power-one®
Renewable Energy Solutions

AURORA®

Photovoltaic Inverters

THE MANUAL: MICRO

Model Number: MICRO-0.25-I-OUTD-US-208/240
MICRO-0.3-I-OUTD-US-208/240

AURORA MICRO ®
Grid Tied Inverters

MICRO-0.25/0.3-I-OUTD-US-208/240

Technical Manual

Power-One

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Table of Revisions

Revision Number	*Author*	*Date*	*Approved by*	*Description of Modification*
AA	***Tech docs***	***12/6/12***	***BCG.00612, BCM.00138***	***New release***
AB	***Tech docs***	***2/4/13***	***BCG.00612, BCM.00138***	***New data sheet, new label, modify overcurrent table 3-1***

Contents

PART 1 INTRODUCTION AND SAFETY

1.1 INTRODUCTION

This manual contains important instructions for models indicated on the front cover that shall be followed during installation and maintenance of the inverter.

THE INSTALLER MUST READ THIS DOCUMENT IN ITS ENTIRETY BEFORE INSTALLING OR COMMISSIONING THIS EQUIPMENT.

1.1.1 PURPOSE

The purpose of this document is to support the qualified technician, who has received training and/or has demonstrated skills and knowledge in construction to install and maintain this Power-One AURORA MICRO ® grid tied inverter. This manual does not cover any details concerning equipment connected to the inverter such as the solar modules. Information concerning the connected equipment is available from the respective manufacturer.

This manual is a guide that will enable installers to work safely, install the MICRO system and maintain it in good working order.

1.1.2 INSTALLATION

The installation is to be done by a qualified installer, normally a licensed electrician or contractor, according to the applicable local code regulations (National Electric Code (NEC), Canadian Electric Code (CEC), and other).

For safety reasons only a qualified electrician, who has received training and/or has demonstrated skills and knowledge in construction and in operation of this unit, can install this inverter.

1.1.3 VALIDITY AND AVAILABLE MODELS

There are two models of the MICRO, delineated by the maximum output power (0.25 kW or 0.3 kW). Each version is also available for either a 240Vac split phase or 208Vac single phase AC grid connection.

This document applies only to the inverter models listed in Table 1-1. All model dimensions are 15.0” x 9.7” x 1.37” and weigh 3-1/2 lb (1.65kg).

Table 1-1: Inverter models available

Output power	Model number
250 Watts	MICRO-0.25-I-OUTD-US-208/240
300 Watts	MICRO-0.3-I-OUTD-US-208/240

1.1.4 NAMEPLATE

The nameplate shown below is affixed to the inverter and provides the following information:

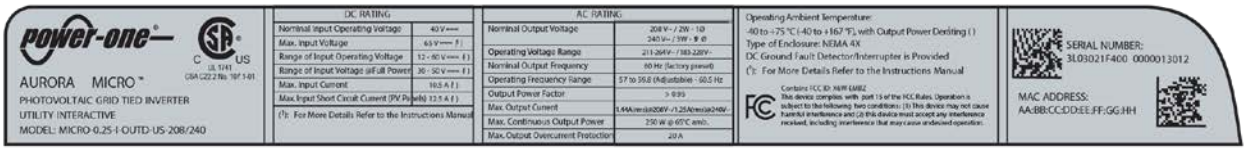
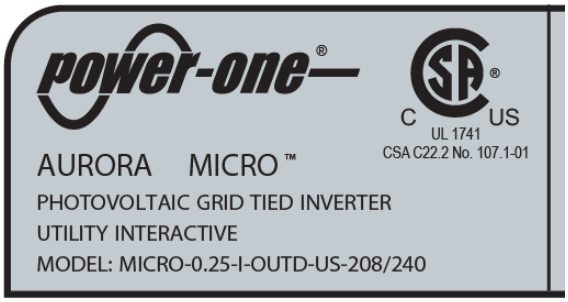


Table 1-2: Product nameplate

Certification

Model name



DC Rating

DC RATING	
Nominal Input Operating Voltage	40 V ⎓
Max. Input Voltage	65 V ⎓ (1)
Range of Input Operating Voltage	12 - 60 V ⎓ (1)
Range of Input Voltage @Full Power	30 - 50 V ⎓ (1)
Max. Input Current	10.5 A (1)
Max. Input Short Circuit Current (P.V. Panels)	12.5 A (1)
(1): For More Details Refer to the Instructions Manual	

AC Rating

AC RATING	
Nominal Output Voltage	208 V~ / 2W - 1Ø 240 V~ / 3W - 1Ø
Operating Voltage Range	211-264V~ / 183-228V~
Nominal Output Frequency	60 Hz (factory preset)
Operating Frequency Range	57 to 59.8 (Adjustable) - 60.5 Hz
Output Power Factor	> 0.95
Max. Output Current	1.44A(rms)@208V~/1.25A(rms)@240V~
Max. Continuous Output Power	250 W @ 65°C amb.
Max. Output Overcurrent Protection	20 A

Environmental rating

Operating Ambient Temperature:
-40 to +75 °C (-40 to +167 °F), with Output Power Derating (1)
Type of Enclosure: NEMA 4X
DC Ground Fault Detector/Interrupter is Provided
(1): For More Details Refer to the Instructions Manual

Contains FCC ID: X6W-EMBZ
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

Serial number

SERIAL NUMBER:
3L03021F400 0000013012

MAC address

MAC ADDRESS:
AA:BB:CC:DD:EE:FF:GG:HH

1.1.5 COMMISSIONING

Power-One can provide commissioning (initial setup and power up). Please contact Power-One Customer Service at 1-877-261-1374.

1.1.6 Maintenance and Service

The MICRO inverter has no user-serviceable parts. Maintenance and service procedures must comply with the manufacturer's documentation. For more detailed information see Maintenance, Part 6, in this document.

1.1.7 Figures and Images in this Manual

The photos in this manual may differ slightly from the final model shipped and the color of the components may not match those illustrated; however, the information is still applicable.

1.1.8 Storage of this Information

Keep this document in a safe place near the AURORA MICRO inverter for easy access during installation and maintenance. It must be accessible for approved service and maintenance personnel at any time.

1.1.9 Additional Information

More information on Power-One's AURORA MICRO inverter can be found at www.power-one.com.

1.1.10 Conditions of Warranty

Warranty Conditions can be found on the Power-One Renewable Energy website located in the download section of the AURORA MICRO inverter product page.

IMPORTANT SAFETY INSTRUCTIONS!

SAVE THESE INSTRUCTIONS – KEEP IN A SAFE PLACE!

1.2 SAFETY

1.2.1 WARNINGS IN THIS DOCUMENT

This is a list of special safety symbols used in this manual that highlights potential safety risks and/or useful information. The symbol usage is described below:

Symbol	Usage
DANGER:	Indicates a hazardous situation that can result in deadly electric shock hazards, other serious physical injury, and/or fire hazards.
WARNING:	Indicates directions which must be fully understood and followed in entirety in order to avoid potential safety hazards including equipment damage or personal injury.
CAUTION:	This points out that the examined area must not be entered or that the described operation must not be carried out. The reader should stop, use caution and fully understand the operations explained before proceeding.
WARNING	**DANGEROUS VOLTAGE** The product works with high voltages. All work on the AURORA Inverter must follow the described documentation and must comply with all prevailing codes and regulations associated with high voltages. During inverter operation, parts will be energized at voltage levels.
WARNING	**HOT TEMPERATURE** Some surfaces may become hot. Do not touch the product while it is in operation.
C US	UL 1741 Standard for Safety for Inverters, Converters, Controllers and Interconnection System Equipment for use with Distributed Energy Resources. CSA CSA-C22.2 No. 107.1-01 - General Use Power Supplies.

1.2.1.1 *Equipment Safety Warnings*

In addition to the safety and hazard symbols, the following symbols are also used in this installation guide:

	System earth conductor (main grounding protective earth, PE)
	Alternating Current (AC) Value
	Direct Current (DC) Value
Ø	Phase
	Grounding (earth)

The equipment has various labels. Those with a yellow background refer to safety concerns. Be sure to read all labels before beginning installation of the equipment. If any questions arise as to the meaning or intent of these notices, please contact Power-One Technical Support at 877-261-1374.

1.2.1.2 *General Installation Warnings*

The AURORA MICRO inverter is designed and tested according to international safety requirements (Ul 1741/IEEE 1547); however, certain safety precautions must be observed when installing and operating this inverter. The installer must read and follow all instructions, cautions and warnings in this installation manual.

The UL1741 requires the following voltage and frequency limits for utility interaction listed in the table below:

Table 1-3: Voltage and frequency trip limits

Condition	Simulated utility source		Maximum time (sec) at 60 Hz before cessation of current to the simulated utility
	Voltage (V)	Frequency (Hz)	
A	V< 50% V_{nor} (Not Adjustable)	Rated	0.16 sec (Not Adjustable)
B	50%V_{nor}≤ V< 88% V_{nor} (Adjustable Set Points 55% to 88%)	Rated	2 sec (Default) (Adj. Set Points 0.16 sec to 5 sec)
C	110%V_{nor}≤ V< 120% V_{nor} (Adjustable Set Points 110% to 118%)	Rated	1 sec (Default) (Adj. Set Points 0.16 sec to 5 sec)
D	V≥120% V_{nor} (Not Adjustable)	Rated	0.16 sec (Not Adjustable)
E	Rated	f > 60.5 (Not Adjustable)	0.16 sec (Not Adjustable)
F	Rated	f < 59.3 (Default) (Adj. Set Points 59.8 Hz to 57.2 Hz)	0.16 sec (Default) (Adj. Set Points 0.16 sec to 300 sec)
G	Rated	f < 57.0 (Not Adjustable)	0.16 sec (Not Adjustable)

WARNING:

All operations regarding transport, installation and start-up, including maintenance, must be carried out by qualified, trained personnel and in compliance with all prevailing local codes and regulations.

Basic safety rules require using qualified and trained personnel possessing the skills necessary for assembly, mounting, start up and operation of the product.

1.2.1.3 *Assembly Warnings*

Prior to installation, inspect the unit to ensure absence of any transport or handling damage, which could affect insulation integrity or safety clearances; failure to do so could result in safety hazards.

Assemble the inverter per the instructions in this manual. Use care when choosing installation location 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 and/or equipment damage.

1.2.1.4 *Electrical Connection Warnings*

This grid-tied inverter system operates only when properly connected to the AC -distribution network. Before connecting the AURORA MICRO 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

CAUTION:

Systems with inverters typically require additional control (e.g., switches, disconnects) or protective devices (e.g., fusing circuit breakers) depending upon the local safety regulations.

It is the responsibility of the installer to provide external disconnect switches and Overcurrent Protection Devices (OCPD) as required by National Electric Codes and other prevailing regulations.

WARNING:

Power-One DOES NOT provide AC output overcurrent protection. To reduce the risk of fire, connect only to a circuit provided with 20A maximum branch circuit overcurrent protection in accordance with the National Electric Code (ANSI/NFPA 70).

Make all electrical connections (e.g. conductor termination, fuses, PE connection, etc.) in accordance with the electrical standards prescribed by the applicable National Electric Code, ANSI/NFPA 70 wiring methods and/or by other local regulations and codes.

CAUTION:

The AC output (neutral) is not bonded to ground.

The input and output circuits are isolated from the enclosure and the system grounding shall be installed per the requirements of the National Electric Code, ANSI/NFPA 70, and is the responsibility of the installer.

1.2.2 APPROPRIATE USAGE

CAUTION:

Power-One accepts NO liability for damage of any kind that may arise from incorrect or careless operation. The equipment must not be used in ways that do not fall within the intended field of use.

1.2.2.1 *Intended or Allowed Use*

This equipment is a MICRO inverter designed to transform direct current (DC) coming from a photovoltaic module (PV) into an alternating current (AC) suitable for being fed into the power distribution grid.

This MICRO Inverter is designed for outdoor use, but can be used indoors if installed according to the National Electric Code and abiding by specified environmental and mounting parameters as stated in this manual (see Environmental Conditions section 1.2.2.3 and General Installation Conditions section 2.2.2).

1.2.2.2 *Conditions of Use*

The operating current output during the normal operation MUST NOT exceed the limits documented in the technical specifications.

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 connected to the electricity grid in qualified countries ONLY.

The inverter can be used only if all the technical characteristics are observed and applied.

1.2.2.3 *Environmental Conditions*

Adverse environmental condition, such as: sun, rain, snow, wind, too hot or too cold, altitudes, humidity, etc., can lead to a reduction in performance.

1.2.2.4 *Improper or Prohibited Use*

The following actions are dangerous and strictly forbidden under the terms of the warranty:

- Installing the equipment in environments with flammability conditions or in adverse/constrained environmental conditions (temperature and humidity).
- Using the equipment with safety devices not working or disabled.
- Using the equipment or parts of the equipment by connecting it to other machines or equipment, unless otherwise expressly allowed in this manual.
- Modifying the operating parameters that are restricted to the installer.
- Cleaning with corrosive products that may corrode parts of the equipment or generate electrostatic charges.
- Using or installing the equipment or its parts without having read and correctly interpreted the contents of the operating and maintenance manual.

1.2.3 SAFETY INSTRUCTIONS

Warning – These servicing instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform any servicing other than that specified in the operating instructions.

Be sure all flammable materials including construction items are away from the unit. Do not install the inverter in or near potentially explosive areas.

Normally grounded conductors may be ungrounded and energized when a ground-fault is indicated resulting in risk of electric shock. Test voltage with a voltmeter before touching.

Do not connect an AURORA MICRO inverter to the electrical distribution grid until after the receipt of a letter of authorization from the authority having jurisdiction.

Install the AURORA Inverter in accordance with the electrical standards prescribed by the applicable National Electric Code (NEC), Canadian Electric Code (CEC), and/or by other local codes and regulations.

Use personal protective equipment; including gloves and eye protection when working on this unit.

1.2.3.1 *General Information*

The equipment has been manufactured in accordance with the strictest accident-prevention regulations and supplied with safety devices suitable for the protection of components and operators. Inform the manufacturer about non-standard installation conditions.

Maintenance operations must be carried out according to the Maintenance section in Part 6 of this manual.

The connection of an inverter energy system to an electrical installation connected to the electricity distribution network shall be approved by the appropriate electric utility.

It is essential to provide operators with correct information. They must therefore read and comply with the technical information given in the manual and in the attached documentation.

The instructions given in the manual do not replace the safety devices and technical data for installation and operation mounted on the product. They do not replace the safety regulations enforced in the country of installation and common sense rules.

The manufacturer is willing to train staff, at its premises or on site, in accordance with conditions to be set out in the contract.

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 Power-One Service representative.

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

1.2.3.2 *Thermal Hazard*

Warning - Certain parts may be extremely hot immediately following shut down due to normal elevated surface temperatures (e.g. transformers, accumulators, coils etc.).

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.

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. To minimize occurrence of such conditions, comply with all corresponding safety symbols and markings present on the unit and in this manual.

1.2.4 LOCATION OF SAFETY LABELS

Please note the location of the safety notices on the AURORA MICRO inverter. These and the product nameplates are for notification and protection.

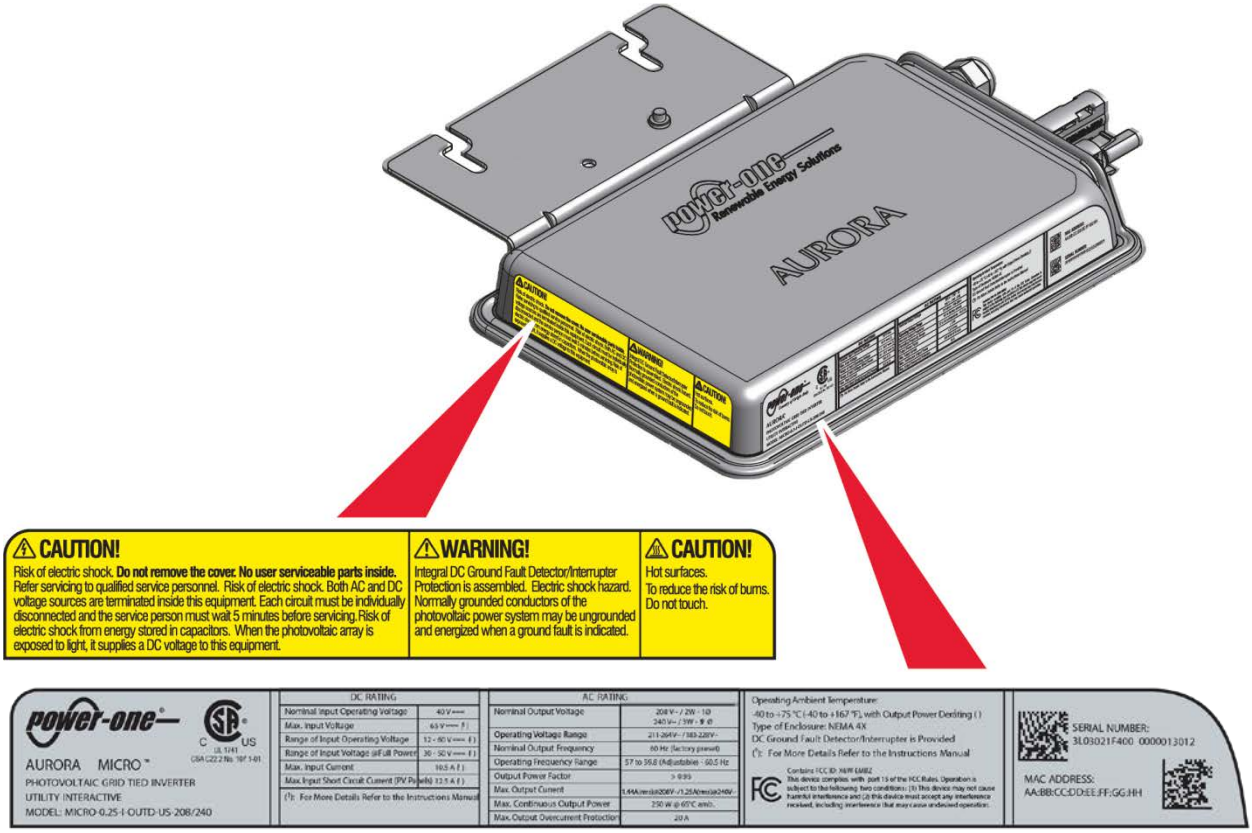


Figure 1-1: Safety label location

The labels and plates attached to the equipment must NOT be removed, damaged, hidden, etc. They must be cleaned regularly and kept visible at all times. This means they must NOT be hidden with objects and extraneous parts (rags, boxes, equipment, etc.).

