



Single Phase Hybrid Inverter

Power-Box SH3K

Power-Box SH3.7K

Power-Box SH4.6K

Power-Box SH5K

Power-Box SH6K

User Manual

Jan. 2025 / Version 1.0 / En

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1 Information on this Document

DISCLAIMER

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

- Operation outside the conditions specified in this manual.
- Installation or operating environments that do not comply with relevant international, national, or regional standards.
- Unauthorized disassembly, product modification, or software code alteration.
- Failure to operate according to the safety instructions and precautions on the product and in the manual.
- Damages caused by abnormal natural environments (force majeure, such as earthquakes, fires, windstorms, floods, mudslides, etc.).
- Damages caused during customer transport.
- Damages caused by storage conditions that do not meet the requirements specified in the manual.
- Damages to hardware or data due to customer negligence, improper operation, or intentional damage.
- Damages to the system caused by a third party or the customer, including damages from improper transport or installation not complying with this manual, as well as unauthorized adjustment, alteration, or removal of identification signs.

Reverse engineering, decompiling, disassembling, adapting, implanting, or performing other derivative operations on the equipment's software is prohibited. Researching the internal implementation of the equipment, obtaining the source code of the equipment's software, or stealing intellectual property in any manner is 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 SH3K

Power-Box SH3.7K

Power-Box SH4.6K

Power-Box SH5K

Power-Box SH6K

1.2 Target Group

This document is intended for:

- Trained and qualified technical installers familiar with the product, local standards, and electrical systems.
- Users authorized to interact with the inverter.

1.3 Content and Structure of this Document

This document contains safety information and instructions, scope of delivery, inverter overview, installation, electrical connection, commissioning, operation, decommissioning, extension, troubleshooting, maintenance and storage, technical parameters. Please finish reading this document before taking any actions on the inverter.

1.4 Declaration of Conformity

The certificate of the inverter is available in the download area at www.bydenergy.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



WARNING

- The inverters are designed and tested to strictly comply with relevant safety regulations. Improper use may result in electric shock or burns. This manual provides critical instructions for the installation and maintenance of the product. Read this manual carefully before using the product and retain it for future reference.

2.1 Safety Symbols

All labels and warning marks must remain visible after installation. Do not cover, deface, or damage any label on the equipment.

Key warning labels on the inverter include:

Icon	Item	Description
	Danger warning	Inverters are power electronic products with potential risks, especially when powered on. Operation must be performed by qualified professionals under appropriate safety protection.
	Warning mark	Inverters operate at high voltage. All operations 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 discharges to a safe voltage 5 minutes after power-off. Only then may qualified personnel perform operations.
	User manual mark	Professionals must consult the user manual during inverter installation or maintenance.
	CE mark	This product complies with CE certification.
	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.



Grounding point

Indicates that the device needs to be electrically grounded

2.2 General Safety

NOTICE

- Read this manual thoroughly before operating the product. We shall not be liable for any failure or loss caused by improper operation.
- Wiring, installation, and commissioning must be performed by professionals familiar with local standards and safety regulations.
- All electrical installations must conform to local electrical codes. The inverter must be connected to the grid by qualified personnel authorized by the local power provider.
- During installation, use insulated tools and personal protective equipment (PPE) to ensure safety. When handling electronic components, wear anti-static gloves, an anti-static wrist strap, or anti-static clothing to protect the inverter from electrostatic discharge (ESD).
- For system maintenance, contact BYD-authorized service personnel or our after-sales department.

2.3 PV String Safety



DANGER

- Connect DC cables using only the supplied PV connectors. Using incompatible terminals may lead to serious consequences, and resulting property damage is not covered by the warranty.
- Before installing a solar PV module during daylight hours, turn off the PV switch. Failure to do so poses a serious risk of electric shock.



WARNING

- Do not connect a single PV string to multiple inverters, as this could cause damage.
- Ensure PV module frames and the mounting system are securely grounded.
- Ensure DC cables are connected tightly, securely, and with correct polarity.
- Measure PV string voltage with a multimeter before connection to avoid reverse polarity. Verify voltage is within the permissible range.
- PV modules used with the inverter must have an IEC 61730 Class A safety rating.
- When exposed to light, the photovoltaic array supplies DC voltage to the inverter.

2.4 Battery Safety

CAUTION

- If the battery has been completely discharged, please strictly follow the User Manual of the battery to charge the battery.
- Battery current and load capacity may be limited by factors such as temperature, humidity, and weather conditions.
- Use the multimeter to measure the DC cable to avoid reverse polarity connection. Also, the voltage should be under the permissible range.

2.5 Inverter Safety

WARNING

- The voltage and frequency at the connecting point should meet the on-grid requirements.
- Additional protective devices like circuit breakers or fuses are recommended on the AC side. Specification of the protective device should be at least 1.25 times the AC rated output current.
- Ensure all grounding connections are tight and secure. For multiple inverters, ensure all enclosure grounding points are equipotential bonded.
- The backup (EPS) function is disabled if no battery is configured in the PV system. System operation risks arising from enabling backup without a battery are not covered by the warranty.
- Before starting installation or maintenance work, disconnect all AC, DC, and battery connections. Wait at least 5 minutes before proceeding to prevent electric shock.
- During operation, the inverter casing temperature is high. Do not touch it to avoid burns.
- Install the inverter out of the reach of children.
- Do not plug or unplug AC/DC terminals during normal inverter operation.
- Do not connect devices requiring continuous, stable power (e.g., life-sustaining medical equipment) to the emergency power supply (EPS) port.

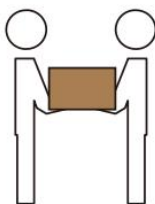
2.6 Moving Heavy Objects

WARNING

- Exercise caution to prevent injury when moving heavy objects.
- When multiple persons move a heavy object, determine manpower and roles considering height and other factors to ensure balanced weight distribution.
- When moving a heavy object with two or more persons, ensure simultaneous lifting and landing, moving at a uniform pace under one person's coordination.
- Wear appropriate PPE such as protective gloves and safety shoes when manually moving equipment.



< 18 kg
(< 40 lbs)



18 ~ 32 kg
(40 ~ 70 lbs)



32 ~ 55 kg
(70 ~ 121 lbs)

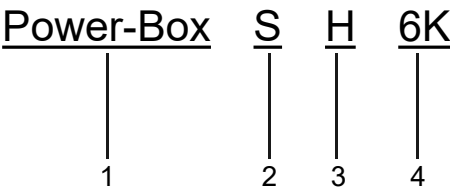
3 Product Introduction

3.1 Product Overview

Function

The Power-Box SH(3~6)K is a single-phase hybrid inverter with 2 MPP trackers and a battery connection that feeds the direct current of the PV array into the connected battery or converts it to grid-compliant single-phase current and then feeds it into the utility grid. In the case of electric power failure, the inverter can continue to supply loads with power from the battery and PV system.

Model identifier

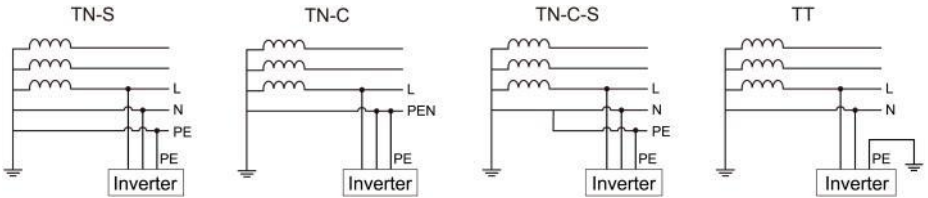


No.	Meaning	Explanation
1	Product name	Power-Box: Hybrid inverter
2	Phase	S: Single phase T: Three phase
3	Battery voltage level	L: Low voltage H: High voltage
4	Rated output power	6K: Rated output power 6 kW

Supported Power Grid Types

The inverter supports the following power grid types: TN-S, TN-C, TN-C-S, and TT.

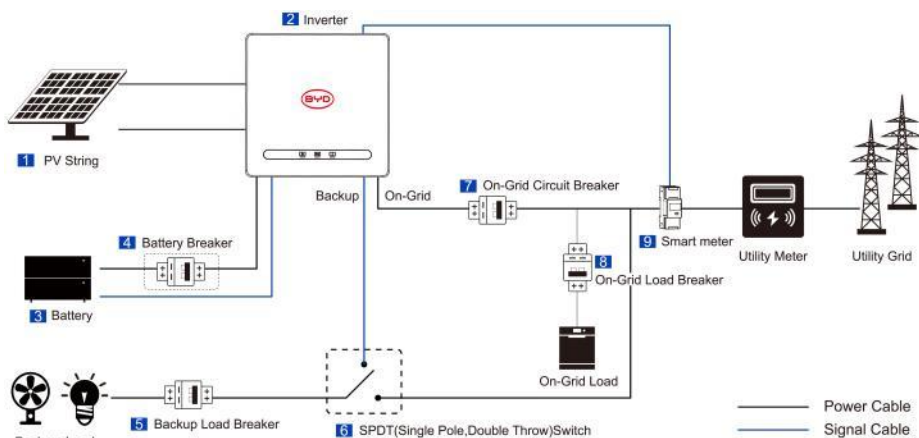
If the power grid system contains a N wire, the neutral to ground voltage should be lower than 10V.



3.2 Application Scenarios

WARNING

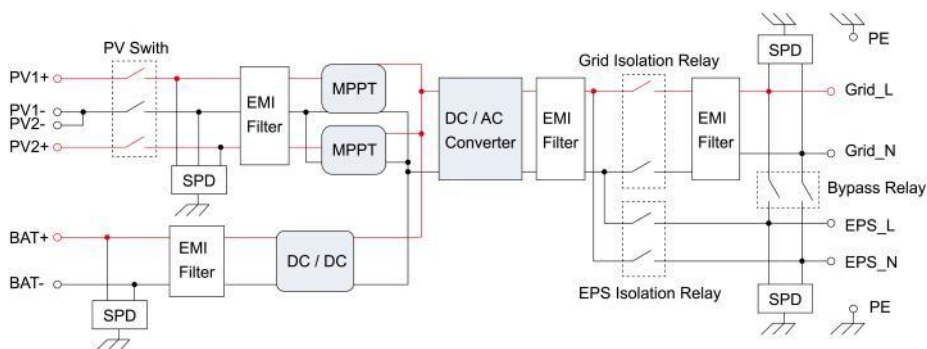
- PV systems are unsuitable for connection to devices requiring a stable power supply, such as life-sustaining medical equipment. Ensure no risk of personal injury exists even if the system shuts down.
- Avoid using loads with high inrush current (e.g., high-power water pumps) in PV systems, as this may cause off-grid output failure due to excessive instantaneous power.
- Enabling the Backup function without a battery is not recommended. Resulting system operation risks are not covered by the warranty.
- Battery current may be limited by factors like temperature, humidity, and weather conditions, affecting load capacity.
- If the inverter trips due to overload protection, it may automatically restart. Repeated occurrences may increase restart time. The inverter can be manually restarted via the App if needed.
- If the load exceeds the inverter's rated power during a grid outage, the off-grid function will automatically shut down. To restart, turn off high-power loads to ensure total load power is below the inverter's rated power.
- In off-grid mode, the inverter supports household loads. The total power of inductive or capacitive loads must be $\leq 0.5 \times$ the inverter's rated output power.



