

# User Manual

Wattsonic 4.0~20.0KW-3P Series

4/5/6/8/10/12K-25A-3P

10/12/15/20K-25A-3P



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# 1 About this Manual



## 1.1 Overview

To secure the full 10-years battery product warranty, be sure to install the Wattsonic 4.0-20.0kW-3P Series by qualified installers.

**Warning:** Read this entire document before installing or using Wattsonic 4.0-20.0kW-3P Series. Failure to do so or to follow any of the instructions or warnings in this document can result in electrical shock, serious injury, or death, or can damage Wattsonic LFP ESS, potentially rendering it inoperable.

### PRODUCT SPECIFICATIONS

All specifications and descriptions contained in this document are verified to be accurate at the time of printing. However, because continuous improvement is a goal at Wattsonic, we reserve the right to make product modifications at any time.

The images provided in this document are for demonstration purposes only. Depending on product version and market region, details may appear slightly different.

### ERRORS OR OMISSIONS

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

### ELECTRONIC DEVICE: DO NOT THROW AWAY

Proper disposal of batteries is required. Refer to your local codes for disposal requirements.



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## 1.2 Important Safety Instruction

SAVE THESE IMPORTANT SAFETY INSTRUCTIONS. Wattsonic 4.0-20.0kW-3P Series 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 properly follow these instructions. These warnings and cautions must be followed when using Wattsonic 4.0-20.0kW-3P Series.

-  Warning: Read this entire document before installing or using Wattsonic 4.0-20.0kW-3P Series. Failure to do so or to follow any of the instructions or warnings in this document can result in electrical shock, serious injury, or death, or can damage Wattsonic LFP Battery, potentially rendering it inoperable.
-  Warning: A battery can present a risk of electrical shock, fire, or explosion from vented gases. Observe proper precautions.
-  Warning: Wattsonic 4.0-20kW-3P Series systems installation must be carried out only by Wattsonic Certified Installers, who have been trained in dealing with high voltage electricity.
-  Warning: Wattsonic is heavy and challenging to lift.
-  Warning: Use Wattsonic LFP Battery only as directed.
-  Warning: Do not use Wattsonic LFP Battery if it is defective, appears cracked, broken, or otherwise damaged, or fails to operate.
-  Warning: Before beginning the wiring portion of the installation, first power off the inverter and then open the AC and DC disconnect switches (if applicable for the installation).
-  Warning: Do not attempt to open, disassemble, repair, tamper with, or modify Wattsonic LFP Battery. Wattsonic LFP Battery is not user serviceable. LFP Cells in Wattsonic Battery are not replaceable. Contact the Wattsonic Authorized Reseller who sold the Wattsonic LFP Battery for any repairs.
-  Warning: Do not connect Wattsonic LFP Battery to alternating current carrying conductors. Wattsonic storage systems including battery and inverter must be wired to either an inverter or a DC combiner panel that is then wired to an inverter. No other wiring configuration may be used.
-  Warning: Wattsonic LFP Battery contains components, such as switches and relays, that can produce arcs or sparks.
-  Warning: To protect Wattsonic LFP Battery and its components from damage when transporting, handle with care. Do not impact, pull, drag, or step on Wattsonic LFP Battery. Do not subject Wattsonic LFP Battery to any strong force. To help prevent damage, leave Wattsonic LFP Battery in its shipping packaging until it is ready to be installed.

-  Warning: Do not insert foreign objects into any part of Wattsonic LFP Battery.
-  Warning: Do not expose Wattsonic LFP Battery or its components to direct flame.
-  Warning: Do not install Wattsonic LFP Battery near heating equipment.
-  Warning: Do not immerse Wattsonic LFP Battery or its components in water or other fluids.

-  Caution: Do not use cleaning solvents to clean Wattsonic LFP Battery, or expose Wattsonic LFP Battery to flammable or harsh chemicals or vapors.
-  Caution: Do not use fluids, parts, or accessories other than those specified in this manual, including use of non-genuine Wattsonic parts or accessories, or parts or accessories not purchased directly from Wattsonic or a Wattsonic-certified party.
-  Caution: Do not place Wattsonic LFP Battery in a storage condition for more than one (1) month, or permit the electrical feed on the Wattsonic LFP Battery to be severed for more than one (1) month, without placing Wattsonic LFP Battery into a storage condition in accordance with Wattsonic's storage specifications.
-  Caution: Do not paint any part of Wattsonic LFP Battery, including any internal or external components such as the exterior shell or casing.
-  Caution: Do not connect Wattsonic LFP Battery directly to photovoltaic (PV) solar wiring.
-  Caution: When installing Wattsonic LFP Battery in a garage or near vehicles, keep it out of the driving path. If possible, install the Wattsonic LFP Battery on a side wall and/or above the height of vehicle bumpers.

## ENVIRONMENTAL CONDITIONS



Warning: Install Wattsonic LFP Battery at a height that prevents damage from flooding.



Warning: Operating or storing Wattsonic LFP Battery in temperatures outside its specified range might cause damage to Wattsonic LFP Battery.



Warning: Do not expose the Wattsonic LFP Battery to ambient temperatures above 60°C (140°F) or below -30°C (-22°F).



Caution: Ensure that no water sources are above or near Wattsonic LFP Battery, including downspouts, sprinklers, or faucets.



### **1.3 What is Wattsonic 4.0-20.0kW-3P Series**

#### **THE FUTURE OF SUSTAINABLE ENERGY**

Wattsonic 4.0-20.0kW-3P Series is a smart hybrid energy storage systems that turns solar panels into an all-day resource while offering backup power in the event of a grid outage. Wattsonic enables storage of renewable energy, allowing optimized home energy control and an increasing amount of total electricity production to come from renewable sources. Reliable renewable energy improves the resiliency of the grid, reduces energy costs, and increases the impact of electric vehicle ownership.

#### **POWER WHEN NEEDED**

Wattsonic enables the storage of energy from solar panels during the day, or from the grid when energy rates are low; discharges energy for backup or use at night; and automatically optimizes home energy. Wattsonic thereby maximizes solar consumption and reduces energy spending.

#### **A FLEXIBLE SOLUTION**

Wattsonic can be charged from solar or grid power and can provide backup power. If greater amounts of energy are needed, multiple Wattsonic 4.0-20.0kW-3P Series can be installed together to work as a larger system.

This manual is an integral part of Wattsonic 4.0-20.0kW-3P Series (hereinafter referred to as the inverter). It mainly introduces the assembly, installation, electrical connection, debugging, maintenance and troubleshooting of the products.

The products, services or features purchased are subject to the commercial contracts and terms of Wattsonic. All or part of the products, services or features described in this document may not be within the scope of purchase. This document serves only as a guide to use, and all statements, information and recommendations in this document do not constitute any express or implied guarantee.

## 1.4 How to Use This Manual

Before installing and using inverters, please read this manual carefully, understand the safety information and be familiar with the functions and characteristics of inverters.

The manual content of subsequent versions of the inverter may be subject to change. The latest manual can be found at [www.Wattsonic-systems.com](http://www.Wattsonic-systems.com).

## 1.5 Target Groups

This manual is applicable to the electrical installers with professional qualifications and end-users, who should have the following skills:

- ① Training for installation and commissioning of 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.

## 1.6 Symbols

Important instructions contained in this manual should be followed during installation, operation and maintenance of the inverter. They will be highlighted by the following symbols.



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



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



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



Indicates a situation that, if not avoided, could result in equipment or property damage, data loss, equipment performance degradation.



Indicates additional information, emphasized contents or tips that may be helpful, e.g., to help you solve problems or save time.

## 2 Safety Instructions

### 2.1 Safety Notes

- ① Before installation, please read this manual carefully and follow the instructions in this manual strictly.
- ② Installers need to 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 contact the local designated personnel for system 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 operation. 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 result in danger to 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.

### 2.2 Statement

Wattsonic 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 the instructions and safety warnings in this document.
- 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 which don't follow the local standards and regulations.
- ⑩ Products beyond the warranty period.

## 3 Inverter Introduction

### 3.1 System Introduction

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

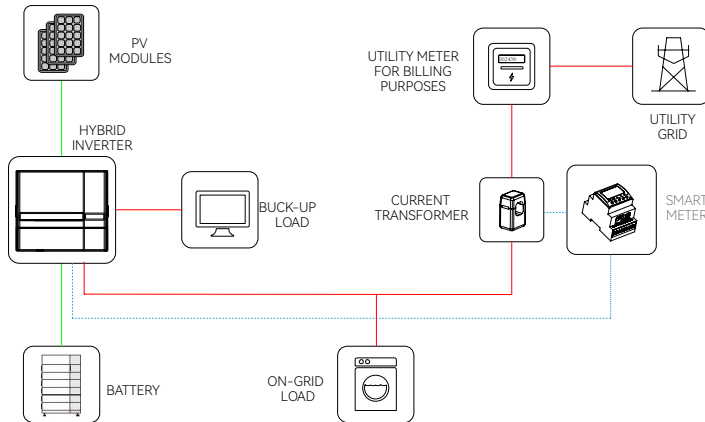


Figure 3-1 Schematic diagram of hybrid system



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 4.0-20.0kW-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.

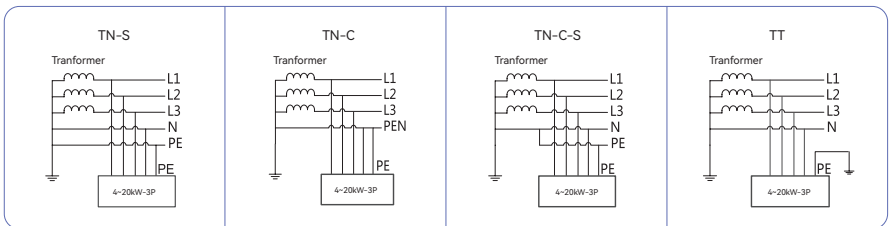


Figure 3-2 Applicable grid types

## 3.2 Product Introduction

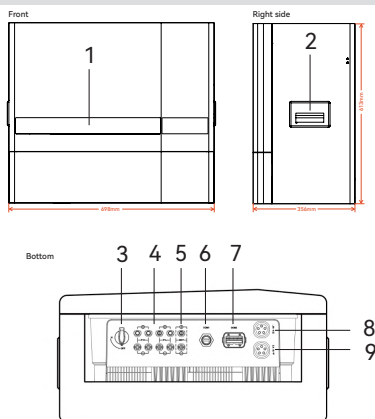
The Wattsonic 4.0~20.0kW-3P Series inverter is also known as hybrid inverter or storage inverter, which is mainly used to combine the PV array, lithium battery, loads and power grid to realize intelligent power management and dispatching.

### ▼ 3.2.1 Models

The Wattsonic 4.0~20.0kW-3P Series includes 10 models which are listed below:

4.0K-25A-3P, 5.0K-25A-3P, 6.0K-25A-3P, 8.0K-25A-3P, 10K-25A-3P, 12K~25A-3P, 10K-40A-3P, 12K-40A-3P, 15K~40.0A-3P, 20K~40A-3P.

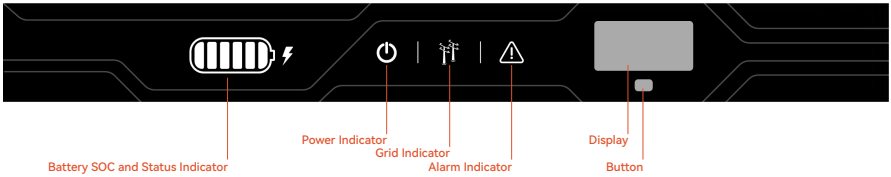
### ▼ 3.2.2 Appearance



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 state 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   |
| 5    | Battery input terminal  | Battery connector  |
| 6    | COM1 port               | WiFi/LAN/4G module connector   |
| 7    | COM2 port               | Multi-function Connector (Meter/BMS/RS485/DRED)                      |
| 8    | On-grid output terminal | Used for On-grid output cable connection                             |
| 9    | Back-up output terminal | Used for Back-up output cable connection                             |








### ▼ 3.2.3 Display Interface



| Item | Indicator                        | Status                 | Description   |
|------|----------------------------------|------------------------|---|
| 1    | Battery SOC and Status Indicator | Off                    | Battery not connected or communication fault.                               |
|      |                                  | Always on              | Battery is discharging or waiting, indicator shows battery SOC.             |
|      |                                  | Single indicator flash | Battery is charging, indicator shows battery SOC.                           |
| 2    | Power Indicator                  | Off                    | No power  |
|      |                                  | Quick flashing         | Inverter entered self-test status.  |
|      |                                  | Slow flashing          | Inverter entered waiting status.  |
| 3    | Grid Indicator                   | Always on              | Inverter works normal.  |
|      |                                  | Off                    | Disconnected with grid.   |
|      |                                  | Slow flashing          | Inverter detected grid but not running in on-grid mode.                     |
| 4    | Alarm Indicator                  | Always on              | Inverter works in on-grid mode.   |
|      |                                  | Off                    | The inverter is running normally.   |
|      |                                  | On                     | An alarm or fault is detected, view the fault info on the display.          |
| 5    | Display                          | On                     | Display the inverter operation information.                                 |
|      |                                  | Off                    | Display off to save power, press the button to wake up the display.         |
| 6    | Button                           | Physical button        | Switch display information and set parameters by short press or long press. |



### 3.3 Symbols on the Inverter

| Symbol  | Description   |
|---|---|
|    | 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 being disconnected from the mains, battery and PV input for 10 minutes.   |
|    | CE mark, the inverter complies with the requirements of the applicable CE guidelines.   |
|    | Danger. Risk of electric shock!   |
|  | The surface is hot during operation and do not touch.   |
|  | Additional grounding point.   |

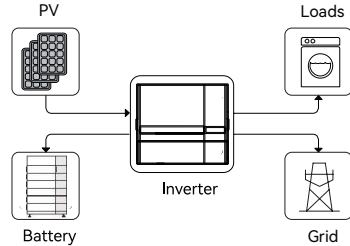
### 3.4 Operation Modes

Wattsonic 4.0-20.0kW-3P Series inverter has the following basic operation modes and you can configure the operation mode as per your preference in the App.

