

X1-SPT

10 kW / 12 kW

User Manual

Version 1.0

www.solaxpower.com

eManual in the QR code or
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About This Manual

Scope of Validity

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

This manual is valid for the following inverter models:

- X1-SPT-10K
- X1-SPT-12K

Model description



Item	Meaning	Description
1	Product family name	"X1-SPT": refers to compatibility with split-phase grids, primarily optimized for the Latin American market.
2	Power	"12K": rated output power of 12 kW.

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 regulations.
- Have good knowledge of this manual and other related documents.

Conventions

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

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

Change History

Version 1.0 (2026-03-17)

Updated "Preparation before wiring" (Revised inverter cable entry instructions).

Updated "Safety" (Added Safety code options)

Version 0.0 (2026-02-04)

Initial release

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1 Safety

1.1 General Safety

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

Please carefully read, fully comprehend, and strictly adhere to the comprehensive instructions provided in the user manual and any other relevant regulations prior to the installation of the inverter. This document does not replace and is not intended to replace any local, state, provincial, federal or national laws, regulations or codes applicable to the installation, electrical safety and use of the inverter.

SolaX assumes no responsibility for any consequences resulting from the violation of the storage, transportation, installation and operation regulations outlined in this document. Such consequences include, but are not limited to:

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

1.2 Safety Instructions of PV, Inverter and Grid

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

1.2.1 Safety Instructions of PV

DANGER!

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

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

WARNING!

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

WARNING!

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

1.2.2 Safety Instructions of Inverter

DANGER!

Potential risk of lethal electric shock associated with the inverter

- Only operate the inverter if it is in a technically faultless condition. Operating a faulty inverter may lead to electric shock or fire.
- Do not attempt to open the enclosure without authorization from 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.
- Never connect or disconnect the AC and DC connector while the inverter is running.
- Prior to conducting any maintenance, turn off the AC and DC power and disconnect them from the inverter. Wait for 5 minutes to fully discharge the energy.

WARNING!

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

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

WARNING!

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

WARNING!

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

CAUTION!

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

NOTICE!

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

1.2.3 Safety Instructions of Utility Grid

NOTICE!

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

2 Product Overview

2.1 Product Introduction

The X1-SPT series is an energy storage PV grid-connected inverter. It supports various intelligent solutions such as load management, dual battery terminals, micro-grid and more to achieve efficient and economical energy utilization. The X1-SPT series inverter can be used with different capacities of SolaX battery.

2.2 Appearance

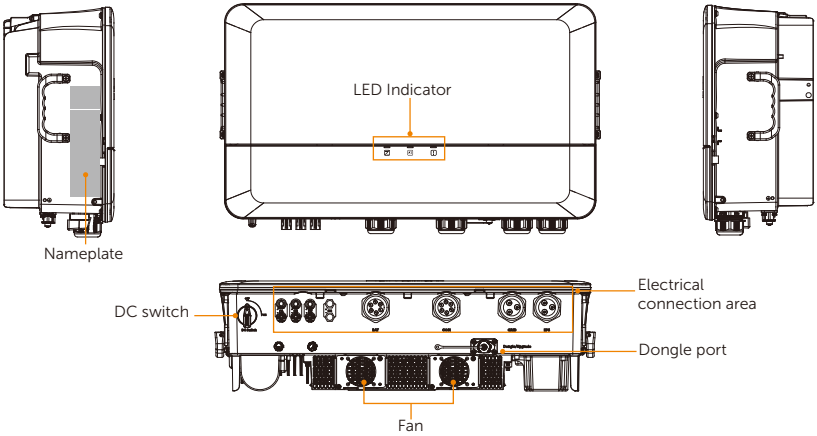


Figure 2-1 Appearance

Table 2-1 Description of appearance

Item	Description
Nameplate	Nameplate clearly identifies the device type, serial number, specific DC/AC parameters, certification, etc.
LED Indicator	Indicators indicate the status of the inverter.
DC switch	Disconnect the DC input when necessary.
Electrical connection area	The exposed terminals on the left are the PV terminals. The battery terminals, grid terminals, load terminals, and communication ports are located inside the inverter, with the cables routed through cable glands.
Dongle port	Connect the dongle for remote monitoring and operation of the inverter via the SolaXCloud platform.
Fan	For heat dissipation.

2.3 Symbols on the Label and Inverter

Table 2-2 Description of symbols

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

2.4 Working Principle

2.4.1 Circuit Diagram

The inverter is equipped with multi-channel MPPTs for DC input to ensure maximum power even under different photovoltaic input conditions. The inverter feeds the direct current generated from PV module into the connected battery or converts it into alternating current that meets the requirements of the power grid and feeds it into the power grid. The principle design of inverter is shown in the figure below:

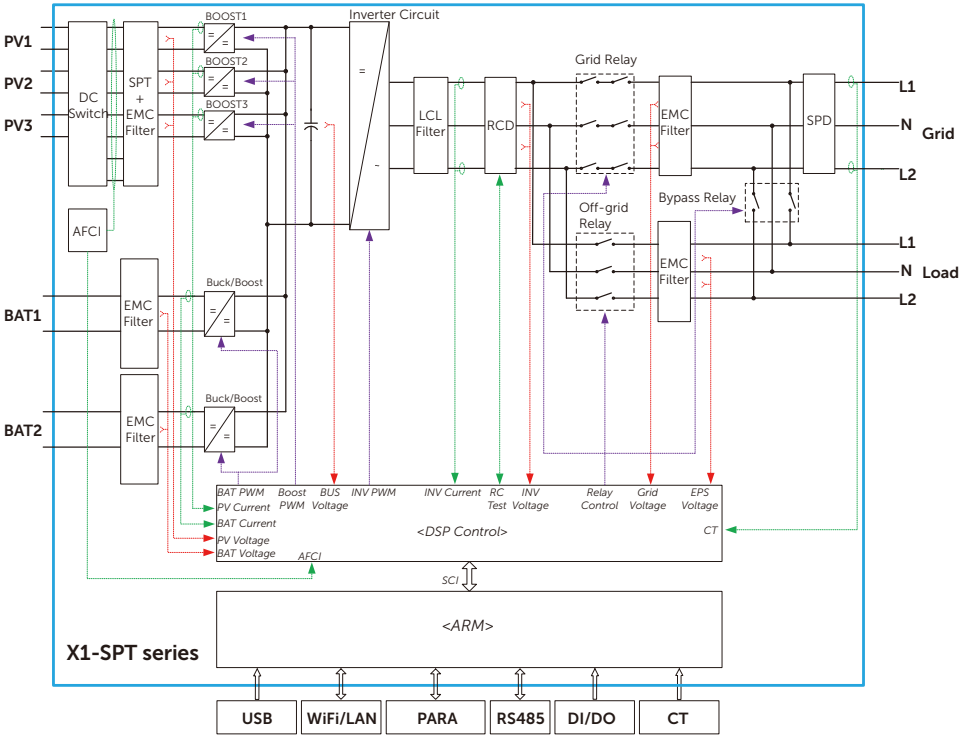


Figure 2-2 Circuit diagram for X1-SPT series inverter

2.4.2 Application Schemes

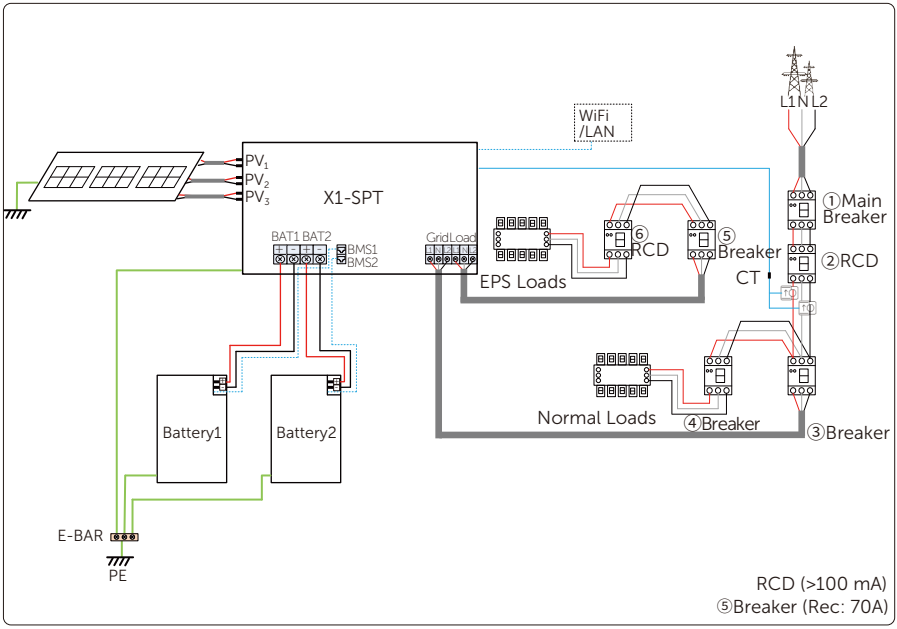


Figure 2-3 Partial home backup

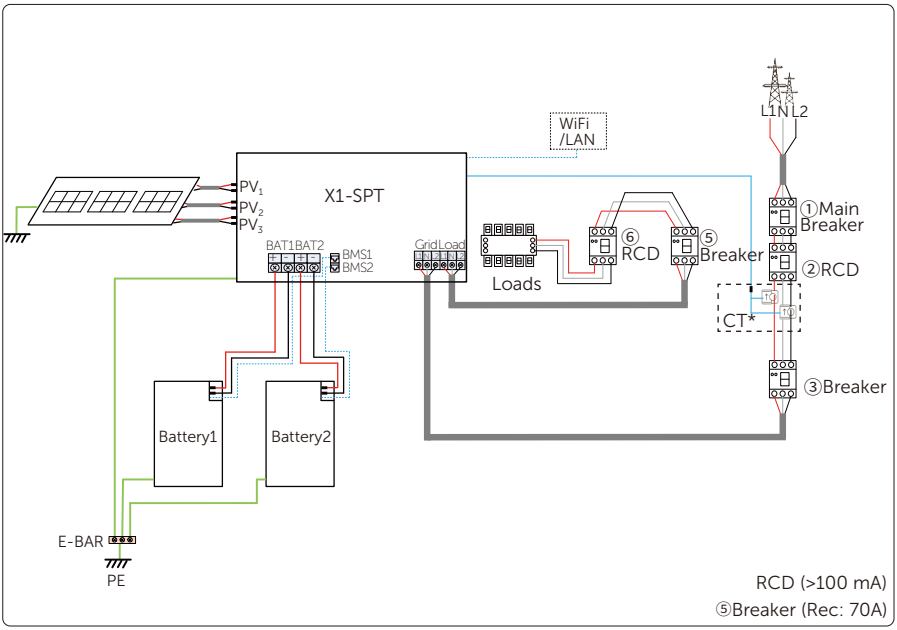


Figure 2-4 Whole home backup

* The X1-SPT inverter is equipped with a built-in CT and can manage whole-house loads of up to 75 A. An external CT is required only when the load exceeds 75 A. You must configure the "CT Type" according to the installation conditions.

2.5 Working State

The series inverter has Waiting, Checking, Normal, EPS Checking, EPS, Fault, Idle and Standby state.

Table 2-3 Description of working state

State	Description
Waiting	• The inverter is waiting for the conditions to be met in order to enter Checking state.
Checking	• The inverter is checking for conditions to enter Normal state.
Normal	• The inverter is working normally.
EPS Checking	• The inverter is checking for conditions to enter EPS state.
EPS	• The inverter is working in an off-grid state.
Fault	• The inverter detects error and prompts error code.
Idle	• When the battery SOC reaches the minimum SOC and there is no sufficient PV input voltage, the battery goes into hibernation and the inverter enters Idle state.
Standby	• When the power of load is extremely low and there is no sufficient PV input voltage, or a state when the battery SOC is larger than or equal to 10% and there is no sufficient PV input voltage, the inverter enters Standby state. • In this state, it detects PV connection, load power, etc to determine whether to exit Standby state and enter Normal state.

2.6 Working mode

Five working modes are available for you to choose in on-grid status, that is **Eco-friendly Mode**, **Economic Mode**, **Backup Mode**, **TOU Mode** and **Manual Mode**. Choose the working modes according to the lifestyle and environment.

When the power supply from the electric power company is stopped due to a power outage, it can switch to EPS mode and connect to the distribution board for a specific load, thereby providing power to important electrical appliances.

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

2.6.1 Eco-friendly Mode (Priority: Loads > Battery > Grid)

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

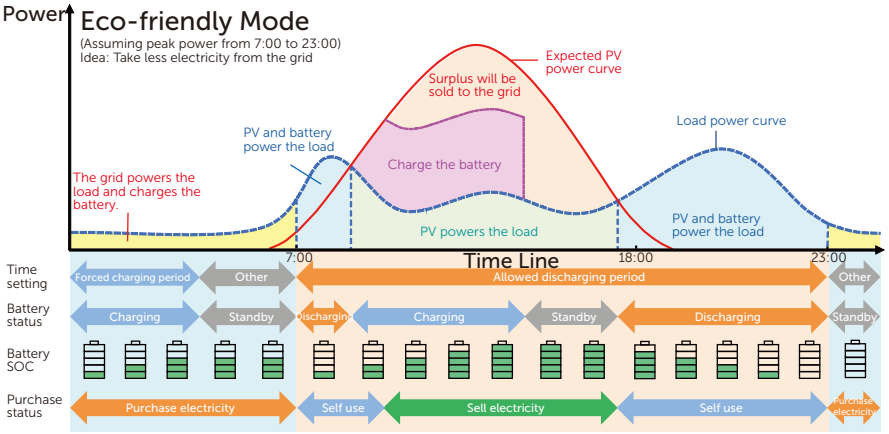


Figure 2-5 Eco-friendly mode

Table 2-4 Description of eco-friendly mode

Time period	Inverter working status
Forced charging period	• Charge the battery first until the battery SOC reaches the specified **Charge SOC** value.

Time period	Inverter working status
Allowed discharging period	PV is sufficient (PV → load → battery → grid) • The power generated from PV prioritizes supplying the load. Any excess power is then directed towards charging the battery, and if there is still surplus electricity, it can be sold to the grid. In the event that the local utility restricts the sale of electricity to the grid, the **Export Control** value can be set on the inverter. Please refer to "Export Control".
	PV is insufficient (PV+battery → load) • The battery discharges power to the load, and once its capacity reaches **Min SOC**, it automatically ceases discharging.

Charge & Discharge Period

You can set two configurable working periods: forced charging period and allowed discharging period. The interval not in the charging & discharging period belongs to other time periods.

- Forced charging period

In the forced charging period, the inverter will charge the battery first until the battery SOC reaches the specified Charge SOC value set in each working mode. You have the option to configure the inverter to either draw power from the grid or not.

- Allowed discharging period

In the allowed discharging period, the inverter will allow the battery to discharge and charge power in accordance with the working mode and load conditions.

- Period not set as forced charging or allowed discharging period

In this period, the inverter will allow the battery to charge but can not discharge power.

2.6.2 Economic Mode (Priority: Loads > Grid)

The economic mode is suitable for areas with high feed-in subsidies. The power generated from PV is directed towards supplying the loads. Any excess power beyond the load requirements will be fed into the grid.

In Economic mode, considering whether the battery can be charged during the daytime. If not, it is recommended to set a forced charging period during off-peak hours.

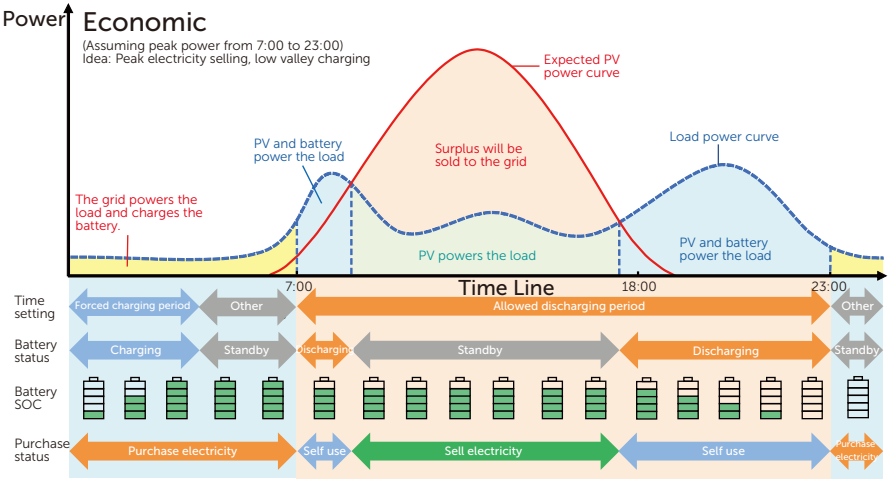


Figure 2-6 Economic mode

Table 2-5 Description of Economic mode

Time period	Inverter working status
Forced charging period	• Charge the battery first until the battery SOC reaches 100%.
Allowed discharging period	PV is sufficient (PV → load → grid) • The power generated from PV is directed towards supplying the loads. Any excess power beyond the load requirements will be fed into the grid.
	PV is insufficient (PV+battery → load) • PV and battery supply power to the load at the same time, and once the battery capacity reaches **Min SOC**, it automatically ceases discharging.

2.6.3 Backup Mode (Priority: Loads > Battery > Grid)

The backup mode is suitable for areas with frequent power outages. If there is a foreseeable power outage, switch from other working modes to the backup mode in advance.

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

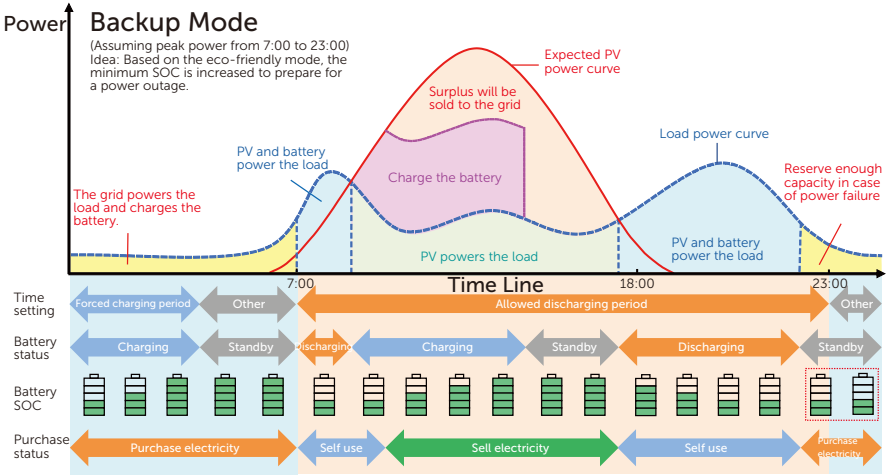


Figure 2-7 Backup mode

Table 2-6 Description of backup mode

Time period	Inverter working status
Forced charging period	• Charge the battery first until the battery SOC reaches the specified **Charge SOC** value.
Allowed discharging period	The working logic remains the same as for eco-friendly mode. The difference lies in: • In eco-friendly mode, the battery goes into hibernation when PV input is not available and the battery SOC reaches **Min SOC** (on-grid min SOC). In the event of a grid outage, the inverter will not enter EPS mode. • In backup mode, the inverter enters a standby state when PV input is not available and the battery SOC reaches **Min SOC** (on-grid min SOC). In the event of a grid outage, it will switch to EPS mode until the battery discharges to **EPS Low SOC** (Off-grid min SOC).

