

InfluxGreen IGSM-220 & IGSM-300 Micro Inverter Installation and Operation Manual

Version: 1.0



NOTE:

IGSM-270: Pairs with most 60-cell PV modules

IGSM-220 & IGSM-300: Pairs with most 72-cell PV modules

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Thank you for choosing InfluxGreen IGSM-220/IGSM-300 micro inverter. For your own safety, please read this manual carefully before installation and operation.



All rights reserved: InfluxGreen reserves the right to change the product and the content of this manual without prior WARNING. Users are recommended to visit the company website at www.influxgreen.com for more information about our new products and the latest versions of the user manuals.

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1. Safety

1.1 Important Safety Instructions

This manual contains important instructions for the equipment installation and maintenance. For your own safety, please follow the safety instructions during the installation and maintenance process and pay attention of the following safety symbols:



WARNING: This indicates a situation where failure to follow instructions may cause personnel danger or serious hardware failure. Use extreme caution when performing this task.



NOTE: This indicates information particularly important for optimal operation. Follow these instructions closely.

1.2 Safety Information



WARNING: The InfluxGreen micro inverter dissipates heat through its case, and the temperature may be **15 °C** higher than the ambient temperature. **DO NOT** touch the device surface when it is in operation to avoid burns. Handle the device with caution.

- **The installation of inverter must be performed in full compliance with the National Wiring Rules of Standard AS/NZS 3000 and other relative local standards and regulations.**
- Be aware that only qualified personnel are allowed to maintain InfluxGreen micro inverters.
- **DO NOT** attempt to repair the InfluxGreen micro inverter as it is not repairable. If it fails, please liaise with your distributor or InfluxGreen Customer Service for service. Tampering with or force opening the InfluxGreen micro inverter will void the warranty.
- Before installing and operating InfluxGreen micro inverter, please read all instructions for the inverter and the module. Take note of the **PRECAUTIONS** in the technical description.
- Connect the InfluxGreen micro inverter to the local electricity utility grid only after receiving prior approval from the utility company. InfluxGreen takes no responsibility for any on-grid system without such approval.
- **DO NOT** disconnect the PV module from the InfluxGreen micro inverter without disconnecting AC power.

2. Micro Inverter System

InfluxGreen micro inverter system is one of the most advanced and simple distributed solar system. This manual contains detailed instructions for installing and operating the InfluxGreen micro inverter.

The following are the three key elements of the InfluxGreen micro inverter system:

- InfluxGreen micro inverter unit
- InfluxGreen Vision communication gateway device
- Inteli web-based monitoring and analysis system

The total integrated system maximizes the energy harvest, simplifies the overall design, installation and management, and thereby greatly improves the system stability.



- 1. InfluxGreen micro inverter**
Each micro inverter works with an individual photovoltaic module
- 2. AC branch cable**
Communication over powerline (PLC)
- 3. Ethernet**
Collection of performance data
- 4. Communication Gateway**
Plug and Play. Provides the communication flow between the raw performance data from the micro inverter to management system and vice versa
- 5. Monitoring Platform**
User friendly Graphical User Interface to monitor, analyze and manage the photovoltaic system

2.1 The Micro Inverter

The InfluxGreen micro inverter maximizes the harvest of solar energy. Each InfluxGreen micro inverter works independently with a single PV module, providing individual Maximum Peak Power Tracking (MPPT) and ensures that the maximum power is exported to the utility grid regardless of the performance of the other PV modules in the array. This basically means that the performance of individual PV modules in the array are not affected by shading, soiling, orientation, or parameter mismatch of other PV modules in the same array, thereby ensuring that the energy harvesting capabilities are not compromised.

The InfluxGreen micro inverter is a grid-connected device. It employs an advanced digital control technology to convert the DC energy to AC energy, which are then synchronized (both frequency and phase) to the utility grid. The main features of InfluxGreen micro inverter system are its simple installation, providing reliability and stability in the solar system as well as maximizing the energy harvest. All these features are complemented with the intelligent monitoring system. The InfluxGreen micro inverter adopts a wholly enclosed potting technology to assure of a IP65 rated enclosure for use in outdoors that are subjected to typical harsh environmental conditions.

