User Manual

for S6 Series Hybrid Inverter

Applicable 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

Applicable System

Single phase system

Version 1.0, Release Date: 10,2022

Contents

1.1 Product Description

The Solis S6 Series is designed for residential hybrid systems, which can work with high voltage lithium ion batteries to maximize self-consumption rate.
This product can operate in both ON-Grid and OFF-Grid modes.
The Solis S6 hybrid inverter series contain the following models which are grid tied transformerless inverters:
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

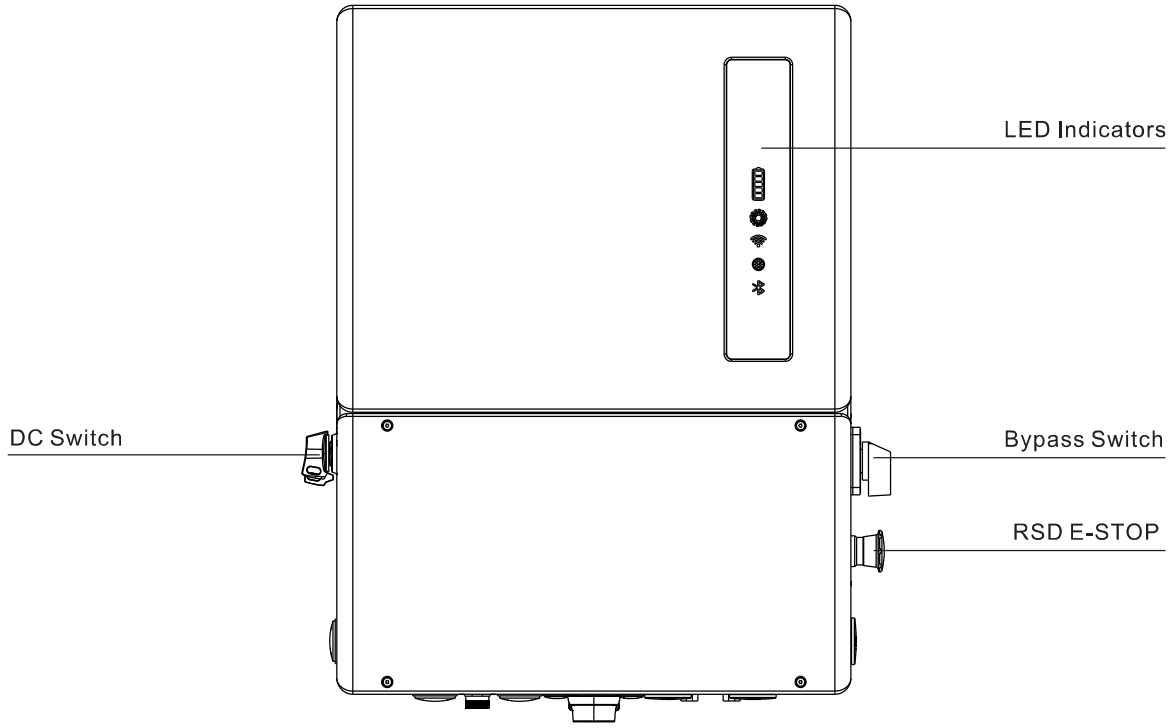


Figure 1.1 Front side view

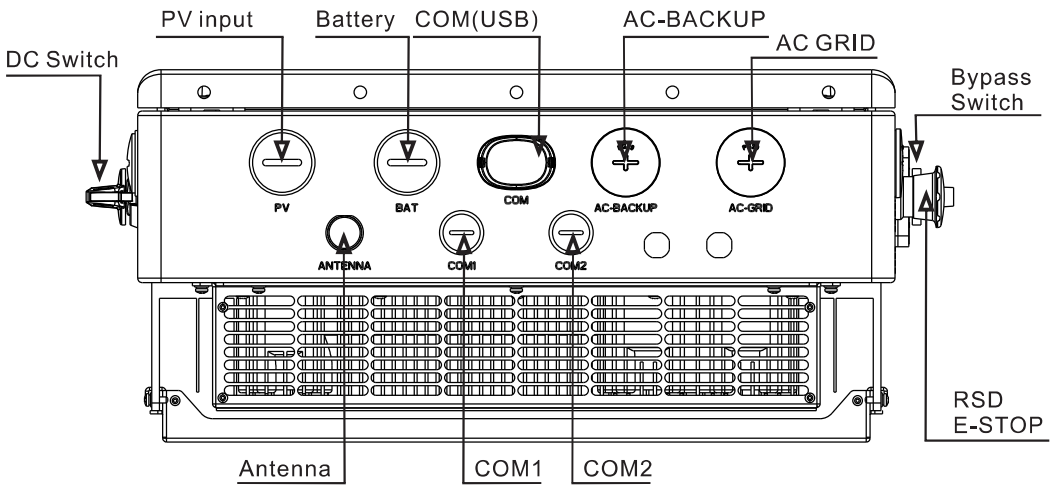
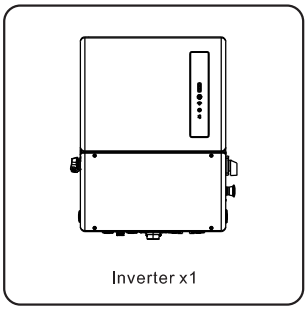
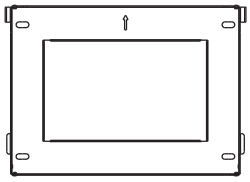


Figure 1.2 Bottom side view

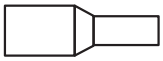
1.2 Packaging

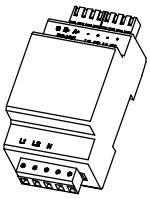
Please ensure that the following items are included in the packaging with your machine:

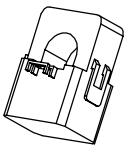

Inverter x1

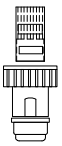

Back plate x1


Hexagon bolt(M4*14) x2

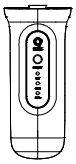

R-Shaped Terminal x18

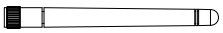

External meter x1


CT x2


RJ45 Connector x5


L-Shaped Wrench x1


WiFi/GPRS Stick x1(optional)


Bluetooth Antenna x1

User manual x1

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

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 areas containing highly flammable materials or gases.
- Do not install the inverter in potentially explosive atmospheres.

2.2 General Safety Instructions

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

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

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

WARNING:
Do not touch any inner live parts until 5 minutes after disconnection from the utility grid and the PV input.

