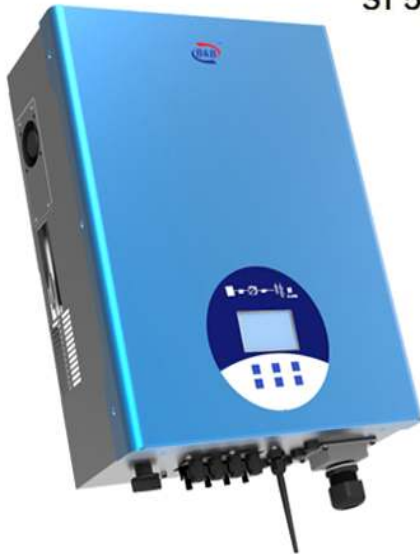


# PV Grid-tied Inverters

ST 5000TL/6000TL/7000TL/8000TL



**User Manual**

Version 1.1 (EN)

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# 1 Notes

This manual is an integral part of the inverter. Please read the product manual carefully before installation, operation or maintenance.

## 1.1 Validity

This manual describes the procedure for mounting, installation, commissioning, maintenance and troubleshooting of the following B&B Power inverters:

<b>ST5000TL</b>	<b>ST6000TL</b>
<b>ST7000TL</b>	<b>ST8000TL</b>

Keep this manual in a convenient place for future reference.

## 1.2 Target Group

This manual is for the use of qualified persons.

The qualified persons have received training and demonstrated skills and knowledge in the construction and operation of this device.

The qualified persons are trained to deal with the dangers and hazards involved in installing electric devices.

## 1.3 Safety

### 1.3.1 Appropriate Usage

The Solar Town (ST for short) series inverters are the PV inverters which convert the DC current of a PV generator (PV plant) into AC current and feed it into the public grid.



Figure 1 Principle of a PV Plant with ST series inverter



### 1.3.2 Symbols Used

You will find further information on special topics such as designing or the description of the parameters and other solutions at [www.bbpower.cn](http://www.bbpower.cn).

Refer to the user manual provided for detailed information on how to operate the inverter.

The following types of safety precautions and general information appear in this document:




	<p><b>DANGER !</b></p> <p>DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.</p>
	<p><b>WARNING !</b></p> <p>WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.</p>
	<p><b>CAUTION!</b></p> <p>CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.</p>









	<p><b>NOTICE!</b></p> <p>NOTICE indicates a situation, which if not avoided, can result in property damage.</p>
	<p><b>Information</b></p> <p>Information provides tips that are valuable for effective installation and operation of the product.</p>

### 1.3.3 Glossary of Symbols

This section gives a glossary of all the symbols shown on the inverter and the type label.




- **Symbols on the inverter**

Symbol	Explanation
	<p><b>Danger to life due to high voltage in the inverter!</b></p> <ul style="list-style-type: none"> <li>• There would be residual voltage in the inverter. The inverter requires 5 minute to discharging.</li> <li>• Wait for 5 minutes before you open the upper lid or other operations.</li> </ul>
	<p><b>Beware of hot surface!</b></p> <ul style="list-style-type: none"> <li>• The inverter can get hot during operation. Avoid contact during operation .</li> </ul>
	<p><b>Danger of high voltages !</b></p> <p>When exposed to sunlight, the PV array generates a dangerous direct voltage which is present in the DC conductors or the live components in the inverter.</p> <ul style="list-style-type: none"> <li>• Do not touch the DC conductors.</li> <li>• Do not touch live components in the inverter.</li> <li>• Prior to performing any work on the inverter, always disconnect it from any voltage sources.</li> </ul>

	<p><b>Risk of electric shock!</b></p> <ul style="list-style-type: none"> <li>• Only authorized personnel can be allowed to operate the inverter.</li> </ul>
	<p>Requests the user to consult the manual.</p>
	<p>Indicates caution followed by important instructions.</p>
	<p>Equipment grounding conductor.</p>
	<p>AC voltage.</p>
	<p>You can operate the interface by tapping on it.</p> <ul style="list-style-type: none"> <li>• Tapping once: The background illumination switches on.</li> <li>• Tapping again: Updating information.</li> </ul>
	<p>You can operate the interface by the keys.</p> <p>For more information on operating the keys, see Section 7.2 'LCD display'.</p>
	<p>Recovery and recycling.</p>





• **Symbols on the type label**

Symbol	Explanation
	CE mark. • The inverter complies with the requirements of the applicable CE guidelines.
	TUV mark. • The inverter complies with the requirements of the applicable TUV guidelines.
	CQC mark. • The inverter complies with the requirements of the applicable CQC guidelines.

• **Important Safety Instructions**

When using the product, please do remember the below information to avoid the fire, lightning or other personal injury:

	<p><b>Danger!</b></p> <p><b>Danger to life due to high voltage in the inverter!</b></p> <ul style="list-style-type: none"> <li>• All work on the inverter must be carried out by qualified person only.</li> <li>• The appliance is not to be used by children or persons with reduced physical sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction.</li> <li>• Children should be supervised to ensure that they do not play with the appliance.</li> </ul>
---	--

	<p><b>Warning!</b></p> <ul style="list-style-type: none"> <li>• Authorized service personnel must disconnect both AC and DC power from the ST series inverter before attempting any maintenance or cleaning or working on any circuits connected to the ST series inverter.</li> </ul>
---	--

**Caution!**

- The photovoltaic array is exposed to light, it supplies a dc voltage to the inverter.

**Warning!**

- Ensure that input DC voltage is less than Max. DC voltage.
- Over voltage may cause permanent damage to inverter or other losses, which will not be included in warranty!
- This chapter contains important safety and operating instructions.
- Read and keep this operation Guide for future reference.

**Note!**

Grounding the PV generator.

- B&B Power recommends PV modules have an IEC 61730 Class A rating. Please don't connect the PV modules to Ground.

## 2 Introduction

### 2.1 Overview



Figure 2 Stereogram

### 2.2 Electrical Block Diagram

- Electrical block diagram

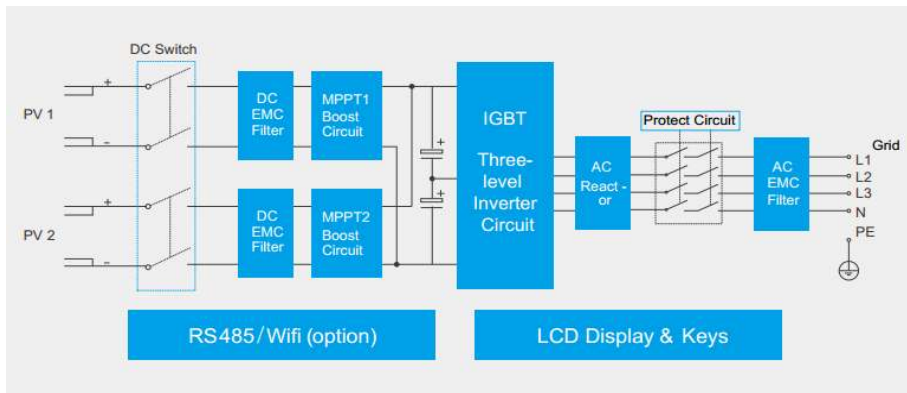


Figure 3 Electrical block diagram

## 2.3 Terminals of PV Inverter

- **PV terminals**

B&B Power ST series inverters have two independent MPP trackers PV1 and PV2. Per tracker has two PV input terminals.

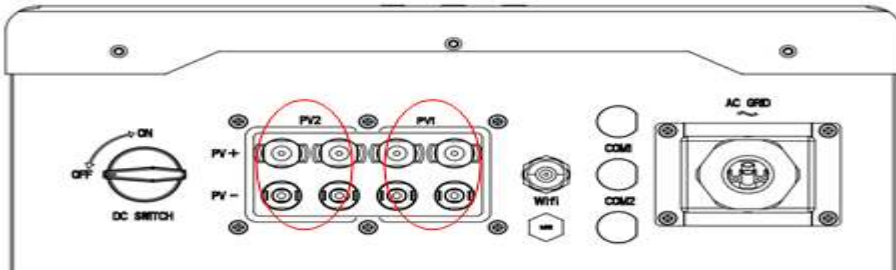


Figure 4 PV Terminals

- **COM terminals**

B&B Power ST series inverters' Communication Interfaces contains RS485、Ethernet and Wifi (optional).

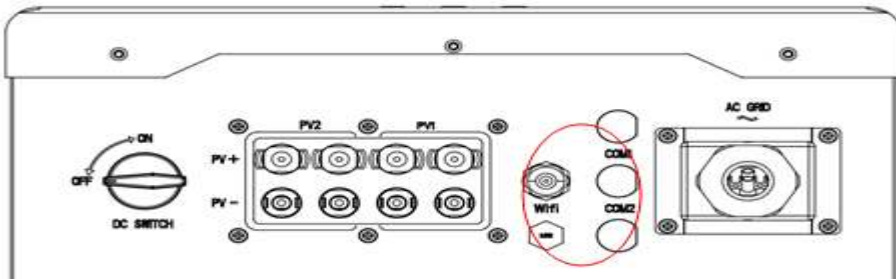


Figure 5 COM Terminals

- **AC terminals**

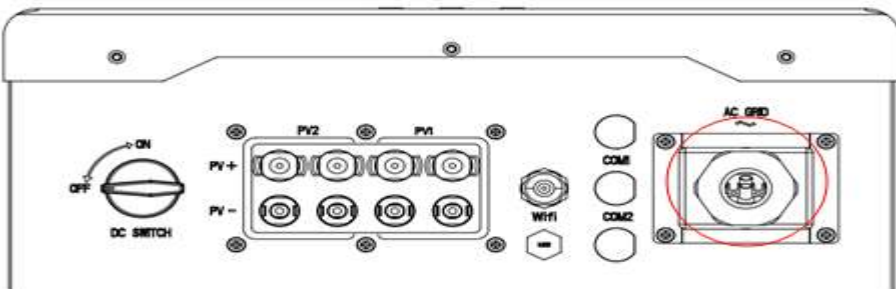


Figure 6 AC Terminals

## 2.4 DC Switch-Disconnecter

The ST series inverter have pre-installed a DC switch-disconnector in the inverter on delivery. By means of the DC switch-disconnector, you can manually close or interrupt the electric circuit between the PV array and the inverter. The DC switch-disconnector enables the safe disconnection of the inverter from the PV array. Disconnection takes place at all poles.