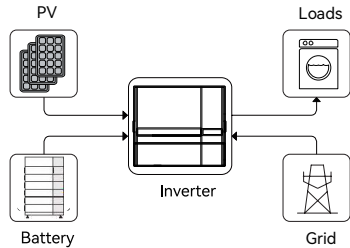
#### General Mode

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).



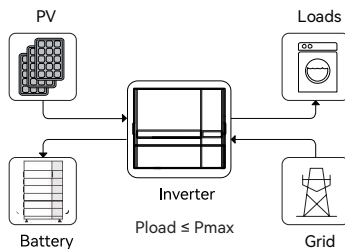
When the PV power is insufficient, the battery will discharge to supply loads, and the grid will join in if the battery is not enough to supply loads.



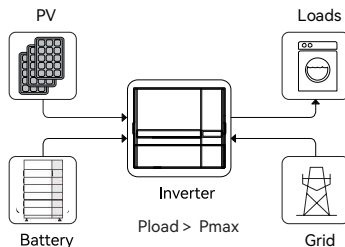
### Peak load Shifting (Load Shifting)

Set the maximum power  $P_{max}$  (kVA) contracted with the grid.

When the load consumption is less than the  $P_{max}$ , the PV will charge the battery first, and the grid supplies the load. When the battery is full, PV will supply the load together with the grid, but the battery doesn't.



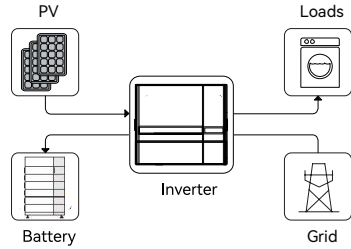
When the load consumption exceeds the  $P_{max}$ , the inverter will take power from the battery and PV to supply power to the load to compensate for the power that exceeds the  $P_{max}$ .



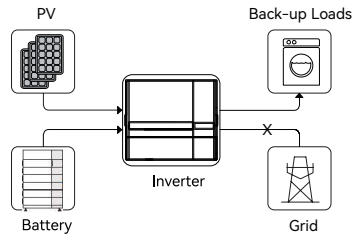
\*To realize the "Peak load Shifting" function, the load power that exceeded  $P_{max}$  has to be within the inverter max output power, otherwise, the inverter will only output the max power which allowed.

**UPS Mode**

In this working mode, the inverter will use the power from 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.

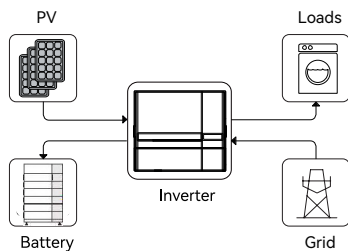


When the grid fails, power from PV and battery will supply loads connected on the back-up side (UPS).

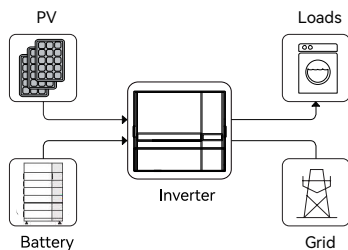


### Economic Mode

In this working mode, you can set charge/discharge power and time in the App, inverter will use the power from PV or grid (whether to use can be set in the App) to charge the battery in the predetermined period.

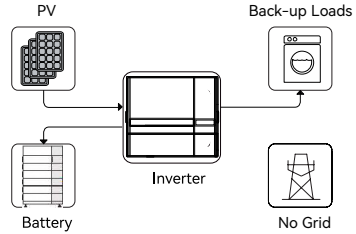


Inverter will use power from PV and battery to supply loads in the predetermined period and the insufficient part will be supplied by the grid.

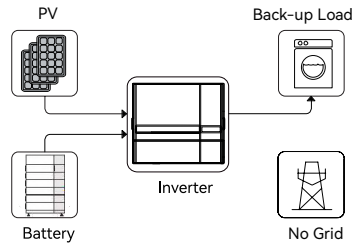


**Off-grid Mode**

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 back-up loads together with PV.



### 3.5 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 the loads whose total capacity is greater than the maximum Back-Up 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 condition of the battery itself, battery current might be limited by some factors, including but not limited to the temperature and weather.

Wattsonic 4.0~20.0kW-3P Series overloading ability in off-grid work mode describes as follows:

| Off-grid Overloading Ability Illustration |                       |            |            |            |            |
|---|-----------------------|------------|------------|------------|------------|
| Status                                    | Mode                  | Phase 1    | Phase 2    | Phase 3    | Duration   |
| Off-grid                                  | Balance Output Mode   | 1.1times   | 1.1times   | 1.1times   | Continuous |
|   |                       | 2times     | 2times     | 2times     | 60s        |
|   | Unbalance Output Mode | 1.25times* | 1.25times* | 1.25times* | Continuous |

The multiples above are calculated based on rated output power.

4.0~20.0kW instantaneous max output power is 25kW.

\*Only one of the three phases can reach up to 1.25times, and the other two phases should be less than 1.1times.

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.

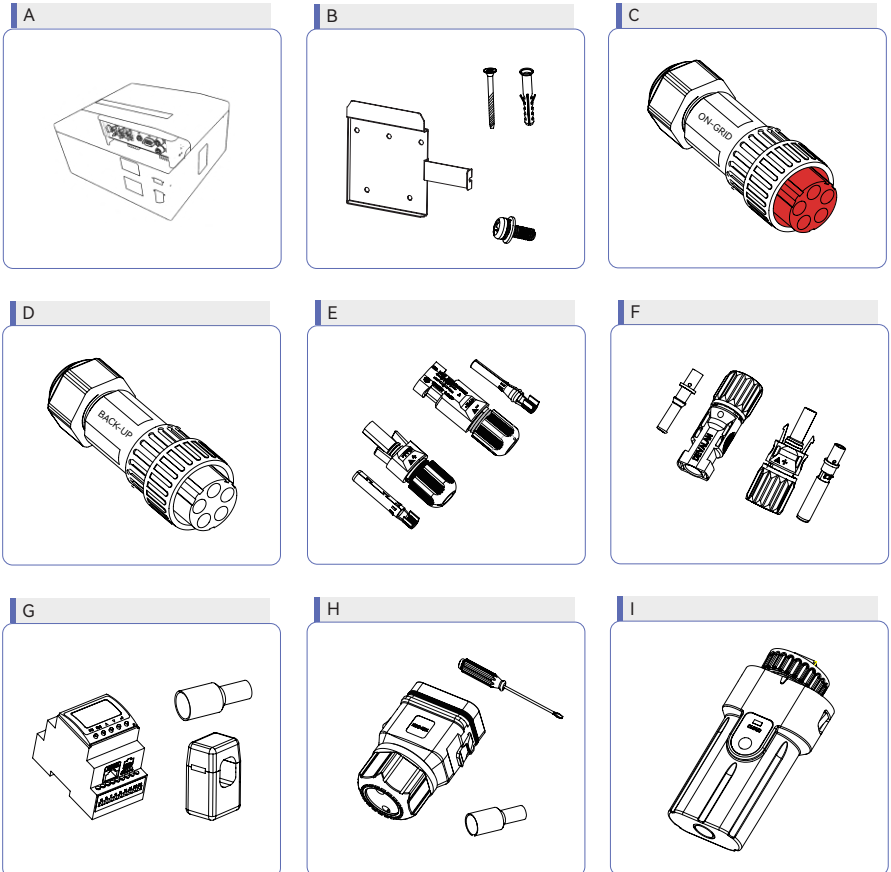
### 3.6 Unpacking and Storage

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.

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

#### ▼ 3.6.1 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.





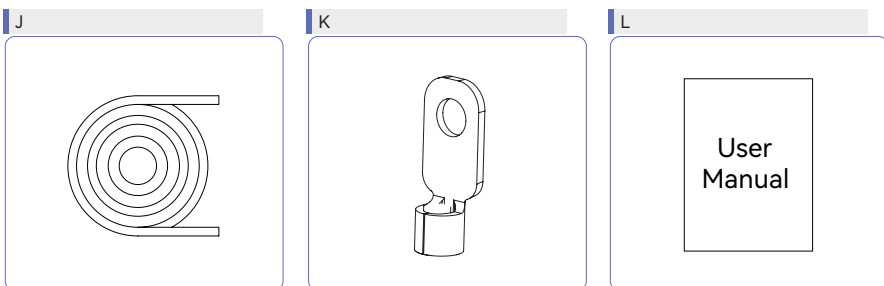


Figure 3-5 Packing list

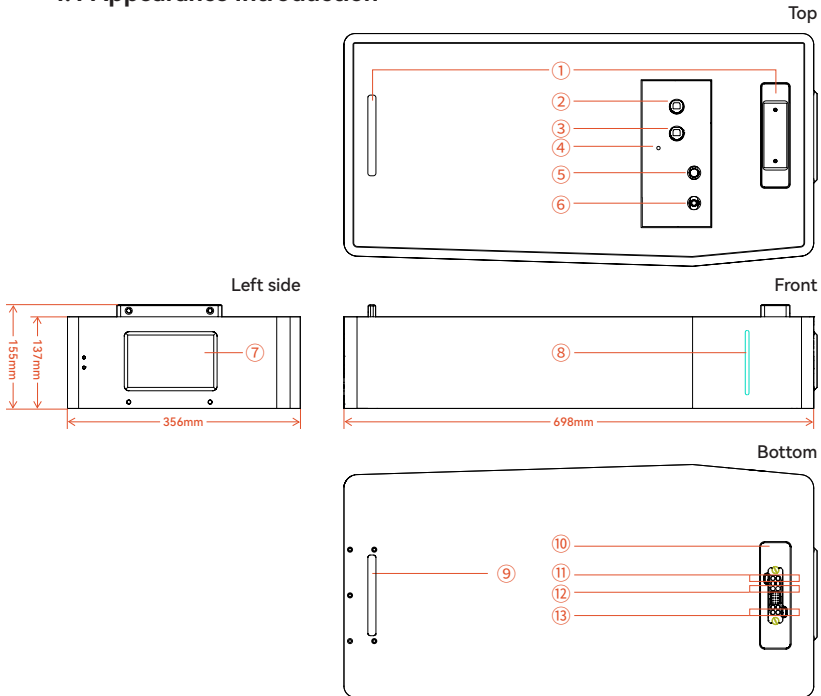
| Item | Name and Quantity   | NOTE  |
|------|---|-------|
| A    | Inverter (1pcs)   |       |
| B    | Wall-mounting bracket (1pcs), Expansion plug set (5pcs), M5 screws (1pcs)   |       |
| C    | On-grid connector set (1pcs)  | Red   |
| D    | Back-up connector set (1pcs)  | Black |
| E    | PV terminal (4.0K-25A-3P 2 pairs / 10K-40A-3P 4 pairs)                      | Black |
| F    | Battery terminal (1pairs)   | Blue  |
| G    | Meter with 3 CTs (1pcs)   |       |
| H    | COM2 connector set (1pcs)   |       |
| I    | Monitoring device (1pcs)  |       |
| J    | 10m meter communication cable (1pcs), 3m battery communication cable (1pcs) |       |
| K    | PE terminal(1pcs)   |       |
| L    | User guide  |       |

### ▼ 3.6.2 Inverter 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 in the range of  $-30^{\circ}\text{C}$  and  $+60^{\circ}\text{C}$ , 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.

## 4 Battery Introduction

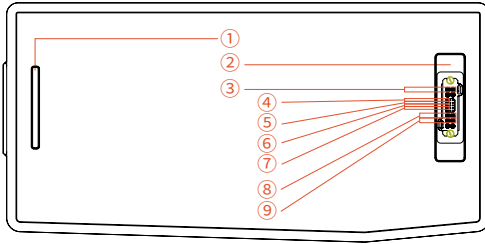
### 4.1 Appearance Introduction



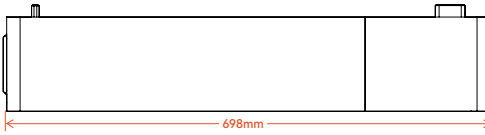
#### Sub-Master BMS

|   |                            |
|---|----------------------------|
| ① | Inverter positioner        |
| ② | Inverter COM               |
| ③ | Service COM                |
| ④ | Earth point                |
| ⑤ | Battery DC Output +        |
| ⑥ | Battery DC Output -        |
| ⑦ | DC Isolator                |
| ⑧ | Indicator light            |
| ⑨ | Battery positioner socket  |
| ⑩ | Terminal positioner socket |
| ⑪ | Battery Negative B-        |
| ⑫ | Battery Negative B+        |
| ⑬ | Earth cable                |

