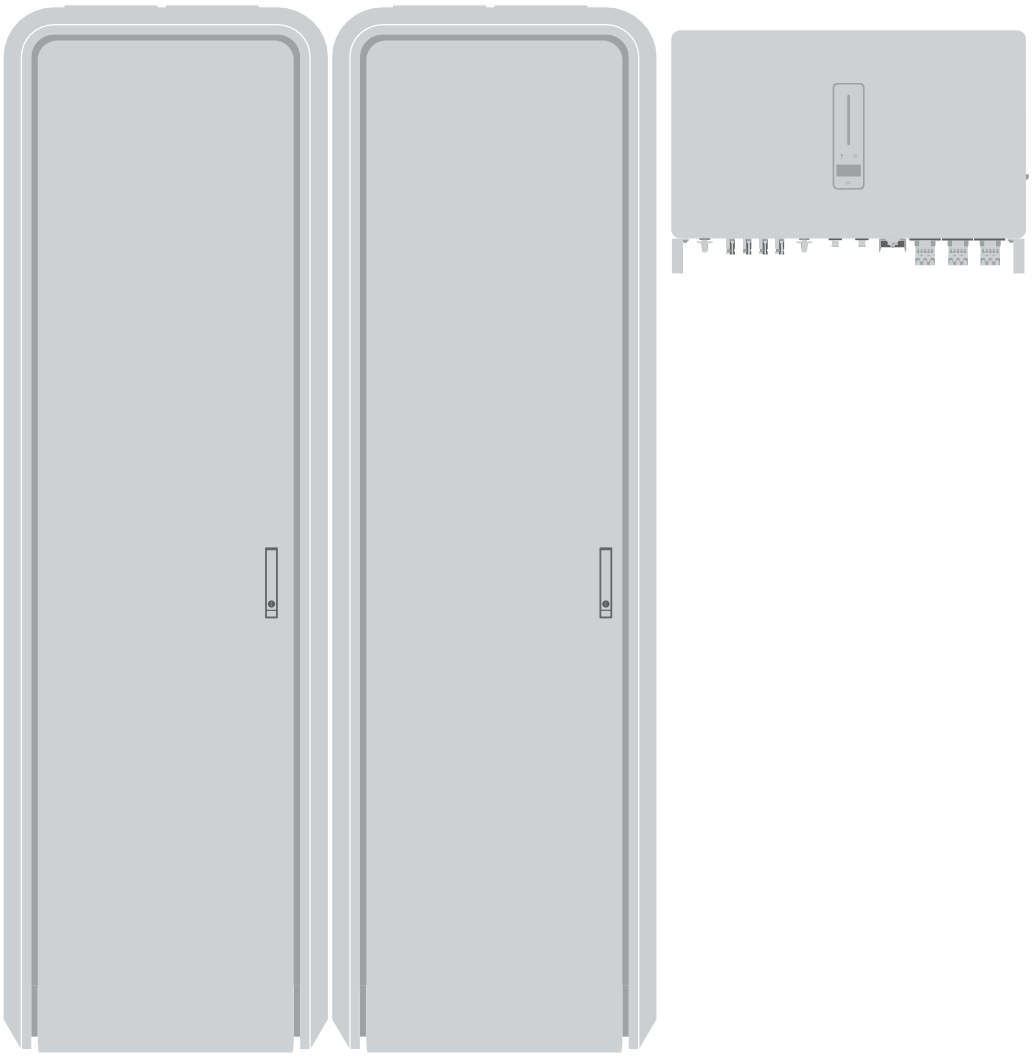


# User Manual

**Wattsonic Li-HV Commercial Three Phase Hybrid**

25/30/36/40/50K-100A-3P | Li-HV 65/130/195/260/325kWh

Dec 2024


WATTSONIC

LIFE'S INNOVATION

# Contents

# Overview

## 1.1 Overview

Thank you for selecting the **Wattsonic Li-HV Commercial Three Phase Hybrid Series**. Of course, you have made a great decision and will be pleased with this product's features, benefits, and quality.

These instructions will help you to familiarise yourself with the Wattsonic Li-HV Commercial Three Phase Hybrid Series, and you will experience a smooth and efficient journey, and make sure to get the maximum benefit from this powerful device by reading the instructions.

**Warning:** Before installing or using the Wattsonic Commercial Cabinet, read this document. Failure to do so or to follow any of the instructions or warnings in this document can result in electrical shock, serious injury, death, or damage to the Wattsonic product, potentially rendering it inoperable.

Before installing and using this product, please read this manual carefully, understand the safety information, and be familiar with the functions and characteristics of this device. The manual content of subsequent versions may be subject to change. You can find the newest manual at www.wattsonic.com.

### Errors or omissions

To communicate any inaccuracies or omissions in this manual, please send an email to: service@wattsonic.com



### ELECTRONIC DEVICE: DO NOT THROW AWAY

Proper disposal of batteries is required. Refer to your local codes for disposal requirements. (ie. EC N 1013/2006 among European Union).

### Copyright

## 1.2 Safety instructions and warning

### 1.2.1 Explanation of symbols

**PLEASE SAVE THESE ESSENTIAL SAFETY GUIDELINES.**

Wattsonic Commercial Cabinet, installation and repair instructions assume knowledge of high voltage electricity and should only be performed by Wattsonic Certified Installers. Wattsonic assumes no liability for injury or property damage due to repairs attempted by unqualified individuals or a failure to follow these instructions properly. These warnings and cautions must be followed when using Wattsonic Commercial Cabinet.

This manual uses the following symbols to highlight important information:

| | |
|---|---|
| DANGER | Danger signs warn of urgent, dangerous situations. If not avoided, it could result in death or serious personal injury. |
| WARNING | Warning indicates a hazardous situation that, if not avoided, could result in injury or death. |
| CAUTION | Caution indicates a hazardous situation that, if not avoided, could damage the equipment. |
| ATTENTION | Attention transmits safety warning information about equipment or the environment, data loss, or other unpredictable results. It does not relate to physical injury. |
| NOTE | The note indicates a vital step or tip that leads to the best results but is not safety or damage-related. |

### Symbols on the packing box


Handle with care


This side up


Keep dry


Stacked layers

### Symbols on the hybrid inverter


Power indicator


Grid status indicator


Inverter status indicator


Battery SOC indicator


Grounding symbol: The inverter casing needs to be properly grounded

### Symbols on the inverter nameplate

| | |
|---|---|
| | To avoid the potential effects on the environment and human health as a result of the presence of hazardous substances in electrical and electronic equipment, end-users of electrical and electronic equipment should understand the meaning of the crossed-out wheeled bin symbol. Do not dispose of WEEE as unsorted municipal waste and have to collect such WEEE separately. |
| | Please read the instructions carefully before installation. |
| | Do not touch any internal parts of the inverter until 5 min after being disconnected from the mains and PV input. |
| CE | CE mark, the inverter complies with the requirements of the applicable CE guidelines. |
| | TÜV certification. |
| | Danger. Risk of electric shock! |
| | The surface is hot during operation and no touch is allowed. |
| | Electric shock hazard: Using a person to disassemble the inverter casing is strictly forbidden. |

### 1.2.2 Safety instructions

**Caution:** Please ensure no flammable materials are near the cabinet or module when installing the Wattsonic Commercial Cabinet, and keep a fire extinguisher in an accessible place.

Do not pile things on modules or cabinets.

Avoid installing in locations where there is a risk of flooding.

The product should be installed and kept level.

The installation position should be stable enough to support a certain amount of weight and vibration.

The appropriate battery storage and operation temperature is 25±5℃.

**Caution:** The humidity range of battery operation and storage is 40 to 80%.

Please adjust the cabinet room to a proper temperature for better battery performance and life span.

Please adjust the cabinet room to a proper humidity; otherwise, it may cause battery failure or fire.

Do not install the cabinet if the temperature is beyond the -20-60℃ range or the humidity is above 80%.

Do not install products with damaged or uninsulated tools.

Please ensure the earth ground wire connection is stable to prevent possible electric shock.

The installation must be carried out only by Wattsonic Certified Installers, who have been trained in dealing with high voltage electricity.

The battery may be in danger of high voltage or short circuit. Please follow the instructions when conducting installation and other operations:

Remove rings, watches, or other metal and conducting electricity objects;

Wear insulated gloves before operation;

Use tools with insulating isolation;

Do not put tools or metal parts on top of the modules and cabinets;

Do not use cleaning solvents to clean the product, or expose the product to flammable or harsh chemicals or vapors;

Do not use fluids, parts, or accessories other than those specified in this manual, including the use of non-genuine Wattsonic parts or accessories or parts or accessories not purchased directly from Wattsonic or a Wattsonic-certified party.

**Warning:** Read this entire document before installing or using Wattsonic Commercial Cabinet. Failure to do so or follow any of the instructions or warnings in this document can result in electrical shock, serious injury, or death, or can damage the product, potentially rendering it inoperable.

Do not short the positive and negative terminals of Module or Sub-Master BMS.

Do not modify, short circuit, or disassemble the modules.

Do not attempt to open, disassemble, repair, tamper with, or modify Wattsonic battery module. Wattsonic battery module is not user serviceable. LFP Cells in Wattsonic Battery are not replaceable. Contact the Wattsonic Authorized Reseller who sold the battery for any repairs.

Please do not throw the battery or shock it.

Do not modify the cables, including power cables, communication cables, etc.

Prohibit battery wiring in any other way than specified in the manual.

Incorrect wiring connections may cause product damage and danger.

Do not touch any metal terminals and mental objects linked with the mental terminals of the module.

Do not use or install the product if it is defective, appears cracked, broken, or otherwise damaged, or fails to operate.

There is a high possibility of electric shock or severe burns due to the high voltage.

This product has potential danger such as death or serious injury by fire, high voltages or explosion if the precautions are not read or fully understood.

The local and national electrical safety standards must do electrical installations.

Rubber gloves and protective clothing (goggles and boots) should be worn when working on high voltage/ high current systems such as battery systems.

The danger of electric shock. Do not remove the cover. There are no internal parts that users can service. Contact a qualified authorized technician for service.

**Note:** 1) Before installation, please read this manual carefully and follow the instructions in this manual strictly.

2) Installers must undergo professional training or obtain electrical related professional qualification certificates.

3) When installing, do not open the front cover of the inverter. Apart from performing work at the wiring terminal (as instructed in this manual), touching or changing components without authorization may cause injury to people, damage to inverters, and annulment of the warranty.

4) All electrical installations must conform to local electrical safety standards.

5) If the inverter needs maintenance, please get in touch with the local designated personnel for installation and maintenance.

6) To use this inverter for power generation needs the permission of the local power supply authority.

7) The temperature of some parts of the inverter may exceed 60° C during operation. To avoid being burnt, do not touch the inverter during the process. Let it cool before touching it.

8) When exposed to sunlight, the PV array generates dangerous high DC voltage. Please operate according to our instructions, or it will endanger your life.

9) When wiring the lithium battery terminals, please disconnect the breaker or switch of the lithium battery in case of a physical injury caused by the high voltage.

### 1.2.3 Statement

## Warranty Statement

Wuxi Wattsonic Energy Technology Ltd. has the right not to undertake quality assurance in any of the following circumstances:

1) Damages caused by improper transportation.

2) Damages caused by incorrect storage, installation or use.

3) Damages caused by installation and use of equipment by non-professionals or untrained personnel.

4) Damages caused by failure to comply with this document's instructions and safety warnings.

5) Damages of running in an environment that does not meet the requirements stated in

this document.

6) Damages caused by operation beyond the parameters specified in applicable technical specifications.

7) Damages caused by unauthorized disassembly, alteration of products, or modification of software codes.

8) Damages caused by abnormal natural environment (force majeure, such as lightning, earthquake, fire, storm, etc.).

9) Any damages caused by the process of installation and operation that don't follow the local standards and regulations.

10) Products beyond the warranty period.

## Qualified personnel

**TO SECURE THE FULL 10-YEAR BATTERY PRODUCT WARRANTY, INSTALL THE WATTSONIC COMMERCIAL CABINET WITH QUALIFIED INSTALLERS.**

This manual applies to electrical installers with professional qualifications, who should have the following skills:

1) Training for installation and commissioning of the electrical system, as well as dealing with hazards.

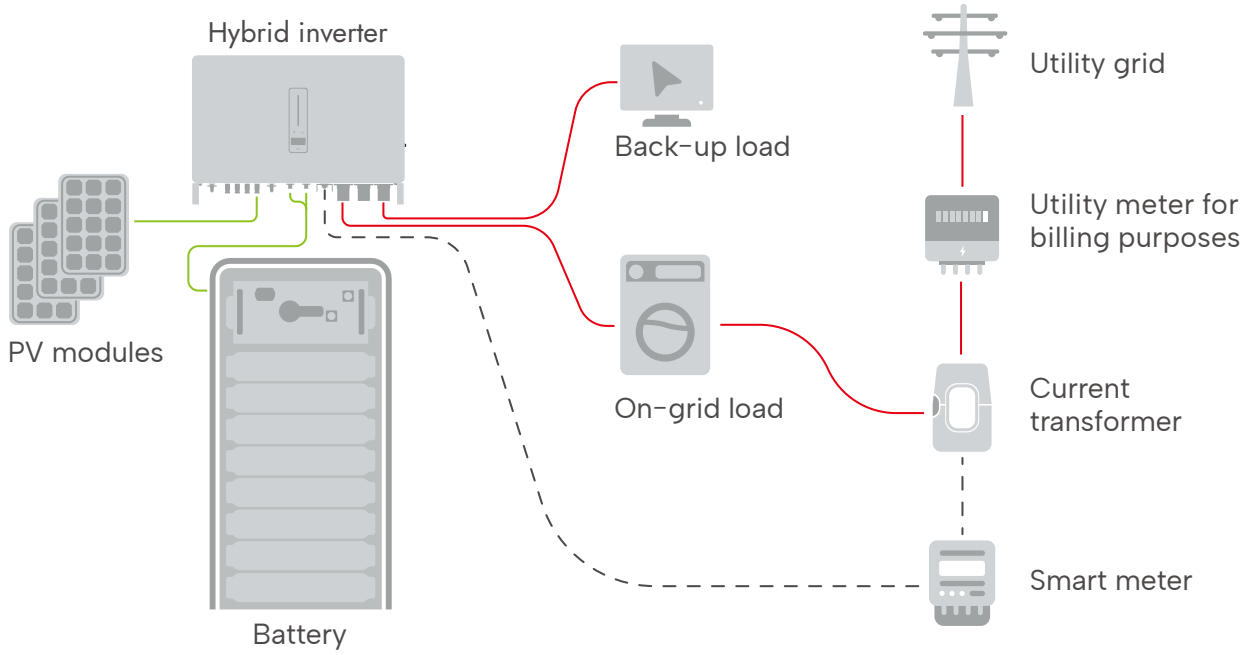
2) Knowledge of the manual and other related documents.

3) Knowledge of the local regulations and directives.

# Product and system introduction

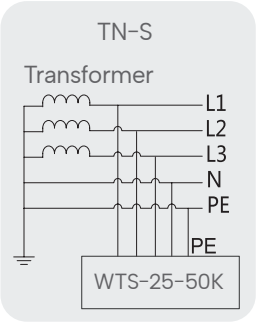
## 2.1 System introduction

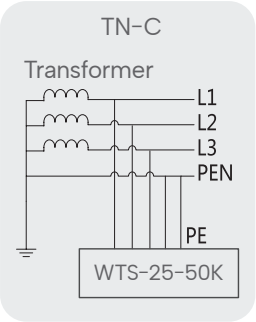
The hybrid solar system usually comprises the PV array, hybrid inverter, lithium battery, loads, and power grid.

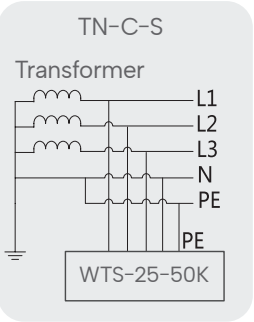


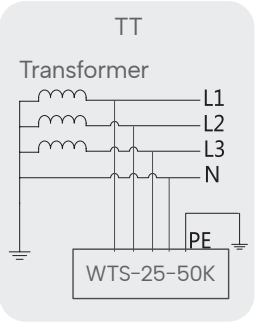

**Note:** The system is not suitable for supplying life-sustaining medical devices. It cannot guarantee backup power in all circumstances.

The applicable grid types for the Wattsonic WTS-[25-50kW]-100A-3P series are TN-S, TN-C, TN-C-S, and TT. When applied to the TT grid, the voltage of N to PE suggests less than 30V.



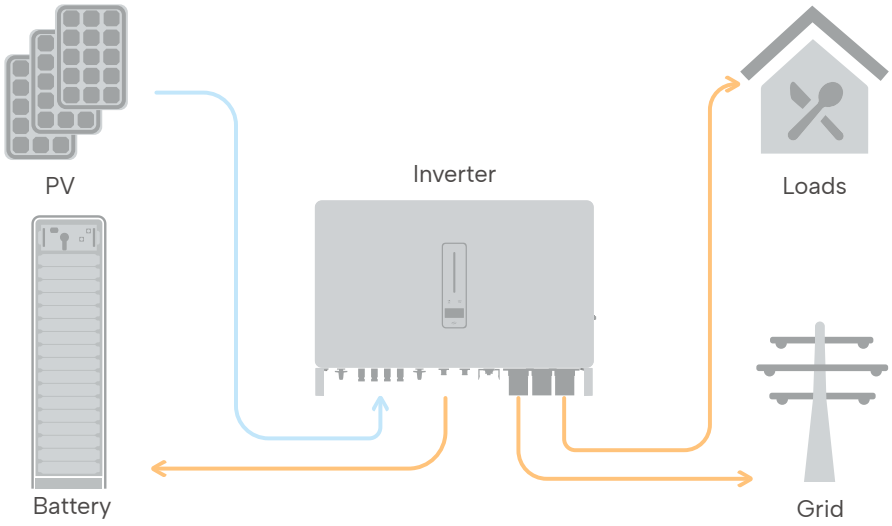



## 2.2 Running modes

Wattsonic WTS Hybrid inverter has the following basic running modes, and you can configure them as per your preference in the App.

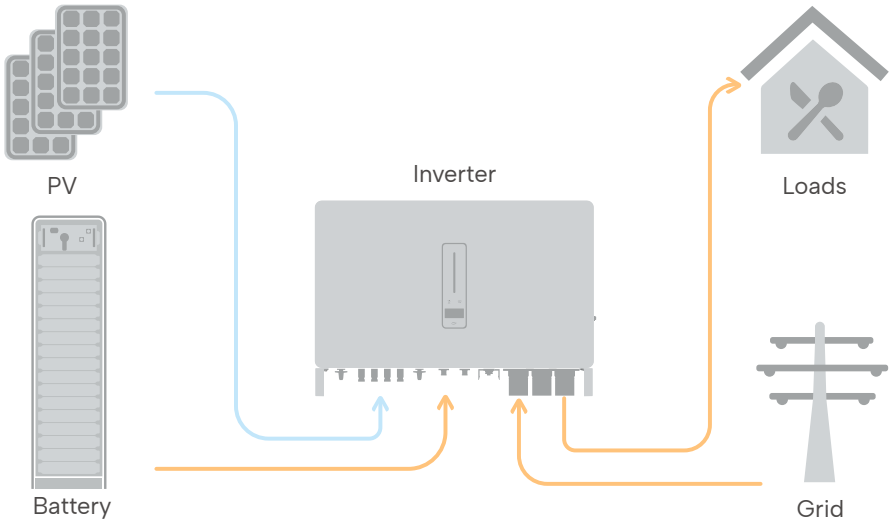
### 2.2.1 Running modes introduction

**General Mode**



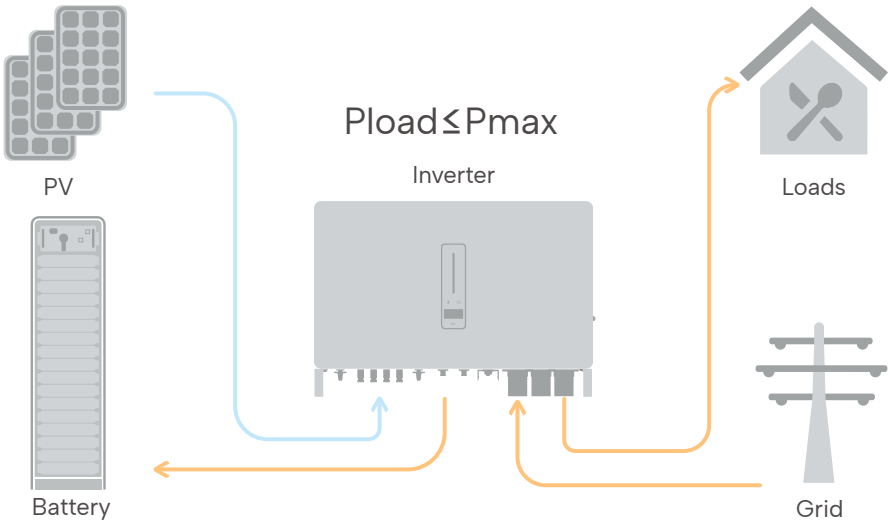

In this working mode, when the power from the PV array is sufficient, PV power will supply the loads, battery, and grid in the order of loads first, battery second, and grid last.

(You can set the power to the grid to 0W when the local grid doesn't allow inverter power to feed to the grid).



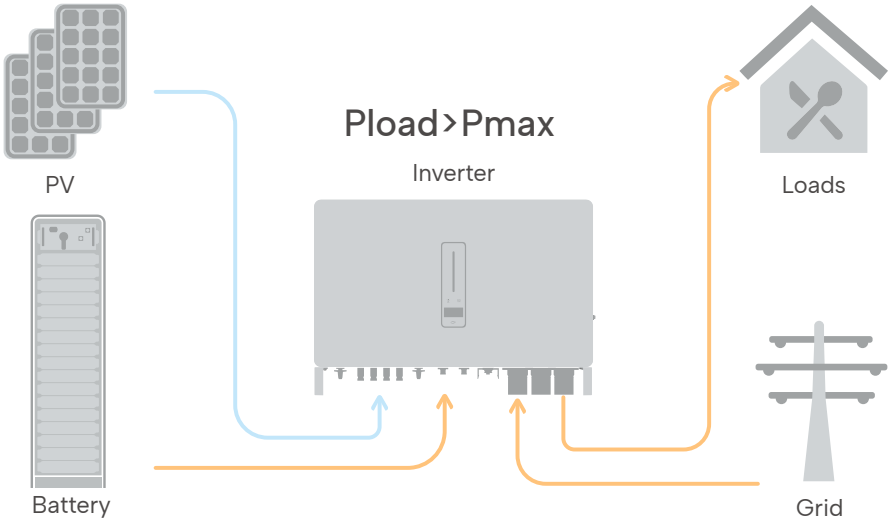

When the PV power is insufficient, the battery will discharge to supply loads, and the grid will join in if the battery is not enough to supply loads.

## Peak load Shifting (Load Shifting)




Set the maximum power Pmax (kVA) contracted with the grid.

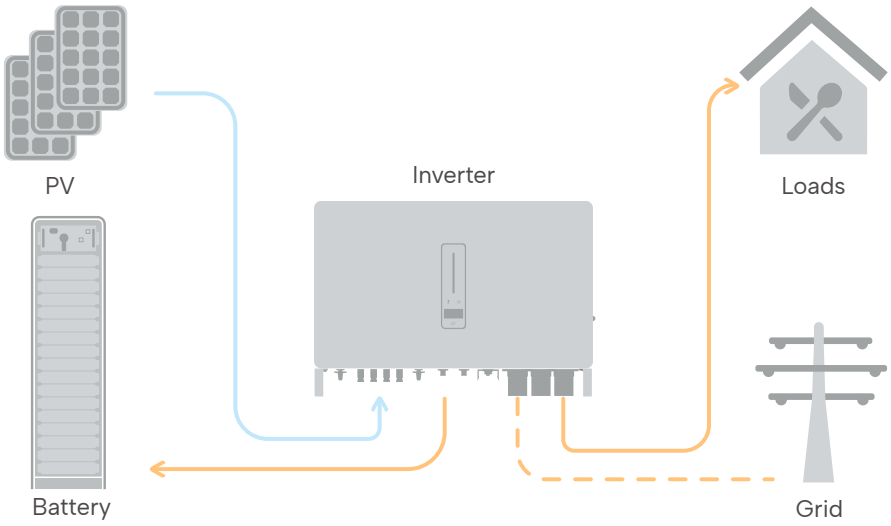
When the load consumption is less than the Pmax, the PV will charge the battery first, and the grid will supply the load. Once the battery is complete, the PV will power the load and the grid rather than the battery.



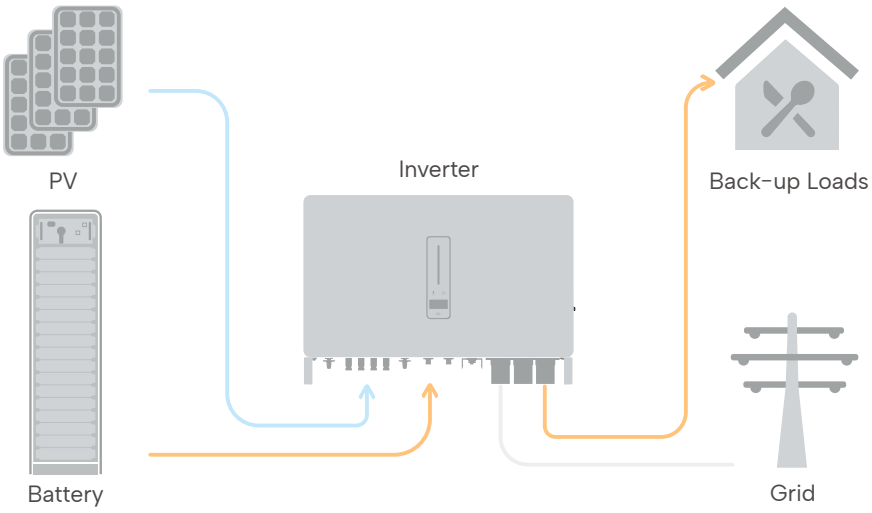

When the load consumption exceeds the Pmax, the inverter will take power from the battery and PV to supply power to the load to compensate for the power that exceeds the Pmax.

*To realize the “Peak load Shifting” function, the load power that exceeds Pmax has to be within the inverter max output power. Otherwise, the inverter will only output the maximum power allowed.

## UPS Mode

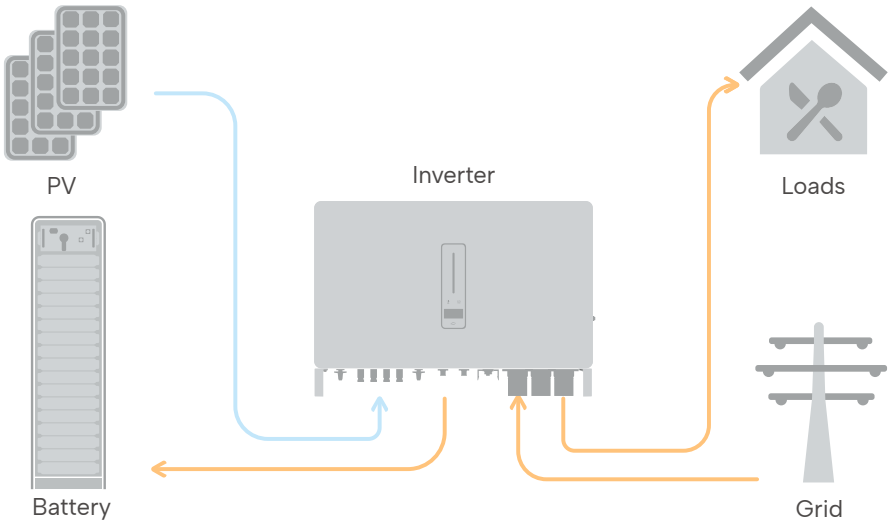



In this working mode, the inverter will use the power from the PV or grid to charge the battery until it is fully charged, and as long as the grid is there, the battery won't discharge.

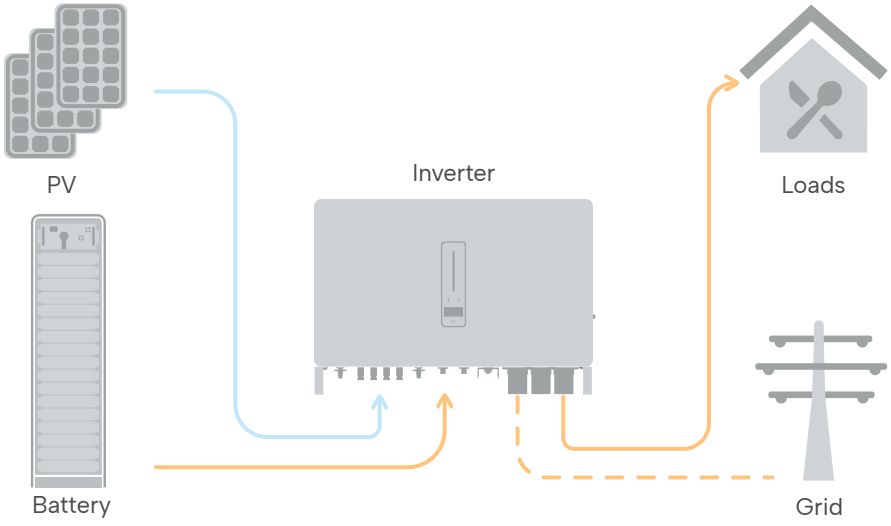



When the grid fails, power from the PV and battery will supply loads connected to the backup side (UPS).