2.6.4 TOU Mode

In TOU mode, different working modes—**Self use**, **Peak Shaving**, **Charging**, **Discharging** and **Battery Off**—can be set for different time slots in accordance with actual needs and environment conditions through SolaXCloud App or Web.

One day (24h) can be divided into different time slots. Two neighboring time slots cannot be overlapped with and separated from each other. Please refer to the help document on web or App for details about how to set the TOU mode.

Table 2-7 Time slot setup

TOU mode	Description	Setting item	Setting range	Default
Self use	Same working logic with eco-friendly mode, but it is not limited by the charging and discharging time slots.	• Min SOC	5%–100%	10%
Charging	The power of PV will charge the battery to the set SoC of **Charge BAT to** (%). You can set whether to enable **ChargeFromGrid**. When the battery reaches the set SOC, the surplus power will perform eco-friendly mode or supply to the grid (based on the system setup). At this point, charging from grid is not allowed.	• Charge from grid	Disable/ Enable	Disable
		• Charge BAT to	5%–100%	100%
		• Charging Power	0–60,000 W	0 W
Discharging	If allowed by the battery, the system outputs a specified power from the battery based on the set output percentage, controlling the power at the AC port. When the battery **Discharge to** (%) reaches the set SOC, the inverter performs eco-friendly mode.	• Rate of AC Power	0%–100%	0%
		• Discharge to	5%–100%	10%
		• Discharging Power	/	0 W
Peak Shaving	When grid power consumption 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	0–600,000 W	1000 W
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.			

(TOU) **Min SOC**: 5%–100% (default 10%)

* The above parameters apply when the inverter is used with the T-BAT SYS-HV-5.8 battery.

Working state of TOU mode

Table 2-8 Description of working state

State	Description
Normal (TOU-S)	• The inverter is in the Self use control state in TOU mode.
Normal (TOU-C)	• The inverter is in the Charging control state in TOU mode.
Normal (TOU-D)	• The inverter is in the Discharging control state in TOU mode.
Normal (TOU-B)	• The inverter is in the Battery off control state in TOU mode.
Normal (TOU-P)	• The inverter is in the Peak Shaving control state in TOU mode.

2.6.5 EPS Mode (Priority: Loads > Battery)

During a power failure, the system will provide uninterrupted power supply to the EPS loads using the power from PV and the battery. It is important to ensure that the EPS loads should not exceed the maximum output power of the battery.

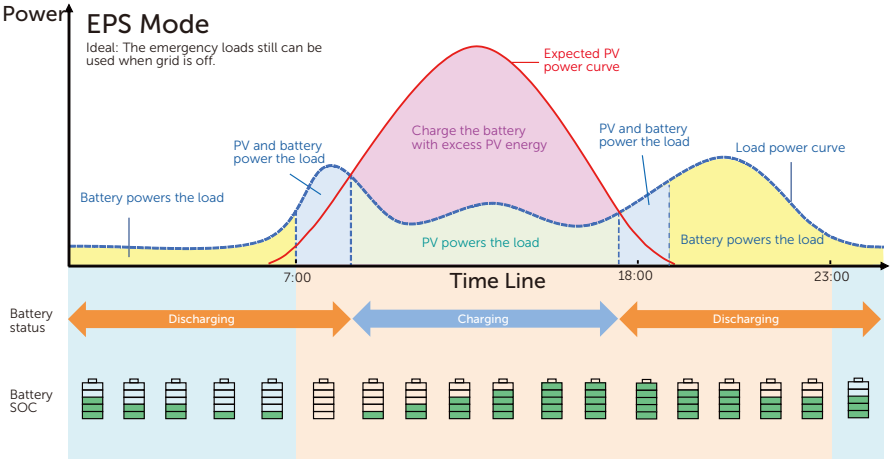


Figure 2-8 EPS mode

Table 2-9 Description of EPS mode

Battery SOC	Inverter working status
Battery SOC >**EPS Low SOC** (off-grid min SOC)	PV is sufficient (PV → load → battery) • The PV prioritizes supplying power to the load, with any excess energy being directed towards charging the battery.
	PV is insufficient (PV+battery → load) • The PV prioritizes supplying power to the load. If the energy is not enough, the battery will discharge power until the battery SOC reaches **EPS Low SOC** and then **Battery Capacity Insufficient** error will be reported.
Battery SOC ≤**EPS Low SOC** (off-grid min SOC)	The inverter reports **Battery Capacity Insufficient**. When there is PV, it will charge the battery first. After charging to the set **Off grid Reconnection SOC** value, it will be automatically recovered and enter EPS mode again.

2.6.6 Manual Mode

This working mode is only for the qualified personnel to perform debugging and maintenance. It includes **Forced Charge**, **Forced Discharge**, and **Stop Chg&Dischrg**. The system will restore to the original working mode after six hours manual mode is set.

- **Forced charge**
  The battery will be charged from the grid and PV. Once fully charged, the battery automatically enters the **Stop Charge & Discharge** state.
- **Forced Discharge**
  In this mode, the battery will be discharged to load until the SOC reaches 5%.
  After complete discharge, the battery enters the **Stop Charge & Discharge** state.
- **Stop Chg&Dischrg**
  It stops the battery from charging or discharging. This is useful for maintenance or when you want to ensure the battery remains inactive.

3 System Overview

System Overview

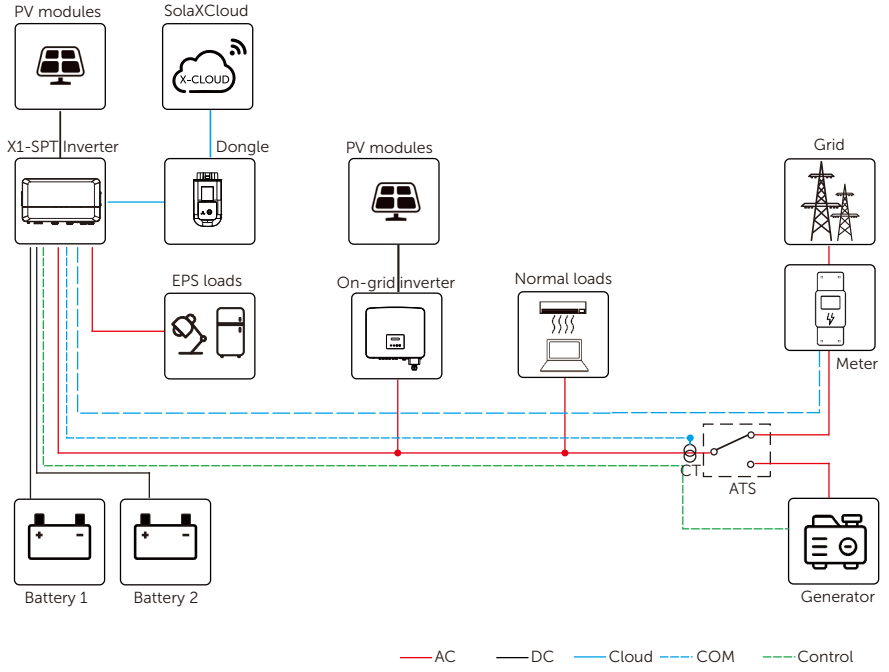


Figure 3-1 System diagram

NOTICE!

- The system diagram is for illustration only , please be subject to the actual situation.

Table 3-1 System item description

Item	Description
X1-SPT series (the device covered in this manual)	The X1-SPT series is an energy storage inverter that supports grid connection of a photovoltaic system. This is equipped with a built-in Current Transformer (CT) for monitoring energy consumption, and is capable of managing whole-house electrical loads up to a maximum of 75 amps.
PV modules	PV modules work in MPPT mode.
Battery	The series inverter should be coupled with SolaX lithium-ion battery. The **BAT 1** and **BAT 2** terminals of the inverter can be connected to clusters of batteries of different capacities and numbers. It communicates with the inverter via BMS and must comply with the specifications of the regulations.
On-grid inverter (supported)	The series inverter supports micro-grid function that makes hybrid inverter simulate the grid to active on-grid inverter during off-grid period by connecting on-grid inverter to hybrid inverter's **Load** terminal. Please refer to "15.2 Application of Micro-grid" for specific wiring and setting.
Generator (supported)	SolaX PV-Genset solution ensures optimum interaction between the photovoltaics and diesel generator, which saves fuel, lowers energy costs and ensures a stable and reliable power supply. When connecting a generator, an energy meter must be installed and configured. Please refer to "15.1 Application of Generator" for specific wiring and setting.
Power grid	120/240 V, 127/220 V power grid are supported.
SolaXCloud	SolaXCloud is an intelligent, multifunctional monitoring platform that can be accessed either remotely or through a hard wired connection. With the SolaXCloud, the operators and installers can always view key and up to date data.

4 Transportation and Storage

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

Transportation

- The inverter must be transported in its original packaging. SolaX will not be held responsible for any damage to the inverter caused by improper transportation or by transportation after it has been installed.
- Observe the caution signs on the packaging of inverter before transportation.
- Pay attention to the weight of the inverter. Carry the inverters by the required number of personnel as specified by local regulations.
- Wear protective gloves when carrying the equipment by hand to prevent injuries.
- When lifting up the inverter, hold the handle position and the bottom position of the carton. Keep the inverter horizontal in case of falling down.

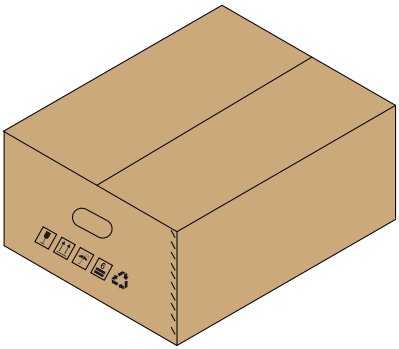


Figure 4-1 Caution signs on the packaging

Storage

- The inverter must be stored indoors.
- Do not remove the original packaging material and check the outer packaging material regularly.
- The storage temperature should be between -10°C and +43°C. The relative humidity should be between 45%RH and 75%RH. (rec. 60%-65%RH)
- Stack the inverter in accordance with the caution signs on the inverter carton to prevent their falling down and device damage. Do not place it upside down.

5 Preparation before Installation

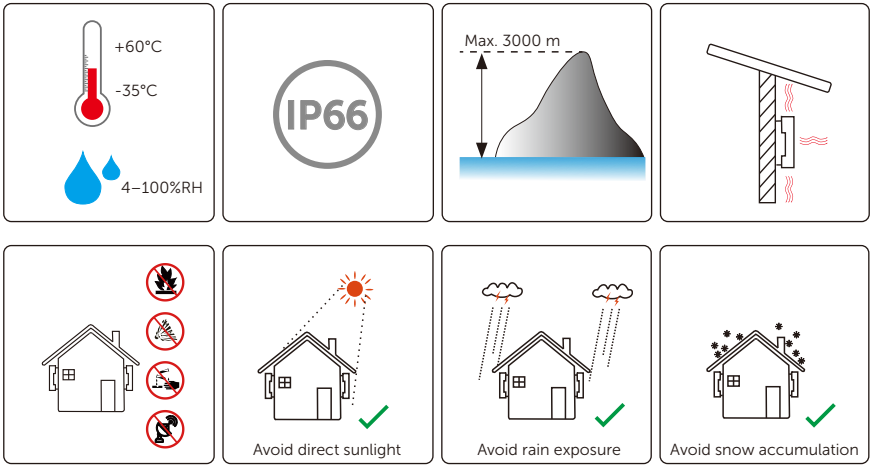
5.1 Selection of Installation Location

The installation location selected for the inverter is quite critical in the aspect of the guarantee of device safety, service life and performance. It has the IP66 ingress protection, which is suitable for indoor and outdoor use. The installation position shall be convenient for wiring connection, operation and maintenance.

5.1.1 Environment Requirement

Make sure the installation environment meets the following conditions:

- The ambient temperature: -35°C to +60°C.
- The relative humidity shall be between 4–100%RH.
- Do not install the inverter in the areas where the altitude exceeds 3000 m.
- Install the inverter in a well-ventilated environment for heat dissipation. It is recommended to install an awning over the inverter if it is installed on a support outdoor.
- Do not install the inverter in areas with flammable, explosive and corrosive materials or near antennas.
- Avoid direct sunlight, rain exposure and snow accumulation.



NOTICE!

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

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

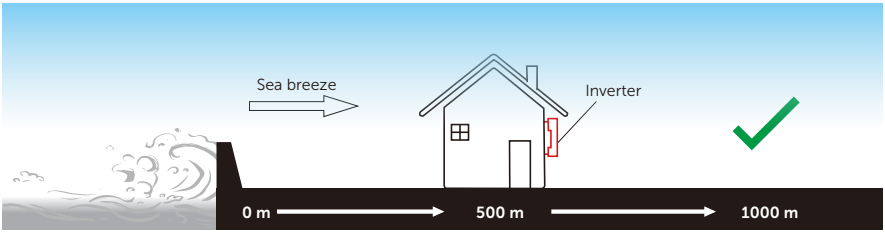


Figure 5-1 Recommended installation position

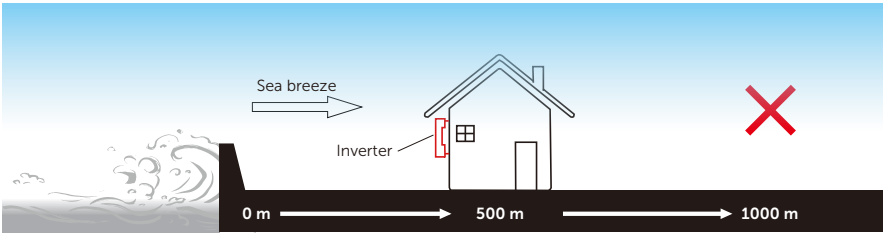


Figure 5-2 Incorrect installation position

NOTICE!

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

5.1.2 Installation Carrier Requirement

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

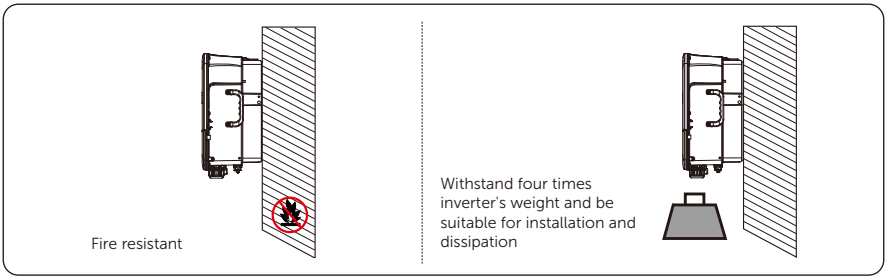


Figure 5-3 Installation carrier requirement

NOTICE!

- Please take the weight of the battery into account when wall-mounting the whole system.

5.1.3 Installation Angle Requirement

The installation angle requirements are as follows:

- Install the inverter vertically or at a maximum back tilt of 5 degrees to facilitate heat dissipation.
- Do not install the inverter at forward tilted, excessive back tilted, side tilted, or upside down.

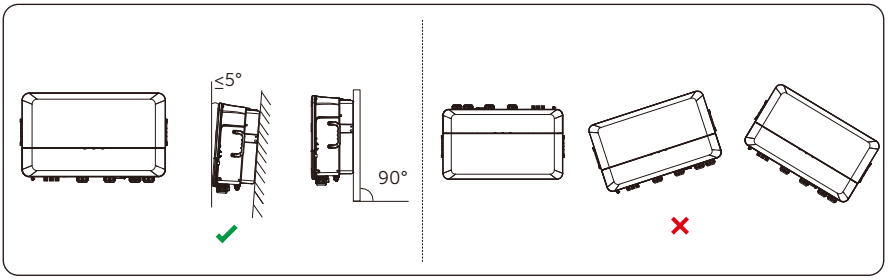


Figure 5-4 Installation angle requirement

5.1.4 Clearance Requirement

When planning installation space, it is important to consider the bending radius of the wires. To guarantee proper heat dissipation and ease of disassembly, ensure a minimum clearance of 300 mm on the left, right, top, and front sides, and 500 mm at the bottom.

In areas with high ambient temperatures, increase the clearances between the inverters and provide adequate fresh air ventilation if feasible.

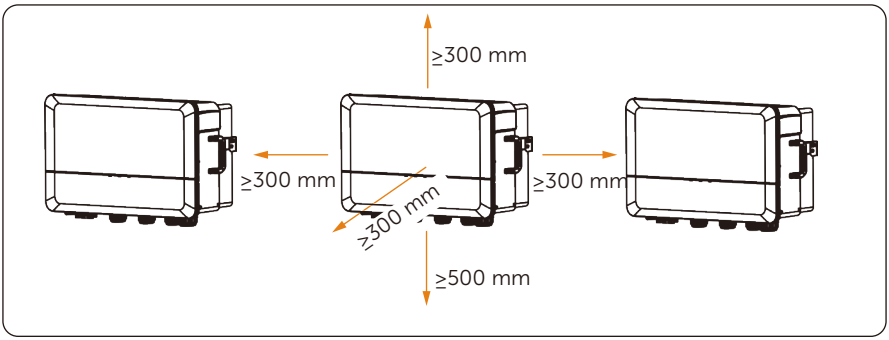
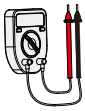


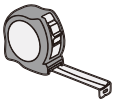
Figure 5-5 Clearance requirement for inverter

5.2 Tools Requirement

Installation tools include but are not limited to the following recommended ones. If necessary, use other auxiliary tools on site. Please note that the tools used must comply with local regulations.