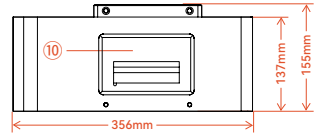
Top



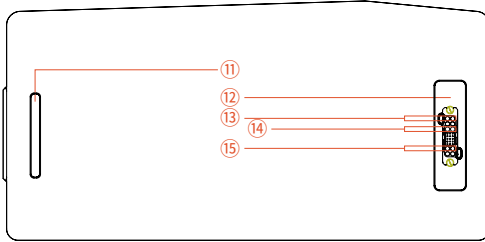
Front



Right side

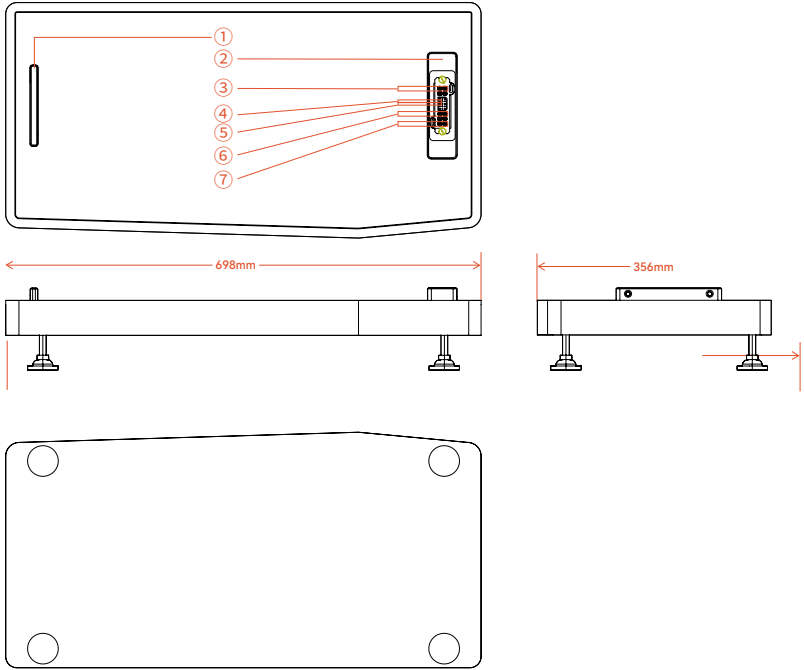


Bottom



## Battery module

|   |                            |
|---|----------------------------|
| ① | Battery positioner plug    |
| ② | Terminal positioner plug   |
| ③ | Earth cable                |
| ④ | BMU Power Supply -         |
| ⑤ | BMU Power Supply +         |
| ⑥ | CAN-L                      |
| ⑦ | CAN-H                      |
| ⑧ | Battery Positive B+        |
| ⑨ | Negative pole              |
| ⑩ | Handle                     |
| ⑪ | Battery positioner socket  |
| ⑫ | Positive pole              |
| ⑬ | Battery Positive B+        |
| ⑭ | Earth cable                |
| ⑮ | Terminal positioner socket |


**Base module**

|   |                                 |
|---|---------------------------------|
| ① | Battery positioner plug         |
| ② | Terminal positioner plug        |
| ③ | Earth cable                     |
| ④ | CAN COM Resistor(Pre-installed) |
| ⑤ | CAN COM Resistor(Pre-installed) |
| ⑥ | Battery Positive B+             |
| ⑦ | Battery Positive B+             |

## 4.2 Specifications



### Sub-Master BMS

|  |  |
|--|--|
| Operation Voltage [Vdc]                | 100-800  |
| Max. Charge/Discharge Current [A]      | 50   |
| Recommend Charge/Discharge Current [A] | 25   |
| Functions                              | Pre-charge, Over-Less Voltage/<br>/Over-Less Temperature Protection,<br>Cells Balancing/SOC-SOH calculation etc. |
| Communication Protocol/Connector Type  | CAN/RS485 ModBus, TCP/IP/ RJ45   |
| Power Connection Type                  | Hard Connection with Positioner  |
| User Interface                         | LCD Display(Optional, need to be confirmed upon order)   |
| Dimension [W*H*D(mm)]                  | 698*356*137  |
| Weight                                 | 11kg   |
| Operating Temperature [°C ]            | -20~55   |
| Ingress Protection                     | IP21(Optional IP65, need to be confirmed upon order)   |
| Installation Method                    | Stackable  |
| Warranty                               | 10 years   |



### Battery Module

|  |  |
|--|--|
| Nominal Voltage/Capacity per Module    | 76.8/3.84KWH   |
| Expand Capability                      | Up to 8 Modules series at 614V/30.7KWH               |
| DOD Recommended                        | 90%  |
| Max. Charge/Discharge Current [A]      | 50A Continual  |
| Recommend Charge/Discharge Current [A] | 25A Continual  |
| Communication Protocol/Connector Type  | CAN/ RJ45  |
| Power Connection Type                  | Hard Connection with Positioner                      |
| Dimension [W*H*D(mm)]                  | 698*356*137 per module                               |
| Weight                                 | 42kg   |
| Charge Temperature Range [°C ]         | 0~45   |
| Discharge Temperature Range[°C ]       | -20~55   |
| Ingress Protection                     | IP21(Optional IP65, need to be confirmed upon order) |
| Installation Method                    | Stackable  |
| Cables Connection Method               | Hard Connection with Positioner                      |
| Warranty                               | 10000 Cycles within 10 Years Guarantee               |

\*Battery Systems Configuration Options: 230V/11.5kWh, 307V/15.3kWh, 384V/19.2kWh, 460V/23.0kWh, 537V/26.8kWh, 614V/30.7kWh.

\*Wattsonic reserves the right to modify the technical datasheet and appearance of the product in the manual without prior advice to the users.

### 4.3 Standard Packing List

#### Main units

|   |  |
|---|--|
|  <p>Sub-Master BMS for 3.84KWH</p>                 |  <p>3.84KWH Li-HV LFP Battery Modules (Stackable)</p> |
|  <p>Base for Stackable Li-HV all-in-one system</p> |  |

#### Standard Accessories

|   |   |
|---|---|
|  <p>300MM Communication Cables from Master BMS to Inverter</p>   |  <p>Grounding Wire 300mm from Master BMS to Inverter</p>         |
|  <p>300MM Positive Power Cables from Master BMS to Inverter</p> |  <p>300MM Negative Power Cables from Master BMS to Inverter</p> |
|  <p>Kit for Wall Mounted</p>                                   |  <p>M6 Plastic Expansion Pipe and Self-tapping Screw</p>       |

## 5 Mechanical Installation

### 5.1 Selection of Installation Location

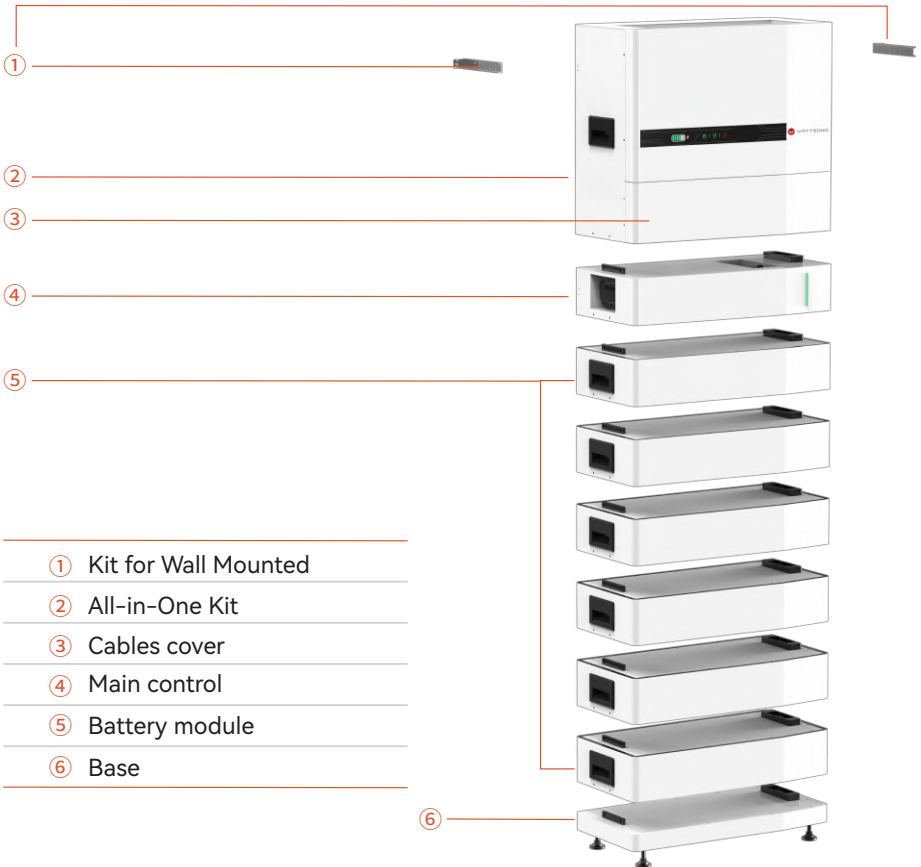
- The wall on which the inverter is mounted must be strong and can withstand the weight of the inverter for a long time.
- The inverter needs to be installed in a well-ventilated environment.
- Do not expose the inverter directly to strong sunlight to prevent the power derating due to excessive temperature.
- The inverter should be installed in a place with shelter to prevent direct exposure to sunlight and rain.
- Install the inverter at the eye level for easy inspection of screen data and further maintenance.
- The ambient temperature of the inverter installation location should be between -30 °C and 60 °C.
- The surface temperature of the inverter may reach up to 75 °C. To avoid risk of burns, do not touch the inverter while it's operating and inverter must be installed out of reaching of children.
- The area is completely water proof.
- The floor is flat and level.
- There are no flammable or explosive materials.
- The ambient temperature is within the range from 0 to 50.
- The temperature and humidity is maintained at a constant level.
- There is minimal dust and dirt in the area.
- The distance from heat source is more than 2 meters.
- The distance from air outlet of whole system is more than 0.5 meters.
- Do not cover or wrap the battery case or cabinet.
- Do not place at a children or pet touchable area.
- The installation area shall avoid of direct sunlight.
- There is no mandatory ventilation requirements for battery module, but please avoid of installation in confined area(minimum 300mm to top/left/right/front).
- The aeration shall avoid of high salinity, humidity or temperature.

## 5.2 General Installation Procedure

### Installation procedure summary

- 1.Install the base;
- 2.Install the battery module and Sub-Master BMS;
- 3.Install the inverter;
- 4.Cables connection;
- 5.Install the cables cover and wall mounting support.

### System component





### Step1 Install the base

Check the installation environment to ensure ground level. Place the base on the ground, and make sure it is level and stable.



### Step2 Install the battery module and Sub-Master BMS

After the base is installed, the remaining battery and Sub-Master BMS are then placed in turn. Once each battery or Sub-Master BMS is in place, tighten it with four m4 screws on the left and right side.



### Step3 Install the Inverter

After the inverter is installed to the All-in-One Kit, put the All-in-One Kit to the stacked battery and Sub-Master BMS.



### Step4 Install the Kit for wall mounted and cables cover


Monuting the kit for wall mounted, and tighten them with M6 plastic expansion pipes and self-tapping screws and screws.

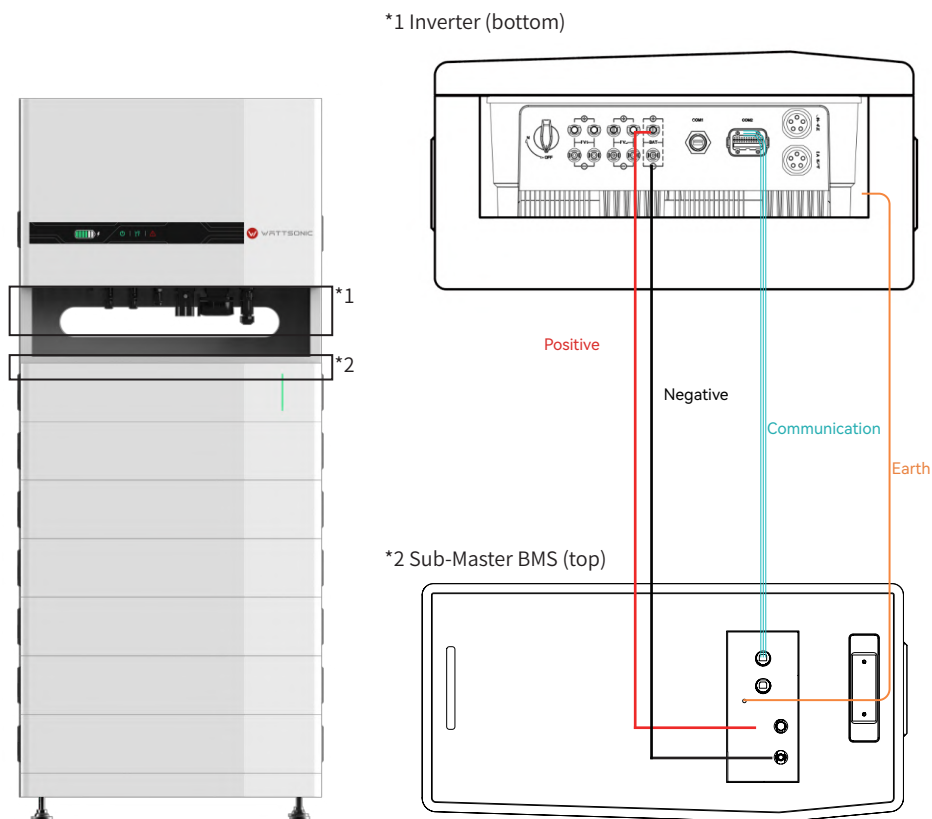
Connet the cables between inverter and Sub-Master BMS as is shown in page24 and then monting the cables cover.



### 5.3 Cables Connection

After mechanical installation is finished, there are positive power line, negative power line, communication cable and earth cable between inverter and Sub-Master BMS need to be connected. The picture on this page shows the cables connection. Please follow the instruction and make sure all the cables are connected correctly.

 **DANGER** Warning: Please make sure the main switch at OFF position during installation to guarantee high voltage protection.



## 6 Electrical Connection



A high voltage in the conductive part of the inverter may cause an electric shock. When installing the inverter, make sure that the AC and DC sides of the inverter are completely de-energized.



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



Do not ground the positive or negative pole of the PV string, otherwise it will cause serious damage to the inverter.



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



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



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 as a result of a poorly connected cable connector.

## 6.1 Electrical wiring diagram

This diagram shows Wattsonic 4.0-20.0kW-3P Series wiring structure and composition, concerning the real project, the installation and wiring have to be in line with the local standards.