2.2 System Monitoring

The Communication Gateway is a plug and play type unit and it utilizes powerline communication (PLC). The user simply needs to connect the power cable of the communication gateway to the indoor socket, and the Ethernet network cable to the computer. The InfluxGreen management system will then upload the full set of operating data from the micro inverter system to the web server. Both the current and historical operating data can be accessed through the web monitoring system. Simply put, the overall system health and its operations can be viewed and monitored through the management system.

2.3 System Reliability

It is generally accepted that the photovoltaic micro inverter system is more reliable compared to traditional central or string inverters due to its original design concept. The simple fact is that the micro inverters are designed to match the lifetime objectives of the PV modules as they are paired to operate together. In addition, the distributed power architecture of the micro inverter system eliminates any single point of failure. The InfluxGreen micro inverter is designed to operate without power loss in ambient temperature exceeding 65°C, and the IP65 rated enclosure will ensure that the unit can be installed in most types of environmental conditions.

2.4 Simplified System Design

The InfluxGreen micro inverter system allows the setup of a distributed power system through the pairing of one micro inverter to one PV module. Therefore, it is extremely simple to plan or design a solar system as there is no requirement for the complicated sizing calculation (like ensuring each worst case fault in a string does not compromise any safety), special concerns on the roof structure (how to place the string of solar panels in order not to compromise the energy harvesting capabilities), and the selection on the type and models of the string or central inverters (based on sizing requirements as well as space constraints). Each individual InfluxGreen micro inverter is easily mounted on the rack under the PV module, and the DC output from the module is directly connected to the micro inverter unit via the quick termination terminals. Overall, it also helps to reduce the risk of the presence of high DC voltage.

2.5 Electrical Compatibility

The current range of the InfluxGreen IGSM-220 and IGSM-300 micro inverters matches with most 72-cell PV modules, when one takes into consideration the electrical current and voltage specifications. The output of the micro inverter shall be synchronized and connected to the utility grid with nominal voltage of 230V (205V to 253V) and frequency of 50Hz. For the IGSM-220, up to 14 units of the micro inverters are allowed in a series connection, whereas for IGSM-300, up to 11 units are allowed. If a common output busbar is used, the number of units connected shall depend on the size of the conductor used.

3. The Micro Inverter Installation Guide

Please read the Installation and Operation Manual carefully before installing the InfluxGreen micro inverter.



WARNING: Perform all electrical installations in accordance with the local electrical codes.



WARNING: Risk of electrical shock. The grounding line may become live if not grounded properly.

3.1 The Micro Inverter Installation Kit

Other than the micro inverter unit, PV module, rack and hardware tools, the following items are required to set up a typical solar system:

- ·protective caps
- ·mounting bracket
- ·AC interconnect cable
- ·AC junction box

Other parts and tools required:

- ·grounding cable and washer
- ·hardware tools for mounting modules to the rack
- ·socket wrenches
- ·screwdrivers
- ·torque wrenches

