AIMS POWER™
A DIVISION OF THE AIMS CORPORATION

MICRO-INVERTER

PIGRID250

250W MICRO GRID TIED INVERTER

208, 220, 230, 240VAC

TECHNICAL MANUAL

CONTENTS

INTRODUCTION

Thank you for using PIGRID250 Micro-Inverter! This Micro-Inverter system is the world's most technologically advanced inverter system with high efficiency, flexibility, safety and reliability for use in utility-interactive applications.

This system is composed of a group of Micro-inverters 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 Micro-inverter for each photovoltaic module. Each Micro-inverter 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 PIGRID250 Micro-inverter 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 should install and maintain this Micro-inverter under the guide of this document.

PIGRID250 is a 250W maximum Grid Tied Micro-inverter, and is designed to operate on 208Vac, 220Vac, 230Vac or 240Vac split phase AC grid connections.

This document applies only to the inverter model listed in Table 1 below:

Table 1

Output Power	Model Number
250W	PIGRID250

For technical assistance or to find out where to buy this or related products you may contact AIMS Power via email sales@aimscorp.net or Techsupport@aimscorp.net or call us at (775)359-6703.

SAFETY

IMPORTANT SAFETY INSTRUCTIONS!

PLEASE SAVE THESE INSTRUCTIONS 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 its 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.**

INSTALLATION WARNINGS

The PIGRID250 Micro-inverter is designed and tested according to international safety requirements (UL 1741/IEEE 1547). 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

 **CAUTION**	➢ 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 Micro-inverter 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).
	➢ AIMS Power DOES NOT provide AC output overcurrent protection. To reduce the risk of fire, connect only to a circuit with 20A maximum branch circuit overcurrent protection in accordance with the National Electric Code (ANSI/NFPA 70)
	➢ The AC output (neutral) is not bonded to ground .
	➢ Only one photovoltaic module can be connected to 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, or extreme humidity. Do not use the equipment when the safety devices do not work or are 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 AIMS Power 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.
	➢ AIMS Power accepts No liability for damage from incorrect or careless operation

PREPARE FOR INSTALLING

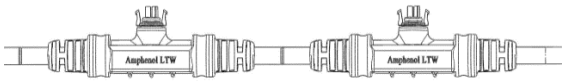
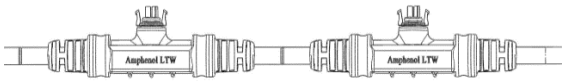
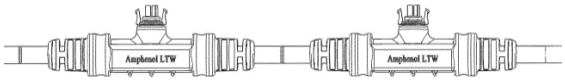
TRANSPORTION AND INSPECTION

AIMS Power 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 of the packaging materials in an appropriate way to avoid unforeseen injury.

It is the customer's responsibility to examine the condition of the components transported. Once receiving the Micro-inverter, it is necessary to check the container for any external damage and verify receipt of all items. Call AIMS Power, the Shipper or the 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.

Table 2 lists components for use with PIGRID250,

Table 2

Code	Description
AC trunk spool_41inches_50plugs 	**AC cable (4conducotors)** **10AWG** **Plug inches 41**
AC trunk spool_67inches_32plugs 	**AC cable (4conducotors)** **10AWG** **Plug inches 67**
AC trunk spool_81inches_27plugs 	**AC cable (4conducotors)** **10AWG** **Plug inches 81**
AC trunk plug cap 	**Insulated AC cap for AC cable connectors**
AC trunk end cap 	**End cap for 10 AWG AC cable**
AC trunk unlock tool 	**Tool for releasing connectors**

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 de-rating 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 Micro-inverter underneath the photovoltaic modules so that they work in the shade. If this condition cannot be met, the inverter could undergo de-rating.

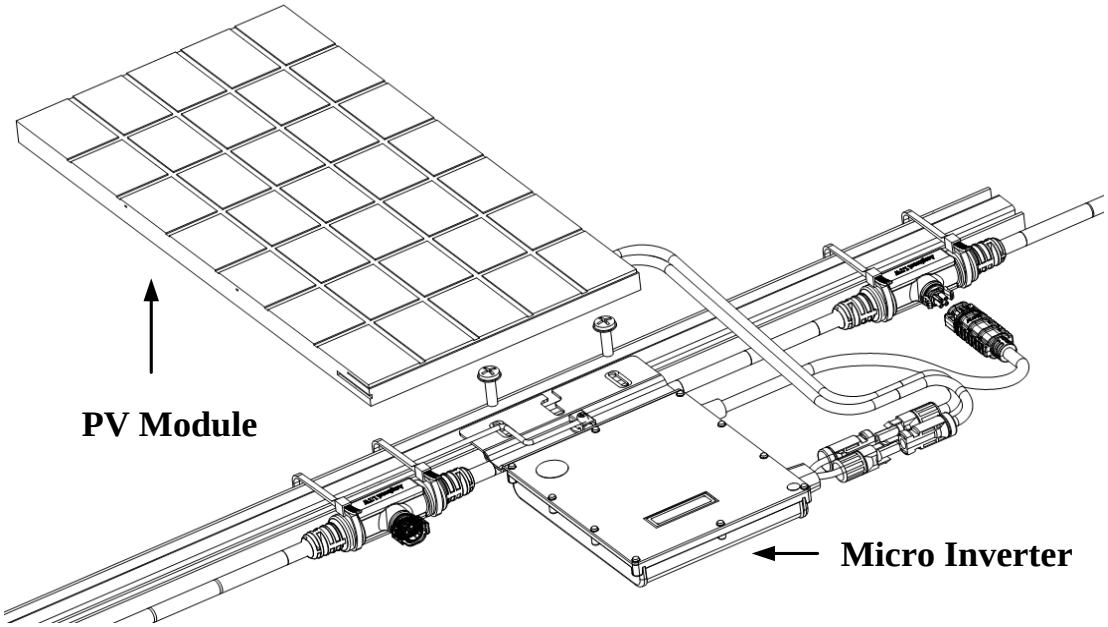


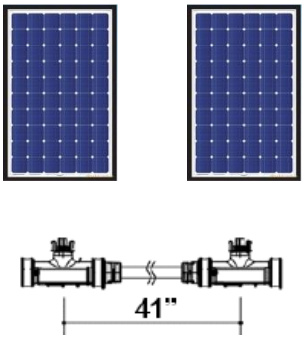
Fig.1. Installation position of Micro-inverter

