User Manual

T SERIES

This guide describes how to use the inverter. In order to prevent improper operation before use, please read this manual carefully.

Table of Contents

1. Notes on This Manual

1.1 Scope of Validity

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

T3, T4, T5, T6, T8, T8(Dual)

T10, T10(Dual), T12, T12(Dual)

T15, T15(Dual), T17, T20, T25

Note: Store this manual where it will be accessible at all times.

1.2 Target Group

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

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.

1.4 Symbols Explanation

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

Symbols	Explanation
	Symbol Explanation CE mark. The inverter complies with the requirements of the applicable CE guidelines.
	Beware of hot surface. The inverter can become hot during operation. Avoid contact during operation.
	Danger of high voltages. Danger to life due to high voltages in the inverter!

	Danger. Risk of electric shock!
	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 lid.
	Read the manual.
	Product should not be disposed as household waste.

2. Safety

2.1 Appropriate Usage

This series inverter is designed and tested in accordance with international safety requirements. However, certain safety precautions must be taken into account when installing and operating this 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 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 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 service representative.
- Liabilities arising from commercial components are delegated to their respective manufacturers.
- Any time the 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 inverter please ensure surfaces and equipment are under touch safe temperatures and voltage potentials before proceeding.

2.2 PE Connection and Leakage Current

- The end-use application shall monitor the protective conductor by residual current operated protective device (RCD) with rated fault current Ifn≤280mA which will automatically disconnect from the grid in case of a fault.
- DC common mode current are caused by insulation resistance and through capacities of the PV generator. In order to prevent unwanted triggering during operation, the rated residual current of the RCD has to be min 240mA. The device is intended to connect to a PV generator with a capacitance limit of approx. 5000nf.

WARNING!
High leakage current! Earth connection essential before connecting supply.

- Incorrect grounding can cause physical injury, death or equipment malfunction and increase electromagnetic interference.
- Make sure that grounding conductor is adequately sized as required by safety regulations.
- Do not connect the ground terminals of the unit in series in case of a multiple installation. This product can cause current with a DC component, where a residual current operated protective device (RCD) or monitoring device (RCM) is used for protection in case of direct or indirect contact, only an RCD or RCM of type B is allowed on the supply side of this product.

For UK

- The installation that connects the equipment to the supply terminals shall comply with the requirements of BS 7671.
- Electrical installation of PV system shall comply with requirements of BS 7671 and IEC 60634-7-712.
- No protection settings can be altered.
- User shall ensure that the equipment is so installed, designed and operated to maintain at all times compliance with requirements of ESQCR22(1)(a).

For AU

- Electrical installation and maintenance shall be conducted by licensed electrician and shall comply with Australia National Wiring Rules.

2.3 Surge Protection Devices (SPDs) for PV Installation

Lightning will cause damage either from a direct strike or from surges due to a nearby strike.

Induced surges are the most likely cause of lightning damage in majority or installations, especially in rural areas where electricity is usually provided by long overhead lines. Surges may impact on both the PV array conduction and the AC cables leading to the building. Specialists in lightning protection should be consulted during the end use application. Using appropriate external lightning protection, the effect of a direct lightning strike into a building can be mitigated in a controlled way, and the lightning current can be discharged into the ground.

Thanks to the integrated SPD on DC and AC side, it is not necessary to install external lightning protection system on both sides. The inside integrated SPD device is SPD type 2 protection, if the voltage protection level (VP) of the surge arresters is greater than 1100V, an additional SPD type 3 is required for surge protection for electrical devices.

3. Introduction

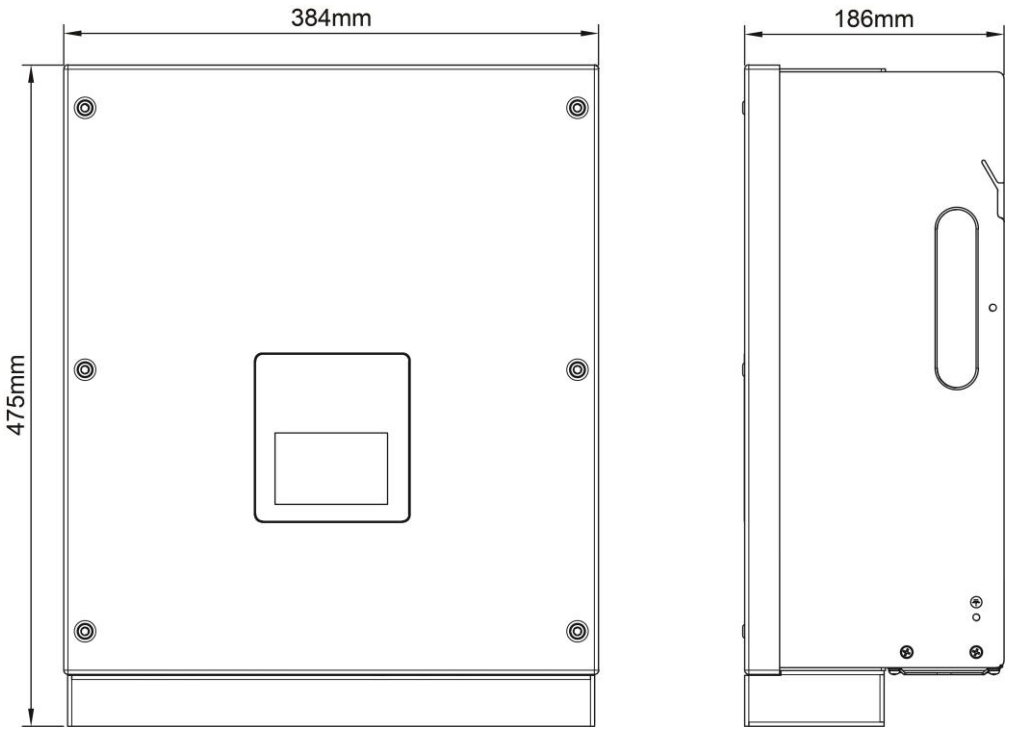
3.1 Basic Features

This three-phase high performance inverter covers 3kW to 25kW. The inverter is integrated with 2 MPP trackers with high efficiency and reliability.

