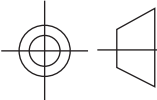


REV.	Description			REV.	Description
00	首次发行				
	种梦雪 2023/10/07				
02	额定功率增加澳洲 4999				
	种梦雪 2023/10/31 (01 版之前用于带 Matebox 版本)				
02	1. 增加 2.5kw 功率段 2. 修改 WIFI 连接方式为 wifi+LAN mode 3. Schedule 改为 TOU 模式 4. 增加 idle 的描述：冷待机情况下，客户可以设置【工作模式】、【Min SOC】和【充电时间段】				
	种梦雪 2023/11/13				
03	1. 封面封底修改 2. 公差改为 3mm 3. 澳洲开关改为可锁开关 4. 二维码改为产品界面二维码 5. 配件包修改 待改 6. 修改 SolaX 橙 7. 配件包序号嵌入正文中 (待改)				
	种梦雪 2023/12/28				
03	删除 UKCA 修改最新联系方式及封底公司名称 03.11 加入 Matebox 修改新 PV 端子				
	种梦雪 2024/03/11				
描述	说明书 X1-IES 系列 英文版 SolaX 03 版			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	320101077103				
单位	mm	页次			

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 $\pm 3\text{ mm}$ ；
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-IES 系列 英文版 SolaX 03 版		设计	种梦雪 2024/03/11
			审核	杨洋 2024/03/11
材料	双胶纸		核准	施鑫淼 2024/03/11
料号	320101077103		浙江艾罗网络能源技术股份有限公司	
单位	mm	页次		



X1-IES

**2.5 kW / 3.0 kW / 3.7 kW / 4.6kW /
5.0kW / 6.0kW / 8.0kW**

User Manual

Version 3.0

www.solaxpower.com



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About This Manual

Scope of Validity

This manual is an integral part of X1-IES system. It describes the installation, electrical connection, commissioning, maintenance and troubleshooting of the product. Please read it carefully before operation.

This X1-IES system includes X1-IES series inverter and T-BAT-SYS-HV-S50E.

X1-IES series inverter models:

X1-IES-2.5K	X1-IES-3K
X1-IES-3.7K	X1-IES-4.6K
X1-IES-5K	X1-IES-6K
X1-IES-8K	

T-BAT-SYS-HV-S50E components:

BMS (TBMS-MCS0800E)	Battery module (TP-HS50E)
Base	Cover (with series box inside)

Note:

"X1-IES system" is a residential single-phase photovoltaic storage hybrid inverter system.

"X1-IES series inverter" (inverter for short) refers to the energy storage inverter that supports photovoltaic grid-connected.

"3K" means rated output power of 3kW.

"T-BAT-SYS-HV-S50E" (T-BAT-SYS for short) is the name of battery system. It includes BMS, battery modules, base, cover and series box.

"BMS" is an electronic system that manages rechargeable batteries. It is installed on battery module (s). Its model name is TBMS-MCS0800E.

"Battery module" is an electrical battery that can charge or discharge loads. It is installed under a BMS or a cover. Its model name is TP-HS50E.

"Base" is used to support the batteries. It is installed under the battery module (s).

"Cover" is installed on the top battery module of the expansion battery tower.

"Series box" is used to connect the two towers through wiring. It is installed on the top battery module of the expansion battery tower and inside the "cover".

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.
NOTICE!	Provides tips for the optimal operation of the product.

Change History

Version 03 (2024-03-11)

Updated 7.3.4 PV Connection (Modified new PV connector)

Updated 8.5 Operation of Lockable DC Switch (Modified Australian Version DC Switch into Lockable DC Switch)

Version 02 (2023-11-15)

Updated 2.3.2 Control Panel (Added the description about idle state)

Updated 2.4.1 Working Mode (Modified TOU mode)

Updated 7.3.7 Monitoring Connection (Modified WiFi and LAN mode)

Version 01 (2023-10-31)

Added 2.5kW inverter

Version 00 (2023-08-04)

Initial release

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1 Safety

1.1 General Safety

The X1-IES system has been meticulously designed and thoroughly 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 X1-IES system to minimize the risk of personal injury and ensure a safe installation.

Please thoroughly 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 X1-IES system. The safety instructions in this document serve as supplementary guidelines to local laws and regulations.

SolaX 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:

- Device damage caused by force majeure events, such as earthquakes, floods, thunderstorms, lightning, fire hazards, volcanic eruptions, and similar events.
- Device damage due to human causes.
- The bearing capacity of the ground and the wall can not bear the weight of the device.
- Usage or operation of the X1-IES system 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.
- Device 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

Save these important safety instructions. Failure to do so may result in damage to the X1-IES system and injury or even loss of life.

1.2.1 Safety Instructions of PV

DANGER!

Potential risk of lethal electrical 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!

- 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.

1.2.2 Safety Instructions of Inverter

DANGER!

Lethal danger from electrical shock due to 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 SolaX. 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!

- The series inverter should be coupled with a high voltage battery. When handling the battery, follow all the safety instructions of the manufacturer.

 CAUTION!

- Make sure that children are supervised to prevent them from playing with the device.
- Pay attention to the weight of the inverter and handle it properly to avoid personal injuries.
- Use insulated tools when installing the device, and always wear personal protective equipment during installation and maintenance.

NOTICE!

- 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 unless a lower value is required by the specific local electric codes. When required by local regulations, the use of an RCD type B is permitted.
- Keep all product labels and the nameplate on the inverter clearly visible and wellmaintained.

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.

1.2.4 Safety Instructions of Battery (T-BAT-SYS)

General Safety Precautions

- Overvoltage or wrong wiring may damage the battery module and cause combustion which may be extremely dangerous;
- Leakage of electrolytes or flammable gas may be occurred due to any type of product breakdown;

- Do not install the battery module in places where flammable and combustible materials are stored, and in which an explosive atmosphere is present;
- The battery module wiring must be carried out by qualified personnel;
- Battery module must be serviced by qualified personal;
- Ensure that the grounding cable is connected before handling the battery module.

Battery Handling Guide

Do's

- DO keep the battery module away from flammables materials, heat sources, and water sources;
- DO keep the battery module out of reach of children and animals;
- DO practice proper battery storage by keeping the battery module in a clean environment, free of dust, dirt and debris;
- DO store the battery module in a cool and dry place;
- DO seal the outer cable connection hole to prevent ingress of foreign objects;
- DO confirm that the wiring of the device must be correct;
- DO install the device according to the local standards and regulations.

Don'ts

- DO NOT expose the battery module to an open flame, or the temperature in excess of 140°F/60°C;
- DO NOT store or install the battery module in direct sunlight;
- DO NOT install or operate the battery module in places where there is excessive moisture or liquids;
- DO NOT place the battery module in a high-voltage environment;
- DO NOT disconnect, disassemble or repair the device by unqualified personnel. Only a qualified personnel is allowed to handle, install and repair the device;
- DO NOT damage the device by dropping, deforming, impacting, cutting or penetrating with a sharp object. Otherwise, it may cause a fire or leakage of electrolytes;
- DO NOT touch the device if liquid spill on it. There is a risk of electric shock;
- DO NOT step on the packaging or the device may be damaged;
- DO NOT place any objects on top of the battery module;

- DO NOT charge or discharge a damaged battery module;
- DO NOT dispose of the battery module in a fire. It may cause leakage or rupture;
- DO NOT mix different types or makes of the battery module. It may cause leakage or rupture, resulting in personal injury or property damage.

Response to Emergency Situations

In case the battery module leaks electrolyte or any other chemical materials, or gas may be generated due to the leakage of battery module, be sure to avoid contact with the discharge at all times. In case of accidentally coming into contact with them, please do as follows:

- In case of inhalation: Leave the contaminated area immediately, and seek medical attention at once;
- In case of contact with eyes: Rinse eyes with running water for 15 minutes, and seek medical attention;
- In case of contact with skin: Wash the contacted area thoroughly with soap, and seek medical attention;
- In case of ingestion: Induce vomiting, and seek medical attention.

If a fire breaks out where the battery module is installed, please do as follows:

- In case the battery module is charging when the fire breaks out, provide it is safe to do so, disconnect the battery module circuit break to shut off the power charge;
- In case the device is not on fire yet, use a Class ABC fire extinguisher or a carbon dioxide extinguisher to extinguish the fire;
- If the battery module catches fire, do not try to put out the fire, and evacuate immediately.
- The battery module may catch fire when it is heated above 302°F/60°C; and in case of catching fire, it will produce noxious and poisonous gas, DO not approach and keep away.

Effective ways to deal with accidents

- In case of the damaged battery module, place it into a segregated place, and call the local fire department at the place where the user lives or qualified personnel.
- If any part of the battery module, or wiring is submerged, DO stay out of the water and DO NOT touch anything; If the battery module gets wet, DO NOT touch it.
- If the battery module is damaged, DO NOT use it. Otherwise, it may result in both personal injury and property damage.

- DO NOT use the submerged battery module again, and contact the qualified personnel for assistance.
- DO contact SolaX immediately for assistance if the user suspects that the battery module is damaged.

 WARNING!

- Do not crush or impact battery; make sure dispose of it according to relevant safety regulations.
- The battery module may catch fire when heated above 150°C/302°F.
- In case of catching fire, the battery module will produce noxious and poisonous gases, please keep away the battery.
- Damaged batteries may leak electrolyte or produce flammable gas. If users suspect that the battery is damaged, please contact SolaX for advice and information immediately.
- All operations of T-BAT SYS-HV relating to electrical connection and installation must be carried out by qualified personnel.

 CAUTION!

- If the battery module is not installed within a month after receipt, it must be charged for maintenance. Non-operational batteries should be discarded according to the local regulations.

1.2.5 Safety Instructions of X1-Matebox-G2

 DANGER!

Lethal danger from electrical shock due to the X1-Matebox-G2

- Only operate the matebox when it is technically faultless. Otherwise, electric shock or fire may occur.
- Only qualified personnel can perform the installation, wiring, maintenance of the matebox following this document and the related regulations.

 WARNING!

- Never connect or disconnect the AC connectors when the matebox is running.
- Turn off the AC beaker between the grid and the matebox, and turn off all the breakers on the matebox, wait for 5 minutes to fully discharge the voltage before attempting any maintenance, cleaning or working on any circuits connected.

 WARNING!

Danger of burn injuries due to hot enclosure parts

- During operation, the enclosure may become hot.

 CAUTION!

- Children should be supervised to ensure that they do not play with the appliance.
- Pay attention to the weight of the meterbox. Personal injuries may be caused if not handled properly.
- Use insulated tools when installing the device. Individual protective tools must be worn during installation, electrical connection and maintenance.

1.3 Additional Safety Instructions

Surge protection devices (SPDs) for PV installation



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

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

Please consult professionals before installing SPDs.

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

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

In order to protect DC system, the level 2 surge protection equipment is needed between DC cable of inverter and photovoltaic equipment module.

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

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

Anti-Islanding Effect

The islanding effect means that when the power grid is cut off, the grid-connected power generation system fails to detect the power outage and still supplies power to the power grid. This is very dangerous for the maintenance personnel and the power grid on the transmission line. The inverter's use active frequency offset method to prevent islanding effect.

PE Connection and Leakage Current

All inverters incorporate a certified internal Residual Current Monitoring (RCM) in order to protect against possible electrocution and fire hazard in case of a malfunction in the PV array, cables or inverter. There are 2 trip thresholds for the RCM as required for certification (IEC 62109-2:2011).

The default value for electrocution protection is 30mA, and for slow rising current is 300mA. the house loads. If an external RCD is required by local regulations, it is recommended to choose a Type-A RCD with the rating residual current of 300 mA.



- High leakage current!
- Earth connection essential before connecting supply.

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

For United Kingdom

The installation that connects the equipment to the supply terminals shall comply with the requirements of BS 7671. Electrical installation of PV system shall comply with requirements of BS 7671 and IEC 60364-7-712. All protective devices cannot be changed.

User shall ensure that equipment is so installed, designed and operated to maintain at all times compliance with the requirements of ESQCR22(1)(a).

2 Product Overview

2.1 System Description

System Overview

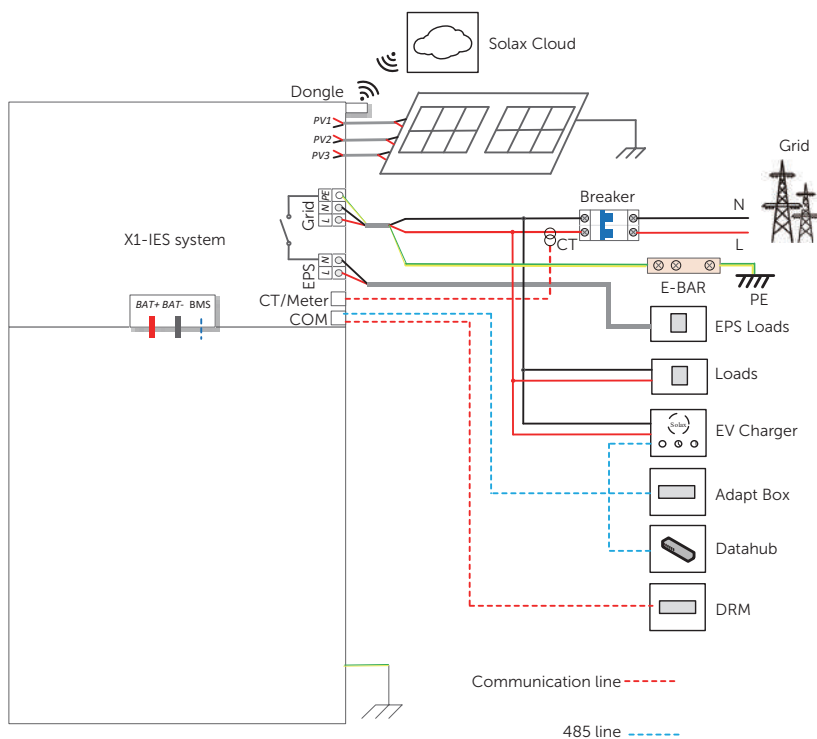


Figure 2-1 System overview diagram

X1-IES system

The X1-IES system is an energy storage system that integrates the inverter and T-BAT-SYS into one.

Inverter

The inverter is a transformerless single-phase PV grid-connected inverter which is designed to convert the direct current generated from the PV modules into grid-compatible AC current and feeds the AC current to the utility grid or store in the batteries for future use. The way it works depends on user preferences.

T-BAT-SYS

The T-BAT-SYS is a high voltage battery. The battery communicate with inverter via BMS and must comply with the specification of regulations.

PV Array

For 3 kW to 3.7 kW inverter, the number of PV string is two. For 4.6 kW to 8 kW inverter, the number of PV string is three.

CT

CT is a device that monitors the input and output current of the grid.

Grid

220V / 230V /240V grid are supported.

SolaX Cloud

SolaX Cloud is an intelligent, multifunctional monitoring platform that can be accessed through either wired or wireless connection. With the SolaX Cloud, the operators and installers can view the real-time data.

DRM

DRM is applicable for AS NZS 4777.2-2015. With the use of an external control box, active or reactive power regulation can be realized in a timely and fast manner, and the inverter can be operated stably during the process of regulation.

Adapter Box

SolaX Adapter Box is matched with a heat pump with the function of dry contact, which can realize heat pump integrated photovoltaic inverter energy system management.

Datahub

DataHub is a device for monitoring platforms of photovoltaic power generation systems, which enables data collection, storage, output control, centralized monitoring, and centralized maintenance of devices such as inverters, electricity meters, and environmental monitoring instruments in photovoltaic power generation systems.

EV Charger

SolaX EV Charger is used for charging electric vehicle.

X1-Matebox G2 (Optional)

X1-Matebox G2 is a device which includes integrated switches and bidirectional meter to control the whole household loads. It can only be used to match with a single inverter and does not support parallel inverters. It is optionally installed in the X1-IES system.

2.2 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:

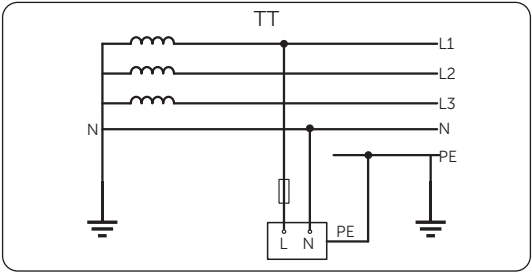


Figure 2-2 Supported power grid TT

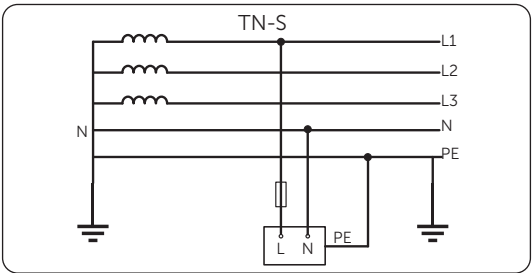


Figure 2-3 Supported power grid TN-S

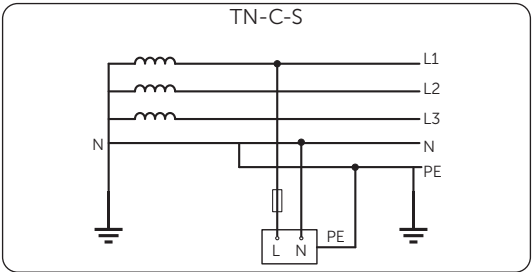


Figure 2-4 Supported power grid TN-C-S

2.3 Appearance

- Appearance of Inverter and Battery (T-BAT-SYS)

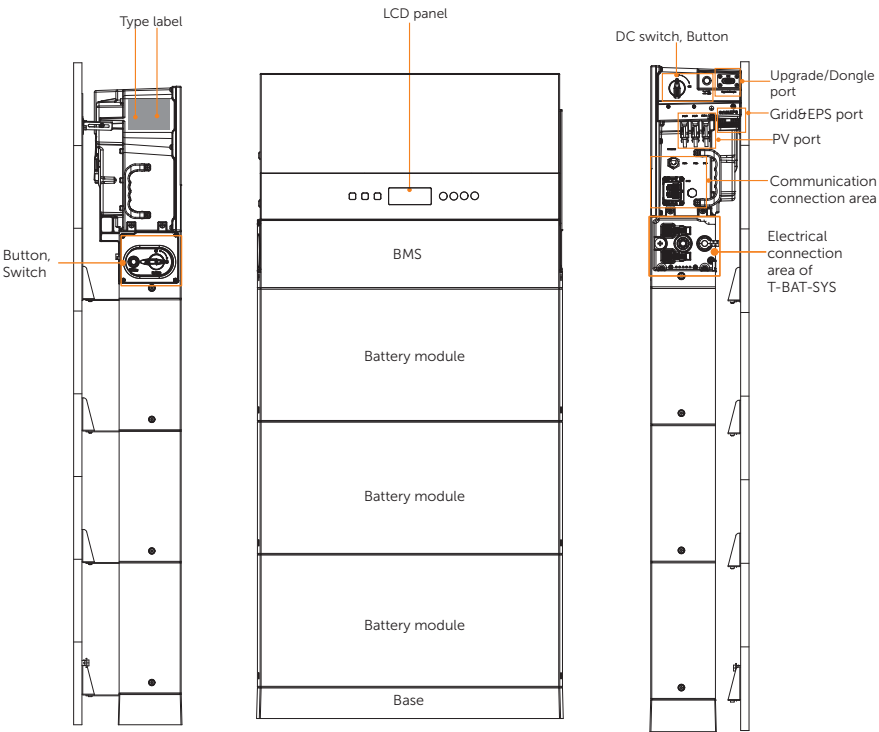


Figure 2-5 Appearance of Battery (T-BAT-SYS) and Inverter

Table 2-1 Description of appearance of Battery (T-BAT-SYS) and Inverter

Item	Description
Type label	Type label identifies the device type, serial number, specific DC/AC parameters, certification, etc.
LCD panel	Including screen, indicators and keys. Screen displays the information; indicators indicates the operating status of inverter. Keys is used to perform the parameter setting.
DC switch	Connect or disconnect the PV input.
Button	Power on or off the X1-IES system.
Upgrade/Dongle	Port for Upgrading and Communication module connection. Communication module includes WiFi, LAN and 4G (optional).

Item	Description
Grid&EPS connection area	Connect Grid and EPS cables.
PV connection area	Connect PV modules.
Communication connection area	Including CT/Meter port, communication port.
Button, Switch	Power on or off the battery system. Please refer to 2.3.3 Ports of Battery BMS (TBMS-MCS0800E) for details.
Electrical connection area of T-BAT-SYS	Including B+/B- ports, communication port, heat port, grounding port. Please refer to 2.3.3 Ports of Battery BMS (TBMS-MCS0800E) for details.

• Apparence of X1-Matebox G2

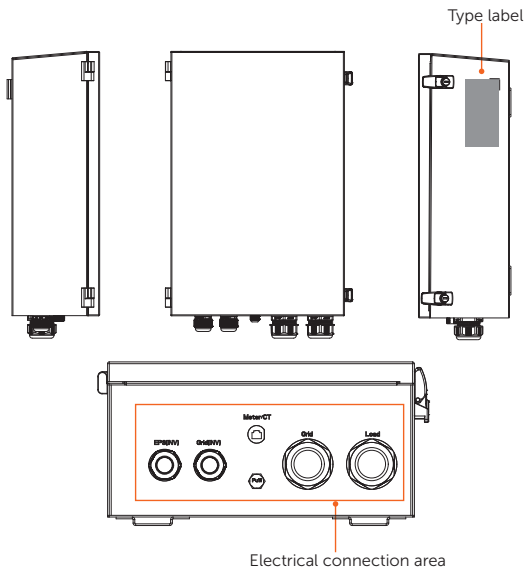


Figure 2-6 Appearance of Matebox

Table 2-2 Description of appearance of Matebox

Item	Description
Type label	Type label clearly identifies the device type, serial number, specific DC/AC parameters, certification, etc.
Electrical connection area	Including EPS (INV) port, Grid (INV) port, Meter/CT port, Grid port and Load port.

2.3.1 Dimensions

- Dimension of Inverter

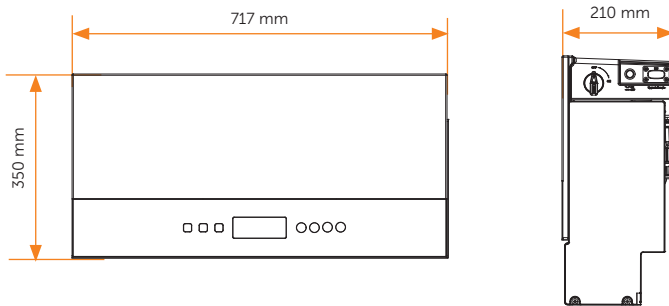


Figure 2-7 Dimension of Inverter

- Dimension of Battery (T-BAT-SYS)

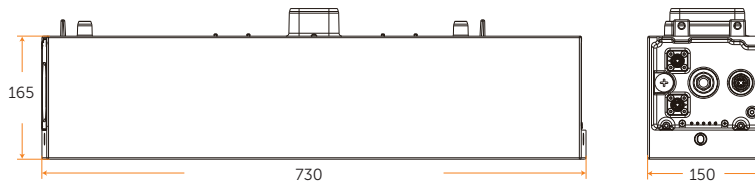


Figure 2-8 Dimension: BMS (TBMS-MCS0800E)

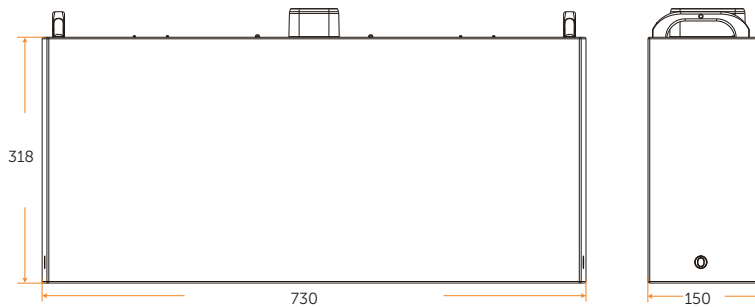


Figure 2-9 Dimension: Battery module (TP-HS50E)

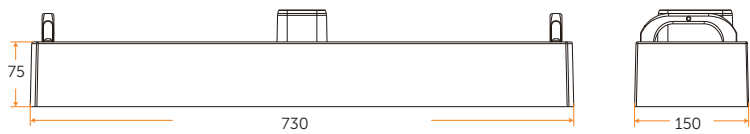


Figure 2-10 Dimension: Base

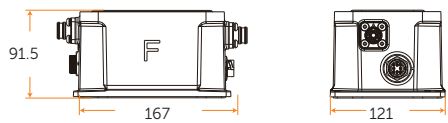


Figure 2-11 Dimension: Series box

- Dimension of Matebox

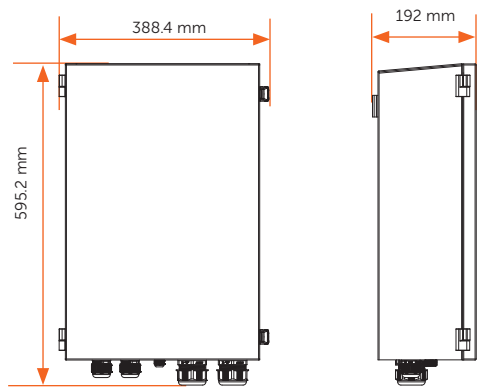


Figure 2-12 Dimension of Matebox

2.3.2 Control Panel

- Control Panel of Inverter

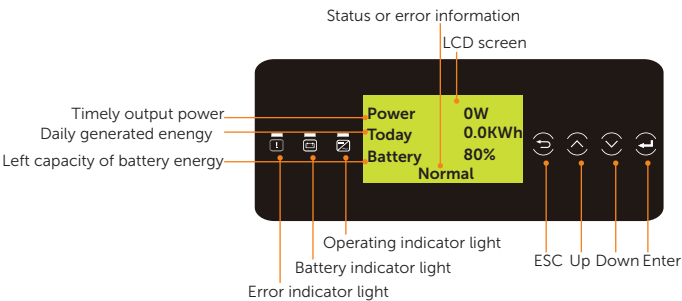


Figure 2-13 Control Panel of Inverter

* Please refer to the actual product for the color of the LCD screen. The screen displayed in the manual is for aesthetic purpose.

In a normal state, the "Power", "Today" and "Battery" information will be displayed. You can press the keys to switch information.

In an error state, the fault message and error code will be displayed, please refer to [11.1 Troubleshooting](#) for corresponding solutions.

Table 2-3 Definition of indicators of Inverter

LED indicator	Status		Definition
 Operating		Solid blue	The inverter is in normal status or EPS (Off-grid) mode.
		Blue blinking	The inverter is in waiting,checking status or the system switch is off.
		Light off	The inverter is in fault status.
 Error		Solid red	The inverter is in a fault state.
		Light off	The inverter is in norml status.
 Battery		Solid green	The battery communication is in normal status and working normally.
		Green blinking	The battery communication is in normal status and in an idle status.
		Light off	The communication between the inverter and the battery is disconnected.

Table 2-4 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

Note:

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

- Control Panel of Battery (T-BAT-SYS)

The power indicators show the current battery percentage. There are five indicators on the BMS, one status light and four SoC power indicators.

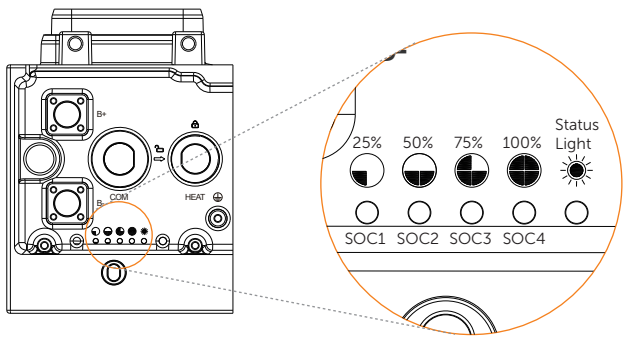


Figure 2-14 Control Panel of Battery (T-BAT-SYS)

Table 2-5 Definition of indicators of Battery (T-BAT-SYS)

Status	Description
Startup	Press and hold the BMS Button for about 1 to 2 seconds to activate the system, at this point, the status light flashes yellow light every 0.1 seconds until finishing self test, the period lasts about 3 to 4 seconds. Then the status light flashes green light every 0.5 seconds. After successful communication to the inverter, the status light turns solid green light, and SoC power indicators go solid green light based on the actual remaining capacity.
Shutdown	After pressing and holding the BMS button for more than 1 second, the status light comes on solid green light, and the SoC power indicators flash blue in turn. Then all lights are off within 2.4 seconds after releasing the button.
Standby	The status light flashes green for 1 second and turns off for 4 seconds. The SoC power indicators are off.
Charging	The status light comes on solid green light, and the state of SoC power indicators depends on the actual situation. For details, please refer to the following Table 2-5 Indicator information while charging .
Discharging	The status light comes on solid green light, and the state of SoC power indicators depends on the actual situation. For details, refer to the following Table 2-6 Indicator information while discharging .
Fault	In case of failure, the status light will remain on solid red light for 10 minutes, and then such red light will flash for 1 second and then turn off for 4 seconds. For details, please refer to Table 2-7 Indicators information while reporting errors .

Warning	In case of warning, the status light will flash yellow light for 1 second, and then turn off for 4 seconds.
Black Start	For details, please refer to 2.3.2 Black Start .

Table 2-6 Indicator information while charging

SoC value	Status light	SoC1	SoC2	SoC3	SoC4
$0\% \leq \text{SoC} < 25\%$	Green	Flash	Light off	Light off	Light off
$\text{SoC} < 50\%$	Green	Light on	Flash	Light off	Light off
$\text{SoC} < 75\%$	Green	Light on	Light on	Flash	Light off
$\text{SoC} < 100\%$	Green	Light on	Light on	Light on	Flash
$\text{SoC} \geq 100\%$	Green	Light on	Light on	Light on	Light on

Table 2-7 Indicator information while discharging

SoC value	Status light	SoC1	SoC2	SoC3	SoC4
$\text{SoC} \geq 75\%$	Green	Flash	Flash	Flash	Flash
$\text{SoC} \geq 50\%$	Green	Flash	Flash	Flash	Light off
$\text{SoC} \geq 25\%$	Green	Flash	Flash	Light off	Light off
$\text{SoC} \geq 0\%$	Green	Flash	Light off	Light off	Light off

Table 2-8 Indicators information while reporting errors

Fault	SoC1	SoC2	SoC3	SoC4
Huge differential pressure	Flash	Off	Off	Off
Voltage fault (undervoltage and overvoltage of unit, overvoltage and undervoltage of total voltage)	Off	Flash	Off	Off
Temperature fault (high temperature, low temperature)	Flash	Flash	Off	Off
Current fault (overcurrent charging, overcurrent discharging)	Off	Off	Flash	Off
Hardware fault (MCU fault, external short circuit fault, AFE fault, voltage sampling disconnection fault, temperature sampling, or current sensor default)	Flash	Off	Flash	Off
Relay fault	Off	Flash	Flash	Off
Insulation fault	Flash	Flash	Flash	Off
Self test fault	Off	Off	Off	Flash

Communication loss of inverter	Flash	Off	Off	Flash
Communication loss of battery module	Off	Flash	Off	Flash

NOTICE!

In case of pressing and holding BMS button, there are two circumstances as follows:

- Press and hold BMS button for more than 5 seconds but less than 20 seconds, the system will enter a startup mode of inverter.
- Press and hold BMS button for more than 20 seconds, the system will enter the Black Start.

Black Start

The equipment can provide **Black Start** capacity, meaning that our energy storage inverter and battery can continue to run even if the power grid and photovoltaic module are out of service. The startup procedure for **Black Start** is as follows:

- First stage: in case of pressing and holding the **BMS button** for less than 20 seconds, the status light will flash green light for 1 second and then turn off for 4 seconds, with a period of 5 seconds.
- Second stage: after pressing and holding the **BMS button** for more than 20 seconds, the status light will come on solid green light, and SoC power indicators will flash as follows:
 - » Firstly, the indicator SoC3 comes on blue, and the rest of the indicators are off;
 - » Secondly, the indicators SoC2 and SoC4 come on blue, and the rest of the indicators are off;
 - » Thirdly, the indicator SoC1 comes on blue, and the rest of the indicators are off;
 - » Finally, all SoC power indicators are off. The time interval between each step is 0.1 seconds.

NOTICE!

- In the case of the second stage, the **BMS button** should be released at anytime in the process.

2.3.3 Ports

- Ports of Inverter

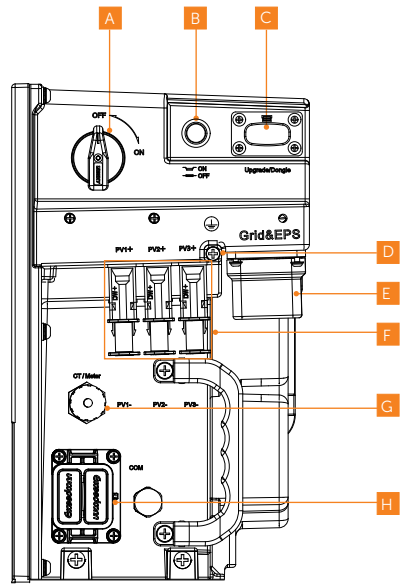


Figure 2-15 Ports of Inverter

Table 2-9 Description of ports of Inverter

Item	Description
A	DC switch
B	Switch button
C	Port for Upgrading and Communication module connection. Communication module includes WiFi, LAN and 4G (optional).
D	Ground connection port
E	Grid and EPS Port
F	PV connection port
G	CT/ Meter Port
H	COM port

- Ports of Battery (T-BAT-SYS)

BMS (TBMS-MCS0800E)

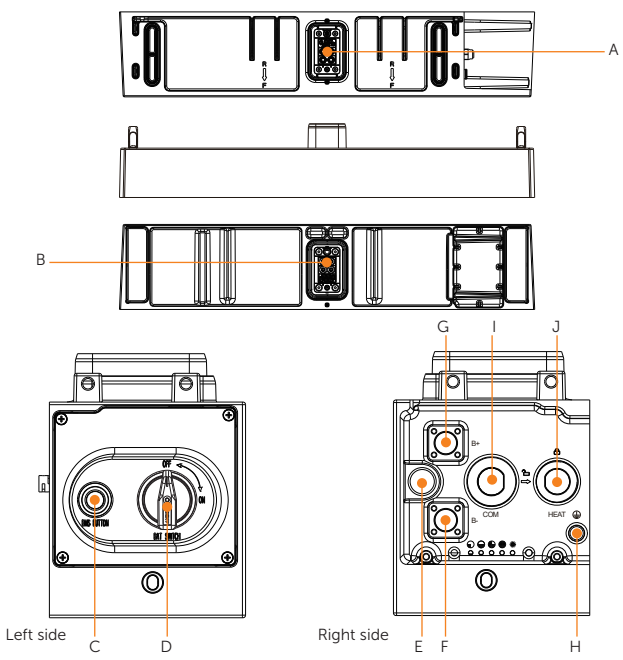


Figure 2-16 BMS (TBMS-MCS0800E)

Table 2-10 Description of ports

Item	Description
A	The hot-plug interface is connected to the inverter.
B	The hot-plug interface is connected to the battery module.
C	BMS Button: Start system.
D	BAT SWITCH: A switch for battery's input and output.
E	2.3.3 DIP Switch : Realize battery's parallel function (a reserved function).
F	B-: Connect BMS's B- to BMS's B+ (or to the series box's B-)
G	B+: Connect BMS's B+ to BMS's B- (or to the series box's B+)
H	GND: Connect the grounding port of the series box (if any); or it doesn't need to be connected.
I	COM: Connect the COM port of the series box (if any); or it doesn't need to be connected.

Item	Description
J	HEAT: Connect the HEAT port of the series box (if any), or a short-circuit plug must be inserted into the port.

DIP Switch

A DIP Switch is equipped on the BMS.

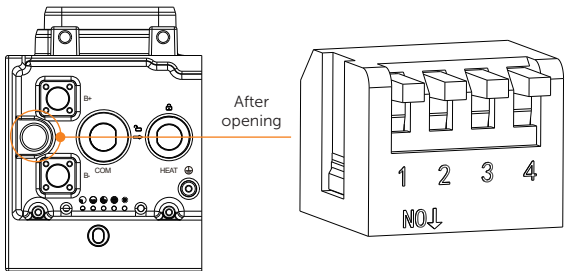


Figure 2-17 DIP Switch

Table 2-11 Definition of DIP switch

	Description
DIP Switch 1	A reserved function
DIP Switch 2	A reserved function
DIP Switch 3	A reserved function
DIP Switch 4	Terminal resistance

NOTICE!

- The DIP switch 4 shall be flipped down (open the circuit) when connecting the BMS to inverter.
- In case of parallel connection, only shall be the DIP switch 4 on the last BMS be flipped down (open the circuit), and the DIP switch 4 on the rest of BMS shall be flipped up (close the circuit).
- The DIP switch 4 is pressed at the factory settings.
- To adjust the DIP switch, a small flat-head screwdriver shall be prepared by users.

Battery Module (TP-HS50E)

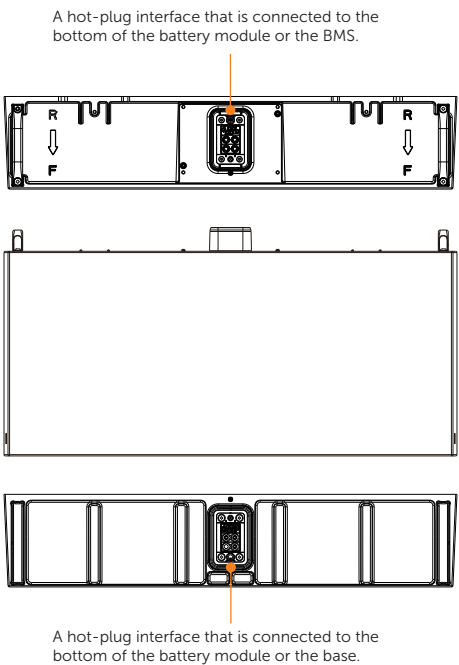


Figure 2-18 Details: Battery module (TP-HS50E)

Base

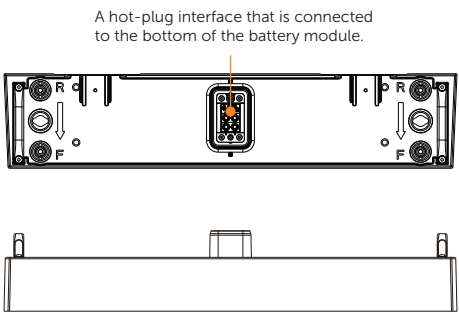


Figure 2-19 Details: Base

Series Box

The series box shall be installed in case the battery modules purchased exceed 4 sets (including 4).

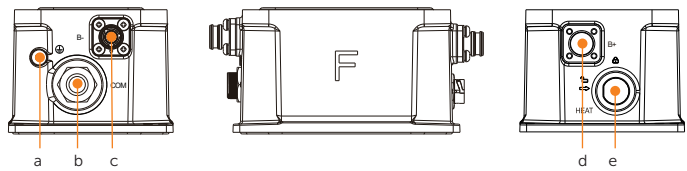


Figure 2-20 Details: Series box

Table 2-12 Description of ports

Item	Description
A	GND: Connect to the grounding port of the BMS.
B	COM: Connect to the COM port of the BMS.
C	B-: Connect to the B- of the BMS.
D	B+: Connect to the B+ of the BMS.
E	HEAT: Connect to the HEAT port of the BMS.

- Ports of Matebox

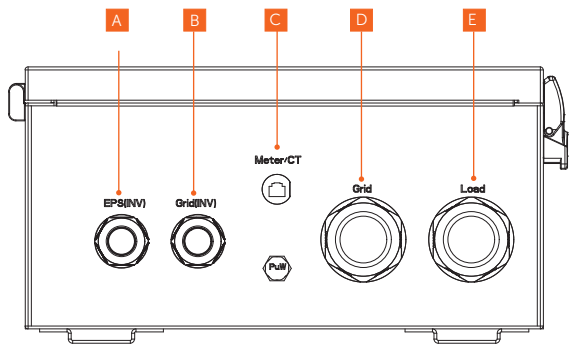


Figure 2-21 Ports of Matebox

Table 2-13

Item	Description
A	EPS output port of the inverter
B	Grid output port of the inverter
C	Meter/CT connection port of the inverter
D	Grid connection port to local grid
E	Load connection port

2.3.4 Symbols on the Label

Table 2-14 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. The inverter can become hot during operation. Avoid contact during operation.
	Danger of high voltages. Danger to life due to high voltages in the inverter!
	Danger. Risk of electric shock!
	Observe enclosed documentation.
	The device can not be disposed together with the household waste.
	Do not operate this inverter until it is isolated from battery, mains and on-site PV generation suppliers.
	Danger to life due to high voltage. There is residual voltage existing in the inverter after powering off, which needs 5min to discharge. Wait 5min before you open the upper lid or the DC lid.
	RCM mark of conformity.
	The battery module may explode.
	Keep the battery system away from children.

Symbol	Description
	Keep the battery system away from open flames or ignition systems.
	Do not dispose of the battery module together with household waste.
	The battery system must be disposed of at a proper facility for environmentally-safe recycling.

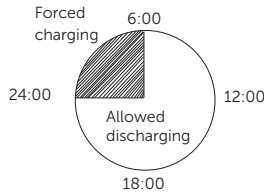
2.4 Working Principle

2.4.1 Working mode

The inverter has two configurable working periods: allowed discharging period and forced charging period.

For how to set the two working periods, please refer to [9.6.1 User Settings](#) to set the working modes.

The default value of allowed discharging period is 00:00~23:59, and the default value of forced charging period is 00:00~00:00(closed in default). You can configure the two work mode by yourself.



As shown in the example above, the allowed discharging period is 6 am to 24 pm, and the forced charging period is 24 pm to 6 am.

