ENVERTECH

MICROINVERTER

EVT560

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User Manual

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1.Important Safety Information

1.1 Read it First

This manual contains important instructions for installation and maintenance of the EVT560 microinverter.
To reduce the risk of electrical shock, and to ensure safe installation and operation of the microinverter, the following safety symbols appear throughout this document to indicate dangerous conditions and important safety instructions.

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, can result in death or serious injury or moderate injury.

NOTICE

NOTICE indicates a situation that can result in property damage, if not avoided.

1.2 Safety Instructions

- Do not use Envertech equipment in a manner not specified by the manufacturer. Doing so may cause death or injury to persons, or damage to equipment.
- Be aware that only qualified personnel should install or replace the Envertech microinverters and the Cable and accessories.
- Do not attempt to repair the Envertech microinverter; it contains no user-serviceable parts. If it fails, contact Envertech customer service to start the replacement process. Tampering with or opening the Envertech microinverter will void the warranty.
- If the AC cable on the microinverter is damaged or broken, do not install the unit.
- Before installing or using the Envertech microinverter, read all instructions and cautionary markings in the technical description and on the Envertech microinverter system and the PV equipment.

- Connect the Envertech Microinverter to the utility grid only after you have completed all installation procedures and after receiving prior approval from the electrical utility company.
- Be aware that the body of the Envertech microinverter itself is aheat sink. Under normal operating conditions, the temperature is 20°C above ambient, but under extreme conditions the microinverter can reach a temperature of 65°C (176°F). To reduce risk of burns, use caution when working with microinverters.
- Do not disconnect the PV module from the Envertech microinverter without first removing AC power.
- Be aware that the EVT560 has the ability to auto adjust voltage and frequency according to the settings based on local standards. Only an authorized installer who has got permission from local electrical utility and meets with the following requirements shall be allowed to set the Envertech microinverter.

2.Envertech Microinverter System

The Envertech microinverter system is an on-grid microinverter system with world top-class technology. This manual gave details about safe installation and operation of the Envertech Microinverter.
The three key elements of an Envertech microinverter system include :

- EVT560 microinverter:Converting the DC of the PV module into AC

- EnverBridge: monitoring and protecting PV system.

• EnverPortal: http://www.envertecportal.com

You can monitor the live data from a web browser.
This integrated system maximizes energy harvest, increases system reliability, and simplifies design, installation and management.

2.1 How it Works

The Envertech microinverter maximizes energy production from your photovoltaic (PV) array. Each Envertech microinverter is individually connected to one PV module in your array. This unique configuration means that an individual Maximum Peak Power Point Tracker (MPPT) controls each PV module. This ensures that the maximum power available from each PV module is exported to the utility grid regardless of the performance of the other PV modules in the array. That is, although individual PV modules in the array may be affected by shading, soiling, orientation, or PV module mismatch, the Envertech microinverter ensures top performance for its associated PV module. The result is maximum energy production from your PV system.

2.2 Monitoring Device: EnverBridge

Once you install EnverBridge and provide an ethernet connection to your broadband router or modem, the Envertech microinverter automatically begin reporting to the Envertech EnverBridge web server. The EnverBridge software presents current and historical system.
performance trends, and it informs you of PV system status.

2.3 Optimal Reliability

Microinverter systems are inherently more reliable than traditional inverters. The distributed nature of a microinverter system ensures that there is no single point failure in the PV system. Envertech Microinverters are designed to operate at full power at ambient temperatures as high as +65℃(150℉). The microinverter casing is designed for outdoor installation and complies with the IP67 protection level.

NOTE: To ensure optimal reliability and to meet warranty requirements, the EVT560 microinverter must be installed according to the instructions in this manual.

2.4 Simple Design

PV systems using Envertech microinverters are very simple to design and install. You can install a combination of PV modules of any type, at any orientation and in any quantity. You won't need to install cumbersome traditional inverters. Each microinverter can be quickly mounted on the PV racking, directly beneath each PV module. Low voltage DC wires connect from the PV module directly to the co-located microinverter, eliminating the risk of personnel exposure to dangerously high DC voltage.

