# X1-Hybrid Series
# User Manual

3.0 kW - 7.5 kW

EN

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## Change History

Changes between document versions are cumulative. The latest version contains all updates made in previous versions.

**Version 01 (Nov.15, 2023)**
  Updated 8.1 Control Panel (Added the description about idle state)
**Version 00 (Sep.20, 2023)**
  Initial release

# Contents

# 1 Notes on this Manual

## 1.1 Scope of Validity

This manual is an integral part of X1-Hybrid G4. It describes the assembly, installation, commissioning, maintenance and failure of the product. Please read it carefully before operating.

| X1-Hybrid-3.0-D | X1-Hybrid-3.7-D | X1-Hybrid-5.0-D X1-Hybrid-5.0K-D | X1-Hybrid-6.0-D | X1-Hybrid-7.5-D |
|---|---|---|---|---|
| X1-Hybrid-3.0-M | X1-Hybrid-3.7-M | X1-Hybrid-5.0-M | X1-Hybrid-6.0-M | X1-Hybrid-7.5-M |

Note: "**X1-Hybrid G4**" Series refers to the energy storage inverter that supports photovoltaic grid-connected.

    "**3.0**" means 3.0 kW.

    "**5.0K-D**" is in compliance with C10/11.

    "**D**" means with "DC Switch", "**M**" means externally attached

X1-Matebox for full load EPS(Off-grid) operation;

X1-Hybrid-5.0/ X1-Hybrid-7.5 complies with Thailand's PEA/MEA grid-connected regulations.

Keep this manual available at any time.

## 1.2 Target Group

This manual is for qualified electricians. The tasks described in this manual can only be performed by qualified electricians.

## 1.3 Symbols Used

The following types of safety instructions and general information appear in this document as described below:

| | |
|---|---|
| ⚠ | **Danger!**<br>"Danger" refers to a dangerous situation that, if not avoided, will result in a high level of risk such as serious injury or even death. |
| ⚠ | **Warning!**<br>"Warning" indicates a hazardous situation which, if not avoided, could result in serious injury or death. |
| ⚠ | **Caution!**<br>"Caution" indicates a hazardous situation which, if not avoided, could result in minor or moderate injury. |
| ☞ | **Notice!**<br>"Notice" provides tips that are valuable for the optimal operation of our product. |

# 2 Safety

## 2.1 Important Safety Instructions

> **Danger!**
>
> **Danger to life due to high voltages in the inverter!**
> The personnel responsible for the installation, electrical connection, debugging, maintenance and fault handling operation of this product need to be trained, master the correct operation method, have the corresponding electrician qualification and safety operation knowledge.

> **Caution!**
>
> When the inverter is working, it is strictly forbidden to touch the shell. The temperature of the shell can be high and there is a risk of scalding.

> **Caution!**
>
> **Radiation may be harmful to health!**
> Do not stay for a long time and keep at least 20 cm away from the inverter.

> **Notice!**
>
> **Ground PV system.**
> Finish PV modules and photovoltaic system grounding in accordance with local requirements to achieve optimal protection of systems and personnel.

> **Warning!**
>
> Ensure that the input DC voltage is below the inverter limit. Excessive DC voltage and current may cause permanent damage or other losses to the inverter, which is not covered by the warranty.

> **Warning!**
>
> Authorized service personnel must disconnect the AC and DC power supply of the inverter before performing any maintenance, cleaning or operation of any circuit connected to the inverter.

> **Warning!**
> The inverter can not be operated when it is running.

> **Warning!**
> Risk of electric shock!

Strictly follow relevant safety specifications for product installation and testing. During installation, operation or maintenance, please read carefully and follow the instructions and precautions on the inverter or user manual. If the operation is incorrect, it may cause personal and property losses. Please keep the user manual properly after use.

This inverter can only use the accessories sold and recommended by us, otherwise it may cause fire, electric shock or casualties.
Without the authorization of our company, you may not open the inverter cover or replace the inverter parts, otherwise the warranty promise of the inverter will be invalid.

The use and operation of the inverter must be carried out in accordance with the instructions in this manual, otherwise this protection will fail and the warranty of the inverter will also fail.
During working, the inverter surface temperature may exceed 60°C, please make sure the inverter cools down before touching, and make sure children can not touch.

When exposed to sunlight, photovoltaic arrays generate dangerous high DC voltages. Please follow our instructions, otherwise it will be life-threatening.

All DC and AC power sources must be disconnected from the inverter for at least 5 minutes before any wiring or electrical operation is performed on the inverter to ensure complete isolation of the inverter and avoid electric shock.

A photovoltaic module used on the inverter must have a IEC61730A rating, and the total open circuit voltage of the photovoltaic string / array is lower than the maximum rated DC input voltage of the inverter. Any damage caused by photovoltaic over voltage is not covered by warranty.

Installation position should be away from wet environment and corrosive substances.

After the inverter and power grid cut off the PV power supply, there will be a certain amount of residual current in a short time, be cautious or it may lead to serious personal injury and even high risk of death.Use a multimeter (impedance at least 1 MΩ) to measure the voltage between the UDC + and the UDC- to ensure that the inverter port is discharged below the safe voltage before starting operation (35 VDC).

➢ **Surge protection devices (SPDs) for PV installation**

> ⚠ **Warning!**
> Over-voltage protection with surge arresters should be provided when the PV power system is installed.
> The grid connected inverter is fitted with SPDs in both PV input side and MAINS side.

Direct or indirect lightning strikes can cause failures. Surge is the main cause of lightning damage to most devices. Surge voltage may occur at photovoltaic input or AC output, especially in remote mountain areas where long distance cable is supplied.

Please consult professionals before installing SPDs.

The external lightning protection device can reduce the influence of direct lightning strike, and the lightning protection device can release surge current to the earth.

If the building installed with external light protection device is far away from the inverter location, in order to protect the inverter from electrical and mechanical damage, the inverter should also install an external lightning protection equipment.

In order to protect DC system, two-stage surge protection equipment is needed between DC cable of inverter and photovoltaic equipment module.

In order to protect the AC system, the level 2 surge protection equipment should be installed at the AC output, located between the inverter and the grid. Installation requirements must comply with IEC61643-21 standard.

All DC cables shall be installed in a distance as short as possible, and the positive and negative cables of the same input need to be bundled together to avoid causing loops in the system. Minimum distance installation and binding requirements also apply to auxiliary grounding and shielding grounding conductors.

➢  **Anti-Islanding Effect**

The islanding effect means that when the power grid is cut off, the grid-connected power generation system fails to detect the power outage and still supplies power to the power grid. This is very dangerous for the maintenance personnel and the power grid on the transmission line.

This inverter use active frequency offset method to prevent islanding effect.

➢  **PE Connection and Leakage Current**

• All inverter's incorporate a certified internal Residual Current Monitoring (RCM) in order to protect against possible electrocution and fire hazard in case of a malfunction in the PV array, cables or inverter.
There are 2 trip thresholds for the RCM as required for certification (IEC 62109-2:2011).
The default value for electrocution protection is 30 mA, and for slow rising current is 300 mA.

· If an external residual current device (RCD) (type A is recommended) is mandatory, the switch must be triggered at a residual current of 300 mA (recommended). RCD of other specifications can also be used according to local standard.

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⚠ **Warning!**
High leakage Current!
Earth connection essential before connecting supply.

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• A faulty ground connection can result in equipment failure, personal and death injuries, and electromagnetic interference.
• Ensure correct according to grounding to IEC62109 and conductor diameter according to STANDARD specification.
• Do not connect the grounding end of the equipment in series to prevent multi-point grounding.
• Electrical appliances must be installed in accordance with the wiring rules of each country.

For United Kingdom
• The installation that connects the equipment to the supply terminals shall comply with the requirements of BS 7671.
• Electrical installation of PV system shall comply with requirements of BS 7671 and IEC 60364-7-712.
• All protective devices cannot be changed.
• User shall ensure that equipment is so installed, designed and operated to maintain at all times compliance with the requirements of ESQCR22(1)(a).

➢  **Battery Safety Instructions**

This inverter should pair with high voltage battery, for the specific parameters such as battery type, nominal voltage and nominal capacity etc., please refer to section 4.3.

Please refer to the matching battery specification for details.

## 2.2 Explanation of Symbols

This section gives an explanation of all the symbols shown on the inverter and on the type label.

● Symbols on the Inverter

| Symbols | Explanation |
| --- | --- |
| | Operating Display |
| | Battery status |
| | Fault indicator |

● Symbols on the Type Label

| Symbols | Explanation |
| --- | --- |
| CE | CE mark.<br>The inverter complies with the requirements of the applicable CE guidelines. |
| UK CA | UKCA mark.<br>The inverter complies with the requirements of the applicable UKCA guidelines. |
| TÜV Rheinland CERTIFIED | TUV certified. |
| | RCM remark. |

| | |
| --- | --- |
| | Beware of hot surface.<br>The inverter can become hot during operation. Avoid contact during operation. |
| | Danger of high voltages.<br>Danger to life due to high voltages in the inverter! |
| | Danger.<br>Risk of electric shock! |
| | Observe enclosed documentation. |
| | The inverter can not be disposed together with the household waste. Disposal information can be found in the enclosed documentation. |
| | Do not operate this inverter until it is isolated from battery, mains and on-site PV generation suppliers. |
| 5min | Danger to life due to high voltage. There is residual voltage existing in the inverter after powering off, which needs 5 min to discharge. Wait 5 min before you open the upper lid or the DC lid. |

### 2.3 EC Directives

This section describes the requirements of the European low voltage regulations, including safety instructions and system licensing conditions, the user must comply with these regulations when installing, operating, and maintaining the inverter, otherwise personal injury or death may occur, and the inverter will be damaged.

Please read the manual carefully when operating the inverter .If you do not understand "Danger", "Warning", "Caution" and the description in the manual, please contact the manufacturer or service agent before installing and operating the inverter.

Make sure that the whole system complies with the requirements of EC(2014/35/EU, 2014/30/EU, etc.) before starting the module (i.e. to start the operation).

Standard of 2014/35/EU (LVD)
 EN IEC 62109-1; EN IEC 62109-2
 EN 62477-1
Standard of 2014/30/EU (EMC)
EN IEC 61000-6-1; EN IEC 61000-6-2;
EN IEC 61000-6-3; EN IEC 61000-6-4;
EN IEC 61000-3-2; EN 61000-3-3;
EN IEC 61000-3-11; EN 61000-3-12
EN 55011

The assembly shall be installed in accordance with the statutory wiring rules. Install and configure the system in accordance with safety rules, including the use of specified wiring methods. The installation of the system can only be done by professional assemblers who are familiar with safety requirements and EMC. The assembler shall ensure that the system complies with the relevant national laws. The individual subassembly of the system shall be interconnected by means of the wiring methods outlined in national/international such as the national electric code (NFPA) No. 70 or VDE regulation 4105.

# 3 Introduction

### 3.1 Basic Features

This inverter is a high-quality inverter that can convert solar energy into alternating current and store energy into batteries.
The inverter can be used to optimize self-consumption, stored in batteries for future use or fed into the public grid. The way it works depends on user preferences. It can provide emergency power during power outages.

### 3.2 System Diagram

The series inverter are designed to has four EPS(Off-grid) wiring schemes, customers can choose EPS(Off-grid) compatible parts Load and EPS(Off-grid) compatible with all load use.
There are different ways of wiring in different countries, one is to connect N line with PE line, the other is to separate the line from the PE line wiring, see below;

**Diagram A: Neutral line and PE line are separated from each other, and the common load is connected to the EPS(Off-grid) port; (For most countries)**
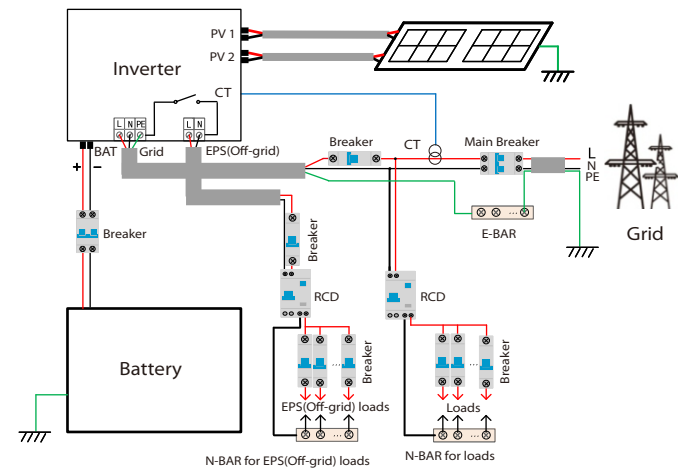
Diagram B: Neutral line and PE line are separated from each other, all loads connect to the EPS(Off-grid) port; (For most countries)
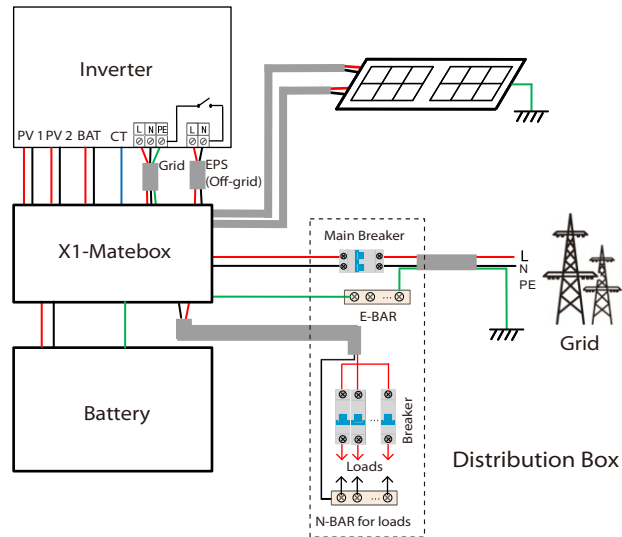


Diagram C: Neutral line and PE line are combined together, and the common load is connected to the EPS(Off-grid) port;
(Apply to Australia)
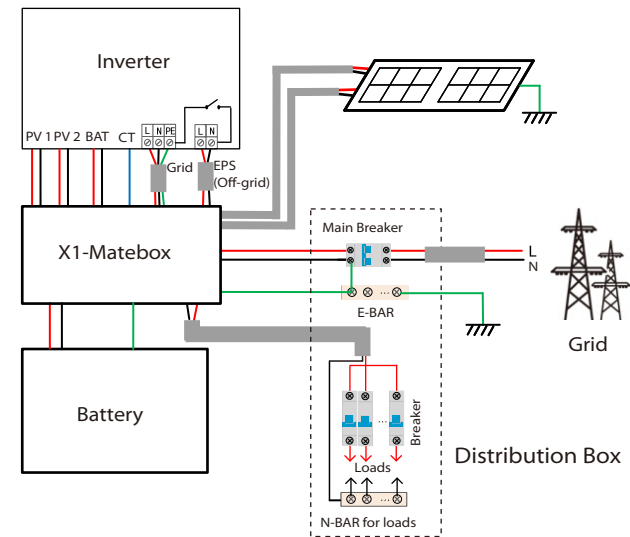
Diagram D: Neutral line and PE line are combined together, all loads connect to the EPS(Off-grid) port; (Apply to Australia)
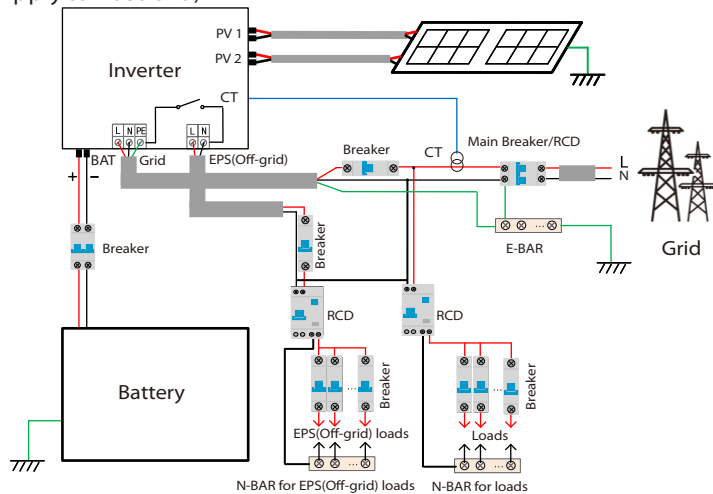


**Notice!**
• When power cuts suddenly, the inverter connects the N line of EPS(Off-grid) load with the ground through relay, providing a fixed zero potential for EPS(Off-grid) load and ensuring the safety of electricity use by users.

• Please control the inverter load and make sure it is "output value" in "within " EPS(Off-grid) mode, otherwise the inverter will stop and alarm overload fault".

• Please confirm with the grid operator whether there are special regulations for grid connection.

## 3.3 Work Modes
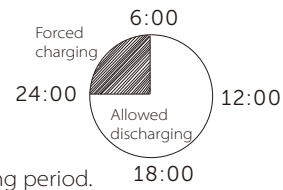


The inverter has two settable working periods:
allowed discharging period and forced charging period.
For how to set the two working periods, please refer to page 92.
The default value of allowed discharging period is 00:00~23:59, and the
default value of forced charging period is 00:00~00:00 (closed in default).
You can set the two working periods by yourself.
As shown in the example above, the allowed discharging period is 6 am to
24 pm, and the forced charging period is 24 pm to 6 am.

### • Forced charging period

The priority of forced charging period is higher than all work modes.
Under the forced charging period, the inverter will charge the battery first
until the battery SOC reaches the value of "charge battery to".

### • Allowed discharging period

Under the allowed discharging period, the inverter will allow the battery to
discharge (but not force the battery to discharge).
The following work modes will take effect under the allowed discharging
period.

For **on-grid** status, there are five work modes: Self Use, Feed-in Priority,
Backup, Manual and Peak shaving mode.

### Self Use



The self-use mode is suitable for areas with low feed-in
subsidies and high electricity prices.
The power of PV will supply the loads first, and surplus
power will charge the battery, then the remaining
power will feed into the grid.

Priority: Loads > Battery > Grid

### Feed-in priority



The feed-in priority mode is suitable for areas with
high feed-in subsidies, but has feed-in power
limitation.
The power of PV will supply the loads first, and surplus
power will feed into the grid, then the remaining
power will charge the battery.

Priority: Loads > Grid > Battery

### Backup mode



The back-up mode is suitable for areas with
frequent power outages.
This mode will maintain the battery capacity at
a relatively high level, to ensure that the
emergency loads can be used when the grid is
off.
Same working logic with "Self-use" mode.

Priority: Loads > Battery > Grid

---

* For the above three work modes, when the power of PV is insufficient to
supply the loads, the battery will supply the loads. If the battery is insufficient,
then the grid will supply the loads.

### Manual

This work mode is for the after-sales team to do after-sales maintenance.

For **off-grid** status, there is only one work mode: EPS (Off-grid).

### EPS (Off-grid)



In case of power failure, the system will supply EPS
loads through PV and battery.
(The battery must be installed, and EPS loads shall
not exceed battery's max. output power.)
The power of PV will charge the loads first, and
surplus power will charge the battery.

Priority: Loads > Battery

---

Note:
The battery will stop discharging when SOC=min SOC. But due to
battery self consumption, sometimes SOC may < min SOC.

For on-grid status, if the battery SOC ≤ (min SOC-5%), the inverter will
take utility energy to charge battery SOC back to (min SOC+1%).

For off-grid status, if the battery SOC ≤min SOC, the inverter will be
unable to enter EPS mode (the battery will be unable to discharge)
unless SOC is back to 31%.

### Peak shaving mode

Peak shaving mode is set for leaving out peaks in electricity use.



The D-A period is the battery charging period during which discharging is not allowed and the PV will charge the battery first for peak shaving.  The ChargeFromGrid" setting determines whether or not to charge from the grid.  When "ChargeFromGrid" is set to "Disable", the battery cannot charge from the grid; when "ChargeFromGrid" is set to "Enable" and the actual battery SOC is less than "Max_SOC", the battery will charge from the grid at no more than "ChargePowerLimits" power.

In the A-B and C-D periods, if the power of loads does not exceed "PeakLimits", the PV will charge the battery first.When the battery is fully charged, the PV will charge loads, and the surplus power will feed into the grid. If the power of loads exceeds "PeakLimits", the PV and battery will discharge energy for loads and thus reduce the amount of energy purchased from the grid.

In the B-C period, the battery does not discharge. The PV will charge the battery to the "Reserved SOC" first and then supply power or loads, with the surplus power feeding into the grid. Charging the battery first in these peiods is storing energy for the peak shaving.

* If there are requirements for zero output from the inverter, the PV output will be limited.

## 3.4 Micro Grid

### Introduction

There are a large number of traditional on-grid inverters on the market. Due to Islanding Effect, on-grid inverters are unable to work during off-grid. This feature makes users lose the on-grid inverter PV energy when off-grid.
Micro-grid is a function that makes hybrid inverter simulate the grid to active on-grid inverter during off-grid. By connecting on-grid inverter to the  EPS port of  hybrid inverter, hybrid  inverter is  able to use PV or battery energy to active on-grid inverter when utility lost.
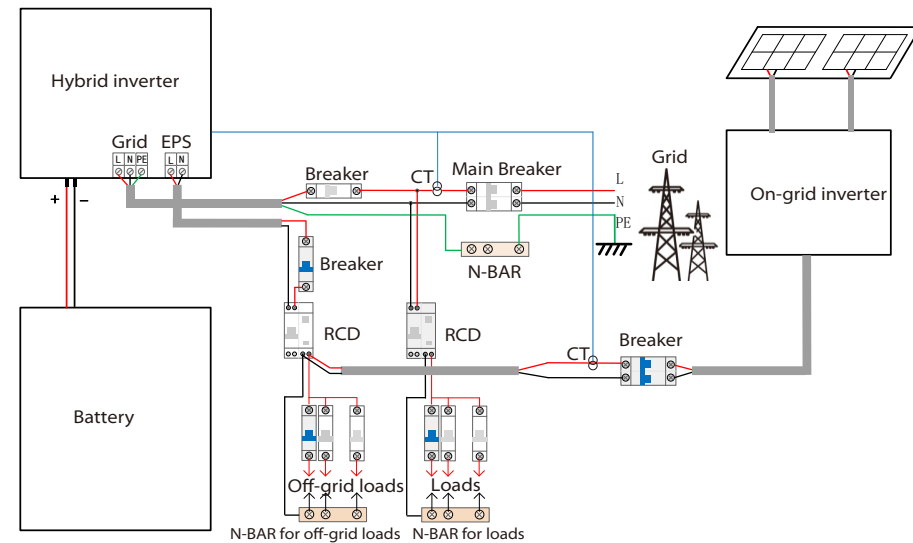


### Configuration

1. Strictly follow the above wiring diagram.
2. Enable: "Settings"→"Advanced settings"→"MicroGrid".

## Compatibility

On-grid inverter: Any brand on-grid inverter that supports "Response to an Increase in Frequency".

On-grid inverter output power ≤ Max hybrid inverter EPS output power
On-grid inverter output power ≤ Max battery charging power

| Battery Quantity | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| On-grid Inverter power upper limitation for T-BAT-5.8 | 3.0 kW | 6.0 kW | 7.5 kW | Unsupported |
| On-grid Inverter power upper limitation for T-BAT-3.0 | 3.0 kW | 6.0 kW | 7.5 kW | 7.5 kW |

### Note :

Since hybrid inverter is unable to control on-grid inverter, therefore hybrid inverter can not achieve zero injection when loads power + battery charging power < on-grid inverter output power.