The technical data shown in this manual does not replace those shown on the plates attached to the equipment.

1.2.1 OTHER LABELS

In addition to the safety label and product nameplate,there is one identification label on the inverter. A duplicate label is attached in a plastic bag as shown below and will be used later to fill in the "system map" for the monitoring software. It is recommended to make a copy of the "system map" for the installer.

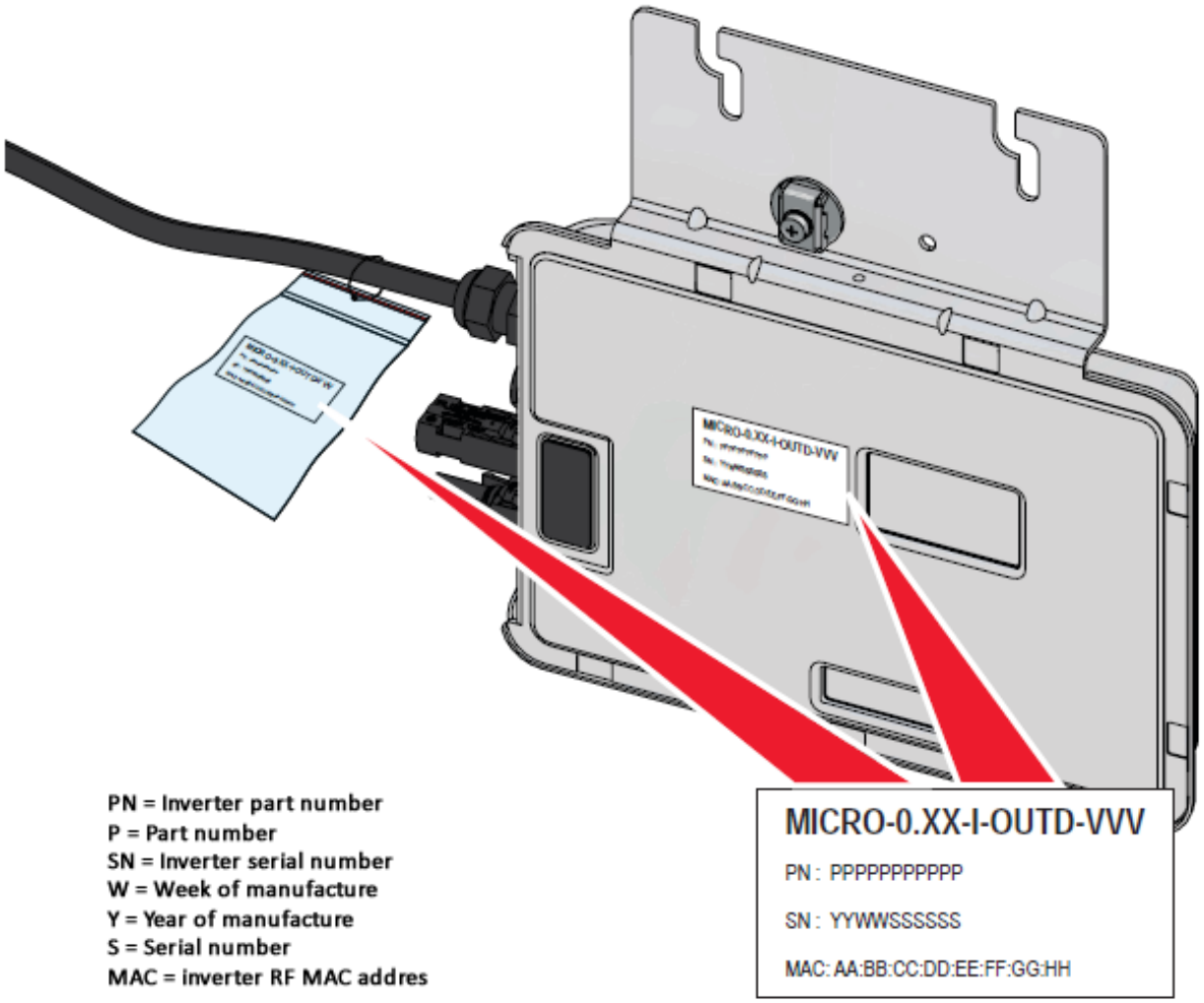


Figure 1-2: Identification label for adhering to system map

1.3 SYSTEM INTEGRATION

This system is composed of a group of MICRO inverters that convert direct electric current from a photovoltaic module into alternating electric current and feeds it into the electric grid.

Photovoltaic modules transform energy from the sun into direct current (DC) electrical energy. In order to use DC energy, it is necessary to transform the type of current into alternating current or "AC". This conversion, known as DC to AC inversion, is made efficiently without using rotating parts and only through static electronic components.

In order to allow inverter operation in safe thermal and electrical conditions, in the event of adverse environmental conditions or unsuitable input voltage values, the unit automatically reduces the value of the power fed into the grid. This way the solar energy system compensates for the energy drawn from the utilities connected to the grid to which it is linked. The solar energy system therefore powers all connected electrical devices, from lighting to household appliances, etc.

When the photovoltaic system is not supplying sufficient power, the power needed to ensure normal operation of the connected electrical devices is drawn from the grid. If, on the other hand, excess power is produced, this is fed directly into the grid, becoming available to other consumers.

1.3.1 CHARACTERISTICS OF MICRO INVERTERS

Unlike systems subdivided into strings controlled by one or several inverters, systems of this sort are built for the incorporation of a MICRO inverter for each photovoltaic module.

Each MICRO inverter works independently of the others, thus its own photovoltaic module supplies the maximum power available to the grid. This setup enables direct control over the production of a single photovoltaic module, consequently optimizing production as much as possible.

1.3.2 NOTES ON SIZING OF THE SYSTEM

Decisions about how to structure a photovoltaic system depend on a number of factors and considerations depending on the type of modules, the availability of space, possible future expansion of the system, and the energy production goals over the long term, etc.

A configuration program that can help to correctly size the photovoltaic system is available on the Power-One website at www.power-one.com.

PART 2 UNPACK AND SELECT INSTALLATION LOCATION

2.1 GENERAL CONDITIONS

Some specifications are not applicable to small equipment or components.

2.1.1 TRANSPORT AND HANDLING

Transportation of the equipment, especially by road, must be carried out by suitable ways and means for protecting the components (in particular, the electronic components) from violent shocks, humidity, vibration, etc.

Power-One packages and protects individual components using suitable means to make its transport and subsequent handling easier.

Discard packaging elements immediately as to not cause unforeseen injury. Packaging elements (cardboard, cellophane, staples, adhesive, tape, straps, etc.) may cause cuts and/or injuries if not handled with care. They should be removed by suitable means and disposed of in accordance with any regulations enforced by the country of installation.

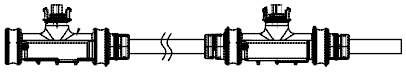
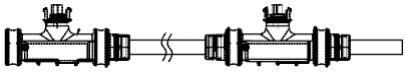
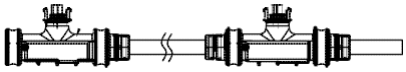
2.1.2 INCOMING INSPECTION

It is the customer's responsibility to examine the condition of the unit shipped. Upon receipt of Power-One's AURORA Inverter, please perform the following check:

- Inspect the shipping container for any external damage.
- Inventory the contents against list below; verify receipt of all items. Use care not to discard any equipment, parts, or manuals.
- Call the delivering carrier 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 2-1: List of components supplied

Code	Description
AC-TRUNK SPOOL-41 inches-50 plugs 	AC cable (4 conductors): 10 AWG Plug (connector) pitch 41"
AC-TRUNK SPOOL-67 inches-32 plugs 	AC cable (4 conductors): 10 AWG Plug (connector) pitch 67"
AC-TRUNK SPOOL-81 inches-27 plugs 	AC cable (4 conductors): 10 AWG Plug (connector) pitch 81"
AC TRUNK PLUG CAP 	Insulated AC cap for AC Bus connectors (female)
AC TRUNK END CAP 	End cap for 10 AWG AC cable
AC TRUNK UNLOCK TOOL 	Tool for releasing connectors

2.2 SELECT INSTALLATION LOCATION

2.2.1 OVERALL DIMENSIONS

The following figure shows the recommended minimum clearances around the inverter. The overall dimensions are expressed in millimeters (mm) and inches (in).

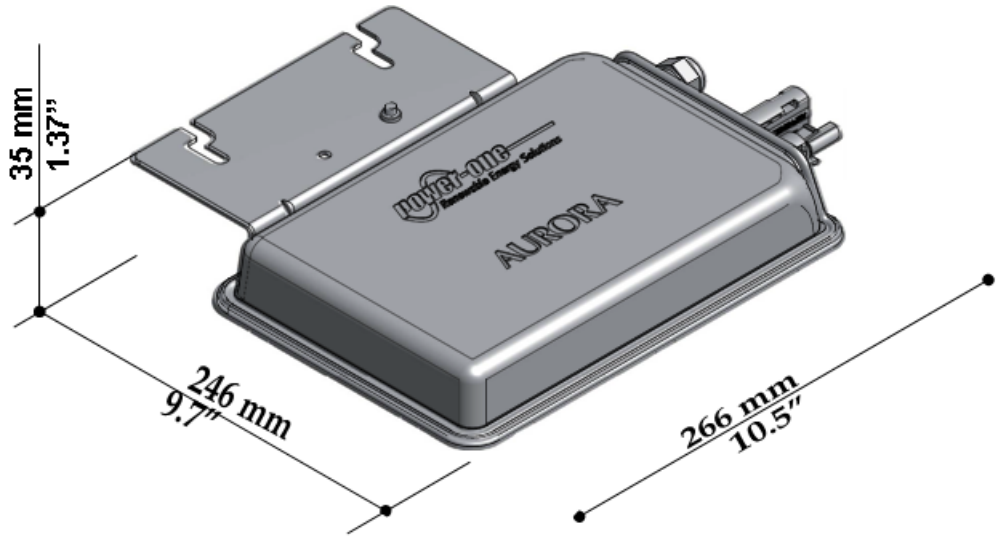


Figure 2-1: Overall dimensions of MICRO inverter

2.2.2 General Installation Conditions

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

The installation is done by qualified installers and/or licensed electrician according to the applicable local code regulations (National Electric Code (NEC), Canadian Electric Code (CEC) and other local codes).

The connection of an inverter energy system to the electricity distribution network shall be approved by the appropriate electrical distributor or authority having jurisdiction.
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.

2.2.3 Environmental Checks

- See Part 7: 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.

2.2.4 High Altitude Installation (Above 2000 Meters/6562 Feet)

Certain conditions should be considered when choosing an installation location at high altitudes:

- Derating - Less efficient cooling; therefore, a greater likelihood of the device going into derating because of high internal temperatures.
- Electric Arc - Reduction in the dielectric resistance of the air that, in the presence of high-operating voltages (DC input), can create electric arcs (electrical discharges) that may reach the point of damaging the inverter.

All installations at altitudes of over 2000 meters/6562 feet must be assessed case by case considering the aforesaid criticalities.

2.2.5 INSTALLATION POSITION

When choosing the place 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 derating.

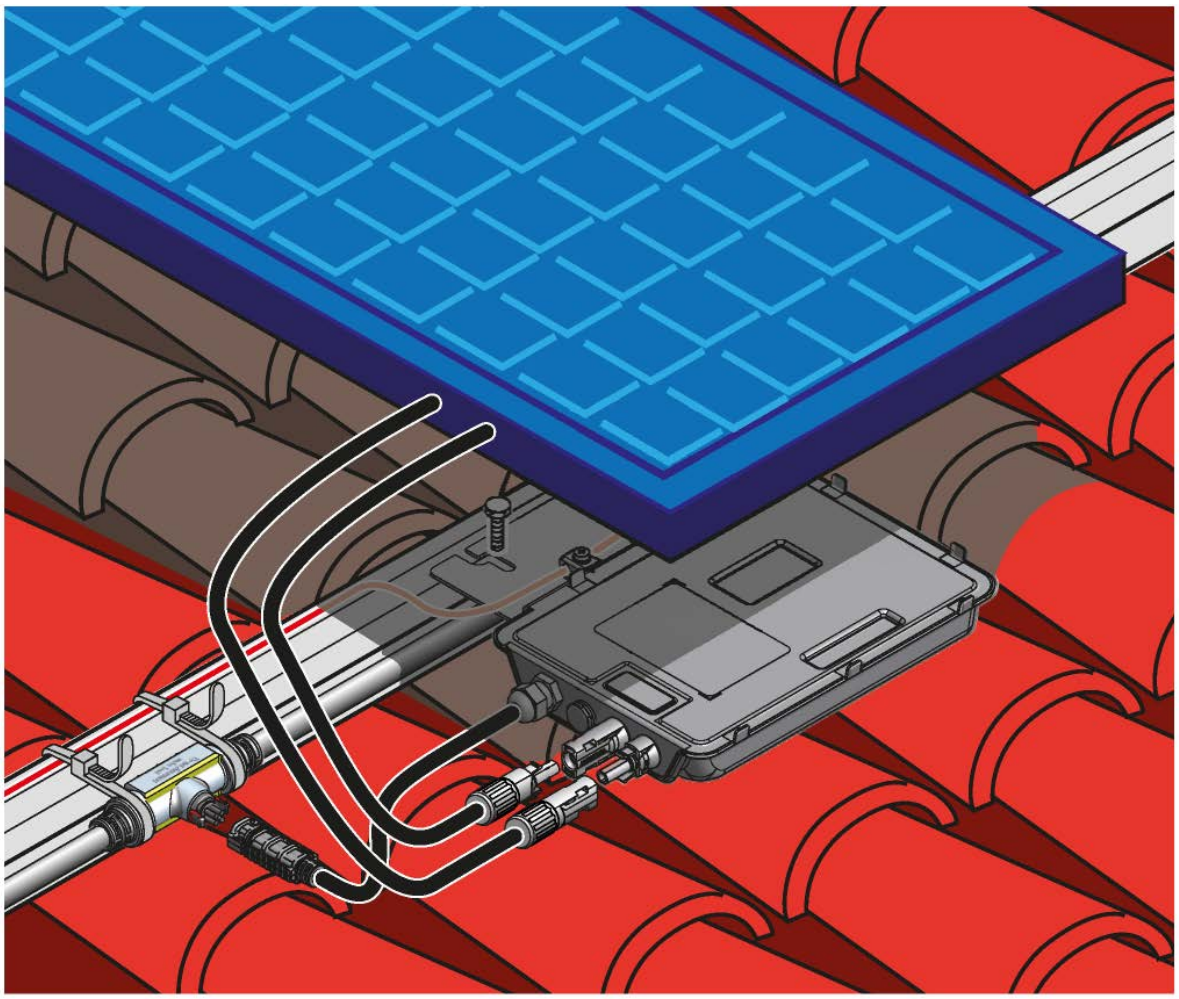


Figure 2-2: Installation position of MICRO underneath PV module

Any maintenance or replacement of the device could require the technician to dismount the photovoltaic module mounted on the top of the MICRO inverter.

This condition must be accounted for during the installation ensuring that the safety distances are correct for normal control and maintenance operations.

The distance between MICRO inverters installed on the same system array depends on the type of photovoltaic modules and its orientation (horizontal or vertical).

Choose the best solution to employ during the project planning stage, bearing in mind that the selected configuration will include the correct type of AC cable.

