User Manual

Hybrid Energy Storage Inverter
HB Series
3.0-6.0kW

Energycreative (Shenzhen) Technology Co., Ltd.

Notice

Due to product version upgrades or other reasons, the document content may be updated periodically, Unless otherwise agreed, the content of the document cannot replace the safety precautions in the product label or user manual. All descriptions in the document are for use only as guidance.

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1 Preface

This document mainly introduces the product information, installation wiring, configuration testing, troubleshooting, and maintenance content of inverters. Before installing and using this product, please carefully read this manual, understand product safety information, and familiarize yourself with the product's functions and features. The document may be updated periodically. Please obtain the latest version information and more product information from the official website.

1.1 Applicable Model

This document applies to the following models of inverters:

Hybrid Energy Storage Inverter

- HB1030EH024
- HB1030EH048
- HB1036EH048
- HB1040EH048
- HB1046EH048
- HB1050EH048
- HB1060EH048

1.2 Applicable Personnel

Only applicable to professionals who are familiar with local regulations, standards, electrical systems, have undergone professional training, and are familiar with the relevant knowledge of this product.

1.3 Symbol Definition

To better utilize this manual, the following symbols are used to highlight important information. Please read the symbols and instructions carefully.

DANGER
Indicates a highly potential danger that, if not avoided, could result in death or serious injury to personnel.
WARNNING
Indicates a moderate potential danger, if not avoided, could lead to death or serious injury.
CAUTION
Indicates a low potential danger that, if not avoided, may result in moderate or mild injury to personnel.
NOTICE
Emphasizing and supplementing the content may also provide tips or tricks for optimizing product usage, which can help you solve a problem or save you time.

1.4 Updates

V1.0 2022-04-30

- First Issue

2 Safety Precautions

The safety precautions contained in this document must be followed at all times when operating the device.

NOTICE
The inverter has been designed and tested in strict accordance with safety regulations, but as an electrical device, it is necessary to follow relevant safety instructions before performing any operations on the device. Improper operation may result in serious injury or property damage.

2.1 General security

NOTICE
• Due to product version upgrades or other reasons, the content of the document may be updated irregularly. Unless otherwise agreed, the content of the document cannot replace the safety precautions in the product label or user manual.All descriptions in the document are only intended as a guide for use. • Please read this document carefully before installing the device to understand the product and precautions. • All operations of the equipment must be conducted by professional and qualified electrical technicians, who are familiar with relevant standards and safety regulations in the project location. • When operating the inverter, it is necessary to use insulating tools and wear personal protective equipment to ensure personal safety.When touching electronic devices, it is necessary to wear electrostatic gloves, electrostatic wristbands, anti-static clothing, etc. to protect the inverter from static damage. • Equipment damage or personal injury caused by the failure to install, use, and configure the inverter according to the documentation requirements is not within the scope of responsibility of the equipment manufacturer.For more product warranty information, please visit the official website.

2.2 PV String Safety

DANGER
Please use the DC terminal block provided with the box to connect the DC cable of the inverter. Using other types of DC terminal blocks may result in serious consequences, and any resulting equipment damage is not covered by the equipment manufacturer's liability.

WARNNING
• Photovoltaic modules used with inverters must comply with IEC61730 Class A standards. • Do not connect the same PV string to multiple inverters, as this may result in damage to the inverters. • After connecting the DC cable, make sure that the cable is firmly connected and not loose. • Ensure that the component frame and support system are well grounded. • Use a multimeter to measure the positive and negative poles of the DC cable to ensure that the positive and negative poles are correct, that there is no reverse connection, and that the voltage is within the allowable range.

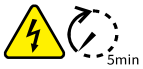
2.3 Inverter Safety

WARNNING

- Ensure that the voltage and frequency of the grid-connected access point meet the grid-connected specifications of the inverter.
- It is recommended to add protection devices such as circuit breakers or fuses on the AC side of the inverter, with specifications greater than 1.25 times the rated AC output current of the inverter.
- The protective grounding wire of the inverter must be firmly connected. When multiple inverters are used, ensure that the protective grounding points of all inverter chassis enclosures are connected at equal potential.
- If the inverter has less than 5 arc faults within 24 hours, the alarm can be automatically cleared.After the fifth arc fault, the inverter shuts down for protection, and it can only work normally after the fault is cleared (arc detection device is optional).
- If the system is not configured with a battery, the LOAD function cannot be used, resulting in system power consumption risks that exceed the warranty scope of the device manufacturer.

DANGER

- After the inverter is installed, the labels and warning signs on the box must be clearly visible, and it is forbidden to cover, alter, or damage them.
- The inverter box has the following marks:

	High voltage hazard.There is high voltage when the inverter is running. When operating the inverter, ensure that the inverter is powered off.		After the device is powered off, please wait for 5 minutes until the device is fully discharged.
	Please read the product manual carefully before operating the equipment.		There are potential dangers after the equipment is running.Please take protective measures during operation.
	The surface of the inverter is hot, and it is forbidden to touch it during operation, otherwise it may cause scalding.		The device cannot be disposed of as household waste. Please dispose of the device according to local laws and regulations, or return it to the device manufacturer.
	CE symbol		RCM symbol
	TUV symbol		Connection point of protective grounding wire.

2.4 Battery Safety

WARNNING

- The batteries used with the inverter need to be approved by the inverter manufacturer. For a list of approved batteries, please contact the inverter manufacturer or distributor.
- Please read the user manual corresponding to the battery carefully before installing the device to understand the product and precautions, and please strictly follow the requirements of the battery user manual.
- If the battery is fully discharged, please charge it in strict accordance with the user manual of the corresponding model.
- The battery current may be affected by some factors, such as temperature, humidity, weather conditions, etc., which may lead to current limiting of the battery and affect its load carrying capacity.
- If the battery cannot be started, please contact the after-sales service center as soon as possible.Otherwise, the battery may be permanently damaged.
- Use a multimeter to measure the positive and negative poles of the DC cable to ensure that the positive and negative poles are correct and the voltage is within the allowable range.

2.5 Personnel Requirements

NOTE

- The personnel responsible for installing and maintaining equipment must be strictly trained first, understand various safety precautions, and master the correct operation methods.
- Installation, operation, maintenance, and replacement of equipment or components are only allowed to be performed by qualified professionals or trained personnel.

2.6 EU Declaration Of Conformity

Devices with wireless communication capabilities that can be sold in the European market meet the following directive requirements:

- Radio Equipment Directive 2014/53/EU (RED)
- Restrictions of Hazardous Substances Directive 2011/65/EU and (EU) 2015/863 (RoHS)
- Waste Electrical and Electronic Equipment 2012/19/EU
- Registration, Evaluation, Authorization and Restriction of Chemicals (EC) No 1907/2006 (REACH)

Devices that do not have wireless communication capabilities and can be sold in the European market meet the following directive requirements:

- Electromagnetic compatibility Directive 2014/30/EU (EMC)
- Electrical Apparatus Low Voltage Directive 2014/35/EU (LVD)
- Restrictions of Hazardous Substances Directive 2011/65/EU and (EU) 2015/863 (RoHS)
- Waste Electrical and Electronic Equipment 2012/19/EU
- Registration, Evaluation, Authorization and Restriction of Chemicals (EC) No 1907/2006 (REACH)

More EU declaration of conformity can be obtained from the official website.

3 Product Introduction

3.1 Product Overview

Function Overview

The inverter controls and optimizes energy flow in the system through an integrated energy management system.It can supply the generated power in the system to the load, store it in the battery, and output it to the grid.

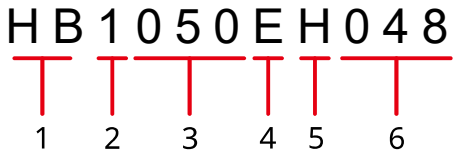
Model Description

This document applies to the following inverter models:

Hybrid Energy Storage Inverter

- HB1030EH024
- HB1030EH048
- HB1036EH048
- HB1040EH048
- HB1046EH048
- HB1050EH048
- HB1060EH048

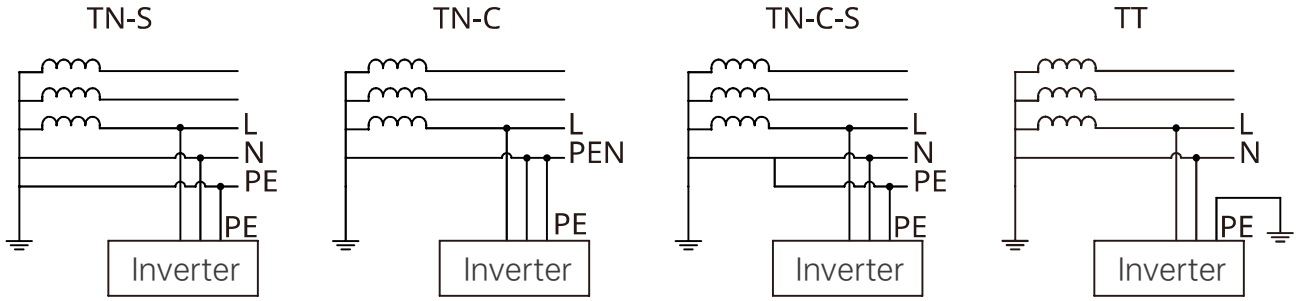
Model Meaning



NO.	Meaning	Description
1	Product type	HB: Household hybrid energy storage
2	Product phase number	1:Single-phase
3	Rated power	050: Rated power is 5000W
4	Rated output voltage	**E:**European Grid Voltage Standards single-phase: single-phase: 220/230V, three-phase: 380/400V
5	PV input voltage	H:PV input voltage>200V
6	Battery voltage	024: battery voltage 24V 048: battery voltage 48V

Supported Grid Types

For power grid types with N lines, the N-to-ground voltage needs to be less than 10V.

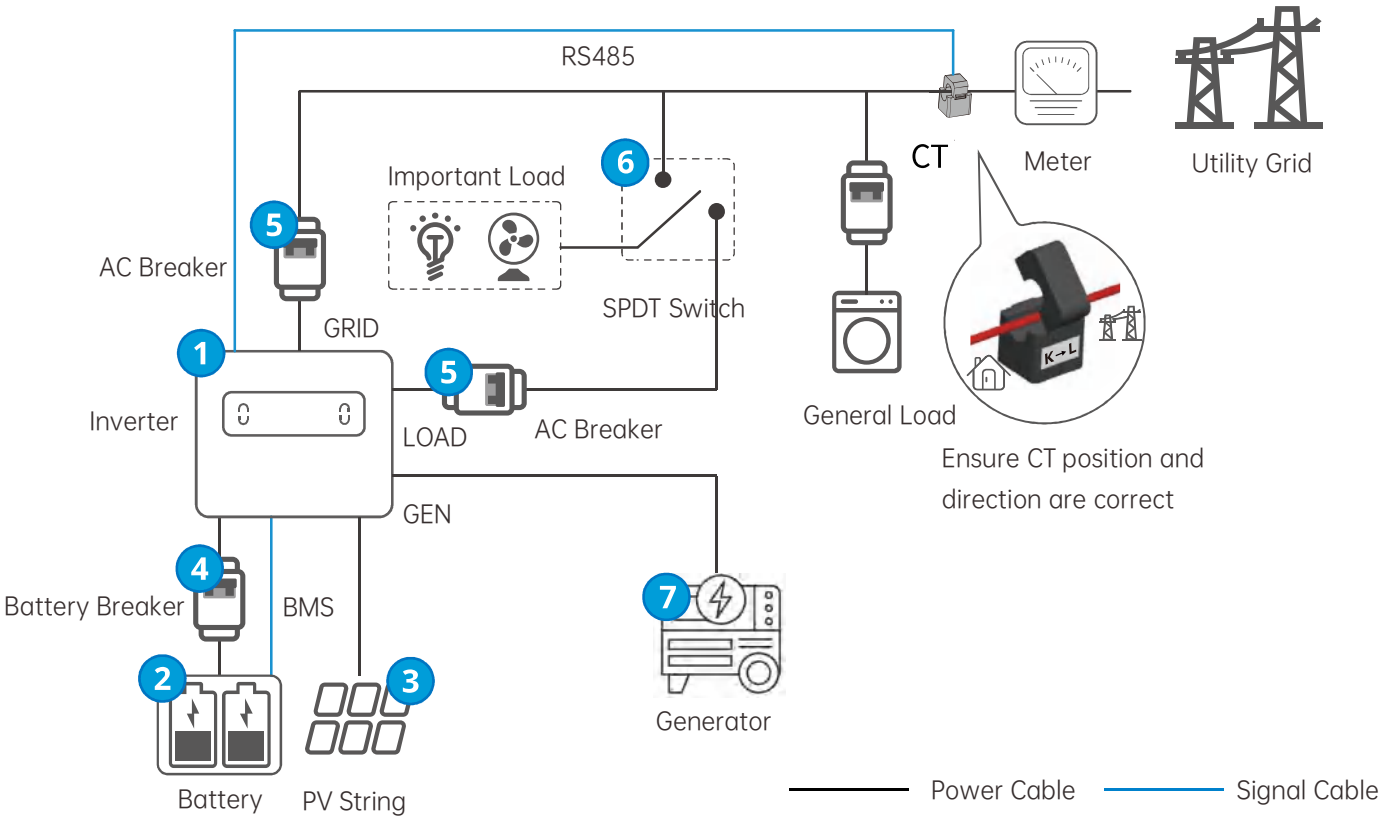


3.2 Application Scenarios

WARNNING

- The system is not suitable for connecting devices that rely on stable power supply, such as life-sustaining medical equipment. Please ensure that personal injury cannot occur when the system is powered off.
- If the system is not configured with a battery, the LOAD function cannot be used, and the resulting system operation risks will exceed the warranty scope of the device manufacturer.
- The battery current may be affected by some factors, such as temperature, humidity, weather conditions, etc., which may lead to current limiting of the battery and affect its load carrying capacity.
- When the inverter is overloaded for a single time, it can automatically restart;if it happens multiple times, the restart time of the inverter will be extended. If you need to restart the inverter as soon as possible, you can power off and then power on the device again.
- When the grid power fails, if the load capacity exceeds the rated power of the inverter, the off-grid function of the inverter will automatically turn off. If it needs to be started, the large load should be turned off to ensure that the load power is less than the rated power of the inverter.
- The inverter's LOAD output port has overload capacity and UPS functionality (switching time <10ms), allowing normal household loads to operate during grid power outages.To ensure UPS switching and load power supply stability, avoid using loads with high starting currents, such as high-power pumps.The supported load sizes are as follows:
  - Inductive load + capacitive load ☒1.1* rated output power of the inverter.

Self-generation for self-use (hybrid energy storage inverter)

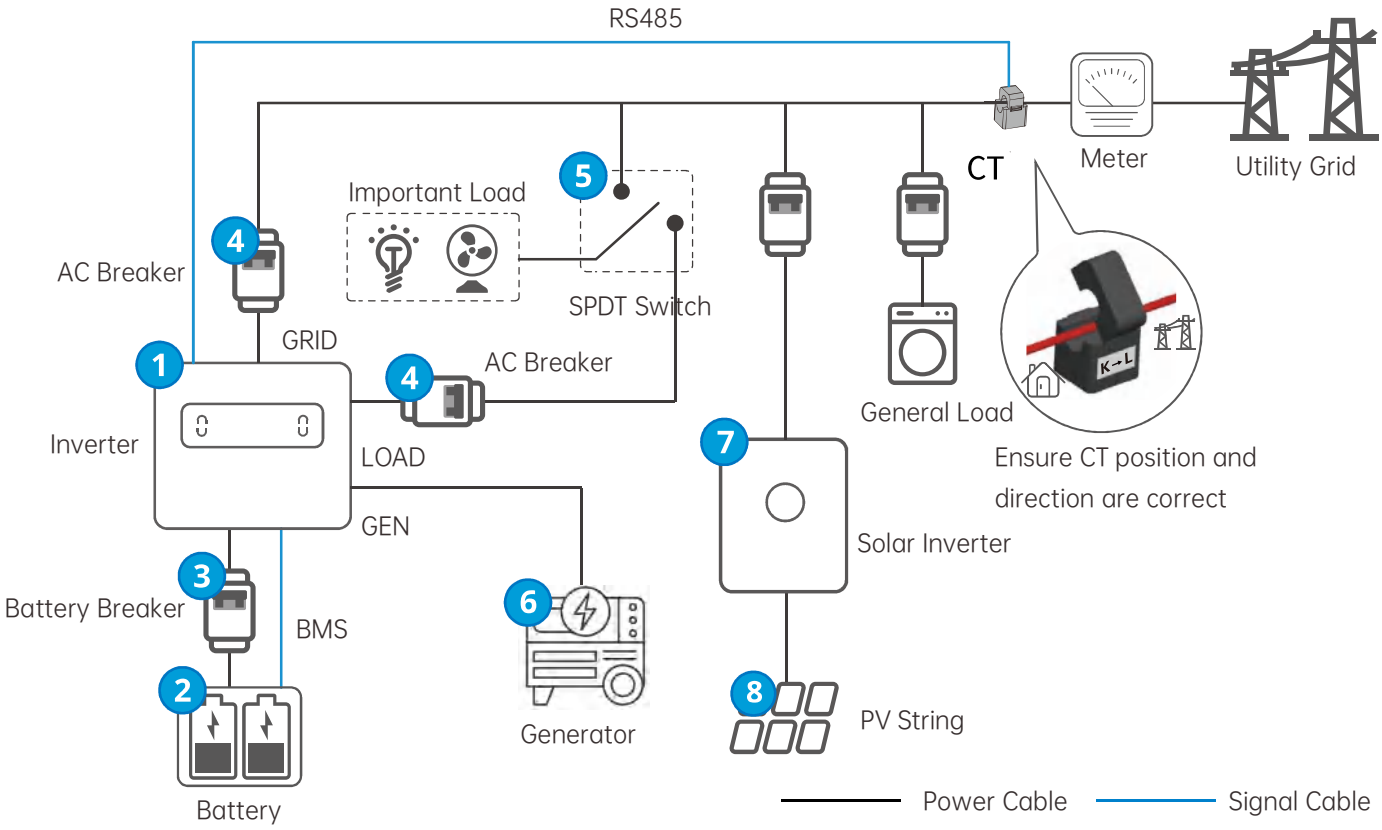


NO.	Parts	Description
1	Inverter	HB series household hybrid energy storage inverter.
2	Battery	Select the model according to the matching list of inverter and battery.
3	PV String	The PV string is composed of photovoltaic modules in series.
4	Battery Breaker	2P DC breakers shall be prepared by the customers with the following specifications: • HB1030EH024:rated current≥200A, rated voltage ≥60V. • HB1030EH048、HB1036EH048、HB1040EH048:rated current≥125A, rated voltage ≥60V. • HB1046EH048、HB1050EH048:rated current≥150A, rated voltage ≥60V. • HB1060EH048:rated current≥200A, rated voltage ≥60V.

5	AC Breaker	• The breaker specifications for the LOAD and GRID for one inverter type shall be the same. The AC breakers shall be prepared by the customers.
		• To ensure the LOAD is powered by the grid during the inverter maintenance, install a SPDT Switch.
		• The specification of the breaker and SPDT for the LOAD and GRID loads:
		  • HB1030EH024、HB1030EH048、HB1036EH048、HB1040EH048: rated current≥32A, rated voltage ≥230V.
		  • HB1046EH048、HB1050EH048、HB1060EH048: rated current≥63A, rated voltage ≥230V.

6	SPDT Switch	
7	Generator	The maximum power of the generator shall not be less than the rated power of the inverter.

Self-generation for self-use (AC-Coupled Scenario)



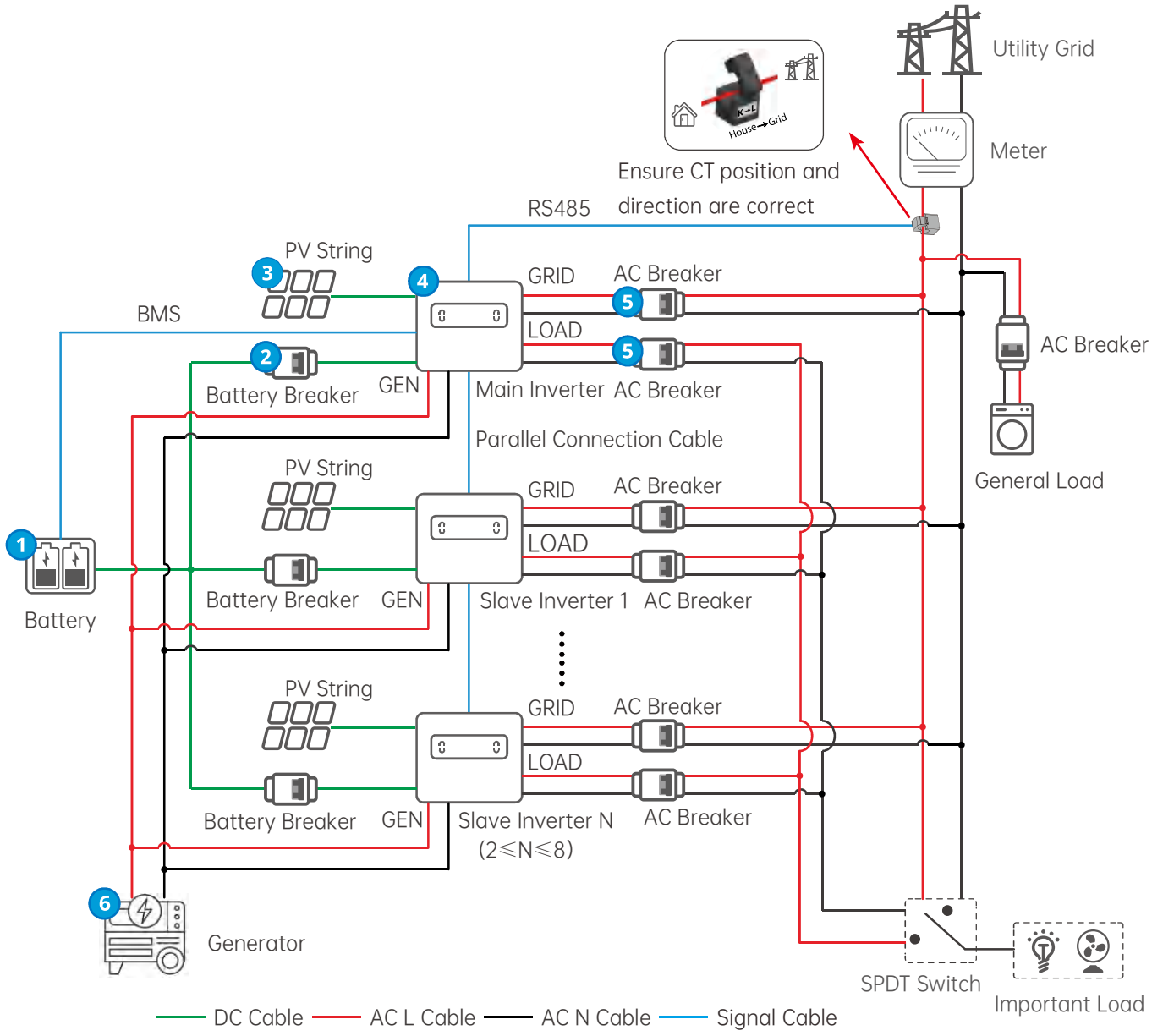
NO.	Parts	Description
1	Inverter	HB series household hybrid energy storage inverter.
2	Battery	Select the model according to the matching list of inverter and battery.
3	Battery Breaker	2P DC breakers shall be prepared by the customers with the following specifications: • HB1030EH024:rated current≥200A, rated voltage ≥60V. • HB1030EH048、HB1036EH048、HB1040EH048:rated current≥125A, rated voltage ≥60V. • HB1046EH048、HB1050EH048:rated current≥150A, rated voltage ≥60V. • HB1060EH048:rated current≥200A, rated voltage ≥60V.

4	AC Breaker	• The breaker specifications for the LOAD and GRID for one inverter type shall be the same. The AC breakers shall be prepared by the customers.
		• To ensure the LOAD is powered by the grid during the inverter maintenance, install a SPDT Switch.
		• The specification of the breaker and SPDT for the LOAD and GRID loads:
		  • HB1030EH024、HB1030EH048、HB1036EH048、HB1040EH048: rated current≥32A, rated voltage ≥230V.
		  • HB1046EH048、HB1050EH048、HB1060EH048: rated current≥63A, rated voltage ≥230V.

5	SPDT Switch	
6	Generator	The maximum power of the generator shall not be less than the rated power of the inverter.
7	Solar Inverter	Support third-party inverters.
8	PV String	The PV string is composed of photovoltaic modules in series.

Parallel Inverter System

single-phase system



NO.	Parts	Description
1	Battery	Select the model according to the matching list of inverter and battery.
2	Battery Breaker	2P DC breakers shall be prepared by the customers with the following specifications: • HB1030EH024:rated current≥200A, rated voltage ≥60V. • HB1030EH048、HB1036EH048、HB1040EH048:rated current≥125A, rated voltage ≥60V. • HB1046EH048、HB1050EH048:rated current≥150A, rated voltage ≥60V. • HB1060EH048:rated current≥200A, rated voltage ≥60V.
3	PV String	The PV string is composed of photovoltaic modules in series.
4	Inverter	Support HB series (3.0-6.0kW) inverters, and the inverter models used in the same system need to be consistent.The single-phase networking system supports up to 9 inverters in parallel.

