AURORA®
Photovoltaic Inverters

The Technical Manual:
PVI-10/12-I-OUTD-US/CAN

POWER-ONE TRADEMARKS:

Power-One
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United States

CONTENTS

PART 1:INTRODUCTION & SAFETY

INSTRUCTIONS FOR USE OF THIS MANUAL
KEEP THESE INSTRUCTIONS!

This manual contains important instructions for safety and operation that must be followed during installation and maintenance of this photovoltaic inverter.

All operations regarding transport, installation, maintenance, and start-up must be carried out by qualified, trained technician or general contractor in compliance with all prevailing codes and regulations.

For a list of contractors certified to install this Power-One AURORA Inverter, please contact Power-One Customer Service at 877-261-1374.

1.1 FOREWORD

1.1.1 CONDITIONS OF WARRANTY AND SUPPLY

Warranty conditions are described in a certificate supplied with the equipment. The warranty conditions are understood to be valid if the installer or licensed contractor observes what is described in this manual. Any conditions deviating from those described below must be explicitly agreed upon in the purchase order.

1.1.1.1 *Exclusions*

Power-One assumes no liability for unauthorized changes to this equipment

Unauthorized changes or modifications to the equipment will result in suspension of warranty and any changes resulting in physical damage or personnel injury is strictly the responsibility of the buyer.

Power-One declines any responsibility in case standards for correct installation are not adhered to and it is not liable for systems upstream or downstream of the equipment it has supplied.

Check for adequate spaces, adapted to accept the unit, air noise produced as a function of the environment, any conditions of flammability as installations can vary.

Power-One CANNOT be held responsible for lack of production even if it results from break-downs of the unit, or the data communication system.

Power-One CANNOT be held responsible for defects or malfunctions as a result of: improper use of the tool; alterations due to transportation or special environmental conditions; lack of/ or improper maintenance; tampering, poor installation repairs or use.

Power-One CANNOT be held responsible for disposal of: displays, cables, batteries, accumulators etc. It is necessary that the user(s) dispose of such substances that are potentially harmful to the environment in accordance to the standards enforced in the country of installation.

1.2 INTRODUCTION

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

1.2.1 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® Photovoltanic (PV) 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 and carry out the operations necessary for keeping the equipment in good working order.

1.2.2 TARGET AUDIENCE

The installation is to be done by a qualified installer and/or licensed electrician or contractor who can install this product according to the applicable local codes and regulations (National Electric Code, Canada Electric Code wiring rules and others)

The customer must make sure the operator has the necessary skill and training to do his/her job. Technician in charge of using and maintaining the equipment must be licensed and qualified for the described tasks and must have the experience to correctly interpret what is described in the manual.

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.

1.2.3 VALIDITY AND AVAILABLE VERSIONS

There are three versions of the chassis, delineated by the presence of integral DC and/or AC disconnect.

	**PVI-10.0/12.0-I-OUTD-US/CAN-XXX-YY** [-US-] No switchbox version 28.2"H x 25.4"8.7"D 99 lb	Models do not have a switch box or integrated disconnect switches; requires external customer supplied switches.
	***PVI-10/12-I-OUTD-S-US/CAN-XXX-YY*** [US] Version w/DC switchbox 36.4"H x 25.4"W x 8.7"D 107 lb	Model has a small switchbox and provisioned with a DC disconnect switch. (Planned for phase out in 2012)
	***PVI-10/12-I-OUTD-S1-US/CAN-XXX-YY*** [US] Version w/DC switchbox 36.4"H x 25.4"W x 8.7"D 107 lb	Model has a large switchbox and provisioned with integral DC switch and dual 3-string fused combiners.
	***PVI-10.0/12.O-I-OUTD-S2-US/CAN-XXX-YY*** [-S2-US] Version w/DC and AC switchbox 36.4"H x 25.4"W x 8.3"D 119 lb	Model has a large switch box and provisioned with integral DC and AC disconnect switches, and dual 3-string fused combiners.

There are three grid-voltage options:

1. ***The 208 models are for connection to a 208VRMS/3Ø 3-wire or 4-wire distribution grid***
2. ***The 480 models are for connection to a 480VRMS/3Ø/4W grid (Neutral required)***
3. ***The 600 models are for connection to a 600VRMS/3Ø/3-wire or 4-wire distribution grid***

Typically, the inverter is connected with the same number of wires as the distribution system. If connecting to a Y grid, use four wires (three phase conductors and neutral conductor).

There are two array ground reference options:

1. ***Negative Ground*** (NG) models have the negative side of the PV array referenced to ground and can operate in either the dual or parallel modes. (default)
2. ***Positive Ground*** (PG) models have the positive side of the PV array referenced to ground and can be operated in only the parallel mode (single MPPT with the two input channels paralleled.)

Table 0.01, below, shows feature data encoded into the part numbers.

Table 0.01 - Part Number Coding Information

Product Series		Output Power		Isolation Type		Environ		Disconnect Switch Options		Use Location		Grid Voltage Option		PV Array Ground Reference Option
PVI	-	**10**	-	**I**	-	**OUTD**	-	**S2**	-	**US**	-	**480**	-	**NG**
[**PVI**] Aurora PV Inverter Platform		[**10**] 10kW Rated output [**12**] 12kW Rated output		[**I**] High frequency isolation xformer		[**OUTD**] Suitable for outdoor usage		[**Empty**] No Switch box [**S**] With integral DC switch [**S1**] With integral DC switch & Combiners* [**S2**] With Integral AC and DC switches & Combiners*		[**US**] Designed for US Grid [**CAN**] Designed for Canada Grid		[**208**] 208V/3Ø 3W-Δ or 4W-Y [**480**] 480V/3Ø 4 Wire Only [**600**] 600V/3Ø 3W-Δ or 4W-Y		[**NG**] Negative Array ref. [**PG**] Positive Array ref.

* S1 and S2 versions have two 3x1 integral string combiners
The example shown in this table indicates a 10kW output PV inverter with isolated output, provisioned with integral AC and DC front panel disconnect switches and wired for a 480V grid

The available versions are listed below:

10kW Models		
10kW/no switchbox	**10kW/DC switchbox**	**10kW/DC+AC switchbox**
PVI-10.0-I-OUTD-US-208-PG/NG	PVI-10.0-I-OUTD-S/S1-US-208-PG/NG	PVI-10.0-I-OUTD-S2-US-208-PG/NG
PVI-10.0-I-OUTD-US-480-PG/NG	PVI-10.0-I-OUTD-S/S1-US-480-PG/NG	PVI-10.0-I-OUTD-S2-US-480-PG/NG
PVI-10.0-I-OUTD-CAN-208-PG/NG	PVI-10.0-I-OUTD-S/S1-CAN-208-PG/NG	PVI-10.0-I-OUTD-S2-CAN-208-PG/NG
PVI-10.0-I-OUTD-CAN-600-PG/NG	PVI-10.0-I-OUTD-S/S1-CAN-600-PG/NG	PVI-10.0-I-OUTD-S2-CAN-600-PG/NG
	12kW Models	
12kW/no switchbox	**12kW/DC switchbox**	**12kW/DC+AC switchbox**
PVI-12.0-I-OUTD-US-480-PG/NG	PVI-12.0-I-OUTD-S/S1-US-480-PG/NG	PVI-12.0-I-OUTD-S2-US-480-PG/NG
PVI-12.0-I-OUTD-CAN-600-PG/NG	PVI-12.0-I-OUTD-S/S1-CAN-600-PG/NG	PVI-12.0-I-OUTD-S2-CAN-600-PG/NG

1.2.4 NAMEPLATE

The nameplate attached to the equipment must absolutely NOT be removed, damaged, stained, etc. They are not to be hidden with external objects or parts such as rags, boxes, or other such equipment. They should be cleaned periodically and always maintained in view.

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

1. Manufacturer code
2. Model code
3. Serial number
4. Week/Year of production

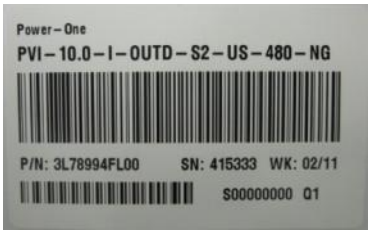


Figure 0.01 - Sample product nameplate (PVI-10.0-I-OUTD-S2-US-480-NG)

Technical data reported in this manual; however, does not substitute the data mentioned on the labels affixed to the equipment.

1.2.5 WARRANTY INFORMATION

After inspecting the AURORA Inverter, it is necessary to fill out the warranty information on this unit and submitted it to Power-One. Submitting this information will register the unit with the manufacturer and the owner will receive technical updates regarding this Power-One photovoltaic inverter.

1.2.6 COMMISSIONING:

As part of the commissioning process, double check the following:

- Make sure that there is no ground fault.
- Double check the voltage doesn't exceed specified voltage ratings.
- See Part 4 on Operations for more information on commissioning and start- up.

1.2.7 MAINTENANCE AND SERVICE

The AURORA Inverter has no user-serviceable parts. Maintenance and service procedures must comply with the manufacturer's documentation. For more detailed information, please see Part 6 on Maintenance. Call Power-One Customer Service at 877-261-1374 for a list of qualified service contractors.

1.2.8 Figures And Images In This Manual

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

1.2.9 Storage Of This Information

Keep this document in a safe place near the AURORA Inverter for easy access during installation and maintenance.

1.2.10 Additional Information

More information on Power-One's AURORA Inverter can be found at www.power-one.com or by scanning the following QR code:

1.3 SAFETY

1.3.1 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. These symbols are as follows:

Symbol	Usage
DANGER:	Indicates a hazardous situation that if not avoided 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 its entirety in order to avoid potential safety hazards including equipment damage, or personal injury.
CAUTION:	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
ATTENTION:	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.
NOTE:	Contains actions and instructions that must be followed in order to avoid potential damage to the equipment and/or faults.
INFORMATION:	Accompanies notes that call attention to supplementary information that ensure optimal operation of the system.
	Indicates that the customer must make sure the operator has the necessary skill and training to do his/her job. Technician in charge of using and maintaining the equipment must be licensed and qualified for the described tasks and must have the experience to correctly interpret what is described in the manual.
	Do NOT install this equipment while under the influence of drugs, narcotics; or with health related issues that might impact mental or physical ability to operate at sound mind. The employment of a person, who is NOT qualified, is, drunk or on narcotics, has a prosthetic mitral valve or a pacemaker is strictly forbidden.
	When operating this equipment, always use Personal Protective Equipment (PPE) recommended by the law and supplied by the employer. The customer is civilly liable for the qualification and mental or physical condition of the professional figures that interact with the equipment. They must always use the PPE enforced by the laws of the country of destination and whatever is provided by their employer.

1.3.1.1 *Other Symbols in this Document:*

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. The descriptions of the symbols used are as follows:

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.

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. Rule Part 15, Subpart B - Unintentional Radiators Class B Limits

1.3.1.2 *General Installation Warnings*

The AURORA Inverter is designed and tested according to international safety requirements; however, certain safety precautions must be observed when installing and operating this inverter. Read and follow all instructions, cautions and warnings in this installation manual. If questions arise, please contact Power-One's technical services at 877-261-1374.

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.

WARNING:

Normal operation of this grid-tied inverter system is possible only when properly connected to an appropriate AC distribution network (grid). Before connecting the AURORA Inverter to the local distribution grid, approval from the grid operator and any local authority having jurisdiction is required. Installation and connection of the inverter must be done by qualified technical personnel.

The Power-One AURORA Inverter is designed and tested according to international safety requirements (IEEE 1547), but as with all electrical and electronic equipment, certain precautions must be observed and followed during installation.

Keep this documentation in the immediate vicinity of the AURORA Inverter. It must be accessible for approved technical service and maintenance personal at any time.

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

1.3.1.3 *Assembly Warnings*

WARNING:

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.

1.3.1.4 *Electrical Connection Warnings*

WARNING:

Make all electrical connections (e.g. conductor termination, fuses, PE connection, etc.) in accordance with prevailing regulations. When working with the inverter powered ON, adhere to all prevailing safety regulations to minimize risk of accidents.

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

Power-One does not provide AC output overcurrent protection.

1.3.1.5 *Operation Warnings*

WARNING:

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.

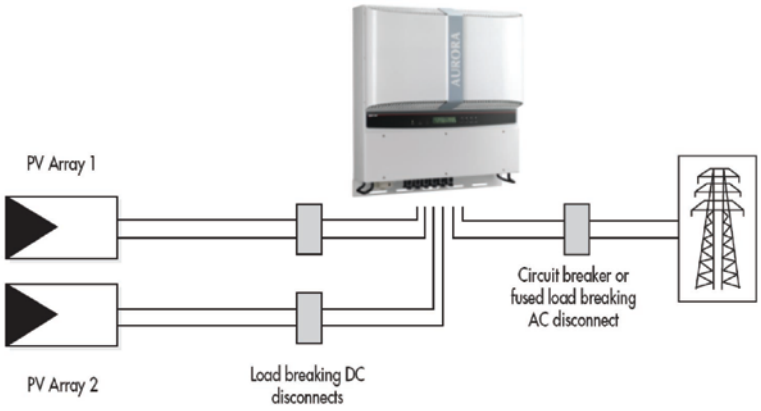
Ensure all covers and doors are closed and secure during operation.

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

1.3.2 APPROPRIATE USAGE

The AURORA Inverter is a photovoltaic inverter that converts direct current of a PV array into alternating current and feeds that power into the power-distribution grid. This AURORA 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 and Mounting Location for more information.

This AURORA Inverter is designed for outdoor used, but can be used indoors if installed according to the National Code and abiding by specified environmental and mounting parameters as stated in this manual. See Environmental Conditions and Mounting Location for more information.



1.3.2.1 *Field Of Use, General Conditions*

Power-One accepts no liability for damage of any kind that may arise from incorrect or careless operations.

The equipment must not be used in ways that do not fall within the intended field of use. The equipment MUST be used ONLY by experienced, licensed contractors/technicians to carry out operations on the equipment that are in accordance with what is described in this manual and in the attached documents.

1.3.2.2 *Intended or Allowed Use*

This equipment is an inverter designed to: transform a Direct Electric Current (DC) coming from a photovoltaic generator (PV) into an Alternating Electric Current (AC) connected to an AC grid.

1.3.2.3 *Limits of the Field Of Use*

The operating current dispersed during the normal operation MUST NOT exceed the limits documented in the technical specifications. The inverter can only be used if all the technical characteristics are observed.

1.3.2.4 *Improper or Prohibited Use*

The following actions are prohibited when using this AURORA Inverter.

Installing the equipment in environments with particular flammability conditions or in adverse or constrained environmental conditions (temperature and humidity).

Using the equipment with safety devices not working or disabled.

The inverter meets NEMA4 construction standards. Connection to equipment other than NEMA4 must meet requirements of local codes and standards.

Modifying the operating parameters that are restricted to the operator and/or parts of the equipment to vary the performance or change its insulations.

Cleaning with corrosive products that may damage parts of the equipment or generate electrostatic charges.

Using or installing the equipment or parts without having read and correctly interpreted the contents of the operating and maintenance section.

Do not warm or dry rags on the unit or accessory parts. This is dangerous and could compromise the ventilation and cooling of the components.

1.3.2.5 *Environmental Conditions and Risks*

The equipment can be installed outdoors, but only in environmental conditions that do not prevent its regular operation.

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

Power-One CANNOT be held responsible for disposal of the equipment: displays, cables, batteries, accumulators, etc. Therefore the customer must dispose of these substances in accordance with the regulations in the country of installation.

The same precautions should be adopted for dismantling the equipment.

Do not operate around explosives or hazardous environmental conditions.

The installer and/or operator should appropriately train personnel in the proper operation of the inverter. The installer and/or operator must properly secure the installation premises from public access and/or highlight with warning signs to communicate the potential hazards of the equipment, e.g., magnetic fields, hazardous voltages, high temperatures, possibility of discharges, generic hazard, etc.

1.3.3 SAFETY INSTRUCTIONS

IMPORTANT SAFETY INSTRUCTIONS – SAVE THESE INSTRUCTIONS!

DANGER:

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.

- Risk of electric shock
- Test before touching
- Work on the AURORA Inverter must be carried out by qualified personnel.

WARNING:

Do not connect an AURORA Inverter to the electrical distribution grid until after 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 and/or by other local codes and regulations.

1.3.3.1 *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.

WARNING:

Inform the user about non-standard installation conditions.

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

The instructions given in the manual does 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 contractors, at its premises or on site, in accordance with conditions to be set out in the contract.

Do not use the equipment if any issues affecting safety or normal operation are found. Avoid temporary repairs. All repairs should be carried out using only factory approved spare parts, installed in accordance with its intended use and by a licensed contractor or authorized Power-One Service representative. Liabilities arising from commercial components are delegated to their respective manufacturers.

1.3.3.2 *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)

CAUTION: After shutdown, wait at least 10 minutes before removing guards or covers in order to allow devices inside the unit to cool and allow any electrostatic charges and parasitic voltages to be discharged.

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.

1.3.3.3 *Clothing and Protective Devices*

Sharp edges and corners have been minimized at the factory, but not completely eliminated; therefore, always wear protective clothing and personal protective devices compliant with prevailing safety standards.

Appropriate Personal Protective Equipment (PPE) must be worn at all times when operating or servicing this equipment.

All operations on the equipment should be performed with properly electrically insulated instruments.

1.3.4 LOCATION OF SAFETY NOTICES

Please note the location of safety notices on the AURORA Inverter for notification and protection. They are located on both side panels of this unit.

1.3.4.1 *Safety Notices*

The location of safety notices on the AURORA Inverter for notification and protection are located on both sides of the equipment and in the inside of the box.

The notices 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 in any case replace those shown on the plates attached to the equipment.

PART 2: UNPACK & SELECT INSTALLATION LOCATION

WARNING

Install the AURORA Inverter in accordance with the electrical standards prescribed by the applicable National Electric Code and/or by other local regulations and codes.

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

2.1 UNPACK AND INSPECT

2.1.1 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 the listing of Table 0.02 - and 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 return/repair process.

Table 0.02 - Package contents

QTY	Description	
1	AURORA Inverter	
1	AURORA Inverter mounting plate	
1	Bag containing hardware:	
	4	6.3x70 screws
	4	SX10 blocks,
	1	6x10 screw
	5	d.18 washer
	2	Mating connector for Remote ON/OFF (3 poles)
	2	Mating connector for RS485 terminal block (8 poles)
	1	Torx 20 wrench
	2	Wire jumpers
1	Installation and Operator's Manual	
1	Certificate of warranty	
1	CD-ROM with communication software	

2.2 SELECTING THE INSTALLATION LOCATION

2.2.1 NOTES ON DIMENSIONING OF THE SYSTEM

Decisions about how to structure a photovoltaic system depend on a certain number of factors and considerations to meet the type of panels, the availability of space, the expected location of the system, energy production goals over the long term, etc., A program designed to optimize string configuration and help to correctly size the photovoltaic system is available on the Power-One website at www.power-one.com

2.2.2 GENERAL INSTALLATION CONDITIONS

Installation of the equipment is carried out based on the grid system and site in which the equipment is installed; therefore, its performance depends on the accuracy of the connections.

Staff authorized to carry out the installation must be specialized and experienced in this job; they must also have received suitable training on equipment of this type.

The operation must be carried out by licensed contractor or electrician. Comply with what is written in this manual, follow the diagrams and attached documentation.

WARNING

For safety reason 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.

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

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 panels shaded or isolated.

2.2.3 INSTALLATION POSITION

Select the installation location based on the following considerations:

1. Select a well-ventilated location sheltered from direct sun radiation.
2. Choose a location that allows unobstructed airflow around the inverter.
3. Allow sufficient room around the inverter to enable easy installation and removal from the mounting surface.
4. Height from ground level should be such that the display and status LEDs are easy to read.
5. Access panels on the front surface of the inverter allow inspection and maintenance of hardware; and must not be blocked. Figure 0.02 shows the recommended minimum clearances around the inverter.
6. When possible, mount the AURORA Inverter vertically. For other mounting orientations consult with Power-One.
7. Tilted mounting (±5° from vertical) is acceptable, but will reduce heat dissipation and may result in self-derating.

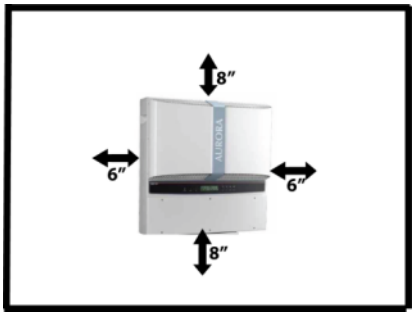


Figure 0.02 - Minimum Clearances around the AURORA Inverter

WARNING

The inverter surface may become hot to the touch during operation. To avoid burn injury, DO NOT touch the inverter surface during operation.

Recommended Arrangement

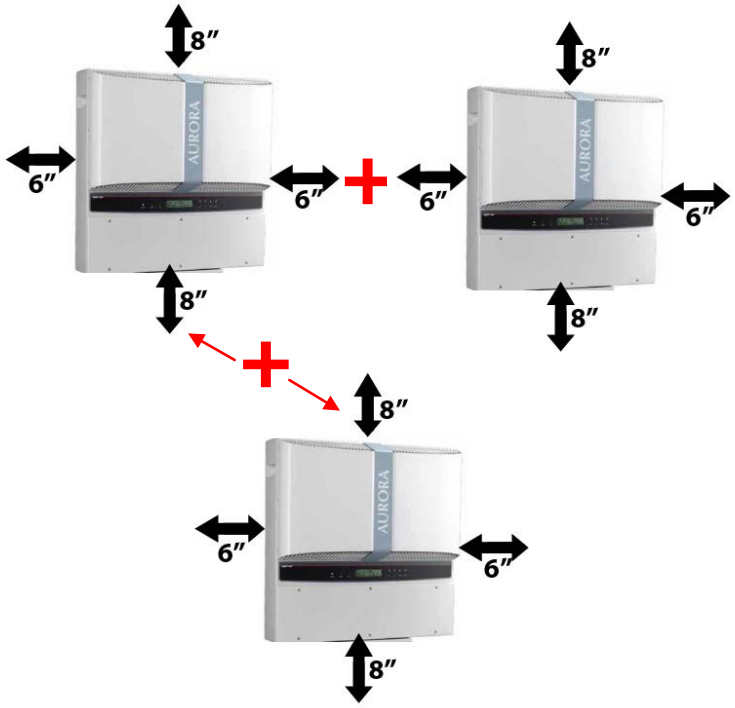
Unacceptable Arrangement

Figure 0.03 – Installation Arrangement for AURORA 3-Phase Inverter

NOTE

Do not mount the AURORA Inverter where exposed to direct sun radiation or any other heat source. This includes heat generated by other AURORA Inverters; otherwise, the inverter will self protect, resulting in derated power output.
When the ambient temperature rises above 113°F/ 45°C the inverter may self-derate the output power.
For full power of AURORA Inverter (no derating), be sure the airflow through the heat sink is clear. Blockages will result in less than expected power output.

For staggered or side-by-side arrangement of multiple inverters, combine the minimum clearance distances where applicable.



2.2.4 Environmental Checks

- See Part 7: Appendix: Technical Data to check the environmental parameters to be observed (degree of protection, temperature, humidity, altitude, etc.)
- Do not expose to direct sunlight to avoid unwanted power derating due to an increase in the internal temperature of the inverter.
- Do not install in small, closed rooms where air cannot circulate freely.
- 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.
- Do not install in rooms where people or animals live or are present for long periods of time due to the noise of the inverter.
- Avoid electromagnetic interference that can compromise the correct operation of electronic equipment with consequent situations of danger.

2.2.5 HIGH ALTITUDE INSTALLATIONS (ABOVE 2000 METERS/6562 FEET)

When the installation site is in a high-altitude location, the effects of the thin, dry air on the operation of the inverter must be considered

- **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.
- **Component lifetime** - As the altitude increases, the failure rate of some electronic components increases exponentially because of cosmic radiation.

All installations at altitudes of over 2000 meters/6562 feet must be assessed case by case considering the above listed items.

PART 3: MOUNTING & WIRING

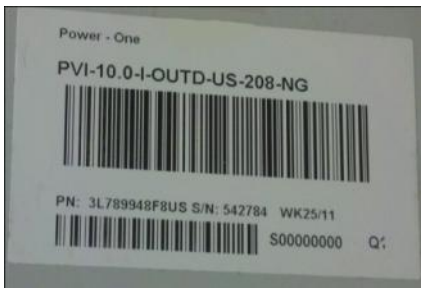
Part 3, Section I: PVI-10/12-I-OUTD-US/CAN - No Switchbox Version

Section I - PVI-10/12-I-OUTD-US/CAN-XXX-YY

3.1 NAMEPLATE

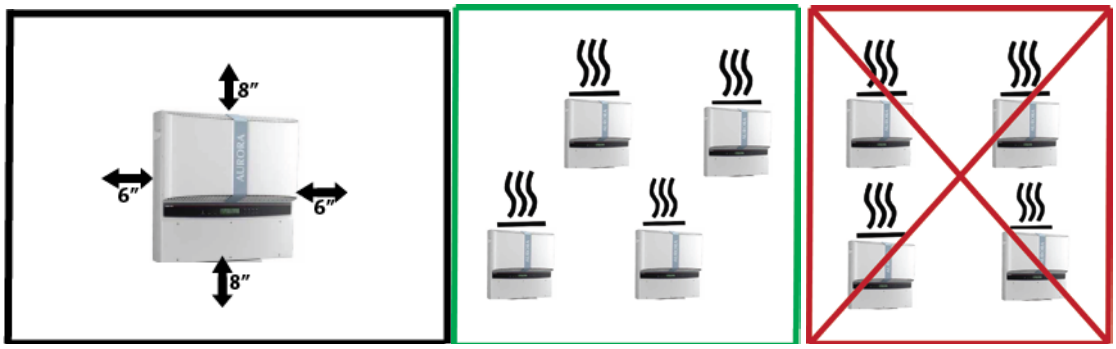
The nameplate shown above is affixed to the inverter and provides the following information:

1. Manufacturer code
2. Model code
3. Serial number
4. Week/Year of production



PVI-10.0-I-OUTD-US-280-NG Sample product nameplate

3.2 UNIT MOUNTING PVI-10/12-I-OUTD-US/CAN-XXX-NG



Step 1: Locate and mark the desired surface mounting location.

Step 2: Orient the bracket such that the "C" hooks face outward and upward. See Figure 1.01a

Step 3: Using the hardware provided, level and mount bracket horizontally using mounting holes **A** and **B** in Figure 1.01a.

Step 4: Hang the inverter up on the mounted bracket by lifting the inverter over and above the mounting plate.

Carefully guide the inverter down into the bracket connecting the lip (Figure 1.01b, **D**) of the mating inverter bracket with the hooks **C**) on the bracket.

Make sure the connecting points in the bracket (**C** and **D**) and in the back of the inverter engage properly.

Step 5: Secure the bottom of the inverter using screw/washer through the hole marked **H.**

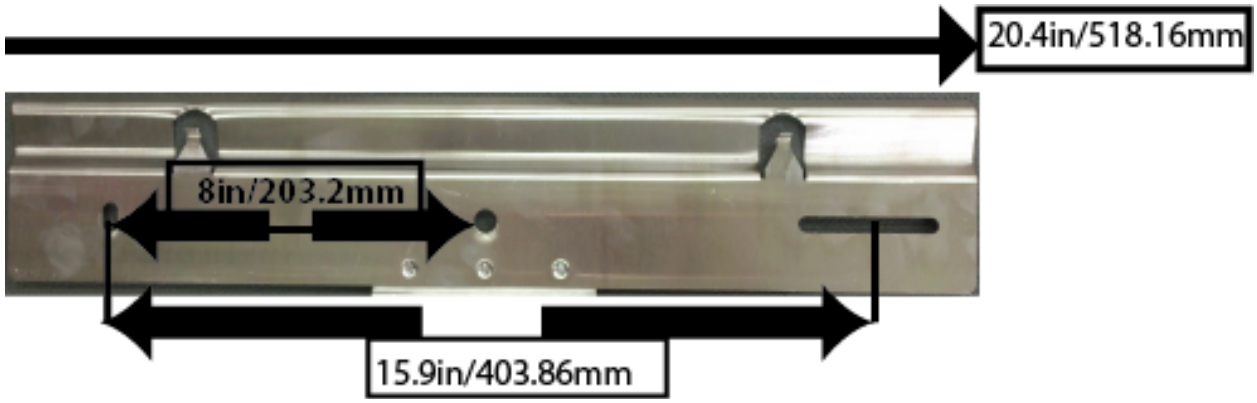


Figure 1:01a - Bracket and Measuring Zoom Detail
PVI-10/12-I-OUTD-US/CAN-XXX-NG

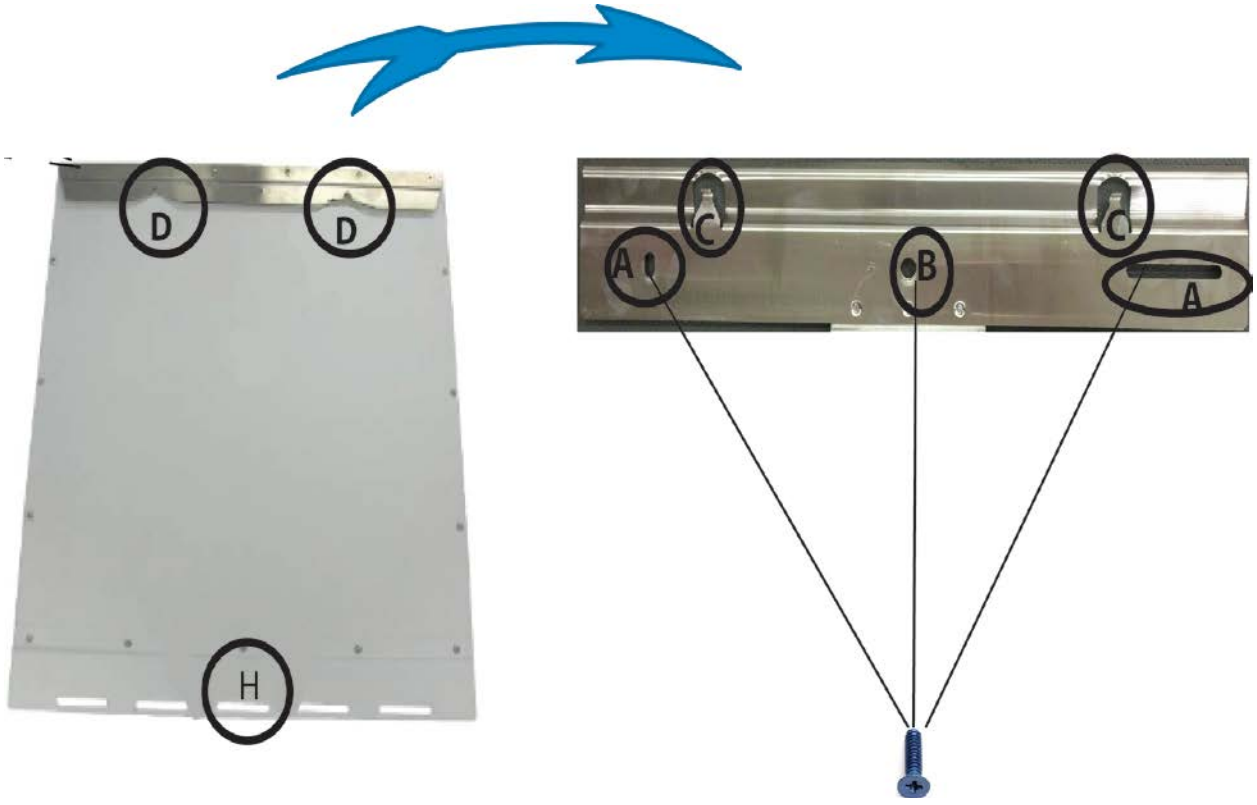


Figure 1.01b - Bracket and Mounting Details
PVI-10/12-I-OUTD-US/CAN-XXX-NG

3.3 INSTALLATION PVI-10/12-I-OUTD-US/CAN-XXX-NG

3.3.1 ELECTRICAL WIRING AND CONNECTIONS PVI-10/12-I-OUTD-US/CAN-XXX-XX

DANGER

This section is dedicated to initial installation wiring of the AURORA Inverter and assumes the unit has been physically mounted in its final location, but not yet wired. If the inverter has been previously wired and connected to the PV array and/or the AC grid, refer to Part 4: Operations & Start-Up for proper disconnect procedures.

3.3.1.1 *Considerations before Performing Electrical Connections*

This section provides a systematic description of correct wiring procedures. Please read the instructions provided and follow all safety warnings. Failure to comply with these instructions can result in safety hazards and may lead to possible injury to personnel and/or equipment damage.

WARNING

- Ensure wire sizing procedures are completed per appropriate local codes and regulations.
- Field wiring terminals are to be rated at 90°C/194°F.
- Permanently mount the AURORA Inverter in its operational location prior to beginning electrical connections.
- Only qualified and properly trained personnel for the process of connecting the AURORA Inverter to the electrical distribution grid, and only after receiving approval from the local authority having jurisdiction.
- Secure all signal wiring and cables to prevent contact with either AC grid and/or DC array field wiring; additionally, maintain spacing between the AC grid wiring and DC array wiring, secure as necessary.
- **Do not under any circumstances** exceed the maximum ratings of voltage and current when designing the system, to include:
  - Do not exceed the maximum array DC voltage input to each MPPT circuit of 520 Vdc under any condition.
  - Do not exceed the maximum array DC current input of 24 Adc (10kW) or 25Adc (12kW) to each MPPT circuit.
  - See Technical Data in Part 7: Appendix for more details.
- An automatic over-current device (e.g., circuit breaker) must be used between the AURORA Inverter and the distribution grid.

3.3.2 REMOVING THE FRONT COVERS

To access the wiring terminals in the inverter and switchbox (when provisioned) the inverter cover and switchbox cover must be removed. Refer to Figure 1:02 below.