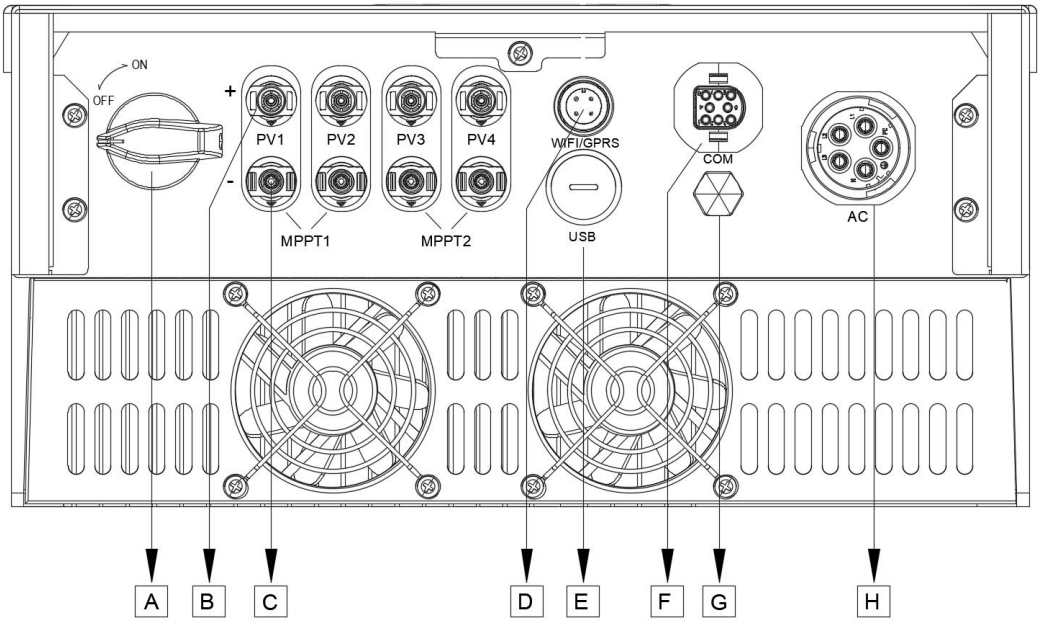
System advantages:

- Advanced DSP control technology.
- Utilizes the latest high-efficiency power components.
- Optimal MPPT technology.
- Two independent MPP trackers.
- Wide MPPT voltage range.
- Advanced anti-islanding solutions.
- IP65 protection level.
- Max. Efficiency up to 98.6%. EU efficiency up to 97.8%. THD<3%.
- Safety & Reliability: Transformerless design with software and hardware protection.
- External limitation (Meter/DRM0/ESTOP).
- Power factor regulation. Friendly HMI.
- LED status indications.
- LCD display technical data, human-machine interaction through touch key.
- Remote monitoring via PC or APP.
- Upgrade through USB interface.

3.2 Dimensions



3.3 Terminals of Inverter



Item	Description	Item	Description
A	DC Switch (Optional)	E	USB
B	PV+	F	COM
C	PV-	G	Waterproof Lock Valve
D	WiFi / GPRS	H	AC Connector

4. Technical Data

4.1 PV Input / AC Output

Model	T3	T4	T5	T6	T8/ T8(Dual)	T10/ T10(Dual)	T12/ T12(Dual)	T15/ T15(Dual)	T17	T20	T25
	3000	4000	5000	6000	8000	10000	12000	15000	17000	20000	25000
PV INPUT											
Max. DC Input power	4500W	6000W	7500W	9000W	12000W	15000W	18000W	22500W	25500W	30000W	37500W
Max. DC voltage	1100V	1100V	1100V	1100V	1100V	1100V	1100V	1100V	1100V	1100V	1100V
Nominal DC operating voltage	600V	600V	600V	600V	600V	600V	600V	600V	600V	600V	600V
Max. input current (input A/input B) (A)	12.5/ 12.5	12.5/ 12.5	12.5/ 12.5	12.5/ 12.5	12.5/12.5 (T8) 25/25 (T8 Dual)	12.5/12.5 (T10) 25/25 (T10 Dual)	12.5/12.5 (T12) 25/25 (T12 Dual)	25/12.5 (T15) 25/25 (T15 Dual)	25/25	25/25	25/25

Max. short circuit current (input A/input B) (A)	16.25/16.25	16.25/16.25	16.25/16.25	16.25/16.25	16.25/16.25(T8) 32.5/32.5 (T8 Dual)	16.25/16.25(T10) 32.5/32.5 (T10 Dual)	16.25/16.25(T12) 32.5/32.5 (T12 Dual)	32.5/16.25 (T15) 32.5/32.5 (T15 Dual)	32.5/32.5	32.5/32.5	32.5/32.5
MPPT voltage range	160-850 Vdc	160-850 Vdc	160-850 Vdc	160-850 Vdc	160-850 Vdc	160-850 Vdc	160-850 Vdc	160-850 Vdc	160-850 Vdc	160-850 Vdc	160-850 Vdc
MPPT voltage range (full load) (Vdc)	160-850	180-850	210-850	250-850	330-850 (T8) 160-850 (T8 Dual)	410-850 (T10) 200-850 (T10 Dual)	490-850 (T12) 240-850 (T12 Dual)	410-850 (T15) 300-850 (T15 Dual)	350-850	410-850	510-850
Start-up voltage	180V	180V	180V	180V	180V	180V	180V	180V	180V	180V	180V
No. of MPP trackers	2	2	2	2	2	2	2	2	2	2	2
Strings per MPP tracker	1+1	1+1	1+1	1+1	1+1(T8) 2+2 (T8 Dual)	1+1(T10) 2+2 (T10 Dual)	1+1(T12) 2+2 (T12 Dual)	2+1(T15) 2+2 (T15 Dual)	2+2	2+2	2+2
Max. Inverter backfeed current to the array (mA)	0										
AC OUTPUT											
Nominal AC power	3000W	4000W	5000W	6000W	8000W	10000W	12000W	15000W	17000W	20000W	25000W
Max. apparent AC power	3300VA	4400VA	5500VA	6600VA	8800VA	11000VA	13200VA	16500VA	18700VA	22000VA	27500VA
Rated grid voltage (AC voltage range)	3/N/PE, 400V										
Rated Grid Frequency	50/60Hz, ±5Hz										
Nominal AC current	4.3A	5.8 A	7.2 A	8.7 A	11.6 A	14.5 A	17.4 A	21.7 A	24.6 A	29.0 A	36.2 A
Max. AC current	4.8A	6.4 A	8.0 A	9.6 A	12.8 A	15.9 A	19.1 A	23.9 A	27.1 A	31.9 A	39.9 A
Inrush current	9.6A@0.8ms				14.5A@0.7ms (T8-T12) 12.1A@0.6ms (T8(Dual)-T12(Dual))			12.1A@0.6ms			19.3A@1.3ms
Maximum output fault current	30A@11us				58A@8us (T8-T12) 93A@8us (T8(Dual)-T12(Dual))			93A@8us			145A@10us
Maximum output overcurrent protection	10.1A	13.5A	16.9A	20.3A	27.1A	33.8A	40.6A	50.7A	57.5A	67.6A	84.5A

