



PV Master APP



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YOUR SOLAR ENGINE



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340-00330-01

# BT SERIES USER MANUAL

AC-COUPLED BATTERY STORAGE RETORFIT

Rev.1.1  
2021-01-08

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## 01 INTRODUCTION

GoodWe BT series bidirectional inverter is designed for both indoor and outdoor use, which could be used with or without existing grid-tied inverter systems to store energy using batteries.

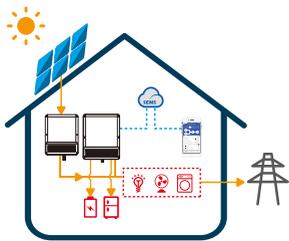
Energy produced from the grid-tied inverters will be used to optimize self-consumption, excess will be used to charge the battery, anymore could be exported to the grid. Loads will be supported in priority by grid-tied system, then battery power, if more power is needed, energy will be imported from the grid.



Note:  
The introduction describes a general behavior of BT system. The operation mode can be adjusted on PV Master App depending on the system layout. Below are the general operation modes for BT system:

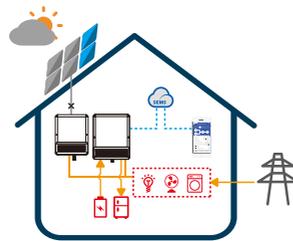
### 1.1 Operation Modes Introduction

BT system normally has the following operation modes based on your configuration and layout conditions.



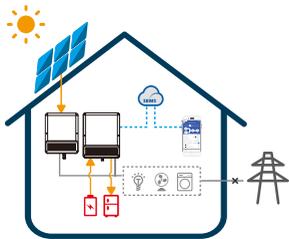
#### Mode I

Energy from grid-tied inverters optimize loads, excess will be used to charge the battery, anymore will be exported to the grid.



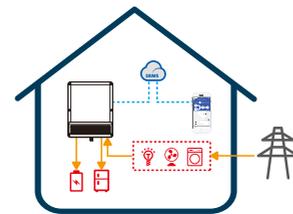
#### Mode II

When energy from grid-tied inverters is weak, battery will discharge to support the load in priority together with the grid.



#### Mode III

When grid power fails, battery will discharge to support back-up Loads.



#### Mode IV

Battery could be charged by grid, and charge time/power could be set flexibly on PV Master APP.

## 1.2 Safety & Warning

The BT series inverter of Jiangsu GoodWe Power Supply Technology Co., Ltd. (hereinafter called as GoodWe) strictly complies with related safety rules for product design and testing. Please read and follow all the instructions and cautions on the inverter or user manual during installation, operation or maintenance, as any improper operation might cause personal or property damage.

### Symbols explanation



Caution!  
Failure to observe a warning indicated in this manual may result in injury



Danger of high voltage and electric shock!



Danger of hot surface!



Components of the product can be recycled.



This side up! The package must always be transported, handled and stored in such a way as the arrows always point upwards.



No more than six (6) identical packages being stacked on each other.



Products should not be disposed as household waste.



Fragile - The package/product should be handled carefully and never be tipped over or slung.



Refer to the operating instructions.



Keep dry! The package/product must be protected from excessive humidity and must be stored under cover.



Signals danger due to electric shock and indicates the time to wait (5 minutes) before it is safe to touch the internal parts of the inverter after it has been disconnected from its power source



CE Mark

## Safety warning

Any installation and operation on inverter must be performed by qualified electricians, in compliance with standards, wiring rules or requirements of local grid authorities or companies (like AS 4777 and AS/NZS 3000 in Australia).

Prohibit inserting and pulling the AC and DC terminals when the inverter is running.

Before any wiring connection or electrical operation on inverter, all DC and AC power must be disconnected from inverter for at least 5 minutes to make sure inverter is totally isolated to avoid electric shock.

The temperature of inverter surface might exceed 60°C during operation, so please make sure it has cooled down before touching it, and make sure the inverter is out of reach of children.

Do not open the inverter's cover or change any components without manufacturer's authorization, otherwise the warranty commitment for the inverter will be invalid.

Usage and operation of the inverter must follow instructions in this user manual, otherwise the protection design might be impaired and warranty commitment for the inverter will be invalid.

Appropriate methods must be adopted to protect inverter from static damage. Any damage caused by static is not warranted by manufacturer.

Battery negative(BAT-) on inveter side is not grounded as default design. Connecting BAT- to EARTH are strictly forbidden.

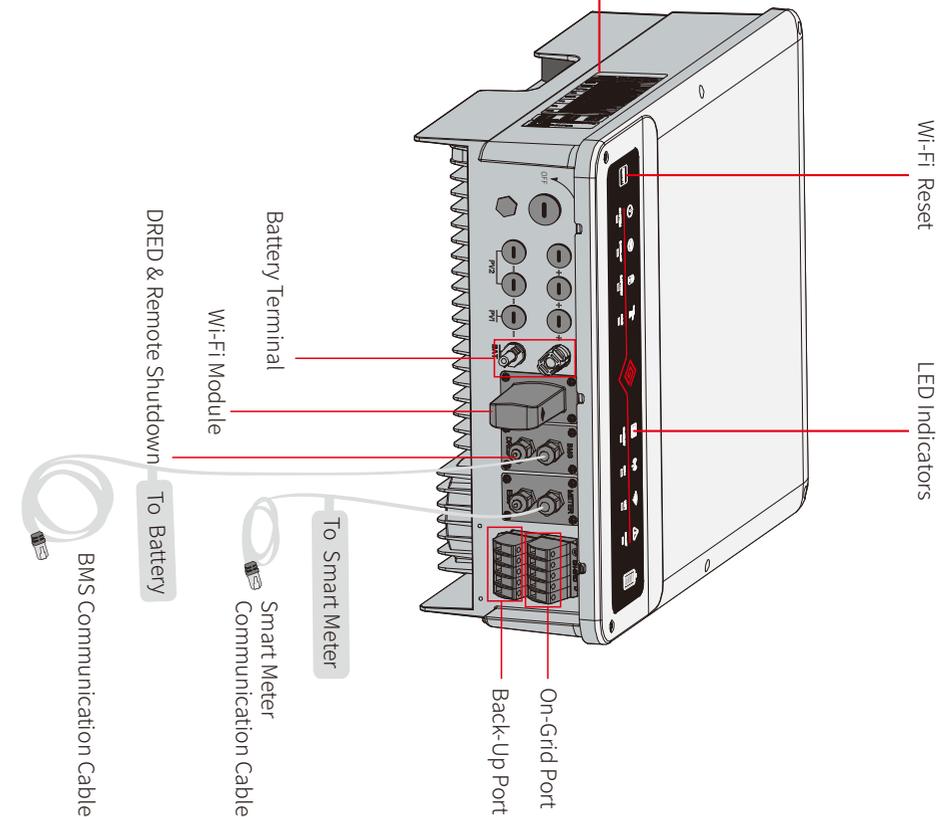
The inverter, with built-in RCMU, will exclude possibility of DC residual current to 6mA, thus in the system an external RCD (type A) can be used( $\geq 30\text{mA}$ ).

In Australia, the inverter internal switching does not maintain neutral integrity, which must be addressed by external connection arrangements like in the Off-Grid System Connection Diagram in page 17.

In Australia, output of back-up side in switchbox should be labeled "Main Switch UPS Supply", the output of normal load side in switch box should be labeled "Main Switch Inverter Supply".

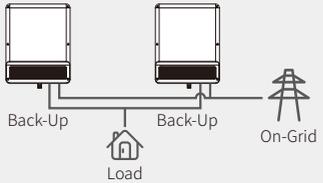
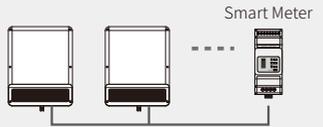
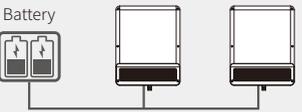
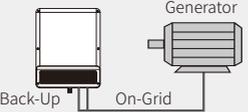
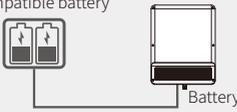
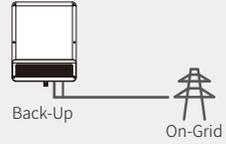
## 1.3 Product Overview

HYBRID LED INDICATORS		
INDICATOR	STATUS	EXPLANATION
SYSTEM	ON = System is ready	ON = System is ready
BACK-UP	ON = Back-up is ready / power available	ON = Back-up is ready / power available
BATTERY	ON = Battery is charging	ON = Battery is charging
GRID	ON = Grid is active but not connected	ON = Grid is active but not connected
ENERGY	ON = Consuming energy from grid / buying	ON = Consuming energy from grid / buying
COM	ON = BMS and meter communication ok	ON = BMS and meter communication ok
WIFI	ON = WiFi connected / active	ON = WiFi connected / active
FAULT	ON = Fault has occurred	ON = Fault has occurred



### 2.1 Unacceptable Installations

Please avoid the following installations, which will damage the system or the Inverter.