4. Installation Procedure

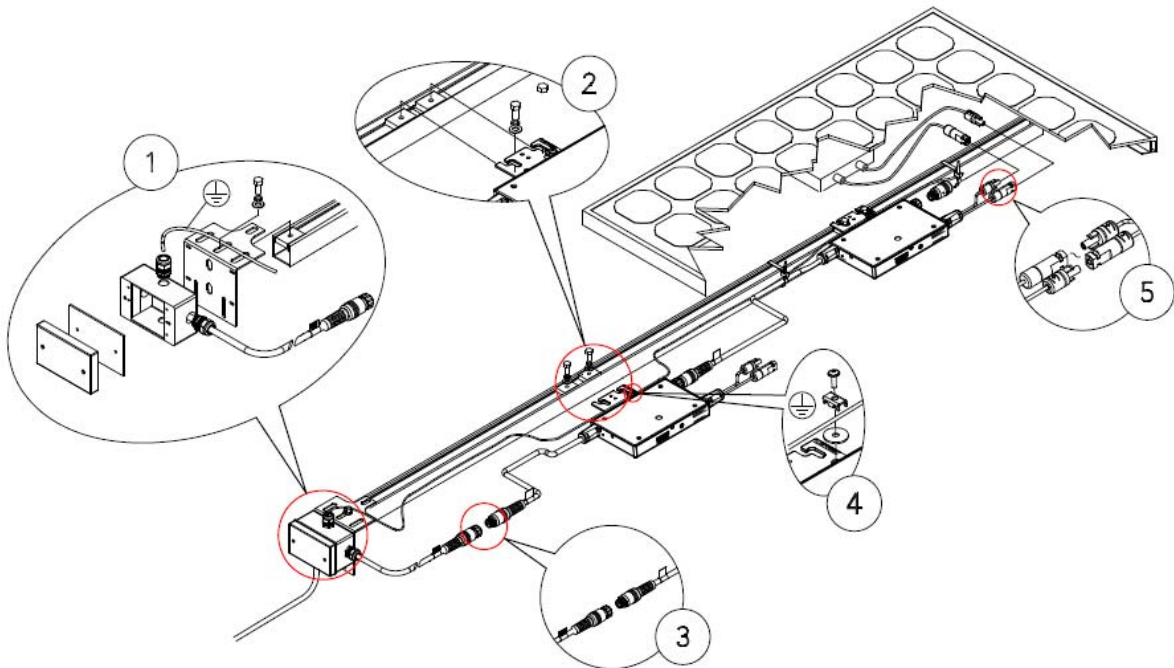
There are 6 key steps to follow in order to install the InfluxGreen micro inverter system:-

1. check and install the AC branch circuit junction box
2. attach Micro inverter to the racking
3. connect the Micro inverter to the AC branch cable
4. grounding the system
5. connect the PV modules
6. Complete the InfluxGreen Micro inverter installation map.

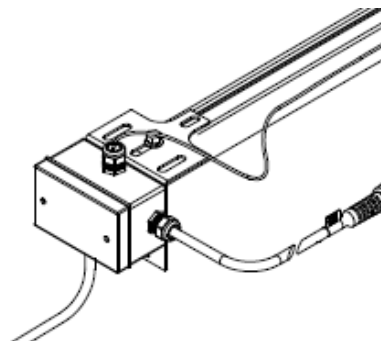
The above steps are numerically referenced in the installation diagrams that followed.



WARNING: DO NOT connect the InfluxGreen micro inverter to the utility grid until you have completed all of the installation procedures as described in the following sections.



Step 1-Installing the AC branch circuit junction box



- A. Check and make sure that the AC voltage is within the voltage range indicated on the label.
- B. Mount the adapter plate provided at a suitable location on the PV racking system (typically at the end of a branch of PV modules).
- C. Connect the open wire end of the AC interconnect cable into the junction box using an appropriate cable gland or strain relief fitting.
- D. Work out the total current basis on the number of micro inverters in each branch, and use an appropriate cable to connect the AC branch circuit junction box to the point of utility interconnection.

Step 2- Attach the micro inverter to the racking

A. Decide on the location to mount the micro inverter, taking into consideration the position of the PV module junction box or any other obstructions.



WARNING: Allow a minimum of 15cm between the top of the roof and the bottom of the Micro inverter. We also recommend that you allow 5cm between the back of the PV module and the top of the inverter. **DO NOT** mount the micro inverter in a location that has exposure to direct sunlight.