Displacement power factor	1 (Adjustable from 0.8 leading to 0.8 lagging)
Total harmonic distortion (THDi, @rated output)	<3%

4.2 Efficiency, Safety and Protection

Model	T3	T4	T5	T6	T8/ T8(Dual)	T10/ T10(Dual)	T12/ T12(Dual)	T15/ T15(Dual)	T17	T20	T25
EFFICIENCY											
Max. MPPT efficiency	99.00%	99.00%	99.00%	99.00%	99.00%	99.00%	99.00%	99.00%	99.00%	99.00%	99.00%
Euro-efficiency	97.80%	97.80%	97.80%	97.80%	97.80%	97.80%	97.80%	97.80%	97.80%	97.80%	97.80%
Max. efficiency (@rated voltage)	98.60%	98.60%	98.60%	98.60%	98.60%	98.60%	98.60%	98.60%	98.60%	98.60%	98.60%
PROTECTION											
DC reverse-polarity protection	Yes										
Insulation monitoring	Yes										
Residual current monitoring	Yes										
AC short circuit protection	Yes										
AC output over current protection	Yes										
AC output over voltage protection	Yes										
Surge protection	Yes										
Temperature protection	Yes										
Anti-Islanding protection method	Frequency shift										
Integrated DC switch	Optional										
STANDARD											
Safety	IEC62109-1/2										
EMC	IEC 61000-6-1 / IEC 61000-6-2 / IEC 61000-6-3 / IEC61000-4-2/3/4/5/6/8										
Certification	AS4777.2-2015 / VDE-AR-N 4105 /VDE0126-1-1 / G98 / G99 / EN50549-1 / CEI 0-21 IEC62116 / IEC61727 / IEC61683										

4.3 General Data

Model	T3	T4	T5	T6	T8/ T8(Dual)	T10/ T10(Dual)	T12/ T12(Dual)	T15/ T15(Dual)	T17	T20	T25
GENERAL DATA											
Dimensions (WxHxD)	475*384*186mm										
Net weight	20KG (T3-T12) 24KG (T8(Dual)-T12(Dual))							24KG			
Cooling concept	Convection							Forced convection			
Ingress protection (according to IEC60529)	IP65										
Topology	Non-isolated										
Over voltage category	III (AC side), II (PV side)										
Noise emission (typical)	<30dB							<55dB			
Max. operating altitude	3000m										
Temperature range (operating)	-20…... +60°C (derating at +45°C)										
Temperature range (storage)	-40…... +70°C										
Humidity	0-100% (no condensation)										
Self-consumption (night)	<3W										
Pollution degree	II										
Monitoring module (optional)	RS485, WiFi (optional)/ GPRS (optional)										
Communication	Meter, DRM, E-stop, USB										
Display	LCD screen, touch key, APP, Web site										

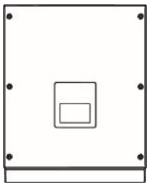
5. Installation

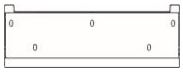
5.1 Check for Physical Damage

Make sure the inverter has not been damaged during transportation. If there is any visible damage, such as cracks, please contact your dealer immediately.

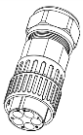
5.2 Packing List

Open the package and take out the product, please check the accessories first. The packing list is as shown as below.


A


B


C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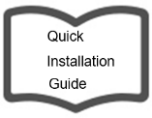
E F


G H


I

J



K


L


M


N

Object	Quantity	Description	Object	Quantity	Description
A	1	Inverter	H	1	Earth terminal
B	1	Bracket	I	1	Communication connector
C	2/3/4	DC connector (F/M)	J	1	Product manual
D	1	AC connector	K	1	Quick installation guide
E	5	Expansion tube	L	1	WiFi/GPRS (optional)
F	5	Expansion screw	M	1	Screwdriver
G	2/3/4	DC pin contact (1*positive, 1*negative)	N	1	Unlock tool

5.3 Mounting

- Installation Precaution

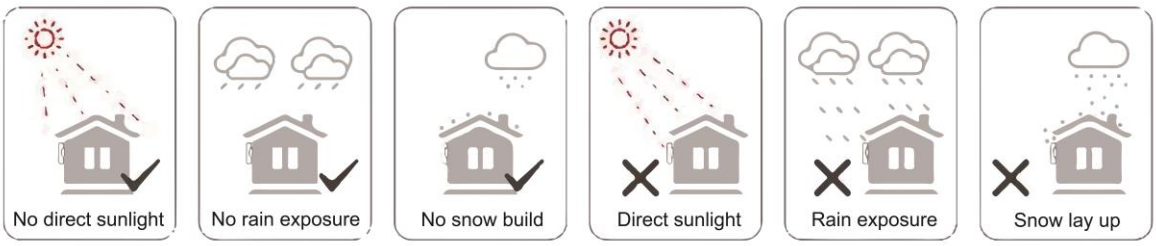
Make sure the installation location complies with the following conditions:

- Not in direct sunlight.
- Not in areas where highly flammable materials are stored.
- Not in potentially explosive areas.
- Not in a direct flow of cool air.
- Not near a television antenna or antenna cable.
- Not higher than altitude of 3000m above sea level.

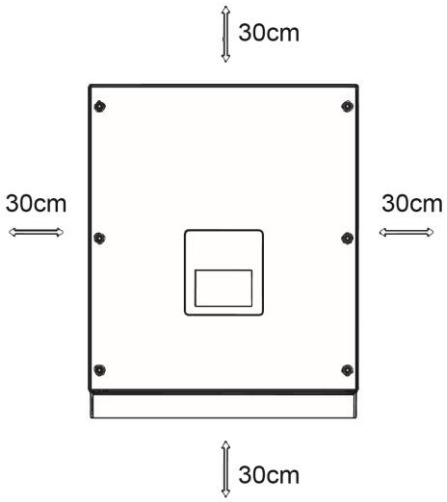
- Not in environment of precipitation or humidity (> 95%).
- Is well ventilated.
- The ambient temperature is in the range of -20°C to +60°C.
- The slope of the wall should be within ±5°.
- The wall where the inverter is mounted should comply with the following conditions:

  1. Is solid brick/concrete or a mounting surface of equivalent strength;

  2. The Inverter must be supported or strengthened if the wall's strength isn't adequate (such as a stud wall or where the wall is covered by thick layer of decoration).
- Avoid direct sunlight, rain exposure or accumulations of snow during installation and operation.