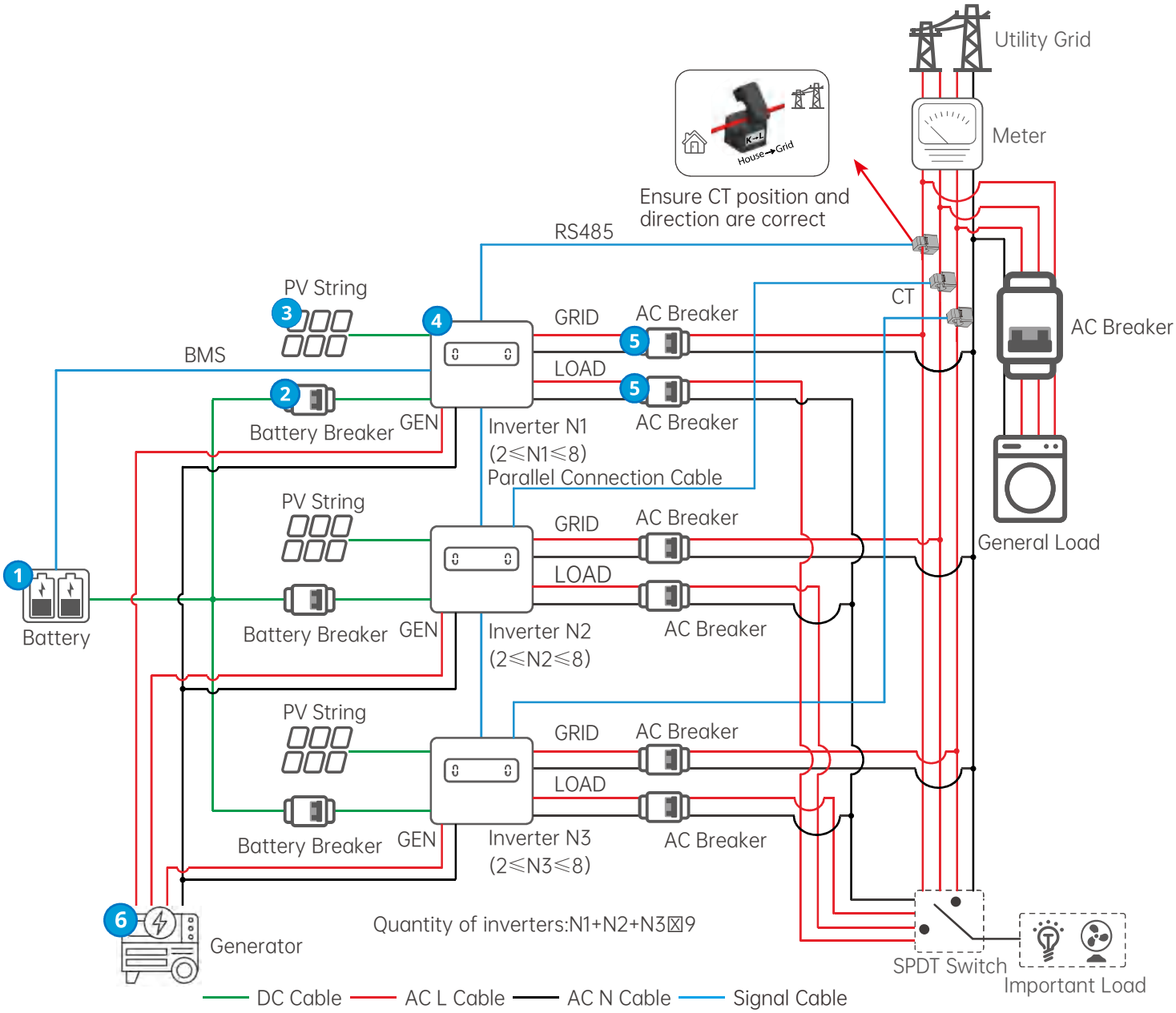
5	AC Breaker	• The breaker specifications for the LOAD and GRID for one inverter type shall be the same. The AC breakers shall be prepared by the customers.
		• The specification of the breaker:
		  • HB1030EH024、HB1030EH048、HB1036EH048、HB1040EH048: rated current≥32A, rated voltage ≥230V.
		  • HB1046EH048、HB1050EH048、HB1060EH048: rated current≥63A, rated voltage ≥230V.

6	Generator	The maximum power of the generator shall not be less than the rated power of the inverter.

See the description on page 75 for the settings of the single-phase parallel operation mode.

Parallel Inverter System

three-phase system



NO.	Parts	Description
1	Battery	Select the model according to the matching list of inverter and battery.
2	Battery Breaker	2P DC breakers shall be prepared by the customers with the following specifications: • HB1030EH024:rated current≥200A, rated voltage ≥60V. • HB1030EH048、HB1036EH048、HB1040EH048:rated current≥125A, rated voltage ≥60V. • HB1046EH048、HB1050EH048:rated current≥150A, rated voltage ≥60V. • HB1060EH048:rated current≥200A, rated voltage ≥60V.
3	PV String	The PV string is composed of photovoltaic modules in series.
4	Inverter	Support HB series (3.0-6.0kW) inverters, and the inverter models used in the same system need to be consistent.The three-phase networking system supports up to 9 inverters in parallel.At least 1 inverter is connected to each phase, and up to 7 inverters can be connected.

5	AC Breaker	• The breaker specifications for the LOAD and GRID for one inverter type shall be the same. The AC breakers shall be prepared by the customers.
		• The specification of the breaker:
		  • HB1030EH024、HB1030EH048、HB1036EH048、HB1040EH048: rated current≥32A, rated voltage ≥230V.
		  • HB1046EH048、HB1050EH048、HB1060EH048: rated current≥63A, rated voltage ≥230V.

6	Generator	The maximum power of the generator shall not be less than the rated power of the inverter.

See the description on page 75 for the settings of the three-phase parallel operation mode.

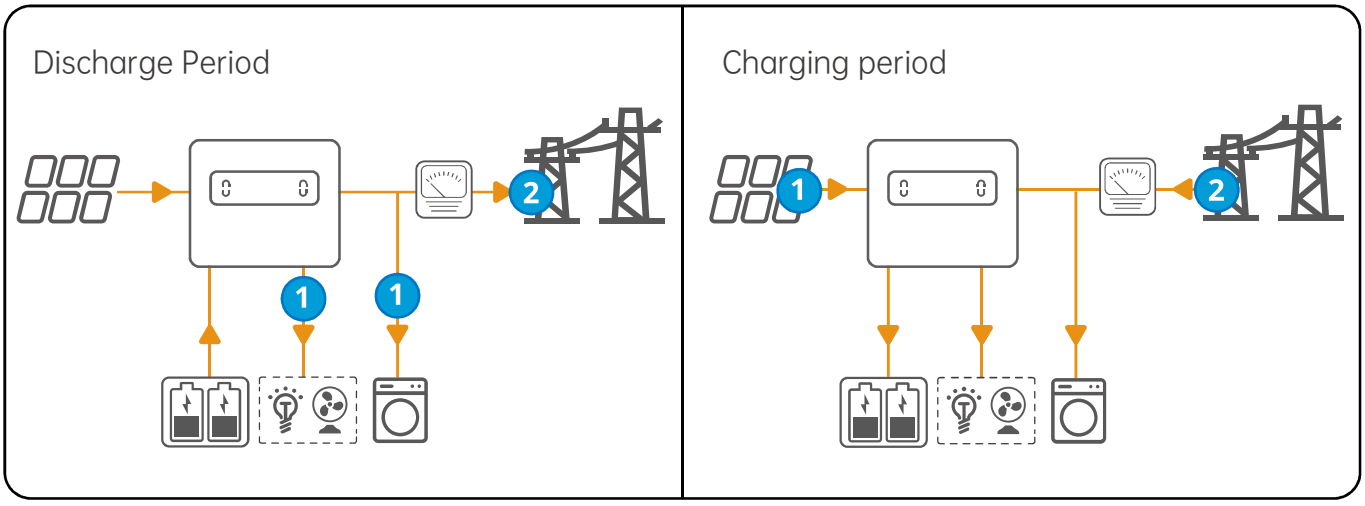
3.3 Working Mode

3.3.1 System working mode

Time-sharing Mode

NOTICE
• The time-sharing mode can only be used if it complies with local laws and regulations, such as whether the power grid is allowed to charge the battery. If not, do not use this mode. • It is recommended to use the time-sharing mode in scenarios where the peak and valley electricity prices vary greatly.

- Discharge period: When the electricity price is at its peak, a discharge period can be set, with photovoltaics and batteries supplying power to the load, with excess energy sold to the grid.
- Charging period: When the electricity price is at its lowest, it can be set as a charging period for the grid and photovoltaic to charge the battery.



Self-use Mode

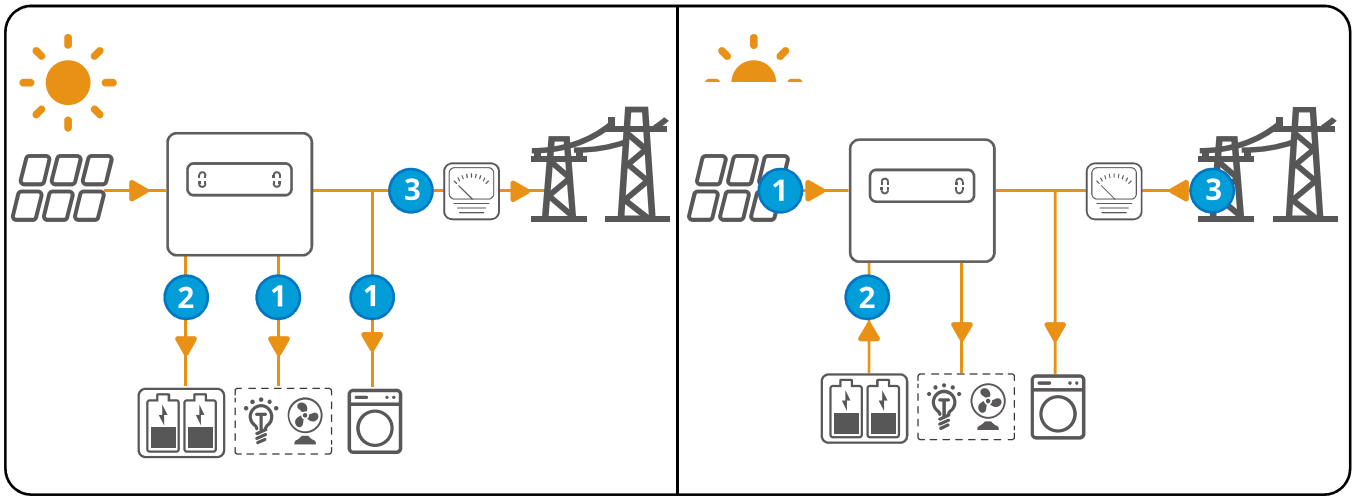
NOTICE
• For solar power, consider self consumption mode as priority: the excess power charges the battery in day time; the battery supplies power to the load when there is no solar power generated at night. It improves the self consumption rate and saves electricity costs. • It is suitable for areas with high electricity prices and little or no solar power generation subsidies.

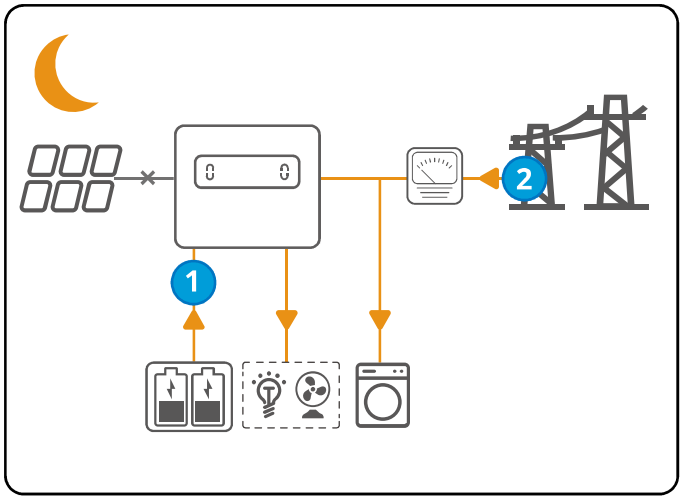
Day:

- When the power generated in the PV system is sufficient, it supplies the household load as priority. And the excess power charges the batteries first. The remaining power will be sold to the grid.
- When the power generated in the PV system is insufficient, use the battery supplies the load first. If the battery power is insufficient, then the load will be powered by the grid.

Night:

- If the battery power is sufficient, the load will be powered by the battery. If the battery power is not enough, the load will be powered by the grid.





Selling First Mode

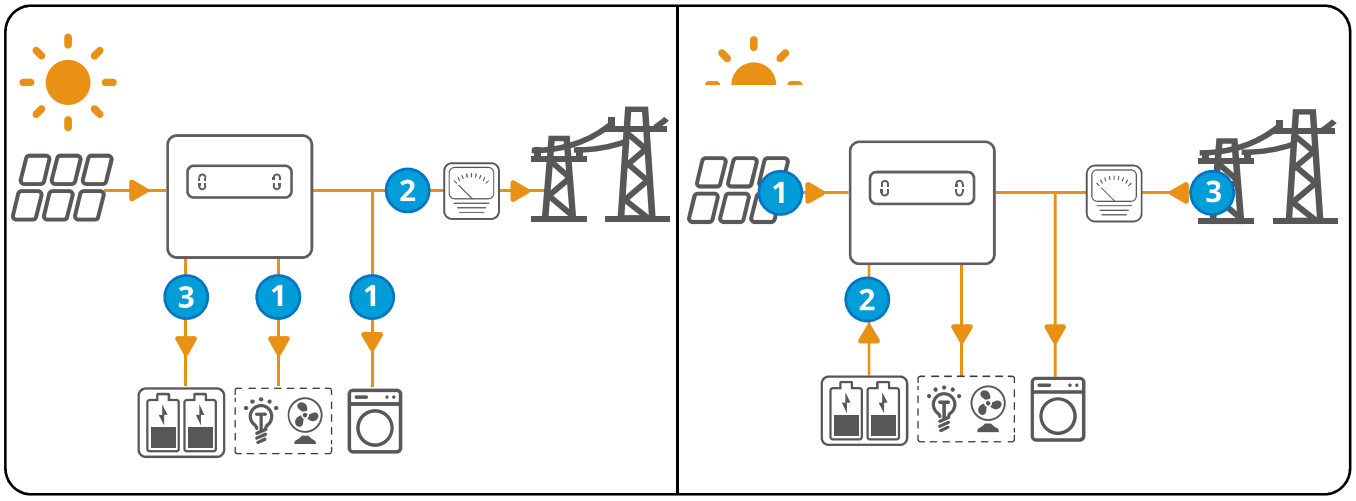
NOTICE
• Solar power generation prioritizes load usage, with excess power sold to the grid; during nighttime when there is no solar power generation, batteries are used to power the load. • This mode is suitable for regions with high feed-in tariffs and electricity sales restrictions.

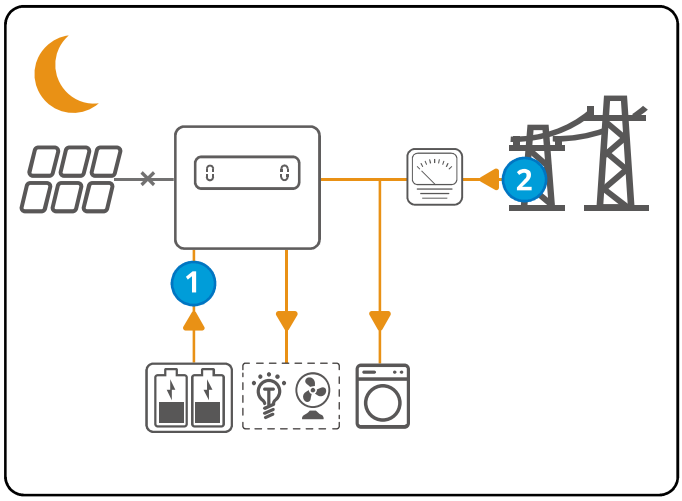
Day:

- When the power generated in the photovoltaic system is sufficient, the power generated in the photovoltaic system is preferentially supplied to household loads, and the excess power is sold to the grid at a set power rate. The remaining power is used to charge the battery.
- When the power generated in the PV system is insufficient, use the battery supplies the load first. If the battery power is insufficient, then the load will be powered by the grid.

Night:

- If the battery power is sufficient, the load will be powered by the battery. If the battery power is not enough, the load will be powered by the grid.



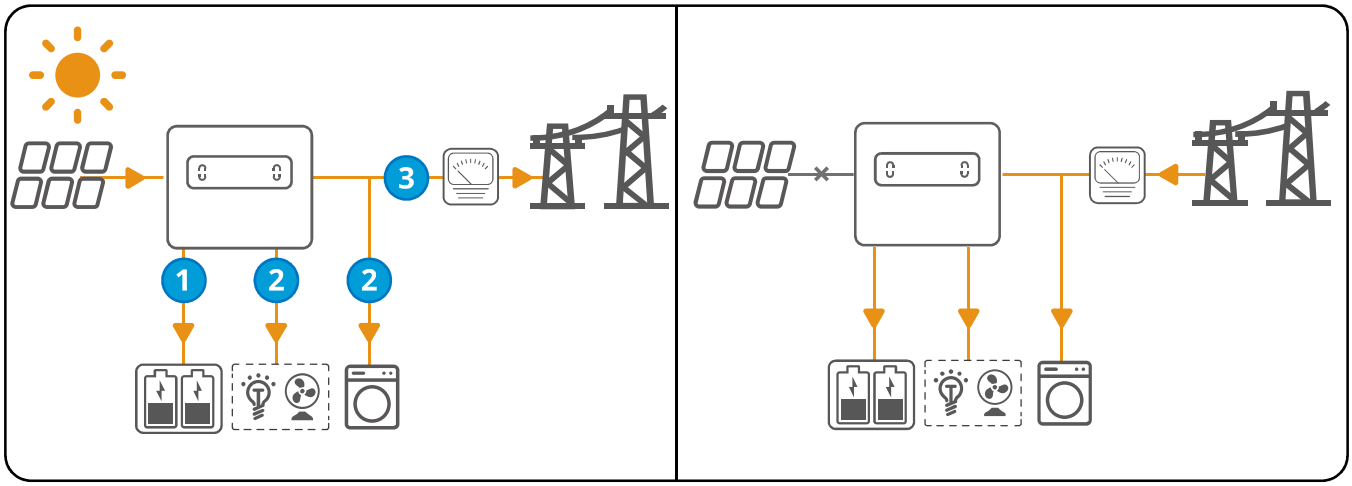


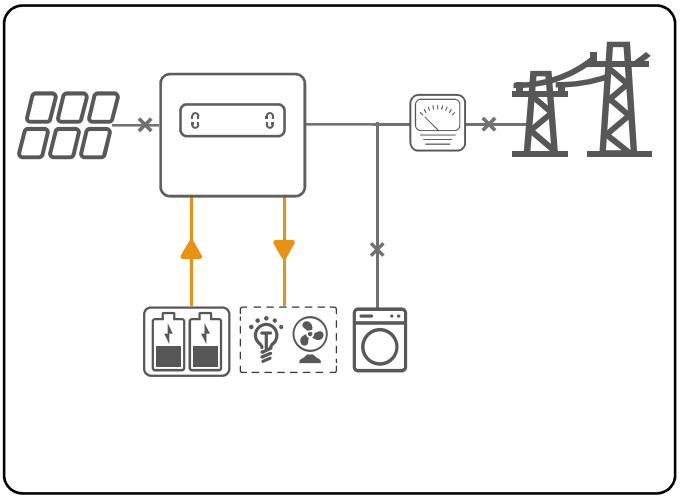
Back-up Mode

NOTICE
• The back-up mode is mainly applied to the scenario where the grid is unstable and there is an important load. When the grid is disconnected, the inverter turns to off-grid mode to • The battery stops discharging when it reaches the cut-off SOC. If the grid is not restored, when there is sunlight the next day,the battery starts to supply power to the load after it is charged to a certain level.

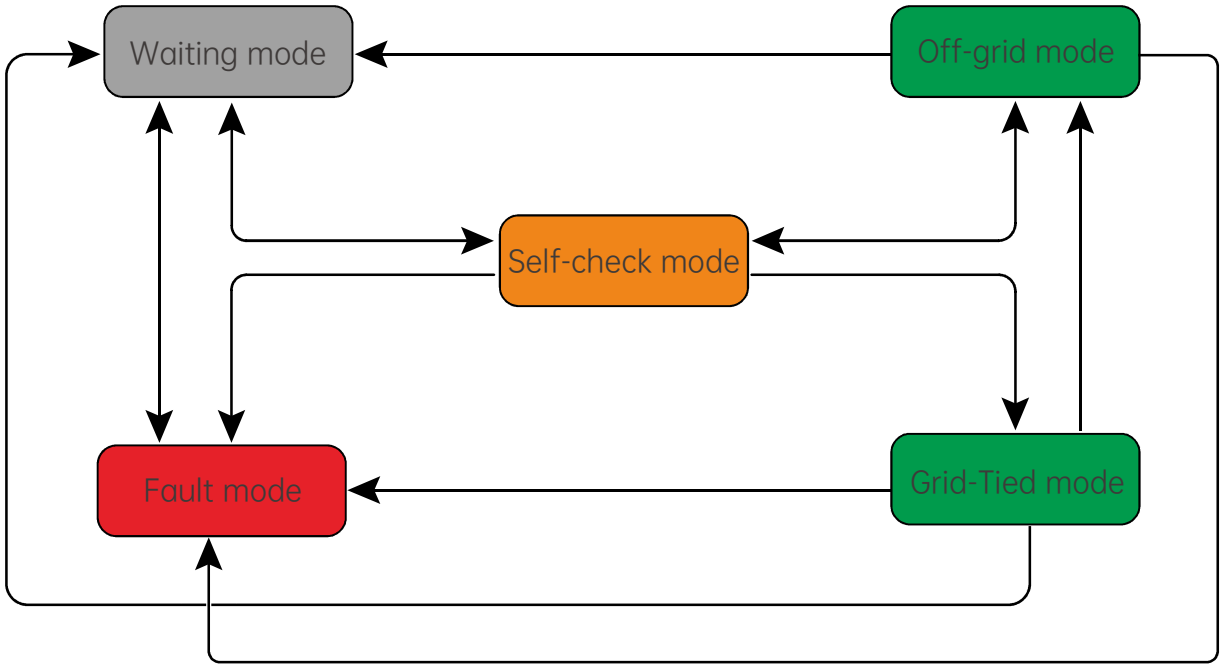
When the power generated in the PV system is sufficient, it charges the battery as priority. And the excess power charges the load. The remaining power will be sold to the grid.
When there is no power generated in the PV system:

- When the grid is normal, the grid can supply load power and battery charging.
- The inverter enters off-grid mode and the battery supplies power to the load when the grid is abnormal.





3.3.2 Inverter Operation Mode



NO.	Mode	Description
1	Waiting mode	Waiting stage after the inverter is powered on. • When the conditions are met, it enters the self-check mode. • If there is a fault, the inverter enters the fault mode.
2	Self-check mode	Before the inverter starts up, it continuously performs self-check, initialization, etc. • When the conditions are met, it enters the grid-tied mode, and the inverter starts on grid connection. • If the grid is not detected, it enters the off-grid mode and the inverter runs off-grid, If the inverter does not meet the conditions for off-grid operation, it enters the waiting mode. • If the self-check is not passed, it enters the fault mode.
3	Grid-Tied mode	The inverter is grid-tied successfully. • If the grid is not detected, it enters the off-grid mode. • If a fault is detected, it enters the fault mode. • If it is detected that the grid conditions do not meet the grid connection requirements and the inverter does not meet the off-grid operation conditions, it will enter the waiting mode.
4	Off-grid mode	When the grid is out of power, the inverter working mode switches to off-grid mode, and the LOAD port continues to supply power to the load. • If a fault is detected, it enters the fault mode. • If it is detected that the off-grid operating conditions are not met, it will enter the waiting mode. • If the conditions meet grid-tied requirements and and the off-grid output function is turned on, it enters the self-check mode.
5	Fault mode	If a fault is detected, the inverter enters the fault mode. When the fault is cleared, it enters the wait mode.

3.4 Functionality

Power derating

For a safe operation, the inverter will automatically reduce the output power when the operating. environment is not ideal.
The following are the factors that may occur power derating. Please try to avoid them during usage.

- Unfavorable environmental conditions, e.g., direct sunlight, high temperature, etc.
- Inverter's output power percentage has been set.
- High altitude.

AFCI (Optional)

Inverters with AFCI functionality has built-in current sensors to detect the high frequency current signals and decide whether an arc- fault occurs.

Reason to occur electric arcs:

- Damaged connectors in PV or battery system.
- Wrong connected or broken cables.
- Aging connectors and cables.

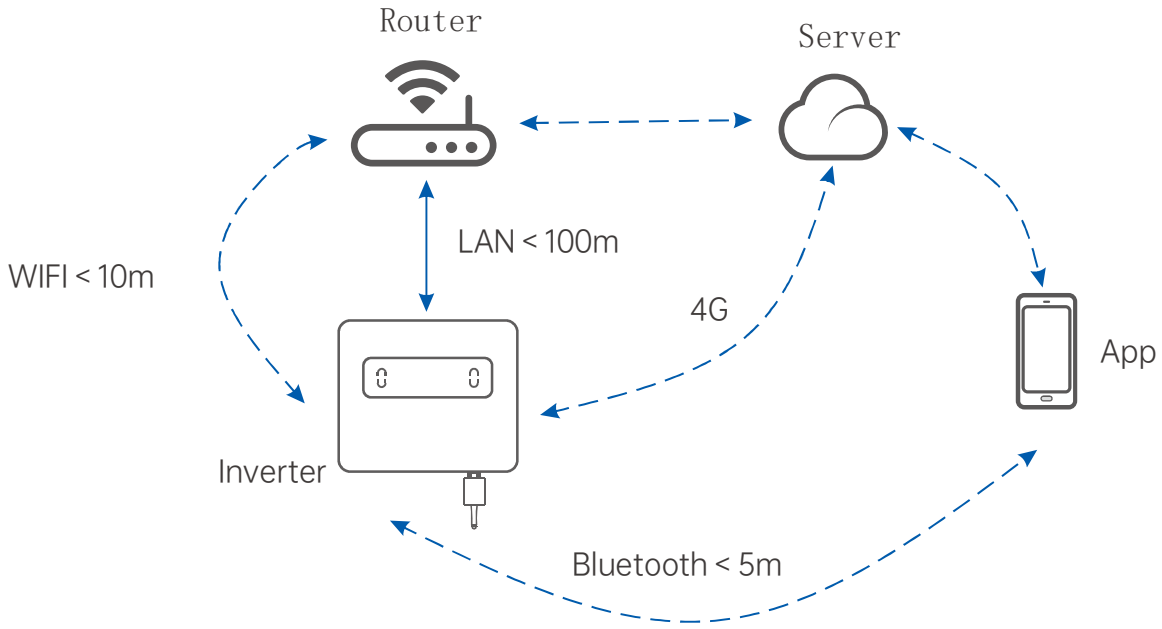
Method to detect electric arcs:

- The inverter is equipped with AFCI function.
- When the inverter detects an electric arc, users can find the time of the fault and the detailed phenomenon through the app.
- The alarm can be cleared automatically if the inverter triggers a fault for less than 5 times within 24 hours. The inverter locks for protection after the 5th electric arc fault. The inverter can operate normally after the fault is solved.

