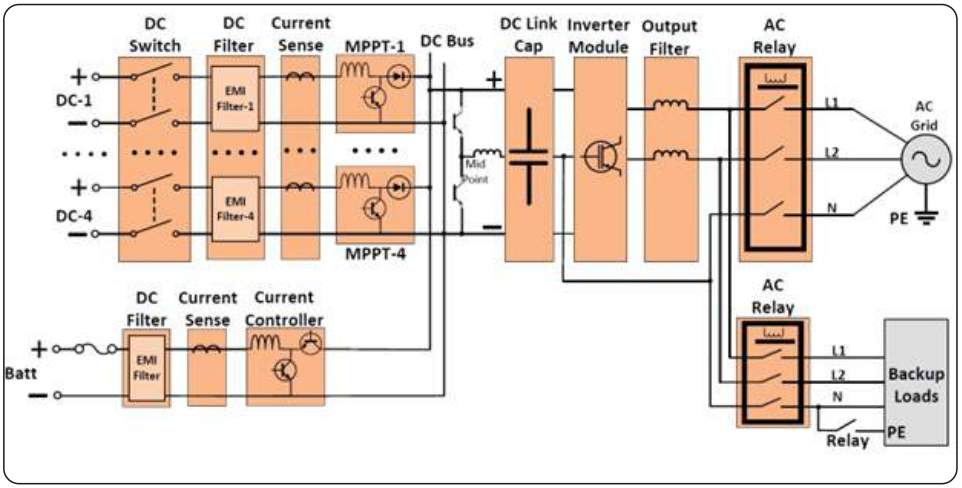
8. Specifications

Technical Data	S6-EH1P10K-H-US	S6-EH1P11.4K-H-US
General data		
Dimensions(H/W/D)	29.53*22.05*8.66 in (750*560*220mm)	
Weight	71.74 lbs (32.54 kg)	
Topology	Transformerless	
Operation temperature range	-25~+60 ℃/-31~+140 ℉	
Ingress protection	TYPE 4X (IP66)	
Noise emission (Typical)	<30 dB (A)	
Cooling method	Natural convection	
Max.operation altitude	13,120 ft (4000 m)	
Compliance	UL 1741 SB, UL 1741 SA, IEEE1547.1-2020,UL 1699B, UL 1998,FCC Part 15 Class B, California Rule 21, HECO Rule 14H (pending), NEC 690.12-2020,CAN/CSA C22.2107.1-1	
Generator support	Yes; up to 25 kW (with a Solis Power Hub)	
Features		
DC connection	1 in. knockouts for conduit (x2) on the side and bottom; Spring clamp terminals	
AC connection	1.5 in. knockouts for conduit (x3) on the side and bottom; Spring clamp terminals	
Interface	LED indicator lights, Bluetooth/Phone app	
Monitoring Platform	SolisCloud (modbus map and API sharing available upon request)	
Communication	RS485, Optional: Cellular, Wi-Fi, LAN	
Warranty	10 years standard (Extendable to 20 years)	

9.1 Temperature Derating Curve



9.2 Inverter Internal Topology Overview



9. Appendix

9.3 UL Certification

Certificate of Compliance

Certificate:	80127112	**Master Contract:**	273488
Project:	80127113	**Date Issued:**	2023-01-13

Issued to: Ginlong Technologies Co., Ltd.
No.57, Jintong Road, Xiangshan
Ningbo, Zhejiang, 130 315712
CHINA

Attention: Ruyi Pan

The products listed below are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US or with adjacent indicator 'US' for US only or without either indicator for Canada only

C US

Issued by: Magic Zhang
Magic Zhang

PRODUCTS

CLASS - C531109 - POWER SUPPLIES - Distributed Generation Power Systems Equipment
CLASS - C531189 - POWER SUPPLIES - Distributed Generation-Power Systems Equipment - Certified to U.S. Standards

Bi-directional Transformerless Utility Interactive Power Conversion Equipment, S6-EH1P(3.8-11.4)K-H-MEX series, include Models S6-EH1P3.8K-H-MEX, S6-EH1P5K-H-MEX, S6-EH1P6K-H-MEX, S6-EH1P7.6K-H-S-MEX, S6-EH1P7.6K-H-L-MEX, S6-EH1P8K-H-MEX, S6-EH1P10K-H-MEX and S6-EH1P11.4K-H-MEX, permanently connected.