## 3.5 Dimension



482 mm

181 mm

417 mm
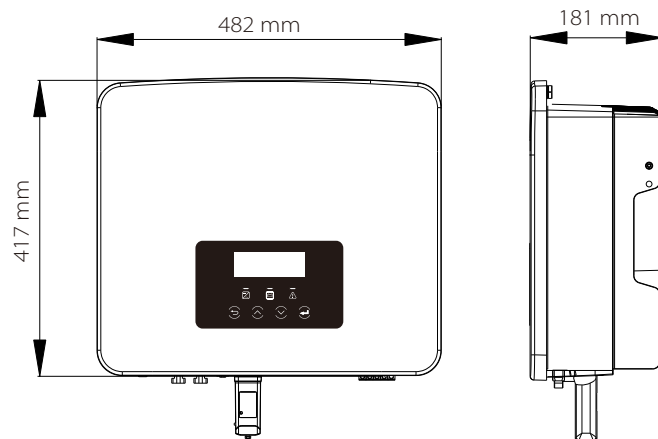
## 3.6 Terminals of Inverter
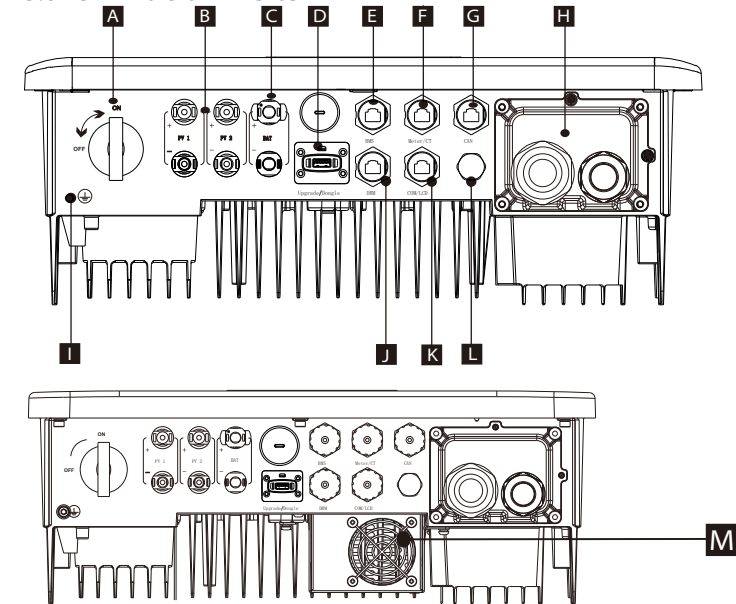


| Object | Description |
|---|---|
| A | DC switch |
| B | PV connection port |
| C | Battery connection port |
| D | USB port for upgrading/ External monitoring connection port |
| E | Battery communication port |
| F | Meter/CT Port |
| G | CAN is a reserved port |
| H | Grid/EPS (Off-grid) Output port |
| I | Ground connection port |
| J | DRM Port (only for Australia) |
| K | Communications/ LCD is a reserved port |
| L | Waterproof valve |
| M | Fans (only for X1-Hybrid-7.5-D and X1-Hybrid-7.5-M ) |

⚠ **Warning!**
Qualified electrician required for the installation.

# 4  Technical Data

## 4.1 DC Input  (apply to version D/M)

| Model | X1-Hybrid-3.0 | X1-Hybrid-3.7 | X1-Hybrid-5.0 X1-Hybrid-5.0K-D | X1-Hybrid-6.0 | X1-Hybrid-7.5 |
|---|---|---|---|---|---|
| Max. recommended PV power[1] [W] | 6000 | 7400 | 10000 | 12000 | 15000 |
| Max. PV Voltage [d.c. V] | 600 | 600 | 600 | 600 | 600 |
| Nominal DC operating voltage [d.c. V] | 360 | 360 | 360 | 360 | 360 |
| MPPT voltage range [d.c. V] | | | 70-550 | | |
| MPPT full power voltage range [d.c. V] | 115-480 | 135-480 | 190-480 | 225-480 | 280-480 |
| Max. PV Current  [d.c. A] | 16/16 | 16/16 | 16/16 | 16/16 | 16/16 |
| Isc PV array Short Circuit Current [d.c. A] | 20/20 | 20/20 | 20/20 | 20/20 | 20/20 |
| Start output voltage [d.c.V] | 90 | 90 | 90 | 90 | 90 |
| Max. inverter backfeed current to the array [d.c.V] | 0 | 0 | 0 | 0 | 0 |
| No. of MPP trackers | 2 | 2 | 2 | 2 | 2 |
| Strings per MPP tracker | 1 | 1 | 1 | 1 | 1 |

Note: Marked with "[1]" indicates that A single channel MPPT can only input a maximum of 5000W

## 4.2 AC Output / Input (apply to version D/M)

| Model | X1-Hybrid-3.0 | X1-Hybrid-3.7 | X1-Hybrid-5.0 X1-Hybrid-5.0K-D | X1-Hybrid-6.0 | X1-Hybrid-7.5 |
|---|---|---|---|---|---|
| **AC Output** | | | | | |
| Rated Output Apparent Power [VA] | 3000 | 3680 | 5000 (Germany 4600, AU 4999) (5.0K-D 4999) | 6000 | 7500 (PEA 6900) |
| Max. Output Apparent Power [VA] | 3300 | 3680 | 5500 (Germany 4600, AU 4999) (5.0K-D 4999) | 6600 | 7500 (PEA 7300) |
| Nominal AC voltage [a.c. V] | | | 220/ 230/ 240 (180 to 270) | | |
| Frequency [Hz] | | | 50/60 | | |
| Rated Output Current [a.c. A] | 13 | 16 | 21.7 | 26.1 | 32.6 |
| Max. Output Continuous Current [a.c. A] | 14.4 | 16 | 23.9 (Germany 20, AU 21.7) | 28.6 | 32.6 (PEA 33) |
| Current (inrush)(at 50μs) [a.c. A] | | | 10 | | |
| Maximum output fault current (at 1ms) [a.c. A] | | | 91 | | |
| Maximum output overcurrent protection [a.c. A] | | | 65 | | |
| Power factor range | | | 0.8 leading - 0.8 lagging | | |
| Total harmonic distortion (THDi) | | | < 2% | | |

## AC Input

| AC Input | | | | | |
|---|---|---|---|---|---|
| Max. apparent power [VA] | 6300 | 7360 | 9200 | 9200 | 9200 |
| Rated AC power [W] | 3000 | 3680 | 5000 | 6000 | 7500 |
| Nominal AC voltage [a.c. V] | | | 220/230/240 (180 to 270) | | |
| Frequency [Hz] | | | 50/60 | | |
| Max. AC input current [a.c. A] | 27.4 | 32 | 40 | 40 | 40 |
| Power factor range | | | 0.8 leading - 0.8 lagging | | |

## 4.3 Battery (apply to version D/M)

| Model | X1-Hybrid-3.0 | X1-Hybrid-3.7 | X1-Hybrid-5.0 X1-Hybrid-5.0K-D | X1-Hybrid-6.0 | X1-Hybrid-7.5 |
|---|---|---|---|---|---|
| Battery type | | | Lithium batteries | | |
| Battery voltage range [d.c. V] | | | 80-480 | | |
| Max. continuous charge/discharge current [d.c. A] | | | 30 | | |
| Communication interface | | | CAN/RS485 | | |
| Reverse connection protection | | | Yes | | |

## 4.4 Efficiency, Safety and Protection (apply to version D/M)

| Model | X1-Hybrid-3.0 | X1-Hybrid-3.7 | X1-Hybrid-5.0 X1-Hybrid-5.0K-D | X1-Hybrid-6.0 | X1-Hybrid-7.5 |
|---|---|---|---|---|---|
| MPPT efficiency | 99.9% | 99.9% | 99.9% | 99.9% | 99.9% |
| European efficiency | 97.0% | 97.0% | 97.0% | 97.0% | 97.0% |
| Maximum efficiency | 97.6% | 97.6% | 97.6% | 97.6% | 97.6% |
| Max. battery charge efficiency (PV to BAT) (@ full load) | 97.0% | 97.0% | 97.0% | 97.0% | 97.0% |
| Max. battery discharge efficiency (BAT to AC) (@ full load) | 97.0% | 97.0% | 97.0% | 97.0% | 97.0% |
| **Security & Protection** | | | | | |
| Safety | | | IEC/EN 62109-1/-2 | | |
| Grid Monitoring | | EN50549, VDE-AR-N 4105,  C10/11, CEI 0-21, G98, G99, AS/NZS4777.2 | | | |
| DC SPD Protection | | | Integrated | | |
| AC SPD Protection | | | Integrated | | |
| Over/under voltage protection | | | YES | | |
| Grid protection | | | YES | | |
| DC injection monitoring | | | YES | | |
| Back feed current monitoring | | | YES | | |
| Residual current detection | | | YES | | |
| Active anti-islanding method | | | Frequency Shift | | |
| Over load protection | | | YES | | |
| Over heat protection | | | YES | | |
| Array insulation resistance detection | | | YES | | |

## 4.5 EPS (Off-grid) Output (apply to version D/M)

| Model | X1-Hybrid-3.0 | X1-Hybrid-3.7 | X1-Hybrid-5.0 X1-Hybrid-5.0K-D | X1-Hybrid-6.0 | X1-Hybrid-7.5 |
|---|---|---|---|---|---|
| Rated EPS Apparent Power [VA] | 3000 | 3680 | 5000 | 6000 | 7500 |
| Nominal EPS Voltage [a.c. V] | 230VAC | | | | |
| Frequency [Hz] | 50/60 | | | | |
| Rated EPS Current [a.c. A] | 13 | 16 | 21.7 | 26.1 | 32.6 |
| EPS (Off-grid) Peak Power [VA] | 6000,10s | 6000,10s | 7500,10s | 9000,10s | 11250,10s |
| Switching time (typical value) [ms] | internal switch<10, external switch＜100 | | | | |
| Total harmonic distortion (THDv) | <2% | | | | |

## 4.6 Generic Data (apply to version D/M)

| Model | X1-Hybrid-3.0 | X1-Hybrid-3.7 | X1-Hybrid-5.0 X1-Hybrid-5.0K-D | X1-Hybrid-6.0 | X1-Hybrid-7.5 |
|---|---|---|---|---|---|
| Dimensions (W/H/D) [mm] | 482*417*181 | | | | |
| Dimensions of Packing (W/H/D) [mm] | 590*530*315 | | | | |
| Net weight [kg] | 24 | 24 | 24 | 24 | 25 |
| Gross weight * [kg] | 28 | 28 | 28 | 28 | 29 |
| Heat dissipation treatment | Natural Cooling | | | | Smart Cooling |
| Noise emission (typical) [dB] | <30 | | | | <45 |
| Storage temperature range [°C] | -40 to +65 | | | | |
| Operating ambient temperature range [°C] | -35 to +60 (derating at 45) | | | | |
| Humidity [%] | 0% to 100% | | | | |
| Altitude [m] | <3000 | | | | |
| Ingress protection | IP65 | | | | |
| Protective class | I | | | | |
| Cold standby consumption | <3W | | | | |
| Overvoltage category | III(MAINS), II(PV, Battery) | | | | |
| Pollution degree | III | | | | |
| Installation mode | Wall mounted | | | | |
| Inverter topology | Non-isolated | | | | |
| Communication interface | Meter/ CT, external control RS485, Dongle series (optional), DRM, USB | | | | |
| Standard warranty | Standard 10 years | | | | |

\*  The specific gross weight is subject to the actual situation of the whole machine, which may be a little different due to the influence of the external environment.
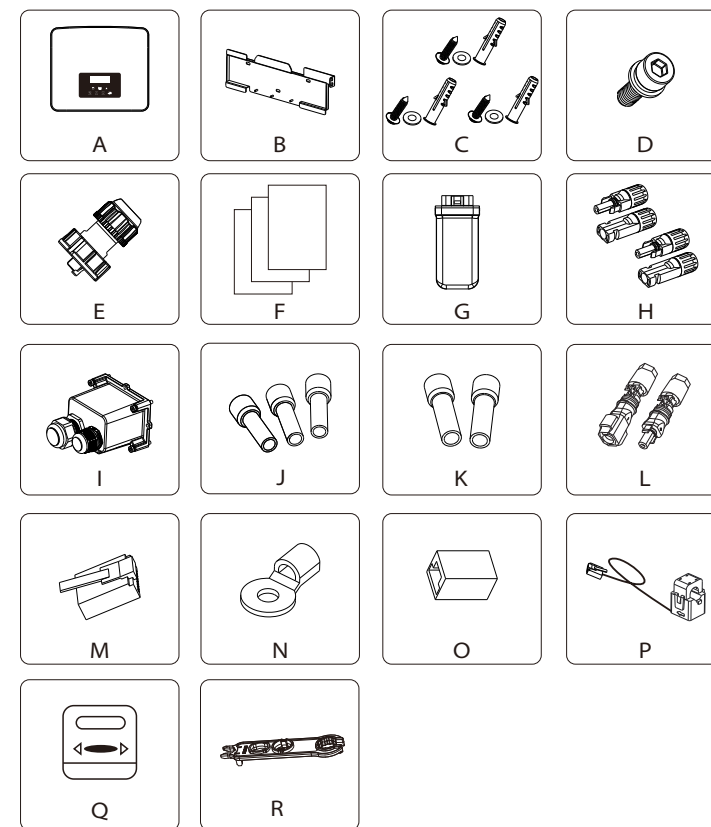
# 5 Installation

## 5.1 Check for Transport Damage

Ensure that the inverter is in good condition via transportation. If there is any visible damage such as cracks, please contact the dealer immediately.

## 5.2 Packing List

Open the package and check  the materials and accessories according to the following list.

### M series

| Number | Quantity | Description |
|--------|----------|-------------|
| A | 1 | Inverter |
| B | 1 | Bracket |
| C | 3 | (Expansion bolt, Gasket, Self-tapping bolt)*3 |
| D | 1 | M5 inner hexagon bolt |
| E★ | 3/2 | Waterproof connector with RJ45 |
| F | / | Documents |
| G | 1 | WiFi Dongle (optional) |
| H | 1 | Meter (optional) |
| R | 1 | Disassembling tool for PV terminal |

### D series

| Number | Quantity | Description |
|--------|----------|-------------|
| A | 1 | Inverter |
| B | 1 | Bracket |
| C | 3 | (Expansion bolt, Gasket, Self-tapping bolt)*3 |
| D | 1 | M5 inner hexagon bolt |
| E★ | 4/3 | Waterproof connector with RJ45 |
| F | / | Documents |
| G | 1 | WiFi Dongle (optional) |
| H | 4 | PV terminal (positive*2 , negative*2) |
| I | 1 | Waterproof shield |
| J | 3 | 8 mm² European terminal |
| K | 2 | 6 mm² European terminal |
| L | 2 | Battery connection terminal (positive*1, negative*1) |
| M | 1 | RJ45 terminal |
| N | 1 | OT terminal (inverter grounding) |
| O | 1 | RJ45 terminal adapter |
| P | 1 | CT |
| Q | 1 | Meter (optional) |
| R | 1 | Disassembling tool for PV terminal |

Note:
"E" marked with "★" indicates that, the M-series inverter is equipped with 3 pieces for Australia and 2 pieces for other countries, and the D-series inverter is equipped with 4 pieces for Australia and 3 pieces for other countries.
*For the optional accessories, please be subject to the actual delivery.

## 5.3 Installation Precautions

The protection level of this inverter is IP 65, so that the inverter can be installed outdoors.
Check the installation environment and pay attention to the following conditions when installing:
 • Do not expose to strong light.
 • Do not touch flammable building materials.
 • Do not approach flammable and explosive gases or liquids (e.g. where chemicals are stored).
 • Do not touch cold air directly.
 • Do not approach TV antenna or cable.
 • Do not place in areas above 3000 meters above sea level.
 • Do not install in precipitation or high humidity, which may cause corrosion or damage Internal devices.
 • Keep the system out of reach of children.
 If the inverter is installed in a narrow area, be sure to reserve appropriate space for heat dissipation.
 The ambient temperature of the installation site is -35℃~60℃.
 The maximum angle range of wall tilt ±5°.
 Avoid direct sunlight, rain and snow weather.
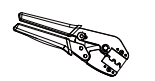
| | | |
|---|---|---|
| No direct sunlight | No rain exposure | No snow lay up |

| | | | | |
|---|---|---|---|---|
| Stay away from combustibles | Direct Sunlight | Rain Exposure | Snow Lay up | Stay away from antenna cables |

## 5.4 Tool preparation

| Type | Name | Image | Name | Image |
|------|------|-------|------|-------|
| Machine Installation Tools | Hammer drill | Bit Φ10 | Multimeter | DC Voltage Range ≥1100 V DC |
| | Torque screwdriver | Crosshead M5 | Socket wrench set (Hexagon) | |
| | OT terminals press clamp | 0.5 mm² ~ 6 mm² | Diagonal pliers | |
| | Utility knife | | Multifunction terminal crimping tool (RJ45) | |
| | Diagonal poliers | | Marker | |
| | Rubber hammer | | Tape measure | |
| | Crimping Tool | | Hexagon keys | |
| | European terminal crimping tool | | Spirit level | |
| | Crimping tool for PV terminal | | | |
| Individual Protection Tools | Dustproof Cover | | Protective glasses | |

| Type | Name | Image | Name | Image |
|------|------|-------|------|-------|
| Individual Protection Tool | Safety gloves | | Safety shoes | |

| Type | Name | Image | Requirement |
|------|------|-------|-------------|
| Equipment Preparation | Breaker | | Grid port and EPS(Off-grid) port wiring section |
| Cable Preparation | PV end wire | | Dedicated PV wire, line number ＃4 mm² withstand voltage 1000 V, temperature resistance 105℃ fire resistance grade VW-1 |
| | EPS(Off-grid) end wire | | Double Core Cables |
| | Grid end wire | | Triple Core Cables |
| | Communication lines | | Twisted pair with shield |
| | Battery Cable | | Conventional wire |
| | PE Cable | | Conventional wire |

### 5.5 Installation Site Conditions

#### 5.5.1 Installation Carrier Requirements

Do not install the inverter near flammable materials.

Please install the inverter on a solid object that can withstand the weight requirements of the inverter and energy storage system.

Please be careful not to install the inverter in the plasterboard wall or similar to the residential places with poor sound insulation ,so as not to work with noise and interfere with the residents life in the morning.

#### 5.5.2 Installation Requirements

Install the inverter at a maximum back tilt of 5 degrees, the inverter can not be tilted forward, inverted, excessive back tilted or side tilted.
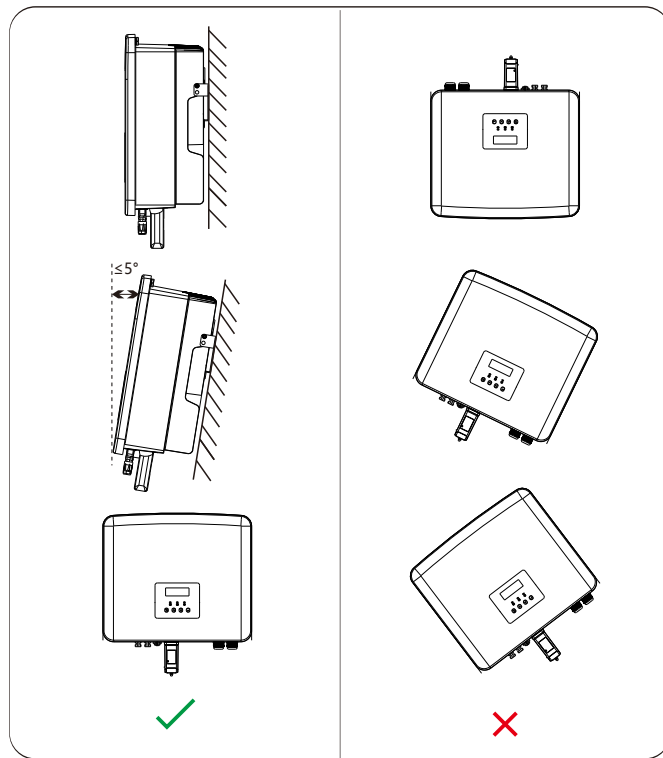


#### 5.5.3 Installation Space Requirements

Reserve enough space when installing inverter (at least 300 mm) for heat dissipation.



Reserved space dimensions of installation

| Position | Min Distance |
| --- | --- |
| Left | 300 mm |
| Right | 300 mm |
| Up | 300 mm |
| Down | 500 mm |
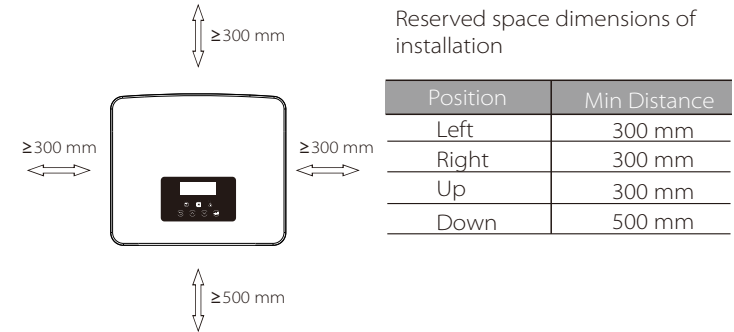
For multi-inverter installation scenarios, the inline installation method is recommended; when the space is insufficient, the recommended method of installation in the form of "products"; it is not recommended to install multiple inverters in stacks. If you choose stack installation, please refer to the installation separation distance below.
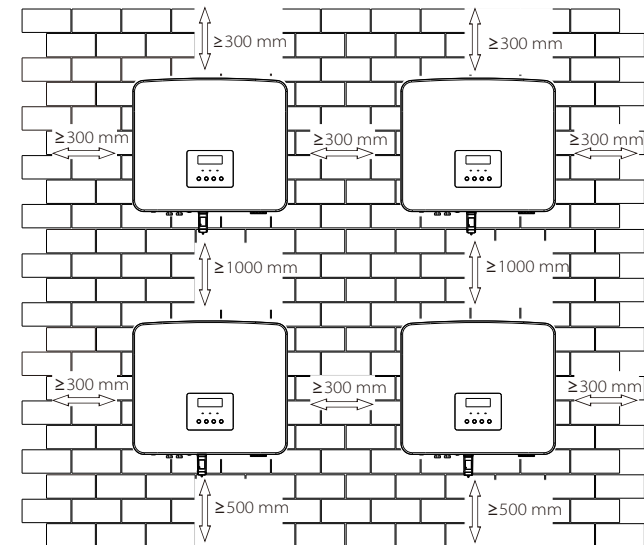
## 5.6 Mounting

Regarding the installation of M-series inverter, please refer to the X1-Matebox Quick Installation Guide.

➢ **Preparation**

Please prepare the following tools before installation.

Installation tools: screwdriver, wrench, Φ10 drill, rubber hammer, socket wrench set, hexagon keys and spirit level.

