

# User Manual

## MICROINVERTER

(Model: MI-1000 /MI-1200)



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## About this User Manual

Thank you for using Hoymiles' MI-1000 /MI-1200 Microinverter! This Microinverter system is the world's most technologically advanced inverter system in the world with benefits of efficient, flexible, safe and reliable for use in utility-interactive applications.

This system is composed of a group of Microinverters that convert direct current (DC) into alternating current (AC) and feeds it into the electric grid. Unlike the systems that photovoltaic modules are subdivided into strings and controlled by one or more inverters, this system is designed for the incorporation of one Microinverter for four photovoltaic modules. Each Microinverter works independently to ensure maximum power of each photovoltaic module. This setup enables user to control the production of a single photovoltaic module directly, consequently improving the flexibility and reliability of the system.

This user manual contains important instructions for the MI-1000 /MI-1200 Microinverter and must be read in its entirety before installing or commissioning the equipment. For safety, only qualified technician, who has received training or has demonstrated skills can install and maintain this Microinverter under the guide of this document.

## Support and Contact Information

If you have technical queries concerning our products, please contact your system installer. If further support is required, contact Hoymiles support at this link.

<http://www.hoymiles.com>

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# Important Safety Instructions

## Symbol Illustration

The safety symbols in this user manual are show as below.

Symbol	Usage
	Indicates a hazardous situation that can result in deadly electric shock hazards, other serious physical injury, or fire hazards.
	Indicates directions which must be fully understood and followed in entirety in order to avoid potential safety hazards including equipment damage or personal injury.
	This points out that the described operation must not be carried out. The reader should stop, use caution and fully understand the operations explained before proceeding.

Symbols replace words on the equipment, on a display.

Symbol	Usage
	<p><b>Treatment</b></p> <p>To comply with European Directive 2002/96/EC on waste Electrical and Electronic Equipment and its implementation as national law, electrical equipment that has reached the end of its life must be collected separately and returned to an approved recycling facility. Any device no longer required must be returned to an authorized dealer or approved collection and recycling facility.</p>
	<p><b>Caution</b></p> <p>Do not come within 8 inches (20cm) of the microinverter for any length of time while it is in operation.</p>
	<p><b>Danger of high voltages</b></p> <p>Danger to life due to high voltage in the microinverter.</p>
	<p><b>Beware of hot surface</b></p> <p>The inverter can become hot during operation. Avoid contact with metal surfaces during operation.</p>
	<p><b>CE mark</b></p> <p>The inverter complies with the requirements of the Low Voltage Directive for the European Union.</p>
	<p><b>Read manual first</b></p> <p>Please read the installation manual first before installation, operation and maintenance.</p>

## Installation Warnings

The MI-1000/MI-1200 Microinverter is designed and tested according to international safety requirements (IEC62109-1/-2, VDE4105, VDE0126, AS 4777.1 /1.2)



- All operations including transport, installation, start-up and maintenance, must be carried out by qualified, trained personnel.



- Before installation, check the unit to ensure absence of any transport or handling damage, which could affect insulation integrity or safety clearances. Choose 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 Microinverter 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. It is the responsibility of the installer to provide external disconnect switches and Overcurrent Protection Devices (OCPD).



- Only one photovoltaic module can be connected in the input of the inverter. Do not connect batteries or other sources of power supply. The inverter can be used only if all the technical characteristics are observed and applied.



- Do not install the equipment in adverse environment conditions such as flammable, explosive, corrosive, extreme high or low temperature, and humid. Do not use the equipment when the safety devices do not work or disabled.



- Use personal protective equipment, including gloves and eye protection when working.



- 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 qualified spare parts, which must be installed in accordance with their intended use and by a licensed contractor or authorized Hoymiles service representative.



- Liabilities arising from commercial components are delegated to their respective manufacturers.

- Anytime the inverter has been disconnected from the power network, use extreme caution as some components can retain charge sufficient to create a shock hazard. Prior to touching any part of the inverter use care to ensure surfaces and equipment are at touch safe temperatures and voltage potentials before proceeding.

