



Three Phase Hybrid Inverter

Power-Box TH5K

Power-Box TH6K

Power-Box TH8K

Power-Box TH10K

Power-Box TH12K

Power-Box TH15K

User Manual

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Technical Information

You can download the latest Technical Information from the Internet at www.bydenenergy.com.

Service Guideline

You can download the latest Service Guideline from the Internet at www.bydenenergy.com.

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1 Information on this Document

DISCLAIMER

When installing, operating, and maintaining the equipment, read this manual first and follow all safety precautions on the equipment and in the manual. BYD shall not be liable if any of the following situations occur.

- Not operate in the conditions described in this manual.
- Installation and using environments not comply with relevant international, national or regional standards.
- Disassembly, change the product or modify the software code without authorization.
- Not operate according to the safety instructions and precautions on the product and in the manual.
- Damages caused by abnormal natural environment (force majeure, such as earthquakes, fires, windstorms, floods, mudslides, etc.).
- Damages caused by the customer's transport.
- Damages caused by unqualified storage conditions that do not meet the requirements mentioned in the manual.
- Damages to the hardware or data due to negligence, improper operation, or intentional damage by the customer.
- Damages to the system caused by a third party or the customer, including damages caused by improper transport and installation that do not comply with the requirements of this manual, as well as adjustment, alteration, or removal of identification signs that do not comply with the requirements of this manual.

Reverse engineering, decompiling, disassembling, adapting, implanting or other derivative operations of the equipment's software are prohibited. Researching the internal implementation of the equipment, obtaining the source code of the equipment's software and stealing intellectual property in any way are prohibited. Disclosing the results of any performance tests of the equipment's software is prohibited.

1.1 Applicable Model

This manual applies to the listed inverters below:

Power-Box TH5K

Power-Box TH6K

Power-Box TH8K

Power-Box TH10K

Power-Box TH12K

Power-Box TH15K

1.2 Target Group

This manual is intended for use by professionals who are familiar with local regulations and electrical system operation, and properly trained to have a full picture of this product.

1.3 Content and Structure of this Document

This manual mainly provides information on the inverter product, installation wiring, configuration testing, troubleshooting, and maintenance. Please carefully read this manual before installation and use it to obtain the product's information on its safety, function and performance. This manual will be revised due to updating of the products. Please obtain the latest product information on the manufacturer's website.

1.4 EU Declaration of Conformity

Devices with wireless communication functions that can be sold on the European market shall meet the following directives:

Radio Equipment Directive 2014/53/EU (RED)

Devices without wireless communication functions that can be sold in the European market shall meet the following directives:

Electromagnetic Compatibility Directive 2014/30/EU (EMC)

Electrical Apparatus Low Voltage Directive 2014/35/EU (LVD)

For more details on the EU declaration of conformity, please go to the official website:

www.bydenenergy.com.

1.5 Levels of Warning Messages



DANGER

Indicates a high-level hazard that, if not avoided, will result in death or serious injury.



WARNING

Indicates a medium-level hazard that, if not avoided, could result in death or serious injury.



CAUTION

Indicates a low-level hazard that, if not avoided, could result in minor or moderate injury.

NOTICE

Highlight and supplement the texts. Or some skills and methods to solve product-related problems to save time.

2 Safety Precaution

NOTICE

- The inverter has been engineered and tested in accordance with the appropriate safety regulations. Ensure to observe related safety requirements before operating this electrical device, which otherwise may lead to serious injury or property loss. Ensure to carefully read all safety precautions in this manual when operating.

For correct use, this manual adopts the following symbols highlighting related important information, which shall be carefully read and understood.

Icon	Item	Description
	Danger warning	There is a potential hazard after the equipment is in operation. Ensure proper protection when operating.
	Warning mark	HV hazard. There is a high voltage when the inverter is running. Make sure that the inverter gets powered off before operating.
	Anti-scald warning	High temperature on the surface of the inverter. Do not touch the device when it is running, otherwise it may cause burns.
	Delayed discharge mark	Delayed discharge. When the device is powered off, please wait for 10 minutes until the device is fully discharged.
	User manual mark	Please read the product manual carefully before operating the device.
	CE mark	CE certificate.
	EU WEEE mark	The device cannot be treated as household waste. Please dispose of it in accordance with local laws and regulations, or send it back to the manufacturer.
	Grounding point	Protective grounding wire connection point.

2.1 General Safety

For product upgrading or other reasons, the manual may be updated in the future. The manual content cannot replace the safety precautions on product labels unless otherwise stated. All descriptions in the manual are for guidance only.



WARNING

- Make sure that the module frame and support system are properly grounded.
- Ensure the connected DC cables are properly secured in place.
- Check the positive and negative terminals of the DC cable with multimeter and ensure that they are correctly wired, with the voltage reading within the allowable range.
- It is prohibited to connect a PV string to more than one inverter, which may otherwise lead to inverter breakdown.
- The PV module selected to match the inverter must conform to the requirements of Class A, IEC61730.

NOTICE

- Carefully read this manual before installation to have a full picture of the product and related precautions.
- All operations must be conducted by professional and qualified electrical staff, who are familiar with local standards and safety regulations.
- Use insulation tools for work with the inverter, plus the appropriate PPEs in place to ensure work safety. Before working with electronic devices, wear static gloves, wrist straps, anti-static clothing, etc. to protect the inverter from electrostatic impact.

2.2 PV String Safety



DANGER

- Use the DC wiring terminal delivered with the case to connect the DC cables of the inverter. Using other DC wiring terminals may lead to serious consequences, and the resulting property loss is not covered by the warranty.

2.3 Inverter Safety

Make sure the grid-connected access point meets the requirements of the voltage and frequency for the grid connection of the inverter.



WARNING

- It is recommended to add protective devices such as circuit breakers or fuses on the AC side of the inverter. The protective device shall be specified at 1.25 times the maximum AC output current of the inverter.
- The protective grounding wire of the inverter must be connected firmly. For multiple inverters, ensure that all inverters share the same protective grounding points.
- If the inverter trips for less than 5 times within 24h, the alarm can be automatically cleared. After the 5th arc fault, the inverter shuts down for protection, and the inverter can work normally only after the fault is cleared.
- The Backup function is not recommended if no battery is configured in the PV system. Otherwise, the resulting system operation risks will not be covered by the warranty.



DANGER

- After installation, the labels and warning signs on the case must be clearly visible. And it is prohibited to cover, alter or damage them.

2.4 Battery Safety



WARNING

The battery used with the inverter must be approved by the inverter manufacturer. The list of approved batteries can be obtained from the official website.

- Before installation, please carefully read the battery's user manual to understand the product and precautions, and operate in strict accordance with the requirements of the battery user manual.
- If the battery has been fully discharged, recharge the battery in accordance with its user manual.
- The battery current may be affected by some factors, such as temperature, humidity, weather conditions, etc., which may cause the battery current to be limited and affect the load capacity.
- If the battery fails to work, please contact the after-sale service center as quickly as possible. Otherwise, the battery may be permanently damaged.
- Check the positive and negative terminals of the DC cable with a multimeter and ensure that they are correctly wired, with the voltage reading within the allowable range.
- It is prohibited to connect a battery pack to multiple inverters, otherwise the inverter may be damaged.

2.5 Personnel Requirements

NOTICE

- The personnel responsible for the installation and maintenance of the device must get strict training to understand all safety precautions and master correct operation methods.
- Only qualified professionals or trained personnel are allowed to install, operate, maintain, and replace equipment or component.

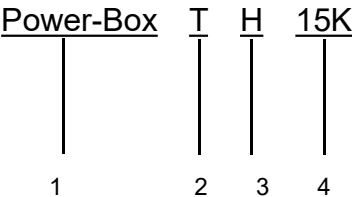
3 Product Introduction

3.1 Product Overview

Function

The inverter may control and optimize energy flow in the PV system through an integrated energy management system. The electricity generated in the PV system can be used by the load, stored in the battery, and transferred to the power grid.

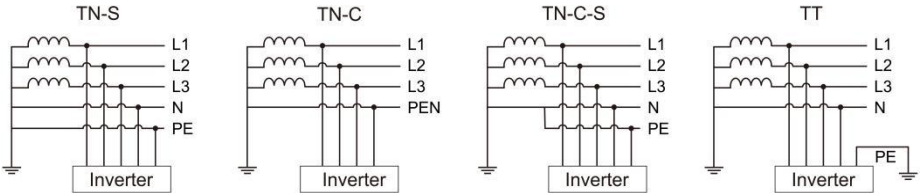
Model identifier



No.	Meaning	Explanation
1	Product name	Power-Box: Hybrid inverter
2	Phase	S: Single phase T: Three phase
3	Battery voltage level	L: Low voltage H: High voltage
4	Rated output power	15K: Rated output power 15 kW

Supported Power Grid Types

The power grids supported by Power-Box TH series are TN-S, TN-C, TN-C-S, TT and IT.

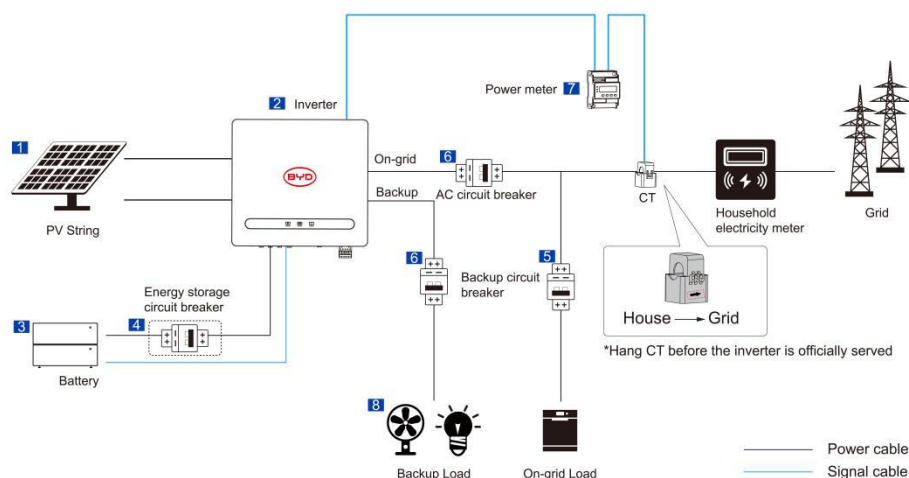


3.2 Application Scenarios



WARNING

- PV systems are not suitable for connection to devices that rely on a stable power supply, such as life-sustaining medical equipment. Please ensure that there is no risk of personal injury despite the system being shut down.
- Please try to avoid using loads with high starting current in the PV systems, such as high-power water pumps, as this may result in off-grid output failure due to excessive instantaneous power.
- No Backup function is not recommended if no battery is used in the PV system. Otherwise, the resulting system operation risks are not covered by the warranty.
- The battery current may be limited by some factors, such as temperature, humidity, weather conditions, etc., thus affecting the load capacity.
- If rapid shutdown module is in the PV system, please ensure that the rapid shutdown module used in the PV string has the same model as the inverter's built-in transmitter. If not, the run-of function may fail.
- When the inverter trips on the overload protection at a time, the inverter can automatically restart. If it occurs repeatedly, it may take more time to restart. The inverter may be shortly restarted by the App whenever required.
- In case of excessive load capacity beyond the rated power of the inverter during grid outage, the inverter's off-grid function will automatically turn off. To restart, turn off the high-power load to ensure that the load power is less than the rated power of the inverter.
- The inverter at the off-grid mode can be used for household loads, such as: Inductive load, Capacitive load: total power $\leq 0.5 \times$ rated output power of the inverter.



As shown in the above diagram, a complete hybrid inverter system in Power-Box TH series consists mainly of the solar PV panels, hybrid inverter, battery and power grid.

S/N	Parts	Description
1	PV string	PV string consists of PV modules.
2	Inverter	Applicable inverters: Power-Box TH(5~15)K series.
3	Battery	Select the appropriate models based on the matching table of the inverter and battery. The approved list of batteries may be obtained on the website or via the App.
4	Energy storage circuit breaker	Recommended capacity: rated current ≥ 40 A, rated voltage > 600 V.
5	Backup circuit breaker	To be specified in conjunction with the actual load.
6	AC circuit break	Recommended specification: Power-Box TH 15K / 12K: rated current ≥ 50 A Power-Box TH 10K / 8K: rated current ≥ 32 A Power-Box TH 6K / 5K: rated current ≥ 25 A
7	Smart meter	To be purchased from the inverter manufacturer, recommended model: AC Smart meter-DTSU666.
8	Backup load	Support connection of standby loads, such as other important loads

3.3 Working Mode

3.3.1 System Operating Mode

3.3.1.1 Timed Charging and Discharging Mode

Set the timing charge and discharge plan, at most three groups.

Set the timing charging and discharging time.

Set the timing charging and discharging power, and the actual power depends on the minimum value of photovoltaic, model rated power and battery charging and discharging limit.

Set the week.

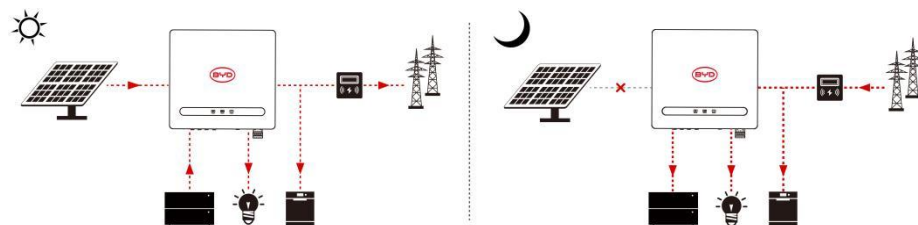
Working condition:

1. If the inverter time is within the timing charging and discharging time set by the user, start charging with the minimum value of photovoltaic, model rated power and battery charging and discharging limit, the maximum SOC of timing charging and discharging cannot be set, and charge to 100% SOC at most.
2. In the set timing charging and discharging period, when the SOC of the battery is less than 15%, discharging is not allowed any more.
3. When the battery SOC is less than 10%, it is forced to charge to 15%.

Furthermore, forced-charging is also controlled by the battery command (forced-charging is prioritized when required by the battery).

When the battery is under abnormal condition, charging or discharging will be stopped.

The inverter, when the grid is cut off, will automatically switch to the off-grid mode.



