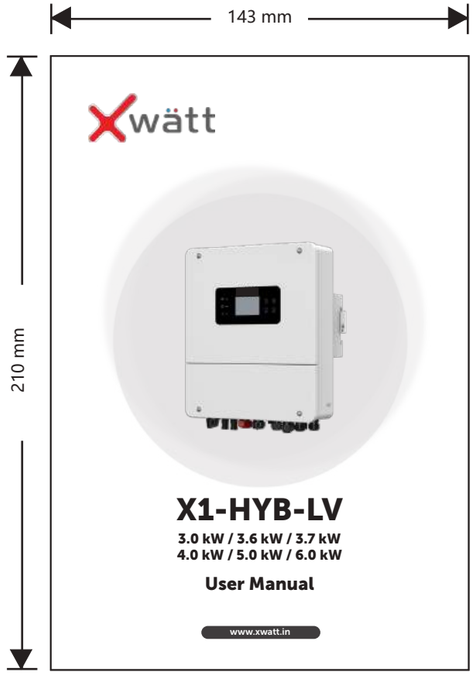
REV.	Description	REV.	Description
00	首次发行（据 SolaX320101069506）		
	周雯　2025/10/23		



技术要求：

1. 封面封底 157g 铜版纸覆哑膜彩打，内部纸 80g 双胶纸黑白印刷，正反打印；
2. 装订方式：胶装或骑马钉，内页大于 60 页时须胶装；
3. 未注尺寸公差按 ±3 mm；
4. 图面、字体印刷清晰、无偏移、无毛边、不起边、油墨不脱落；
5. 黑色字体颜色为 PANTONE BLACK C, 无边框，底色为白色；
6. 符合 ROHS 要求。

描述	说明书 X1-Hybrid LV 系列 英文版 印度 Xwatt	设计	周　雯　2025/10/23
		审核	丁　琦　2025/10/23
材料	双胶纸	核准	施鑫淼　2025/10/23
料号	320101154500	浙江艾罗网络能源技术股份有限公司	
单位	mm　页次		

描述	说明书 X1-Hybrid LV 系列 英文版 印度 Xwatt	浙江艾罗网络能源技术股份有限公司 SolaX Power Network Technology (Zhejiang) Co., Ltd.	
料号	320101154500		
单位	mm　页次		

X1-HYB-LV

3.0 kW / 3.6 kW / 3.7 kW
4.0 kW / 5.0 kW / 6.0 kW

User Manual

www.xwatt.in

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About This Manual

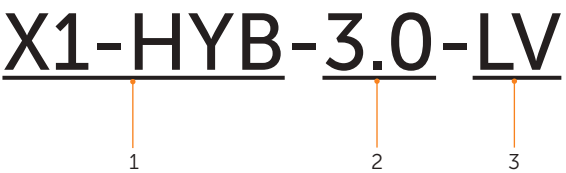
Scope of Validity

This manual is an integral part of X1-HYB-LV series inverter. It describes the transportation, storage, installation, electrical connection, commissioning, maintenance and troubleshooting of the product. Please read it carefully before operating.

This manual is valid for the following inverter models:

- X1-HYB-3.0-LV
- X1-HYB-3.6-LV
- X1-HYB-3.7-LV
- X1-HYB-4.0-LV
- X1-HYB-5.0-LV
- X1-HYB-6.0-LV

Model description



Item	Meaning	Description
1	Product family name	"X1-HYB" Series: a series of energy storage inverter which support photovoltaic grid-connected.
2	Power	"3.0": rated output power of 3.0 kW.
4	Voltage	"LV": low voltage.

Target Group

The installation, maintenance and grid-related setting can only be performed by qualified personnel who:

- Are licensed and/or satisfy state and local jurisdiction regulations.
- Have good knowledge of this manual and other related documents.

Conventions

The symbols that may be found in this manual are defined as follows.

Symbol	Description
DANGER	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
WARNING	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION!	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury, device damage, power generation loss or unanticipated results.
NOTICE!	Provides tips for the optimal operation of the product.

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1 Safety

1.1 General Safety

The series inverter has been meticulously designed and tested to comply with all relevant state and international safety standards. Nevertheless, like all electrical and electronic equipment, safety precautions must be observed and followed during the installation of the inverter to minimize the risk of personal injury and ensure a safe installation.

Please carefully read, comprehend, and strictly adhere to the comprehensive instructions provided in the user manual and any other relevant regulations prior to the installation of the inverter. The safety instructions in this document serve as supplementary guidelines to local laws and regulations.

Xwatt shall not be liable for any consequences resulting from the violation of the storage, transportation, installation, and operation regulations outlined in this document. Such consequences include, but are not limited to:

- Inverter damage caused by force majeure events, such as earthquakes, floods, thunderstorms, lightning, fire hazards, volcanic eruptions, and similar events.
- Inverter damage due to human causes.
- Inverter damage caused by strong vibrations from external factors before, during and after installation.
- Usage or operation of the inverter in violation of local policies or regulations.
- Failure to comply with the operation instructions and safety precautions provided with the product and in this document.
- Improper installation or usage of the inverter in unsuitable environmental or electrical conditions.
- Unauthorized modifications to the product or software.
- Inverter damage occurring during transportation by the customer.
- Storage conditions that do not meet the requirements specified in this document.
- Installation and commissioning performed by unauthorized personnel who lack the necessary licenses or do not comply with state and local jurisdiction regulations.

1.2 Safety Instructions of PV, Inverter and Grid

Save these important safety instructions. Failure to do so may result in damage to the inverter and injury or even loss of life.

1.2.1 Safety Instructions of PV

DANGER!

Potential risk of lethal electric shock associated with the photovoltaic (PV) system

- Exposure to sunlight can result in the generation of high DC voltage by PV modules, which can lead to electric shock causing severe injuries or even death.
- Never touch the positive or negative poles of the PV connecting device, and avoid touching both poles simultaneously.
- Do not ground the positive or negative poles of the PV modules.
- Only qualified personnel can perform the wiring of the PV modules.

WARNING!

- Overvoltage protection with surge arresters should be provided when the PV system is installed. The inverter is fitted with SPDs on both PV input side and MAINS side.
- Please consult professionals before installing SPDs.

WARNING!

- Make sure that the input DC voltage does not exceed the maximum DC input voltage specified for the inverter. Overvoltage can cause irreversible damage to the inverter, and such damage is not covered by the warranty.
- PV modules should have an IEC61730 class A rating.

1.2.2 Safety Instructions of Inverter

DANGER!

Potential risk of lethal electric shock associated with the inverter

- Only operate the inverter if it is in a technically faultless condition. Operating a faulty inverter may lead to electric shock or fire.
- Do not attempt to open the enclosure without authorization from Xwatt. Unauthorized opening of the enclosure will void the warranty and can result in lethal danger or serious injury due to electric shock.
- Make sure that the inverter is reliably grounded before any operation to prevent the risk of electric shock causing lethal danger or serious injury.
- Only qualified personnel can perform the installation, wiring, maintenance of the inverter by following this document and the related regulations.

WARNING!

- During operation, avoid touching any parts of the inverter other than the DC switch and LCD panel (if any).
- Never connect or disconnect the AC and DC connector while the inverter is running.
- Prior to conducting any maintenance, turn off the AC and DC power and disconnect them from the inverter. Wait for 5 minutes to fully discharge the energy.

WARNING!

Potential danger of scalding due to the hot enclosure of the inverter

- Avoid touching the inverter while it is running, as it becomes hot during operation and may cause personal injuries.

WARNING!

- When handling the battery, carefully follow all safety instructions provided in the battery manual. The battery used with the inverter must meet the specified requirements of the series inverter.

WARNING!

- Use insulated tools when installing the device, and always wear personal protective equipment during installation and maintenance.

WARNING!

- Xwatt assumes no responsibility for any problems arising from the use of third-party lithium batteries connected as lead-acid batteries.
- Prohibit the use of Xwatt lithium battery in Lead-acid mode. Any consequences arising from the use of lead-acid mode shall be borne by users themselves, and Xwatt will not provide warranty!

CAUTION!

- Make sure that children are supervised to prevent them from playing with the inverter.
- Pay attention to the weight of the inverter and handle it properly to avoid personal injuries.

NOTICE!

- The inverter has an integrated Type-B Residual Current Monitoring Unit (RCMU). If an external Residual Current Device (RCD) is required by local regulations, verify the type of RCD required. It is recommended to use a Type-A RCD with a rating of 300 mA. The use of a Type-B RCD is also permitted.
- Keep all product labels and the nameplate on the inverter clearly visible and well-maintained.

1.2.3 Safety Instructions of Utility Grid

NOTICE!

- Only connect the inverter to the grid with the permission of the local utility grid company.

2 Product Overview

2.1 Product Introduction

The X1-HYB-LV series is an energy storage PV grid-connected inverter. It supports various intelligent solutions such as load management, battery terminals, microgrids, etc. to achieve efficient and economical energy utilization.
The X1-HYB-LV series inverter can be used with different capacities of Xwatt battery.

2.2 Appearance

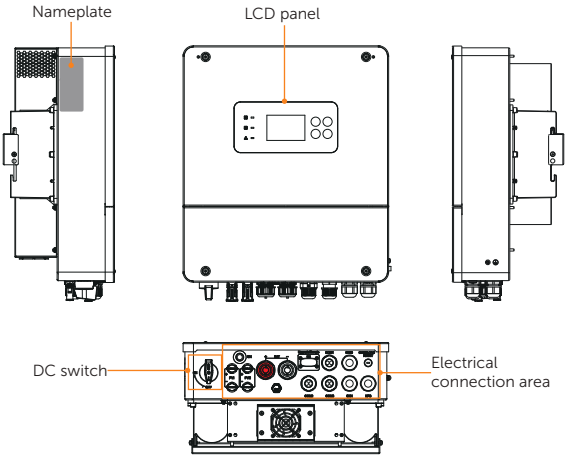


Figure 2-1 Appearance

Table 2-1 Description of appearance

Item	Description
Nameplate	Nameplate clearly identifies the device type, serial number, specific DC / AC parameters, certification, etc.
LCD panel	Including screen, indicators and keys. Screen displays the information; indicators indicate the status of inverter. Keys are used to perform the parameter setting.
DC switch	Disconnect the DC circuit when necessary.
Electrical connection area	Including PV terminals, battery terminals, AC terminals, communication terminals, etc.

2.3 Supported Power Grid

There are different ways of wiring for different grid systems. Three grid types, TT / TN-S / TN-C-S are shown as below:

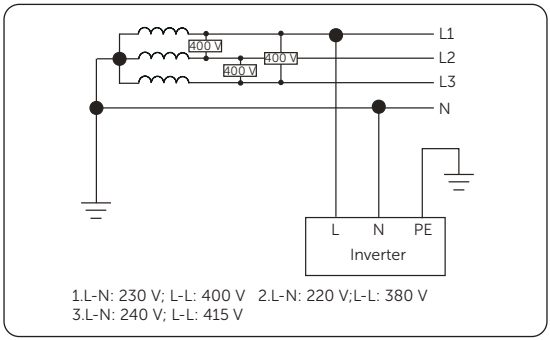


Figure 2-2 Supported power grid-TT

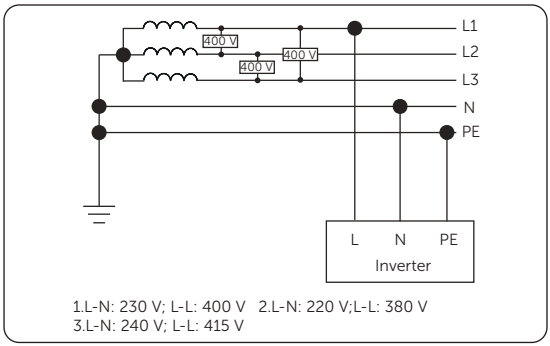


Figure 2-3 Supported power grid-TN-S

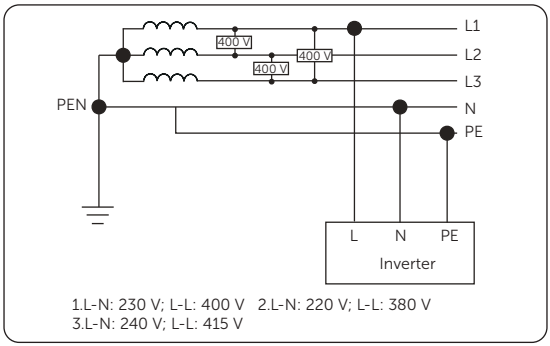


Figure 2-4 Supported power grid-TN-C-S

2.4 Symbols on the Label and Inverter

Table 2-2 Description of symbols

Symbol	Description
	CE mark. The inverter complies with the requirements of the applicable CE guidelines.
	TUV certified.
	Additional grounding point.
	Beware of hot surface. Do not touch a running inverter, as the inverter becomes hot during operation!
	Risk of electric shock. High voltage exists after the inverter is powered on!
	Risk of danger. Potential hazards exist after the inverter is powered on!
	Read the enclosed documentations.
	Do not dispose of the inverter together with household waste.
	Do not operate this inverter until it is isolated from battery, mains and on-site PV generation source.
5min	Danger of high voltage. Do not touch live parts for 5 minutes after disconnection from the power sources.

2.5 Working Principle

2.5.1 Circuit Diagram

The inverter is equipped with multi-channel MPPT for DC input to ensure maximum power even under different photovoltaic input conditions. The inverter unit converts direct current into alternating current that meets the requirements of the power grid and feeds it into the power grid. The lightning arrester at AC / DC side realizes the function of surge protection. The principle design of inverter is shown in the figure below:

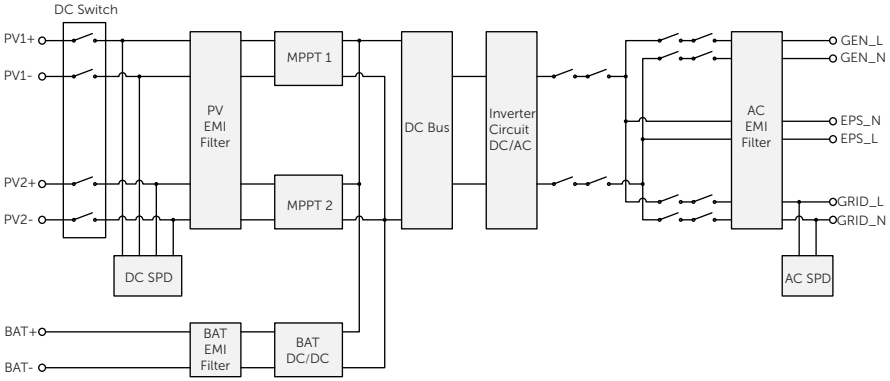


Figure 2-5 Circuit Diagram for X1-HYB-LV series inverter

2.5.2 Application Schemes

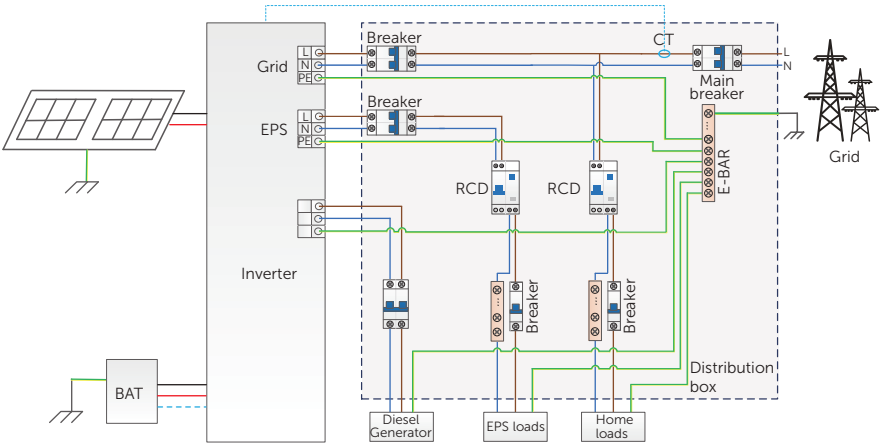


Figure 2-6 Partial home backup

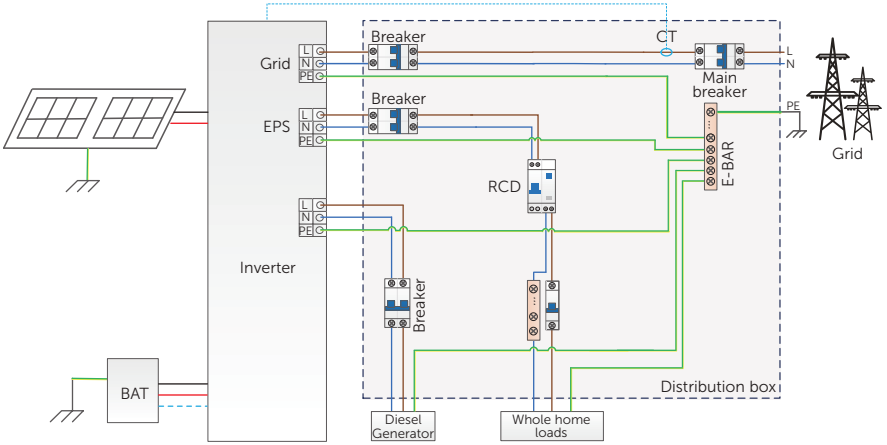


Figure 2-7 Whole home backup

2.6 Working State

The series inverter has InitMode, Checking, Normal, EPS, EPS Waiting, Waiting, Fault, Normal(Gen), and UPDATE state.

Table 2-3 Description of working state

State	Description
InitMode	• The inverter is checking for the initialization information such as the model and country, the conditions to be met in order to enter Checking state.
Checking	• The inverter is checking for conditions to enter Normal state.
Normal	• The inverter is working normally.
EPS	• The inverter is working in EPS state.
EPS Waiting	• Without utility power, the inverter waits to enter the EPS state (Overload or low SOC will cause the inverter to enter the EPS wait).
Waiting	• The inverter is waiting for the conditions to be met in order to enter Checking state.
Fault	• The inverter detects error and prompts error code.
Normal(Gen)	• The inverter is in the generator operating state.
UPDATE	• The inverter is updating ARM, DSP or BMS, etc.

2.7 Working Mode

There are different work modes of the inverter based on different needs.

Applicable areas	Work modes
Pakistan	SUB mode, SBU mode, MKS/EPS mode and Force time use mode
Countries other than Pakistan (including Vietnam, India, South Africa, etc.)	Back up mode, Self consumption mode, and Force time use mode

For how to set the working mode, please refer to "10.3 Work Mode".

2.7.1 SUB Mode (Pakistan)

SUB mode is applicable to Pakistan. This mode uses the energy storage system as a backup power source and is suitable for applications with frequent power outages or wish to feed excess electricity generated by PV into the grid.

Table 2-4 Description of SUB mode

Battery state	Battery Charge Source	Power Supply Situation
The battery is not fully charged	PV Only	PV → load > battery > grid • PV prioritizes supplying power to the load. If PV is insufficient, the grid supplies power to the load. If the PV output exceeds the load demand, the surplus energy is first used to charge the battery. Once the battery is fully charged, the excess energy is fed into the grid according to the **Export Control** settings. For specific settings, please refer to "10.4 Export Control". • In off-grid situation, both PV and the battery supply power to the load.
	PV Then Utility	PV is available: PV → load > battery > grid • Consistent with the PV Only charging situation.
		PV is not available: grid → load+battery • The grid supplies power to the load and draws electricity from the grid to charge the battery based on the **Max Utility Charge Current**.
	PV and Utility	PV → load > battery > grid, and grid → battery • PV is prioritized for the load, with excess used to charge the battery. Simultaneously, power is drawn from the grid to charge the battery based on the **Max Utility Charge Current**. After the battery is fully charged, surplus energy is either fed into the grid or curtailed according to **Export Control** settings. For specific settings, please refer to "10.4 Export Control".

2.7.2 SBU Mode (Pakistan)

This mode is applicable to Pakistan and suitable for applications where electricity prices are high and PV cannot be fed into the grid. PV is prioritized for loads, and excess power is stored in the battery for later use. This mode is ideal for customers with low daytime electricity consumption and higher nighttime electricity consumption. **No Export** is set by default to disallow power feed-in to grid for this mode.

Table 2-5 Description of SBU mode

Battery state	Battery Charging And Discharging Situation	Power Supply Situation
BAT<**Return to Utility Voltage/SOC**	PV Only charging	PV → battery, grid → load • PV charges the battery, and the load is supplied by the grid.
	PV Then Utility charging	PV is available: PV → battery > load • PV prioritizes supplying power to the battery. If the PV output exceeds the battery demand, the surplus energy is first used to supply the load.
		PV is not available: grid → load+battery • The grid supplies power to the load and charge the battery based on the **Max Utility Charge Current**. For specific settings, please refer to "10.4 Export Control".
	PV and Utility charging	PV+grid → battery, grid → load • All electricity generated by the PV is used to charge the battery, and concurrently, power is drawn from the grid to charge the battery based on the **Max Utility Charge Current**. For specific settings, please refer to "10.4 Export Control".
BAT>**Return to Battery SOC** (Lithium battery)	Battery discharge	PV+battery → load • PV prioritizes supplying power to the load. If the PV is insufficient, the battery supplies power to the load until the battery voltage/SOC is less than the **Return to Utility SOC**.

Battery state	Battery Charging And Discharging Situation	Power Supply Situation
BAT>**Return to Battery Voltage** (Lead acid battery)	With **Charge to Full** on, battery first charge then discharge	First PV/PV+grid/grid → battery, then PV +battery → load • The battery will continued to be charged by the charging source until it reaches the float voltage, then the inverter will work off-grid two minutes later (PV is priority to supply power to the load. If the PV is insufficient, the battery supplies power to the load until the battery voltage is less than the **Return to Utility Voltage**).
	With **Charge to Full** off, battery discharge	PV+battery → load • PV prioritizes supplying power to the load. If the PV is insufficient, the battery supplies power to the load until the battery voltage is less than the **Return to Utility Voltage**.

2.7.3 MKS/EPS Mode (Pakistan)

This mode is applicable to Pakistan and suitable for customers who have higher electricity consumption during the day and lower consumption at night.

When PV is available, the working logic will switch based on settings for **Return to SUB Mode** and **Return to SBU Mode**. At night when PV is unavailable, this mode is basically the same as the SUB mode, with the battery only charging and not discharging, which prevents the battery from being depleted.

Table 2-6 Description of MKS/EPS mode

PV state	Battery state	Inverter working state
PV is available	Battery voltage/SOC > **Return to SBU Mode**	The inverter works in basically same as the SBU mode.
	Battery voltage/SOC < **Return to SUB Mode**	The inverter works in basically same as the SUB mode, and charges the battery with the selected charging source (PV prioritizes charging the battery), and switches to basically same as the SBU mode when the battery voltage/SOC reaches **Return to SBU Mode**.
PV is unavailable	/	The inverter works in basically same as the SUB mode.

2.7.4 Force Time Use Mode (Pakistan)

This mode is suitable for application with peak and valley price difference. When the price of electricity is high, the battery is discharged to supply the load, and when the price of electricity is low, the battery is charged from PV or the grid to reach full capacity.

Table 2-7 Description of Force Time Use mode

Time Period	Battery Charging And Discharging Situation	Power Supply Situation
Charge Period	PV Only charging	PV → battery, grid → load • PV charges the battery, and the load is supplied by the grid.
	PV Then Grid charging	PV+grid → battery+load • PV prioritizes charging the battery, if the PV is insufficient, electricity is drawn from the grid to charge the battery. The load is supplied by the grid.
	PV and Grid charging	PV+grid → battery+load • All electricity generated by the PV is used to charge the battery, and concurrently, power is drawn from the grid to charge the battery based on the **Max Utility Charge Current**. For specific settings, please refer to "10.4 Export Control".
Home Load Removed From Utility Time Periods	Battery discharge	Battery+grid → load • The battery discharges to supply the load until the battery voltage is less than the **Battery Stop Discharge** Voltage or SOC, after which the load will be supplied by the grid.
Outside of peak-valley scheduled time periods	The battery charges according to the priority settings of the battery charging source mode.	

2.7.5 Back Up Mode (Other Countries)

Back up mode is applicable to countries other than Pakistan.

This mode uses the energy storage system as a backup power source and is suitable for applications with frequent power outages or wish to feed excess electricity generated by PV into the grid.

Table 2-8 Description of Back Up mode

Battery state	Battery Charge Source	Power Supply Situation
The battery is not fully charged	PV Only	PV → load > battery > grid • PV prioritizes supplying power to the load. If PV is insufficient, the grid supplies power to the load. If the PV output exceeds the load demand, the surplus energy is first used to charge the battery. Once the battery is fully charged, the excess energy is fed into the grid according to the **Export Control** settings. For specific settings, please refer to "10.4 Export Control". • In off-grid situation, both PV and the battery supply power to the load.
	PV Then Utility	PV is available: PV → load > battery > grid • Consistent with the PV Only charging situation.
		PV is not available: grid → load+battery • The grid supplies power to the load and draws electricity from the grid to charge the battery based on the **Max Utility Charge Current**.
	PV and Utility	PV → load > battery > grid and grid → battery • PV is prioritized for the load, with excess used to charge the battery. Simultaneously, power is drawn from the grid to charge the battery based on the **Max Utility Charge Current**. After the battery is fully charged, surplus energy is either fed into the grid or curtailed according to **Export Control** settings. For specific settings, please refer to "10.4 Export Control".