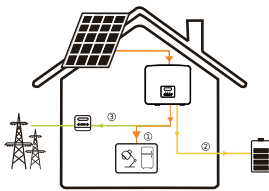
- Forced Charging Period

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

- Allowed Discharging Period

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

For on-grid status, there are four work modes: Self Use, Feed-in Priority, Backup and Manual.

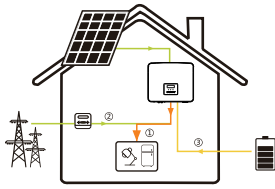


Self Use mode

The self-use mode is suitable for areas with low feed-in subsidies and high electricity prices.

The power of PV will supply the loads first, and surplus power will charge the battery, then the remaining power will feed into the grid.

Priority: Loads > Battery > Grid

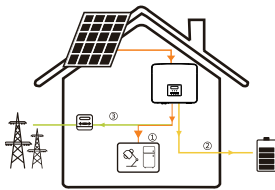


Feed-in Priority

The feed-in priority mode is suitable for areas with high feed-in subsidies.

The power of PV will supply the loads first, and surplus power will feed into the grid, then the remaining power will charge the battery.

Priority: Loads > Grid > Battery



Backup mode

The back-up mode is suitable for areas with frequent power outages.

This mode will maintain the battery capacity at relatively high level, to ensure that the emergency loads can be used when the grid is off. Same working logic with "Self-use" mode.

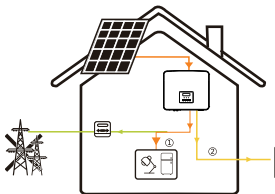
Priority: Loads > Battery > Grid

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

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

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

EPS (Off-grid)



In case of power failure, the system will supply EPS loads through PV and battery. (The battery must be installed. And the EPS loads must be less than the minimum of the following two values: the sum of the maximum battery discharge power and the maximum PV output power, or the overload limit power of the inverter.)

The power of PV will supply the loads first, and surplus power will charge the battery.

Priority: Loads > Battery

* The battery will stop discharging when $\text{SoC} = \text{min SoC}$. But due to self consumption of the battery, sometimes the battery will stop discharging when $\text{SoC} < \text{min SoC}$.

For on-grid status, if the battery $\text{SoC} \leq (\text{min SoC} - 5\%)$, the inverter will take energy from grid to charge battery SoC to $(\text{min SoC} + 1\%)$.

For off-grid status, if the battery $\text{SoC} \leq \text{min SoC}$, the inverter can not enter EPS mode (the battery can not discharge unless its SoC reaches Min ESC SoC (Default: 20%, settable))

Peak shaving mode

Peak shaving mode is set for leveling out peaks in electricity use. The system is intelligently controlled to ensure charging takes place during off-peak hours and discharging occurs during peak hours.

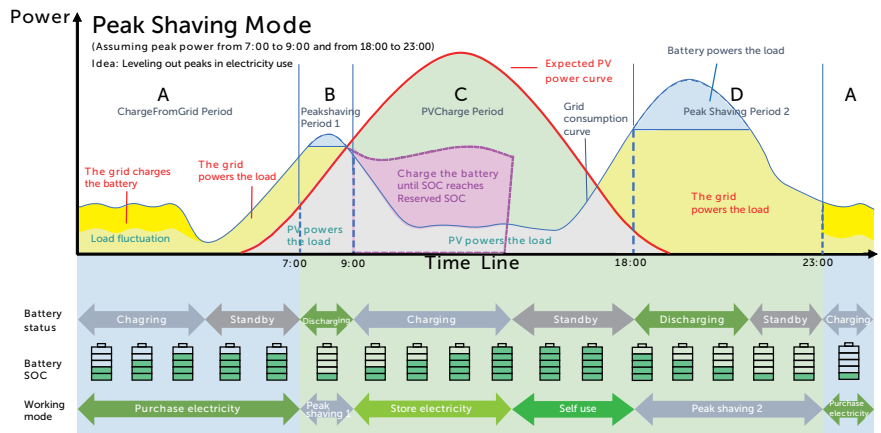


Figure 2-22 Peak shaving mode

Time Period	Inverter working status
Period A	Battery charging period during which discharging is not allowed and the grid will charge the battery first for peak shaving.
Period B & D	Load < Peaklimits (PV+grid → load) The PV and grid will power the load.
Period C	Load > Peaklimits (PV + battery+grid → load) The battery will discharge energy for loads and thus reduce the amount of energy purchased from the grid.
Period C	(PV → battery → load → grid) The battery does not discharge. The PV will charge the battery to the "Reserved SOC" first and then supply power for loads, with the surplus power feeding into the grid. Charging the battery first in this period is storing energy for the peak shaving.

Note:

PeakLimits: The load consumption from grid side. The settable range: 0-60000 W.

Reserved SOC: The lower limit of SOC required for later peak shaving period. The default value is 50%. The settable range is 10~100%.

TOU mode

In the TOU mode, different working modes, i.e Self-use, Charging, Discharging, Peaking shaving and Battery off can be set for different time periods in accordance with actual needs and environment conditions through SolaX Cloud App or Web.

The day can be divided into up to 24 time slots, and the minimum time slot is 15 minutes, independent working mode can be set for each time slot. Please refer to Web Guide or App Guide for details about how to set the TOU mode.

Time Slot	Working Mode
X:XX~X:XX (e.g 0:00~0:15)	Choose one mode from Self-use / Charging / Discharging / Battery off / Peaking shaving

Note:

Self-use: Same working logic with "Self-use Mode", but it is not limited by the charging and discharging time slots. The priority of PV: Loads > Battery > Grid.

Charging: The power of PV will charge the battery as much as possible to the set SOC of Charge BAT to (%). You can set whether to Charge from grid. The default value of Charge BAT to (%) is 100%. When the battery reaches the set SOC, the surplus power will perform "Self-use Mode" or supply to the grid (based on the system setup), at this point, Charge from grid is not allowed.

Discharging: If allowed by the battery, the system outputs a specified power from the grid based on the set output percentage, controlling the power at the AC port. You need to set the RatePower (%) through Web or App when choosing Discharging mode. When the battery Discharge to (%) reaches the set SOC, the inverter performs "Self-use Mode".

Peak shaving: The working logic is that when the power consumption from the grid exceeds the set PeakLimit value, the battery is allowed to discharge power. The excess power beyond the limit is provided by the combination of photovoltaic and battery to ensure that the maximum power purchased from the grid does not exceed the set limit. You need to set the PeakLimit value through Web or App when choosing Peak shaving mode.

Battery off: The battery neither charges nor discharges. The power of PV will supply to loads or the grid. Only when the battery SOC is lower than the system (TOU) Min SOC, the battery can be charged.

2.4.2 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 DC into AC that meets the requirements of the power grid and feeds it into the power grid. The lightning arrester at AC / DC side can realize the function of surge protection. The principle design of inverter is shown in the figure below:

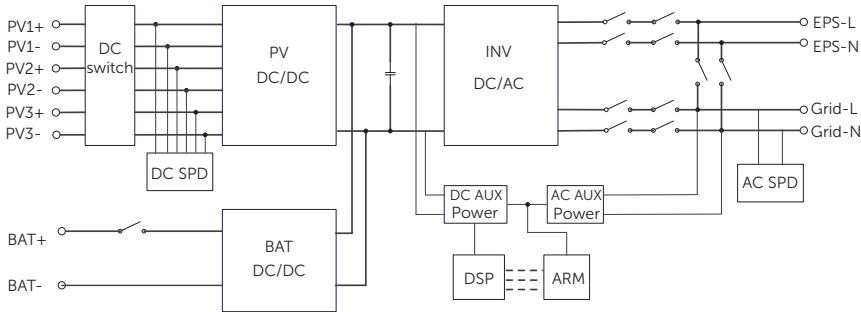


Figure 2-23 Circuit Diagram

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

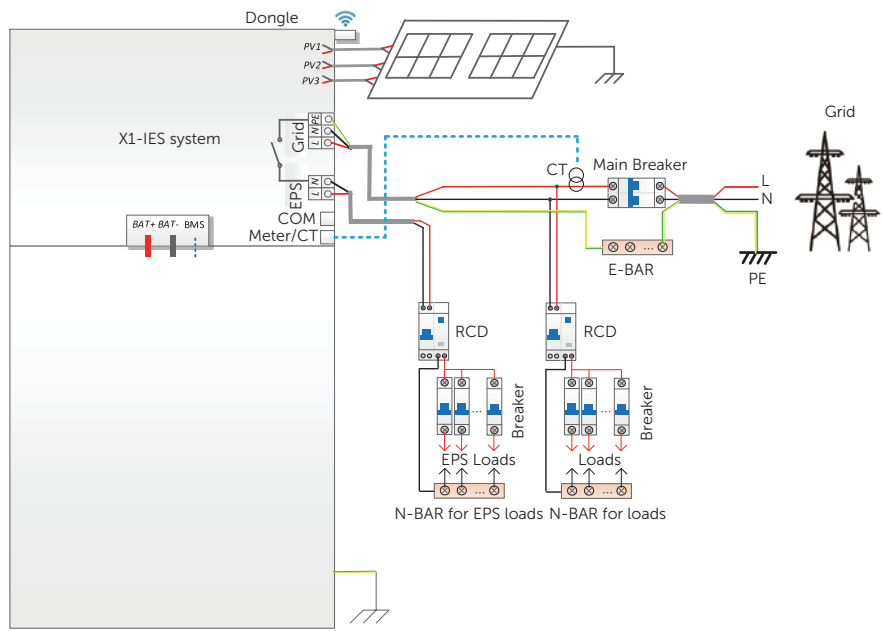


Figure 2-24 N line and PE line separate wiring, common load connected

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

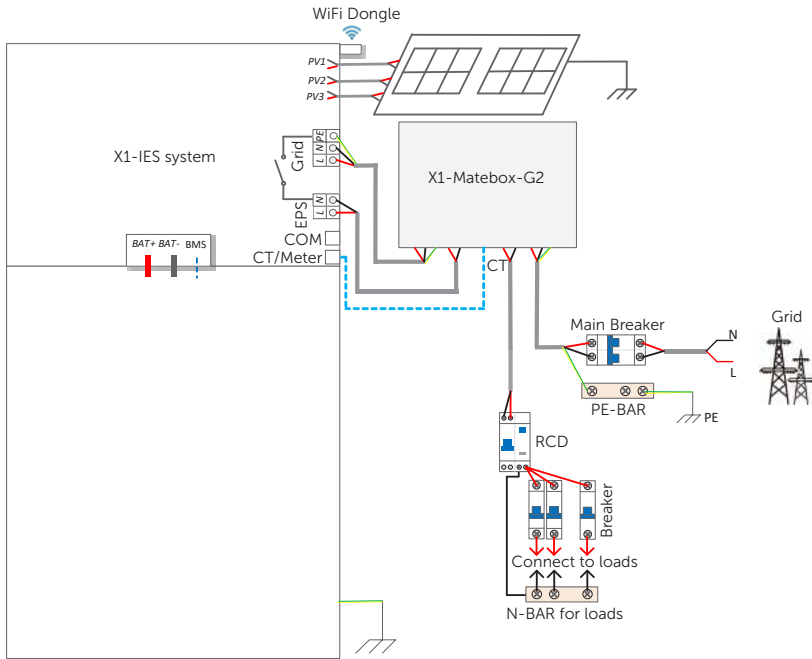


Figure 2-25 N line and PE line separate wiring, all loads connected

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

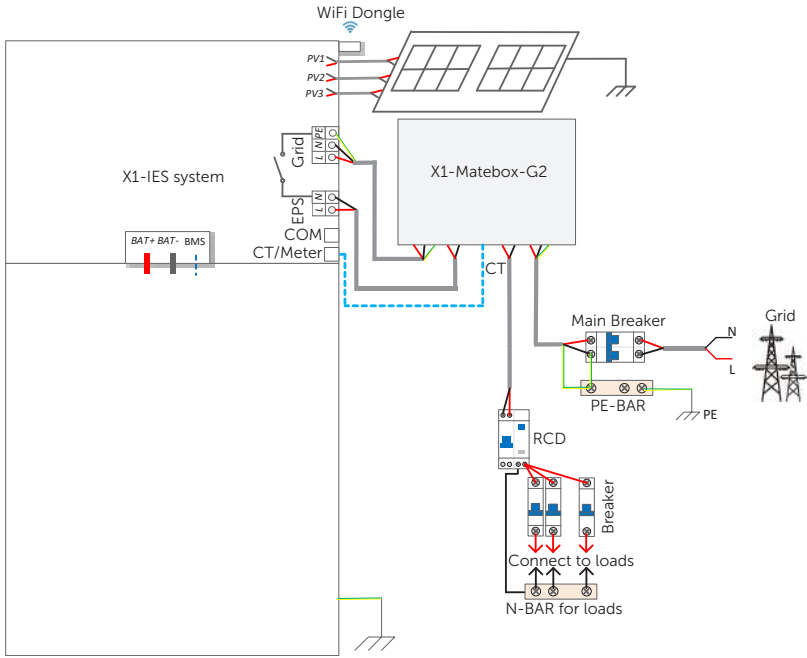


Figure 2-27 N line and PE line combine together, all loads connected

NOTICE!

- When power cuts suddenly, the inverter connects the N line of EPS load with the ground through relay, providing a fixed zero potential for EPS load and ensuring the safety of electricity use by users. Make sure the value of the inverter load is less than that of EPS rated power, otherwise the inverter will stop and alarm overload fault. Confirm with the grid operator whether there are special regulations for grid connection.

2.5 Micro Grid

Due to islanding effect, on-grid inverters are unable to work during off-grid. This feature makes users lose the PV energy of on-grid inverter when off-grid. Micro-grid is a function that makes X1-IES series inverters stimulate the grid to active on-grid inverter during off-grid. By connecting on-grid inverter to the EPS port of the X1-IES series inverter, the X1-IES series inverter is able to use PV or battery energy to active on-grid inverter when utility lost.

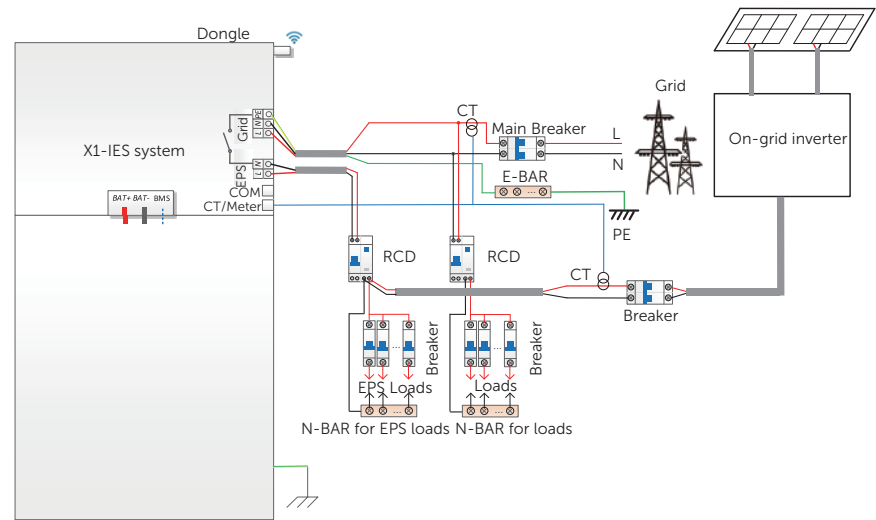


Figure 2-28 Micro grid diagram

Compatibility

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

On-grid inverter outout power ≤ Max X1-IES series inverter EPS output power

On-grid inverter outout power ≤ Max battery charging power

Battery Quantity	1	2	3	4
On-grid inverter power upper limitation for HS50E	5.12 kW	10.24 kW	15.36 kW	20.48 kW

* Since X1-IES series inverter is unable to control on-grid inverter, therefore X1-IES series inverter can not achieve zero injection when loads power + battery power < on-grid inverter output power.

3 Transportation and Storage

If the X1-IES system is not put into use immediately, the transportation and storage requirements needs to be met:

Transportation

- Observe the caution signs on the packaging of the device before transportation.
- Pay attention to the weight of the device. Be cautious to avoid injury when carrying the device. Two installers are recommended.
- When carrying the equipment by hand, wear protective gloves to prevent injuries.
- When lifting up the device, hold the handle position and the bottom position of the device. Keep the device horizontal in case of falling down due to tilt.

Storage

- The device must be stored indoors.
- Do not remove the original packaging material and check the outer packaging material regularly.
- The storage temperature should be between -30°C and $+53^{\circ}\text{C}$. The humidity should be between 5% and 65%.
- Stack the device in accordance with the caution signs on the carton to prevent the device falling down and damage. Do not place it upside down.

4 Preparation before Installation

4.1 Selection of Installation Location

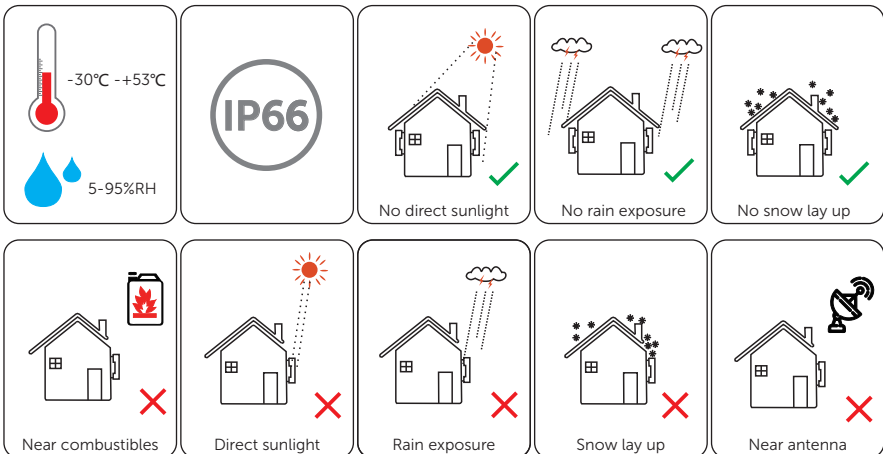
The installation location selected for the X1-IES system is quite critical in the aspect of the guarantee of machine safety, service life and performance.

- It has the IP66 ingress protection, which allows it to be installed outdoor;
- The installation position shall be convenient for wiring connection, operation and maintenance.

4.1.1 Environment Requirement

Make sure the installation site meets the following conditions:

- The operating temperature: -30°C to $+53^{\circ}\text{C}$;
- The humidity shall be between 5-95%;
- Do not install the device in the areas where the altitude exceeds 3000 m;
- Install the device in a well-ventilated environment for heat dissipation;
- Do not install the device in areas with flammable, explosive and corrosive materials;
- Do not install the device in areas near combustibles and antenna
- You are recommended to install an awning over it. Direct sunlight, rain exposure and snow laying up is not allowed.



- Install the device 500 meters away from sea and at the place where the sea breeze does not directly hit.

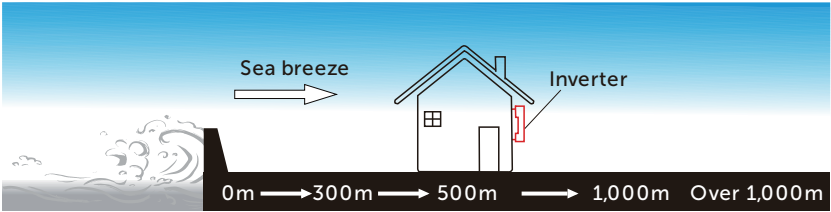


Figure 4-1 Recommended installation position

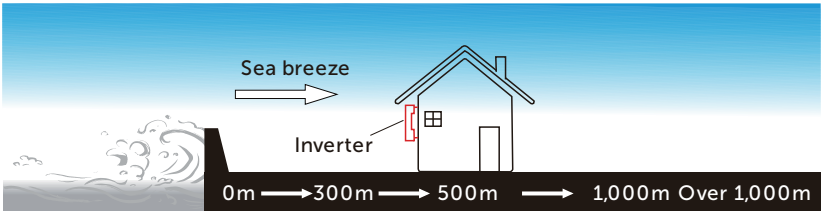


Figure 4-2 Incorrect installation position

4.1.2 Installation Options

NOTICE!

- X1-IES system inverter matches 1~4 battery modules. It is suitable for "option A/B/C/D" in one tower and "option E/F" in two towers.
- Wall mounting is recommended.
- Up to three battery modules in one tower is recommended. When the installation space is limited, four battery modules in one tower can be chosen.
- The following installation options apply to the modes of floor mounting and wall mounting.

There are 6 installation options available, with details as follows:

One Tower

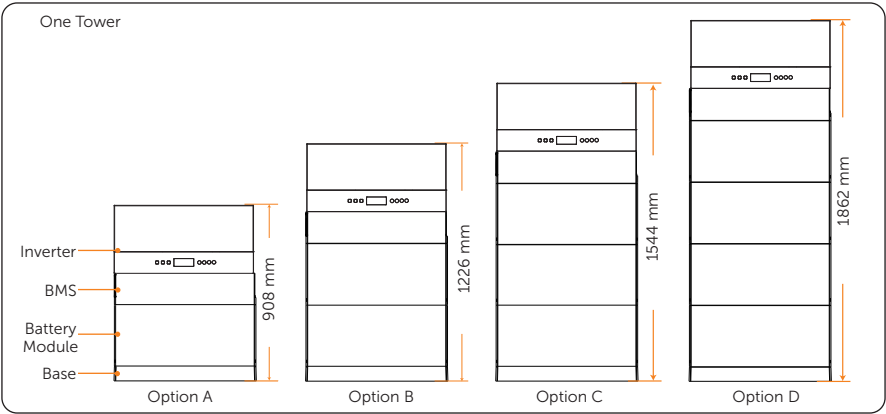


Figure 4-3 Installation option for one tower

Two Towers

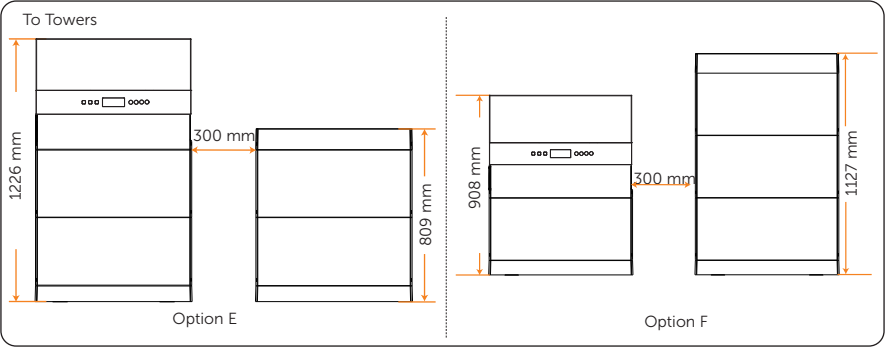


Figure 4-4 Installation option for two towers

Table 4-15 Components of different options

	Option A	Option B	Option C	Option D	Option E		Option F	
					Left tower	Right tower	Left tower	Right tower
Inverter	1	1	1	1	1		1	
BMS	1	1	1	1	1		1	
Battery Module	1	2	3	4	2	2	1	3
Base	1	1	1	1	1	1	1	1
Series box						1		1
Cover						1		1

* If the wall mounting is selected, the base support (s) is (are) necessary.

Net weight and dimension of X1-IES system

Table 4-16 Net weight and dimension of one tower

	Option A	Option B	Option C	Option D
Net Weight (kg)	87.2	134.2	181.2	228.2
Dimension (mm)	730*908*210	730*1226*210	730*1544*210	730*1862*210

Table 4-17 Net weight and dimension of two towers

	Option E		Option F	
	Left tower	Right tower	Left tower	Right tower
Net Weight (kg)	134.2	99.2	87.2	146.2
Dimension (mm)	730*1226*210	730*809*150	730*908*150	730*1127*210

* The maximum net weight of an inverter (27kg) is taken as an example.

Table 4-18 Weight and Dimension of the Inverter

Model	X1-IES-2.5K	X1-IES-3K	X1-IES-3.7K	X1-IES-4.6K	X1-IES-5K	X1-IES-6K	X1-IES-8K
Weight (kg)	26.2	26.2	26.2	26.4	26.4	26.4	27
Dimension (mm)	717*350*210						

Table 4-19 Weight and Dimension of the Battery (T-BAT-SYS)

Item	TBMS-MCS0800E	TP-HS50E	Base	Series Box
Length (mm)	730	730	730	167
Width (mm)	150	150	150	121
Height (mm)	165	318	75	91.5
Net weight (kg)	9.3	47	3.9	1.3

4.1.3 Installation Carrier Requirement

The mounting location must be suitable for the weight and dimension of the product and the support surface for installation must be made of a non-flammable material.

- Solid brick/concrete, or mounting surface with equivalent strength;
- Please ensure that the bearing capacity of the ground and the wall, respectively, that are used to install the X1-IES system must be over 927 kg, which is based on option C. If option D is chosen, the bearing capacity of the ground and the wall, respectively, must be over 1077 kg; (The maximum net weight of an inverter (27kg) is taken as an example.)
- The device must not be installed on the wood wall.

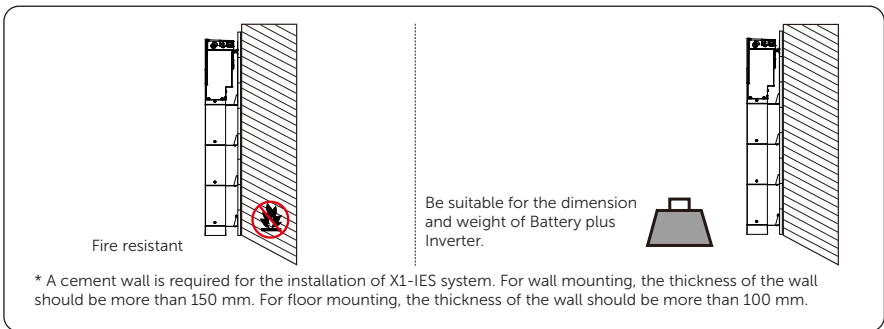


Figure 4-5 Installation carrier requirement

4.1.4 Clearance Requirement

To guarantee proper heat dissipation and ease of disassembly, the minimum space around the X1-IES system must meet the standards indicated below.

For installations with two towers, make sure to leave a minimum space of 30 cm between each system and 30 cm from the ceiling. In areas with high ambient temperatures, increase the clearances between the towers and provide adequate fresh air ventilation if feasible.

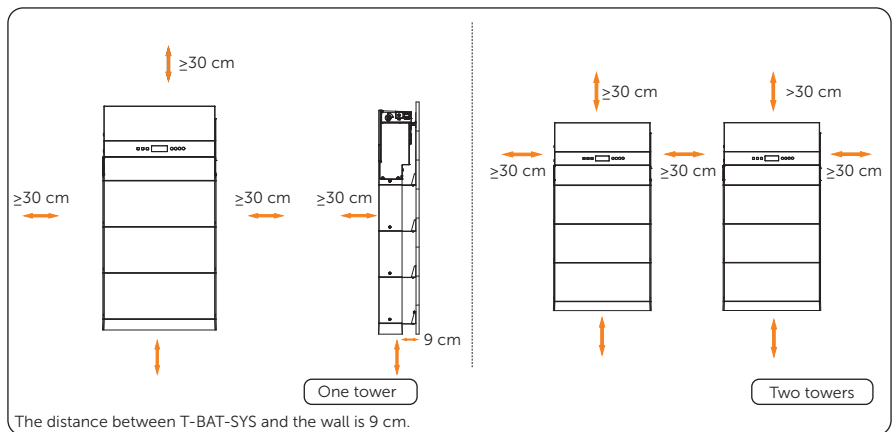


Figure 4-6 Clearance requirement

NOTICE!

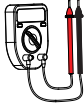
- If wall mounting is selected, the distance between the base and the ground is decided by the corresponding requirement of the local regulations. For safety, it is suggested the base should be installed as low as possible.

4.2 Tools Requirement

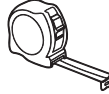
Installation tools include but are not limited to the following recommended ones. If necessary, use other auxiliary tools on site.



Hammer drill



Multimeter



Measuring tape



Utility knife



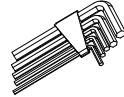
Marker



Cross screwdriver



Flat-head
screwdriver



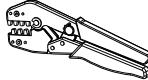
Allen key



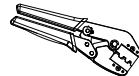
Wire stripper



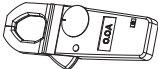
Crimping tool
for RJ45



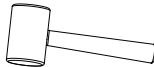
Crimping tool



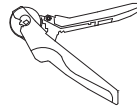
Crimping tool
for PV terminal



Current clamp



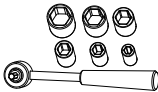
Rubber mallet



Crimping tool for ferrule



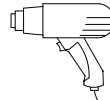
Wire cutter



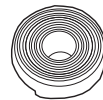
Torque wrench



Spirit level



Heat gun



Ø6 mm Heat shrink tubing



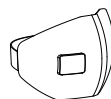
Safety gloves



Safety boots



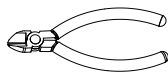
Safety goggles



Anti-dust mask



Torque wrench (M4)



Diagonal plier

4.3 Additionally Required Materials

- Additionally Required Materials of Inverter

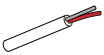
Table 4-20 Additionally required wires of Inverter

No.	Required Material	Type	Conductor Cross-section
1	PV wire 	Dedicated PV wire withstand voltage 600 V	6 mm ²
2	Communication wire 	Network cable CAT5E	0.2 mm ²
3	Additional PE wire 	Conventional yellow and green wire	6 mm ²
4	Protective pipe 	White corrugated pipe	External diameter: over 60 mm

Table 4-21 Grid wire and breaker recommended

Model	2.5 kW	3 kW	3.7 kW	4.6 kW	5 kW	6 kW	8 kW
Three-core wire (copper) 	4 mm ²	6 mm ²	6 mm ²	10 mm ²	10 mm ²	10 mm ²	10 mm ²
Breaker 	25A	32 A	40 A	50 A	50 A	50 A	50 A

Table 4-22 EPS wire and breaker recommended

Model	2.5 kW	3 kW	3.7 kW	4.6 kW	5 kW	6 kW	8 kW
Two-core wire (copper) 	4 mm ²	4 mm ²	4 mm ²	6 mm ²	6 mm ²	6 mm ²	10 mm ²
Breaker 	25 A	25 A	25 A	32 A	32 A	32 A	50 A

*The wire diameter of Grid and EPS cables should be within 13-21 mm.

- **Additionally Required Materials of Battery (T-BAT-SYS)**

Table 4-23 Additionally required wire of T-BAT-SYS

No.	Required Material	Type	Diameter
1	Protective pipe	Corrugated pipe	External diameter: over 67.2 mm

- **Additionally Required Materials of Matebox**

For European and Australian version
Grid and Load Cable and Micro-breaker Recommended

Copper wire		Three-core wire for Grid	14 mm ²
		Two-core wire for Load	
Micro-breaker			63 A

For UK version
Grid and Load Cable and Micro-breaker Recommended

Copper wire		Three-core wire for Grid	27 mm ²
		Two-core wire for Load	
Micro-breaker			125 A

5 Unpacking and Inspection

The number of cartons will be different due to different modes of mounting. Therefore, please check whether the number of cartons received are correct before unpacking. For details, please refer to the following table.

Table 5-1 Number of cartons

	One Tower	Two Towers
Floor Mounting	A BMS carton, and carton(s) of battery modules	A BMS carton, a series box carton, and carton(s) of battery modules
Wall Mounting	A BMS carton, a base support carton, and carton(s) of battery modules	A BMS carton, two base support cartons, a series box carton, and carton(s) of battery modules

NOTICE!

- As for the number of cartons of battery modules, it depends on how many battery modules the users purchased.

5.1 Unpacking

- The X1-IES system undergoes 100% testing and inspection before shipping from the manufacturing facility. However, transport damage may still occur. Before unpacking the X1-IES system, please verify that the model and outer packing materials for damage, such as holes and cracks.
- Unpacking the inverter according to the following figure.

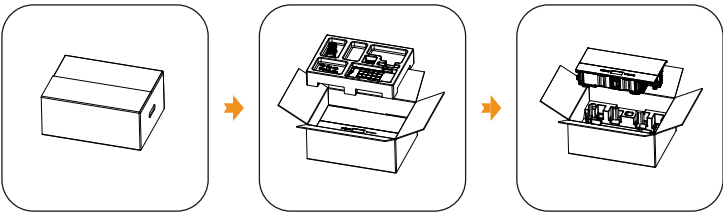


Figure 5-1 Unpacking the Inverter

- Unpacking the BMS and battery module according to the following figures. If there are other cartons, such as the base support carton, and series box carton, the unpacking procedure can also be referred to the following figures.

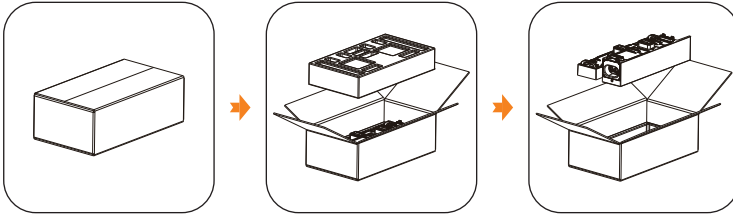


Figure 5-2 Unpacking the BMS

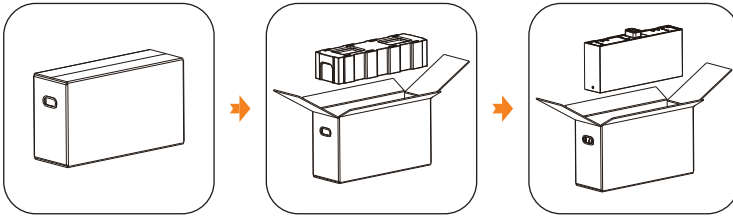
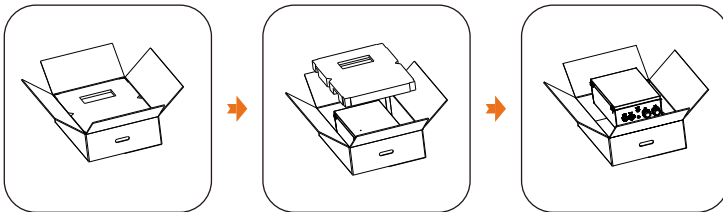


Figure 5-3 Unpacking the battery module

- Unpacking the Matebox according to the following figure.



- Be careful when dealing with all package materials which may be reused for storage and relocation of the X1-IES system in the future.
- After 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.

5.2 Scope of Delivery

- Packing list of Inverter

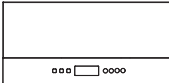
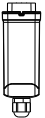
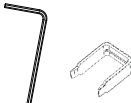
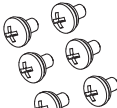
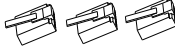
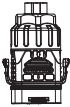
 Inverter	 Bracket	 Positioning cardboard	 Expansion tubes, Self-tapping screws
 Waterproof connector with RJ45	 Document	 Dongle	 Positive & Negative PV connector Positive & Negative PV pin contact
 AC terminal Ferrules for AC terminal	 AC terminal tool	 M5*14 screws	 M5*10 screws
 RJ45 terminals	 Communication terminal	 Right cover plate	 RJ45 connector
 OT terminal	 CT	 Ferrules for Communication terminal	 Disassembling tool for PV terminal
 Positive & Negative PV dustproof buckle			

Table 5-2 Packing list of Inverter

Item	Quantity
Inverter	1 pc
Bracket	2 pcs
Positioning cardboard	1 pc
Expansion tube, Self-tapping screw	2 pairs
Waterproof connector with RJ45	1 pc
Document	1 pc
Dongle	1 pc
Positive & Negative PV connector / pin contact	2 pairs for 2.5kW~3.7kW inverters 3 pairs for 4.6kW~8kW inverters
AC terminal	1 pc
Ferrules for AC terminal *	5 pcs of per type
AC terminal tool	1 pair
M5*14 screw	6 pcs
M5*10 screw	2 pcs
RJ45 terminal	3 pcs
Communication terminal	1 pc
Right cover plate	1 pc
RJ45 connector	1 pc
OT terminal	1 pc
CT	1 pc
Ferrules for Communication terminal	16 pcs
Disassembling tool for PV terminal	1 pc
Positive & Negative PV dustproof buckle	2 pairs for 2.5kW~3.7kW inverters 3 pairs for 4.6kW~8kW inverters

*Ferrules for AC terminal

Model	X1-IES-2.5K	X1-IES-3K X1-IES-3.7K	X1-IES-4.6K X1-IES-5K X1-IES-6K	X1-IES-8K
Ferrules	E 4012 (5 pcs)	E 4012 , E 6012 (5 pcs of per type, 10 pcs in total)	E 6012, E 1012 (5 pcs of per type, 10 pcs in total)	E 1012 (5 pcs)
Applicable wire diamaters	4 mm ²	4 mm ² , 6mm ²	6 mm ² , 10 mm ²	10 mm ²

For Grid and EPS cables, make sure to choose the appropriate ferrules based on the wire diameters.

- Packing list of T-BAT-SYS

BMS (TBMS-MCS0800E)

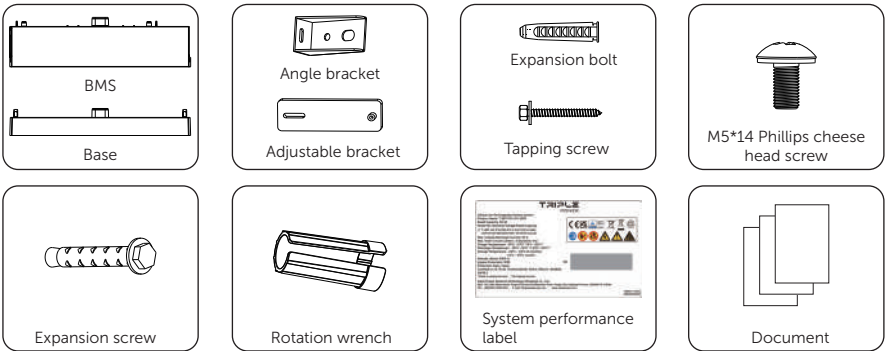


Table 5-3 Packing list of BMS

Item	Quantity
BMS	1 pc
Base	1 pc
Angle bracket	4 pcs
Adjustable bracket	4 pcs
Expansion bolt	6 pcs
Tapping screw	4 pcs
M5x14 Phillips cheese head screw	8 pcs
Expansion screw	2 pcs
Rotation wrench	1 pc

Item	Quantity
System performance label	1 pc
Document	1 pc

Battery Module (TP-HS50E)

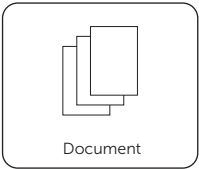
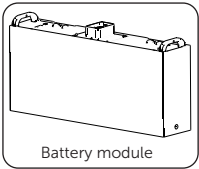


Table 5-4 Packing list of battery module

Item	Quantity
Battery module	1 pc
M5x14 Phillips cheese head screw	2 pcs
Document	1 pc

Series Box (For two towers only)

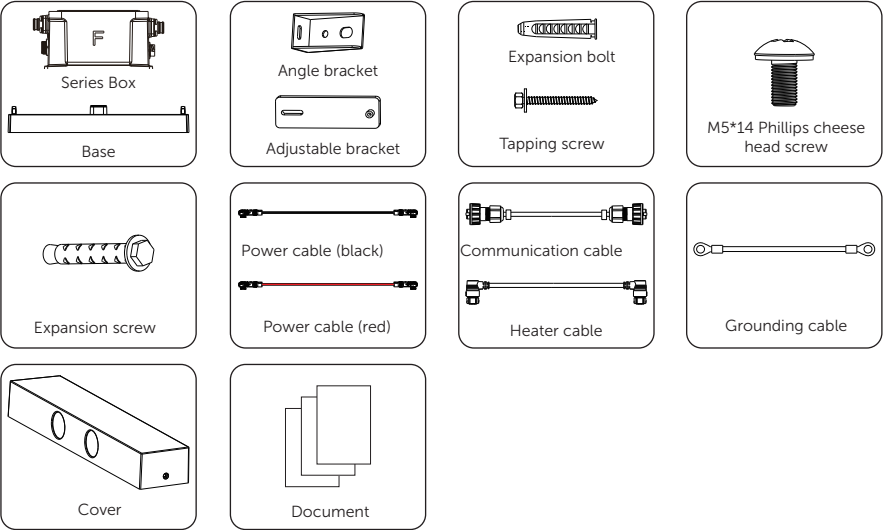


Table 5-5 Packing list of Series Box

Item	Quantity
Series box	1 pc
Base	1 pc
Angle bracket	4 pcs
Adjustable bracket	4 pcs
Expansion bolt	6 pcs
Tapping screw	4 pcs
M5x14 Phillips cheese head screw	12 pcs
Expansion screw	2 pcs
Power cable (black)	1 pc
Power cable (red)	1 pc
Communication cable	1 pc
Heater cable	1 pc
Grounding cable	1 pc
Cover	1 pc
Document	1 pc

Base Support (For wall mounting only)

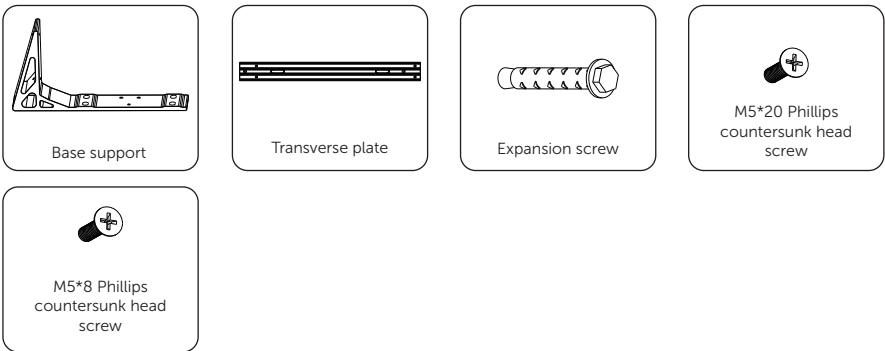


Table 5-6 Packing list of base support

Item	Quantity
Base support	2 pcs
Transverse plate	1 pc
Expansion screw	6 pcs
M5x20 Phillips countersunk head screw	6 pcs
M5x8 Phillips countersunk head screw	4 pcs

• Packing list of X1-Matebox-G2

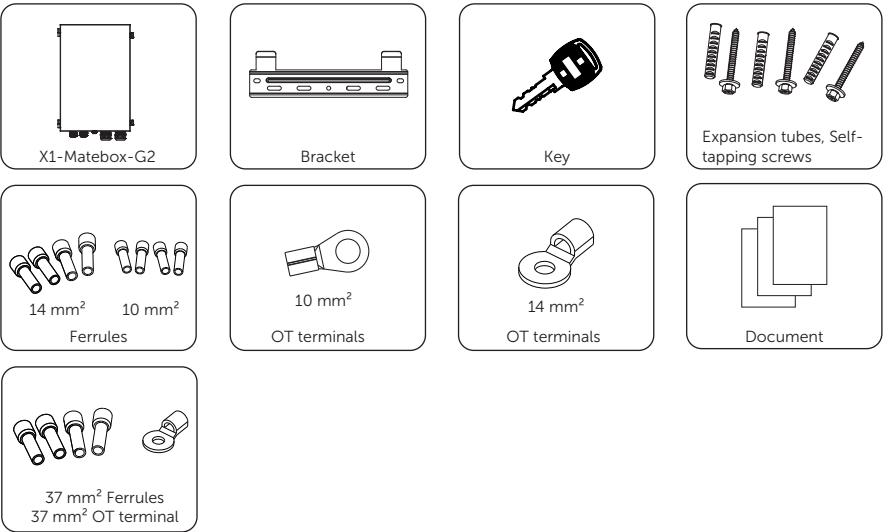


Table 5-7 Packing list of X1-Matebox-G2

Item	Quantity
X1-Matebox-G2	1 pc
Bracket	1 pc
Key	4 pcs
Expansion tube, Self-tapping screw	3 pairs
Ferrules (14 mm ² × 4, 10 mm ² × 4)	4 pcs
OT terminal (10 mm ²)	1 pc
OT terminal (14 mm ²)	1 pc
Document	1 pc
Ferrules (37 mm ²)	4 pcs
OT terminal (37 mm ²)	1 pc

6 Mechanical Installation

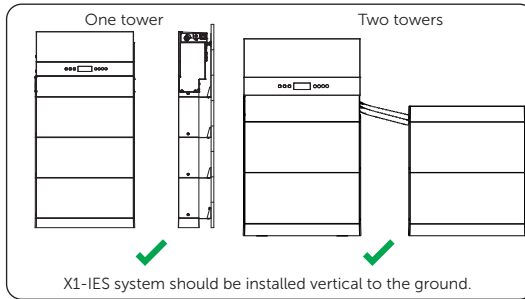


Figure 6-1 Correct installation angle

There are two mechanical installation modes of X1-IES system, floor mounting and wall mounting. The following is the two installation modes. Option C (with three battery modules) is taken as an example.

