# TABLE OF CONTENTS

## 01 INTRODUCTION
1.1 OPERATION MODES INTRODUCTION ............................................. 01  
1.2 SAFETY & WARNINGS .................................................................. 02  
1.3 PRODUCT OVERVIEW .................................................................. 04  

## 02 INSTALLATION INSTRUCTIONS
2.1 UNACCEPTABLE INSTALLATIONS ..................................................... 05  
2.2 PACKING LIST ........................................................................... 05  
2.3 MOUNTING .................................................................................. 06  
  2.3.1 SELECT MOUNTING LOCATION ........................................... 06  
  2.3.2 MOUNTING ........................................................................... 07  
2.4 ELECTRICAL WIRING CONNECTION ........................................... 08  
  2.4.1 BATTERY WIRING CONNECTION ........................................ 08  
  2.4.2 ON-GRID & BACK-UP CONNECTION ................................. 09  
  2.4.3 SMART METER & CT CONNECTION .................................... 12  
2.5 DRED & EARTH FAULT ALARM .................................................. 13  
2.6 EARTH FAULT CONNECTION ....................................................... 14  

## 03 MANUAL OPERATION
3.1 WI-FI CONFIGURATION ................................................................. 17  
3.2 PV MASTER APP OPERATION ....................................................... 18  
3.3 GEI AUTO-TEST INSTRUCTION .................................................... 18  

## 04 OTHERS
4.1 ERROR MESSAGE AND TROUBLESHOOTING .............................. 19  
4.2 DISCLAIMER ............................................................................... 24  
4.3 TECHNICAL PARAMETERS AND CERTIFICATES ....................... 25  
4.4 WARINING QUICK CHECK LIST .................................................. 27  
4.5 CHECKING THE ELECTRICAL CONNECTION .............................. 28
INTRODUCTION

GoodWe BH series bi-directional inverter is designed for both indoor and outdoor use, which could be used with or without existing grid-tied inverter systems to store energy with batteries. Energy produced from grid-tied inverters shall be used to optimize self-consumption, then charge battery, exceed power from grid-tied system could export to grid. Loads will be supported in priority by grid-tied system, then battery power, exceed consumption power will be drained from grid.

Note:
The introduction describes a general behavior of BH system. The operation mode can be adjusted on GoodWe PV Master APP, depends on the system layout. Below are the general operation modes for BH system:

1.2 SAFETY & WARNING
The BH series inverter of Jiangsu GoodWe Power Supply Technology Co., Ltd. (hereinafter called as GoodWe) strictly comply 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 damage.

• SYMBOLS EXPLANATION

Caution!
Failing 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 that the arrows always point upwards.

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

Product should not be disposed as household waste.

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.

Inverter will be touchable or operable after minimum 5 minutes of being turned off or totally disconnected, in case of any electrical shock or injury.

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 to insert or pull the AC and DC terminals when the inverter is running.

Before any wiring connection or electrical operation on inverter, all battery 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 working, so please make sure it is cooled down before touching it, and make sure the inverter is unapproachable for children.

Do not open inverter cover or change any components without GoodWe’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 useless and warranty 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 GoodWe.

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 (≥30mA).

In Australia, the inverter internal switching does not maintain neutral integrity, which must be addressed by external connection arrangements like in the system connection diagram for Australia on page 16.

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’.
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 to disconnected 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 installation should stand vertically or lie on a slope by max 15° (Pic 1).

Rule 3. Ambient temperature should be lower than 45°C.

Rule 4. The installation of inverter should be protected under shelter from direct sunlight or bad weather like snow, rain, lightning etc. (Pic 2).

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 inverter following the values in Pic 3.

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

Remember that this inverter is heavy! Please be careful when lifting out from the package. The inverter is suitable for mounting on concrete or other non-combustible surface only.

- Please use the mounting bracket as a template to drill 4 holes on right positions (10mm in diameter, and 80mm in depth) (Pic 4)
- 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 155.5kg, otherwise may not be able to keep inverter from dropping.

---

2.4 ELECTRICAL WIRING CONNECTION

2.4.1 BATTERY WIRING CONNECTION

- Please be careful against any electric shock or chemical hazard.
- Make sure there is an external DC breaker (>40A) connected for battery without build-in DC breaker.