 <p>Back-Up Back-Up On-Grid Load</p> <p>For general version, back-up cannot connect in parallel. For further advanced application, please contact after-sales.</p>	 <p>Smart Meter</p> <p>One meter cannot be connected to multiple inverters, and different CTs cannot be connected to a same line cable.</p>
 <p>Battery Back-Up Back-Up</p> <p>Inverter does not support off-grid function in grid-less area.</p>	 <p>Back-Up On-Grid Generator</p> <p>On-Grid or back-up side cannot be connected to any AC generator.</p>
 <p>Incompatible battery Back-Up Battery</p> <p>Inverter battery input cannot be connected to incompatible batteries.</p>	 <p>Back-Up On-Grid</p> <p>Back-up side cannot be connected to grid.</p>

### 2.2 Packing List

Upon receiving the hybrid inverter, please check if any of the components as shown below are missing or broken.

 <p>Inverter</p>	 <p>Wall-Mounted Bracket</p>	 <p>Smart Meter With 3 CT</p>	 <p>Positive &amp; Negative BAT</p>	 <p>AC Cover</p>	 <p>Pin Terminal</p>
 <p>PE Terminal</p>	 <p>Pin Terminal</p>	 <p>Fixed Screw</p>	 <p>User Manual</p>	 <p>Quick Installation Instructions</p>	

### 2.3 Mounting

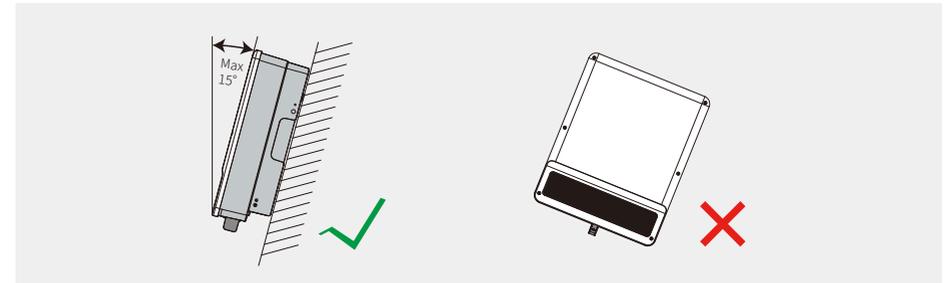
#### 2.3.1 Select Mounting Location

For inverter's protection and convenient maintenance, mounting location for inverter should be selected carefully based on the following rules:

Any part of this system shouldn't block the switch and breaker from disconnecting the inverter from DC and AC power.

**Rule 1.** Inverter should be installed on a solid surface, where is suitable for inverter's dimensions and weight.

**Rule 2.** Inverter should be installed vertically or lie on a slope of no more than 15°.



**Rule 3.** Ambient temperature should be lower than 45°C.  
(High ambient temperature will cause power derating of inverter.)

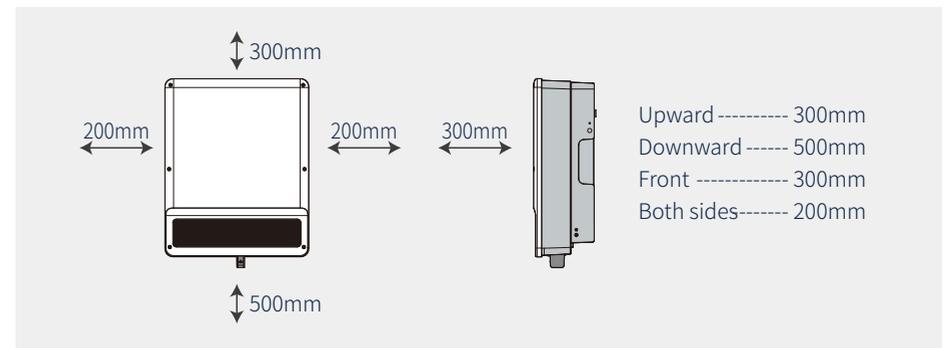
**Rule 4.** The inverter installation should be protected under shelter from direct sunlight or bad weather like snow, rain, lightning etc.



**Rule 5.** Inverter should be installed at eye level for convenient maintenance.

**Rule 6.** Product label on inverter should be clearly visible after installation.

**Rule 7.** Leave enough space around the inverter according to the below figure.



## 2.3.2 Mounting

 Inverter cannot be installed near flammable, explosive or strong electro-magnetic equipment.

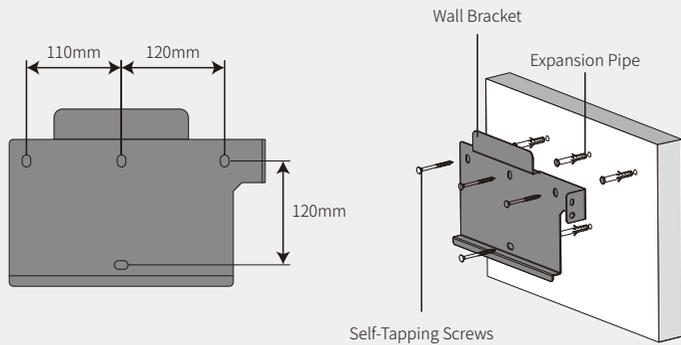
The inverter is suitable for mounting on concrete or other non-combustible surface only.

### Step 1

Please use the mounting bracket as a template to drill 4 holes in the right positions (10mm in diameter, and 80mm in depth)

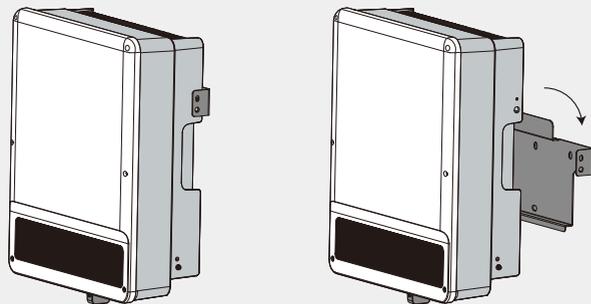
Use expansion bolts in accessory box and fix the mounting bracket onto the wall tightly.

**Note:** Bearing capacity of the wall must be higher than 25kg, otherwise may not be able to keep the inverter from dropping.



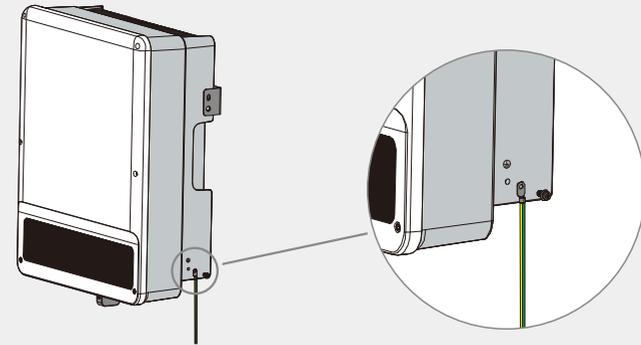
### Step 2

Carry the inverter by holding the heatsink on both sides and place the inverter on the mounting bracket.



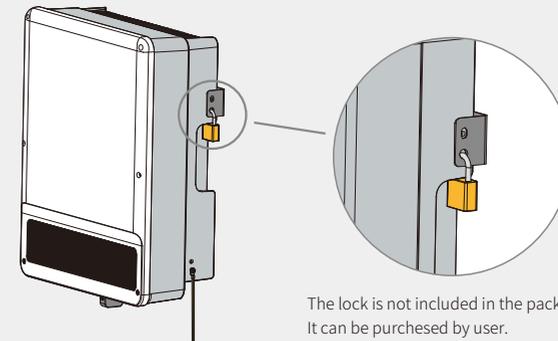
### Step 3

Ground cable shall be connected to the ground plate on grid side.



### Step 4

Inverters could be locked for anti theft purposes if it is necessary for individual requirements.



## 2.4 Electrical Wiring Connection

### 2.4.1 Battery Wiring Connection

Please be careful about any electric shock or chemical hazard.