3.Product Information

3.1 Overview

3.2 Major Characteristics

Envertech microinverter has the following characteristics which make Envertech microinverter "High Efficient, High Reliable, High Cost Effecient"

Low DC input voltage.
Wide MPPT voltage range ensures high yield under various weather conditions.
High MPPT accuracy, ensures the minimum power loss during converting.
Complete set of protection functions.

Also, the following protection functions are integrated in Envertech microinverter:
Internal overvoltage/undervoltage
Faulty grounding protection
Grid monitoring
Ground overcurrent monitoring
DC current monitoring
EVT560 can be adapted to almost all 60-cell or 72-cell modules. Before installation, please check the parameters of the microinverters and modules to ensure that they match each other.

3.3 Datasheet

Model	EVT560
Input Data (DC)	
Recommended input power range(STC)	180~360W *2
Maximum input DC voltage	54V
MPPT voltage range	24V~42V
Full load MPPT voltage range	28V~42V
Start voltage	24V
Cut-off voltage	18V
Maximum input current	9.5A*2
Maximum DC short circuit current	15A
Output Data (AC)	
Maximum output power	560W
Maximum output current	2.55A
Nominal grid voltage	220V/230V
Nominal grid frequency	50Hz/60Hz
Grid voltage range*	165V~256V
Grid frequency range*	47~51.5Hz/57~60.6Hz
Power factor	>0.99
Total harmonic distortion	<3%
Nighttime power consumption	<100mW
Maximum units per branch	10units(12AWG Cable)
Efficiency	
Peak inverter efficiency	95.6%
CEC efficiency	95%
MPPT efficiency	99.9%
Mechanical Data	
Dimensions (WxHxD)	248mm*263mm*27.5mm
Weight	2.4Kg
Enclosure environmental rating	IP67 (refer to IEC 60529)
Cooling method	Natural cooling
Overvoltage level	Panel side II / AC side III (refer to IEC 62109-1)
Features	
Safety standard	EN 62109, AS 4777 , IEC61727
Compliance	EN 61000-6-1, EN 61000-6-3, EN 61000-6-2, EN 61000-6-4, EN61000-3-2, EN61000-3-3
Grid Standard	VDE-AR-N-4105, VDE 0126-1-1, IEC 61727 , AS4777 , EN50438, EN62109 , IEC 60068 61683
General parameters	
Ambient temperature range	-40℃~+65℃
Operating temperature range	-40℃~+65℃
Relative humidity	0%~98% (no condensation)
Maximum altitude	2000m
Isolation type	High frequency transformer isolation
Commutation	PLCC (Power Line Carrier Communication)
Lifetime	25 Years

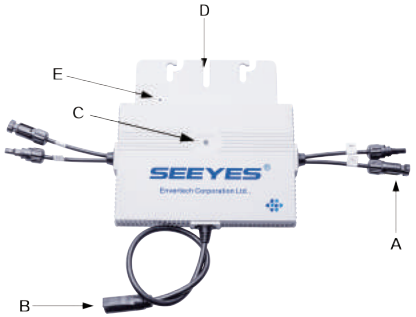
* AC voltage and current range may vary according to national standards

4.Packing checklist

4.1 Accessories

After you receive the Envertech microinverter, please check if there is any damage on the carton, and then check the inside completeness for any visible external damage on the microinverter and accessories. Contact your dealer if anything is damaged or missing.

4.2 Product Description



Item	Description
A	DC connectors
B	AC connector
C	LED light
D	Wall bracket hole
E	Grounding hole

4.3 Further information

If you have any further questions concerning accessories or installation, please check our website www.envertec.com or send an email to info@envertec.com

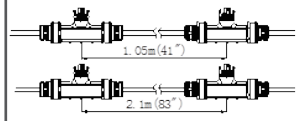
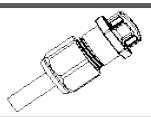
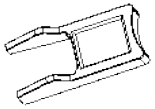
5.Planning of Microinverter Installation

5.1 Symbols on Inverter

Symbol	Description
	Dangerous electrical voltage This device is directly connected to public grid, thus all work related to theinverter shall only be carried out by qualified personnel.
	NOTICE, danger! This device directly connected with electricity generators and public grid.
	Danger of hot surface The components inside the inverter will release a log of heat during operation. DO NOT touch aluminum casing during operating.