3.3.1.2 Self-use Mode

Overview:

The self-use function can adjust the power of PV, battery, and power grid based on the meter power. Given the enabled power meter and normal communication, energy flow will be adjusted based on the power of the meter. The inverter, when the grid is cut off, will automatically switch to the off-grid mode.

The default is self-use mode.

A maximum of two groups are planned for the self-use mode.

After the power grid is cut off, it automatically enters the off-grid mode.

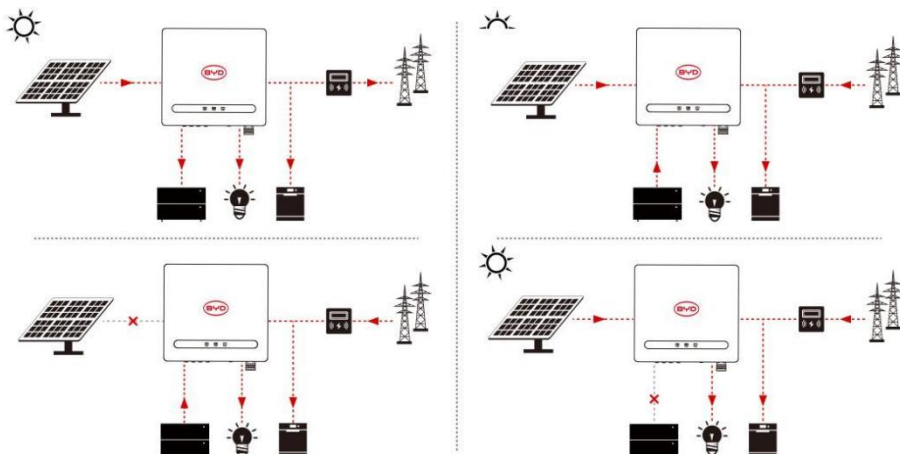
When the power grid is connected, the energy flow is adjusted according to the power of the electric energy meter.

Priority: load (and EPS) > battery > grid.

Working condition:

1. PV power is sufficient to supply load, battery and grid according to priority.
2. PV power is insufficient but PV + battery power is sufficient, and the load is supplied by PV + battery.
3. The PV + battery power is insufficient, and the load is supplied by the PV + battery + grid.
4. When the battery SOC is less than 10%, the battery is forced to be charged to 15%.

Forced charging option in winter: after it is turned on, when the SOC is less than set starting SOC for self-use within the set time, it will be forced to charge to the set SOC + 23% according to the set charging power.



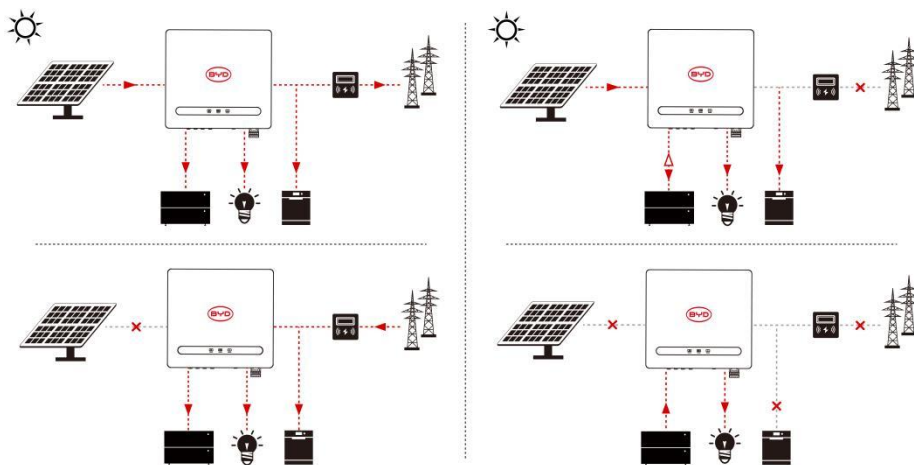
3.3.1.3 Backup Mode

Only when the main power supply is abnormal, the battery is allowed to discharge;

Priority: battery > load (and EPS) > grid;

Working condition:

1. When the power grid is not cut off, the battery, the load and the power grid are supplied according to the priority;
2. When the grid is cut off, keep the current SOC of the battery higher than minimum grid-connected SOC (it should be off-grid SOC);
3. When the SOC is less than minimum grid-connected SOC, charge to the minimum grid-connected SOC hysteresis point (minimum charge state + 2%);
4. If the minimum on-grid SOC is set to 100%, charging will begin at 90% SOC;
5. When the current SOC of the battery is between 95% and 100%, the priority is to ensure the power supply to the EPS, and the excess energy is fed back to the battery for charging;



3.3.1.4 Forced Off-grid Mode

A pure off-grid system consisting of PV, batteries, and loads is suitable for areas without grids.

In this mode, the inverter can be forced to disconnect from the grid and runs in the off-grid mode.

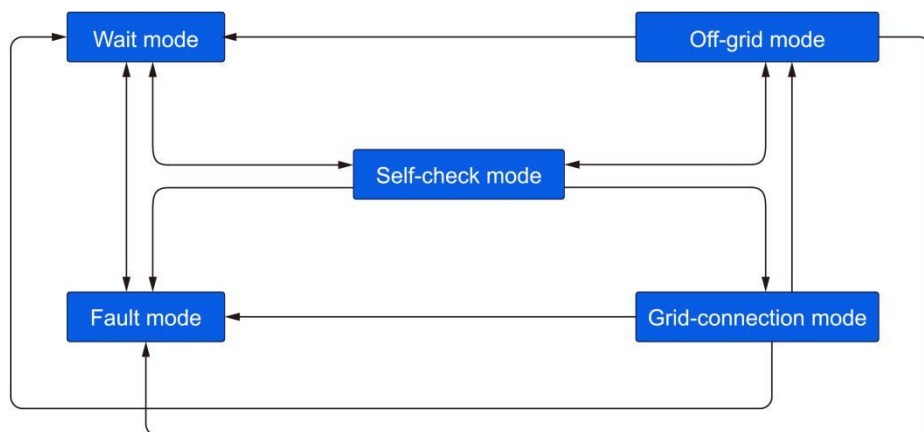
Under such circumstances, the inverter can neither send power to the grid or take power from the grid.

When the inverter detects no grid-connected power supply, it will enter the same working mode as the forced off-grid mode;

Working condition:

1. When $PV > EPS$, the excess power charges the battery;
2. When $PV < EPS$, the insufficient power is provided by the battery;
3. The battery SOC is less than off-grid minimum SOC, and the strong charge is triggered to the off-grid SOC + 10%;

3.3.2 Inverter Run Mode



S/N	Parts	Description
1	Wait mode	Wait stage when the machine is powered on. - Enter the self-check mode when conditions are met. - In case of fault, the inverter is switched to the fault mode.
2	Self-check mode	The inverter, before startup, shall continuously perform self-check, initialization, etc. - When conditions are met, enter the grid-connection mode so that the inverter starts grid-connected operation. - If no grid is detected, enter the off-grid mode so that the inverter starts off-grid operation. Given the inverter is lack of off-grid function, enter the wait mode. - If self-check fails, enter the fault mode.
3	Grid-connection mode	The inverter performs the grid-connection operation as usual. - If detection shows grid absence, enter the off-grid working mode. - If fault is detected, enter the fault mode. - If it is detected that the grid condition does not meet the grid-connection requirements, and no off-grid output function is activated, enter the wait mode.
4	Off-grid mode	In case of power failure, the inverter is switched to the off-grid mode from the working mode so as to continuously supply power to the loads. - If fault is detected, enter the fault mode. - If it is detected that the grid condition does not meet the grid-connection requirements, and no off-grid output function is activated, enter the wait mode.

	• If it is detected that the grid conditions meet the grid-connection requirements, and off-grid output function is activated, enter the self-check mode.
5	Fault mode • If fault is detected, the inverter enters the fault mode, and enters the wait mode after fault clearance.

Note: When the inverter is powered on for the first time, there must be a normal AC voltage on the grid side; otherwise, the inverter's relay will not be able to perform self-inspection, resulting in the inverter's inability to start up properly. If you want the inverter to operate, you can choose to enter off-grid mode, which allows the inverter to function independently of the grid. After the inverter has completed its initial power-up self-inspection, you can proceed with mode switching as indicated in the above diagram.

3.4 Function Characteristic

Power derating

For safe operation, the inverter will automatically reduce the output power under the non-optimum condition. The following factors may cause power derating, please try to avoid them during use.

- Unfavorable environmental condition, such as direct exposure to sunshine, high temperature, etc.
- Inverter's output power percentage has been set.
- Load shedding due to over frequency.
- The input voltage is too high or too low.
- The input current is high.

AFCI (By default, this function is closed)

Causes of electric arc:

Inadequate connector connection in the PV system or battery system.

Cable connection is incorrect or damaged.

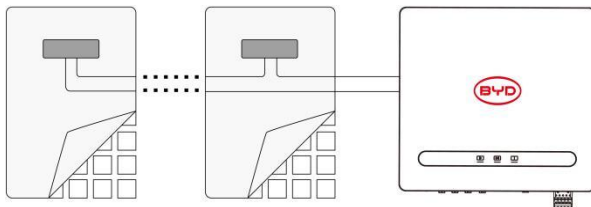
Connector, cable are aging.

Electric arc detection method

- Inverter integrated AFCI function.
- When the inverter detects an electric arc, an indication of the time and phenomenon of the fault can be displayed through the App.
- If the inverter trips less than 5 times within 24h, the alarm can be automatically cleared. The inverter will be shut down for protection on the 5th arc fault trip. The inverter may not resume operation until the fault is cleared.

RSD (optional)

The inverter is equipped with a built-in signal transmitter that can communicate with an external unit module-level disconnector. In case of the emergency, the transmitter can be disabled by enabling the external emergency switch to shut down the module.

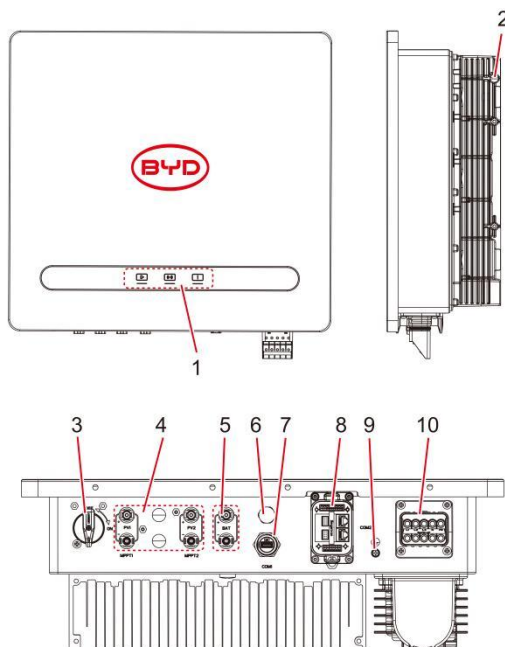


Earth Fault Alarm

The inverter is equipped with the reserved port used for earth fault alarm. In case of earth fault, the LED fault light of the inverter will be on.

3.5 Product Appearance

3.5.1 Introduction of Appearance

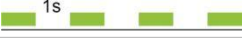


Taking the Power-Box TH15K as an example.

Position	Designation
1	Indicator light
2	Hangers
3	DC switch*
4	PV input port
5	Energy storage DC input port (BAT)
6	SRV(Safety Relief Value)
7	Communication module interface(WIFI&Bluetooth)
8	Communication port
9	Protective ground terminal
10	Grid-connected terminal / Off-grid terminal

* DC switch ratings: Ui: 1200V; Uimp:8kV; -40°C to +85°C; 4 polarity; DC-PV2, Ue/Ie:1200V / 25A; 1000V / 32A; I(make) / Ic(break): 4xIe; Icw: 1.5KA, 1s; Icm:2.0kA; Suitability for isolation.

3.5.2 Description of Panel Indicators

Category	Symbol	Status	Definition
Operation light			On-grid operation
			Standby mode
			Off-grid operation
Communication light			Normal communication (battery / meter)
			Abnormal / disconnected communication (battery / meter)
Fault light			Serious fault, need to stop for inspection

3.5.3 Nameplate and Label

The nameplate is for reference only, please refer to the actual product.

BYD

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- Trademark, product name and product model

- Technical parameters

- DRM mode

- Safety symbols and certification marks

- Serial number

- Manufacturer contact information

Icon	Item	Description
	Danger warning	Inverters are power electronic products with potential risks, especially after power-on, therefore, they must be operated by professionals under safety protection.
	Warning mark	The inverters have high voltage during operation. All operations on the inverter must be performed by well-trained professional electrical technicians.
	Anti-scald warning	When the inverter is running, the surface (especially the radiator) is under high temperature, please do not touch it directly to avoid burns.
	Delayed discharge mark	The inverter can discharge to a safe voltage 10 minutes after it is powered off, only then can the professionals operate it.
	User manual mark	Professionals should refer to the user manual when installing or maintaining the inverter.
	EU WEEE mark	If the user intends to discard this product, it must be sent to an appropriate place for recovery and recycling, which cannot be disposed of as domestic waste.
	CE mark	This product complies with CE certification.
	TUV mark	This product complies with TUV certification.
	RCM mark	This product complies with RCM certification.
	DRM mark	This product complies with DRM certification.

4 Inverter Storage



WARNING

- The inverters must be stored indoors, and the package of the inverters must be intact. It is strictly prohibited to store the inverters without packaging. Otherwise, BYD shall not assume any liability for the damage to the inverters, the shortening in service life or other losses caused by such storage conditions.
- No more than 6 inverters should be stacked together! It is strictly prohibited to store the inverter horizontally or upside down!
- The inverter should be stored in a temperature range of -40~70°C, with the relative humidity of 0~100%(non-condensation).
- Inverters that have been stored for more than one year need to be inspected and tested by professionals before being put into use.

