REV.	Description	REV.	Description
00	首次发行（据 SolaX320101105800）		
	周雯 2024/08/19		

描述	说明书 X1-Genki 系列（内部 X1-Lite-LV）英文版 巴基斯坦 Renewable power
料号	320101108900
单位	mm 页次

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

技术要求：

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

描述	说明书 X1-Genki 系列（内部 X1-Lite-LV）英文版 巴基斯坦 Renewable power	设计	周 雯 2024/08/19
		审核	侯 坚 2024/08/19
材料	双胶纸	核准	施鑫淼 2024/08/19
料号	320101108900	浙江艾罗网络能源技术股份有限公司	
单位	mm 页次		

بھروسے اجالا زندگی میں ®
Fronus
SOLAR ENERGY

SOLAX
POWER

X1-Genki

User Manual

8kW / 10kW / 12kW

Scan QR Code for eManual

Fronus SOLAR ENERGY
WEBSITE www.fronus.com
EMAIL info@fronus.com
CALL UAN 042 111 111 140

STATEMENT

Copyright

Trademarks

Fronus SOLAR ENERGY and other symbol or design (brand name, logo) that distinguishes the products or services offered by FRONUS has been trademark protected. Any unauthorized use of the above stated trademark may infringe the trademark right.

Notice

Please note that certain products, features, and services mentioned in this document may not be within the scope of your purchase or usage. Unless otherwise specified in the contract, the contents, information, and recommendations presented in this document are provided "as is" by FRONUS. We do not provide any warranties, guarantees, or representations, whether express or implied.

The content of the documents is reviewed and updated as needed. However, occasional discrepancies may occur. FRONUS retains the right to make improvements or changes in the product(s) and the program(s) described in this manual at any time without prior notice.

The images included in this document are solely for illustrative purposes and may differ based on the specific product models.

For more detailed information, kindly visit the website of FRONUS SOLAR ENERGY (WASIQ TRADERS) at WWW.FRONUS.COM.

FRONUS retains all rights for the final explanation.

About This Manual

Scope of Validity

This manual is an integral part of X1-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:

- X1-Genki-8K
- X1-Genki-10K
- X1-Genki-12K

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, Inverter and Battery

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.

WARNING!

- A photovoltaic module used on the inverter must have an IEC61730A rating, and the total open circuit voltage of the photovoltaic string / array is lower than the maximum rated DC input voltage of the inverter. Any damage caused by photovoltaic overvoltage is not covered by 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.
- Unauthorized opening of the upper cover will void the warranty and can result in lethal danger or serious injury due to electric shock.
- Make sure that the inverter is reliably grounded before any operation to prevent the risk of electric shock causing lethal danger or serious injury.
- Only qualified personnel can perform the installation, wiring, maintenance of the inverter by following this document and the related regulations.

WARNING!

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

WARNING!

- The inverter can not be operated when it is running. Radiation may be harmful to health! Do not stay for a long time and keep at least 20 cm away from the inverter.
- After the inverter cut off the PV power supply, there will be a certain amount of residual voltage in a short time, be cautious or it may lead to serious personal injury and even high risk of death. Use a multimeter (impedance at least 1 MΩ) to measure the voltage between the UDC and the UDC to ensure that the inverter port is discharged below the safe voltage before starting operation (35 VDC).

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!

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

1.2.3 Safety Instructions of Battery

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.

NOTICE!

- This inverter should pair with low voltage battery, for the specific parameters such as battery type, nominal voltage and nominal capacity etc., please refer to Battery Data. Refer to the matching battery specification for details.

2 Product Overview

2.1 Product Introduction

The X1-Genki series inverter supports various intelligent solutions to achieve efficient and economical energy utilization.

2.2 Appearance

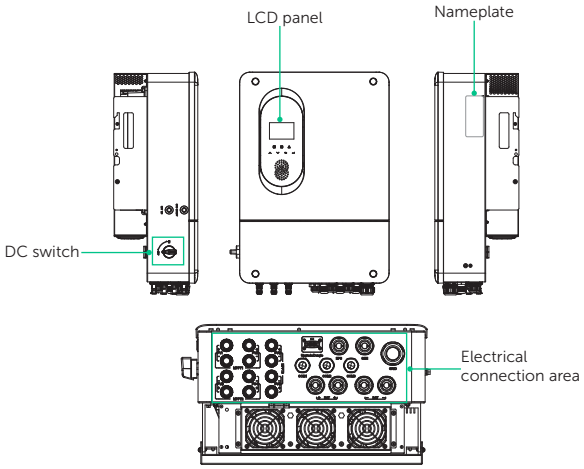


Figure 2-1 Appearance

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 perfom the parameter setting.
DC switch	Connect or disconnect the PV input.
Electrical connection area	Including PV terminals, battery terminals, GEN and EPS terminals, communication terminals, etc.

Figure 2-2

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

2.4 Working Principle

2.4.1 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.

NOTICE!

- MPPT 3 is available for 12 kW inverter.

2.4.2 Application Schemes

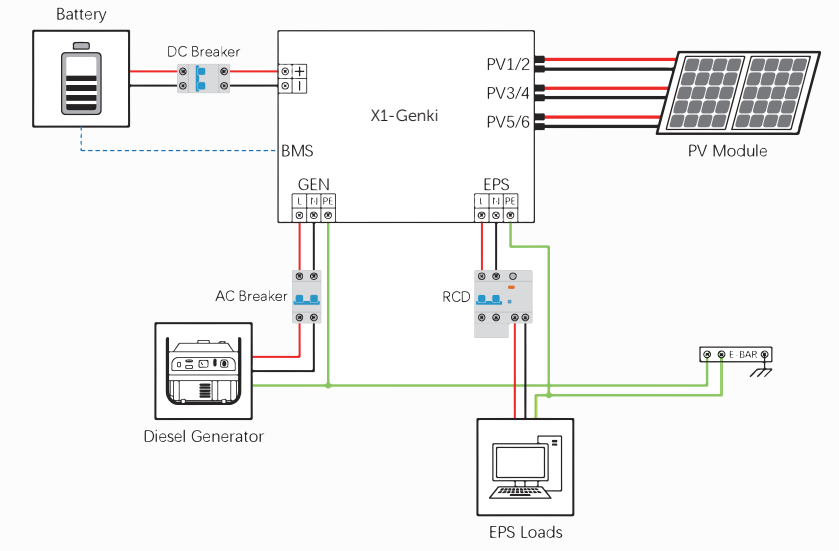


Figure 2-3 Partial home backup for most countries

2.5 Working State

The series inverter has INIT, IDLE, START, RUN and STOP state.

Table 2-3 Description of working state

State	Description
INIT	• The inverter is checking for the initialization information such as the model and country, the conditions to be met in order to enter IDLE state.
IDLE	• The inverter is doing some preparations to enter START state, such as checking relays.
STOP	• Users power off the inverter or fault occurs to the inverter.

2.6 Working mode

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

Applicable areas	Work modes
Countries other than Pakistan (including India, Vietnam, South Africa, Uzbekistan)	Self consumption mode, backup mode and Force time use mode
Pakistan	SUB mode, SBU mode, MKS mode and Force time use mode

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

2.6.1 Self consumption mode

This mode is applicable to countries other than Pakistan.

Application Scenarios:

Solar power takes priority in supplying the load, with any excess power being stored in the battery for later use. If the PV power exceeds the load power, the excess power will be used to charge the battery.

2.6.2 Force time use mode

This mode is applicable to all countries including Pakistan.

Application Scenarios:

This mode is more suitable for applications with peak and off-peak electricity price differences. When the electricity price is high, the battery discharges to power the load. It provides three battery discharge time slots, corresponding to peak periods with higher electricity prices. During these periods, the battery discharges to power the load, providing economic value to the customer. The operation during these periods is consistent with the

normal operation mode of the Self Consumption mode.

Note:

In this mode, it also provides three battery charging time slots, corresponding to off-peak periods with lower electricity prices. Different priority settings for the battery charging source can be selected for each of the three battery charging time slots, and it is possible for the battery to reach full capacity and enter the float charging stage during these time slots. Outside the peak and off-peak time slots set, the battery follows the priority setting mode for the battery charging source.

2.6.3 SUB Mode

This mode is applicable under Pakistan's safety, corresponding to backup mode for other countries.

Note:

In this mode, if the priority setting for the battery charging source is as follows: **Only Solar Charging:** No response, and the normal operation mode described above is followed.

2.6.4 SBU Mode

This mode is applicable under Pakistan's safety, corresponding to self consumption mode for other countries.

Application Scenarios:

Solar power is prioritized for loads, and excess power is stored in the battery for later use. This mode is ideal for customers with low daytime electricity consumption and higher nighttime electricity consumption.

Loads are primarily powered by solar energy. If the solar power is insufficient, the battery will provide power. If the solar power generated exceeds the load demand, the excess power will be used to charge the battery.

2.6.5 MKS Mode

This mode is applicable under Pakistan's safety.

Application Scenarios:

This mode is suitable for customers who have higher electricity consumption during certain periods of the day and lower consumption at night. When solar power is available, this mode is basically the same as the SBU mode, and the discharge range of the battery is wider than that of the SBU mode. Normal operation is resumed only when the battery is charged to a voltage higher than the maximum charging voltage.

At night when solar power is unavailable, this mode is basically the same as the SUB mode, with the battery only charging and not discharging, which prevents the battery from being depleted.

3 System Overview

System Overview

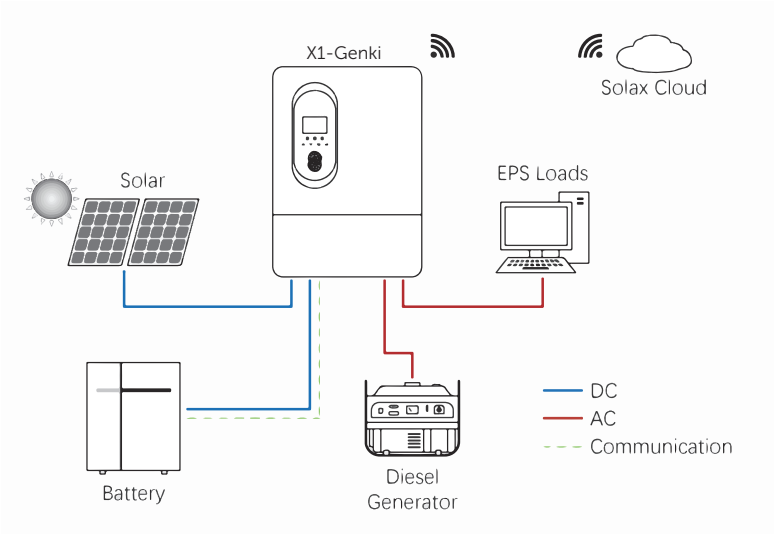


Figure 3-1 System diagram

Table 3-1 System item description

Item	Description
Battery	The series inverter should be coupled low voltage battery (Lithium or Lead-Acid). The battery with the same capacity and the same model can be installed simultaneously. It communicates with the inverter via BMS and must comply with the specifications of the regulations.
Generator (To be released in quarter 4)	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.
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.

4 Transportation and Storage

If the inverter is not put into use immediately, the transportation and storage requirements needs 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.(gross/net weight of X1-Genki: 42/37 kg)
- Wear protective gloves when carrying the equipment by hand to prevent injuries.
- When lifting up the inverter, hold the bottom position of the carton. Keep the inverter horizontal in case of falling down.

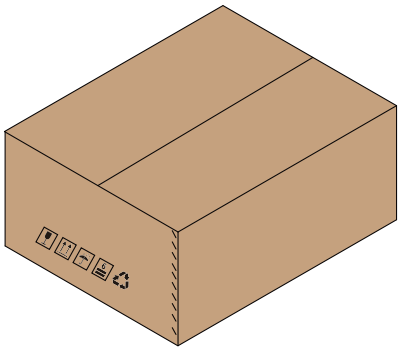


Figure 4-1 Caution signs on the packaging

Storage

- The inverter must be stored indoors.
- Do not remove the original packaging material and check the outer packaging material regularly.
- The storage temperature should be between -40°C and +70°C. The relative humidity should be between 0%RH and 100%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

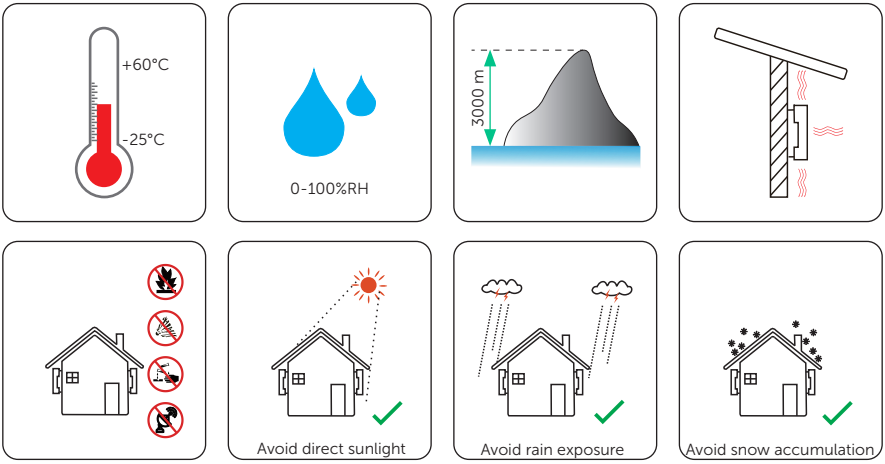
5.1 Selection of Installation Location

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

Make sure the installation environment meets the following conditions:

- The ambient temperature: -40°C to +70°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. You are 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 antenna.
- Avoid direct sunlight, rain exposure and snow laying up.



NOTICE!

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

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

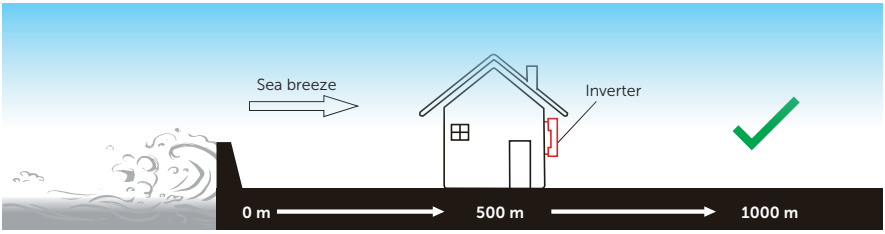


Figure 5-1 Recommended installation position

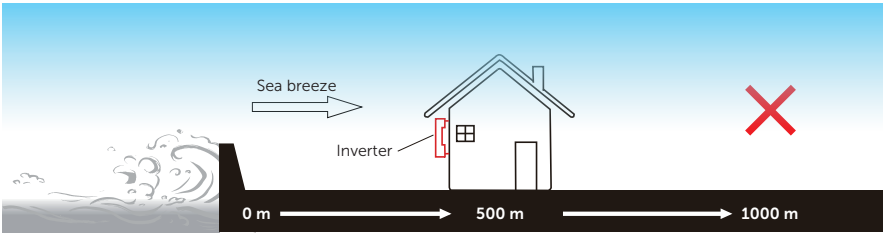


Figure 5-2 Incorrect installation position

NOTICE!