- To remove the front cover of the inverter compartment, loosen the six (6) captive screws indicated below using the Torx screwdriver provided.
- When connection operations are completed, re-install the front covers and tighten the cover screws with at least 1.5Nm (13.2 in-lbs) torque to ensure proper waterproof sealing.

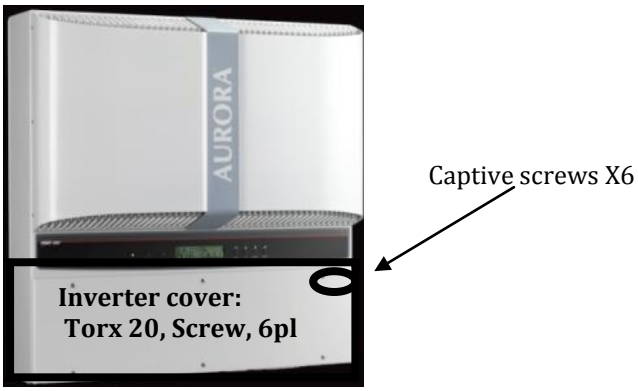
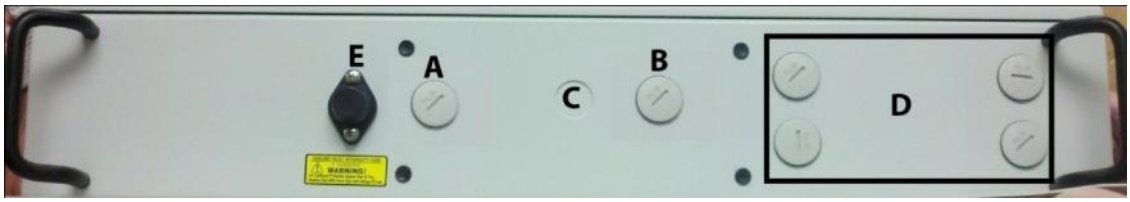


Figure 1.02 - Location of Front Access Panels
PVI-10/12-I-OUTD-US/CAN-XXX-NG

3.3.3 FIELD WIRING –KNOCKOUT DETAILS PVI-10/12-I-OUTD-US/CAN-XXX-YY



Code Location	Description	Code Location	Description
A	DC Power Cable Knockouts; 1", ¾"trade size.	D	Signal Cable Knockouts; ½" trade size
B	AC Power Cables Knockouts 1", ¾" trade size	E	GFD Fuse Holder
C	Ground Cable Knockouts;1/2" trade size		

Figure 1.03 - Chassis Layout PVI-10/12-I-OUTD-US/CAN-XXX-NG (bottom view)

In this version of AURORA Inverter, DC array wiring and AC grid wiring (with any required switching and Over Current Protection Device (OCPD) are connected directly to the inverter terminals without benefit of integral disconnect switches.

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

WARNING

Use care when accessing the DC array and AC grid wiring and associated terminals as this version has no integrated disconnect switches. Hazardous voltage is present unless the user provided external disconnect switches are turned OFF and locked out. External disconnect switches for both the AC and DC connections are mandated by electrical codes.

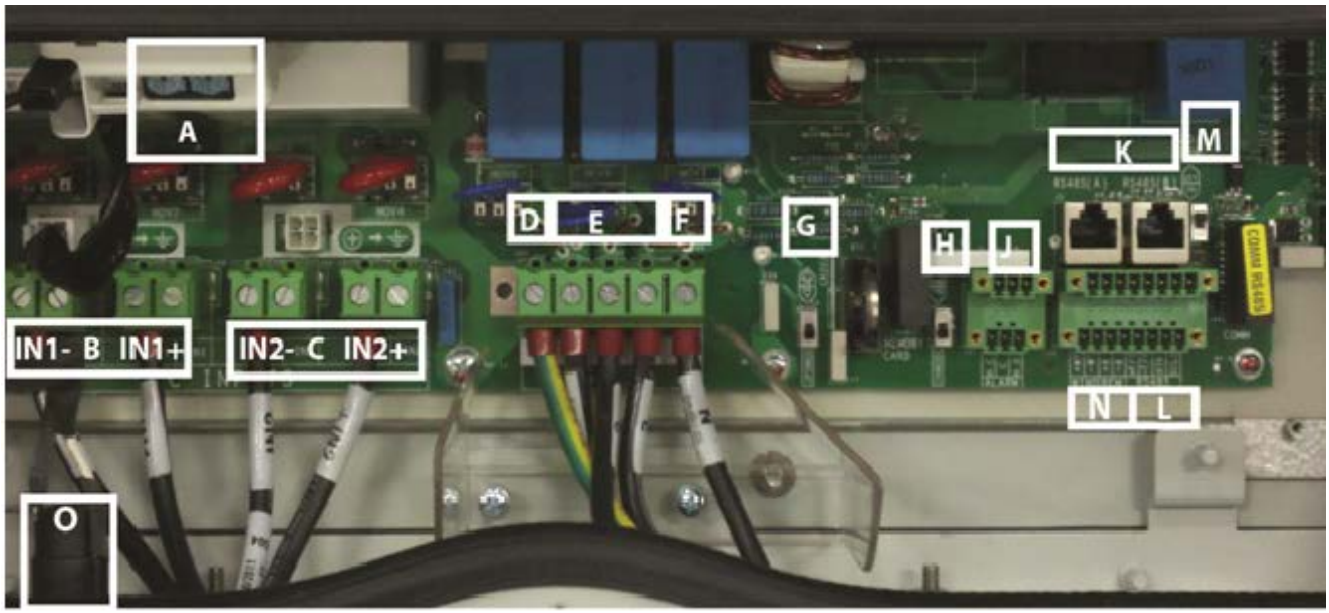


Figure 1.04 - Wiring Connection Details for PVI-10/12-I-OUTD-US/CAN-XXX

Location Indicator	Details		Location Indicator	Details	
A	Grid Selector/Country Code – thumbwheel switches	Set to [04]	**H**	MPPT Input Selector Switch	Choose PAR or IND MPPT Operation
B	DC Array: MPPT 1 input	Note 1 below	**J**	Alarm Out Terminals for External Alarm	Note 3 below
C	DC Array: MPPT2 input	Note 1 below	**K**	RS485 Bus Connection Via RJ485 Connector	Use with CAT5/6 Cable
D	Main PE Ground Terminal ⏚	Note 1 below	**L**	RS485 Bus Connection Via Screw Terminals	Note 3 below
E	3 ø AC Grid Output Terminals	Note 2 below	**M**	RS485 Termination Switch	See Signal Connection Section for more detail
F	3 ø AC Grid Neutral Terminal for 4W Grid Connection	Note 2 below	**N**	Remote ON/OFF screw terminals	See Signal Connection Section for more detail
G	**3PHMOD Switch** 3ø Mode Selector	Choose 3W or 4W Grid Connection	**O**	GFD Fuse	

Notes: 1. Terminals accept wire range of #12-#4AWG (Refer to local code for appropriate wire size); torque to 13in-lb.
2. Terminals accept wire range of #12-#4AWG (Refer to local code for appropriate wire size); torque to 13in-lb.
3. Mating terminal in hardware kit. Terminals accept wire size range up to #16 AWG; torque to 8in-lb.

3.3.4 INITIAL ELECTRICAL CONNECTIONS PVI-10/12-I-OUTD-US/CAN-XXX-NG

DANGER

If the unit has been previously wired and energized, refer to Section 4: Operations for appropriate disconnection procedures.

This section describes initial installation procedures for DC and AC wiring connections to the PVI-10/12-I-OUTD-US/CAN-XXX inverter version, which has no integral, disconnect switches or associated switchbox.

- Typical system connections for this inverter are shown in Figure 1.05.
- Relevant wiring connections are shown in Figure 1.03 and Figure 1.04.

This version requires the installer to provide the following items:

1. DC disconnect switch: Two (2)-pole, 600V rated. Current rating is based on the model chosen - refer to Technical Notes in Part 7: The Appendix. The switch must have two independent sections to accommodate the dual MPPT capability.
2. AC disconnect switch: Three (3)-pole, with or without neutral block depending upon chosen grid connection (3W or 4W). Voltage and current rating depends on the grid connection voltage and output power of the inverter being installed.
3. Over-Current Protection Device: fusing or circuit breaker - between inverter and grid. Circuit breaker must be rated for bidirectional current flow. Rating of OCPD is dependent on specific grid connection - see product nameplate above.

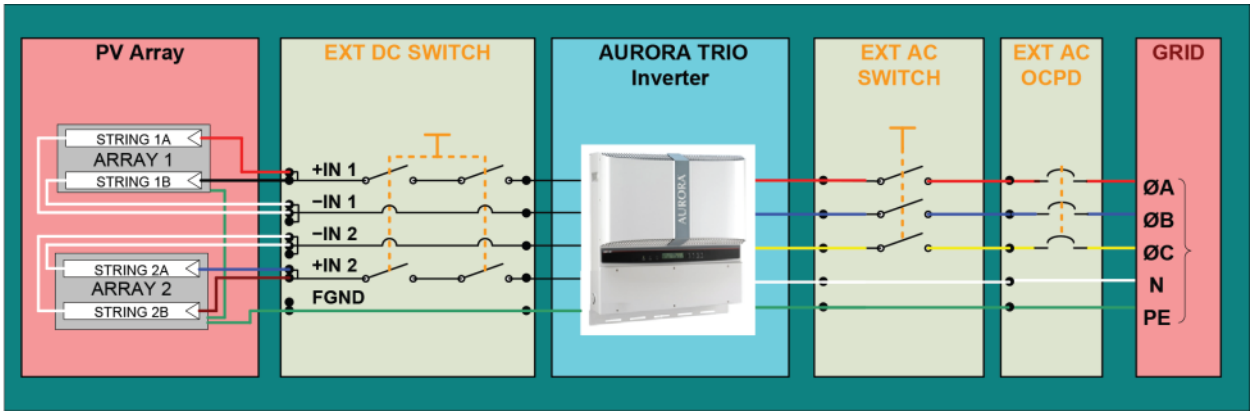


Figure 1.05 - Electrical Connection Diagram PVI-10/12-I-OUTD-US-XXX-NG

1. Refer to Figure 1.06 and locate the designated entry locations for the conduits from the DC array and to the AC grid.
2. Verify that the appropriate knock-outs have been employed for the use specified to maintain spacing between wiring groups.

3.3.5 DC ARRAY CONNECTIONS PVI-10/12-I-OUTD-US/CAN-XXX-NG

WARNING

Before attempting to connect the array wiring, be certain the array sizing has been completed to the specific plan associated with the system being installed. Please use Power-One's string sizing tool at www.p1-tool.com

To eliminate the potential for shock hazard during the connection procedure for the PV array wiring, either "open-circuit" all PV circuits prior to entry to the inverter and/or cover all panels with dark or opaque material in order to eliminate hazardous voltage at the terminals of the array wiring.

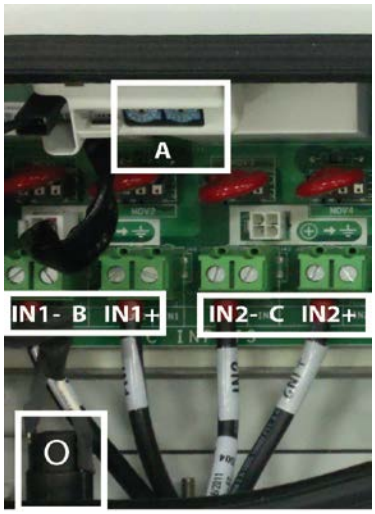


Figure 1.06 - DC Array Connections PVI-10/12-I-OUTD-US/CAN-XXX

Location Code	Details	
A	Grid Selector/ Country Code thumbwheel switches	Code for all North America applications is [0,4]
B	DC Array: MPPT 1 input	Note 1
C	DC Array: MPPT 2 Input	Note 1
O	Ground Fault Fuse holder	Note 2

Notes
1. Terminals accept wire range #12-#4AWG torque to 13in-lb.
2. GFD fuse is accessed externally

Procedure:

1. Refer to Figure 1:06. Locate the incoming DC array wiring at the inverter chassis and measure the voltage to ensure the array output is non-hazardous.
2. Once de-energized, connect the DC wiring to the MPPT1 and MPPT2 array terminals shown in inverter per the specific array design.
3. If the array is wired for dual MPPT mode, run separate wires for POS and NEG for each array and ensure no jumpers are installed between the two inputs (See Figure 1:04).
4. If the array is designed for the parallel MPPT input mode, ensure the jumpers are in place. See Signal Configuration below to reference the use of the jumpers.
5. Ensure the MPPT mode switch is in the correct position to match the array design.

3.3.6 AC GRID CONNECTIONS PVI-10/12-I-OUTD-US/CAN-XXX-XX

WARNING

Power-One does not provide AC output overcurrent protection.

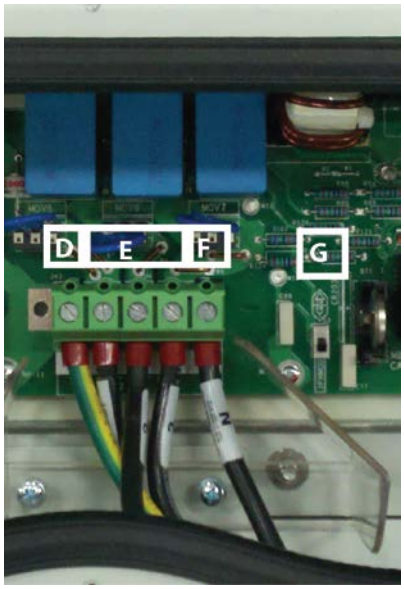


Figure 1.07 - AC Grid Connections PVI-10/12-I-OUTD-US/CAN-XXX-NG

Location Code	Details		Location Code	Details	
D	Main PE Ground Terminal	Note 1,2	**F**	3ø AC Grid Neutral Terminal for 4W Grid Connection	Note 1,2
E	3ø AC Grid Output Terminals	Note 1,2	**G**	3PHMOD Switch 3ø Mode Selector	Note 3

Notes:
1. Terminals accept wire range of #12-#4AWG (Refer to local code for appropriate wire size)
2. Tighten to 13in-lb torque.
3. Use to set 3W or 4W Grid Connection

1. Refer to Figure 1.07. Locate the AC grid wiring at the inverter and measure the voltage to ensure all connections to the grid have been eliminated and no hazardous voltage is present.

2. Once de-energized, connect the AC wiring to the AC grid terminals as shown in Figure 1.07.
   a. If the grid connection is to be 3W, the Neutral conductor does not need to be pulled or connected. Place the ***3PHMOD*** switch in the *3W* position.

   b. If the grid connection is to be 4W, the Neutral connection must be provisioned and connected to the Neutral terminal. Place the *3PHMOD* switch in the *4W* position.

3.3.7 SIGNAL WIRING CONNECTIONS –PVI-10/12-I-OUTD-US/CAN-XXX-YY

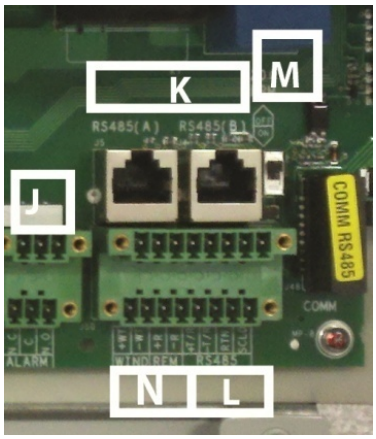


Figure 1.08 - Signal Configuration Connections PVI-10/12-I-OUTD-US/CAN-XXX-NG

Code	Details	
J	Alarm Out Terminals for External Alarm	Note 1 below
K	RS485 Bus Connection via RJ485 Connector	Use with CAT5 Cable
L	RS485 Termination Terminal unit Screw Terminals	Communication cable with plug
M	Rs485 Termination Switch	See Multi-Unit Connection for more detail
N	Remote ON/OFF Signals	See Multi-Unit connection for more detail

Notes:
1. Mating terminal in hardware kit.
2. Terminals accept wire size range up to #16AWG; torque to 8 in-lb.

- Route the cables through the inverter chassis refer to Figure 1.03.
- Refer to Figure 1.03 and note the position where the monitoring and alarm cables (if used) enter the chassis.
- Refer to Figure 1.08.Locate the terminals for the alarm and monitoring connections within the chassis.
- Connect alarm cable to the mating connector (in hardware kit) and plug connector into position shown in Figure 1.09.

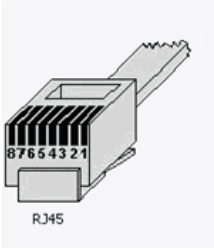
3.3.7.1 *Connect RS485 Monitoring Cable*

a. If using CAT5 cable for monitoring connections, connect RJ45 plug to the end of the cable as shown in Table 1.01 and plug into RJ45 jack. A second jack is in parallel to accommodate daisy chaining of communication line to other inverters. See Multi-System Connections below for more information.

b. If running standard cable locate the mating connector (hardware bag) and connect three RS-485 leads as shown in Figure 1.09. Plug connector into position shown; second connector is to facilitate daisy chaining.

c.

Table 1.01 - RJ45 Connectors



Pin #	Signal Name	Description	Notes
1,2,6,8	N/U	Not Used	-
3	+TR	+ Data Line	1
4	+R	Remote OFF	2
5	-TR	- Data Line	1
7	RTN	Signal Return	1

1. Required for RS485 communication
2. Required for Remote OFF control

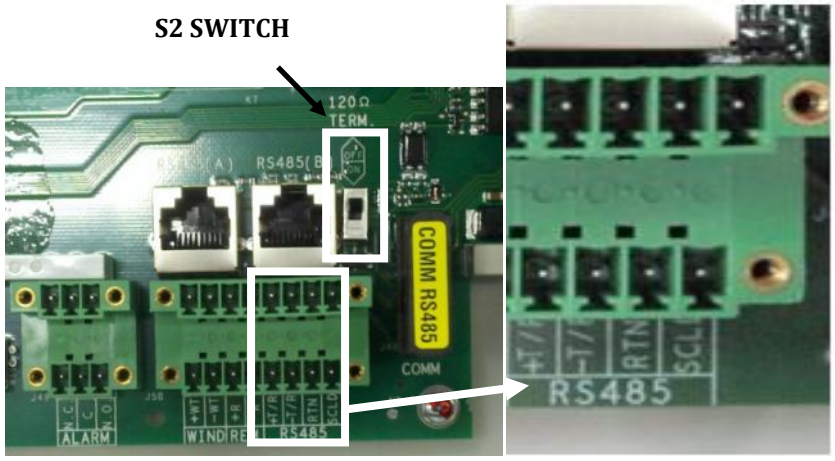


Figure 1.09 - Standard RS 485 Connection

3.4 CONFIGURATION PVI-10/12-I-OUTD-US/CAN-XXX-NG

3.4.1 POSSIBLE AURORA INVERTER DC INPUT CONFIGURATION

The AURORA Inverter is configurable with an independent MPPT for each DC input channel *or* the two input DC channels maybe connected in parallel and operated with one MPPT. If the inverter is configured with independent MPPTs, the max current for each channel shall not exceed 24 Adc (10kW) or 25Adc (12kW) and the power input for a single channel shall not exceed 6.8 kW.

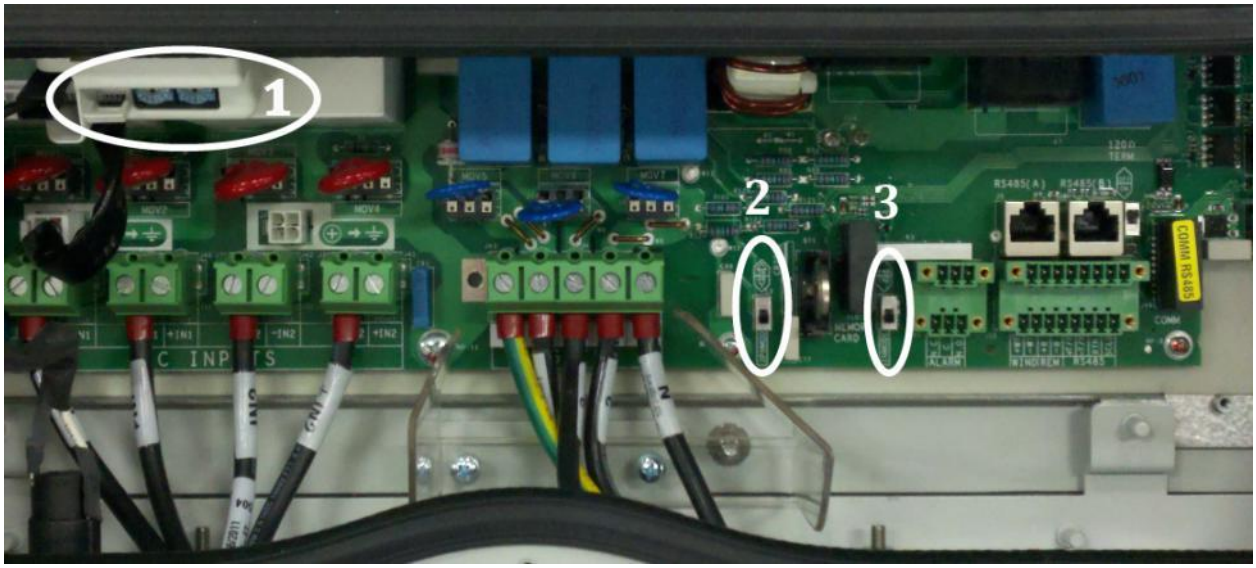
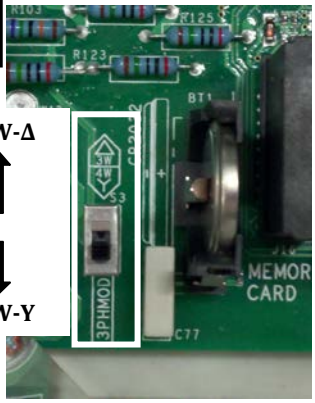


Figure 1.10 - Configuration Settings

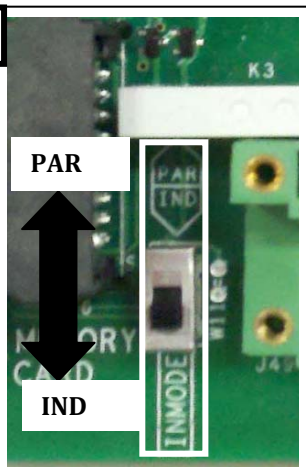
COUNTRY CODE SELECTOR **3PHMOD SWITCH** **PAR/IND INMODE SWITCH**

1:

2:



3:



3.4.2 SELECTING THE COUNTRY CODE

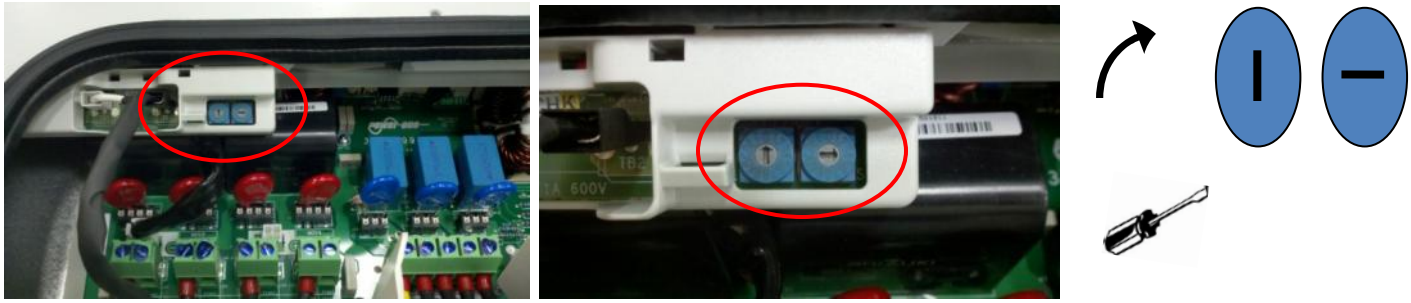


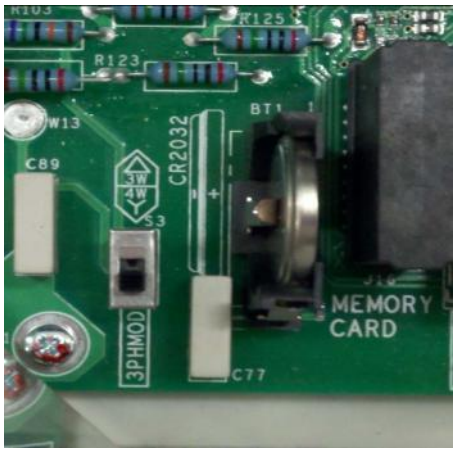
Figure 1.11 - Selector Switches for choice of Country Code

The inverter has two selector switches (see Figure 1.11) which enables the installer to set the proper country code. The unit ships from the factory with the selectors in a default setting of [0, 4].

For the North American market:

- To access the selectors remove the inverter front panel as explained in Figure 1.02.
- Verify the switches are set to [0, 4] (default), change as required.
- Once the installer has selected a grid standard and energized the inverter, an internal, 24-hours counter will start to count down. During the first 24 hours of grid connection it is possible to modify the chosen standard (in case of a mistake). After 24 hours, the chosen setting is finalized and cannot be changed without contacting Power-One Customer Service.
- The user can check the counter residual time via the LCD display scrolling menu.

3.4.3 GRID-TYPE CONFIGURATION: THREE-PHASE MODE SWITCH



3W-Δ

4W-Y

Figure 1.12 – Grid-Type Configuration 3W-Δ/ 4 W-Y

The grid type (3W or 4W) is changed via the ***3PHMOD*** switch depending on the installation location.

The grid type (3W or 4W) default is set to 4W-Y MODE.

The PVI-10/12-I-OUTD-(US/S/S1/S2)-480 models MUST BE connected to a 480V/3Ø/4W grid; therefore, requires a neutral conductor to be connected.

In addition, the "3PHMOD" switch MUST BE in the 4W position. (See figure 1.0)

Delt or WYE connection availability depends on the inverter model:

- 208V/10kW-either 3W delta or 4W WYE
- **480V/10kW 4WWYE connection only (neutral conductor required)**
- 480/12kW –models-WYE connection only (neutral conductor required)

The unit's voltage (208/480/600) is pre-set at the factory and is reflected in the part number

All models require a 3-phase grid connection.

WARNING

Before selecting the grid standard on the unit, check the necessary standard utility connection.

3.4.4 INDEPENDENT OR PARALLEL CONNECTION

AURORA Inverters have dual inputs with independent MPPT circuits. The inverter when operated in the dual input mode can optimize two independent arrays. The inverter can also be operated in a single MPPT mode from a single array by connecting the inputs in parallel using jumpers and proper setting of the INMODE switch (see Figure 1.10, above). The following sections show how to connect the inverter in either the INDependent or PARallel mode.

3.4.4.1 *Independent Connection*

For applications where the two MPPT channels will be used independently:

- Place switch "S1" (shown in Figure 1.13) in the "IND" (default position) position to configure the inverter controls in the independent mode.
- Make sure the parallel jumpers, as shown in Figure 1.14b are not installed. The parallel jumpers are not needed when inverter is set in independent (IND) mode. **Do not** install parallel jumpers in IND configuration. If they are installed, remove them.
- After switching the AURORA Inverter to independent mode configuration, re-install the front panel (apply 13.2 in-lbs of torque to each of the four (4) screws).
- This unit is default set to the independent mode: IND

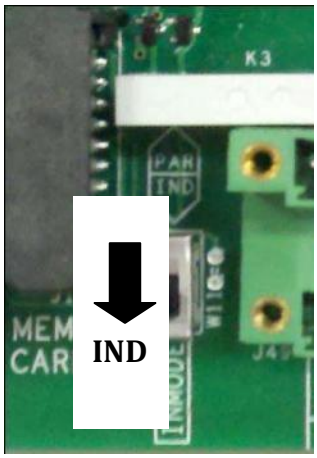


Figure 1.13 - INMODE switch set to IND mode

3.4.4.2 *Parallel Connection*

To operate the inverter in the single MPPT mode:

- Place switch "INMODE" (shown in Figure 1.14a) in the "PAR" in order to configure the inverter controls in parallel mode.
- Parallel the two MPPT inputs using terminal [–IN1 and –IN2] and [+IN1 and +IN2] as shown in Figure 1.14b using two #10 AWG jumper wires (1 black and 1 red cable) to connect the input.
- After switching the AURORA Inverter to parallel mode configuration, re-install the front panel (apply 13.2 in-lbs of torque to each of the four (4) screws).

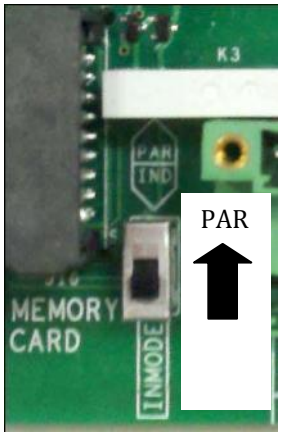


Figure 1.14a - INMODE switch set to PAR mode

Figure 1.14b - Jumpers for Parallel MPPT Input Configuration PVI-10/12-I-OUTD-US/CAN-XXX-NG

Part 3, Section II:
PVI-10/12-I-OUTD-S/S1-US/CAN-XXX-YY

Section II-A:
PVI-10/12-I-OUTD-S-US/CAN-XXX-YY
Without fuse holders

Section II-B:
PVI-10/12-I-OUTD-S1-US/CAN-XXX-YY
With fuse holders

Section II-A: PVI-10/12-I-OUTD-S-US/CAN-XXX-YY Without fuse holders

Section II-A: PVI-10.0-I-OUTD-S-US-XXX-YY

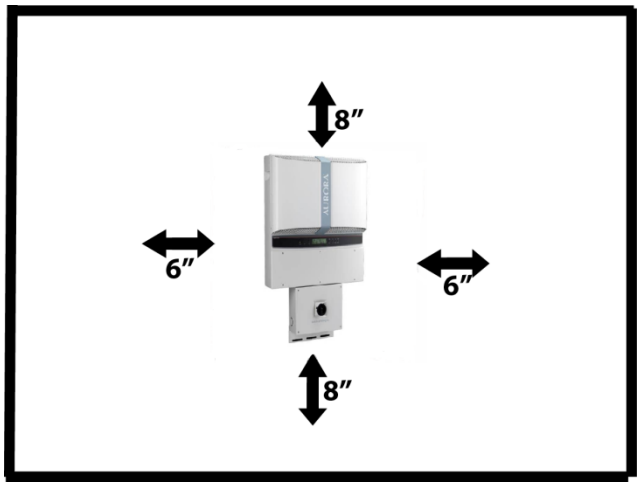
3.5 NAMEPLATE

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

1. Manufacturer code
2. Model code
3. Serial number
4. Week/Year of production

Sample product nameplate

3.6 MOUNTING PVI-10/12-I-OUTD-S-US/CAN-XXX-YY



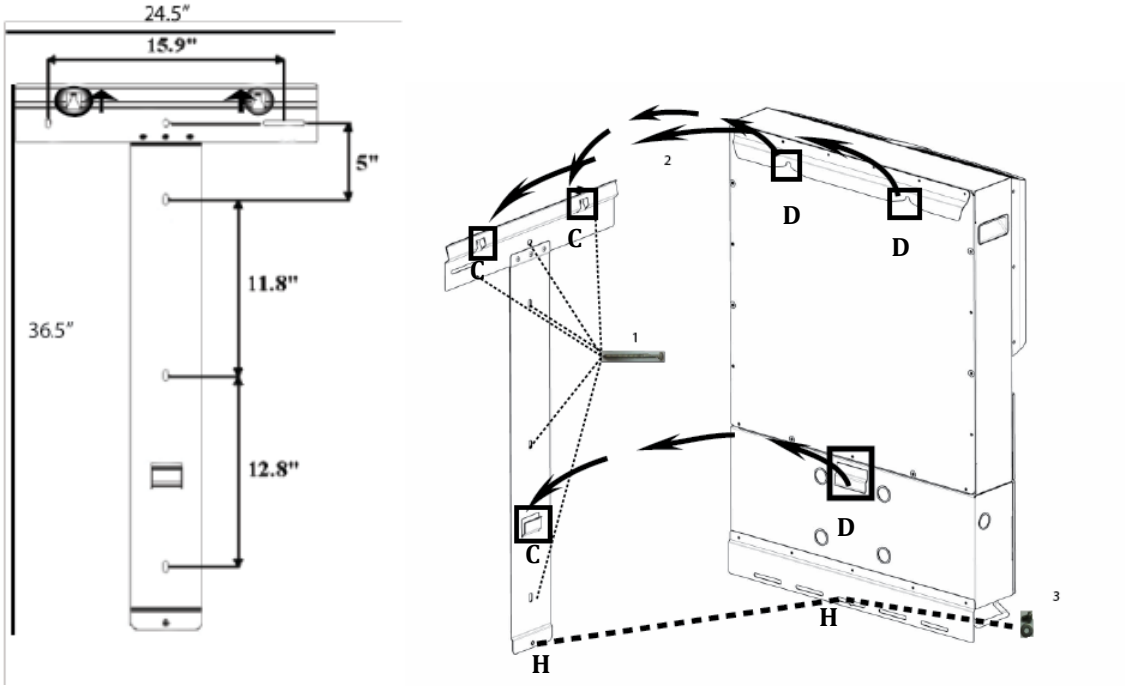


Figure 2.01 - Bracket and Mounting Details *PVI-10.0-I-OUTD-S-US-XXX-YY*

Step 1: Locate and mark the desired mounting location as shown above in mounting location.

Step 2: Orient the bracket such that the "C" hooks face outward and upward. (Figure 2.01)

Step 3: Using the hardware provided, level and mount the bracket to the surface using mounting holes shown in Figure 2.01.

Step 4: Hang the inverter on the mounted bracket by lifting the unit up over and above the mounting plate. Carefully guide the inverter and switchbox brackets and in the back of the inverter engage properly.