For battery without build-in DC breaker, make sure there is an external DC breaker ( $\geq 40A$ ) connected.

 Make sure that the battery switch is off and battery nominal voltage meets ET series' specification before connecting battery to inverter. Make sure inverter is totally isolated from PV and AC power.

Please follow the requirements and steps below strictly. Using improper wire may cause bad contact and high impedance, which is dangerous to the system.

Use the right BAT plugs from the accessory box.

The maximum battery current is 25A, please use the tin-plated cables of which the cross section ranges from 4 to 6 mm<sup>2</sup> (AWG 10). Battery cable requirements are as Figure 2.4.1-1.

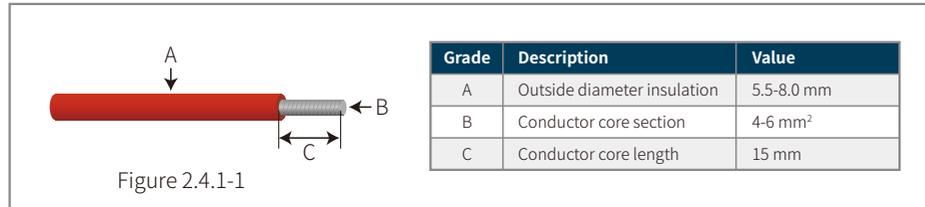
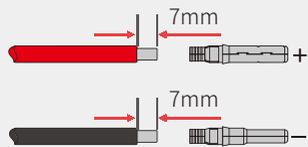


Figure 2.4.1-1

#### Battery wiring connection process

##### Step 1

Prepare BAT cables and BAT plugs

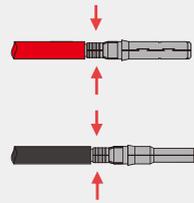


Note

1. Please use BAT plugs and connectors in accessory box.
2. BAT cable should be standard, 4-6mm<sup>2</sup> BAT cable.

##### Step 2

Connect BAT cables to BAT connectors



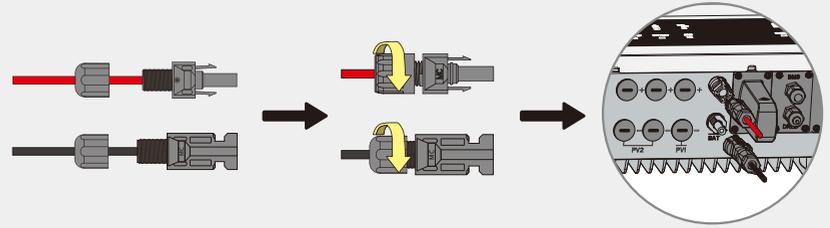
Note

1. BAT cable must be tightly crimped into the connectors
2. There will be a click sound if connectors are inserted correctly into BAT plugs.

##### Step 3

Screw the cap on and plug it onto inverter side.

Note: There will be a click sound if connectors are inserted correctly into BAT plugs.



Note: For the compatible lithium batteries (Pylon/BYD) connection, please refer to battery connection part in BT quick installation instructions.

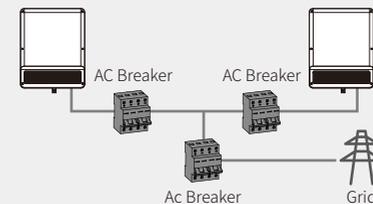
### 2.4.2 On-Grid & Back-Up Connection

An external AC breaker is needed for on-grid connection to isolate from grid when necessary. The requirements of on-grid AC breaker are shown below.

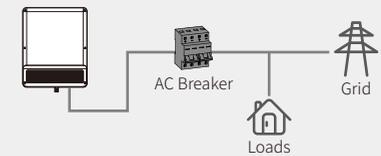
Inverter model	AC breaker specification
GW5K-BT	25A / 400V (e.g. DZ47-60 C25)
GW6K-BT	25A / 400V (e.g. DZ47-60 C25)
GW8K-BT	32A / 400V (e.g. DZ47-60 C32)
GW10K-BT	32A / 400V (e.g. DZ47-60 C32)

Note: The absence of AC breaker on back-up side will lead to inverter damage if an electrical short circuit happens on back-up side.

1. Use separated AC breaker for individual inverter.



2. On the AC side, the individual breaker should be connected between inverter and Grid but before loads.



AC cable is required to connect to both on-grid and back-up side.



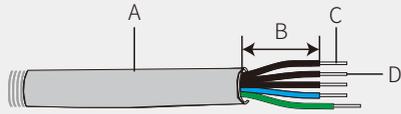
Make sure the inverter is totally isolated from any DC or AC power before connecting AC cable.

Note:

1. Neutral cable shall be blue, line cable shall be black or brown (preferred) and protective earth cable shall be yellow-green.
2. For AC cables, PE cable shall be longer than N&L cables, so in case that the AC cable slips or is taken out, the protecting earth conductor will be the last to take the strain.

### Step 1

Prepare the terminals and AC cables according to the right table.

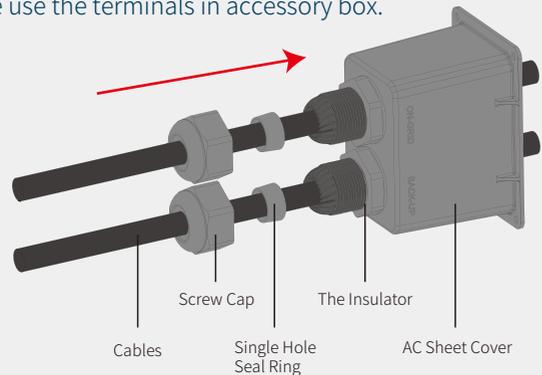


Grade	Description	Value
A	Outside diameter	13-18 mm
B	Separated wire length	20-25 mm
C	Conductor wire length	7-9 mm
D	Conductor core section	4-6 mm <sup>2</sup>

### Step 2

Put AC cable through terminal cover as shown in the figure.

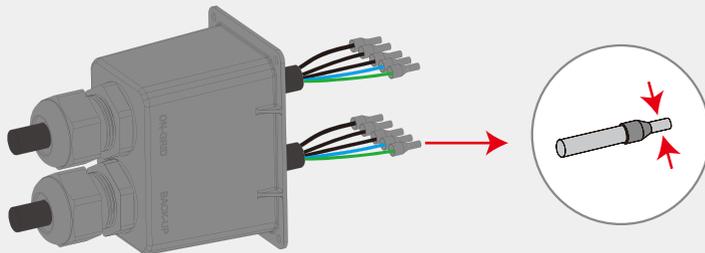
Note: Please use the terminals in accessory box.



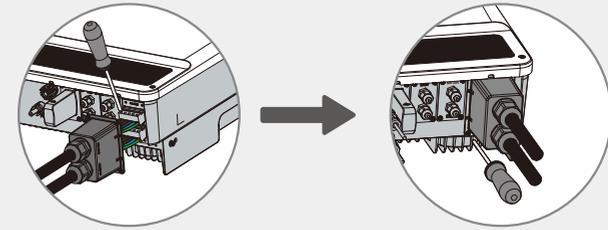
### Step 3

Press the 10 connectors on cable conductor core tightly.

Note: Make sure cable jacket is not locked within the connector.



### Step 4



1. Connect the assembled AC cables into AC terminals with fastening torque about 2.0-2.5N.m.

Note: Connect back-up terminals before connecting on-grid terminals. Make sure it is not connected to a wrong side.

2. Lock the cover and screw the cap.

### Special adjustable setting

The inverter has a field where the user could set functions, such as trip points, trip time, time of reconnection, active and invalid of QU curve and PU curve. Functions can be adjusted through special software. If interested, please contact with our department of server.

### Declaration for back-up function

The back-up output of BT hybrid inverters have over load ability.

For details please refer to the technical parameters of BT series inverter(4.3 se)

And the inverter has self-protection derating at high ambient temperature.

The below statement lays out general policies governing the energy storage inverters of the series EH, EM, ES, ET, BH, BT and SBP.