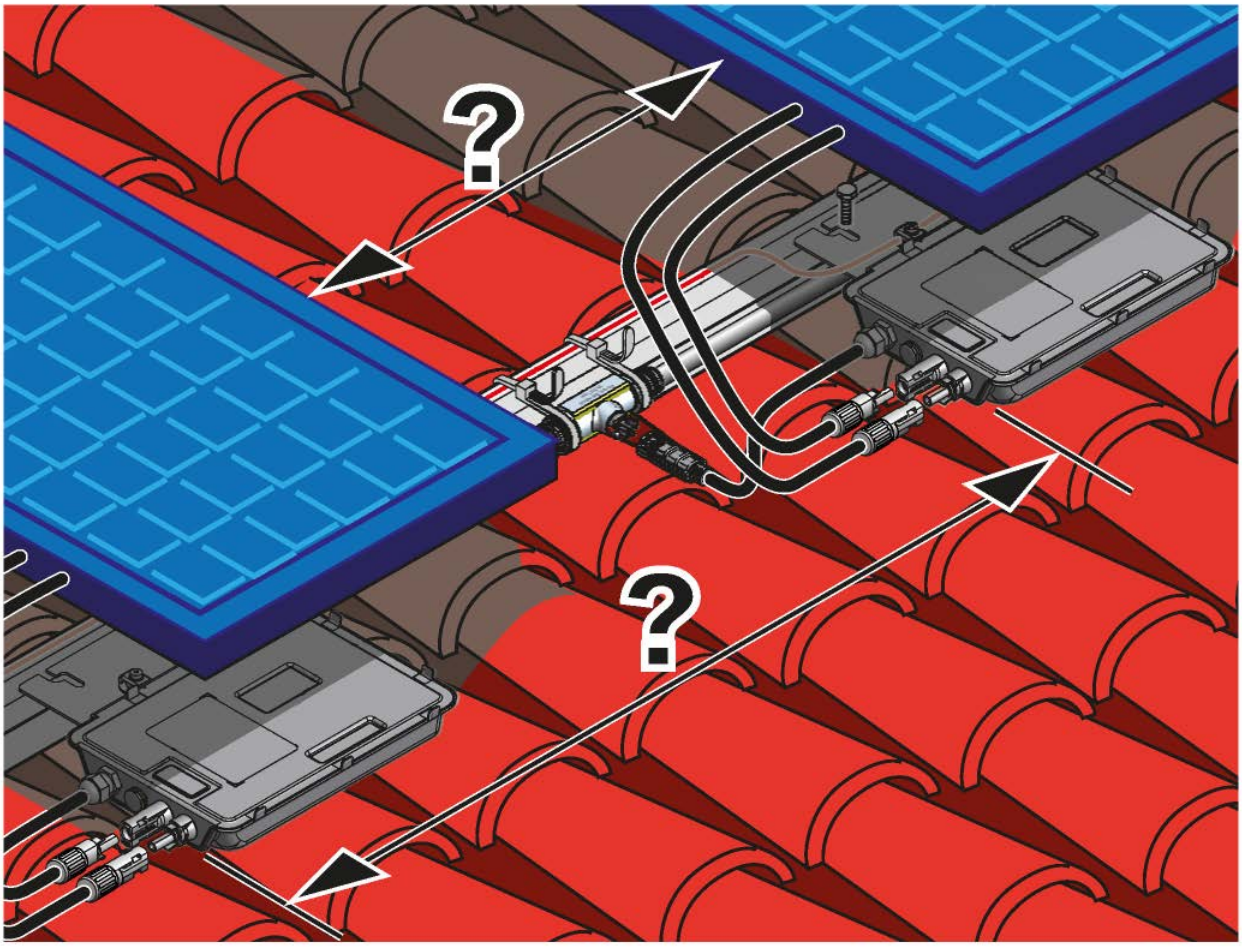


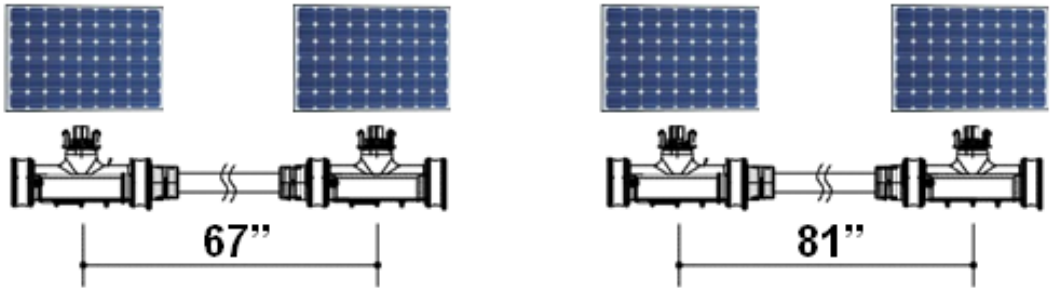
Figure 2-3: Installation orientation of MICRO considering distances

2.3 CHOICE OF 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".

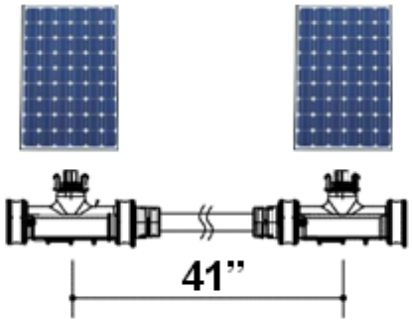
The installer is responsible for choosing the AC cable model with the correct spacing on the basis of the orientation (shown below) and type of photovoltaic modules.

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



Power-One Cable Item	Power-One Cable Item
AC-Trunk Spool – 67 inches 32 plugs *	AC-Trunk Spool – 81 inches 27 plugs *
Ideal for 60-cell or 96-cell PV modules	Ideal for 72-cell PV modules
60 96	72

Figure 2-4: Horizontal orientation of the photovoltaic modules



Power-One Cable Item
AC-Trunk Spool – 41 inches 50 plugs *
Ideal for 60-cell, 72-cell, 96-cell PV modules

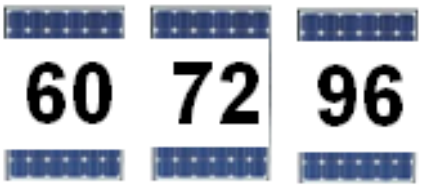


Figure 2-5: Vertical orientation of the photovoltaic modules

*** 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.**

PART 3 MOUNTING AND WIRING

3.1 ASSEMBLY DIAGRAM

01 photovoltaic module
02 frame
03 junction box
04 MICRO inverter
05 DC cables from PV module
06 AC-TRUNK cable plug (connector)
07 AC-TRUNK cable temporary plug cap (discard after installation)
08 AC-TRUNK PLUG CAP
09 MICRO inverter AC drop cable
10 AC-TRUNK UNLOCK TOOL
11 AC-TRUNK END CAP

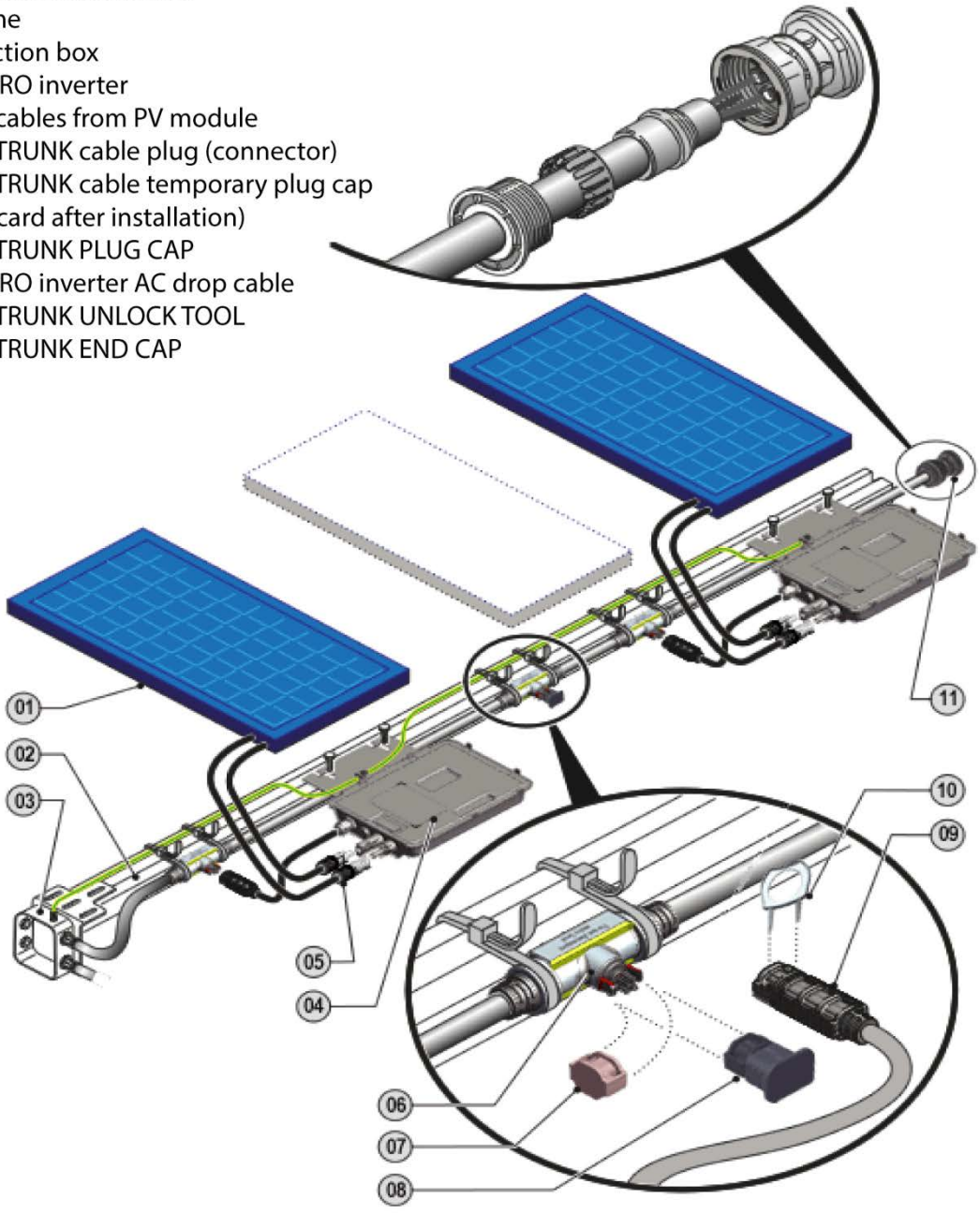


Figure 3-1: Graphical representation of assembly instructions

3.2 ASSEMBLY INSTRUCTIONS

1. Run the AC cable along the frame structure provided for installing the photovoltaic modules.

The cable must be compatible with the expected installation conditions, particularly concerning the number of modules and their orientation (portrait or landscape).

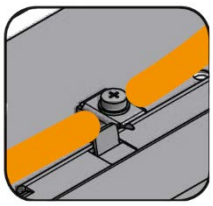
Legislation in force in the country of installation and the installed power will determine the maximum number of MICRO inverters permitted for installation at each AC cable section.

Do NOT exceed the maximum number of MICRO inverters permitted for installation! (See technical data found in the Appendix, Part 7, of this manual.)

2. Secure the MICRO inverter to the photovoltaic module frame with the logo side facing downwards**.**

Mark the approximate center of each photovoltaic module on the frame in order to facilitate positioning.

3. The inverter and photovoltaic modules must be connected to an equipment grounding conductor in accordance with the pertinent legislation in force in the country of installation.



The inverter can be earth grounded using the connect clamp secured to the chassis and an adequately-sized conductor.

There are two possible configurations for grounding the inverters shown below:

Equipment grounding conductor coupling all the MICRO inverters:

The conductor must have a minimum cross section of 6 AWG (8AWG in conduits).

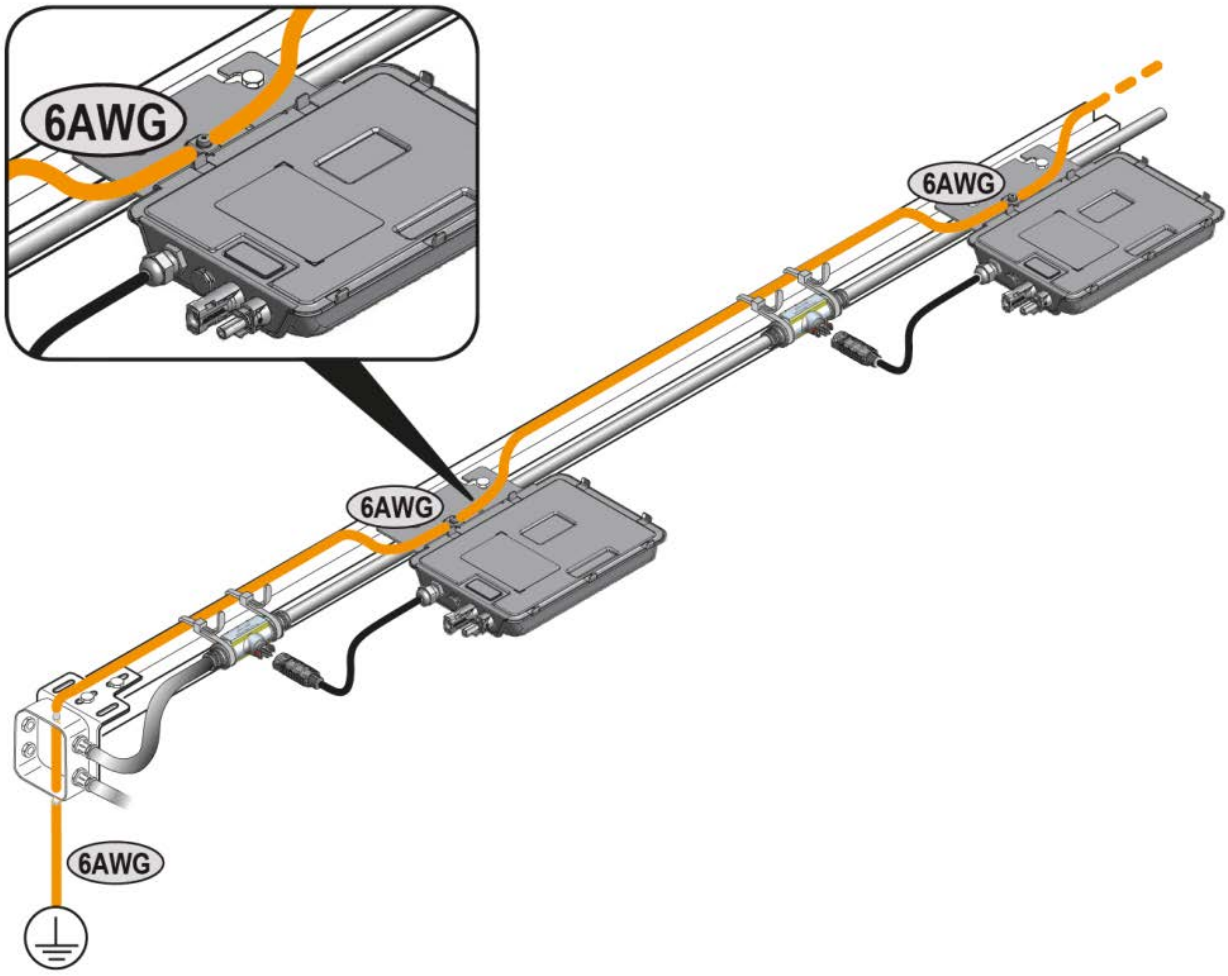


Figure 3-2: Equipment grounding conductor coupling all the inverters

Individual earth conductors for each MICRO inverter:

- The conductor linking the assembly to the grounding distribution structure must be at least 6 AWG.
- The conductor bonding the MICRO inverter to the structure must have a minimum cross section of 8 AWG (maximum length 1m).
- Ensure that the quality of the bond made between the conductor and the structure is secure.

Only a racking system that is certified for use as a grounding structure is permitted to use this method.

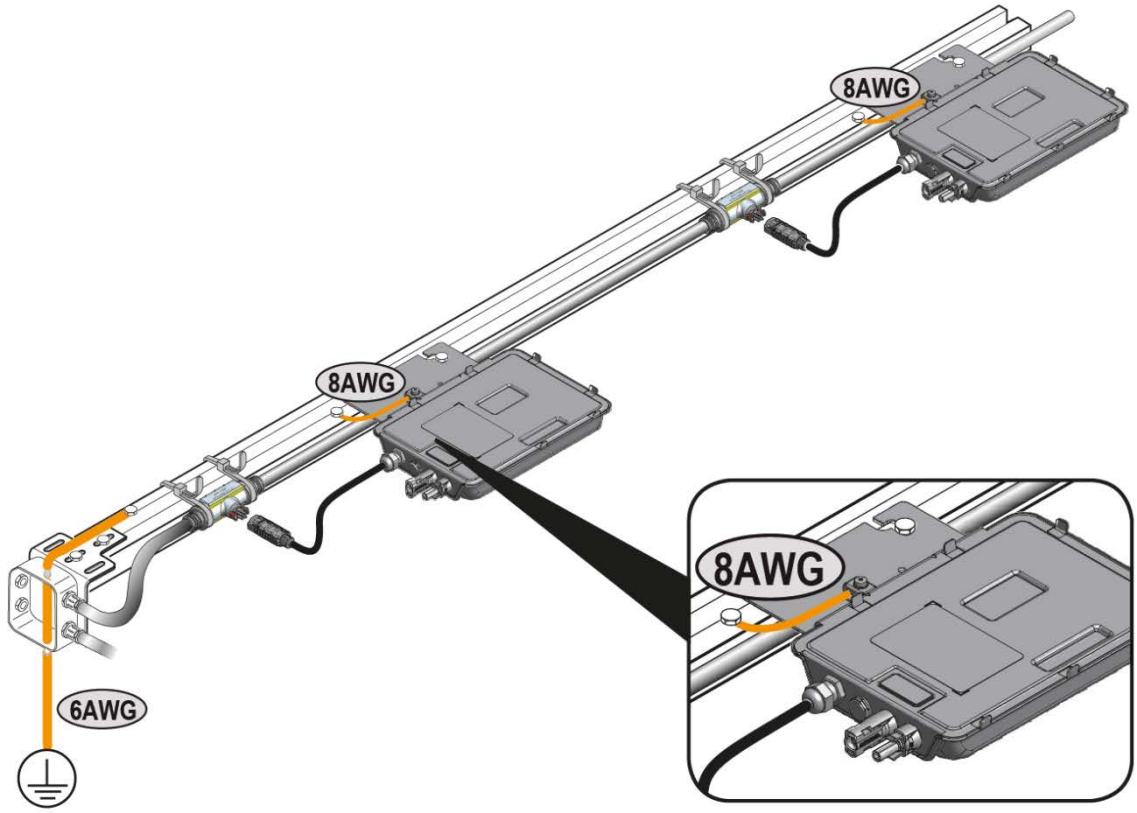
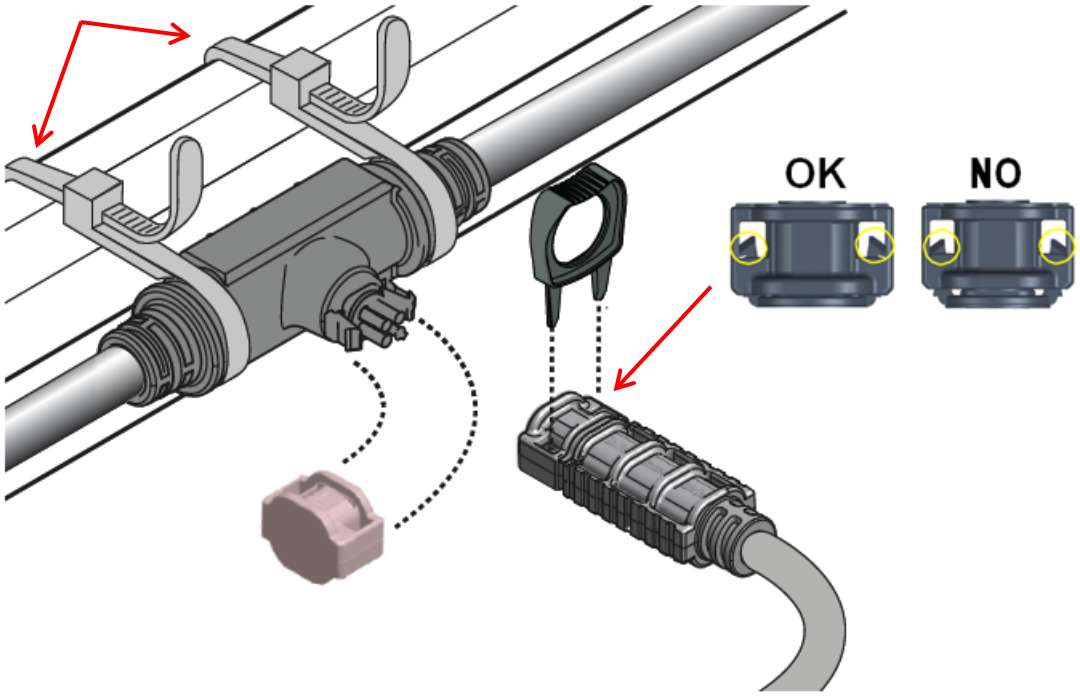


Figure 3-3: Configurations for grounding the MICRO inverters

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

4. Fasten the AC-TRUNK cable to the frame with cable ties. Each connector is provided with two guides for ideal fastening. Cable ties are not supplied with the inverter or AC-TRUNK cable. Use cable ties that are rated for use in the installation location.