Step 5: Secure the bottom of the inverter using the machine screw (6x20mm) and washer (18mm diameter) provided. Insert machine screw through center hole of the bottom inverter mount, and engage the PEMnut mounted in the bracket. (H, in Figure 2.01)

3.7 INSTALLATION PVI-10/12-I-OUTD-S-US/CAN-XXX-YY

3.7.1 REMOVING THE FRONT COVERS

To access the wiring terminals in the inverter and switchbox (when provisioned) the inverter cover and switchbox cover must be removed. Refer to Figure 2.02

- To remove the front cover of the **inverter** compartment, loosen the six (6) captive screws indicated using the Torx screwdriver provided.
- To remove the front cover of the **switchbox** Figure 2.02, loosen the six (6) captive screws indicated using the Torx screwdriver provided in the box with the inverter.
- When connection operations are completed, re-install the front covers and tighten the cover screws with at least 1.5Nm (13.2 in-lbs) torque to ensure proper waterproof sealing.

Figure 2.02 - Location of Front Access Panels
PVI-10.0-I-OUTD-S-US-XXX-YY

3.7.2 ELECTRICAL WIRING AND CONNECTIONS PVI-10/12-I-OUTD-S-US/CAN-XXX-YY

DANGER

- **This section is dedicated to initial installation wiring of the AURORA Inverter and assumes the unit has been physically mounted in its final location, but not yet wired.**
- **If the inverter has been previously wired and connected to the PV array and/or the AC grid, refer to Part 4: Operations for disconnection procedures.**

3.7.2.1 *Considerations before Performing Electrical Connections*

This section provides a systematic description of correct wiring procedures. Please read the instructions provided and follow all safety warnings.

WARNING

Failure to comply with these instructions can result in safety hazards and may lead to possible injury to personnel and/or equipment damage.

3.7.3 FIELD WIRING-KNOCKOUT- DETAILS
PVI-10/12-I-OUTD-S-US/CAN-XXX-YY

To access the wiring components inside the switchbox shown in Figure 2.04, loosen the four cover panel captive screws shown in Figure 2.02, and remove the cover panel.

Figure 2.03 - DC Switchbox Chassis Layout *PVI-10.0-I-OUTD-S-US-XXX-YY*

Code	Description	Code	Description
A	DC Power cable KO's, 2pl shown; trade size 3/4", 1"	E	AC Power Cable KOs, 2 pl shown; trade size 1"
B	AC Power Cable KOs, 2 pl shown; trade size ¾", 1"	F	DC Power cable KO's, 2pl shown; trade size 1"
C	DC Switch	G	Ground cable KO ½" trade size.
D	Signal cable KOs: ½: trade size	H	Cover panel screw, Torx 20, 4pl.

WARNING

The wiring configuration for units with negative ground (PVI-10/12-I-OUTD-S-US/CAN-NG) models in which the switch disconnects only the positive DC inputs while the negative side is referenced to ground via the GFDI fuse.

For positive ground units (PVI-10/12-I-OUTD-S-US/CAN-PG) models the switch disconnects the negative DC inputs while the positive are grounded via the GFDI fuse.

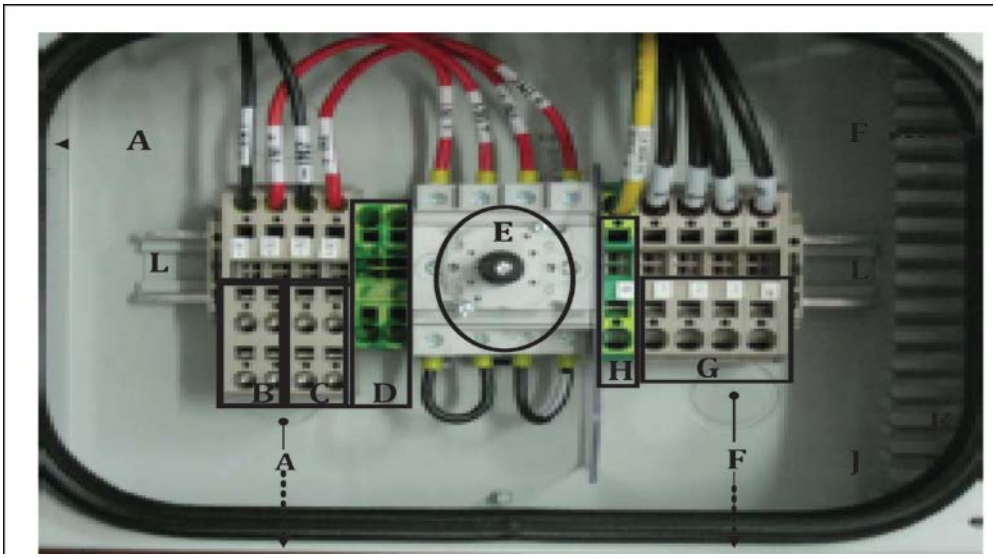


Figure 2.04 - Switchbox Wiring Connections Details *PVI-10/12-I-OUTD-S-US/CAN-XXX-YY*

Location Code	Details		Location Code	Details	
A	DC array conduit entry (KOs,3pl)	¾ and 1" trade size	**F**	AC grid conduit entry (KOs, 3pl)	¾" and 1" trade size
B	DC Array MPPT 1 input		**G**	AC grid output terminals	3Ø, 3W or 4W (NOTE 3)
C	DC Array MPPT2 input		**H**	Main Ground ⏚	Note 2
D	Array PE Ground	Note 2	**J**	RS485 Cable conduit entry (KOs)	½" trade size
E	DC Switch	Note 1	**K**	Plastic conduit for signal cables	
			L	DIN rails for accessories	

Notes:

1. Jumpers used to series connect the DC switches – See Section on configuration.
2. Terminal accepts up to #20 to #6AWG
3. Terminal accepts up to #12 to #4AWG Switchable between 3W or 4W

3.7.4 INITIAL ELECTRICAL CONNECTIONS PVI-10/12-I-OUTD-S-US/CAN-XXX-NG

If the unit has been previously wired and energized, refer to Section 4: Operations for appropriate disconnection and maintenance procedures.

Power-One does not provide AC output overcurrent protection.

This section describes initial installation procedures for DC and AC wiring connections to the PVI-10/12-I-OUTD-*S-US/CAN-XXX* inverter. This version has an integral DC disconnect switch and associated switchbox.

- Typical system connection for this inverter is shown in 2.05.
- Relevant wiring connections are shown in Figure 2.03 and Figure 2.04.

This version requires the installer to provide the following items:

1. AC disconnect switch. Four-pole (three phase and neutral switched). Voltage and current rating of this switch depends on the inverter model (grid voltage and output power) being installed.
2. Over-Current Protection Device (OCPD) - fusing or circuit breaker - between inverter and grid. Circuit breaker must be rated for bidirectional current flow. Rating of OCPD is dependent on specific grid connection - see Nameplate in Section 2:1.0.

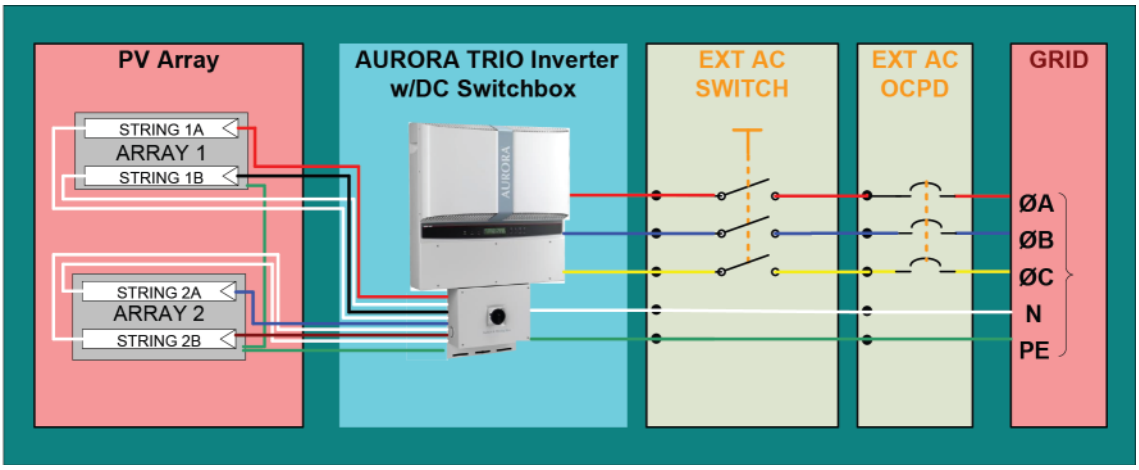


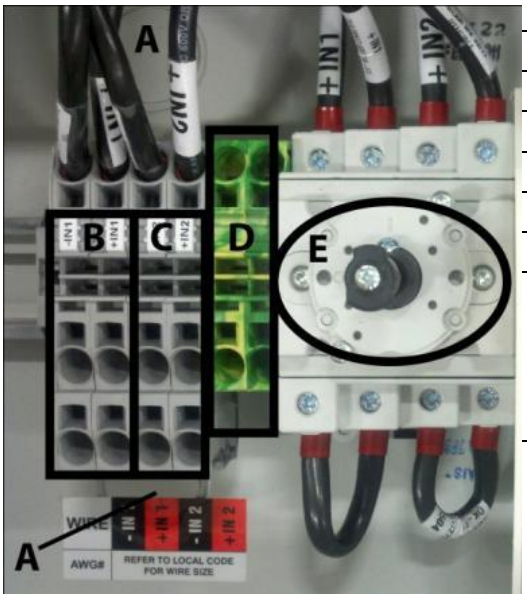
Figure 2.05 - Electrical Connection Diagram PVI-10/12-I-OUTD-S-US/CAN-XXX-NG

1. Refer to the photo of Figure 2.03 and locate the designated entry locations for the conduits from the DC array and to the AC grid.
2. Make sure the appropriate knockouts are employed for the use specified in order to maintain required spacing between wiring groups.

3.7.5 DC ARRAY CONNECTIONS

Before attempting to connect the array wiring be certain the array sizing has been completed to the specific plan associated with the system being installed.

WARNING: To eliminate the potential for shock hazard during the connection procedure for the PV array wiring, either open-circuit all PV circuits prior to entry to the inverter and/or cover all panels with dark or opaque material in order to eliminate hazardous voltage at the terminals of the array wiring.



	Details	
A	DC array conduit entry (KOs,3pl)	¾ and 1" trade size
B	DC Array MPPT1 input	Note 1
C	DC Array MPPT2 input	
D	Array PE Ground	Note 2
E	DC Switch	Note 3

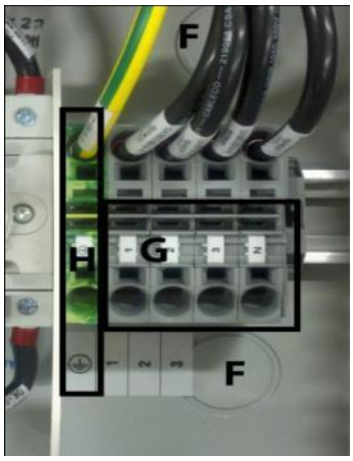
Notes:
1 Terminal accepts up to #20 to #6AWG
2. Terminal accepts up to #4AWG.
3. Jumpers used to series connect the DC switch segments for 600V operation.

Figure 2.06 - DC Array Wiring *PVI-10/12-I-OUTD-S-US/CAN-XXX-NG*

- Refer to Figure 2.06. Locate the incoming DC array wiring at the inverter chassis. Measure the voltage to ensure the array output is non-hazardous.
- Once de-energized, connect the DC wiring to the MPPT1 and MPPT2 array terminals shown in inverter per the specific array design.
- If the array is wired for dual MPPT mode, run separate wires for POS and NEG for each array and ensure no jumpers are installed between the two inputs. See Signaling Section for more details.
- If the array is designed for the parallel MPPT input mode, ensure the jumpers shown in place. See signaling section for more details.
- Ensure the MPPT-mode switch is in the correct position to match the array design.

3.7.6 AC GRID CONNECTIONS

WARNING: **Power-One does not provide AC output overcurrent protection.**



Code	Details	
F	AC grid conduit entry (KOs, 3pl)	¾" and 1" trade size
G	AC grid output terminals	Note 1,2
H	Main Ground ⏚	Note 1

Notes:
1. Terminal accepts up to #4AWG
2. 3W or 4W via 3PHMOD switch setting.

Figure 2.07 - AC Grid Connection *PVI-10.0-I-OUTD-S-US-XXX-YY*

- Locate the AC grid wiring at the inverter switchbox. Measure the voltage to ensure all connections to the grid have been eliminated and no hazardous voltage is present.

- Once de-energized, connect the AC wiring to the AC grid terminals as shown in 2.07.
  a. If the grid connection does not require a neutral connection (i.e., 3Ø/3W), the Neutral is not used. Ensure the **3PHMOD** switch is placed in the **3W** position. See Figure 2.10 for more details.

  b. If the grid connection requires a neutral connection (i.e., 3Ø/3W) the Neutral terminal must be connected to the grid neutral conductor. Ensure the **3PHMOD** switch is place in the **4W** position. See Figure 2.10 for more information.

3.7.7 SIGNAL WIRING CONNECTIONS

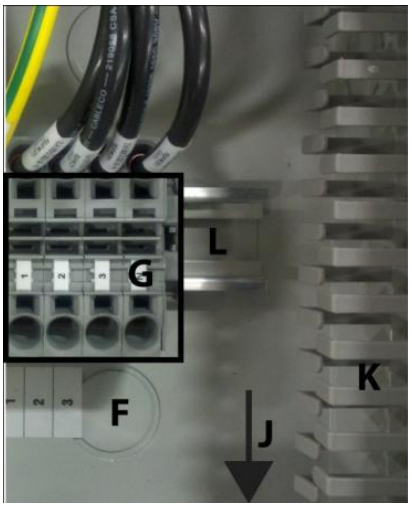


Figure 2.08 - Signal Wire Routing

Code	Details	
F	AC grid conduit entry (KOs, 3pl)	¾" and 1" trade size
G	AC grid output terminals	3Ø, 3W or /4W
J	RS485 Cable conduit entry (KOs)	½" trade size
K	Plastic conduit for signal cables	
L	DIN rails for accessories	

- Route the cables through the switchbox and into the inverter chassis using plastic guide (item K, Figure 2.08).
- Refer to Figure 2.03, and note the position where the monitoring and alarm cables (if used) enter the chassis.
- Refer to Figure 2.03. Locate the terminals for the alarm and monitoring connections within the chassis
- Connect alarm cable to the mating connector (in hardware kit) and plug connector into position shown in Figure 2.09.
- a) If using CAT5 cable for monitoring connections, connect RJ45 plug to end of cable as shown in Table 1, and plug into RJ45 jack shown in Table 1. A second jack is available to accommodate daisy chaining of communication line to other inverters.
- b) If using standard multi-wire cable (e.g., Belden 3106A) locate the mating connector (hardware bag) and connect the three RS-485 leads. Plug connector into position shown in Table 1; second connector is to facilitate daisy chaining. See Table 1 and Figure 1.7 or refer to the multi-system wiring section.
- c) Refer to Part 4: Operations for details to set RS485 address.

3.7.8 CONNECT RS485 MONITORING CABLE

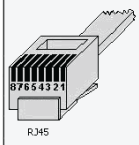
	Pin #	Signal Name	Description	Notes
	1,2,6,8	N/U	-	-
	3	+TR	*+ Data Line*	1
	4	+R	*Remote OFF*	2
	5	-TR	*- Data Line*	1
	7	RTN	*Signal Return*	1
1. Required for RS485 communication 2. Required or Remote OFF control 3. Common reference for logical signals				

Table 2.01 - RJ45 Connectors

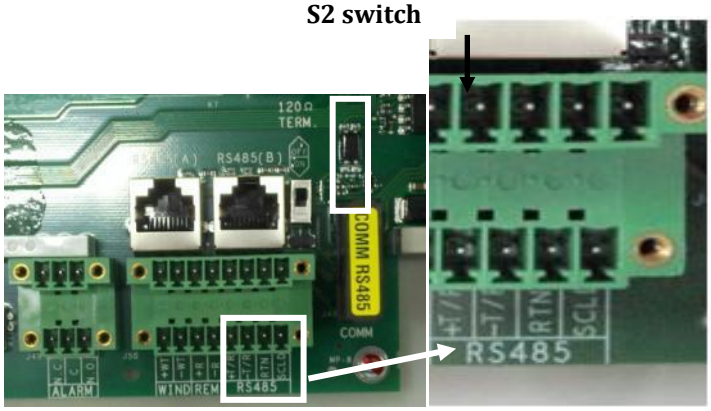


Figure 2.09 - Standard RS485 connection

a. If using CAT5 cable for monitoring connections, connect RJ45 plug to the end of the cable as shown in Table 2.01 and plug into RJ45 jack. A second jack is in parallel to accommodate daisy chaining of communication line to other inverters. See Multi-System Connections below for more information.

b. If running standard cable locate the mating connector (hardware bag) and connect three RS-485 leads as shown in Figure 2.09. Plug connector into position shown; second connector is to facilitate daisy chaining.

3.8 CONFIGURATION PVI-10/12-I-OUTD-S-US/CAN-XXX-NG

3.8.1 POSSIBLE AURORA INVERTER DC INPUT CONFIGURATION

The AURORA Inverter is configurable with an independent MPPT for each DC input channel *or* with the two input DC channels connected in parallel with one MPPT. If the inverter is configured with two independent MPPTs, the max current for each channel shall not exceed 24 Adc (10kW)/ 25Adc (12kW) and the power input for the single channel shall not exceed 6.8 kW.

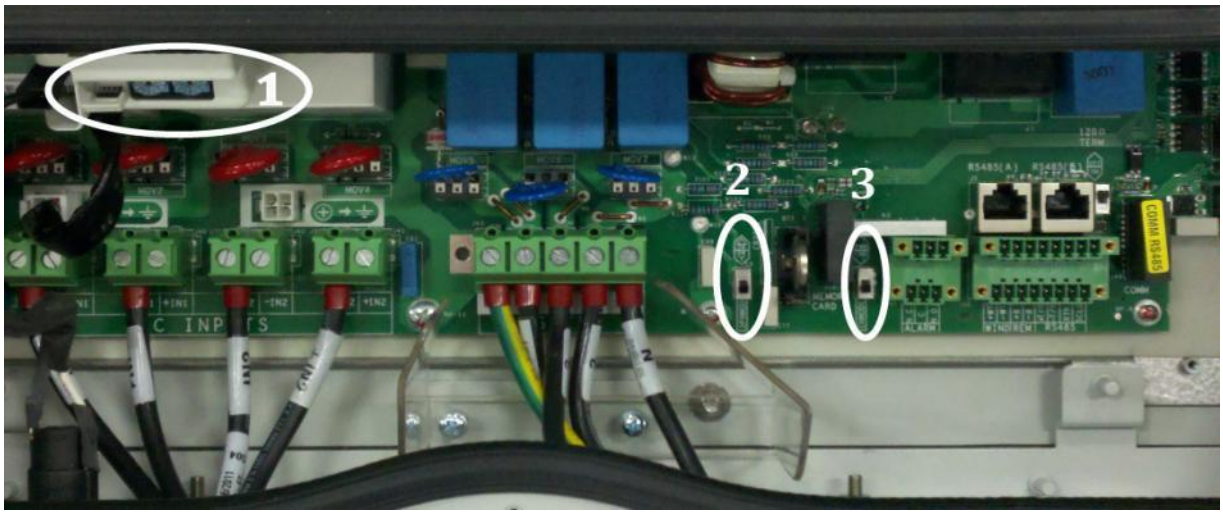


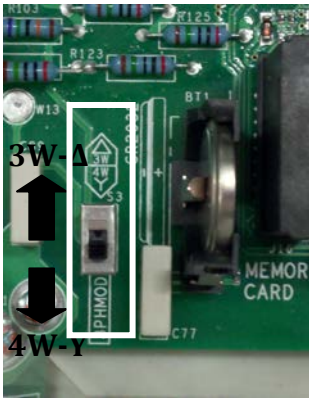
Figure 2.10 - Configuration Settings

COUNTRY CODE SELECTOR

1:

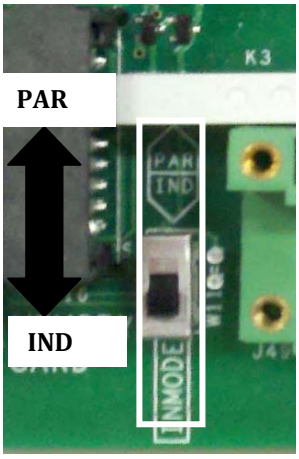
3PHMOD SWITCH

2:



PAR/IND INMODE SWITCH

3:



3.8.2 SELECTING THE COUNTRY CODE

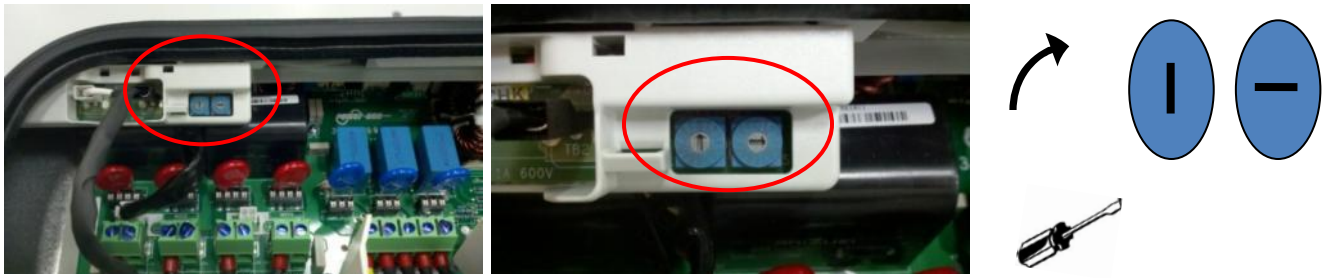


Figure 2.11- Selector Switches for Choice of Country Code

The inverter has two selector switches (see Figure 2.11). These enable installers to set the proper grid standard for the North American versions. The factory default setting is [0, 4].

For the North American market:

- To access the selector switches remove the inverter front panel as explained in Figure 2.02
- Ensure the switches are set to [0, 4], change if necessary.

WARNING

Once the installer has selected a grid standard and energized the inverter, an internal, 24 hour counter will start to count down. During the first 24 hours of grid connection it is possible to modify the chosen standard (in case of mistakes). After 24 hours, the chosen setting is finalized and cannot be changed without contacting Power-One Customer Service. User can check the counter residual time via the LCD scrolling menu.

Before selecting the inverter grid standard on the, accurately identify the required utility grid standard.

3.8.3 GRID-TYPE CONFIGURATION: THREE-PHASE CONNECTION SELECTION:

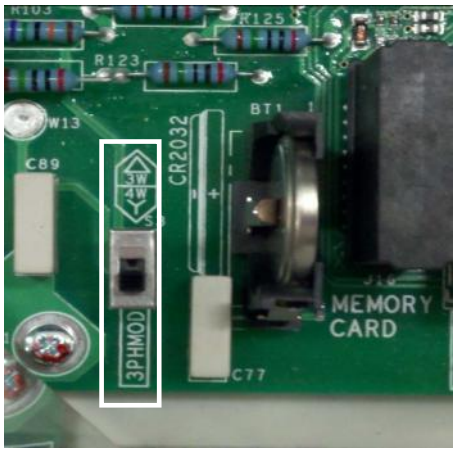


Figure 2.12 - Phase configuration 3W-Δ/ 4W- Y

The grid type (3W or 4W) is changed via the 3-phase mode switch depending on the installation location.

The grid type (3W or 4W) default is set to 4W-Y MODE.

The PVI-10/12-I-OUTD-(US/S/S1/S2)-480V/3Ø/4W grid; therefore, requires a neutral conductor to be connected.

Connection to the grid without a neutral conductor will result in intermittent operation of the inverter.

In addition, the "3PHMOD" switch MUST BE in the 4W position (figure 1.0). Delta or WYE connection availability depends on inverter model:

- 208V/10kW-either 3W Delta or 4W WYE.
- **480V/10kW 4W WYE connection only (neutral conductor required)**
- 480/12kW-models-WYE connection only (neutral conductor required)

The unit's voltage (208/480/600) is pre-set at the factory and is reflected in the part number

3.8.4 INDEPENDENT OR PARALLEL CONNECTION OF DUAL INPUTS

The AURORA Inverters have dual inputs with independent MPPT circuits. The inverter when operated in the dual input mode can optimize two independent arrays. The inverter can also be operated in a single MPPT mode from a single array by connecting the inputs in parallel using jumpers and proper setting of the INMODE switch (see Figure 2.10, above. The following sections show how to connect the inverter in either the INDependent or PARallel mode.

3.8.4.1 *Independent Connection*

For applications where the two MPPT channels will be used independently:

- Place switch "INMODE" (shown in Figure 2.13) in the "IND" (default position) position to configure the inverter controls in the independent mode.
- Ensure the parallel jumper wiring (see Figure 2:14b), is **not present**.
- After switching the AURORA Inverter to independent mode configuration, re-install the front panel (apply 13.2 in-lbs of torque to each of the four (4) screws).

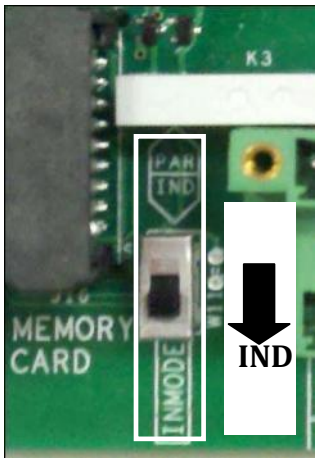


Figure 2.13 - Independent MPPT Configuration Switch

3.8.4.2 *Parallel Connection*

To operate the inverter in the single MPPT mode:

- Place switch S1 (shown in Figure 2.14a) in the "PAR" in order to configure the inverter controls in parallel mode.
- Parallel the two MPPT inputs using terminal [–IN1 and –IN2] and [+IN1 and +IN2] as shown in Figure 2.14b using two#10 AWG jumper wires (1 black and 1 red cable) to connect the input.
- After switching the AURORA Inverter to parallel mode configuration, re-install the front panel (apply 13.2 in-lbs of torque to each of the four (4) screws).

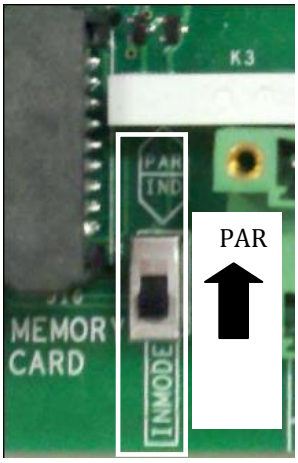


Figure 2.14a - Parallel MPPT Configuration Switch

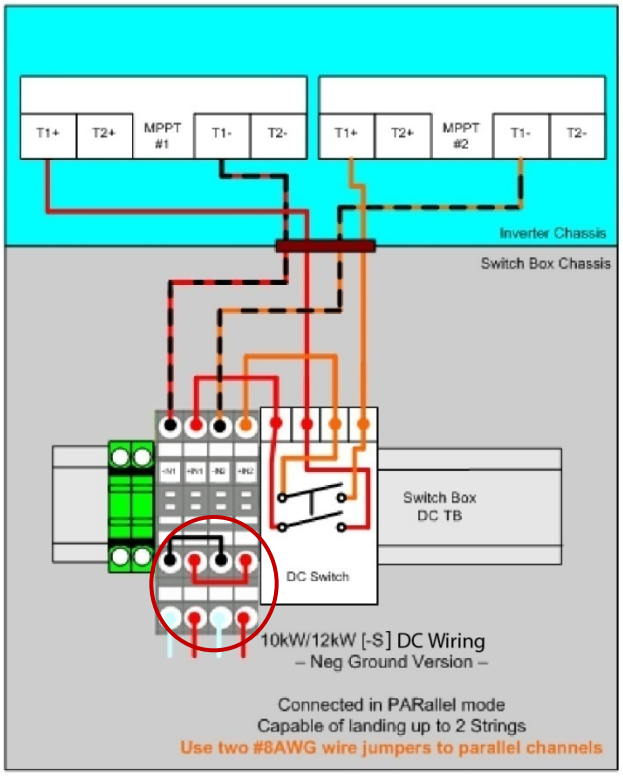


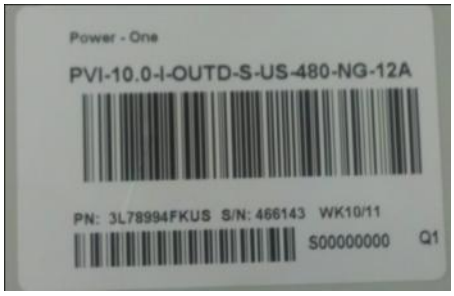
Figure 2.14b - Switchbox Jumpers for Parallel MPPT Input Connection
PVI-10.0-I-OUTD-S-US-XXX-YY

Section II-B: PVI-10/12-I-OUTD-S1-US/CAN-XXX YY With fuse holders

Section II-B: PVI-10/12-I-OUTD-S1-US/CAN-XXX-YY

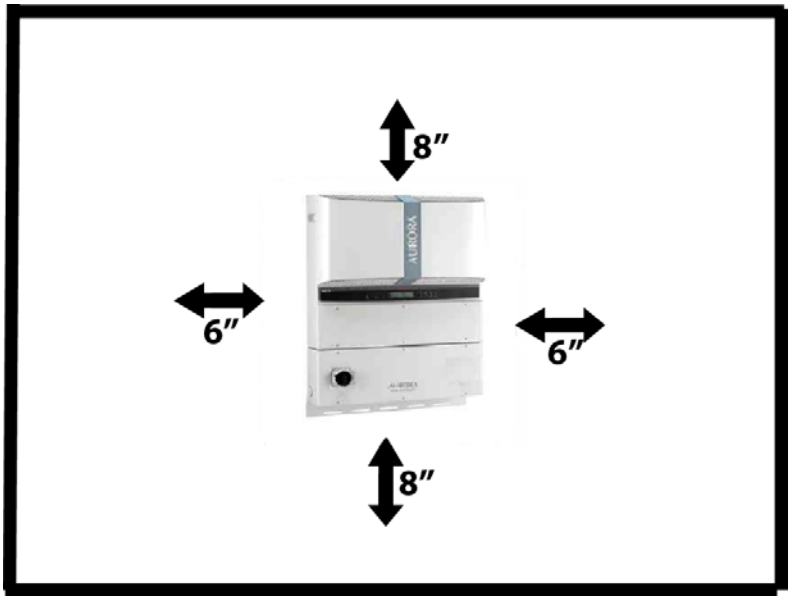
3.9 NAMEPLATE

1. Manufacturer code
2. Model code
3. Serial number
4. Week/Year of production



Sample product nameplate PVI-10.0-I-OUTD-S-US-480-NG-12A

3.10 MOUNTING PVI-10/12-I-OUTD-S1-US/CAN-XXX-YY



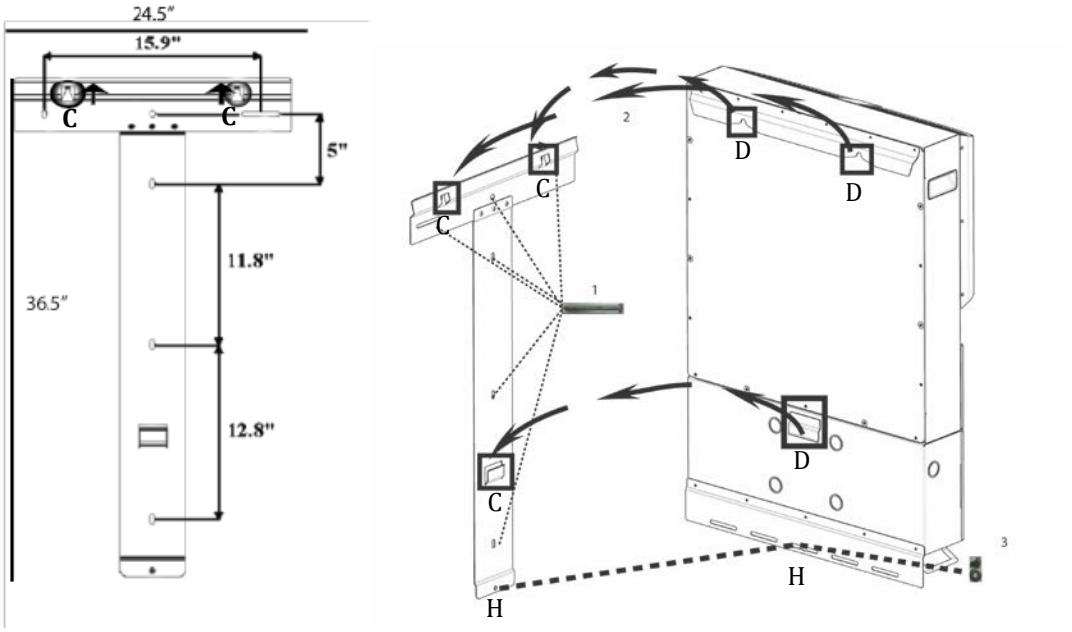


Figure 2.01 - Bracket and Mounting Details *PVI-10.0-I-OUTD-S1-US/CAN-XXX-YY*

Step 1: Locate and mark the desired location using the above inverter mounting requirements.

Step 2: Orient the bracket on the mounting surface such that the "C" hooks face outward and upward (Figure 2.01).

Step 3: Using the hardware provided, mount the bracket using mounting holes shown in Figure 2.01.

Step 4: Hang the inverter on the mounted bracket by lifting the unit up over and above the mounting plate. Carefully guide the inverter and switchbox brackets into the mating upper and lower bracket hooks. Make sure the connecting points(C and D) in the bracket and in the back of the inverter engage properly.

Step 5: Secure the bottom of the inverter using the machine screw (6x20mm) and washer (18mm diameter) provided. Insert machine screw through center hole (H; 3.01) of the bottom inverter mount and engage the PEMnut mounted in the bracket.

3.11 INSTALLATION PVI-10/12-I-OUTD-S1-US/CAN-XXX-YY

3.11.1 REMOVING THE FRONT COVERS

To access the wiring terminals in the inverter and switchbox the inverter cover and switchbox cover must be removed. Refer to Figure 2.02.