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

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

CAUTION:
The PV array supplies a DC voltage when they 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's operating. Inverter must be installed out of the reach of children.

NOTE:
PV module used with inverter must have an IEC 61730 Class A rating.

WARNING:
Operations below must be accomplished by licensed technician or Solis authorized person.

WARNING:
Operator must put on the technicians' gloves during the whole process in case of any electrical hazards.

WARNING:
AC BACKUP Port of S6 Series is not allowed to connect to the grid.

WARNING:
Please refer to the specification of the battery before configuration.

2.3 Notice for Use

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

1. Permanent installation is required.

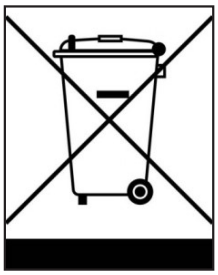
2. The electrical installation must meet all the applicable regulations and standards.

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

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

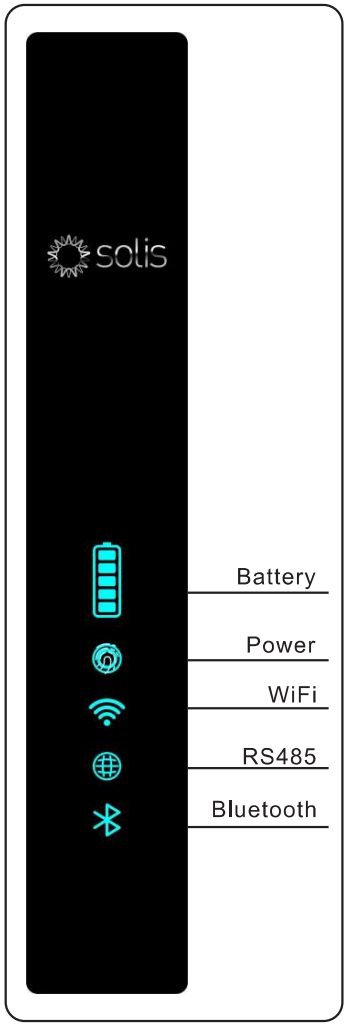
2.4 Notice for Disposal

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



3.1 Intelligent LED Indicators

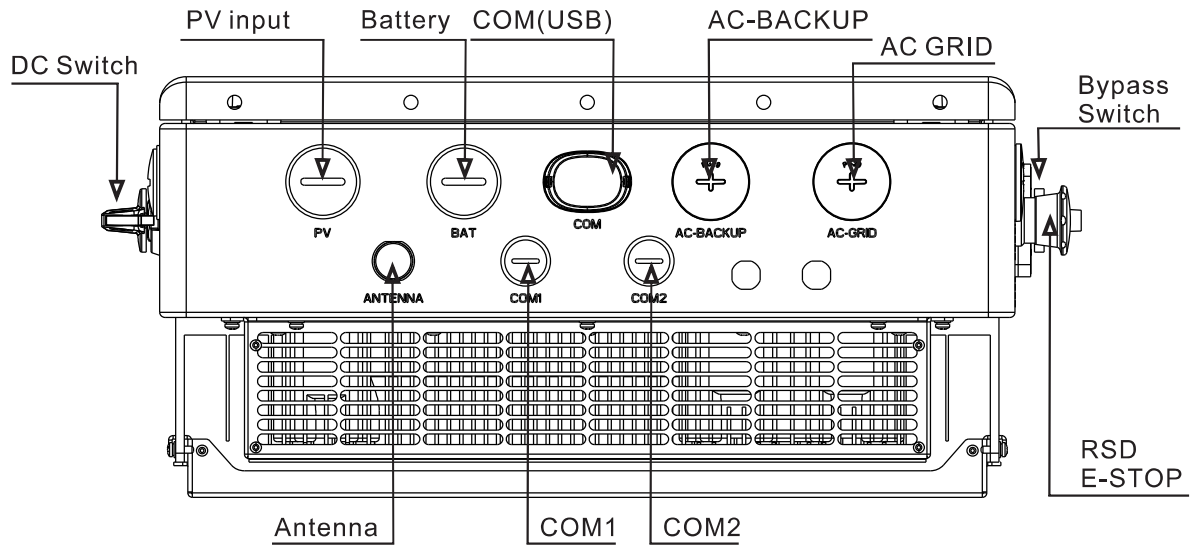
There are five indicators on the The Solis S6-EH1P(3.8-11.4)K-H-US Series Inverter (Battery, Power, WiFi, RS485 and Bluetooth) which indicate the working status of the inverter.
The Bluetooth Antenna or WiFi datalogger shall be installed at the Antenna/COM port of the hybrid inverter before local debugging.



Light	Status	Description
Battery	Blue Flashing every 3s	Battery discharging.
	Blue Flashing every 1.5s	Battery charging.
	Blue Solid ON	Idle.
	Yellow Solid ON	Battery Warning.
Power	Blue Solid ON	Normally Operating.
	Yellow Solid ON	Warning.
	Red Solid ON	Alarm.
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.

NOTE:
Battery/WiFi/RS485/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.

3.2 Terminal Connection Overview



Name	Description
DC Switch	The switch is used to turn off the PV inputs
PV Input	conduit for passing through PV cables
Battery	conduit for passing through Battery cables
COM(USB)	USB Type communication port for connecting Solis data loggers
AC-BACKUP	conduit for passing through AC cables for backup circuit
AC-GRID	conduit for passing through AC cables for grid circuit
Antenna	Antenna connection for local bluetooth signal
COM1/COM2	conduits for communication cables
RSD-E-STOP	Rapid shutdown emergency button to power off the transmitter and module level receivers
Bypass Switch	Bypass switch for backup circuit. Mode 0 - Backup load is disconnected from the system Mode 1 - Backup load is supported by the Grid Mode 2 - Backup load is supported by the Backup circuit of the inverter

4.1 Select a Location for the Inverter

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

- Exposure to direct sunlight may cause output power derating. It is recommended to avoid installing the inverter in direct sunlight.
- It is recommended that the inverter is installed in a cooler ambient which doesn't exceed 104F/40C.

