User Manual

US SERIES

Table of Contents

1. Notes on This Manual

1.1 Scope of Validity

This manual describes the assembly, installation, commissioning, maintenance and troubleshooting of the following model(s) of Fox ESS products:

H1-3.8-US	H1-5.7-US	H1-7.6-US	H1-9.6-US	H1-11.4-US
AC1-3.8-US	AC1-5.7-US	AC1-7.6-US	AC1-9.6-US	AC1-11.4-US

Note: Please keep this manual where it will be accessible at all times. The information in this document is subject to change without notice. Every effort has been made in the preparation of this document to ensure accuracy of the contents, but all statements, information, and recommendations in this document do not constitute a warranty of any kind, express or implied.

1.2 Target Group

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

1.3 Symbols Used

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

⚠	**Danger!** "Danger" indicates a hazardous situation which, if not avoided, will result in death or serious injury.
⚠	**Warning!** "Warning" indicates a hazardous situation which, if not avoided, could result in death or serious injury.
⚠	**Caution!** "Caution" indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
☞	**Note!** "Note" provides important tips and guidance.

Table 1-1 Label Description

This section explains the symbols shown on the inverter and on the type label:

Symbols	Explanation
CSA C 302680 US	Certified to meet the requirements of CSA-C22.2 No. 107.1-16, UL Std. No. 1741-Third Edition, UL 1741 SB, IEEE 1547-2018, IEEE 1547.1-2020, and CA Rule 21.
⚠	Beware of burning. The case temperature may exceed 140°F (60℃) during operation. Avoid contact during operation.

	Danger of high voltages. Disconnect from the grid and the PV generator before opening the device.
	Danger. Risk of electric shock!
	Danger to life due to high voltage. There is residual voltage in the inverter which needs 5 min to discharge. Wait 5 min before you open the upper cover or the lower cover.
	Read the manual.
	Product should not be disposed as household waste.

<p align="center">Table 1-2 Label Description</p>

2. Safety Precautions

2.1 Appropriate Usage

US series hybrid inverters are designed and tested in accordance with international safety requirements. However, certain safety precautions must be taken when installing and operating this hybrid inverter. The installer must read and follow all instructions, cautions and warnings in this installation manual.

- All operations including transport, installation, start-up and maintenance, must be carried out by qualified, trained personnel.
- The electrical installation & maintenance of the hybrid inverter shall be conducted by a licensed electrician and shall comply with local wiring rules and regulations.
- Before installation, check the unit to ensure it is free of any transport or handling damage, which could affect insulation integrity or safety clearances. Choose the installation location carefully and adhere to specified cooling requirements. Unauthorized removal of necessary protections, improper use, incorrect installation and operation may lead to serious safety and shock hazards or equipment damage.
- Before connecting the inverter to the power distribution grid, contact the local power distribution grid company to get appropriate approvals. This connection must be made only by qualified technical personnel.
- Do not install the equipment in adverse environmental conditions such as in close proximity to flammable or explosive substances; in a corrosive or desert environment; where there is exposure to extreme high or low temperatures; or where humidity is high.
- Do not use the equipment when the safety devices do not work or are disabled.
- Use personal protective equipment, including gloves and eye protection during the installation.
- Inform the manufacturer about non-standard installation conditions.
- Do not use the equipment if any operating anomalies are found. Avoid temporary repairs.
- All repairs should be carried out using only approved spare parts, which must be installed in accordance with their intended use and by a licensed contractor or authorized Fox ESS service representative.
- Liabilities arising from commercial components are delegated to their respective manufacturers.
- Any time the hybrid inverter has been disconnected from the public network, please be extremely cautious as some components can retain charge sufficient to create a shock hazard. Prior to touching any part of the hybrid inverter please ensure surfaces and equipment are under touch safe temperatures and voltage potentials before proceeding.

2.2 PE Connection and Leakage Current

PV System Residual Current Factors

- In every PV installation, several elements contribute to the current leakage to protective earth (PE). These elements can be divided into two main types.
- Capacitive discharge current-Discharge current is generated mainly by the parasitic capacitance of the PV modules to PE. The module type, the environmental conditions (rain, humidity) and even the distance of the modules from the roof can effect the discharge current. Other factors that may contribute to the parasitic capacitance are the inverter's internal capacitance to PE and external protection elements such as lighting protection.
- During operation, the DC bus is connected to the alternating current grid via the inverter. Thus, a portion of the alternating voltage amplitude arrives at the DC bus. The fluctuating voltage

constantly changes the charge state of the parasitic PV capacitor (i.e. capacitance to PE). This is associated with a displacement current, which is proportional to the capacitance and the applied voltage amplitude.

- Residual current-if there is a fault, such as defective insulation, where an energized cable comes into contact with a grounded person, an additional current flows, known as a residual current.

Residual Current Device (RCD)

- All Fox ESS hybrid inverters incorporate a certified internal RCD (Residual Current Device) to protect against possible electrocution in case of a malfunction of the PV array, cables or inverter (DC). The RCD in the Fox ESS inverter can detect leakage on the DC side. There are 2 trip thresholds for the RCD as required by the UL1741 standard. A low threshold is used to protect against rapid changes in leakage typical of direct contact by people. A higher threshold is used for slowly rising leakage currents, to limit the current in grounding conductors for the safety. The default value for higher speed personal protection is 30mA, and 30mA, 60mA, 150mA per unit for lower speed fire safety.

3. Introduction

3.1 Basic Features

US series is high-quality hybrid inverters which can convert solar energy to AC energy and store energy into battery. The hybrid inverter can be used to optimize self-consumption, store in the battery for future use or feed-in to public grid. Work mode depends on PV energy and user's preference.

- System advantages:
    - Easy installation: flexible configuration, plug and play set-up
    - High Voltage: compatible with high-voltage batteries for maximum round-trip efficiency.
    - Type 4X: engineered to last with maximum flexibility, and suitable for outdoor installation.
    - Remote monitoring: monitor your system remotely via smartphone app or web portal.
    - 100% imbalance for Split-Phase Loads.
    - High backup power, up to 12.5kW.
    - High scalability, up to 4 inverters in parallel.
    - Fast battery charging, up to 50A charging and 60A discharging current.
    - RSD transmitter inside: a Tigo or APsystem transmitter is integrated in the inverter, and only RSD receivers should be installed by the installer.
    - RGM inside：a 0.5% accuracy revenue grade meter (RGM) is integrated in the inverter and FOX Hub to finance the solar array.
    - Generator ready: the FOX Hub is ready to connect to an up to 200A generator.
    - Safety&Reliability: transformerless design with software and hardware protection.
    - Arc detection function: capability of detecting up to 35A arc current. When the PV panel produces arc, the inverter will shut down immediately, disconnect the grid side relay, BDC relay will send shutdown instructions to the battery to disconnect the battery. Meanwhile, turn off the quick shut-off device (RSD) to avoid the fire of the PV panel. After the arcing occurs, the inverter will report the arcing fault immediately and upload it to the cloud.

- Work modes:

Work modes	Description
Self-use (with PV Power)	Priority: load>battery>grid The energy produced by the PV system is used to optimize self-consumption. The excess energy is used to charge the batteries, and then exported to gird.
Self-use (without PV Power)	When no PV supplied, battery will discharge for local loads firstly, and grid will supply power when the battery capacity is not enough.
Time-of-use	Priority: battery>load>grid (when charging) Priority: load>battery>grid (when discharging) This mode applies the area that has electricity price between peak and valley. User can use off-peak electricity to charge the battery. The charging and discharging time can be set flexibly, and it also allows to choose whether charge from the grid or not.
Back up mode	When the grid is off, system will supply emergency power from PV or battery to the home loads (Battery is necessary in off-grid mode).

Table 3-1 Work Mode Description

Note: Charging time is when the battery is charged within the set time range. The setting of time can be

used in the above three modes.

3.2 Dimensions
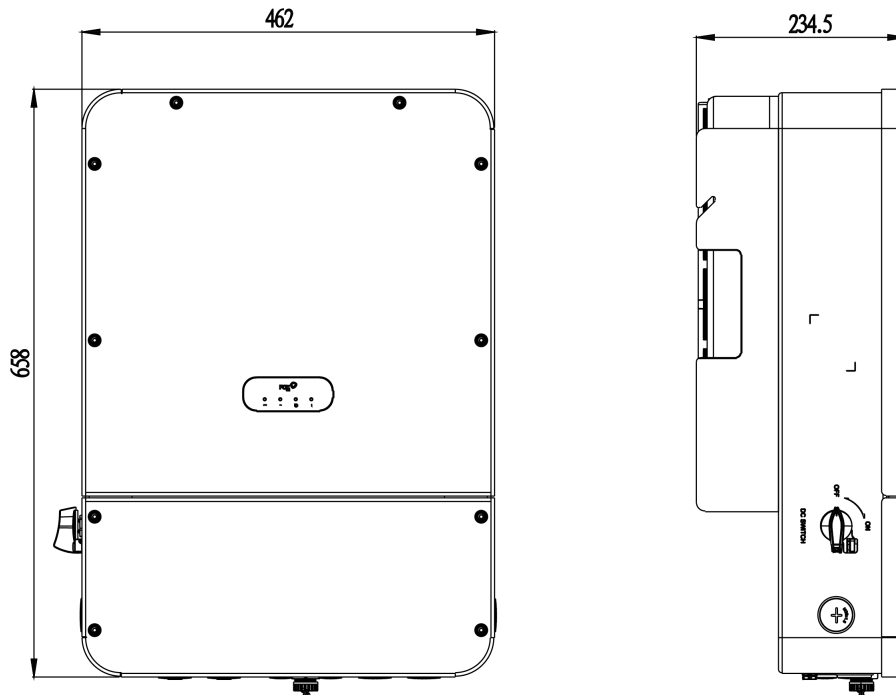
Figure 3-1 Enclosure Dimensions

3.3 Terminals of Hybrid Inverter
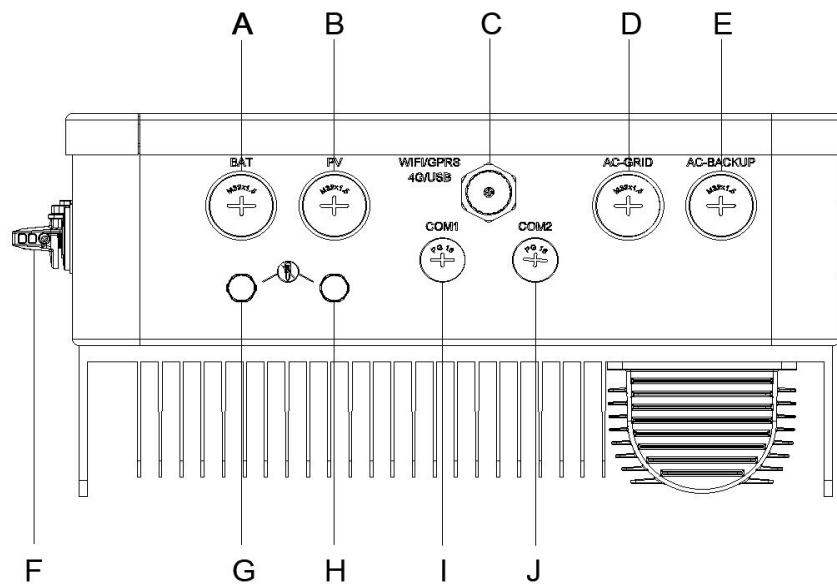
Figure 3-2 Bottom of Hybrid Inverter

Item	Description
A	BAT
B	PV (For Hybrid Only)
C	WIFI/GPRS/4G/USB
D	AC-GRID
E	AC-BACKUP
F	DC Switch (For Hybrid Only)
G	Waterproof Lock Valve
H	Waterproof Lock Valve
I	COM1
J	COM2

Table 3-2 Terminal Description

4. Technical Data

4.1 PV Input (For Hybrid Only)

Module	H1-3.8-US	H1-5.7-US	H1-7.6-US	H1-9.6-US	H1-11.4-US
PV INPUT					
Max. PV input power (W)	5700	8550	11400	14400	17100
Nominal DC voltage (V)	380				
Max. DC voltage (V)	600				
System startup voltage (V)	100				
MPPT Voltage Range (V)	80-550V				
MPPT Voltage Range (V) (Full Load)	204–500	204–500	271–500	257–500	305–500
Max. PV input current per MPPT (A)	28/14			28/14/14	
Max. input short circuit current per MPPT (A)	44/22			44/22/22	
No. of MPPT	2			3	
Strings per MPPT	2/1			2/1/1	

4.2 Battery

Module	H1-3.8-US	H1-5.7-US	H1-7.6-US	H1-9.6-US	H1-11.4-US
Battery					
Battery type	Li-ion				
Nominal battery voltage (V)	360				
DC operating voltage range (V)	85-460				
Full Load DC operating voltage range (V)	95-460	140-460	190-460	235-460	280-460
Max. continuous charge and discharge current (A)	50				
Max. continuous charge/discharge power (W)	5700/4180	8550/6270	11400/8360	14400/10560	17100/12540
Peak discharge current for 60 sec. (A)	60				
BMS Communication interface	CAN2.0				

Module	AC1-3.8-US	AC1-5.7-US	AC1-7.6-US	AC1-9.6-US	AC1-11.4-US
Battery					
Battery type	Li-ion				
Nominal battery voltage (V)	360				
DC operating voltage range (V)	85-460				

Module	AC1-3.8-US	AC1-5.7-US	AC1-7.6-US	AC1-9.6-US	AC1-11.4-US
Full load DC operating voltage range (V)	95-460	140-460	190-460	235-460	280-460
Max. continuous charge and discharge current (A)	50				
Max. continuous charge/discharge power (W)	3800/4180	5700/6270	7600/8360	9600/10560	11400/12540
Peak discharge current for 60 sec. (A)	60				
BMS Communication interface	CAN2.0				

4.3 AC Output/Input

Module	H1-3.8-US	H1-5.7-US	H1-7.6-US	H1-9.6-US	H1-11.4-US
OUTPUT AC (Grid side)					
nominal AC Power (W)	3800	5700	7600	9600	11400
Max. AC Apparent Power (VA)	3800	5700	7600	9600	11400
Nominal AC output voltage (V)	240				
AC Voltage Range (V)	211~264				
Nominal AC output current (A)	15.8	23.8	31.7	40.0	47.5
Max.AC output current (A)	15.8	23.8	31.7	40.0	47.5
Nominal AC output frequency (Hz)	60				
Operating AC frequency range (Hz)	57~63				
Output power factor	>0.99 (0.8 leading - 0.8 lagging)				
Total harmonic distortion	<3%				
INPUT AC (Grid side)					
Max.AC input power (W)	3800	5700	7600	9600	11400
Input voltage range (V)	211~264				
Nominal AC input frequency (Hz)	60				
Max.AC input current (A)	15.8	23.8	31.7	40.0	47.5
OUTPUT AC (Back-up)					
Rated output power (W)	3800	5700	7600	9600	11400
Max. apparent output power (VA)	4180	6270	8360	10560	12540
Peak output power for 60 sec. (W)	5130	7695	10260	12960	15390
Peak output power for 10 min. (W)	4560	6840	9120	11520	13680
Nominal AC output voltage	120V/240 V				

Module	H1-3.8-US	H1-5.7-US	H1-7.6-US	H1-9.6-US	H1-11.4-US
Max. Continuous AC output current (A)	17.4	26.1	34.8	44.0	52.3
Nominal AC output frequency (Hz)	60				
Imbalance for Split-Phase Loads	100%				
Maximum Output Overcurrent Protection	25	35	45	60	70

Module	AC1-3.8-US	AC1-5.7-US	AC1-7.6-US	AC1-9.6-US	AC1-11.4-US
OUTPUT AC (Grid side)					
Nominal AC Power (W)	3800	5700	7600	9600	11400
Max. AC Apparent Power (VA)	3800	5700	7600	9600	11400
Nominal AC output voltage (V)	240				
AC Voltage Range (V)	211~264				
Nominal AC output current (A)	15.8	23.8	31.7	40.0	47.5
Max.AC output current (A)	15.8	23.8	31.7	40.0	47.5
Nominal AC output frequency (Hz)	60				
Operating AC frequency range (Hz)	57~63				
Output power factor	>0.99 (0.8 leading - 0.8 lagging)				
Total harmonic distortion	<3%				
Maximum Output Overcurrent Protection	20	30	40	50	60
INPUT AC (Grid side)					
Max.AC input power (W)	3800	5700	7600	9600	11400
Input voltage range (V)	211~264				
Nominal AC input frequency (Hz)	60				
Max.AC input current (A)	15.8	23.8	31.7	40.0	47.5
OUTPUT AC (Back-up)					
Rated output power(W)	3800	5700	7600	9600	11400
Max. apparent output power (VA)	4180	6270	8360	10560	12540
Peak output power for 60 sec. (W)	5130	7695	10260	12960	15390
Peak output power for 10 min. (W)	4560	6840	9120	11520	13680

Nominal AC output voltage	120V/240 V				
Max. Continuous AC output current (A)	17.4	26.1	34.8	44.0	52.3
Norminal AC output frequency (Hz)	60				
Imbalance for Split-Phase Loads	100%				

4.4 Efficiency, Protection and Standard

Module	H1-3.8-US	H1-5.7-US	H1-7.6-US	H1-9.6-US	H1-11.4-US
EFFICIENCY					
Max. efficiency	97.6%				
PROTECTION					
DC Reverse-polarity Protection	YES				
DC Switch	YES				
DC Surge Protection	Type II				
Insulation Resistance Monitoring	YES				
AC Surge Protection	Type II				
AC short-circuit Protection	YES				
Ground Fault Monitoring	YES				
Grid Monitoring	YES				
Anti-islanding Protection	YES				
Residual-current Monitoring Unit	YES				
AFCI Protection	YES				
STANDARD					
Safety and EMC	UL Std No. 1741, UL62109, IEEE1547-2018, IEEE1547a-2020, IEEE1547.1-2020; CSA C22.2 No.107.1-16, UL1998, UL1699B, FCC part15 CLASS B, HECO				

Module	AC1-3.8-US	AC1-5.7-US	AC1-7.6-US	AC1-9.6-US	AC1-11.4-US
EFFICIENCY					
Max. efficiency	97.60%				
Round-trip efficiency	90.90%				
PROTECTION					
DC Surge Protection	Type II				
Insulation Resistance Monitoring	YES				
AC Surge Protection	Type II				
AC short-circuit Protection	YES				
Ground Fault Monitoring	YES				
Grid Monitoring	YES				

Anti-islanding Protection	YES				
Residual-current Monitoring Unit	YES				
STANDARD					
Safety and EMC	UL 1741, IEEE1547-2018, IEEE1547a-2020, IEEE1547.1-2020; CSA C22.2 No.107.1-16, UL1998,UL1699B, FCC part15 CLASS B, HECO				

4.5 General Data

Module	H1-3.8-US	H1-5.7-US	H1-7.6-US	H1-9.6-US	H1-11.4-US
Dimension and Weight					
Dimension (W*H*D)	462mm*658mm*234.5mm				
Weight	83.8 lbs/38kg				
Enclosure rating	Type 4X				
Operation temperature range	–13°F~+140°F (–25 °C ~ +60 °C) derating above 104°F(40℃)				
Relative humidity	0-100% (No Condensation)				
Typical noise emission	<35dB				
Max. operation altitude	9843 ft(3000 m) (>6, 560 ft (2000 m) derating)				
Internal Consumption at Night	<25W				
Topology	Transformerless				
Cooling Method	Natural convection				
HMI					
Display	LED, App, Website				
Communication interface	CAN2.0, RS485, Meter, CT, ISO alarm, SUNSPEC				
Monitoring Module: Smart WiLAN/GPRS	Optional				
Warranty	Standard 10 years				

Module	AC1-3.8-US	AC1-5.7-US	AC1-7.6-US	AC1-9.6-US	AC1-11.4-US
Dimension and Weight					
Dimension (W/H/D)	658/462/234.5mm				
Weight	80.5 lbs /36.5kg				
Enclosure rating	Type 4X				
Operation temperature range	–13°F~+140°F (–25 °C ~ +60 °C) derating above 104°F(40℃)				
Relative humidity	0-100%　(No Condensation)				
Typical noise emission	<35dB				
Max. operation altitude	9843 ft(3000 m) (>6, 560 ft (2000 m) derating)				
Internal Consumption at Night	<25W				
Topology	Transformerless				
Cooling Method	Natural convection				
HMI					

Display	LED, App, Website
Communication interface	CAN2.0, RS485, Meter, CT, ISO alarm, SUNSPEC
Monitoring Module: Smart WiLAN/GPRS	Optional
Warranty	Standard 10 years

5. Installation

5.1 Check for Physical Damage

Make sure the hybrid inverter is intact during transportation. If there is any visible damage, such as cracks, please contact your dealer immediately.