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

5.1.2 Installation Carrier Requirement

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

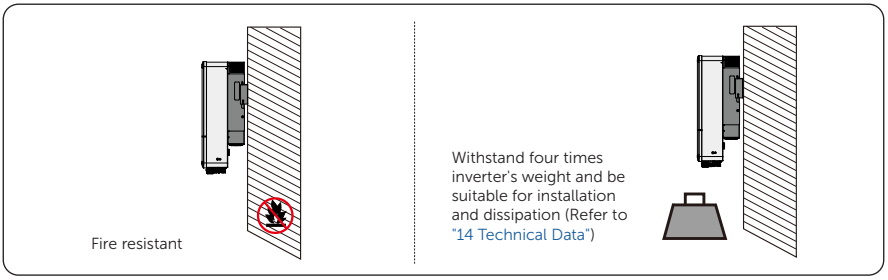


Figure 5-3 Installation carrier requirement

5.1.3 Clearance Requirement

The minimum clearance reserved for the connected terminal at the bottom of inverter should be 14 cm. When planning installation space, it is important to consider the bending radius of the wires.

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

For installations with multiple inverters, make sure to leave a minimum space of 60 cm between each inverter. In areas with high ambient temperatures, increase the clearances between the inverters and provide adequate fresh air ventilation if feasible.

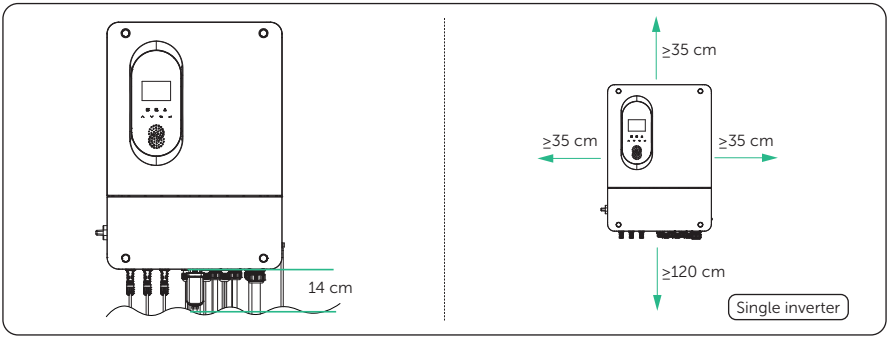


Figure 5-4 Clearance requirement for single inverter

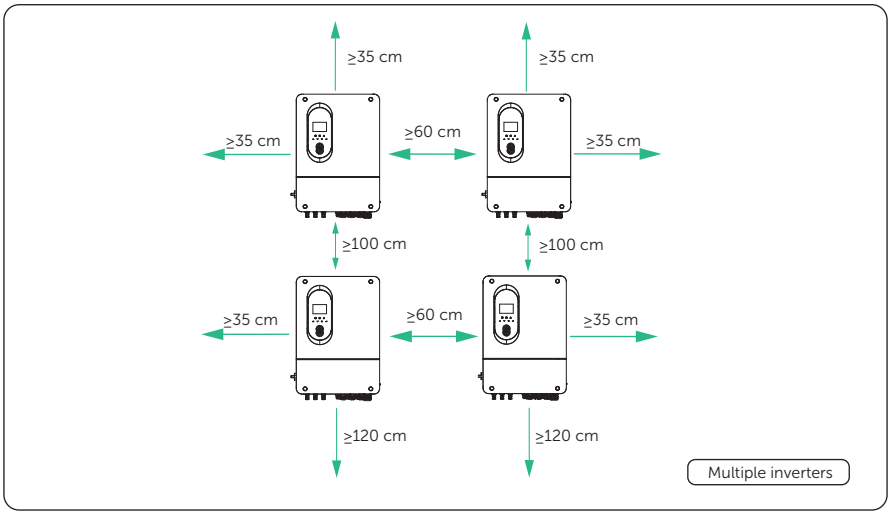
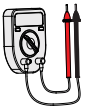


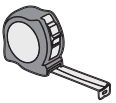
Figure 5-5 Clearance requirement for multiple inverters

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.

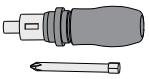

Hammer drill
(drill bit: Ø10 mm)

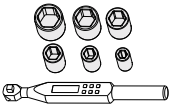

Multimeter
(≥ 600 V DC)

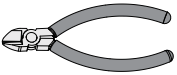

Measuring tape


Utility knife


Marker

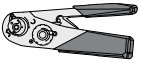

Torque screwdriver
(Phillips head: M4 / M6 / M8)

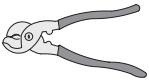

Torque wrench
(10 mm)

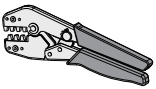

Diagonal plier

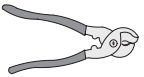

Wire stripper

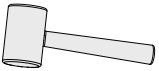

Crimping tool
for RJ45


Crimping tool
for Battery

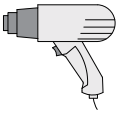

Wire cutter


Crimping tool


Crimping tool
for PV terminal

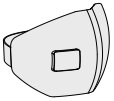

Rubber mallet


Spirit level


Heat gun


Ø6 mm Heat shrink tubing


Safety goggles


Anti-dust mask


Safety gloves


Safety boots

5.3 Additionally Required Materials

Table 5-1 Additionally required wires

No.	Required Material		Type	Conductor Cross-section
1	PV wire		Dedicated PV wire with a voltage rating of 600 V	4-6 mm^2
2	Communication wire		Network cable CAT5E	0.2 mm^2
3	Battery power cable		Conventional copper wire	35~50 mm^2
4	Additional PE wire		Conventional yellow and green wire	10~16 mm^2

Table 5-2 Wire and breaker recommended for EPS connection

Model		8 kW	10 kW	12 kW
Wire (copper)		8 mm^2	10 mm^2	16 mm^2
Circuit breaker		50 A	60 A	80 A

Table 5-3 Wire and breaker recommended for GEN connection

Model		15 kW	20 kW	25 kW
Wire (copper)		10 mm^2	16 mm^2	16 mm^2
Circuit breaker		60 A	80 A	100 A

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.

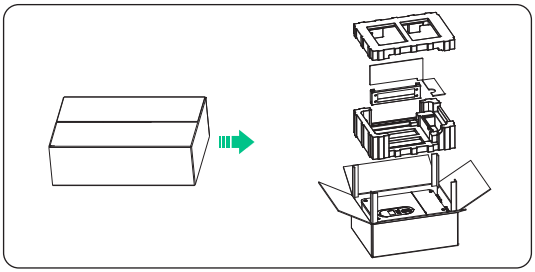


Figure 6-1 Unpacking the inverter

- 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

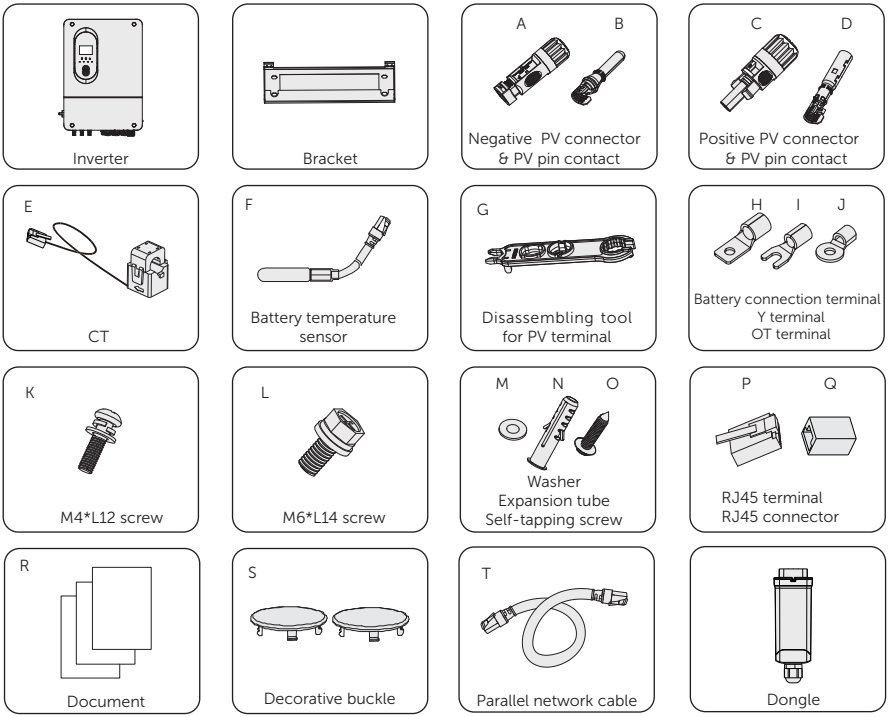


Table 6-1 Packing list

Item	Description	Quantity	Remark
/	Inverter	1 pc	
/	Bracket	1 pc	
A	Negative PV connector	4 pairs for 8kW~10kW inverters 6 pairs for 12kW inverter	
B	Negative PV pin contact	4 pairs for 8kW~10kW inverters 6 pairs for 12kW inverter	
C	Positive PV connector	4 pairs for 8kW~10kW inverters 6 pairs for 12kW inverter	
D	Positive PV pin contact	4 pairs for 8kW~10kW inverters 6 pairs for 12kW inverter	
E	CT	1 pc	

Item	Description	Quantity	Remark
F	Battery temperature sensor	1 pc	For measuring the temperature of battery
G	Disassembling tool for PV terminal	1 pc	
H	Battery connection terminal	4 pcs	
I	Y terminal	9 pcs	For EPS and GEN connection
J	OT terminal	1 pc	For grounding
k	M4*L12 screw	2 pcs	For fixing the inverter
L	M6*L14 screw	1 pc	For grounding
M	Washer	4 pcs	For fixing the bracket
N	Expansion tube	4 pcs	For fixing the bracket
O	Self-tapping screw	4 pcs	For fixing the bracket
P	RJ45 terminal	4 pcs	
Q	RJ45 connector	2 pcs	
R	Document	/	
S	Decorative buckle	2 pcs	For decorating the lower cover
T	Parallel network cable	1 pc	For parallel connection
/	Dongle	1 pc	

NOTICE!

- Refer to the actual delivery for the optional accessories.

7 Mechanical Installation

WARNING!

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

CAUTION!

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

NOTICE!

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

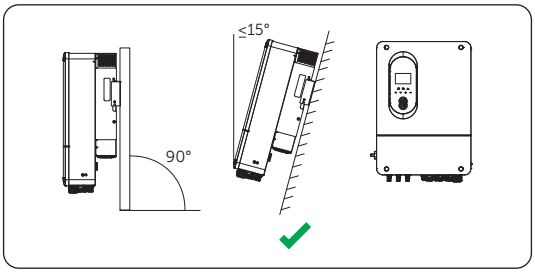


Figure 7-1 Correct installation

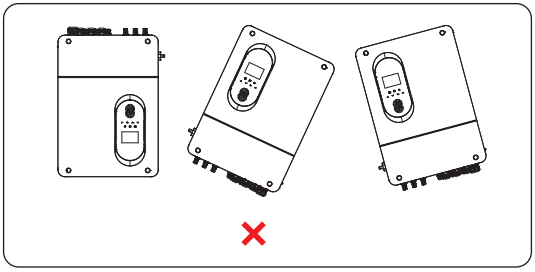


Figure 7-2 Incorrect installation

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.

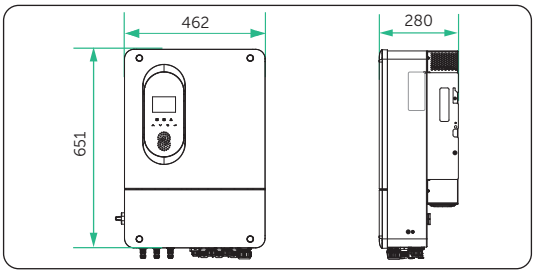


Figure 7-3 Dimensions 1 (Unit: mm)

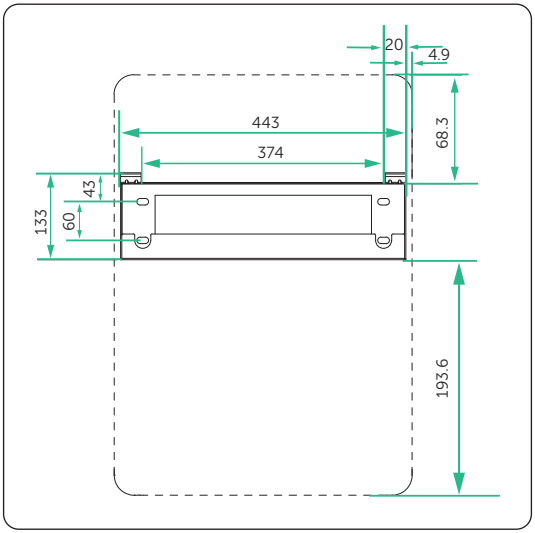


Figure 7-4 Dimensions 2 (Unit: mm)

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. The minimum distance between the ground and the inverter is 1200 mm.

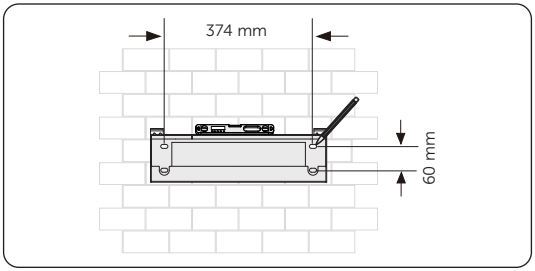


Figure 7-5 Marking the holes

Step 2: Set the wall mounting bracket aside and drill holes with Ø10 drill bit. The depth of the holes should be over 80 mm.

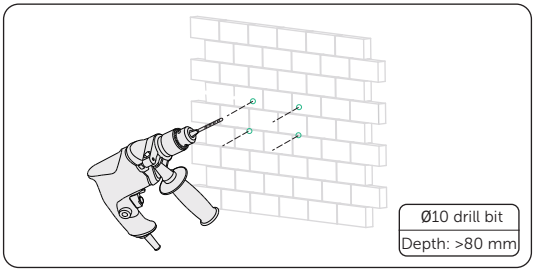


Figure 7-6 Drilling holes

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

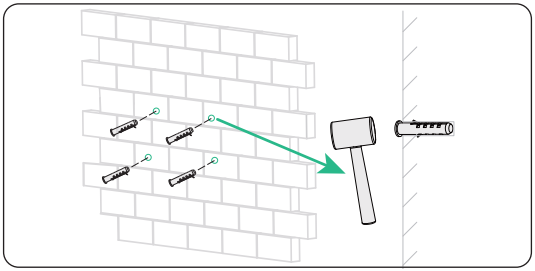


Figure 7-7 Knocking the expansion tubes

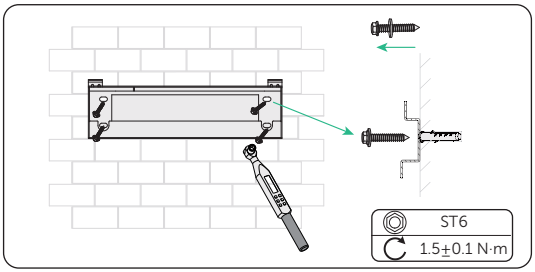


Figure 7-8 Securing the wall mounting bracket

Step 4: If the inverter needs to be temporarily placed on the ground, use foam or other protective materials to protect it against potential damages. Lift up the inverter collaboratively by the required number of personnel in accordance with the local regulation and hang it onto the wall mounting bracket. Make sure that the hanging holes of the inverter are properly inserted into the lugs of the bracket.

