X1-SPLIT

(UL)

3.0 kW / 3.6 kW / 6 kW / 7 kW

User Manual

Version 5.0

www.solaxpower.com

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Change History

Changes between document versions are cumulative. The latest version contains all updates made in previous versions.The contents are subject to change without prior notice.

Version 05 (Sep.14, 2024)
  Delete APP User Guide chapter.
  Delete lead acid battery description.
  Add Inverter Settings and Appendix chapter.

Version 04 (Jul.15, 2024)
  Updated the cover of this manual
  Updated the graph and notice of 4.3 Installation Precautions

Version 03 (Apr.21, 2023)
  Added 5.4.2 Parallel Connection

Version 02 (Aug.03, 2022)
  Updated all the figures of CT

Version 01 (Dec.21, 2022)
  Updated all the figures of CT
  Updated torque when tightening terminals
  Add product photo(cover)
  Updated grid and load connection figures

Version 00 (Nov.12, 2021)
  Initial release

Contents

* Warranty registration form

1 Notes on this Manual

1.1 Scope of Validity

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

X1-SPT-3K	X1-SPT-3.6K	X1-SPT-6K	X1-SPT-7K

Note: "**X1-SPLIT** Series refers to the energy storage inverter that supports photovoltaic grid-connected.
"**3k**"means 3.0kW.
Keep this manual available at any time.

1.2 Target Group

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

1.3 Symbols Used

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

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

1.3.1 Important Safety Instructions

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Please consult professionals before installing SPDs.

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

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

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

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

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

> ➢ Anti-Islanding Effect

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

X1-SPLIT series inverters use active frequency offset method to prevent islanding effect.

> ➢ PE Connection and Leakage Current

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

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

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

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

> ➢ Battery Safety Instructions

SolaX X1-SPLIT Series inverter should pair with high voltage battery, for the specific parameters such as battery type, nominal voltage and nominal capacity etc., please refer to section 3.3.

Please refer to the matching battery specification for details.

1.3.2 Explanation of Symbols

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

● Symbols on the Inverter

Symbol Explanation	Explanation
⊡	Operating Display
🔋	Battery status
⚠	An error has occurred, please inform your installer immediately

● Symbols on the Type Label

Symbols	Explanation
ETL Intertek	ETL certification.
⚠	Beware of hot surface. The inverter can become hot during operation. Avoid contact during operation.
⚡	Danger of high voltages. Danger to life due to high voltages in the inverter!
⚠	Danger. Risk of electric shock!
📖	Observe enclosed documentation.
🗑	The inverter can not be disposed together with the household waste. Disposal information can be found in the enclosed documentation.

🚫	Do not operate this inverter until it is isolated from battery, mains and on-site PV generation suppliers.
⚡ 5min	Danger to life due to high voltage. There is residual voltage existing in the inverter after powering off, which needs 5 min to discharge. Wait 5 min before you open the upper lid or the DC lid.

2 Introduction

2.1 Basic Features

X1-SPLIT series is a high-quality inverter that can convert solar energy into alternating current and store energy into batteries.
The inverter can be used to optimize self-consumption, stored in batteries for future use or fed into the public grid. The way it works depends on user preferences. It can provide emergency power during power outages.

2.2 System Diagram

X1-SPLIT series are designed to has Load wiring scheme, customers can choose Load compatible parts Load compatible with all load use.

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

Load wiring scheme:
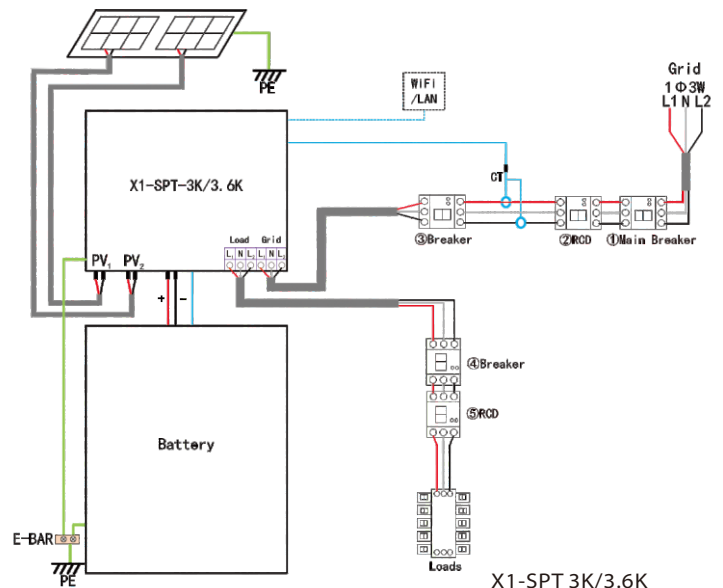
X1-SPT 3K/3.6K
Full load wiring diagram

X1-SPT 6K/7K
Full load wiring diagram

X1-SPT 3K/3.6K
General load wiring diagram
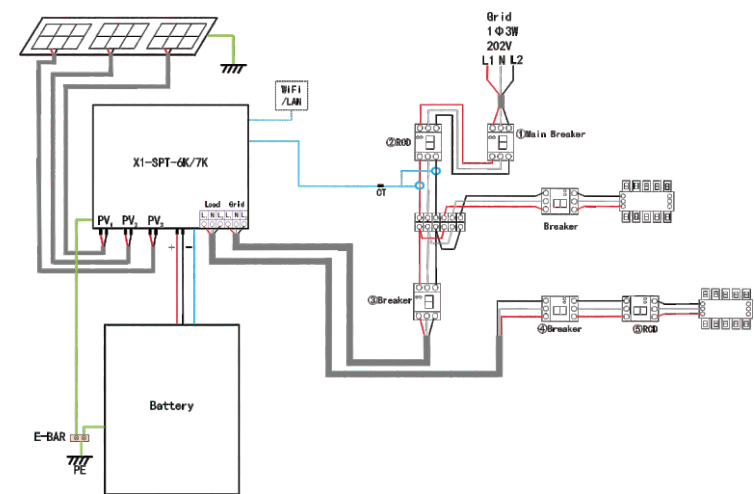
X1-SPT 6K/7K
General load wiring diagram

2.3 Work Modes

X1-SPLIT has multiple working modes.

① Off-grid Mode
In the event of a power outage, the system will automatically switch to power outage mode.If a specific load is overloaded, the error "independent operation load protection" will be displayed. In this case, check whether the specific load is within the possible range, if it is overloaded, reduce some load, and then click the button of "standalone load protection" displayed in the current error in the error history to clear it and restart normally system.
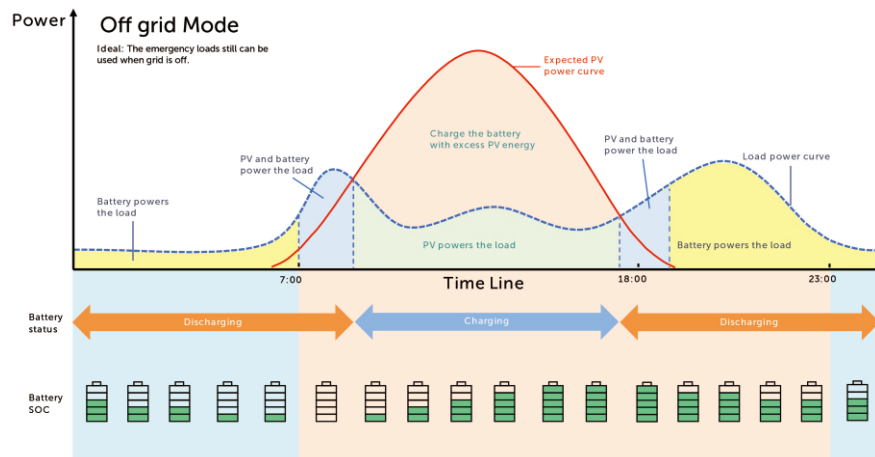
② Eco-friendly Mode
In the daytime, the power generated by the photovoltaic power generation panel is supplied to the household load,
Charge the surplus in the storage battery and use it during peak hours at night and in the morning.
It is a eco-friendly mode that emphasizes the environment.
Power generation of photovoltaic power generation panel
If there is insufficient power or there is no generated power, start with the storage battery.
Discharge. If the storage battery is fully charged, the surplus power will be sold.
In addition, charging from the system is performed at midnight when electricity charges are cheap, and it is released.
Electricity is installed during the time when electricity charges are high during the day and electricity usage is at its peak.
By setting it, you can save on electricity charges.
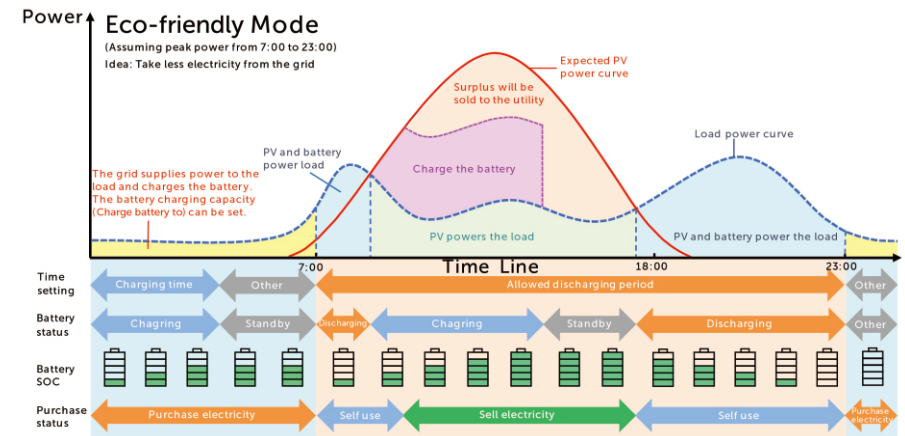
③Economic Model
In economic model, you can save electricity bills by charging the storage battery at night when the electricity bill is cheap and discharging it from the storage battery during the daytime when the electricity bill is expensive. If the surplus power of solar power generation is sold in the daytime, the storage battery will not be discharged. The storage battery will be charged within the set time zone. (charging time zone can be set).
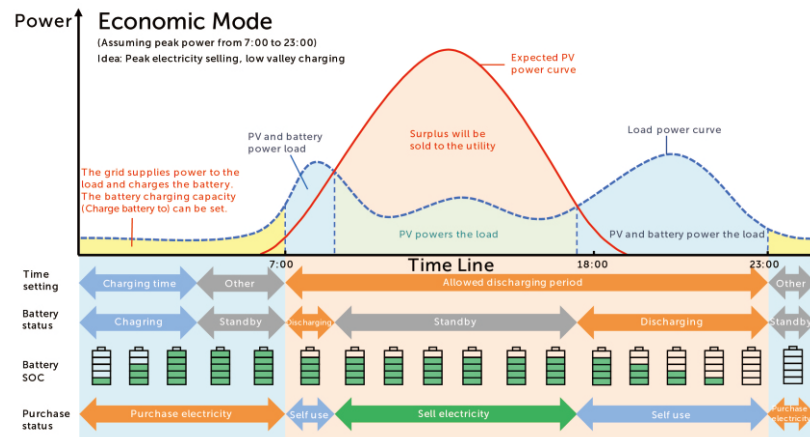
④Relief Mode
In the relif mode, a certain amount of remaining battery power is secured so that you can use it with peace of mind in an emergency. The basic operation is the same as Eco-friednly mode.
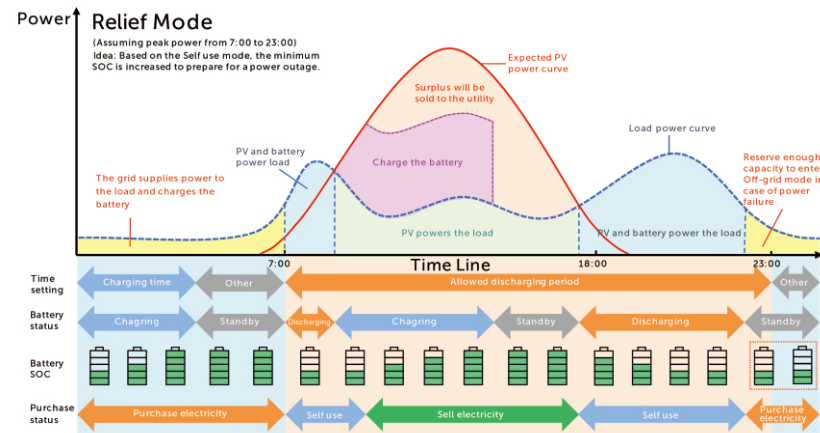
⑤Manual Mode

The manual mode has three functions: forced charge, forced discharge, and forced charge / discharge stop. Manual mode is basically available only to maintenance personnel.

Manual charging:
This mode charges the storage battery regardless of the time of day. For manual charging, the system charges the battery with maximum power. The battery is charged until it is fully charged, and after the battery is fully charged, the storage battery is in a charge / discharge stop state.

Manual discharge:
This mode discharges the storage battery to the household load regardless of the time of day. In the case of manual discharge, the system discharges from the battery with maximum power. After full discharge, the storage battery will be in the charge / discharge stop state.

Charge / discharge stop:
This mode does not charge or discharge the storage battery regardless of the time of day. Solar power is still in operation. Operate each solar power generation other than this product. Note: If you set the manual operation mode and there is no operation for 6 hours, it will automatically switch to the operation mode (economic mode, relief mode, or eco-friendly mode) that was used before setting the manual operation mode.

2.4 Dimension

X1-SPT3K&X1-SPT3.6K
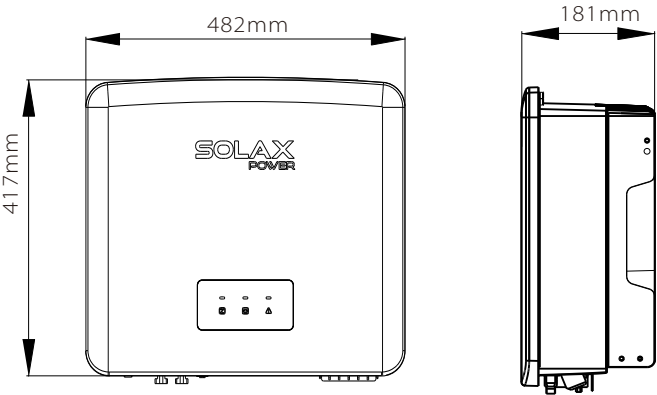
X1-SPT6K&X1-SPT7K
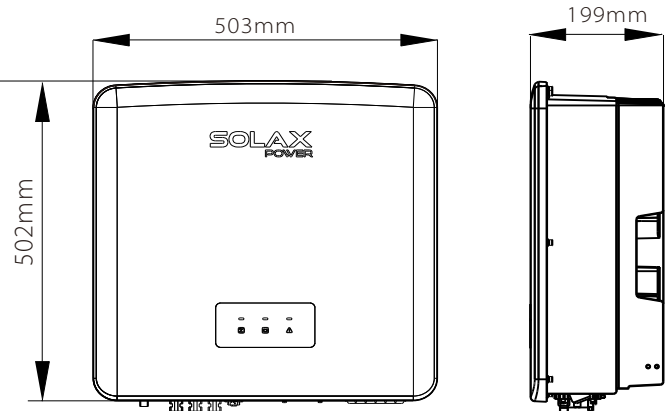
2.5 Terminals of Inverter

X1-SPT3K&X1-SPT3.6K
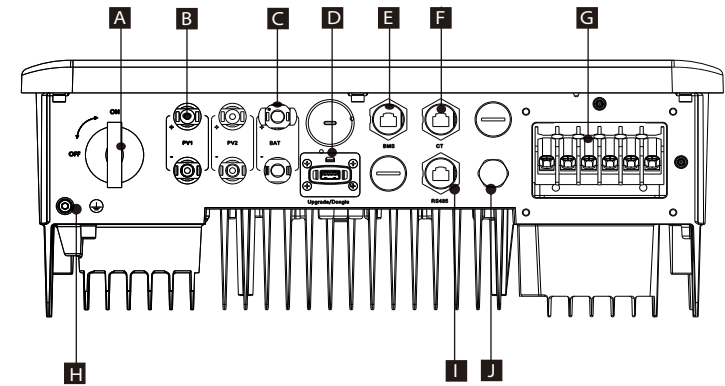
Object	Description
A	DC switch
B	PV connection port
C	Battery connection port
D	USB port for upgrading/ External monitoring connection port
E	Battery communication port
F	CT Port
G	Load Output port/Grid Output port
H	Ground connection port
I	Rs485 port
J	Waterproof valve

X1-SPT6K&X1-SPT7K
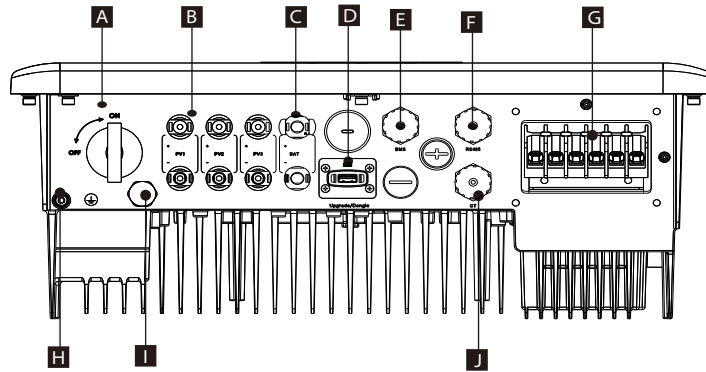
Object	Description
A	DC switch
B	PV connection port
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D	USB port for upgrading/ External monitoring connection port
E	Battery communication port
F	Rs485 Port
G	Load Output port/Grid Output port
H	Ground connection port
I	Waterproof valve
J	CT Port

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

3 Technical Data

3.1 Input PV

Module	X1-SPT-3K	X1-SPT-3.6K	X1-SPT-6K	X1-SPT-7K
Max.recommended PV panel power[W]	4500	5400	9000	10500
Max.DC voltage[V]	500	500	500	500
Norminal DC operating voltage[V]	390	390	390	390
Max. input current(per mppt)[A]	14/14	14/14	14/14/14	14/14/14
Max. short circuit current(per mppt)[A]	16/16	16/16	16/16/16	16/16/16
MPPT voltage range[V]	70-480	70-480	70-480	70-480
Start output voltage[V]	90	90	90	90
No. of MPP trackers	2	2	3	3
Strings per MPP tracker	1	1	1	1

3.2 Output / Input AC

Module	X1-SPT-3K	X1-SPT-3.6K	X1-SPT-6K	X1-SPT-7K
Rated grid voltage(AC voltage range)[V]	1Φ 3W 120/240	1Φ 3W 120/240	1Φ 3W 120/240	1Φ 3W 120/240
Rated grid Frequency[Hz]	50/60	50/60	50/60	50/60
Norminal AC outpout power[W]	3000	3600	6000	7000
Max. apparent AC output power[VA]	3000	3600	6000	7000
Norminal AC current[A]	12.5	15	25	29.2
Max. AC current[A]	14	16.5	26	29.5
Max. apparent AC input power[VA]	6000	7000	9300	9300
Max. AC input current[A]	25	29.2	39	39
Displacement power factor	0.8 leading to 0.8 lagging			
Total harmonic distortion (THDi, rated power)	<5%	<5%	<5%	<5%

