Growatt New Energy

Download
Manual

Shenzhen Growatt New Energy Technology CO.,LTD
No.28 Guangming Road, Shiyan Street, Bao'an District,
Shenzhen, P.R.China
T +86 755 2747 1942
E service@ginverter.com
W www.ginverter.com

SPH3000TL BL-US
SPH3600TL BL-US
SPH4000TL BL-US
SPH4600TL BL-US
SPH5000TL BL-US
SPH6000TL BL-US

Installation & Operation Manual

List

1 Brief Introduction

1.1 Preface

This manual will provide the users who use the SPHTL BL-US Series with the detailed product information and the installation instructions. Please read this manual carefully and put this manual on some place where is convenient to installation, operation, obtain. If there are any modifications , we will not notify the user.

1.2 Target Group

SPH TL BL-US inverter must be installed by professional electrical personnel who have obtained the certification of the relevant departments. We have two kinds of energy storage machine for different battery one is for lithium battery and the other is for lead-acid battery, we suggest: customer should decide which kind of energy storage machine you want, manufacturer can provide only lithium battery with energy storage machine, customer can change to lead-acid mode while they can buy these battery from market easily. Especially if customer choose energy storage system with lithium battery (which must be provide by manufacturer or in the compatibility list which provide by manufacturer) but used for lead-acid battery or used lead-acid battery for lithium battery model, it will be dangerous. Installer can install energy storage machine of SPHTL BL-US Series rapidly and troubleshooting, build communication system through read this manual carefully. If you have any questions in the process of installation, you can login in www.ginverter.com and leave some message. Or you can call our 24-hour service hotline :+86 0755-29515888.

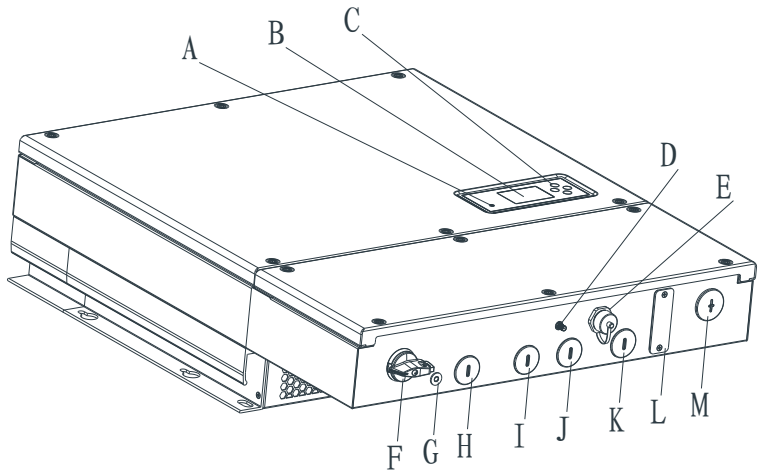
1.3 Product Description

SPHTL BL-US Series is used to store energy generated by the photovoltaic cell panels or energy from grid if it is allowed in the battery, also energy can be sent to power grid through SPH TL BL-US for self consumption or when Grid power is lost, SPH TL BL-US can be used as backup power.
SPH series has six kinds of type:

- SPH3000TL BL-US
- SPH3600TL BL-US
- SPH4000TL BL-US
- SPH4600TL BL-US
- SPH5000TL BL-US
- SPH6000TL BL-US

Note: We describe this series as "SPH" as below.

Overview:



Position	Description
A	LED of status display
B	LCD screen
C	Function button LCD screen
D	Antenna
E	USB interface
F	PV switch Dry contact
G	Ground point
H	PV input port
I	EPS output port
J	AC Grid (on grid connection) port
K	Communication interface port
L	RS232 port
M	Battery terminal port

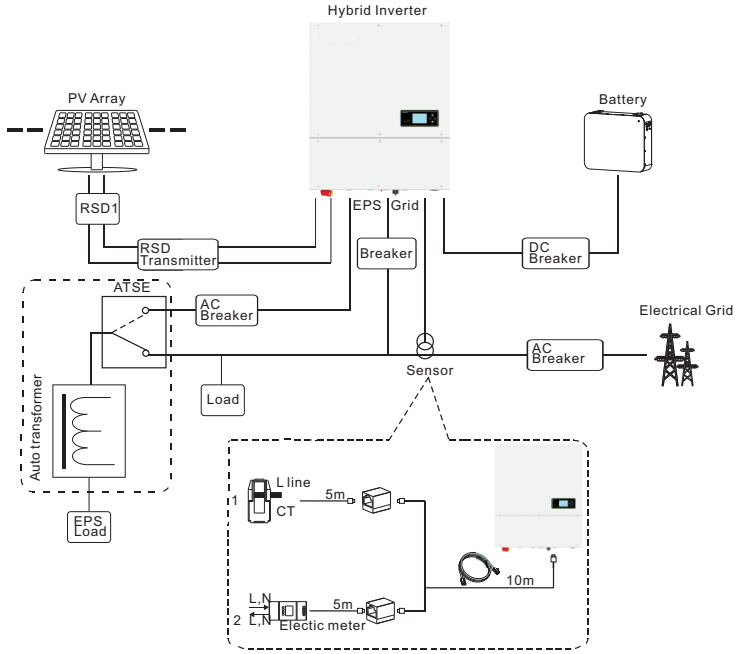
1.4 Safety Instructions

1. Please be clear which kind of battery system you want, lithium battery system or lead-acid battery system, if you choose the wrong system, SPH can't work normally.
2. Please read this manual carefully before the installation, the company has the right not to quality assurance, If not according to the instructions of this manual for installation and cause equipment damage.
3. All the operation and connection please professional electrical or mechanical engineer.
4. During installation, please don't touch the other parts within the box.
5. All the electrical installation must comply with the local electrical safety standards.
6. If equipments needs to maintain, please contact with local specify system installation and maintenance personnel.
7. Use the equipment to combined to grid needs to obtain the permission of local power supply department.
8. When install PV modules in the daytime, please turn off the PV switch, Otherwise it will be dangerous as high terminal voltage of modules in the sunshine.

2 Safety

1.2 Purpose Us

The system chart of SPH:



As shown above, a complete grid-connected system of SPH consists of PV modules, SPH inverter, battery, utility grid and other components.

Attention:

Battery installation requirement

As the system refer to battery use, we must make sure ventilation of the service environment and temperature control in order to prevent the danger of battery explosion, battery recommended installation environment must be strictly in accordance with the specification,If the chosen PV modules needs to positive or negative ground connection, please contact with manufacturer for technical support before installation.

PV modules Capacitive Discharge Currents

PV modules with large capacities relative to earth, such as thin-film PV modules with cells on a metallic substrate, may only be used if their coupling capacity does not exceed 470nF. During feed-in operation, a leakage current flows from the cells to earth, the size of which depends on the manner in which the PV modules are installed (e.g. foil on metal roof) and on the weather (rain, snow). This "normal" leakage current may not exceed 50mA due to the fact that the inverter would otherwise automatically disconnect from the electricity grid as a protective measure.

2.2 Safety Measure

DANGER

Risk of high voltage !

- Relevant operation for professional personnel
- Please notice children, disabled, laypeople do not close

Supervise and make sure children don't play near the installation position of energy storage machine.

DANGER

Risk of burns on the parts shell of SPH inverter !

During the work, Cover, shell around, radiator is likely to be hot.

CAUTION

SPH inverter exists radiation maybe affect health !

Don't stay a long time within 20cm range from SPH inverter.

SPH inverter ground connection!

Please ensure SPH inverter ground connection is reliable for make sure people's safety.

2.3 Symbols introduction on the SPH inverter

Symbol	Description
	Caution: Risk of electrical shock!
	Caution : hot surface
	Caution: risk of danger
	Danger to life due to high voltage in SPH There is residual voltage in SPH, SPH requires 5 minutes to discharge. Please wait 5 minutes before you open the upper lid or the DC lid.
	Protective conductor terminal
	Direct Current (DC)
	Alternating Current (AC)
	Refer to the operating instructions

3.1 Growatt SPH series inverter

Marks of SPH:

Mark	Description	Explanation	
	Push-button	Operation of display screen and set system	
	Status symbol of SPH	Green light on	SPH run normally
		Red light on	Fault state
		Green light blinking	Alarm state
		Red light blinking	Software updating

3.2 Label Explanation

Label contains the following information: for example SPH6000TL BL-US shows as below:

Hybrid Inverter	
Model name	SPH6000TL BL-US
PV input data	
Max.PV voltage	550 d.c.V
PV voltage range	150-550 d.c.V
Max. input current	13 d.c.A*2
PV Isc	15 d.c.A*2
AC outputput data	
Nominal input/output power	6000/6000 W
Max. output apparent power	6000 VA
Nominal voltage	240/208 a.c.V
Max. input/output current	27/27 a.c.A
Nominal Frequency	60 Hz
Power factor range	0.8leading~0.8lagging
Stand alone data	
Max. AC apparent power	3680 VA
Nominal AC voltage	240 a.c.V
Nominal AC Frequency	60 Hz
Battery data	
Battery voltage range	42-59 d.c.V
Max. charging and discharging current	75 d.c.A
Type of battery	Lithium / Lead-acid
Others	
Enclosure	Type 4X
Operation Ambient Temperature	-25°C - +60°C -13°F - +140°F

Intertek 4003184

Utility Interactive 1-Phase Inverter

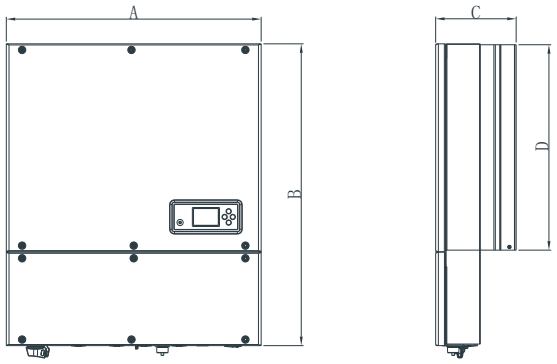
Tested To Comply With FCC Standards

FOR HOME AND OFFICE USE

X

Made in China

3.3 Size and weight



A=565 B=669 C=179 D=455

Model	A(mm/In)	B(mm/In)	C(mm/In)	weight(kg/lb)
Growatt SPH	565/22.24	669/26.34	179/7.05	32(73.85)

3.4 The advantage of the unit of SPH

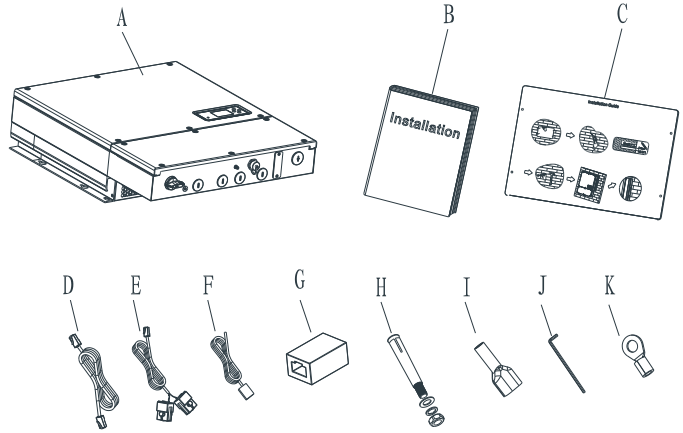
Features below:

- All in one design. Can improve self consumption, back up and also Pinch the valley
- Smart management, work mode can be set
- Safe battery used
- Easy installation
- Two mpp tracker input

Unpacking 4

Please check whether external damage to the goods before unpacking.
After unpacking, please check whether the unit damage or missing parts, if it is happen, please contact with supplier.