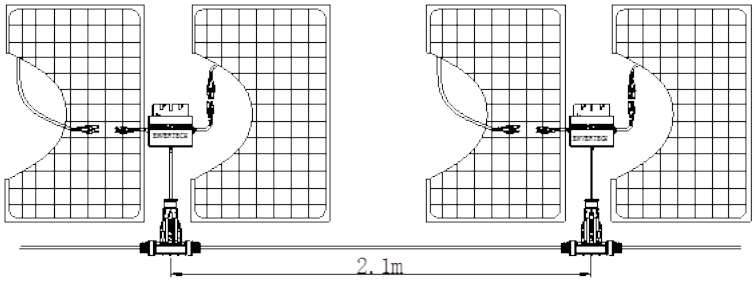
	An error has occurred Please go to Chapter 10 "Trouble Shooting" to repair the error.
	This device SHALL NOT be disposed of in residential wastePlease go to Chapter 9 "Recycling and Disposal" for proper treatments.
ATTENTION! Any illegal tampering activity to electronic or mechanic components(perforations, modifications, etc) will affect the validation of the factory guaranty.	No unauthorized perforations or modifications Any unauthorized perforations or modifications are strictly forbidden. If any defect or damage (device/person) is occurred, Envertech shall not take any responsibility for it.

5.2 Accessories

AC Bus Cable	AC Bus Cable AC Bus Cable consists of a three-core cable and a T-connector. Three-core cable: fire wire (brown), zero wire (blue) and ground wire (yellow-green); The distance between the T-connectors is 2.1m/83".	
AC Extension Cable (Optional)	Three-core cable is used to connect the AC junction box and grid, and also can be grid cable. Three-core cable: 2.5㎡-4㎡.	
AC Trunk Plug Cap	Insulated cap for unused T-connector.	
AC Trunk End Cap	Seal the unused end of the AC Bus Cable.	
AC Trunk Unlock Tool	Disconnect the T-connector from the AC branch cable.	

5.3 Cable Model Selection

To install the AC Bus Cable, you just simply unroll the cable to the needed length to make the cut. Directly connect the AC Bus Cable to the junction box of the branch. Seal the other cutting end with the end cap to make it isolated from the environment. You should choose the type of AC Bus Cable according to the orientation of PV module. We suggest the following type of cable:



6.Microinverter Installation

WARNING

Only qualified personnel may connect the Envertech microinverter to the utility grid after receiving prior approval from the electrical utility company.

Installing the microinverter system involves several key steps. Each step listed here is detailed in the following page.

Step 1: Position AC Bus Cable.
Step 2: Fasten AC Bus Cable.
Step 3: Fix the microinverter to the rack.
Step 4: Grounding.
Step 5: Connect AC Bus Cable.
Step 6: Seal the unused connector of AC Bus Cable.
Step 7: Connect AC Bus Cable to the junction box.
Step 8: Mount EnverBridge.
Step 9: Prepare AC extension cables.
Step 10: Connect PV modules to microinverters.
Step 11: Switch on the PV system.

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⚠	You must install microinverters without connecting to the grid and the modules should be out of rain or disconnected.

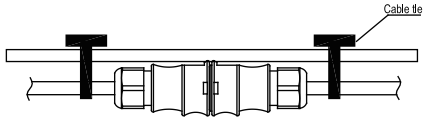
Step1:Position AC BUS cable.

Ensure that the number of microinverters on each branch of AC Bus Cable is no more than 10.

Place the AC Bus Cable along the frame where PV module are installed.

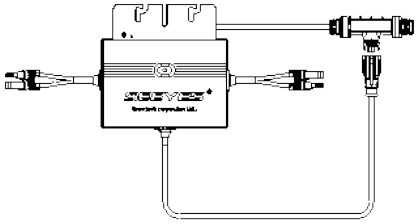
Step 2: Fasten AC Bus Cable.

Fasten AC Bus Cable and ground cable to the rack with cable ties.



Step 3: Fix the microinverter to the rack.