## Economic Mode

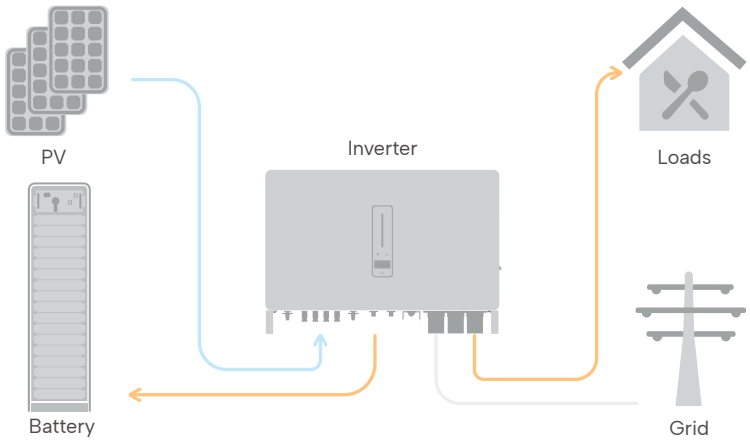



In this working mode, you can set charge/discharge power and time in the App. The inverter will use the energy from PV or the grid (whether to use it or not can be set in the App) to charge the battery for a predetermined period.

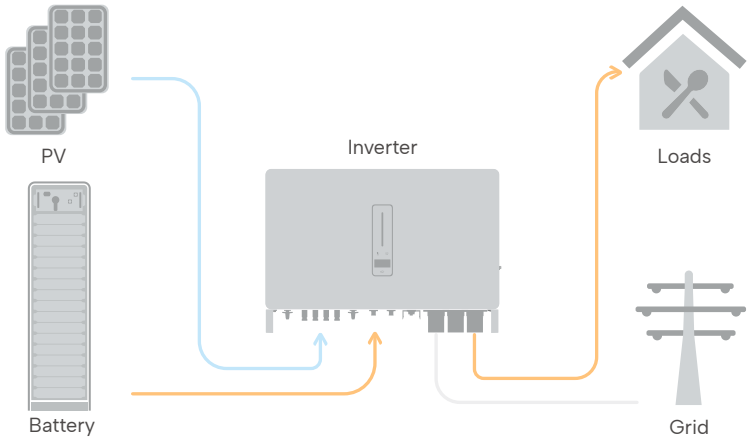



The inverter will use power from PV and batteries to supply loads for the predetermined period, and the grid will deliver the insufficient part.

**Off-Grid Mode**




In the purely off-grid mode, power from PV will supply the back-up loads first and then charge the battery if there's surplus power.




When the power from PV isn't enough, the battery will discharge to supply backup loads with PV.

## 2.2.2 Back-up and off-grid output

Normally, the Back-Up switching time is less than 10ms. However, some external factors may cause the system to fail on switching to Back-Up mode. Therefore, the conditions for using the Back-Up function smoothly are as follows for your awareness.

1) Do not connect loads that are dependent on a stable energy supply for a reliable operation.

2) Do not connect loads with a total capacity more incredible than the maximum Backup capacity.

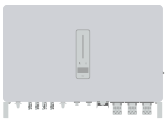
3) Do not connect the loads that may cause very high start-up current surges, such as non-frequency conversion air conditioning, vacuum cleaner or half-wave loads such as hair dryer, heat gun, hammer drill.

4) Due to the battery's condition, battery current might be limited by some factors, including but not limited to the temperature and weather.

The inverter will restart in case of overload protection. The time required for restarting will increase (5 min at most) if overload protection repeats. Try to reduce Back-Up load power within maximum limitation or remove the loads which may cause very high start-up current surges.

## 2.3 Product introduction

### Component list

| Picture | Item | Content | Size(mm) |
|---|---|---|---|
|  | Inverter | Inverter | W:800<br>D300<br>H:620 |
|  | Cabinet | Cabinet Frame | W:640<br>D:870<br>H:2109 |
|  | Battery Module | Battery Module | W:445<br>D:737.8<br>H:95 |
|  | Master BMS Module | Master BMS Module | W:449<br>D:740.4<br>H:188 |
|  | Sub-Master BMS Module | Sub-Master BMS Module | W:449<br>D:740<br>H:188 |
| – | Accessory | Accessory | – |

### 2.3.1 Inverter

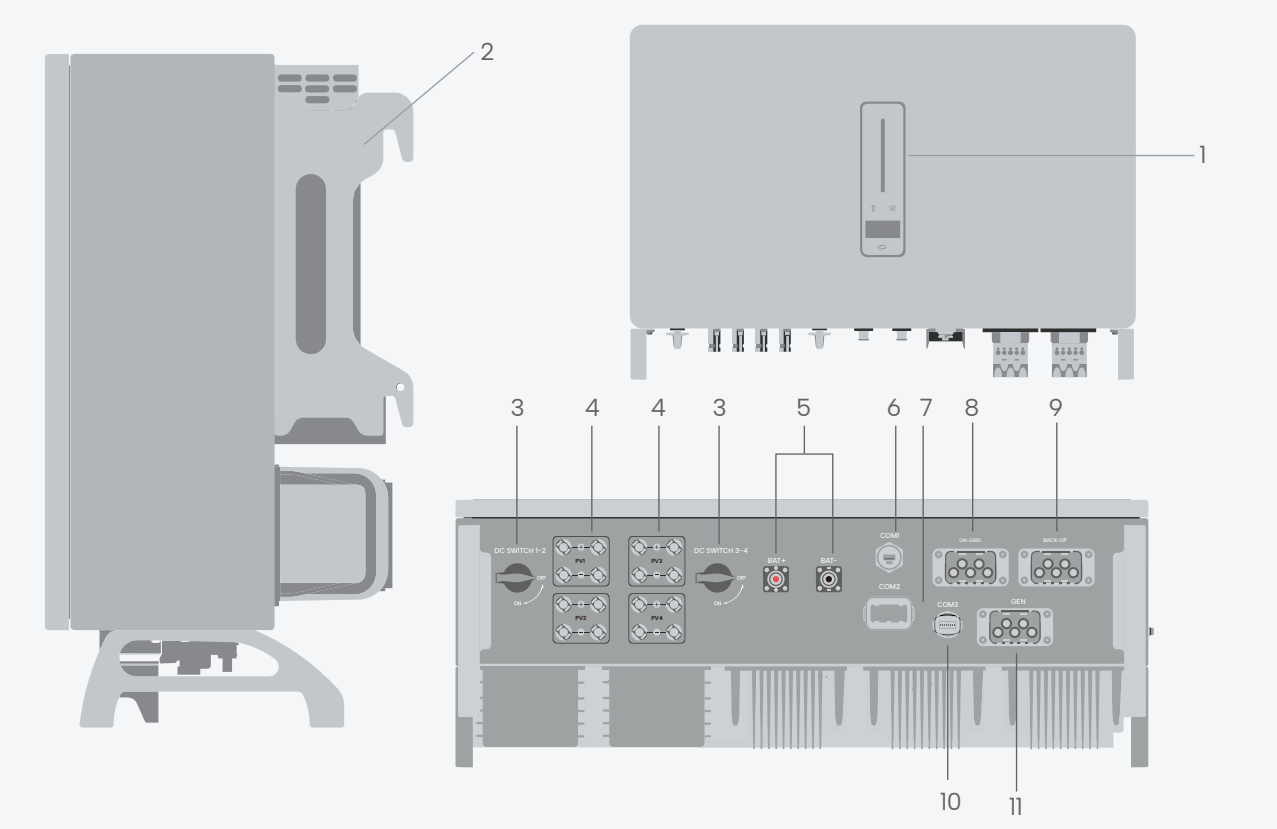
The Wattsonic WTS-[25-50kW]-100A-3P series inverter is also known as a hybrid inverter or storage inverter, which is mainly used to combine the PV array, lithium battery, loads, and power grid to realize intelligent power management and dispatching.

## Models

The WTS-[25-50kW]-100A-3P series hybrid inverter includes 7 models, which are listed below:

WTS-25K-100, WTS-30K-100, WTS-36K-100, WTS-40K-100, WTS-50K-100, WTS-40K-P-100, WTS-50K-P-100

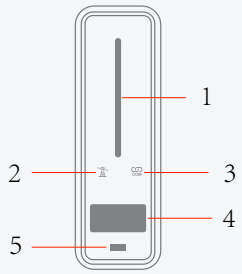
## Connection area




Wiring terminals are at the bottom of the inverter, as shown in the table below.

| Item | Terminal | Note |
|---|---|---|
| 1 | Display and LED panel | Display the operation information and working status of the inverter. |
| 2 | Hanger | Used to hang the inverter on the wall-mounting bracket. |
| 3 | DC switch | Used to safely disconnect the DC circuit. |
| 4 | DC input terminal | PV connector (WTS-25-50K 8 pairs / WTS-40-50K-3P 6 pairs) |
| 5 | Battery input terminal | Battery connector |
| 6 | COM1 port | WiFi/LAN/4G module connector |
| 7 | COM2 port | Multi-function Connector (Meter/BMS/RS485/DRED/DO Connector) |
| 8 | On-grid output terminal | Used for On-grid output cable connection |
| 9 | Back-up output terminal | Used for Back-up output cable connection |
| 10 | COM3 por | DO/0-10V AO/4-20mA AO Connector |
| 11 | Generator input terminal | Generator connector(This function is temporarily unavailable. Please contact Wattsonic if necessary) |

## Indicators/controls on the device




| Item | Indicator | Status | | Description |
|---|---|---|---|---|
| 1 | Power and Alarm Indicator | Off | | No power. |
| | | Blue | Quick flashing | Inverter entered self-test status. |
| | | | Slow flashing | Inverter entered waiting status. |
| | | | Breathe flashing | Inverter works normal. |
| | | Orange | Breathe flashing | Low battery warning, the battery power is about to reach the SOC protection value. |
| | | Red | Always on | An alarm or fault is detected, view the fault info on the display. |
| 2 | Grid Indicator | Off | Grid lost. | |
| | | Slow flashing | Inverter detected grid but not running in on-grid mode. | |
| | | Always on | Inverter works in on-grid mode. | |
| 3 | Communication Indicator | Green | Always on | The inverter communication is running normally. |
| | | Green | Flashing | The inverter communicates with EMS or Master inverter through RS485 or CAN. |
| | | Orange | Always on | The inverter isn't communicating with Wattsonic smart meter. |
| | | Red | Always on | The inverter isn't communicating with the BMS. |
| 4 | Display | Display off to save power, press the button to wake up the display. | | |
| 5 | Button | Switch display information and set parameters by short press or long press. | | |

## 2.3.2 Battery module

**A battery module consisting of battery cells and a slave control**

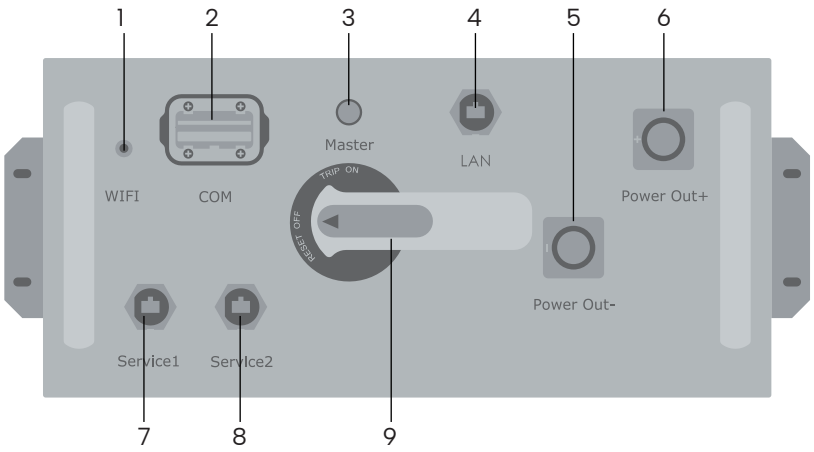
Connection terminals of the battery module are integrated into the terminal set in the back side of the battery module. No extra cables are needed for battery module installation.

## 2.3.3 Master & Sub-Master BMS

The battery management unit of the rack has a built-in rack BMS and battery protection unit, which is generally mounted in the uppermost position of the cabinet.

Use 1*sub-master BMS for a single cabinet system.

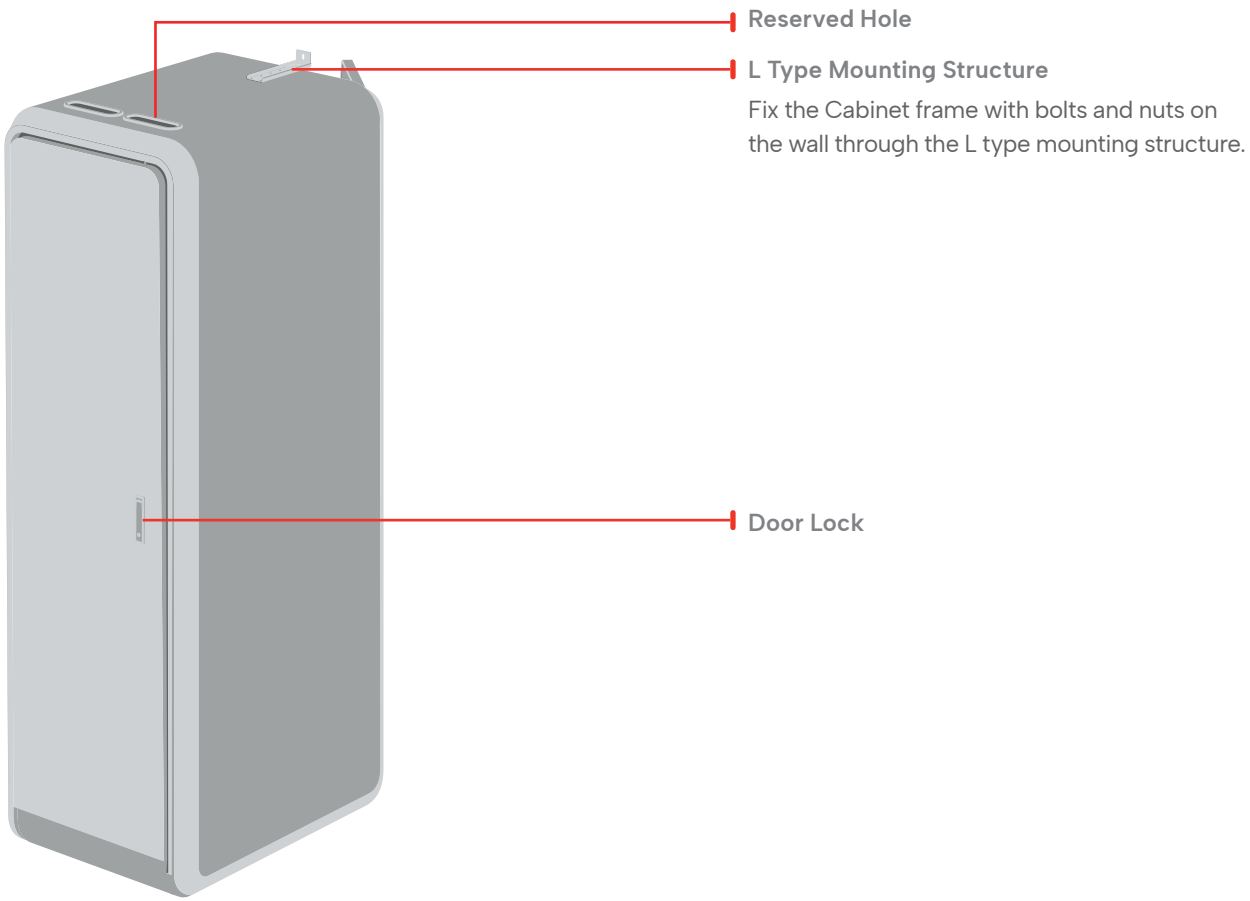
Use 1*master BMS and (n-1)*sub-master BMS for a n*cabinet system.




| | | |
|---|---|---|
| 1 | WiFi port | Connect with external antenna |
| 2 | COM port | Multi-function communication connector: RS485/CAN/DRED<br>Please refer to page 38 for terminal definition |
| 3 | Status indicator | Green --> system start normally<br>Red --> system error<br>No light --> system shutdown |
| 4 | LAN port | RJ45 connnection |
| 5 | Power out - | Negative& positive power output port |
| 6 | Power out + | |
| 7 | Service 1 | Reserved service port for BMS system and inverter<br>Please refer to page 61 for terminal definition |
| 8 | Service 2 | |
| 9 | Main switch | Battery rack switch, turn clockwise to open, turn counterclockwise to close |

### 2.3.4 Cabinet frame

The cabinet frame is the enclosure to mount and secure the battery and Sub-Master BMS module.




## 2.4 Delivery and storage

Delivery:

1) The device is thoroughly tested and strictly inspected before delivery. Nonetheless, damage may still occur during shipping. For this reason, please conduct a thorough inspection after receiving the device.

2) Contact Wattsonic or the transport company in case of any damage or incompleteness, and provide photos to facilitate services.

Storage:

1) Do not dispose of the original packing case. It is recommended to store the device in the original packing case when the device is decommissioned.

2) The storage temperature and humidity should be between -30 and 60 and less than 90%, respectively.

3) If a batch of inverters needs to be stored, the height of each pile should be no more than 6 levels.

# Product Installation

## 3.1. Installation tool

**Caution:** All tools used for installing the battery should be insulated or free of exposed metal parts. If not, at least the handle knob must be insulated.

(1) Torque wrench
Used for fastening the cable terminal and product.

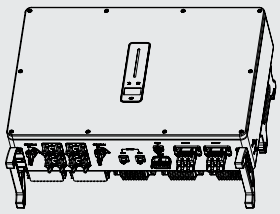
(2) Electric driver
Used to fasten the enclosure of a product.

(3) Digital multimeter
Used for checking product voltage and insulation.

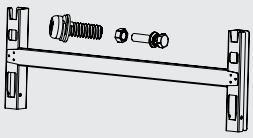
## 3.2 Packing list

The package of the inverter includes the following accessories. Please check whether the accessories in the packing box are complete when receiving the goods.

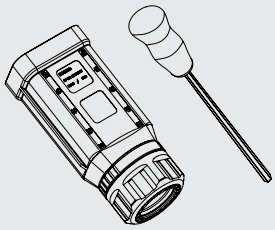
### Inverter packing list



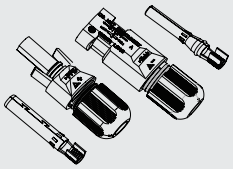
Inverter(1pcs)



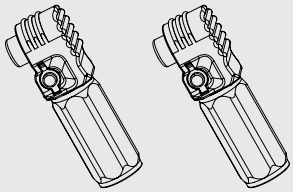
Inverter bracket (1pcs),
Bolt assembly (4pcs),
M6 screws (2pcs)



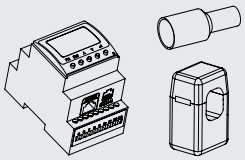
AC connector set (2pcs)



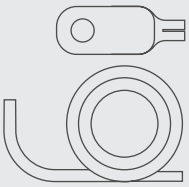
PV terminal ((WTS-25-50K 8 pairs / WTS-40-50K-P 6 pairs)



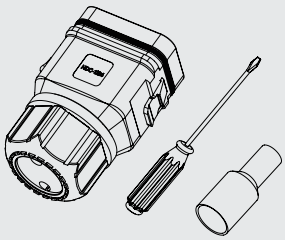
Battery terminal (1 pairs)



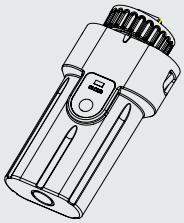
Meter with 3 CTs (1pcs)



PE terminal(1pcs)
10m meter communication cable (1pcs), 3m battery communication cable (1pcs)

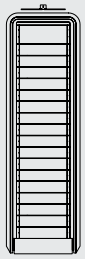


COM2 connector set (1pcs)

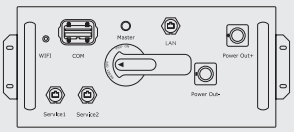


Monitoring device (1pcs)

## Cabinet packing list

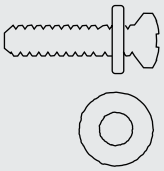


Cabinet frame
L type mounting structure

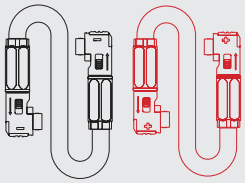


Master BMS module
Sub-master BMS module

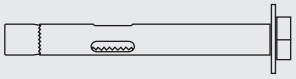

Battery module



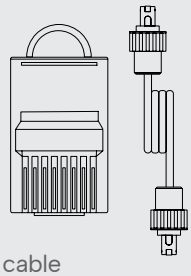
M4×10 triad screw
Lock washer



Positive/ negative power cable

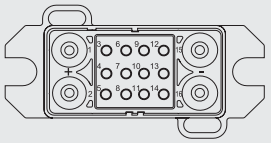


M6×60 expansion bolt



Com resistor
Communication cable

External antenna



Placeholder relay socket (optional)

PE terminal

## 3.3 Supported installation environment

### 3.3.1 Installation location of inverter

The Wattsonic WTS-[25-50kW]-100A-3P series inverters are designed with IP65 protection enclosure for indoor and outdoor installations. When selecting an inverter installation location, the following factors should be considered:

The wall on which the inverters are mounted must be able to withstand the weight of the inverter.

The inverter needs to be installed in a well-ventilated environment.

Do not expose the inverter directly to strong sunlight to prevent excessive temperature operation. The inverter should be installed in a place with shelter to prevent direct exposure to sunlight and rain.

Install the inverter at eye level for easy inspection of screen data and further maintenance.

The ambient temperature of the inverter installation location should be between -30℃ and 60℃ .

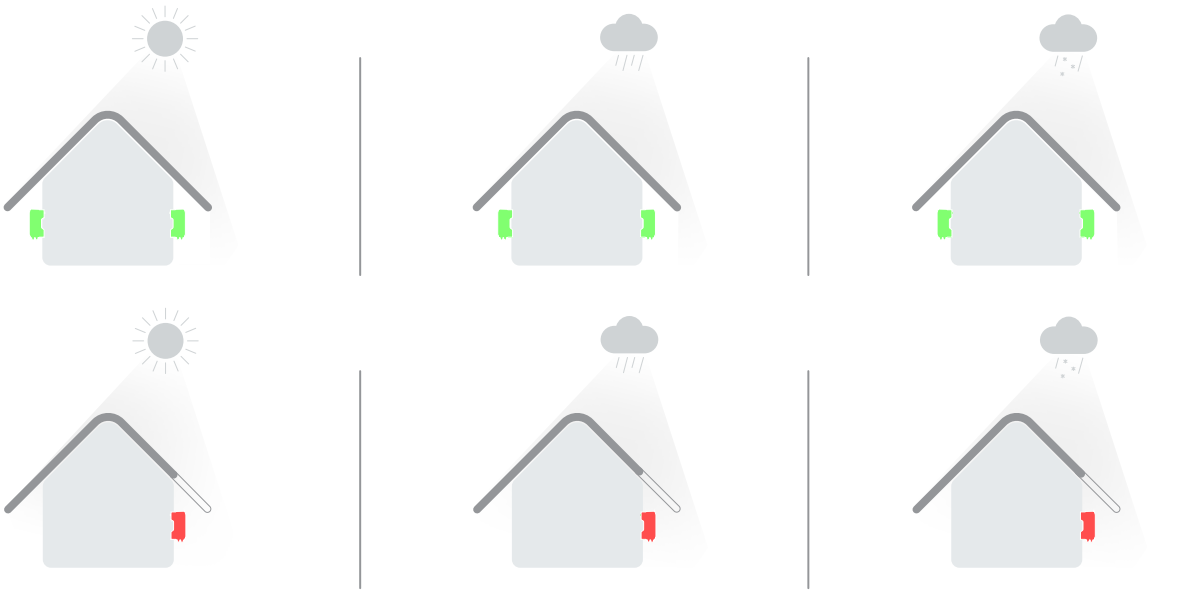
The surface temperature of the inverter may reach up to 75℃ . To avoid the risk of burns, do not touch the inverter while it's operating and the inverter must be installed out of reach of children.

**Warning**: Do not put flammable and explosive items around the inverter.

Select an optimal mounting location for safe operation, long service life and expected performance.

1 ) The inverter with protection rating IP65 can be installed both indoors and outdoors.

2) Install the inverter at a place convenient for electrical connection, operation, and maintenance.




**Recommended installation location**

### 3.3.2 Installation location of cabinet

**Caution:** Product installation in an inappropriate environment can result in installation problems or product problems.

1) The wall on which the cabinet is mounted must be strong and can withstand the weight of the cabinet for a long time.

2) The cabinet needs to be installed in a well-ventilated environment.

3) Do not expose the cabinet directly to strong sunlight to prevent the power from derating due to excessive temperatures.

4) The cabinet should be installed in a place with shelter to prevent direct exposure to sunlight and rain.

5) To avoid risk the cabinet must be installed out of reach of children.

6) The area is completely waterproof.

7) The floor is flat and level.

8) There are no flammable or explosive materials.

9) The ambient temperature is within the range from 0 ℃ to 50℃.

10) The temperature and humidity are maintained at a constant level.

11) There is minimal dust and dirt in the area.

12) The distance from a heat source is more than 2 meters.

13) The distance from the air outlet of the whole system is more than 0.5 meters.

14) Do not cover or wrap the battery case or cabinet.

15) Do not place at a children's or pet-touchable area.

16) The installation area shall avoid direct sunlight.

17) Due to ventilation or airtight requirements, please follow the installation distance requirements (top, left, right, front) on the next page.

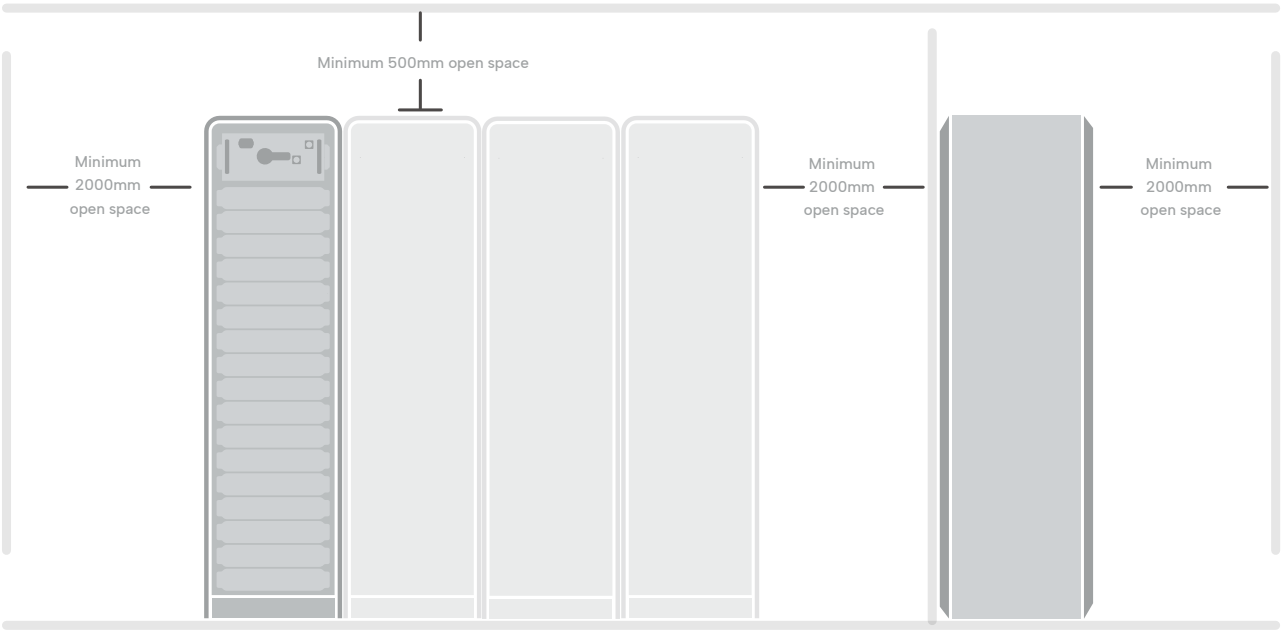
18) The aeration shall avoid high salinity, humidity, or temperature.

