



MICROINVERTER

User Manual

(Model: MI-500 /MI-600 /MI-700)



User Manual

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INTRODUCTION

Thank you for using **MI-500 /MI-600 /MI-700** Microinverter! This **Microinverter system** is the world's most technologically advanced inverter system 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. Different from systems that photovoltaic modules are subdivided into strings and controlled by one or several inverters, this system is built for the incorporation of a Microinverter for each photovoltaic module. Each Microinverter works independently of the others to guarantee maximum power of each photovoltaic module. This setup enables direct control over the production of a single photovoltaic module, consequently improving the flexibility and reliability of the system.

This manual contains important instructions for the **MI-500 /MI-600 /MI-700** 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.

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Hoymiles can provide commissioning. Please contact Hoymiles customer service at 086-0571-89775158. More information at website:

<http://www.hzconverter.com/cn/index.php>




SAFETY

IMPORTANT SAFETY INSTRUCTIONS!







PLEASE KEEP THIS INTRODUCTION IN A SAFE PLACE!

SYMBOL ILLUSTRATION

The safety symbols used in this manual are list below and illustrated in detail.


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.

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

Symbol	Usage
	<p>Treatment</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>Caution</p> <p>Do not come within 8 inches (20cm) of the microinverter for any length of time while it is in operation.</p>
	<p>Danger of high voltages</p> <p>Danger to life due to high voltage in the microinverter.</p>
	<p>Beware of hot surface</p> <p>The inverter can become hot during operation. Avoid contact with metal surfaces during operation.</p>
	<p>CE mark</p> <p>The inverter complies with the requirements of the Low Voltage Directive for the European Union.</p>
	<p>Read manual first</p> <p>Please read the installation manual first before installation, operation and maintenance.</p>

INSTALLATION WARNINGS

The **MI-500 /MI-600 /MI-700** Microinverter is designed and tested according to international safety requirements (**IEC62109-1/-2, VDE4105, VDE0126, AS 4777.1 /2& AS 3000**). However, certain safety precautions must be taken when installing and operating this inverter. The installer must read and follow all instructions, cautions and warnings in this installation manual

 <p>CAUTION</p>	<ul style="list-style-type: none"> ➤ All operations including transport, installation, start-up and maintenance, must be carried out by qualified, trained personnel.
	<ul style="list-style-type: none"> ➤ 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.
	<ul style="list-style-type: none"> ➤ 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).
	<ul style="list-style-type: none"> ➤ 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.
	<ul style="list-style-type: none"> ➤ 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.
	<ul style="list-style-type: none"> ➤ Use personal protective equipment, including gloves and eye protection when working.
	<ul style="list-style-type: none"> ➤ Inform the manufacturer about non-standard installation conditions.
	<ul style="list-style-type: none"> ➤ Do not use the equipment if any operating anomalies are found. Avoid temporary repairs.
	<ul style="list-style-type: none"> ➤ 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.
	<ul style="list-style-type: none"> ➤ Liabilities arising from commercial components are delegated to their respective manufacturers.
<ul style="list-style-type: none"> ➤ 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 of the equipment 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.

