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浙江艾罗网络能源技术股份有限公司
SolaX Power Network Technology (Zhejiang) Co., Ltd.

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2. 装订方式：胶装或骑马钉，内页大于 60 页时须胶装；
3. 未注尺寸公差按 ±3 mm；
4. 图面、字体印刷清晰、无偏移、无毛边、不起边、油墨不脱落；
5. 黑色字体颜色为 PANTONE BLACK C, 无边框，底色为白色；
6. 符合 ROHS 要求。

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浙江艾罗网络能源技术股份有限公司

بھروسے اجالا زندگی میں ®
Fronus
SOLAR ENERGY

SOLAX
POWER

X3-Genki

User Manual

5kW / 8kW / 10kW / 12kW / 15kW

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About This Manual

Scope of Validity

This manual is an integral part of X3-Genki series inverter. It describes the transportation, storage, installation, electrical connection, commissioning, maintenance and troubleshooting of the product. Please read it carefully before operating.

This manual is valid for the following inverter models:

- X3-Genki-5K
- X3-Genki-8K
- X3-Genki-10K
- X3-Genki-12K
- X3-Genki-15K

Target Group

The installation and maintenance can only be performed by qualified personnel who:

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

Conventions

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

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

Table of Contents

1 Safety

1.1 General Safety

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

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

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

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

1.2 Safety Instructions of PV and Inverter

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

1.2.1 Safety Instructions of PV

DANGER!

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

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

WARNING!

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

WARNING!

- Make sure that the input DC voltage does not exceed the maximum DC input voltage specified for the inverter. Overvoltage can cause irreversible damage to the inverter, and such damage is not covered by the warranty.

1.2.2 Safety Instructions of Inverter

DANGER!

Potential risk of lethal electric shock associated with the inverter

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

WARNING!

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

WARNING!

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

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

WARNING!

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

WARNING!

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

CAUTION!

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

NOTICE!

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

2 Product Overview

2.1 Product Introduction

The X3-Genki series supports various intelligent solutions such as load management, wireless metering, dual battery terminals, etc. to achieve efficient and economical energy utilization. The X3-Genki series inverter is compatible with both Lithium-ion batteries and lead-acid batteries.

2.2 Appearance

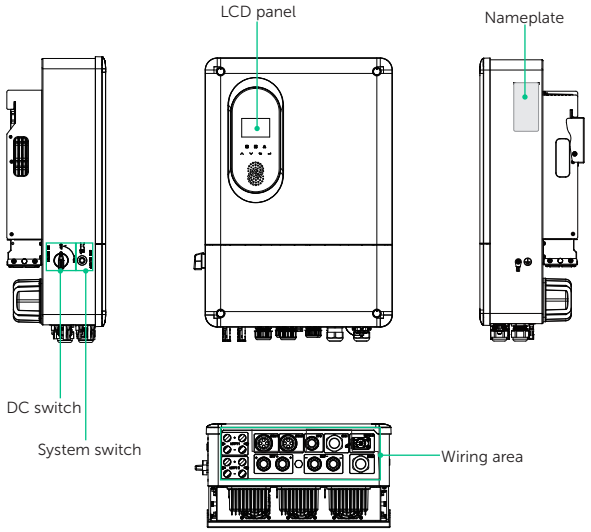


Figure 2-1 Appearance

Table 2-1 Description of appearance

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

Item	Description
System switch	Button pressed: ON, the system is allowed to operate; Button released: OFF, the system is not allowed to operate (no voltage output from EPS, and BAT terminals).
Wiring area	Including PV terminals, battery terminals, GEN terminals, EPS terminals, communication terminals, etc.

2.3 Symbols on the Label and Inverter

Table 2-2 Description of symbols

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

2.4 Working Principle

2.4.1 Working Principle

The inverter is equipped with multi-channel MPPT for DC input to ensure maximum power even under different photovoltaic input conditions. The inverter unit converts direct current into alternating current and supplies the load.

2.4.2 Application Schemes

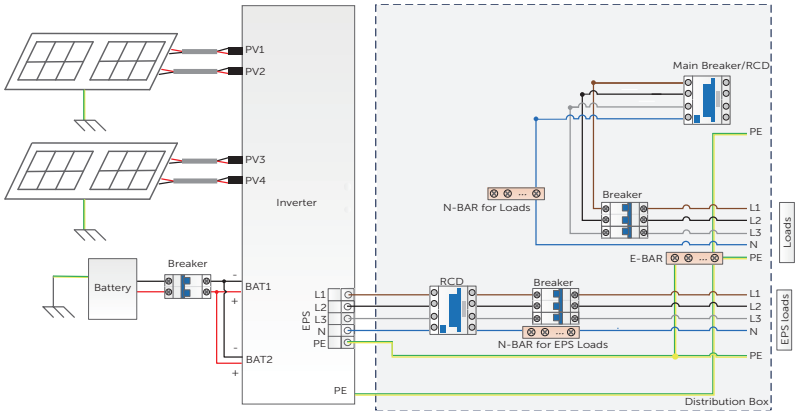


Figure 2-2 Partial home backup for most countries

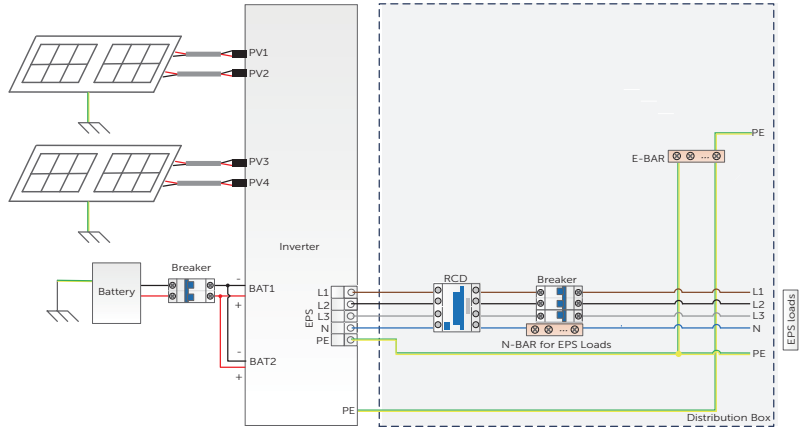


Figure 2-3 Whole home backup for most countries

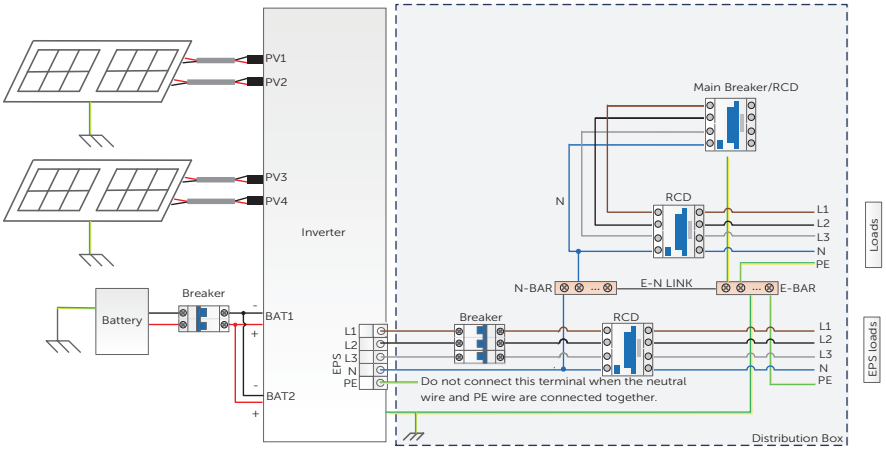


Figure 2-4 Neutral point connected to PE in distribution box

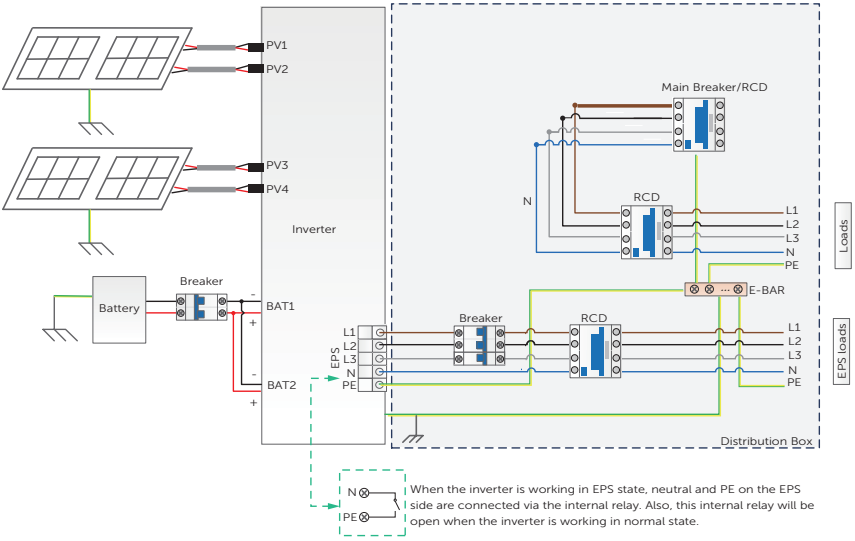


Figure 2-5 Neutral point separate from PE in distribution box

2.5 Working State

The series inverter has Wait, Check, Normal, Fault, Update, EPS Check, EPS Wait, EPS, GEN Check, GEN, Idle Standby and Force Wakeup state.

Table 2-3 Description of working state

State	Description
Wait	• The inverter is waiting for the conditions to be met in order to enter Checking state.
Fault	• The inverter detects error and prompts error code.
Update	• The inverter is updating ARM, DSP or BMS, etc.
EPS Check	• The inverter is checking for conditions to enter EPS state.
EPS wait	• Without utility power, the inverter waits to enter the EPS state (Overload or low SOC will cause the inverter to enter the EPS wait).
EPS	• The inverter is working in EPS state.
GEN Check	• The inverter is checking for conditions to enter generator state.
GEN	• The inverter is in the generator operating state.
Idle	• The battery SOC reaches the minimum SOC and there is no sufficient PV input voltage, etc.
Standby	• When the power of load is extremely low and there is no sufficient PV input voltage, or a state when the battery SOC is more than or equal to 10% and there is no sufficient PV input voltage, the inverter enters Standby state. • In this state, it detects PV connection, load power, battery forced charged, etc to determine whether to exit Standby state and enter Normal state.
Force Wakeup	• The system is forced to operate to wake up the battery and supplement its power.

3 System Overview

System Overview

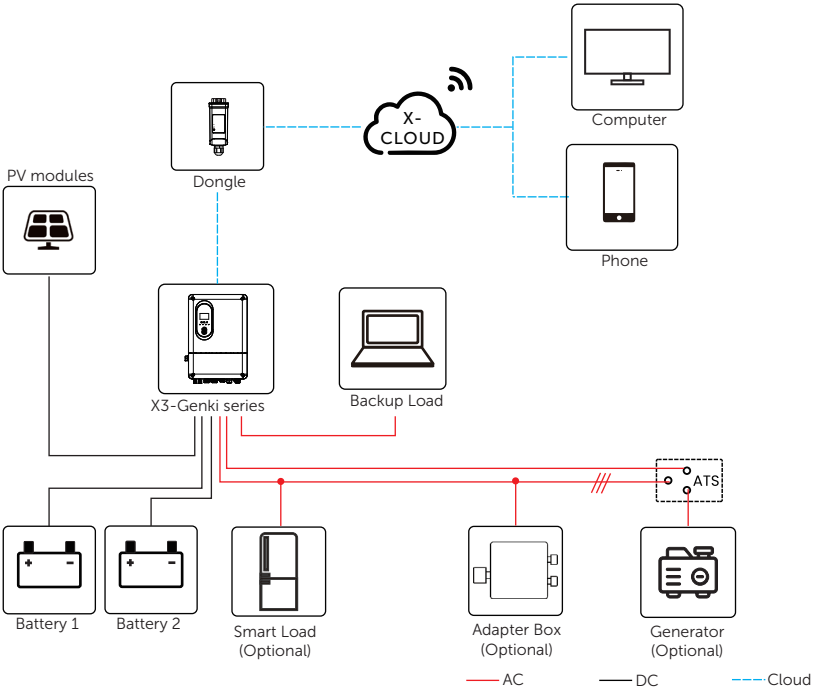


Figure 3-1 System diagram

Table 3-1 System item description

Item	Description
PV modules	PV modules work in MPPT mode.
Battery	The series inverter can be conencted with lithium-ion batteries or lead-acid batteries. Lithium-ion batteries communicate with the inverter through the BMS.
Adapter Box G2 (Optional)	With FRONUS Adapter Box G2, you can connect the smart heat pump to the energy storage systems, realizing the control of the heat pump through inverter.
Generator (Optional)	FRONUS PV-Genset solution ensures optimum interaction between the photovoltaics and diesel generator, which saves fuel, lowers energy costs and ensures a stable and reliable power supply.
Smart Load (Optional)	This mode utilizes the Gen input connectior as an output which only receives power when the battery SOC is above a user programmable threshold.
SolaX Cloud	SolaX Cloud is an intelligent, multifunctional monitoring platform that can be accessed either remotely or through a hard wired connection. With the SolaX Cloud, the operators and installers can always view key and up to date data.

4 Transportation and Storage

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

Transportation

- Observe the caution signs on the packaging of inverter before transportation.
- Pay attention to the weight of the inverter. Carry the inverters by the required number of personnel as specified by local regulations.
- Wear protective gloves when carrying the equipment by hand to prevent injuries.
- When lifting up the inverter, hold the handle position and the bottom position of the carton. Keep the inverter horizontal in case of falling down.

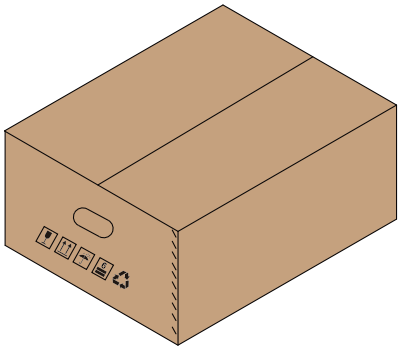


Figure 4-1 Caution signs on the packaging

Storage

- The inverter must be stored indoors.
- Do not remove the original packaging material and check the outer packaging material regularly.
- The storage temperature should be between -40°C and +70°C. The relative humidity should be between 5%RH and 65%RH.
- Stack the inverter in accordance with the caution signs on the inverter carton to prevent their falling down and device damage. Do not place it upside down.