2.7.6 Self Consumption Mode (Other Countries)

This mode is applicable to countries other than Pakistan and suitable for applications where electricity prices are high and PV cannot be fed into the grid. PV is prioritized for loads, and excess power is stored in the battery for later use. This mode is ideal for customers with low daytime electricity consumption and higher nighttime electricity consumption. **No Export** is set by default to disallow power feed-in to grid for this mode.

There are three options under this mode, i.e. **Self Comp**, **Battery First** and **Load First**, among which the working logic is slightly different.

Table 2-9 Description of Self Consumption mode - Self Comp

Battery state	Battery Charging And Discharging Situation	Power Supply Situation
BAT<**Return to Utility Voltage/SOC**	PV Only charging	PV → battery, grid → load • PV charges the battery, and the load is supplied by the grid.
	PV Then Utility charging	PV is available: PV → battery > load • PV prioritizes supplying power to the battery. If the PV output exceeds the battery demand, the surplus energy is first used to supply the load.
		PV is not available: grid → load+battery • The grid supplies power to the load and charge the battery based on the **Max Utility Charge Current**. For specific settings, please refer to "10.4 Export Control".
	PV and Utility charging	PV+grid → battery, grid → load • All electricity generated by the PV is used to charge the battery, and concurrently, power is drawn from the grid to charge the battery based on the **Max Utility Charge Current**. For specific settings, please refer to "10.4 Export Control".
BAT>**Return to Battery Voltage/ SOC**	Battery discharge	PV+battery → load • PV prioritizes supplying power to the load. If the PV is insufficient, the battery supplies power to the load until the battery voltage/SOC is less than the **Return to Utility Voltage/ SOC**.

Table 2-10 Description of Self Consumption mode - Load First and Battery First

Option	PV State	Power Supply Situation
Load First	PV is sufficient	PV → load > battery • PV prioritizes supplying power to the load. If the PV output exceeds the load demand, the surplus energy is used to charge the battery.
	PV is insufficient	PV+battery → load • Both PV and battery supply power to the load. When the battery voltage/SOC < **Return to Utility Voltage/SOC**, the battery will stop discharging.
Battery First	PV > battery maximum charging power	PV → battery > load • PV prioritizes supplying power to the battery. If the PV output exceeds the battery demand, the surplus energy is used to supply the load.
	PV < battery maximum charging power	• If the charge source is selected as **PV Only** or **PV then Utility**, the battery is supplied solely by PV (PV → battery). • If the charge source is selected as **PV and Utility**, the battery is supplied by both PV and grid (PV+grid → battery).
	PV is unavailable	• If the charge source is selected as **PV Only**, the battery won't be charged. • If the charge source is selected as **PV then Utility** or **PV and Utility**, the battery is supplied by the grid (grid → battery).

2.7.7 Force Time Use Mode (Other Countries)

This mode is suitable for application with peak and valley price difference. When the price of electricity is high, the battery is discharged to supply the load, and when the price of electricity is low, the battery is charged from PV or the grid to reach full capacity*.

Table 2-11 Description of Force Time Use mode

Time Period	Battery Charging And Discharging Situation	Power Supply Situation
Charge Period	PV Only charging	PV → battery, grid → load • PV charges the battery, and the load is supplied by the grid.
	PV Then Grid charging	PV+grid → battery+load • PV prioritizes charging the battery, if the PV is insufficient, electricity is drawn from the grid to charge the battery. The load is supplied by the grid.
	PV and Grid charging	PV+grid → battery+load • All electricity generated by the PV is used to charge the battery, and concurrently, power is drawn from the grid to charge the battery based on the **Max Utility Charge Current**. For specific settings, please refer to "10.4 Export Control".
Discharge Period	Battery discharge	Battery+grid → load • The battery discharges to supply the load until the battery voltage is less than the **Battery Stop Discharge** Voltage or SOC, after which the load will be supplied by the grid.
Outside of peak-valley scheduled time periods	The battery charges according to the priority settings of the battery charging source mode.	

*** Note:**

For Vietnam, there are additional **Charge Stop VOL/SOC** (the battery will cease charging when reach this value) and **Max Charge Power** that can be set for the charge periods and **Max Discharge Power** for the discharge periods.

3 System Overview

System Overview

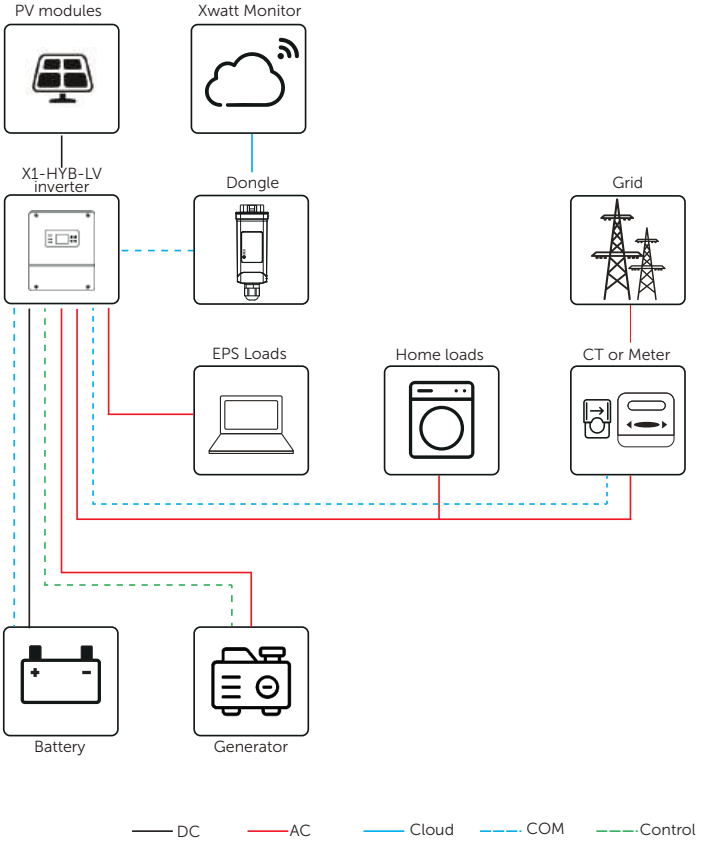


Figure 3-1 System overview diagram

Table 3-1 System item description

Item	Description
X1-HYB-LV series (the device covered in this manual)	The series inverter combines solar inverter, solar charger, AC charger and emergency power supply (EPS) function together with IP65 degree of protection. 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.
PV String	For 3 kW to 6 kW inverter, the number of PV string is two.
Battery	The series inverter should be coupled low voltage battery (Lithium or Lead-Acid). It communicates with the inverter via BMS and must comply with the specifications of the regulations.
CT or Meter	The CT/Meter is used by the inverter for import / export or consumption readings, and manages the battery charge / discharge accordingly for smart energy management applications.
Grid	220V/230V/240V grid are supported.
Generator	Xwatt PV-Genset solution ensures optimum interaction between the photovoltaics and diesel generator, which saves fuel, lowers energy costs and ensures a stable and reliable power supply.
Xwatt Monitor	Xwatt Monitor is an intelligent, multifunctional monitoring platform that can be accessed either remotely or through a hard wired connection. With the Xwatt Monitor, the operators and installers can always view key and up-to-date data.

4 Transportation and Storage

If the inverter is not put into use immediately, the transportation and storage requirements needs to be met:

Transportation

- The inverter must be transported in its original packaging. Xwatt will not be held responsible for any damage to the inverter caused by improper transportation or by transportation after it has been installed.
- Observe the caution signs on the packaging of inverter before transportation.
- Pay attention to the weight of inverter. Be cautious to avoid injury when carrying X1-HYB-LV (gross weight: 20 kg). Four installers or lifting equipment are recommended.
- Wear protective gloves when carrying the equipment by hand to prevent injuries.
- When lifting up the inverter, hold the bottom position of the carton. Keep the inverter horizontal in case of falling down.

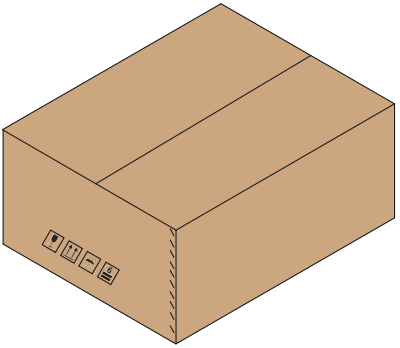


Figure 4-1 Caution signs on the packaging

Storage

- The inverter must be stored indoors.
- Do not remove the original packaging material and check the outer packaging material regularly.
- The storage temperature should be between -25℃ and +70℃ . The humidity should be between 0% and 100%.
- Stack the inverter in accordance with the caution signs on the inverter carton to prevent their falling down and device damage. Do not place it upside down.

5 Preparation before Installation

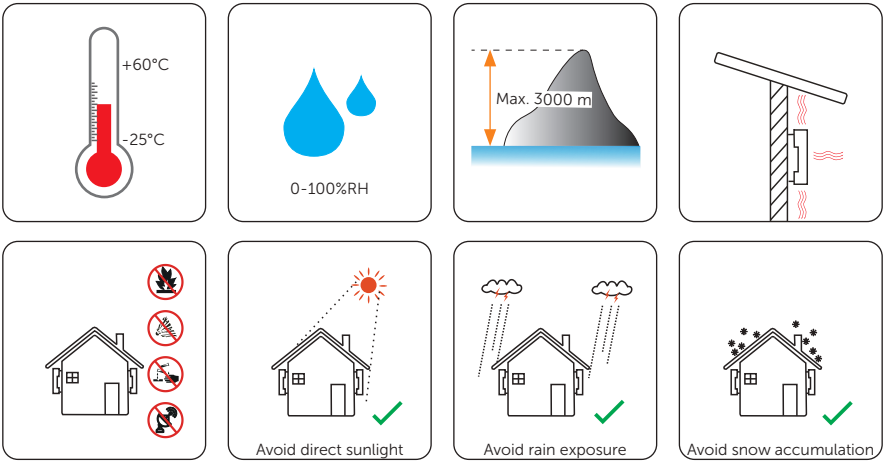
5.1 Selection of Installation Location

The installation location selected for the inverter is quite critical in the aspect of the guarantee of machine safety, service life and performance. It has the IP65 ingress protection, which allows it to be installed outdoor. The installation position shall be convenient for wiring connection, operation and maintenance.

5.1.1 Environment Requirement

Make sure the installation environment meets the following conditions:

- The ambient temperature: -25°C to +60°C.
- The relative humidity shall be between 0~100%RH.
- Do not install the inverter in the areas where the altitude exceeds 3000 m.
- Install the inverter in a well-ventilated environment for heat dissipation. It is recommended to install an awning over the inverter if it is installed on a support outdoor.
- Do not install the inverter in areas with flammable, explosive and corrosive materials or near antennas.
- Avoid direct sunlight, rain exposure and snow accumulation.



NOTICE!

- For outdoor installation, precautions against direct sunlight, rain exposure and snow accumulation are recommended.
- Exposure to direct sunlight raises the temperature inside the device. This temperature rise poses no safety risks, but may impact the device performance.

- Install the inverter at least 500 meters away from the coast and avoid sea breeze directly.

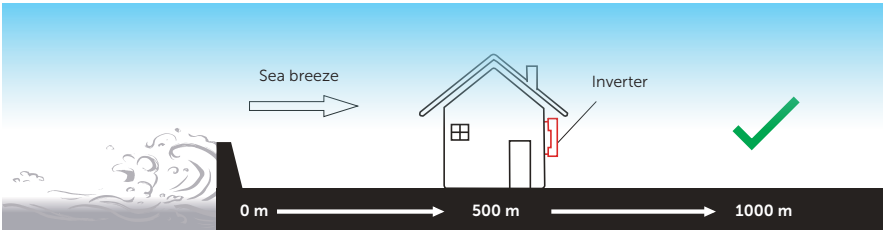


Figure 5-1 Recommended installation position

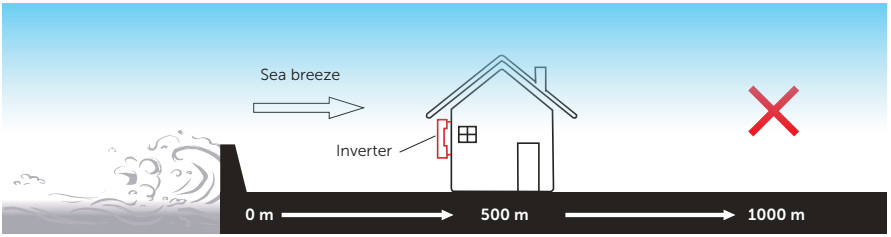


Figure 5-2 Incorrect installation position

NOTICE!

- For the installation of the whole system, please refer to the specific environment requirement of each unit.

5.1.2 Installation Carrier Requirement

The installation carrier must be made of a non-flammable material, such as solid brick, concrete, etc. and be capable of supporting the weight of the inverter and suitable of the dimensions of the inverter. If the wall strength is not enough (such as wooden wall, the wall covered by a thick layer of decoration), it must be strengthened additionally.

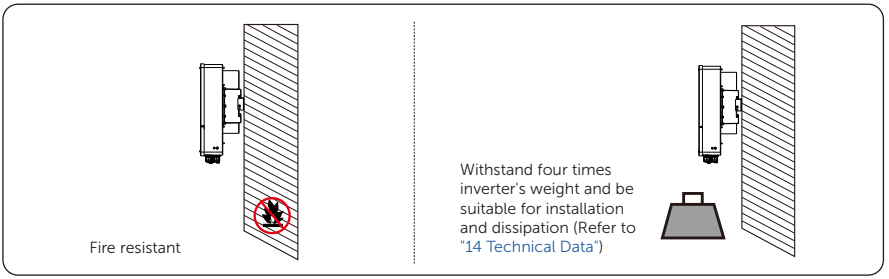


Figure 5-3 Installation carrier requirement

5.1.3 Clearance Requirement

The minimum clearance reserved for the connected terminal at the bottom of inverter should be 10 cm. When planning installation space, it is important to consider the bending radius of the wires.

To guarantee proper heat dissipation and ease of disassembly, the minimum space around the inverter must meet the standards indicated below.

For installations with multiple inverters, please refer to the installation separation distance below. In areas with high ambient temperatures, increase the clearances between the inverters and provide adequate fresh air ventilation if feasible.

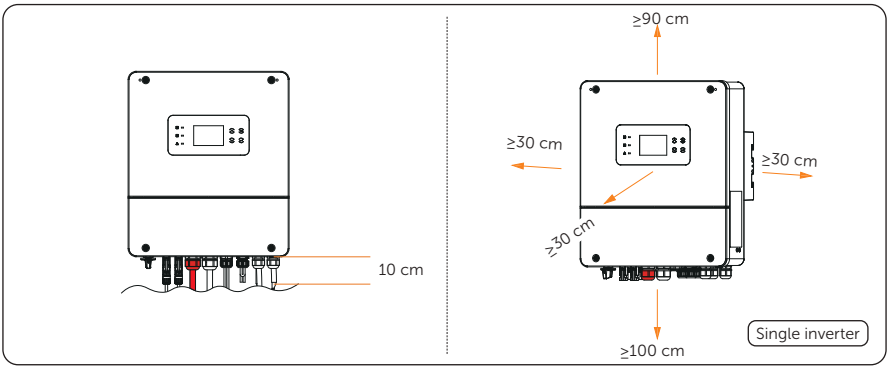


Figure 5-4 Clearance requirement for single inverter

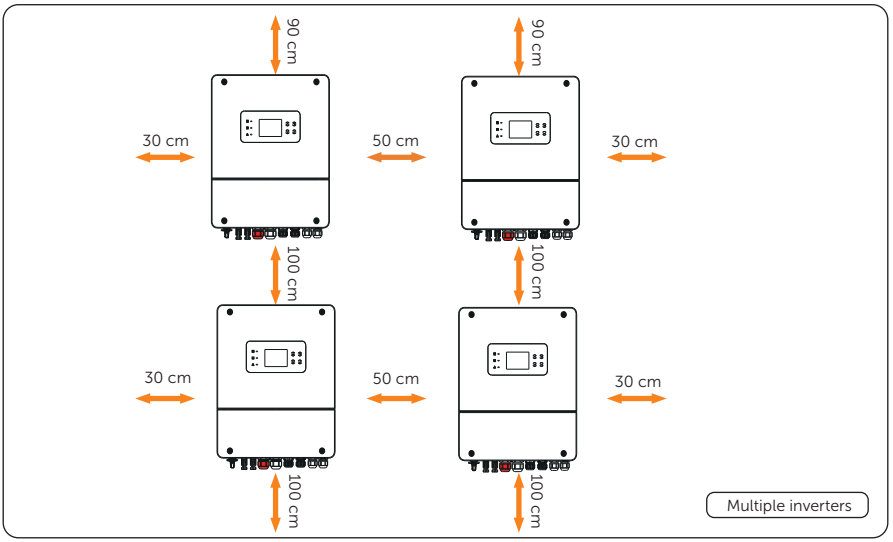


Figure 5-5 Clearance requirement for multiple inverter

5.2 Tools Requirement

Installation tools include but are not limited to the following recommended ones. If necessary, use other auxiliary tools on site.

5.3 Additionally Required Materials

Table 5-1 Additionally required wires

No.	Required Material		Type	Conductor Cross-section
1	PV wire		Dedicated PV wire with a voltage rating of 600 V	4 mm^2
2	Communication wire 1		Network cable CAT5E	0.2 mm^2
3	Additional PE wire		Conventional yellow and green wire	4 mm^2-10 mm^2
4	Battery power cable		Conventional copper wire	16-25 mm^2 or 35-50 mm^2

Table 5-2 Grid cable and micro-breaker recommended

Model	X1-HYB-3.0-LV	X1-HYB-3.6-LV	X1-HYB-3.7-LV	X1-HYB-4.0-LV	X1-HYB-5.0-LV	X1-HYB-6.0-LV
Cable (copper)	4-6 mm^2	6-8 mm^2	6-8 mm^2	6-8 mm^2	8-10 mm^2	8-10 mm^2
Micro-Breaker	32 A	40 A	40 A	40 A	50 A	50 A

Table 5-3 EPS cable and micro-breaker recommended

Model	X1-HYB-3.0-LV	X1-HYB-3.6-LV	X1-HYB-3.7-LV	X1-HYB-4.0-LV	X1-HYB-5.0-LV	X1-HYB-6.0-LV
Cable (copper)	3-4 mm^2	3-4 mm^2	3-4 mm^2	3-4 mm^2	4-6 mm^2	6-8 mm^2
Micro-Breaker	25 A	25 A	25 A	25 A	32 A	40 A

Table 5-4 GEN cable and micro-breaker recommended

Model	X1-HYB-3.0-LV	X1-HYB-3.6-LV	X1-HYB-3.7-LV	X1-HYB-4.0-LV	X1-HYB-5.0-LV	X1-HYB-6.0-LV
Cable (copper)	3-4 mm^2	3-4 mm^2	3-4 mm^2	3-4 mm^2	4-6 mm^2	6-8 mm^2
Micro-Breaker	25 A	25 A	25 A	25 A	32 A	40 A

6 Unpacking and Inspection

6.1 Unpacking

- The inverter undergoes 100% testing and inspection before shipping from the manufacturing facility. However, transport damage may still occur. Before unpacking the inverter, please check the outer packing materials for damage, such as holes and cracks.
- Unpacking the inverter according to the following figure.

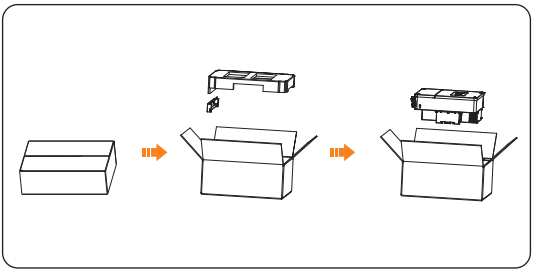


Figure 6-1 Unpacking the inverter

- Be careful when dealing with all package materials which may be reused for storage and relocation of the inverter in the future.
- Upon opening the package, check whether the appearance of the inverter is damaged or lack of accessories. If any damage is found or any parts are missing, contact your dealer immediately.

6.2 Scope of Delivery

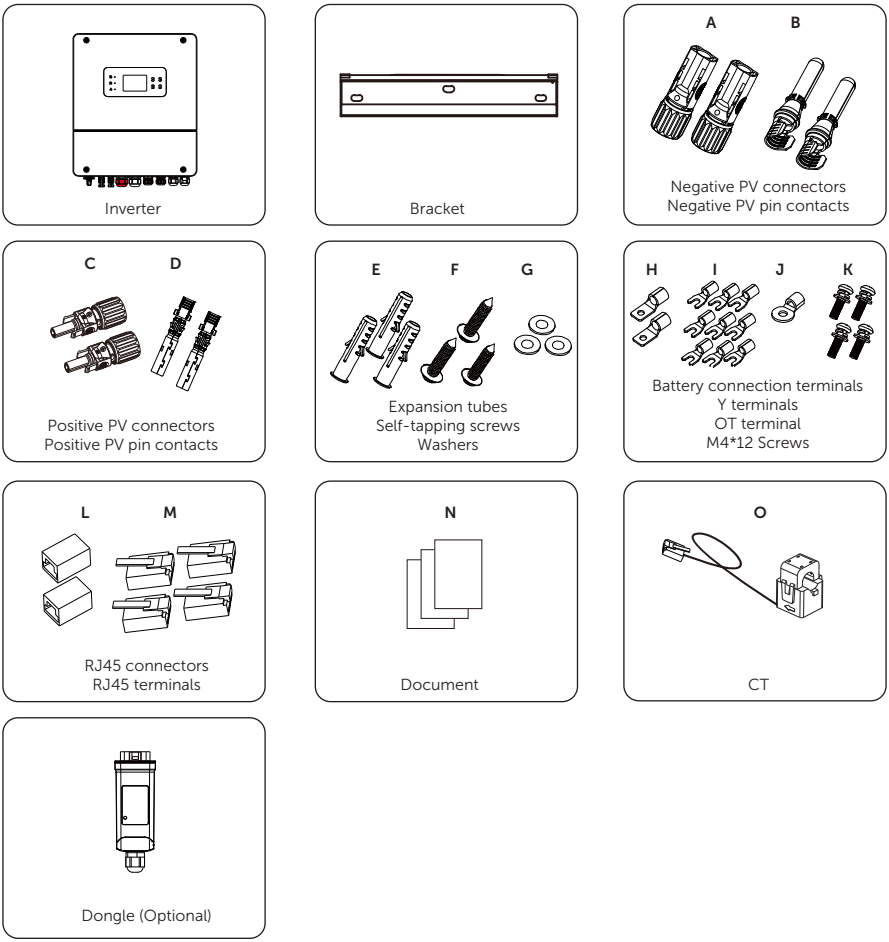


Table 6-1 Packing list

Item	Description	Quantity
/	Inverter	1 pc
/	Wall mounting bracket	1 pc
A	Negative PV connectors	2 pcs
B	Negative PV pin contacts	2 pcs
C	Positive PV connectors	2 pcs

Item	Description	Quantity
D	Positive PV contacts	2 pcs
E	Expansion tubes	3 pcs
F	Self-tapping screws	3 pcs
G	Washers	3 pcs
H	Battery connection terminals	2 pcs
I	Y terminals	9 pcs
J	OT terminal	1 pc
K	M4*12 Screws	4 pcs
L	RJ45 connectors	2 pcs
M	RJ45 terminals	4 pcs
N	Document	/
O	CT	1 pc
/	Dongle (Optional)	1 pc

NOTICE!

- Please refer to the actual delivery for the optional accessories.

7 Mechanical Installation

WARNING!

- Only qualified personnel are allowed to perform the mechanical installation in accordance with local laws and regulations.
- Check the existing power cables or other piping in the wall to prevent electric shock or other damage.
- Use insulated tools and wear personal protective equipment throughout the installation and maintenance process.

CAUTION!

- During installation, always be cautious about the weight of the inverter. Improper lifting or dropping of the inverter may result in personal injury.

NOTICE!

- Install the inverter at a maximum back tilt of 15 degrees and avoid it being forward tilted, side tilted, or upside down.