As shown in the above diagram, a complete hybrid inverter system in Power-Box SH 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 SH(3-6)K series.
3	Battery	Applicable batteries: Battery-Box HVE
4	Battery breaker	Recommended capacity: The nominal current ≥ 63 A and the nominal voltage ≥ 750 V.
5	Backup load breaker	The load breaker specifications for the Backup and On-grid for one inverter type shall be the same.
6	SPDT	- The AC breakers shall be prepared by the customers. - To ensure the Backup load is powered by the grid during the inverter maintenance, install a SPDT (Single Pole, Double Throw) Switch by yourself.
7	On-grid circuit breaker	The specification of the breaker and SPDT for the Backup and On-grid loads: the nominal current is ≥ 63 A and the nominal voltage is ≥ 230 V.
8	On-grid load breaker	Depend on the actual using load.
9	Smart meter	The smart meter is delivered with the inverter. Smart meter standard model: DDSU666.

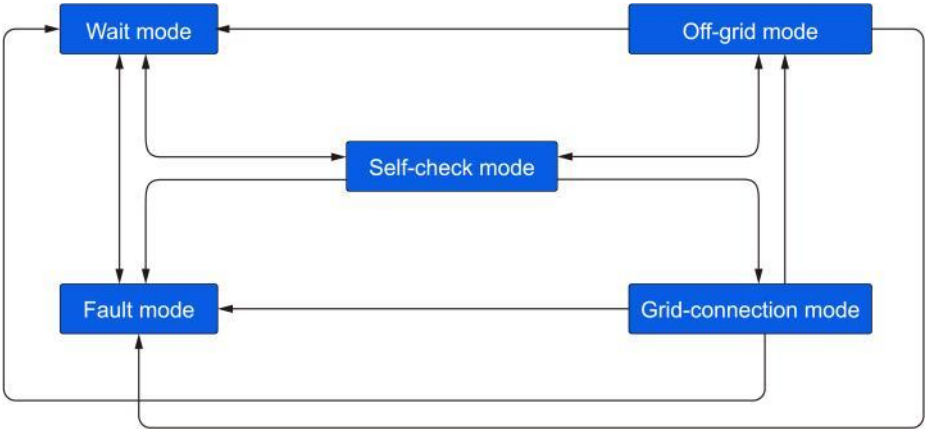
3.3 Schematic Diagram



The inverter accepts inputs from up to two PV strings. These inputs are processed through two independent MPPT circuits to maximize power harvest. The DC power is converted into single-phase AC power via the inverter circuit. Surge protection is integrated on both DC and AC sides.

The battery port facilitates energy storage, with charging and discharging governed by the configured battery operating mode.

3.4 Working Mode



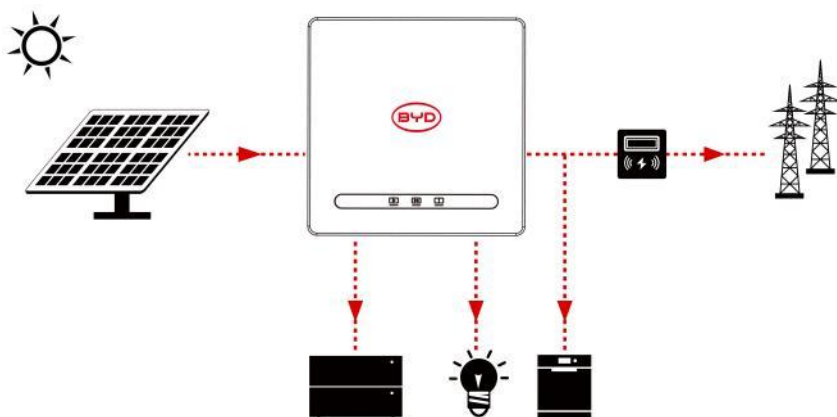
3.4.1 Normal Mode

Energy storage working mode

Self-Consumption

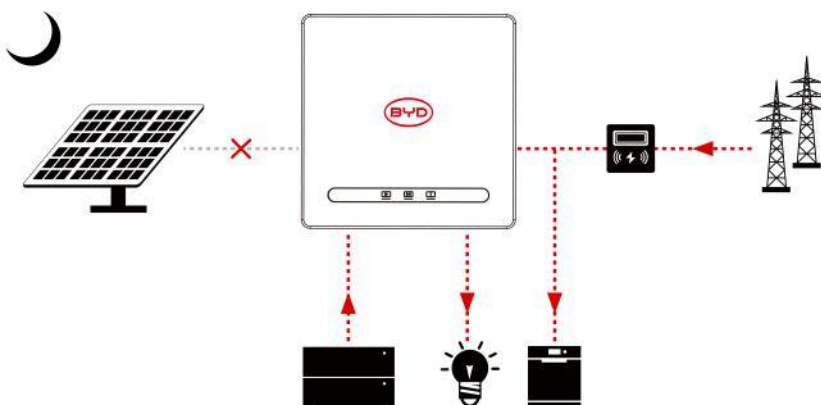
With PV Power——Priority: load > battery > grid

The electricity generated by photovoltaic power generation is first used to power the local load, and when the photovoltaic energy meets the load demand, the excess electricity will be stored in the battery. If the battery is not connected or the battery is full, excess power will be supplied to the grid (if anti-back flow protection is not enabled).



Without PV Power——Priority: load > battery

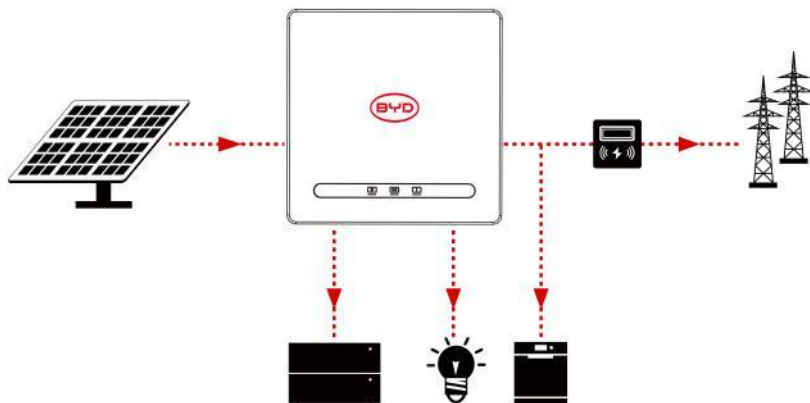
When no PV supplied, battery will discharge for local loads firstly, and grid will supply power when the battery capacity is not enough.



Grid First

Priority: load > grid > battery

When the system works in this mode, the photovoltaic power generation will first be used for local loads and then output to the public grid. The excess power will charge the battery.

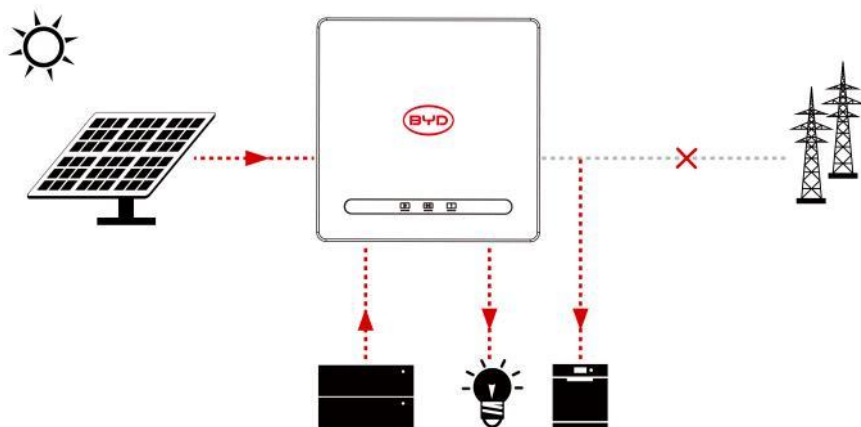


Backup Mode

Priority: load > battery

In case of grid power failure, the system will automatically get into the backup mode (you can disable this function as instructed in Chapter 9).

In this state, the system will output voltage via the EPS port and power the load by the battery and solar PV panel. Please note that the load at the EPS port should not exceed the maximum output power (6000 W) of the inverter.



3.4.2 Fault State

Hybrid inverter has an intelligent control system that can continuously monitor and adjust the state of the system. In case of a system fault or device fault, the fault information will be displayed on the App and the corresponding LED will be turned on.

NOTICE

- See Section 9 for more fault information.
- Some of the fault information is intended to remind you of possible internal faults of the inverter.

3.4.3 Firmware Upgrade

Do not power off during upgrade.. The system will automatically proceed to working mode at the end of firmware upgrade.

3.4.4 Self-test State

Before activating the working mode, the system will get into the power-on self-test state. If no fault is detected, the system will proceed to working mode; otherwise, it will get into the fault state.

3.4.5 Standby State

When no fault is detected and a certain operating has not been met, the system will get into the standby state.

3.4.6 Power-off State

To stop the operation of the hybrid inverter, please disconnect all energy sources to enter automatic shutdown.

Procedure:

1. Disconnect the PV side.
2. Disconnect the power grid.
3. Turn off the BAT switch. The LED light will be turned off.



WARNING

- At the end of the above steps, please wait at least 5 minutes before proceeding to other

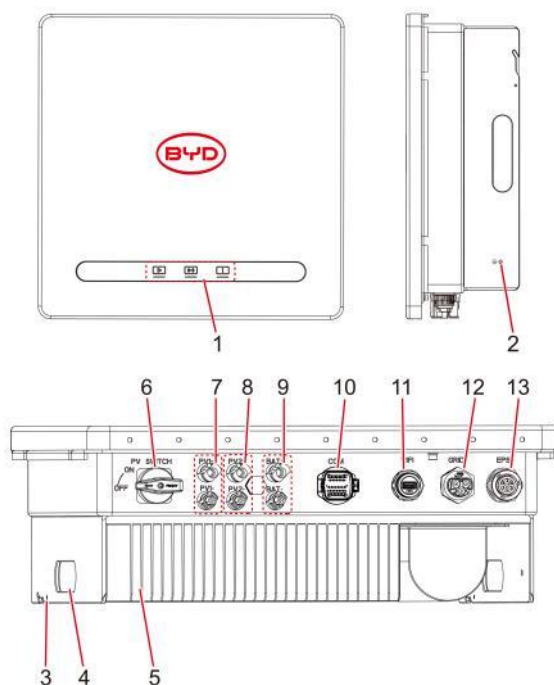
operations.