➢ **Step 1: Fix the wall bracket to the wall**

First find the expansion screw and the wall bracket in the accessory bag, as shown below:
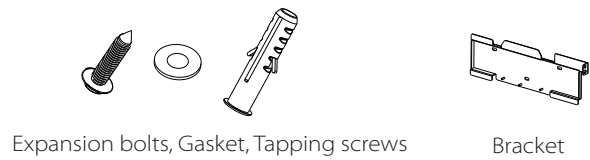
Expansion bolts, Gasket, Tapping screws

Bracket

a) Draw drilling holes as per the bracket's hole locations by a marker, and ensure that the two top holes lie on the same straight line by spirit level.

b) Drill holes at marked spots at depth of 80 mm.

a)
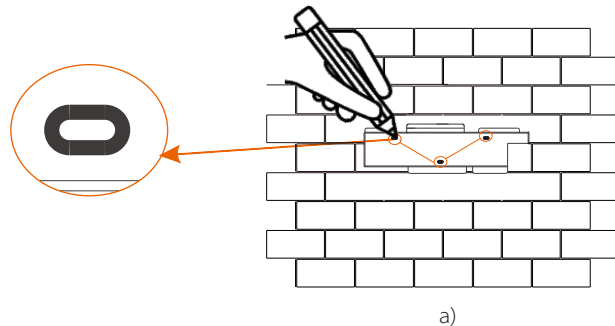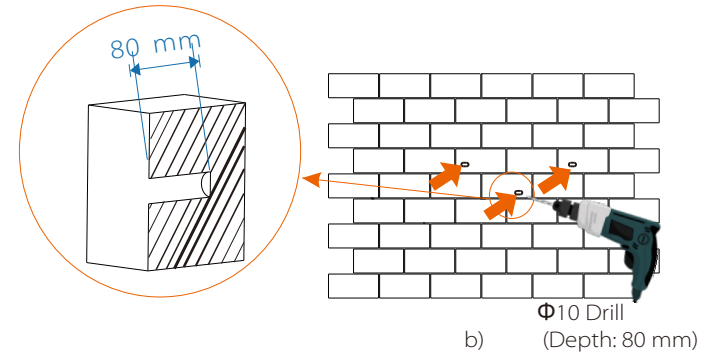
80 mm

Φ10 Drill
(Depth: 80 mm)

b)

➢ **Step 2: Hang the inverter on the bracket**

c) Insert expansion bolt into the holes, use rubber hammer to knock the expansion screw bolt into the wall;

d) The bracket is aligned with the screw uses the outer hexagonal wrench to screw the tapping screw until the expansion bolt "bang" is heard.
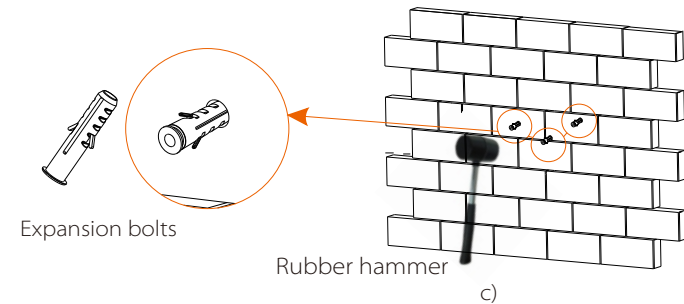
Expansion bolts

Rubber hammer

c)
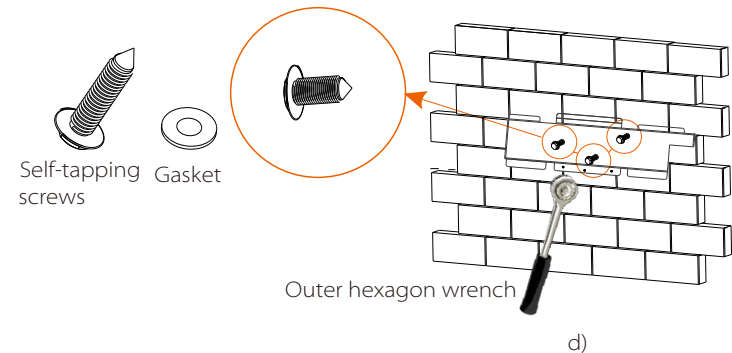
Self-tapping screws    Gasket

Outer hexagon wrench

d)

➤ Step 3: Tighten the inverter and bracket

e) Hang the buckle on the inverter to the corresponding position of the backplane;

f) Use the inner hexagonal wrench to tighten the inner hexagonal screw on the right side of the inverter.
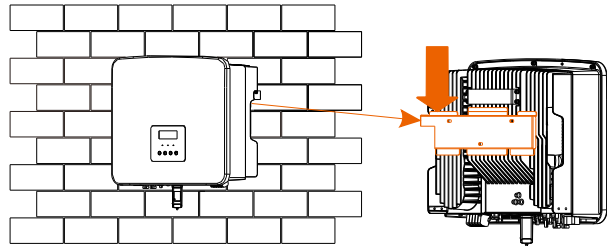


e)
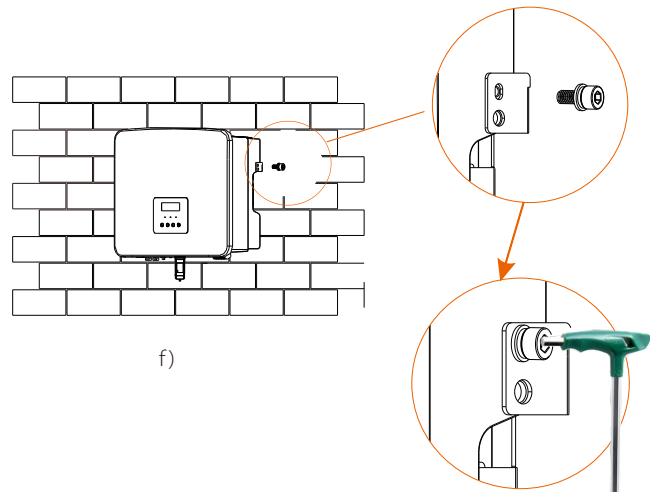


f)

Inner hexagonal wrench
(Torque :1.2±0.1 N· m)

# 6 Electrical Connections

## 6.1 PV Connection

The series inverter have two PV inputs. Please select photovoltaic modules with good performance and quality assurance. The open circuit voltage of the module array should be less than the maximum PV input voltage specified by the inverter, and the working voltage should be within the MPPT voltage range.

### Table 1: Maximum input voltage limit

| Model | X1-Hybrid-3.0-D X1-Hybrid-3.0-D | X1-Hybrid-3.7-D X1-Hybrid-3.7-M | X1-Hybrid-5.0-D X1-Hybrid-5.0K-D X1-Hybrid-5.0-M | X1-Hybrid-6.0-D X1-Hybrid-6.0-M | X1-Hybrid-7.5-D X1-Hybrid-7.5-M |
|---|---|---|---|---|---|
| Max. DC input voltage | 600 V | | | | |

⚠ **Warning!**
The voltage of photovoltaic modules is very high, and is dangerous voltage. When wiring, please follow the safe electricity regulations.

⚠ **Warning!**
Do not ground the positive or negative pole of the photovoltaic module!

⚠ **Notice!**
The following PV module requirements need to be applied to each input range:
1. Same model
2. Same quantity
3. The same queue
4. The same angle

**Notice!**
The series inverters support the following PV module connection modes.
Method : Multi
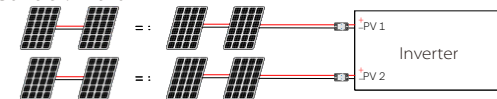
➢ **Connection step**

The PV port wiring of M-series inverter has been completed, and it can be used directly with the PV port of the X1-Matebox. The D series needs to be wired according to the following steps.

**Step 1.** Turn off the DC switch, connect the PV module, prepare a 6 mm² PV cable, and find the PV (+) terminal and PV (-) terminal in the package.



PV cable    PV pin    Negative terminal
Positive terminal
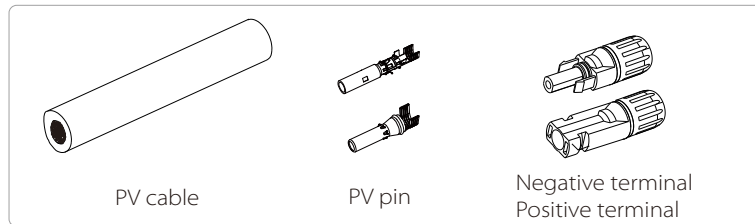
**Step 2.** Use a wire stripper to strip the 7 mm insulation layer of the wire end.



Wire stripper    7 mm
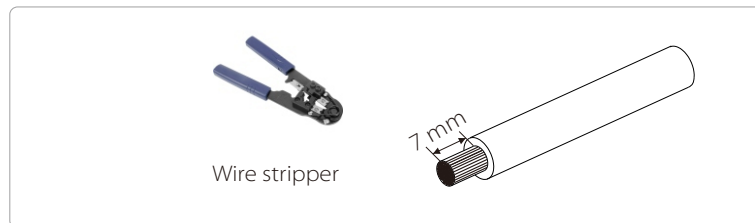
**Step 3.** Tighten the cable with the insulation layer stripped and insert it into the metal terminal (see Figure 1), make sure all wires are inserted into the metal terminal (see Figure 2).



Figure 1

Figure 2
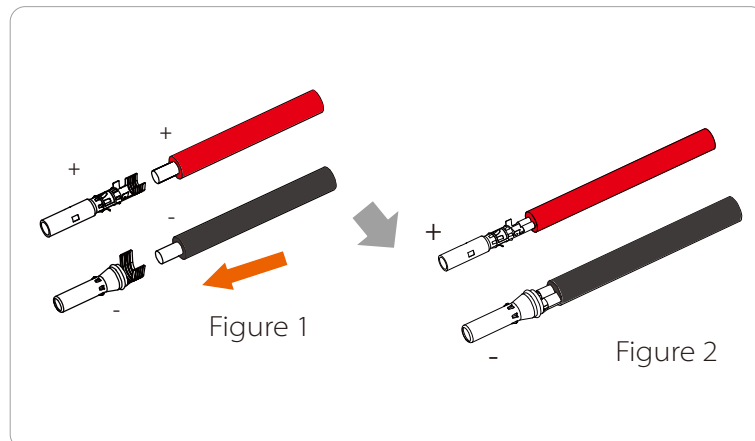
**Step 4.** Tighten the PV pin contact and the wiring harness to make the connection tight without looseness.



Crimping tool for PV terminal
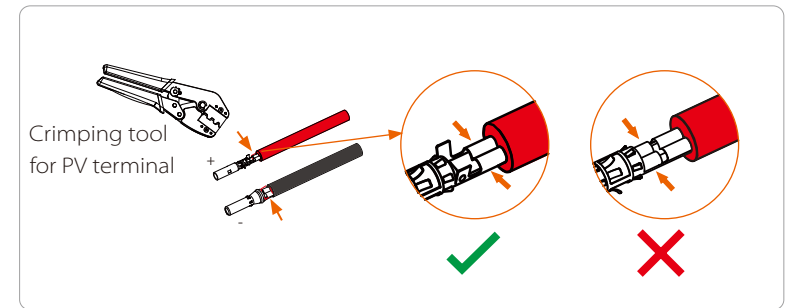
**Step 5.** The PV joint is divided into 2 parts - the plug and the fastening head. Insert the cable through the fastening head and the opposite plug. Notice that the red and black lines correspond to different of plugs. Finally, force the cable pair into the plug, will a "click" sound, which indicates that the connection is completed.



click!
click!
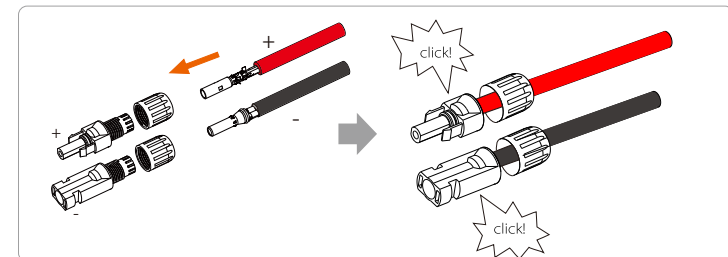
**Step 6.** Tighten the fastening head and insert into the corresponding positive and negative (PV+/PV-) ports of the inverter.



Positive

Negative

click!    PV+

PV-

click!
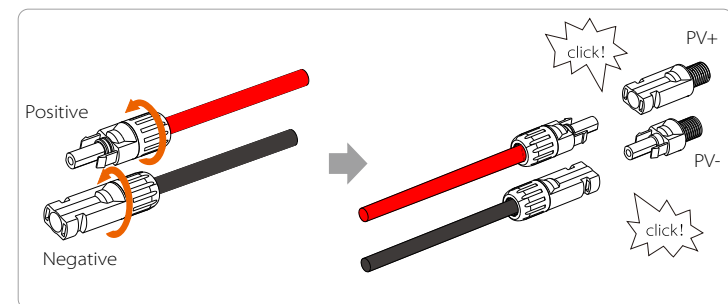
The following is the location of the inverter positive and negative (PV+/PV-) ports.



PV1+
PV2+
PV1-
PV2-
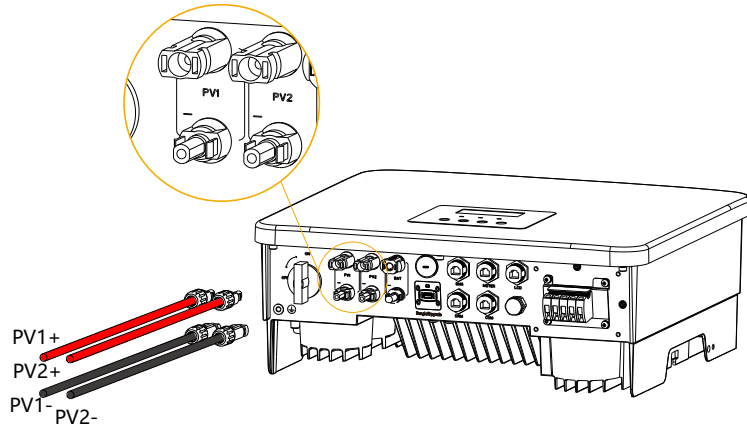
Schematic diagram of the inverter PV connected.
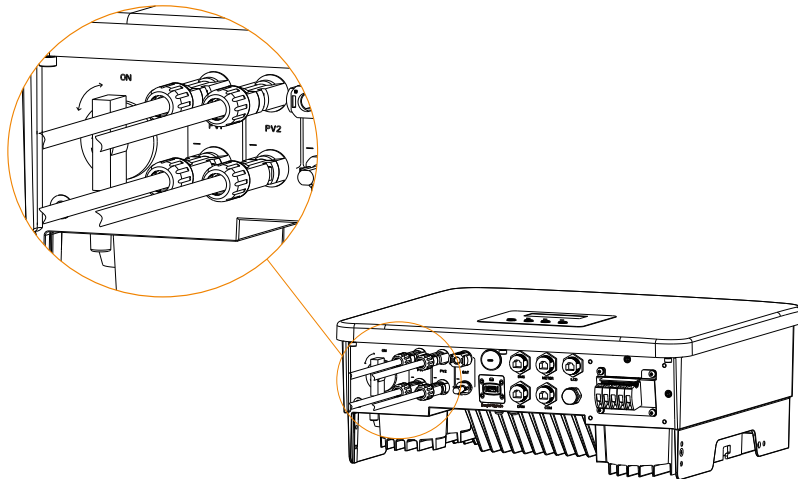
## 6.2 Grid Port and EPS(Off-grid) Output Connection

The series inverter are single-phase inverter. Suitable for rated voltage 220/230/240 V, frequency 50/60 Hz. For more technical requirements, please consult the requirements of the local public grid.

➢ Grid port connection

### Grid Cable and Micro-breaker recommended

| Model | X1-Hybrid-3.0-D | X1-Hybrid-3.7-D | X1-Hybrid-5.0-D<br>X1-Hybrid-5.0K-D | X1-Hybrid-6.0-D | X1-Hybrid-7.5-D |
|---|---|---|---|---|---|
| Cable (copper) | 4-6 mm² | 6-8 mm² | 8-10 mm² | 8-10 mm² | 8-10 mm² |
| Micro-Breaker | 32 A | 40 A | 50 A | 50 A | 50 A |

| Model | X1-Hybrid-3.0-M | X1-Hybrid-3.7-M | X1-Hybrid-5.0-M | X1-Hybrid-6.0-M | X1-Hybrid-7.5-M |
|---|---|---|---|---|---|
| Cable (copper) | 3-4 mm² | 3-4 mm² | 4-6 mm² | 4-6 mm² | 4-6 mm² |
| Micro-Breaker | 25 A | 25 A | 32 A | 32 A | 32 A |

### EPS(Off-grid) Cable and Micro-breaker recommended

| Model | X1-Hybrid-3.0-D<br>X1-Hybrid-3.0-M | X1-Hybrid-3.7-D<br>X1-Hybrid-3.7-M | X1-Hybrid-5.0-D<br>X1-Hybrid-5.0K-D<br>X1-Hybrid-5.0-M | X1-Hybrid-6.0-D<br>X1-Hybrid-6.0-M | X1-Hybrid-7.5-D<br>X1-Hybrid-7.5-M |
|---|---|---|---|---|---|
| Cable (copper) | 3-4 mm² | 3-4 mm² | 4-6 mm² | 4-6 mm² | 4-6 mm² |
| Micro-Breaker | 25 A | 25 A | 32 A | 32 A | 32 A |

The circuit breaker should be installed between the inverter and the mains, and the load should not be directly connected to the inverter.
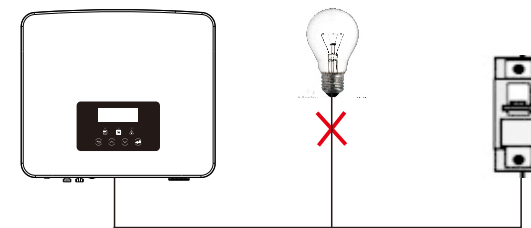


Figure: Wrong connection of load and inverter

### 6.3 EPS(Off-grid) Block Diagram

The series inverter has an EPS(Off-grid) function. When the grid is connected, the inverter outputs go through the Grid port, and when the grid is disconnected, the inverter outputs go through the EPS(Off-grid) port.
The EPS(Off-grid) function can be connected to part of the load, and it can also be used to connect to all loads. Please refer to the following diagram for the wiring .
To be compatible with all loads, you will need an addition a accessory. If you need a solution, please contact our sales.

➢ EPS(Off-grid) wiring diagram

For to different local wiring rules, please refer to the diagram below
Please select the appropriate wiring method according to local wiring rules.

Diagram A: Neutral line and PE line are separated from each other, and the common load is connected to the EPS(Off-grid) port; (For most countries)



Diagram B: Neutral line and PE line are separated from each other, all loads connect to the EPS(Off-grid) port; (For most countries)



Diagram C: Neutral line and PE line are combined together, and the common load is connected to the EPS(Off-grid) port; (Apply to Australia)

Diagram D: Neutral line and PE line are combined together, all loads connect to the EPS(Off-grid) port; (Apply to Australia)



X1-Matebox is a convenient wiring and accessory that can realize EPS(Off-grid) full load. For more information, please refer to X1-Matebox. If you need to buy X1-Matebox, please contact us.

**Notice!**

In full load scheme **Diagram B** and **Diagram D**, set "Matebox" to "Enable" under Settings;
The Australian customer must shorten the N lines of the Grid and the EPS(Off-grid) in the X1-Matebox.
If your local wiring method does not follow the above operation guide, especially the neutral wire, ground wire, RCD wire, please contact our company before operation.

➢ EPS(Off-grid) load requirements

**Warning!**

Ensure that the EPS(Off-grid) load rated power is within the EPS(Off-grid) rated output power range, otherwise, the inverter will report an "overload" warning.

When "overload" occurs, adjust the load power to make sure it is within the EPS(Off-grid) rated output power range, and the inverter will automatically return to normal.

For non-linear loads, ensure that the inrush current power is within the EPS(Off-grid) rated output power range.
When the configuration current is less than the maximum DC input current, the capacity and voltage of lithium battery and lead acid battery will decrease linearly.

The following table shows some common loads for your reference.

Notice: Please check with the manufacturer for high-power inductive loads.

| Content | Power | | Common equipment | Instance | | |
|---|---|---|---|---|---|---|
| | Start | Rated | | Equipment | Start | Rated |
| Resistive load | X 1 | X 1 | Incandescent lamp | Incandescent lamp 100 W | 100 VA (W) | 100 VA (W) |
| Inductive load | X 3~5 | X 2 | Fan    Fridge | Fridge 150 W | 450 - 750 VA(W) | 300 VA (W) |

> ➢ Grid and EPS(Off-grid) connection steps

• Connection requirements

Notice: Check the grid voltage and compare the voltage range
 (see technical data).
Disconnect the circuit board from all power sources to prevent electric
shock.
**The Grid and the EPS(Off-grid) ports of M series inverter have been
connected, for specific installation details, please refer to the X1-Matebox
Quick Installation Guide. And the D series needs to be wired according to
the following steps.**

**Step 1.** Prepare a Grid cable (three-core wire) and an EPS(Off-grid) cable
(two-core wire), and then find the European terminal and waterproof shield
in the accessory bag.



Grid(Triple Core Cable)      EPS(Off-grid)(Double Core      6 mm² Euro Terminal*2
8 mm² *3                     Cable) 6 mm² *2

Euro Terminal 8 mm² *3       Waterproof shield
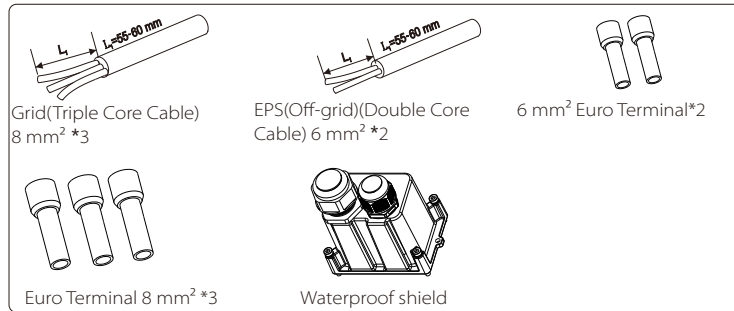
**Step 2:** The Grid and EPS(Off-grid) cables go through the corresponding
Grid and EPS(Off-grid) ports of the waterproof shield.



Grid

EPS(Off-grid)
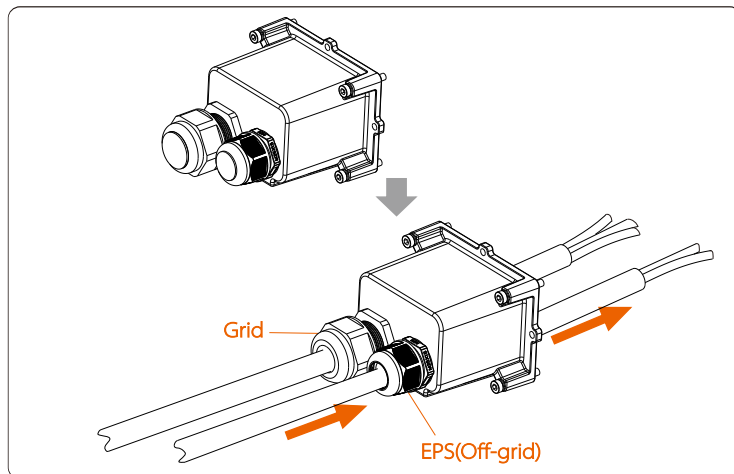
**Step 3.** Remove the 12 mm insulation layer at the end of the wire. Insert
the European-style terminals respectively, and make sure that the
stripped ends are inserted into the European-style terminal, and finally
use crimping pliers to press tightly.



Diagonal plier

$L_2$=12 mm

Crimping Tool

Grid

EPS(Off-grid)
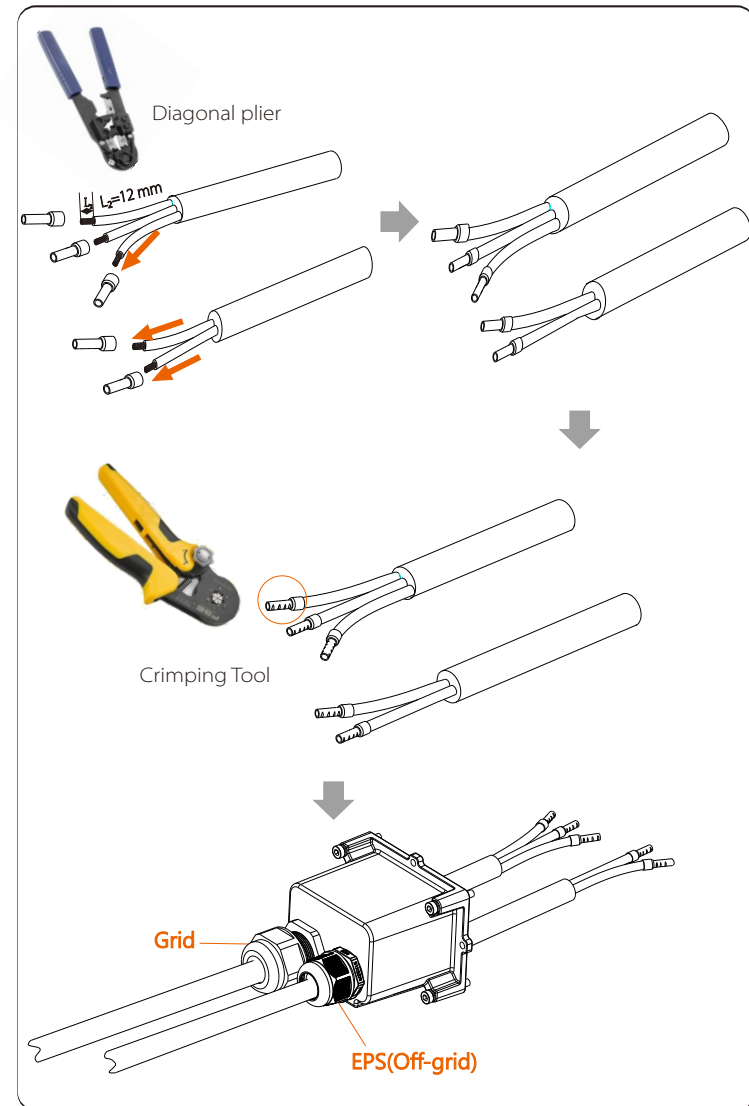
**Step 4.** Find the location of the AC interface on the inverter, insert the crimped terminals into the UW10 terminals L, N, and P according to the wire sequence, and use a flat-blade screwdriver to tighten the screws. (Torque: 1.5±0.1 N·m)

GRID EPS(Off-grid)

L N PE L N

Torque screwdriver
(Torque: 1.5±0.1 N·m)
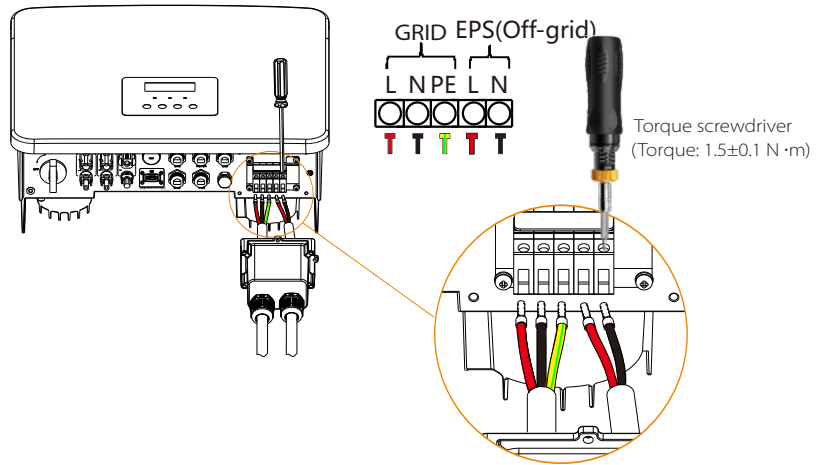
**Step 5.** Install the AC waterproof shield and tighten the screws on the four sides of the waterproof shield with an Allen wrench.