- Hoymiles accepts No liability for damage from incorrect or careless operation
- Electrical Installation & Maintenance shall be conducted by licensed electrician and shall comply with Australia National Wiring Rules.

## **Prepare for Installing**

### **Transport and Inspect**

Hoymiles packages and protects individual components using suitable means to make the transport and subsequent handling easier. Transportation of the equipment, especially by road, must be carried out by suitable ways for protecting the components (in particular, the electronic components) from violent, shocks, humidity, vibration, etc. Please dispose the packaging elements in appropriate ways to avoid unforeseen injury.

It is the customer's responsibility to examine the condition of the components transported. Once receiving the Microinverter, it is necessary to check the container for any external damage and verify receipt of all items. Call the delivering carrier immediately if damage or shortage is detected. If inspection reveals damage to the inverter, contact the supplier, or authorized distributor for a repair/return determination and instructions regarding the process.

## Check Installation Environment

Installation is carried out based on the system design and the place in which the equipment is installed.

- The installation must be carried out with the equipment disconnected from the grid (power disconnect switch open) and with the photovoltaic modules shaded or isolated.
- See Appendix: Technical Data to check the environmental parameters to be observed (degree of protection, temperature, humidity, altitude, etc.)
- 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.

## Installation Position

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

Install only on structures specifically conceived for photovoltaic modules (supplied by installation technicians).

Install Microinverter underneath the photovoltaic modules so that they work in the shade. If this condition cannot be met, the inverter could undergo derating.

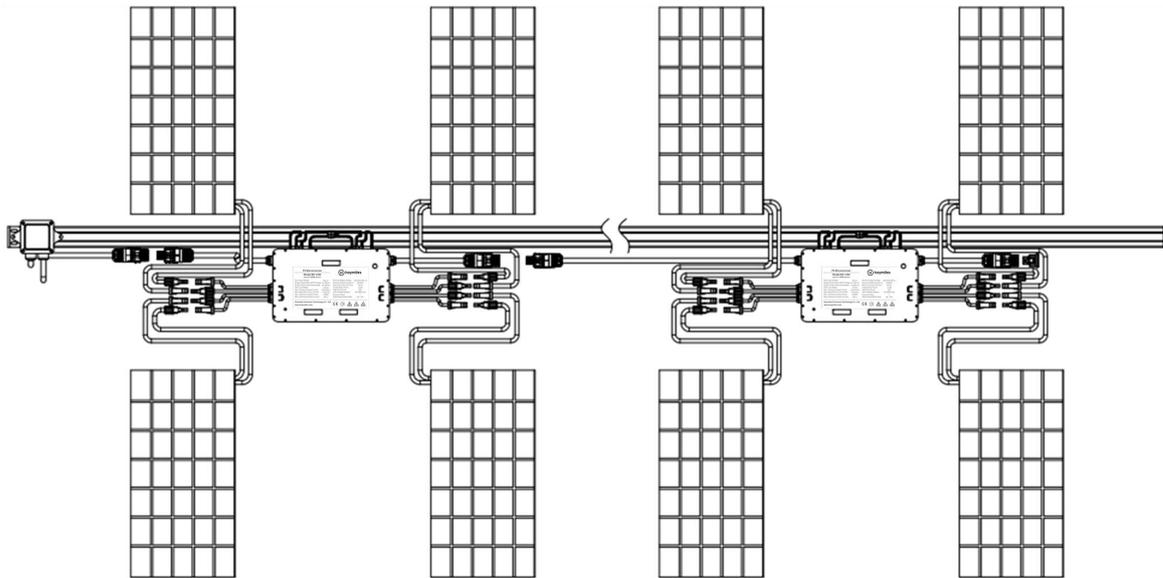
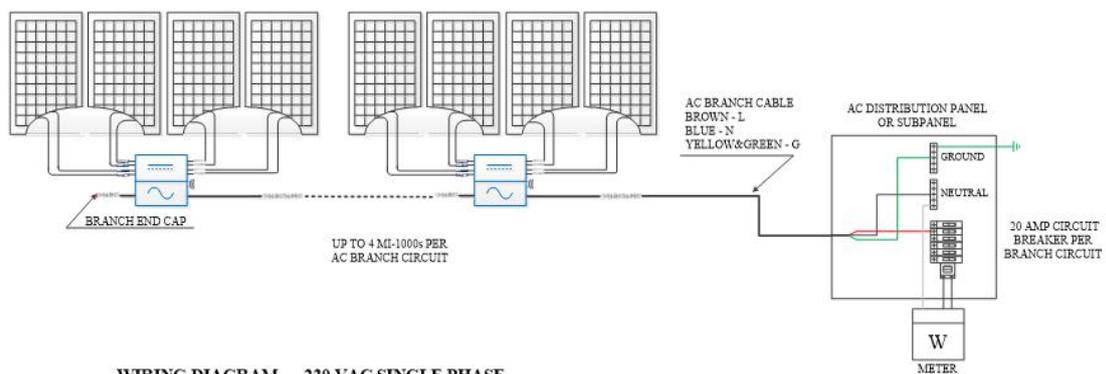