5 Inverter Installation

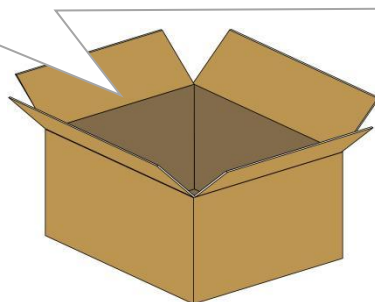
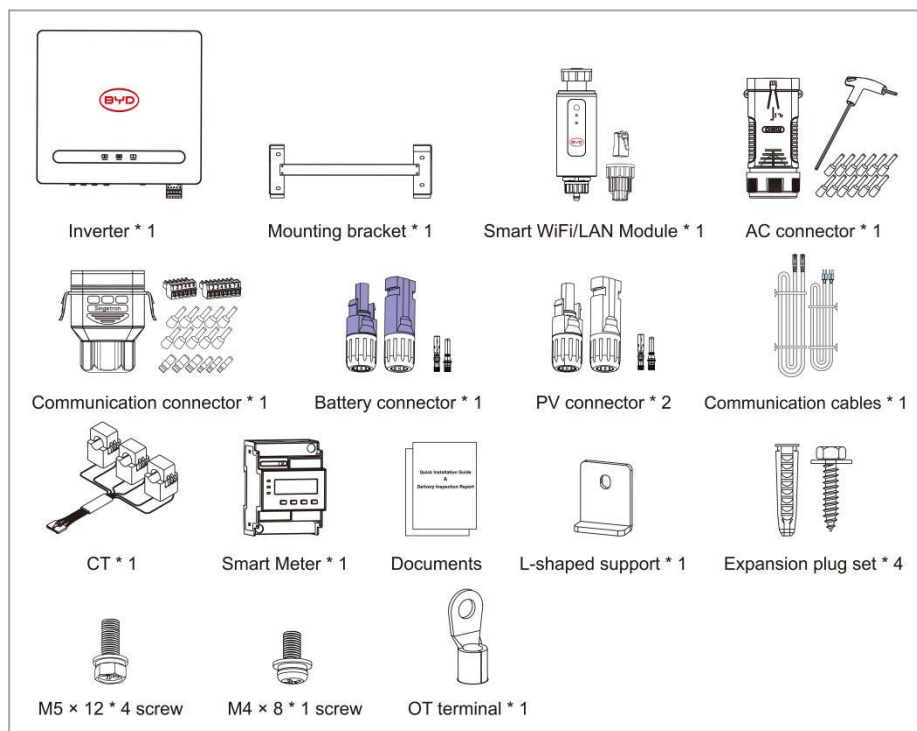
This chapter introduces the installation steps, and other related instructions.

5.1 Inspection before Installation

NOTICE

- The inverter has been fully tested and strictly inspected before delivery, but damage may still occur during transportation.
- Before unpacking the inverter, check the outer packaging for visible damage, such as holes, cracks, or other signs of possible internal damage, and check the inverter model.
- If there is any deformation of the packaging or the inverter model does not match, please do not disassemble it and contact your dealer as soon as possible.
- **IMPORTANT:** Once the equipment arrives, keep the equipment balance when unpacking and unpack it carefully to avoid scratching.
- After unpacking the inverter, check that the items are intact and free of any visible external damage. If there are any items missing or damaged, please contact your dealer.

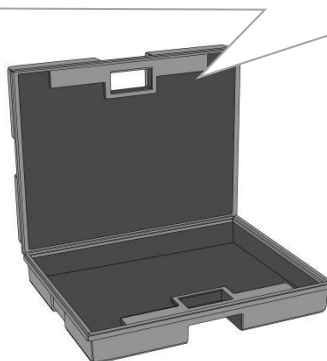
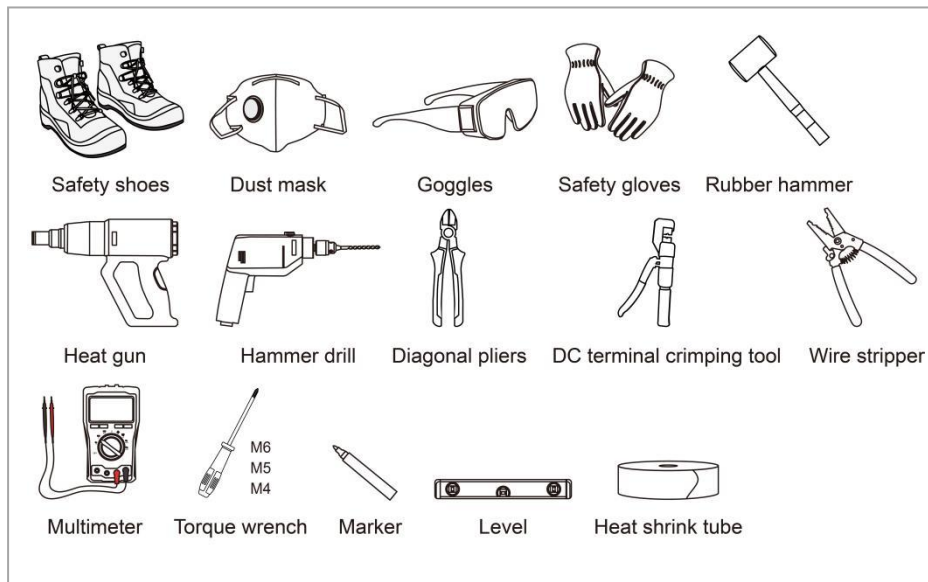
Standard Deliverables



5.2 Requirements for Inverter Installation

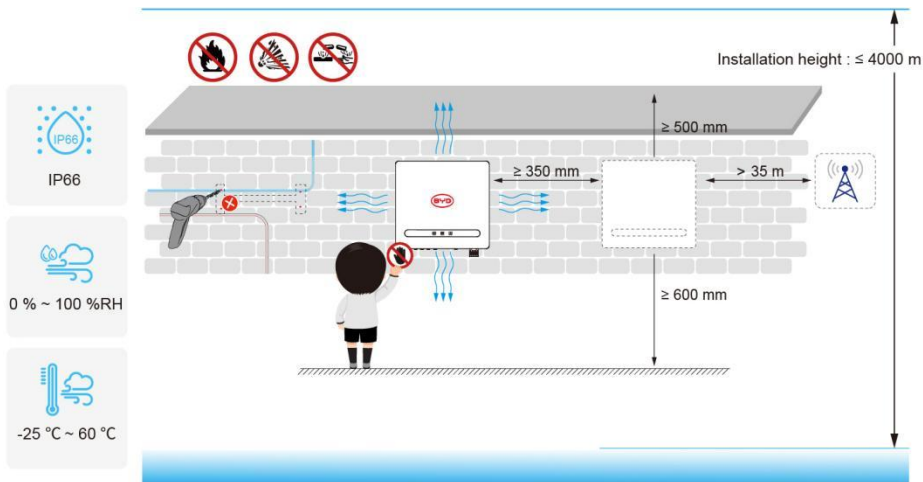
5.2.1 Requirements for Installation Tool

For installation, the following installation tools are recommended. Other auxiliary tools can be used on site if necessary.



5.2.2 Requirements for Installation Environment

1. The equipment cannot be installed in flammable, explosive, corrosive hot source or other alike environments.
2. The installed equipment should be out of reach for children, and should not be in places that are easy to touch. The surface of the equipment may be hot when it is in operation, take caution to avoid burns.
3. Please avoid the water pipes and cables in the wall to avoid danger when drilling holes for installation.
4. The inverter needs to be installed away from sunshine, rain, snow, and other alike environments. It is recommended to install it in a sheltered location. If necessary, a sunshade can be built.
5. The installation space must meet the requirements for ventilation, heat dissipation and operation.
6. The equipment protection level meets the requirements for indoor and outdoor installation, and the temperature and humidity of the installation environment must be within the appropriate range.
7. The installation height of the equipment should be convenient for operation and maintenance. Ensure that the indicators and all labels of the equipment are easy to check, and the terminal blocks are easy to operate.
8. The inverter installation altitude should be less than 4000m (the maximum working altitude).
9. Keep away from strong magnetic field to avoid electromagnetic interference. If there are radio stations or wireless communication equipment below 30MHz nearby, please install the equipment according to the following requirements:
 - Add a ferrite core with multi-turn windings at the DC input line or AC output line of the inverter, or add a low-pass EMI filter.
 - The distance between the inverter and the wireless electromagnetic interference equipment exceeds 35 m.



5.2.3 Requirements for Installation Carrier

- The installation carrier must be fire-resistant.
- Please ensure that the installation surface is firm, and the carrier meets the load-bearing requirements of the equipment.
- When the equipment is running, it will vibrate. Please do not install it on a carrier with poor sound insulation, to ensure that the noise generated by the equipment will not trouble other residents in the living area.

5.2.4 Installation Angle Requirements

Recommended inverter installation inclination: vertical or leaning backward $\leq 15^\circ$.

Do not install the inverter upside down, leave it tilting forward or backward beyond the angle, or install it horizontally.

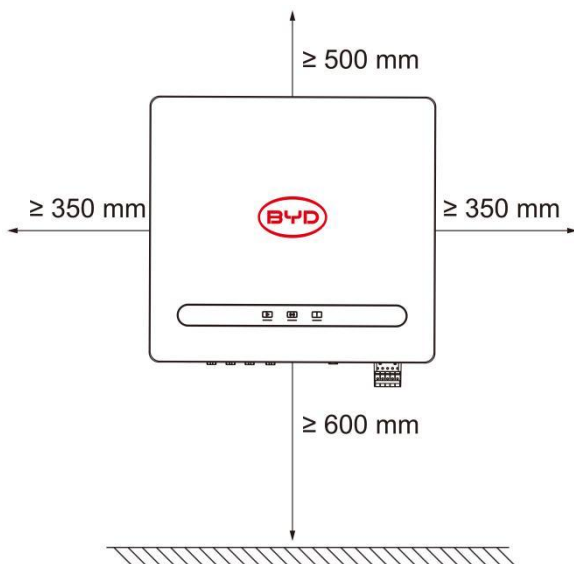


NOTICE

- It is recommended to install the equipment vertically or within a caster angle of 15° . Damages of the inverter due to non-conforming installation will not be covered by the product warranty.
- When installing, make sure that the radiator is free from obstructions to ensure unobstructed air ducts.

5.2.5 Requirements for Installation Space

When installing a single inverter, reserve enough space around it for the installation, maintenance and heat dissipation. The distance between the bottom of the inverter and the ground is recommended to be greater than or equal to 600mm. The installation space of a single inverter is shown in the figure below.

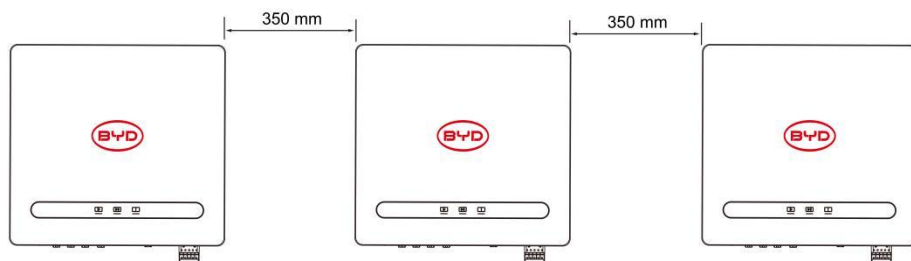


5.2.6 Installation of Multiple Inverter

To ensure good heat dissipation of the inverter and easy maintenance, when multiple inverters installed, leave an appropriate distance between them. Generally, the recommended installation forms include single-row side-by-side installation and multi-row staggered installation. The specific installation requirements are as follows.

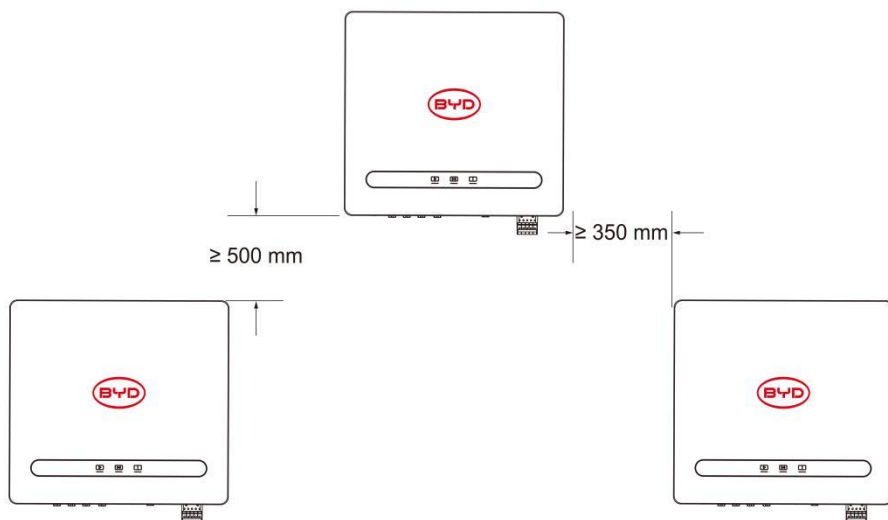
Single-row side-by-side installation

When the inverters are installed side by side in a single row, the distance between the inverters is not less than 350mm. And the distance between the inverters and the upper, lower, left, and right solid objects (such as walls) should meet the spatial requirements for the installation of a single inverter, please refer to the following diagram.



Multi-row staggered installation

To facilitate heat dissipation when installing multi-row inverters, there must be no intersection between two adjacent rows of inverters in the upper and lower spaces. The horizontal distance between two staggered inverters is not less than 350mm, and the vertical distance between the inverters is not less than 500mm. The distance between the inverters and the upper, lower, left, and right solid objects (e.g. walls) should correspond to the space required for the installation of a single inverter, as shown in the following diagram.



5.3 Installation of Inverter

5.3.1 Moving Inverter



WARNING

- Before installation, the inverter needs to be transported to the installation site. To avoid personal injury or equipment damage during the transportation, please pay attention to the following:
- Please arrange personnel according to the weight of the equipment to prevent the equipment from exceeding the weight that the human body can carry and even hurting people.
- Wear safety gloves to avoid injury.
- Please ensure that the equipment is balanced during transportation to avoid falling.