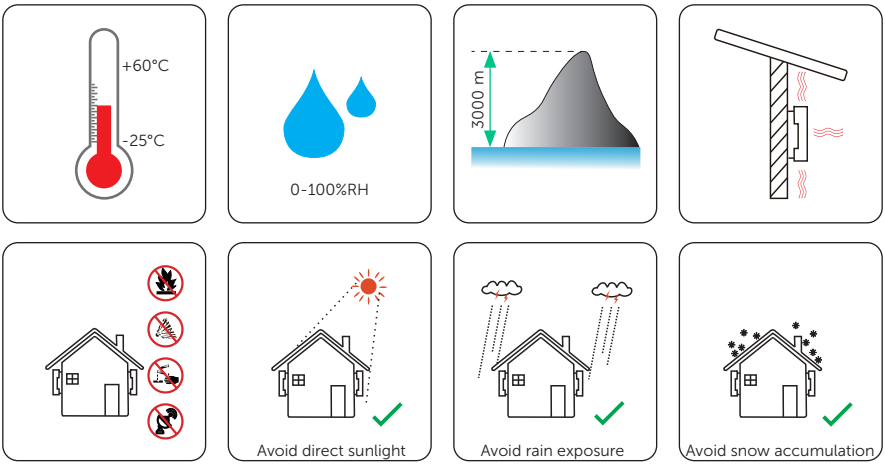
5 Preparation before Installation

5.1 Selection of Installation Location

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

5.1.1 Environment Requirement

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



NOTICE!

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

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

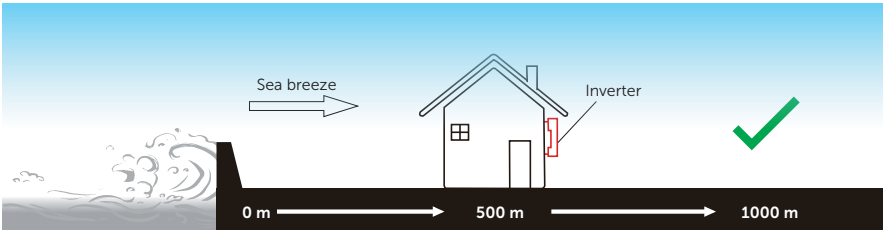


Figure 5-1 Recommended installation position

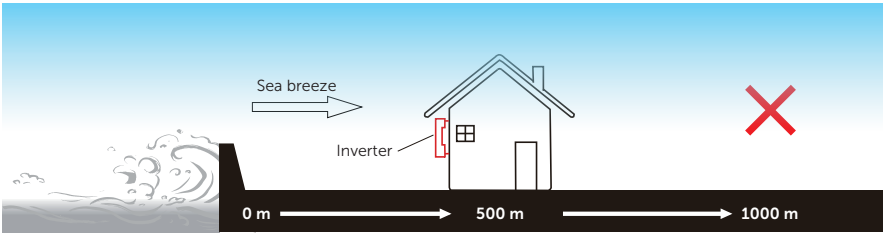


Figure 5-2 Incorrect installation position

NOTICE!

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

5.1.2 Installation Carrier Requirement

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

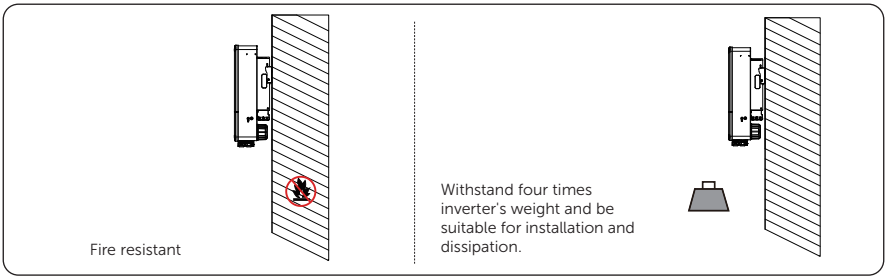


Figure 5-3 Installation carrier requirement

NOTICE!

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

5.1.3 Clearance Requirement

When planning installation space, please reserve space in the bottom of the inverter and consider the bend radius of the cables at the same time.

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

For installations with multiple inverters, make sure to leave a minimum space of 600 mm between each inverter laterally and 1000 mm vertically. In areas with high ambient temperatures, increase the clearances between the inverters and provide adequate fresh air ventilation if feasible.

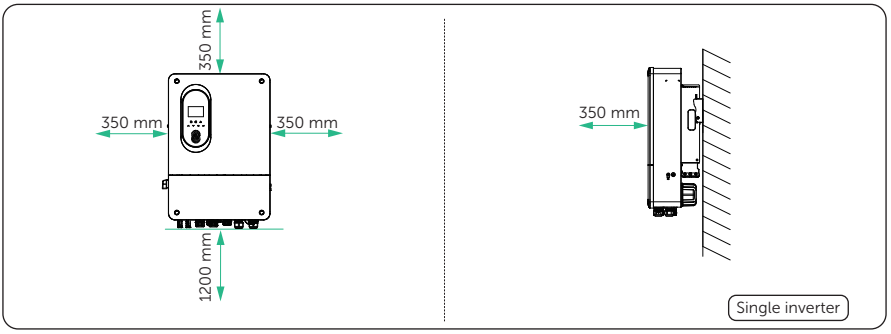


Figure 5-4 Clearance requirement for single inverter

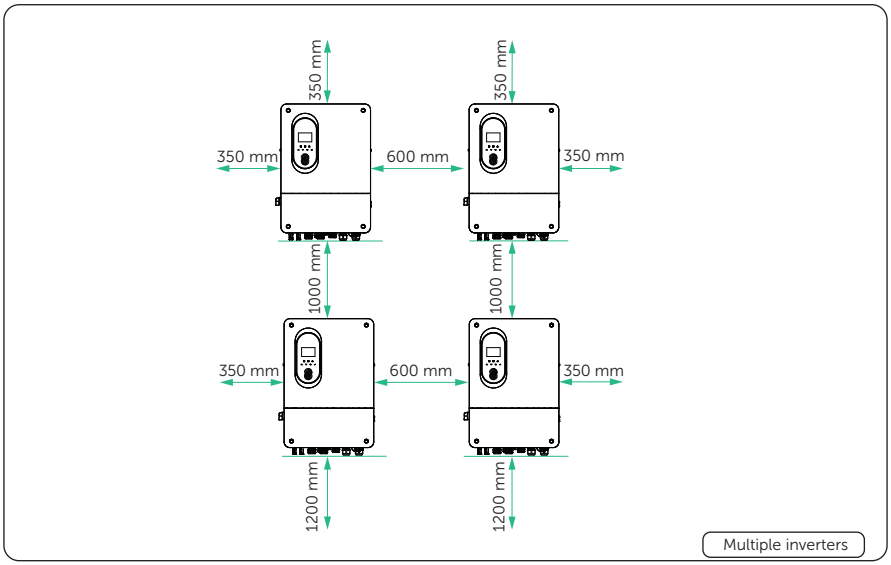
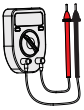


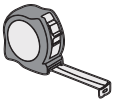
Figure 5-5 Clearance requirement for multiple inverters

5.2 Tools Requirement

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


Hammer drill
(drill bit: Ø10 mm)

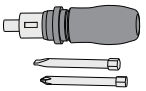

Multimeter
(≥ 1100 V DC)

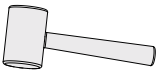

Measuring tape

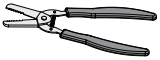

Utility knife


Marker

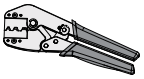

Spirit level

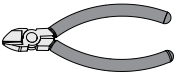

Torque screwdriver
(Flat-head: M2)
(Phillips head: M2.5 / M3 / M5)

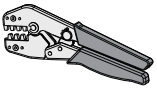

Rubber mallet

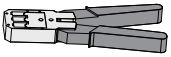

Wire stripper

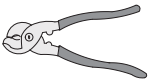

Torque wrench


Crimping tool for
PV terminals

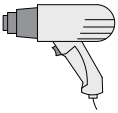

Diagonal pliers

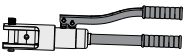

Crimping tool


Crimping tool for RJ45


Wire cutter


Heat shrink tubing
(Ø8 mm)

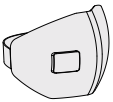

Heat gun


Hydraulic wire crimper
for battery terminal


Safety gloves


Safety boots


Safety goggles


Anti-dust mask

5.3 Additionally Required Materials

Table 5-1 Additionally required wires

No.	Required Material		Type	Conductor Cross-section
1	PV wire		Dedicated PV wire with a voltage rating of 1000 V, a temperature resistance of 105°C, a fire resistance grade of VW-1	4-6 mm^2
2	Communication wire		Network cable CAT5E	/
3	GEN and EPS wire		Five-core copper cable	6-10 mm^2
4	Battery power wire (2 sets, length<3 m)		/	35-50 mm^2
5	Additional PE wire		Conventional yellow and green wire	10-16 mm^2

Table 5-2 Circuit breaker recommended

Model	5 kW	8 kW	10 kW	12 kW	15 kW
Circuit breaker (For EPS and GEN terminal)	25 A	32 A	50 A	50 A	63 A

Table 5-3 Non-polarized DC circuit breaker recommended

Model	5 kW	8 kW	10 kW	12 kW	15 kW
Non-polarized DC circuit breaker (For BAT terminal)	200 A	320 A	320 A	400 A	400 A

Table 5-4 Anti-theft lock recommended

Required Material	Type	Remark
(Optional) Anti-theft lock	< Ø8 mm	Installed on the left side of the inverter for anti-theft purposes.

6 Unpacking and Inspection

6.1 Unpacking

- The inverter undergoes 100% testing and inspection before delivery. However, damages may still occur during transportation. Before unpacking, please carefully check the external packaging for any signs of damage, such as punctures or cracks.
- Unpacking the inverter according to the following figure.

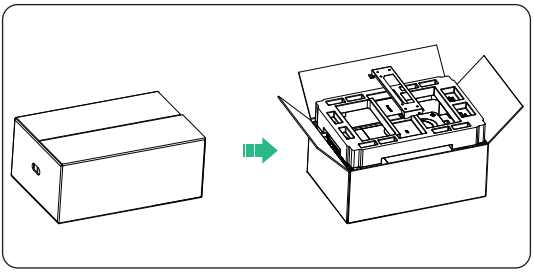


Figure 6-1 Unpacking the inverter

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

6.2 Scope of Delivery

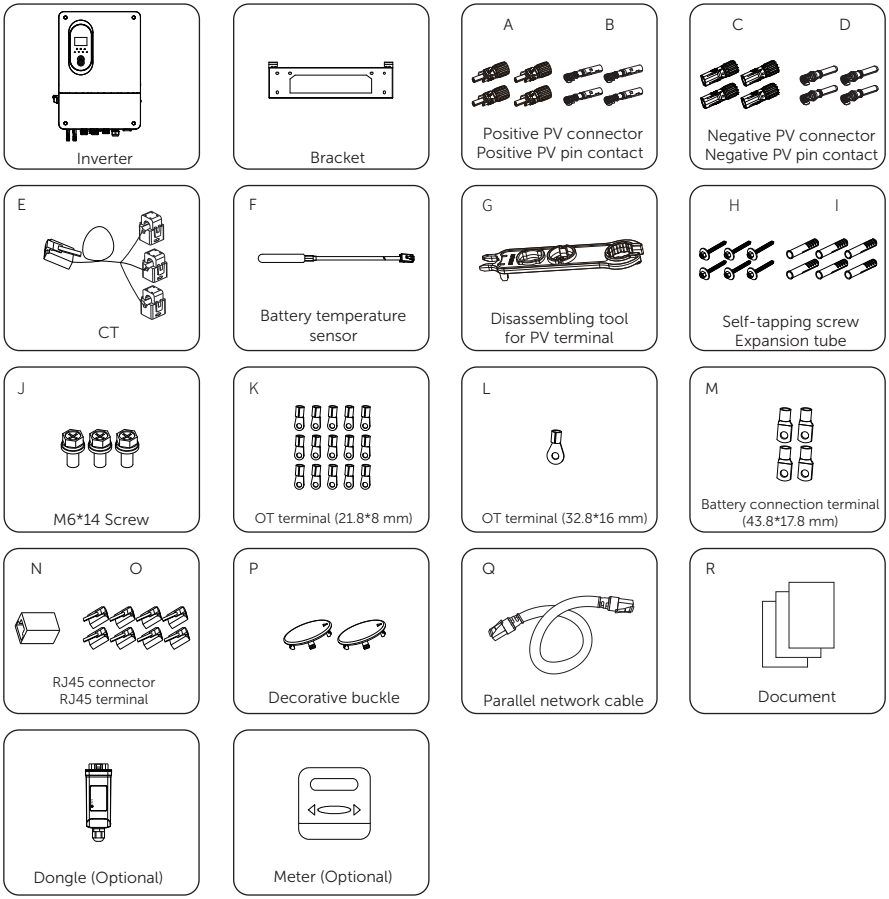


Table 6-1 Packing list

Item	Description	Quantity	Remark
/	Inverter	1 pc	
/	Bracket	1 pc	
A	Positive PV connector	4 pcs	4 pcs for X3-Genki-10K, 12K and 15K 2 pcs for X3-Genki-5K and 8K
B	Positive PV pin contact	4 pcs	
C	Negative PV connector	4 pcs	
D	Negative PV pin contact	4 pcs	

Item	Description	Quantity	Remark
E	CT	1 pc	
F	Battery temperature sensor	1 pc	Temperature sensor for lead-acid batteries
G	Disassembling tool for PV terminal	1 pc	
H	Self-tapping screw	6 pcs	Bracket mounting
I	Expansion tube	6 pcs	
J	M6*14 Screw	3 pcs	1 pc for grounding the inverter casing 2 pcs for securing the inverter to the bracket
K	OT terminal (21.8*8 mm)	15 pcs	5 pcs for GEN terminal 5 pcs for EPS terminal
L	OT terminal (32.8*16 mm)	1 pc	For grounding the inverter
M	Battery connection terminal (43.8*17.8 mm)	4 pcs	
N	RJ45 connector	1 pc	
O	RJ45 terminal	8 pcs	
P	Decorative buckle	2 pcs	For the upper cover of inverter
Q	Parallel Network cable	1 pc	For parallel connection
R	Document	/	
/	Dongle (Optional)	1 pc	
/	Meter (Optional)	1 pc	

NOTICE!

- Refer to the actual delivery for the optional accessories.
- The figures of packing list takes 15 kW inverter as an example.

7 Mechanical Installation

WARNING!

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

CAUTION!

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

NOTICE!

- Install the inverter at a maximum back tilt of 5 degrees and avoid it being forward tilted, side tilted, or upside down.