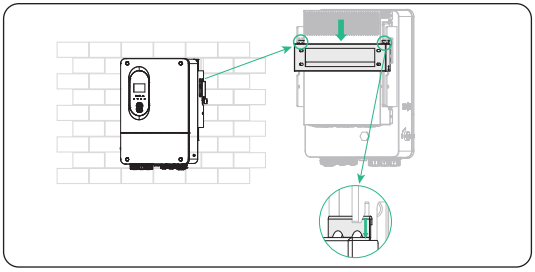


Figure 7-9 Hanging the inverter

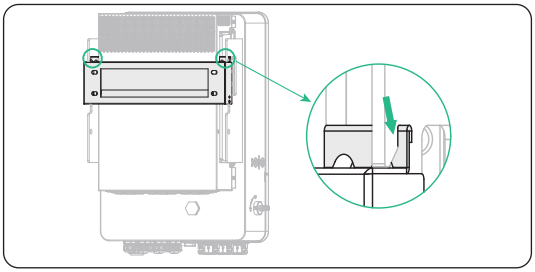


Figure 7-10 Hanging the inverter

Step 5: Use M4*12 screws to secure the inverter on both sides.

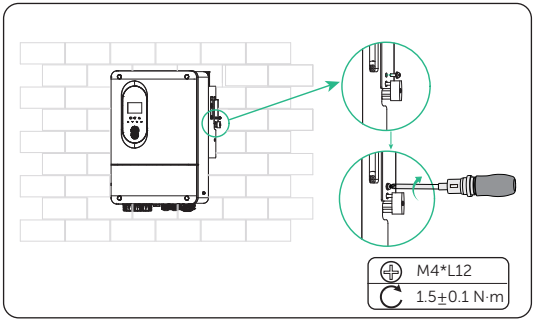


Figure 7-11 Securing the inverter

8 Electrical Connection

DANGER!

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

WARNING!

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

8.1 Terminals of Inverter

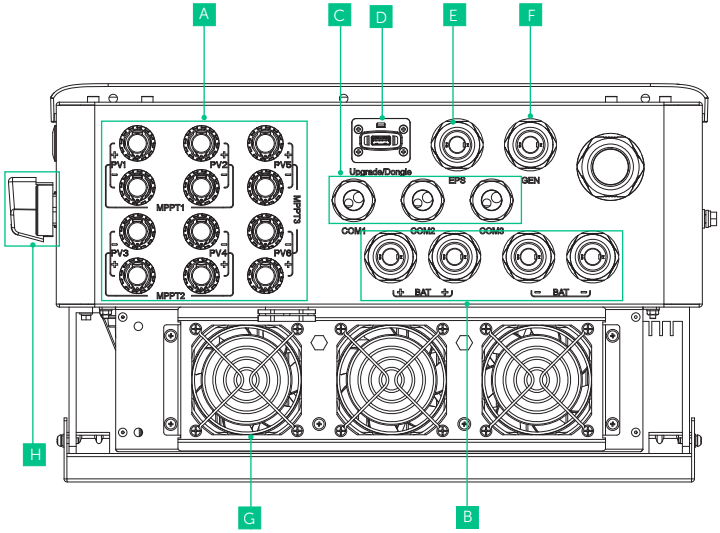


Figure 8-1 Terminals of Inverter

Table 8-1 Description of terminals

Item	Description	Remarks
A	PV connection terminal	PV1 ~ PV4 terminals for 8 and 10 kW inverter; PV1~ PV6 terminals for 12 kW inverter
B	Battery connection terminal	
C	COM communication terminal	Including DI/COM, DO, BMS, DRM, CT_1, CT_2, Parallel_1, Parallel_2
D	Dongle terminal	
E	EPS connection terminal	
F	GEN connection terminal	
G	Fan	
H	DC switch	

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.

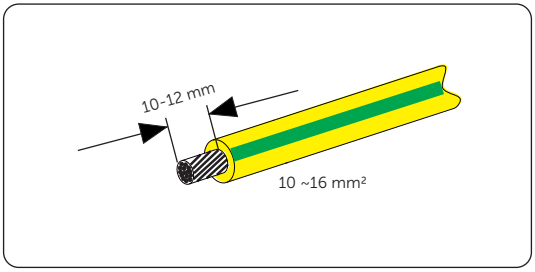


Figure 8-2 Striping the PE cable

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

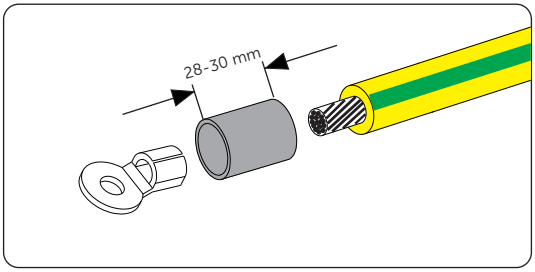


Figure 8-3 Installing the tubing and OT teriminal

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

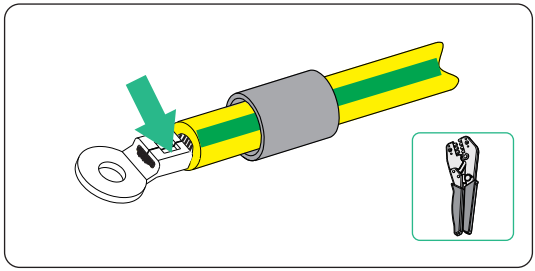


Figure 8-4 Crimping the cable

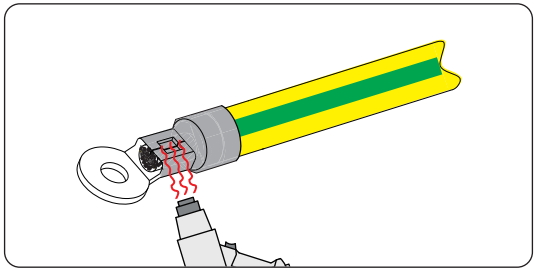


Figure 8-5 Shrinking the tubing

Step 4: Connect the assembled PE cable to the grounding point of the inverter, and secure it with the M6*14 screw in the packing list. (Torque: 3±0.3 N·m)

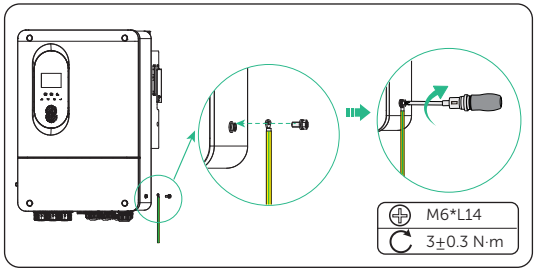


Figure 8-6 Securing the PE cable

8.3 EPS and GEN Connection

The inverter supports the EPS mode.

Requirements for EPS and GEN 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.
- AC breaker
  - » An AC breaker that matches the power of the inverter must be used between the inverter output. For specific information on the AC breaker for EPS and GEN, see "5.3 Additionally Required Materials".
- EPS load
  - » Make sure that the rated power of the EPS load is within the rated output power range of the inverter. Otherwise, the inverter will report an **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 8-2 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 the table in Additionally Required Materials to view the recommended wire sizes for EPS, and GEN.
- For 8kW inverter, the size of Y terminal is 10 mm^2. For 10kW and 12kW inverters, the size of Y terminal is 16 mm^2.

Step 1: Prepare three-core cables as the EPS and GEN cables and strip the insulation of L, N and the grounding conductor to an appropriate length. Insert the conductors L, N, and grounding conductor into the Y terminals.

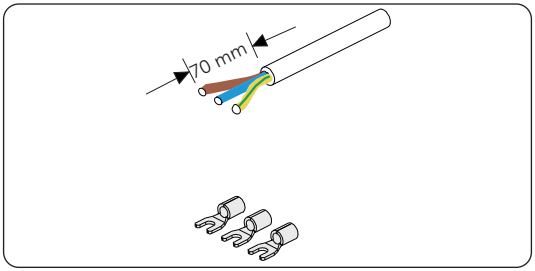


Figure 8-7 Stripping cables

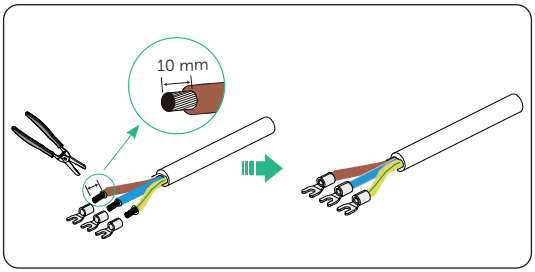


Figure 8-8 Stripping cables

Step 2: Use crimping tool to crimp it. Make sure the conductors are correctly assigned and firmly seated in the Y terminals.

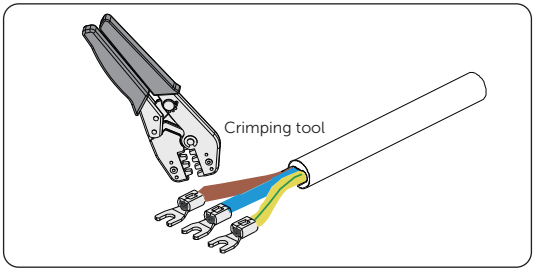


Figure 8-9 Crimping the conductors

Step 3: Use a cross screwdriver to loosen the M6 screws on both sides of the inverter. Then remove the lower cover of the inverter.(Torque: 3±0.3 N·m)

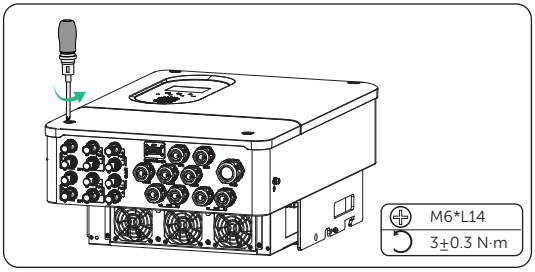


Figure 8-10 Loosening the screws

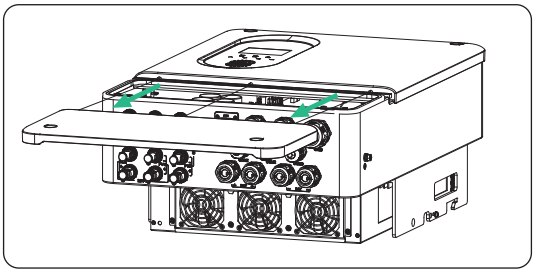


Figure 8-11 Removing the lower cover

Step 4: Disassemble EPS and GEN ports. And remove the plugs and sealing cover as shown below. It is recommended to seal unused plugs with fireproof putty.

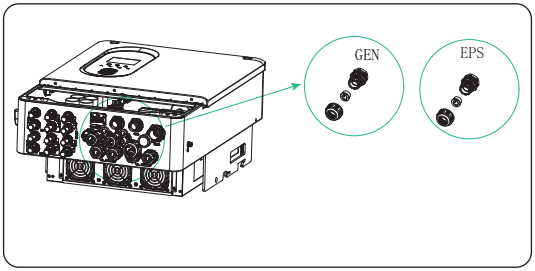


Figure 8-12 Removing the plugs

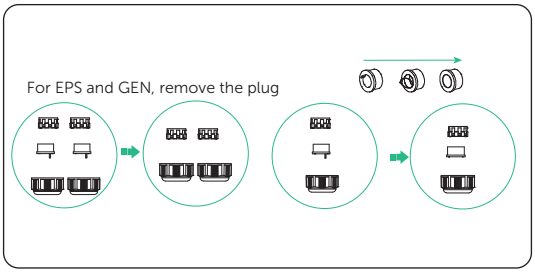


Figure 8-13 Removing the plugs

NOTICE!

- For EPS and GEN, remove the plug. keep the plugs in a safe place, seal the unused terminals with them.

Step 5: Find the location of EPS and GEN connection port.

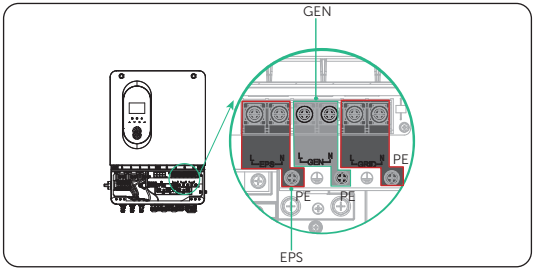


Figure 8-14 Finding the location

Step 6: Thread EPS and GEN cables through the corresponding EPS and GEN ports.

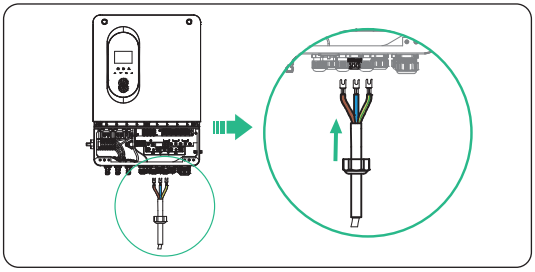


Figure 8-15 Threading the EPS cable

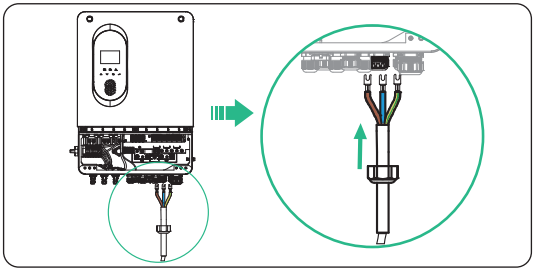


Figure 8-16 Threading the GEN cable

Step 7: Loose the M6 screws to insert the crimped conductors. (Torque: 3±0.3 N·m)

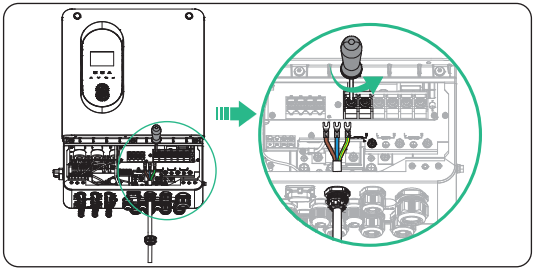


Figure 8-17 Loosening the EPS screws

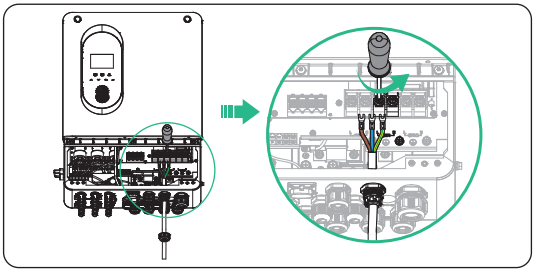


Figure 8-18 Loosening the GEN screws

Step 8: Insert the crimped conductors L, N, and grounding conductor into the terminals according to the wire sequence and tighten the screws with a cross screwdriver (Torque: 3±0.3N·m). Then tighten the swivel nut.