5.2 Packing List

Open the package and take out the product, please check the accessories first. The packing list is shown as below.
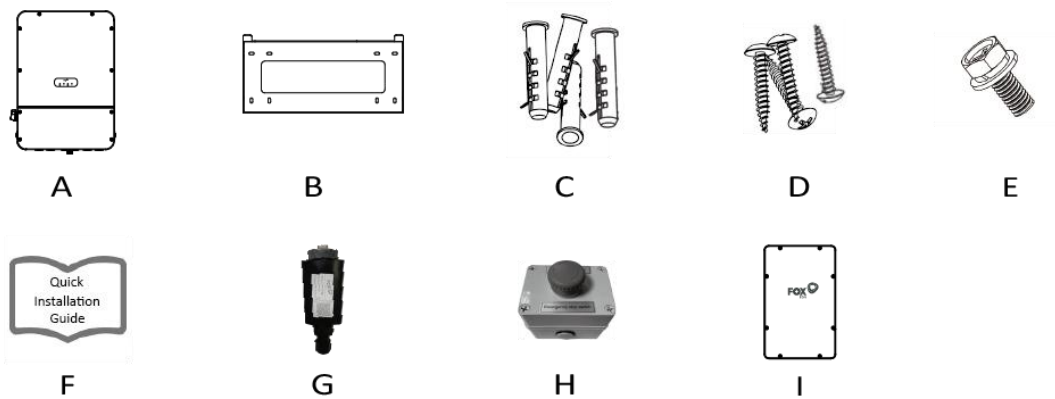
Figure 5-1 Packing List

Object	Quantity	Description	Object	Quantity	Description
A	1	Inverter	F	1	Quick Installation Guide
B	1	Bracket	G	1	WiLAN/GPRS (Optional)
C	4	Expansion tube	H	1	E-STOP
D	4	Expansion screw	I	1	FOX Hub
E	1	Set screw			

Table 5-1 Object Description

5.3 Mounting

• **Installation Precaution**

Make sure the installation site meets the following conditions:

- Not in direct sunlight.
- Not in areas where highly flammable materials are stored.
- Not in potential explosive areas.
- Not in the cool air directly.
- Not near the television antenna or antenna cable.
- Not higher than altitude of about 3000m above sea level.
- Not in environment of precipitation or humidity (>100%).
- Under good ventilation condition.
- The ambient temperature in the range of -25°C to +60°C.
- The slope of the wall should be within ±5°.

- The wall hanging the hybrid inverter should meet conditions below:

1. Solid brick/concrete, or strength equivalent mounting surface;

2. Hybrid inverter must be supported or strengthened if the wall's strength isn't enough (such as wooden wall, the wall covered by thick layer of decoration).

- Please avoid direct sunlight, rain exposure, snow laying up during installation and operation.

| No direct sunlight | No rain exposure | No snow build | Direct sunlight | Rain exposure | Snow lay up |
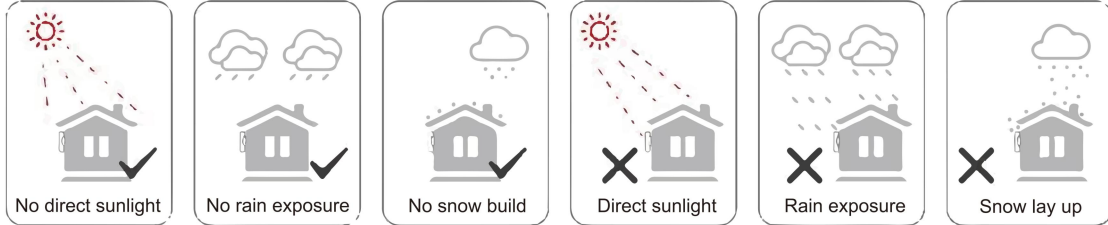
- **Space Requirement**

  - Reserve enough clearance around the inverter to ensure sufficient space for installation and heat dissipation.
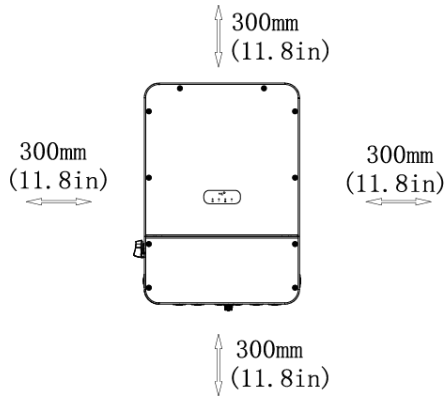
Position	Min Size
Left	300mm (11.8in)
Right	300mm (11.8in)
Top	300mm (11.8in)
Bottom	300mm (11.8in)
Front	300mm (11.8in)

Figure 5-2 Installation space requirements   Table 5-2 Minimum size for installation

  - When installing multiple hybrid inverters, install them in a staggered arrangement.

≥ 300 mm (11.81 in.)

≥ 300 mm (11.81 in.)
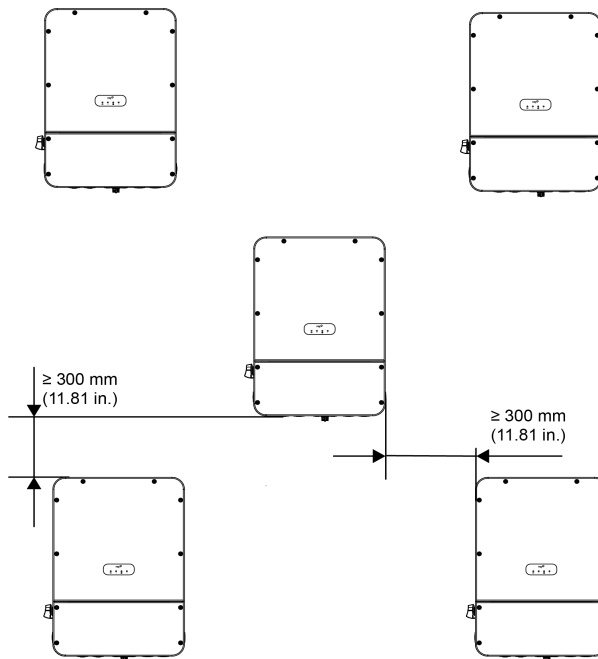
Figure 5-3 Staggered installation

• **Mounting Steps**

Tools required for installation:

Category	Tools		
Installation	Sleeves	Crimping pliers	Cross screwdriver
	Stripping pliers	Percussion drill	Internal hexagonal wrench
	Crystal head crimping pliers	Straight screwdriver	

• **Inverter Installation**

Step 1: Fix the bracket on the wall

Choose the place on which you want to install the hybrid inverter. Place the bracket on the wall and mark the position of the 4 holes from bracket.
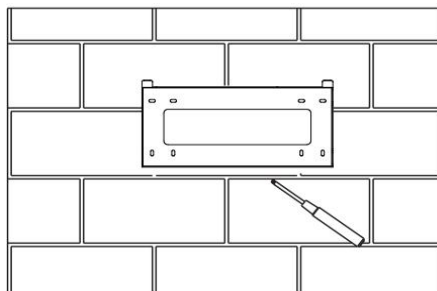
Figure 5-4 Marking the position of the bracket

Drill holes with electric drill, make sure the holes are at least 50mm deep, and then tighten the expansion tubes.
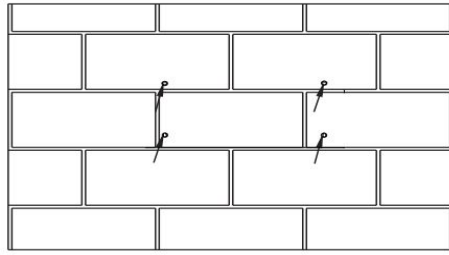
Figure 5-5 Tightening expansion tubes

Insert the expansion tubes into the holes and tighten them. Install the bracket with the expansion screws.
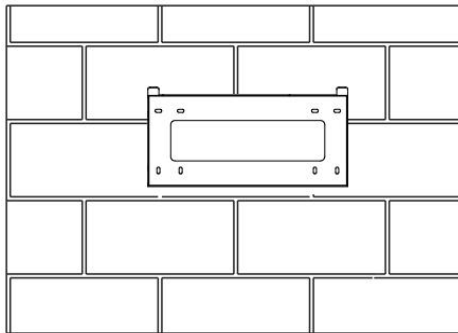
Figure 5-6 Installing the bracket

Step 2: Match the hybrid inverter with wall bracket

Hang the hybrid inverter over the bracket, slightly lower the hybrid inverter, and make sure the two mounting grooves on the back are properly fixed with the two bracket bars.
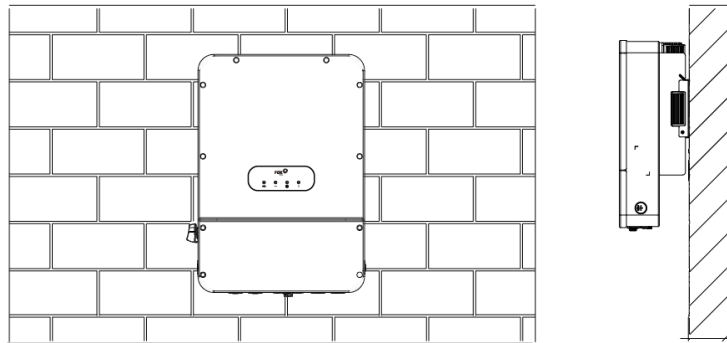
Figure 5-7 Hanging the hybrid inverter

Tighten the anti-theft screw with a screwdriver as shown below:
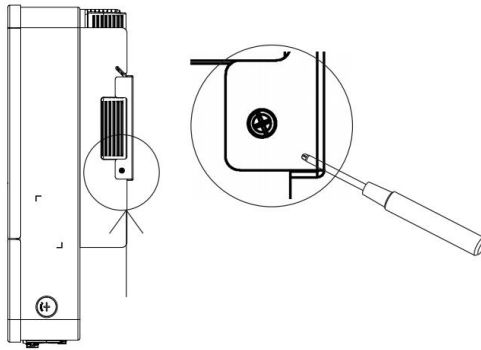
Figure 5-8 Tightening the anti-theft screw

- **FOX Hub Installation**

Step 1: Fix the bracket on the wall

Choose the place on which you want to install the FOX Hub. Place the bracket on the wall and mark the position of the 4 holes from bracket.
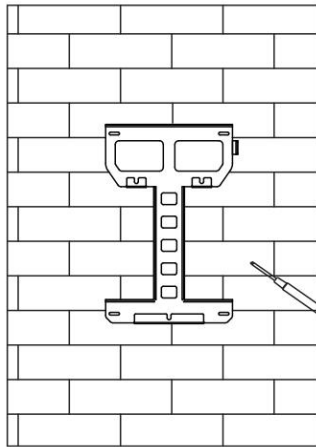
Figure 5-9 Marking the position of the bracket

Drill holes with an electric drill, make sure the holes are at least 50mm deep, and then tighten the expansion tubes.
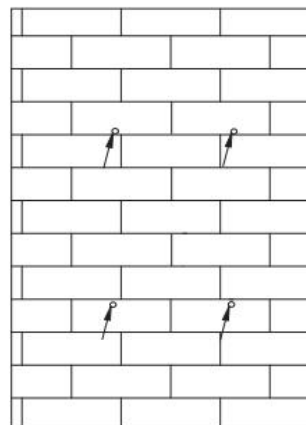
Figure 5-10 Tightening expansion tubes

Insert the expansion tubes into the holes and tighten them. Install the bracket with the expansion screws.
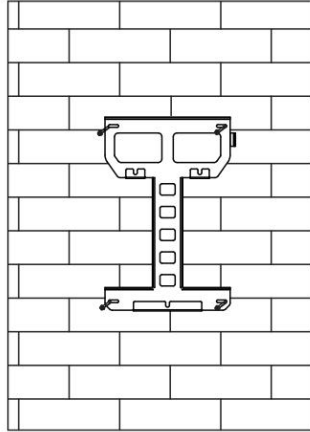
Figure 5-11 Tightening expansion tubes

Step 2: Match the FOX Hub with wall bracket

Hang the FOX Hub over the bracket, slightly lower the FOX Hub, and make sure the two mounting grooves on the back are properly fixed with the two bracket bars.
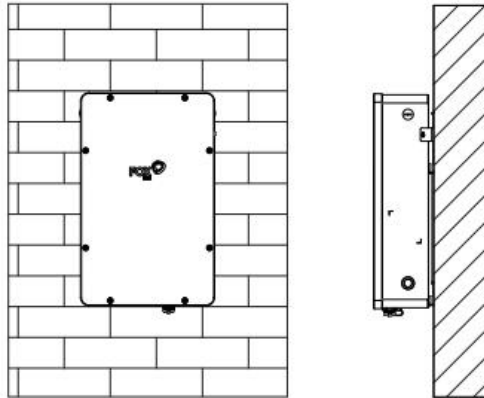
Figure 5-12 Hanging the FOX Hub

Tighten the anti-theft screw.
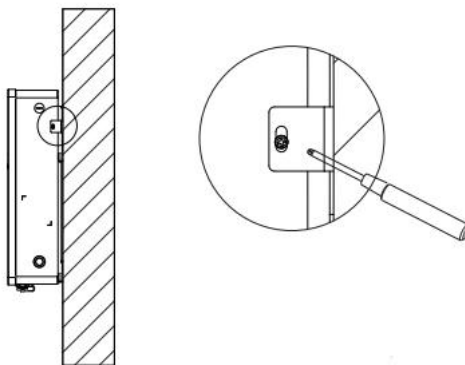
Figure 5-13 Tightening the anti-theft screw

Suggestion: the height difference between the highest installation holes of the FOX Hub bracket and the inverter bracket is 101.3mm.

FOX Hub Bracket   Inverter Bracket
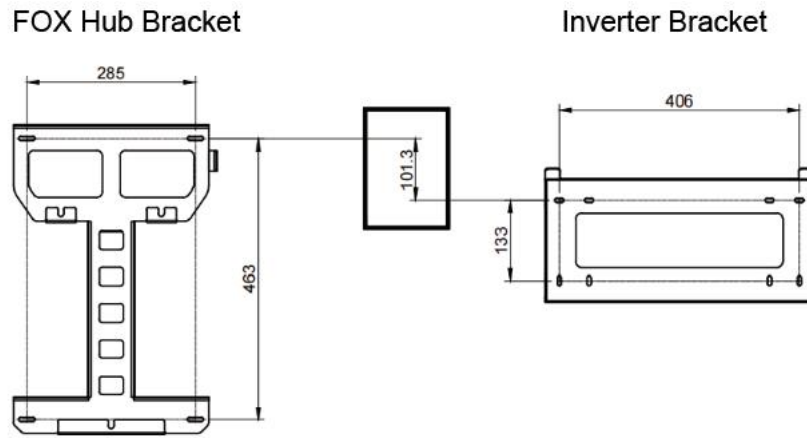
Figure 5-14 Suggested installation distance

6. Electrical Connection

6.1 Battery Connection

- Choose 6 AWG copper cable to connect the battery module.
- Trim 12mm of insulation from the cable end.
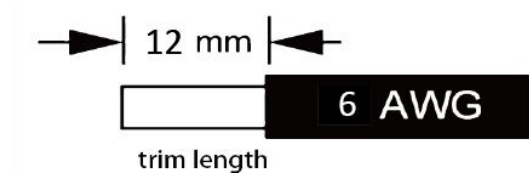
Figure 6-1 Trim length of the cable

- Connect the DC connector (battery) via the above copper cable as below.
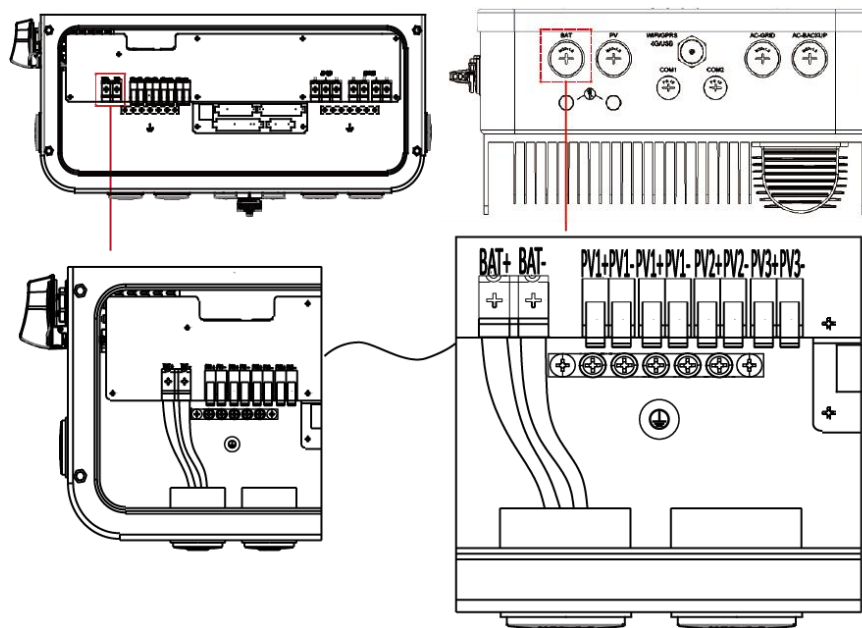
Figure 6-2 Connecting the battery with power cables

- Plug one RJ45 connector of a communication wire into the BAT port of the AC adaptor, and plug the other RJ45 connector into the CAN port of the battery.
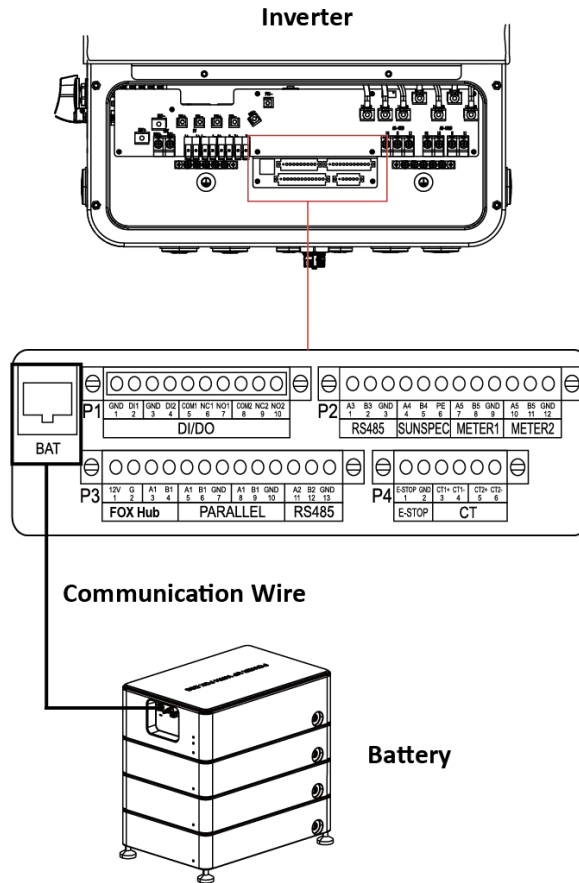
Figure 6-3 Connecting the battery with communication wire

6.2 PV Connection (For Hybrid Only)

Step 1: PV String Connection

US series hybrid inverters can be connected with 3~4-strings of PV modules. Please select suitable PV modules with high reliability and quality. Open circuit voltage of module array connected should be less than 550V, and operating voltage should be within the MPPT voltage range.

👉	**Note!** Please choose a suitable external DC switch if the hybrid inverter does not have a built-in DC switch.
⚠	**Warning!** PV module voltage is very high and within a dangerous voltage range, please comply with the electric safety rules when connecting.
⚠	**Warning!** Please do not make PV positive or negative to ground!
👉	**Note!** PV modules: Please ensure they are the same type, have the same output and specifications, are aligned identically, and are tilted to the same angle. In order to save cable and reduce DC loss, we recommend installing the hybrid inverter as near to the PV modules as possible. PV strings: Please do not connect the PV strings in a parallel mode.

Step 2: PV Wiring

• Turn off the DC switch.

• Choose 10 AWG copper cable to connect the PV module.

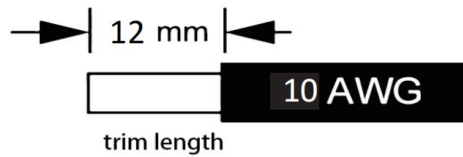• Trim 12mm of insulation from the cable end.

Figure 6-4 Trim length of the cable

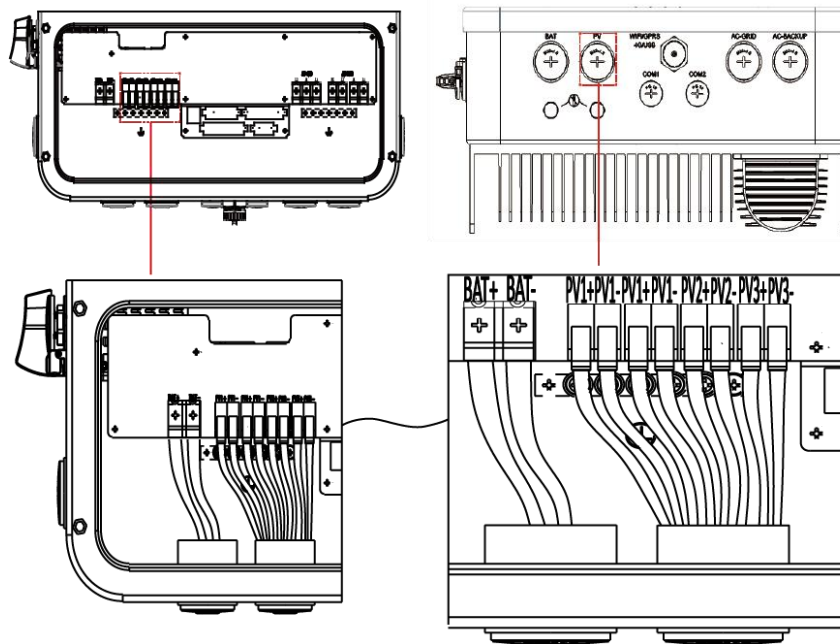• Connect the DC connector (PV) via the above copper cable as below.