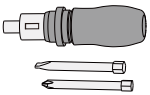

Hammer drill
(drill bit: Ø10 mm)


Multimeter
(≥600 V DC)

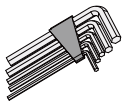

Measuring tape

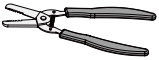

Utility knife


Marker

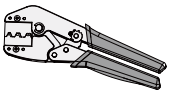

Torque screwdriver
(Phillips head: M4, M5, M6)

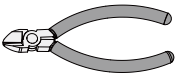

Spirit level

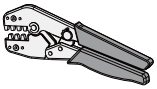

Allen key

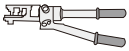

Wire stripper

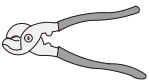

Crimping tool for RJ45

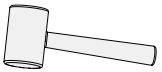

Crimping tool for
PV terminals

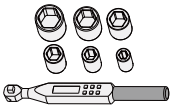

Diagonal pliers


Crimping tool for
Ring terminal


Hydraulic crimping tool


Wire cutter


Rubber mallet

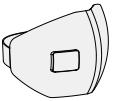

Torque wrench


Flathead screwdriver
(Ø2mm)


Safety gloves


Safety boots


Safety goggles


Anti-dust mask

5.3 Additionally Required Materials

Table 5-1 Additionally required wires

No.	Required Material		Type	Conductor Cross-section
1	PV cable		Dedicated PV wire with a voltage rating of 1000 V, a temperature resistance of 105°C, a fire resistance grade of VW-1	12–10 AWG (4–6 mm^2)
2	Communication cable		Network cable CAT5e or higher	/
3	AC cable (Grid&Load)		Single core copper cable	4 AWG (22 mm^2)
4	Additional PE cable		Conventional yellow and green wire	8 AWG (10 mm^2)
5	Cicuit breaker (Grid&Load)		70 A	

6 Unpacking and Inspection

6.1 Unpacking

- The inverter undergoes full testing and inspection before delivery. However, damages may still occur during transportation. Before unpacking, please carefully check the external packaging for any signs of damage, such as punctures or cracks.
- Unpacking the inverter according to the following figure.

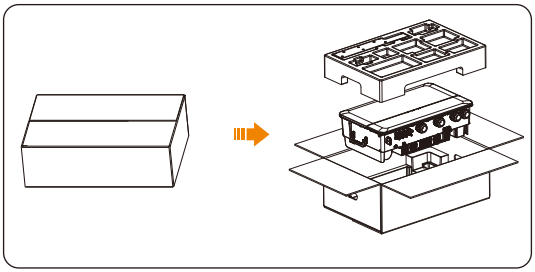


Figure 6-1 Unpacking the inverter

- Properly handle all the packaging materials in case they may be reused for storage and transportation of the inverter in the future.
- Upon opening the package, check whether the inverter is intact and whether all accessories are included. If any damage is found or any parts are missing, contact your dealer immediately.

6.2 Scope of Delivery

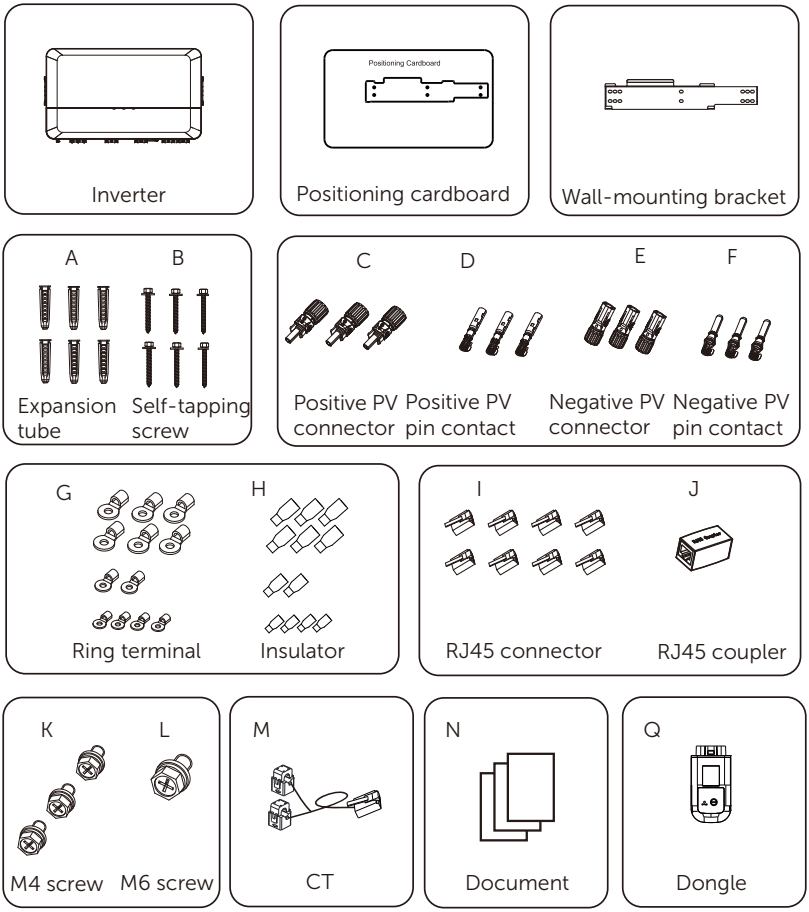


Table 6-1 Packing list

Item	Description	Quantity
/	Inverter	1 pc
/	Positioning cardboard	1 pc
/	Bracket	1 pc
A	Expansion tube	6 pcs
B	Self-tapping screw	6 pcs
C	Positive PV connector	3 pairs for inverters with three inputs of MPPT, 4 pairs for inverters with four inputs of MPPT.
D	Positive PV pin contact	
E	Negative PV connector	3 pairs for inverters with three inputs of MPPT, 4 pairs for inverters with four inputs of MPPT.
F	Negative PV pin contact	
G	Ring terminal 4 AWG (RNBS22-6) 8 AWG (RNBS8-5) 10 AWG (RNB5-5)	Total 12 pcs 6 pcs (for AC cable crimping) 2 pcs (for PE cable crimping) 4 pcs (for battery power cable crimping)
H	Insulator Red (Ø12 × 30 mm) White (Ø7.2 × Ø5.3 × 21 mm) White (Ø5.7 × Ø5.2 × 20 mm)	Total 12 pcs 6 pcs (for AC cable crimping) 2 pcs (for PE cable crimping) 4 pcs (for battery power cable crimping)
I	RJ45 connector	8 pcs
J	RJ45 coupler	1 pc
K	M4 screw	3 pcs (spare part for fixing the waterproof cover plate)
L	M6 screw	1 pc (for fixing the inverter)
M	CT	1 pc
N	Document	/
O	Dongle	1 pc

7 Mechanical Installation

WARNING!

- Only qualified personnel are allowed to perform the mechanical installation in accordance with local laws and regulations.
- Check the existing power cables or other piping in the wall to prevent electric shock or other damage.
- Use insulated tools and wear personal protective equipment throughout the installation and maintenance process.
- Make sure there is no electrical connection before installation.

CAUTION!

- Make sure the holes are drilled perpendicular to the wall and avoid tilting up or down.
- When drilling, cover the device to protect it from dusts and debris entering, and clean it at once after finishing drilling.
- During installation, always be cautious about the weight of the inverter. Improper lifting or dropping of the inverter may result in personal injury.

NOTICE!

- If the inverter needs to be temporarily placed on the ground, use foam or other protective materials to protect it against potential damages.
- The bottom terminal should not come into contact with the ground or any other object that could cause damage to the terminal.

There are three combinations of mounting holes for fixing the mounting bracket. The hole positions on the positioning template correspond to Method A. Methods B and C are provided as alternatives.

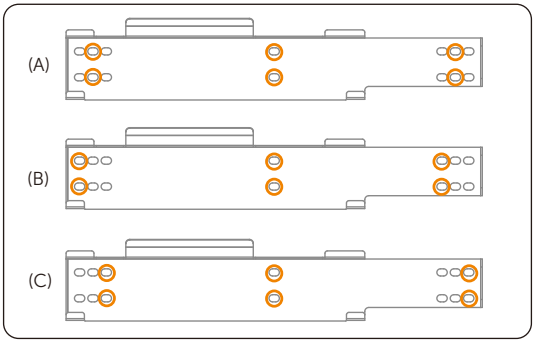


Figure 7-2 Mounting bracket hole description

Installation procedures

Step 1: Use the positioning cardboard to mark six hole positions on the wall, then drill holes with a Ø10 drill bit. The depth of the holes should be no less than 60 mm.

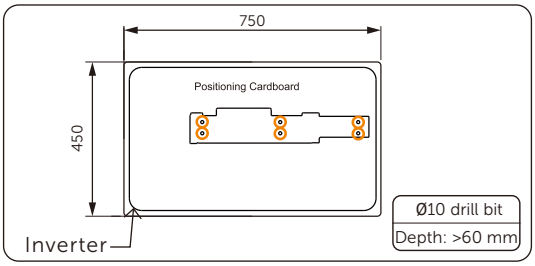


Figure 7-3 Hole marking and drilling

Step 2: Take the expansion tubes (part A) from the accessory bag, then knock them into the holes with a rubber mallet.

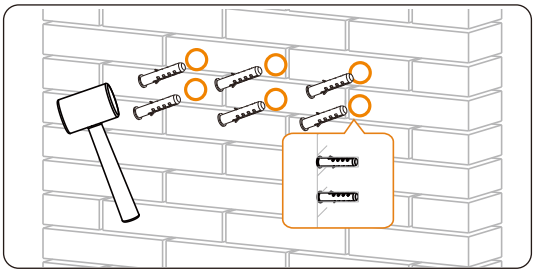


Figure 7-4 Knocking the expansion tubes

Step 3: Attach the wall mounting bracket on the wall. Secure the bracket to the wall with self-tapping screws (part B).

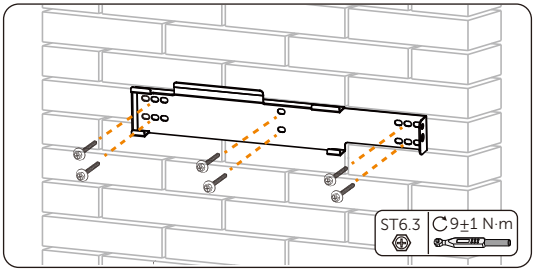


Figure 7-5 Fixing the wall-mounting bracket

Step 4: Open the anti-static bag, and take out the inverter. Lift up the inverter collaboratively 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.

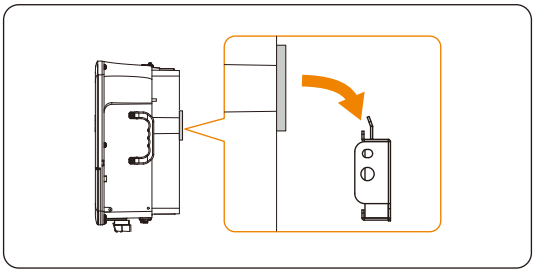


Figure 7-6 Hanging the inverter (side view)

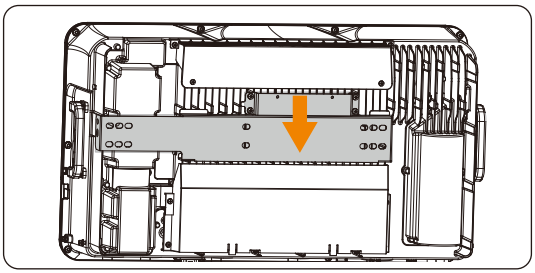


Figure 7-7 Hanging the inverter(rear view)

Step 5: Use M6 screw (part L) to secure the inverter with the wall mounting bracket on the right side of the inverter.

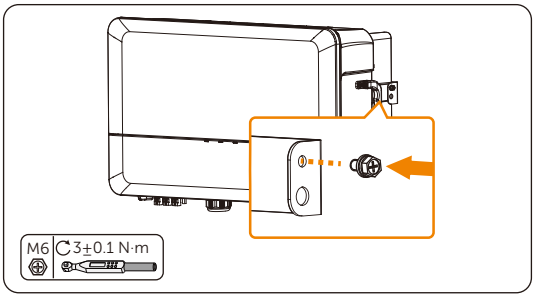


Figure 7-8 Securing the inverter

8 Electrical Connection

8.1 Overview of Electrical Connection

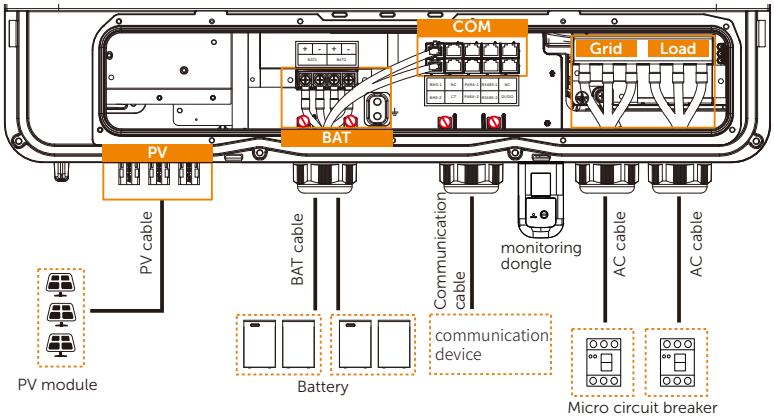


Figure 8-1 Internal terminals of Inverter

Table 8-1 Cable connections of inverter

Inverter		Connection device	Cable
PV terminal		PV module	PV cable
Battery terminal		SolaX battery "T-BAT SYS-HV-5.8" is supported.	Battery power cable(+),(-)
Grid/Load terminal		Micro circuit breaker (MCB)	AC cable
Dongle port		SolaX dongle	/
COM port	BMS-1, BMS-2	SolaX battery	Battery communication cable
	CT	CT	Communication cable
	PARA-1, PARA-2	X1-SPT series inverter (for Parallel connection)	
	RS485-1	Meter	
	RS485-2	SolaX RS-485 device ,such as DataHub1000	
	DI/DO	DI/DO device	

Battery power cable(+)(-), and battery communication cable are delivered with battery. Other cables needed to be prepared by the user. Please refer to "5.3 Additionally Required Materials".

8.1.1 Cable Preparation

Crimping Ring Terminal

Step 1: Use wire strippers to strip the insulation jacket of wires. The stripping length (L) is as follows. Select the appropriate Ring terminals (part G) and insulator (part H) from the accessories included with the inverter.

Cable Type	Stripping length (L)	Ring terminal	Insulator
AC cable	13 mm	4 AWG	Red
Inverter PE cable	8-10 mm	8 AWG	White
Battery power cable	8-10 mm	10 AWG	White

* The battery power cables (+/-) are pre-crimped on the battery side, while the inverter side is left as bare wires and needs to be crimped. The battery communication cable has been pre-terminated with an RJ45 connector.

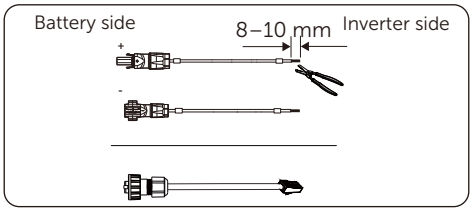


Figure 8-2 Battery cables

Step 2: Slide the insulator onto the cable, then insert the stripped end of the copper wire into the barrel of the ring terminal. The wire should fit snugly inside the barrel, filling the space without leaving any exposed strands.

Step 3: Crimp the terminal. Pull gently on the terminal to ensure it is securely attached to the wire. The connection should be strong, with no movement of the wire within the terminal.

Step 4: After crimping, apply an insulator over the crimped area.

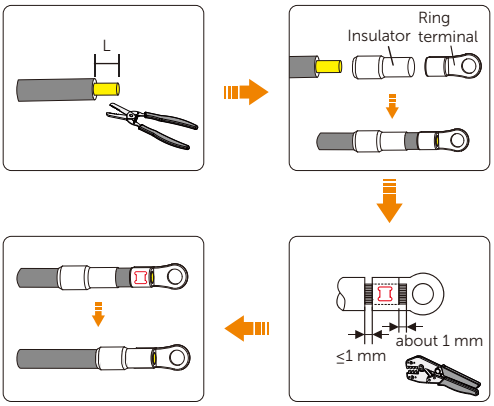


Figure 8-3 Crimping ring terminal

Making RJ45 connector

Step 1: Strip about 15 mm insulation of the communication cable.

Step 2: Insert the stripped section into the RJ45 connector (part I), making sure the pin order is correct.

Step 3: Crimp it tightly with a crimping tool for RJ45.

Step 4: Use a network cable tester to check if the cable has been correctly and properly crimped.

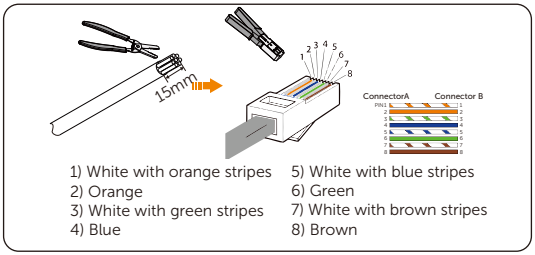


Figure 8-4 Making RJ45 connector

For inverter parallel communication, use a standard communication cable. For other communication cables, fabricate the cables according to the pin definitions specified below.

Table 8-2 Pin Assignment of COM port

No.	CT	RS485-1	RS485-2	DI/DO
1	CT-U+	-	-	DI_OVGR_A
2	CT-U-	-	-	DI_OVGR_B
3	CT-EXPV-U+	GND	+12V	GND
4	CT-EXPV-W+	REMOTE_485_A	PARA_485_A	DO1_A
5	CT-EXPV-W-	REMOTE_485_B	PARA_485_B	DO1_B
6	CT-EXPV-U-	GND	GND	GND
7	CT-W+	GND	DO1_A	DI_RPR_A
8	CT-W-	GND	DO1_B	DI_RPR_B

8.1.2 Preparation before wiring

DANGER!

- Before electrical connection, make sure the DC switch and AC breaker are disconnected. Otherwise, the high voltage may cause electric shock, resulting in severe personal injuries or even death.

WARNING!

- Only qualified personnel are allowed to perform the electrical connection following local laws and regulations.
- Strictly follow the instructions of this manual or other related documentation for electrical connection. Inverter damages caused by incorrect wiring are not covered by the warranty.
- Use insulated tools and wear personal protective equipment throughout the electrical connection process.

Step 1: Remove the inverter's front cover by tilting it upward and forward. Loosen the ten M4 × L10 screws securing the waterproof cover plate, then remove it.