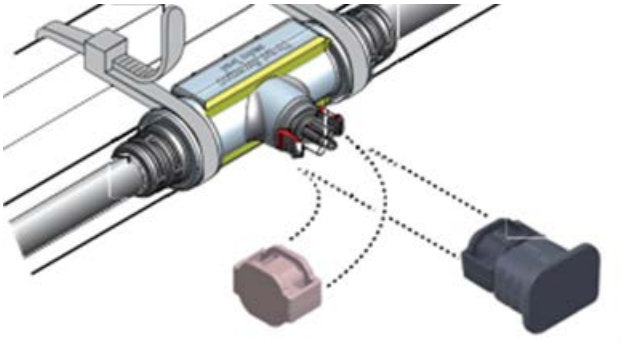


5. Remove the temporary cap from AC-TRUNK cable connectors and then connect the MICRO inverters. The connectors are coupled correctly when two clicks are heard.

Be mindful to keep the connectors in a position accessible to the AC-TRUNK cable coming from the MICRO inverter.

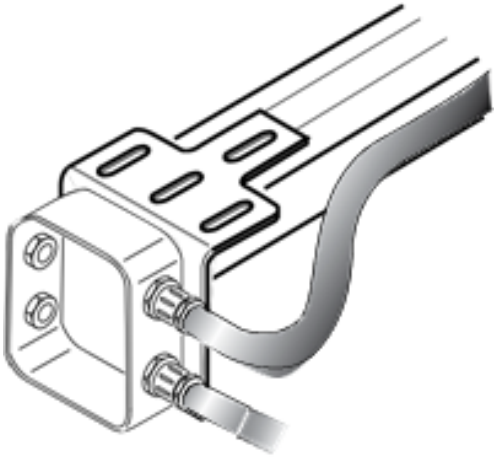
Protect any unused AC-TRUNK cable connectors by fitting the AC-TRUNK PLUG CAP on them to keep them watertight.

The temporary caps are only fitted for shipping and provide no seal whatsoever!

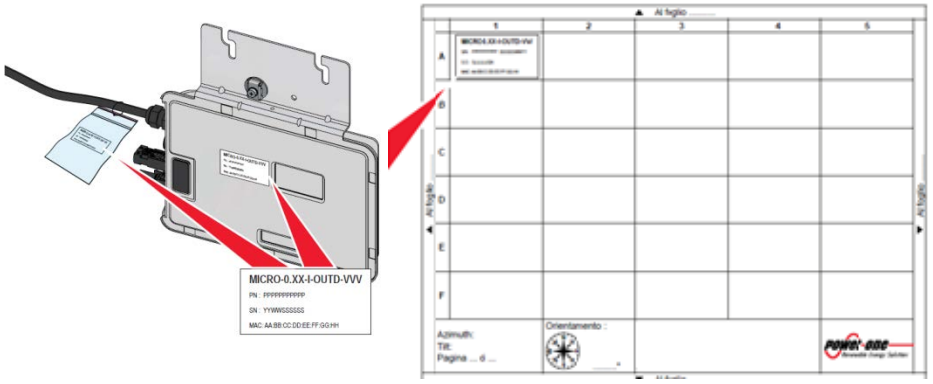


6. Fit the appropriate AC-TRUNK END CAP on the unused ends of the AC-TRUNK cable.

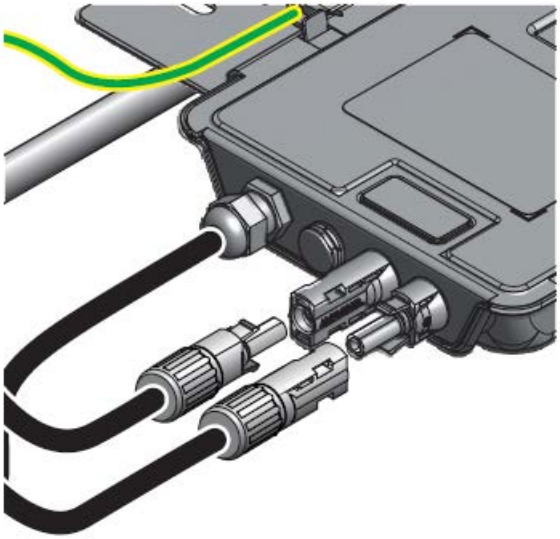
7. Connect the AC-TRUNK cable/s coming from the MICRO inverters to the junction box or to the AC distribution panel.



8. 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).



9. Plug the DC cables into the corresponding inputs on the MICRO inverters and install the photovoltaic modules.



The recommended installation entails keeping the MICRO inverters underneath the photovoltaic modules, having them operate in the shade. Direct sunlight could cause elevated temperatures and consequently derating.

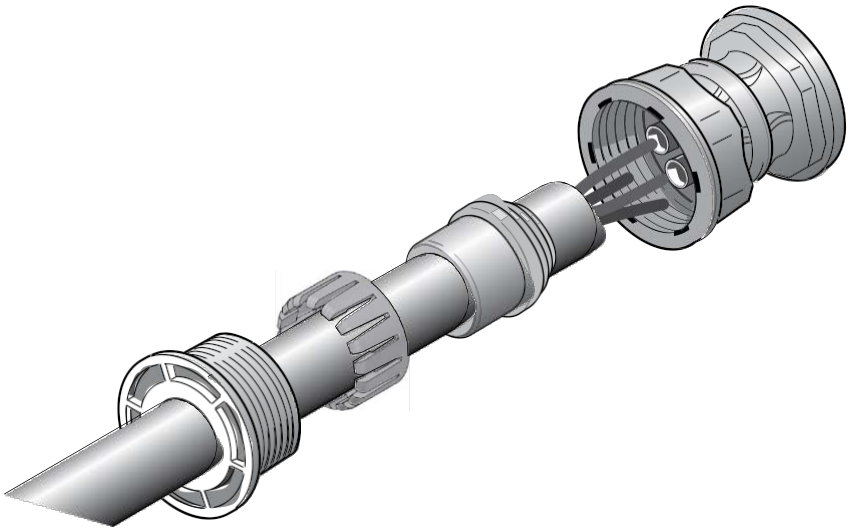
Each module must be connected to the MICRO-Inverter with a DC cable having a length of less than 3m.

10. The inverter will not begin to feed energy into the distribution grid until the association procedure of the CDD (Concentrator Data Device) has been completed.

See the AURORA CDD Instruction Manual for the procedures.

3.2.1 INSTALLING THE AC-TRUNK END CAP

The unused ends of the AC-TRUNK cable must be terminated with the proper end.



The following is necessary for properly installing the cap:

1 Fit the ring nut and gasket around the cross section of the cable to terminate.
2 Strip 50 mm/1.97 inches of the external insulation and separate each conductor.
3 Insert the conductors into the recesses inside the cap to block them.
4 Insert the gasket into the cap with slight pressure.
5 Screw the ring nut to apply the correct pressure on the gasket (max.2.45Nm/1.81 ft-lbs).
6 Secure the section of the terminated cable to the frame structure with cable ties.

3.2.2 USE OF THE AC-TRUNK UNLOCK TOOL

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 AC-TRUNK cable.

The tool is used to release the two retaining clips on the connectors installed on the AC-TRUNK cables. The disconnection or cap removal can be performed in three simple steps:

- Insert the AC-TRUNK UNLOCK TOOL in the two holes on the connector or cap.
- Press to release the retaining clips.
- Remove the connector or cap.

The figures below illustrate the use of the AC-trunk unlock tool.

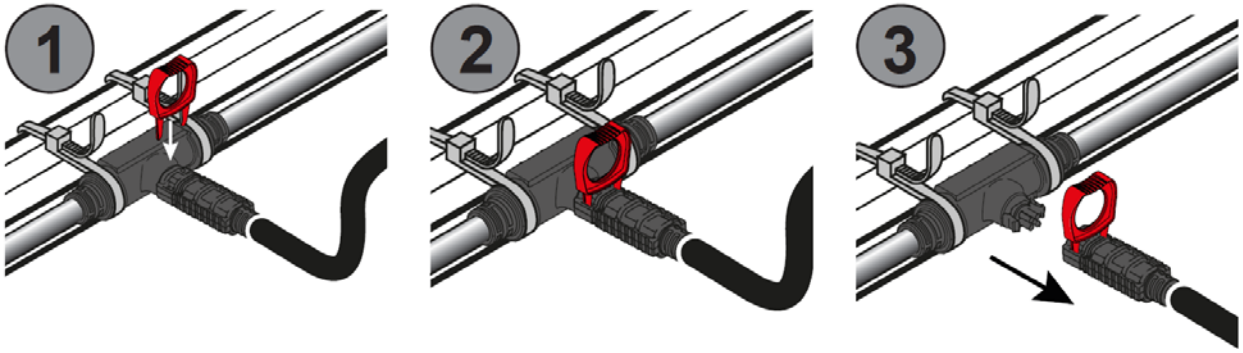


Figure 3-4: Disconnection of the MICRO inverter AC cable

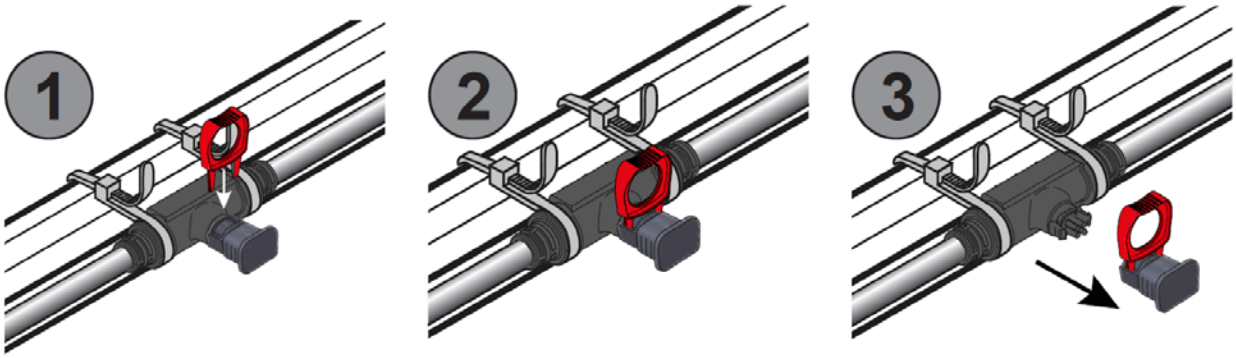


Figure 3-5: Removing the AC trunk plug cap

3.3 WIRING DETAILS

3.3.1 LOAD PROTECTION SWITCH (AC DISCONNECT SWITCH)

To protect each AC connection line of the MICRO inverter, it is required to install a device for protection against overcurrent with the following characteristics:

Table 3-1: Overcurrent device recommended characteristics

Protection breaker rating		**6A**	**10A**	**16A**	**20A**
Max number of Inverters @240VAC	**MICRO-0.25**	4	7	12	15
	MICRO-0.3	3	6	9	12
Max number of inverters @208VAC	**MICRO-0.25**	4	6	10	13
	MICRO-0.3	3	5	8	11

The dimensions of the thermal-magnetic circuit breaker should be determined by the number of MICRO inverters connected to a single AC line. A 20A thermal-magnetic circuit breaker represents the maximum value permitted for installation in a single AC line, sized based on the AC cable cross section (10 AWG).

It is the installer's responsibility to adequately size the overcurrent protection, based on the number and types of MICRO inverters in the system (see Table 3-1). The maximum thermal-magnetic circuit breaker current rating is 20A for each AC line.

3.3.2 DIFFERENTIAL PROTECTION DOWNSTREAM OF THE INVERTER

Aurora Power-One inverters with a high frequency transformer are equipped with an isolation transformer for each of the DC/DC converters which operate at high frequency (switch-over frequency of the converter). This transformer allows for high frequency galvanic isolation between the DC and AC side of the system. In addition to this the inverters include protection mechanisms so that they cannot input ground fault currents.

Power-One recommends the use of a switch with type A or AC differential magnetothermal protection with IΔn=30mA sensitivity.

3.3.3 CHOOSING THE INTERFACE PROTECTION SYSTEM AND DEVICE DOWNSTREAM OF THE INVERTER

The inverter does not include any electromechanical devices (relays, contactors, etc.) for automatic disconnection from the power grid. The system must therefore be provided with external protection for the physical disconnection of the MICRO inverters from the grid, in compliance with the applicable regulations and with the requirements of the installation country's power distributor.

Such protection is typically composed of an interface protection system that analyzes and controls the grid parameters and, if necessary, sends commands to the interface device, in charge of physically disconnecting the PV installation MICRO inverters line.

CAUTION: To reduce the risk of fire, connect only to a circuit provided with 20A maximum branch circuit overcurrent protection in accordance with the National Electric Code (ANSI/NFPA 70)

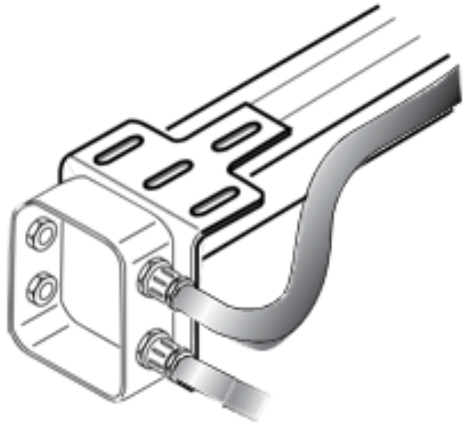
3.4 CONNECTION TO THE AC DISTRIBUTION GRID (AC SIDE)

To prevent electrical hazards, all the connection operations must be carried out with the disconnect switch downstream of the inverter (grid side) open and locked.

When connecting to the grid, all the Power-One AC cables coming from MICRO inverters must be joined inside a junction box.

A single line cable must then form the connection to the distribution grid.
Be particularly mindful of the dimensions of the line cable. The grounding connection from the inverters is obligatory**.**

The AC cable used is quadrupole



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

3.4.1 CHARACTERISTICS AND SIZING OF THE LINE CABLE

The line cable (not supplied from Power-One) runs between the junction box and the load distribution panel.

The cross-section of the AC line conductor must be sized in order to prevent unwanted disconnections of the inverter from the grid due to high impedance of the line that connects the inverter to the power supply point. If the impedance is too high, it causes an increase in the AC voltage that, on reaching the limit set by the country of installation, causes the inverter to switch OFF.

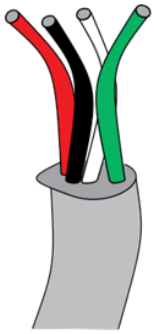
The installation technician is responsible for selecting a cable of the appropriate length and cross section. In case of any doubt as to dimensions, refer to the technical characteristics in the Appendix.

3.5 WIRING OF AC CABLE

The installation must be carried out with the equipment disconnected from the grid (power disconnect switch open).

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

Table 3-2: Wiring of AC Cable

		Item code	Description
	**L1** red **L2** black **Neutral** white **Ground** green	**AC-TRUNK SPOOL-41inches-50plugs** 	AC cable (4 conductors): 10 AWG; wheelbase 41" 50 connectors
		AC-TRUNK SPOOL-67inches-32plugs 	AC cable (4 conductors): 10 AWG; wheelbase 67" 32 connectors
		AC-TRUNK SPOOL-81inches-27plugs 	AC cable (4 conductors): 10 AWG; wheelbase 81" 27 connectors

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.

Close the junction box after the wiring is complete. Ensure that the seal is tight.

When connecting the inverter to the distribution grid, the configuration is made with the CDD. It is essential to plan for the pertinent standards in the country.

PART 4 OPERATIONS GUIDE

4.1 GENERAL CONDITIONS

One of the first rules for preventing damage to the equipment and to the operator is to have a thorough knowledge of the operations.

It is necessary to read the AURORA CDD Instruction Manual before commissioning the MICRO inverter.

Power-One CANNOT be held responsible for damage to the equipment or the operator if it is the result of incompetence, insufficient qualifications or lack of training.

4.2 DISPLAY AND KEYPAD

The Power-One MICRO inverters associated with the CDD are controlled and monitored through the CDD.

4.2.1 DESCRIPTION OF THE DISPLAY

The display for the CDD permits simultaneous monitoring of all the associated inverters. During operation, the display behaves dynamically and cycles through the display of information.

The following information can be viewed by navigating in the menu:

- Operating status of each MICRO inverter and statistics.
- Operating status of the connection to the internet/local network.
- Alarm messages and fault indicators.

The display offers user friendly and intuitive use with the option of navigating through the various menus by means of buttons on the side of the CDD.

4.2.2 DESCRIPTION OF THE KEYPAD

On the right side of CDD device are four buttons used to control the various functions visualized on the display.

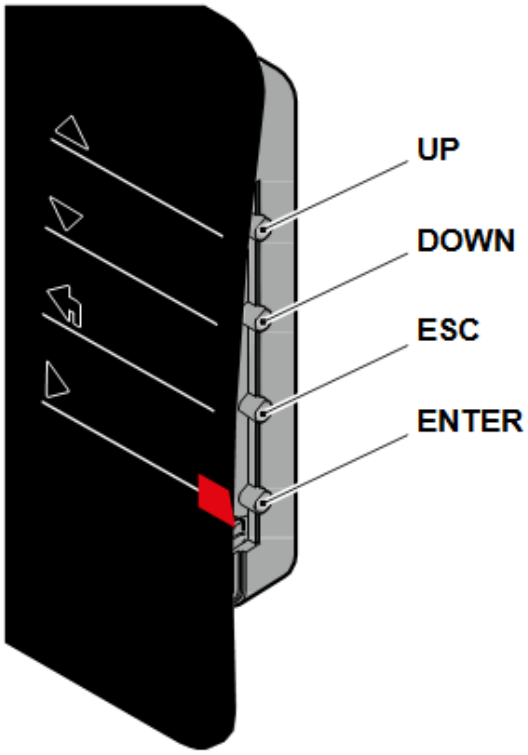
The UP and DOWN buttons are used to move around inside a menu or to increase/decrease the settable values.