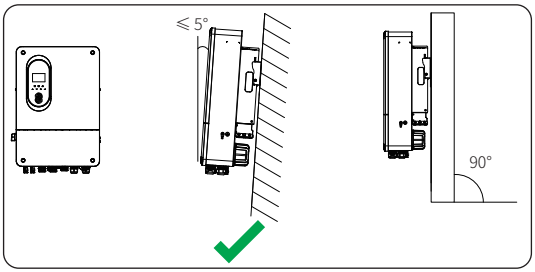


Figure 7-1 Correct installation

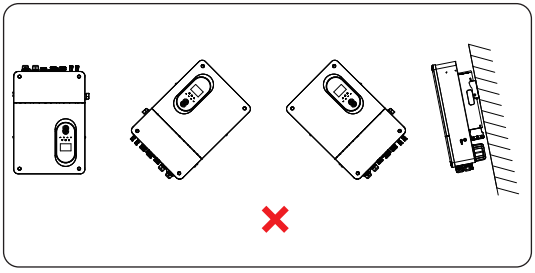


Figure 7-2 Incorrect installation

7.1 Dimensions for mounting

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

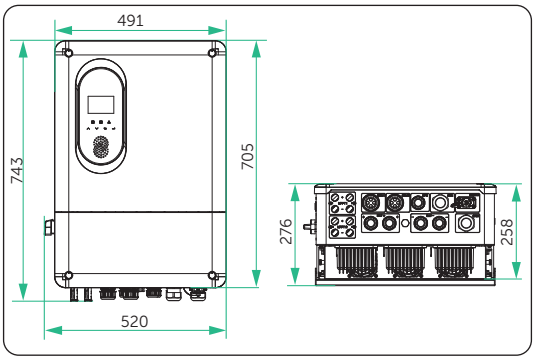


Figure 7-3 Dimensions 1 (Unit: mm)

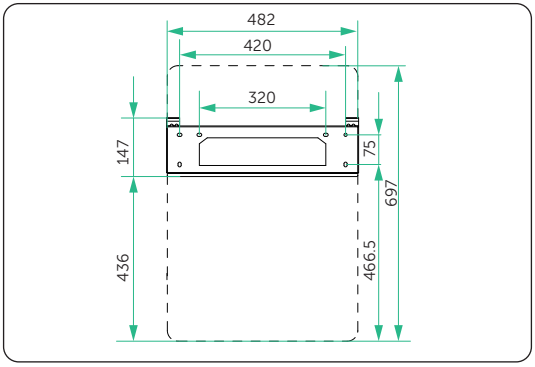


Figure 7-4 Dimensions 2 (Unit: mm)

7.2 Installation procedures

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

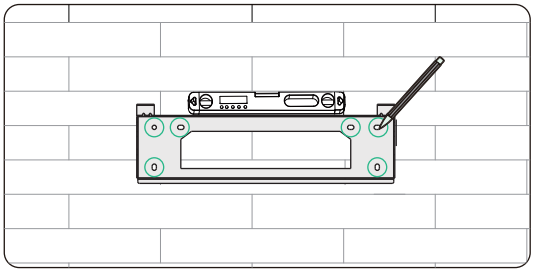


Figure 7-5 Marking the holes

Step 2: Set the wall mounting bracket aside and drill holes with Ø10 drill bit. The depth of the holes should exceed 55 mm.

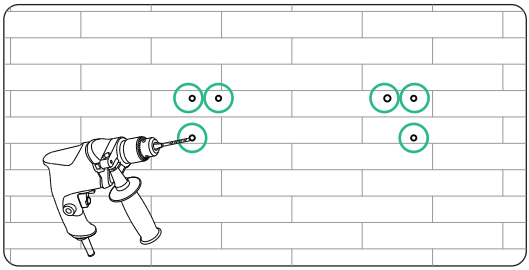


Figure 7-6 Drilling holes

Step 3: Knock the expansion tubes (part I) into the holes.

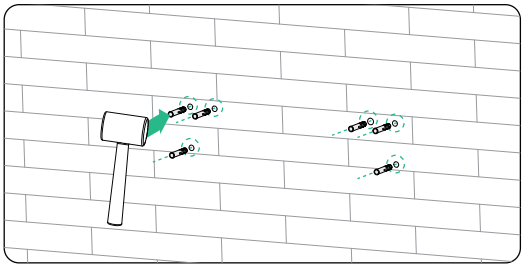


Figure 7-7 Knock the expansion tubes

Step 4: Use expansion screws (part H) to attach the wall mounting bracket on the wall again and secure them to the wall by torque wrench.

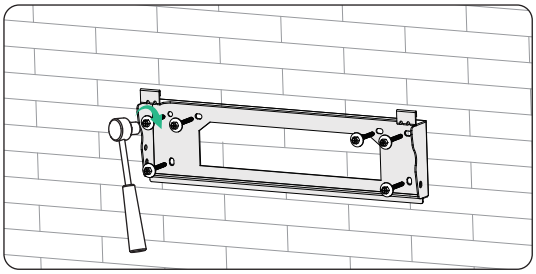


Figure 7-8 Securing the wall mounting bracket

Step 5: Open the anti-static bag, take out the inverter. Lift up the inverter collaboratively by the required number of personnel in accordance with the local regulation and hang it onto the wall mounting bracket. Make sure that the inverter is mounted on the bracket as shown in the diagram.

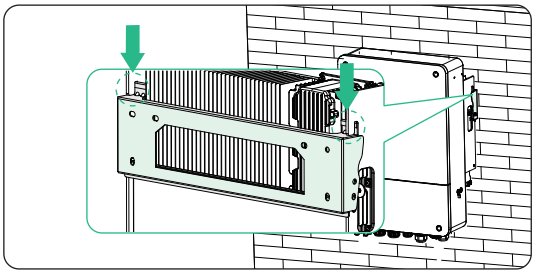


Figure 7-9 Hanging the inverter

Step 6: Use M6*14 screws (part J) to secure the inverter on both sides.

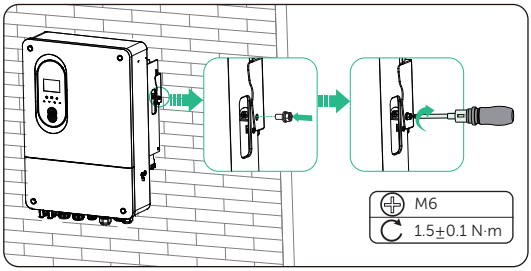


Figure 7-10 Securing the inverter (Right side)

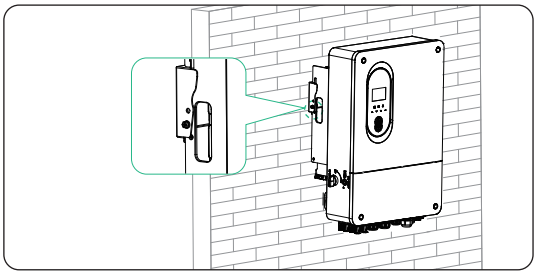


Figure 7-11 Securing the inverter (Left side)

Step 7: (Optional) For safety reason, install an anti-theft lock. The anti-theft lock is not in the scope of delivery. If necessary, prepare a lock with a diameter < Ø8 mm by yourself, and keep the key to the lock in a safe place.

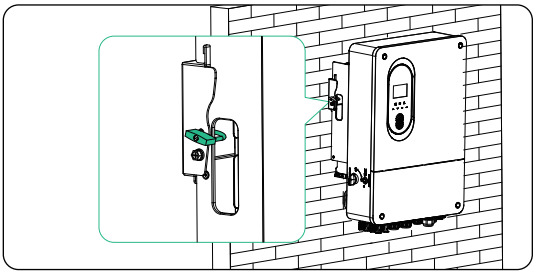


Figure 7-12 Locking the inverter

8 Electrical Connection

DANGER!

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

WARNING!

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

8.1 Overview of Electrical Connection

8.1.1 Terminals of Inverter

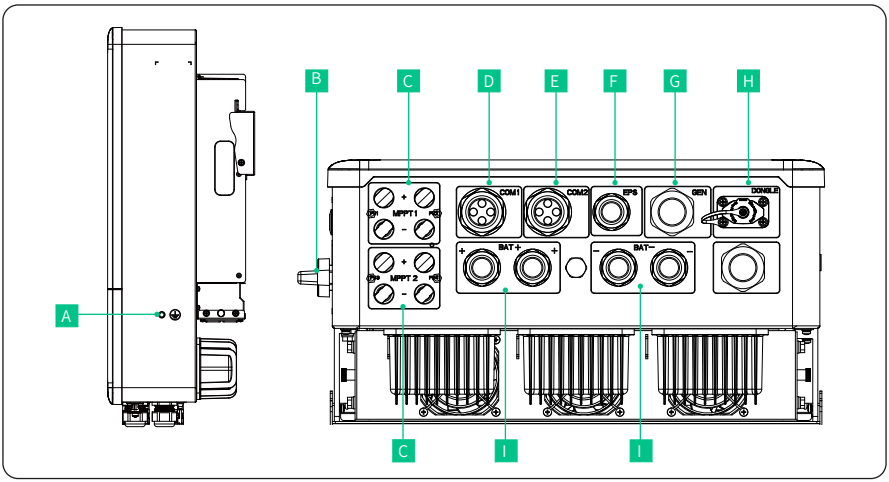


Figure 8-1 Terminals of Inverter

Table 8-1 Description of terminals

Item	Description	Remarks
A	Ground connection point	
B	DC switch	
C	PV input terminal	
D	COM 1 communication terminal	
E	COM 2 communication terminal	
F	EPS connection terminal	
G	GEN connection terminal	
H	Dongle terminal	
I	Battery connection terminal	

8.1.2 Cable Connections of Inverter

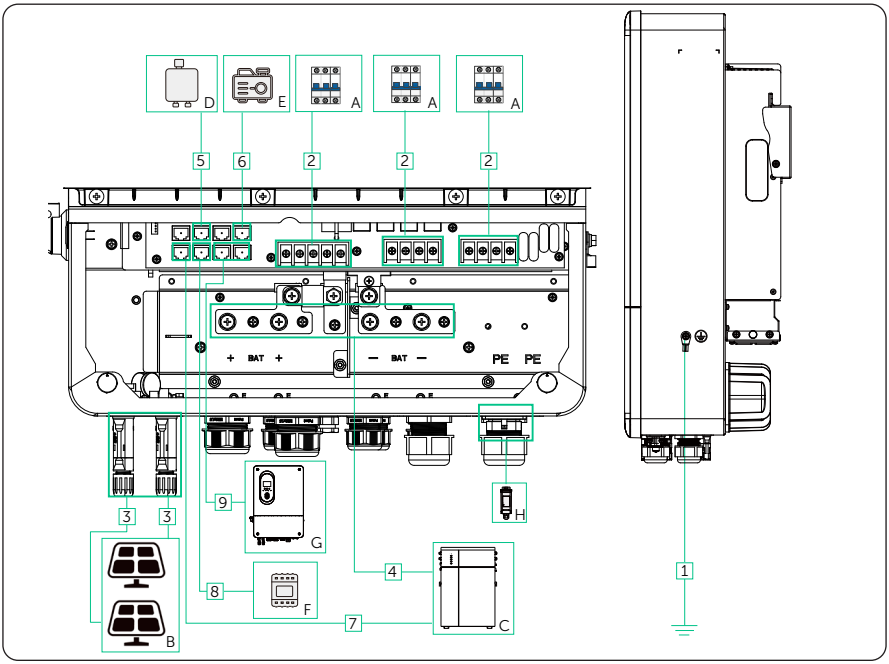


Figure 8-2 Cable connections of inverter

Table 8-2 Dsecriptons of connected part

Item	Part	Description	Source
A	AC swicth	Refer to "5.3 Additionally Required Materials" for the recommended specifications of AC switch.	Prepared by user
B	PV module	A PV string is composed of the PV modules connected in series.	Prepared by user
C	Battery	TP-LD53, TP-LD150 and lead-acid battery can be connected with the series inverter. For lithium-ion batteries, batteries from the same brand, model, and version should be connected. For lead-acid batteries, batteries with the same voltage, current, and amp-hour (AH) capacity should be connected.	Prepared by user
D	(Optional) communication device	Adapter Box G2, Datahub are supported. Select the device as needed.	Purchased from FRONUS
E	(Optional) Generator	For generator, select a generator equipped with an Automatic Transfer Switch (ATS), and the rated output power of the generator should be greater than the sum of the load power and the battery charging power.	Purchased from FRONUS
F	Meter	Supported FRONUS authorized DTSU666-CT or CT.	Purchased from FRONUS
G	(Optional) X3-Genki series inverter	Select a same model of inverter	Purchased from FRONUS
H	(Optional) Monitoring dongle	Only FRONUS monitoring dongle supported.	Purchased from FRONUS

Table 8-3 Descriptions of cables

Item	Cable	Type and specifications	Source
1	PE cable	Refer to "5.3 Additionally Required Materials".	Prepared by user
2	AC output cable		Prepared by user
3	PV DC input power cable		Prepared by user
4	Battery power cable for lithium battery	/	In the battery accessory package.
	Battery power cable for lead-acid battery	Refer to "5.3 Additionally Required Materials".	Prepared by user

Item	Cable	Type and specifications	Source
5	Communication cable	Refer to "5.3 Additionally Required Materials".	Prepared by user
6	Communication cable		Prepared by user
7	Battery communication cable (lithium battery)	/	In the battery accessory package.
	Battery temperature sensor(lead-acid battery)	/	In the inverter accessory package.
8	Communication cable	Refer to "5.3 Additionally Required Materials".	Prepared by user
9	Communication cable		Prepared by user

8.2 PE Connection

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

PE connection procedures

Step 1: Strip the insulation of the PE cable to an appropriate length.

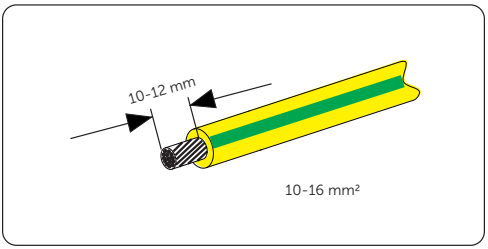


Figure 8-3 Striping the PE cable

Step 2: Insert the stripped section into the OT terminal (part L) .

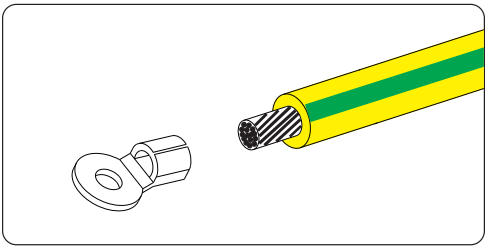


Figure 8-4 Installing the tubing and OT teriminal

Step 3: Crimp it with crimping tool.

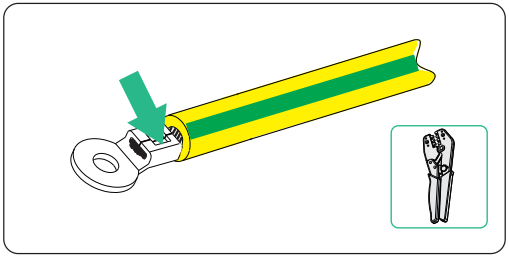


Figure 8-5 Crimping the cable

Step 4: Connect the assembled PE cable to the grounding point of the inverter, and secure it with M6*14 screw (Part J). (Torque: 1.5±0.1 N·m)

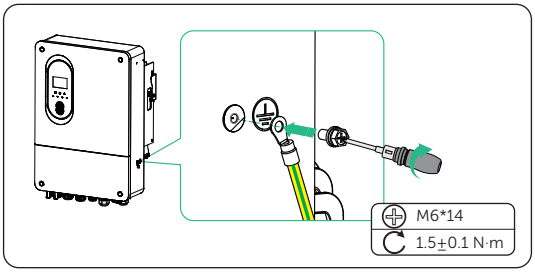


Figure 8-6 Securing the PE cable

8.3 Battery Power Cable Connection

DANGER!