Hexagon keys
(Torque: 0.8±0.1 N·m)
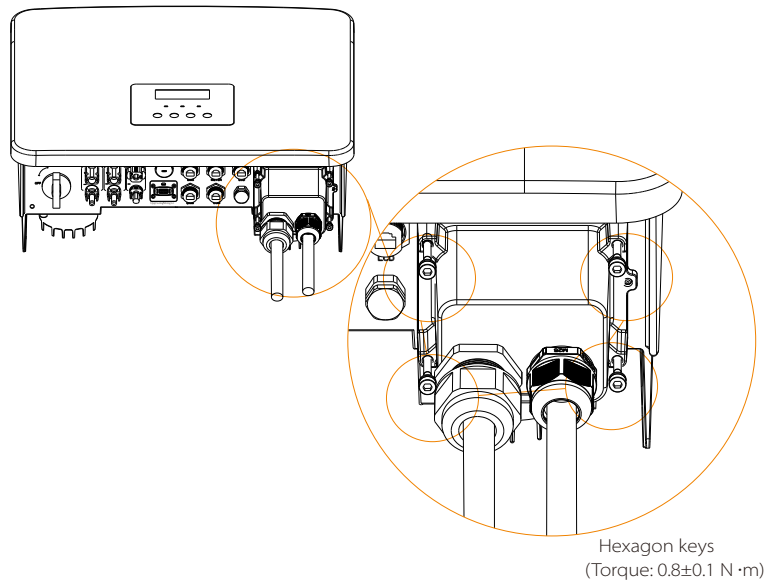
**Step 6.** Tighten the waterproof fastening head.
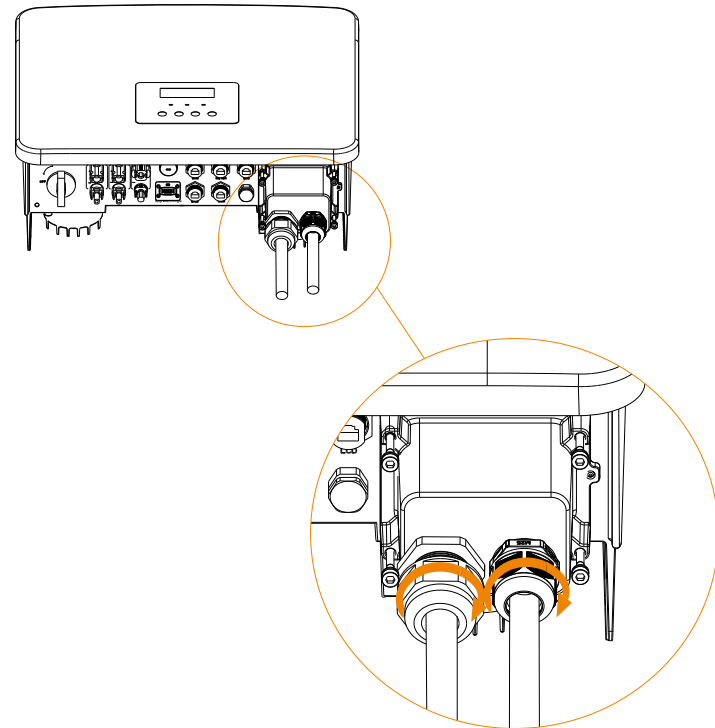
## 6.4 Battery Connection

➢ Connection requirements

The series inverter charge and discharge system can be equipped with high voltage lithium battery and lead acid battery.
Please note that the maximum voltage of the battery should not exceed 480 V, battery communication should be compatible with the this inverter.

➢ Battery Breaker

Before connecting the battery, a non-polar DC MCB must be installed to ensure safety.
Before maintenance, the inverter need to be safely disconnected.

| Model | X1-Hybrid-3.0-D X1-Hybrid-3.0-M | X1-Hybrid-3.7-D X1-Hybrid-3.7-M | X1-Hybrid-5.0-D X1-Hybrid-5.0K-D X1-Hybrid-5.0-M | X1-Hybrid-6.0-D X1-Hybrid-6.0-M | X1-Hybrid-7.5-D X1-Hybrid-7.5-M |
|---|---|---|---|---|---|
| Voltage | Nominal voltage of DC breaker should be larger than maximum voltage of battery. | | | | |
| Current[A] | 32 A | | | | |

➢ Battery connection diagram



Non-polar DC MCB

Communication line connection

Power line connection

CAN/RS485

High voltage lithium battery
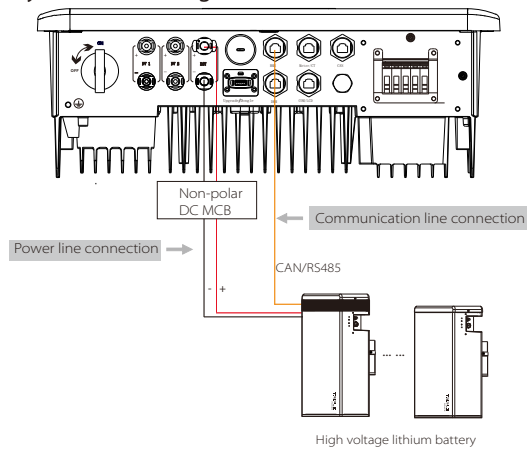
* Whether to add Non-polar DC MCB depends on local safety regulations.

| | Battery Control | Battery Modules |
|---|---|---|
| Battery & Quantity | T-BAT 5.8 (1 PCS) | HV11550 (0-2 PCS) |
| Battery & Quantity | MC0600 (1 PCS) | HV10230 (1-4 PCS) |
| Battery & Quantity | TBMS-MCR0800 (1 PCS) | TP-HR25 (2~8 PCS) |
| Battery & Quantity | TBMS-MCR0800 (1 PCS) | TP-HR36 (2~8 PCS) |
| Battery & Quantity | TBMS-MCS0800 (1 PCS) | TP-HS25 (2~8 PCS) |
| Battery & Quantity | TBMS-MCS0800 (1 PCS) | TP-HS36 (2~8 PCS) |

* T58 battery has V1 and V2, V1 and V2 with the same number of inverters, the specific collocation can refer to the relevant part of the battery manual.

➢ Battery connection steps

Battery port connection line of the M series inverter is on the X1-Matebox, just connect it. It is necessary to wire the D series according to the following steps.

Step 1. Prepare 8 mm² battery power line, find the DC plug (+), DC plug (-) in the accessory bag.



Power line                    BAT plug (+)                    BAT plug (-)



Diagonal pliers                    15 mm
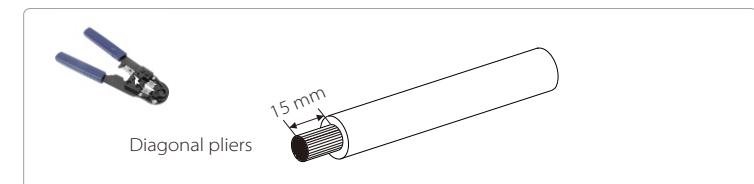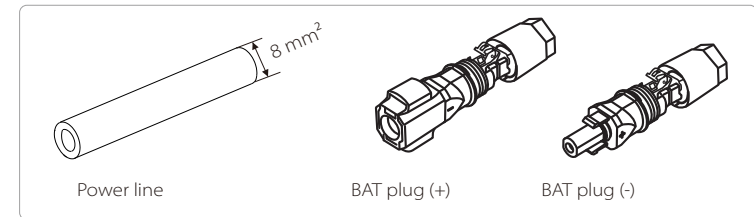
Step 3. Insert the stripped cables into the  DC plug (-) and DC Plug (+) respectively.



-                                        +

DC plug (-)                              DC plug (+)

Spring

Cavity

The cable must pass through here
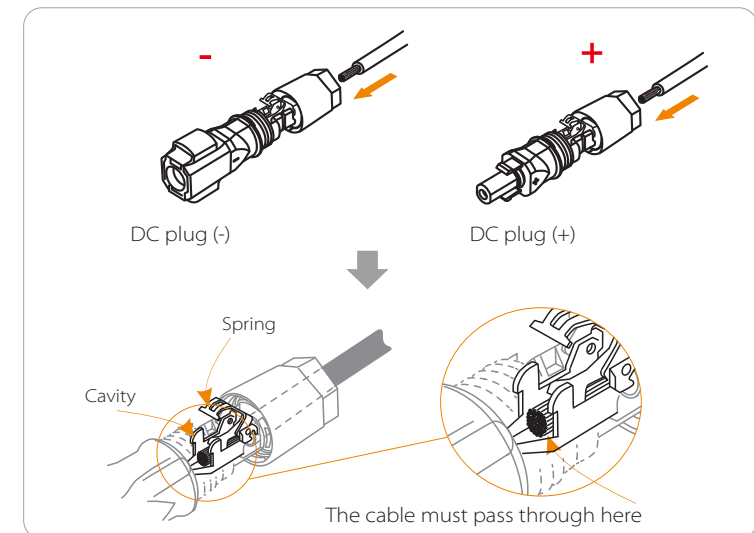
**Step 4.** Press down on the spring by hand, you can hear a click sound, then push the ends together, and tighten the screw joints.
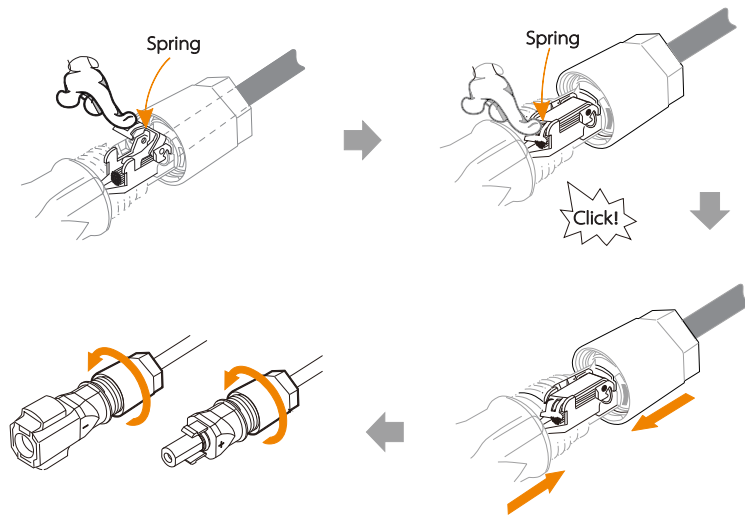


**Step 7.** Insert the battery power lines into the corresponding BAT port (+), (-) of the inverter.
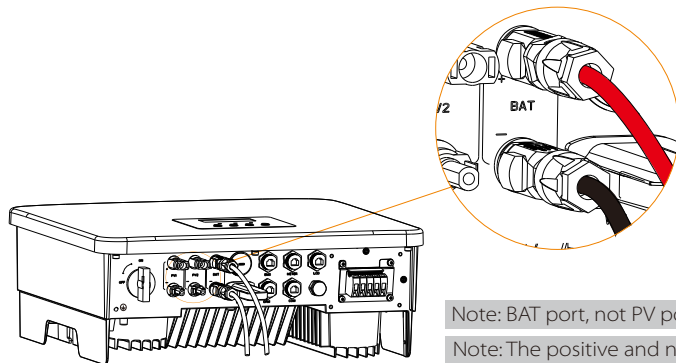


Note: BAT port, not PV port!

Note: The positive and negative wires of the battery are not allowed to be reversed!

➢ Communication connection

BMS port definition

The communication interface between the inverter and the battery uses the waterproof connector with RJ45.



1) White with orange stripes
2) Orange
3) White with green stripes
4) Blue
5) White with blue stripes
6) Green
7) White with brown stripes
8) Brown
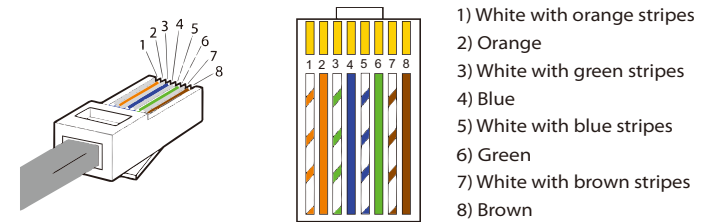
| PIN | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Definition | BAT_TEMP | GND | GND | BMS_CANH | BMS_CANL | X | BMS_485A | BMS_485B |

**Notice!**
After the BMS communication between the battery and the inverter is finished, the battery will work normally.

## 6.5 Communication Connection

### 6.5.1 Introduction to DRM communication

This inverter can support external control signal response, such as complying with AS4777 regulatory requirements.

➢ DRM requirements( AS4777 regulatory requirements )

| Mode | Requirement |
|------|-------------|
| DRM0 | Operation disconnect device |
| DRM1 | Do not consume power |
| DRM2 | Do not consume more than 50% of rated power |
| DRM3 | Do not consume more than 75% of rated power AND Source reactive power if capable |
| DRM4 | Increase power consumption (subject to constraints from other active DRMs) |
| DRM5 | Do not generate power |
| DRM6 | Do not generate more than 50% of rated power |
| DRM7 | Do not generate more than 75% of rated power AND Sink reactive power if capable |
| DRM8 | Increase power generation (subject to constraints from other active DRMs) |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| DRM1/5 | DRM2/6 | DRM3/7 | DRM4/8 | +3.3V | DRM0 | GND | GND |
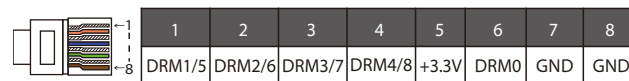
**Notice!**

For AS4777 DRM function, currently only PIN6 (DRM0) and PIN1 (DRM1/5) are functional, other PIN functions are under development.

### 6.5.2 Introduction to meter/CT Communication

The inverter should work with an electric meter or current sensor (CT for short) to monitor household electricity usage. The electricity meter or CT can transmit the relevant electricity data to the inverter or platform, which is convenient for users to read at anytime.

Users can choose to use electric meters or CTs according to demand.

Please Notice that the meter/CT brand required by us must be used.

**Notice!**

The meter or CT must be connected to the inverter, otherwise the inverter will shut down and alarm "meter failure" alarm. Smart meters must be authorized by us, third party or other companies. Unauthorized meter may be incompatible with the inverter.

Our company will not be responsible for the impact caused by the use of other appliances.

➢ Electric meter connection diagram



Grid

Load

in ········→ out

L

N

Household Meter

Meter1
(Single-phase meter)

in ◄········ out

If the user has other power generation equipment (such as inverter) at home and wants to monitor both, X1-Hybrid G4 inverter provides Meter2 communication function to monitor the power generation equipment. For more information, please contact SolaX.

Meter2

Other power generation equipment
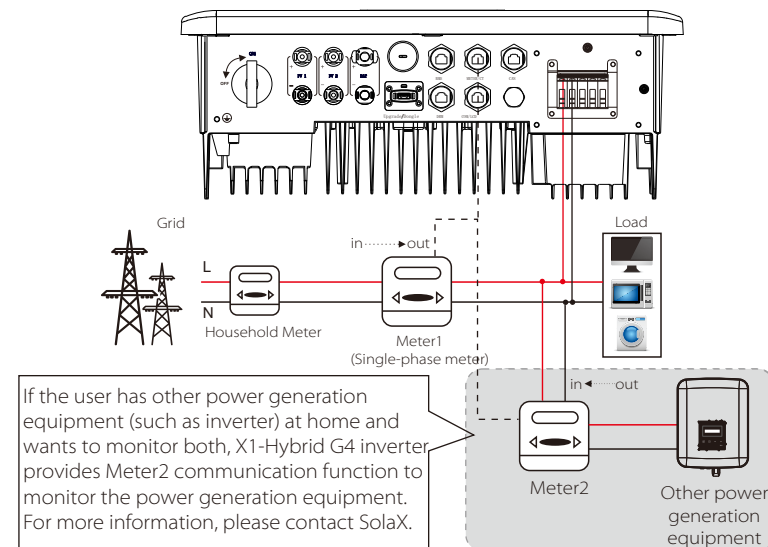
➢ **CT Connection**

The current sensor measures the current on the live wire between the inverter and the public grid.

• **CT connection diagram**



Grid

Loads

L

CT 1

N

Household Meter

Meter/CT port is at the bottom of the inverter.

Note: The arrow on the CT must point at the public grid.

Public grid electricity

CT

Meter/CT

CT 2

Other power generation equipment

If the user has other power generation equipment (such as inverter) at home and wants to monitor both, X1-Hybrid G4 inverter provides CT2 communication function to monitor the power generation equipment. For more information, please contact us.

• **LCD settings**
To select CT, you need to enter Use setting, then enter CT/Meter Setting.

| CT/Meter Setting |
| --- |
| > Select |
| CT |
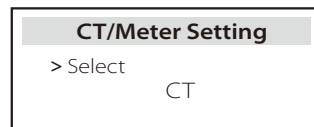
Notice for CT connection:

**Notice!**
• Do not place the CT on the N wire or ground wire.
• Do not put CT on the N line and L line at the same time.
• Do not place the CT on the side where the arrow points to the inverter.
• Do not place the CT on non-insulated wires.
• The cable length between CT and inverter should not exceed 100 meters.
• After CT is connected, prevent the CT clip from falling off. It is recommended to wrap the CT clip around in circles with insulating tape.
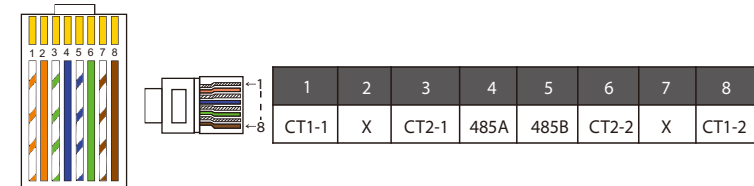


| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| --- | --- | --- | --- | --- | --- | --- | --- |
| CT1-1 | X | CT2-1 | 485A | 485B | CT2-2 | X | CT1-2 |

**Notice!**
Only one of the Meter and CT connections can be selected. Meter cable goes to pin terminal 4 and 5; CT cable goes to pin terminal 1 and 8; reserve CT cable goes to pin terminal 3 and 6. If you need this feature, please contact us for assistance.

**Notice!**
If two meters were to be connected in the system, the communication cables of the meters should be connected in parallel, i.e. 485A & 485A, 485B & 485B.

➢ **BMS communication cable**

The BMS pin is defined as follows:



| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| | BAT_TEMP | GND | GND | BMS_CANH | BMS_CANL | X | BMS_485A | BMS_485B |
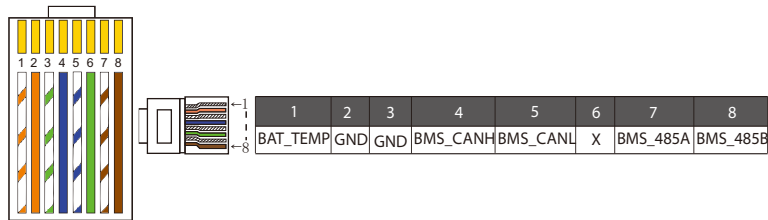
**Notice!**
The BMS port on the inverter is the communication port for connecting the battery. The communication port on the lithium battery must be consistent with the definition of pins 4, 5, 7, and 8 above.

➢ **DRM communication cable**

The DRM pin is defined as follows:



| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| DRM1/5 | DRM2/6 | DRM3/7 | DRM4/8 | +3.3V | DRM0 | GND | GND |
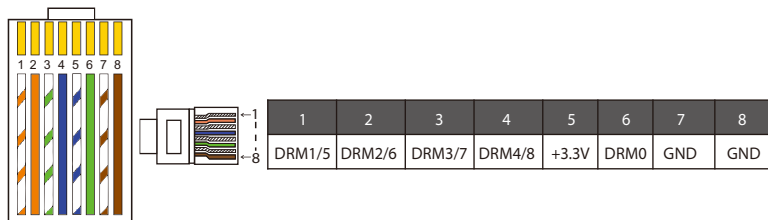
**Notice!**
At present, there are only PIN6 (DRM0) and PIN1 (DRM1 /5), and other PIN functions are under development.

## 6.5.3 Parallel Connection

The series inverters provide parallel function, and up to 2 inverters can be connected in a system. In this system, one inverter is set as the "master inverter", and the other inverter is switched to the "slave inverter" state, and the inverters are connected to communicate through the CAN line. The converter "controls the "slave inverter".

**Notice!**
D series& M series + X1 MATEBOX BASIC supports parallel function. M series + X1 MATEBOX ADVANCED does not support parallel function.

➢ **System Diagram**

System diagram applied to electric meters:
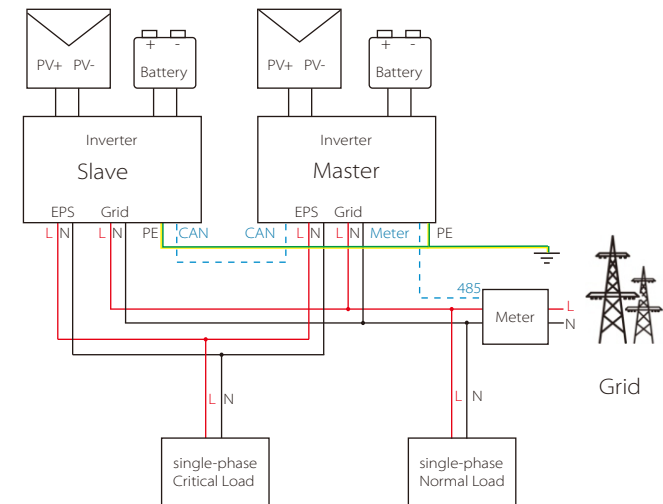
System diagram applied to temperature sensor CT:
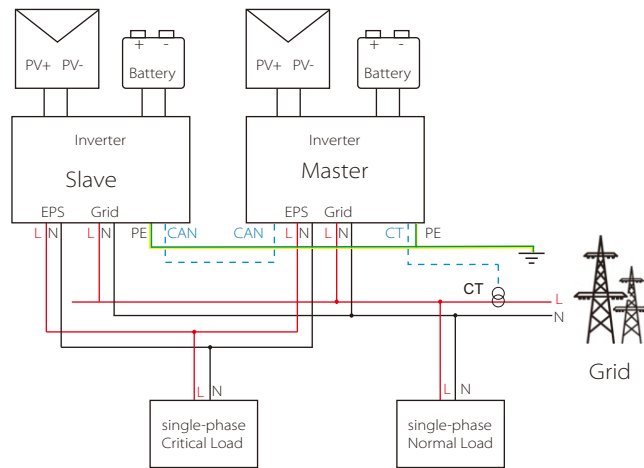


➢ **Work Modes in parallel system**

There are three work modes in parallel system, and your acknowledge of different inverter's work modes will help you understand parallel system better, therefore please read it carefully before operating.

| Free mode | Only when none of the inverters is set to "Master", both inverters are in free mode in the system. |
| --- | --- |
| Master mode | When one inverter is set as "Master", this inverter enters master mode.<br>Master mode can be changed to free mode. |
| Slave mode | Once one inverter is set as "Master", another inverter will enter slave mode automatically. Slave mode cannot be changed from other modes by LCD setting. |

➢ **Wiring Operation and LCD Setting**

> Note: Before operation, please make sure that the inverter meets the following three conditions:
> 1. The software version of all inverters is the same;
> 2. The power range of all inverter models is the same;
> 3. The type and quantity of batteries connected to all inverters are the same;
> Otherwise, this function cannot be used.

**Step1:** Connect all inverters' communication together by connecting CAT7 network cables between CAN ports.
- Insert one side of CAT7 cable into the first inverter's CAN port and the other side into the next inverter's CAN port.
− Insert one side of CAT5 cable Meter, and the other side into the Meter port the master inverter.
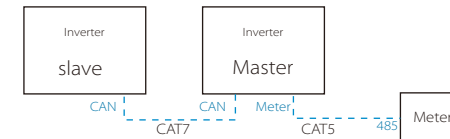


➢ **CAN PIN Definition**

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 485A | 485B | VCC | CANH | CANL | GND | SYN1 | SYN2 |

**Step 2:** Turn on the power of the entire system, find the inverter connected to the meter, enter the setting page of the inverter LCD screen, click on the parallel settings, and select "master control".
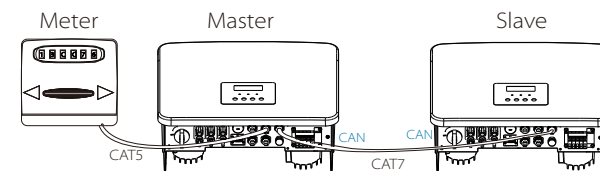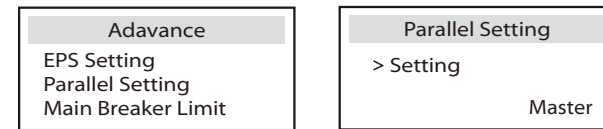


**Step 3:** Disable "settings - Advanced settings-External ATS" on both master inverter and slave inverter.

> ➢ How to Remove parallel system

If one inverter wants to exit from this parallel system, please do the steps as below:

- Step1: Disconnect all the network cables on the CAN port.
- Step2: Enter setting page and click parallel setting, and choose "Free".