Communication

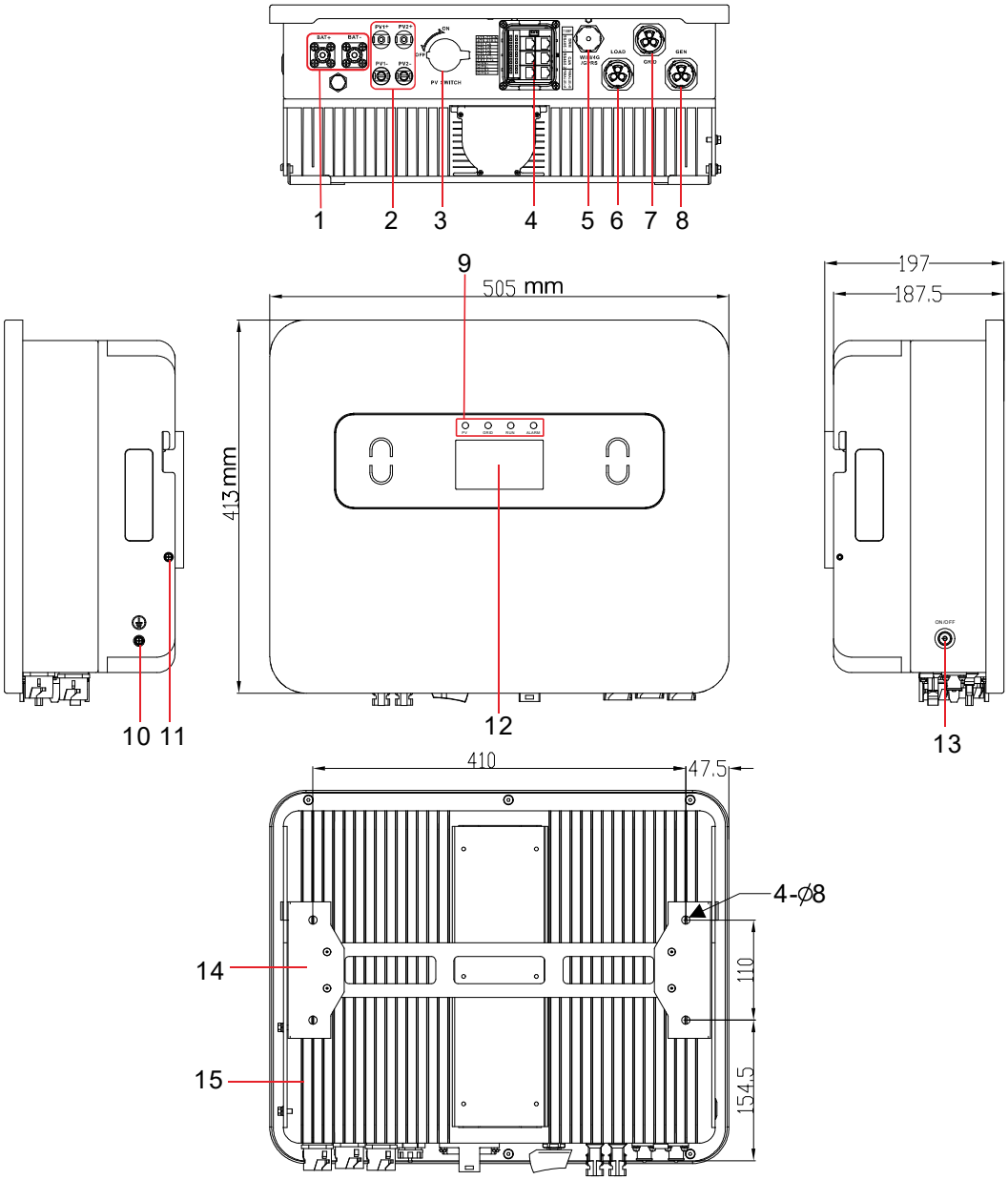
The inverter supports setting via WiFi or Bluetooth in a short distance: connected to the Server via WiFi or LAN to monitor the inverter operations, etc.

- Bluetooth: meets Bluetooth 5.1 standard
- WiFi: supports 2.4G frequency band. Set the router to 2.4G or 2.4G/5G coexistence mode.
  - User can set 40 bytes for router wireless signal name maximumly.
  - It is able to check the WiFi signal intensity via App. It is recommended to move the router close to the inverter or clear the signal blocking objects to enhance the signal intensity when it is less than -60.
- LAN (optional): support connecting to the router via LAN communication and then connecting to the Server.
- 4G: support connected to the Server via 4G communication. For 4G module information, please refer to the 4G module manual.



3.5 Appearance Description

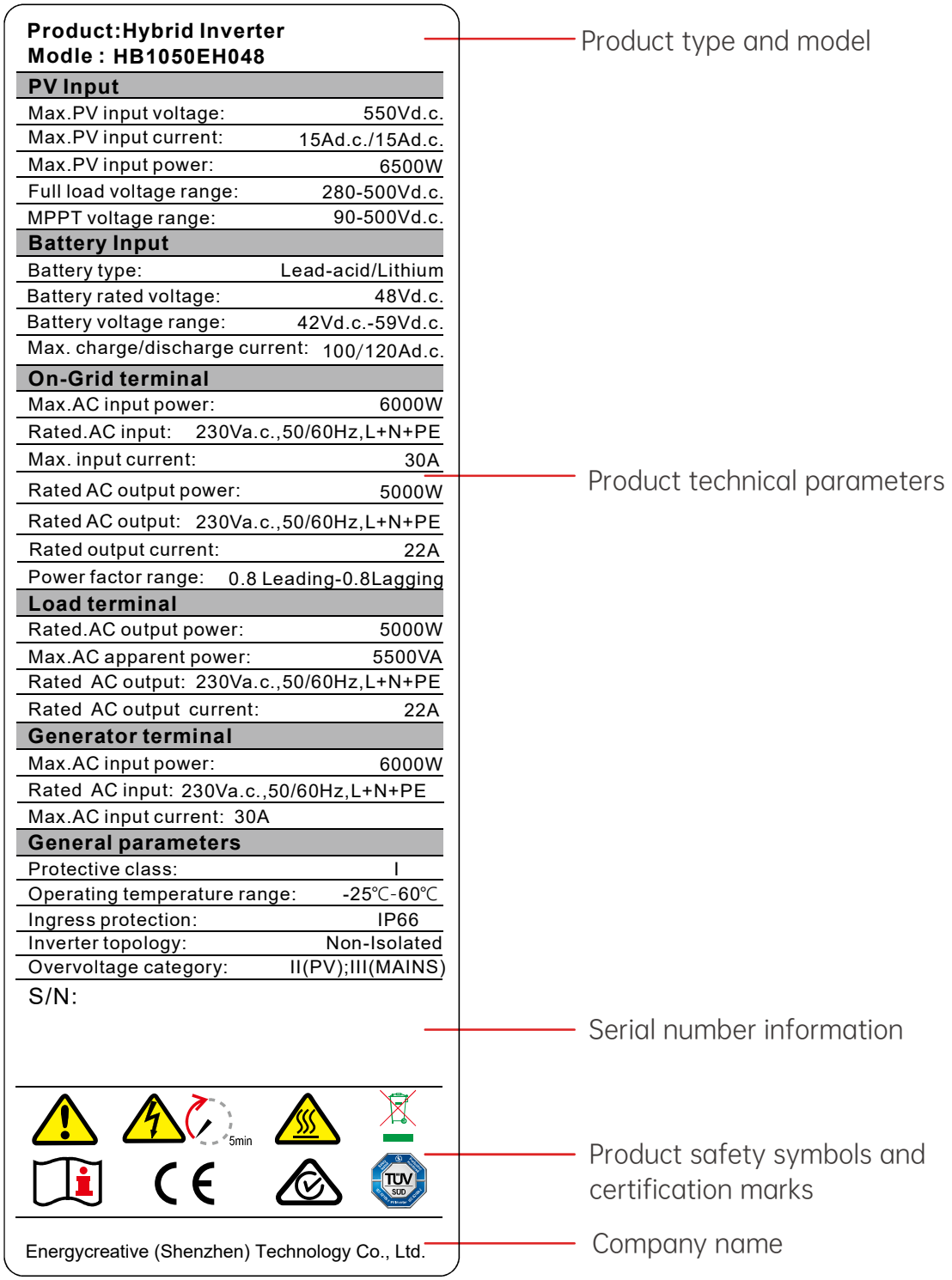
3.5.1 Appearance Introduction



1	Battery Port（+/-）	2	PV Port（PV1/PV2）*
3	PV DC Switch	4	Multi-function Communication Port
5	Communication Module Port	6	LOAD Port
7	GRID Port	8	Generator Port
9	LED Indicator	10	Grounding Terminal
11	Mounting Plate Fixing Screw	12	Display Screen
13	Cold Start Button	14	Mounting Plate
15	Heat Sink		
*:HB1030EH024、HB1030EH048：1 X PV+/PV-；Other:2 X PV+/PV-			

3.5.2 Nameplate

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



Product:Hybrid Inverter
Modle : HB1050EH048

PV Input	
Max.PV input voltage:	550Vd.c.
Max.PV input current:	15Ad.c./15Ad.c.
Max.PV input power:	6500W
Full load voltage range:	280-500Vd.c.
MPPT voltage range:	90-500Vd.c.
Battery Input	
Battery type:	Lead-acid/Lithium
Battery rated voltage:	48Vd.c.
Battery voltage range:	42Vd.c.-59Vd.c.
Max. charge/discharge current:	100/120Ad.c.
On-Grid terminal	
Max.AC input power:	6000W
Rated.AC input:	230Va.c.,50/60Hz,L+N+PE
Max. input current:	30A
Rated AC output power:	5000W
Rated AC output:	230Va.c.,50/60Hz,L+N+PE
Rated output current:	22A
Power factor range:	0.8 Leading-0.8Lagging
Load terminal	
Rated.AC output power:	5000W
Max.AC apparent power:	5500VA
Rated AC output:	230Va.c.,50/60Hz,L+N+PE
Rated AC output current:	22A
Generator terminal	
Max.AC input power:	6000W
Rated AC input:	230Va.c.,50/60Hz,L+N+PE
Max.AC input current:	30A
General parameters	
Protective class:	I
Operating temperature range:	-25℃-60℃
Ingress protection:	IP66
Inverter topology:	Non-Isolated
Overvoltage category:	II(PV);III(MAINS)

S/N:

5min

Energycreative (Shenzhen) Technology Co., Ltd.

Product type and model

Product technical parameters

Serial number information

Product safety symbols and certification marks

Company name

4 Check and Storage

4.1 Check Before Receiving

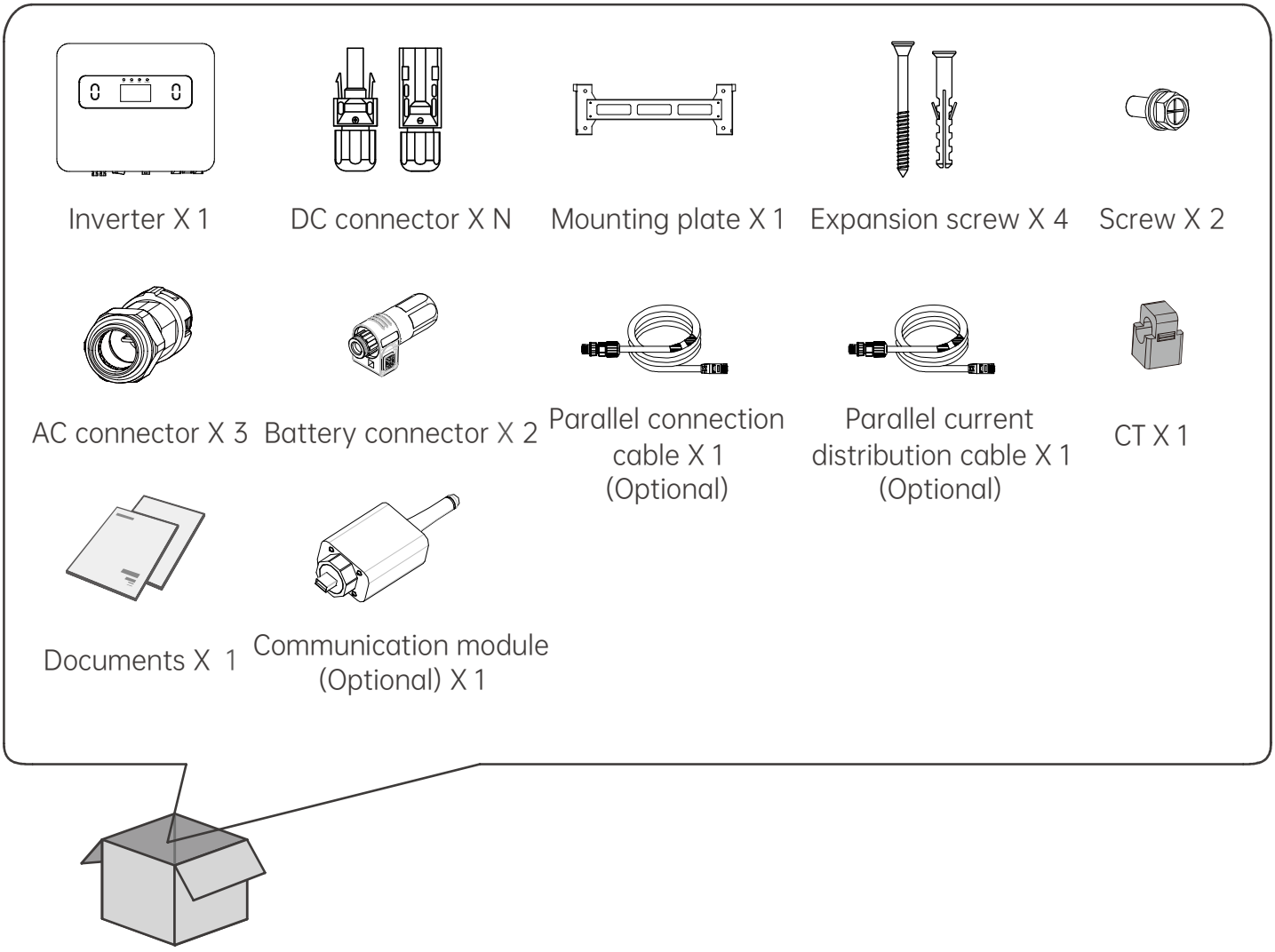
Check the following items before receiving the product.

1. Check the outer packing box for damage, such as holes, cracks, deformation, and others signs of equipment damage. Do not unpack the package and contact the supplier as soon as possible if any damage is found.
2. Check the inverter model. If the inverter model is not what you requested, do not unpack the product and contact the supplier.
3. Check the deliverables for correct model, complete contents, and intact appearance. Contact the supplier as soon as possible if any damage is found.

4.2 Deliverables

WARNING

- Connect the DC cables with the delivered terminals. The manufacturer shall not be liable for the damage if other terminals are used.
- N represents the accessories' quantity delivered varies depending on the specific inverter type.
  - DC connector: HB1030EH024、HB1030EH048:1 X PV+/PV-; Other:2 X PV+/PV-。



4.3 Storage

If the equipment is not to be installed or used immediately, please ensure that the storage environment meets the following requirements:

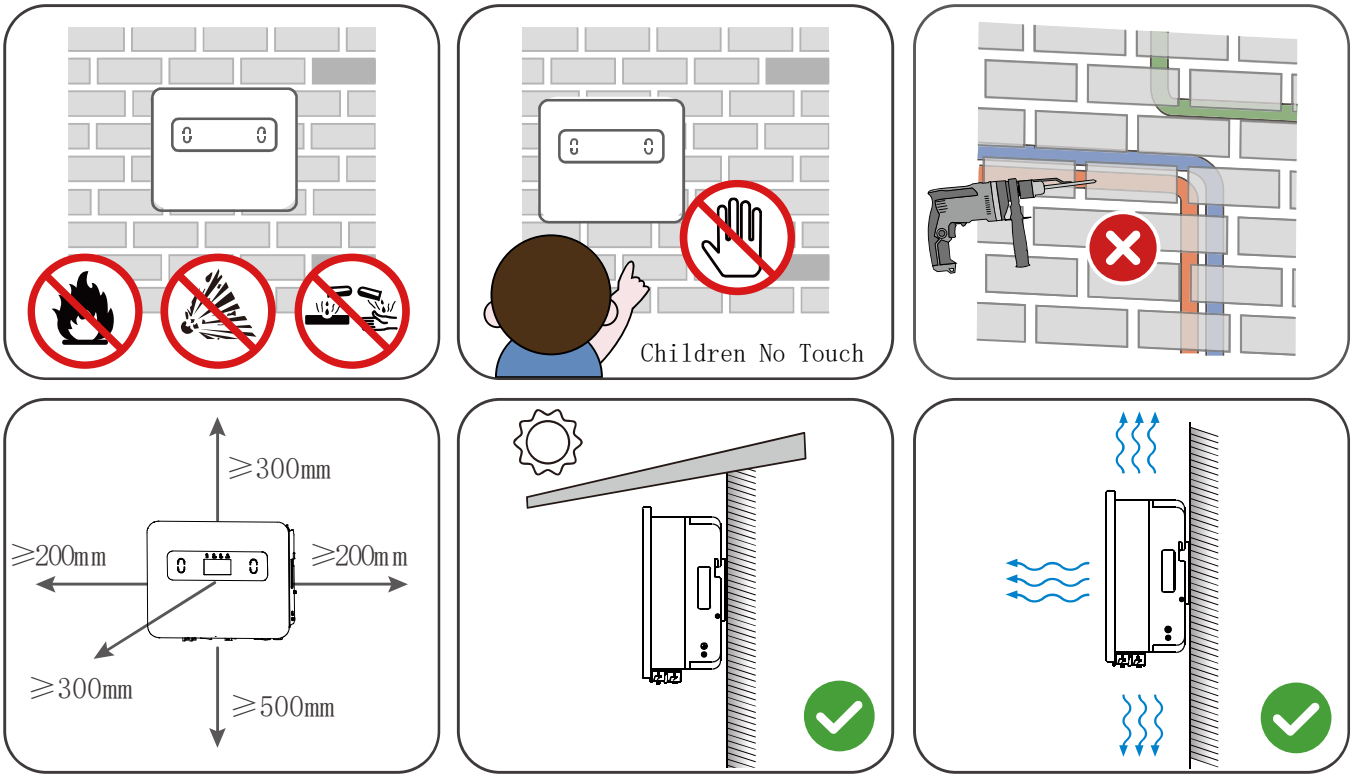
1. Do not unpack the outer package or throw the desiccant away.
2. Store the equipment in a clean place. Make sure the temperature and humidity are appropriate and no condensation.
3. The height and direction of the stacking inverters should follow the instructions on the packing box.
4. The inverters must be stacked with caution to prevent them from falling.
5. If the inverter has been long term stored, it should be checked by professionals before being put into use.

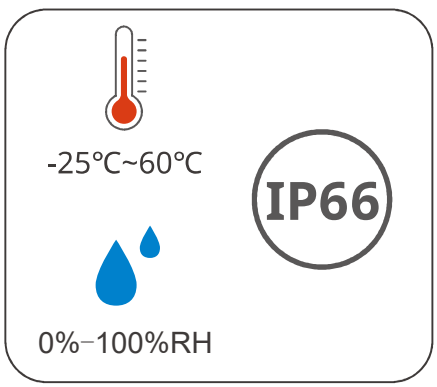
5 Installation

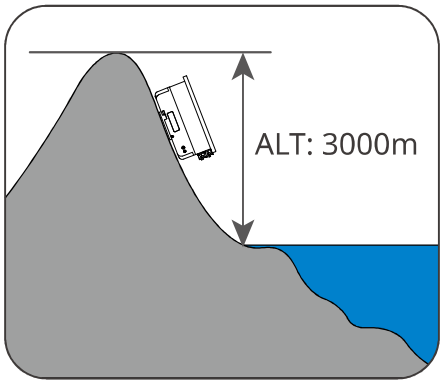
5.1 Installation Requirements

Installation Environment Requirements

1. Do not install the equipment in a place near flammable, explosive, or corrosive materials.
2. The equipment with a high ingress protection rating can be installed indoors or outdoors. The temperature and humidity at the installation site should be within the appropriate range.
3. The place to install the equipment shall be well-ventilated for heat radiation and large enough for operations.
4. Avoid the water pipes and cables buried in the wall when drilling holes.
5. Install the equipment in a sheltered place to avoid direct sunlight, rain, and snow. Build a sunshade if it is needed.
6. Do not install the equipment in a place that is easy to touch, especially within children's reach. High temperature exists when the equipment is working. Do not touch the surface to avoid burning.
7. Install the equipment at a height that is convenient for operation and maintenance, electrical connections, and checking indicators and labels.
8. The altitude to install the inverter shall be lower than the maximum working altitude 3000m.
9. Install the equipment away from electromagnetic interference. If there are radio stations or wireless communication equipment below 30 MHz near the installation location, please install the equipment as follows:
   - Add a multi-turn winding ferrite core 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 EMI equipment is more than 30m.





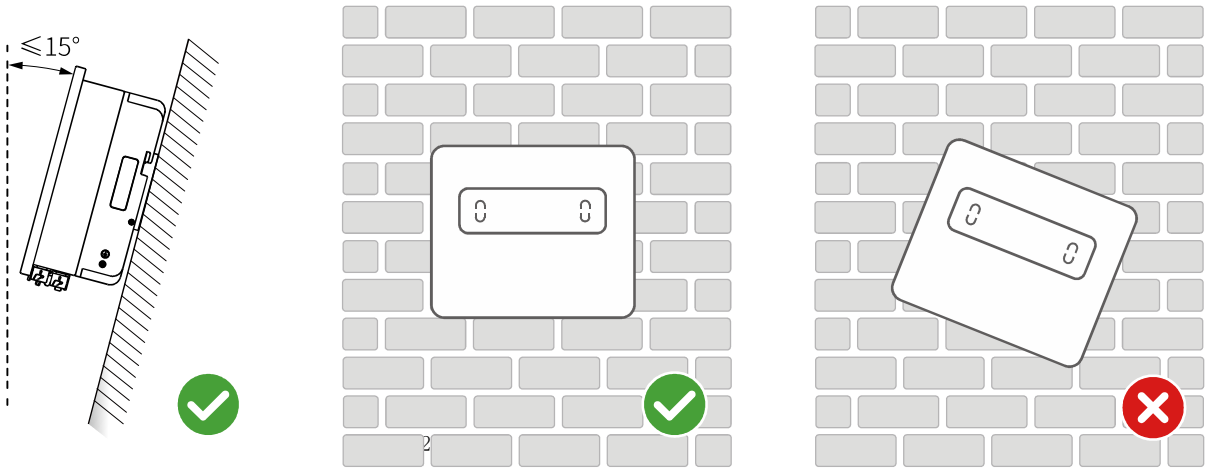


Mounting Support Requirements

- The mounting support shall be nonflammable and fireproof.
- Install the equipment on a surface that is solid enough to bear the inverter weight.
- Do not install the product on the support with poor sound insulation to avoid the noise generated by the working product, which may annoy the residents nearby.

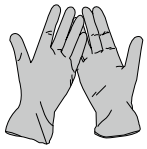
Installation Angle Requirements

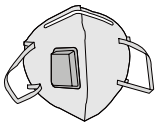
- Install the inverter vertically or at a maximum back tilt of 15 degrees.
- Do not install the inverter upside down, forward tilt, back forward tilt, or horizontally.



Installation Tool Requirements

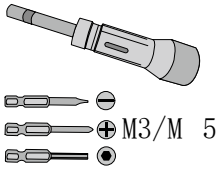
The following tools are recommended when installing the equipment. Use other auxiliary tools on site if necessary.