Make sure battery breaker is off and battery nominal voltage meet BH specification before connecting battery to inverter and make sure inverter is totally isolated from AC power.

Please following Cnents and steps bellow strictly. Use improper wire may cause bad contact and high impedance, which is dangerous to the system.

- Use the right BAT plugs in the accessory box.
- Use the tin-plated cables with a conductor cross section of 4 to 6 mm² (AWG 10) because the maximum battery current is 25A (for BH3, 6-6kW) and 32A (for BH3kW). Battery cable requirements are as (Pic 8).

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Outside Diameter</td>
<td>5.5-6.0mm</td>
</tr>
<tr>
<td>B</td>
<td>Conduct Wire Length</td>
<td>7mm</td>
</tr>
<tr>
<td>C</td>
<td>Conduct Core Section</td>
<td>4.6-6mm²</td>
</tr>
</tbody>
</table>

---

Step 1
Prepare BAT cables and BAT plugs (Pic 9)

Note:
- Please use BAT plugs and connectors in GoodWe accessory box
- BAT cable should be standard, 4-6mm²
- BAT cable

Step 2
Connect BAT cables to BAT connectors (Pic 10)

Note:
- BAT cable must be tightly crimped into the connectors
- For Amphenol connector, the limit buckle cannot be pressed
- There will be a click sound if connectors are inset correctly into BAT plugs

Step 3
Screw the cap on and plug onto inverter side (Pic 11)

Note: For the compatible lithium batteries (Pylon/BYD) connection, please refer to battery connection part in BH quick installation instructions.
2.4.2 ON-GRID & BACK-UP CONNECTION

An external AC breaker is needed for On-Grid connection to be isolate from grid when necessary. Below are the requirements of On-Grid AC breaker.

<table>
<thead>
<tr>
<th>Inverter Model</th>
<th>AC Breaker Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>GW2K-BH</td>
<td>50A230V AC breaker</td>
</tr>
<tr>
<td>GW4K-BH</td>
<td>50A230V AC breaker</td>
</tr>
<tr>
<td>GW8K-BH</td>
<td>63A230V AC breaker</td>
</tr>
<tr>
<td>GW10K-BH</td>
<td>63A230V AC breaker</td>
</tr>
</tbody>
</table>

1. Use separate AC breaker for individual inverter. (Pic12)
2. On AC side, the individual breaker should be connected before loads (between inverter and loads). (Pic 13)

Requirement of AC cable connected to On-Grid and Back-Up side

Make sure inverter is totally isolated from any DC or AC power before connecting AC cable.[4]

Note:
1. The choice of AC cable needs to meet both the outside diameter and conduct core section requirements. Please refer to the table for selecting the AC cable.
2. Neutral cable shall be blue, line cable is black or brown (preferred) and protective earth cable yellow-green.
3. For AC cables, PE cable shall be longer than NBL cables, so that if in any case AC cable slips or taken out, the protecting earth conductor will be the last to take the strain.

On-Grid wiring connection process is as below

Step 1
Prepare the AC cable according to the table. (Pic 14)

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Out side Diameter</td>
<td>10-14mm</td>
</tr>
<tr>
<td>B</td>
<td>Separated Wire Length</td>
<td>10-15mm</td>
</tr>
<tr>
<td>C</td>
<td>Conduct Wire Length</td>
<td>12-14mm</td>
</tr>
<tr>
<td>D</td>
<td>Conduct Core Section</td>
<td>6-10mm²</td>
</tr>
</tbody>
</table>

Note: If you don’t use the Back-Up function or use on-grid power to charge the battery, the wiring conduct core section can use 4-6mm².

Step 2
1. Prepare the terminals AC cables.
2. Put AC cable through terminal cover and screw the three cables tightly on the connectors. (Pic 15)

Note:
1. Please use the terminals in GoodWe components box;
2. Make sure cable jacket is not locked with conductor.

Step 3
Lock terminal cover and screw up the terminal cap. (Pic 16)

Note: Make sure the terminal cover is rightly locked onto the terminal.

Step 4
Connect the assembled AC terminals onto inverter. (Pic 17)

Note: Make sure it is connected to “On-Grid” side (other side connected to public grid).