SPH series and accessories as follows:

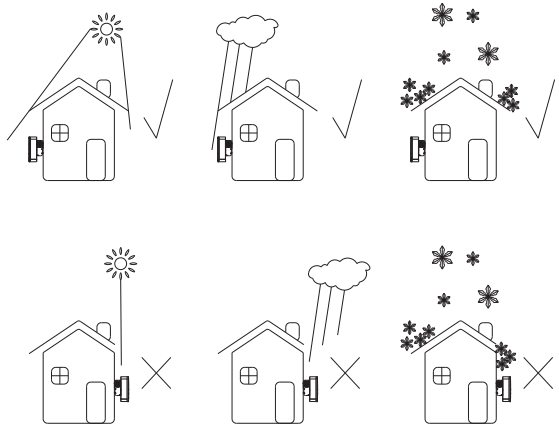


Item	Description	Quantity
A	SPH inverter	1
B	User Manual	1
C	Paper board(installation guide)	1
D	Communication cable (10m)	1
E	Current sensor	1
F	Lead-acid battery temperature sensor	1
G	RJ45 connector	1
H	M6 setscrew	4
I	Wire terminal	12
J	Hex screwdriver	1
K	Battery power terminal	2

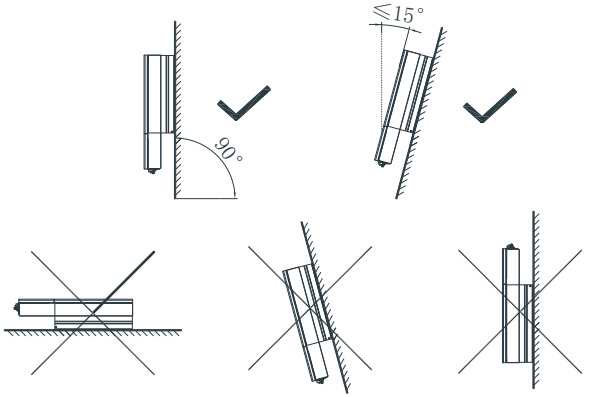
5 Installation

5.1 Basic installation requirements

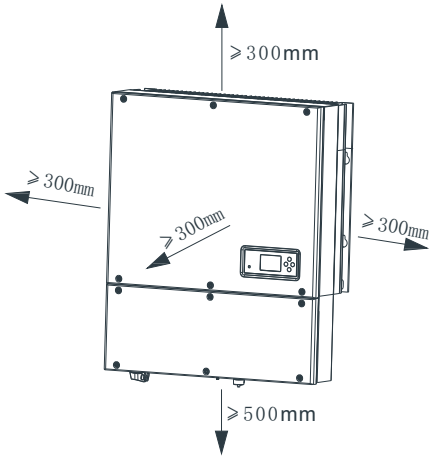
A. The installation location must be suitable for SPH's weight for a long period time
B. The installation location must conforms with dimension of SPH
C. Do not install the unit on structures constructed of flammable or thermo labile materials
D. The ingress Protection rate is IP65 (NEMA Type 4X), and SPH can't be enclosed. Please refer to the below:



E. Battery installation option is not far away from the position of SPH, the length between SPH and battery should not be more than 1.5m.
F. The ambient temperature should be -25℃~60℃(-13°F~140°F).
G. SPH can be installed in vertical or lean back on plane, please refer to the below:



H. Installation position shall not prevent access to the disconnection means.
I. In order to ensure machine can run normally and easy to operate, please pay attention to provide adequate space for SPH, please refer to below:



J. Do not install the machine near television antenna or any other antennas and antenna cables.
K. Don't install the machine in the living area.
L. Be sure that the machine is out of the children's reach.
M. Taking the battery fixing space into account, about the dimensions please reference user manual.
N. The inflammable and explosive dangerous goods must not be placed around battery in case of cause serious danger.

5.2 Installation requires tools and RJ 45 terminal sequence of the LAN line

When installing, we need to use tools as follow, prepare the follow tools before installing:

No.	Description	No.	Description
1	Press the RJ45 terminal	2	Press battery terminal
3	Ruler	4	Unscrew nut
5	Unscrew screw	6	Knock explosion bolt
7	Drill holes on the wall		

LAN line RJ45 sequence as follow:

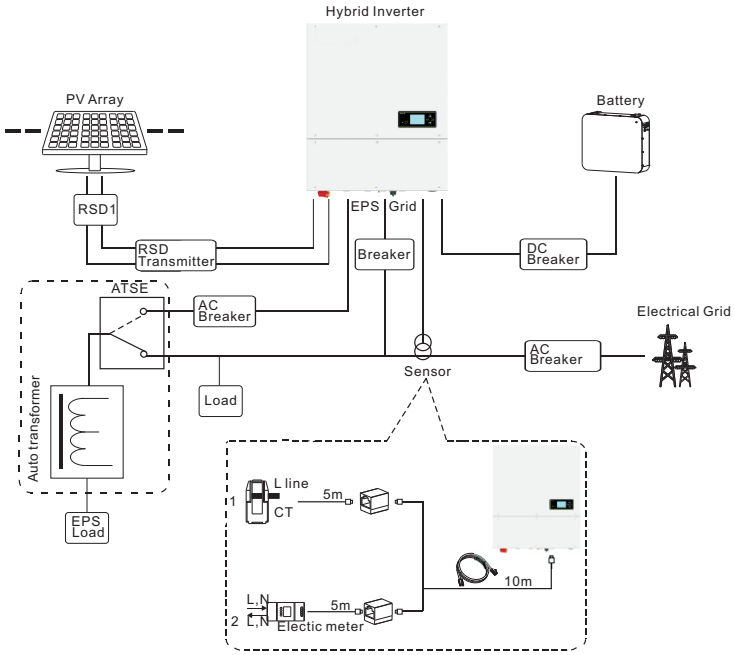
LAN line 1-8 colors as below:

PIN	1	2	3	4	5	6	7	8
Color	White orange	Orange	White green	Blue	White blue	Green	White brown	Brown

5.3 Installing the inverter

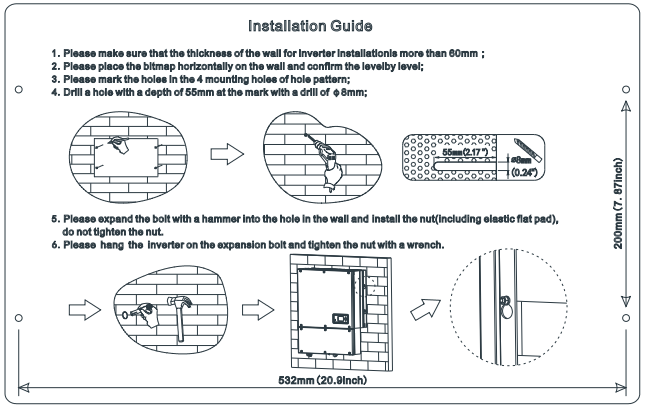
5.3.1 Attention Layout (length of sensors consider)

There're two types of sensors for use with Growatt SPH. One is wired current sensor, one is meter sensor, if you choose wired sensor or meter. Before installing you should know something that as below:
The cable of wired sensor and meter is suggested not longer than 15m. So you need to consider the length between SPH with combiner box for the sensor should be installed in the live line.
The installation layout of energy storage machine at home as following:

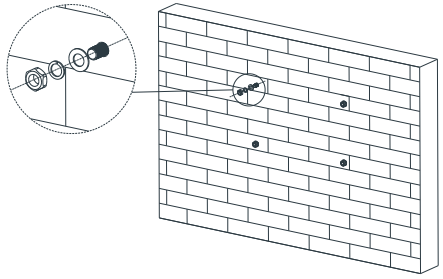


5.3.2 Installation of SPH

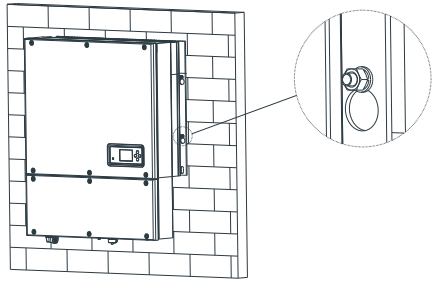
1. Project the machine's probably sizes on the wall, the thickness of wall for SPH must be not less than 60mm.
2. Make sure the drill position, use paper board(installation guide), put the paper board cling to the wall, make sure the top edge of paper board is level (As the chart 5.7a below).
3. Mark four points at the wall via the hole of the paper board, then remove the paper board.
4. Drill four Φ8 holes at the mark point, the depth is not less than 55mm.
5. Knock four explosion bolt into Φ8 holes (As the chart 5.7b below).
6. Hang the energy storage machine on the four setscrews.
7. Lock the nut of setscrew (As the chart 5.7c below).
8. The whole installation has finished.



A



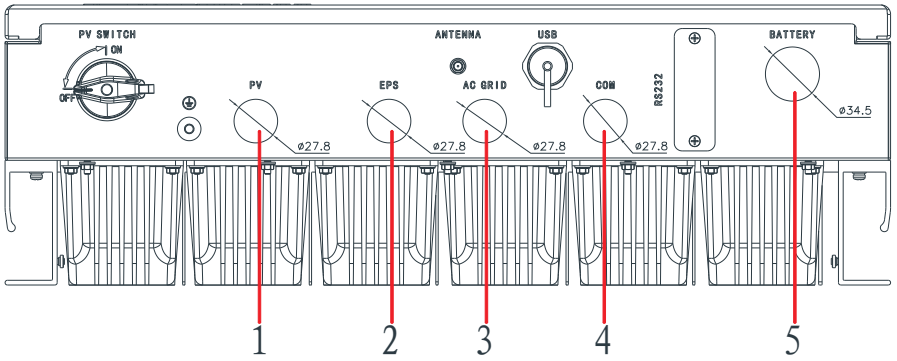
B



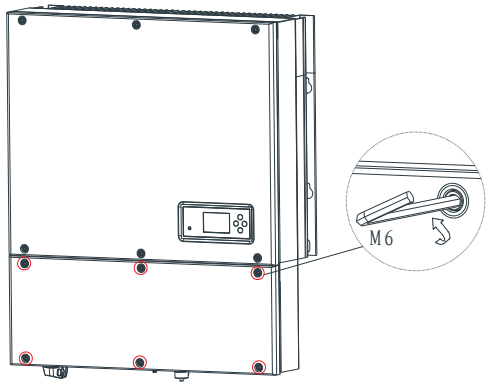
C

5.3.3 Installing the Pipe Fittings

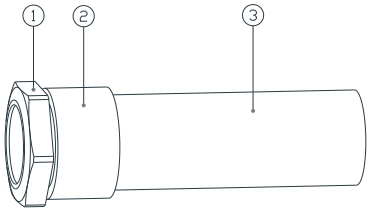
The pipe specifications should comply with the waterproofing bolt specifications.
The following figure shows the diameters of the cable holes with waterproofing bolts removed.



1. PV cable hole 2. EPS load cable hole (off grid power) 3. AC Grid cable hole(on grid power) 4. COM cable hole(including meter com & battery com & CT cable & lead-acid temperature sensor) 5. battery cable hole.

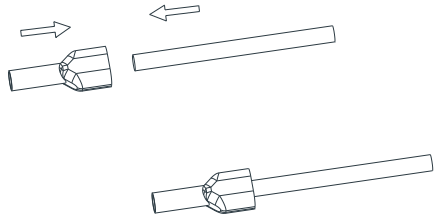


When connecting to electronic connection, please remove the cover of the wirebox show as above and using pipe for routing cable. Pipe introduction as below.



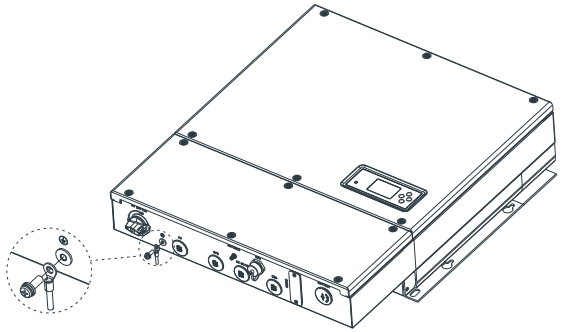
(1) Nut (2) Fitting (3) Conduit

When you connecting cable to terminal of inverter. A special terminal is suggested to used, Bring the wire back through the crimp bead and flatten, then connect to inverter, show as below:



5.4 Grounding connection

SPH must be grounded by cable, the grounding point is showed as follow, and the minimum grounding cable wire is AWG10.



PV Array Grounding

Grounding conductor of PV panel brackets must be firmly connected to earth at PV array side and inverter side and SP side. The sectional area of grounding conductor should be equal to the sectional area of DC grounding conductor. The minimum wire is AWG10.

