



User Manual

TSOL-MS800

TSOL-MS700

TSOL-MS600

TSOL-MS400

TSOL-MS350

TSOL-MS300

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Product information is subject to change without notice. User documentation is updated frequently; Check www.tsun-ess.com for the latest information. To ensure optimal reliability and to meet warranty requirements, the TSUN Microinverter must be installed according to the instructions in this manual. For warranty text refer to www.tsun-ess.com.

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Audience

This manual is intended for use by professional installation and maintenance personnel.

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Read This First

Dear customer, thank you for choosing the TITAN series microinverter from TSUN. We hope you will find our products meet your needs for renewable energy. Meantime, we appreciate your feedback regarding our products.

A solar microinverter, or simply microinverter, is a plug-and-play device used in photovoltaics, that converts direct current (DC) generated by a single solar module to alternating current (AC). The main advantage is that small amounts of shading, debris or snow lines on any single solar module, or even a complete module failure, do not disproportionately reduce the output of the entire array. Each microinverter harvests optimum power by performing maximum power point tracking (MPPT) for its connected module. Simplicity in system design, lower amperage wires, simplified stock management, and added safety are other factors introduced with the microinverter solution.

This manual contains important instructions for TSOL-MS800/MS700/MS600/MS400/MS350 /MS300 microinverters and must be read in its entirety before installing or commissioning the equipment. For safety, only qualified technicians, who have received training or have demonstrated skills can install and maintain this microinverter under the guide of this document.

Important Safety Information

During installation, testing and inspection, adherence to all the handling and safety instructions is mandatory. Failure to do so may result in injury or loss of life and damage to the equipment.

Product Label

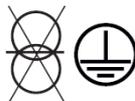
The following safety symbols are used in this document. Familiarize yourself with the symbols and their meaning before installing or operating the system.

 DANGER
· DANGER indicates a hazardous situation that can result in deadly electric shock hazards, other serious physical injury, or fire hazards.
 WARNING
· WARNING indicates directions which must be fully understood and followed in their entirety in order to avoid potential safety hazards including equipment damage or personal injury.

 **CAUTION**

· CAUTION indicates that the described operation must not be carried out. The reader should stop use and fully understand the operations explained before proceeding.

The symbols on the microinverter are list below and illustrated in detail.

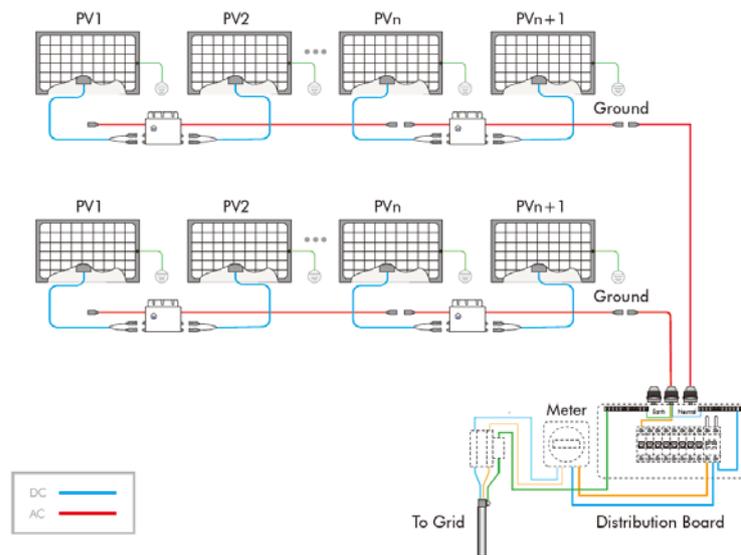
Symbol	Description
	This device is directly connected to public grid, thus all work to the inverter shall only be carried out by qualified personnel.
	The components inside the inverter will release a lot of heat during operation. Do not touch metal plate housing during operating.
	Please read the installation manual first before installation, operation and maintenance.
	This device SHALL NOT be disposed of in residential waste.
	This inverter does not use transformer for the isolation function.
	With CE mark & the inverter fulfills the basic requirements of the Guideline Governing Low-Voltage and Electro-magnetic Compatibility.
	This device complies the RoHS Directive.

System Introduction

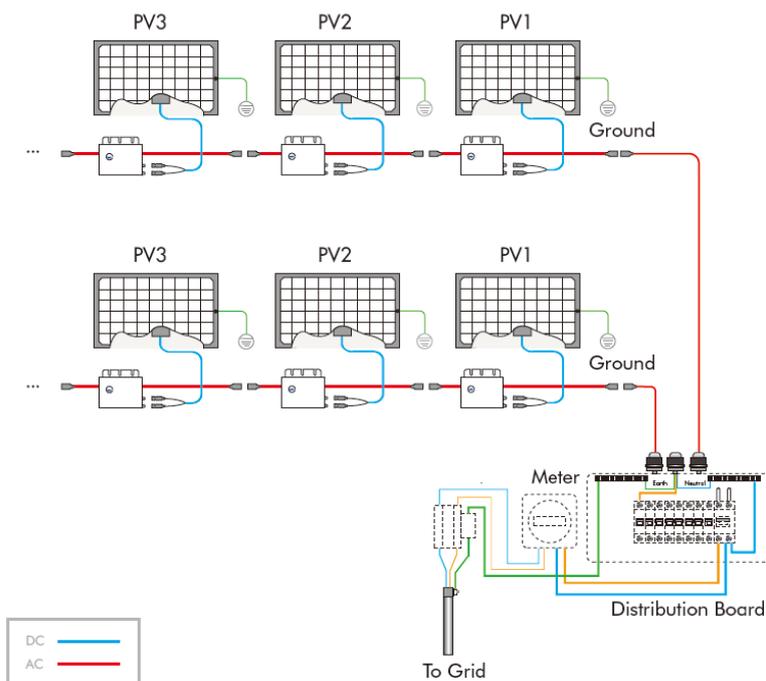
The TSOL- MS800/MS700/MS600/MS400/MS350/MS300 microinverter is used in grid-tied applications, comprised of two key elements:

- TSOL- MS800/MS700/MS600/MS400/MS350/MS300 Microinverter.
- Talent web-based monitoring and analysis system.

The microinverter converts the DC electricity generated by solar panels into AC electricity which is in accordance with the requirements of public grid and send the AC into the grid, reduce the load pressure of the grid.