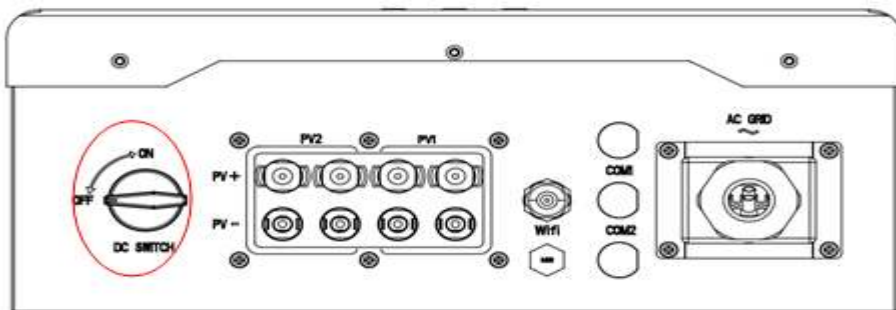


Figure 7 DC switch-disconnector

## 2.5 Display

The display shows the current operating data of the inverter (e.g. status, power, input voltage) as well as errors and disturbances.

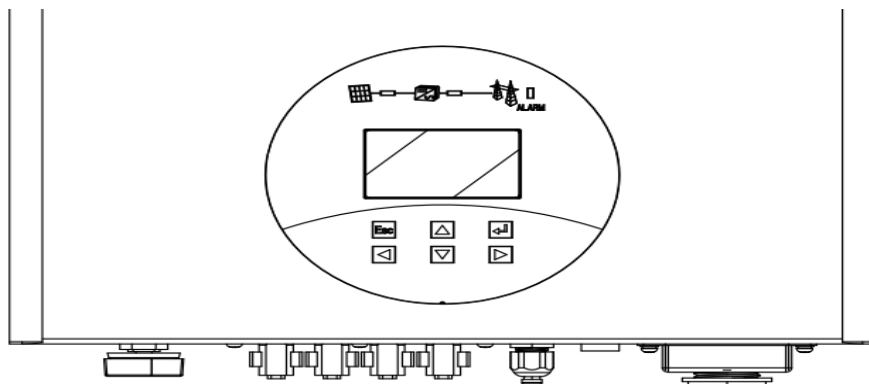


Figure 8 LCD display

## 2.6 Dimension and Weight

- **Dimension**



Figure 9 ST5000TL/ ST6000TL/ ST7000TL/ ST8000TL

- **Weight**

Table 1

Model	ST5000TL	ST6000TL	ST7000TL	ST8000TL
Weight	24kg	24kg	24kg	24kg

## 3 Packaging List

### • List

Table 2

Item	Name	Quantity
A	Solar Inverter	1
B	Mounting Frame	1
C	plug bolt	4
D	Manual	1
E	PV connector	8
F	expansion bolt	4
G	RS485 connector	2

The ST series inverter is shipped with the following items:

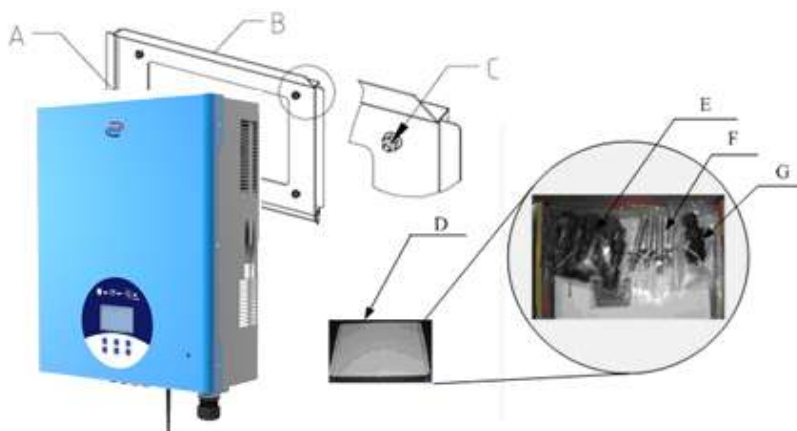


Figure 10

### • Identifying the Inverter

You can identify the inverter by the type label. The type label is located on the right-hand side of the housing.

The inverter type (type/model), serial number (serial no.) and other device-specific characteristics are specified on the type label.



Check the delivery for completeness and for any visible external damage. Contact your specialist dealer if the delivery is incomplete or you find any damage.

## 4 Technical Data

### 4.1 Input (DC)

Table 3

Model	ST5000TL	ST6000TL	ST7000TL	ST8000TL
Max.DC power(W)	5150	6200	7250	8350
Max.DC voltage (V)	1000	1000	1000	1000
DC nominal voltage(V)	610	610	610	610
MPP voltage range(V) @full power	250-800	280-800	300-800	330-800
Max.input current/ per tracker(A)	13/13	13/13	13/13	13/13
Number of MPP Trackers/ Strings per MPP Tracker	2/2	2/2	2/2	2/2
Isc PV (A)	20	20	20	20
Overvoltage category	III	III	III	III



## 4.2 Output (AC)

Table 4

Model	ST5000TL	ST6000TL	ST7000TL	ST8000TL
AC nominal power(KW)	5	6	7	8
Max. AC apparent power(kVA)	5	6	7	8
Nominal AC voltage(V)	3/N/PE/230/400			
Grid frequency (HZ)	50/60	50/60	50/60	50/60
Max.output current(A)	8	9.6	11.2	12.8
Max.output fault current(A)	490	490	490	490
Power factor (cosΦ) adjustable	0.9leading-0.9laging			
Harmonics	<3%	<3%	<3%	<3%
Overvoltage category	III	III	III	III

## 4.3 Efficiency Safety and Protection

Table 5

Model	ST5000TL	ST6000TL	ST7000TL	ST8000TL
Max. Efficiency	98.5%	98.5%	98.6%	98.6%

Model	ST5000TL	ST6000TL	ST7000TL	ST8000TL
Euro-Efficiency	98.1%	98.1%	98.3%	98.3%
MPPT Efficiency	99.9%	99.9%	99.9%	99.9%
Overvoltage / Under-Voltage Protection	Yes	Yes	Yes	Yes
Shutdown Voltage / Start	Yes	Yes	Yes	Yes
DC Isolation Impedance Monitoring	Yes	Yes	Yes	Yes
Ground Fault Protection	Yes	Yes	Yes	Yes
Grid Monitoring	Yes	Yes	Yes	Yes
Ground Fault Current Monitoring	Yes	Yes	Yes	Yes
DC Injection Monitoring	Yes	Yes	Yes	Yes

## 4.4 General Data

Table 6

Model	ST5000TL	ST6000TL	ST7000TL	ST8000TL
Dimension (W/H/D) [mm]	550/430/180			
Weight [kg]	24kg			
Operating Temperature Range [°C]	-25°C ~ +60°C			

<b>Model</b>	<b>ST5000TL</b>	<b>ST6000TL</b>	<b>ST7000TL</b>	<b>ST8000TL</b>
Degree of Protection	IP65			
Protective class	I			
Climatic Category (according to IEC 60721-3-4)	4K4H			
Internal Consumption (night) [W]	<1W			
Cooling Concept	Fans			
Display	LCD			
humidity	0-100%, no condensation			
Communication Interfaces	RS485/Ethernet(opt.)/Wifi(opt.)			
Standard Warranty (5/10/15year)	Free/opt./opt.			

## 5 Function

- **Operation Mode**

**【Waiting Mode】**

When the PV string DC voltage is over 160V but not reach to 200V, the inverter enters a "Waiting mode".

Under this mode, it will continue check if PV array has enough power to feedback into grid.

**【Self Testing Mode】**

After initialization is finished in "Waiting mode", if the PV string voltage is over 200V and the Grid voltage & frequency meets the standard, the inverter will operates in the "Checking mode".

**【On-grid Mode】**

Under this mode, The ST series inverters convert PV array's DC into AC and feedback into grid.



**NOTICE!**

The inverter output power decrease is usual in the condition of thermal protection, but if it occurs frequently, you need to check the heat sink or consider putting the inverter in the place where have better air flow, and if

output power decreases caused by electrical problem, please ask for professional supports.

**【Fault Mode】**

If any fault/error occurs, inverter stops delivering power until the fault/error is clear. Some fault/error will auto recover, and some may need manual restart to resolve.

## 6 Installation

### 6.1 Safety Instructions



#### **DANGER!**

##### **Danger to life due to fire or explosion.**

- Despite careful construction, electrical devices can cause fires.
- Do not mount the inverter on flammable construction materials.
- Do not mount the inverter in areas where highly flammable materials are stored.
- Do not mount the inverter in a potentially explosive atmosphere.



#### **CAUTION!**

##### **Risk of injury due to the heavy weight of the inverter (approximately 24 kg) .**

- Take the weight of the inverter into account during transport.
- Select a suitable mounting location and mounting surface.
- When mounting the rear panel, use fastening material suitable for the mounting surface.
- Two people are needed to mount the inverter.



#### **CAUTION!**

##### **Risk of burns due to hot enclosure parts.**

- Mount the inverter in such a way that it cannot be touched inadvertently.

#### • **Disassembly**

Carefully remove the unit from its packaging and inspect for external damage. If you find any imperfection, please contact with your local distributor or service center.

## 6.2 Selecting the Installation location

- Take the following requirements into consideration when selecting the mounting location:
  - The mounting method and location must be suitable for the weight and dimensions of the inverter.
  - Mount on a solid surface.
  - The mounting location must at all times be clear and safely accessible without the use of additional aids such as scaffolding or lifting platforms. Non-fulfilment of these criteria may restrict execution of servicing.
  - Mount vertically or tilted backwards by max. 15° .
  - The connection area must face downwards.
  - Never mount the device with a forward tilt.
  - Never mount the device with a sideways tilt.
  - Do not mount horizontally.