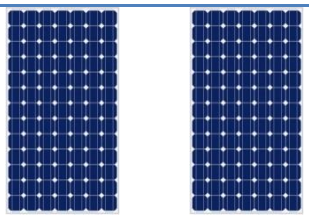
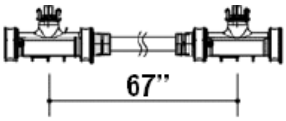
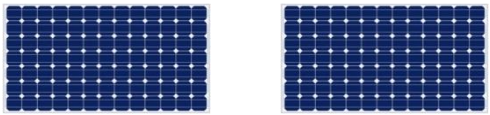
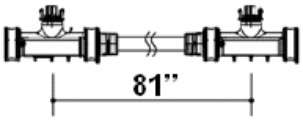
CHOOSE AC CABLE

The AC cable is shipped on a reel with the connectors pre-mounted. The available spacing between connectors is: 41", 67", and 81". The installer is responsible for choosing the AC cable model with the correct spacing on the basis of the orientation (shown below) and type of photovoltaic modules.

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

Table 3

AC Cable Items	Photovoltaic Modules Orientation Illustration
AC-TRUNK Spool **41 Inches** **50 Plugs**	**60 Cells** 

AC-TRUNK Spool **41 Inches** **50 Plugs**	 **72 Cells** 
AC-TRUNK Spool **67 Inches** **32 Plugs**	 **60 Cells** 
AC-TRUNK Spool **81 Inches** **27 Plugs**	 **72 Cells** 

* Note: The AC-TRUNK SPOOL may contain a number of connectors indicated by the number of plugs in the part number. The installer may cut the cable to the length needed for the specific installation.