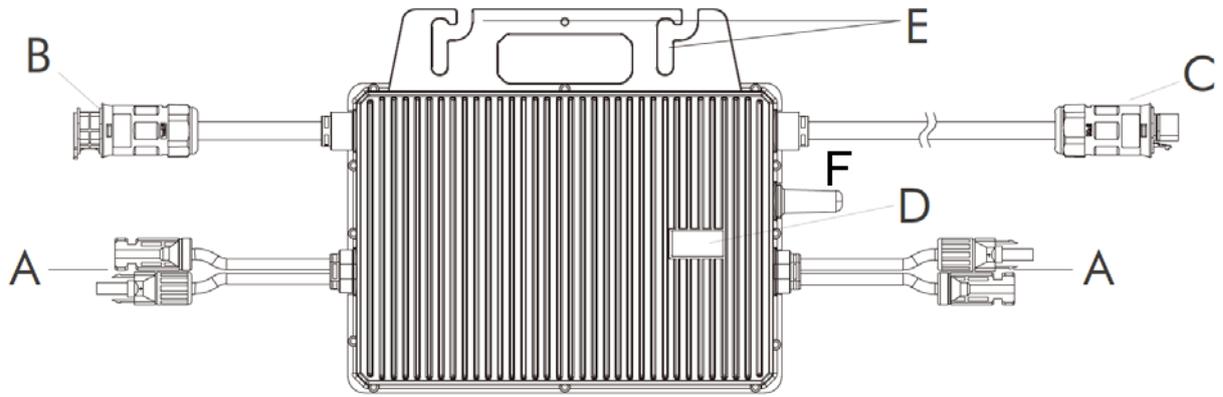


TSOL- MS800/MS700/MS600

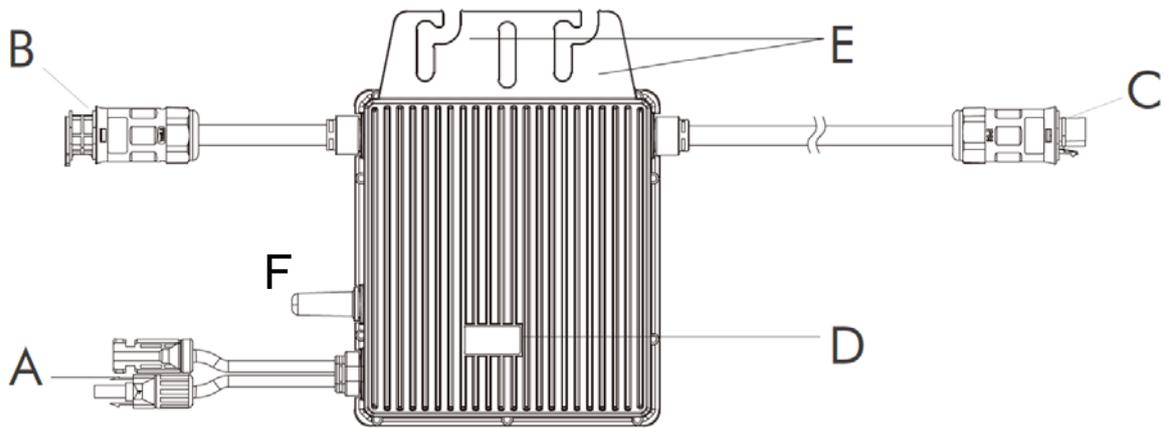


TSOL- MS400/MS350/MS300

Product Description



TSOL- MS800/MS700/MS600



TSOL- MS400/MS350/MS300

A	DC Cables	D	Status Light
B	AC Cable (Female Connector)	E	Mounting Hole
C	AC Cable (Male Connector)	F	Antenna

Datasheet

Model	TSOL-MS800	TSOL-MS700	TSOL-MS600
Input Data (DC)			
Recommended Module Power (W)	300 ~ 550	300 ~ 550	300 ~ 550
Start-up Voltage per Input (V)	22		
Rated Input Voltage (V)	42		
MPPT Voltage Range per Input (V)	16~60		
Max. Input Voltage per Input (V)	60		
Max. Short-circuit Current per Input (A)	20	20	15
Max. Input Current per Input (A)	14	13.3	12.5
Quantity of MPPT	2		
Max. Inverter Back-feed Current to the Array (A)	0		
Output Data (AC)			
Max. Output Power (VA)	800	700	600
Nominal Continuous Output Power (W)	800	700	600
Nominal Output Current (A)	3.48	3.04	2.61
Max. Output Current (A)	4	3.19	3
Nominal Output Voltage/Range (V)*	220/230/240, 175 – 270, L/N/PE		
Nominal Frequency (Hz)*	50/60		
Power Factor	>0.99 default, 0.8 leading ... 0.8 lagging		
Output Current Harmonic Distortion	<3%		
Efficiency			
Peak Inverter Efficiency	97.0%	97.1%	97.2%
CEC Weighted Efficiency	96.5%	96.6%	96.7%
Nominal Mppt Efficiency	99.9%	99.9%	99.9%
Nighttime Power Consumption	<1W	<1W	<1W
Protection			
Anti-Islanding protection	Integrated		
DC reverse polarity protection	Integrated		
Insulation monitoring	Integrated		
AC surge protection	TYPE II		
Residual current monitoring	Integrated		
AC overcurrent protection	Integrated		
AC short-circuit protection	Integrated		
AC overvoltage protection	Integrated		
Over-heat protection	Integrated		
Mechanical Data			
Dimensions (W×H×D mm)	250 * 170 * 28		
Weight [kg]	3		
General Data			
Display	LED indicators; TSUN APP+WEB		

Communication	built-in WiFi module; 4G module (Optional)
Type of Isolation	Galvanically Isolated HF Transformer
Type of Enclosure	IP67
Cooling	Natural convection
Operating Ambient Temperature Range	-25 ~ +65 (derating of over 50°C Ambient Temperature)
Relative Humidity	100%
Max. Operating Altitude Without Derating [m]	2000

※ The AC voltage and frequency range may vary depending on specific country grid.

Model	TSOL-MS400	TSOL-MS350	TSOL-MS300
Input Data (DC)			
Recommended Module Power (W)	300 ~ 550	300 ~ 550	300 ~ 550
Start-up Voltage per Input (V)	22		
Rated Input Voltage (V)	42		
MPPT Voltage Range per Input (V)	16~60		
Max. Input Voltage per Input (V)	60		
Max. Short-circuit Current per Input (A)	20	20	15
Max. Input Current per Input (A)	14	13.3	12.5
Quantity of MPPT	1		
Max. Inverter Back-feed Current to the Array (A)	0		
Output Data (AC)			
Max. Output Power (VA)	400	350	300
Nominal Continuous Output Power (W)	400	350	300
Nominal Output Current (A)	1.74	1.52	1.3
Max. Output Current (A)	2	1.59	1.45
Nominal Output Voltage/Range (V)*	220/230/240, 175 – 270, L/N/PE		
Nominal Frequency (Hz)*	50/60		
Power Factor	>0.99 default, 0.8 leading ... 0.8 lagging		
Output Current Harmonic Distortion	<3%		
Efficiency			
Peak Inverter Efficiency	97.0%	97.1%	97.2%
CEC Weighted Efficiency	96.5%	96.6%	96.7%
Nominal Mppt Efficiency	99.9%	99.9%	99.9%
Nighttime Power Consumption	<1W	<1W	<1W
Protection			
Anti-Islanding protection	Integrated		
DC reverse polarity protection	Integrated		
Insulation monitoring	Integrated		
AC surge protection	TYPE II		
Residual current monitoring	Integrated		

AC overcurrent protection	Integrated
AC short-circuit protection	Integrated
AC overvoltage protection	Integrated
Over-heat protection	Integrated
Mechanical Data	
Dimensions (W×H×D mm)	178 * 153 * 28
Weight [kg]	1.98
General Data	
Display	LED indicators; TSUN APP+WEB
Communication	built-in WiFi module; 4G module (Optional)
Type of Isolation	Galvanically Isolated HF Transformer
Type of Enclosure	IP67
Cooling	Natural convection
Operating Ambient Temperature Range	-25 ~ +65 (derating of over 50°C Ambient Temperature)
Relative Humidity	100%
Max. Operating Altitude Without Derating [m]	2000

※ The AC voltage and frequency range may vary depending on specific country grid.

Microinverter Installation

Pre-installation Check

Check the Package

Although TSUN's microinverters have surpassed stringent testing and are checked before they leave the factory, it is uncertain that the microinverters may suffer damages during transportation. Please check the package for any obvious signs of damage, and if such evidence is present, do not open the package and contact your dealer as soon as possible.

Check the Installation Environment and Position

When choosing the position of installation, comply with the following conditions:

- ◆ To avoid unwanted power derating due to an increase in the internal temperature of the inverter, do not expose it to direct sunlight.
- ◆ To avoid overheating, always make sure the flow of air around the inverter is not blocked.
- ◆ Do not install in places where gasses or flammable substances may be present.
- ◆ Avoid electromagnetic interference that can compromise the correct operation of electronic equipment.
- ◆ It's recommended to install microinverter on structures underneath the photovoltaic modules so that they work in the shade.