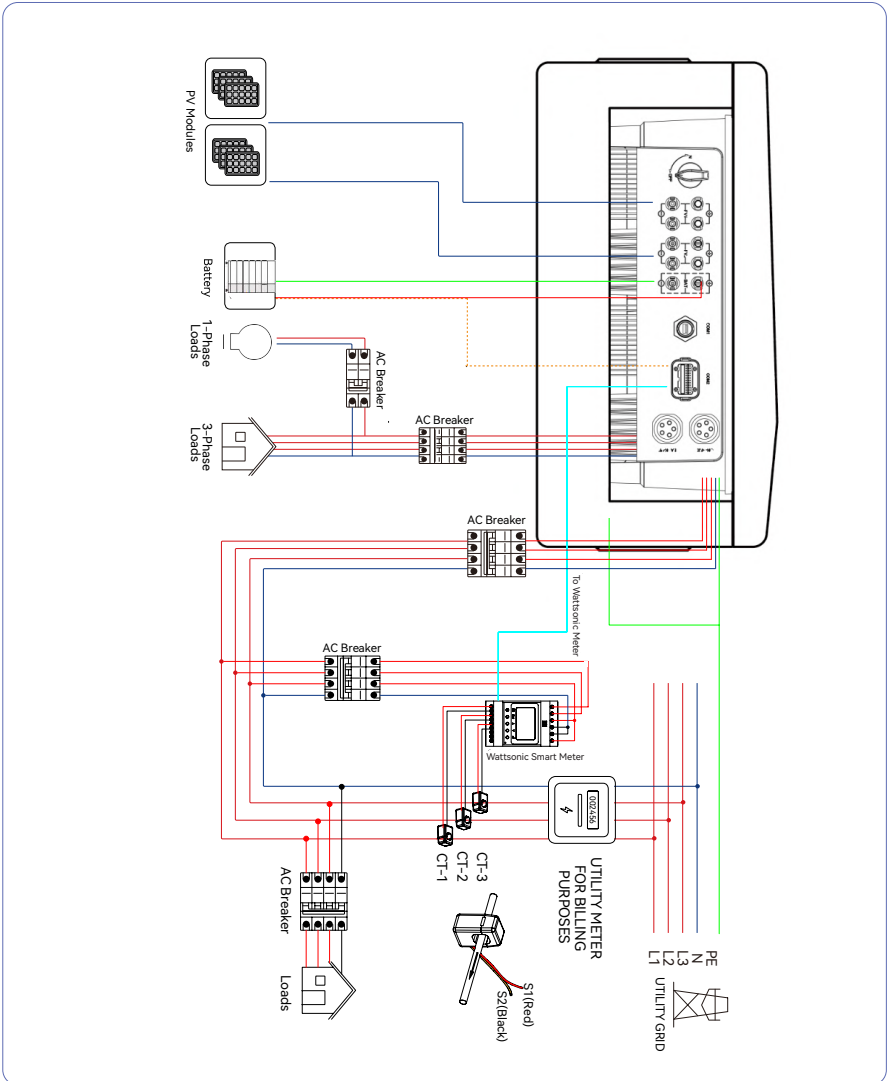


Figure 5-1 Electrical wiring diagram

Single inverter wiring diagram

This diagram is an example without special requirement on electrical wiring connection. Neutral line of AC supply can be isolated or switched.

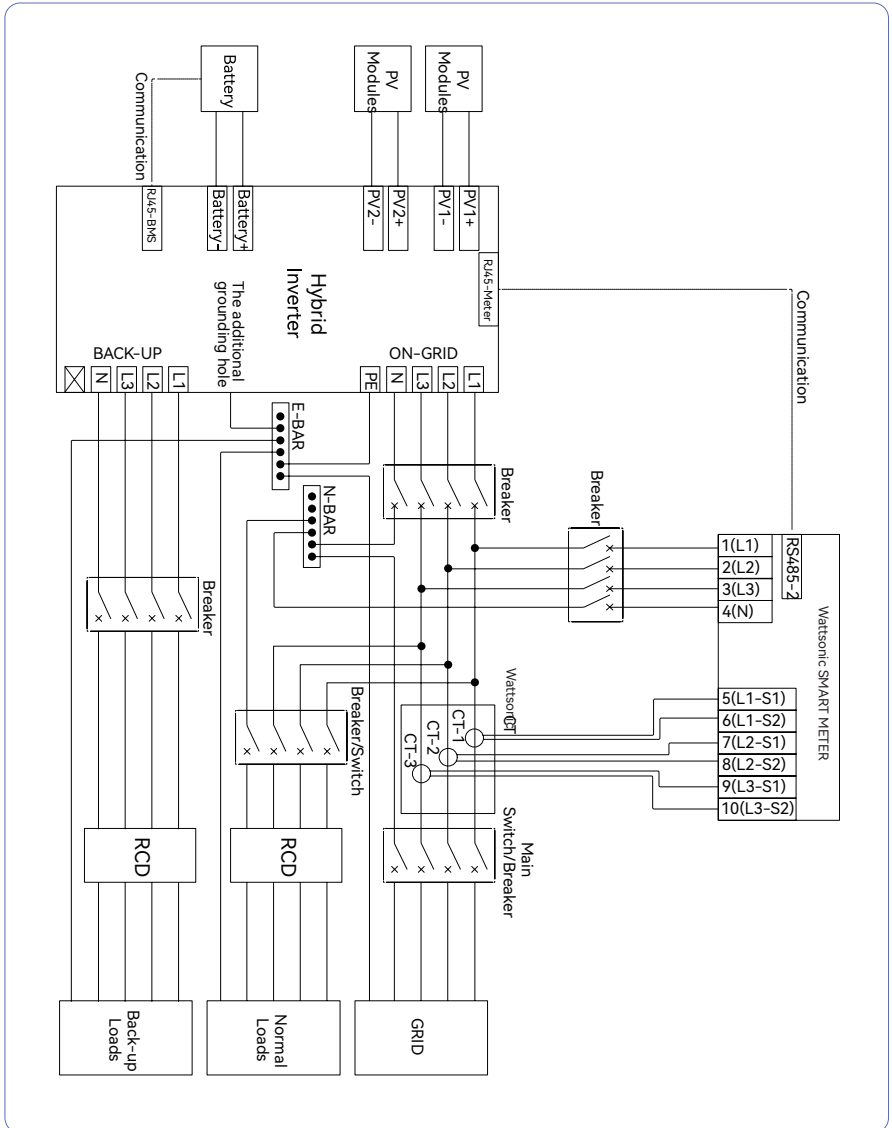


Figure 5-2 Standard wiring diagram

This diagram is an example for Australia and New Zealand. Neutral line of AC supply must not be isolated or switched, and the neutral line of GRID side and BACK-UP side must be connected together according to the wiring rules AS/NZS\_3000. Otherwise, BACK-UP function will not work.

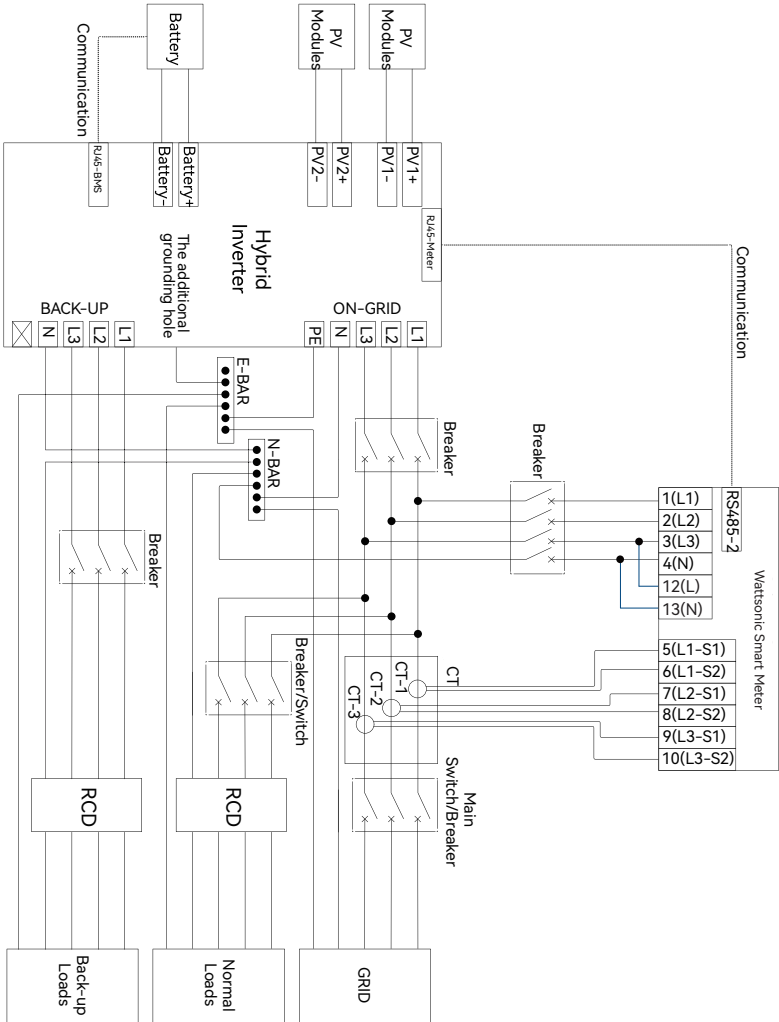


Figure 5-3 Australia wiring diagram

## 6.2 AC Connection

### ▼ 6.2.1 AC Side Requirements



**NOTICE**

- ① An independent AC breaker is required in both on-grid and back-up output side, and any loads cannot be connected with inverter directly.
- ② Before making the connection of AC cable, please confirm all DC & AC power source are disconnected from the inverter.
- ③ The Wattsonic 4.0-20.0kW-3P 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 an approval from the local electric power company.

A Wattsonic 4.0-20.0kW-3P Series breaker needs to be installed on the AC side of the Wattsonic 4.0-20.0kW-3P Series. To ensure that the Wattsonic 4.0-20.0kW-3P Series can safely disconnect itself from the power grid when an exception occurs, select a proper overcurrent protection device in compliance with local power distribution regulations and Max. input (output) current of 4-20kW AC side.

The allowable AC cable of wire diameter and cross-sectional area for Wattsonic 4.0-20.0kW-3P Series are as shown in the following:

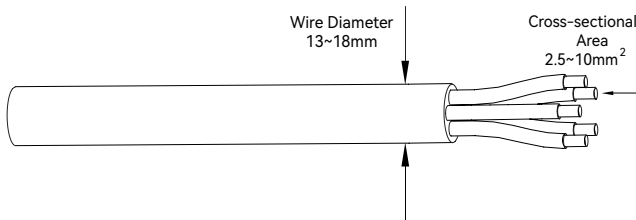


Figure 5-4

On-grid side uses a five-core cable (L1, L2, L3, N, and PE). Back-up side uses a four-core cable (L1, L2, L3, N).



**NOTICE**

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 included, 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) is mandatory, the switch must be triggered at a residual current of 300 mA (recommended), or it can be set to other values according to local regulations. For example, in Australia, the inverter can use an additional 30mA (type A) RCD in installations.

### ▼ 6.2.2 Assembling the AC Connector

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

- ① Take the AC connector out of the accessory bag and disassemble it.

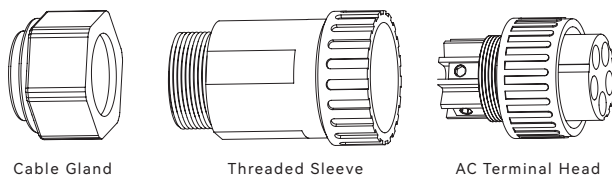


Figure 5-5

- ② According to the figure 5-4, select an appropriate cable, peel the insulation sleeve of AC cable off for 50mm, and peel off the end of 3L / PE / N wires for 8mm.

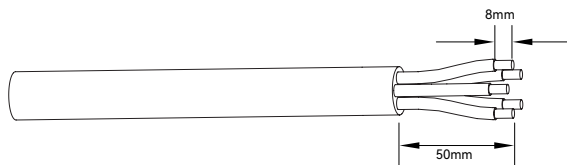


Figure 5-6

- ③ Insert the stripped end of the five wires into the appropriate hole of the terminal head. Please try to pull out the cable to make sure it is well connected.

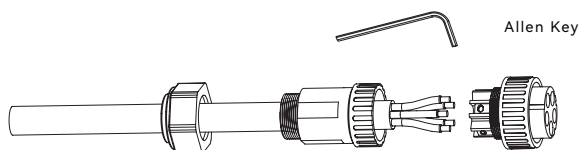


Figure 5-7



The cord end terminals must be locked tightly, and make sure it won't be loose after a long period of use.

- ④ According to the arrow direction push the threaded sleeve to make it connected with the AC terminal head and then rotate the cable gland clockwise to lock it.

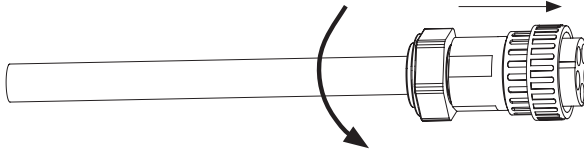


Figure 5-8

▼ 6.2.3 Installing the AC Connector



High voltage may be present in inverter!  
Ensure all cables are voltage-free before electrical connection.  
Do not connect the AC circuit breaker until all inverter electrical connections are completed.

Connect the AC connector to the inverter AC terminal, and rotate the AC connector buckle clockwise until its tight enough.

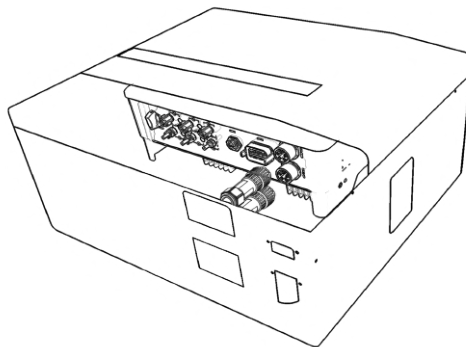


Figure 5-9



Please distinguish the on-grid and back-up port, and don't mix up the on-grid port and back-up port when making the connection.