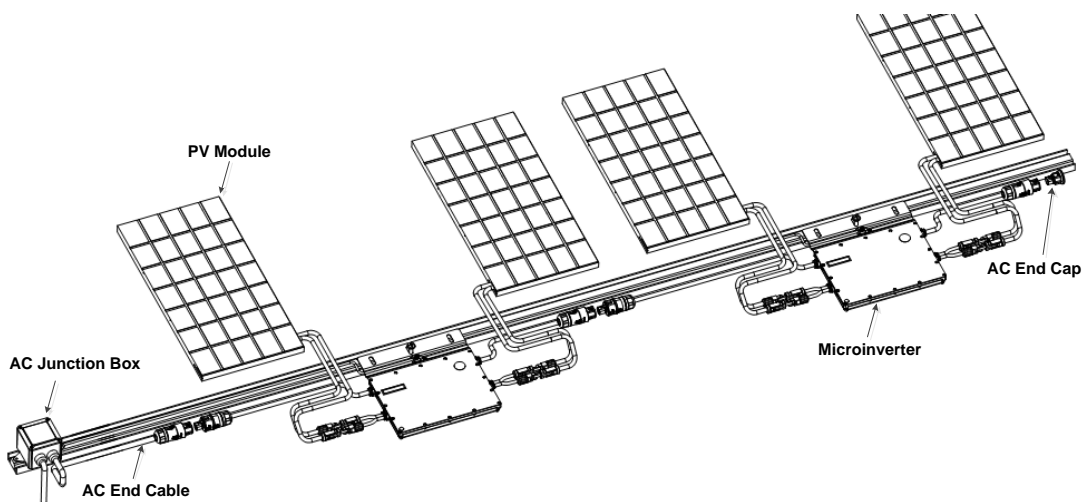
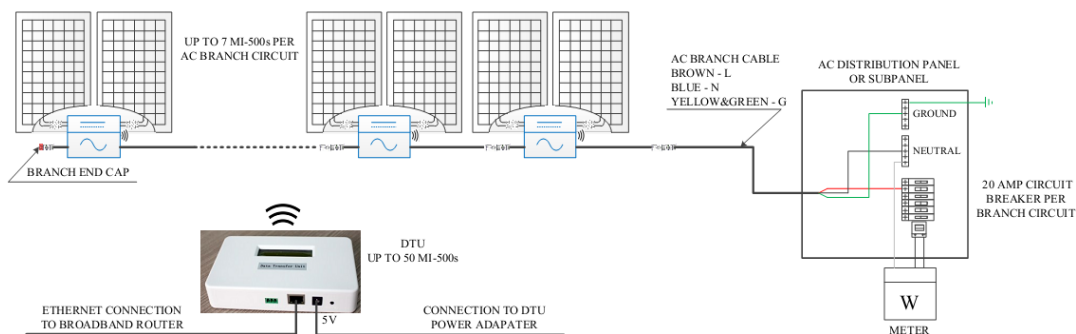


Fig.1. Installation position of Microinverter

MOUNTING AND WIRING

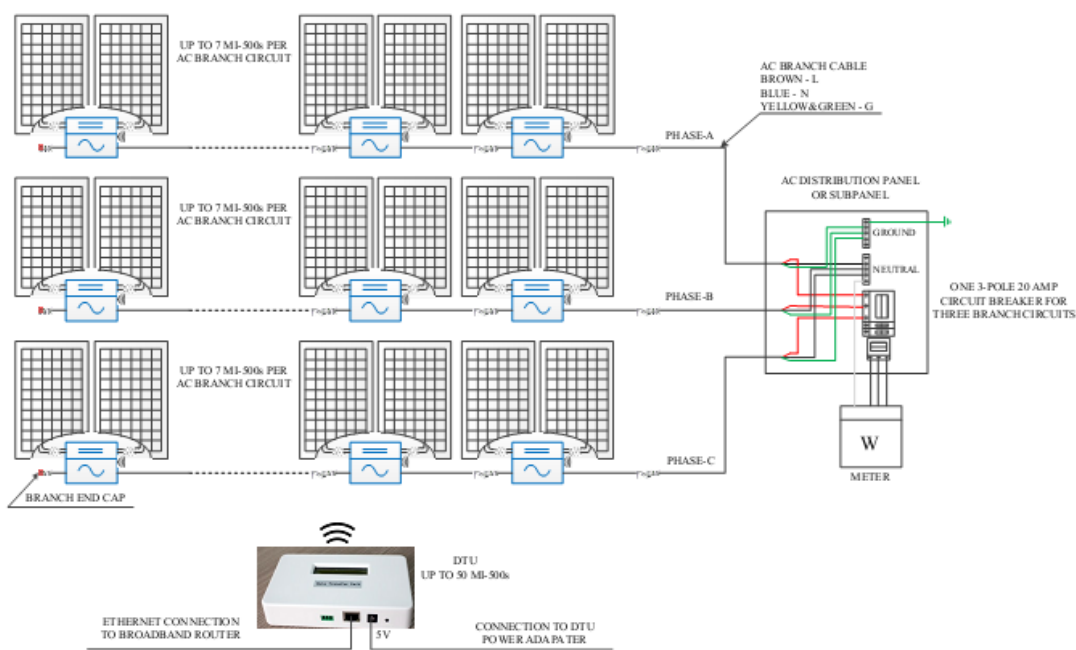
INSTALLING DIAGRAM

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-500 /MI-600 /MI-700 Microinverter wiring diagram

Note 1: 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.