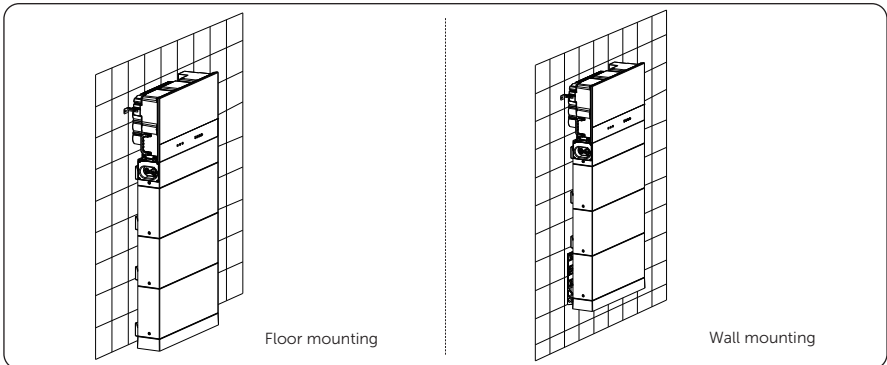


Figure 6-2 Installation modes

 WARNING!

- Only the qualified personnel can perform the mechanical installation following the local standards and requirements.
- Check the existing power cables or other piping in the wall to prevent electric shock or other damage.

 CAUTION!

- Always be aware of the weight of the X1-IES system. Personal injuries may result if the inverter is lifted improperly or dropped while being transported or mounted.
- Use insulated tools and wear individual protective tools when installing the X1-IES system.

NOTICE!

- Please ensure that the bearing capacity of the ground and the wall, respectively, that are used to install the X1-IES series must be over 927 kg, which is based on option C. If option D is chosen, the bearing capacity of the ground and the wall, respectively, must be over 1077 kg; (The maximum net weight of an inverter (27kg) is taken as an example.)
- The device must not be installed on the wood wall.
- At least two persons are required to move the devices of X1-IES system.
- Please reserve enough distance from the device to the ceiling (or the grounding) for capacity expansion.

6.1 Mechanical Installation of Battery and Inverter

6.1.1 Floor Mounting

One Tower for Floor Mounting

NOTICE!

- The mode of floor mounting is given priority for installation.
- Take the installation procedure Option C (With 3 battery modules) as an example.

1. Prepare and install the base and battery modules

Step 1: Remove dust covers from the base, battery module(s) and BMS before conducting installation.

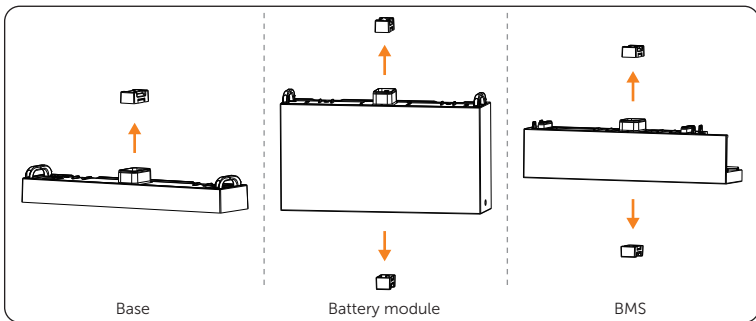


Figure 6-3 Removing dust covers

Step 2: Place a spirit level to check whether the base is even. If yes, refer to the Step 4; if no, refer to the Step 3. The side with "R" shall be against the wall.

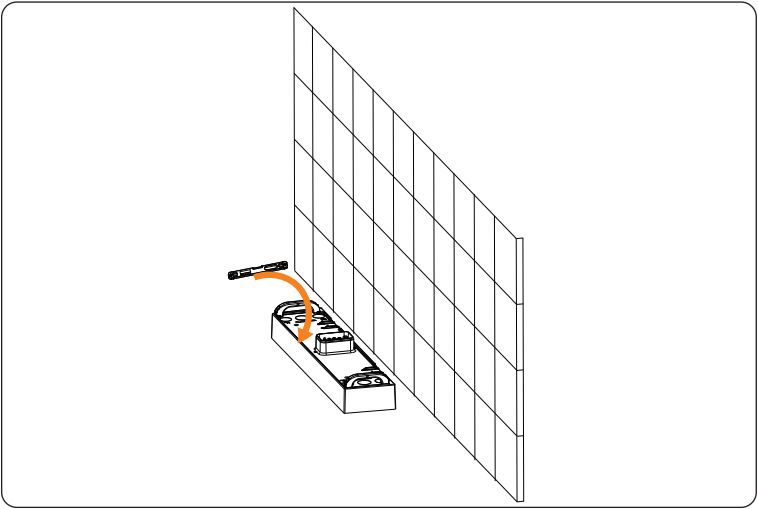


Figure 6-4 Determining whether the Base is level

Step 3: Rotate the adjustment screws clockwise to ensure that it is even.
Turn clockwise to lower the base, and turn anticlockwise to raise the base.

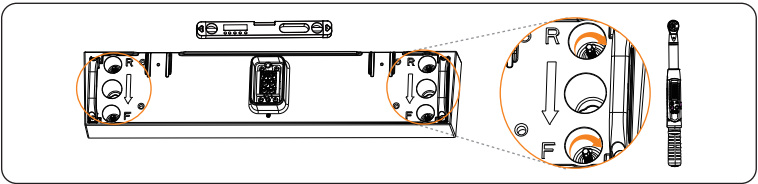
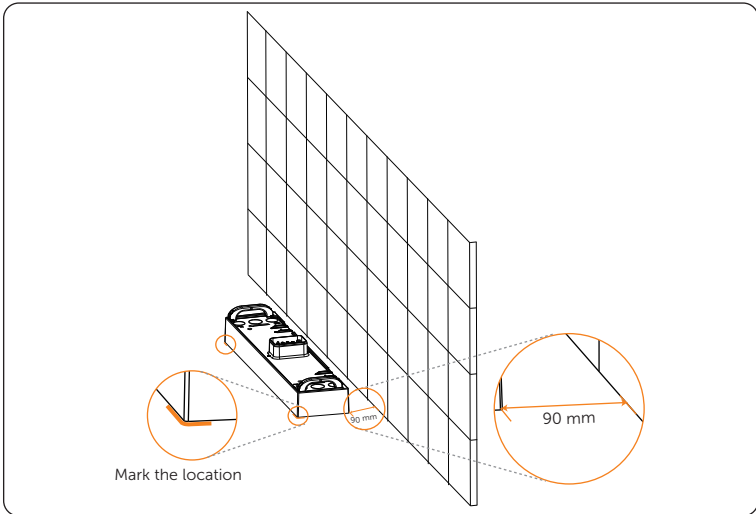


Figure 6-5 Rotating adjustment screws

NOTICE!

- Use a spirit level to measure both side of the base to ensure that the base is even. If not, please rotate the adjustment screws by a torque wrench to ensure that the base is even.

Step 4: Locate the base 90 mm away from the wall, mark the location of the base on both sides with a marker.



Step 5: Attach the angle bracket and adjustable bracket together by using M5x14 screws, but do not tighten them for a while.

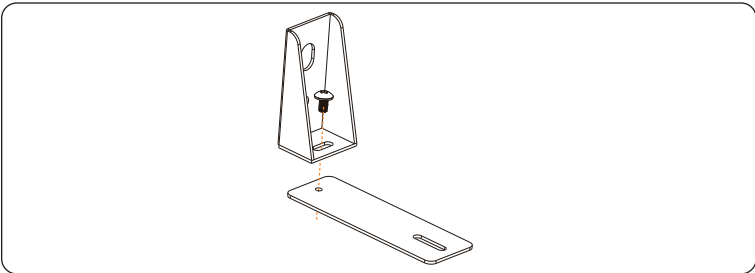


Figure 6-6 Attaching two brackets

Step 6: Place the assembled bracket on the wall, align the hole to the hole on the battery module; and circle along the inner ring of the holes on the angle brackets. Totalling 2 assembled brackets need to be installed.

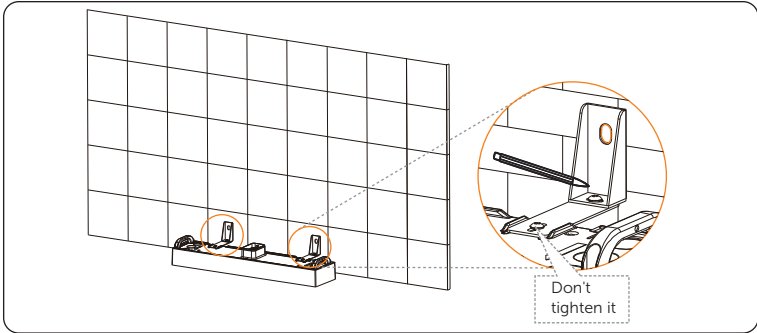


Figure 6-7 Circling inner ring of holes

Step 7: Remove the assembled bracket, and then drill two holes at a depth of more than 60 mm in the concrete wall by using a Drill ($\varnothing 10$ mm).

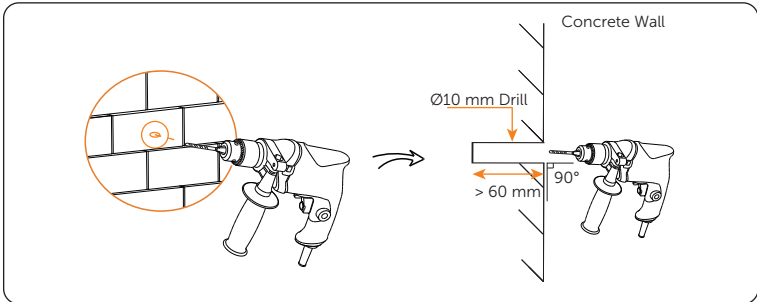


Figure 6-8 Drilling holes

NOTICE!

- An electric drill dust collector is recommended.
- When drilling holes, make sure the already installed part is covered to prevent dust from falling onto the device.

Step 8: Insert the expansion bolts into two holes, tighten the tapping screws to secure the assembled bracket on the wall (torque: 8-10 N·m), and then tighten M5x14 screws on both sides (torque: 2.2-2.5 N·m).

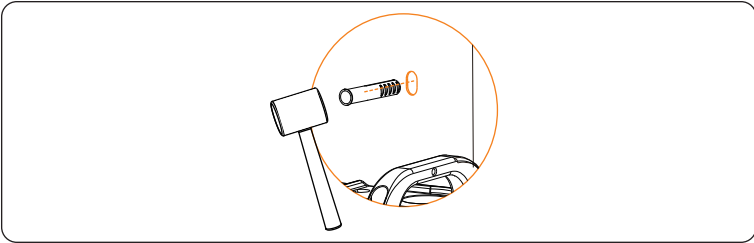


Figure 6-9 Inserting the expansion bolt

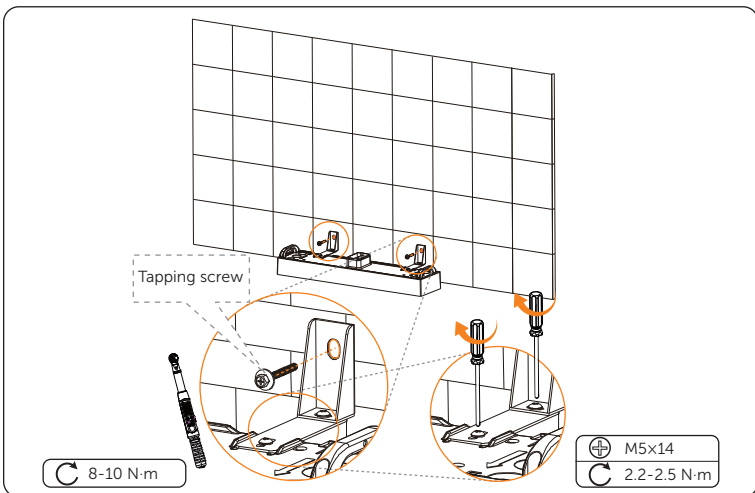


Figure 6-10 Securing the assembled bracket

NOTICE!

- If the base is shifted before securing assembled bracket, move it to its original location according to the mark previously drawn.

Step 9: Place a battery module on the base.

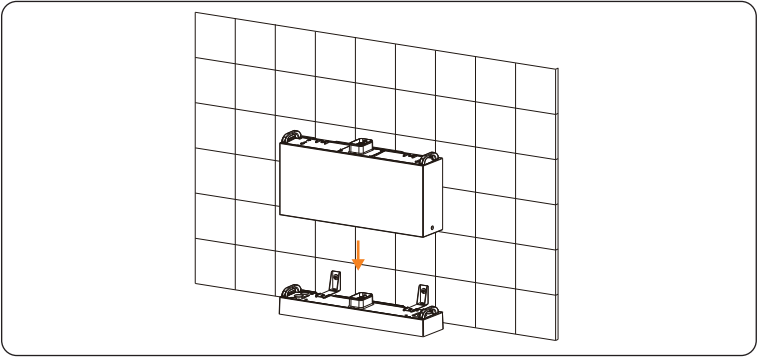


Figure 6-11 Placing the battery module

NOTICE!

- At least two persons are required to move the battery module.
- please ensure that the side with "R" shall be lean against the wall.

Step 10: Insert and tighten M5x14 screws on both sides (torque: 2.2-2.5 N·m).

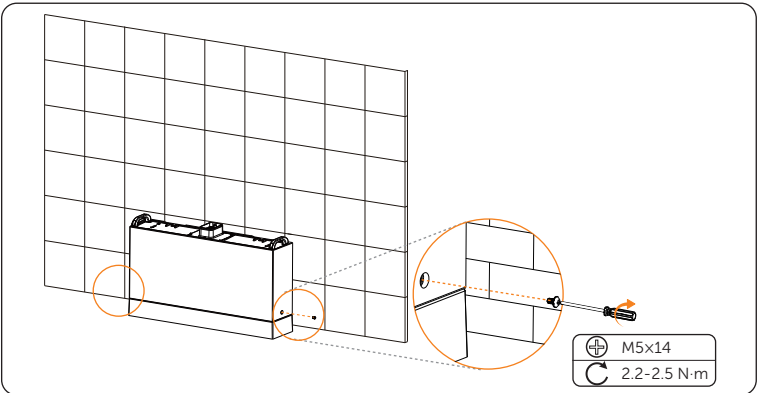


Figure 6-12 Tightening screws

NOTICE!

- Please make sure that the corners and edges of the base and battery module are aligned before tightening screws.

Step 11: Place the second and third battery modules, and make sure that the corners and edges of the battery modules are aligned.

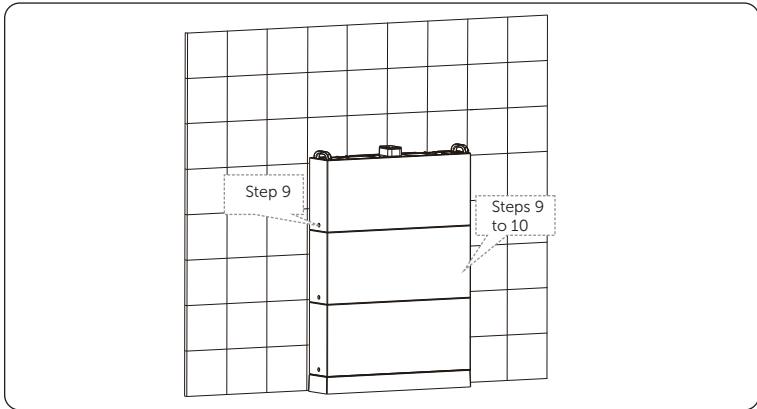


Figure 6-13 Placing battery modules

2. Install the bracket of the top battery module

Step 1: Assemble the bracket of the battery module, secure the bracket with M5*14 screw, but not tighten it for a while.

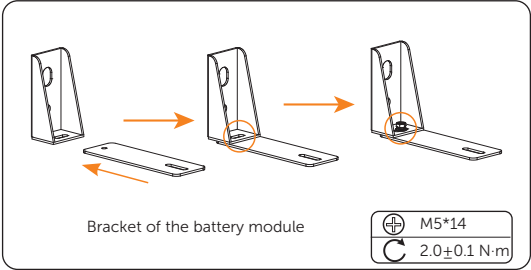


Figure 6-14 Securing the bracket

Step 2: Align the bracket of the battery module with the mounting holes on the battery module, and mark the position of the mounting holes.

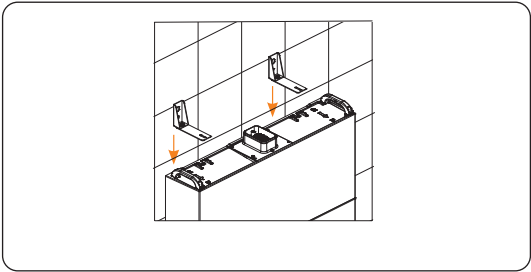
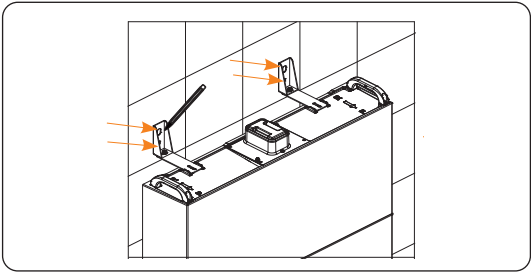


Figure 6-15 Aligning the bracket with the mounting holes



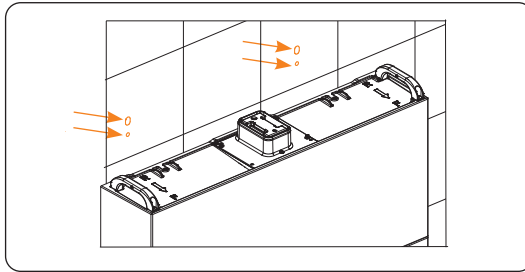


Figure 6-16 Marking the position of the mounting holes

Step 3: Align the positioning cardboard with the bottom two mounting holes, and mark the position of the mounting holes of X1-IES.

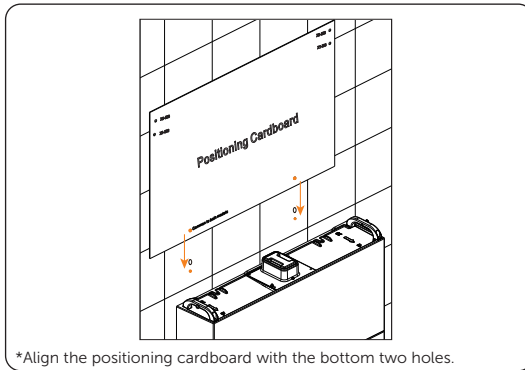
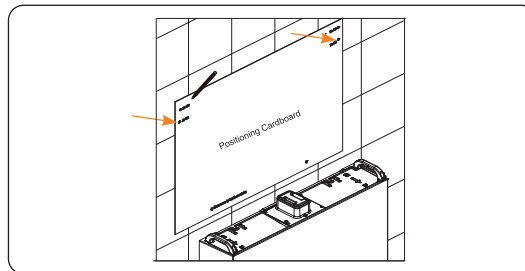


Figure 6-17 Aligning the positioning cardboard



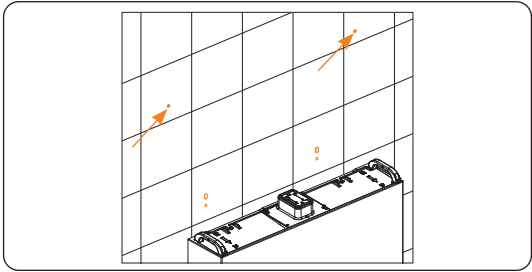


Figure 6-18 Marking the position of the mounting holes

Step 4: Drill the upper four holes with Ø10 drill bit, and make sure the depth of the holes should be over 60 mm. Then insert the expansion tubes into the holes.

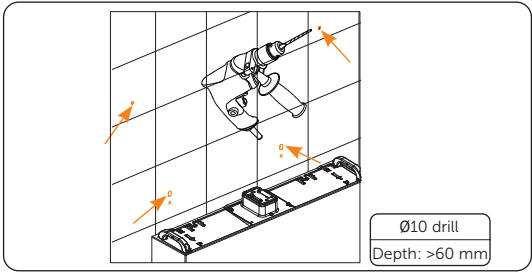


Figure 6-19 Drilling the upper four holes

NOTICE!

- When drilling holes, make sure the already installed part is covered to prevent dust from falling onto the device.

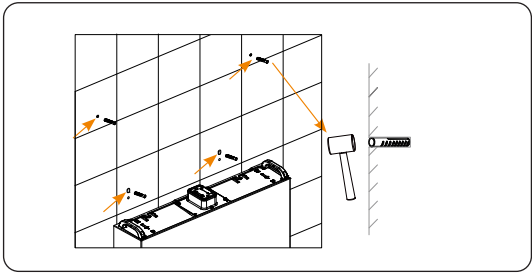


Figure 6-20 Inserting the expansion tubes into the holes

Step 5: Secure the assembled brackets on the wall by using tapping screws, and then tighten M5x14 screws (torque: 2.2-2.5 N·m).

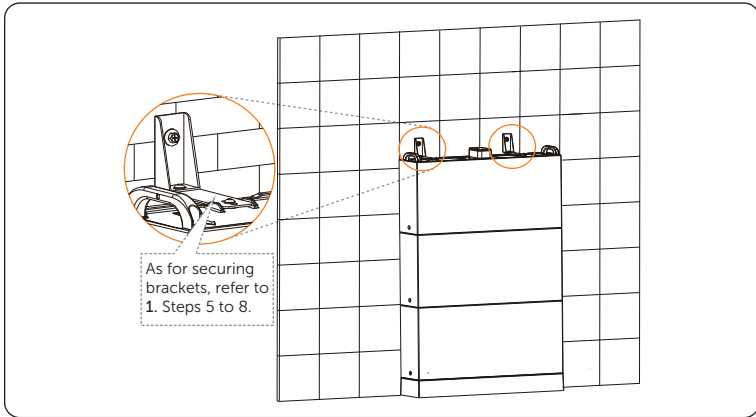


Figure 6-21 Securing assembled bracket

Step 6: Remove the dust cover of top battery module.

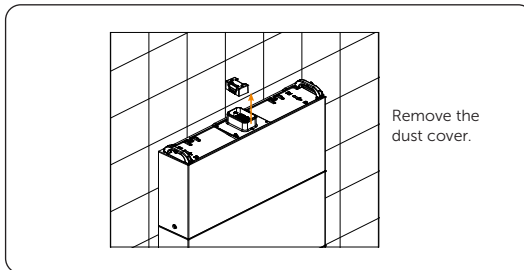


Figure 6-22 Removing the dust cover

3. Install the BMS

Step 1: Remove the dust cover of the BMS. Place the BMS, and then tighten the M5x14 screws on both sides (torque: 2.2-2.5 N·m)

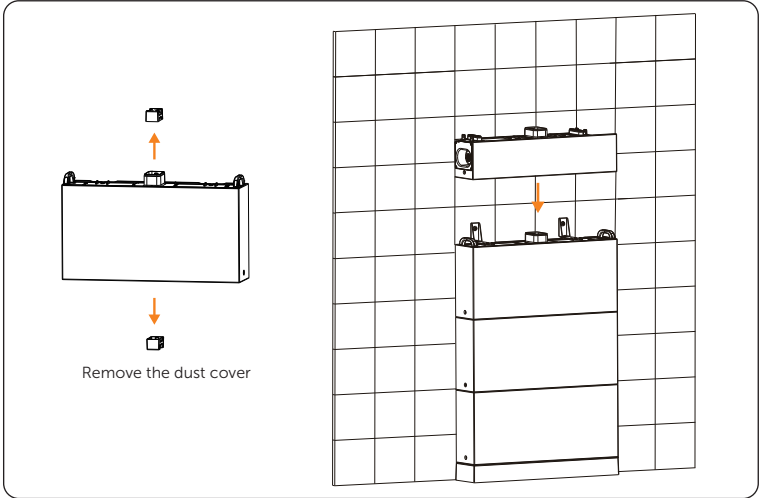


Figure 6-23 Placing the BMS

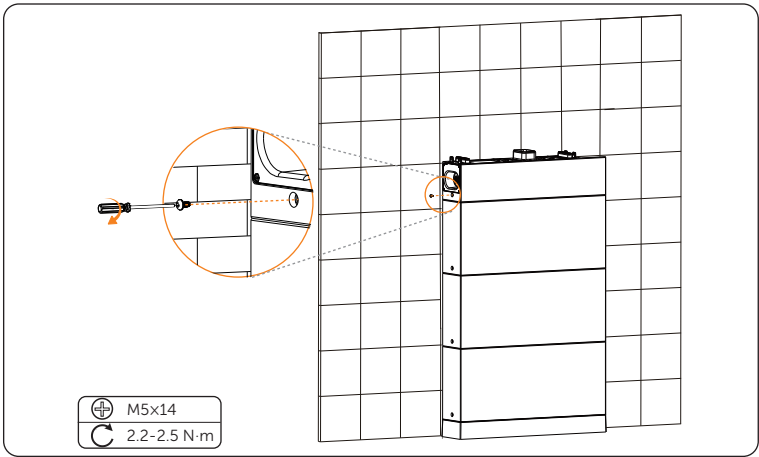


Figure 6-24 Tightening M5 screws

NOTICE!

- Please make sure that the corners and edges of the BMS and battery module are aligned before tightening screws.

4. Install the inverter

Step 1: Remove the dust cover of the inverter, and stack the inverter into the BMS.

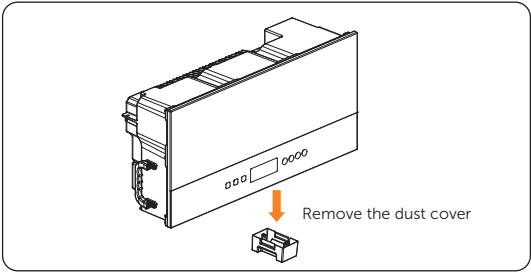


Figure 6-25 Removing the dust cover

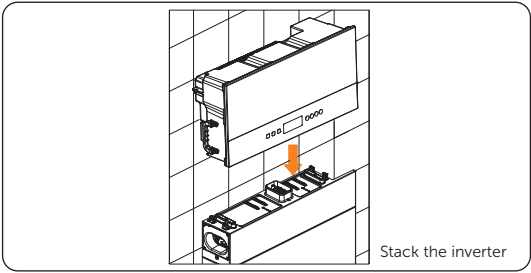


Figure 6-26 Stacking the inverter

Step 2: Tighten the M5*14 screws between the inverter and the BMS (torque: 2.0 ± 0.1 N·m).

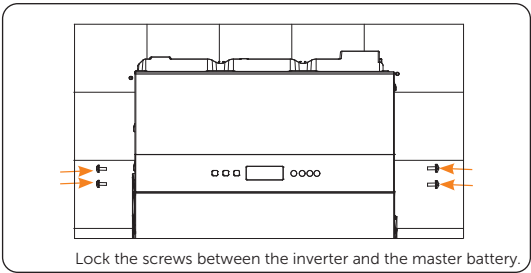


Figure 6-27 Lock the M5*14 screws

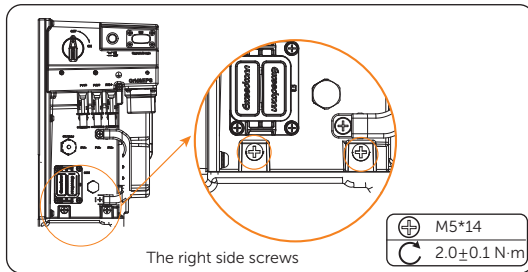


Figure 6-28 Locking the right side screws

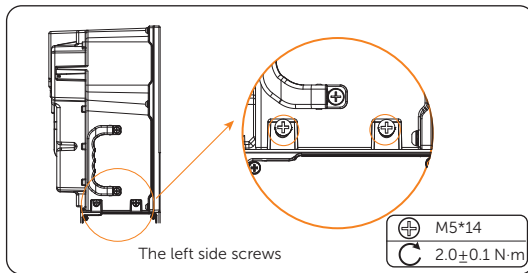


Figure 6-29 Locking the left side screws

Step 3: Install the bracket of the inverter. Slightly tighten but not lock the M5*10 screws on both sides of the inverter (torque: 2.0 ± 0.1 N·m).

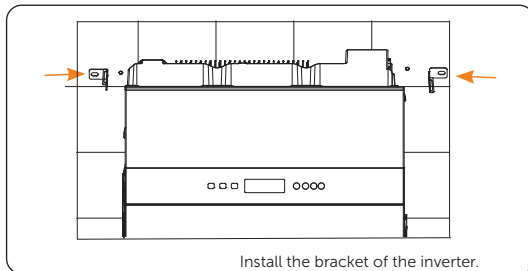


Figure 6-30 Installing the bracket of the inverter

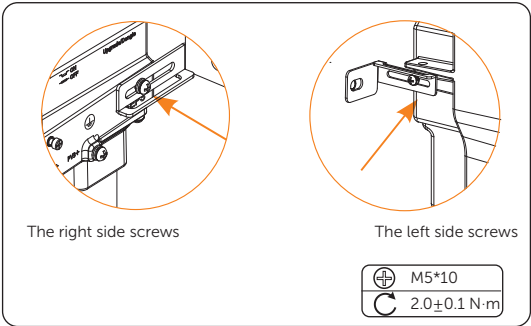


Figure 6-31 Tightening but not locking the screws

Step 4: Lock the self-tapping screws on the wall, then lock the M5*10 screws on both sides of the inverter.

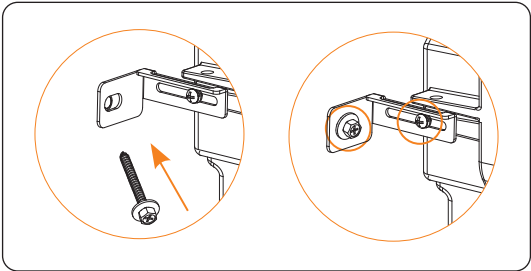


Figure 6-32 Locking the left side self-tapping screw and M5*10 screw

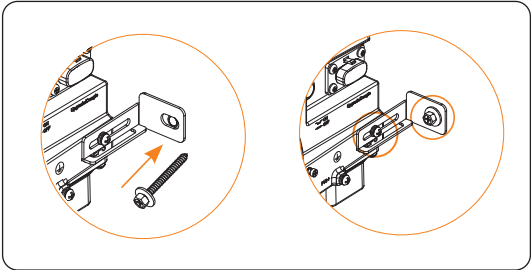


Figure 6-33 Locking the right side self-tapping screw and M5*10 screw

Step 5: (Optional) Users can choose to lock the bracket on the left side of the inverter with a lock, thus providing the device a double guarantee. The aperture of the bracket is 8 mm, make sure the aperture of the lock is less than 8 mm.

Two Tower for Floor Mounting

NOTICE!

- Take the installation procedure Option E (with 2+2 battery modules) as an example.

Step 1: As for the installation steps for the following figure, please refer to the installation procedure for [6.1.1 One Tower for Floor Mounting](#). The installation procedure for both left and right towers is the same.

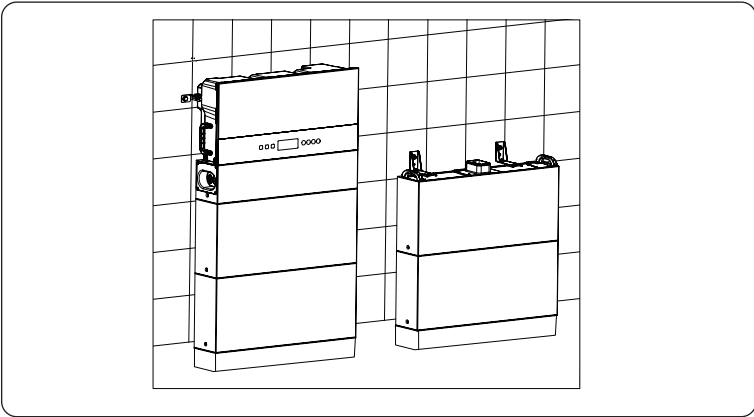


Figure 6-34 Installing two towers

Step 2: Place the series box, insert and tighten M5x14 screws, with totalling 4 screws (torque: 2.2-2.5 N·m).

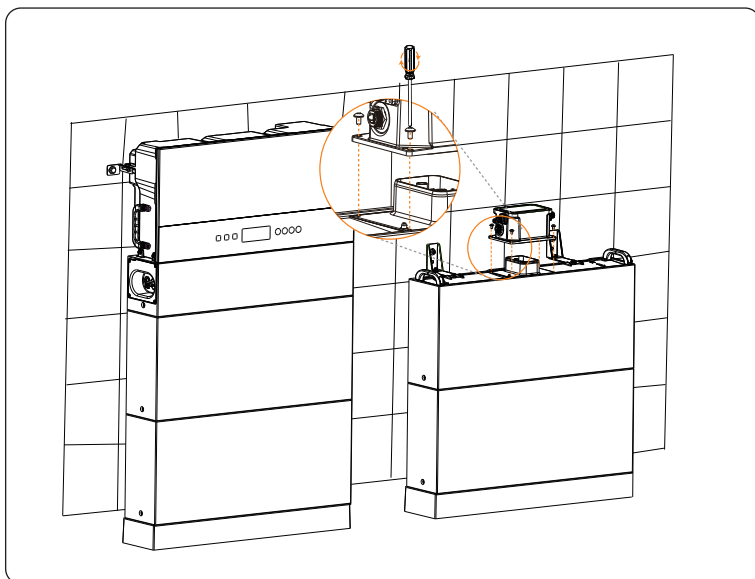


Figure 6-35 Placing the series box

NOTICE!

- The side of the series box with "R" shall be lean against the wall.
- The cover that covers on the series box shall be installed after finishing wiring. As for the installation procedure of the cover, please refer to the section of [7.2.3 Installation of Cover](#).

6.1.2 Wall Mounting

One Tower for Wall Mounting

NOTICE!

- Ensure that the bearing capacity of ground and the wall is greater than the weight of X1-IES system. Otherwise, the wall mounting mode is not recommended.
- Take the installation procedure Option C (With 3 battery modules) as an example.

1. Prepare and install the base and battery modules

Step 1: Remove dust covers from the base, battery module(s) and BMS before conducting installation.

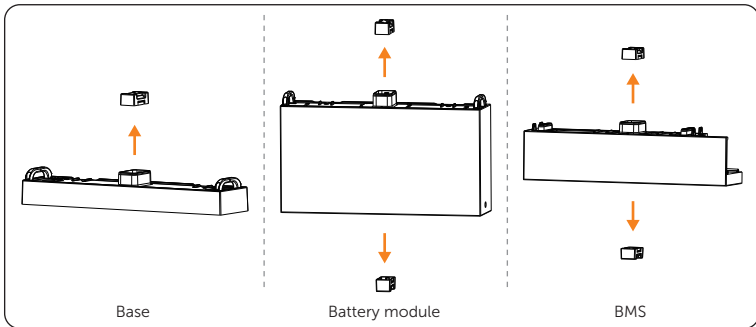


Figure 6-36 Removing dust covers

Step 2: Tighten M5×8 screws on both sides to attach the base support and transverse plate together (torque: 2.2-2.5 N·m).

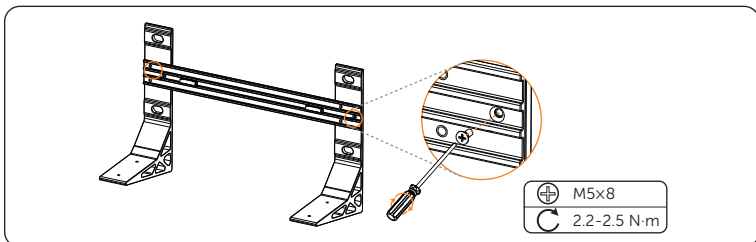


Figure 6-37 Attaching base support and transverse plate

Step 3: Place the assembled base support and transverse plate on the wall, check the cylindrical plastic bubble spirit level on the transverse plate. If the bubble is not in the centre, slightly bow it to the horizontal.

Then circle along the inner ring of the four holes.

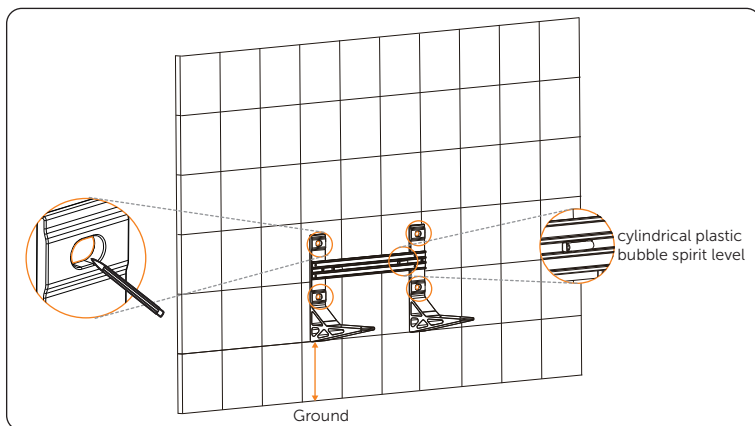


Figure 6-38 Drawing circles

NOTICE!

- The distance between the base support to the ground is decided according to the local regulations. And it is also the distance between the base to the ground. For the safety concerns, it is suggested that the height from the ground not be too high.
- Please leave enough distance to the ceiling to install the inverter.

Step 4: Remove the assembled base support and transverse plate, and then drill four holes at a depth of at least 110 mm by using a Drill (Ø15 mm).

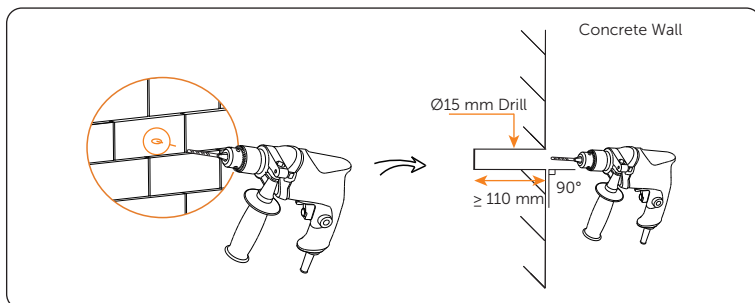


Figure 6-39 Drilling holes

NOTICE!

- An electric drill dust collector is recommended.
- When drilling holes, make sure the already installed part is covered to prevent dust from falling onto the device.

Step 5: Place the assembled base support and transverse plate on the wall again, and check whether the bubble is in the centre.