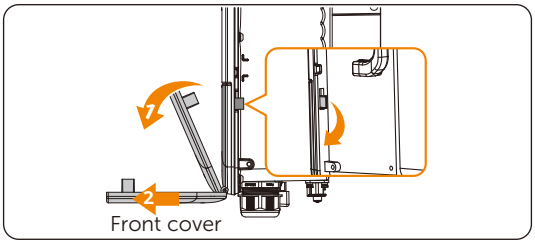


Figure 8-5 Remove front cover

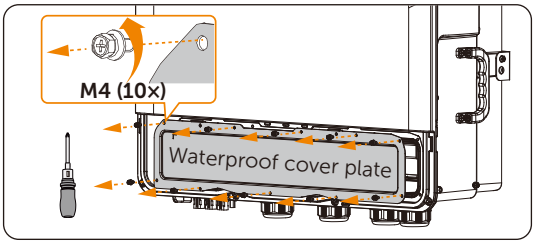


Figure 8-6 Remove waterproof cover plate

Step 2: Loosen the swivel nut of the cable gland, remove sealing plugs from the inner seal as needed. Do not remove the sealing plugs from holes you are not going to use.

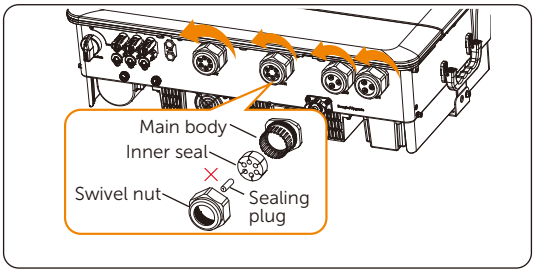


Figure 8-7 Remove cable gland

NOTICE!

- Sealing plugs must remain in unused cable entry holes.

Step 3: After crimping the battery power cable, AC cable, and communication cable, Thread the cables through the swivel nut, inner seal, and main body into the inverter.

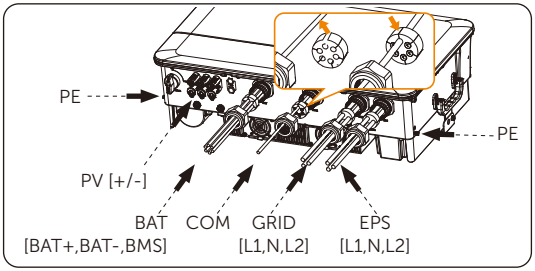
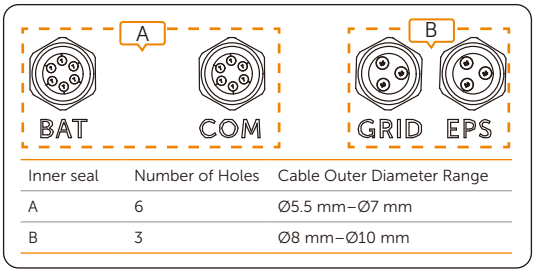


Figure 8-8 Threading the cables



Inner seal	Number of Holes	Cable Outer Diameter Range
A	6	Ø5.5 mm–Ø7 mm
B	3	Ø8 mm–Ø10 mm

Figure 8-9 Cable outer diameter range

8.2 PE Connection

The inverter must be reliably grounded. The PE connection points are located on both the left and right sides of the inverter (marked with ⏚), and both must be grounded. It is recommended to connect the inverter to a nearby grounding point.

Remove the M5 screw on the left and right side of the inverter. Connect the assembled PE cable to the grounding point, and secure it with the original screw. (Torque: 2±0.1 N·m)

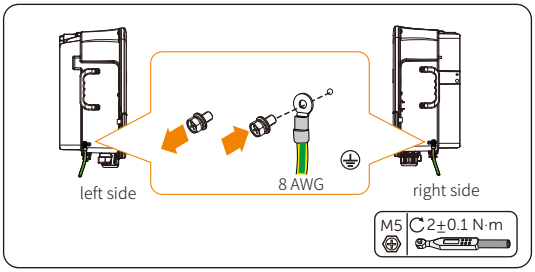


Figure 8-10 Securing the PE cable

8.3 AC Connection

NOTICE!

- Before connecting the inverter to the grid, approval must be received by local utility as required by national and state regulations.
- The inverter supports the EPS mode. The inverter outputs go through the **Load** terminal in the event of power outages.

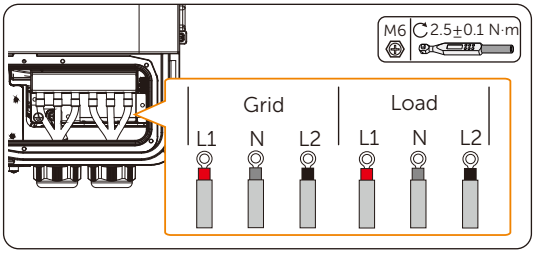


Figure 8-11 Connecting the AC cable

Requirements for AC connection

- Grid voltage requirement
  - » The grid voltage and frequency must be within the allowable range(120/240 V, 127/220 V, 50/60 Hz) and comply with the requirements of the local power grid.
- Residual Current Device (RCD)
  - » The inverter has an integrated Type-B Residual Current Monitoring Unit (RCMU) inside the inverter. If an external RCD is required by local regulations, verify the type of RCD required. It is recommended to use a Type-A RCD with a rating of 300 mA. The use of a Type-B RCD is also permitted.
- Circuit breaker
  - » A circuit breaker that matches the power of the inverter must be used between the inverter output and the power grid. Each inverter must be equipped with an independent breaker or other load disconnection unit to ensure the safe disconnection from the grid. For specific information on the AC breaker for **Grid** and **Load** terminal, please refer to "5.3 Additionally Required Materials".

- EPS load
  - » Make sure that the rated power of the EPS load is within the rated output power range of the inverter. Otherwise, the inverter will report an **EPS Overload Protection** alarm. In this case, turn off some loads to suit the rated EPS output power range of the inverter.
  - » When connecting to the **Load** terminal, pay attention to the following points:

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

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

Table 8-3 EPS load information

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

8.4 PV Connection

DANGER!

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

WARNING!

- Utilize a dedicated crimping tool specifically designed for PV installations to ensure secure and reliable connections. Otherwise, electrical shock or fire might be caused.

CAUTION!

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

Requirements for PV connection

- Open circuit voltage and operating voltage
  - » The open circuit voltage of each module array cannot exceed the maximum PV input voltage (500 V) of the inverter. Otherwise, the inverter may be damaged.
  - » The operating voltage of PV modules must be within the MPPT voltage range (35–490 V) of the inverter. Otherwise, the inverter will prompt a **PV Voltage Protection** alarm. Consider the impact of low temperature on the voltage of the photovoltaic panels, as lower temperatures tend to result in higher voltages.
- PV module
  - » The PV modules within the same MPPT channel are of the same brand. Additionally, the strings within the same channel should have identical quantities, and be aligned and tilted identically.
  - » The positive or negative pole of the PV modules should not be grounded.
  - » The positive cables of the PV modules must be connected with positive DC connectors.
  - » The negative cables of the PV modules must be connected with negative DC connectors.

Wiring procedures

Step 1: Strip the insulation of the PV cables to an appropriate length.

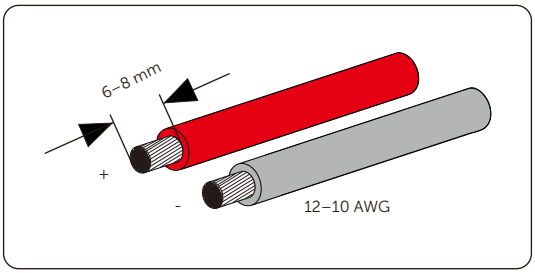


Figure 8-12 Stripping the PV cable

Step 2: Insert the stripped cable into the PV pin contact (part D&F). Make sure the PV cable and PV pin contact are of the same polarity.

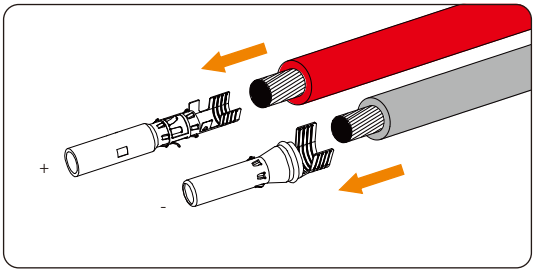


Figure 8-13 Inserting the PV pin contact

Step 3: Crimp it with a crimping tool for the PV terminal. Pay attention to the crimping position.

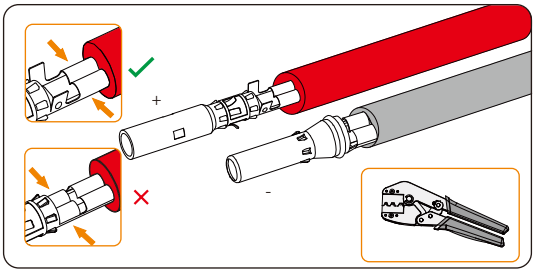


Figure 8-14 Crimping the terminal

Step 4: Thread the PV cable through swivel nut and insert the cable into the Positive & Negative PV connector (part C&E).

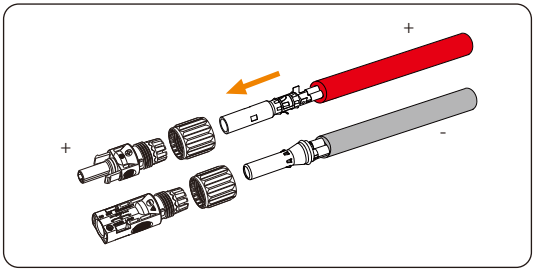


Figure 8-15 Threading the PV cable

Step 5: A "Click" will be heard if it is connected correctly. Gently pull the cable backward to ensure firm connection. Tighten the swivel nut. Verify that the PV connectors have the correct polarity before connection.

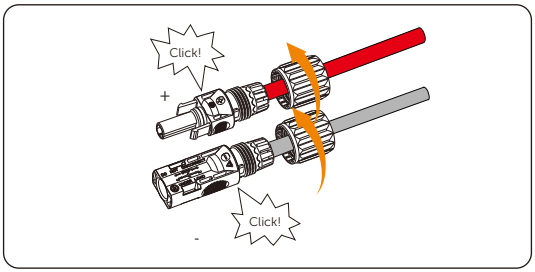


Figure 8-16 Securing the PV cable

Step 6: Use a voltage measuring device which complies with the local regulation to measure the positive and negative voltage of the assembled PV connectors. Make sure the open circuit voltage does not exceed the input limit of 500 V.

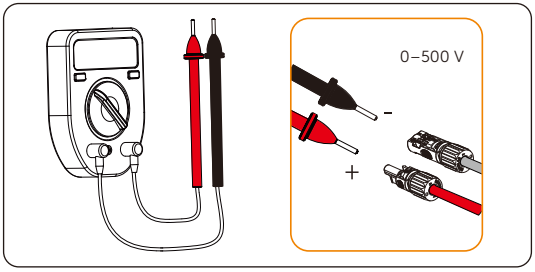


Figure 8-17 Measuring the voltage of PV connectors

NOTICE!

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

Step 7: Remove the PV terminal caps and connect the assembled PV connectors to the corresponding terminals until there is an audible "Click". The PV+ on the string side must be connected to the PV+ on the inverter side, and the PV– on the string side must be connected to the PV– on the inverter side.

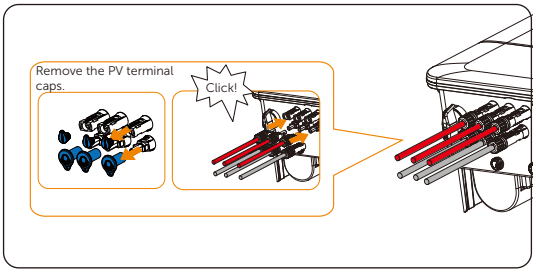


Figure 8-18 Connecting the PV cable

NOTICE!

- Seal the unused PV terminals with the terminal caps.

8.5 Battery Connection

DANGER!

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

NOTICE!

- The power cable of battery is in the battery accessory pack. NOT in the scope of inverter's delivery.
- Carefully follow all safety instructions provided in the battery manual when handling the battery. The battery used with the inverter must meet the specified requirements of the series inverter.

Requirements for battery connection

- Battery
  - » SolaX Lithium-ion battery
  - » The inverter is equipped with two independent battery terminals, allowing for connection to two separate battery clusters. The model of each battery cluster must be the same.
  - » Make sure the input voltage of each BAT terminal is higher than minimum voltage 100 V and lower than maximum input voltage 480 V.
- Micro circuit breaker (MCB)
  - » If the battery is integrated with a readily accessible internal DC breaker, no additional DC breaker is required. If local regulations mandate the use of a DC MCB between the battery and the inverter, install a non-polar DC MCB.
  - » The nominal voltage of DC MCB should be larger than the maximum voltage of battery.
- Battery configuration information

Supported battery system	Number of connectable battery packs (two battery clusters)	Maximum battery capacity
T-BAT-SYS-HV-5.8 V3	2–6	34.8kWh

BMS connection diagram

* Take battery system T-BAT-SYS-HV-5.8 V3 as an example
* The battery PE cable is connected to the same E-bar as the inverter.

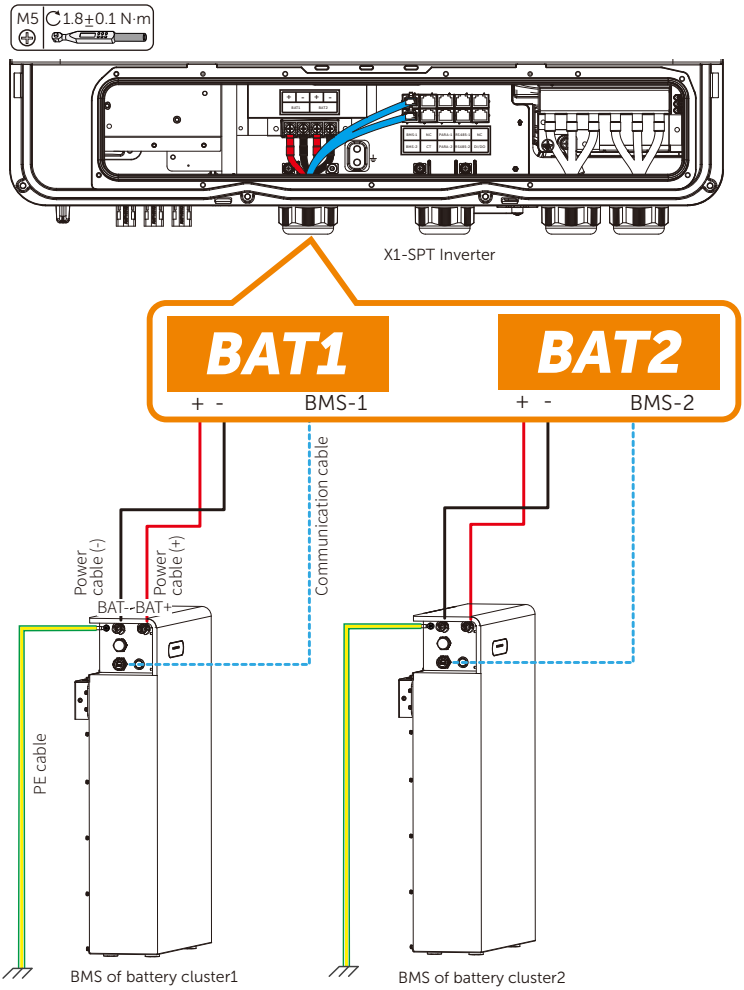


Figure 8-19 Battery connection

8.6 Communication Connection

CT Connection

If the load current is 75 A or below, an external CT is not required, as the inverter is equipped with a built-in CT supporting whole-house loads up to 75 A. If the load current exceeds 75 A, an external CT must be installed.

NOTICE!

- Do not place the CT on the N wire or ground wire.
- Do not put CT on the N wire and L wire at the same time.
- Do not place the CT on the side where the arrow points to the inverter.
- Do not place the CT on non-insulated wires.
- The cable length between CT and inverter should not exceed 100 meters.
- It is recommended to wrap the CT clip around in circles with insulating tape.

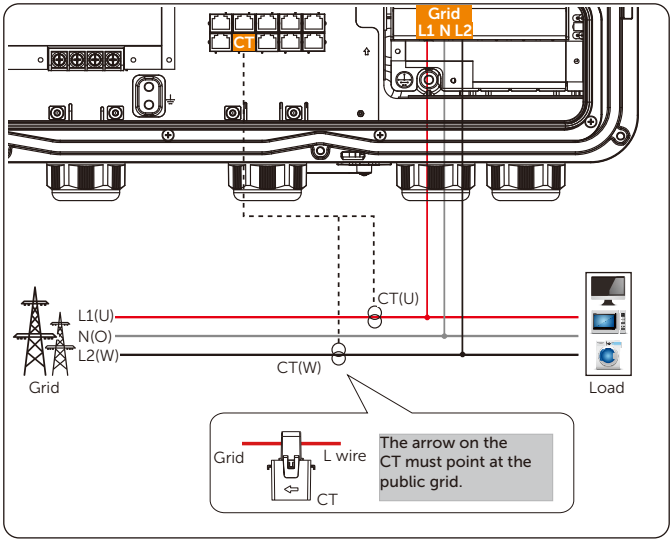


Figure 8-20 CT connection diagram

Step 1: Install the CT (part M) on the L1 and L2 wire in the distribution box. The arrow on the CT must point at the public grid.

Step 2: Use the extension communication cable and RJ45 coupler (part J) to connect the CT to the CT connector of the inverter. An audible "Click" will be heard if it is successfully connected.

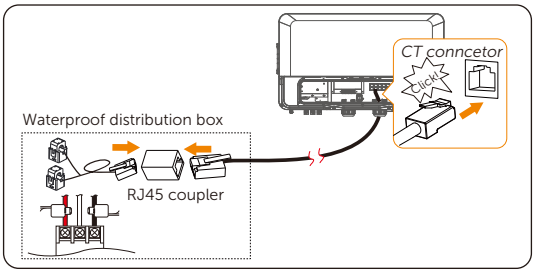


Figure 8-21 Connecting CT

8.7 Monitoring Connection

The inverter provides a **Dongle/Upgrade** port, which can transmit data of the inverter to the monitoring website via WiFi monitoring module.

Monitoring connection diagram

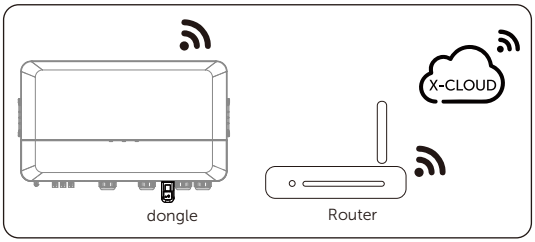


Figure 8-22 Wi-Fi mode connection diagram

NOTICE!

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

Monitoring wiring procedure

Remove the dust cap from the Dongle terminal. Plug the dongle (part Q) to the inverter.