Figure 6-5 Connecting the PV with power cables

6.3 Grid Connection

Step 1: Grid Cable Connection

US series hybrid inverters are designed for split-phase grid. Voltage is 120/240V; frequency is 60Hz.

Other technical requests should comply with the requirement of the local public grid.

Table 6-1 Technical requests of cables and breakers

Model	H1-3.8-US AC1-3.8-US	H1-5.7-US AC1-5.7-US	H1-7.6-US AC1-7.6-US	H1-9.6-US AC1-9.6-US	H1-11.4-US AC1-11.4-US
Cable (AC)	12 AWG	10 AWG	8 AWG	6 AWG	6 AWG
Cable (BACK-UP)	12 AWG	10 AWG	8 AWG	6 AWG	6 AWG
Breaker (Grid)	20A	32A	40A	50A	60A
Breaker (BACK-UP)	32A	40A	50A	60A	65A

Note:

1. A breaker for max output overcurrent protection device shall be installed between hybrid inverter and grid, and the current of the protection device is referred to the table above, any load SHOULD NOT be connected with the hybrid inverter directly.
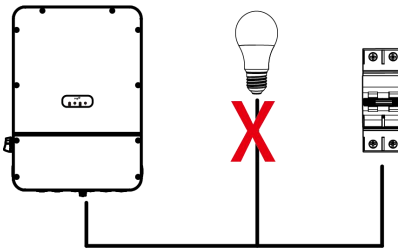
Figure 6-6 Example of forbidden connection of loads

Step 2: Grid Wiring

• Check the grid voltage and compare with the permitted voltage range (refer to technical data).

• Disconnect the circuit-breaker from all the phases and secure against re-connection.

• Trim the cables:

   - Trim all the cables to 60mm.

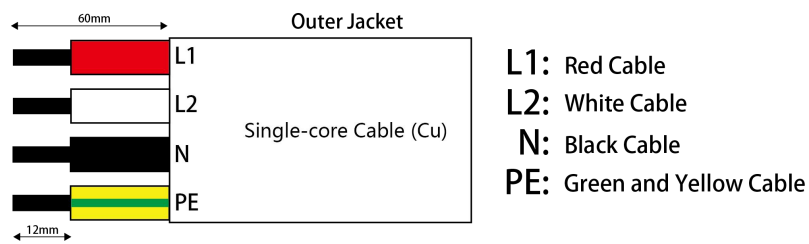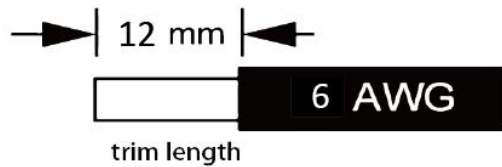   - Use the crimping pliers to trim 12mm of insulation from all cable ends as below.

Figure 6-7 Trim length of cables

Note: Please refer to local cable type and color for actual installation.

AC Wiring

• Choose 6 AWG copper cable to connect the battery module.

• Trim 12mm of insulation from the cable end.

Figure 6-8 Trim length of the cable

• Connect the AC connector via the above copper cable as below.
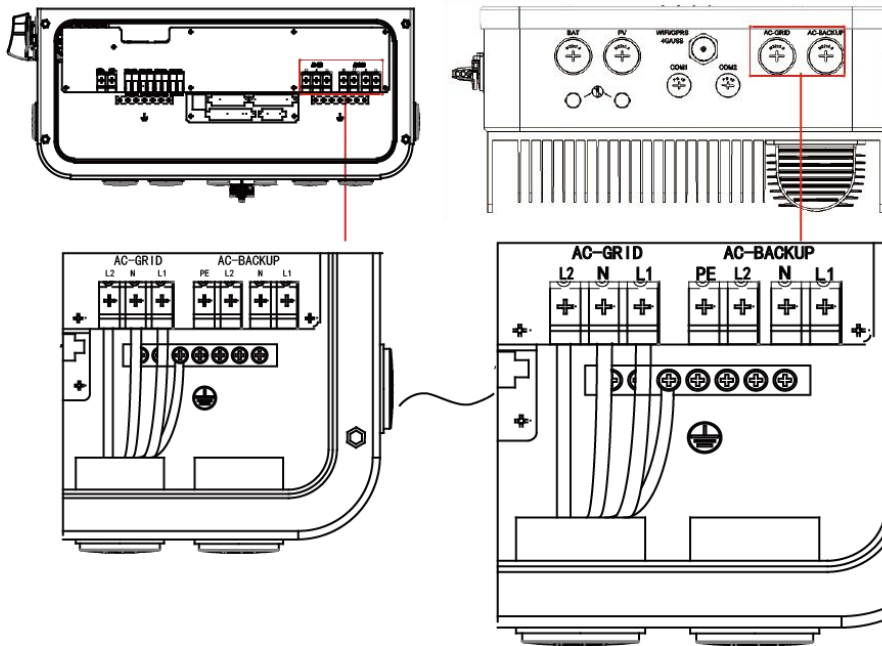
Figure 6-9 Connecting the AC connector with power cables

6.4 Communication Device Installation (Optional)

US series hybrid inverter are available with multiple communication options such as Smart WiLAN, GPRS, RS485 and Meter with an external device.

Operating information like output voltage, current, frequency, fault information, etc., can be monitored locally or remotely via these interfaces.

• **Smart WiLAN (Optional)**

The hybrid inverter has an interface for Smart WiLAN that allows this device to collect information from hybrid inverter; including hybrid inverter working status, performance etc., and update that information to monitoring platform (the Smart WiLAN is available from your local supplier).

Connection steps:

1. Plug the Smart WiLAN into "WIFI/GPRS/4G/USB" port at the bottom of the hybrid inverter, and complete the Smart WiLAN configuration (please refer to the Smart WiLAN quick installation guide for more details).

• **BMS**

The BMS has functions of CAN and AWAKEN. Pins of the network wire are defined as below:
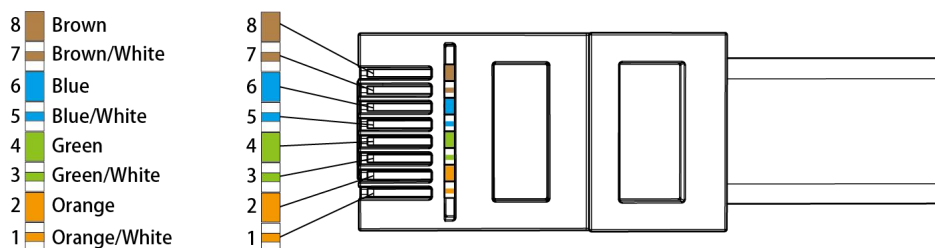

8	Brown
7	Brown/White
6	Blue
5	Blue/White
4	Green
3	Green/White
2	Orange
1	Orange/White

Figure 6-10 Pin definitions of network wire

PIN	Definition
1	AWAKEN
2	GND

3	N/A
4	BMS-CANL
5	BMS-CANH
6	BMS-CANH
7	BMS-CANL
8	N/A

- **Meter**

The hybrid inverter has integrated export limitation functionality. To use this function, a power meter with CTs must be installed.
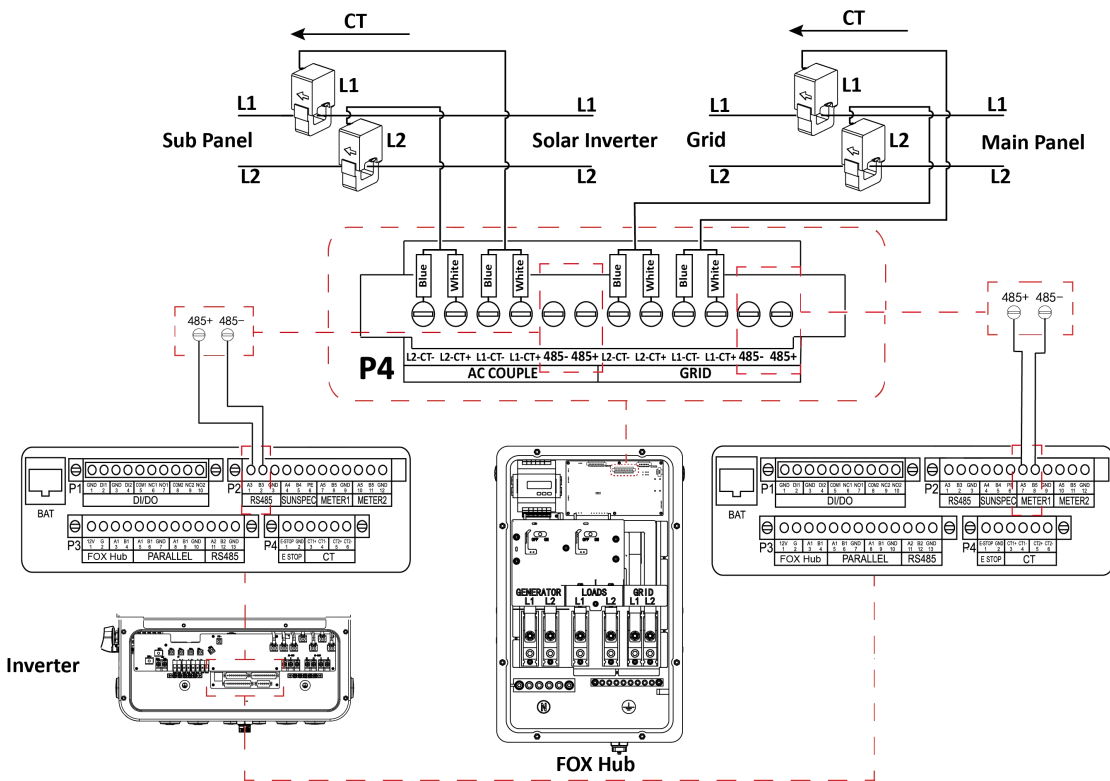
The meters are wired as below:

Figure 6-10 Meter wiring diagram

6.5 E-STOP Wiring

Signal Wire Wiring

1. Remove the protection wire at the P4 module of the AC adaptor.
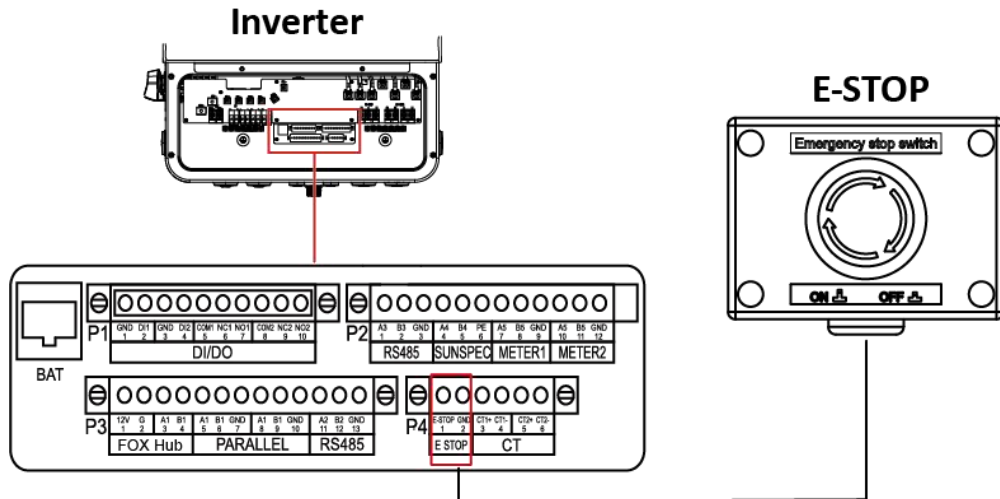2. Connect the conductors P4-1 and P4-2 of the AC adaptor to the E-STOP.

Figure 6-11 E-STOP wiring diagram

Warning: do not remove the protection wire at the P4 module of the AC adaptor if E-STOP is not used.

6.6 FOX Hub Wiring

Signal Wire Wiring

1. Choose a multi-paired and individually foil shielded wire with a conductor cross-sectional area range of 24-16 AWG to connect the FOX Hub.
2. Connect the conductor 12V of the AC adaptor to the conductor 12V of the FOX Hub as below.
3. Connect the conductor G of the AC adaptor to the conductor G of the FOX Hub as below.
4. Connect the conductor A1 of the AC adaptor to the conductor 485A+ of the FOX Hub as below.
5. Connect the conductor B1 of the AC adaptor to the conductor 485A- of the FOX Hub as below.

FOX Hub   Inverter
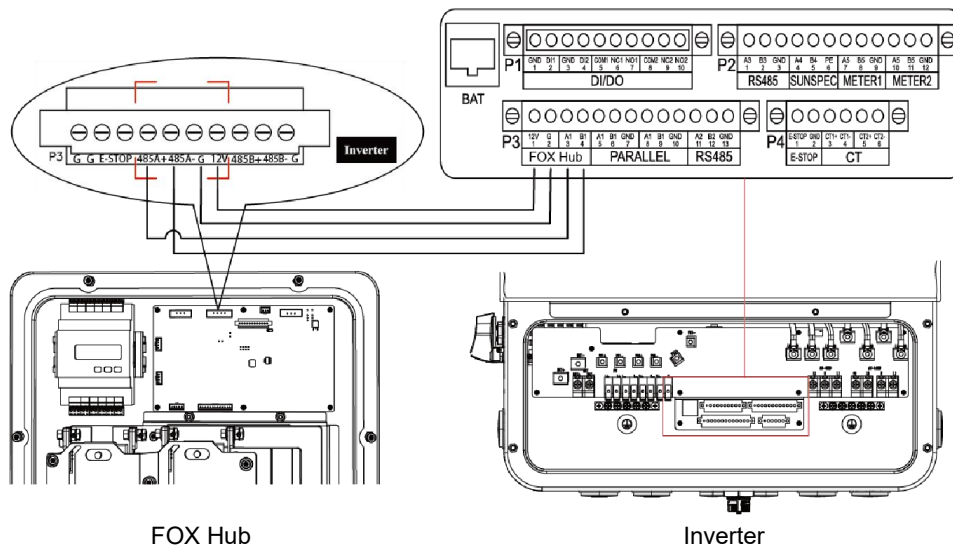
Figure 6-12 FOX Hub Wiring Diagram

Power Cable Wiring

1. Choose cables with the following cable diameters to connect conductors L1 and L2 of the GENERATOR module of the FOX Hub to the generator.
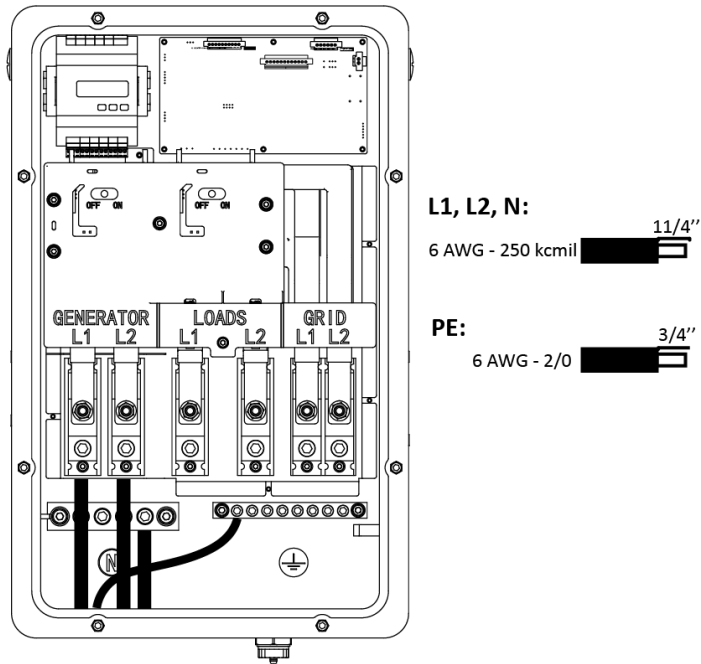
Figure 6-13 Connecting the Fox Hub to the generator

2.   Choose cables with the following cable diameters to connect conductors L1 and L2 of the LOADS module of the FOX Hub to the sub panel.
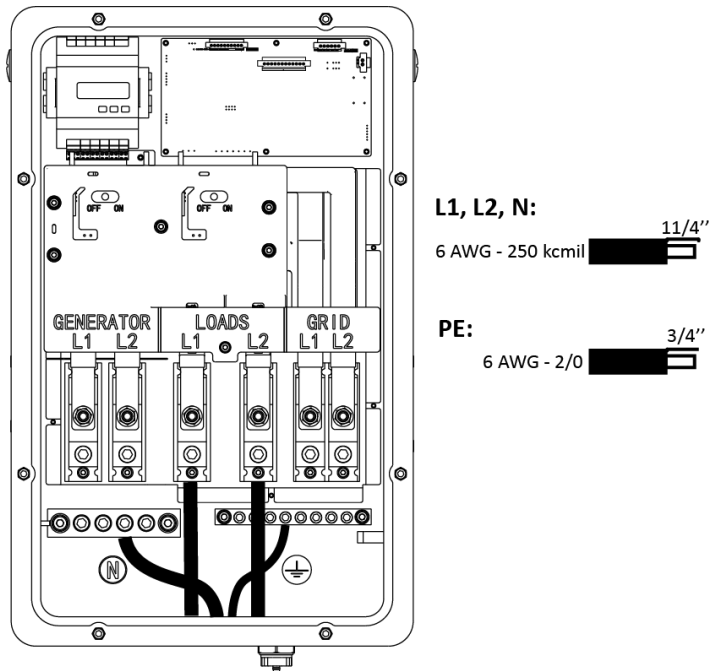

Figure 6-14 Connecting the Fox Hub to the loads

3.   Choose cables with the following cable diameters to connect conductors L1 and L2 of the GRID module of the FOX Hub to the switch.
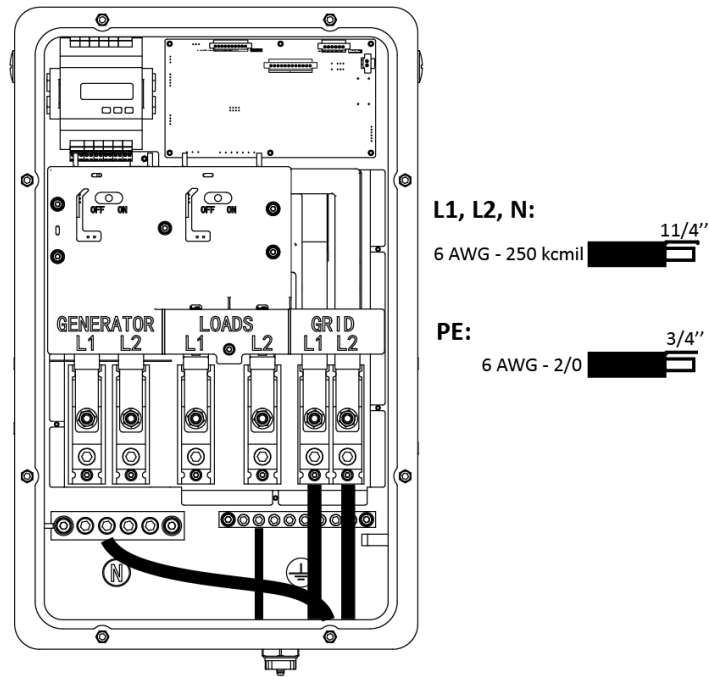
L1, L2, N:
6 AWG - 250 kcmil
11/4''

PE:
6 AWG - 2/0
3/4''

Figure 6-15 Connecting the Fox Hub to the grid

Notes：

1.FOX Hub: Used for On-Grid and Off-Grid switching of hybrid inverters, improve maximum off-grid loads capacity, maximum bypass current is 200A.