- To remove the front cover of the inverter compartment, loosen the six (6) captive screws indicated using the Torx screwdriver provided.
- To remove the front cover of the switchbox Figure 2.02, loosen the six (6) captive screws indicated using the Torx screwdriver provided in the box with the inverter.
- When connection operations are completed, re-install the front covers and tighten the cover screws with at least 1.5Nm (13.2 in-lbs) torque to ensure proper waterproof sealing.
-

Figure 2.02 - Location of Front Access Panels *PVI-10.0-I-OUTD-S1-US/CAN-XXX-YY*

3.11.2 Electrical Wiring And Connections
PVI-10/12-I-OUTD-S1-US/CAN-(208/480/600)

DANGER

This section is dedicated to <u>initial</u> installation wiring of the AURORA Inverter and assumes the unit has been physically mounted in its final location, but not yet wired.

If the inverter has been previously wired and connected to the PV array and/or the AC grid, refer to Part 4 for Operations and Start Up Procedures.

3.11.3 Considerations Before Performing Electrical Connections
PVI-10/12-I-OUTD-S1-US/CAN-XXX-YY

This section provides a systematic description of correct wiring procedures. Please read the instructions provided and follow all safety warnings. Failure to comply with these instructions can result in safety hazards and may lead to possible injury to personnel and/or equipment damage.

WARNING

- Ensure wire sizing procedures are completed per appropriate local codes and regulations.
- Field wiring terminals for inverters are rated at 90°C/194°F.
- Permanently mount the AURORA Inverter in its operational location prior to beginning electrical connections.
- Only qualified and properly trained personnel for the process of connecting the AURORA Inverter to the electrical distribution grid, and only after receiving approval from the local authority having jurisdiction.
- Secure all signal wiring and cables to prevent contact with either AC grid and/or DC array field wiring; additionally, maintain spacing and between the AC grid wiring and DC array wiring; secure as necessary.
- **Do not under any circumstances** exceed the nominal ratings of voltage and current when designing the system. These include:
  - Do not exceed the maximum array DC voltage input to each MPPT circuit of 520 Vdc under any condition.
  - Do not exceed the maximum array DC current input of 24 Adc (10kW) or 25A (12kW) to each MPPT circuit.
  - See technical data information in Part 7: The Appendix
- An automatic over-current device (e.g., circuit breaker) must be used between the AURORA Inverter and the distribution grid.

3.11.4 FIELD WIRING-KNOCKOUT- DETAILS - PVI-10/12-I-OUTD-S1-US/CAN-XXX-YY

The PVI-10/12-I-OUTD-*S1-U/CAN-XXX* suffix is provisioned with a switchbox containing integral DC switch as shown in Figure 2.03.

Figure 2.03 - AC+DC Switchbox Chassis Layout *PVI-10/12-I-OUTD-S1-US/CAN-XXX-YY*

Code	Description	Code	Description
A	DC Power cable KO's, 2pl shown; trade size 3/4", 1"	D	AC Power Cable KOs, 2 pl shown; trade size ¾", 1"
B	DC Switch	F	Signal Cables: KO 2/3"-1" trade size
C	Ground cable KO ½" trade size.		

Due to the high voltage typically present on the DC power cable in the switchbox, ALWAYS check for the presence of hazardous voltage on these cables and eliminate it prior to working on the inverter.

WARNING

The electrical connection for the -NG model, in which the DC switch electrically disconnects only the positive DC input leads, while the negative lead is not switched and grounded via the GFDI fuse. For -PG models the polarity of the wiring is reversed from the -NG version, and the DC switch will electrically disconnect only the negative DC inputs while the positive leads are not switched and grounded via the GFDI fuse.

All wiring examples shown reference the PVI-10/12-I-OUTD-S1-US/CAN-XXX-NG model.

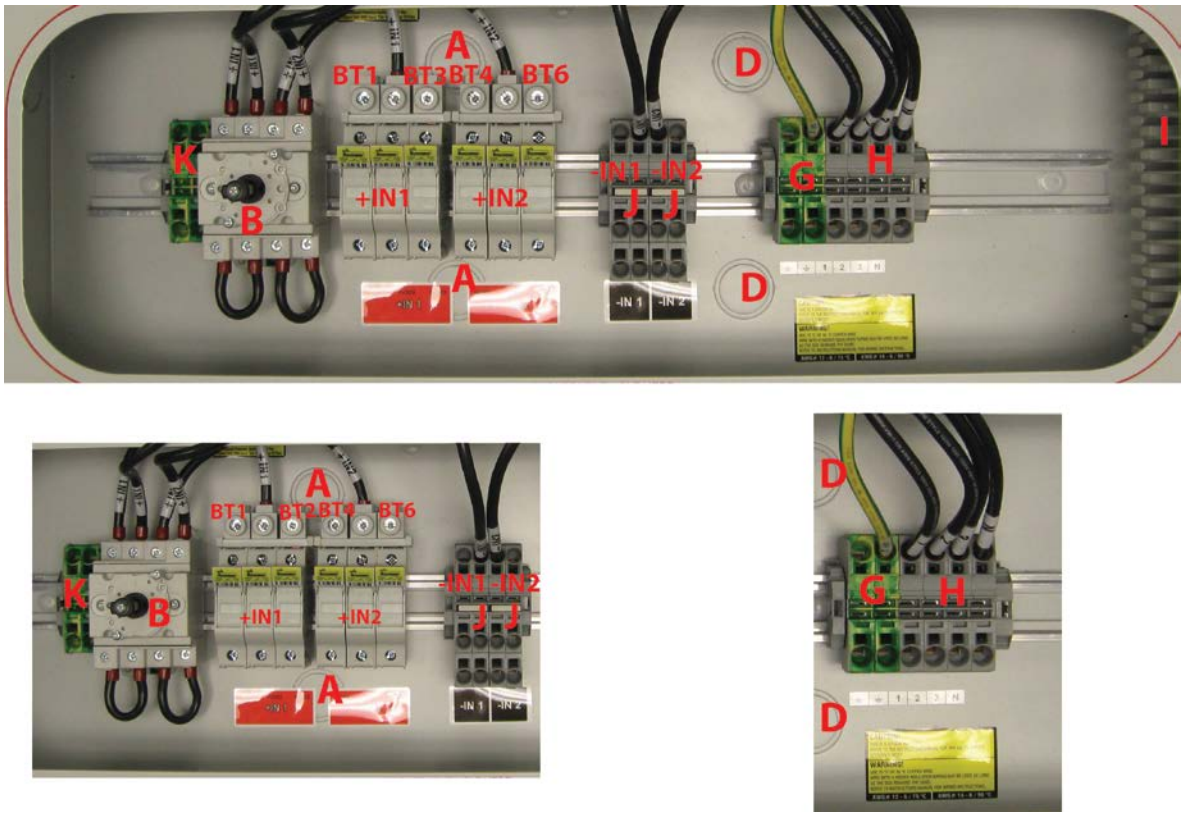


Figure 2.04 - Switchbox Wiring Connection Details *PVI-10.0-I-OUTD-S1-US/CAN-XXX-YY*

Location Code	Details		Location Code	Details	
A	DC Array conduit entry (KOs, 3 places)	KO for ¾" and 1" trade size	F	Signal Cable conduit entry KO's	KO, shown 2 places, trade size 2/3"-1"
B	DC Switch	Note 1	G	AC Ground Terminals	Note 1
D	AC Power Cable entry (KOs, 3 places		H	Grid Output Terminals 1,2,3,N	Note 3,4
+IN1	DC Array MPPT 1 F1, F2, F3	Note 2	I	Plastic Conduit For Signal Cables	
-IN1	DC Array MPPT 1 NEG Returns	Note 1	J	Terminal Block Jumpers	½" trade size KO
+IN2	DC Array MPPT 2 F4, F5, F6	Note 2	K	Array PE Ground	Note 1
-IN2	DC Array MPPT 1 NEG Returns	Note 1	BT1-BT6	Busbar Terminals 1, 2, 3, 4,5,6	Note 5

Notes:

1. All array wiring terminal blocks are spring pressure type and can accommodate a wire size range of #20-#6 AWG.
2. Fuse holders F1-F6 have screw terminals and tightening torque depends on wire size. See legend on fuse holders.
3. All grid wiring terminals are spring pressure type and can accommodate wire size #12-#4 AWG.
4. Grid connection can be either 3W or 4W; set 3PHMODE switch accordingly.
5. Bus Bar Terminals BT1, BT3, BT4, BT6 are used for various input wiring configurations.

3.11.5 Initial Electrical Connections
PVI-10/12-I-OUTD-S1-US/CAN-XXX-NG

DANGER: **If the unit has been previously wired and energized, refer to Part 4: Operations for appropriate disconnection procedures.**

WARNING **Power-One does not provide AC output overcurrent protection.**

This section describes initial installation procedures for DC and AC wiring connections to the PVI-10/12-I-OUTD-*S1-US/CAN-xxx* inverter version having an integral DC and AC disconnect switches and associated switchbox.

- Typical system connection for this inverter is shown in Figure 2.05
- Relevant wiring connections are shown in Figure 3.04

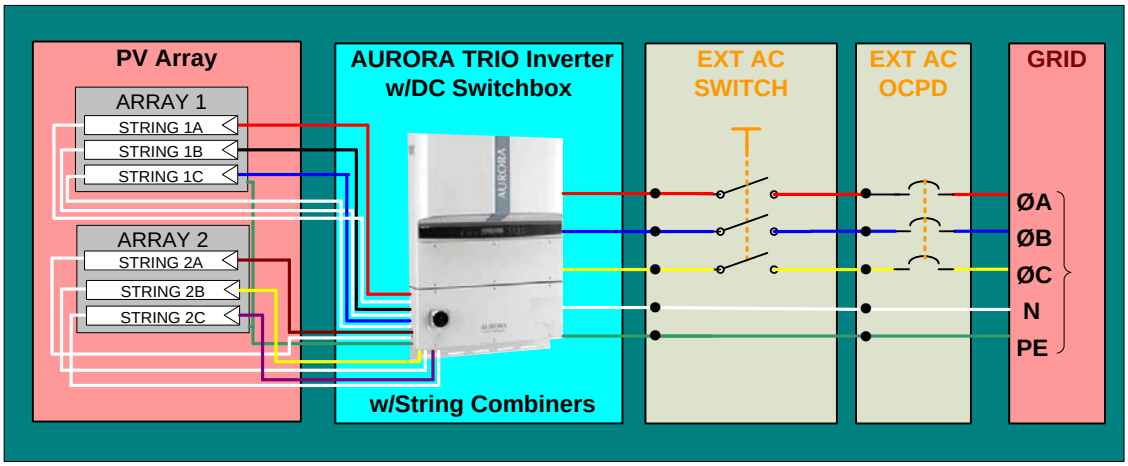


Figure 2.05 - Electrical Connection Diagram *PVI-10.0-I-OUTD-S1-US/CAN-XXX-YY*

1. Refer to the photo of Figure 2.03. Locate the designated entry locations for the conduits from the DC array and to the AC grid.
2. Make sure the appropriate knock-outs are employed for the use specified in order to maintain required spacing between wiring groups.

3.11.6 DC ARRAY CONNECTIONS

WARNING:

Before attempting to connect the array wiring be certain the array sizing has been completed to the specific plan associated with the system being installed.

To eliminate the potential for shock hazard during the connection procedure for the PV array wiring, either "open-circuit" all PV circuits prior to entry to the inverter and/or cover all panels with dark or opaque material in order to eliminate hazardous voltage at the terminals of the array wiring.

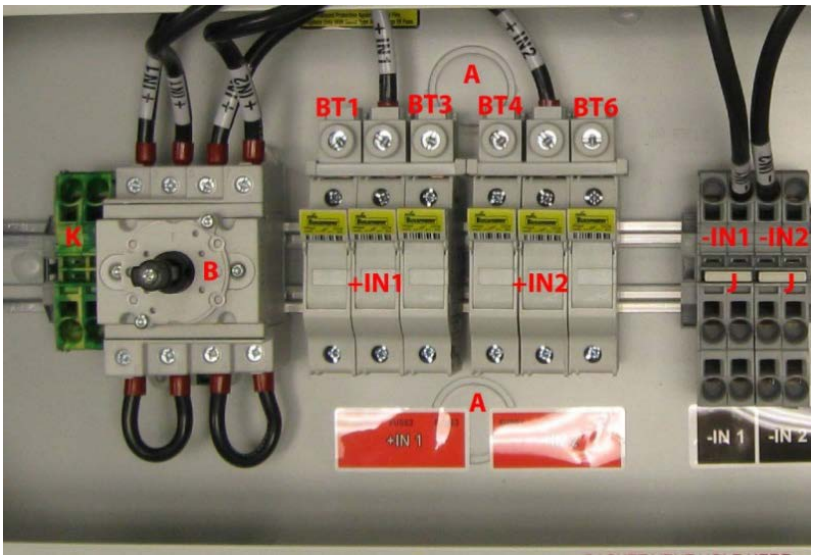


Figure 2.06a – DC Array Connection *PVI-10.0-I-OUTD-S1-US/CAN-XXX-YY*

Location Code	Details		Location Code	Details	
A	DC Array conduit entry (KOs, 3 places)	KO for ¾" and 1" trade size	+IN1	DC Array MPPT 1 F1, F2, F3	Note 2
B	DC Switch		-IN1	DC Array MPPT 1 NEG Returns	Note 1
K	Array DC Ground	Note 1	+IN2	DC Array MPPT 2 F4, F5, F6	Note 2
J	Terminal Block Jumpers	Note 1	-IN2	DC Array MPPT 1 NEG Returns	Note 1
			BT1-BT6	Busbar terminals 1,2,3,4,5,6	Note 3

Notes:

1. All array wiring terminal blocks are spring pressure type and can accommodate a wire size range of #20-#6 AWG.
2. Fuse holders F1-F6 have screw terminals and tightening torque depends on wire size. See legend on fuse holders.
3. Bus bar Terminals BT1, BT3, BT4, and BT6 are used for various input wiring configurations.

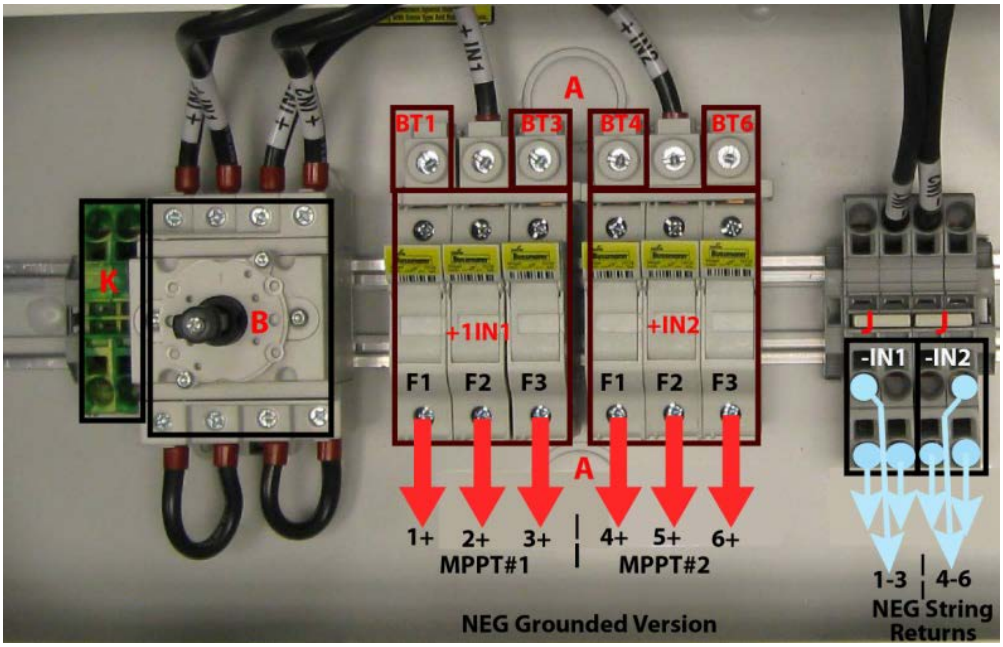


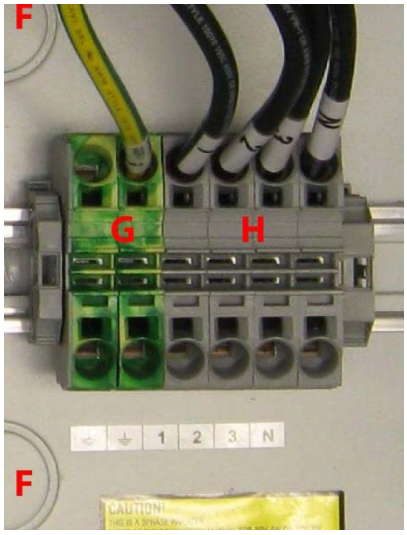
Figure 2.06b- DC Array Connection
PVI-10.0-I-OUTD-S1-US/CAN-XXX-YY

- Refer to Figure 2.06. Locate the incoming DC array wiring at the switchbox chassis and measure the voltage to ensure the array output is non-hazardous.
- Once de-energized, connect the DC wiring to the MPPT1 and MPPT2 array terminals shown in inverter per the specific array design.
- If the array is designed for the parallel MPPT input mode, ensure the channel paralleling jumpers shown in Figure 2.14b are installed. See signaling section for more details.
- If the array is designed for the parallel MPPT input mode, ensure the jumpers shown in Figure 2.14b are in place.
- Ensure the MPPT mode switch is in the correct position to match the array design.

3.11.7 AC GRID CONNECTIONS

WARNING

Power-One does not provide AC output overcurrent protection.



Location Code	Details	
F	Cable Knockouts	
G	Main Ground	Note 1
H	Grid Output Terminals [1, 2, 3, N]	Note 1,2

Notes:
1. All grid wiring terminals are spring pressure type and can accommodate wire size #12-#4 AWG.
2. Grid connection can be either 3W or 4W; ***3PHMOD*** switch must be set accordingly.

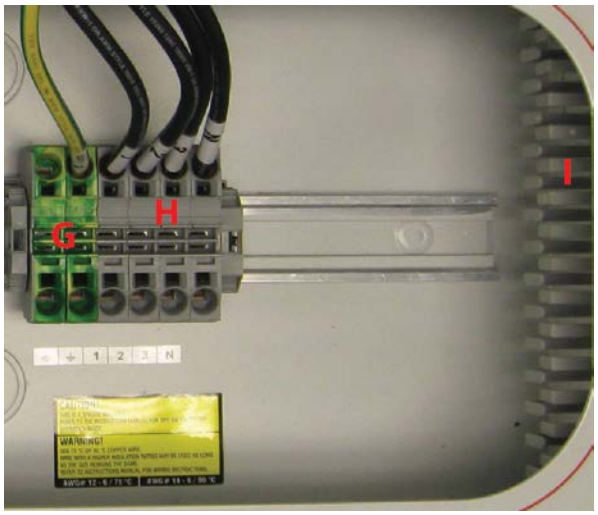
Figure 2.07 - AC Grid Connections PVI-10.0-I-OUTD-S1-US/CAN-XXX-YY

- Refer to Figure 2.07. Locate the AC grid wiring at the inverter switchbox. Measure the voltage to ensure all connections to the grid have been eliminated and no hazardous voltage is present.

- Once de-energized, connect the AC wiring to the AC grid terminals.
  - If the grid connection does not require a neutral connection (i.e., 3Ø/3W) the Neutral terminal is not used. Ensure the 3PHMOD switch is placed in the **3W** position.

  - If the grid connection requires a neutral connection (i.e., 3Ø/4W), the Neutral terminal must be connected to the grid neutral conductor. Ensure the 3PHMOD switch is placed in the 4W position. See Figure 2.10 for more information.

3.11.8 SIGNAL WIRING CONNECTIONS –PVI-10/12-I-OUTD-S1-US/CAN-XXX-NG



Code	Details	
H	Grid Output Terminals	Note 1
J	RS485 Cable conduit entry (KOs)	½" trade size
K	Plastic conduit for signal cables	

Notes:
1. All grid wiring terminals are spring pressure type and can accommodate wire size #12-#4 AWG.
2. Grid connection can be either 3W or 4W; ***3PHMOD*** switch must be set accordingly.

Figure 2.08 – Signal Wire Routing

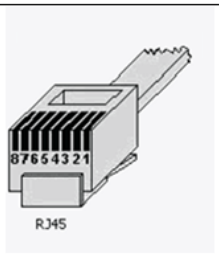
- Route the cables through the switchbox and into the inverter chassis using plastic guide (item I, Figure 2.08).
- Refer to Figure 2.03. Note the position where the monitoring and alarm cables (if used) enter the chassis.
- Refer to Figure 2.07. Locate the terminals for the alarm and monitoring connections within the chassis.
- Connect alarm cable to the mating connector (in hardware kit) and plug connector into position shown in Figure 2.09.
- Connect RS485 monitoring cable:

a) If using CAT5 cable for monitoring connections, connect RJ45 plug to end of cable as shown in Table 1, and plug into RJ45 jack shown in Table 2.01. A second jack is available to accommodate daisy chaining of communication line to other inverters. Insure that the +T/R and -T/R lines are connected to a single twisted pair in the cable. WARNING: Do not use prewired Ethernet LAN cable for this wiring Table 2.01 wiring does not match wiring of a standard Ethernet cable, If CAT5/6 cable is used it must be wired to the RJ45 plug as shown in the table to minimize communication connectivity issues.

b) If using standard multi-wire cable (e.g., Belden 3106A) locate the mating connector (hardware bag) and connect the three RS-485 leads. Plug connector into position shown in Table 1; second connector is to facilitate daisy chaining. See Table 2.01 and Figure 2.09 or refer to the multi-system wiring section.

c) Refer to Part 4: Operations for details to set RS485 address.

Table 2.01 - RJ45 Connectors



Pin #	Signal Name	Description	Notes
1,2,6,8	N/U	Not Used	-
3	+TR	+ Data Line	1
4	+R	Remote OFF	2
5	-TR	- Data Line	1
7	RTN	Signal Return	1

1. Required for RS485 communication
2. Required for Remote OFF control

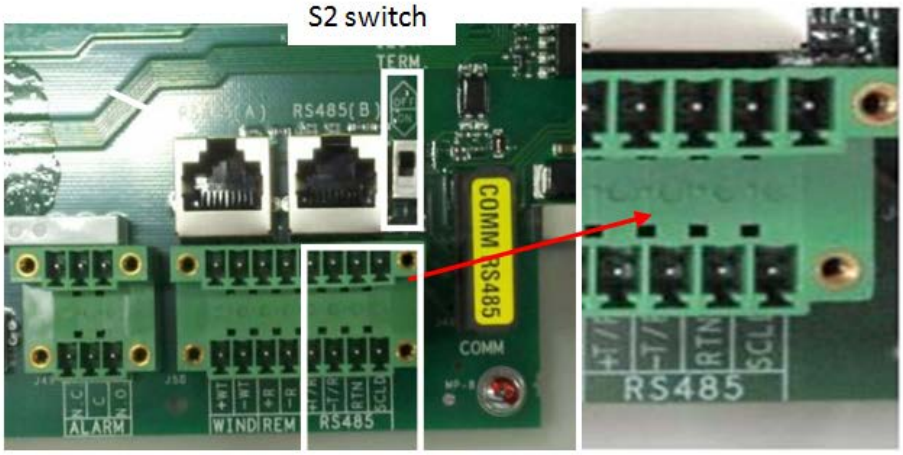


Figure 2.09 - Standard RS485 Connection

3.12 CONFIRGURATION OF PVI-10/12-I-OUTD-S1-US/CAN-XXX-NG

3.12.1 POSSIBLE AURORA INVERTER DC INPUT CONFIGURATION

The AURORA Inverter is configurable with an independent MPPT for each DC input channel *or* with the two input DC channels connected in parallel with one MPPT. If the inverter is configured with two independent MPPTs, the max current for each channel shall not exceed 24 Adc (10kW) or 25Adc (12kW) and the power input for the single channel shall not exceed 6.8 kW.

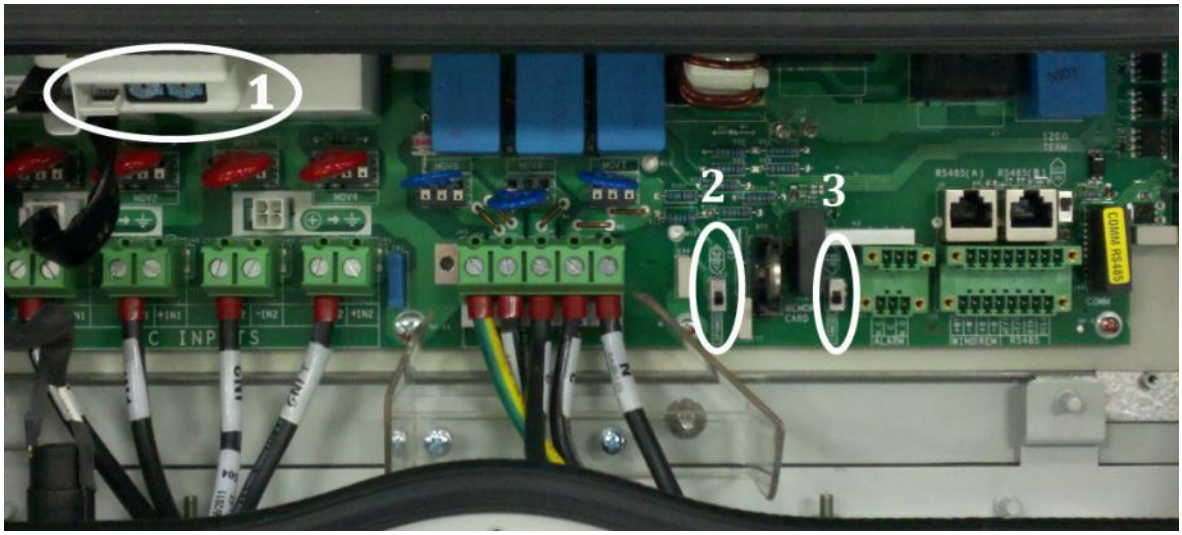


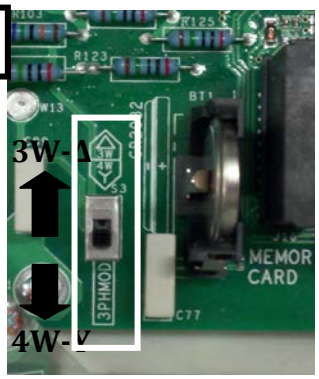
Figure 2.10 - Configuration Settings

COUNTRY CODE SELECTOR

1:

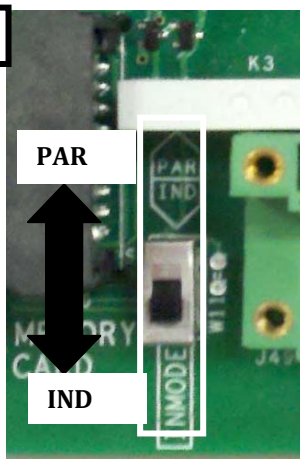
3-PHMOD SWITCH

2:



PAR/IND INMODE SWITCH

3:



3.12.2 SELECTING THE COUNTRY CODE

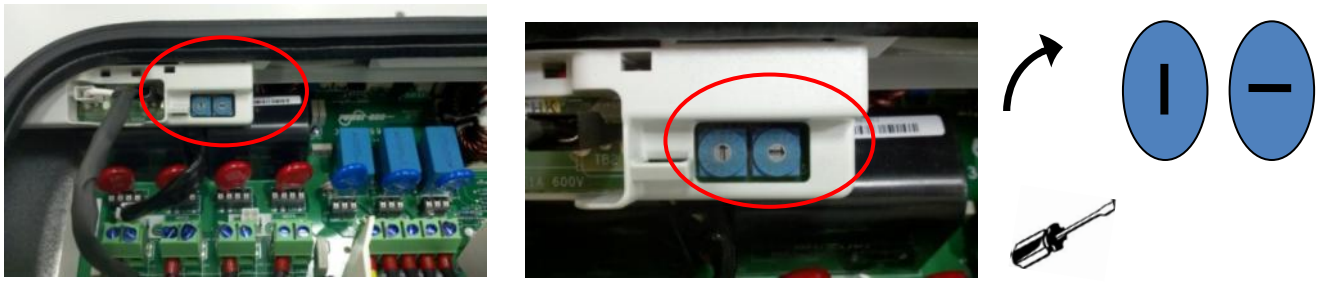


Figure 2.11 - Selector Switches for Choice of Country Code

The inverter has a two-selector switch (see Figure 2.11). These enable installers to set the proper country code. The factory default setting is [0, 4]. The installer must select the appropriate country code in order to enable the proper inverter connection to the grid.

For the North American market:

1. To access the selectors remove the inverter front panel as explained in Figure 2.02.
2. Ensure the dials are set to [0, 4], change if necessary.

WARNING: **Once the installer has selected a grid standard and energized the inverter, an internal, 24h counter will start to count down. During the first 24 hours of grid connection it is possible to modify the chosen standard (in case of mistakes). After 24 hours, the chosen setting is finalized and cannot be changed without contacting Power-One Customer Service. User can check the counter residual time via the LCD scrolling menu.**

3.12.3 PHASE CONNECTION SELECTION PVI-10/12-I-OUTD-S1-US/CAN-XXX-YY:

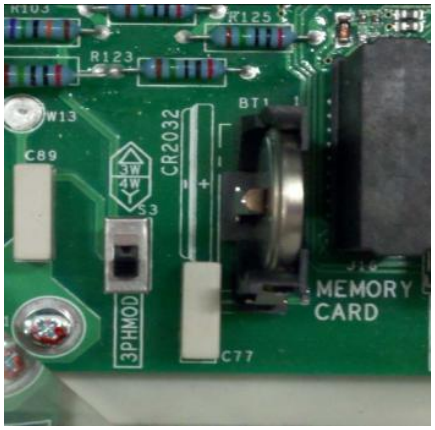


Figure 2.12 - Grid configuration; 3W-Δ/ 4W-Y

The grid type (3W or 4W) is changed via the 3PHMOD switch depending on the installation location.

The grid type (3W or 4W) default is set to 4W-Y MODE.

The PVI-10/12-I-OUTD-(US/S/S1/S2)-480 models MUST BE connected to a 480V/3Ø/4W grid; therefore, requires a neutral conductor to be connected.

Connection to the grid without a neutral conductor will result in intermittent operation of the inverter.

In addition, the "3PHMOD" switch MUST be in the 4W position. (see Figure 1.0)

Delta or WYE connection availability depends on inverter model:

208V/10kW-either 3W delta or 4W WYE.

480V/10kW WYE connection only (neutral conductor required)

480/12kW-models-WYE connection only (neutral conductor required)

The unit's voltage (208/480/600) is pre-set at the factory and is reflected in the part number

All models require a 3-phase grid connection.

3.12.4 INDEPENDENT OR PARALLEL CONFIGURATION OF DUAL INPUTS

The AURORA Inverters have dual inputs with independent MPPT circuits. The inverter when operated in the dual input mode can optimize two independent arrays. The inverter can also be operated in a single MPPT mode from a single array by connecting the inputs in parallel using jumpers and proper setting of the INMODE switch (see Figure 2.10, above. The following sections show how to connect the inverter in either the INDependent or PARallel mode.

3.12.4.1 *Independent Connection*

For applications where the two MPPT channels will be used independently:

- Place the "INMOD" switch (shown in Figure 2.13) in the "IND" (default position) position to configure the inverter controls in the independent mode.
- Ensure the parallel jumpers shown in Figure 2.14b, are **not present**.
- After switching the AURORA Inverter to independent mode configuration, re-install the front panel (apply 13.2 in-lbs of torque to each of the six (6) screws).
-

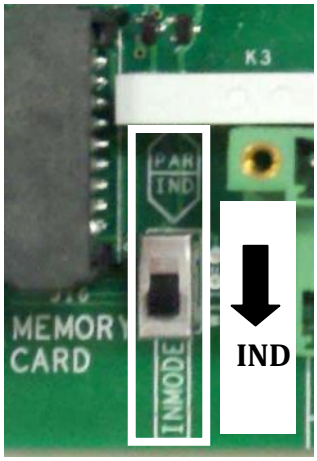


Figure 2.13 - INDependent mode switch configuration

3.12.4.2 *Parallel Connection*

To operate the inverter in the single MPPT mode:

- Place the INMODE switch (shown in Figure 2.14a) in the "**PAR**" position to configure the inverter controls in parallel mode.
- Connect bus bar terminals **BT3** and **BT4** together via a short #8AWG jumper found in the hardware bag. Refer to Figure 2.14b.
- Connect terminal blocks **-IN1** and **-IN2** return terminals together using #8AWG jumper wire found in the hardware bag. Refer Figure 2.14b.

  Upon completion, re-install the front panel (apply 13.2 in-lbs of torque to each of the six (6) screws).