- ◆ Use a mobile phone to check the Wi-Fi signal strength at the installation position. If the Wi-Fi signal is bad, try to install the microinverter at another position or move the Wi-Fi router.

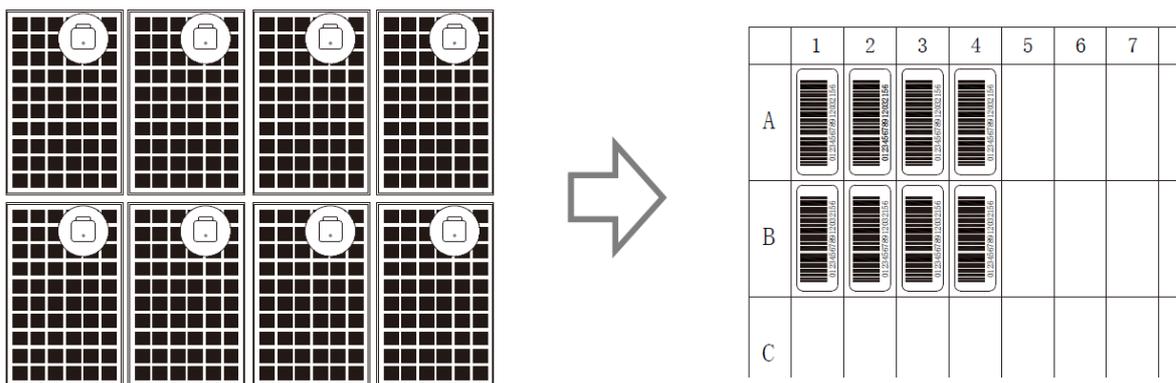
Installation Steps

 DANGER
<ul style="list-style-type: none"> · Only qualified personnel should install, troubleshoot, or replace TITAN micro inverters or the cable and accessories. · Before installation, check the unit to ensure absence of any transport or handling damage, which could affect insulation integrity or safety clearances. · Unauthorized removal of necessary protections, improper use, incorrect installation and operation may lead to serious safety and shock hazards or equipment damage. · Be aware that installation of this equipment includes risk of electric shock.

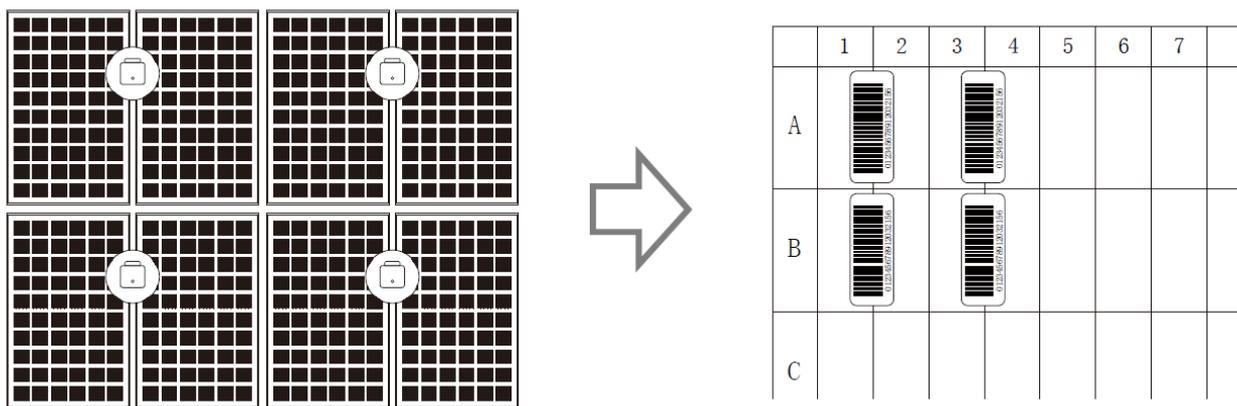
Step 1. Make an installation map

 CAUTION
<ul style="list-style-type: none"> · If there are more than one installation site, please make the installation map separately and give a clear description about the installation site. · The row of the table corresponds the shorter side of PV module and the column of the table corresponds the longer side of PV module. The direction on the upper left corner means the actual installation orientation.

Take out the SN labels and installation map from the package. Paste the SN labels on the installation map as below and complete the information of the solar plant.



TSOL- MS400/MS350/MS300

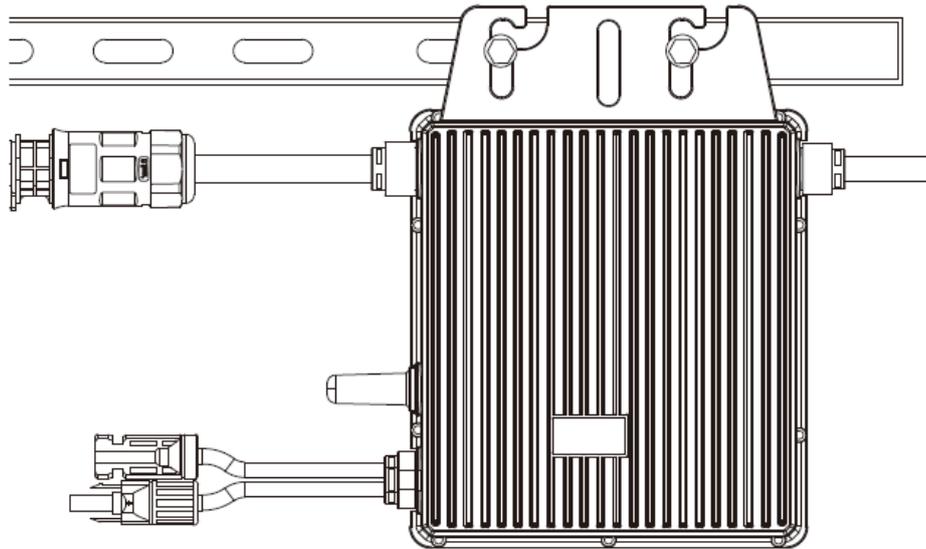


TSOL- MS800/MS700/MS600

Step 2. Fix the microinverter.

 DANGER	
·Do not install the equipment in adverse environment conditions such as flammable, explosive, corrosive, extreme high or low temperature, and humid.	
 WARNING	
·Choose installation location carefully and adhere to specified cooling requirements. Micro-inverter should be installed in a suitable position with good ventilation and no directly sunshine.	
 CAUTION	
·There are no screws and nuts in the package.	
·The distance between every two micro-inverters should meet the length of AC cables. The length of AC cables are shown as below:	
Model	Cable Length
TSOL-MS800/MS700/MS600	2.5 m
TSOL-MS400/MS350/MS300	1.4 m

Choose an installation position. Using two pairs of screws and nuts to fix the microinverter on the frame. Make sure that the label of microinverter should be upside.



Step 2. Connect the AC cable of two microinverters

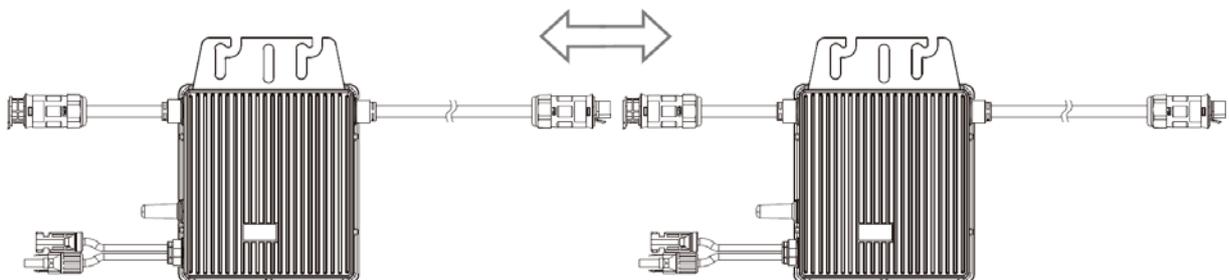
WARNING

·According to the max current of the AC cables, there is a max installation quantity for the micro-inverter in each cable section.