### 6.3 Monitoring Device Installation

Wattsonic 4.0-20.0kW-3P Series supports WIFI, LAN, and 4G communication. Plug the WIFI, LAN, or 4G module into the COM1 port in the bottom of inverter. A slight "click" sound during the installation represents that the assembly is in place.

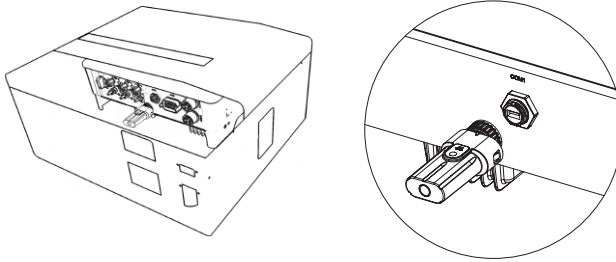


Figure 5-10 Monitoring device installation



Refer to "8 Monitoring" for more information.

### 6.4 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 length of 2m, it's fixed and can't be extended.

The CTs have been connected to the Wattsonic Meter when you received them, and you

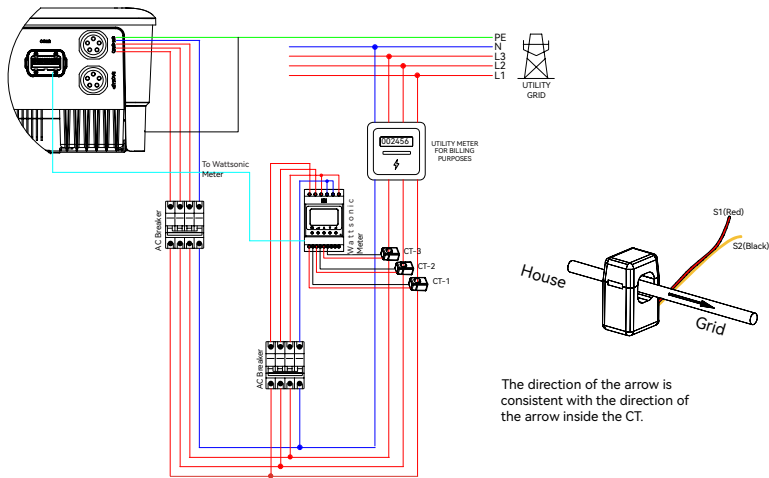


Figure 5-11



**NOTICE**

CT installation direction and phase sequence should strictly follow the instruction in the user manual, otherwise, the inverter may not be working normally.

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



**NOTE**

Please choose the appropriate CT size according to your needs.

Meter terminals definition as shown in table below:

| No.   | Definition | Function  |
|-------|------------|---|
| 5     | L1-S1      | To detect the CT current                                |
| 6     | L1-S2      |   |
| 7     | L2-S1      |   |
| 8     | L2-S2      |   |
| 9     | L3-S1      |   |
| 10    | L3-S2      |   |
| 1     | L1         | L1/L2/L3/N connect to grid to detect power grid voltage |
| 2     | L2         |   |
| 3     | L3         |   |
| 4     | N          |   |
| 12    | L          | Power supplied from grid                                |
| 13    | N          |   |
| RS485 | RS485      | Communicate with inverter                               |

### 6.5 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, RLYOUT port, DRED port.

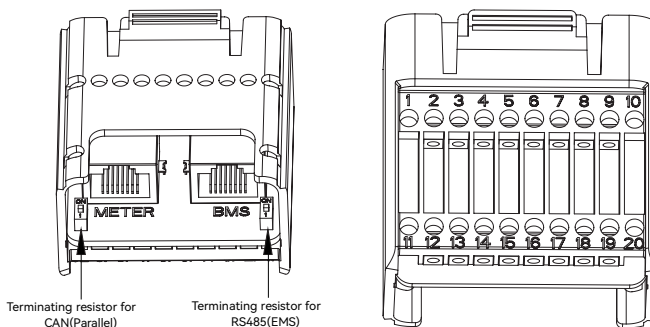


Figure 5-12

| Pin    | Definition         | Function                                 |
|--------|--------------------|--|
| RJ45-1 | RS 485             | Communicate with Meter                   |
| RJ45-2 | CAN                | Communicate with BMS                     |
| 1      | COM                | Multifunction Relay                      |
| 2      | NO (Normally Open) |  |
| 3      | /                  | Reserved                                 |
| 4      | /                  | Reserved                                 |
| 5      | DRM4/8             | DRED<br>For Australia and New Zealand    |
| 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                                 |

### ▼ 6.5.1 Assembling the Multi-com Connector

- ① Unscrew the swivel nut from the connector.

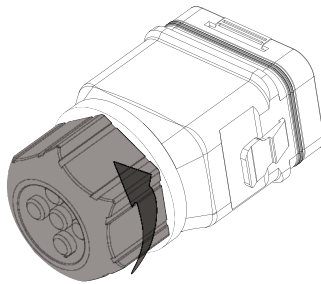


Figure 5-13

② Take out the terminal block.

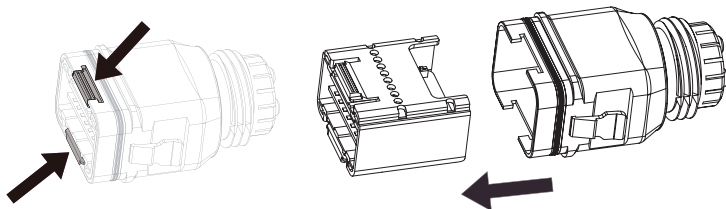


Figure 5-14

② Remove the seal and lead the cable through the cable gland.

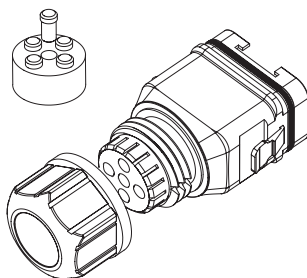


Figure 5-15

### ▼ 6.5.2 Connect the Meter and BMS communication cables



NOTE

The communication between meter/BMS and inverter is RJ45 interface cable.

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

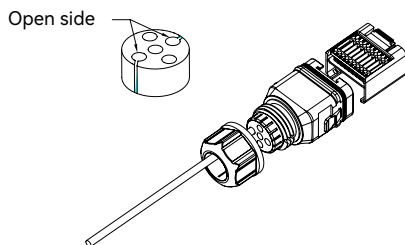


Figure 5-16

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

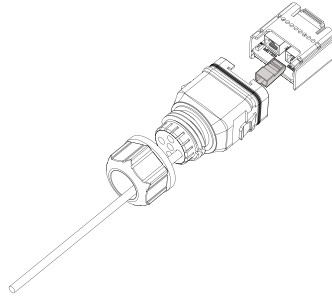


Figure 5-17

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

▼ 6.5.3 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.

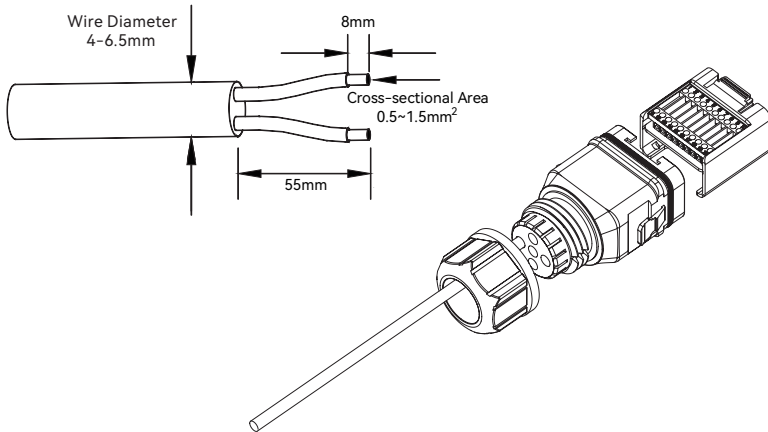


Figure 5-18

- 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 case of single-strand copper wire, skip this step.



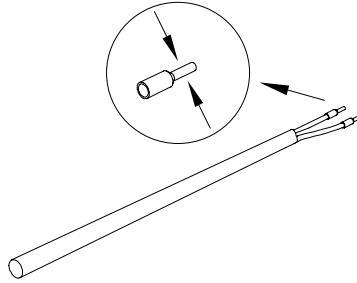


Figure 5-19

- ③ Fix all the wires to the terminal plug according to the assignment and tighten to a torque of  $1.2\pm 0.1\text{N}\cdot\text{m}$  with a screwdriver.

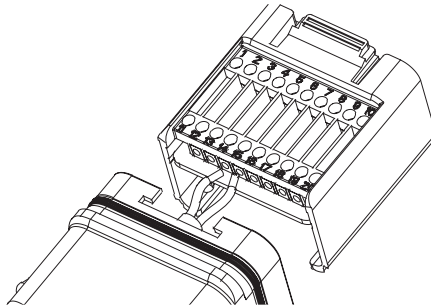


Figure 5-20

- 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.

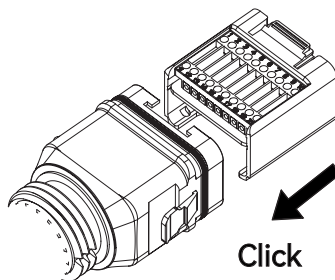


Figure 5-21

- ⑤ Fasten the swivel nut.

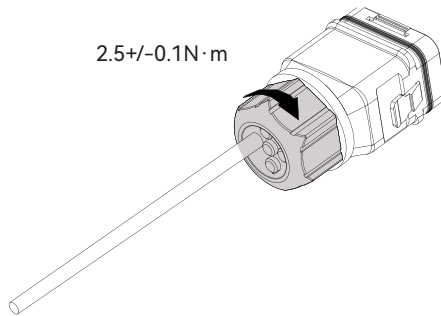


Figure 5-22

#### ▼ 6.5.4 Installing the COM Connector

- ① Remove the waterproof lid from the COM terminal.
- ② Insert the COM connector into COM terminal on the bottom of the inverter until there is an audible click.

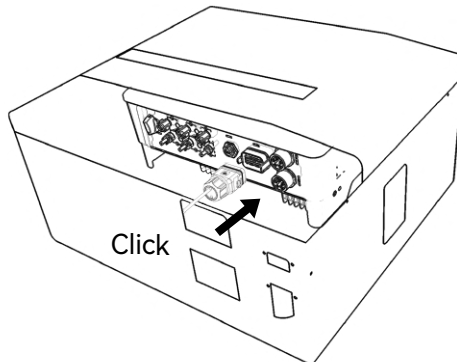


Figure 5-23

▼ 6.5.5 Meter and BMS communication



Before purchasing the battery, you need to make sure the battery you selected is in the battery approval list of Wattsonic, otherwise, the system may not work properly. Please contact your installer or Wattsonic service team for confirmation if you're not sure about it.

RJ45 terminal connection sequence and definition as below.

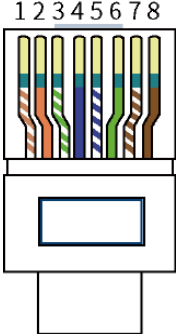
|   | No. | Color          | Meter Side | Battery Side |
|---|-----|----------------|------------|--------------|
|  | 1   | Orange & White | /          | RS485_A3     |
|   | 2   | Orange         | /          | RS485_B3     |
|   | 3   | Green & White  | RS485_B2   | /            |
|   | 4   | Blue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

Figure 5-24 RJ45 terminal connection sequence and definition

▼ 6.5.6 EMS communication

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

▼ 6.5.7 DRED

DRED 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.



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

▼ 6.5.8 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.



Maximum voltage and current at DO dry contact port: 230VAC 1A/  
30VDC 1A.



For more installation and setup information, please contact Wattsonic.

Load Control

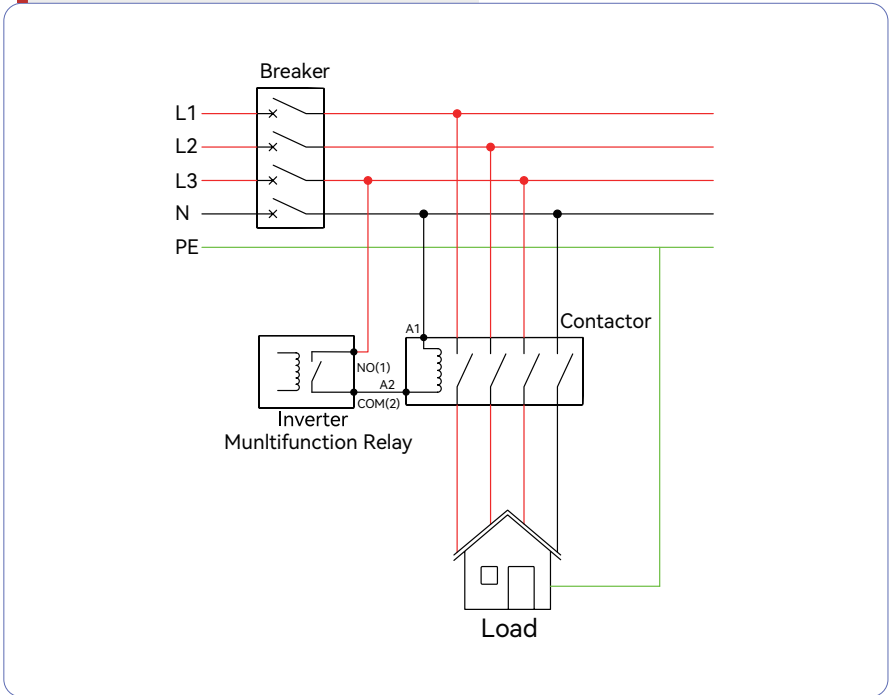


Figure 5-25 Load control connection diagram



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

The contactor is not supplied by the Wattsonic. 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

### Generator Control

#### Inverter Multifunction Relay

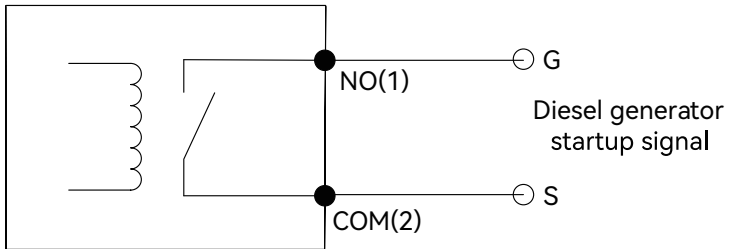
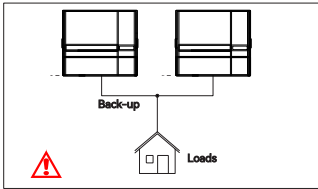


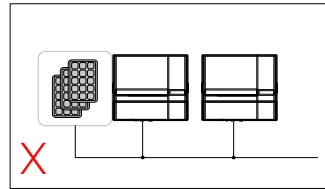
Figure 5-26 Generator Control connection diagram

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

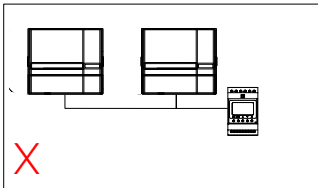
▼ 6.5.9 Parallel System



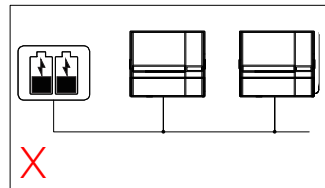
For the general version, back-up cannot connect in parallel. For advanced applications, please contact our after-sales department.