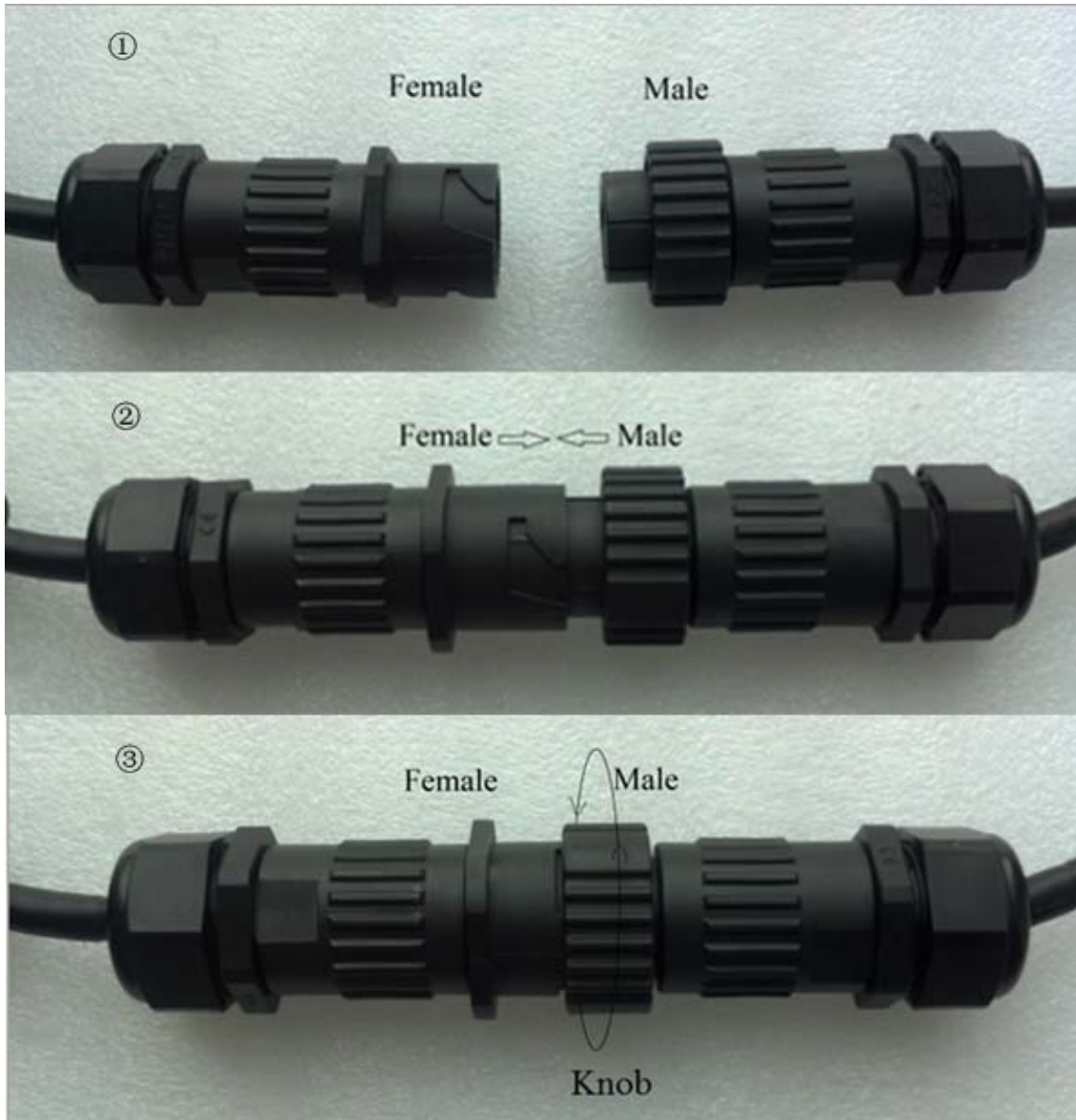
B. If a ground washer is to be used to connect the micro inverter to the racking, then please use only ground washers that are approved by the manufacturer of the racking system. Do install a minimum of one ground washer per micro inverter.

C. Mount one micro inverter at each of these locations using the hardware tools recommended by the module racking supplier.

Step 3-Connect the micro inverter to the AC branch cable

Each micro inverter are pre-installed with a 15cm AC wire c/w a 3 pin female connector; and a 156cm AC wire c/w one 3 pin male connector as indicated in the following picture:





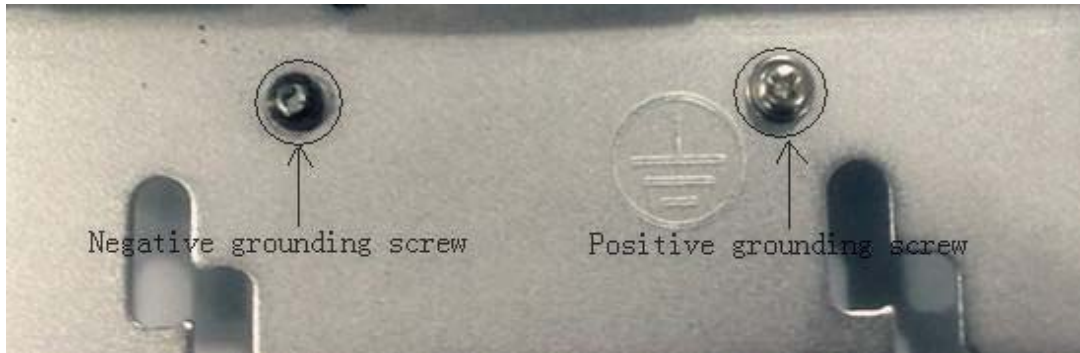
- A. Connect the male connector of the first micro inverter in every branch to the AC junction box.
- B. Plug the AC female connector of the first micro inverter into the male connector of the next micro inverter, and so forth. The objective is to form a continuous AC branch circuit.



NOTE: Check the micro inverter rating label for the maximum number of micro inverters allowed on one AC branch circuit.

- C. Install a protective end cap on the open AC connector of the last micro inverter in the AC branch circuit.

Step 4-Grounding the system



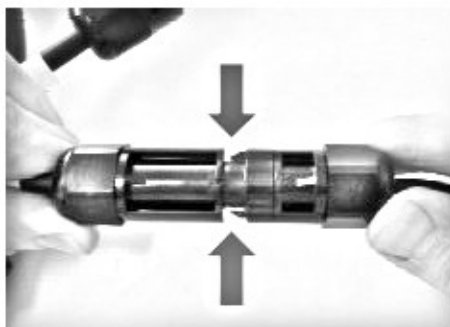
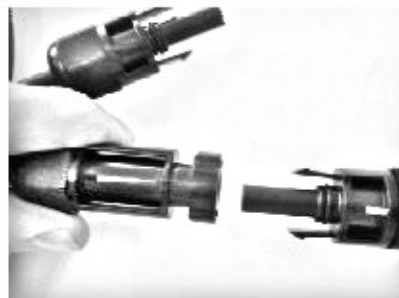
NOTE: If you are already use grounding washers to ground the micro inverter to the PV module racking system as described in step 1, then skip this step.

Each InfluxGreen micro inverter comes with a ground screw of diameter 5mm. Check your local code for grounding conductor sizing requirement and connect the correctly rated grounding electrode conductor to the micro inverter ground screw.

Step 5-Connect the PV modules



NOTE: Do complete the installation of all micro inverters and the respective system inter-wiring connections prior to installing the PV modules.



First, connect the positive DC wire from the PV module to the negatively marked DC connector (female socket) of the micro inverter. Then connect the negative DC wire from the PV module to the positively marked DC connector (male socket) of the micro inverter. Repeat this step for all the remaining PV modules pairing up one micro inverter to each module.

Step 6-Complete the Micro Inverter Installation Map

The Installation Map is a diagram highlighting the physical location of each micro inverter in the PV installation. You can use the blank map provided in the Appendix to record the position/placement of the micro inverters in your system. When the map is completed, send it to InfluxGreen as described below. InfluxGreen then uses this information to provide you with the detailed information about the performance of your PV system. In addition, you will also get to see a graphical representation of your PV system on our web-based monitoring and analysis system. Do feel free to provide your own layout if the copy provided is insufficient or a more complex installation map is required.

Complete the InfluxGreen micro inverter installation map.

- A. Each InfluxGreen micro inverter has a removable serial number label located on the mounting plate. You may peel off the label and affix it to the respective location on the installation map, which is available at the Appendix section of this manual or you can download from the website @ www.influxgreen.com.
- B. Send the installation map to InfluxGreen after completion.

5. Commissioning



WARNING: Connect the micro inverter to the electrical utility grid only after receiving prior approval from the utility company.



WARNING: Be aware that only qualified technical personnel is authorized to connect the micro inverter to the electrical utility grid.



WARNING: Make sure that all AC and DC connections are correct, and that none of the AC and DC wires are pinched or damaged. Make sure that all junction boxes are properly closed, and that the circuit breaker for DC and AC are installed accordingly.