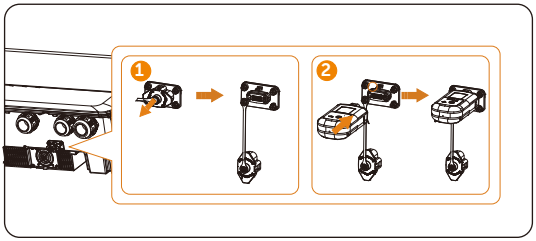


Figure 8-23 Plug the dongle to the inverter

CAUTION!

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

NOTICE!

- This section uses a specific dongle model as an example. Please refer to your actual dongle. For dongle installation, see its documentation.

8.8 Final Installation Steps

Step 1: Thread the innver seal into the main body and tighten the swivel nut.

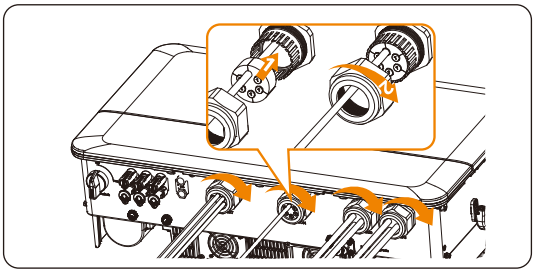


Figure 8-24 Tighten the cable gland

Step 2: After confirming that there is no moisture or dirt around the terminal block, reinstall the waterproof cover plate with ten M4 × L10 screws(Torque: 1.2±0.1 N·m) ReInstall the front cover. Ensure the slots on the back of the cover are aligned with the tabs.

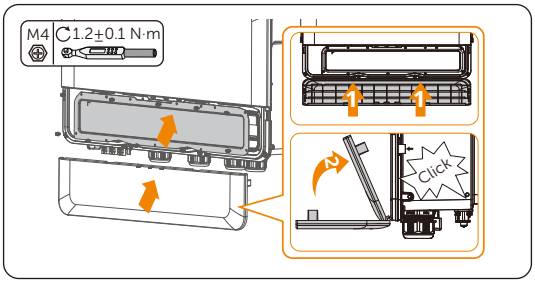


Figure 8-25 Reinstall the waterproof cover plate and the front cover

9 System Commissioning

9.1 Checking before Power-on

Table 9-1 Pre-power-on Checklist

No.	Item	Checking details
1	Installation	The inverter is installed correctly and securely. The battery is installed correctly and securely. Other devices (if any) are installed correctly and securely.
2	Wiring	All DC, AC cables and communication cables are connected correctly and securely; The CT (if any) is connected correctly and securely. The ground cable is connected correctly and securely;
3	Breaker	All the DC breakers and AC breakers are OFF;
4	Unused terminal	Unused terminals and ports are locked by waterproof caps.
5	Screw	All the screws are tightened.

9.2 Powering on the System

Step 1: Switch on the AC breaker.

Step 2: Turn on the DC switch of the inverter.

Step 3: Switch on the battery or the breaker, button, DC switch of the battery (see documentation of the battery).

When the photovoltaic panel generates enough power, the inverter will start automatically.

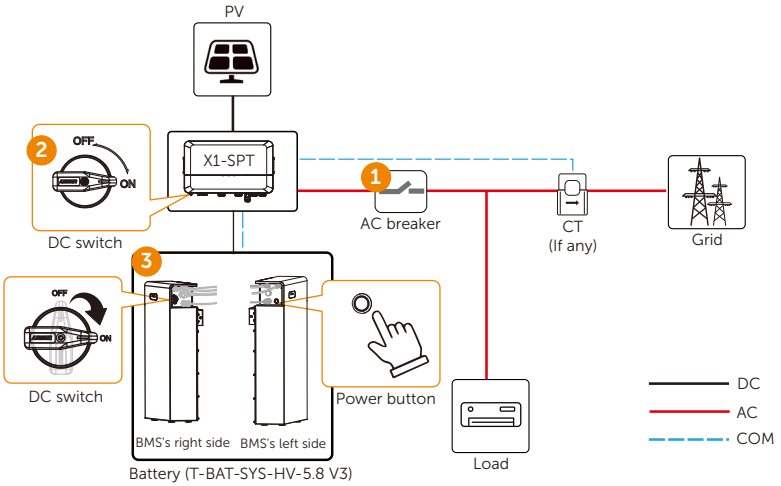


Figure 9-1 Powering on the System

Table 9-2 Definition of indicators

LED indicator	Status		Definition
Operating		(Green) Light on	The inverter is in a normal state.
		(Green) Blinking	The inverter is in a waiting or checking state.
Battery		(Blue) Light on	The inverter is in an off-grid state.
		(Blue) Blinking	The inverter is checking for off-grid operation.
Error		(Red) Light on	The inverter is in a fault state.

10 Operation on SolaXCloud

10.1 Introduction of SolaXCloud

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

10.2 Operation Guide on SolaXCloud App

10.2.1 Downloading and Installing App

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

The QR codes are also available on the login page of our official website (www.solaxcloud.com), and the installation guide of the dongle.



Figure 10-1 QR code

Method 2: Search for **SolaXCloud** in App Store or Google Play, and then download the App.

10.2.2 Operation on the App

For instructions on the related operations, see the online documents on the SolaXCloud App.

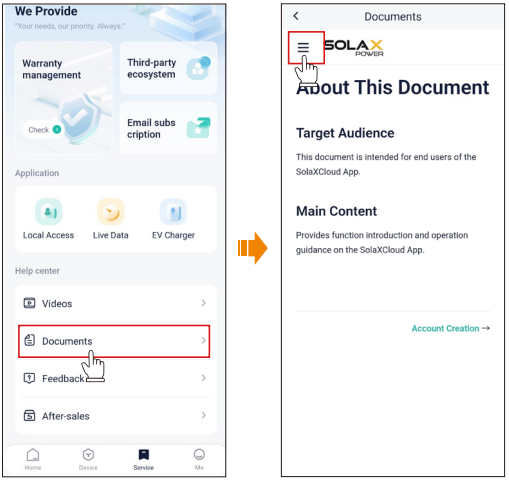


Figure 10-2 Online document on the SolaXCloud App

NOTICE!

- The pages above are taken from SolaXCloud App V6.1.0, which may change with software upgrade. The finally displayed pages are subject to the actual situations.

10.3 Operations on SolaXCloud Web Page

Open a browser and enter www.solaxcloud.com and then complete registration, login, plant creation and other operations according to the help document.

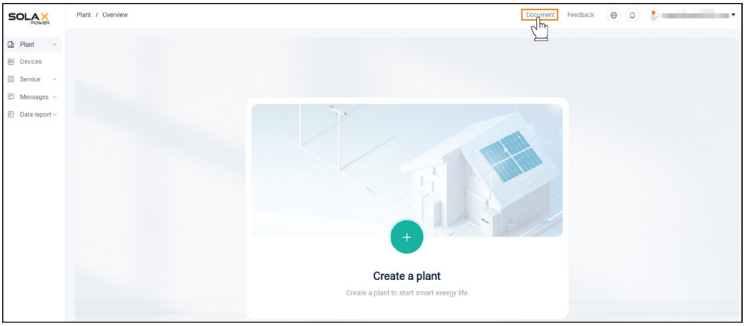


Figure 10-3 Online document on the SolaXCloud Web

10.4 Setting Up the Monitoring System

For remote monitoring the inverter, you need to connect the dongle to the inverter via WiFi. Here take the app as an example to explain how to set up the monitoring system. For details, refer to the SolaXCloud help document.

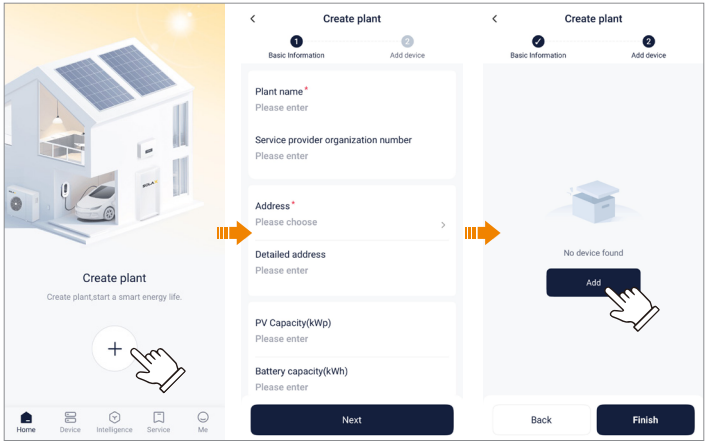
1 Account register & Log in

Run the APP, select the language, tap **Sign up** at the bottom of monitoring APP, and select a server, identity, fill in your information (User name, Password, E-mail address, etc.) to sign up an account. **Log in** your account.



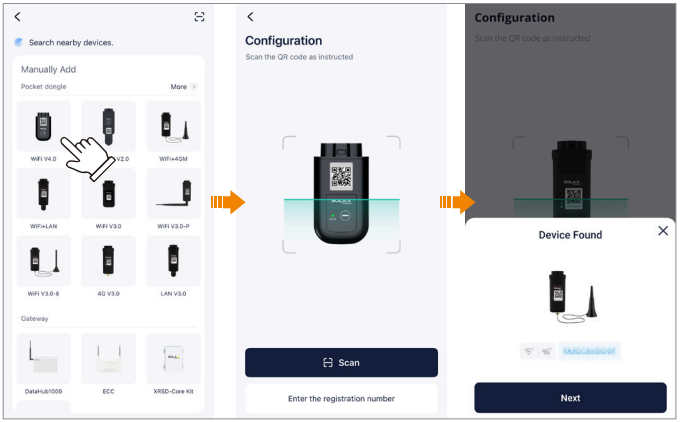
2 Create plant

Tap + in the main interface and then fill in the corresponding information to create your plant. Then tap **Add** to enter the Add Device interface.



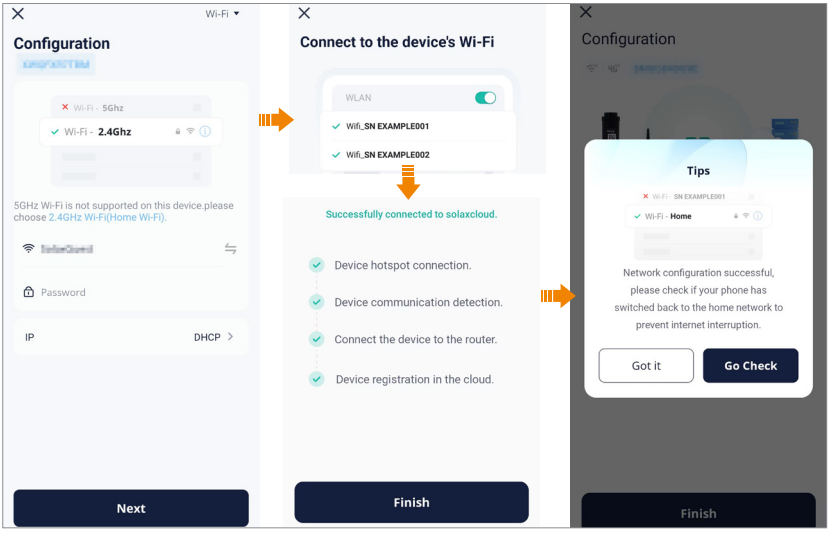
3 Add device

Select the corresponding dongle, scan or enter the registration number of the dongle (10-digit alphanumeric). After the registration number is identified successfully, tap **Next**.



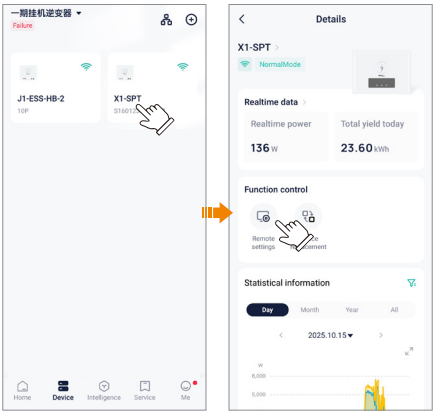
4 Network configuration

Enter your WiFi account and password. Then, connect the device hotspot (name: Wifi_XXXXXXXXXX), and start to configure the device network. After the network configuration is completed, Tap **Go Check**, to ensure that the phone WLAN has been switched to the family Wi-Fi. After switchover, return to this App and tap **Got it**.



11 Inverter settings

Tap **Device** at the bottom of the app, find the X1-SPT device, tap it to enter the inverter detail interface. Then Tap **Remote Settings** to enter setting interface.



Set the parameters of the inverter, including **Basic Setting** and **Advanced Setting**.

- Basic
  - 1) Date & Time
  - 2) Mode Select
  - 3) Chrg & Dischrg Period
  - 4) Contract Current
- Advanced
  - 1) ModbusRTU/485
  - 2) Grid
  - 3) Export Control
  - 4) Max Charging Power
  - 5) EPS
  - 6) Reset
  - 7) New Password
  - 8) Reactive Mode
  - 9) GMPPT
  - 10) Clear EPS Overload Fault
  - 11) CT settings
  - 12) FastCTCheckEN
  - 13) Extend BAT FUNC
  - 14) HotStandby
  - 15) Power Limit
  - 16) Parallel Setting
  - 17) External ATS
  - 18) Safety
  - 19) Soft Start Slope
  - 20) ArcCheck
  - 21) External Gen
  - 22) Internal 485
  - 23) System ON/OFF

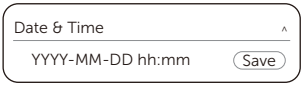
* Advanced settings only can be set by the installer.(The password to enter the advanced settings is only available to the installer.)

11.1 Basic Setting

1 Date & Time

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

The display format is "YYYY-MM-DD hh:mm", in which the first four numbers represent the year (e.g. 2000–2099);
The fifth and sixth numbers represent the month (e.g. 01–12);
The seventh and the eighth numbers represent the date (e.g. 01–31).
The remaining numbers represent the time.



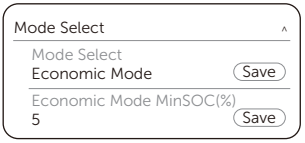
After setting, Tap **Save**

2 Mode Select

Here you can only select the working mode (Eco-friendly, Economic, Back up, Manual) in on-grid status.

Min SOC: The minimum SOC of the battery. The battery will not discharge power when the SOC of the battery reaches this value.

Charge SOC: Set the target SOC to charge the battery from grid in the forced charging period.



Working mode	Min SOC(%)	Charge SOC(%)
Eco-friendly Mode	5%–100% (default 5%)	10%–100% (default 50%)
Economic Mode	5%–100% (default 5%)	/
Back up Mode	30%–100% (default 50%)	30%–100% (default 50%)

* The above parameters apply when the inverter is used with the T-BAT SYS-HV-5.8 battery.

* For details on TOU mode settings, refer to the SolaXCloud help document.

* Generator mode is display-only and cannot be configured.

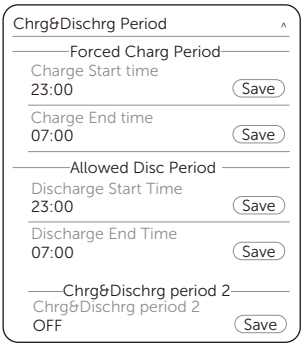
3 Charge & Discharge Period

Here you can set the charge period from grid and discharge period from battery. The minimum time scale is 15 minutes.

Chrg&Dischrg period 1
Default charge start/end time 23:00/07:00
Default discharge start/end time 07:00/23:00

If two charging and discharging periods are needed, switch on the Chrg&Dischrg period 2 to activate the Chg&Dischg Period2.

Chrg&Dischrg period 2
Default charge start/end time 00:00/00:00
Default discharge start/end time 00:00/00:00



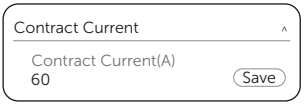
NOTICE!

- The charging and discharging period is only applicable for eco-friendly mode, economic mode and backup mode. The priority of forced charging period is higher than all working modes.
- In the period not set as charging period and discharging period, the battery can be charged but can not discharge power.
- In the period simultaneously set as charging period and discharging period, the battery will be charged forcefully.
- The charging/discharging period is defined as: Start time ≤ Period < Stop time. For example, if the period is set from 9:00 to 10:00, charging/discharging stops before 10:00, so 10:00 itself is not included.
- If you do not want to charge from the grid, set the charge start time and end time to be the same, for example, 6:00 to 6:00.

4 Contract Current

Due to the power limit, the contract current must be set according to the utility's requirements. Failure to set it may cause a circuit breaker fault of the main switchboard, thereby affecting charging and discharging of a battery.

Default: 60 A; range: 10–400 A



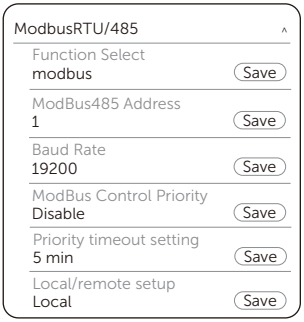
11.2 Advanced Setting

1 ModbusRTU/485

You can set the address and baud rate for communicating with an external device.

Function Select: The default setting is **Modbus** . When the inverter is connected to an external generator, select **meter**.

* The other settings are not required, keep the default values.



2 Grid

Select the appropriate safety code first (refer to "Safety") . The grid parameters will be displayed according to the selected safety code.

* The table below illustrates the grid parameters using the grid codes **Brazil_2P_220** and **Mexico_2P_240** as examples.

* When the grid frequency is 60 Hz, all values in the boxed area shall be increased by 10. e.g. (50–55, 52.6) → (60–65, 62.6)

Item		Brazil_2P_220		Mexico_2P_240	
		Range	Default	Range	Default
OVP_L1	VacUpperL1 (V)	127–177.8	142.2	120–168	144.0
	TimeVacUpperL1 (ms)	0–100000	1000	0–100000	1000
UVP_L1	VacLowerL1 (V)	1.2–127	101.6	1.2–120	105.0
	TimeVacLowerL1 (ms)	0–100000	2500	0–100000	2000
OVP_L2	VacUpperL2 (V)	127–177.8	149.8	120–168	145.0
	TimeVacUpperL2 (ms)	0–100000	20	0–100000	160
UVP_L2	VacLowerL2 (V)	1.2–127	63.5	1.2–120	72.0
	TimeVacLowerL2 (ms)	0–100000	500	0–100000	1000
UVP_L3	VacLowerL3 (V)	1.2–127	25.4	1.2–120	54.0
	TimeVacLowerL3 (ms)	0–100000	20	0–100000	160

Item		Brazil_2P_220		Mexico_2P_240	
		Range	Default	Range	Default
OFP_L1	FacUpper (Hz)	50–55	52.6	50–55	51.0
	TimeFacMaxadj (ms)	0–100000	10000	0–100000	2000
UFP_L1	FacLower (Hz)	45–50	47.4	45–50	48.5
	TimeFacMinadj (ms)	0–300000	5000	0–300000	2000
OFP_L2	FacUpperL2 (Hz)	50–55	53.1	50–55	51.0
	TimeFacUpperL2 (ms)	0–100000	100	0–100000	160
UFP_L2	FacLowerL2 (Hz)	45–50	46.9	45–50	48.5
	TimeFacLowerL2 (ms)	0–300000	100	0–300000	160
TimeStart(S)		14–1000	180	14–1000	60

- MicroGridEN
  Set for inverter microgrid operation, for details, refer to "15.2 Application of Micro-grid".
  Default: Disable; range: Disable/Enable
- Weak-Grid Parameters
  This feature is designed for areas with frequent voltage fluctuations. After clicking **Confirm**, the inverter can operate normally within a wider voltage range.