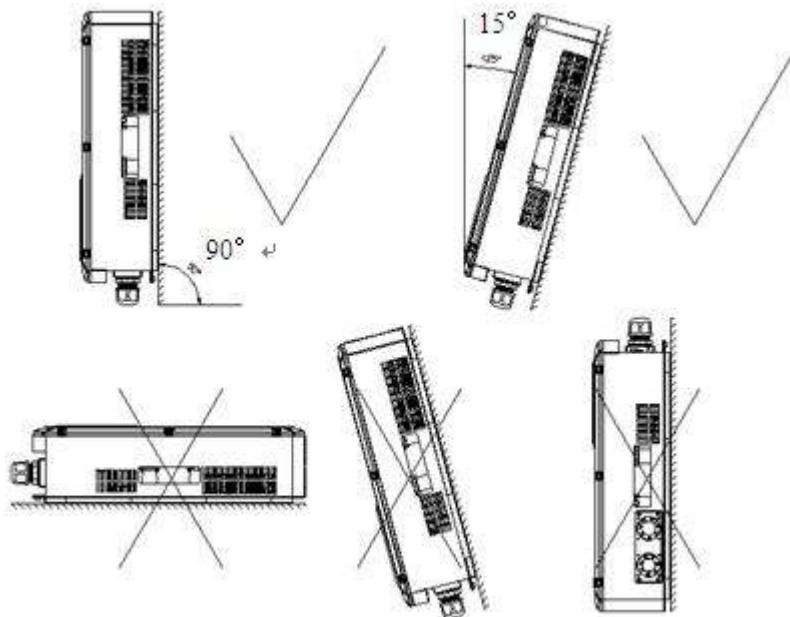


Figure 11 Installation

- Mount the inverter at eye level. Given the weight of the device, this will facilitate disassembly if service work is necessary.

- The ambient temperature should be below 40° C to ensure optimum operation.
- Do not expose the inverter to direct solar irradiation as this can cause excessive heating and thus power reduction.
- In living areas, do not mount the unit on plasterboard walls or similar in order to avoid audible vibrations. When in use, the inverter emits noises which may be perceived as a nuisance in a living area.
- Observe the recommended clearances to walls ,other inverters or other objects, as shown in the diagram. This ensures adequate heat dissipation and sufficient room to operate the optional DC switch-disconnector.

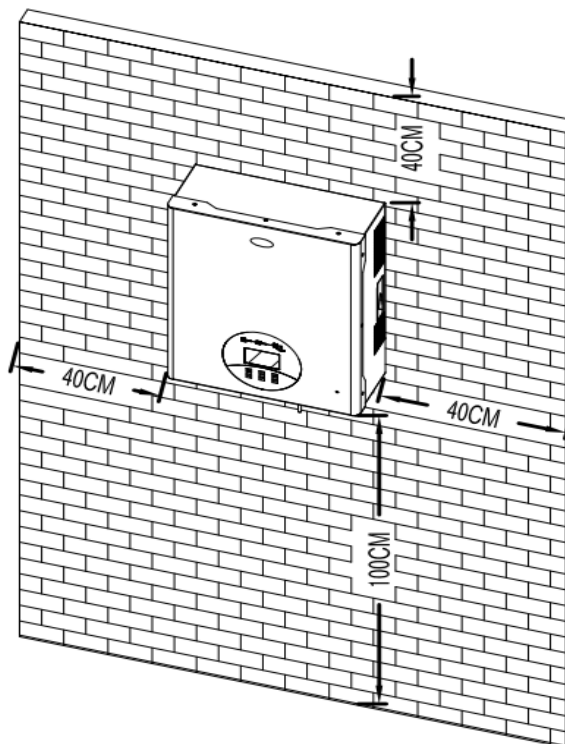


Figure 12

- If multiple inverters are mounted in areas with high ambient temperatures, increase the clearances between the inverters and ensure an adequate fresh-air supply. This will prevent a reduction in inverter power as a result of excessively high temperatures (details on temperature derating can be found in the Technical Information).

## 6.3 Preparation

Below tools are needed before installation.



Figure 13 installation Tools

## 6.4 Fixed the Mounting on the Wall

Using the mounting frame as a template, drill 4 holes as illustrated in image.

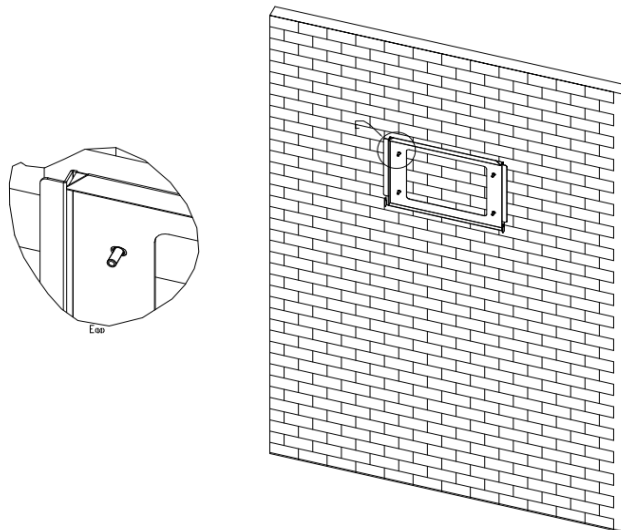


Figure 14

Fix the mounting frame as the figure 15 shows. Do not make the screws too close to the wall, leaving 2-4 mm exposed instead.



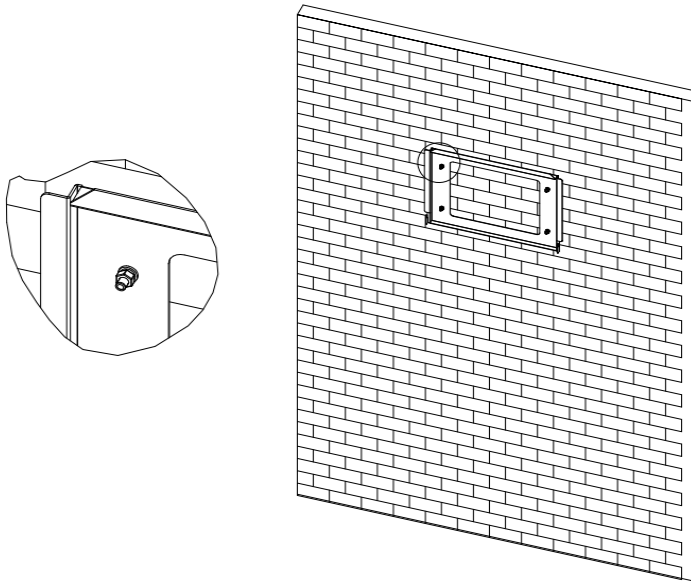


Figure 15

## 6.5 Fixed the Inverter on the Wall

Hang the inverter onto the mounting frame.

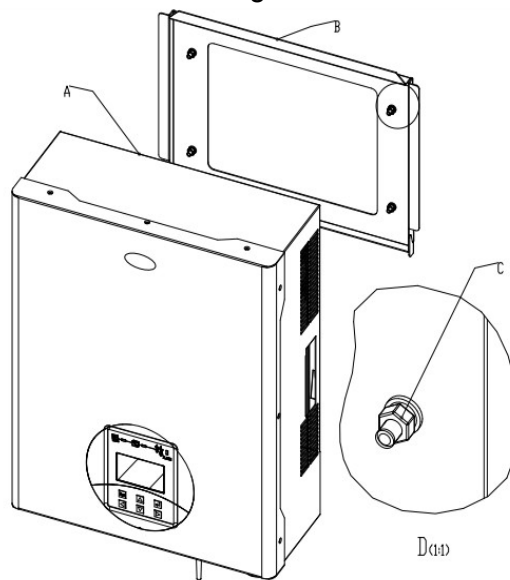


Figure 16

Fasten the inverter into the T slot with the fastener .

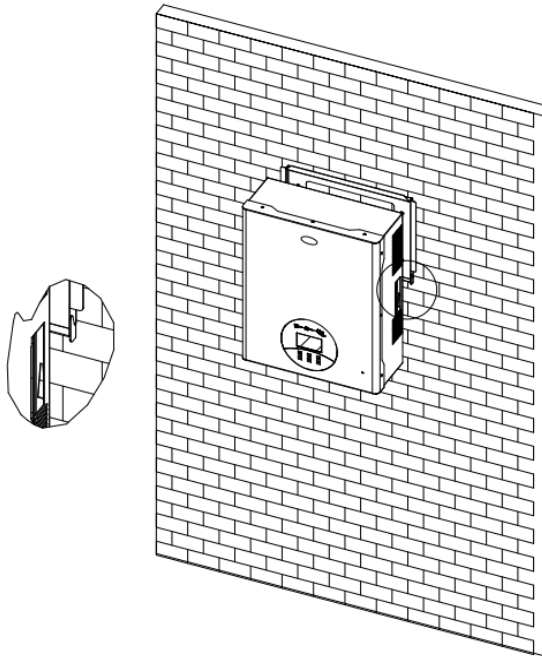


Figure 17

## 6.6 Check Inverter Installation Status

- Check the upper straps of Inverter to ensure it fixed on to the bracket.
- Check the secure mounting of the PV-Inverter by trying to raise it from the bottom.
- The PV-Inverter should remain firmly attached.
- Select the installation location so that the status of display can be easily viewed.
- Choose a strong mounting wall to prevent vibrations while inverter is operating.