The ESC button returns the user to the previous submenu when navigating.

The ENTER button is pressed to bring the user to the desired submenu or to confirm an entered value/parameter.

The **UP** and **DOWN** buttons pushed together will open the main menus for STATISTICS, DATA DISPLAY and DEFAULT SETTINGS.

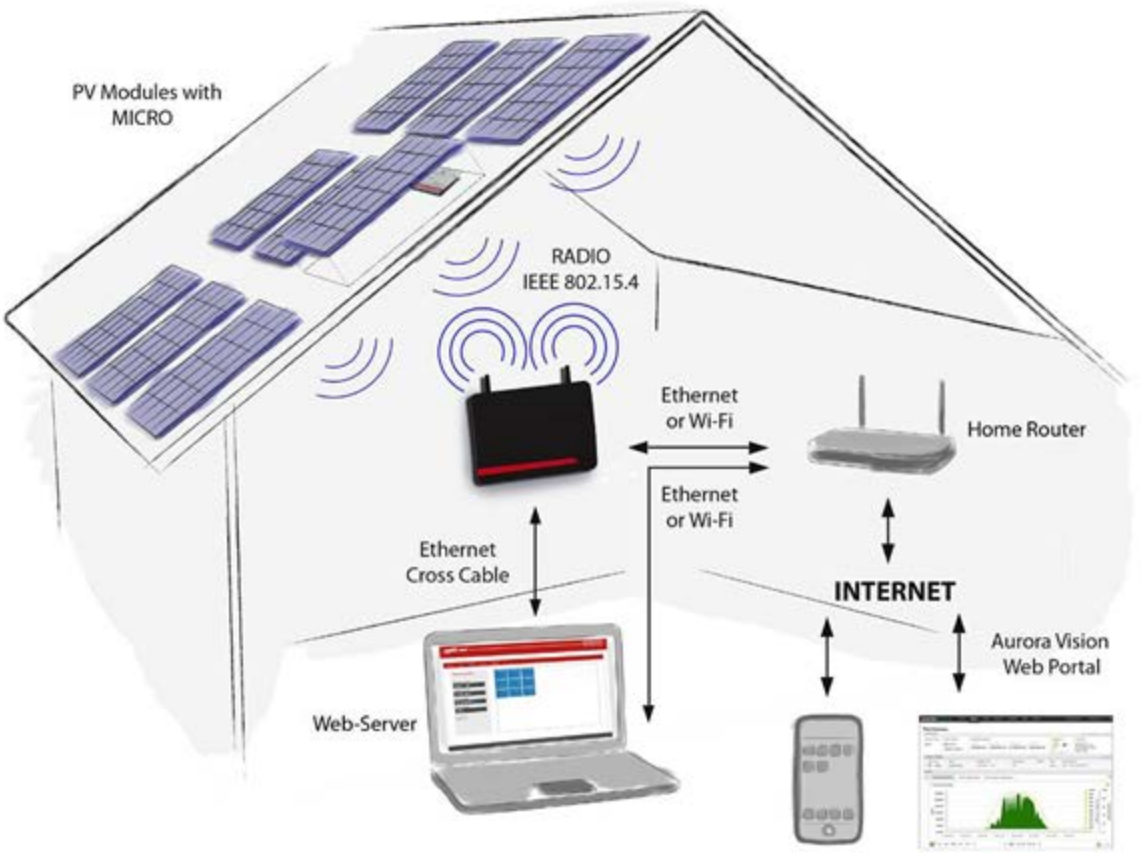
Pressing any of these buttons during normal operation (when the display reads GENERAL DATA) will open the screen displaying information on the CDD.



4.2.3 REMOTE MANAGEMENT

The CDD device is equipped with an Ethernet port and a Wi-Fi network interface controller to connect to a local network or Internet.

The system can be managed and monitored from a PC or Smartphone with internet access if the device is registered at the Power-One portal (AURORA VISION web portal).



4.3 COMMISSIONING

Before checking the operation of the equipment, it is necessary to have a thorough knowledge of the instruments described above and the functions that have been enabled in the installation.

The MICRO inverter operates automatically without the aid of a controller. The operating state is controlled through the instruments.

The interpretation or variation of some data is reserved exclusively for specialized and qualified staff.

The incoming voltage must not exceed the maximum values shown in the technical data in order to avoid damaging the equipment. Consult the technical data in the Appendix section of this manual for further details.

4.3.1 PRELIMINARY CHECKS

- When conducting the checks, ensure that the main AC disconnect (downstream from the system) and any other possible isolator switches are disarmed.
- Ensure that all conductors and protective grounding points are connected.
- Check the position of all connection cables and the tightness of all nuts and terminals.
- Ensure that all electrical safeguards have been correctly installed.

4.3.2 SEQUENCE OF OPERATIONS

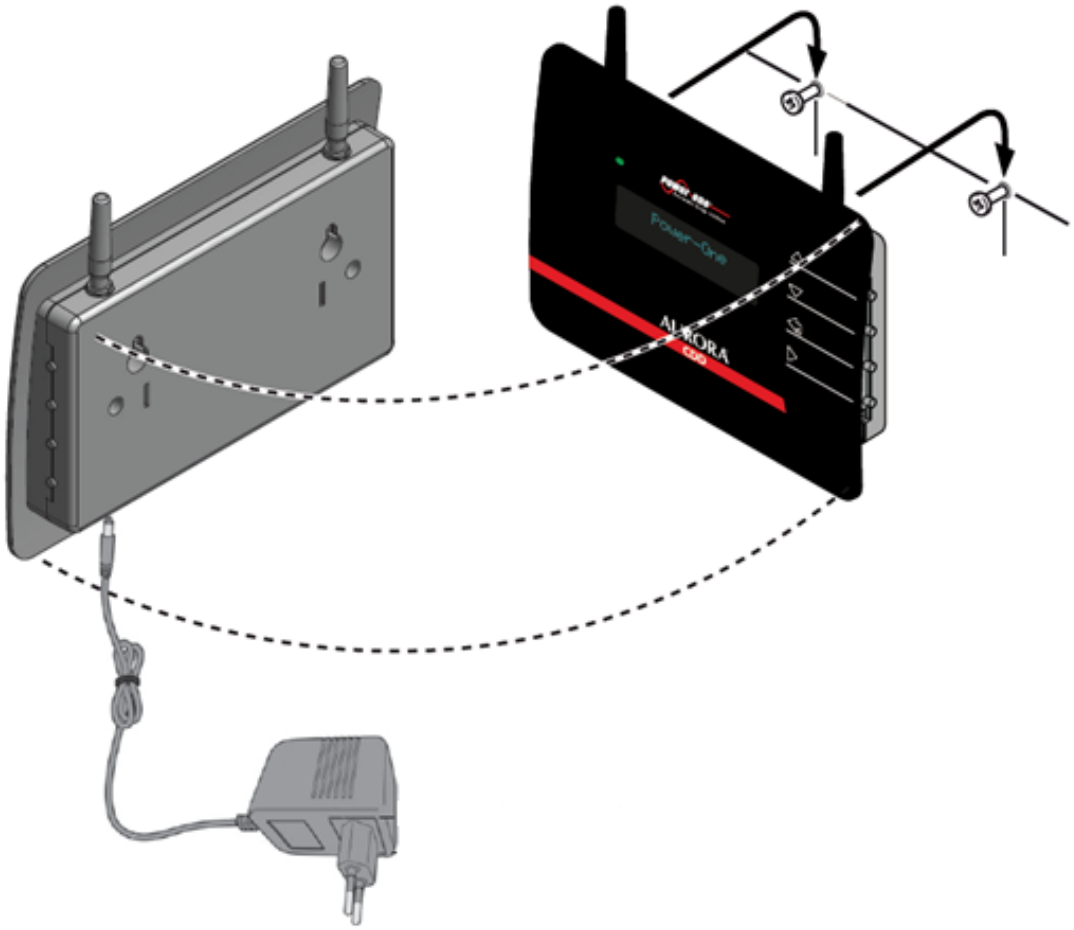
Start up the system as follows:

- Ensure that the MICRO inverters and photovoltaic modules have been correctly installed.
- Arm the main AC disconnector (downstream from the system) and any other possible isolator switches.

At this stage, we recommend not securing the CDD to the wall because the final installation position might need to be re-evaluated based on the strength of the signal.

The steps to take for configuring the CDD, acquiring the MICRO inverters in the system and registering at the “AURORA VISION” portal are described in the AURORA CDD Instruction Manual. Please refer to the Operations Guide, Part 4, of the AURORA CDD Instruction Manual to complete the commissioning of the MICRO inverter.

Upon completion of the commissioning, mount the CDD to the wall. Complete instructions for wall mounting can be found in Part 3 of the AURORA CDD Instruction Manual.



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PART 5 TROUBLESHOOTING

5.1 ALARM MESSAGES GENERATED BY THE MICRO INVERTER

The equipment is capable of communicating errors/warnings via radio to the associated CDD device. Any messages received and related codes can be checked on the display for the CDD device.

To understand and address warning (Wxxx) or error (Exxx) messages generated by the MICRO inverters, in the installation and displayed on the CDD display, refer to the table shown below.

Table 5-1: Alarm messages and error codes displayed on CDD

Alarm Messages	Code displayed	Cause	Solution
Input OC	E001	The error appears when the inverter input current exceeds the set overcurrent threshold. This may be caused by: a) sudden irradiance changes that may generate input current surges into the MICRO inverter b) PV module incompatible with the MICRO inverter input characteristics c) Faulty MICRO inverter	a) The error occurs sporadically and no action is required as the MICRO inverter will automatically reset to normal operation b) It is necessary to verify that the photovoltaic module specifications are compatible with the inverter. c) If conditions a) and b) have been verified and the error persists, the malfunction may be caused by an internal inverter fault
Vbulk OV	E004	The error is generated when the voltage at the ends of the bulk capacitors exceeds the Over Voltage threshold. This may be caused by: a) Grid voltage too high b) Internal inverter fault	a) Check that the grid voltage is compatible with the MICRO inverter specifications. In the event of highly abnormal grid voltage, please contact your grid operator to address the problem. b) If no problems are found when checking the grid voltage, the alarm may be caused by internal inverter faults.
Output OC	E006	The error appears when the inverter output current exceeds the internal inverter alarm threshold. This may be caused by: a) High impedance grid with significant voltage variations, even with small loads. b) Internal inverter fault	a) Check that the grid voltage is stable, mainly upon: - loading with high current peak loads. - maximum power generation of the PV system If the grid voltage is unstable, verify the appropriate sizing of the line cable/s, and, if correct, please contact your grid operator to address the problem. b) If no problems are found when checking the grid voltage, the alarm may be caused by internal inverter faults

Alarm Messages	Code displayed	Cause	Solution
OverTemp	E014	High internal temperature recorded by the inverter. This parameter depends in part on the power that the inverter must supply, as the internal inverter temperature is affected by the heat dissipated internally by its components. This may be caused by: a) Failure to observe the installation conditions b) Internal inverter fault	a) Verify the installation conditions (exposure to sunlight) and check that air flow to the MICRO inverter is not obstructed, so as to permit cooling of the device. Check that the ambient temperature measured around the MICRO inverter does not exceed the limits set in the technical data. b) Verify the MICRO inverter temperature readings (see the Internal Web Server section in the CDD manual). If one of the temperatures remains at a value which is not compatible with the environmental conditions (e.g. -40°C internal temp. reading with 20°C effective ambient temperature), the alarm may be due to internal inverter causes.
Ground fault	E018	The error is generated when a ground leakage current is detected in the DC section of the system. This may be caused by: a) PV module ground leakage b) Internal inverter fault	See the "Verification of ground leakage" and "Measuring the insulation resistance" sections for information on how to perform checks and measurements. a) If the measured insulation resistance value is less than 1KΩ, the PV module has a ground leakage that prevents the grid connection of the inverter. In this case the PV module must be replaced. b) If the measured value exceeds 1KΩ, try connecting the MICRO inverter to a different PV module. If the error persists, the alarm may be caused by internal inverter faults. To perform this test, the MICRO inverter Ground Fault condition must be reset via the Web Server.
DC Injection	E023	The error is generated if the DC component of the current supplied to the grid exceeds the threshold set by the country of installation's applicable regulation. In any case, the inverter will automatically try to reconnect to the grid. This may be caused by: a) Sporadic recurrence of this error is a sign of large grid distortions or sudden changes in irradiance. b) Systematic recurrence of this error may be due to an inverter fault.	a) Verify the grid parameters and, if the grid voltage is strongly distorted, please contact your grid operator to address the problem If the grid voltage is stable, the error may also be due to sudden irradiance variations. In this case, the inverter will automatically try to reconnect to the grid and no actions are required to solve the problem. b) If the grid voltage is stable, yet the error systematically persists, the malfunction may be caused by an internal inverter fault

Alarm Messages	Code displayed	Cause	Solution
Internal Error	E024	a) The alarm may occur during inverter initialization and is caused by the initialization of communication between the CDD and the MICRO inverters. b) Systematic occurrence of this error may be due to an inverter fault.	a) The alarm will automatically reset upon connection of the inverter to the grid, and no actions are required to solve the problem. b) If the error systematically persists, the malfunction may be caused by an internal inverter fault
Country Mismatch	E050	The alarm is generated when the grid standard (selected on the CDD during installation) has not been correctly set on the MICRO inverters. This may be caused by: a) communication problems while setting the grid standard for the MICRO inverter from the CDD: b) poor irradiance while setting the grid standard for the MICRO inverter from the CDD: MICRO inverters are directly supplied by the voltage generated at the panel, and poor irradiance may cause inverter shut downs	a) Verify on the Internal Web Server (as described in the CDD manual), the radio communication quality on each MICRO inverter (values above 60% indicate good reception). If the quality of the received signal is good re-configure the installation, otherwise consider installing the CDD device in a different position to ensure better radio signal quality. b) System configuration must be carried out in good irradiance conditions, in order to guarantee the correct operation of the MICRO inverter and to prevent the risk of shut-downs due to insufficient input voltage generated by the PV module.
Country Not Comp	E051	The set grid standard is not compatible with the firmware installed on the MICRO inverter. This condition may be generated if a MICRO inverter is replaced.	The firmware in the MICRO inverter/s in the installation must be updated to a compatible version. Firmware updates are performed via the Internal Web Server (see the CDD manual), with the software package obtained from Power-One Service
Vpanel Problem	W001	This alarm is displayed when the input voltage generated at the PV generator is outside the allowed range given in the technical data. This may be caused by: a) Poor irradiance b) Possible shadows that may darken the module during part of the day. b) PV module incompatible with the MICRO inverter input parameters d) Internal inverter fault	a) Wait for appropriate irradiance to guarantee correct operation of the inverter b) Verify that no shadows are present on the PV module when the error is generated c) Verify that the PV module voltage characteristics are compatible with the inverter input specifications. d) If the above checks have yielded positive results, yet the error persists, the malfunction may be caused by the MICRO inverter.
Grid Fail	W003	This alarm is generated when one or more grid parameters lie outside the permitted range set by the country of installation's grid standard. The error code will be followed by a suffix in brackets indicating the grid parameter out of range: (UV) Grid voltage below the set lower limit (OV) Grid voltage above the set upper limit (UF) Grid frequency below the set lower limit (OF) Grid frequency above the set upper limit	If the error is generated only on one of the installation MICRO inverters, this may be due to an inverter fault. If the alarm is generated at multiple inverters in the installation, check the grid voltage for instabilities in any of the 4 parameters monitored by the inverter. If anomalous values are detected, verify the sizing of the AC line conductors. In case of correct sizing, please contact your grid operator to address the problem.

Alarm Messages	Code displayed	Cause	Solution
Vbulk UV	W011	Internal fault of the booster circuit inverter	Contact Power-One Service.
Comm warning	W025	The alarm is generated when the CDD device does not receive messages from the MICRO inverter for more than 5 minutes. This may be caused by non-optimal positioning of the CDD.	Consider a new installation position that ensures better communication between the CDD device and the MICRO inverters. Use the CDD Internal Web Server to verify the signal quality (refer to the CDD manual for information on the Internal Web Server)
Comm fault	W005	The alarm is generated when the CDD device does not receive messages from the MICRO inverter for more than 15 minutes. This may be caused by non-optimal positioning of the CDD.	Consider a new installation position that ensures better communication between the CDD device and the MICRO inverters. Use the CDD Internal Web Server to verify the signal quality (refer to the CDD manual for information on the Internal Web Server)
Remote Off	E035	The alarm is generated when an external shutdown command has been sent to the MICRO inverter.	Disable the Remote Off command.

5.2 VERIFICATION OF GROUND LEAKAGE

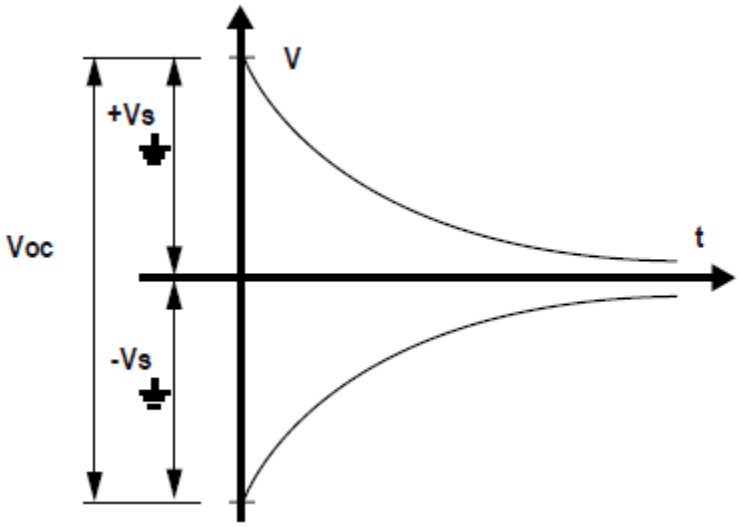
In the presence of anomalies or report of ground fault, there may be a ground leakage from the photovoltaic module.