MOUNTING AND WIRING

INSTALLATION DIAGRAM

System Schematic Diagram

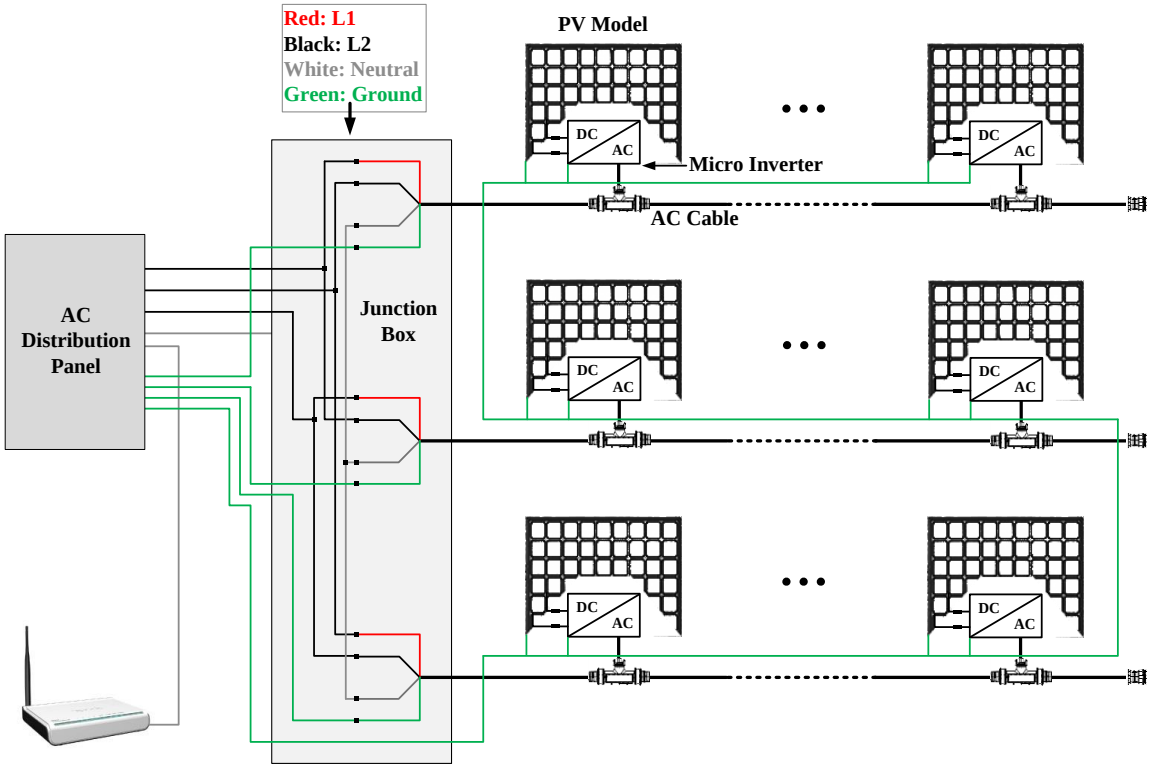


Fig.2. 208Vac three phase

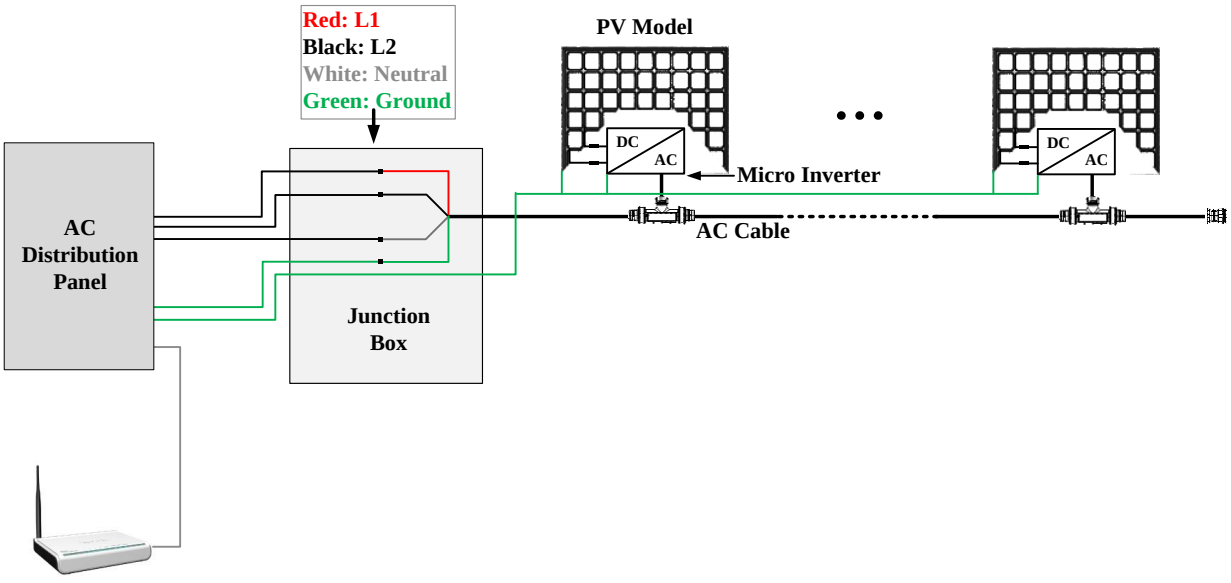


Fig.3. 220Vac, 230Vac, 240Vac split phase

Assembly Diagram

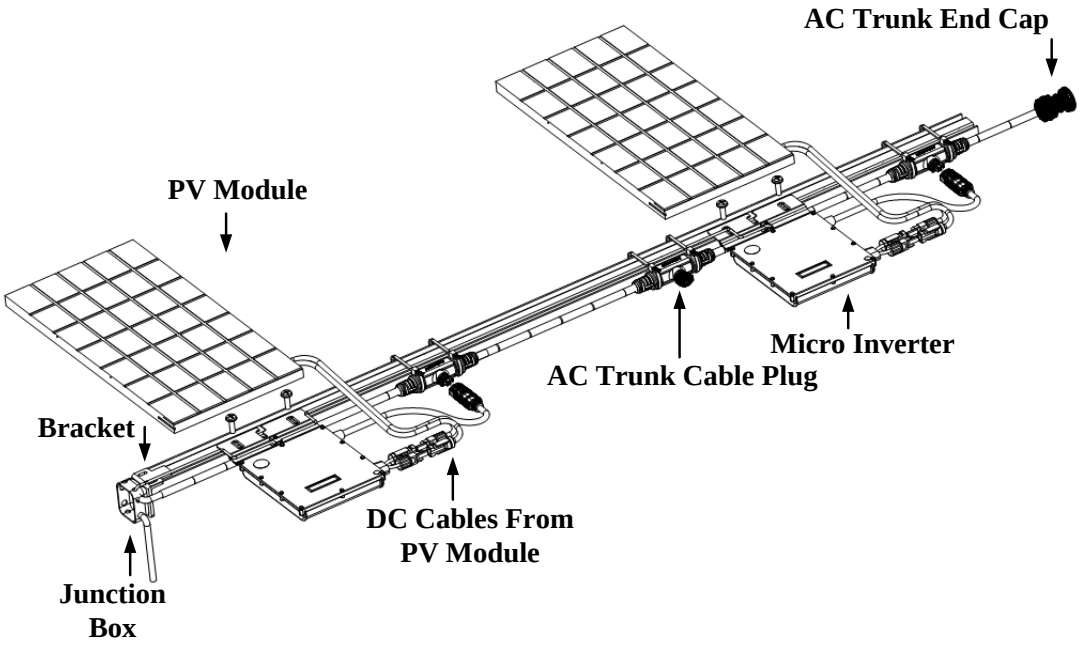


Fig.4. Assembly Illustration

ASSEMBLY INSTRUCTIONS

Step 1. Wire AC Cable

Wire the AC cable along the frame structure of photovoltaic modules.

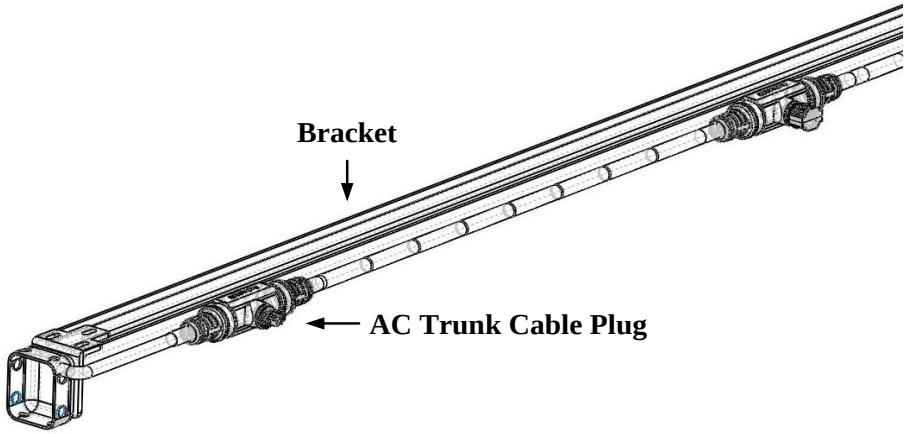


Fig.5. Wiring the AC cable

Ensure that the cable matches the installation conditions, particularly in regards to the number of the modules and their orientation.