3.5 Functionality

1. Intelligent management system with multiple working modes for diverse needs.
2. Configurable grid connection priority, battery type, and inverter settings.
3. Dual MPPT with high current input, compatible with large 210mm solar modules for flexible configuration.
4. All-in-one design providing backup power and peak shaving.
5. Integrated battery safety management system (BMS), supporting remote BMS upgrades.
6. Anti-backflow prevention support.
7. Comprehensive protection (over-temperature, over-current, short-circuit) for safe, stable, reliable operation.
8. Multiple communication options (RS485, Wi-Fi, LAN, Bluetooth) for monitoring and control via computer, phone, or internet.
9. Supports parallel operation of up to 3 inverters.
10. Grid-connected current THDi < 3%, minimizing grid pollution.
11. Off-grid voltage THDv < 2%, suitable for inductive loads like air conditioners.
12. IP65 rating, lightweight, compact design for easy installation.
13. Grid port supports simultaneous full-power battery charging and load operation.

3.6 Product Appearance

3.6.1 Introduction of Appearance



Position	Designation	Position	Designation
1	LED indicators	8	PV2 connector
2	PE port	9	Battery connector
3	Lock hole	10	Communication port
4	Hand holder	11	WiFi port
5	Heat sink	12	Grid connector
6	PV switch	13	EPS connector
7	PV1 connector		

3.6.2 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

3.6.3 Nameplate and Label

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

Taking the Power-Box SH6K as an example.

BYD Name : Hybrid Inverter
Model : Power-Box SH6K

PV Input

Max. Input Voltage	600 Vd.c.
MPPT Voltage Range	80 ~ 550 Vd.c.
Max. Input Current	16 A / 16 Ad.c.
Isc PV	24 A / 24 Ad.c.

Battery

Rated Voltage	300 Vd.c.
Voltage Range	80 ~ 480 Vd.c.
Max. Charge / Discharge Current	35 Ad.c.
Battery Type	Li-ion

Grid Input / Output

Rated Voltage	1 / N / PE 230 Va.c.
Rated Frequency	50 Hz
Rated Output Power	6 kW
Max. Apparent Output Power	6 kVA
Max. AC Input / Output Current	26.1 Aa.c.
Power Factor	0.8 leading ~ 0.8 lagging

Backup Output

Rated Voltage	1 / N / PE 230 Va.c.
Rated Frequency	50 Hz
Rated Output Power	6 kW
Max. Apparent Output Power	6 kVA
Max. AC Output Current	26.1 Aa.c.
Power Factor	0.8 leading ~ 0.8 lagging
Inverter Topology	Non-isolated
Protective Class	
Ingress Protection	IP65
Operating Temperature	-25 ~ +60 °C
Overvoltage Category	III [AC], II [DC]

Safety symbols and certification marks

Serial number

Manufacturer contact information

Shanwei BYD Auto Co., Ltd.
Xinhe Industrial Park, Luhe, Shanwei MADE IN CHINA

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

Taking the Power-Box SH6K as an example.

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 could be stored in a temperature range of $-25 \sim 60^{\circ}\text{C}$, with the relative humidity of $0 \sim 95\%$. If you want to keep it for a long time, The product should be stored in a clean and dry place and be protected from dust and water vapor corrosion.
- Inverters stored over one year require professional inspection and testing before use.

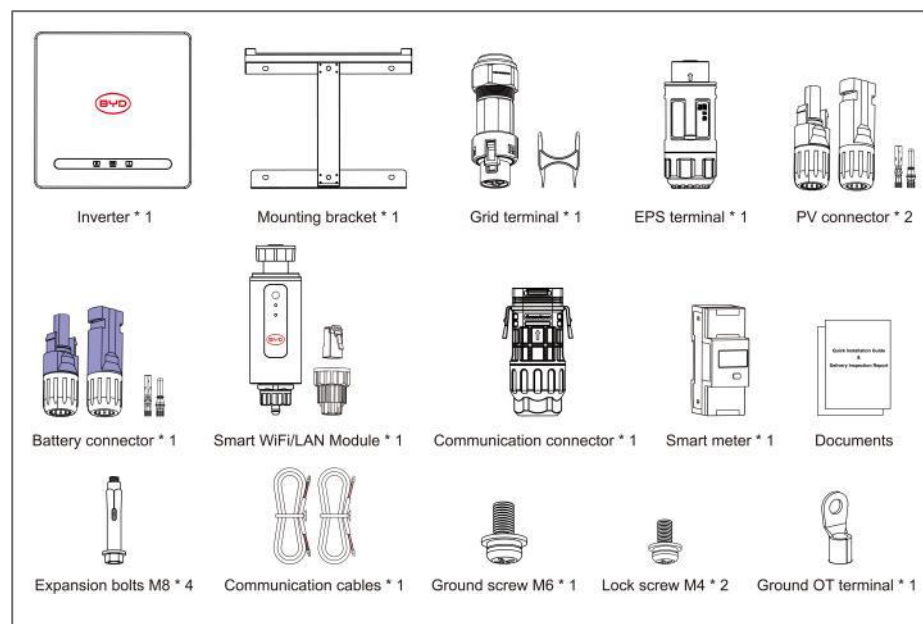
5 Inverter Installation

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

5.1 Inspection before Installation

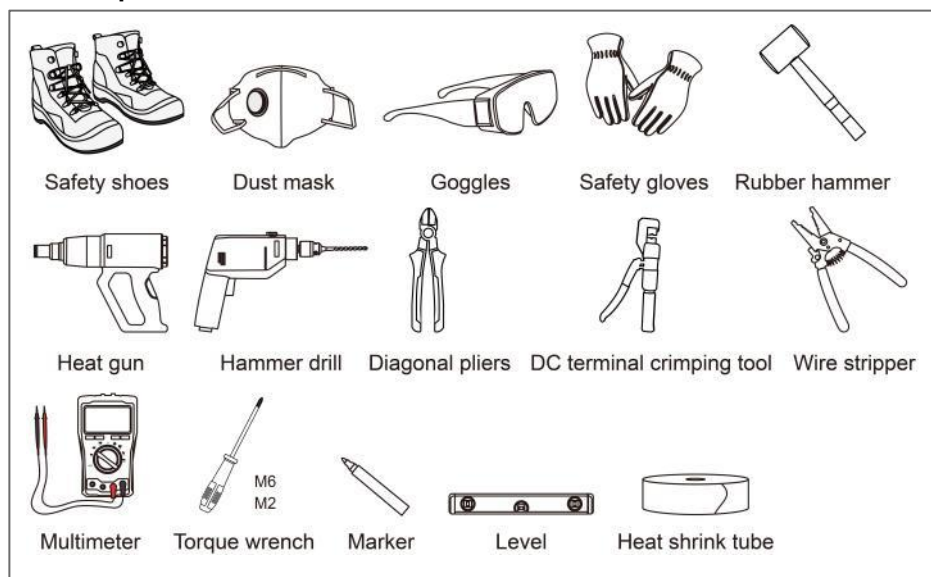
NOTICE

- 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 packaging is deformed or the model is incorrect, do not disassemble; contact your dealer immediately.
- 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

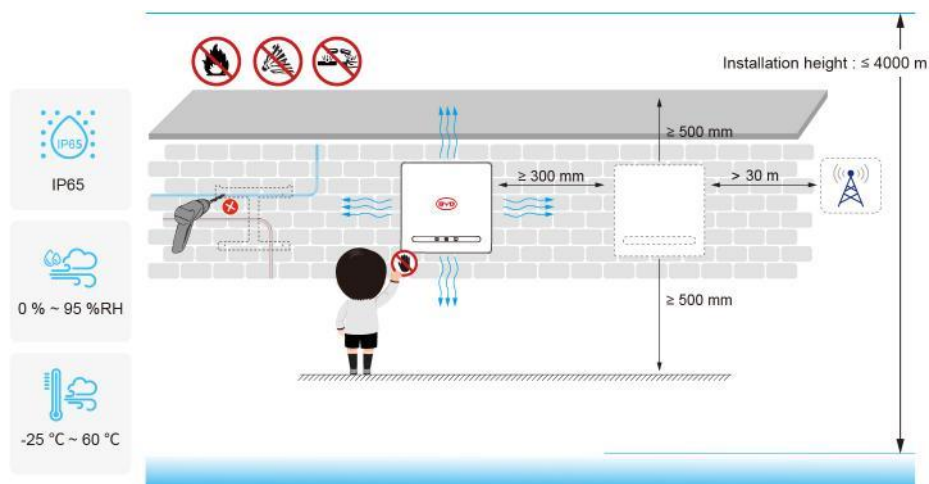
5.2 Requirements for Inverter Installation

5.2.1 Requirements for Installation Tool



5.2.2 Requirements for Installation Environment

1. The equipment cannot be installed in flammable, explosive, corrosive or other alike environments.
2. Install at a height convenient for operation and maintenance, ensuring indicators, labels, and terminals are accessible.
3. Please avoid the water pipes and cables in the wall to avoid danger when drilling holes for installation.
4. Installation environment temperature and humidity must be within specified limits (IP65 allows indoor/outdoor).
5. 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.
6. The installation space must meet the requirements for ventilation, heat dissipation and operation.
7. 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.
8. The inverter installation altitude should be less than 4000 m (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 30 MHz 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 30 m.



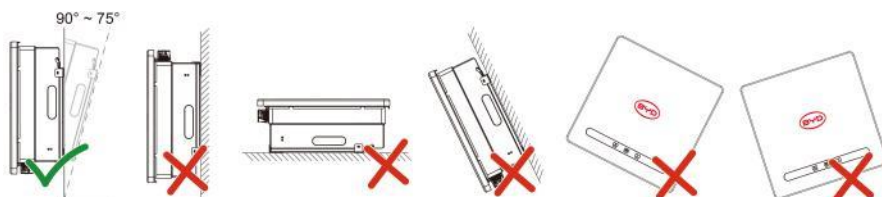
5.2.3 Requirements for Installation Carrier

- 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.
- Must provide a reliable grounding point for the inverter.

5.2.4 Installation Angle Requirements

The mounting surface should be upright. Install the inverter vertically or at a backward tilt of $\leq 15^\circ$ so as to facilitate heat radiation.

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

- Install the inverter at such a height that allows the operator to observe the LED indicator lights of the inverter easily.
- Leave adequate space around the inverter to facilitate air circulation, and future handling of the inverter.
- To install more than one inverter, please keep a certain distance between the inverters and at the top / bottom of the inverters, so as to facilitate heat radiation.