To check this, measure the voltage between the positive pole and ground and between the negative pole and ground using a voltmeter.

5.2.1 BEHAVIOR OF A SYSTEM WITHOUT LEAKAGE

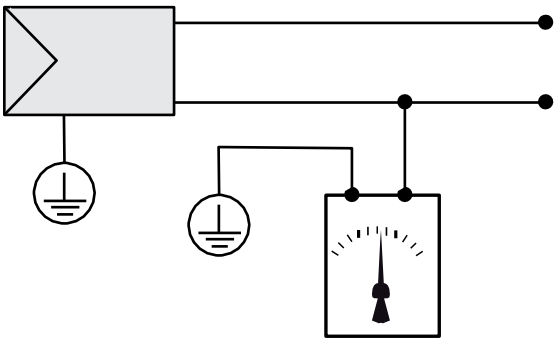
Due to the capacitive effect of the photovoltaic module, during the first moments that the voltmeter is connected between one of the two poles and ground, it will measure a voltage of about Voc/2, which will tend to stabilize to around 0V if there is no ground leakage, as shown in the graph below:

The internal resistance of the voltmeter tends to zero the voltage present on the PV generator due to the capacitive effect

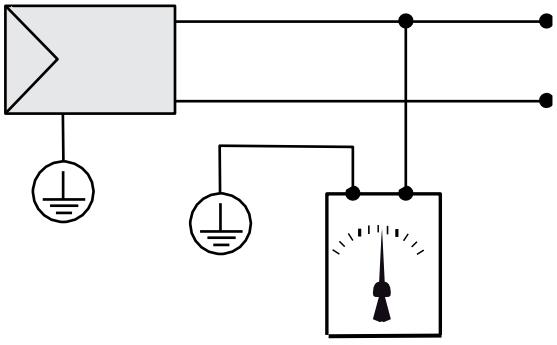


How to make the measurement:

Positive pole Vs Ground



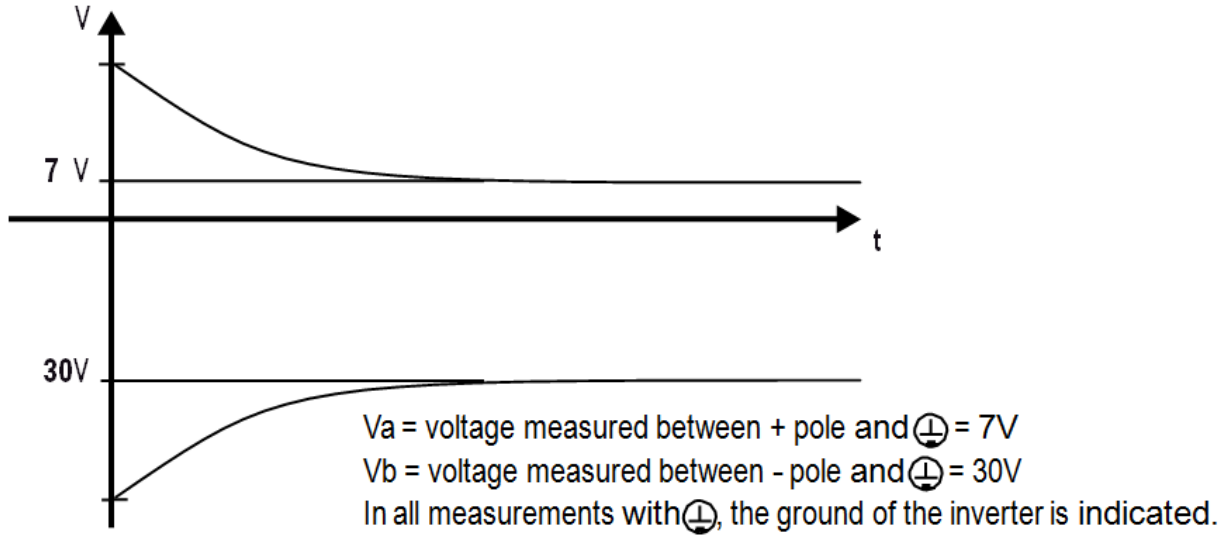
Negative pole Vs Ground



5.2.2 BEHAVIOR OF A SYSTEM WITH LEAKAGE

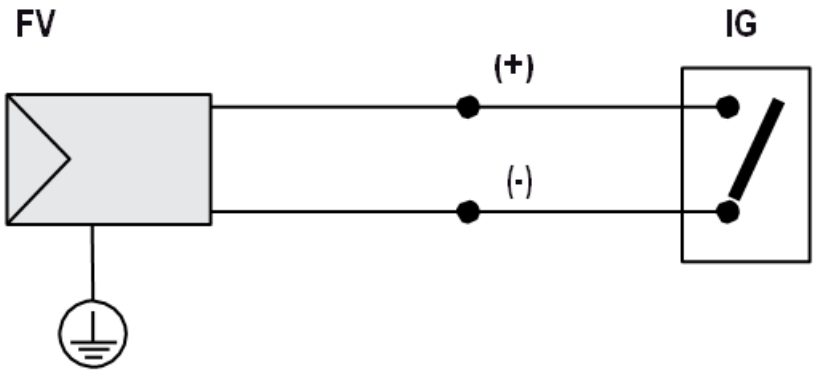
If the voltage measured between one of the two poles and ground does not tend to 0V and stabilizes on a value, there is a ground leakage from the photovoltaic module.

Example: When the measurement is made between positive pole and ground, on a photovoltaic module with Voc=37V, a voltage of 7V is measured.

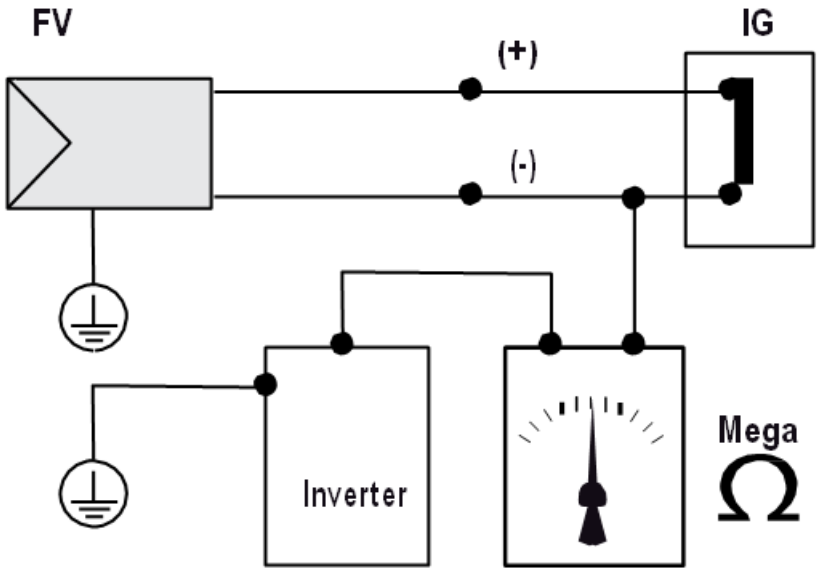


5.3 MEASURING THE INSULATION RESISTANCE OF PHOTOVOLTAIC MODULE

To measure the insulation resistance of the photovoltaic module compared to ground, the two poles of the PV generator must be short-circuited (using a suitably sized selector), and verify that the chassis of the module itself is referred to ground (of the inverter).



Once the short-circuit has been made, measure the insulation resistance (Riso) using a megohmmeter positioned between the two shorted poles and ground (of the inverter).



If the measured insulation resistance is less than 1Kohm the inverter does not connect to the grid due to a low insulation of photovoltaic module respect to ground.

The insulation resistance is affected by the environmental conditions the photovoltaic module is in (E.g.: photovoltaic module wet from dump or rain); therefore, the measurement must be made immediately after the anomaly.

5.4 THE POWER-0NE SERVICE CALL

Call **Power-One Technical Support at 1-877-261-1374** and provide the following information.

- ✓ AURORA model?
- ✓ Serial number?
- ✓ Week of production?
- ✓ What signals are shown on the display?

NOTE: information above is available from the CCD.

Additional helpful information when troubleshooting with the Power-One Technical Service Engineers:

- Provide a brief description of the fault.
- Information on the photovoltaic module
- Brand and model of photovoltaic modules
- Identify the system structure:
  - Maximum voltage and current values
  - Can the fault be reproduced? If so, how?
  - Is the fault cyclical in nature? If so, how often?
  - Was the fault apparent at the time of installation?
  - If so, has it got worse?

Describe the atmospheric conditions at the time the fault appears/appeared.

PART 6 MAINTENANCE GUIDE

6.1 GENERAL CONDITIONS

Maintenance operations must be carried out by authorized personnel assigned to carry out this work.

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.

The maintenance technician is under obligation to promptly report any anomalies.

DO NOT allow the equipment to be used if problems of any kind are found, and restore the normal conditions correctly or otherwise make sure that this is done.

Always use the personal protective equipment provided by the employer and comply with the safety conditions in Part 1, Introduction and Safety.

During normal operation, check that the environmental and logistic conditions (described in Part 1 of this manual) 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.

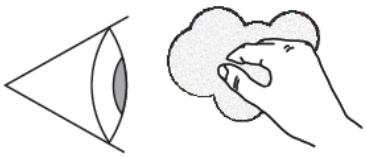
6.1.1 ROUTINE MAINTENANCE

Routine maintenance, although not mandatory, is recommended to maintain efficient operation of the PV installation.

It is recommended that maintenance operations be only performed by qualified personnel or Power-One personnel (under a servicing contract).

The maintenance schedule may vary depending on the environmental conditions of the installation site

Table 6- 1: Routine Maintenance

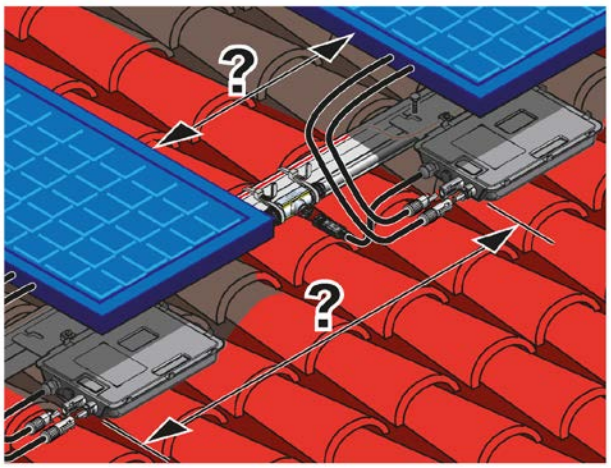
Annual cleaning 	Conduct an annual visual inspection (where possible) on the various components (DC cables, MICRO-inverters and AC cables) to check for dust, dirt, moisture and water seepage. Clean the equipment if necessary. Clean using compressed air, a vacuum cleaner or special brushes, if possible.
Annual operations 	Check that there has been no drastic change in the installation conditions that might have a negative influence on radio communication with the micro-inverters.

Do not attempt to dismantle the equipment or make any internal repairs! With a view to preserving the integrity of their safety and insulation, AURORA 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.

Any maintenance or replacement of the device could require dismounting the photovoltaic module mounted on top of the MICRO inverter.

This condition must be accounted for during installation, ensuring that the safety distances are correct for normal control and maintenance operations.



6.2 STORAGE AND DISMANTLING

6.2.1 STORAGE OF THE EQUIPMENT OR PROLONGED STOP

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.

Restarting after a long or prolonged stop requires a check and, in some cases, the removal of oxidation and dust that will also have settled inside the equipment if not suitably protected.

6.2.2 DISMANTLING, DECOMMISSIONING AND DISPOSAL

Power-One CANNOT be held responsible for disposal of the equipment: displays, cables, batteries, accumulators, etc.; therefore, the customer must dispose of these substances, which are potentially harmful to the environment, in accordance with the regulations in force in the country of installation.

If the equipment is dismantled, you must adhere to the regulations in force in the country of destination, and in any case avoid causing any kind of pollution in order to dispose of the products listed below.

Table 6- 2: Disposal of Components

COMPONENT	MATERIAL OF CONSTRUCTION
Frame, brackets, supports	Arc-welded steel FE37
Casing or covers	ABS, plastic
Paint and	RAL
Gaskets and seals	Rubber / Teflon / Viton
Electrical cables	Copper / Rubber
Polyethylene / Nylon	Conduits
Back-up battery	Nickel / Lead/ Lithium

Dispose of the various types of materials that the parts of the equipment consist of in dumps that are suitable for the purpose.

PART 7 APPENDIX

7.1 TECHNICAL DATA

TECHNICAL DATA	VALUES	MICRO-0.25-I-OUTD-US-208/240		MICRO-0.3-I-OUTD-US-208/240	
Nominal Output Power	W	250		300[1]	
Rated Grid AC Voltage	V	208	240	208	240
Maximum Output Power	W	250		300	
Input Side (DC)					
Maximum Usable DC Input Power	Wp	265[2]		320[2]	
Absolute Maximum Voltage (Vmax)	V	65		65	
Start- Up Voltage (Vstart)	V	25		25	
Full Power MPPT Voltage Range	V	25-60		30-60	
Operating Voltage Range	V	12-60[3]		12-60[3]	
Maximum Usable Current (Idcmax)	A	10.5		10.5	
Maximum Short Circuit Current Limit	A	12.5[3]			
DC Connection Type		Amphenol H4 (MC4 compatible) PV connector			
Output Side (AC)					
Grid Connection Type		1Ø/2W	Split-Ø/3W	1Ø/2W	Split-Ø/3W
Adjustable Voltage Range (Vmin-Vmax)	V	183-228	211-264	183-228	211-264
Grid Frequency	Hz	60		60	
Adjustable Grid Frequency Range	Hz	57-60.5		57-60.5	
Maximum Output Current	A	1.20	1.04	1.44	1.25
Power Factor		> 0.95		> 0.95	
Maximum Number of Inverters per String		13	15	11	12
Grid Wiring Termination Type		12AWG Drop Cable from Inverter to 10AWG AC Trunk Cable			
Protection Devices					
Input					
Reverse Polarity Protection		Yes Polarized PV Connectors (Amphenol H4)			
Output					
Anti-Islanding Protection		Meets UL 1741/IEEE1547 requirements		Meets UL 1741/IEEE1547 requirements	
Over-Voltage Protection Type		Varistor		Varistor	
Maximum AC OCPD Rating	A	20		20	
Efficiency					
Maximum Efficiency	%	96.5		96.5	
CEC Efficiency	%	96		96	
Operating Performance					
Stand-by Consumption	mW	< 50		< 50	
Communication					
Monitoring System		Wireless and Web-Based Monitoring through AURORA CDD			
Environmental					
Ambient Air Operating Temperature Range	°F (°C)	-40 to 167 (-40 to 75) with derating above 149 (65)		-40 to 167 (-40 to 75) with derating above 149 (65)	
Ambient Air Storage Temperature Range	°F (°C)	-40 to 167 (-40 to +75)		-40 to 167 (-40 to +75)	
Relative Humidity	% RH	0-100 condensing		0-100 condensing	
Acoustic Noise Emission Level	db (A) @1m	< 30		< 30	
Maximum Operating Altitude without Derating	ft(m)	6560 (2000)		6560 (2000)	
Mechanical Specifications					
Enclosure rating		NEMA 4X		NEMA 4X	
Cooling		Natural Convection		Natural Convection	
Dimensions (H x W x D)	in (mm)	10.5 x 9.7 x 1.37 (266 x 246 x 35)			
Weight	lb/(kg)	< 3.5 (1.65)		< 3.5 (1.65)	
Mounting System		Rack mounting with 5/16" bolt			
Safety					
Isolation Level		HF Transformer		HF Transformer	
Safety and EMC Standard		UL1741, EN61000-6-2, EN61000-6-3, FCC Part 15		UL1741, EN61000-6-2, EN61000-6-3, FCC Part 15	
Safety Approval		$_{c}CSA_{us}$		$_{c}CSA_{us}$	
Warranty					
Standard Warranty	years	10		10	
Available Models					
Standard		MICRO-0.25-I-OUTD-US-208/240		MICRO-0.3-I-OUTD-US-208/240	

1 With derating below 200V for 208VAC operation
2 This is the maximum power that the inverter will utilize. It does not define the maximum power rating for the PV module.
3 Only use PV modules that satisfy these parameters under all operating conditions.

7.1.1 EFFICIENCY CURVES

Graphs of the efficiency curves of all the models of inverter described in this manual are shown below. The efficiency curves are linked to technical parameters that are continually being developed and improved and should therefore is considered approximate.