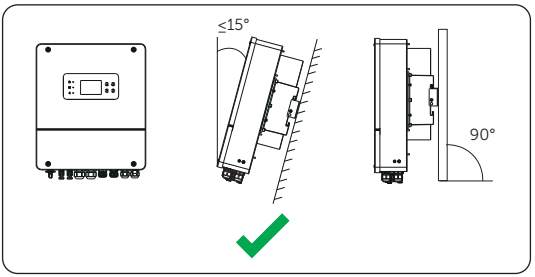


Figure 7-1 Correct installation

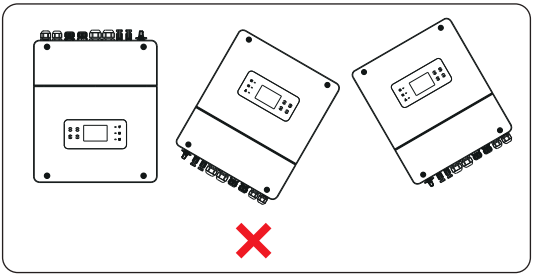


Figure 7-2 Incorrect installation

7.1 Dimensions for mounting

Before installation, check the dimensions of the bracket and ensure that enough space is reserved for the installation and heat dissipation of the entire system.

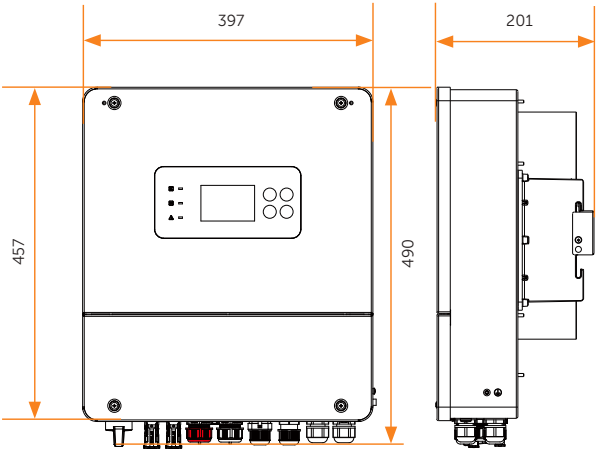


Figure 7-3 Dimensions 1 (Unit: mm)

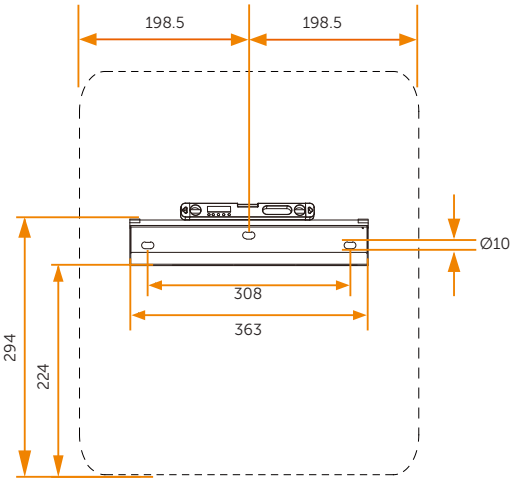


Figure 7-4 Dimensions 2 (Unit: mm)

7.2 Installation procedures

Step 1: Align the wall mounting bracket horizontally on the wall and mark the position of the drill holes.

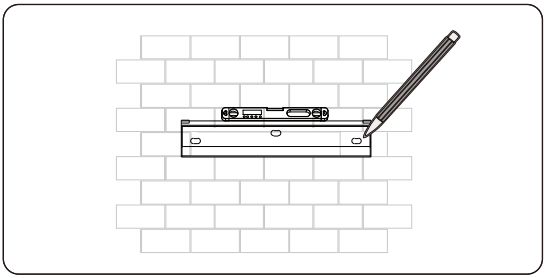


Figure 7-5 Marking the holes

NOTICE!

- Take the height of the battery into account when mounting the bracket.
- Observe the bubble of spirit level and adjust the bracket until the bubble stays in the middle.

Step 2: Set the wall mounting bracket aside and drill holes with Ø10 drill bit. The depth of the holes should be greater than 80 mm. The Hammer drill needs to be 90° perpendicular to the wall when using it. Do cover the inverter before drilling holes and clean up any dust in and around the holes using a dust collector.

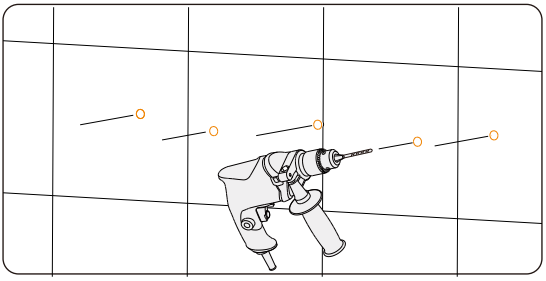


Figure 7-6 Drilling holes

Step 3: Attach the wall mounting bracket on the wall again. Insert the expansion tubes (Part E) into the holes and secure the wall bracket to the wall with self-tapping screws (Part F) .

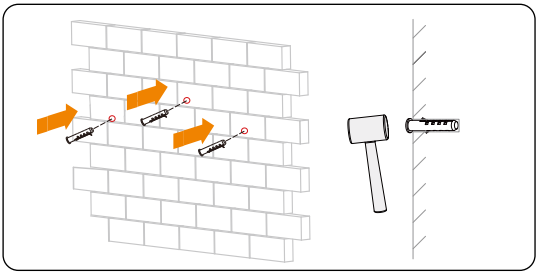


Figure 7-7 Insert the expansion tubes

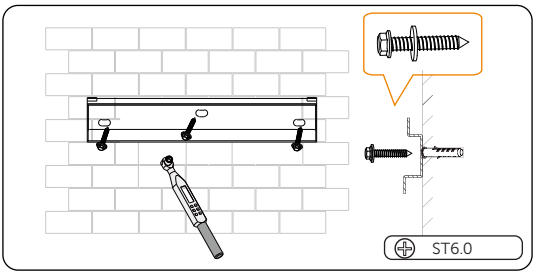


Figure 7-8 Securing the wall mounting bracket

Step 4: Open the anti-static bag and take out the machine.If it is to be temporarily placed on the ground, the bottom of the inverter should be padded with protective material.

Step 5: Lift up the inverter by three installers and hang it on the wall mounting bracket. The keyways of the inverter must be hooked into the buckles of wall mounting bracket.

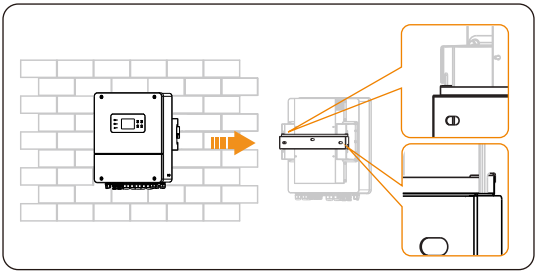


Figure 7-9 Hanging the inverter

Step 6: Secure the inverter to the wall mounting bracket with M4 screws. Tighten the M4*12 screws (Part K) on both sides.

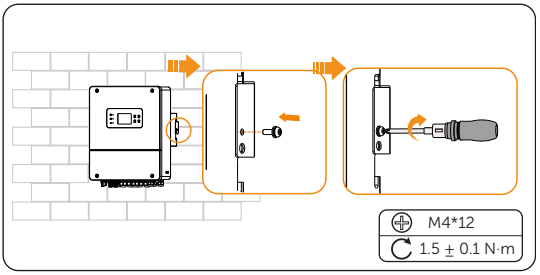


Figure 7-10 Securing the inverter

8 Electrical Connection

DANGER!

- Before electrical connection, make sure the DC switch and AC breaker are disconnected. Otherwise, electrical shock may be caused by high voltage, resulting in serious personal injury or death.

WARNING!

- Only the qualified personnel can perform the electrical connection following the local standards and requirements.
- Follow this manual or other related document to wire connection. The inverter damage caused by incorrect cabling is not in the scope of warranty.

CAUTION!

- Use insulated tools and wear individual protective tools when connecting cables.

8.1 Terminals of Inverter

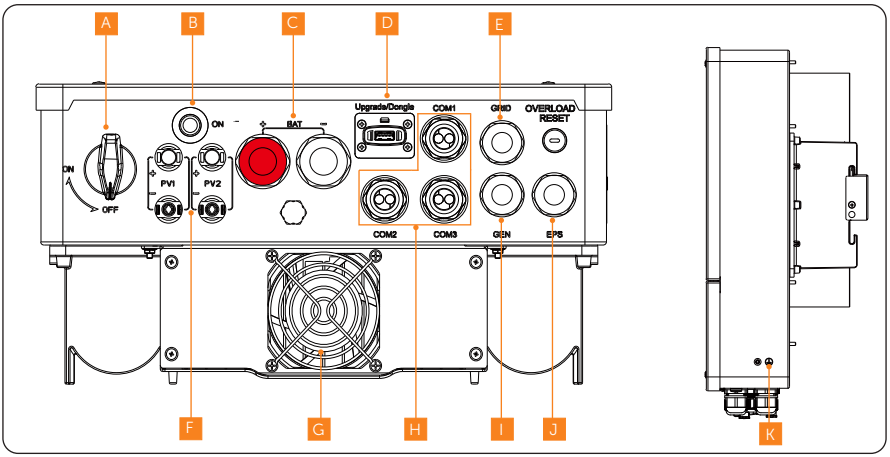


Figure 8-1 Terminals of Inverter (Bottom view) (1)

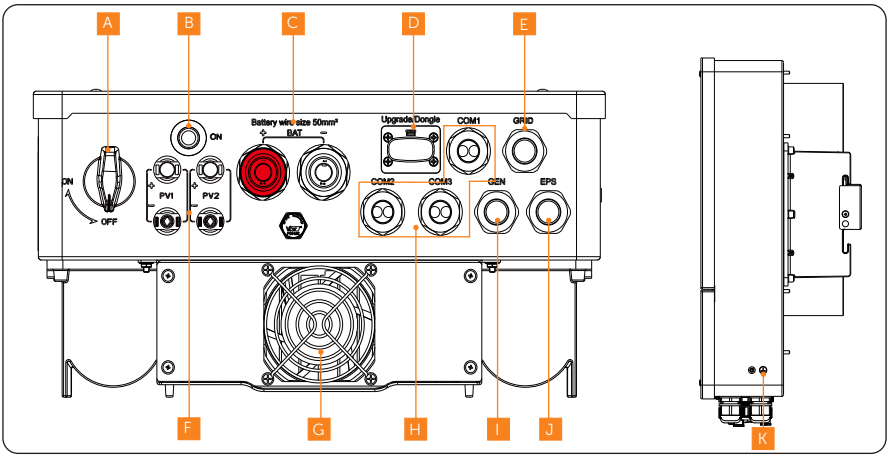


Figure 8-2 Terminals of Inverter (Bottom view) (2)

NOTICE!

- There may be slight differences in appearance among different versions of the machine. Please refer to the actual product.

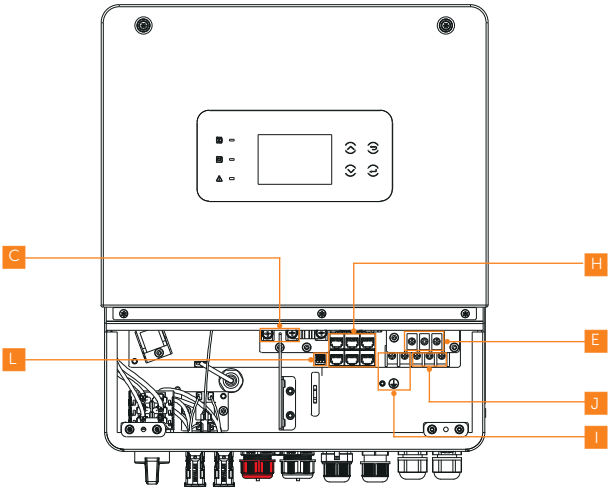


Figure 8-3 Terminals of Inverter (Front perspective view)

Table 8-1 Description of terminals

Item	Description	Remarks
A	DC switch	
B	Battery power on button	
C	Battery connection terminal	
D	Upgrade/Dongle terminal	
E	Grid connection terminal	
F	PV connection terminal	
G	Fan	(Only for X1-HYB-5.0-LV and X1-HYB-6.0-LV)
H	COM communication terminal	Including BMS, RS485, DI, Meter, CT, DO. Refer to "8.6 Communication Connection".
I	GEN connection terminal	
J	EPS connection terminal	
K	Grounding point	
L	Dry-contact terminal	

8.1.1 Cable Connections of Inverter

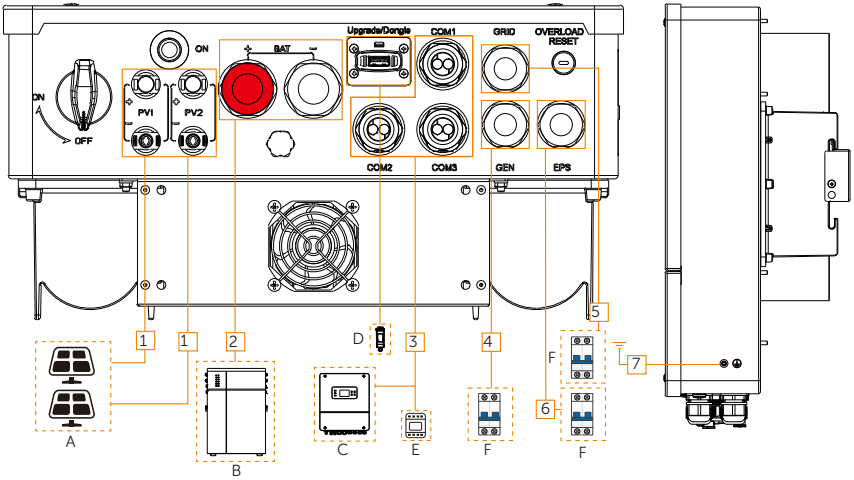


Figure 8-4 Cable connections of inverter (1)

Table 8-2 Descriptions of connected part

Item	Part	Description	Source
A	PV module	A PV string is composed of the PV modules connected in series.	Prepared by user
B	Battery	Xwatt low-voltage battery such as LD53 can be connected with the series inverter.	Purchased from Xwatt
		Lead-acid battery (48V) can be connected with the series inverter.	Prepared by user
C	(Optional) X1-HYB-LV series inverter	Select a same model of inverter	Purchased from Xwatt
D	(Optional) Monitoring dongle	Only Xwatt monitoring dongle supported.	Purchased from Xwatt
	USB drive	USB 2.0/3.0, ≤32 GB, FAT 16/32	Prepared by user
E	Meter/CT	Supported Xwatt authorized DDSU666 or CT.	Purchased from Xwatt
	BMS, RS485, DI, DO		Purchased from Xwatt or prepared by user
F	AC switch	Select an appropriate AC switch according to the local regulations to ensure the inverter can be securely disconnected from the grid, EPS loads and the generator. when an emergency occurs.	Prepared by user

Table 8-3 Descriptions of cables

Item	Cable	Type and specifications	Source
1	PV DC input power cable	Refer to "5.3 Additionally Required Materials".	Prepared by user
2	Battery power cable	/	Delivered with battery
3	Communication cable	Refer to "5.3 Additionally Required Materials".	Prepared by user
4	GRID, EPS and GEN wire		Prepared by user
5	GRID, EPS and GEN wire		Prepared by user
6	GRID, EPS and GEN wire		Prepared by user
7	PE cable		Prepared by user

8.2 PE Connection

The inverter must be reliably grounded. The PE connection point has been marked with ⏚ It is recommended to connect the inverter to a nearby grounding point.

PE connection procedures

Step 1: Prepare a one-core cable (4-10 mm^2), and then find the OT terminal (Part J) in the accessories. Strip the grounding cable insulation (length:8-10 mm).

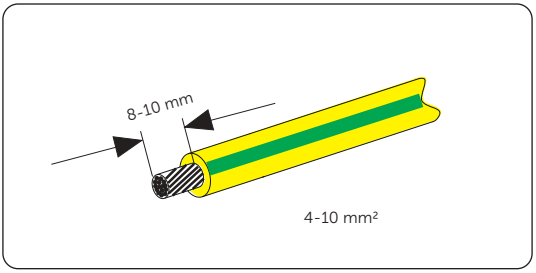


Figure 8-5 Striping the PE cable

Table 8-4 PE cable recommended

Model	X1-HYB-3.0-LV	X1-HYB-3.6-LV	X1-HYB-3.7-LV	X1-HYB-4.0-LV	X1-HYB-5.0-LV	X1-HYB-6.0-LV
PE Cable	4-6 mm^2	6-8 mm^2	6-8 mm^2	6-8 mm^2	8-10 mm^2	8-10 mm^2

NOTICE!

- When AC cable ≤16 mm^2, the earthing conductor should be as thick as the AC cable..

Step 2: Pull the heat-shrink tubing over the PE cable and insert the stripped section into the OT terminal.

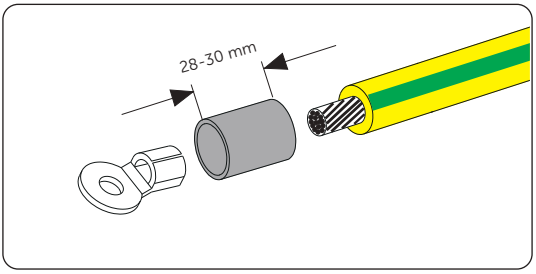


Figure 8-6 Installing the tubing and OT terminal

Step 3: Crimp it with crimping tool, pull the heat-shrink tubing over the stripped section of the OT terminal and use a heat gun to shrink it so that it can be firmly contacted with the terminal.

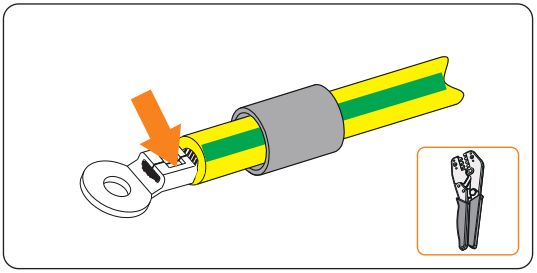


Figure 8-7 Crimping the cable

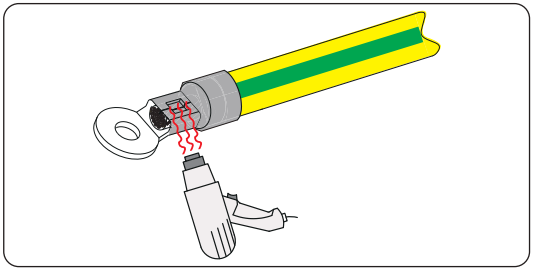


Figure 8-8 Shrinking the tubing

Step 4: Find the ground connection port on the inverter, loosen the PE screw on the inverter with cross screwdriver and screw the ground wire on the inverter with a cross screwdriver.

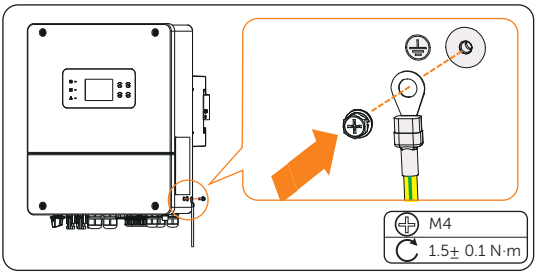


Figure 8-9 Securing the PE cable

8.3 AC Connection

NOTICE!

- Before connecting the inverter to the grid, approval must be received by local utility as required by national and state interconnection regulations.

The inverter supports the EPS mode. When connected to the grid, the inverter outputs go through the Grid terminal, and when disconnected from the grid, the inverter outputs go through the EPS terminal.

Requirements for AC connection

- Grid voltage requirement
  - » The grid voltage and frequency must be within the allowable range (220/230/240V, 50/60 Hz) and comply with the requirements of the local power grid.
- Residual Current Device (RCD)
  - » The inverter has an integrated Type-B Residual Current Monitoring Unit (RCMU). If an external Residual Current Device (RCD) is required by local regulations, verify the type of RCD required. It is recommended to use a Type-A RCD with a rating of 300 mA. The use of a Type-B RCD is also permitted.
- AC breaker
  - » An AC breaker that matches the power of the inverter must be used between the inverter output and the power grid. Each inverter must be equipped with an independent breaker or other load disconnection unit to ensure the safe disconnection from the grid. For specific information on the AC breaker for Grid, GEN and EPS, see "5.3 Additionally Required Materials".
- EPS load
  - » Make sure that the rated power of the EPS load is within the rated output power range of the inverter. Otherwise, the inverter will report a fault. In this case, turn off some loads to suit the rated EPS output power range of the inverter, and then turn back to the LCD screen to clear the fault.
  - » When connecting to the EPS terminal, pay attention to the following points:

Medical equipment	Connection prohibited
Precision instrument	Connection prohibited
Appliances susceptible to malfunctions in the event of power outages during use.	Connection prohibited

  - » For inductive loads such as refrigerators, air conditioner, washing machine, etc., ensure that their start power does not exceed the EPS peak power of the inverter.

Table 8-5 EPS load information

Type of load	Equipment	Start power
Resistive load	Lamp	Rated power
	Fan	Rated power
	Hair dryer	Rated power
Inductive load	Refrigerator	3-5 times rated power
	Air conditioner	3-6 times rated power
	Washing machine	3-5 times rated power
	Microwave oven	3-5 times rated power

* Refer to the nominal start power of the equipment for the actual start power.

Grid, GEN and EPS connection steps

NOTICE!

- Please see "14 Technical Data" to check the grid voltage and compare with the voltage range.
- Remember to disconnect all power sources to prevent electric shock.

Step 1: Prepare a grid cable (triple-core cable), an EPS cable (triple-core cable), and a GEN cable (triple-core cable). Then, find the Y Terminals in the accessory bag. (Using X1-HYB-3.0-LV as an example)

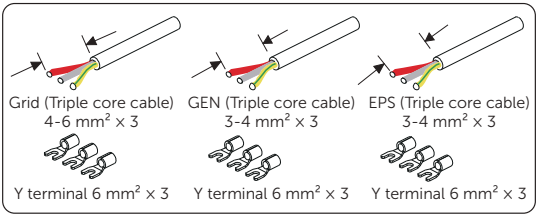


Figure 8-10 Striping the Grid cable

NOTICE!

- Please refer to the table in "5.3 Additionally Required Materials" to view the recommended wire sizes for GRID, EPS, and GEN.
- It is recommended to use copper wire. Non-triple or non-dual core cables shall be sealed with glue or fireproof mud.
- When using wire sizes of 6 mm^2 and above, only 2-core wires can be used because the 3-core wire cannot pass through the waterproof terminal. In the case of using 2-core wire, the PE wire should only be connected to the inverter shell and does not need to be connected to the internal terminals.
- All connection diagrams provided here are based on the use of a 3-core wire, with X1-HYB-3.0-LV serving as an example.

Step 2: Use a cross screwdriver to loosen the screws on both sides of the inverter. Remove the lower cover of the inverter.

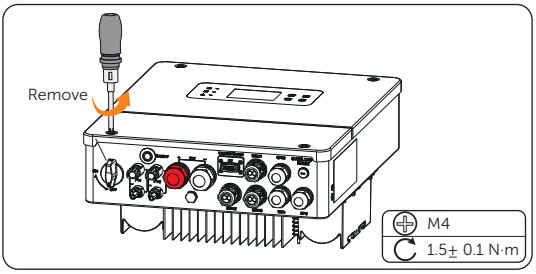


Figure 8-11 Loosen the screws

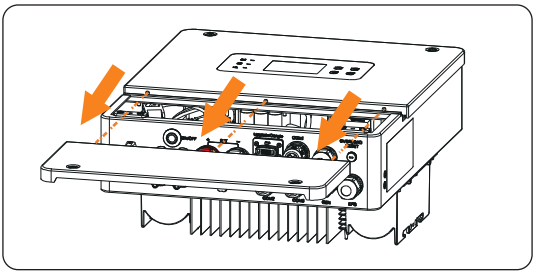


Figure 8-12 Remove the lower cover

Step 3: Remove the plug of Grid, GEN and EPS ports.

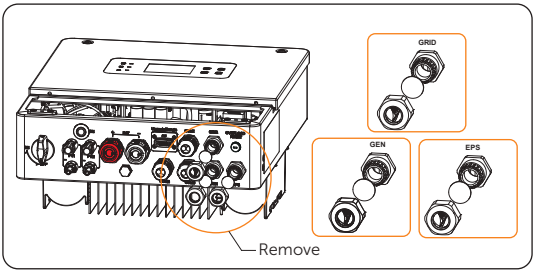


Figure 8-13 Remove the plug

Step 4: Find the location of the AC interface. The Grid, GEN, and EPS connection port are shown below.

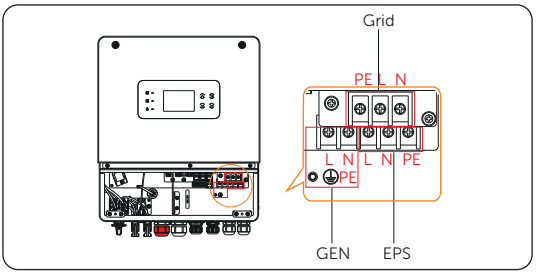


Figure 8-14 Find the Location

Step 5: Pass the previously prepared Grid, GEN and EPS cables through the corresponding screw caps and seals rings. The Grid, GEN, and EPS cables should go through the corresponding Grid, GEN, and EPS ports.