Attach the expansion screws to such four holes, hit it by using rubber mallet, and then tighten it by using torque wrench (torque: 20-25 N·m)

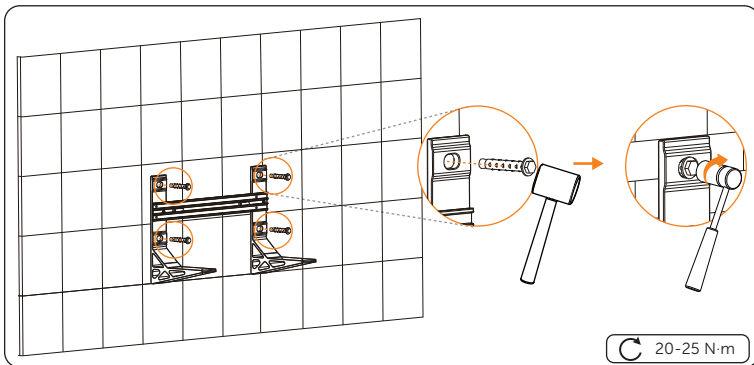


Figure 6-40 Tightening expansion screws

Step 6: Place the base on the base support, and secure both left and right sides with M5x20 screws (torque: 2.2-2.5 N·m). There are totalling 4 M5x20 screws shall be tightened.

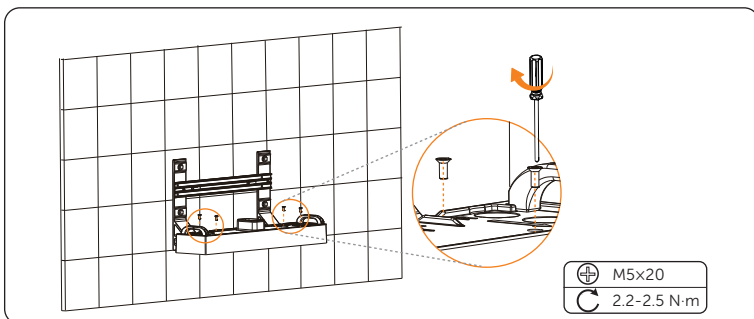


Figure 6-41 Securing the base

Step 7: Place the battery module on the base.

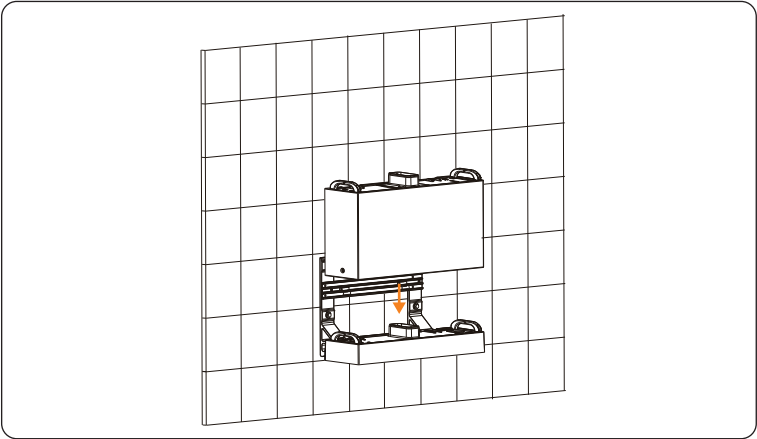


Figure 6-42 Placing battery module

NOTICE!

- At least two persons are required to move the battery module.
- Make sure that the side of the series box with "R" shall be lean against the wall.

Step 8: Insert and tighten M5x14 screws on both sides (torque: 2.2-2.5 N·m).

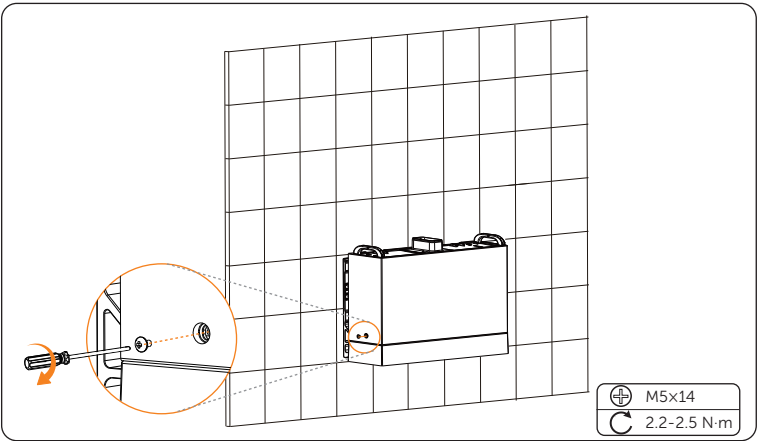


Figure 6-43 Tightening screws

NOTICE!

- Please make sure that the corners and edges of the base and battery module are aligned before tightening screws.

Step 9: Place the second and third battery modules, and make sure that the corners and edges of the battery modules are aligned.

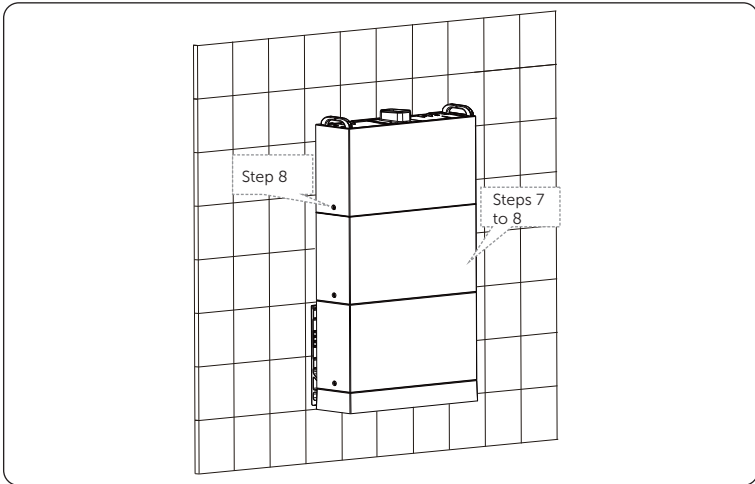


Figure 6-44 Placing battery modules

2. Install the bracket of the top battery module

Step 1: Assemble the bracket of the battery module, secure the bracket with M5*14 screw, but not tighten it for a while.

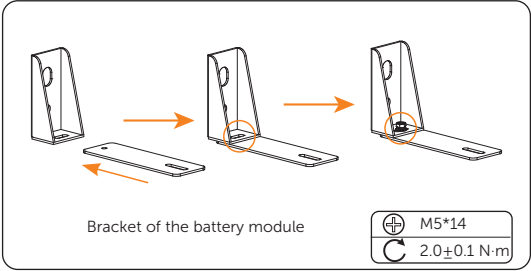


Figure 6-45 Securing the bracket

Step 2: Align the bracket of the battery module with the mounting holes on the battery module, and mark the position of the mounting holes.

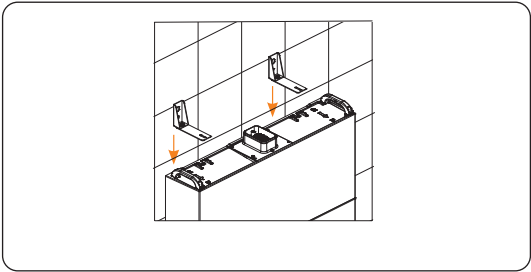
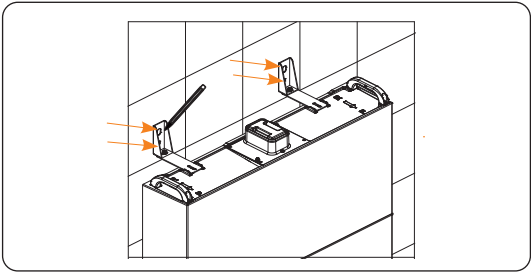


Figure 6-46 Aligning the bracket with the mounting holes



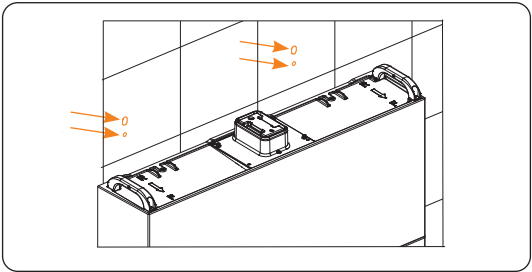


Figure 6-47 Marking the position of the mounting holes

Step 3: Align the positioning cardboard with the bottom two mounting holes, and mark the position of the mounting holes of X1-IES .

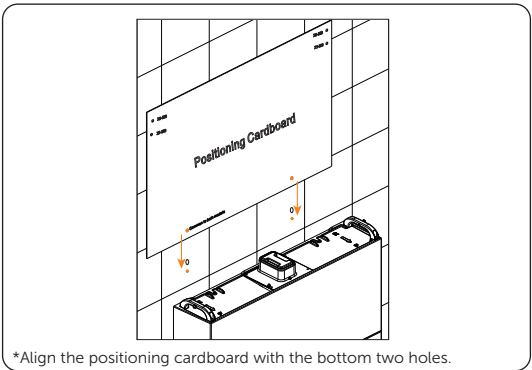
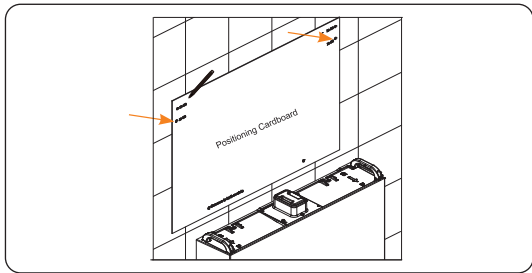


Figure 6-48 Aligning the positioning cardboard



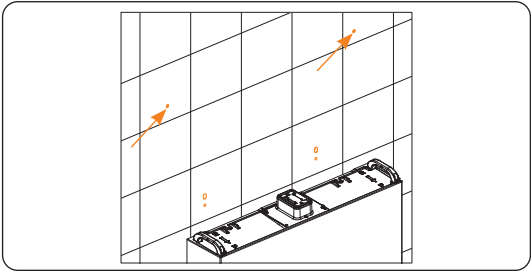


Figure 6-49 Marking the position of the mounting holes

Step 4: Drill the upper four holes with $\varnothing 10$ drill bit, and make sure the depth of the holes should be over 60 mm. Then insert the expansion tubes into the holes.

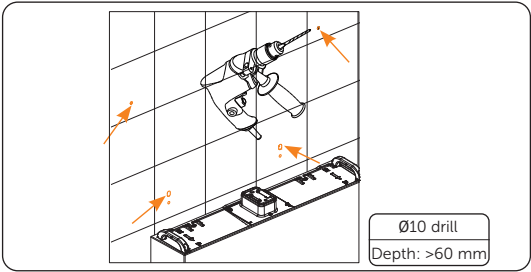


Figure 6-50 Drilling the upper four holes

NOTICE!

- When drilling holes, make sure the already installed part is covered to prevent dust from falling onto the device.

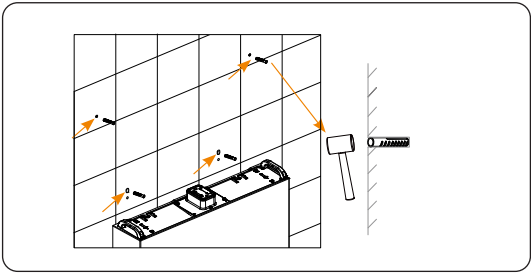


Figure 6-51 Inserting the expansion tubes into the holes

Step 5: Tighten the tapping screws to secure the assembled bracket on the wall (torque: 8-10 N·m), and then tighten M5x14 screws on both sides (torque: 2.2-2.5 N·m).

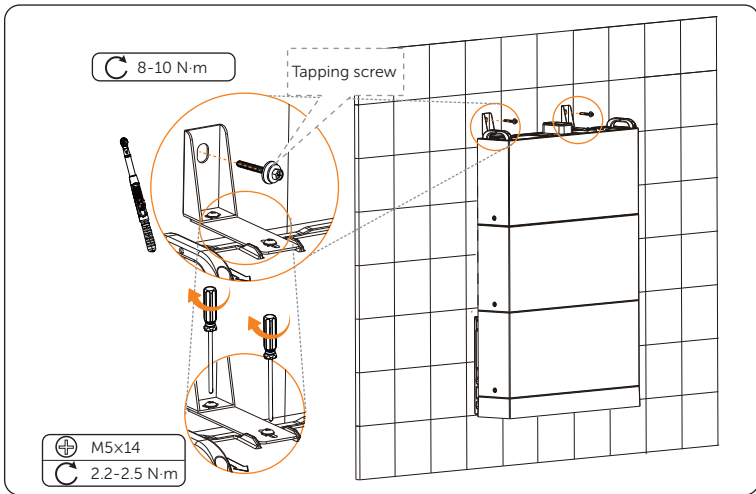


Figure 6-52 Securing the assembled bracket

Step 6: Remove the dust cover of top battery module.

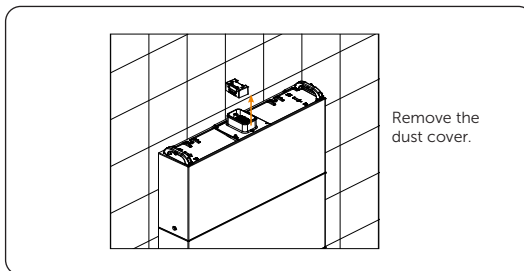


Figure 6-53 Removing the dust cover

3. Install the BMS

Step 1: Remove the dust cover of the BMS. Place the BMS, and then tighten the M5×14 screws on both sides (torque: 2.2-2.5 N·m)

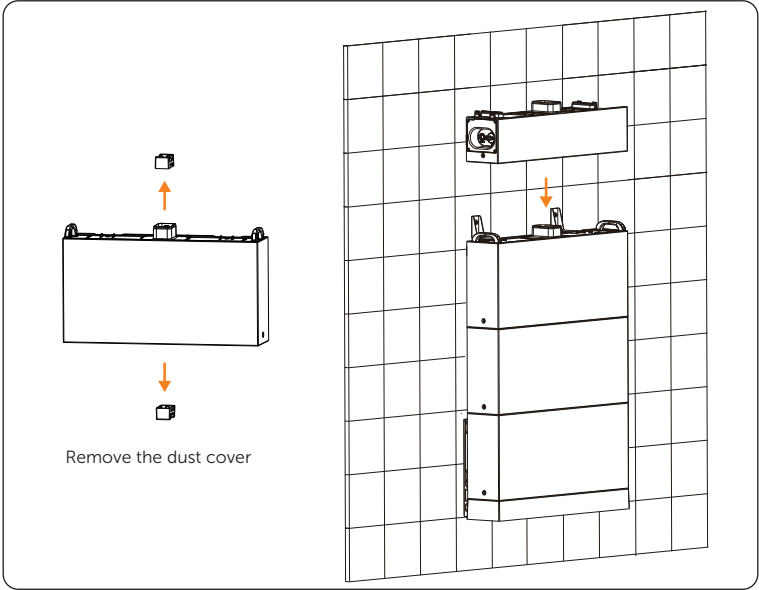


Figure 6-54 Placing the BMS

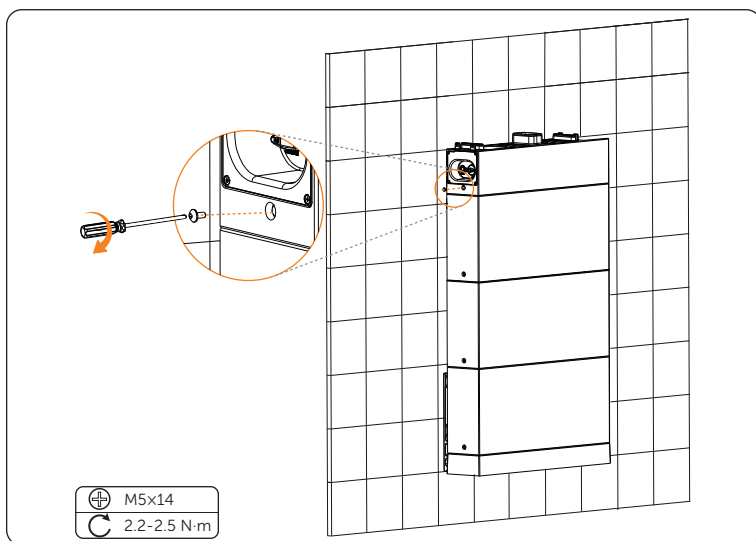


Figure 6-55 Tightening M5 screws

NOTICE!

- Please make sure that the corners and edges of the BMS and battery module are aligned before tightening screws.

4. Install the inverter

For the steps of installing the inverter, please refer to [4. Install the inverter](#) in One Tower for Floor Mounting.

Two Towers for Wall Mounting

NOTICE!

- Take the installation procedure Option E (with 2+2 battery modules) as an example.

Step 1: As for the installation steps for the following figure, please refer to the installation procedure for [6.1.2 One Tower for Wall Mounting](#). The installation procedure for both left and right towers is the same.

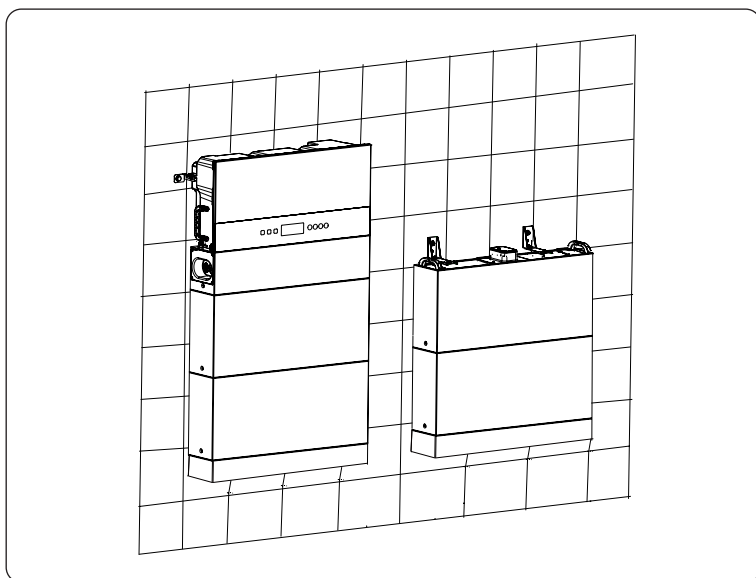


Figure 6-56 Installing two towers

Step 2: Place the series box, insert and tighten M5x14 screws, with totalling 4 screws (torque: 2.2-2.5 N·m).

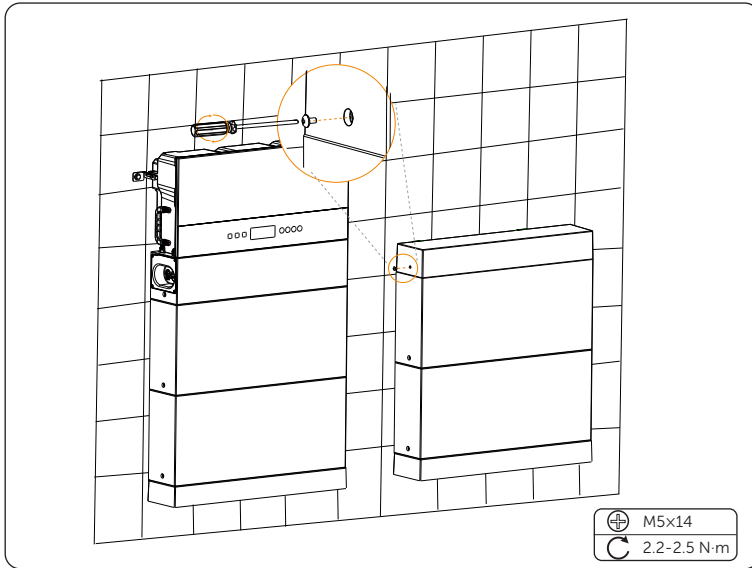


Figure 6-57 Placing the series box

NOTICE!

- The side of the series box with "R" shall be lean against the wall.
- The cover that covers on the series box shall be installed after finishing wiring. As for the installation procedure of the cover, please refer to the section of [7.2.3 Installation of Cover](#)

6.1.3 Battery Capacity Expansion

The device is allowed to increase the number of battery modules to achieve capacity expansion. After the system is installed, if users need to add batteries for capacity expansion, perform this operation.

As for the battery capacity expansion, it may have to dismantle the inverter. In that case, please strictly follow the *User Manual* to remove or install the inverter.

NOTICE!

- Do not mix different types or makes of the battery module. It may cause leakage or rupture, resulting in personal injury or property damage.
- Please confirm that there is enough space to increase the number of battery modules.
- Please make sure that the ground and wall that are used to install the new battery modules can handle the additional weight.

6.2 Mechanical Installation of X1-Matebox-G2

NOTICE!

- The recommended horizontal distance between X1-IES and X1-Matebox G2 is less than 100 cm.
- For the height of X1-Matebox G2, the bottom of the ports of X1-Matebox G2 should be a little bit higher than the outlet of the inverter.

Step 1: Horizontally align the wall mounting bracket with the wall, adjust the position of the bracket with a spirit level until the bubble stays in the middle, and then mark holes. Please note that take the height of the battery into account when determining the position of the wall mounting bracket.

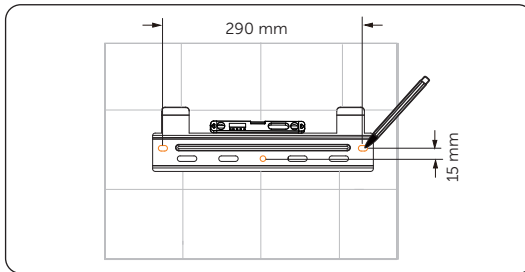


Figure 6-58 Marking holes

Step 2: Set the wall mounting bracket aside and drill holes with $\varnothing 10$ drill bit. The depth of the holes should be more than 80 mm.

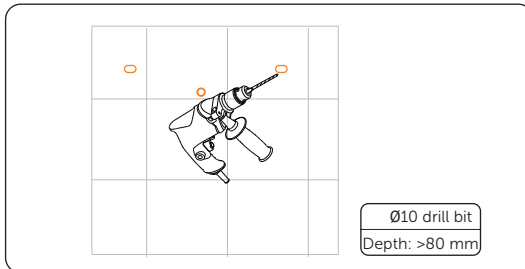


Figure 6-59 Drilling holes

NOTICE!

- When drilling holes, make sure the already installed part is covered to prevent dust from falling onto the device.

Step 3: Knock the expansion tubes into the holes.

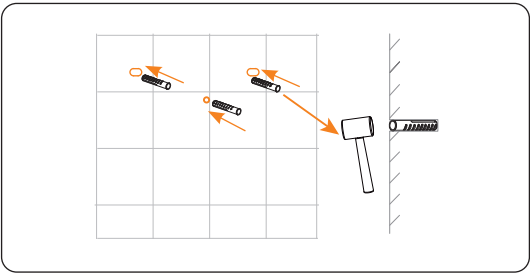


Figure 6-60 Knocking the expansion tubes

Step 4: Attach the wall mounting bracket on the wall again. Insert the ST6.3 self-tapping screws into expansion tubes and secure them to the wall by torque wrench.

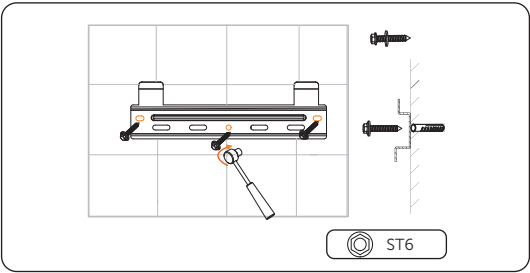


Figure 6-61 Securing the bracket

- Step 5:** Lift up the inverter collaboratively by the required number of personnel in accordance with the local regulation and hang it onto the wall mounting bracket. Make sure that the hanging holes of the inverter are properly inserted into the lugs of the bracket.

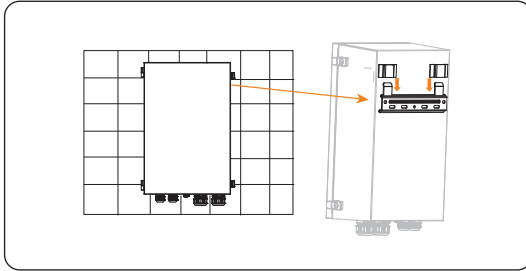


Figure 6-62 Hanging the inverter

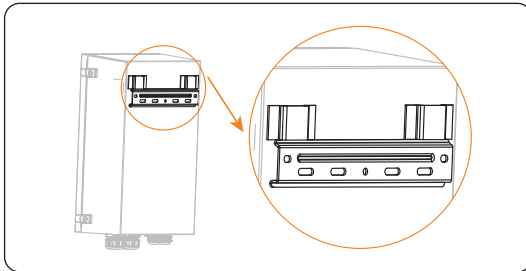
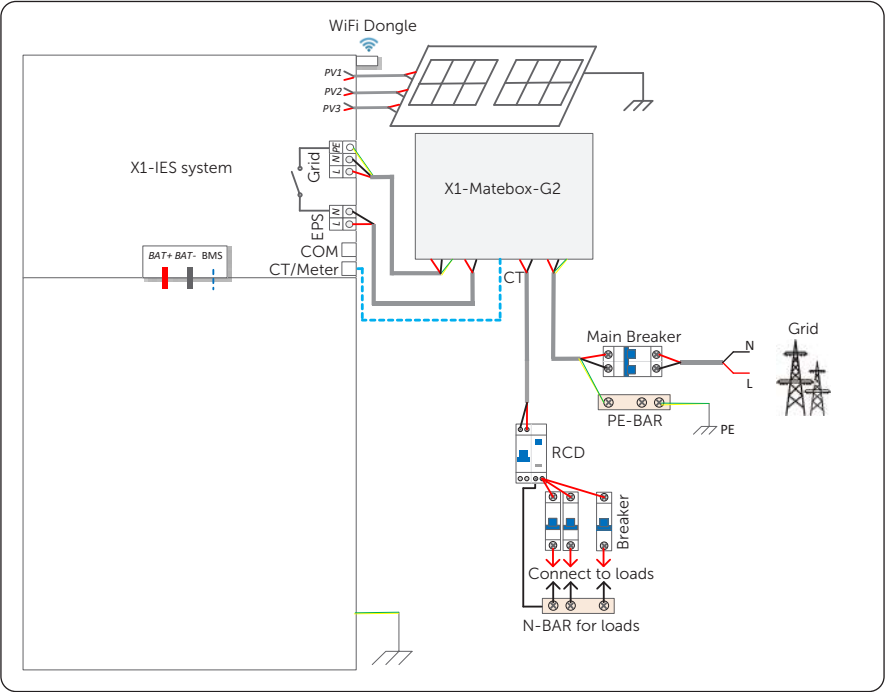


Figure 6-63 Hanging the inverter

7 Electrical Connection

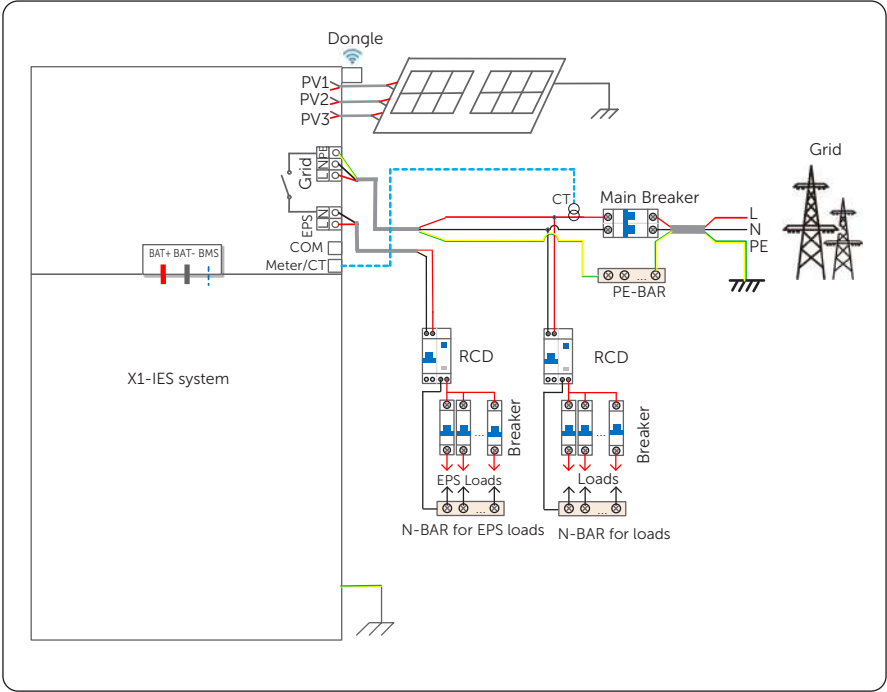
7.1 System Diagram

System Diagram with Matebox



*For X1-Matebox G2, the Meter/CT port supports only CT connection.

System Diagram without Matebox



*The inverter supports Meter or CT connection. Here is taken CT connection as an example.

7.2 Electrical Connection on the Battery (T-BAT-SYS)

7.2.1 Details of Cables

Communication cable: There are two terminals at both ends. One connects to the COM port of the BMS, and the other connects to the COM port of the series box.

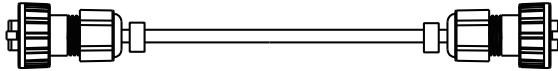


Figure 7-1 Communication cable

Heater cable: There are two terminals at both ends. One connects to the HEAT port of the BMS, and the other connects to the HEAT port of the series box.

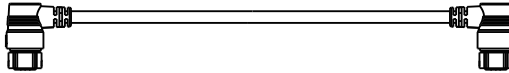


Figure 7-2 Heater cable

Power cable (black): There are two terminals with the same function at both ends. One connects to the "BAT-" of the BMS, and the other connects to the "BAT-" of the series box.



Figure 7-3 Power cable (black)

Power cable (red): There are two terminals with the same function at both ends. One connects to the "BAT+" of the BMS, and the other connects to the "BAT+" of the Series Box.



Figure 7-4 Power cable (red)

Grounding cable: There are two terminals at both ends. One connects the grounding port of the BMS, and the other connects to the grounding port of the series box.

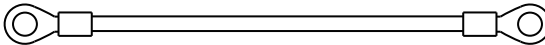


Figure 7-5 Grounding cable

NOTICE!

- The above-mentioned cables are delivered with the **Accessories of Series Box**.

7.2.2 Wiring Procedure

WARNING!

- Only the qualified personnel can perform the wiring.
- Follow this manual to wire connection. The device damage caused by incorrect cabling is not in the scope of warranty.

CAUTION!

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

NOTICE!

- In the case of one tower, the BMS does not need to conduct wiring. The short power cable, short-circuit plug, and waterproof cap will be connected before delivery. And in that case, please don't remove the short power cable, short-circuit plug, or waterproof cap.
- The wiring procedure for both floor mounting and wall mounting is the same.
- Take the wiring procedure of two towers in floor mounting as an example.

Step 1: Before conducting wiring between the BMS and series box, press and hold the lock button to unplug the short power cable.

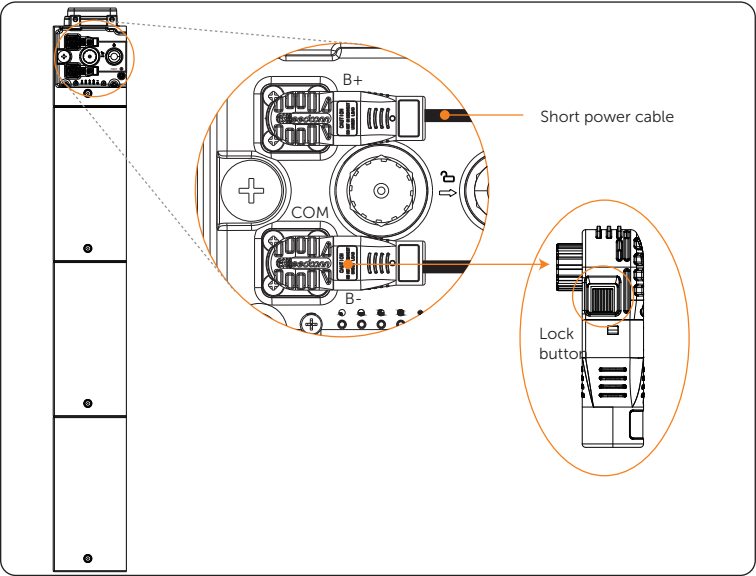


Figure 7-6 Removing short power cable

Step 2: Rotate the waterproof cap anti-clockwise to remove it. And rotate the short-circuit plug anti-clockwise. When the arrow on the rotating ring is aligned with the arrow on the panel, the short-circuit plug can be remove.

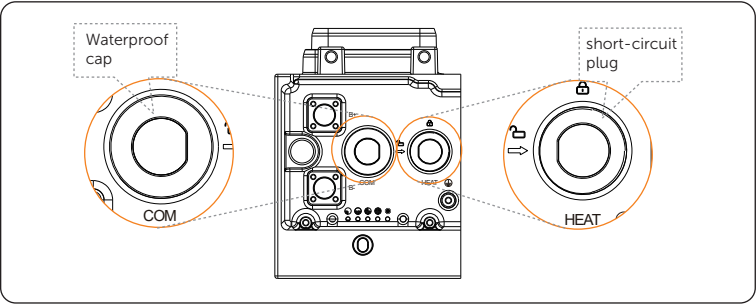


Figure 7-7 Removing waterproof cap

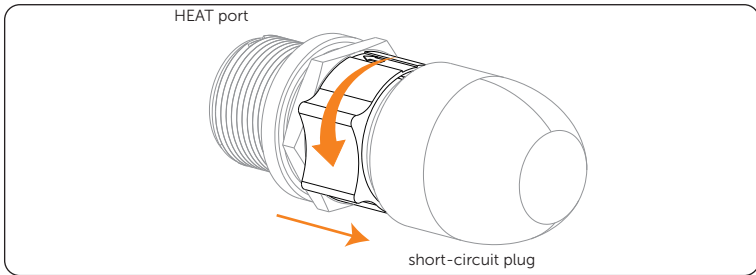


Figure 7-8 Closing short-circuit plug

NOTICE!

- Press and hold the lock button while unplugging the power cable, or it can not be pulled out.
- Do not violently remove the short-circuit plug before the arrow on the rotating ring is aligned with the arrow on the panel.
- Do not violently remove the cable when it is locked.

- Step 3:** Connect B+ of the BMS to B+ of the series box;
Connect B- of the BMS to B- of the series box;
Connect COM port of the BMS to COM port of the series box;
Connect HEAT port of the BMS to HEAT port of the series box;
Connect the grounding port of the BMS to the grounding port of the series box.

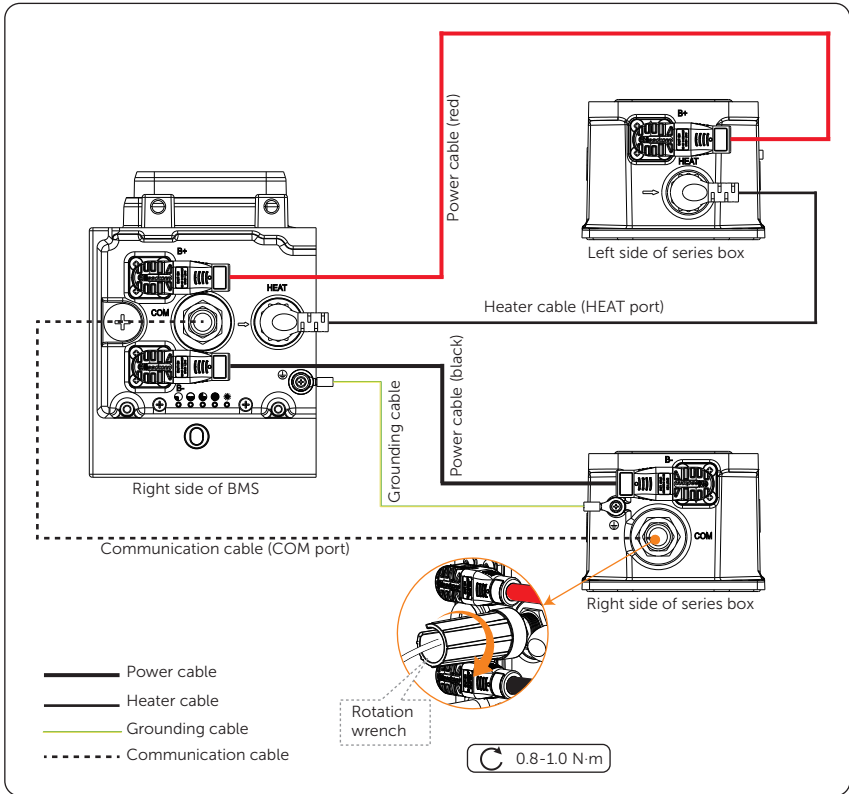


Figure 7-9 Connecting cables

NOTICE!

- There are two terminals on both ends of the power cable;
- Both ends of the communication cable shall be closed by using a rotation wrench.

Step 4: Pull cables through pipes after connecting cables to the BMS.

Pull the power cable (red) and heater cable through pipe 1, and pull the power cable (black), communication cable and grounding cable through pipe 2.

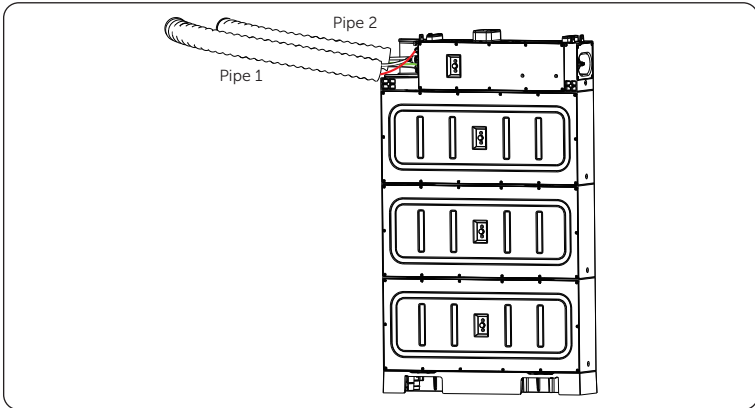


Figure 7-10 Pulling cables

NOTICE!

- A corrugated pipe should be prepared by the users.

Step 5: Insert pipes into the holes on the cover, and then connect the cables to the series box.

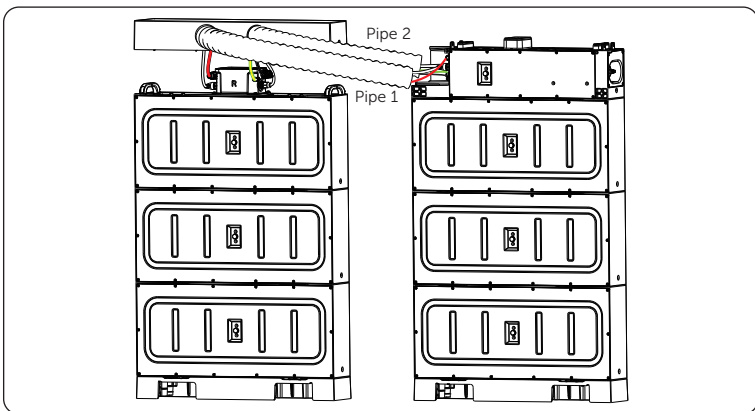


Figure 7-11 Inserting pipes into the cover

Step 6: Firstly rotate the rotating ring until the arrow on it is aligned with the arrow on the panel before removing the short-circuit plug, and then insert the heater cable into the HEAT port and rotate clockwise to close it.

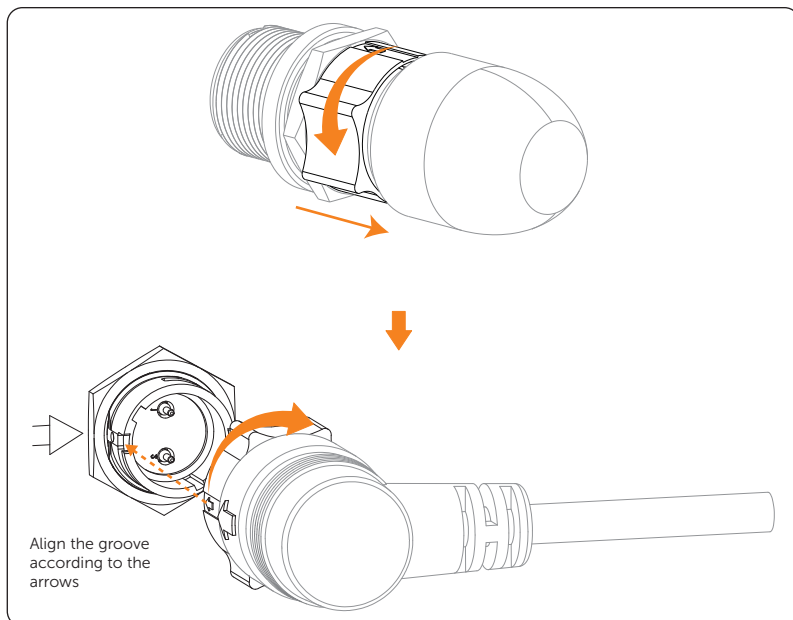


Figure 7-12 Locking heater cable

NOTICE!

- A rotation wrench is used to tighten both ends of the communication cable, and it may be removed after tightening.
- Do not violently remove the cable when it is locked.
- A corrugated pipe with an external diameter of 67.2 mm is recommended for use to keep cable insulation in place and avoid potential damages.

7.2.3 Installation of Cover

After finishing wiring, push the cover to the series box, and tighten M5x14 screws on both sides to secure the cover (torque: 2.2-2.5 N·m).

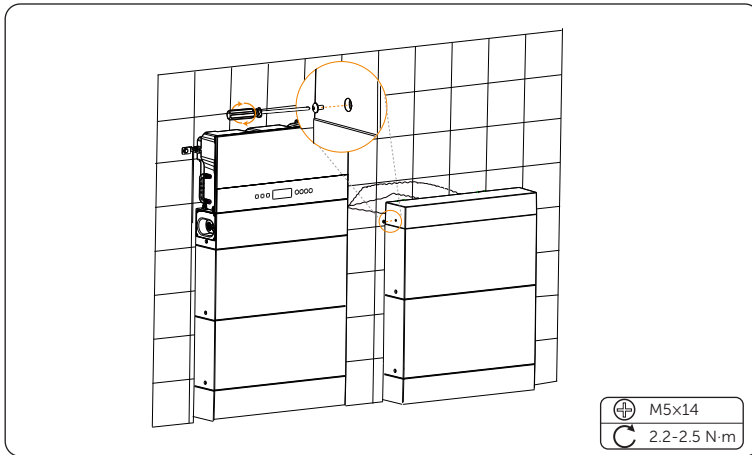


Figure 7-13 Tightening M5 screws

NOTICE!