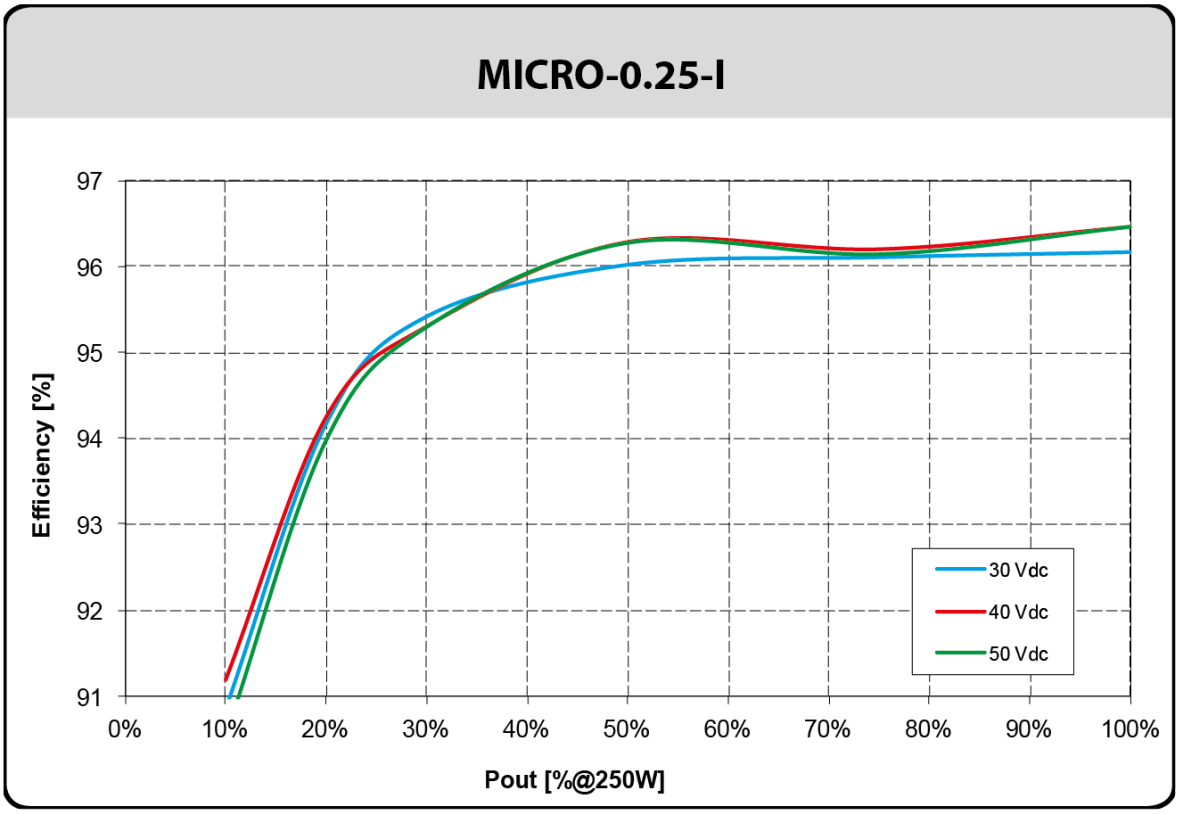


Figure 7-1: MICRO-0.25-I-OUTD-208/240 efficiency curve

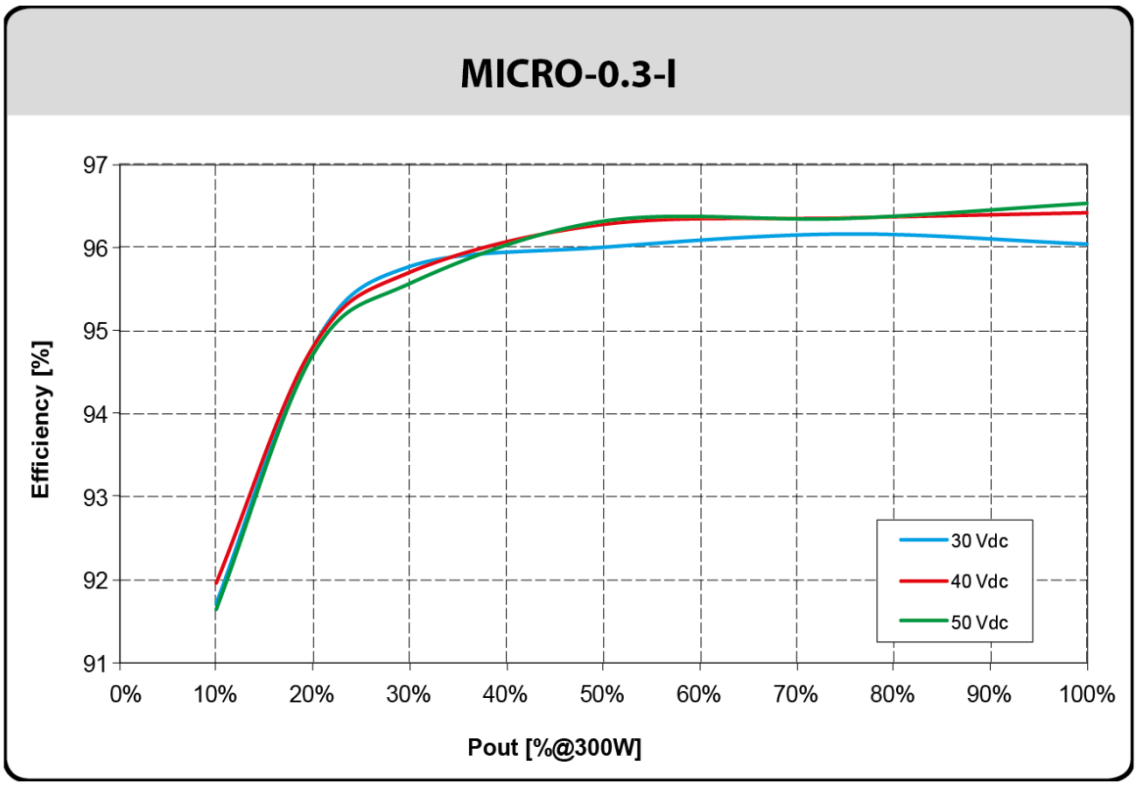


Figure 7-2: MICRO-0.3-I-OUTD-208/240 efficiency curve

7.1.2 POWER DERATING

In order to allow inverter operation in safe thermal and electrical conditions, the unit automatically reduces the value of the power fed into the grid. Power derating can take place due to adverse environmental conditions or due to unsuitable input voltage values.

The conditions for power reduction due to environmental conditions and input voltage can also occur at the same time, but the power reduction will always relate to the lower value measured.

7.1.2.1 *Power Reduction Due To Environmental Condition*

The power reduction value and the inverter temperature at which it occurs depend on the ambient temperature and on many operating parameters. Example: input voltage, grid voltage and power available from the photovoltaic field.
The inverter can therefore reduce the power during certain periods of the day and according to the value of these parameters.
In any case, the inverter guarantees the maximum output power even at high temperatures, provided the sun is not shining directly on it.

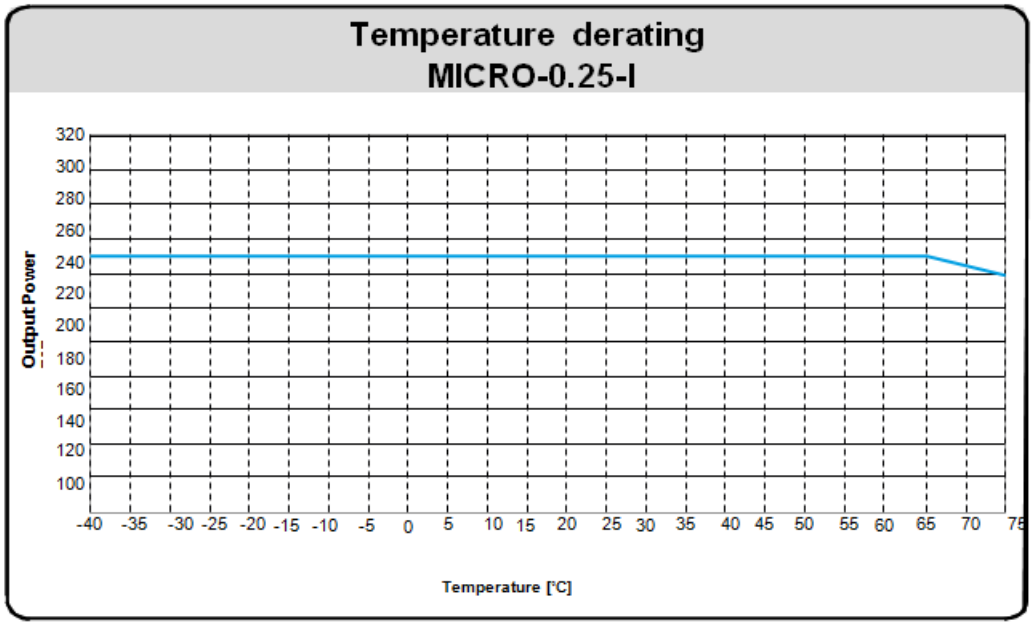


Figure 7-3: MICRO-0.25-I-OUTD-208/240 temperature derating curve

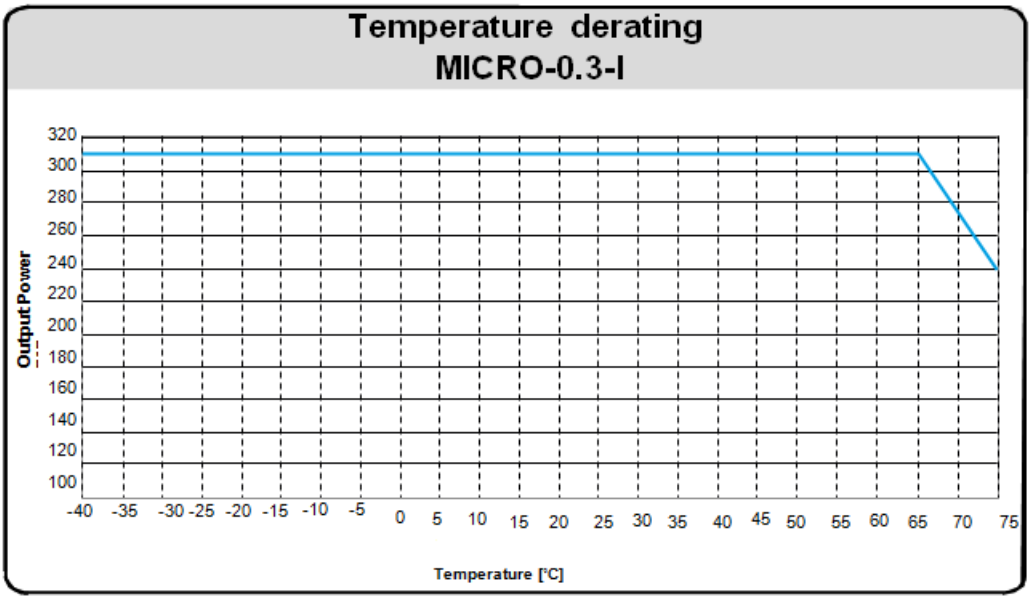


Figure 7-4: MICRO-0.3-I-OUTD-208/240 temperature derating curve

7.1.2.2 *Power Reduction Due To the Input Voltage*

The graphs show the automatic reduction of supplied power when input voltage values are too high or too low.