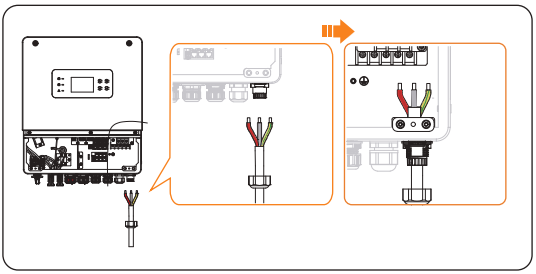


Figure 8-15 Pass the Grid cable

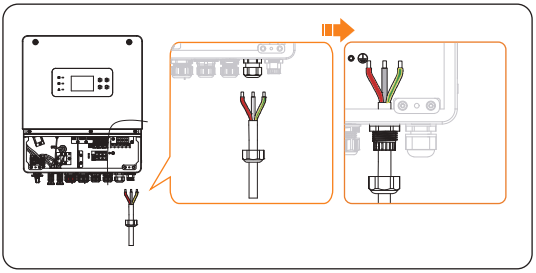


Figure 8-16 Pass the GEN cable

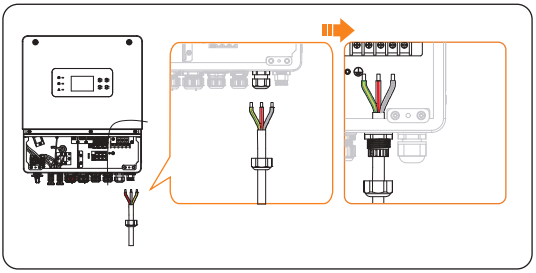


Figure 8-17 Pass the EPS cable

Step 6: Remove the 10 mm insulation layer at the end of the wire. Insert the Y terminals (Part I) respectively, and make sure that the stripped ends are inserted into the fork terminal, and finally use crimping pliers to press tightly.

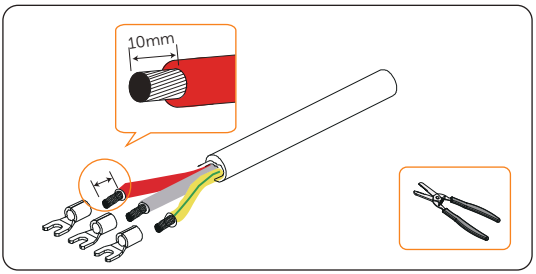


Figure 8-18 Remove the layer

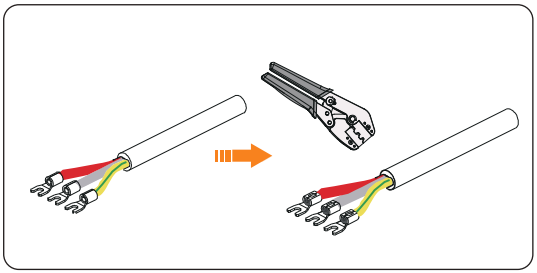


Figure 8-19 Insert and press the terminal

Step 7: Insert the crimped cables into the corresponding L, N, and PE terminals according to the wire sequence and tighten the screws with a cross screwdriver. Twist to tighten the screw caps and seals rings.

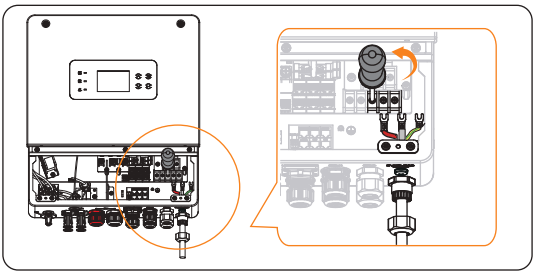


Figure 8-20 Insert the Grid cable

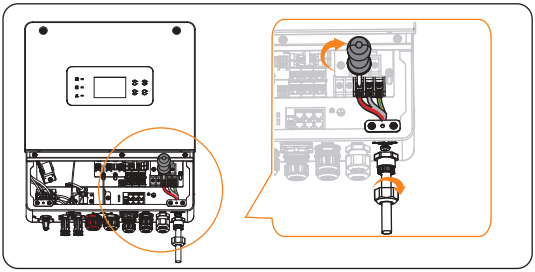


Figure 8-21 Tighten the Grid cable

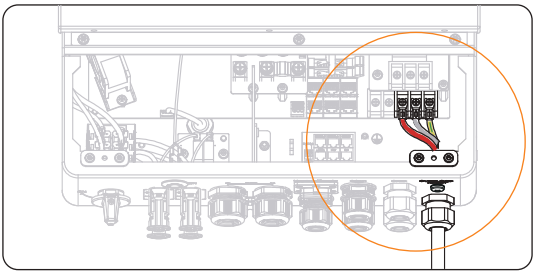


Figure 8-22 Grid cable connected

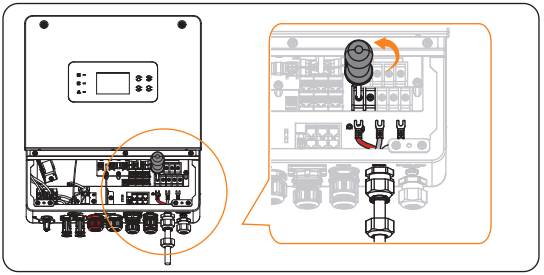


Figure 8-23 Insert the GEN cable

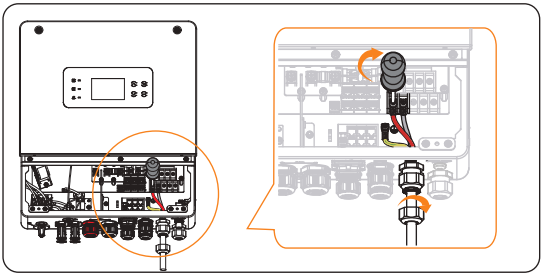


Figure 8-24 Tighten the GEN cable

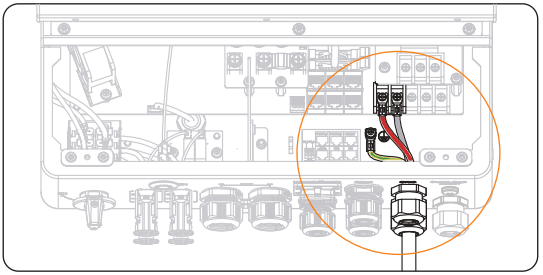


Figure 8-25 GEN cable connected

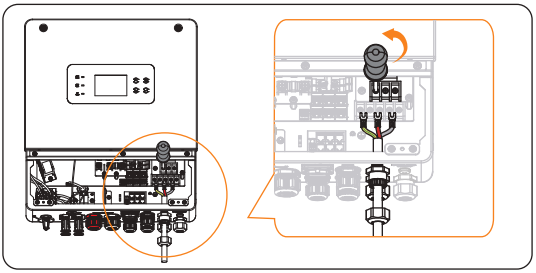


Figure 8-26 Insert the EPS cable

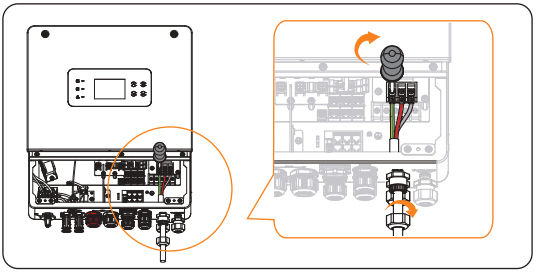


Figure 8-27 Tighten the EPS cable

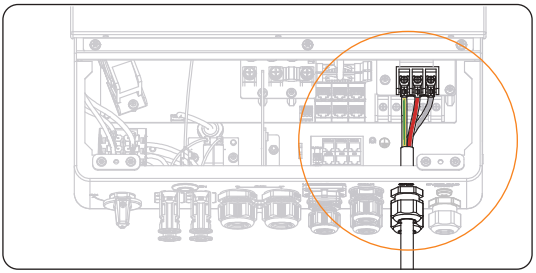


Figure 8-28 EPS cable connected

8.4 PV Connection

DANGER!

- When exposed to the sunlight, PV modules will generate lethal high voltage. Please take precautions.
- Before connecting the PV modules, make sure that both DC switch and AC breaker are disconnected, and that the PV module output is securely isolated from the ground.

WARNING!

- To mitigate the risk of fire, it is crucial to utilize a dedicated crimping tool specifically designed for PV installations to ensure secure and reliable connections.

CAUTION!

- Power is fed from more than one source and more than one live circuit.

Requirements for PV connection

- Open circuit voltage and operating voltage
  - » The open circuit voltage of each module array cannot exceed the maximum PV input voltage (550 V) of the inverter. Otherwise, the inverter may be damaged.
  - » The operating voltage of PV modules must be within the MPPT voltage range (80-520 V) of the inverter. Otherwise, the inverter will prompt a fault. Consider the impact of low temperature on the voltage of the photovoltaic panels, as lower temperatures tend to result in higher voltages.
- PV module
  - » The PV modules within the same MPPT channel are of the same brand. Additionally, the strings within the same channel should have identical quantities, and be aligned and tilted identically.
  - » The positive or negative pole of the PV modules should not be grounded.
  - » The positive cables of the PV modules must be connected with positive DC connectors.
  - » The negative cables of the PV modules must be connected with negative DC connectors.

Wiring procedures

Step 1: Turn off the DC switch, prepare a 4 mm^2 PV cable, and find the PV (+) connectors (Part A) and PV (-) connectors (Part C) in the package. Strip approx. 7 mm of the cable insulation.

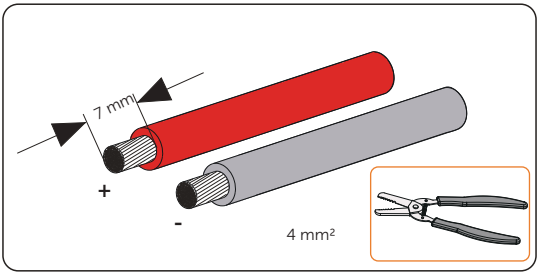


Figure 8-29 Striping the PV cable

Step 2: Insert the stripped cable into the PV pin contact (Part B and D) . Ensure that the stripped cable and the PV pin contact are of the same polarity. Crimp it with crimping tool for PV terminal.

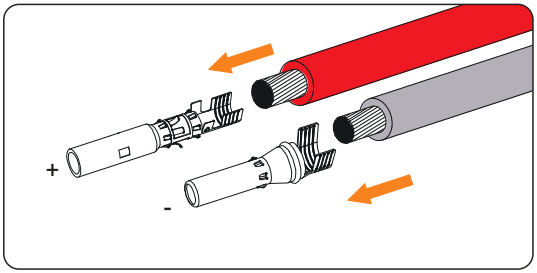


Figure 8-30 Inserting the PV pin contact

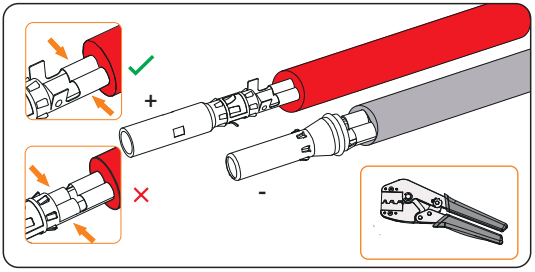


Figure 8-31 Criping the terminal

WARNING!

- To mitigate the risk of fire, it is crucial to utilize a dedicated crimping tool specifically designed for PV installations to ensure secure and reliable connections.

Step 3: Thread the PV cable through swivel nut and insert the cable into the PV connector until a "Click" is heard. Gently pull the cable backward to ensure firm connection. Tighten the swivel nut clockwise. You can use the disassembling tool to secure or loose the swivel nut.

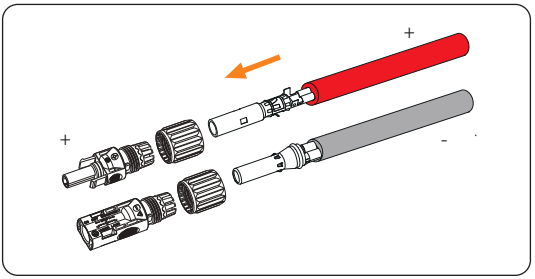


Figure 8-32 Threading the PV cable

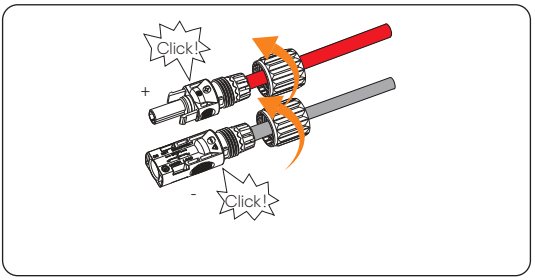


Figure 8-33 Securing the swivel nut

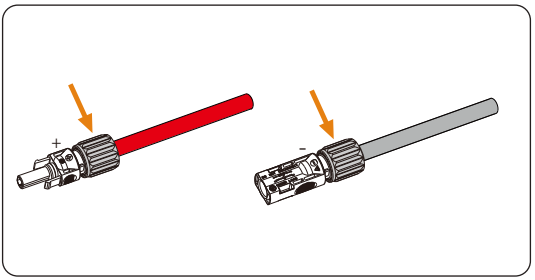


Figure 8-34 Loosening the swivel nut

Step 4: Use a multimeter to measure the positive and negative voltage of the assembled PV connectors. Make sure the open circuit voltage does not exceed the input limit of 500 V.

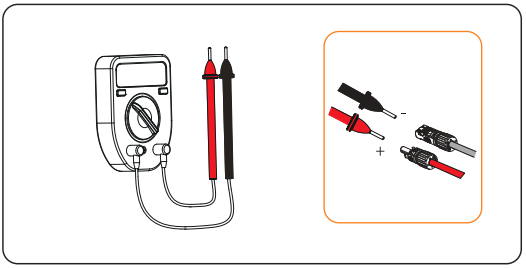


Figure 8-35 Measuring the voltage of PV connectors

NOTICE!

- If the voltage reading is negative, it indicates an incorrect DC input polarity. Please check if the wiring connections on the multimeter is correct or PV connectors are not mistakenly connected.

Step 5: Remove the PV terminal caps and connect the assembled PV connectors to corresponding terminals until there is an audible "Click". The PV+ on the string side must be connected to the PV+ on the inverter side, and the PV– on the string side must be connected to the PV– on the inverter side.

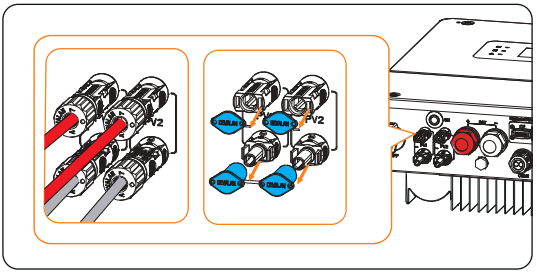


Figure 8-36 Connecting the PV cable

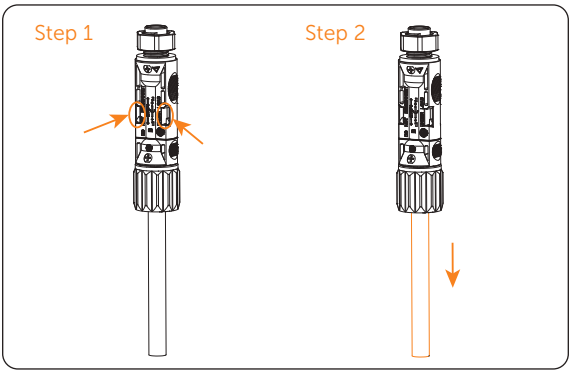
WARNING!

- Seal the unused PV terminals with original terminal caps. If all PV terminals are connected, keep the waterproof caps in a safe place. Reinstall it immediately after removing the connectors from terminals.

Disassembling the PV cable

Step 1: Use the disassembling tool to snap the two tabs inside the PV terminal to disassemble it.

Step 2: Remove the PV cable, and slightly pull it out.



8.5 Battery Power Cable Connection

Requirements for battery connection

- Required battery
  - » The series inverter system can be equipped with low voltage lithium battery and lead acid battery.
- 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-HYB-3.0-LV	X1-HYB-3.6-LV	X1-HYB-3.7-LV	X1-HYB-4.0-LV	X1-HYB-5.0-LV	X1-HYB-6.0-LV
Voltage	Nominal voltage of DC breaker should be larger than maximum voltage of battery.					
Current	75 A				120 A	

DANGER!

- Make sure the breaker, power button (if any) and DC switch (if any) of battery is OFF.
- Always ensure correct polarity. Never reverse the polarity of the battery cables as this will result in inverter damage.

NOTICE!

- Please ensure that the BAT power line and BMS communication line are correctly connected when using the low-voltage batteries.

Battery connection diagram

Model	X1-HYB-3.0-LV	X1-HYB-3.6-LV	X1-HYB-3.7-LV	X1-HYB-4.0-LV	X1-HYB-5.0-LV	X1-HYB-6.0-LV
Recommended battery capacity (kWh)	3~4.5	3.7 ~ 5.55	3.7 ~ 5.55	4.0 ~ 6.0	5.0 ~ 7.5	6.0 ~ 9.0

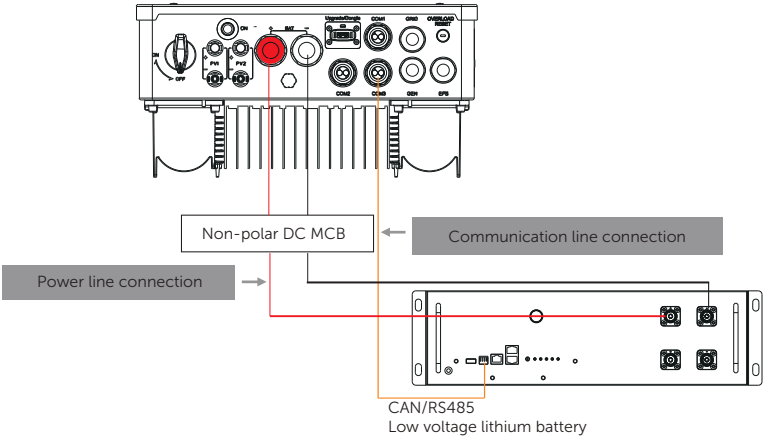


Figure 8-37 Lithium battery connection diagram

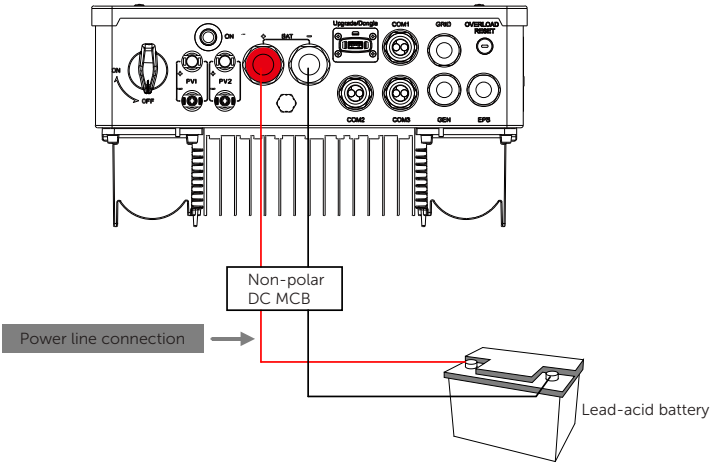


Figure 8-38 Lead-acid battery connection diagram

Battery connection steps

Step 1: Prepare a 16-25 mm² or 35-50 mm² battery power cable. Strip approx. 10 mm of the cable insulation.

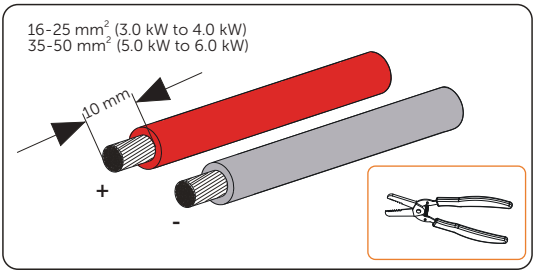


Figure 8-39 Stripping the battery cable

Step 2: Insert the stripped cables into the Battery connection terminals (Part H) respectively and crimp the terminals tightly.

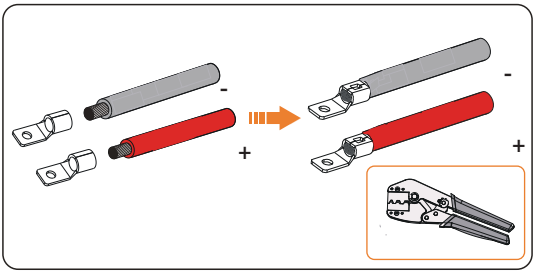


Figure 8-40 Insert the terminal

Step 3: Loosen the waterproof connector.

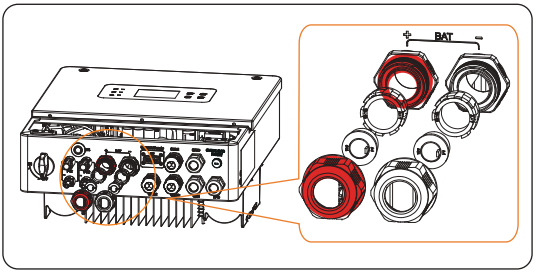


Figure 8-41 Connecting the battery connector

- **For battery connection from 3.0 kW to 4.0 kW**

Step 4: Remove the sealing cover of the plug.

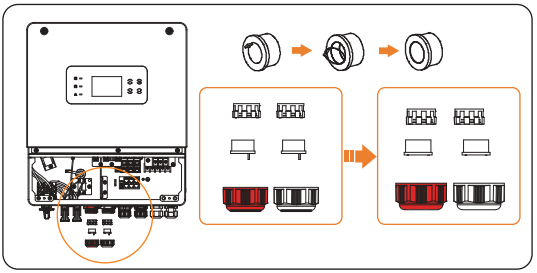


Figure 8-42 Remove the sealing cover

Step 5: Pass the previously assembled cables through the corresponding swivel nut. Find the battery interface, insert the positive cable into BAT+ port and the negative cable to BAT-port.

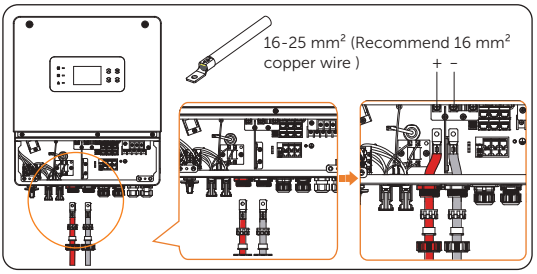


Figure 8-43 Pass and insert the cable

Step 6: Find the battery interface, remove the screw, insert the positive cable into BAT+ port and the negative cable to BAT-port.

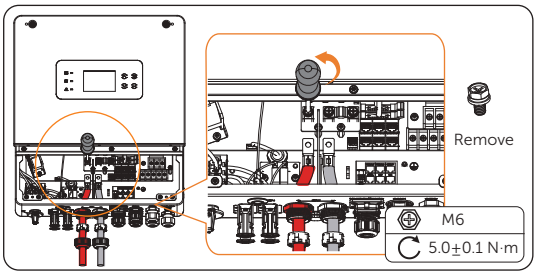


Figure 8-44 Remove the screw

Step 7: Use cross screwdriver to tighten the screw. Twist to tighten the swivel nut.

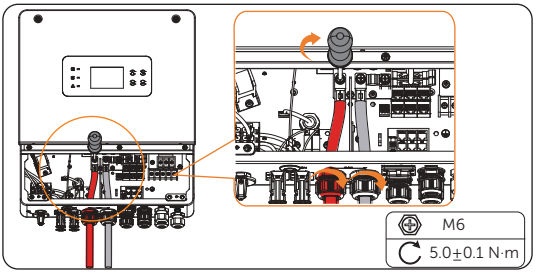


Figure 8-45 Tighten the cable

- **For battery connection from 5.0 kW to 6.0 kW**

Step 4: Remove the plug.

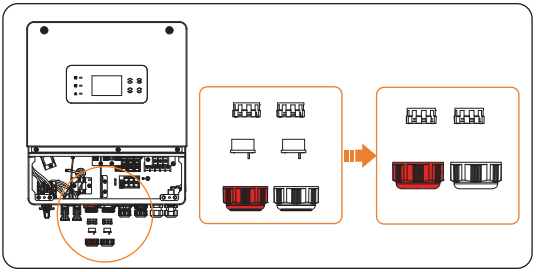


Figure 8-46 Remove the plug

Step 5: Pass the previously assembled cables through the corresponding swivel nut. Find the battery interface, insert the positive cable into BAT+ port and the negative cable to BAT-port.