- Please make sure that the corners and edges of the cover and battery module are aligned before tightening screws.
- The above steps for installing the cover also apply to the mode of wall mounting.

7.3 Electrical Connection on the Inverter

DANGER!

- Before electrical connection, make sure the DC switch on the battery (T-BAT-SYS); the DC switch on the inverter, and the AC and EPS breakers between the inverter and the power grid; the AC beaker between the grid and the matebox, and all the breakers on the matebox 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 device damage caused by incorrect cabling is not in the scope of warranty.

CAUTION!

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

7.3.1 Wiring Sequence

The recommended wiring sequence is as follows: PE connection, Grid & EPS connection, CT/Meter connection, Communication connection and PV connection.

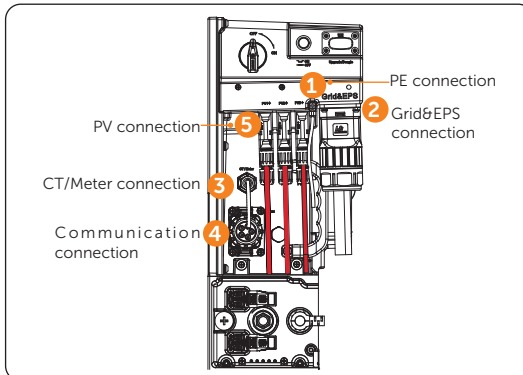


Figure 7-14 Wiring sequence

7.3.2 PE Connection

All non-current carrying metal parts of the equipment and other enclosures in the PV system must be grounded reliably. We recommend that the inverter is earthed to a nearby ground point. For a system with multiple inverters connected in parallel, connect the ground points of all inverters to ensure equipotential connections to ground cables.

PE connection procedures

Step 1: Strip the PE cable by wire stripper;

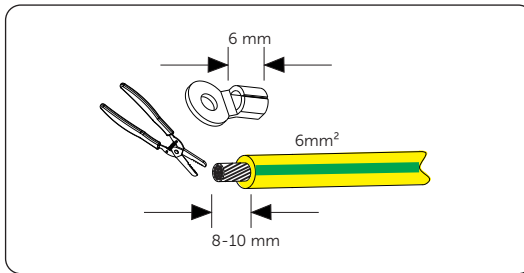


Figure 7-15 Stripping the PE cable

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

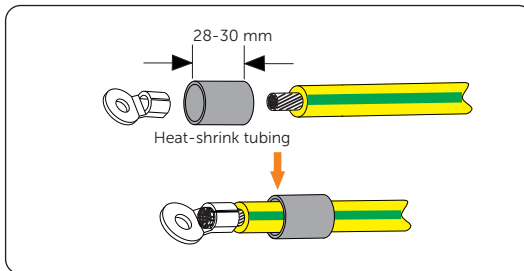


Figure 7-16 Inserting the stripped section into OT terminal

Step 3: Crimp OT terminal 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;

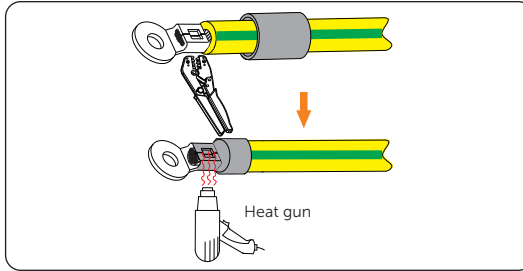


Figure 7-17 Crimping the cable

Step 4: Remove the M5*10 screw at the ground port (Torque: 2.0 ± 0.1 N·m);

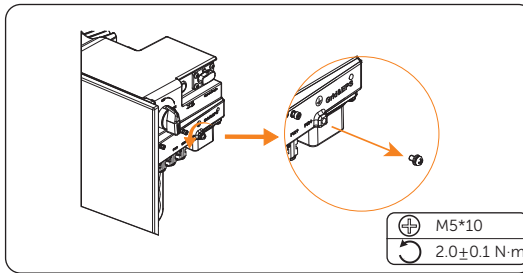


Figure 7-18 Removing the M5*10 screw

Step 5: Connect the PE cable to the inverter, and secure the M5*10 screw (Torque: 2.0 ± 0.1 N·m).

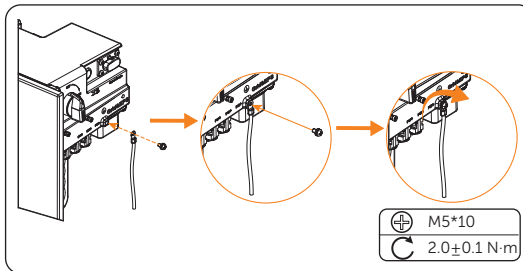


Figure 7-19 Securing the PE cable

Step 6: Connect the other end of the PE cable to the PE bar on the grid inlet wire.

7.3.3 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 has an EPS function. When the grid is connected, the inverter outputs go through the Grid port, and when the grid is disconnected, the inverter outputs go through the EPS port.

Requirements for AC side connection

- Grid Voltage requirement
 - » The grid voltage must be within the permissible range. The inverter is suitable for rated voltage 220/230/240V, frequency 50/60Hz. Other technical requests should comply with the requirement of the local public grid.
- RCD requirement
 - » The inverter does not require an external residual-current device when operating. If an external RCD is required by local regulations, It is recommended to use a Type-A RCD with the value of 300 mA.
- AC breaker requirement
 - » An AC breaker that matches the power of the inverter must be connected between the inverter output and the power grid, and each inverter must be equipped with an independent breaker or other load disconnection unit to ensure the safe disconnection from the grid. Refer to [4.3 Additionally Required Materials](#) for specific data of breaker of Grid and EPS (Off-grid).
- Load requirement
 - » It is prohibited to connect any load between the inverter and the AC breaker.
 - » Ensure that the EPS load rated power is within the EPS rated output power range, otherwise, the inverter will report an **EPS Overload Fault** warning. When **EPS Overload Fault** occurs, adjust the load power to make sure it is within the EPS rated output power range, and the inverter will automatically return to normal. For non-linear loads, ensure that the inrush current power is within the EPS rated output power range. When the configuration current is less than the maximum DC input current, the capacity and voltage of lithium will decrease linearly.

Table 7-1 Load requirement

Content	Power		Common equipment	Instance		
	Start	Rated		Equipment	Start	Rated
Resistive load	× 1	× 1	Lamp	100 W lamp	100 VA (W)	100 VA (W)
Inductive load	× 3-5	× 2	Fan/Fridge	150 W fridge	450-750 VA (W)	300 VA (W)

* The EPS (Off-grid) load of the inverter does not support a half-wave load, and the half-wave load cannot be used here.

Wiring procedures

Step 1: Remove the sealing plug of the AC terminal, and select the appropriate sealing plug according to the outer diameter of the cable.

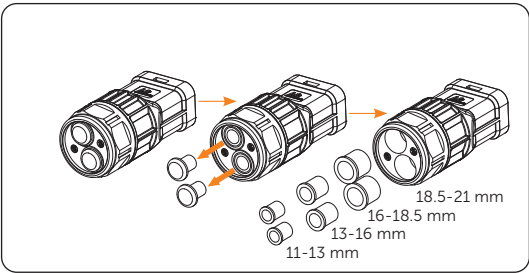


Figure 7-20 Removing the sealing plug

Step 2: Prepare a Grid cable (three-core cable) and an EPS cable (two-core cable), then strip the cables as below.

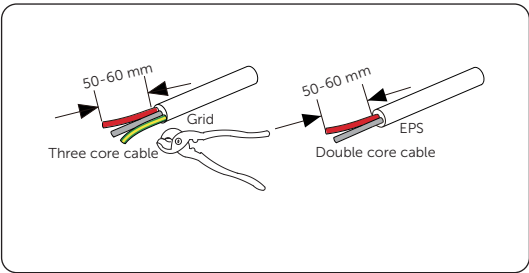


Figure 7-21 Striping the Grid and EPS cables

Step 3: Thread the Grid and EPS cables through the AC terminal.

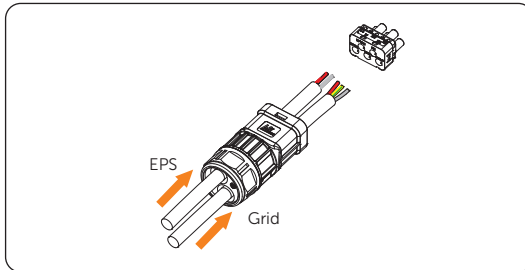


Figure 7-22 Threading the Grid and EPS cables

Step 4: Strip 14 mm of Grid and EPS cables, and Insert the stripped cables into ferrules.

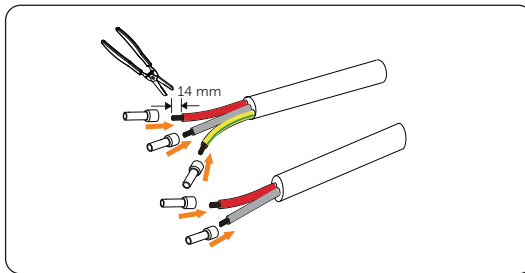


Figure 7-23 Inserting the stripped cables into ferrules

Step 5: Use crimping tool for ferrules to crimp the ferrules. Make sure the the conductors are correctly assigned and firmly seated in the ferrules.

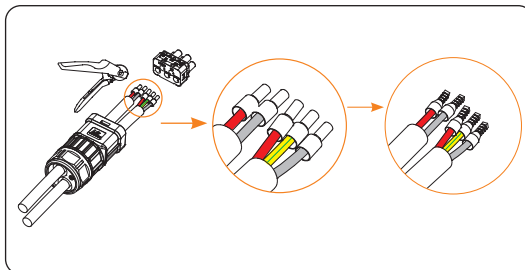


Figure 7-24 Crimping the ferrules

Step 6: Thread the crimped cables into the corresponding EPS and Grid ports. Then lock the cables with the Allen key. (Torque: $2.0 \pm 0.1 \text{ N.M}$)

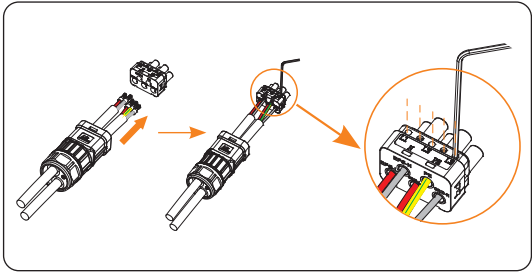


Figure 7-25 Threading the crimped cables

Step 7: Install the head of AC terminal into the AC terminal block. Make sure the side with silk screen is upward. Then tighten the fastening head.

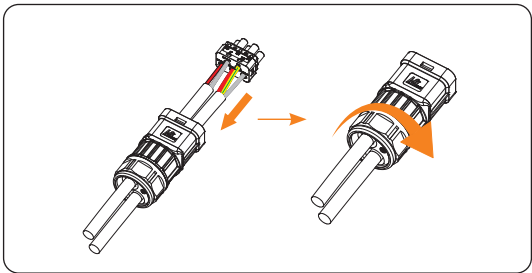


Figure 7-26 Installing the AC terminal

Step 8: Remove the AC protective cover.

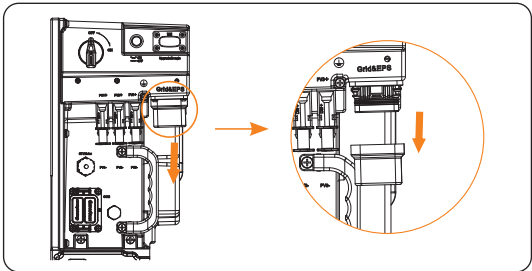


Figure 7-27 Removing the AC protective cover

Step 9: Plug the wired AC terminal into the Grid&EPS port.

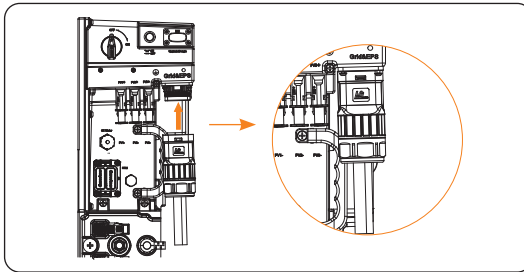


Figure 7-28 Plugging the AC terminal into the Grid&EPS port

7.3.4 PV Connection



- High DC voltage will be generated by PV modules when exposed to sunlight. Death or lethal injuries will occur due to electric shock.
- Make sure the DC switch on the battery (T-BAT-SYS); the DC switch on the inverter, and the AC and EPS breakers between the inverter and the power grid; the AC beaker between the grid and the matebox, and all the breakers on the matebox are disconnected before connection and no live voltages are present on the PV input and AC output circuit.
- Make sure that the PV module output is well insulated to ground.



- Power is fed from more than one source and more than one live circuit. Note that all DC and AC terminals may carry current even without connected wires.

Requirements for PV connection

- Open circuit voltage
 - » The open circuit voltage of the module array should be less than the maximum PV input voltage (600 V) by the inverter, and the working voltage should be within the MPPT voltage range (40-560 V).
- PV module
 - » The positive or negative pole of the PV modules is not grounded.
 - » The polarities of electric connections are correct on the DC input side. Incorrect polarity could permanently damage the equipment.
- PV module connection mode

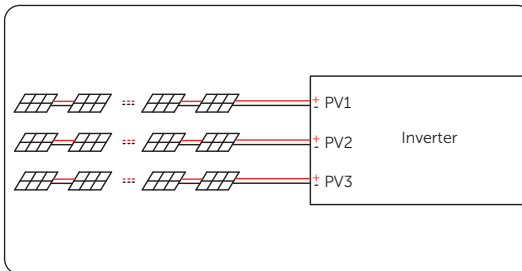


Figure 7-29 "Multi" mode connection diagram

Wiring procedures

Step 1: Remove the terminal caps of PV terminals. (For 3.0kW~3.7kW inverters, remove 2 pairs of PV terminal caps. And the third PV terminal is unavailable. For 4.6kW~8kW inverters, remove 3 pairs of PV terminal caps.)

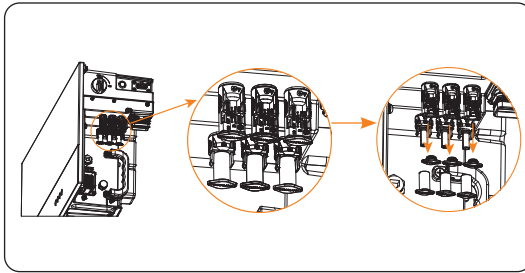


Figure 7-30 Removing the PV terminal caps

Step 2: Strip 7 mm of the PV cables and insert the stripped cables into the PV pin contact. Make sure the stripped cables and the PV pin contact are of the same polarity. Then crimp the PV cables with crimping tool for PV terminal.

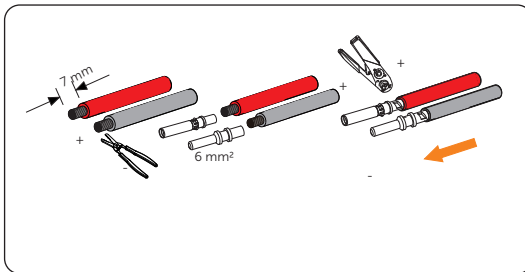


Figure 7-31 Stripping the PV terminals

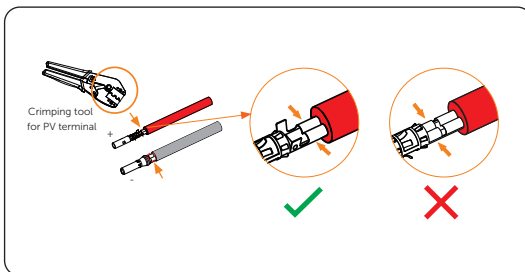


Figure 7-32 Crimping the PV terminals

Step 3: Thread the PV cables through the fastening head and insert the PV pin contact into the PV connectors until a "Click" is heard. Gently pull the cable backward to ensure firm connection. Then tighten the fastening head.

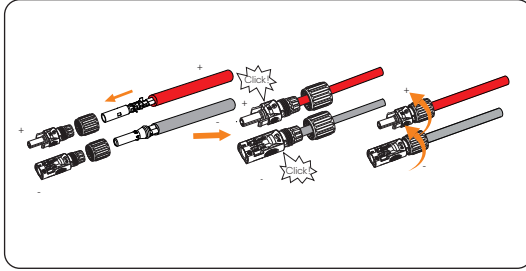


Figure 7-33 Inserting the PV pin contact into PV connectors

Step 4: Check whether the PV cables have the correct polarity. Use a multimeter to measure the positive and negative voltage of the assembled PV cables. Make sure the open circuit voltage does not exceed the input limit of 600 V.

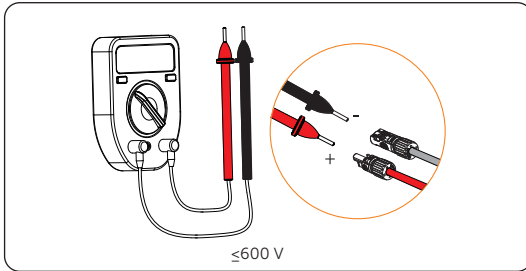


Figure 7-34 Measuring the voltage of PV cables

Step 5: Disconnect the AC breaker and secure against reconnection; turn the DC switch of the inverter to position OFF; make ensure the battery is switched off.

Step 6: Connect the assembled PV cables to corresponding terminals. Make sure 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.

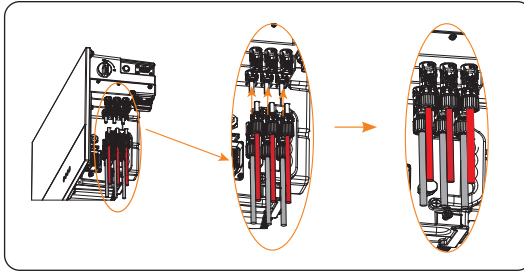


Figure 7-35 Connecting the PV cables

Step 7: Then seal the unused PV terminals with dustproof buckles.

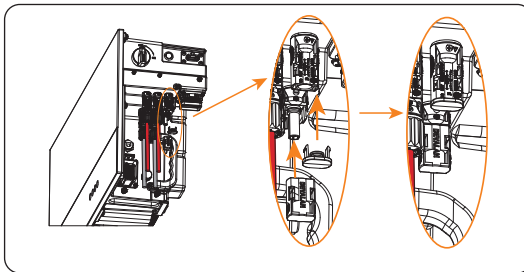
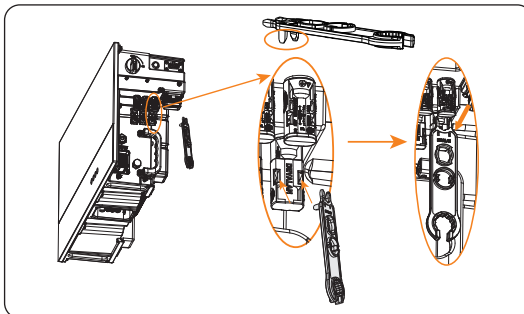


Figure 7-36 Sealing the unused PV terminals

Disassembling the dustproof buckles



7.3.5 Communication Connection

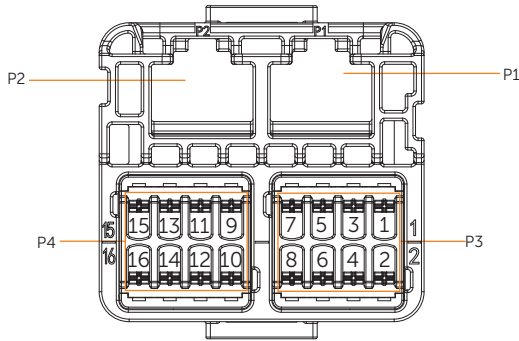


Figure 7-37 COM port

7.3.5.1 Parallel Connection (P2 port of COM port)

The inverter provides the parallel connection function. Up to 2 inverters can be connected in a system. In this system, one inverter will be set as the "Master inverter" to control the other "Slave inverter" in the system via CAN.

Requirments for parallel connection

- The two inverters should be of the same software version.
- The two inverter models should be of the same power range.
- The type and quantity of batteries connected to the two inverters should be the same.

System diagram

- Diagram 1: System diagram applied to temperature sensor CT.

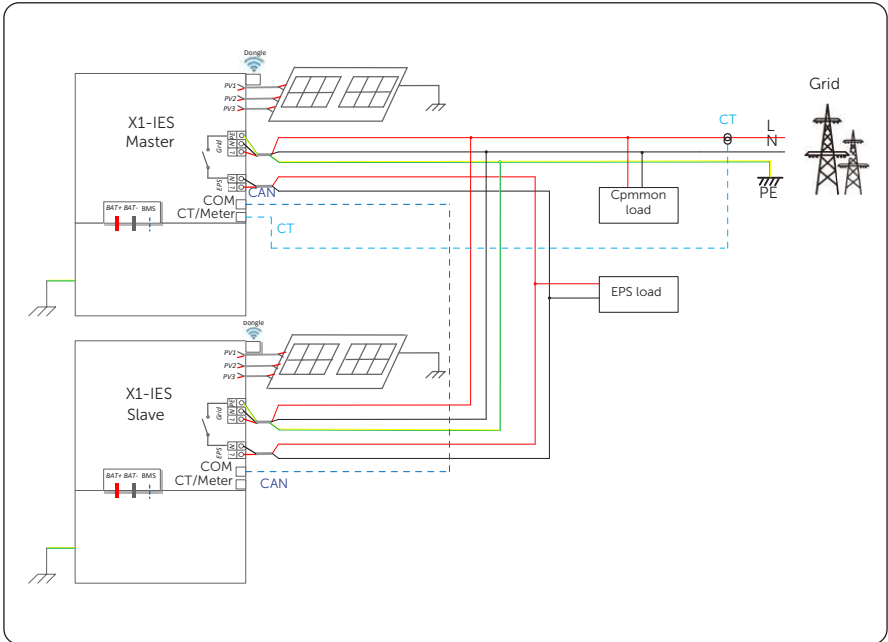


Figure 7-38 System diagram applied to temperature sensor CT

* The CT is in the packing list, and CT cable has already connected to the CT.

- Diagram 2: System diagram applied to electric Meter.

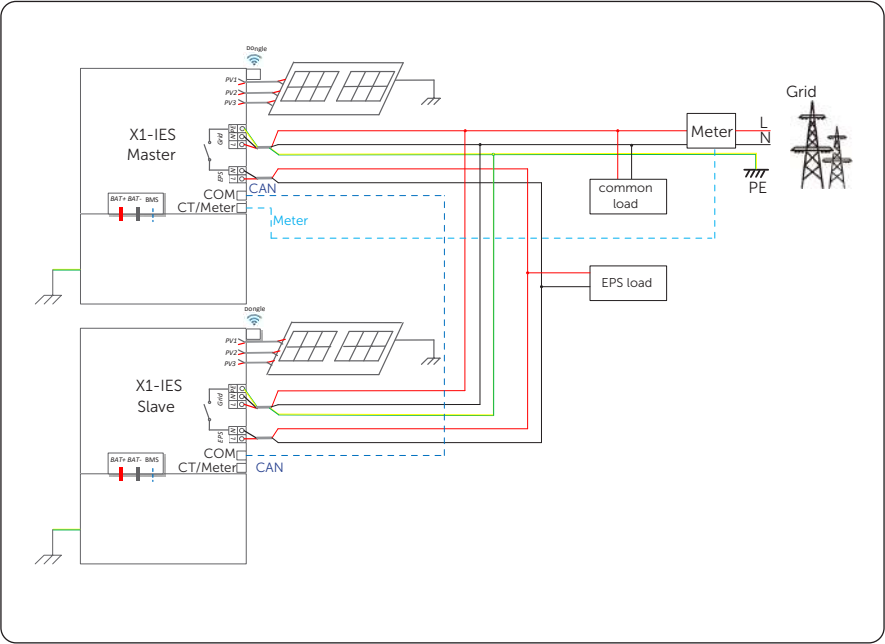


Figure 7-39 System diagram applied to electric Meter

* The Meter needs to be purchased additionally, and the cable connecting the meter needs to be made by users.

Parallel connection diagram

- Diagram 1: Parallel connection with Meter
 - » Use standard CAT5E network cables for CAN(P2) - CAN(P2) connection.
 - » Master inverter CAN(P2) to the Slave inverter CAN(P2).
 - » Meter connects to meter port of the master inverter.

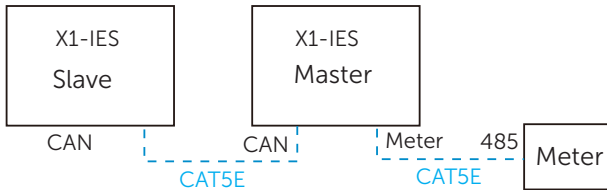


Figure 7-40 Parallel connection with Meter

- Diagram 2: Parallel connection with CT
 - » Use standard network cables for CAN(P2)-CAN(P2) connection.
 - » Master inverter CAN(P2) to Slave inverter CAN(P2).
 - » CT connects to CT port of the master inverter.

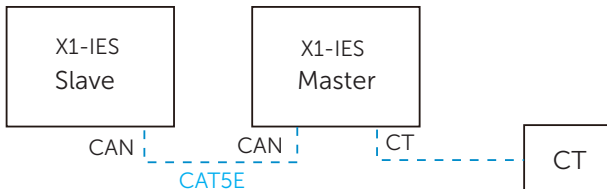


Figure 7-41 Parallel connection with CT

* CAN refers to Parallel port (P2) of COM port.

7.3.5.2 Meter/CT Connection (Meter/CT Port)

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, which is convenient for users to read it at anytime.

 CAUTION!

- The meter or CT must be connected to the inverter, otherwise the inverter will prompt "Meter fault" or "Missed CT fault" (If Cyclic Check is enabled)alarm. Smart meters must be authorized by our company, third party or other companies, Unauthorized meter may be incompatible with the inverter.
- SolaX 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 line and L line at the same time.
- Do not place the CT on the side where the arrow points to the inverter.
- Do not place the CT on non-insulated wires.
- The cable length between CT and inverter should not exceed 100 meters.
- After CT is connected, prevent the CT clip from falling off.
- It is recommended to wrap the CT clip around in circles with insulating tape.

Table 7-2 Pin assignment for Meter/CT

Pin	1	2	3	4	5	6	7	8
Function	CT		Meter		CT			
Pin Definition	CT_11_ CON	GND_ COM1	CT_21_ CON	METER_ 485A	METER_ 485B	CT_22_ CON	GND_ COM1	CT_12_ CON

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

Connection Diagram

- CT connection diagram

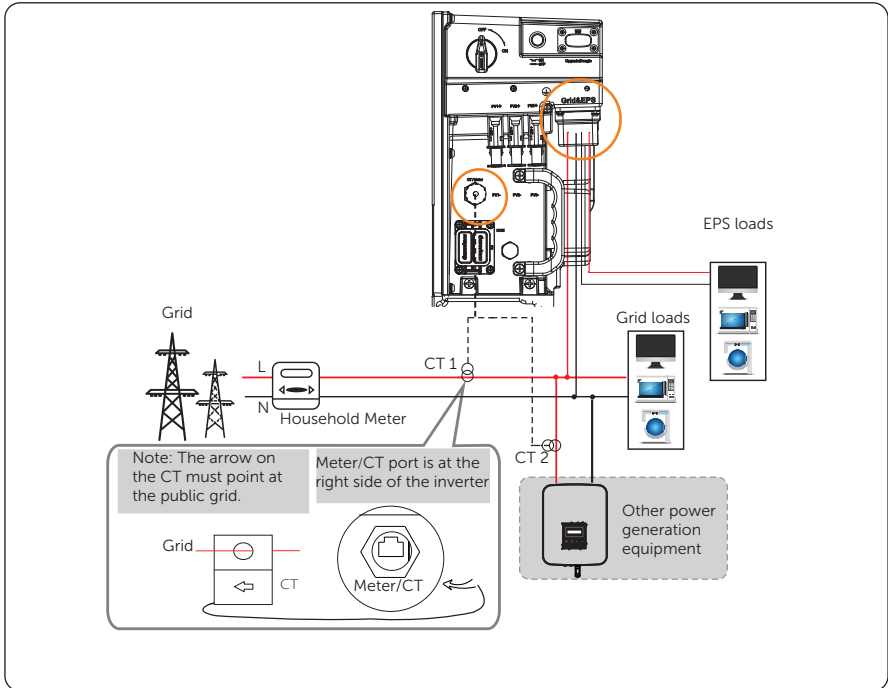


Figure 7-42 CT connection diagram

* The arrow on the CT must point at the public grid.

- Meter connection diagram

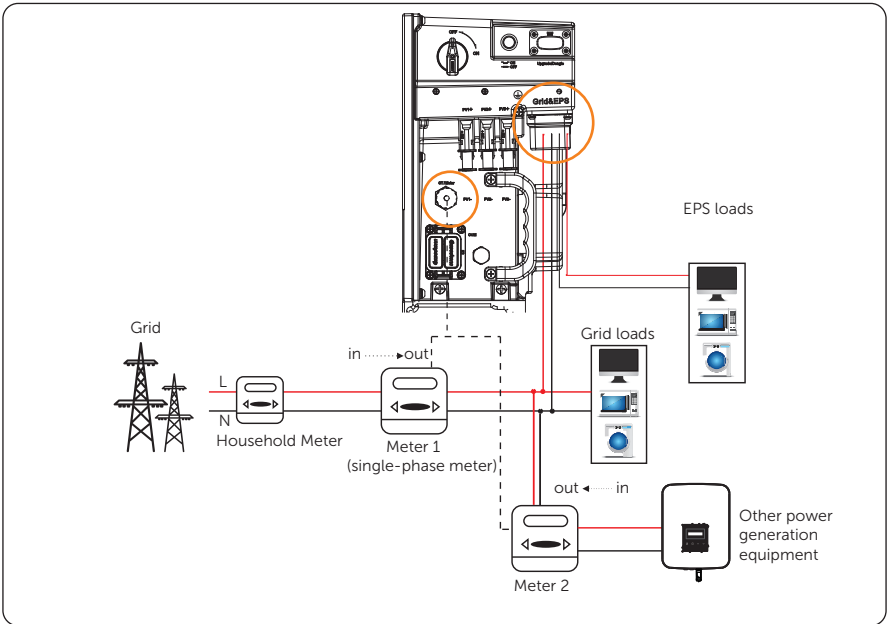


Figure 7-43 Meter connection diagram

* If two meters were to be connected in the system, the communication cables of the meters should be connected in parallel, i.e. 485A of meter1 should be connected with 485A of meter2, 485B of meter1 should be connected with 485B of meter2, then connect the two cables to the corresponding 485A and 485B on the inverter.

Wiring procedures

Step 1: Crimp one RJ45 terminal with crimping tool for RJ45, and thread the communication cable through waterproof connector. Then crimp another RJ45 terminal. Pay attention to the pin order of RJ45. When connecting meter, crimp only one RJ45 terminal.

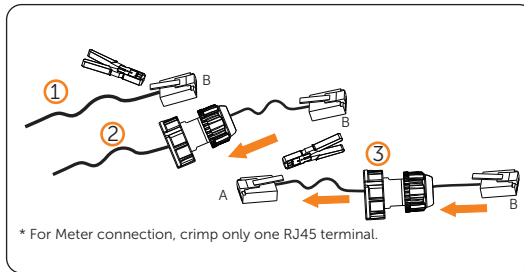


Figure 7-44 Crimping RJ45 terminals

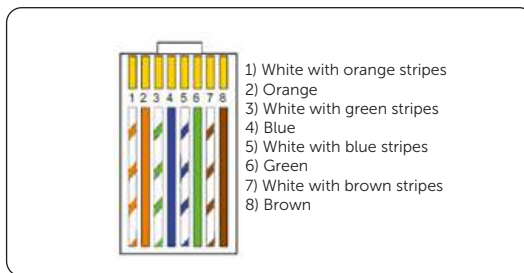


Figure 7-45 Pin order of RJ45 terminal

Step 2: Remove the terminal cap of the CT/Meter port.

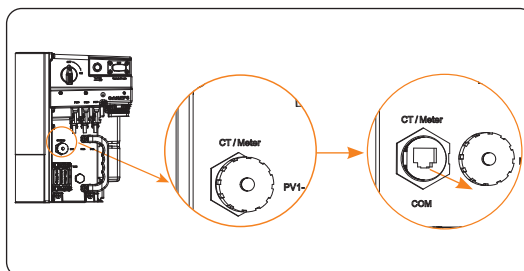


Figure 7-46 Removing the terminal cap

Step 3: Plug the terminal A to the Meter/CT port. An audible “Click” will be heard if it is successfully connected.

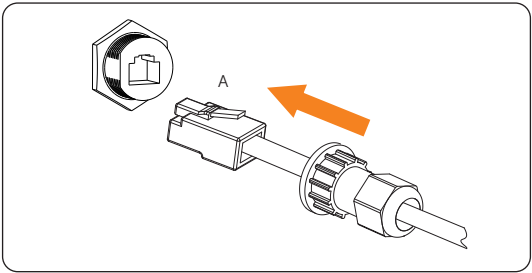


Figure 7-47 Plugging the terminal A to CT/Meter port

Step 4: For CT, plug the terminal B to RJ45 connector. For Meter, directly plug the terminal A to the Meter/CT port. Refer to Meter document for specific.

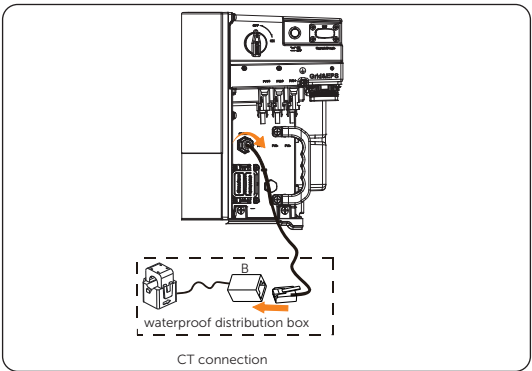


Figure 7-48 CT connection diagram

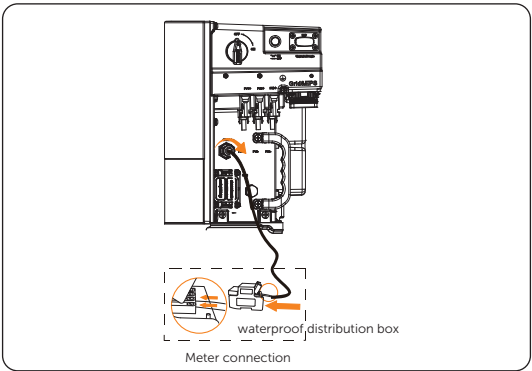


Figure 7-49 Meter connection diagram

7.3.5.3 COM Connection (COM Port)

COM is a standard communication interface, through which the monitoring data of the inverter can be directly obtained. Also the external equipment can be controlled through COM communication.

Pin assignment

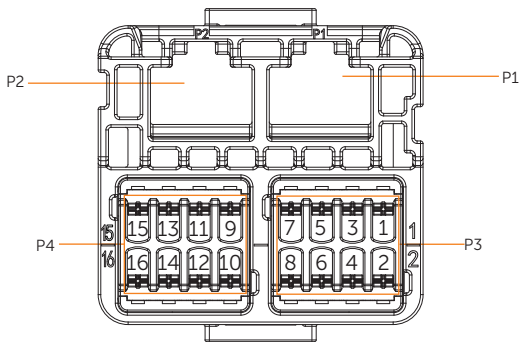


Figure 7-50 COM port

Table 7-3 Pin assignment for COM

Icon	PIN	PIN Definition	Function
P1 (DRM Port)	1	DRM1/5	DRM
	2	DRM2/6	
	3	DRM3/7	
	4	DRM4/8	
	5	+3.3V_COM	
	6	COM/DRM0	
	7	GND_COM	
	8	GND_COM	
P2 (Parallel Port)	1	REMOTE_485A	RS485
	2	REMOTE_485B	
	3	GND_COM	/
	4	PARALLEL_SYN2	Parallel synchronization signal
	5	PARALLEL_SYN1	
	6	EPSBOX_RELAY_VCC	/
	7	PARALLEL_CANL	Parallel CAN
	8	PARALLEL_CANH	

P3	1	/	/
	2	/	
	3	/	
	4	/	
	5	GND_COM	/
	6	GND_COM	Communication with SolaX's Datahub, EV Charger, Adapter Box and other internal devices
	7	REMOTE_485A	
	8	REMOTE_485B	
P4	9	ARM_POWER	/
	10	GND_COM	/
	11	MODBUS_485A	Communication with other external devices
	12	MODBUS_485B	
	13	DO_1	Output drycontact
	14	DO_2	
	15	DI_1	Input drycontact
	16	DI_2	

External devices connection

- Connection with a SolaX datahub

COM port of X1-IES series inverter		RS485-1/-2/-3/-4 port of SolaX datahub
Pin	Pin definition	Pin definition
6 (P3)	GND_COM	GND
7 (P3)	REMOTE_485A	RS485A
8 (P3)	REMOTE_485B	RS485B

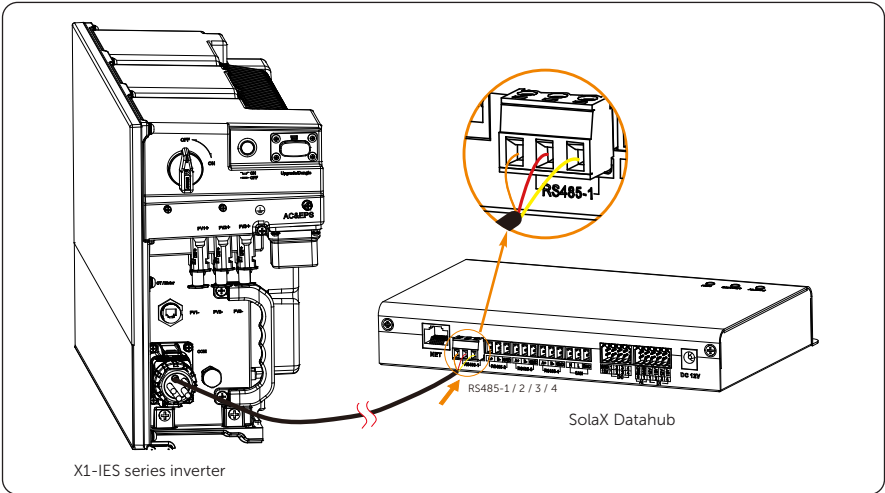


Figure 7-51 Connecting with a SolaX datahub

- Connection with a SolaX EV Charger

COM port of X1-IES series inverter		COM port of SolaX EV Charger	
Pin	Pin definition	Pin	Pin definition
7 (P3)	REMOTE_485A	4	A1
8 (P3)	REMOTE_485B	5	B1

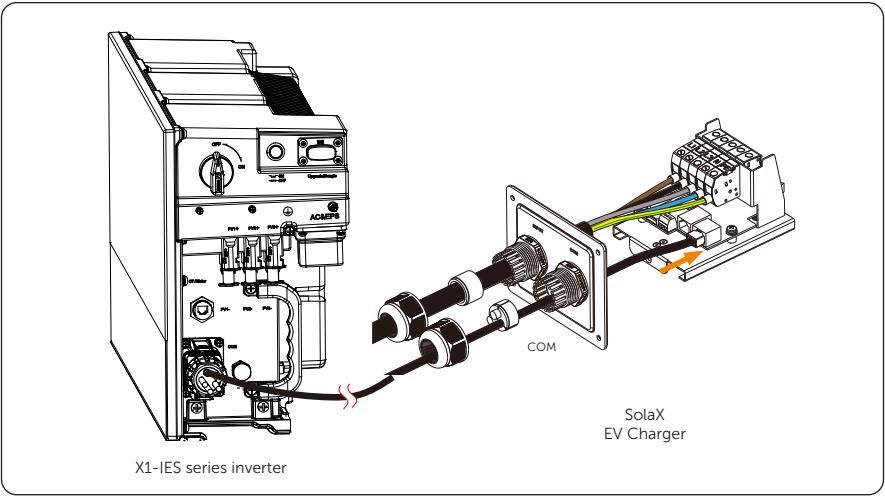


Figure 7-52 Connecting with a SolaX EV Charger

- Connection with a SolaX Adapter Box G2

COM port of X1-IES series inverter		485_INV port of SolaX Adapter Box G2	
Pin	Pin definition	Pin	Pin definition
9 (P4)	ARM_POWER	3	+13 V
7 (P3)	REMOTE_485A	4	RS485-A
8 (P3)	REMOTE_485B	5	RS485-B
6 (P3)	GND_COM	6	GND

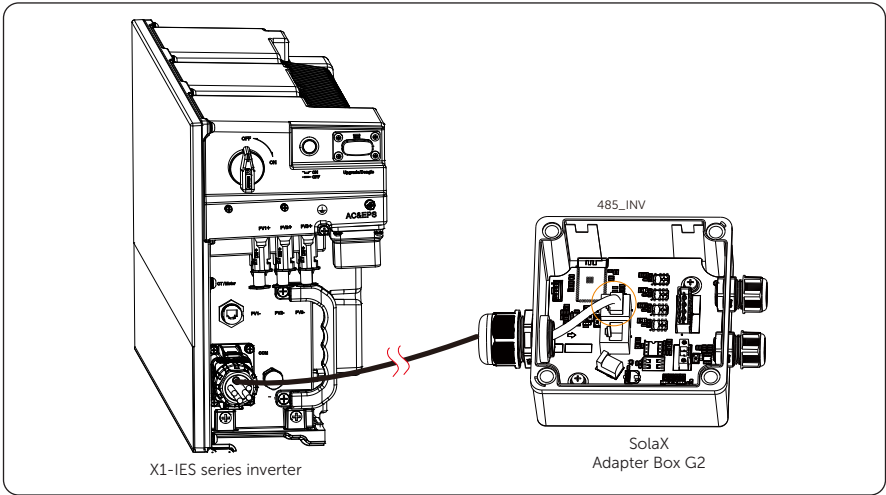


Figure 7-53 Connecting with a SolaX Adapter Box G2

Wiring procedure

Step 1: Unscrew the rear end of the communication terminal, and remove the waterproof plug.