The number of the Micro-inverters should not exceed the maximum number permitted for installation.

Step 2. Install Micro-inverter

Mark the approximate center of each photovoltaic module on the frame and install the Micro-inverter with the logo side facing downwards.

Ensure that the Micro-inverter does not block the stiffening braces of the photovoltaic modules and the connector can easily reach the connector on the AC cable.

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

Step 3. Grounding the System

The system must be grounded according to local laws. The inverter can typically be earth grounded using the connector clamp secured to the chassis and an adequately-sized conductor.

Equipment grounding conductor coupling all of the MICRO inverters:

The conductor must have a minimum cross section of 6 AWG（4.11mm）

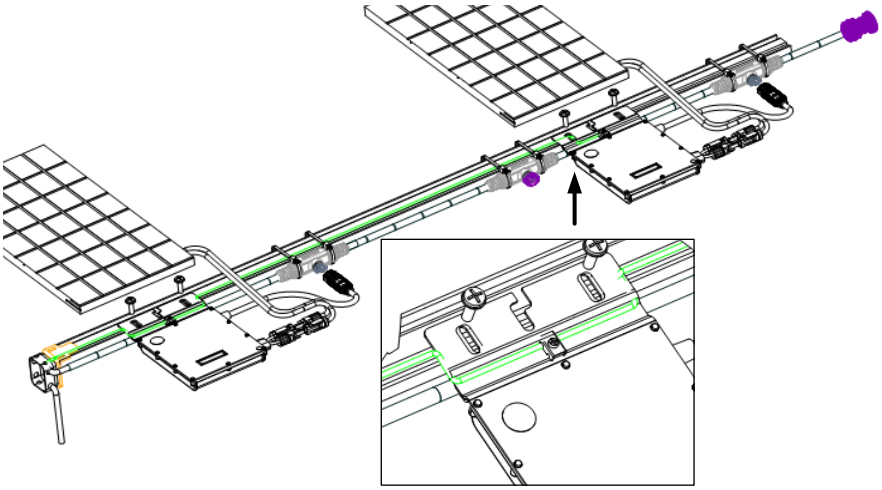


Fig.6. Typical Grounding

Incorrect grounding may cause physical injury, death or equipment malfunction and increase electromagnetic interference. Make sure that grounding conductors are adequately sized as required by safety regulations.

Step 4. Fasten AC Cable

Fasten the AC cable to the frame with cable ties or tie wraps. Each connector is provided with two slots for ideal fastening. If using nylon or materials that may decompose in sun light or over time, it is strongly recommended to inspect on occasion.

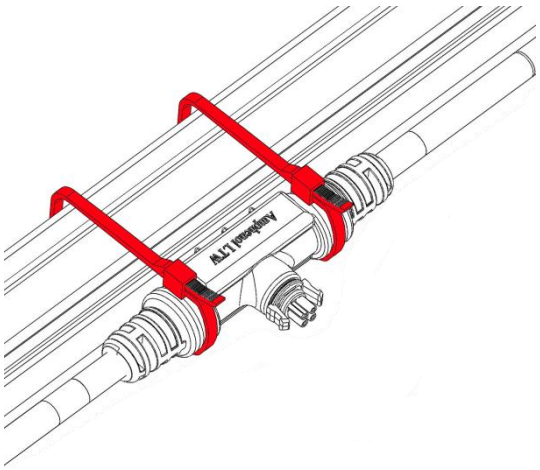


Fig.7. Fasten AC Cable

Step 5. Connect AC Cable of Micro-inverter

Remove the temporary cap and then connect the AC cable of the Micro-inverters to the AC-TRUNK cable connectors. The connectors are coupled correctly when two clicks are heard.

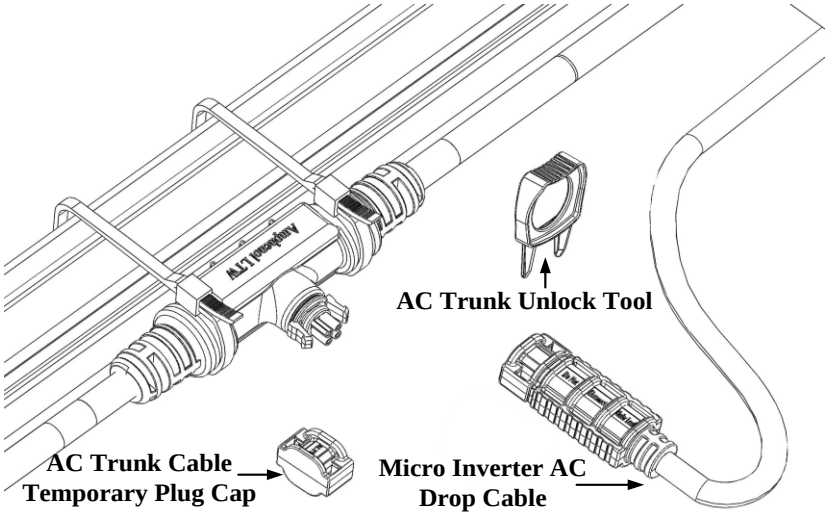


Fig.8. Connect AC Cable of Micro-inverter

CAUTION

The AC-TRUNK UNLOCK TOOL must be used for the disconnection of the AC connector from the MICRO inverter or for the removal of the AC-TRUNK PLUG CAP from the connectors on the ACTRUNK cable.