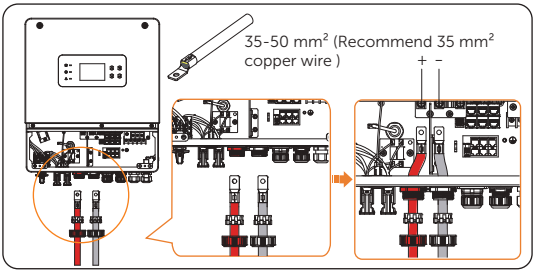


Figure 8-47 Pass and insert the cable

Step 6: Find the battery interface, remove the screw. insert the positive cable into BAT+ port and the negative cable to BAT-port.

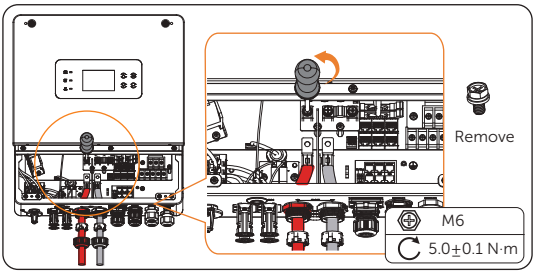


Figure 8-48 Remove the screw

Step 7: Use cross screwdriver to tighten the screw. Twist to tighten the swivel nut.

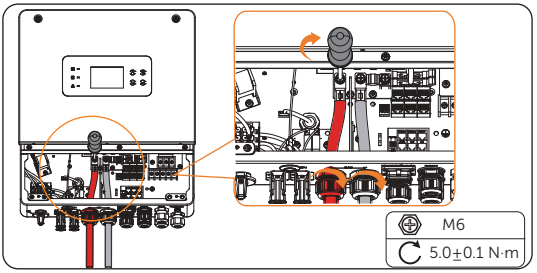


Figure 8-49 Tighten the cable

WARNING!

- Keep the terminal caps in a safe place if batteries are connected to the inverter.
- Reinstall the caps immediately after removing the connectors from terminals.

NOTICE!

- If only the battery is connected but the PV, GRID, and GEN are not connected, to start the inverter, press and hold the battery power on button until the screen is on.

8.6 Communication Connection

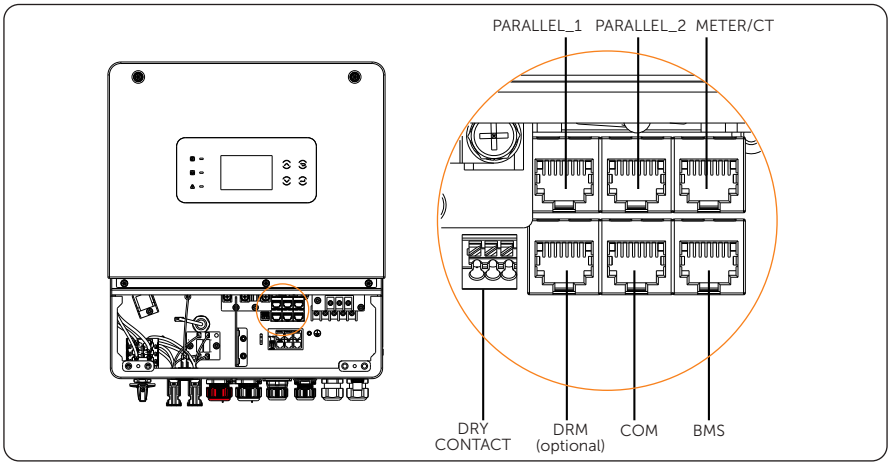


Table 8-6 Definition of communication ports

Port	PIN	PIN Definition	Port	PIN	PIN Definition
PARALLEL_1	1	/	PARALLEL_2	1	/
	2	/		2	/
	3	/		3	/
	4	CAN_H		4	CAN_H
	5	CAN_L		5	CAN_L
	6	GND		6	GND
	7	SYNC_1		7	SYNC_1
	8	SYNC_2		8	SYNC_2
Meter/CT	1	CT1-1	DRY CONTACT	1	DO_1
	2	/		2	/
	3	/		3	DO_2
	4	RS485_A		/	/
	5	RS485_B		/	/
	6	/		/	/
	7	/		/	/
	8	CT1-2		/	/
DRM (optional)	1	DRM1/5	COM	1	DI_1
	2	DRM2/6		2	DI_2
	3	DRM3/7		3	/
	4	DRM4/8		4	RS485_A
	5	RG/0		5	RS485_B
	6	CL/0		6	GND
	7	/		7	/
	8	/		8	/

Port	PIN	PIN Definition	Port	PIN	PIN Definition
BMS	1	BMS_485B			
	2	BMS_485A			
	3	GND			
	4	BMS_CANH			
	5	BMS_CANL			
	6	/			
	7	WAKEUP			
	8	BAT_TEMP			

8.6.1 CT/meter port connnection

The inverter should work with an electric meter or current transformer (CT for short) to monitor household electricity usage. The electricity meter or CT can transmit the relevant electricity data to the inverter or platform.

CAUTION!

- The inverter is set to disable by default. In the enabled state, if the meter is not connected to the inverter, the inverter will shut down and indicate a fault. Smart meters must be authorized by our company. Unauthorized meter may be incompatible with the inverter, thereby resulting in inverter damage and working mode malfunction. Xwatt will not be responsible for the impact caused by the use of other appliances.

NOTICE!

- Do not place the CT on the N wire or ground wire.
- Do not put CT on the N wire and L wire 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.
- It is recommended to wrap the CT clip around in circles with insulating tape.

Meter/CT connection diagram

NOTICE!

- The following diagrams take Xwatt authorized DDSU666 meter connection for example.
- If you have other power generation equipment (such as an inverter) at home and wants to monitor both equipment, our inverter provides Meter 2 communication function to monitor the power generation equipment. For more information, please contact us.
- Please make PE connection for Meter if the meter has ground terminal.

- CT connection diagram

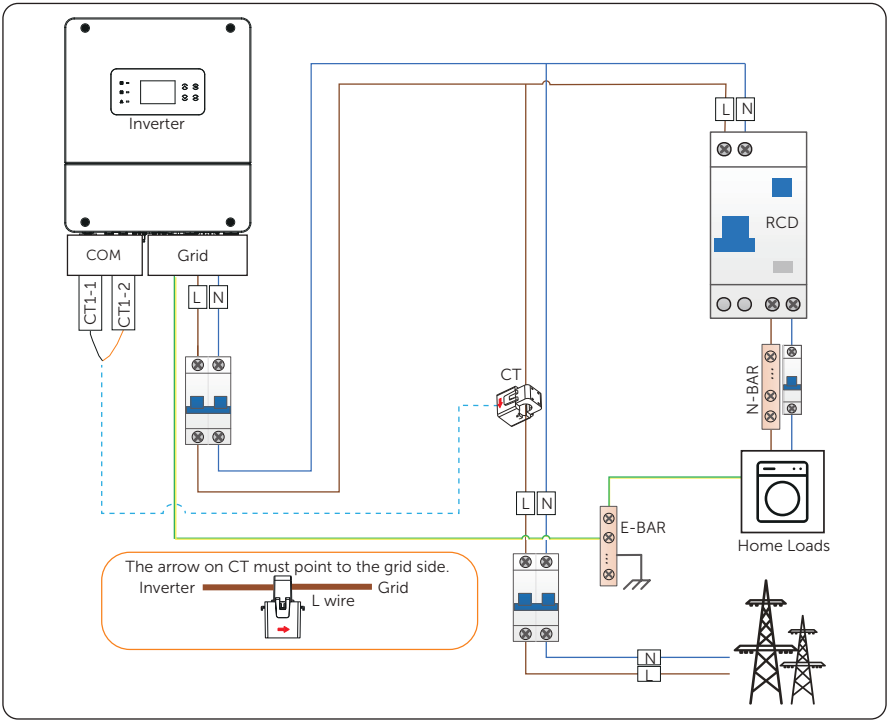


Figure 8-50 CT connection diagram

- Meter connection diagram

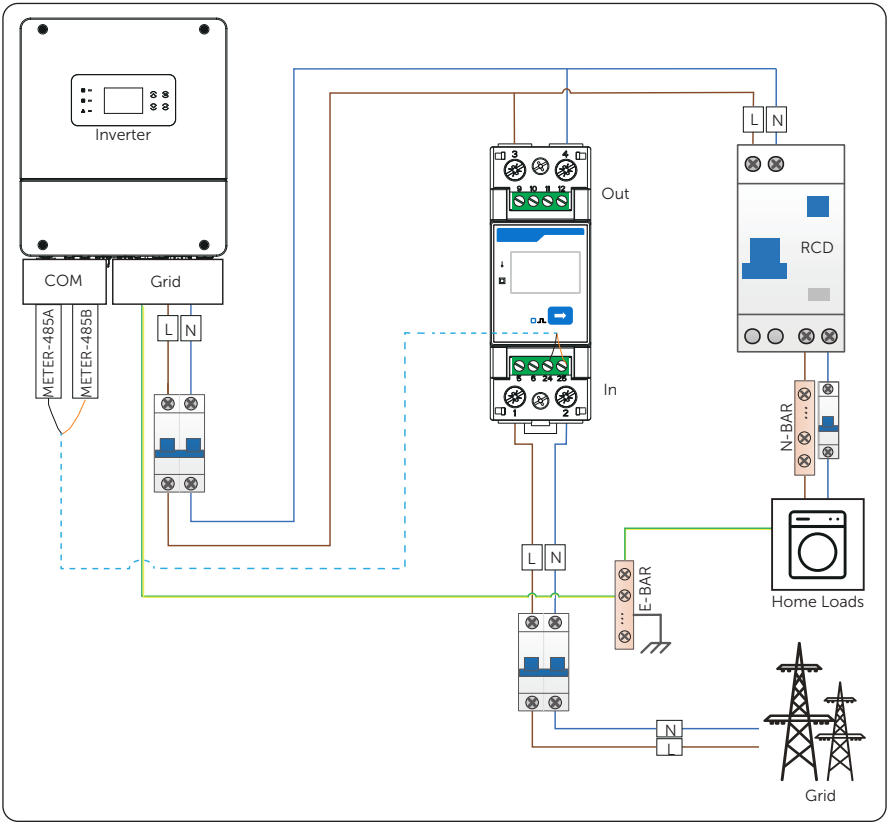
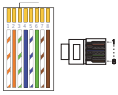


Figure 8-51 Meter connection diagram

NOTICE!

- If two meters are to be connected in the system, the communication cables of the meters should be connected in parallel. For example, the 485A of one meter should be connected with the 485A of the other meter, and the 485B of one meter should be connected with the 485B of the other meter.

- Pin definition for CT/Meter



Pin	1	2	3	4	5	6	7	8
Pin Definition	CT1-1	X	X	RS485_A	RS485_B	X	X	CT1-2

NOTICE!

- Only one of the Meter and CT connections can be selected. Meter cable goes to pin terminal 4 and 5, while the CT cable goes to pin terminals 1 and 8.

CT/Meter connection steps

Step 1: Remove the plug. For Communication connection, you can select any port from COM 1, COM 2 and COM3.

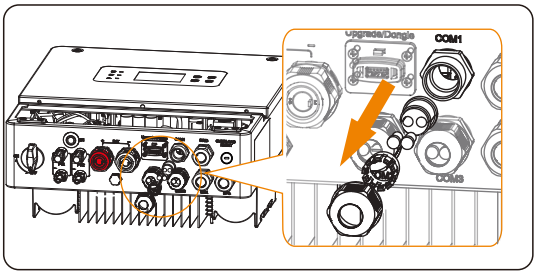


Figure 8-52 Remove the plug

Step 2: For meter connection, crimp only one RJ45 terminal (Part M) .
For CT connection without RJ45 connector, there is no need to crimp another RJ45 terminal.
For CT connection with RJ45 connector, crimp two RJ45 terminal.

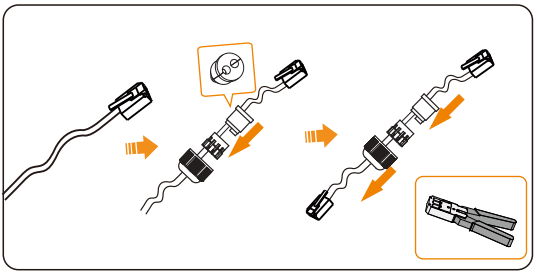


Figure 8-53 Crimp the terminal

NOTICE!
• It is recommended to use CAT5 Cable.

Step 3: For meter connection, insert one side of the cable (with no terminal) into the inverter, and the other side of the cable into the waterproof distribution box.

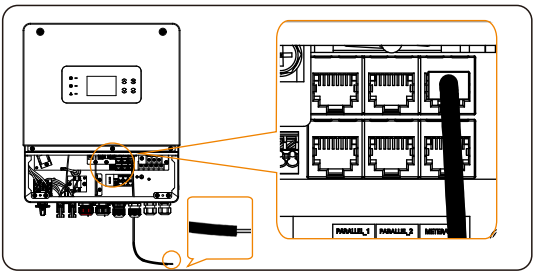


Figure 8-54 Insert one side of the cable into the inverter

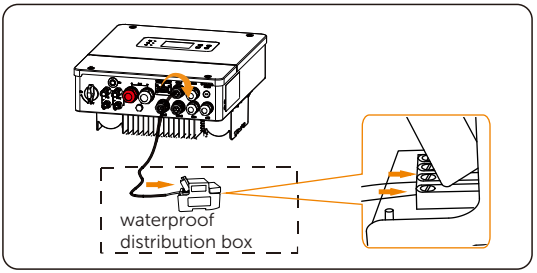


Figure 8-55 Insert the other side of the cable into the waterproof distribution box

Step 4(1): For CT connection without RJ45 connector, insert one side of the finished cable and the waterproof connectors with RJ45 into the Meter/CT port of the inverter, tighten the waterproof screw and insert the other side of the RJ45 terminal into the CT connection.

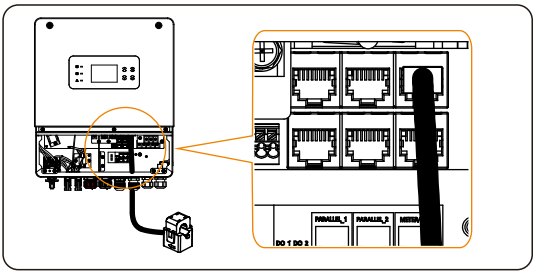


Figure 8-56 Insert one side of the cable into the inverter

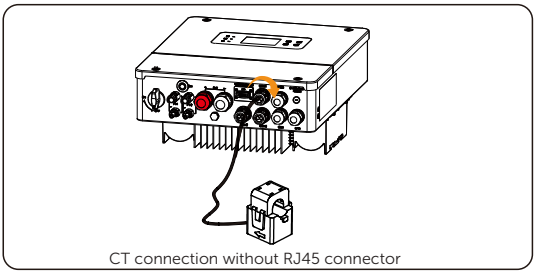


Figure 8-57 Insert the other side of the cable into the CT connection

Step 4(2): For CT connection with RJ45 connector, connect the A terminal to the Meter/CT port of the inverter, tighten the waterproof screw and connect the B terminal to the RJ45 connector (Part L) .

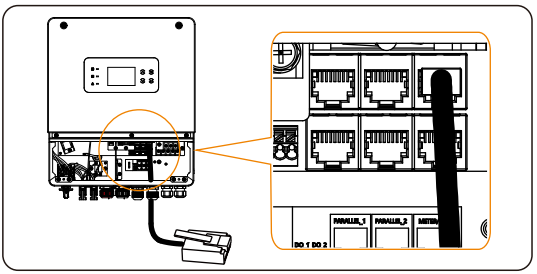


Figure 8-58 Connect the A teminal

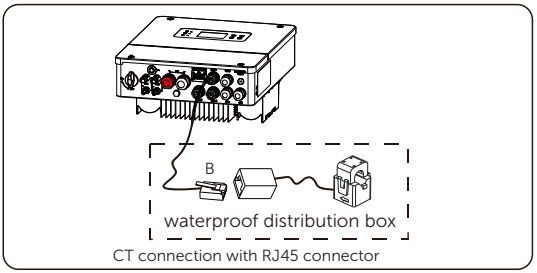


Figure 8-59 Connect the B teminal

8.6.2 BMS/DRM/COM port connnection

BMS/DRM/COM connection steps

Step 1: Remove the plug. Pass the cable through the corresponding screw caps and seals rings. Strip the insulation layer (length: 15mm) at one end of the cable. Crimp a RJ45 terminal at the same end of the cable.

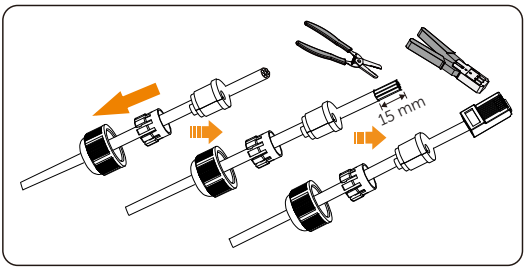


Figure 8-60 Prepare the cable

Table 8-7 CAT5 wiring order

1	White with orange stripes	5	White with blue stripes
2	Orange	6	Green
3	White with green stripes	7	White with brown stripes
4	Blue	8	Brown

NOTICE!

- It is recommended to use CAT5 Cable.
- Use network cable tester to test the crimped cable before connecting to the inverter.

Step 2: Find the DRM(optional), COM, BMS port. For comunication connection, you can select any port from COM 1, COM 2 and COM 3. Insert the previously prepared cables into the corresponding ports.

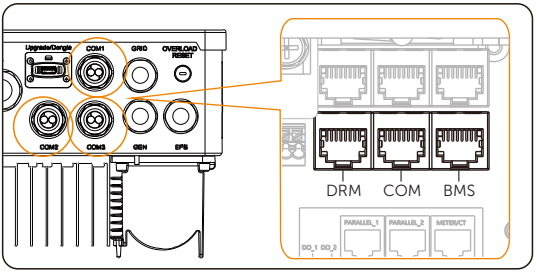


Figure 8-61 Find the DRM(optional), COM, BMS port

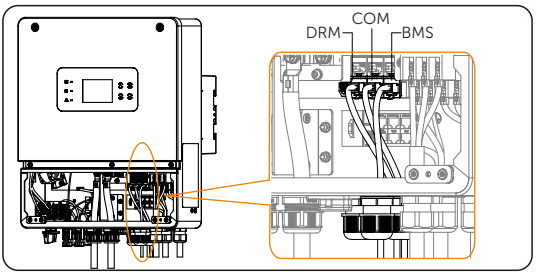


Figure 8-62 Insert the cable

NOTICE!

- After the BMS communication between the battery and the inverter is finished, the battery will work normally.

8.6.3 Parallel Connection

The inverter provides the parallel connection function. One inverter will be set as the Master inverter to control other Slave inverters in the system. For details, please refer to "15.2 Application of Parallel Function".

The parallel cable making method is the same as BMS/DRM/COM.

NOTICE!

- In parallel operation, if there are PV modules, the master inverter must be connected to the PV modules.

8.6.4 Dry-contact output connection

Dry-contact output connection steps

Step 1: Strip the insulation layer (length: 15mm) at one end of the cable. And cut off the 6 cables (length:6-8mm), keep the rest 2 cables.
For dry-contact output connection, you can select any two cables from the following four groups: white with orange stripes, Orange; white with green stripes, blue; white with blue stripes, green; white with brown stripes, brown.

NOTICE!

- It is recommended to use CAT5 Cable.
- Use network cable tester to test the crimped cable before connecting to the inverter.

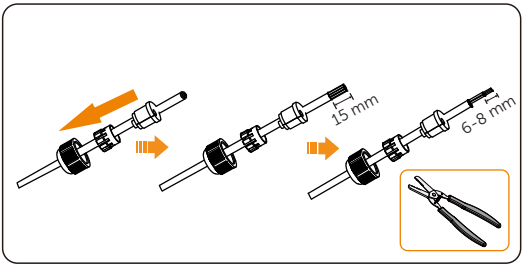


Figure 8-63 Prepare the cable

Table 8-8 CAT5 wiring order

1	White with orange stripes	5	White with blue stripes
2	Orange	6	Green
3	White with green stripes	7	White with brown stripes
4	Blue	8	Brown

NOTICE!

- It is recommended to use CAT5 Cable.
- Use network cable tester to test the crimped cable before connecting to the inverter.

Step 2: Find DO_1 and DO_2 port. For Communication connection, you can select any port from COM 1, COM 2 and COM3. Insert the prepared cable into the corresponding ports. .

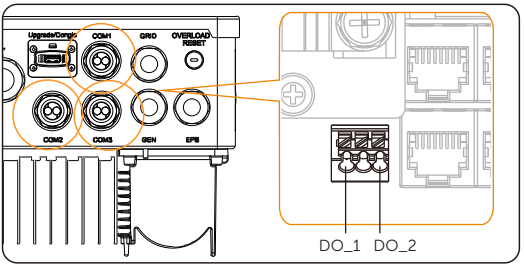


Figure 8-64 Find the port

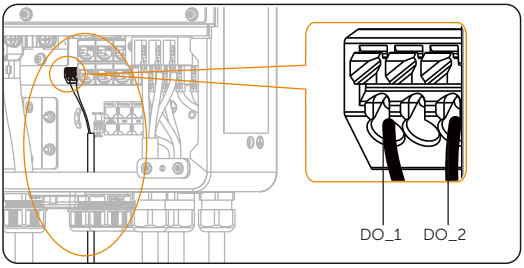


Figure 8-65 Insert the cable

Step 3: Slide to close the lower cover. Use cross screwdriver to tighten the screws on both sides of the inverter.

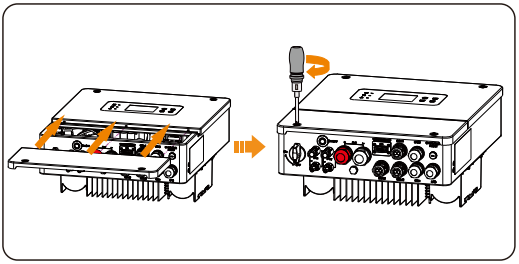


Figure 8-66 Close the lower cover and tighten the screws

8.7 Monitoring Connection

The inverter provides a Upgrade/Dongle terminal, which can transmit data of the inverter to the monitoring website via WiFi+LAN dongle (Optional). The WiFi+LAN dongle is equipped with two kinds of communication modes (Wi-Fi mode or LAN mode). Users can choose based on actual needs. (If needed, purchase products from us.)

Monitoring connection diagram

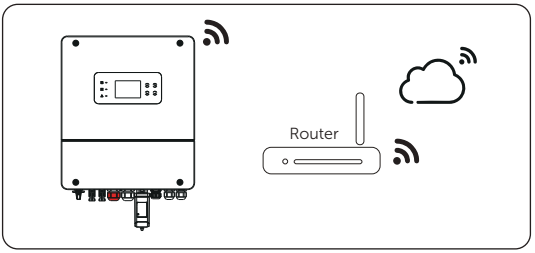


Figure 8-67 Wi-Fi mode connection diagram

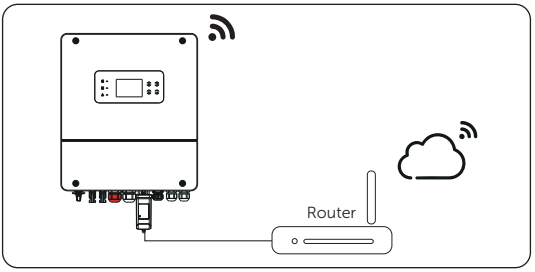


Figure 8-68 LAN mode connection diagram

Monitoring wiring procedure

Wi-Fi mode:

a. Assemble the dongle.

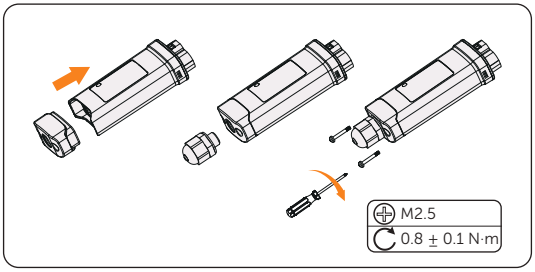


Figure 8-69 Assembling the dongle

b. Plug the dongle to the inverter.

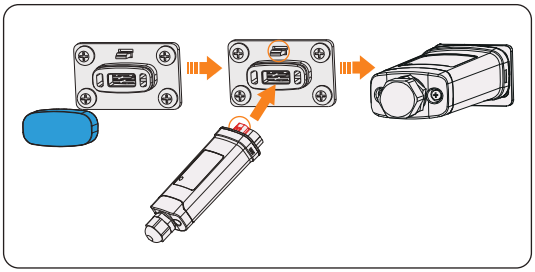


Figure 8-70 Dongle connection procedure

CAUTION!

- The buckles on the inverter and dongle must be on the same side. Otherwise, the dongle may be damaged.

NOTICE!

- The distance between the router and the inverter must be no more than 100 meters. If there are walls in between, the distance must be no more than 20 meters.
- For locations where Wi-Fi signals are weak, install a Wi-Fi signal booster.