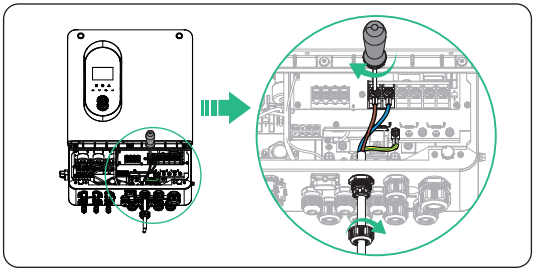


Figure 8-19 Connecting the EPS cable

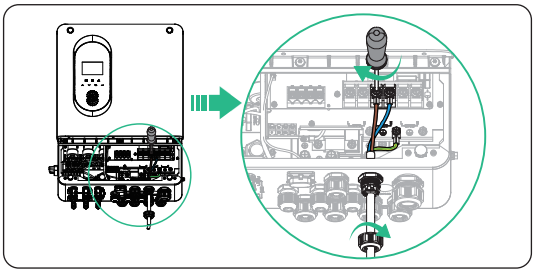


Figure 8-20 Connecting the GEN cable

DANGER!

- Before powering on the inverter, seal the unused terminals of EPS and GEN with the plugs. Otherwise, electrical shock may be caused by high voltage, resulting in serious personal injury or death.

8.4 PV Connection

DANGER!

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

WARNING!

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

CAUTION!

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

Requirements for PV connection

- Open circuit voltage and operating voltage
  - » The open circuit voltage of each module array cannot exceed the maximum PV input voltage (600 V) of the inverter. Otherwise, the inverter may be damaged.
  - » The operating voltage of PV modules must be within the MPPT voltage range (50-550 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 is not 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.

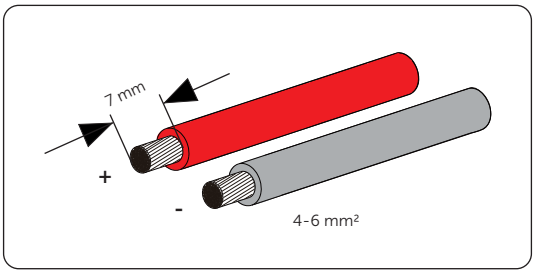


Figure 8-21 Stripping the PV cable

Step 2: Insert the stripped cable into the PV pin contact.

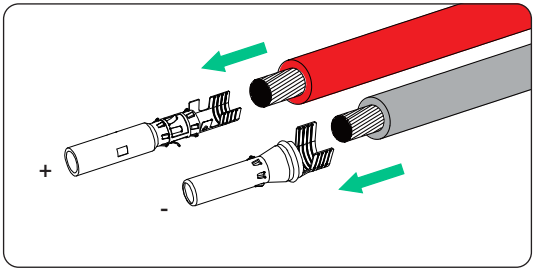


Figure 8-22 Inserting the PV pin contact

Step 3: Make sure the the PV cable and PV pin contact are of the same polarity. Crimp it with crimping tool for PV terminal. Pay attention to the crimping position.

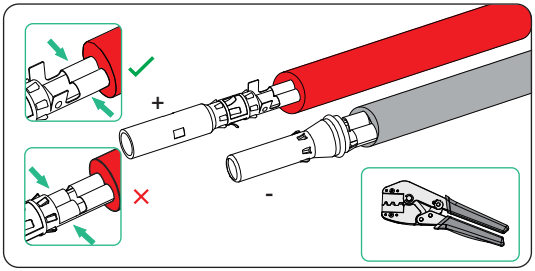


Figure 8-23 Crimping the terminal

Step 4: Thread the PV cable through swivel nut and insert the cable into the PV connector.

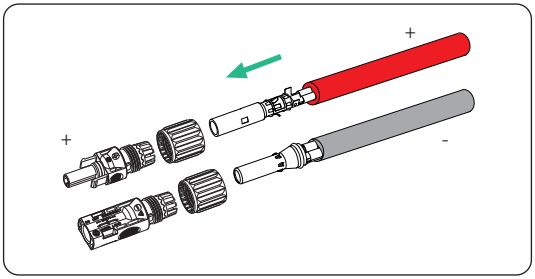


Figure 8-24 Threading the PV cable

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

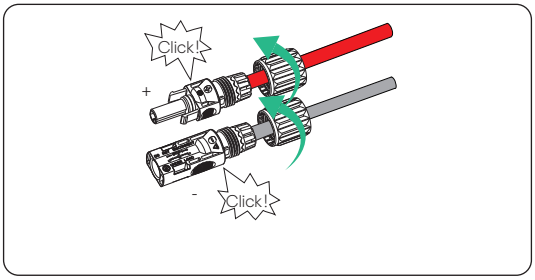


Figure 8-25 Securing the PV cable

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 600 V.

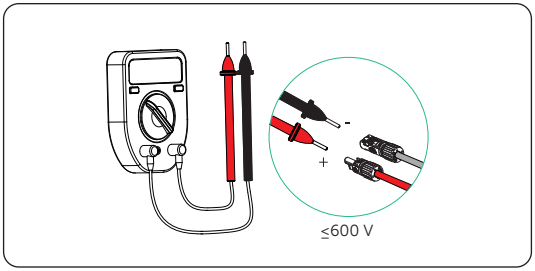


Figure 8-26 Measuring the voltage of PV connectors

NOTICE!

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

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

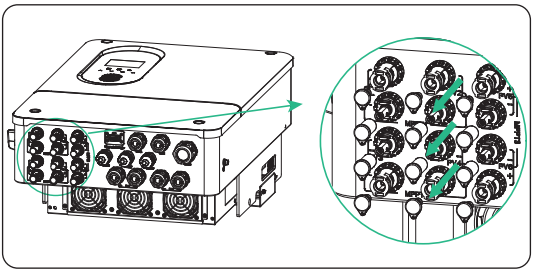


Figure 8-27 Removing the PV terminal caps

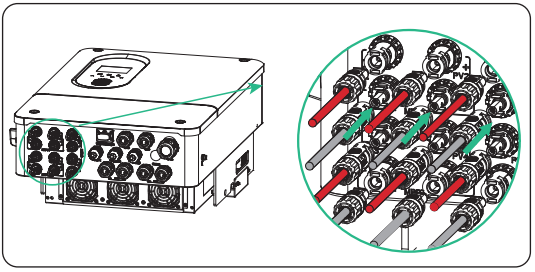


Figure 8-28 Connecting the PV cable

NOTICE!

- For 8kW~10kW inverters, remove PV terminal caps of MPPT1 and MPPT2.

WARNING!

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

8.5 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.

NOTICE!

- The power cable of battery is in the battery accessory pack. NOT in the scope of inverter's delivery.

Requirments for battery connection

- Battery
  - » Lithium and Lead-acid battery
  - » The inverter is equipped with two independent battery terminals, allowing for connection to two separate battery strings.
  - » 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 local regulations mandate the use of a DC MCB between the battery and the inverter, install a non-polar DC MCB.
  - » The nominal voltage of DC MCB should be larger than maximum voltage of battery.

Model	X1-Genki-8K	X1-Genki-10K	X1-Genki-12K
Voltage	Nominal voltage of DC breaker should be larger than maximum voltage of battery.		
Current (A)	250	250	300

- Battery configuration information
  - » X1-Genki series inverter matches with FRONUS low voltage battery TP-LD53, TP-LD150. A single inverter can match with maximum 16 batteries.

Battery connection diagram

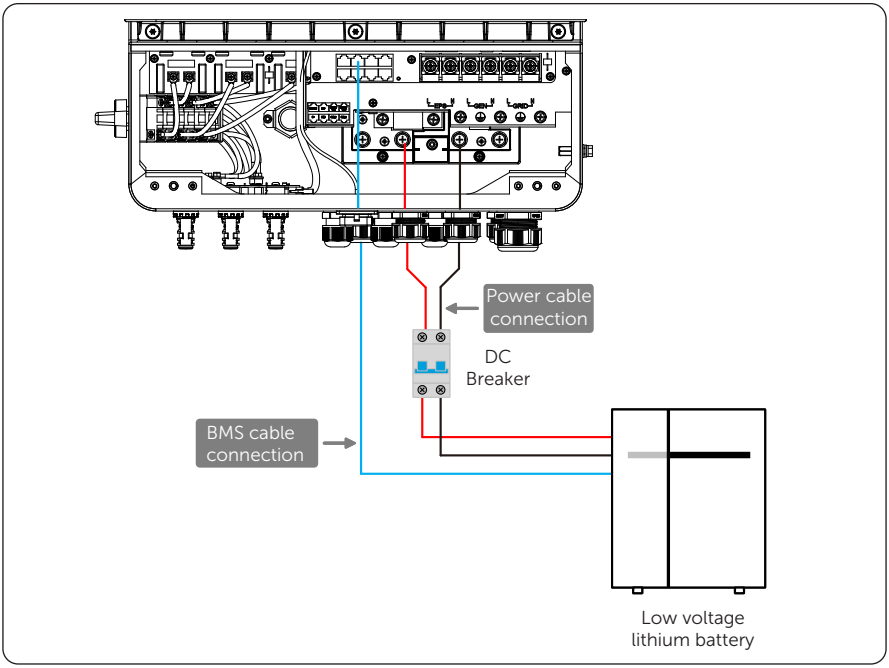


Figure 8-29 Lithium battery connection diagram

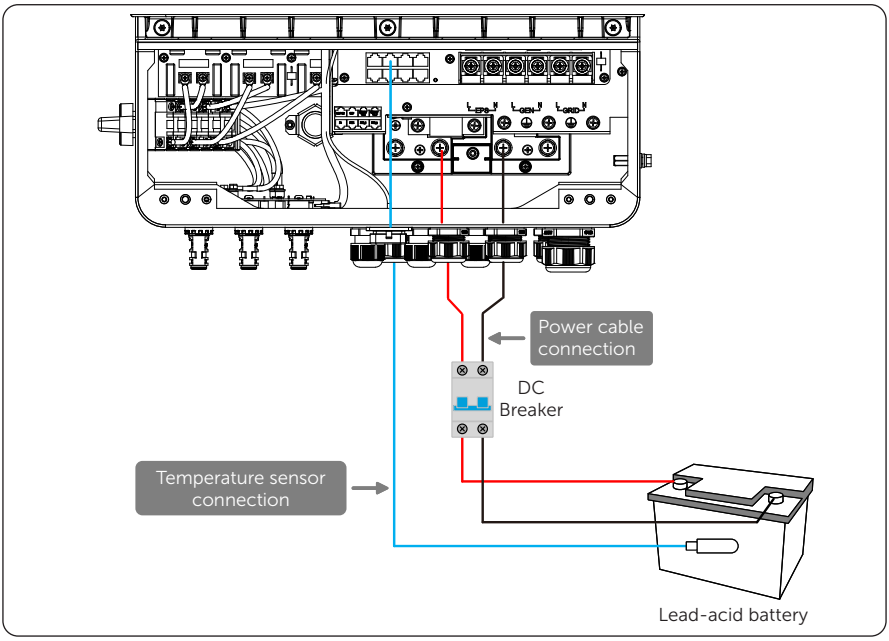


Figure 8-30 Lead-acid battery connection diagram

Wiring procedures

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

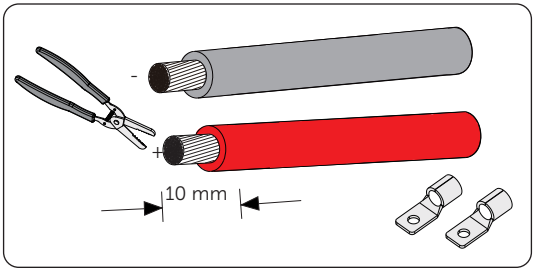


Figure 8-31 Stripping the battery cable

Step 2: Insert the stripped cable into the battery connection terminal. Use crimping tool for battery to crimp it.

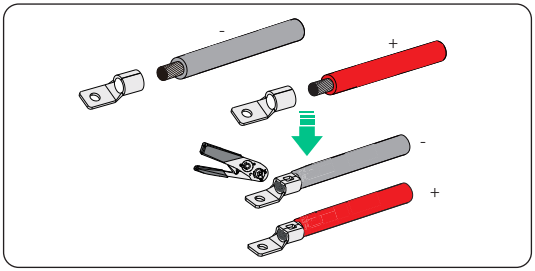


Figure 8-32 Inserting the battery connection terminal

Step 3: Disassemble the BAT+ and BAT- ports. Then remove the plug.

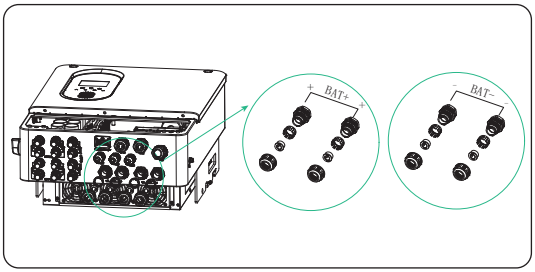


Figure 8-33 Disassembling the terminal

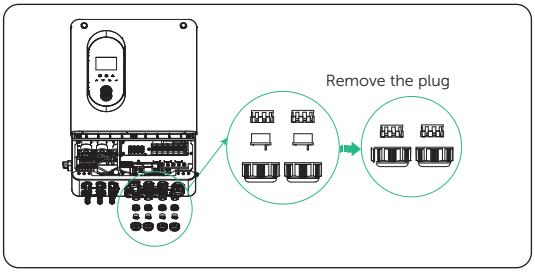


Figure 8-34 Removing the plug

Step 4: Thread the battery cable through swivel nut and the battery terminal.

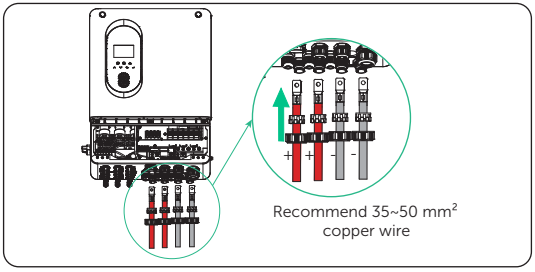


Figure 8-35 Removing the plug

Step 5: Remove the M8 screws to connect the battery cable. (Torque: 5±0.5N·m)

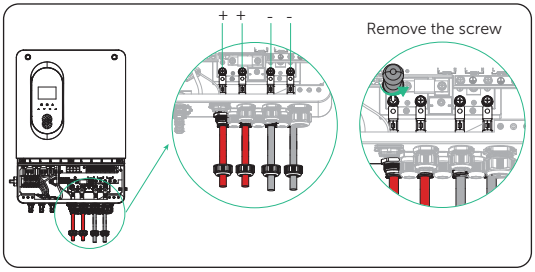


Figure 8-36 Removing the screws

Step 6: Insert the positive cable into BAT+ port and the negative cable to BAT-port. Use cross screwdriver to tighten the screws (Torque: 5±0.5 N·m). Then tighten the swivel nut. Verify that the battery connectors have the correct polarity before connection.