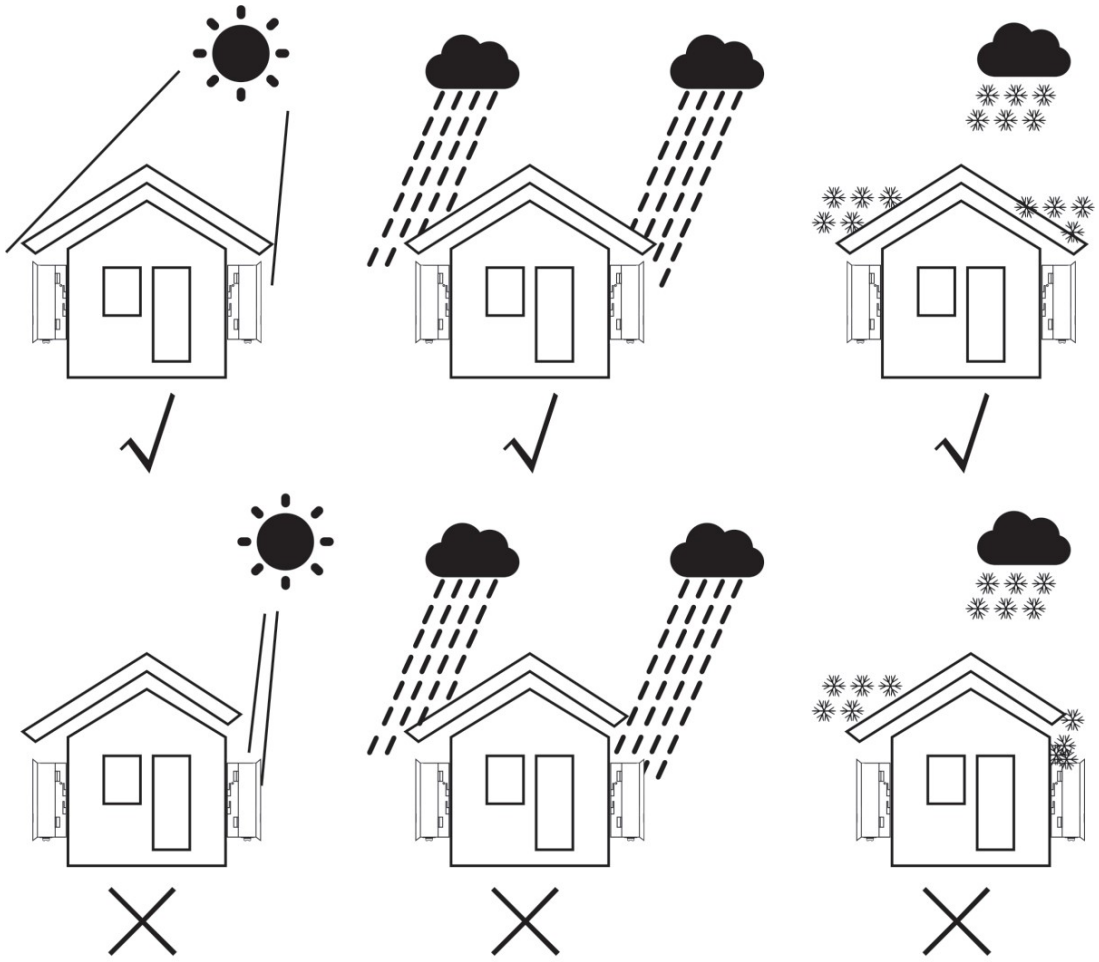


Figure 4.1 Recommended Installation locations

WARNING: Risk of fire

Despite careful construction, electrical devices can cause fires.

- Do not install the inverter in areas containing highly flammable materials or gases.
- Do not install the inverter in potentially explosive atmospheres.
- The mounting structure where the inverter is installed must be fireproof.

- Install on a wall or strong structure capable of bearing the weight of the machine (30kg).
- Install vertically with a maximum incline of +/- 5 degrees: exceeding this may cause output power derating.
- To avoid overheating, always ensure the flow of air around the inverter is not blocked. A minimum clearance of 300mm(11.8in) should be kept between inverters or objects and 500mm(19.6in) clearance between the bottom of the machine and the ground.

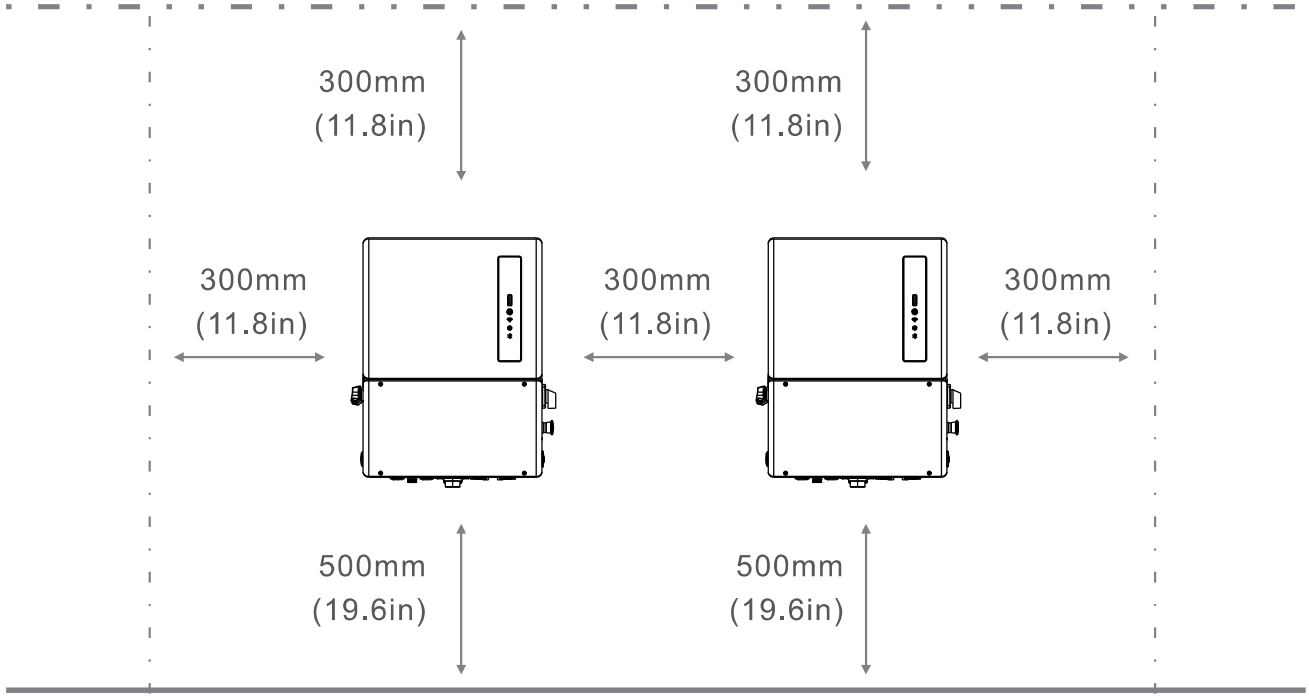


Figure 4.2 Inverter Mounting clearance

- Visibility of the LEDs should be considered.
- Adequate ventilation must be provided.