3.3 Battery

Module	X1-SPT-3K	X1-SPT-3.6K	X1-SPT-6K	X1-SPT-7K
Battery voltage range[V]	100-480	100-480	100-480	100-480
Max.charge/discharge current[A]	30	30	30	30
Max. discharge power[W]*	3200	3800	6300	7300
Max. charge power[W]*	3000	3600	6000	7000
Communication interfaces	CAN/ RS485	CAN/ RS485	CAN/ RS485	CAN/ RS485
Reverse connect protection	YES	YES	YES	YES

3.4 Load output (with battery)

Module	X1-SPT-3K	X1-SPT-3.6K	X1-SPT-6K	X1-SPT-7K
Load rated voltage[V]	1Φ 3W 120/240	1Φ 3W 120/240	1Φ 3W 120/240	1Φ 3W 120/240
Load rated Frequency[Hz]	50/60	50/60	50/60	50/60
Load rated power[VA]	3000	3600	6000	7000
Load rated current	12.5	15	25	29.2
Load peak power[VA]	100%~110%,10min;110%~120%, 1min;cannot exceed 120%			
Total harmonic distortion (THDv, linear Load)	<5%	<5%	<5%	<5%

3.5 Efficiency, standard, environment limit and others

Module	X1-SPT 3-3.6k	X1-SPT 6-7k
MPPT efficiency	99.9%	99.9%
Max eciency from PV to AC	97.0%	96.5%
Max eciency from PV to Battery	97.0%	97.4%
Max eciency from Battery to AC	96.0%	96.0%
Max eciency from AC to Battery	96.0%	96.0%
Satety	NEMA 4X	
IP class	UL Std. 1741, IEEE Std. 1547A and 1547.1	
Operating temperature range[℃]	-25℃~+60℃(derating at +45℃)	
Storage temperature[℃]	-25℃~+60℃	
Humidity[%]	0~100(condensing)	
Altitude[m]	<2000	
Noice emission(typical)[dBi]	30	
Over voltage category	Ⅲ（AC）,Ⅱ（DC）	
Cooling concept	Nature cooling	
Topology	Transformerless	
Communition	Rs485 CT*2 Dry contact(both for input and output)	
Dimensign[mm]	482*417*181	502*503*199
Net weight[kg]	24	31

4 Installation

4.1 Check for Transport Damage

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

4.2 Packing List

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

A	B	C	D
E	F	G	H
I	J	K	L
M	N	O	P
Q	R	S	
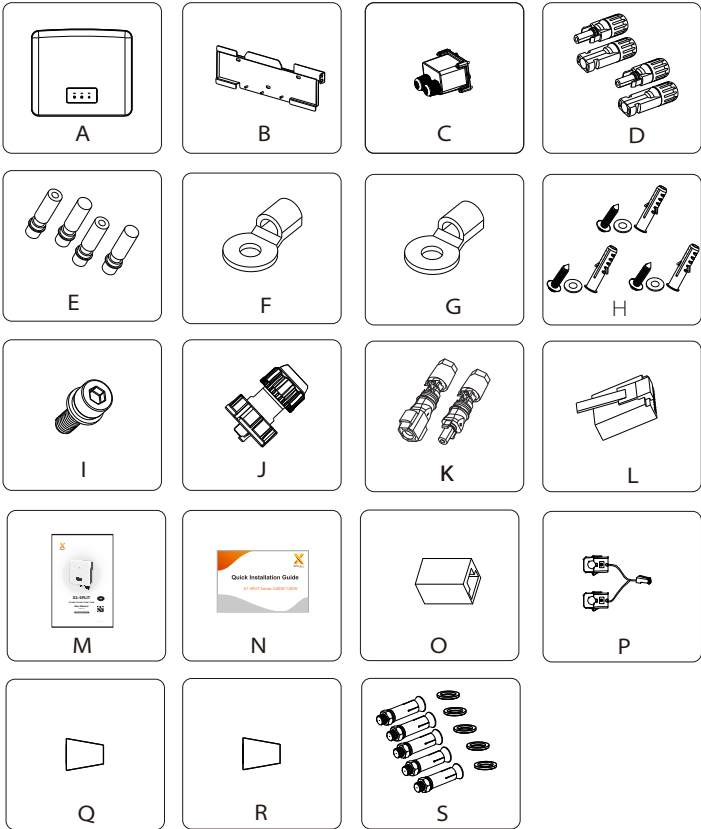
Number	Quantity	Description
A	1	X1-SPLIT series inverter
B	1	Bracket
C	1	Waterproof connector
I	1	M5 inner hexagon bolt
J	3	Waterproof connector with RJ45 (COM/CAN/CT)
K	2	Battery connection terminals(positive*1, negative*1)
L	1	RJ 45 terminals
M	1	Manual
N	1	Quick Installation Guide
O	1	Rj45 connector
P	1	CT

These are differences between X1-SPT 3-3.6k and X1-SPT 6-7k

X1-SPT 3-3.6K

Number	Quantity	Description
D	4	PV terminal (positive*2 , negative*2)
E	4	PV pin angle (positive*2, negative*2)
F	8	OT terminals (10AWG)
H	3	(Expansion bolt, Gasket, Self-tapping bolt)*5
Q	8	10AWG Protective line casing

X1-SPT 6-7K

Number	Quantity	Description
D	6	PV terminal (positive*3 , negative*3)
E	6	PV pin angle (positive*3, negative*3)
F	5	OT terminals (10AWG)
G	3	OT terminals (8AWG)
Q	5	10AWG Protective line casing
R	3	8AWG Protective line casing
S	5	(Expansion bolt, Gasket, Self-tapping bolt)*5

4.3 Installation Precautions

The protection level of X1-SPLIT series inverters is IP 65, so that the inverter can be installed outdoors.
Check the installation environment and pay attention to the following conditions when installing:
 • Do not expose to strong light.
 • Do not touch flammable building materials.
 • Do not approach flammable and explosive gases or liquids (e.g. where chemicals are stored).
 • Do not touch cold air directly.
 • Do not approach TV antenna or cable.
 • Do not place in areas above 2000 meters above sea level.
 • Do not install in precipitation or high humidity, which may cause corrosion or damage Internal devices.
 • Keep the system out of reach of children.
 If the inverter is installed in a narrow area, be sure to reserve appropriate space for heat dissipation.
 The ambient temperature of the installation site is -25℃~60℃.
 The maximum angle range of wall tilt ±5°.
 Avoid direct sunlight, rain and snow weather.

Avoid direct sunlight	Avoid rain exposure	Avoid snow lay up
Near combustibles	Near antenna	
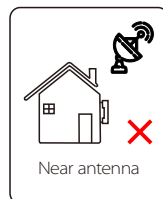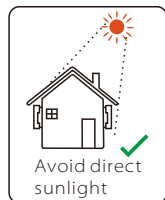
Notice!
• For outdoor installation, precautions against direct sunlight, rain exposure and snow accumulation are recommended.
• Exposure to direct sunlight raises the temperature inside the device. This temperature rise poses no safety risks, but may impact the device performance.

4.4 Tool preparation

Tool equipment				
Type	Name	Image	Name	Image
Machine Installation Tools	Hammer drill	Bit Φ10	Multimeter	DC Voltage Range ≥1100 V DC
	Torque screwdriver	Crosshead M5	Socket wrench set (Hexagon)	
	OT terminals press clamp	$0.5mm^2 \sim 6mm^2$	Diagonal pliers	
	Utility knife		Multifunction terminal crimping tool (RJ45)	
	Diagonal poliers		Marker	
	Rubber hammer		Tape measure	
	Crimping Tool		Hexagon keys	
	European terminal crimping tool		Spirit level	
Individual Protection Tools	Dustproof Cover		Protective glasses	

Tool equipment				
Type	Name	Image	Name	Image
Individual Protection Tool	Safety gloves		Safety shoes	

Type	Name	Image	Requirement
Equipment Preparation	Breaker	Use local model standard air switch	Grid port and Load port wiring section (4.5.2)
Cable Preparation	PV end wire		Dedicated PV wire, line number #12 AWG withstand voltage 1000V, temperature resistance 105℃ fire resistance grade VW-1
	Load end wire		Triple Core Cables
	Grid end wire		Triple Core Cables
	Communi-cation lines		Twisted pair with shield
	Battery Cable		Conventional wire
	PE Cable		Conventional wire

4.5 Installation Site Conditions

4.5.1 Installation Carrier Requirements

Do not install the inverter near flammable materials.

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

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

4.5.2 Installation Requirements

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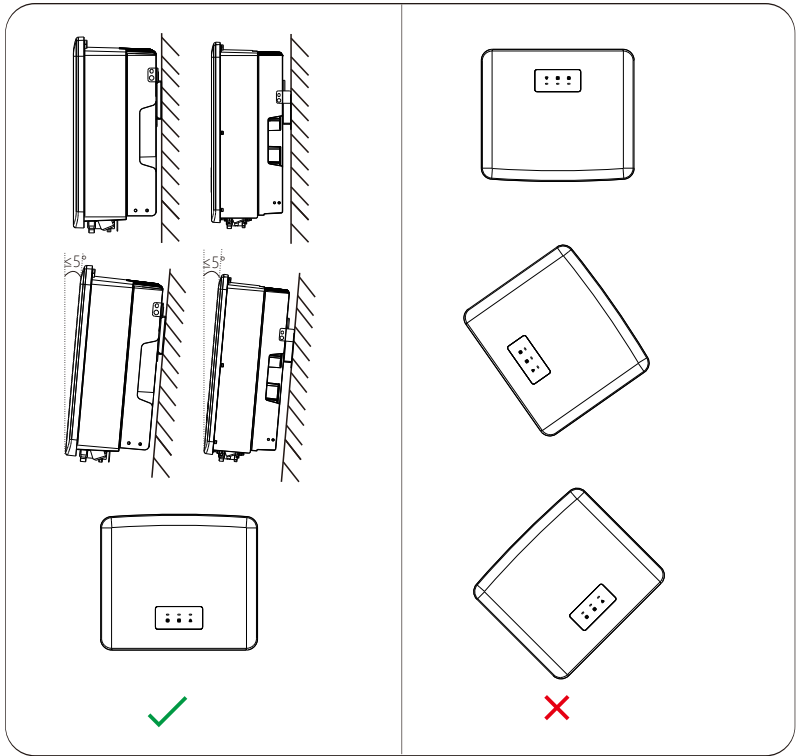
4.5.3 Installation Space Requirements

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

≥300mm

Reserved space dimensions of installation

Position	Min Distance
Left	300mm
Right	300mm
Up	300mm
Down	500mm

≥300mm   ≥300mm

≥500mm
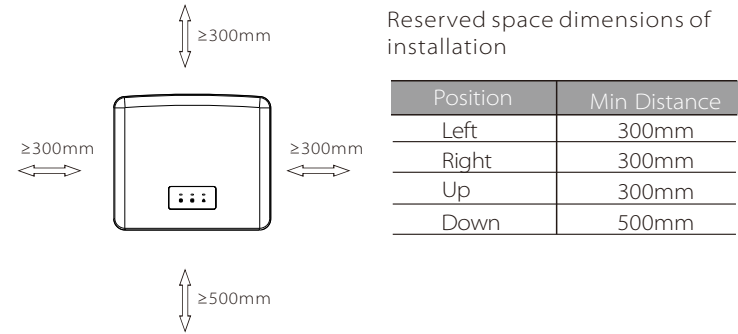
For multi-inverter installation scenarios, the inline installation method is recommended; when the space is insufficient, the recommended method of installation in the form of "products"; it is not recommended to install multiple inverters in stacks. If you choose stack installation, please refer to the installation separation distance below.

X1-SPLIT 3K/3.6K

≥300mm   ≥300mm

≥300mm   ≥300mm   ≥300mm

≥1000mm   ≥1000mm

≥300mm   ≥300mm   ≥300mm

≥500mm   ≥500mm

X1-SPLIT 6K/7K

≥300mm   ≥300mm

≥300mm   ≥300mm   ≥300mm

≥1000mm   ≥1000mm

≥300mm   ≥300mm   ≥300mm

≥500mm   ≥500mm
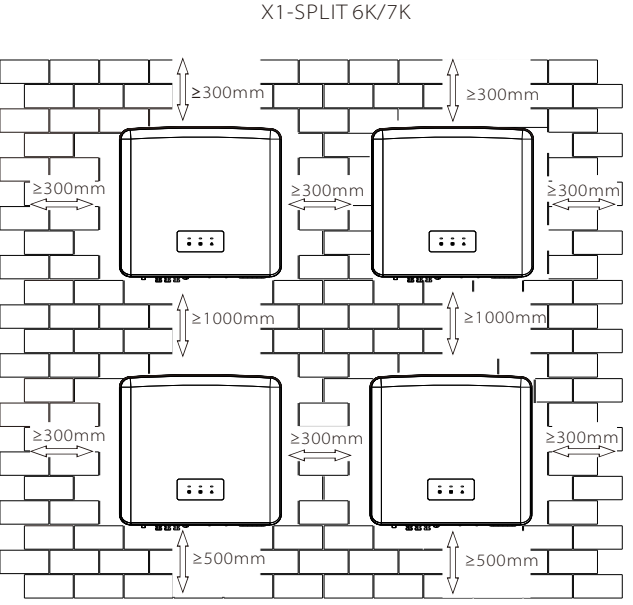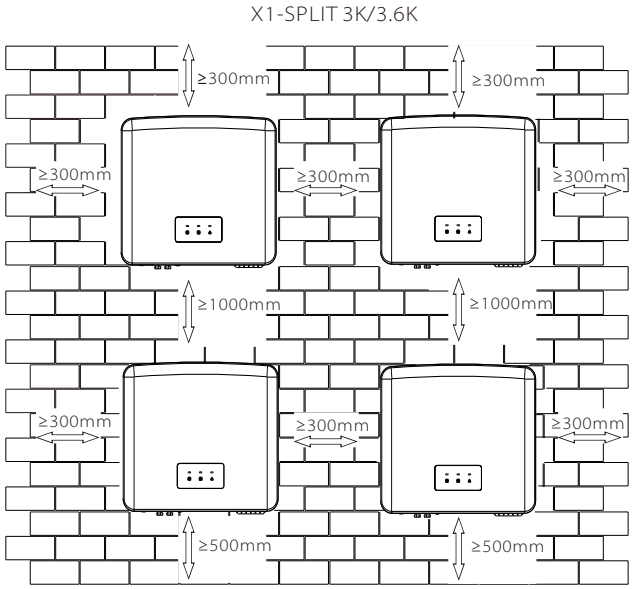
4.6 Mounting

➢ **Preparation**

Please prepare the following tools before installation.

Installation tools: screwdriver, wrench, Φ10 drill, rubber hammer, socket wrench set and Hexagon keys.

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

First find the expansion screw and the wall bracket in the accessory bag, as shown below:

It consists of four parts

Expansion bolts, Gasket, Tapping screws

Expansion bolts, Tapping screws, nut, Gasket
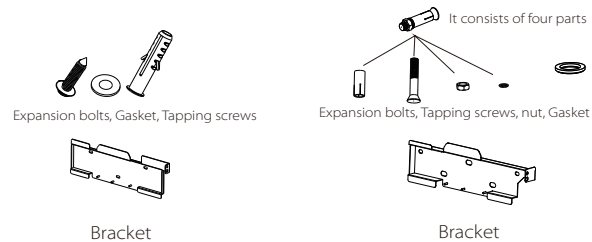
Bracket   Bracket

X1-SPT 3K/3.6K   X1-SPT 6K/7K

a) Use a marker to mark drilling holes of the bracket on the wall .
b)Drill holes at marked spots with depth of 80mm.(X1-SPLIT 6-7K need 5 holes).

a)

65.00 mm

Φ8 Drill
b)   (Depth: 65 mm)
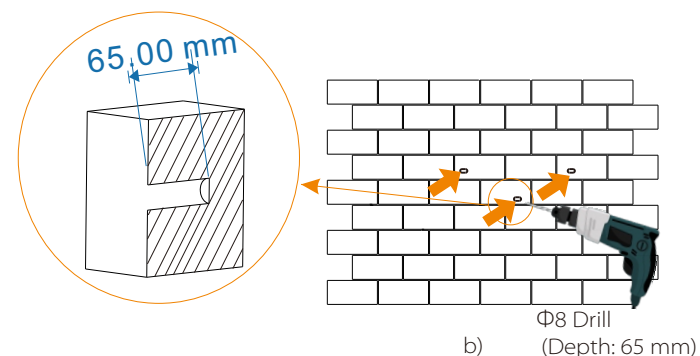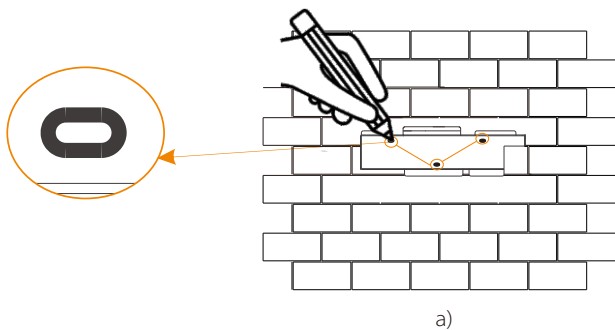
➢ **Step 2: hang the inverter on the bracket**

c) Insert expansion bolt into the hole, use rubber hammer to knock the expansion screw bolt into the wall;
d) The bracket is aligned with the screw uses the inner hexagonal wrench to screw the tapping screw until the expansion bolt "bang" is heard.

Expansion bolts
Rubber hammer

Expansion screws

Hammer

c)

X1-SPT 3K/3.6K

Gasket

Self-tapping screws

nut, Gasket,

Outer hexagon wrench
(Torque :9±0.2 N· m)

d)

X1-SPT 6K/7K
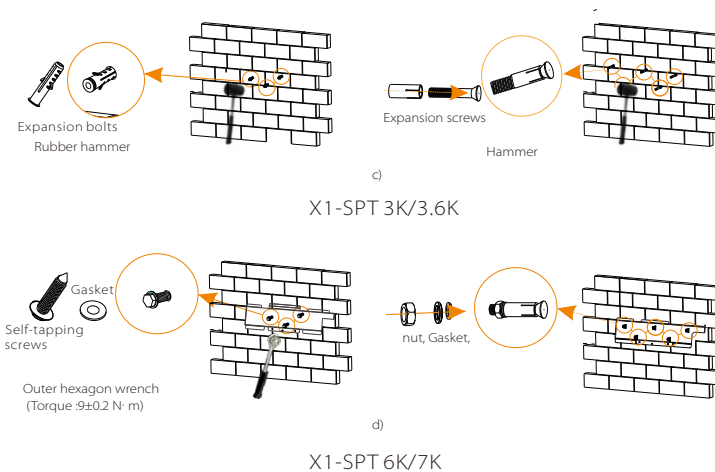
> ➤ **Step 3: Tighten the inverter and bracket**

e) Hang the buckle on the inverter to the corresponding position of the backplane;
f) Use the inner hexagonal wrench to tighten the inner hexagonal screw on the right side of the inverter.