## 3.4 Commercial cabinet installation

### 3.4.1 Installation preparation

### Choice of installation position

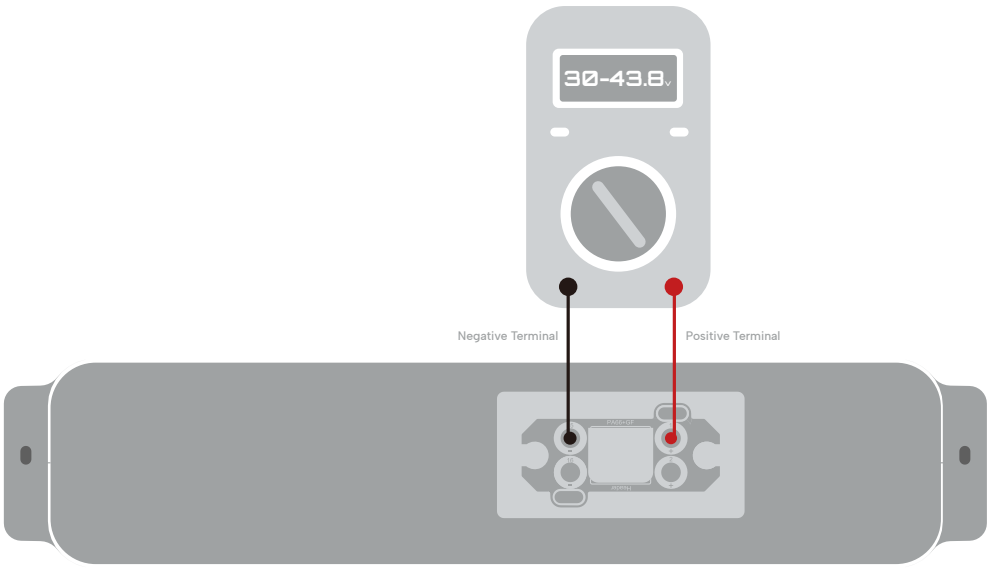
Recommended installation space of single rack / multiple racks:




### Pre-installation check

Before installing, please pre-check the battery to ensure it is safe.

As shown in the figure, measure the voltage between the positive and negative terminals of the battery with a voltmeter. The voltage of the battery should be between 30 and 43.8V.



### 3.4.2 Single cabinet installation

#### (1) Rack installation and fixing **Refer to the construction drawing to install the cabinet.**

**Step 1**: Place the cabinet on a level stable floor.

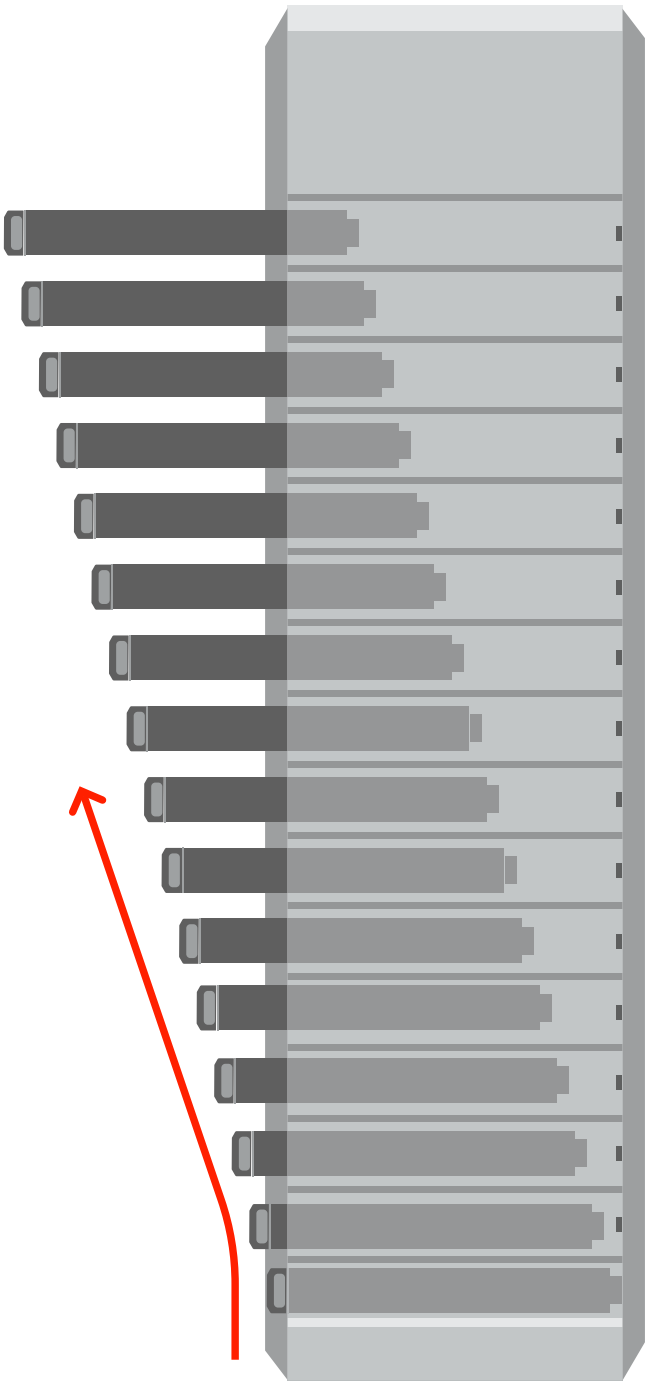
**Step 2**: The cabinet can be adjusted as needed from the back wall, and matched with the equidistant holes of the L type mounting structure, and fixed.

**Step 3**: Fix the L type mounting structure and cabinet with one M6×60 expansion bolt on the wall side and two M4×10 triad screws on the cabinet side.

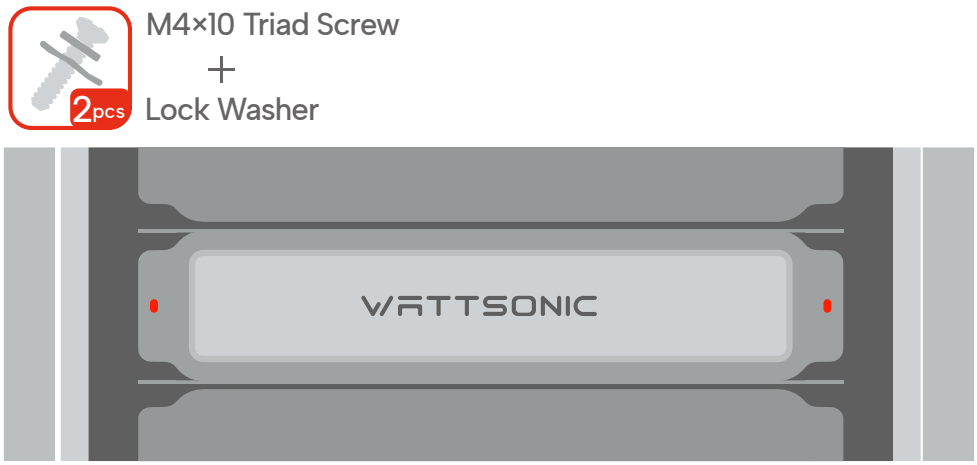
## (2) Mounting and securing product

**Caution**: Please use at least 3-4 people during installation for safety reasons.
Do not mount the module upside down.
Check the module before installation to ensure safety.

**Step 1**: Open the cabinet door and put the battery modules one by one into the cabinet until a “click” sounds.



**Step 2**: After putting battery modules into the cabinet, fix them with 4 M4×10 triad screws on both sides. As well as set a lock washer between each triad screw and module. As shown below, tighten the nuts well to enhance the grounding of the whole cabinet.




**Step 3**: Install the battery module from bottom to top, then install the Master BMS or Sub-Master BMS at the top of the cabinet. Use screws and lock washer to secure the product to the cabinet.

**Step 4**: Install all the battery modules and Master BMS/Sub-Master BMS modules to the cabinet, as shown in the figure beside, and secure them to the cabinet.

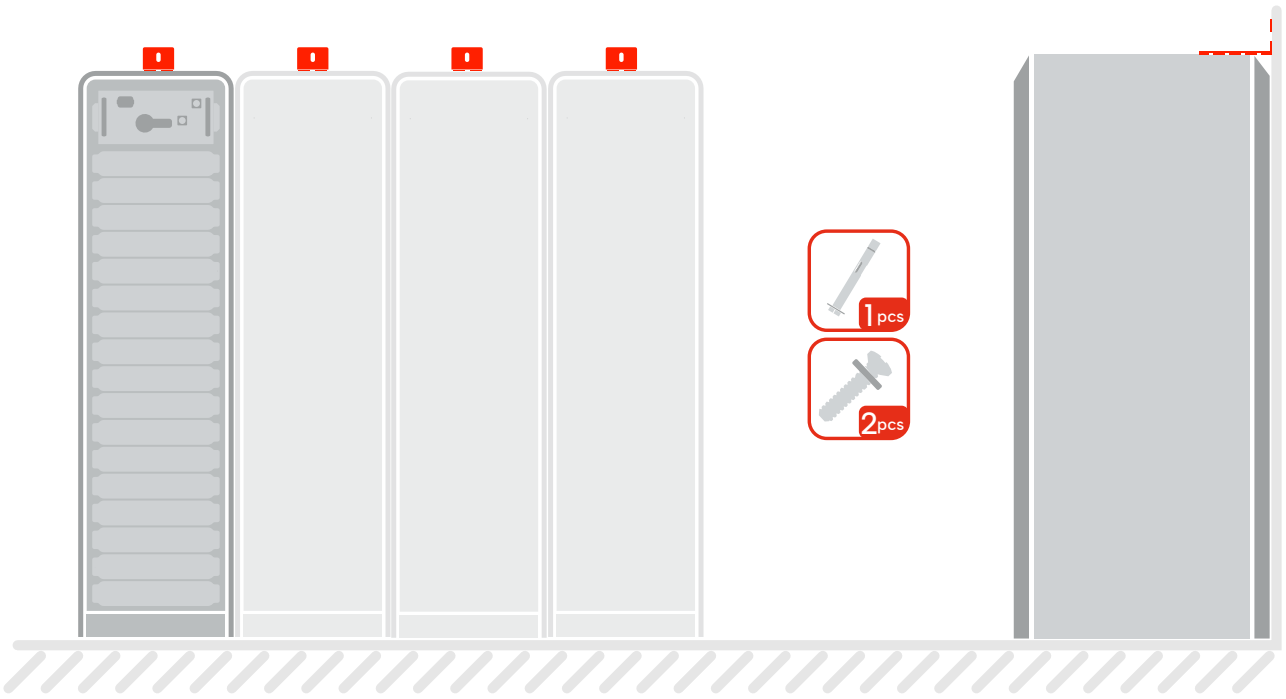
### 3.4.3 Multi-cabinet installation

#### (1) Rack installation and fixing **Refer to the construction drawing to install the cabinet.**

**Step 1**: Place the cabinet on a level stable.

**Step 2**: The cabinet can be adjusted as needed from the back wall, and matched with the equidistant holes of the L type mounting structure, and fixed.

**Step 3**: Fix the L type mounting structure and cabinet with one M6×60 expansion bolt on the wall side and two M4×10 triad screws on the cabinet side.

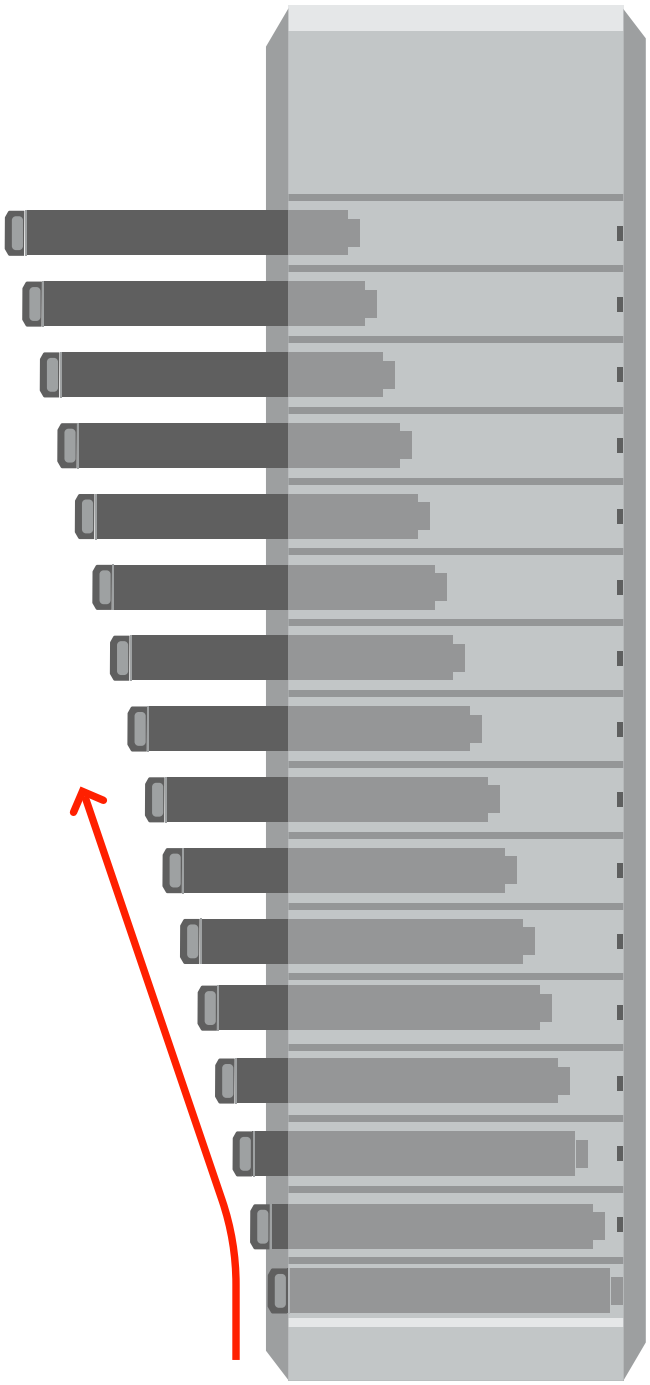


## (2) Mounting and securing product

**Caution**: For safety reasons, please use at least 3-4 people during installation.
Do not mount the module upside down.
Check the module before installation to ensure safety.

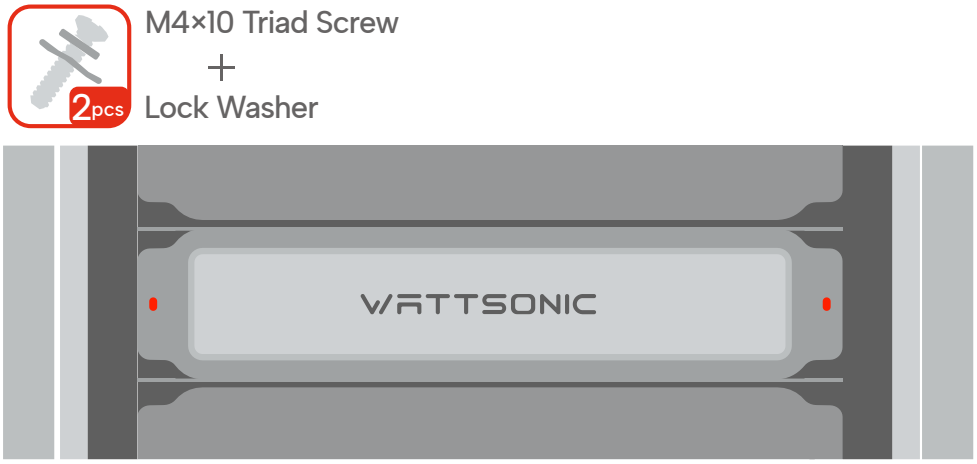
**Step 1**: Open the cabinet door and put the battery modules one by one into the cabinet until a "click" sounds.

Please install the battery from the bottom to the top for safety reasons.

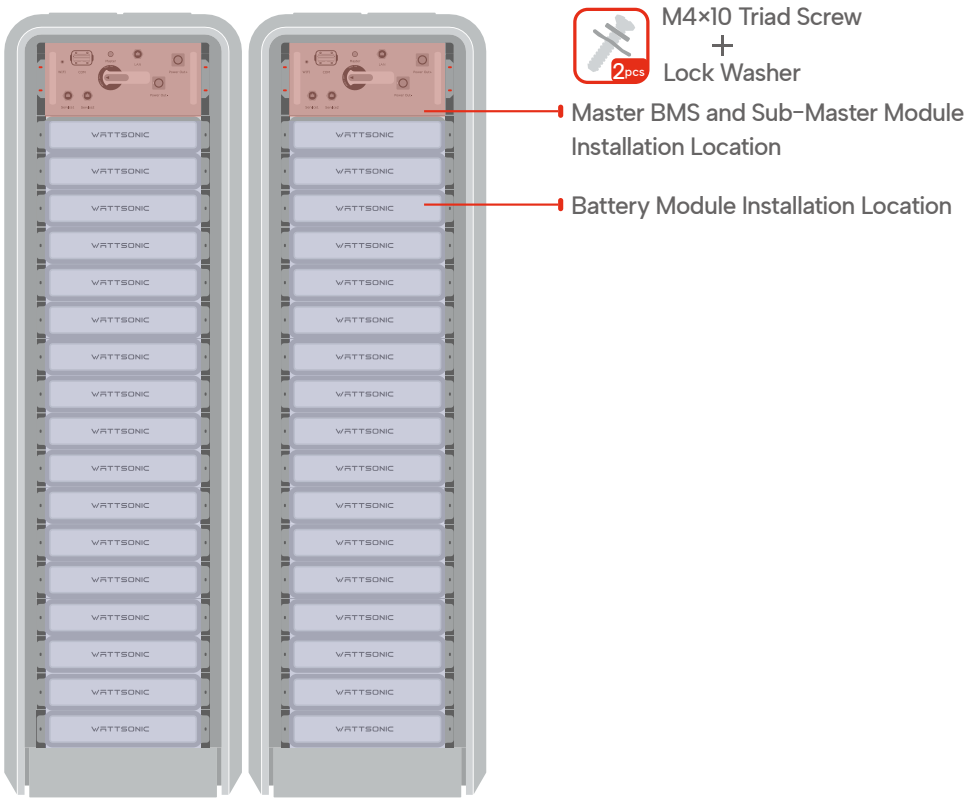


**Step 2**: Fix the battery modules to the cabinet with 4 M4×10 triad screws on both sides after putting them into the cabinet.  And put a break paint gasket in the paint gasket between each triad screw and module, as shown above, to enhance the electrical conductivity of the whole cabinet.

**Step 3**: Install the battery module from bottom to top, then install the Sub-Master BMS at the top of the cabinet. Use screws and lock washer to secure the Sub-Master BMS to the cabinet.




**Step 4**: Install all the battery modules and Sub-Master BMS modules to the cabinet, as shown in the figure beside, and secure them to the cabinet.

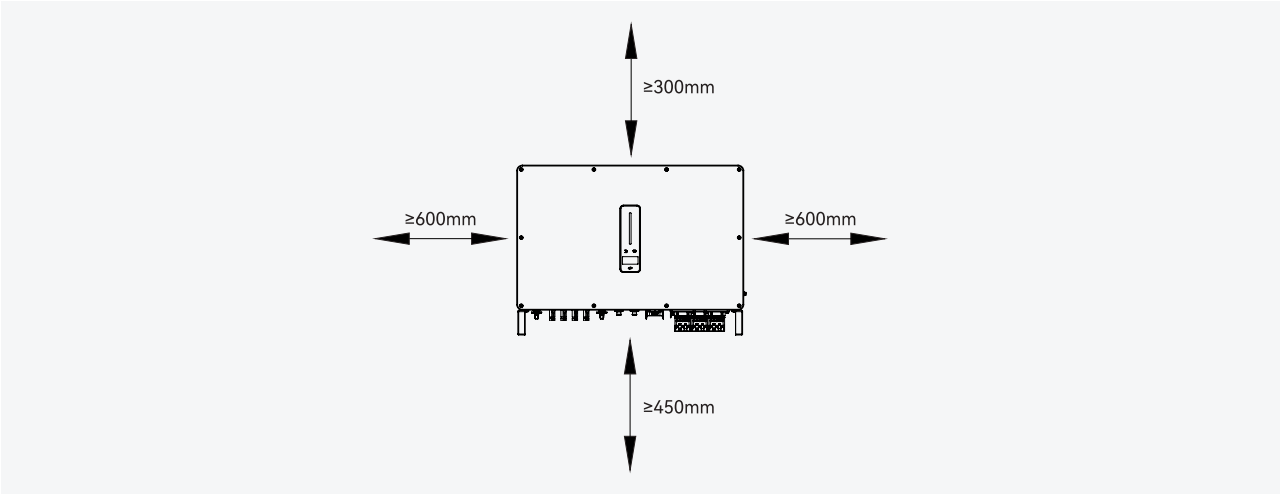


# 3.5 Inverter installation

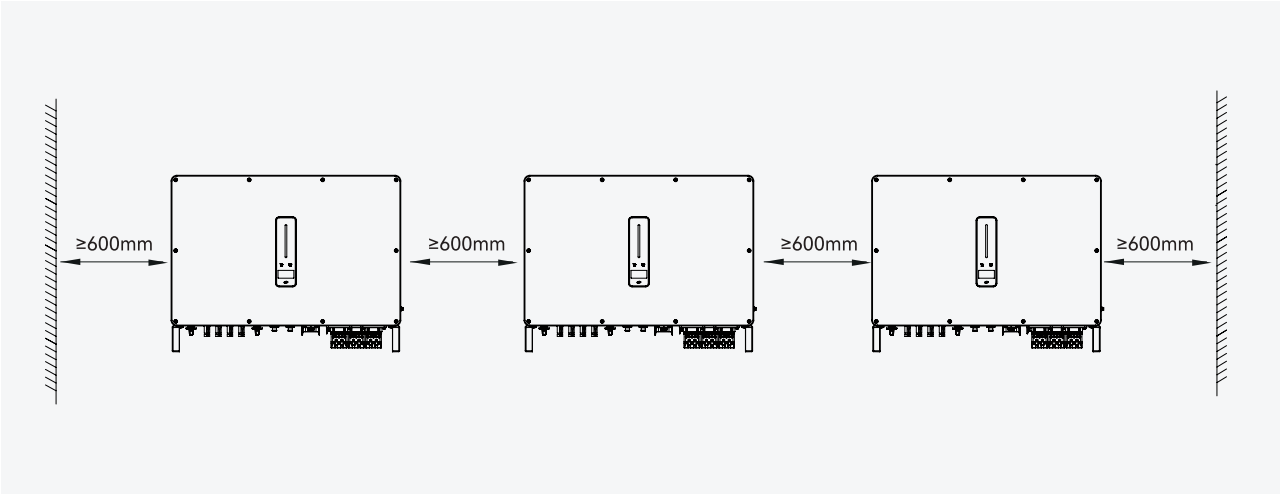
## 3.5.1 Installation preparation

### Installation spacing

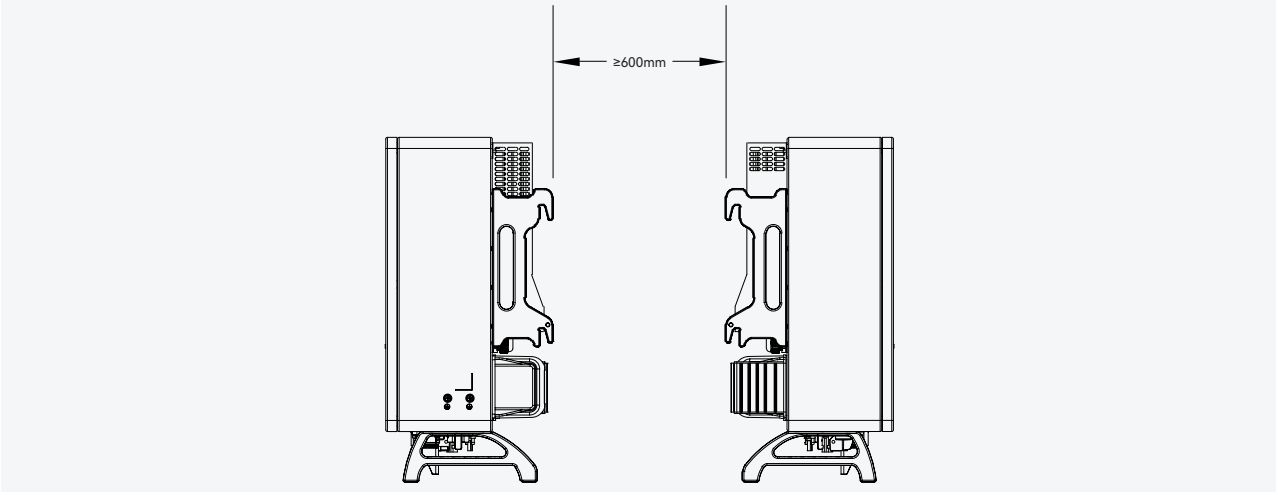
Reserve enough clearance around the inverter to ensure sufficient space for heat dissipation.




In case of multiple inverters, reserve specific clearance between the inverters.

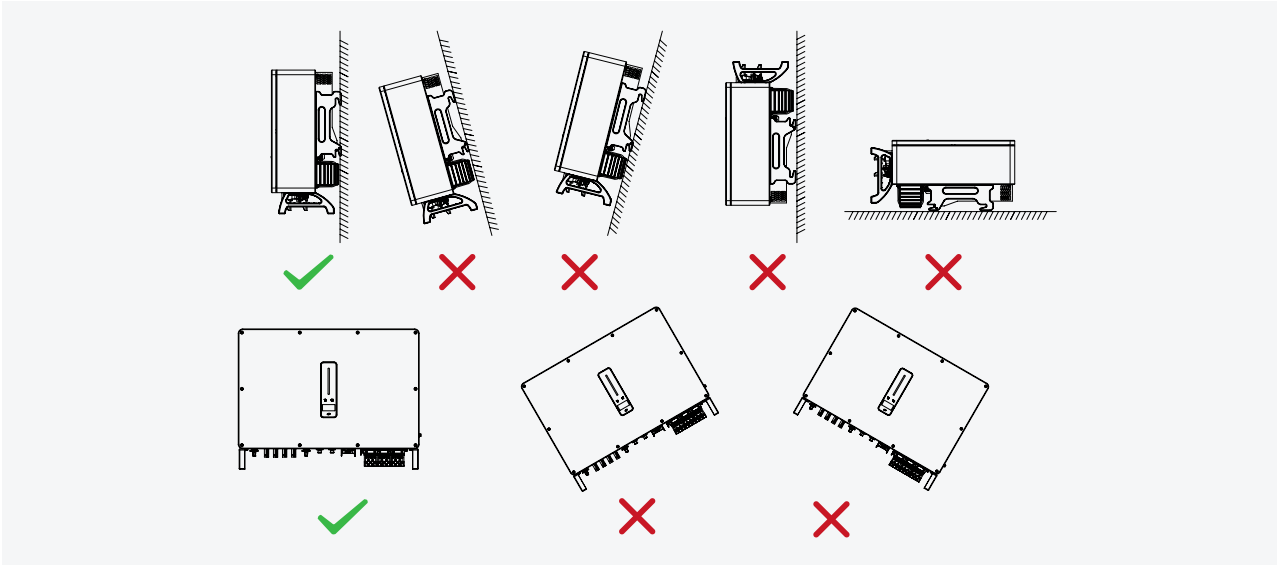



When installing inverters back-to-back, the distance between every two inverters should be at least 600 mm.



## Installation angle

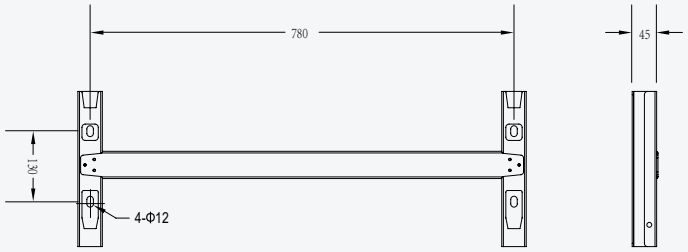
Install the inverter vertically. Never install the inverter horizontally, or at forward/backward tilted, or upside down.



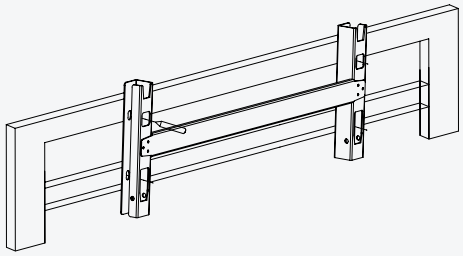
### 3.5.2 Mounting the inverter

## Bracket installation

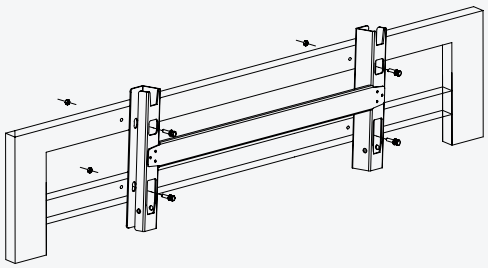
Dimensions of wall bracket (mm)




1) Level the assembled inverter-bracket by using the level, and mark the positions for drilling holes on the mounting bracket. Drill the holes by using a hammer drill.