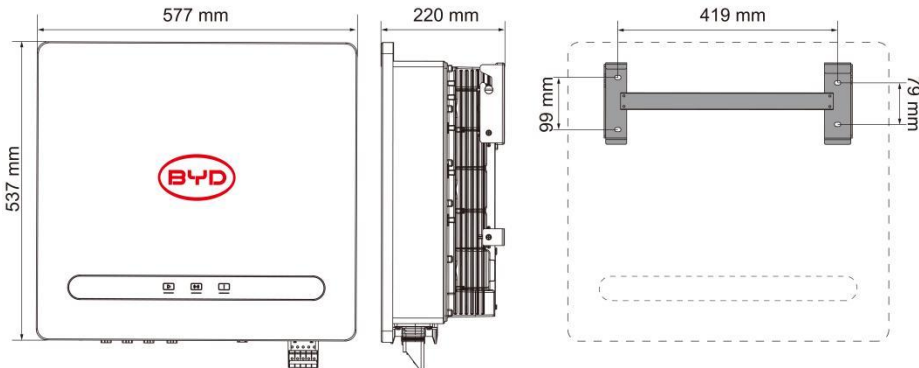
5.3.2 Installing Inverter

NOTICE

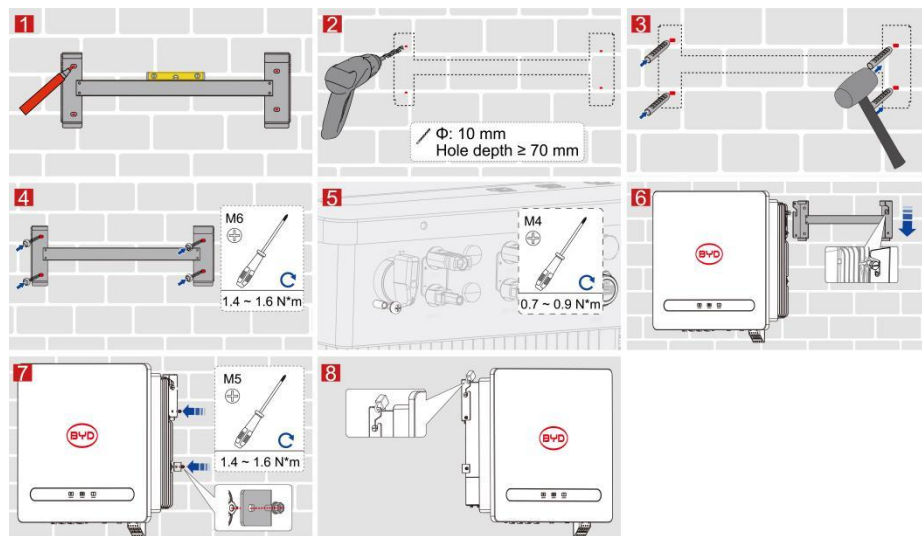
- Please avoid the water pipes, cables, etc. in the wall to prevent danger when drilling holes.
- When drilling holes, please wear goggles and a dust mask to prevent dust from being inhaled or falling into your eyes.
- Please prepare your own DC switch lock.

5.3.2.1 Inverter Installation Dimensional Diagram

Backplate dimensional diagram of the inverter is as follows:



5.3.2.2 Wall Mounting



*Inverter could be locked for anti-theft if it is needed.

Procedure:

1. Take out the cardboard from the accessories, use a level to ensure That the cardboard is placed horizontally on the wall, and mark the Drilling positions with a marking pen.
2. Use a percussion drill with the drill bit diameter of 10mm to drill holes and ensure that the depth of the hole is about 70 mm.
3. Install expansion tubes and fix the backplate to the wall with self-tapping screws.
4. Install the DC switch locking screw.
5. Put out the inverter from the box.
6. Hang the inverter on the backplate.
7. Install the screws of the back panel and L-shaped brackets.
8. Place gaskets and tighten the expansion screws on the backplate at the bottom. Install anti-theft locks (if it is needed).

NOTICE

- Pay attention to personal safety when handling.
- The product accessory package contains expansion tubes and self-tapping screws.
- The wall must have enough carrying capacity.
- The DC switch locking screw is delivered with the inverter. According to the requirements of Australian standards, it is used to fix the DC switch (DC SWITCH) to prevent accidental startup (this step needs to be performed for the models used in Australia according to local standards).

6 Electrical Connection

6.1 Electrical Connection Overview



DANGER

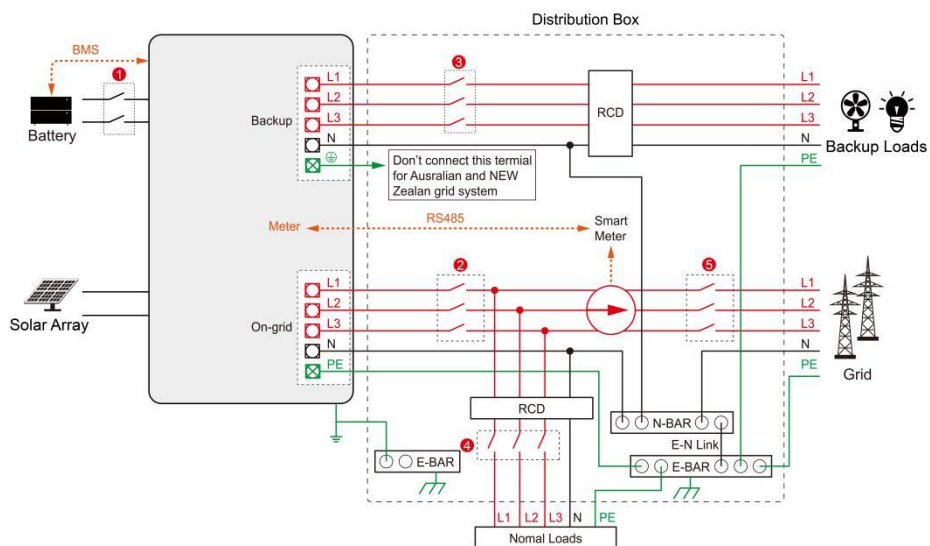
- When PV modules are exposed to light, DC high voltage exists at the PV panel port, which endangers the personal safety of the operator!
- The insulation layer of the power cable must remain intact and free from damage and scratches. Otherwise, it may cause the short circuit and fire!
- Before wiring for the inverter, you must check and confirm that all the connecting cables of the equipment are free from dangerous voltage, and you must set up obvious warning signs at the external power distribution switch of the equipment to prevent others from misoperating the external switches of the equipment and threatening the personal safety of operators!
- Before wiring the inverter, make sure the AC wiring port is disconnected from the grid, and the AC port is under zero voltage.



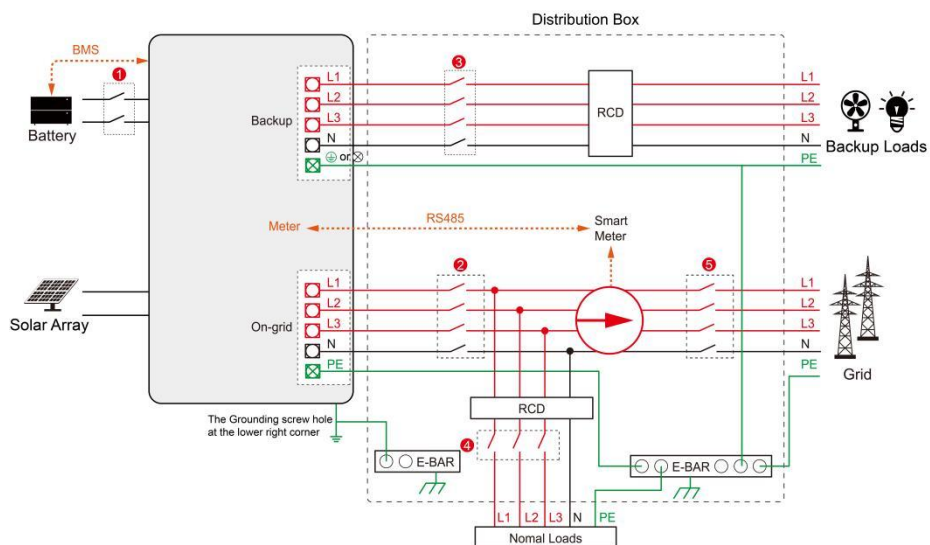
WARNING

- Strictly follow the label inside the inverter to connect the cables, otherwise the equipment will be damaged.
- The inverter cable connection must be safe and reliable. The cable selection and tightening torque must comply with the requirements in this manual, otherwise it may cause fire and damage to the inverter.
- Operators are not allowed to open the upper cover of the main compartment without permission. If the tamper-evident label is torn off and the inverter is damaged, the damage will not be covered by our warranty.
- When opening the upper cover of the wiring compartment, be careful not to scratch or damage the protective foam on the upper cover, as this may cause water to enter the inverter.
- Please try not to open the inverter wiring compartment in rainy or snowy weather to avoid the risk of water ingress.

This diagram is an example for an application that neutral connects with the PE in a distribution box.



For countries such as Australia, New Zealand, South Africa, etc., please follow local wiring regulations!



This diagram is an example for an application in which neutral is separated from the PE in the distribution box.

For countries such as China, Germany, the Czech Republic, Italy, etc., please follow local wiring regulations!

To ensure that the Power-Box series hybrid inverter is normally disconnected from the grid under abnormal conditions, please select a suitable AC circuit breaker. The recommended specifications are as follows.

Position	Power-Box TH5K/6K/8K/10K
1	≥ 40 A / 600 V DC breaker
2	Power-Box TH15K / TH12K: Rated current ≥ 50 A Power-Box TH10K / TH8K: Rated current ≥ 32 A Power-Box TH6K / TH5K: Rated current ≥ 25 A
3	Power-Box TH15K / TH12K: Rated current ≥ 32 A Power-Box TH10K / TH8K / TH6K / TH5K: Rated current ≥ 25 A
4	Depends on loads
5	Depends on household loads and inverter capacity(Optional)

The Power-Box series hybrid inverter integrates a leakage protection circuit. If the leakage current is greater than the protection threshold value required by safety regulations, the inverter will automatically disconnect from the power grid.

If the AC circuit breaker is furnished with leakage current detection function, please select the appropriate device according to the table below.

Inverter Model	Leakage Current Trigger Value
Power-Box TH15K	300 mA
Power-Box TH12K	
Power-Box TH10K	
Power-Box TH8K	
Power-Box TH6K	
Power-Box TH5K	

6.2 Recommended Cable Specifications

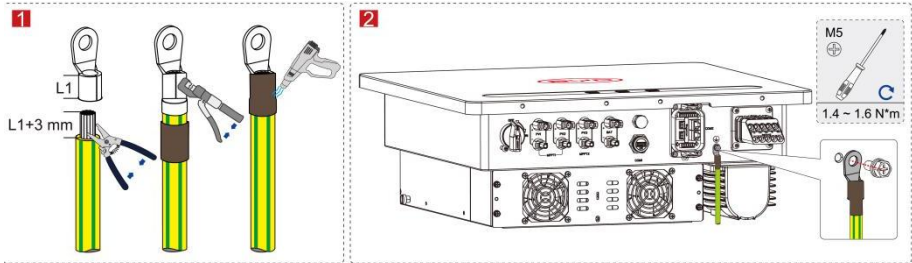
Power-Box series hybrid inverter external cables include grounding cables, AC cables(on-grid), AC cables(off-grid), DC input cables, battery input cables, and communication cables. Recommended cable specifications are as follows:

Content	Type	Cable Sectional Area	Wiring Terminal	Tightening Torque
Grounding cable	Outdoor copper core cable	6 mm ²	M5 (OT terminal)	1.4~1.6N.m
AC cable (On-grid)	Outdoor copper core cable (5-core)	6 mm ²	\	1.9~2.0N.m
AC cable (Off-grid)	Outdoor copper core cable (5-core)	6 mm ²	\	1.9~2.0N.m
DC input cable	Meet the standard for 1000V	4~6 mm ²	\	\
Battery input cable	Meet the standard for 1000V	6~10 mm ²	\	\
Communication cable	Shielded twisted pair	0.5mm ²	\	\
	CAT 5E outdoor shielded network cable	0.2mm ²	\	\

6.3 Connection of Grounding Wire

WARNING

- The inverter must be reliably grounded, otherwise it will cause personal injury or abnormal operation of the inverter!.



Procedure:

1. Use a wire stripper to strip a piece of bare copper core from the grounding cable of the corresponding specification, and the length of the bare copper core should be 3mm longer than the wiring end of the OT terminal.
2. Use crimping pliers to crimp the OT terminal to the bare copper core.
3. Put a heat-shrinkable sleeve of suitable size on the wiring end of the OT terminal, and the length of the heat-shrinkable sleeve (withstanding voltage ≥ 1000 V) is generally recommended to be 1.5~2 times longer than that of the wiring end.
4. Use a heat gun to blow the heat-shrinkable sleeve, making the sleeve wrap the terminal and cable tightly to complete the preparation of cable (the process is shown in the steps in the figure above).
5. Fasten the OT terminal of the grounding cable to the grounding port with an M5 screw, and the tightening torque is 1.4~1.6 N.m (refer to the steps in the figure above for details).

Remarks: After the grounding terminal is fastened, it is recommended to apply silicone or paint the outside of the terminal to improve the anti-corrosion performance of the terminal.

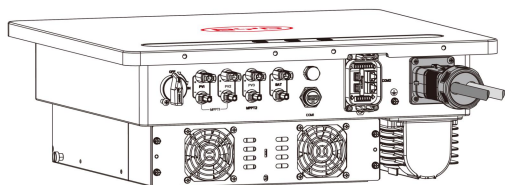
NOTICE

- Users need to prepare cables and heat shrinkable sleeves for the protective grounding cables by themselves.
- The tools users need to use include diagonal pliers, wire strippers, crimping pliers, a heat gun, and a M5 Phillips screwdriver.