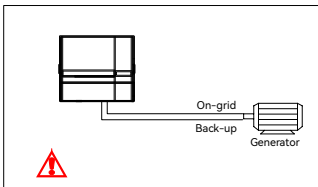
Single PV string cannot connect to multiple inverters.



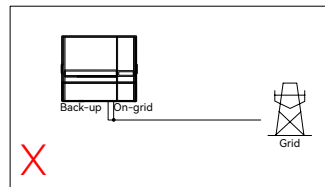
One meter cannot be connected to multiple inverters. Different CTs cannot connect to the same line cable.



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.

Figure 5-27



For more installation and setup information about parallel system, please contact Wattsonic.

▼ 6.5.10 Fast stop

Wattsonic 4.0-20.0kW-3P Series comes standard with fast stop function, and you can use this function by connecting an external switch into the fast stop interface if it requires in the installation place. The external switch doesn't include in our accessory box.

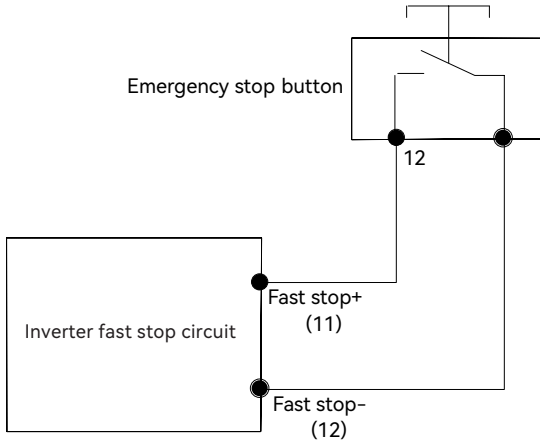


Figure 5-28 Fast stop connection diagram

## 6.6 PV string connection



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 electrical connection.



For best practice, ensure PV modules of the same model and specifications are connected in each string.  
Make sure the maximum output voltage of each PV string does not exceed 1000V.



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.

▼ 6.6.1 PV Side Requirements

**System Layout of Units with external DC Switch**

① Local standards or codes may require that PV systems are fitted with an external DC switch on the DC side. The DC switch must be able to safely disconnect the open-circuit voltage of the PV array plus a safety reserve of 20%. Install a DC switch to 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 Australia and New Zealand market. The Max. current of the DC switch matched by Wattsonic 4.0-20.0kW-3P Series is no less than 40A. We recommend the following electri-

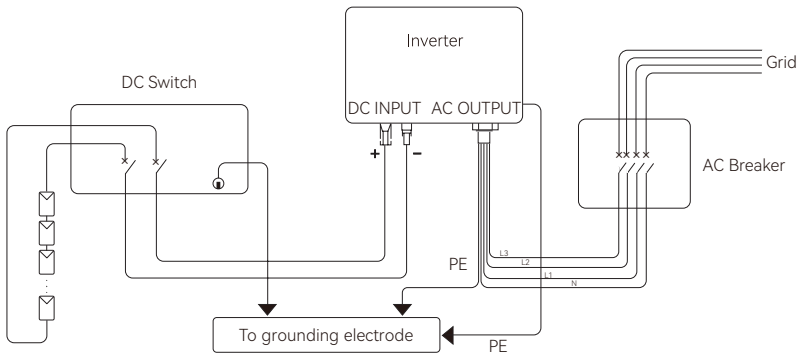



Figure 5-29

**Select the appropriate photovoltaic cable**

| Cable requirements |                        | Cable stripping length |
|--------------------|------------------------|------------------------|
| Outside diameter   | Conductor core section |                        |
| 5.9-8.8 mm         | 4 mm <sup>2</sup>      | 7 mm                   |

▼ 6.6.2 Assembling the PV Connector



**WARNING**

Before assembling the DC connector, make sure that the cable polarity is correct.



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

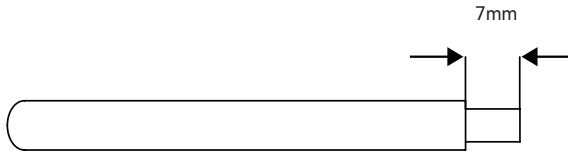


Figure 5-30

- ② Disassemble the connector in the accessory bag.

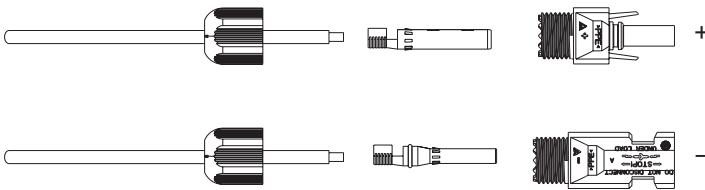


Figure 5-31

- 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).

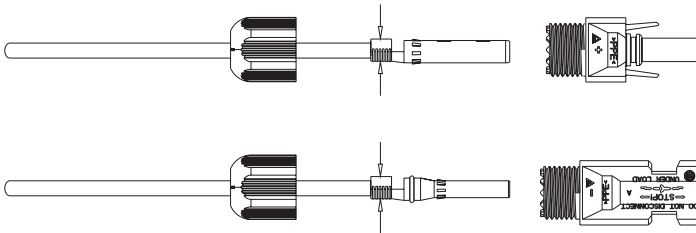


Figure 5-32

- ④ Insert the positive and negative cables into the corresponding positive and negative connectors, pull back the DC cable to ensure that the terminal is tightly attached in the connector.
- ⑤ Use an open-end wrench to screw the nut to the end to ensure that the terminal is well sealed.

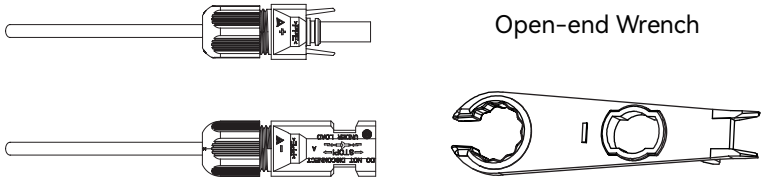


Figure 5-33

▼ 6.6.3 Installing the PV Connector

- ① Rotate the DC switch to “OFF” position.

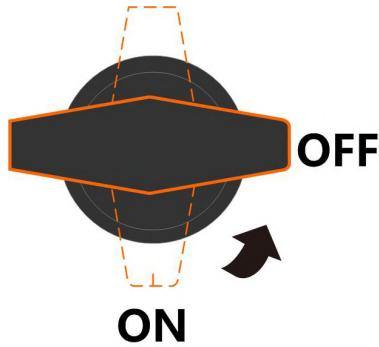


Figure 5-34

- 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.

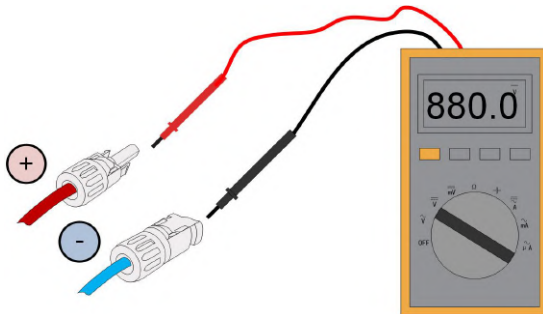


Figure 5-35

- 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.

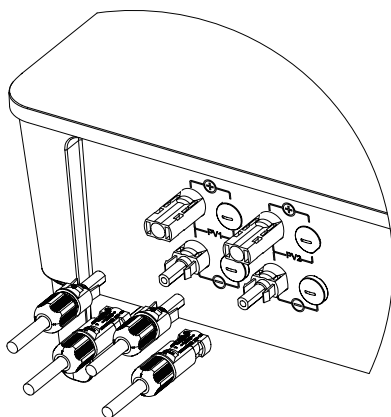


Figure 5-36

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

## 6.7 Power cable of the battery connection



Please contact your battery supplier for detailed battery installation information.

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

- ① Disconnect the AC breaker on the grid side.
- ② Disconnect the breaker on the battery side.
- ③ Turn the inverter DC switch to the “OFF” position.
- ④ Make sure the maximum input voltage of battery is within the inverter limitation.

### ▼ 6.7.2 Lithium battery connector assembly procedures

#### Select an appropriate DC cable

| Cable requirements |                        | Cable stripping length |
|--------------------|------------------------|------------------------|
| Outside diameter   | Conductor core section |                        |
| 5.0-8.0 mm         | 10 mm <sup>2</sup>     | 10 mm                  |



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 10 mm.



Figure 5-37

- ② Disassemble the connector in the accessory bag.

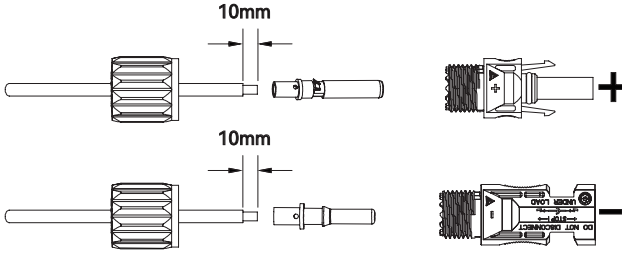


Figure 5-38

③ Insert the battery cable through the battery 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).

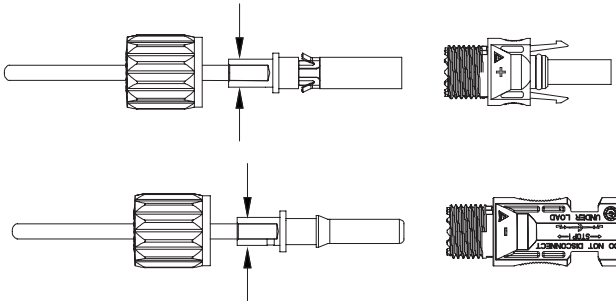


Figure 5-39

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

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

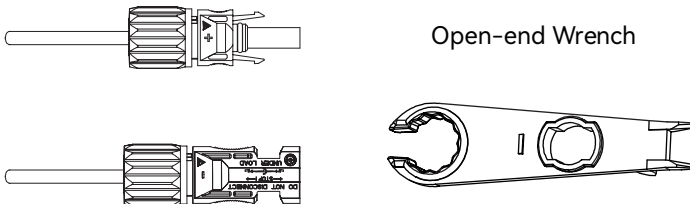


Figure 5-40



- 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.

⑥ Insert the positive and negative connector into the inverter battery terminals respectively, and a “click” sound represents the assembly in place.

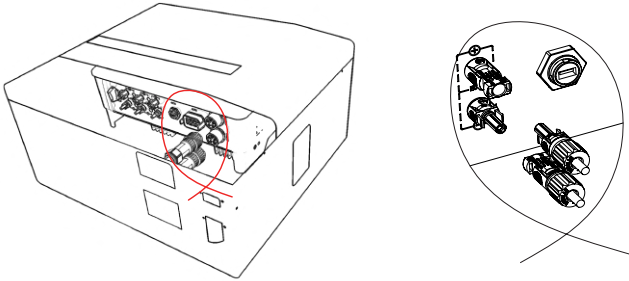


Figure 5-41

## **7 Commissioning**

### **7.1 App Preparation**

- ① Install the Local configuration App and Cloud monitoring App with latest version. Refer to "8.2 Cloud monitoring App and 8.3 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.

### **7.2 Inspection before Commissioning**

Check the following items before starting the inverter:

- ① All equipment has been reliably installed.
- ② DC switch(es) 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 is).
- ⑨ The AC circuit breaker is selected in accordance with the requirements of this manual and local standards.
- ⑩ All warning signs & labels are intact and legible.

### **7.3 Commissioning Procedure**

If all of the items mentioned above meet the requirements, proceed as follows to start up the inverter for the first time.

- 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 the DC switch, the DC switch may be integrated in the inverter or installed by the customer.
- ④ The inverter will work properly after turning on the DC and AC breakers on the condition 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.



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 at.
- ② Select the battery ID suitable for the battery is installed.



#### CT AUTO TEST FUNCTION

Wattsonic 4.0-20.0kW-3P Series 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.