• Space Requirement



Position	Min Size
Left	30cm
Right	30cm
Top	30cm
Bottom	30cm
Front	30cm

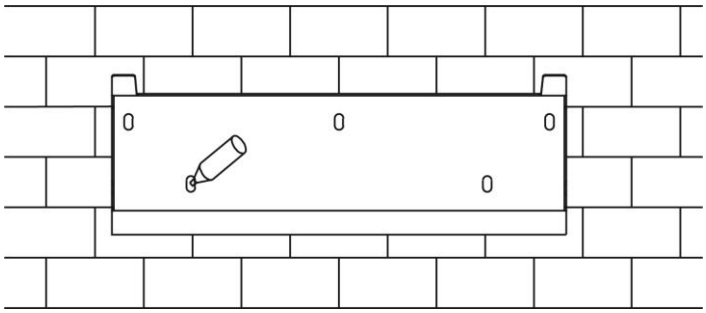
• Mounting Steps

Tools required for installation.

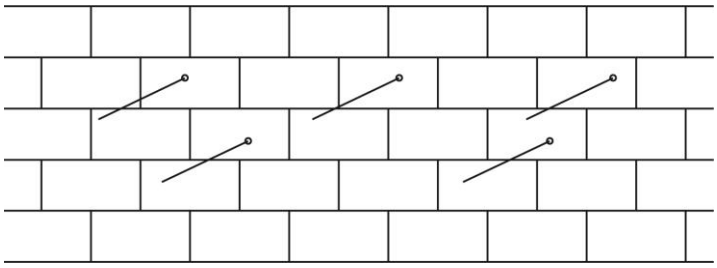
- Manual wrench;
- Electric drill (drill bit set 8mm);
- Crimping pliers;
- Stripping pliers;
- Screwdriver.

Step 1: Fix the bracket on the wall

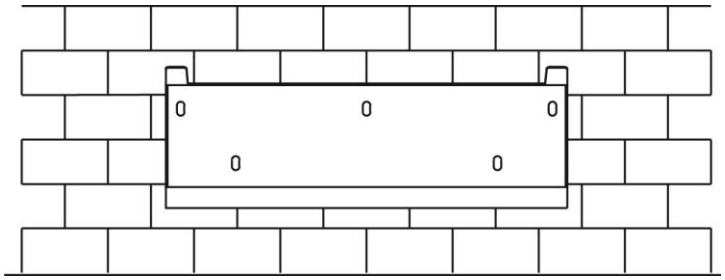
Choose the place you want to install the inverter. Place the bracket on the wall and mark the position of the 5 holes from bracket.



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

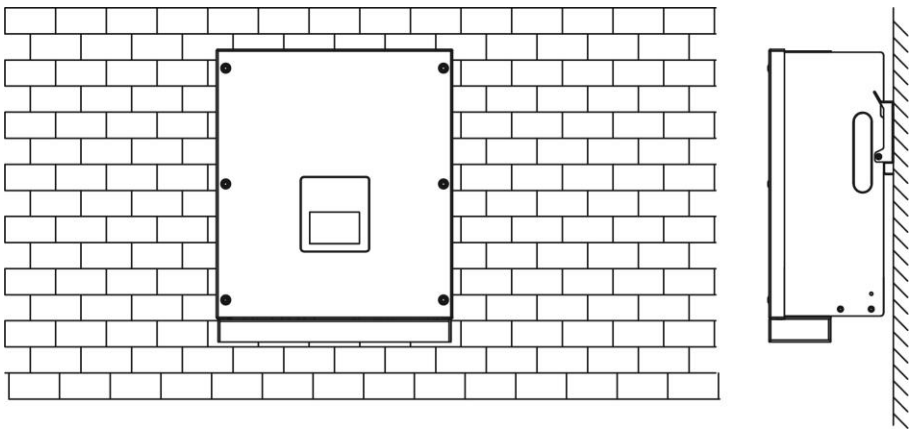


Insert the expansion tubes into the holes and tighten them. Install the bracket with the expansion screws.



Step 2: Match the inverter with wall bracket

Hang the inverter over the bracket, slightly lower the inverter, and make sure the two mounting grooves on the back are properly fixed with the two bracket bars.



6. Electrical Connection

6.1 Wiring Steps

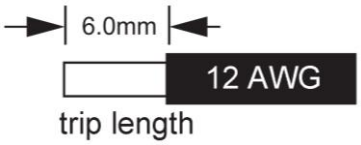
Step 1: PV String Connection

This series inverters can be connected with 2 to 4 strings of PV modules depending on the inverter type. Please select suitable PV modules with high reliability and quality. Open circuit voltage of the module array connected should be less than 1100V, and operating voltage should be within the MPPT voltage range.

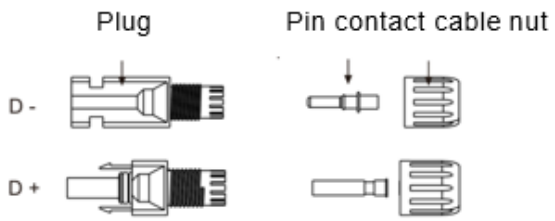
	Note! Please choose a suitable external DC switch if the inverter does not have a built-in DC switch.
	Warning! PV module voltage is very high and within a dangerous voltage range, please comply with the electric safety rules when connecting.
	Warning! Please do not make PV positive or negative to ground!
	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 inverter as near to the PV modules as possible.

Step 2: DC Wiring

- Turn off the DC switch.
- Choose 12 AWG wire to connect the PV module.
- Trim 6mm of insulation from the wire end.

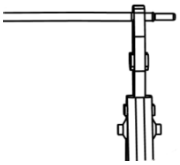


- Separate the DC connector as below.



- Insert striped cable into pin contact and ensure all conductor strands are captured in the pin contact.

- Crimp pin contact by using a crimping plier. Put the pin contact with striped cable into the corresponding crimping pliers and crimp the contact.



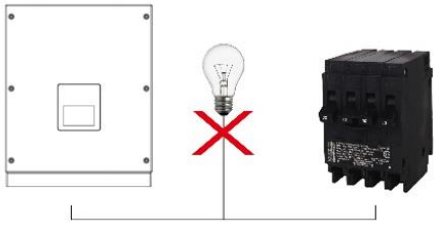
- Insert pin contact through the cable nut to assemble into back of the male or female plug. When you feel or hear a “click” the pin contact assembly is seated correctly.