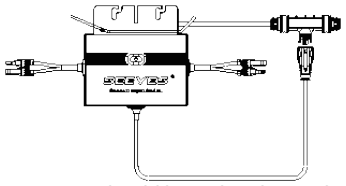
Mark the center of each PV module on the rack for convenient position. Mount all microinvertes under modules to avoid rain and sun, with the trademark facing downward.



Step 4: Grounding.

Microinverters and modules must be connected to ground conductor in accordance with national standards.

Fix ground wire to the ground mark on microinverters with screws, and the grounding of microinverters can be realized.

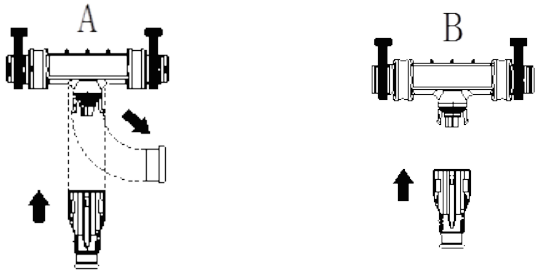


Notice: The position of the connector should be within the reach of the AC cable of microinverter.

Step 5: Connect AC Bus Cable

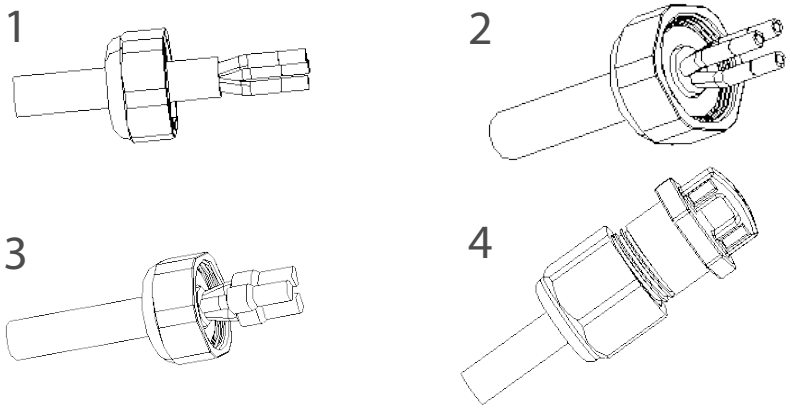
A. Remove the temporary cover on the T-connector of AC Bus Cable and connect it to the microinverter.

B. Protect any unused T-connector from water with an AC Plug Cap.



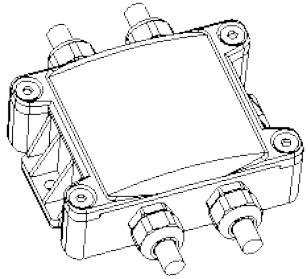
Step 6: Seal the unused end of AC Bus Cable

1. Remove the cover of wire for 25mm.
2. Check if all the parts of connector are inside. Screw the nuts on the cable, set the lock ring and seal ring at the wire end;
3. Plug the sealed wire end into the hole to isolate each wire with others;
4. Screw the nut to the seal ring with torque of 2.5 Nm

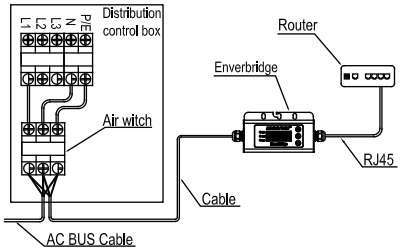
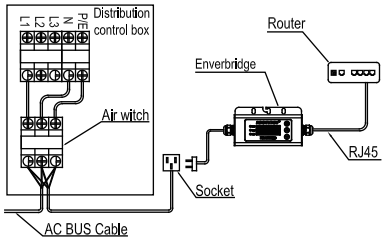
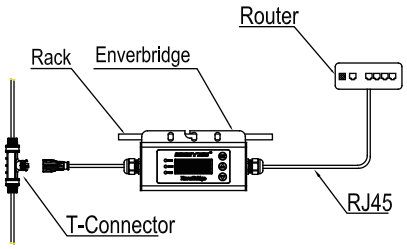


Step 7: Connect AC Bus Cable to the junction box

Connect AC Bus Cable to the input terminal of the junction box.