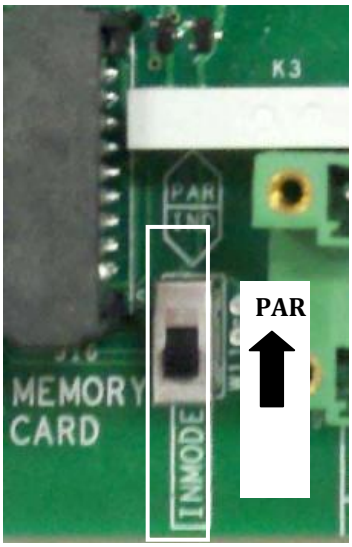


Figure 2.14a - Parallel Mode switch configuration

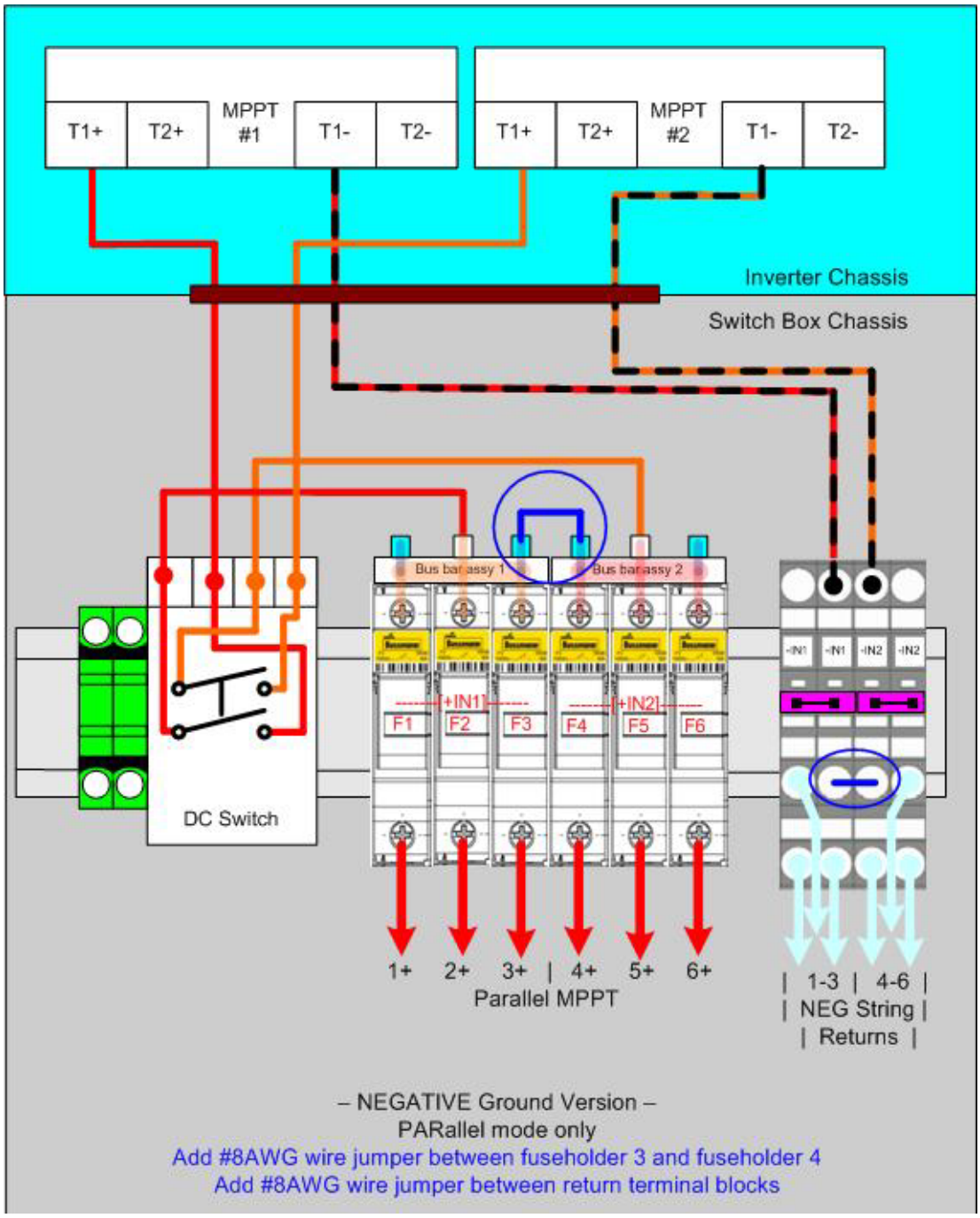


Figure 2.14b - Large switchbox with combiners showing jumpers (circled) required for Parallel MPPT Input Connection *PVI-10.0-I-OUTD-S1-US/CAN-XXX-YY*

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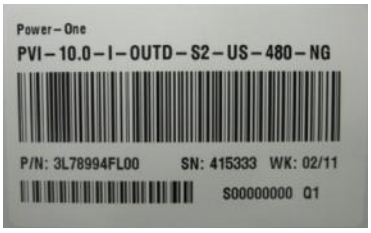
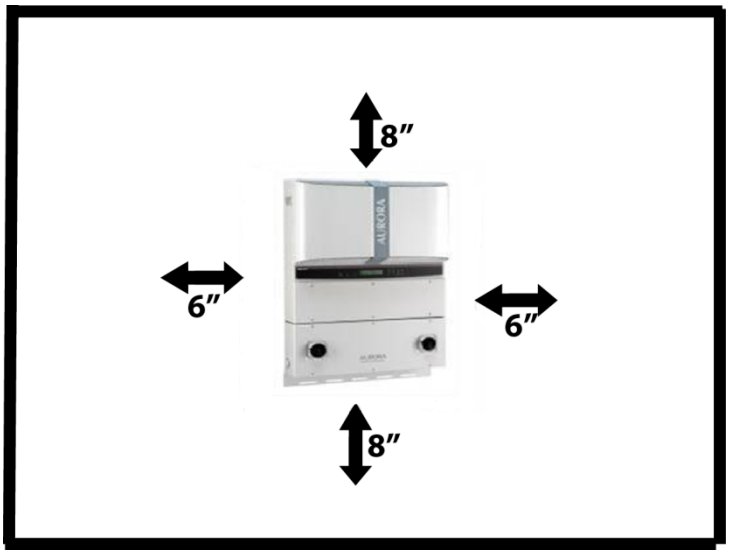
Section III: PVI-10/12-I-OUTD-S2-US/CAN-XXX-YY

3.13 NAMEPLATE



Sample product nameplate (PVI-10.0-I-OUTD-S2-US-480-NG)

3.14 MOUNTING PVI-10/12-I-OUTD-S2-US/CAN-XXX-YY



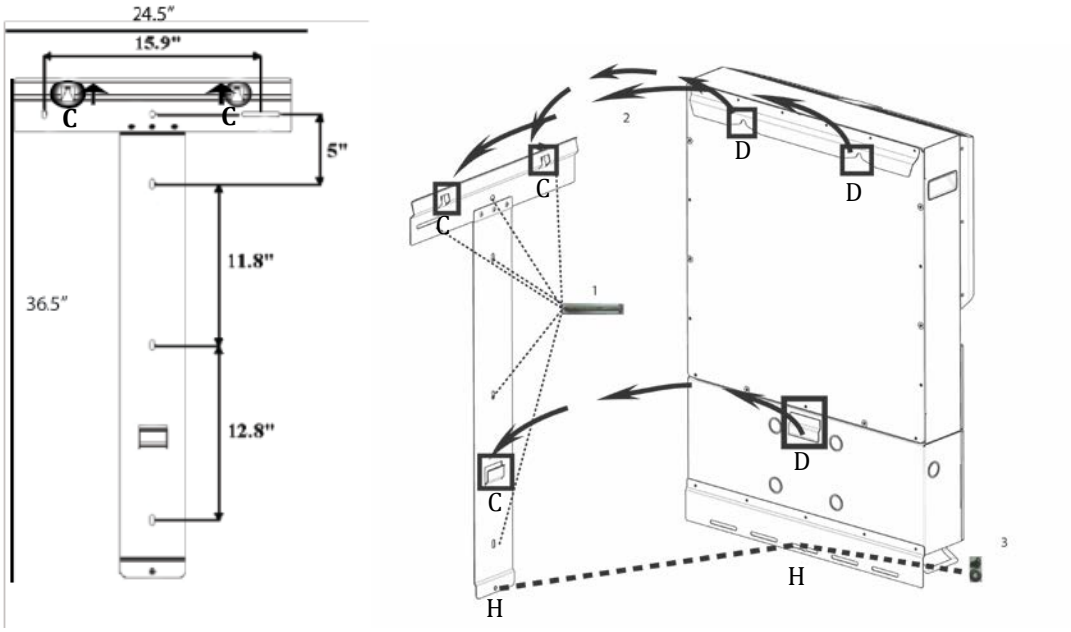


Figure 3.01 - Bracket and Mounting Details *PVI-10/12-I-OUTD-S2-US/CAN-XXX*

Step 1: Locate and mark the desired location using the above inverter mounting requirements.

Step 2: Orient the bracket on the mounting surface such that the "C" hooks face outward and upward. (Figure 3.01)

Step 3: Using the hardware provided, mount the bracket using mounting holes shown in Figure 3.01.

Step 4: Hang the inverter on the mounted bracket by lifting the unit up over and above the mounting plate. Carefully guide the inverter and switchbox brackets into the mating upper and lower bracket hooks. Make sure the connecting points (C and D) in the bracket and in the back of the inverter engage properly.

Step 5: Secure the bottom of the inverter using the machine screw (6x20mm) and washer (18mm diameter) provided. Insert machine screw through center hole (H; 3.01) of the bottom inverter mount and engage the PEMnut mounted in the bracket.

3.15 INSTALLATION PVI-10/12-I-OUTD-S2-US/CAN-XXX-YY

3.15.1 REMOVING THE FRONT COVERS

To access the wiring terminals in the inverter and switchbox the inverter cover and switchbox cover must be removed. Refer to Figure 3.02

- To remove the front cover of the inverter compartment, loosen the six captive screws indicated using the Torx screwdriver provided.
- To remove the front cover of the switchbox Figure 3.02, loosen the six captive screws indicated using the Torx screwdriver provided in the box with the inverter.
- When connection operations are completed, re-install the front covers and tighten the cover screws with at least 1.5Nm (13.2 in-lbs) torque to ensure proper waterproof sealing.

Figure 3.02- Location of Front Access Panels
PVI-10/12-I-OUTD-S2-US/CAN-XXX

3.15.2 Electrical Wiring And Connections
PVI-10/12-I-OUTD-S2-US/CAN-XXX-YY

DANGER

This section is dedicated to <u>initial</u> installation wiring of the AURORA Inverter and assumes the unit has been physically mounted in its final location, but not yet wired. If the inverter has been previously wired and connected to the PV array and/or the AC grid, refer to Part 4 for Operations and Start Up Procedures.

3.15.3 Considerations Before Performing Electrical Connections
PVI-10/12-I-OUTD-S2-US/CAN-XXX-YY

This section provides a systematic description of correct wiring procedures. Please read the instructions provided and follow all safety warnings. Failure to comply with these instructions can result in safety hazards and may lead to possible injury to personnel and/or equipment damage.

WARNING

- Ensure wire sizing procedures are completed per appropriate local codes and regulations.
- Field wiring terminals for inverters are rated at 90°C/194°F.
- Permanently mount the AURORA Inverter in its operational location prior to beginning electrical connections.
- Only qualified and properly trained personnel for the process of connecting the AURORA Inverter to the electrical distribution grid, and only after receiving approval from the local authority having jurisdiction.
- Secure all signal wiring and cables to prevent contact with either AC grid and/or DC array field wiring; additionally, maintain spacing and between the AC grid wiring and DC array wiring; secure as necessary.
- **Do not under any circumstances** exceed the nominal ratings of voltage and current when designing the system. These include:
  - Do not exceed the maximum array DC voltage input to each MPPT circuit of 520 Vdc under any condition.
  - Do not exceed the maximum array DC current input of 24 Adc (10kW) or 25A (12kW) to each MPPT circuit.
  - See technical data in Part 7: The Appendix
- An automatic over-current device (e.g., circuit breaker) must be used between the AURORA Inverter and the distribution grid.

3.15.4 FIELD WIRING-KNOCKOUT DETAILS
PVI-10/12-I-OUTD-S2-US/CAN-XXX-YY

The PVI-10/12-I-OUTD-*S2-US/CAN-xxx* suffix is provisioned with a switchbox containing integral DC and AC disconnect switches as shown in Figure 3.03.

Figure 3.03 - AC+DC Switchbox Chassis Layout *PVI-10/12-I-OUTD-S2-US/CAN-XXX-YY*

Code	Description	Code	Description
A	DC Power cable KO's, 2pl shown; trade size 3/4", 1"	D	AC Power Cable KOs, 2 pl shown; trade size 1"
B	DC Switch	E	AC Switch
C	Ground cable KO ½" trade size.	F	Signal cable KOs: 2/3"- 1" trade size

Due to the high voltage typically present on the DC power cable in the switchbox, ALWAYS check for the presence of hazardous voltage on these cables and eliminate it prior to working on the inverter.

WARNING

The electrical connection for the -NG model, in which the DC switch electrically disconnects only the positive DC input leads, while the negative lead is not switched and grounded via the GFDI fuse. For -PG models the polarity of the wiring is reversed from the -NG version, and the DC switch will electrically disconnect only the negative DC inputs while the positive leads are not switched and grounded via the GFDI fuse.

All wiring examples shown reference the PVI-10/12-I-OUTD-S2-US/CAN-XXX-NG model.

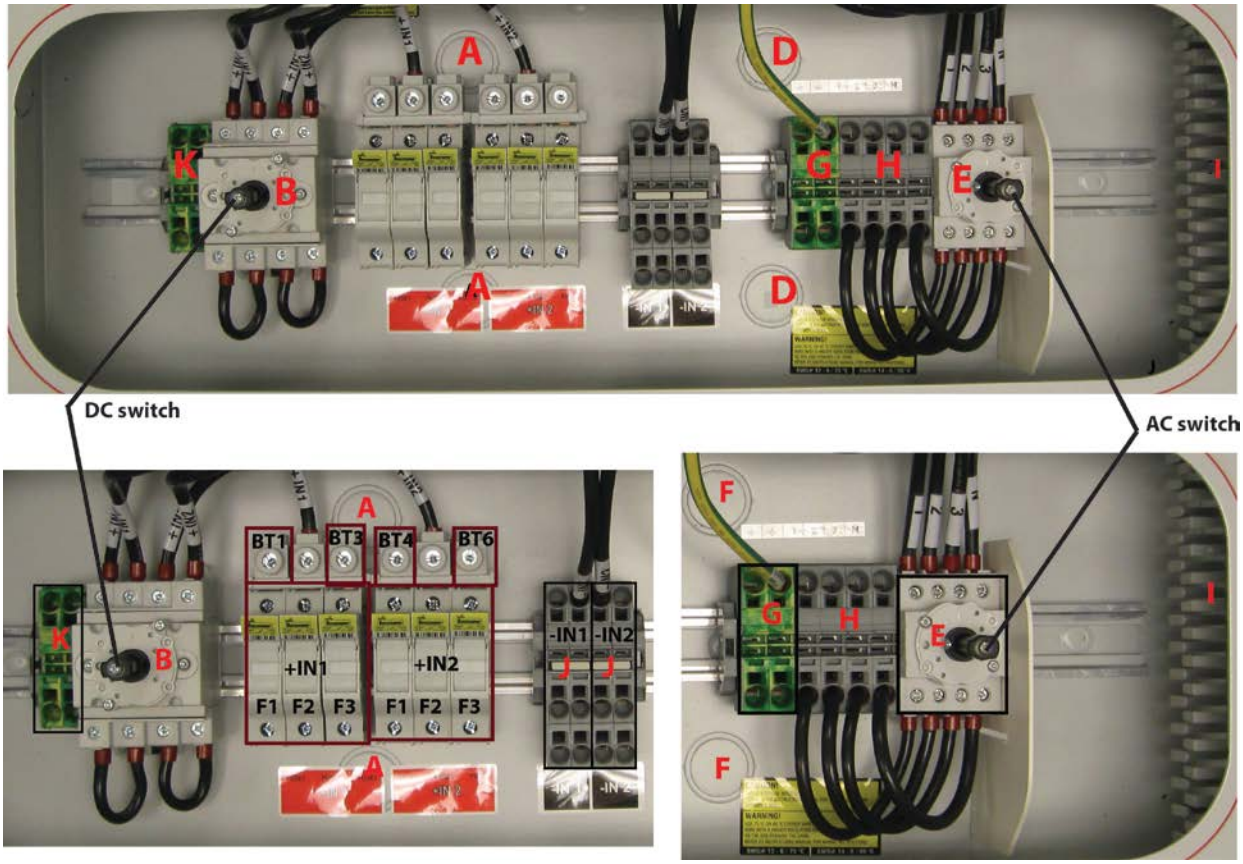


Figure 3.04 - Switchbox, showing internal component locations
PVI-10/12-I-OUTD-S2-US/CAN--XXX with Fuse Holders

Location Code	Details		Location Code	Details	
A	DC Array conduit entry (KOs, 4 places)	¾" and 1" trade size	I	Plastic conduit for signal cables	
B	DC Disconnect Switch		J	Terminal Block Jumpers	Standard
D	AC Power Cable KO's, 2 places shown, trade size ¾", 1"	¾" and 1" trade size	K	Array PE Ground	Note 1
E	AC Switch		+IN1	DC Array MPPT 1, [F1,F2,F3]	Note 2
F	Signal Cable conduit entry (KOs 4 places)	½" trade size	-IN1	DC Array MPPT 1 (Neg return)	Note 1
G	AC Ground Terminals	Note 3	+IN2	DC Array MPPT 2 [F4, F5, F6]	Note 2
H	Grid Output Terminals (1,2,3,N)	Note 3	-IN2	DC Array MPPT 2 Neg Return	Note 1
Notes:			BT1-BT6	Busbar terminals (1,2,3,4,5,6)	Note 4

1. All array wiring terminal blocks are spring pressure type and can accommodate a wire size range of #20-#6 AWG.
2. Fuse holders F1-F6 have screw terminals and tightening torque depends on wire size. See legend on fuse holders.
3. All AC wiring terminal blocks are spring pressure type and can accommodate a wire size range of #12-#4AWG

Location Code	Details	Location Code	Details
4. Bus bar Terminals BT1, BT3, BT4, and BT6 are used for various input wiring configurations.			

3.15.5 INITIAL ELECTRICAL CONNECTIONS
PVI-10/12-I-OUTD-S2-US/CAN-XXX-NG

If the unit has been previously wired and energized, refer to Part 4: Operations for appropriate disconnection procedures.

Power-One does not provide AC output overcurrent protection.

This section describes initial installation procedures for DC and AC wiring connections to the PVI-10/12-I-OUTD-*S2-US/CAN-xxx* inverter version having an integral DC and AC disconnect switches and associated switchbox.

- Typical system connection for this inverter is shown in Figure 3.05.
- Relevant wiring connections are shown in Figure 3.04

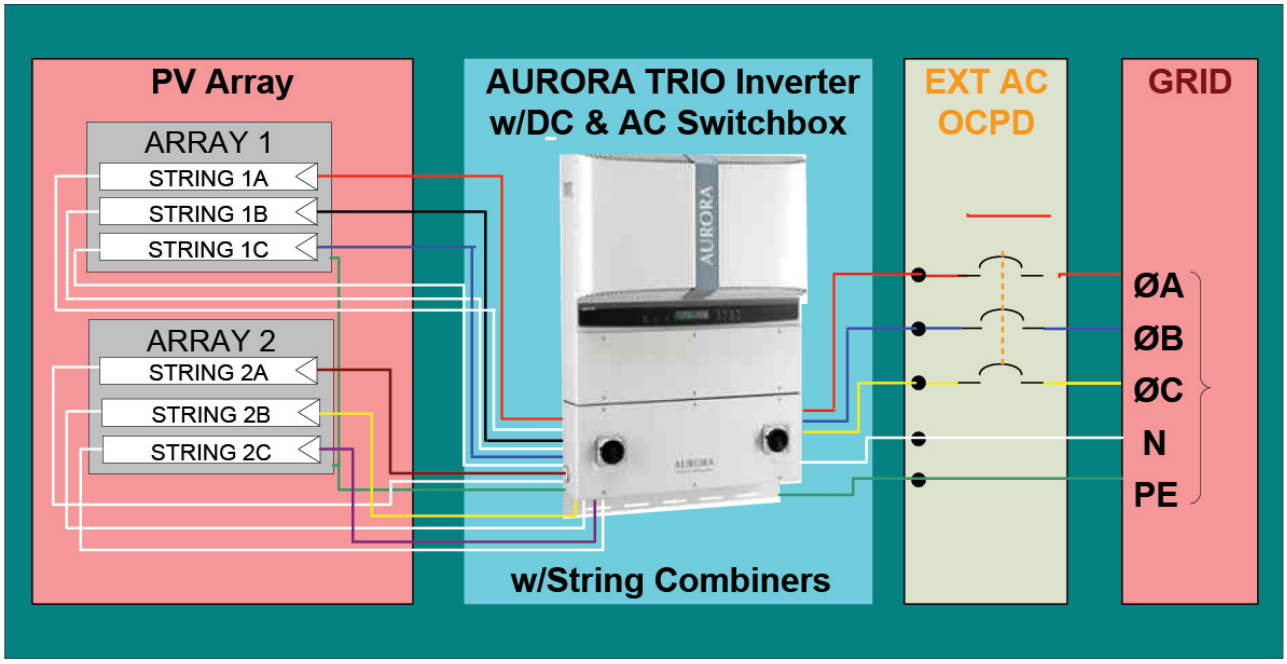


Figure 3.05 - Electrical Connection Diagram *PVI-10/12-I-OUTD-S2-US/CAN--XXX With Fuse Holders*

- Refer to the photo of Figure 3.03 Locate the designated entry locations for the conduits from the DC array and to the AC grid.
- Make sure the appropriate knockouts are employed for the use specified in order to maintain required spacing between wiring groups.

3.15.6 DC ARRAY CONNECTIONS

WARNING:

Before attempting to connect the array wiring be certain the array sizing has been completed to the specific plan associated with the system being installed.

To eliminate the potential for shock hazard during the connection procedure for the PV array wiring, either "open-circuit" all PV circuits prior to entry to the inverter and/or cover all panels with dark or opaque material in order to eliminate hazardous voltage at the terminals of the array wiring.

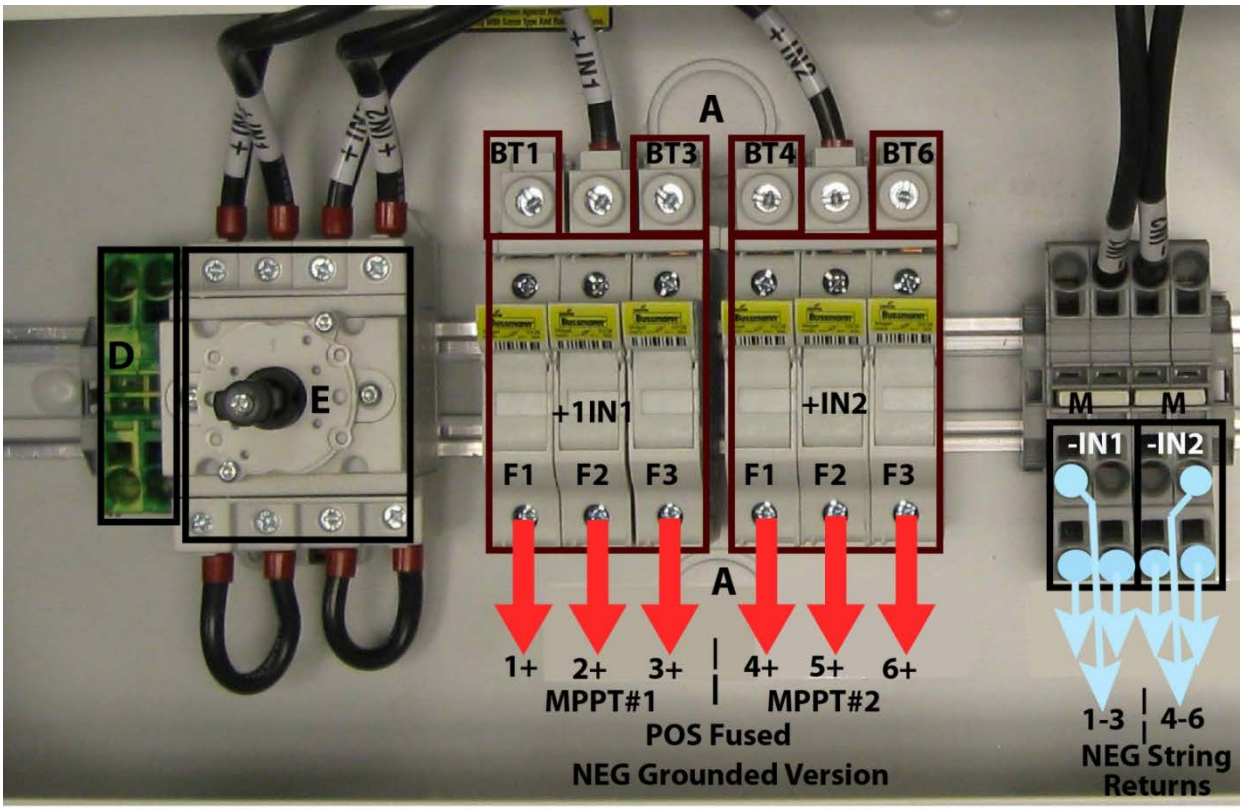


Figure 3.06 - DC Array Connection PVI-10/12-I-OUTD-S2-US/CAN--XXX using Fuses

Location Code	Details	
A	DC Array Conduit Entry (KOs)	¾" and 1" trade size
E	DC Switch	
D	Array PE Ground	Note 1
M	Terminal Block Jumpers (Factory installed	
+IN1	DC Array MPPT 1 (F1,F2,F3)	Note 2

-IN1	DC Array MPPT1, Neg return	Note 1
+IN2	DC Array MPPT 2,(F4, F5, F6)	Note 2
-IN2	DC Array MPPT 1, Neg Return	Note 1

Notes:

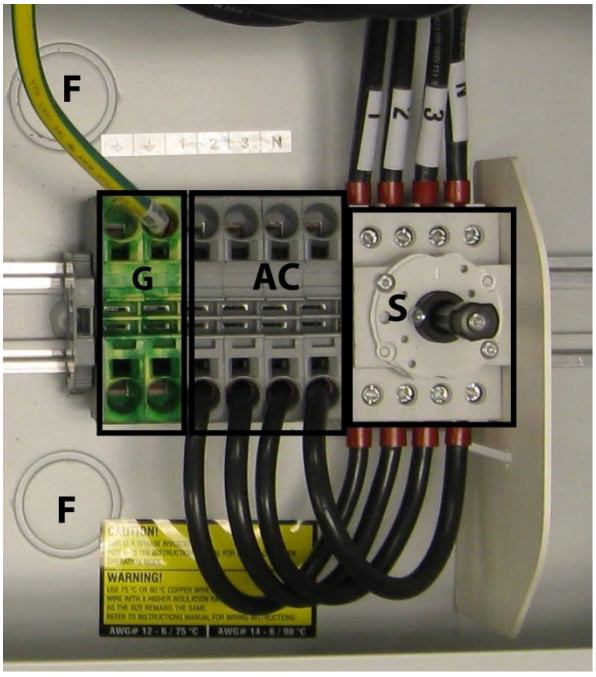
1. All array wiring terminal blocks are spring pressure type and accommodate a wire size range of #20-#6 AWG.
2. Fuse holders F1-F6 have screw terminals and tightening torque depends on wire size. See legend on fuse holders.
3. Bar Terminals BT1, BT3, BT4, BT6 are used for various input wiring configurations.

- Refer to Figure 3.06. Locate the incoming DC array wiring at the switchbox chassis and measure the voltage to ensure the array output is non-hazardous.
- Once de-energized, connect the DC wiring to the MPPT1 and MPPT2 array terminals shown in inverter per the specific array design.
- If the array is wired for dual MPPT mode, run separate wires for POS and NEG for each array and ensure no jumpers are installed between the two inputs See section on Signal Wiring below for more information.
- If the array is designed for the parallel MPPT input mode, ensure the jumpers shown in Figure 3.12 are in place.
- Ensure the MPPT mode switch is in the correct position to match the array design.

WARNING: When operating in **PAR mode** the input terminals in the switchbox must also be wired in parallel to ensure current through switch is equalized.

3.15.7 AC GRID CONNECTIONS

Power-One does not provide AC output overcurrent protection.



Location Code	Details	
S	AC Grid switch	3ø/4wire
AC	Grid Output Terminals	Note 1, 2
G	Main Ground	Note 1

Notes:

1. All grid wiring terminals are spring pressure type and can accommodate wire sizes #12 to #4AWG.
2. Grid connection can be either 3W or 4W. Set 3PHMOD switch accordingly ***(Note: 480V models are 4W only)***

Figure 3.07 - AC Grid Connections *PVI-10/12-I-OUTD-S2-US/CAN--XXX With Fuse Holders*

- Refer to Figure 3.07. Locate the AC grid wiring at the inverter switchbox. Measure the voltage to ensure all connections to the grid have been eliminated and no hazardous voltage is present.

- Once de-energized, connect the AC wiring to the AC grid terminals.
  a. If the grid connection does not require a neutral connection (i.e., 3Ø/3W), the Neutral terminal is not used. Ensure the 3PHMOD switch is placed in the 3W position. See Figure 3.10 for more information.

  b. If the grid connection requires a Neutral connection (i.e., 3Ø/4W), the Neutral terminal must be connected to the grid Neutral conductor. Ensure the 3PHMOD switch is placed in the 4W position. See Section 3.10 for more information.

3.15.8 SIGNAL WIRING CONNECTIONS –PVI-10/12-I-OUTD-S2-US/CAN-XXX-NG

Code	Details
E	AC Switch
I	Plastic conduit for signal cables

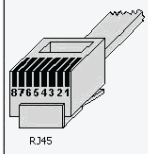
Figure 3.08 - Signal Wire Routing

- Route the cables through the switchbox and into the inverter chassis using plastic guide (item I, Figure 3.08).
- Refer to Figure 3.03. Note the position where the monitoring and alarm cables (if used) enter the chassis.
- Refer to Figure 3.09. Locate the terminals for the alarm and monitoring connections within the chassis.
- Connect alarm cable to the mating connector (in hardware kit) and plug connector into position shown in Figure 3.04
- Connect RS485 monitoring cable:

a). If using CAT5 cable for monitoring connections, connect RJ45 plug to end of cable as shown in Table 3.01, and plug into RJ45 jack. A second jack is available to accommodate daisy chaining of communication line to other inverters. See Multi-System Connections below for more information.

b). If using standard multi-wire cable (e.g., Belden 3106A) locate the mating connector (hardware bag) and connect the three RS-485 leads as shown in Figure 3.09. Refer to Part 4: Operations for details to set RS485 address.

Table 3.01 - RJ45 Connectors

	Pin #	Signal Name	Description	Notes
	1,2,6,8	N/U	-	-
	3	+TR	*+ Data Line*	1
	4	+R	*Remote OFF*	2
	5	-TR	*- Data Line*	1
	7	RTN	*Signal Return*	1

1. Required for RS485 communication
2. Required or Remote OFF control
3. Common reference for logical signals

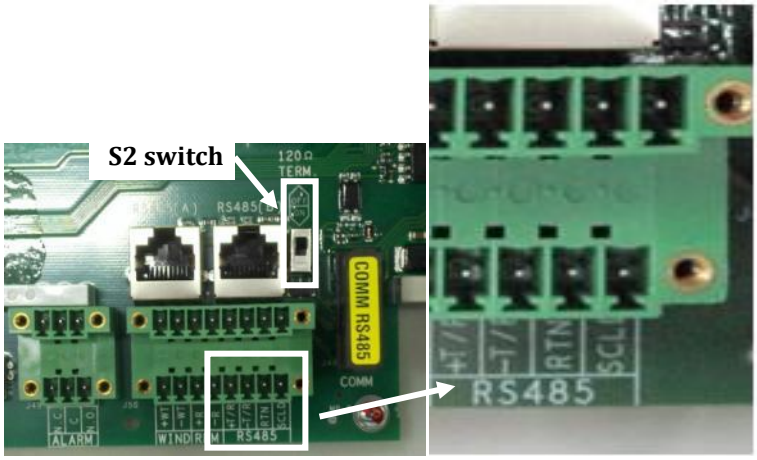


Figure 3.09 - Standard RS485 connection

3.16 CONFIGURATION OF PVI-10/12-I-OUTD-S2-US/CAN-XXX-NG

3.16.1 POSSIBLE AURORA INVERTER DC INPUT CONFIGURATION

The AURORA Inverter is configurable with an independent MPPT for each DC input channel *or* with the two input DC channels connected in parallel with one MPPT. If the inverter is configured with two independent MPPTs, the max current for each channel shall not exceed 24 Adc (10kW) or 25Adc (12kW) and the power input for the single channel shall not exceed 6.8 kW.