- Unlock the DC connector
  - Use the specified wrench tool.
  - When separating the DC+ connector, push the tool down from the top.
  - When separating the DC - connector, push the tool up from the bottom.
  - Separate the connectors by hand.

- Grid Connection

This series inverters are designed for three-phase grid. Voltage range is 220/230/240V; frequency is 50/60Hz. Other technical requests should comply with the requirement of the local public grid.

Model (kW)	3.0	4.0	5.0	6.0	8.0	10.0	12.0	15.0	17.0	20.0	25.0
Cable	2.5~6mm²				4~6mm²			6~10mm²			10mm²
Micro-Breaker	16A				25A			40A		50A	60A



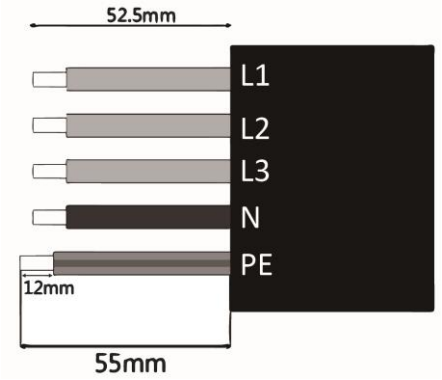
WARNING!

A micro-breaker for max output overcurrent protection device shall be installed between inverter and grid, and the current of the protection device is referred to the table above, any load SHOULD NOT be connected with the inverter directly.

Step 3: AC 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 wires:

- Trim all the wires to 52.5mm and the PE wire to 55mm.
- Use the crimping pliers to trim 12mm of insulation from all wire ends as below.



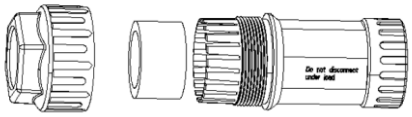
L1/L2/L3: Brown/Red/Green or Yellow Wire

N: Blue/Black Wire

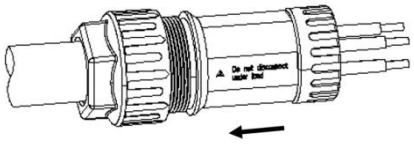
PE: Yellow & Green Wire

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

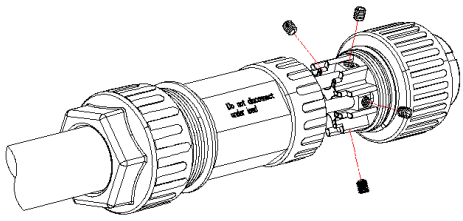
- Separate the AC plug into three parts as below.



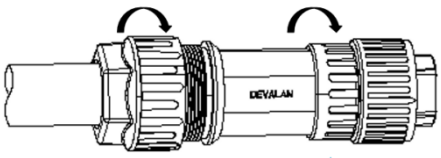
- Insert the sleeve assembly into the cable.



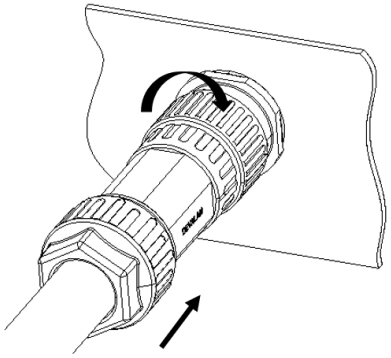
- Install the copper wire into the plug terminal and lock the screw.



- Lock the lock nut and the sleeve (3~5N·M), lock the sleeve and the plug (1.5~1.7N·M).

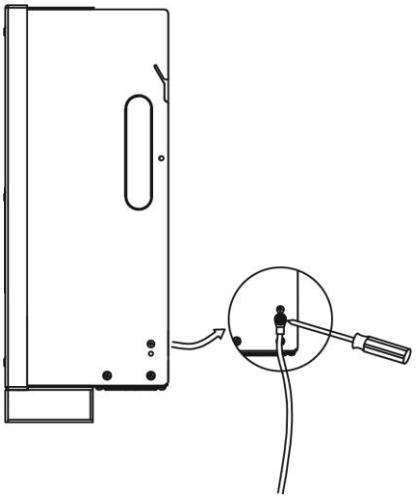


- Insert the plug assembly into the socket (inverter end) and lock each other by the coupling twist.



6.2 Earth Connection

Screw the ground screw with screwdriver as shown below:



6.3 Communication Device Installation (Optional)

This series inverter is available with multiple communication options such as WiFi, 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.

- WiFi/GPRS (Optional)

The inverter has an interface for WiFi/GPRS devices that allow this device to collect information from inverter; including inverter working status, performance etc., and update that information to monitoring platform (the WiFi/GPRS device is available to purchase from your local supplier).

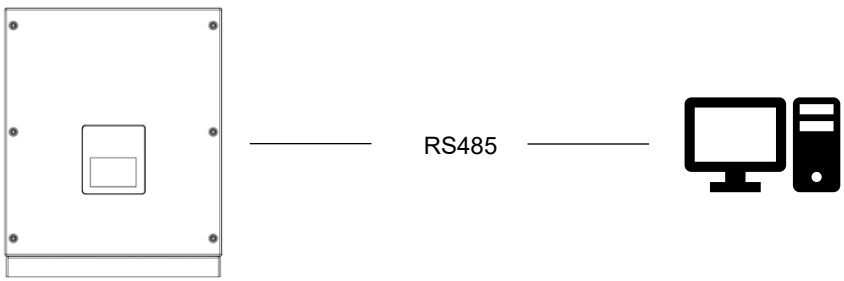
Connection steps:

1. For GPRS device: Please insert the SIM Card (please refer to the GPRS product manual for more details).
2. Plug the WiFi/GPRS device into “WiFi/GPRS” port at the bottom of the inverter.
3. For WiFi device: Connect the WiFi with the local router and complete the WiFi configuration (please refer to the WiFi product manual for more details).
4. Set-up the site account on the Fox monitoring platform (please refer to the monitoring user manual for more details).

- RS485/Meter

- RS485

RS485 is a standard communication interface which can transmit the real time data from inverter to a PC or other monitoring devices.