CAUTION

Protect any unused AC-TRUNK cable connectors by fitting the AC-TRUNK PLUG CAP on them to keep them watertight. The temporary caps are only fitted for shipping and provide no seal whatsoever!

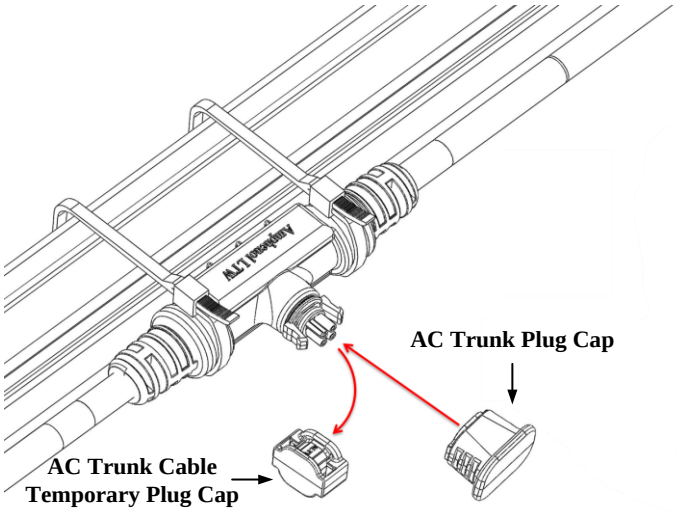


Fig.9. Unused Connectors

Step 6. Protecting Unused Ends

The unused ends of the AC-TRUNK cable must be terminated with the proper end. Fit the appropriate AC-TRUNK END CAP on the unused ends of the AC-TRUNK cable.

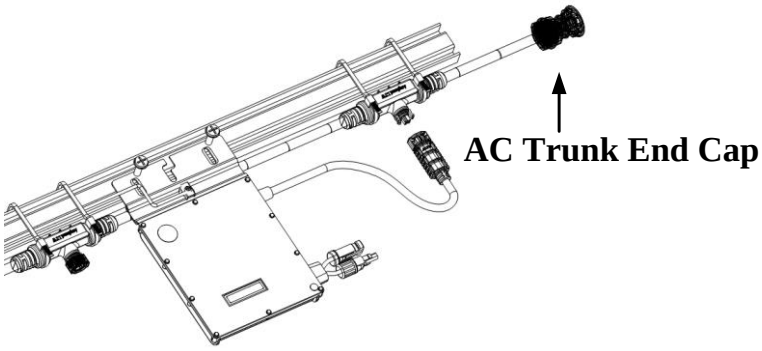


Fig.9. Unused Ends

Step 7. Connecting AC-TRUNK Cables to a Junction Box

Connect the AC-TRUNK cables coming from the MICRO inverters to a junction box. Close the junction box after the wiring is complete. Ensure that the seal is tight.

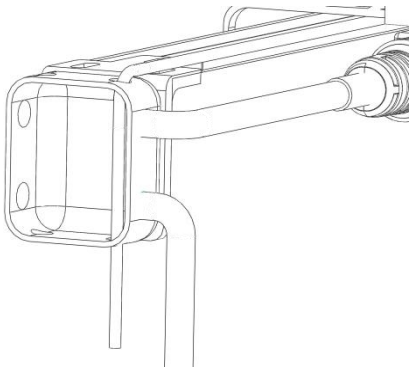


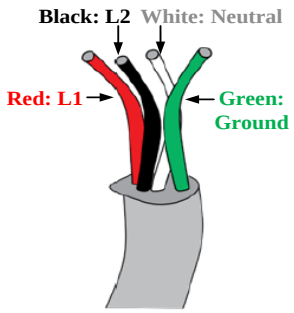
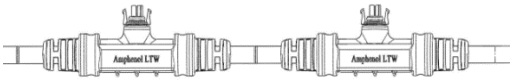
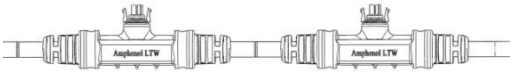
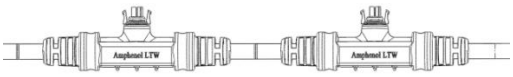
Fig.10. Junction Box

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

All the external connections to the insulated junction box (caps, adapters, etc.) should be made with securely-sealed AIMS Power components.

AIMS Power AC cables from the Micro-inverters have four conductors with different colors to identify the function of each conductor:

Table 4

	Code	Description
	AC trunk spool_41inches_50plugs 	**AC cable (4conducotors)** **10AWG** **Plug inches 41**
	AC trunk spool_67inches_32plugs 	**AC cable (4conducotors)** **10AWG** **Plug inches 67**
	AC trunk spool_81inches_27plugs 	**AC cable (4conducotors)** **10AWG** **Plug inches 81**

Pay special attention and ensure not to reverse the phase (load lines) with the neutral!

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

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 8. Drawing System Map

Draw a map of the system, affixing the extra label that comes attached to each inverter, on the appropriate position on the diagram (found in the Appendix of this manual).

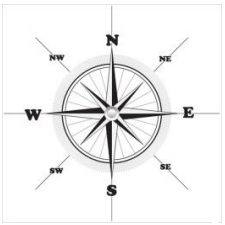
	**Customer Information:**		**Please affix the extra label that comes from each inverter, on the appropriate position on the diagram.**	AIMS POWER™ A DIVISION OF THE AIMS CORPORATION	
	1	**2**	**3**	**4**	**5**
A					
B					
C					
D					
E					

Fig.11. System Map

Step 9. Install Photovoltaic Modules

Install the photovoltaic modules, and connect the DC cables of the modules to the corresponding DC input side of the Micro-inverter.