2.When the grid power is off, ensure that the Back-up load power is lower than the hybrid inverter's maximum output power.
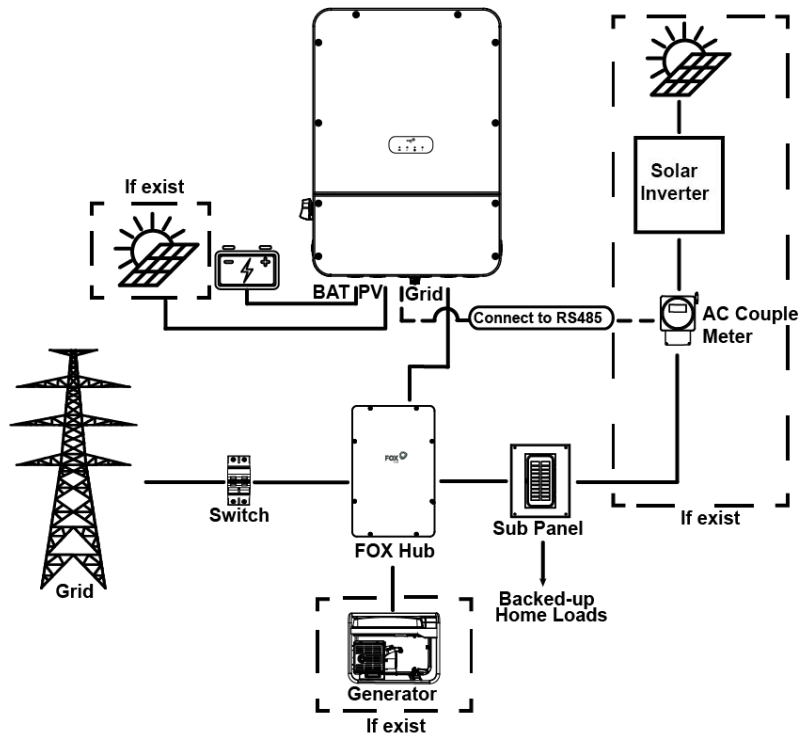
6.7 System Wiring Diagram
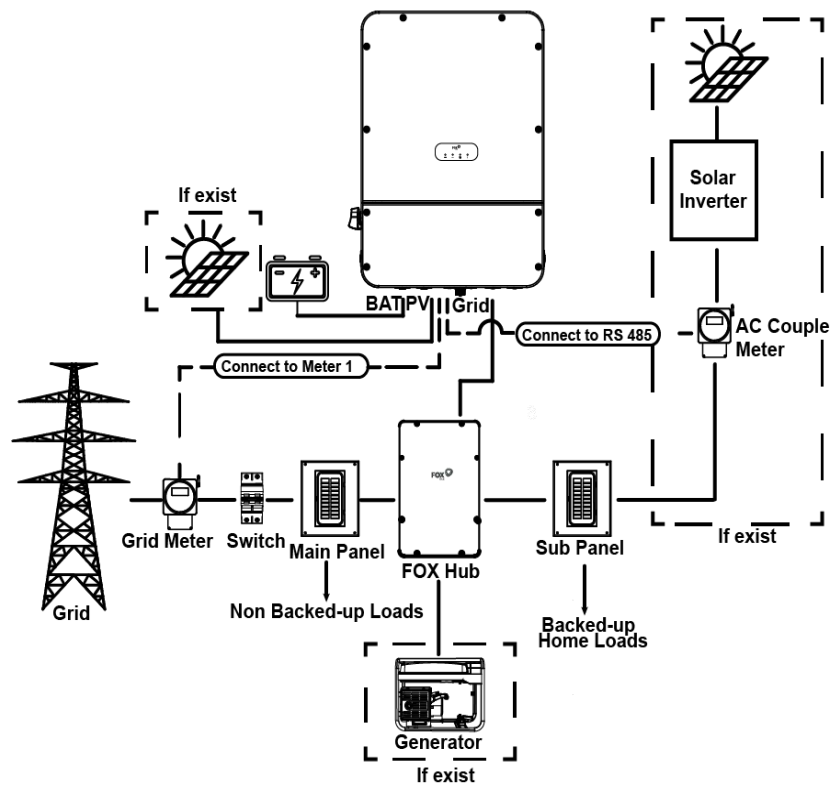
Whole-Home Backup

Figure 6-16 Whole-home backup wiring diagram

Partial Home Backup

Figure 6-17 Partial-home backup wiring diagram

A. Common loads description

Under off-grid mode, if need to connect the inductive load on off-grid port, please ensure that the instantaneous power of the load at startup is lower than the maximum power of the off-grid mode. Below table shows some conventional and reasonable loads for you reference. Please refer to your loads' manual for the actual specs.
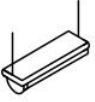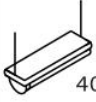
Type	Power		Common equipment	Example		
	Start	Rated		Equipment	Start	Rated
Resistive load	X 1	X 1	Incandescent lamp TV	Incandescent lamp 100W	100VA (W)	100VA (W)
Capacitive load	X 2	X 1.5	Fluorescent lamp	Fluorescent lamp 40W	80VA (W)	60VA (W)
Inductive load	X 3~5	X 2	Fan Fridge	Fridge 150W	450-750VA (W)	300VA (W)

Figure 6-18 Common loads

6.8 Hybrid Inverter Start-Up

Please refer to the following steps to start up the hybrid inverter.

1. Make sure the inverter is fixed well on the wall.
2. Make sure all cables are completed.
3. Make sure the meter and external off-grid Energy Hub connected well (if needed).
4. Make sure the battery and E-STOP wires are connected well.
5. Turn on the PV/DC switch, AC breaker, and off-grid breaker.
6. Enter the settings page, select START/STOP and set it to start.

Note:

• When starting the inverter for the first time, the country code will be set by default to the local settings. Please check if the country code is correct.
• Set the time on the inverter using the APP.
• Off-grid function is off by default, if it needs to be opened, enter the setting page, select Off-Grid "ON/OFF", default Off-Grid voltage/frequency is 120V/240V and 60Hz.

6.9 Hybrid Inverter Switch Off

Please refer to the following steps to switch off the inverter.

1. Enter the settings page, select START/STOP and set it to stop.
2. Turn off the PV/DC switch (for hybrid only), AC breaker, and Off-Grid breaker.
3. Wait 5 min before you open the upper lid (in case of repair).

7. Operations on the FoxCloud US App

7.1 App Overview

• Function

The FoxCloud US app is a mobile phone app that locally communicates with the hybrid inverter to allow for querying alarms, configuring parameters, and performing routine maintenance, and commissioning.

• Connection Method

After the DC or AC side of the hybrid inverter is energized, the app can connect to the hybrid inverter in the following way:

The mobile phone connects to the hybrid inverter through a router. Ensure that the hybrid inverter has connected to the router if you need to use this method.

Figure 7-1 Mobile phone connecting to the hybrid inverter through a router

7.2 Downloading and Installing the App

Search for FoxCloud US from one of the following app stores in the following list, download the installation package, and install the FoxCloud US app by following the instructions.

• Google Play (Android)

• App Store (iOS)

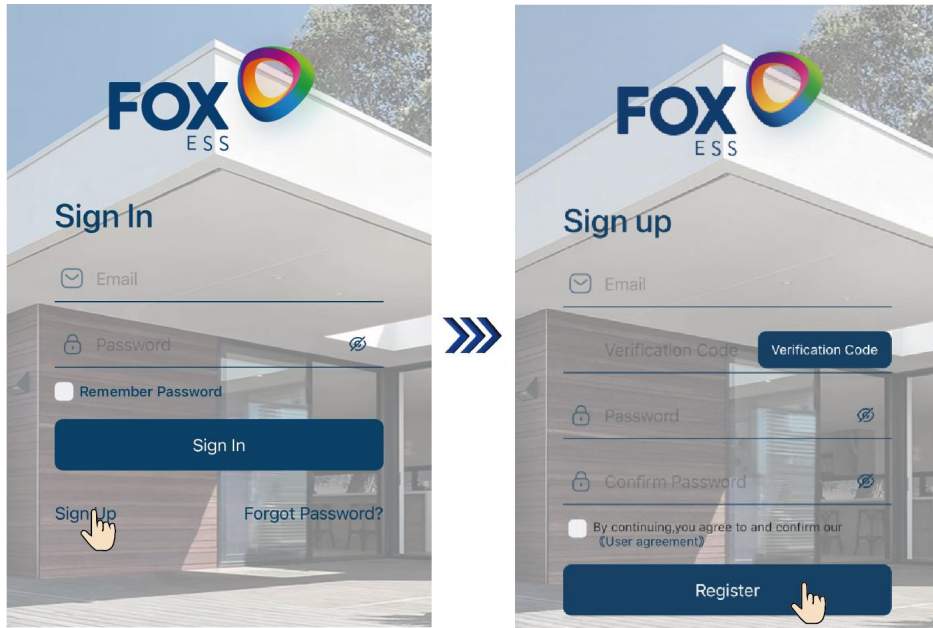Or, scan the following QR code to select the corresponding store to download the installation package.

After the app is installed, the FoxCloud US icon is displayed on the home screen.

7.3 Registering the App

Step 1 Tap "Sign Up", enter the installer/end user's desired information, check User Agreement, tick the box, and finally tap "Register".
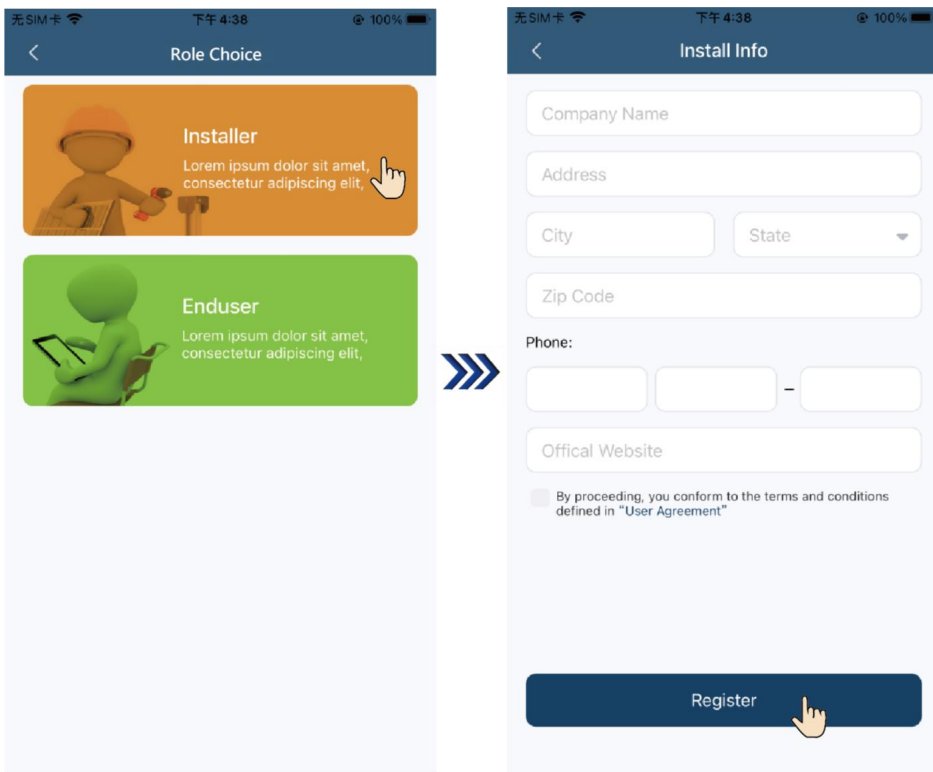
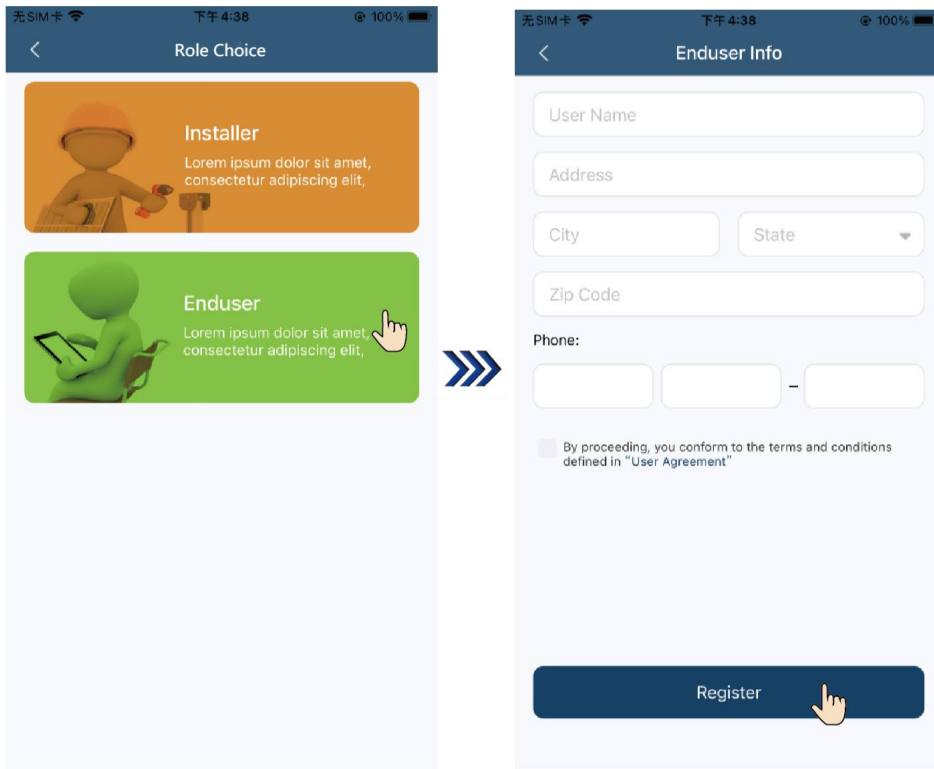**Step 2** Make role choice.The app users are classified as the installer and end user.

For Installer

Select "Installer", enter the installer's information, tick the box, and tap "Register"to complete registration.

For End User

Select "Enduser", enter the end user's information, tick the box, and tap "Register" to complete registration.
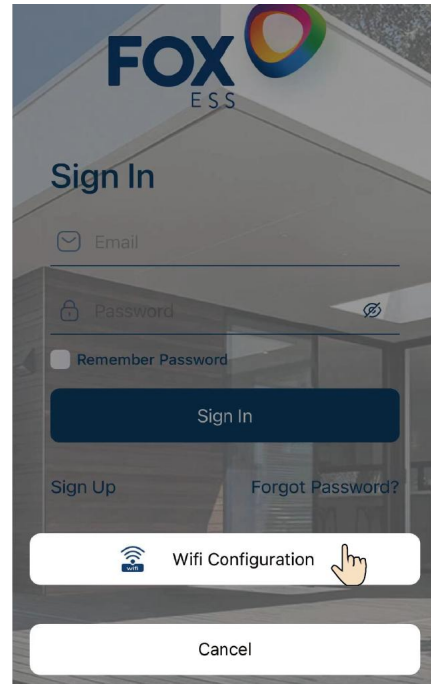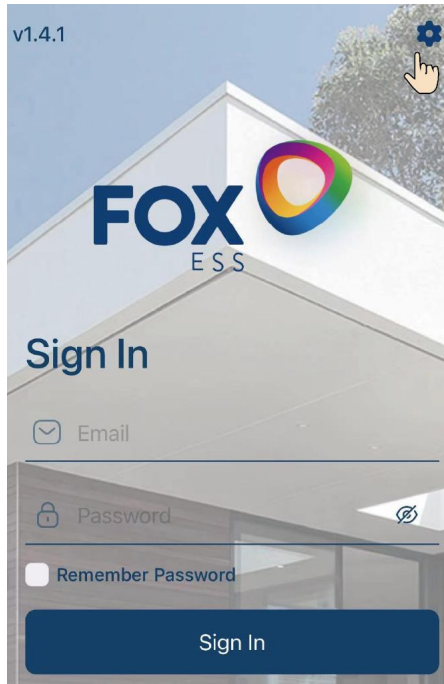
7.4 Resetting the Password

If you forget the password, tap "Forgot Password", enter the information as desired, tap "Submit" to reset the password.
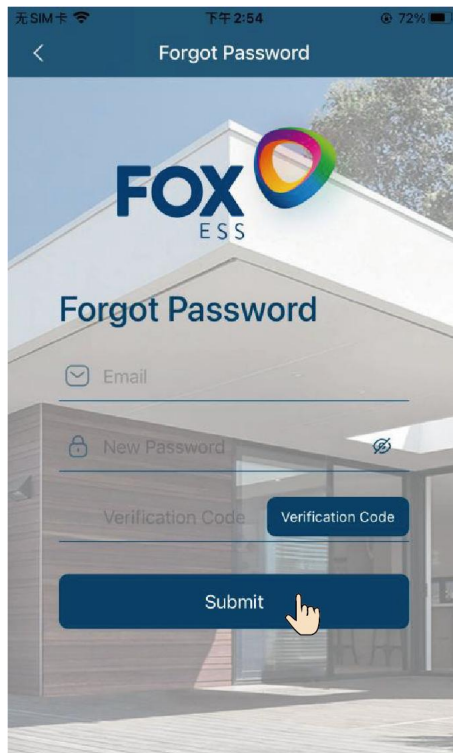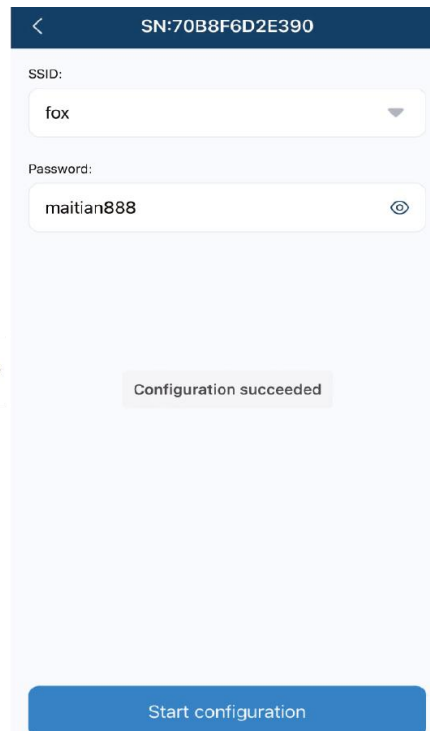

7.5 WIFI Configuration

Step 1 Open the APP, tap " ", and tap "Wifi Configuration".

Step 2 Scan the QR code on the Smart WiLAN, or enter the SN code, and then tap "confirm".

Select the house router WiFi, input the house router's password, and tap "Start configuration".
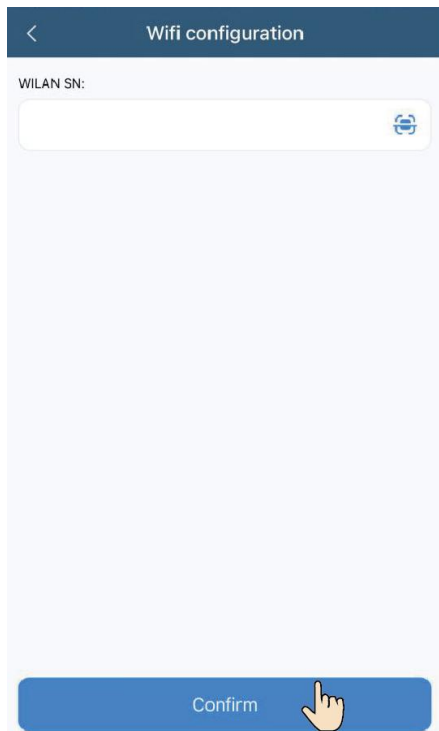
Note:

- if you cannot perform the next step,

1. check whether the inverter is normally powered on;

2. it takes a while to power on the inverter;

3. check whether the SN code is correct or contains any redundant space;

4. check whether Bluetooth is on or whether FoxCloud US is allowed to access Bluetooth; and

5. check whether your mobile phone is near the inverter.

- if you cannot search WiFi,

1. check whether the frequency band of WiFi is 2.4G.

- if the page is loaded for a long time and wifi configuration is not successful,

1. check whether the WiFi password is correct;

2. check whether the WiFi signal of the WiLAN is weak; and

3. check whether there exist any other WiFi with the same name and different password.

- if the page returns and a prompt of success does not appear,

1. check whether WiFi of the hybrid inverter is affected by other objects;

2. check whether the WiFi signal of the WiLAN is weak.