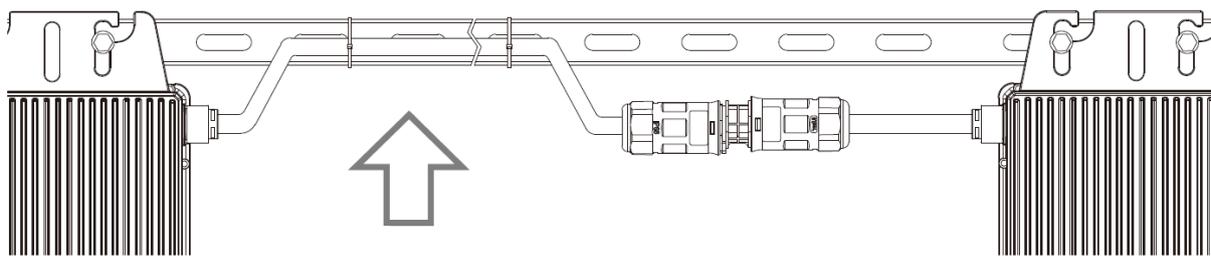
Model	Quantities for each cable section
TSOL-MS800	4
TSOL-MS700	5
TSOL-MS600	6
TSOL-MS400	9
TSOL-MS350	10
TSOL-MS300	12

Every micro-inverter could be connected to the other one by its AC cables.

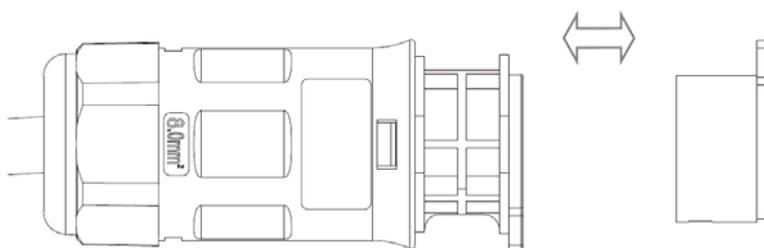
Plug the female AC connector of one microinverter into a male AC connector of another micro-inverter to form a continuous AC branch circuit.



Use Nylon cable ties to fix the AC cables onto the frame.



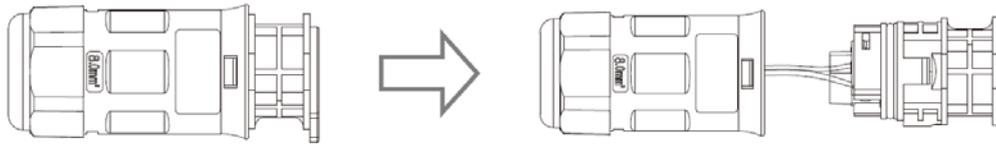
Use a Connector Protective Cap to make sure the unused AC connector to be closed.



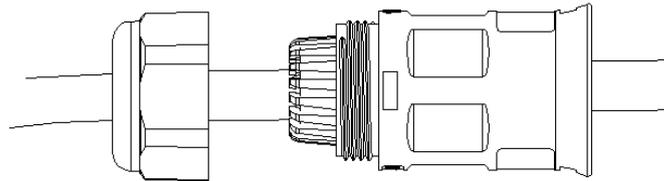
Step 3. Connect the AC end cable of each cable section

 DANGER
<ul style="list-style-type: none"> · Do not install the AC junction box without first removing AC power from the system. · To prevent electrical hazards, make sure the micro-inverter system is disconnected from the home distribution network and the AC breaker is open.
 WARNING
<ul style="list-style-type: none"> · Ensure that all AC cables are correctly wired and that none of the wires are pinched or damaged. · Use AWG 12 (4 mm²) cable for AC end cable.
 CAUTION
<ul style="list-style-type: none"> · The installation technician is responsible for selecting a kind of AC cable and connecting the micro-inverter system into the home distribution network correctly. · The AC connectors may be provided by different suppliers. The port definitions are subject to actual objects.

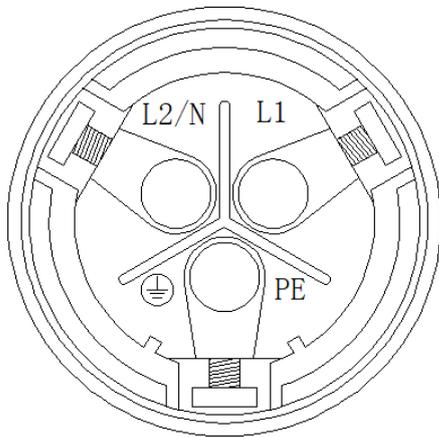
Take out the AC connector from the package. Separate the AC connector as shown below.



Get the AC cable through the shell of AC connector and connect the cable to the right port.

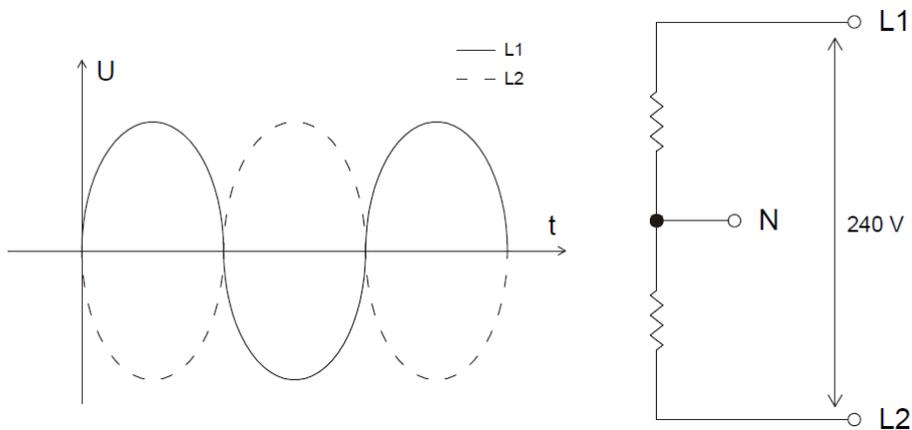


The definition of the port is shown below:

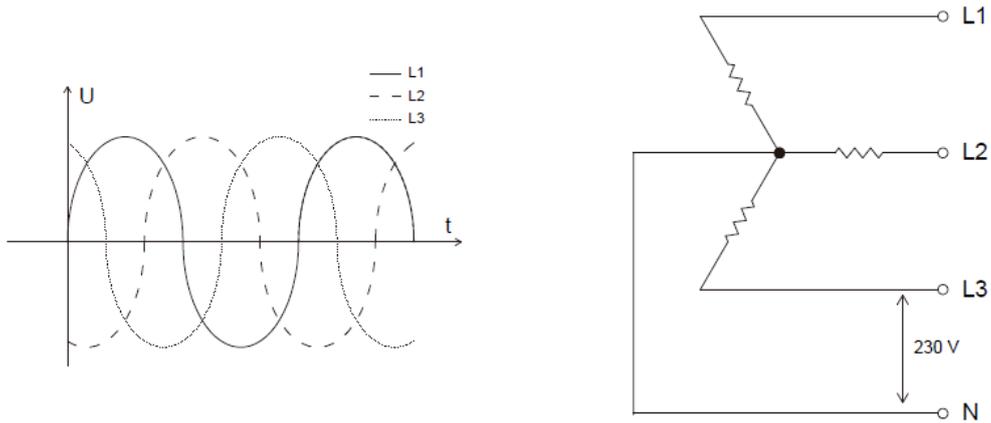


L:	Live	(Brown/Red)
N:	Neutral	(Blue/Black)
PE:	Ground	(Yellow-Green)

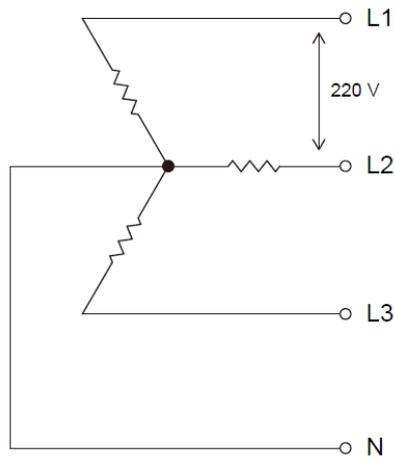
If the microinverter is connected to 120/240V split-phase power grid, connect two live lines to port L and port N.