NOTICE!

- For details on Wi-Fi configuration, see *Pocket WiFi + LAN Installation Manual*. You can configure Wi-Fi only after the inverter is powered on.

LAN mode:

a. Disassemble the waterproof connector into components 1, 2, 3 and 4; Component 1 is not used. Keep it in a safe place.

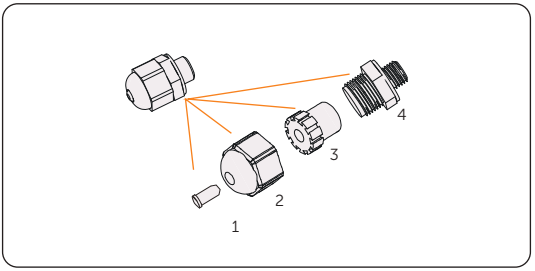


Figure 8-71 Disassembling the waterproof connector

b. Assemble the dongle.

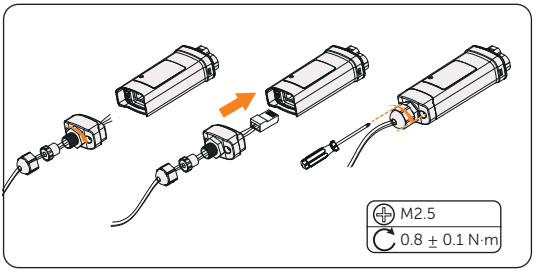


Figure 8-72 Assembling the dongle

c. Plug the dongle to the inverter.

9 System Commissioning

9.1 Checking before Power-on

No.	Item	Checking details
1	Installation	The inverter is installed correctly and securely. The battery is installed correctly and securely. Other device (if any) is installed correctly and securely.
2	Wiring	All DC, AC cables and communication cables are connected correctly and securely; The meter/CT is connected correctly and securely; The ground cable is connected correctly and securely; Photovoltaic panels are connected correctly and securely;
3	Breaker	All the DC breakers and AC breakers are OFF;
4	Connector	The external AC and DC connectors are connected; The connectors on the Grid, GEN and EPS terminal are connected correctly and securely.
5	Unused terminal	Unused terminals and ports are locked by waterproof caps. Seal the unused PV terminals with the dustproof buckle.
6	Screw	All the screws are tightened.

9.2 Powering on the System

Step 1: Turn on the Grid port load and EPS port load breaker

Step 2: Turn on the AC breaker between the inverter and wait for the inverter power on.

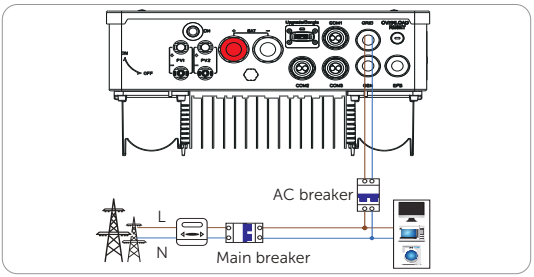


Figure 9-1 Turning on AC BREAKER

Step 3: Turn on the DC switch and check the LCD screen.

» If the LCD screen is not on, turn off the DC switch and check whether the PV polarity is connected correctly.

» If the error of any channel of PV is displayed on LCD, turn off the DC switch and check the corresponding channel of PV connection.

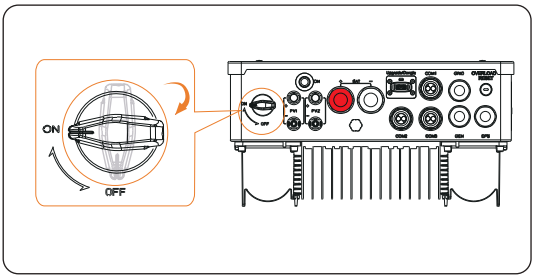


Figure 9-2 Turning on DC switch

Step 4: Switch on the battery or the breaker, button, DC switch of the battery.

Step 5: Press the button on the inverter. Please note that pressing this button is necessary only when the battery is connected; it is not necessary to press the button when the PV or grid is connected.

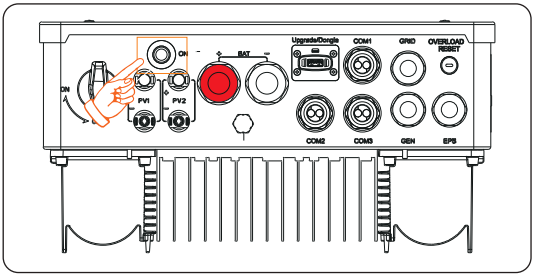


Figure 9-3 Pressing the button

Step 6: Check the LCD screen to verify if the inverter can start normally.

WARNING!

- Only when all the installation work of the inverter has been completed can you switch on the PV/battery/Grid/GEN/EPS terminal.

10 Operation on LCD

10.1 Introduction of Control Panel

Figure 10-1 Control Panel of the inverter

- In a normal state, the **PV**, **Inverter**, **Load**, **Grid** and **Battery** information will be displayed. You can touch the screen to check information.
- In error state, an error alarm will be displayed at the LCD screen, please check the information and refer to corresponding solutions in the troubleshooting.

Table 10-1 Definition of indicators

LED indicator	Status		Definition
Operating		Light on	The inverter is in grid-connected operation state or off-grid operation state.
		Blinking	The inverter is in the process of grid connection or off-grid.
		OFF	The inverter is in a fault or manual shutdown state.
Battery		Light on	The battery is online and the voltage is normal.
		OFF	Low battery voltage or no battery.
Error		Light on	The inverter is in a fault state, stop running.
		Blinking	The inverter has an alarm massage.
		OFF	The inverter has no faults or alarms.

NOTICE!

- While upgrading, the green, blue and red indicator lights will flash in turns, indicating that the upgrade is in progress.

Table 10-2 Definition of keys

Key	Definition
ESC key	Exit from the current interface or function
Up key	Move the cursor to the upper part or increase the value
Down key	Move the cursor to the lower part or decrease the value
Enter key	Confirm the selection

10.2 Introduction of Menu Interface

The default menu is shown as below. In this interface, you can power on/off the inverter, and check the specific information of **PV**, **Grid**, **Battery** and **Load** by tapping the corresponding icons.

- **Inverter:** You can Power ON/OFF the inverter after tapping it. Information contains the inverter voltage, inverter current, inverter power, input/export electric energy of the inverter today and total input/export electric energy since the inverter activated for the first time (Positive value means power output; Negative value means power input).

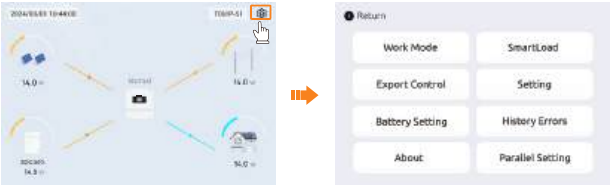
- **PV**: Display the PV information of the system, containing input voltage, current and power situation of each MPPT.

- **Battery**: Display the power, voltage, current, temperature and SOC status of battery. Tap the BMS Detail, you can see the battery's SN number and Version.

- **Grid**: Information contains the voltage, current, output power, and frequency of Grid terminal. And information of feed-in and consumption power today and total.

- **Load**: Information contains the total load, the voltage, current and frequency of load.

- **Settings:** After tapping the setting icon on the upper right corner, you can enter the submenus interface. There are eight submenus in the menu that can be selected for relevant setting operations.



» **Work Mode**: Select the working mode of the inverter, including Work mode for Pakistan : **SUB, SBU, MKS/EPS and Force Time Use** and Work mode for other countries: **Back Up, Self Consumption and Force Time Use**.

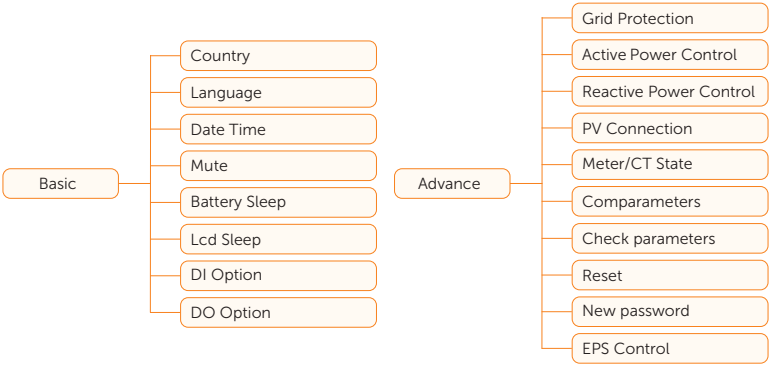
» **Export Control**: Set whether or not feeding power to the grid (Including **No Export** and **Export**) and **Max Utility Charge Current**.

» **Battery Settings**: Select **Battery Type** and set **Charge Source**.

» **About**:Here you can see some basic information of the inverter.

» **Smart Load**: Set the generator port connections including: **None**, **Load** and **Generator**.

» **Setting**: Set the parameters of the inverter, including **Basic** and **Advance**.



» **History Errors**: Display the history data of errors.

» **Parallel Setting**: Set the information of parallel.

10.3 Work Mode

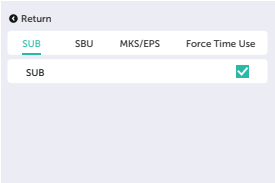
Please refer to "2.7 Working Mode" for working logic of these modes.

Selecting path: **Menu>⚙>Work Mode**

Work Mode for Pakistan

To select the Pakistan work modes, please tap "Country" on the **Basic** interface (**Inverter**>⚙> **Basic**) and select "Pakistan" first. You can refer to "Country" section for details. There are four work modes for Pakistan: **SUB**, **SBU**, **MKS/EPS** and **Force Time Use**.

- **SUB**



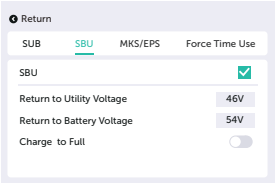
- **SBU**

  » **Return To Utility Voltage/SOC**: When the voltage/SOC is lower than the setted value, the battery starts to charge.
  (For lead acid battery) Default: 46 V, range: 42~50 V;
  (For Lithium battery) Default: 20%, range: 10~80%.

  » **Return To Battery Voltage/SOC**: When the voltage/SOC is higher than the setted value, the battery starts to discharge.
  (For lead acid battery) Default: 54 V, range: 48~59 V;
  (For Lithium battery) Default: 80%, range:20~90%.

  The minimum difference between the above two parameters is 2 V for lead acid battery and 5% for Lithium battery.

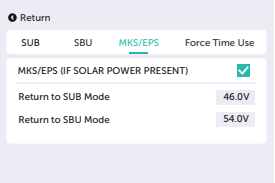
  » **Charge to Full** (only for lead acid battery): Disabled by default. When enabled, the battery will be charged to full capacity without discharging.



- **MKS/EPS**

  » **Return to SUB Mode**:
  (For lead acid battery) Default: 46.0 V, range: 40.0~56.0 V;
  (For Lithium battery) Default: 20%, range: 10~80%.

» **Return to SBU Mode**:
(For lead acid battery) Default: 54.0 V, range: 42.0~58.0 V
(For Lithium battery) Default: 100%, range: 20~100%.

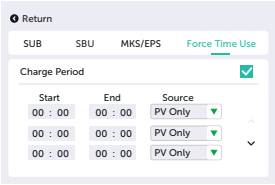


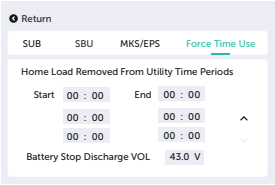
- **Force Time Use**

  » **Charge Period**: You can set three charge periods (start time and end time) here and set the charge source (**PV Only**, **PV Then Grid**, **PV and Grid**).

  » **Home Load Removed From Utility Time Periods**: You can set three discharging periods here.

  » **Battery Stop Discharge VOL/SOC**: When the battery voltage/SOC is lower than the set value, the battery will stop discharging.
  (For lead acid battery) Default: 43.0 V, range: 40.0~47.0 V
  (For Lithium battery) Default: 10%, range: 10~40%.

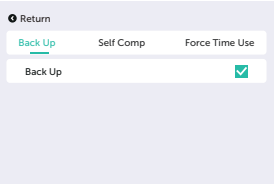




Work Mode for other countries

There are three work modes for other countries: Back Up, Self Consumption and Force Time Use.

- **Back Up**



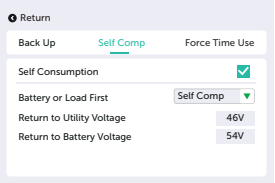
- **Self Consumption**

  » **Battery or Load First:** There are three options: **Self Comp**, **Battery First** and **Load First**.

» **Return to Utility Voltage/SOC**: When the voltage/SOC is lower than the setted value, the battery starts to charge.
(For lead acid battery) Default: 46 V, range: 42~47 V;
(For Lithium battery) Default: 20%, range: 10~80%.

» **Return to Battery Voltage/SOC**: When the voltage/SOC is higher than the setted value, the battery starts to discharge.
(For lead acid battery) Default: 54 V, range: 48~59 V;
(For Lithium battery) Default: 80%, range:20~90%.

The minimum difference between the above two parameters is 2 V for lead acid battery and 5% for Lithium battery when **Self Comp** is selected.



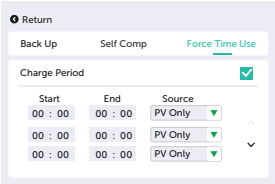
- **Force Time Use**

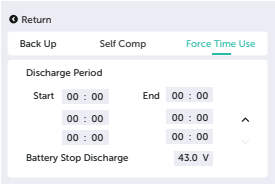
For most countries, the setting interfaces are as below:

» **Charge Period**: You can set three charge periods (start time and end time) here and set the charge source (**PV Only**, **PV Then Grid**, **PV and Grid**).

» **Discharge Period**: You can set three discharging periods here.

» **Battery Stop Discharge**: When the battery voltage/SOC is lower than the set value, the battery will stop discharging.
(For lead acid battery) Default: 43.0 V, range: 40.0~47.0 V
(For Lithium battery) Default: 10%, range: 10~40%.





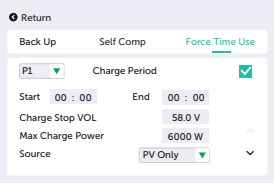
For Vietnam, the setting interfaces are slightly different with more parameters to be set. You can select to set each **Charge Period** and **Discharge Period**. Except start time, end time and charging source for charge period, and start time, end time for discharge period, the following can be set:

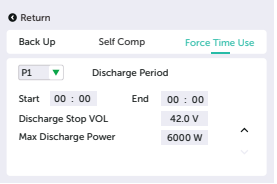
» **Charge Stop VOL/SOC**: When the battery voltage/SOC is higher than the set value, the battery will stop charging.
(For lead acid battery) Default: 58.0 V, range: 40.0~60.0 V
(For Lithium battery) Default: 99%, range: 20~99%.

» **Max Charge Power**: Maximum allowable charging power. Default: 6000 W, range: 0~6000 W.

» **Discharge Stop VOL/SOC**: When the battery voltage/SOC is lower than the set value, the battery will stop discharging.
(For lead acid battery) Default: 42.0 V, range: 40.0~52.0 V
(For Lithium battery) Default: 10%, range: 10~40%.

» **Max Charge Power**: Maximum allowable discharge power. Default: 6000 W, range: 0~6000 W.



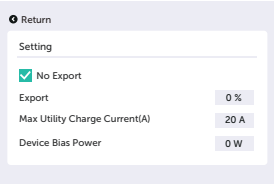


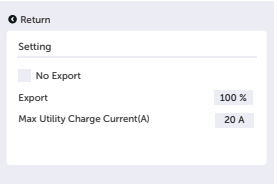
10.4 Export Control

Setting path: **Menu>⚙>Export Control**

Here users can choose between feeding excess PV power into the grid or limiting it.

- **No Export**: Disallow feeding power into the grid.
  - » **Device Bias Power**: The inverter will be biased to take power from the grid. Default: 0 W; Range: 0 W ~ 10% rated output power.
- **Export**: Allow feeding power into the grid and enables to set the percentage of power to be fed in as needed. Range: 0~100%
- **Max Utility Charge Current**: Setting the current that can be taken from the power grid when the battery is charged. Default: 20 A; Range: 2~120 A.





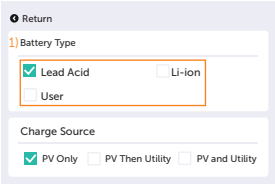
10.5 Battery Setting

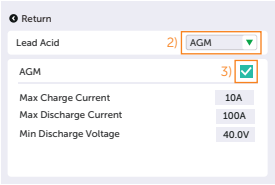
Setting path: **Menu>⚙>Battery Setting**

- **Battery Type**: Select the battery type according to the actual battery used.

Country	Battery type	Option
Pakistan	Lead Acid	AGM, FLD, TBL
	Lithium	Cyclone, Volta, SC_Li
	User	User (User defined)
Other countries	Lead Acid	Lead Acid
	Lithium	Cyclone, Volta, SC_Li
	User	User (User defined)

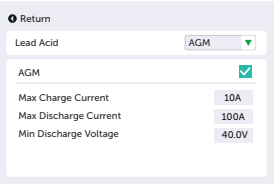
Touch the corresponding Battery type to enter the next level. Select from the options (if any) on the upper right and then touch the square on the right side of the displayed option to confirm the selection.



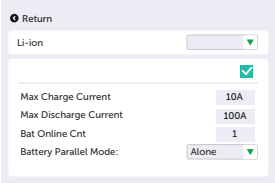


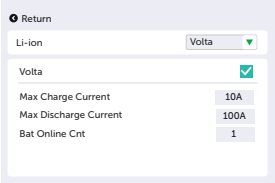
After that, you can set the relative parameters.

» Lead acid battery:
Max Charge Current: Default: 10 A, range: 2~120 A
Max Discharge Current: Default: 100 A, range: 2~120 A
Min Discharge Voltage: Default: 40 V, range: 40~47 V

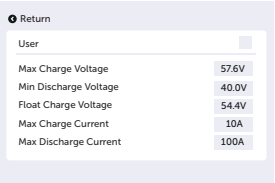


» Lithium battery:
Max Charge Current: Default: 10 A, range: 2~120 A
Max Discharge Current: Default: 100 A, range: 2~120 A
Bat Online Cnt: Display the number of batteries connected.
Battery Parallel Mode : Set up the battery parallel mode.
Alone: Each battery is connected to the inverter separately. **Converge**: All the batteries is converged to the BMS.





» User: Here you can set the parameters of the battery according to your actual needs.
Max Charge Voltage: Default: 57.6 V, range: 49~59 V
Min Discharge Voltage: Default: 40.0 V, range: 40~47 V
Float Charge Voltage: Default: 54.4 V, range: 49~59 V
Max Charge Current: Default: 10 A, range: 2~120 A
Max Discharge Current: Default: 100 A, range: 2~120 A

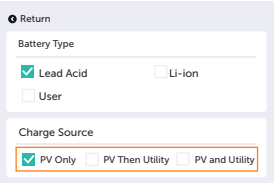


- **Charge Source**: For charging the battery, there are three options to choose from: PV Only, PV Then Utility and PV and Utility.

  » **PV Only**: allows only PV charging.

  » **PV Then Utility**: prioritizes PV charging and supplements with grid charging when needed.

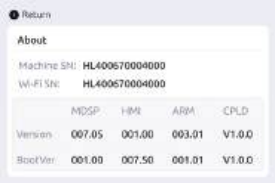
  » **PV and Utility**: allows for both PV and grid charging.



10.6 About

Setting path: **Menu>⚙>About**

Here you can check the basic information of the inverter.

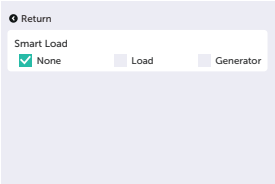


10.7 Smart Load

Setting path: **Menu>⚙>Smart Load**

The generator port has three options:

- **None**: No device is connected to the generator port;



- **Load**: The generator port is connected to a load;

  There are two types of Battery: Lead acid (Voltage type) and Lithium (SOC type).

  » **Smart Load Battery off Voltage/SOC**: When the voltage/SOC is lower than the setted value, the battery will no longer supply power to the smart load;

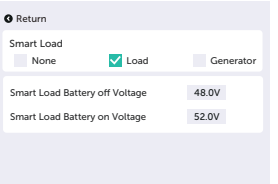
  » **Smart Load Battery on Voltage/SOC**: When the voltage/SOC is higher than the setted value, the battery will supply power to the smart load again.

  Smart Load Battery off Voltage: Default: 48 V, range: 40-52 V

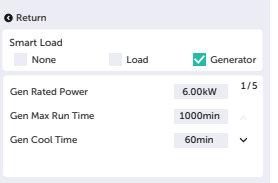
  Smart Load Battery on Voltage: Default: 52 V, range: 41-53 V

  Smart Load Battery off SOC: Default: 30%, range: 15-80%

  Smart Load Battery on SOC: Default: 50%, range: 30-85%



- **Generator**: The generator port is connected to the generator. For the details, please refer to "15.1 Application of Generator".

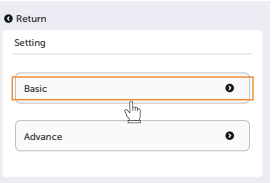


10.8 Setting

Settings includes Basic setting and Advance setting.

10.8.1 Basic Setting

Setting path: **Menu**>⚙>**Setting**>**Basic**



You can set Country, Grid Code, Language, Mute, Battery Sleep, Lcd Sleep, Date Time, DI Option, DO Option in Basic interface.

Setting Safety Code

NOTICE!

- The inverter cannot be connected to the grid before the grid code is correctly set. If there is any doubt about your safety code where the inverter installed, please consult your dealer or Xwatt service for details.
- The setup will vary from different grid codes.

You can set grid code according to different countries and grid-tied standards.

- **Setting Country**

This inverter provides multiple countries for customers to choose from according to the installation site.

- **Setting Grid Code**

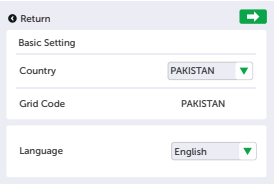
After the Country is set, select the applicable Grid Code.

There are several standards to choose from, please refer to the LCD screen on the inverter. (May be changed or added without notice.)

In addition, the inverter has a user defined option which allows you to customize relevant parameters with a wider range. You can select: **Basic**>**Country**>**OTHER** and **Basic**>**Grid Code**>**USER_DEFINED**. Then complete the parameter settings under Advance interface as needed.

Setting Language

You can set the display language.



Setting Off-Grid Mute

When the inverter is running in off-grid (EPS) Mode, you can choose whether the buzzer is turned on or not.

- Turn ON, the buzzer mutes.
- Turn off, the buzzer will sound every 4 seconds when the battery SOC is > EPS min. SOC. When the battery SOC is equal to EPS min. SOC, the buzzer will sound with higher frequency at every 400 ms.

Setting LCD Sleep

You can set whether to enable the LCD Sleep function or not.

LCD Sleep state means if you do not operate the screen for a period of time , the screen will stay off.

Setting Battery Sleep

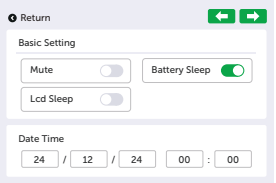
You can set whether to enable the battery sleep function or not.

Battery Sleep state means the battery is in standby state. At this time, it will neither charge

nor discharge.

Setting Date Time

You can set the current date and time of the installation site.

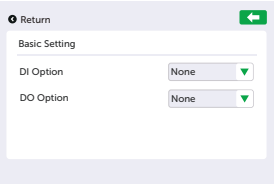


Setting DI Option

You can set whether to enable the DI Option or not. **None** means disable the function. **Emerg Stop** means enable the function for emergency stop.

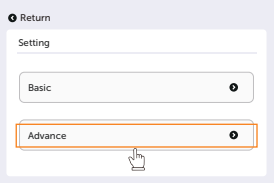
Setting DO Option

You can set whether to enable the DO Option or not. **None** means disable the function. **Generator** means enable the function to allow communication with the generator.

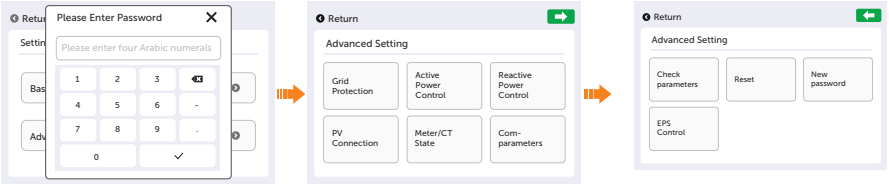


10.8.2 Advance Setting

Setting path: **Menu>⚙>Setting>Advance**



After tapping the Advance interface, you need to enter the password, the default password is "2014".

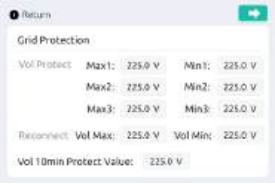


NOTICE!