Step 8: Mount EnverBridge

Option 1: Indoor installation（I） 1. Turn off the air switch and connect the socket. This operation should be done under the instructions of professionals. Fix EnverBridge at proper position in or close to the distribution box； 2. Open the cover on the right side of EnverBridge. Set RJ45 cable through the water proof connector and connect it to EnverBridge. Close the cover and recheck if it's completely sealed；	
Option 2: Indoor installation（II） 1. Open the cover on the right side of EnverBridge. Set RJ45 cable through the water proof connector and connect it to EnverBridge. Close the cover and recheck if it's completely sealed; 2. Run the RJ45 cable and connect it to your router; 3. Fix EnverBridge at proper position in or close to the distribution box; 4. Turn off the air switch and connect EnverBridge to it. This operation should be done under the instructions of professionals.	
Option 3: Outdoor installation: 1. Open the cover on the right side of EnverBridge. Set RJ45 cable through the water proof connector and connect it to EnverBridge. Close the cover and recheck if it's completely sealed; 2. Run the RJ45 cable and connect it to your router. Fix EnverBridge on the rack (Refer to the installation of Microinverter); 3. Connect the power cable to the T-Connector of trunk cable.	

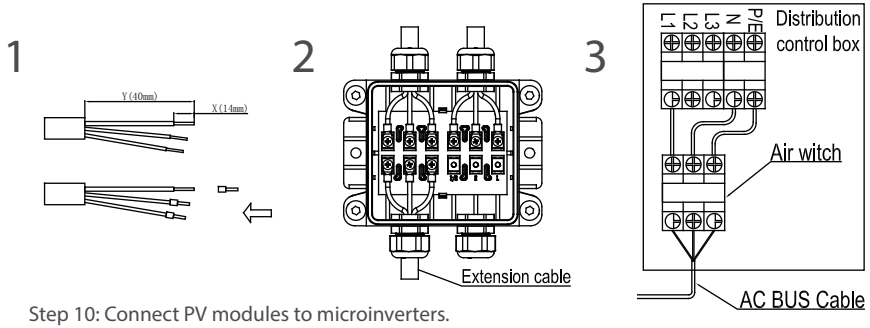
Step 9: Prepare AC extension cables.

You can order AC Extension Cable from Envertech, or from any other stores. 2.5mm2 or 4mm2 cable suggested.

1.Remove the external cover of cable by y=40mm and cover of wire by x=14mm. Set the metal connector on the wire and clamp to fix the connection;

2. Connect the extension cable to the junction box;

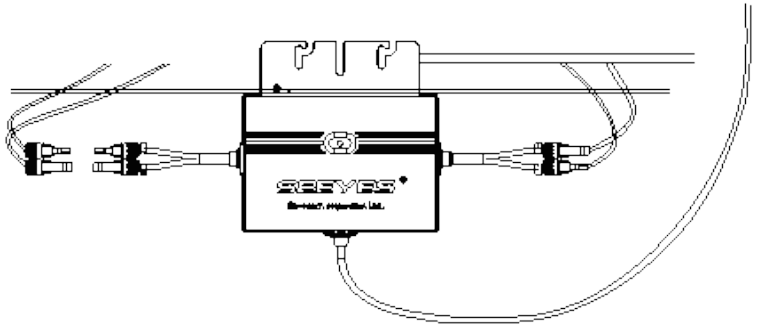
3. Connect the other side of extension cable to the air switch.



Step 10: Connect PV modules to microinverters.

Mount the PV modules on microinverters;

Connect each PV module to DC input terminal of microinverter.



Step 11: Switch on the PV system

Ensure the completion of connection and turn on the air switch.

7. Debugging and Operating

Please notice the symbols.

WARNING

Only qualified personnel may connect the Envertech microinverter to the utility grid after receiving prior approval from the electricalutility company.

WARNING

Ensure that all AC and DC wiring is correct. Ensure that none of the AC and DC wires is pinched or damaged. Ensure that all AC junction boxes are properly closed.