DC Grounding

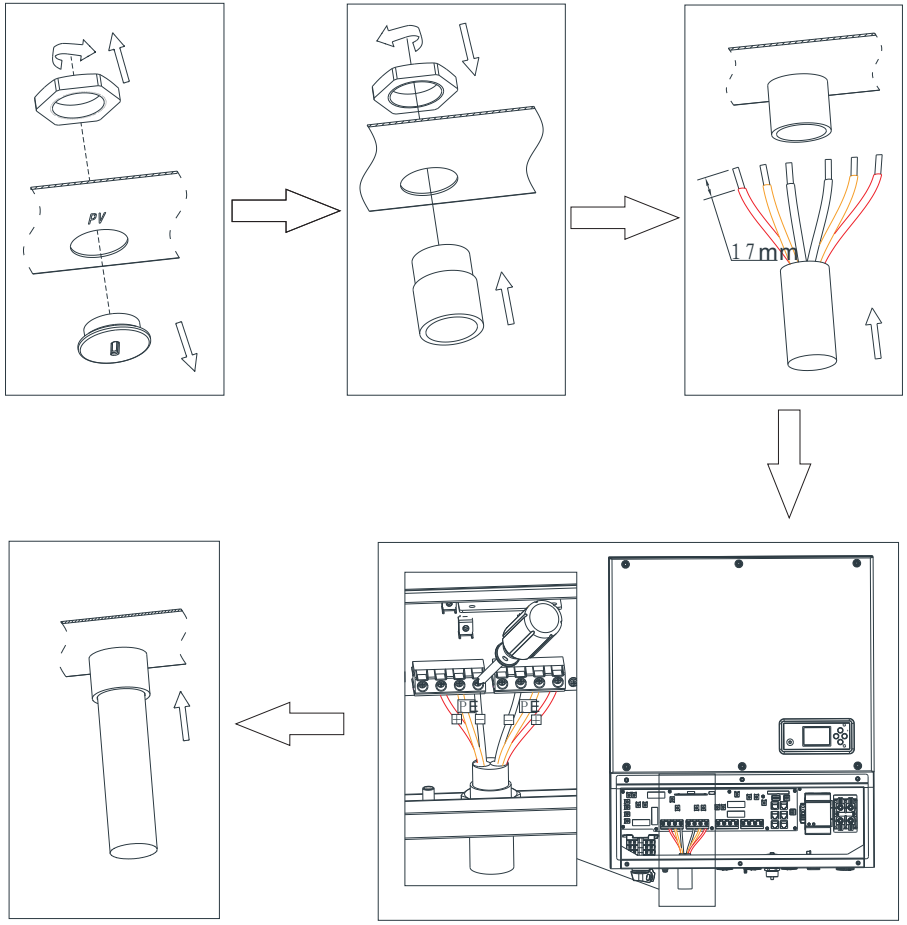
Select the DC Grounding mode according to the local standard and use the PV grounding terminal box and DC Grounding wires of the same specification.

Grounding Device

If the positive pole or the negative pole of PV array needs to be grounded in the PV system, the inverter output should be insulated by Isolation Transformer. Isolation transformer must conform to IEC62109-1,-2 standard.
Connection as below:

5.5 SPH System electrical connection

5.5.1 Connection of PV terminal

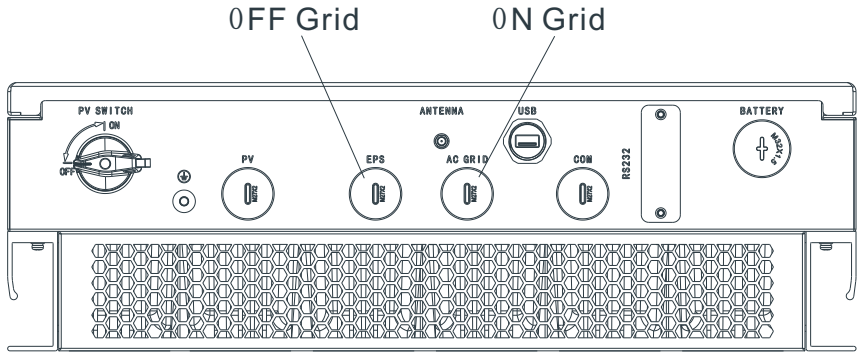


Step 1 Turn off the PV swith.
Step 2 Remove the locking nut and waterproofing bolt.
Step 3 Secure the pipe fitting to the enclosure using the nut provided with the pipe.
Step 4 Route the PV input power cable through the conduit and then fitting of the pipe.
Step 5 Connect the PV input power cable to the terminal block. connect positive pole(+) of connection cable to positive pole(+) of PV input terminal block, connect negative pole(-) of connection cable to negative pole(-)of PV input terminal block, please pay attention to PV input voltage and current within permission.
Step 6 Secure the fitting to the conduit.
Step 7 Check that the cables are connected correctly and securely. Then take appropriate measures to ensure that the pipe conduit and fittings are secured reliably, and seal the cable holes.

Limit:
Max PV voltage: 550V (consider the lowest temperature)
Max PV input current: 13A
Remark:
1. We suggest you use the cable≥4mm2/12 AWG to connect.
2. Please do not connect to DC source!

5.5.2 Connection of AC terminal and off grid terminal

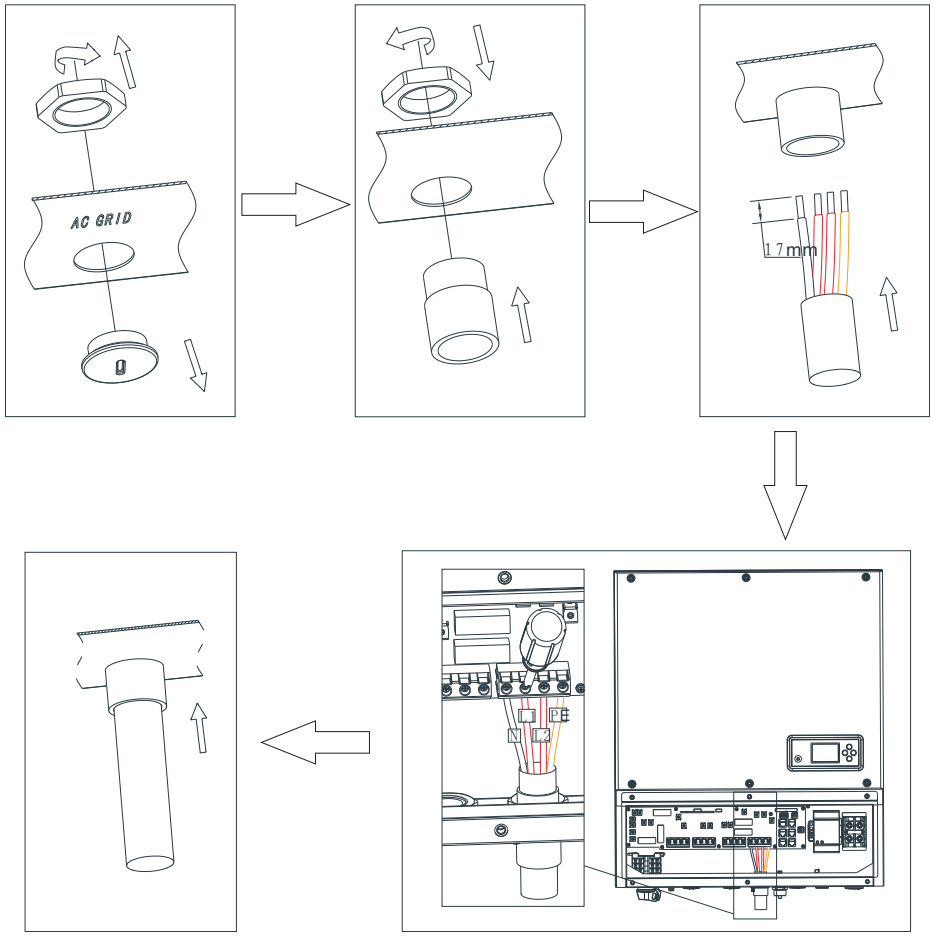
SPH has a grid output terminal and off grid out terminal, look down on the SPH from the front, the terminal on the right (on grid) is grid outlet for connecting grid, the terminal on the left is an uninterrupted power outlet for connecting critical load.



Wire suggest length

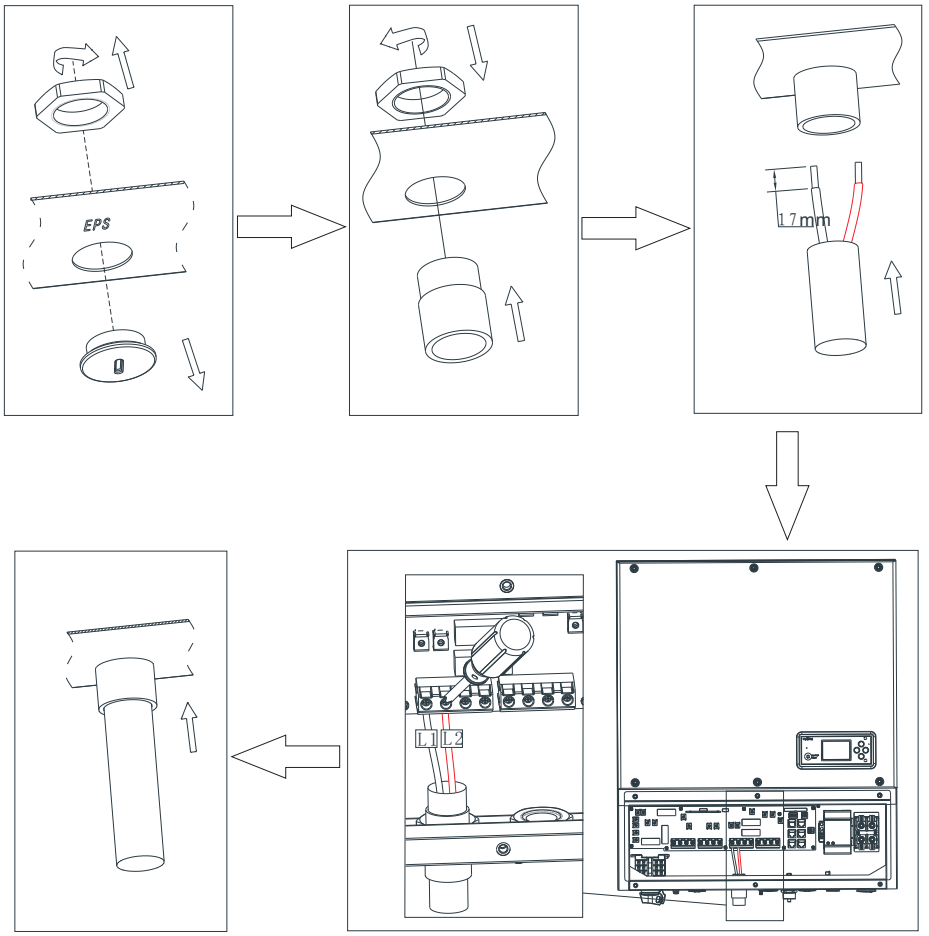
Conductor cross section	Max cable length					
	Growatt SPH3000	Growatt SPH3600	Growatt SPH4000	Growatt SPH4600	Growatt SPH5000	Growatt SPH6000
5.2mm2 10AWG	40m	33m	28m	26m	25m	23m
6.6mm2 9AWG	50m	42m	36m	33m	32m	29m

AC output terminal connection steps as follow:



Step 1: Remove the locking nut and waterproofing bolt..
Step 2: Route the AC output power cable through the conduit and then the fitting of the pipe.
Step 3: Connect the AC output power cable to the terminal block..
Step 4: Secure the fitting to the conduit.
Step 5: Check that the cables are connected correctly and securely. Then take appropriate measures to
ensure that the pipe conduit and fittings are secured reliably, and seal the cable holes.

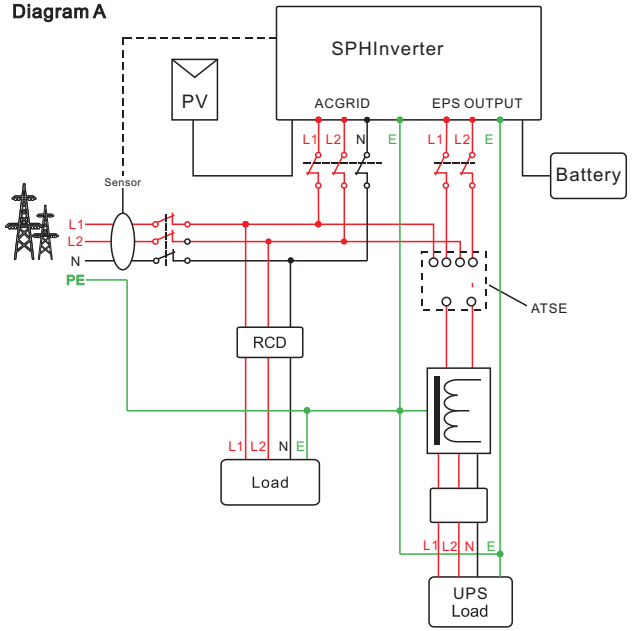
EPS output terminal connection steps as follow:



Step 1: Remove the locking nut and waterproofing bolt..
Step 2: Route the EPS output power cable through the conduit and then the fitting of the pipe.
Step 3: Connect the EPS output power cable to the terminal block..
Step 4: Secure the fitting to the conduit.
Step 5: Check that the cables are connected correctly and securely. Then take appropriate measures to
ensure that the pipe conduit and fittings are secured reliably, and seal the cable holes.