---

☞ **Note!**
- If a slave inverter is set to "Free" mode but not disconnect the network cable, this inverter will return to "slave"mode automatically.
- If a slave inverter is disconnected with other inverter but not be set to "Free" mode, this inverter will stop working and report "Parallel Fault".

---

> ➢ LCD display

**Main display:**
Once inverter enters parallel system, the "today yield" will be replaced by "Inverter Class", and parallel relevant fault has a higher priority than other faults and will be shown firstly on main display.

```
Power        5688W        Power         5688W        Power         5688W
Today       20.5KWh  ⟹   Parallel      Master       Parallel      Slave1
Battery       67%         Battery        67%         Battery        67%
       Normal                    Normal                     Normal
```
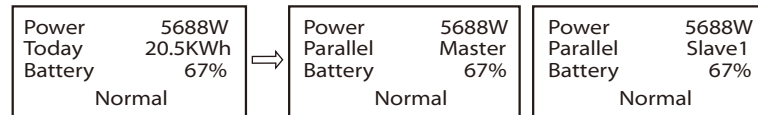
**Status display:**
User can obtain all the status data from master inverter. System power and individual slave inverter power can be obtain in status display of master inverter.

```
      Menu                 Parallel Status          Parallel Status
  Status               >All            2        >Grid
 >Parallel Status  ⟹    Slave1              ⟹    Solar
  History               Slave2                   Load
```

Means the total number of online inverters
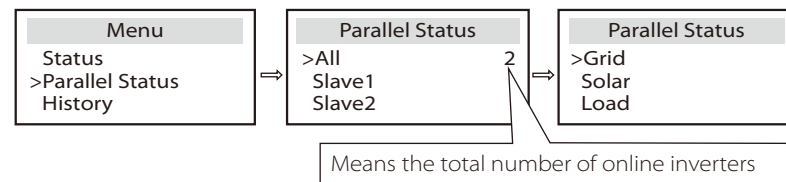
> ➢ Parallel Control Function

Master inverter has an absolute lead in the parallel system to control slave inverter's energy management and dispatch control. Once master inverter has some error and stop working, slave inverter will be stop simultaneously. But master inverter is independent of slave inverter to work and will not be affected by slave inverter's fault.

Overall system will be running according to master inverter's setting parameters, and most setting parameters of slave inverter will be kept but not be cancelled.
Once slave inverter exit from system and be running as an independent unit, its all setting will be re-excuted.

The rest of this section covers several important parallel control functions, and the next page table shows which LCD options are controlled by master inverter and which can work independently.

**Off mode setting:**
Off mode can only be set by master inverter
( long press ESC button on LCD ).

**Safety setting:**
System safety protection is cancelled by master inverter's safety. Slave inverter protection mechanism will only be triggered by master inverter's instructions.

**Self-use setting:**
If system is running as self-use mode, please note the Feedin Power Limit set of master inverter is for the overall system and the corresponding set of slave inverter is invalid.

**Power Factor setting:**
All sets about power factor are all for the overall system and the corresponding sets of slave inverter are invalid.

**Remote control setting:**
The remote demand instructions received by master inverter will be interpreted as the demand instructions to overall system.

### 6.5.4 COM Communication

COM communication interface is mainly provided for customization the second step of development use. The inverter supports the control of external equipment or external equipment control through communication. For example, the inverter adjusts the working mode of the heat pump and so on.

➢ **Application occasion**

COM is a standard communication interface, through which the monitoring data of the inverter can be directly obtained. Also, external communication devices can be connected to carry out the secondary development of the inverter. For specific technical docking, please contact us.

• External communication equipment controls the inverter
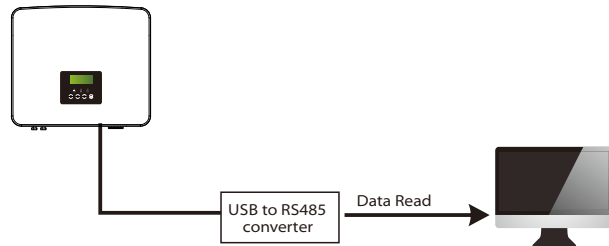
• Inverter communication control external equipment
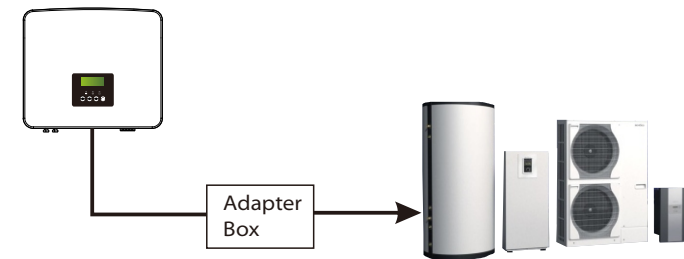


➢ **COM PIN Definition**

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| | Drycontact_A(in) | Drycontact_B(in) | +13V | 485A | 485B | GND | Drycontact_A(out) | Drycontact_B(out) |

> **Notice!**
> Customers can communicate or control the inverter and external devices through the COM interface. Professional users can use pins 4 and 5 to realize data acquisition and external control functions. The communication protocol is Modbus RTU. For details, please contact us. If the user wants to use the inverter dry contact to control external equipment (such as a heat pump), it can be used with our Adapter Box. For details, please refer to the Quick Installation Manual of the Adapter Box.

### 6.5.5 Communication Connection Steps

**Step 1.** Prepare a communication cable, and then find the communication adapter in the accessory bag.
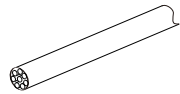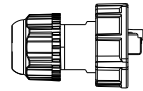
Communication cable          Waterproof connector with RJ45          RJ45 terminal
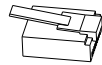
**Step 2.** Insert the communication cable through the communication adapter, and peel off the outer insulation layer of 15 mm.

Diagonal pliers

15 mm
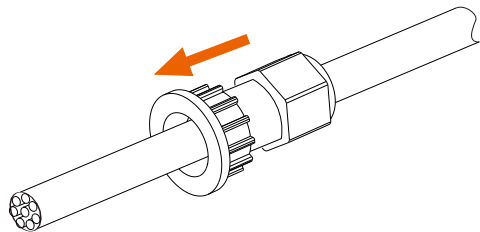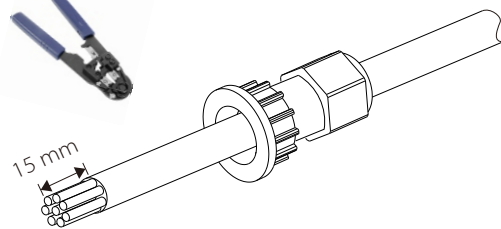
**Step 3.** Insert the prepared communication cables into the RJ45 terminals in sequence, and then use network cable crimping pliers to press them tightly.
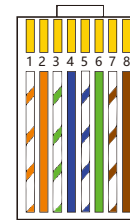
1) White with orange stripes
2) Orange
3) White with green stripes
4) Blue
5) White with blue stripes
6) Green
7) White with brown stripes
8) Brown

Multifunction terminal crimping tool (RJ45)
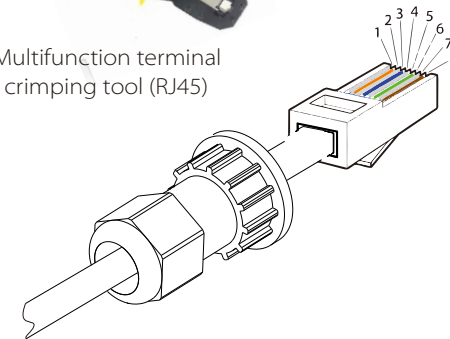
➢ **METER/CT communication cable**

METER/CT pin is defined as follow:
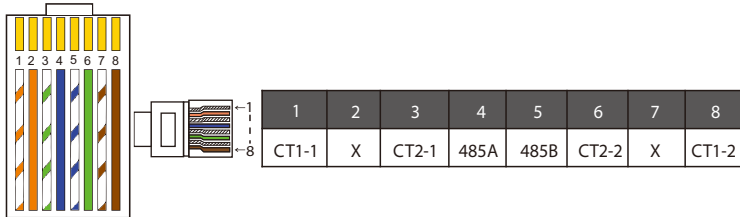


| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| CT1-1 | X | CT2-1 | 485A | 485B | CT2-2 | X | CT1-2 |

> **Notice!**
> Only one of the Meter and CT connections can be selected.
> Meter cable goes to pin terminal 4 and 5; CT cable goes to pin terminal 1 and 8; CT2 cable goes to pin terminal 3 and 6.

1) Users can customize the length of the CT communication cable. The accessory package provides 1*RJ45 and 1*waterproof connector with RJ45 terminals.
When the CT cable is completed, connect the A terminal to the "CT/METER" port of the inverter and tighten the waterproof screw, and connect the B terminal to the RJ45 coupler.



A

B
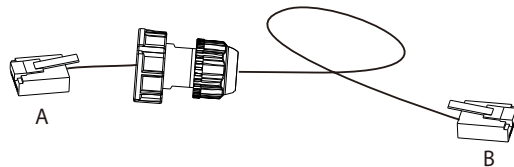
2) One side of the finished cable, Waterproof connector with RJ45 is inserted into the inverter, and one side of the RJ45 terminal is inserted into the CT connection.
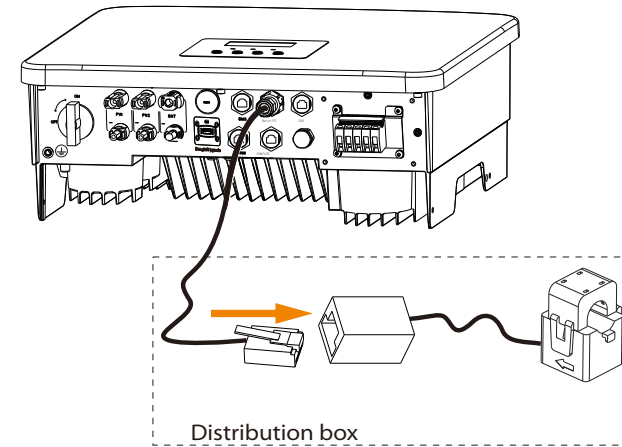


Distribution box

> **Notice!**
> When installing, pay attention to water resistance. All the connected parts of CT must be put into the distribution cabinet.

**Step 4.** Tighten the completed Meter/CT/BMS communication line and tighten the waterproof plug.
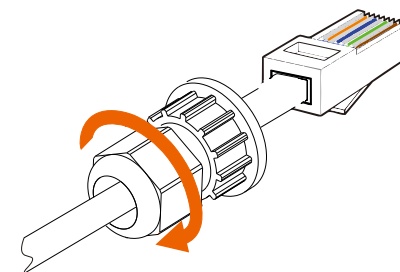
**Step 5:** Finally, find the corresponding COM, METER, CT, DRM, LCD poets on the inverter and insert the communication cable into the corresponding ports.
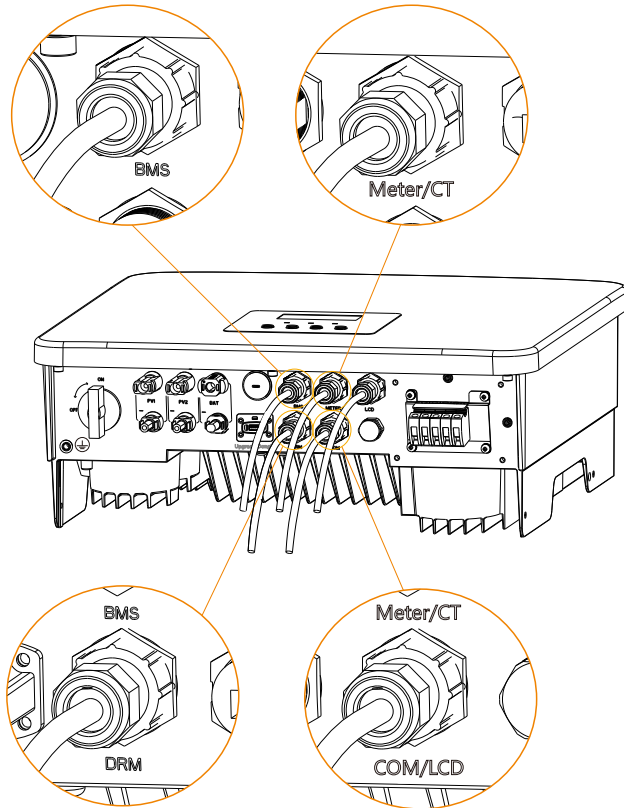
## 6.6 Grounding Connection (Mandatory)

The user must make two ground connections: one shell grounding, and one equipotential grounding. This prevents electric shock.

Notice: If the PV end of the inverter is not connected with earth , the inverter will turn on a red light Inspect and report ISO Fault. This inverter complies with IEC 62109-2 clause 13.9 for earth fault alarm monitoring.

**The ground wire port of the series inverter has been connected, and the D series needs to be wired according to the following steps.**

➢ **Ground connection steps**

**Step 1.** Prepare a one-core cable (4 mm$^2$), and then find the ground terminal in the accessories.



One-core cable (4 mm$^2$)　　OT terminal　　Hexagon socket screws

**Step 2.** Strip the grounding cable insulation(length"L2"), insert the stripped cable into the ring terminal, and then clamp it.



Diagonal pliers
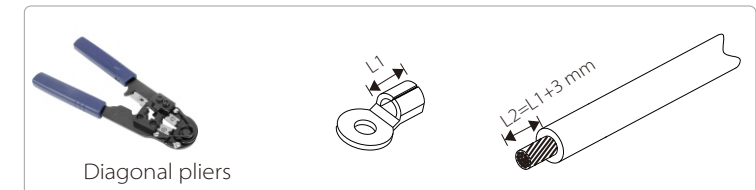
**Step 3.** Insert the stripped cable into OT terminal and tighten the terminal with a terminal crimping tool.



Leaking cable

Crimping Tool
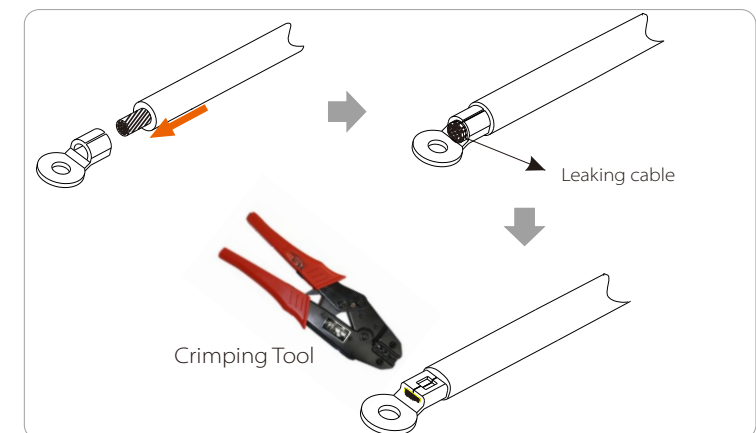
Step 4. Find the ground connection port on the inverter, and screw the ground wire on the inverter with an M5 Hexagon keys.



Hexagon keys
Torque: 1.5±0.2N·m
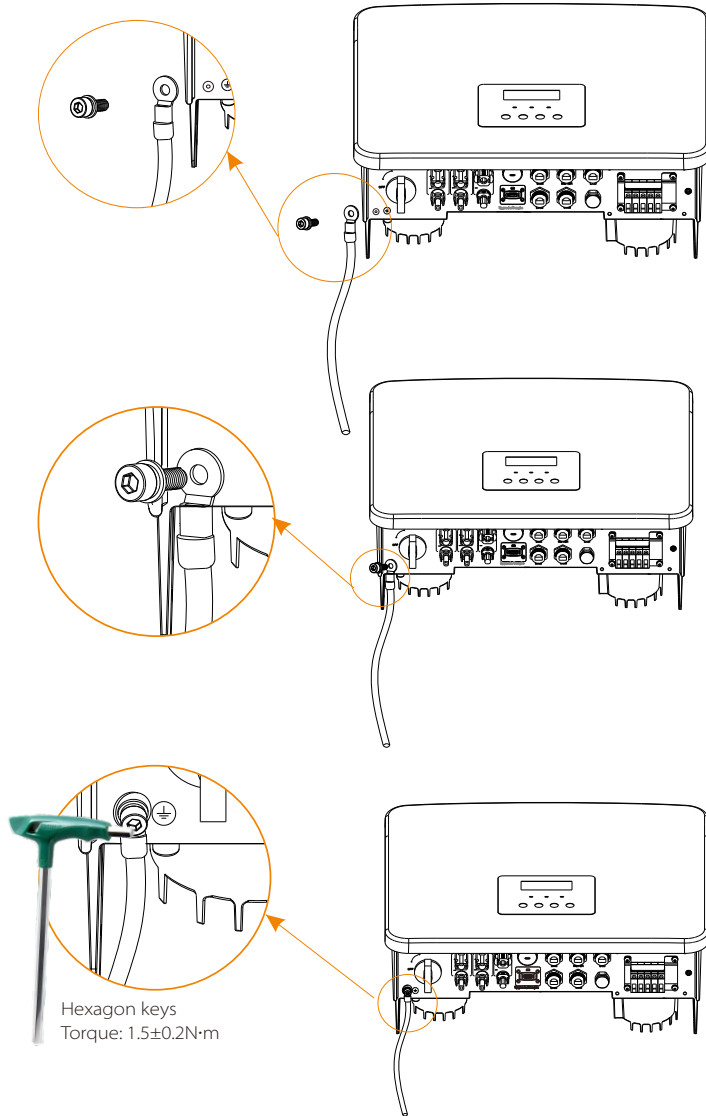
## 6.7 Monitoring Connection (Accessories)

The inverter provides a DONGLE port, which can transmit data of the inverter to the monitoring website via WiFi Plus Dongle, 4G Dongle, GPRS Dongle, and LAN Dongle. (If necessary, purchase products from us)

➢ WiFi connection diagram



Cloud

Router
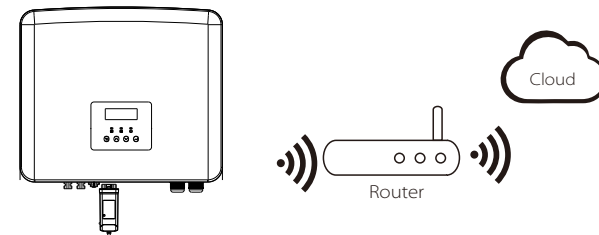
➢ Wireless monitoring accessories connection steps

Step 1. First find the DONGLE port of the inverter.



Dongle/Upgrade
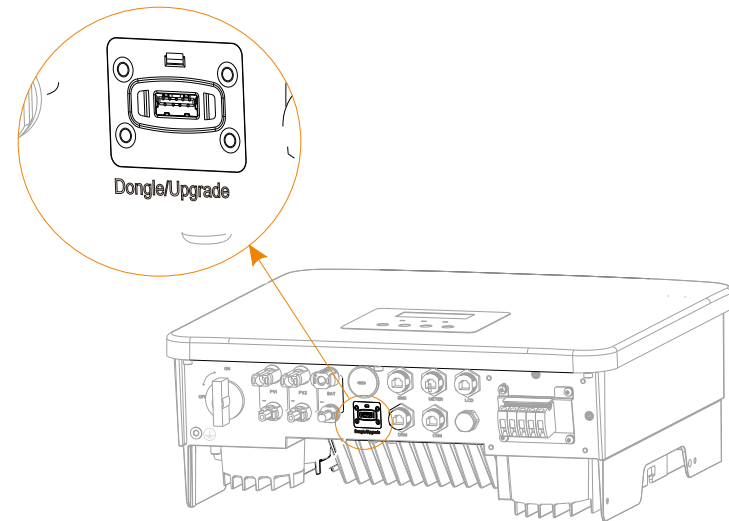
**Step 2.** Plug WiFi Dongle into the DONGLE port.
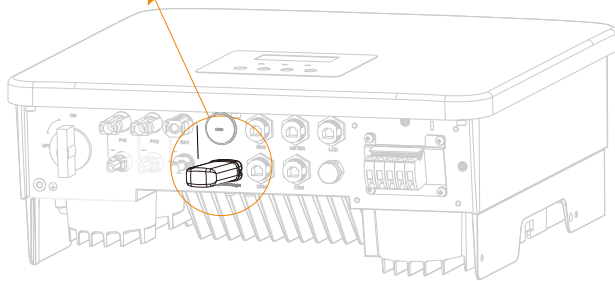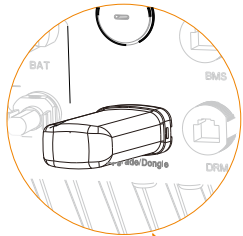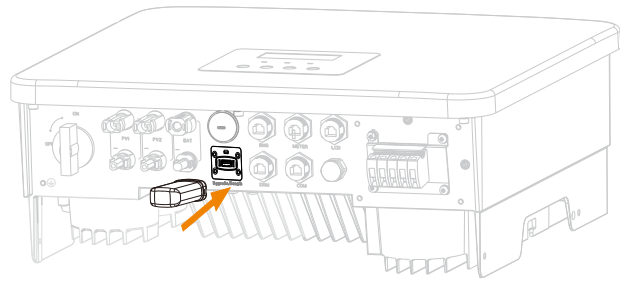


Please check the WiFi Dongle user manual/LAN Dongle user manual /4G Dongle user manual.

## 6.8 Check All Below Steps Before Starting Inverter

➢ After the inverter is checked, then conduct the following steps

❶ Make sure that the inverter is fixed on the wall.
❷ Ensure that all ground wires are grounded.
❸ Confirm that all DC lines and AC lines are connected.
❹ Make sure the CT or Meter is wellconnected.
❺ Make sure the battery is well connected.
❻ Turn on the Load breaker and EPS(Off-grid) breaker.
❼ Turn on the battery breaker.
❽ Turn on the DC switch.

Long press the "Enter "key for 5 seconds to exit the Off mode. (The mode is factory defaulted as Off Mode)
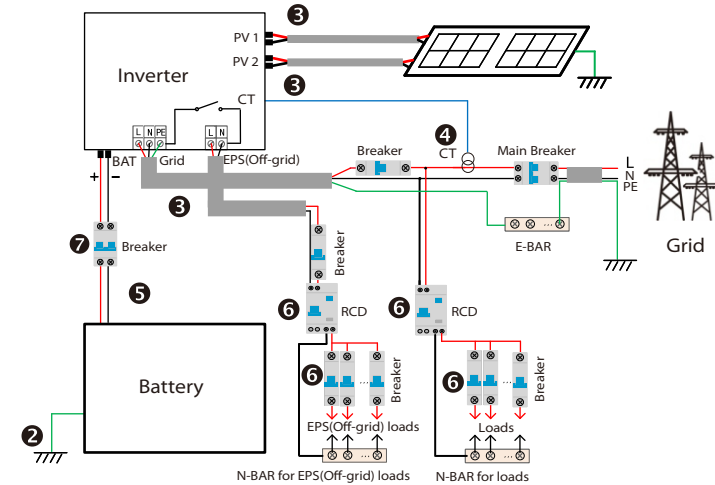
## 6.9 Inverter Operation

➢ **Before operation, check the inverter according to the following steps**

a) Check that the inverter is well fixed on the wall.
b) Ensure that all ground wires are well tightened.
c) Ensure that all DC and AC circuit breakers are disconnected.
d) Ensure that all ground wires are well tightened.
e) The AC output terminal is correctly connected to the mains.
f) Ensure that all photovoltaic panels and inverter are properly connected.
Unused DC connectors should be blocked with caps.

➢ **Start the inverter**

• Steps to start the inverter
  - Turn on the AC switch between the inverter and the power grid.
  - (Optional) Remove the locking screw from the DC switch.
  - Turn on the DC switch between the PV string and the inverter if there is any.
  - Turn on the DC switch at the bottom of the inverter .
• When the photovoltaic panel generates enough power, the inverter will start automatically.
• Check the status of the LED and LCD screen, the LED is green, and the LCD screen displays the main interface.
• If the LED is not green, please check the following:
  -All connections are correct.
  -All external disconnect switches are closed.
  -The DC switch of the inverter is set to the "ON" position.