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

4.2 Mounting the Inverter

Dimensions of mounting bracket:

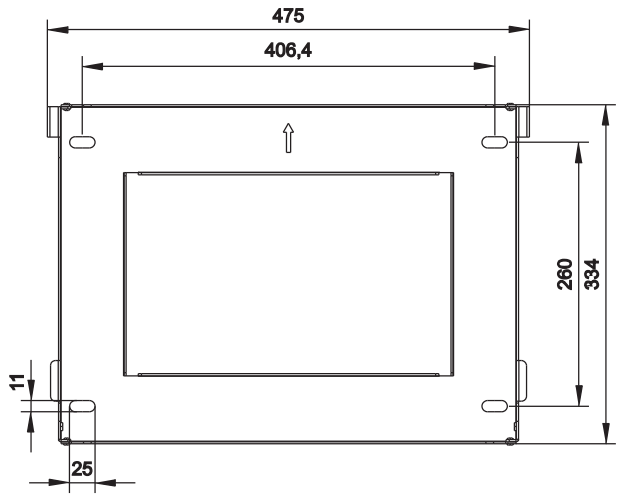


Figure 4.3 Inverter wall mounting

Once a suitable location has been found according to 4.1 using figures 4.3 and 4.4 mount the wall bracket to the wall.

The inverter shall be mounted vertically.

The steps to mount the inverter are listed below:

1. Select the mounting height of the bracket and mark the mounting holes.
   For brick walls, the position of the holes should be suitable for the expansion bolts.

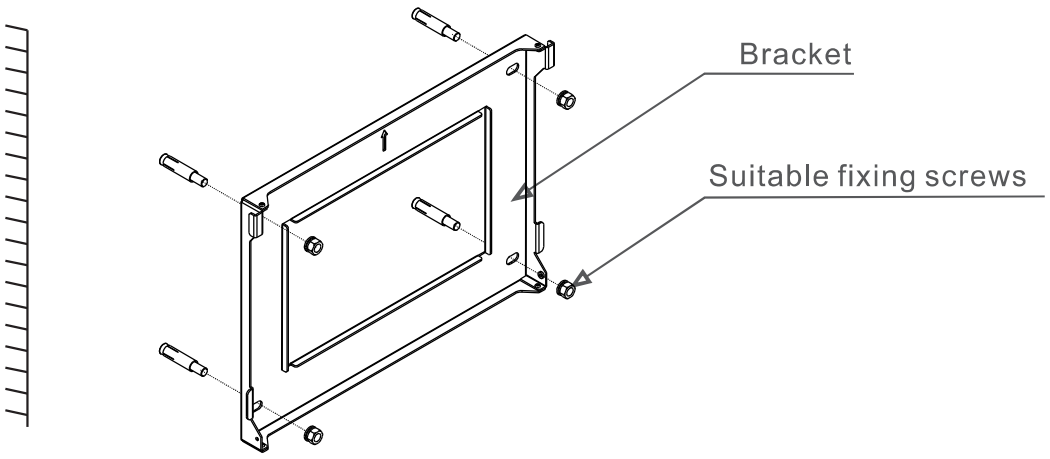


Figure 4.4 Fix bracket on the wall

WARNING:
The inverter must be mounted vertically.

2.Lift up the inverter (be careful to avoid body strain) and align the back bracket on the inverter with the convex section of the mounting bracket. Hang the inverter on the mounting bracket and ensure the inverter is secure (see Figure 4.5)

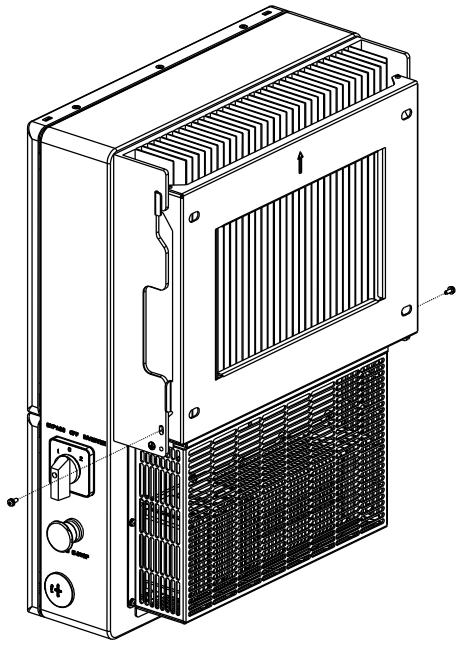


Figure 4.5 Wall Mount Bracket

NOTE:
The installation shall meet the National Electrical Code, ANSI/NFPA 70 and Canadian Electrical Code wiring methods.

	Cross-sectional Dimension	Functionality	Where to connect
PV Cables	12-10AWG, 90°C Copper	PV DC source	From PV strings to terminal “DC+” and “DC-”
Battery Cables	10-8AWG for 3.8K-7.6K-(S), 6AWG for 7.6K-(L)-11.4K, 90°C Copper	Battery DC source	From Battery modules to terminal “BAT+” and “BAT-”
AC Grid Cables	12AWG for 3.8K, 12-10AWG for 5K, 10AWG for 6K, 8AWG for 7.6K-8K, 6AWG for 10K-11.4K, 90°C Copper	AC Grid connection	From incoming AC distribution box to terminal AC-GRID “L1” and “L2”
AC Backup Cables	12AWG for 3.8K, 12-10AWG for 5K, 10AWG for 6K, 8AWG for 7.6K-8K, 6AWG for 10K-11.4K, 90°C Copper	AC Backup connection	From backup loads to terminal AC-BACKUP “L1”,and “L2”
Ground Cables	12AWG for 3.8K, 12-10AWG for 5K, 10AWG for 6K, 8AWG for 7.6K-8K, 6AWG for 10K-11.4K, 90°C Copper	Grounding connection (Dimension depends on AC backup cables and AC grid cables)	From AC groundings to copper bar inside the wiring box
Meter COM cable	22-16AWG, 90°C Copper	Communication between inverter to Meter	From meter to terminal MT “A” and “B”. Details refer to “4.2.2 Install the energy meter”
CAN Cable	22-16AWG, 90°C Copper	Communication between inverter to Battery	From battery to terminal CAN “L” and “H”. Details refer to 4.2.3 Install the battery
BMS Cable	22-16AWG, 90°C Copper	Not Applicable in these systems	Not Applicable in these systems
Cover External Grounding Cable	12AWG for 3.8K, 12-10AWG for 5K, 10AWG for 6K, 8AWG for 7.6K-8K, 6AWG for 10K-11.4K, 90°C Copper	Ground the inverter cover	From grounding screw on the inverter external cover to the ground
Datalogger (Optional)	Pre-assembled Plug	Modbus/Sunspec Communication between the system and the Solis monitoring portal	USB COM port at the bottom of the inverter. (Detailed info please refer to Solis datalogger user manual)