NOTE: The starting voltage for micro inverter is **30V**. This means that the micro inverter will start to operate only after the DC input voltage is **30V** or above. The RED LED indicates the micro inverter is in normal working operation.

5.1 Commissioning a InfluxGreen micro inverter system

1. Connect each micro inverter to the respective PV module. Make sure the PV module is in normal operation, and the RED LED on the micro inverter is lighted.
2. Switch on the circuit break on each AC branch circuit.
3. Switch on the main AC breaker on the connection point of the utility grid. Your InfluxGreen micro inverter will start to feed power to the utility grid after 2 minutes if all the micro inverters are correctly connected. The GREEN LED blinks in a 4-second interval to indicate that the system is in normal working operation.
4. The InfluxGreen micro inverter will report the operation data to the Vision communication gateway over the powerline after 2 minutes if the AC voltage is normal. Each data packet is sent/received in a 5 minute-interval. The LCD screen on the Vision communication gateway will display number of inverters, total energy harvested and other relevant information. Please refer to the installation and operation manual for Vision communication gateway for more information.
5. Log on to the monitoring website or use the monitoring software to monitor the micro inverter operating condition.

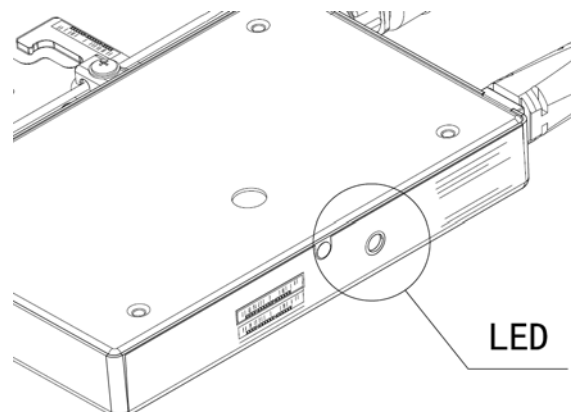
6. Troubleshooting

The micro inverter is designed and tested to ensure correct operation within the specified set of conditions and parameters. However, if the micro inverters do not operate correctly due to incidence or other occurrences, then the troubleshooting section steps will help to facilitate the initial resolutions. Only qualified technical personnel shall use the troubleshooting for resolution as required.



WARNING: DO NOT attempt to repair the InfluxGreen micro inverter as it is not repairable. If it fails, please return the unit to your distributor or InfluxGreen Customer Service. Tampering with or force opening the InfluxGreen micro inverter will void the warranty.

LED Indications:- The LED indicator has 3 different colour indications – RED, ORANGE and GREEN.



6.1 Starting up

With DC input voltage is within the specified input range, the RED LED turns on to indicate that the PV module is in operation and the micro inverter is starting up.



Note: the starting voltage for the InfluxGreen micro inverter is **30V**. The micro inverter starts to operate only after the DC input voltage is **30V** or above and the RED LED indicates that the micro inverter is in normal operation.

6.2 Starting Grid connect indication

After start-up, if the utility grid voltage and the PV module energy output are in normalized condition within 20 seconds, the micro inverter will start to synchronize the output to the utility grid. Three short ORANGE blinks indicate that the micro inverter is attempting to connect to the grid. If the connection is successful, the micro inverter starts to produce power and the GREEN LED is on.

6.3 Normal operation indication

After a 4-second interval, the GREEN LED turns off and the micro inverter enters the Maximum Power Point Tracking (MPPT) operation. The GREEN LED then stays on with long interval blink.

6.4 Communication indication

When in normal operation, the micro inverter reports the operational data to the communication gateway in a 5-minute interval. At that moment, the GREEN LED will blink quickly until the data transfer is completed.

6.5 Failure indication

IGSM-220 and IGSM-300 are designed with 9 different types of failure protections. When in failure mode, the RED LED will turn on and it continues to stay lighted until the failure is removed.



NOTE: For low voltage protection, the recovery time is variable. For other failure modes, the recovery time is 20s. The initial recovery time for low voltage protection is 2 minutes and it varies if the low voltage situation continues. The recovery time returns to 2 minutes if the MPPT starts working and the GREEN LED blinks in long interval.