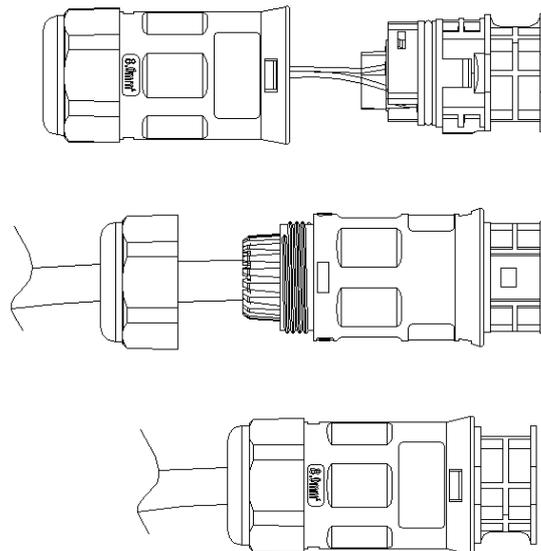
If the microinverter is connected to 230/400V three-phase WYE power grid, connect the live line to port L and connect the neutral line to port N, as the connection of single-phase power grid.



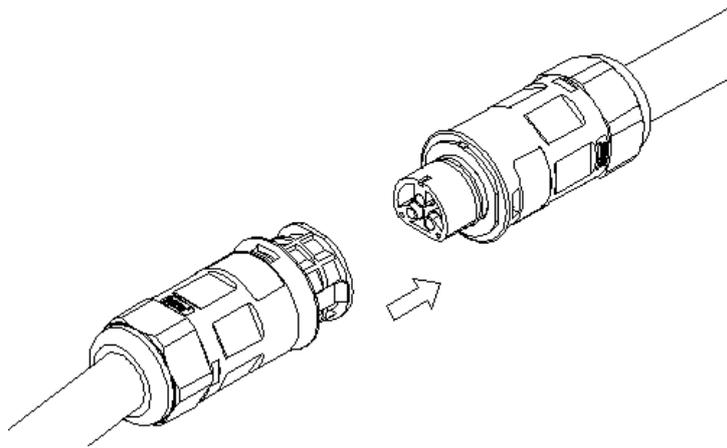
If the microinverter is connected to 127/220 V three-phase power grid, connect one live line to port L and connect another live line to port N.



Reassemble the AC connector as shown below.



Plug the AC connector into the microinverter and connect the AC cable to the AC distribution box.



Step 4. Connect the DC cable

⚡ DANGER

·When the photovoltaic array is exposed to light, it supplies a DC voltage to the inverter.

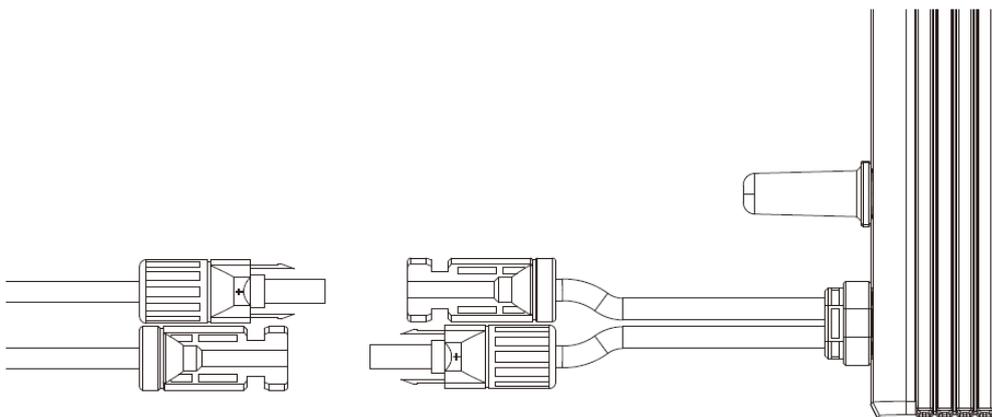
⚠ WARNING

·Ensure that all DC cables are correctly wired and that none of the wires are pinched or damaged.
 ·The DC conductors of this photovoltaic system are ungrounded and may be energized.
 ·The maximum open circuit voltage of the PV module must not exceed the specified maximum input DC voltage of the TSOL micro inverter.

⚠ CAUTION

·If the DC cable is too short for installation, use a DC Extension Cable to connect PV modules to the microinverter.
 ·Use MC4 compatible DC connectors in the inverter side of DC extension cable, or get the DC connectors form TSUN.
 ·Contact PV module manufacturers for the requirements of DC connectors in the module side of DC extension cable.

Install the PV modules and connect the DC cable to the microinverter.



Step 5. Start the System

 DANGER
·Only qualified personnel should connect this system to the utility grid.
 CAUTION
·Do not connect micro-inverters to the grid or energize the AC circuit(s) until you have completed all the installation procedures and have received prior approval from the electrical utility company.

While installation is all finished, turn on the main utility-grid AC circuit breaker. Your system will start producing power after about a two-minute wait time.

The LED will flash green and red at start up. The definition of LED is shown as below.

Status	Indicates
Solid Green	Standby/Waiting/Checking Status
Flashing Green (1s)	Working normally
Flashing Red	Working abnormally
Solid Red	Fault

Talent Monitoring Configuration

TITAN microinverter has integrated monitoring module inside. The microinverter will directly connect the router (Wi-Fi Version). Users can use the Talent APP or enter the Talent website to monitor the microinverter.

Visit www.tsun-ess.com to find the Talent monitoring platform and download the Talent APP.

Got an Account

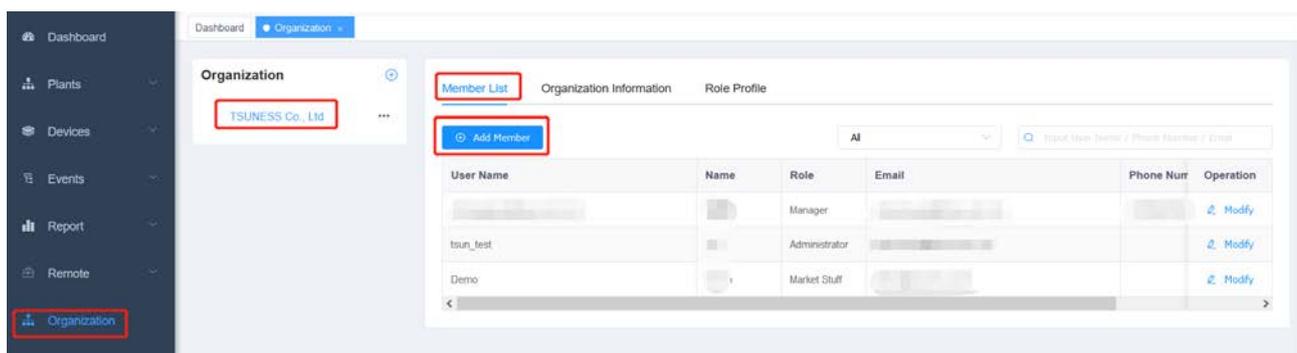
Distributor Account

Distributors must contact the superior distributor or TSUN to get a distributor account. The default password is “123456”.