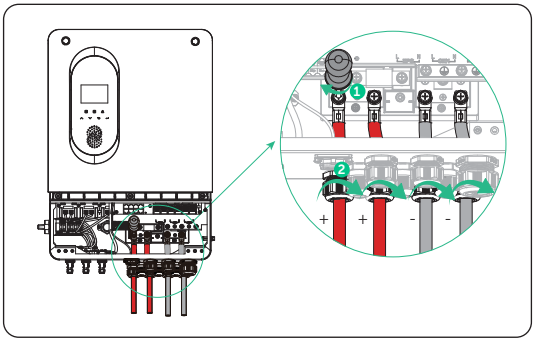


Figure 8-37 Connecting the battery connector

Battery temperature sensor wiring procedures

Step 1: Find the battery temperature sensor in the accessory bag.

Step 2: Disassemble the COM1/2/3 terminal. You can select any port from COM1/2/3. Pass the battery temperature sensor through the COM port and insert the RJ45 terminal of the battery temperature sensor into the BMS port located inside the inverter. Then attach the terminal of the other end to the lead-acid battery in order to measure the battery temperature.

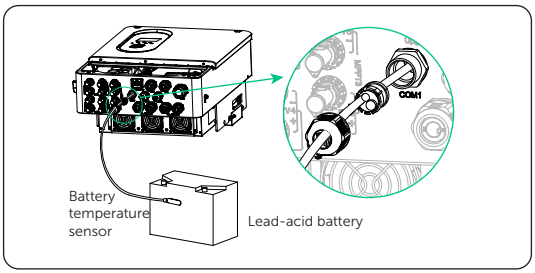


Figure 8-38 Disassemble the swivel nut and attaching the terminal

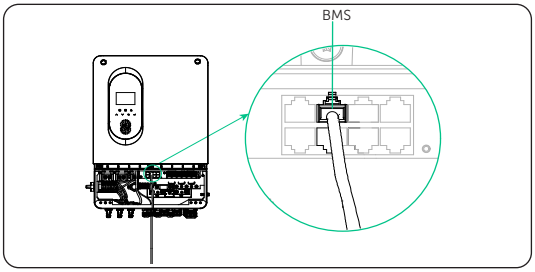
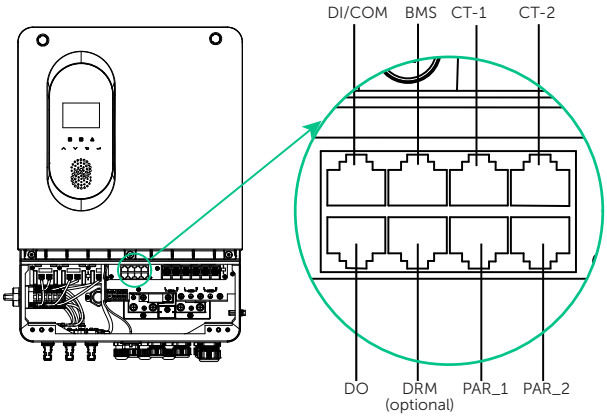


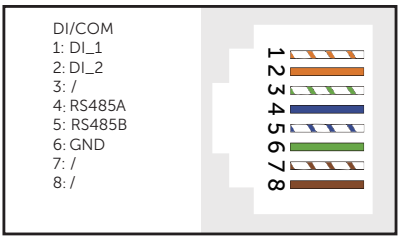
Figure 8-39 Inserting the cable into BMS port

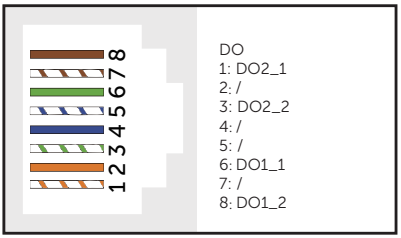
8.6 COM Communication Connection

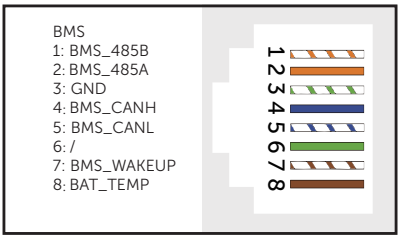
8.6.1 Pin Assignment of COM Terminal

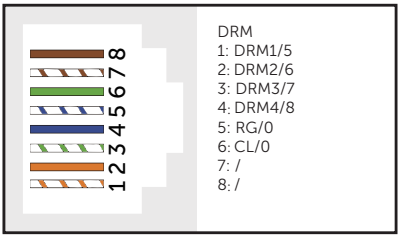
The COM terminal is used for generator state detection, rapid shutdown and remote monitoring via DI/COM terminal, generator start-up via DO terminal, battery communication via BMS terminal, controlling the device response via DRM terminal, CT connection via CT_1 and CT_2 terminal, parallel connection via PAR_1 and PAR_2 terminal.











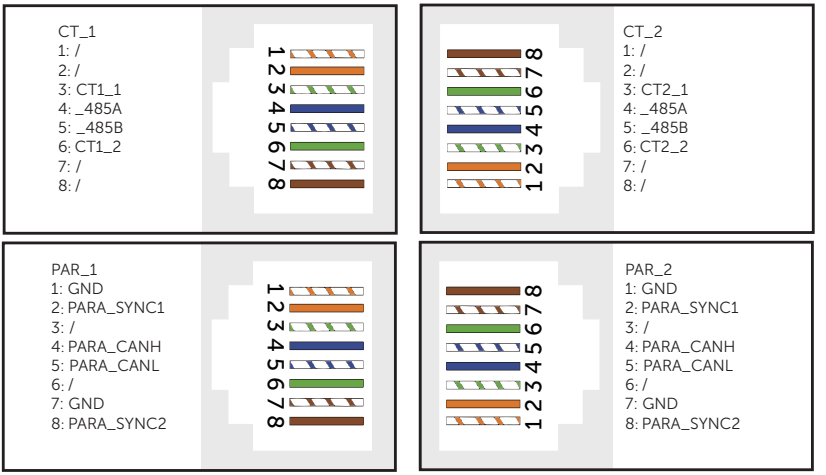


Figure 8-40 Pin assignment of COM terminal

8.6.2 DI/COM Connection

DI/COM terminal is designed to support generator state detection, rapid shutdown and remote monitoring through dry contact input.

To enhance safety and reduce the risk of injury, you can install the emergency stop switch in a readily accessible location through dry contact connection. In the event of an emergency, this switch can be easily reached and pressed to promptly switch off the entire system, ensuring a swift response and preventing further harm.

DI/COM pin assignment

Table 8-3 DI/COM pin assignment

	Pin	Pin assignment
For generator state detection or rapid shutdown (dry contact input)	1	DI_1
	2	DI_2
	3	/
For remote mointoring (dry contact input)	4	RS485A
	5	RS485B
	6	GND
	7	/

	8	/

8.6.3 DO Connection

DO terminal is designed to support generator start-up through dry contact output.

DO pin assignment

Table 8-4 DO pin assignment

	Pin	Pin assignment
For generator start-up (dry contact output)	1	DO2_1
	2	/
For generator start-up (dry contact output)	3	DO2_2
	4	/
	5	/
For generator start-up (dry contact output)	6	DO1_1
	7	/
For generator start-up (dry contact output)	8	DO1_2

8.6.4 BMS Communication Connection

Through BMS communication terminal, the inverter can communicate with the battery.

8.6.5 Parallel Connection

The inverter provides the parallel connection function. One inverter will be set as the **Master** inverter to control other **Slave** inverters in the system. (To be released in quarter 3)

8.6.6 Wiring procedure of COM Communication Connection

CT wiring procedure

Step 1: Disassemble the COM port, then remove the plug. For communication connection, you can select any port from COM1/2/3. For unused terminals, keep the plug to protect the terminal.

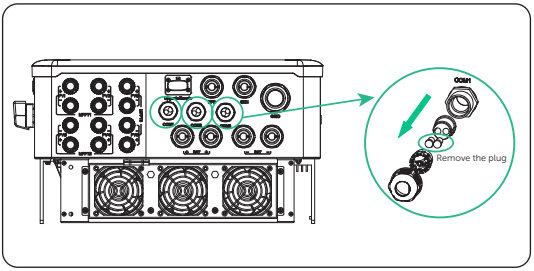


Figure 8-41 Removing the plug

Step 2: Crimp RJ45 terminal. It is recommended to use CAT5 network cable.

For CT connection without RJ45 connector, there is no need to crimp RJ45 terminal.
For CT connection with RJ45 connector, crimp two RJ45 terminals. (Step a, b,c)

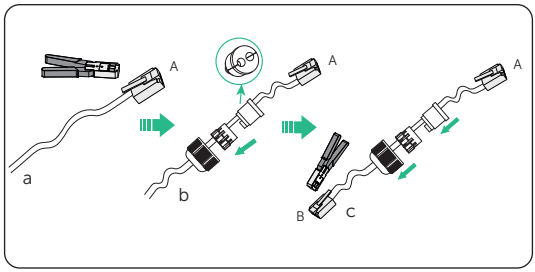


Figure 8-42 Crimping RJ45 terminalFor connection. Insert one side of the cable (with RJ45 terminal) into the CT port of the inverter, Then tighten the swivel nut.

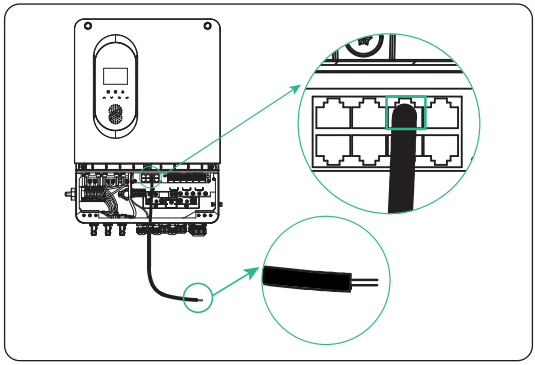


Figure 8-43 Inserting the cable into the CT port

Step 3: For CT connection without RJ45 connector. Insert the cable with RJ45 terminal side into the CT port of the inverter. Then tighten the swivel nut.

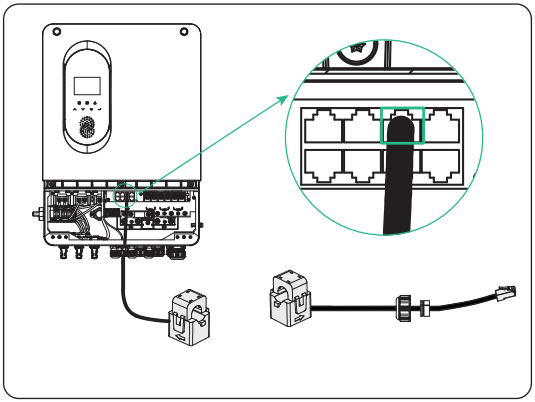


Figure 8-44 Inserting the cable into the CT port

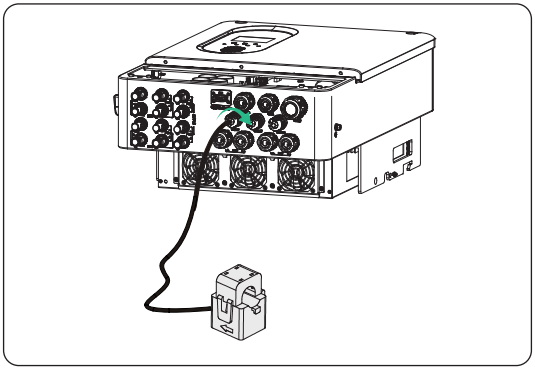


Figure 8-45 Tightening the swivel nut

Step 4: For CT connection with RJ45 connector. Insert one side of the cable into the CT port of the inverter, and the other side into the RJ45 connector. Then insert the RJ45 terminal of the CT into the RJ45 connector. Then tighten the swivel nut.

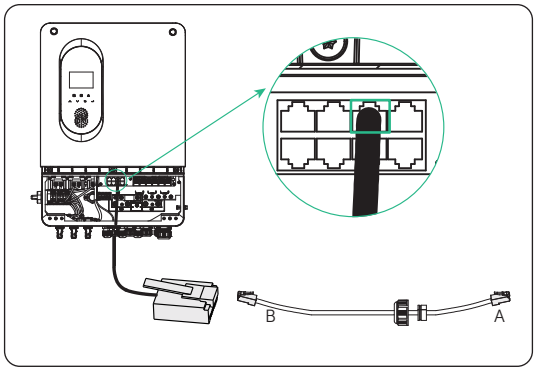


Figure 8-46 Inserting the cable into the CT port

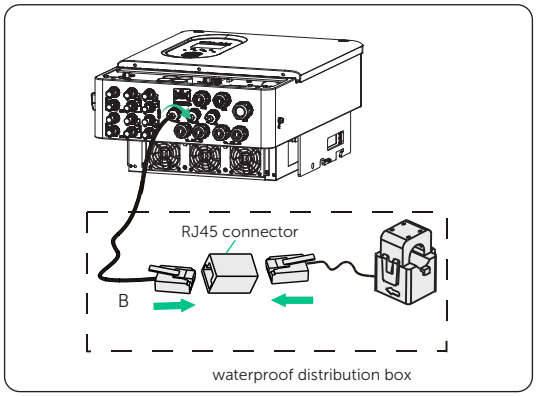


Figure 8-47 Inserting the RJ45 terminals into the RJ45 connector

DI/COM, BMS, DO, DRM wiring procedure

Step 1: Thread the cable into the swivel nut, clamping jaw and cable support sleeve. Strip the insulation layer (length: 15mm) at one end of the cable. Crimp RJ45 terminal at the same end of the cable. Pay attention to the pin order of RJ45 terminal. Use a network cable tester to check if the cable has been correctly and properly crimped before connecting to inverter.

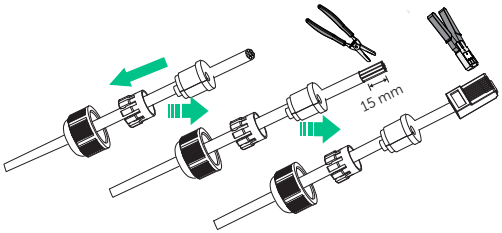
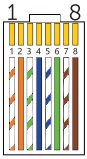


Figure 8-48 Cable making procedure



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

Figure 8-49 Pin order of RJ45 terminal

Step 2: For communication connection, you can select any port from COM1/2/3. Find the location of DI/COM, BMS, DO, DRM port inside the inverter.