Back-Up wiring connection process is as below

Step 1
Prepare the AC cable according to the table. (Pic 18)

Step 2
1. Prepare the terminals AC cables.
2. Put AC cable through terminal cover and screw the three cables tightly on the connectors. (Pic 19)

Note: The absence of AC breaker on Back-Up side will lead to inverter damage if only electrical short-circuit happened on Back-Up side. And Back-Up function cannot turn off under On-Grid condition.
Step 3
Lock terminal cover and screw up the terminal cap. (Pic 20)

Note: Make sure the terminal cover is tightly locked onto the terminal.

Step 4
Connect the assembled AC terminals onto inverter. (Pic 21)

Press the button and hold it to unlock when unplugging AC terminals.

Note: Make sure it is connected to “Back-Up” side (other side connected to public grid).

Special Adjustable Setting
The inverter has fixed adjustable setting like tripping point, tripping time, reconnect time, active and invalid of Q/U/PU curves etc. by special firmware. Please contact GoodWe after sales for the special firmware and adjust methods.

Connection For SPLIT Grid System
In SPLIT grid system, there is a solution allowing inverter to work under On-Grid condition (Pic 22).
But the export power and load power might be detected inaccurately as the nominal output power of inverter is 230V and there could be loads of 110V or 220V.

Declaration For Back-Up Function
The below statement lays out GoodWe general policies governing the energy storage inverters of the series ES, EM, SMBT ET, EH and BH.

1. For Hybrid inverter (Series ES, EM, EH and ET), the standard PV installation typically consists of the connection of the inverter with both panels and batteries. In case of systems not connected to the batteries, the Back-Up function is strongly not advised to use. GoodWe 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 refer to the instructions as below:
   1) Do not connect loads if they are dependent on a stable energy supply for a reliable operation
   2) Do not connect the loads which may in total exceed the maximum Back-Up capacity
   3) Try to avoid those loads which may create very high start-up current surges such as Inverter Air-conditioner, high-power pump etc.
4) Due to the condition of battery itself, battery current might be limited by some factors including but not limited to the temperature, weather etc.

Declaration For Back-Up Loads
BH series hybrid inverters are able to supply over load output at its’ Back-Up. For details please refer to the technical parameters of BH series inverter (4.3 section). And the inverter has self-protection derating at high ambient temperature.

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 unstable.
- Capacitive Load: Total power <= 0.6 x nominal power of model. (Any load with high inrush current at start-up is not accepted.)
- For complicated application, please contact GoodWe’s after service.

Note:
For a convenient maintenance, an DP3T support could be installed on Back-Up and On-Grid side. Then it is adjustable to support load by Back-Up or by grid or just leave it there (Pic 23).

Declaration For Back-Up Overload Protection
Inverter will restart itself as overload protection happens. 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 → Advanced Setting → Click “Reset Back-Up Overload History”

2.4.3 SMART METER & CT CONNECTION

Detailed pin function of each port on BH (Pic 24)

- Smart Meter LED Indications (Pic 25)

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

The Smart Meter with CT in GoodWe product box is compulsory for BH system installation, used to detect grid voltage and current direction and magnitude, further to instruct the operation condition of BH 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 BH inverter.
3. CT must be connected on the same direction as the CT indicated.

- **Smart Meter Wiring (Pic 26)**

  Note:
  1. Please use the Smart Meter with CT in GoodWe product box.
  2. CT cable is 3m as default, could be extended to max 5m.
  3. Smart Meter communication cable (RJ45) is attached on the inverter (“To Smart Meter” cable), could be extended to max 100m, and must use standard RJ45 cable and plug, as below:

**Anti-Reverse Function Connection**

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

1. This diagram is only for installation where has exporting power limit function requirement.
2. For anti-reverse function, will also need set on PV Master App—>Advanced Setting—>Power Limit.
3. This diagram only be reasonable if grid-tied inverter has anti-reverse function itself. And the power limitation value shall be set on grid-tied inverter.
4. When using anti-reverse function, it would buy about 100W from the grid.

- **Connection Diagram as below (Pic 27)**

**2.5 DRED & REMOTE SHUTDOWN CONNECTION**

DRED is used for Australia and New Zealand installation (also used as remote shutdown function in European countries), in compliance with Australia and New Zealand safety requirements (or European countries). And DRED device is not provided by GoodWe.

**Detailed connection of DRED device is shown below:**

**Step 1**

Screw this plate off from inverter (Pic 28).