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

Requirments for battery connection

- Battery
  - » FRONUS Lithium-ion battery and lead-acid battery.
  - » The inverter is equipped with two battery terminals. Max charge and discharge current is 300 A.
  - » Make sure the input voltage of each BAT terminal is higher than minimum voltage 40 V and lower than maximum input voltage 60 V.
- Micro circuit breaker (MCB)
  - » If the battery is integrated with a readily accessible internal DC breaker, no additional DC breaker is required. If lead-acid batteries are used, a DC circuit breaker needs to be installed between the battery and the inverter.
  - » The nominal voltage of DC MCB should be larger than maximum voltage of battery.
- Battery configuration information
  - » X3-Genki series inverter matches with FRONUS low voltage battery TP-LD53, TP-LD150. A single inverter can match with maximum 16 batteries. Without a minimum.

Wiring procedures

Step 1: Use a Phillips screwdriver to remove the inverter's upper cover as shown in the diagram.

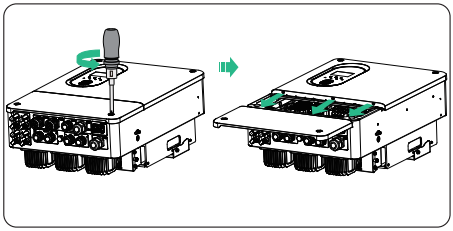


Figure 8-7 Removing the inverter's upper cover

Step 2: Use a Phillips screwdriver to remove the protective cover inside the inverter. Please store it properly after removal.

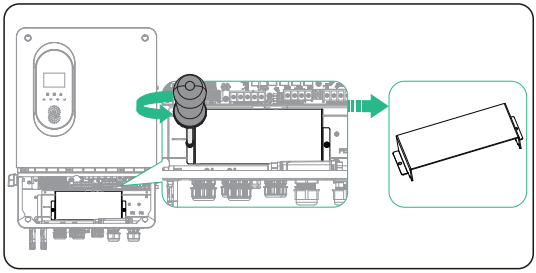


Figure 8-8 Remove the protective cover

Step 3: Strip the insulation of the battery power cable to an appropriate length.

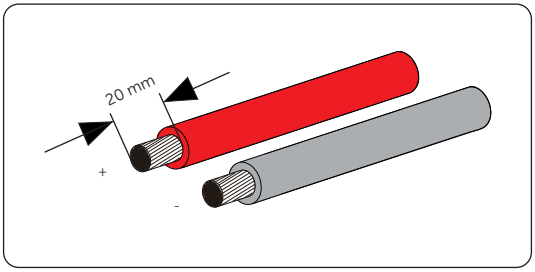


Figure 8-9 Stripping the battery cable

Step 4: Insert the stripped cable into the battery connection terminal (part M). Crimp it with crimping tool.

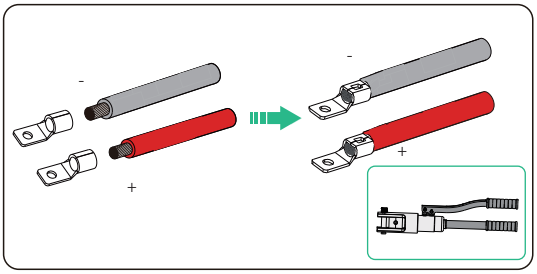


Figure 8-10 Crimping the terminal

Step 5: Loosen the swivel nut of the battery terminals then remove the screws.

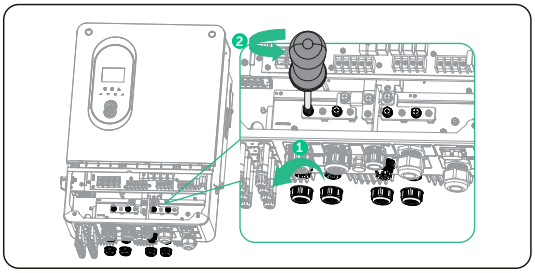


Figure 8-11 Threading the battery cable

Step 6: Thread the cable through the swivel nut, puncture a waterproof seal, then pass through the BAT terminal. Connect the positive and negative cables to their respective positions, screw back the removed screws (Torque: 5.0±0.1 N·m). Gently pull the cable backward to ensure firm connection. Tighten the swivel nut clockwise.

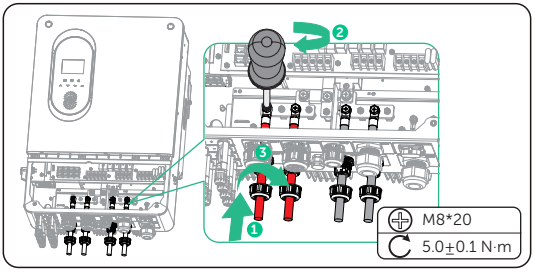


Figure 8-12 Connecting the battery cables

Step 7: Reinstall the protective cover onto the inverter.

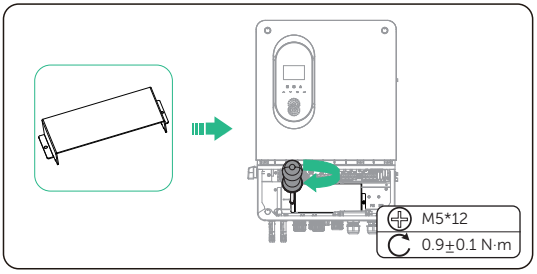


Figure 8-13 Reinstall the protective cover

8.4 AC Connection

The inverter supports the EPS mode.

Requirements for AC connection

- Residual Current Device (RCD)
  - » The inverter does not require an external RCD when operating. If an external RCD is required by local regulations, a 300 mA Type-A RCD is recommended. If required by local regulations, a Type-B RCD is also permitted.
- EPS load
  - » Make sure that the rated power of the EPS load is within the rated output power range of the inverter. Otherwise, the inverter will report an **EPS Overload Fault** alarm. In this case, turn off some loads to suit the rated EPS output power range of the inverter, and then press the **ESC** key on the LCD screen to clear the fault.
  - » When connecting to the EPS terminal, pay attention to the following points:

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

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

Table 8-4 EPS load information

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

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

Wiring procedures

NOTICE!

- Please refer to "5.3 Additionally Required Materials" to view the recommended wire sizes for EPS, and GEN.

Step 1: Prepare a GEN cable (Optional) and an EPS cable, strip the protective layer of L1, L2, L3, N and the grounding conductor according to the recommended length in the table.

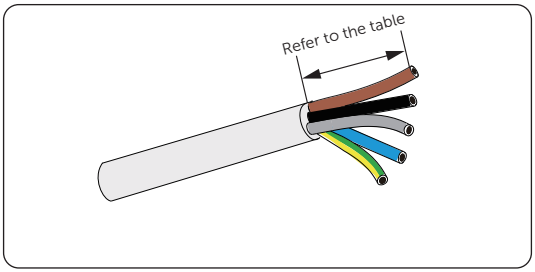


Figure 8-14 Stripping the cable

Table 8-5 Strip length (mm)

Length (mm)	L1	L2	L3	N	PE
GEN	120	120	120	120	110
EPS	130	130	135	120	140

Step 2: Strip the insulation layer of L1, L2, L3, N and the grounding conductor to a length of 10±0.5 mm

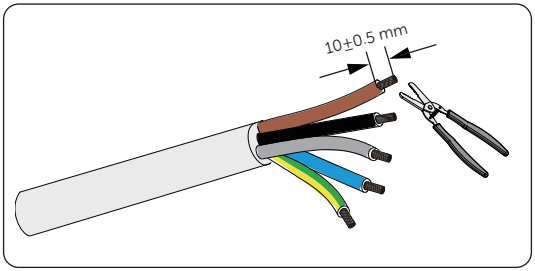


Figure 8-15 Strip the insulation

Step 3: Pull the heat-shrink tubing over the cable and insert the stripped section into the OT terminal (part K).

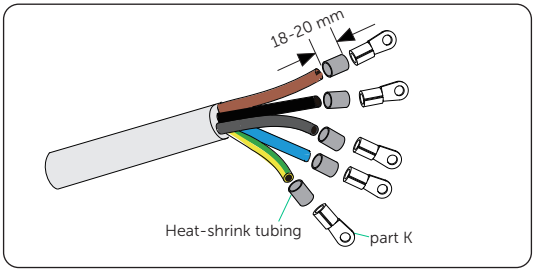


Figure 8-16 Installing the tubing and OT teriminal

Step 4: Crimp it with crimping tool, pull the heat-shrink tubing over the stripped section of the OT terminal and use a heat gun to shrink it so that it can be firmly contacted with the terminal.

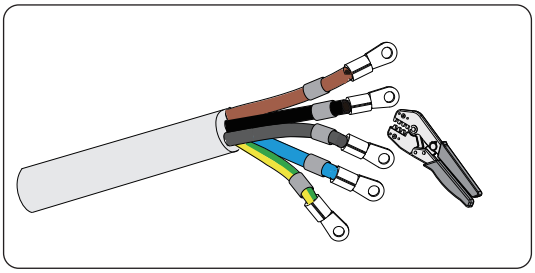


Figure 8-17 Crimping the cable

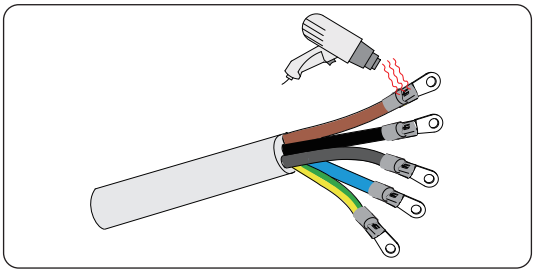


Figure 8-18 Shrinking the tubing

Step 5: Remove the swivel nut of GEN and EPS terminal. Remove the sealing ring which will be no longer used.

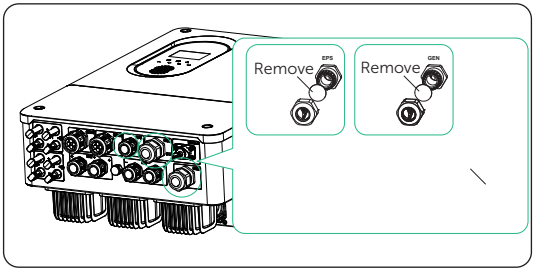


Figure 8-19 Removing the swivel nut

Step 6: (Optional) GEN terminal connection. Thread the crimped cables through the swivel nut and terminal. Insert the conductors into the terminal block and tighten the terminal block screws (Torque: 0.9 ± 0.1 N·m). Ensure that the conductors are firmly seated in the terminal. After connecting, tighten the swivel nut.

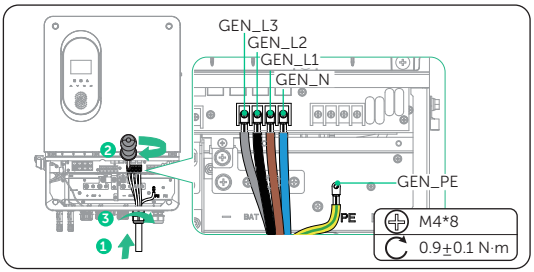


Figure 8-20 GEN terminal connection

Step 7: EPS terminal connection. Thread the crimped cables through the swivel nut and terminal. Insert the conductors into the terminal block and tighten the terminal block screws (Torque: 0.9 ± 0.1 N·m). Ensure that the conductors are firmly seated in the terminal. After connecting, tighten the swivel nut.

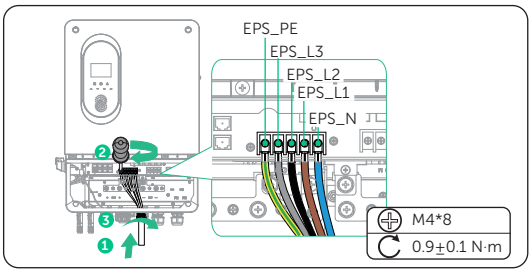


Figure 8-21 EPS terminal connection

DANGER!

- Before powering on the inverter, make sure the AC connector has been installed correctly on the EPS terminal even if the EPS terminal is not wired. Otherwise, electrical shock may be caused by high voltage, resulting in serious personal injury or death.

WARNING!

- Reinstall AC terminal caps immediately after removing the connectors from the terminals.

8.5 PV Connection

DANGER!

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

WARNING!

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

CAUTION!

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

Requirements for PV connection

- Open circuit voltage and operating voltage
  - » The open circuit voltage of each module array cannot exceed the maximum PV input voltage (1000 V) of the inverter. Otherwise, the inverter may be damaged.
  - » The operating voltage of PV modules must be within the MPPT voltage range (80-950 V) of the inverter. Consider the impact of low temperature on the voltage of the photovoltaic panels, as lower temperatures tend to result in higher voltages.
- PV module
  - » The PV modules within the same MPPT channel are of the same brand. Additionally, the strings within the same channel should have identical quantities, and be aligned and tilted identically.
  - » The positive or negative pole of the PV modules should not be grounded.
  - » The positive cables of the PV modules must be connected with positive DC connectors.
  - » The negative cables of the PV modules must be connected with negative DC connectors.

Wiring procedures

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

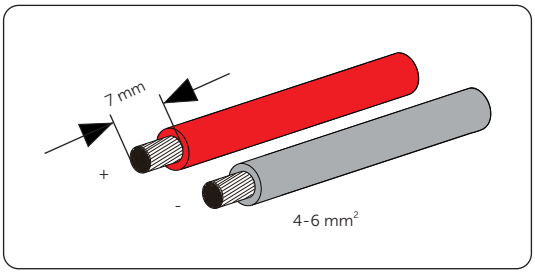


Figure 8-22 Stripping the PV cable

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

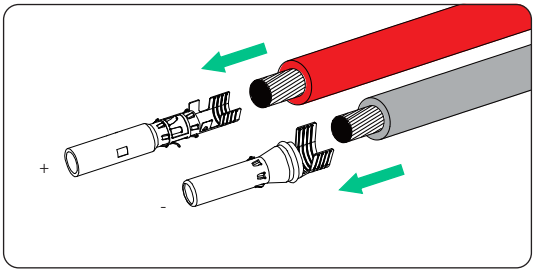


Figure 8-23 Inserting the PV pin contact

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

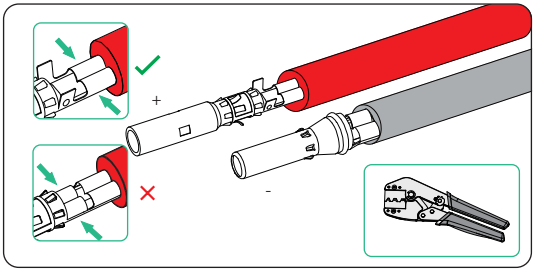


Figure 8-24 Crimping the terminal

Step 4: Thread the PV cable through swivel nut and insert the cable into the PV connector (part A, B, C, D).