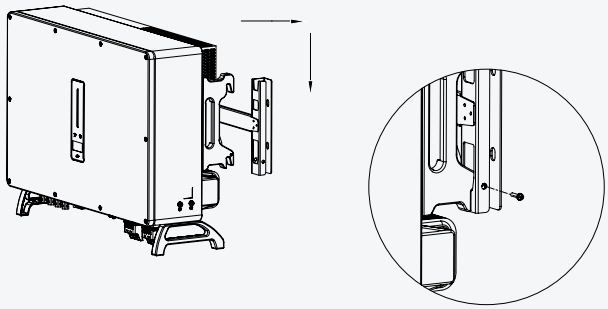


2) Secure the inverter-bracket with bolts.



3) Mounting the inverter

Lift the inverter, hang the back rail on the fixed bracket carefully. Secure the inverter with M6 screws (two sides).



# Electrical connection

**Danger**: A high voltage in the inverter's conducting component could result in an electric shock. Please ensure the inverter's AC and DC sides are fully de-energized before installation.

**Danger**: Do not connect the N-wire to the inverter casing as a protective ground wire. Otherwise, it may cause electric shock.

**Warning**: Do not ground the positive or negative pole of the PV string. Otherwise, it will cause severe damage to the inverter.

**Warning**: Static may cause damage to the electronic components of the inverter. Anti-static measures should be taken during installation and maintenance.

**Note**: Do not use other brands or terminals other than the terminals in the accessory package. Wattsonic has the right to refuse all damages caused by the mixed-use of terminals.

**Note**: Moisture and dust can damage the inverter, ensure the cable gland is securely tightened during installation. The warranty claim will be invalidated if the inverter is damaged due to a poorly connected cable connector.

## 4.1 External ground connection

### (1) Ground terminal connection of inverter

Connect the inverter and ground bar through PE wire to achieve the purpose of grounding protection. Please always remember to wire the PE wire before wiring other cables.

**Danger**: Do not connect the N-wire to the inverter casing as a protective ground wire. Otherwise, it may cause electric shock.

**Note**: Reliable grounding is good for resisting surge voltage shock and improving EMI performance.

Inverters must be well-grounded.

For a system with only one inverter, just ground the PE cable.

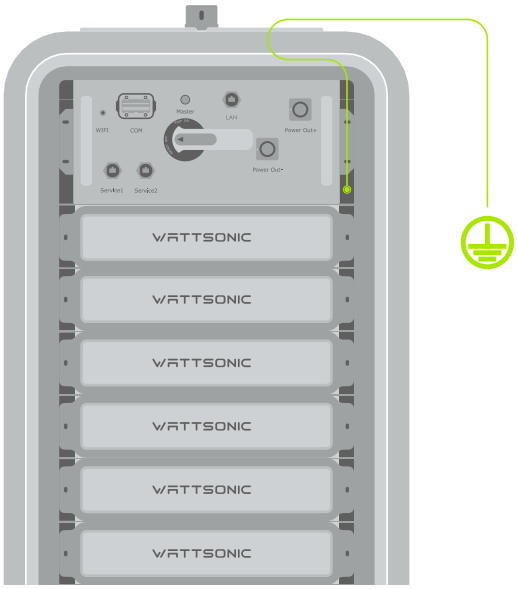
For a multi-inverter system, all inverters PE wire need to be connected to the same grounding copper bar to ensure equipotential bonding.

1) The external grounding terminal is located on the inverter's lower right side.

2) Fix the grounding terminal to the PE wire with a proper tool and lock the grounding terminal to the grounding hole in the lower right side of the inverter.

## (2) Ground terminal connection of single cabinet

After the cabinet is fixed, connect one of the earth points of the cabinet (side top or bottom) to the PE distribution box.




**Warning**: Please make sure the Main Switch is always at the OFF position during cable connection to guarantee high voltage protection.

## (3) Ground terminal connection of multi cabinet

After the cabinet is fixed, connect one of the earth points of each cabinet (side top or bottom) to the PE distribution box. And each cabinet should be connected with a grounding wire.

## 4.2 Connection between BMS and inverter

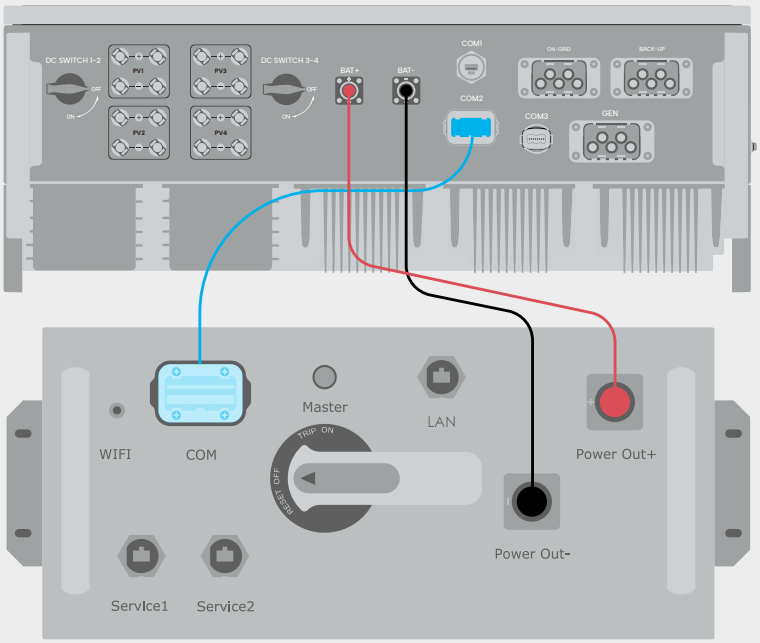
### 4.2.1 Single cabinet

**Warning**: Please make sure the Main Switch is always at the OFF position during cable connection to guarantee high voltage protection.

**Note**: To ensure the safe use of the equipment, please connect the circuit breaker between the PC and the BMS. Ensure there is no power supply before connecting, and use a cable that meets the requirements.

#### 1) Power Cable

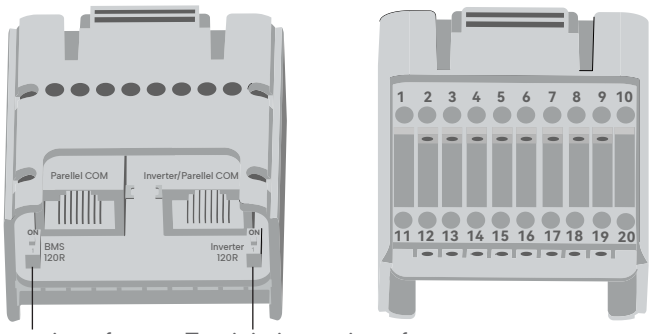
Connect the BAT OUT+ and BAT OUT- of Master BMS to B+ and B- of the inverter.



## 2) Communication Cable

All communication ports are in the multifunction communication port at the front of BMS, including CAN port, 485 port, EMS port, and DRED port. Terminal definition details are listed below.

Connect the Parallel COM of the multifunction communication port to the inverter BMS COM port.




Teminiating resistor for CAN(Parallel COM)

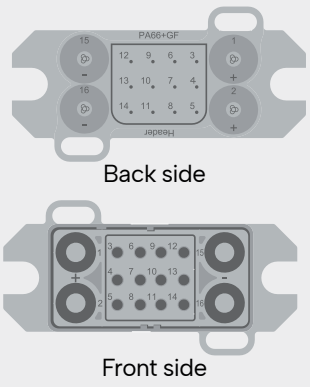
Teminiating resistor for CAN(Inverter/Parallel COM)

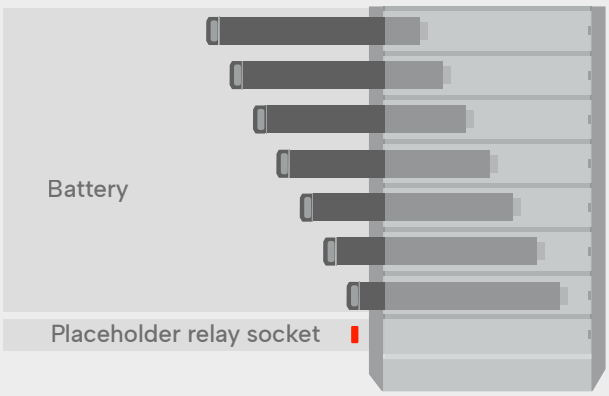
| PIN | Definition | Function |
|---|---|---|
| Parallel COM | CAN | CAN for parallel connection of BMS |
| Inverter/Parallel COM | CAN | CAN for communicate with inverter |
| 1 | 485-2B | 485 connection for EMS |
| 2 | 485-2A | |
| 3 | CAN0_H | CAN for communicate with inverter |
| 4 | CAN0_L | |
| 5 | CAN1_H | CAN for parallel connection |
| 6 | CAN1_L | |
| 7 | 485-1B | Reserved display connection |
| 8 | 485-1A | |
| 9 | DRY2_COM | Dry contact output |
| 10 | DRY2_NO | |
| 11 | HS1_IN | Fast stop |
| 12 | PWR+ | |
| 13 | DRY3_COM | Dry contact output |
| 14 | DRY3_NO | |
| 15 | DRY4_COM | Dry contact output |
| 16 | DRY4_NO | |
| 17 | 485-3B | Dry contact output |
| 18 | 485-3A | |
| 19 | 24V- | 24V output for EMS |
| 20 | 24V+ | |

### 3) Placeholder relay socket (optional)

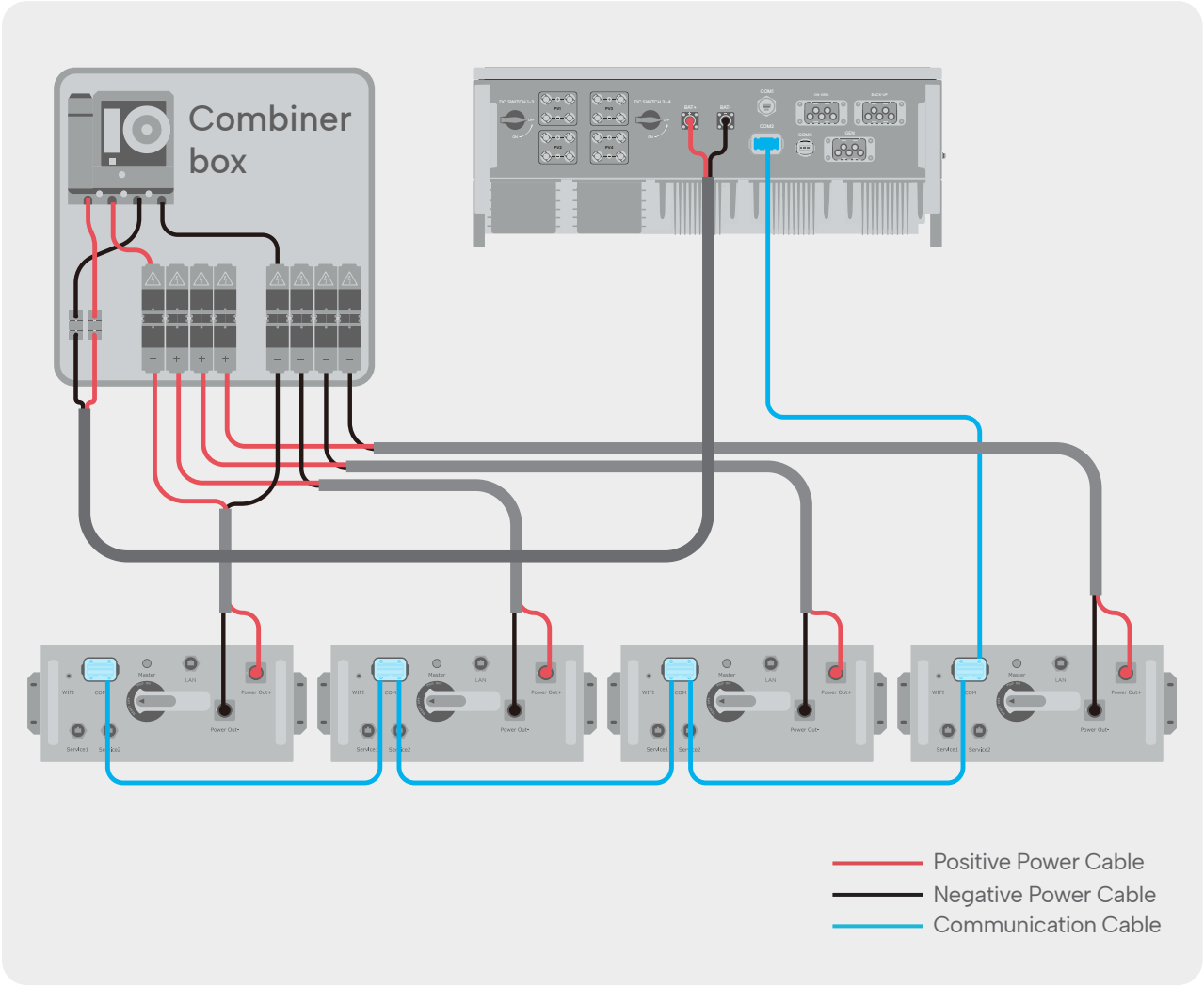
If the cabinet is not fully equipped with batteries, please install/insert placeholder relay sockets in vacant positions. In addition, the battery should be mounted from bottom to top.

**Note**: The batteries placed in each commercial cabinet must be more than 10.



### 4.2.2 Multiple cabinets




**Warning**: Please make sure the Main Switch is always at the OFF position during cable connection to guarantee high voltage protection.

**Note**: To ensure the safe use of the equipment, please connect the circuit breaker between the PC and the BMS. Ensure there is no power supply before connecting, and use a cable that meets the requirements.

### 1) Power Cable

As the figure below shows, when installing multiple cabinets in one system, please use a DC combiner box to connect between cabinets and inverter.

### 2) Communication Cable

All communication ports are in the multifunction communication port at the front of BMS, including CAN port, 485 port, 485 port, EMS port, and DRED port.

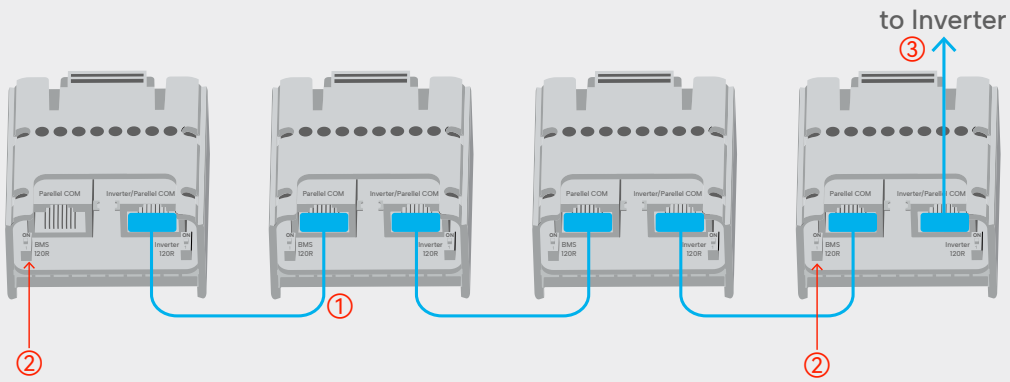
Please refer to page 38 for terminal definition details.

When using more than one cabinet, please check the following steps to realize communication connection.

① Connet "Parallel/Inverter COM" and “Parallel COM” between BMS.

② Set the switch off the "Terminating resistor" of the first and the last communication terminal to "ON" status.

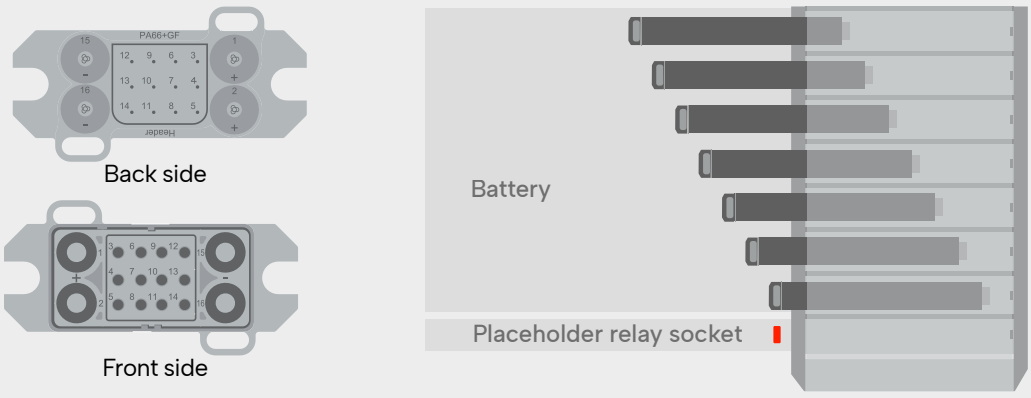
③ Connect the "Parallel/Inverter COM" of the Master BMS to the inverter COM terminal.




### 3) Placeholder relay socket (optional)

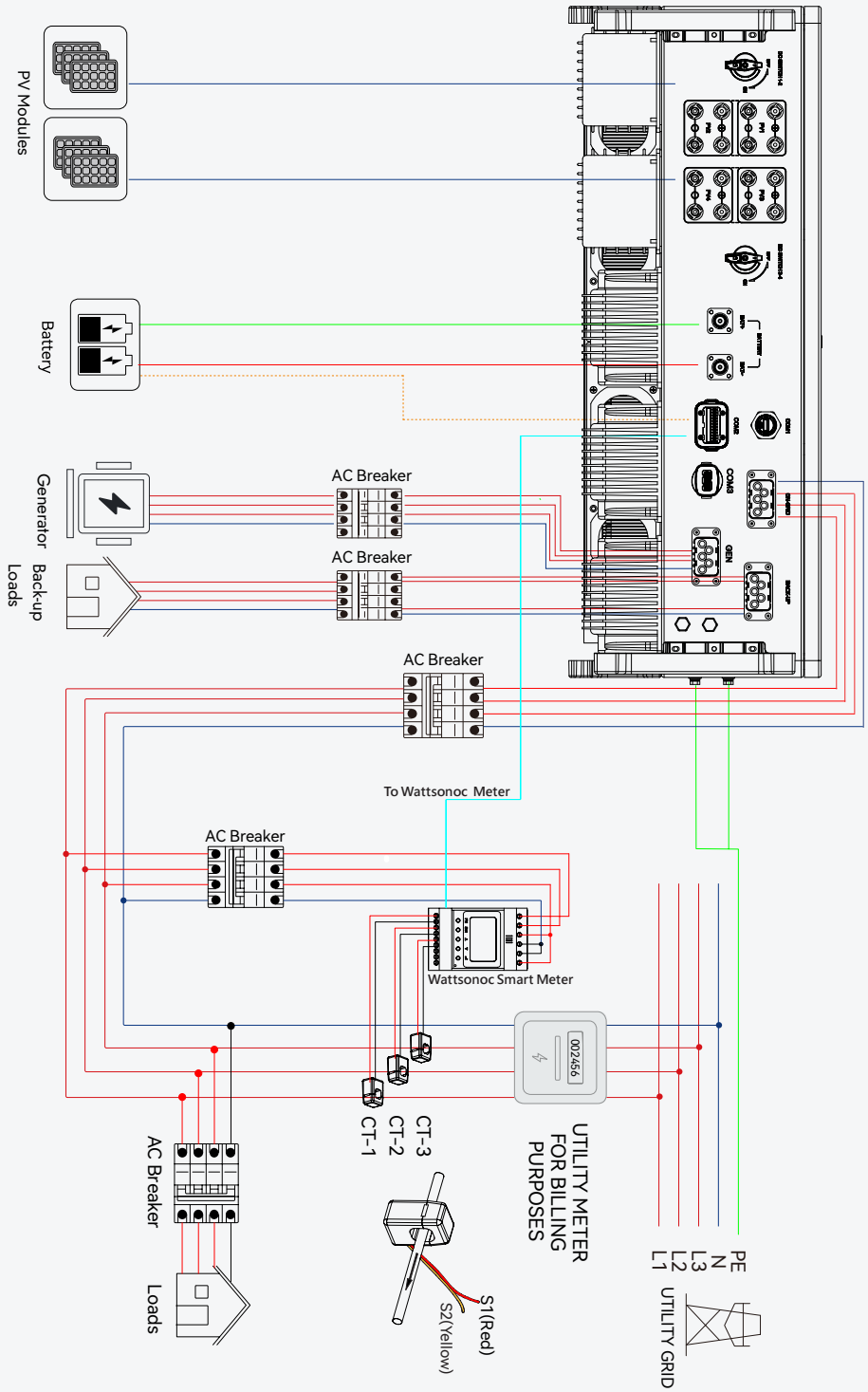
When the number of battery modules in each cabinet is less than 17, please insert the placeholder relay socket in each empty position where the battery modules are not installed to guarantee that the product operates normally.

**Note**: The batteries placed in each commercial cabinet must be more than 10.



## 4.3 Electrical wiring diagram

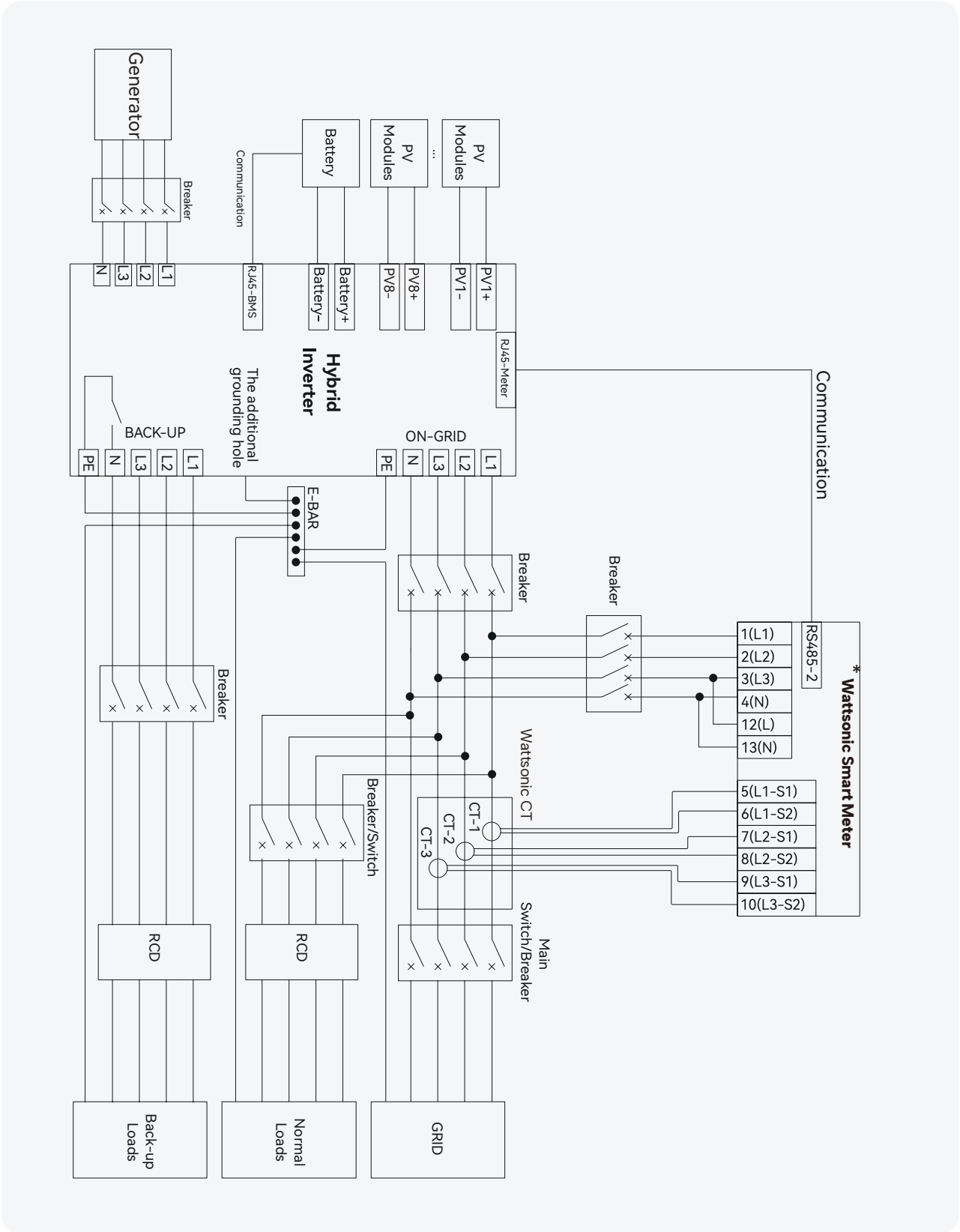
This diagram shows Wattsonic WTS 25-50K series hybrid inverter wiring structure and composition, concerning the actual project, the installation and wiring have to be in line with the local standards.



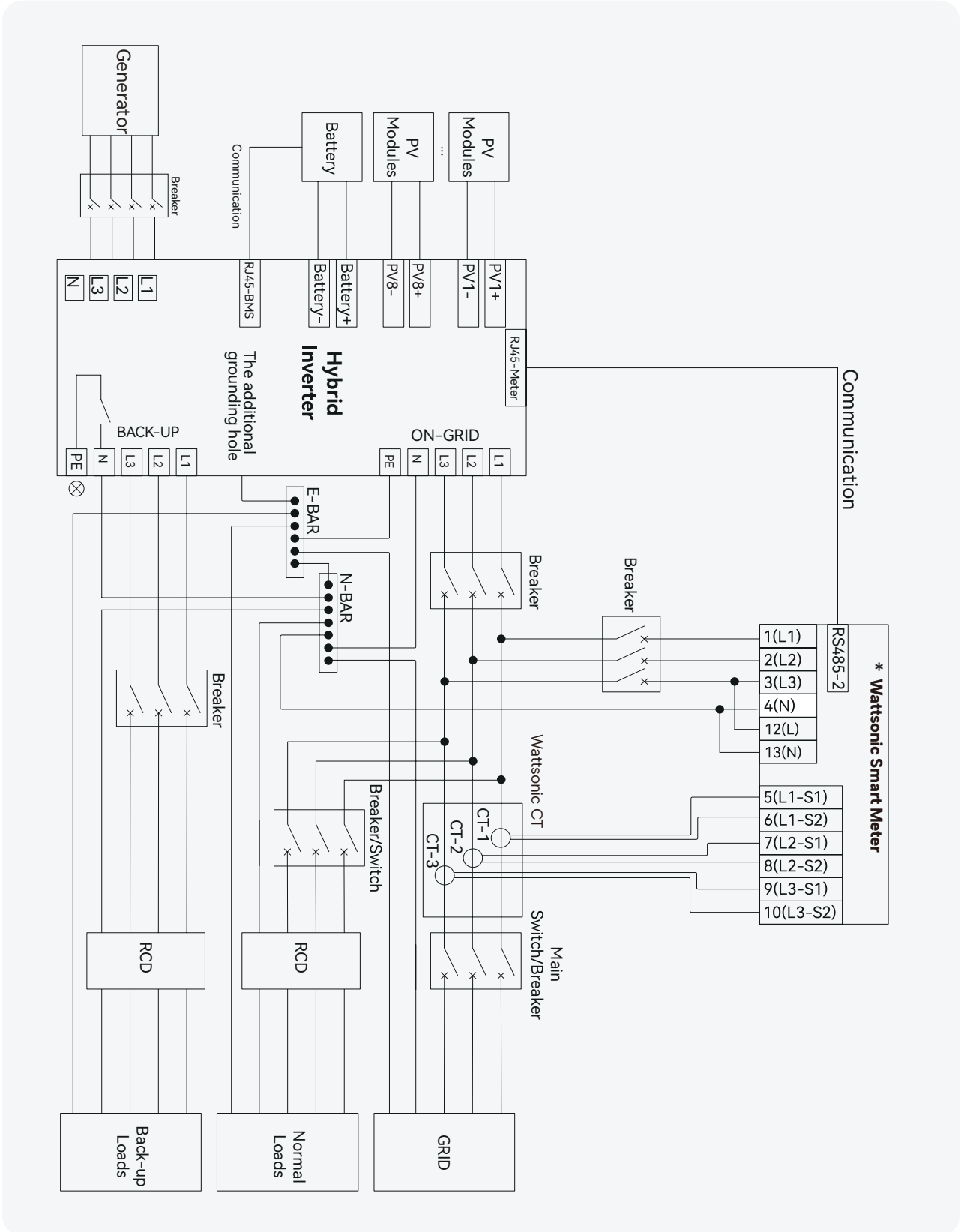
Single inverter wiring diagram

This diagram is an example without a special requirement for an electrical wiring connection.