Safety gloves

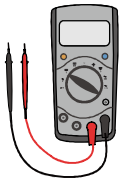

Dust mask


Goggles


Safety shoes



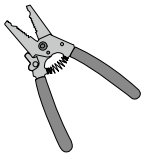
Torque wrench


Multimeter

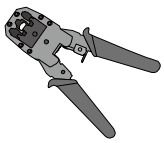

Marker

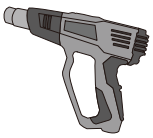

Level

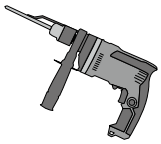

Diagonal pliers


Wire stripper

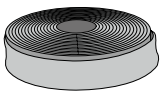

Hydraulic tongs

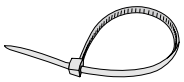

Rj45 crimping tool


Heat gun


Hammer drill


Vacuum cleaner


Heat shrink tube


Cable tie


Rubber hammer

5.2 Inverter Installation

5.2.1 Moving the Inverter

WARNING

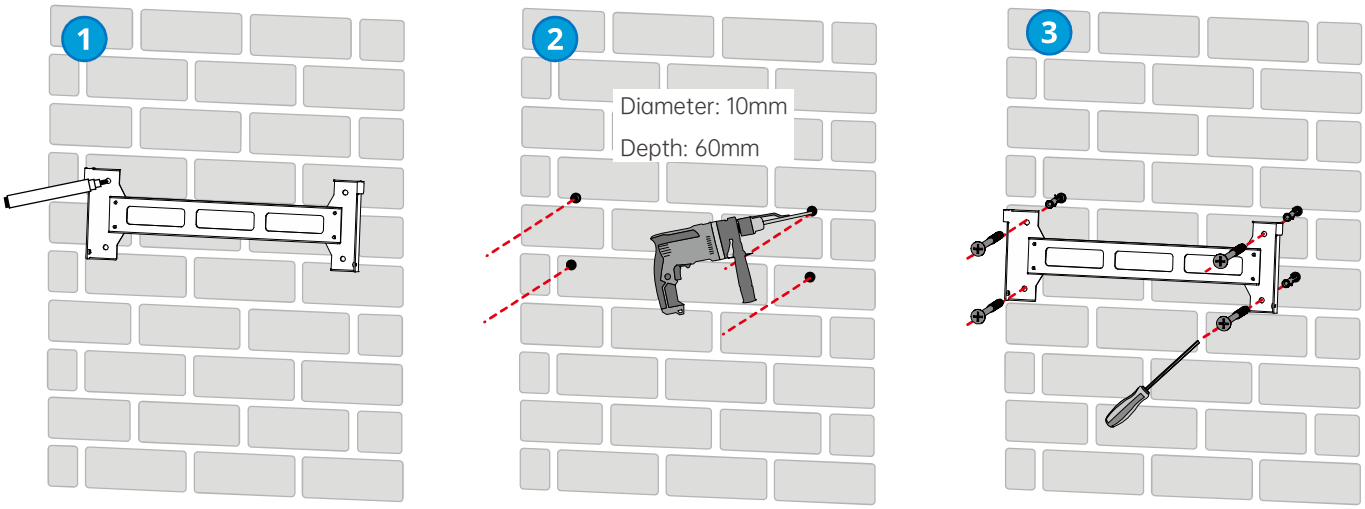
- Operations such as transportation, turnover, installation and so on must meet the requirements of the laws and regulations of the country or region where it is located.
- Move the inverter to the site before installation. Follow the instructions below to avoid personal injury or equipment damage.
  1. Consider the weight of the equipment before moving it. Assign enough personnel to move the equipment to avoid personal injury.
  2. Wear safety gloves to avoid personal injury.
  3. Keep the equipment in balance during moving to avoid its falling down.

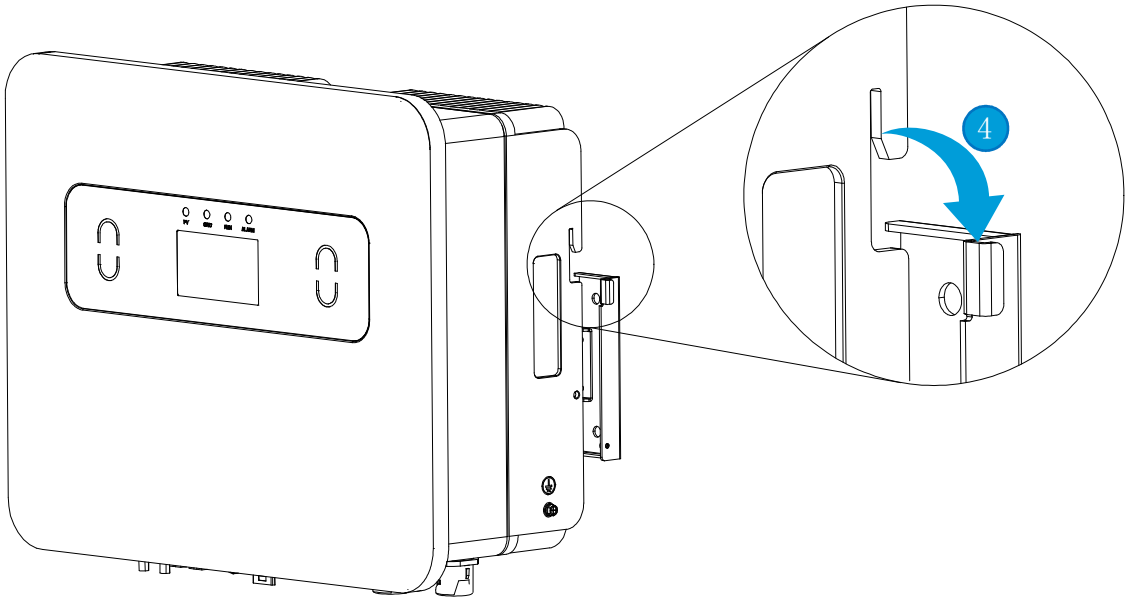
5.2.2 Installing the Inverter

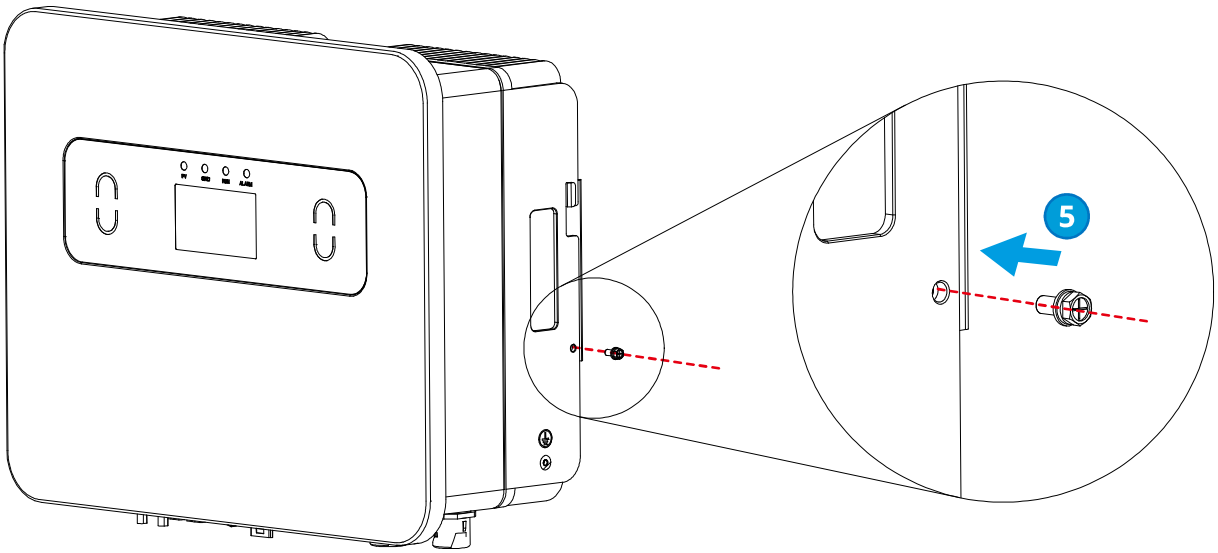
NOTICE

- Avoid the water pipes and cables buried in the wall when drilling holes.
- Wear goggles and a dust mask to prevent the dust from being inhaled or contacting eyes when drilling holes.
- Make sure the inverter is firmly installed in case of falling down.

Step 1: Put the plate on the wall horizontally and mark positions for drilling holes.
Step 2: Drill holes to a depth of 60mm by using the hammer drill with diameter of 10mm.
Step 3: Use the expansion bolts to fix the inverter on the wall.
Step 4: Install the inverter on the mounting plate.
Step 5: Tighten the nuts to secure the mounting plate and the inverter.


1
2
Diameter: 10mm
Depth: 60mm
3


4


5

6 Electrical Connection

6.1 Circuit Diagram

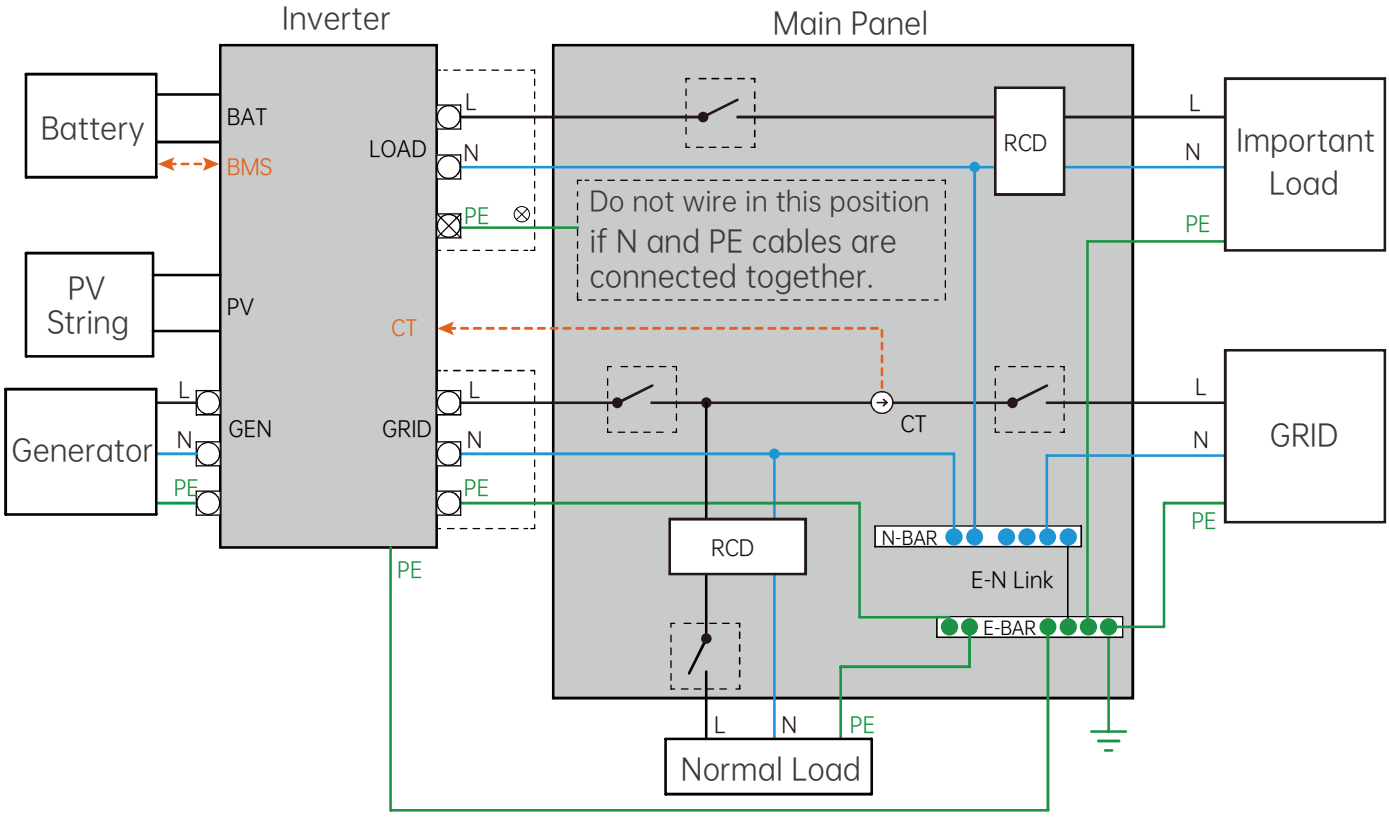
NOTICE

- N and PE wiring via ON-GRID and BACK-UP ports of the inverter are different based on the regulation requirements of different regions. Refer to the specific requirements of local regulations.

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

NOTICE

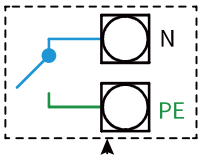
Below wirings are applicable to areas in Australia, New Zealand, South Africa, and etc.



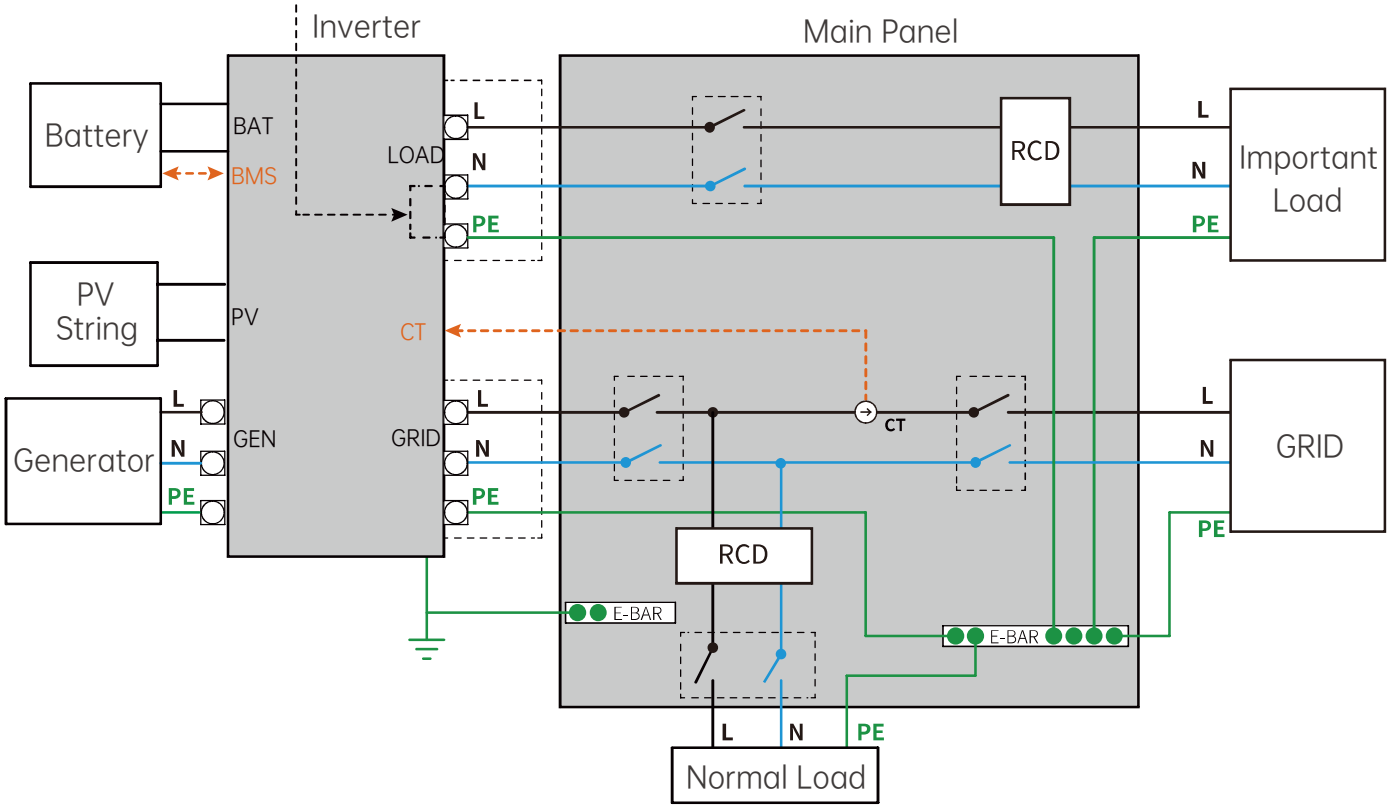
N and PE cables in the Main Panel shall be wired separately

NOTICE

- Ensure that the grounding of BACK-UP is correctly and tightened. Otherwise, the BACK-UP function may be abnormal in case of grid failure.
- Other areas except Australia, New Zealand, South Africa, etc., are applicable to the following wirings:



- In Germany, the internal relay will connect the N wire and PE cable in back-up mode in 100ms. The internal relay will be disconnected in ON-GRID mode.
- In areas other than Germany, the internal relay is disconnected by default in either mode.



6.2 Safety Precaution

DANGER

- All operations, cables and parts specification during the electrical connection shall be in compliance with local laws and regulations.
- Disconnect the DC switch and the AC output switch of the inverter to power off the inverter before any electrical connections. Do not work with power on. Otherwise, an electric shock may occur.
- Tie the same type cables together, and place them separately from cables of different types. Do not place the cables entangled or crossed.
- If the cable bears too much tension, the connection may be poor. Reserve a certain length of the cable before connecting it to the inverter cable port.
- When crimping the terminals, ensure that the conductor part of the cable is in full contact with the terminals. Do not crimp the cable jacket with the terminal. Otherwise the inverter may not operate, or its terminal block getting damaged due to heating and other phenomenon because of unreliable connection after operation.

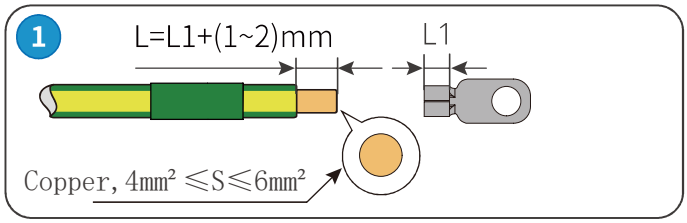
NOTICE

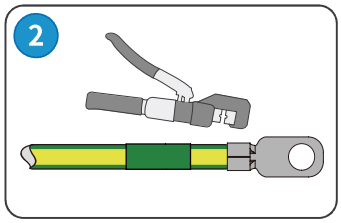
- Wear personal protective equipment like safety shoes, safety gloves, and insulating gloves during electrical connections.
- All electrical connections should be performed by qualified professionals.
- Cable colors in this document are for reference only. The cable specifications shall meet local laws and regulations.

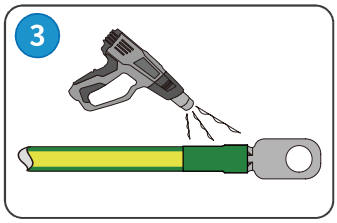
6.3 Connecting The PE Cable

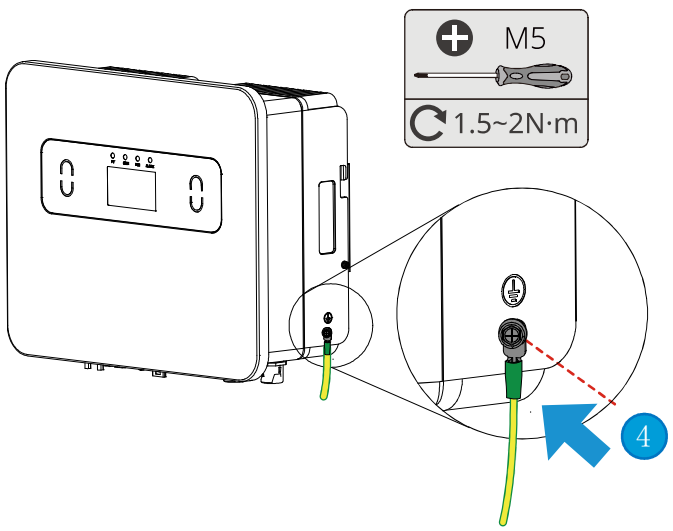
WARNING

- The PE cable connected to the enclosure of the inverter cannot replace the PE cable connected to the AC output port. Both of the two PE cables must be securely connected.
- Make sure that all the grounding points on the enclosures are equipotential connected when there are multiple inverters.
- To improve the corrosion resistance of the terminal, it is recommended to apply silica gel or paint on the ground terminal after installing the PE cable.
- Prepare PE cables with the recommended specification:
  - Type: Outdoor single-core copper wire
  - Cross-sectional area: 4-6mm²









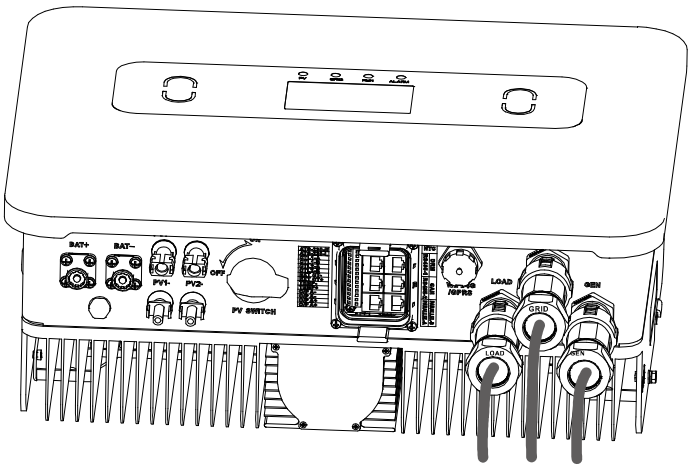
6.4 Connecting The AC Cable

WARNING

- Do not connect loads between the inverter and the AC switch directly connected to the inverter.
- The residual current monitoring unit (RCMU) is integrated into the inverter. When the inverter detects the leakage current is bigger than the allowable value, it can disconnect from the grid quickly.
- There are built-in relays inside of the inverter's GRID ports.When the inverter is in the off-grid mode, the built-in GRID relay is open; while when the inverter is in grid-tied mode, it is closed.
- When the inverter is powered on, the LOAD AC port is charged. Power off the inverter first if maintenance is required for the loads connected with BACK-UP ports. Otherwise, it may cause electric shock.

Select and Install RCD depending on local laws and regulations.Type A RCDs (Residual Current Monitoring Device) can be connected to the outside of the inverter for protection when the DC component of the leakage current exceeds the limit value. The following RCDs are for reference:

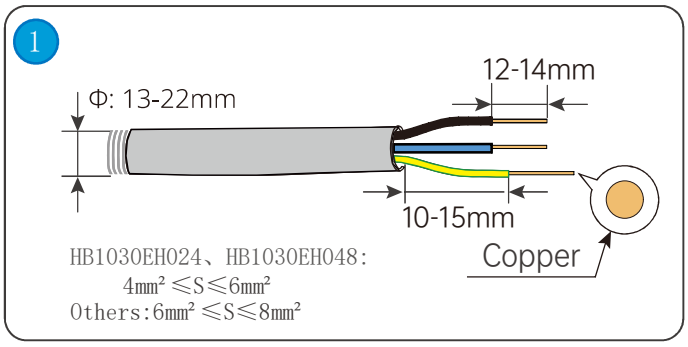
NO.	Inverter Model	RCD Type (GRID)	RCD Type (LOAD)
1	HB1030EH024	300mA	30mA
2	HB1030EH048		
3	HB1036EH048		
4	HB1040EH048		
5	HB1046EH048		
6	HB1050EH048		
7	HB1060EH048		

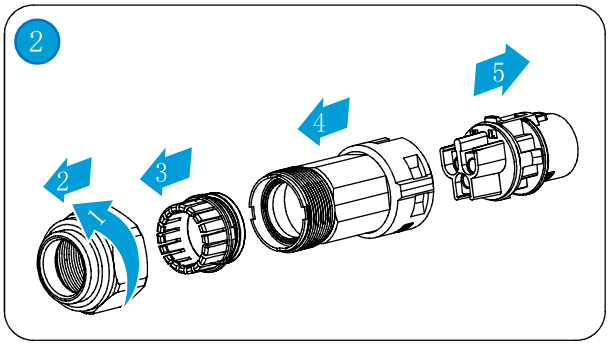


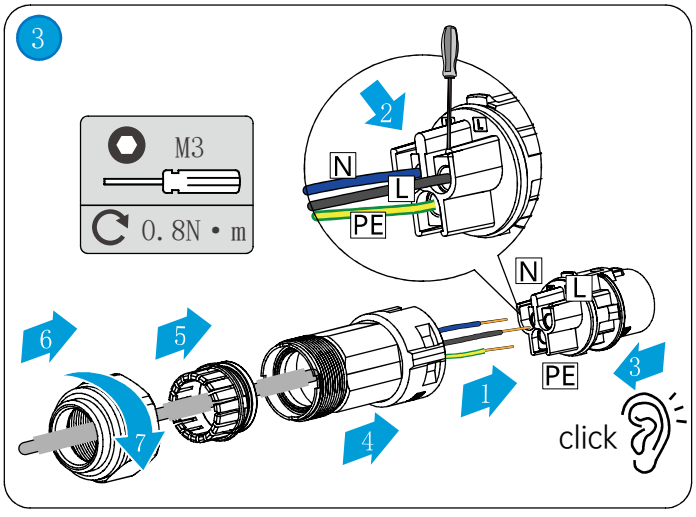
WARNING

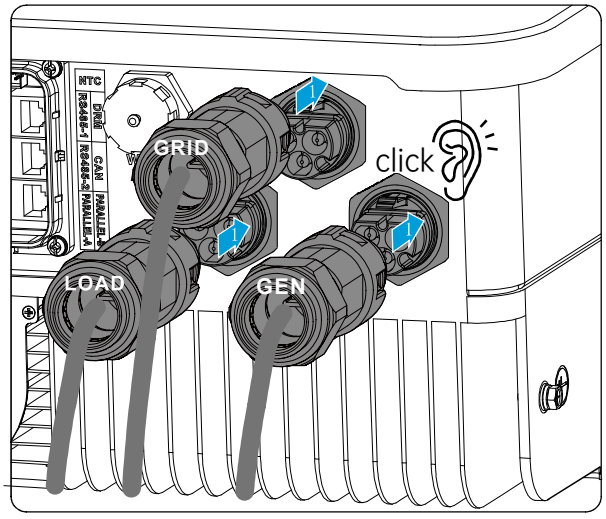
- Connect the AC cables to the corresponding terminals such as "L", "N" and "PE" ports correctly. Otherwise it will cause damage to the inverter.
- Ensure that the whole cable cores are inserted into the terminal holes. No part of the cable core can be exposed.
- Ensure that the cables are connected securely. Otherwise it will cause damage to the inverter due to overheat during its operation.