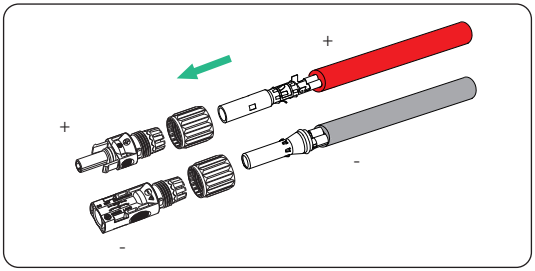


Figure 8-25 Threading the PV cable

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

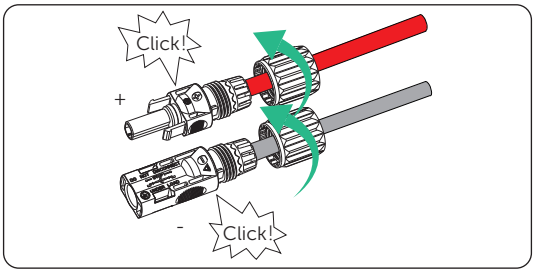


Figure 8-26 Securing the PV cable

Step 6: Use a voltage measuing device which complies with the local regulation to measure the positive and negative voltage of the assembled PV connectors. Make sure the open circuit voltage does not exceed the input limit of 1000 V.

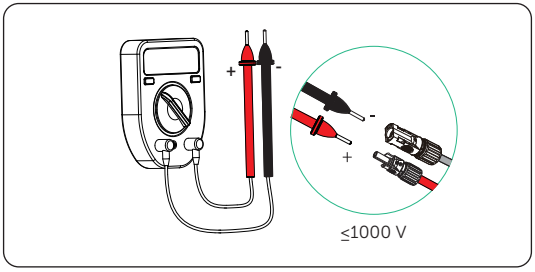


Figure 8-27 Measuring the voltage of PV connectors

NOTICE!

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

Step 7: Use the PV removal tool (part G) to remove the PV terminal caps and connect the assembled PV connectors to the corresponding terminals until there is an audible "Click". The PV+ on the string side must be connected to the PV+ on the inverter side, and the PV– on the string side must be connected to the PV– on the inverter side.

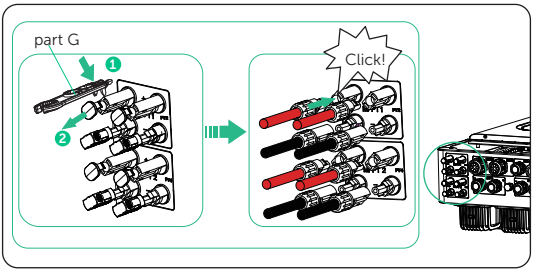


Figure 8-28 Connecting the PV cable

WARNING!

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

9 Communication Connection

9.1 Pin Assignment of COM Terminal

Battery communication or battery temperature sensor connection via BMS terminal, CT/Meter connection via CT/METER terminal.

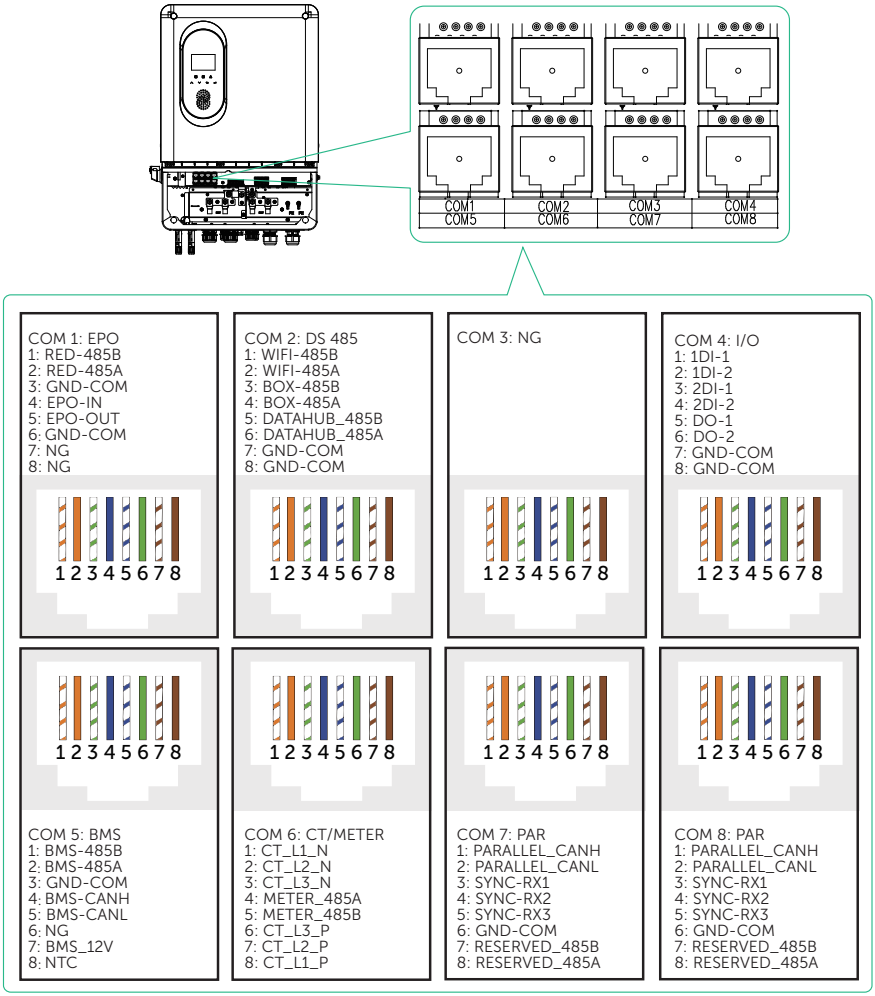


Figure 9-29 Pin assignment

NOTICE!

- When using the Lithium battery, refer to "9.2 Battery Communication Connection" for wiring procedure; when using lead-acid batteries, refer to "9.3 Battery Temperature Sensor Connection".

9.2 Battery Communication Connection

Connection diagram

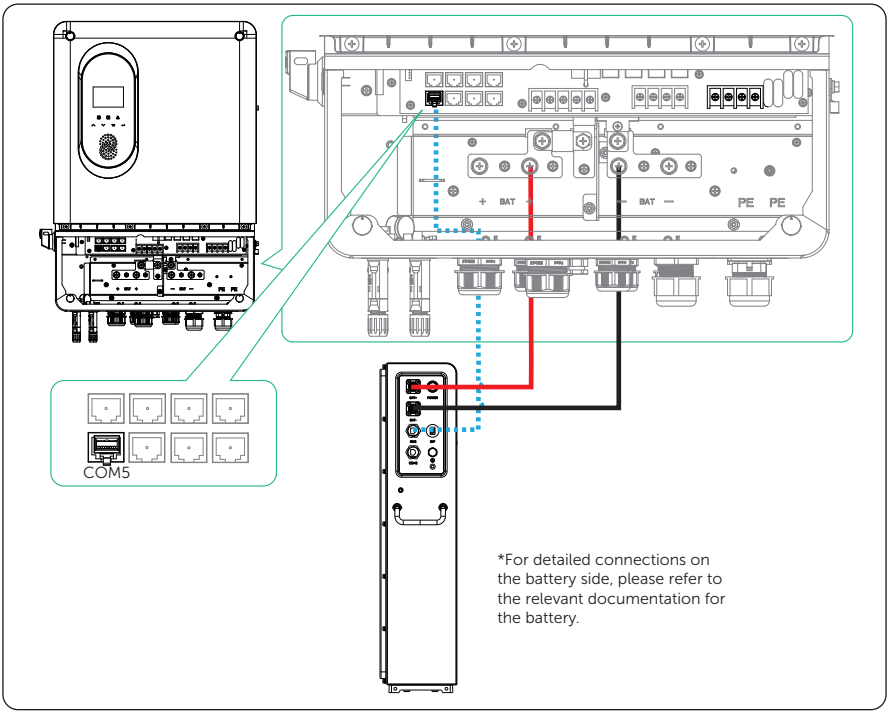


Figure 9-30 BMS connection diagram

Wiring procedure

Step 8: Loosen the swivel nut on the enclosure, and then remove the sealing plugs from the cable support sleeve as needed. Do not remove the sealing plugs from holes if you choose not to connect the cable.

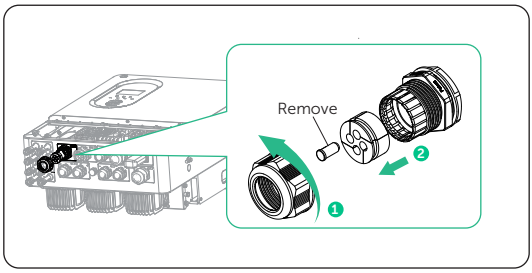


Figure 9-31 Disassembling the connector

Step 9: Find the battery communicaiton cable in the battery accessory package. Directly thread the cable through the swivel nut, cable support sleeve and connector enclosure in sequence.

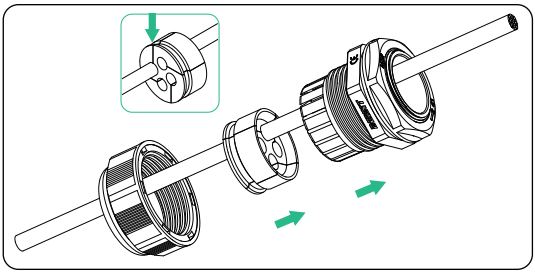


Figure 9-32 Threading the cable

Step 10: Strip the insulation to an appropriate length.

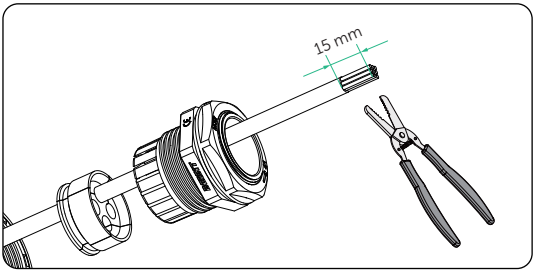


Figure 9-33 Stripping the insulation

Step 11: Insert the stripped section into the RJ45 terminals (part O). Crimp it tightly with a crimping tool for RJ45. Pay attention to the pin order of RJ45 terminals. Use a network cable tester to check if the cable has been correctly and properly crimped before connecting to inverter.

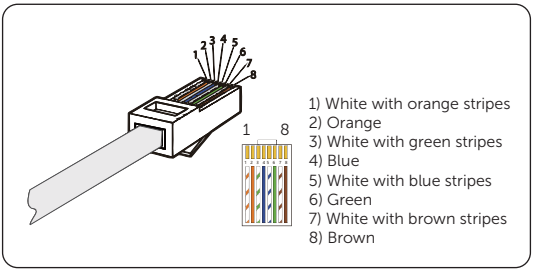


Figure 9-34 Crimping the communication cable

Step 12: Insert the RJ45 connector into the COM 5 located inside the inverter. You will hear an audible "Click".

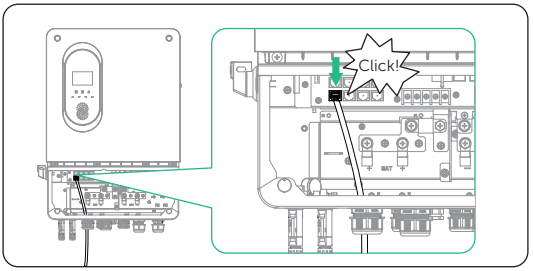


Figure 9-35 Inserting the connector to COM 1

9.3 Battery Temperature Sensor Connection

Connection diagram

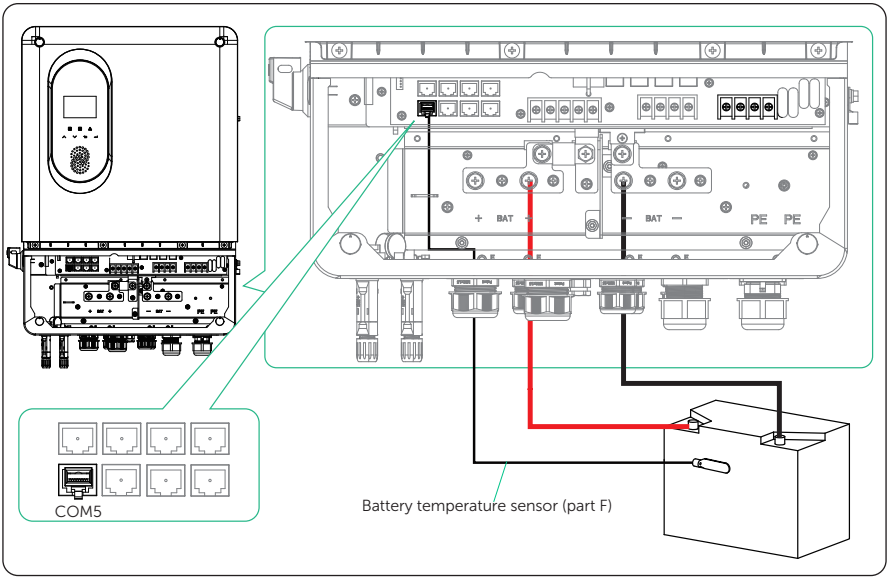


Figure 9-36 Battery temperature sensor connection diagram

Wiring procedure

Step 1: Loosen the swivel nut, and then remove the sealing plugs from the cable support sleeve as needed. Do not remove the sealing plugs from holes if you choose not to connect the cable.

Step 2: Thread the NTC (part F) through the swivel nut, cable support sleeve and connector enclosure in sequence.

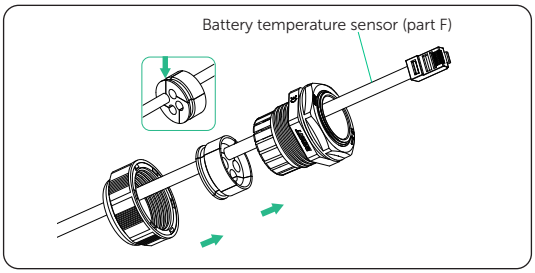


Figure 9-37 Threading the NTC

Step 3: Insert the RJ45 connector into the COM 5 located inside the inverter. You will hear an audible "Click".

Step 4: Connect the other end to the lead-acid battery, ensuring that the battery temperature is measured.

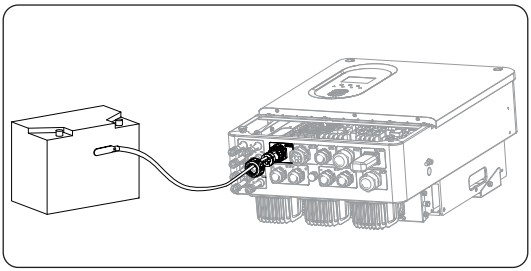


Figure 9-38 Connecting the NTC

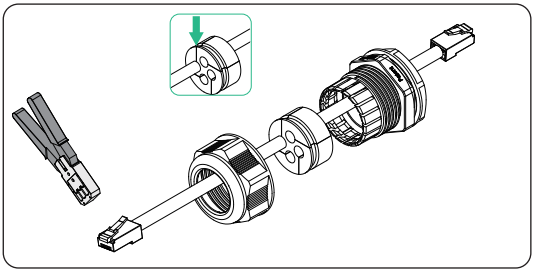


Figure 9-39 Crimping the RJ45

9.4 Upper Cover Installation

Step 1: After the connection is completed, replace the upper cover as follows (Torque: 2.8±0.1 N·m).