Table 4.1 Wire Specification

4.3 PE Cable Installation

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

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

Connect the OT terminal with ground cable to the right side of inverter. The torque is 2N.m.

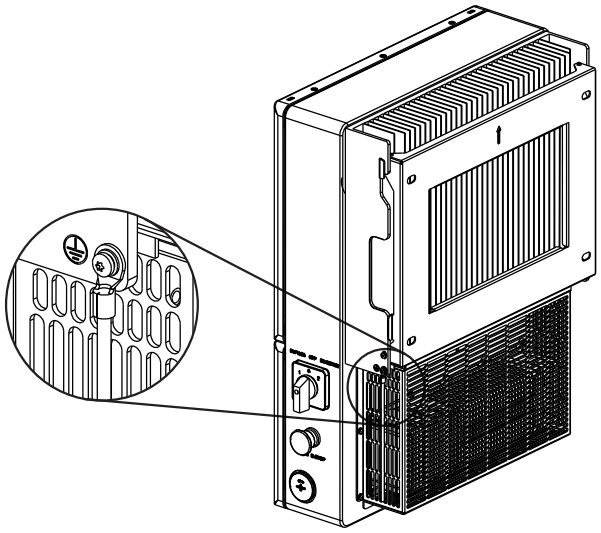


Figure 4.6 Connect the external grounding conductor

4.4 PV Input Cable Installation

Please ensure the following before connecting the inverter:

- Ensure the voltage of the PV string will not exceed the max DC input voltage (600Vdc). Violating this condition will void the warranty.
- Ensure the polarity of the PV terminals and battery are correct.
- Ensure the DC-switch, battery, AC-BACKUP, and AC-Grid are all in their off-states.
- Ensure the PV resistance to ground is higher than 20K ohms.

PV wire requirements: 12-10AWG 90°C Copper

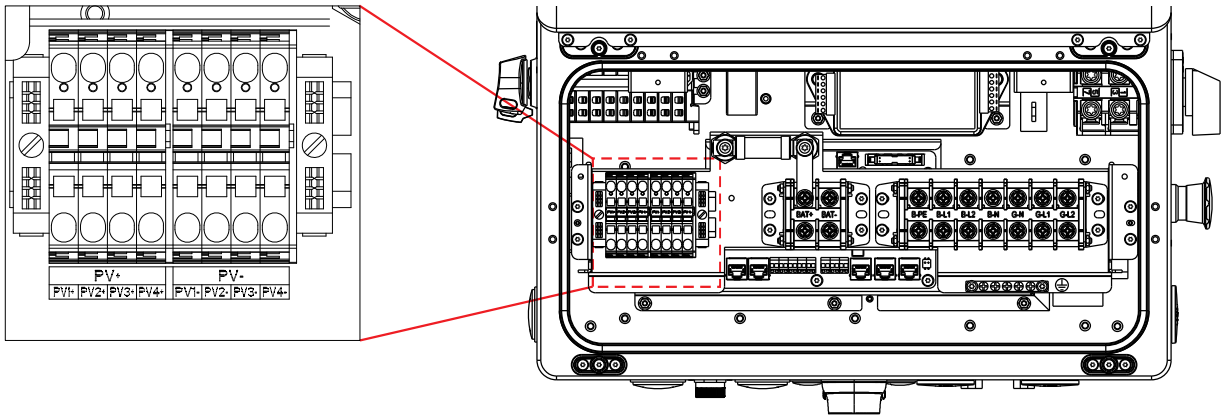


Figure 4.7 PV input terminals

CAUTION:

If DC inputs are accidently reversely connected or inverter is faulty or not working properly, it is NOT allowed to turn off the DC switch. Otherwise it may cause DC arc and damage the inverter or even lead to a fire disaster.
The correct actions are:
*Use a clip-on ammeter to measure the DC string current.
*If it is above 0.5A, please wait for the solar irradiance reduces until the current decreases to below 0.5A.
*Only after the current is below 0.5A, you are allowed to turn off the DC switches and disconnect the PV strings.
* In order to completely eliminate the possibility of failure, please disconnect the PV strings after turning off the DC switch to aviod secondary failures due to continuous PV energy on the next day.
Please note that any damages due to wrong operations are not covered in the device warranty.

4.5 Battery Fuse Terminals

Battery power cables should be connected to the battery fuse terminals in the wiring box through the BAT conduit.

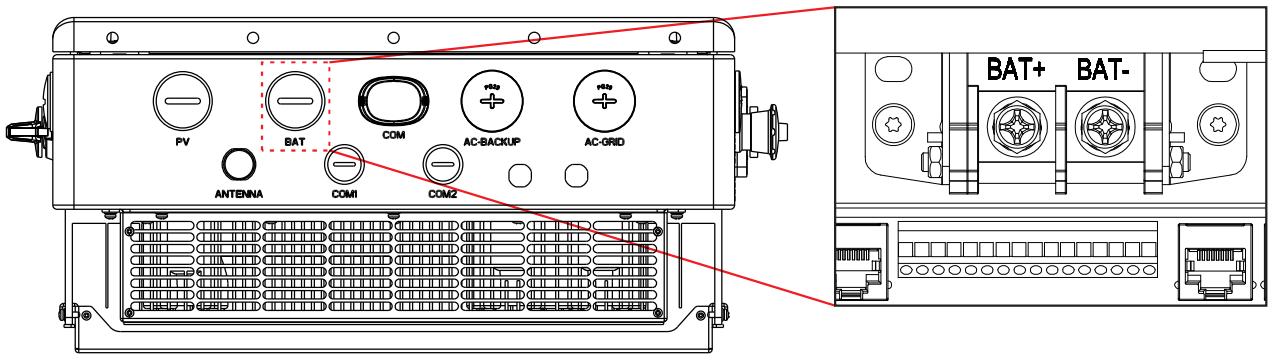


Figure 4.8 Connected to the battery fuse terminals

Model	S6-EH1P(3.8-7.6)K-H-(S)	S6-EH1P(7.6-11.4)K-H-(L)
Battery Cable Cross Sectional Area	10-8 AWG	6 AWG
OT Terminal	M6	M6
Torque	4-5N.m	4-5N.m
Battery Conduit Diameter	34.5mm	34.5mm

Table 4.2 Battery power cable requirement

Note:

The battery fuses in the wiring box are replaceable.
The replacement must be done by Solis authorized technicians only.
Fuse specification: 750V, 63A.