The following are 3 different states of inverter operation, which means that the inverter starts successfully.
*Waiting: When the DC output voltage of the photovoltaic panel is higher than 70V (lowest starting voltage) and lower than 90V (lowest working voltage), the inverter waits for checking.*
*Checking: The inverter will automatically detect the DC input. When the DC input voltage of the photovoltaic panel is higher than 90V and the photovoltaic panel has enough energy to start the inverter, the inverter will enter the checking state.*
*Normal: When the inverter is working normally, the green light is always on. At the same time, the power is fed back to the grid, and the LCD displays the output power.*

If it is the first time to boot, please follow the prompts to enter the setting interface.

> **Warning!**
> The input terminal of the inverter can be opened only when all the installation work of the inverter has been completed. All electrical connections must be performed by professionals in accordance with local regulations.

> **Notice!**
> If it is the first time to operate the inverter, the system will automatically display setup guide. Please follow the setup guide to complete the basic inverter settings.

# 7 Firmware Upgrading

➢ **Upgrade Notices**

Please read the following precautions before upgrading.

> **Warning!**
> -In order to upgrade the firmware smoothly, if the DSP and ARM firmware need to be upgraded, please note that ARM firmware must be upgraded first, then DSP firmware!
> -Please make sure that the category format is correct, do not modify the firmware file name, otherwise, the inverter may not work!

> **Warning!**
> -For this inverter, ensure that the PV input voltage is greater than 100 V (upgrade on sunny days). please ensure that the battery SOC is greater than 20% or the battery input voltage is greater than 90 V. Otherwise, it may cause serious failure during the upgrade process!

> **Caution!**
> -If the ARM firmware upgrade fails or stops, please do not unplug the U disk power off the inverter and restart it. Then repeat the upgrade steps.

> **Caution!**
> -If the DSP firmware upgrade fails or stops, please check whether the power is off. If it is normal, plug in the U disk again and repeat the upgrade.

➢ **Upgrade preparation**

1) Please check the inverter version and prepare a U disk (USB 2.0/3.0) and personal computer before upgrading.

> **Caution!**
> -Please make sure that the size of the U disk is smaller than 32G, and the format is fat16 or fat 32.

2) Please contact our service support to obtain the firmware, and store the firmware in the U disk according to the following path.

***Update:***
*For ARM file:update \ARM\618.xxxxx.00_HYB_1P_ARM_Vx.xx_xxxxxxxx.usb";*
*For DSP file:update\DSP\618.xxxxx.00_HYB_1P_DSP_Vx.xx_xxxxxxxx.usb";*

Note: Vx.xx is version number, xxxxxxxx is file completion date.

➢ **Upgrade steps**

**Step 1.** Please save the "Upgrade" firmware in your U disk first, and press the "Enter" button on the inverter screen for 5 seconds to enter the OFF mode.



Long press for 5 seconds
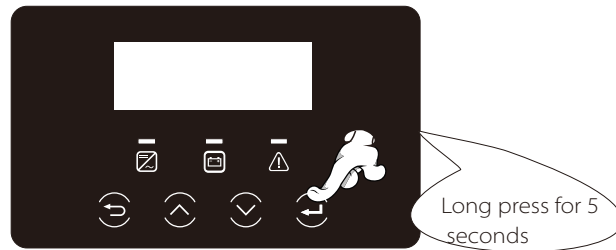
**Step 2.** Find the "Upgrade" port of the inverter, unplug the monitoring module (WiFi Dongle/LAN Dongle/4G Dongle) by hand, and insert the USB flash drive.

U Disk
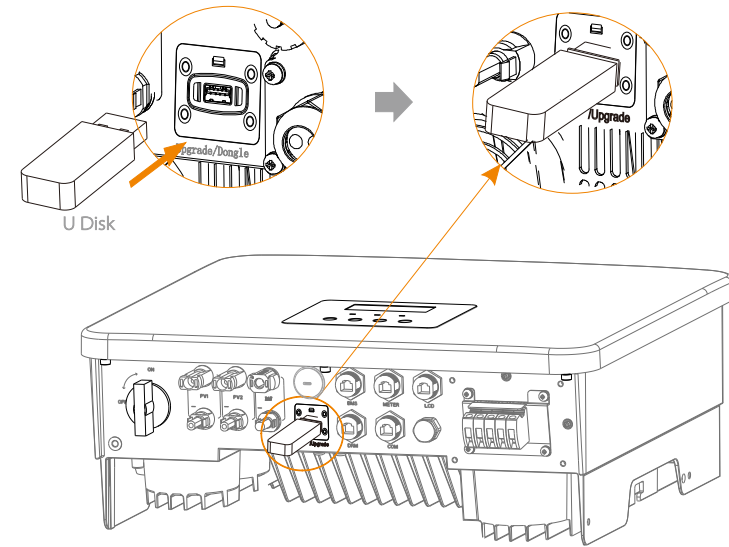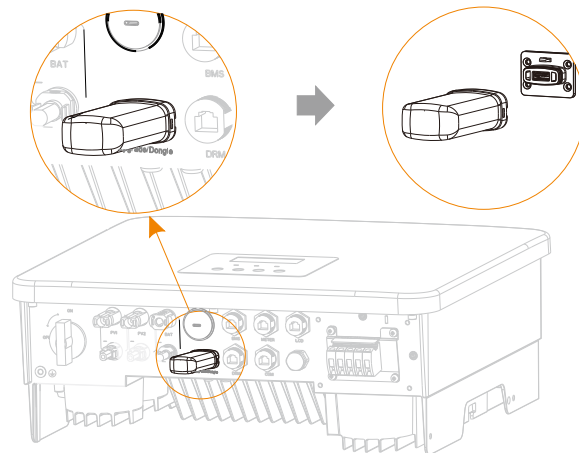
**Step 3.** LCD operation, enter the upgrade interface "update", as shown below(a): Please press the up and down keys to select ARM, then press down to set "OK", press the enter key to enter the software version interface;



(a)  (b)
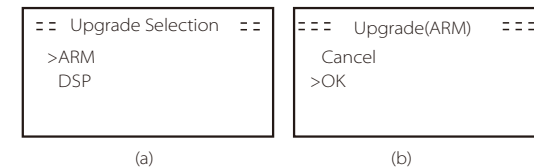
**Step 4.** Please confirm the new firmware version again and select the firmware to upgrade. The upgrade takes about 20 seconds.
(d) When it is completed, the LCD screen returns to the "Update" page.



(c)  (d)  (e)
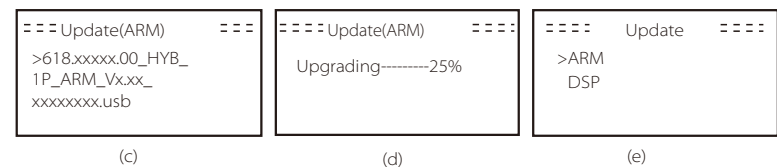
**Step 5.** For DSP: Please wait for 10 seconds. When "Update" page shown as as below, press down to select "DSP" and then press Enter. Please confirm the firmware version again and press Enter to upgrade. The upgrade takes about 2 minutes.

```
≡≡≡:    Update    ≡≡≡:
  ARM
 >DSP
```
( f )

```
≡≡≡   Update(DSP)   ≡≡≡
  >618.xxxxx.00_HYB_
  1P_DSP_Vx.xx_
  xxxxxxxx.usb
```
(g)

```
≡≡≡   Update(DSP)   ≡≡≡
  connect
```
(h)

```
≡≡≡   Update(DSP)   ≡≡≡
  DSP Erasing---------
```
(i)
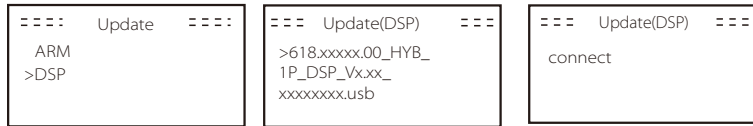
```
≡≡≡   Update(DSP)   ≡≡≡
  Upgrading---------25%
```
(j)

**Step 6.** After the upgrade is completed, the LCD screen displays "Upgrade Successful".
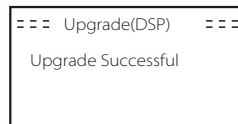
```
≡≡≡   Upgrade(DSP)   ≡≡≡
  Upgrade Successful
```
(k)

**Step 7.** Plug off the U disk, press "Esc" to return to the main interface, and long press the enter key to exit the mode.

> **⚠ Caution!**
> -Please strictly follow each step from step 1-6, don't miss it.
> -Please confirm the ARM/DSP firmware version on the USB flash drive.

Tip: If the display screen is stuck on "X1-Hybrid G4" after the upgrade, please turn off the photovoltaic power supply and restart, and the inverter will restart and return to normal. If not, please contact us for help.

# 8 Setting

## 8.1 Control Panel
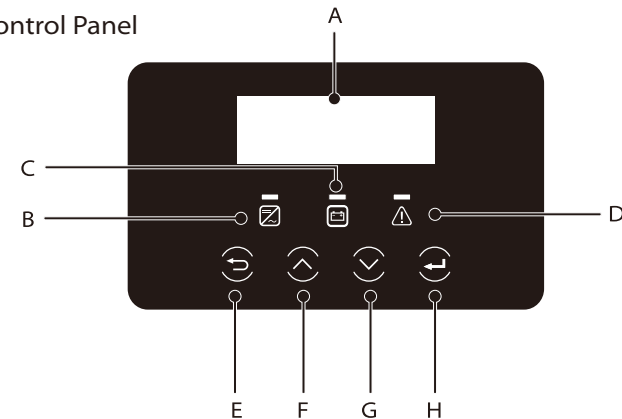


| Object | Name | Description |
|---|---|---|
| A | LCD Screen | Display inverter information on the LCD display. |
| B | LED Indicator light | Blue light: The inverter is in normal state or EPS(Off-grid) mode. Blue flashing: The inverter is in the waiting, checking state or the system switch is off. Off: The inverter is in a fault state. |
| C | | Green: The battery communication is normal and working normally. Green flashing: The battery communication is normal and in an idle state. Off: The battery does not communicate with the inverter. |
| D | | Red light on: The inverter is in a fault state. Off: The inverter has no error. |
| E | Key Function | ESC button: Return from the current interface or function. |
| F | | Up button: Move the cursor to the upper part or increase the value. |
| G | | Down button: Move the cursor down or decrease the value. |
| H | | Enter button: Confirm selection. |

Note: When the inverter is in an idle state, you can reset the work mode, the Min SOC and the charging periods through the inverter LCD or the SolaX APP to charge the battery to the Min SOC in the charging periods and then awaken the inverter. Please make sure that the actual battery SOC - the modified Min SOC ≥ 2% under a specific work mode, so that other modifications are effective. When the current system time is within the new charging periods you reset, the battery begins charging.

## 8.2 Menu Structure

Menu main
- ① System ON/OFF
- ② Work Mode
  - Self Use
  - Feed-in priority
  - Backup mode
  - Manual
    - Forced discharge
    - Forced charge
    - Stop Chrg&Dischrg
  - Peak Shaving
- ③ System Status
  - PV1
  - PV2
  - Battery
  - On-grid
  - EPS
  - Meter/CT
- ④ History Data
  - On-grid
  - EPS
  - Meter/CT-1
  - Meter/CT-2
  - Error Log
- ⑤ Settings
  - User settings
    - Date&Time
    - Language
    - EPS Mute
    - Self Use Mode
    - Feed-in Priority
    - Backup mode
    - Chrg & Dischrg Period
    - Peak Shaving mode
    - Dry Contact
    - User Password
  - ☆Advanced settings
    - Safety Code
    - Grid Parameters
    - Charger
    - PV Connection
    - Export Control
    - Meter/CT Settings
    - Self Test
    - GMPPT
    - Modbus
    - External ATS
    - Power Factor
    - Pu Function
    - FVRT Function
    - Power Limit
    - AS4777 Setting
    - DRM Function
    - Main Breaker Limit
    - Battery Heating
    - EPS Setting
    - Parallel Setting
    - Exten BAT Func
    - Reset
    - ShutDown
    - MicroGrid
    - ExternalGen
    - HotStandby Setting
    - Pgrid Bias
    - Battery Charge EVC
    - Advance Password
- ⑥ About
  - Inverter
  - Battery
  - Internal Code

Notice:" ☆"This part of the content cannot be set by the end user. Please contact the installer or us if necessary.

## 8.3 LCD Operation

The main interface is the default interface, the inverter will automatically return to this interface when the system started up successfully or not operated for a period of time.

The information of the interface is as below. "Power" means the instant output power; "Today" means the power generated within the day. "Battery" means the left capacity of battery energy.

```
Power        0W
Today        0.0KWh
Battery      80%
        Normal
```

➢ **Menu interface**

The menu interface is another interface for users to change settings or obtain information.
-When the LCD displays the main interface, click "OK" to enter this interface.
-The user can select up and down the menu, and press the "OK" key to confirm.

```
         Menu
 > System ON/OFF
   Work Mode
   System Status
```

Menu main
- System ON/OFF
- Work Mode
- System Status
- History Data
- Settings
- About
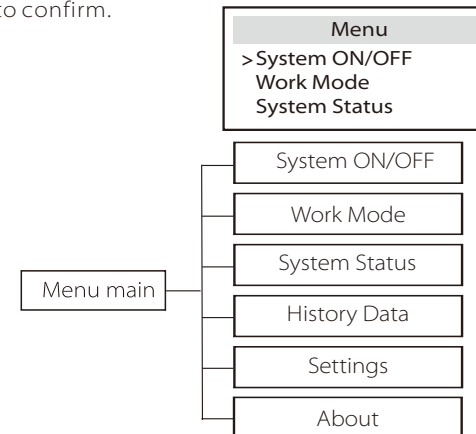
➢ **System ON/OFF**

"ON" indicates that the inverter is in working state, which is generally the default state.

"OFF" means that the inverter stops running and only the LCD screen is turned on.

```
    System ON/OFF
 Switch

      ON      OFF
```

➢ **Work Mode**

```
Work Mode ─┬─ Self Use
           ├─ Feed-in priority
           ├─ Backup mode
           ├─ Manual
           └─ Peak Shaving
```

```
        Work Mode
    > Work Mode
        Self Use
    Press Ent to save
```

For **on-grid** status, there are five work modes: Self Use, Feed-in Priority, Backup, Manual. and Peak shaving mode.

### Self Use

The self-use mode is suitable for areas with low feed-in subsidies and high electricity prices.
The power of PV will supply the loads first, and surplus power will charge the battery, then the remaining power will feed into the grid.

Priority: Loads > Battery > Grid

### Feed-in priority

The feed-in priority mode is suitable for areas with high feed-in subsidies, but has feed-in power limitation.
The power of PV will supply the loads first,  and surplus power will feed into the grid, then the remaining power will charge the battery.

Priority: Loads > Grid > Battery

### Backup mode

The back-up mode is suitable for areas with frequent power outages.
This mode will maintain the battery capacity at a relatively high level, to ensure that the emergency loads can be used when the grid is off.
Same working logic with "Self-use" mode.

Priority: Loads > Battery > Grid

* For the above three work modes, when the  power of PV is insufficient to supply the loads, the battery will supply the loads. If the battery is insufficient, then the grid will supply the loads.

### Manual
This work mode is for the after-sales team to do after-sales maintenance.

Manual mode (manual mode), there are three options to choose from: forced charging, forced discharge, stop charging and discharging (grid-connected 0 power).

```
     Work Mode
  >Manual
    Forced Discharge
```

```
     Work Mode
  >Manual
    Forced Charge
```

```
     Work Mode
  >Manual
    Stop Chrg&Dischrg
```

For **off-grid** status, there is only one work mode: EPS (Off-grid).

### EPS (Off-grid)

In case of power failure, the system will supply EPS loads through PV and battery.
(The battery must be installed, and EPS loads shall not exceed battery's max. output power.)
The power of PV will charge the loads first,  and surplus power will charge the battery.

Priority: Loads > Battery

Note:
The battery will stop discharging when SOC=min SOC. But due to battery self consumption, sometimes SOC may < min SOC.

For on-grid status, if the battery SOC ≤ (min SOC-5%), the inverter will take utility energy to charge battery SOC back to (min SOC+1%).

For off-grid status, if the battery SOC ≤min SOC, the inverter will be unable to enter EPS mode (the battery will be unable to discharge) unless SOC is back to 31%.

### Peak shaving mode

Peak shaving mode is set for leaving out peaks in electricity use.



The D-A period is the battery charging period during which discharging is not allowed and the PV will charge the battery first for peak shaving. The ChargeFromGrid" setting determines whether or not to charge from the grid. When "ChargeFromGrid" is set to "Disable", the battery cannot charge from the grid; when "ChargeFromGrid" is set to "Enable" and the actual battery SOC is less than "Max_SOC", the battery will charge from the grid at no more than "ChargePowerLimits" power.

In the A-B and C-D periods, if the power of loads does not exceed "PeakLimits", the PV will charge the battery first.When the battery is fully charged, the PV will charge loads, and the surplus power will feed into the grid. If the power of loads exceeds "PeakLimits", the PV and battery will discharge energy for loads and thus reduce the amount of energy purchased from the grid.

In the B-C period, the battery does not discharge. The PV will charge the battery to the "Reserved SOC" first and then supply power or loads, with the surplus power feeding into the grid. Charging the battery first in these peiods is storing energy for the peak shaving.

* If there are requirements for zero output from the inverter, the PV output will be limited.

---

➢ System Status
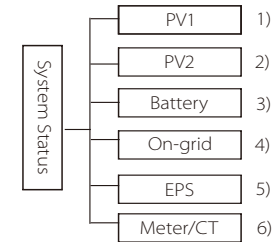


System status contains six content: PV1/PV2/Battery/On-grid (energy feed into or buy from the grid)and EPS and so on.

Press up and down to select, press "Enter" to confrm the selection, and press "ESC" to return to the menu.

1/2) PV1, PV2
Here you can see the voltage, current and power of the PV 1 and PV 2 photovoltaic panels respectively;

| PV1 | |
| --- | --- |
| >U | 0.0V |
| I | 0.0A |
| P | 0W |

| PV2 | |
| --- | --- |
| >U | 0.0V |
| I | 0.0A |
| P | 0W |

3) Battery
This status shows the battery condition of the system. Including battery voltage and battery current, Battery power, battery capacity, battery temperature, BMS connection status. The meaning of the sign of battery current and power: "+" means charging; "-" means discharging.

| Battery | |
| --- | --- |
| U | 400.0V |
| I | 1.0A |
| P. | 400W |

| Battery | |
| --- | --- |
| U | 400.0V |
| I | -1.0A |
| P | -400W |

**4) On-grid**

Here you can see the voltage, current, frequency, and power of the grid.

| On-grid | |
|---|---|
| U | 0.0V |
| I | 0.0A |
| p | 0.0W |

**5) EPS**

Here you can see the voltage, current, frequency and power of the inverter when it is disconnected from the grid.

| EPS | |
|---|---|
| U | 0.0V |
| I | 0.0A |
| P | 0VA |

**6) Meter/CT**

Here you can see the data showing the meter or the CT.

| Meter/CT |
|---|
| >Meter/CT-1 |
| Meter/CT-2 |

| Meter/CT | | Meter/CT | |
|---|---|---|---|
| >Meter/CT-1 | | >Meter/CT-2 | |
| | 4000w | | 4000w |

➢ **History Data**

| History Data | On-grid | 1) |
|---|---|---|
| | EPS | 2) |
| | Meter/CT-1 | 3) |
| | Meter/CT-2 | 4) |
| | Error Log | 5) |
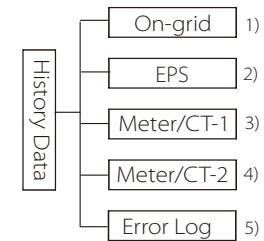
The history data contains five pieces of information: on-grid power of the inverter, EPS power generation, power of the meter/CT and error logs.

Press up and down to select, press Enter to confirm selection, and press ESC to return to the menu.

**1) On-grid**
Here is a record of the power capacity of the inverter connected to the grid today and the total.

| On-grid | On-grid |
|---|---|
| Output Today | Output Total |
| 0.0 kWh | 0.0 kWh |

| On-grid | On-grid |
|---|---|
| Input Today | Input Total |
| 0.0 kWh | 0.0 kWh |

**2) EPS**
Here you can see the EPS output of the inverter today and the total output.

| EPS | EPS |
|---|---|
| Today： | Total: |
| 0.0 kWh | 0.0 kWh |

3) Meter /CT-1
Here you can see the inverter electricity sold, total electricity sold, electricity bought from the grid and total electricity bought on that day.

| Meter/CT-1 |
| --- |
| >FeedIn Today: |
| 00.0KWh |

| Meter/CT-1 |
| --- |
| >FeedIn Total: |
| 00.0KWh |

| Meter/CT-1 |
| --- |
| >Consume Today: |
| 00.0KWh |

| Meter/CT-1 |
| --- |
| >Consume Total: |
| 00.0KWh |

4) Meter /CT-2
Here you can see the total power output of the inverter for the day.

| Meter/CT-2 |
| --- |
| >Output Today: |
| 00.0KWh |

| Meter/CT-2 |
| --- |
| >Output Total: |
| 00.0KWh |

5) Error Log
Here you can see the most recent six error messages.

| Error log |
| --- |
| >No error |

➢ **User Settings**

User settings
- Date&Time — 1)
- Language — 2)
- EPS Mute — 3)
- Self-use Mode — 4)
- Feed-in Priority — 5)
- Backup Mode — 6)
- Chrg & Dischrg Period — 7)
- Peak Shaving mode — 8)
- DryContact — 9)
- User Password — 10)
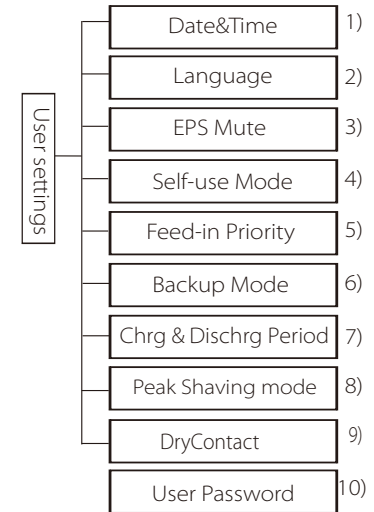
Here you can set the inverter time, language, working mode, charging and discharging time period and user password.

| User Setting |
| --- |
| Date&Time |
| Language |
| EPS Mute |

1) Date&Time
This interface is for users to set the system date and time.

| Date&time |
| --- |
| >2019 - 11 - 15 |
| 10 : 19 |

2) Language
This inverter provides multiple languages for customers to choose.

| Language |
| --- |
| > Select: |
| English |

**3) EPS Mute**
Here you can choose whether the buzzer is turned on when the inverter is running in EPS mode. Select Yes, the buzzer mutes, select NO, EPS mode, the buzzer will sound once every 4s when the battery is fully charged, the closer the battery is to the empty state, the higher the buzzer will sound, to remind users to avoid battery loss.

```
EPS Mute
> Mute:
        Yes    No
```

**4) Self-use mode**
In this mode, you can set the power reserve percentage of the minimum battery state, set whether the power can be taken from the mains side to charge the battery, and set the amount of power to charge the battery. For example: set the reserved minimum SOC of the battery capacity to "10%", which means that when the battery has been discharged to 10% of the battery capacity, the battery is not allowed to continue to discharge; When Charge from grid is set to "Enable", the utility power is allowed to charge the battery; when set to "Disable", the utility power is not allowed to charge the battery;
Charge battery to is set to 90%, indicating that the mains is allowed to charge the battery at 90%.

```
Self-use Mode
> Min SOC:
              10%
```
```
Self-use Mode
> Charge from grid
          Disable
```
```
Self-use Mode
> Charge battery to
              90%
```

**5) Feed-in Priority**
In this mode, you can set the power reserve percentage of the minimum battery state, set whether the power can be taken from the mains side to charge the battery, and set the amount of power to charge the battery. For example: set the reserved minimum SOC of the battery capacity to "10%", which means that when the battery has been discharged to 10% of the battery capacity, the battery is not allowed to continue to discharge; Charge battery to is set to 90%, indicating that the mains is allowed to charge the battery at 90%.

```
Feed-in Priority
> Min SOC:
              10%
```
```
Feed-in Priorty
> Charge battery to
              90%
```

**6) Backup mode**
In this mode, you can set the power reserve percentage of the minimum battery state, set whether the power can be taken from the mains side to charge the battery, and set the amount of power to charge the battery. For example: set the reserved minimum SOC of the battery capacity to "30%", which means that when the battery has been discharged to 10% of the battery capacity, the battery is not allowed to continue to discharge; Charge battery to is set to 90%, indicating that the mains is allowed to charge the battery at 90%.

```
Backup mode
> Min SOC:
  Charge from grid
              10%
```
```
Backup mode
> Charge battery to
              90%
```