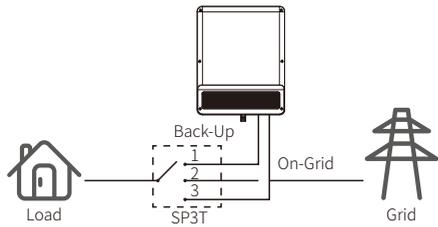
1. For hybrid inverters (Series ES, EM, EH and ET), the standard PV installation typically consists of the connection of the inverter with both panels and batteries. In the case where the system is not connected to the batteries, the back-up function is strongly not advised for use. Manufacturer shall not cover the standard warranty and be liable for any consequences arising from users not following this instruction.
2. Under normal circumstances, the back-up switching time is less than 10 ms (the minimal condition to be considered as the UPS level). However, some external factors may cause the system to fail on Back-Up mode. As such, we recommend the users to be aware of conditions and follow the instructions as below:
  - Do not connect loads if they are dependent on a stable energy supply for a reliable operation
  - Do not connect the loads which may in total exceed the maximum back-up capacity
  - Try to avoid those loads which may create very high start-up current surges such as inverter air-conditioner, high-power pump etc.
  - Due to the condition of the battery itself, battery current might be limited by some factors including but not limited to the temperature, weather etc.

### Accepted loads as below:

- Inductive load: 1.5P non-frequency conversion air-conditioner can be connect to back-up side. Two or more non-frequency conversion air-conditioner connect to back-up side may cause UPS mode to be unstable.
- Capacitive load: Total power  $\leq 0.6 \times$  nominal power of model. (Any load with high startup current at start-up is not accepted.)
- For complicated application, please contact after-sales.

#### Note:

For convenient maintenance, please install a "4Pole3Throw" on back-up and on-grid side. Then it is adjustable to support load by back-up or by grid or default settings.



1. Back-up load is supplied from back-up side.
2. Back-up load is isolated.
3. Back-up load is supplied from grid side.

### Declaration for back-up overload protection

Inverter will restart itself if overload protection triggers. The preparation time for restarting will be longer and longer (max one hour) if overload protection repeats. Take following steps to restart inverter immediately.

- Decrease back-up load power within max limitation
- On PV Master App → Advanced Setting → Click "Reset Back-Up Overload History".

### 2.4.3 Smart Meter & CT Connection



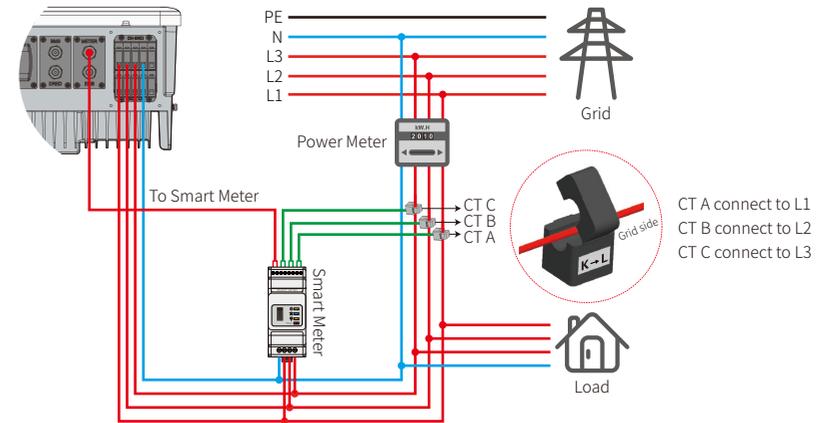
Make sure AC cable is totally isolated from AC power before connecting Smart Meter & CT.

The Smart Meter with CT in product box is compulsory for BT system installation, used to detect grid voltage and current direction and magnitude, further to instruct the operation condition of BT inverter via RS485 communication.

#### Note:

1. The Smart Meter with CT is well configured, please do not change any setting on Smart Meter.
2. One Smart Meter can only be used for one ET inverter.
3. Three CTs must be used for one Smart Meter, and must be connected on the same phase with Smart Meter power cable.

### Smart Meter & CT connection diagram



#### Note:

1. Please use the Smart Meter with 3 CTs in product box.
2. CT cable is 3m as default, could be extended to a maximum of 5m.
3. Smart Meter communication cable (RJ45) is attached on the inverter ("To Smart Meter" cable), could be extended to a max of 100m, and must use standard RJ45

### Detailed pin function of each port on BT

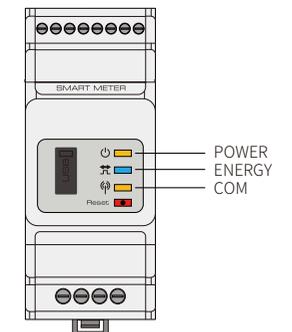
BMS: CAN communication is configured by default. If 485 communication is used, please contact after-sales to replace with the corresponding communication line.

Position	Color	BMS Function	Smart Meter Function	EMS
1	Orange&white	485_A2	NC	485_A
2	Orange	NC	NC	485_B
3	Green&white	485_B2	485_B1	485_A
4	Blue	CAN_H	NC	NC
5	Blue&white	CAN_L	NC	NC
6	Green	NC	485_A1	485_B
7	Brown&white	NC	485_B1	NC
8	Brown	NC	485_A1	NC



### Smart Meter LED indications

STATUS	OFF	ON	Blinking
POWER	Not working	Working	/
ENERGY	/	Importing	Exporting
COM	Blink one time when it transfer data to inverter		

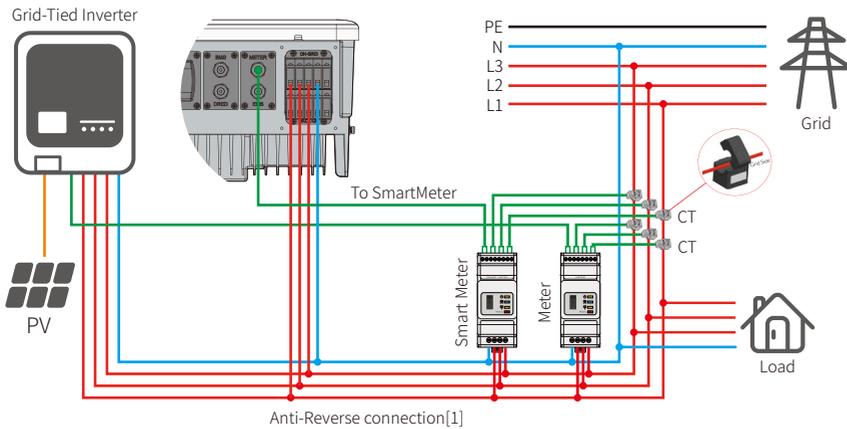


## Anti-reverse function connection

If BT system (connected with grid-tied inverters) requires anti-reverse function, it is operable but please note:

1. This diagram is only for installation where there is exporting power limit function requirement.
2. For anti-reverse function, it can be set on PV Master App → Advanced Setting → Power Limit.
3. This diagram will only apply if grid-tied inverter has anti-reverse function build-in. And the power limitation value can be set on grid-tied inverter.
4. When using anti-reverse function, it would buy about 150W from the grid.

## Connection diagram



[1] This cable is a theoretical connection supporting anti-reverse function, which could be different for different grid-tied inverters.

## 2.5 DRED / Remote Shutdown Connection

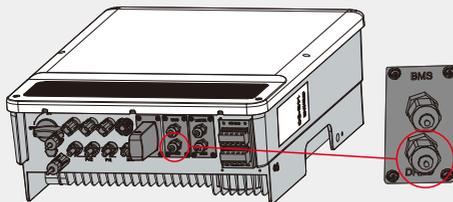
DRED (Demand response enabling device) is used for installations in Australia and New Zealand (also used as remote shutdown function in European countries), in compliance with Australia and New Zealand safety requirements (Or European countries). The inverter integrates the DRED control logic and provides the DRED interface. DRED is not provided by the manufacturer.

Detailed connection of DRED / Remote shutdown is shown below:

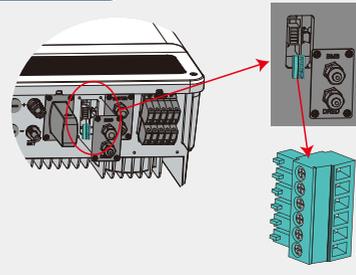
### Step 1

Screw this plate off from the inverter.

Note: DRED should be connected through "DRED Port" as the figure shows.



### Step 2



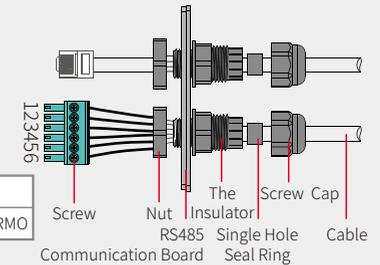
1. Plug out the 6-pin terminal and dismantle the resistor on it.
2. Plug the resistor out, leave the 6-pin terminal for next step.

Note: The 6-pin terminal in the inverter has the same function as DRED. Please leave it in the inverter if no external device is connected.