5.3 Installation of Inverter

5.3.1 Moving Inverter

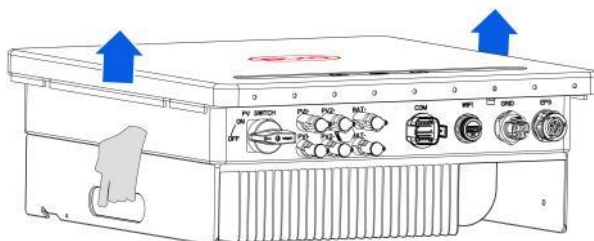


WARNING

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.
- Maintain equipment balance during transport to avoid dropping.

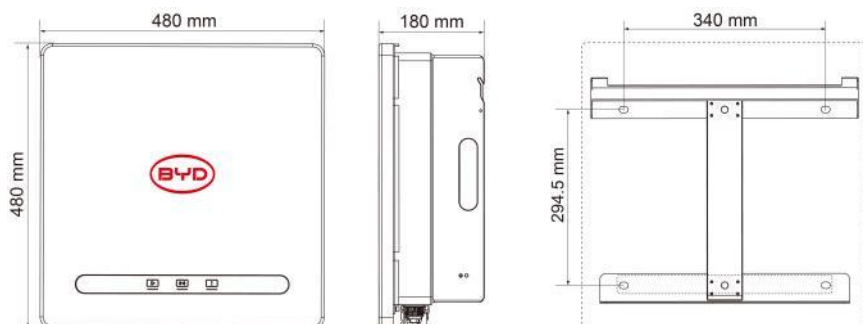
Hold the handles on both sides of the inverter, lift the inverter from the packing case, and transport it to the installation position.



5.3.2 Installing Inverter

5.3.2.1 Inverter Installation Dimensional Diagram

Dimensions of bracket and mounting holes for the Inverter is as follows:

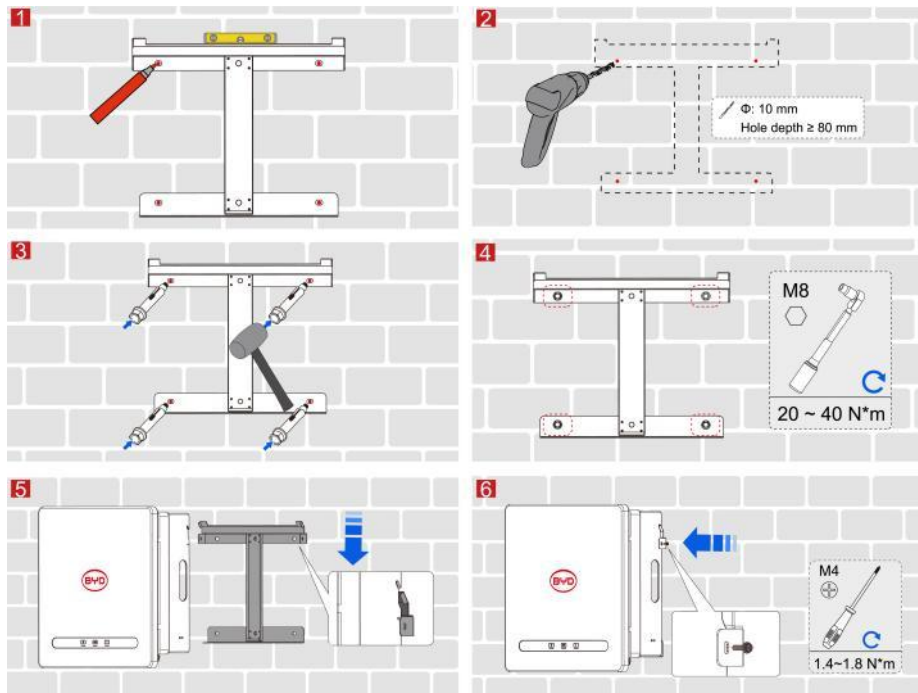


5.3.2.2 Wall Mounting



WARNING

- When installing a support, place the support first and then the bolts. Do not secure the bolts to the wall first. Otherwise, the installation may fail.



Procedure:

- Position the backplate horizontally using a level. Mark drilling points.
- Drill holes ($\varnothing 10\text{mm}$, depth $\sim 80\text{mm}$) using a percussion drill.
- Clean holes, align bracket holes, insert M8x80 expansion bolts, tighten to secure bracket.
- Place inverter onto the mounted bracket.
- Ensure pin hooks engage the inverter.
- Secure inverter to bracket using M4x14 screws (torque: $5\text{ N}\cdot\text{m}$) in the heat sink side holes.

6 Electrical Connection

6.1 Electrical Connection Overview



DANGER

- When PV modules are exposed to light, DC high voltage exists at the battery 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!
- Disconnect the DC switches and the AC output switches to power off the equipment before any electrical connections. Do not work with power on. Otherwise, an electric shock may occur.
- When crimping terminals, ensure the conductor fully contacts the terminal. Insulation must not be crimped. Improper crimping causes unreliable connections, malfunction, or terminal damage.



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.

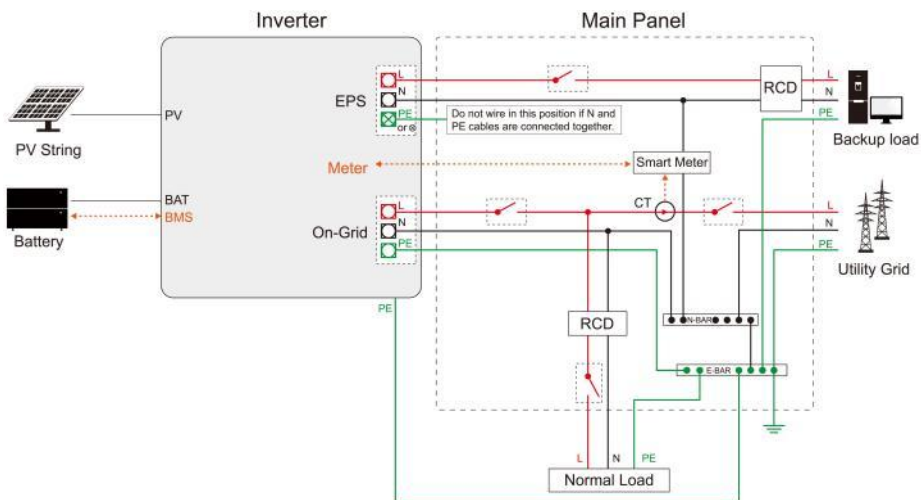
NOTICE

- Connection modes for Neutral (N) and Protective Earth (PE) wires at Grid and EPS ports vary by region. Consult local regulations.
- The Grid port and EPS AC port of the inverter have built-in relays. When the inverter works in off-grid state, the built-in Grid relay will be open; when the inverter works in on-grid state, the built-in Grid relay will be closed.
- When the inverter is powered on, the EPS AC port will be charged; if you need to perform maintenance of the EPS load, please power off the inverter first in order to avoid electric shock.
- Tie the same type cables together, and place them separately from cables of different types. Do not place the cables entangled or crossed.
- Avoid excessive cable tension. Leave sufficient slack before connecting to inverter ports.

N and PE cables are connected together in the Main Panel for wiring.

NOTICE

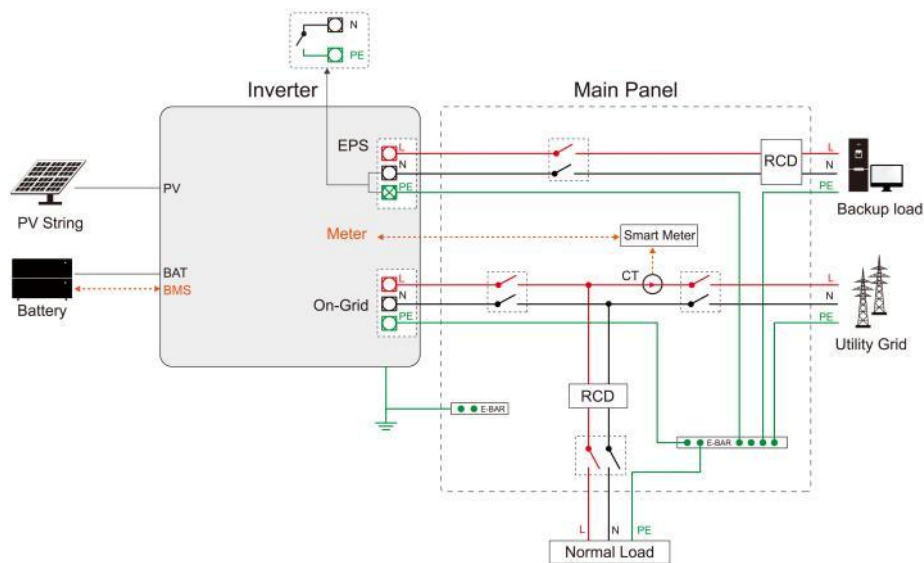
- The following wiring method is applicable for Australia, New Zealand.



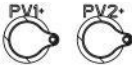
N and PE cables in the Main Panel shall be wired separately.

NOTICE

- Make sure the Backup grounding wire is properly connected and secured; otherwise, the Backup function may fail in the case of power grid failure.
- The following wiring method is applicable for regions other than Australia, New Zealand.



6.2 Connection Port Description

Connector	Description	Recommend Cable Type
	+ : Connect the positive electrode of photovoltaic cell	Industry common outdoor photovoltaic cable
	- : Connect the negative electrode of photovoltaic cell	
	+ : Connect the positive electrode of lithium battery	Outdoor multi-core copper cable
	- : Connect the negative electrode of lithium battery	
	EPS (Load)	L N PE Outdoor multi-core copper cable
	Grid (AC)	L N PE Outdoor multi-core copper cable

6.3 Recommended Cable Specifications

Inverter external cables include grounding cables, AC cables, DC input cables, battery input cables, and communication cables.

Recommended cable specifications are as follows:

No.	Designation	Position	Designation
1	Grounding cable	Single multi-core yellow-green copper cable	10 mm ²
2	Grid output cable	Two-core (L and N) or three-core (L/N and PE) different color multi-core copper cables	10 mm ²
3	EPS output cable	Two-core (L and N) or three-core (L/N and PE) different color multi-core copper cables	4 mm ²
4	PV input cable	Photovoltaic dedicated cable (such as PV1-F)	4 mm ²
5	Battery cable	Red and black multi-core copper	6 mm ²

6.4 Connection of Grounding Wire(mandatory)

NOTICE

- 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.



The inverter needs to be grounded nearby, and the steps to connect the protective grounding cable are as follows:

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 1 ~ 2 mm longer than the wiring end of the OT terminal. Use crimping pliers to crimp the OT terminal to the bare copper core. 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. 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 below).
2. Secure OT terminal to grounding port with M6 screw (torque: 2 N·m).