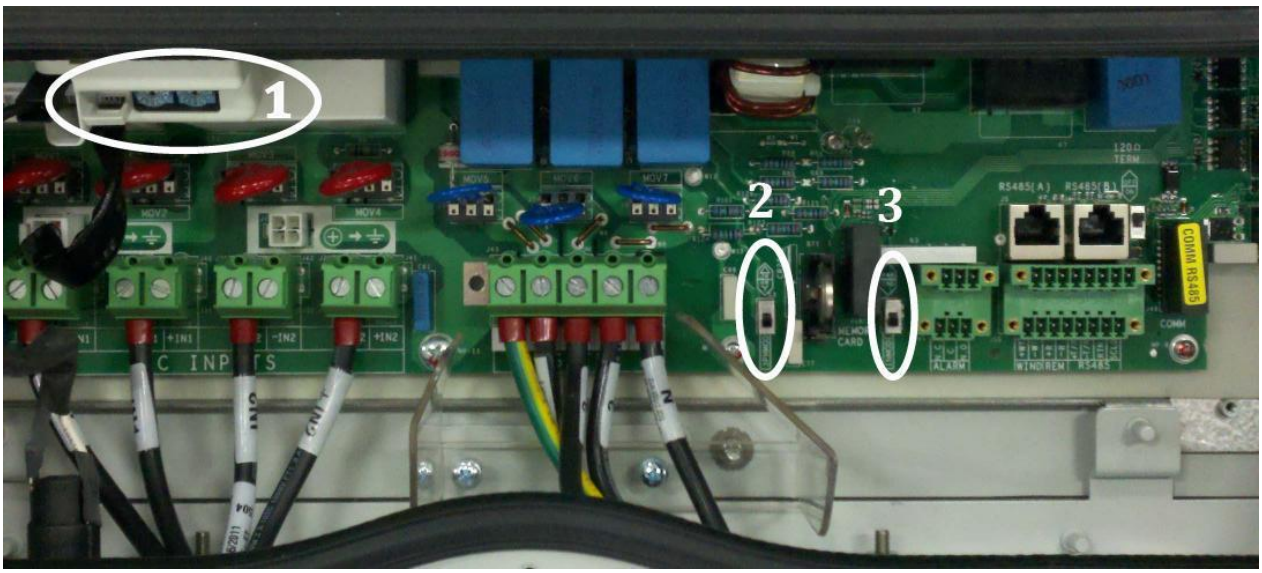


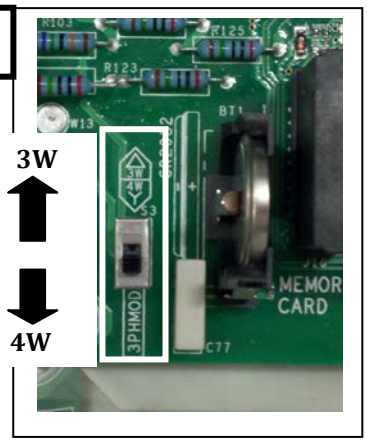
Figure 3.10 - Configuration Settings

COUNTRY CODE SELECTOR

1:

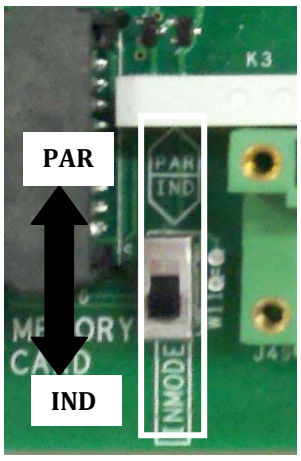
3-PHMOD SWITCH

2:



PAR/IND INMODE SWITCH

3:



3.16.2 SELECTING THE COUNTRY CODE

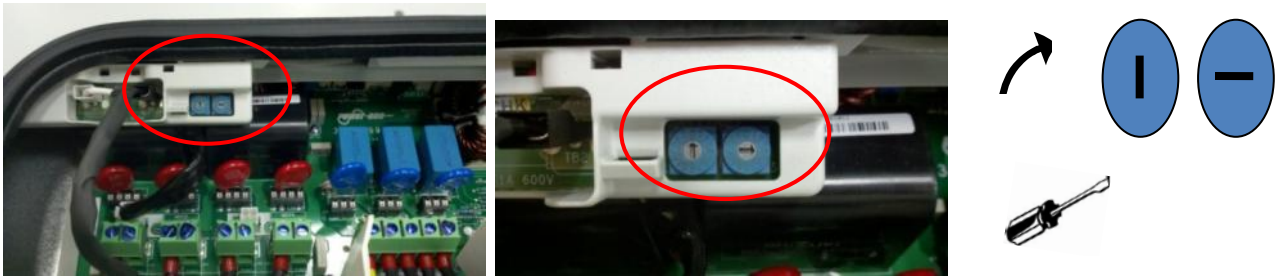


Figure 3.11 - Selector Switches for choice of Country Code

The inverter has a two selector switches (see Figure 3.11). These enable installers to set the proper grid standard. The factory default setting is [0, 4].

For the North American market:

1. To access the selectors remove the inverter front panel as explained in Figure 2.02
2. Ensure the switches are set to [0, 4], change if necessary.
3.

DANGER:

Normally grounded conductors may be ungrounded and energized when a ground-fault is indicated.

- **Risk of electric shock**
- **Test before touching**
- **Work on the AURORA Inverter must be carried out by qualified personnel.**

WARNING:

Once the installer has selected a grid standard and energized the inverter, an internal, 24h counter will start to count down. During the first 24 hours of grid connection it is possible to modify the chosen standard (in case of mistakes).

After 24 hours, the chosen setting is finalized and cannot be changed without contacting Power-One Customer Service. User can check the counter residual time via the LCD scrolling menu.

3.16.3 GRID-TYPE CONFIGURATION: PHASE CONNECTION SELECTION

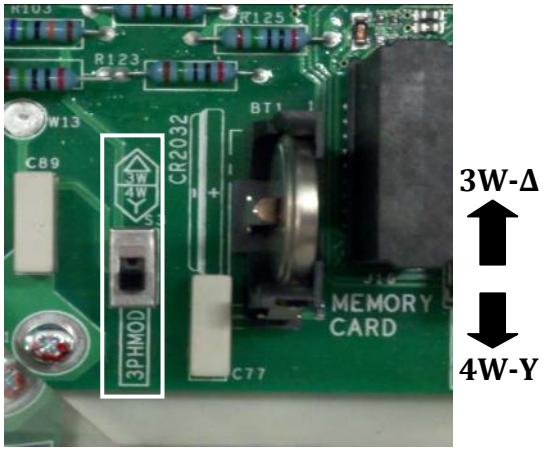


Figure 3.12 - Grid-Type configuration; 3W-Δ/ 4W-Y

The grid type (3W or 4W) is changed via the ***3PHMOD*** switch depending on the installation location.
The grid type (3W or 4W) default is set to 4W-Y MODE.
The PVI-10/12-I-OUTD (US/S/S1/S2)-480 models MUST BE connected to a 480V/3Ø/4W grid; therefore, requires a neutral conductor to be connected.
Connection to the grid without a neutral conductor will result in intermittent operation of the inverter. In addition, the "3PHMOD" switch MUST be in the 4W position (figure 1.0). Delta or WYE connection availability depends on inverter model:

- 208V/10kW-either 3W delta or 4W WYE
- 480V/10kW 4W WYE connection only (neutral conductor required)
- 480/12kW-models-WYE connection only (neutral conductor required)

The unit's voltage (208/480/600) is pre-set at the factory and is reflected in the part number
All models require a 3-phase grid connection.

3.16.4 INDEPENDENT OR PARALLEL CONFIGURATION

The AURORA Inverters have dual inputs with independent MPPT circuits. The inverter when operated in the dual input mode can optimize two independent arrays. The inverter can also be operated in a single MPPT mode from a single array by connecting the inputs in parallel using jumpers and proper setting of the INMODE switch (see Figure 3.10, above. The following sections show how to connect the inverter in either the INDependent or PARallel mode.

3.16.4.1 *Independent Connection*

For applications where the two MPPT channels will be used independently:

•Place the "INMOD" switch (shown in Figure 3.13) in the "IND" (default position) position to configure the inverter controls in the independent mode.

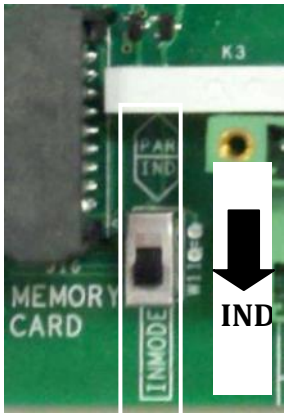


Figure 3.13- INDependent mode switch configuration Switch

•Ensure the parallel jumpers shown in Figure 3.14b, are **not present**.

•After switching the AURORA Inverter to independent mode configuration, re-install the front panel (apply 13.2 in-lbs of torque to each of the six (6) screws).

3.16.4.2 *Parallel Connection*

To operate the inverter in the single MPPT mode:

- Place the INMODE switch (shown in Figure 3.14a) in the "**PAR**" position to configure the inverter controls in parallel mode.
- Connect bus bar terminals **BT3** and **BT4** together via a short #8AWG jumper
- Connect terminal blocks **-IN1** and **-IN2** return terminals together using terminal block jumpers found in hardware bag.
- Upon completion, re-install the front panel (apply 13.2 in-lbs of torque to each of the six (6) screws).

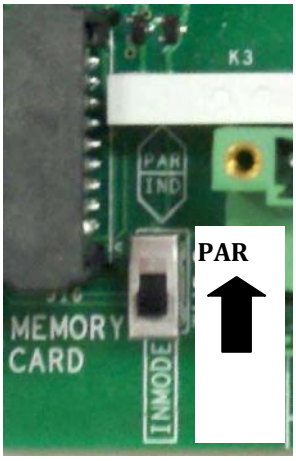


Figure 3.14a - Parallel Mode Configuration Switch

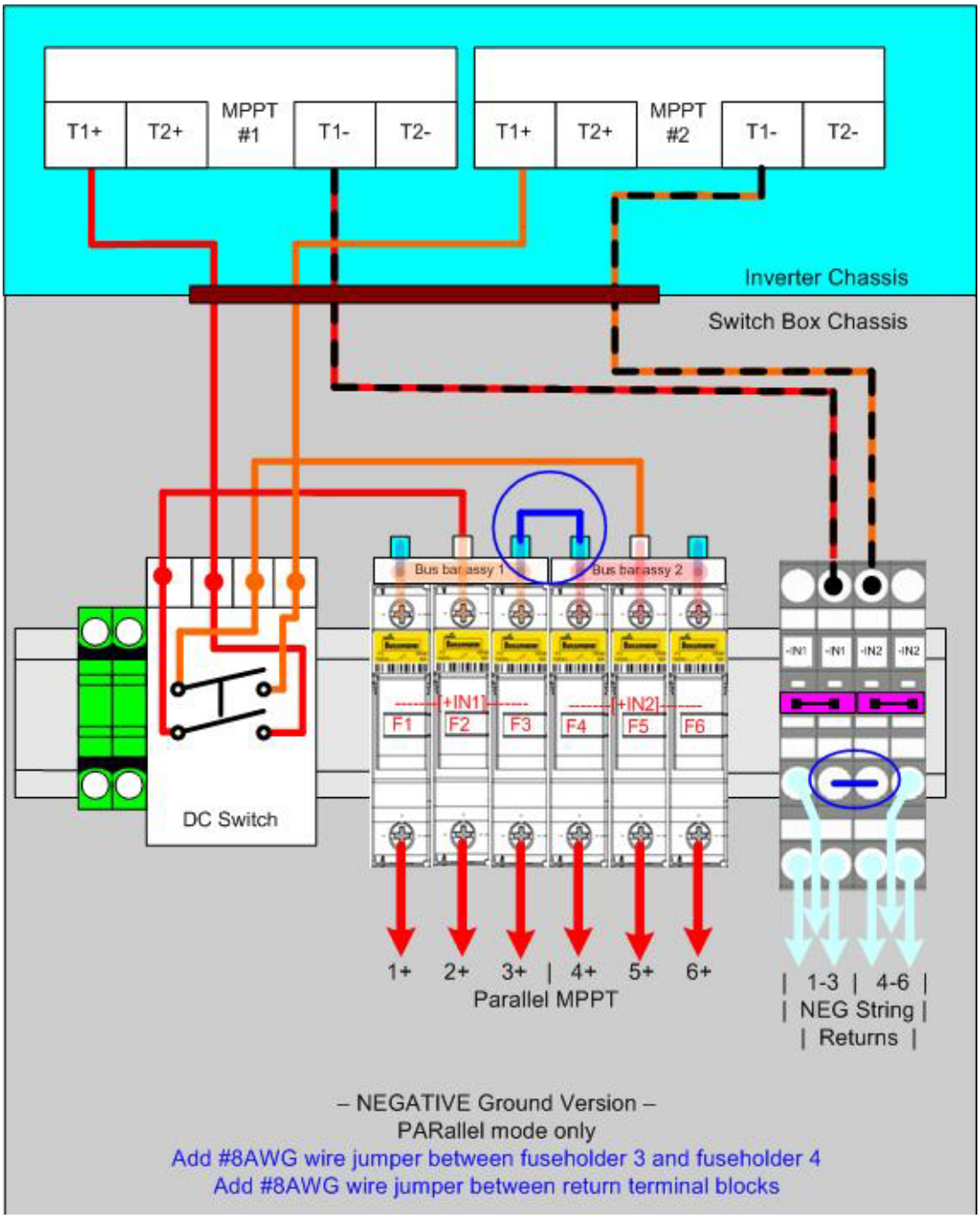


Figure 3.14b - Parallel mode-negative ground version
PVI-10/12-I-OUTD-S2-US/CAN--XXX With Fuse Holders

The [-S1] and [-S2] models are provisioned with two 3-input fused combiner blocks consisting of three fuse holders bused to each MPPT input channel. The two combiners can be used independently for the IND mode, or they can be paralleled by use of jumpers for the PAR mode.
Note that the positive ground version can ***only*** be operated in the **PAR**allel input mode configurations.

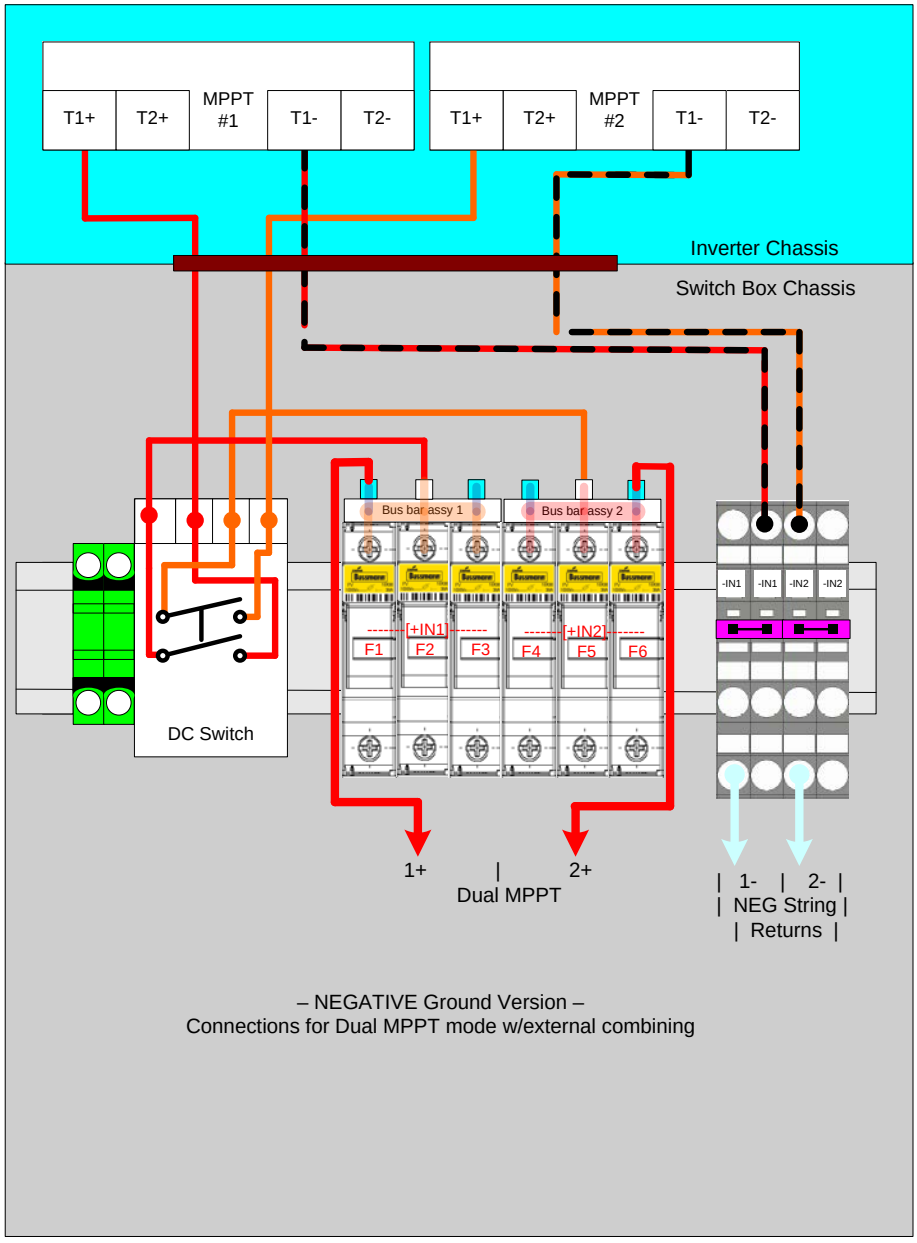


Figure 3.14c - External Combiner feed for Dual MPPT operation (Negative Ground Version)

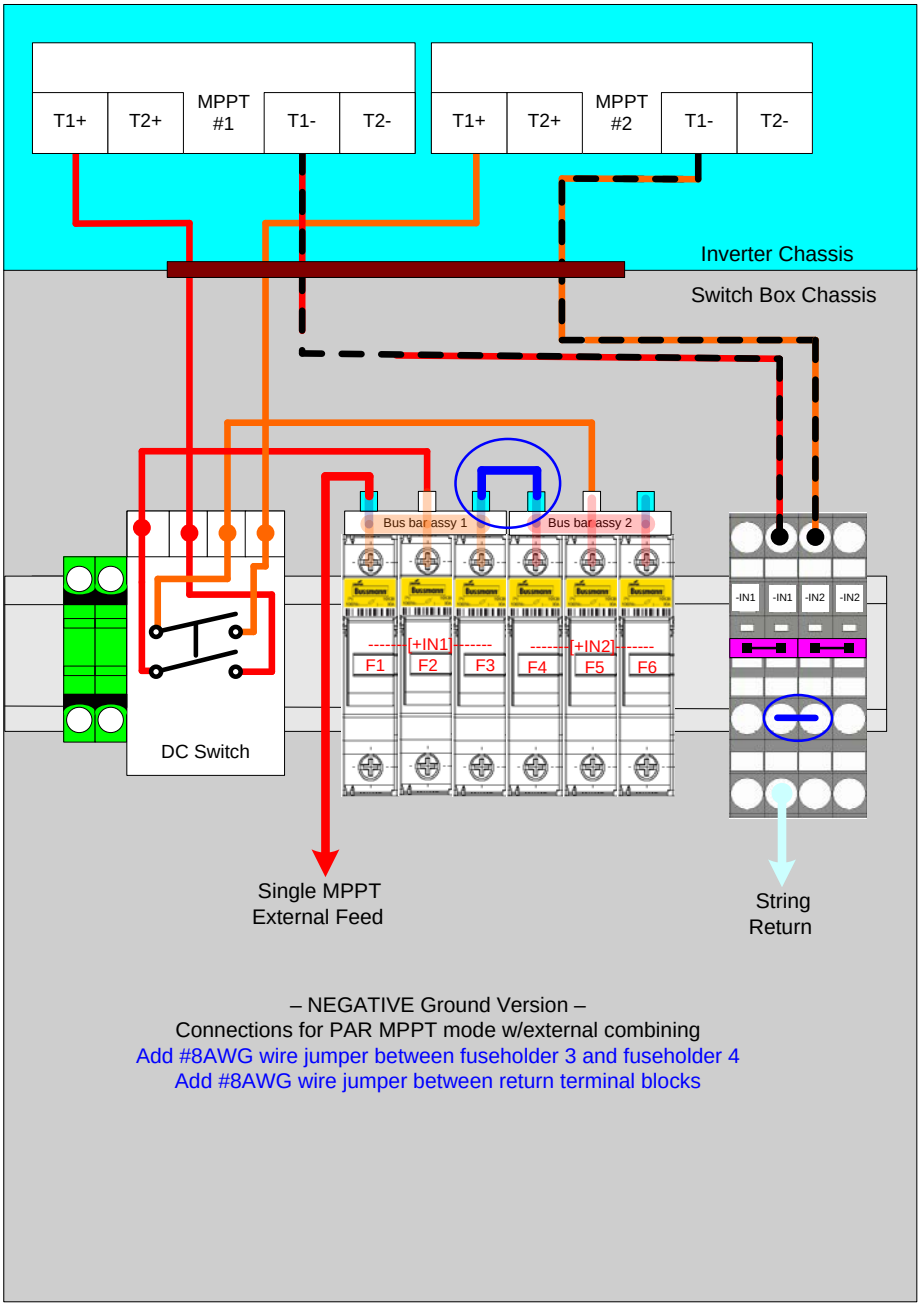


Figure 3.14d - External Combiner feed for Single/Parallel MPPT operation (Negative Ground Version)

3.17 WIRING DETAILS FOR ALL VERSIONS

3.17.1 AC AND DC WIRING AND OVER CURRENT PROTECTION

Before setting the grid standard on the unit, check accuracy of the information

Table 3.02 - Wiring Details for No Switchbox version

Wire sizing parameter	DC side			Wire sizing parameter	AC side	
	Rating	Comments			Rating	Comments
Array wiring terminals	90° C			Grid wiring terminals	90° C	
Rated temperature Wire Size Range Tightening Torque	#20-#6 AWG	Screw terminal block		Rated temperature Wire Size Range Tightening Torque	#20-#6 AWG	Screw terminal block
	13 in-lb				13 in-lb	
Number of wire landings per terminal	2			Number of wire landings per terminal	1	
Allowable conductors per terminal	1			Allowable conductors per terminal	1	
Max Current values	See Technical Data table			Max Current values	See Technical Data table	
RS-485 Terminals	75° C					
	8 in-lb	slotted screws				

Table 3.03 - Wiring Details for [-S Small Switchbox] version

Wire sizing parameter	DC side			Wire sizing parameter	AC side	
	Rating	Comments			Rating	Comments
Array wiring terminals	90° C			Grid wiring terminals	90° C	
Rated temperature Wire Size Range	#12-#4 AWG	Per manufacturers rating		Rated temperature Wire Size Range	#12-#4 AWG	Per manufacturers rating
Tightening Torque	NR	Pressure Clamp		Tightening Torque	NR	Pressure Clamp
Number of wire landings per terminal	2			Number of wire landings per terminal	1	
Allowable conductors per terminal	1			Allowable conductors per terminal	1	
Max Current values	See Technical Data table			Max Current values	See Technical Data table	
RS-485 Terminals	75° C					
	8 in-lb	slotted screws				

Table 3.04 - Wiring Details for [-S1 and -S2 with Large Switchbox and String Combiners]						
Wire sizing parameter	**DC side**			**Wire sizing parameter**	**AC side**	
	Rating	**Comments**			**Rating**	**Comments**
Array wiring terminals Rated temperature Wire Size Range Tightening Torque	90° C			Array wiring terminals Rated temperature Wire Size Range Tightening Torque	90° C	
	#12-#4 AWG	Per mfr's rating			#12-#4 AWG	Per manufacturers rating
	N/A in-lb	Pressure Clamp			N/A in-lb	Pressure Clamp
Number of wire landings per terminal	2			Number of wire landings per terminal	1	
Allowable conductors per terminal	1			Allowable conductors per terminal	1	
Max Current values	See Technical Data table			Max Current values	See Technical Data table	
RS-485 Terminals	75° C			RS-485 Terminals	75° C	
	8 in-lb	slotted screws			8 in-lb	slotted screws

3.17.2 DAISY CHAIN MULTI-UNIT CONFIGURATION

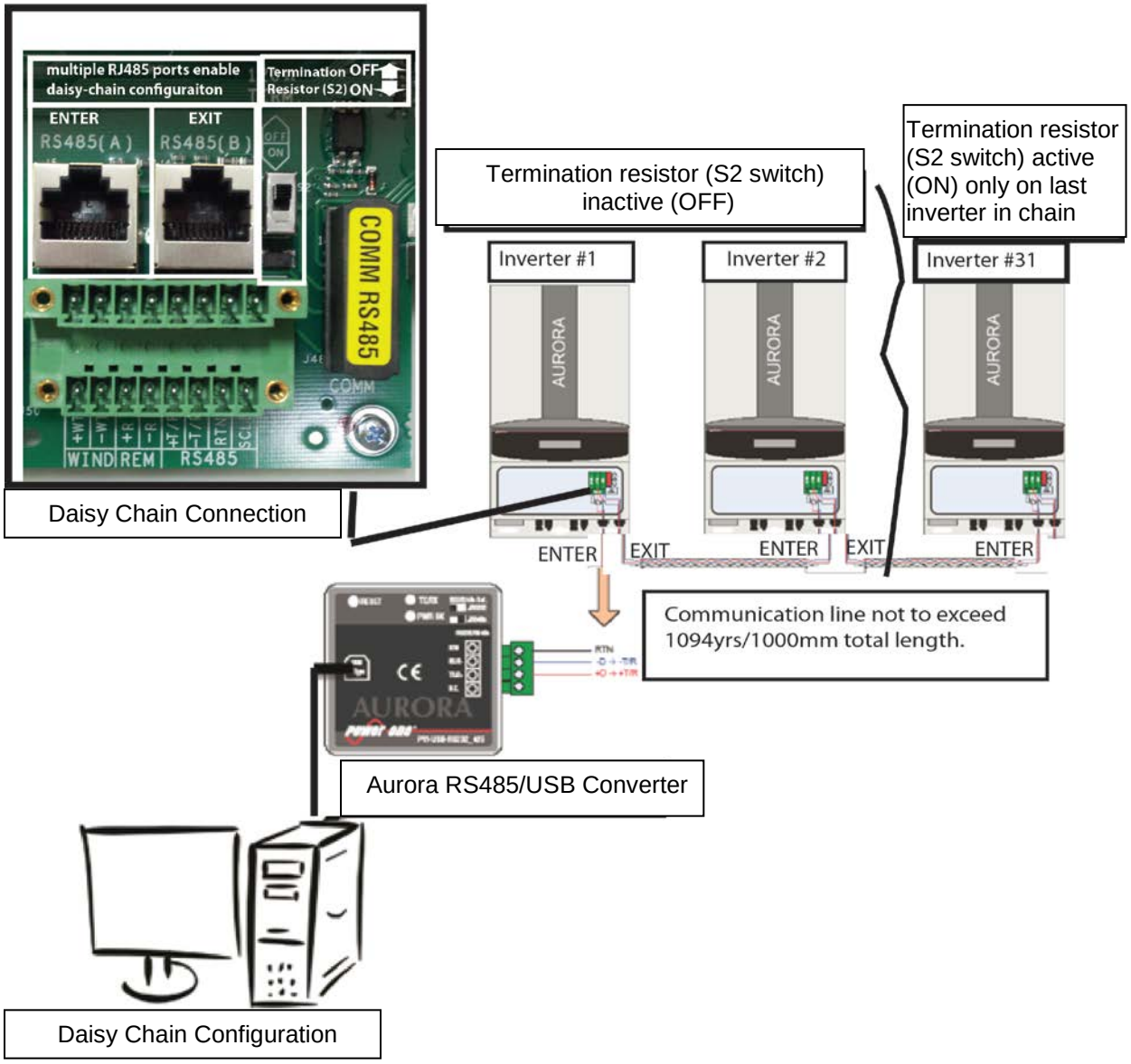


Figure 3.15 – Daisy Chain Connections and Configuration

The RS-485 terminal block or RJ45 connectors can be used to connect a single AURORA Inverter. This terminal block also enables a multi-unit wiring configuration called “daisy-chain configuration”as picture above.

3.17.2.1 *Connection & Cabling*

It is possible to connect up to 31 AURORA Inverters in one line.

The recommended length of total communication cable line for all inverters in the system is 1,000 meters [1094 yards] or less.

Depending on the type of computer used, the cable line adaptor can be RS485-RS232 or RS485 to USB.

In order to ensure optimum communication on the RS-485 line, Power-One recommends connecting the RS-485 converter to a location between the first unit in the "daisy chain" or multi-unit system configuration and the computer; not in between two inverters in the series.

NOTE:

- The ON position means the RS485(B) port is inactive. The OFF position means the RS485(B) port is active.

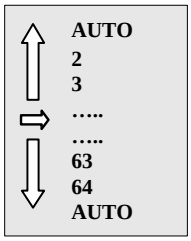
STEP 1: Using the appropriate cable, connect all the AURORA Inverter units according to the "daisy-chain" cabling method ENTER- EXIT. Make sure to respect the correspondence between all the signals. See Figure 3.15.

STEP 2: Locate the S2 switch. See Figure 3.15. Push the switch **UP** into the **OFF** position for every inverter in the chain except for the last inverter. The last inverter needs to have the S2 switch pushed **DOWN** into the **ON** position.

3.17.2.2 *ADDRESSING EACH INVERTER*

When multiple inverters are connected in a daisy chain, it is necessary to assign a different RS-485 address to each unit.

Selecting this function enables the bus addresses (for the inverter connected to the RS485 communication bus) to be set to an appropriate value. Address values are assigned manually using any value in the range [2 to 64]. Press the **UP** and **DOWN** keys to scroll numbers. NOTE: Maximum 31 inverters in a line. (See Part 4: Operations Guide for further details.



Do not select 'AUTO' as the RS485 address in a multi-unit, daisy-chain configuration.

Every AURORA device has a default address of [02] two, with the S2 switch in the OFF position.

Other third party RS485 converters, available on the market can also be used but Power-One does not assure correct connection operation since these devices have never been specifically tested. Also, please note that other commercial devices could require external termination impedance, which is not necessary for AURORA brand RS485 converters.

The diagram in Figure 3.15 shows how to connect multiple units into a daisy-chain configuration.

3.18 AURORA VISION SOFTWARE

Included in the shipment of the AURORA Inverter is the AURORA Installer CD. The installation of this software is optional as most of this functionality can be done through the inverter display.
If it is desired to view the basic monitoring and setting options from a computer screen, follow the instructions below.

3.18.1 INSTALLATION INSTRUCTIONS

Remove the disk from its cover. Insert the disk into the computer to install the desired program onto the computer.

Connect the adapter from Inverter to the computer. Depending on the configuration determined the type of converter needed (RS485-RS232 or RS485-USB).

For more a more comprehensive monitoring solution, please see Power-One's AURORA Vision product line at www.power-one.com

PART 4: OPERATIONS GUIDE

4.1 COMMISSIONING

The procedure for commissioning AURORA Inverter is as follows:

1) Set the inverter's DC disconnect switch (external or part of switchbox version) to ON.

2) Set the AC disconnect switch (external or part of switchbox depending on version) to the inverter to ON.

NOTE: There is no specific order for closing the two switches.

3) Once both switches are closed, the inverter starts the grid connection sequence. This routine is indicated by the flashing green LED labelled POWER over the display.

This routine may take from 30 seconds up to several minutes, depending on grid condition. Three screens are shown in sequence on the LCD display during this routine:

- Grid voltage value and status compared to specified values (within/outside range).
- Grid frequency value and status compared to specified values (within/outside range).

4)When the connection sequence is completed the AURORA Inverter starts operating. Proper operation is indicated by a warning sound and the green LED lights steadily green.

5)If the grid check routine does not give a positive result, the unit will repeat the procedure until all grid voltage; frequency parameters and grid configuration are found or changed to be within the specified range. During this process, the green LED will keep flashing.

4.2 INVERTER START-UP AND OPERATION

WARNING

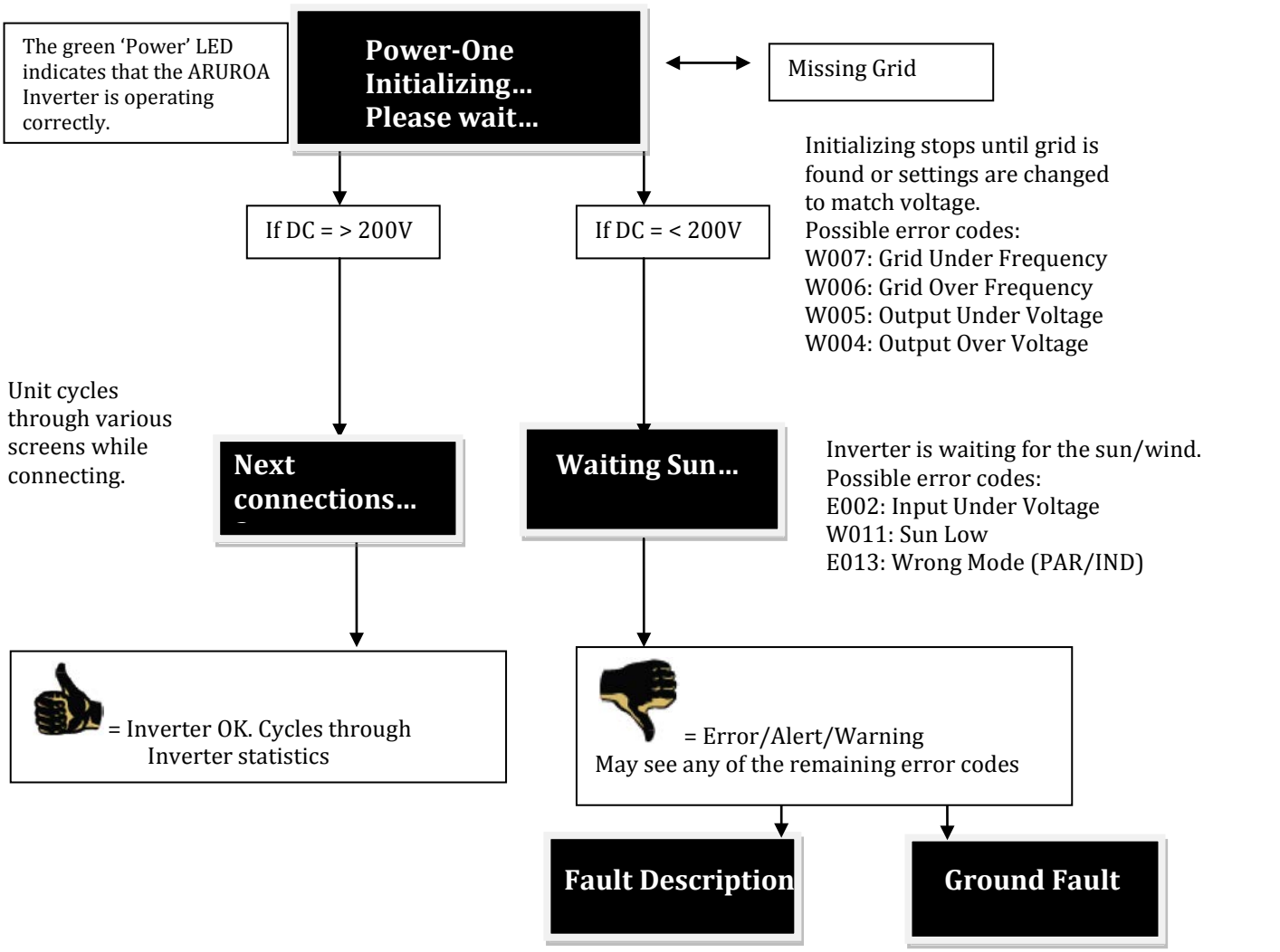
Do not place any items on the AURORA Inverter during operation.