## 7 Electrical Connection

### 7.1 Safty

	<p><b>NOTICE!</b> <b>Electrostatic discharge can damage the inverter.</b></p> <ul style="list-style-type: none"> <li>• Internal components of the inverter can be irreparably damaged by electrostatic discharge.</li> <li>• Earth yourself before touching any components.</li> </ul>
--	--

	<p><b>NOTICE!</b> <b>PV modules for non-isolated inverters</b></p> <p>Non-isolated inverters shall be provided with installation instructions that require PV modules that have an IEC 61730 Class A rating. if the maximum AC mains operating voltage is higher than the PV array maximum system voltage then the instructions shall require PV modules that have a maximum system voltage rating based upon the AC mains voltage.</p>
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### 7.2 Overview of the Connection Area

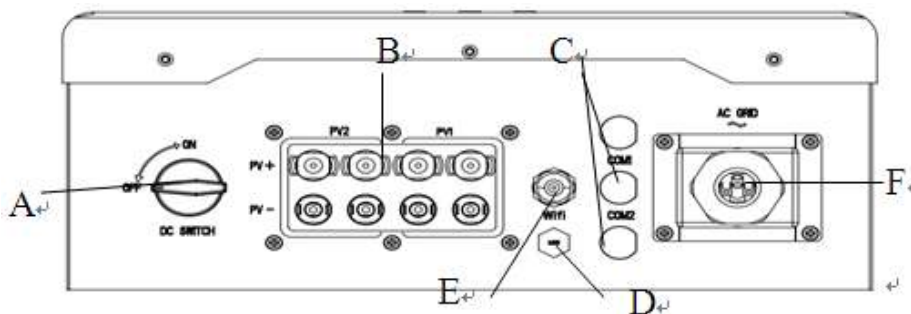


Figure 18

Table 7

Object	Description
A	DC switch-disconnector
B	DC connectors for connecting the strings
C	Communication via RS485
D	The optional communication via Ethernet
E	The optional communication via WIFI
F	AC connectors for connecting the grid

## 7.3 Connection of the PV Array (DC)

### 7.3.1 Conditions for DC Connection

The inverter has two input areas, "PV1" and "PV2", each with two strings can be connected. In total, up to four strings can be connected.

- Requirements for the PV modules of the connected strings (per input areas) :
  - Same type
  - Same number of in-series-connected PV modules
  - Identical alignment
  - Identical tilt
- The connection cables of the PV modules must be fitted with connectors. The DC plug connectors for the DC connectors are included in the scope of delivery.

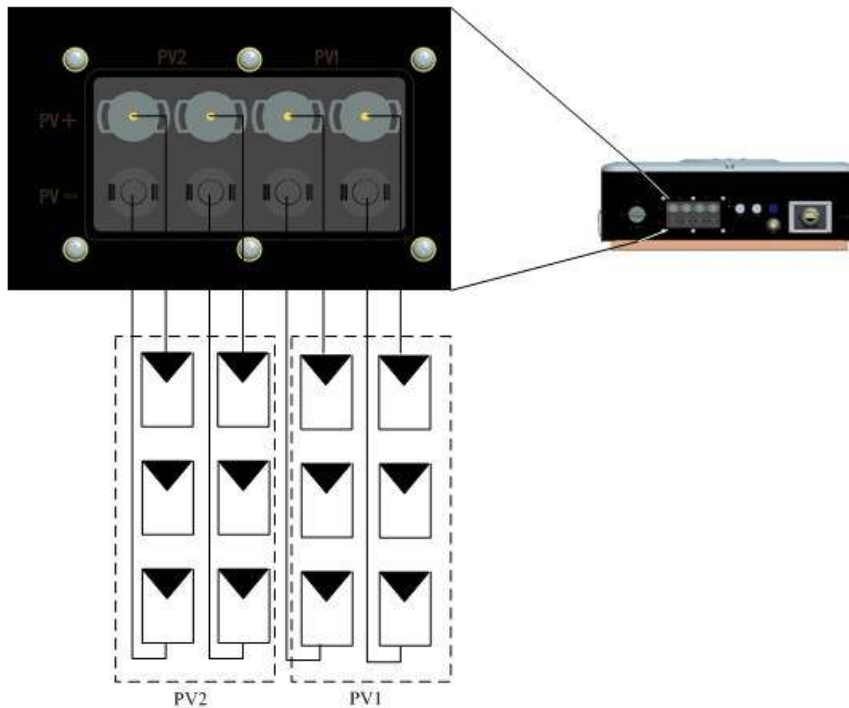


Figure 19

- The inverter is equipped with a DC switch-disconnector, install an external DC breaker for recommendation .



At the DC input of the inverter, the following limits must not be exceeded:

Maximum input voltage	Maximum input current per MPP tracker
1,000 V (DC)	20 A (DC)



### No mixed connections at input areas

- For instance, if the positive pole of a string is connected at input area PV1 and the negative pole of the same string is connected at input area PV2, this is called a mixed connection.
- Only connect strings at one input area and never mix the input areas PV1 and PV2!

- Otherwise, the inverter will not comply with the requirements of the EMC directive (directive on the electromagnetic compatibility of devices), and will forfeit its operating licence.

### 7.3.2 Assembling the DC Connectors

This product has a professional IP68 DC waterproof connector. You have to wire DC by yourself. Please see figure 20 and 22 for DC connector disassembling guide.

- **Connectors must only be connected by qualified personnel**
- For connection to the inverter, all connection cables of the PV modules must be equipped with the DC connectors provided.
- To assemble the DC connectors, proceed as follows. Be sure to observe the correct polarity. The DC connectors have the symbols "+" and "-".

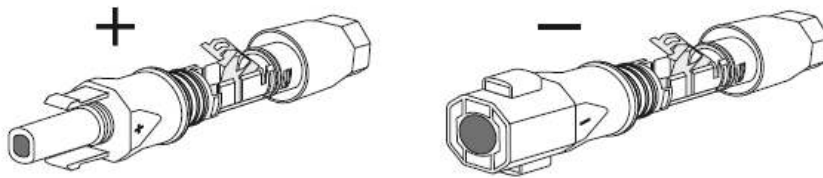


Figure 20

- **Cable Requirements**
- Use a PV1-F cable.
- Insert the stripped conductor.
- Cross-sections: 4 to 6 mm<sup>2</sup>.
- Outside diameter: 5.0 to 8 mm.
- Stripping length: 15 mm.

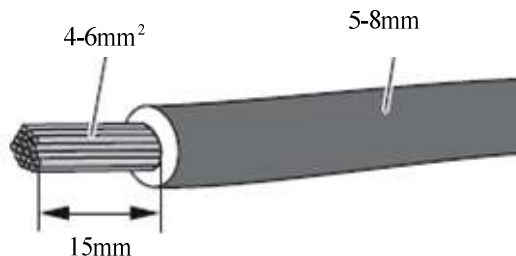


Figure 21

- **Procedure:**

- 1. Lead the stripped cable all the way into the plug.
- 2. Close spring with the thumb or using combination pliers. Please ensure that the spring is closed. (see fig 22 procedure 1 and 2.)
- 3. Push connectors together. ( see fig 22 procedure 3) Screw cable gland tight(see fig 22 procedure 4). Screw in the nut until it reaches the O-ring and then tighten it with at least 2 Nm, using a suitable tool. Finished!

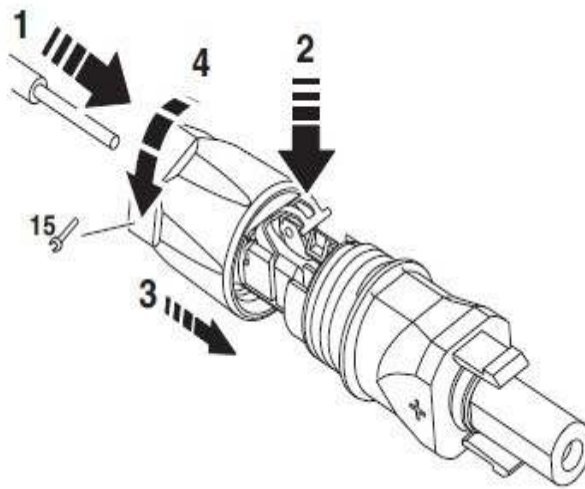


Figure 22

- **Connector/socket unlocking process:**

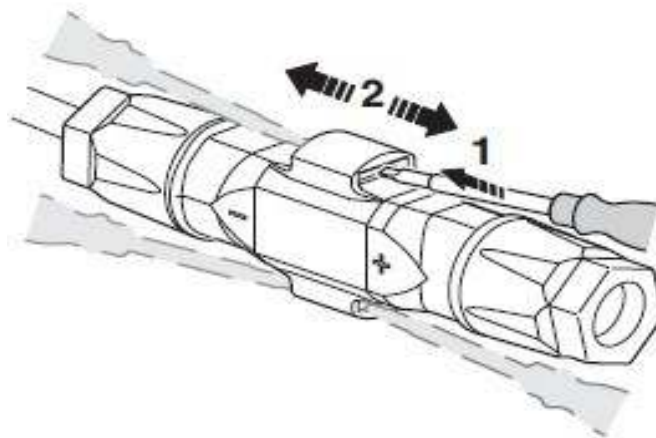


Figure 23

- 1. Insert screwdriver SZF 1 or phase tester in one of the illustrated positions.
- 2. Leave screwdriver inserted and remove connector from socket.
- **Conductor reconnection to the:**

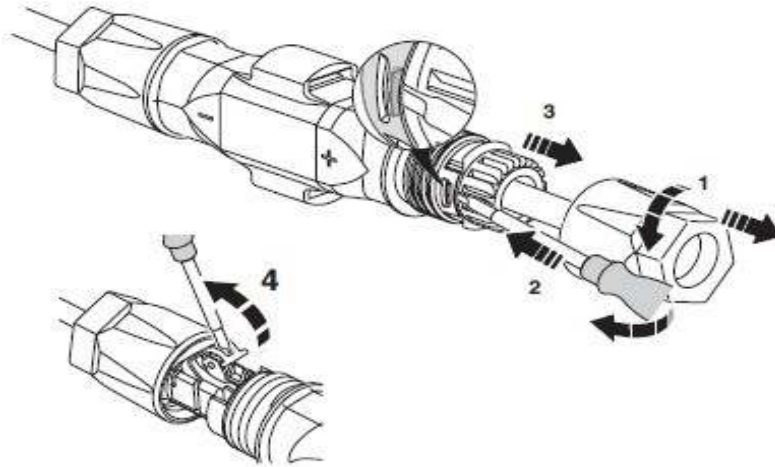


Figure 24

- 1. Screw on the cable gland.
- 2. Never open the interlock as shown in the figure by using the screwdriver.
- 3. Pull plug connectors apart.
- 4. Open spring with screwdriver and remove conductor.