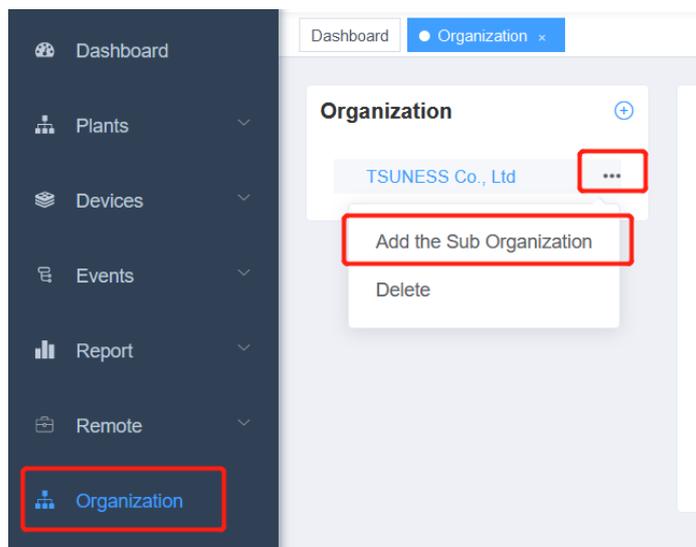
Each distributor account is defined as “Manager” Role. Each organization only has one “Manager” who can add other members in this organization.

Role	Description
Manager	Person in charge has the greatest authority of the organization, and there is only one person in charge of the organization.
Administrator	The administrator is the owner of the largest authority in the organization, and has all management function authority such as organization, plant, operation and maintenance.
Operation Manager	Operation manager can add, delete, modify, and control the plants and devices in the organization, and can dispatch and process tickets.
Operation and Maintenance User	Operation and maintenance user can add, delete, modify, and control the plants and devices in the organization, and can process tickets, but cannot dispatch tickets.
Installer	Installer can add, delete, modify, check and control the plants and devices in the organization, but there is no ticket function.
General User	General User can add, delete, modify, and inspect the plants and devices in the organization, but cannot remotely control the device.
Market Stuff	Marketing stuff can only view and operate the plants and device in the organization.

Login the Talent monitoring platform. Distributor can add a new member by **Organization** → **Organization Name** → **Member List** → **Add Member**. The default password is “123456”.



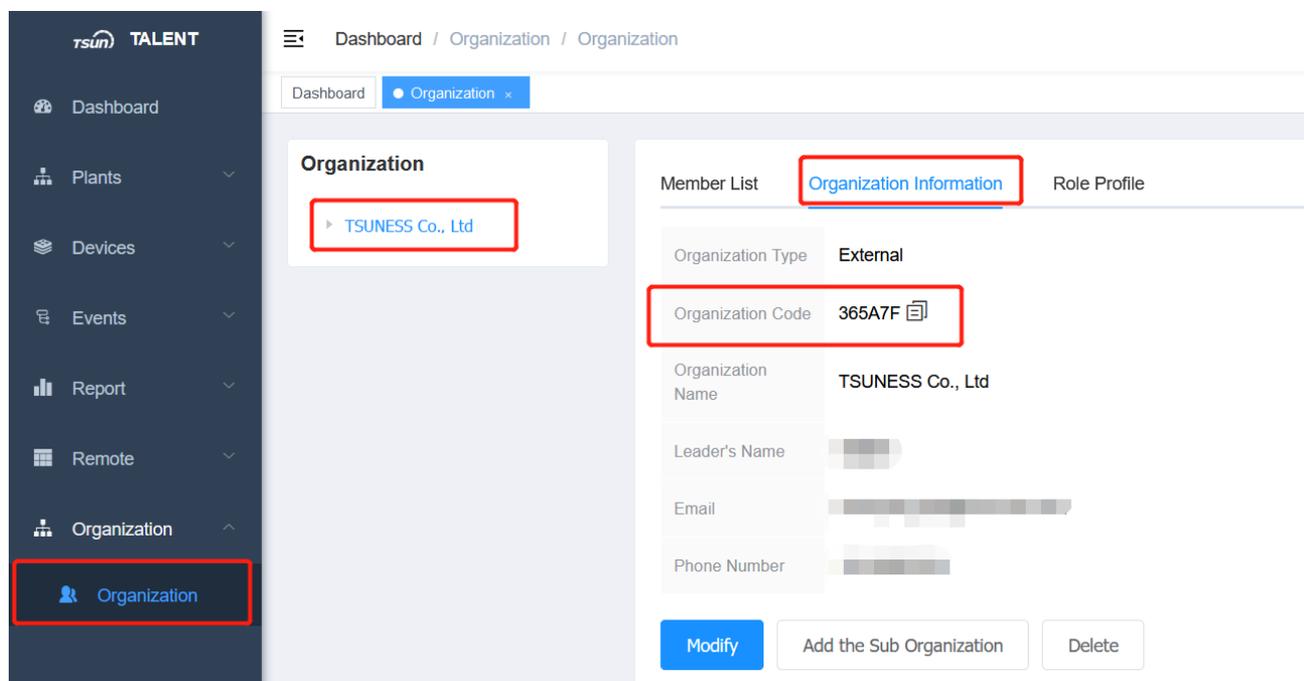
Distributors can create a sub organization account for internal department or external organization (sub distributor or installer). Visit **Organization** → “...” → **Add the Sub Organization**. The default password is “123456”.



Installer Account

Installers must contact the distributor to get an account. The default password is “123456”.

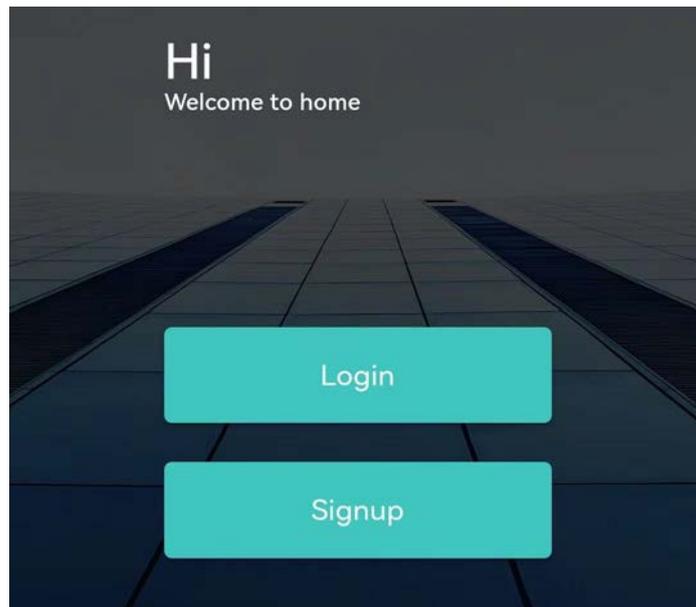
Each organization has an Organization Code. Find it in the Talent APP or Talent monitoring platform. Visit **Organization** → **Organization Name** → **Organization Information**.



The Organization Code will be used while creating a solar plant for the customer.

End User Account

End user must download the Talent APP and register a new account.