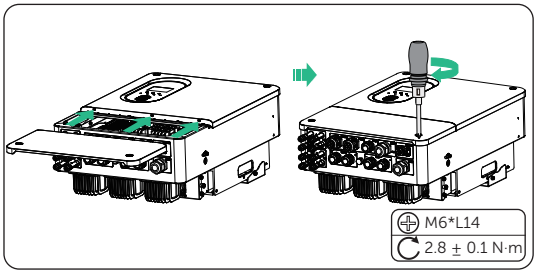


Figure 9-40 Install the upper cover

Step 2: Install the screw cover (part P) into the hole position on the upper cover.

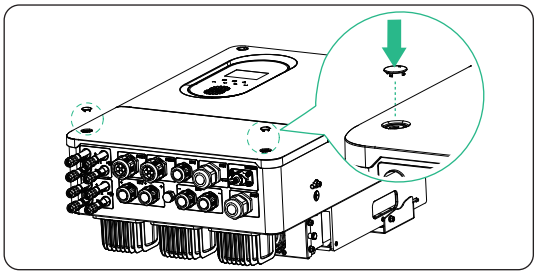


Figure 9-41 Install the upper cover

9.5 Monitoring Connection

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

Monitoring connection diagram

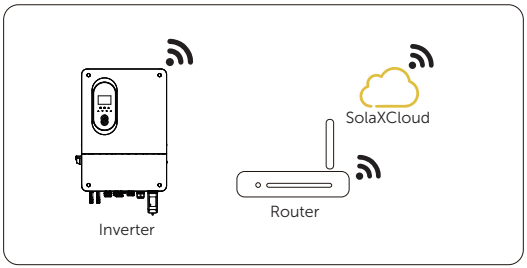


Figure 9-42 Wi-Fi mode connection diagram

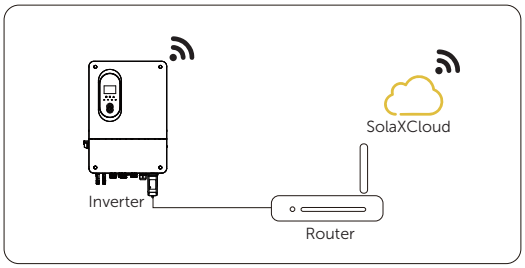


Figure 9-43 LAN mode connection diagram

Monitoring wiring procedure

Wi-Fi mode:

a. Assemble the dongle.

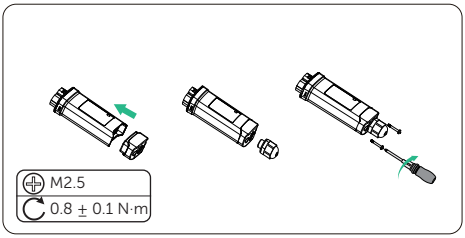


Figure 9-44 Assembling the dongle

b. Plug the dongle to the inverter.

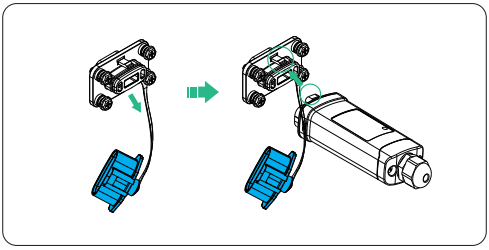


Figure 9-45 Dongle connection procedure

CAUTION!

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

NOTICE!

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

NOTICE!

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

LAN mode:

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

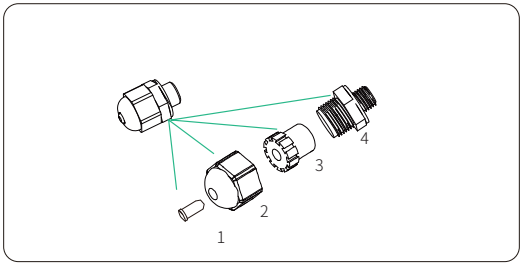


Figure 9-46 Disassembling the waterproof connector

b. Assemble the dongle.

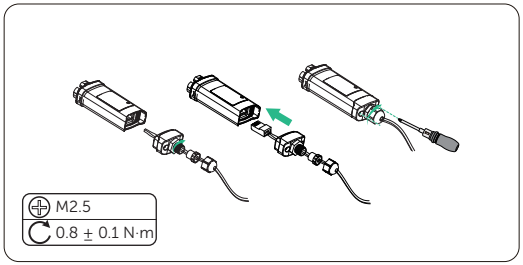
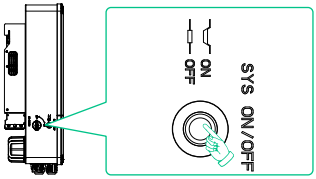


Figure 9-47 Assembling the dongle

c. Plug the dongle to the inverter.

10 System Commissioning

10.1 Checking before Power-on

No.	Item	Checking details
1	Installation	The inverter is installed correctly and securely. The battery is installed correctly and securely. Other device (if any) is installed correctly and securely.
2	Wiring	All DC, AC cables and communication cables are connected correctly and securely; The ground cable is connected correctly and securely;
3	Breaker	All the DC breakers and AC breakers are OFF;
4	Connector	The external AC and DC connectors are connected; The connectors on the EPS terminal are connected correctly and securely.
5	Unused terminal	Unused terminals and ports are locked by waterproof caps.
6	Screw	All the screws are tightened.
7	System switch	The system switch on the left side of the inverter is in the OFF (pop-up) state. 

10.2 Powering on the System

Step 1: Turn on the DC switch and check the LCD screen.

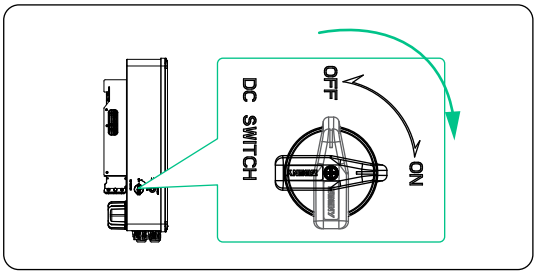


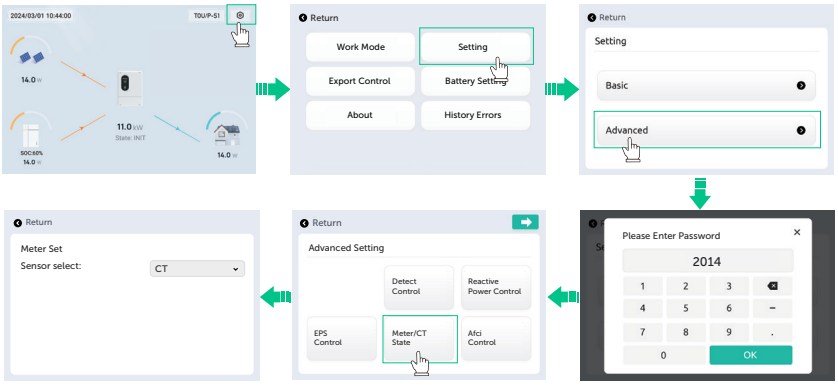
Figure 10-48 Turn on the DC switch

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

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

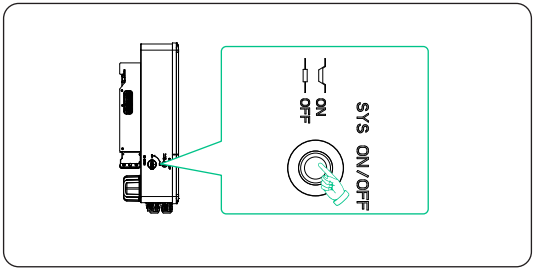
Step 2: Switch on the AC breaker and wait for the inverter power on.

» Select **None** based on actual usage, with CT as the default.

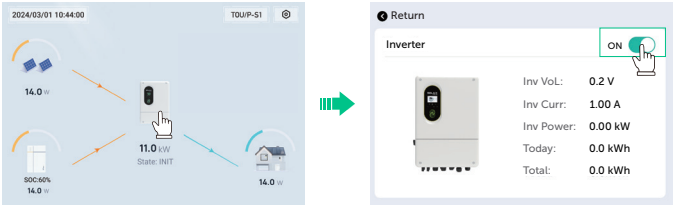


Step 3: Switch on the battery or the breaker, button, DC switch of the battery (see documentation of the battery manufacturer).

Step 4: Press the system switch down to the ON.



Step 5: Switch on the system switch on the LCD.



Step 6: Wait for the inverter to start up.

11 Operation on LCD

11.1 Introduction of Control Panel

The default menu is shown as below. In this interface, you can tap on the four icons of PV, battery and load to check the basic information of each part. .

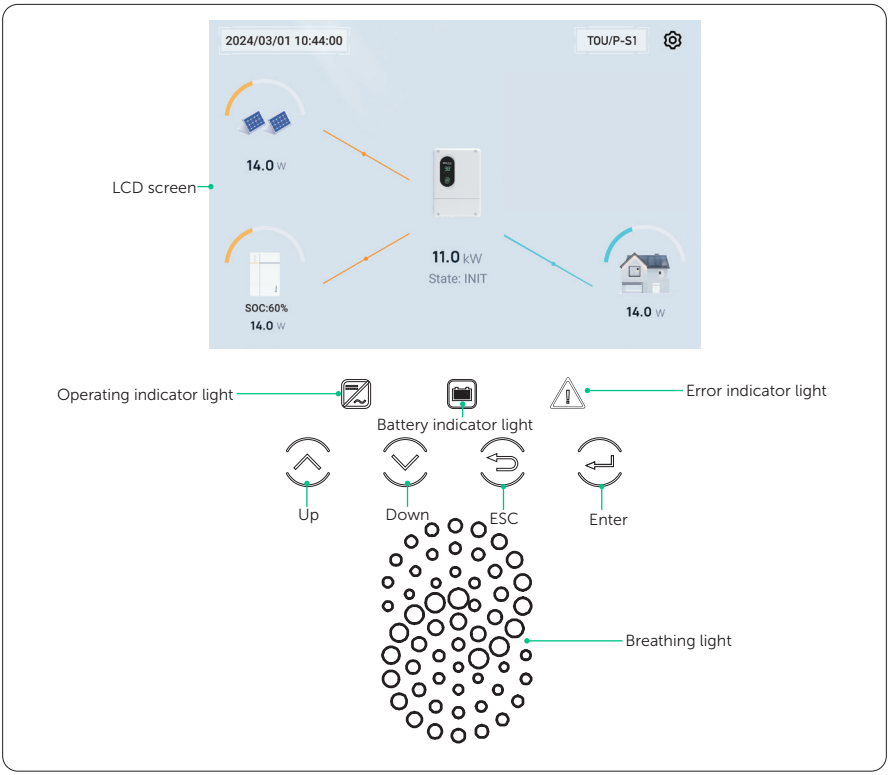


Figure 11-1 Control Panel

- The semi-circular arcs on each icon represent the ratio of current power to the full-load power.
- The position of the dots on the connecting lines between the inverter icon and the other icons indicates the current status of inputs or outputs.

Table 11-1 Definition of indicators

LED indicator	Status		Definition
Operating		Light on	The inverter is in a normal state.
		Blinking	The inverter is in the process of EPS.
	/	OFF	The inverter is in fault or manual shutdown state.
Battery		Light on	The battery is online and the voltage is normal.
	/	OFF	Low battery voltage or no battery.
Error		Light on	The inverter is in a fault state, stop runnning.
		Blinking	The inverter has an alarm message.
	/	OFF	The inverter has no faults or alarms.

Table 11-2 Definition of keys

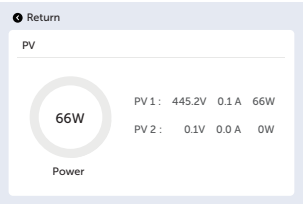
Key	Definition
ESC key	Exit from the current interface or function
Up key	Move the cursor to the upper part or increase the value
Down key	Move the cursor to the lower part or decrease the value
Enter key	Confirm the selection

Table 11-3 Definition of breathing light

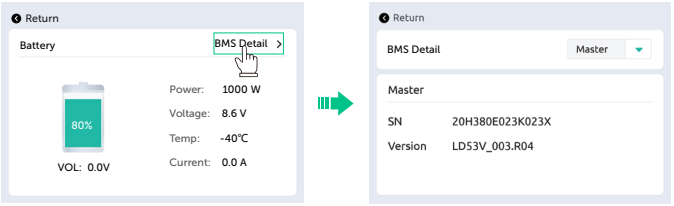
Key	Status		Definition
Breathing light		Green blinking	Both inverter and battery are in normal status.
		Red blinking	The inverter has alarm information.
		Blue blinking	The battery is in normal status, but the battery SOC is lower than the set min SOC.
		Green, blue and red lights flash in turns	The upgrade is in progress. After successfully upgraded, the light turns green and the buzzer sounds for one second.

11.2 Introduction of Menu Interface

- **PV**: Display the information about **PV1**, **PV2**. Information contains input voltage, current and power of each PV.



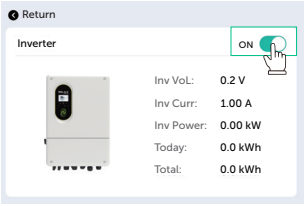
- **Battery**: Display the information about **Battery**. Information contains the power voltage, current, temprature and SOC status. Positive value means charging; Negative value means discharging. Select the **BMS detail**, you can see the battery's SN number and Version.



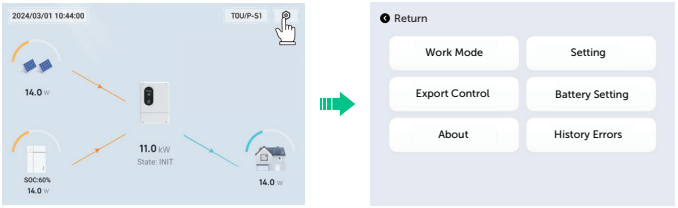
» **Consume Today**: The electric energy consumed by the inverter today.

» **Consume Total**: The electric energy consumed by the inverter since the inverter activated for the first time.

- **Load:** Information contains the total load, Load three-phase voltage, current, power
- **Inverter:** You can **Power ON/OFF** the inverter after tapping the icon of the inverter. Information contains the inverter voltage, inverter current, inverter power, Input/export electric energy of the inverter today and Total input/export electric energy since the inverter activated for the first time. Positive value with power means power output; Negative value means power input.



- **Setting:** Here you can set or choose the **Work Mode**, **Export Control**, **About, Setting**, **Battery Setting**, **History Errors**.