### Step 3-1 For DRED

1. Put DRED cable through the plate.
2. Connect DRED cable on the 6-pin terminal. The function of each connection position is shown as below.

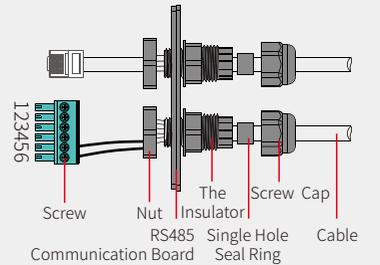
NO.	1	2	3	4	5	6
Function	DRM1/5	DRM2/6	DRM3/7	DRM4/8	REFGEN	COM / DRMO



### Step 3-2 For Remote Shutdown

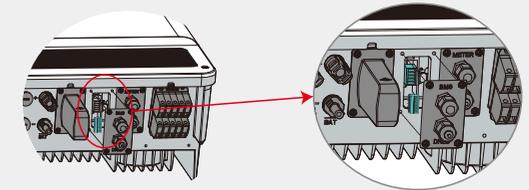
1. Put the cable through the plate.
2. Wiring from the No. 5 and 6 holes respectively.

NO.	5	6
Function	REFGEN	COM / DRMO



### Step 4

Connect DRED terminal to the right position onto the inverter.

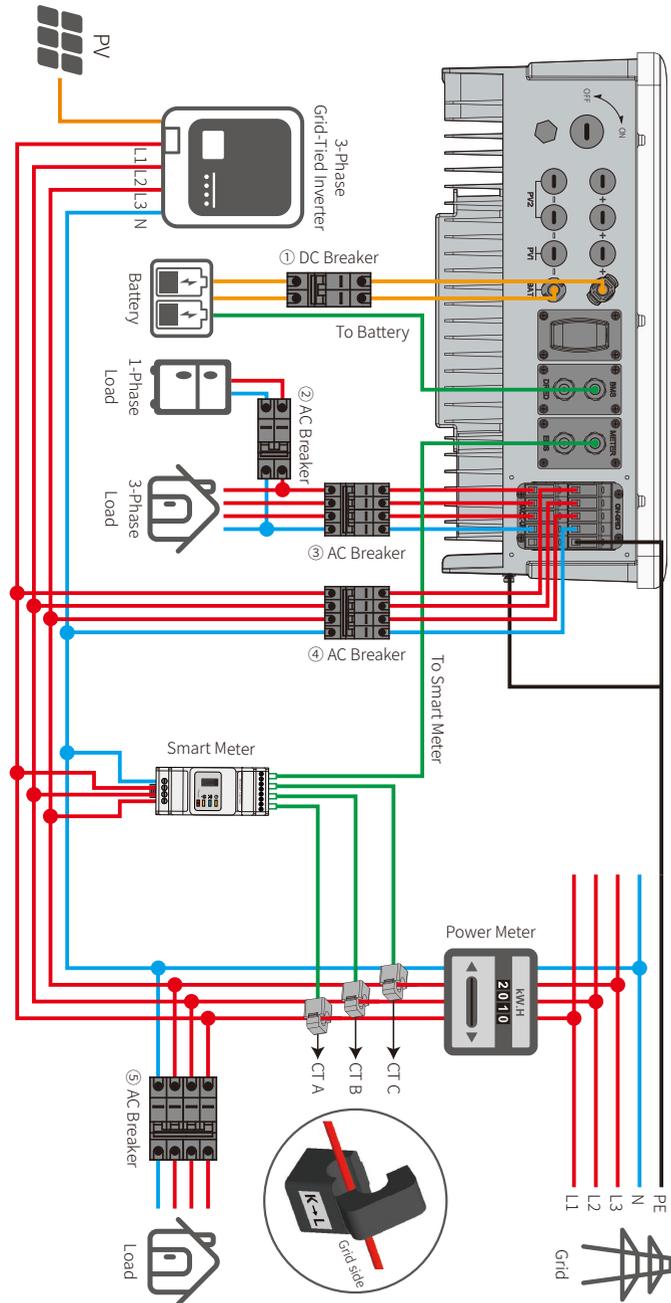


## 2.6 Earth Fault Alarm Connection

BT series inverter complies with IEC 62109-2 13.9. Fault indicator LED on the inverter cover will light up and the system will email the fault information to customer.

## Wiring system for BT series hybrid inverter

Note: This diagram indicates wiring structure of BT series AC coupled inverter, not the electric wiring standard.



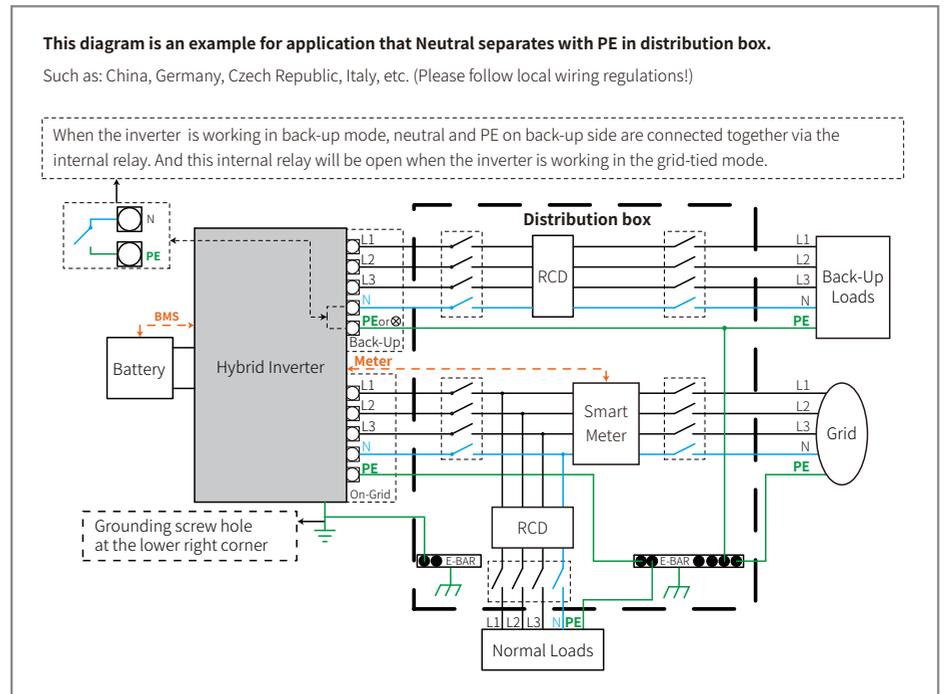
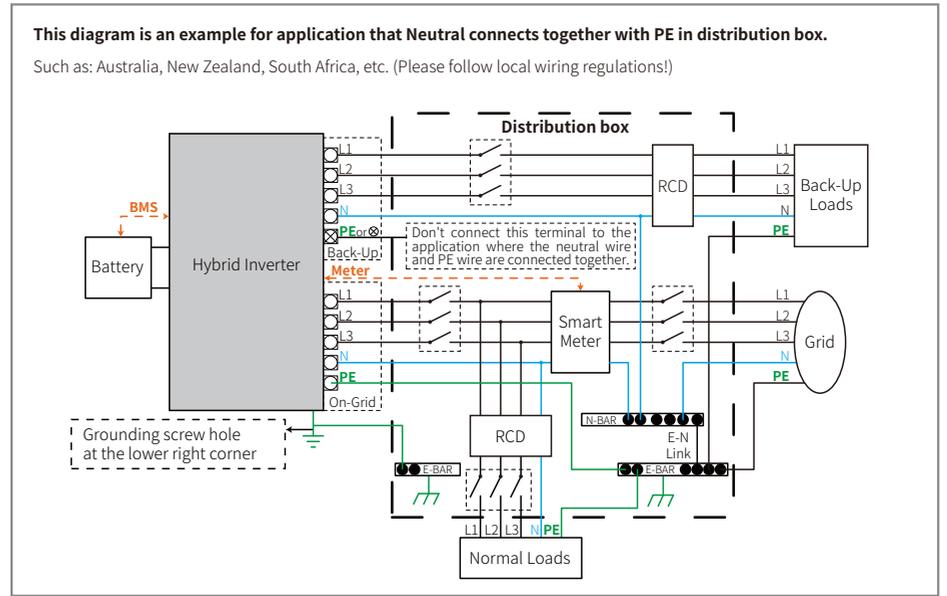
Please select Breaker according to the specification below

Inverter	①	②	③	④	⑤
GW5K-BT		25A/400V AC breaker			
GW6K-BT		25A/400V AC breaker			
GW8K-BT	40A/600V DC breaker	25A/400V AC breaker			Depends on household loads
GW10K-BT		32A/400V AC breaker			

- For batteries with attached breaker, the external DC breaker can be omitted.
- Please use CT A for L1, CT B for L2 and CT C for L3. And follow "House(K) → Grid(L)" direction to do the connection. Otherwise there will be an error reminded by PV Master App.