Fig.1 Installation position of microinverter

## Mounting and Wiring

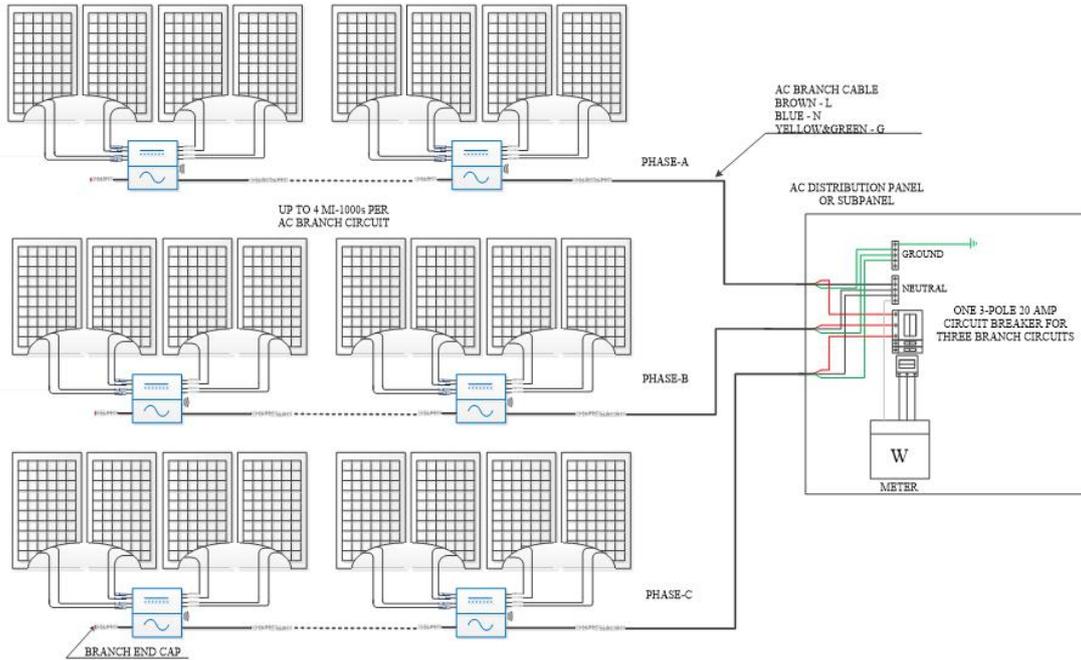
### Installing Diagram

#### System Wiring Diagram



WIRING DIAGRAM - 230 VAC SINGLE PHASE

(a) Single phase wiring diagram



WIRING DIAGRAM - 230 VAC / 400 VAC THREE PHASE

**(b) Three phase wiring diagram**

**Fig.2 MI-1000 /MI-1200 Microinverter wiring diagram**

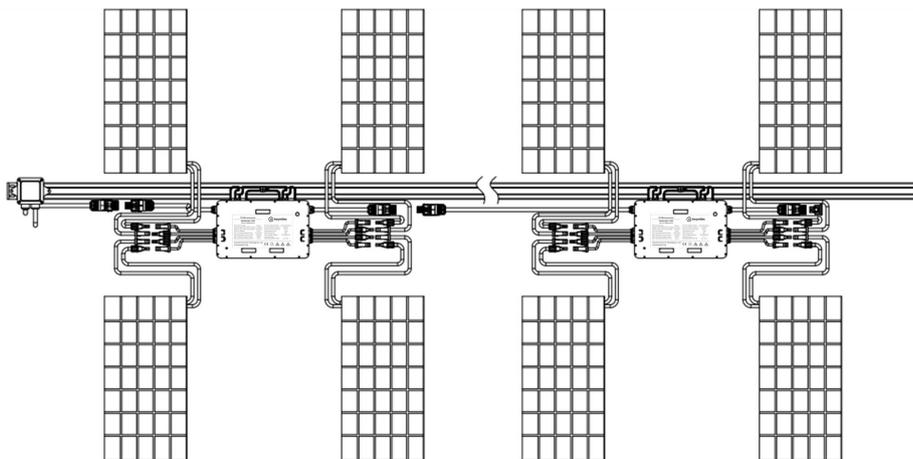


DTU connects the power production of each microinverter. If the asymmetry current is going to exceed 16 A, DTU will send stop signal to one or more microinverters to let the asymmetry current lower than 16A.



Each branch should provide a 20A circuit breaker, but no need for central protection unit.

**Assembly Diagram**

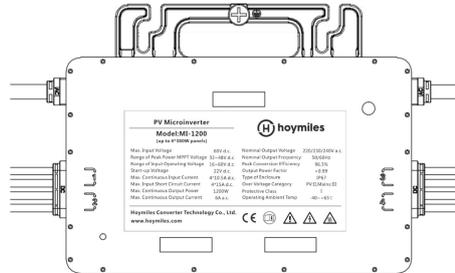


**Fig.3. Assembly diagram**

## Assembly Instruction

### Step 1. Install Microinverter

- a. Mark the approximate center of each panel on the frame.
- b. Install the microinverter shown as below. The silver cover side should be up.



**WARNING**

**Observe the certification documents concerning the maximum number of Micro-inverters permitted for installation at each cable section!**

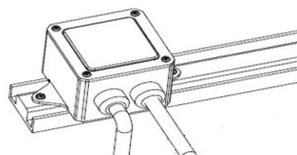


**CAUTION**

**The Microinverter must be under the module, out of long-term exposure to direct sunlight or rain.**

### Step 2. Install AC Junction Box

- a. Install an AC junction box at the suitable location on the racking.



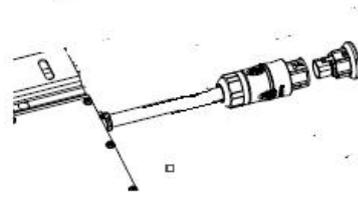