11.3 Battery Setting

Displaying path: >**Battery Setting**

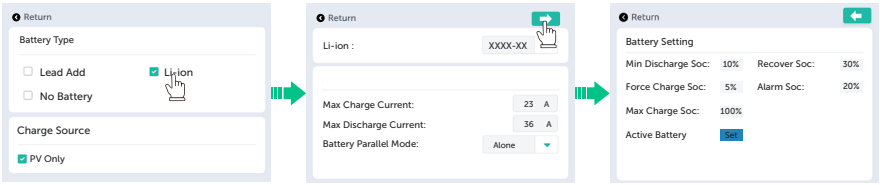
- **Battery type**: Select the battery type according to the actual battery used.
- **Charge Source**: Select the source to charge the battery.

NOTICE!

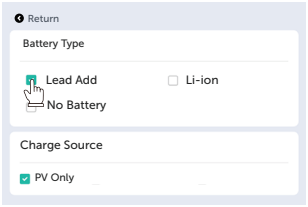
- The settings must be: **Min Discharge Voltage/Soc** < **Alarm Voltage/Soc**, otherwise, the settings will not be successful.
- The priority of **Alarm Voltage/Soc** is higher than all working modes.

11.3.1 Li-ion battery setting

- **Max Charge Current**: Default: 160 A, range: 0-300 A
- **Max DisCharge Current**: Default: 160 A, range: 0-300A
- **Battery Parallel Mode**: Set up the battery parallel mode
- **Recover Soc**: When the battery SOC drops below the **Min Discharge Soc**, the battery must recover to above the **recovery Soc** before it can resume discharging and supply power. Default: 30%, range: 5-100%
- **Force Charge Soc**: Default: 5%, range: 1-100%
- **Max Charge Soc**: Default: 100%, range: 80-100%

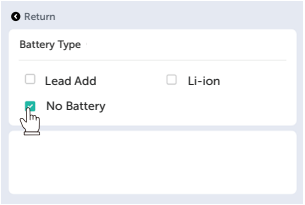


11.3.2 Lead battery setting



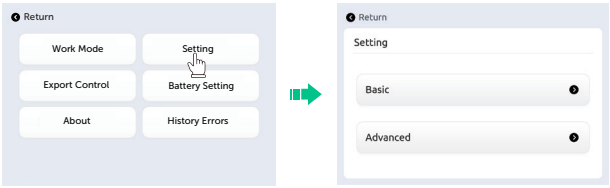
11.3.3 No Battery

No battery is connected.



11.4 Setting

Settings includes Basic Settings and Advanced Settings.

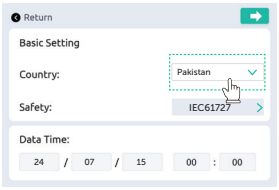


11.4.1 Basic Setting

Setting path: >**Setting**>**Basic Setting**

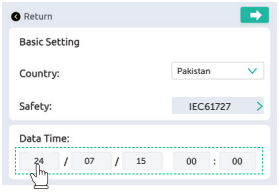
You can set the **Country**, **Safty**, **Data&Time**, **Phase Self Adaption** and **Unbalance Output** in Basic setting.

Setting Country



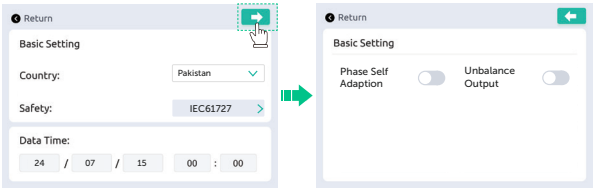
Setting Data Time

The display format is "24-07-15 00:00", in which the first two numbers represent the year (e.g. 2000~2099); the third and fourth numbers represent the month (e.g. 01~12); the fifth and sixth numbers represent the date (e.g. 01~31). The remaining numbers represent the time.



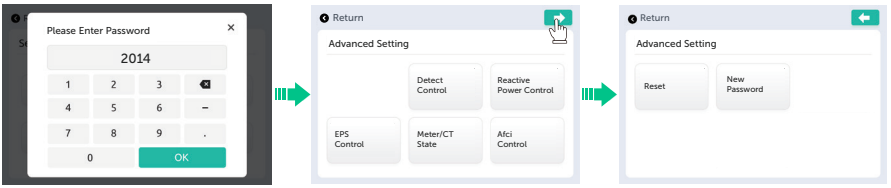
Setting Phase Self Adaption and Unbalance Output

- **Unbalance Output:** Enable Unbalanced Three-Phase Output. How to achieve unbalanced output, refer to "2.7.5 Export Control Function".



11.4.2 Advanced Setting

Setting path: >**Setting**>**Advance Setting.** The default password is **"2 0 1 4".**

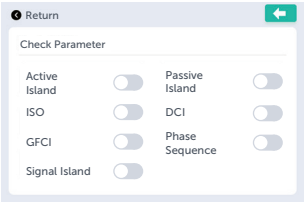


NOTICE!

- Unauthorized use of the installer password by unauthorized persons can lead to incorrect parameters being inputted, resulting in power generation loss or violation of local regulation. Get the installer password from the dealer and never open the password to unauthorzied person.

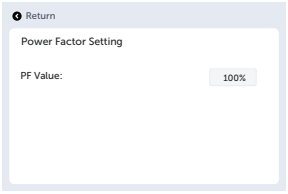
Detect Control

- **Active Island**: You can set whether the active island is turned on or not.
- **ISO**: You can set whether the ISO is turned on or not.
- **GFCI**: You can set whether the GFCI is turned on or not.
- **Signal Island**: You can set whether the signal island is turned on or not.
- **Passive Island**: You can set whether the passive island is turned on or not.
- **DCI**: You can set whether the DCI is turned on or not.
- **Phase sequence**: You can set whether the phase sequence is turned on or not.



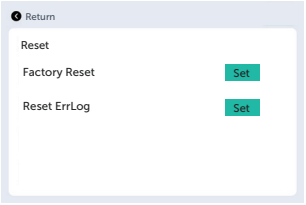
Reactive Power Control

The default value is the specified value under the current safety regulations. The contents will be displayed according to the requirements of local laws and regulations.



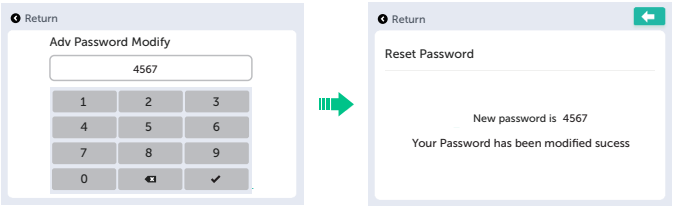
Reset

Here you can reset value of History Record and restore to the factory reset.



New Password

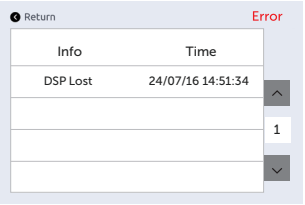
You can reset the advanced password here.



11.5 History Errors

Displaying path: > **About**

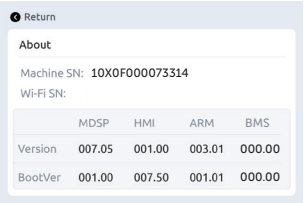
Display the recent error messages. Information contains date and time error happened and error description.



11.6 About

Displaying path: > **About**

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



12 Operation on App and Web

12.1 Introduction of Cloud App

SolaX Cloud provides customers with a platform that can monitor FRONUS inverter data and set it remotely. The inverter connects the system through Pocket Wifi, Pocket LAN, Pocket 4G or Ethernet direct connection, and upload the operation data to SolaX Cloud every 5 minutes. You can log in to your user account at any time through a personal computer, IOS or Android device to view real-time monitoring data or historical data, and perform remote settings as needed.

12.2 Downloading and installing App

12.2.1 Downloading and installing App

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

App Store Google play

Figure 12-1 QR code

Please watch the video or read the document on the SolaXCloud App for relevant operation.

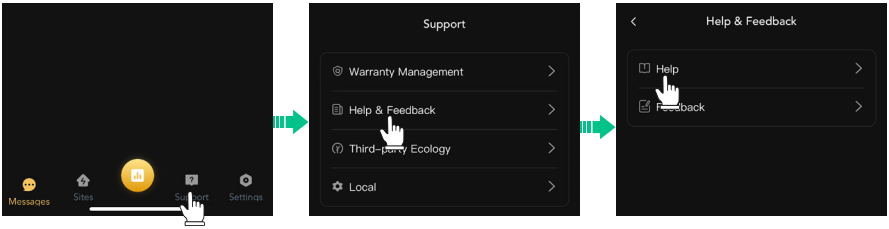


Figure 12-2 App guide on SolaXCloud

NOTICE!

- The screenshots in this chapter correspond to the SolaX Cloud App V5.5.0 .

12.3 Operation Guide on SolaXCloud Web

Open a browser and enter www.solaxcloud.com to complete registration, login, add site and other related operations according to the User Guide.

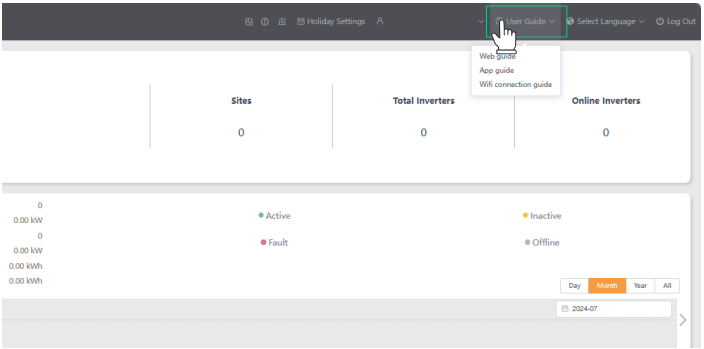


Figure 12-3 Web guide on SolaXCloud

13 Troubleshooting and Maintenance

13.1 Power OFF

a. Release the system button switch on the left side of the inverter to turn it off, or turn the system off on the LCD screen.

b. Turn **OFF** the DC switch.

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

d. Waiting for the inverter to power off.

⚠ WARNING!

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

13.2 Troubleshooting

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

Table 13-1 Troubleshooting list

Faults	Diagnosis and solution
HW-Protect Fault	Internal hardware anomaly • Contact FRONUS for help.
PV Volt Fault	PV voltage out of range • Check the output voltage of the PV panel. • Or ask the installer for help.
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.
Bat Volt Fault	Battery voltage fault • Check battery input voltage if it's within normal range. • Or ask the installer for help.

Faults	Diagnosis and solution
AC10M Volt Fault	• Or ask the installer for help.
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.
DCV OVP Fault	DCV EPS(Off-grid) overvoltage protection failure • Wait for a while to check if it's back to normal. • Or ask the installer for help.
SW OCP Fault	Software Detection of Overcurrent Fault. • Wait for a while to check if it's back to normal. • Shut down photovoltaic, battery connections. • Or ask the installer for help.
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.
IsolationFault	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.
Temperature Over Fault	Temperature beyond limit • Check if ambient temperature exceeds the limit. • Or ask the installer for help.
EPS Overload Fault	EPS(Off-grid) over load fault. • Shutdown the high-power device and press the **ESC** key to restart the inverter. • Or ask for help from the installer if it can not return to normal.
Bat Power Low	• 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.
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.
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.

Faults	Diagnosis and solution
Parallel Fault	Parallel Fault • Check the communication and earth cable connection and matching resistor settings. • Or contact FRONUS for help if it can not return to normal.
Hard Limit Fault	HardLimitFault • Check the power value set in the HardLimit setting, increase the value larger if needed. • Or contact FRONUS for helpif it can not return to normal.
CT-Check Fault	• Check if the CT or meter is well connected. • Or contact FRONUS for help if it can not return to normal.
Inter_Con_Fault	Mgr InterCom Fault • Shut down photovoltaic, battery reconnect. • Or ask for help from the installer if it can not return to normal . • Internal communication errors. • Shut down photovoltaic, battery connections. • Or ask for help from the installer if it can not return to normal.
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.
EPS Relay Fault	EPS(Off-grid) relay failure • Disconnect PV+ ,PV-, batteries and reconnect. • Or ask for help from the installer if it can not return to normal.
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.
Earth Raley Fault	EPS(Off-grid) 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.
Power Type Fault	Power type fault • Upgrade the software and press the ESC" key to restart the inverter. • Or ask for help from the installer if it can not return to normal.
Port OC Warning	EPS(Off-grid) port over current fault • Check that the EPS(Off-grid) load does not exceed the system requirements. • and press the ESC" key to restart the inverter. • Or ask for help from the installer if it can not return to normal.

Faults	Diagnosis and solution
Bat Temp Low	• Shutdown 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.
Bat Temp High	• Check if the battery temperature is too high or the battery temperature sampling wire is not connected or disconnected.
Meter Fault	• Check if the meter is working properly. • Or contact FRONUS for help if it can not return to normal.
Inner Other Fault	• Turn off the inverter and re-power on. • Try to update the processing. • Or contact FRONUS for help.
AC Other Fault	• Check the AC power condition (may be missing phase), • Try to update the processing. • Or contact FRONUS for help.
DC Other Fault	• Shut down and re-power on (check battery wiring). • Try to update the processing. • Or contact FRONUS for help.
PV Other Fault	• General PV energy is weak, confirm the PV energy is normal, if it still exists. • Try to update the processing. • Or contact FRONUS for help.
EPOSwitchFault	• Check the EPO wiring (loose or disconnected).
Bat-OCP	Battery overcurrent • Shut down and re-power (check the battery wiring) • Try to update the processing. • Or contact FRONUS for help.
PVx-OCP	PV overcurrent • Shut down and re-power (check the battery wiring) • Try to update the processing. • Or contact FRONUS for help.
NTC1 Sample Invilad	Battery temperature sampling wire is not connected or disconnected • Check or ontact FRONUS for help.
ExFAN1Fault	• Check if the foreign objects stuck in the fan. • Or contact FRONUS for help.
ExFAN2Fault	• Check if the foreign objects stuck in the fan. • Or contact FRONUS for help.
ExFAN3Fault	• Check if the foreign objects stuck in the fan. • Or contact FRONUS for help.

Faults	Diagnosis and solution
BMS Lost	BMS communication loss fault • Check the power supply, try to update the process. • Or contact FRONUS for help.
DSP Lost	DSP communication loss fault • Check the power supply, try to update the process. • Or contact FRONUS for help.
Bat Disconnect	• Check battery power cable access • Or contact FRONUS for help.
CellOverFault	Over-voltage faults in the battery cells • Wait for fault recovery. • Restart the battery. • Or contact FRONUS for help.
CellLowFault	Cell undervoltage fault • Charge the battery.
CellDiffFault	Excessive cell pressure difference • Contact FRONUS for help.
HVBOverFault	Overvoltage faults on the main voltage • Wait for fault recovery. • Restart the battery. • Or contact FRONUS for help.
HVBLowFault	Mains undervoltage fault • Charge the battery.
TempOverFault	Over Temperature Fault • Stop using the battery and wait for the temperature to recover.
SelfCheckFault	self-checking faults • Check what's happening to the battery and contact FRONUS for help.
PosRlyAdhFault	Main Positive Relay Sticky Fault • Contact FRONUS for help.
PosRlyOpenFault	Main positive relay open circuit fault • Contact FRONUS for help.
NegRlyAdhFault	Main negative Relay Sticky Fault • Contact FRONUS for help.
NegRlyOpenFault	Main negative relay open circuit fault • Contact FRONUS for help.
PreChgFailFault	Precharge Failure Fault • Restart the battery. • If this failure occurs several times please contact FRONUS for help.