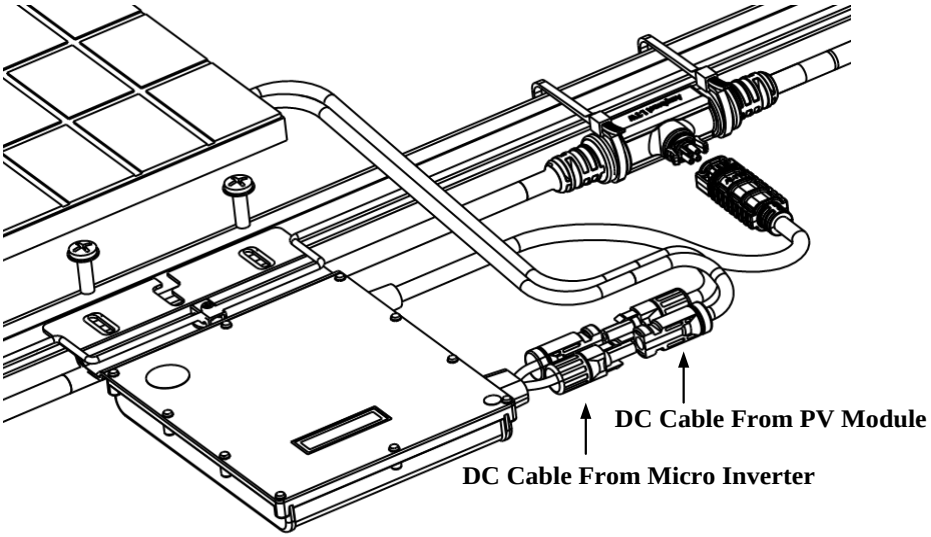


Fig.12. Connect DC Cables

The recommended installation requires keeping the Micro-inverters underneath the photovoltaic modules, so that the Micro-inverters can operate in the shade. Direct sunlight may cause damage to the Micro-inverters and will at minimum de-rate the performance.

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

MAINTENANCE GUIDE

ROUTINE MAINTENANCE

- Only authorized personnel are allowed to carry out the maintenance operations and are responsible to report any anomalies.
- Always use personal protective equipment when working on or around power equipment.
- During normal operation, check that the environmental and logistical 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 such as filth or vegetation.
- DO NOT use the equipment if any problems are found, and restore to normal conditions after the fault has been removed.
- Conduct an annual inspection on various components, and clean the equipment with a vacuum cleaner or special brushes. Do not hose down the inverters directly.

Do not attempt to dismantle the Micro-inverter or make any internal repairs! In order to preserve the integrity of safety and insulation, the Micro-inverters 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.
- Perform a complete inspection when restarting your system after a long period of being unused.
- Please dispose of the equipment properly after scrapping, as it is potentially harmful to the environment, in accordance with the regulations in force in the country of installation.

APPENDIX

TECHNICAL DATA

Model	PIGRID250
Input data(DC)	
Recommended PV module power (STC) range (W)	200~310
MPPT voltage range (V)	27~48
Operating voltage range (V)	16~60
Maximum input voltage (V)	60
Maximum input current (A)	10
Maximum input source back feed current to input source (A)	-36
Output Data (AC)	
Rated output power (W)	250
Rated output current (A)	1.04
Nominal output voltage/range (V)	240/211-264 [1]
Nominal frequency/range (Hz)	60/57-60.5 [1]
Power factor	>0.99
Output current harmonic distortion	<3%
Maximum output overcurrent protection (A)	20
Maximum Units per 20A Branch	14
Maximum output fault current (ac) and duration	66.67 Apk, 2.13 ms of duration, 11.22 Arms

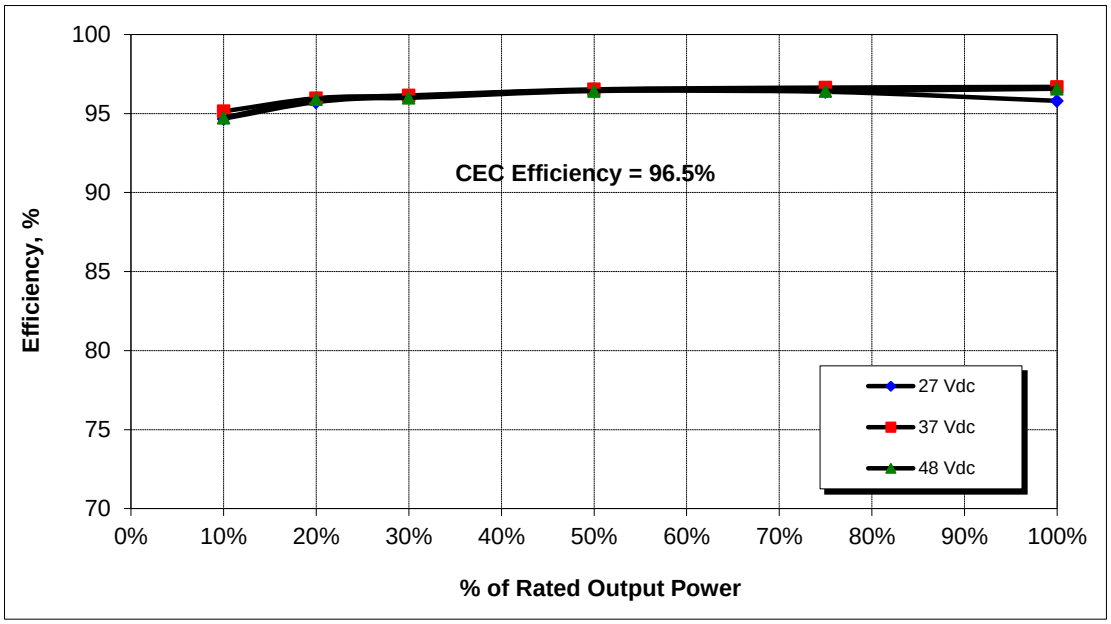
Utility interconnection voltage and frequency trip limits and trip times		See Note 1 below.
Trip limit and trip time accuracy	Voltage:	+/- 1%
	Frequency:	+/- 0.1 Hz
	Alternate Trip Time	+/- 50 ms
Efficiency		
Peak inverter efficiency		96.5%
CEC weighted efficiency		96.0%
Nominal MPPT efficiency		99.9%
Mechanical Data		
Ambient temperature range (℃)		-40 ~ +65
Operating temperature range (℃)		-40 ~ +85
Dimensions (W×H×D mm)		165×183×28
Weight (kg)		1.5
Enclosure rating		NEMA6
Cooling		Natural convection
Features		
Communication		Wireless
Warranty		Standard,15years Option, 20/25 years extended
[1] Voltage and frequency ranges can be extended beyond nominal if required by the utility		