The neutral line of AC supply can be isolated or switched.



This diagram is an example of Australia and New Zealand. The neutral line of the AC supply must not be isolated or switched, and the neutral cable of the GRID side and BACK-UP side must be connected according to the wiring rules AS/NZS_3000. Otherwise, the BACK-UP function will not work.



## 4.4 AC connection

### 4.4.1 AC side requirements

**Note**: 1) An independent AC breaker is required in both the on-grid and backup output sides, and any loads cannot directly connect with the inverter.

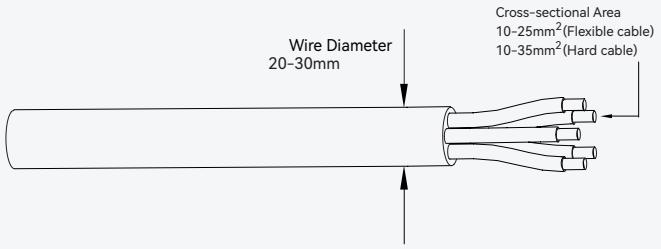
2) Please confirm that all DC & AC power sources are disconnected from the inverter before connecting the AC cable.

3) The Wattsonic WTS 25-50K series three-phase high voltage hybrid inverter applies to the three-phase power grid with a voltage of 230/400V and a frequency of 50/60Hz.

4) Connect the inverter to the grid only after getting approval from the local electric power company.

A three phase AC breaker needs to be installed on the AC side of the WTS 25-50K. Select a proper overcurrent protection device in compliance with local power distribution regulations and Max to ensure that the WTS 25-50K can safely disconnect itself from the power grid when an exception occurs. Input (output) current of WTS 25-50K AC side.

The allowable AC cable of wire diameter and cross-sectional area for Wattsonic WTS 25-50K are as shown in the following:




**Note**: Determine whether an AC circuit breaker with greater overcurrent capacity is required based on actual conditions.

### Residual current monitoring device

With an integrated universal current-sensitive residual current monitoring unit, the inverter will disconnect immediately from the mains power once a fault current with a value exceeding the limit is detected.

However, if an external residual current device (RCD) (type A is recommended) is mandatory, the switch must be triggered at the residual current. RCD of other specifications can also be used according to local standards. The recommended residual current is as follows.

| Inverter | Recommended residual current |
|---|---|
| WTS-25K-100<br>WTS-30K-100 | 300mA |
| WTS-36K-100 | 360mA |
| WTS-40K-100<br>EWTS-40K-100-P | 400mA |
| WTS-50K-100<br>WTS-50K-100-P | 500mA |

### 4.4.2 Installing the AC connector

**Danger**: High voltage may be present in the inverter!

Ensure all cables are voltage-free before electrical connection.

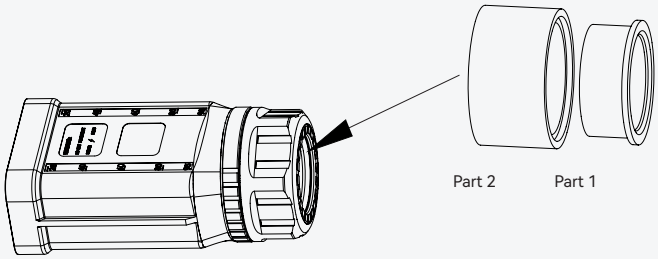
Do not connect the AC circuit breaker until all inverter electrical connections are completed.

The AC terminal block is on the bottom side of the inverter.

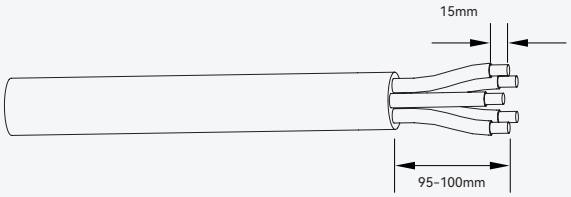
1) Seal accessory option.

The recommended outer diameter of the cable is 20-24 mm and 24.5-30mm.

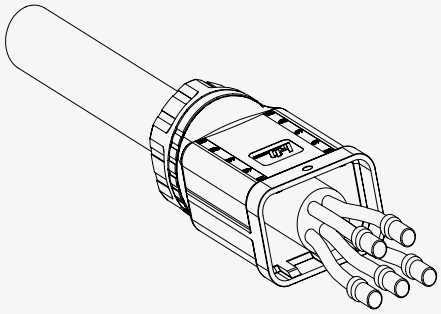
If the outer diameter of the cable is greater than 24mm, remove part 1.




2) According to the figure below select an appropriate cable, peel the insulation sleeve of the AC cable off for 95-100mm, and peel off the end of 3L /PE / N wires for 15mm.

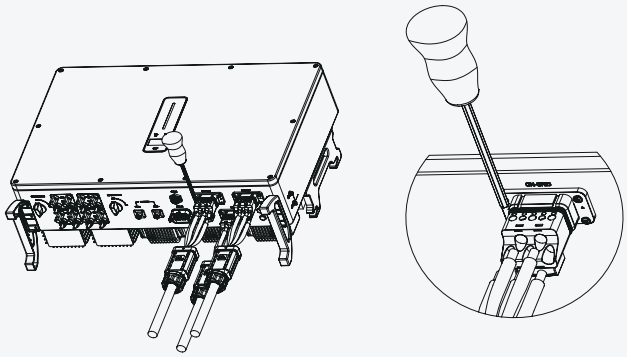



3) Thread the stripped wire into the lock nut and the main body (the multi-core, multi-strand copper wire cable must be riveted to the cord end terminal).



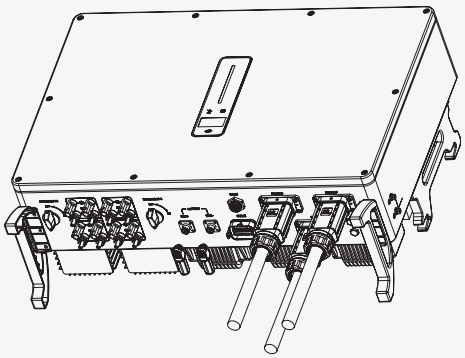
4) Insert the cable into the rubber core according to the line sequence, observe the perspective hole, the cable is in place, and the torque of the crimping screwdriver is 5 ± 0.1N.m.

**Warning**: The cord end terminals must be locked tightly and ensure they won't be loose after a long period of use.



A

5) Insert the main body into the rubber core and hear the "click" sound, then tighten the nut with an open-ended wrench (torque 10.0±0.1N·m) and complete the installation with a "click, click, click."

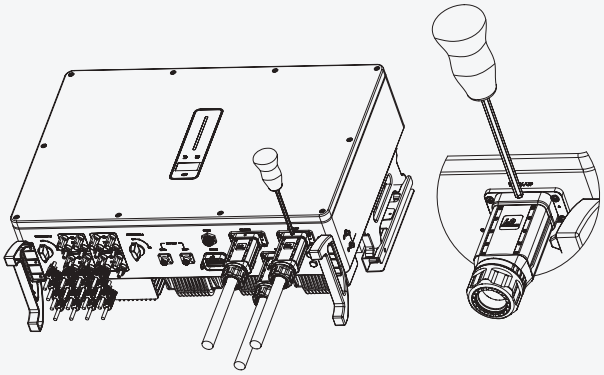


B

### 4.4.3 Removal the AC connector

1) Hold the unlocking buckle with one hand and rotate it in the marked direction, and rotate the nut in the opposite direction with the other hand.

2) Use a screwdriver to align the unlocking position, press and hold the main body, and pull back to complete the removal.

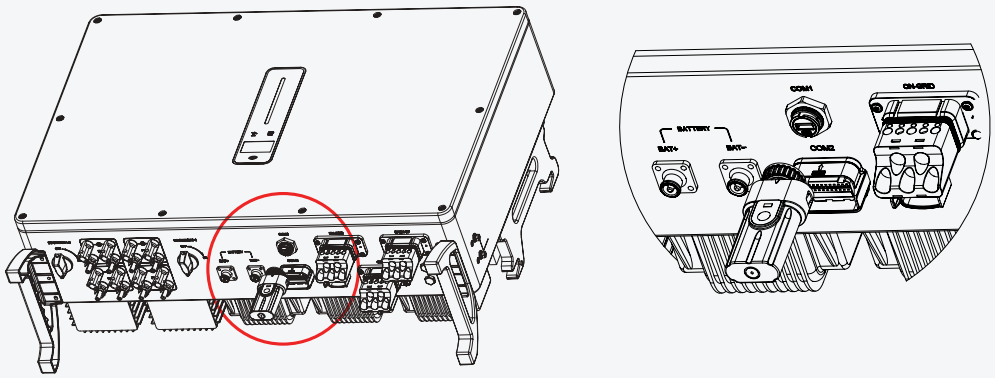


**Caution**: Please distinguish the on-grid and backup ports, and don't mix up the on-grid and backup ports when making the connection.

## 4.5 Monitoring device installation

The wattsonic WTS-[25-50kW]-100A-3P hybrid inverter supports WIFI, LAN, and 4G communication.

Plug the WIFI, LAN, or 4G module into the COM1 port at the bottom of the inverter. A slight “click” sound during the installation indicates the assembly is in place.



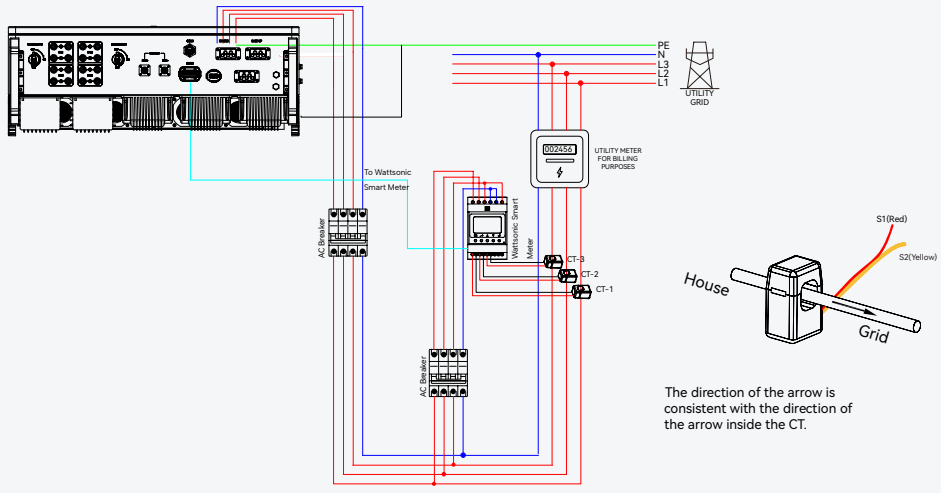

**Note**: Please refer to “7 Monitoring” for more information.

## 4.6 Meter and CT connection

The current Transformer, also called CT, is usually installed on the L wires between the house loads and the power grid.

The Meter can be installed in the AC combiner box or other places that are unable to be touched by children. Wattsonic CT cable with a length of 2m is fixed and can not be extended.

The CTs were connected to the Wattsonic Meter when you received them, and you need to follow the wiring diagram in the Meter to join the CT.



**Notice:** CT installation directions should strictly follow the instructions in the user manual. Otherwise, the inverter may not be working.

The CT has to correspond with the port in the Meter, and the connection between the CT and the Meter needs to be reliable. Otherwise, the CT measurement accuracy may be affected.

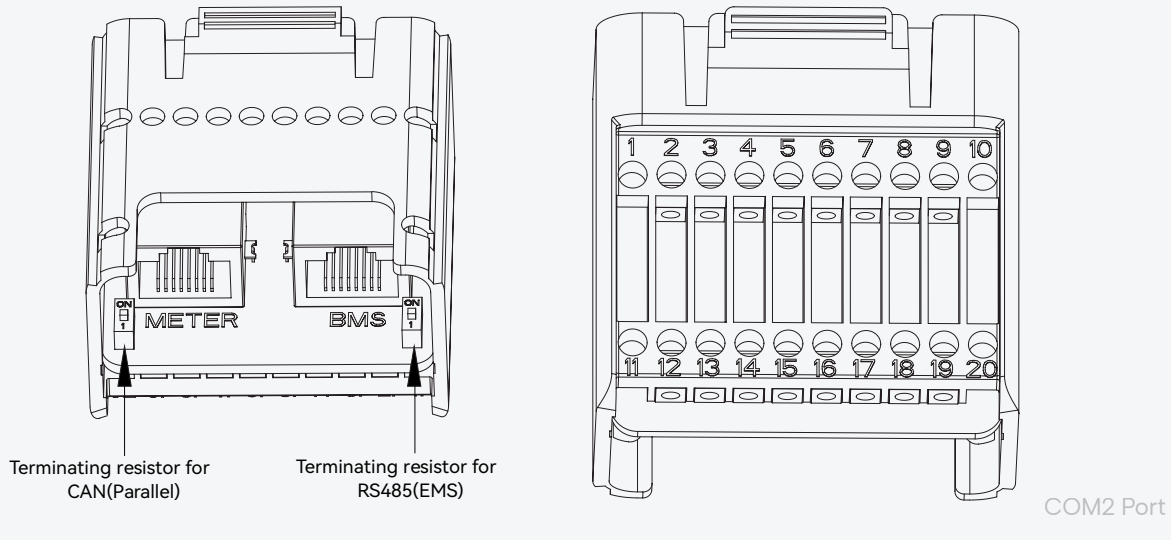
**Note:** Please choose the appropriate CT size according to your needs.

The definition of Meter terminals is shown in the table below:

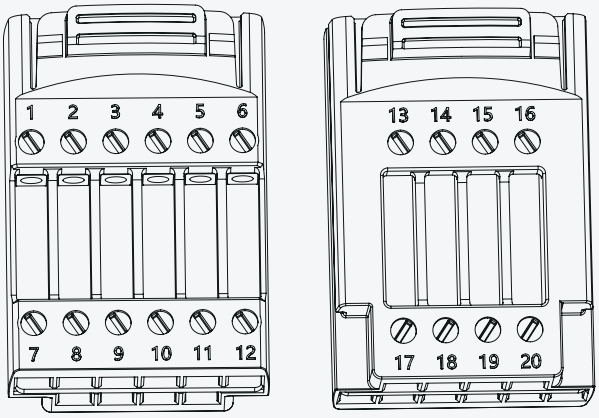
| No. | Definition | | Function |
|---|---|---|---|
| | ACR10R | RMM | |
| 1 | | L1 | L1/L2/L3/N connect to grid to detect power grid voltage |
| 2 | | L2 | |
| 3 | | L3 | |
| 4 | | N | |
| 5 | | L1-S1 | To detect the CT current and direction |
| 6 | | L1-S2 | |
| 7 | | L2-S1 | |
| 8 | | L2-S2 | |
| 9 | | L3-S1 | |
| 10 | | L3-S2 | |
| 11 | / | PE | Ground connection |
| 12 | L | / | Power supplied from grid |
| 13 | N | / | |
| RS485 | / | Reserve | |
| | RS485 | RS485-2 | Communicate with inverter |
| ANT | / | Reserve | |
| LAN | / | Reserve | |
| Type-C | / | Type-C | Specified Debug Interface.<br>Do not use it by non-professionals |

## 4.7 Communication connection

All communication ports are in the multifunction communication Port at the bottom of inverter which including Meter port, CAN port, BMS port, EMS port, DRED port. DO port, 0-10V AO port, 4-20mA AO port.




| Pin | Definition | Function |
|---|---|---|
| METER(RJ45-1) | RS 485 | Communicate with Meter |
| BMS(RJ45-1) | CAN | Communicate with BMS |
| 1 | COM | DO-1 (Multifunction Relay) |
| 2 | NO (Normally Open) | |
| 3 | / | Reserved |
| 4 | / | Reserved |
| 5 | DRM4/8 | DRED For Australia and New Zealand<br>RCR For Germany and some other European countries |
| 6 | DRM3/7 | |
| 7 | DRM2/6 | |
| 8 | DRM1/5 | |
| 15 | COM D/0 | |
| 16 | REF D/0 | |
| 11 | Fast stop + | Fast stop |
| 12 | Fast stop - | |
| 13 | 485 B1 | EMS |
| 14 | 485 A1 | |
| 17 | CANL_P | CAN for parallel connection of inverters |
| 18 | CANH_P | |
| 19 | / | Reserved |
| 20 | / | Reserved |

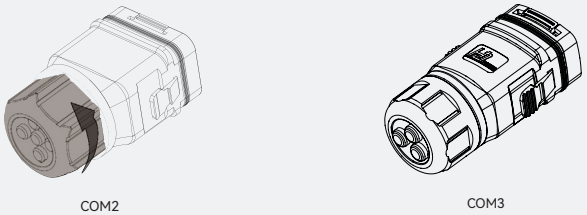



COM3 Port

| Pin | Definition | Function |
|---|---|---|
| 1-6 | / | Reserved |
| 7 | COM | DO-2 (Multifunction Relay) |
| 8 | NO | |
| 9-10 | / | Reserved |
| 11 | COM | DO-3 (Multifunction Relay) |
| 12 | NC | |
| 13-16 | / | Reserved |
| 17 | 4-20mA_OUT | 4-20mA analog output |
| 18 | GND | |
| 19 | GND | 0-10V analog output |
| 20 | 0-10V_OUT | |

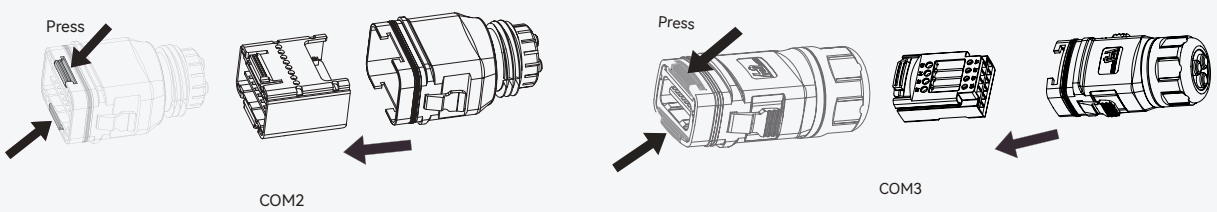
### 4.7.1 Assembling the multi-COM connector

1) Unscrew the swivel nut from the connector.



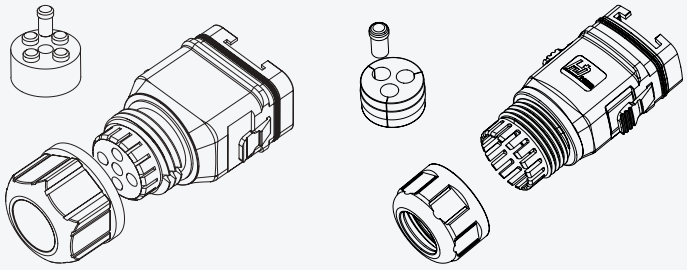
COM2 COM3

2) Take out the terminal block.




COM2 COM3

3) Remove the seal and lead the cable through the cable gland.

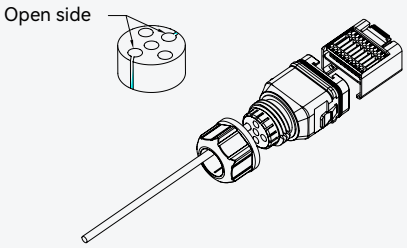


COM2 COM3

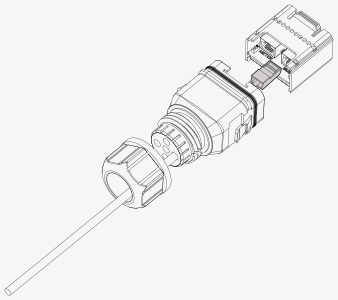
## 4.7.2 Connect the Meter and BMS communication cables

**Note:** The communication between the meter/BMS and inverter is the RJ45 interface cable. The communication cable of the meter is 10M, and the line of BMS is 3M.

1) Thread the RJ45 plug of appropriate length through the swivel nut, and insert it into the open side of the rubber gasket.



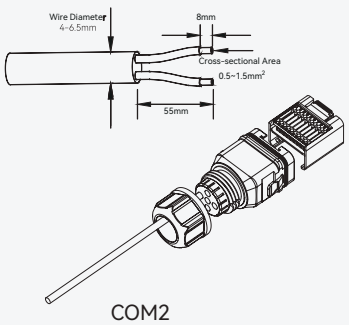

2) Insert one side of the RJ45 plug into the RJ45 port of the terminal block.



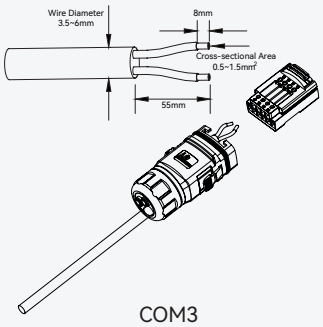
3) Insert another side of the communication cable into the meter RS485 port or BMS CAN port.

### 4.7.3 Connect other cables

1) Thread the cable of appropriate length through the swivel nut and the housing. Remove the cable jacket and strip the wire insulation.

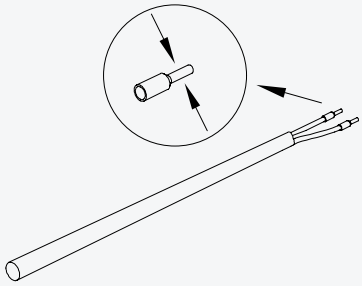



COM2

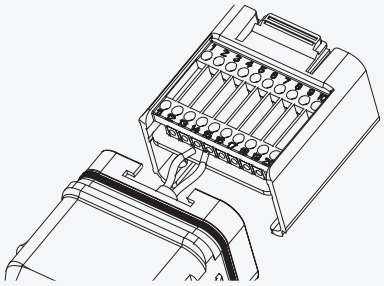



COM3

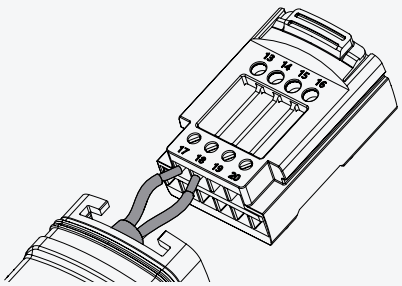
2) (Optional) When using a multi-core, multi-strand copper wire cable, connect the AC wire head to the cord end terminal (hand-tight). In the case of single-strand copper wire, skip this step.



3) Fix all the wires to the terminal plug according to the assignment and tighten to a torque of 1.2+/-0.1N·m with a screwdriver.



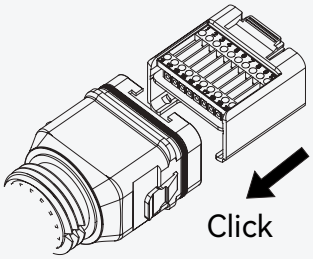
COM2



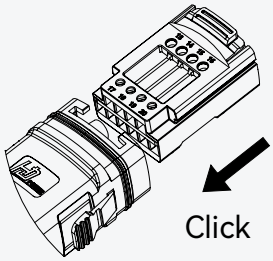

COM3

4) Pull the wires outward to check whether they are firmly installed.

Insert the terminal block into the connector until it snaps into place with an audible click.

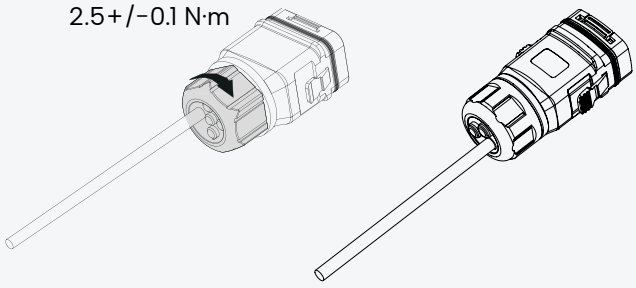



COM2




COM3

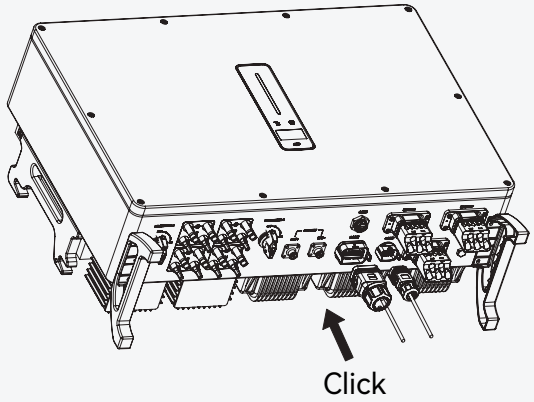
5) Fasten the swivel nut.




### 4.7.4 Installing the COM connector

1) Remove the waterproof lid from the COM terminal.

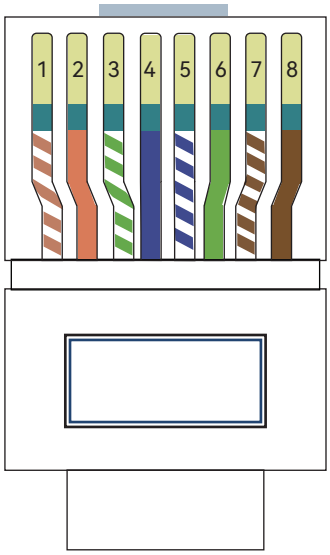
2) Insert the COM connector into the COM terminal on the bottom of the inverter until there is an audible click.




### 4.7.5 Meter and BMS communication

**Note:** Before purchasing the battery, you need to ensure the battery you selected is in the battery approval list of Wattsonic; otherwise, the system may not work correctly. If you are unsure, don't hesitate to contact your installer or Wattsonic service team for confirmation.

RJ45 terminal connection sequence and definition as below:




| No. | Color | Meter Side | Battery Side |
|---|---|---|---|
| 1 | Orange & White | / | RS485_A3 |
| 2 | Orange | / | RS485_B3 |
| 3 | Green & White | RS485_B2 | / |
| 4 | Blue | / | CANH_B |
| 5 | Blue & White | / | CANL_B |
| 6 | Green | RS485_A2 | / |
| 7 | Brown & White | RS485_B2 | / |
| 8 | Brown | RS485_A2 | / |

### 4.7.6 EMS communication

An EMS communication cable needs to be connected to control the operation of a hybrid inverter through the EMS, and communication between EMS and inverter is RS485.

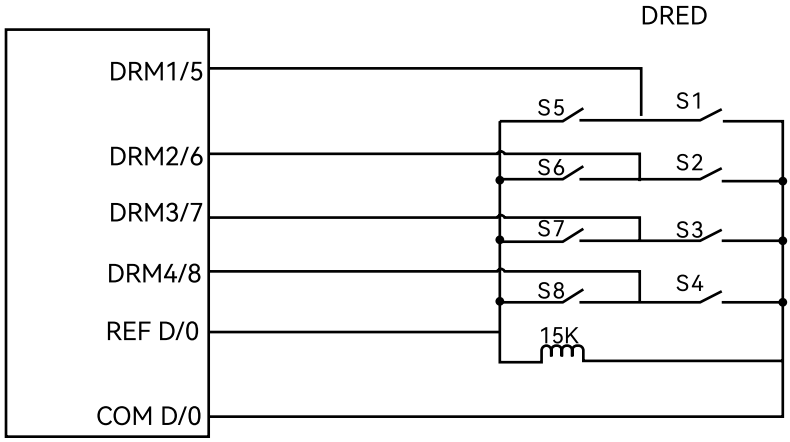
### 4.7.7 DRED

DRM and Ripple Control support only one function at the same time.

### DRM

DRED (Demand Response Enabling Device) interface is special reserved for Australia and New Zealand according to their safety regulation, and Wattsonic doesn't provide the DRED device for the customer. The inverter supports the demand response modes as specified in the standard AS/NZS 4777. The inverter has integrated a terminal block for connecting to a DRED.

DRED wiring diagram (hybrid inverter) as below:




DRED mode as shown in table below:

| Mode | Function |
|---|---|
| DRM 0 | Operate the disconnection device |
| DRM 1 | Do not consume power |
| DRM 2 | Do not consume at more than 50% of rated power |
| DRM 3 | Do not consume at more than 75% of rated power and source reactive power if capable |
| DRM 4 | Increase power consumption (subject to constraints from other active DRMs) |
| DRM 5 | Do not generate power |
| DRM 6 | Do not generate at more than 50% of rated power |
| DRM 7 | Do not generate at more than 75% of rated power and sink reactive power if capable. |
| DRM 8 | Increase power generation (subject to constraints from other active DRMs |
| Priority | DRM1 > DRM2 > DRM3 > DRM4<br>DRM5 > DRM6 > DRM7 > DRM8 |

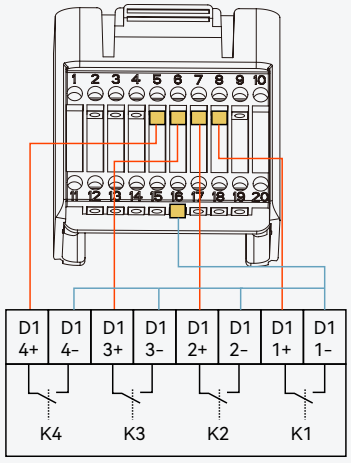
**Note**: There is a resistor between 15 (COM D/0) and 16(REF D/0), do not move the resistor while wiring.