6.6 Failure Report

There are altogether 9 types of failure modes for IGSM-220 and IGSM-300 micro inverters, and all the failure information are reported to the communication gateway. Please refer to the installation and operation manual for details.

The 9 failure modes are as follows:

- Input over-voltage
- Input under-voltage
- BUS over-voltage
- BUS under-voltage
- Utility grid under-voltage
- Utility grid over-voltage
- Utility grid over-current
- Micro inverter over-temperature
- Grounding Fault



WARNING: Only qualified personnel should troubleshoot the micro inverter.



WARNING: DO NOT disconnect the PV module from the micro inverter without disconnecting AC power.



WARNING: Never disconnect the DC wire connectors under loading conditions. Make sure that no current is flowing in the DC wires prior to disconnecting.



WARNING: IGSM-220 and IGSM-300 micro inverters are powered by DC power. When reconnecting the DC wire after disconnect, make sure the RED LED is on.

6.7 Troubleshooting Procedure

When the PV module is operating normally and the power output is >40W, and in such a condition, if the RED LED stays on, it indicates the micro inverter is not operating correctly.

To troubleshoot an the micro inverter, please follow the steps in the order shown below:

1. Check and verify that the utility voltage and frequency are within allowable range stated in the technical data section on page 19 of this manual.
2. Check the connection to the utility grid. Disconnect the AC cable prior to disconnecting the DC cables. Never disconnect the DC cables while the micro inverter is in operation. Check if the RED LED is on after reconnecting the DC cables. Check if the micro inverter is attempting to connect to the utility grid after reconnecting the AC cables.

3. Check the connection between the micro inverters in the AC branch and verify that the utility grid is operating normally.
4. Check that all the AC circuit breakers are functioning normally and closed.
5. Check the DC connection between the micro inverters and the PV modules.
6. Verify that the PV module DC voltage is within the allowable range stated in the technical data section on page 19 of this manual.
7. Please call customer support at InfluxGreen if the problem persists.



WARNING: DO NOT attempt to repair the InfluxGreen micro inverter as it is not repairable. If it fails, please return the unit to your distributor or InfluxGreen Customer Service.

7. Disconnecting the micro inverter from the PV module

To disconnect the micro inverter from the PV module, please follow the steps in the order shown:-

1. Open the AC circuit breaker.
2. Disconnect the first connector in the AC branch.
3. Cover the PV module with an opaque cover.
4. Using a DC current probe and verify there is no current flowing in the DC cables between the PV module and the micro inverter (make sure the current probe works correctly).
5. Disconnect the PV module DC wire connectors from the micro inverter.
6. Remove the micro inverter from the PV array racking.

8. Replacing a InfluxGreen Micro inverter

To replace the micro inverter, please follow the steps in the order shown:-

1. Disconnect the micro inverter from the PV module as per steps detailed above.
2. Install a new micro inverter to the module rack.
3. Connect the AC connectors of the new micro inverter to the next micro inverter and connect the DC connectors to the PV module. Remove the opaque cover on the module and complete the connection.
4. Close the AC circuit breaker to verify the operation status.



WARNING : Residual voltage exists in the inverter and the inverter needs to wait about 5 minutes to ensure that the capacitor is fully discharged.

9. Technical Specifications Data

Note: The output voltage and current of the PV module depend upon several factors such as the number, size and temperature of the cell, and these parameters are influenced by the intensity of sunlight. The highest voltage of a PV module is output when the cell is at the lowest temperature and circuit is open. The short circuit current must be less than or equal to the maximum DC input current of the micro inverter.

Please make sure the output voltage and current of the PV module match with the InfluxGreen micro inverter.



WARNING: The maximum open circuit voltage of the PV module must not exceed the specified maximum input voltage of the micro inverter.



WARNING: The maximum short circuit current of the PV module must not exceed the specified maximum input current of the micro inverter.

Electrical Connection

The inverter is compatible with RCD and RCM.

The DC component may produce electricity; and as a result, a residual current operated protective device (RCD) or monitoring device (RCM) can be used for protection in direct or indirect contact. Only Type B RCD/RCM is allowed to be connected to the supply side of the product.