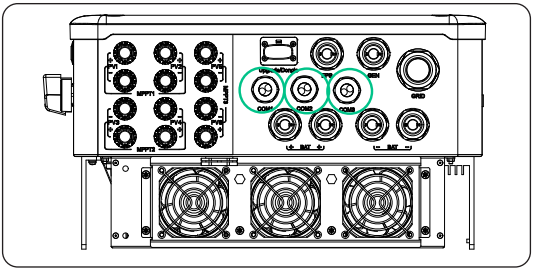


Figure 8-50 Finding the COM terminal

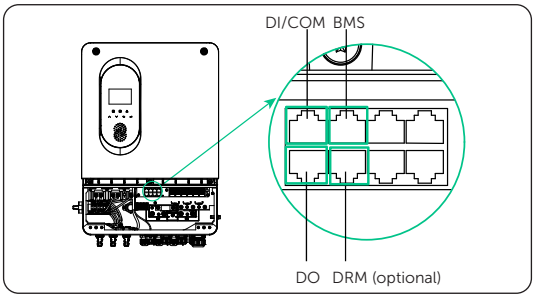


Figure 8-51 Finding the DI/COM, BMS, DO, DRM port

Step 3: Insert the assembled cable into the corresponding ports, then tighten the swivel nut.

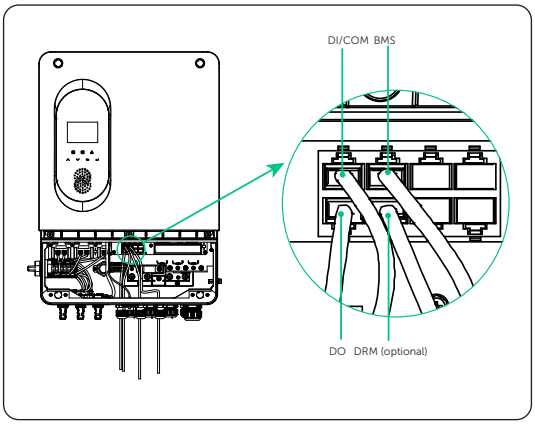


Figure 8-52 Connecting the DI/COM, BMS, DO, DRM port

Parallel wiring procedure

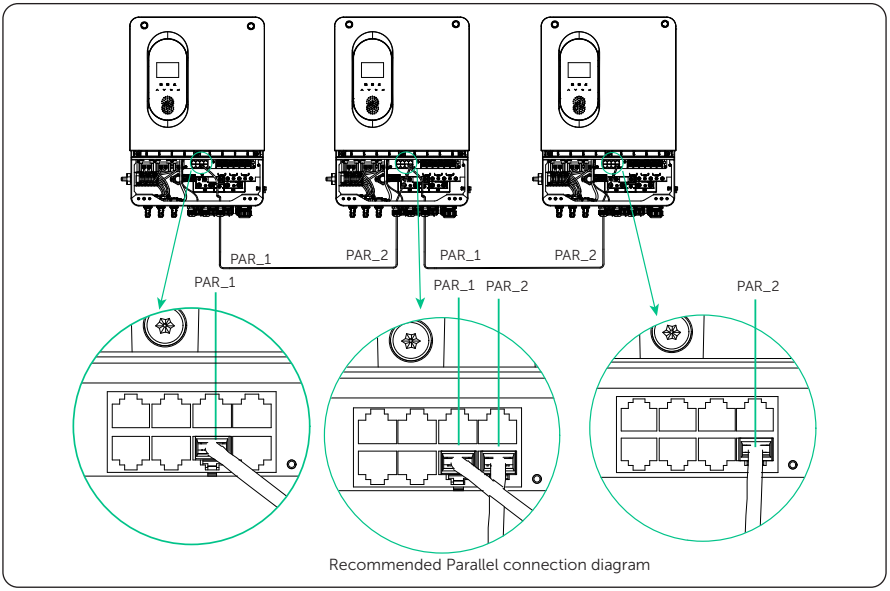


Figure 8-53 Parallel connection diagram

NOTICE!
• Parallel network cable is in the accessory bag.

Close the lower cover

Step 1: Put the lower cover back to the inverter. Use cross screwdriver to tighten the screws on both sides. (Torque: 3±0.3 N·m)

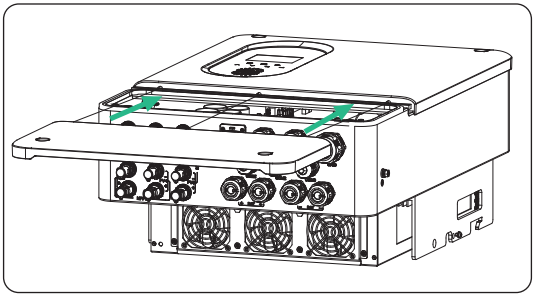


Figure 8-54

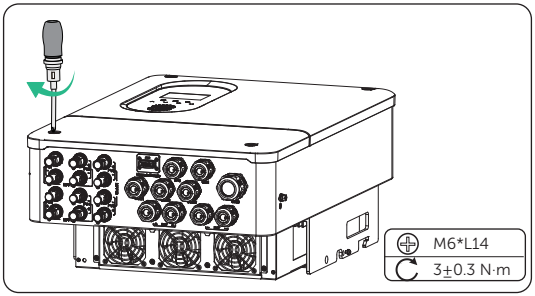


Figure 8-55 Tighten the screws

Step 2: Install the two decorative buckles to the two screws form the accesory bag.

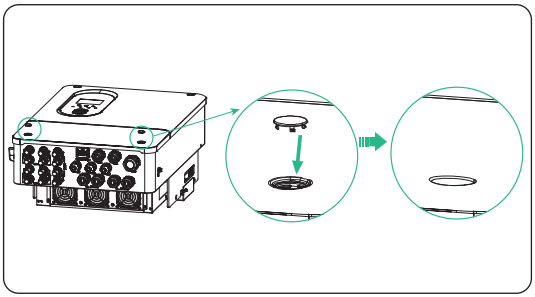


Figure 8-56 Installing the decorative buckles

8.7 Monitoring Connection

The inverter provides a Dongle terminal, which can transmit data of the inverter to the monitoring website via WiFi+LAN dongle. 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.

Monitoring connection diagram

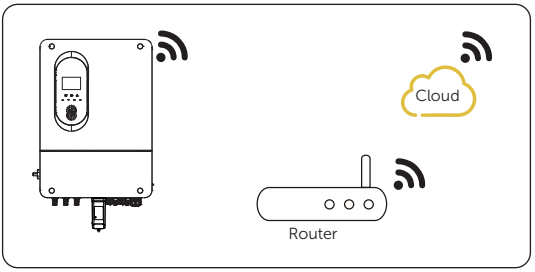


Figure 8-57 Wi-Fi mode connection diagram

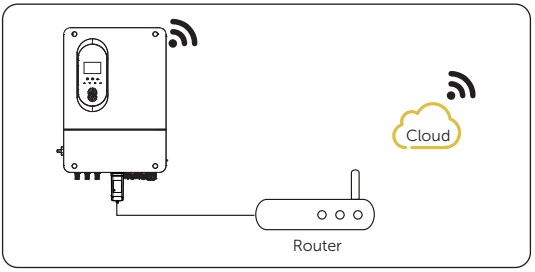


Figure 8-58 LAN mode connection diagram

Monitoring wiring procedure

Wi-Fi mode:

a. Assemble the dongle.

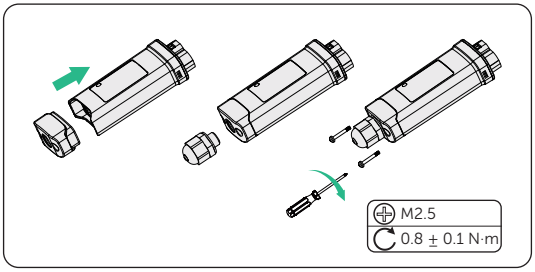


Figure 8-59 Assembling the dongle

b. Plug the dongle to the inverter.

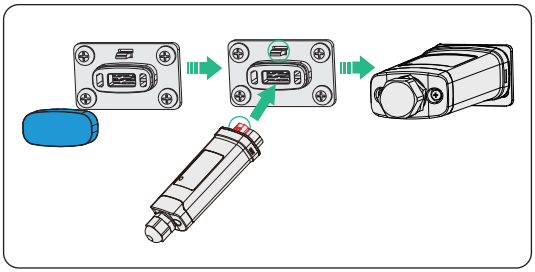


Figure 8-60 Dongle connection procedure

CAUTION!

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

NOTICE!

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

NOTICE!

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

LAN mode:

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

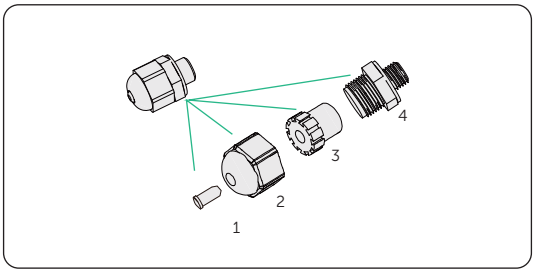


Figure 8-61 Disassembling the waterproof connector

b. Assemble the dongle.

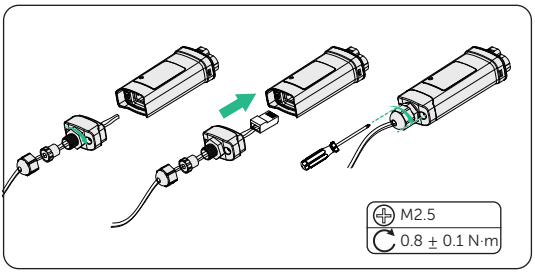


Figure 8-62 Assembling the dongle

c. Plug the dongle to the inverter.

9 System Commissioning

9.1 Checking before Power-on

No.	Item	Checking details
1	Installation	The inverter is installed correctly and securely. The battery is installed correctly and securely. Other device (if any) is installed correctly and securely.
2	Wiring	All DC, AC cables and communication cables are connected correctly and securely; The CT is connected correctly and securely. The ground cable is connected correctly and securely;
3	Breaker	All the DC breakers and AC breakers are OFF;
4	Connector	The 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.

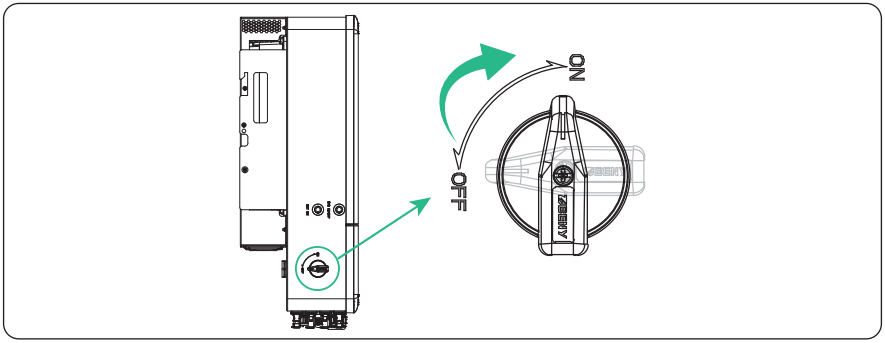
9.2 Powering on the System

Step 3: Turn on the AC breaker between the inverter and the EPS loads.

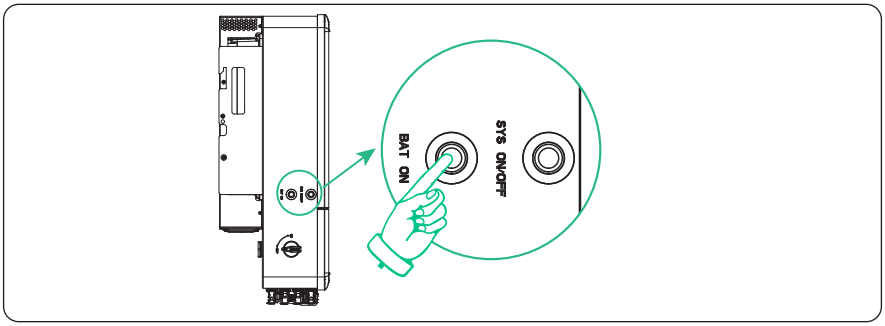
Step 4: Turn on the DC switch between the PV string and the inverter. (if any)

Step 5: Turn on the DC switch between the battery and the inverter.

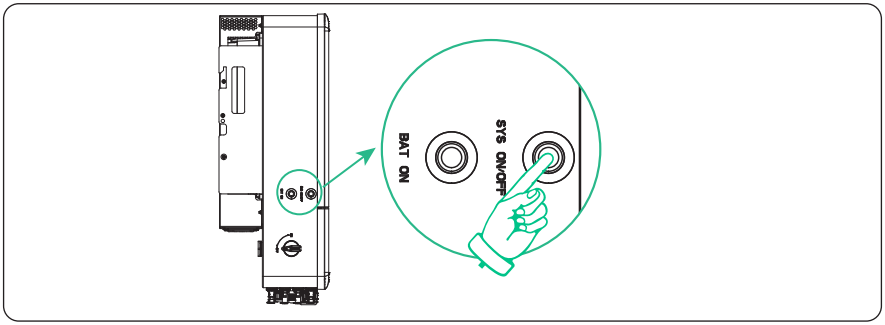
Step 6: Turn on the DC switch at the left side of the inverter.



Step 7: If the battery is connected, but PV is not connected. Press and hold the battery button until the screen is on. If PV is connected, skip this step.



Step 8: Turn on the system button at the left side of the inverter, the light on the system button will light up. Then the inverter will start automatically.



10 Operation on LCD

10.1 Introduction of Control Panel

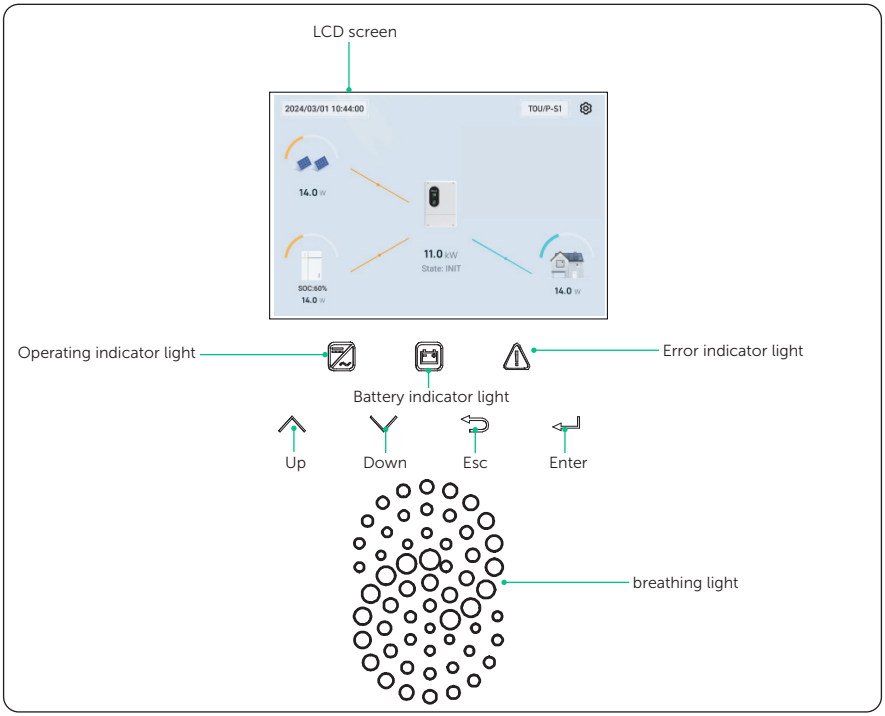


Figure 10-1 Control Panel

- While upgrading, the green, blue and red indicator lights will flash in turns and the breathing light also flashs the three color in turns, indicating that the upgrade is in progress.
- In error state, the fault message and error code will be displayed at the LCD screen, please refer to corresponding solutions in the troubleshooting.