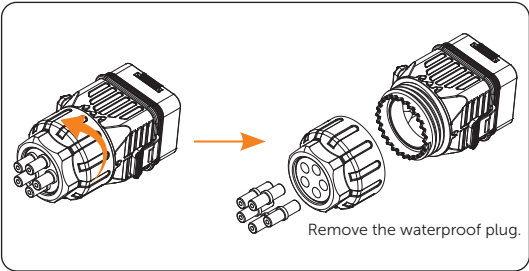


Figure 7-54 Unscrewing the communication terminal

Step 2: Press the position indicated by the arrow, and remove the wiring terminal block.

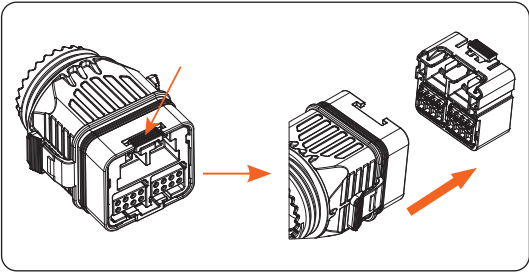


Figure 7-55 Removing the wiring terminal block

- DRM and Parallel connection (P1 P2)

Step 1: Take two CAT5E network cables. Thread the two cables into the communication terminal, and strip 15 mm of the two cables.

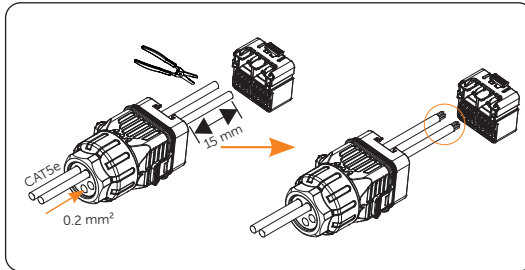


Figure 7-56 Stripping CAT5E network cables

Step 2: Insert the stripped cables through the RJ45 terminals, and crimp it with the crimping tool for RJ45 terminal according to the pin order. Then insert the crimped two RJ45 terminals into the wiring terminal block.

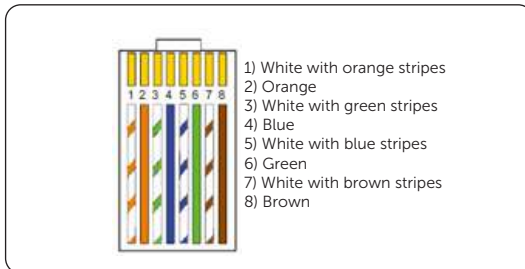


Figure 7-57 Pin order of RJ45 terminal

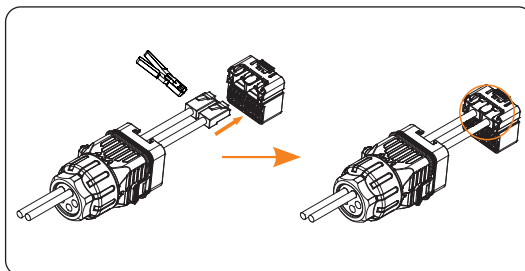


Figure 7-58 Crimping the RJ45 terminals

- PIN 1-16 connection (P3 P4)

Step 1: Take another two CAT5E network cables. Strip 35-40 mm of the two cables, then strip 12-14 mm of the front end of the two cables.

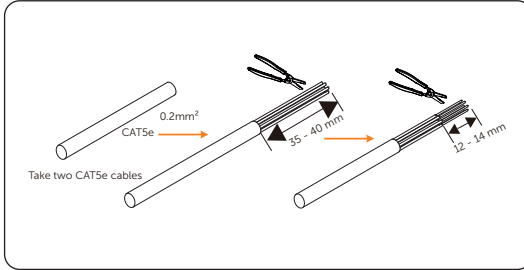


Figure 7-59 Stripping CAT5E network cables

Step 2: Thread the stripped cables through the communication terminal. Then insert the ferrules into the stripped cables.

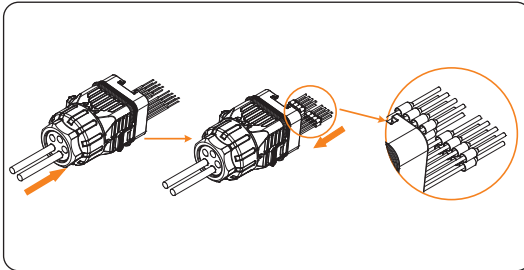


Figure 7-60 Inserting ferrules into the stripped cables

Step 3: Crimp the ferrules with the crimping tool for ferrule.

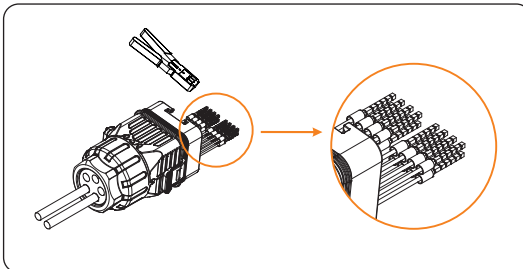


Figure 7-61 Crimping the ferrules

Step 4: Insert the crimped ferrules into the wiring terminal block. Then assemble the communication terminal.

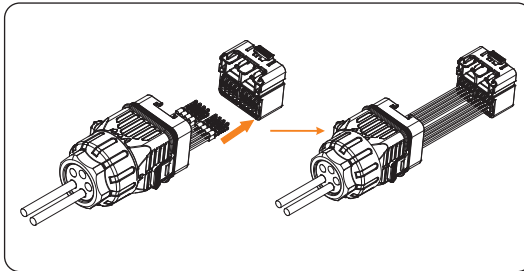


Figure 7-62 Inserting the ferrules

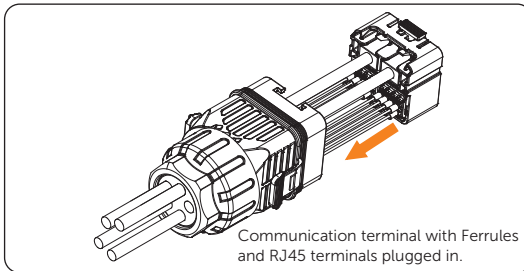


Figure 7-63 Assemble the communication terminal

Step 5: Seal the unused terminals with the waterproof plug.

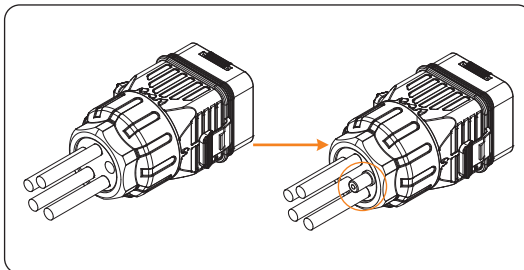


Figure 7-64 Sealing the unused terminals

Step 6: Remove the dust cover of the communication terminal.

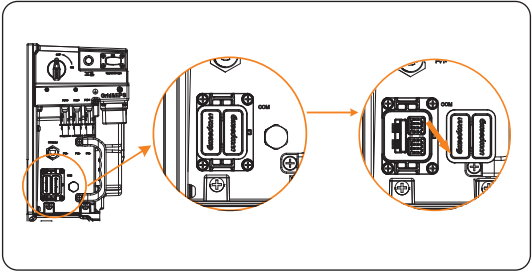


Figure 7-65 Removing the dust cover

Step 7: Plug the wired communication terminal into the communication port on the inverter.

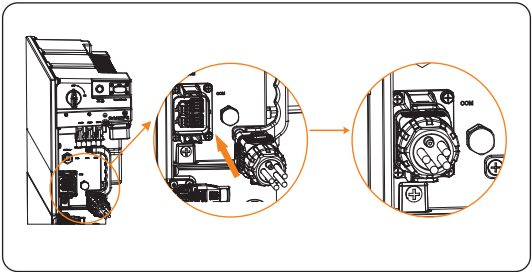


Figure 7-66 Plugging the wired communication terminal

7.3.6 Cover Plate Installation

Step 1: Hang the cover plate on the two screws indicated by the arrow.

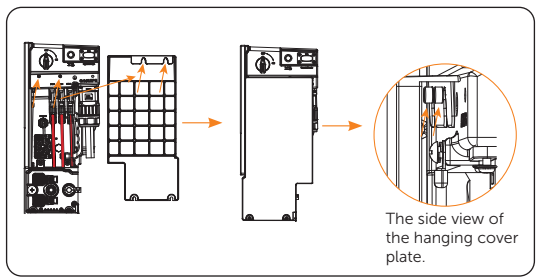


Figure 7-67 Hanging the cover plate

Step 2: Tighten the two M5*14 screws (Torque: 2.0 ± 0.1 N·m).

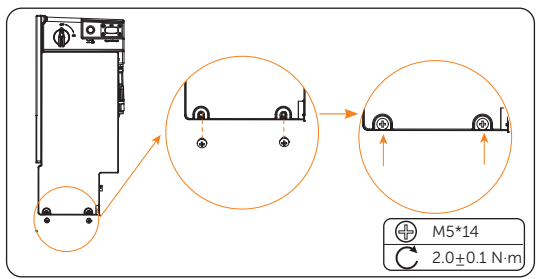


Figure 7-68 Tightening the screws

7.3.7 Monitoring Connection (Upgrade/Dongle Port)

The inverter provides a Upgrade/Dongle port, which can transmit data of the inverter to the monitoring website via WiFi+LAN dongle. A WiFi+LAN dongle can be matched with two kinds of communication modes (WiFi mode or LAN mode).

NOTICE!

- When no device is plugged into Upgrade/Dongle port, ensure the port is covered with a dust cover. Otherwise, it may cause damage to the inverter.

NOTICE!

WiFi dongle

- Harness the power of WiFi with WiFi dongle, connect to a local network within 50m of the installation to enable access to the Cloud monitoring platform.

NOTICE!

LAN dongle

- If Wi-Fi is not suitable for your situation, the LAN dongle enables you to connect to your network via an ethernet cable. Ethernet allows for a much more stable connection with less interference.

NOTICE!

4G dongle (optional)

- 4G dongle allows you to use a 4G connection to monitor your system without the option of connecting to a local network. (This product is not available in the UK)

Monitoring connection diagram

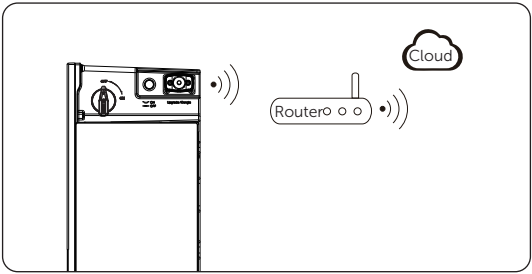


Figure 7-69 WiFi mode connection diagram

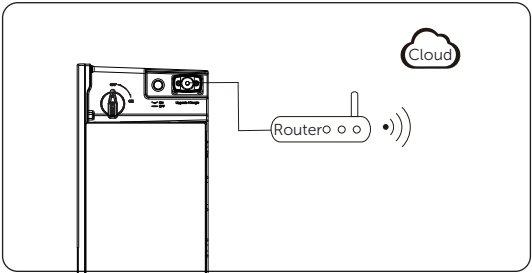


Figure 7-70 LAN mode connection diagram

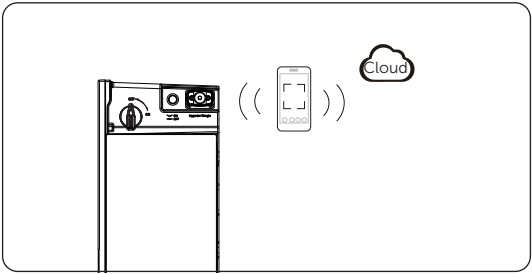


Figure 7-71 WiFi+4G connection diagram

Wiring procedure

WiFi mode:

Step 1: Assemble the dongle;

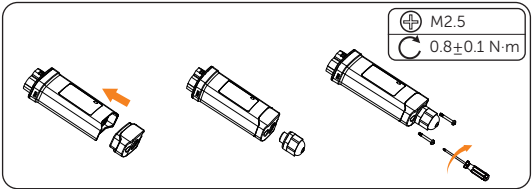


Figure 7-72 Assembling the dongle

Step 2: Plug the dongle to the inverter.

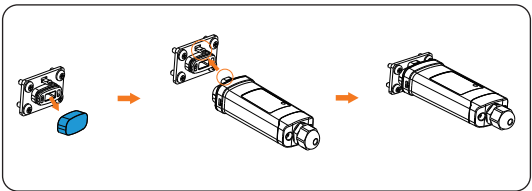


Figure 7-73 WiFi connection procedure

⚠ CAUTION!

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

NOTICE!

- The longest connection distance between the router and the equipment should be no more than 100 meters; if there is a wall between the router and the equipment, the longest connection distance is 20 meters.
- When the WiFi signal is weak, please install a WiFi signal booster at the appropriate location.

NOTICE!

- Please refer to Pocket WiFi + LAN Installation Guide for instructions on configuring the WiFi. It is important to note that the WiFi configuration should be performed after powering on the inverter..

LAN mode:

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

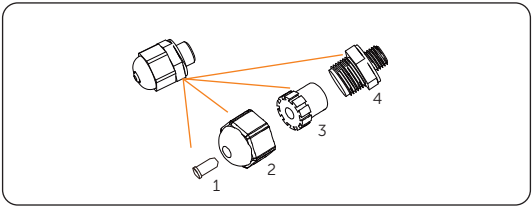


Figure 7-74 Disassembling the waterproof connector

Step 2: Assemble the dongle;

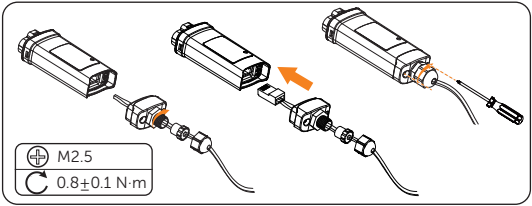


Figure 7-75 Assembling the LAN dongle

Step 3: Plug the dongle to the inverter.

7.4 Electrical Connection on the X1-Matebox-G2

NOTICE!

- Only CT connection is supported for Meter/CT port.
- For the height of X1-Matebox G2, the bottom of the ports of X1-Matebox G2 should be a little bit higher than the outlet of the inverter.

7.4.1 EPS (INV) and Grid (INV) Connection

Wiring procedure

Step 1: Open the buckle with the key.

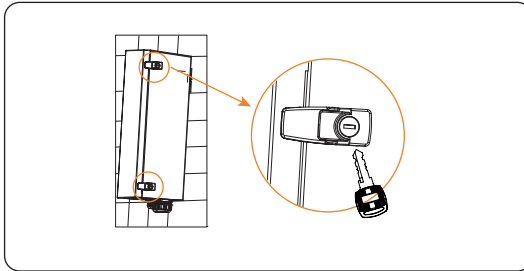


Figure 7-76 Opening the buckle

Step 2: Then open the upper cover. Unscrew the four M4*8 screws to remove the baffle back (Torque: 1.5 ± 0.2 N·m).

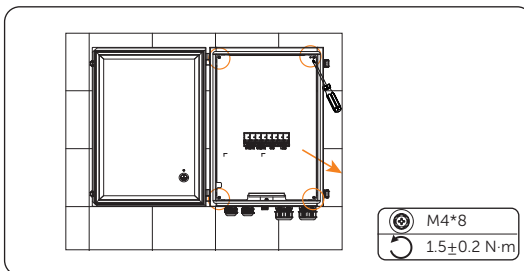


Figure 7-77 Opening the upper cover

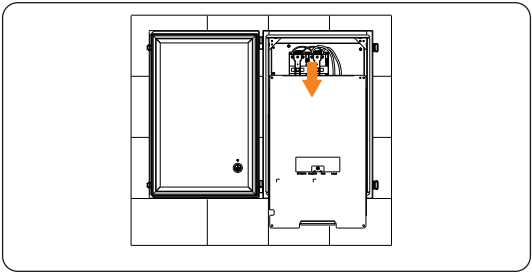


Figure 7-78 Removing the baffle back

Step 3: Find the EPS (INV) and Grid (INV) ports on the matebox.

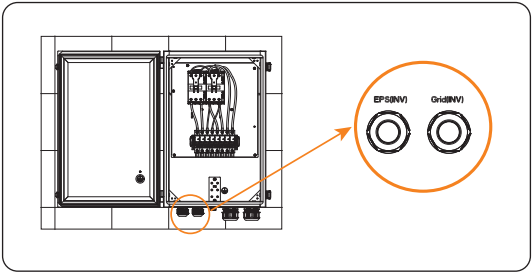


Figure 7-79 Finding the EPS (INV) and Grid (INV) ports

Step 4: Prepare a 10 mm² Grid cable (three core cable) and a 10 mm² EPS (Off-grid) cable (two core cable). Strip 200 mm of the two cables.

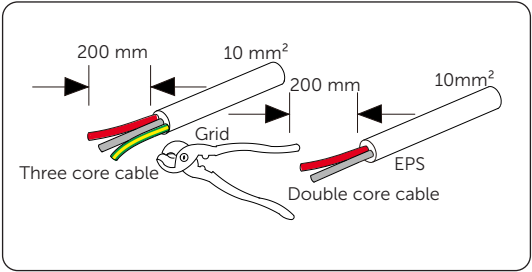


Figure 7-80 Stripping the cables

- Step 5:** Strip 12 mm of the front end of the two cables, then insert the ferrules into the stripped L/N cables, insert OT terminal to the striped PE cable. Crimp the ferrules with the crimping tool for ferrule, and crimp OT terminal with crimping tool.

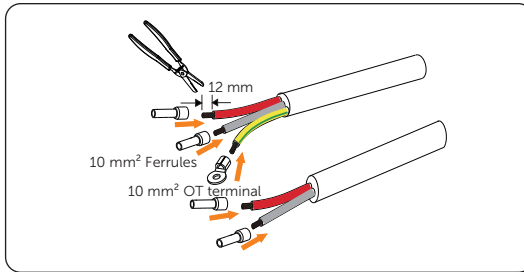


Figure 7-81 Inserting the ferrules and OT terminal

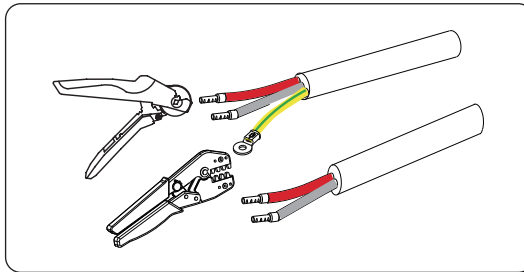


Figure 7-82 Crimping the ferrules and OT terminal

- Step 6:** Remove the fastening heads of EPS (INV) and Grid (INV) ports. Then thread the crimped cables into the corresponding EPS (INV) and Grid (INV) ports.

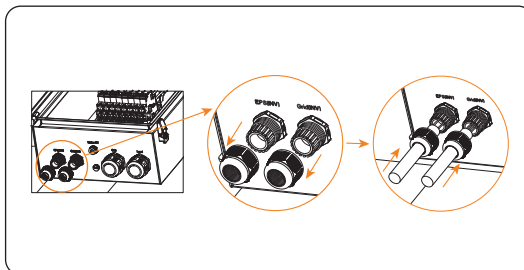


Figure 7-83 Removing the fastening heads

Step 7: Insert the EPS (Off-grid) (L/N) and Grid (L/N/PE) cables into the corresponding ports. Then tighten the fastening heads.

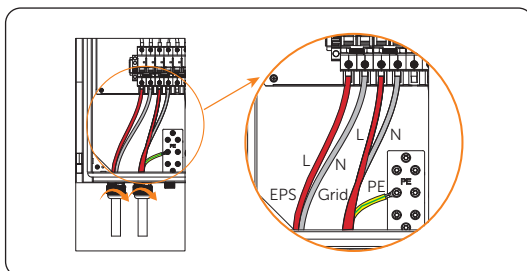


Figure 7-84 Inserting the EPS and Grid cables

Step 8: Connect Grid (INV) and EPS (INV) cables between the inverter and the Matebox.

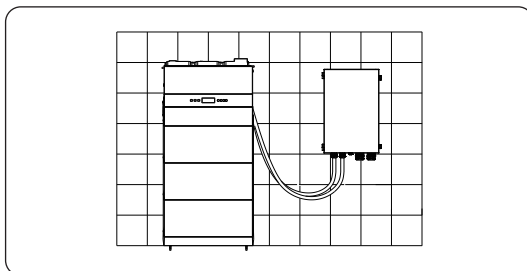


Figure 7-85 Connecting the EPS and Grid cables

7.4.2 CT Connection

Wiring procedure

Step 1: Remove the waterproof plug of the Meter/CT port.

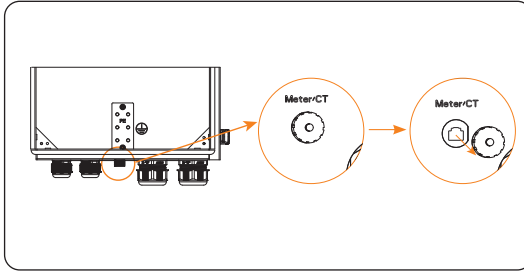


Figure 7-86 Removing the waterproof plug

Step 2: Insert the wired CT cable to the Meter/CT port, then tighten the fastening head.

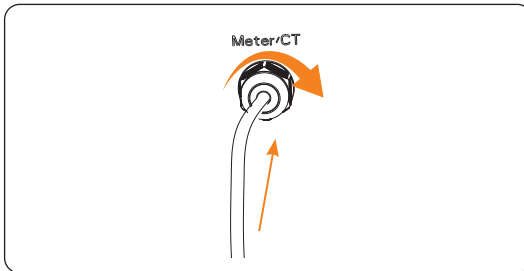


Figure 7-87 Inserting the CT cable

Step 3: Connect the CT cable between the inverter and the Matebox.

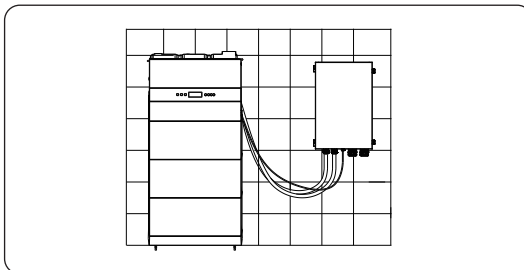


Figure 7-88 Connecting the CT cable

7.4.3 Grid and Load Connection

Wiring procedure

Step 1: Find the Grid and Load ports on the matebox.

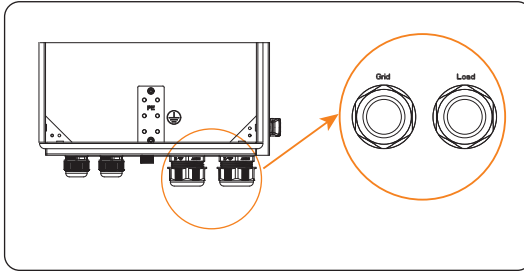


Figure 7-89 Finding the Grid and Load ports

Step 2: Prepare a 10 mm² Grid cable (three core cable) and a 10 mm² Load cable (three core cable). Strip 200 mm of the two cables.

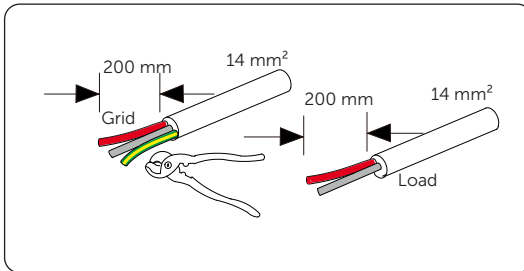


Figure 7-90 Stripping the cables

Step 3: Strip 12 mm of the front end of L/N cables, and 13 mm of PE cables. Then insert ferrules into the stripped L/N cables, OT terminals to PE cables.

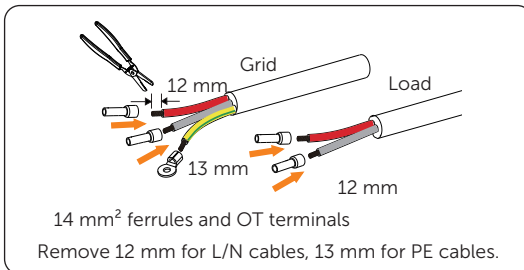


Figure 7-91 Inserting the ferrules and OT terminals

Step 4: Crimp the ferrules with crimping tool for ferrule and crimp the OT terminals with crimping tool.

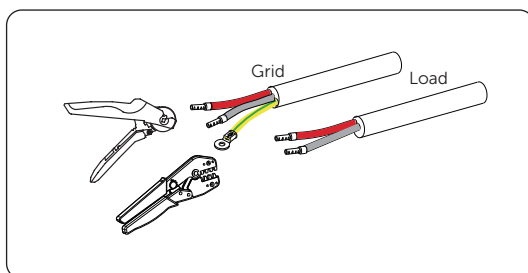


Figure 7-92 Crimping the ferrules and OT terminals

Step 5: Remove the fastening head of the two ports. Then thread the crimped cables into the corresponding Grid and Load ports.

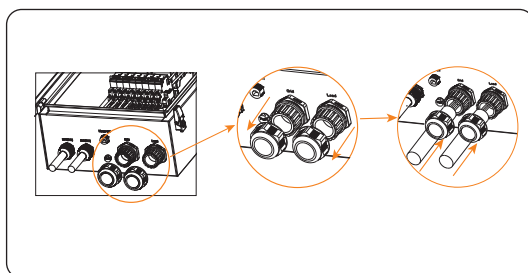


Figure 7-93 Removing the fastening heads

Step 6: Connect the Grid (L/N/PE) and Load (L/N) cables to the corresponding ports. Then tighten the fastening head.

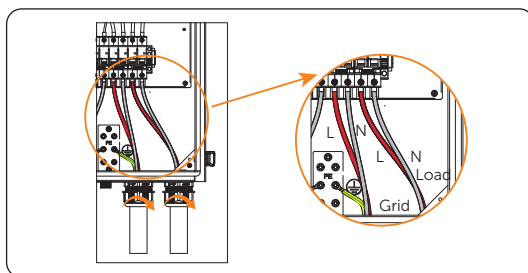


Figure 7-94 Connecting the Grid and Load cables

Step 7: Connect the Grid and Load cables between the inverter and the Matebox.

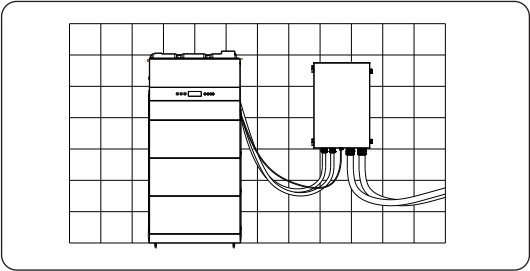


Figure 7-95 Connecting the Grid and Load cables

7.4.4 Close the Matebox

Wiring procedure

Step 1: Tighten the M4*8 screws to install the baffle back (Torque: 1.5 ± 0.2 N·m).

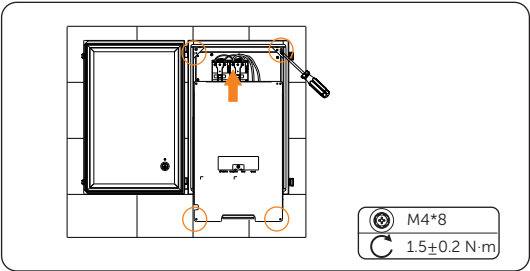


Figure 7-96 Tightening the screws

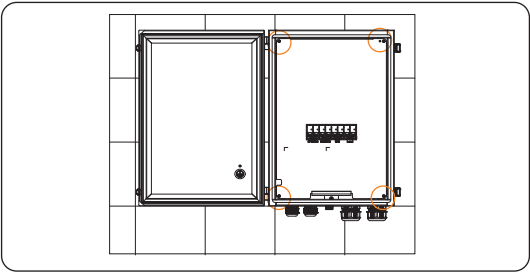


Figure 7-97 Installing the baffle back

Step 2: Close the upper cover.

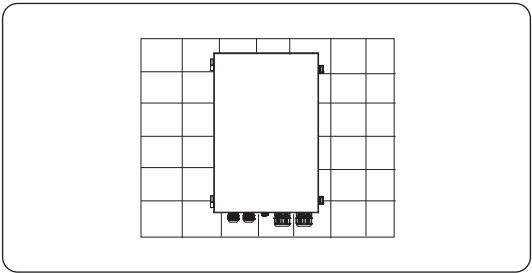


Figure 7-98 Closing the upper cover

Step 3: Lock the buckle with the key.

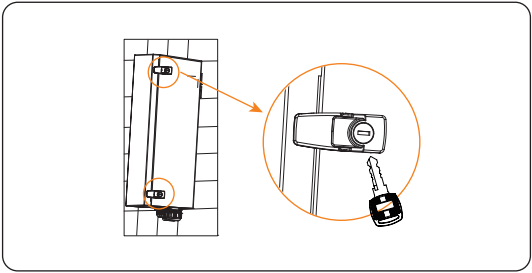


Figure 7-99 Locking the buckle

8 System Commissioning

8.1 Checking before Power-on

- a. Check the device installed correctly and securely;
- b. Make sure the DC switch and the button on the inverter are OFF;
- c. Make sure the BMS Button and BAT switch are OFF.
- d. Make sure the AC and EPS breakers between the inverter and the power grid are OFF.
- e. Make sure the breaker between the Matebox and the power grid is OFF, and all breakers on the matebox are OFF. (With X1-Matebox G2)
- f. Make sure all Grid and EPS cables are connected correctly and securely;
- g. Make sure the inverter is connected to the battery correctly and securely ;
- h. Make sure the communication cable is connected correctly and securely;
- i. Make sure the CT/Meter cable is connected correctly and securely;
- j. Make sure all photovoltaic modules are connected correctly and securely;
- k. Make sure all the connectors which are not used sealed by covers;
- l. The cover plate of the inverter is closed and the cover screws are tightened.

8.2 Powering on the System

Step 1: 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 connection is connected correctly.

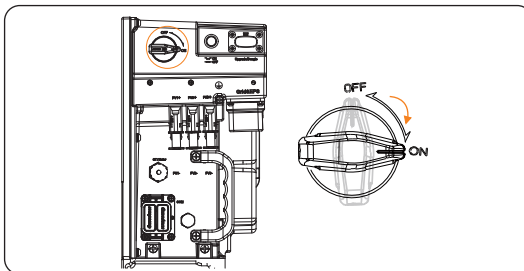


Figure 8-1 Turning on DC switch

Step 2: Press the button on the inverter.

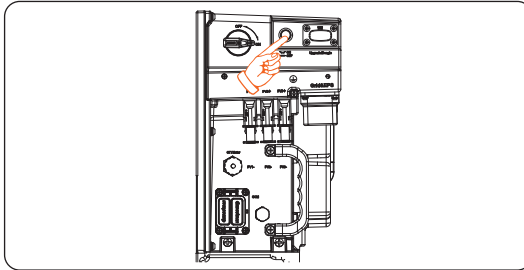


Figure 8-2 Pressing the button

NOTICE!

- The button is in OFF state by default.
- A system problem may be encountered while pressing the button frequently. The user may need to wait at least 10 seconds and then try again.

Step 3: Set **Safety Code** according to different countries and grid-tied standards on the LCD screen. The inverter cannot be connected to the grid before the safety code is correctly set. Refer to [9.6.2 Setting Safety Code](#) for details.

Step 4: Set the System ON/OFF to ON state on the LCD screen.

Step 5: Power on the inverter.

Without X1-Matebox G2

» Turn on the AC breaker and wait for the inverter to power on.

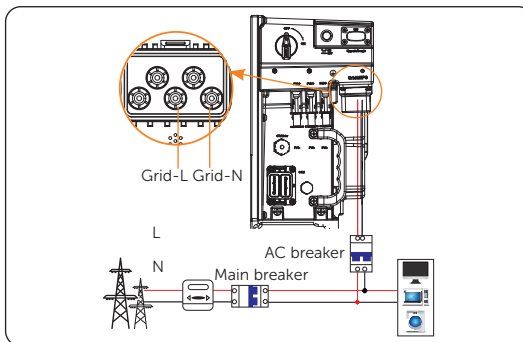
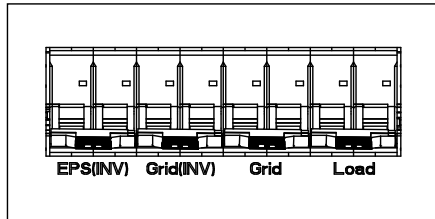


Figure 8-3 Turning on AC breaker

With X1-Matebox G2

- » Turn on the breaker between the Matebox and the power grid.
- » Turn on the Grid Breaker and Load Breaker on the Matebox.
- » Turn on the EPS (INV) Breaker and GRID (INV) Breaker on the Matebox.
- » Then turn on the AC breaker and wait for the inverter to power on.



After powering on the inverter, you can check whether Meter/CT is correctly connected.

- » If CT is connected, please perform the [Meter/CT Check](#) on the LCD screen to check the correct connection.
- » If meter is connected, please set the connection of meter through [Meter/CT Settings](#) on the LCD screen.
- » If Meter/CT is successfully connected , the power information of Meter/CT will be displayed on the LCD screen. If the Meter/CT connection fails, the screen will prompt "**Meter Fault**" or "**Missed CT Fault**".

Step 6: Switch the BAT switch to the "ON" position. Press and hold the BMS Button for about 1 to 2 seconds, at the point, the status light flashes yellow light until finishing self test. Then the status light flashes green light. After successful communication to the inverter, the status light turns solid green light, and the SoC power indicators go solid green light.

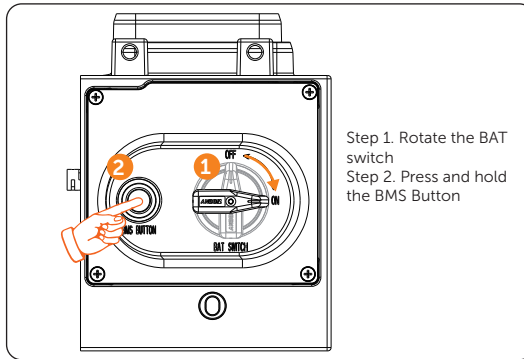


Figure 8-4 Turning on the battery

NOTICE!

- The button is in OFF state by default.
- A system problem may be encountered while pressing the button frequently. The user may need to wait at least 10 seconds and then try again.

Step 7: When the battery turns on, the inverter will restart automatically. The inverter will go Waiting, Checking and Normal status in sequence.

*Note:

Waiting: When the DC output voltage of the photovoltaic module is higher than 50V (minimum starting voltage) and there are no other abnormal conditions, the inverter will enter the waiting state.

Checking: The inverter will automatically detect the DC input. When the DC output voltage of the photovoltaic module is higher than 40V, the photovoltaic module has enough energy to start the inverter and there are no other abnormal conditions, the inverter will enter the checking state.

Normal: When the inverter is working normally, the green light is always on. At the same time, the power is fed back to the grid, and the LCD displays the output power.

8.3 Checking after Power-on

- Check whether the inverter has any abnormal noise.
- Check whether the indicator lights report an error and whether the LCD screen displays the error message.
- Check whether the data of PV, grid and battery are normal through the LCD screen.
- Check whether the Work Mode is consistent with what had been set through LCD screen or the SolaX Cloud APP.

8.4 Power off

- Press the Button on the inverter to shut down the system;
- Turn off the AC and EPS breakers between the inverter and the power grid;
- Turn off the DC switch on the inverter.
- Turn off the BAT switch and button on the battery.
- Turn off the AC and EPS breakers between the inverter and the power grid. And turn off all the breakers on the matebox. (With X1-Matebox G2)

WARNING!

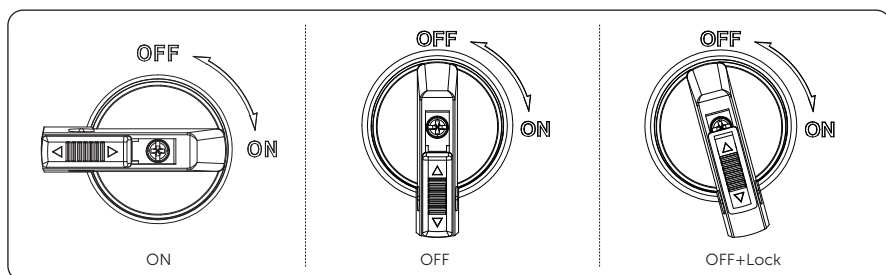
- After the X1-IES system powers off, there will still be the remaining electricity and heat which may cause electric shocks and body burns. Please wear personal protective equipment (PPE) and begin servicing the inverter and the battery five minutes after power off.

8.5 Operation of Lockable DC Switch

This series of inverters are provided with two kinds of DC switches: unlockable DC switch (optional; without lock); and lockable DC switch (standard; with lock).

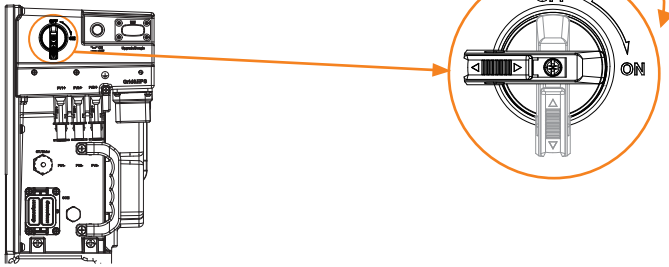
- For lockable DC switch:

The lockable DC switch includes 3 states: ON, OFF, and OFF+Lock. The DC switch is in the OFF state by default.



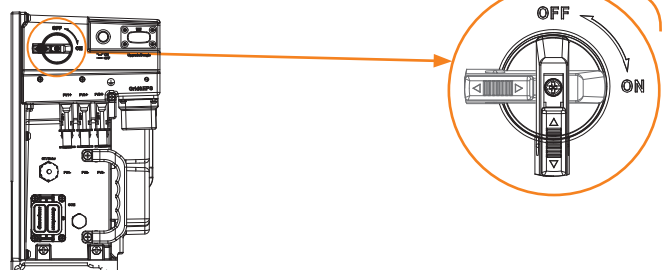
- To turn on the DC switch
Turn on the DC switch from OFF state to ON state.

Turn on DC switch (Australian version)

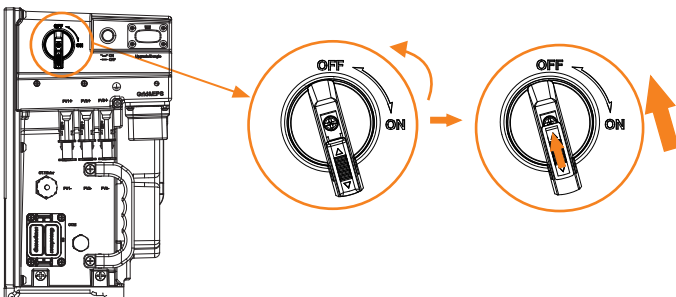


- To turn off the DC switch
Rotate the DC switch from ON state to OFF state.

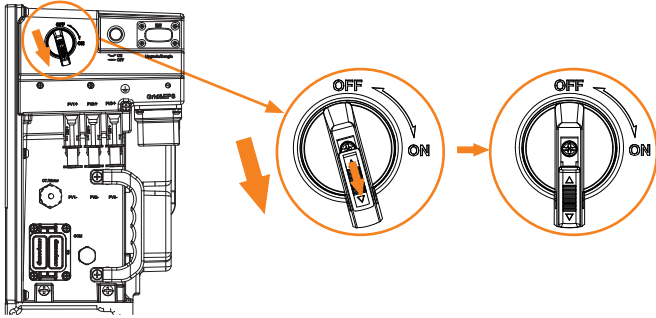
Turn off DC switch (Australian version)



- To lock the DC switch
 - 1) Rotate the DC switch to OFF state, then rotate the DC switch to the left side;
 - 2) Push the position indicated by the arrow upward (as shown in the diagram below).
 - 3) (Optional) After pushing the position upward, users can choose to lock the DC switch with a lock.



- To unlock the DC switch
 - 1) Remove the lock. (If any);
 - 2) Push the position indicated by the arrow down (as shown in the diagram below);
 - 3) Wait for it to return to OFF state.



9 Operation on LCD

9.1 Overview of LCD

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

The information of the main interface is as below. **Power** means the current output power of the inverter; **Today** means daily generated power of the inverter!; **Battery** means the left capacity of the battery.

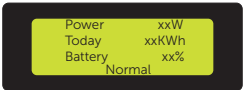


Figure 9-1 Information of main interface

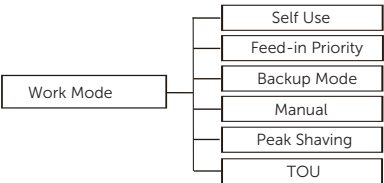
The menu interface is for users to change settings or obtain information.

When the LCD displays the main interface, press **Enter** to enter the menu interface. Press **Up/Down** to display the full information.