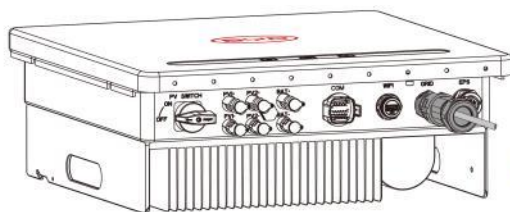
6.5 AC Wiring



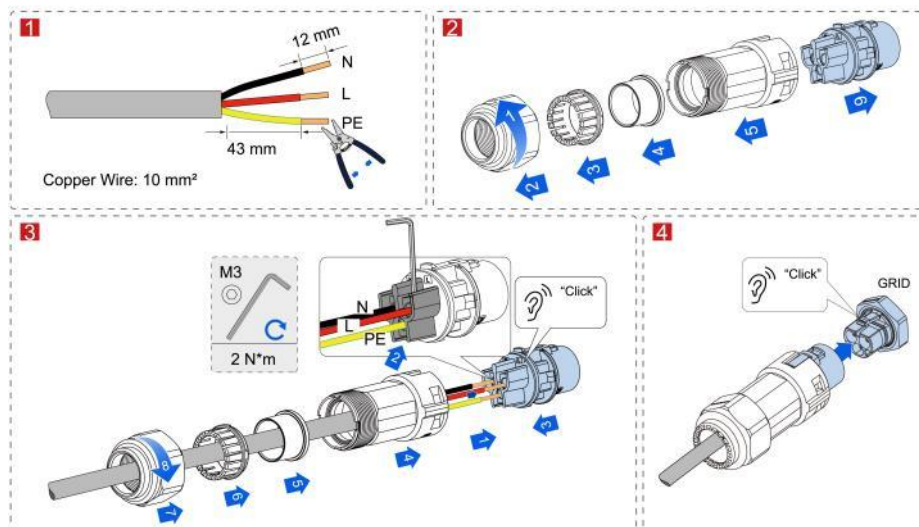
WARNING

- Install an AC circuit breaker matching the inverter's power rating between the inverter output and grid. Each inverter requires its own breaker!
- The on-grid and off-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!
- Never connect loads directly to inverters or AC circuit breakers!
- Make sure that the protective layer of the cable is inside the connector, otherwise it will lower the sealing level at the terminal.
- When fixing the cables, ensure that the cores are fully inserted into the wiring holes without exposure.

6.5.1 Grid Wiring



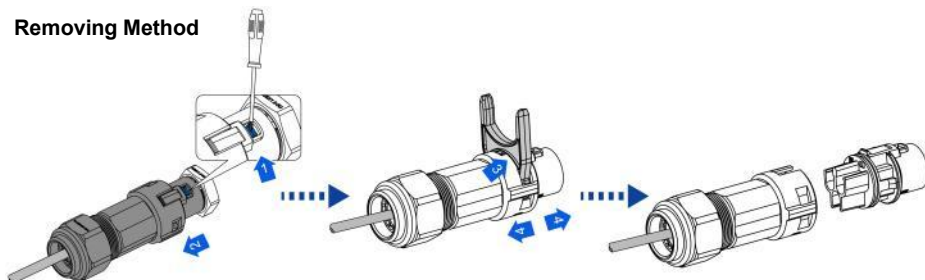
⚠ Before connecting the cables, disconnect the circuit breaker between the power grid and the inverter.



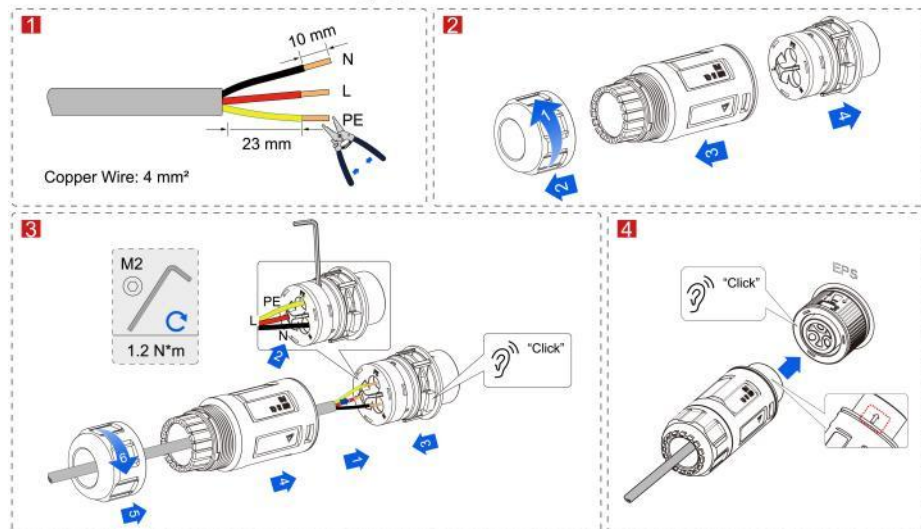
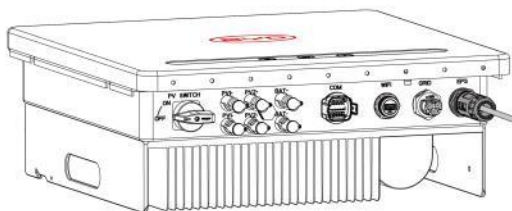
Procedure:

1. Prepare on-grid cables and strip the cables as shown in the above figure.
2. Disassemble the on-grid connector.
3. Insert the on-grid cables into on-grid output terminal, tighten the screw with the hex key, and tighten the cable connector.
4. Connect the on-grid output terminal and the inverter.

Removing Method



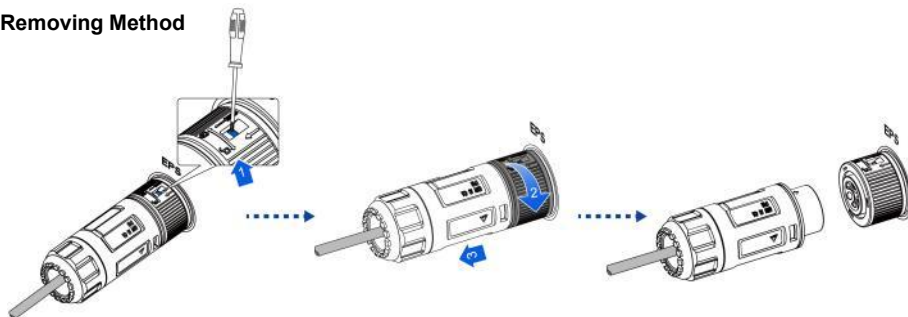
6.5.2 EPS Wiring



Procedure:

1. Prepare backup cables and strip the cables as shown in the above figure.
2. Disassemble the backup connector.
3. Insert the backup cables into backup output terminal, tighten the screw with the hex key, and tighten the cable connector.
4. Connect the backup output terminal and the inverter.

Removing Method

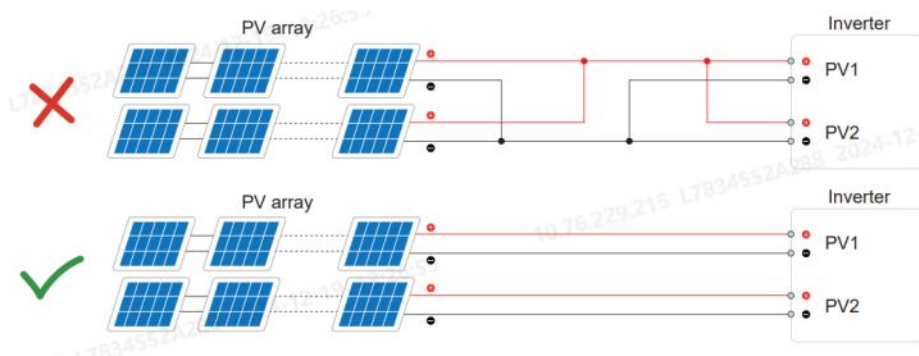


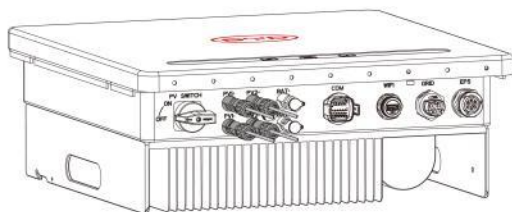
6.6 PV Wiring



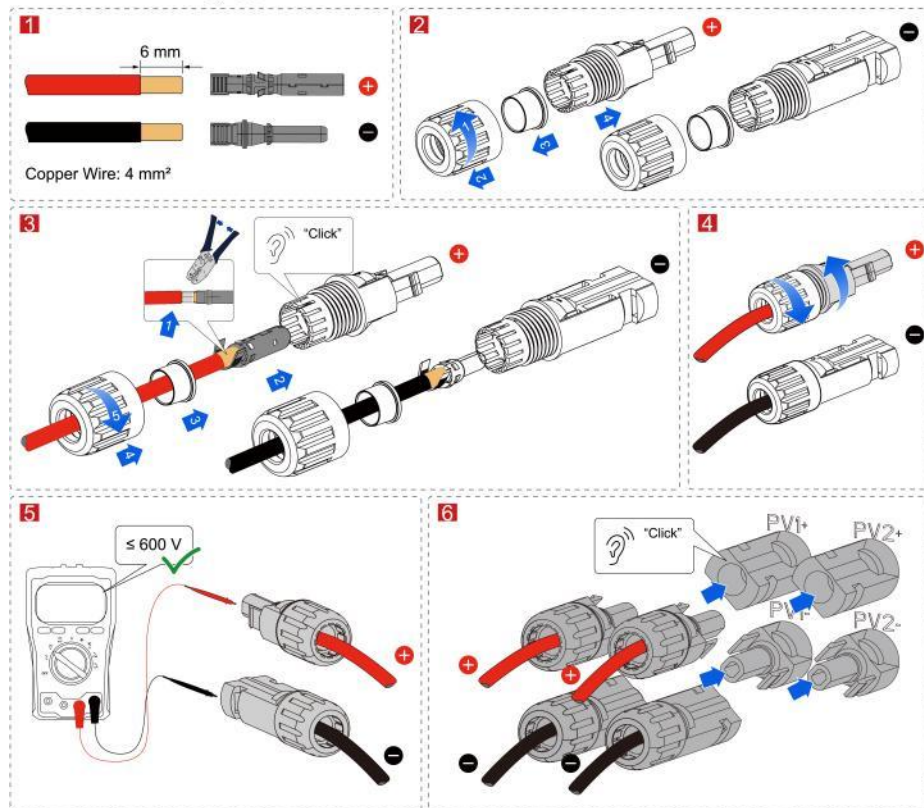
WARNING

- 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 photovoltaic panel is completely covered with an opaque cloth before the operation.
- The PV switch of the inverter must be in the "OFF" position!
- The parameter configuration of the battery 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.