3 Export Control

This function allows the inverter to control the output power to the grid. If you do not want to feed power to the grid, set value to "0".

X1-SPT-10K
Default: 15000 W; range: 0–100000 W

X1-SPT-12K
Default: 18000 W; range: 0–120000 W

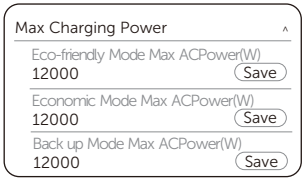


4 Max Charging Power

Set the maximum charging power from grid. (only available for eco-friendly mode, economic mode and back up mode.)

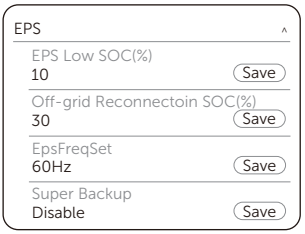
X1-SPT-10K
Default: 10000 W; range: 0–10000 W

X1-SPT-12K
Default: 12000 W; range: 0–12000 W



5 EPS

Select and enter EPS(off grid) Setting and set below items.



- **EPS Low SOC(%)**:
  If the battery SOC is lower than the **EPS Low SOC(%),** the inverter will prompt **Battery Capacity Insufficient** and turn off if there is no PV input.
  Default: 10%; range: 10%–**Off-grid Reconnection SOC(%)**

- **Off-grid Reconnection SOC(%)**:
  The inverter will re-enter EPS mode only when the following conditions are met:
  - » The battery SOC reaches the **Off-grid Reconnection of SOC(%)**.
  - » The battery SOC is higher than the **EPS Low SOC(%)+5%**

  Default: 30%; range: **EPS Low SOC(%)**–100%

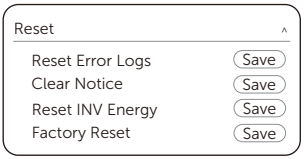
- **EPS Frequency**: Output frequency of EPS
  Default: 60 Hz; range: 50/60 Hz

- **Super Backup:** Disabled by default. This function enables the inverter to enter EPS (fuera de la red) mode when there is only PV input (no battery input).

EPS output	X1-SPT-10K	X1-SPT-12K
Normal output power(W)	5000	6000
Apparent power (VA) 130% overload	6500	7800

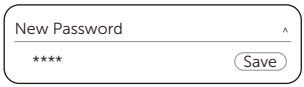
6 Reset

Here you clear the inverter error logs, notice, energy data, and restore to the factory set.



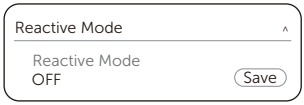
7 New password

You can reset the password for advanced settings.

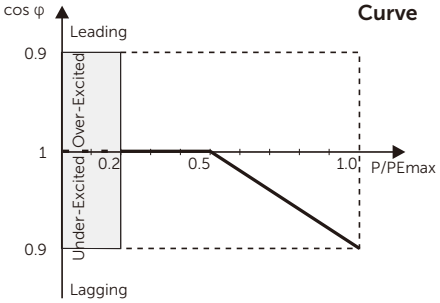


8 Reactive Mode

The default setting complies with current safety regulations. Available options and settings may vary based on local laws, regulations, and grid requirements.



- **Off**: Disable reactive power control
- **Over Excited/Under Excited**:Controls reactive power by setting the power factor. (Default: 1.00; range: 0.8–1)
- **Curve** (Only applicable in Brazil.): Controls reactive power according to a programmable V/Var curve. The default value of PFLockInPoint is 1.04. When Vac > 1.04Vn, curve cos φ = f(P) corresponds to the curve below.



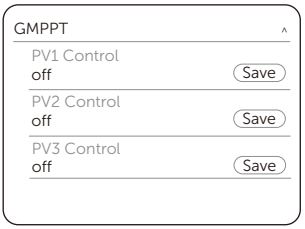
- **Fix Q Power**:
  Set a fixed reactive power value in Var.

9 GMPPT

GMPPT (Global Maximum Power Point Tracking) is to find the maximum points of PV modules and maintain them at the maximum power output.

This function is off by default. If no shadow falls on the solar panels, keep the system set to **Off**. If shadows occur frequently or cover a large area, it is recommended to increase the tracking frequency (e.g., **Low**, **Middle**, and **High**)

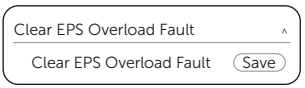
- **Off**: Switch off the shadow tracking function.
- **Low**: Scan the shadow every four hours.
- **Middle**: Scan the shadow every three hours.
- **High**: Scan the shadow per hour.



10 Clear EPS Overload Fault

You can manually clear **EPS Overload Protection** alarm here.

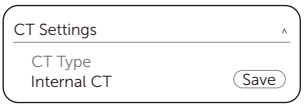
The inverter will automatically clear the fault and attempt to restart after a preset time interval, until normal operation is restored or the fault is cleared manually.



11 CT settings

Set the CT type to according to the actual situations. When an external CT is installed, a CT capacity must be selected from the available options (100/200/300A).

Default: Internal CT
Range:Internal CT/100A/200A/300A



12 Fast CT CHECK EN

Check whether the CT is connected correctly.

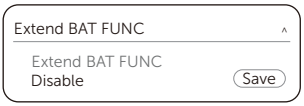
* This option is unavailable when the CT is set to **Internal CT**.



13 Extend BAT FUNC

This function allows for the extension of battery modules, such as adding a new battery module to an existing system. It is only applicable and functional in on-grid mode and cannot be used in EPS mode. In on-grid mode, enabling this function will make the inverter charge or discharge the battery SOC to approximately 40%. This function will turn to **Disable** automatically after 48 hours.

Default: Disable; range: Disable/Enable



14 HotStandby

This function is mainly to reduce the energy losses of the system when the power of load is very low.

- **Enable**: When the power of load is very low and other conditions for entering hot standby are met, the inverter will enter HotStandby status to reduce system losses.
- **Disable** (default): Even when the power of load is very low and other conditions for entering hot standby are met, the inverter will not enter HotStandby status and continue to output power to the load.



15 Power Limit

Here you can set the rated output power.

X1-SPT-10K
Default: 10000 W; range: 0–10000 W

X1-SPT-12K
Default: 12000 W; range: 0–12000 W



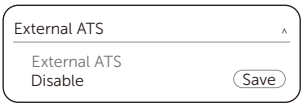
16 Parallel Setting

This setting is required when X1-SPT inverters are connected in parallel. Please refer to "15.3 Application of Parallel Function".

17 External ATS

When an external ATS is connected to the system, enable the **External ATS** option.

Default: Disable



18 Safety

Here you can set safety code according to different countries and grid-tied standards.

Select **Brazil_2P_220** or **Mexico_2P_240** if the installation country is Brazil or Mexico.

For other Latin American countries, where the inverter is compliant with IEC 61727, select the safety code according to the grid voltage:
LATAM_2P_220 for 127/220 V grids
LATAM_2P_240 for 120/240 V grids

In addition, the inverter has a **User-Defined** option which allows you to customize relevant parameters with a wider range.



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.

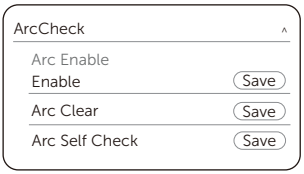
19 Soft Start Slope

Set the gradient of the power to increase from 0 to full power operation after the inverter enters the normal state. If set as shown, 20 percent of the rated power increases per minute.

Range: 0.00%–600.00%



20 Arc check



* The arc module of the series inverter meets the requirements of IEC 63027.

- **Arc Enable**: If the switch is enabled, it detects the arcing of the DC side and cuts the circuit in time to protect the user and the electrical system. The inverter will report **Arc Fault Detection Error** when DC arc faults are detected (Default: Disable).
- **Arc Clear**: The inverter will automatically clear the arc fault within five minutes, up to four consecutive times. If the arc fault occurs a fifth time, manual clearing is required. To clear manually, tap **Save** next to **Arc clear**, the inverter will clear the arc fault immediately.
- **Arc SelfCheck**: Tap **Save** next to **Arc SelfCheck**, the inverter will self-check whether the arc detection function is working properly. During the self-check, the inverter shuts down for a few seconds. If the test succeeds, the inverter restarts after a short time. If the test fails, the inverter stays shut down and the cloud reports an **ARC Check Error**, please contact us for help.

21 External Gen

This setting is required when connected to a generator. You can select **ATS Control** or **Dry Contact** to control ExternalGen. ExternalGen is disabled by default. Please refer to "15.1 Application of Generator"

22 Internal 485



Sets the baud rate for internal device communication (e.g., X1-SPT Parallel connection).

This option does not require configuration. Keep the default setting.

23 System ON/OFF

Select ON or OFF to switch on and off the inverter.

When you select **ON**, the inverter starts running.

When you select **OFF**, the inverter stops running.



12 Troubleshooting and Maintenance

12.1 Power off

a. Turn off the system by **System ON/OFF** via the SolaXCloud.

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

c. Rotate the inverter's DC switch to **OFF** position.

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

WARNING!

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

12.2 Troubleshooting

This section lists the possible problems with the inverter, and provides information and procedures for identifying and resolving them. In case of any errors, check for the warnings or error messages on the SolaXCloud, and then refer to the suggestions below. For further assistance, contact SolaX Customer Service. Please provide the model and SN of the inverter, and be prepared to describe the system installation details.

* "Restart the inverter" refers to turning the system switch **OFF** and then **ON** via the cloud platform.

Table 12-1 Inverter Troubleshooting list

Error Code	Fault	Diagnosis and Solutions
0	Hardware Overcurrent Protection	• Wait for a while to check if it returns to normal. • Disconnect PV+, PV- and batteries, reconnect. • If the system is in off-grid state, check if the power of EPS loads exceeds the maximum limit of the system or exceeds the current power supply of battery. • If the system fails to restore to its normal state, contact SolaX for help.
1	Grid Disconnection Protection	• Check the grid connection status. • Contact SolaX for help.

Error Code	Fault	Diagnosis and Solutions
2	Grid Voltage Protection	• Wait a moment, if the utility returns to normal, the system will reconnect. • Please check if the grid voltage is within normal range. • Contact SolaX for help.
3	Grid Frequency Protection	• Wait a moment, if the utility returns to normal, the system reconnects. • Contact SolaX for help.
4	PV Voltage Protection	• Check the output voltage of the PV panel. • Check if the DC switch is OFF. • Contact SolaX for help.
5	DC Bus Voltage Protection	• Restart the inverter. • Check if the PV input open circuit voltage is in the normal range. • Check if the power of half-wave load exceeds the system limit. • Contact SolaX for help.
6	Battery Voltage Protection	• Check if the battery input voltage is within normal range. • Contact SolaX for help.
7	Active Anti-Islanding Protection	• Restart the inverter. • Contact SolaX for help.
8	DCI Overcurrent Protection	• Wait for a while to check if it's back to normal. • Contact SolaX for help.
9	DCV Overvoltage Protection	• Wait for a while to check if it's back to normal. • Contact SolaX for help.
10	Software Overcurrent Protection	• Wait for a while to check if it's back to normal. • Shut down photovoltaic, battery and grid connections. • Contact SolaX for help.
11	RC Overcurrent Protection	• Check the impedance of DC input and AC output. • Wait for a while to check if it's back to normal. • Contact SolaX for help.
12	Isolation Protection	• Please check the wire insulation for damage. • Wait for a while to check if it's back to normal. • Contact SolaX for help.
13	Overtemperature Protection	• Check if the ambient temperature exceeds the limit. • Contact SolaX for help.

Error Code	Fault	Diagnosis and Solutions
14	Battery Reverse Polarity Protection	• Check if the battery cables are connected in the opposite direction. • Contact SolaX for help.
15	EPS Overload Protection	• Shutdown the high-power device and restart the inverter. • Contact SolaX for help.
16	Grid Overload Protection	• Shutdown the high-power device and restart the inverter. • Contact SolaX for help.
17	Battery Capacity Insufficient	• Shutdown the high-power device and restart the inverter. • Charge the battery to a level higher than the protection capacity or protection voltage. • Contact SolaX for help.
18	Battery Communication Error	• Check that the communication cable between the battery and the inverter are properly connected. • Contact SolaX for help.
19	Fan Error	• Check for any foreign matter that may have caused the fan not to function properly. • Contact SolaX for help.
20	Low Temperature Protection	• Check if the ambient temperature is too low. • Contact SolaX for help.
21	Passive Anti-Islanding Detection Protection	• Restart the inverter. • Contact SolaX for help.
22	RPR Protection	• Restart the inverter. • Contact SolaX for help.
23	CT Connection Error	• Check if the CT is connected correctly. • Contact SolaX for help.
24	Internal Communication Error	• Restart the inverter. • Contact SolaX for help.
25	Inverter EEPROM Memory Error	• Shut down photovoltaic, battery and grid, reconnect. • Contact SolaX for help.
26	RCD Error	• Check the impedance of DC input and AC output. • Disconnect PV+, PV - and batteries, reconnect. • Contact SolaX for help.

Error Code	Fault	Diagnosis and Solutions
27	Grid Relay Error	• Disconnect PV+, PV-, grid and batteries and reconnect. • Contact SolaX for help.
28	Stand-Alone Operation Relay Error	• Disconnect PV+, PV-, grid and batteries and reconnect. • Contact SolaX for help.
29	PV Reverse Polarity Protection	• Check if the PV input cables are connected in the opposite direction. • Contact SolaX for help.
30	EV Charger Relay Error	• Restart the inverter. • Contact SolaX for help.
31	Stand-Alone Side Ground Relay Error	• Restart the inverter. • Contact SolaX for help.
32	Balance Bridge Overcurrent Protection	• Update inverter firmware. • Contact SolaX for help.
33	Arc Fault Detection Error	• Update inverter firmware. • Contact SolaX for help.
35	Multi-Leader Error	• Check that two or more devices are configured as leader inverter, and set only one device as the leader inverter. • Check the cable connections for the parallel system. • Restart the inverter. • Contact SolaX for help.
36	Parallel Software Mismatch	• Update inverter firmware. • Contact SolaX for help.
37	CAN Communication Disconnected	• Check if the communication cable are properly connected. • Contact SolaX for help.
38	CT Installation Error in Parallel Operation	• Check if the CT is set correctly. • Check the cable connections for the parallel system. • Contact SolaX for help.
100	Fan 1 Error	• Check the fan for foreign objects. • Check the cable connections for the parallel system. • Contact SolaX for help.
101	Fan 2 Error	

Error Code	Fault	Diagnosis and Solutions
102	ARM EE Memory Error	• Shut down photovoltaic, battery and grid, and then reconnect. • Contact SolaX for help.
105	ARC Check Error	• Shut down photovoltaic, battery and grid, and then reconnect. • Contact SolaX for help.
106	ARC Communication Error	• Shut down photovoltaic, battery and grid, and then reconnect. • Contact SolaX for help.
107	Bypass Relay Error	• Restart the inverter. • Contact SolaX for help.
110	Data Sync Error	• Update inverter firmware. • Contact SolaX for help.
111	Battery Communication Disconnected	• Check if the battery communication cables are properly connected. • Contact SolaX for help.
112	Battery Identification Error	• Check if the battery power cables (+), (-) and communication cables are correctly connected • Check if the BMS switch is turned to the "ON" position. • Check that the battery voltage display is normal. • Contact SolaX for help.
113	ARM Parallel Software Mismatch	• Check that the ARM versions of the leader and follower inverter are identical. If they differ, update the firmware. • Restart the inverter. • Contact SolaX for help.
114	Follower Communication Disconnected	• Check the communication cable between the follower units. • Restart the inverter. • Contact SolaX for help.

Table 12-1 Battery Troubleshooting list

Error Code		Fault	Solutions
BMS1	BMS2		
150	200	Battery External Communication Error	• Contact SolaX for help.
151	201	Battery Internal Communication Error	
152	202	Battery Total OverVoltage Fault	
153	203	Battery Total UnderVoltage Fault	
154	204	Battery Charge Overcurrent Protection	
155	205	Battery Discharge Overcurrent Protection	
156	206	Battery High Temperature Protection	
157	207	Battery Low Temperature Protection	
158	208	Battery Cell Voltage Imbalance Protection	
159	209	Battery Hardware Protection	
160	210	Battery Circuit Error	• Restart the battery. • Contact SolaX for help.
161	211	Battery Insulation Fault	• Check that the battery is properly grounded and restart the battery. • Contact SolaX for help.
162	212	Battery Voltage Sensor Error	• Contact SolaX for help.
163	213	Battery Temperature Sensor Error	• Restart the battery. • Contact SolaX for help.
164	214	Battery Current Sensor Error	• Contact SolaX for help.
165	215	Battery Relay Error	

Error Code		Fault	Solutions
BMS1	BMS2		
166	216	Battery Type Mismatch	• Upgrade the battery BMS software. • Contact SolaX for help.
167	217	Battery Version Mismatch	
168	218	Battery Manufacturer Mismatch	
169	219	Battery Software/Hardware Mismatch	
170	220	Battery Leader/Follower Mismatch	
171	221	Battery Not Charging	
172	222	Battery Follower Software Protection	
173	223	Battery Voltage Detection Error	• Contact SolaX for help.
174	224	Battery Commissioning Error	
175	225	Battery Temperature Difference Error	
176	226	Battery Disconnection Error	
177	227	Battery Memory Chip Error	
178	228	Battery Pre-Charge Error	
179	229	Battery Breaker Tripped	• Check if the battery breaker is off. • Contact SolaX for help.
184	234	Battery Cell OverVoltage Fault	• Contact SolaX for help.
185	235	Battery Cell UnderVoltage Fault	

12.3 Maintenance

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

WARNING!