Note 2: Each branch should provide a 20A circuit breaker, but no need for central

protection unit.

Assembly Diagram

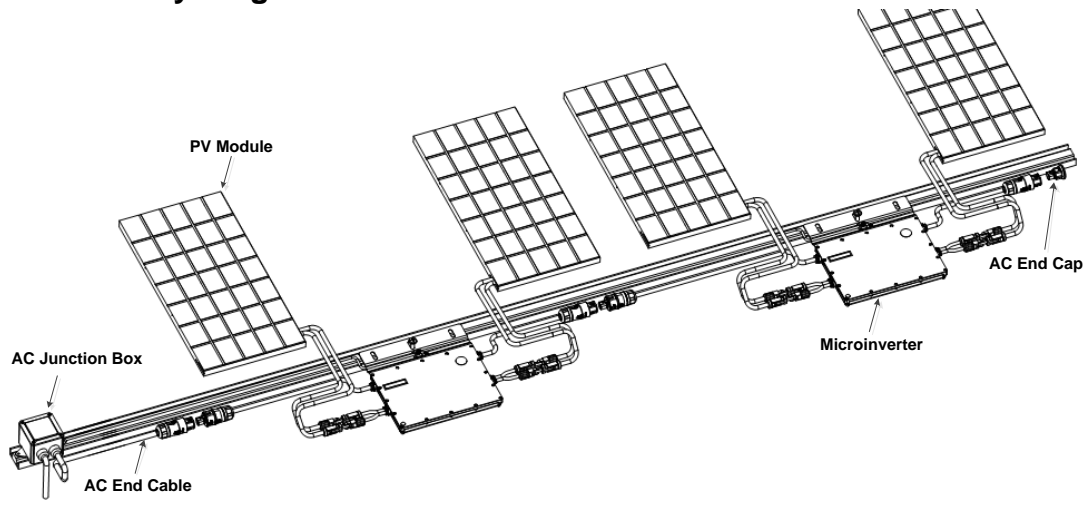
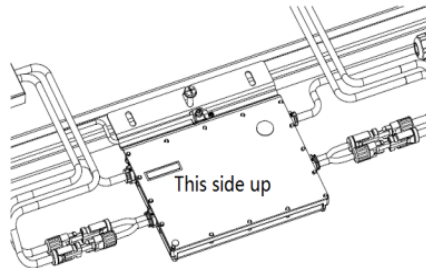


Fig.3. Assembly Illustration

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!

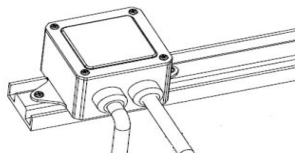


CAUTION

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.



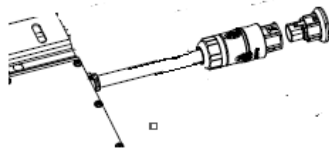
- b. Provide an AC connection from the AC junction box back to the electricity network connection using equipment and practices as required by local jurisdictions.

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

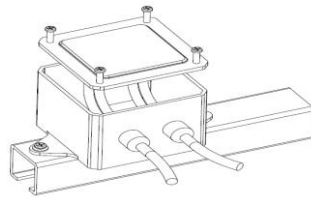


- b. Install the AC End Cap on the open AC connector of the last microinverter in the AC branch circuit



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.



WARNING

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



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.