*Note: DRED device 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 (Pic 29).
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 of DRED device. Please leave it in the inverter if no external device connected.*

**Step 3-1 For DRED**

1. Put DRED cable through the plate as shown in Pic 30.
2. Connect DRED cable on the 6-pin terminal.

*The function of each connection position as below:*

<table>
<thead>
<tr>
<th>NO.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function</td>
<td>DRM1/5</td>
<td>DRM1/6</td>
<td>DRM1/7</td>
<td>DRM1/8</td>
<td>REGEN</td>
<td>COM/DITMO</td>
</tr>
</tbody>
</table>

**Step 3-2 For Remote Shutdown**

1. Put the cable through the plate as shown in Pic 31.
2. Wiring from the No. 5 and 6 holes respectively.

**Step 4**

Connect DRED terminal to the right position onto the inverter (Pic 32).

**2.6 EARTH FAULT ALARM CONNECTION**

GoodWe BH series inverter complies with IEC 62109-2 13.9. Fault indicator LED on inverter cover will light up and the system will email the fault information to customer. Inverter should be installed at eye level for convenient maintenance.
**SYSTEM CONNECTION DIAGRAMS**

Note: For Australia safety country, the neutral cable of On-Grid side and Back-Up side must be connected together, otherwise Back-Up function will not work.

This diagram is an example for Australia, South Africa and New Zealand grid system.

This diagram is an example for grid system without special requirement on electrical wiring connection.

Note: The Back-Up PE line and rack earth must be grounded properly and effectively. Otherwise the Back-Up function may be abnormal when the grid fail.

This diagram is an example for Off-Grid system.

Note: After the inverter is installed and worked normal when the grid connected, please turn off the grid power to check whether the Back-Up function is normal, which can avoid the problems in subsequent uses.
3.1 WIFI CONFIGURATION

- This part shows configuration on web page
- Wi-Fi configuration is absolutely necessary for online monitoring and after-sales maintenance.

**PREPARATION:**
1. Inverter must be powered up with only PV power
2. Need a router with available internet access to GoodWe portal, https://www.semportal.com

**Step 1**
1. Connect Solar-WiFi® to your PC or smartphone. (® means the last 8 characters of the inverter serial No.)
2. Open browser and login 10.10.100.253
3. Admin (U): admin; Password: admin
4. Then click “OK”

**Step 2**
1. Click “Start Setup” to choose your router
2. Then click “Next”

**Step 3**
1. Fill in the password of the router, then click “Next”
2. Click “Complete”

- **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**
    - 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 doing Wi-Fi configuration again.

**Note:** Wi-Fi Reset & Reload function is only used when:
1. Wi-Fi lost connection to internet or cannot connect to PV Master APP successfully.
2. Cannot find “Solar-WiFi signal” or have other Wi-Fi configuration problem.
3. Please do not use this button if Wi-Fi monitoring works well.

3.2 PV MASTER APP OPERATION

PV Master is an external monitoring/configuration application for GoodWe hybrid inverters, used on smart phones or pad for both Android and iOS system, main functions as below:
1. Edit system configuration to make the system work as customer needs.
2. Monitor and check performance of the hybrid system.
3. Wi-Fi configuration.

Please download PV Master OPERATION INSTRUCTIONS from https://en.goodwe.com/

3.3 CEI AUTO-TEST FUNCTION

PV Auto-Test function of CEI is integrated in PV Master APP for Italy safety country requirement. For detailed instruction of this function please refer to PV Master Operation Instructions.
### 4.1 ERROR MESSAGE AND TROUBLESHOOTINGS

#### ERROR MESSAGE

The error message below will be displayed on PV Master APP or reported by Email if the error really happens.