- b. Provide an AC connection from the AC junction box back to the electricity network connection using equipment and practices as required by local jurisdictions.

### Step 3. Connect AC Cables of Microinverter

- a. Plug the AC connector of the first microinverter into the connector of the next microinverter, and so forth, to form a continuous AC branch circuit

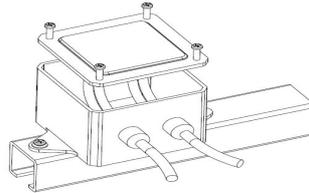


- b. Install the AC End Cap on the open AC connector of the last microinverter in the AC branch circuit.



#### Step 4. Connect AC End Cable

- a. Connect the AC End Cable connector to the adjacent microinverter connector.



- b. Connect AC End Cable to the junction box and wire with the cable to the electricity network. Close the junction box after the wiring is complete.

Note: Brown Wire: L

Blue Wire: N

Yellow/Green Wire: Ground



**WARNING**

**To prevent electrical hazards, all the connection operations must be carried out with the equipment disconnected from the grid.**

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**WARNING**

**All the external connections to the insulated junction box (caps, adapters, etc.) must be made with securely-sealed Hoymiles components.**

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**WARNING**

**Pay special attention and ensure not to reverse the phase with the neutral!**

**The installation technician is responsible for selecting a junction box with the appropriate dimensions and insulation.**