**7) Charge and discharge period**
Here you can set the charge and discharge time period.
If two charging and discharging periods are needed, turn on the charging and discharging period 2 and set the period.

```
Chrg&DischrgPeriod
> Forced Charg Period
    Start Time
       00:00
```
```
Chrg&DischrgPeriod
> Forced Charg Period
    End Time
       00:00
```
```
Chrg&DischrgPeriod
> Allowed Disc Period
    Start Time
       00:00
```
```
Chrg&DischrgPeriod
> Allowed Disc Period
    End Time
       00:00
```
```
Chrg&DischrgPeriod
  Chrg&DischrgPeriod2
```
```
Chrg&DischrgPeriod2
> Function
       Enable/Disable
```
```
Chrg&DischrgPeriod2
> Forced Charg Period
    Start Time
       00:00
```
```
Chrg&DischrgPeriod2
> Forced Charg Period
    End Time
       00:00
```
```
Chrg&DischrgPeriod2
> Allowed Disc Period
    Start Time
       00:00
```
```
Chrg&DischrgPeriod2
> Allowed Disc Period
    End Time
       00:00
```

**8) Peak Shaving mode**

This setting is for enabling peak shaving mode.
"DisChgPeriod1" and "DisChgPeriod2" are two discharging periods you can set. Set "ShavingStartTime1" (default value: 7:00) and "ShavingEndTime1 (default value: 15:00) under "DisChgPeriod1" , and "ShavingStartTime2 (default value: 19:00) and "ShavingEndTime2" (default value: 23:00) under "DisChgPeriod2" to define the peak hours of electricity.
Set "PeakLimits1/2" to limit the power that loads get from the grid. Once the power of loads exceeds "peak limits" during the peak hours, the PV and battery will discharge energy for loads and thus reduce the amount of energy purchased from the grid. In non-peak hours, discharging of the battery is not allowed. If you want to get electricity from the grid, set "ChargeFromGrid" to "Enable". "Disable" is the default setting. When you select "Enable" and the actual battery SOC is less than "MAX_SOC "(settable), the battery can be charged from the grid at no more than "ChargePowerLimits" (settable) power.
Range of "ChargePowerLimits": 0 W~rated power (W)
The range of "MAX_SOC" is 10%–100%; the default value is 50%.
Range of "Reserved_SOC" is10%–100%; the default value is 50%.
"Reserved_SOC" is the battery capacity saved for the next peak shaving in the non-peak shaving period.

| User Setting | Peak shaving mode | DisChgPeriod1 |
|---|---|---|
| > Peak shaving mode | >DisChgPeriod1<br>DisChgPeriod2<br>ChargeFromGrid | ShavingStartTime<br><br>07:00 |

| DisChgPeriod1 | DisChgPeriod1 | Peak shaving mode |
|---|---|---|
| ShavingEndTime<br><br>15:00 | ShavingLimits1<br><br>0W | DisChgPeriod1<br>>DisChgPeriod2<br>ChargeFromGrid |

| DisChgPeriod2 | DisChgPeriod2 | DisChgPeriod2 |
|---|---|---|
| ShavingStartTime<br><br>19:00 | ShavingEndTime<br><br>23:00 | ShavingLimits2<br><br>0W |

| Peak shaving mode | ChargeFromGrid | ChargeFromGrid |
|---|---|---|
| DisChgPeriod1<br>DisChgPeriod2<br>>ChargeFromGrid | ChargeFromGrid<br><br>Disable | ChargePowerLimits<br><br>1000W |

| ChargeFromGrid | Peak shaving mode | ReservedSOC |
|---|---|---|
| MAX_SOC<br><br>50% | DisChgPeriod2<br>ChargeFromGrid<br>>Reserved_SOC | Reserved_SOC<br><br>50% |

**9) Dry Contact**
When the user uses the inverter communication control external device function, you can enter here to set the parameters of the external response control. For the setting method, please refer to the user manual of the compatible external device.
If the user uses the inverter dry contacts to control external devices (such as heat pumps) through the Adapter box, please refer to the Adapter box quick installation manual to set the parameters here.

| Load Management |
|---|
| > Mode Select |
| Disable |
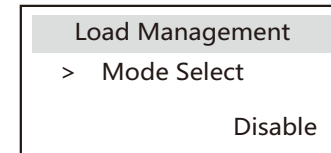
**10) User Password**
The default password for the end user is "0000", where you can reset the new password and press the up/down key to increase or decrease the value. Press "Enter" to confirm the value and jump to the next digit. When all passwords have been entered and confirmed, press "OK" to set the password successfully.

| User Password |
|---|
| > |
| 0    0    0    0 |

> ➤ **Advance settings**

| | | |
|---|---|---|
| Safety Code | 1) | |
| Grid Parameters | 2) | |
| Charger | 3) | |
| PV Connection | 4) | |
| Export Control | 5) | |
| Meter/CT Settings | 6) | |
| Self Test | 7) | |
| GMPPT | 8) | |
| Modbus | 9) | |
| External ATS | 10) | |
| Power Factor | 11) | |
| Pu Function | 12) | |
| FVRT Function | 13) | |
| Power Limit | 14) | |
| AS4777 Setting | 15) | |
| DRM Function | 16) | |
| Main Breaker Limit | 17) | |
| Battery Heating | 18) | |
| EPS Setting | 19) | |
| Parallel Setting | 20) | |
| Exten BAT Func | 21) | |
| Reset | 22) | |
| ShutDown | 23) | |
| MicroGrid | 24) | |
| ExternalGen | 25) | |
| HotStandby Setting | 26) | |
| Pgrid Bias | 27) | |
| Battery Charge EVC | 28) | |
| Advance Password | 29) | |

(Advanced settings)

All advanced settings can be set here, such as battery, grid, EPS(Off-grid), etc..
"Advanced" setting is generally customization and resetting for battery and grid. Each part has lower level parts.
Please contact your installer or factory and enter the installer password.
.

```
          Advanced
       Safety Code
     > Grid Parameters
```
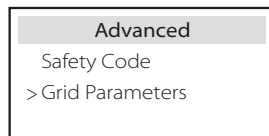
**1) Safety Code**
User can set safety standard according to different countries and grid tied.
There are now several standards to choose from. (There may be changes in the future, please refer to the screen display.)

**2) Grid Parameters**

Here you can set the protection value of grid voltage and frequency. The default value is the specified value under the current safety regulations, and the user cannot change it .

The display content will be displayed according to the requirements of local laws and regulations, which are constantly increasing. Please refer to the contents displayed on the inverter screen.

Grid Parameters:
- OverVoltage_L1
- UnderVoltage_L1
- OverFreq_L1
- UnderFreq_L1
- Vac 10min Avg
- OverVoltage_L2
- UnderVoltage_L2
- OverFreq_L2
- UnderFreq_L2
- Tovp_L1
- Tuvp_L1
- Tofp_L1

Grid Parameters:
- Tufp_L1
- Tovp_L2
- Tuvp_L2
- Tofp_L2
- Tufp_Fast
- Reconnection Time
- Checking Time
- W(Gra)
- OFPL_Setting
- UFPL_Setting
- Local Command

```
       Grid Parameters
      >OverVoltage_L1

                   0.0V
```

```
       Grid Parameters
      >UnderVoltage_L1

                   0.0V
```

```
       Grid Parameters
      >OverFreq_L1

                   0.0Hz
```

```
       Grid Parameters
      >UnderFreq_L1

                   0.0Hz
```

**3) Charger**
Here the user can set the parameters of "Charger" on this page, the inverter is compatible with both lithium battery and lead-acid battery. The default battery type is lithium, users can change it to lead-acid in actual usage.  The relevant parameters needed to be set.
For the detailed parameters, please refer to the contents display on the screen.

```
         Charger
      Battery Type

      Lead Acid      Lithium
```

```
         Charger

        Lead Acid
```
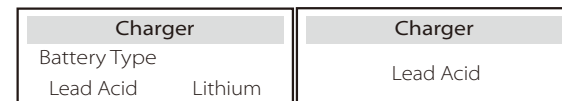
| Charger | Charger | Charger |
|---|---|---|
| Charge Equalization<br>00.0V | Charge float<br>00.0V | Discharge Cut<br>00.0V |

| Charger | Charger | Charger |
|---|---|---|
| Discharge BackUp<br>00.0V | >Max Charge<br>Current:<br>30A | >Max Discharge<br>Current:<br>30A |

| Charger | Charger | Charger |
|---|---|---|
| Charge upper limit<br>100% | Lithium | >Max Charge<br>Current:<br>30A |

| Charger | Charger |
|---|---|
| >Max Discharge<br>Current:<br>30A | Charge upper limit<br>100% |

4) PV Connection
PV connection supports Multi Mode. Multi Mode means that each PV module connects to the inverter's one MPPT .

| PV Connection |
|---|
| PV Mode:<br>> MULTI < |

5) Export Control
This feature allows the inverter to control the amount of electricity output to the grid.
The factory value is the default and can be changed by the user. The user value set by setup must be less than the maximum. If the user does not want to supply power to the grid, set it to 0.
When Safety codes related to Australia are chosen, this item won't show on the screen.

| Export Control |
|---|
| User value:<br>0W |

6) Meter/CT Setting
The user needs to select the CT or electricity meter to connect the inverter here. Select the address of the meter. CT does not need to select the address. In the Meter/CT Settings box, there are two options (Negative and Positive) available for users. If the Meter is reversely connected, please click the Negative tab.

| CT/Meter Setting | CT/Meter Setting | CT/Meter Setting |
|---|---|---|
| > Select<br>Meter    CT | > Select<br>Disable    Enable | > Meter 1Addr:<br>1 |

| CT/Meter Setting | CT/Meter Setting | CT/Meter Setting |
|---|---|---|
| > Meter 2 Addr:<br>2 | > Meter 1Direction:<br>Positive    Negative | > Meter 2 Direction:<br>Positive    Negative |

7) Self Test (only for CEI 0-21)
The self test function allows users to test the following items. "Full test", "Ovp(59.S2) test", "Uvp (27.S1) test", "Uvp (27.S2) test", "Ofp (81>.S1) test", "Ufp (81<.S1) test", "Ofp (81>.S2) test", "Ufp (81<.S2) test", "Ovp10 (59.S1) test". In the self-test interface, the user can select "all tests" or a single test item for testing.
Before testing, make sure that the inverter is connected to the grid. All tests take about 6 minutes. And it will display "Success" and then "Delivery". For a single test item, it takes about a few seconds or minutes. Click "Test Report" to view the test results of all items.

| Self Test | >Ofp2(81>.S2)result | >Ovp2(59.S2)result |
|---|---|---|
| ALL Test<br>Test report<br>Uvp(27.S1) test | Ft: 51.50Hz  Tt:1000ms<br>Fs:  0.00Hz  To: 998ms<br>F0:  0.00Hz    pass | Vt: 264.5V  Tt: 300ms<br>Vs:   0.0V  To: 200ms<br>V0:   0.0V       pass |

| >Ofp2(27.S2)result | >Uvp2(27.S1)result | >Ofp2(81>S1)result |
|---|---|---|
| Vt:  92.0V  Tt: 200ms<br>Vs:   0.0V  To: 196ms<br>V0:   0.2V    pass | Vt: 195.5V  Tt: 400ms<br>Vs:   0.0V  To: 200ms<br>V0:   0.0V       pass | Ft:  50.50Hz  Tt: 100ms<br>Fs:   0.00Hz  To:  96ms<br>F0:   0.2Hz       pass |

| >Ufp2(81<.S1)result | >Ufp2(81<.S2)result | >Ovp10(59.S1)result |
|---|---|---|
| Ft:  49.50Hz  Tt: 100ms<br>Fs:   0.00Hz  To:  98ms<br>F0:   0.02Hz       pass | Ft:  47.50Hz  Tt: 400ms<br>Fs:   0.00Hz  To: 3999ms<br>F0:   0.02Hz       pass | Vt:  253.0V  Tt: 600ms<br>Vs:   0.0V  To: 598ms<br>V0:   0.0V       pass |

8) GMPPT
Here, you can set the shadow tracking with four options, which are off, low, middle, and high.

| GMPPT | GMPPT |
|---|---|
| PV1 Control | >Func Select<br>OFF/Low/Middle/High |

| GMPPT | GMPPT |
|---|---|
| PV2 Control | >Func Select<br>OFF/Low/Middle/High |

### 9) Modbus

Select the functional use of the external communication port. COM for normal Modbus communication, "EV Charger" for communicating with the EV Charger, DataHub for communicating with DataHub.

```
            Modbus
> Function Select:
   COM/EV Charge/Datahub/
   AdaptBoxG2/EVC&AdaptBoxG2
```
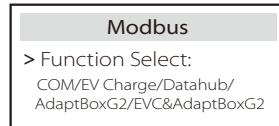
Here you select the baud rate of the external communication protocol, the default location of 19200 and 485 addresses.

```
       Modbus              Modbus
    Baud Rate:           Address:
     115200                        1
```
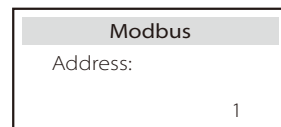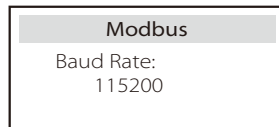
### 10) External ATS

If the Matebox with the inverter has built-in ATS, that is to say the advanced version, you need to enable this function. In other cases, disable this function is required.

```
        External ATS
    > Select
        Disable    Enable
```
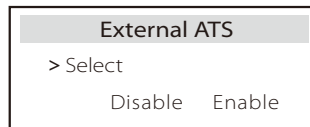
### 11) Power Factor (applicable to specific countries, please refer to local grid requirements.)

```
     Power Factor            Power Factor
   Mode Select             Mode Select

   >        Off       <    >    Fixed Q Power   <


     Power Factor            Power Factor
   Mode Select             Mode Select

   >        Q(u)      <    >      Curve         <


     Power Factor            Power Factor
   Mode Select             Mode Select

   >    Under-Excited   <   >    Over-Excited    <
```
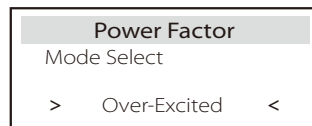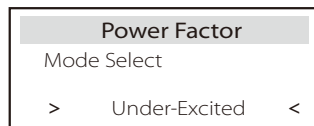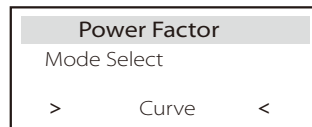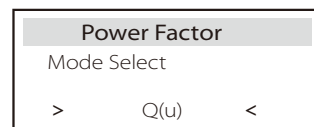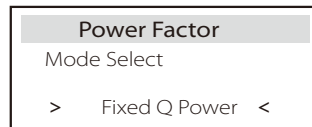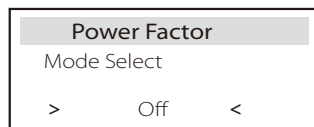
| Mode | Comment |
|---|---|
| Off | – |
| Over-Excited | PF value |
| Under-Excited | PF value |
| Curve | Upper limit |
| | Lower limit |
| | Power Upper |
| | Power Lower |
| | PFLockInPoint ( CEI 0-21 only) |
| | PFLockOutPoint ( CEI 0-21 only) |
| | 3Tau |
| Q( u ) | VoltRATIO 1 ( AS4777.2 only) |
| | VoltRATIO 4 ( AS4777.2 only) |
| | QURESPONSEV2 ( AS4777.2 only) |
| | QURESPONSEV3 ( AS4777.2 only) |
| | QURESPONSEV4 ( AS4777.2 only) |
| | K Value (CEI 0-21 only) |
| Fixed Q Power | Q Power |

● Reactive power control, reactive power standard curve cos φ = f(P)

For VDE ARN 4105, the curve cos φ = f(P) should refer to curve A. The set default value is shown in curve A.

For TOR, the curve cos φ = f(P) should be curve B. The set default value is shown in curve B.

For CEI 0-21, the default value of PFLockInPoint is 1.05. When Vac> 1.05Vn, Pac> 0.2 Pn, curve cos φ = f(P) corresponds to curve C.



curve A
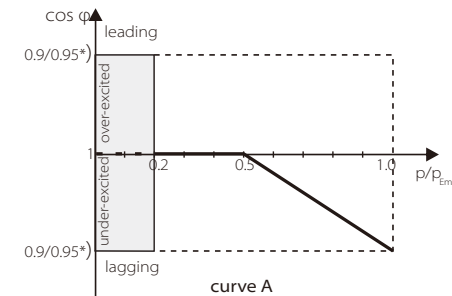
*) If the grid-connected power of the inverter ≤ 4.6kW, the Power Factor is 0.95 at 1.0 power; if the grid-connected power of the inverter > 4.6kW, the Power Factor is 0.90 at 1.0 power.
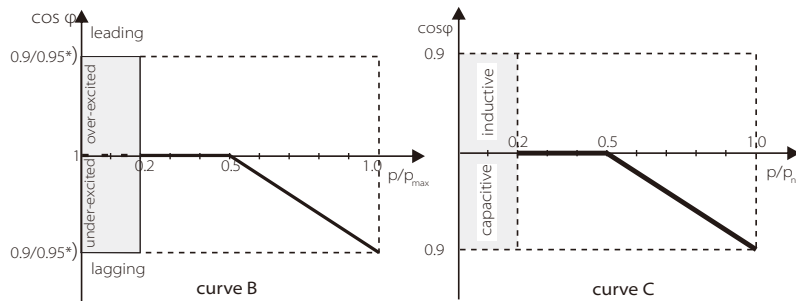
curve B

curve C

*) Depend on the required Q capacity

● Reactive power control, reactive power standard curve Q= f(V)



V2s=1.10Vn

V1s=1.08Vn=QuVlowRate

V2i=0.90Vn

V2i=0.92Vn=QuVlowRate
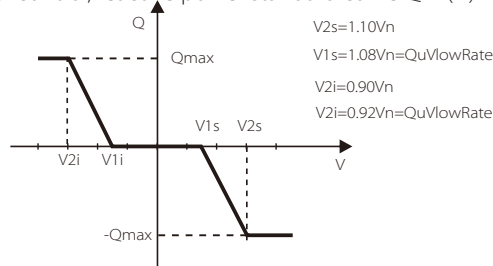
12) PU Function (applicable to specific countries, please refer to local grid requirements)

The PU function is a volt-watt response mode required by certain national standards such as AS4777.2. This function can control the active power of the inverter according to the grid voltage.
Selecting "Enable" means that this function is turned on and is the default value.
Select "Disable" to deactivate the function.

| PU Function |
| --- |
| >PuFunction |
| Enable |

| PU Function |
| --- |
| Response V2 |
| 220.0V |

| PU Function |
| --- |
| Response V3 |
| 250.0V |

| PU Function |
| --- |
| Response V4 |
| 265.0V |

13) FVRT Function(apply to 50549)
Here you can enable or disable the FVRT Function.

| FVRT Function |
| --- |
| Function Select |
| Disable/Enable |

14) Power limit
Power limit function, the maximum power of the AC port can be set by percentage.

| Power Limit |
| --- |
| >Proportion |
| 1.00 |

15) AS4777 Setting
It is the same as the function of Export Control, but it's only applicable to Australia and New Zealand.

| AS4777 Setting |
| --- |
| >Export Control |
| General Control |

| Export Control |
| --- |
| >Soft Limit |
| Enable |

| Export Control |
| --- |
| >Soft Limit Value |
| 00000W |

16) DRM function (applied to NZS4777.2)

The DRM function is a demand response method required by the NZS4777.2 standard and is only applicable to NZS4777.2.
The default value is "enable". Select "Disable" to disable this function.

| DRM Function |
| --- |
| >Function Select |
| Enable/Disable |

17) Main Breaker Limit

For power limit of smart meter or CT, the current must be set in line with the utility's contract requirements. In case of failure to set, it may cause a circuit breaker fault of main switchboard, adversely affecting the charging or discharging of battery. Click Main Breaker Limit to enter the setting interface, and then choose the corresponding amperage according to the utility's requirements.

| Main Breaker Limit |
| --- |
| >Current |
| 40A |

### 18) Battery Heating

If the battery heating function is needed, you can enable it here. After you enable this function, as long as PV is available, the battery system will be heated.

Once the battery system temperature is lower than 0℃, the battery will be heated until 10℃.

Then you need to set the heating periods that the battery system needs to be heated.

There are two periods can be set.

During the heating periods, if BAT actual SOC >35%*, the priority of heating energy source will be in the sequence of PV>BAT>grid.

During the heating periods, if BAT actual SOC<35%*, the priority of heating energy source will be in the sequence of PV>grid.

Out of the heating periods, the heating energy source is PV merely.

*The inverter will synchronize to consider the battery cell voltage.

| Battery Heating | Battery Heating |
|---|---|
| >Func Select:<br><br>Enable/Disable | >Heating Period 1<br>Start Time<br>00:00 |

| Battery Heating | Battery Heating |
|---|---|
| >Heating Period 1<br>End Time<br>00:00 | >Heating Period 2<br>Start Time<br>00:00 |

| Battery Heating |
|---|
| >Heating Period 2<br>End Time<br>00:00 |

### 19) EPS Setting

Users can set the frequency selection in the EPS mode here, and set the minimum SOC and minimum ESC SOC.

When the device is in EPS mode, once the battery SOC is lower than the Min SOC of the inverter, it displays "Bat Power Low". If there is PV, the energy of PV will charge the battery. When the SOC of the battery reaches the Min Esc SOC, the inverter will automatically enter EPS mode. The default value of Min Esc SOC is 20% and Min Esc SOC can set between 15% and 100%.

| EPS Setting | EPS Setting |
|---|---|
| > Frequency<br><br>50Hz | >Frequency<br><br>60Hz |

| EPS Setting | EPS Setting |
|---|---|
| > Min SOC<br>10% | > Min ESC SOC<br>20% |

### 20) Parallel Setting (a function for parallel operation)

If a parallel operation is required, the user may set it with Parallel Setting.

| Parallel Setting | |
|---|---|
| Status | Free/Master |
| Setting | Free/Master |

### 21) Exten BAT Func

This function is for extending new batteries. This setting shall be invalid under the EPS mode. When it is on-grid, enabling this setting will make the inverter charge or discharge the battery SOC to about 40%, which is convenient for adding new batteries.

| Exten BAT Func | |
|---|---|
| Select | Enable/Disable |

### 22) Reset

Users can reset the reset error log, meter power, inverter power, and restore factory settings here.

| Reset Error Log | Reset Meter/CT_1 |
|---|---|
| >Reset<br>Yes   No | >Reset<br>Yes   No |

| Reset Meter/CT_2 | Reset INV Energy |
|---|---|
| >Reset<br>Yes   No | >Reset<br>Yes   No |

| Factory Reset | Wifi Reset★ |
|---|---|
| >Reset<br>Yes   No | >Reset<br>Yes   No |

★
"Wifi Reset" is only supported by inverters whose 6th digit of the SN is "A" or "C" and whose hardware has a WiFi reset circuit.