<table>
<thead>
<tr>
<th>ERROR MESSAGE</th>
<th>EXPLANATION</th>
<th>REASON</th>
<th>SOLUTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utility Loss</td>
<td>Not available of public grid power (power lost or on grid connection fails)</td>
<td>Inverter does not detect the connection of grid</td>
<td>1. Check (use multimeter) if AC side has voltage. Make sure grid power is available.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Make sure AC cables are connected tightly and right well.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. If all is well, please try to turn off AC breaker and turn on again after 5 mins.</td>
</tr>
<tr>
<td>VAC Failure</td>
<td>Grid voltage is not within permissible range</td>
<td>Inverter detects that AC voltage is beyond the normal range required by the safety country</td>
<td>1. Make sure safety country of the inverter is set right.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Check (use multimeter) if AC voltage (between L &amp; N) is within a normal range (Also on AC breaker side)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>a. If AC voltage is high, then make sure AC cable complies with that required on user manual and AC cable is not too long</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>b. If voltage is low, make sure AC cable is connected well and the jacket of AC cable is not compressed into AC terminal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. Make sure the grid voltage of your area is stable and within normal range.</td>
</tr>
<tr>
<td>FAC Failure</td>
<td>Grid Efficiency is not within permissible range</td>
<td>Inverter detects that Grid frequency is beyond the normal range required by the safety country</td>
<td>1. Make sure safety country of the inverter is set right.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. If safety country is right, then please check-inverter display if AC frequency (Fac) is within a normal range</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. If AC failure only appear a few times and resolved soon, it should be caused by occasional grid frequency instability.</td>
</tr>
<tr>
<td>Over Temperature</td>
<td>Temperature inside of the inverter is too high</td>
<td>Inverter working environment leads to a high temperature condition</td>
<td>1. Try to decrease surrounding temperature.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Make sure the installation complies with the instruction on inverter user manual.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. Try to close inverter for 15 mins, then start up again.</td>
</tr>
<tr>
<td>DC Over Voltage</td>
<td>DC voltage is too high</td>
<td>The battery voltage is higher than the max BAT input voltage of the inverter.</td>
<td>Check battery voltage is lower than Max battery input voltage of the inverter.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>If battery voltage is high, please decrease battery pack to make sure the voltage is within the max battery input voltage of the inverter.</td>
</tr>
<tr>
<td>Ground Failure</td>
<td>Ground leakage current is over-high</td>
<td>Ground leakage could be caused by multi reasons like neutral cable on AC side is not connected well or surrounding humidity is comparative heavy, etc.</td>
<td>Check use multi-meter if there is voltage (normally should be close to 0V) between earth &amp; inverter frame. If the is a voltage, it means the neutral &amp; ground cable are not connected well on AC side. If it happened only at early morning, dawn or on rainy days with higher air humidity, and recover soon, it should be normal.</td>
</tr>
<tr>
<td>Relay Check Failure</td>
<td>Self-checking of relay fails</td>
<td>Neutral &amp; ground cable are not connected well on AC side or just occasional failure</td>
<td>Check use multi-meter if there is high voltage (normally should be lower than 10V) between N &amp; PE cable on AC side. If the voltage higher than 10V, it means the Neutral &amp; ground cable are not connected well on AC side or restart inverter.</td>
</tr>
<tr>
<td>DC Injection High</td>
<td>/</td>
<td>Inverter detects a higher DC component in AC output</td>
<td>Try to restart inverter, check if it still happens, if not, means it is just an occasional situation or contact GoodWe.</td>
</tr>
<tr>
<td>ERR:COM/WW Failure</td>
<td>/</td>
<td>Caused by a strong external magnetic field etc.</td>
<td>Try to restart inverter, check if it still happens, if not, means it is just an occasional situation or contact GoodWe.</td>
</tr>
<tr>
<td>SPI Failure</td>
<td>Internal communication fails</td>
<td>Caused by a strong external magnetic field etc.</td>
<td>Try to restart inverter, check if it still happens, if not, means it is just an occasional situation or contact GoodWe.</td>
</tr>
<tr>
<td>DC Bus High</td>
<td>BUS voltage is over-high</td>
<td>/</td>
<td>Try to restart inverter, check if it still happens, if not, means it is just an occasional situation or contact GoodWe.</td>
</tr>
<tr>
<td>Back-Up Over Load</td>
<td>Back-up side is over loaded</td>
<td>Total Back-Up load power is higher than the nominal backup output power</td>
<td>Decrease Back-Up loads to make sure the total load power is lower than Back-Up nominal output power (please refer to page 12).</td>
</tr>
</tbody>
</table>
TROUBLE SHOOTINGS

Checking Before Turn On AC Power

- **Battery Connection**: Confirm the connection between BH and battery: polarities (+/-) not reversed, refer to Pic 33.
- **On-Grid & Back-Up Connection**: Confirm ON-GROUND connected to power grid and Back-Up to loads: polarity (+/-) not reversed, refer to Pic 34.
- **Smart Meter & CT Connection**: Make sure Smart Meter & CT are connected between house loads and grid, follow the Smart Meter direction sign on CT, refer to Pic 35.