7.6 App Operations by the Installer

For Installer
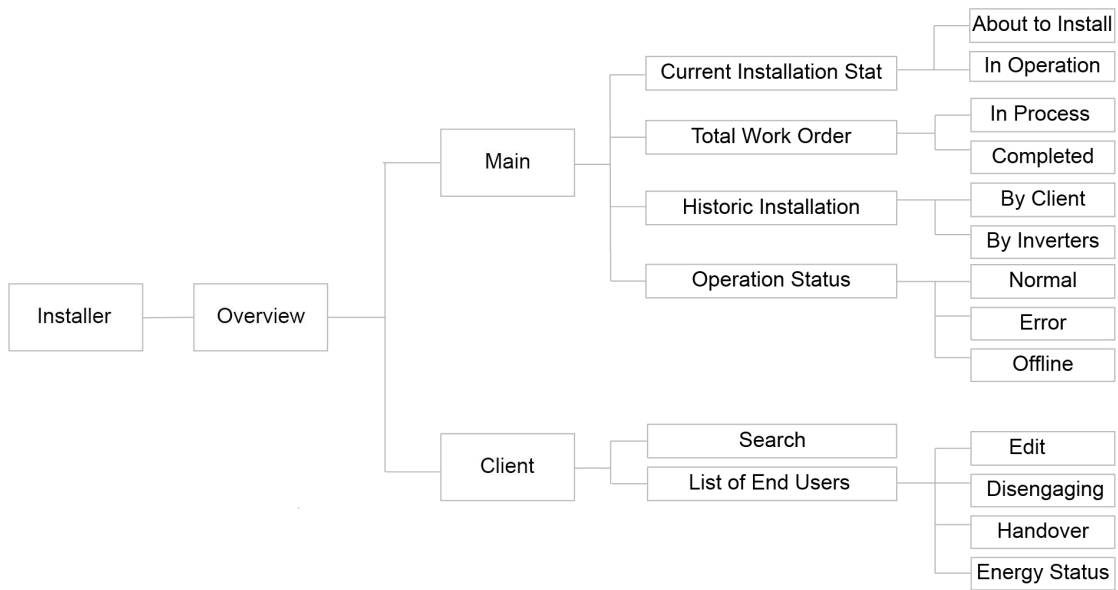
Figure 7-2 Operation permissions of the installer

Signing in to the App

Correctly enter the Email address and password, and tap "Sign In" to sign in the App

Querying the Installation Status of the Device

To query the installation status of the device, choose "Main" from the home screen. "Main" exhibits Current Installation Status, Total Work Order, Historical Installation, and Operation Status.
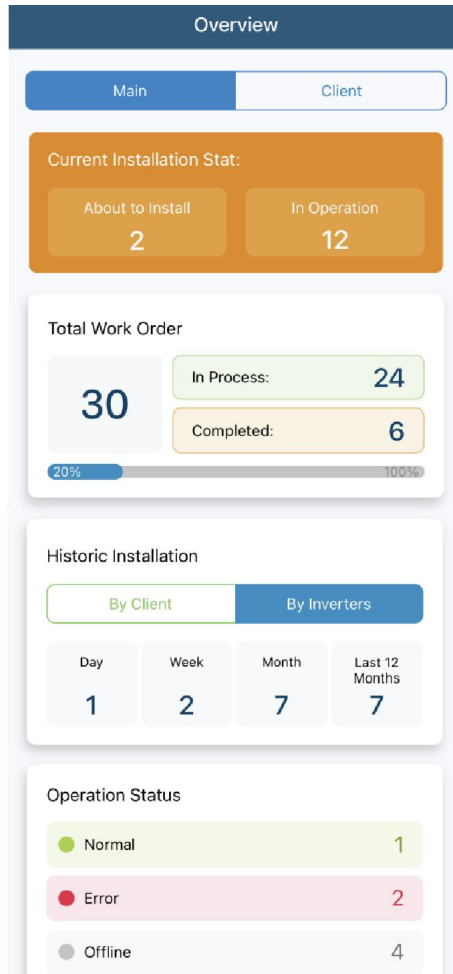
Querying the Information of Clients

To query the information of the client, choose "Client" from the home screen. "Client" exhibits search and a list of end users.

① Tap "Search", and query the information of clients by entering user name, Email, Device SN, and status.
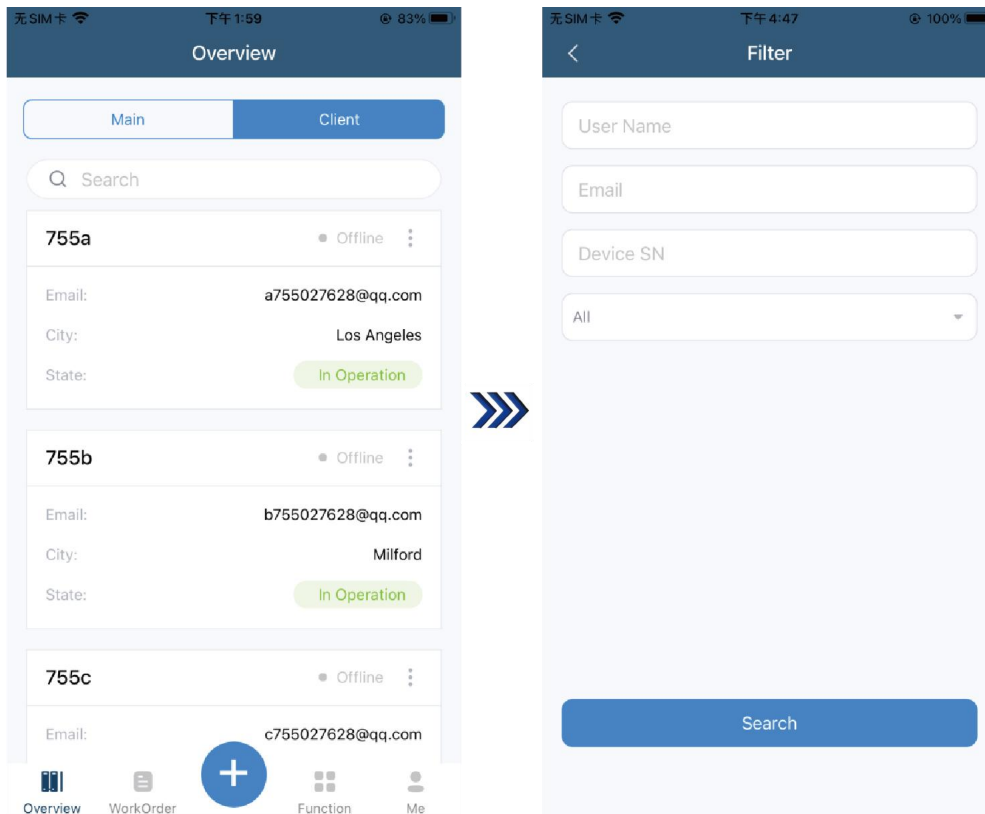
② Tap " ⋮ " to edit user information, unbind the device, and handover target installer account.

③ Query "Energy Status" by tapping any of the list of end users. The page of "Energy Status" exhibits user information, current power, day generation power, power curve, statistics histogram and a list of devices, and work order, wherein "Power" exhibits the day power condition of the inverter, and the installer 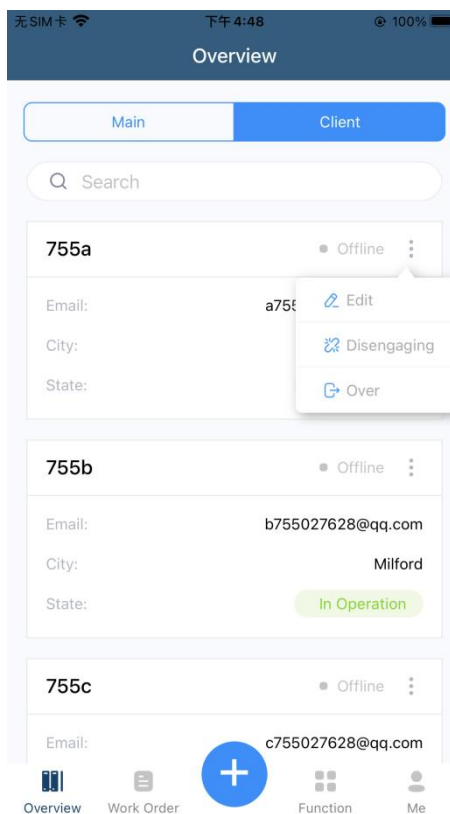can screen dates to query historical power curves; "Statistics" exhibits a total/day/month/year generation power histogram, and the installer can screen dates to query historical generation power curves.
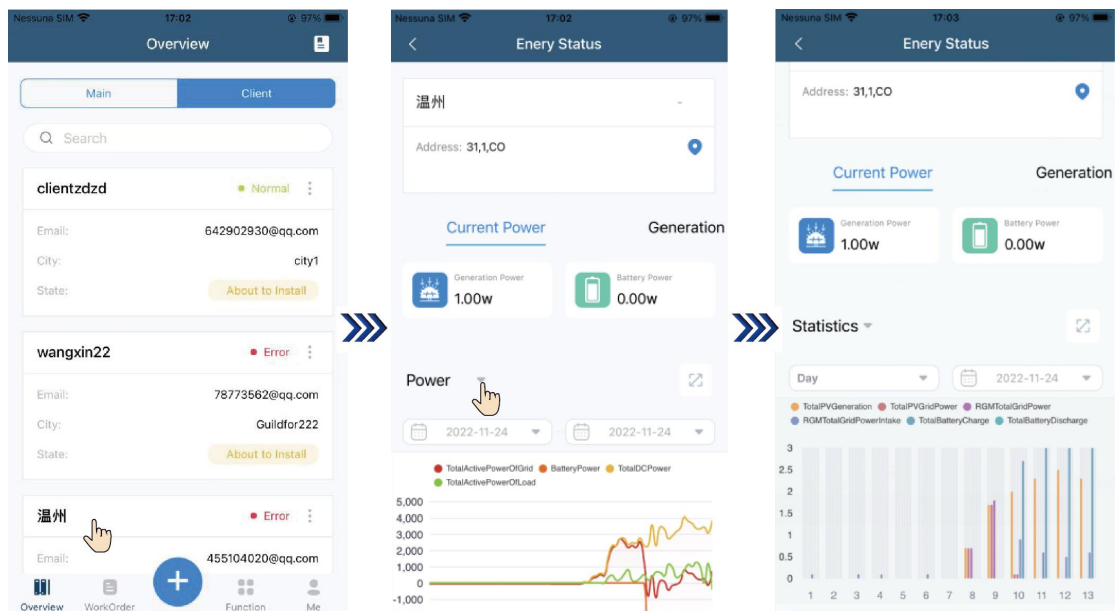
④ Query detailed device information by tapping any device on "Device Management" of "Energy Status". The page of detailed device information exhibits day generation power, year/month/day charge and discharge statistics, SOC/battery charge and discharge status, temperature, etc.
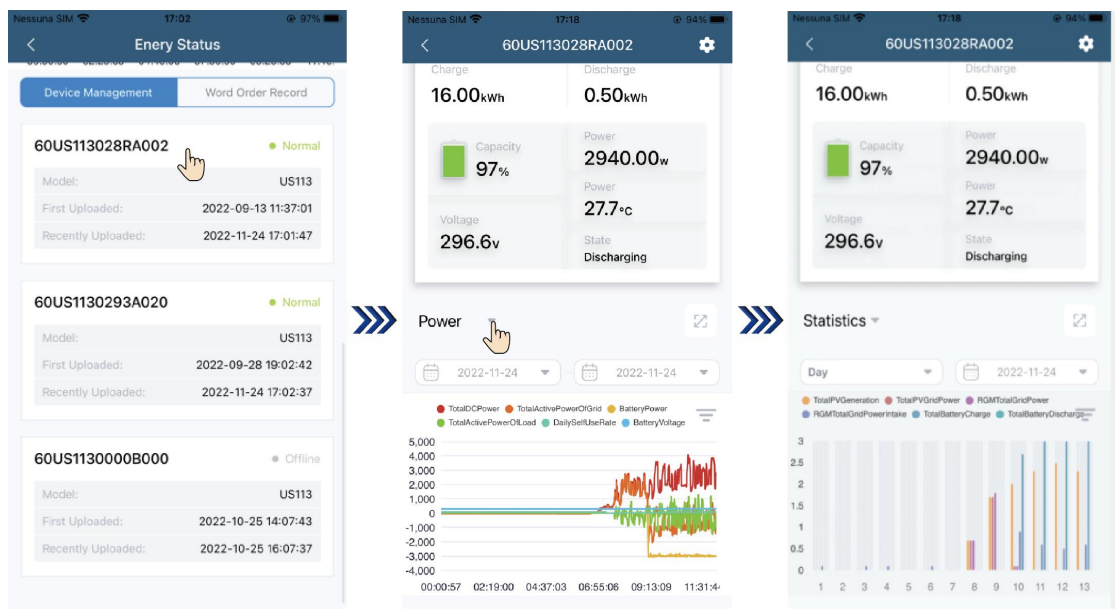
Tap " ≡ " to query other variables in "Power/Statistics".
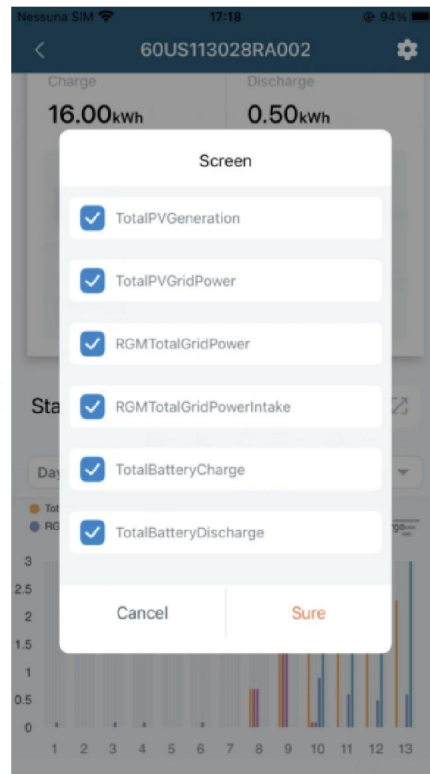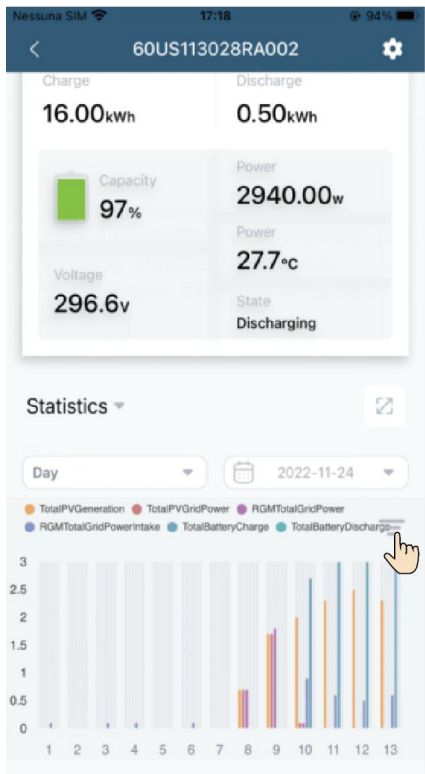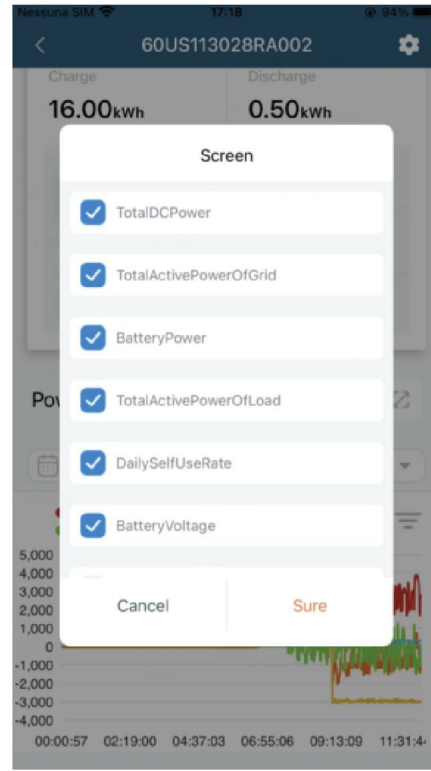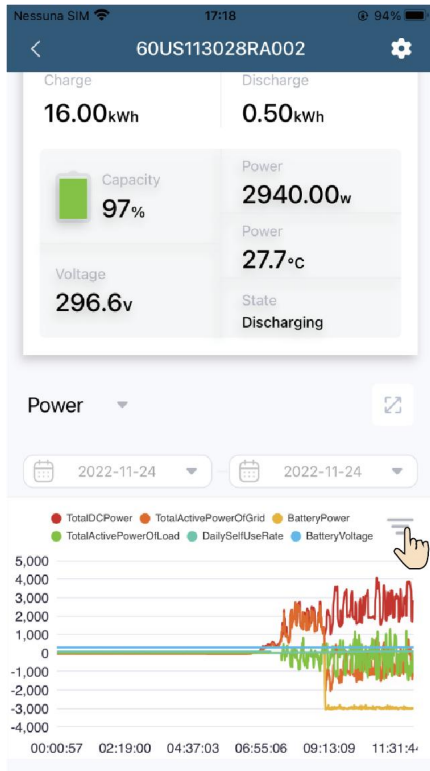
Tap "⚙" to perform remote settings when the device is online. Select different options on the page of remote settings.
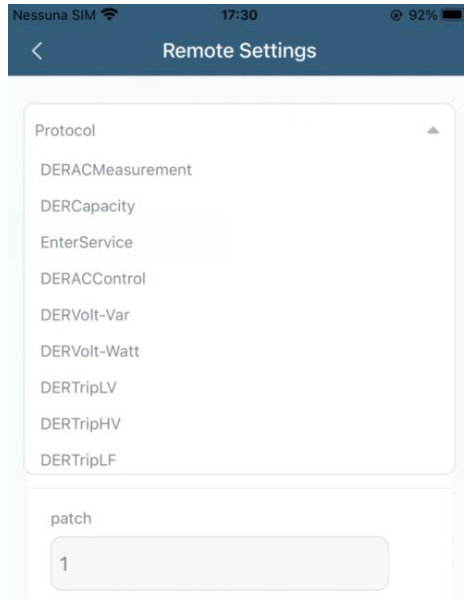
⑤ Query work order conditions by tapping any device in the list of "Work Order Record" of "Energy Status". The page exhibits user information, work order information, and timeline.
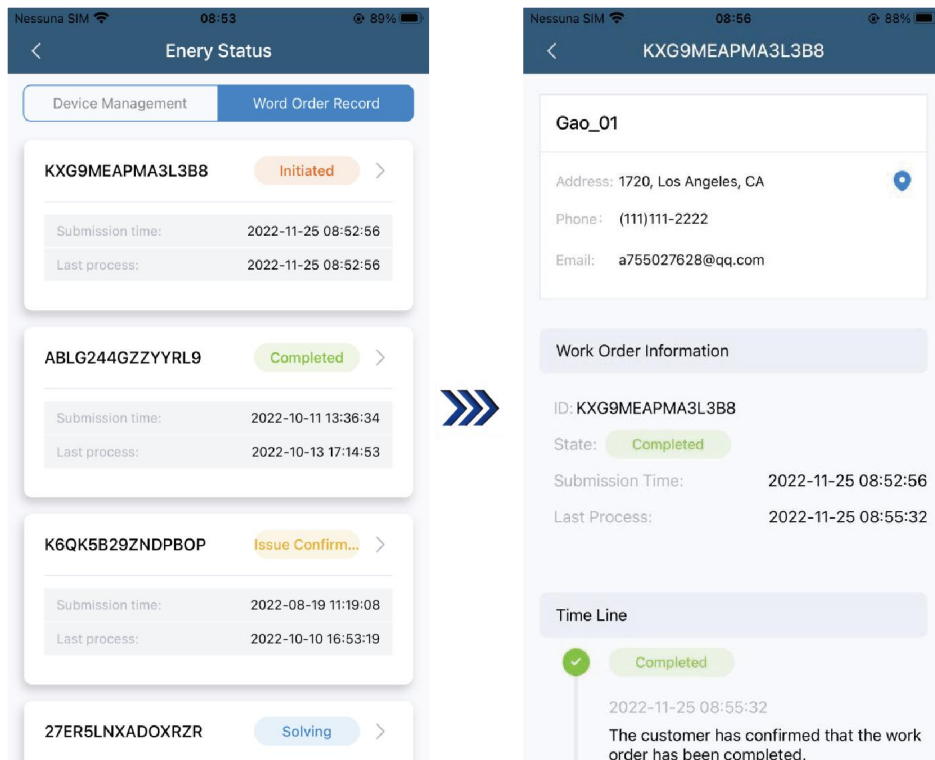
When the status is "Initiated", tap " " to modify into "Issue Confirmed".
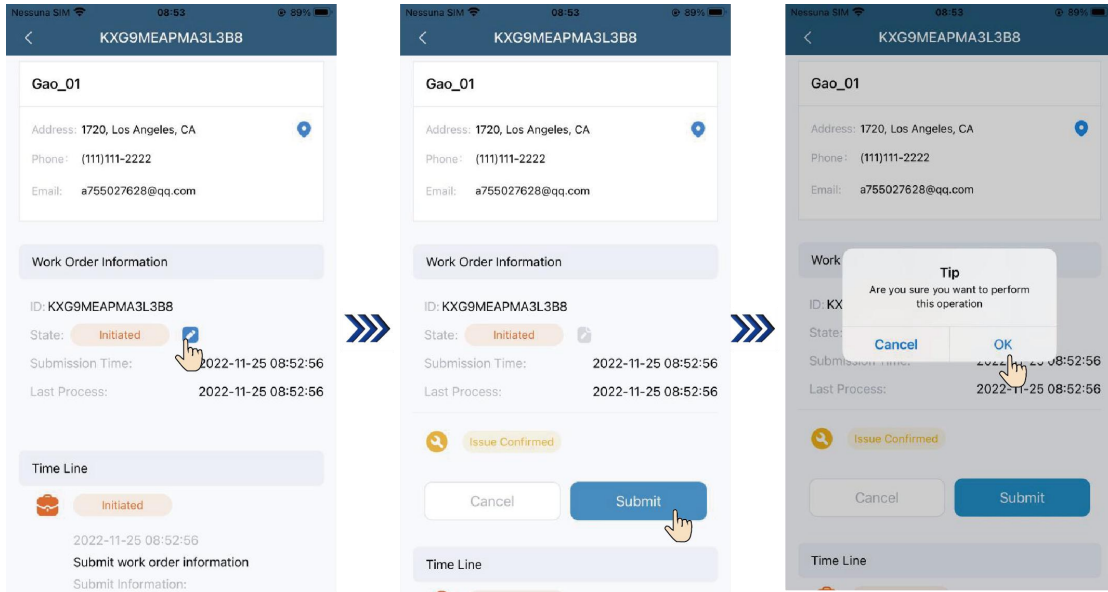
When the status is "Issue Confirmed", tap " " to modify into "Solving".