## System connection diagrams

Note: According to Australian safety regulation, the neutral cable of on-grid side and back-up side must be connected together, otherwise back-up function will not work.



### 3.1 Wi-Fi Configuration

This part shows configuration on the web page.

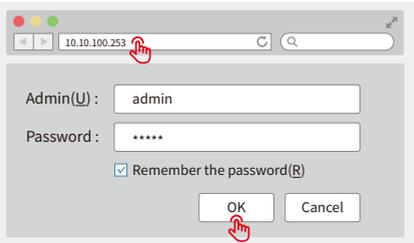
Wi-Fi configuration is absolutely necessary for online monitoring and maintenance.

#### Preparation:

1. Inverter must be powered up with battery or grid power.
2. Router with available internet access to the website [www.semsportal.com](http://www.semsportal.com) is required.

#### Step 1

1. Connect Solar-WiFi\* to your PC or smart phone (\* its named the last 8 character of the inverter's serial No.).
2. Open browser and login 10.10.100.253 Admin (User): admin; Password: admin.
3. Then click "OK".



#### Step 2

1. Click "Start Setup" to choose your router.
2. Then click "Next".

##### Device information

Firmware version	1.6.9.3.38.2.1.38
MAC address	60:C5:A8:60:33:E1
Wireless AP mode	Enable
SSID	Solar-WiFi
IP address	10.10.100.253
Wireless STA mode	Disable
Router SSID	WiFi_Bum-in
Encryption method	WAP/WAP2-PSK
Encryption algorithm	AES
Router Password	WiFi_Bum-in

Cannot join the network, may be caused by:

No router / weak WiFi signal / password is not correct

★ Help: Wizard will help you to complete setting with one minute.

Start Setup

##### Please select your current wireless network

SSID	AUTH/ENCRY	RSSI	Channel
<input type="radio"/> WiFi_Bum-in	WPAPSKWPA2PSK/TKIPAES	66	1
<input type="radio"/> WiFi_Bum-in	WPAPSKWPA2PSK/TKIPAES	100	1
<input type="radio"/> WiFi_Bum-in	WPAPSKWPA2PSK/TKIPAES	70	1
<input type="radio"/> WiFi_Bum-in2	WPAPSKWPA2PSK/TKIPAES	72	1

Refresh

★ Help: When RSSI of the selected Wi-Fi network is lower than 15%, the connection may be unstable. Please select other available network or shorten the distance between the device and router. If you wireless router does not broadcast SSID, please click "Next" and add a wireless network manually.

Back

Next

#### Step 3

1. Fill in the password of ther router, then click "Next".
2. Click "Complete".

##### Add wireless network manually

Network name (SSID)	WiFi-Test
Encryption method	WPA/WPA2-PSK
Encryption algorithm	AES

##### Please enter the wireless network password:

Passwork (8-63 bytes)	Router password
	show psk

Note: Case sensitive for SSID and password, Please make sure all parameters of wireless network are matched with router, including password.

Back

Next

##### Save success!

Click "Complete", the current configuration will take effect after restart.

If you still need to configure the other pages of information, please go to complete your required configuration.

Configuration is completed, you can log on the Management page to restart device by Click on "OK" button.

Confirm to complete?

Back

Complete

Note:

1. Please make sure the password, Encryption method / algorithm is the same with the router's.
2. If everything is correct, the Wi-Fi LED on inverter will change from double blink to quartic blink then to solid status, which means Wi-Fi has connected to the server successfully.
3. Wi-Fi configuration could also be done on PV Master App, details please check on PV Master App.

#### Wi-Fi reset & reload

Wi-Fi reset means restarting Wi-Fi module. Wi-Fi settings will be reprocessed and saved automatically. Wi-Fi Reload means setting Wi-Fi module back to default factory setting.

Wi-Fi Reset Button



##### Wi-Fi reset

Short press reset button.

Wi-Fi LED will blink for a few seconds.

##### Wi-Fi reload

Long press reset button (longer than 3s).

Wi-Fi LED will double blink until Wi-Fi configuration again.

Note:

Wi-Fi Reset & Reload function is only used when:

1. Wi-Fi loses connection to internet or cannot connect to PV Master App successfully.
2. Cannot find "Solar-WiFi signal" or have other Wi-Fi configuration problems.
3. Please do not use this button if Wi-Fi monitoring works well.

### 3.2 PV Master App

PV Master is an external monitoring/ configuration application for hybrid inverters, used on smart phones or tablet for both Android and iOS system. Main functions are as below:

1. Edit system configuration to make the system work as customer needs.
2. Monitor and check the performance of the hybrid system.
3. Wi-Fi configuration.

Please download "PV Master App" from [www.goodwe.com](http://www.goodwe.com) or scan the QR code on the back of this user manual.



### 3.3 CEI Auto-Test Function

PV auto-test function of CEI is integrated in PV Master App for Italy's safety country requirements. For detailed instruction of this function please refer to "PV Master Operation Instructions".

## 4.1 Error Messages

The error messages below will be displayed on PV Master App or reported by e-mail if the error occurs.

ERROR MESSAGE	EXPLANATION	REASON	SOLUTIONS
Utility Phase Failure	The sequence of on-grid wire is wrong	Inverter detects that phase angle of L2 and L3 are reversed	Reverse connection order of L2 and L3 cable.
Utility Loss	Public grid power is not available (Power lost or on-grid connection fails)	Inverter does not detect the connection of grid	<ol style="list-style-type: none"> <li>1. Check (use multi-meter) if AC side has voltage. Make sure grid power is available.</li> <li>2. Make sure AC cables are connected tightly and well.</li> <li>3. If all is well, please try to turn off AC breaker and turn on again in 5 mins.</li> </ol>
VAC Failure	Grid voltage is not within permissible range	Inverter detects that AC voltage is beyond the normal range required by the safety country	<ol style="list-style-type: none"> <li>1. Make sure safety country of the inverter is set right.</li> <li>2. Check (use multi-meter) if the AC voltage (Between L &amp; N) is within a normal range (also on AC breaker side) <ol style="list-style-type: none"> <li>a. If the AC voltage is high, then make sure the AC cable complies with that required on user manual and the AC cable is not too long.</li> <li>b. If the voltage is low, make sure the AC cable is connected well and the jacket of the AC cable is not compressed into the AC terminal.</li> </ol> </li> <li>3. Make sure the grid voltage of your area is stable and within normal range.</li> </ol>
FAC Failure	Grid frequency is not within permissible range	Inverter detects that the grid frequency is beyond the normal range required by the safety country	<ol style="list-style-type: none"> <li>1. Make sure the safety country of the inverter is set right.</li> <li>2. If safety country is right, then please check on the inverter display if AC frequency (Fac) is within a normal range.</li> <li>3. If FAC failure only appears a few times and is resolved soon, it should be caused by occasional grid frequency instability.</li> </ol>
BAT Over Voltage	BAT voltage is too high	The battery voltage is higher than the max BAT input voltage of the inverter.	Check battery voltage is lower than Max Battery Input Voltage of the inverter. If voltage of Battery is high, please reduce battery module.
Over Temperature	Temperature inside of the inverter is too high	The inverter's working environment leads to a high temperature condition	<ol style="list-style-type: none"> <li>1. Try to decrease surrounding temperature.</li> <li>2. Make sure the installation complies with the instruction on inverter user manual.</li> <li>3. Try to close the inverter for 15 mins, then start up again.</li> </ol>
Isolation Failure	Ground insulation impedance of Battery is too low	Isolation failure could be caused by multiple reasons like battery not being grounded well, DC cable is broken, battery are aged or surrounding humidity is comparatively heavy, etc.	<ol style="list-style-type: none"> <li>1. Use multi meter to check if the resistance between earth &amp; inverter frame is about zero. If it's not, please ensure that the connection is well.</li> <li>2. If the humidity is too high, isolation failure may occur.</li> <li>3. Check the resistance between BAT to earth, if the resistance is lower than 33.3k, check the system wiring connection.</li> <li>4. Try to restart the inverter, check if the fault is still occurs, if not, means it is just an occasional situation, or contact after-sales.</li> </ol>
Ground Failure	Ground leakage current is too high	Ground failure could be caused by multiple reasons like that the neutral cable on the AC side is not connected well or the surrounding humidity is comparatively heavy, etc.	Check (use multi-meter) if there is voltage (normally should be close to 0V) between earth & inverter frame. If there is a voltage, it means the neutral & ground cables are not connected well on the AC side. If it happens only in the early morning/dawn /rainy days with higher air humidity and is recovered soon, it should be normal.
Relay Check Failure	Self checking of relay failure	Neutral & ground cables are not connected well on AC side or just an occasional failure	Check (use multi-meter) if there is high voltage (normally should be lower than 10V) between N & PE cable on the AC side. If the voltage is higher than 10V, it means the neutral & ground cable are not connected well on AC side or restart inverter.
DC Injection High	/	Inverter detects a higher DC component in AC output	Try to restart the inverter, check if it still occurs. If not, it is just an occasional situation. Otherwise, contact after-sales immediately.
EEPROM R/W Failure	/	Caused by a strong external magnetic field etc.	Try to restart the inverter, check if it still occurs. If not, it is just an occasional situation. Otherwise, contact after-sales immediately.
SPI Failure	Internal communication fails	Caused by a strong external magnetic field etc.	Try to restart the inverter, check if it still occurs. If not, it is just an occasional situation. Otherwise, contact after-sales immediately.
DC Bus High	BUS voltage is too high	/	Try to restart the inverter, check if it still occurs. If not, it is just an occasional situation. Otherwise, contact after-sales immediately.
Back-Up Over Load	Back-up side is over loaded	Total back-up load power is higher than the back-up nominal output power	Decrease back-up loads to make sure the total load power is lower than back-up nominal output power (please refer to page 12).