### 7.3.3 Connecting the PV Array (DC)



#### **DANGER!**

**Danger to life due to high voltages in the inverter.**

- Before connecting the PV array, ensure that the AC miniature circuit-breaker is disconnected from all three phase conductors and that it cannot be reconnected.



#### **NOTICE!**

**Destruction of the inverter due to overvoltage.**



- If the voltage of the PV modules exceeds the maximum input voltage of the inverter, it could be destroyed by the overvoltage. This will void all warranty claims.
- Do not connect any strings to the inverter which have an open-circuit voltage greater than the maximum input voltage of the inverter.
- Check the plant design.



**NOTICE!**

**Excessive voltages can destroy the multimeter.**

- Only use multimeters with a DC input voltage range up to at least 1,000 V.



The connectors must be not disconnected while under load. For protection against electric shock, connectors must always be disconnected from the power supply during assembly.

Turn the DC switch-disconnector to 'OFF' before your any operations.  
(see fig 25).

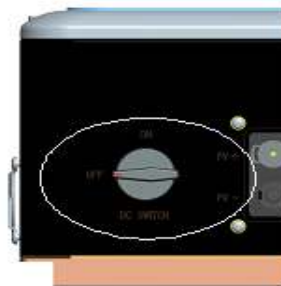


Figure 25

1. Check the connection cables of the PV modules for correct polarity and make sure that the maximum input voltage of the inverter is not exceeded. At an ambient temperature of over 10° C, the open-circuit voltage of the PV modules should not exceed 90% of the maximum input voltage of the inverter. If this is not the case, review the plant design and the PV module circuitry. Otherwise, the maximum inverter input voltage may be exceeded

at low ambient temperatures.

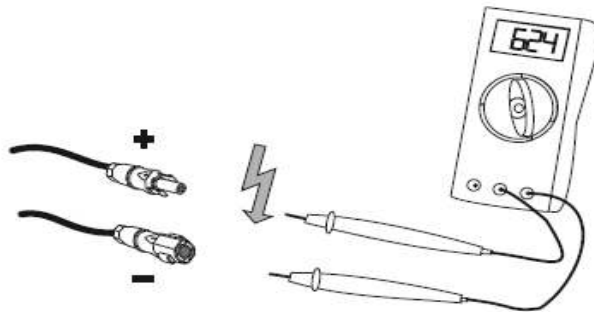


Figure 26

2. Check the strings for earth faults as described in Section 1.3.3 'note'.
3. Check the assembled DC connectors for correcting polarity and connect them to the inverter.

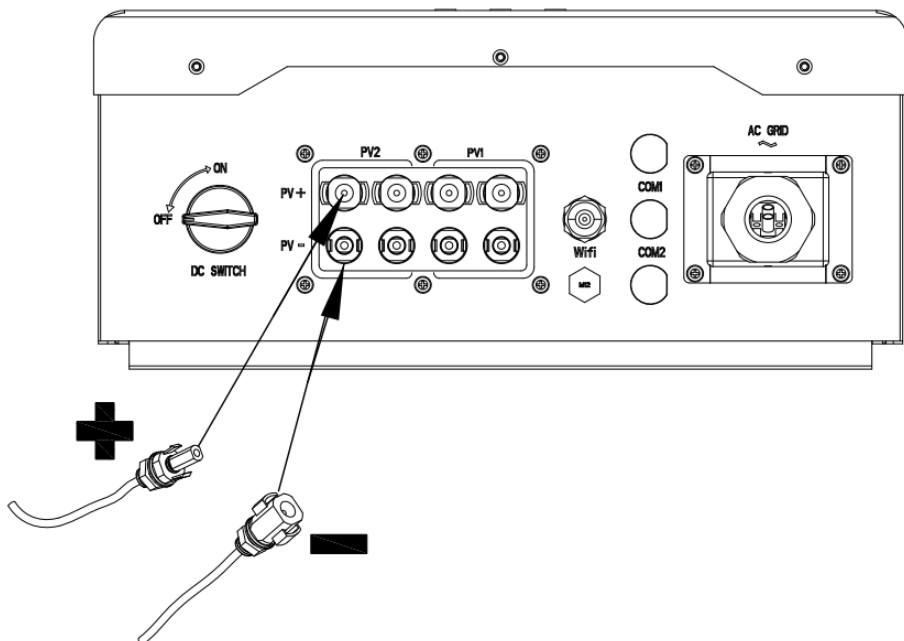


Figure 27

4. In order to seal the inverter, all unused DC inputs must be closed using DC connectors and sealing plugs.
5. Ensure that all DC connectors are securely in place.



The PV connectors provide IP68 protection but should not be continually exposed to water (e.g. immersed under water) and not placed directly on the top side.

## 7.4 Connection to the Electricity Grid (AC)

### 7.4.1 Conditions for AC Connection

You must comply with the connection requirements of your network operator.

- **Cable Requirements**

Table 7 Cable and Micro-breaker Requirement

Model	ST5000TL	ST6000TL	ST7000TL	ST8000TL
Cable (Cu)	$\geq 4\text{mm}^2$	$\geq 4\text{mm}^2$	$\geq 4\text{mm}^2$	$\geq 6\text{mm}^2$
Micro-Breaker	25A	25A	25A	32A

- External diameter: 14 mm to 25 mm.
- Conductor cross-section: max.  $16\text{ mm}^2$  ; with bootlace ferrule: max.  $10\text{ mm}^2$  .
- Stripping length: 12 mm.
- The cable must be dimensioned in accordance with any local and national directives on cable dimensions which specify requirements for the minimum conductor cross-section. Examples of factors influencing cable dimensioning are: nominal AC current, type of cable, routing method, cable bundling, ambient temperature and maximum desired line losses (for calculation of line losses, see design software 'Solar Design' at [www.mosopower.com](http://www.mosopower.com)).

- **Switch-Disconnecter**

You must install a separate, three-phase miniature circuit-breaker for each inverter so that the inverter can be safely disconnected under load.

**DANGER!****Danger to life due to fire.**

- When more than one inverter is connected in parallel to the same miniature circuit-breaker, the protective function of the miniature circuit-breaker is no longer guaranteed. This could result in a cable fire or destruction of the inverter.
- Never connect several inverters to the same miniature circuit-breaker.
- Observe the maximum permissible fuse protection of the inverter when selecting the miniature circuit-breaker.

**DANGER!****Danger to life due to fire.**

- When a generator (inverter) and a load are connected to the same miniature circuit breaker, the protective function of the miniature circuit-breaker is no longer guaranteed. The currents from the inverter and the electricity grid can accumulate to form over currents which are not detected by the miniature circuit-breaker.
- Never connect loads between the inverter and the miniature circuit-breaker without fuse protection.
- Always fuse each load separately.

**NOTICE!****Damage to the inverter by using screw-type fuses as a load disconnection unit.**

- A screw-type fuse, e.g. DIAZED fuse or NEOZED fuse, is not a switch-disconnector and thus may not be used as a load disconnection unit. A screw-type fuse only acts as cable protection.
- If the inverter is disconnected under load using a screw-type fuse, the inverter may be damaged.
- Use only a switch-disconnector or a miniature circuit-breaker as a load disconnection unit.

## 7.4.2 AC Connection Procedure

1. Check the mains voltage and compare it with the permissible voltage range (see Section 4.2"Output" (table 4).
2. Disconnect the miniature circuit-breaker from all three phase conductors and secure against reconnection.
3. Release all four captive screws of the AC output terminal(see fig 28).

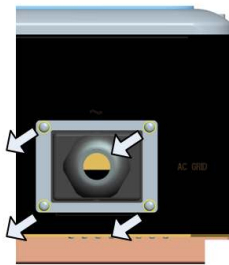


Figure 28 Cable gland

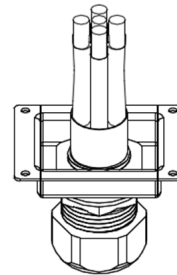


Figure 29 Cable through gland

4. Insert the AC cable gland from the outside into the enclosure opening and tighten it from the inside using the counter nut.
5. Pull the cable through(see fig 29).
6. Raise all five terminals of the AC terminal as far as they will go (see fig 30).

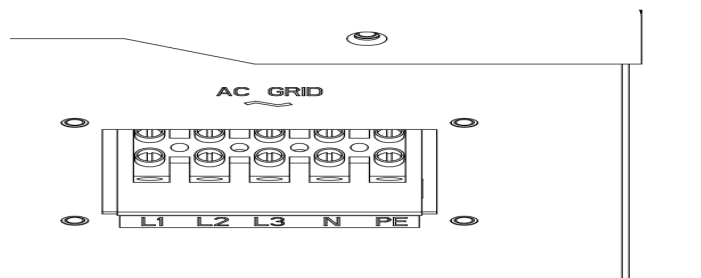


Figure 30 AC terminals

7. Connect L1, L2, L3, N and the protective conductor (PE) to the AC terminal in accordance with the labeling (see fig 31).

- To do this, the PE insulated wire must be 5 mm longer than the L and N insulated conductors.
- L and N must not be swapped.