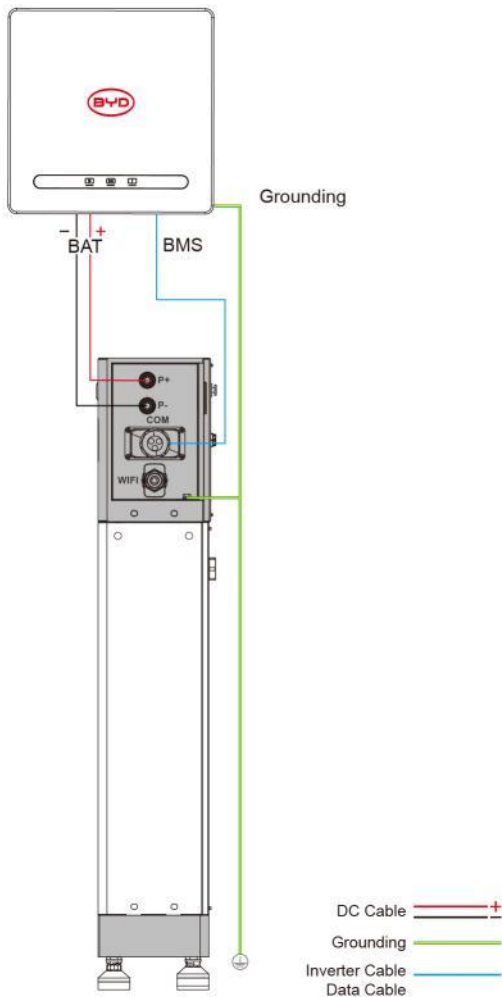


Procedure:

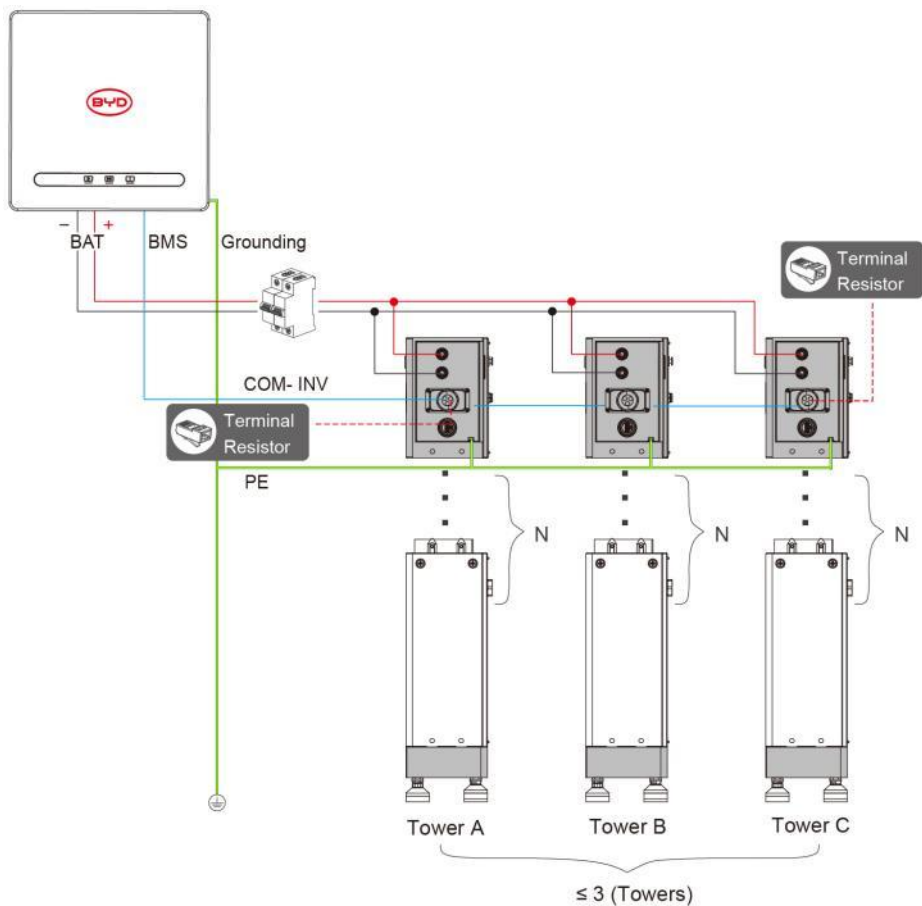
1. Use wire strippers to strip the insulation layer of the positive and negative cables to an appropriate length.
2. Disassemble the PV connector.
3. Put the insulation layer of the positive and negative cables into the corresponding metal terminals, and crimp them tightly with crimping pliers. Insert 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 PV terminals to ensure that the polarity of the PV 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 PV input terminals of the inverter. Insert the positive and negative connectors into the positive and negative poles of the PV input terminals of the inverter until a "click" sound is heard, indicating that they have been installed in place.

6.7 Battery Wiring Diagram

6.7.1 With One Battery Module



6.7.2 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 _____

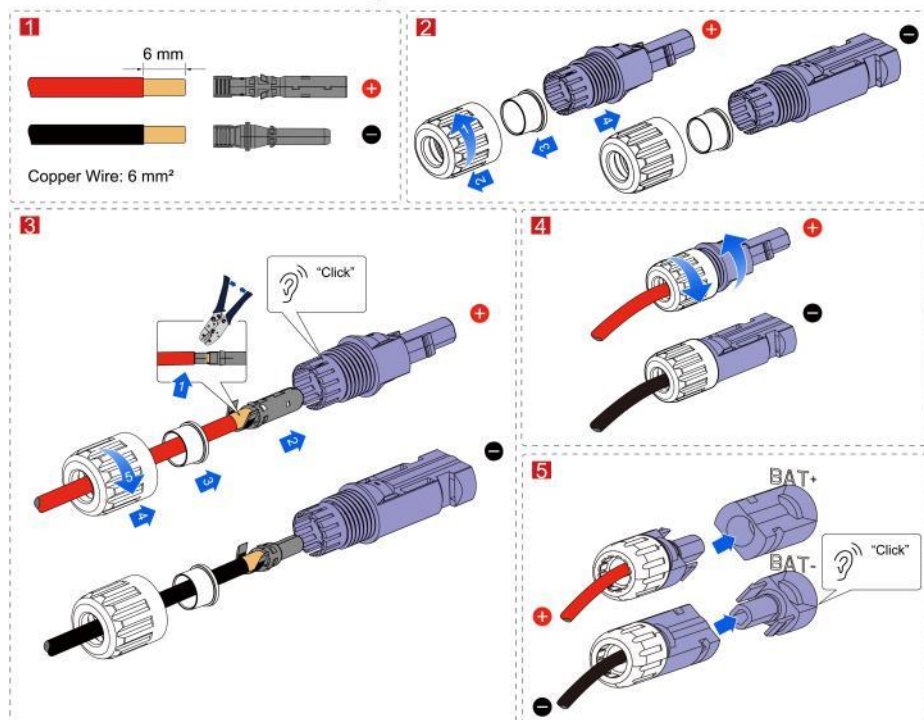
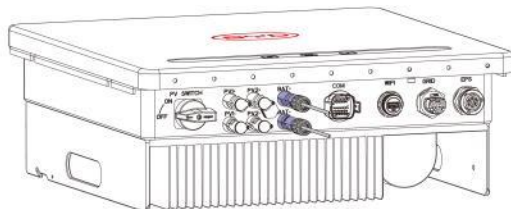
Data Cable

6.8 Battery Power Cable Wiring



WARNING

- Make sure polarity at both the battery and inverter is correctly connected.
- Power cable between the battery and the inverter: ≤ 1.5 m in length.
- Use only BYD-approved batteries (list available on official website).



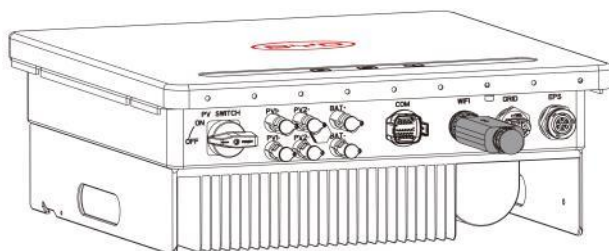
Procedure:

1. Use wire strippers to strip the insulation layer of the positive and negative cables to an appropriate length.
2. Disassemble the battery connector.
3. Put the insulation layer of the positive and negative cables into the corresponding metal terminals, and crimp them tightly with crimping pliers. 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. Remove the protection plugs of the positive and negative poles of the battery input terminal of the inverter. Insert the positive and negative connectors into the positive and negative poles of the battery input terminal of the inverter until a "click" sound is heard, indicating that they have been installed in place.

6.9 Connection of Smart WiFi/LAN Module

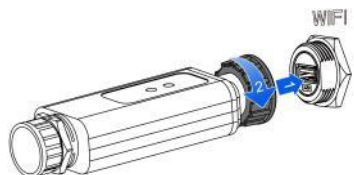
NOTICE

- Smart WiFi/LAN Module is a smart communications expansion module that works with BYD inverter.
- Connect via mobile App or WEB interface to configure parameters, view operation data, errors, and system status.
- LAN connection is recommend when there is no WiFi network or WiFi network is unstable.

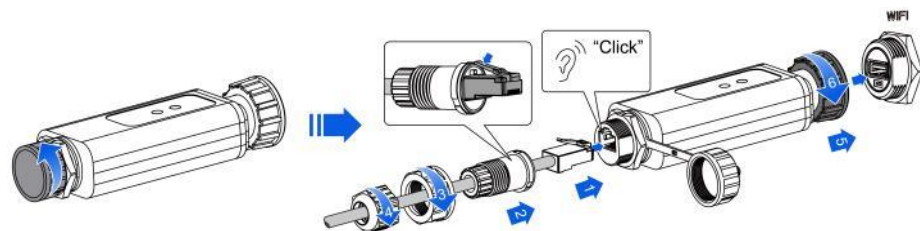


Installation Procedure

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 10 seconds to reset to factory settings.

6.10 Inverter Communication Cable Connection

NOTICE

- The Power-Box SH3-6K supports WiFi, Bluetooth, RS485, and external meter communication.
- Operating information like output voltage, current, frequency, fault information, etc., can be monitored locally or remotely and cellphone App via these interfaces.