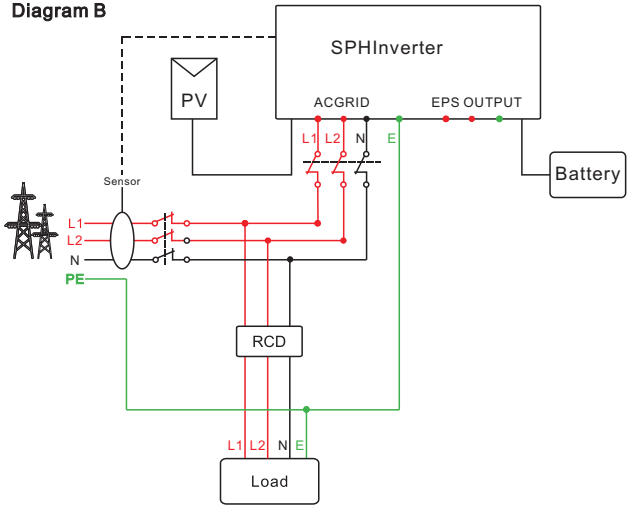
The recommended wiring diagram is as follows:

Diagram A



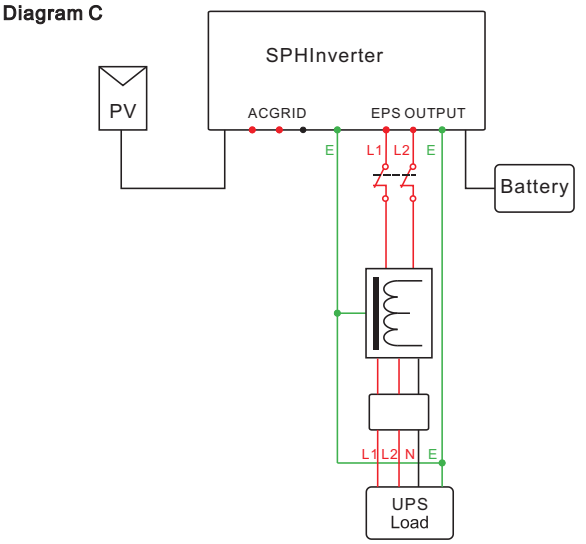
Note:
This diagram is an example for on gird system and off grid system.

Diagram B



Note:
This diagram is an example for customer who only wants to use the on grid storage system to max his self-consumption.

Diagram C



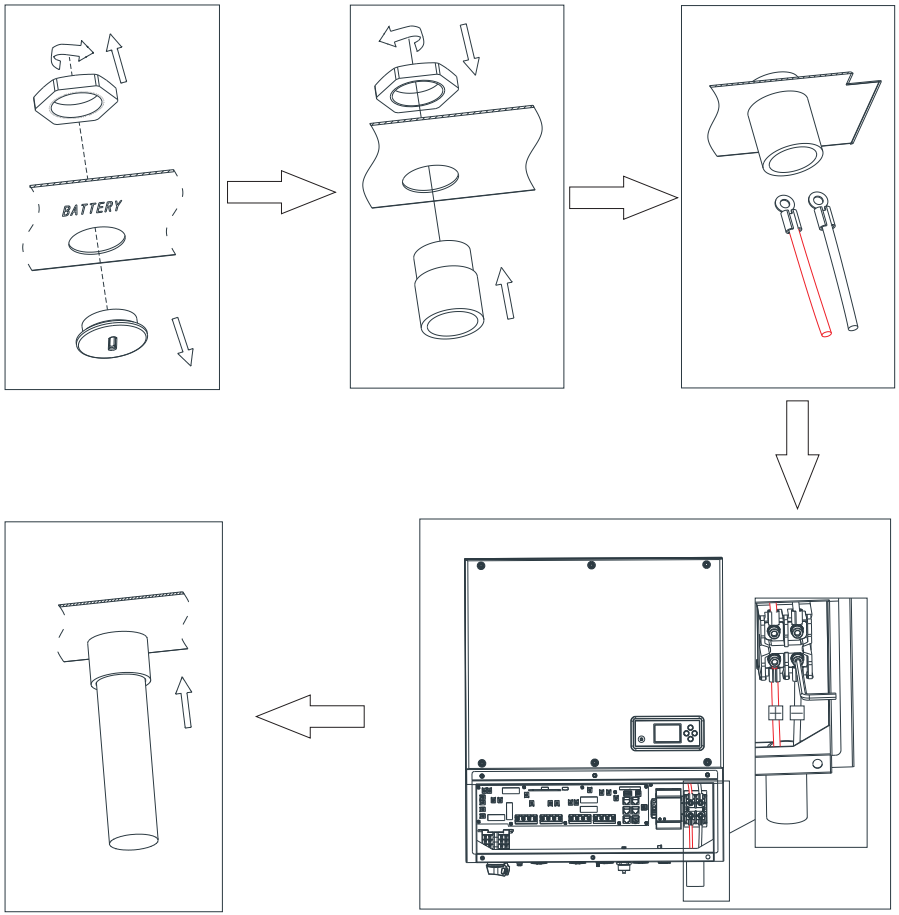
Note:
This diagram is an example for customer who only wants to use the off grid storage system.

Notice:

1. If you want to use on gird only, please refer to chart 5.24 connect with AC grid and float EPS OUTPUT.
2. If you have no battery now, you can also float BAT terminal, and this hybrid inverter will only work like a PV inverter.
3. If you want to use both on gird power and uninterrupted power, please refer to chart 5.22 connect with AC grid and EPS OUTPUT like the chart show.
4. On grid terminal and off grid terminal can't directly connect together.
5. Off Grid terminal can't connect to grid.
6. If you want to use on gird and off grid, you can use ATS (transfer switch single phase) like chart 5.22 before or ask Growatt for help to connect them. ATS is using to switch when SPH is not working or in fault mode. For example: if SPH is in fault mode but there is Grid power. ATS will turn to Gird to keep Critical load having power.
7. Max EPS load should be less than 3600W.
8. The first start of system needs Grid power.

5.5.3 Connection of battery terminal

Install battery cable steps are as follows:

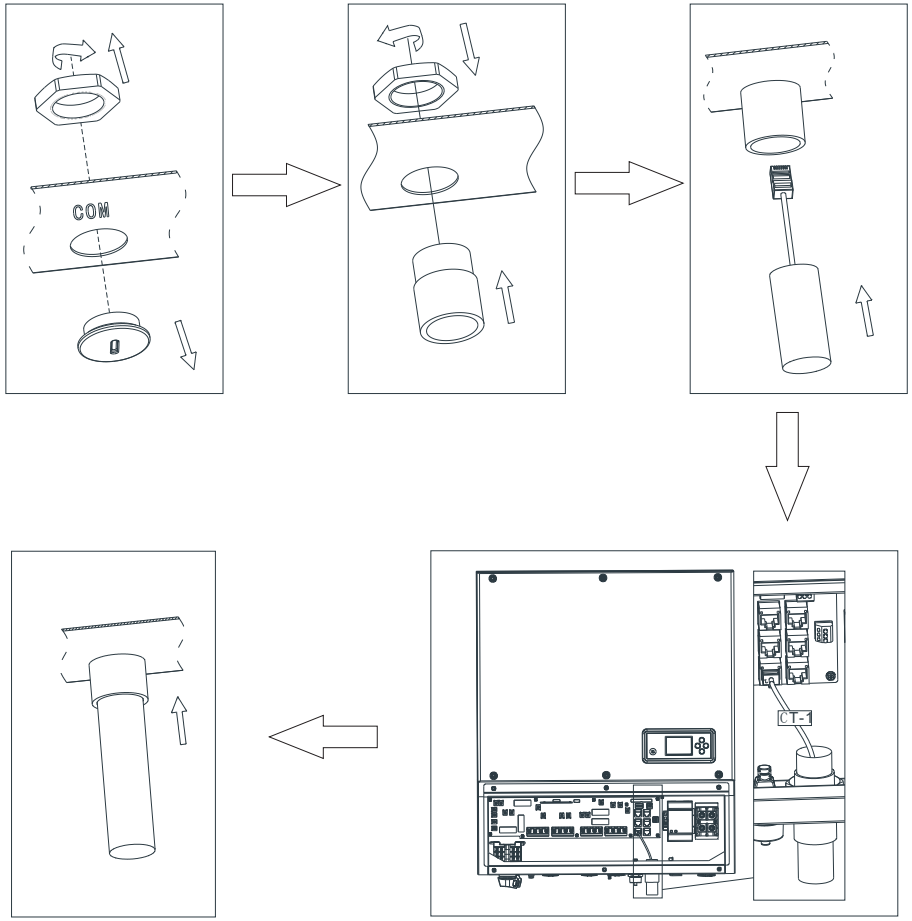


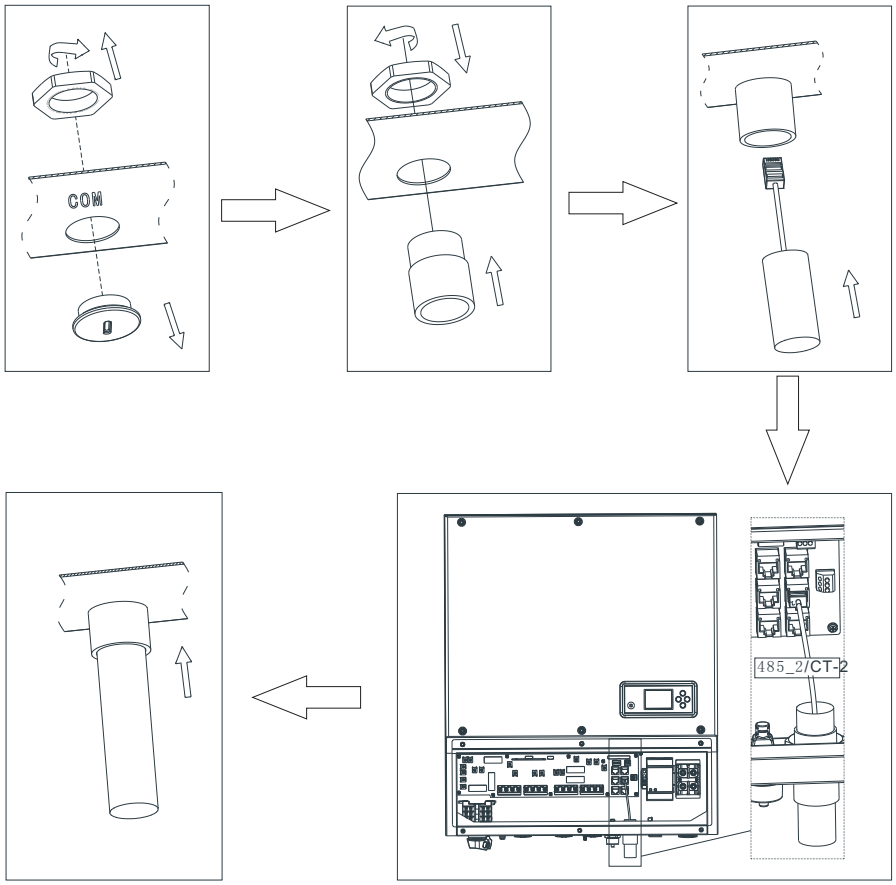
Installation steps as follow:
Step 1: Remove the locking nut and waterproofing bolt..
Step 2: Route the battery power cable through the conduit and then the fitting of the pipe.
Step 3: Connect the battery power cable to the terminal block..
Step 4: Secure the fitting to the conduit.
Step 5: Check that the cables are connected correctly and securely. Then take appropriate measures to ensure that the pipe conduit and fittings are secured reliably, and seal the cable holes.

Note:
We suggest the distance between battery and SPH no longer than 1.5m, and the power line area must be larger than 5 AWG.

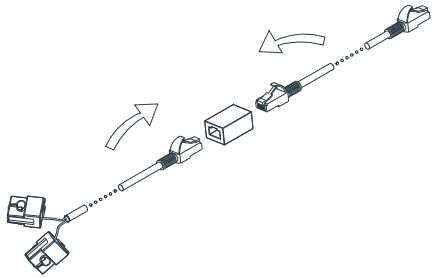
5.5.4 Connection of CT terminal or meter

There is a CT or meter communication in SPH inverter to monitor the power consumption situation of residential users, so the CT terminal or meter connection steps are as follows:
Step 1: Remove the locking nut and waterproofing bolt..
Step 2: Route the "CT" or meter cable through the conduit and then the fitting of the pipe.
Step 3:Insert the RJ45 plug of the network cable into the "CT" pin connector or meter communication cable into the "485-2" pin connector on the inverter until it snaps into place.
Step 4:If no other cables need to be installed, Secure the fitting to the conduit.