Description	Size
A. External diameter of the wire	12mm-25mm
B. Sectional area of conducting materials	4-6mm ²
C. Length of bare wire	Approx.10mm


If you choose the models without DC switch, an external disconnection device should be used. It should be a multi-pole switch-disconnector (all poles disconnected simultaneously) that has been approved according to standard IEC/EN 60947-3. The rated current should be between 20A and 25A. In addition, a AC breaker is also needed between inverter and grid. The rated current should be higher than the AC output current. One branch of the AC breaker should be at least >15A.

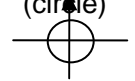

9.1 Technical Specifications


Micro Inverter Models	IGSM-220	IGSM-300
DC side/Input parameters		
Max. DC power [W]	220	300
Max. DC voltage [Vdc]	55	55
Start voltage range[Vdc]	30-50	30-50
MPPT voltage range [Vdc]	30-40 (Extended 28-42V)	30-40(Extended 28-42V)
Max. input current [A]	10	12
AC side/output parameters		
Nominal output power [W]	200	270
Maximum output power [W]	200	270
Nominal output voltage/range [V]	230/205~253	
AC grid frequency/range [Hz]	50/49.5~50.5	
Maximum output current [mA]	1100	1400
AC connection(with PE)	Single phase	
Current distortion(THDi) [%]	<2	<2
Power Factor	0.99	0.99
Maximun units per branch	14	11
Efficiency		
Maximum conversion efficiency[%]	95	95
European Efficiency[%]	94	94
MPPT efficiency[%]	99	99
General Parameters		
Night power consumption[W]	20mW	
Protection degree	IP65	
Operation temperature[°C]	- 40 ~ 65	
Heat Dissipation	Natural Convection	
Altitude[m]	<2000 without power derating	
Storage temperature[°C]	- 40 ~ 80	
Communication Interface	Powerline	
Other Parameters		
Standard warranty	15 years	
Dimensions(LxWxH)	228mm*136mm*33.7mm	
Weight	2.5kg	
Warranty	15 years (25 years optional)	
Compliance	AS 4777.2 AS4777.3 AS3100 EN 62109-1	


Appendix


A1. InfluxGreen Micro Inverter Installation Map

To Sheet 


	Array: Orientation: Tilt: Form /		Customer information Serial No.:		Installer information		N/S/E/W (circle) 
	1	2	3	4	5	6	7
A							
B							
C							
D							
E							
F							
G							
H							
I							
J							
K							
L							
M							
Fax					Installation Map		Version

To Sheet 

To Sheet 


To Sheet 

A2. Quick installation Guide

 **Warning:** Perform all electrical installations in accordance to the local electrical codes
 <<IGSM-300 (220) Micro Inverter Installation and Operation Manual>>

Quick Installation Guide

- 1
 - 1A: Attach the micro inverter to the mounting rack
 - 1B: Install junction box to the support panel
 - 1C: Connect the grounding cable to the junction box
 - 1D: Connect the "first" AC connectors
- 2
 - 2A: Mark the centre location of each PV module
 - 2B: Mount the micro inverters at each of these locations, taking into consideration the distance of the DC connectors to the PV module. Use the hardware tools recommended by the rack supplier.
- 3
 - 3A: Connect the male connector of the first micro inverter in every branch of the AC junction box.
 - 3B: Connect the micro inverters in series, taking note of the maximum number of units allowed in each branch.
 - 3C: Connect the grounding cable to the junction box.

 **Do not connect the system under load**
- 4
 - 4A: Ground each of the micro inverter, making sure the entire system is firmly grounded.
 - 4B: Ensure that the grounding is reliable.
- 5
 - 5A: Connect the +VE DC cable from the PV module to the -VE marked DC connector (female socket) of the micro inverter.
 - 5B: Connect the -VE DC cable from the PV module to the +VE marked DC connector (male socket) of the micro inverter.
 - 5C: Repeat the steps for all the micro inverters.
- 6
 - 6A: Each InfluxGreen micro inverter has a removable serial number label located on the mounting plate. Peel off the label and affix it to the respective location on the installation map.

! The Installation Map is just a diagram of the physical location of each micro-inverter in your PV installation, please read installation and operation manual prior to complete the installation.