- Unauthorized use of the installer password by unauthorized persons can lead to incorrect parameters being inputted, resulting in power generation loss or violation of local regulation. The default password should be changed for the consideration of account security, and never open the password to unauthorzied person.

Setting Grid Protection

When the Safety is selected, the parameters of **Grid Protection** corresponding to the selected grid code will be automatically matched. The default value is the specified value under the current safety regulations. The contents will be displayed according to the requirements of local laws and regulations.
You can also set the parameters according to your actual needs within the range of the specific Safety.



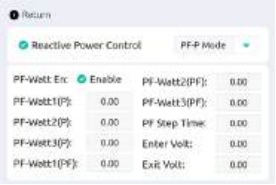
Setting Active Power Control

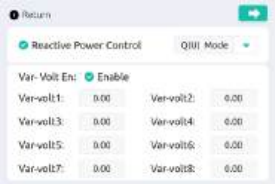
You can set the **Power limit** and **Power Slope** of the active power.

- **Power Limit** (%): Output power limitation; Range:0~110.
- **Power Slope** (% Pmax/Min): Rising slope of active power; Range:-1.0~1.0.

Setting Reactive Power Control

There are four modes can be selected: **PF Mode**, **Fix Q Power**, **PF_P Mode** and **QU Mode**. The default value is the specified value under the current safety regulations. The contents will be displayed according to the requirements of local laws and regulations. Please refer to local grid requirements.





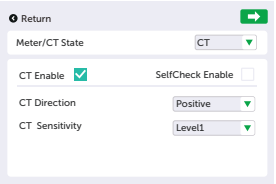
Setting PV Connection

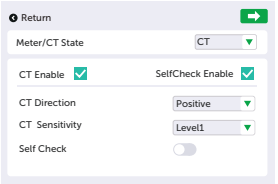
Here you can set PV connection mode.

Setting Meter/CT State

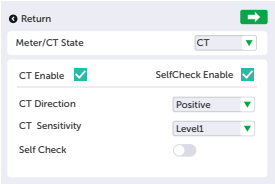
Here you can set **Meter/CT State** based on the actual application.

CT is enabled by default in **Meter/CT State**. If need to change, select from the upper right and for CT and Meter you need to touch the small square to confirm the selection.

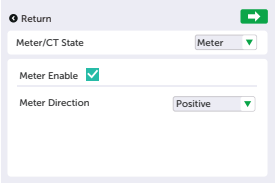




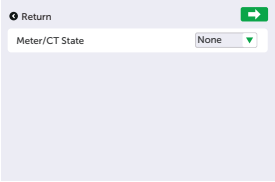
- **CT**: The Meter/CT port is connected to CT;
  - » **CT Direction**: Here you can set the direction of CT to **Positive** or **Negative** connection according to the actual situation.
  - » **CT Sensitivity**: Here you can set the sensitivity level of CT. There are three levels to choose from: **Level1** / **Level2** / **Level3**. The larger the number, the higher the sensitivity.
  - » **SelfCheck Enable**: After touching the square to enable this function, you need to enable **Self Check** to start the checking process. After checking, there will be an alarm about CT if anything abnormal is detected; please check the CT connection and try self checking again.



- **Meter**: The Meter/CT port is connected to Meter;
  - » **Meter Direction**: Here you can set the direction of Meter to **Positive** or **Negative** connection according to the actual situation.



- **None**: No meter or CT is connected to the Meter/CT port.



Setting Com-Parameters

You can select the baud rate and set the address of the external communication protocol for communicating with external equipment.

- **Ex485 Modbus Baudrate**: Default: 9600. Range: 4800, 9600, 19200.

- **Ex485 Modbus Address:** Default: 1. Range:1~127

Setting Check Parameters

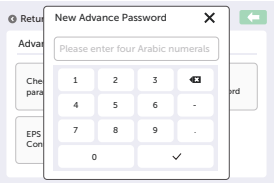
- **AI_En**: choose it to enable the active islanding function;
- **ExFanCheck_En**: choose it to enable the external fan failure detection function;

Reset Setting

Here you can reset value of Comm Module and Meter1/CT1; Clear history record and energy records; and restore to the factory set.

Setting New Password

Enter your New Password to reset the password.

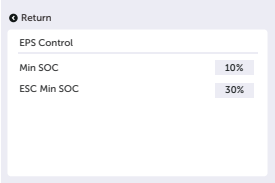


Setting EPS Control

Here you can set the battery min. SOC in off-grid (EPS) mode for lithium batteries.

» **Min SOC**: If the battery SOC falls below this value, the battery will stop discharging. Default: 10%. Range: 10%~25%.

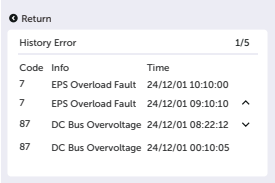
» **ESC Min SOC**: If the battery SOC reaches this value, the battery can restart to discharge. Default: 30%. Range: 15%~100%.



10.9 History Errors

Displaying path: **Menu**>⚙>**History Errors**

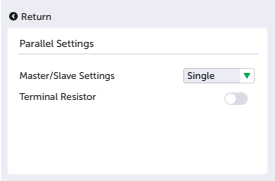
After entering the History Errors interface, the data of history errors will be displayed on the LCD. Information contains error code, error description and the date and time the error happened. Twenty records can be displayed at most.



10.10 Parallel Setting

Setting path: **Menu**>⚙>**Parallel Setting**

The series inverters support up to 10 units in the parallel system. The default setting is **Single**, if the inverters are to work in parallel the relative settings must be done. For details of the application of parallel function, please refer to "15.2 Application of Parallel Function".



11 Operation on Xwatt App and Web

11.1 Introduction of Xwatt Monitor

Xwatt Monitor is an intelligent management platform for home energy, which integrates energy efficiency monitoring, device management, data security communication and other integrated capabilities. While managing your home energy device, it helps you optimize the efficiency of electricity consumption and improve the revenue of power generation.

11.2 Operation Guide on Xwatt Monitor App

11.2.1 Downloading and Installing App

Method 1: Scan the QR code below to download the App.

Google IOS

Figure 11-1 QR code for downloading Xwatt Monitor App

Method 2: Search for **Xwatt Monitor** in the Google Play or Appstore, and then download the app.

11.2.2 Operation on the Xwatt Monitor App

For instructions on related operations, see the online App guide, Wifi connection guide and Setup tutorial video on the Xwatt Monitor App.

12 Troubleshooting and Maintenance

12.1 Power off

a. Turn off the system on LCD screen.

b. Turn off the AC switch between the inverter and the power grid.

c. Set the DC switch to **OFF**.

d. Switch off the battery or the breaker, button, DC switch of the battery (see documentation of the battery manufacturer).

WARNING!

- After the inverter is powered off, there may still be residual electricity and heat which may cause electric shocks and body burns. Please wear personal protective equipment (PPE) and start maintaining the inverter at least five minutes after power off.

12.2 Troubleshooting

This section contains information and procedures for resolving possible problems with the inverter, and provides the troubleshooting tips to identify and solve most problems that may occur. Please check the warning or fault information on the system control panel or on the App and read the suggested solutions below when error occurs. Contact Xwatt Customer Service for further assistance. Please be prepared to describe the details of your system installation and provide the model and serial number of the inverter.

Table 12-1 Troubleshooting list

Error Code	Fault	Diagnosis and Solutions
1	Isolation Fault	Insulation impedance detection failed. • Check whether the wire insulation is intact.
2	Meter Fault	Electricity meter has no power. • Check the status of the meter.
4	Grid Freq Mismatch	Frequency configuration mismatch. • Check whether the frequency is within the correct range.
6	Arc Fault	Arc fault • Wait for a while to see if it returns to normal.

Error Code	Fault	Diagnosis and Solutions
7	EPS Overload Fault	1.05 times overload • Turn off high-power load.
8		1.25 times overload • Turn off high-power load.
9		1.5 times overload • Turn off high-power load.
10	Overload Self-Lock	Overload self-locking • Turn off high-power load, PV, battery and power grid, and restart inverter.
20	PV1 Reversed	PV1 reverse connection • Turn off PV, battery and power grid, restart inverter, and check the connection status of positive and negative poles of PV1.
21	PV2 Reversed	PV2 reverse connection • Turn off PV, battery and power grid, restart inverter, and check the connection status of positive and negative poles of PV2.
22	MPPT1 Over Voltage	PV1 Voltage is too high • Check the voltage of PV1.
23	MPPT2 Over Voltage	PV2 Voltage is too high • Check the voltage of PV2
26	EPS Overload Fault	EPS load current exceeds level 4 overcurrent value • Turn off high-power load.
40	Bat Type Error	Battery type configuration error • Turn off PV, battery and power grid, restart inverter, and confirm whether the battery type is correct.
41	Bat Voltage Fault	Battery voltage is too high • Check whether the battery output voltage is within the normal range.
44	Low Bat SOC	Low battery SOC • Please charge the battery in time.
45	EPS Overload Fault	EPS load current exceeds level 4 overcurrent value • Turn off high-power load.
46	EPS Overload Fault	EPS load power exceeds the battery power • Turn off high-power load.

Error Code	Fault	Diagnosis and Solutions
51	Grid Voltage Fault	The grid voltage exceeds the allowable value 1 • Check whether the grid voltage is within the normal working range.
52		The grid voltage exceeds the allowable value 2 • Check whether the grid voltage is within the normal working range.
53		The grid voltage is lower than the allowable value 1 • Check whether the grid voltage is within the normal working range.
54		The grid voltage is lower than the allowable value 2 • Check whether the grid voltage is within the normal working range.
55	Ac10mins Volt Fault	The abnormal grid overvoltage lasts for 10 minutes • Check whether the grid voltage is within the normal working range and restart the inverter when the grid voltage is back to normal.
57	Grid Frequency Fault	Power grid frequency exceeds the allowable value 1. • Check whether the grid frequency is within the normal working range.
58		Power grid frequency exceeds the allowable value 2 • Check whether the grid frequency is within the normal working range.
59		The power grid frequency is lower than the allowable value 1. • Check whether the grid frequency is within the normal working range.
60		The power grid frequency is lower than the allowable value 2. • Check whether the grid frequency is within the normal working range.
61	Grid Voltage Fault	The grid voltage exceeds the allowable value 3 • Check whether the grid voltage is within the normal working range.
62		The grid voltage is lower than the allowable value 3. • Check whether the grid voltage is within the normal working range.
63	Grid Frequency Fault	Power grid frequency exceeds the allowable value 3 • Check whether the grid frequency is within the normal working range.
64		The power grid frequency is lower than the allowable value 3. • Check whether the grid frequency is within the normal working range.

Error Code	Fault	Diagnosis and Solutions
70	BST1 Software OCP	BST1 software overcurrent • Please contact the after-sales personnel.
71	BST2 Software OCP	BST2 software overcurrent • Please contact the after-sales personnel.
72	Tz Protect Fault	BST1 hardware overcurrent • Please contact the after-sales personnel.
73		BST2 hardware overcurrent • Please contact the after-sales personnel.
75		BST3 hardware overcurrent • Please contact the after-sales personnel.
76	BuckBst Software OCP	BuckBst software overcurrent • Please contact the after-sales personnel.
77	BuckBst Software OVP	BuckBst software overvoltage • Please contact the after-sales personnel.
78	BuckBst Software UVP	BuckBst software undervoltage • Please contact the after-sales personnel.
79	Tz Protect Fault	Llc hardware overcurrent • The battery may be short-circuited. Use a multimeter to check whether the battery port is short-circuited. • Wait for a while to see if it returns to normal.
80	LLC Start Fail	Llc startup failed. • Please contact the after-sales personnel.
81	BuckBst Start Fail	BuckBst startup failed. • Please contact the after-sales personnel.
85	DC Bus Init Fail	DCBUS initialization detection failed. • Turn off PV, battery and power grid, and restart inverter.
86	Tz Protect Fault	DCBUS hardware overvoltage • Please contact the after-sales personnel.
87	DC Bus Overvoltage	DCBUS software overvoltage • Please contact the after-sales personnel.
88	DC Bus Undervoltage	DCBUS software undervoltage • Please contact the after-sales personnel.
92	BuckBst Soft Start Fail	DCBUS BUCKBST soft start failed. • Please contact the after-sales personnel.
100	INV PLL FAIL	Inverter phase-lock failure • Please contact the after-sales personnel.

Error Code	Fault	Diagnosis and Solutions
101	INV Relay Fault	Inverter relay fault • Please contact the after-sales personnel.
104	EPS Overload Fault	Soft start AC voltage failed. • Please contact the after-sales personnel.
105	INV SW OCP	Inverter software overcurrent • Please contact the after-sales personnel.
106	EPS Overload Fault	Inverter hardware half-wave overcurrent • Please contact the after-sales personnel.
107	EPS Overload Fault	Inverter hardware overcurrent • Please contact the after-sales personnel.
108	DCI OCP Fault	During on-grid operation, DC component of the inverter exceeds the permissible value. • Contact Xwatt for help.
109	DCV OVP Fault	During off-grid operation, DC component of the inverter exceeds the permissible value. • Contact Xwatt for help.
110	EPS Overload Fault	EPS overload caused inverter soft-start AC voltage failure. • Turn off high-power load.
111	CT/Meter Check Fault	CT fault • Wait for a while to see if it returns to normal. Check whether CT works properly.
112	GFCI Fault	GFCI fault • Wait for a while to see if it returns to normal.
113	INV Frequent OCP	Inverter frequent overcurrent alarm • Wait for a while to see if it returns to normal. Check whether the inverter current works in the normal range.
114	INV SW OVP	Inverter overcurrent fault • Wait for a while to see if it returns to normal.
115	Gen Voltage PLL Fail	The inverter failed to phase lock the generator • Wait for a while to see if it returns to normal.
117	Gen Overload	1.5 times overload of the generator • Turn off high-power load.
130	INV Overheat	Inverter over temperature fault • Check whether the fan works normally. If not, shutdown for inspection. If yes, wait for a while and restart when it is back to normal.

Error Code	Fault	Diagnosis and Solutions
131	High Ambient Temp	High ambient temperature fault • Check whether the fan works normally.
132	Bat Plate Hot (+)	Battery positive copper plate over temperature fault • Check whether the battery power cables can stand the maximum battery current. • Check whether the battery cables are connected correctly and whether the screws are tightened.
133	Bat Plate Hot (-)	Battery negative copper plate over temperature fault • Check whether the battery power cables can stand the maximum battery current. • Check whether the battery cables are connected correctly and whether the screws are tightened.
140	Type Model Error	Model configuration error • Turn off PV, battery and power grid, and restart inverter. Check whether the inverter model is configured correctly.
145	Para Slave Fault	Slave inverter fault in parallel connection mode • Check the error information on the slave inverter and handle the error correspondingly
146	Para CAN Fault	CAN communication lost in parallel connection mode • Check whether the CAN communication cables between the master and the slaves are correctly connected. • Replace the communication cables.
147	Para Sync Fault	The master and slave inverters failed to synchronize when starting and during operation • Check whether the PV, Grid, and battery connections of the master and slave inverters are consistent. If not, reconnect and make sure they are consistent. If yes, wait for fault recovery and automatic restart.
150	Cell Overvoltage	Overvoltage fault of cell. • Wait for fault recovery, restart the battery and contact after-sales personnel.
151	Cell Undervoltage	Undervoltage fault of cell. • Recharge the battery.
152	Hight Cell Vol Diff	Excessive voltage difference fault of cell. • Ensure that the battery works in the normal voltage range.
153	HVB Overvoltage	Overvoltage fault of total voltage. • Wait for fault recovery, restart the battery and contact after-sales personnel.
154	HVB Undervoltage	Undervoltage fault of total voltage. • Recharge the battery.

Error Code	Fault	Diagnosis and Solutions
155	Overtemp Fault	High temperature fault. • Stop using the battery and wait for the temperature to recover.
156	Self-check Fault	Self-test fault. • Check the battery failure and contact the after-sales personnel.
157	Main Relay Stuck(+)	Main positive relay sticking fault. • Please contact the after-sales personnel.
158	Main Relay Open(+)	Main positive relay open circuit fault. • Please contact the after-sales personnel.
159	Main Relay Stuck(-)	Main negative relay sticking fault. • Please contact the after-sales personnel.
160	Main Relay Open(-)	Main negative relay open circuit fault. • Please contact the after-sales personnel.
161	Precharge Fail	Pre-charge failure fault. • Reset the battery. If this fault is reported many times, please contact after-sales personnel.
162	Cell Sample Fault	Cell sampling fault. • Please contact the after-sales personnel.
163	Temp Sample Fault	Temperature sampling fault. • Please contact the after-sales personnel.
164	System Fault	System fault. • Please contact the after-sales personnel.
165	Dischrg Overcurrent	Over-discharge current fault. • Stop using the battery and wait for it to recover or restart the battery. If this fault is reported many times, please contact the after-sales personnel..
166	Chrg Overcurrent	Over-charge current fault. • Ensure that the battery works in the normal voltage range.
167	AFE Comm Fault	AFE communication fault. • Please contact the after-sales personnel.
168	INV Comm Fault	External network communication fault. • Check the communication line between the battery and the inverter. If this fault still occurs after reinserting the line, please contact the after-sales personnel.

Error Code	Fault	Diagnosis and Solutions
169	Mid Comm Fault	Intermediate network communication fault. • Check the communication line between the batteries. If this fault still occurs after reinserting the line, please contact the after-sales personnel.
170	Voltage Sensor Fault	Voltage sensor fault. • Please contact the after-sales personnel.
171	ID Duplicate	ID duplication fault. • Check if the system connections are correct and follow the initial installation steps to perform the startup operation again.
172	Low Temp Fault	Low temperature fault. • Wait for fault recovery, restart the battery and contact after-sales personnel.
173	Current Sensor Fault	Current sensor fault. • Please contact the after-sales personnel.
174	Power Line Open	Power line open circuit fault. • Check whether the power line is connected properly and restart the battery.
175	Flash Error	Flash fault. • Please contact the after-sales personnel.
176	AFE Protect Fault	AFE self-protection fault. • Please contact the after-sales personnel.
177	Charge Request Fault	Charging request fault. • Check if the inverter is correctly supplying power to the battery.
178	Insulation Fault	Insulation fault. • Please contact the after-sales personnel.
200	Bat Volt Out Limit	Battery voltage overrun • Ensure that the battery works in the normal voltage range.
201	PV Volt Out Limit	Battery voltage overrun • Ensure that PV works in the normal voltage range.
202	Low Grid Bat SOC	Low soc of grid-connected battery • Stop discharging and start charging.
203	Low EPS Bat SOC	Low soc of off-grid battery • Stop discharging and start charging.
204	INV Power De-rate	Inverter power derating • Ensure that the inverter power is within the normal range.

Error Code	Fault	Diagnosis and Solutions
205	Bat Chrg De-rate	Battery charging power derating • Ensure that the battery charging power is within the normal range.
206	Bat Dischrg De-rate	Battery discharge power derating • Ensure that the battery discharge power is within the normal range.
207	Bat Float Charge	Battery floating charge • Check battery voltage.
208	Bat Recharge	Battery recharge • Check the battery voltage and replenish the power in time.
209	Bat Power Config	Battery power configuration mode • Make sure that the battery works correctly.
210	Boost CV Mode	BST constant voltage source mode. • BST operates in constant voltage source mode.
211	PV De-rate, Inv Limit	Inverter power limit • Ensure that the inverter output power is within the normal range.
212	PV De-rate, Rev Flow Alarm	Anti-reflux. • Ensure that it is in an anti-reflux state.
213	PV De-rate, Chrg Limit	Charging power limit. • Ensure that the charging power is within the normal range.
214	PV De-rate, Curr Limit	Current limiting • Ensure that the current works within the normal range.
215	Inter Fan Fault	Internal fan failed. • Check whether there is any foreign matter inside the fan.
240	FAN1Fault	External fan1 failure • Please check if the external fan is damaged or blocked.
241	DSP Upgrade Failed	DSP upgrade failure • Please contact after-sales for assistance with software upgrade.
242	ARM Upgrade Failed	ARM upgrade failure • Please contact after-sales for assistance with software upgrade.
243	SMCU Upgrade Failed	SMCU upgrade failure • Please contact after-sales for assistance with software upgrade.

Error Code	Fault	Diagnosis and Solutions
244	METER FAULT	Meter loss • Please check if the meter is connected or if the meter communication line works normally.
245	MISS CT FAULT	CT loss • Please check if the CT is connected.
247	BMS Lost	Communication loss between inverter and battery management system equipment. • Please check the connection status between the BMS device and the inverter.

Error Code	Fault	Diagnosis and Solutions
/	Screen not on	• Check if the inverter correctly and normally connected to PV, battery or grid. • Contact Xwatt for help if the inverter is connected correctly.
/	Abnormal sound on fan	• Check if there is foreign objects stuck in the fan. • Contact Xwatt for help.
/	Screen on but no content display	• Contact Xwatt for help.
/	No readings after CT connection	• Check if CT is correctly clipped on the L wire • Check if the arrow on the CT points at Grid. • Contact Xwatt for help if it can not return to normal.
/	No readings on Load (on App or Web)	• Check if the load is connected correctly. • Check if the power of load on the LCD screen displays normally. • Check if the monitoring module works normally. • Contact Xwatt for help if it can not return to normal.
/	No readings on Grid (on App or Web)	• Check if the grid connection is normal. • Check if the grid parameter on the LCD screen displays normally. • Check if the monitoring module works normally. • Contact Xwatt for help if it can not return to normal.

Error Code	Fault	Diagnosis and Solutions
/	No readings on battery (on App or Web)	• Check if the battery is connected correctly. • Check if the battery parameter on the LCD screen displays normally. • Check if the monitoring module works normally. • Contact Xwatt for help if it can not return to normal.
/	No Feedin data (on App or Web)w	• Check if the meter/CT is connected correctly. • Check if the meter/CT parameter on the LCD screen displays normally. • Check if the monitoring module works normally. • Contact Xwatt for help if it can not return to normal.
/	No data on App or Web	• Check if the monitoring module works normally. • Contact Xwatt for help.
/	No display on meter after power on	• If the meter connection is abnormal, reconnect them according to the wiring diagrams. • Wait for the grid voltage to restore. • Contact Xwatt for help if it can not return to normal.
/	Abnormal electrical data on meter	• If the wiring is incorrect, reconnect them based on the wiring diagrams. • Set the voltage and current ratio according to the setting steps of meter user manual. • Contact Xwatt for help if it can not return to normal.

12.3 Maintenance

Regular maintenance is required for the inverter. Please check and maintain the following items based on the instructions below to ensure the optimal performance of the inverter. For inverters working in inferior conditions, more frequent maintenance is required. Please keep maintenance records.

WARNING!

- Only qualified person can perform the maintenance for the inverter.
- Only spare parts and accessories authorized by Xwatt can be used for maintenance.

12.3.1 Maintenance routines

Table 12-2 Proposal of Maintenance

Item	Check notes	Maintenance interval
Safety check	• Check the items mentioned in section 1 "Safety" • The safety check shall be performed by manufacturer's qualified person who has adequate training, knowledge, and practical experience.	Every 12 months
Indicators	• Check if the indicators of the inverter are in normal state. • Check if the display of the inverter is normal.	Every 6 months
Fans	• Check if the fan makes noise or is covered by dust. • Clean the fan with a soft and dry cloth or brush, or replace the fan if necessary.	Every 6-12 months
Electrical connection	• Ensure that all cables are firmly connected. • Check the integrity of the cables, ensuring that there are no scratches on the parts touching the metallic surface. • Verify that the sealing caps on idle terminals are not falling off.	Every 6-12 months
Grounding reliability	• Check if the grounding cables are firmly connected to the grounding terminals. Use a ground resistance tester to test the grounding resistance from the inverter enclosure to the PE bar in the power distribution box.	Every 6-12 months
Heat sink	• Check if there are foreign objects in the heat sink.	Every 6-12 months
General status of inverter	• Check if there is any damage on the inverter. • Check if there is any abnormal sound when the inverter is running.	Every 6 months

12.4 Firmware Upgrade

WARNING!

- Make sure that the type and format of the firmware file are correct. Do not modify the file name. Otherwise, the inverter may not work properly.
- Do not modify the folder name and file path where the firmware files are located, as this may cause the upgrade to fail.

WARNING!

- Before upgrading, ensure that the PV input voltage is higher than 180 V (preferably on sunny day), or that the battery SOC is higher than 20%, or the battery input voltage is higher than 180 V. Failure to meet one of these conditions may result in upgrade process failure.