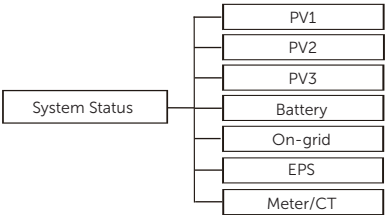


Figure 9-2 Overview of menu interface

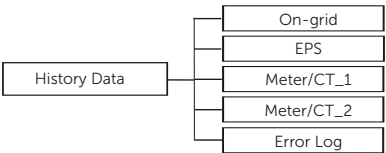
- [System ON/OFF](#)
- [Work Mode](#)



- System Status



- History Data



- Settings

Settings includes User Settings and Advanced Settings. Among them, [User Settings](#) includes (Figure 9-3); [Advanced Settings](#) includes (Figure 9-4).

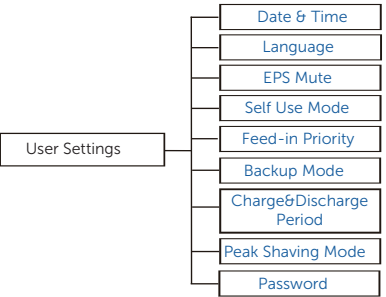


Figure 9-3 User Settings

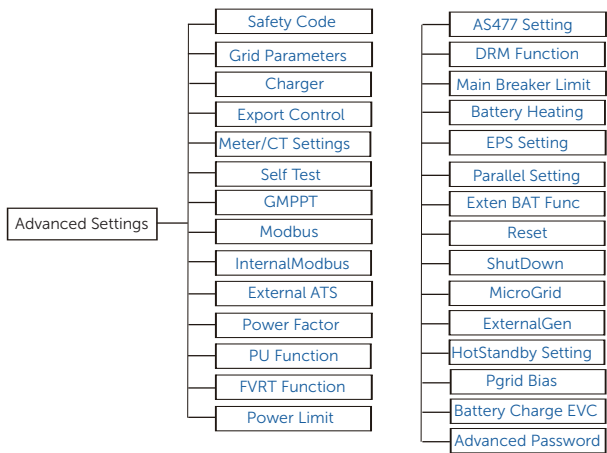
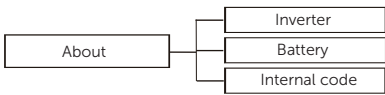


Figure 9-4 Advanced Settings

- About



NOTICE!

Property losses or system damage due to unauthorized access to the system when the keys on the LCD is mistakenly pressed.

- System ON/OFF, Work Mode, System Status, History Data, and About can be set without any password. Keep the system out of reach of children.

NOTICE!

Property losses or system damage due to unauthorized access to the system when the user password is used.

- Settings can be set with password. User settings can be set by the users, replace the user password with a new secure password. Advanced settings can only be set by the installer.

NOTICE!

- The LCD screen can only display 4 datas. Press **UP** and **Down** to display the full information.

9.2 System ON/OFF

Setting path: Menu > System ON/OFF

Setting System ON/OFF

After entering into the System ON/OFF interface, you can set the **System ON** or **OFF**.

"ON" means the inverter is in working status. "OFF" means the inverter stops running and only the LCD screen is turned on.

Default: OFF



9.3 Work Mode

Selecting path: Menu > Work Mode

Default: Self Use

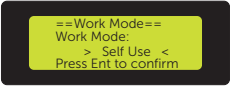
You can select one of the work modes to operate the inverter.

Selecting Work Mode

After entering into the Work Mode interface, you can set **Self Use**, **Feed-in Priority**, **Backup Mode**, **Manual**, **Peak shaving** and **TOU** as follows:

» Selecting **Self Use**

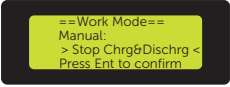
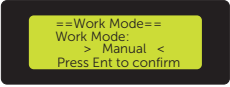
Feed-in Priority, **Backup Mode** and **Peak Shaving** have the same setting logic as **Self Use**.



» Selecting **Manual**

There are three options to choose from: **Forced Discharge**, **Forced Charge** and **Stop Chrg&Dischrg**

Default: **Stop Chrg&Dischrg**

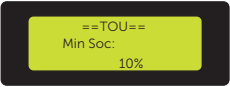
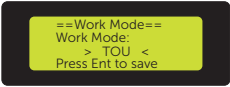


» Selecting **TOU**

TOU can only be set in SolaX Cloud App. Aftering setting the TOU in the App, the selected TOU mode will be displayed in TOU interface on the LCD.

Min SoC: The minimum SoC of the system.

Min Soc: Default: 10%

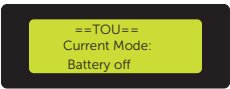


Self-use: Same working logic with "Self-use Mode", but it is not limited by the charging and discharging time slots. The priority of PV: Loads > Battery > Grid.

Min Soc: Default: 10%



Battery off: The battery neither charges nor discharges. The power of PV will supply to loads or the grid. Only when the battery SOC is lower than the system (TOU) Min SOC, the battery can be charged.



Peak shaving: The working logic is that when the power consumption from the grid exceeds the set PeakLimit value, the battery is allowed to discharge power. The excess power beyond the limit is provided by the combination of photovoltaic and battery to ensure that the maximum power purchased from the grid does not exceed the set limit.

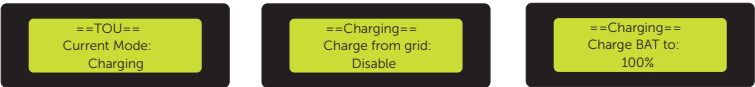
Peaklimits: Default: 0W



Charging: The power of PV will charge the battery as much as possible to the set SOC of Charge BAT to (%). You can set whether to Charge from grid. The default value of Charge BAT to (%) is 100%. When the battery reaches the set SOC, the surplus power will perform "Self-use Mode" or supply to the grid (based on the system setup), at this point, Charge from grid is not allowed.

Charge from grid: Default: Disable

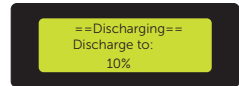
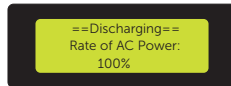
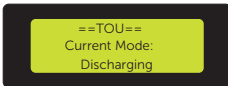
Charge BAT to: Default: 100%



Discharging: If allowed by the battery, the system outputs a specified power from the grid based on the set output percentage, controlling the power at the AC port. You need to set the RatePower (%) through Web or App when choosing Discharging mode. When the battery Discharge to (%) reaches the set SOC, the inverter performs "Self-use Mode".

Rate of AC Power: Default: 100%

Discharge to: Default: 10%



9.4 System Status

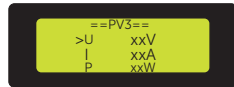
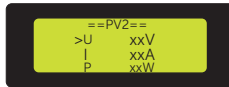
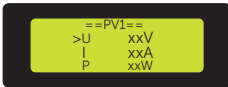
Displaying path: Menu > System Status

Displaying System Status

After entering into the System Status interface, the status of **PV1, PV2, PV3, Battery, On-grid, EPS** and **Meter/CT** will be displayed on the LCD as follows:

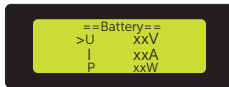
» Displaying **PV1, PV2, PV3**

Here shows the input voltage, current and power of PV1, PV2 and PV3.



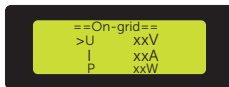
» Displaying **Battery**

Here shows the status of battery, including its voltage, current, power, capacity, temperature and BMS connected status.



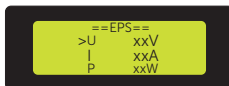
» Displaying **On-grid**

Here shows the voltage, current, power and frequency of the grid.



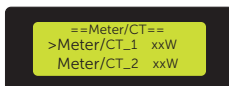
» Displaying **EPS**

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



» Displaying **Meter/CT**

Here shows the data of Meter or CT



9.5 History Data

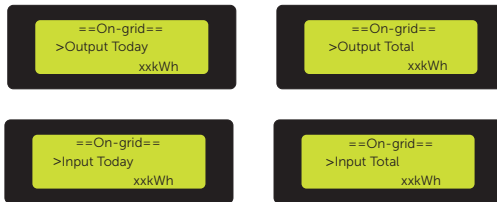
Displaying path: Menu > History Data

Displaying History Data

After entering into the History Data interface, the status of **On-grid**, **EPS**, **Meter/CT_1**, **Meter/CT_2**, **Error Log** will be displayed on the LCD as follows:

» Displaying On-grid

Here shows the inverter's daily and total Input/Output energy when it is connected to the grid.



» Displaying EPS

Here shows the inverter's daily and total Output energy when it is disconnected to the grid.



» Displaying Meter/CT_1

Here shows the inverter's daily selling and buying electricity, and its total selling and buying electricity.



» Displaying Meter/CT_2

Here shows the inverter's daily and total Output energy.



» Displaying Error Log

Here shows the recent six error messages of the inverter.



9.6 Settings

Settings includes User Settings and Advanced Settings.

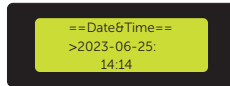
The default password of entering into **Settings** is "0000", and the default password of entering into **User Settings** is "2014".

9.6.1 User Settings

Setting path: Menu > Settings (0000) > User Settings (2014)

After entering into the User Settings interface, you can set the following settings:

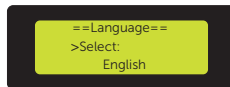
1) Setting Date & Time



2) Setting Language

The inverter provides multiple languages for users to choose.

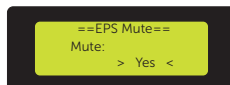
Default: English



3) Setting EPS Mute

When the inverter is running in EPS Mode, you can choose whether turn the buzzer on. Selecting Yes , the buzzer will mute. Select No, the buzzer will sound every 4s when the battery is fully charged, the closer the battery is to the empty state, the higher the buzzer will sound, to remind users to avoid battery loss.

Default: Yes

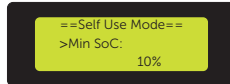


4) Setting Self Use Mode

» Setting Min SoC

The minimum SoC of the system. When the SoC of the battery reaches this value, the battery will not discharge power.

Min SoC: Default: 10%; range: 10%~100%

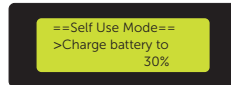
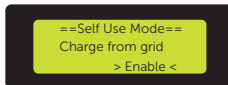


» Setting Charge from grid

Charge from grid: You can set whether the power can be taken from the grid to charge the battery. When **Charge from grid** is set to **Enable**, the utility power is allowed to charge the battery; when it is set to **Disable**, the utility power is not allowed to charge the battery.

Charge battery to: Default: 30%; range: 10%~100%

Set the amount of power to charge the battery from grid (applicable only when the "Charge from grid" is enabled).



5) Setting Feed-in Priority

The same setting logic as **Self Use Mode**.

» Setting Min SoC

Min SoC: Default: 10%; range: 10%~100%

» Setting Charge battery to

Charge battery to: Default: 100%; range: 10%~100%

6) Setting Backup Mode

The same setting logic as **Self Use Mode**.

» Setting Min SoC

Min SoC: Default: 30%; range: 15%~100%

» Setting Charge battery to

Charge battery to: Default: 50%; range: 30%~100%

7) Setting Charge&Discharge Period

Here you can set **Charge and Discharge Period**. If two charge and discharge periods are needed, turn on the **Charge and Discharge Period 2** and set the period.

» Setting Charge & Discharge Period

Forced Chrg Period Start&End Time: Default:00:00; range: 00:00~23:59

Allowed Disc Period Start Time: Default:00:00; range: 00:00~23:59

Allowed Disc Period End Time: Default:23:59; range: 00:00~23:59

Forced Charge only takes effect during the forced charge period and when the battery SoC is lower than the target charging SoC.



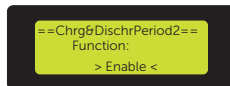
» Setting Charge & Discharge Period 2

Default: Disable

After **Enabling** the Charge & Discharge Period 2, the period will hold the same setting logic as Charge & Discharge Period.

Forced Chrg Period Start&End Time: Default:00:00; range: 00:00~23:59

Allowed Disc Period Start&End Time: Default:00:00; range: 00:00~23:59



8) Setting Peak Shaving Mode

» Setting DischgPeriod1 and DischgPeriod2

"DischgPeriod1" and "DischgPeriod2" are two discharging periods you can set. Set "ShavingStartTime1" (7:00 by default) and "ShavingEndTime1" (15:00 by default) under "DischgPeriod1", and "ShavingStartTime2" (19:00 by default) and "ShavingEndTime2" (23:00 by default) under "DischgPeriod2".

Shaving Start&End Time 1: Range: 00:00~23:59

Shaving Start&End Time 2: Range: 00:00~23:59

Set "PeakLimit1" and "PeakLimit2" to limit the power that gets from the grid. Once the power of loads exceeds "PeakLimits" during the peak hours, the PV and battery will discharge energy to loads and thus reduce the amount of energy purchased from the grid. In non-peak hours, discharging of the battery is not allowed.

PeakLimit1&2: Default:0W; range:0W~60000W



» Setting ChargeFromGrid

ChargePowerLimits: When the actual battery SoC is less than "MAX_SoC" (settable), the battery can be charged from the grid at no more than "ChargePowerLimits" (settable) power.

ChargePowerLimits: Default:0W, range: 0W~8000W

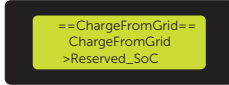
MAX_SoC: Default: 50%; range:10%~100%



» Setting **Reserved_SoC**

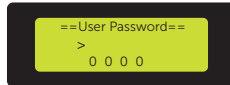
Reserved_SoC is the battery capacity saved for the next peak shaving in the non-peak shaving period.

Reserved_SoC:Default: 50%; range:10%~100%



9) Setting Password

The default password of the User Settings is "0000". You can reset the new password. Press **Enter** to confirm the value and jump to the next number. When all passwords have been entered and confirmed, press **Enter** to set the password successfully.



9.6.2 Advanced Settings

NOTICE!

Property losses or system damage due to unauthorized access to adjustable parameters.

- All the adjustable parameters including safety code, grid parameter, export control, etc can be modified under the permissions of installer password. Unauthorized use of the installer password by unauthorized persons can lead to incorrect parameters being input, resulting in property losses and system damage. Get the installer password from the dealer and never open the password to unauthorized person.

Setting path: Menu > Settings (0000) > Advanced Settings

After entering into the Advanced Settings interface, you can set the following settings:

1) Setting Safety Code

NOTICE!

- The inverter cannot be connected to the grid before the safety code is correctly set. If there is any doubt about your safety code where the inverter installed, please consult your dealer or SolaX service for details.
- When the **Safety Code** is selected, the information of **Grid Parameters/ Power Factor/ PU Function/ FVRT Function** corresponding to the selected safety code will be automatically matched.

In order for the inverter to be fed in, the safety code must be set correctly to the installation site. Here you can set safety code according to different countries and grid-tied standards.

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

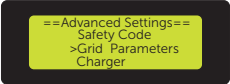
==Advanced Settings==
>Safety Code
Grid Parameters
Charger

2) Setting Grid Parameters

Here you can set the protective voltage and frequency value of the grid. 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 the contents displayed on the LCD screen on the inverter.

When the **Safety Code** is selected, the information of **Grid Parameters** corresponding to the selected safety code will be automatically matched.



==Advanced Settings==
Safety Code
>Grid Parameters
Charger

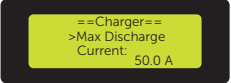
3) Setting Charger

The inverter is compatible with lithium battery. Here you can set the Max Discharge/Charge current and Charge upper limit of the battery.

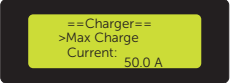
Max Discharge: Default: 50; range: 0~50

Max Charge: Default: 50; range: 0~50

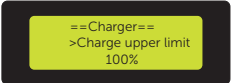
Charge upper limit: Default: 100; range: 10~100



==Charger==
>Max Discharge
Current: 50.0 A



==Charger==
>Max Charge
Current: 50.0 A

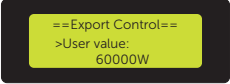


==Charger==
>Charge upper limit
100%

4) Setting Export Control

This function allows the inverter to control the amount of power output to the grid. If the user does not want to supply power to the grid, set it to 0.

User value: Default: 60000W; range: 0~60000W



==Export Control==
>User value:
60000W

5) Setting "Meter/CT Settings"

Here you can select Meter or CT to connect the inverter. CT is set by default.

NOTICE!

- If the user has other power generation equipment (such as inverter) at home and wants to monitor both, the inverter provides Meter2 communication function to monitor the power generation equipment. Please refer to section "7.5.4" for specific meter connection diagram.

» Setting Meter/CT Select

```
==Meter/CT Settings==
>Select:
Meter / CT
```

» Setting Meter 1 Addr/Meter 2 Addr

The address of the meter should be set. CT does not need to select the address. So when selecting CT, there is only Meter2Addr can be set.

Meter 2 Addr: Default: 2; range: 1~255

```
==Meter/CT Settings==
>Meter 1 Addr:
1
```

```
==Meter/CT Settings==
>Meter 2 Addr:
2
```

» Setting Meter 1 Direction/Meter 2 Direction

If the Meter/CT is reversely connected, select the Negative direction.

Meter1/CT Direction: Default: Positive

Meter2/CT Direction: Default: Positive

```
==Meter/CT Settings==
>Meter1/CT Direction
Positive
```

```
==Meter/CT Settings==
>Meter2/CT Direction
Positive
```

» Setting Meter/CT Check

Installation Check is for active detection of Meter/CT status after the first installation. If this function is enabled, the Meter/CT status will be checked one time.

Cyclic Check is a function that if it is enabled, the Meter/CT status will be checked every half hour.

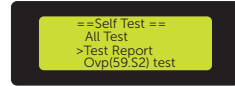
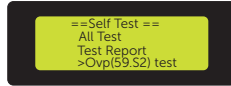
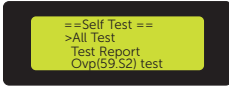
Installation/Cyclic Check: Default: Disable

```
==Meter/CT Settings==
Installation Check
>Disable <
CT status Disable
```

```
==Meter/CT Settings==
Cyclic Check
> Disable <
```

6) Setting Self Test (only for CEI 0-21)

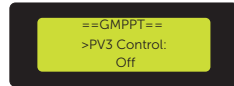
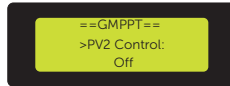
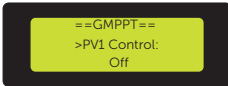
Here you can select "All Test" or a single item for testing. Before testing, make sure the inverter is connected to the grid. "All Test" takes about 6 minutes. For a single test item, it takes about a few seconds or minutes. Click "Test Report" to view the test results.



7) Setting GMPPT

Here you can set the shadow tracking with four options, which are Off, Low, Middle and High.

PV1/2/3 Control: Default: OFF

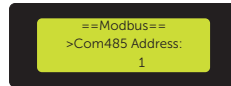
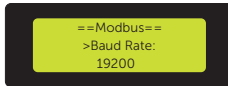


8) Setting Modbus

You can control the external communication device through this function.

Baud Rate: Default: 19200; range: 1400, 9600, 19200, 38400, 56000, 57600, 115200

Com485 Address: Default: 1; range: 1~255



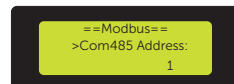
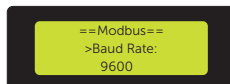
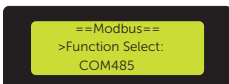
9) Setting InternalModbus

You can control SolaX's internal communication device through this function.

Function Select: Default: Com 485; range: Com 485, Datahub, EV Charger, AdapterBoxG2, EVC&AdapterBoxG2

Baud Rate: Default: 9600; range: 1400, 9600, 19200, 38400, 56000, 57600, 115200

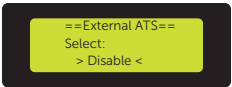
Com485 Address: Default: 1; range: 1~255



10) Setting External ATS

Enable means the inverter achieves grid and off-grid switching through the advanced matebox. **Disable** means the inverter achieves grid and off-grid switching by the inverter itself. (Disable by default)

External ATS needs to be set to **Enable** only when an advanced matebox is connected. In other cases, **Disable** this function is required. When the inverter is in Parallel state, **Enable** can not be set.

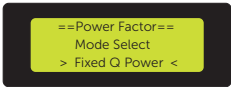
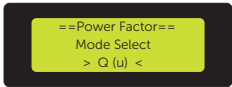
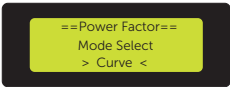
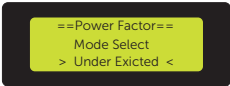
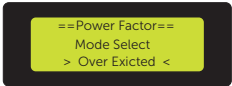


11) Setting Power Factor

(applicable to specific countries, please refer to local grid requirements.)

After selecting the **Safety Code** according to different countries and grid-tied standards, the **Power Factor** corresponding to safety code will be automatically matched.

Default : Off



Off	/
Over-Exicted	PF Value
Under-Exicted	PF Value
Curve	P1_PF
	P2_PF
	P3_PF
	P4_PF
	Power1
	Power2
	Power3
	PflockInPoint
	PflockOutPoint
	3Tua

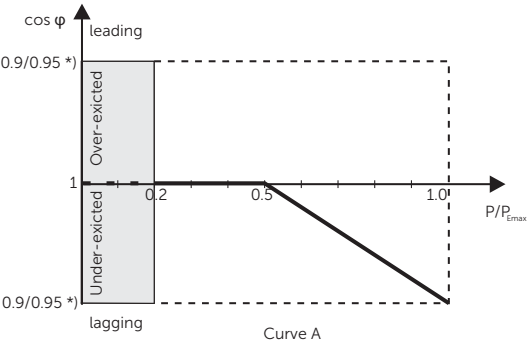
Q (u)	VoltRatio1
	VoltRatio4
	QUResponseV1
	QUResponseV2
	QUResponseV3
	QUResponseV4
	K
	QuDelayTimer
	QuLockEn
	QuLockIn
	QuLockOut
	VoltRatio2
	VoltRatio3
Fixed Q Power	Q Power

- Reactive power control, reactive power standard curve $\cos \varphi = f(P)$

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

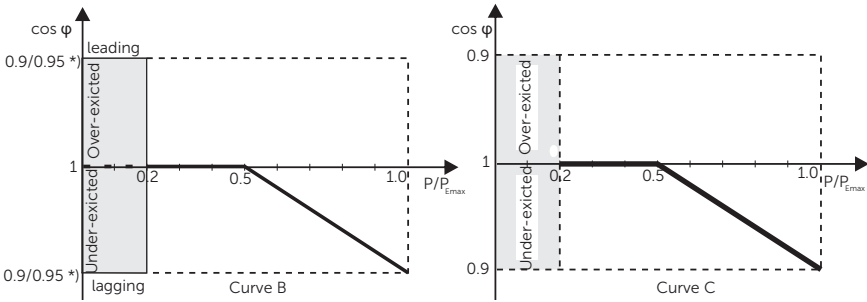
For TOR, the curve $\cos \varphi = f(P)$ should be curve B. The set default value is shown in curve B.

For CEI 0-21, the default value of PFLockInPoint is 1.05. When $V_{ac} > 1.05 V_n$, $P_{ac} > 0.2 P_n$, curve $\cos \varphi = f(P)$ corresponds to curve C.

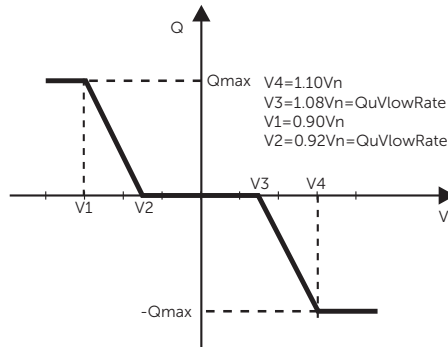


*) If the grid-connected power of the inverter $\leq 4.6kW$, the Power Factor is 0.95 at 1.0 power; if the grid-connected power of the inverter $> 4.6kW$, the Power Factor is 0.90 at 1.0 power.

*) Depend on the required Q capacity



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



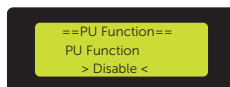
12) Setting PU Function

(applicable to specific countries, please refer to local grid requirements.)

When the **Safety Code** is selected, the information of **PU Function** corresponding to the selected safety code will be automatically matched.

The PU function is a volt-watt response mode required by certain national standards such as AS4777. This function can control the active power of the inverter according to the grid voltage. Here you can Enable or Disable the PU Function.

Default: Disable



13) Setting FVRT Function

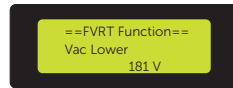
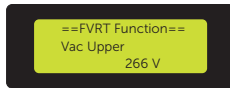
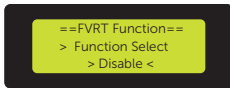
When the **Safety Code** is selected, the information of **FVRT Function** corresponding to the selected safety code will be automatically matched.

Here you can Enable or Disable the FVRT Function, and set the parameters of Vac Upper and Vac Lower when this function is enabled.

Default: Disable

Vac Upper: Default: 266V; range: 230~288V

Vac Lower: Default: 181V; range: 46~240V

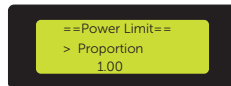


14) Setting Power Limit

Here you can set the maximum power of grid port by percentage.

The percentage of rated output power is used as the actual output power.

Proportion: Default: 1.00; range: 0.00~1.10



15) Setting "AS477 Setting"

When the **Safety Code** is selected, the information of **AS477 Setting** corresponding to the selected safety code will be automatically matched.

It is the same function as Export Control, but it is only applicable to Australia and New Zealand.

Soft Limit: Control the output value to a certain range.

Hard Limit: If the actual output value reaches the setting **Hard Limit Value**, the system will automatically disconnect from grid and display error message on the LCD.

» Setting Export Control

Export Control is to control active power.

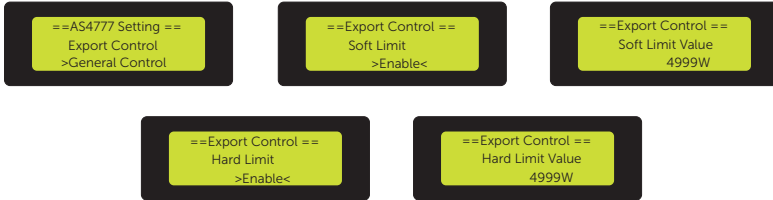
Soft/Hard Limit Value: Default: 4999W; range: 0~15000W



» Setting General Control

General Control is to control apparent power.

Soft/Hard Limit Value: Default: 4999W; range: 0~15000W



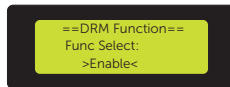
16) Setting DRM Function (Applied to AS4777)

When the **Safety Code** is selected, the information of **DRM Function** corresponding to the selected safety code will be automatically matched.

The DRM Function is a demand response method required by the NZS4777 standard and is only applicable to Australia and New Zealand.

Here you can enable or disable this function.

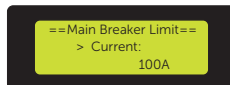
Default: Enable



17) Setting Main Breaker Limit

Due to power limit, the current of Meter or CT must be abide by the utility's requirements. You can set the corresponding amperage according to the utility's requirements. Failure to set the current may cause a circuit breaker fault of main switchboard, thus affecting the charging and discharging of battery.

Main Breaker Limit : default:100A; range:32A~100A



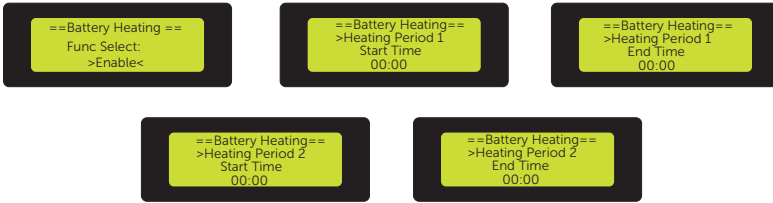
18) Setting Battery Heating

Here you can enable the battery heating function, and set the time period that the battery needs to be heated. There are two time periods can be set.

Default: Disable

Heating Period 1 Start/End Time: Default: 00:00; range: 00:00~23:59

Heating Period 2 Start/End Time: Default: 00:00; range: 00:00~23:59



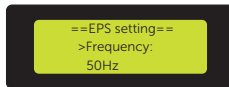
19) Setting "EPS Setting"

Here you can set the Frequency, Min SoC and Min ESC SoC in EPS mode.

» Setting Frequency

Here you can choose to set the frequency of 50Hz or 60Hz.

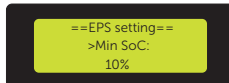
Default: 50Hz



» Setting Min SoC

When the inverter is in EPS mode, once the battery SoC is lower than the Min SoC , the inverter will display "Bat Power Low". If there is PV, the energy of PV will charge the battery.

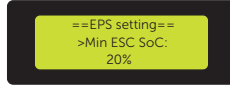
Min SoC: Default: 10%; range: 10%~25%



» Setting Min ESC SoC

When the battery SoC reaches the Min ESC SoC, the inverter will automatically enter EPS mode.

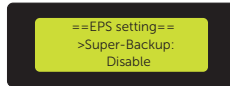
Min ESC SoC: range: Default: 20%; range: 15%~100%.



» Setting Super-Backup

When the **Super-Backup** is enabled, if there is only PV and no battery is available, the inverter can also enter EPS mode when there is a loss of grid.

Super-Backup: Default: Disable



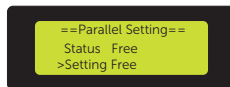
20) Setting "Parallel Setting"

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

Status shows whether the inverter is in parallel status. **Free** means the inverter is not in parallel. **Master** means the inverter has been set in parallel and has become the master inverter.

Setting means you can set the inverter's status. There are two status to choose: Free and Master.

Default: Free



NOTICE!

- Master inverter has an absolute lead in the parallel system to control slave inverter's energy management and dispatch control.
- Overall system will be running according to master inverter's setting parameters, and most setting parameters of slave inverter will be kept but not be cancelled.
- Once slave inverter exit from system and be running as an independent unit, its all setting will be re-activation.

NOTICE!

- If a slave inverter is set to **Free** mode but not disconnect the network cable, this inverter will return to **Slave** mode automatically.
- If a slave inverter is disconnected with the Master inverter but not be set to **Free** mode, the slave inverter will report "Parallel Fault".

Free mode	Only if no inverter is set as a Master , the two inverters are in free mode in the system.
Master mode	When one inverter is set as a Master , this inverter enters master mode. Master mode can be changed to free mode.
Slave mode	Once one inverter is set as a Master , the other inverter will enter into slave mode automatically. slave mode can not be changed from other modes by LCD setting.

NOTICE!

- Refer to section "[7.3.5.1 Parallel Connection](#)" for specific parallel connection diagram.

21) Setting Exten BAT Func

This function is for extending new batteries. The setting is invalid under the EPS Mode. When the inverter is on-grid, enabling this setting will make the inverter charge or discharge the battery SoC to about 40%, which is convenient for adding new batteries. After enabling 48 hours, this function will turn to Disable automatically

Default: Disable

==Exten BAT Func==
Select:
>Disable<

22) Setting Reset

Here you can choose to reset the **Error Log**, **Meter/CT**, **INV energy**, **Factory** and **WiFi** settings or not.

Default: No

==Reset Error Log ==
Reset:
>No<

==Reset Meter/CT_1 ==
Reset:
>No<

==Reset Meter/CT_2 ==
Reset:
>No<

==Reset INV Energy ==
Reset:
>No<

==Factory Reset ==
Reset:
>No<

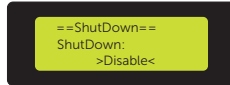
==WiFi Reset ==
Reset:
>No<

23) Setting ShutDown

ShutDown is an Enable Switch, it determines whether to allow the external switch to turn on and off the inverter. If you want to use the external switch, the Enable mode can be set.

When the ShutDown function is enabled, connecting Pins 15 and 16 (DI_1 and DI_2 in the communication port of P4) can shut down the inverter.

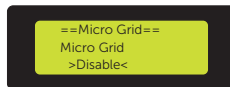
Default: Disable



24) Setting MicroGrid

Here you can Enable the function of MicroGrid.

Default: Disable



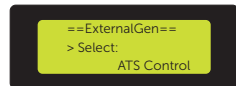
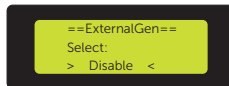
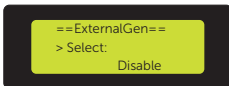
25) Setting ExternalGen

Setting path: Menu Main > Settings > Advanced Settings

You can select **ATS Control** or **Dry Contact** to control ExternalGen. ExternalGen is disable by default.

Setting ATS Control to control ExternalGen

- a. Select **ExternalGen** and enter the interface, the default Disable interface will be displayed. Then press **Enter** to select **ATS Control** and enter the interface.

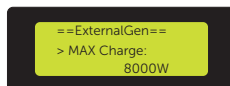


- b. After entering into the ATS Control interface, you can set **MAX Charge**, **Forced Charge Period** and **Allowed Disc Period**, **Charge from Gen** as follows:

» Setting MAX Charge

MAX Charge means the maximum power of the generator charged to the battery.

Max Charge: Default: 3000W; range: 0~8000W



» Setting Forced Charge Period and Allowed Disc Period

Forced Charge Period Start/End Time: Default: 00:00; range: 00:00~23:59

Allowed Disc Period Start Time: Default: 00:00; range: 00:00~23:59

Allowed Disc Period End Time: Default: 23:59; range: 00:00~23:59

Chrg&DischrgPeriod2 has the same setting logic as Forced Charge Period and Allowed Disc Period.

Forced Charge Period Start/End Time: Default: 00:00; range: 00:00~23:59

Allowed Disc Period Start/End Time: Default: 00:00; range: 00:00~23:59



» Setting Charge from Gen

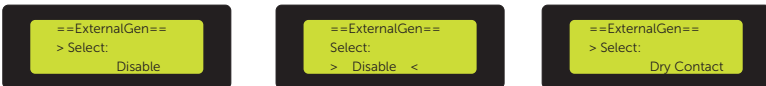
Charge battery to can only be set after Charge from Gen is enabled.

Charge battery to: Default: 30%; range: 10%~100%



Setting Dry Contact to control ExternalGen

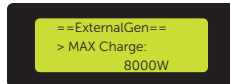
- a. Select **ExternalGen** and enter the interface, the default Disable interface will be displayed. Then press **Enter** to select **Dry Contact** and enter the interface.



- b. After entering into the Dry Control interface, you can set **MAX Charge**, **Start Gen Method**, **Max Run Time**, **Min Rest Time**, **Allow Work Time**, **Charge and Discharge Period** (Refer to Setting ATS Control [Setting Forced Charge Period and Allowed Disc Period](#) for details), **Charge from Gen** (Refer to Setting ATS Control [Setting Charge from Gen](#) for details) as follows:

» **Setting Max Charge**

Max Charge: Default: 3000W; range: 0~8000W



» **Setting Start Gen Method**

immediately: When the grid is disconnected from the inverter and the ExternalGen is enabled, the generator will start immediately.

reference SoC: The generator will start or close according to the Switch on/off SoC.

Switch on SoC: Default: 20%; range: 10%~100%

Switch off SoC: Default: 80%; range: 10%~100%



» **Setting Max. Run Time and Min. Rest Time**

Max. Run Time means the maximum time that the generator can run at a single start, and when the single start time reaches the maximum running time, the generator will actively shutdown.

Default: 1000min; range: 1~60000min

Min. Rest Time means once the generator is turned on, the generator can be turned off only after the minimum running time is reached.

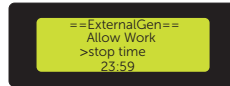
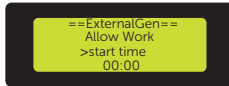
Default: 60min; range: 1~60000min



» Setting Allow Work Time

Start Time: Default: 00:00; range: 00:00~23:59

Stop Time: Default: 23:59; range: 00:00~23:59



26) Setting "HotStandby Setting"

This function is mainly to save the capacity of the battery. When PV has no power and the inverter has no output power, the inverter will enter "HotStandby" status. When the power of loads is higher than 100W, the inverter will exit "HotStandby" status.

Here you can choose to enable or disable this function.

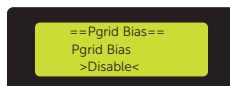
Default: Disable



27) Setting Pgrid Bias

Here you can set whether to bias to discharge power to the grid or take power from the grid. **Disable** means do not bias to discharge power or take power. **Grid** means the inverter will be biased to discharge to the grid. **INV** means the inverter will be biased to take power from the grid.

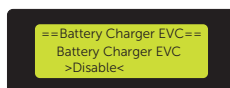
Default: Disable



28) Setting Battery Charge EVC

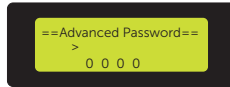
Enable means allowing the battery to discharge energy to EV Charger. **Disable** means battery discharging energy to EV Charegr is not allowed.

Default: Disable



29) Setting Advanced Password

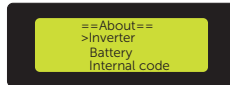
Here you can reset the advanced password. When setting successfully, the LCD screen will display "Set Successfully!". While setting failed, the LCD screen will display "Setting Failed!"



9.7 About

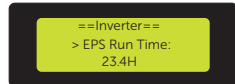
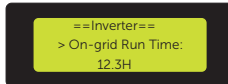
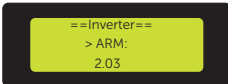
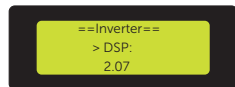
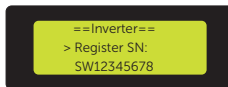
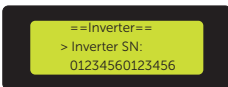
Displaying path: Menu > About

Here shows the basic information of the inverter, battery and internal code. After entering into the About interface, you can check those information .



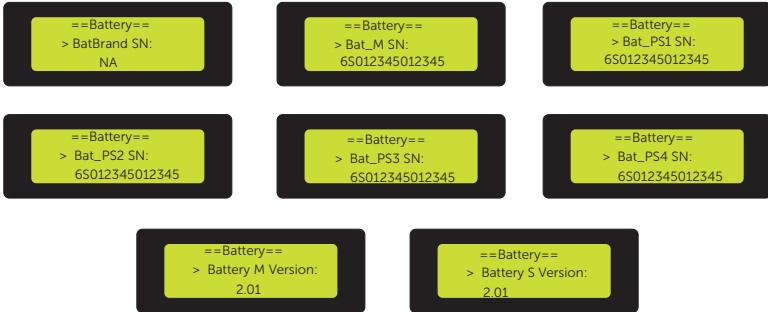
» Inverter

Here shows the basic information of the inverter, including Inverter SN, Register SN, DSP, ARM, On-grid Run Time and EPS Run Time.



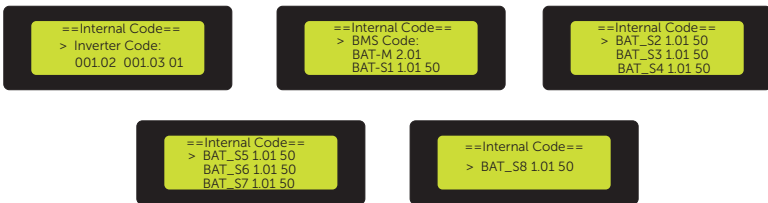
» Battery

Here shows the basic information of the battery.



» Internal code

Here shows the basic information of the internal code.



10 Operation on SolaX App and Web

10.1 Introduction of SolaX Cloud

SolaX Cloud 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, improve the revenue of power generation, and meet the unknown energy challenges.

10.2 Operation Guide on SolaX Cloud App

10.2.1 Downloading and installing App

Select and scan the QR code below to download Solax Cloud APP. You can also find the QR codes at the top left of the login page of www.solaxcloud.com or on the user manual of Pocket series communication module. In addition, you can search with the key word SolaxCloud in Apple Store or Google Play to download it.



App Store

Google play

Figure 10-1 QR code

Please check the online App guide, WiFi connection guide or Setup tutorial video on the SolaXCloud App for relevant operation.

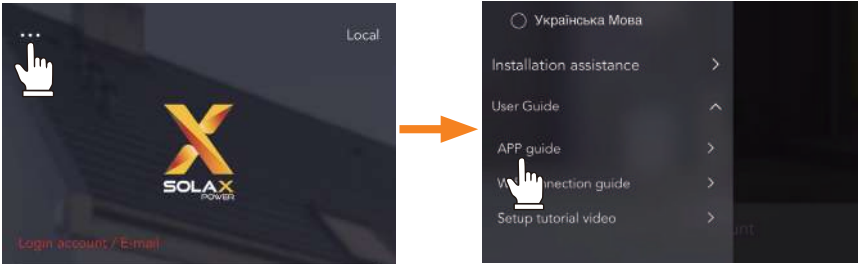


Figure 10-2 App guide on SolaX Cloud

NOTICE!

- The screenshots in this chapter correspond to the SolaX Cloud App V4.2.8

10.3 Operation Guide on SolaX Cloud Wed

Open a browser and enter www.solaxcloud.com to complete registration, login, add site and other related operations according to the guidelines of user guide.

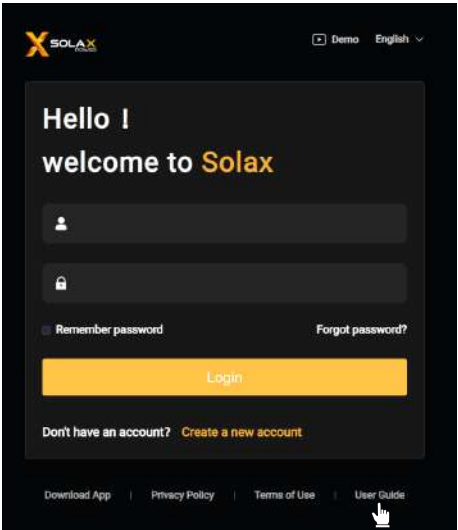


Figure 10-3 User guide on Web

11 Troubleshooting and Maintenance

Before troubleshooting and maintenance, make sure the X1-IES system is powered off.

For how to power off, please refer to [8.4 Power off](#).

WARNING!