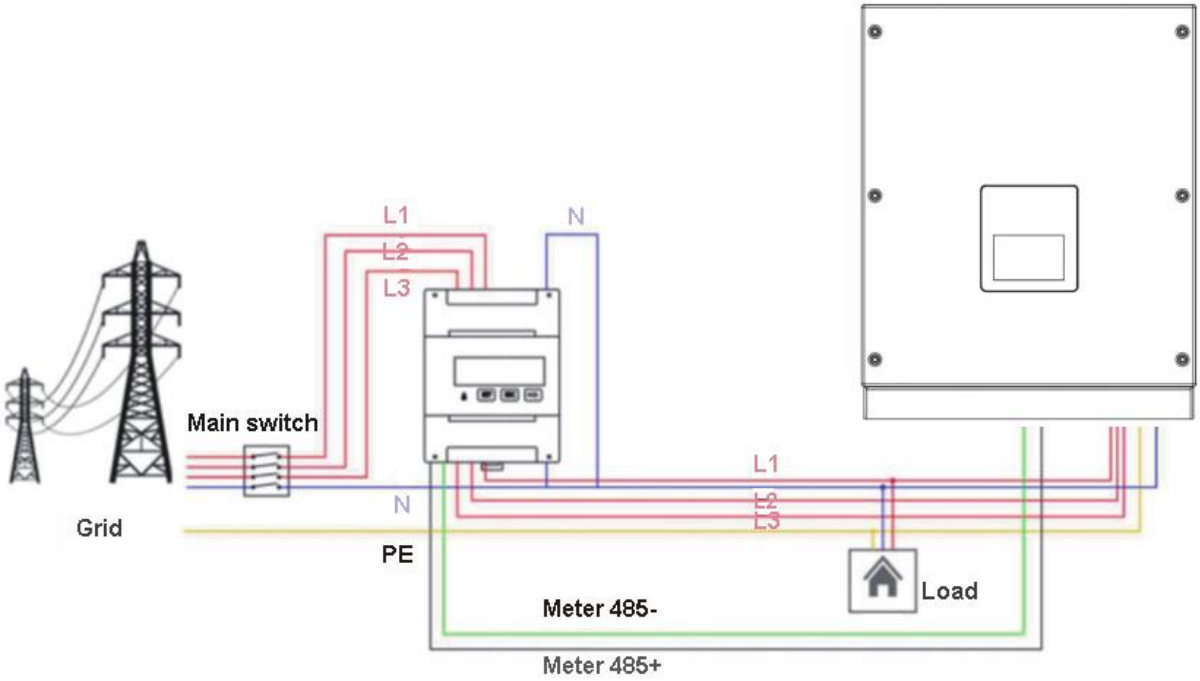


- Meter (optional)

The inverter has integrated export limitation functionality. To use this function, a power meter must be installed. For Meter installation, please install it on the grid side.

Export limitation setting:

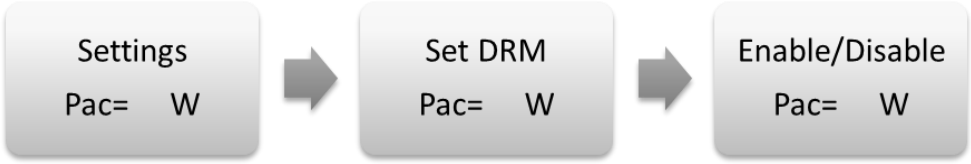
Short press the touch key to switch display or make the Value+1. Long press the touch key to confirm your setting.



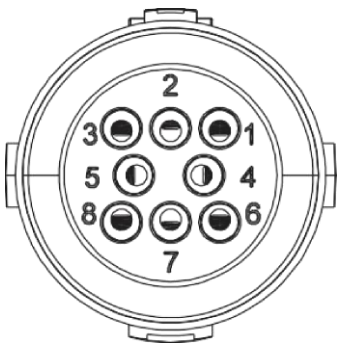
• DRM0/ESTOP

DRM0 setting

Short press the touch key to switch display or make the value+1. Long press the touch key to confirm your setting.



The PIN definitions of RS485/DRM0/ESTOP interface are as below.



PIN	1	2	3	4	5	6	7	8
Definition	485-	485+	METER 485-	METER 485+	GND	DRM0	+12V	ESTOP

Model	Socket asserted by shorting pins		Function
DRM0	5	6	Operate the disconnection device.
ESTOP	5	8	Emergency stop the inverter.

Note:

- Isolation Fault (Australia Market Only)

This inverter complies with IEC 62109-2 clause 13.9 for earth fault alarm monitoring. If an Earth Fault Alarm occurs, the fault code Isolation fault will be displayed on the inverter screen and the RED LED indicator will light up.

- Reactive Power Regulation for Voltage Variation (Volt-VAr Mode)

Details of how to enable this mode are contained in the “Advanced Configuration Guide”, which can be accessed at our website at https://www.foxess.com.

- Power Derating for Voltage Variation (Volt-Watt Mode)

Details of how to enable this mode are contained in the “Advanced Configuration Guide”, which can be accessed at our website at https://www.foxess.com.

6.4 Inverter Start-Up

Please refer to the following steps to start-up the inverter:

a) Check if device is fixed well on the wall;

b) Make sure all DC breakers and AC breakers are disconnected;

c) Ensure AC cable is connected to the grid correctly;

d) All PV panels are connected to inverter correctly; DC connectors that are not used should be sealed by cover;

e) Turn on the external AC and DC connectors;

f) Turn the DC switch to the “ON” position (if equipped with DC switch on the inverter).

If the LED is not green, please check the below:

- All the connections are correct.
- All the external disconnect switches are closed.
- The DC switch of the inverter is in the “ON” position.

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 button or by using the APP.

Below are the three possible inverter states indicating that the inverter has started up successfully.

Waiting: Inverter is waiting to check whether or not the DC input voltage from panels is greater than 180V (lowest start-up voltage) and is waiting to check whether the voltage and frequency on AC side are within the range; display will indicate the Waiting status and green LED will flash.

Checking: Inverter will check DC input environment automatically when DC input voltage from the PV panels exceeds 180V and PV panels have enough energy to start inverter, display will indicate the Checking status and green LED will flash.

Normal: Inverter begins to operate normally with green light on. Meanwhile feedback energy to grid, LCD displays present output power.
Note: You can go to the setting interface on the display to follow the instructions if it is the first time to start up.

- **Complete inverter Start-up guide**

After the initial start-up the inverter, display will go to the language settings page, short press to switch language and long press to confirm selection. Once language set, display will guide to set the safety regulation. Short press to switch safety regulation, and long press to confirm selection.

	**Note!** Please set-up the inverter if it is the first time to start-up. The above steps are for the regular start-up of the inverter. If it is the first time to start up the inverter, you need to carry-out the initial set-up of the inverter.
	**Warning!** Power to the unit must be turned on only after installation work has been completed. All electrical connections must be carried out by qualified personnel in accordance with legislation in force in the country of installation.