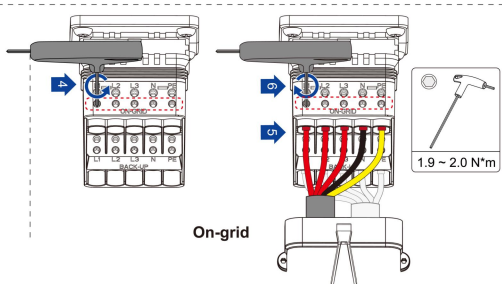
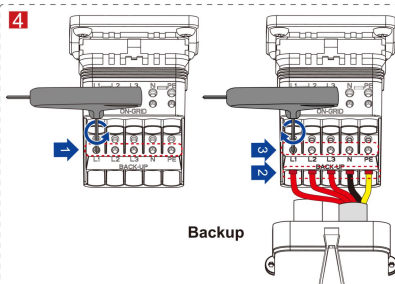
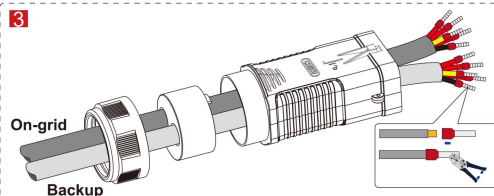
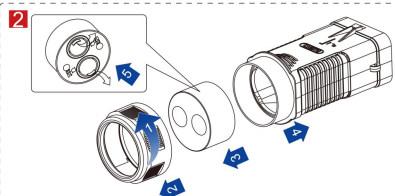
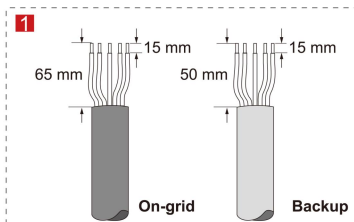
6.4 AC Wiring

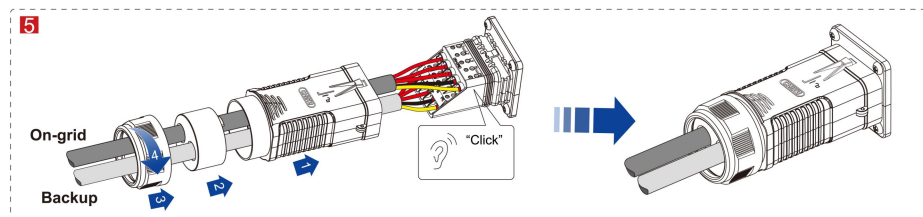
WARNING

- An AC circuit breaker matching the power of the inverter must be connected between the inverter output and the grid, and each inverter corresponds to an independent circuit breaker!
- The on-grid and of -grid cable locks and fixing screws must be tightened, otherwise there is a risk of inverter damage or fire!
- When connecting on-grid and off-grid cables, make sure that the AC circuit breaker is disconnected!
- Inverters and AC circuit breakers are prohibited from connecting to loads!



 Before connecting the cables, disconnect the circuit breaker between the power grid and the inverter.



**Procedure:**

1. Prepare on-grid cables, and strip the cables as shown in the following figure.
2. Disassemble the on-grid connector, and insert the on-grid cable into the on-grid output terminal.
3. Use a hex wrench to fix the on-grid cable. Connect the AC output terminal and the inverter.

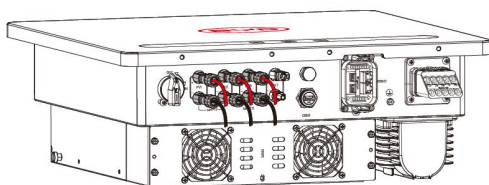
NOTICE

- Users need to prepare cables and heat shrinkable sleeves for the protective grounding cables by themselves.
- The tools users need to use include diagonal pliers, wire strippers, crimping pliers, a heat gun, and a M5 Phillips screwdriver.

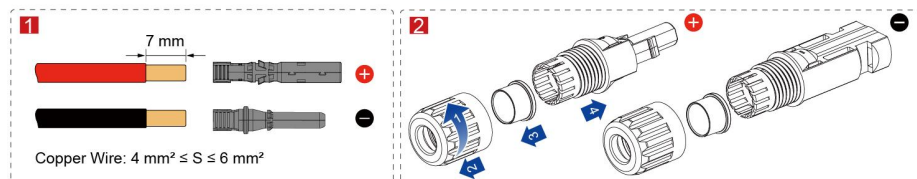
6.5 PV Wiring

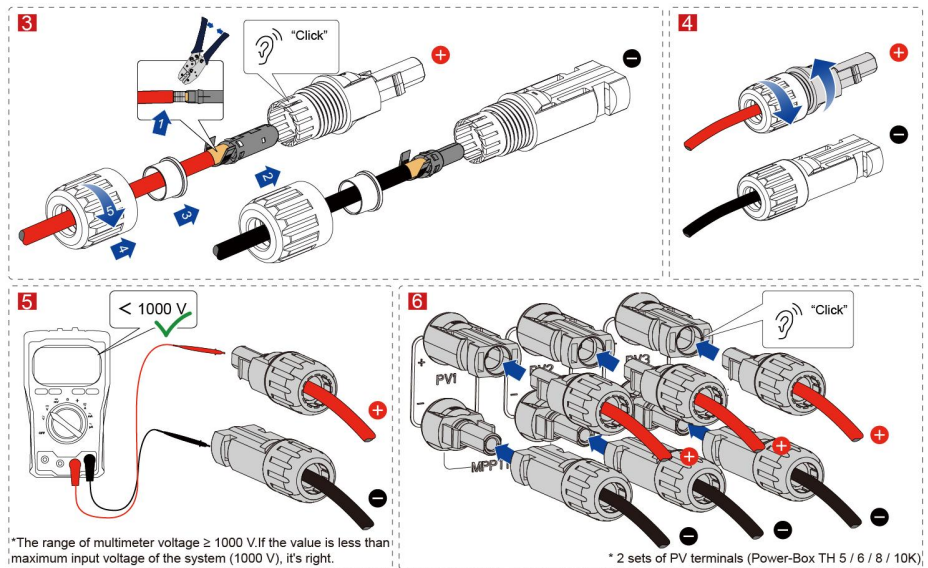
WARNING

- If PV modules are exposed to light, the photovoltaic panel may endanger the life of the operator with high voltage output!
- Before wiring, make sure that the side of the PV panel is completely covered with an opaque cloth before the operation.
- The DC switch of the inverter must be in the "OFF" position!
- The parameter configuration of the PV string should match the DC input parameters of the inverter.
- If the inverter is directly connected to the grid, the positive and negative poles of the photovoltaic panel cannot be directly grounded.
- If multiple inverters are connected in parallel to the grid through a transformer, the positive and negative poles of the photovoltaic panel cannot be directly grounded.
- It is forbidden to use DC terminals with specifications, models, and brands other than those provided by us!
- Before connecting the photovoltaic strings to the inverter, ensure that the photovoltaic strings are well insulated from the ground!
- To increase the power generation capacity of the system, it is recommended that each string be connected with the photovoltaic strings with the same number, specifications, and direction.



 Pay attention to the current from the PV panels.





Procedure:

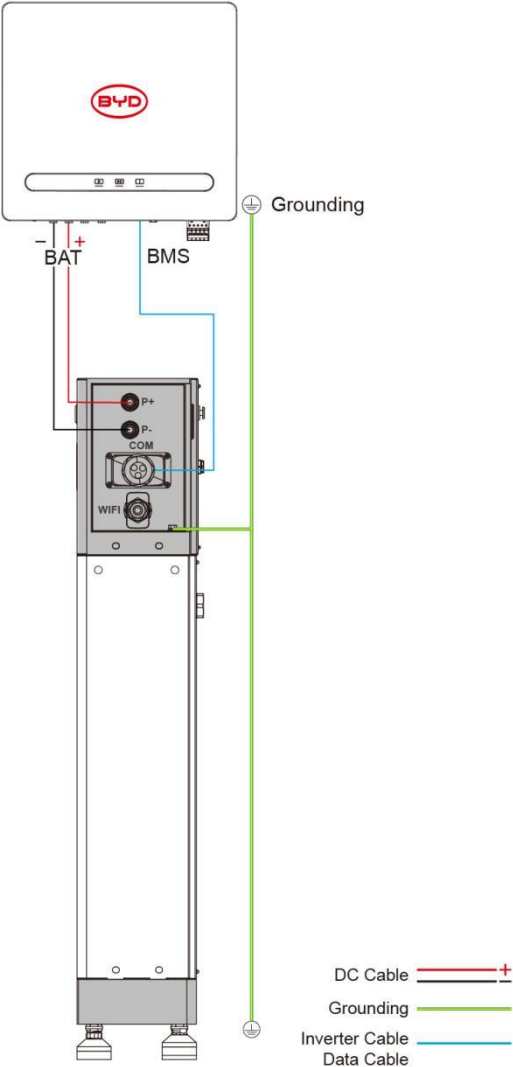
1. Use wire strippers to strip the insulation layer of the positive and negative cables to an appropriate length.
2. Put the insulation layer of the positive and negative cables into the corresponding metal terminals, and crimp them tightly with crimping pliers.
3. Insert the crimped positive and negative cables into the corresponding insulating shells until a "click" sound is heard, indicating that they are in place.
4. Tighten the plastic nuts at the end of the insulating shell of the positive and negative connectors.
5. Use a multimeter to measure the voltage of the positive and negative DC terminals to ensure that the polarity of the battery panel is correct, and the voltage is less than the maximum input voltage that the system can withstand.
6. Remove the protection plugs of the positive and negative poles of the DC input terminal of the inverter.
7. Insert the positive and negative connectors into the positive and negative poles of the DC input terminal of the inverter until a "click" sound is heard, indicating that they have been installed in place.

NOTICE

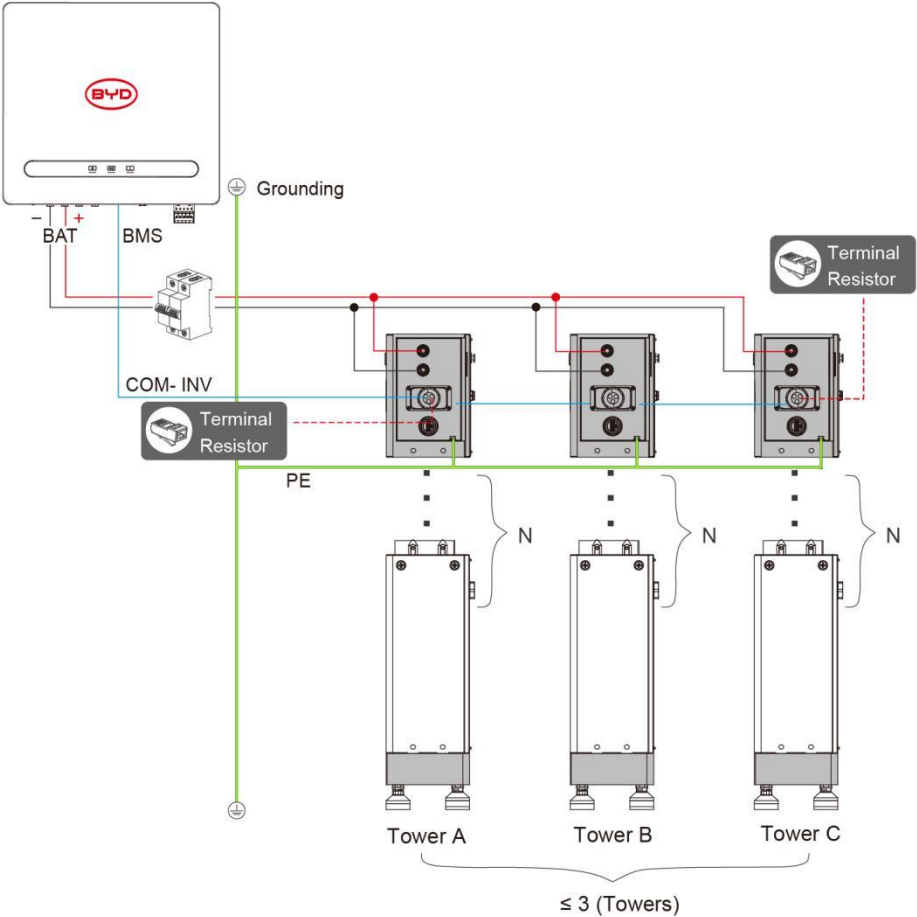
- The DC switch must be in the "OFF" position before wiring!
- Before connecting the photovoltaic strings to the inverter, ensure that the photovoltaic strings are well insulated from the ground.
- The photovoltaic strings connected to the same channel of MPPT must adopt the photovoltaic panels of the same type and number.
- For the positive and negative pole connectors that have been connected, when measuring the voltage with a multimeter, ensure the value is positive to ensure that the polarity is correct; and its value is less than the maximum input voltage of the system (1000V), to ensure that the number of photovoltaic modules is properly configured

6.6 Battery Wiring Diagram

6.6.1 With One Battery Module



6.6.2 With Multiple Battery Modules



* Number of Modules: $1 \leq N \leq 4$

Product Model: $A = B = C$ ✓

$A \neq B$ or $A \neq C$ or $B \neq C$ ✗

DC Cable

Grounding

Inverter Cable

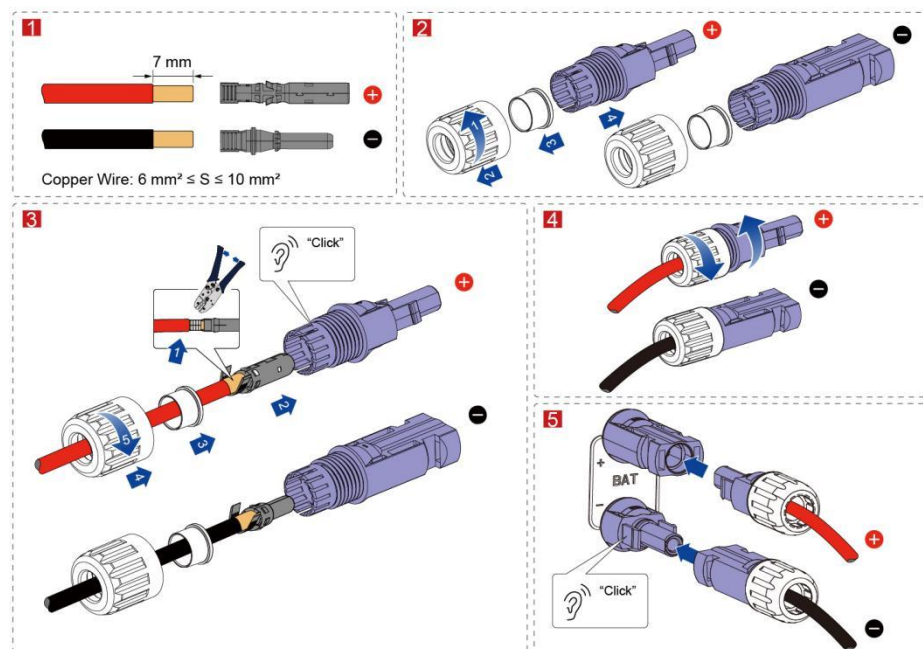
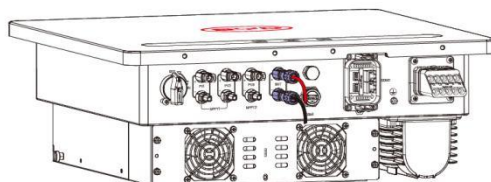
Data Cable

6.7 Battery wiring

The wiring method for the battery connection and DC connections is similar, except for the different colors of the terminals: the battery connector is blue, while the DC connector is black.