Type Ⅰ

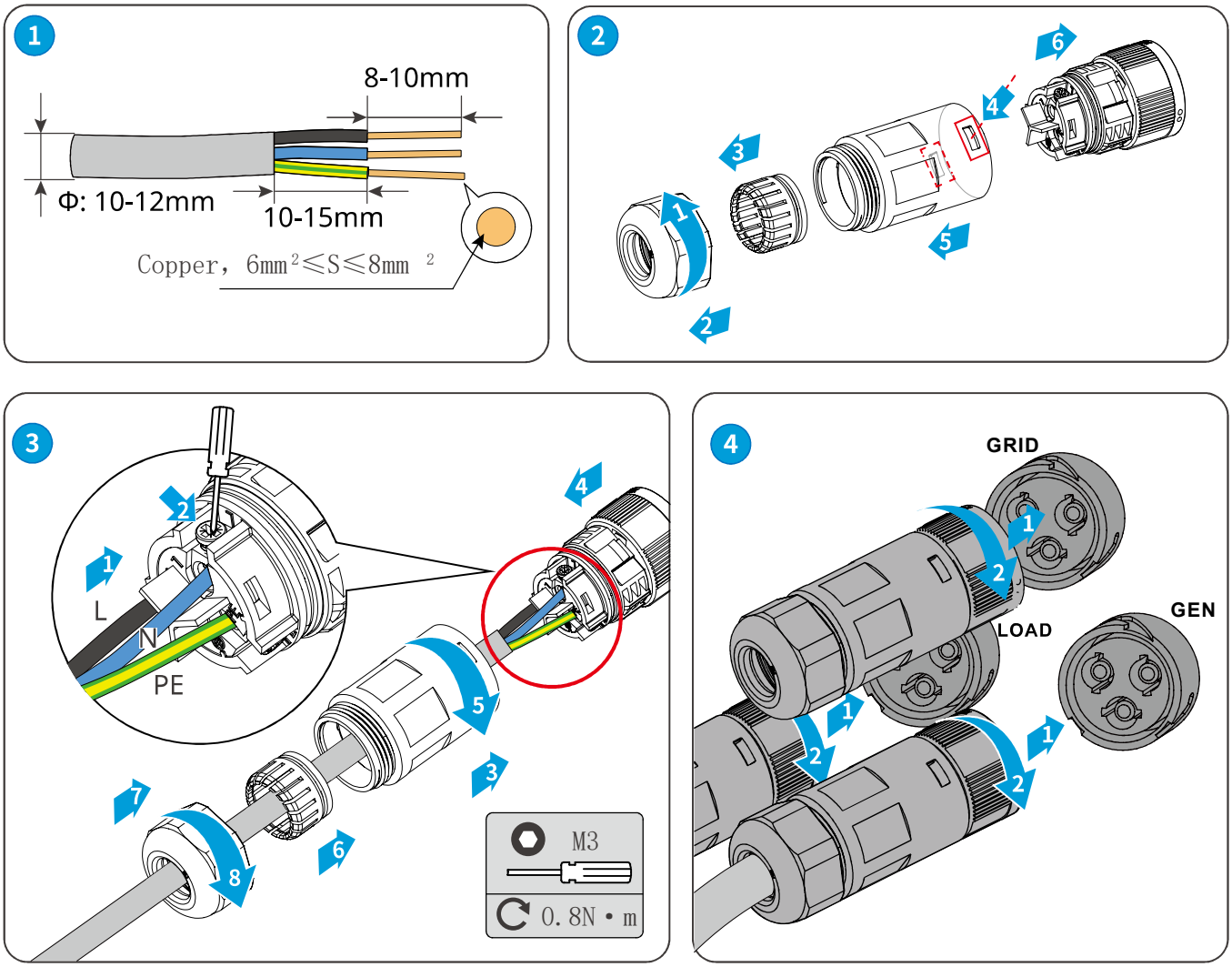








Type II


1
8-10mm
Φ: 10-12mm
10-15mm
Copper, 6mm²≤S≤8mm²
2
3
L
N
PE
M3
0.8N·m
4
GRID
LOAD
GEN

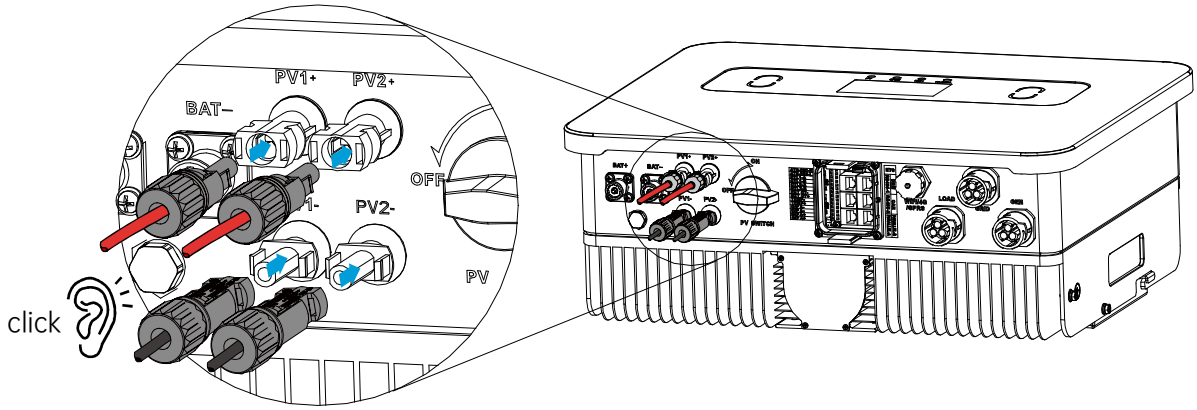
6.5 Connecting The DC Input Cable(PV)

DANGER

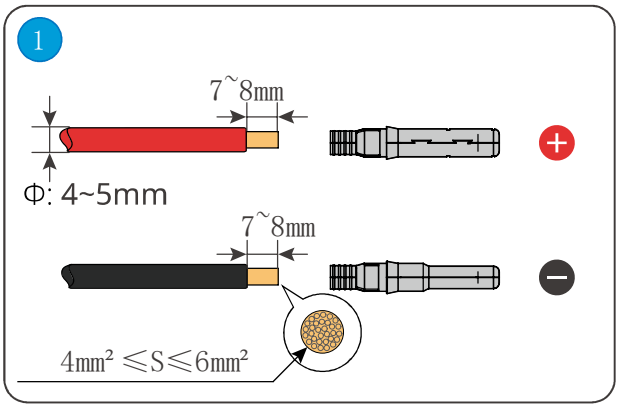
- Do not connect one PV string to more than one inverter at the same time. Otherwise, it may cause damage to the inverter.
- Confirm the following information before connecting the PV string to the inverter. Otherwise, the inverter may be damaged permanently or even cause fire and cause personal and property losses.
  1. Make sure that the max short circuit current and the max input voltage per MPPT are within the permissible range.
  2. Make sure that the positive pole of the PV string connects to the PV+ of the inverter. And the negative pole of the PV string connects to the PV- of the inverter.

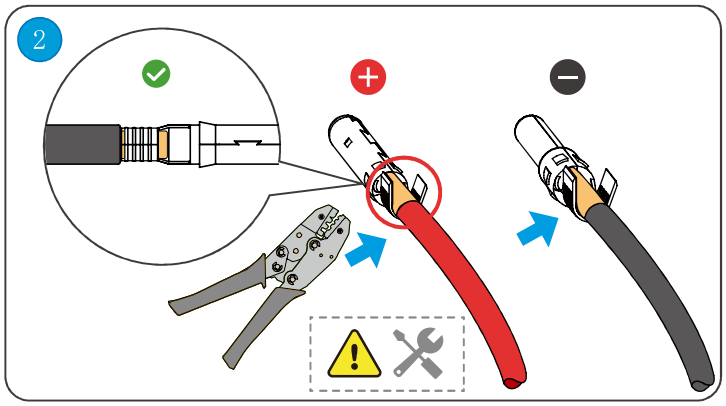
WARNING

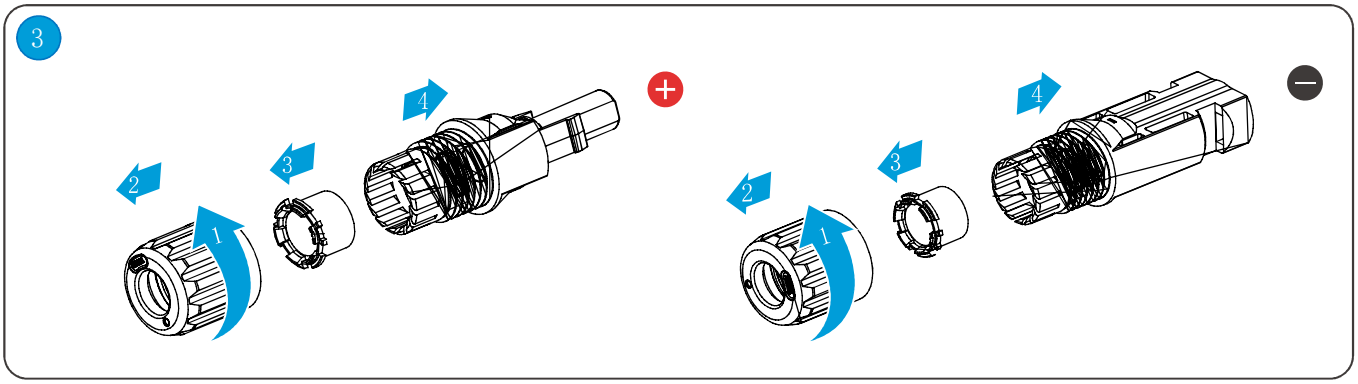
The PV strings cannot be grounded. Ensure the minimum insulation resistance of the PV string to the ground meets the minimum insulation resistance requirements before connecting the PV string to the inverter (R=maximum input voltage/ 30mA). If the insulation resistance value is less than above requirement, it will trigger the insulation resistance alarming in the inverter.

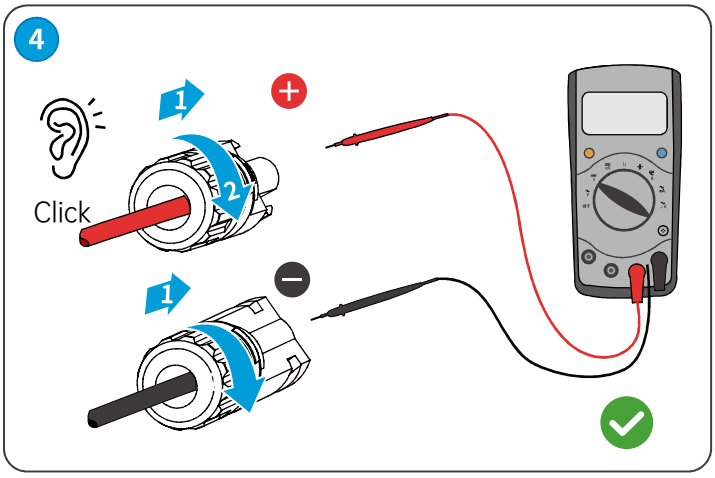


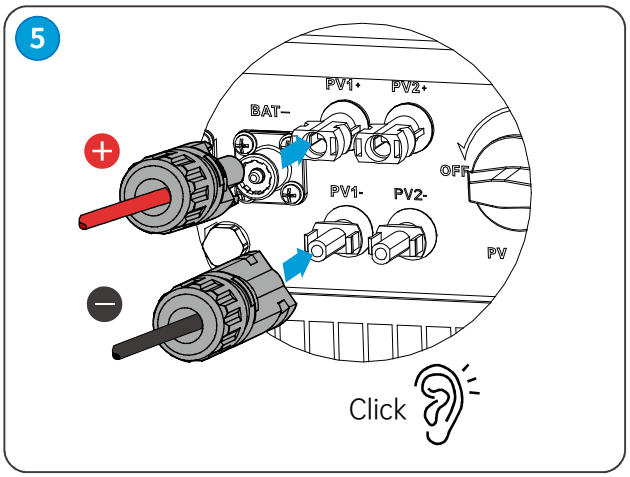
MC4








4
Click
1
2
1


5
BAT–
PV1+
PV2+
PV1-
PV2-
OFF
PV
Click

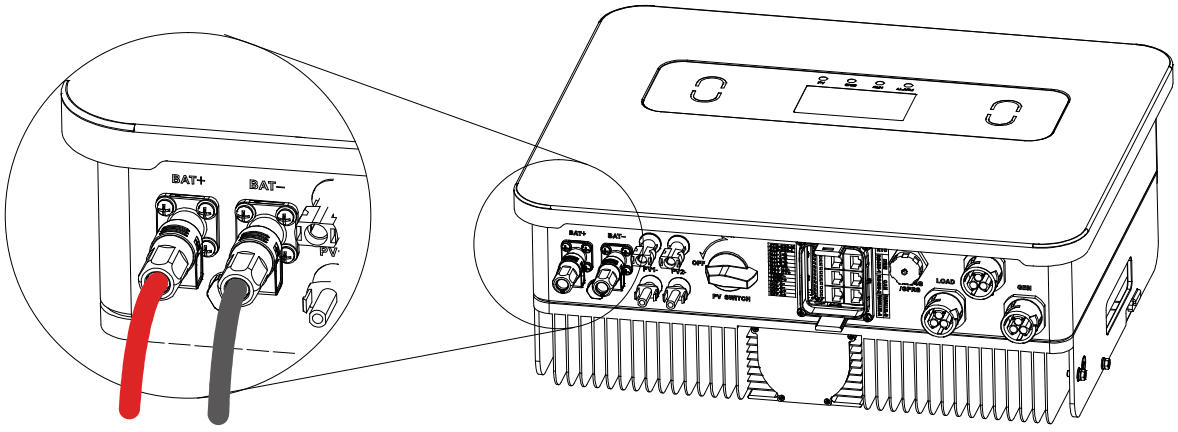
6.6 Connecting The Battery Cable

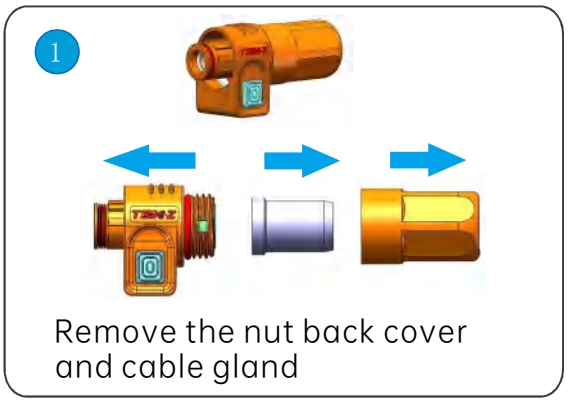
DANGER

- The battery used with the inverter shall be approved by the inverter manufacturer. The approved battery list can be obtained through the official website.
- A short circuit in the battery may cause personal injury. The instantaneous high current caused by a short circuit can release a large amount of energy and may cause a fire.
- Before connecting the battery cable, ensure the inverter and the battery, and downstream& upstream switches, are all disconnected.
- It is forbidden to connect and disconnect the battery cables when the inverter is running. Otherwise it may cause electric shock.
- It is forbidden to connect loads between the inverter and batteries.
- When connecting battery cables, use insulated tools to prevent accidental electric shock or short circuit to the batteries.
- Ensure that the open circuit voltage of the battery is within the permissible range of the inverter.
- Install a DC switch between the inverter and the battery.

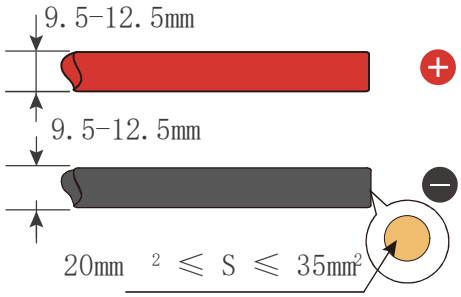
WARNING

- Connect the battery cables to the corresponding terminals such BAT+, BAT- and grounding ports correctly. Otherwise it will cause damage to the inverter.
- Ensure that the whole cable cores are inserted into the terminal holes. No part of the cable core can be exposed.
- Ensure that the cables are connected securely. Otherwise it will cause damage to the inverter due to overheat during its operation.



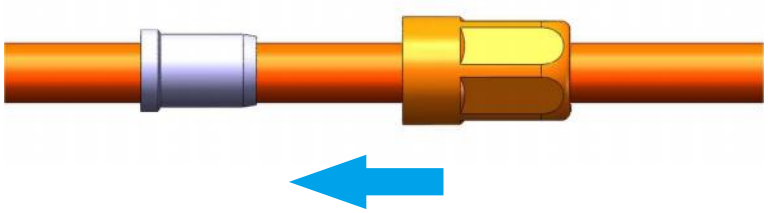


Remove the nut back cover and cable gland

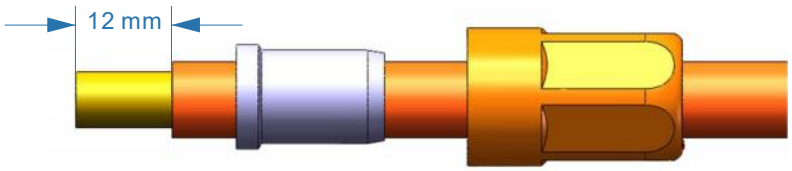


Prepare 25mm² cable with specifications as shown in the figure above

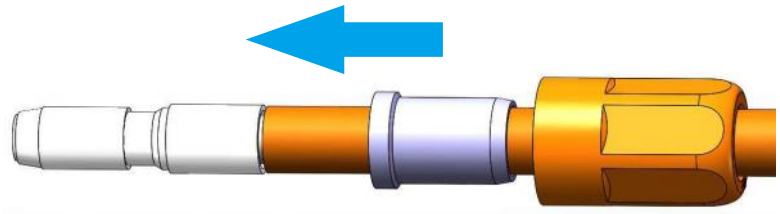
2 Pass the wire through the nut back cover and cable gland



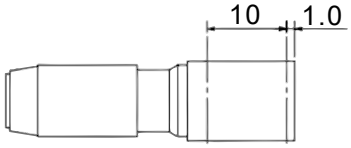
3 Peeling:Peel off a segment of cable insulation with a length of 12mm



4 Cable crimping: Insert the stripped cable into the terminal wiring hole



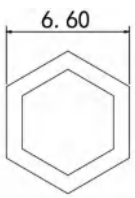
Suggested crimping position

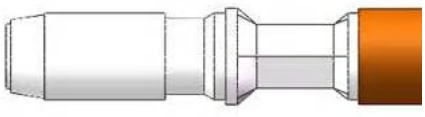


Suggested blade size

sectional area	Diameter after crimping (Min)	Tolerance	Withstand tensile force (Min)
10mm²	4.75mm	±0.15	500N
16mm²	5.8mm	±0.15	1500N
25mm²	6.6mm	±0.15	1900N
35mm²	35mm²	±0.15	2200N

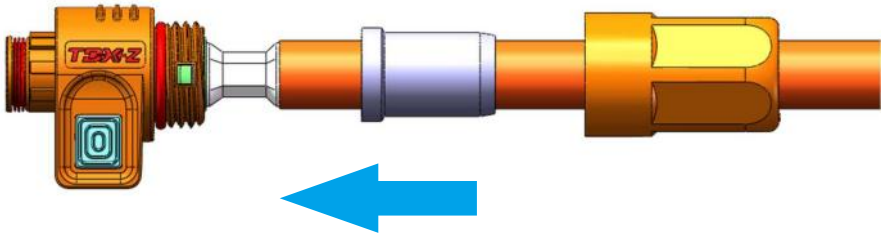
Set the parameters of the hydraulic clamp, and place the connector plug into the hydraulic clamp pressure interface for crimping



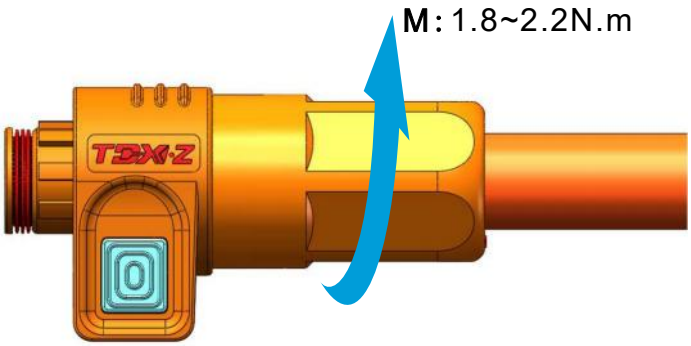


Crimping completion effect

5 Insert the cable with the pressed terminals into the connector body



6 Lock the nut back cover with a torque value of 1.8-2.2N.m

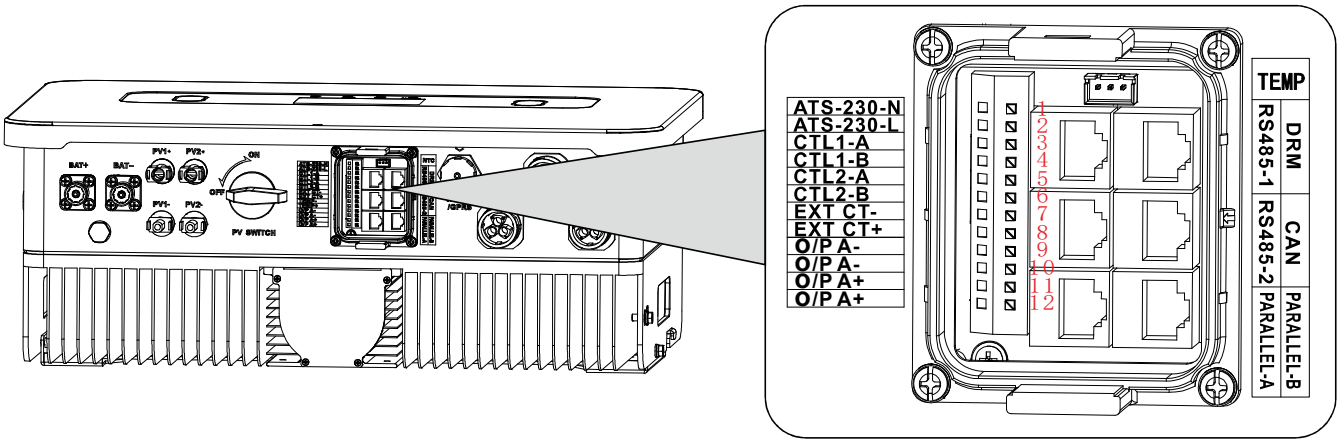


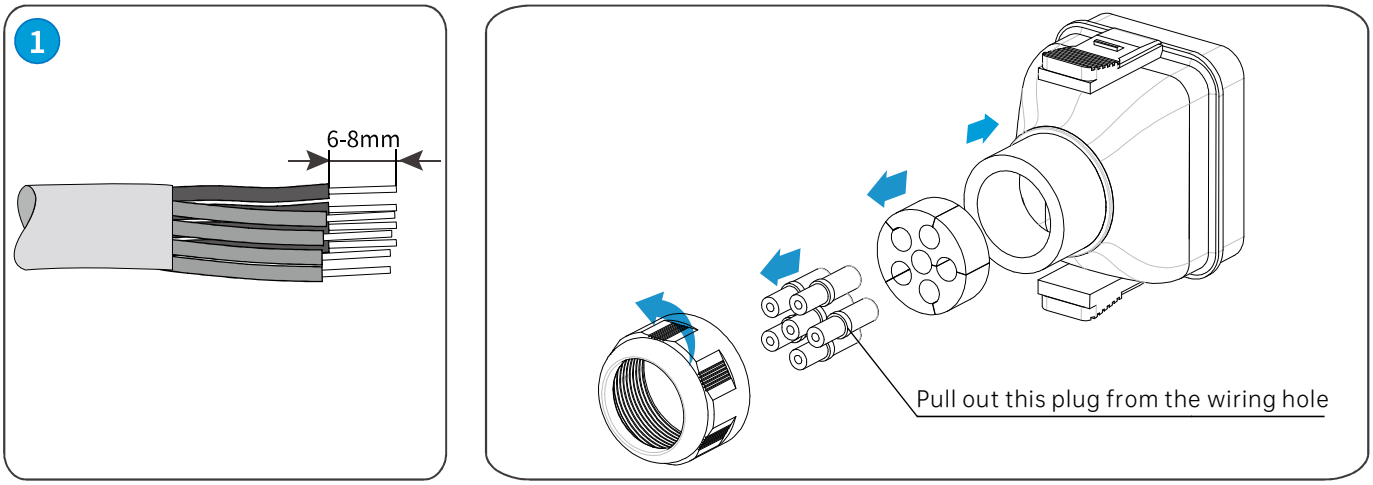
6.7 Multi-functional Communication Interface Connection

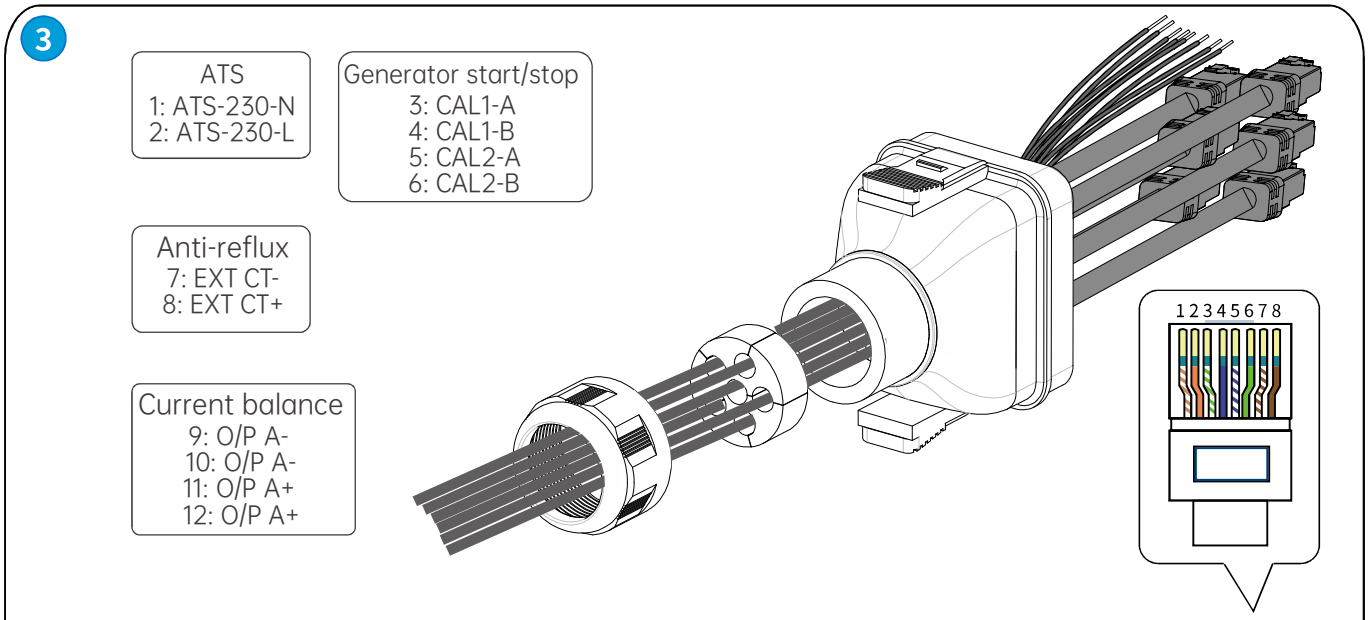
NOTICE
Make sure that the communication device is connected to the right COM port. Route the communication cable far away from any interference source or power cable to prevent the signal from being influenced.