## DRM

RCR (Ripple Control Receiver) interface is special reserved for Germany and some other European country according to their safety regulation, and Wattsonic doesn't provide the RCR device for the customer.

In Germany and some European areas, a ripple control receiver is used to convert a power grid dispatching signal to a dry contact signal. The dry contact is required for receiving the power grid dispatching signal.

RCR wiring diagram (hybrid inverter) as below:




Ripple Control Receiver

RCR operation mode as shown in table below:

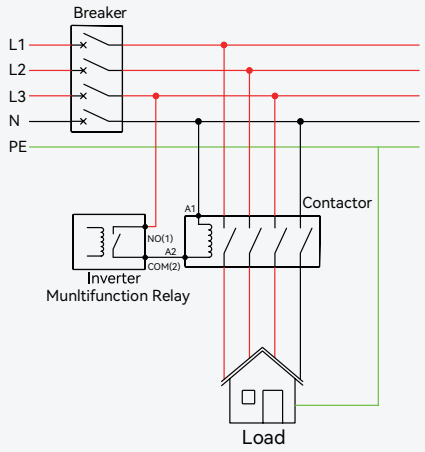
| Switch mode (External RCR device) | Feed-in output power (in % of the Rated AC output power) |
|---|---|
| K1 turn on | 100% |
| K2 turn on | 60% |
| K3 turn on | 30% |
| K4 turn on | 0% |
| RCR priority: K1<K2<K3<K4 | |

## 4.7.8 Multifunction relay

The inverter is equipped with a multifunction dry contact relay, which helps turn the loads on or off when an extra contactor is connected, or startup the diesel generator when the diesel generator startup signal is connected.

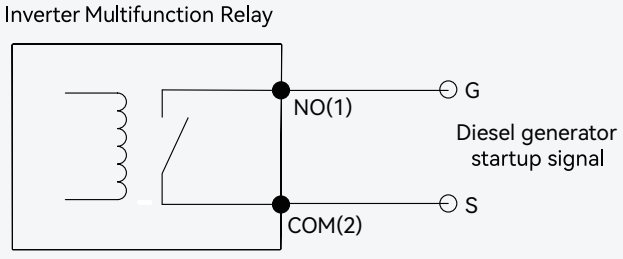
**Note**: Maximum voltage and current at DO dry contact port: 230VAC 1A/30VDC 1A.
**Note**: For more installation and setup information, please contact Wattsonic.

### Load control




### Generator control

When the "GEN signal" is active, the open contact (GS) will switch on (no voltage output).



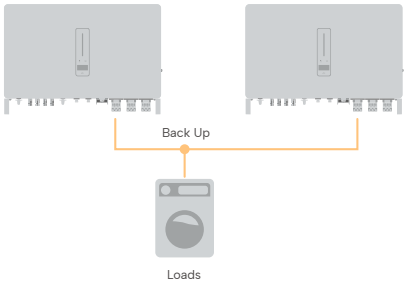

Generator control connection diagram

**Note**: The AC contactor should be placed between the inverter and the loads. Do not connect the load to the DO port directly.

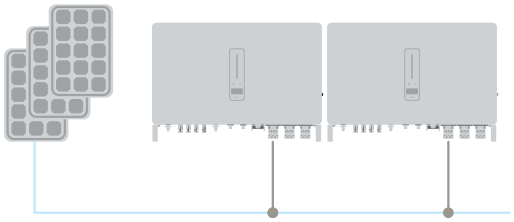
The Wattsonic does not supply the contractor. Connect the load to the DO port of the inverter directly if the load is designed with a DI port.

When the controlled load is connected to ONGRID, the contactor coil must also be connected to ONGRID. When the controlled load is connected to BACKUP, the contactor coil must also be connected to BACKUP.

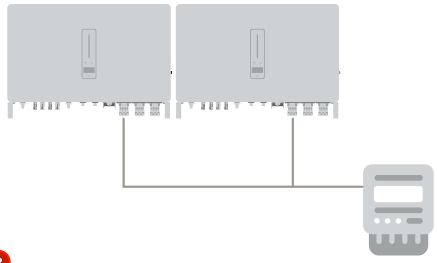
## 4.7.9 Parallel system



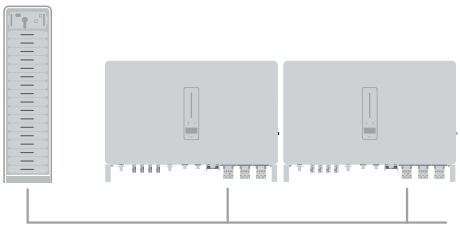

For the general version, the backup cannot connect in parallel. For advanced applications, please get in touch with our after-sales department.



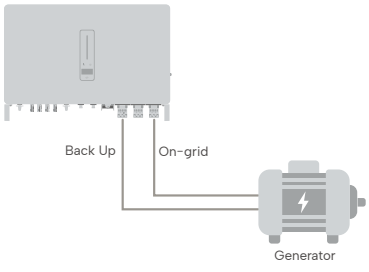
A single PV string cannot connect to multiple inverters.



One meter cannot be connected to multiple inverters. Different CTs cannot connect to the same line cable.

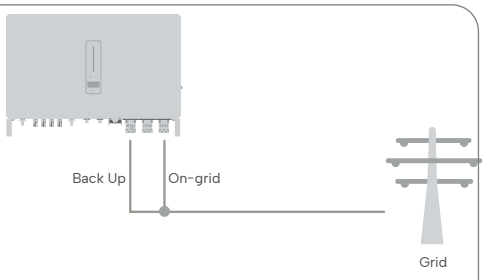


One battery bank cannot be connected to multiple inverters.




The on-grid and back-up side cannot be connected to and generator directly.

For advanced applications, please contact our after-sales department.




The back-up side cannot be connected on-grid side or grid.

**Note**: For more installation and setup information about parallel systems, please contact Wattsonic.

## 4.8 PV string connection

**Danger**: High voltage may be present in the inverter!

Ensure all cables are voltage-free before performing electrical operations.

Do not connect the DC switch and AC circuit breaker before finishing the electrical connection.

**Warning**: When the inverter is connected to the battery, the maximum MPPT voltage and operating voltage is 900V.

When the inverter is not connected to the battery, the maximum MPPT voltage and operating voltage is 950V.

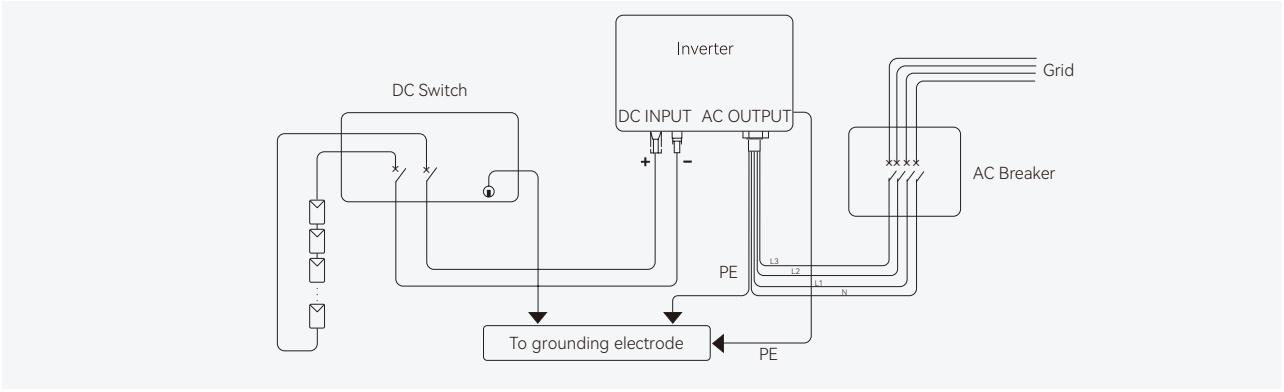
**Note**: For best practice, ensure PV modules of the same model and specifications are connected in each string.

### 4.8.1 PV side requirements

System layout of units with external DC switch

1) Local standards or codes may require PV systems that fit with an external DC switch on the DC side. The DC switch must safely disconnect the open-circuit voltage of the PV array, plus a safety reserve of 20%. Install a DC switch on each PV string to isolate the DC side of the inverter.

2) The DC switch has to be certified by AS 60947.3:2018 and AS/NZS IEC 60947.1:2020 in the Australian and New Zealand markets. The Max. current of the DC switch matching with the WTS-25-50K inverter is no less than 40A. We recommend the following electrical connection.



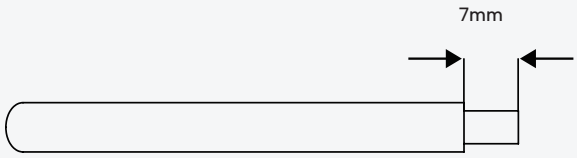

### Select the appropriate photovoltaic cable

| Cable requirements | | Cable stripping length |
|---|---|---|
| Outside diameter | Conductor core section | |
| 5.9-8.8 mm | 4 mm² | 7 mm |

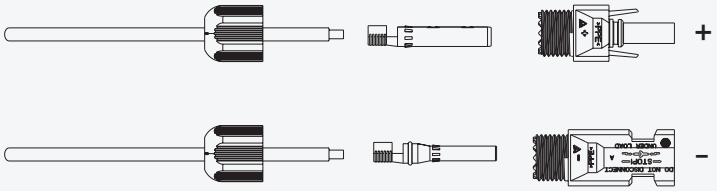
### 4.8.2 Assembling the PV connector

**Warning**: Before assembling the DC connector, ensure the cable polarity is correct.

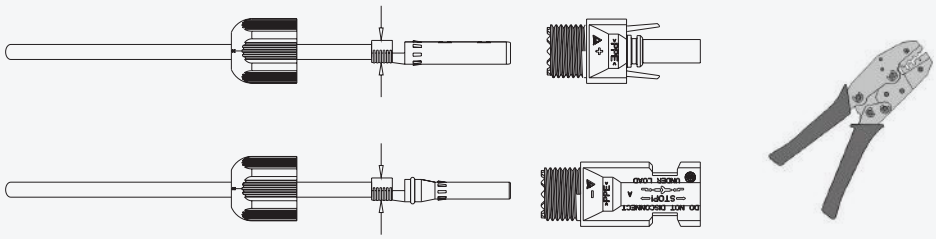
1) Peel off the DC cable insulation sleeve for 7 mm.




2) Disassemble the connector in the accessory bag.

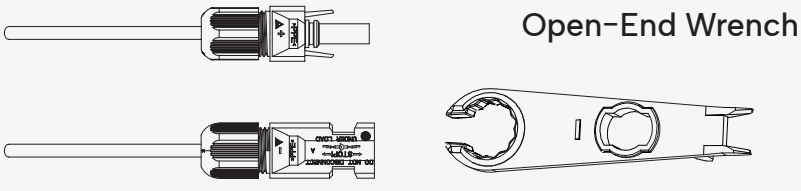



3) Insert the DC cable through the DC connector nut into the metal terminal and press the terminal with a professional crimping plier (pull back the cable with some power to check if the terminal is well connected to the cable).



4) Insert the positive and negative cables into the corresponding positive and negative connectors, and pull back the DC cable to ensure that the terminal is tightly attached to the connector.

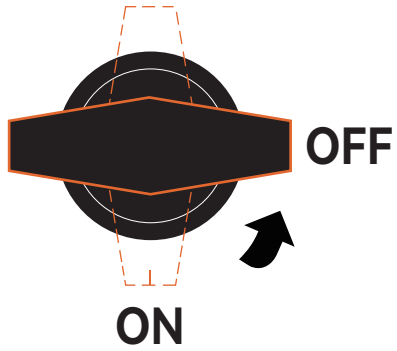
5) Use an open-end wrench to screw the nut to the end to ensure that the terminal is well sealed.



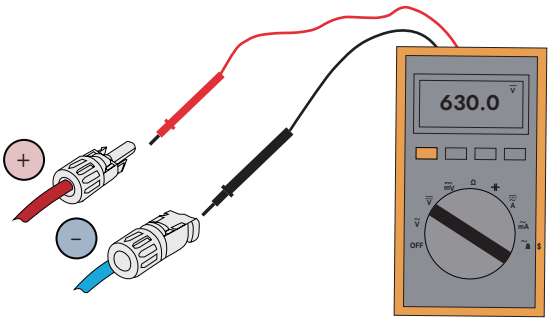
### 4.8.3 Installing the PV connector

**Warning**: Please make sure the DC isolator is always at the OFF position during cable connection to guarantee high voltage protection.

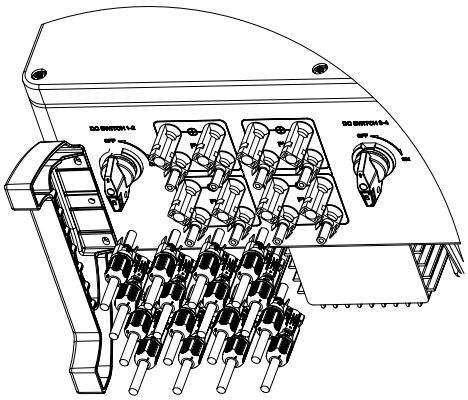
1) Rotate the DC switch to the "OFF" position.




2) Check the cable connection of the PV string for polarity correctness and ensure that the open circuit voltage, in any case, does not exceed the inverter input limit of 1,000V.




3) Insert the positive and negative connectors into the inverter DC input terminals respectively, a click sound should be heard if the terminals are well connected.



4) Seal the unused PV terminals with the terminal caps.

## 4.9 Power Cable of the Battery Connection connection

**Note**: Please contact your battery supplier for detailed battery installation information.

### The following principles must be considered when making battery connection:

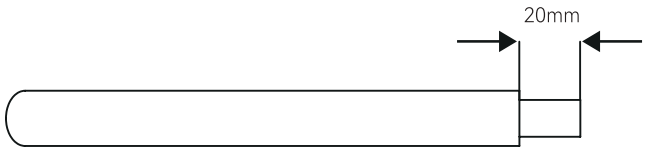
- Disconnect the AC breaker on the grid side.
- Disconnect the breaker on the battery side.
- Turn the inverter DC switch to the “OFF” position.
- Make sure the maximum input voltage of battery is within the inverter limitation.

### Select an appropriate DC cable

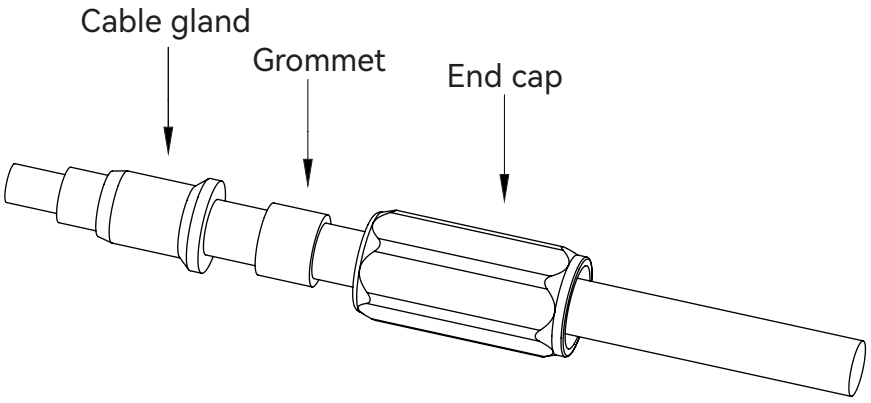
| Cable requirements | | Cable stripping length |
|---|---|---|
| Outside diameter | Conductor core section | |
| 9.8±0.2 mm | 25 mm² | 20 mm |

**Caution**: If the conductor core of the battery cable is too small, which may cause poor contact between the terminal and the cable, please use the cable specified in the above table, or contact Wattsonic to purchase terminals of other specifications.

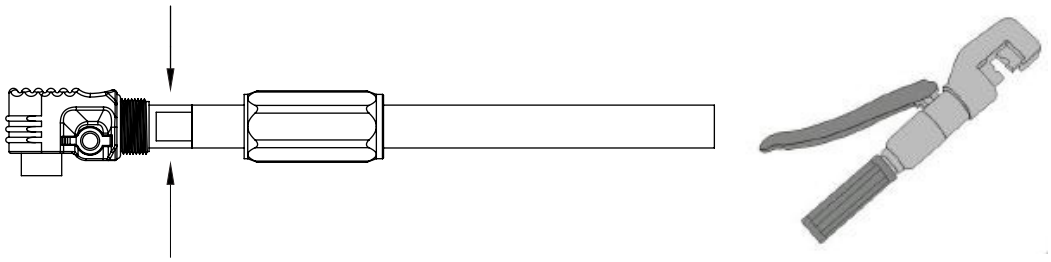
1) Peel off the battery cable insulation sleeve for 20 mm.



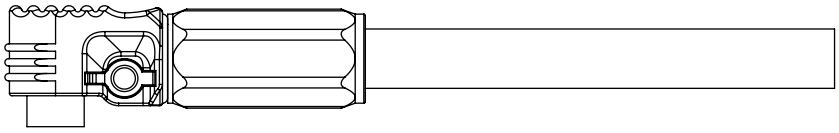

2) Disassemble the connector in the accessory bag, Thread the cable into end cap, grommet, and cable gland in turn.



3) Insert the battery cable into the metal terminal and press the terminal with a professional crimping plier (pull back the cable with some power to check if the terminal is well connected to the cable).



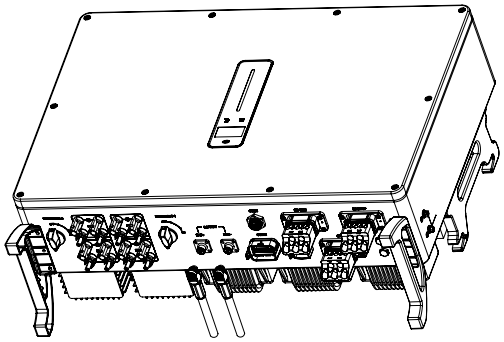
4) After the crimping is completed, push the cable gland, grommet and end cap at the plug end into place, and tighten the end cover with the thread of the plug unit.



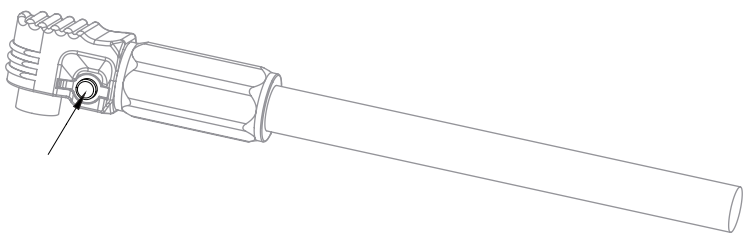
**Warning**: 1. Before making the battery connector, please make sure the polarity of the cable is correct.

2. Use a multimeter to measure the voltage of the battery pack and make sure the voltage is within the inverter limitation and the polarity is correct.

5) Insert the positive and negative connector into the inverter battery terminals respectively, and a “click” sound represents the assembly in place.



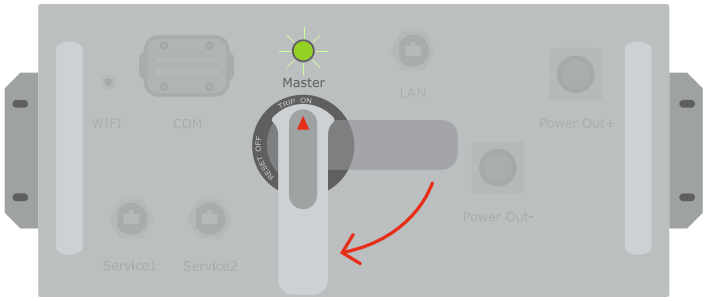
6) When pulling out the plug, you need to press the switch button first, and then pull the plug out.



# Commissioning and maintenance

## 5.1 System start and stop

### 5.1.1 Start up procedures




1. Rotate the switch handles of the Master & Sub-Master BMS to the "ON" position.

2. The system starts successfully when the indicator light shows a steady green light.

### 5.1.2 Shut down procedures

1. Stop the inverter.

When turning off the inverter, please follow the steps below:

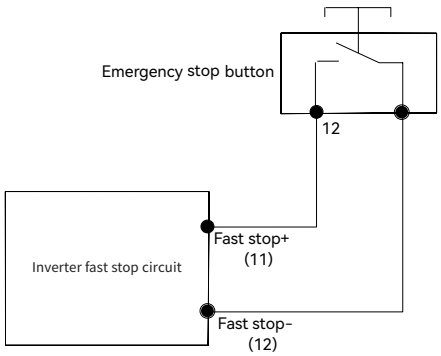
1) Shut down the inverter through the APP or the button on the display first.
2) Disconnect the breakers on the grid and load side.
3) Turn off the battery switch, and disconnect the DC breaker on the battery side (if any).
4) Wait 30 seconds and then turn the inverter DC switch to the “OFF” position. At this time, there is remaining power in the inverter capacitor. Wait for 10 minutes until the inverter is completely de-energized before operating.
5) Disconnect the AC and DC cables.

2. Rotate the switch handle of the Master BMS and Sub-Master BMS to the "OFF" position one by one in multi-rack cabinets.

**Warning:** Please don't try to switch off Master BMS during regular charge and discharge, which has high risk to damage BMS inside core components.

### 5.1.3 Emergency stop function

Wattsonic WTS 25-50K hybrid inverter comes standard with a fast stop function, and you can use this function by connecting an external switch to the Emergency stop interface if required in the installation place. The external controller is not in our accessory box.



## 5.2 Inverter commissioning

### 5.2.1 App preparation

1) Install the Local configuration App and Cloud monitoring App with latest version. Refer to "7.2 Cloud monitoring App and 7.3 Local configuration App".

2) Register an account on the Cloud monitoring App. If you have got the account and password from the distributor/ installer or Wattsonic, skip this step.

### 5.2.2 Inspection

Check the following items before starting the inverter:

1) All equipment has been reliably installed.

2) DC switch and AC circuit breaker are in the "OFF" position.

3) The ground cable is properly and reliably connected.

4) The AC cable is properly and reliably connected.

5) The DC cable is properly and reliably connected.

6) The communication cable is properly and reliably connected.

7) The vacant terminals are sealed.

8) No foreign items, such as tools, are left on the top of the machine or in the junction box (if there are).

9) The AC circuit breaker is selected under the requirements of this manual and local standards.

10) All warning signs & labels are intact and legible.

### 5.2.3 Commissioning precedures

Please start the inverter for the first time as follows if all items mentioned above meet the requirements.

1) Turn on the AC breaker.

2) Turn on the lithium battery switch. Power on the battery pack manually if a battery is equipped.

3) Turn on the DC switch, the DC switch may be integrated into the inverter or installed by the customer.

4) The inverter will work adequately after turning on the DC and AC breakers, depending on whether the weather and grid meet requirements. The time for entering the operating mode may vary according to the chosen safety code.

5) Observe the LED indicator to ensure that the inverter operates normally.

6) After the inverter is started, please refer to the [QUICK USE GUIDE] which is attached to the access to configure the inverter.

**Note:** If the inverter does not work properly, check the country code and battery ID Settings.

1) Select the safety code suitable for the country (region) where the inverter is installed.

2) Select the battery ID suitable for the battery that is installed.

**Note:** CT AUTO TEST FUNCTION

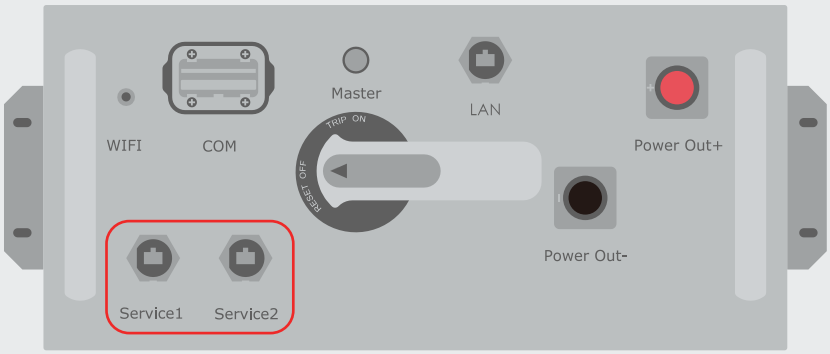
WTS hybrid inverter has the function of detecting the installation direction and phase sequence of CT. The system is installed, this function can be enabled on the APP for detection.

**Note:** SOC RESET FUNCTION

When the inverter is turned on for the first time, the battery will be automatically charged to calibrate the battery SOC. After the battery is charged, this function will be turned off automatically (If you confirm that it is not necessary, you can manually turn off the function. We recommend enabling this function.)

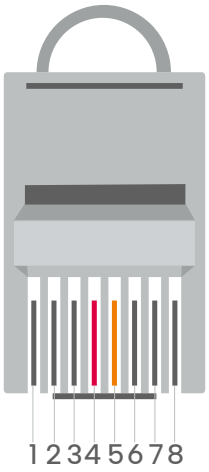
If you need to calibrate the SOC during system use, you can manually enable the function to calibrate the battery SOC on the app or inverter screen. After the battery is fully charged, the function is automatically disabled again.

## 5.3 BMS commissioning




There are two service COM reserved for BMS commissioning.

Please customize the COM cable(RJ45) according to the below RJ45 pin definition for the customized cables.




| Service 1 | |
|---|---|
| 4 | CAN2_H |
| 5 | CAN2_L |

| Service 2 | |
|---|---|
| 1 | 485_2B |
| 2 | 485_2A |
| 4 | CANO_H |
| 5 | CAN0_L |
| 6 | CAN1_L |
| 7 | CAN2_H |

## 5.4 Maintenance

**Danger:** Risk of product damage or personal injury due to incorrect service!

**Caution:** Verify that there is no voltage or current before pulling any connector.

**Caution:** Keep non-related persons away!

**Caution:** A temporary warning sign or barrier must be posted to keep non-related persons away while performing electrical connection and service work.

**Attention:** For any maintenance need, please contact us. Otherwise, Wattsonic shall not be held liable for any damage caused.

**Note:** Servicing of the device under the manual should never be undertaken in the absence of proper tools, test equipment, or the latest revision of the manual which has been clearly and thoroughly understood.

| Items | Methods | Period |
|---|---|---|
| System clean | Use a soft dry cloth to clean the product.<br>If the surface is dirty, use a soft cloth lightly moistened with water.<br>Do not clean the battery terminals when wet.<br>Do not use volatile liquid when cleaning the product.<br>When cleaning the cabinet room, shut down all systems before cleaning. | Six months to a year (it depends on the dust contents in the air). |

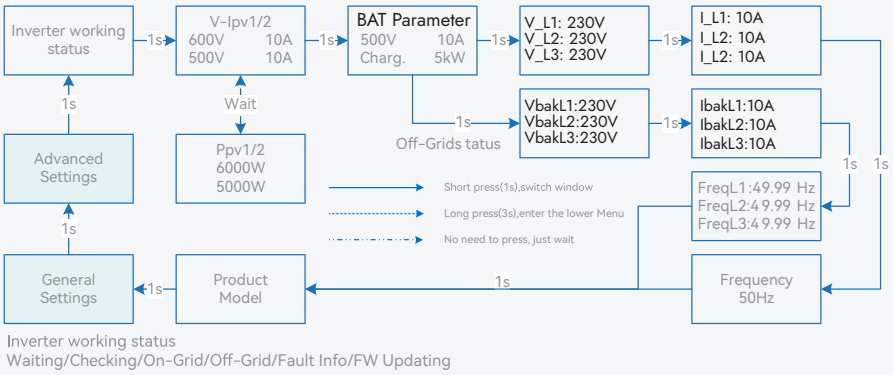
# Inverter operation

When the inverter is turned on, the following interfaces will be displayed on the OLED display and the OLED display allows the user to check various operation information and modify the settings of the inverter.

**Note:** If the parameter is a number short press to change the number, long press to confirm the number and jump to the next number.

Please wait for 10 seconds and the inverter will automatically save your settings or modifications.