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

12.3.1 Maintenance routines

Table 12-2 Proposal of Maintenance

Item	Check notes	Maintenance interval
Fans	• Check if the fan makes noise or is covered by dust. • Clean the fan with a soft and dry cloth or brush, or replace the fan if necessary	Every 12 months
Electrical connection	• Ensure that all cables are firmly connected. • Check the integrity of the cables, ensuring that there are no scratches on the parts touching the metallic surface. • Verify that the sealing caps on idle terminals are not falling off.	Every 12 months
Grounding reliability	• Check if the grounding cables are firmly connected to the grounding terminals. Use a ground resistance tester to test the grounding resistance from the inverter enclosure to the PE bar in the power distribution box.	Every 12 months
Heat sink	• Check if there are foreign objects in the heat sink.	Every 12 months
General status of inverter	• Check if there is any damage on the inverter. • Check if there is any abnormal sound when the inverter is running.	Every 6 months

12.3.2 Replacement of Fans

If the fan does not rotate and inverter report **Fan 1 Error/Fan 2 Error**, turn off the inverter and replace the fan.

Step 1: Loosen the two diagonal screws on the fan cover located at the bottom of the inverter, remove the fan cover, and disconnect the fan signal wire.

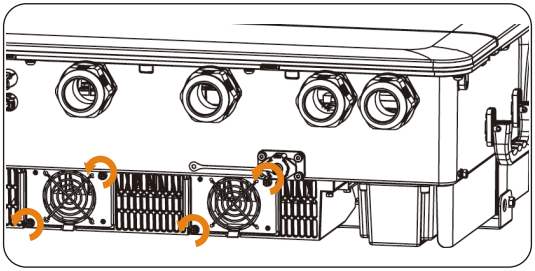


Figure 12-1 Loosen the screws on the fan cover

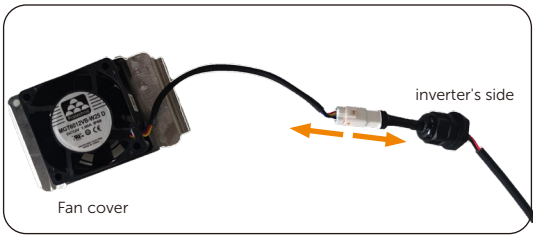


Figure 12-2 Disconnect the signal wire

Step 2: Loosen the four screws securing the fan inside the cover, replace the fan.

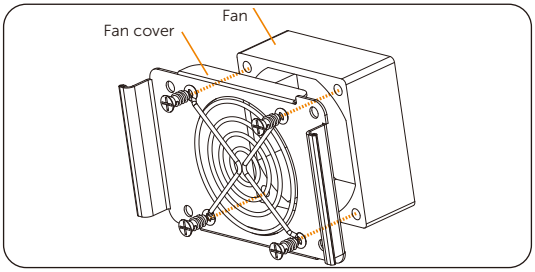


Figure 12-3 Remove the fan

Step 3: Reinstall the fan, reconnect the signal wire, and securely attach the fan cover (Torque: 1.2 N·m).

12.3.3 Upgrading Firmware

WARNING!

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

WARNING!

- Before upgrading, ensure that the PV input voltage is higher than 45 V (preferably on sunny day), or that the battery SOC is higher than 20%, or the battery input voltage is higher than 180 V. Failure to meet one of these conditions may result in upgrade process failure.

Upgrade preparation

- Prepare a USB drive (USB 2.0/3.0, ≤32 GB, FAT 16/32).
- Check for the current firmware version of the inverter.
- Contact our service support for the update firmware file, and save it to the USB drive. V***.** refers to the file version, YYYYMMDD refers to date.
  - » For ARM file: **********_X1-SPT-2 ARM_V***.**_YYYYMMDD.USB
  - » For DSP file: **********_X1-SPT-2 DSP_V***.**_YYYYMMDD.USB
  - » For BAT file (Take battery system T-BAT-SYS-HV-5.8 V3 as an example):
    (BMS) **********_TP016_T58V3_M_V***.**_YYYYMMDD.bin
    (Battery pack)**********_TP016_T58V3_S_V***.**_YYYYMMDD.bin
  - » For ARC file: **********_X1-SPT-2 ARC_V***.**_YYYYMMDD.USB

  *V***.** refers to the file version, YYYYMMDD refers to date.*
- Check the folder name and file path:

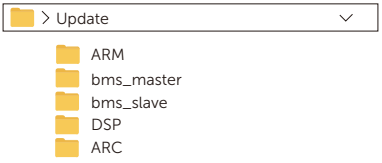


Figure 12-4 Folder name and path

Upgrade steps

The upgrade sequence is: DSP program > battery master control > battery slave control > ARM program. ARM update takes about 20 seconds, and DSP update takes about 2 minutes.

Step 1: Remove the dongle from the dongle terminal of the inverter by hand, and then insert the USB drive.

Step 1: Confirm the upgrade results by checking the LED indicator.

Step 2: After the upgrade is completed, unplug the USB drive and reconnect the dongle.

Table 12-3 LED indicator display during the upgrade process

Item	(Green)	(Blue)	(Red)
Upgrading 0–33%	Flashing	OFF	OFF
Upgrading 33%–66%	ON	Flashing	OFF
Upgrading 66%–99%	ON	ON	Flashing
Current object upgrade complete	ON	ON	ON
All objects upgrade complete	Flashing	Flashing	Flashing
DSP Upgrade failed	Flashing	Flashing	OFF
Battery upgrade failed	OFF	Flashing	Flashing
ARC upgrade failed	ON	OFF	ON

CAUTION!

- If the ARM firmware upgrade fails or stops, do not unplug the USB drive. Power off the inverter, restart it, and then repeat the above upgrade steps.

CAUTION!

If the DSP firmware upgrade fails or stops, perform operations below to troubleshoot:

- Check if the DC switch is turned off. If it is off, turn it on.
- (Recommended) If the DC switch is already on, check if the battery and PV parameters meets the upgrade requirements (The PV or battery input voltage should be larger than 45 V, or the battery SOC be higher than 20%).
- Alternatively, select **Forced Charge** to charge the battery. This process can help wake up the battery for DSP upgrade.

NOTICE!

- If the inverter does not work properly after the upgrade, turn off the DC switch, and then restart the inverter. Check if the inverter returns to normal. If not, contact us.

13 Decommissioning

13.1 Disassembling the Inverter

Refer "Power off" to stop the inverter and make sure that both the AC and DC power supplies are completely disconnected.

WARNING!

- Strictly follow the steps below to disassemble the inverter.

Step 1: Disconnect the PV connectors: Insert the flat-head screwdriver into the notch of connectors and slightly pull the connectors. Put the original terminal caps on the terminals.

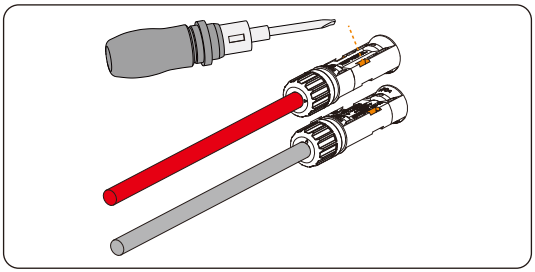


Figure 13-1 Disassembling the PV connector

Step 2: Loosen and remove AC cables, battery power cables, battery communication cables, and other communication cables.

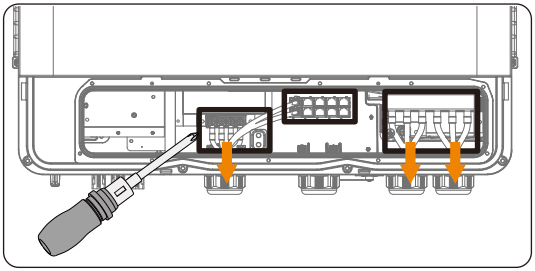


Figure 13-2 Disassembling the Battery connector

Step 3: Unscrew the grounding screw and remove the grounding cable.

Step 4: Slightly pull out the dongle module.

Step 5: Unscrew the M6 screw on the right side of inverter and vertically lift up the inverter to dismantle the inverter.

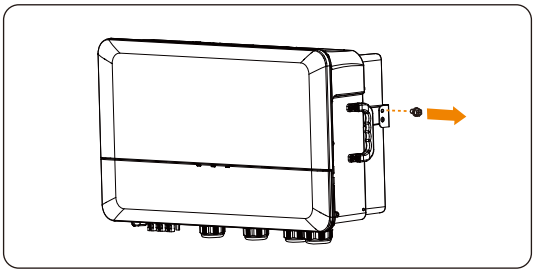


Figure 13-3 Unscrewing the M6 screws

Step 6: Unscrew the screws for fastening the wall mounting bracket and remove the wall mounting bracket if needed.

13.2 Packing the Inverter

- Use the original packaging materials if available.
- If the original packing material is not available, use the packing material which meets the following requirements:
  - » Suitable for the weight and dimension of product
  - » Convenient for transportation
  - » Can be sealed with adhesive tape

13.3 Disposing of the Inverter

Properly dispose of the inverter and accessories in accordance with local regulations on the disposal of electronic waste.

14 Technical Data

- PV Input

Model	X1-SPT-10K	X1-SPT-12K
Max. recommended PV power [W]	15,000	18,000
Max PV voltage [d.c. V]	500	
Nominal DC operating voltage [d.c. V]	390	
MPPT voltage range [d.c. V]	35–490	
MPPT full power voltage range [d.c. V]	200–460	235–460
Start output voltage [d.c. V]	45	
No. of MPP trackers	3	3
Strings per MPP trackers	1	
Max. PV curent per MPPT [d.c. A]	18	
Isc PV array short circuit per MPPT [d.c. A]	22	

- AC Output & Input (On-grid)

Model	X1-SPT-10K	X1-SPT-12K
Rated output apparent power [VA]	10,000	12,000
Max. output apparent power [VA]	10,000	12,000
Nominal AC voltage [a.c. V]	2L/N/PE, 120/240 2L/N/PE, 127/220	
Frequency [Hz]	50/60	
Rated output current [a.c. A]@120V, @127V	41.7 39.4	50.0 47.3
Max. output continuous current [a.c. A]	42.5	51
Max. input apparent power [VA]	10,000	12,000
Max. AC input current [a.c. A]	75	
Power factor range	0.8 leading–0.8 lagging	
Total harmonic distortion (THDi)	< 3 %	

- Battery

Model	X1-SPT-10K	X1-SPT-12K
Battery type	Lithium-ion battery	
Battery voltage range [d.c. V]	100–480	
No. of battery ports	2	
Max. continuous charge/discharge current [d.c. A]	60(30×2)/60(30×2)	
Communication interface	CAN/RS485	
Reverse connection protection	Yes	

- EPS (Off-grid) Output

Model	X1-SPT-10K	X1-SPT-12K
Rated EPS apparent power [VA]	10,000	12,000
Nominal EPS voltage [a.c. V]	2L/N/PE, 120/240 2L/N/PE, 127/220	
Frequency	50/60	
Rated EPS current [a.c. A]@120V, @127V	41.7 39.4	50.0 47.3
EPS (Off-grid) peak power [VA]	2 times of rated power, 10s	1.67 times of rated power, 10s
Switching time (typical value) [ms]	< 10	
Total harmonic distortion (THDv)	< 3 %	

- Efficiency

Model	X1-SPT-10K	X1-SPT-12K
MPPT efficiency	99.9%	99.9%
Max. efficiency (PV to AC)	96.9%	96.9%
Max. efficiency (PV to Battery)	98.1%	98.1%
Max. efficiency (Battery to AC)	96.5%	96.5%
Max. efficiency (AC to Battery)	96.8%	96.8%

- General Data

Model	X1-SPT-10K	X1-SPT-12K
Dimensions (W/H/D) [mm]	720 × 417 × 213	
Net weight [kg]	33kg	
Installation mode	Wall mounted	
Operating ambient temperature range [°C]	-35 to +60 (> 45°C derating)	
Storage temperature range [°C]	-40 to +70	
Humidity [%]	4 – 100 (Condensing)	
Altitude [m]	< 3000	
Ingress protection	NEMA 4X / IP66	
Isolation type	Transformerless	
Heat dissipation treatment	Smart air cooling	
Protective class	I	
Power consumption(night) [W]	< 10	
Noise emission (typical) [dB]	< 45	
Overvoltage category	DC: II, AC: III	
Pollution degree	III	
Topology	Non-isolated	
Communication interface	RS485, WIFI, DI, DO, CAN	

- Safety and Protection

Model	X1-SPT-10K	X1-SPT-12K
Certifications	IEC 62109, IEC 61727, UL1741, IEC63027, Inmetro	
Over/ under voltage protection	Yes	
DC isolation protection	Yes	
DC reverse-polarity protection	Yes	
Grid monitoring	Yes	
DC injection monitoring	Yes	
Back feed current monitoring	Yes	
Residual current detection	Yes	
Over temperature protection	Yes	
AC overcurrent protection	Yes	
AC short-circuit protection	Yes	
Active anti-islanding method	Frequency Shift	
Surge protection	DC: Type II, AC: Type II	
Arc-fault circuit interrupter (AFCI)	F-I-AFPE-1-2/1-2*	

* The AFCI type is defined as below.
- Full coverage
- Integrated
- AFPE
- 1 monitored string per input port,
- 2/1 input ports per monitored channel,
- 2 monitored channel.

15 Appendix

15.1 Application of Generator

15.1.1 Introduction of Generator Application

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

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

15.1.2 Notice for Generator Application

- Note 1: The generator should be equipped with an Auto Transformer Switch (ATS), enabling it to start automatically in the event of a power outage.
- Note 2: The rated output power of the generator should be greater than the sum of the load power and the battery charging power. If there are two inverters in parallel, the rated output power of the generator should be greater than the sum of the load power and the battery charging power of the two inverters.
- Note 3: If the rated output power of the generator is small and cannot meet the requirements of Note 2, the setting value of **External Gen Max Charge** can be changed in the **Setting**>**Advance Setting**>**ExternalGen** to ensure that the generator power can meet the load and battery charging use at the same time.
- Note 4: The EPS load power cannot be greater than the battery discharge power to prevent the battery power from being unable to meet the EPS load after the generator shuts down and the inverter will report an **EPS Overload Protection** alarm. If two inverters are paralleled, the EPS load power shall be doubled.

15.1.3 ATS Control Mode

In this operating mode, the generator functions as a substitute for the grid. There is no communication between the generator and the inverter, which means no wiring modifications are required (although the inverter cannot control the generator, either). The ATS working for the generator determines whether the generator should be turned on or off based on the status of the grid.

Wiring connection diagram

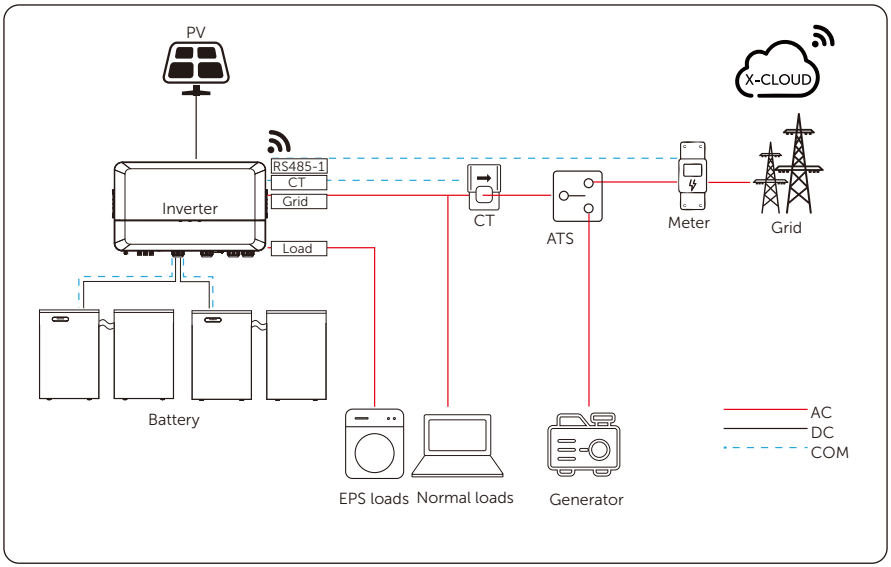


Figure 15-1 ATS control wiring diagram

Inverter settings for ATS control mode

Setting path: Settings>Advanced>ExternalGen

a. Select **ATS Control** (Disable by default).



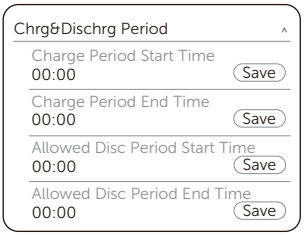
b. Set **ExternalGenMaxCharge**: Maximum battery charging power from generator. (Default:5000 ; range: 0–30000 ; unit: 10 W)



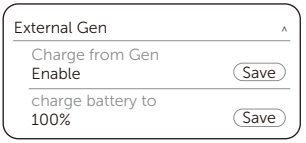
c. Set forced charge period and allowed discharge period.
You can set up to two charge/discharge time periods.



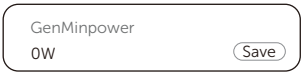
Select **Enable** to set the Chrg&Dischrg Period 2



d. Set **Charge from Gen** (whether to charge from the generator, Enable by default) and **Charge battery to** (The SOC which allows the system charging from generator. 10-100 %, 100% by default)



e. Set **GenMinpower**: The minimum charging power of the generator to charge the battery. Default: 0 W; range: 0–60000 W



15.1.4 Dry Contact Mode

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

Wiring connection diagram

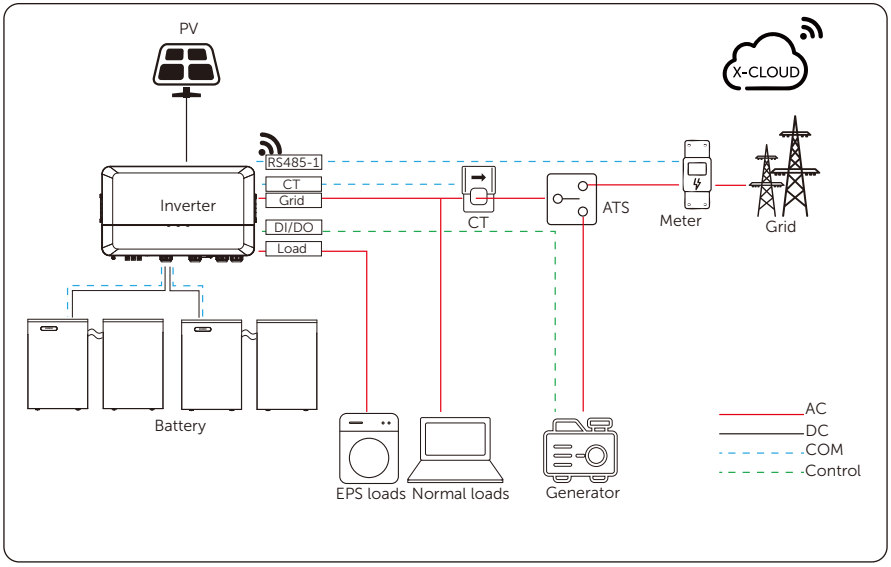


Figure 15-2 Dry contact wiring diagram

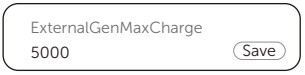
Inverter settings for dry control mode

Setting path: Settings>Advanced>ExternalGen

a. Select **Dry Contact**(Disable by default).