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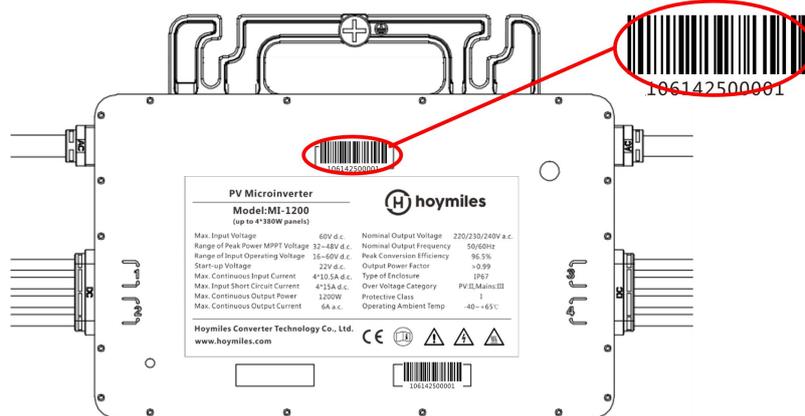
**WARNING**

**The installation technician is responsible for selecting a cable running between the junction box and the load distribution panel with the appropriate length and cross section.**

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#### Step 5. Create an Installation Map

- a. Peel the removable serial number label from each microinverter. The position of the label is shown as below.



**Note:** the DC inputs of MI-1000/MI-1200 are identified by 1,2 and 3,4. The left input is 1,2 and the right one is 3,4, shown as above.

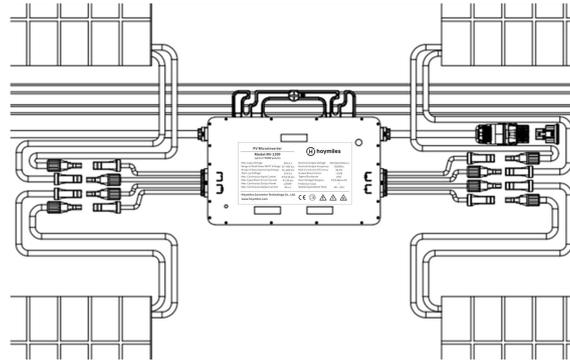
**b.** Affix the serial number label to the respective location on the installation map.

N S E W (circle one)		Panel Group: Azimuth: Tilt: Sheet of _____		Customer Information:				DTU Serial Number:						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
A	1	3												
B	2	4												
C														
D														

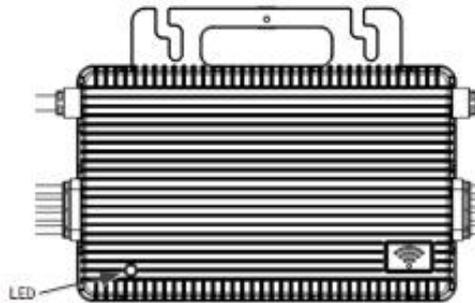
**Note:** the serial number label of MI-1000/MI-1200 should be affixed between for 4 blanks and mark 1,2,3 and 4 to identify the four connected PV panels.

### Step 6. Connect PV Modules

- a. Mount the PV modules above the microinverters.
- b. Connect the DC cables of the modules to the DC input side of the microinverter.



- c.** Check the LED on the side of the microinverter. The LED flashes six times at start up. All green flashes indicate normal start up.



The recommended installation need keeping the Microinverters underneath the photovoltaic modules, so that the Microinverters can operate in the shade. Direct sunlight may cause damage to the Microinverters.



Each module must be connected to the Microinverters with a DC cable having a length of less than 3m.

## Step 7. Energize the System

- If applicable, turn on the AC disconnect or circuit breaker for the branch circuit.
- Turn on the main utility-grid AC circuit breaker. Your system will start producing power after about a two-minute wait time.

## Step 8. System Monitoring Set Up

Refer to the DTU User Manual or the DTU Quick Install Guide to install the DTU and set up system monitoring.

## Troubleshooting

Qualified personnel can use the following troubleshooting steps if the PV system does not operate correctly.

### Status Indications and Error Reporting

#### Startup LED Operation

Five short green blinks when DC power is first applied to the microinverter indicate a successful microinverter startup.