Note:

Before connecting the battery, please carefully read the user manual of the battery and perform the installation exactly as the battery manufacturer requests.

4.6 AC Cable Installation

There are two AC terminals and the assembly steps for both are the same.

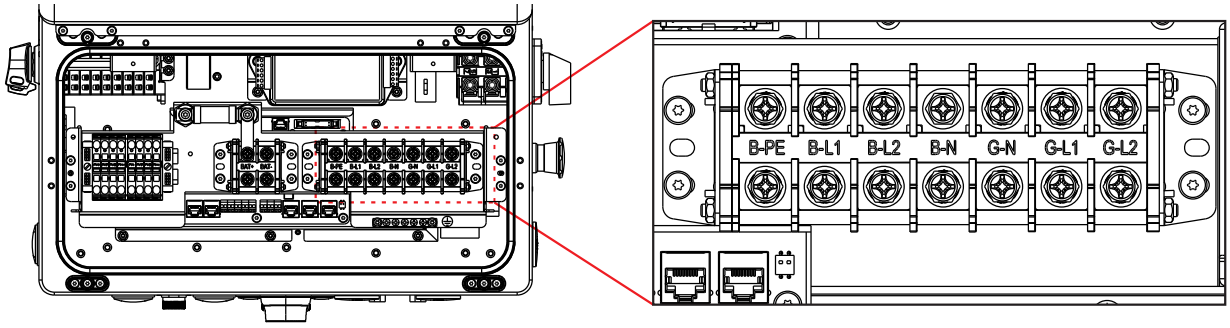


Figure 4.9 AC output terminals

Model	S6-EH1P3.8K-H	S6-EH1P5K-H	S6-EH1P6K-H	S6-EH1P (7.6-8)K-H	S6-EH1P (40-11.4)K-H
AC Grid Cable Cross Sectional Area	12 AWG	12-10 AWG	10 AWG	8 AWG	6 AWG
AC Backup Cable Cross Sectional Area	12 AWG	12-10 AWG	10 AWG	8 AWG	6 AWG
Torque	4.5N.m	4.5N.m	4.5N.m	4.5N.m	4.5N.m
OT Terminal	M6	M6	M6	M6	M6
Grounding Bar Specification	12 AWG	12-10 AWG	10 AWG	8 AWG	6 AWG
AC Grid Conduit Diameter	37.3mm	37.3mm	37.3mm	37.3mm	37.3mm
AC Backup Conduit Diameter	37.3mm	37.3mm	37.3mm	37.3mm	37.3mm

Table 4.3 AC wire specification

1. Lead the AC cables into the corresponding conduit.
2. Please refer to the terminal marks to connect the AC wires accordingly.

B-L1 -> AC Backup L1
B-L2 -> AC Backup L2
B-N -> AC Backup Neutral
G-N -> AC Grid Neutral
G-L1 -> AC Grid L1
G-L2 -> AC Grid L2

Note:
Do not mismatch the AC terminals, otherwise the inverter may not function properly.

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

To protect the inverter's AC connection line, we recommend installing a device for protection against over-current and leakage, with the following characteristics noted in Table 4.4:

Inverter	Rated voltage(V)	Grid Max Output Current (Amps)	Grid Max Input Current (Amps)	Current for protection device (A)
S6-EH1P3.8K-H-US	240/120	15.8	23.8	30
S6-EH1P5K-H-US	240/120	20.8	31.2	40
S6-EH1P6K-H-US	240/120	25.0	37.5	50
S6-EH1P7.6K-H-S-US	240/120	31.7	47.6	60
S6-EH1P7.6K-H-L-US	240/120	31.7	47.6	60
S6-EH1P8K-H-US	240/120	33.3	49.9	65
S6-EH1P10K-H-US	240/120	41.7	62.6	80
S6-EH1P11.4K-H-US	240/120	47.5	71.3	90

Table 4.4 Rating of grid OCPD

4.6 Communication Terminals

4.6.1 Communication Terminal Definition

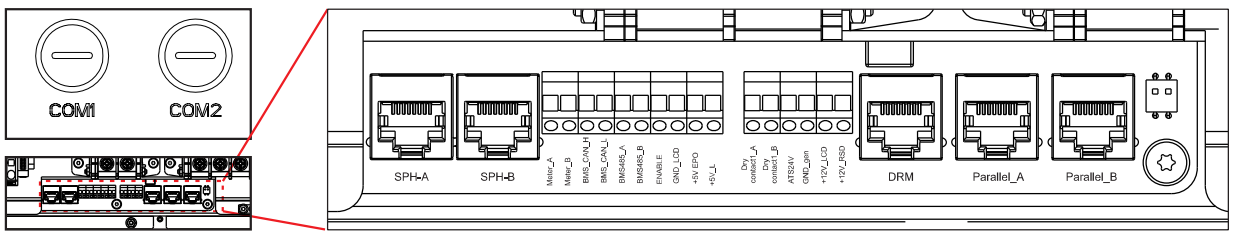


Figure 4.10 Communication port

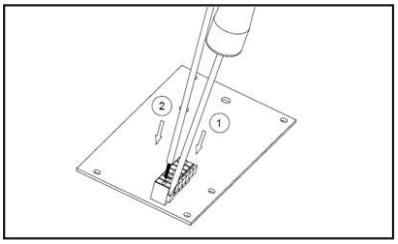
From left to right, the communication terminals consist of 16 ports.