X1-SPT 3K/3.6K

e)

f)

Hexagon keys
(Torque :1.2±0.1 N· m)

X1-SPT 6K/7K

e)

f)

Hexagon keys
(Torque :1.2±0.1 N· m)
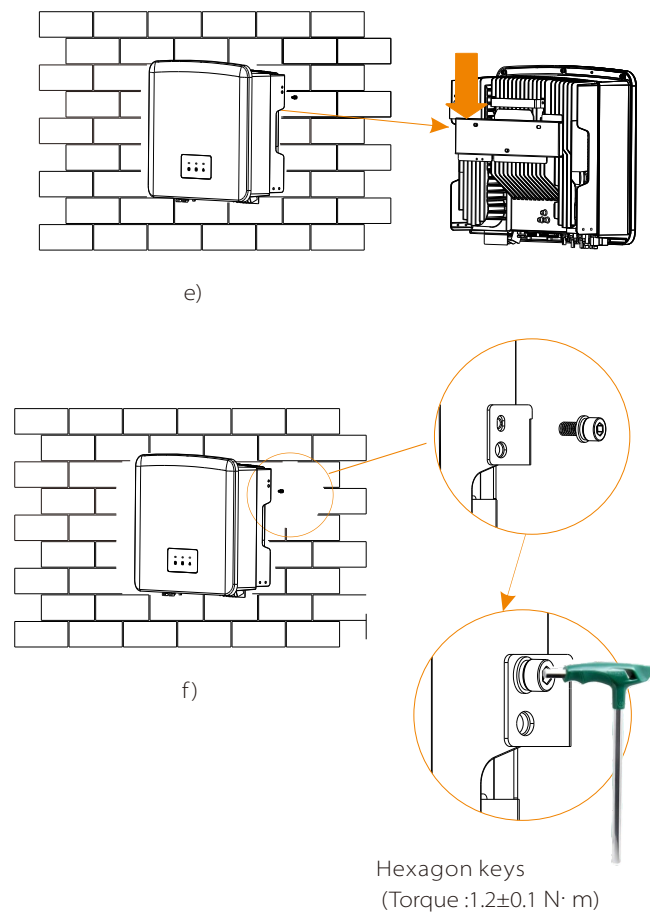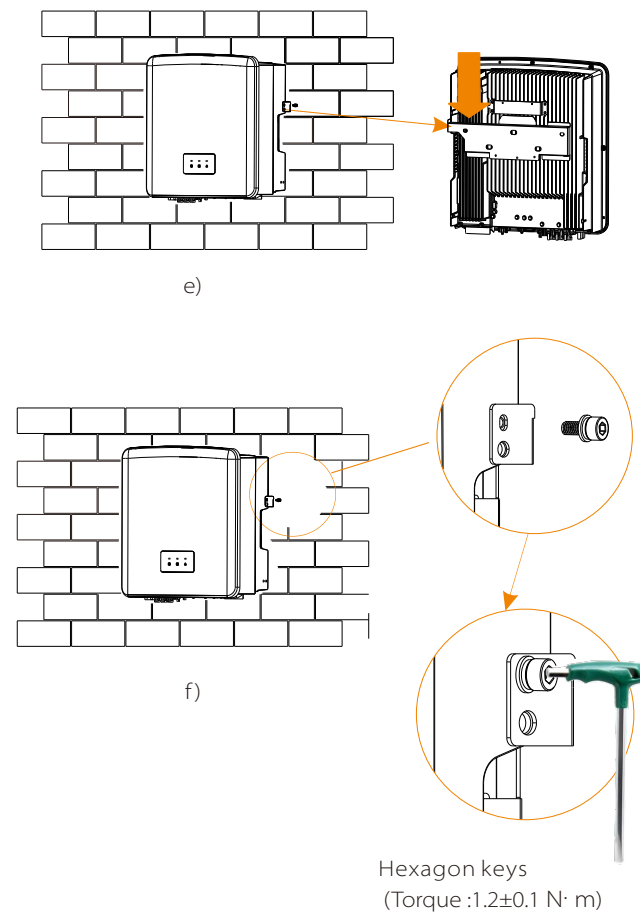
5 Electrical Connections

5.1 PV Connection

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

Table 1: Maximum input voltage limit

Model	X1-SPLIT 3k	X1-SPLIT 3.6k	X1-SPLIT 6k	X1-SPLIT 7k
Max. DC input voltage		500V		

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

Notice!
Do not ground the positive or negative pole of the photovoltaic module!

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

Notice!
X1-SPLIT series inverters do not support the following PV module connection modes.
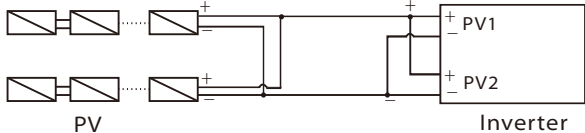
X1-SPLIT series inverters support the following PV module connection modes.
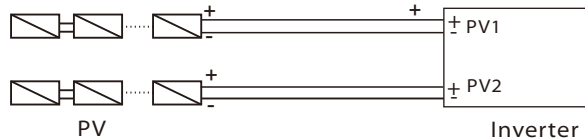
➤ **Connection step**

Step 1. Turn off the DC switch, connect the PV module, prepare a 12AWG PV cable, and find the PV (+) terminal and PV (-) terminal in the package.

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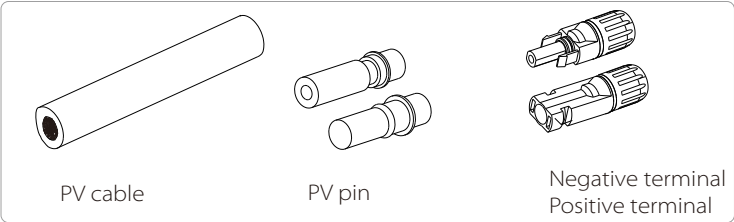
Step 2. Use a wire stripper to strip the 7mm insulation layer of the wire end.

Wire stripper   7.0mm
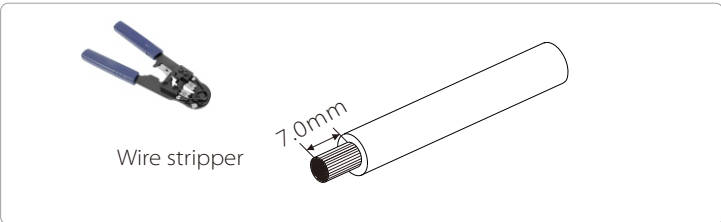
Step 3. Tighten the cable with the insulation layer stripped and insert it into the metal terminal (see Figure 1), make sure all wires are inserted Into the metal terminal (see Figure 2).

Positive PV pin
Negative PV pin
Figure 1
Positive metal terminal
Negative metal terminal
Figure 2
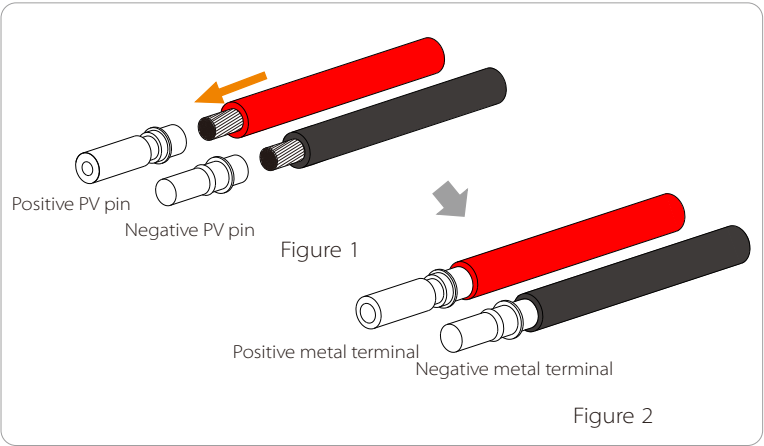
Step 4. Tighten the PV pin needle and the wiring harness to make the connection tight without looseness.

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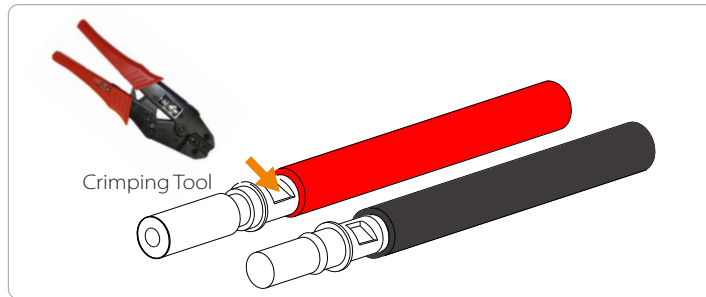
Step 5. The PV joint is divided into 2 parts - the plug and the fastening head. Insert the cable through the fastening head and the opposite plug.
Notice that the red and black lines correspond to different of plugs. Finally, force the cable pair into the plug, will a "click" sound, which indicates that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

Positive terminal

click!

click!

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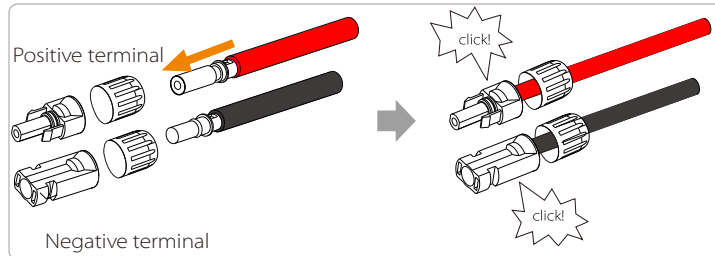
Step 6. Tighten the fastening head and into insert the corresponding positive and negative (PV-/PV+) ports of the inverter.

Positive terminal

click!

PV+

Negative terminal

click!

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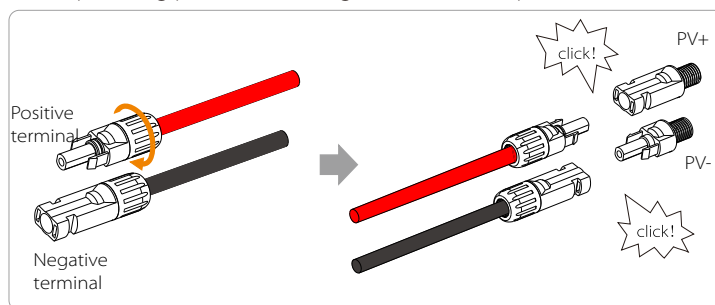
The following is the location of the inverter positive and negative (PV-/PV+) ports.

PV1
PV2

PV1+
PV2+
PV1-
PV2-

X1-SPT 3K/3.6K

PV1
PV2

PV1+
PV2+
PV1-
PV2-
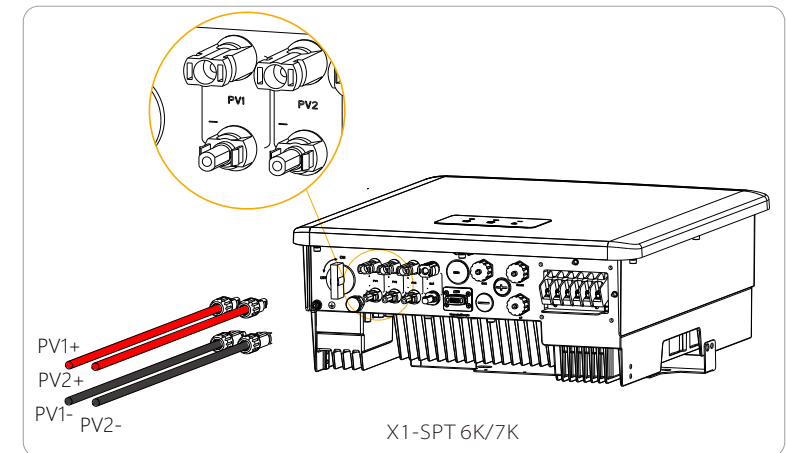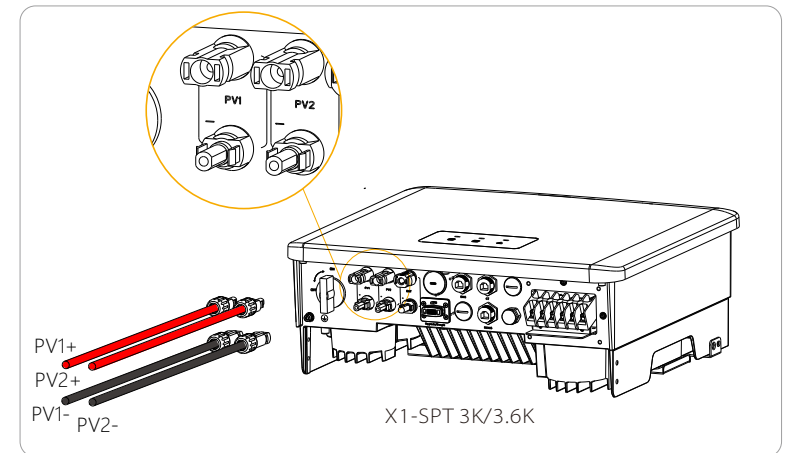
X1-SPT 6K/7K

Schematic diagram of the inverter PV connected.
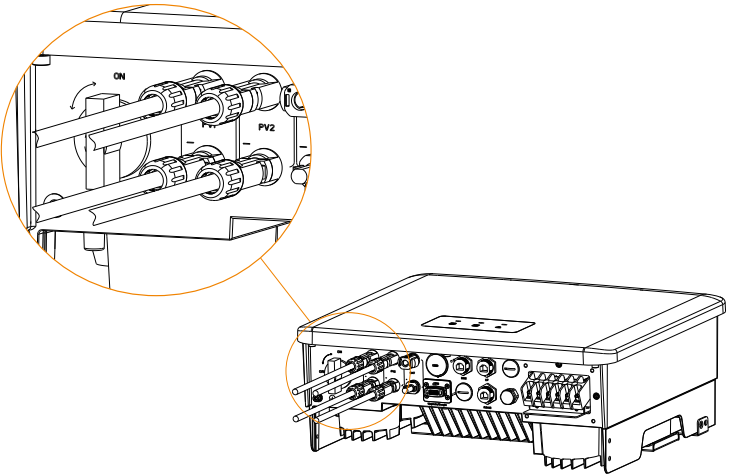
X1-SPT 3K/3.6K
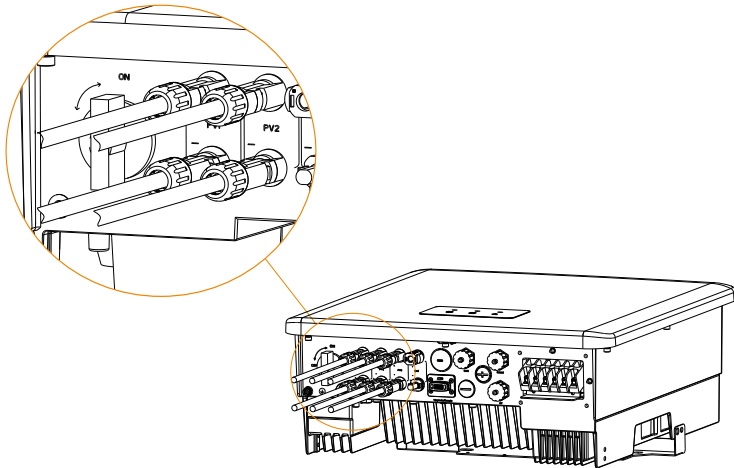
X1-SPT 6K/7K

5.2 Grid Port and Load Output Connection

X1-SPLIT series inverter are single-phase inverter . Suitable for rated voltage 120/240V, frequency 50/60Hz. For more technical requirements, please consult the requirements of the local public grid.

➢ **Grid port connection**

Grid Cable and Micro-breaker recommended

Module	X1-SPT 3-3.6k	X1-SPT 6-7k
Cable(copper)	5.5mm^2	8mm^2
Micro-Breaker	40A	50A

Load Cable and Micro-breaker recommended

Module	X1-SPT 3-3.6k	X1-SPT 6-7k
Cable(copper)	5.5mm^2	5.5mm^2
Micro-Breaker	20A	30A

The circuit breaker should be installed between the inverter and the mains, and the load should not be directly connected to the inverter.
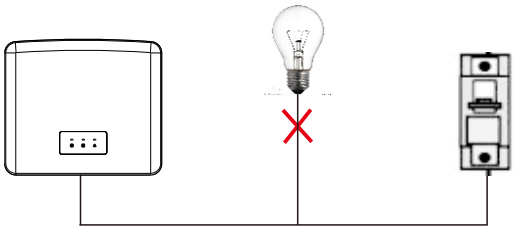
Figure: Wrong connection of load and inverter

➢ **Load requirements**

> **Warning!**
>
> ⚠ Ensure that the Load rated power is within the Load rated output power range, otherwise, the inverter will report an "overload" warning.
>
> When "overload" occurs, adjust the load power to make sure it is within the Load rated output power range, and the inverter will automatically return to normal.
>
> For non-linear loads, ensure that the inrush current power is within the Load rated output power range.
> When the configuration current is less than the maximum DC input current, the capacity and voltage of lithium battery will decrease linearly.

The following table shows some common loads for your reference.

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

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

➢ **Grid and Load connection steps**

• Connection requirements

Notice: Check the grid voltage and compare the voltage range (see technical data).
Disconnect the circuit board from all power sources to prevent electric shock.

Step 1. Prepare a Grid cable (three-core wire) and an Load cable (three-core wire), and then find the OT terminal and waterproof cover in the accessory bag.

X1-SPT 3K/3.6K — L=12mm — Grid/Load(Double Core Cable)10AWG*3 — Waterproof cover

X1-SPT 6K/7K — L=12mm — Grid(Triple Core Cable) 8AWG*3 — L=12mm — Load(Double Core Cable)10AWG*3 — Waterproof cover
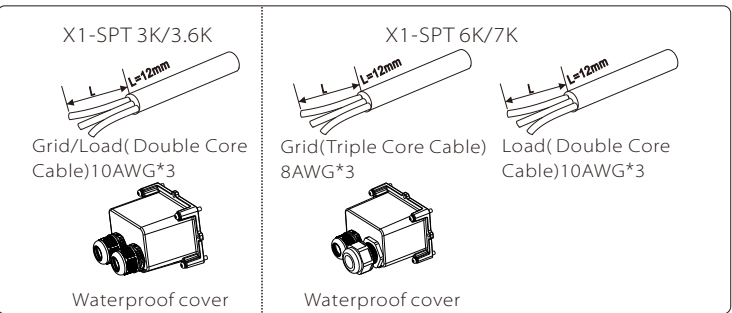
Step 2. The Grid and Load cables go through the corresponding Grid and Load ports of the waterproof cover.