#### 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 to enable this function.)

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

## 7.4 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.



## 8 Screen Operation

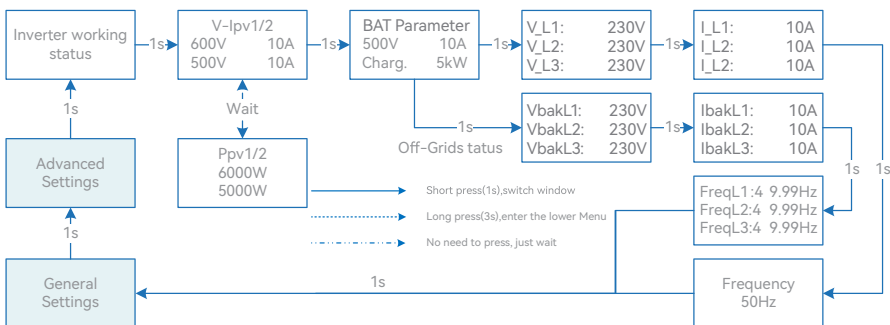
When the inverter is turned on, the following interfaces will be displayed on the OLED display, and the OLED display allows the user to check various operation information and to modify the settings of the inverter.



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.

### 8.1 Main Window



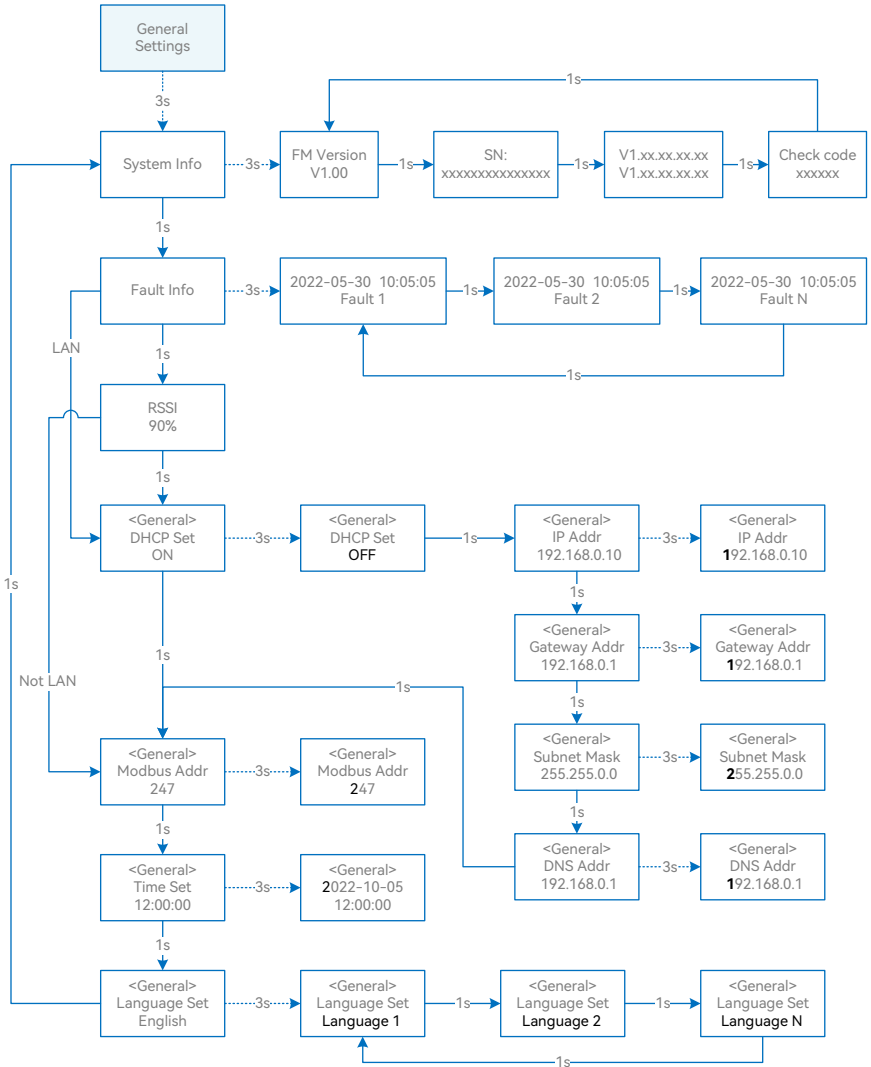
Inverter working status  
Waiting/Checking/On-Grid/Off-Grid/Fault Info/FW Updating

MHT-OLED-01-EN

### 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                           |

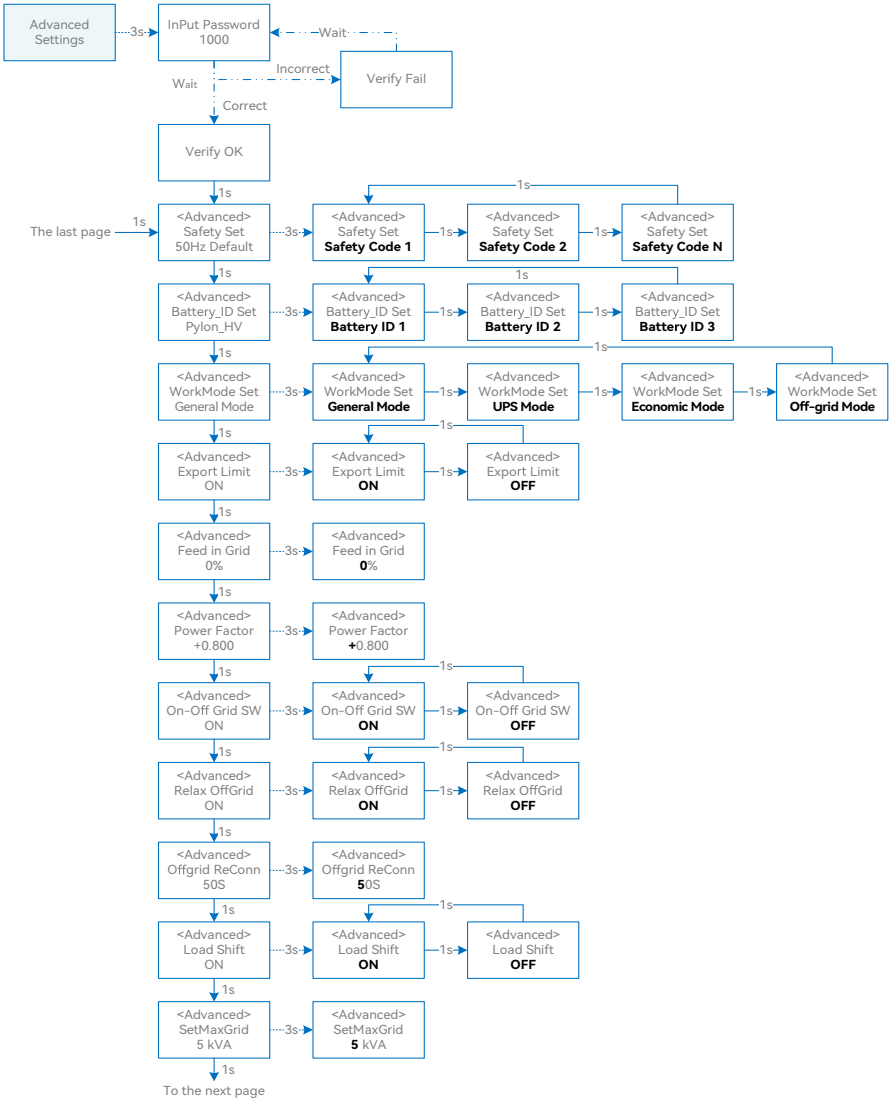
## 8.2 General Setting

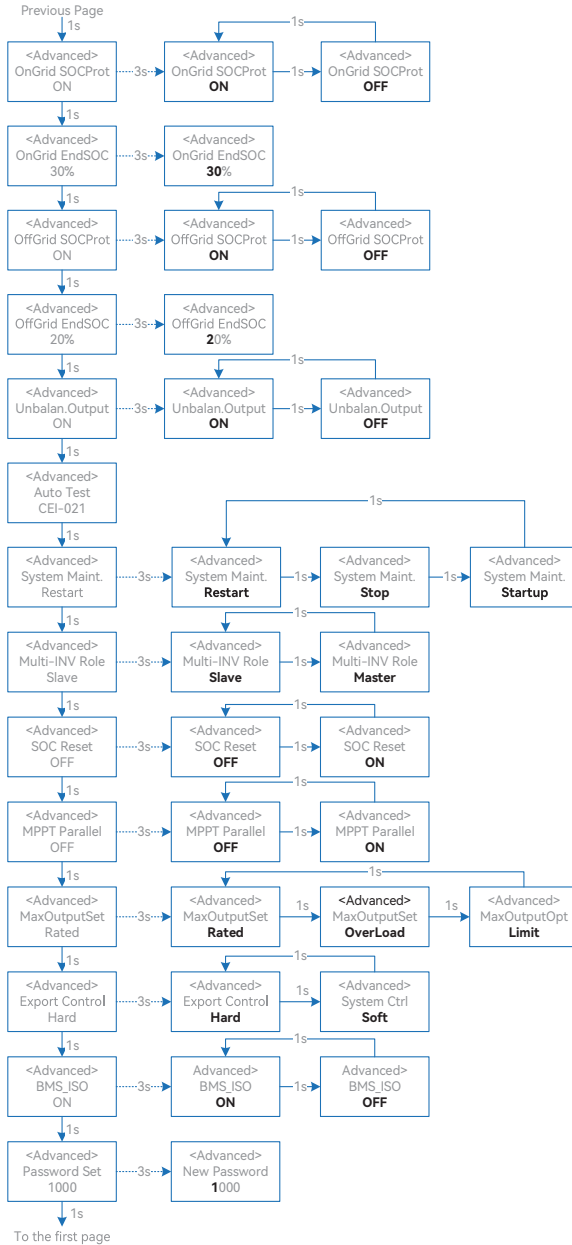


### Inverter Display Abbreviation and Complete Name Reference Table

| 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  |

### 8.3 Advanced Setting





## 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  |
| 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 grid 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.   |

| Abbreviation   | Complete Name   |
|----------------|---|
| 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.   |
| 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 |

## 8.4 Country Code (Safety Code) Setting

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

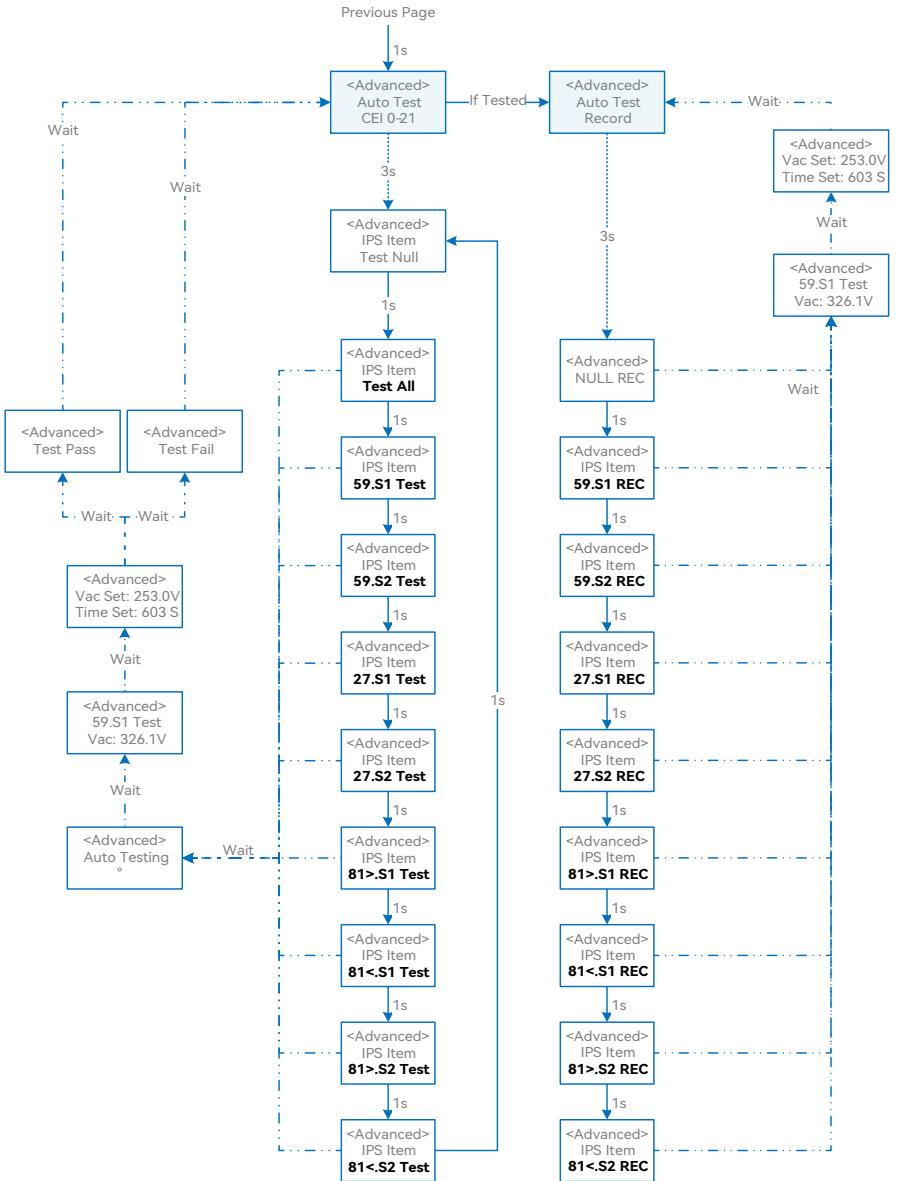
Refer to "7.3 Advanced Setting" for more information.

## 8.5 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 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 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 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:





## 8.6 Reactive Power

The inverter provides a reactive power regulation function.