NO.	Port	Spec	Function
1	Meter_A	22-16 AWG	Used for RS485 communication between inverter and the compatible smart meter. It is necessary to realize the normal hybrid control logics.
2	Meter_B		
3	BMS_CAN_H		Used for CAN communication with compatible battery.
4	BMS_CAN_L		
5	BMS485_A		Used for RS485 communication with compatible battery.
6	BMS485_B		
7	ENABLE		
8	GND_LCD		
9	+5V EPO		Emergency Power Off Signal.
10	+5V_L		
11	Dry contact1_A		(Reserved)Dry contact for generator connection.
12	Dry contact1_B		
13	ATS24V		(Reserved)For ATS connection.
14	GND_gen		
15	+12V_LCD		(No Need Connect)Power Supply for control board.
16	+12V_RSD		(No Need Connect)Power Supply for MLRSD Transmitter.
17	Parallel_A	RJ45 Port	(Reserved) For parallel connection.
18	Parallel_B		
19	DRM		Not Applicable.
20	COM	USB Type Port	For inverter remote monitoring connection.
21	COM1/COM2	Conduit	Empty conduit for running through communication cables.
22	ANTENNA		For connecting the bluetooth antenna.

Table 4.5 communication terminals

Note:
Diameter of the conduits for COM1 and COM2 is 22.5 mm. Please arrange suitable communication wires to run through the two conduits.

Note:
Communication Terminal Connection Steps:
1. Use slot type screwdriver to press the block on the top.
2. Insert the exposed copper part of the cable into the terminal.
3. Remove the screwdriver and the terminal will clamp down on the exposed copper.
4. Give the cable a gentle tug to ensure that it is firmly secured.



4.6.2 Meter Communication

AGF-AE-D smart meter is provided in the accessory package, please follow the following diagram to connect the meter communication wires to the Meter_A and Meter_B pins on the communication terminal.

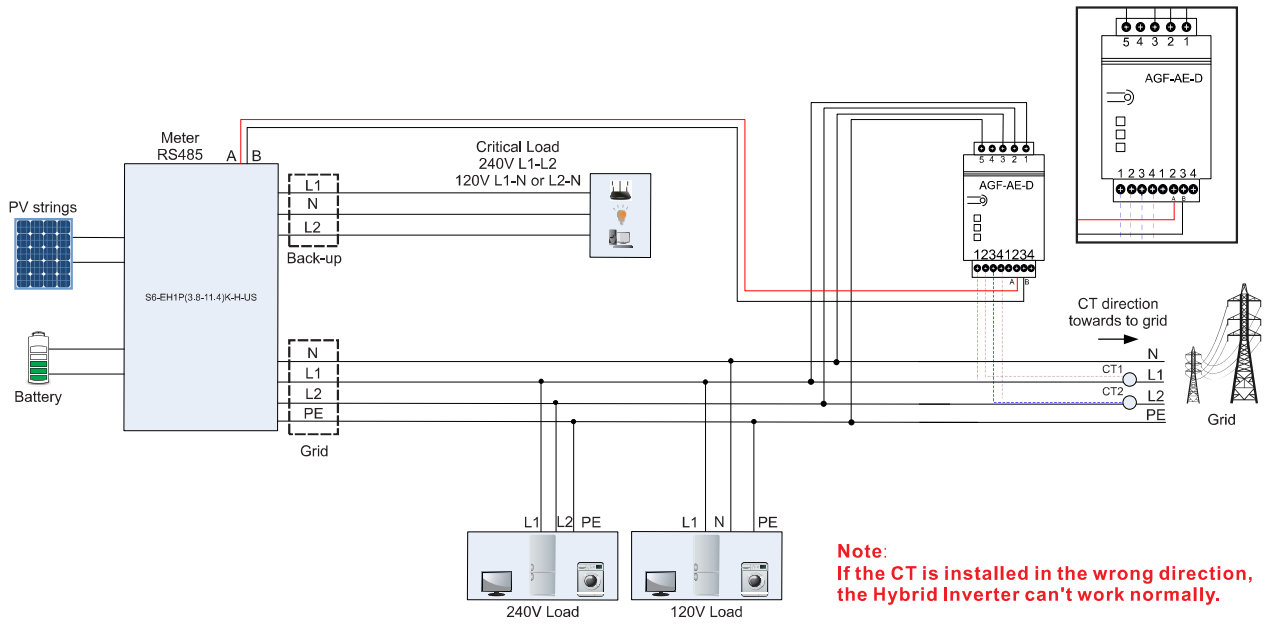


Figure 4.11 Meter (AGF-AE-D)

4.6.3 Battery Communication

CAN Communication Terminals: BMS_CAN_H / BMS_CAN_L
RS485 Communication Terminals: BMS485_A/BMS485_B/ENABLE/GND_LCD.

- BYD Battery

For BYD Battery-BoxH, BMS_CAN_H / BMS_CAN_L are used
The detailed connection is shown in the following figure.

Figure 4.12 BYD Battery Communication

- LG Battery BMS485_A/BMS485_B/ENABLE/GND_LCD

For LG RESU10H Type R, BMS485_A/BMS485_B/ENABLE/GND_LCD are used
The detailed connection is shown in the following figure.

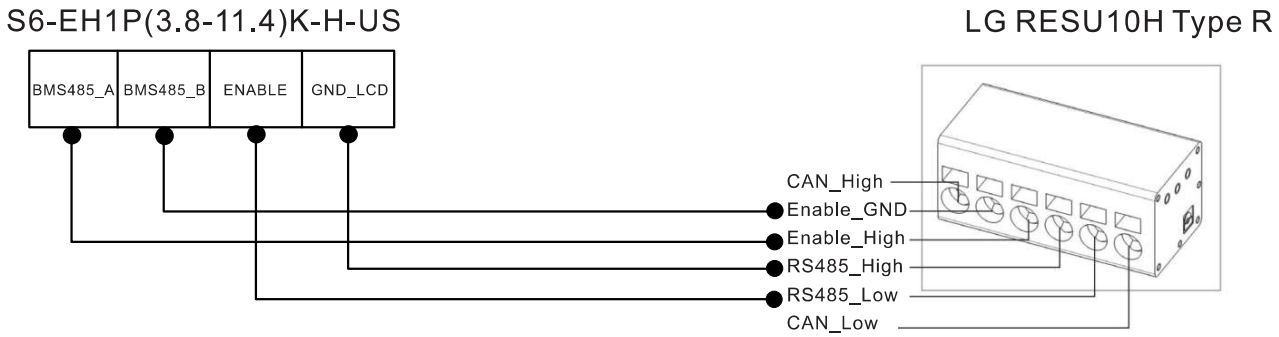


Figure 4.13 LG Battery Communication

Note:

When working with LG batteries in OFF-GRID mode, due to the circuit design of the battery, some specific loads may cause the inverter to display battery alarm. This is a normal situation and the system will recover once the grid is available.