Upgrade preparation

- Prepare a USB drive (USB 2.0/3.0, ≤32 GB, FAT 16/32).
- Check for the current firmware version of the inverter.
- Contact our service support for the update firmware files, and save them to the root directory of the USB drive.Files:
  - » X1HybridLV_3_6kW_***.bin
  - » X1HybridLV_3_6kW_lap.txt

Upgrade steps

a. Plug the U disk into the upgrading port below: If the Dongle is connected to the port, please remove the dongle first.

b. After the U disk is plugged in, the system will start upgrading, and the three indicator lights and the breathing light will flash in turns. (Operating indicator: green; battery indicator: blue; Error indicator: Red). Wait approximately 4-5 minutes.

c. After successfully upgraded, the breathing light turns green and the buzzer sounds for one second, and the three indicator lights on the LCD will be a constant state. If the breathing light turns red, it means that the upgrade has failed. If the upgrade fails, please contact our after-sales support.

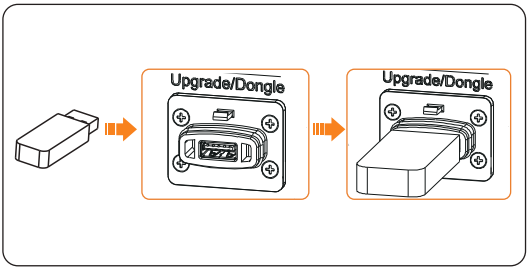


Figure 12-2 Plug in the U disk

NOTICE!
• The USB disk can be plugged in when the inverter is in normal status.

13 Decommissioning

13.1 Disassembling the Inverter

WARNING!

- Strictly follow the steps below to disassemble the inverter.
- Only use the dedicated removal tool delivered with the inverter to disassemble PV connector.

Step 1: Turn off the system on LCD screen.

Step 2: Disconnect the external AC and EPS breaker of the inverter.

Step 3: Turn the DC switch to OFF.

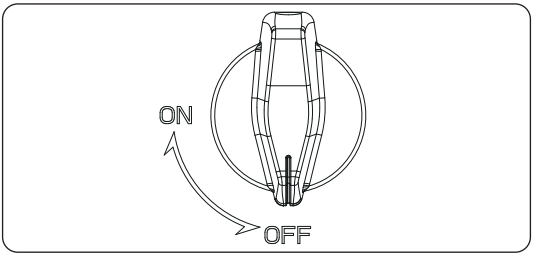


Figure 13-1 Turning off the DC switch

Step 4: Turn off the battery switch / button / breaker (if any). (See documents of battery)

Step 5: Use a current clamp to ensure there is no current present in the PV cables.

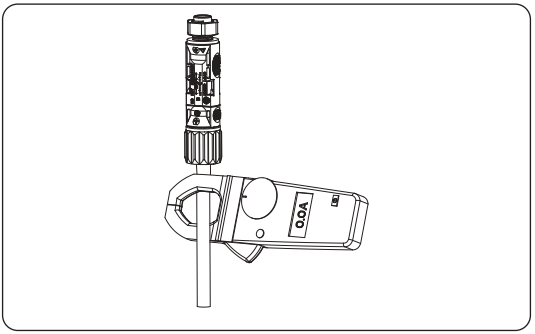


Figure 13-1 Measuring the current

Step 6: Use the disassembling tool for PV terminal to disassemble the PV cables. Then remove the PV cables, and slightly pull out the cables.

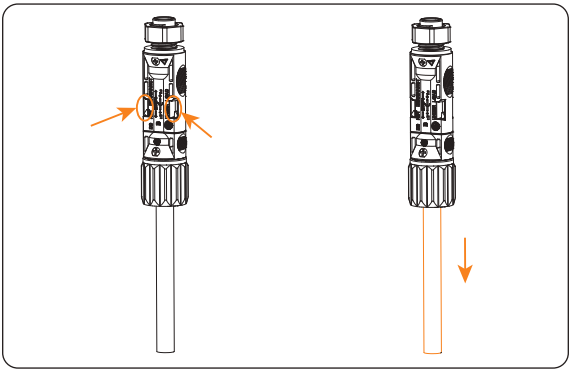


Figure 13-2 Disassembling the PV cables

Step 7: Remove the lower cover of the inverter, measure whether there is AC voltage. If not, remove the cables from Grid, GEN and EPS port.

Step 8: Remove the Communication cable.

Step 9: Remove the Meter/CT cable.

Step 10: Remove the PE cable.

Step 11: Remove the Dongle.

Step 12: Close the lower cover of the inverter.

Step 13: Unscrew the screws of fastening the wall mounting bracket and remove the wall mounting bracket.

Step 14: Remove the inverter.

13.2 Packing the Inverter

- Load the inverter into the original packing material if possible.
- If the original packing material is not available, use the packing material which meets the following requirements:
  - » Suitable for the weight of product
  - » Easy to carry
  - » Be capable of being closed completely

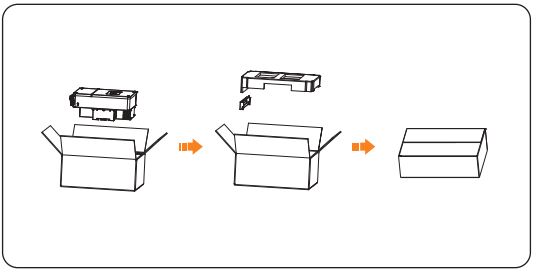


Figure 13-3 Packing the inverter

13.3 Disposing of the Inverter

Please dispose of the inverters or accessories in accordance with the electronic waste disposal regulations applicable at the installation site.

14 Technical Data

- DC input

Model	X1-HYB-3.0-LV	X1-HYB-3.6-LV	X1-HYB-3.7-LV	X1-HYB-4.0-LV	X1-HYB-5.0-LV	X1-HYB-6.0-LV
Max. PV array power [Wp]	4500	5400	5500	6000	7500	9000
Max. recommended PV array power [Wp]	6000	7200	7360	8000	10000	12000
Max. PV Voltage [d.c.V]	550					
Start output voltage [V]	110					
Nominal input voltage [V]	360					
MPPT voltage range [d.c.V]	80 ~ 520					
No. of MPPT/Strings per MPPT	2 / (1/1)					
Max. input current per MPPT(MPPT1/2) [d.c.A]	16/16					
Max. input short circuit current per MPPT(MPPT1/2) [d.c.A]	20/20					
Max. inverter backfeed current to the array [d.c. A]	0					

- AC output/ input

Model	X1-HYB-3.0-LV	X1-HYB-3.6-LV	X1-HYB-3.7-LV	X1-HYB-4.0-LV	X1-HYB-5.0-LV	X1-HYB-6.0-LV
Nominal AC Output Current [A]	13	15.7	16	17.4	21.7	26.1
Rated AC Output Power [VA]	3000	3600	3680	4000	5000	6000
Max. AC Output Apparent Power [VA]	3300	3600	3680	4400	5000	6000
Max. AC Output Continuous Current [a.c.A]	15	16	16	20	22.7	27.3
Current (inrush) [a.c. A]	30					
Maximum output fault current [a.c. A]	73.5					
Maximum output overcurrent protection [a.c. A]	94					
Max. AC Input Apparent Power [VA]	6000	7200	7360	8000	9200	9200
Max. AC Input Current [A]	26.1	31.3	32	34.8	40	40
Nominal AC voltage [a.c.V], frequency [Hz]	220/230/240, 50/60					
Displacement power factor	0.8 leading ~ 0.8 lagging					

Model	X1-HYB-3.0-LV	X1-HYB-3.6-LV	X1-HYB-3.7-LV	X1-HYB-4.0-LV	X1-HYB-5.0-LV	X1-HYB-6.0-LV
THDi (rated power) [%]	<3					
AC Connection	L/N/PE					

- EPS output

Model	X1-HYB-3.0-LV	X1-HYB-3.6-LV	X1-HYB-3.7-LV	X1-HYB-4.0-LV	X1-HYB-5.0-LV	X1-HYB-6.0-LV
Nominal output power [W]	3000	3600	3680	4000	5000	6000
Peak apparent power [VA]	2 times the rated power, 10s					
Nominal Output Current [A]	13	15.7	16	17.4	21.7	26.1
Nominal EPS Voltage [a.c.V], frequency [Hz]	230, 50/60					
Switch Time [ms]	<4					

- Battery data

Model	X1-HYB-3.0-LV	X1-HYB-3.6-LV	X1-HYB-3.7-LV	X1-HYB-4.0-LV	X1-HYB-5.0-LV	X1-HYB-6.0-LV
Battery type	Lithium/Lead-Acid					
Battery voltage range [d.c.V]	40-60					
Nominal Battery Voltage [V]	48					
Max. Charging Voltage [V]	≤60 (Adjustable)					
Max. Charging/Discharging Current [d.c.A]	75	75	75	75	120	120
Charging Strategy for Li-Ion Battery	Self-adaption to BMS					
Charging Strategy for Lead-Acid Battery	3 stages curve					
Temperature Sensor	Yes					

- System data

Model	X1-HYB-3.0-LV	X1-HYB-3.6-LV	X1-HYB-3.7-LV	X1-HYB-4.0-LV	X1-HYB-5.0-LV	X1-HYB-6.0-LV
MPPT Efficiency	>99.9%					
Max. efficiency [%]	97.6					
Euro. efficiency [%]	97.0					

- Protection device

Model	X1-HYB-3.0-LV	X1-HYB-3.6-LV	X1-HYB-3.7-LV	X1-HYB-4.0-LV	X1-HYB-5.0-LV	X1-HYB-6.0-LV
Anti-Islanding Protection	Yes					
PV String Input Reverse Polarity Protection	Yes					
Insulation Resistor Detection	Yes					
Residual Current Monitoring Unit	Yes					
Output Over Current Protection	Yes					
Output Short Protection	Yes					
Output Over Voltage Protection	Yes					
Surge Protection	AC Type II/DC Type II					
Battery Terminal Temp Protection	Yes					

- Power consumption & Environment limit

Model	X1-HYB-3.0-LV	X1-HYB-3.6-LV	X1-HYB-3.7-LV	X1-HYB-4.0-LV	X1-HYB-5.0-LV	X1-HYB-6.0-LV
Self Consumption(night) [W]	Standby < 40, Shutdown < 10					
Ingress Protection	IP65					
Operating Ambient Temperature Range [°C]	-25 ~ +60 (derating above +45)					
Relative humidity [%]	0 ~ 100 (condensing)					
Max. operation altitude [m]	<3000					
Storage Temperature [%]	-25 ~ +70					
Noise Emission(typical) [dB]	<39	<39	<39	<39	<50	<50

- General data

Model	X1-HYB-3.0-LV	X1-HYB-3.6-LV	X1-HYB-3.7-LV	X1-HYB-4.0-LV	X1-HYB-5.0-LV	X1-HYB-6.0-LV
Dimensions(WxHxD) [mm]	397x490x201 (with connectors) 397x457x201 (without connectors)					
Net weight [kg]	16.5	16.5	16.5	16.5	17.3	17.3
Cooling concept	Natural cooling				Smart cooling	
Topology	Transformerless for PV Side/HF for battery Side					
HMI Interface	LED+LCD					
Active anti-islanding method	Frequency Shift					
Pollution degree	II(Inside), III(Outside)					
Communication interfaces	CAN, RS485, CT, Meter, USB, NTC, Dongle Interface					

15 Appendix

15.1 Application of Generator

15.1.1 Introduction of generator application

When utility power supply is unavailable, the system can seamlessly switch to the generator for power supply and continue the collaboration with the energy storage system to ensure the uninterrupted operation of the load.

In this case, the generator functions as the utility grid to supply power for the load, and the hybrid inverter converts the solar energy to electricity.

15.1.2 Notice for generator application

- Note 1: The rated output power of the generator should be greater than the sum of the load power and the battery charging power. If there are several inverters in parallel, the rated output power of the generator should be greater than the sum of the load power and the battery charging power of the inverters.
- Note 2: If the rated output power of the generator is small and cannot meet the requirements of Note 1, the setting value of **Max Power Obtain From Gen** can be changed in the **Menu**>**Smart Load**>**Generator**>**Gen Charge Period** to ensure that the generator power can meet the load and battery charging use at the same time.
- Note 3: The EPS load power cannot be greater than the battery discharge power to prevent the battery power from being unable to meet the EPS load after the generator shuts down and the inverter will report a fault. If two inverters are paralleled, the EPS load power shall be doubled.

15.1.3 Dry contact mode

In this operating mode, users can intelligently control the system by establishing a dry contact connection between the inverter and the generator. It allows for adjustments to multiple settings so that the system can meet the requirements of different scenarios.

Wiring connection diagram

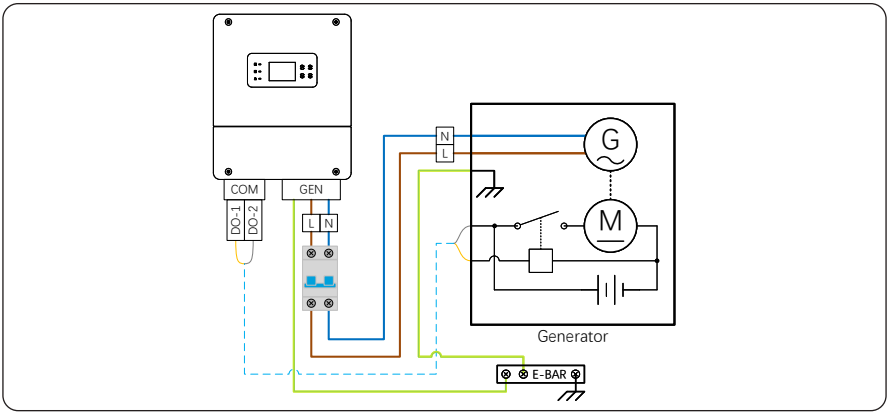


Figure 15-1 Dry contact wiring diagram

Inverter connection for dry contact mode

- Connection terminal - DO of DRY CONTACT terminal

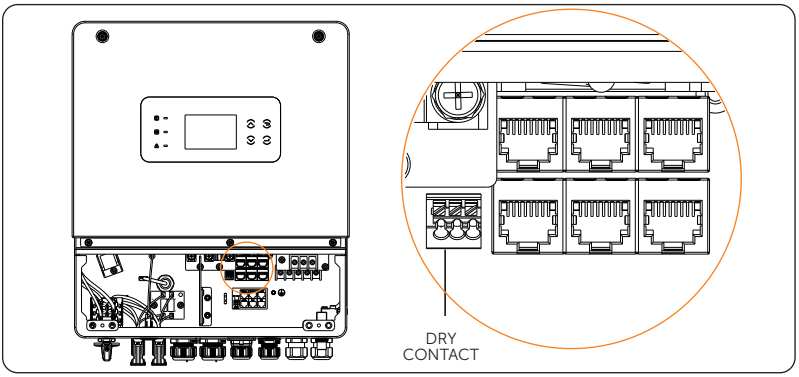


Figure 15-2 Connection terminal for generator

- Connection pins

Table 15-1 Connection pins for generator

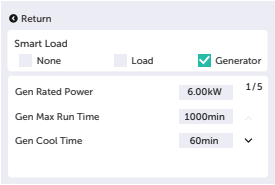
Pin	Assignment	Description
1	DO_1	For generator connection
3	DO_2	

- Connection steps: Please refer to "8.6.4 Dry-contact output connection" for specific wire making and connection.

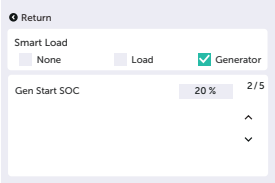
Inverter settings for dry contact mode

Setting path: **Menu**>⚙>**Smart Load**>**Generator**

- **Gen Rated Power**: Set the rated power of the generator based on the actual situation. Default: 6.0 kW, range: 0.0~20.0 kW
- **Gen Max Run Time**: Maximum operating time of the generator. Default: 1000min, range: 1~60000 min
- **Gen Cool Time**: The cooling time interval between two operating sections of the generator. Default: 60min, range: 1~60000 min

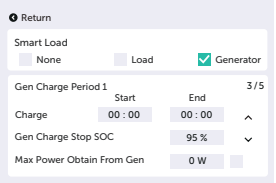


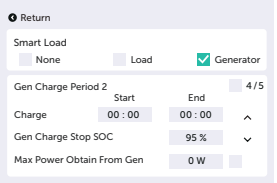
- **Gen Start SOC**: When the battery SOC is less than this set value, the generator will start to charge the battery while supply power for the load. Default: 20%, range: 17%~98%



- **Gen Charge Period**: The generator will charge the battery during the set period(s). Totally three periods can be set and at least one period (**Gen Charge Period 1**) should be set. You can decide whether to enable **Gen Charge Period 2** and **Gen Charge Period 3** by touching to select the square on the right side.
  - » **Charge**: Set the **Start** time and **End** time.
  - » **Gen Charge Stop SOC**: When the battery SOC is more than this set value, the generator will stop charging the battery. Default: 95%, range: 20%~100%

» **Max Power Obtain From Gen**: Maximum battery charging power from the generator. You can decide whether to enable this setting by touching to select the square on the right side. Default: 0 W, range:0~65535 W





15.2 Application of Parallel Function

15.2.1 Introduction of parallel application

The inverter provides the parallel connection function. One inverter will be set as the Master inverter to control other Slave inverters in the system. It supports up to 10 units in the parallel system. Details as follows:

15.2.2 Notice for parallel application

- All inverters should be of the same software version.
- For optimal efficiency, it is recommended that all inverters have the same model, and are connected to batteries of the same model and quantity.
- In parallel system, there are three status: **Slave** and **Master**.

Table 15-2 Two status

Slave	Once one inverter is set as a **Master**, all other inverters will enter **Slave** mode automatically. **Slave** mode can not be changed from other modes by LCD setting.
Master	When one inverter is set as a **Master**, this inverter enters **Master** mode.

- Master inverter has an absolute lead in the parallel system to control all slave inverter's energy management and dispatch control. Once master inverter has some error and stop working, all slave inverters will be stop simultaneously. But master inverter is independent of all slave inverters 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 exits from the system and be running as an independent unit (the network cable is disconnected simultaneously), its all setting will be re-activated.
- The parallel system is extremely complex and requires a large number of cables to be connected. Therefore, the cables must be connected in the correct wire sequence. Otherwise, any small mistake can lead to system failure.
- The communication cable length should not exceed 3 m.

15.2.3 System wiring diagram

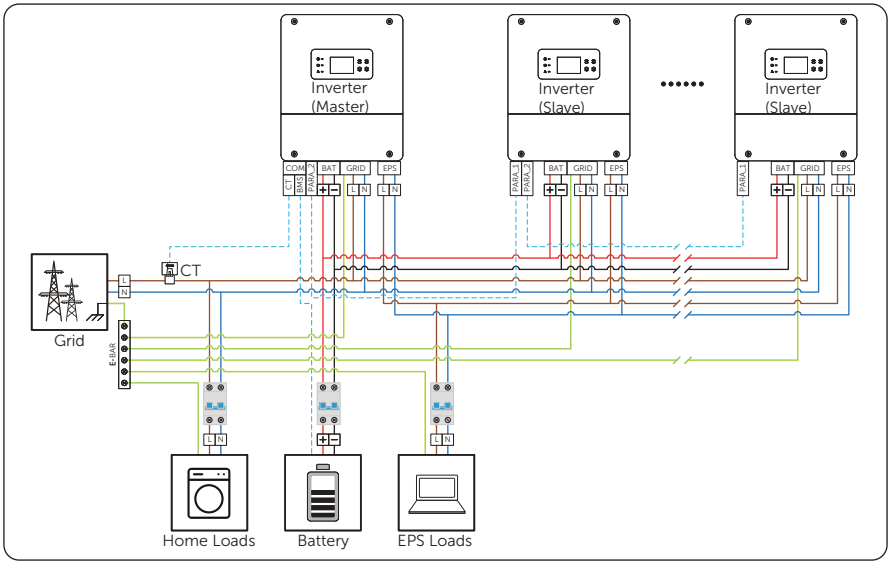


Figure 15-3 System wiring diagram 1

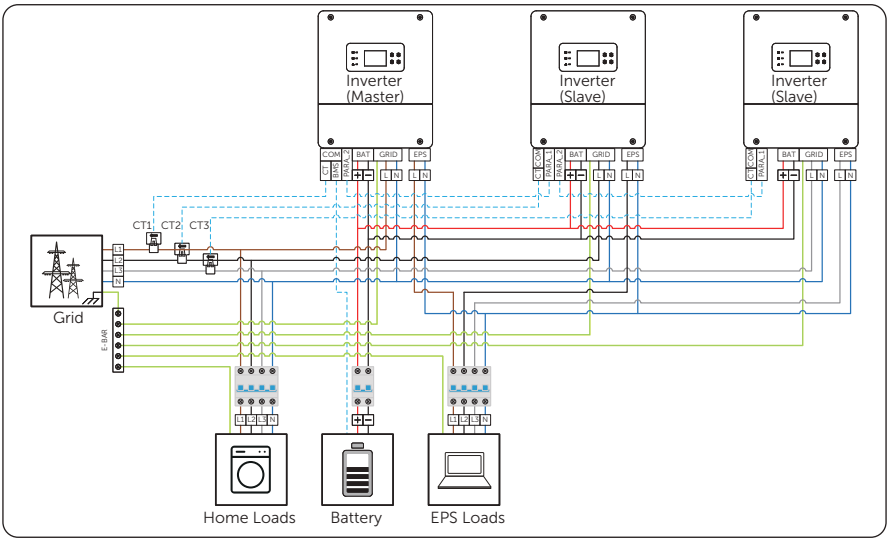


Figure 15-4 System wiring diagram 2

15.2.4 System wiring procedure

Power cable wiring-Grid and EPS terminal

a. Grid terminal of Master and Slave inverter: L connects to L and N connects to N,

b. EPS terminal of Master and Slave inverter: L connects to L and N connects to N,

c. All PE cable connects to the same E-BAR nearby.

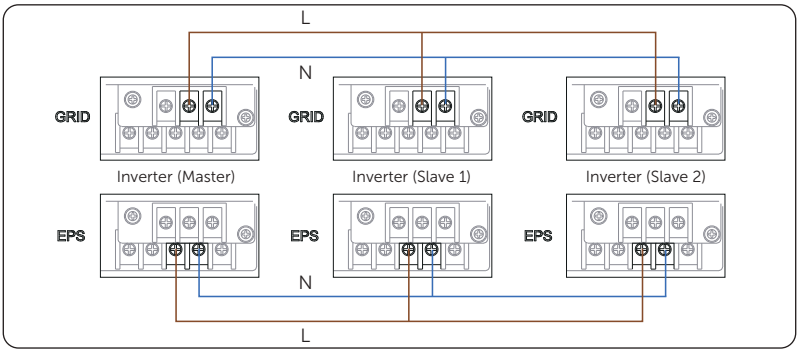


Figure 15-5 Power cable wiring

Communication cable wiring-COM terminal

- Parallel connection.

a. Use standard network cables for Master-Slave inverter connection.

b. Master inverter PARALLEL_2 connects to Slave 1 inverter PARALLEL_1.

c. Slave 1 inverter PARALLEL_2 connects to Slave 2 inverter PARALLEL_1.

d. Meter connects to COM communication terminal of the Master inverter. Please refer to "8.6.1 CT/meter port connnection".

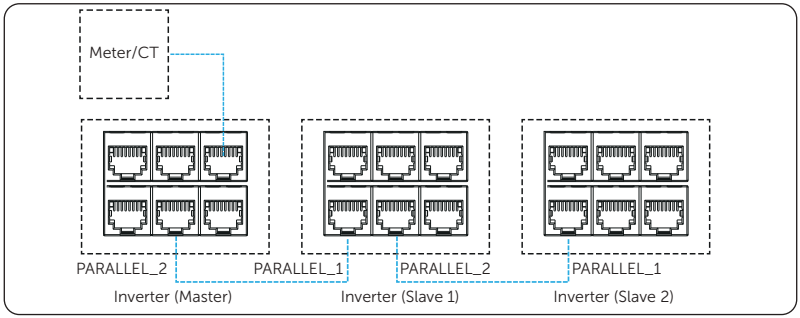


Figure 15-6 Communication wiring

NOTICE!

- For details on the specific wiring of the inverter, see"8.6 Communication Connection".

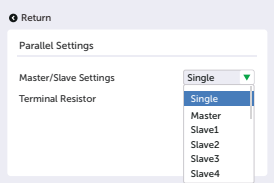
15.2.5 Settings for parallel connection

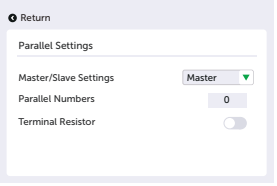
Parallel setting

Setting path: **Menu**>⚙>**Parallel Setting**

The series inverters support up to 10 units in the parallel system.

- **Master/Slaver Settings**: You can set the state of inverter to **Single** or Parallel. When parallel, the state of inverter can be set to Master/Slave. Select **Master** for the master inverter and **Slave** 1~9 for the slave inverters.
- **Parallel Numbers**: You can set parallel numbers as 1~10 on the master inverter according to the actual application which include both the master and slaves.
- **Terminal resistor**: Inverters with only one parallel communication line need to enable the **Terminal Resistor**. After enabling the **Terminal Resistor** of the two inverters, the whole parallel system can successfully be connected and realize inter-inverter communication.





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