Load — Grid — X1-SPT 3K/3.6K

Load — Grid — X1-SPT 6K/7K
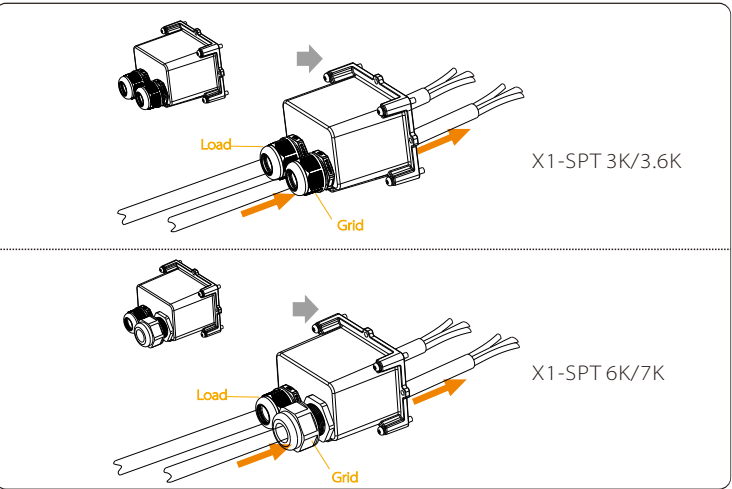
Step 3. Remove the 12mm insulation layer at the end of the wire. Insert the European-style terminals respectively, and make sure that the stripped ends are inserted into the OT terminal ,and finally use crimping pliers to press tightly.

Diagonal plier

Crimping Tool

70 mm

12 mm
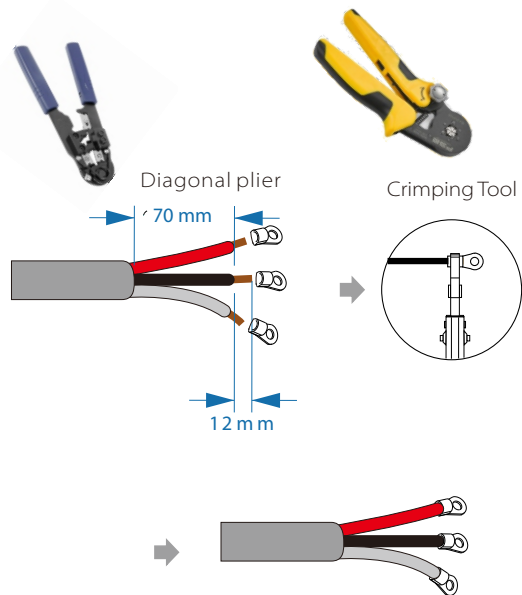
Step 4. Find the location of the AC interface on the inverter, insert the crimped terminals into the UW10 terminals L1, N, L2 according to the wire sequence, and use a flat-blade screwdriver to tighten the screws. (Torque: 0.2±0.1N ·m)

X1-SPT 3K/3.6K

Load   Grid

L1   N   L2   L1   N   L2
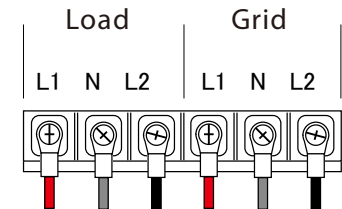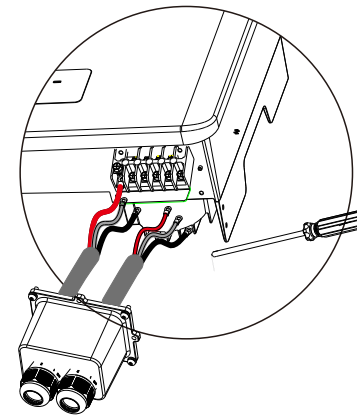
Torque screwdriver
(Torque: 1.5±0.1N ·m)

X1-SPT 6K/7K

Load   Grid

L1   N   L2   L1   N   L2
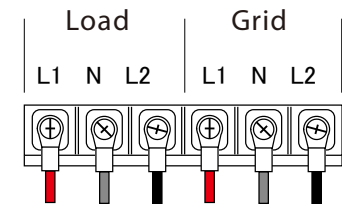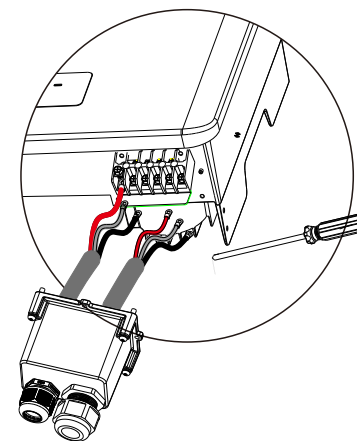
Torque screwdriver
(Torque: 1.5±0.1N ·m)

Step 5. Install the AC waterproof cover, and tighten the screws on the four sides of the waterproof cover with an Allen wrench.
(Torque: 0.4±0.1N*m)

X1-SPT 3K/3.6K

Hexagon keys
(Torque: 0.8±0.1N ·m)

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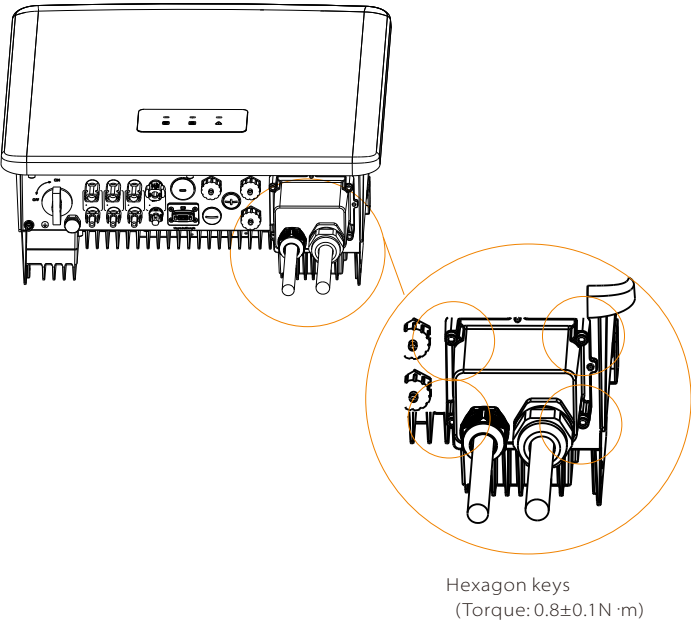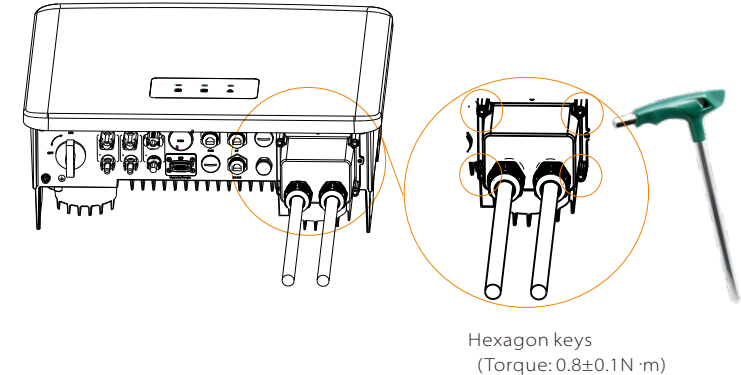
Step 6. Tighten the waterproof fastening head.

X1-SPT 6K/7K

Torque for Sealing Nut
(Torque: 5.0-6.0 N ·m)

Torque for Sealing Nut
(Torque: 5.0-6.0 N ·m)

Torque for Sealing Nut
(Torque: 6.0-7.0 N ·m)
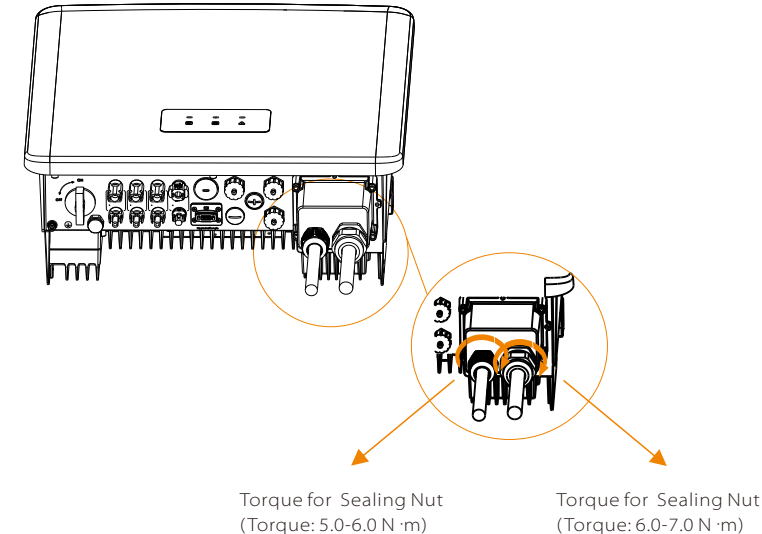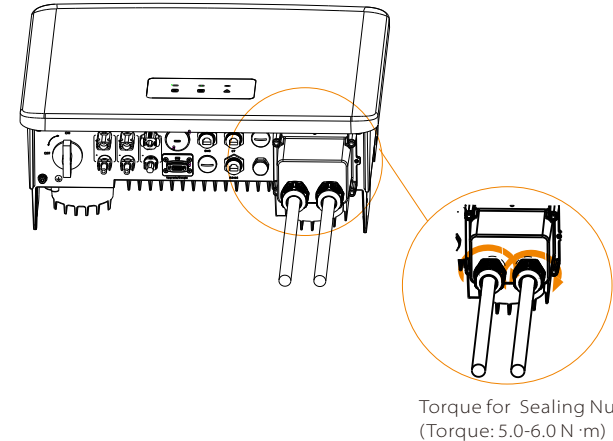
5.3 Battery Connection

➤ Connection requirements

X1-SPLIT series inverter charge and discharge system can be equipped with high voltage lithium battery.
 Please note that the maximum voltage of the battery should not exceed 480 V, battery communication should be compatible with the X1-SPLIT inverter.

➤ Battery connection steps

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

8 AWG

Power line   BAT plug (+)   BAT plug (-)
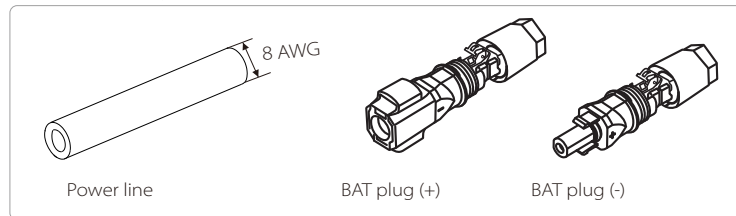
Step 2. Strip the insulation layer (length:15mm) at one end of the power line.

15.0mm

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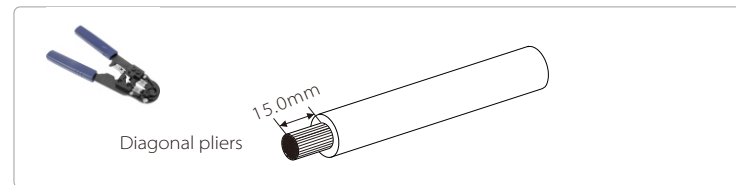
Step 3. Insert the striped cables into the DC plug (-) and DC Plug (+) respectively.

-    +

DC plug (-)   DC plug (+)

Spring

Cavity

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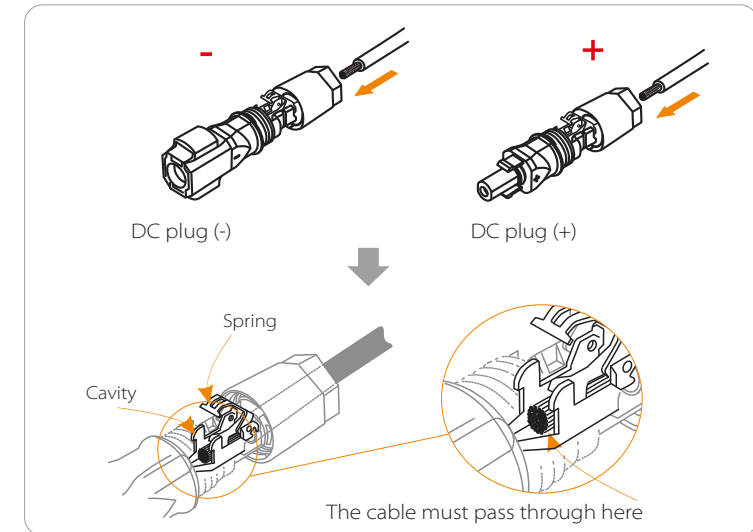
Step 4. Press down on the spring by hand, you can hear a click sound , then push the ends together, and tighten the screw joints.

Spring   Spring

Crack
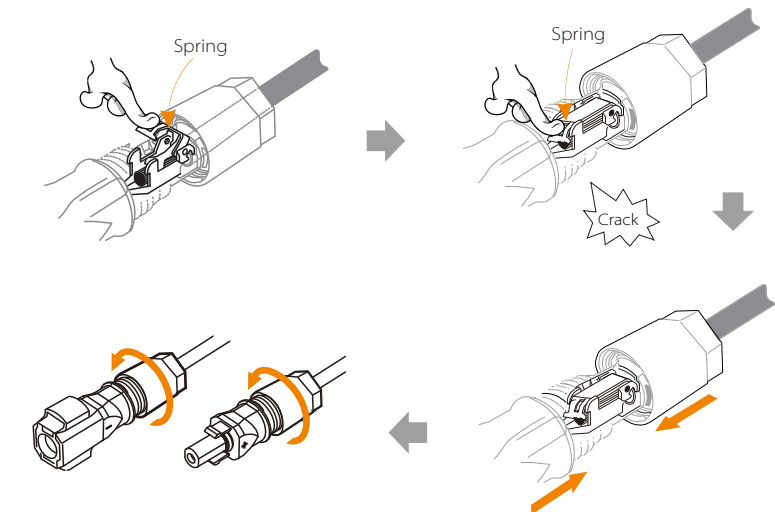
Step 5. Insert the battery power lines into the corresponding BAT port (+), (-) of the inverter.

X1-SPT 3K/3.6K

X1-SPT 6K/7K

Note: BAT port, not PV port!

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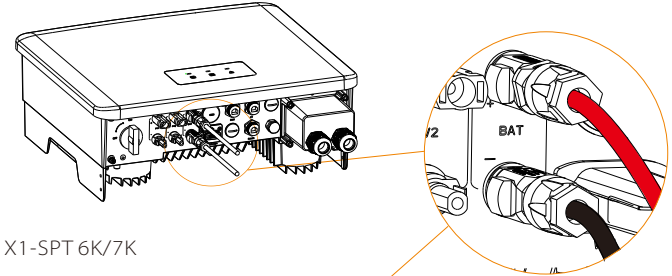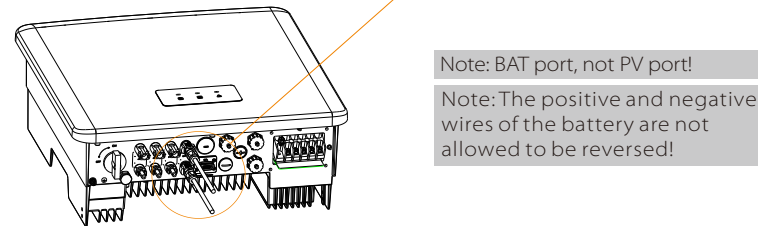
➢ **Communication connection**

BMS port definition

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

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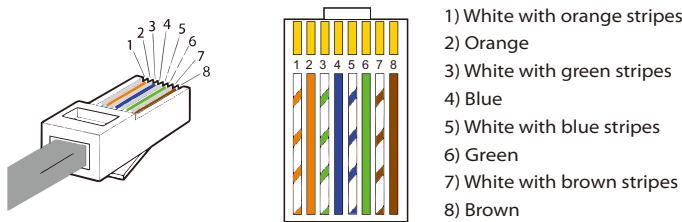
PIN	1	2	3	4	5	6	7	8
Definition	BAT_TEMP	GND	GND	BMS_CANH	BMS_CANL	X	BMS_485A	BMS_485B

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

5.4 Communication Connection

5.4.1 Introduction to CT Communication

X1-SPLIT inverter should work with an electric meter or current sensor (CT for short) to monitor household electricity usage.
The electricity meter or CT can transmit the relevant electricity data to the inverter or platform, which is convenient for users to read at anytime.

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

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

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

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

➢ **CT Connection**

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

- **CT connection diagram**

Grid

L1 (U)
N (O)
L2 (W)

CT(U)
CT(W)

Loads

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

CT port is at the bottom of the inverter.

Public grid electricity

L Line

CT

CT

X1-SPT 3K/3.6K

Grid

L1 (U)
N (O)
L2 (W)

CT(U)
CT(W)

Loads

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

CT port is at the bottom of the inverter.