Item	Definition
LCD screen	Display the information of the inverter.

Table 10-1 Definition of indicators

LED indicator	Status		Definition
Operating		Solid green	The inverter is in off-grid operation state.
		Green blinking	The inverter is in the process of powering on.
		Light off	The inverter is in a fault or manual shutdown state.
Error		Solid red	The inverter is in a fault state.
		Red blinking	The inverter has alarm information.
		Light off	There are no faults and alarms in the inverter.
Battery		Solid blue	The battery is online and the voltage is normal.
		Light off	Low battery voltage or no battery.

Breathing light	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 setted 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.

Table 10-2 Definition of keys

Key	Definition
ESC key	Return to the superior menu or cancel setting value.
Up key	Turn to the previous page.
Down key	Turn to the next page.
Enter key	Confirm the selection

- **Work Mode**: Select the working mode of the inverter, including Work mode Work

11 Operation on App and Web

11.1 Introduction of SolaXCloud

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

11.2 Operation Guide on SolaXCloud App

11.2.1 Downloading and installing App

Method 1: Select and scan the QR code below to download the app.

The QR codes are also available on the upper-left corner of the login page of our official website (www.solaxcloud.com), and the user manual of the dongle.

App Store Google play

Figure 11-1 QR code

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

11.2.2 Operation on the App

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

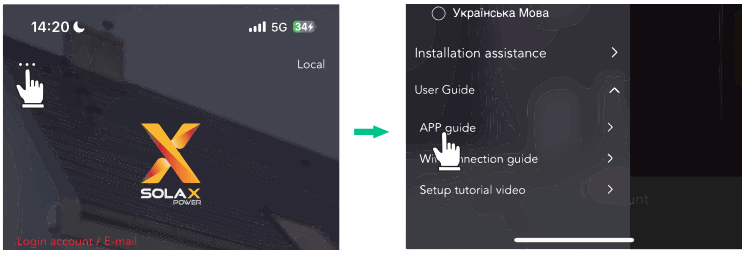


Figure 11-2 App guide on SolaXCloud

NOTICE!
• The screenshots in this chapter correspond to the SolaX Cloud App V4.2.8.

11.3 Operations on SolaXCloud Webpage

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

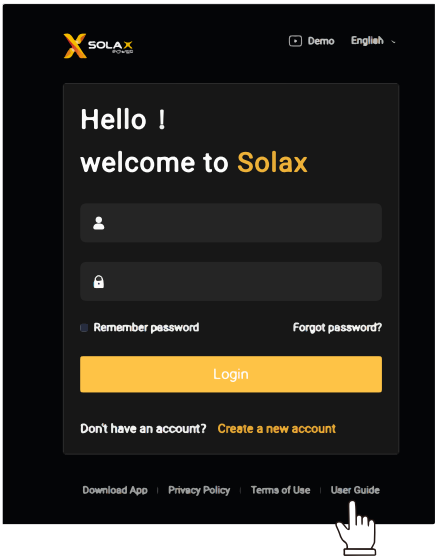


Figure 11-3 User guide on Web

12 Troubleshooting and Maintenance

12.1 Power off

a. Turn off the system button at the left side of the inverter.

b. Turn off the DC switch at the left side of the inverter.

c. Turn off the DC switch between the battery and the inverter and turn off the battery.

d. Turn off the DC switch between the PV string and the inverter. (If there is any).

e. Turn off the AC breaker between the inverter and the EPS loads.

⚠ WARNING!

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

12.2 Troubleshooting

This section lists the possible problems with the inverter, and provides information and procedures for identifying and resolving them. In case of any errors, check for the warnings or error messages on the 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 12-1 Troubleshooting list

Error Type	Error Code	Fault	Descriptions and Diagnosis
INSTALL	1	ISO_FAIL	Insulation impedance detection failed. • Check whether the wire insulation is intact.
INSTALL	2	NO_PWR_	• Check the status .
INSTALL	3	REMOTE_TURN_OFF	Remote shutdown • Restart the inverter.
INSTALL	4	FREQ_CFG_UN-MATCH	Frequency configuration mismatch • Check whether the frequency is within the correct range.
INSTALL	6	ARC_FAIL	Arc fault • Wait for a while to see if it returns to normal.
INSTALL	7	EPS_OVER-LOAD_105PER	1.05 times overload • Turn off high-power load.

Error Type	Error Code	Fault	Descriptions and Diagnosis
INSTALL	8	EPS_OVER-LOAD_125PER	1.25 times overload • Turn off high-power load.
INSTALL	9	EPS_OVER-LOAD_150PER	1.5 times overload • Turn off high-power load.
INSTALL	10	EPS_OVERLOAD_LOCK	Overload self-locking • Turn off high-power load, PV, battery restart inverter.
INSTALL	11	PV_CONN_CFG_ERROR	PV connection configuration error. • Turn off PV and battery restart inverter, and confirm whether PV connection is correct.
INSTALL	12	STARTUP_CON-DITION_FAILL	Startup state failed. • Wait for a while to see if it returns to normal.
INSTALL	14	CPLD_BLOCK_DSP_PWM	CPLD chip shuts down all drivers due to hardware over-current or overvoltage. • Contact FRONUS for help.
PV	20	PV_01_REVERSE	PV1 reverse connection • Turn off PV and battery, restart inverter, and check the connection status of positive and negative poles of PV1.
PV	21	PV_02_REVERSE	PV2 reverse connection • Turn off PV and battery, restart inverter, and check the connection status of positive and negative poles of PV2.
PV	22	PV_03_REVERSE	PV3 reverse connection • Turn off PV and battery, restart inverter, and check the connection status of positive and negative poles of PV3.
PV	23	PV_01_VOLT_HIGH	PV1 Voltage is too high • Check the output voltage of PV1.
PV	24	PV_02_VOLT_HIGH	PV2 Voltage is too high • Check the output voltage of PV2
PV	25	PV_03_VOLT_HIGH	PV3 Voltage is too high • Check the output voltage of PV3
BAT	40	BAT_TYPR_CFG_ERR	Battery type configuration error • Turn off PV and battery, restart inverter, and confirm whether the battery type is correct.
BAT	41	BATT_VOLT_HIGH	Battery voltage is too high • Check whether the battery output voltage is within the normal range.
BAT	42	BAT_BMS_CELL_FAULT	BMS battery failure • Please contact the battery supplier.
BAT	43	BAT_BMS_COMM_FAULT	BMS communication failure • Check whether the communication between battery and inverter is normal.
BAT	44	BAT_SOC_LOW	Low battery SOC • Please charge the battery in time.
INV	71	BST02_SW_OCP	BST2 software overcurrent • Please contact the after-sales personnel.
INV	72	BST03_SW_OCP	BST3 software overcurrent • Please contact the after-sales personnel.

Error Type	Error Code	Fault	Descriptions and Diagnosis
INV	73	BST01_HW_OCP	BST1 hardware overcurrent • Please contact the after-sales personnel.
INV	74	BST02_HW_OCP	BST2 hardware overcurrent • Please contact the after-sales personnel.
INV	75	BST03_HW_OCP	BST3 hardware overcurrent • Please contact the after-sales personnel.
INV	76	BST_OVER_PWR	BST overpower • When only PV is connected to supply loads, the power of one mppt exceeds the maximum power of the Mppt. • Turn off high-power load and wait for a while to see if it returns to normal.
INV	77	BUCKBST_HW_OCP	BuckBst hardware overcurrent • Wait for a while to see if it returns to normal.
INV	78	BUCKBST_SW_OCP	BuckBst software overcurrent • Please contact the after-sales personnel.
INV	79	BUCKBST_SW_OVP	BuckBst software overvoltage • Please contact the after-sales personnel.
INV	80	BUCKBST_SW_UVP	BuckBst software undervoltage • Please contact the after-sales personnel.
INV	81	LLC_HW_OCP	Llc hardware overcurrent • The battery may be short-circuited. Use a multimeter to check whether the battery port is short-circuited. • Wait for a while to see if it returns to normal.
INV	82	LLC_START_FAIL	Llc startup failed. • Please contact the after-sales personnel.
INV	83	BUCKBST_START_FAIL	BuckBst startup failed. • Please contact the after-sales personnel.
INV	85	DCBUS_INIT_CHK_FAIL	DCBUS initialization detection failed. • Turn off PV and battery and restart inverter.
INV	86	DCBUS_HW_OVP	DCBUS hardware overvoltage • Please contact the after-sales personnel.
INV	87	DCBUS_SW_OVP	DCBUS software overvoltage • Please contact the after-sales personnel.
INV	88	DCBUS_SW_UVP	DCBUS software overvoltage • Please contact the after-sales personnel.

Error Type	Error Code	Fault	Descriptions and Diagnosis
INV	89	DCBUS_SHORT	DCBUS short circuit • Turn off PV and battery and restart inverter.
INV	90	DCBUS_INV_SS_FAIL	DCBUS inverter soft start failed. • Please contact the after-sales personnel.
INV	91	DCBUS_BST_SS_FAIL	DCBUS BST soft start failed. • Check whether the battery SOC is too low. • Please contact the after-sales personnel.
INV	92	DCBUS_BUCKBST_SS_FAIL	DCBUS BUCKBST soft start failed. • Please contact the after-sales personnel.
INV	100	INV_PLL_FAIL	Inverter phase-locked failure • Please contact the after-sales personnel.
INV	101	INV_RLY_FLT	Inverter relay fault • Please contact the after-sales personnel.
INV	102	INV_RLY_ON_FAIL	Pull-in fault of inverter relay • Please contact the after-sales personnel.
INV	103	INV_EPS_RLY_FAULT	EPS end relay failure • Please contact the after-sales personnel.
INV	104	INV_SS_ACVOLT_FAIL	Soft start AC voltage failed. • Please contact the after-sales personnel.
INV	105	INV_SW_OCP	Inverter software overcurrent • Please contact the after-sales personnel.
INV	106	INV_HW_WAVE_OCP	Inverter hardware half-wave overcurrent • Please contact the after-sales personnel.
INV	107	INV_HW_OCP	Inverter hardware overcurrent • Please contact the after-sales personnel.
INV	108	INV_DCI_PROT	• Contact FRONUS for help.
INV	109	INV_DCV_PROT	During off-grid operation, DC component of the inverter exceeds the permissible value. • Contact FRONUS for help.
INV	111	INV_GFCI_CT_FAIL	CT fault • Wait for a while to see if it returns to normal. Check whether CT works properly.
INV	112	INV_GFCI_PROT	GFCI fault • Wait for a while to see if it returns to normal.

Error Type	Error Code	Fault	Descriptions and Diagnosis
INV	113	INV_FREQT_OCP	Inverter frequent overcurrent alarm • Wait for a while to see if it returns to normal. Check whether the inverter current works in the normal range.
INV	115	INV_SW_OVP	Inverter software overvoltage • Please shut down and restart.
VER	140	TYPE_MODEL_ ERR	Model configuration error • Turn off PV, battery , and restart inverter. Check whether the inverter model is configured correctly.
BMS	150	BMS_CELL_ OVER_FAULT	Overvoltage fault of cell. • Wait for fault recovery, restart the battery and contact after-sales personnel.
BMS	151	BMS_CELL_LOW_ FAULT	Undervoltage fault of cell. • Recharge the battery..
BMS	152	BMS_CELL_DIFF_ FAULT	Excessive voltage difference fault of cell. • Ensure that the battery works in the normal voltage range.
BMS	153	BMS_HVB_OVER_ FAULT	Overvoltage fault of total voltage. • Wait for fault recovery, restart the battery and contact after-sales personnel.
BMS	154	BMS_HVB_LOW_ FAULT	Undervoltage fault of total voltage. • Recharge the battery.
BMS	155	BMS_TEMP_ OVER_FAULT	High temperature fault. • Stop using the battery and wait for the temperature to recover.
BMS	156	BMS_SELF_ CHECK_FAULT	Self-test fault. • Check the battery failure and contact the after-sales personnel.
BMS	157	BMS_POS_RLY_ ADH_FAULT	Main positive relay sticking fault. • Please contact the after-sales personnel.
BMS	158	BMS_POS_RLY_ OPEN_FAULT	Main positive relay open circuit fault. • Please contact the after-sales personnel.
BMS	159	BMS_NEG_RLY_ ADH_FAULT	Main negative relay sticking fault. • Please contact the after-sales personnel.
BMS	160	BMS_NEG_RLY_ OPEN_FAULT	Main negative relay open circuit fault. • Please contact the after-sales personnel.

Error Type	Error Code	Fault	Descriptions and Diagnosis
BMS	161	BMS_PRECHG_ FAIL_FAULT	Pre-charge failure fault. • Reset the battery. If this fault is reported many times, please contact after-sales personnel.
BMS	162	BMS_CELL_SAM-PLE_FAULT	Cell sampling fault. • Please contact the after-sales personnel.
BMS	163	BMS_TEMP_ SAMPLE_FAULT	Temperature sampling fault. • Please contact the after-sales personnel.
BMS	164	BMS_SYS_FAULT	System fault. • Please contact the after-sales personnel.
BMS	165	BMS_DSG_ OVER_FAULT	Over-discharge current fault. • Stop using the battery and wait for it to recover or re-start the battery. If this fault is reported many times, please contact the after-sales personnel..
BMS	166	BMS_CHG_ OVER_FAULT	Over-charge current fault. • Ensure that the battery works in the normal voltage range.
BMS	167	BMS_AFE_COM_ FAULT	AFE communication fault. • Please contact the after-sales personnel.
BMS	168	BMS_INV_COM_ FAULT	External network communication fault. • Check the communication line between the battery and the inverter. If this fault still occurs after reinserting the line, please contact the after-sales personnel.
BMS	169	BMS_MID_COM_ FAULT	Intermediate network communication fault. • Check the communication line between the batteries. If this fault still occurs after reinserting the line, please contact the after-sales personnel.
BMS	170	BMS_VOLT_SEN-SOR_FAULT	Voltage sensor fault. • Please contact the after-sales personnel.
BMS	171	BMS_ID_REPET_ FAULT	ID duplication fault. • Check if the system connections are correct and follow the initial installation steps to perform the startup operation again.
BMS	172	BMS_TEMP_ LOW_FAULT	Low temperature fault. • Wait for fault recovery, restart the battery and contact after-sales personnel.
BMS	173	BMS_CURR_SEN-SOR_FAULT	Current sensor fault. • Please contact the after-sales personnel.