## 4.2 Troubleshootings

### Checking Before Turning On AC Power

- **Battery connection:** Confirm the connection between BT and battery : polarities (+/-) are not reversed, refer to Figure 4.2-1
- **On-grid & back-up connection:** Confirm on-grid connected to power grid and back-up connected to loads: polarities (L1/L2/L3/N are in sequence) are not reversed, refer to Figure 4.2-2.
- **Smart Meter & CT connection:** Make sure Smart Meter & CT are connected between house loads and grid, and follow the Smart Meter direction sign on CT, refer to Figure 4.2-3.

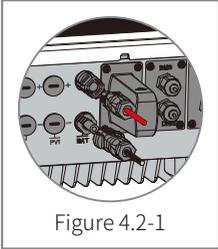


Figure 4.2-1

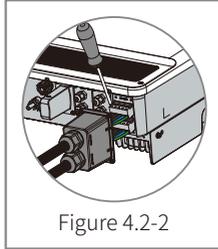


Figure 4.2-2

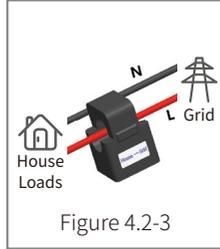
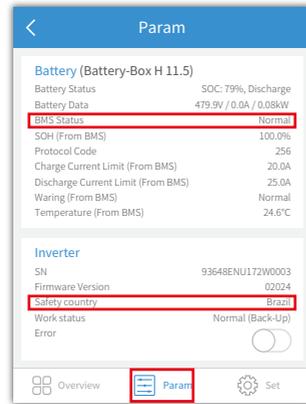
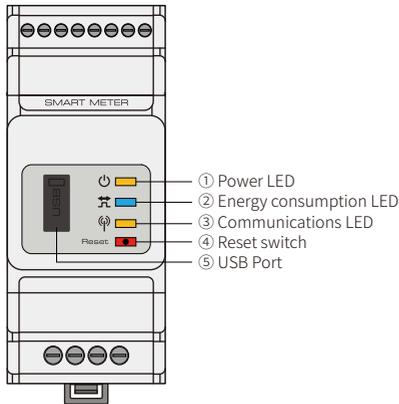


Figure 4.2-3

### Checking as Start BT up and Turn On AC Power

#### Battery settings, BMS communication and safety country:

After connecting Solar-WiFi\* (\*The Wi-Fi signal is named the last 8 characters of the inverter's serial No.), check on PV Master App "Param" to make sure battery type is the same as what you have installed, and "Safety Country" Setting is right. Please set it right in "Set" if the setting is not right.



Note: For compatible lithium batteries, BMS status will display "Normal" after selecting the right battery company.

### Problems During Operation

#### BT does not start up with only battery

##### Solution:

Make sure the voltage of battery is higher than 180V, otherwise battery cannot start BT up.

#### High power fluctuation on battery charge or discharge:

##### Solution:

Check if there is a fluctuation on load power.

#### Battery does not charge:

##### Solution:

1. Make sure BMS communication is OK on PV Master.
2. Make sure the CT is connected in the right position and to right direction as on the user manual page 12
3. Make sure the total load power is much higher than PV power.

### Questions & Answers (Q & A)

#### About Wi-Fi Configuration

##### Q: Why can't I find the Solar-WiFi\* signal on mobile devices?

A: Normally Solar-WiFi\* signal could be searched right after inverter has powered up. But Solar-Wi-Fi signal will disappear when BT connects to internet. If changes to the setting are required, connect to the router to change. If you can't find the WiFi signal or connect to the router, then please try to reload Wi-Fi (please refer to BT user manual page 17).

##### Q: Why can't I connect Solar-WiFi\* signal on my phone?

A: The Wifi module can only connect to one device at a time. If the signal is already connected to another device at the time for some reason, you cannot connect to the signal.

#### About Battery Operation

##### Q: Why does the battery not discharge when grid is not available, while it discharges normally when grid is available?

A: On the App, off-grid output and back-up function should be turned on to make battery discharge under off-grid mode.

##### Q: Why is there no output on back-up side?

A: For back-up supply, the "Back-Up Supply" on PV Master App must be turned on. Under off-grid

mode or grid power is disconnected, "Off-Grid Output Switch" function must be turned on as well.

Note: As turn "off-grid output switch" on, don't restart inverter or battery, otherwise the function will switch off automatically.

**Q: Why does the battery SOC suddenly jump to 95% on the Portal?**

A: This normally happens on when BMS communication fail on lithium. If battery enter float charge, SOC will be reset to 95% automatically.

**Q: The battery cannot be fully charged to 100%.**

A: Battery will stop charge when battery voltage reaches charge voltage set on PV Master App.

**Q: Why battery switch always trip when it starts up (Lithium battery)?**

A: The switch of lithium battery normally trips for following reasons:

1. BMS communication fails.
2. Battery SOC is too low, battery trips to protect itself.
3. An electrical short-cut happened on battery connection side. Or other reasons please contact with our department of server for details.

**Q: Which battery should I use for BT?**

A: For BT series inverter, it could connect lithium batteries which have compatibility with BT series inverter with nominal voltage from 180V to 600V. For compatible lithium batteries please refer to battery list in PV Master App.

**About PV Master Operation and Monitoring**

**Q: Why can't I save settings on PV Master App**

A: This could be caused by losing connection to Solar-WiFi\*:

1. Make sure you connected Solar-WiFi\* (make sure no other devices connected) or router (if connected Solar-WiFi\* to router) and on App home page shows connection well.
2. Make sure you restart inverter 10mins after you change some settings because the inverter will save settings every 10 mins under normal mode. We recommend you change setting parameters when inverter is in wait mode.

**Q: On the App, why are the data displayed on the homepage different from the Param page, like charge/discharge, PV value, load value or grid value?**

A: The data refresh frequency is different, so there will be a data inconformity between different pages on App as well as between that on portal and App.

**Q: On App, some columns show NA, like battery SOH, etc. Why does that happen?**

A: NA means App does not receive data from inverter or server because of communication problem, such as battery communication, and communication between inverter and the App.

**About Smart Meter and Power Limit Function**

**Q: How to activate Output Power Limit function?**

A: For BT system, the function could be realized by:

1. Make sure Smart Meter connection and communication are well.
2. Turn on Export Power Limit function and set the max output power to grid on App.

Note: Even if output power limit is set to 0W, there might still be a deviation of a max of 100W exporting to grid.

**Q: Why is there still power exporting to grid after I set power limit as 0W?**

A: Export limit could theoretically be 0W, but there will be a deviation of around 50-100W for BT system.

**Q: Can I use other brand Meter to take over Smart Meter in BT system or change some settings on Smart Meter?**

A: No, because the communication protocol is inset between inverter and Smart Meter, other brand Meter cannot communicate. Also any manual setting change could cause Meter communication failure.