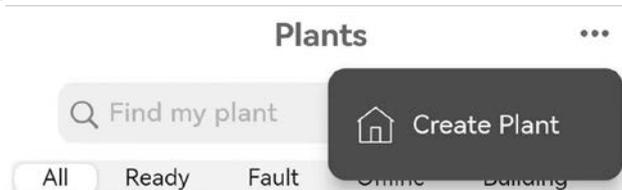


Create a Solar Plant

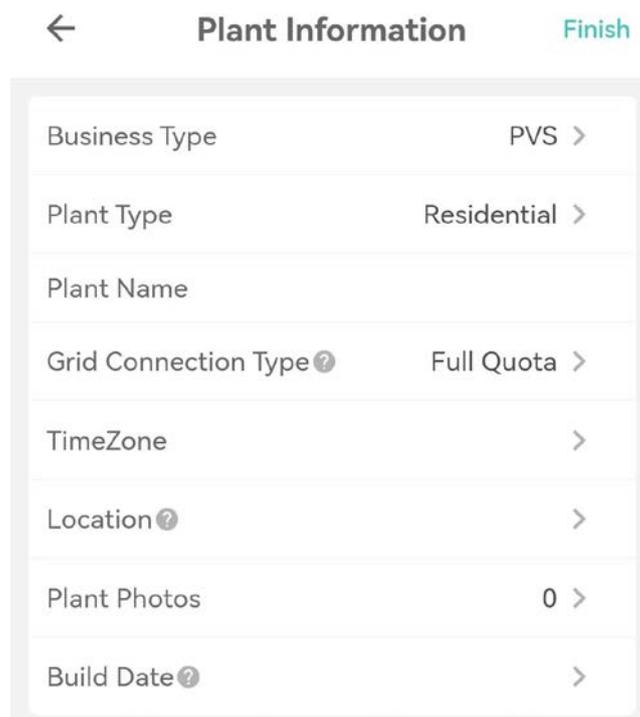
Use the end user account to login the Talent App. Enter the “Plants” page.



Find the “...” in the up-right corner and click “Create Plant”.



Finish the information of the solar plant.



Pay attention that:

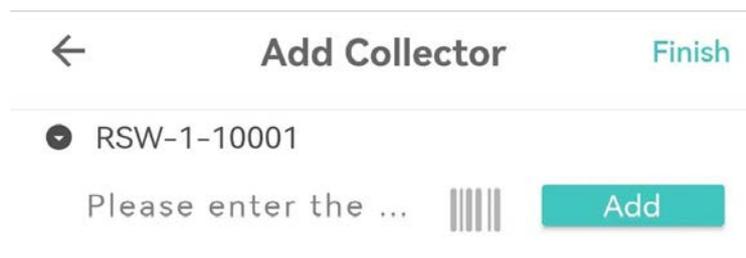
- ✓ The “Business Type” should be “PVS”.
- ✓ The “Organization Code” should be provided by installer. This code will has a huge influence on the after-sales service.
- ✓ The “Organization Code” of TSUNESS is “365A7F”
- ✓ The solar plant can only be deleted on the website platform.

Add a Microinverter

Enter the “Plant List” page. Find the “Add Collector”.



Set the monitoring type as “RSW-1-10001”. Then scan or enter the monitoring SN. The monitoring SN start with “R”. Click “Finish”.

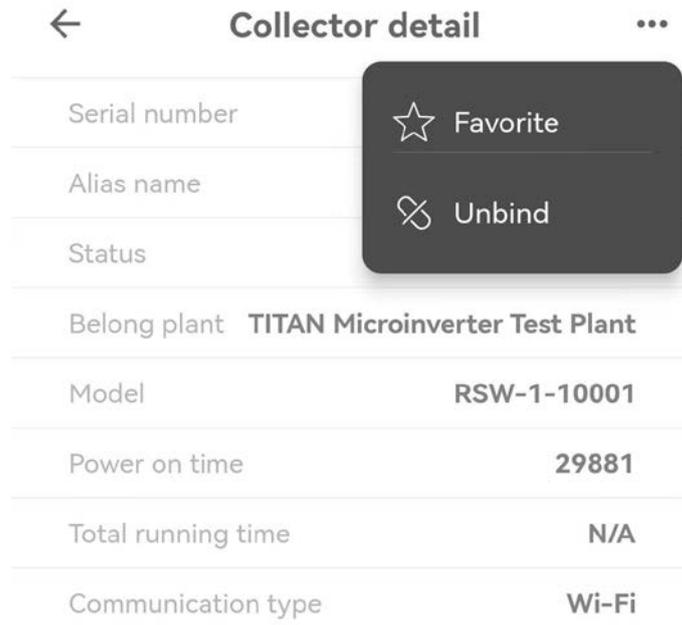


Delete a Microinverter

Enter the “Plants List” page. Find the plant and device list. Click the monitoring SN to enter the “Collector Detail” page.



Find the “...” in the up-right corner and click “Unbind”.



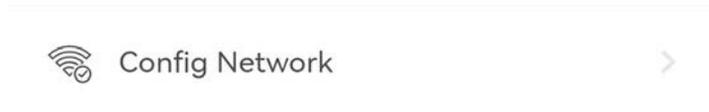
Wi-Fi Configuration

Connect the home Wi-Fi first.

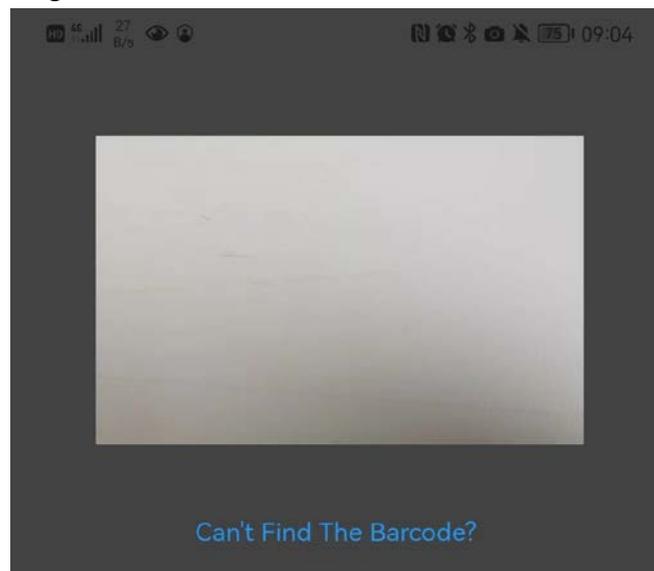
Enter the “Me” page.



Click “Config Network”.



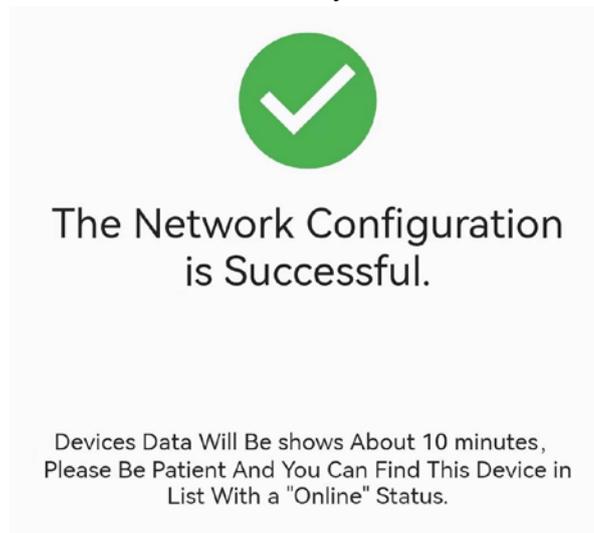
Scan or enter the monitoring SN.



Choose the WIFI and enter the password. Click “Start Config”.