Error Type	Error Code	Fault	Descriptions and Diagnosis
BMS	174	BMS_LINE_FAULT	Power line open circuit fault. • Check whether the power line is connected properly and restart the battery.
BMS	175	BMS_FLASH_FAULT	Flash fault. • Please contact the after-sales personnel.
BMS	176	BMS_AFE_PROTECT_FAULT	AFE self-protection fault. • Please contact the after-sales personnel.
BMS	177	BMS_CHG_REQ_FAULT	Charging request fault. • Check if the inverter is correctly supplying power to the battery.
BMS	178	BMS_INS_FAULT	Insulation fault. • Please contact the after-sales personnel.
INV	200	BAT_VOLT_OUT-RANGE	Battery voltage overrun • Ensure that the battery works in the normal voltage range.
INV	201	PV_VOLT_OUT-RANGE	Battery voltage overrun • Ensure that PV works in the normal voltage range.
INV	204	INV_PWR_DRT	Inverter power derating • Ensure that the inverter power is within the normal range.
INV	205	BAT_CHRG_PWR_DRT	Battery charging power derating • Ensure that the battery charging power is within the normal range.
INV	206	BAT_DISCHRG_PWR_DRT	Battery discharge power derating • Ensure that the battery discharge power is within the normal range.
INV	207	BAT_FLOATING_CHRG	Battery floating charge • Check battery voltage.
INV	208	BAT_REPLENISH_CHRG	Battery recharge • Check the battery voltage and replenish the power in time.
INV	209	BAT_PWR_IN_CFG_MODE	Battery power configuration mode • Make sure that the battery works correctly.
INV	210	BST_IN_CVS_MODE	BST constant voltage source mode. • BST operates in constant voltage source mode.
INV	211	PV_PWR_DRT_INV_PWR_LMT	Inverter power limit • Ensure that the inverter output power is within the normal range.

Error Type	Error Code	Fault	Descriptions and Diagnosis
INV	212	PV_PWR_DRT_ ZERO_	Anti-reflux. • Ensure that it is in an anti-reflux state.
INV	213	PV_PWR_DRT_ CHRG_PWR_LMT	Charging power limit. • Ensure that the charging power is within the normal range.
INV	214	PV_PWR_DRT_ CURR_LMT	Current limiting • Ensure that the current works within the normal range.
COM	215	INTER_FAN_FAIL	Internal fan failed. • Check whether there is any foreign matter inside the fan.
INSTALL	240	EXTERN_FAN1_ FAIL	External fan1 failure • Please check if the external fan is damaged or blocked..
INSTALL	241	EXTERN_FAN2_ FAIL	External fan2 failure • Please check if the external fan is damaged or blocked..
INSTALL	242	EXTERN_FAN3_ FAIL	External fan3 failure • Please check if the external fan is damaged or blocked..
INSTALL	243	DSP_UPDATE_ FAIL	DSP upgrade failure • Please contact after-sales for assistance with software up grade.
INSTALL	244	ARM_UPDATE_ FAIL	ARM upgrade failure • Please contact after-sales for assistance with software upgrade.
INSTALL	245	SMCU_UPDATE_ FAIL	SMCU upgrade failure • Please contact after-sales for assistance with software upgrade.
INSTALL	246	NO_	Loss • Please check if is connected or if the communication line works normally.
INSTALL	247	NO_CT	CT loss • Please check if the CT is connected.
INSTALL	248	NO_NTC	NTC loss • Please check if the NTC is connected correctly.
INSTALL	249	BMS_LOST	Communication loss between inverter and battery management system equipment. • Please check the connection status between the BMS device and the inverter.

Error Code	Fault	Diagnosis and Solutions
/	Screen not on	• Check if the inverter correctly and normally connected to PV and 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 after power on	• If the connection is abnormal, reconnect them according to the wiring diagrams. • Contact FRONUS for help if it can not return to normal.
/	Abnormal electrical data	• If the wiring is incorrect, reconnect them based on the wiring diagrams. • Set the voltage and current ratio . • Contact FRONUS for help if it can not return to normal.

12.3 Maintenance

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

WARNING!

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

12.3.1 Maintenance routines

Table 12-2 Proposal of Maintenance

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

Item	Check notes	Maintenance interval
General status of inverter	• Check if there is any damage on the inverter. • Check if there is any abnormal sound when the inverter is running.	Every 6 months

12.3.2 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 180 V (preferably on sunny day), or that the battery SOC is higher than 20%, or the battery input voltage is higher than 180 V. Failure to meet one of these conditions may result in upgrade process failure.

Upgrade preparation

- Prepare a USB drive (USB 2.0/3.0, ≤32 GB, FAT 16/32).
- Check for the current firmware version of the inverter.
- Contact our service support for the update firmware file, and save it to the USB drive.
  - » For ARM file: XXXXXX_8_12kW_V001.00.bin
  - » For DSP file: XXXXXX_8_12kW_lap.txt
- Check the folder name and file path:

Figure 12-4 Folder name and path

Upgrade steps

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

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

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

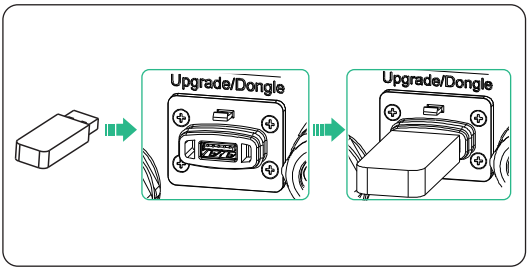


Figure 12-5 Plug in the U disk

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

13 Decommissioning

13.1 Disassembling the Inverter

WARNING!

- Strictly follow the steps below to disassemble the inverter.
- Only use the dedicated removal tool delivered with the inverter to disassemble the AC connector, PV connector, battery connector and communication connnector.

Step 1: Turn off the system by **ON/OFF** on LCD screen.

Step 2: Disconnect the external breakers of the inverter.

Step 3: Turn off the system button and the DC switch at the left side of the inverter.

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

Step 5: Disconnect the PV connector: Insert the disassemble tool for PV terminal into the notch of PV connector and slightly pull out the connector.

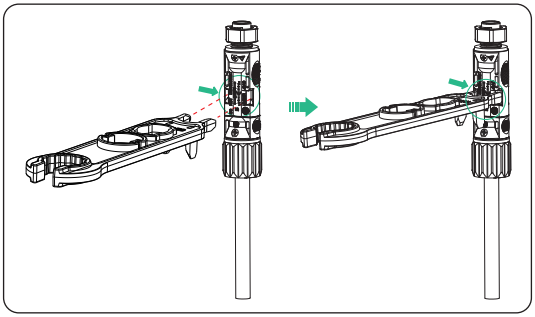


Figure 13-6 Disassembling the PV connector

Step 6: Slightly pull out the dongle module.

Step 7: Disconnect the battery connectors: remove the M8 screws and loosen the swivel nuts, and slightly pull the connectors. (Torque: 15±1 N·m)

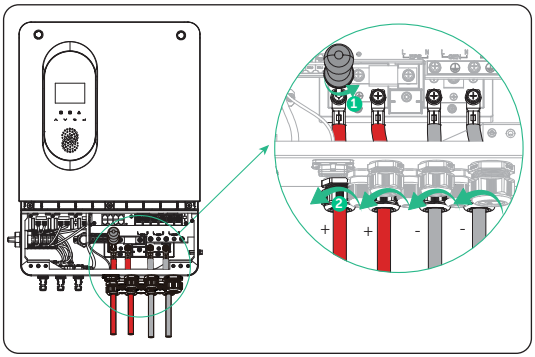


Figure 13-7 Removing the battery connectror

Step 8: Disconnect EPS and GEN connector: remove the M6 screws and loosen the swivel nuts, and slightly pull the connectors.

Step 9: Disconnect the COM connector: loosen the swivel nut of the COM connector and remove the RJ45 terminals of CT_1, CT_2, D1/COM, DO, BMS, DRM, PAR_1 and PAR_2.

Step 10: Put the original teriminal caps on the terminals.

Step 11: Unscrew the grounding screw and remove the grounding cable.

Step 12: Unscrew the M4 screw on the sides of inverter and vertically lift up the inverter to dismantle the inverter. (Torque: 1.5±0.1 N·m)

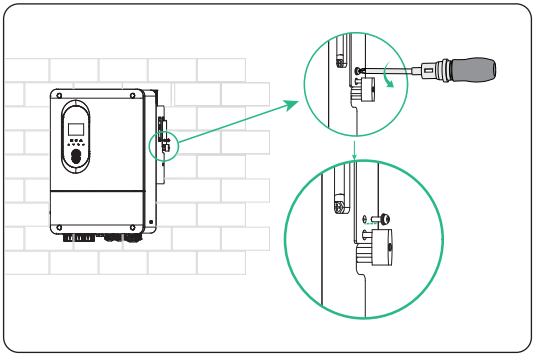


Figure 13-8 Unscrewing the M4 screws

Step 13: Unscrew the screws for fastening the wall mounting bracket and remove the wall mounting bracket if needed.

13.2 Packing the Inverter

- Use the original packaging materials if available.

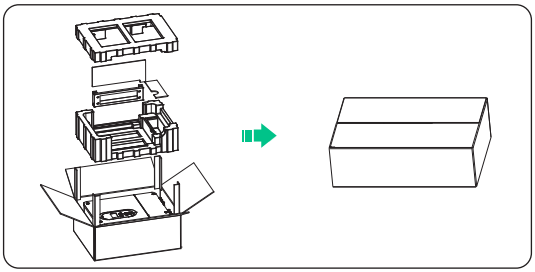


Figure 13-9 Packing the inverter

- 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

13.3 Disposing of the Inverter

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

14 Technical Data

DC input

Model	X1-Genki-8K	X1-Genki-10K	X1-Genki-12K
Max. recommended PV power [W]	16000	20000	24000
Max PV voltage [d.c. V]		600	
Nominal DC operating voltage [d.c. V]		360	
MPPT voltage range [d.c. V]		50-550	
MPPT full power voltage range [d.c. V]	180-500	200-500	180-500
Max. PV curent [d.c. A] [1]	32/32	32/32	32/32/32
Isc PV array short circuit [d.c. A]	40/40	40/40	40/40/40
Start output voltage [d.c. V]	110	110	110
Max. inverter backfeed current to the array [d.c. V]		0	
No. of MPP trackers	2	2	3
Strings per MPP trackers	A:2/B:2	A:2/B:2	A:2/B:2/C:2

* "1" When 1 MPPT has 2 string input, if both strings are connected to PV, the maximum string current of a single string does not exceed 16A. If only one string of PV is connected, the maximum single string current does not exceed 32A.

Battery

Model	X1-Genki-8K	X1-Genki-10K	X1-Genki-12K
Battery type		Lithium / Lead-Acid	
Battery voltage range [d.c. V]		40-60	
Nominal battery voltage [d.c. V]		48	
Max. charging voltage [d.c. V]		≤60 (Adjustable)	
Max. continuous charge/ discharge current [d.c. A]	190	220	250
Charging strategy for Lithium battery		Self-adaption to BMS	
Charging strategy for Lead-Acid battery		3 stages curve	
Temperature sensor		Optional	

AC input (GEN)

Model	X1-Genki-8K	X1-Genki-10K	X1-Genki-12K
Max. AC input apparent power [VA]	12650	14950	18400
Max. AC input current [A]	55	65	80
Nominal voltage [V], frequency [Hz]		220/230/240, 50/60	

Efficiency, Safety and Protection

Model	X1-Genki-8K	X1-Genki-10K	X1-Genki-12K
Efficiency			
MPPT efficiency	>99.9%	>99.9%	>99.9%
European efficiency	97.0%	97.0%	97.0%
Maximum efficiency	97.6%	97.6%	97.6%
Battery charge efficiency [2]	95.0%	95.0%	95.0%
Battery discharge efficiency [2]	94.0%	94.0%	94.0%
Safety and Protection			
Safety		IEC 62109-1/-2	
DC SPD protection		Integrated	
AC SPD protection		Integrated	
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	
Battery terminal temp protection		Yes	
Surge protection		AC Type II / DC Type II	

* "2" PV to BAT Max. efficiency 96.0%, BAT to AC Max. efficiency 95.0%.

EPS (Off-grid) output

Model	X1-Genki-8K	X1-Genki-10K	X1-Genki-12K
Rated EPS apparent power [VA]	8000	10000	12000
Nominal EPS voltage [a.c. V]		230	
Frequency		50/60	
Rated EPS current [a.c. A]	34.8	43.5	52.2
Peak apparent power [VA] [3]		2 times of rated, 10s	
Switching time (typical value) [ms]		< 10	
Total harmonic distortion (THDv) (linear load)		< 2 %	

* "3" Depend on PV and battery capacity.

Generic data

Model	X1-Genki-8K	X1-Genki-10K	X1-Genki-12K
Dimensions (W/H/D) [mm]		651*462*280	
Dimensions of packing (W/H/D) [mm]		790*595*340	
Net weight [kg]		37	
Gross weight * [kg]		42	
Cooling concept	Natural cooling	Smart cooling	
Noise emission (typical) [dB(A)]		< 45	
Storage temperature range [℃]		-40 to +70	
Operating ambient temperature range [℃]		-25 to +60 (derating above +45)	
Humidity [%]		0% to 100% (condensing)	
Altitude [m]		< 3000	
Ingress protection		IP65	
Self consumption (night) [W]		< 10	
Installation mode		Wall bracket	
Inverter topology		Transformerless for PV Side / HF for Battery Side	
Human machine interfaces		LED+LCD (capacitive touch)	
Communication interfaces		CAN, RS485, CT, WiFi, LAN, 4G (optional)	

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

Contact Information

UNITED KINGDOM

Unit C-D Riversdale House, Riversdale Road, Atherstone, CV9 1FA
+44 (0) 2476 586 998
service.uk@solaxpower.com

AUSTRALIA

21 Nicholas Dr, Dandenong South VIC 3175
+61 1300 476 529
service@solaxpower.com.au

TURKEY

Fevzi Çakmak mah. aslım cd. no 88 A Karatay / Konya / Türkiye
service.tr@solaxpower.com

GERMANY

Am Tullnaupark 8, 90402 Nürnberg, Germany
+49 (0) 6142 4091 664
service.eu@solaxpower.com
service.dach@solaxpower.com

USA

3780 Kilroy Airport Way, Suite 200, Long Beach, CA, US 90806
+1 (408) 690 9464
info@solaxpower.com

NETHERLANDS

Twekkeler-Es 15 7547 ST Enschede
+31 (0) 8527 37932
service.eu@solaxpower.com
service.bnl@solaxpower.com

POLAND

WARSAW AL. JANA P. II 27. POST
+48 662 430 292
service.pl@solaxpower.com

SPAIN

+34 9373 79607
tecnico@solaxpower.com

ITALY

+39 011 19800998
support@solaxpower.it

BRAZIL

+55 (34) 9667 0319
info@solaxpower.com

PAKISTAN

service.pk@solaxpower.com

SOUTH AFRICA

service.za@solaxpower.com

FRONUS SOLAR ENERGY (WASIQ TRADERS).

Add.: Plot #64&65 FRONUS HOUSE MOULANA SHOUKAT ALI ROAD, BLOCK E, PHASE 1, JOHAR TOWN, LAHORE PUNJAB 54782

E-mail.: INFO@FRONUS.COM

SALES & SERVICE TEL.: +92 42 111 111 140, +92 42 351 732 22-23-24, +92 42 352 227 54

WWW.FRONUS.COM

320101108900