Note:
1. Meter and CT can't be installed at same time, please set the sensor model when selecting CT or electricity meter, please refer to section 6.3.3 for details.
2. CT wire (5m in length) specification: RJ45, standard LAN line (one end with 8P modular plug, the other connected with transformer). But if the length is not enough, customer can add cable, so the length can be increased to 15m max, the operation is as follow chart:

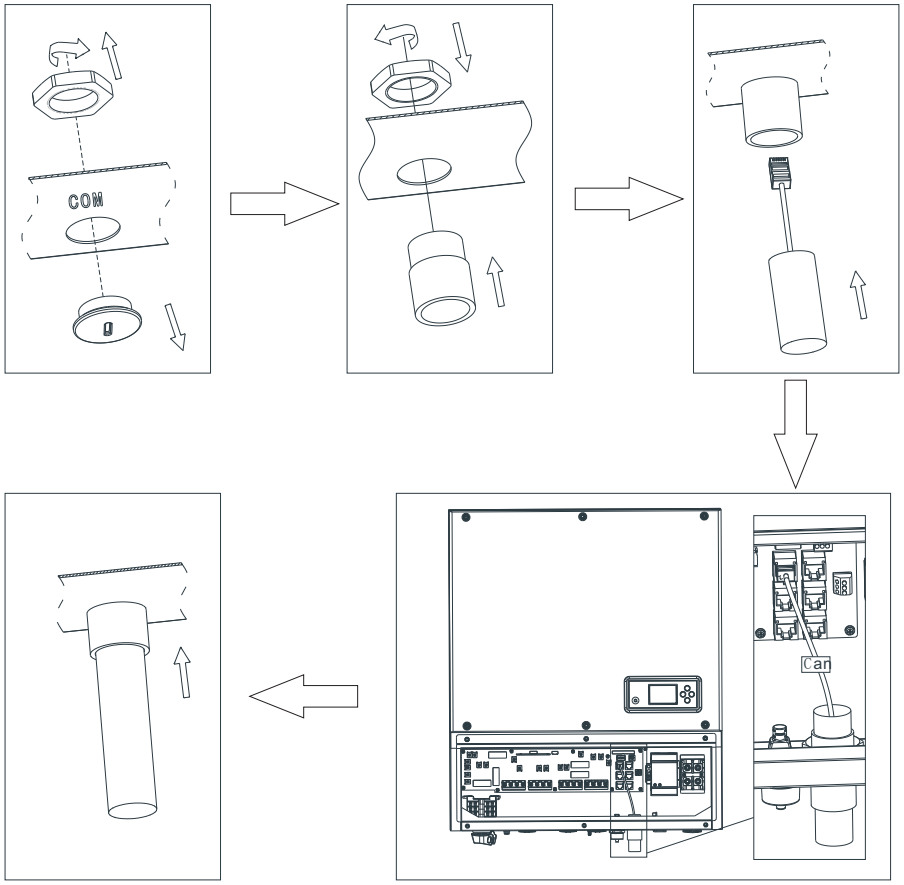


3. During the actual operation, please pay attention to the installation of current transformer as the diagram shows below:

As illustrated above, open the current transformer and you can see an arrow labeled on it indicating the direction of current. Put the live wire among the under-detection wires onto the current transformer, in the USA, there are two live wires need to add current sensor, do not add the current sensor in the same live wire. After latching the current transformer, the installation has been finished
Notice:
1. The direction (from K to L) of the arrow on the current transformer is corresponding to the direction of the current in live wire from Grid to Load. Sensor needs to be placed in the power distribution cabinet.
2. Meter must be provided by Growatt. If not, maybe meter can't communicate with SPH inverter.
3. The more detail describe of meter installation, please turn to meter user manual.
4. In USA or other split phase market. Two current sensors must add to the separated two live wires.

5.5.6 Connection of communication terminal for lithium battery (CAN)

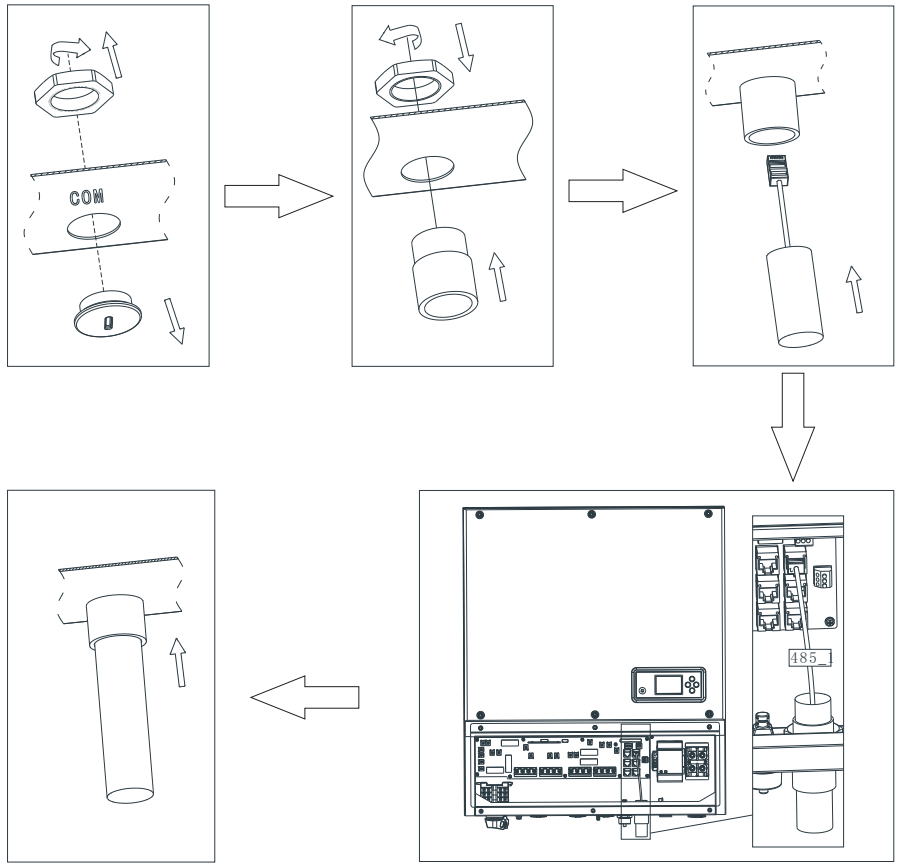
When using CAN communication with lithium batteries (for example HOMEe11), connect lithium battery terminal (RJ45) steps as follows:
Step 1: Remove the locking nut and waterproofing bolt..
Step 2: Route the "CAN" cable through the conduit and then the fitting of the pipe.
Step 3: Insert the RJ45 plug of the network cable into the "CAN" pin connector on the inverter until it snaps into place.
Step 4: If no other cables need to be installed, Secure the fitting to the conduit.



Note:
1. If you are using a lead-acid battery, you do not need to install this communication cable.
2. The CAN battery communication and 485-1 battery communication can't be installed at same time, please select the correct communication method according to the battery manual.
3. If the cable such as "485-1" cable or "CAN" cable is not used, please do not remove the filler plug from the cable support sleeve.

5.5.7 Connection of communication terminal for lithium battery (RS485)

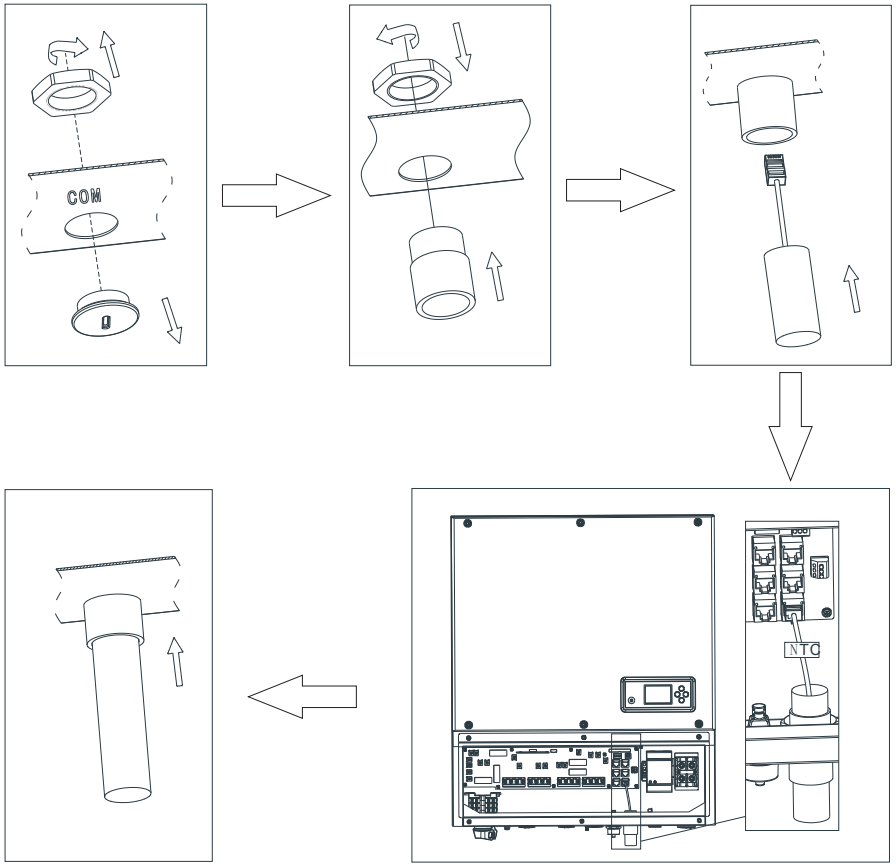
When using lithium batteries which need to connect BMS system of the battery, connect lithium battery terminal (RJ45) steps as follows:
Step 1: Remove the locking nut and waterproofing bolt..
Step 2: Route the "485" cable through the conduit and then the fitting of the pipe.
Step 3:Insert the RJ45 plug of the network cable into the "485" pin connector on the inverter until it snaps into place.
Step 4:If no other cables need to be installed, Secure the fitting to the conduit.



Note:
1. If you are using a lead-acid battery, you do not need to install this communication cable.
2. The CAN battery communication and 485-1 battery communication can't be installed at same time, please select the correct communication method according to the battery manual.
3. If the cable such as "485-1" cable or "CAN" cable is not used, please do not remove the filler plug from the cable support sleeve.

5.5.8 Connection of temperature probe for lead-acid battery

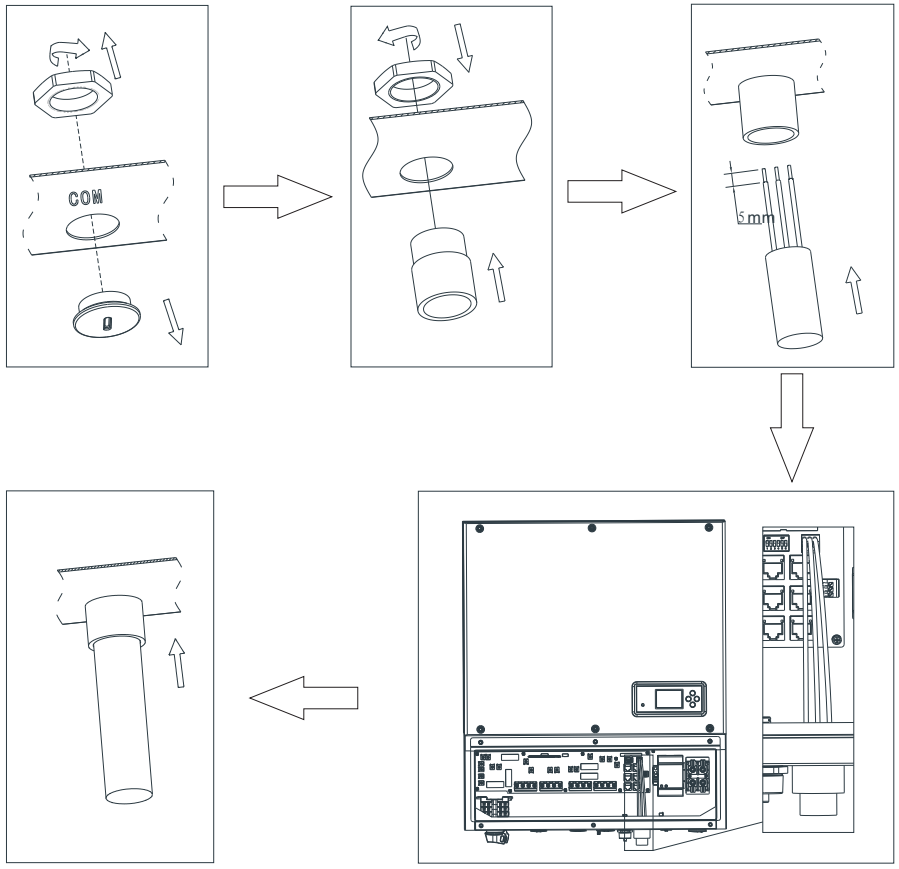
When customer using lead-acid battery, the temperature probe of the lead-acid battery is used to detect the ambient temperature of the lead-acid battery, the battery temperature cable of the SPH side connection steps are as follows:
Step 1: Remove the locking nut and waterproofing bolt..
Step 2: Route the "NTC" cable through the conduit and then the fitting of the pipe.
Step 3:Insert the RJ45 plug of the network cable into the "NTC" pin connector on the inverter until it snaps into place.
Step 4:If no other cables need to be installed, Secure the fitting to the conduit.