7.1 Energize the System

1.Turn on circuit breaker or disconnect switch for each microinverter AC branch.
2.Turn on the main utility-grid AC circuit breaker in the switch board. Your system starts producing power after 3 minutes.
3.The Envertech microinverter begins communicating over the power lines to EnverBridge. The entire system will be detected within 10 minutes.
4.The EVT300 has the ability to auto adjust voltage and frequency according to the settings based on local standards. If adjustments are required by your local utility, the installer can use EnverBridge to manage the grid profile after all microinverters have been detected.

7.2 EVT560 Operation

The Envertech microinverter is powered on when sufficient DC voltage from the PV module is applied. The LED status of each microinverter will blink green to indicate normal start-up operation approximately 1 minute after DC power is applied.

8.Troubleshooting and Maintenance

Adhere to all the safety measures described throughout this manual. Qualified personnel can use the following troubleshooting steps if the PV system does not operate correctly.

WARNING

Do not attempt to repair the Envertech microinverter.It contains no user-serviceable parts. If the Microinverter fails, contact Envertech customer service to obtain an RMA (return merchandise authorization) number and start the replacement process.

8.1 LED Status Indications and Error Reporting

Startup LED Operation:
The LED status of each microinverter blinks red for a while at the beginning, and then blinks green to indicate normal start-up operation approximately 10 seconds after DC power is applied.
Red blinks after DC power is on indicate a failure during the startup.

Post-Startup LED Indications:
Check LED status to confirm the present condition.
Flashing Green: indicates normal operation.
Flashing Red:
1.If red light flashes every 2 or 3 seconds, it indicates that the microinverter is waiting for sunshine or prepare for producing energy.
2.If red light flashes continuously, it indicates that the microinverter is not operating normally. The microinverter does not sense that the utility grid is within voltage/frequency specifications. The microinverter can not produce power until this is solved.

8.2 Troubleshoot an Inoperable Microinverter

To troubleshoot an inoperable microinverter, follow the steps in the order shown below.
WARNING: Be aware that only qualified personnel should troubleshoot the PV array or the Envertech microinverter.
Best Practice: Never disconnect the DC wire connectors under load. Ensure that no current is flowing in the DC wires prior to disconnecting. If necessary, use an opaque covering to cover the PV module prior to disconnecting the PV module. Always disconnect AC power before disconnecting the PV module wires from the Envertech microinverter. The AC connector of the microinverter is suitable as a disconnecting means.
WARNING: The AC and DC connectors on the cabling are rated as a disconnecting point only when used with an Envertech microinverter.

WARNING: The AC and DC connectors on the cabling are rated as a disconnecting point only when used with an Envertech microinverter.

WARNING: The Envertech microinverters are powered by DC power from the PV modules. Make sure you disconnect and reconnect DC power to watch for the LED blinks 1 minute after DC is applied.

1. Make sure AC breakers is turned on.
2. Check the connection to the utility grid and verify that the utility voltage is within allowable ranges shown in the Technical Data section.
3. Verify that AC voltage at all solar power circuit breakers at the load center is within the ranges shown in the following table.
4. Verify that AC line voltage at the junction box for each AC branch circuit are within the ranges shown in the following table:

230 Volt AC,Single Phase		400 Volt AC, Three Phases	
L to N	180 to 265Vac	L1 to L2 to L3	310 to 460Vac

5. Please use Envertech Unlock Tool to disconnect the AC cable of problematic microinverter from AC Bus Cable.
6. Confirm if utility grid on the microinverter side is present by measuring line to line and line to neutral at the Cable connector.
7. Visually check that the AC branch circuit connections (Cable and AC connections) are properly seated. Reseat if necessary. Check also for damage, such as rodent damage.
8. Make sure that all circuit breakers are off.
9. Disconnect and re-connect the PV module DC connectors. The LED status of each microinverter will blink green to indicate normal start-up operation soon (less than one minute) after DC power is applied. The LED subsequently resumes normal operation if the grid is present.
10. Attach an ammeter clamp to one conductor of the DC cables from the PV module to measure microinverter current. This will be under one Amp if AC is disconnected.
11. Check the DC connections between the microinverter and the PV module. The connection may need to be tightened or reseated. If the connection is worn out or damaged, it needs replacement.
12. Verify with your utility that line frequency is within range.