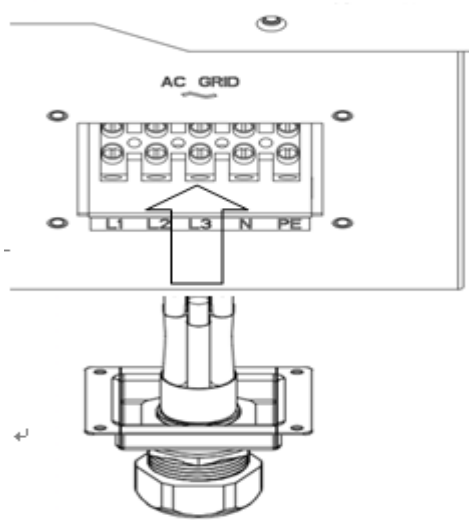


Figure 31



**NOTICE!**

**Risk of fire if two conductors are connected.**

- If two conductors are connected to one terminal, this may result in a poor electrical contact which could pose a risk of overheating or fire.
- Never connect more than one conductor per terminal.

8. Close all terminals of the AC terminal until they snap into place.
9. Tighten the swivel nut firmly to the cable gland (see fig 32).

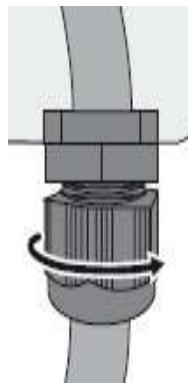


Figure 3



**DANGER!**

**Danger to life due to high voltages in the inverter.**

- Do not switch on the miniature circuit-breaker until the PV array has been connected and the inverter is securely closed.

## 8. Operation

### 8.1 LED Display

The panel has three LED indicators as follows:

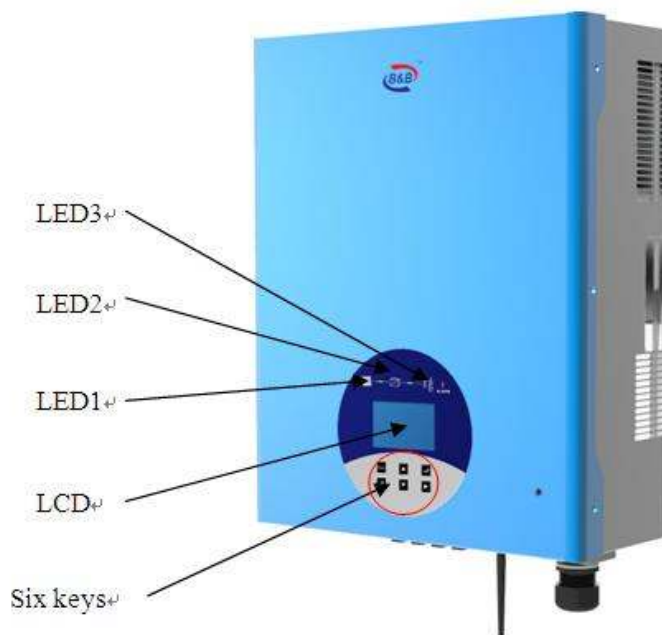


Figure 33

#### 8.1.1 DC/DC status LED 1 (Green)

Table8

Off	The DC/DC Circuit is off.
Blinking	The DC/DC Circuit is starting.
On	The DC/DC Circuit is working normally



## 8.1.2 DC/AC status LED 2(Green)

Table9

Off	The DC/AC Circuit is off.
Blinking	The DC/AC Circuit is starting.
On	The DC/AC Circuit is working normally.

## 8.1.3 Fault LED 3 (Red)

Table10

Off	No Error occurs
On	The inverter is in fault status

Normally, after starting up, DC/DC LED and DC/AC LED will be lighted indicating that the Inverter's feeding power status to the grid.

## 8.2 LCD Display

The LCD display monitors the inverter status and collects statistical data for assessing system performance.

Once turn on , Logo "MOSO" or "B&B Power" will show on the LCD display, after a few seconds the index display image will appear:



Figure 34

There are six keys on the inverter, which you can use to control LCD, and then control inverter.



Figure 35

The display on the inverter can be controlled by the keys or tapping the front of LCD.

To save power, the backlight of LCD will turn off automatically after 30 seconds (by default setting). When the LCD is dark, click any key or one tap will make it become bright again.

A summary diagram of the display functions is shown as the figure below, the LCD will show next page by tap or left and right key.

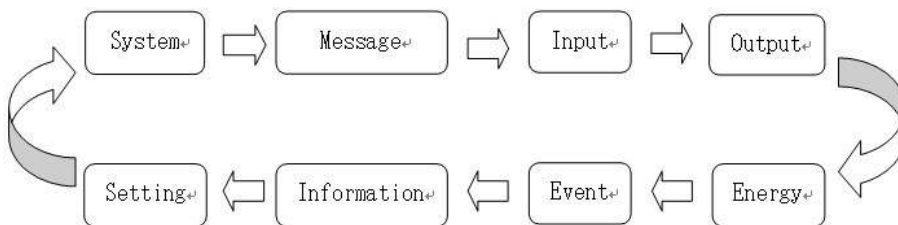


Figure 36 Summary diagram

## 8.2.1 System Page

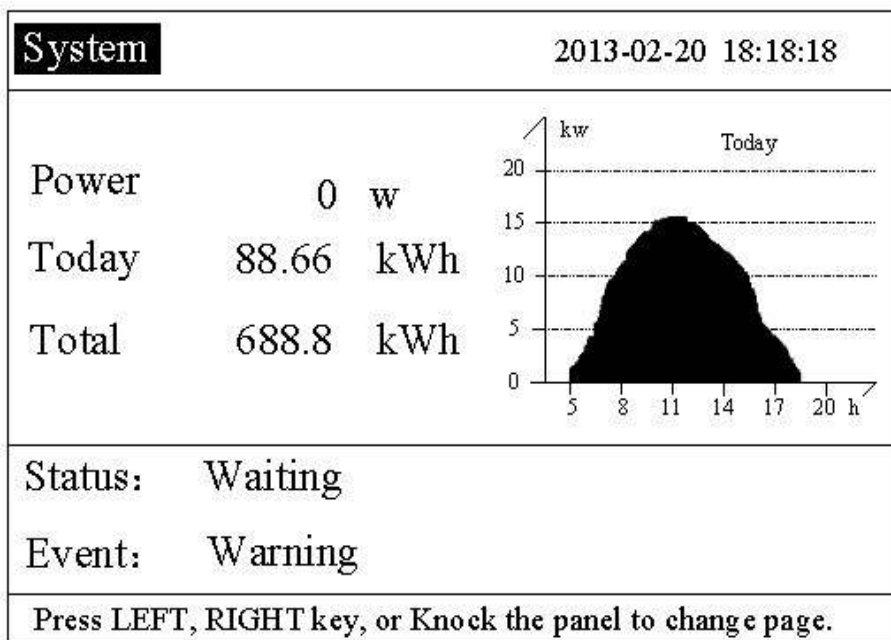


Figure 37

Power: the present power feed into the grid;

Today: Energy exports to the grid in the present day, and updates every 10 minutes;

Total: Sum of the total energy exports to the grid, and updates every 10 minutes;

Status: Show system status, including: Waiting Mode, Self Testing Mode, On-grid Mode, and Fault Mode;

Event: If the inverter has some events, the event item will show Warning, and the detailed information is in the Next Message Page. If the inverter has no event, the event item is blank.

## 8.2.2 Message Page

<b>Message</b> -1/1	2013-02-20 18:18:18
<p>Status:     Waiting</p> <p>Current Event:</p> <p>1. [F13] CommLoseFault</p>	
Press UP, DOWN key to view more event.	

Figure 38

The system status is identified through the MESSAGE page; the first line displays inverter operation Mode: Waiting Mode, Self Testing Mode, On-grid Mode, and Fault Mode. The following items are the current events.

Event Information is listed as the following table.

Table11

Number	Description
F01	Gird Fault
F09	Pv1 VoltOver Fault
F10	Pv2 VoltOver Fault
F11	Pv VoltLow Fault
F12	Pv Voltovr Fault
F13	Comm Lose Fault
F14	RC chip Fault
F15	Aux Power Fault
F16	Over Temp Fault
F17	Pv1 Iso Fault
F18	Pv2 Iso Fault
F19	PLL Fault

F20	Viso Power Fault
F26	Bus Volt Low Fault
F27	Bus Un Balance
F28	Bus Ovp Fault
F29	Ocp Ac
F30	Ocp Boost
F32	IAC_ RMS_ Unbalance
F33	DCI Gird over limit
F36	GFCI Fault
F49	Pv Config Set Wrong
F51	Unrecover Phase Sequence Fault
F52	HWAD Fault
F59	UnrecoverBoost1_ocp
F60	UnrecoverBoost2_ocp
F62	Relay Short
F63	Relay Open
F65	Comm Err
F66	Fan Fault

### 8.2.3 Input page

The input parameters of the inverter will be displayed in this page.

Input		2013-02-20 18:18:18	
	PV-1	PV-2	
Voltage ( V )	0	0	
Current ( A )	0	0	
Power ( W )	0	0	
ISO ( k $\Omega$ )	0	0	
Press LEFT, RIGHT key, or Knock the panel to change page.			

Figure 39

## 8.2.4 Output page

The output three-phase electric information will be displayed in this page.

Output		2013-02-20 18:18:18		
		AC-R	AC-S	AC-T
Voltage	(V)	231	232	233
Current	(A)	0	0	0
Frequency	(Hz)	50.1	50.1	50.1
Act.Power	(W)	0	0	0
App.Power	(VA)	0	0	0
Press LEFT, RIGHT key, or Knock the panel to change page.				

Figure 40

## 8.2.5 Energy Page

Press ENTER to change DAY MONTH YEAR, and press UP or DOWN to view the energy of other dates.