- After the X1-IES system powers off, there will still be the remaining electricity and heat which may cause electric shocks and body burns. Please wear personal protective equipment (PPE) and begin servicing the inverter and the battery five minutes after power off.

11.1 Troubleshooting

• Troubleshooting of Inverter

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 SolaX 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.

Error Code	Fault	Descriptions and Diagnosis
IE 01	TZ Protect Fault	Overcurrent fault. • Wait for a while to check if it is back to normal. • Disconnect PV+ PV- and batteries, reconnect. • Or ask for help from the installer if it can not return to normal.
IE 02	Grid Lost Fult	• Check Grid input voltage if it's within normal range • Or ask the installer for help.
IE 03	Grid Volt Fault	Power grid voltage overrun • Wait a moment, if the utility returns to normal, the system will reconnect. • Please check if the grid voltage is within normal range. • Or ask the installer for help.
IE 04	Grid Freq Fault	Electricity frequency beyond range • If the utility returns to normal, the system reconnects. • Or ask the installer for help.

Error Code	Fault	Descriptions and Diagnosis
IE 05	PV Volt Fault	PV voltage out of range • Check the output voltage of the PV module • Or ask the installer for help.
IE 06	Bus Volt Fault	• Press the "ESC" key to restart the inverter. • Check that the PV input open circuit voltage is in the normal range. • Or ask the installer for help.
IE 07	Bat Volt Fault	Battery voltage fault • Check battery input voltage if it's within normal range • Or ask the installer for help.
IE 08	AC10mins Volt	• The grid voltage was out of range in the last 10 minutes. • The system will return to normal if the grid returns to normal. • Or ask the installer for help.
IE 09	DCI OCP Fault	DCI overcurrent protection fault. • Wait for a while to check if it's back to normal. • Or ask the installer for help.
IE 11	SW OCP Fault	Software Detection of Overcurrent Fault. • Wait for a while to check if it's back to normal. • Shut down photovoltaic, battery and grid connections • Or ask the installer for help.
IE 12	RC OCP Fault	Overcurrent protection fault. • Check the impedance of DC input and AC output. • Wait for a while to check if it's back to normal. • Or ask the installer for help.
IE 13	Isolation Fault	Insulation Fault • Please check the wire insulation for damage. • Wait for a while to check if it's back to normal. • Or ask the installer for help.
IE 14	Temp Over Fault	Temperature beyond limit • Check if ambient temperature exceeds the limit. • Or ask the installer for help.
IE 15	Bat Con Dir Fault	EPS(Off-grid) mode current is too strong. • Ensure that the load power is within the EPS(Off-grid) power range. • Check for any non-linear load connections on the EPS(Off-grid). • Move this load to check for recovery. • Or ask for help from the installer if it can not return to normal.

Error Code	Fault	Descriptions and Diagnosis
IE 16	EPS Overload Fault	EPS(Off-grid) over load fault. • Shutdown the high-power device and press the "ESC" key to • Restart the inverter. • Or ask for help from the installer if it can not return to normal.
IE 17	Overload Fault	On-grid mode over load • Shutdown the high-power device and press the "ESC" key to • Restart the inverter. • Or ask for help from the installer if it can not return to normal.
IE 18	BatPowerLow	• Close the high-power device and press the "ESC" key to restart the inverter. • Please charge the battery to a level higher than the protection capacity or protection voltage.
IE 19	BMS Lost	Battery communication loss • Check that the communication lines between the battery and the inverter are properly connected. • Or ask for help from the installer if it can not return to normal.
IE 20	Fan Fault	Fan Fault • Check for any foreign matter that may have caused the fan not to function properly. • Or ask for help from the installer if it can not return to normal.
IE 21	LowTemp Fault	• Low temperature fault. • Check if the ambient temperature is too low. • Or ask for help from the installer if it can not return to normal.
IE 23	Other Device Fault	Other device Fault • update the software and press the "ESC" key to restart the inverter. • Or ask for help from the installer if it can not return to normal .
IE 24	Missed CT Fault	Missed CT Fault • Please check if the CT is connected properly • Or seek help from the installer if it can not return to normal.

Error Code	Fault	Descriptions and Diagnosis
IE 25	InterComms Error	- Internal communication errors - Shut down photovoltaic, battery and grid connections. - Or ask for help from the installer if it can not return to normal.
IE 26	INV EEPROM	Inverter EEPROM Fault. - Shut down photovoltaic, battery and grid, reconnect. - Or ask for help from the installer if it can not return to normal.
IE 27	RCD Fault	Fault of Residual Current Device - Check the impedance of DC input and AC output. - Disconnect PV + PV - and batteries, reconnect. - Or ask for help from the installer if it can not return to normal.
IE 28	Grid Relay Fault	Electrical relay failure - Disconnect PV+ PV- grid and batteries and reconnect. - Or ask for help from the installer if it can not return to normal.
IE 29	EPS(Off-grid) Relay Fault	EPS(Off-grid) relay failure - Disconnect PV+ ,PV- , grid and batteries and reconnect. - Or ask for help from the installer if it can not return to normal.
IE 30	PV ConnDirFault	PV direction fault - Check if the PV input lines are connected in the opposite direction. - Or ask for help from the installer if it can not return to normal.
IE 31	Battery Realy	Charge relay fault - Press the ESC" key to restart the inverter. . - Or ask for help from the installer if it can not return to normal.
IE 32	Battery Relay	Charge relay fault - Press the ESC" key to restart the inverter. . - Or ask for help from the installer if it can not return to normal.
IE 35	Parallel Fault	Parallel Fault - Check if the parallel communication line is correctly connected. - Or ask for help from the installer if it can not return to normal.

Error Code	Fault	Descriptions and Diagnosis
IE 36	HardLimit Fault	HardLimit Fault • Check if the limit value of grid-connected power is appropriate. • Or ask for help from the installer if it can not return to normal.
IE 101	PowerTypeFault	Power type fault • Upgrade the software and press the ESC" key to restart the inverter. • Or ask for help from the installer if it can not return to normal.
IE 102	Port OC Warning	EPS(Off-grid) port over current fault • Check that the EPS(Off-grid) load does not exceed the system requirements, and press the ESC" key to restart the inverter. . • Or ask for help from the installer if it can not return to normal.
IE 103	Mgr Eeprom Fault	Manager EEPROM Fault. • Shut down photovoltaic ,battery and grid ,reconnect. • Or seek help from the installer if it can not return to normal.
IE 105	NTC Sample Invalid	NTC invalid • Make sure the NTC is properly connected and the NTC is in good condition. • Please confirm that the installation environment is normal • Or ask for help from the installer, if it can not return to normal.
IE 106	Bat Temp Low	Battery temp low • Check the battery installation environment to ensure good heat dissipation. • Or ask for help from the installer, if it can not return to normal.
IE 107	Bat Temp High	Battery temp high • Check the battery installation environment to ensure good heat dissipation. • Or ask for help from the installer, if it can not return to normal.
IE 109	Meter Fault	Meter Fault • Please check if the Meter is connected properly • Or seek help from the installer if it can not return to normal.

Error Code	Fault	Descriptions and Diagnosis
IE 110	BypassRaleyFlt	Bypass relay fault • Press the ESC" key to restart the inverter. • Or ask for help from the installer if it can not return to normal.
IE 111	ARMParaComFlt	ARMParaComFlt • Please check that the communication cables of inverters are well connected and the baud rate of COMM setting of inverters are the same. • Or seek help from the installer if it can not return to normal.
BE 01	BMS_ExtEr_Err	Battery Error - External Communication Fault • Please contact the battery supplier.
BE 02	BMS_InterErr	Battery Error - Internal Communication Fault • Please contact the battery supplier.
BE 03	BMS_OverVolt	Over voltage in battery system • Please contact the battery supplier.
BE 04	BMS_LowerVolt	Low voltage in battery system • Please contact the battery supplier.
BE 05	BMS_ChargeOCP	Battery fault - over charge fault • Please contact the battery supplier.
BE 06	DischargeOCP	Battery fault-discharge over current fault • Please contact the battery supplier.
BE 07	BMS_TemHigh	Over temperature in battery system • Please contact the battery supplier.
BE 08	BMS_TemLow	Lower temperature in battery system • Please contact the battery supplier.
BE 09	CellImblance	Battery Unbalanced Failure • Please contact the battery supplier.
BE 10	BMS_Hardware	Battery hardware protection failure • Please contact the battery supplier.
BE 11	BMS_Circuit	Battery circuit failure • Restart the battery . • Please contact the battery supplier.
BE 12	BMS_ISO_Fault	Battery insulation failure • Check that the battery is properly grounded and restart the battery. • Please contact the battery supplier
BE 13	BMS_VolSen	Battery voltage sensor fault • Please contact the battery supplier

Error Code	Fault	Descriptions and Diagnosis
BE 14	BMS_TempSen	Temperature sensor failure - Restart the battery. - Please contact the battery supplier.
BE 15	BMS_CurSen	Battery current sensor fault Please contact the battery supplier.
BE 16	BMS_Relay	Battery relay failure Please contact the battery supplier.
BE 17	TypeUnmatched	Battery type failure - Upgrade the battery BMS software. - Please contact the battery supplier.
BE 18	Ver Unmatched	Battery version mismatch failure - Upgrade the battery BMS software. - Please contact the battery supplier.
BE 19	MFR Unmatched	Battery manufacturer did not match the fault - Upgrade the battery BMS software. - Please contact the battery supplier.
BE 20	SW Unmatched	Battery hardware and software mismatch failure - Upgrade the battery BMS software. - Please contact the battery supplier.
BE 21	M&S Unmatched	Battery master slave control mismatches - Upgrade the battery BMS software. - Please contact the battery supplier
BE 22	CR NORespond	Battery charging request does not respond to a fault - Upgrade the battery BMS software. - Please contact the battery supplier.
BE 23	BMS SW Protect	Battery slave software protection failure - Upgrade the battery BMS software. - Please contact the battery supplier.
BE 24	BMS 536 Fault	Battery fault-discharge over current fault Please contact the battery supplier.
BE 25	BMS SelfCheck	Over temperature in battery system Please contact the battery supplier.
BE 26	BMS_Tempdiff	Battery temperature sensor malfunction Please contact the battery supplier.
BE 27	BMS_BreakFault	Battery Unbalanced Failure Please contact the battery supplier.
BE 28	BMS_FlashFault	Battery hardware protection failure Please contact the battery supplier.

Error Code	Fault	Descriptions and Diagnosis
BE 29	BMS_Precharge	Battery precharge failure • Please contact the battery supplier.
BE 30	AirSwitchBreak	Battery air switch failure • Check that the battery breaker is off. • Please contact the battery supplier.

- **Troubleshooting of Battery (T-BAT-SYS)**

This section contains information and procedures for resolving possible problems with the rechargeable battery and provides the troubleshooting tips to identify and solve most problems that may occur. Please conform the state of the indicators to check the status of the T-BAT-SYS, check the warning or fault information via the monitoring software on the inverter, and read the suggested solutions below when error occurs.

In case of the following circumstances, e.g. voltage or temperature exceeds the limit specified, a warning state will be triggered.

T-BAT-SYS's BMS will periodically report its operating state to the inverter. Therefore, when a warning is reported, the inverter will stop working immediately.

Contact SolaX 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 rechargeable battery.

Error Code	Fault	Diagnosis and Solution
BMS_Lost	External fault of BMS	Unable to establish communication with inverter. - Restart the BMS. - Contact the after-sales personnel of our company.
BMS_Internal_Err	Internal fault of BMS	Unable to establish communication among battery modules. - Restart the BMS. - Check whether the wire connections among battery modules are correct. - Contact the after-sales personnel of our company.
BMS_OverVoltage	BMS overvoltage	Overvoltage of a single battery module. Contact the after-sales personnel of our company.
BMS_LowerVoltage	BMS undervoltage	Undervoltage of a single battery module. - Battery module is forced to charge through inverter. - Contact the after-sales personnel of our company.
BMS_ChargeOverCurrent	Overcurrent charging of BMS	Overcurrent charging of BMS. - Restart the BMS. - Contact the after-sales personnel of our company.
BMS_DischargeOverCurrent	Discharge overcurrent of BMS	Discharge overcurrent of BMS. - Restart the BMS. - Contact the after-sales personnel of our company.
BMS_TemHigh	High temperature of BMS	The temperature of the BMS is too high. - Cool down the BMS to normal temperature, and then restart it. - Contact the after-sales personnel of our company.
BMS_TemLow	Low temperature of BMS	The temperature of the BMS is too low. - Warm up the BMS, and restart it. - Contact the after-sales personnel of our company.
BMS_CellImbalance	Cell imbalance of BMS	Inconsistency of battery module. - Restart the BMS. - Contact the after-sales personnel of our company.

Error Code	Fault	Diagnosis and Solution
BMS_Circuit_Fault	Circuit fault	Circuit fault of the BMS. - Restart the BMS. - Contact the after-sales personnel of our company.
BMS_Insulation_Fault	Insulation fault	Insulation fault of the BMS. - Restart the BMS. - Contact the after-sales personnel of our company.
BMS_VoltSensor_Fault	Voltage sensor fault	Voltage sampling fault of the BMS. - Restart the BMS. - Contact the after-sales personnel of our company.
BMS_CurrSensor_Fault	Current sensor fault	Current sampling fault of the BMS. - Restart the BMS. - Contact the after-sales personnel of our company.
BMS_Relay_Fault	Relay fault	Relay contact adhesion fault of the BMS. - Restart the BMS. - Contact the after-sales personnel of our company.
BMS_CR_Unresponsive	Charging request not responded	Inverter does not respond the charging request. - Restart the BMS or the inverter. - Contact the after-sales personnel of our company.
BMS_536_Fault	536 fault of the BMS	BMS voltage sampling fault. - Restart the BMS. - Contact the after-sales personnel of our company.
BMS_Selfchecking_Fault	Self-test fault of the BMS	Self-test fault of the BMS. - Restart the BMS. - Contact the after-sales personnel of our company.
BMS_Temdiff_Fault	Temperature different fault	BMS temperature varies greatly. - Restart the BMS. - Contact the after-sales personnel of our company.
BMS_Break	Disconnection fault of the BMS	BMS sampling fault. - Restart the BMS. - Contact the after-sales personnel of our company.

Error Code	Fault	Diagnosis and Solution
BMS_Precharge_Fault	BMS precharge fault	External short circuit of the BMS. • Check the external connection and restart the BMS. • Contact the after-sales personnel of our company.

11.2 Maintenance

Regular maintenance is required for the X1-IES system. Pay attention to the following maintenance routines of inverter and battery for expressing the optimum device performance. More frequent maintenance service is needed in the worse work environment. Please make records of the maintenance.



- Only qualified person can perform the maintenance for the X1-IES system.
- Only use the spare parts and accessories approved by SolaX for maintenance.

11.2.1 Maintenance routines

Table 11-1 Maintenance routines of Inverter

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 (if it has screen) is normal.	Every 6 months
Input and output cables	• Cables are securely connected. • Cables are intact, and in particular, the parts touching the metallic surface are not scratched. Check whether the terminal caps of idle PV terminals fall off. • Check whether the fastening heads of CT/Meter, COM and Grid&EPS ports are securely tightened.	Every 6 months
Grounding reliability	Check whether the grounding terminal and ground cable are securely connected and all terminals and ports are properly sealed.	Every 6 months
Dongle	Check whether the Dongle is securely connected.	From time to time

Table 11-2 Maintenance routines of Battery (T-BAT-SYS)

Precautions

- If the ambient temperature for storage is between 30°C and 50°C (86°F to 122°F), please recharge the battery modules at least once every 6 months.
 - If the ambient temperature for storage is between -20°C and 30°C (-4°F to 86°F), please recharge the battery modules at least once every 12 months.
 - For the first installation, the interval among manufacture dates of battery modules shall not be exceed 3 months.
 - If a battery module is replaced or added for capacity expansion, each battery's SoC should be consistent. The max. SoC difference should be $\pm 5\%$.
 - If users want to increase their battery system capacity, please ensure that the SoC of the existing system capacity is about 40%. The manufacture date of the new battery module shall not exceed 6 months. If the manufacture date of the new one exceeds 6 months, please charge it to around 40%.
-

11.2.2 Upgrading Firmware

Upgrade precautions

WARNING!

- If the DSP and ARM firmware need to be upgraded, please note that ARM firmware must be upgraded first, then DSP firmware!
- Please make sure that the category format is correct, do not modify the firmware file name. Otherwise, the inverter may not work!

WARNING!

- For the inverter, ensure that the PV input voltage is greater than 60V (upgrade on sunny days). please ensure that the battery SoC is greater than 20% or the battery input voltage is greater than 90V. Otherwise, it may cause serious failure during the upgrade process!

CAUTION!

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

CAUTION!

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

Upgrade preparation

- Please check the inverter version and prepare a U disk (USB 2.0/3.0) and personal computer before upgrading. Please make sure that the size of the U disk is smaller than 32G, and the format is FAT 16 or FAT 32.
- Please contact our service support to obtain the firmware, and store the firmware in the U disk according to the following path.
 - » For ARM file: update\ARM\323101038300_IES_1P_ARM_VX.XX_XX.XX.usb
 - » For DSP file: update\DSP\323101038300_IES_1P_DSP_VX.XX_XX.XX.usb

NOTICE!

- VX.XX refers to the file version, XX.XX refers to date.

Upgrade steps

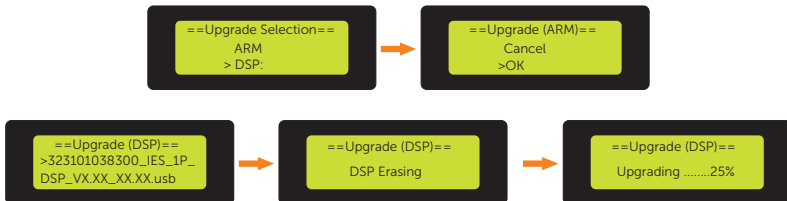
- Please save the Upgrade firmware in your U disk first, and press the **Enter** button on the inverter screen for 5 seconds to enter the OFF mode.
- Find the **Upgrade** port of the inverter, unplug the monitoring module (WiFi Dongle / LAN Dongle / 4G Dongle) by hand, and insert the USB flash drive. (Refer to section [7.3.7 Monitoring Connection](#) for the specific position of **Dongle/ Upgrade** port.
- Select **ARM** and **OK** to enter the software version interface;



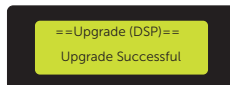
- Please confirm the new firmware version again and select the firmware to upgrade. The upgrade takes about 20 seconds. When it is completed, the LCD screen returns to the **Update** page.



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



- After the upgrade is completed, the LCD screen displays **Upgrade Successful**.



NOTICE!

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

12 Decommissioning

12.1 Disassembling the X1-IES system



- When disassembling the X1-IES system, strictly follow the steps as below.
- Only use measuring devices with a DC input voltage range of 600 V or higher.

Disassembling the inverter

Step 1: Press the button on the inverter to shut down the system.

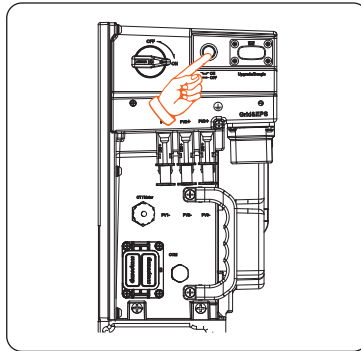


Figure 12-1 Pressing the button

Step 2: Turn off the AC and EPS breakers between the inverter and the power grid.

Step 3: Turn off the DC switch on the inverter

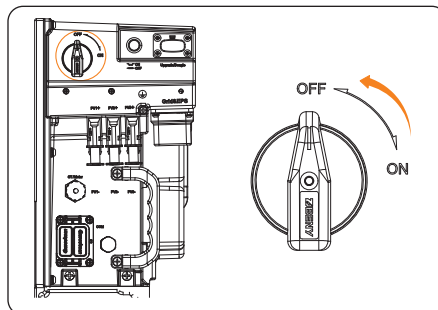


Figure 12-2 Turning off the DC switch

Step 4: Press the BMS Button to shut down the battery, then turn off the BAT switch.

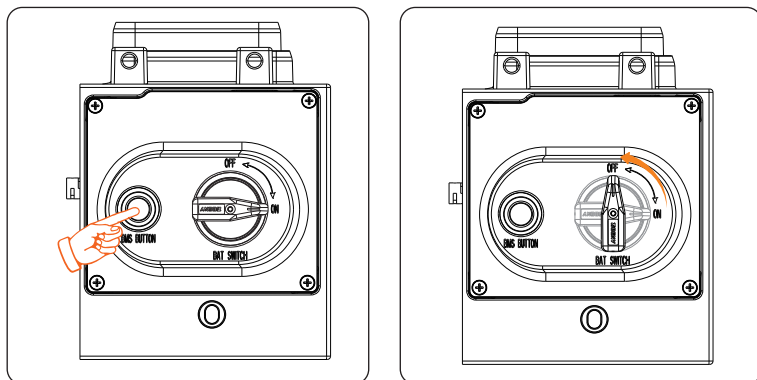


Figure 12-3 Pressing the button and turning off the switch

! WARNING!

- Wait for at least 5 minutes to fully discharge the capacitors inside the X1-IES system.

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

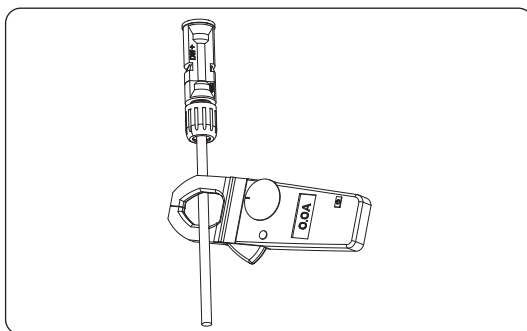


Figure 12-4 Measuring the current

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.

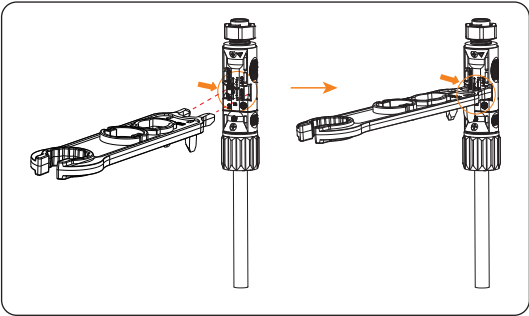


Figure 12-5 Disassembling the PV cables

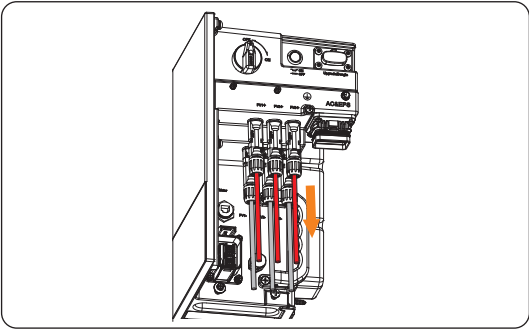


Figure 12-6 Removing the PV cables

Step 7: Use a flat-head screwdriver to prise open the position indicated by the arrow to remove the Grid&EPS cable.

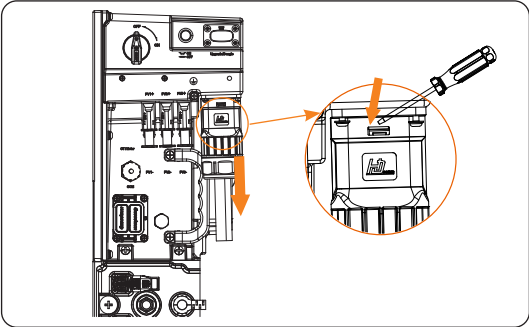


Figure 12-7 Removing the Grid&EPS cable

Step 8: Remove the Communication cable.

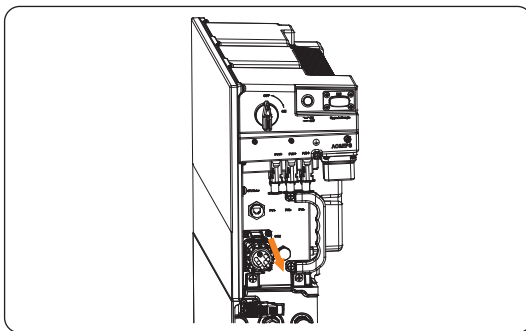


Figure 12-8 Removing the communication cable

Step 9: Remove the Meter/CT cable.

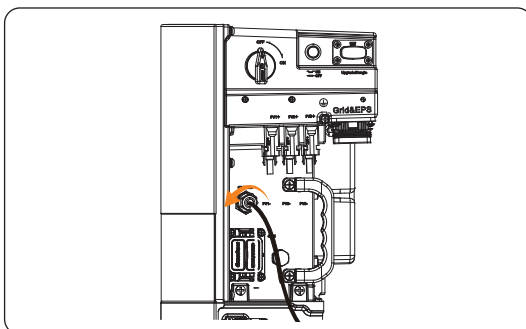


Figure 12-9 Removing the Meter/CT cable

Step 10: Remove the PE cable.

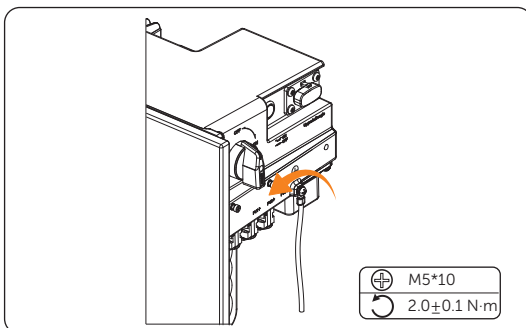


Figure 12-10 Removing the PE cable

Step 11: Remove the Dongle.

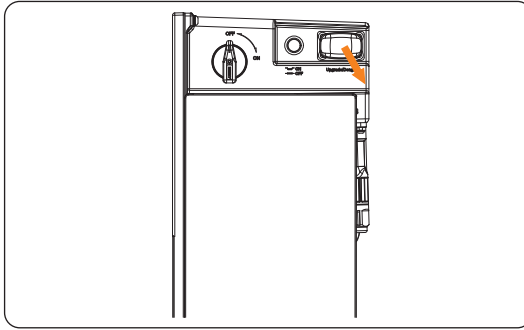


Figure 12-11 Removing the Dongle

Step 12: Put the original protective caps on the terminals.

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

Step 14: Remove the inverter.

Disassembling the Battery (T-BAT-SYS)

Step 15: Press and hold the lock button on the terminals to unplug the short power cable in the case of one tower;

Or press and hold the lock button on the terminals to unplug power cables in the case of two towers.

Step 16: Rotate the ring anti-clockwise to unplug the heater cable after two arrows are aligned in the case of two towers.

Step 17: Use and rotate anti-clockwise a rotation wrench to unplug the communication cable in the case of two towers.

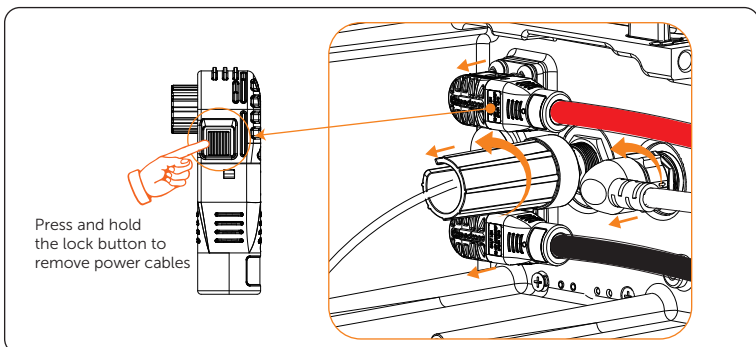


Figure 12-12 Unplugging cables

Step 18: Unscrew the screws to remove the grounding cable.

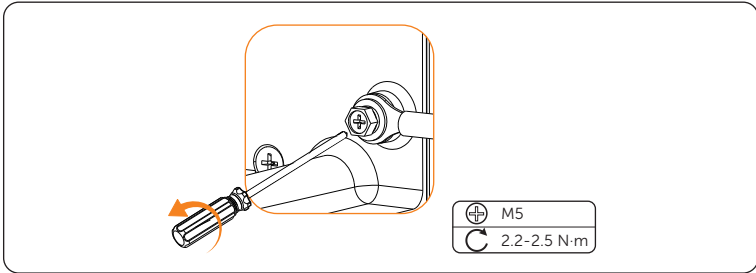


Figure 12-13 Removing grounding cable

NOTICE!

- The above steps for disconnecting cables apply to both the BMS and series box.

Disassembling X1-Matebox G2 (If any)

Step 19: Disconnect the Grid and Load cables.

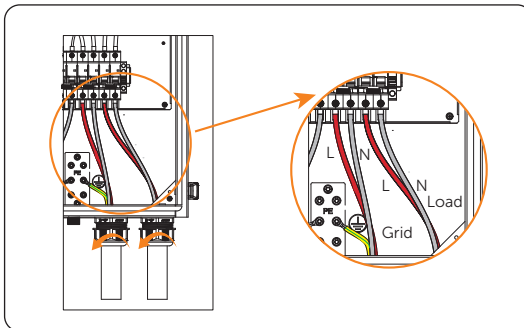


Figure 12-14 Disconnecting the Grid and Load cables

Step 20: Disconnect the CT cable.

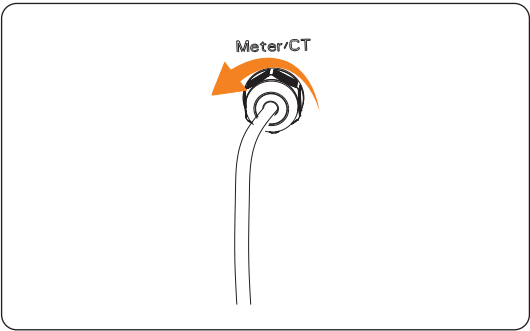


Figure 12-15 Disconnecting the CT cable

Step 21: Disconnect the Grid (INV) and EPS (INV) cables.

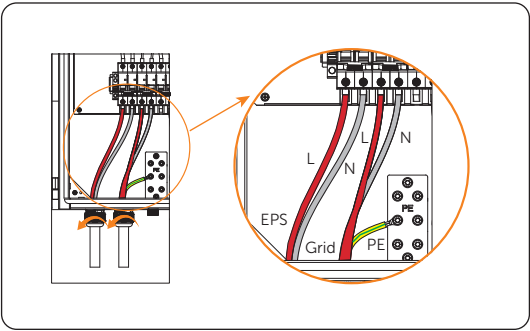


Figure 12-16 Disconnecting the Grid (INV) and EPS (INV) cables

12.2 Packing the X1-IES system

- Load the X1-IES system into the original packing material if possible.
- If the original packing material is not available, you can also use the packing material which meets the following requirements:
 - » Suitable for the weight of product.
 - » Easy to carry
 - » Be capable of being closed completely

12.3 Disposing of the X1-IES system

Please dispose of the X1-IES system in accordance with the disposal regulations for electronic waste which is applied at the installation site.

13 Technical Data

- Inverter

DC input

Model	X1-IES-2.5K	X1-IES-3K	X1-IES-3.7K	X1-IES-4.6K	X1-IES-5K	X1-IES-6K	X1-IES-8K
Max. recommended PV power ¹ [W]	5000	6000	7400	9200	10000	12000	16000
Max PV voltage [d.c. V]	600						
Nominal DC operating voltage [d.c. V]	360						
MPPT voltage range [d.c. V]	40-560						
MPPT full power voltage range [d.c. V]	115-460	115-460	115-460	115-460	125-460	150-460	200-460
Max. PV current [d.c. A]	20/20	20/20	20/20	20/20/20	20/20/20	20/20/20	20/20/20
Isc PV array short circuit [d.c. A]	30/30	30/30	30/30	30/30/30	30/30/30	30/30/30	30/30/30
Start output voltage [d.c. V]	50	50	50	50	50	50	50
Max. inverter backfeed current to the array [d.c. V]	0	0	0	0	0	0	0
No. of MPP trackers	2	2	2	3	3	3	3
Strings per MPP trackers	A:1/B:1	A:1/B:1	A:1/B:1	A:1/B:1/C:1	A:1/B:1/C:1	A:1/B:1/C:1	A:1/B:1/C:1

*Marked with "1" indicates that a single channel MPPT can only input a maximum of 8000W.

AC output/ input

Model	X1-IES-2.5K	X1-IES-3K	X1-IES-3.7K	X1-IES-4.6K	X1-IES-5K	X1-IES-6K	X1-IES-8K
AC output							
Rated output apparent power [VA]	2500	3000	3680	4600	5000 (4600 for VDE4105, 4999 for AS4777)	6000	8000
Max. output apparent power [VA]	2500	3300	3680	4600	5500 (4600 for VDE4105, 4999 for AS4777, 5000 for C10/11)	6600	8000
Nominal AC voltage [a.c. V]	220/230/240						
Frequency [Hz]	50/60						
Rated output current [a.c. A]	10.9	13.1	16	20	21.8	26.1	34.8

Model	X1-IES-2.5K	X1-IES-3K	X1-IES-3.7K	X1-IES-4.6K	X1-IES-5K	X1-IES-6K	X1-IES-8K
Max. output continuous current [a.c. A]	10.9	14.4	16	20	21.8	28.7	34.8
Current (inrush) (at 50µs) [a.c. A]	53A						
Maximum output fault current (at 1ms) [a.c. A]	55	55	55	75	75	100	100
Maximum output overcurrent protection [a.c. A]	65	65	65	100	100	125	125
Power factor range	0.8 leading - 0.8 lagging						
Total harmonic distortion (THDi)	< 3 %						
AC input							
Max. apparent power [VA]	6576	6576	7680	9600	9600	9600	9600
Rated AC power [W]	6300	6300	7360	9200	9200	9200	9200
Nominal AC voltage [a.c. V]	220/230/240						
Frequency [Hz]	50/60						
Max. AC input current [a.c. A]	27.4	27.4	32	40	40	40	40
Power factor range	0.8 leading - 0.8 lagging						

Battery

Model	X1-IES-2.5K	X1-IES-3K	X1-IES-3.7K	X1-IES-4.6K	X1-IES-5K	X1-IES-6K	X1-IES-8K
Battery type	Lithium batteries						
Battery voltage range [d.c. V]	80-480						
Max. continuous charge/ discharge current [d.c. A]	50						
Communication interface	CAN/RS485						
Reverse connection protection	Yes						

Efficiency, Safety and Protection

Model	X1-IES-2.5K	X1-IES-3K	X1-IES-3.7K	X1-IES-4.6K	X1-IES-5K	X1-IES-6K	X1-IES-8K
Efficiency							
MPPT efficiency	99.9%	99.9%	99.9%	99.9%	99.9%	99.9%	99.9%
European efficiency	97.0%	97.0%	97.0%	97.0%	97.0%	97.0%	97.0%
Maximum efficiency	97.6%	97.6%	97.6%	97.6%	97.6%	97.6%	97.6%
Rated battery charge efficiency	98.5%	98.5%	98.5%	98.5%	98.5%	98.5%	98.5%
Rated battery discharge efficiency	97.0%	97.0%	97.0%	97.0%	97.0%	97.0%	97.0%
Safety and Protection							
Safety	IEC/EN 62109-1/-2						
Grid monitoring	VDE0126-1-1 A1:2012/VDE-AR-N 4105/G98/G99/AS4777/EN50549/CEI 0-21						

Technical Data

DC SPD protection	Integrated
AC SPD protection	Integrated
Over/ under voltage protection	Yes
Grid protection	Yes
DC injection monitoring	Yes
Back feed current monitoring	Yes
Residual current detection	Yes
Active anti-islanding method	Frequency Shift
Over load protection	Yes
Over heat protection	Yes
Array insulation resistance detection	Yes

EPS (Off-grid) output

Model	X1-IES-2.5K	X1-IES-3K	X1-IES-3.7K	X1-IES-4.6K	X1-IES-5K	X1-IES-6K	X1-IES-8K
Rated EPS apparent power [VA]	2500	3000	3680	4600	5000	6000	8000
Nominal EPS voltage [a.c. V]	220/230/240						
Frequency	50/60						
Rated EPS current [a.c. A]	10.9	13.1	16	20	21.8	26.1	34.8
EPS (Off-grid) peak power [VA]	$\leq 1.1P_n$ continuous operation; $1.1P_n - 2P_n$ 10s; $> 2P_n$ report error immediately						
Switching time (typical value) [ms]	< 10						
Total harmonic distortion (THDv)	< 3 %						

Generic data

Model	X1-IES-2.5K	X1-IES-3K	X1-IES-3.7K	X1-IES-4.6K	X1-IES-5K	X1-IES-6K	X1-IES-8K
Dimensions (W/H/D) [mm]	717*350*210						
Dimensions of packing (W/H/D) [mm]	790*590*350						
Net weight [kg]	26.2	26.2	26.2	26.4	26.4	26.4	27
Gross weight * [kg]	30.9	30.9	30.9	31.1	31.1	31.1	31.7
Heat dissipation treatment	Natural cooling						
Noise emission (typical) [dB(A)]	< 35						
Storage temperature range [°C]	-40 to +65						
Operating ambient temperature range [°C]	-35 to +60 (derating at 45)						
Humidity [%]	0% to 100% (condensing)						
Altitude [m]	≤ 3000						
Ingress protection	IP66						
Protective class	I						
Cold standby consumption	< 5W						
Overvoltage category	III(electric supply side), II(PV side)						
Pollution degree	III						
Installation mode	Wall mounted						
Inverter topology	Non-isolated						
Communication interface	RS485 (Meter), Pocket-X, USB, RS485 (Modbus, EV Charger, Datahub), Parallel (CAN+RS485), DO (SG ready), DI						
Standard warranty	Standard 10 years						

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

- Battery (T-BAT-SYS)

Configuration List

Model	BMS	Battery Module	Nominal Energy (kWh)	Operating Voltage (Vdc)
T-BAT HS 5	TBMS-MCS0800E x 1	TP-HS50E x 1	5.1	90-116
T-BAT HS 10	TBMS-MCS0800E x 1	TP-HS50E x 2	10.2	180-232
T-BAT HS 15	TBMS-MCS0800E x 1	TP-HS50E x 3	15.3	270-348
T-BAT HS 20	TBMS-MCS0800E x 1	TP-HS50E x 4	20.4	360-464
T-BAT HS 25	TBMS-MCS0800E x 1	TP-HS50E x 5	25.6	450-580
T-BAT HS 30	TBMS-MCS0800E x 1	TP-HS50E x 6	30.7	540-696

Performance Parameter

Module	T-BAT HS 5	T-BAT HS 10	T-BAT HS 15	T-BAT HS 20	T-BAT HS 25	T-BAT HS 30
Nominal Voltage (Vdc)	102.4	204.8	307.2	409.6	512	614.4
Operating Voltage (Vdc)	90-116	180-232	270-348	360-464	450-580	540-696
Nominal Capacity (Ah) ¹	50	50	50	50	50	50
Nominal Energy (kWh) ¹	5.1	10.2	15.3	20.4	25.6	30.7
Usable Energy 90% DOD (kWh) ²	4.6	9.2	13.8	18.4	23.0	27.6
Max. Charge/Discharge Current (A) ³	50	50	50	50	50	50
Recommend Charge/Discharge Current (A) ⁴	30	30	30	30	30	30
Standard Power (kW)	3	6.1	9.2	12.2	15.3	18.4
Max. Power (kW)	5.1	10.2	15.3	20.4	25.6	30.7
Short-circuit current	3.57 kA (0.333 ms)					
Battery Round-trip Efficiency (0.2C, 25°C) ⁵	95%					
Expected Lifetime (25°C)	10 years					
Cycle Life 90% DOD (25°C)	6000 cycles					
Charge Temperature	0°C ~ 53°C (Off heating function) ³ / -30°C ~ 53°C (In heating function) ³					
Discharge Temperature	-20°C ~ 53°C (Off heating function) ³ / -30°C ~ 53°C (In heating function) ³					
Storage Temperature	30°C ~ 50°C (6 months); -20°C ~ 30°C (12 months)					
Ingress Protection	IP66					
Protection Class	I					

NOTICE!

1. Test conditions: 25°C .100 %, depth of discharge (DoD), 02.C charge & discharge.
2. System usable energy may vary with inverter different setting.
3. Discharge: In case of battery cell's temperature range of -20°C ~ 10°C and 45°C ~ 53°C, the discharge current will be reduced; Charge: In case of battery cell's temperature range of 0°C ~ 25°C and 45°C ~ 53°C, the charge current will be reduced. Product charge or discharge power depends on the actual temperature of the battery cell.
4. The battery can only be discharged and can not be charged when the battery cell's temperature range is between -20°C and 0°C.
5. Test conditions: 25°C .100 %, depth of discharge (DoD), 02.C charge & discharge.

• X1-Matebox G2

On-GRID (Inverter)	
Rated voltage [a.c. V], frequency [Hz]	220/230/240, 50/60
Max. apparent on-grid input/output power [VA]	8000
Max. on-grid current [a.c. A]	36.4
Off-Grid (Inverter)	
Rated voltage [a.c. V], frequency [Hz]	230, 50/60
Max. power [VA]	8000
Rated current [a.c. A]	36.4
Grid (Utility)	
Rated grid voltage [a.c. V], frequency [Hz]	220/230/240, 50/60
Max. input current [a.c. A] *	60 (For European and Australian versions) 100 (For UK version)
Load	
Rated voltage [a.c. V], frequency [Hz]	220/230/240, 50/60
Max. current [a.c. A] *	60 (For European and Australian versions) 100 (For UK version)
Environment Limit	
Degree of protection	IP65
Protection class	Class I
Operating temperature range [°C]	-25 to +60 (derating above +45°C)
Storage temperature [°C]	-40 to +70°C
Relative humidity [%]	0 to 100 (condensing)
Altitude [m]	< 3000
Overvoltage category	III (AC)
Other	
Cooling concept	Nature cooling
Dimension and Weight	
Dimensions [mm]	595.2*388.4*192
Net weight [kg]	10.7

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