Public grid electricity

L Line

CT

CT

X1-SPT 6K/7K
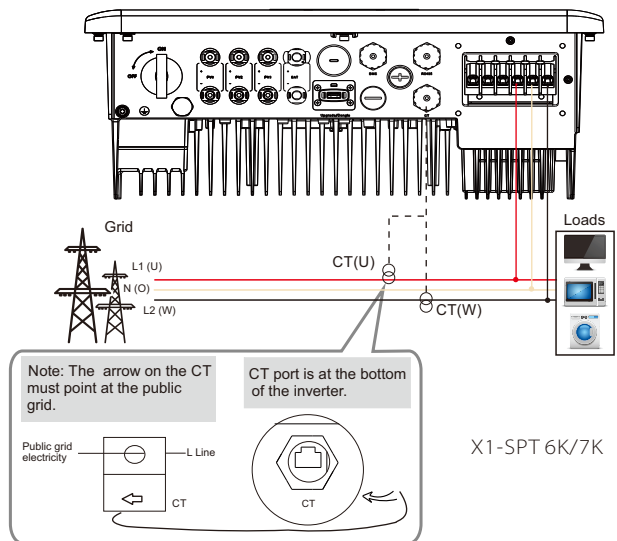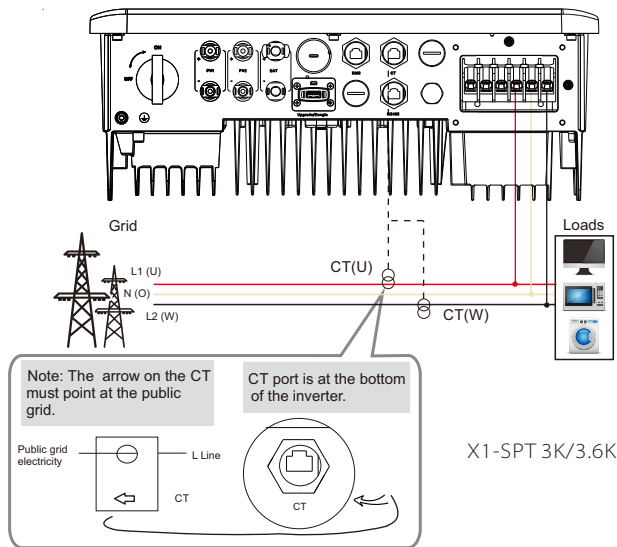
- **Notice for CT connection:**

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

➢ **BMS communication cable**

The BMS pin is defined as follows:

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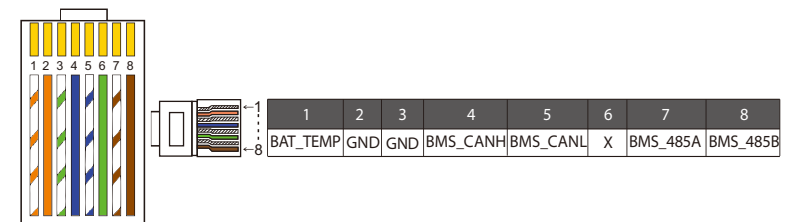
> **Notice!**
> The BMS port on the inverter is the communication port for connecting the battery. The communication port on the lithium battery must be consistent with the definition of pins 4, 5, 7, and 8 above;

5.4.2 COM Communication

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

➢ Application occasion

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

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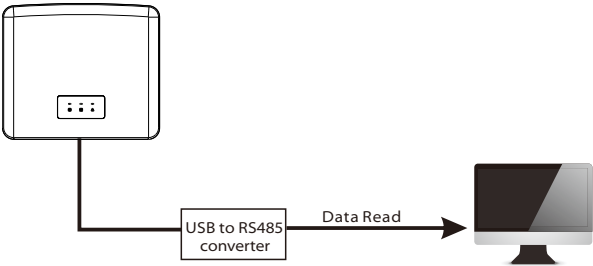
• Inverter communication control external equipment

➢ COM PIN Definition

1	2	3	4	5	6	7	8
+5V_COM	Drycontact_(input)	GND	485A	485B	GND	Drycontact_B(out)	Drycontact_A(out)

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

5.4.3 Communication Connection Steps

Step 1. Prepare a communication cable, and then find the communication adapter in the accessory bag.
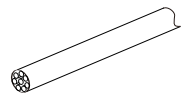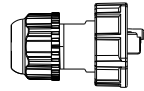
Communication cable   Waterproof connector with RJ 45   RJ 45 terminal
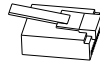
Step 2. Insert the communication cable through the communication adapter, and peel off the outer insulation layer of 15 mm.
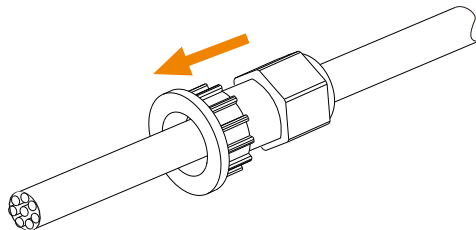
Diagonal pliers

15.00mm
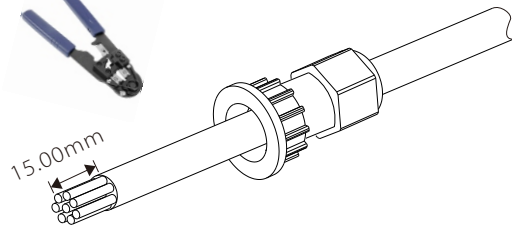
Step 3. Insert the prepared communication cables into the RJ45 terminals in sequence, and then use network cable crimping pliers to press them tightly.

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

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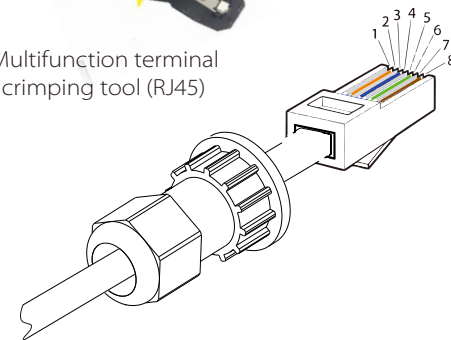
➢ **CT communication cable**

CT pin is defined as follow:

1 2 3 4 5 6 7 8
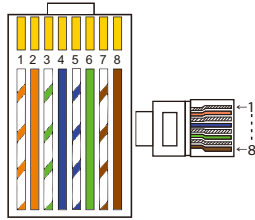
Notice!
Only one of the CT connections can be selected. Meter cable goes to pin terminal 4 and 5; CT cable goes to pin terminal 1.

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

A

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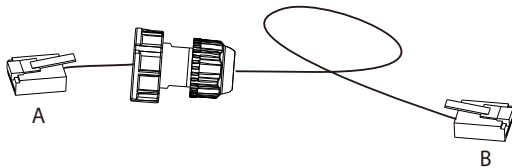
2) One side of the finished cable, Waterproof connector with RJ45 is inserted into the inverter, and one side of the RJ45 terminal is inserted into the CT connection.

X1-SPT 3K/3.6K   X1-SPT 6K/7K

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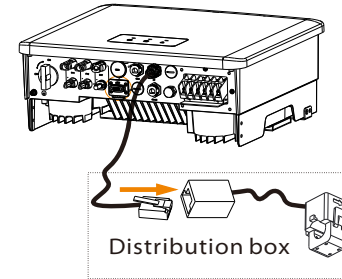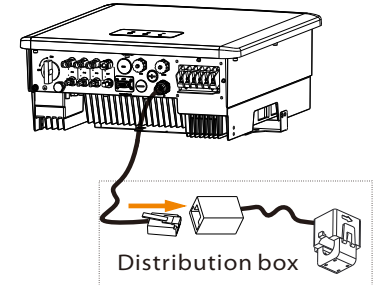
Notice!
When installing, pay attention to water resistance. All the connected parts of CT must be put into the distribution cabinet.

Step 4. Tighten the completed CT/BMS communication line and tighten the waterproof plug.

Torque for Sealing Nut
(Torque: 3.0-5.0 N·m)
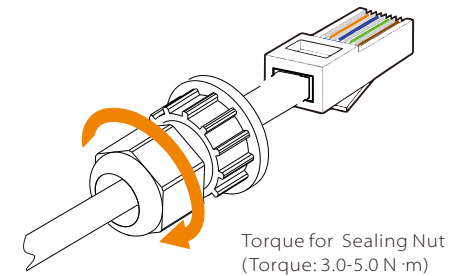
Step 5: Finally, find the corresponding COM, CT poets on the inverter and insert the communication cable into the corresponding ports.

BMS

CT

X1-SPT 3K/3.6K

RS485

BMS

RS485

X1-SPT 6K/7K

CT
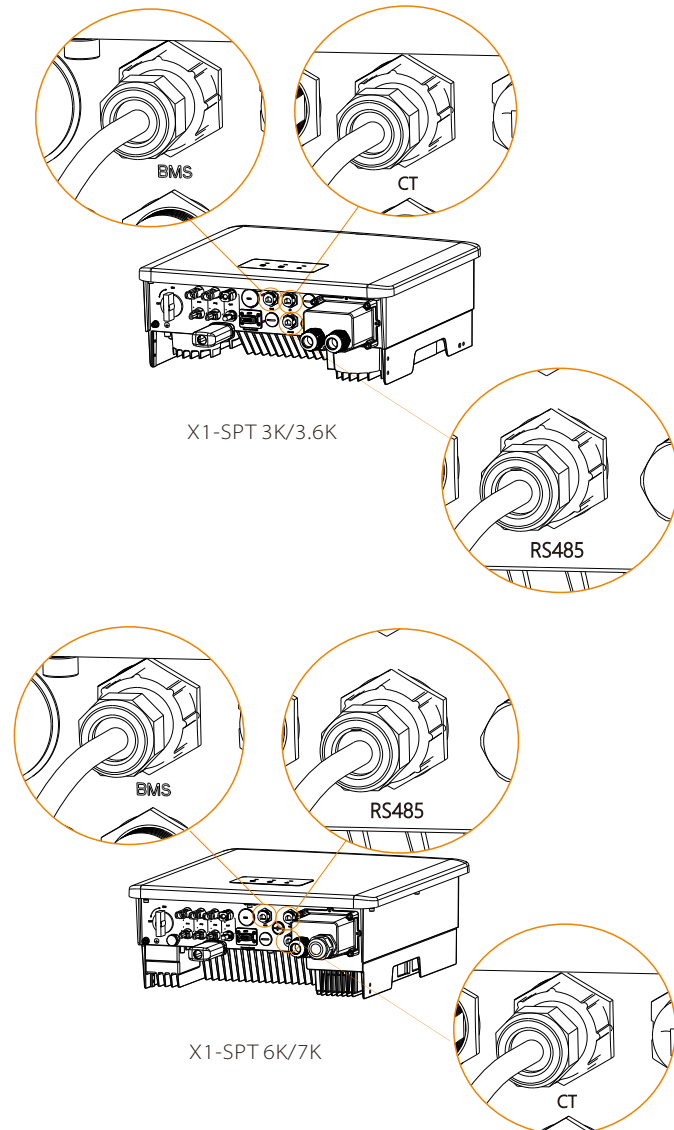
5.5 Grounding Connection (Mandatory)

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

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

➢ **Ground connection steps**

Step 1. Prepare a one-core cable (10AWG), and then find the ground terminal in the accessories.

10AWG

One-core cable (10 AWG)   OT terminal
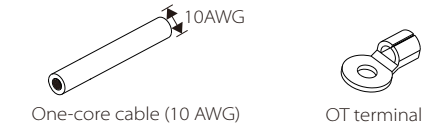
Step 2. Strip the grounding cable insulation(length"L2), insert the striped cable into the ring terminal, and then clamp it.

$L1$

$L2=L1+3mm$

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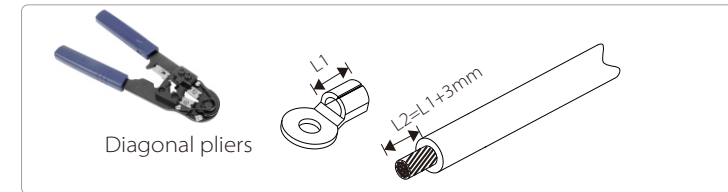
Step 3. Insert the stripped cable into OT terminal and tighten the terminal with a terminal crimping tool.

Leaking cable

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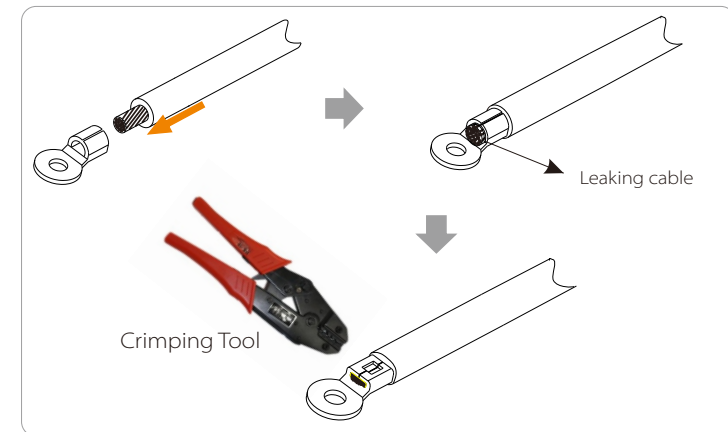
Step 4. Find the ground connection port on the inverter, and screw the ground wire on the inverter with an M5 Hexagon keys.

X1-SPT 3K/3.6K

X1-SPT 6K/7K

Hexagon keys
Torque: 1.5±0.2N·m

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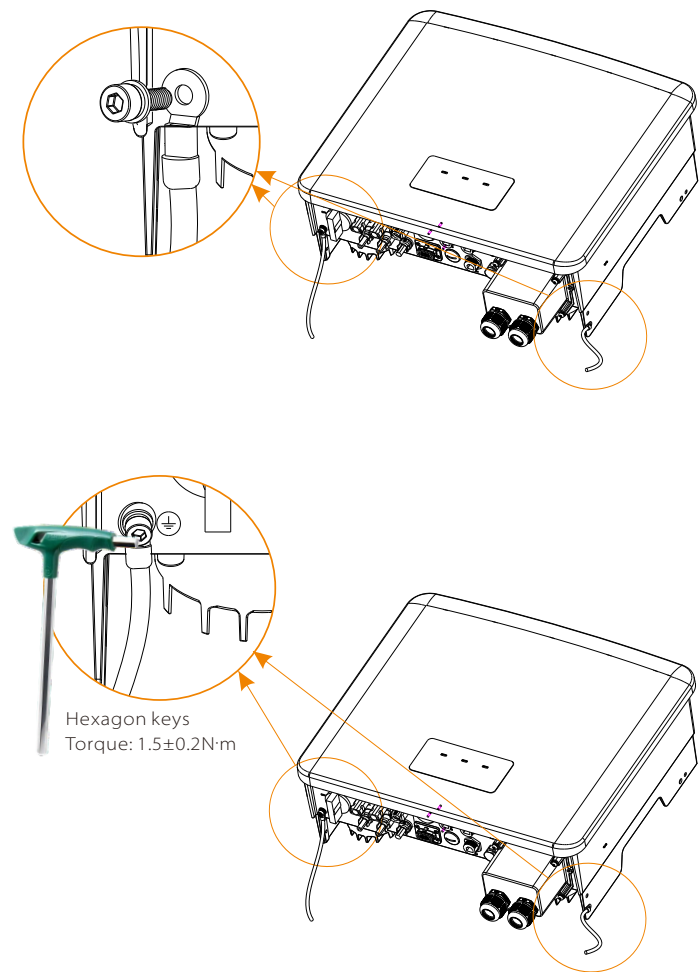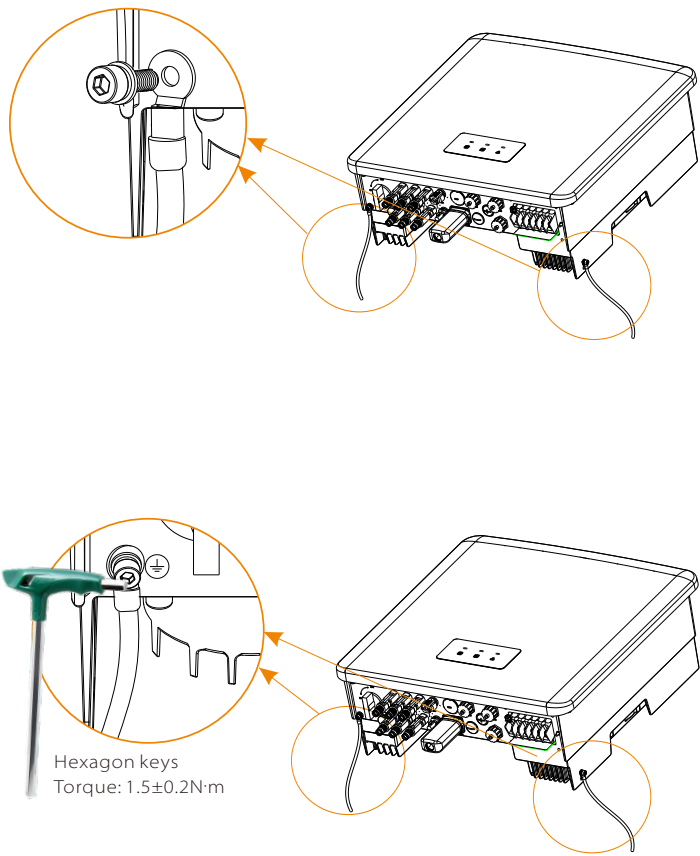
5.6 Monitoring Connection (Accessories)

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

➢ **WiFi connection diagram**
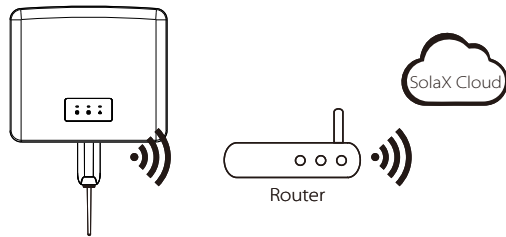
➢ **Wireless monitoring accessories connection steps**

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

X1-SPT 3K/3.6K
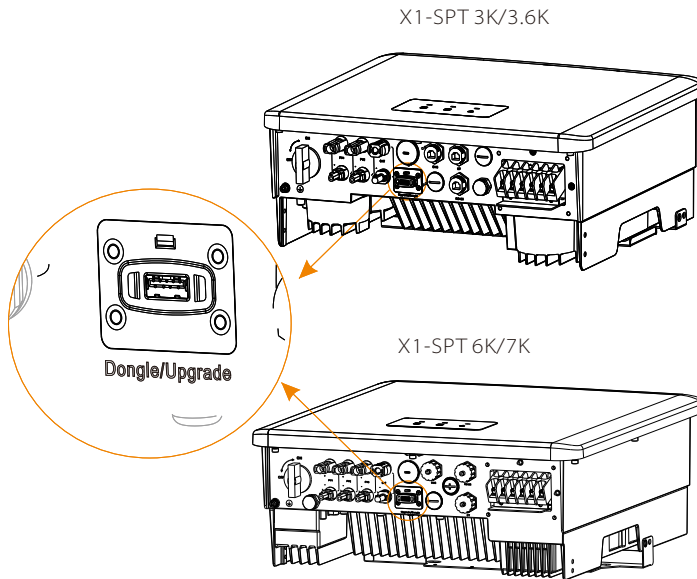
X1-SPT 6K/7K

Step 2. Plug Pocket WiFi into the DONGLE port.
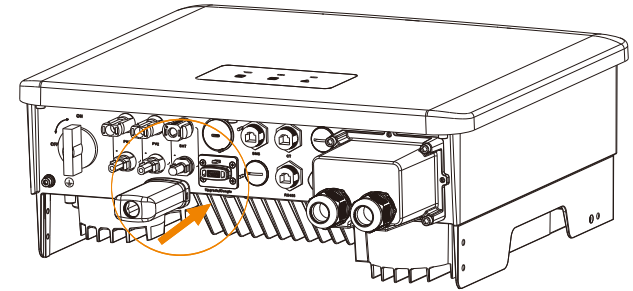
X1-SPT 3K/3.6K
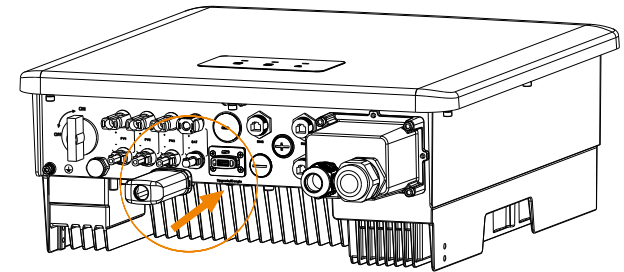
X1-SPT 6K/7K

Please check the Pocket wifi user manual/Pocket LAN user manual /4G user manual for more details.