Notes:

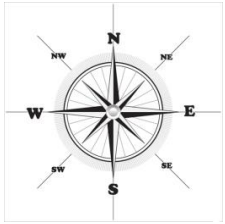
Utility Interconnection Voltage and Frequency Trip Limits and Trip Times:

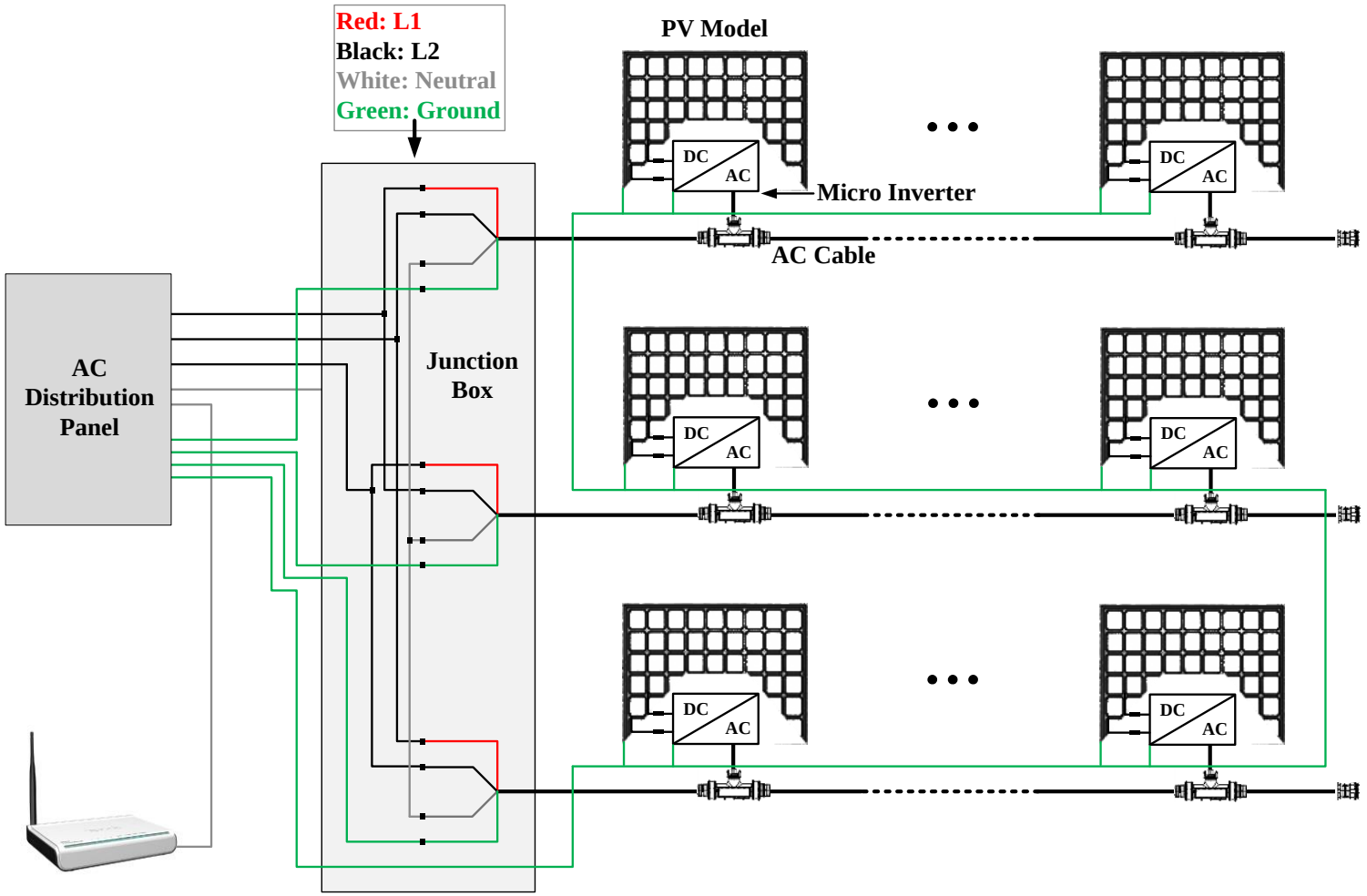
Voltage and frequency limits for utility Interaction			
Condition	Simulated utility source		Maximum time (sec) (cycles) at 60 Hz[a] before cessation of current to the simulated utility
	Voltage (V)	Frequency (Hz)	
A	< 0.50 V_{nor}	Rated	0.16
B	0.50 $V_{nor} \leq V < 0.88\ V_{nor}$	Rated	0.16-5
C	1.10 $V_{nor} < V < 1.20\ V_{nor}$	Rated	0.16-5
D	1.20 $V_{nor} \leq V$	Rated	0.16
E	Rated	f > 60.5	0.16
F	Rated	f < (59.8 - 57.0) (adjustable set point)	0.16 - 300 seconds (adjustable)