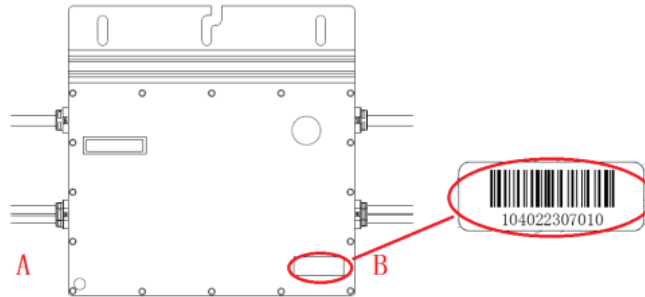


WARNING

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.

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-500 are identified by A and B. The left input is A and the right one is B, shown as above.

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

To sheet _____

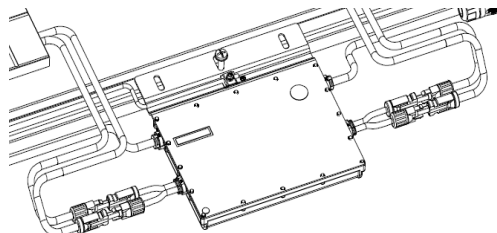
N S E W (circle one)		Panel Group: Azimuth: Tilt: Sheet		Customer Information:				DTU Serial Number:							
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
To sheet _____	A	A	B												
	B														
	C	A													
	D	B													

To sheet _____

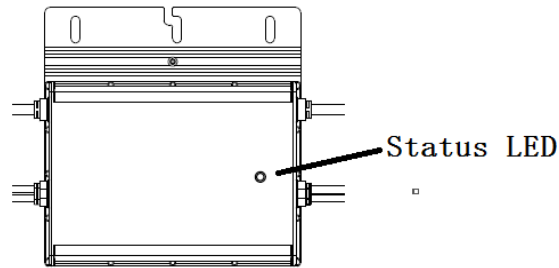
Note: the serial number label of MI-500 should be affixed between two blanks and mark A and B to identify the two connected PV panels.

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.



WARNING

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.



WARNING

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

Step 7. Energize the System

- a. If applicable, turn on the AC disconnect or circuit breaker for the branch circuit.
- b. 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.

Post-Startup LED Indications

Flashing Slow Green (4s gap): Producing power and communicating with DTU

Flashing Fast Green (2s gap): Producing power and not communicating with DTU

Flashing Red : Not producing power. AC grid invalid (Voltage or frequency out of range)

Solid Red: 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.

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!



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



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.



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 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

1. 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

Note: The connection and synchronisation occur three minutes, at the earliest, after voltage and frequency have come within the normal production range

2. Active power control at over frequency

The default value f_R is 50.20 Hz, and can be adjusted to any value in the 50.00-52.00 Hz range with an accuracy of 10 mHz. The default value for droop is 4% of P_n , and can be adjusted to any value in the range 2-12% of P_n

3. Constraint functions

Absolute power constraint and ramp rate constraint function are provided and meets the TR3.2.1 standard, these functions are deactivated by default.

4. Reactive power control

Three kinds of reactive power control is provided, which is shown below.

Reactive power control function	Technical data	Remark
Q control	10VAr resolution	deactivated
Power Factor control	0.85 leading to 0.85 lagging	deactivated
Automatic Power Factor control	activation level is 1.05Un deactivation level is 1.0 Un	deactivated

TECHNICAL DATA

Model	MI-500
Input data(DC)	
Recommended input power (W)	200~310,200~310
MPPT voltage range (V)	27~48, 27~48
Operating voltage range (V)	16~60 , 16~60
Maximum input voltage (V)	60 , 60
Maximum input current (A)	10.5, 10.5
Maximum short circuit current limit (A)	15, 15
Output Data (AC)	
Rated output power (W)	500
Rated output current (A)	2.17
Nominal output voltage/range (V)	230/180-275 ¹
Nominal frequency/range (Hz)	50/45-55 ¹
Power factor	>0.99
Output current harmonic distortion	<3%
Max. inverter backfeed current to the array (A)	0
Maximum output overcurrent protection (A)	20
Maximum output fault current	85.2 Apk, 2.50 ms of duration, 6.12 Arms
Maximum Units per 20A Branch	6
Efficiency	
Peak inverter efficiency	96.7%
CEC weighted efficiency	96.5%
Nominal MPPT efficiency	99.8%
Night time power consumption (mW)	<50
Mechanical Data	
Ambient temperature range (°C)	-40 ~ +65
Operating temperature range (°C)	-40 ~ +85
Relative humidity (%RH)	0-100% condensing
Maximum operating altitude without derating (m)	2000
Dimensions (W×H×D mm)	250×170×28
Weight (kg)	3.0
Enclosure rating	IP67, outdoor use
Cooling	Natural convection – No fans
Features	
Communication	Wireless
Warranty	15~25 years
¹ Volatage and frequency ranges can be extended beyond nominal if required by the utility	