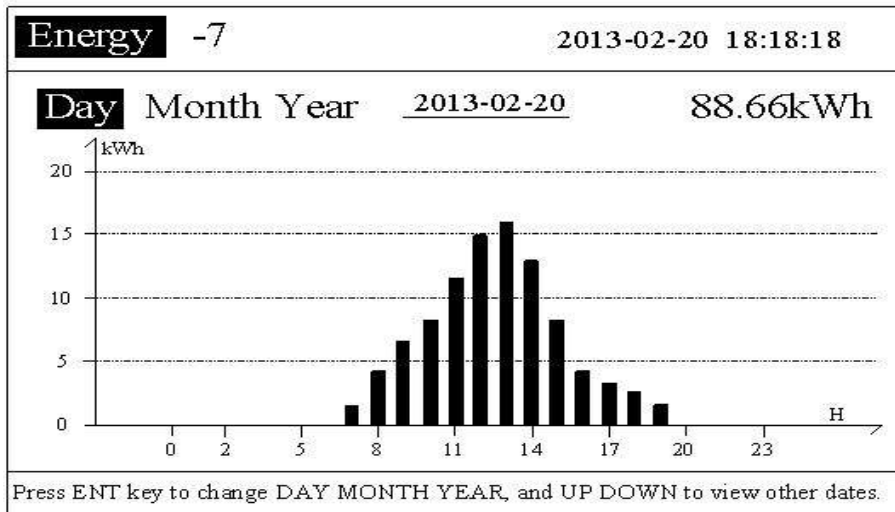


Figure 41

“-7” in figure 41 indicates that the inverter has already been stored 7 days of generating energy.

Press ENTER to enter figure 42. “-1” in figure 42 indicates that the inverter has already been stored one month of generating energy.

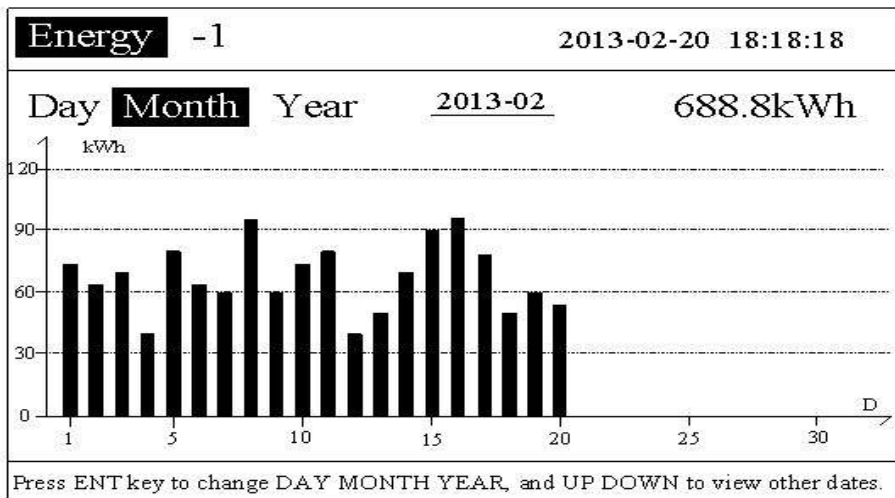


Figure 42

Press ENTER to enter figure 43. “-1” in figure 43 indicates that the inverter has already been stored one year of generating energy.

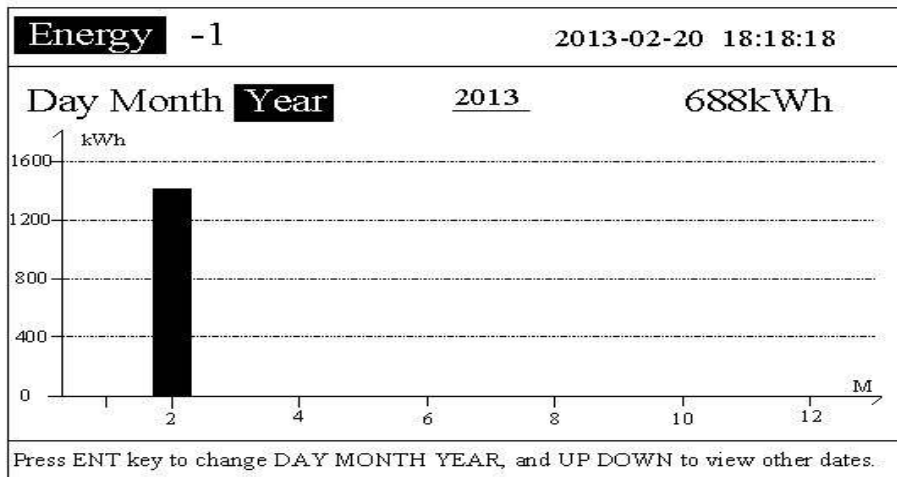


Figure 43

## 8.2.6 Event Page

Events page displays historical event information. "-1/1" in figure 44 indicates that the current is only one page history event information. You can use UP or DOWN key to view other events, when the events more than one page.

<b>Event -1/1</b>			2013-02-20 18:18:18
1.F13 Commlose On	2013-02-20	14:55:55	
2.F13 Commlose Off	2013-02-20	13:55:15	
3.F13 Commlose On	2013-02-20	13:54:26	
4.F13 Commlose Off	2013-02-19	11:59:28	
5.F13 Commlose On	2013-02-16	17:52:26	
6.F13 Commlose Off	2013-02-04	15:10:28	
Press UP, DOWN key to view more event.			

Figure 44



## 8.2.7 Information Page

Information	2013-02-20 18:18:18
<p>B&amp;B Power Co.,Ltd</p> <p>www.mosopower.cn</p> <p>SN: ST8K00000000</p> <p>Software Version:</p> <p>Control Cpu: 1.00 1.00</p> <p>Monitor Cpu: 1.03</p>	
按左右键或敲击面板进行换页	

Figure 45

SN: provides the production No. of the inverter.

Software Version: provides the production Firmware version of the inverter.

## 8.2.8 Setting Page

<b>Setting -1/2</b>		2013-02-20 18:18:18
Language:	English	◀ ▶
Country:	GER -11	
Working Mode:	PV1&PV2 Independent	
Time:	2013-02-20 18:18:18	
Communication:	[001]	
Lcd Contrast:	[5]	
Lcd Saver:	[ On ]	
UP/DOWN, or press ENT to start setting.		

Figure 46

Language: Select display language, and Note that the language item is nothing to do with the country safety setting.

Country: The Grid Standard of the Inverter can work. Setting the Country item according to user local grid regulations.

GER-11: DIN VDE V 0126-1-1:2006+A1:2011;

AUS-11: AS 4777-2005;

GBR-12: G83 Issue 2 August 2012;

GBR-22: G59 Issue 2 August 2010;

GER-21: VDE-AR-N 4105: 2011-08 VDE 0124-100: 2012-07.

Working Mode: Work mode of the Inverter. It includes: PV1 and PV2 Parallel, PV1 and PV2 Independent, DC Source In (only for Factory Test);

Time: the present date and time of the inverter.

Communication: the RS485 communication address. If you communicate with multi inverters at the same time, all the inverters must have different address.

LCD Contrast: Set the LCD's Contrast level form 0 to 9.

LCD Saver: Turn off LCD's backlight after some time when no operation.

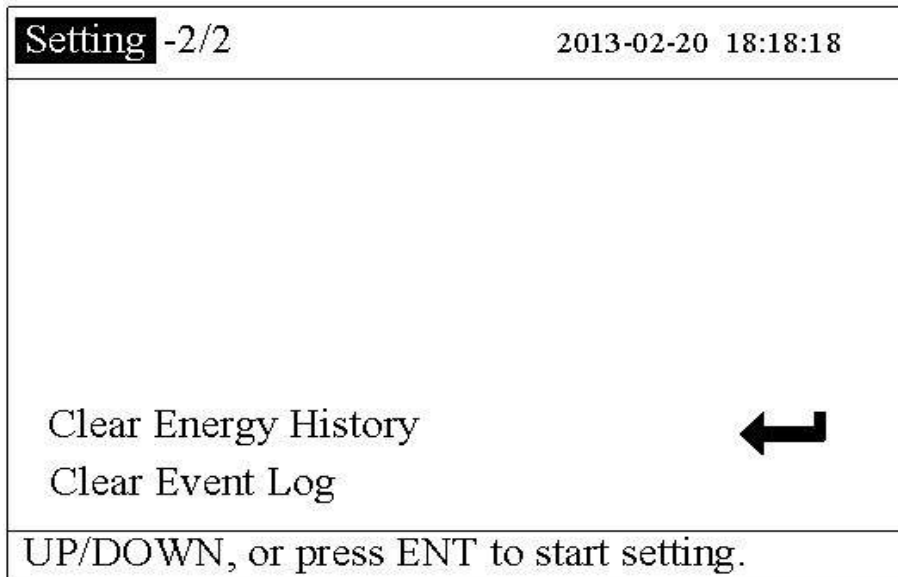


Figure 47

The LCD will show “SETTING -2/2” page as Figure 47, when press UP or DOWN key in the “SETTING -1/2” page.

- **Setting language**

In the “SETTING -1/2” page, press ENTER key, Language item become black, and press UP or DOWN key at this condition can enter other setting items, use LEFT or RIGHT key to change language, find the language you need . Then press ENTER key, system will prompt ‘are you sure you want to change?’. Press ENTER to confirm or press ESC to cancel.

- **Setting Country**

Operation as Setting language.

- **Setting communication address**

Operation as Setting language.

- **Setting working mode**

Operation as Setting language.

- **Setting time**

In the “SETTING -1/2” page, press ENTER key, Language item become black, then use DOWN or UP key to Select setting time item, then use LEFT or RIGHT key to select year/month/day/hour/minute/second, then use UP or Down key change the value. Then press ENTER key, system will prompt ‘are

you sure you want to change?'. Press ENTER to confirm or press ESC to cancel.

- **Setting Lcd Contrast**

Operation as Setting language.

- **Setting Lcd Saver**

Operation as Setting language.

- **Clear Energy History**

In the "SETTING -2/2" page, press ENTER key, Energy History item become black, then press ENTER key, system will prompt are you sure you want to change. Press ENTER to confirm or press ESC to cancel.

- **Clear Event Log**

Operation as Clear Energy History.

## 9 Setting up Communication

### 9.1 Communication Interface Type

This product has a communication interface RS485. Operating information such as output voltage, current, frequency, fault information, etc., can be delivered to PC or other monitoring equipment via RS485.

### 9.2 Communication

#### 9.2.1 RS485

When user wants to know the information of the power station and manage the entire power system. We offer below two types of communications.