5.7 Check All Below Steps Before Starting Inverter

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

❶ Make sure that the inverter is fixed on the wall.

❷ Ensure that all ground wires are grounded.

❸ Confirm that all DC lines and AC lines are connected.

❹ Make sure the CT is connected.

❺ Make sure the battery is well connected.

❻ Turn on the Grid switch and Load switch.

❼ Turn on the battery switch.

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

5.8 Inverter Operation

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

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

➢ **Start the inverter**

• Steps to start the inverter
  - Turn on the AC switch between the X1-SPLIT and the power grid.
  - (Optional) Remove the locking screw from the DC switch.
  - Turn on the DC switch between the PV string and the X1-SPLIT if there is any.
  - Turn on the DC switch at the bottom of the X1-SPLIT .
• When the photovoltaic panel generates enough power, the inverter will start automatically.
• If the LED is not green, please check the following:
  -All connections are correct.
  -All external disconnect switches are closed.
  -The DC switch of the inverter is set to the "ON" position.

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

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

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

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

6 Firmware Upgrading

➢ Upgrade Notices

Please read the following precautions before upgrading.

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

> **Warning!**
> -For X1-SPLIT, ensure that the PV input voltage is greater than 100V (upgrade on sunny days). please ensure that the battery SOC is greater than 20% or the battery input voltage is greater than 90V. Otherwise, it may cause serious failure during the upgrade process!

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

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

➢ Upgrade preparation

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

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

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

➢ Upgrade steps

Step 1. Please save the "Upgrade" firmware in your U disk , and insert the USB flash drive.
Step 2. Observe the LED indicator light.

Note: The upgrade sequence is: DSP program, battery master control, battery slave control (twice), ARM program.

(X1-SPT 3-3.6k)

Upgrade progress	Indicator
0%-33%	Blue flashing, Green off, Red off
33%-66%	Blue on, Green flashing, Red off
66%-99%	Blue on, Green on, Red flashing
Current object upgrade complete	Blue on, Green on, Red on
All objects upgrade complete	Blue flashing, Green flashing, Red flashing
Upgrade failed	Blue flashing, Green flashing, Red off
Battery upgrade failed	Blue off, Green flashing, Red flashing

(X1-SPT 6-7k)

Upgrade progress	Indicator
33%	Green flashing, Blue off, Red off
33%-66%	Green on, Blue flashing, Red off
66%-99%	Green on, Blue on, Red flashing
Current object upgrade complete	Green on, Blue on, Red on
All objects upgrade complete	Green flashing, Blue flashing, Red flashing
Upgrade failed	Green flashing, Blue flashing, Red off
Battery upgrade failed	Green off, Blue flashing, Red flashing

7 LED Indicator
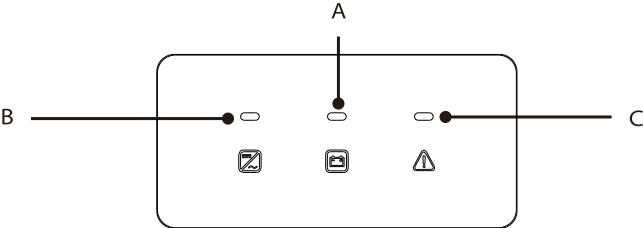
Object	Name	Description
A	LED Indicator light	Green light on: The inverter is in normal state. Green flashing: The inverter is in the waiting, checking state. Off: The inverter is in a fault state or in off-grid mode.
B		Blue light on: The inverter is in off-grid mode.
C		Red light on: The inverter is in a fault state. Off: The inverter has no error.

8 Inverter Settings

You can set the inverter through the remote monitoring platform SolaXCloud. SolaxCloud is an intelligent home energy management platform. It is integrated with energy efficiency monitoring, device management, data communication and other capabilities. While managing your home energy devices, it also helps you optimize the electricity usage efficiency and improve the power generation revenue.

Note:The screenshots in this chapter may differ from your actual screens.

➢ **Operation Guide on SolaXCloud App**

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

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

After registration and login, select Service>Help Center for text and video operation guidance. According to the guidance, create new site, Add device, and connect to the network.
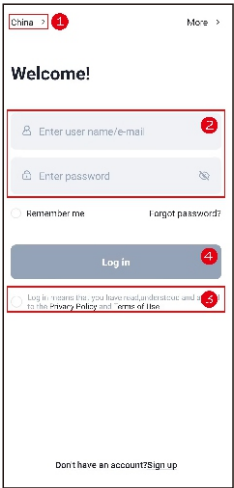
➤ **Operation Guide on SolaXCloud Webpage**

Open a browser and enter www.solaxcloud.com and then complete registration, login, site adding and other operations according to the User Guide.
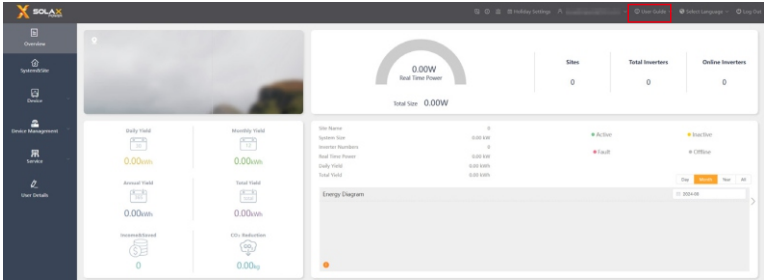
8.1 Menu Structure

Take APP as an example to show how to set up the inverter.
After logging in, tap **Device** tab, select X1-SPT device to enter device details page.
Then Tap **Remote Settings** to enter basic and advanced setting page.

Basic		
Date&Time	1)
System Switch	2)
Mode Select	3)
Chrg & Dischrg Period	4)
Contract Current	5)

Advanced*		
Safety	1)
ModbusRTU/485	2)
Grid	3)
Export Control	4)
Maximum charging power	5)
EPS	6)
Reset	7)
Clear Eps Overload Fault	8)
Reactive Mode	9)
Safety function switch	10)
GMPPT	11)
CT Type	12)
Fast CT CheckEN	13)
Parallel Setting	14)
Soft Start Slope	15)
New Password	16)
ExternalGen	17)
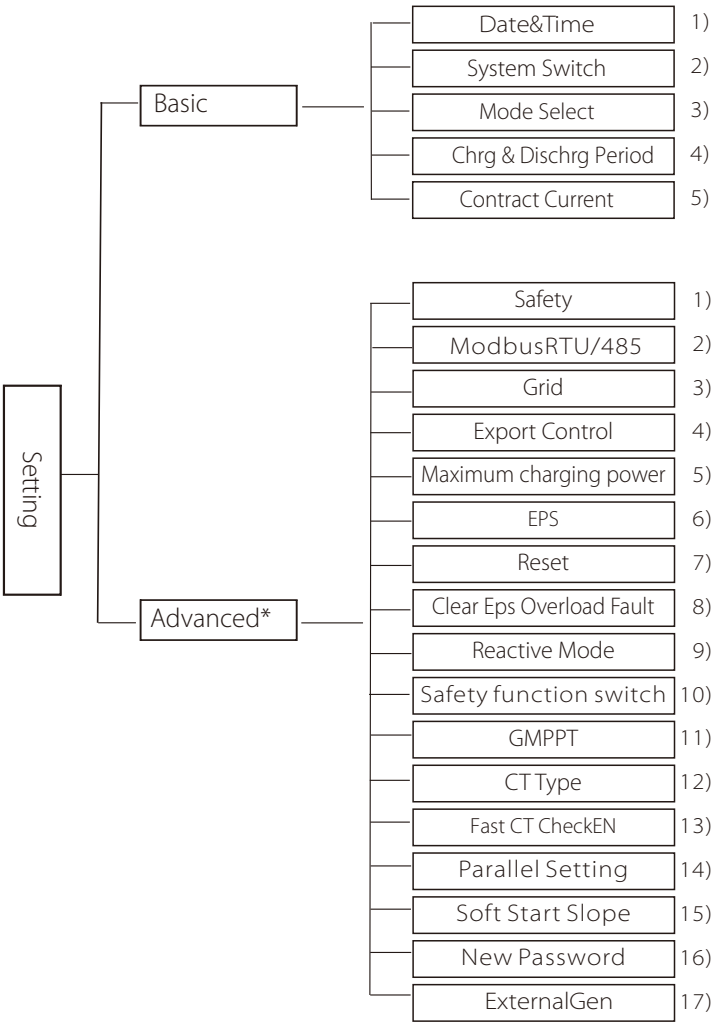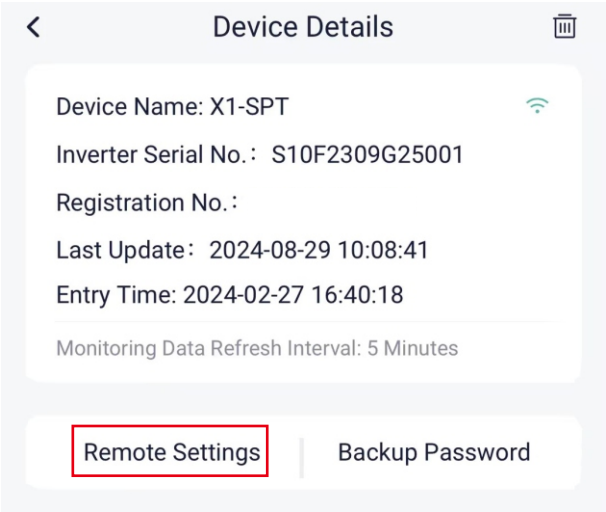
Notice: Advanced setting only can be set by the installer.
Please contact the installer or us if necessary.

8.2 Basic setting

After completing the settings, tap the **Save** button on the right.

1) Date&Time

This interface is for users to set the system date and time.
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.

```
Date&Time                          ^

  YYYY-MM-DD hh:mm          ( Save )
```

2) System Switch

"ON" indicates that the inverter is in working state.

"OFF" means that the inverter stops running.

```
System Switch                      ^

  System Switch
  OFF                       ( Save )
```

3) Mode Select

You can choose the working modes according to your lifestyle and environment. There are four work modes: Economic, Eco-friendly, Relief and Manual.

Min SOC: the power reserve percentage of the minimum battery state. The battery will not discharge power when its remaining power reaches this value.

Charge SOC: the target SOC to charge the battery from grid in the forced charging period (applicable only when the Eco-friendly mode is selected).

```
Mode Select                        ^

  Mode Select
  Releif Mode               ( Save )

  Economic Mode MinSoc(%)
  90                        ( Save )
```

Working mode	Min SOC(%)	Charge SOC(%)
Eco-friendly mode	10%-100% (default 10%)	50%-100% (default 50%)
Economic mode	10%-100% (default 10%)	/
Relief mode	30%-100% (default 90%)	/

Manual mode is only for the qualified debugging and maintenance personnel. It includes **Manual charge**, **Manual discharge**, **stop Charging&Discharge**. The mode will automatically exit after it has been working for 6 hours.

4) Charge & Discharge Period

Here you can set the charge and discharge period.
If two charging and discharging periods are needed, turn on the charging and discharging period 2 and set the period.
The default charge start/end time   :00:00/23:45
The default discharge start/end time :00:00/00:00

```
Chrg&Dischrg Period                ^

  Charge Sart Time
  00:00                     ( Save )

  Charge End Time
  23:45                     ( Save )

  Discharge Start Time
  00:00                     ( Save )

  Discharge End Time
  00:00                     ( Save )

  ───────  Discharge period 2  ───────
  Time period 2 switch
  off                       ( Save )
```

5) Contract Current

Due to power limit, the main breaker 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.
The default value is 60 A, range: 10-100 A

```
Contract Current                   ^

  Contract Current(A)
  60                        ( Save )
```

8.3 Advanced setting

Only the installer can operate the advanced settings. (The password to enter the advanced settings is only available to the installer.)

1) Safety Code
Set safety standard according to different countries and grid tied.
For countries other than Brazil, please select **Latin_1P_120/240**.

Safety	^
Latin 1P_120/240	Save

2) ModbustRTU/485
You can set the address and braud rate for communicating with an external device.

Function Select: When the inverter is connected to an external generator, select **meter**. In other cases, select **modbus**.

*The following settings are not required, keep the default values.
ModBus Control Priority: Select whether the modbus device can control the inverter first.

Priority timeout setting: Change the timeout period of the modbus device.

Local/remote setup: Select modbus devices control locally or remotely.

ModbusRTU/485	^
Function Select modbus	Save
ModBus485 Address 1	Save
ModBus485 Baud Rate 19200	Save
ModBus Control Priority Disable	Save
Priority timeout setting 5min	Save
Local/remote setup Grounded	Save

Item	Setting range	Default
Function Select	modbus,meter	modbus
ModBus485 address	0-255(Interval 1)	1
ModBus485 Baud Rate	9600,14400,19200, 38400,56000,57600, 115200	19200
ModBus Control Priority	Enable/Disable	Disable
Priority timeout setting	Close, 5min, 10min, 30min	5min
local/remote setup	Grounded/remotely	Grounded

3) Grid

The grid standart needs to be set according to local requirements.The default value is the specified value under the current safety regulations.

Item		Setting range	Default
OVP_L1	VacUpperL1(V)	100-160	144
	TimeVacUpperL1(ms)	0-5000	1000
UVP_L1	VacLowerL1(V)	10-120	105.6
	TimeVacLowerL1(ms)	0-5000	2500
OVP_L2	VacUpperL2(V)	100-160	145
	TimeVacUpperL2(ms)	0-10000	160
UVP_L2	VacLowerL2(V)	10-120	72
	TimeVacLowerL2(ms)	0-10000	1000
UVP_L3	VacLowerL3(V)	10-120	54
	TimeVacLowerL3(ms)	0-30000	160
OFP_L1	FacUpper(Hz)	40-65	61
	TimeFacMaxadj(ms)	0-30000	2000
UFP_L1	FacLower(Hz)	40-65	59
	TimeFacMinadj(ms)	0-30000	2000
OFP_L2	FacUpperL2(Hz)	40-65	62
	TimeFacUpperL2(ms)	0-30000	160
UFP_L2	FacLowerL2(Hz)	40-65	57
	TimeFacLowerL2(ms)	0-30000	160
PhaseJumpDegree(±°)		0-10	10
TimeStart(S)		0-1000	90

4) 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 User Value to 0.
 Default: 60000; range: 0-300000

```
Export Control                          ∧

    Export Control(W)
    60000                          ( Save )
```

5) Maximum charging power

Set the maximum charging power from grid. (only available for Eco-friendly mode and economic mode.)
Default: 7000; range: 0-7000

```
Maximum charging power                  ∧

    Eco-friendly mode max ACPower(W)
    7000                           ( Save )

    Economic mode max ACPower(W)
    7000                           ( Save )
```

 6) EPS

 Select and enter EPS Setting interface and set below items.

EPS Low Soc: Default: 10%, range: 10%-100%
If the battery SOC is lower than the EPS Low Soc, the inverter will turn off if there is no PV input.

EPS Restart Soc: Default: 30%, range: 10%-100%
In EPS mode, the minimum SOC required for re-entry EPS mode. When the battery SOC reaches the EPS Restart Soc through charging from PV, the inverter will automatically enter EPS mode from EPS Waiting mode.

EPS Frequency: Default: 60 Hz, range: 50Hz/60Hz.
 Output frequency of EPS

```
EPS                                     ∧

    EPS Low Soc(%)
    10                             ( Save )

    EPS Restart Soc(%)
    30                             ( Save )
    EpsFreqSet
    60Hz                           ( Save )
```

Super Backup: This function is disabled by default. It allow PV without battery to enter EPS.

EPS output (Without battery)	X1-SPT-6K	X1-SPT-7K
Normal output power(W)	3000	3500
Normal output power(W)	3900	4550

```
EPS                                     ∧

    Super Backup
    Disable                        ( Save )
```

 7) Reset
Clear the inverter energy data, error log, notice, and restore factory settings here.

```
Reset                                   ∧

    Clear Inverter History         ( Save )

    Reset Error Logs               ( Save )

    Clear Notice                   ( Save )

    Factory Reset                  ( Save )
```

 8) Clear Eps Overload Fault

Clear Eps overload Fault error here.
Note:When EPS overload error is reported more than 3 times, the inverter will shut down.

```
Clear Eps Overload Fault                ∧

    Clear Eps Overload Fault       ( Save )
```

9) Reactive Mode

It pplicable to specific countries, please refer to local grid requirements.)
Default:off.

Reactive Mode   ∧

   Reactive Mode

   off   (Save)

Mode	Comment
Off	–
Over-Excited	PF value
Under-Excited	PF value
Curve	Upper limit
	Lower limit
	Power Upper
	Power Lower
	3Tau
Fixed Q Power	Q Power

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

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

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

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

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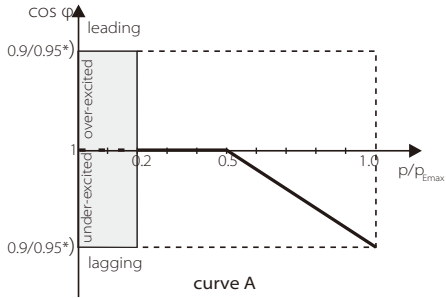
*) If the grid-connected power of the inverter ≦ 4.6kW, the Power Factor is 0.95 at 1.0 power; if the grid-connected power of the inverter > 4.6kW, the Power Factor is 0.90 at 1.0 power.
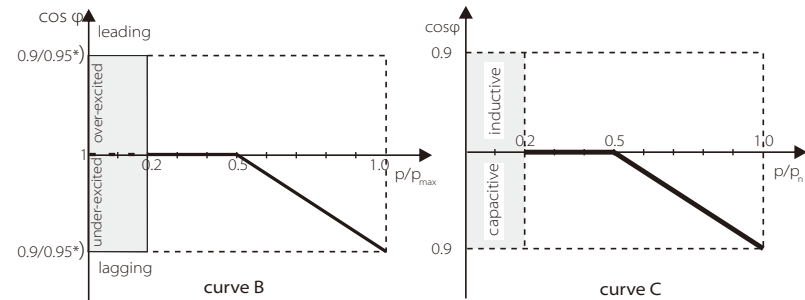
curve B

curve C

*) Depend on the required Q capacity

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

V2s=1.10Vn
V1s=1.08Vn=QuVlowRate
V2i=0.90Vn
V2i=0.92Vn=QuVlowRate
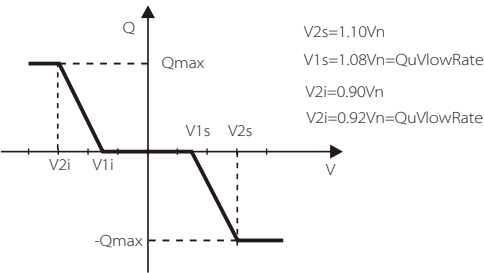
10) Safety function

The following are the protection functions of the inverter. Keep the default status and do not set it.