6.5 Inverter Switch Off

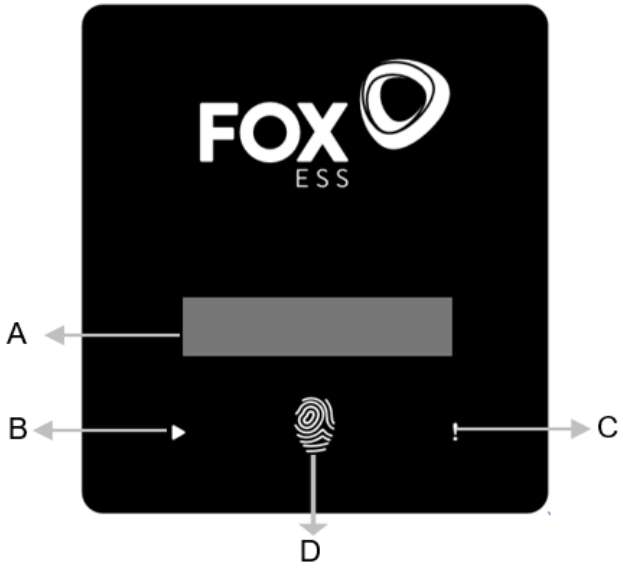
Please follow the below steps to switch off the inverter:

a) Switch off the inverter AC isolation switch.

b) Switch off the DC isolation switch and allow 5 minutes for the inverter to power down completely.

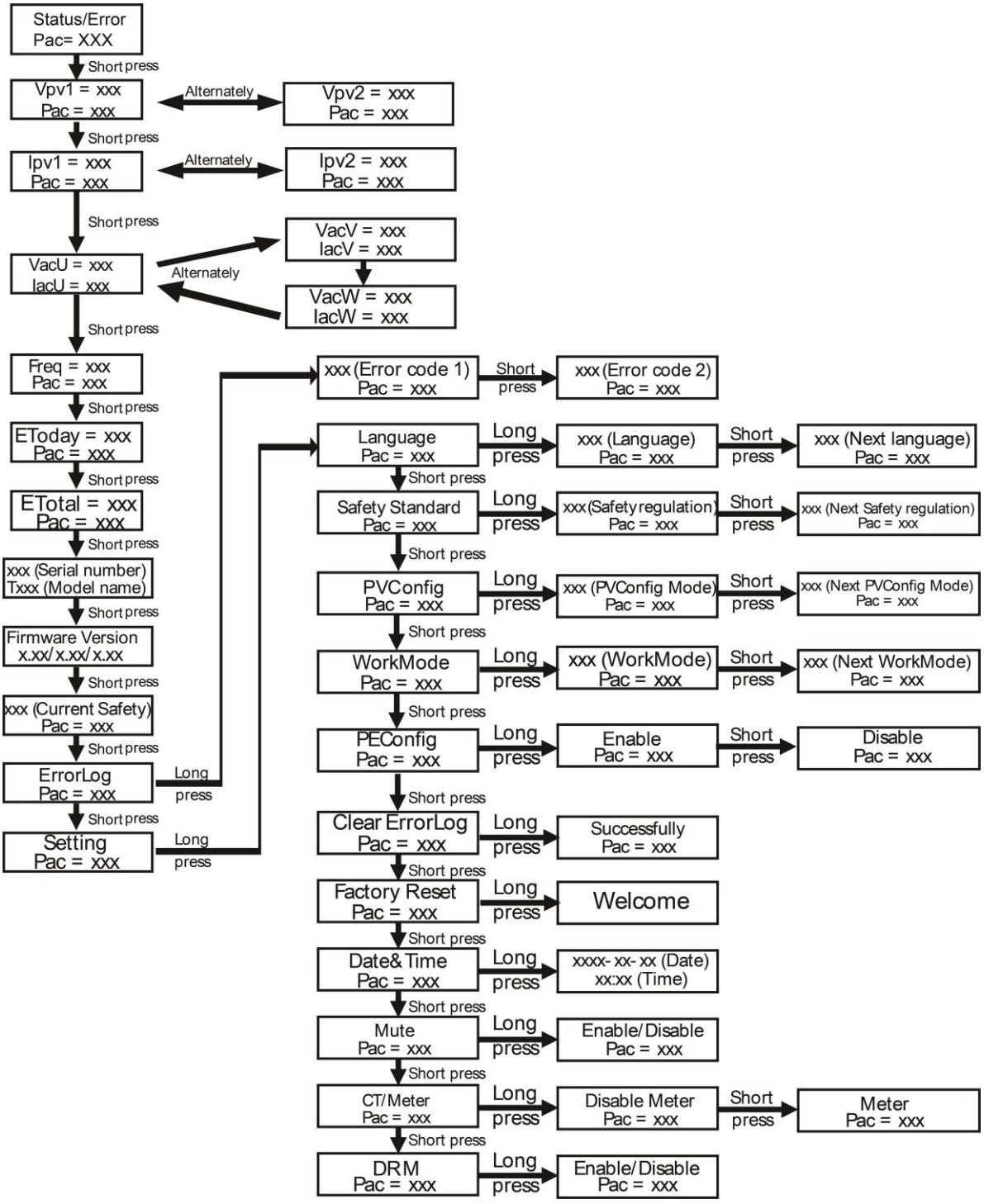
7. Operation

7.1 Control Panel



Object	Name	Function
A	LCD Screen	Display the information of the inverter.
B	Indicator LED	Green: The inverter is in normal state.
C		Red: The inverter is in fault mode.
D	Touch Key	The touch key is used to set the LCD to display different parameters. Press time <1s (short press): Next; Press time >2s (long press): Enter. Wait time 15s: Return to start.

7.2 Function Tree



8. Firmware Upgrading

User can upgrade inverter's firmware via a U-disk.

- Preparation

Please ensure the inverter is steadily powered on.

Inverter must remain powered through whole procedure of upgrading. Prepare a PC and make sure the size of U-disk is under 32G, and the format is fat 16 or fat 32.