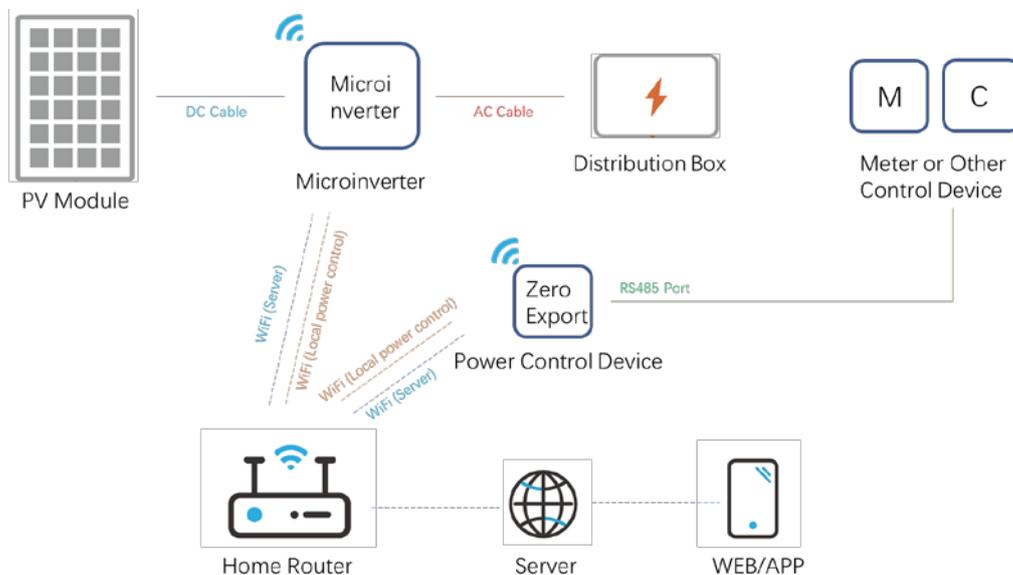


The networking operation will be done automatically.



Remote Active Power Control

In some countries, it might be required that the generating plants should be equipped with a logic interface (input port) to cease the output of active power or limit active power to a regulated level. This logic input can be the RS485 port, Ethernet port, and so on. TSUN microinverter provide a extra power control device which contains a RS485 port for this remote active power control. For more information, refer to the “User manual of TSUN power control device”.



Fault Code and Troubleshooting

Code	Fault Information	Troubleshooting
1	PV1VoltOver_Fault	Check the voltage of PV module and make sure that the voltage is below the maximum DC input voltage of the microinverter. If this fault appears continuously, please contact the TSUN service.
2	PV2VoltOver_Fault	
3	PV1VoltLow_Fault	This warning mostly appears in the morning or at dusk. It's normal and will disappear automatically. If this warning appears in the daytime, please check the connection of PV module. If this fault appears continuously, please contact the TSUN service.
4	PV2VoltLow_Fault	
5	PV1CurrOver_Fault	Disconnect the AC power to restart the microinverter. If this fault appears continuously, please contact the TSUN service.
6	PV2 CurrOver_Fault	
7	No Utility	The AC power grid is disconnected. Check the AC power grid. If this fault appears continuously, please contact the TSUN service.
8	GridVoltOverRating	The AC power grid is abnormal. This fault will disappear automatically when the AC power grid is normal. If this fault appears continuously, please contact the TSUN service.
9	GridVoltUnderRating	
10	GridFreqOverRating	
11	GridFreqUnderRating	
12	OverTemp	Check the installation of microinverter. Make sure the microinverter has a good heat dissipation. If this fault appears continuously, please contact the TSUN service.
13	GFDI_Fault	This is an internal fault. Disconnect the AC power to restart the microinverter. If this fault appears continuously, please contact the TSUN service.
14	Fault 01 - 08	Disconnect the AC power to restart the microinverter. If this fault appears continuously, please contact the TSUN service.

Maintenance Guide

Routine Maintenance

- ◆ Only authorized personnel are allowed to carry out the maintenance operations and are responsible for reporting any anomalies.
- ◆ Always use the personal protective equipment provided by the employer when carrying out maintenance.
- ◆ During normal operation, check that the environmental and logistic conditions are appropriate. Make sure that the conditions have not changed over time and that the equipment is not exposed to adverse weather conditions and has not been covered with foreign bodies.
- ◆ DO NOT use the equipment if any problems are found, and restore the normal conditions after the fault has been corrected.
- ◆ Conduct an annual inspection on various components, and clean the equipment with a vacuum cleaner or special brushes.
- ◆ Firmware version can be checked by using the monitoring system.
- ◆ Always de-energize the AC branch circuit before servicing.
- ◆ Do not attempt to dismantle the Micro-inverter or make any internal repairs! In order to preserving the integrity of safety and insulation, the Micro inverters are not designed to allow internal repairs!
- ◆ Maintenance operations must be carried out with the equipment disconnected from the grid (AC power switch off) and the photovoltaic modules shaded or isolated, unless otherwise indicated.
- ◆ For cleaning, DO NOT use rags made of filamentary material or corrosive products that may corrode parts of the equipment or generate electrostatic charges.
- ◆ Avoid temporary repairs. All repairs should be carried out using only genuine spare parts.

Storage and Dismantling

- ◆ If the equipment is not used immediately or is stored for long periods, check whether it is correctly packed. The equipment must be stored in well-ventilated indoor areas that do not have characteristics that might damage the components of the equipment.
- ◆ Take a complete inspection when restarting after a long time or prolonged stop.
- ◆ Please dispose the equipment properly after scrapping, as component parts are potentially harmful to the environment, in accordance with the regulations in force in the country of installation.

Recycling and Disposal

This device should not be disposed as residential waste. An Microinverter that has reached the end of its life is not required to be returned to the dealer. Users must find an approved collection and recycling facility in the area.

Warranty Service

This Warranty is subject to the following conditions:

- ◆ The products must have been installed and correctly commissioned by an authorized and licensed installer. Proof may be required of correct commissioning of the Product (such as certificate of compliance). Claims for failures due to incorrect installation or commissioning are not covered under this Warranty.
- ◆ Where a Product or part thereof is replaced or repaired under this Warranty, the balance of the original Warranty period will apply. The replacement product or part(s) do not carry a new voluntary warranty.
- ◆ The product must have its original serial number and rating labels intact and readable.
- ◆ This Warranty does not extend to any product that has been completely or partially disassembled or modified, except where such disassembly is carried out by TSUNESS
- ◆ The terms of this Warranty cannot be amended except in writing by one of our authorized officers.
- ◆ There must have been a commissioning report signed by the end-user and the installer for product commissioning and handling instructions.

Exclusions

- (a) TSUNESS makes no warranties, either expressed or implied, orally, or in writing, with respect to any other warranty coverage except those expressly stated in this limited Factory Warranty.
- (b) The Factory Warranty does not cover damages that occur due to:
 - Transport damage;
 - Installation or commissioning through any person who is not an Authorized, Certified Dealer;
 - Failure to observe the user manual, maintenance regulations and intervals;
 - Modifications, changes, or attempted repairs, except as conducted by an Authorized Dealer;
 - Incorrect use or inappropriate operation;
 - Insufficient ventilation of the Covered Product;
 - Failure to observe the applicable safety regulations;
 - Force majeure.
- (c) This factory warranty does not cover cosmetic defects which do not directly influence energy production, or degrade form, fit, and function.
- (d) Claims that go beyond the scope of this limited Factory Warranty, in particular claims for

compensation for direct or indirect damages arising from the defective device, for compensation for costs arising from disassembly and installation, or loss of profits, are expressly NOT covered by this Factory Warranty.

(e) In no event will TSUNESS Co., Ltd be held responsible or liable for any personal injuries resulting from the use of the system, or for any other damages, whether direct, indirect, incidental, or consequential; even if TSUNESS Co., Ltd has been advised of such damages.

Distributor Responsibility

In the event of an equipment failure or fault, it is the Distributor's responsibility to work directly with TSUNESS Service Centre in order to limit the return of non-faulty equipment. TSUNESS Service Centre will work with the Distributor to rectify the fault or fault message through telephone support or with direct PC links. Note: In order to qualify for further compensation and a replacement unit, the distributor/installer must first contact TSUNESS and fulfil the distributor's /installer's responsibilities under instruction.

Within warranty period of the microinverter, the invoice and date of purchase are required for the service. Besides, the trademark on the product should be clearly visible, otherwise warranty is not available.

More information can be found in TSUN Warranty Policy.



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