Item	Setting range	Default
FRT function	Enable/Disable	Enable
Act islanding	Enable/Disable	Enable
Pass islanding	Enable/Disable	Enable
CT check	Enable/Disable	Disable
Microgriden	Enable/Disable	Disable
Motivation state	Usually/standby	Usually
P(Overfreq)	Open/close	Open

11) GMPPT
GMPPT (Global Maximum Power Point Tracking) is to find the maximum points of PV modules and maintain them at the maximum power output. You can set the shadow tracking speed with four options, which are **Off, Low**, **Middle**, and **High**. This function is off by default.

```
GMPPT                          ^

   PV1 Control
   off                        ( Save )

   Pv2 Control
   off                        ( Save )

   Pv3 Control
   off                        ( Save )
```

12) CT Type

Set the CT type to 100 /200/300A according to the actual situations.
Default: 100A

```
CT Type                        ^

   CT Type
   100A                       ( Save )
```

13) Fast CT CHECK EN

Check whether the CT is connected correctly.

```
Fast CT CHECK EN               ^

   Fast CT CHECK EN           ( Save )
```

14) Parallel Setting

Note: For more details, refer to the appendix.

This function is only applicable to X1-SPT 6K & X1-SPT 7K.

If multiple inverters are connected in parallel, you can set below items.
a. Parallel Enable: **Enable** (disable by default)
b. Parallel Master or Slave: Set master inverter to **Master**, slave to **Slave**
c. Parallel Slave Notify: Every 1 minute when connected to the grid, the Master SOC information is converted into 200Var reactive information and told to the slave (Enable by default).

```
Parallel Setting               ^

   Parallel Enable
   Disable                    ( Save )

   Parallel Master or Slave
   Master                     ( Save )

   Parallel Slave Notify
   Enable                     ( Save )
```

15) Soft Start Slope

If set as shown, 20 percent of the rated power increase per minute.

> **Soft Start Slope** ∧
>
> Soft Start Slope
> **20** (Save)

16) New password

You can re-set the advanced password here.

> **New Password** ∧
>
> ******** (Save)

17) External Gen

Note: For more details, refer to the appendix.

This function is only applicable to X1-SPT 6K & X1-SPT 7K.

In certain regions where utility power is unstable, the use of generators becomes necessary to ensure uninterrupted operation of loads. The characteristic of this system is its ability to seamlessly switch to generators combined with an energy storage system, forming a new power supply configuration in the absence of utility power.

A diesel generator is employed to replicate grid-like functionality, while a hybrid inverter converts solar energy into usable electric energy.

There are two methods for switching on/off the external generator: ATS and dry contact.

You can refer to the corresponding settings according to the method you selected.

ATS control wiring diagram
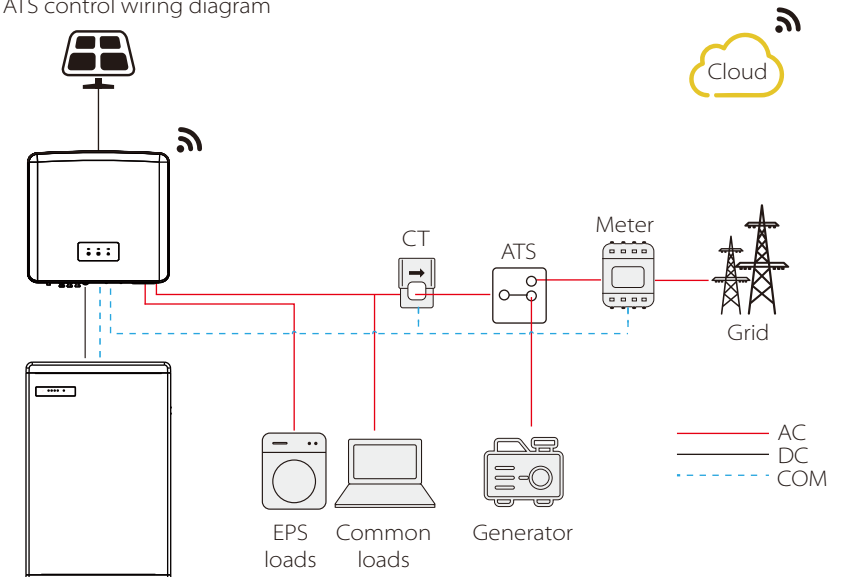
Dry contact wiring diagram
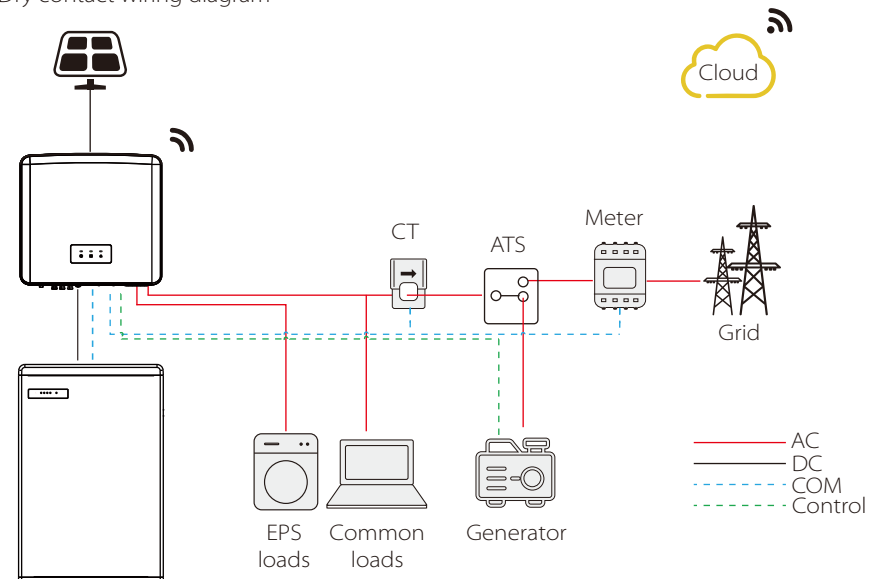
Inverter settings for external generation.

a. Set External generation type
(OFF/Dry contact modeATS control/Dry contact mode)

Set the maximum power of generator charging battery.
Default: 5000; range: 0-30000

```
External Gen                                    ∧
    ExternalGen
    Dry contact                          ( Save )
    External Gen Max Charge
    5000                                 ( Save )
```

If you select dry contact mode, you need to set the following additional.

Start Gen Method:
Immediately(default):Turn on /off the generator immediately when the inverter disconnects from the grid.

Reference SOC: Turn on/off the generator according to the set battery SOC.

```
Start Gen Method                                ∧
    Immediately                          ( Save )
```

Switch on/off SOC:
The option is activated when you select Reference SOC for Start Gen Method.

Switch on SOC:The inverter will **turn on** the generator when the battery reaches the set value.
Default: 20; range: 10-100

Switch off SOC:The inverter will **turn off** the generator when the battery reaches the set value.
Default: 95; range: 10-100

```
Switch on SoC (%)
20                                       ( Save )
Switch off SoC (%)
95                                       ( Save )
```

MaxRunTime & MinRestTime

MaxRunTime: Maximum operating time of generator.
Default: 1000; range: 1-60000

MinRestTime: Minimum time interval for two consecutive starts to avoid switching on and off frequently.
Default: 60; range: 1-60000

```
MaxRun Time(Min)
1000                                     ( Save )
MinRest Time(Min)
60                                       ( Save )
```

Allow Work

Allowed time period for generator operating. You can set the start time and end time
Default allow work period: 00:00~23:59

```
Allow Work start time
00:00                                    ( Save )
Allow Work stop time
23:59                                    ( Save )
```

b. Set Forced Charg Period and Allowed Disc Period.
Two periods can be set at most.

Chrg&Dischrg Period

Charge Period Start Time
00:00   Save

Charge Period End Time
00:00   Save

Allowed Disc Period Start Time
00:00   Save

Allowed Disc Period End Time
00:00   Save

Chrg&Dischrg Period2

Function
Disable   Save

c. Charge from Gen: It allows the battery to take power from the generator.
Default: Disable; range: Enable/Disable

Charge battery to(%):Set the battery target SOC .
Default: 10%; range: 10-100%

Charge from Gen
Enable   Save

Charge battery to(%)
10   Save

9 Troubleshooting

9.1 Troubleshooting

This section contains information and procedures for resolving possible problems with X1-SPLIT, and provides you with troubleshooting tips to identify and solve most problems that may occur in X1-SPLIT. This section will help you narrow down the source of any problems you may encounter. Please read the troubleshooting steps below. Check the warning or fault information on the system control panel or the fault code on the inverter information panel. If a message is displayed, log it before doing anything further.
Try the solutions indicated in the table below.

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

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

Number	Faults	Diagnosis and solution
IE 022	ARM Unmatched	ARM software version mismatch Fault • update the software and press the ESC" key to restart the inverter. • Or ask for help from the installer if it can not return to normal .
IE 023	Other Device Fault	Other device Fault • update the software and press the ESC" key to restart the inverter. • Or ask for help from the installer if it can not return to normal .
IE 025	InterComms Error	Mgr InterCom Fault • Shut down photovoltaic, battery and grid, reconnect. • Or ask for help from the installer if it can not return to normal .
IE 025	InterComms Error	• Internal communication errors • Shut down photovoltaic, battery and grid connections. • Or ask for help from the installer if it can not return to normal.
IE 026	Inv EEPROM Fault	Inverter EEPROM Fault. • Shut down photovoltaic, battery and grid, reconnect. • Or ask for help from the installer if it can not return to normal.
IE 027	RCD Fault	Fault of Residual Current Device • Check the impedance of DC input and AC output. • Disconnect PV + PV - and batteries, reconnect. • Or ask for help from the installer if it can not return to normal.
IE 028	Grid Relay Fault	Electrical relay failure • Disconnect PV+ PV- grid and batteries and reconnect. • Or ask for help from the installer if it can not return to normal.
IE 029	Load Relay Fault	Load relay failure • Disconnect PV+ ,PV-, grid and batteries and reconnect. • Or ask for help from the installer if it can not return to normal.
IE 030	PV ConnDirFault	PV direction fault • Check if the PV input lines are connected in the opposite direction. • Or ask for help from the installer if it can not return to normal.
IE 031	ChargerRelayFault	Charge relay fault • Press the ESC" key to restart the inverter. . • Or ask for help from the installer if it can not return to normal.
IE 032	EarthRaleyFault	Load earth relay fault • Press the ESC" key to restart the inverter. . • Or ask for help from the installer if it can not return to normal.
IE 103	Mgr EEPROM Fault	Manager EEEPROM Fault. • Shut down photovoltaic, battery and grid, reconnect. • Or seek help from the installer if it can not return to normal.

Number	Faults	Diagnosis and solution
BE 001	BMS_External_Err	Battery Error - External Communication Fault • Please contact the battery supplier.
BE 002	BMS_Internal_Err	Battery Error - Internal Communication Fault • Please contact the battery supplier.
BE 003	BMS_OverVoltage	Over voltage in battery system • Please contact the battery supplier.
BE 004	BMS_LowerVoltage	Low voltage in battery system • Please contact the battery supplier.
BE 005	BMS_ChargeOCP	Battery fault - over charge fault • Please contact the battery supplier.
BE 006	BMS_DischargeOCP	Battery fault-discharge over current fault • Please contact the battery supplier.
BE 007	BMS_TemHigh	Over temperature in battery system • Please contact the battery supplier.
BE 008	BMS_TempSensor Fault	Battery temperature sensor malfunction • Please contact the battery supplier.
BE 009	BMS_CellImblance	Battery Unbalanced Failure • Please contact the battery supplier.
BE 010	BMS_Hardware Protect	Battery hardware protection failure • Please contact the battery supplier.
BE 011	BMS_Circuit_Fault	Battery circuit failure • Restart the battery . • Please contact the battery supplier.
BE 012	BMS_ISO_Fault	Battery insulation failure • Check that the battery is properly grounded and restart the battery. • Please contact the battery supplier.
BE 013	BMS_VolSen_Fault	Battery voltage sensor fault • Please contact the battery supplier.
BE 014	BMS_TemppSen_Fault	Temperature sensor failure • Restart the battery . • Please contact the battery supplier.
BE 015	BMS_CurSensor Fault	Battery current sensor fault • Please contact the battery supplier.
BE 016	BMS_Relay Fault	Battery relay failure • Please contact the battery supplier.
BE 017	BMS_Type_Unmatch	Battery type failure • Upgrade the battery BMS software. • Please contact the battery supplier.

Number	Faults	Diagnosis and solution
BE 018	BMS_Ver_ Unmatch	Battery version mismatch failure • Upgrade the battery BMS software. • Please contact the battery supplier.
BE 019	BMS_MFR_ Unmatch	Battery manufacturer did not match the fault • Upgrade the battery BMS software. • Please contact the battery supplier.
BE 020	BMS_SW_ Unmatch	Battery hardware and software mismatch failure • Upgrade the battery BMS software. • Please contact the battery supplier.
BE 021	BMS_M&S_ Unmatch	Battery master slave control mismatches • Upgrade the battery BMS software. • Please contact the battery supplier.
BE 022	BMS_CR_ NORespond	Battery charging request does not respond to a fault • Upgrade the battery BMS software. • Please contact the battery supplier.
BE 023	BMS_SW_ Protect	Battery slave software protection failure • Upgrade the battery BMS software. • Please contact the battery supplier.
BE 024	BMS_536_Fault	Battery fault-discharge over current fault • Please contact the battery supplier.
BE 025	BMS_SelfcheckErr	Over temperature in battery system • Please contact the battery supplier.
BE 026	BMS_TempdiffErr	Battery temperature sensor malfunction • Please contact the battery supplier.
BE 027	BMS_BreakFault	Battery Unbalanced Failure • Please contact the battery supplier.
BE 028	BMS_Flash_Fault	Battery hardware protection failure • Please contact the battery supplier.
BE 029	BMS_Precharge_Fault	Battery precharge failure • Please contact the battery supplier.
BE 030	BMS_AirSwitch_Fault	Battery air switch failure • Check that the battery breaker is off. • Please contact the battery supplier.

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

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

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

9.2 Routine Maintenance

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

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

➤ **Safety inspections**

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

➤ **Regular maintenance**

Only qualified people can do the following work.

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

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

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

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

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

10 Decommissioning

10.1 Disassemble of Inverter

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

10.2 Packing

Load the inverter into the original package if possible.

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

10.3 Storage and Transportation

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

10.4 Waste Disposal

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

11 Disclaimer

The X1-SPLIT series hybrid inverters are transported, used and
operated under limited condition, such as environmental, electrical
etc. SolaX shall not be liable to provide the service, technical
support or compensation under conditions listed below, including
but not limited to :

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

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

12 Appendix

12.1 Application of Generator

Introduction of Generator Application

When the utility power supply is unavailable, the system can seamlessly switch to a generator, to form a new energy supply system, thereby ensuring uninterrupted operation of loads. In this case, the generator functions as the utility grid to supply power to the loads, and the hybrid inverter converts the solar energy to electricity.

Notice for Generator Application

● The generator scenario is only applicable to X1-SPT 6K & X1-SPT 7K.
● No other external devices can be connected when a generator is connected. If the external generator parameters are set, the **Generator mode** will be displayed in the mode selection area (only used for display, cannot be set)
 Displaying path: Settings>Basic>Mode Select
 If you need to use other modes such as economic mode, you must first exit the generator mode.

Mode Select	∧
Mode Select	
Generator mode	Save

● The generator should be equipped with an ATS, enabling it to start automatically in the event of a power outage.
● 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 multiple inverters connected 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 all the inverters.
● 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 by selecting **Setting>Advanced>ExternalGen**, to ensure that the generator power can meet the total needs of loads and battery charging.
● The EPS load power cannot be greater than the battery discharge power to prevent that the battery power cannot meet the requirements of EPS loads after the generator shuts down. Or the inverter will report an **Overload fault alarm**. If two inverters are connected in parallel, the EPS load power shall be doubled.

Generator connection

For ATS mode, the meter is connected to RS485 Pin 4 and Pin 5. For Dry contact mode, the meter is connected to RS485 Pin 4 and Pin 5. And the generator is connected to RS485 pin 7 and pin8.

Crimp RJ45 Network Cables

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

Inverter RS485 port

Definition of pins of port RS485

Pin	Definition	Description
1	+5V_COM	Dry contract for input
2	Drycontact_(input)	
3	GND	/
4	485A	System off signal
5	485B	
6	GND	/
7	Drycontact_B(out)	Dry contract for output
8	Drycontact_A(out)	

➢ ATS Control Mode

In this 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 (but the inverter cannot control the generator either). The ATS working for the generator determines whether to turn on the generator based on the status of the grid.

ATS control wiring diagram

Inverter settings for ATS control mode
Setting path: **Settings>Advanced>ExternalGen**

a. Set **ATS control**
Then set the maximum power of generator charging battery.
Default: 5000; range: 0-30000

External Gen	∧
ExternalGen	
ATS Control	Save
External Gen Max Charge	
5000	Save

b. Set Forced Charg Period and Allowed Disc Period.
Two periods can be set at most.

Chrg&Dischrg Period	
Charge Period Start Time	
00:00	Save
Charge Period End Time	
00:00	Save
Allowed Disc Period Start Time	
00:00	Save
Allowed Disc Period End Time	
00:00	Save
Chrg&Dischrg Period2	
Function	
Disable	Save

c. Charge from Gen: It allows the battery to take power from the generator.
Default: Disable; range: Enable/Disable

Charge battery to(%):Set the battery target SOC .
Default: 10%; range: 10-100%

Charge from Gen	
Enable	Save
Charge battery to(%)	
50	Save

➢ **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.

Dry contact wiring diagram

Inverter settings for Dry contact mode
Setting path: Settings>Advanced>ExternalGen

a. Set **Dry contact**
Then set the maximum power of generator charging battery.
Default: 5000; range: 0-30000

b. Set the relative parameters in accordance with actual needs.

Start Gen Method:
Immediately(default):Turn on /off the generator immediately when the inverter disconnects from the grid.

Reference SOC: Turn on/off the generator according to the set battery SOC.

Switch on/off SOC:
The option is activated when you select Reference SOC for Start Gen Method.