8.3 Disconnect Microinverters from PV Modules

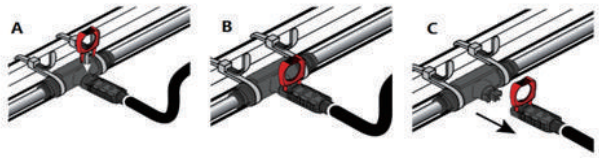
If your problems are still unsettled in accordance with the steps above,please contact Envertech through www.envertec.com. If Envertech approves to replace, please take off microinverter according to the following instructions. Make sure to disconnect microinverter from PV module without load, please follow the steps below strictly.

1. Turn off AC branch circuit breaker.
2. Disconnect microinverter from AC Bus Cable as in the following steps:

a) Insert the Unlock Tool into the 2 holes of the connector;

b) Press to push the fixation clip;

c) Remove the AC connector.

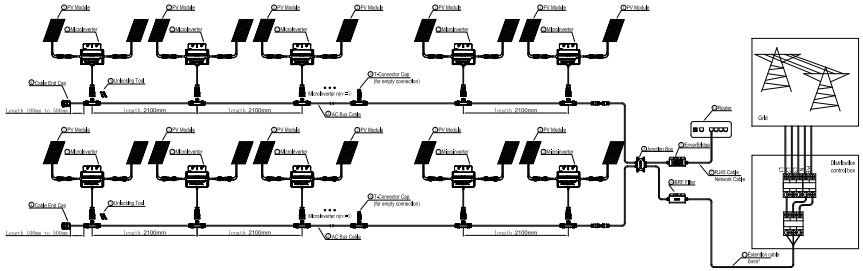


3. Cover the PV module with a non-transparent cover, and then disconnect the PV module DC connector from the microinverter.
4. Release the ground screw and remove the ground wire.
5. Remove the microinverter from the PV frame.

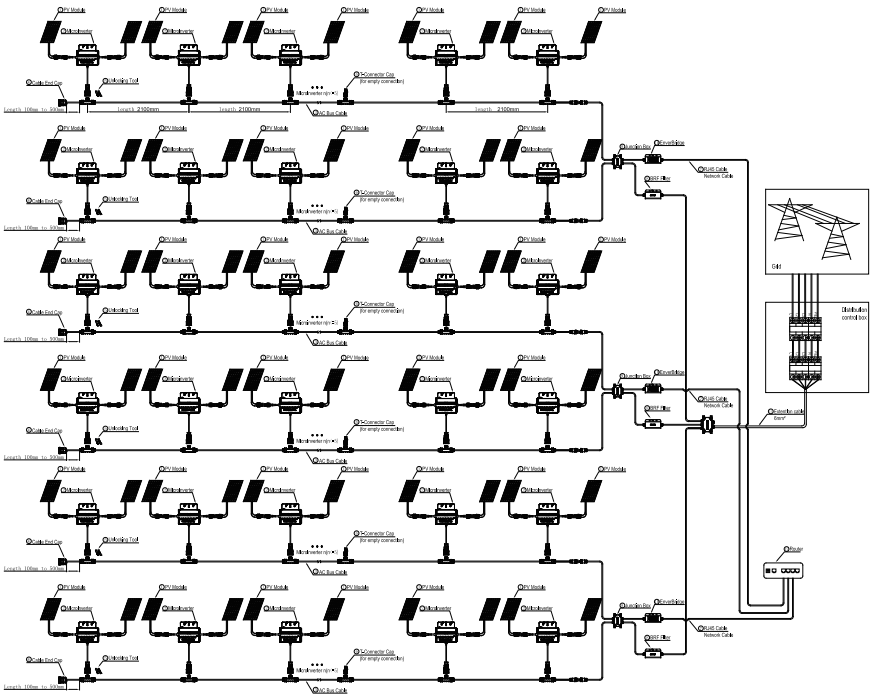
Do not leave the AC cable connector without covering for a long time. All unused connectors must be covered by sealing covers.

9. System Diagram

1. Single phase：



2. Three phase:



10.Contact

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