6.7.1 Connecting The COM Cable

NO.	Port Definition	Function	Description
1	ATS-230V-N	External neutral grounding,control relay	The neutral grounding relay controls the power supply. If used, please configure a relay with a coil of 230Vac.
2	ATS-230V-N		
3	CTL1-A	Generator start/stop controlling	Support accessing the generator controlling
4	CTL1-B		
5	CTL2-A		
6	CTL2-B		
7	EXT CT-	Anti-reflux	Through the access to external CT, it can achieve functions such as anti-reflux and self-use.
8	EXT CT+		
9	O/P A-	Current balance of parallel system	The output current of each inverter is balanced in the parallel system.
10	O/P A-		
11	O/P A+		
12	O/P A+		





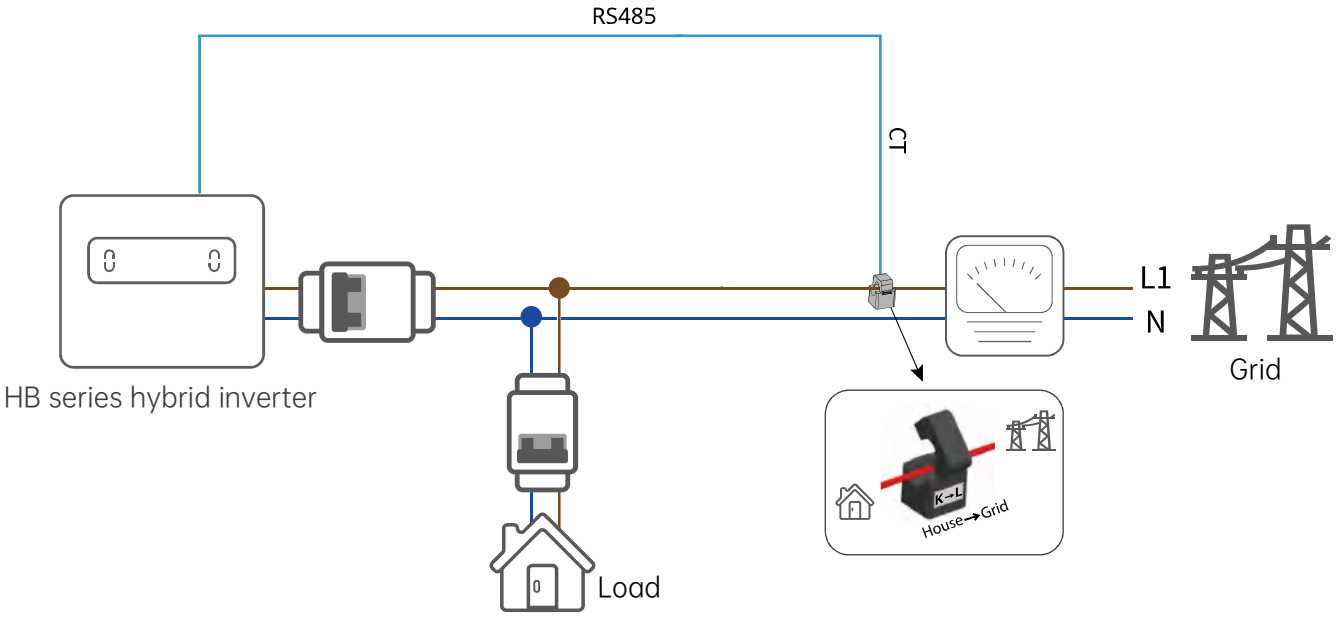


NO.	Color	CAN	DRM	RS485-1	RS485-2	parallel-A	parallel-B
1	Orange&white	/	DRM1/5	/	/	CANH_2	CANH_2
2	Orange	/	DRM2/6	/	/	CANL_2	CANL_2
3	Green&white	/	DRM3/7	/	/	GND	GND
4	Blue	CANH_1	DRM4/8	/	/	OS-TRIG+	OS-TRIG+
5	Blue&white	CANL_1	REF GEN/0	/	/	OS-HOST+	OS-HOST+
6	Green	GND	COM/DRM0	GND	GND	OS-SYN+	OS-SYN+
7	Brown&white	/	/	RS485 B1	RS485 B1	MARDET	MARDET
8	Brown	/	/	RS485 A1	RS485 A1	GND	GND

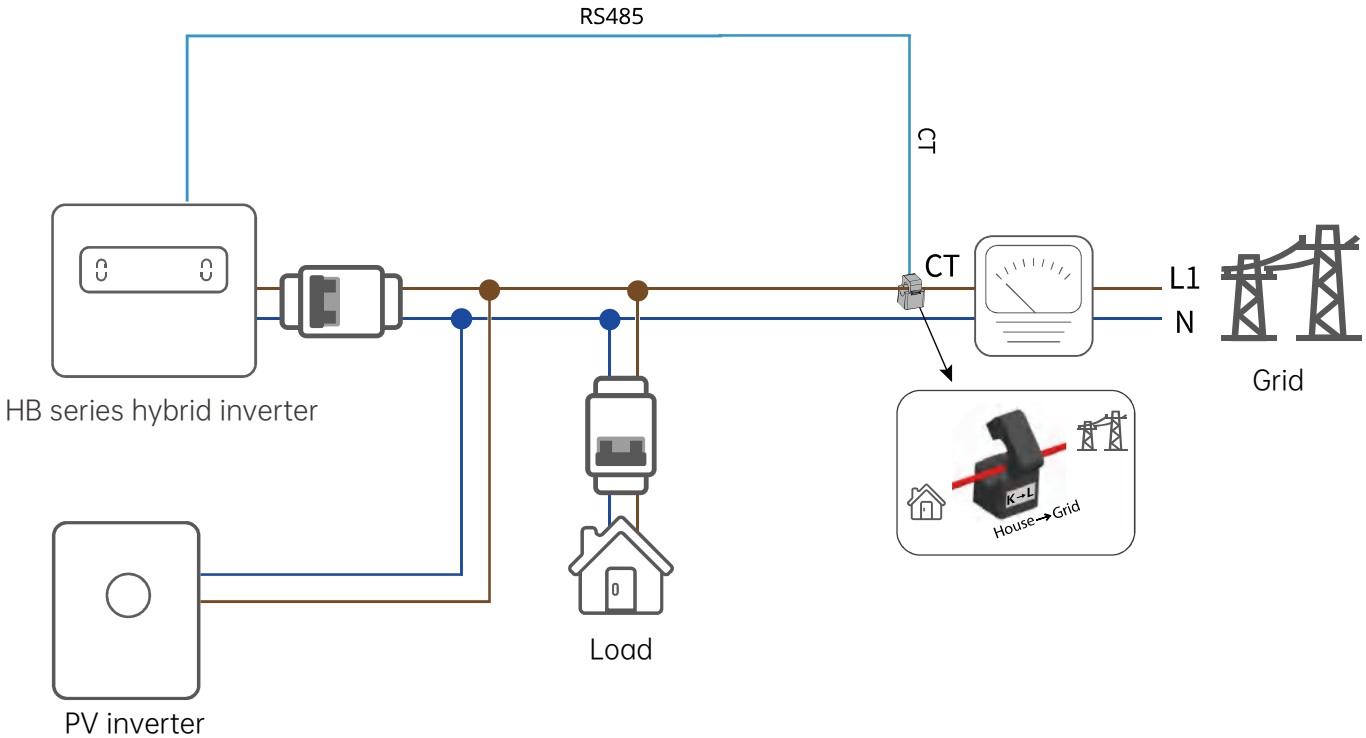
NOTICE
Combining with CT can achieve anti-reflux function, and the specific networking scheme is as follows:

Anti-reflux networking scheme(single-phase)

When the load used is a single-phase load and no PV inverter is used to coordinate the self consumption scenario, the HB series hybrid inverter can be paired with a CT to achieve anti-reflux function.

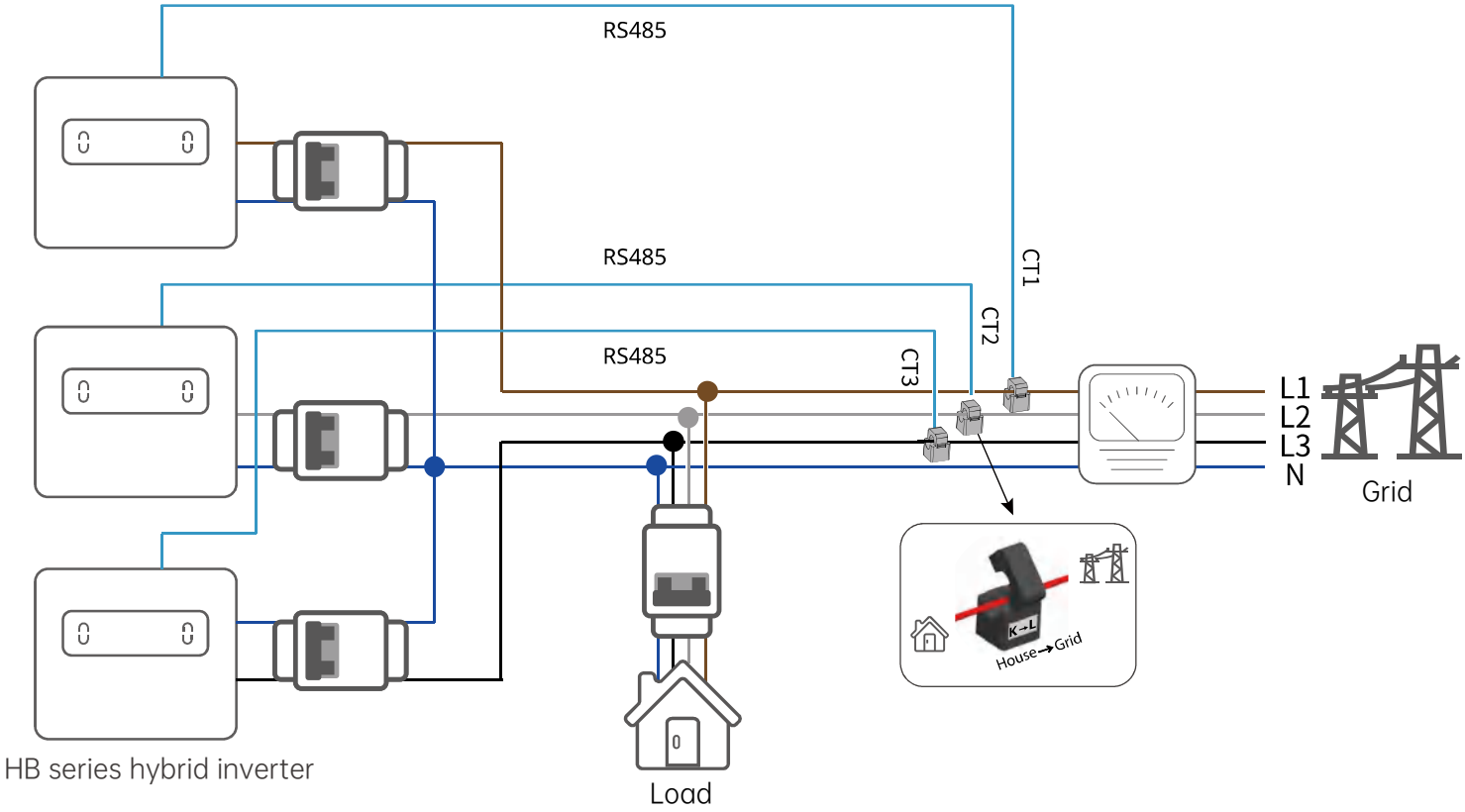


When the load connected is single-phase and HB series hybrid inverters with PV inverters are used under the self consumption mode, the anti-reflux function can be realized by connecting the inverters with CT.There may exist situations when the load gets the electricity from the grid for the Power Limit function.Below networking schemes are for reference only.



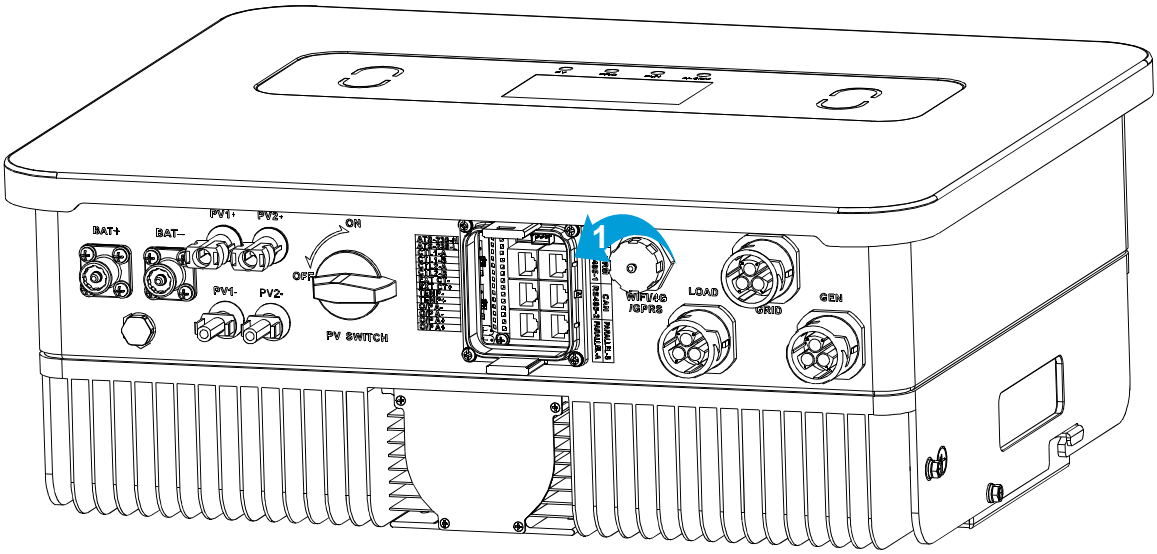
Anti-reflux networking scheme(three-phase)

When the load used is a three-phase load, the HB series hybrid inverter can be used with a CT to achieve anti-reflux function .The specific wiring is as follows:

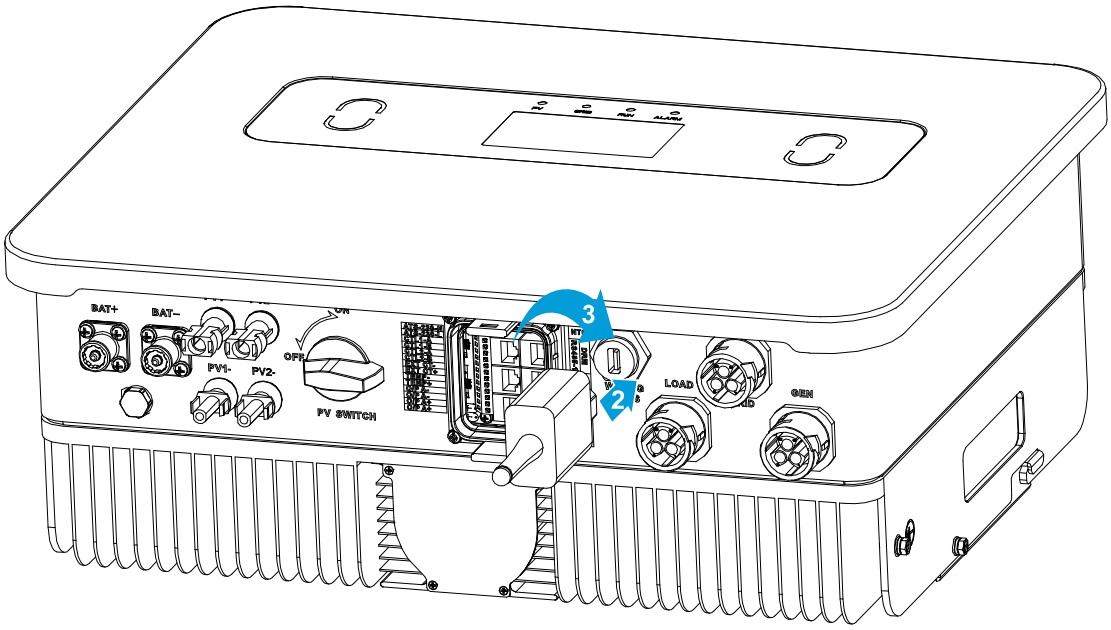


6.7.2 Installing the COM Module

NOTICE
• It supports setting the inverter; connecting to the server for monitoring the inverter operations etc. via WiFi, LAN and 4G module. • Refer to the delivered communication module user manual to get more introduction to the module. For more detailed information, visit official website .



1. Unscrew the protective cover of the communication module interface on the machine as shown in the figure above.



2. Insert the communication module into the corresponding port of the machine and tighten it as shown in the above figure.

7 Equipment Commissioning

7.1 Check Before Power ON

NO.	Checking Item
1	The product is firmly installed at a clean place that is well-ventilated and easy-to operate.
2	The PE, DC input, AC output, and communication cables are connected correctly and securely.
3	Cable ties are intact, routed properly and evenly.
4	Unused cable holes are fitted using the waterproof nuts.
5	The electrical conduit holes are sealed.
6	The voltage and frequency at the connection point meet the inverter grid connection requirements.

7.2 Power On

Step 1: Turn on the AC breaker on the GRID side of the inverter.
Step 2: Turn on the AC breaker on the LOAD side of the inverter.
Step 3: Turn on the battery breaker between the inverter and the battery.
Step 4: Turn on the DC switch of the inverter.

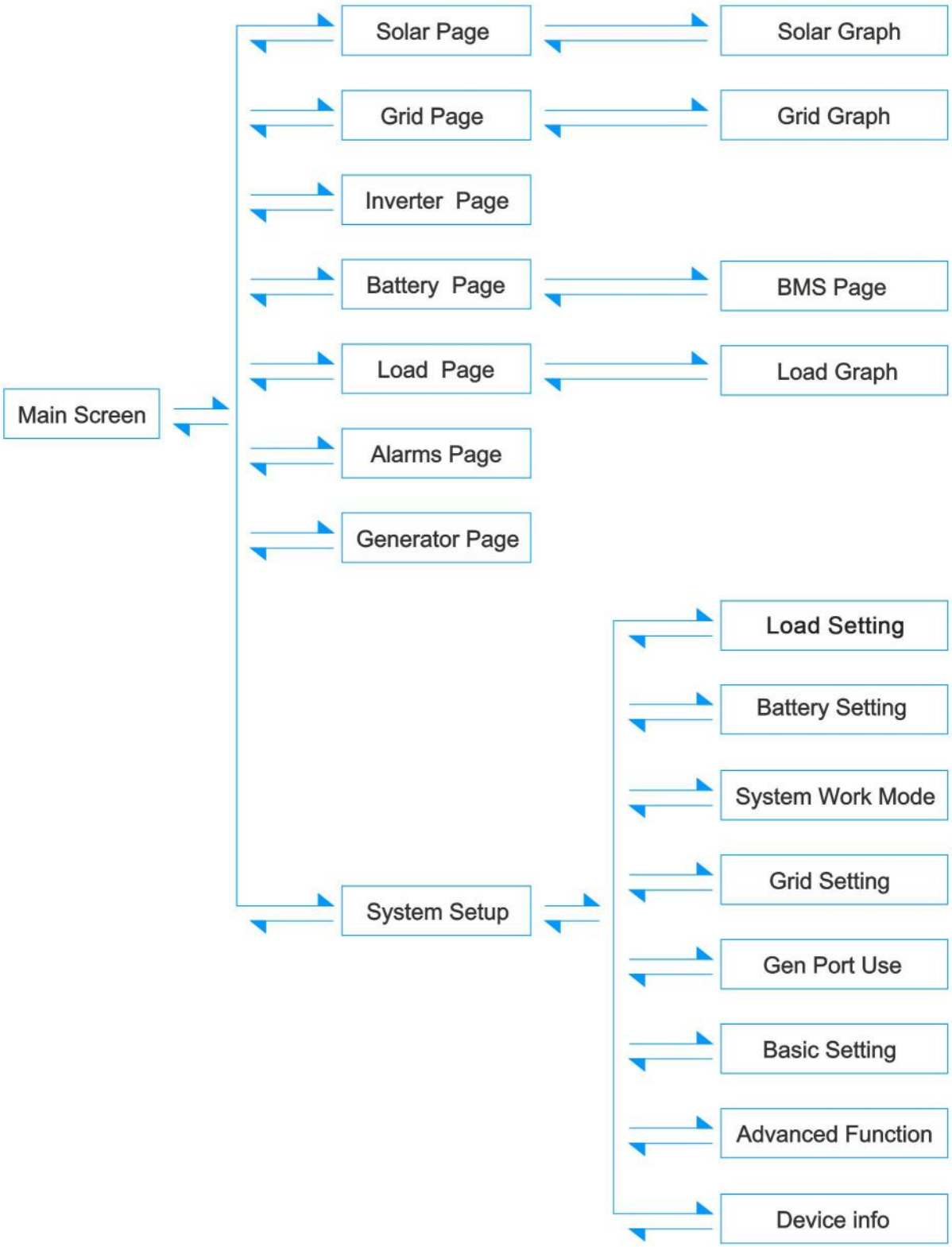
8 System Commissioning

8.1 Indicators

Indicator	Status	Description
Grid		The power grid is connected and the voltage, frequency, etc. are normal.
		Abnormal power grid parameters, exceeding normal range.
		Not connected to the power grid.
PV		Both PV voltages are normal.
		One of the PV voltages is abnormal.
		Two PV voltages are abnormal or not connected.
Inverter		The inverter works normally.
		The inverter is starting up.
		Abnormal or shutdown of inverter.
Fault		Inverter alarm.
		Inverter fault.

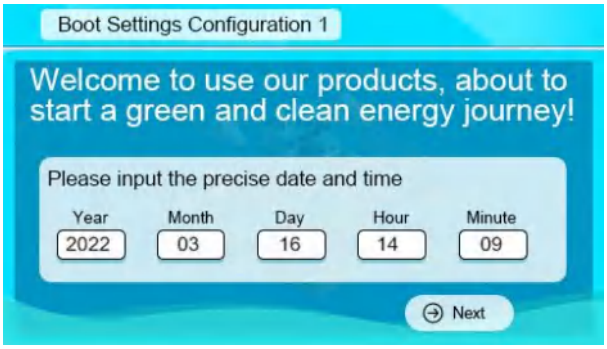
8.2 System Information

8.2.1 Screen Interface Operation Flow Chart



8.2.2 First boot and boot settings

Date and time settings

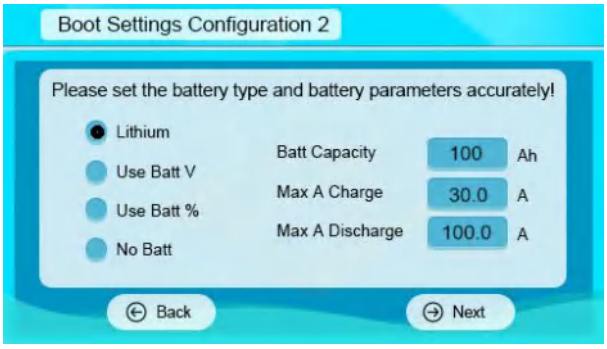


When powered on for the first time, you will enter the startup boot settings page

1. Enter device date and time settings。
2. Please accurately enter the current date and time, click on the input box to enter information.

After setting up, press the Next key to proceed to the next page.

Battery information settings



Enter the battery information settings page

1. First, select the battery type. There are four types of batteries available:

a. Lithium（Lithium battery）

b. Use Batt V(Other batteries use voltage as a unit)

c. Use Batt %(Other battery usage percentage in units)

d. NO Batt(Not connected to the battery, used for photovoltaic grid connected inverters)

2. Set the battery capacity, maximum charging current, and maximum discharge current of the battery.

After setting up, press the Next key to proceed to the next page.

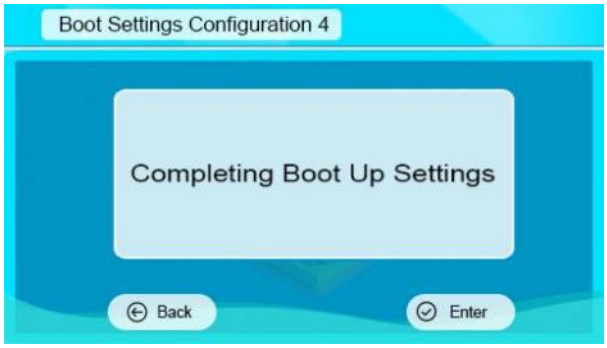
Grid standard settings

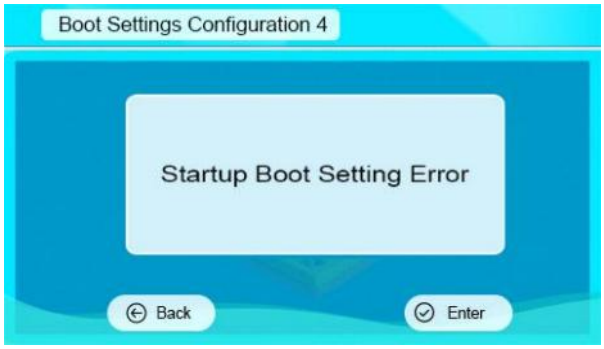
Enter the grid standard settings page

1. Click on 'Setting Grid Standards' to enter the grid standards page.
2. Find the local national and power grid standards for selection.
3. After selecting the local power grid standards, click to Enter save the current settings.

After setting up, press the Next key to proceed to the next page.