EFFICIENCY CURVES

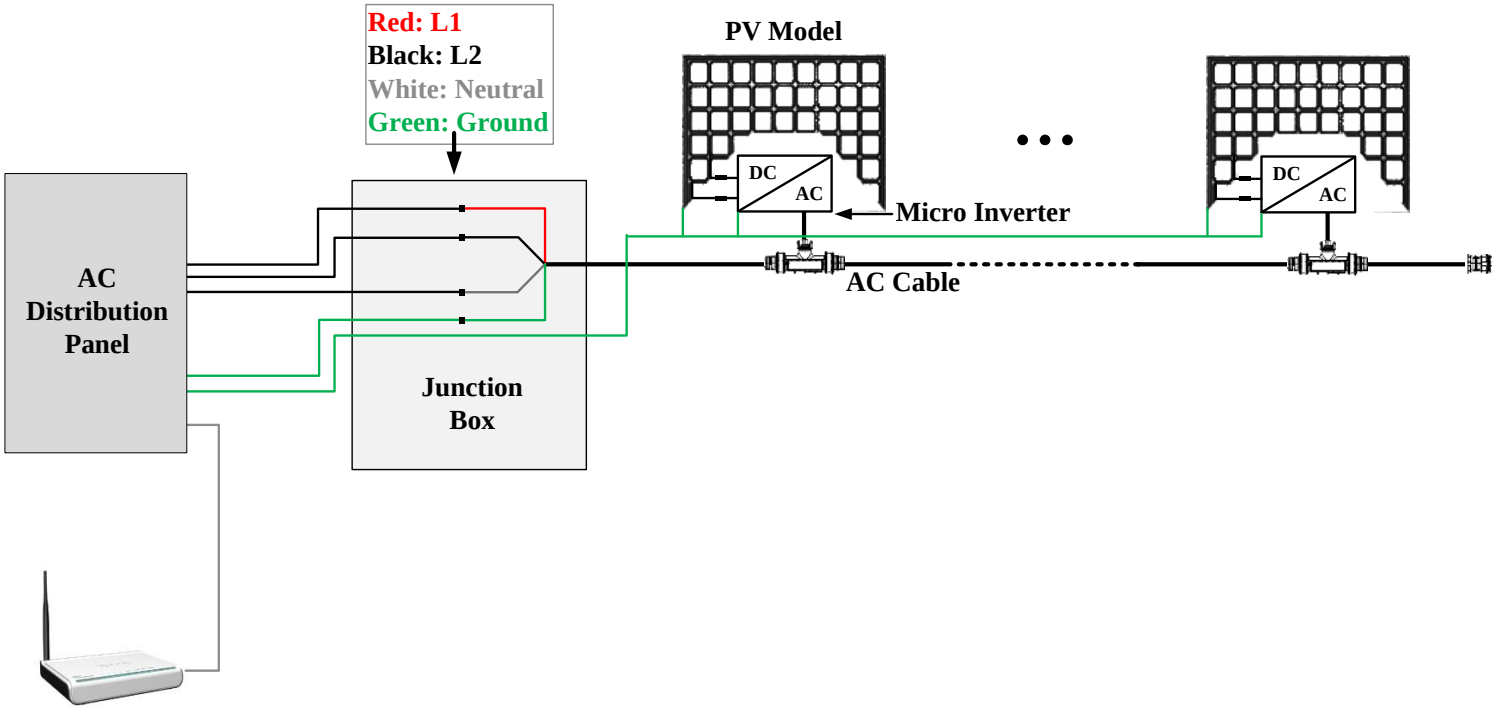


TEMPLATE FOR MAP OF MICRO-INVERTER INSTALLATION

	**Customer Information:**		**Please affix the extra label that comes from each inverter, on the appropriate position on this diagram.**		AIMS POWER™ A DIVISION OF THE AIMS CORPORATION
	1	**2**	**3**	**4**	**5**
A					
B					
C					
D					
E					



208Vac three phase



240Vac split phase

Warranty Instructions:

This product is designed using the most modern digital technology and under very strict quality control and testing guide lines. If however you feel this product is not performing as it should, please contact us:

techsupport@aimscorp.net or (775)359-6703

We will do our best to resolve your concerns. If the product needs repair or replacement, make sure to keep your receipt/invoice, as that will need to be sent back along with the package and RA# prepaid to AIMS. You have a full 1 year from date of purchase warranty.

This warranty is valid world wide with the exception that freight and duty charges incurred outside the contiguous 48 United States will be prepaid by customer.

Except as provided above, AIMS makes no warranty of any kind, express or implied, including without limitation the implied warranties of merchantability and fitness for a particular purpose. In no event shall AIMS be liable for indirect, special or consequential damages. This warranty only applies to AIMS Power branded products. All other name brand products are warranted by and according to their respective manufacturer. Please do not attempt to return non-AIMS Power branded products to AIMS Power.

For additional products such as:

- Modified sine wave inverters
- Pure sine wave inverters
- Low Frequency Inverters
- Solar Charge Controllers
- Micro Grid Tied Inverters
- Inverter Chargers and Automatic transfer switches
- Converters AC-DC and DC-DC
- Custom cut cables
- Batteries
- Solar Panels & Racks

Please visit our web site: www.aimscorp.net

To find out where to buy any of our products, you may also e-mail: sales@aimscorp.net or call (775)359-6703.