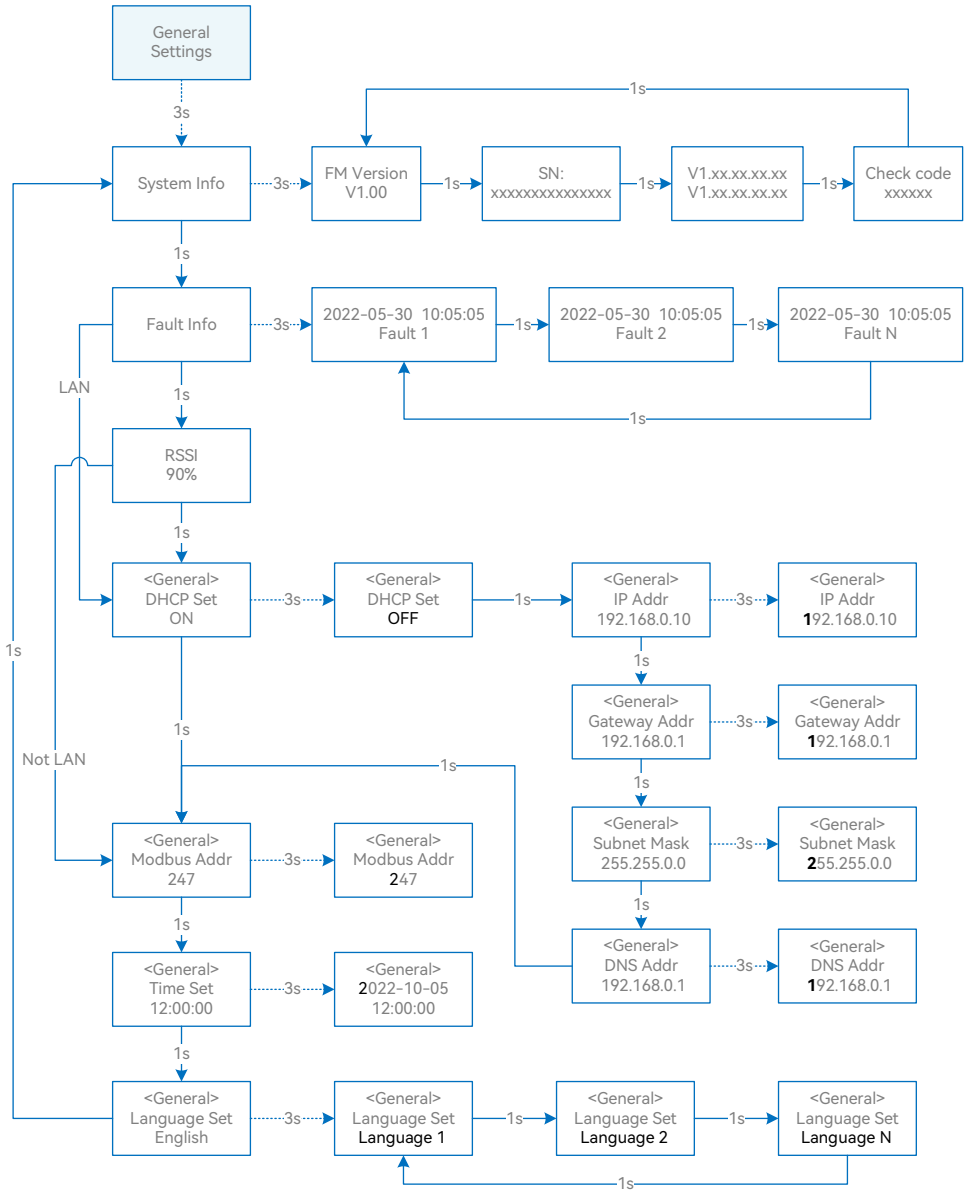
## 6.1 Main window




Inverter Display Abbreviation and Complete Name Reference Table

| Abbreviation | Complete Name |
|---|---|
| V-Ipv1/2 | PV input voltage and current of each MPPT |
| Ppv1/2 | PV input power of each MPPT |
| BAT Parameter | Battery Parameter |
| Charg. | Charge |
| Disch. | Discharge |
| V_L1: / V_L2: / V_L3: | Three-phase AC voltage (On-Grid status) |
| VbakL1: / VbakL2: / VbakL3: | Three-phase AC voltage (Off-Grid status) |
| I_L1: / I_L2: / I_L3: | Inverter output current (On-Grid status) |
| IbakL1: / IbakL2: / IbakL3: | Inverter output current (Off-Grid status) |
| FreqL1: / FreqL2: / FreqL3: | Inverter output Frequency (Off-Grid status) |
| FW Updating | Firmware Updating |

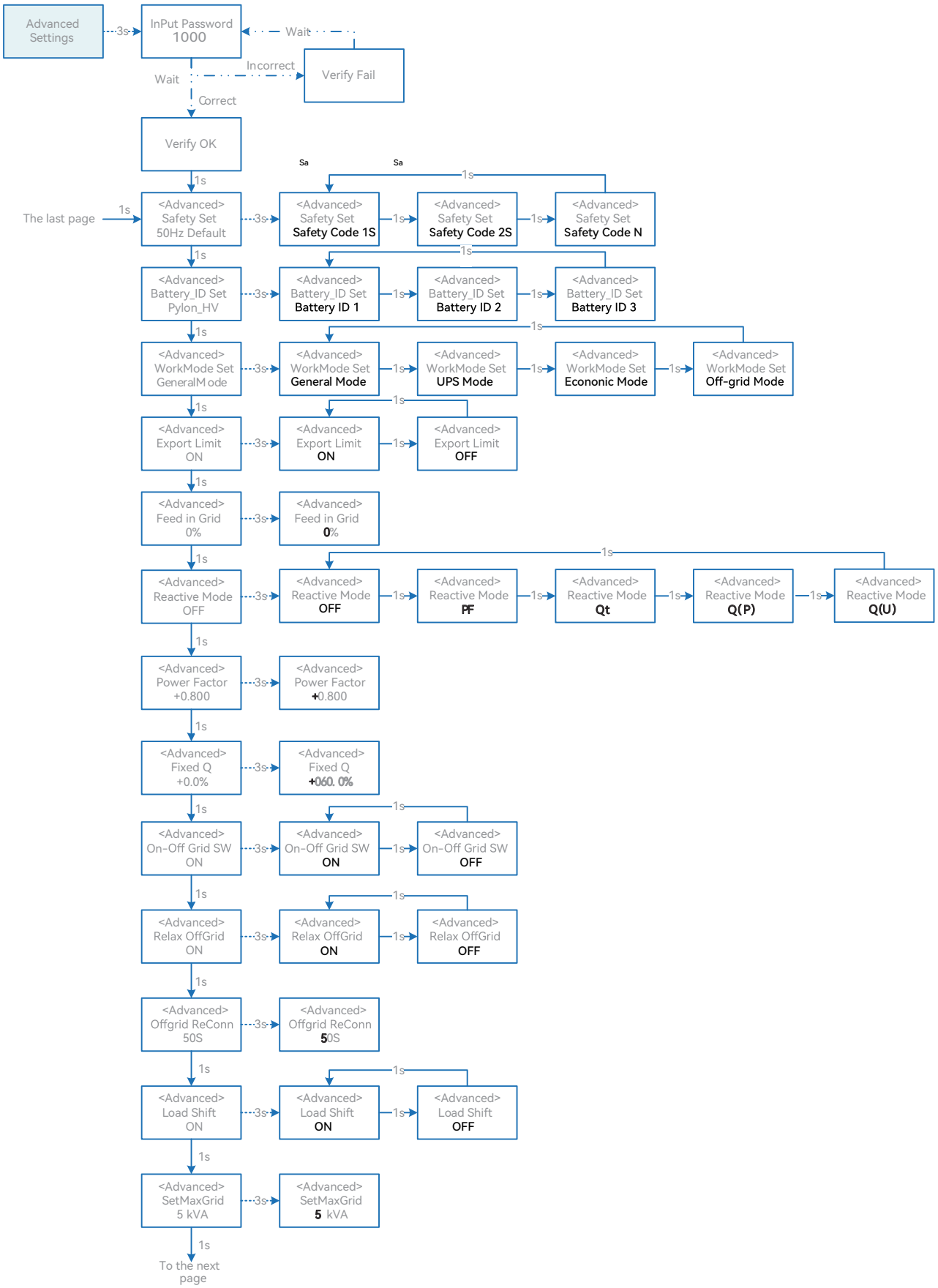
## 6.2 General Setting

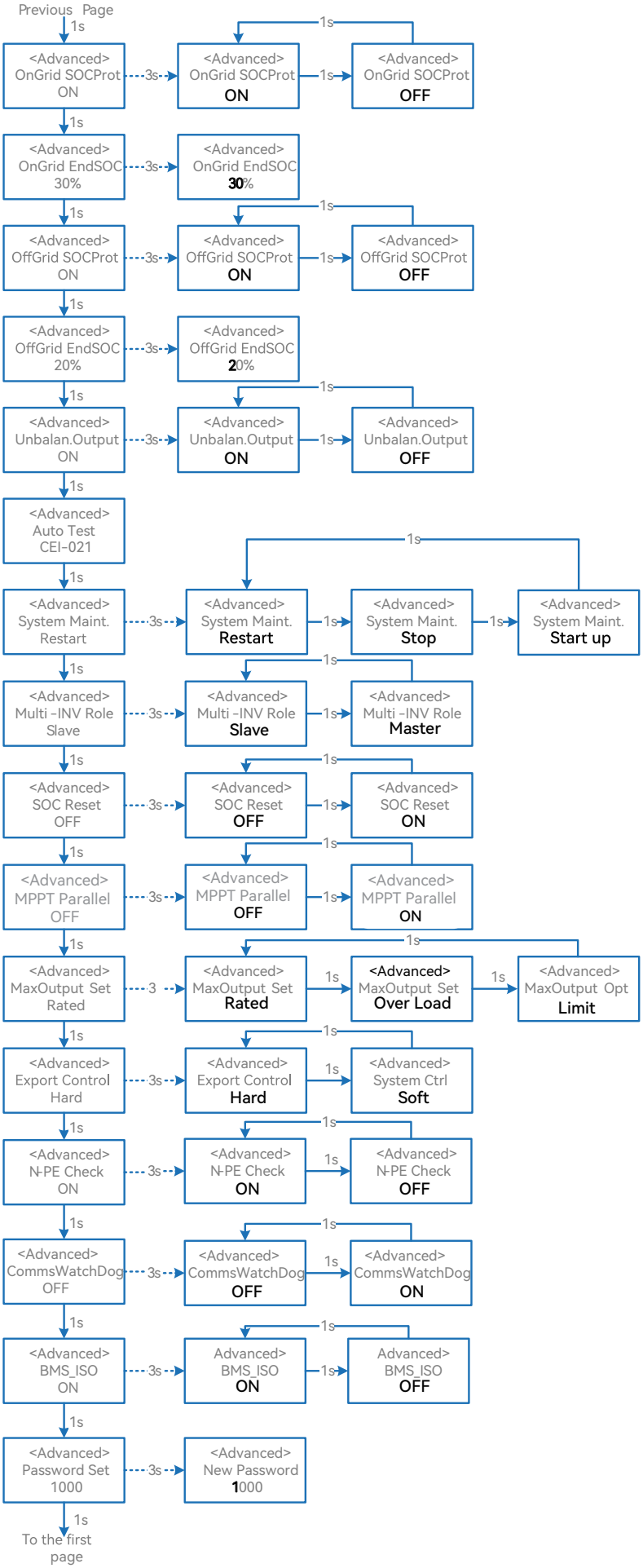



Inverter Display Abbreviation and Complete Name Reference Table

| Abbreviation | Complete Name |
|---|---|
| System Info | System information |
| FM Version | Firmware version |
| SN | Series number |
| Fault Info | Fault information |
| RSSI | Received signal strength indicator |
| DHCP Set | Enable or disable DHCP functionality |
| IP Addr | If DHCP is turned off, set the static IP address |
| Gateway Addr | If DHCP is turned off, set the Gateway IP address |
| Subnet Mask | If DHCP is turned off, set the subnet mask |
| DNS Addr | If DHCP is turned off, set the domain name server address |
| Modbus Addr | Modbus address |

# 6.3 Advanced Setting




Previous Page
1s
<Advanced> OnGrid SOCProt ON
3s
<Advanced> OnGrid SOCProt ON
1s
<Advanced> OnGrid SOCProt OFF
<Advanced> OnGrid EndSOC 30%
<Advanced> OnGrid EndSOC 30%
<Advanced> OffGrid SOCProt ON
<Advanced> OffGrid SOCProt ON
<Advanced> OffGrid SOCProt OFF
<Advanced> OffGrid EndSOC 20%
<Advanced> OffGrid EndSOC 20%
<Advanced> Unbalan.Output ON
<Advanced> Unbalan.Output ON
<Advanced> Unbalan.Output OFF
<Advanced> Auto Test CEI-021
<Advanced> System Maint. Restart
<Advanced> System Maint. Restart
<Advanced> System Maint. Stop
<Advanced> System Maint. Start up
<Advanced> Multi -INV Role Slave
<Advanced> Multi -INV Role Slave
<Advanced> Multi -INV Role Master
<Advanced> SOC Reset OFF
<Advanced> SOC Reset OFF
<Advanced> SOC Reset ON
<Advanced> MPPT Parallel OFF
<Advanced> MPPT Parallel OFF
<Advanced> MPPT Parallel ON
<Advanced> MaxOutput Set Rated
3
<Advanced> MaxOutput Set Rated
<Advanced> MaxOutput Set Over Load
<Advanced> MaxOutput Opt Limit
<Advanced> Export Control Hard
<Advanced> Export Control Hard
<Advanced> System Ctrl Soft
<Advanced> N-PE Check ON
<Advanced> N-PE Check ON
<Advanced> N-PE Check OFF
<Advanced> CommsWatchDog OFF
<Advanced> CommsWatchDog OFF
<Advanced> CommsWatchDog ON
<Advanced> BMS_ISO ON
Advanced> BMS_ISO ON
Advanced> BMS_ISO OFF
<Advanced> Password Set 1000
<Advanced> New Password 1000
To the first page

Inverter Display Abbreviation and Complete Name Reference Table

| Abbreviation | Complete Name |
|---|---|
| Safety Set | Select the code that meet local regulatory requirements |
| Battery_ID Set | Select the battery model |
| Work Mode | Current work mode / work mode setting |
| Export Limit | On-grid export limit function switch |
| Feed in Grid | Set the percentage of the power that is allowed to feed to the grid |
| Reactive Modes | Reactive Power Mode |
| PF | "Under ""Reactive Mode" "The reactive power can be regulated by the parameter PF (Power Factor)." |
| Qt | "Under ""Reactive Mode" "The reactive power can be regulated by the parameter Q-Var limits (in %)." |
| Q(P) | "Under ""Reactive Mode" "The PF changes with the output power of the inverter." |
| Q(U) | "Under ""Reactive Mode" "The reactive power changes with the grid voltage" |
| Fixed Q | The reactive power ratio when the "Reactive Mode" is Qt. |
| On-Off Grid SW | Off-grid function switch (If turn it on, the inverter will automatically switch to off-grid mode to ensure the back-up side power supply when the gird is abnormal or off, otherwise, there is no output on the back-up side) |
| Relax OffGrid | Reduce the switching sensitivity of the On/Off-grid (applied to the places where the grid is unstable or inverter always entered off-grid mode for some reasons) |
| Offgrid ReConn. | When the power grid is off, the inverter can automatically restart the back-up output after a fault or overloading protection occurred if the Off-grid restart is ON. Otherwise, the back-up output needs to be restarted manually |
| Load Shifting | Peakload shifting function switch |
| SetMaxGrid | Set max allowed power from grid (under the condition of Peakload Shifting is on) |
| OnGrid SocProt. | On-grid battery SOC (State of Charge) Protection |
| OnGrid EndSOC | End-of-discharge SOC of on-grid |
| OffGrid SocProt. | Off-grid SOC Protection |
| OffGrid EndSOC | End-of-discharge SOC of off-grid |
| Unbalan. Output | 3-Phase Unbalanced Output Switch when inverter work on On-grid state |
| System Maint. | System maintenance, includes inverter stop and run, system restart |
| Multi-INV Role | In the multi-inverter parallel system, set the role of one inverter as the master and the other inverter as the slave. |
| SOC Reset | If turned it on, the battery will be automatically charged to calibrate the battery SOC. After the battery is charged, this function will be turned off automatically . |
| MPPT Parallel | If MPPT is connected in parallel, enable this function. |

| Abbreviation | Complete Name |
| --- | --- |
| MaxOutputSet | Select the maximum AC output power.<br>Rated, Max. output power= Rated output power on the datasheet<br>Overload, Max. output power= Max. output power on the datasheet<br>Limit, Max. output power< Rated output power on the datasheet |
| Export Control | In the power export limit on mode, when the communication between the inverter and meter or the inverter and datalogger is interrupted, select the inverter operation mode from one of the follows:<br>Hard, inverter stops<br>Soft, inverter generates power as the “Feed in Grid” value set on the screen |
| N-PE Check | The N and PE shorting function on the BACK-UP side in the off-grid operation status. |
| CommsWatchDog | When the function is turned on, the inverter stops working when communication with the master is lost. |

## 6.4 Country Code (Safety Code) Setting

Please set "Country code (Safety code)" under the menu "Safety Set" in " Advanced Settings ".

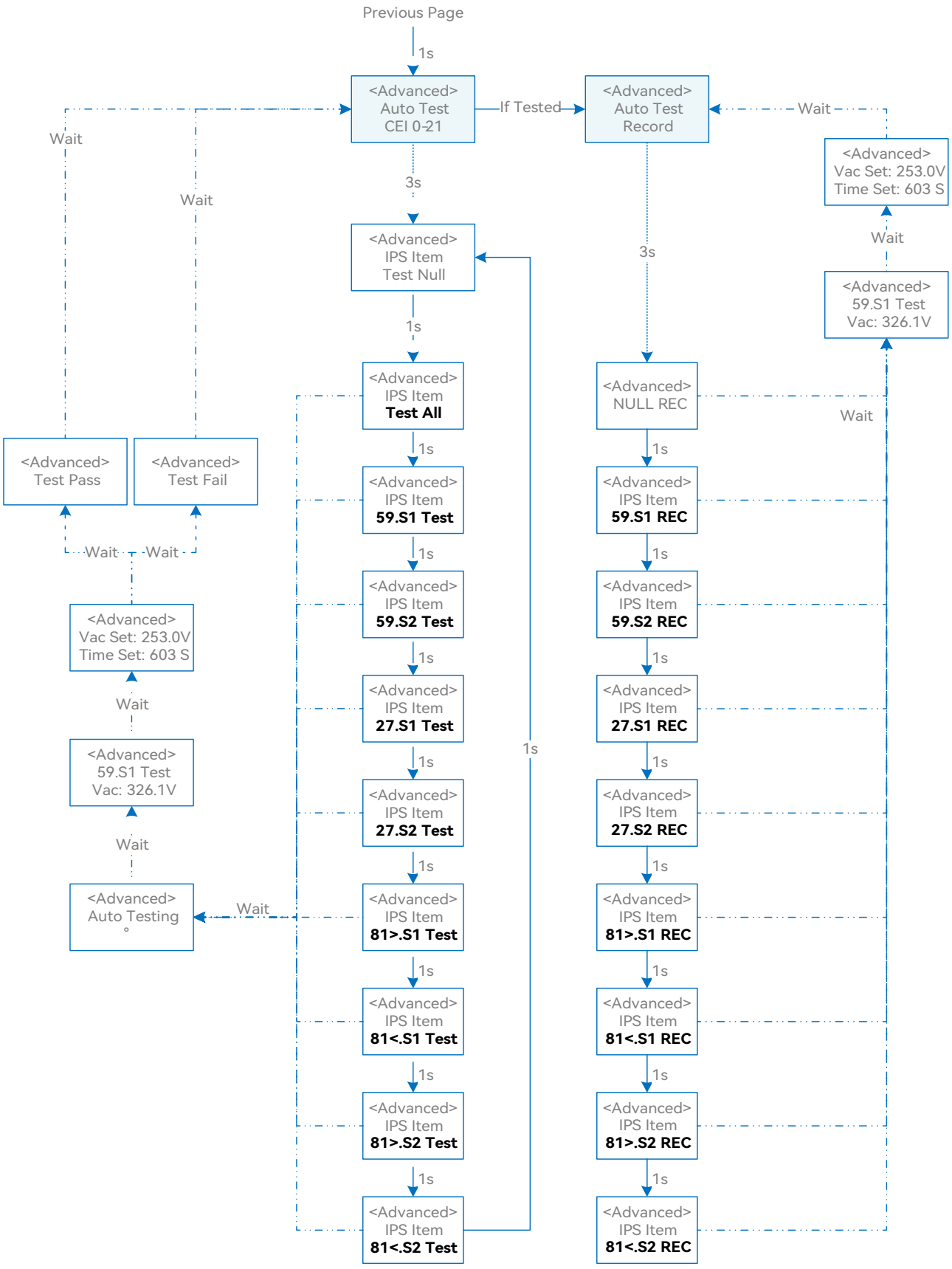
Refer to “7.3 Advanced Setting” for more information.

## 6.5 Auto-Test

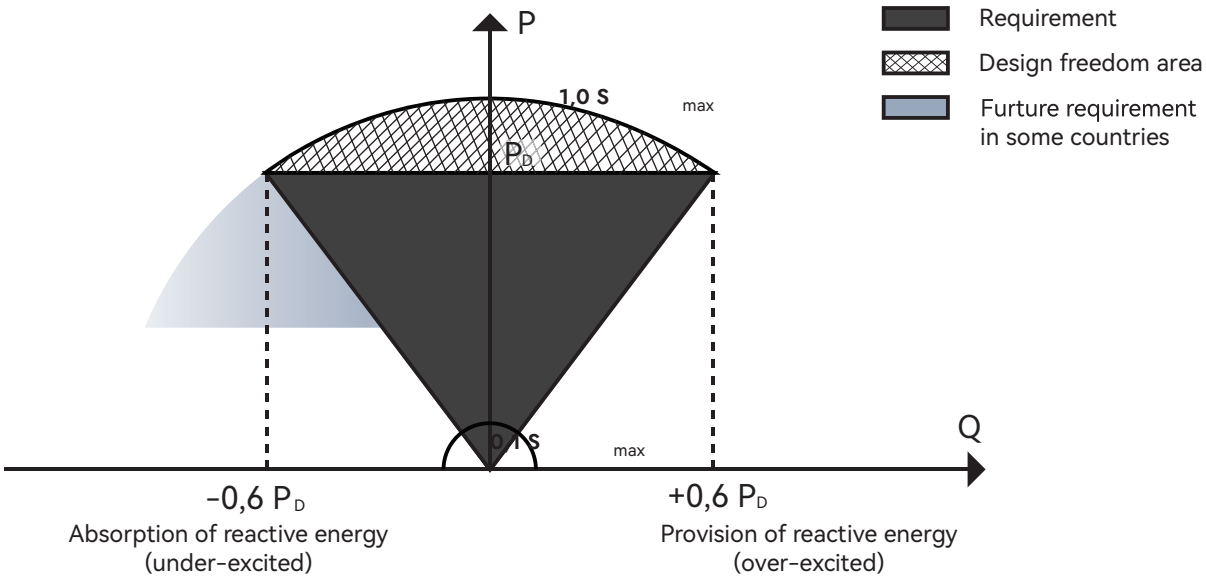
This function is disabled by default and will be only functional in the safety code of Italy. Short press the button several times until "Auto Test CEI 0-21" displays on the screen, press and hold the button for 3 seconds to activate “Auto Test". After the auto test is finished, short press the button several times until the screen displays "Auto Test Record", and hold the button for 3 seconds to check the test results.

The auto test will start when the correct test item is selected, and the test result will be displayed on the screen when it finished. If the test was successful, it will display "Test Pass", otherwise will display "Test Fail”. After each item is tested, the inverter will reconnect to the grid and automatically start the next test according to the requirements of CEI 0-21.

Connect the AC cable, auto test will start after the inverter connected to the grid, see the operation steps below:



## 6.6 Reactive Power




**Capabilities**

| Mode | Descriptions |
|---|---|
| Off | The PF is fixed at +1.000. |
| PF | The reactive power can be regulated by the parameter PF (Power Factor). |
| Qt | The reactive power can be regulated by the parameter fixed Q(in Pn%). |
| Q(P) | The PF changes with the output power of the inverter. |
| Q(U) | The reactive power changes with the grid voltage. |

### 6.6.1 "Off" Modes

The power factor is fixed and the reactive power setpoint is calculated according to the current power. The PF ranges from 0.8 leading to 0.8 lagging.

Leading: the inverter is sourcing reactive power to the grid.

Lagging: the inverter is injecting reactive power into the grid.

### 6.6.2 "PF" Mode

The reactive power regulation function is disabled. The PF is limited to +1.000.

### 6.6.3 "Qt" Mode

In the Qt mode, system rated reactive power is fixed, and the system injects reactive power according to the delivered reactive power ratio.

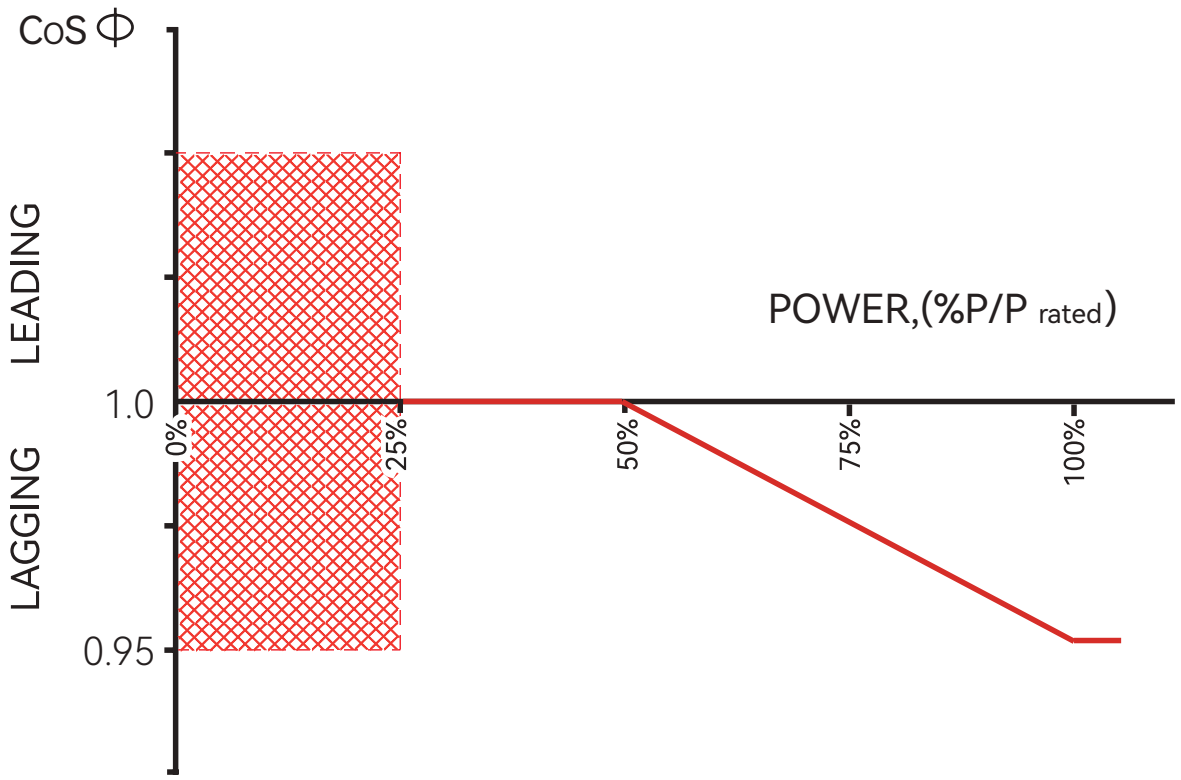
The setting range of the reactive power ratio is 0-60% or 0--60%, corresponding to the ranges of inductive and capacitive reactive power regulation respectively.

### 6.6.4 “Q(P)” Mode

The PF of the inverter output varies in response to the output power of the inverter.