Note:
1. If you are using a lithium battery, you do not need to install this temperature probe, the probe of the temperature cable should be attached to the surrounding environment of the lead-acid battery, and the length of this cable is 1.5m, so pay attention to the distance of battery and SPH.
2. If the cable such as "NTC" (lead-acid battery temperature sensor) cable is not used, please do not remove the filler plug from the cable support sleeve.

5.5.9 Connection of Dry contact

The dry contact is used to communicate with external devices (such as remote start hot water heater). The wiring steps are as follows:
Step 1: Remove the locking nut and waterproofing bolt..
Step 2: Route the "DRY" cable through the conduit and then the fitting of the pipe.
Step 3:Insert the RJ45 plug of the network cable into the "DRY" pin connector on the inverter until it snaps into place.
Step 4:If no other cables need to be installed, Secure the fitting to the conduit.



Note:
1. If the cable such as "Dry contact" cable is not used, please do not remove the filler plug from the cable support sleeve.
2. Dry contact can give an 12V and less than 200mA source output to driver relay and so on. Please be careful of the capacity of this power.

6 Commissioning

6.1 Commissioning of SPH

Electrify SPH after all installation of Part5 be finished, here are the steps:
1. Turn on PV first
2. Then turn on Grid
3. Last turn on battery

If PV Grid and battery are available, system would work on the "normal" mode. When the SPH on the normal mode, the screen showing "Normal", LED is green. If SPH not enter normal mode successful, especially the LCD is red, you need to check below:
1. Make sure all the connection is correct.
2. All the external switches are on.
3. Inverter built -in switch is on.
4. Make sure the lithium battery is on.
5. Refer to Part 9.1 for correction.

You can refer to Part 6.3.4 for work mode setting, then configure monitor, finish commissioning lastly.

6.2 Operation modes

6.2.1 Normal mode

Normal mode is working state which including online mode and backup mode.

Online mode

User can set an appropriate priority mode according to request when SPH working on the online mode. If customer uses the LCD and key settings, you can only set one period, but if you use website settings, you can set up to three periods of the priority mode.

(refer to 6.3.4)

1. Load first: Load first is the default mode, when it's working in this mode, PV energy would offer to load and battery prior; when PV is Insufficient, battery would discharge; when PV is sufficient for load, the excess energy would feed to battery. If there is no battery or battery is full, the excess energy would feed to Grid (except anti-reflux).
2. Battery first: When SPH working in this mode, battery would be charged first, it's suitable working on the period when the electric charge is low. user need to set the mode ON and OFF time, and the end time of battery SOC. Users can set power rate which less than the battery maximum output power. If the customer doesn't enable the AC CHG (AC grid charging functions). Inverter will charge battery by PV power as large as it can do. If the customer enables the AC CHG (AC grid charging functions). Inverter will charge battery by PV power and AC power from grid as large as it can do.
3. Grid first: When SPH working in Grid-first mode, the PV energy would feed to Grid first. User can choose the period when electric charge is high. User need to set the mode ON and OFF time, and the end time of battery SOC. User can set power rate which less than the battery maximum output power.

offgrid mode

If Grid lost, system would turn to offgrid mode (user can disable it, refer to 6.3.4) and EPS OUTPUT will keep powering the load, all the energy from PV and battery, if the PV also lost, then only battery discharge. Mind you, SPH maximum output power is 3680W in this mode, the load which connect with EPS LOAD should less than 3680W.

Notice:

1. Users only can set one period for battery first and Grid first on the LCD, if users need set more pleases login shineserver or shinephone (the biggest period is three).
2. If users need Grid charge battery, users need input password on the SC surface and set the AC CHG to enable.

Back up mode

Back up mode is used for bad weather, if back up mode is enable, battery will be charged first. Customer can set up charging power ratio and stop SOC. If back up mode continued more than 3 days. LED will flashing red to warning stop back up mode. If back up mode continued more than one week. SPH will stop back up mode and charge to online mode or offline mode automatically.

6.2.2 Fault mode

The SPH's intelligent control system could monitor and adjustment system's status continuously, when SPH inverter monitoring anything unexpected happen, such as system fault or machine fault ,the LCD will display the fault information, in fault mode, the LED light will be lighten.

Notice:

1. The detail's fault information please refer to 9.1
2. Some fault information is in order to remind users that might have some faults occurred in inverter side.

6.2.3 Programming mode

Programming mode indicates the SPH is updating, don't cut out power when it's updating until the processing is finish, SPH inverter would log out automatically when the updating finish and turn to other mode.

6.2.4 Checking mode

Before SPH work in normal mode, it will go to self-check mode. If all are ok, system will go to normal mode, otherwise, it will go to fault mode.

6.2.5 Standby mode

If the system hasn't faults while the condition is not qualified, SPH would stay at standby mode.

6.2.6 Shutdown mode

If customer need SPH inverter stop working, customer must disconnect all the energy source, then SPH inverter will turn into shutdown mode automatically.

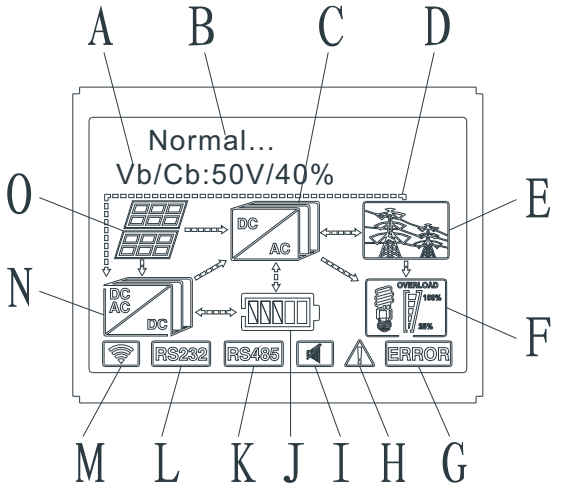
The following is the shutdown procedure:
1. Shutdown the PV side
2. Turn off battery switch.
3. Shut down AC power of SPH. Then you can see the both LED and LCD of SP are off.

Notice:

After all the actions are done, you still have to wait for more than 5 minutes.

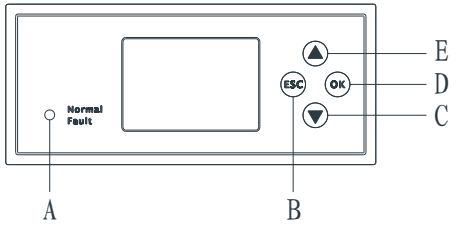
6.4 Display and button

6.4.1 LCD display area



Location	Description
A	State
B	Information
C	PV input (If you connect two tracks, it will show two. Otherwise show one)
D	SPH inverter
E	Power flow line
F	Grid
G	Battery (Show the SOC in five grid, Every grid represents 20%)
H	Local load
I	Wireless communication
J	Rs23
K	Rs485
L	Buzzer(Reserved)
M	Warning
N	Fault

6.4.2 LED and button instruction

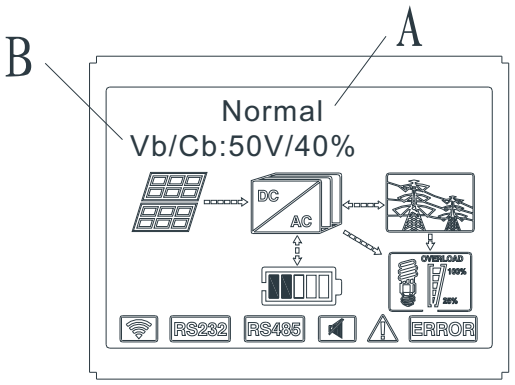


Location	Description
A	Status
B	ESC- button(cancel control)
C	Down-button
D	Enter-button
E	UP-button

Notice:
LED showing status of SPH, it has two colors, one is green and another is red. Please turn to 3.1 and read the detail of LED.

6.4.3 LCD display column

LCD display column is used to show the current state, basic information and fault information. Also include language setting, program charging/discharging priority and system time. On default condition will take turns to display the information.



The A line's concluding information as follow:
1. Standby state: SPH is in standby state. No error in this state, but for other reasons, make it in a wait state.
2. Normal state: SPH is normal working state.
3. Checking state: SPH is in self-check state, if there is no error or warning, SPH will go to normal state or standby state. Otherwise it will go to fault state.
4. Programming state: SPH is in updating firmware state.
5. Fault state: SPH has fault information, it will be in stopped operational protection state.

The B line's information as follow:
In normal, it will turn on page automatically, when pushing the button "UP", the order of the paging information as follow:

Note:
1. "Down" control command (if pushing "up" button, command will go back).
2. Workmode depend on the situation. If SPH is normal state, it will show "normal". If SPH is standby state, it will show as "standby" etc.
3. Some special definitions are explained, for example: Vb means the voltage of battery. Cb means the capacity of lithium battery (only lithium battery shows this data). Pm means the monitor power of user.

6.4.4 Work mode set up

Keep pressing "enter "for 3S, you can enter set up surface, in the set up surface you need hold button Enter or ESC 1S for selection, you can see the surface as showing below.

1. Under the Basic Para, you can see the setup options below after pressing Enter for 1S：

In the basic Parameter, you can set language (English default), system time, lead-acid cell charging voltage (default is 58V), discharge low voltage (default is 48V) and lead-acid constant current (default is 75A).

2. Under the Off gird mode, you can see the setup options below after pressing Enter for 1S:

In the Off grid you can set EPS, including enable or disable (default is enable), AC voltage(default is 240V) and frequency (default site 60HZ).

3. Under the Priority, you can see the setup options below after pressing Enter:

Note:
1. "Power Rate" is used to set up power of battery. So different battery may have the different power, customer need to check the max power of battery.
2. Time setting is 24-hour.If the end time is less than beginning time, it defaults to spanning days.

4. Under the MODE Change, you can see the setup options below after pressing Enter:

The MODE change has two options what are sensor and battery type, sensor is cable CT (default), meter. In the battery type, you can choose lithium battery or lead-acid battery.

5. Under the ExportLimit, you can see the setup options below after pressing Enter:

Exportlimit is used for users to control the energy flowing to the grid. If this function is enabled, the feeding power to grid will be equal or less than the setup value.
The purpose of the Fail Safe function is to ensure that should any part of the ELS fail, the Active Power exported across the Connection Point will drop to the Agreed Export Capacity or less within the specified time.
Note:
1. Default value is 00.0%
2. Fail safe works only in meter mode
3. Fail safe works only in G99 or G98 certification.
4. If Exportlimit function is working, we can't setup priority of Grid first.

6. Under the Dry connector, you can see the setup options below after pressing Enter:

Customer can set dry connector to start up heart to heart water or start up Generator.

7. Under the Backup set, you can see the setup options below after pressing Enter:

You can setup the charge power ratio and stop SOC of battery. If back up was set up. Battery will be charged first to keep the capacity. When back up keeps more than 3 days, system will give a warning to disable this function. If customer forgot to stop it. This function will stop automatically in one week.

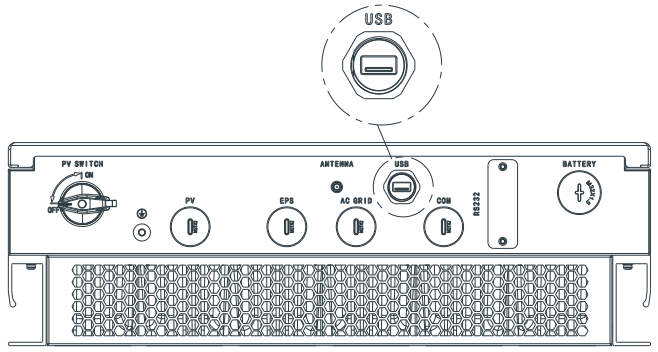
8. Under the default set, you can see the setup options below after pressing Enter:

Default set is “resume to default setting ”, please don't use it unless it's necessary.