Checking As Start BH Up And Turn On AC Power

- **Battery Settings**, **BMS Communication and Safety Country**: After connecting Solar-WiFi™ means the last 8 characters of the inverter serial No., check on PV Master APP (in “Param” column) to make sure battery type is right what you have installed, and Safety Country is right. If not, please set it right in “Set” column (Pic 36).

**Note:**
For compatible lithium batteries, BMS status is “Communication OK” after selecting the right battery type.

Possible Problems During Operation

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. Check if CT connected in the right position and to right direction as on the user manual page 15.

Questions & Answer (Q&A)

About Wi-Fi Configuration
_Q: Why cannot connect Solar-WiFi® signal on my phone?_
_A: It is the character of the Wi-Fi module that it can connect to only one device at a time. So please make sure the signal is not connected on other device._

About Battery Operation
_Q: Why battery does not discharge when grid is not available, while it discharges normally when grid is available?_
_A: On APP, Off-Grid output and Back-Up function should be turned on to make battery discharge under Off-Grid mode._
_Q: Why there is 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: On Portal, why battery SOC has a sudden jump up to 95%?_
_A: This normally happens when BMS communication fail on lithium. If battery enter float charge, SOC will be reset to 95% compulsively._
_Q: Why 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 breaker always trip when starts it up (Lithium battery)?_
_A: The breaker 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 GoodWe for details._
_Q: Which battery should I use for BH?_
_A: For BH series inverter, it could connect lithium batteries which have compatibility with BH series inverter with nominal voltage from 85V to 450V. Compatible lithium batteries can see on battery list in PV Master APP._
About PV Master Operation and Monitoring
Q: Why Cannot 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 restart inverter 10mins later after you do some settings because inverter will save settings every 10 mins under normal mode. We recommend you change setting parameters when inverter under waiting mode.
Q: On App, some columns show NA, like battery SOH, etc. why is that?
A: NA means App does not receive data from inverter or server, normally it is because communication problem, such as battery communication, and communication between inverter and the APP.

About Smart Meter and Power Limit Function
Q: How to Act Output Power Limit function?
A: For BH system, the function could be realized by:
1. Make sure Smart Meter connection and communication well.
2. Turn on Export Power Limit function and set the max output power to grid on APP.
Note: if output power limit set as 0W, then there might still have deviation max 100W exporting to grid.
Q: Why there is still power exporting to grid after I set power limit as 0W?
A: Export limit could theoretically to minimum 0W, but there will have a deviation of around 50-100W for BH system.
Q: Can I use other brand Meter to take over Smart Meter in BH system or change some settings on Meter?
A: Cannot, because the communication protocol is set between inverter and Smart Meter, other brand Meter cannot communicate. Also any manual setting change could cause Meter communication failure.
Q: What is the max 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 BH 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: Whether the warranty of the inverter still valid if the installation or operation does not follow the user manual instructions, for some special conditions when we cannot 100% follow them?
A: Normally if any problem caused by disobey the instructions on user manual, we can provide technical support to help to solve the problem, but cannot guarantee a replacement or returns. So if there is any special conditions when you cannot 100% follow the instructions, please contact GoodWe for suggestions.

4.2 DISCLAIMER
The BH series inverters are transported, used and operated under environmental and electrical conditions. GoodWe has the right not providing after-sales services or assistance under following conditions:
- Inverter is damaged during transferring.
- Inverter is out of warranty year and extended warranty is not bought.
- Inverter is installed, refitted or operated in improper ways without authority from GoodWe.
- Inverter is installed or used under improper environment or technical condition mentioned in this user manual, without authority from GoodWe.
- 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 lightening, earthquake, fire hazard, storm and volcanic eruption etc.
- Inverter is disassembled, changed or updated on software or hardware without authority from GoodWe.
- 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 BH system.

Note:
GoodWe will keep right to explain all the contents in this user manual. To insure IP65, inverter must be sealed well, please install the inverters in one day after unpacking, otherwise please seal all unused terminals/holes, not allowed to keep any terminals/holes open. confirm there is no risk to have water & dust in.