**Q: What is the maximum current allowed going through CT on Smart Meter?**

A: The max current for CT is 120A.

**Other Questions**

**Q: Is there a quick way to make the system work?**

A: The shortest way, please refer to "BT Quick Installation Instructions" and "PV Master App Instruction".

**Q: What kind of load can i connect on back-up side?**

A: Please refer to user manual on page 12.

**Q: Will the warranty of the inverter still be valid if for some special conditions we cannot 100% follow the installation or operation instructions of the user manual?**

A: Normally we can still provide technical support to problems caused b disobeying the instruction on the user manual, but we cannot guarantee a replacement or returns. So if there is any special conditions where you cannot 100% follow the instructions, please contact after-sales.

### 4.3 Disclaimer

The BT series inverters are transported, used and operated under environmental and electrical conditions. Manufacturer has the right not to provide after-sales services or assistance under following conditions:

- Inverter is damaged during transfer.
- Inverter's warranty has expired and extended warranty is not bought.
- Inverter is installed, refitted or operated in improper ways without authorisation from manufacturer.
- Inverter is installed or used under improper environment or technical condition mentioned in this user manual, without authorisation from manufacturer.
- Installation or configuration of the inverter does not follow requirements mentioned in this user manual.
- The inverter is installed or operated against the requirements or warnings that are mentioned in this user manual.
- Inverter is broken or damaged by any force majeure like lightning, earthquake, fire hazard, storm and volcanic eruption etc.
- Inverter is disassembled, changed or updated on software or hardware without authorisation from manufacturer.
- Inverter is installed, used or operated against any related items in international or local policies or regulations.
- Any non-compatible batteries, loads or other devices connected to BT system.

Note: Manufacturer will keep the right to explain all the contents in this user manual. To insure IP66, inverter must be sealed well, please install the inverters within one day after unpacking, otherwise please seal all unused terminals / holes, unused terminals / holes are not allowed to be kept open, confirm that there is no risk of water or dust entering the terminals / holes.

### Maintenance

The inverter requires periodical maintenance, details as shown below:

- Make sure inverter is totally isolated from all DC and AC power for at least 5 mins before maintenance.
- Heat sink: Please use clean towel to clean up heat sink once a year.
- Torque: Please use torque wrench to tighten AC and DC wiring connection once a year.
- DC breaker: Check DC breaker regularly, active the DC breaker 10 times in a row once a year.
- Operating DC breaker will clean contacts and extend lifespan of DC breaker.
- Water-proof covers: Check if water-proof covers of RS485 and other part are replaced once a year.

### 4.4 Technical Parameters

Technical Data	GW5K-BT	GW6K-BT	GW8K-BT	GW10K-BT
<b>Battery Input Data</b>				
Battery Type	Li-Ion			
Battery Voltage Range (V)	180-600			
Max. Charging Current (A)	25			
Max. Discharging Current (A)	25			
Charging Strategy For Li-Ion Battery	Self-Adaption To BMS			
<b>AC Output Data (On-Grid)</b>				
Nominal Apparent Power Output to Utility Grid (VA)	5000	6000	8000	10000
Max. Apparent Power Output to Utility Grid (VA) [1]	5500	6600	8800	11000
Max. Apparent Power from Utility Grid (VA)	10000	12000	15000	15000
Nominal Output Voltage (V)	400/380, 3L/N/PE			
Nominal Output frequency (Hz)	50/60			
Max. AC Current Output to Utility Grid (A)	8.5	10.5	13.5	16.5
Max. AC Current From Utility Grid (A)	15.2	18.2	22.7	22.7
Output Power Factor	~1 (Adjustable from 0.8 leading to 0.8 lagging)			
Output THDi (@Nominal Output)	<3%			
<b>AC Output Data (Back-Up)</b>				
Max. Output Apparent Power (VA)	5000	6000	8000	10000
Peak Output Apparent Power (VA) [2]	10000, 60sec	12000, 60sec	15000, 60sec	15000, 60sec
Max. Output Current (A)	8.5	10.5	13.5	16.5
Nominal Output Voltage (V)	400/380			
Nominal Output Frequency (Hz)	50/60			
Output THDv (@Linear Load)	<3%			
<b>Efficiency</b>				
Max. Battery To Load Efficiency	97.6%			
Max. Charge Efficiency	97.6%			
<b>Protection</b>				
Anti-Islanding Protection	Integrated			
Insulation Resistor Detection	Integrated			
Residual Current Monitoring Unit	Integrated			
Output Over Current Protection	Integrated			
Output Short Protection	Integrated			
Battery Input Reverse Polarity Protection	Integrated			
Output Over Voltage Protection	Integrated			

Technical Data	GW5K-BT	GW6K-BT	GW8K-BT	GW10K-BT
<b>General Data</b>				
Operating Temperature Range (°C)	-35~60			
Relative Humidity	0~95%			
Operating Altitude (m)	≤4000			
Cooling	Nature Convection			
Noise (dB)	<30			
User Interface	LED & APP			
Communication With BMS	RS485; CAN			
Communication With Meter	RS485			
Communication With EMS	RS485 (Insulated)			
Communication With Portal	Wi-Fi;LAN			
Weight (kg)	21			
Size (Width*Height*Depth mm)	516*415*180			
Mounting	Wall Bracket			
Protection Degree	IP66			
Standby Self Consumption (W) [3]	<15			
Topology	Transformerless			
<b>Certifications &amp; Standards</b>				
Grid Regulation	CEI 0-21; VDE-AR-N 4105; G98, G99, G100; EN 50549			
Safety Regulation	IEC/EN 62477			
EMC	EN61000-6-1, EN61000-6-2, EN61000-6-3, EN61000-6-4, EN61000-4-16, EN61000-4-18, EN61000-4-29			

[1] According to the local grid regulation

[2] Can be reached only if battery capacity is enough, otherwise will shut down.

[3] No back-up output

## 4.5 Other Test

For Australian requirements, in the THDi test, Zref should be added between inverter and mains.

RA, XA for Line conductor

RN, XN for Neutral conductor

Zref:

RA=0, 24; XA=j0,15 at 50Hz;

RN=0, 16; XN=j0,10 at 50Hz

## 4.6 Quick Check List To Avoid Danger

1. Inverter cannot be installed near flammable, explosive or strong electro-magnetic equipment, please refer to page 06
2. Remember that this inverter is heavy! Please be careful when lifting out from the package, please refer to page 07
3. Make sure battery breaker is off and battery nominal voltage meets BT specification before connecting battery to inverter and make sure inverter is totally isolated from AC power, please refer to page 10
4. Make sure inverter is totally isolated from any DC or AC power before connecting AC cable, please refer to page 11
5. Make sure AC cable is totally isolated from AC power before connecting Smart Meter & CT, please refer to page 14

## Appendix protection category definition

Overvoltage category definition

<b>Category I</b>	Applies to equipment connected to a circuit where measures have been taken to reduce transient overvoltage to a low level.
<b>Category II</b>	Applies to equipment not permanently connected to the installation. Examples are appliances, portables tools and other plug-connected equipment.
<b>Category III</b>	Applies to a fixed equipment downstream, including the main distribution board. Examples are switchgear and other equipment in an industrial installation.
<b>Category IV</b>	Applies to equipment permanently connected at the origin of an installation (upstream of the main distribution board). Examples are electricity meters, primary over-current protection equipment and other equipment connected directly to outdoor open lines.

Moisture location category definition

Moisture Parameters	Level		
	3K3	4K3	4K4H
Temperature Range	0~+40°C	-33~+40°C	~20~+55°C
Moisture Parameters	5%~85%	15%~100%	4%~100%

Environment category definition

Environment Condition	Ambient Temperature	Relative Humidity	Applied to
Outdoor	-20~50°C	4%~100%	PD3
Indoor Unconditioned	-20~50°C	5%~95%	PD3
Indoor conditioned	0~40°C	5%~85%	PD2

Pollution degree definition

Pollution Degree I	No pollution or only dry, non-conductive pollution occurs. The pollution has no influence.
Pollution Degree II	Normally only non-conductive pollution occurs. Occasionally, however, a temporary conductivity caused by condensation must be expected.
Pollution Degree III	Conductive pollution occurs, or dry, non-conductive pollution occurs, which becomes conductive due to condensation, which is expected.
Pollution Degree IV	Persistent conductive pollution occurs, for example, the pollution caused by conductive dust, rain or snow.