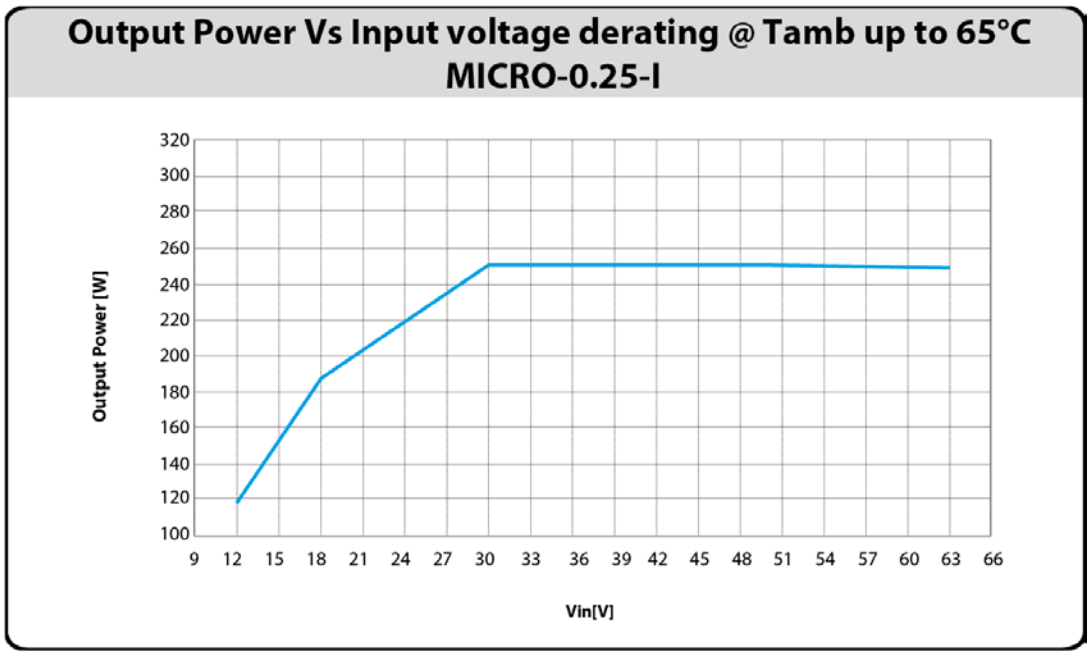


Figure 7-5: MICRO-0.25-I-OUTD-208/240 voltage derating curve @ Tamb up to 65°C

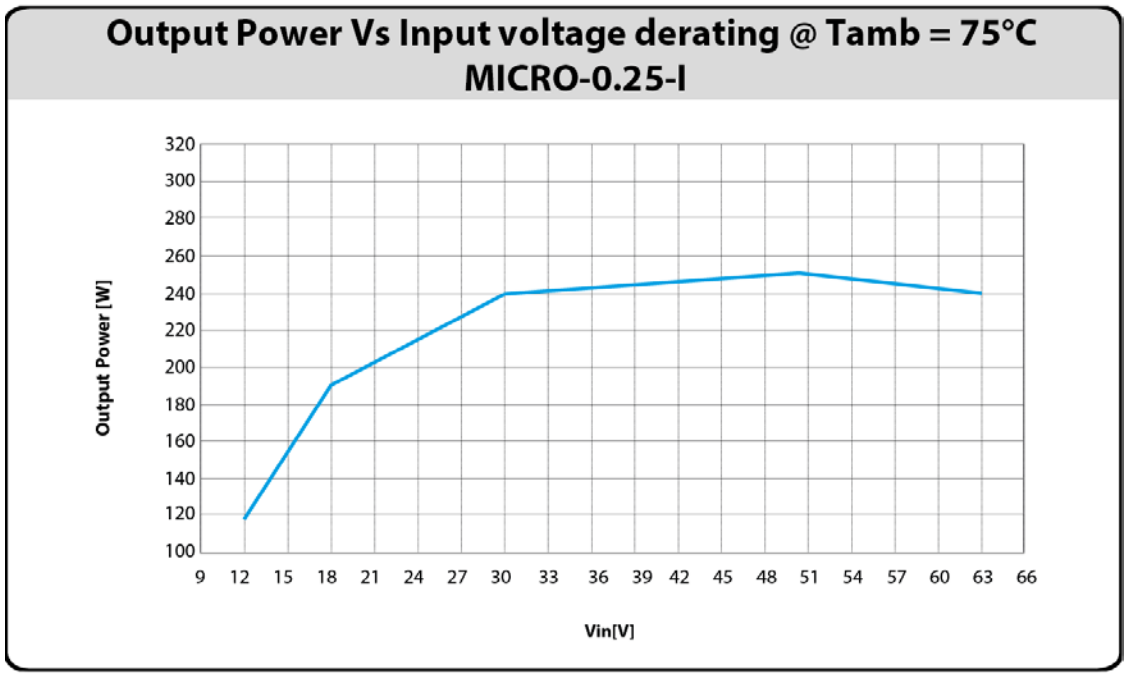


Figure 7-6: MICRO-0.25-I-OUTD-208/240 voltage derating curve @ Tamb up to 75°C

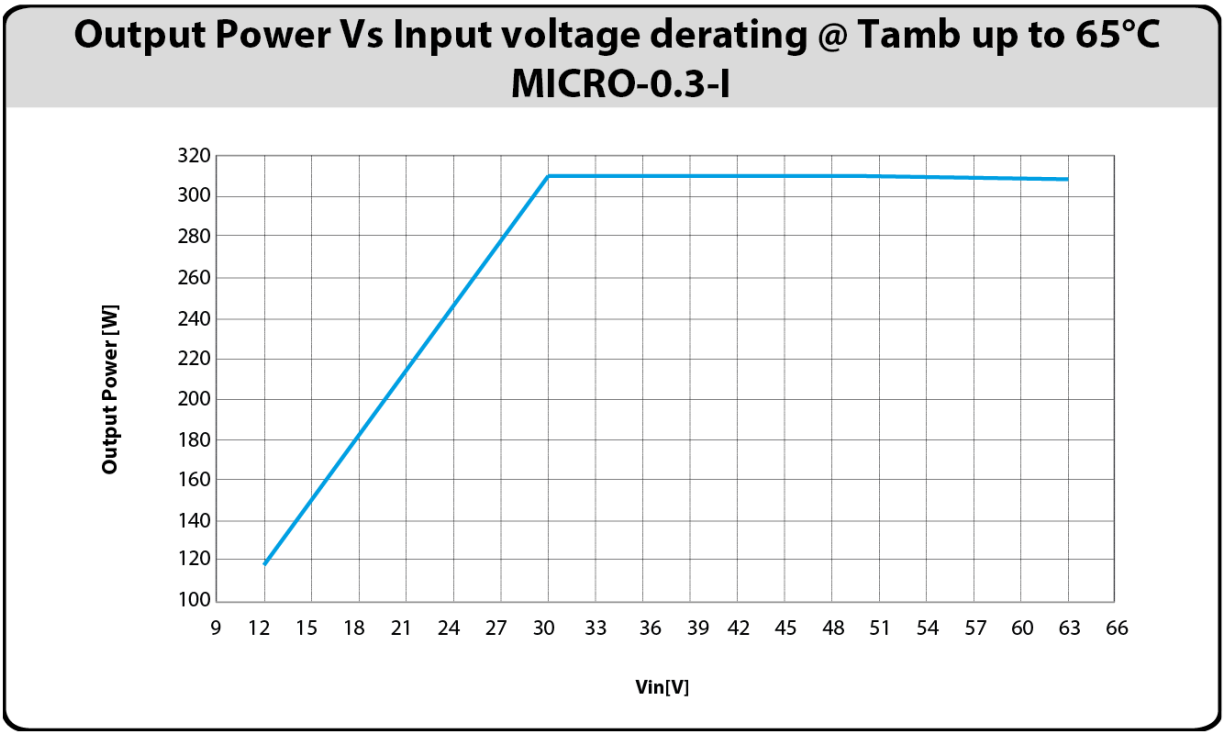


Figure 7-7: MICRO-0.3-I-OUTD-208/240 voltage derating curve @ Tamb up to 65°C

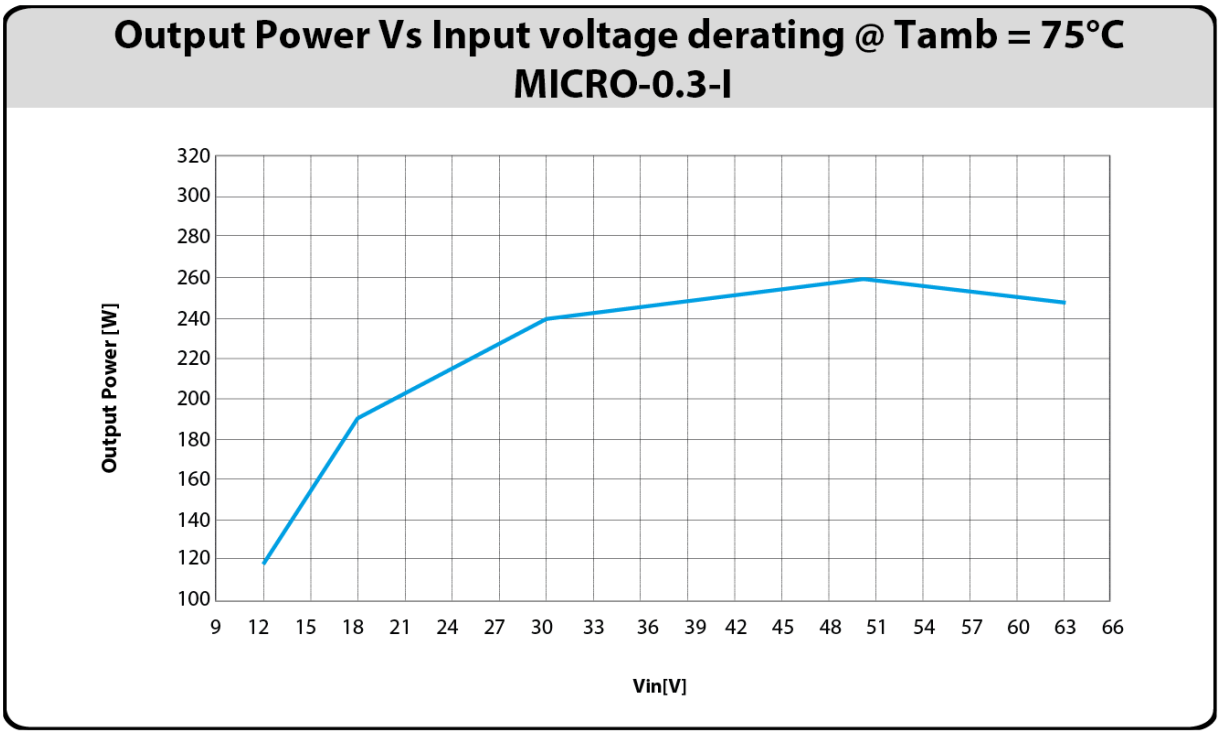


Figure 7-8: MICRO-0.3-I-OUTD-208/240 voltage derating curve @ Tamb up to 75°C

7.1.1 BLOCK WIRING DIAGRAM

The diagram below summarizes the layout of the MICRO inverter. The main blocks are the DC-DC input converter (the "boost" section) and the DC-AC output inverter. Both work at a high switching frequency, are small and relatively light.

The inverter is equipped with a single input converter with Maximum Power Point Tracking (MPPT) to which it is possible to connect a single photovoltaic module. This means that the modules connected to the MICRO inverters could be installed in different positions and orientations. This inverter is equipped with a high-frequency transformer, in other words with galvanic isolation of the primary (DC side) from the secondary (AC side), while maintaining very high performance in terms of output and energy export. This type of circuit allows for the grounding of the positive input pole.

The inverter is controlled by two independent DSPs (Digital Signal Processors) and a central microprocessor. The connection to the power grid is thus kept under control by two independent monitors, in full compliance with the electric field norms both for power supply to the systems as well as security.

The wireless communication system inside the MICRO inverter transmits the information to the CDD device that analyzes and manages all system data. All this guarantees optimal operation of the entire unit and high efficiency in all insolation and load conditions, always in full compliance with the relevant directives, standards and provisions.

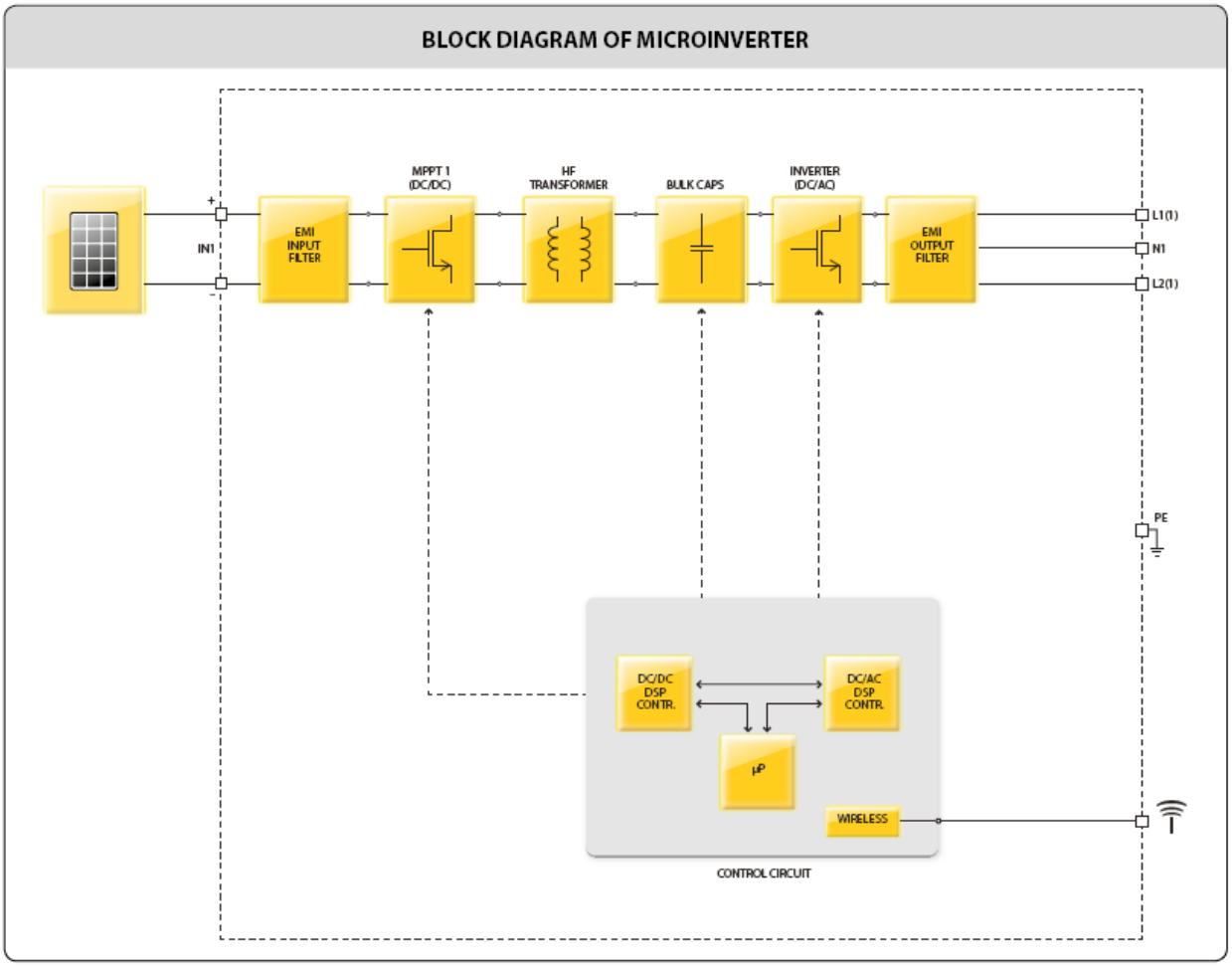


Figure 7-9: Topographic Diagram

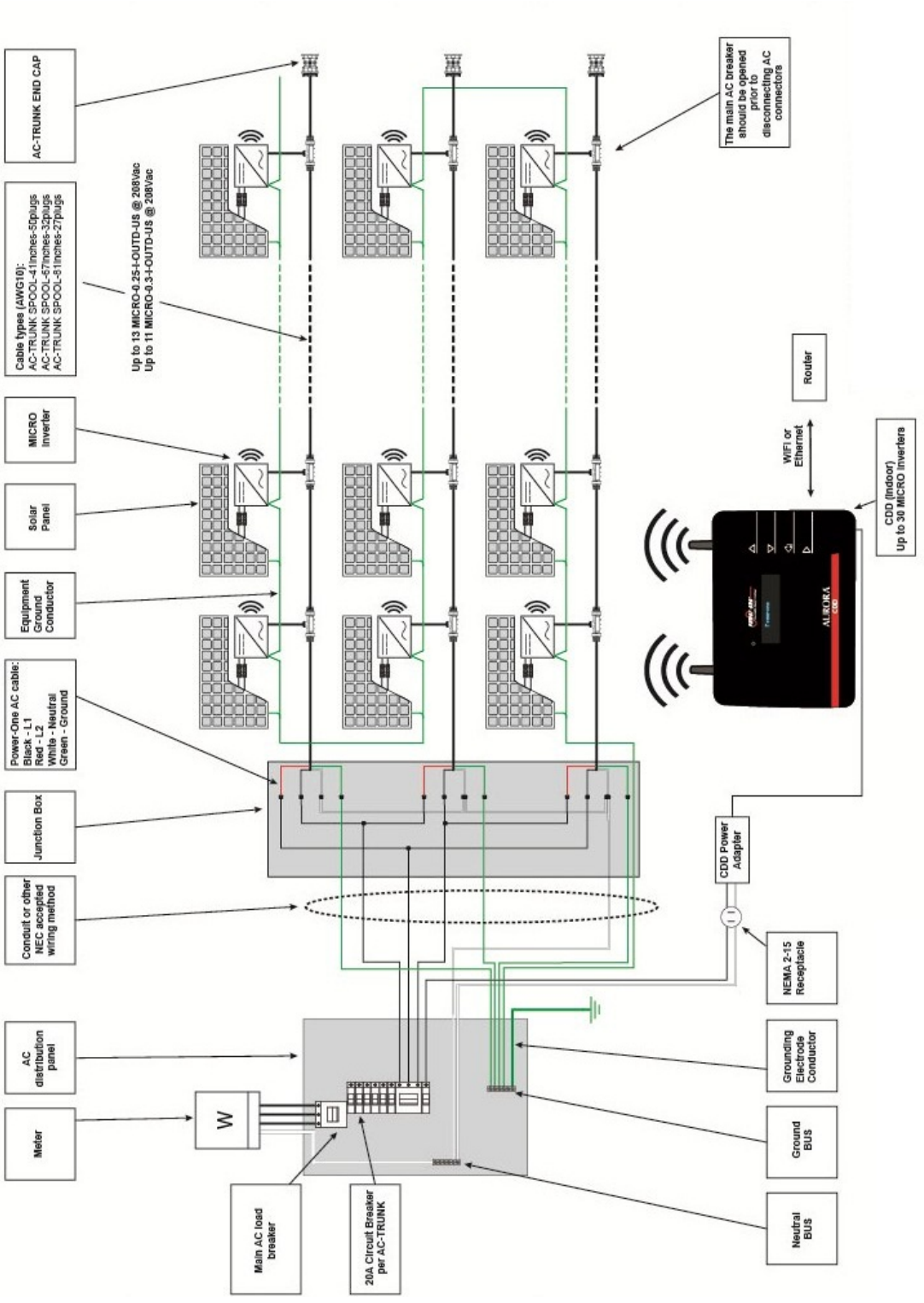


Figure 7-10: Wiring diagram – 208Vac three phase *

***IMPORTANT: If several Aurora MICRO inverters are installed in a three-phase AC GRID, it is recommended to distribute the inverters between the phases in order to reduce the power unbalances between the phases. Always refer to the local standards.**

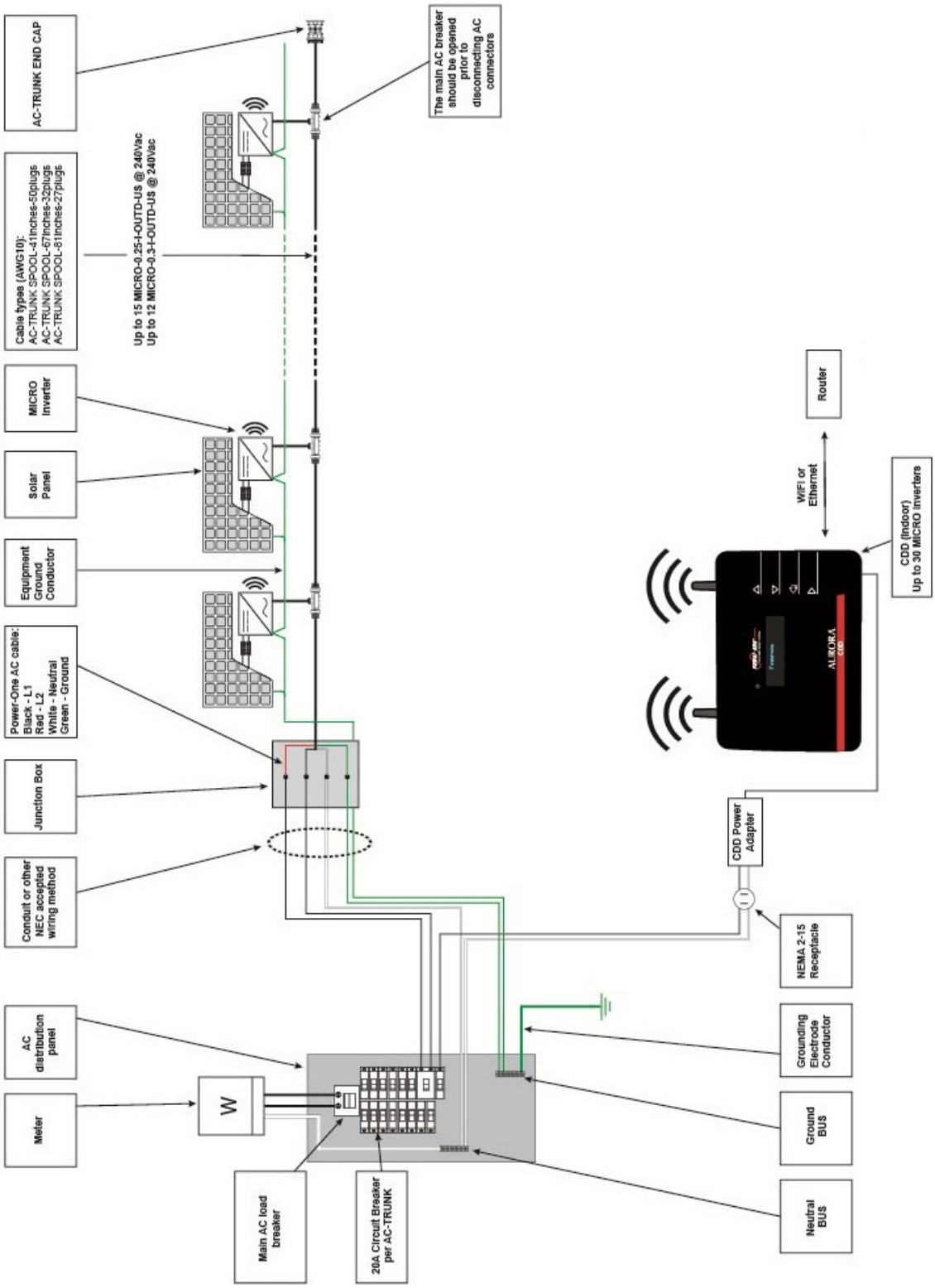


Figure 7-11: Wiring diagram – 240Vac split phase

7.1.1 FUNCTIONALITY OF THE EQUIPMENT

Data transmission and control
The MICRO inverters are monitored remotely through an advanced communications system based on a wireless connection and the CDD device. In addition to local monitoring of the system, it is possible to have remote data visualization through an internet access to Power-One's AURORA® VISION web portal.

Single photovoltaic module management benefit
There are many advantages of having each MICRO inverter monitor a single photovoltaic module:
Capability of viewing each module's production
Possibility of controlling when to clean each module, as necessary
Ease of service interventions from the possibility of singling out individual modules or inverter that are down.
Preservation of production even if there is a malfunctioning module or inverter

7.1.2 PROTECTIVE DEVICES

7.1.2.1 *Anti-Islanding*

In accordance with required national standards and laws, in the event of a local grid outage by the utility, or when the grid equipment is switched OFF for maintenance operations, the inverter must be physically and safely disconnected, to ensure protection of personnel working on the grid. To prevent possible islanding, the inverter has an automatic protective disconnection system called "Anti-Islanding".

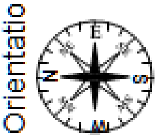
7.1.2.2 *Ground fault in the photovoltaic modules*

An advanced ground fault protection circuit continuously monitors the ground connection and disconnects the inverter if a ground fault occurs, indicating this condition by means of the red GFI LED on the LED panel.

7.1.2.3 *Protective devices*

The inverter is equipped with additional protective devices to facilitate safe operation. These protective devices include:
Continuous monitoring of the grid voltage to ensure the voltage and frequency values stay within operating limits;
Control of internal temperatures to automatically limit the power if necessary to ensure the unit does not overheat (derating).

7.2 TEMPLATE FOR MAP OF MICRO INVERTER INSTALLATION

	1	2	3	4	5
A					
B					
C					
D					
E					
F					
		Orientation:  ………°	Affix the detachable label to each field on the map (located on the rear side of the inverter) bearing the serial number of the PVI-MICRO.		power-one Renewable Energy Solutions

7.3 INDEX OF TABLES AND FIGURES

power-one®
Renewable Energy Solutions

www.power-one.com

Aurora® Power Service	USA	877-261-1374
Aurora® Power Service	France	00 800 00 28 76 72
Aurora® Power Service	Germany	0800-2200211
Aurora® Power Service	Italy	00 800 00 28 76 72
Aurora® Power Service	Spain	00 800 00 28 76 72
Aurora® Power Service	Middle East	00 800 00 28 76 72
Aurora® Power Service	Australia	+61 2 9735 3111
Aurora® Power Service	China	+86 755 2988 5888
Aurora® Power Service	Singapore	+65 6896 3363
Aurora® Power Service	Malaysia	+603-8025 9963