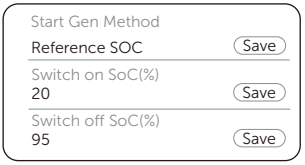
b. Set **ExternalGenMaxCharge**: Maximum battery charging power from generator.
(Default:5000 ; range: 0–30000 ; unit: 10 W)



c. Set Start Gen Method (Default: Immediately)

- **Immediately**: Turn on /off the generator when grid status changed.
- **Reference SOC**: Turn on/off generator according to the set Switch on/off SOC. The inverter will turn on the generator when the battery reaches the set **Switch on SOC** (10–100%, 20% by default) and turn it off when the battery reaches the set **Switch off SOC** (10–100%, 95% by default) .



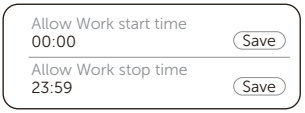


d. Set **MaxRunTime**: Maximum operating time of generator. (1–6000Min, 1000 Min by default)

e. Set **MinRestTime**: Minimum time interval for two consecutive starts to avoid frequent generator on and off. (1–6000Min, 60Min by default)



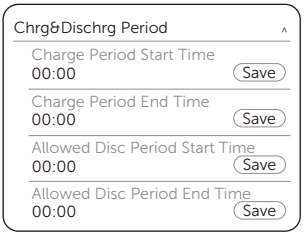
f. Set **Allow Work start time, Allow Work stop time**: Allowed time period for generator operating (00:00–23:59 by default).



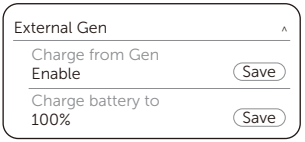
g. Set forced charge period and allowed discharge period.
You can set up to two charge/discharge time periods.



Select **Enable** to set the Chrg&Dischrg Period 2



h. Set **Charge from Gen** (whether to charge from the generator, Enable by default) and **Charge battery to** (The SOC which allows the system charging from generator. 10–100 %, 100% by default)



15.2 Application of Micro-grid

15.2.1 Introduction of Micro-Grid Application

Micro-grid is the function that making hybrid inverter simulate the grid to active on-grid inverter during off-grid by connecting on-grid inverter to hybrid inverter's **Load** terminal.

Notice for micro-grid application

- On-grid inverter output power ≤ X1-SPT Hybrid inverter rated off-grid output power.

15.2.2 Wiring Connection Diagram

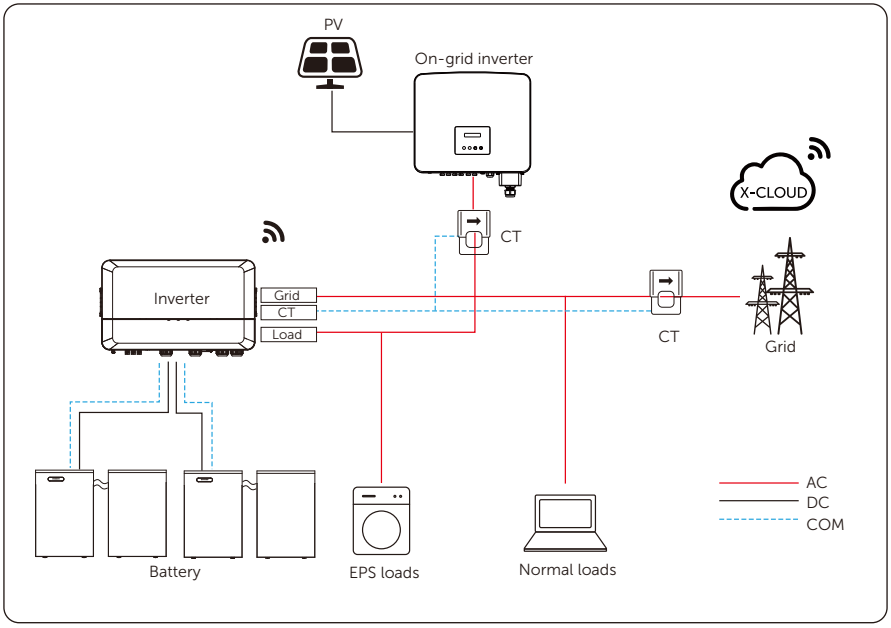


Figure 15-3 Micro-grid wiring connection

NOTICE!

- To detect and monitor the power data generated from the on-grid inverter, install a CT on the on-grid inverter side. Otherwise, the relevant power data of on-grid inverter can not be monitored.
- If CTs are installed on both the hybrid inverter and the on-grid inverter, use an RJ45 splitter adapter and connect it to the CT port of the hybrid inverter.



RJ45 splitter adapter

15.2.3 Working Modes

Grid on

- When PV is sufficient, the hybrid and on-grid inverters power the common and EPS loads together. When there is surplus energy on the on-grid inverter, it will also charge the battery.
- When PV is insufficient, the hybrid(1), on-grid inverter(2) and grid(3) power all the loads.

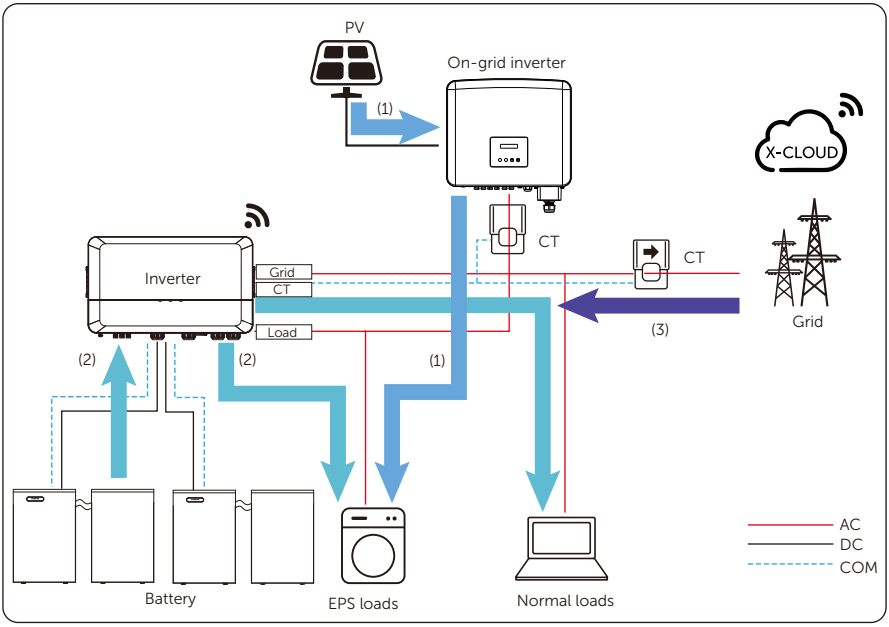


Figure 15-4 Power flowing (grid on and PV insufficient)

Grid off

In this case, the hybrid inverter will simulate the grid so as to make the on-grid inverter work. Hybrid and on-grid inverter will power the EPS loads together. If there is surplus energy, it will charge the battery.

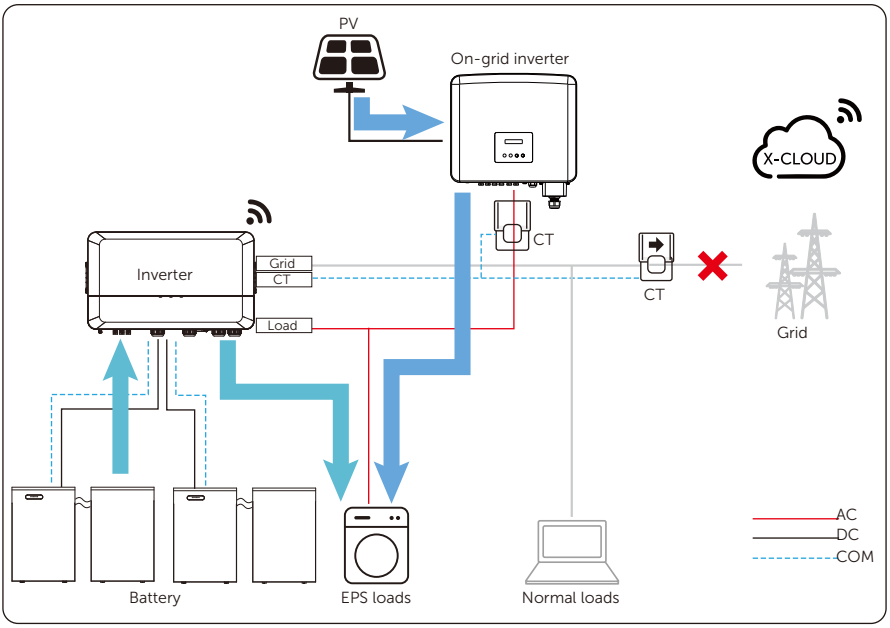


Figure 15-5 Power flowing (grid off and PV insufficient)

NOTICE!

- In EPS mode, when PV is sufficient and the battery is nearly fully charged or subject to charging limitations, the hybrid inverter will increase the EPS output frequency to restrict and shut down the on-grid inverter, ensuring the stable operation of the entire system. In this period, the on-grid inverter may report a **Grid Frequency Protection** which is a normal phenomenon.

15.2.4 Cable Connection

(Hybrid inverter) Please refer to "8.3 AC Connection" for Grid and EPS connection on X1-SPT series inverter.

(On-grid inverter) Please connect the AC cable of on-grid inverter to the Load terminal of X1-SPT series inverter. Please refer to the user manual of specific on-grid inverter.

15.2.5 Inverter Setting for Micro-grid

Setting path: Settings>Advanced>Grid

Set the **MicroGridEn** to **Enable**. (Default: Disable)



15.3 Application of Parallel Function

15.3.1 Introduction of Parallel Application

The series inverters support parallel operation in both Grid and EPS modes. It supports up to 3 units in the parallel system.

- All inverters should be of the same software version.
- For optimal efficiency, it is recommended that the two inverters have the same model, and are connected to batteries of the same model and quantity.

15.3.2 Notice for Parallel Application

In parallel system, there are three status: **Free**, **Follower** and **Leader**.

Table 15-1 Three status

Free	Only if no inverter is set as a **Leader**, the two inverters are in **Free** mode in the system.
Follower	Once one inverter is set as a **Leader**, the other inverter will enter **Follower** mode automatically. **Follower** mode can not be changed from other modes.
Leader	When one inverter is set as a **Leader**, this inverter enters **Leader** mode. **Leader** mode can be changed to **Free** mode.

- Leader inverter has an absolute lead in the parallel system to control all follower inverter's energy management and dispatch control. Once leader inverter has some error and stop working, all follower inverters will be stopped simultaneously. But leader inverter is independent of all follower inverters to work and will not be affected by follower inverter's fault.
- Overall system will be running according to leader inverter's setting parameters, and most setting parameters of follower inverter will be kept but not be cancelled.
- Once follower inverter exits from the system and be running as an independent unit. (The network cable is disconnected simultaneously.) Its all setting will be re-activated.

15.3.3 Parallel System Wiring Diagram

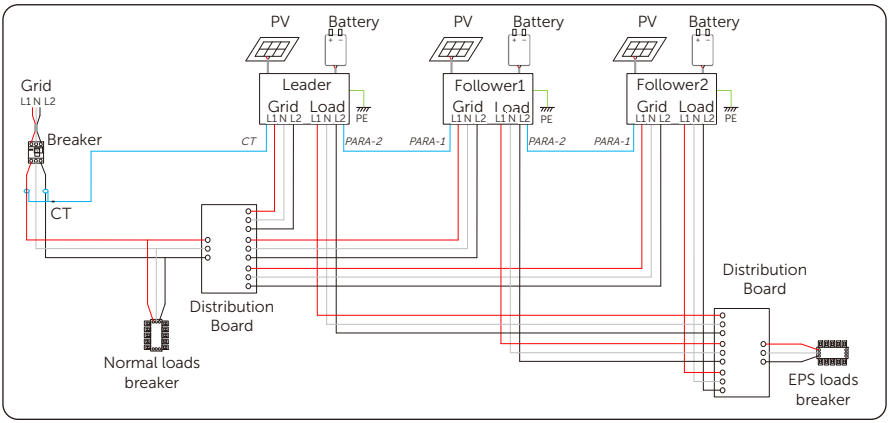


Figure 15-6 Parallel system wiring diagram

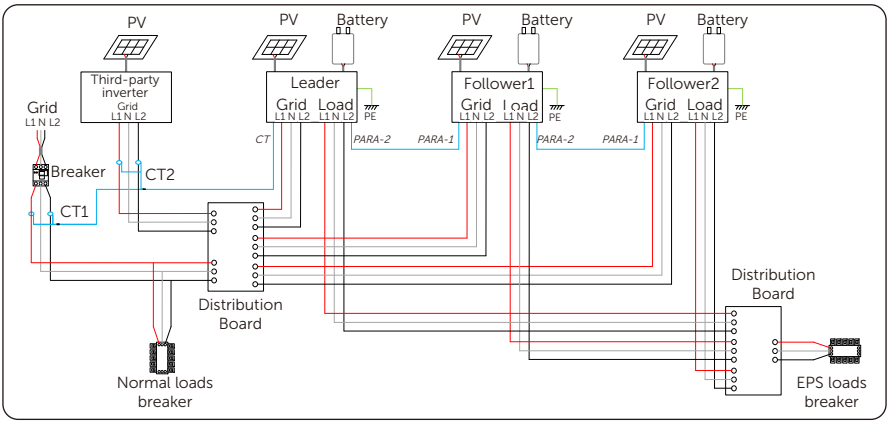


Figure 15-7 Parallel system wiring diagram (AC coupling with third-party inverter)

15.3.4 Parallel System Wiring Procedure

Power cable wiring procedure:

a. **Grid** terminal of Leader and Follower inverter: L1 connects to L1, N connects to N, L2 connects to L2.

b. **Load** terminal of Leader and Follower inverter: L1 connects to L1, N connects to N, L2 connects to L2.

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

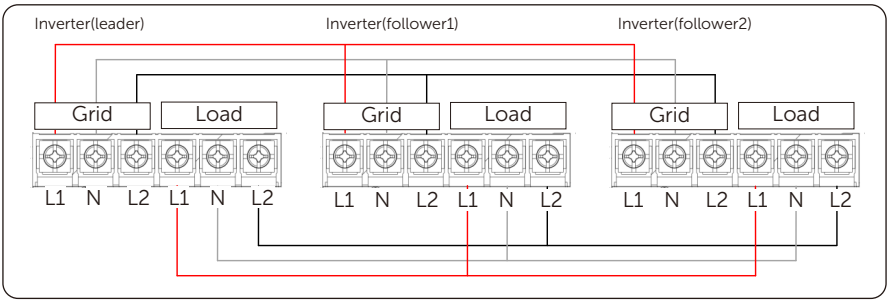


Figure 15-8 Power cable wiring

Communication cable wiring procedure:

a. Use standard communication cable for Leader-Follower inverter connection.

b. Leader inverter **PARA-2** connects to follower 1 inverter **PARA-1**.

c. Follower 1 inverter **PARA-2** connects to follower 2 inverter **PARA-1**.

d. CT connects to CT terminal of the Leader inverter.

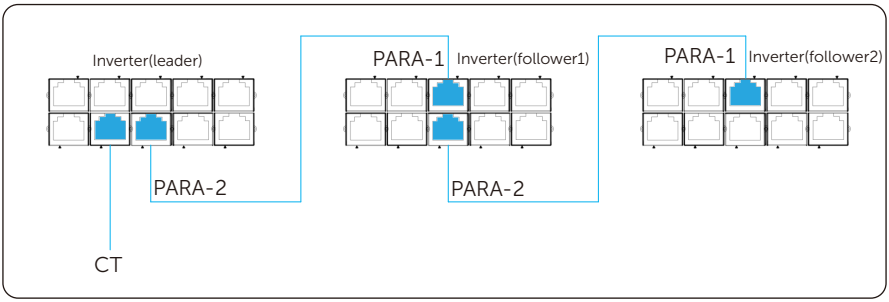


Figure 15-9 Communication wiring

15.3.5 Settings for Parallel Connection

CT setting

Setting path: Settings>Advanced>CT Setting. For details, please refer to "CT Type".

Parallel setting

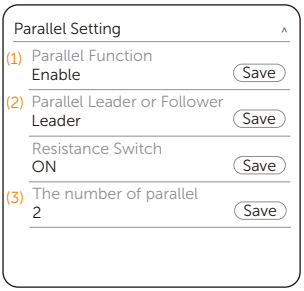
Setting path: Settings>Advanced>Parallel Setting

How to build the parallel connection

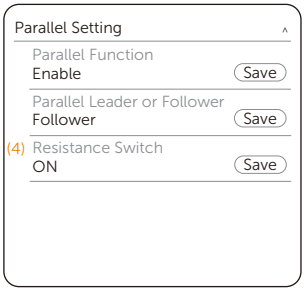
a. Enter the leader inverter's setting interface and **Enable** the parallel function. Set leader inverter to **Leader**. Set the total number of units in the parallel system.

b. Enter the last follower inverter's setting interface and set the **Resistance Switch** to **ON**.

Leader inverter



Last follower inverter



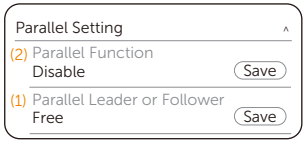
Once the parallel operation is configured successfully, the follower address (e.g., F0, F1) will be visible on the follower inverter.

How to move the parallel connection

a. Set all inverters to **Free** mode.

b. **Disable** the parallel function for all inverters.

c. Disconnect all the communication cable on the PARA-1 and PARA-2 port.



NOTICE!

- If a follower inverter is set to **Free** mode but does not disconnect the communication cable, this inverter will return to **Follower** mode automatically.
- If a follower inverter is disconnected with leader inverter but not set to **Free** mode, this follower inverter will stop working and prompt **Follower Communication Disconnected**.

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