### 23) ShutDown

ShutDown is an Enable Switch. If the user wanna use ShutDown, the Enable mode can be set.

| ShutDown |
|---|
| ShutDown<br>Enable / Disable |

24) MicroGrid
If the user wanna use MicroGrid, the Enable mode can be set.

| MicroGrid |
| --- |
| >MicroGrid |
| Enable/Disable |

25) ExternalGen

The set value of power must meet the following two conditions when the maximum charging power of batteries is to be set.
1) The value of Max Charge Power is less than that of rated power of the generator minus total load power.
2) The value of Max Charge Power is less than or equals that of rated power of the inverter.

| External Gen | External Gen | External Gen |
| --- | --- | --- |
| Function Control<br>Enable       Disable | Function Control<br>ATS Control | MaxChargePower<br>0W |
| External Gen<br>Forced Charg Period<br>Start Time<br>00:00 | External Gen<br>Forced Charg Period<br>End Time<br>00:00 | External Gen<br>Allowed Disc Period<br>Start Time<br>00:00 |
| External Gen<br>Allowed Disc Period<br>End Time<br>00:00 | External Gen<br>Char&Disc Period2<br>Enable       Disable | External Gen<br>Forced Charg Period<br>Start Time     2<br>00:00 |
| External Gen<br>Forced Charg Period<br>End Time     2<br>00:00 | External Gen<br>Allowed Disc Period<br>Start Time     2<br>00:00 | External Gen<br>Allowed Disc Period<br>End Time     2<br>00:00 |
| External Gen<br>Charge from Gen<br>Enable/Disable | Charge from Gen<br>Charge battery to<br>10% | ExternalGen<br>Function Control<br>Dry Contact |
| ExternalGen<br>MaxChargePower<br>0W | ExternalGen<br>Start Gen Method<br>reference soc/immediately | ExternalGen<br>Switch on SoC<br>0% |
| ExternalGen<br>Switch off SoC<br>0% | ExternalGen<br>MaxRunTime<br>Min | ExternalGen<br>MaxRestTime<br>Min |
| ExternalGen<br>Char&Disc Period<br>Enable       Disable | ExternalGen<br>Charg Period<br>Start Time<br>00:00 | ExternalGen<br>Charg Period<br>End time<br>00:00 |
| ExternalGen<br>Allowed Disc Period<br>Start Time<br>00:00 | ExternalGen<br>Allowed Disc Period<br>End Time<br>00:00 | ExternalGen<br>Char&Disc Period2<br>Enable       Disable |

| External Gen | ExternalGen |
| --- | --- |
| Charge from Gen<br>Enable       Disable | Charge battery to<br>10% |

26) HotStandby Setting
This function is mainly to save the capacity of the battery. When PV has no power and the inverter has no output power, the inverter will enter "HotStandby" status. When the power of loads is higher than 100W, the inverter will exit "HotStandby" status.
It is " Disable" by default, setting "Enable" the inverter will enter "HotStandby" status.

| HotStandby Setting |
| --- |
| HotStandby Setting |
| Enable/Disable |

27) Pgrid Bias
Here you can set whether to discharge more to the grid or prefer to take power from the grid. If disable is selected , means no preference. If Grid is selected, the inverter will be biased to discharge the mains; if INV is selected, the inverter will be biased to take power from the mains.

| Pgrid Bias |
| --- |
| >Pgrid Bias |
| Disable/Grid/INV |

28) Battery Charge EVC

Here you can set "Enable" to allow the battery  to discharge energy to EV Charger. When you set "Disable", battery discharging energy to EV Charger is not allowed.

| Battery charge EVC |
| --- |
| Disable/Enable |

29) Advance Password
Here you can reset the advanced password. "Set OK!" is displayed on success, and "Setting Failed!" will also be displayed on failure.

| Advance Password | Advance Password |
| --- | --- |
| Set  OK! | Setting failed! |

> ➢  **About**

```
                                    ┌─ Inverter SN
                                    ├─ Register SN★
                                    ├─ DSP
                        Inverter ───┤
                                    ├─ ARM
                                    ├─ On-grid Run Time
                                    └─ EPS Run Time

                                    ┌─ "BatBrand": BAK
                                    ├─ Bat_M  SN
                                    ├─ Bat_PS1 SN
                                    │
                                    ├─ Bat_PS2 SN
  About ───┤
                        Battery ────┤  Bat_PS3 SN
                                    │
                                    ├─ Bat_PS4 SN
                                    ├─ BatteryM  Version
                                    └─ BatteryS  Version

                                    ┌─ Inverter code
                   Internal Code ───┤
                                    └─ BMS Code
```
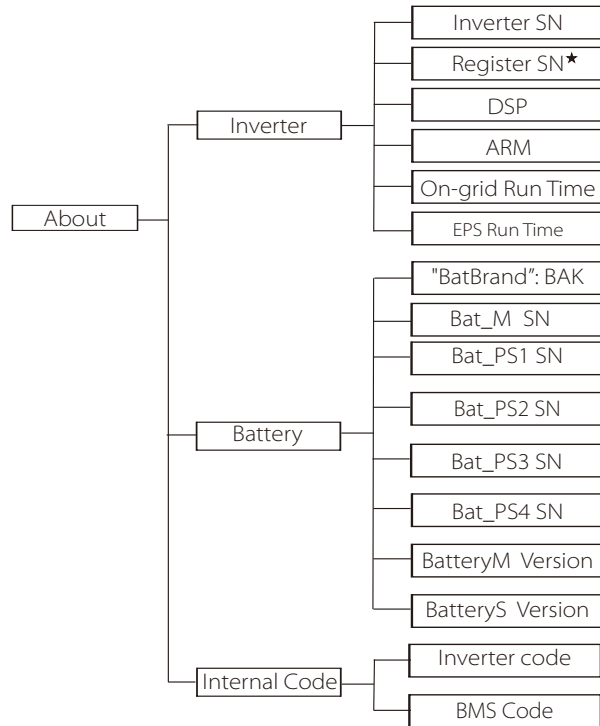
★ Register1 SN: Represents the serial number of external monitoring equipment, such as WiFi Dongle, LAN Dongle and GPRS Dongle.

a) About

Here you can see some basic information of the inverter and battery. such as the inverter and battery SN number, software version number, and system run time.

```
┌─────────────────────────┐
│         About           │
├─────────────────────────┤
│ >Inverter               │
│   Battery               │
│                         │
└─────────────────────────┘
```

Inverter

```
┌───────────────────────┐   ┌───────────────────────┐
│       Inverter        │   │       Inverter        │
├───────────────────────┤   ├───────────────────────┤
│ >Inverter SN          │   │ >Register SN          │
│    01234560123456     │   │    SWNZJ23ZUR         │
└───────────────────────┘   └───────────────────────┘

┌───────────────────────┐   ┌───────────────────────┐
│       Inverter        │   │       Inverter        │
├───────────────────────┤   ├───────────────────────┤
│ >DSP                  │   │ >ARM                  │
│    2.07               │   │    1.03               │
└───────────────────────┘   └───────────────────────┘

┌───────────────────────┐   ┌───────────────────────┐
│       Inverter        │   │       Inverter        │
├───────────────────────┤   ├───────────────────────┤
│ >On-grid runtime      │   │ >EPS Runtime          │
│              45.9H    │   │              20.0H    │
└───────────────────────┘   └───────────────────────┘
```
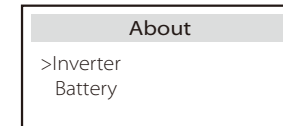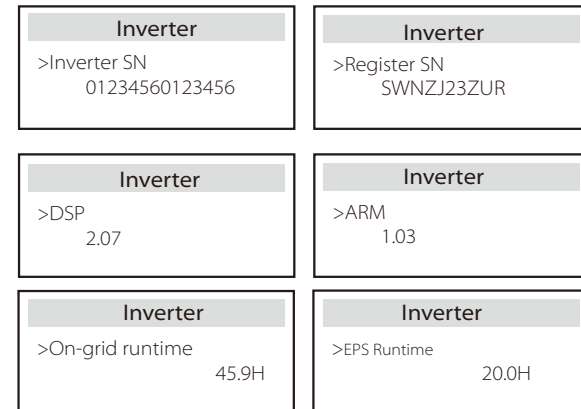
Battery

| Battery |
| --- |
| >BatBrand:<br>BAK |

| Battery |
| --- |
| >Bat_M SN<br>6S012345012345 |

| Battery |
| --- |
| >Bat_PS1 SN<br>6S012345012345 |

| Battery |
| --- |
| >Bat_PS2 SN<br>6S012345012345 |

| Battery |
| --- |
| >Bat_PS3 SN<br>6S012345012345 |

| Battery |
| --- |
| >Bat_PS4 SN<br>6S012345012345 |

| Battery |
| --- |
| >BatteryM Version<br>2.01 |

| Battery |
| --- |
| >BatteryS Version<br>2.01 |

Internal Code

| Internal Code |
| --- |
| >Inverter code<br>01 00 01 xx |

| Internal Code |
| --- |
| >BMS code |

| Internal Code |
| --- |
| >BAT-M<br>2.01 |

| Internal Code |
| --- |
| >BAT-S1<br>1.01 50 |

| Internal Code |
| --- |
| >BAT-S2<br>1.01 50 |

• • •

| Internal Code |
| --- |
| >BAT-S8<br>1.01 50 |

# 9 Troubleshooting

## 9.1 Troubleshooting

This section contains information and procedures for resolving possible problems with this inverter, and provides you with troubleshooting tips to identify and solve most problems that may occur in this inverter. This section will help you narrow down the source of any problems you may encounter. Please read the troubleshooting steps below.
Check the warning or fault information on the system control panel or the fault code on the inverter information panel. If a message is displayed, log it before doing anything further.
Try the solutions indicated in the table below.

| Number | Faults | Diagnosis and solution |
| --- | --- | --- |
| IE 001 | TZ Protect Fault | Overcurrent fault.<br>• Wait for a while to check if you're back to normal.<br>• Disconnect PV+ PV- and batteries, reconnect.<br>• Or ask for help from the installer if it can not return to normal. |
| IE 002 | Grid Lost Fult | • Check grid input voltage if it's within normal range<br>• Or ask the installer for help. |
| IE 003 | Grid Volt Fault | Power grid voltage overrun<br>• Wait a moment, if the utility returns to normal, the system will reconnect.<br>• Please check if the grid voltage is within normal range.<br>• Or ask the installer for help. |
| IE 004 | Grid Freq Fault | Electricity frequency beyond range<br>• If the utility returns to normal, the system reconnects.<br>• Or ask the installer for help. |
| IE 005 | PV Volt Fault | PV voltage out of range<br>• Check the output voltage of the PV panel<br>• Or ask the installer for help. |
| IE 006 | Bus Volt Fault | • Press the "ESC" key to restart the inverter.<br>• Check that the PV input open circuit voltage is in the normal range.<br>• Or ask the installer for help. |
| IE 007 | Bat Volt Fault | Battery voltage fault<br>• Check battery input voltage if it's within normal range<br>• Or ask the installer for help. |
| IE 008 | AC10M Volt Fault | • The grid voltage was out of range in the last 10 minutes.<br>• The system will return to normal if the grid returns to normal.<br>• Or ask the installer for help. |

| Number | Faults | Diagnosis and solution |
|---|---|---|
| IE 009 | DCI OCP Fault | DCI overcurrent protection fault.<br>• Wait for a while to check if it's back to normal.<br>• Or ask the installer for help. |
| IE 010 | DCV OVP Fault | DCV EPS(Off-grid) overvoltage protection failure.<br>• Wait for a while to check if it's back to normal.<br>• Or ask the installer for help. |
| IE 011 | SW OCP Fault | Software Detection of Overcurrent Fault.<br>• Wait for a while to check if it's back to normal.<br>• Shut down photovoltaic, battery and grid connections<br>• Or ask the installer for help. |
| IE 012 | RC OCP Fault | Overcurrent protection fault.<br>• Check the impedance of DC input and AC output.<br>• Wait for a while to check if it's back to normal.<br>• Or ask the installer for help. |
| IE 013 | Isolation Fault | Insulation Fault<br>• Please check the wire insulation for damage.<br>• Wait for a while to check if it's back to normal.<br>• Or ask the installer for help. |
| IE 014 | Temp Over Fault | Temperature beyond limit<br>• Check if ambient temperature exceeds the limit.<br>• Or ask the installer for help. |
| IE 015 | Bat Con Dir Fault | EPS(Off-grid) mode current is too strong.<br>• Ensure that the load power is within the EPS(Off-grid) power range.<br>• Check for any non-linear load connections on the EPS(Off-grid).<br>• Move this load to check for recovery.<br>• Or ask for help from the installer if it can not return to normal. |
| IE 016 | EPS Overload Fault | EPS(Off-grid) over load fault.<br>• Shutdown the high-power device and press the "ESC" key to restart the inverter.<br>• Or ask for help from the installer if it can not return to normal. |
| IE 017 | OverLoad Fault | On-grid mode over load<br>• Shutdown the high-power device and press the" ESC" key to restart the inverter.<br>• Or ask for help from the installer if it can not return to normal. |
| IE 018 | BatPowerLow | • Close the high-power device and press the "ESC" key to restart the inverter.<br>• Please charge the battery to a level higher than the protection capacity or protection voltage |
| IE 019 | BMS Lost | Battery communication loss<br>• Check that the communication lines between the battery and the inverter are properly connected.<br>• Or ask for help from the installer if it can not return to normal. |
| IE 020 | Fan Fault | Fan Fault<br>• Check for any foreign matter that may have caused the fan not to function properly.<br>• Or ask for help from the installer if it can not return to normal. |
| IE 021 | Low Temp | Low temperature fault.<br>• Check if the ambient temperature is too low.<br>• Or ask for help from the installer if it can not return to normal. |

| Number | Faults | Diagnosis and solution |
|---|---|---|
| IE 022 | ARM Unmatched | ARM software version mismatch Fault<br>• update the software and press the ESC" key to restart the inverter.<br>• Or ask for help from the installer if it can not return to normal . |
| IE 023 | Other Device Fault | Other device Fault<br>• update the software and press the ESC" key to restart the inverter.<br>• Or ask for help from the installer if it can not return to normal . |
| IE 025 | InterComms Error | • Internal communication errors<br>• Shut down photovoltaic, battery and grid connections.<br>• Or ask for help from the installer if it can not return to normal. |
| IE 026 | Inv EEPROM Fault | Inverter EEPROM Fault.<br>• Shut down photovoltaic, battery and grid, reconnect.<br>• Or ask for help from the installer if it can not return to normal. |
| IE 027 | RCD Fault | Fault of Residual Current Device<br>• Check the impedance of DC input and AC output.<br>• Disconnect PV + PV - and batteries, reconnect.<br>• Or ask for help from the installer if it can not return to normal. |
| IE 028 | Grid Relay Fault | Electrical relay failure<br>• Disconnect PV+ PV- grid and batteries and reconnect.<br>• Or ask for help from the installer if it can not return to normal. |
| IE 029 | EPS Relay Fault | EPS(Off-grid) relay failure<br>• Disconnect PV+ ,PV-, grid and batteries and reconnect.<br>• Or ask for help from the installer if it can not return to normal. |
| IE 030 | PV ConnDirFault | PV direction fault<br>• Check if the PV input lines are connected in the opposite direction.<br>• Or ask for help from the installer if it can not return to normal. |
| IE 031 | ChargerRelayFault | Charge relay fault<br>• Press the ESC" key to restart the inverter. .<br>• Or ask for help from the installer if it can not return to normal. |
| IE 032 | EarthRaleyFault | EPS(Off-grid) earth relay fault<br>• Press the ESC" key to restart the inverter. .<br>• Or ask for help from the installer if it can not return to normal. |
| IE 101 | PowerTypeFault | Power type fault<br>• Upgrade the software and press the ESC" key to restart the inverter.<br>• Or ask for help from the installer if it can not return to normal. |
| IE 102 | Port OC Warning | EPS(Off-grid) port over current fault<br>• Check that the EPS(Off-grid) load does not exceed the system requirements, and press the ESC" key to restart the inverter. .<br>• Or ask for help from the installer if it can not return to normal. |

| Number | Faults | Diagnosis and solution |
|---|---|---|
| IE 103 | Mgr EEPROM Fault | Manager EEEPROM Fault.<br>• Shut down photovoltaic, battery and grid, reconnect.<br>• Or seek help from the installer if it can not return to normal. |
| IE 104 | DSPunmatched | DSP version error.<br>• Check that the DSP1 version matches<br>• Or seek help from the installer if it can not return to normal. |
| IE 105 | NTC Sample Invalid | NTC invalid<br>• Make sure the NTC is properly connected and the NTC is in good condition.<br>• Please confirm that the installation environment is normal<br>• Or ask for help from the installer, if it can not return to normal. |
| IE 106 | Bat Temp Low | Battery temp low<br>• Check the battery installation environment to ensure good heat dissipation.<br>• Or ask for help from the installer, if it can not return to normal. |
| IE 107 | Bat Temp High | Battery temp high<br>• Check the battery installation environment to ensure good heat dissipation.<br>• Or ask for help from the installer, if it can not return to normal. |
| IE 109 | Meter Fault | Meter error<br>• Please check that the instrument is working properly.<br>• Or seek help from the installer if it can not return to normal. |
| IE 110 | BypassRaleyFault | Bypass relay fault<br>• Press the ESC" key to restart the inverter. .<br>• Or ask for help from the installer if it can not return to normal. |
| BE 001 | BMS_External_Err | Battery Error - External Communication Fault<br>• Please contact the battery supplier. |
| BE 002 | BMS_Internal_Err | Battery Error - Internal Communication Fault<br>• Please contact the battery supplier. |
| BE 003 | BMS_OverVoltage | Over voltage in battery system<br>• Please contact the battery supplier. |
| BE 004 | BMS_LowerVoltage | Low voltage in battery system<br>• Please contact the battery supplier. |
| BE 005 | BMS_ChargeOCP | Battery fault - over charge fault<br>• Please contact the battery supplier. |
| BE 006 | BMS_DischargeOCP | Battery fault-discharge over current fault<br>• Please contact the battery supplier. |
| BE 007 | BMS_TemHigh | Over temperature in battery system<br>• Please contact the battery supplier. |
| BE 008 | BMS_TempSensor Fault | Battery temperature sensor malfunction<br>• Please contact the battery supplier. |

| Number | Faults | Diagnosis and solution |
|---|---|---|
| BE 009 | BMS_CellImblance | Battery Unbalanced Failure<br>• Please contact the battery supplier. |
| BE 010 | BMS_Hardware Protect | Battery hardware protection failure<br>• Please contact the battery supplier. |
| BE 011 | BMS_Circuit_Fault | Battery circuit failure<br>• Restart the battery .<br>• Please contact the battery supplier. |
| BE 012 | BMS_ISO_Fault | Battery insulation failure<br>• Check that the battery is properly grounded and restart the battery.<br>• Please contact the battery supplier. |
| BE 013 | BMS_VolSen_Fault | Battery voltage sensor fault<br>• Please contact the battery supplier. |
| BE 014 | BMS_TemppSen_Fault | Temperature sensor failure<br>• Restart the battery.<br>• Please contact the battery supplier. |
| BE 015 | BMS_CurSensor Fault | Battery current sensor fault<br>• Please contact the battery supplier. |
| BE 016 | BMS_Relay Fault | Battery relay failure<br>• Please contact the battery supplier. |
| BE 017 | BMS_Type_Unmatch | Battery type failure<br>• Upgrade the battery BMS software.<br>• Please contact the battery supplier. |
| BE 018 | BMS_Ver_ Unmatch | Battery version mismatch failure<br>• Upgrade the battery BMS software.<br>• Please contact the battery supplier. |
| BE 019 | BMS_MFR_ Unmatch | Battery manufacturer did not match the fault<br>• Upgrade the battery BMS software.<br>• Please contact the battery supplier. |
| BE 020 | BMS_SW_ Unmatch | Battery hardware and software mismatch failure<br>• Upgrade the battery BMS software.<br>• Please contact the battery supplier. |
| BE 021 | BMS_M&S_ Unmatch | Battery master slave control mismatches<br>• Upgrade the battery BMS software.<br>• Please contact the battery supplier. |
| BE 022 | BMS_CR_ NORespond | Battery charging request does not respond to a fault<br>• Upgrade the battery BMS software.<br>• Please contact the battery supplier. |
| BE 023 | BMS_SW_ Protect | Battery slave software protection failure<br>• Upgrade the battery BMS software.<br>• Please contact the battery supplier. |
| BE 024 | BMS_536_Fault | Battery fault-discharge over current fault<br>• Please contact the battery supplier. |
| BE 025 | BMS_SelfcheckErr | Over temperature in battery system<br>• Please contact the battery supplier. |

| Number | Faults | Diagnosis and solution |
|--------|--------|------------------------|
| BE 026 | BMS_TempdiffErr | Battery temperature sensor malfunction<br>• Please contact the battery supplier. |
| BE 027 | BMS_BreakFault | Battery Unbalanced Failure<br>• Please contact the battery supplier. |
| BE 028 | BMS_Flash_Fault | Battery hardware protection failure<br>• Please contact the battery supplier. |
| BE 029 | BMS_Precharge_Fault | Battery precharge failure<br>• Please contact the battery supplier. |
| BE 030 | BMS_AirSwitch_Fault | Battery air switch failure<br>• Check that the battery breaker is off.<br>• Please contact the battery supplier. |

If the information panel of your inverter does not show the fault light, check the following list to ensure the current installation status, correct operation.

------ Is the inverter located in a clean, dry and well-ventilated place?
------ Is the DC input circuit breaker open?
------ Is the specification and length of the cable adequate?
------ Are the input and output connections and wiring in good condition?
------ Is the configuration set correct for your particular installation?

Please contact our customer service for further assistance. Please be prepared to describe the details of your system installation and provide the inverter serial number.

## 9.2 Routine Maintenance

Inverter do not require any maintenance or correction in most cases, but if the inverter often loses power due to overheating, this can be attributed to the following reason:

•heat sink behind the inverter is covered with dirt. If necessary, clean the cooling heat sink with a soft dry cloth or brush. Only trained and authorized professionals familiar with safety requirements can perform maintenance and maintenance work.

➤ **Safety inspections**

Safety checks should be conducted at least every 12 months, please contact the manufacturer to arrange for appropriate training, expertise, and practical experience in performing these tests. (Please note that this action is not covered by warranty).
These data should be recorded in the device log. If the equipment is not running properly or any test fails, the equipment must be repaired for details of safety inspections, refer to section 2 of this manual for safety instructions and European commission instructions.

➤ **Regular maintenance**

Only qualified people can do the following work.

In the process of using frequency converter, the manager should check and maintain the machine regularly. The specific operation is as follows.

1. Check whether the heat sink is covered with dirt, clean the inverter and absorb dust if necessary. This work should be performed from time to time.

2. Check whether the frequency converter indicator is normal, check whether the frequency converter button is normal, check whether the frequency converter display is normal. This inspection should be conducted at least every 6 months.

3. Check the input and output lines for damage or aging. This inspection should be conducted at least every 6 months.

4. Cleaning and safety inspection of PV modules should be carried out at least once every 6 months.

# 10  Decommissioning

## 10.1 Disassemble the Inverter

· Remove DC input line and AC output line of inverter.
· Wait for at least 5 minutes to power off.
· Remove all cable connections from the inverter.
· Remove inverter from finger support the bracket.
· Remove the bracket if necessary.

## 10.2 Packaging

Load the inverter into the original package if possible.

· If the original package can not be found, you can also use the following
  requirements of the carton packaging:
  Bearing capacity of more than 30kg;
  Easy to carry;
  Can completely seal the cover.

## 10.3 Storage and Transportation

Store the inverter in a dry, temperature -40°C~ 65°C environment.
Pay attention to less than four inverters on each stack board during
storage and transportation.

## 10.4 Waste Disposal

If it is necessary to scrap the inverter or other related parts, be sure to
send the waste inverter and packaging materials to the designated
ocation for recycling by the relevant department.

---

# 11 Disclaimer

The series inverters are transported, used and operated under limited
condition, such as environmental, electrical etc. We shall not be liable to
provide the service, technical support or compensation under conditions
listed below, including but not limited to:

· Inverter is damaged or broken by force majeure (such as earthquake,
  flooding, thunderstorm, lighting, fire hazard, volcanic eruption etc).
· Inverter's warranty is expired and not extended.
· Can't provide the inverter's SN, warranty card or invoice.
· Inverter is damaged by man-made cause. Inverter is used or operated
  against any items in local policy.
· Inverter's installation, configuration, commissioning doesn't follow the
  requirements mentioned in this manual.
· Inverter is installed, refitted or operated in improper ways mentioned in
  this manual without authority from us.
· Inverter is installed, operated under improper environment or electrical
  condition mentioned in this manual without authority from us.
· Inverter is changed, updated or disassembled on hardware or software
  without authority from us.
· Obtain the communication protocol from other illegal channels.
· Build monitoring, control system without authority from us.
· Connect to other brands batteries without authority from us.

SolaX will keep right to explain all the contents in this user manual.

# Warranty Registration Form

SOLA**X** POWER

## For Customer (Compulsory)

Name_____ Country _____

Phone Number_____ Email _____

Address_____

State_____ Zip Code_____

Product Serial Number _____

Date of Commissioning _____

Installation Company Name _____

Installer Name _____ Electrician License No. _____

## For Installer

### Module ( If Any )

Module Brand _____

Module Size(W) _____

Number of String _____ Number of Panel Per String _____

### Battery ( If Any )

Battery Type _____

Brand _____

Number of Battery Attached _____

Date of Delivery _____ Signature _____

Please visit our warranty website: https://www.solaxcloud.com/#/warranty to complete the online warranty registration or use your mobile phone to scan the QR code to register.

For more detailed warranty terms, please visit SolaX official website: www.solaxpower.com to check it.

614.00002.07

**PLEASE REGISTER THE WARRANTY IMMEDIATELY AFTER INSTALLATION! GET YOUR WARRANTY CERTIFICATE FROM SOLAX! KEEP YOUR INVERTER ONLINE & WIN SOLAX POINTS!**

**1** Open your camera app and point your device at the QR code

**2** Wait for the camera to recognize the QR code

**3** Click banner or notification when it appears on the screen

**4** Warranty registration page will be loaded automatically