- **RS485 Communication (One inverter or several inverters)**

RS485 is generally for multi inverters' communication. Up to 32 inverters could communicate at the same time, but wire length should be  $\leq 1200\text{m}$ .

Select high-quality network cable; peel the isolation surface, Select 8-wires (orange white, orange, green white, blue, blue white, green, brown white, brown), then follow the same order with the press pliers push into the 8-wire RJ45 crystal head.



Figure 48 Communication Interface of B&B Series Inverter



Figure 49 8-line RJ45

Table13 8-line RJ45

8-line RJ45 Wire No.	Function	Wire Color
1	VCC	Orange white
2	VCC	Orange
3	NC	Green white
4	GND	Blue
5	GND	Blue white
6	NC	Green
7	A	Brown white
8	B	Brown

- **RS485 to Webbox connection method**

The connection between B&B Inverters uses a straight through cable. But the connection between B&B Inverter and Webbox uses a crossover cable. As shown in the following figure.

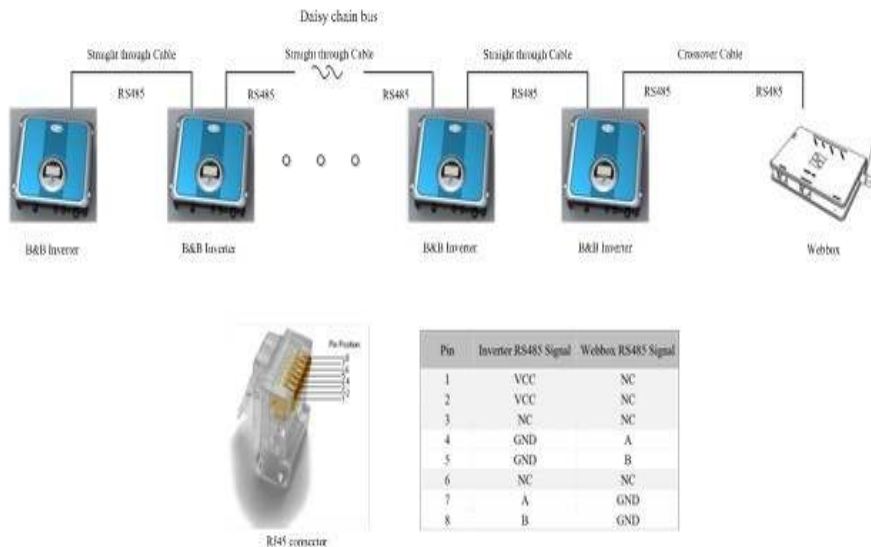


Figure 50 B&B Web Box Monitoring Diagram

- **Connect the system to PC by RS485/USB Adapter**

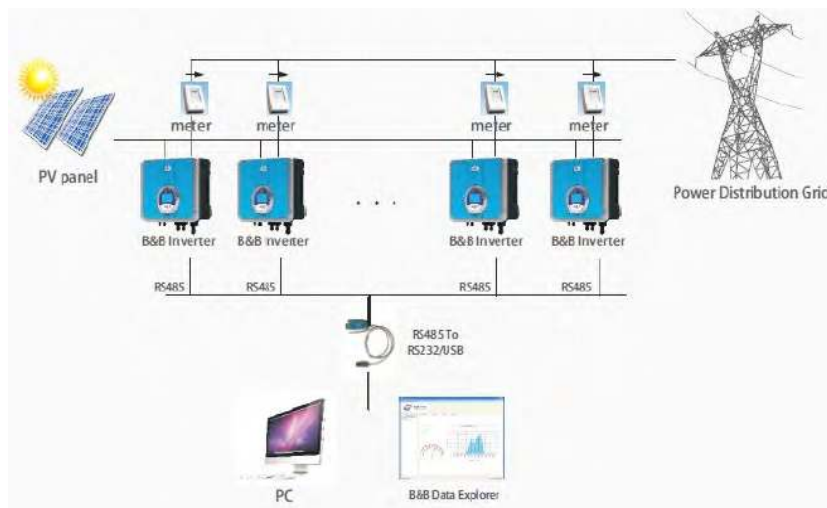


Figure 51

## 9.2.2 Build-in Wifi(optional)

The Build-in Wifi interface is optional. If you have ordered the inverter with Build-in Wifi, it will be pre-installed in the inverter on delivery. The

Build-in Wifi module is integrated into the inverter, only the antenna outside.

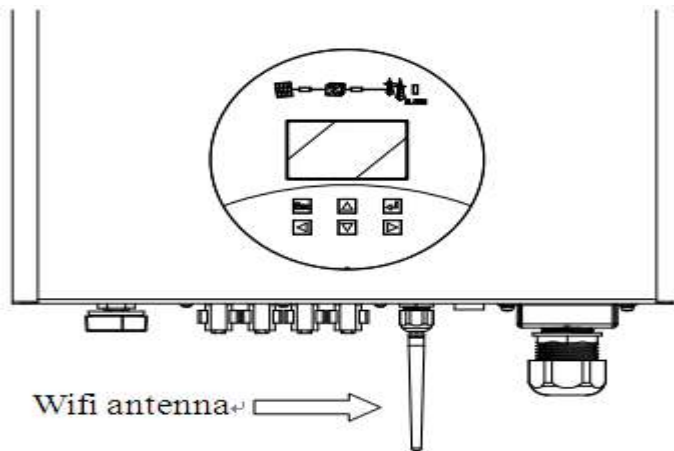


Figure 52 Wifi interface



**refer Wifi user manual for complete guide.**



# 10 Troubleshooting

In most situations, the inverter requires very little maintenance. However, if Inverter fails to work perfectly, please refer to the following instructions before calling your local dealer.

Should any problem arises, the LED on the front panel will be red and the LCD will display the relevant information. Please refer to the following table for a list of potential problems and solutions.

Table 14 Troubleshooting list

Faults	Diagnosis and Solutions
Grid Fault	<ul style="list-style-type: none"> <li>-Waiting for one minute, grid will go back to normal working state.</li> <li>-Making sure that grid voltage and frequency complies with standards.</li> <li>-Or, please seek for help from us.</li> </ul>
	<ul style="list-style-type: none"> <li>-Off to grid.</li> <li>-Please check grid-connection, like wire, interface, etc.</li> <li>-Checking grid usability.</li> <li>-Or seek for help from us.</li> </ul>
Pv1VoltOverFault Pv2VoltOverFault	<ul style="list-style-type: none"> <li>-Checking the panel's open-circuit voltage whether the value is similar or already &gt;Max.DC voltage.</li> <li>-Please seek help from us when voltage <math>\leq</math> Max.DC voltage.</li> </ul>
DCI Gird over limit	<ul style="list-style-type: none"> <li>-Disconnect the PV (+), PV (-) with DC input, then reconnect them.</li> <li>-Check L line and N line to see whether it has connection faults.</li> <li>-Please seek for help from us when this fault happens.</li> </ul>

Relay Short	-Disconnect the PV (+), PV (-) with DC input, then reconnect them.
Relay Open	-Please seek for help from us if it can not go back to normal state.

- Check the warning or fault messages on the information panel. Record the message if displayed for further action.
  - Try the solution indicated in Table 14.
  - If your inverter information panel didn't have a Fault light, check the following list to make sure that the present state of the installation allows proper operation of the unit.
    - Is the inverter located in a clean, dry, ventilated place?
    - Have the DC input breakers been opened?
    - Is the size & length of cables suitable?
    - Are the input and output connections and wiring in good condition?
    - Are the configurations settings correct for your particular installation?
    - Are the display panel and the communications cable properly connected without damage?
- Contact B&B Power Customer Service for further assistance. Please provide your details of installation, model & serial number of the unit to us when inquiry.

# 11 Decommissioning

## 11.1 Dismantling

- Disconnect the inverter from DC input and AC output.
- Wait for 5 minutes.
- Remove all connection cables from the inverter.
- Remove the inverter from the bracket.

## 11.2 Packaging

If possible, it's better to pack the inverter with the original packing. If it is not available, please use similar packing which meets below requirements

- Load ability should be over 24kg.
- With handle.
- Can be fully closed.

## 11.3 Storage

Store the inverter in a dry place where ambient temperature are always between -20 °C and +60 °C. -4°F to +140°F.

## 11.4 Disposal

Please put the wasted inverters & packing materials to a place which is convenient for relevant department to dispose and recycle.

## 12 Warranty

Warranty certificate represents a five year warranty service for mentioned products since the date of purchase.

### **Warranted Products**

This warranty is applicable solely to the following products:

<b>ST5000TL</b>	<b>ST6000TL</b>
<b>ST7000TL</b>	<b>ST8000TL</b>

### **Limited Product Warranty**

(Applicable under normal application, installation, use and service conditions.)

B&B warrants the above listed products to be free from defects and/or failure specified for a period not exceeding six years from the date of sale as shown in the roof of Purchase to the original purchaser.

If you have any questions about B&B series inverter, please call service support hotline: +86 755 8656 7100.

Please keep following information to better our service for you.

(Please note and advise below information to us before inquiry for better service).

- a. Inverter's Model.
- b. Inverter's Serial No.
- c. Communication Method.
- d. PV Modules' Model.

## **B&B Power Co., Ltd.**

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### **Sales Department**

Add: 3rd Floor,Block A,Xin YongFeng Industry Park,Tian Bao 2nd Road,ShiYan Town,BaoAn District,Shenzhen,China

Tel: +86 755 8656 7100

Fax: +86 755 8656 7102

Web: [www.mosopower.com](http://www.mosopower.com)/[www.bbpower.cn](http://www.bbpower.cn)

E-mail: [info@bbpower.cn](mailto:info@bbpower.cn); [sales6@bbpower.cn](mailto:sales6@bbpower.cn)

### **After sales service**

Tel: +86 755 8656 7100

+86 755 8651 0065

Fax: +86 755 8656 7102

E-mail: [info@bbpower.cn](mailto:info@bbpower.cn)

[service@bbpower.cn](mailto:service@bbpower.cn)