#### Status LED Indicator

- ✓ Flashing Slow Green (**2s gap**): Producing power and communicating with DTU.
- ✓ Flashing Fast Green (**4s gap**): Producing power and not communicating with DTU.
- ✓ Flashing Red(**1s gap**): Not producing power AC grid invalid (Voltage or frequency out of range).
- ✓ Flashing Red(**always**): GFDI Fault. The LED will remain red and the fault will continue to be reported by the DTU.

## Troubleshoot an Inoperable Microinverter

To troubleshoot an inoperable microinverter, follow the steps in the order shown.

1. Verify the utility voltage and frequency are within ranges shown in the in appendix Technical Data of this microinverter.
2. Check the connection to the utility grid. Verify utility power is present at the inverter in question by removing AC, then DC power. Never disconnect the DC wires while the microinverter is producing power. Re-connect the DC module connectors and watch for five short LED flashes.
3. Check the AC branch circuit interconnection between all the microinverters. Verify each inverter is energized by the utility grid as described in the previous step.
4. Make sure that any AC breaker are functioning properly and are closed.
5. Check the DC connections between the microinverter and the PV module.
6. Verify the PV module DC voltage is within the allowable range shown in appendix Technical Data of this manual.
7. If the problem persists, please call Hoymiles customer support.



### **Warning**

- Do not try to repair the microinverter. If the troubleshooting fails, please return it to the factory for replacement.

## Maintenance Guide

### Routine Maintenance

- Only authorized personnel are allowed to carry out the maintenance operations and are responsible to report any anomalies.
- Always use the personal protective equipment provided by the employer when carry out the maintenance operation.
- During normal operation, check that the environmental and logistic conditions are correct. 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 removed.
- Conduct an annual inspection on various components, and clean the equipment with a vacuum cleaner or special brushes.



**Do not attempt to dismantle the Microinverter or make any internal repairs! In order to preserving the integrity of safety and insulation, the Microinverters are not designed to allow internal repairs!**

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**The AC output wiring harness (AC drop cable on the Microinverter) cannot be replaced. If the cord is damaged the equipment should be scrapped.**

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**Maintenance operations must be carried out with the equipment disconnected from the grid (power switch open) and the photovoltaic modules obscured or isolated, unless otherwise indicated.**

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**For cleaning, do not use rags made of filamentary material or corrosive products that may corrode parts of the equipment or generate electrostatic charges.**

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**Avoid temporary repairs. All repairs should be carried out using only genuine spare parts.**

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## Storage and Dismantling

- If the equipment is not used immediately or is stored for long periods, check that 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, which are potentially harmful to the environment, in accordance with the regulations in force in the country of installation.

## Appendix

### Grid Friendly Functions

#### Protection Settings against electricity system faults

Protective function	Symbol	Setting		Trip time	
Overvoltage (step 2)	U>>	264.5	V	200	ms
Overvoltage (step 1)	U>	253.0	V	60	s
Undervoltage (step 1)	U<	195.5	V	50	s
Undervoltage (step 2)	U<<	184.0	V	100	ms
Overfrequency	f>	52	Hz	200	ms
Underfrequency	f<	47	Hz	200	ms
Change of frequency	df/dt	+2.5	Hz/s	80	ms



The connection and synchronisation occur three minutes, at the earliest, after voltage and frequency have come within the normal production range, the reconnection voltage range is 195.5V to 253.0V and the reconnection frequency range is 47Hz to 52Hz.

## Datasheet



### Warning

- ✓ Confirm the output current, voltage and microinverter matching of the solar module.
- ✓ The DC operating voltage range of the solar module must be within the microinverter input voltage range.
- ✓ The maximum open circuit voltage of the solar module cannot exceed the maximum input voltage of the microinverter