4.6.4 Inverter Remote Monitoring Connection

The inverter can be remotely monitored via WiFi, LAN or 4G.
The USB type COM port at the bottom of the inverter can connect to different kinds of Solis data loggers to realize the remote monitoring on Soliscloud platform.
To install Solis data loggers, please refer to corresponding user manuals of Solis data loggers.
The Solis data loggers are optional and can be purchased separately.
Dust cover is provided the inverter package in case the port is not used.

WARNING:
The USB type COM port is only allowed to connect Solis data loggers.
It is forbidden to be used for other purposes.

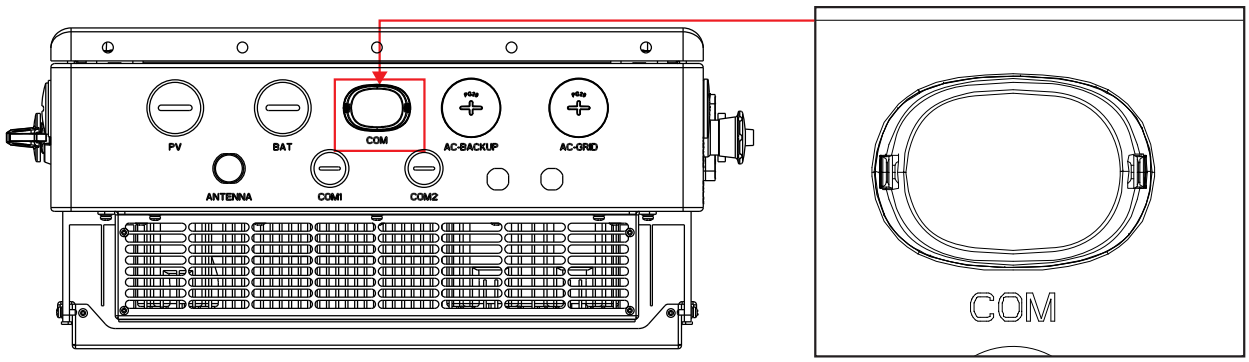


Figure 4.14

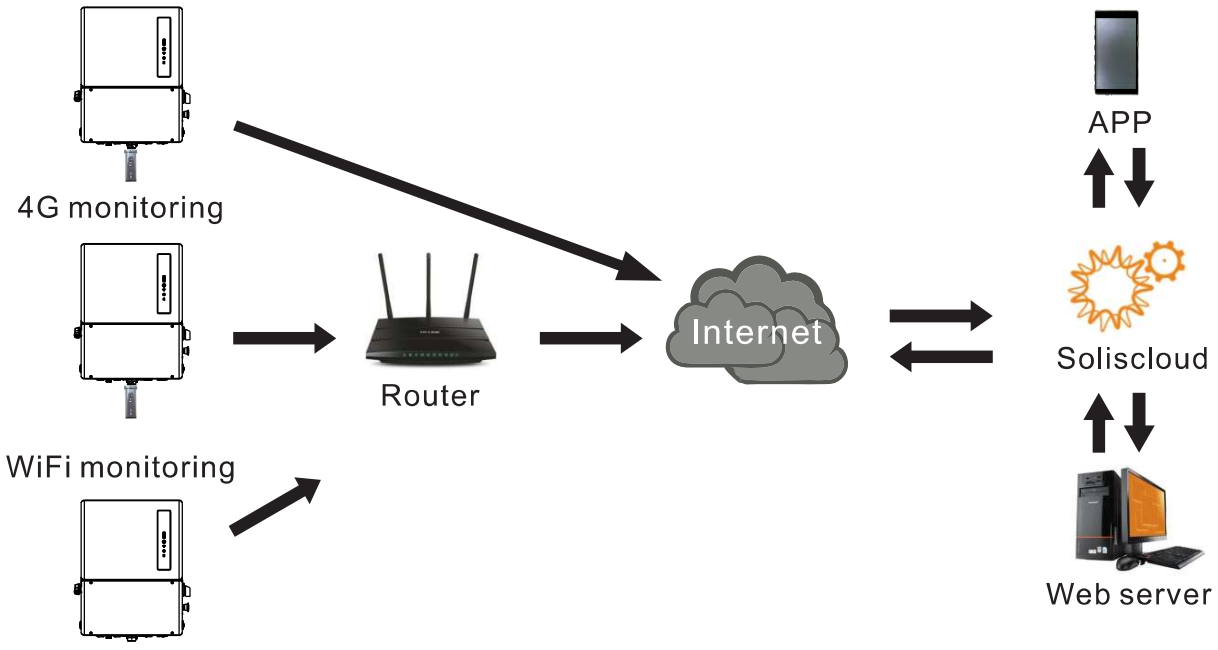


Figure 4.15 Wireless communication function

4.6.5 Local Bluetooth Antenna Connection

An antenna is provided in the accessory package, please insert the antenna to the “ANTENNA” port at the bottom of the inverter to enhance the local bluetooth signal strength.

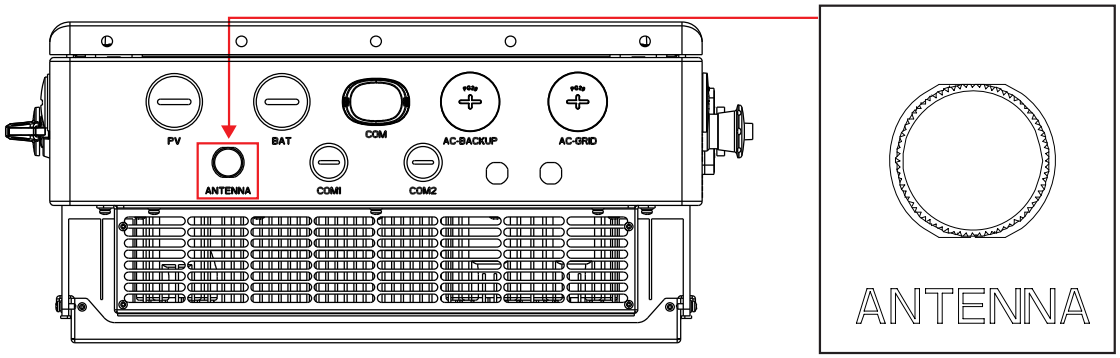


Figure 4.16