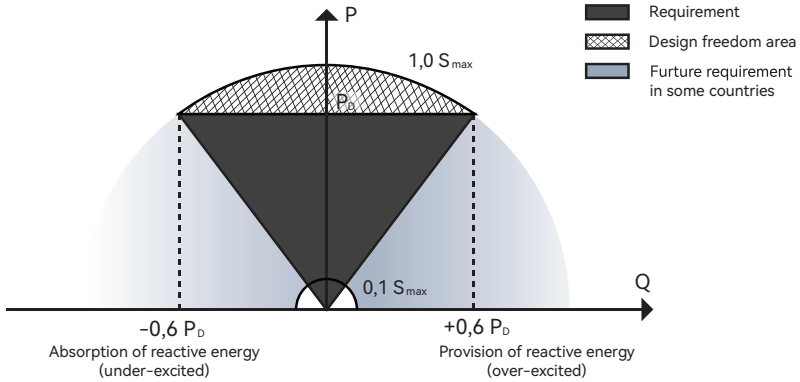


Figure 8-1 Capabilities

This mode can be enabled via configuration software. It is enabled by default in some regions, such as AU, DE market. For information on how to change default setpoints please contact Wattsonic Technical Support at [service@wattsonic.com](mailto:service@wattsonic.com).

Descriptions of reactive power regulation mode:

| 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 Q-Var limits (in %). |
| Q(P) | The PF changes with the output power of the inverter.                     |
| Q(U) | The reactive power changes with the grid voltage.                         |

### ▼ 8.6.1 “Off” Modes

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

### ▼ 8.6.2 “PF” Mode

The power factor is fixed and 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.

### ▼ 8.6.3 “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.

### ▼ 8.6.4 “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                 | 0.8 ~ 1     |
| QP_K2            | Power factor at P2 on the Q(P) mode curve                 |             |
| 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    |

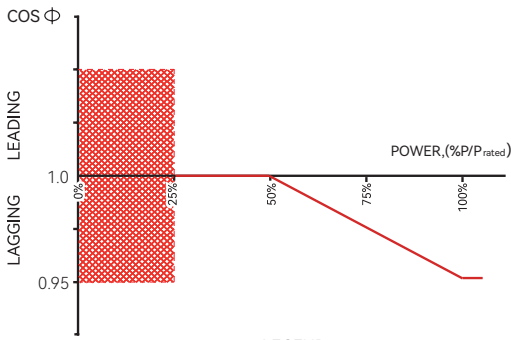


Figure 8-2 Q(P) Curve

▼ 8.6.5 “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 |

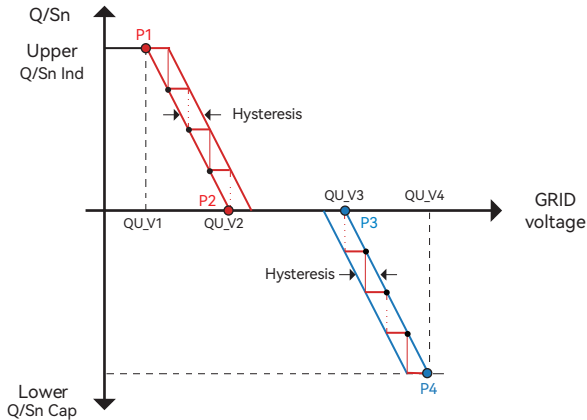


Figure 8-3 Q(U) Curve

## 9 Monitoring

### 9.1 Monitoring Device

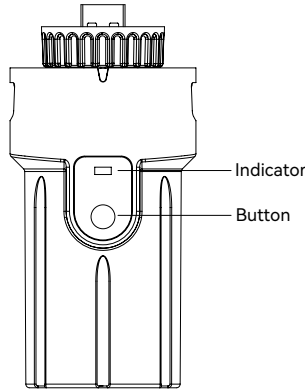


Figure 8-1 Monitoring device display interface

| 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. |



The WiFi version module needs to be configured to the router for 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] which is 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] which is attached to the accessory bag.

## 9.2 Cloud monitoring App

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

## 9.3 Local configuration App

Local configuration App is designed for quick configuration of 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 side of enclosure to get the application. If download issues exist, contact your dealer or Wattsonic technical support.

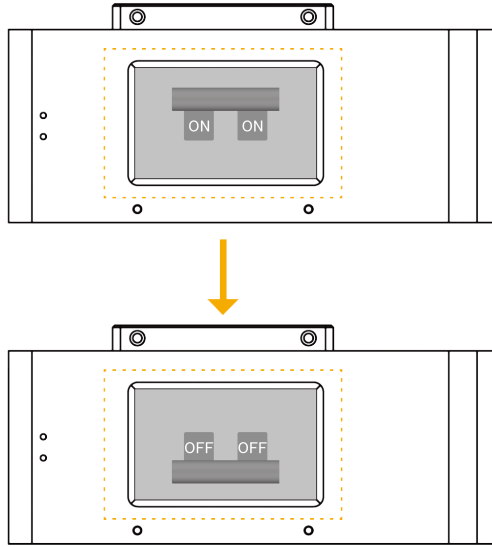
## 9.4 Battery Start and Stop

### Start Battery

Turn on the DC Switch on the Sub-Master BMS. When the indicator light on the Sub-Master BMS flashing 5 times with solid green or the display show correct system information with no error.

### Stop Battery

Turn off the DC Switch on the Sub-Master BMS.



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.

## 10 Troubleshooting

### 10.1 Error Message

Wattsonic 4.0-20.0kW-3P Series is designed in accordance with grid operation standards, and conform to the requirements of safety and EMC. The inverter had passed a series of rigorous tests to ensure it runs 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 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.   | <ol style="list-style-type: none"><li>1. Check whether the mains supply is lost.</li><li>2. Check whether the AC breaker and terminal are well connected.</li></ol>  |
| Grid Voltage Fault   | Grid overvoltage or undervoltage, the grid voltage is higher or lower than the set protection value.   | <ol style="list-style-type: none"><li>1. Check whether the impedance of the AC cable is too high to lead the grid voltage increased. Change a thicker AC cable if it is.</li><li>2. Extend the voltage protection range if it is allowed by the electricity company.</li></ol> |
| Grid Frequency Fault | Grid over frequency or underfrequency, the grid frequency is higher or lower than the set protection value.                                    | <ol style="list-style-type: none"><li>1. Check whether the AC cable is correct and well connected.</li><li>2. Change to another country with wider protection range if it's allowed by the local electricity company.</li></ol>  |
| GFCI Fault           | DC injection High. Inverter detects a higher DC component in AC output.  | <ol style="list-style-type: none"><li>1. Restart the inverter.</li><li>2. Seek for help from the installer or manufacturer.</li></ol>  |
| ISO Over Limitation  | Low system insulation resistance, which is generally caused by poor insulation to ground of the module/cable or by rainy and damp environment. | <ol style="list-style-type: none"><li>1. Restart the inverter.</li><li>2. Check if the insulation of the wires in PV, battery, and AC is damaged.</li></ol> Seek for help from the installer or manufacturer.  |

| Error Message             | Description   | Solution  |
|---------------------------|---|---|
| GFCI Fault                | Excessive leakage current.  | <ol style="list-style-type: none"> <li>1. Restart the inverter.</li> <li>2. Check if the insulation of the wires in PV, battery, and AC is damaged.</li> <li>3. Seek for help from the installer or manufacture.</li> </ol> |
| PV Over Voltage           | PV over voltage is too high.  | <ol style="list-style-type: none"> <li>1. Reduce the number of PV panels to make sure the open-circuit voltage of each string is lower than the inverter max allowed input voltage.</li> </ol>                              |
| Bus Voltage Fault         | BUS voltage is over-high.   | <ol style="list-style-type: none"> <li>1. Check whether the input voltage is over the limitation.</li> <li>2. Seek for help from the installer or manufacture.</li> </ol>   |
| Inverter Over Temperature | Temperature anomaly, the temperature of the interior of the inverter is excessively high and out of the safe range. | <ol style="list-style-type: none"> <li>1. Check if the heat dissipation of the inverter is normal.</li> <li>2. Seek for help from the installer or manufacture.</li> </ol>  |
| SPI Fault                 | Internal communication fails. Caused by a strong external magnetic field etc.                                       | <ol style="list-style-type: none"> <li>1. Restart the inverter.</li> <li>2. Seek for help from the installer or manufacture.</li> </ol>   |
| E2 Fault                  | Internal storage anomaly. Caused by a strong external magnetic field etc.   | <ol style="list-style-type: none"> <li>1. Restart the inverter.</li> <li>2. Seek for help from the installer or manufacture.</li> </ol>   |
| GFCI Device Fault         | GFCI device anomaly.  | <ol style="list-style-type: none"> <li>1. Restart the inverter.</li> <li>2. Seek for help from the installer or manufacture.</li> </ol>   |



| Error Message          | Description  | Solution  |
|------------------------|--|---|
| AC Transducer Fault    | AC transducer anomaly.   | <ol style="list-style-type: none"> <li>1. Restart the inverter.</li> <li>2. Seek for help from the installer or manufacturer.</li> </ol>  |
| Relay Check Fail       | Self-checking of relay fails. neutral & ground cable are not connected well on AC side or just occasional failure. | <ol style="list-style-type: none"> <li>1. Check use multi-meter if there is high voltage (normally should be lower than 10V) between N&amp;PE cable on AC side. If the voltage higher than 10V, it means the Neutral &amp; ground cable are not connected well on AC side or restart inverter.</li> <li>2. If the neutral &amp; ground cable are connected well, please contact Wattsonic.</li> </ol> |
| Internal Fan Fault     | Internal fan anomaly.  | <ol style="list-style-type: none"> <li>1. Restart the inverter.</li> <li>2. Seek for help from the installer or manufacturer.</li> </ol>  |
| External Fan Fault     | External fan anomaly.  | <ol style="list-style-type: none"> <li>1. Stop the inverter and disconnect the AC&amp;DC cables.</li> <li>2. Check whether the fan is blocked by foreign matters. If not, replace the fan.</li> </ol>   |
| Bus Voltage Hard Fault | BUS voltage is over-high   | <ol style="list-style-type: none"> <li>1. Restart the inverter.</li> <li>2. Seek for help from the installer or manufacturer.</li> </ol>  |
| PV Power Low           | PV power Low.  | <ol style="list-style-type: none"> <li>1. Check if part of the PV array is sheltered.</li> <li>2. Check if the sunlight is sufficient at the PV installed area.</li> </ol>  |

| Error Message | Description                        | Solution  |
|---------------|------------------------------------|---|
| Bat OV        | Battery voltage is too high.       | <ol style="list-style-type: none"> <li>1. Check whether the battery voltage exceeds the upper limit of the battery.</li> <li>2. Check battery terminal wiring.</li> </ol> |
| Backup OV     | Backup output voltage is too high. | <ol style="list-style-type: none"> <li>1. Restart the inverter.</li> <li>2. Check the inverter Backup side wiring.</li> </ol>   |
| Bus Volt Low  | Bus voltage is too low.            | <ol style="list-style-type: none"> <li>1. Restart the inverter.</li> <li>2. Seek for help from the installer or manufacture.</li> </ol>                                   |
| Hard Fault    | Other faults.                      | <ol style="list-style-type: none"> <li>1. Restart the inverter.</li> <li>2. Seek for help from the installer or manufacture.</li> </ol>                                   |
| Backup OP     | Backup output overload.            | <ol style="list-style-type: none"> <li>1. Reduce loads connected in the Backup side.</li> <li>2. Restart the inverter.</li> </ol>   |
| Inverter OV   | Backup output overvoltage.         | <ol style="list-style-type: none"> <li>1. Restart the inverter.</li> <li>2. Seek for help from the installer or manufacture.</li> </ol>                                   |
| Inverter OF   | Backup output over frequency.      | <ol style="list-style-type: none"> <li>1. Restart the inverter.</li> <li>2. Seek for help from the installer or manufacture.</li> </ol>                                   |

| Error Message    | Description   | Solution  |
|------------------|---|---|
| Inverter OC      | Backup output overcurrent.  | <ol style="list-style-type: none"><li>1. Restart the inverter.</li><li>2. Seek for help from the installer or manufacturer.</li></ol> |
| Phase Order Err  | phase sequence error.   | <ol style="list-style-type: none"><li>1. Restart the inverter.</li><li>2. Seek for help from the installer or manufacturer.</li></ol> |
| SCI Fault        | Internal communication fails. Caused by a strong external magnetic field etc. | <ol style="list-style-type: none"><li>1. Restart the inverter.</li><li>2. Seek for help from the installer or manufacturer.</li></ol> |
| FLASH Fault      | Internal storage anomaly. Caused by a strong external magnetic field etc.     | <ol style="list-style-type: none"><li>1. Restart the inverter.</li></ol> Seek for help from the installer or manufacturer.            |
| Meter Comm Fault | Inverter and meter communication abnormal.                                    | <ol style="list-style-type: none"><li>1. Check the Meter wiring.</li><li>2. Check whether the Meter is normal.</li></ol>              |
| Battery Fault    | Battery fault.  | <ol style="list-style-type: none"><li>1. Restart the inverter.</li><li>2. Seek for help from the installer or manufacturer.</li></ol> |

## 10.2 Inverter Maintenance



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

Always keep in mind 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 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 Verify that there is no voltage or current before pulling any connector.



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.



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

Never arbitrarily replace any internal components.

For any maintenance support, please contact Wattsonic. Otherwise, Wattsonic shall not be held liable for any damage caused.



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

### 10.3 Battery Maintenance

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

Please contact your battery supplier for detailed battery installation and maintenance information.



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.



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 charging source prior to connecting or disconnecting battery terminals.
- f) Determine if battery is inadvertently grounded. If inadvertently grounded, remove source from ground. Contact with any part of a grounded battery can result in electrical shock. The likelihood of such shock can be reduced if such grounds are removed during installation and maintenance.

## 10.4 Contact Information

Should you have any question 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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