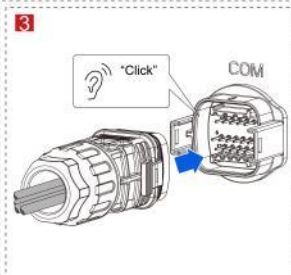
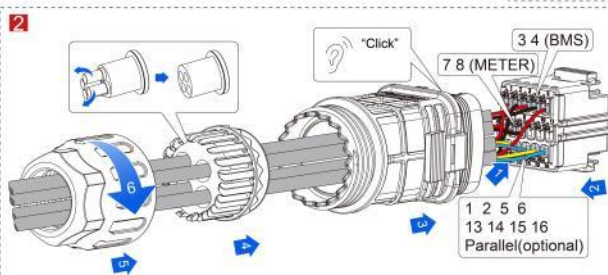
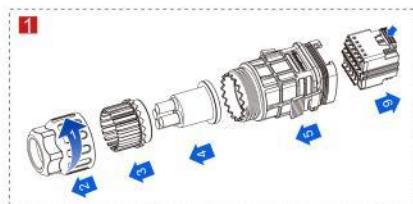
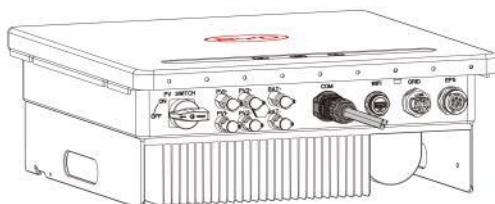
BMS_CAN



METER



PARA_CAN



No.	Function	Designation
1	BMS	Communication with battery for BMS monitoring and management (CAN/RS485).
2	EMS	Connect to PC through RS485A & B port for real-time data reading of inverter. The inverter manufacturer's debugging serial port.
3	METER	Connect the smart meter communication cable.
4	Parallel	Communication port for parallel inverters.

6.10.1 Connection of Lithium Battery BMS

NOTICE

- The BMS cable is included in the package of the inverter.

Connection with Battery Box HVE



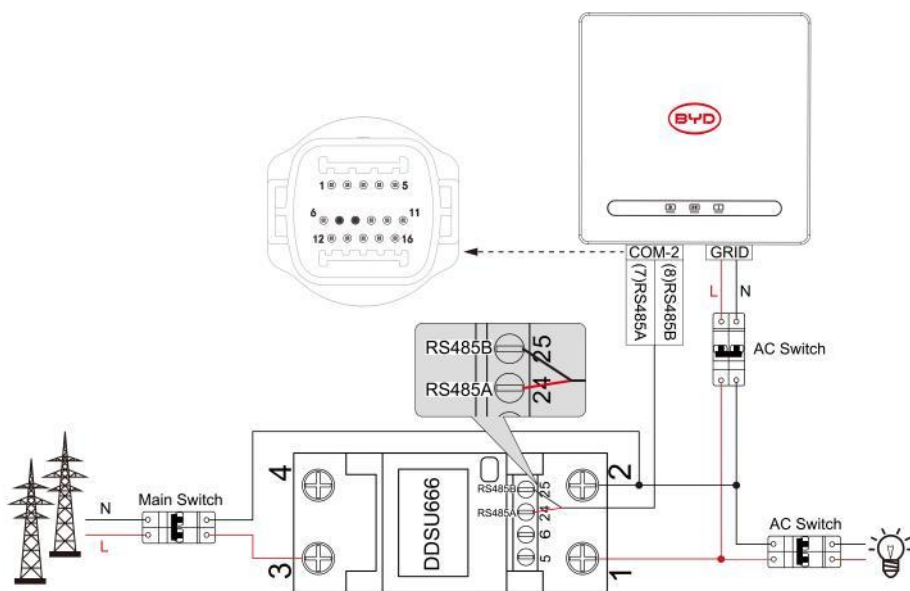
6.10.2 Connection of Smart Meter

NOTICE

- Ensure AC power is isolated before connecting meter wiring.
- Smart Meter is provided as a standard component.
- The Smart Meter 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.

End user can monitor home consumption by smart meter. You can connect the communication cable of the smart meter.

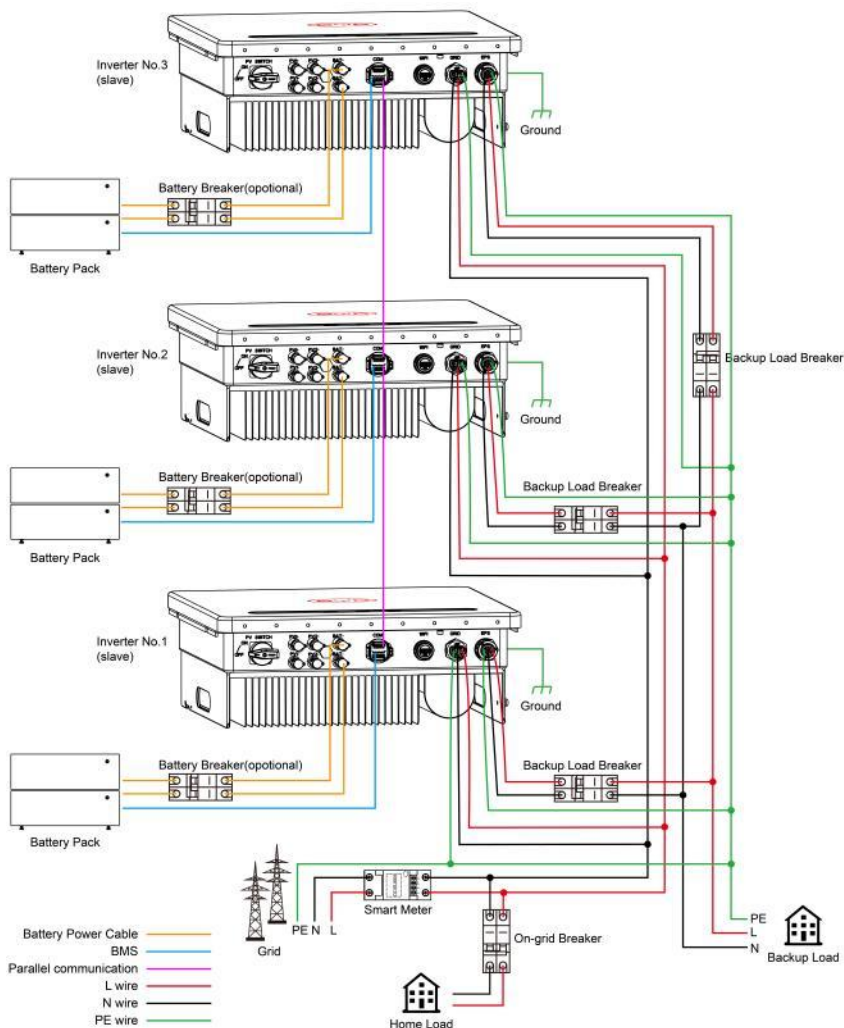
Below is the connection diagram of smart meter:



6.10.3 Connection of Smart Meter Parallel System

NOTICE

- The following diagram mainly introduces parallel connections. For other port connections, refer to the single system.
- Set master/slave roles via App.
- The maximum number of inverters that can be paralleled is 3 units.



6.10.4 Communication Line Connection Method

NOTICE

- The provided signal cable has been crimped. You do not need to crimp it yourself.

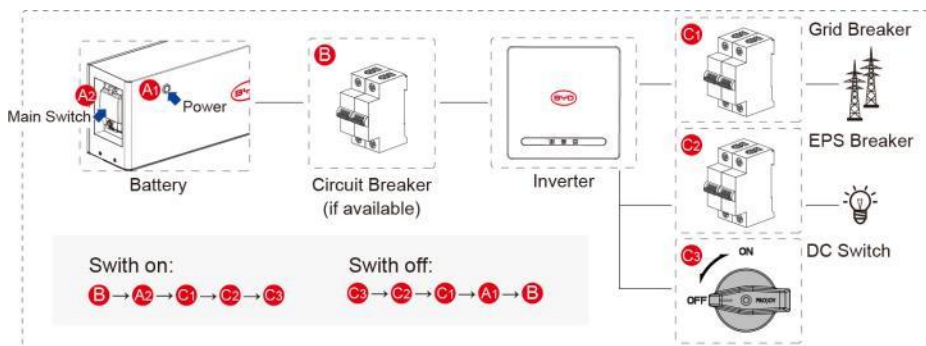
1. Press both the upper and lower sides of the connector head simultaneously, then remove the connector base to disassemble the connector.
2. Remove the waterproof cover, Route the cables through the nut and body, insert them into the corresponding ports, and press the signal cables.
3. Reinsert socket into connector body. Tighten connector. Push connector into inverter port until it clicks.

7 Commissioning

7.1 Check before Power on

NO.	Inspection Item
1	Verify inverter DC switch is "OFF".
2	Confirm inverter is securely installed in a clean, ventilated, accessible location.
3	Verify PE, DC input, AC output, and communication cables are correct and secure.
4	Ensure cable ties are intact, properly routed, and evenly spaced.
5	Confirm unused cable holes are sealed with waterproof nuts.
6	Ensure electrical conduit holes are sealed.
7	Verify grid voltage and frequency meet inverter requirements.
8	Confirm data acquisition module (WiFi/LAN) is installed correctly.

7.2 Power on



⚠ WARNING

- At the end of the above steps, please wait at least 5 minutes before proceeding to other operations.

7.3 Setting Inverter Parameters via BYD Energy App

NOTICE

- Do not power off during firmware upgrade. 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

Hybrid inverter has undergone a series of tests before delivery. To maintain and extend the service life of the inverter, you need to perform necessary routine maintenance in addition to using it in strict accordance with this Manual.



WARNING

- Make sure the inverter is disconnected from the power supply.
- To operate the inverter, please wear personal protective equipment(PPE).

8.1 Regular Maintenance of Inverter

Maintenance Item	Interval	Process
Saving the inverter's running data	Every quarter	Use the monitoring software to read the inverter data in real time, and backup the recorded data periodically. Save the running data, parameters and logs of the inverter recorded by the monitoring software to a file. Check the monitoring software and view the parameter settings of the inverter through the hand-held keyboard.
Inverter Running condition of the inverter	Every six months	Observe whether the inverter is installed securely, damaged or deformed. Check if there is any abnormal sound during operation. Check the variables when the system is running in on-grid state. Check whether the heating of the inverter housing is normal, and use the thermal imager to monitor the heating of the system.
Cleaning the inverter	Every six months	Check the ambient humidity and dust around the inverter. If they affect the heat dissipation of the inverter, shut down the inverter and turn off the power supply, and clean the inverter with a soft brush or dry cloth after it cools down.
DC switch	Every year	Check whether the DC switch functions properly by turning it on and off 10 times consecutively.
Electrical connection	Every six months	Check whether the cable connections and the terminals of the inverter become loose. Check the cables for damage, especially whether there are any cuts on the cable skin that may come in contact with metal surface.
Sealing	Every year	Check whether the sealing of the cable holes meets the requirements. If any cable hole is not sealed or shows a large sealing gap, re-seal it.
Safety function	Every year	Check the LCD screen and the system shutdown function. Simulate a shutdown and check the shutdown signal communication. Check the warning labels and replace them if necessary.

8.2 Removing the Inverter

Procedure :

1. Disconnect all electrical connections of the inverter, including the DC wire, AC wire, communication cable, communication module and grounding wire.
2. Remove the inverter from the mounting bracket.
3. Remove the mounting bracket.
4. Keep the inverter properly for future use, according to the storage environment requirements.