Note: the installer needs to classify the issue and enter reasons and solutions.
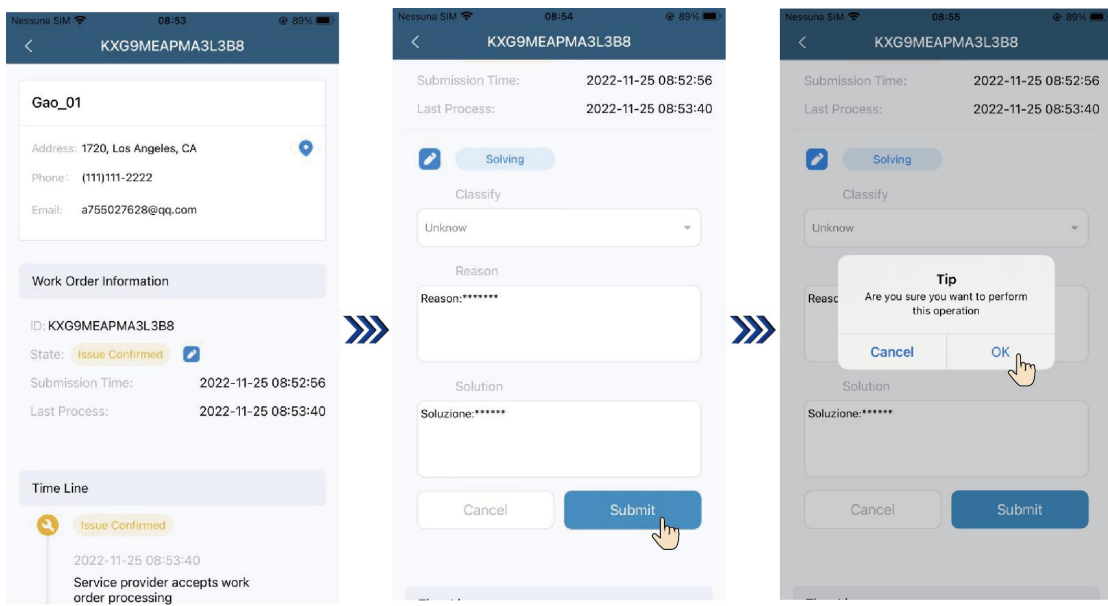
Wait for the end user to confirm the work order to complete work order processing.
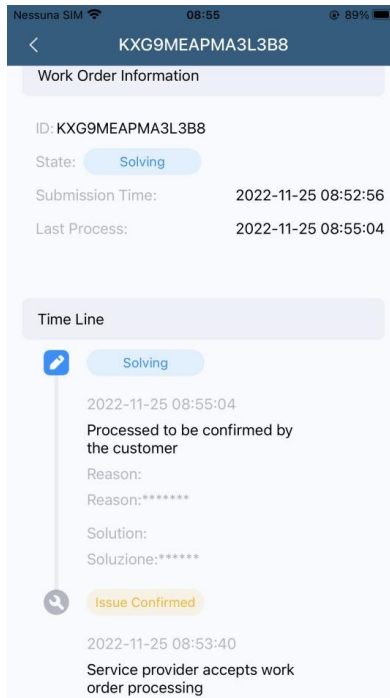
Adding New Client

Tap " " at the bottom to add a new client, enter new client's information, adding a device by tapping "+ Add Device", and slide leftward to delete the device.
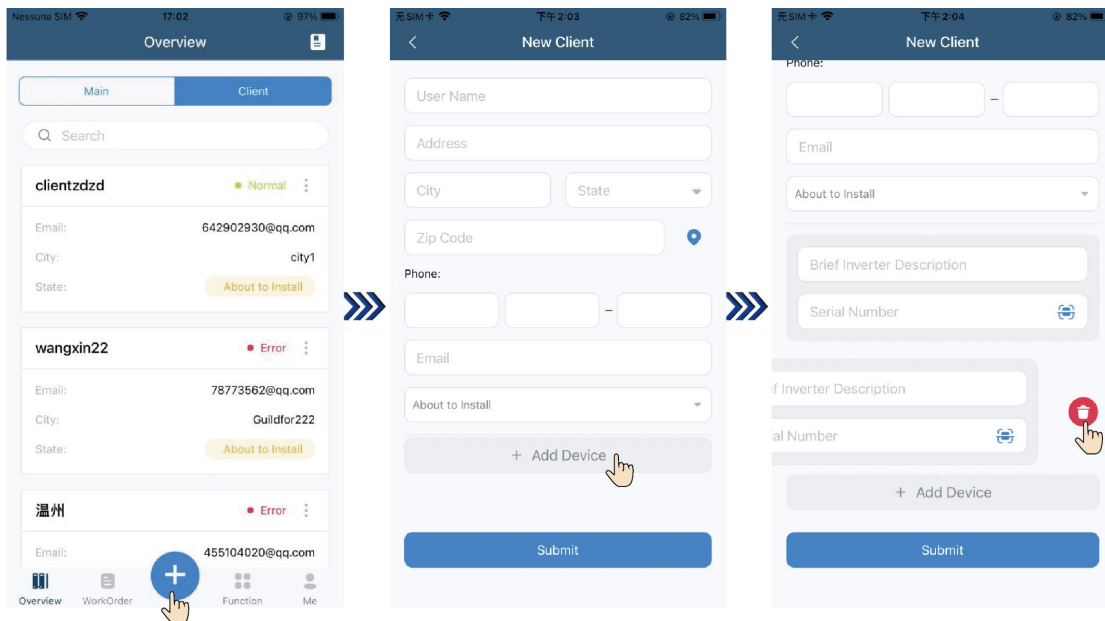
Logging out of the App and canceling the account

The page of "Me" exhibits App version, user agreement, log out, and account cancellation.

① Tap "Log Out" to log out of the current account.
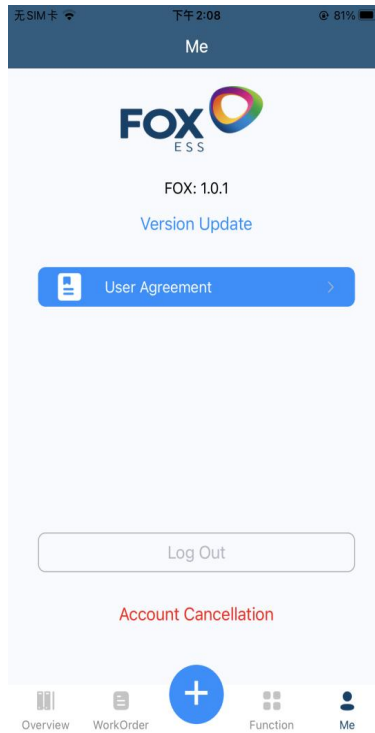
② Tap **"Account Cancellation"**, and enter correct password to cancel the account (on the premise that it is mandatory to transfer user information to another account before being allowed to log out).
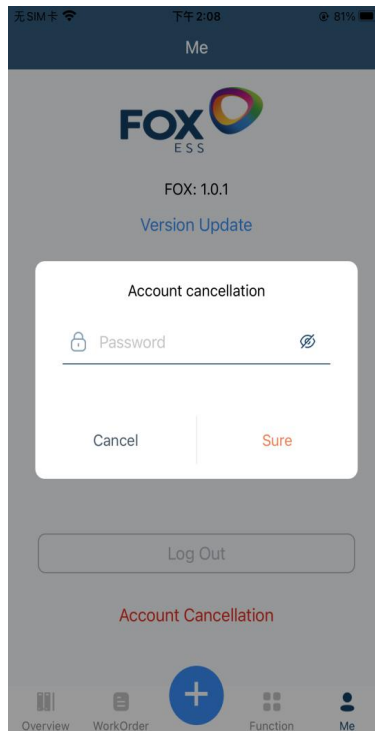
7.7   App Operations by the End User

For End User
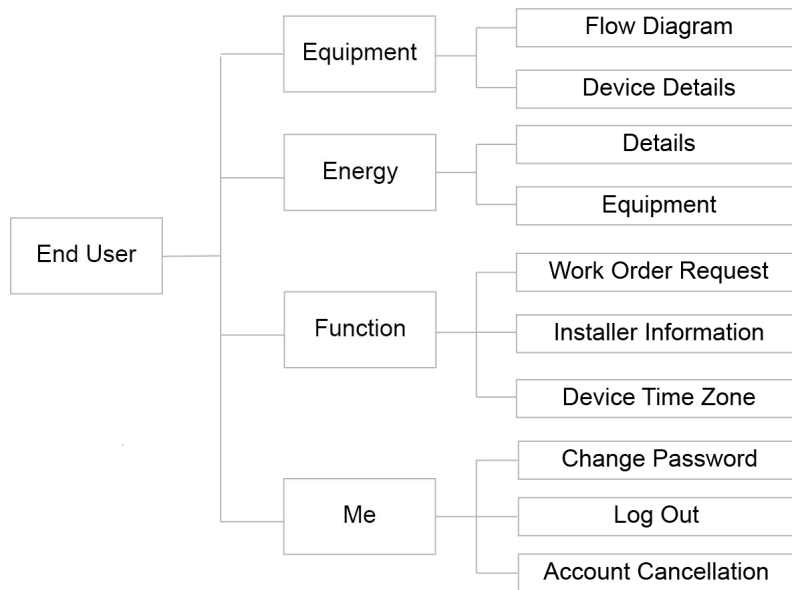
Figure 7-3 Operation permissions of the end user

Querying Device Details

Tap "Flow Diagram" in "Equipment" to find a flow diagram exhibiting the power flow condition of the current device.

① Tap " " to query real-time data.
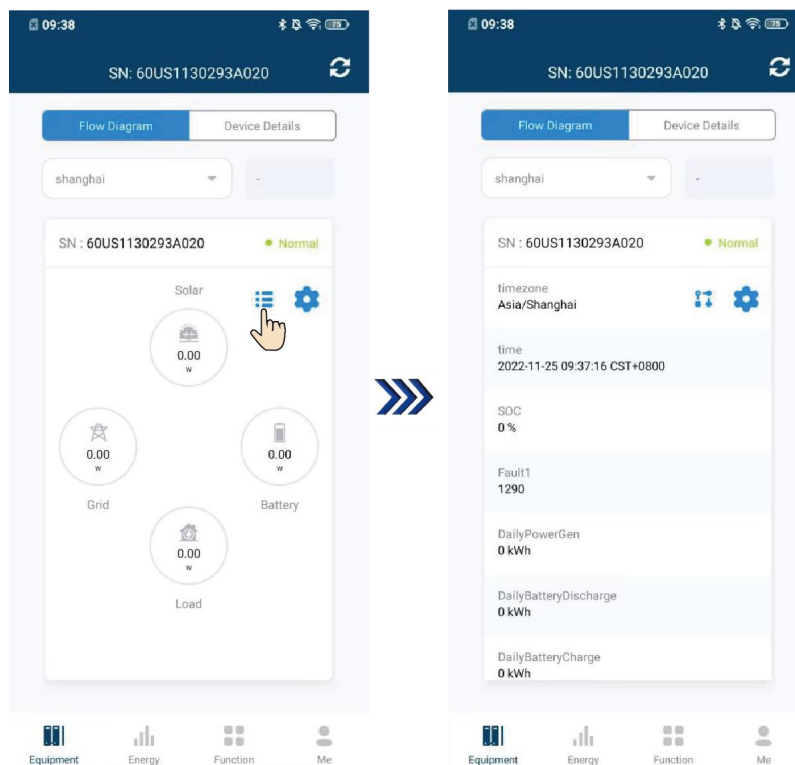
② Tap " " to enter the page of "Settings", and select the desired content through the drop-down box.
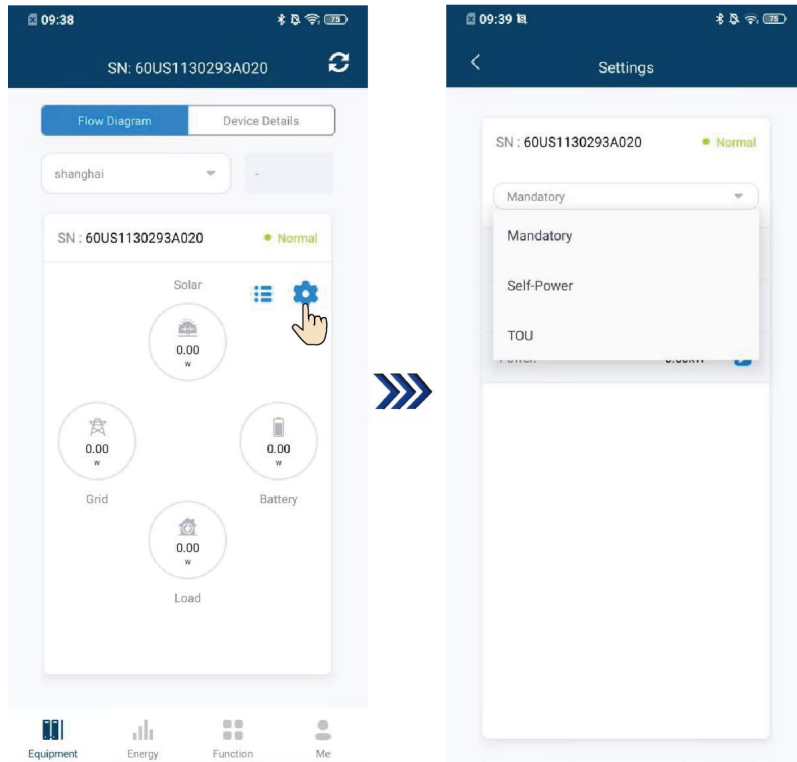
Tap "Device Details" in "Equipment" to exhibit power generation today, year/month/day charge and discharge statistics, SOC/battery charge and discharge status, power, and statistics, wherein "Power" exhibits the day power condition of the inverter, and the end user can screen dates to query historical power curves; "Statistics" exhibits a total/day/month/year generation power histogram, and the end user can screen dates to query historical generation power curves.
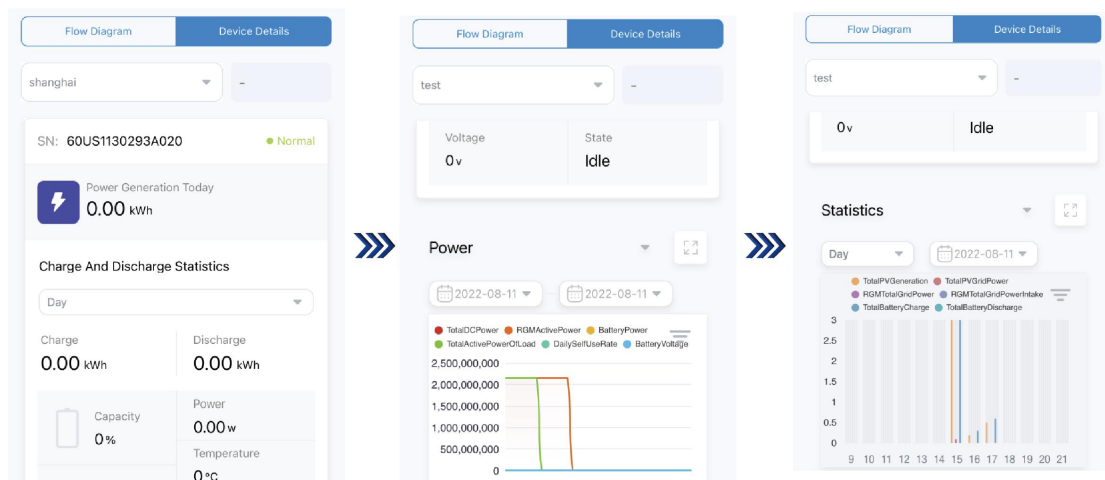

Tap " " to query other variables in "Power/Statistics".
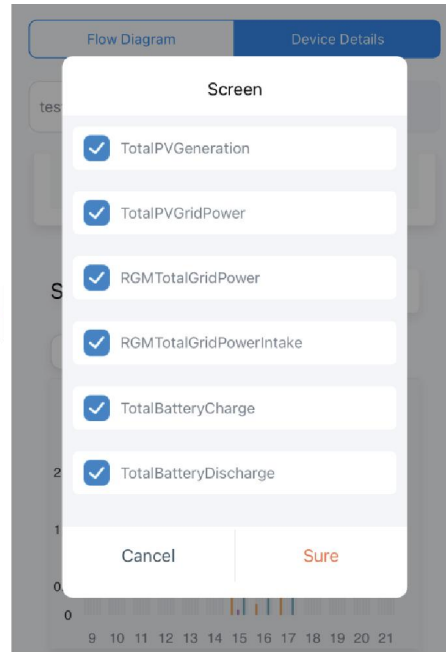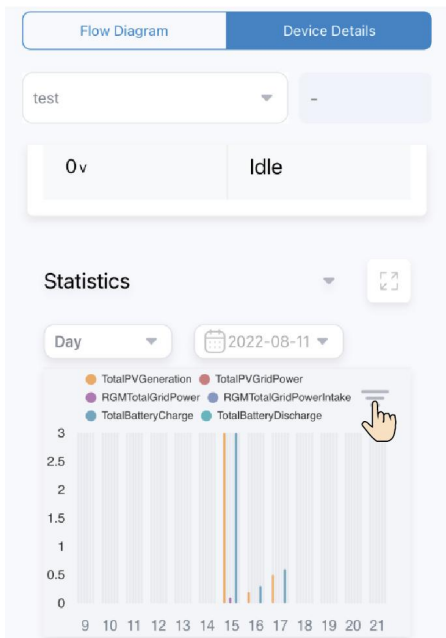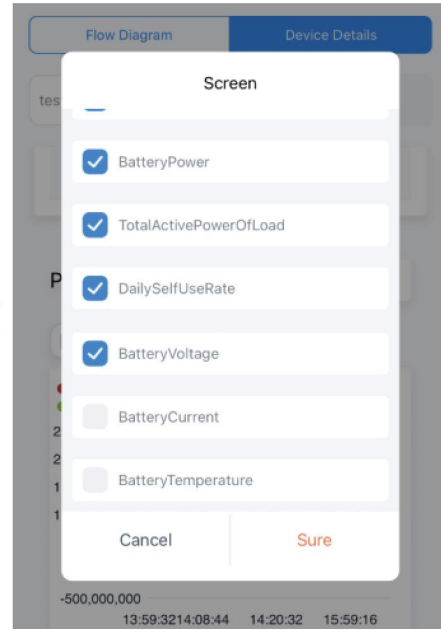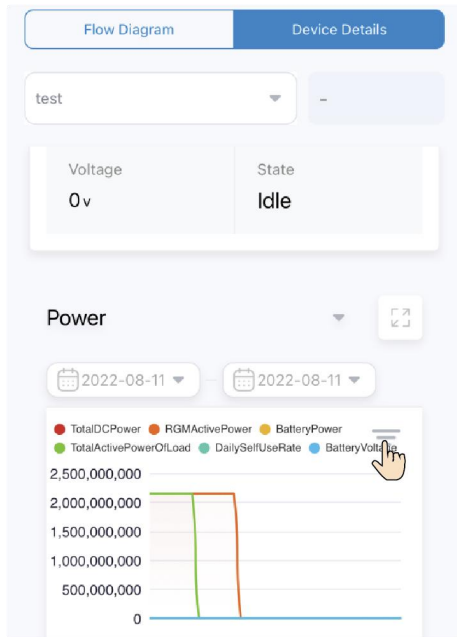
Querying Energy Status