“Q(P)” Mode Parameter Descriptions:

| Parameter | Explanation | Range |
|---|---|---|
| QP_P1 | Output power at P1 on the Q(P) mode curve (in percentage) | 10% ~ 100% |
| QP_P2 | Output power at P2 on the Q(P) mode curve (in percentage) | 20% ~ 100% |
| QP_P3 | Output power at P3 on the Q(P) mode curve (in percentage) | 20% ~ 100% |
| QP_K1 | Power factor at P1 on the Q(P) mode curve | |
| QP_K2 | Power factor at P2 on the Q(P) mode curve | 0.8 ~1 |
| QP_K3 | Power factor at P3 on the Q(P) mode curve | |
| QP_Enter-Voltage | Voltage percentage for Q(P) function activation | 100% ~ 110% |
| QP_Exit-Voltage | Voltage percentage for Q(P) function deactivation | 90% ~ 100% |
| QP_Exit-Power | Power percentage for Q(P) function deactivation | 1% ~ 20% |
| QP_Enable-Mode | Unconditional activation/deactivation of Q(P) function | Yes / No |

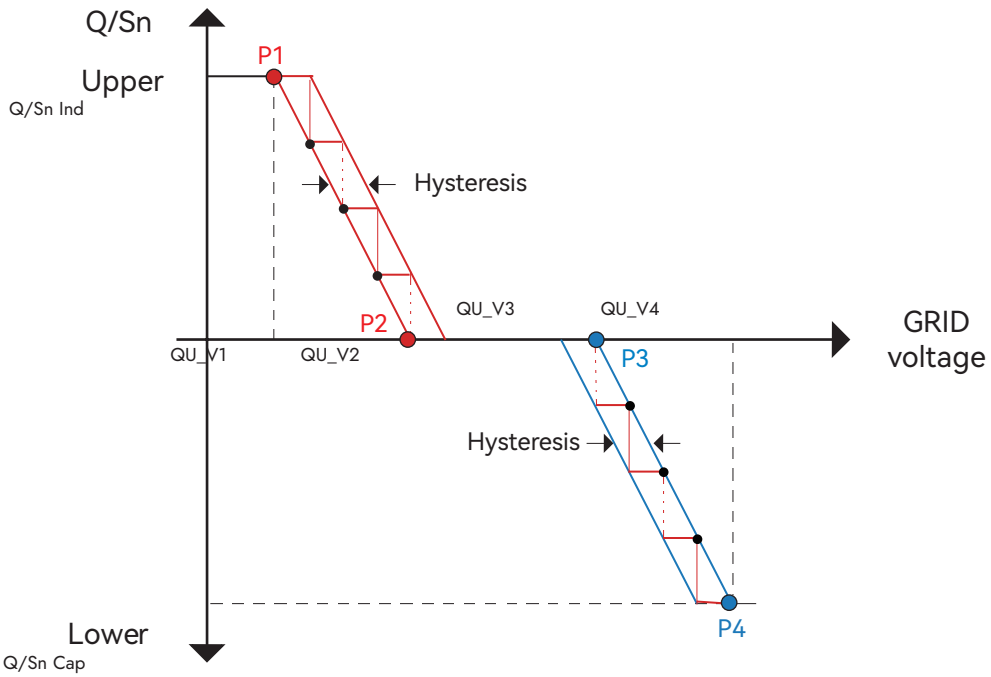



Q(P) Curve

### 6.6.5 “Q(U)” mode

The reactive power output of the inverter will vary in response to the grid voltage.
“Q (U)” Mode Parameter Descriptions:

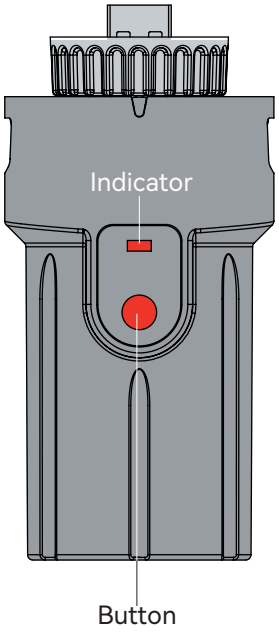
| Parameter | Explanation | Range |
|---|---|---|
| Hysteresis Ratio | Voltage hysteresis ratio on the Q(U) mode curve | 0 ~ 5% |
| QU_V1 | Grid voltage limit at P1 on the Q(U) mode curve | 80% ~ 100% |
| QU_Q1 | Value of Q/Sn at P1 on the Q (U) mode curve | -60% ~ 0 |
| QU_V2 | Grid voltage limit at P2 on the Q(U) mode curve | 80% ~ 110% |
| QU_Q2 | Value of Q/Sn at P2 on the Q (U) mode curve | -60% ~ 60% |
| QU_V3 | Grid voltage limit at P3 on the Q(U) mode curve | 100% ~120% |
| QU_Q3 | Value of Q/Sn at P3 on the Q (U) mode curve | -60% ~ 60% |
| QU_V4 | Grid voltage limit at P4 on the Q(U) mode curve | 100% ~120% |
| QU_Q4 | Value of Q/Sn at P4 on the Q(U) mode curve | 0 ~ 60% |
| QU_Enter-Power | Active power for Q(U) function activation | 20% ~ 100% |
| QU_Exit-Power | Active power for Q(U) function deactivation | 1% ~ 20% |
| QU_Enable-Mode | Unconditional activation/deactivation of Q(U) function | Yes/No/Yes, Limited by PF |




Q(U) Curve

# Monitoring

## 7.1 Monitoring device




| Indicator Status | Description |
|---|---|
| Off | Connection abnormal |
| Always On | Communicate with the server normally |
| Slow flashing | The monitoring device is not connected to the router or is not connected to the base station. |
| Quick flashing | The monitoring device is connected to the router or connected to the base station but not connected to the server. |

| Button | Description |
|---|---|
| Press 1 second | Reset device, the indicator goes off for 2 seconds, then flashes normally. |
| Press 5 second | Restore factory default settings, the indicator goes off for 2 seconds, then flashes once every 2 seconds, until the factory restore is completed. |

**Note:** The WiFi module must be configured to the router in the first installation. If the router name or password are changed, the WiFi devices will need to be reconfigured. For details, please refer to the [QUICK USE GUIDE] attached to the accessory bag.

If DHCP is enabled on the router, the LAN version module does not need to be configured. Otherwise, please refer to the [QUICK USE GUIDE] attached to the accessory bag.

## 7.2 Cloud monitoring app

Wattsonic inverter provides a monitoring port that can collect and transmit data from the inverter to the Wattsonic monitoring platform via an external monitoring device. Please refer to the product nameplate on the side of the enclosure to get the monitoring application. If download issues exist, contact your dealer or Wattsonic technical support.

## 7.3 Local configuration app

The local configuration App is designed to quickly configure Wattsonic hybrid inverters, offering features such as safety code, battery brand and type, work modes, and off-grid application settings through WiFi direct connection, etc.

Please refer to the product nameplate on the side of the enclosure to get the application. If download issues exist, contact your dealer or Wattsonic technical support.

# Troubleshooting

## 8.1 Error message

Wattsonic WTS-[25-50kW]-100A-3P series hybrid inverter is designed following grid operation standards and conforms to the requirements of safety and EMC. The inverter had passed rigorous tests to ensure it ran sustainably and reliably before shipment.

When a fault occurs, the corresponding error message will be shown on the OLED display, and in this case, the inverter might stop feeding into the grid. The fault messages and their corresponding troubleshooting methods are listed below:

| Error Message | Description | Solution |
|---|---|---|
| Mains Lost | Grid power outage, AC switch or circuit is disconnected. | 1. Check whether the mains supply is lost.<br>2. Check whether the AC breaker and terminal are well connected |
| Grid VoltageFault | Inverter detects that the gird voltage exceeds the limit of selected safety set range. | 1. Check whether the safety code is correct.<br>2. Check whether the AC cable wiring is correct.<br>3. Check whether the voltage increase is cause by a large AC cable impedance. In this case we could replace it with a thicker AC cable.<br>4. Extend the voltage protection limit with the permission of the electricity authority |
| Grid Fre quency Fault | Grid overvoltage or undervoltage, the grid voltage is higher or lower than the set protection value. | 1. Check whether the AC cable is correct and well connected.<br>2. Change to another country with a wider protection range if it's allowed by the local electricity company |
| DCI Fault | Inverter detects that the gird voltage exceeds the limit of selected safety set range. | 1. Restart the inverter.<br>2. Seek help from the installer or manufacturer. |
| ISO Over Limitation | Inverter detects that DC side's insulation impedance to the ground is too low. | 1. Check whether PV panels, cables, and connectors are waterlogged or damaged.<br>2. Use a megger to measure ground resistance on the DC side, and the measured value should not be less than 500 KΩ.<br>3. Seek help from the installer or manufacturer. |

| Error Message | Description | Solution |
| --- | --- | --- |
| GFCI Fault | The inverter detects that the ground leakage current exceeds the limitation. | 1. Restart the inverter.<br>2. Check whether the PV panels, cables, and connectors are waterlogged or damaged.<br>3. Seek help from the installer or manufacturer. |
| PV Over Voltage | PV input voltage exceeds the upper limit. | Reduce the number of PV panels to ensure that each string's open-circuit voltage is lower than the maximum allowed input voltage of the inverter. |
| Bus Voltage Fault | The voltage of bus circuit is too high | 1. Check whether the input voltage exceeds the limit.<br>2. Restart the inverter.<br>3. Seek help from the installer or manufacturer. |
| Inverter Over Temperature | The inverter detects its high internal temperature | 1.Check whether the inverter installation location is well ventilated.<br>2.Try to turn it off for a while, and then power it back on when it cools down.<br>3.Seek help from the installer or manufacturer. |
| N-PECheck Fault | The ground cable is losse or in poor connection | Check whether the ground cable wiring is correct.<br>1. Restart the inverter.<br>2. Seek help from the installer or manufacturer. |
| SPI Fault | Internal communication got failed. Caused by a strong external magnetic field etc. | 1. Restart the inverter.<br>2. Seek help from the installer or manufacturer. |
| E2 Fault | Internal storage got abnomal. Caused by a strong external magnetic field etc. | 1. Restart the inverter.<br>2. Seek help from the installer or manufacturer. |
| GFCI De vice Fault | GFCI device got abnormal | 1. Restart the inverter.<br>2. Seek help from the installer or manufacturer. |
| AC Transducer Fault | AC transducer got abnomal | 1. Use multimeter to measure the voltage between N&PE cable on AC side. If the voltage is higher than 10V, which means the neutral or ground connection is abnormal. |
| Relay Check Fail | Self-checking of internal relay got failed. Neutral & ground | 2. restart the inverter.<br>3. Seek help from the installer or manufacturer. |

| Error Message | Description | Solution |
| --- | --- | --- |
| | cable are in poor connection on AC side. | 1. Restart the inverter.<br>2. Seek help from the installer or manufacturer. |
| Internal Fan Fault | Inverter's internal fan got failed | Check whether the fan is blocked by foreign matters, clean them if necessary. |
| External Fan Fault | Inverter's external fan got failed | 1. Check working status of battery.<br>2. Check if battery is alarming. |
| Bat OV | Battery protection got triggered | Turn off inverter and remove the back-up connector. Use a multimeter to measure whether there is voltage existing on the back-up connector. |
| Backup OV | Abnormal voltage exists on the back-up side | Check whether the battery voltage or PV input voltage is normal.<br>1. Restart the inverter.<br>2. Seek help from the installer or manufacturer. |
| Bus Volt Low | Abnormal power schedduling | Check whether the load power on back-up side exceeds the maximum output power of inverter. |
| Hard Fault | Hardware protection got triggered | 1. Check whether there is an impact load on the back-up side and whether the load power is too high.<br>2. Check whether back-up side is short circuit. |
| Backup OP | Output power over limitation on back-up side | |
| Inverter OV | The load power exceeds the range of its limit of inverter in off-gird mode | 1. Check whether there is an impact load on the back-up side and whether the load power is too high.<br>2. Check whether back-up side is short circuit. |
| Inverter OF | The load power exceeds the range of its limit of inverter in off-gird mode | 1. Check whether there is an impact load on the back-up side and whether the load power is too high.<br>2. Check whether back-up side is short circuit. |
| | | 1. Restart the inverter.<br>2. Seek help from the installer or manufacturer. |

| Error Message | Description | Solution |
|---|---|---|
| Inverter OC | The load power exceeds the range of its limit of inverter in off-gird mode. | 1. Restart the inverter.<br>2. Seek help from the installer or manufacturer. |
| SCI Fault | Internal communication got failed. Caused by a strong external magnetic field etc. | 1. Check whether the communication connection between inverter and meter is reliable.<br>2. Comfirm whether the meter model is compatible. |
| FLASH Fault | Internal storage anomaly. Caused by a strong external magnetic field etc. | |
| Meter Comm Fault | Abnormal communication between meter and inverter. | 1. Check whether the battery ID selection is correct.<br>2. Check whether the communication connection between inverter and BMS is reliable.<br>3. Check the working status of battery. |
| B M S Comm Fault | Abnormal communication between inverter and battery BMS. | |

## 8.2 Inverter maintenance

**Danger:** Risk of inverter damage or personal injury due to incorrect service!

Remember that the inverter is powered by three sources: PV strings, battery, and utility grid.

Before any service work, observe the following procedure.

1) Shut off the inverter through the APP or the button on the display first.

2) Disconnect the breakers on the grid and load side.

3) Turn off the battery switch and disconnect the DC breaker on the battery side (if any).

4) Wait 30 seconds and turn the inverter DC switch to the “OFF” position. At this time, there is remaining power in the inverter capacitor. Wait for 10 minutes until the inverter is completely de-energized before operating.

5) Verify there is no voltage or current before pulling any connector.

**Caution:** Keep non-qualified persons away!

A temporary warning sign or barrier must be posted to keep non-qualified persons away while performing electrical connection and service work.

**Note:** Restart the inverter only after removing the fault that impairs safety performance.

Never arbitrarily replace any internal components.

For any maintenance support, please get in touch with Wattsonic. Otherwise, Wattsonic shall not be held liable for any damage caused.

**Note:** Servicing of the device in accordance with the manual should never be undertaken in the absence of proper tools, test equipment or the latest revision of the manual which has been clearly and thoroughly understood.

| Items | Methods | Period |
|---|---|---|
| System clean | Check the temperature and dust of the inverter.<br>Clean the inverter enclosure if necessary.<br>Check if the air inlet and outlet are normal. | Six months to a year (it depends on the dust contents in air.) |
| Electrical connection | Check whether there is damage to the cables, especially the surface in contact with metal. | 6 months after commissioning and then once or twice a year. |

## 8.3 Battery maintenance

Installation and maintenance of batteries should be performed or supervised by personnel knowledgeable about batteries and the required precautions.

Please get in touch with your battery supplier for detailed installation and maintenance information.

**Caution:**Do not dispose of batteries in a fire. The batteries may explode.

Do not open or damage batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic.

**Caution:** A battery can present a risk of electrical shock and high short-circuit current. The following precautions should be observed when working on batteries:
a) Remove watches, rings, or other metal objects.
b) Use tools with insulated handles.
c) Wear rubber gloves and boots.
d) Do not lay tools or metal parts on top of batteries.
e) Disconnect the charging source before connecting or disconnecting battery terminals.
f) Determine if the battery is inadvertently grounded. If inadvertently grounded, remove the source from the ground.
Contact with any part of a grounded battery can result in an electrical shock. The likelihood of such a shock can be reduced if such grounds are removed during installation and maintenance.

# Appendix

## 9.1 Technical Parameters

### Module specification

| Sub-Master BMS | |
|---|---|
| Operation Voltage | 150-900V/ 900-1500V (Need to confirm upon order) |
| Max. Charge/Discharge Current | 100A |
| Recommend Charge/Discharge Current | 100A |
| Functions | Pre-charge, Over-Less Voltage/ Over-Less Temperature Protection, Cells Balancing/ SOC-SOH calculation etc. |
| Communication Protocol/Connector Type | CAN/RS485 ModBus, TCP/ IP/ WiFi/ LAN/ GPRS |
| Power Connection Type | Phoenix |
| User Interface | LCD Display (Optional, need to be confirmed upon order) |
| Dimension [W×H×D] | 465×180×356mm |
| Weight | 11.8kg |
| Operating Temperature | -20-55℃ |
| Ingress Protection | IP21 |
| Installation Method | Rack Mounted |
| Warranty | 10 years |

| Battery Module | |
|---|---|
| Nominal Voltage/Capacity per Module | 38.4V/ 3.84KWH |
| Expand Capability | String: Max. 1000V [20*3.84kWh], Optional 1500V [34*3.84kWh] |
| DOD Recommended | 90% |
| Max. Charge/Discharge Current | 100A Continual |
| Recommend Charge/Discharge Current | 100A Continual |
| Communication Protocol/Connector Type | CAN |
| Power Connection Type | Integrated connector |
| Dimension [W×H×D] | 465×194×403.5mm per module |
| Weight | 40kg |
| Charge Temperature Range | 0-45℃ |
| Discharge Temperature Range | -20-55℃ |
| Ingress Protection | IP21 |
| Installation Method | Rack Mounted |
| Cables Connection Method | Connection at front |
| Warranty | 10 years or 8,000 cycles @90% DOD |

## Inverter specification

| Model | 25K-100-3P | 30K-100-3P |
|---|---|---|
| **PV Input** | | |
| Start-up voltage (V) | 135 | 135 |
| Max. DC input voltage (V) | 1000 | 1000 |
| Rated DC input voltage (V) | 620 | 620 |
| MPPT voltage range (V) | 200-850 | 200-850 |
| No. of MPP trackers | 4 | 4 |
| No. of DC inputs per MPPT | 2 | 2 |
| Max. input current (A) | 30*4 | 30*4 |
| Max. short-circuit current (A) | 40*4 | 40*4 |
| **Battery Side** | | |
| Battery type | Lithium Battery (with BMS) | |
| Battery communication mode | CAN | CAN |
| Battery voltage range (V) | 135-750 | 135-750 |
| Maximum charging current (A) | 100 | 100 |
| Maximum discharge current (A) | 100 | 100 |
| **Grid Side** | | |
| Rated output power (kW) | 25.0 | 30.0 |
| Max. output power (kW) | 27.5 | 33.0/30.0[1)] |
| Rated output apparent power (kVA) | 25.0 | 30.0 |
| Max. output apparent power (kVA) | 27.5 | 33.0/30.0[2)] |
| Max. input apparent power (kVA) | 30.0 | 36.0 |
| Max. charging power of battery (kW) | 25.0 | 30.0 |
| Rated AC voltage (V) | 3L/N/PE, 220/380V; 230/400V; 240/415V | |
| Rated AC frequency (Hz) | 50/60 | 50/60 |
| Rated output current (A) | 38.0 | 43.5 |
| Max. output current (A) | 42.0 | 50.0/43.5[3)] |
| Max. input current (A) | 43.5 | 52.2 |
| Power factor | 0.8 leading ...0.8 lagging | |
| Max. total harmonic distortion | <3% @Rated output power | |
| DCI | <0.5%In | |
| **Back-up Side** | | |
| Rated output power (kW) | 25.0 | 30.0 |
| Max. output power (kW) | 27.5 | 33.0 |
| Rated output apparent power (kVA) | 25.0 | 30.0 |
| Max. output apparent power (kVA) | 27.5 | 33.0 |
| Rated output current (A) | 38.0 | 43.5 |
| Max. output current (A) | 42.0 | 50.0 |
| UPS switching time | <20ms | <20ms |
| Rated output voltage (V) | 3/N/PE, 220/380V; 230/400V; 240/415V | |
| Rated output frequency (Hz) | 50/60 | 50/60 |
| Peak output apparent power (kVA) | 30, 60s | 36, 60s |
| Voltage harmonic distortion | <3% @Linear load | |

| Model | 25K-100A-3P | 30K-100A-3P |
|---|---|---|
| **Efficiency** | | |
| Max. efficiency | 98.8% | 98.8% |
| European efficiency | 98.3% | 98.3% |
| **Protection** | | |
| DC reverse polarity protection | Integrated | |
| Battery input reverse connection protection | Integrated | |
| Insulation resistance protection | Integrated | |
| Surge protection | Integrated | |
| Over-temperature protection | Integrated | |
| Residual current protection | Integrated | |
| Islanding protection | Integrated (Frequency shift) | |
| AC over-voltage protection | Integrated | |
| Overload protection | Integrated | |
| AC short-circuit protection | Integrated | |
| **General Data** | | |
| Over voltage category | PV: 2 ; Main: 3 | |
| Dimensions (mm) | 800*620*300 (W*H*D) | |
| Weight (KG) | 72 | |
| Protection degree | IP65 | |
| Standby self-consumption (W) | < 15 | |
| Topology | Transformerless | |
| Operating Temperature Range (°C) | - 30 ~ 60 | |
| Relative Humidity (%) | 0 ~ 100 | |
| Operating Altitude (m) | 3000 (> 3000m derating) | |
| Cooling | Smart fan | |
| Noise Level (dB) | < 50 | |
| Display | OLED & LED | |
| Communication | CAN, RS485, WiFi/LAN (Optional) | |

| Model | 36K-100-3P | 40K-100-3P |
|---|---|---|
| **PV Input** | | |
| Start-up voltage (V) | 135 | 135 |
| Max. DC input voltage (V) | 1000 | 1000 |
| Rated DC input voltage (V) | 620 | 620 |
| MPPT voltage range (V) | 200-850 | 200-850 |
| No. of MPP trackers | 4 | 4 |
| No. of DC inputs per MPPT | 2 | 2 |
| Max. input current (A) | 30*4 | 30*4 |
| Max. short-circuit current (A) | 40*4 | 40*4 |

| Model | 36K-100-3P | 40K-100-3P |
|---|---|---|
| **Battery Side** | | |
| Battery type | Lithium Battery (with BMS) | |
| Battery communication mode | CAN | CAN |
| Battery voltage range (V) | 135 - 750 | 135 - 750 |
| Maximum charging current (A) | 100 | 100 |
| Maximum discharge current (A) | 100 | 100 |
| **Grid Side** | | |
| Rated output power (kW) | 36.0 | 40.0 |
| Max. output power (kW) | 39.6 | 44.0 |
| Rated output apparent power (kVA) | 36.0 | 40.0 |
| Max. output apparent power (kVA) | 39.6 | 44.0 |
| Max. input apparent power (kVA) | 43.5 | 48.0 |
| Max. charging power of battery (kW) | 36.0 | 40.0 |
| Rated AC voltage (V) | 3L/N/PE, 220/380V; 230/400V; 240/415V | |
| Rated AC frequency (Hz) | 50/60 | 50/60 |
| Rated output current (A) | 52.0 | 60.0 |
| Max. output current (A) | 60.0 | 66.0 |
| Max. input current (A) | 63.0 | 69.6 |
| Power factor | 0.8 leading ...0.8 lagging | |
| Max. total harmonic distortion | <3% @Rated output power | |
| DCI | <0.5%In | |
| **Back-up Side** | | |
| Rated output power (kW) | 36.0 | 40.0 |
| Max. output power (kW) | 39.6 | 44.0 |
| Rated output apparent power (kVA) | 36.0 | 40.0 |
| Max. output apparent power (kVA) | 39.6 | 44.0 |
| Rated output current (A) | 52.0 | 60.0 |
| Max. output current (A) | 60.0 | 66.0 |
| UPS switching time | <20ms | <20ms |
| Rated output voltage (V) | 3/N/PE, 220/380V; 230/400V; 240/415V | |
| Rated output frequency (Hz) | 50/60 | 50/60 |
| Peak output apparent power (kVA) | 43.5, 60s | 48, 60s |
| Voltage harmonic distortion | <3% @Linear load | |
| **Efficiency** | | |
| Max. efficiency | 98.8% | 98.8% |
| European efficiency | 98.3% | 98.3% |
| **Protection** | | |
| DC reverse polarity protection | Integrated | |
| Battery input reverse connection protection | Integrated | |
| Insulation resistance protection | Integrated | |
| Surge protection | Integrated | |
| Over-temperature protection | Integrated | |
| Residual current protection | Integrated | |
| Islanding protection | Integrated (Frequency shift) | |
| AC over-voltage protection | Integrated | |
| Overload protection | Integrated | |
| AC short-circuit protection | Integrated | |

| Model | 36K-100-3P | 40K-100-3P |
|---|---|---|
| **General Data** | | |
| Over voltage category | PV: 2 ; Main: 3 | |
| Dimensions (mm) | 800*620*300 (W*H*D) | |
| Weight (KG) | 72 | |
| Protection degree | IP65 | |
| Standby self-consumption (W) | < 15 | |
| Topology | Transformerless | |
| Operating Temperature Range (°C) | - 30 ~ 60 | |
| Relative Humidity (%) | 0 ~ 100 | |
| Operating Altitude (m) | 3000 (> 3000m derating) | |
| Cooling | Smart fan | |
| Noise Level (dB) | < 50 | |
| Display | OLED & LED | |
| Communication | CAN, RS485, WiFi/ LAN (Optional) | |

| Model | 50K-100-3P | 40K-100-3P-P | 50K-100-3P-P |
|---|---|---|---|
| **PV Input** | | | |
| Start-up voltage (V) | 135 | 135 | 135 |
| Max. DC input voltage (V)* | 1000 | 1000 | 1000 |
| Rated DC input voltage (V) | 620 | 620 | 620 |
| MPPT voltage range (V)* | 200-850 | 200-850 | 200-850 |
| No. of MPP trackers | 4 | 2 | 2 |
| No. of DC inputs per MPPT | 2 | 3 | 3 |
| Max. input current (A) | 30*4 | 60*2 | 60*2 |
| Max. short-circuit current (A) | 40*4 | 80*2 | 80*2 |
| **Battery Side** | | | |
| Battery type | Lithium Battery (with BMS) | | |
| Battery communication mode | CAN | CAN | CAN |
| Battery voltage range (V) | 135-750 | 135-750 | 135-750 |
| Maximum charging current (A) | 100 | 100 | 100 |
| Maximum discharge current (A) | 100 | 100 | 100 |
| **Grid Side** | | | |
| Rated output power (kW) | 50.0 | 40.0 | 50.0 |
| Max. output power (kW) | 55.0 | 44.0 | 55.0 |
| Rated output apparent power (kVA) | 50.0 | 40.0 | 50.0 |
| Max. output apparent power (kVA) | 55.0 | 44.0 | 55.0 |
| Max. input apparent power (kVA) | 60.0 | 48.0 | 60.0 |
| Max. charging power of battery (kW) | 50.0 | 40.0 | 50.0 |
| Rated AC voltage (V) | 3L/N/PE, 220/380V; 230/400V; 240/415V | | |
| Rated AC frequency (Hz) | 50/60 | 50/60 | 50/60 |
| Rated output current (A) | 75.0 | 60.0 | 75.0 |
| Max. output current (A) | 83.5 | 66.0 | 83.5 |
| Max. input current (A) | 87.0 | 69.6 | 87.0 |
| Power factor | 0.8 leading ...0.8 lagging | | |
| Max. total harmonic distortion | < 3% @Rated output power | | |
| DC | < 0.5%In | | |

| Model | 50K-100-3P | 40K-100-3P-P | 50K-100-3P-P |
|---|---|---|---|
| **Back-up Side** | | | |
| Rated output power (kW) | 50.0 | 40.0 | 50.0 |
| Max. output power (kW) | 55.0 | 44.0 | 55.0 |
| Rated output apparent power (kVA) | 50.0 | 40.0 | 50.0 |
| Max. output apparent power (kVA) | 55.0 | 44.0 | 55.0 |
| Rated output current (A) | 75.0 | 60.0 | 75.0 |
| Max. output current (A) | 83.0 | 66.0 | 83.0 |
| UPS switching time | <20ms | <20ms | <20ms |
| Rated output voltage (V) | 3/N/PE, 220/380V; 230/400V; 240/415V | | |
| Rated output frequency (Hz) | 50/60 | 50/60 | 50/60 |
| Peak output apparent power (kVA) | 60, 60s | 48, 60s | 60, 60s |
| Voltage harmonic distortion | <3% @Linear load | | |
| **Efficiency** | | | |
| Max. efficiency | 98.8% | 98.8% | 98.8% |
| European efficiency | 98.3% | 98.3% | 98.3% |
| **Protection** | | | |
| DC reverse polarity protection | Integrated | | |
| Battery input reverse connection protection | Integrated | | |
| Insulation resistance protection | Integrated | | |
| Surge protection | Integrated | | |
| Over-temperature protection | Integrated | | |
| Residual current protection | Integrated | | |
| Islanding protection | Integrated (Frequency shift) | | |
| AC over-voltage protection | Integrated | | |
| Overload protection | Integrated | | |
| AC short-circuit protection | Integrated | | |
| **General Data** | | | |
| Over voltage category | PV: 2 ; Main: 3 | | |
| Dimensions (mm) | 800*620*300 (W*H*D) | | |
| Weight (KG) | 72 | | |
| Protection degree | IP65 | | |
| Standby self-consumption (W) | < 15 | | |
| Topology | Transformerless | | |
| Operating Temperature Range (°C) | - 30 ~ 60 | | |
| Relative Humidity (%) | 0 ~ 100 | | |
| Operating Altitude (m) | 3000 (> 3000m derating) | | |
| Cooling | Smart fan | | |
| Noise Level (dB) | < 50 | | |
| Display | OLED & LED | | |
| Communication | CAN, RS485, WiFi/LAN (Optional) | | |

1) AS 4777.2&VDE-AR-N 4105: 15.0kW

2) AS 4777.2&VDE-AR-N 4105: 15.0kVA

3) AS 4777.2&VDE-AR-N 4105: 43.5A

Max. operating DC voltage is 850V, max. withstanding DC voltage is 1000 V

1) AS 4777.2, VDE-AR-N 4105: 30.0kW 2) AS 4777.2, VDE-AR-N 4105: 30.0kVA 3) AS 4777.2, VDE-AR-N 4105: 43.5A

* Max apparent power from the grid means the maximum power imported from the utility grid used to satisfy the backup loads and charge the battery.

## 9.2 Contact Information

If you have any questions about this product, please contact us.

We need the following information to provide you the best assistance:

- Model of the device
- Serial number of the device
- Date of the device
- Fault code/name
- Brief description of the problem

China (HQ)

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