<b>Model</b>	<b>MI-1000</b>		
<b>Input data(DC)</b>			
Recommended input power (W)	240~380		
MPPT voltage range (V)	27~48		
Start-up voltage (V)	22		
Operating voltage range (V)	16~60		
Maximum input voltage (V)	60		
Maximum input current (A)	10.5		
<b>Output Data (AC)</b>	<b>@230V AC</b>	<b>@240V AC</b>	<b>@208V AC</b>
Rated output power (W)	1000		
Rated output current (A)	4.35	4.16	4.81
Nominal output voltage/range (V)	230/180-275	240/211-264	208/183-250
Nominal frequency/range (Hz)	50/45-55	60/59.3-60.5	60/59.3-60.5
Power factor	>0.99	>0.99	>0.99
Output current harmonic distortion	<3%	<3%	<3%
Maximum Units per 20A Branch	4	4	3
<b>Efficiency</b>			
Peak inverter efficiency	96.5%		
CEC weighted efficiency	96.0%		
Nominal MPPT efficiency	99.8%		
Night time power consumption (mW)	<50		
<b>Environmental &amp; Mechanical Data</b>			
Ambient temperature range (°C)	-40 ~ +65		
Operating temperature range (°C)	-40 ~ +85		
Dimensions (W×H×D mm)	280×176×33		
Weight (kg)	3.75		
Enclosure rating	IP67		
Cooling	Natural convection – No fans		
<b>Features</b>			
Communication	Wireless		
Design Life	>25 Years		
<sup>1</sup> Volatage and frequency ranges can be extended beyond nominal if required by the utility			

<b>Model</b>	<b>MI-1200</b>		
<b>Input data(DC)</b>			
Recommended input power (W)	240~380		
MPPT voltage range (V)	32~48		
Start-up voltage (V)	22		
Operating voltage range (V)	16~60		
Maximum input voltage (V)	60		
Maximum input current (A)	10.5		
<b>Output Data (AC)</b>	<b>@230V AC</b>	<b>@240V AC</b>	<b>@208V AC</b>
Rated output power (W)	1200		
Rated output current (A)	5.22	5	5.76
Nominal output voltage/range (V)	230/180-275	240/211-264	208/183-250
Nominal frequency/range (Hz)	50/45-55	60/59.3-60.5	60/59.3-60.5
Power factor	>0.99	>0.99	>0.99
Output current harmonic distortion	<3%	<3%	<3%
Maximum Units per 20A Branch	3	3	3
<b>Efficiency</b>			
Peak inverter efficiency	96.5%		
CEC weighted efficiency	96.0%		
Nominal MPPT efficiency	99.8%		
Night time power consumption (mW)	<50		
<b>Environmental &amp; Mechanical Data</b>			
Ambient temperature range (°C)	-40 ~ +65		
Operating temperature range (°C)	-40 ~ +85		
Dimensions (W×H×D mm)	280×176×33		
Weight (kg)	3.75		
Enclosure rating	IP67		
Cooling	Natural convection – No fans		
<b>Features</b>			
Communication	Wireless		
Design Life	>25 Years		
<sup>1</sup> Volatage and frequency ranges can be extended beyond nominal if required by the utility			

# Installation Map

To sheet \_\_\_\_\_

N S E W (circle one) 	Panel Group: Azimuth: Tilt: Sheet ___ of ___		Customer Information:								DTU Serial Number:							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14				
<b>A</b>																		
<b>B</b>																		
<b>C</b>																		
<b>D</b>																		

To sheet \_\_\_\_\_

## Accessories Details

Accessories			
Name	Function	Applicable models	Picture
DC Extension Cable	Provide extended connection between microinverter & PV model; With x1 MC4 male and x1 MC4 female connector.	MI1000/1200	
AC Extension Cable	To extend cable length; with male connector and female connector.	All	
AC End Cable-F	Provide connection from last microinverter to distribution box; One female connector with 2m 12 AWG cable.	All	
AC Female Connector	AC female connector is provided to make AC end cable or AC extension cable.	All	
AC Male Connector	AC male connector is provided to make AC end cable or AC extension cable.	All	
AC Female End Cap	IP67 female end cap is provided to seal AC female connector of microinverter.	All	
AC Male End Cap	IP67 male end cap is provided to seal AC male connector of microinverter.	All	
DC Connector Unlock Tool	Used to remove DC connectors.	All	
AC Connector Unlock Tool	Used to unlock AC connectors.	All	
Screw	Install one microinverter on the rail by 2 pcs of M8*25 screws.	All	