Tap "Details" in "Energy" to find generating power, power generation today, total charge, total discharge, charging power, discharge power, today's charge energy data, today's discharge energy data, power, and statistics, wherein "Power" exhibits the day power condition of the inverter, and the end user can screen dates to query historical power curves; "Statistics" exhibits a total/day/month/year generation power histogram, and the end user can screen dates to query historical generation power curves.
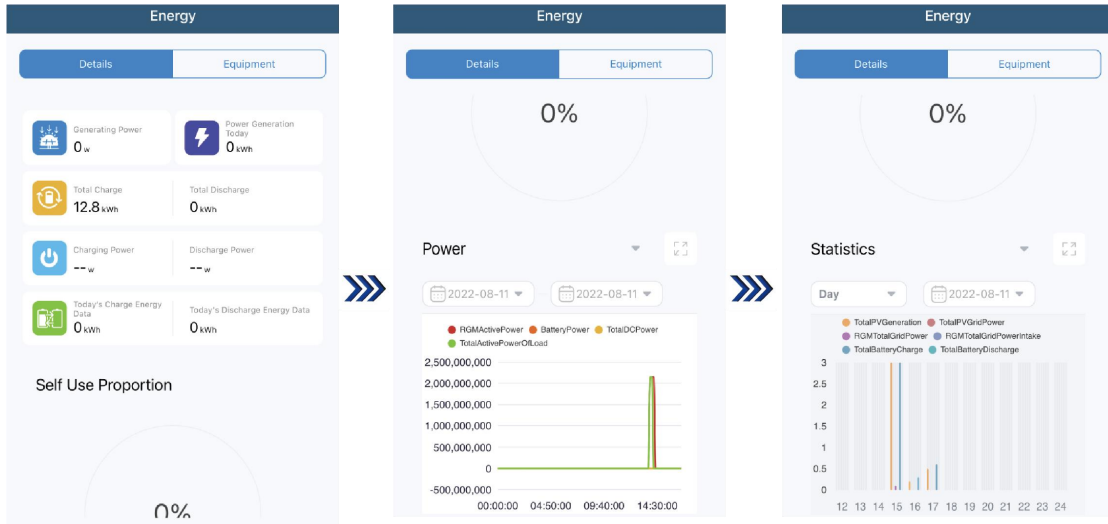
Tap "Equipment" in "Energy" to find details of the device.
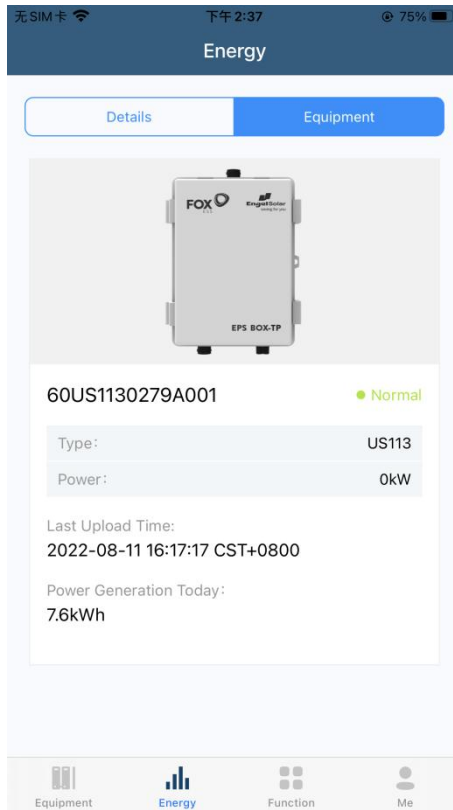
Querying Work Order and Installer Information

Tap "Function" at the bottom to find work order request, installer information, and device time zone.
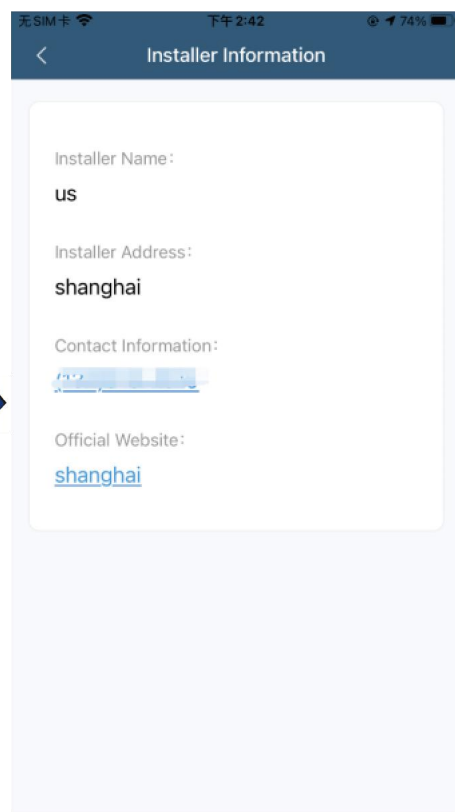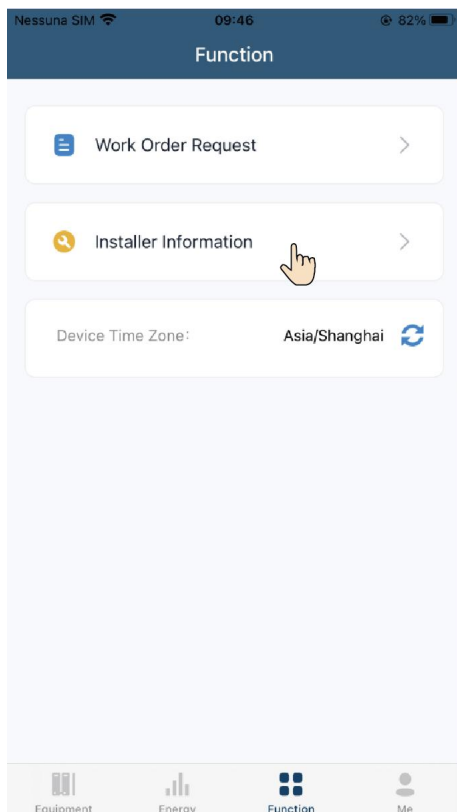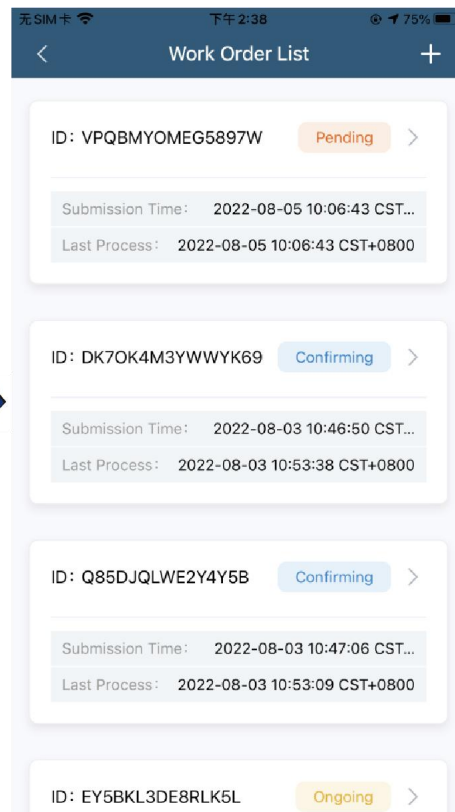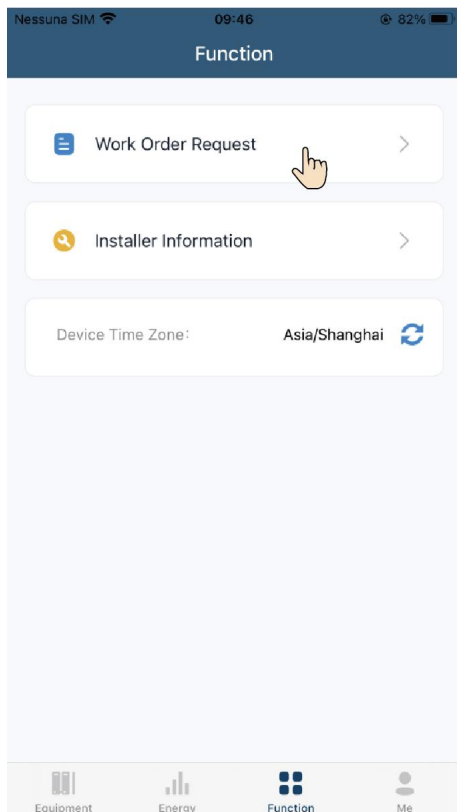
Tap " [+] " at the top right corner to create a work order. Tap any in the work order list to check details of the work order.
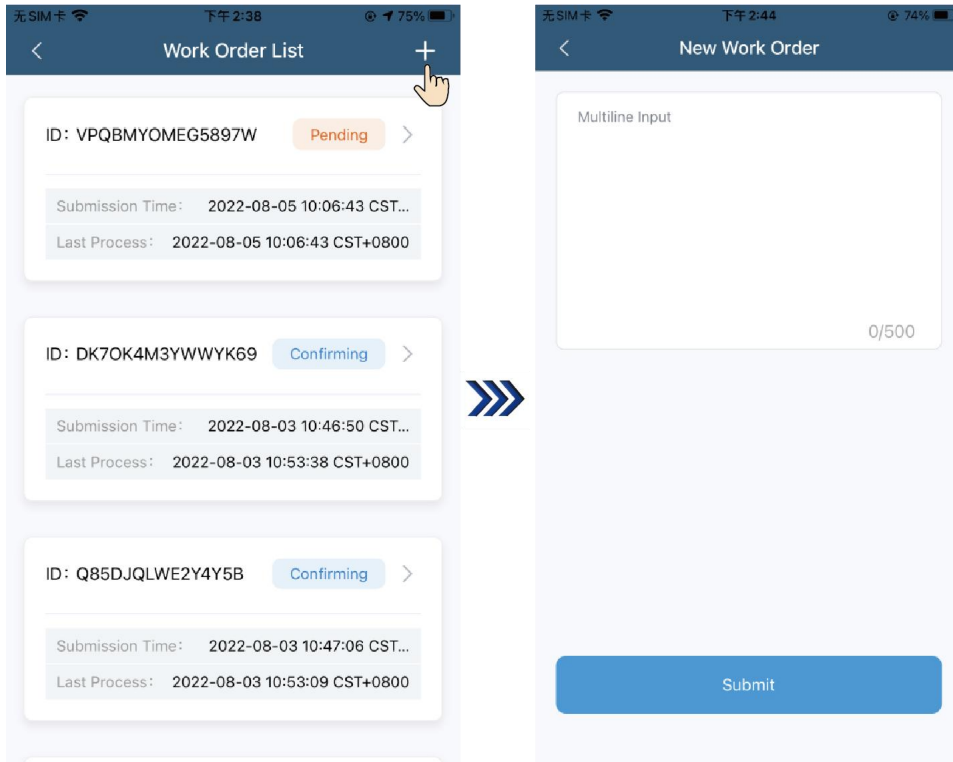
Tap "Completed" at the top right corner to confirm the work order if the work status is confirming.
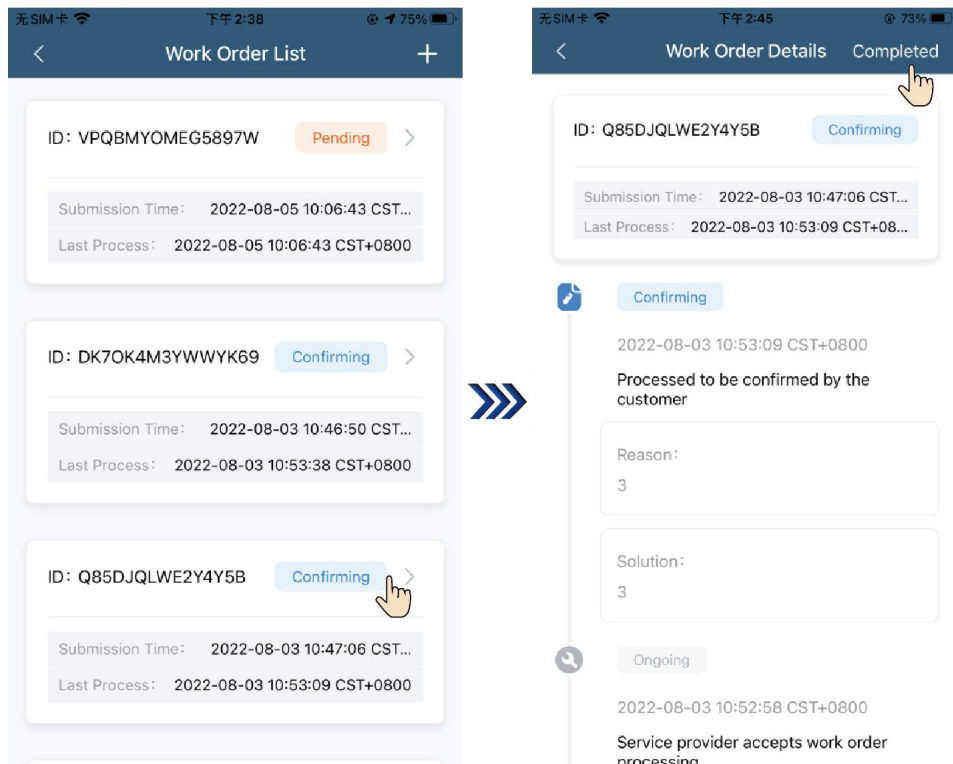
Changing the Password, Logging out of the App and Canceling the Account

The page of "Me" exhibits partial user information, App version, change password, log out, and account cancellation.

① Tap " 🖉 " to edit user information.
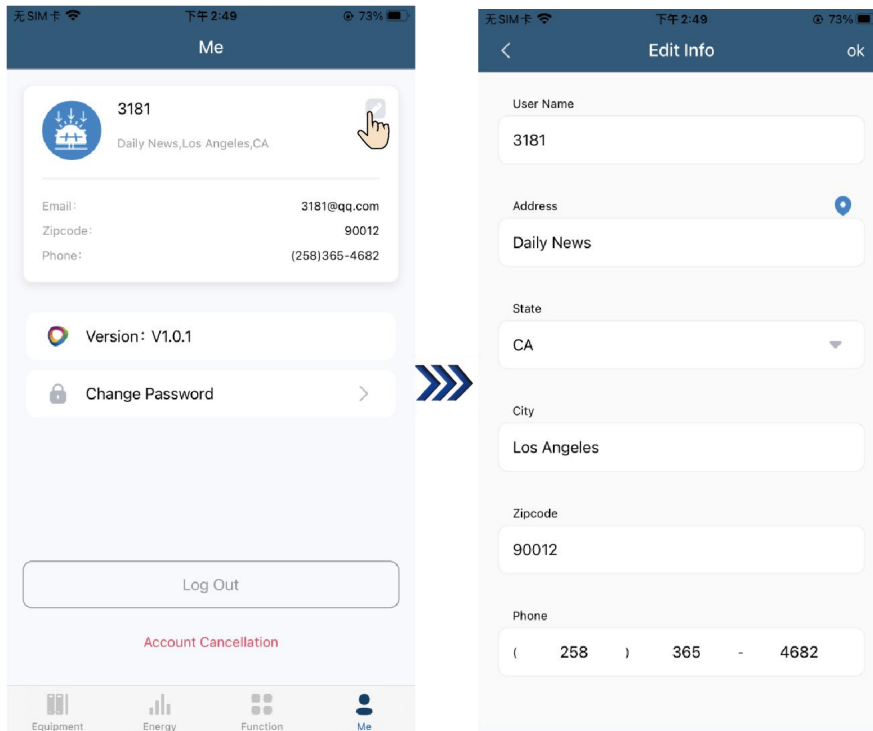
② Tap "Change Password" to change user's password.
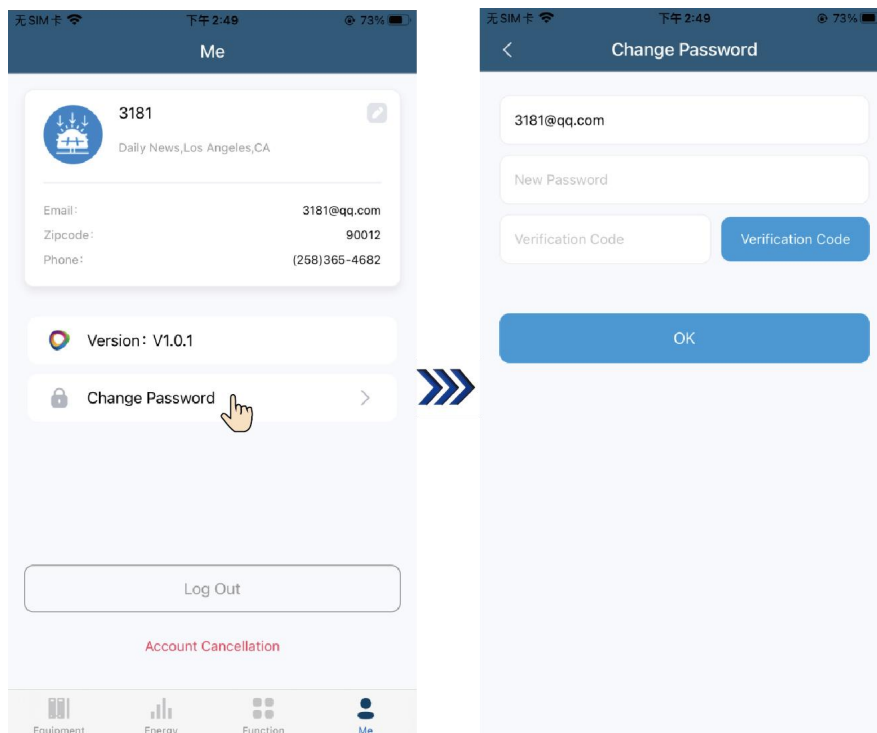
③ Tap "Log Out" to log out of the current account.
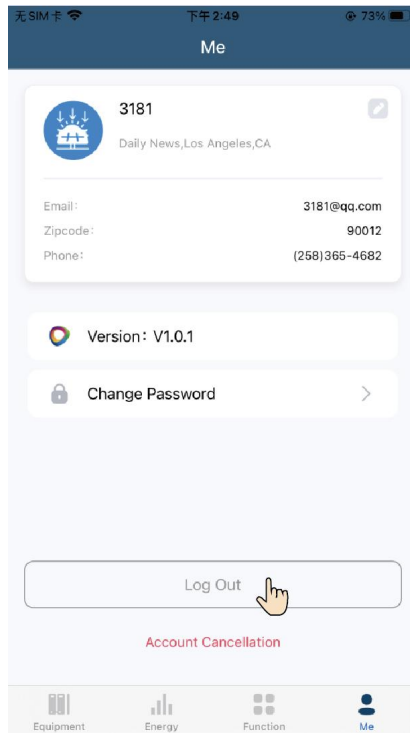
④ Tap **"Account Cancellation"**, and enter correct password to cancel the account.
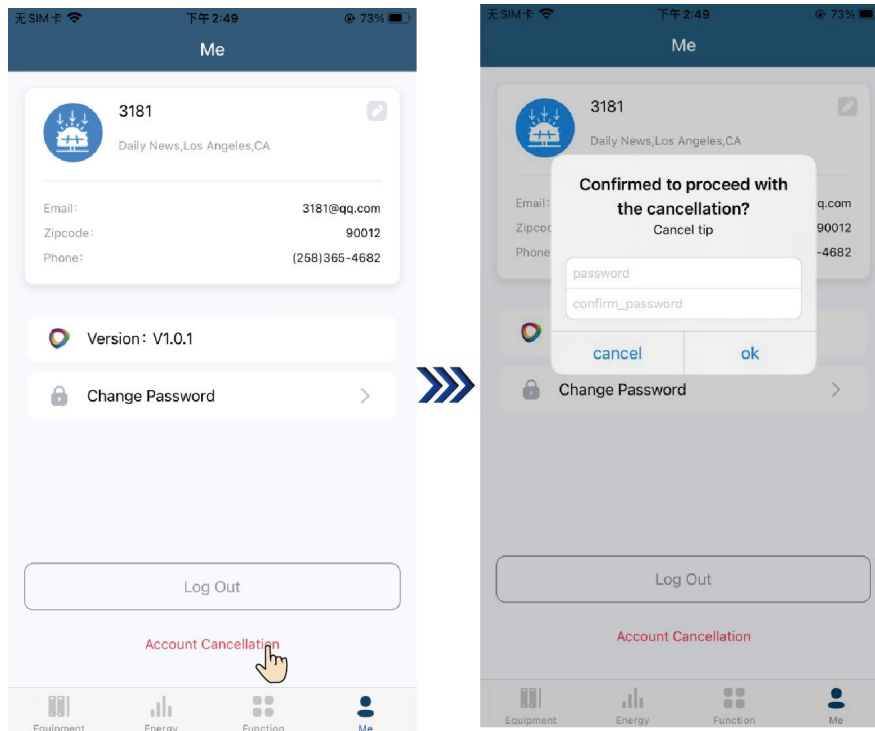
8. Operation

8.1 Control Panel
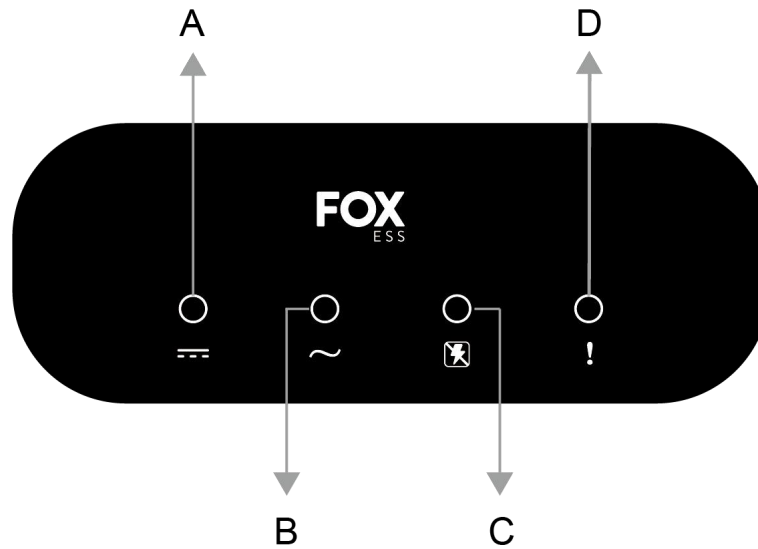
LED Description

Status				Meaning
A	**B**	**C**	**D**	N/A
DC Status	**AC Status**	**Off-grid**	**Alarm**	
Green	Green	Off	Off	The inverter is running in on-grid state and exporting power to the power grid.
Blinking green	Off	Off	Red	The DC is on and the AC is off in on-grid mode.
Off	Blinking green	Off	Off/Red	The DC is off and the AC is on.
Blinking green	Blinking green	Off	Off/Red	The DC is on, the AC is on, and the inverter is not exporting power to the power grid.
Off	Off	Off	Red	Both the DC and AC are off in on-grid mode.
Green	Green	Green	Off	The inverter is running in backup state.
Blinking green	Off	Green	Off/Red	The DC is on and the inverter has no output in backup state.
Off	Off	Green	Red	Both the DC and AC are off in backup state.
Off	Off	Off	Off	Both the DC and AC are off.