Bi-directional Transformerless Grid Support Utility Interactive Power Conversion Equipment, S6-EH1P(3.8-11.4)K-H-US series, include Models S6-EH1P3.8K-H-US, S6-EH1P5K-H-US, S6-EH1P6K-H-US, S6-EH1P7.6K-H-S-US, S6-EH1P7.6K-H-L-US, S6-EH1P8K-H-US, S6-EH1P10K-H-US and S6-EH1P11.4K-H-US, permanently connected.

For details related to rating, size, configuration, etc., reference should be made to the CSA Certification Record, Certificate of Compliance, Annex A, or the Descriptive Report.

Certificate: 80127112
Project: 80127113

Master Contract: 273488
Date Issued: 2023-01-13

APPLICABLE REQUIREMENTS

CSA-C22.2 No.107.1-16	-	Power Conversion Equipment
*UL Std No. 1741	-	Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources (Third Edition, Dated September 28, 2021)
**UL 1699B	-	Photovoltaic (PV) DC Arc-Fault Circuit Protection (First Edition, Revision Dated August 22, 2018)
**UL1741 CRD	-	Non-Isolated EPS Interactive PV Inverters Rated Less Than 30Kva (Dated April 26, 2010)

*Note: Conformity to UL 1741(Third Edition, Dated September 28, 2021) includes compliance with applicable requirements of IEEE 1547-2003 (R2008), IEEE 1547a-2014, IEEE 1547.1-2005(R2011), IEEE 1547.1a-2015 for all models. Grid support function is verified according to UL 1741 Supplement SA8-SA18 with the SRDs of California Electric Rule 21, and also verified according to UL 1741 Supplement SB and IEEE 1547.1-2020 with the SRDs of IEEE 1547-2018 and IEEE 1547a-2020 for S6-EH1P(3.8-11.4)K-H-US series inverter. While the grid support function evaluated according to IEEE 1547.1-2020, the interoperability is verified with IEEE 2030.5-2018 communication protocol.

**Note: The functional safety has been evaluated according to applicable requirement of UL 1998-Edition 3 as required by the product standard.

Notes:

Products certified under Class C531109 have been certified under CSA's ISO/IEC 17065 accreditation with the Standards Council of Canada (SCC). www.scc.ca

9. Appendix

Supplement to Certificate of Compliance

Certificate: 80127112 **Master Contract:** 273488

The products listed, including the latest revision described below, are eligible to be marked in accordance with the referenced Certificate.

Product Certification History

Project	Date	Description
80127113	2023-01-13	Updated report 80127112 to add S6-EH1P(3.8-11.4)K-H-US series inverter, include models S6-EH1P3.8K-H-US, S6-EH1P5K-H-US, S6-EH1P6K-H-US, S6-EH1P7.6K-H-S-US, S6-EH1P7.6K-H-L-US, S6-EH1P8K-H-US, S6-EH1P10K-H-US, S6-EH1P11.4K-H-US and evaluate the Grid support function to comply with UL 1741 Supplement SA8-SA18 with the SRDs of California Electric Rule 21 and UL 1741 Supplement SB according to IEEE 1547.1-2020 with SRDS IEEE 1547-2018 and IEEE 1547a-2020.
80127112	2022-09-20	Bi-directional Transformerless Utility Interactive Power Conversion Equipment, S6-EH1P(3.8-11.4)K-H-MEX series, include Models S6-EH1P3.8K-H-MEX, S6-EH1P5K-H-MEX, S6-EH1P6K-H-MEX, S6-EH1P7.6K-H-S-MEX, S6-EH1P7.6K-H-L-MEX, S6-EH1P8K-H-MEX, S6-EH1P10K-H-MEX and S6-EH1P11.4K-H-MEX. (C/US)

9.4 FCC Instructions

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC WARNING:
Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note:
This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-Reorient or relocate the receiving antenna.
-Increase the separation between the equipment and receiver.
-Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
-Consult the dealer or an experienced radio/TV technician for help.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

Ginlong Technologies Co., Ltd.
No. 57 Jintong Road, Binhai Industrial Park, Xiangshan, Ningbo,
Zhejiang, 315712, P.R.China.
Tel: +1(866)438-8408
Email:info@ginlong.com
Web:www.ginlong.com

If you encounter any problems with the inverter, please take note of the inverter serial number and then contact us using the phone number or email listed above.

SunSpec Certified

Compliant with CA Rule 21 & HECO Rule 14H
Certified to UL 1741 SA and UL 1741 SB
Certified to UL Std. No. 1741-Second Edition
& CSA-C22.2 No.107.1-16