When the terminal is inserted into the machine, please make sure the insertion is correct.

The steps for the connection of the battery input cable are as follows:



NOTICE

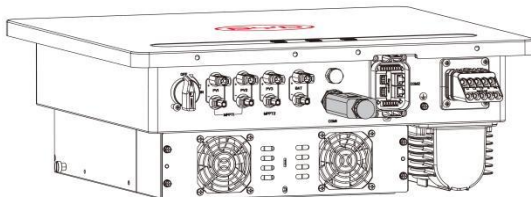
- When wiring, make sure that the polarity of the battery cable is correct, and do not reverse it. If the positive and negative poles of the battery get reversed, there is a risk of damaging the inverter.

6.8 Communication Connection

6.8.1 Install Communication Module

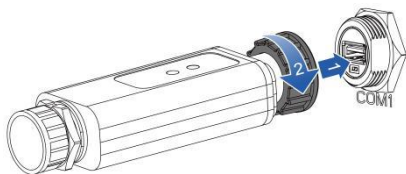


- Please install the communication module in strict accordance with the user manual!

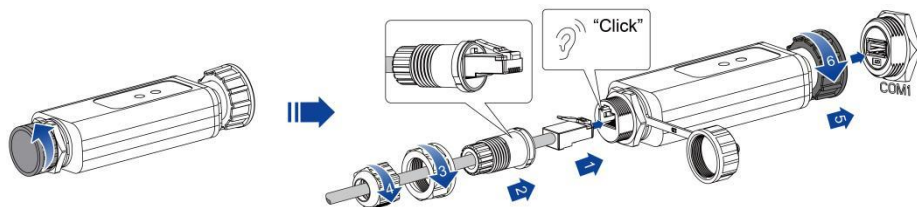


Installation procedure

Option 1, using WLAN



Option 2, using LAN



Indicator Light Status Explanation

Indicator	Frequency	Status	Designation
Bluetooth	On for 0.5s and then off for 0.5s		Blinking slowly: The Bluetooth is not connected.
	Steady on		Steady on: The Bluetooth connection is successful.
	On for 0.1s and then off for 0.1s		Quick blinking: Bluetooth pairing mode.
Network	On for 0.5s and then off for 0.5s		Blinking slowly: The Network is not connected.
	Steady on		Steady on: The Network connection is successful.

Button Function Description

- Both lights are off, the lights are in hibernation state, and tap to wake up.
- Hold the button for more than 5 seconds to reset to factory settings.

Procedure:

1. Before installation, please read the manual of the communication module carefully.
2. Unscrew the dust-proof cover of the aviation plug, insert the communication module into the data acquisition stick terminal, and tighten the plastic nut clockwise.

NOTICE

- The installation method of the communication module is illustrated in the above diagram.
- When installing the communication module, the three indicator lights should face outward.
- When installing the communication module, it is forbidden to rotate the WIFI module, which may result in loose terminals on the panel end and cause water to enter the inverter.
- To install the communication module, please tighten the plastic nut clockwise, otherwise there will be a risk of abnormal communication or water ingress.

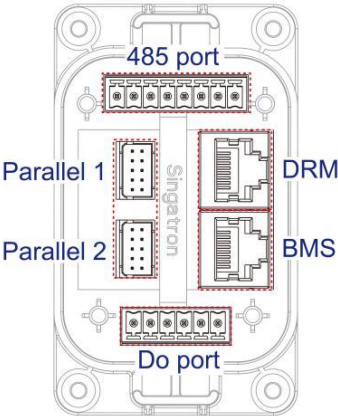
6.8.2 Install Communication Cable

 WARNING

- Please connect the inverter communication cable in strict accordance with the inverter communication port label!

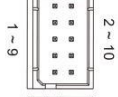
The communication signal is defined as follows:

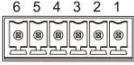
																		
485 port																		
PIN	Definition	Function																
1	485_A_PARALLEL	For WiFi & Communication moudle																
2	485_B_PARALLEL																	
3	NC																	
4																		
5																		
6	GND	GND																
7	485_A_METER	For Smart Energy Meter																
8	485_B_METER																	



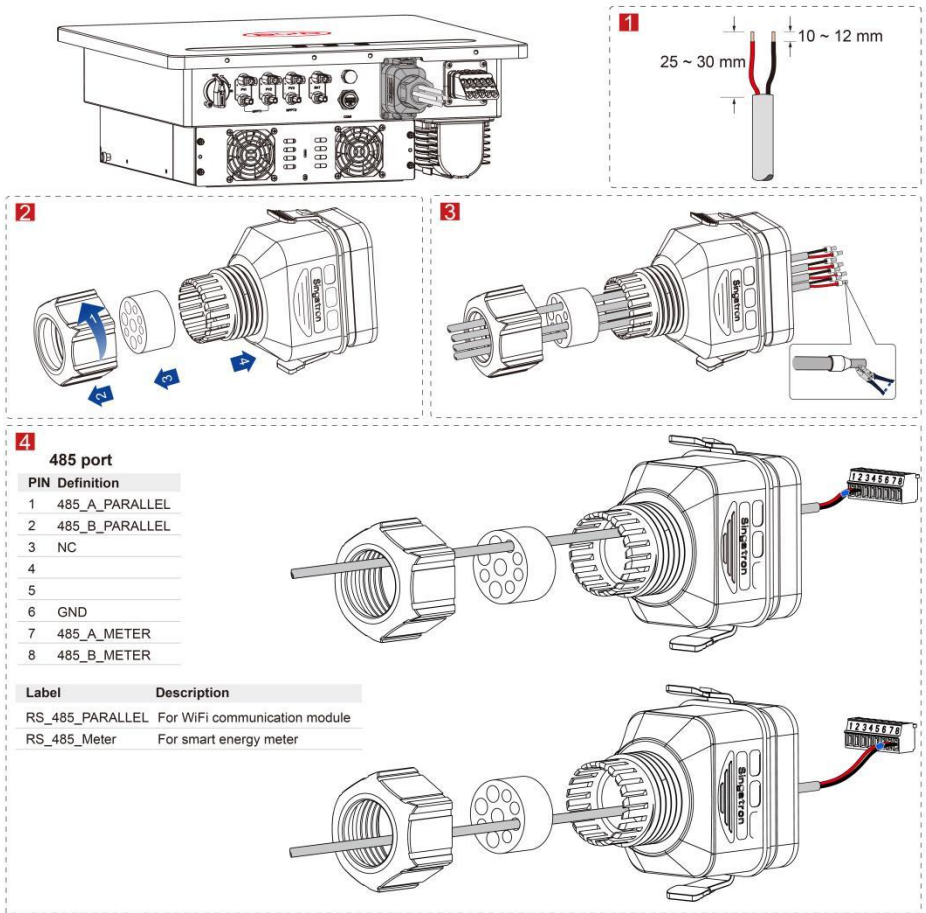
PIN	Definition	Function
1	GNDS	GNDS
2	5 VS	+5 V
3	COM/DRM0_OUT	
4	DRM 1 / 5_OUT	
5	DRM 2 / 6_OUT	
6	DRM 3 / 7_OUT	
7	DRM 4 / 8_OUT	
8	DRM_COM	

PIN	Definition	Function
1	NC	
2		
3		
4	CAN_H_BMS	For Battery Communication
5	CAN_L_BMS	
6	NC	
7	485_A_BMS	For Battery Communication
8	485_B_BMS	

		PIN	Definition	Function
Parallel 1		1	PARALLELL_SELECT_L	Reserved
		2	PARALLELL_SELECT_H	Reserved
2 ~ 10		3	CAN2_H	Reserved
		4	SYNC_H	Reserved
5		5	CAN2_L	Reserved
		6	SYNC_L	Reserved
6		7	ON_OFF_H	Reserved
		8	485_A_METER	Reserved
7 ~ 10		9	ON_OFF_L	Reserved
		10	485_B_METER	Reserved
Parallel 2				

						PIN	Definition	Function
Do port						1	DI_OUT	Reserved
						2	GND	Reserved
6 5 4 3 2 1						3	NC	
						4	DO_COM	Dry contact
						5	NC	
						6	DO_NO	Dry contact

The steps to connect the communication cable are as follows:

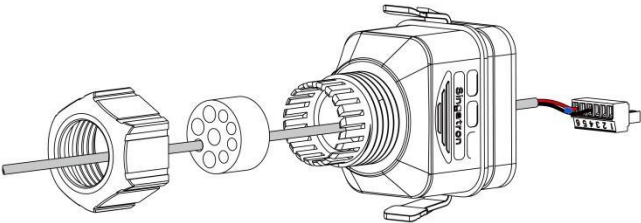


5

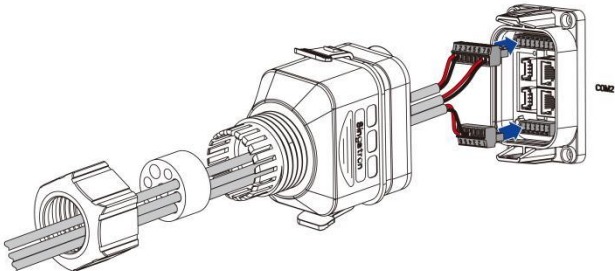
Do port

PIN	Definition
1	DI_OUT
2	GNDS
3	NC
4	DO_COM
5	NC
6	DO_NO

Label	Description
DI	Reserved



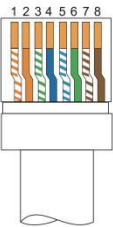
6



7

DRM

PIN	Colour	Definition
1	White and Orange	GNDS
2	Orange	5VS
3	White and Green	COM / DRM0_OUT
4	Blue	DRM 1 / 5_OUT
5	White and Blue	DRM 2 / 6_OUT
6	Green	DRM 3 / 7_OUT
7	White and Brown	DRM 4 / 8_OUT
8	Brown	DRM_COM

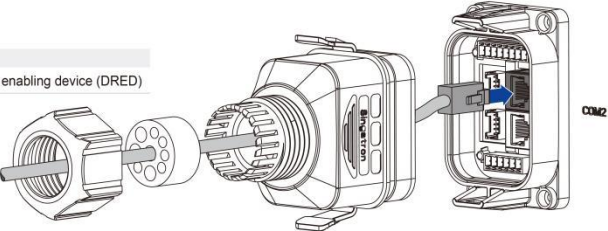


BMS

PIN	Colour	Definition
1	White and Orange	NC
2	Orange	NC
3	White and Green	NC
4	Blue	CAN_H_BMS
5	White and Blue	CAN_L_BMS
6	Green	NC
7	White and Brown	485_A_BMS
8	Brown	485_B_BMS

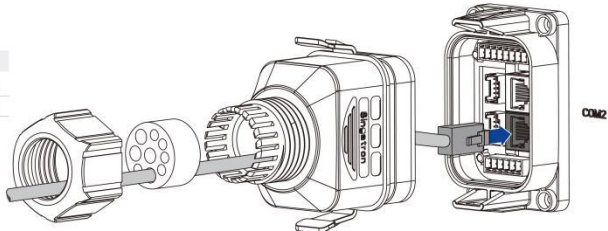
DRM

Label	Description
DI / DRM	"AU" / "NZ": Demand response enabling device (DRED)



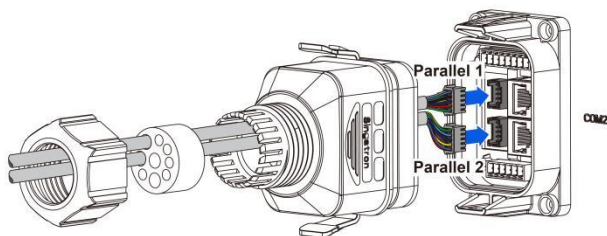
BMS

Label	Description
BMS / RS485	For battery communication
BMS / CAN	For battery communication



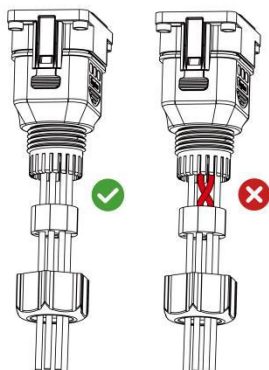
8

Label	Description
PARALLEL_SELECT_L	Reserved
PARALLEL_SELECT_H	Reserved
CAN2_H	Reserved
SYNC_H	Reserved
CAN2_L	Reserved
SYNC_L	Reserved
ON_OFF_H	Reserved
485_A_METER	Reserved
ON_OFF_L	Reserved
485_B_METER	Reserved



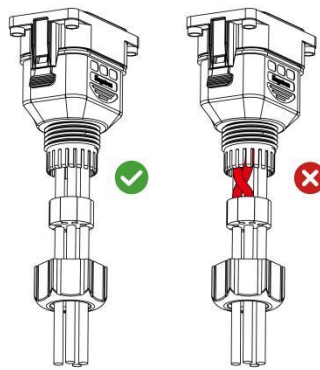
Press the cable into the rubber plug (reserved the incision around the plug, and press the cable in the bundle directly when installing).

1 Press 485 interface signal cable



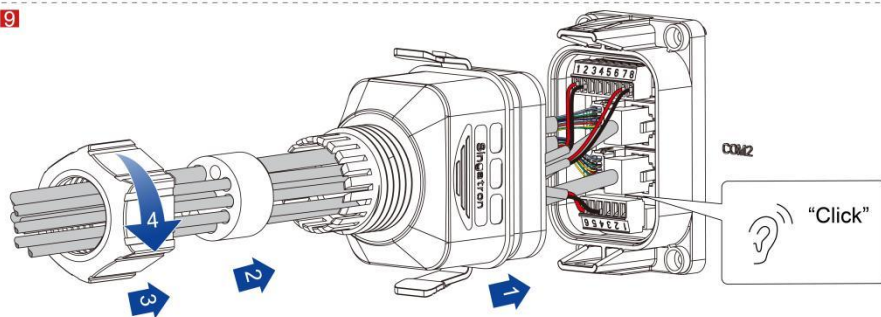
* Cable cannot be entangled

2 Press RJ45 interface signal cable



* Cable cannot be entangled

9



NOTICE

- Make sure that the protective layer of the communication cable is inside the connector, otherwise it will lower the sealing level at the communication terminal.
- When fixing the communication cables, ensure that the cores are fully inserted into the communication wiring holes without exposure, and fasten with the specified torque.