9. Maintenance

This section contains information and procedures for solving possible problems with the Fox ESS hybrid inverters and provides you with troubleshooting tips to identify and solve most problems that can occur.

9.1 Alarm List

Item	Alarm Number	Alarm Name	Alarm Severity	Alarm Action	Possible Cause	Suggestion
1	1025	GridOverVolt Fault	Major	Shutdown, alarm reporting, and automatic recovery after the fault is rectified.	The grid voltage RMS value exceeds the higher threshold specified for HVRT.	1. If the alarm is triggered accidentally, it may be due to temporary abnormalities in the power grid. The inverter will automatically recover after the power grid has resumed normal functioning. 2. Check whether the grid connection voltage exceeds the upper threshold. If so, contact the local power operator. 3. If you have confirmed that the grid connection voltage exceeds the upper threshold and have obtained the consent of the local power operator, modify the overvoltage protection threshold.
2	1026	GridInstVolt HighFault	Major	Shutdown, alarm reporting, and automatic recovery after the fault is rectified.	The grid voltage peak value exceeds the higher threshold specified for HVRT.	1. If the alarm is triggered accidentally, it may be due to temporary abnormalities in the power grid. The inverter will automatically recover after the power grid has resumed normal functioning. 2. If the alarm is triggered frequently, check whether the grid voltage is within the acceptable range. If not, contact the local power operator. If so, modify the power grid overvoltage protection threshold with the consent of the local power operator.

3	1027	GridUnderVo ltFault	Major	Shutdown, alarm reporting, and automatic recovery after the fault is rectified.	The grid voltage rms value is below the lower threshold specified for LVRT.	1. If the alarm is triggered accidentally, it may be due to temporary abnormalities in the power grid. The inverter will automatically recover after the power grid has resumed normal functioning. 2. If the alarm is triggered frequently, check whether the grid voltage is within the acceptable range. If not, contact the local power operator. If so, modify the power grid undervoltage protection threshold with the consent of the local power operator. 3. If the fault persists for a long time, check the connection between the AC switch and the output power cable.
4	1028	GridLowVolt Fault	Major	Shutdown, alarm reporting, and automatic recovery after the fault is rectified.	The grid voltage rms value is below the lower threshold specified for LVRT.	1. If the alarm is triggered accidentally, it may be due to temporary abnormalities in the power grid. The inverter will automatically recover after the power grid has resumed normal functioning. 2. If the alarm is triggered frequently, check whether the grid voltage is within the acceptable range. If not, contact the local power operator. If so, modify the power grid undervoltage protection threshold with the consent of the local power operator. 3. If the fault persists for a long time, check the connection between the AC switch and the output power cable.
5	1030	GridInstCurr HighFault	Major	Shutdown, alarm reporting, and automatic recovery after	The grid voltage drops dramatically or the power grid or the output load	1. The inverter monitors its external working conditions in real time. And it can automatically recover after the

				Shutdown, alarm reporting, and automatic recovery after the fault is rectified.	is short-circuited. As a result, the inverter transient output current exceeds the upper threshold and, which triggers the inverter protection.	fault is rectified. 2. If the alarm is triggered frequently and affects the power production of the PV plant, check whether grid or the output is short-circuited. If the fault persists, contact your installer.
6	1031	GridOverFreqFault	Major	Shutdown, alarm reporting, and automatic recovery after the fault is rectified.	The actual grid frequency is higher than the local power grid standard.	1. If the alarm is triggered accidentally, it may be due to temporary abnormalities in the power grid. The inverter will automatically recover after the power grid has resumed normal functioning. 2. If the alarm is triggered frequently, check whether the grid frequency is within the acceptable range. If not, contact the local power operator. If so, modify the grid overfrequency protection threshold with the consent of the local power operator.
7	1032	GridUnderFreqFault	Major	Shutdown, alarm reporting, and automatic recovery after the fault is rectified.	The actual grid frequency is below than lower threshold standard.	1. If the alarm is triggered accidentally, it may be due to temporary abnormalities in the power grid. The inverter will automatically recover after the power grid has resumed normal functioning. 2. If the alarm is triggered frequently, check whether the grid frequency is within the acceptable range. If not, contact the local power operator. If so, modify the grid underfrequency protection threshold with the consent of the local power operator.

8	1035	cLeakCurrFault	Major	Shutdown, alarm reporting, and automatic recovery after the fault is rectified.	The leak current RMS value exceeds the threshold specified for leak current, and the temporary dynamic value exceeds 30mA over 0.3s, or exceeds 60mA 0.15s or 150mA 0.04s.	1. If the alarm is triggered accidentally, it may be due to leak current exceeding the threshold or temporary dynamic value exceeding the threshold. The inverter will automatically recover when the leak current is less than 100mA. 2. If the alarm is triggered frequently and affects the power production of the PV plant, check ground impedance of PV. If the fault persists, contact your installer.
9	1038	GridHighVolt Fault	Major	Shutdown, alarm reporting, and automatic recovery after the fault is rectified.	The grid voltage RMS value exceeds the higher threshold specified for HVRT.	1. If the alarm is triggered accidentally, it may be due to temporary abnormalities in the power grid. The inverter will automatically recover after the power grid has resumed normal functioning. 2. Check whether the grid connection voltage exceeds the upper threshold. If so, contact the local power operator. 3. If you have confirmed that the grid connection voltage exceeds the upper threshold and have obtained the consent of the local power operator, modify the overvoltage protection threshold.
10	1039	HwInvOverC urrFstFault (L1)	Major	Shutdown, alarm reporting, and automatic recovery after the fault is rectified.	The grid voltage drops dramatically or the power grid or the output load is short-circuited. As a result, the inverter transient output current exceeds the upper threshold and, which triggers the inverter protection.	1. The inverter monitors its external working conditions in real time. And it can automatically recover after the fault is rectified. 2. If the alarm is triggered frequently and affects the power production of the PV plant, check whether grid or the output is overloaded or short-circuited. If the fault persists, contact your installer.

11	1040	GridVoltUnbalanFault	Major	Shutdown, alarm reporting, and automatic recovery after the fault is rectified.	The difference between grid phase voltages exceeds the upper threshold.	1. Check that the grid voltage is within the normal range. 2. Check the connection of the AC output power cable. 3. If the cable is connected properly but the alarm is triggered frequently and affects the power production of the PV plant, contact the local power operator.
12	1041	HwInvOverCurrSndFault (L2)	Major	Shutdown, alarm reporting, and automatic recovery after the fault is rectified.	The grid voltage drops dramatically or the power grid or the output load is short-circuited. As a result, the inverter transient output current exceeds the upper threshold and, which triggers the inverter protection.	1. The inverter monitors its external working conditions in real time. And it can automatically recover after the fault is rectified. 2. If the alarm is triggered frequently and affects the power production of the PV plant, check whether grid or the output is overloaded or short-circuited. If the fault persists, contact your installer.
13	1042	GridHighFreqFault	Major	Shutdown, alarm reporting, and automatic recovery after the fault is rectified.	The actual grid frequency is higher than the local power grid standard.	1. If the alarm is triggered accidentally, it may be due to temporary abnormalities in the power grid. The inverter inverter will automatically recover after the power grid has resumed normal functioning. 2. If the alarm is triggered frequently, check whether the grid frequency is within the acceptable range. If not, contact the local power operator. If so, modify the grid overfrequency protection threshold with the consent of the local power operator.

14	1043	GridLowFreq Fault	Major	Shutdown, alarm reporting, and automatic recovery after the fault is rectified.	The actual grid frequency is below than the local power grid standard.	1. If the alarm is triggered accidentally, it may be due to temporary abnormalities in the power grid. The inverter will automatically recover after the power grid has resumed normal functioning. 2. If the alarm is triggered frequently, check whether the grid frequency is within the acceptable range. If not, contact the local power operator. If so, modify the grid underfrequency protection threshold with the consent of the local power operator.
15	1047	GroundWire Fault	Major	Shutdown, alarm reporting, and automatic recovery after the fault is rectified.	1. The PE cable for the inverter is not connected. 2. The voltage between the inverter neutral wire and ground exceeds the upper threshold.	1. Check whether the PE cable for the inverter is connected properly. 2. Check whether the output is connected to an isolation transformer. If so, set OFF due to abnormal grounding to Disable. 2. If the inverter is connected to the TN power grid, check whether the voltage of the neutral wire to ground is normal.
16	1057	cBusInstVolt HighFault	Major	Shutdown, alarm reporting, and automatic recovery after the fault is rectified.	Bus voltage is higher than the value of protection.	1. If the alarm is triggered accidentally, it may be due to temporary abnormalities in the power grid. The inverter will automatically recover after the power grid resumes normal functioning. 2. Check the PV open voltage if higher than 550V. 3. Check the BAT voltage if higher than 460V. 4. If the fault persists, contact your installer.

17	1066	cPV1RevCo nnFault	Major	Shutdown, alarm reporting, and automatic recovery after the fault is rectified.	The PV1 module output is reversely connected.	Check whether the PV1 module output is reversely connected.
18	1067	cPV2RevCo nnFault	Major	Shutdown, alarm reporting, and automatic recovery after the fault is rectified.	The PV2 module output is reversely connected.	Check whether the PV2 module output is reversely connected.
19	1081	cPV3RevCo nnFault	Major	Shutdown, alarm reporting, and automatic recovery after the fault is rectified.	The PV3 module output is reversely connected.	Check whether the PV3 module output is reversely connected.
20	1089	cInvIgbtHigh TempFault	Major	Shutdown, alarm reporting, and automatic recovery after the fault is rectified.	The temperature of INV IGBT is higher than the threshold. 1. The inverter is installed in a place with poor ventilation. 2. The ambient temperature exceeds the upper threshold. 3. The inverter is not working properly.	1. Check the ventilation and ambient temperature at the inverter installation position. 2. If the ventilation is poor or the ambient temperature exceeds the upper threshold, improve the ventilation and heat dissipation. 3. If the ventilation and ambient temperature both meet requirements, contact your installer.
21	1095	cEStOPFault	Major	Shutdown, alarm reporting, and automatic recovery after the fault is rectified.	Emergency Stop Switch triggered.	1. Check the Emergency Stop Switch if it is pushed. 2. Check the Emergency Stop Switch cable if the Emergency Stop Switch is open. 3. Check whether the Emergency Stop Switch cable is connected to the correct connector of the inverter. 4. If the fault persists, contact your installer.

22	1109	cLeakCurrCh anFault	Major	Shutdown, alarm reporting, and automatic recovery after the fault is rectified.	Residual Current CT check failure. The insulation impedance of the input side to PE decreased.	1. If it is triggered accidentally, the external power cable may be abnormal temporarily. The inverter automatically recovers after the fault is rectified. 2. If the alarm is triggered frequently or persists, check that the impedance between the PV string and ground is not below the lower threshold.
23	1122	cEnvTempHi ghFault	Major	Shutdown, alarm reporting, and automatic recovery after the fault is rectified.	The inner temperature of inverter is higher than the upper threshold . 1. The inverter is installed in a place with poor ventilation. 2. The ambient temperature exceeds the upper threshold. 3. The inverter is not working properly.	1. Check the ventilation and ambient temperature at the inverter installation position. 2. If the ventilation is poor or the ambient temperature exceeds the upper threshold, improve the ventilation and heat dissipation. 3. If the ventilation and ambient temperature both meet requirements, contact your installer.
24	1124	cISOFault	Major	Shutdown, alarm reporting, and automatic recovery after the fault is rectified.	Low Insulation Resistance is below than the value of protection. 1. The PV string is shorted to PE. 2. The PV string has been operating in a moist environment for a long time.	1. Check the impedance between the PV array output and PE, and eliminate short circuits and poor insulation points. 2. Check whether the inverter PE cable is correctly connected. 3. If you are sure that the impedance is less than the value of protection in a cloudy or rainy environment, reset insulation resistance protection.
25	1126	cLeakSamp CurrChanFa ult	Major	Shutdown, alarm reporting, and automatic recovery after the fault is rectified.	Residual Current CT check failure. The insulation impedance of the input side to PE decreased.	1. If it is triggered accidentally, the external power cable may be abnormal temporarily. The inverter automatically recovers after the fault is rectified. 2. If the alarm is triggered frequently or persists, check that

						the impedance between the PV string and ground is not below the lower threshold.
26	1136	cLoadOverP owerFault	Major	Shutdown, alarm reporting, and automatic recovery after the fault is rectified.	The power of the Off-Grid Load is higher than the upper threshold in the Off-Grid Mode.	Check if the power of the Off-Grid Load exceeds the permitted value.
27	1137	cUPSInvLow VoltFault	Major	Shutdown, alarm reporting, and automatic recovery after the fault is rectified.	The output voltage is below the lower threshold in the Off-Grid Mode.	1. Check if the power of the Off-Grid Load exceeds the permitted value. 2. Check if the output is shorted.
28	1144	cAFCIChkFa ult	Major	Shutdown, alarm reporting, and automatic recovery after the fault is rectified.	The PV string power cable arcs or is in poor contact.	Check whether the string circuit arcs or is in poor contact. After the fault is rectified, manually clear the alarm and then start again.
29	1145	cAFCISelfCh kFault	Major	Shutdown, alarm reporting, and automatic recovery after the fault is rectified.	The sampling circuit of the AFCI circuit is not operating correctly.	Check whether the string circuit arcs or is in poor contact. After the fault is rectified, manually clear the alarm and then start again.
29	1154	cInvFstOver CurrPermFa ult	Major	Shutdown, alarm reporting, and automatic recovery after the fault is rectified.	The grid voltage drops dramatically or the power grid or the output load is short-circuited. As a result, the inverter transient output current exceeds the upper threshold and, which triggers the inverter protection.	1. The inverter monitors its external working conditions in real time. And it can automatically recover after the fault is rectified. 2. If the alarm is triggered frequently and affects the power production of the PV plant, check whether grid or the output is overloaded or short-circuited. If the fault persists, contact your installer.

30	1168	cInvSndOver CurrPermFa ult	Major	Shutdown, alarm reporting, and automatic recovery after the fault is rectified.	The grid voltage drops dramatically or the power grid or the output load is short-circuited. As a result, the inverter transient output current exceeds the upper threshold and, which triggers the inverter protection.	1. The inverter monitors its external working conditions in real time. And it can automatically recover after the fault is rectified. 2. If the alarm is triggered frequently and affects the power production of the PV plant, check whether grid or the output is overloaded or short-circuited. If the fault persists, contact your installer.
31	1172	cLeakCurrPe rmFault	Major	Shutdown, alarm reporting, and automatic recovery after the fault is rectified.	The insulation impedance of the input side to PE decreases when the inverter is operating	1. If the alarm is triggered accidentally, the external power cable may be abnormal temporarily. The inverter automatically recover after the fault is rectified. 2. If the alarm is triggered frequently or persists, check that the impedance between the PV string and ground is not below the lower threshold.
32	1217	cBDCChaOv erCurrSwFa ult	Major	Shutdown, alarm reporting, and automatic recovery after the fault is rectified.	The Battery DC charge current is higher than the upper threshold. 1. The battery is faulty.	1. If the FAULT indicator on the front of the battery pack is ON or flashing, contact your installer. 2. Check that the communications cable and power cable between the inverter and the battery are properly connected. 2. Send a shutdown command on the app. Turn off the AC output switch, DC input switch, and battery switch in order, and then turn on the battery switch, AC output switch, and DC input switch in sequence after 5 minutes. 3. If the alarm still exists, contact your installer.
33	1218	cBDCDisCha OverCurrSw Fault	Major	Shutdown, alarm reporting, and automatic	The Battery DC discharge current is higher than the	1. If the FAULT indicator on the front of the battery pack is ON or flashing, contact your installer.

				recovery after the fault is rectified.	upper threshold. 1. The battery is faulty. 2. The battery SOC is too low.	2. Check that the communications cable and power cable between the inverter and the battery are properly connected. 3. Send a shutdown command on the app. Turn off the AC output switch, DC input switch, and battery switch in order, and then turn on the battery switch, AC output switch, and DC input switch in sequence after 5 minutes. 4. If the alarm still exists, contact your installer.
34	1229	cBDCHighTemp1Fault	Major	Shutdown,alarm reporting,and automatic recovery after the fault is rectified.	The temperature of battery DC IGBT is higher than the upper threshold. 1. The inverter is installed in a place with poor ventilation. 2. The ambient temperature exceeds the upper threshold. 3. The inverter is not working properly.	1. Check the ventilation and ambient temperature at the inverter installation position. 2. If the ventilation is poor or the ambient temperature exceeds the upper threshold, improve the ventilation and heat dissipation. 3. If the ventilation and ambient temperature both meet requirements, contact your installer.
35	1242	cBatUnderVoltFault	Major	Shutdown, alarm reporting, and automatic recovery after the fault is rectified.	1. The battery is faulty.	1. If the FAULT indicator on the front of the battery pack is ON or flashing, contact your installer. 2. Check that the communications cable and power cable between the inverter and the battery are properly connected. 2. Send a shutdown command on the app. Turn off the AC output switch, DC input switch, and battery switch in order, and then turn on the battery switch, AC output switch, and DC input

						switch in sequence after 5 minutes. 3. If the alarm still exists, contact your installer.
36	1247	cBatRevCon nFault	Major	Shutdown, alarm reporting, and automatic recovery after the fault is rectified.	The battery output is reversely connected.	Check whether the battery output is reversely connected.
37	1248	cBDCDischa rgeCtlFault	Major	Shutdown, alarm reporting, and automatic recovery after the fault is rectified.	1. The battery is faulty. 2. The battery SOC is too low.	1. Check that the communications cable and power cable between the inverter and the battery are properly connected. 2. Send a shutdown command on the app. Turn off the AC output switch, DC input switch, and battery switch in order, and then turn on the battery switch, AC output switch, and DC input switch in sequence after 5 minutes. 3. If the alarm still exists, contact your installer.
38	1283	Communicati on warning	Minor	Alarm reporting	Communication fault with BMS.	Check that the communications cable and power cable between the inverter and the battery are properly connected.
39	1285	Communicati on warning	Minor	Alarm reporting	Communication fault with Meter.	Check that the communications cable and power cable between the inverter and the Meter are properly connected.

9.2 Troubleshooting and Routine Maintenance

- Troubleshooting

a. Please check the fault message on the System Control Panel or the fault code on the hybrid inverter information panel. If a message is displayed, record it before doing anything further.

b. Attempt the solution indicated in table above.

c. If your hybrid inverter information panel is not displaying a fault light, check the following to make sure that the current state of the installation allows for proper operation of the unit:

   (1) Is the hybrid inverter located in a clean, dry, adequately ventilated place?

   (2) Have the DC input breakers opened?

   (3) Are the cables adequately sized?

(4)   Are the input and output connections and wiring in good condition?

(5)   Are the configurations settings correct for your particular installation?

(6)   Are the display panel and the communications cable properly connected and undamaged?

Contact Fox ESS Customer Service for further assistance. Please be prepared to describe details of your system installation and provide the model and serial number of the unit.

• Safety check

A safety check should be performed at least every 12 months by a qualified technician who has adequate training, knowledge and practical experience to perform these tests. The data should be recorded in an equipment log. If the device is not functioning properly or fails any of the tests, the device has to be repaired. For safety check details, refer to section 2 of this manual.

• Maintenance checking list

During the process of using the hybrid inverter, the responsible person shall examine and maintain the machine regularly. The required actions are as follows.

-    Check that if the cooling fins at the rear of the hybrid inverters are collecting dust/dirt, and the machine should be cleaned when necessary. This work should be conducted periodically.

-    Check that if the indicators of the hybrid inverter are in normal state, check if the display of the hybrid inverter is normal. These checks should be performed at least every 6 months.

-    Check if the input and output wires are damaged or aged. This check should be performed at least every 6 months.

-    Get the hybrid inverter panels cleaned and their security checked at least every 6 months.

Note: Only qualified individuals may perform the following works.

10. Decommissioning

10.1Dismantling the hybrid inverter

- Disconnect the hybrid inverter from DC (for hybrid only) Input and AC output. Wait for 5 minutes for the hybrid inverter to fully de-energize.
- Disconnect communication and optional connection wirings. Remove the hybrid inverter from the bracket.
- Remove the bracket if necessary.

10.2 Packaging

If possible, please pack the hybrid inverter with the original packaging. If it is no longer available, you can also use an equivalent box that meets the following requirements.

- Suitable for loads more than 38 kg.
- Contains a handle.
- Can be fully closed.

10.3 Storage and Transportation

Store the hybrid inverter in dry place where ambient temperatures are always between -40°C-+70°C.Take care of the hybrid inverter during the storage and transportation; keep less than 4 cartons in one stack. When the hybrid inverter or other related components need to be disposed of, please ensure it is carried out according to local waste handling regulations. Please be sure to deliver any hybrid inverter that needs to be disposed from sites that are appropriate for the disposal in accordance with local regulations.