Maintenance
The inverter requires periodically maintenance, details as 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 fastend once a year.
4.3 TECHNICAL PARAMETERS AND CERTIFICATES

### TECHNICAL PARAMETERS OF BH INVERTER

<table>
<thead>
<tr>
<th>Technical Data</th>
<th>GW6000-BH</th>
<th>GW5000-BH</th>
<th>GW3600-BH</th>
<th>GW3K-BH</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Battery Input Data</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Battery Type</td>
<td>Li-ion</td>
<td>Lithium-ion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Battery Voltage Range (V)</td>
<td>85〜450</td>
<td>85〜450</td>
<td>85〜450</td>
<td>85〜400</td>
</tr>
<tr>
<td>Start-up Voltage (V)</td>
<td>90</td>
<td>90</td>
<td>90</td>
<td>90</td>
</tr>
<tr>
<td><strong>AC Output/Input Data (On-grid)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nominal Apparent Power Outputs to Utility Grid (kW)</td>
<td>4600/3600/3000/2600</td>
<td>4600/3600/3000</td>
<td>3600</td>
<td>1800</td>
</tr>
<tr>
<td>Nominal Apparent Power Outputs to Utility Grid (kW)</td>
<td>4600/3600/3000/2600/2000</td>
<td>4600/3600/3000/2000</td>
<td>3600/2500</td>
<td>3000/2500</td>
</tr>
<tr>
<td>Max. Apparent Power from Utility Grid (kW)</td>
<td>12000 (Charging 6kW), backup output 6kW</td>
<td>10000 (Charging 3.6kW), backup output 3.6kW</td>
<td>7000 (Charging 3.6kW), backup output 3.6kW</td>
<td>6000 (Charging 3.6kW), backup output 3.6kW</td>
</tr>
<tr>
<td>Nominal Output Voltage (V)</td>
<td>230</td>
<td>230</td>
<td>230</td>
<td>230</td>
</tr>
<tr>
<td>Nominal Output Frequency (Hz)</td>
<td>50/60</td>
<td>50/60</td>
<td>50/60</td>
<td>50/60</td>
</tr>
<tr>
<td>Max. AC Current From Utility Grid (A)</td>
<td>52.2</td>
<td>43.4</td>
<td>32</td>
<td>26.2</td>
</tr>
<tr>
<td>Output Power Factor</td>
<td>Adjustable from 0.8 leading to 0.8 lagging</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output THD (%) (Nominal Output)</td>
<td>&lt;1%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Back-Up Output Data</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. Output Apparent Power (VA)</td>
<td>6000</td>
<td>5000</td>
<td>3600</td>
<td>3600</td>
</tr>
<tr>
<td>Peak Output Apparent Power (VA)</td>
<td>7000, 6000</td>
<td>6000, 6000</td>
<td>4300, 6000</td>
<td>3600, 6000</td>
</tr>
<tr>
<td>Max. Output Current (A)</td>
<td>26.1</td>
<td>21.7</td>
<td>15.7</td>
<td>13.1</td>
</tr>
<tr>
<td>Automatic Switch Time (ms)</td>
<td>&lt;10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nominal Output Voltage (V)</td>
<td>230 (1.3%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nominal Output Frequency (Hz)</td>
<td>50/60 (+0.2%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output THD (%) (85% linear load)</td>
<td>&lt;1%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Efficiency</strong></td>
<td>95.7%</td>
<td>95.7%</td>
<td>95.7%</td>
<td>95.7%</td>
</tr>
<tr>
<td><strong>Protection</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anti-islanding Protection</td>
<td>Integrated</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Battery Input Reverse Priority Protection</td>
<td>Integrated</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insulation Resistor Detection</td>
<td>Integrated</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residual Current Monitoring Unit</td>
<td>Integrated</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output Over Current Protection</td>
<td>Integrated</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grid Output Short Protection</td>
<td>Integrated</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output Over Voltage Protection</td>
<td>Integrated</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>General Data</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Temperature Range (°C)</td>
<td>-35〜40</td>
<td>-35〜40</td>
<td>-35〜40</td>
<td>-35〜40</td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>0〜95%</td>
<td>0〜95%</td>
<td>0〜95%</td>
<td>0〜95%</td>
</tr>
<tr>
<td>Environment Category</td>
<td>Outdoors &amp; indoor</td>
<td>Outdoors &amp; indoor</td>
<td>Outdoors &amp; indoor</td>
<td>Outdoors &amp; indoor</td>
</tr>
<tr>
<td>External Environment Pollution Degree</td>
<td>Grade 2, 3</td>
<td>Grade 2, 3</td>
<td>Grade 2, 3</td>
<td>Grade 2, 3</td>
</tr>
<tr>
<td>Protective class</td>
<td>Class I</td>
<td>Class I</td>
<td>Class I</td>
<td>Class I</td>
</tr>
</tbody>
</table>