6.8.3 Smart Meter & CT Connection



WARNING

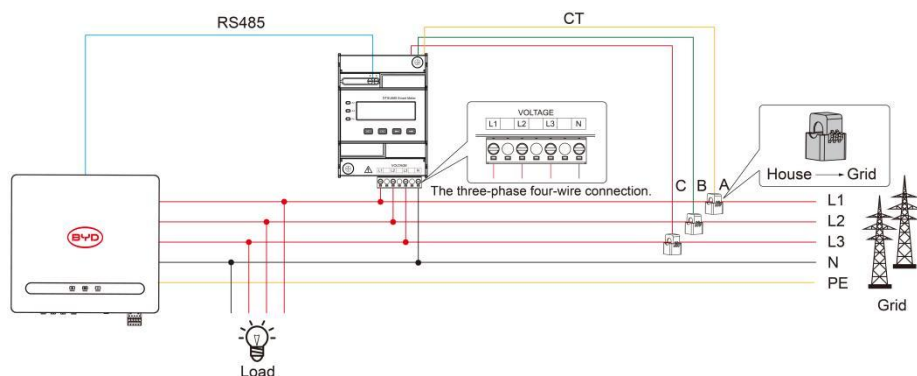
- Make sure AC cable is totally isolated from AC power before connecting Smart Meter & CT.

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

NOTICE

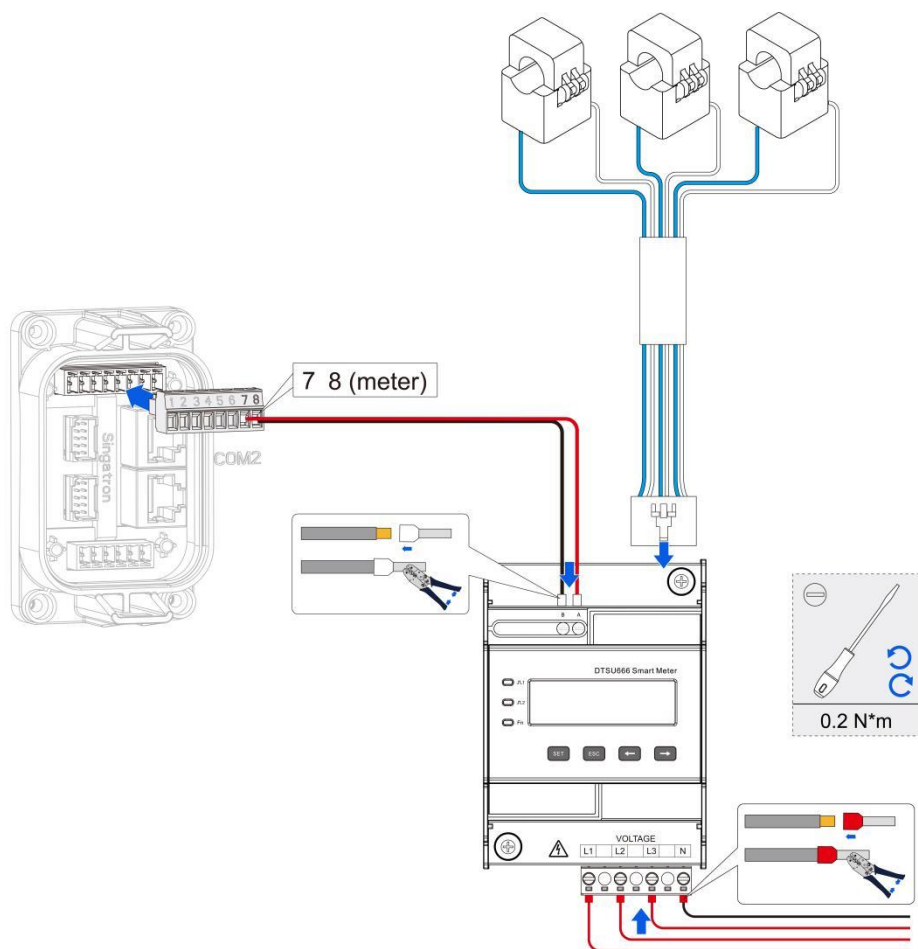
- The Smart Meter and CT is well configured, please do not change any setting on Smart Meter.
- For more detailed instructions, please refer to the user manual included with the smart meter.

Smart Meter & CT Connection Diagram:



NOTICE

- Please use the Smart Meter with CT in the inverter product box.
- CT cable is 3m as default, which could be extended to 5m at maximum.



Taking the CHINT:DTSU-666 smart meter as an example.

Label	Description
L1 / L2 / L3 / N	Connected Gird L1 / L2 / L3 / N
RS485_A / B or RJ45 pin 3 / 6	Connected Inverter RS_485_Meter
CT_1	Connected Gird L1 / L2 / L3 / N (as shown in the figure)

7 Commissioning

7.1 Check before Power on

S/N	Inspection Item	Inspection Result:(Yes √/No ×)
1	Check whether the DC switch of the inverter is in the "OFF" position.	☐
2	Check whether the inverter installation is firm and reliable.	☐
3	Check whether the connection of the external grounding cable is correct, whether the terminal is tight, whether the grounding is reliable, and ensure that there is no open circuit or short circuit.	☐
4	Check whether the AC output cables are connected correctly, whether the terminals are fastened, and ensure that there is no open circuit or short circuit.	☐
5	Check whether the polarity of the DC input cable is correct, whether the connector insertion is firm, and ensure that there is no open circuit or short.	☐
6	Check whether the connection of the communication cable is correct, whether the terminal is tight, and ensure that there is no open circuit or short circuit.	☐
7	Check whether the plastic nuts on AC side and those at the end of the communication cable lock are tightened.	☐
8	Check whether the unused ports are fitted with dust plugs.	☐
9	Check whether the data acquisition stick module is installed correctly (only for products with optional data acquisition stick).	☐

Special reminder:

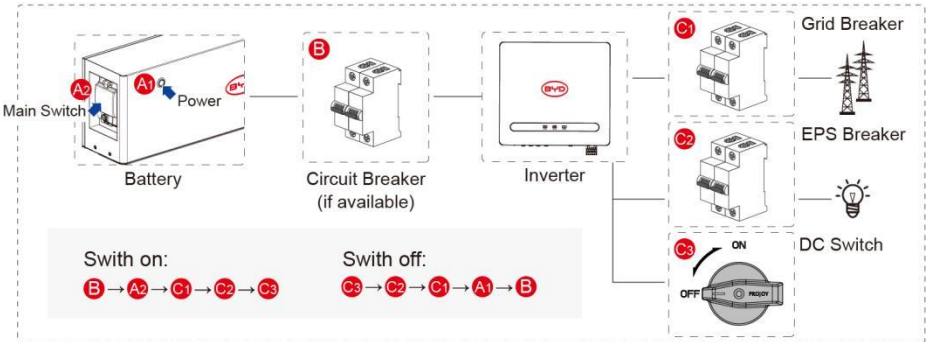
It is recommended that after one week of operation, in an environment with sufficient light, the on-site operation and maintenance personnel use an infrared detector to measure the temperature of the direct connection terminal. If everything is normal, it means that the connection of the DC terminal is reliable.

If everything is normal for the temperature of the direct connection terminal, it means that the connection of the DC terminal is reliable.

7.2 Power on

WARNING

- Multi-point grounding in the matrix is prohibited.



7.3 Setting Inverter Parameters via BYD Energy App

NOTICE

- Do not turn off the power during the firmware upgrade progress. The system will automatically proceed to working mode at the end of firmware upgrade.
- Please set the inverter parameters first via BYD Energy App to ensure its normal operation.

BYD Energy App is one smart phone application used to communicate with the inverter via bluetooth, WiFi modules.

Commonly used functions:

1. Check the operating data, software version, alarms, etc.
2. Set grid parameters, communication parameters, etc.
3. Maintain the equipment.
4. Upgrade the software version of the inverter.

For more details, refer to the BYD Energy APP User Manual. Scan the QR code or visit

<http://www.bydenenergy.com/smartEnergy?locale=EN> to get the user manual.



iOS



Android

8 System Maintenance

This chapter covers shutting down, removing, scrapping, and maintaining of the inverter (including the inverter maintenance cycle and inverter maintenance methods). When servicing the inverter, be sure to read the instructions in this chapter carefully.

8.1 Regular Maintenance of Inverter

 DANGER

- The inverter may only be serviced by qualified personnel and must not be operated by unauthorized persons!
- To ensure the safety of maintenance personnel, do not touch any live parts of the inverter when it is running, and it is necessary to always check that the product's earth point is securely connected.
- When the inverter is completely disconnected, dangerous voltages are still present inside the inverter! Please wait for 30 minutes before servicing the inverter!
- Do not connect or disconnect the DC connector while the inverter is operating!
- Please be sure to use qualified spare parts provided by BYD. If the equipment is damaged due to the use of spare parts not provided by us, we take no responsibility.
- Unauthorized or improper disassembly of the inverter may result in damage to the equipment. BYD is not responsible.

Inspection Content	Method	Inspection Cycle
System clearing	check that there are no foreign objects on the heat sink	Once a year or when an anomaly is detected
Visual inspection	Check to see if the inverter is damaged or deformed in any way	Once a year
Cable connection	Check that the AC and DC cables are securely connected and that there is no damage Check that the earth cable is securely connected	Half a year after first use, and every six months thereafter
Tightness	Check that all terminals and connections are well sealed	Once a year

The periodic inspection and maintenance of the inverter can be used to confirm the status of the inverter in time and improve the reliability of the inverter. The periodic inspection list is shown in the table above.

8.2 Power-off of Inverter



DANGER

- Always turn of the inverter before operating or servicing it. Operating equipment with the power on may cause damage to the inverter or electric shock.
- When the inverter is switched off, it takes some time for the internal components to discharge Please wait until the equipment has fully discharged in accordance with the time specified on the label.

Procedure :

1. (Optional) Issue a trip command to the inverter.
2. Disconnect the AC switch between the inverter and the grid.
3. Disconnect the DC and battery switches.

8.3 Disassemble Inverter



WARNING

- Make sure the inverter is switched of .
- Wear professional protective equipment when operating the inverter.

Procedure :

1. Disconnect all electrical connections to the inverter, including the DC cable, AC cable, communication wire, communication module, and protective earth cable.
2. The person carrying out the disassembly should hold the handle during the operation, or the disassembly should be carried out by lifting and then removing the inverter from the back plate.
3. Remove the back plate.
4. Store the inverter properly. If the inverter is to be used at a later date, ensure that the storage conditions meet the requirements.

8.4 Scrapping the Inverter

If the inverter can no longer usable and must be scrapped, please dispose of it in accordance with the electrical waste disposal regulations of the country/region in which the inverter is located.

It cannot be treated as household waste.

9 Troubleshooting



WARNING

- Non-professionals cannot deal with inverter alarms or faults!
- When dealing with inverter events, strictly follow the relevant instructions in this manual!

When the inverter is running, if it encounters an abnormal state of the power grid, PV panel, or inverter, it will make an intelligent judgment and display the fault on the display or mobile App. The following table lists the fault alarms, interpretations, and recommended handling procedures.

You can use the following methods to do troubleshooting. If they cannot help you, contact our After-sales Service Center.

Please provide the following information to our After-sales Service Center or contact us on the mobile app so that we can help you more quickly.

Model No. of the inverter: _____

SN of the inverter: _____

System version of the inverter — Version 1: _____

— Version 2: _____

— MCU software version: _____

Fault code: _____

Installation environment of the inverter: _____

Description of fault: _____

Fault Code	Description	Actions
1	Grid Volt Abnormal	Check that the AC output side voltage of the inverter meets the grid requirements. Check that the phase sequence of the AC line is connected correctly and that the wiring sequence of the N line and PE is correct and fixed. If not fixed, please contact the BYD customer service center.
4	Grid Freq Abnormal	Check that the AC output frequency of the inverter meets the grid standards. Check that the phase sequence of the AC is connected correctly and that the wiring sequence of the N line and PE is correct and fixed. Check the frequency of the fault. If it occurs occasionally, it may be caused by the instantaneous change in the mains frequency and no action is required. If not fixed, please connect the BYD customer service center.
5	No Grid Volt	The inverter will resume operation when the grid returns to normal. Otherwise: Check whether the AC switch of the inverter is on. Confirm that the phase sequence of the AC line is connected correctly and that the wiring sequence of the N line and PE is correct.
6	Grid Sequence Fault	Check that the phase sequence of the AC line is correctly connected. If phase sequence detection is not required, enable the phase sequence adaptive function. If not fixed, please contact the BYD customer service center.
7	GFCI Fault	Wait for the inverter until it returns to normal. Otherwise: A humid environment or poor lighting will cause this fault, and the inverter will return to operation when the environment improves; If the environment is normal, check whether the insulation of the DC and AC cables is normal; Confirm that the cause is not one of the above and if the fault still exists, please contact the BYD customer service center.
8	ISO Fault	Wait for the inverter to return to normal. Otherwise: Check the impedance of the strings and the DC cables to the earth. If there is a short circuit or if the cable insulation is damaged, please take corrective action; If the cable is normal and the fault occurs on a rainy day (or in the morning with dew), check when the weather improves; If it is confirmed that the cause is not one of the above, but the fault still exists, please contact the BYD customer service center.
9	DCI Fault	Check that the phase sequence of the AC line is correct, and that the wiring sequence of the N line and PE is correct. If not fixed, please connect the BYD customer service center.