6.5 Communication

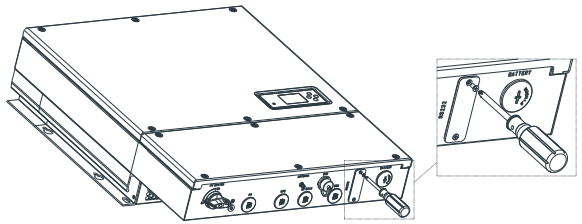
6.5.1 Use of USB-A port

USB-A port is mainly for firmware update and monitor. Through USB connection, we can quickly update the software of machine or using shine-WiFi-X(RF or GPRS also ok) to monitor the system. You can see USB-A as below:

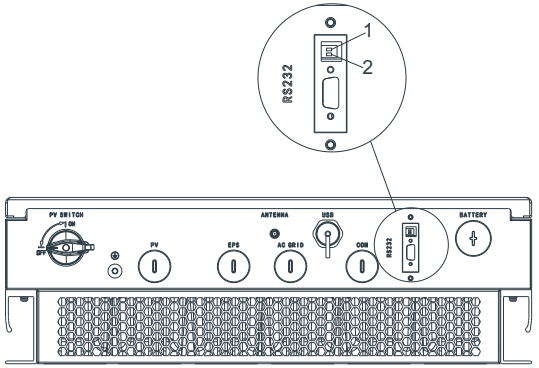


6.5.2 Use of RS232 port

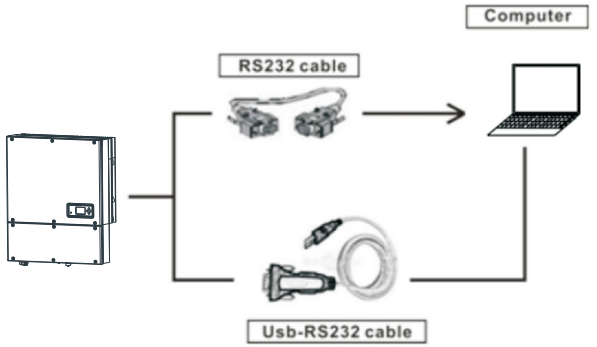
RS232 port is mainly used for monitoring connection with computer, users can monitor, set parameters and update the software of the machine through RS232 connection with machine and PC, using the shinebus software developed by Growatt.
Removing RS232 cover first:



Customer can use shinebus to monitor SPH by PC
Before use RS232 communication, you should make sure the follow PIN1 and PIN2 are OFF:

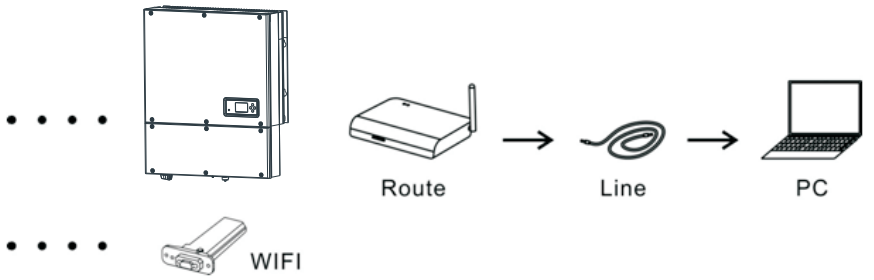


The wiring diagram is as follows:

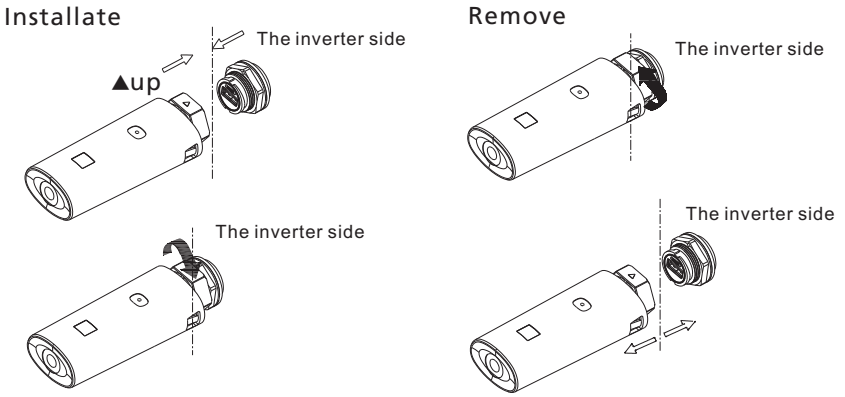


6.5.3 The SPH's monitoring

The SPH provide USB interface. Users can through the following communication solution to monitor the SPH. For example Using Wi-Fi-X monitor SPH as follow:
Note:
This kind of monitoring can only be used by the monitor of Growatt's Shineserver /shine phone provided by the company. Through RS232 interface connect to Wi-Fi-S/shinelink/GPRS, use computer terminal/or mobile phone for data monitoring.



Plug in the communication module and tighten the screws as follow.



How to register account, please turn to the usermanual of shine Wi-Fi-X.

7 Start-up and shut down SPH system

7.1 Start-up the SPH system

Users can start-up SPH inverters through following steps:
1. Connect to PV
2. Connect to Grid
3. Connect to Battery
4. Turn the switch on in turn of PV, Grid and battery
5. When the LED turns green, the working information on LCD indicates the successful start-up of SPH inverter

7.2 Disconnect the SPH system

1. Turn off all the circuit breaker and switch
2. Disconnect PV
3. Disconnect the inverter
4. Disconnect the battery
5. Pull up AC PLUG connection
6. Waiting until LED, LCD display have gone out, the SPH is shut down completely

Attention of the installation environment, maintenance and cleaning 8

Heat dissipation performance is very important when SPH inverter work under the environment of high temperature, better heat dissipation can reduce the possibility of SPH inverter stops working. Growatt SPH series inverter without fan so belongs to natural cooling, hot air from the top of the radiator, tie-in battery, use environment for IP65 (NEMA Type 4x), please pay attention to the temperature of the installation environment, to ensure that the battery's safety and the normal work of the machine.
When use battery, please pay attention to the follow information:
Caution: Do not dispose of batteries in a fire. The batteries may explode.
Caution: Do not open or damage batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic.
Caution: A battery can present a risk of electrical shock and high short-circuit current. The following precautions should be observed when working on batteries:

- Remove watches, rings or other metal objects.
- Use tools with insulated handles.
- Wear rubber gloves and boots.
- Do not lay tools or metal parts on top of batteries.
- Disconnect charging source prior to connecting or disconnecting battery terminals.
- Determine if battery is inadvertently grounded. If inadvertently grounded, remove source from ground. Contact with any part of a grounded battery can result in electrical shock. The likelihood of such shock can be reduced if such grounds are removed during installation and maintenance (applicable to equipment and remote battery supplies not having a grounded supply circuit).

If SPH inverter doesn't work for overheating or too cold, solve it according to the following methods.

- Confirm whether the radiator air duct installation is reasonable, choose the appropriate position before installation.
- If lead-acid batteries are connected, confirming the NTC battery is in a good installation.
- Confirm whether the battery temperature is too high, too high temperature of battery can also lead to SPH fail to work, at this point, to ventilation, cooling or still handle to the battery, please.
- If temperature is low, also can appear the battery low temperature protection, the battery will start with small load in low temperature output, after temperature back to normal system can work normally, please be patient at this time
- If the temperature is too low, it is possible that battery will be low temperature protection, at this time, please pay attention to the working temperature range listed in the specifications of the book.
- Servicing of batteries should be performed or supervised by personnel knowledgeable about batteries and the required precautions.
- When replacing batteries, replace with the same type and number of batteries or battery packs.
- General instructions regarding removal and installation of batteries.

Remark:
All of above action should be operated by professional person, if you want to do these works, you must make sure the whole system are off.

9 Fault removal

Our products are carried out with strict tests before they take out, if the operation difficulties in the process of installation, please log on to www.ginverter.com website, view the Q&A program.
When SPH inverter fault happens, please inform our company, and to provide SPH related information, we will have a professional after-sales service personnel to answer you.
What you need to provide the information about the SPH including:

- Serial number
- Model
- Information about the LCD display
- Brief description of problems
- The battery voltage
- The PV input voltage and power per string.
- The grid voltage and frequency
- Can you retell the failure problem? If you can, what kind of a situation
- Did the problem happen in the past?
- When did this fault happen? First installation?
- About the battery
- The manufacturer name and model of battery
- Capacity of battery
- Output voltage of the battery

The time you buy Battery and frequency you use it

9. 1 System fault information list and troubleshooting suggestions

Warning Message		
Error Message	Discription	Suggestion
Warning 401	Raillog/Meter Communication fault	Check the wire connection between meter and inverter is good or not. Check the distance of Raillog and inverter is in the range of specification or not. Restart inverter and Raillog, reconnect.
Warning 203	Pv1 or PV2 Circuit short	Check the positive and negative of PV input is reversed or not. Reinserted the PV terminal, please contact Growatt service center if restart can't solve the problem.
Warning 506	Battery temperature out of specified range for charge or discharge	Check the environment temperature of battery is in the range of specification or not.
AC V Outrange	Grid voltage fault. Please refer to the local grid standard for more details of the grid frequency.	Check the AC voltage is in the range of standard voltage in specification. Check the grid connection is good or not.
AC F Outrange	Grid frequency fault. Please refer to the local grid standard for more details for the grid voltage.	Check the frequency is in the range of specification or not. Restart inverter. Please contact Growatt service center if restart can't solve the problem.

BMS COM Fault	Communication fault	Check the lithium Battery is open or not. Check the connection of lithium Battery and inverter is good or not.
Battery reversed	Battery terminals reversed	Check the positive and negative of battery is reversed or not.
BAT NTC Open	NTC open (only for lead-acid battery)	Check the temperature of lead-acid battery is installed or not. Check the temperature of lead-acid battery is connected well or not.
Battery Open	Battery terminal open (only for lithium battery)	Check the battery connection is good or not. Check the switches between the battery and inverter are all on or not.
Over Load	EPS output overload warning. If this warning occurred three time. Off-grid function will be locked one hour and output power again.	Please reduce the load of EPS output.
No AC Connection	No Utility	Please confirm grid is lost or not. Check the grid connection is good or not. Check the switches on the cable are on or not.
Output High DCI	Output DC current too high. Please refer to the local grid standard for disconnection time when the output DC current is too high.	Restart inverter. Please contact Growatt service center if restart can't solve the problem.
Bat Voltage High	Battery Voltage higher than 60V	Check the voltage of battery is in the range of specification or not. Check the battery connection is right or not If battery is really higher than 60V. Please disconnect the connection of battery and check inverter.
Bat Voltage Low	Battery Voltage Lower than 42 V	Check the real voltage of battery. Check the wire of battery and inverter is good or not.
BMS Warning:XXX	BMS report warning	Check the warning information from lithium battery user manual. Please contact Growatt service center if restart can't solve the problem.
BMS error:XXX	BMS report error	Check the warning information from lithium battery user manual. Please contact Growatt service center if restart can't solve the problem.
EPS Volt Low	EPS output voltage low	Check the load of EPS. If overload occurred, reduce load. Restart inverter again.

Error Message		
Error Message	Fault Discription	Suggestion
Error 103	BUS voltage high	Check the PV input voltage. Do not exceed the range of specification. Restart inverter. Please contact Growatt service center if restart can't solve the problem.
Error 411	Internal communication failed	Restart inverter. Please contact Growatt service center if restart can't solve the problem.
Error 417	Sample fault	Restart inverter Please contact Growatt service center if restart can't solve the problem
Error 418	DSP and COM firmware version unmatch, system fault.	Read DSP and COM firmware version from LCD or shinebus. Check if the firmware is correct.
Error 303	Inverter L N reversed or ground failed	Check the L line and N line is reversed or not. Check the PE s connected well or not.
Error 405	Relay fault	Restart inverter. Please contact Growatt service center if restart can't solve the problem.
PV Isolation Low	PV isolation too low	Check the connection of PV panels and inverter is good or not. Check the PE of inverter is good or not.
OP Short Fault!	EPS Output Short Fault	Check the load of EPS. Check the output of EPS. Especial not connect to grid
NTC Open	Internal temperature failed	Please contact Growatt service center
Error 406	Model set up not meet with certification	Please check model set or check the DIP setting
Error 401	DC Voltage High Fault	1. Restart inverter. 2. If error message still exists,contact manufacturer.
Residual I High	Leakage current too high	Check the cable of inverter. Restart inverter. Please contact Growatt service center if restart can't solve the problem
Error 408	Temperature over range	Please check the temperature is in the range of specification or not.
PV Voltage High	PV voltage higher than datasheet	Please check the voltage of PV input is in the range of specification or not.