Set boot end





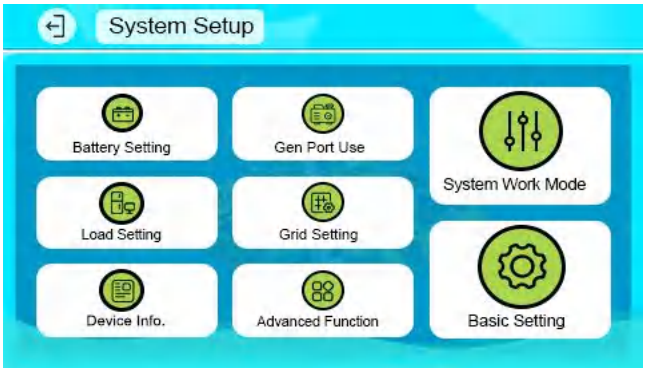
Enter the end page of startup boot settings

1. Enter the boot boot boot settings judgment page, and the previous settings will be analyzed and judged to see if the settings have been completed.
2. If the setting is successful, it will display that the boot setting is complete.
3. If there is an error in the settings, a boot setting error will be displayed. You need to go back and recheck the settings to see if there are any error items. After making the changes, continue to the next step until the boot setting is completed and passed.

After setting up, press the Enter key to immediately enter the device's main page.

8.2.3 Main Screen

1. The green background of the inverter  in the middle of the main page represents that the inverter is in normal operation. If it turns gray  , it indicates that the device is in a shutdown state (details of the status can be found in the inverter status comparison code table). If it turns red  , it indicates that the device is faulty. You can click on the alarm icon  above the main page to view the current specific alarms and faults.
2. The information displayed on the main page includes photovoltaic strings  inverters  , power grids  , loads  , and batteries  . It also displays the direction of energy flow through arrows. When the power dial shows that the current power exceeds the rated power, the color on the dial will change from green to red, vividly displaying system information on the main screen.
3. The generator  parameter information on the main page needs to be set to open the generator port and connect to the generator in order to display the connection status and parameter information of the generator.
4. The button in the upper right corner of the screen is the system settings button  . Clicking this button will take you to the system settings page, which includes basic settings, battery settings, load settings, power grid settings, system working mode, generator port usage, advanced functions, and device information.



5. The photovoltaic power and load power remain positive at all times.
6. A negative battery power indicates battery charging, and a regular power indicates battery discharge.

8.2.4 Equipment Operation Status

Operation status of inverter

Click the icon of inverter on the home screen to enter the detail page

1. Display the power values of the inverter.
2. Display the current voltage and current values of the inverter.
Display the current operating status of the inverter and the bus voltage.
4. Display the current inverter frequency and internal temperature.
Click the icon to return to the main page.

Solar operation status

Click the solar icon on the home screen to enter the detail page

1. Display the voltage, current, power, and ISO insulation impedance of the current two independent MPPTs.
2. The current total power of two PV strings.
3. The total daily power generation and historical total power generation of the two PV srings.
Click the icon to enter the power chart page.
Click the icon to return to the main page.
Press the icon to enter the PV module configuration design page.

Power grid operation status

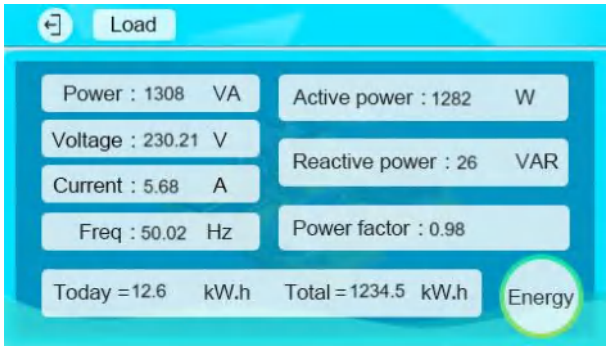
Click the icon of power grid on the home screen to enter the detail page

1. The current working status, power value, and frequency value of the power grid.
2. Current grid voltage, current, external CT power, Household load power, leakage current value.
3. Display the daily purchased electricity and historical total purchased electricity, as well as the daily sold electricity and historical total sold electricity.

Click the icon to enter the power chart page.

Click the icon to return to the main page.

Load operation status



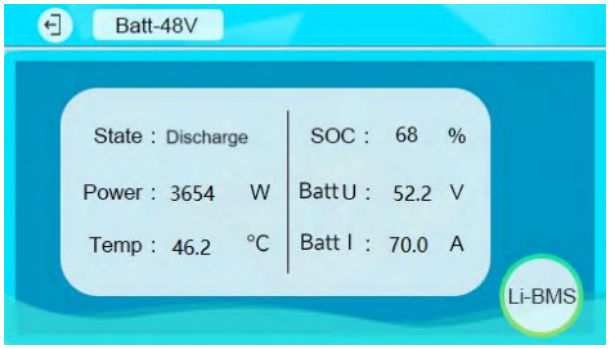
Click the load icon on the home screen to enter the detail page

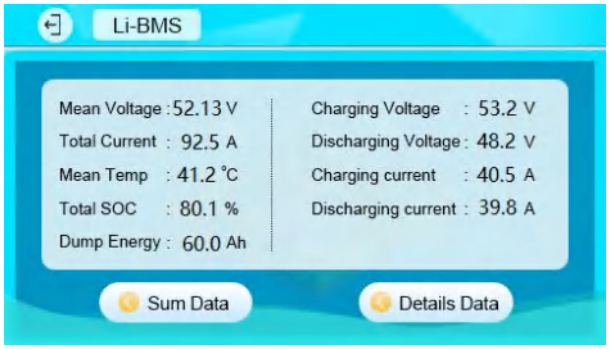
1. Current load power factor, voltage, current, frequency.
2. Current load power value.
3. The daily electricity consumption and historical total electricity consumption of the load.

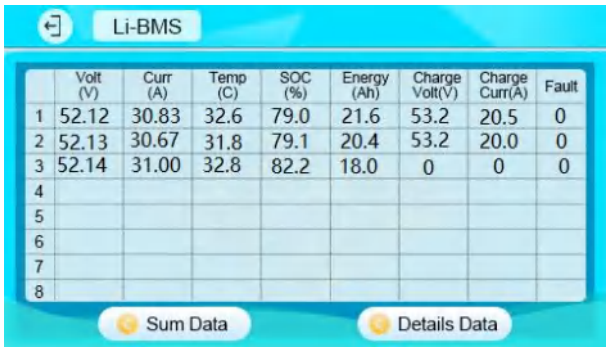
Click the icon to enter the power chart page.

Click the icon to return to the main page.

Battery operating status







Click the battery icon on the home screen to enter the details page

1. Current battery operating status, power, battery temperature, remaining capacity of battery pack, battery voltage, battery current value and other parameter information.

Click on the icon to enter the BMS system page.

Click the icon to return to the main page.

BMS details page

1. Click the Sum Data icon to display the total parameters of the entire battery cluster.

Click the icon to return to the main page.

Note: The data on the Li BMS page will only be available if the device successfully communicates with the lithium battery BMS system.

BMS details page

1. Click on the Details Data icon to display the parameters of each battery pack within the battery cluster.

Click the icon to return to the main page.

Note: The data on the Li BMS page will only be available if the device successfully communicates with the lithium battery BMS system.

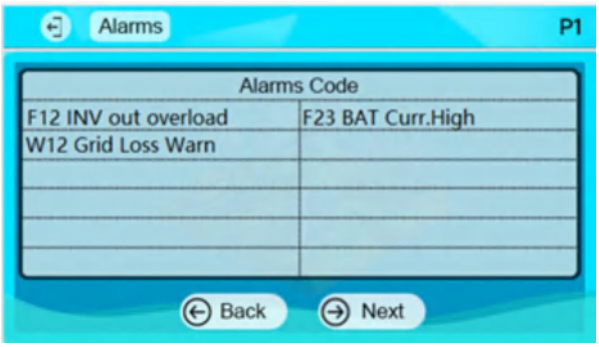
Generator operation status (requires equipment to be connected to the generator)

Click the generator icon on the home screen to enter the details page.

1. The apparent power, voltage, current, and frequency of the current generator.
2. The daily power generation and historical total power generation of the generator.

Click the icon to return to the main page.

Equipment fault alarm



Click on the red alarm icon 3 in the upper right corner of the main screen to enter the current alarm and fault page.

1. The alarm icon will display the current number of alarms.
2. The fault is displayed as "Fxx" and the alarm is displayed as "Wxx".

Click the icon to return to the main page.

Inverter operation status and comparison code table

Code	0	1	2	3	4	5
Work status	power-on delay	waiting state	Initialize	soft start	mains operation	inverter operation
Color	orange	orange	orange	orange	green	green
Code	6	7	8	9	10	11
Work status	inverter to mains	mains to inverter	working	self-checking	power off	fault
Color	green	green	green	orange	grey	red

8.2.5 Electricity Charts

Chart of solar power generation

Click the icon on the solar energy details page to enter the solar power generation chart.

You can choose to view the daily, monthly, annual, and total power generation charts of solar energy.

Chart of power grid purchase and sale

Click the icon on the grid details page to enter the solar power generation chart.

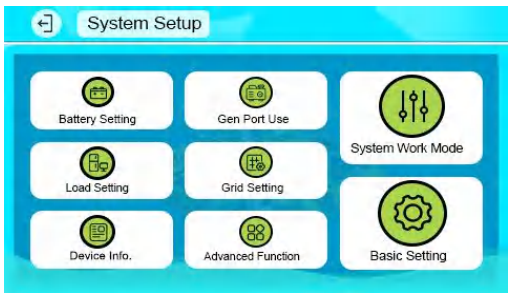
You can choose to view the daily, monthly, annual, and total grid purchasing and selling electricity charts of the power grid.

Chart of load power consumption

Click the icon on the load details page to enter the Load electricity consumption generation chart.

You can choose to view the daily, monthly, annual, and total load electricity consumption charts of the load.

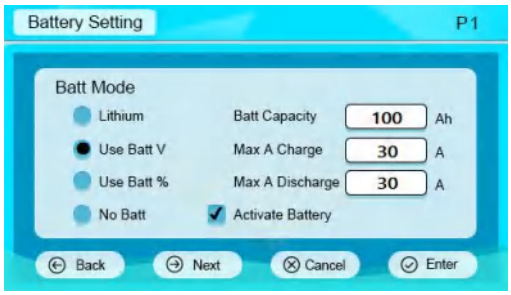
8.3 System Settings



Click the gear icon on the top right corner of the main page to enter the system settings page

1. After setting all parameters on the settings page, you need to click the key Enter to confirm and save the settings. Otherwise, the settings will not take effect.Otherwise, the settings will not take effect.
2. Click the key Cancel on the function settings page to return to the system settings page. Click the icon to return to the main page.

8.3.1 Battery parameter setting



Click "Battery Setting" to enter the battery setting page

Set battery type and battery parameters, which are divided into 4 types,But only one option can be selected for setting.

A. Lithium: Lithium battery

B. Use Battery V: Other batteries use voltage as a unit

C. Use Battery%: Other battery usage percentage in units

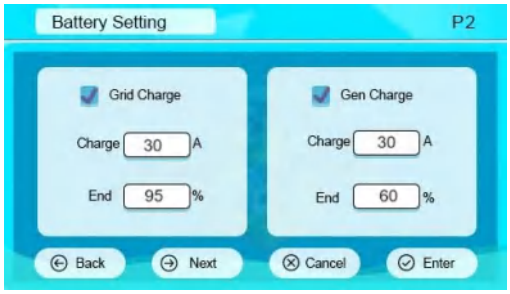
D. No Batt: Not connected to the battery, used for photovoltaic grid connected inverters

1.1 Battery capacity: Set the total capacity value of the battery pack, which is usually marked on the battery pack device.

1 2 M a x A C h a r g e: The maximum charging current for the battery (5kW model current range 0-100A). For A G M or wet batteries, it is recommended to set the maximum charge and discharge current to 20% A of the battery capacity, and for lithium batteries, it is recommended to set the current to 50% A. For gel batteries, please refer to the battery specification settings.

1.3 Max A Discharge: Set the maximum discharge current value of the battery (maximum discharge current of 120A for 5KW models,combined with battery parameter settings).

1.4 When "Activate Battery" is selected, After battery protection, the inverter will automatically repair the battery



2. After clicking Next , enter the battery P2 settings page

Set the power grid and generator to control the charging of batteries. The parameter for this setting is the same for all battery types. The reference settings are as follows:

2.1 When "Grid Charge" is selected, it allows the grid to charge the battery. When the battery reaches the set low voltage or low capacity threshold, the system will automatically use the grid to charge the battery.

End: Set the cutoff capacity threshold for charging batteries from the power grid. When the battery reaches the set threshold, the system will stop using the power grid to charge the battery. If the battery charging and discharging custom function is enabled (time-sharing mode), this setting threshold will be invalid.

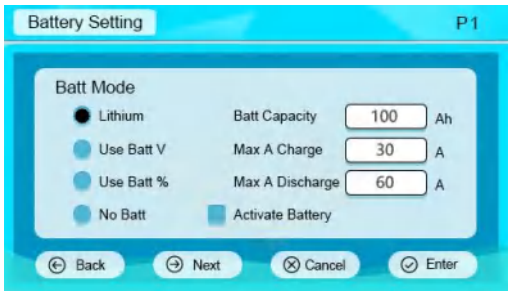
Charge: Set the maximum current allowed by the power grid to charge the battery, in units of A.

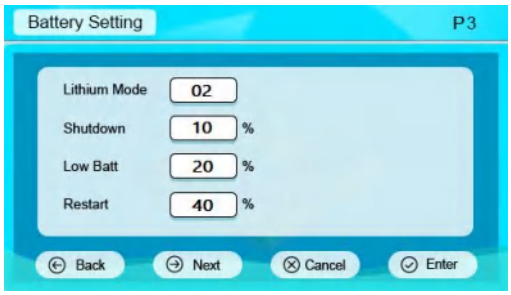
2.2 When "Gen Charge" is selected, it allows the generator to charge the battery. When the battery reaches the set low voltage or low capacity threshold, start the generator to charge the battery. (If grid charging is also checked, grid charging will be prioritized)

End: Set the cut-off capacity threshold for the generator to charge the battery. When the battery reaches the set threshold, the system will stop the generator from charging the battery.

Charge: Set the maximum current allowed by the generator to charge the battery, in units of A.

Lithium battery mode





Select "Lithium" battery type, click on Enter

Click Next to enter the lithium battery P3 settings page. The battery parameter settings are as follows:

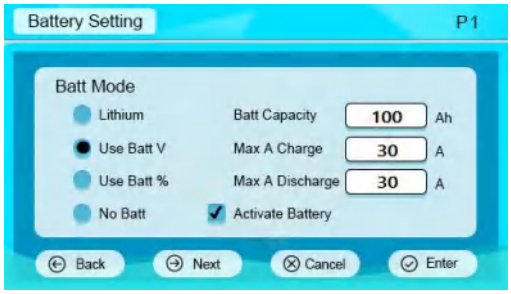
Lithium Mode: This is the BMS protocol. Please refer to the documentation and select the corresponding protocol command.

Shutdown: Set the battery discharge termination capacity threshold. If the threshold is reached, the inverter will shut down.

Low Batt: Set the low capacity threshold for battery discharge. If the threshold is reached, the inverter will give an alarm and the battery pack voltage will be low.

Restart: Set the battery discharge recovery capacity threshold. If the threshold is reached, the battery can resume discharge function.

Use Batt V/Use Batt % battery mode



Select Use Batch V/Use Batch% and click Enter

Click Next to enter the battery P3 settings page. The battery parameter settings are as follows:

1. The parameter settings for the three stages of battery charging vary depending on the type of battery. The parameter settings can be found in the attached table.

2. Battery discharge parameter settings, if the parameter unit set for "Use Batt%" is%, and if "Use Batt V" is set, the parameter unit set is V.

Shutdown: If the set remaining battery capacity is% or the battery voltage reaches this threshold, the inverter will shut down.

Low Batt: If the set remaining battery capacity% or battery voltage reaches this threshold, the inverter will give an alarm and report a low voltage alarm for the battery pack.

Restart: If the remaining capacity or voltage of the set battery returns to this threshold, the battery can resume its discharge function.

3. TEMPCO: Battery temperature compensation setting, which needs to be set by professionals and may not be set.

4. Battery Resistance: Setting the internal resistance parameter of the battery, which needs to be set by professionals and can be omitted.

Battery Charging Parameter Setting Table

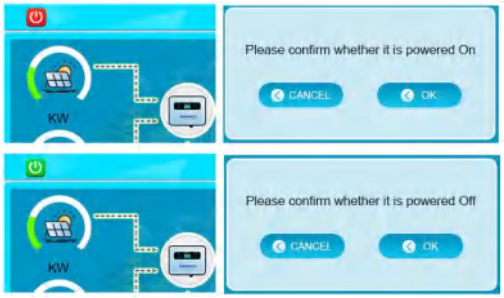
Battery type	Float charging	Constant voltage	Equal charging
Lithium	Follow its BMS voltage parameters		
AGM	53.6V (13.4V)	56.4V(14.1V)	57.6V (14.4V)
Gel	54.0V(13.5V)	56.4V(14.1V)	/
Wet	54.8V(13.7V)	57.6V(14.4V)	58.8V(14.7V)

8.3.2 Basic Settings

Click "Basic Setting" to enter the basic setting P1 page

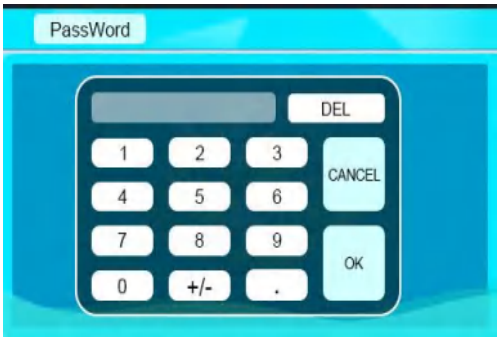
Time Syncs: switch time synchronization.
Touch Beep: switch the screen touch sound.
Display: Pop-up window to adjust screen brightness and sleep time.
Alam Beep: switch the alarm sound.
Set the date, time, month, day, hour, and hour.
After setting up, click the Enter icon to confirm and save the set parameters.
Click the Cancel icon to return to System Settings Page.

Manual switch system



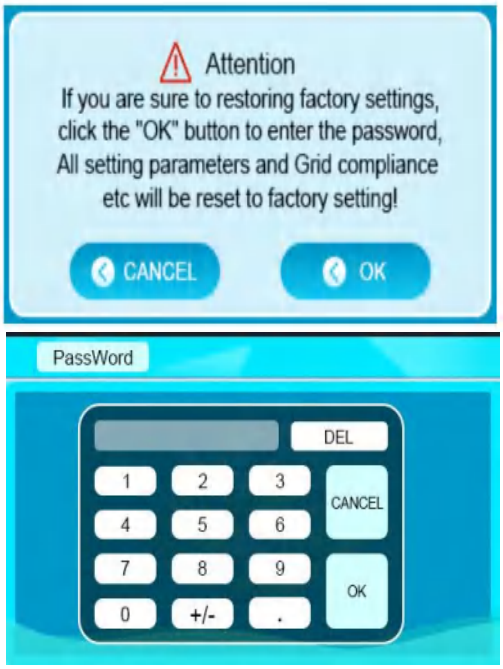
Check "Manual Swith" on page P1 of the basic settings and click the Enter button (close to uncheck the settings).
The on/off case chart button is displayed in the upper left corner of the main page. After turning on the manual power on/off function of the system, it is necessary to manually click on the power on button every time the device system starts up.
Click the power on button, a pop-up window will prompt to turn on or off, click the confirm button to proceed.

Lock all setting parameters

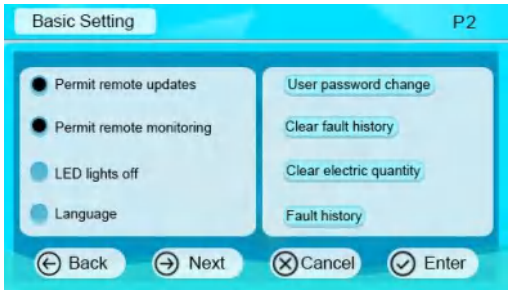


On the basic settings page P1, select "Lock out all changes" and click Enter . In the pop-up window, enter the user password to complete the setting. All setting parameters cannot be set, but can only be viewed. To unlock, select the function again and enter the user password to unlock.
Factory default user password: 123456

Reset to factory settings



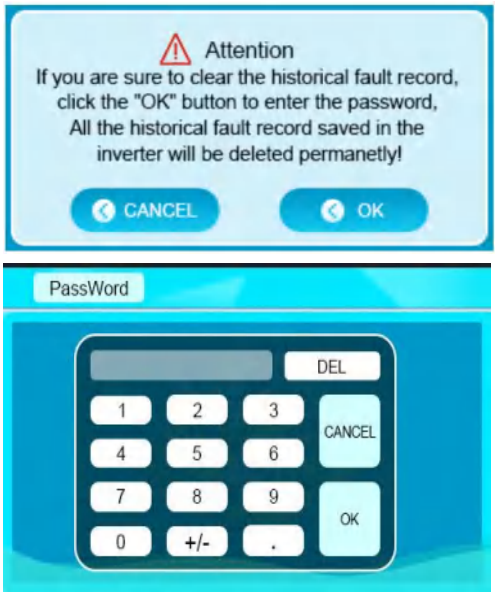
On the Basic Settings P1 page, select "Factory Reset" and click Enter to pop up a risk prompt explanation. Once you know it, please confirm and enter the user password to complete the factory settings of the device.Factory default user password: 123456



Basic parameter settings P2 page (press Next to enter)

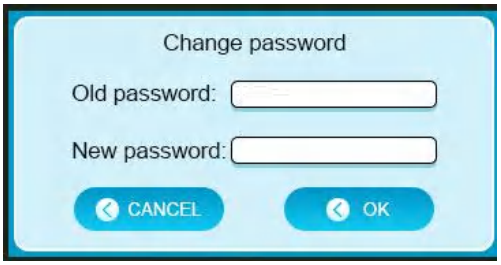
Permit remote updates: Allow remote Permit remote monitoring: Allow remote monitoring
LED lights off: LED lights off
Language: Using language selection settings
After setting up, click the Enter icon to confirm and save the set parameters.
Click the Cancel icon to return to System Settings Page.

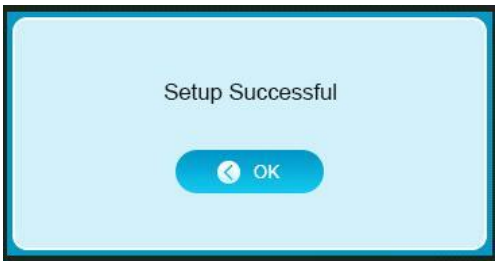
Clear the historical fault records

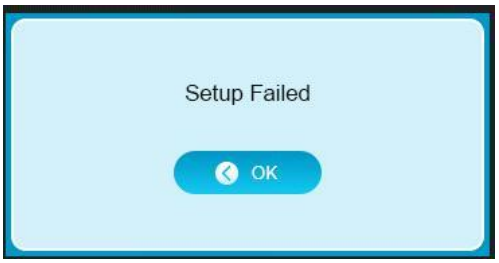


Click on "Clear fault history" on page 2 of the basic settings. Please confirm reading the risk warning instructions. Once you know it, please confirm and enter the user password to confirm. This will complete the clearing of the device's historical fault record.
Factory default user password: 123456

User password change





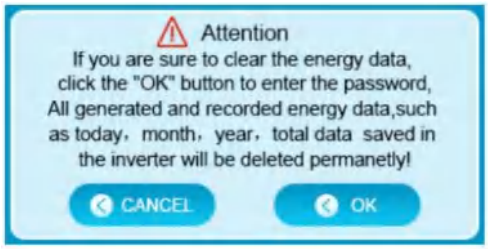


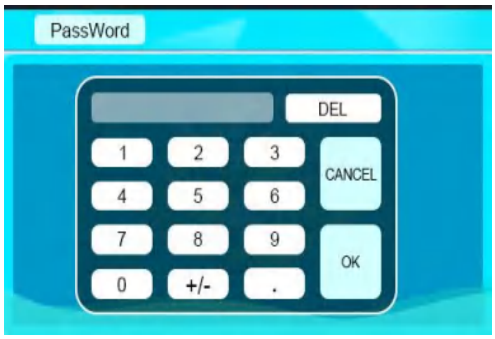
Click on "User password change" on the Basic Settings P2 page, and a pop-up window will appear to enter the password modification page.

To confirm the modification, please enter the old user password first, then enter the new 6-digit user password. Click confirm, and the password will be prompted to confirm whether the modification was successful. If not, please check if the old and new passwords are entered correctly.

Factory default user password: 123456

Clear electric quantity record

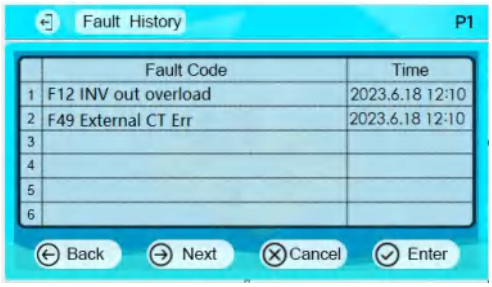




Click on "Clear electric quantity" on the basic settings page 2. Please confirm reading the risk warning instructions. Once you are aware, click "OK" and enter the user password to confirm. This will complete the clearing of all device power records.

Factory default user password: 123456

View historical fault records

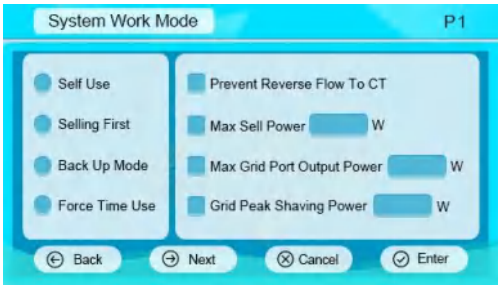


Click on "Fault history" on the P2 page of the basic settings to enter the historical fault record page. You can view the historical faults and occurrence time recorded by the current device.

The display screen can currently display up to 66 historical faults, which can be viewed by flipping up and down. When space is insufficient, it will overwrite the earliest fault records.

Click the Cancel icon to return to System Settings Page.