**Technical Data**

- **Over voltage category**: DC & AC11
- **Cooling**: Nature Convection
- **Noise (dB)**: <15
- **User Interface**: LED & APP
- **Communication with BMS**: CAN
- **Communication with Meter**: RS485
- **Communication with Portal**: Wi-Fi/Ethernet (Optional)
- **Weight (kg)**: 15.5 | 15.5 | 15.5 | 15.5
- **Size (Width×Height×Depth mm)**: 350×133×177
- **Mounting**: Wall Bracket
- **Protection Degree**: IP65
- **Standby Self Consumption (W)**: <10
- **Topology**: Transformerless

**Grid Regulation**

- AS/NZS 4777.2;2013: G99; CEI 0 21 VDE0105 AR N
- AS/NZS 4777.2;2015: G99; CEI 0 21 VDE0105 AR N
- AS/NZS 4777.2;2015: G99; CEI 0 21 VDE0105 AR N
- AS/NZS 4777.2;2015: G99; CEI 0 21 VDE0105 AR N

**Safety Regulation**

- IEC61726-1
- IEC61726-1
- IEC61726-1
- IEC61726-1

**EMC**

- EN61000-6-1
- EN61000-6-2
- EN61000-6-3
- EN61000-6-4

**Certifications & Standards**

- CERTIFICATES OF BH SERIES

- **G100**: IEC62109-1, CEI 0-21
- **RD1699**: VDE0126-1-1
- **VDE-AR-N 4105**: NRS 097-2-1
• OTHER TEST
For Austria requirements, in the THDi test, there should add Zref 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.

4.4 WARNING QUICK CHECK LIST

[1] Inverter cannot be installed near flammable, explosive or strong electro-magnetic equipment. page 06
[2] Remember that this inverter is heavy! Please be careful when lifting out from the package. page 07
[3] Make sure battery breaker is off and battery nominal voltage meet BH specification before connecting battery to inverter and make sure inverter is totally isolated from PV and AC power. page 09
[4] Make sure inverter is totally isolated from any DC or AC power before connecting AC cable. page 11
[5] Make sure AC cable is totally isolated from AC power before connecting Smart Meter & CT. page 13

Appendix: Protection Category Definition

Overvoltage Category Definition

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

Moisture Location Category Definition

<table>
<thead>
<tr>
<th>Moisture Parameters</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>3K3</td>
<td>4K2</td>
</tr>
<tr>
<td>Temperature Range</td>
<td>0—40°C</td>
</tr>
<tr>
<td>Humidity Range</td>
<td>5%—85%</td>
</tr>
</tbody>
</table>

Environment Category Definition

<table>
<thead>
<tr>
<th>Environment Condition</th>
<th>Ambient Temperature</th>
<th>Relative Humidity</th>
<th>Applied to</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outdoor</td>
<td>-20—+50°C</td>
<td>4%—100%</td>
<td>PC03</td>
</tr>
<tr>
<td>Indoor Unconditioned</td>
<td>-20—+50°C</td>
<td>5%—95%</td>
<td>PC03</td>
</tr>
<tr>
<td>Indoor Conditioned</td>
<td>0—+40°C</td>
<td>5%—85%</td>
<td>PC02</td>
</tr>
</tbody>
</table>

Pollution Degree Definition

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

4.5 CHECKING THE ELECTRICAL CONNECTION

1. Check if the AC or DC wire is loose.
2. Check if the earth wire is reliable grounding.
3. Check if the waterproof covers of BMS and Meter port is fasten.
4. Please use torque wrench to tighten the AC and battery terminal wiring connection once a year; followed 2.4 torque instruction.

Caution: Maintenance cycle is once half a year.