8.3 Scrapping the Inverter

If the inverter cannot be used any longer, dispose of the inverter according to the electrical waste disposal requirements of the laws and regulations of your country/region. Do not dispose of the inverter as household waste.

9 Troubleshooting

Fault Codes and Troubleshooting



WARNING

- If you are not professional at troubleshooting, contact your dealer for help. Please wear personal protective equipment(PPE) and power off the inverter before troubleshooting!

This Chapter lists the faults by a list of fault codes, so that you can find troubleshooting actions quickly.

You can use the following methods to do troubleshooting. If unresolved, contact BYD After-sales Service.

Please provide the following information to our After-sales Service Center 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: _____

Warning Codes of Inverter

Warning Code	Description	Actions
2000	Bypass Relay Fault	Check whether the EPS load is short-circuited. If no, wait for 5 minutes after the power is off, power it on again, and check again. If not, please contact us.
2001	Over Load	Check whether the total load on the load side exceeds the rated load power of the inverter.
2002	Bat Volt Low	Check whether the battery voltage is lower than the rated minimum input voltage of the inverter.
2003	Pv2 Volt Low	Check whether the output voltage of the photovoltaic panel is within the rated minimum voltage range of the inverter.
2004	Pv1 Volt Low	
2005	Unknown Model	Wait for 5 minutes after the power is off, power it on again, and check it again. If not, please contact us.
2006	BMS Lost	Check whether the communication cable between the inverter and the battery is abnormal.

Fault Codes of Inverter

Fault Code	Description	Actions
2007	Grid Lost Fault	Check whether the power grid is cut off. If yes, wait for the power grid to recover. If no, check whether the cable connection is normal, for example, whether the cable is a breakpoint or whether the cable connection is yes.
2009	Grid Ground Fault	Check whether L and N are reversed, and whether PE is properly grounded.
2010	Relay Fault	Wait for 5 minutes after the power is off, power it on again, and check it again. If not, please contact us.
2011	Inverter Relay Fault	
2012	EPS Relay Fault	
2013	Battery Relay Fault	
2014	PV Config Director Fault	Check whether the PV input polarity is reversed.
2015	SCI Communication Fault	Wait for 5 minutes after the power is off, power it on again, and check it again. If not, please contact us.
2016	DSP SPI Communication Fault	
2019	Grid Volt Fault	Check whether the power grid voltage is within the rated power grid voltage range of the inverter.
2020	Grid Frequency Fault	Check whether the power grid frequency is within the rated power grid frequency range of the inverter.
2021	10min Volt Fault	Check whether the power grid voltage is within the rated power grid voltage range of the inverter.
2022	EPS Volt Fault	Check whether the EPS voltage is within the rated output value. If not, power off the device, wait for 5 minutes, power on the device, and check again. If not, please contact.
2023	Output Short Fault	Check whether the total load on the load side exceeds the rated load power of the inverter.
2030	PV Iso Fault	Check whether the insulation of the PV input cable is damaged.
2031	Battery ISO Fault	Check whether the insulation of the battery input cable is damaged
2032	PV Volt Fault	Check whether the output voltage of the photovoltaic panel is within the rated PV voltage range of the inverter.
2041	Hardware PV Current Fault	Check whether the output current of the photovoltaic panel is within the rated PV current range of the inverter.
2042	Software PV Current Fault	
2043	Bus Voltage Fault	Check whether the PV and battery voltage exceeds the rated voltage range of the inverter.
2044	Hardware Bus Over Volt Fault	
2045	Bus Under Volt Fault	
2046	Software Bus Over Volt Fault	
2072	Hardware Inverter Current Fault	Check whether the load at the EPS end is at the rated output power. If not, please turn off the power and wait for 5 minutes, turn on the power again and check again. If unable to recover, please contact us.
2076	Software Inverter Current Fault	
2081	Grid Volt Consistent Fault	Power off, wait for 5 minutes, power on again, and check again. If unable to recover, please contact us.
2082	Grid Frequency Consistent	

	Fault	
2083	RCD Consistent Fault	
2084	DCI Consistent Fault	
2092	DCI Fault	Power off, wait for 5 minutes, power on again, and check again. If unable to recover, please contact us.
2093	EPS DCV Fault	
2098	Res Current Fault	Check whether the wire insulation of each input and output is damaged.
2099	Res Current Hardware Fault	Power off, wait for 5 minutes, power on again, and check again. If unable to recover, please contact us.
2109	Temperature Fault	
2110	Ambient Temperature Fault	Check whether the installation ambient temperature of the inverter is too high; shut down the inverter and restart it after the temperature of the inverter is reduced.
2114	Control Board EEPROM Write Fault	Power off, wait for 5 minutes, power on again, and check again. If unable to recover, please contact us.
2115	Control board EEPROM Read Fault	
2116	ARM EEPROM Write Fault	
2118	DSP Sample Fault	
2133	Battery Volt Fault	Check whether the battery voltage is within the rated battery voltage range of the inverter.
2134	BMS Charge Current High	Wait 5 minutes, power up again, and check again. If unable to recover, please contact us.
2135	BMS Discharge Current High	
2136	Battery Power Low	Power off, wait for 5 minutes, power on again, and check again. If unable to recover, please contact us.
2137	Battery Volt Low Warn	Check whether the battery voltage is lower than rated minimum input voltage of the inverter.
2138	Battery Buck Fault	Power off, wait for 5 minutes, power on again, and check again. If unable to recover, please contact us.
2139	Battery Boost Fault	
2141	EPS Over Load	Check whether the total load on the load side exceeds the rated value of the inverter load power.
2142	Battery Config Director Fault	Check whether the input polarity is reversed.
2143	Hardware Battery Current Fault	Power off, wait for 5 minutes, power on again, and check again. If unable to recover, please contact us.
2144	Software Battery Current Fault	
2145	BMS Volt High	Check whether the battery voltage is higher than rated maximum input voltage of the inverter.
2146	BMS Ext Fault	Check whether the communication line between the inverter and the battery is connected abnormally.
2147	BMS Int Fault	Power off, wait for 5 minutes, power on again, and check again. If it cannot be restored, please contact the battery manufacturer.
2148	BMS Temperature High	
2149	BMS Temperature Low	
2150	BMS Hardware Protect	
2151	BMS Hardware Protect	
2152	BMS Insul Fault	
2153	BMS Volt Sensor Fault	

2154	BMS Temperature Sensor Fault	
2155	BMS Current Sensor Fault	
2156	BMS Relay Fault	
2157	BMS Software Hardware Unmatch	
2158	BMS M&S Unmatch	
2159	BMS Version Unmatch	Confirm whether the battery BMS version matches the inverter.
2160	BMS Mfg Unmatch	Confirm whether the battery is matched with the inverter.
2161	BMS Charge Request NoAck	Check whether the inverter battery input cable connection is loose or falls off.
2162	BMS Type Unmatch	Confirm that the battery type is lithium battery/lead-acid battery, and select the corresponding battery type.
2167	Meter Lost Fault	Check whether the communication line between the inverter and the ammeter is connected abnormally.

10 Technical Parameters

	Power-Box SH3K	Power-Box SH3.7K	Power-Box SH4.6K	Power-Box SH5K	Power-Box SH6K
Battery Parameters					
Compatible Battery	BYD Battery-Box HVE				
Battery Type	Lithium battery				
Battery Voltage (V)	80 ~ 480 V				
Max. Charge Current (A)	35 A				
Max. Discharge Current (A)	35 A				
Max. Charge Power (W)	3,000	3,680	4,600	5,000	6,000
Max. Discharge Power (W)	3,000	3,680	4,600	5,000	6,000
Communication Mode	CAN / R485				
PV String Input					
Max. Input Power (W)	6000	7360	8280	9000	9000
Max. Input Voltage (V)	600				
Start-up Voltage (V)	120				
Rated Voltage (V)	360				
MPPT Voltage Range (V)	80 - 500				
Max. Current per MPPT (A)	16				
Max. Short Circuit Current per MPPT (A)	24				
Number of MPP Trackers	2				
Number of Strings per MPPT	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1
AC Input / Output (Grid)					
Rated Input / Output Power (W)	3,000+3,000	3,680+3,680	4,600+4,600	5,000+5,000	6,000+6,000
Max. Input / Output Apparent Power (VA)	3,300	4,050	4,600	5,500	6,600
Rated Input / Output Current (A)	13	16	20	21.7	26.1
Max. Input / Output Current (A)	26 / 15	32 / 18	40 / 20.9	44 / 25	52 / 30
Rated Voltage Range	1 / N / PE, 230 V				
Voltage Range	0.9 Ur ~ 1.1 Ur				
Grid Frequency (Hz)	50 (47.5~52.5) / 60 (57~ 63)				
Power Factor	0.99, 0.8 leading ~ 0.8 lagging adjustable				
THDi	< 3%	< 3%	< 3%	< 3%	< 3%

EPS Output					
Rated Output Power (W)	3,000	3,680	4,600	5,000	6,000
Max. AC Output Apparent Power (VA)	6,000@10sec	7,360@10sec	9,200@10sec	10,000@10sec	12000@10sec
Switching Time (ms)	< 13				
Max. Output Current (A)	13	16	20	22	26
Rated Output Voltage	1 / N / PE, 230 V				
Rated Output Grid Frequency (Hz)	50 / 60				
THDv	< 2%				
Efficiency					
MPPT Efficiency	99.9%				
Max. Efficiency	97.7%				
Protection					
Protection Class	I				
Anti-islanding Protection	Integrated				
DC Reverse Polarity Protection	Integrated				
Insulation Monitoring	Integrated				
DC Surge Protection	Integrated				
AC Surge Protection	Integrated				
Residual Current Monitoring	Integrated				
AC Overcurrent Protection	Integrated				
AC Short-circuit Protection	Integrated				
Over Voltage Category	DC II / AC III				
Over-heat Protection	Integrated				
General Date					
Operating Temperature Range (°C)	-25 ~ +60 °C				
Relative Operating Humidity	0 ~ 100% RH, Non-Condensing				
Max. Operating Altitude (m)	4000 m				
Nighttime Power (W)	< 13				
Topology	Non-isolated				
Ingress Protection	IP65				
RH	0 ~ 100%				
Communication	RS485, CAN, Wi-Fi, LAN , Bluetooth				

Noise (dB)	< 25
Cooling Mode	Natural Convection
Display	LED
Dimensions (W × H × D mm)	480 * 480 * 180
Weight (kg)	20
Standards Compliance	
Safety / EMC Standard	EN/IEC 62109-1/2, EN/IEC 60529, EN/IEC 62040-1,EN IEC 61000-6-1, EN IEC 61000-6-3, EN IEC 61000-3-12, EN IEC 61000-3-11, EN IEC 61000-3-2, EN 61000-3-3
Grid Connection Standard	CEI 0-21, EN 50549-1, VDE-AR-N 4105, UNE 217002, NTS TYPEA, G99



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