Do not touch the heat sink when the inverter is operating, as some parts may be hot and injury.

4.2.1 NORMAL START- UP PROCEDURE

Front Panel LED Operation			
LED	Label	LED Status	
		LIT	UNLIT
1	***POWER***	Inverter power on	Inverter power off
2	***ALARM***	Active alarm	Normal operation
3	***GFI***	Active ground fault	Normal operation

Name of Key	Function Description
ENTER	Moves cursor from existing menu location to new menu location
ESC	Escapes action of previous ENTER
UP	Moves cursor upward in menu tree
DOWN	Moves cursor downward in menu tree



Depending on the DC input voltage present, the inverter behaves as follows:

a) When the inverter is switched ON, it will start as soon as the input voltage value of 130 Vdc is reached.

b) The inverter will display the message 'Waiting Sun' until the input voltage exceeds the set Vin start value.

c) When the Vin start value is exceeded, the inverter will connect to the grid if it is identified or it will display the message '*Vac absent*' if the grid is not connected.

d) The inverter will remain connected to the grid if the input voltage is between 70% of the Vin start set and 520 Vdc. If the input voltage value is outside this range, the inverter disconnects itself from the grid.

4.2.2 START-UP USING SIDE BUTTON

When **no** DC array voltage is available (night) at the input, if the AC is properly connected and present, user can turn ON the inverter using an internal standby supply by pressing the side key shown in Figure 4.01, for more than 2 seconds. An audible "beep" will indicate the detection of pressed key from the inverter. The key is located on the right side of the inverter.

The inverter will stay ON for 10 minutes enabling every type of control on the display (statistics, settings etc.); however, the inverter will not connect to the grid unless a valid DC input is applied.

If turned ON with no DC voltage the inverter will use energy from the grid to stay on (less than 20W).

Figure 4.01- Inverter Stand-by Supply Button

4.2.3 SHUT-DOWN PROCEDURE

There are three options for shutting down the inverter:

1) Disconnect the DC and the AC grid, by disconnecting its associated switches (in any order). The inverter will shut down within a few seconds necessary to discharge the internal capacitors.
2) Disconnect the DC input by turning-OFF the associated disconnect switch and waiting for the UV port time out
3) Disconnect the grid, by turning-OFF its associated disconnect switch and reduce DC input to less than 130 Vdc.

4.3 USER INTERFACE, MONITORING AND DATA TRANSMISSION

4.3.1 USER INTERFACE MODE

Normally, the AURORA Inverter operates automatically and needs no particular supervision. When solar radiation is not enough to generate power for the grid (for example: at night), AURORA Inverter disconnects automatically and goes into a standby mode.

The operating cycle resumes automatically when sufficient sunlight becomes available.

The AURORA Inverter provides operational data to the operator through the following instruments:

- LED Indicator lights
- LCD display
- Digital data transmission is via a dedicated RS-485 serial port using AURORA Protocol and a PC or a data logger equipped with an RS-485 port collects data. If an RS-485 line is used, it may be convenient to use the AURORA USB/RS-485_232 serial interface converter (model number PVI-USB-RS485_232). The optional AURORA PVI-UNIVERSAL data logger is also available, which allows a web-based monitoring platform.

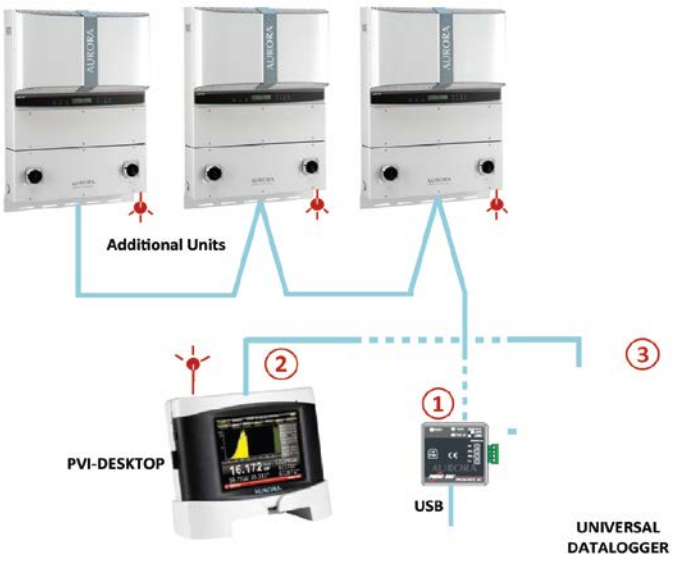


Figure 4.02 - Data Transmission Options

4.3.2 DATA TYPES AVAILABLE

AURORA Inverter provides two types of data that can be collected using the display and/or the appropriate interface software.

4.3.2.1 *Real-Time Operational Data*

Real-time operational data can be transmitted on demand through the communication lines and are not stored inside the inverter. The free AURORA Communicator software (included on the installation CD) may be used to transmit data to a PC.

The following data is available via the RS-485 link:

- Grid voltage
- Grid current
- Grid frequency
- Power transferred to the grid
- Voltage of photovoltaic array 1
- Current of photovoltaic array 1
- Voltage of photovoltaic array 2
- Current of photovoltaic array 2
- Serial Number/Code
- Week of production
- Firmware revision code
- Daily energy
- Leakage current of the system
- Total energy
- Partial energy
- Mean grid voltage
- Insulation resistance
- Leakage current to ground
- Date, time

4.3.2.2 *Data Logged Internally*

Power-One's AURORA Vision stores the following data internally:

- Total and partial counter of grid connection time.
- Total and partial counter of energy transferred to the grid.
- Daily Energy Production (365 values).
- Energy transferred to the grid every 10 seconds for the last 8,640 periods of 10 seconds (which on average cover more than 2 days of logged data).
- Last 100 fault conditions with error code and time stamp.
- Last 100 changes to grid connection parameters with parameter code and new value.

The first two types of data are displayed on the LCD display and through the RS-485 interface, while all other data can be displayed only through the RS-485 interface.

4.4 LED INDICATORS

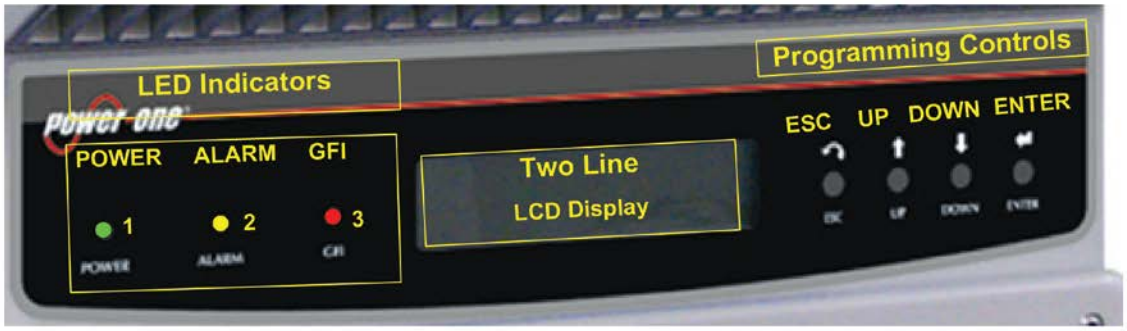


Figure 4.03 - Location of the buttons and LEDs

There are three LEDs on the left side of the display:

1. The green 'Power' LED indicates that AURORA Inverter is operating correctly.

   This LED flashes upon start-up, during the grid check routine. If a correct grid voltage is detected and solar radiation is strong enough to start-up the unit, the LED stays on steady. If not, the LED keeps flashing until solar radiation becomes strong enough to start-up the inverter. In this condition, the display will read **'Waiting Sun....'**

2. The yellow 'FAULT' LED indicates that the AURORA Inverter has detected a fault condition. A fault description will appear on the display.

3. The red 'GFI' (ground fault) LED indicates that AURORA Inverter is detecting a ground fault in the DC side of the photovoltaic system. When this kind of fault is detected, the AURORA Inverter disconnects from the grid and the corresponding fault indication appears on the LCD display. AURORA Inverter remains in this condition until the operator presses the ESC key to re-start the grid connection sequence. If pressing the ESC key doesn't clear the ground fault check the ground-fault, fuse located in the switchbox. If AURORA Inverter does not reconnect to the grid, contact Power-One Technical Service.

DANGER:

Normally grounded conductors may be ungrounded and energized when a ground-fault is indicated.

- **Risk of electric shock**
- **Test before touching**
- **Work on the AURORA Inverter must be carried out by qualified personnel.**

The following table shows all the possible LED-signalling indications related to the operational status of AURORA Inverter.

Key:

LED on **LED off**

LED flashing **Any of the above conditions**

	LED STATUS	OPERATIONAL STATUS	NOTES
1	1: green: ☒ 2: yellow: ☒ 3: red: ☒	AURORA self-disconnects during night-time	Input voltage less than 90 Vdc at both inputs
2	1: green: ◪ 2: yellow: ☒ 3: red: ☒	AURORA Inverter initialization, settings loading, and waiting for grid check	It is in transition status while operating conditions are being checked.
3	1: green: ■ 2: yellow: ☒ 3: red: ☒	AURORA Inverter is powering the grid	Standard machine operation (search for maximum power point or constant voltage)
4	1: green: □ 2: yellow: □ 3: red: ■	System insulation device faulty	Leakage to ground found
5	1: green: ☒ 2: yellow: ■ 3: red: ☒	Defect – fault!!!	The fault can be inside or outside the inverter. See the alarm appearing on the LCD display.
6	1: green: ☒ 2: yellow: ◪ 3: red: ☒	Installation Phase: AURORA Inverter is disconnected from the grid.	During installation, it indicates set-up phase of the address for RS-485 communication.
7	1: green: ◪ 2: yellow: ■ 3: red: ☒	Grid disconnection	Indicates a missing grid condition

NOTE: Inverter status is indicated by the corresponding LED turning to a steady ON-condition or flashing, and by a message on the AURORA LCD displaying a description of the existing operation or fault condition (see the following sections).

4.5 MESSAGES AND ERROR CODES

The system status is identified through message or error signals displayed on the LCD display. The following tables briefly describe the two types of signals which may be displayed.

- ***MESSAGES*** identify the current status AURORA Inverter status. Messages do not relate to a fault. When a **(W)** with a number after it appears in the display, it indicates a **WARNING CODE** and is usually cleared through an orderly shutdown/re-set or a self-corrective action performed by the inverter. See the **(W)** codes in the following table.
- ***ALARMS*** or **(E)** codes identify a possible equipment failure, fault or incorrect inverter setting/ configuration. However, some of the **(E)** codes may require contacting Power-One Technical Support to assist in correcting a fault. Any and all attempts to correct or clear a fault must be performed by qualified personnel. Typically, the **(E)** can be cleared once the cause or fault is removed. Some of the **(E)** codes, (INT. Error) as indicated in the table below, may indicate a fatal error and require the support of Power-One Technical Support for diagnostics support. The appearance of an alarm signal will be managed as much as possible by AURORA Vision or, in case this is not possible, AURORA Vision will supply all the necessary information to perform the maintenance operations and to fix the fault on the equipment or system. See the (**E)** lines in the following table.

Table 4.01 - Messages and Error Codes

Message	Error Warning	Error Type	Description		Message	Error Warning	Error Type	Description
Sun Low	W001	//	Input Voltage under Vstart threshold		Int.Error	//	E022	Autotest Timeout
Input OC	//	E001	Input Overcurrent		Int.Error	//	E023	Dc-Injection Error
Input UV	W002	//	Input Undervoltage		Grid OV	W004	//	Output Overvoltage
Input OV	//	E002	Input Overvoltage		Grid UV	W005	//	Output Undervoltage
Int.Error	//	E003	No parameters		Grid OF	W006	//	Output Overfrequency
Bulk OV	//	E004	Bulk Overvoltage		Grid UF	W007	//	Output Underfrequency
Int.Error	//	E005	Communication Error		Z Grid HI	W008	//	Z grid out of range
Out OC	//	E006	Output Overcurrent		Int.Error	//	E024	Unknown Error –
Int. Error	//	E007	IGBT Sat		---------	//	E025	Riso Low (Log Only)
Sun Low	W011	//	Bulk Undervoltage		Int.Error	//	E026	Vref Error
Int.Error	//	E009	Internal Error		Int.Error	//	E027	Vgrid Measures Fault
Grid Fail	W003	//	Grid Fail		Int.Error	//	E028	Fgrid Measures Fault
Int.Error	//	E010	Bulk Low		Int.Error	//	E029	Zgrid Measures Fault
Int.Error	//	E011	Ramp Fail					
Over Temp.	//	E014	Overtemperature		Int.Error	//	E030	Ileak Measures Fault
Cap. Fault	//	E015	Bulk Capacitor Fail		Int.Error	//	E031	Wrong V Measure
DC/DC Fail	//	E012	DcDc Error revealed by inverter		Int.Error	//	E032	Wrong I Measure
Wrong Mode	//	E013	Wrong Input setting (Single instead of dual) or wrong grounding mode		Empty Table	W009	//	No wind table (only wind -W versions)
Inv. Fail	//	E016	Inverter fail revealed by DcDc		Fan Fail	W010	//	Fan Fail (No disconnection)
Int.Error	//	E017	Start Timeout		Int.Error	//	E033	UnderTemperature
Ground F.	//	E018	I leak fail			//	E034	Interlock Fail (Not Used)
Int.Error	//	E019	Ileak Sensor fail			//	E035	Remote Off
Int.Error	//	E020	DcDc relay fail			//	E036	Vout Avg Error
Int.Error	//	E021	Inverter relay fail			W012	//	Clock Battery Low (No disconnection)
						W013	//	Clock Failure (No disconnection)

4.6 LCD DISPLAY

4.6.1 CONNECTION OF THE SYSTEM TO THE GRID

A two-line LCD display is located on the front panel. It shows the following:

- ✓ Inverter operating status and statistics;
- ✓ Service messages for the operator;
- ✓ Alarm and fault messages.

During regular operation, the display will cycle through available data. The display changes to a different screen every 5 seconds, or screens may be scrolled manually by pressing the UP (2nd key from display) and DOWN keys (3rd key from display).

A NOTE ON DISPLAY KEY OPERATION:
During regular operation, the display will cycle through available data. The display changes to a different screen every 5 seconds, or screens may be scrolled manually by pressing the UP (2nd key from display) and DOWN keys (3rd key from display).
To return to the preceding menu, press the ESC key (1st key from display).

Activation of cyclical scrolling is indicated by the 2 arrows in the top left corner of the display (Figure. A).

Scrolling can be blocked by pressing the ENTER key (4th key from display). A padlock symbol will appear (Figure. A).

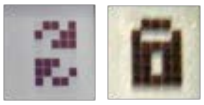
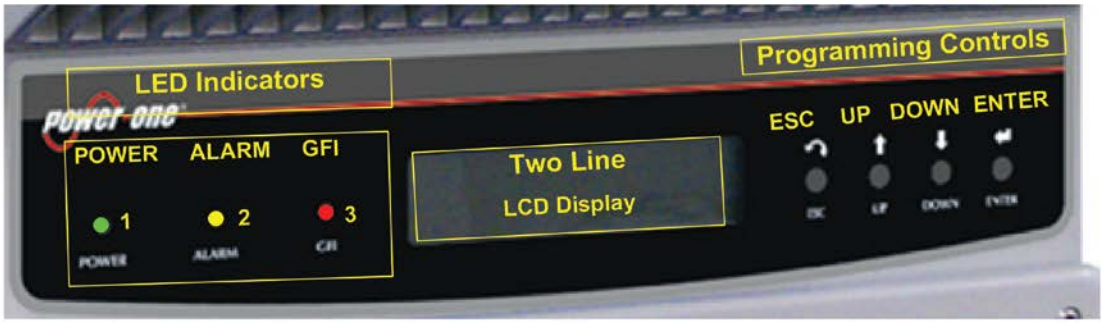


Figure 4.04 - Display Key Operation



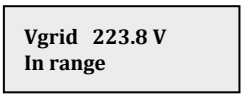
1) These two screens are displayed at inverter start-up:

2) The following screens may appear while waiting for the connection to be established:

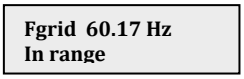
- While the system checks for grid connection to be established ('Missing Grid'), the yellow LED next to the display turns ON steady, while the green LED flashes.
- When waiting for solar radiation ('Waiting Sun'), the green LED turns ON steady.
- As soon as the 'Missing Grid' and 'Waiting Sun' conditions are met successfully, the inverter is connected.

3) This display shows the time (seconds) remaining to complete the output voltage and frequency values check.

4) This display shows the instant output voltage value and whether it is within/outside range.



5) This displays the instant output frequency value and whether it is within/outside range.



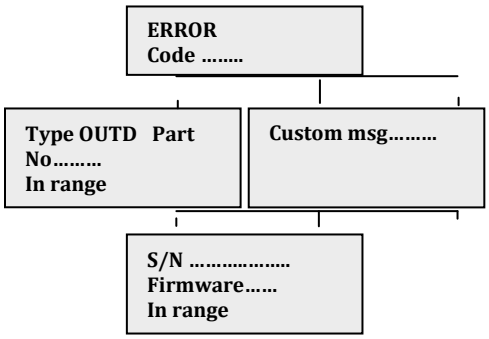
6) If the measured instant values of voltage (point 4) and frequency (point 5) are outside the allowed range, the following screens are scrolled alternately:

Next connections (screen 3) → Vgrid (screen 4) →-Fgrid (screen 5)

4.6.2 ERROR MESSAGES

After the connection is established, the inverter runs a test cycle. If the wrong data is found, the cycle is interrupted and an error code is displayed. Please refer to Table 4:01 for error codes and their meanings.

To customize the message shown on the display, you must carry out the programming procedure described in Section 2.5.25, 'Alarm Message'. The system will continue to cycle through the following screens until the error has been rectified:



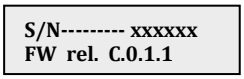
Once the error is cleared, the inverter resets all functions in progress and re-starts the connection:

Missing grid - Waiting sun

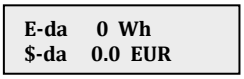
4.6.3 FIRST PHASE- ELECTRIC PARAMETER CHECK

1A) If the measurements taken previously (see section 2.1) are found to be correct, the system will proceed to the next checks. The 12 screens outlined below are shown alternately as listed in the Note A: 'A FEW POINTERS ON DISPLAY KEY OPERATION'.

2A) This display shows the inverter serial number and firmware revision level.



3A)

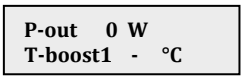


- E-da: Daily energy output.
- $-da: Daily energy savings. The value is expressed in the set currency.

4A)

- E-tot: Total energy output (since first installation).
- E-par : Partial energy output during the period selected by us.

5A)

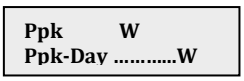


P-out: Measures instant output power.

The second line of the display shows the higher of the two temperatures:

- T-boost1: Booster channel 1 switching device temperature.
- T-boost2: Booster channel 2 switching device temperature.

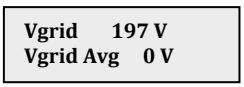
6A)



Ppk: Maximum peak power achieved since the 'partial' function was activated.

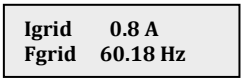
Ppk-Day: Indicates the maximum peak power achieved during the day. The counter will reset when unit is powered OFF.

7A)



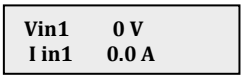
- Vgrid: Measures instant grid voltage
- Vgrid Avg: Average grid voltage calculated over the last 10 minutes of inverter operation.

8A)



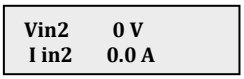
- Igrid: Measures instant grid current
- Fgrid: Measures instant grid frequency

9A)



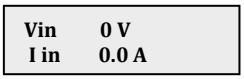
- Vin1: Instant input voltage value measured at channel 1 input.
- Iin1: Instant input current value measured at channel 1 input.

10A)

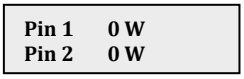


- Vin2: Instant input voltage value measured at channel 2 input.
- Iin2: Instant input current value measured at channel 2 input.

If the inverter configuration is set for single input (Parallel) mode, the following screen appears instead of the two screens previously described.



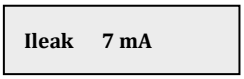
11A)



- Pin1: Measures instant input power of channel 1.
- Pin2: Measures instant input power of channel 2.

If the inverter configuration is set for single input (Parallel) mode, the following screen appears instead of the two screens previously described.

12A)



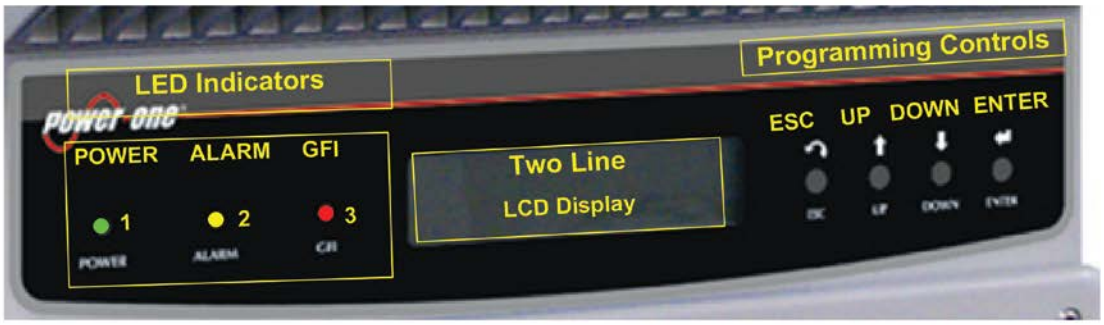
- Ileak: Value of the leakage current passing through the grounding fuse and displayed only when the connected positive or negative terminal is being grounded.
-

If all items described above tested OK, the inverter shows a corresponding message in the display top line along with the date and time. Clock malfunctioning or other non- function-related faults (meaning faults that do not affect the inverter's ability to generate energy) are shown in the second line of the display instead of the date and time.

The following error messages are provided:

- CLOCK FAILURE: Indicates clock malfunction; contact Power-One Customer Service
- BATTERY LOW
- ADJ. TIME: Appears the first time the unit is powered up or after the battery has been replaced.
- FAN FAILURE: Does not affect the inverter's proper operation; replace the fan at the first convenient opportunity.
- MEMORY FAILURE: Data logging malfunction. Call Power-One Customer Service.

4.6.4 MAIN MENU



When the grid connection sequence and all electrical parameter checks are completed, other screens become available, which enable monitoring of the inverter's operation from different viewpoints.

Pressing the ESC key (1st key from display) gives access to three new screens:

Statistics	Settings	Info

A NOTE ON DISPLAY KEY OPERATION:

- Press the UP (2nd key from display) and DOWN keys (3rd key from display) to scroll through items.
- Press the ESC key (1st from display) to go back to the previous session described in the highlighted area preceding section 4.6.3.
- Press ENTER (4th key from display) to open the selected submenu.

4.6.4.1 *Statistics*

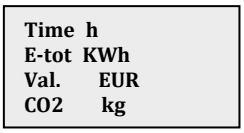
Select the STATISTICS menu to display the following submenu:

- ⇨ **Lifetime**
- **Partial**
- **Today**
- **Last 7 days**
- **Last Month**
- **Last 30 Days**
- **Last 365 Days**
- **User period**

The display shows only two lines; use the keys at the side of the display to scroll through items or open the corresponding sub-menus as described in Note 4:01 above. An arrow on the left side of the display highlights the current selection as shown in the following screen shot:

4.6.4.2 *Lifetime*

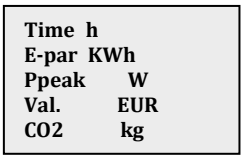
Select ***Lifetime*** to view the following information:



- Time: Lifetime operation time
- E-tot: Total energy produced
- Val. : Economic gain
- CO_2: CO_2 saving compared to fossil fuels

4.6.4.3 *Partial*

Select ***Partial*** to view the following information:

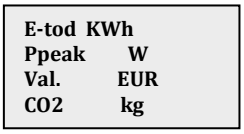


- Time: Total operation time since the counter was last reset. *
- E-par: Total energy produced since the counter was last reset. *
- PPeak: Maximum peak power measured since the 'partial' counter was activated
- Val. : Economic gain since the counter was last reset.*
- CO_2: CO_2 saving compared to fossil fuels since counter was last reset. *

** Hold the ENTER key (4th key from display) depressed for over 3 seconds to reset all counters in this submenu. After this time, a warning sound is repeated 3 times.*

4.6.4.4 *TODAY*

Select ***Today*** to view the following information:



- E-tod: Total energy produced during the day.
- Ppeak: Peak power value achieved during the day.
- Val. : Economic gain during the day.
- CO_2: CO_2 saving for the day compared to fossil fuels.

4.6.4.5 *Last 7 days*

Select ***Last 7 Days*** to view the following information:

- E-7d: Total energy output over the last 7 days.
- Val. : Economic gain over the last 7 days.
- CO_2: CO_2 saving over the last 7 days compared to fossil fuels.

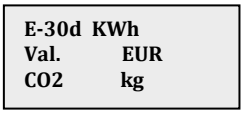
4.6.4.6 *Last Month*

Select ***Last Month*** to view the following information:

- E-mon: Total energy output this month.
- Val. : Economic gain this month.
- CO_2: CO_2 saving this month compared to fossil fuels.

4.6.4.7 *Last 30 Days*

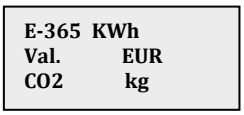
Select ***Last 30 Days*** to view the following information:



- E-30d: Total energy output over the last 30 days.
- Val. : Economic gain over the last 30 days.
- CO_2: CO_2 saving over the last 30 days compared to fossil fuels.

4.6.4.8 *Last 365 Days*

Select ***Last 365 Days*** to view the following information:



- E-365: Total energy output over the last 365 days.
- Val. : Economic gain over the last 365 days.
- CO2: CO2 saving over the last 365 days compared to fossil fuels.

4.6.4.9 *User Period*

Select ***User Period*** to view the energy saving during a period specified by the user:

- Press ENTER from the 'User period' screen to access the following submenu:

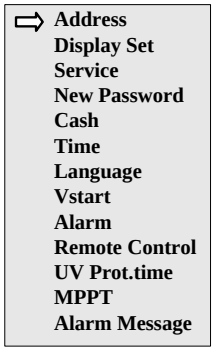
- Use the display keys to set the start and end date of the period as follows:
  - Use ENTER to move from one field to the next (from left to right).
  - Use ESC to go back to the previous field (from right to left).
  - Press ESC repeatedly to go back to the previous menus as described in section 2.5.3.
  - To set the day:
    - Press DOWN to scroll numbers backwards (from 31 to 1).
    - Press UP to scroll numbers forwards (from 1 to 31).
  - To set the month:
    - Press DOWN to scroll months from December to January.
    - Press UP to scroll months from January to December.

If the dates set are inconsistent, the screen below alerts the user to the problem:

4.6.5 SETTINGS

Select ***SETTING*** from the Main Menu and [ENTER] to display the ***Password*** screen, which enables the user to access the Settings Menu:

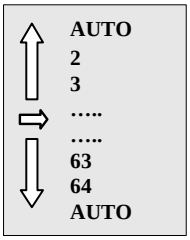
- To enter this menu, the correct four digit password must be entered.
  - At initial set up, enter the default password [0000] unless the default password has been modified by the user (per Note 4:01) in which case, enter the correct user password.
  - Follow instructions below to enter password digits into their proper location:
    - Use ENTER to move from one digit location to the next (from left to right).
    - Use ESC to go back to the previous figure (from right to left).
    - Press DOWN to scroll numbers backwards (from 9 to 0).
    - Press UP to scroll numbers forwards (from 0 to 9).
    - Press ESC repeatedly to go back to the previous menus as described in section 2.5.3
- After entering the required password, press ENTER to access to the ***Settings Menu***:



The front panel display has only two lines; therefore, the display keys must be used to scroll through the menu items and/or open the corresponding submenus (see Note 4:01). An arrow on left side of the display highlights the current selection. Once the chosen item is selected, press [ENTER] to access the desired submenu. The following section provides descriptions of each of the available submenus.

4.6.5.1 *Address*

Selecting this function enables the bus addresses (for the inverter connected to the RS485 communication bus) to be set to an appropriate value. Address values are assigned manually using any value in the range [2 to 64]. Press the UP and DOWN keys to scroll numbers.



If desired, the RS485 address can be selected automatically by the system. This function is active when ***AUTO*** is selected from the address list.

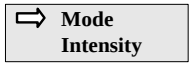
NOTE: If wiring multiple units using a daisy chain configuration, do not select AUTO configuration.

4.6.5.2 *Display Set*

Selecting this function displays the following sub-menu enabling the user to set display features parameters:

The following sections describe the available settings:

- ***Light*** - select this menu choice and [ENTER] to open the Display light submenu:



  - Select ***MODE*** and [ENTER] to allow setting the display backlighting.

    - **ON**: Light always ON.
    - **OFF**: Light always OFF.
    - **AUTO**: Automatic light setting - light turns ON every time a key is pressed and stays ON for 30 seconds before fading OFF.
  - Select ***INTENSITY*** and [ENTER] to allow adjustment of the backlighting intensity from 1 to 9.
-
- ***Contrast:*** Select this menu choice and [ENTER] to adjust display lighting contrast
  - Available display light tones go from 0 to 9.
  - Press UP and DOWN keys to scroll the numbers and then press ENTER to confirm the selection.
-
- **Buzzer:** Select this menu choice and [ENTER] to set key tone setting, choices are:
  - **ON**: The key tone is ON.
  - **OFF**: The key tone is OFF.

4.6.5.3 *Service*

This is a controlled access area of the operating system used by the factory to set certain control functions. Access is via an Advanced Password, which is a dedicated security code based on the unit serial number and access controlled by Power-One.

Installers may need to access this menu for certain adjustments during the installation process, and Power-One will provide Advanced Password access to authorized installers to allow specific actions upon completion of required documentation.

4.6.5.4 *New Password*

Selecting this function allows changing the default password (0000) to a personal code.

To set a personal code, use the display keys as follows:

- Use ENTER to move from one digit to the next (from left to right).
- Use ESC to go back to the previous digit (from right to left).
- Press ESC repeatedly to go back to the previous menus as described in section 2.5.3.
- Press DOWN to scroll numbers backwards (from 9 to 0).
- Press UP to scroll numbers forwards (from 0 to 9).

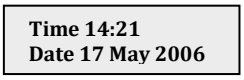
4.6.5.5 *Cash*

Selecting this function enables the user to set the measurement units for earnings based on energy output.

- **Name**: Set desired currency, using the keys in the usual manner. The default currency is the Euro.
- **Val/KWh**: This indicates the cost of 1 kWh expressed in the currency set. The default setting is Euro 0.50.

4.6.5.6 *Time*

Selecting this function allows adjustment of the system time and date settings.



4.6.5.7 *Language*

Selecting this function allows setting of the language desired for system prompts. Choices are Italian or English (default).

4.6.5.8 *Start-Up Voltage*

Selecting this function enables modification of the start-up voltage associated with each of the input channels to match requirements of the connected PV array. The voltage can be set over the range [120V to 350V]. The default setting for AURORA Inverter is 200V. Use the display keys to change the value of this parameter.

4.6.5.9 *Alarm*

Selecting this function accesses the inverter's alarm function, which is used for external controls or, for example, to activate a visual and/or audible alarm. The function has two different modes of operation. Select the desired mode using the UP/DOWN arrow keys and press [ENTER] to open the relevant submenu:

The function controls a set of dry relay contacts, which can be wired by the user as either normally open (N.O.) or normally closed (N.C.); contacts are rated at 250V/1A. The terminals for this function are accessed via the front panels.

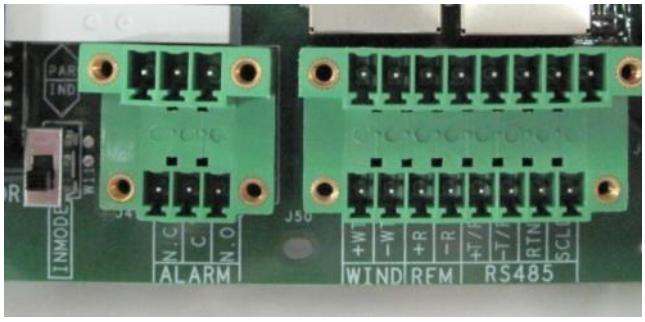


Figure 4.05 - Alarm contact terminal block

The two operational modes are described below:

- **PRODUCTION**: In this mode, the relay is activated only when the inverter is connected to the grid.

  For example, if the N.O. (Normally Open) contact is chosen, the contact will remain open (closed) as long as the inverter is not connected to the grid. Once grid connection occurs and the inverter begins to export power, the relay switches its status and closes (opens). Upon disconnection from the grid, the relay contact returns to its rest position, i.e. open (closed).

- **FAULT**: In this mode, the alarm relay triggers when the system logs a fault condition, based on the error codes (E-code) described in Section 2.4

  For example, if the N.O. (Normally Open) contact is chosen, the contact will remain open (closed) as long as no E-code fault is logged (E-code faults disconnect the inverter from the grid). When any E-code is logged, the relay will change state and stay latched until the next successful grid reconnection, at which time it is reset. Note the alarm function does not switch when warning codes (W-code) are logged.

4.6.5.10 *Remote Control*

Selecting this function accesses the remote ON/OF function used to disable the inverter operation by an external switch or an external controller. Set as follows:

- DISABLE: Disables the ON/OFF function, so that inverter operation will operate normally, depending only on grid access and external solar radiation (default).
- ENABLE - Activates the ON/OFF function, requiring an external contact closure to activate the inverter.

Hardware access to the ON/OFF function is via terminals +R and -R, shown in Figure 4.05. When the function is active:

- Turn ON the inverter terminals by shorting terminals +R and –R.
- Turn OFF the inverter by removing the short between terminals +R and –R.