Manufacturer Warranty 10

This certificate represents a 5 year warranty for the Growatt products listed below. Possession of this certificate validates a standard factory warranty of 5 years from the date of purchase.

Warranted products

This warranty is applicable solely to the following products:

- SPH3000TL BL-US.
- SPH3600 TL BL-US.
- SPH4000 TL BL-US.
- SPH4600 TL BL-US.
- SPH5000 TL BL-US.
- SPH6000 TL BL-US.

Limited Product Warranty

(Applicable under normal application, installation, use and service conditions) manufacturer warrants the above listed products to be free from defects and/or failure specified for a period not exceeding five (5) years from the date of sale as shown in the Proof of Purchase to the Original purchaser.

The warranties described in these "Limited Warranty" are exclusive and are expressly in lieu of and exclude all other warranties, whether written, oral, expresser implied, including but not limited to, warranties of merchantability and of fitness for a particular purpose, use, or application, and all other obligations or liabilities on the part of manufacturer , unless such other obligations or liabilities are expressly agreed to it in writing signed and approved by manufacturer , manufacturer shall have no responsibility or liability whatsoever for damage or injury to persons or property, or for other loss or injury resulting from any cause whatsoever arising out of or related to the modules, including, without limitation, any defects in the modules or from use or installation. Under no circumstances shall manufacturer be liable for incidental, consequential or special damages howsoever caused; loss of use, loss of production, loss of revenues are therefore specifically and without limitation excluded to the extent legally permissible, manufacturer's aggregate liability, if any, in damages or otherwise, shall not exceed the invoice as paid by the customer.

The "Limited Product Warranty" described above shall not apply to, and Growatt shall have no obligation of any kind whatsoever with respect to, any machine which has been subjected to:

- Misuse, abuse, neglect or accident;
- Alteration, improper installation or application;
- Unauthorized modification or attempted repairs;
- Insufficient ventilation of the product;
- Transport damage;
- Breaking of the original manufacturers seal;
- Non-observance of manufacturer installation and maintenance instruction;
- Failure to observe the applicable safety regulations
- Power failure surges, lighting, flood, fire, exposure to incorrect use, negligence, accident, force majeure, explosion, terrorist act, vandalism or damage caused by incorrect installation, modification or extreme weather conditions or other circumstances not reasonably attributable to manufacturer.

The warranty shall also cease to apply if the product cannot be correctly identified as the product of manufacturer. Warranty claims will not be honored if the type of serial number on the machines have been altered, removed or rendered illegible.

Liability

The liability of manufacturer in respect of any defects in its machines shall be limited to compliance with the obligations as stated in these terms and conditions of warranty. Maximum liability shall be limited to the sale price of the product. Manufacturer shall accept no liability for loss of profit, resultant of indirect damage, any loss of electrical power and / or compensation of energy suppliers within the express meaning of that term.

The warranty rights as meant herein are not transferable or assignable to any third party excepting the named warranty holder.

Warranty Conditions

If a device becomes defective during the agreed manufacturer factory warranty period and provided that it will not be impossible or unreasonable, the device will be, as selected by manufacturer:

1. Shipped to a manufacturer service center for repair.
2. Repaired on-site.
3. Exchanged for a replacement device of equivalent value according to model and age.

The warranty shall not cover transportation costs in connection with the return of defective modules. The cost of the installation or reinstallation of the modules shall also be expressly excluded as are all other related logistical and process costs incurred by all parties in relation to this warranty claim.

Decommissioning 11

11.1 Dismantling the energy storage

1. Disconnect the storage machine such as mentioned in section 7.
2. Disconnect the upper cable of SPH inverter

Watch out the SPH's shell heat and prevent to scald
Wait 20 minutes until the SPH cooling and then to disassembly!

3. Unscrew all the connecting cable.
4. Unscrew the radiator and wall-mounted anchor screw and then take down the machine from wall.

11.2 Packing the SPH inverter

Usually placed SPH inverter in the packing box with tape sealing, if the SPH inverter cannot reoccupy, you can choose a cheap carton for packaging. Carton requirements must meet the size of the inverter and can support energy storage machine overall weight.

11.3 Storing SPH inverter

Store SPH inverter in a dry place where ambient temperatures are always between -25°C and +60°C.

11.4 Disposing of the SPH inverter

Do not dispose of SPH inverter together with household waste. Please accordance with the disposal regulations for electronic waste which apply at the installation site at that time. Ensure that the old unit and, where applicable, any accessories are disposed of in a proper manner

12 Product specification

12.1 SPH series energy storage machine product specification

Specifications \ Model	SPH3000 TL BL-US	SPH3600 TL BL-US	SPH4000 TL BL-US
Input data(DC)			
Max. recommended PV power(for module STC)	6600		
Max. DC voltage	550		
Start voltage	150		
Nominal voltage	370		
MPP voltage range	150V-550V		
No. of MPP trackers	2		
No. of PV strings per MPP trackers	1		
Max. input current per MPP trackers	13		
Max. short-circuit current per MPP trackers	15		
Output data(AC)			
AC nominal power	3000W	3680W	4000W
Max. AC apparent	3000VA	3680VA	4000VA
Nominal AC voltage/range	240V (211~264V) / 208/ (183~228V)		
AC grid frequency/range	60Hz /59.3~60.5Hz		
Max. output current	16A	16A	22A
Power factor(@nominal power)	1		
Adjustable power factor	0.8Leading ...0.8Lagging		
THDi	<3%		
AC grid connection type	split phase		
Stand alone data			
Max. AC apparent power	3000VA	3680VA	3680VA
Nominal AC voltage	240Vac		
Nominal AC frequency	60Hz		
Max. output current	16		
THDv	<3%		
Switch time	≤1s		

Specifications \ Model	SPH3000 TL BL-US	SPH3600 TL BL-US	SPH4000 TL BL-US
Battery data (DC)			
Battery voltage range	42~59V		
Recommended battery voltage	48V		
Max. charging / discharging current	75A		
Continuous charging / discharging power	3000W	3680W	3680W
Max charging / discharge power	4000W/10s		
Type of battery	Li/lead-acid		
Capacity of battery	50Ah~2000Ah		
Efficiency			
Max. efficiency	97.2%		
MAX. Battery charge/discharge efficiency	94%		
Protection devices			
DC reverse-polarity protection	YES		
Battery reverse protection	YES		
DC switch	YES		
Insulation resistance monitoring	YES		
AC surge protection	YES		
AC short-circuit protection	YES		
Ground fault monitoring	YES		
Grid monitoring	YES		
Anti-islanding protection	YES		
Residual-current monitoring unit	YES		
General data			
Dimensions (W / H / D) in mm	669*565*179/(26.34*22.24*7.05)		
Weight	33.5kg(73.85lb)		
Operating temperature range	-25°C ... +60°C(-13°F~140°F) with deratingabove		
Noise emission (typical)	≤25dB(A)		
Altitude	2000m(6561ft)		

Specifications \ Model	SPH3000 TL BL-US	SPH3600 TL BL-US	SPH4000 TL BL-US
Self-Consumption	< 12 W*4		
Topology	Transformerless		
Cooling	Natural		
Protection degree	IP65/ NEMA Type 4X		
Relative humidity	100%		
DC connection	Screw		
AC connection	Screw		
Battery connection	Screw		
Interfaces			
Display	LCD+LED		
USB/RS485	YES		
RS232/RS485/CAN/USB/ RF/WIFI/GPRS/4G	YES/YES/YES/YES/YES/OPT/OPT/OPT		
Warranty: 5 / 10 years	5		
Certificates and approvals			
IEEE 1547:2003, IEEE 1547A:2014, IEEE 1547.1:2005; Rule 21+Rule 14H+SRD1.1			
FCC(EMC) standards: part 15B			
UL 1741: 2018, CSA C22.2 No.107.1:2016			

Specifications \ Model	SPH4600 TL BL-US	SPH5000 TL BL-US	SPH6000 TL BL-US
Input data(DC)			
Max. recommended PV power(for module STC)	8000		
Max. DC voltage	550		
Start voltage	150		
Nominal voltage	370		
MPP voltage range	150V-550V		
No. of MPP trackers	2		
No. of PV strings per MPP trackers	1		
Max. input current per MPP trackers	13		
Max. short-circuit current per MPP trackers	15		
Output data(AC)			
AC nominal power	4600W	4999W	6000W
Max. AC apparent	4600VA	4999VA	6000VA
Nominal AC voltage/range	240V (211~264V) / 208/ (183~228V)		
AC grid frequency/range	60Hz /59.3~60.5Hz		
Max. output current	22A	22A	27A
Power factor(@nominal power)	1		
Adjustable power factor	0.8Leading ...0.8Lagging		
THDi	<3%		
AC grid connection type	split phase		
Stand alone data			
Max. AC apparent power	3680VA		
Nominal AC voltage	240Vac		
Nominal AC frequency	60Hz		
Max. output current	16		
THDv	<3%		
Switch time	≤1s		

Specifications \ Model	SPH4600 TL BL-US	SPH5000 TL BL-US	SPH6000 TL BL-US
Battery data (DC)			
Battery voltage range	42~59V		
Recommended battery voltage	48V		
Max. charging / discharging current	75A		
Continuous charging / discharging power	3680W		
Max charging / discharge power	4000W/10s		
Type of battery	Li/lead-acid		
Capacity of battery	50Ah~2000Ah		
Efficiency			
Max. efficiency	97.3%	97.3%	97.5%
MAX. Battery charge/discharge efficiency	94%		
Protection devices			
DC reverse-polarity protection	YES		
Battery reverse protection	YES		
DC switch	YES		
Insulation resistance monitoring	YES		
AC surge protection	YES		
AC short-circuit protection	YES		
Ground fault monitoring	YES		
Grid monitoring	YES		
Anti-islanding protection	YES		
Residual-current monitoring unit	YES		
General data			
Dimensions (W / H / D) in mm	669*565*179/(26.34*22.24*7.05)		
Weight	33.5kg(73.85lb)		
Operating temperature range	-25°C ... +60°C(-13°F~140°F) with deratingabove		
Noise emission (typical)	≤25dB(A)		
Altitude	2000m(6561ft)		

Specifications \ Model	SPH4600 TL BL-US	SPH5000 TL BL-US	SPH6000 TL BL-US
Self-Consumption	< 12 W*4		
Topology	Transformerless		
Cooling	Natural		
Protection degree	IP65/ NEMA Type 4X		
Relative humidity	100%		
DC connection	Screw		
AC connection	Screw		
Battery connection	Screw		
Interfaces			
Display	LCD+LED		
USB/RS485	YES		
RS232/RS485/CAN/USB/ RF/WIFI/GPRS/4G	YES/YES/YES/YES/YES/OPT/OPT/OPT		
Warranty: 5 / 10 years	5		
Certificates and approvals			
IEEE 1547:2003, IEEE 1547A:2014, IEEE 1547.1:2005; Rule 21+Rule 14H+SRD1.1			
FCC(EMC) standards: part 15B			
UL 1741: 2018, CSA C22.2 No.107.1:2016			

12.2 Torque

Upper cover screws	1.3Nm(10.8 1bf.in)
Shell and RS232screws	0.7Nm(6.2 1bf.in)
Dc connector	1.8Nm(16.0 1bf.in)
M6 screwdriver	2Nm(18 1bf.in)
Grounding screw	2Nm(18 1bf.in)

12.3 Appendix

The following chart is the energy storage machine optional appendix list, if there is a need please contact the Manufacturer or dealer orders (P/N is only for reference and it may be changed).

Name	Description
ATF	Used for on grid and off grid switch and also used for split phase load
Shine WIFI-X	Used for data record
IM(intelligence meter)	RS485 meter sensor(Acrel)
	RS485 meter sensor(DTS)

Certificate 13

SPH series inverter apply within the scope of the world, so the inverter have to satisfy different countries and regions of different safety standards.

Model	Certificate
SPH3000TL BL-US SPH3600 TL BL-US SPH4000 TL BL-US SPH4600 TL BL-US SPH5000 TL BL-US SPH6000 TL BL-US	IEEE 1547:2003, IEEE 1547A:2014, IEEE 1547.1:2005; Rule 21+Rule 14H+SRD1.1

Contact 14

If you have technical problems about our products, contact the manufacturer Service line or dealer. We need the following information in order to provide you with the necessary assistance:

- SPH inverter Serial number
- SPH inverter module information
- SPH inverter communication mode
- SPH inverter fault information code
- SPH inverter Display content
- The manufacturer and model of the battery
- Battery capacity and connection mode

Shenzhen Growatt New Energy Technology CO.,LTD
No.28 Guangming Road, Shiyan Street, Bao'an District,
Shenzhen, P.R.China
T +86 755 2747 1942
E service@ginverter.com
W www.ginverter.com