Switch on SOC:The inverter will **turn on** the generator when the battery reaches the set value.
Default: 20; range: 10-100

Switch off SOC:The inverter will **turn off** the generator when the battery reaches the set value.
Default: 95; range: 10-100

MaxRunTime & MinRestTime

MaxRunTime: Maximum operating time of generator.
Default: 1000; range: 1-60000

MinRestTime: Minimum time interval for two consecutive starts to avoid switching on and off frequently.
Default: 60; range: 1-60000

MaxRun Time(Min)
1000   Save

MinRest Time(Min)
610   Save

Allow Work

Allowed time period for generator operating. You can set the start time and end time
Default allow work period: 00:00~23:59

Allow Work start time
00:00   Save

Allow Work stop time
23:59   Save

c. Set Forced Charg Period and Allowed Disc Period.
   Two periods can be set at most.

Chrg&Dischrg Period

Charge Period Start Time
00:00   Save

Charge Period End Time
00:00   Save

Allowed Disc Period Start Time
00:00   Save

Allowed Disc Period End Time
00:00   Save

Chrg&Dischrg Period2

Function
Disable   Save

d. Charge from Gen: It allows the battery to take power from the generator.
   Default: Disable; range: Enable/Disable

Charge battery to(%):Set the battery target SOC .
Default: 10%; range: 10-100%

Charge from Gen
Enable   Save

Charge battery to(%)
10   Save

12.2 Application of Micro-grid

Introduction of Micro-grid Application

Due to the islanding effect, an on-grid inverter cannot work during off-grid. This characteristic makes user losing the on-grid inverter PV energy when off-grid. Micro-grid is the function that making hybrid inverter simulate the grid to active on-grid inverter during off-grid by connecting the on-grid inverter to hybrid inverter's EPS port.

Nota:
- Any brand of on-grid inverter that supports "frequency adaptation"
- On-grid inverter output power ≤ Max hybrid inverter EPS output power
- On-grid inverter output power ≤ Max battery charging power
- Since X1-SPT series inverter is unable to control the output power of on-grid inverter in grid connection mode, the series inverter cannot achieve zero export when "loads power + battery charging power   on-grid inverter output power".
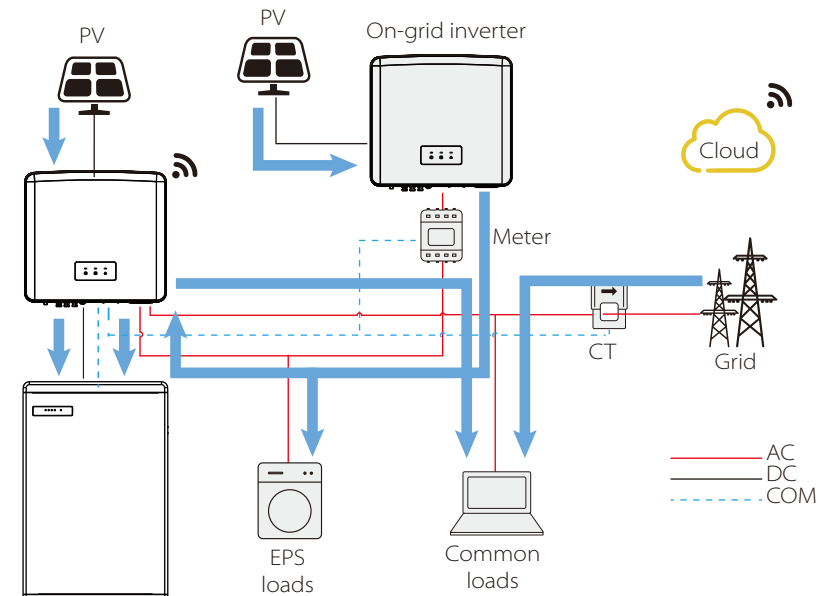
### Wiring Conenction Diagram
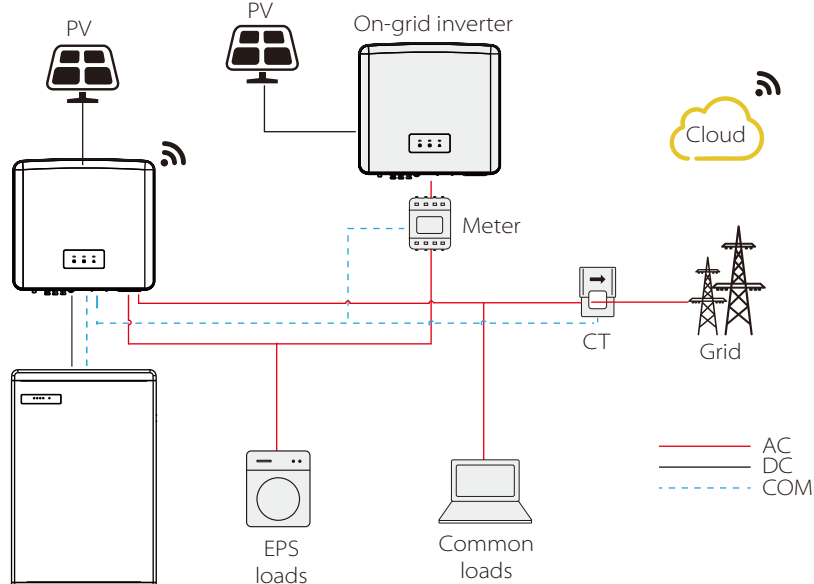
Working Modes

➢ **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 inverter, on-grid inverter and grid power the loads together.

> ➤ 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.

--- AC
--- DC
----- COM
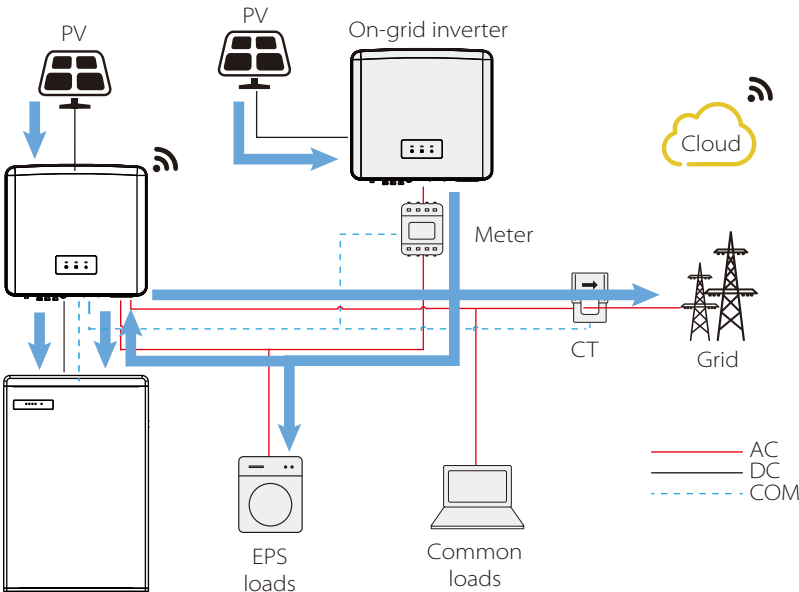
> Nota:
> In EPS mode, due to limited battery charging power, the hybrid inverter will increase the EPS output frequency to restrict and shut down the on-grid inverter, ensuring the stable operation of the entire system. In this period, the on-grid inverter may report a Grid frequency Fault, which is a normal phenomenon.

Cable Connection

Hybrid inverter:
Please refer to **5 Electrical Connection** for Grid and EPS connection.

On-grid inverter:
Please connect the AC cable of an on-grid inverter to the EPS port of X1-SPT series inverter. Please refer to the user manual of specific on-grid inverter.

Meter:
To detect and monitor the power data generated from the on-grid inverter, install a meter on the on-grid inverter side. Otherwise, the relevant power data of on-grid inverter cannot be monitored.

Definition of pins of port RS485

Pin	Definition	Description
1	+5V_COM	Dry contract for input
2	Drycontact_(input)	
3	GND	/
4	485A	System off signal
5	485B	
6	GND	/
7	Drycontact_B(out)	Dry contract for output
8	Drycontact_A(out)	

Inverter settings for Micro-grid

Setting path: **Settings>Advanced>Safety function**
Enable the MicroGridEN (Disable by default)

Safety function switch ∧
MicroGridEn
Enable   Save

12.3 Parallel Connection

> **Notice!**
> Only X1-SPT 6K/7K supports parallel function, X1-SPT 3K/3.6K doesn't support. In the meanwhile. the master and slave should be same.

The parallel machines of the X1-Split have no communication lines, only power linkage and the basic logic is independent of each other, e.g. information on charging and discharging times and error reporting. The series inverters provide parallel functionality and up to two inverters can be connected in one system. In this system, one inverter is set to "master" and the other to "slave" status. The master is voltage-controlled and the slave work in a similar way to on-grid machines, which are current-controlled. The slave get the real-time output current of the master via CT, the SOC information of the master via frequency off-grid and the SOC information of the master via reactive power on-grid. The master does not communicate with the slave.

➤ **Work Modes in parallel system**
  （Via APP, Setting>Advanced Setting>Paralleset)

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

| Parallel enable switch	Whether to start parallel mode (default disable, When reset to disabled, the default is to change the parallel type to master.)	Cancel OK ─── Disable Enable
Parallel mode	Set as "master mode" or "slave mode". The default is master mode. **Note:** When re-enabling the parallel function, the slave needs to be manually changed to a slave again.	Cancel OK ─── Master Slave
Master SOC broadcast enabled	Every 1 minute when connected to the grid, the Master SOC information is converted into 200Var reactive information and told to the slave (Enabled by default).	–

Note: ParallelSet needs to be reset after each program upgrade.

Advice:
1. Upgrade the program when the load does not exceed 6 kW, because the DSP cannot control and switch off-grid during the upgrade process, preventing all the load current from flowing through one inverter.
2. The number of batteries for the Master is not recommended to be less than two.
3. When paralleling, the power of the master and slave and the number of batteries are recommended to be consistent.

➤ **Wiring Operation**

The wiring diagram for the X1-Split parallel is shown as below.
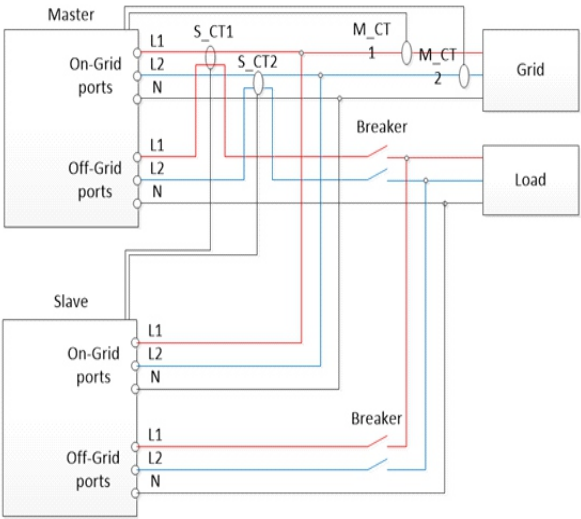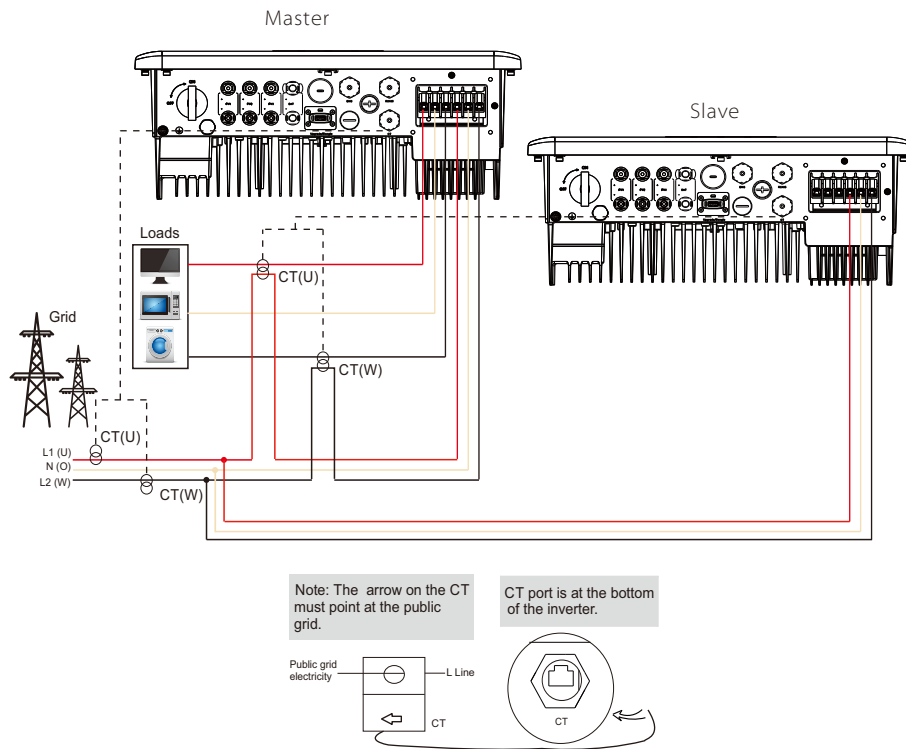

> **Warning!**
> When paralleling the machine, the wiring of the Load port and Grid port should be wired in the way specified in the requirements (Refer to Wiring Operation), and there is a risk of damage to the machine if it is connected incorrectly. Sorry to inform you that we do not provide warranty if the machine is damaged due to not following the requirements.

Notice!

When paralleling the machine, the wiring between the Grid to the 2 inverters should be as short as possible (<3m) and the length should be as consistent as possible. If the wiring is too long or the difference in wiring length from Grid to the 2 inverters is too large, it will lead to too much difference in output power of the 2 inverters and there will be a risk of not being able to supply power above 10kW.

The power connection line between master and slave is as short as possible, so that when both inverters do not start, the current sharing between the two will be better.

CT connection diagram

Master

Slave

Loads

Grid

CT(U)

CT(W)

CT(U)

L1 (U)
N (O)
L2 (W)

CT(W)

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

CT port is at the bottom of the inverter.

Public grid electricity

L Line

CT

CT

Inverter 1 is the master and the CT needs to be placed in the on-grid port. Inverter 2 is the slave and the CT needs to contain both the on-grid port outgoing line of the master and the off-grid port outgoing line. For example, the CT of Inverter 2 needs to contain both the on-grid outlet of Inverter 1, and the EPS outlet. In addition, it must install a 30A breaker on the EPS and Grid line of each machine to prevent overcurrent.

The master machine works in exactly the same way as a stand-alone machine. The slave machine obtains the real time output current of the Master through the CT and outputs the same current to supplement the output power of the Master.

To further enrich the energy management function of the parallel machine, the Master machine sends its own SOC information to the slave machine after turning on the "Master SOC broadcast enable" function of the Master machine. In on-grid operation, the master converts the SOC information to varying reactive power and in off-grid operation, the master converts the SOC information to frequency. The slave, on the other hand, obtains the SOC from the master and increases or decreases its own output in conjunction with its own SOC.

➢ How to Remove parallel system

If an inverter wants to exit this parallel system, perform the following steps:

- **Step 1.** Turn off the master first, then turn off the slave, and last, disconnect all relevant CT monitoring cables.
- **Step 2.**: Go to the settings page, turn off and enable, set to disable.

➢ Protection features

1. If the instantaneous voltage of the EPS exceeds 200V, it will enter standby without reporting an error.
2. EPS mode, frequency deviation of more than 2Hz, voltage deviation of more than 20V for one second, slave shutdown.
3. After the power grid is restored, the slave will automatically exit the EPS mode after waiting for about 10s (the master should notify the slave to shut down within about 10s normally).
4. The judgment condition of the instantaneous overload power of EPS is 150% when the machine is single and the value is 135% when it is in parallel.

➢ **Power on and off logic**

1. In grid-connected mode, parallel machines are the same as when they are stand-alone.
2. The off-grid the master first establishes a low voltage and then increases to a normal voltage. When shutting down, reduce the frequency to a low frequency, and then shut down.
3. The slave observed that the EPS port voltage is greater than a low voltage before starting, and observed that the frequency is reduced, and will shut down after a few time.
4. In short, when exiting EPS, the master notifies the slave to quit and then retire after exiting, and the master retires first. The slave machine will exit directly if it wants to.

➢ **Energy control logic**

In grid-connected mode, parallel machines are the same as when they are stand-alone.

When off-grid:
Output power distribution:
1. The difference between the SOC of the master and slave is not large, and the output power is the same.
2. The difference between the SOC of the master and slave is large, slave SOC is high, according to (slave SOC-master SOC) * 0.1 times output (maximum 3 times), master SOC is high, slave according to 1/(slave SOC-master SOC) * 0.1) output.

Slave charging logic to the Master:
1. If the Master SOC is low, or if the slave SOC is much larger than the Master and the slave SOC is not low, or if the slave SOC is sufficient and the Master SOC is much less than the slave, then charge the Master.
2. Stop charging the master if the SOC of the master is sufficient and the SOC of the slave is not much larger than SOC of the master and the SOC of the slave is not sufficient, or if the SOC of the slave is low, or if the SOC of the master is sufficient and the SOC of the slave is sufficient.

The logic of charging the slave by the Master:
1. If the Slave SOC is low, or if the Master SOC is much larger than the Slave and the Master SOC is not low, or if the Master SOC is sufficient and the Slave SOC is much less than the Master, then charge the Slave.
2. Stop charging the Slave if the SOC of the Master is sufficient and the SOC of the Master is not much larger than SOC of the Slave and the SOC of the Master is not sufficient, or if the SOC of the Master is low, or if the SOC of the Slave is sufficient and the SOC of the Master is sufficient.

☞ **Notice!**
- When on-grid, if the master want to charge the slave, the master should be in the discharge period; the slave want to charge the master, and the slave should be in the discharge period;
- When off-grid, there is no limit on the charging and discharging time period；
- The above 1 and 2 are aimed at battery discharge, and PV discharge has no limit.

➢ **Anti-overcharge and overdischarge logic**

1. If the output power of each phase of the master is greater than 80%, the slave will increase the output power of the corresponding phase.
2. If the input power of each phase of the master is greater than 80%, the slave reduces the output power of the corresponding phase.
（When the slave is working, the priority of preventing the master from charging or discharging at high power is higher than that of charging or discharging the slave.）

Warranty Registration Form

For Customer (Compulsory)

Name _____ Country _____

Phone Number _____ Email _____

Address _____

State _____ Zip Code _____

Product Serial Number _____

Date of Commissioning _____

Installation Company Name _____

Installer Name _____ Electrician License No. _____

For Installer

Module (If Any)

Module Brand _____

Module Size(W) _____

Number of String _____ Number of Panel Per String _____

Battery (If Any)

Battery Type _____

Brand _____

Number of Battery Attached _____

Date of Delivery _____ Signature _____

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

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

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

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

2 Wait for the camera to recognize the QR code

3 Click banner or notification when it appears on the screen

4 Warranty registration page will be loaded automatically