10	NPE Volt Fault	Measure if the voltage of the grid N-line to earth is higher than 30V. If not fixed, please contact the BYD customer service center.
12	EPS Overload	The output load power is too high. Check whether the power of the output load is greater than the rated power of the inverter. If so, it must be disconnected. Use a load that is less than or equal to the rated power of the inverter and restart the inverter. If the fault information remains, contact the BYD customer service center.
13	AC Port Reversed	Reverse the wiring of the EPS terminal and the mains terminal. Reverse the wiring terminal of EPS and that of the utility power, then restart the inverter, if the fault information remains, please contact the BYD customer service center.
14	Load NPE Volt Fault	Measure if the voltage of the Load N-line to earth is higher than 30V. If not fixed, please contact the BYD customer service center.
16	Neutral Disconnected (EPS_Grid)	EPS_N is not connected to grid N. Disconnect the AC side switch, the DC side switch, and the battery switch. Check whether the EPS_N is connected to the N wire of the mains. If not, connect the EPS_N to the N wire of the mains, and the machine will operate normally. If the fault information remains, please contact the BYD customer service center.
21	Device Fault	Wait for the inverter returns to normal. Turn off the AC&DC switch, wait for 15 minutes and then restart the inverter. If not fixed, please contact the BYD customer service center.
23	Temp High	Ensure that the installation environment and space of the inverter meet the heat dissipation requirements. Check that the fan is not blocked by foreign objects and confirm that the fan can operate normally. Check that the ambient temperature of the inverter is not too high. If not fixed, please contact the BYD customer service center.
24	M-S DSP Version Fault	DSP version issue, please contact the BYD customer service center.
25	Communication Error (DSP-ARM)	Wait for the inverter to return to normal. If faults occur frequently please contact the BYD customer service center.
26	Communication Error (Master-Slave)	Wait for the inverter to return to normal. If failures occur frequently please get in touch with the after-sales service center.
28	Logical Interface Enabled	Under this mode, the inverter can be shut down by the logical interface. If failures occur frequently without logical interface being enabled, please get in touch with the after-sales service center.
29	Device Model Mismatch	Please contact the BYD customer service center.
33	BUS Volt High	Restart the inverter and check that it is operating normally.

		Check that the PV string voltage meets the maximum input voltage requirements of the inverter. If not fixed, please contact the BYD customer service center.
39	AFCI Fault	Check the DC side for damaged cables, loose terminals, poor contact, and scorch marks on components; if so, replace any abnormal cables, terminals, or other components. Clear the error message. If not fixed, please connect the BYD customer service center.
40	PV Volt High	Check that the PV string input voltage matches the inverter display. Check that the PV string voltage meets the maximum input voltage requirements of the inverter. If not fixed, please contact the BYD customer service center.
41	PV Reverse	Check whether the string corresponding to the alarm is reserved. If so, it is recommended to turn off the DC switch and reserve the string polarity when the solar irradiance decreases and the string current drops below 0.5A; Confirm that the cause is not one of the above and the fault still exists, please contact the BYD customer service center.
42	PV More Panels	Check that the PV string input voltage matches the inverter display. Check that the PV string voltage meets the maximum input voltage requirements of the inverter. If not fixed, please contact the BYD customer service center.
44	Series Temperature High	Confirm that the installation environment and the space around the inverter meet the heat dissipation requirements. Check that the fan is not blocked by other objects and confirm that the fan can operate normally. Check that the ambient temperature of the inverter is not too high.
48	Battery Volt Out Range	Check the battery voltage. If the battery voltage exceeds the allowable range, the inverter will operate normally when the voltage returns to normal. If the battery voltage is within the allowed range, and the fault information remains, please contact the BYD customer service center.
50	EPS Volt Out Range	Restart the inverter, if the fault information is still present, please contact the BYD customer service center.
55	EPS Over Current	The output load current is too high. Check whether the power of the output load is greater than the rated power of the inverter. If so, it must be disconnected. Use a load that is less than or equal to the rated power of the inverter and restart the inverter. If the fault information remains, contact the BYD customer service center.
65	Relay Fault	Restart the inverter and check that it is operating normally. Check that the wiring of the inverter is correct (Neutral & PE). If this happens frequently, please contact the BYD customer service center.

79	Internal Fan Fault	If this happens frequently, please contact the BYD customer service center.
80	External Fan Fault	If this happens frequently, please contact the BYD customer service center.
201	AC Over Current	The inverter monitors the external operating conditions in real time, and the inverter will resume normal operation after the fault disappears, no manual intervention is required. If this alarm occurs frequently, check that there is no short circuit in the external output circuit; if the problem cannot be solved, please contact the BYD customer service center.
202	AC Current Hardware Protect	The inverter monitors the internal operating conditions in real time, and resumes normal operation when the fault is cleared, without the need for manual intervention. If this alarm occurs frequently, check that there is no short circuit in the external output circuit; if the problem cannot be solved, please contact the BYD customer service center.
203	High Voltage Ride Through / HVRT	If it occurs accidentally, it may be caused by a short-term abnormality of the grid The inverter will resume normal operation when it detects that the grid has recovered, no manual intervention is required. If it occurs frequently, please check that the grid voltage is within the allowable range, If not fixed, please contact the BYD customer.
204	Low Voltage Ride Through / LVRT	If it occurs accidentally, it may be caused by a short-term abnormality of the grid The inverter will resume normal operation when it detects that the grid has recovered, no manual intervention is required. If it occurs frequently, please check that the grid voltage is within the allowable range, If not fixed, please connect the BYD customer service center.
205	PV-PE Volt High	Wait for the inverter to recover; If the inverter cannot be restored for a long time, disconnect the switch on the AC side switch and DC side switch, wait for 5 minutes, and then close the AC and DC switches in turn. Restart the inverter, if the fault information still exists, contact BYD customer service center.
206	Island	If it occurs accidentally, it may be caused by a short-term abnormality of the grid The inverter will resume normal operation when it detects that the grid has recovered, no manual intervention is required. If it occurs frequently, please check that the grid frequency is within the acceptable range, If not fixed, please contact the BYD customer service center.
207	DSP EEPROM Fault	Restart the inverter and check that it is operating normally. If this happens frequently, please contact the BYD customer service center.
208	RTC Fault	Restart the inverter and check that it is operating normally.

		If this happens frequently, please contact the BYD customer service center.
209	MCU_Register Fault	Restart the inverter and check that it is operating normally. If this happens frequently, please contact the BYD customer service center.
210	MCU_RAM Fault	Restart the inverter and check that it is operating normally. If this happens frequently, please contact the BYD customer service center.
214	Temp Low	Wait for the ambient temperature to return to the specified range, and then the inverter will start up automatically. If not fixed, please connect the BYD customer service center.
219	MPPT Over Current	Wait for the inverter to recover; If the inverter cannot be restored for a long time, disconnect the switch on the AC side switch and DC side switch, wait for 5 minutes and close the AC and DC switches in turn. Restart the inverter, if the fault information still exists, contact the BYD customer service center.
220	MPPT Over Current (hardware)	Restart the inverter, if the fault information is still present, please contact the BYD customer service.
221	MPPT Start Volt Out Range	Check the series configuration of the photovoltaic panels to ensure that the open-circuit voltage of each string is lower than the maximum operating voltage of the inverter. After the configuration is correct, the inverter will automatically start. If not fixed, please contact the BYD customer service center.
223	Boost1 Current Limiting	The inverter monitors the internal operating conditions in real time, and resumes normal operation when the fault is cleared, without the need for manual intervention. If this alarm occurs frequently and the problem cannot be solved, please contact the BYD customer service center.
224	Boost2 Current Limiting	The inverter monitors the internal operating conditions in real time, and resumes normal operation when the fault is cleared, without the need for manual intervention. If this alarm occurs frequently and the problem cannot be solved, please contact the BYD customer service center.
229	AC Current Limiting	The inverter monitors the internal operating conditions in real time, and resumes normal operation when the fault is cleared, without the need for manual intervention. If this alarm occurs frequently and the problem cannot be solved, please contact the BYD customer service center.
230	Inverter PWM Abnormality	The inverter monitors the internal operating conditions in real time, and resumes normal operation when the fault is cleared, without the need for manual intervention. If this alarm occurs frequently and the problem cannot be solved, please contact the BYD customer service

		center.
231	EPS Overload	The output load power is too high. Check whether the power of the output load is greater than the rated power of the inverter. If so, it must be disconnected. Use a load that is less than or equal to the rated power of the inverter and restart the inverter. If the fault information remains, contact the BYD customer.
241	Buck-Boost Over Current (hardware)	Restart the inverter and if the fault information is still present, please contact the BYD customer service center.
242	Buck-Boost Wave to Wave Current Limit	The inverter monitors the internal operating conditions in real time, and resumes normal operation when the fault is cleared, without the need for manual intervention. If this alarm occurs frequently and the problem cannot be solved, please contact the BYD customer service center.
245	Buck-Boost Over Current	Restart the inverter, if the fault information is still present, please contact the BYD customer service center.
247	Balance Bridge Over Current (Hardware)	The output half wave load power is too high. Check whether the half wave load power of the output load is greater than the sixth rated power of the inverter. If so, it must be disconnected. Use a load that is less than or equal to the sixth rated power of the inverter of the inverter and restart the inverter. If the fault information remains, contact the BYD customer service center.

10 Product Specifications

	Power-Box TH5K	Power-Box TH6K	Power-Box TH8K	Power-Box TH10K	Power-Box TH12K	Power-Box TH15K
Input (PV)						
Max. Input Power	7500 Wp	9000 Wp	12000 Wp	15000 Wp	18000 Wp	22500 Wp
Max. Input Voltage	1000 V					
Start-up Voltage	180 V					
MPPT Voltage Range	160 - 950 V					
Max. Current per MPPT			18 A	32 A / 18A		
Max. Short Circuit Current per MPPT			25 A	40 A / 25 A		
Number of MPPT Trackers			2	2		
Number of Strings per MPPT			1 / 1	2 / 1		
Battery						
Compatible Battery	Battery-Box HVE or Battery-Box HVB					
Battery Voltage	160 - 600 V					
Max. Charge / Discharge Current			25 A / 25 A	30 A / 30 A		
Max. Charge / Discharge Power	7500 W / 7500 W	9000 W / 9000 W	12000 W / 12000 W	15000 W / 15000 W	18000 W / 18000 W	
AC Input / Output (Grid)						
Nominal Voltage	3 / N / PE 220 / 380 230 / 400 V					
Nominal Frequency	50 / 60 Hz					
Nominal Output Power	5000 W	6000 W	8000 W	10000 W	12000 W	15000 W
Max. Apparent Output Power	5500 VA	6600 VA	8800 VA	11000 VA	13200 VA	16500 VA
Rated Output Current	7.6 / 7.3 A	9.1 / 8.7 A	12.2 / 11.6 A	15.2 / 14.5 A	18.2 / 17.4 A	22.8 / 21.8 A
Max. Output Current	8.4 / 8.0 A	10.0 / 9.6 A	13.4 / 12.8 A	16.7 / 16.0 A	20.0 / 19.2 A	25.0 / 24.0 A
Rated(Max.) Input Power	7.5 kW	9 kW	12 kW	15 kW	18 kW	22.5 kW
Rated(Max.) Input Current	11.4 / 10.9 A	13.7 / 13.1 A	18.2 / 17.4 A	22.8 / 21.8 A	27.3 / 26.1 A	34.1 / 32.7 A
Power Factor	0.8(leading) - 0.8(lagging)					
THDi	≤ 3%					
AC Output (Backup)						
Nominal Output Power	5000 W	6000 W	8000 W	10000 W	12000 W	15000 W
Peak Output Power	7500 VA, 60s	9000 VA, 60S	12000 VA, 60s	15000 VA ,	18000 VA,	22500 VA ,

		60s	60s	60s
Backup Switch Time	10 ms			
Nominal Voltage	3 / N / PE 220 / 380 230 / 400 V			
Nominal Frequency	50 / 60 Hz			
THDv	≤ 2%			
Efficiency				
MPPT Efficiency	> 99.9%			
Max. Efficiency	97.80%		98.20%	
EU Efficiency	97.20%		97.50%	
Protection				
Anti Islanding Protection	Yes			
Leakage Current Protection	Yes			
PV Reverse Protection	Yes			
Short Circuit Protection	Yes			
Arc-fault Circuit-interrupter	Yes			
Surge Protection	DC II / AC II			
Battery Reverse Protection	Yes			
General Data				
Operating Temperature Range	-25 °C - 60 °C			
Relative Operating Humidity	0 - 100%			
Operating Altitude	4000m (> 3000 m derating)			
Cooling	Natural		Smart fan cooling	
Dimensions	577 * 537 * 206 mm			
Weight	26 kg		29 kg	
Inverter Topology	Transformerless			
Display	LED + App			
Parallel Operation	Up to 3			
Communication	Wifi / Ethernet, RS485, CAN			
Ingress Protection	IP66			
Standards Compliance				
Safety / EMC Standard	IEC 62109-1/2, IEC61000-6, IEC61000-3, IEC62116, IEC61727, IEC61683, IEC60068, IEC62477			
Grid Connection Standard	EN50549-1, VDE4105, C10/11, CEI-0-21, TOR Type A, PTPIREE: 2021, AS4777-2, PPDS			

Appendix

Safety Standard Code	List of safety regulations	
0	China-1	CHN-A
1	General-1	General-A
2	China-2	CHN-B
3	General-3	General-C
4	General-4	General-D
5	Germany-1	DEU-A
6	General Europe-1	EU-General-A
7	Belgium	BEL
8	Holland	NLD
9	Portuguesa	PRT
10	Sweden	CHE
11	Brazil-1	BRA-A
12	France	FRA
13	Italy	ITA
14	Spain	ESP
15	Greece-1	GRC-A
16	General-2	General-B
17	Korea	KOR
18	UK-1	GBR-A
19	UK-2	GBR-B
20	India	IND
21	Poland	POL
22	General Europe-2	EU-General-B
23	Czech	CZE
24	Denmark-1	DNK-A
25	Greece-2	GRC-B
26	Ireland	IRL
27	Lithuania	LUX
28	Norway	NOR
29	Slovenia	SVN
30	Switzerland	SWE

31	Turkey	TUR
32	Finland	FIN
33	Cyprus	CYP
34	Slovakia-1	SVK-A
35	Iceland	ISL
36	Latvia	LVA
37	Romania	ROM
38	Australia-1	AUS-A
39	Australia-2	AUS-B
40	Australia-3	AUS-C
41	Austria	AUT
42	New Zealand	NZL
43	Denmark-2	DNK-B
44	Brazil-2	BRA-B
45	South Africa	ZAF
46	Invalid safety	Undefined
47	Thailand-PEA	THA-P
48	Thailand-MEA	THA-M
49	Germany-2	DEU-B
50	Saudi Arabia	SAU
51	IEC General-50HZ	IEC General-50HZ
52	Pakistan	PAK
53	Sri Lanka	LKA
54	Hungary	HUN
55	Singapore	SGP
56	Dubai	Dubai
57	IEC General-60HZ	IEC General-60HZ
58	Morocco	MAR
59	Serbia	SRB



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