8.3.3 Work mode



Click "System Work Mode" to enter the system work mode P1 setting page

Debugging selects the device's working mode and related parameters. The device currently has four working modes and can only be selected individually.

Self Use: self-use mode

Selling First: the priority mode of selling electricity

Back Up Mode: Backup mode

Force Time Use: Time-sharing mode

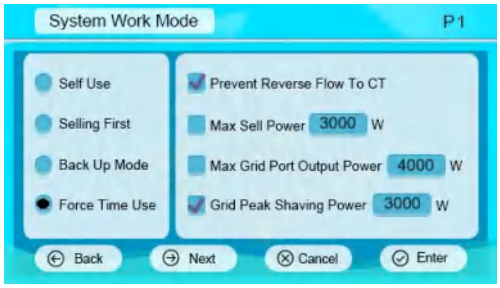
Prevent Reverse To CT: When turned on, prevent the device from backflowing excess electrical energy to the external CT port to sell electricity to the grid; When turned off, excess electricity is allowed to be sold for internet access, but this option cannot be used in the sales priority mode.

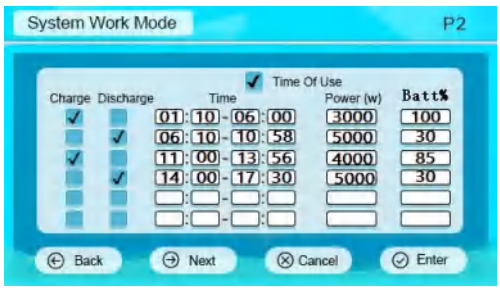
Max Sell Power: The maximum power allowed to sell electricity to the grid, only used in the electricity priority mode.

Max Grid Port Output Power: When enabled, limits the maximum power output of the device's grid port; When turned off, the device will operate according to the maximum default power set by the device, and can only be used in sales priority mode.

Grid Peak Shaving Power: If the grid peak shaving function is enabled, the power purchased from the grid will be limited to the set value. If the load power exceeds the allowable value, photovoltaic energy and batteries will be used as supplements. If the current load requirements cannot be met, the power grid will be increased to meet the load demand.

Force time use mode





When selecting the Force Time Use work mode

The charging and discharging time period of the P2 page battery that needs to be set for the working mode and the weekly date and time used on the P3 page.

Prevent Reverse Flow To CT: Is it allowed to allow excess solar energy to be sold and connected to the grid? If it is prohibited, check this option to prevent reverse current from being sold and connected to the grid. If it is allowed, do not check this option.

Grid Peak Shaving Power: Whether the grid peak shaving function is enabled. If enabled, the maximum power allowed to purchase electricity from the grid needs to be set.

After completing the settings, click Enter to save the set parameters.

Click Next to enter the P2 charging and discharging time period setting page

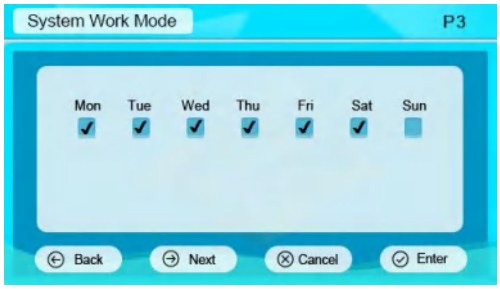
First, turn on the Time or Use time-sharing setting.

Set the battery charging and discharging time period and power parameters, and other unset time periods will allow the device to automatically operate in self use and sell electricity mode. After completion, click Enter to save the settings. For example:

1. Set the battery charging to a maximum power of 3000W from 01:10 to 06:00, and stop charging when the battery capacity reaches 100%.

2. Set the battery discharge to a maximum power of 5000W from 06:10 to 10:58, and stop discharging when the remaining capacity of the battery reaches 30%.

After completing the settings, click Enter to save the set parameters.



Click Next to enter the P3 date setting page

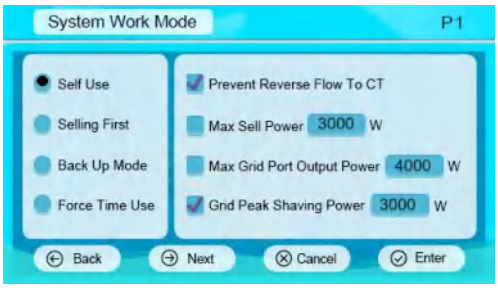
Set the day of the week for use within a week. Check the week that needs to be used, and other unset date devices will automatically run. For example:

The current date only selects Monday to Saturday to charge and discharge the battery according to the time sharing. The device will automatically run on Sunday to determine whether to charge and discharge the battery.

After completing the settings, click Enter to save the set parameters.

Click the Cancel icon to return to System Settings Page.

Self-use mode



When selecting the Self Use working mode

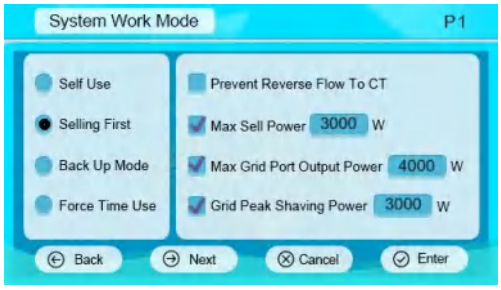
Prevent Reverse Flow To CT: Is it allowed to allow excess solar energy to be sold and connected to the grid? If it is prohibited, check this option to prevent reverse current from being sold and connected to the grid. If it is allowed, do not check this option.

Grid Peak Shaving Power: Whether the grid peak shaving function is enabled. If enabled, it is also necessary to set the maximum power limit allowed to purchase electricity from the grid.

After completing the settings, click Enter to save the set parameters.

Click the Cancel icon to return to System Settings Page.

Selling first mode



When choosing the Selling First work mode

Max Sell Power must be selected to enable and a maximum power limit allowed for sale to the grid must be set.

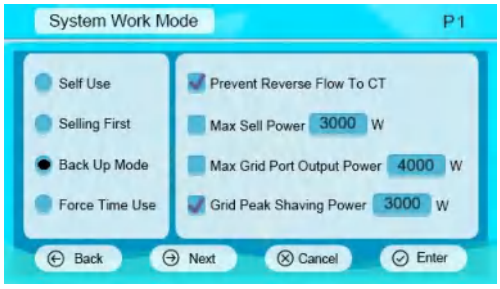
Max Grid Port Output Power: Whether to limit the maximum power output of the device's grid port to enable it. If you need to limit it, check this option and set the power limit.

Grid Peak Shaving Power: Whether the grid peak shaving function is enabled. If enabled, the maximum power allowed to purchase electricity from the grid needs to be set.

After completing the settings, click Enter to save the set parameters.

Click the Cancel icon to return to System Settings Page.

Back up mode



When selecting the Back Up Mode operating mode

Prevent Reverse Flow To CT: Is it allowed to allow excess solar energy to be sold for grid connection? If it is prohibited, check this option to prevent reverse flow for grid connection. If it is allowed, do not check this option

Grid Peak Shaving Power: Whether the grid peak shaving function is enabled. If enabled, the maximum power allowed to purchase electricity from the grid needs to be set.

After completing the settings, click Enter to save the set parameters.

Click the Cancel icon to return to System Settings Page.

8.3.4 Viewing device information

Click "Device Info" to view the device information

Model: Product modelInverter

SN: Product serial number

HMI: Monitoring software version number

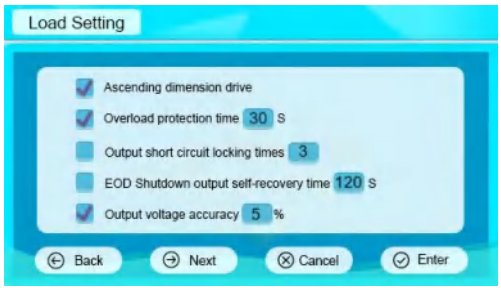
Main: Main control software version number

Slave: From the control software version number

LCD: Display software version number

Hardware: Product hardware version number

8.3.5 Load setting



Click "Load Setting" to enter the load setting page

Ascending dimension drive: The dimension drive is enabled to enhance the load carrying capacity in off grid mode.

Overload protection time: Set the overload protection time for the load output.

Output short circuit locking times: Set the number of times the short circuit protection is locked.

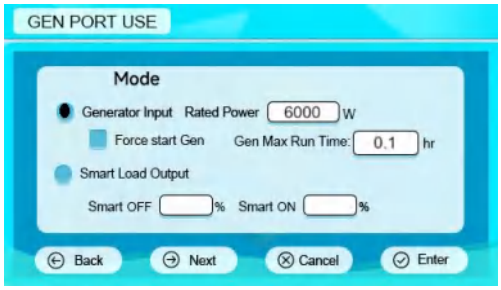
EOD Shutdown output self recovery time: EOD shutdown output self recovery time.

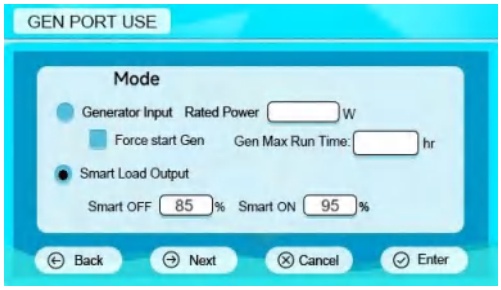
Output voltage accuracy: The range of output voltage accuracy.

After completing the settings, click Enter to save the set parameters.

Click the Cancel icon to return to System Settings Page.

8.3.6 Generator port settings





Click "GEN PORT USE" to enter the generator port settings:

Generator Input mode

The Generator Input mode is enabled, indicating that the generator input port is connected to the generator. (If the generator supports self start, the generator self start signal can be connected to the equipment to control the automatic start stop operation of the generator. Otherwise, manual operation of the generator start stop is required.)

Rated Power: Set the maximum output power value of the generator.

After completing the settings, click Enter to save the set parameters.

Click the Cancel icon to return to System Settings Page.

Smart Load Output mode

The Smart Load Output mode is enabled, indicating that the generator input port is used as a controllable smart load output port. This mode assumes that the generator port is not connected to the generator.

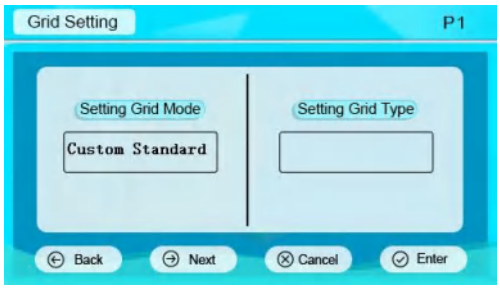
Explanation of intelligent load activation conditions: It is activated when the remaining battery capacity exceeds the set threshold.

For example: Smart ON: 95%, Smart OFF: 85%。When the battery SOC capacity reaches 95%, the intelligent load interface automatically opens to supply power to the connected load. When the SOC capacity of the battery pack is below 85%, the smart load port will automatically close.

After completing the settings, click Enter to save the set parameters.

Click the Cancel icon to return to System Settings Page.

8.3.7 Grid setting



Click "Grid Setting" to enter the grid setting page

Click on "Setting Grid Mode" to enter the device's grid standard settings. (The selected national grid standards will be displayed below)

Click on "Setting Grid Type" to enter the device grid type settings. (Currently, this setting has not been activated)

Click "Setting Grid Mode" to enter the "Grid Mode" P1 page of the device grid standard setting.

Firstly, select the country or region where the device will be used (click Next to view more countries and regions). When there are multiple power grid standards in the local area, multiple power grid standards will pop up. Please confirm and select the one that meets the local power grid standards, and click "OK" to confirm.

The standard selection "Custom Standard" supports custom setting of grid standard parameters. (For use by professionals)

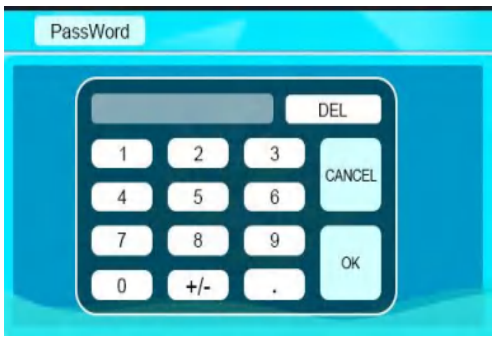
After completing the settings, click Enter to save the set parameters.

When the grid standard is set to custom mode, click Next to enter the grid setting P2 page.

Custom settings for power grid standards are not recommended for those who are not familiar with local power grid standards and non professionals. This may cause equipment and power grid failures, leading to serious damage.

Note: The legend is only a demonstration parameter.

8.3.8 Advanced Settings



Click the "Advanced Function" icon to enter the advanced function settings page

To access the advanced feature settings, it is necessary to verify the user password. Once verified, access the advanced parameter settings.

The default user password is 123456.

AFCI Fault On: DC arc fault detection enabled (optional function, hardware detection equipment needs to be installed).

Clear AFCI Fault: When an arcing fault occurs, the device will shut down for protection. It is necessary to manually confirm whether the arcing fault has been resolved. If it has been resolved, manually click to clear the arcing fault.

DRM: Receive power grid dispatch instructions, only applicable to the following safety standard countries: Australia (As4777), Europe (EN50549), Germany (VDE4105).

Signal Island Mode:Signal Island ModeSignal island mode, used to control the relay of the external neutral line connected to PE

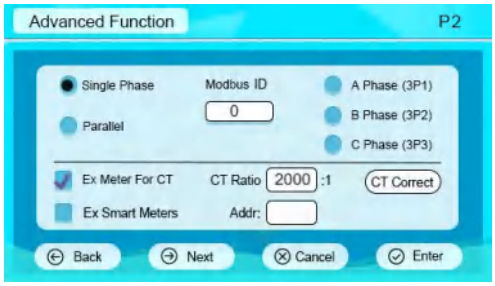
Anti islanding: Anti islanding function

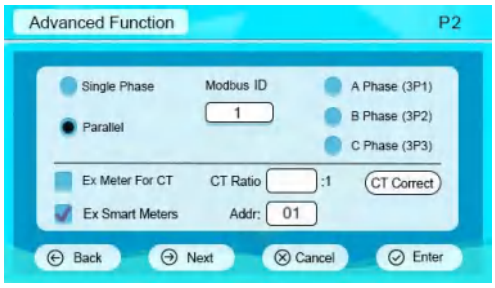
BMS_Err_Stop: After being turned on, when there is a communication interruption between the battery BMS and the inverter, the inverter will stop running and automatically shut down

HVRT/LVRT: High and low voltage ride through function.

System selfcheck: Only used for system self check in accordance with the Italian safety standard CEI 0-21.

SVG: The device's reactive power compensation function is enabled.





Click Next to enter the advanced settings P2 page

Single Phase: indicates that single mode is enabled. (Device defaults to standalone)

Ex-Meter For CT: External detection CT enabled, set CT ratio (pay attention to CT installation direction).

Ex Smart meters: Turn on the external smart meter, set the smart meter address, and pay attention to the wiring direction.

Parallel: indicates that parallel mode is turned on. In parallel mode, both the host and slave must be checked to enable "Parallel" (see system wiring diagram for settings)

Modbus ID: Set the parallel communication address, 001-255.

Set the host, select an inverter as the host, set Modbus ID to 001, and this machine will be set as the host.

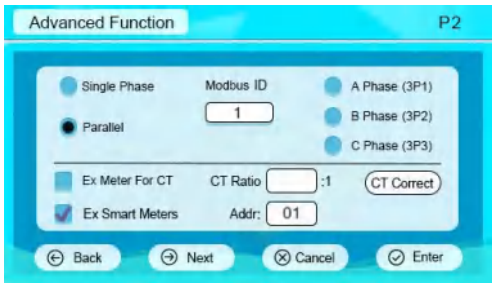
Set slave address: In a parallel system, each inverter should have a unique address that is not duplicated with other machines, and the slave should be set to Modbus ID 002-255.

A Phase (3P1): parallel unit network A phase

B Phase (3P1): parallel unit network B phase

C Phase (3P1): parallel unit network C phase

Single phase parallel mode



Enter the "Advanced Function" P2 page

1.In parallel mode, both the host and slave must be checked to enable "Parallel".

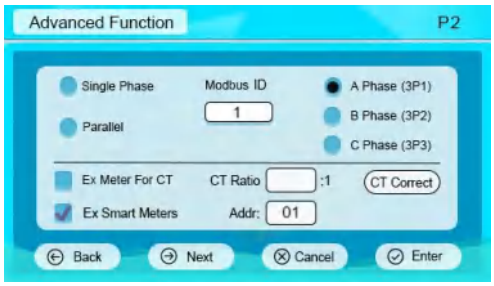
2. Set the host and select an inverter as the host. Set the Modbus ID to 001, and this machine will be set as the host. Other parallel addresses (002-255 are all slave addresses).

3. Set parallel address: Set the parallel address for each inverter. In a parallel system, each inverter should have a parallel address that is not duplicated with other machines. Select the address settings 002-255 from the slave address.

After completing the settings,click Enter to save the set parameters.

Click the Cancel icon to return to System Settings Page.

Three phase networking mode



Enter the "Advanced Function" P2 page

1. Set the host and select an inverter as the host. Set the Modbus ID to 001, and this machine will be set as the host. Other parallel addresses (002-255 are all slave addresses).

2. Set parallel address: Set the parallel address for each inverter. In a parallel system, each inverter should have a parallel address that is not duplicated with other machines. Select the address settings 002-255 from the slave address.

3. Select "A Phase" for the inverter of phase A in the parallel unit network.

Select "B Phase" for the inverter of phase B in the parallel unit network.

Select "C Phase" for the inverter of phase C in the parallel unit network.

Please ensure that each phase has at least one inverter.

After completing the settings,click Enter to save the set parameters.

Click the Cancel icon to return to System Settings Page.

9 Maintenance

9.1 Power Off the Inverter

DANGER

- Power off the inverter before operations and maintenance. Otherwise, the inverter may be damaged or electric shocks may occur.
- After the inverter is powered off, the internal components need to discharge for 5 minutes. Please wait until the device is fully discharged.

Step 1: Turn off the AC breaker on the GRID side of the inverter.
Step 2: Turn off the AC breaker on the LOAD side of the inverter.
Step 3: Turn off the battery breaker between the inverter and the battery.
Step 4: Turn off the DC switch of the inverter.

9.2 Removing the Inverter

WARNING

- Make sure that the inverter is powered off.
- Wear proper PPE before any operations.

Step 1: Disconnect all the cables, including DC cables, AC cables, communication cables, the communication module, and PE cables.
Step 2: Remove the inverter from the mounting plate.
Step 3: Remove the mounting plate.
Step 4: Store the inverter properly. If the inverter needs to be used later, ensure that the storage conditions meet the requirements.

9.3 Disposing of the Inverter

If the inverter cannot work anymore, dispose of it according to the local disposal requirements for electrical equipment waste. The inverter cannot be disposed of together with household waste.

9.4 Troubleshooting

Perform troubleshooting according to the following methods. Contact the after-sales service if these methods do not work.
Collect the information below before contacting the after-sales service, so that the problems can be solved quickly.

1. Inverter information like serial number, software version, installation date, fault time, fault frequency, etc.
2. Installation environment, including weather conditions, whether the PV modules are sheltered or shadowed, etc. It is recommended to provide some photos and videos to assist in analyzing the problem.
3. Utility grid situation.

Fault code	Cause	Fault type
F01	Bus Volt.High	Fault
F02	Bus Volt.Low	Fault
F03	HWBus Volt.High	Fault
F04	Bus Curr.High	Fault
F05	Bus SoftTime Out	Fault
F06	Bus precharge	Fault
F09	INV Curr.High	Fault
F10	HWInv Curr.High	Fault
F11	INV Short Err	Fault
F12	INV out overload	Fault
F13	Bypass out overload	Fault
F14	INV DVI Err	Fault
F15	Para Grid.V Diff	Fault
F17	PV1 Volt.High	Fault
F18	PV2 Volt.High	Fault
F19	Pv1 Curr.High	Fault
F20	Pv2 Curr.High	Fault
F21	HWPV Curr.High	Fault
F22	HWBat Curr.High	Fault
F23	BAT Curr.High	Fault

Fault code	Cause	Fault type
F24	Discharge Err	Fault
F25	LLC Curr.High	Fault
F26	BMS Device Err	Fault
F27	BAT charge H. V	Fault
F28	BAT Boost Err	Fault
F29	Para Batt Volt Diff	Fault
F33	Temp.Low Err	Fault
F34	DC T.High	Fault
F35	INV T.High	Fault
F36	X-FMR T.High	Fault
F37	Grid 1 Relay	Fault
F38	Grid 2 Relay	Fault
F39	Gen Relay	Fault
F40	INV Relay	Fault
F41	HMI RTC Err	Fault
F42	Lost M.Control-H	Fault
F43	Lost S.Control-H	Fault
F44	CanComm Err	Fault
F45	SysFwVersionDiff	Fault
F46	Para Share Curr Err	Fault
F47	Paral Mode Err	Fault
F48	Para Addr Err	Fault
F49	External CT Err	Fault
F50	GND Loss Err	Fault

Fault code	Cause	Fault type
F51	Flash Err	Fault
F52	Anti-islanding	Fault
F53	AFCI Err	Fault
F54	LVRT.Err	Fault
F55	HVRT.Err	Fault
F56	Drms0 Off	Fault
F57	GFCI Err	Fault
F58	GFCI Device	Fault
F59	Internal Fan Err	Fault
F60	ISO Err	Fault
W01	BMS Cell Volt.H	Warn
W02	BMS Cell Volt.L	Warn
W03	BMS CHG Curr.H	Warn
W04	BMS Voltage Low	Warn
W05	BMS Lost.Conn	Warn
W06	BMS Bat Temp.High	Warn
W07	BMS Bat Temp.low	Warn
W08	Grid Volt.High	Warn
W09	Grid Volt.Low	Warn
W10	Grid Freq.High	Warn
W11	Grid Freq.Low	Warn
W12	Grid Loss Warn	Warn
W13	Grid Volt.10min Warn	Warn
W14	PV Low Warn	Warn

Fault code	Cause	Fault type
W15	Bat Volt.High Warn	Warn
W16	Battery Open Warn	Warn
W17	Bat Volt.Low Warn	Warn
W18	Bus Volt.Consis	Warn
W19	Grid Volt.Consis	Warn
W20	Grid Freq.Consis	Warn
W21	GFCI Consis	Warn
W22	DCI Consis	Warn
W23	DVI Consis	Warn
W24	Temp.High derate	Warn
W25	Over Freq derate	Warn
W26	Drms logic derate	Warn

9.5 Routine Maintenance

WARNING

- Make sure that the inverter is powered off.
- Wear proper PPE before any operations.

Maintaining Item	Maintaining Method	Maintaining Period
System Clean	Check the heat sink, air intake, and air outlet for foreign matter or dust.	Once 6-12 months
DC Switch	Turn the DC switch on and off ten consecutive times to make sure that it is working properly.	Once a year
Electrical Connection	Check whether the cables are securely connected. Check whether the cables are broken or whether there is any exposed copper core.	Once 6-12 months
Sealing	Check whether all the terminals and ports are properly sealed. Reseal the cable hole if it is not sealed or too big.	Once a year

10 Technical Parameters

MODEL	HB1030 EH024	HB1030 EH048	HB1036 EH048	HB1040 EH048	HB1046 EH048	HB1050 EH048	HB1060 EH048
PV Input							
Max PV Input Power	3900W	3900W	4680W	5200W	5980W	6500W	7800W
Max PV Input Voltage	550Vdc						
PV Input Startup voltage	90Vdc						
MPPT Input Voltage	370Vdc（90-500V）						
MPPT Full Load Voltage Range	180-500Vdc						
PV Max Input Current	15A		15A+15A				
PV Short-circuit Current	17A		17A+17A				
Number of MPPT / Strings per MPPT	1/1		2/1+1				
AC Output							
Rated Output Voltage	220/230Vac						
Output Frequency Range	50/60Hz(±5)，Intelligent adaptive/Settable						
Rated Output Current	13A	13.6A	16.4A	18.2A	20.9A	22.7A	27.2A
Max Grid-connected Current	15A	15A	18A	20A	23A	25A	30A
Rated Grid-connected Power	3000W	3000W	3600W	4000W	4600W	5000W	6000W
Max Grid-connected Viewing Power	3300VA	3300VA	3960VA	4400VA	5060VA	5500VA	6600VA
Max Grid-connected Active Power	3300W	3300W	3960W	4400W	5060W	5500W	6600W
DC Component	<0.5%In						
Grid Type	Single-phase，L+N+PE						
Output Power Factor	> 0.99 @ Rated power（Adjustable 0.8 leading~0.8 lagging）						
THDi	<3%						
THDu	< 2%(Linear load)						
Transfer Time	< 10ms(Typical value)						
Off-grid Overload Capability	< 105%Long-term work , 106%-120% 1min , >120% 10S						
Battery Input							
Battery Type	Lead-acid , lithium batteries , Gel batteries						
Charging Mode	3-section type/Equilibrium/Self-adaption BMS						

MODEL	HB1030 EH024	HB1030 EH048	HB1036 EH048	HB1040 EH048	HB1046 EH048	HB1050 EH048	HB1060 EH048
Battery Voltage	24Vdc(20-30V)	48Vdc（42-59V）					
Max Discharge Current	120A	70A	90A	100A	115A	120A	120A
Max Charging Current	100A	70A	90A	100A	100A	100A	100A
Efficiency							
Max PV Conversion Efficiency	97.60%						
European Efficiency	97.00%						
MPPT Efficiency	>99%						
General Parameters							
Display	Touch Screen+LED						
Communication Mode	Standard：RS485/CAN/DRM，Optional 4G/WIFI/GPRS/Temperature compensation module						
Surge Protection	DC Type II / AC Type III						
Noise	<30dB						
Cooling	Natural convection						
Operating Ambient Temperature	-25°C ~ 60°C(> 45℃ Derating)						
Humidity	0-100%						
Altitude	3000m (>2000m Derating)						
Electricity Consumption At Night	15W						
Protection Degree	IP66						
Installation Method	Wall-mounted						
Dimension. W*D*H(mm)	505*188*413						
Weight (kg)	25				28		
Warranty	5 years standard/10 years optional						