Faults	Diagnosis and solution
CellSampleFault	single-unit sampling fault • Contact FRONUS for help.
TempSampleFault	Temperature Sampling Fault • Contact FRONUS for help.
SysFault	System fault • Contact FRONUS for help.
DsgOverFault	Discharge overcurrent fault • Stop using the battery and wait for fault recovery. • Restart the battery. • Or contact FRONUS for help.
ChgOverFault	Charge overcurrent fault • Stop using the battery and wait for fault recovery. • Restart the battery. • Or contact FRONUS for help.
AFEComFault	AFE communications failure • Contact FRONUS for help.
InvComFault	Extranet communication failure • Check the communication cable between the battery and the inverter, after re-plugging, it still appears to contact FRONUS for help.
MidComFault	Intermediate network communications failure • Check the communication cable between the batteries, after re-plugging still appears to contact FRONUS for help.
VoltSensorFault	Voltage Sensor Fault • Contact FRONUS for help.
IDRepetFault	ID Repeat Fault • Check if the system is connected correctly, follow the initial installation steps again for power-on operation, contact FRONUS for help.
TempLowFault	Low temperature fault • Wait for fault recovery, restart the battery, contact FRONUS for help.
CurrSensorFlt	Current Sensor Failure • Contact FRONUS for help.
LineFlt	Power line open circuit fault • Check that the power cables are connected, restart the battery.
FlashFlt	Flash Fault • Contact FRONUS for help.

Faults	Diagnosis and solution
AFEProtectFlt	APE self-protection fault • Contact FRONUS for help.
ChgReqFlt	Charge Request Fault • Check that the inverter is properly recharging the batteries.
InsFlt	Insulation faults • Contact FRONUS for help.
MCBFlt	• Contact FRONUS for help.
LinkerTempHi	• Contact FRONUS for help.
BatLinkerError	• Contact FRONUS for help.

Table 13-1 Other faults

Faults	Diagnosis and solution
Screen not on	• Check if the inverter correctly and normally connected to PV, battery . • Contact FRONUS for help if the inverter is connected correctly.
Abnormal sound on fan	• Check if there is foreign objects stuck in the fan. • Contact FRONUS for help.
Screen on but no content display	• Contact FRONUS for help.
No readings after CT connection	• Check if CT is correctly clipped on the L wire • Contact FRONUS for help if it can not return to normal.
No readings on Load (on App or Web)	• Check if the load is connected correctly. • Check if the power of load on the LCD screen displays normally. • Check if the monitoring module works normally. • Contact FRONUS for help if it can not return to normal.
No readings on battery (on App or Web)	• Check if the battery is connected correctly. • Check if the battery parameter on the LCD screen displays normally. • Check if the monitoring module works normally. • Contact FRONUS for help if it can not return to normal.
No data on App or Web	• Check if the monitoring module works normally. • Contact FRONUS for help.
No display on meter after power on	• If the meter connection is abnormal, reconnect them according to the wiring diagrams. • Contact FRONUS for help if it can not return to normal.

Faults	Diagnosis and solution
Abnormal electrical data on meter	• If the wiring is incorrect, reconnect them based on the wiring diagrams. • Set the voltage and current ratio according to the setting steps of meter user manual. • Contact FRONUS for help if it can not return to normal.

13.3 Maintenance

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

⚠ WARNING!

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

13.3.1 Maintenance routines

Table 13-3 Proposal of Maintenance

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

13.3.2 Replacement of Fans

When the fan is not rotating and the feedback speed of the fan is 0, the LCD screen will display **ExFAN1Faul** / **ExFAN2Faul** / **ExFAN3Faul** error. Refer to the following steps for replacement.

Step 1: Loosen the screw on the inverter with cross screwdriver.

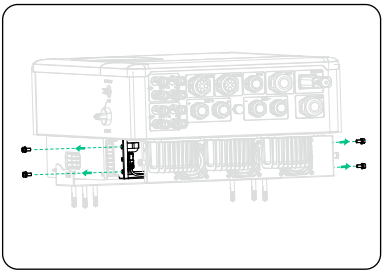


Figure 13-1 Loosening the screws

Step 2: Remove the spring pin, remove the outer casing of the inverter, proceed to disconnect the terminals that are connected to the fans.

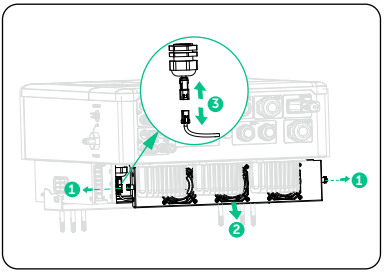


Figure 13-2 Disconnecting the fan

Step 3: Loosen the screws on the fan assembly and after disassembling it, replace the fans. After the replacement is complete, please check if the fan can operate normally.

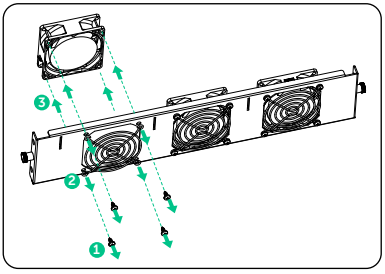


Figure 13-3 Replacing the fan

13.3.3 Upgrading Firmware

WARNING!

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

WARNING!

- Before upgrading, ensure that the PV input voltage is higher than 150 V (preferably on sunny day), or that the battery SOC is higher than 20%, or the battery input voltage is higher than 150 V. Failure to meet one of these conditions may result in upgrade process failure.

Upgrade preparation

- Prepare a USB drive (USB 2.0/3.0, ≤32 GB, FAT 16/32).
- Check for the current firmware version of the inverter.
- Contact our service support for the update firmware file, and save it to the USB drive.
  - » For ARM file: XXXXXXXXX_ARM_VX.XX_XXXXXX.bin
  - » For DSP file: XXXXXXXXX_MDSP_VX.XX_XXXXXX.bin
  - » For SDSP file: XXXXXXXXX_SDSP_VX.XX_XXXXXX.bin
- Check the folder name and file path:

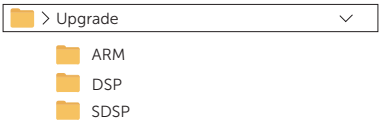


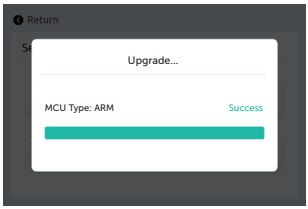
Figure 13-4 Folder name and path

Upgrade steps

a. Insert the U disk into the dongle terminal. If the Dongle is connected to the terminal, please remove the dongle first. For the position of Dongle terminal, refer to "8.1.1 Terminals of Inverter".

b. The inverter will automatically enters the upgrade process and displays the current upgrade progress.

c. After the upgrade is completed, the LCD screen displays **Success**. If the upgrades fail, the LCD screen displays **Fail**.



CAUTION!

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

CAUTION!

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

- Check if the DC switch is turned off. If it is off, turn it on.
- (Recommneded) If the DC switch is already on, check if the battery and PV parameters meets the upgrade requirements (The PV or battery input voltage should be larger than 150 V, or the battery SOC be higher than 20%).

NOTICE!

- If the LCD screen lags or freezes after the upgrade, turn off the DC switch, and then restart the inverter. Check if the inverter returns to normal. If not, contact us.

14 Decommissioning

14.1 Disassembling the Inverter

WARNING!

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

Step 1: Follow the "13.1 Power OFF" and wait for the inverter to power off.

Step 2: Disconnect the PV connectors: Insert the removal tool into the notch of PV connectors and slightly pull out the connectors.

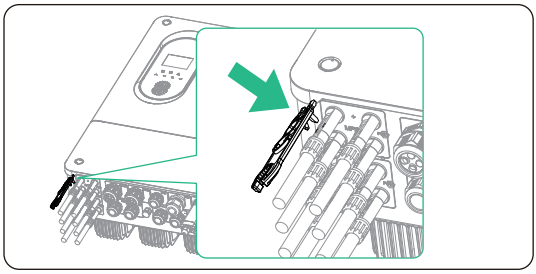


Figure 14-5 Releasing the PV connector

Step 3: Slightly pull out the dongle module.

Step 4: Open the upper cover of the inverter.

Step 5: Remove the internal cables (battery cable, GEN and EPS cable, communication cable) and the CT.

Step 6: Put the original teriminal caps on the terminals.

Step 7: Reinstall the upper cover.

Step 8: Unscrew the grounding screw by crosshead screw and remove the grounding cable.

Step 9: (Optional) Unlock the anti-theft lock.

Step 10: Unscrew the M6 screw on the both sides of inverter and vertically lift up the inverter to dismantle the inverter.

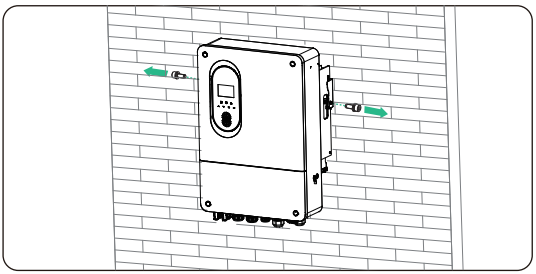


Figure 14-6 Unscrewing the M6 screws

Step 11: Unscrew the screws for fastening the wall mounting bracket and remove the wall mounting bracket if needed.

14.2 Packing the Inverter

- Use the original packaging materials if available.

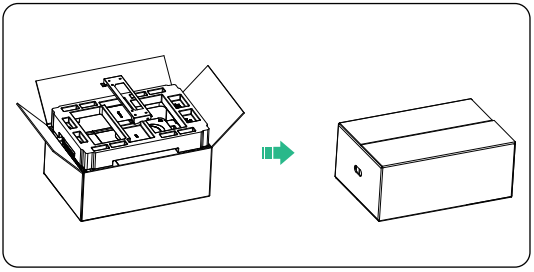


Figure 14-7 Packing the inverter

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

14.3 Disposing of the Inverter

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

15 Technical Data

- PV Input

Model	X3-Genki-5K	X3-Genki-8K	X3-Genki-10K	X3-Genki-12K	X3-Genki-15K
Max. PV array input power [Wp]	10000	16000	20000	24000	30000
Max. PV input power [W] (derating above +45℃)	10000	16000	20000	24000	30000
Max. PV input voltage[1] [V]			1000		
Start output voltage [V]			150		
Nominal input voltage [V]			640		
MPPT operating voltage range[2] [V]			160 - 950		
No. of MPPT/Strings per MPPT	2(1/1)	2(1/1)	2(2/1)	2(2/2)	2(2/2)
Max. input current [3][A]	18/18	18/18	36/18	36/36	36/36
Max. short circuit current [A]	25/25	25/25	50/25	50/50	50/50
Max. inverter backfeed current to the array [A]			0		

Note:

[1] The maximum input voltage is the upper limit of the DC voltage. Any higher input DC voltage would probably damage inverter.

[2] Input voltage exceeding the operating voltage range may triggers inverter protection.

[3] When both strings are connected to a single MPPT, the Max. output current for a single string is 18 A; When a single string is connected to one MPPT, the Max output current for a single string is 20 A.

- AC Input(GEN)

Model	X3-Genki-5K	X3-Genki-8K	X3-Genki-10K	X3-Genki-12K	X3-Genki-15K
Nominal GEN input power [W]	5000	8000	10000	12000	15000
Nominal GEN input Current[A]	15.0	24.0	29.0	29.0	29.0
Nominal GEN input voltage (GEN input voltage range)[V]	220/380, 230/400				
Nominal GEN Frequency[Hz]	50/60				

- EPS Output

Model	X3-Genki-5K	X3-Genki-8K	X3-Genki-10K	X3-Genki-12K	X3-Genki-15K
Nominal output power [W]	5000	8000	10000	12000	15000
Peak apparent power [VA]	2 times of rated power, 10 s				
Nominal AC Output Frequency [Hz]	50/60				
Nominal AC Output Current [A]	7.2	11.6	14.5	17.4	21.7
Nominal AC voltage [V]	220/380, 230/400, 240/415				
Switch Time [ms]	< 6				
THDv (@Linear load)	< 2%				

- Battery Data

Model	X3-Genki-5K	X3-Genki-8K	X3-Genki-10K	X3-Genki-12K	X3-Genki-15K
Battery type	Lithium / Lead-Acid				
Battery voltage range [V]	40 - 60				
Nominal battery voltage [V]	48				
Max. Charging/ Discharging Current [A]	125	200	250	280	300
Charging Strategy for Lead-Acid Battery	3 stages curves				
Temperature Sensor	Yes				

- Protection Device

Model	X3-Genki-5K	X3-Genki-8K	X3-Genki-10K	X3-Genki-12K	X3-Genki-15K
Anti-Islanding Protection	Yes				
PV String Input Reverse Polarity Protection	Yes				
Insulation Resistor Detection	Yes				
Residual Current Monitoring Unit	Yes				
Output Over Current Protection	Yes				
Output Short Protection	Yes				
Output Over Voltage Protection	Yes				
Surge Protection	AC Type II/DC Type II				
Battery Terminal Temp Protection	Yes				

- Environment Limit

Model	X3-Genki-5K	X3-Genki-8K	X3-Genki-10K	X3-Genki-12K	X3-Genki-15K
Degree of protection	IP65				
Operating temperature range[℃]	-25 ~ +60 (derating above +45)				
Pollution level	III				
Relative humidity [%]	0 ~ 100 (condensing)				
Max. operation altitude [m]	<3000				
Storage Temperature[℃]	-40 ~ +70				
Noise Emission(typical)[dB]	<55				

- General

Model	X3-Genki-5K	X3-Genki-8K	X3-Genki-10K	X3-Genki-12K	X3-Genki-15K
Dimension (W*H*D)[mm]	520 * 705 * 258				
Net Weight [kg]	44.6				
Cooling concept	/	/	FAN	FAN	FAN
Topology	Transformerless for PV side / HF for battery side				
HMI Interface	LED+LCD				
Communication Interfaces	CAN / RS485 / WiFi / LAN / 4G (optional) / NTC				

- System Data

Model	X3-Genki-5K	X3-Genki-8K	X3-Genki-10K	X3-Genki-12K	X3-Genki-15K
MPPT Efficiency			> 99.9%		
Max. efficiency			97.6%		
Euro. efficiency			97.0%		

- Standard

Model	X3-Genki-5K	X3-Genki-8K	X3-Genki-10K	X3-Genki-12K	X3-Genki-15K
Safety			IEC 62109-1 / -2		
EMC			EN61000-6 / 1 / 2 / 3 / 4		
Cetification			IEC 61727, IEC 62116		

Note:

[1] The specific weight is subject to the actual situation of the whole machine.

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