- Upgrading steps:

Step 1: Please contact our service support to get the update files, and extract it into your U-disk as follows:

Master: “Update\master\xxxxx_Master_Vx.xx.hex”

Slave: “Update\slave\xxxxx_Slave_Vx.xx.hex”

Manager: “Update\manager\xxxxx_manager_Vx.xx.hex”

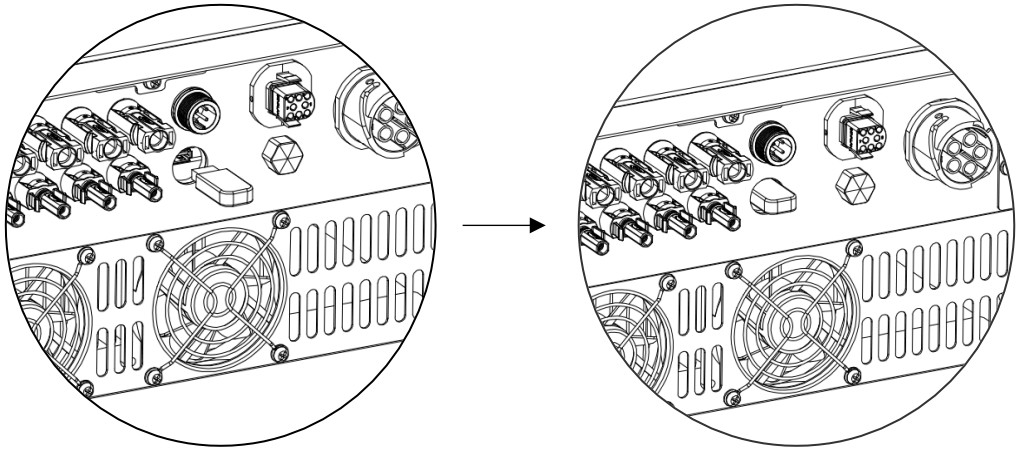
Note: Vx.xx is version number.

Warning: Make sure the directory structure is strictly in accordance with above! Do not modify the program file name, or it may cause the inverter to cease working.

Step 2: Unscrew the waterproof lid and insert U-disk into the "USB" port at the bottom of the inverter.

Step 3: The LCD will show update information. Then shortly press touch key to select the firmware that you want to upgrade and press touch key for 5 seconds to confirm the upgrade.

Step 4: Wait for few minutes until the upgrade is finished. The LCD will go back to the first page and show “Upgrade Master”. Please pull out the U-disk and check if the firmware version is the correct one. Then screw the waterproof lid.



9. Maintenance

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

9.1 Alarm List

Fault Code	Solution
SPS fault	- Turn off the PV and grid, reconnect them. - Please seek for help from us if it does not go back to normal state.

Bus volt fault	- Disconnect PV (+), PV (-) using DC switch. - After the LCD switches off, reconnect and check again. - Please seek for help from us if it does not go back to normal state.
DCI over range	- Wait for one minute after the inverter reconnects to grid. - Disconnect PV (+), PV (-) using DC switch. - After the LCD switches off, reconnect and check again. - Please seek for help from us if it does not go back to normal state.
EEprom fault	- Disconnect PV (+), PV (-) using DC switch. - After the LCD switches off, reconnect and check again. - Please seek for help from us if it does not go back to normal state.
GFCI fault or GFCD fault	-Disconnect DC and AC connector, check the surrounding equipment on the AC side. -Reconnect the input connector and check the state of inverter after troubleshooting. -Please seek for help from us if it does not go back to normal state.
Grid10MinOVP	- System will reconnect if the grid is back to normal. - Or seek for help from us if it does not go back to normal state.
Grid freq fault	- Wait for one minute, grid may go back to normal working state. - Make sure that grid voltage and frequency complies with standards. - Or, please seek for help from us.
Grid lost fault	- Please check grid-connection, e.g., wires, interface etc. - Checking grid usability. - Or seek for help from us.
V grid transient	- Disconnect PV (+), PV (-) using DC switch. - After the LCD switches off, reconnect and check again. - Please seek for help from us if it does not go back to normal state.
Grid volt fault	- Wait for one minute, grid may go back to normal working state. - Make sure that grid voltage and frequency complies with standards. - Or, please seek for help from us.
Inconsistency	- Disconnect PV (+), PV (-) using DC switch. - After the LCD switches off, reconnect and check again. - Please seek for help from us if it cannot go back to normal state.
ISO fault	- Check the impedance among PV (+), PV (-) and ground. Impedance should be >100kohm. - Please seek for help from us if the impedance is >100kohm.
Ground fault	- Check the voltage of neutral and PE. - Check AC wiring. - Disconnect PV (+), PV (-) using DC switch. - After the LCD switches off, reconnect and check again.
OCP fault	- Turn off the PV and grid, reconnect them. - Or seek for help from us if it does not go back to normal.

PLL fault	- Check the connection of ac grid - System will reconnect if the utility is back to normal. - Or seek for help from us if it does not go back to normal state.
Pv volt fault	- Check the panel's open-circuit voltage whether the value is similar or already >1000Vdc. - Please seek help from us when voltage ≤1000Vdc.
Relay fault	- Disconnect PV (+), PV (-) using DC switch. - Check the connection of ac grid - After the LCD switches off, reconnect and check again. - Please seek for help from us if it does not go back to normal state.
Sample fault	- Disconnect PV (+), PV (-) using DC switch. - After the LCD switches off, reconnect and check again. - Please seek for help from us if it cannot go back to normal state.
SCI Comm fault or SPI Comm fault	- Disconnect PV+, PV-, reconnect them. - Or seek for help from us if it does not go back to normal state.
Over temp fault	- Check if the environment temperature is over the limit. - Or seek for help from us.
Meter fault	- Check the inverter's setup items about meter. - Disconnect DC and AC connector, check the connection of the meter. - Reconnect the DC and AC connector. - Please seek for help from us if it does not go back to normal state.
Fan fault	- Disconnect PV+, PV-, reconnect them. - Check whether the FAN is seized up by something or not. - Or seek for help from us if it does not go back to normal state.

9.2 Troubleshooting

a. Please check the fault message on the System Control Panel or the fault code on the 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 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 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 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.

9.3 Routine Maintenance

- 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 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 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 inverter are in normal state, check if the display of the 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 inverter panels cleaned and their security checked at least every 6 months.

Note: Only qualified individuals may perform these actions.

10. Decommissioning

10.1 Dismantling the Inverter

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

10.2 Packaging

If possible, please pack the 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 30 kg.
- Contains a handle.
- Can be fully closed.

10.3 Storage and Transportation

Store the inverter in dry place where ambient temperatures are always between -40°C - + 70°C. Take care of the inverter during the storage and transportation; keep less than 4 cartons in one stack. When the inverter or other related components need to be disposed of, please ensure it is carried out according to local waste handling regulations.

FOXESS CO., LTD WUXI BRANCH
Add: No.11, Lijiang Road, Xinwu District, Wuxi
City, Jiangsu Province, China
Tel: 0510- 68092998
WWW.FOX-ESS.COM.

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