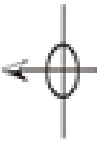

Model	MI-600
Input data(DC)	
Recommended input power (W)	200~350 , 200~350
MPPT voltage range (V)	29~48 , 29~48
Operating voltage range (V)	16~60 , 16~60
Maximum input voltage (V)	60 , 60
Maximum input current (A)	11.5, 11.5
Maximum short circuit current limit (A)	15, 15
Output Data (AC)	
Rated output power (W)	600
Rated output current (A)	2.61
Nominal output voltage/range (V)	230/180-275 ¹
Nominal frequency/range (Hz)	50/45-55 ¹
Power factor	>0.99
Output current harmonic distortion	<3%
Max. inverter backfeed current to the array (A)	0
Maximum output overcurrent protection (A)	20
Maximum output fault current	110.0 Apk, 2.10 ms of duration, 7.56 Arms
Maximum Units per 20A Branch	5
Efficiency	
Peak inverter efficiency	96.7%
CEC weighted efficiency	96.5%
Nominal MPPT efficiency	99.8%
Night time power consumption (mW)	<50
Mechanical Data	
Ambient temperature range (°C)	-40 ~ +65
Operating temperature range (°C)	-40 ~ +85
Relative humidity (%RH)	0-100% condensing
Maximum operating altitude without derating (m)	2000
Dimensions (W×H×D mm)	250×170×28
Weight (kg)	3.0
Enclosure rating	IP67, outdoor use
Cooling	Natural convection – No fans
Features	
Communication	Wireless
Warranty	15~25 years
¹ Volatage and frequency ranges can be extended beyond nominal if required by the utility	
Model	MI-700
Input data(DC)	
Recommended input power (W)	250~400 , 250~400

MPPT voltage range (V)	33~48 , 33~48
Operating voltage range (V)	16~60 , 16~60
Maximum input voltage (V)	60 , 60
Maximum input current (A)	11.5, 11.5
Maximum short circuit current limit (A)	15, 15
Output Data (AC)	
Rated output power (W)	700
Rated output current (A)	3.04
Nominal output voltage/range (V)	230/180-275 ¹
Nominal frequency/range (Hz)	50/45-55 ¹
Power factor	>0.99
Output current harmonic distortion	<3%
Max. inverter backfeed current to the array (A)	0
Maximum output overcurrent protection (A)	20
Maximum output fault current	130.0 Apk, 2.02 ms of duration, 7.94 Arms
Maximum Units per 20A Branch	5
Efficiency	
Peak inverter efficiency	96.7%
CEC weighted efficiency	96.5%
Nominal MPPT efficiency	99.8%
Night time power consumption (mW)	<50
Environmental & Mechanical Data	
Ambient temperature range (°C)	-40 ~ +65
Operating temperature range (°C)	-40 ~ +85
Relative humidity (%RH)	0-100% condensing
Maximum operating altitude without derating (m)	2000
Dimensions (W×H×D mm)	250×170×28
Weight (kg)	3.0
Enclosure rating	IP67, outdoor use
Cooling	Natural convection – No fans
Features	
Communication	Wireless
Warranty	15~25 years
¹ Volatage and frequency ranges can be extended beyond nominal if required by the utility	

INSTALLATION MAP

To sheet _____

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
A														
B														
C														
D														

To sheet _____

To sheet _____