With the function enabled, the ON/OFF input status is indicated on the inverter display.

Remote ON/OFF Enable	Remote ON/OFF Disable

When set to OFF, the display will cycle through the following screens:

Remote OFF	Waiting Rem.ON... to restart

4.6.5.11 *UV Protection Time (PROT. TIME)*

Selecting this function allows setting of the inverter connection time after the input voltage drops below the under voltage limit, set at 90V.

For example: If UV Prot.time is set at 60 seconds, and Vin voltage drops below 90V, the inverter stays connected to the grid (at 0 power) for up to 60 seconds afterwards.

The default value is 60 seconds, but can be set over the range of [1 s to 3,600 s].

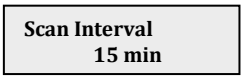
4.6.5.12 *MPPT*

Selecting this function enables setting parameters associated with the Maximum Power Point Tracker (MPPT) function. Following sections provide details of these settings:

- MPPT Amplitude: Set this parameter to choose the amplitude of the disturbance introduced in DC used by the MPPT circuit to establish the optimal work point. There are three options (LOW, MEDIUM, HIGH). The default setting is LOW.

- MPPT Scan - the periodic scan of the MPPT circuit to detect if the system is on its Maximum Power Point can be enabled (default) or disabled.

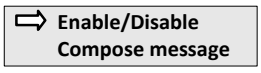
- Scan Interval - allows setting of the time interval between scans when system searches for real Maximum Power Point. The default setting is 15 minutes.



4.6.5.13 *Alarm Message*

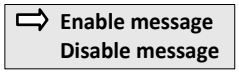
Selecting this function allows access to the procedure to program the message shown on the display in the event of a logged error code:

After selecting the function, press [ENTER] to open the associated submenu.

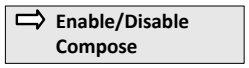


Select the desired function using display buttons to scroll between the options; once the desired option is selected, press [ENTER] to enter the submenu.

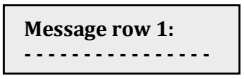
- ENABLE/DISABLE - the following screen will appear in the menu and the alarm message can either be Disabled or Enabled (default):



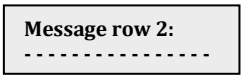
- With the ENABLE MESSAGE line is selected, press [ENTER] to open the submenu below.



- Select COMPOSE MESSAGE to access the field for the first line of a custom the message, where up to 16 characters may be entered:



  After entering the desired message, continue pressing [ENTER] until the field for the second line appears, where up to 16 characters may be entered:



- To write the message always use the display keys in the following way:
  - Use ENTER (4th key) to move from one figure to the next (from left to right).
  - Use ESC (1st key) to go back to the previous position (from right to left).
  - Press ESC repeatedly to go back to the previous menus as described in section 2.5.3.
  - Use UP (2nd key) to scroll upwards through the numbers, letters and symbols.
  - Use DOWN (3rd key) to scroll downwards through the numbers, letters and symbols.

4.6.6 INFORMATION

Selecting this menu allows display all AURORA Inverter data, the chosen language, and enables reading and/or modification of the grid standard by means of the special selector switches.

- Part No. (part number)
- Serial No. – Wk – Yr (serial number, week, year)
- Fw rel (firmware revision level)
- Country Selector

The ***Country Selector*** menu allows display of the user-set grid standard currently programmed into the inverter (Current Value), and the future grid standard to be used when the inverter is next switched-ON, if a new value has been selected. Once a grid standard has been operating for 24 hours, the inverter control locks the selector switches shown in Part 3, Section 2.5.1 of respective unit number. Changing the grid standard after the 24 hour timer has elapsed requires user to contact Power-One Technical Service. The time available for making changes to the grid standard can be checked (Residual Time).

4.7 DATA CHECK AND COMMUNICATION

The AURORA Inverters have remote monitoring and capabilities which are accessed externally using an RS485 communication port. The AURORA Inverter is provisioned with the communication capability as a standard feature, and all that is needed for remote monitoring is monitoring hardware which connects to the RS485 port and collects the available data. Following sections detail the wiring connections necessary to implement the RS485 bus. See Part 3 for specific wiring directions.

PART 5: TROUBLESHOOTING

5.1 TROUBLESHOOTING

AURORA Inverters comply with the standards set for grid-tied operation, safety, and electromagnetic compatibility.

Before the product is dispatched various tests are carried out successfully to ensure: functioning, protection devices, performance and durability.

Such tests, together with the Power-One quality assurance system, support optimal operation of the AURORA Inverter.

In case of any possible malfunction of the inverter, solve problems as follows:

- Work under safe conditions. Check that the connections between AURORA, photovoltaic field and power distribution network have been made correctly as stated in Part 1 Introduction & Safety and Part 3 Wall Mount & Wire Configuration.
- Carefully observe which LED is flashing and read the signal appearing on the display; then, following the instructions given in the Sections below, try to identify the type of fault found.

5.2 LED INDICATORS

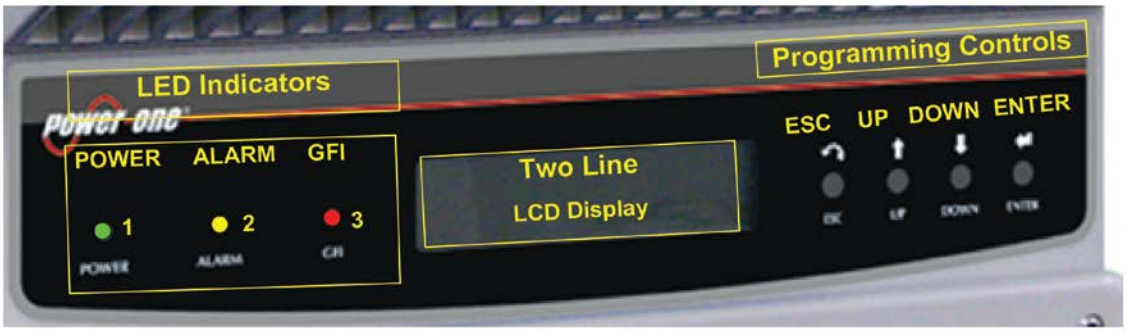


Figure 5:01- Location of the buttons and LEDs

There are three LEDs on the left side of the display:

1. The green 'Power' LED indicates that AURORA Inverter is operating correctly.

   This LED flashes upon start-up, during the grid check routine. If a correct grid voltage is detected and solar radiation is strong enough to start-up the unit, the LED stays on steady. If not, the LED keeps flashing until solar radiation becomes strong enough to start-up the inverter. In this condition, the display will read **'Waiting Sun….'**

2. The yellow 'FAULT' LED indicates that the AURORA Inverter has detected a fault condition. A fault description will appear on the display.
3. The red 'GFI' (ground fault) LED indicates that AURORA Inverter is detecting a ground fault in the DC side of the photovoltaic system. When this kind of fault is detected, the AURORA Inverter disconnects from the grid and the corresponding fault indication appears on the LCD display. AURORA Inverter remains in this condition until the operator presses the ESC key to re-start the grid connection sequence. If pressing the ESC key doesn't clear the ground fault check the ground-fault, fuse located in the switchbox. If AURORA Inverter does not reconnect to the grid, see Section 1.6: The Power-One Service Call.

The following table shows all the possible LED-signalling indications related to the operational status of AURORA Inverter.

NOTE: Inverter status is indicated by the corresponding LED turning to a steady ON-condition or flashing, and by a message on the AURORA LCD displaying a description of the existing operation or fault condition (see the following sections).

Key:

LED on **LED OFF**

LED flashing **Any of the above conditions**

	LED STATUS	OPERATIONAL STATUS	NOTES
1	1: green: ☒ 2: yellow: ☒ 3: red: ☒	AURORA self-disconnects during night-time	Input voltage less than 90 Vdc at both inputs
2	1: green: ◪ 2: yellow: ☒ 3: red: ☒	AURORA Inverter initialization, settings loading, and waiting for grid check	It is in transition status while operating conditions are being checked.
3	1: green: ■ 2: yellow: ☒ 3: red: ☒	AURORA Inverter is powering the grid	Standard machine operation (search for maximum power point or constant voltage)
4	1: green: □ 2: yellow: □ 3: red: ■	System insulation device faulty	Leakage to ground found
5	1: green: ☒ 2: yellow: ■ 3: red: ☒	Defect – fault!!!	The fault can be inside or outside the inverter. See the alarm appearing on the LCD display.
6	1: green: ☒ 2: yellow: ◪ 3: red: ☒	Installation Phase: AURORA Inverter is disconnected from the grid.	During installation, it indicates set-up phase of the address for RS-485 communication.
7	1: green: ◪ 2: yellow: ■ 3: red: ☒	Grid disconnection	Indicates a missing grid condition

5.3 MESSAGES AND ERROR CODES

DANGER:

Normally grounded conductors may be ungrounded and energized when a ground-fault is indicated.

- **Risk of electric shock**
- **Test before touching**
- **Work on the AURORA Inverter must be carried out by qualified personnel.**

The system status is identified through message or error signals displayed on the LCD display. The following tables briefly describe the two types of signals which may be displayed.

Messages identify the current status of the AURORA Inverter. Messages do not relate to a fault. When a **(W)** with a number after it appears in the display, it indicates a **Warning Code** and is usually cleared through an orderly shut down/re-set or a self corrective action performed by the inverter. See the (W) codes in the following table.

Alarms or **(E)** codes identify a possible equipment failure, fault or incorrect inverter setting or configuration. However, some of the (E) codes may require you to contact Power-One Technical Support to assist in correcting a fault. Any and all attempts to correct or clear a fault must be performed by qualified personnel. Typically, the (E) code can be cleared once the cause or fault is removed. Some of the (E) codes, **(Int. Error)** as indicated in the table below, may indicate a fatal error and require you to contact Power-One Technical Support for diagnostics and/or a product replacement.

Table 5.01 - Messages and Error Codes

Message	Error Warning	Error Type	Description		Message	Error Warning	Error Type	Description
Sun Low	W001	//	-Input Voltage under Vstart threshold -Sun too low -PV Array strings may be configured incorrectly. - A factory default setting of 200VDC Min is required to start the AURORA inverter.		Int.Error	//	E022	Autotest Timeout
Input OC	//	E001	-Input Overcurrent -PV Array strings may be configured incorrectly. -Similar to W001 after MIN VDC start has been adjusted		Int.Error	//	E023	Dc-Injection Error
Input UV	W002	//	Input Undervoltage Similar to W001 after MIN VDC start has been adjusted.		Grid OV	W004	//	Output Overvoltage
Input OV	//	E002	Input Overvoltage		Grid UV	W005	//	Output Undervoltage
Int.Error	//	E003	No parameters		Grid OF	W006	//	Output Overfrequency
Bulk OV	//	E004	-Bulk Overvoltage -Contact Power-One Technical Support		Grid UF	W007	//	Output Underfrequency
Int.Error	//	E005	Communication Error		Z Grid HI	W008	//	Z grid out of range
Out OC	//	E006	-Output Overcurrent		Int.Error	//	E024	Unknown Error –
Int. Error	//	E007	-IGBT Sat -Contact Power-One		---------	//	E025	Riso Low (Log Only)

Message	Error Warning	Error Type	Description		Message	Error Warning	Error Type	Description
			Technical Support-possible.					
Sun Low	W011	//	Bulk Undervoltage		Int.Error	//	E026	Vref Error
Int.Error	//	E009	-Internal Error -Conduct inverter Re-Set* -Call Power-One Technical support if error isn't cleared.		Int.Error	//	E027	Vgrid Measures Fault
Grid Fail	W003	//	Grid Fail		Int.Error	//	E028	Fgrid Measures Fault
Int.Error	//	E010	-Bulk Low -Conduct inverter reset * - if error doesn't clear, contact Power-One Technical Support		Int.Error	//	E029	Zgrid Measures Fault
Int.Error	//	E011	Ramp Fail					
Over Temp.	//	E014	Overtemperature		Int.Error	//	E030	Ileak Measures Fault
Cap. Fault	//	E015	Bulk Capacitor Failure Call Power-One Technical Support.		Int.Error	//	E031	Wrong V Measure
DC/DC Fail	//	E012	DcDc Error revealed by inverter		Int.Error	//	E032	Wrong I Measure
Wrong Mode	//	E013	-Wrong Input setting (Single instead of dual) or wrong grounding mode -Wrong DC array input (verify PAR/IND MPPT switch is correct. Conduct inverter reset*. If error isn't cleared call Power-One Technical Support.		Empty Table	W009	//	No wind table (only wind -W versions)
Inv. Fail	//	E016	Inverter fail revealed by DcDc		Fan Fail	W010	//	Fan Fail (No disconnection)
Int.Error	//	E017	-Start Timeout -Conduct inverter reset* -If error doesn't clear contact Power-One Technical Support.		Int.Error	//	E033	UnderTemperature
Ground F.	//	E018	- I leak fail - Ground-fault is present. Inspect field wiring-verify there are no pinched wires or damaged wire insulation-conduct inverter reset*-contact Power-One Technical Support.			//	E034	Interlock Fail (Not Used)
Int.Error	//	E019	Ileak Sensor fail			//	E035	Remote Off
Int.Error	//	E020	DcDc relay fail			//	E036	Vout Avg Error
Int.Error	//	E021	Inverter relay fail			W012	//	Clock Battery Low (No disconnection)
						W013	//	Clock Failure (No disconnection)

***To conduct the inverter reset, turn the AC and the DC OFF. Turn DC ON and wait for sun. Turn AC ON.**

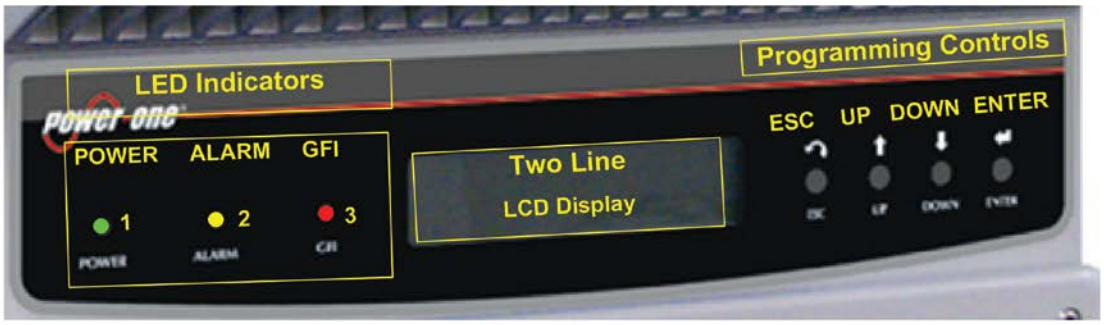
5.4 LCD DISPLAY

5.4.1 CONNECTION OF THE SYSTEM TO THE GRID

A two-line LCD display is located on the front panel shows the following:

- ✓ Inverter operating status and statistics;
- ✓ Service messages for the operator;
- ✓ Alarm and fault messages.

During regular operation, the display will cycle through available data. The display changes to a different screen every 5 seconds, or screens may be scrolled manually by pressing the UP (2nd key from display) and DOWN keys (3rd key from display).



1) These two screens are displayed at inverter start-up:

Initializing... Please wait	POWER-ONE

2) The following screens may appear while waiting for the connection to be established:

Missing Grid	Waiting Sun

- While the system checks for grid connection to be established ('Missing Grid'), the yellow LED next to the display turns ON steady, while the green LED flashes.
- When waiting for solar radiation ('Waiting Sun'), the green LED turns ON steady.
- As soon as the 'Missing Grid' and 'Waiting Sun' conditions are met successfully, the inverter is connected.

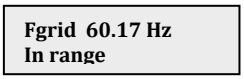
3) This display shows the time (seconds) remaining to complete the output voltage and frequency values check.

Next connections: 2 secs

4) This display shows the instant output voltage value and whether it is within/outside range.

Vgrid 223.8 V In range

5) This displays the instant output frequency value and whether it is within/outside range.



6) If the measured instant values of voltage (point 4) and frequency (point 5) are outside the allowed range, the following screens are scrolled alternately:

Next connections (screen 3) → Vgrid (screen 4) →-Fgrid (screen 5)

5.4.2 First Phase- Electric Parameter Check

If all items in the electric parameter check OK, the inverter shows a corresponding message in the display top line along with the date and time.

Clock malfunctioning or other non- function-related faults (meaning faults that do not affect the inverter's ability to generate energy) are shown in the second line of the display instead of the date and time.

The following error messages are provided:

- CLOCK FAILURE: Indicates clock malfunction; contact Power-One Customer Service
- BATTERY LOW
- ADJ. TIME: Appears the first time the unit is powered up or after the battery has been replaced.
- FAN FAILURE: Does not affect the inverter's proper operation; replace the fan at the first convenient opportunity.
- MEMORY FAILURE: Data logging malfunction. Call Power-One Customer Service.

If the malfunction cannot be cleared by following these instructions, contact the Power-One Customer Service center or the installer (see Section 1.6 below). Before contacting Power-One Customer Service, please make the following information available in order to maximize the effectiveness of the intervention:

5.5 THE POWER-ONE SERVICE CALL

INFORMATION ON AURORA INVERTER

- ✓ AURORA model?
- ✓ Serial number?
- ✓ Week of production?
- ✓ Which LED is flashing?
- ✓ Steady or flashing light?
- ✓ What signals are shown on the display?

NOTE: above information available directly from the LCD display

Additional helpful information when troubleshooting with the Power-One Technical Service Engineers:
Provide a brief description of the fault.

- Information on the photovoltaic field
- Brand and model of photovoltaic panels
- Identify the System structure:
  - Maximum array voltage and current values
  - Number of strings in the array
  - Number of panels for each string
  - 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.

Power-One Customer Service & Technical Support

AURORA Power Service (Americas)
Phone: 877-261-1374

PART 6: MAINTENANCE GUIDE

6.1 MAINTENANCE

The AURORA Inverter has no user-serviceable parts. Maintenance and service procedures must comply with the manufacturer's documentation. Call Power-One Customer Service at 877-261-1374 for a list of qualified service contractors.

6.2 SHUT-DOWN PROCEDURE

There are three options for shutting down the inverter:

1. Disconnect the DC and the AC grid, by disconnecting its associated switches (in any order). The inverter will shut down within a few seconds necessary to discharge the internal capacitors.
2. Disconnect the DC input by turning-OFF the associated disconnect switch and waiting for the UV port time out.
3. Disconnect the grid, by turning-OFF its associated disconnect switch and reduce DC input to less than 130 Vdc.

6.3 POWER-DOWN PROCEDURES

Once the inverter is wired and connected to the grid use the following procedures to disconnect for maintenance

WARNING

Before performing any operation on the switcbox power input, ALWAYS perform the appropriate disconnection procedure outlined below.

6.3.1 DISCONNECTION OF AURORA INVERTER

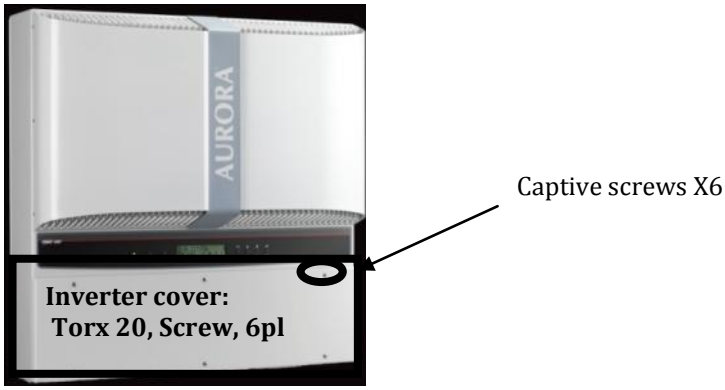
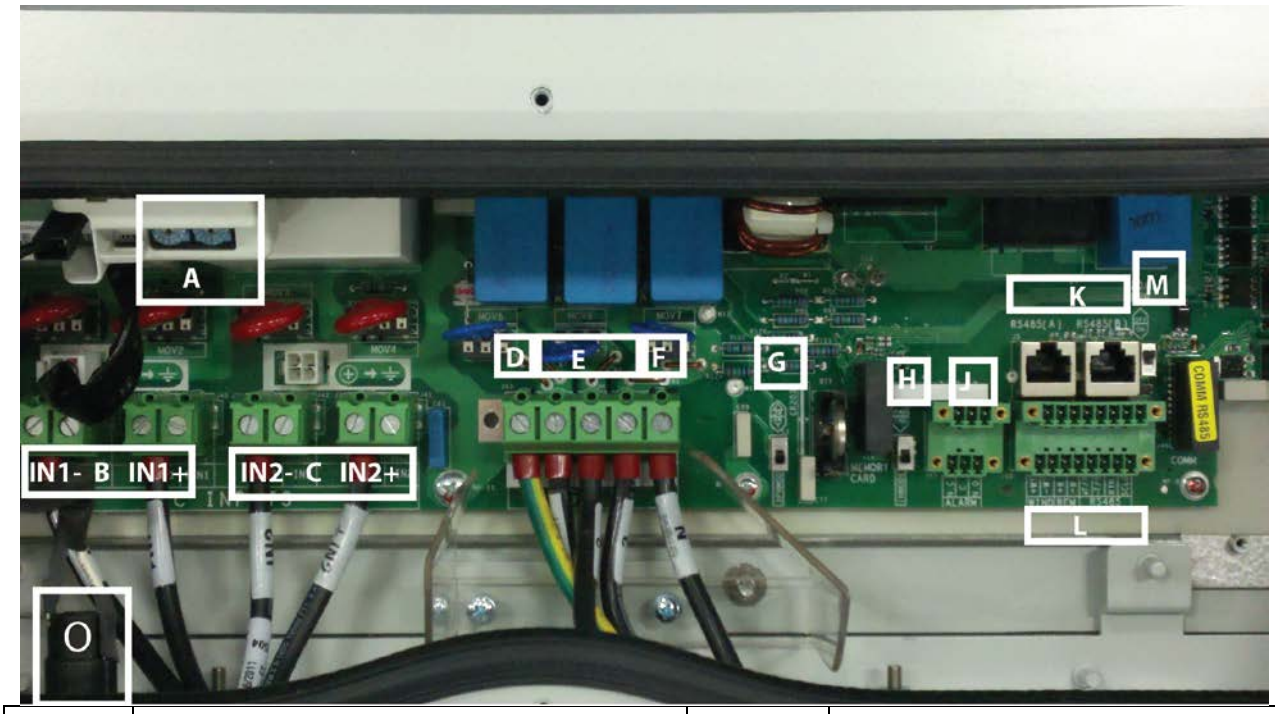


Figure 6.01 - Location of Front Access Panels



Location Indicator	Details		Location Indicator	Details	
A	Grid Selector/Country Code – thumbwheel switches	04	**H**	MPPT Input Selector Switch	Choose PAR or IND MPPT Operation
B	DC Array: MPPT 1 input	Note 1 below	**J**	Alarm Out Terminals for External Alarm	Note 3 below
C	DC Array: MPPT2 input	Note 1 below	**K**	RS485 Bus Connection Via RJ485 Connector	Use with CAT5 Cable
D	Main PE Ground Terminal ⏚	Note 1 below	**L**	RS485 Bus Connection Via Screw Terminals	Note 3 below
E	3 ø AC Grid Output Terminals	Note 2 below	**M**	RS485 Termination Switch	See Signal Connection Section for more detail
F	3 ø AC Grid Neutral Terminal for 4W Grid Connection	Note 2 below	**N**	Remote ON/OFF Switch	See Signal Connection Section for more detail
G	**3PHMOD Switch** 3ø Mode Selector	Choose 3W or 4W Grid Connection	**O**	GFD Fuse	

Notes: 1. Terminals accept wire range up to #4AWG (Refer to local code for appropriate wire size); torque to 13in-lb.
2. Terminals accept wire range up to #4AWG (Refer to local code for appropriate wire size); torque to 13in-lb.
3. Mating terminal in hardware kit. Terminals accept wire size range up to #4AWG; torque to 13 in-lb.

Figure 6.02 - PVI-10/12-I-OUTD-US/CAN Wiring Connection Details

6.4 GROUND FAULT DETECTOR FUSE REPLACEMENT

DANGER:

Normally grounded conductors may be ungrounded and energized when a ground-fault is indicated.

- **Risk of electric shock**
- **Test before touching**
- **Work on the AURORA Inverter must be carried out by qualified personnel.**

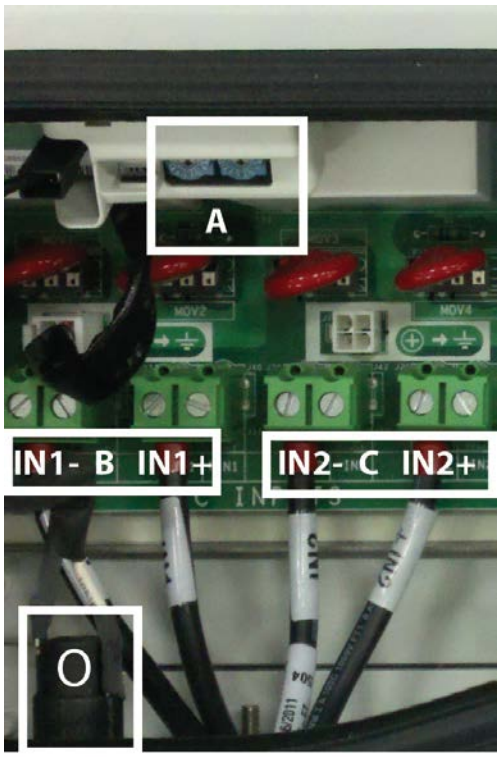


Figure 6.03 - GFD Fuse Location

WARNING **Before performing any operation on the switchbox power input or on the inverter, ALWAYS perform the disconnection procedure as explained in Section 1.0.**

The AURORA, PVI-10.0 isolated inverter series has separate versions depending on the array grounding preference. This functionality is identified within the part number as noted in Part 1: Introduction & Safety.

NOTE: Ensure the proper part number is ordered as required to fulfil project requirements.

The GFD Fuse holder is located on the bottom of the inverter (inside the switchbox for AURORA -S/S2-US models) as shown in Figure 6.03. Unscrew the fuse holder in order to change the fuse if necessary. Replace only with appropriate fuses:

Littelfuse KLKD-1(10x38mm cartridge fuse, 600V)

6.5 CR2032 LITHIUM BATTERY REPLACEMENT

WARNING

Before performing any operation on the switchbox power input or on the inverter, ALWAYS perform the disconnection procedure as explained in Part 4: Operations of this manual.

The replacement of this battery should be performed only by trained personnel.

Inside the AURORA Inverter there is a CR2032 lithium battery. When this battery is at end-of-life, a message will be shown in the display informing that the battery needs to be replaced.

The battery is visible after removing the AURORA PV Inverter's front panel. Refer Figure 6.01 above for the procedure to remove the front panel.

To insert the new battery into its holder, slide the battery at a 30° angle pushing it into insertion as shown in Figure 6.04 below. When pushed ON into insertion it should seat into the correct position within the holder.

After battery replacement is completed, re-install and secure the front panel of the inverter and perform the START-UP procedure in Part 4: Operations.

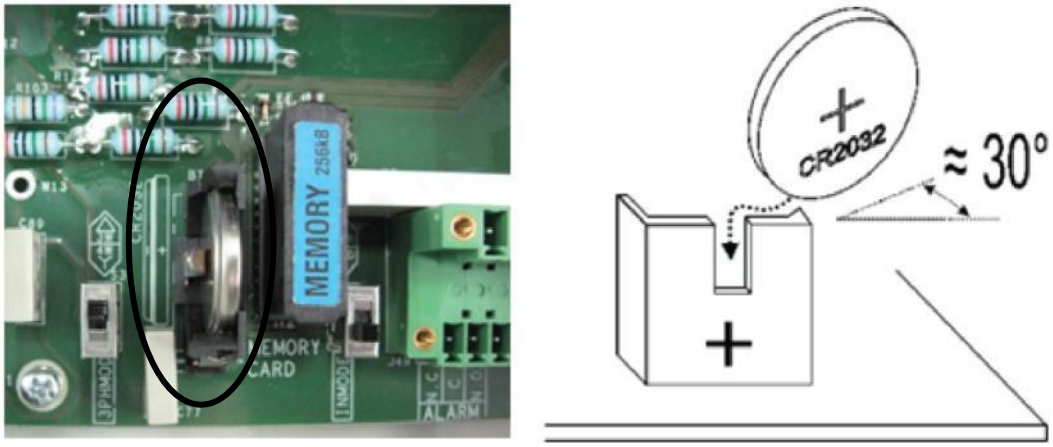


Figure 6.04 Lithium Battery Replacement

PART 7: THE APPENDIX

7.1 DATA SHEETS

NOTE: **If the input current supplied by the photovoltaic field connected to the inverter is above the maximum usable value and the input voltage is within the allowed range, the inverter will not be damaged.**

TECHNICAL DATA	VALUES	PVI-10.0-I-OUTD-US		PVI-10.0-I-OUTD-CAN		
Nominal Output Power	W	10000	10000	10000	10000	10000
Maximum Output Power	W	11000**	11000**	10000***	10000***	10000***
Rated Grid AC Voltage	V	208	480	208	480	600
Input Side (DC)						
Number of Independent MPPT Channels		2; programmable as a single paralleled input		2; programmable as a single paralleled input		
Maximum Usable Power for Each Channel	W	6800		6800		
Absolute Maximum Voltage (Vmax)	V	520		520		
Start- Up Voltage (Vstart)	V	200 (Adj. 120-350)		200 (Adj. 120-350)		
Full Power MPPT Voltage Range	V	220-470		220-470		
Operating MPPT Voltage Range	V	0.7 x Vstart-520		0.7 x Vstart-520		
Maximum Current (Idcmax) for both MPPT in Parallel	A	48		48		
Maximum Usable Current per Channel	A	24		24		
Maximum Short Circuit Current Limit per Channel	A	29		29		
Number of Wire Landing Terminals per Channel		Standard version: 2; -S1/-S2 version: 3		Standard version: 2; -S1/-S2 version: 3		
Array Wiring Termination Type		Terminal Block, Pressure Clamp, 20AWG-6AWG		Terminal Block, Pressure Clamp, 20AWG-6AWG		
Output Side (AC)						
Grid Connection Type		3Ø/3W or 4W+Ground	3Ø/4W+Ground	3Ø/3W or 4W+Ground	3Ø/4W+Ground	3Ø/3W or 4W+Ground
Adjustable Voltage Range (Vmin-Vmax)	V	183-228	422-528	183-228	422-528	528-660
Grid Frequency	Hz	60		60		
Adjustable Grid Frequency Range	Hz	57-63		57-63		
Maximum Current (Iac max)	A_{rms}	30.0	14.0	30.0	14.0	10.6
Power Factor		>0.995 (+/-0.9)		>0.995 (+/-0.9)		
Total Harmonic Distortion At Rated Power	%	<2		<2		
Grid Wiring Termination Type		Terminal Block, Pressure Clamp,12AWG-4AWG		Terminal Block, Pressure Clamp, 12AWG-4AWG		
Protection Devices						
Input						
Reverse Polarity Protection		Yes		Yes		
Over-Voltage Protection Type		Varistor, 2 for each channel		Varistor, 2 for each channel		
PV Array Ground Fault Detection		GFDI (GFD fuse) per UL1741/NEC690.5 (A)		GFDI (GFD fuse) per UL1741/NEC690.5 (A)		
Output						
Anti-Islanding Protection		Meets UL1741/IEEE1547 requirements		Meets UL1741/IEEE1547 requirements		
Over-Voltage Protection Type		3 + gas arrester Varistor, One per line + spark gap to Ground		3 + gas arrester Varistor, One per line + spark gap to Ground		
Efficiency						
Maximum Efficiency	%	96.5	97.3	96.5	97.3	97.3
CEC Efficiency	%	96.0	97.0	96.0	97.0	97.0
Operating Parameters						
Feed-In Power Threshold	WRMS	30		30		
Stand-by Consumption	WRMS	< 8		< 8		
Communication						
User-Interface (Display)		16 Characters X 2 lines LCD display		16 Characters X 2 lines LCD display		
Remote Monitoring (1xRS485 incl.)		AURORA-UNIVERSAL (opt.)		AURORA-UNIVERSAL (opt.)		
Wired Local Monitoring (1xRS485 incl.)		PVI-USB-RS485_232 (opt.), PVI-DESKTOP (opt.)		PVI-USB-RS485_232 (opt.), PVI-DESKTOP (opt.)		
Wireless Local Monitoring		PVI-DESKTOP (opt), with PVI-RADIO MODULE (opt)		PVI-DESKTOP (opt), with PVI-RADIO MODULE (opt)		
Environmental						
Ambient Air Operating Temperature Range	F(°C)	-13 to +140 (-25 to +60) Derating above +122 (+50)		-13 to +140 (-25 to +60) Derating above +122 (+50)		-13 to +140 (-25 to +60) Derating above +113 (+45)
Ambient Air Storage Temperature Range	F(°C)	-40 to +176 (-40 to +80)		-40 to +176 (-40 to +80)		
Relative Humidity	%RH	0-100 condensing		0-100 condensing		
Acoustic Noise Emission Level	db (A) @1m	<50		<50		
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	28.2" x 25.4" x 8.7" / 716mm x 645mm x 222mm // 37.7" x 25.4" x 8.7" / 958mm x 645mm x 222mm (-S/-S1/-S2 version)		28.2" x 25.4" x 8.7" / 716mm x 645mm x 222mm // 37.7" x 25.4" x 8.7" / 958mm x 645mm x 222mm (-S/-S1/-S2 version)		
Unit Weight	lb(kg)	101(45.8) (US version); 107(48.5) (S1 version); 114(51.7)(S2 version)		101(45.8) (US version); 107(48.5) (S1 version); 114(51.7)(S2 version)		
Shipping Weight	lbs(kg)	with pallet: 254(<115); without pallet: 143(<65)		with pallet: 254 (<115); without pallet: m143 lb(<65)		
Conduit Connections		Bottom: (1) 1/2" EKO,(2) 1" pluggable opening, (4) 1/2" pluggable openings / Left and Right Side: (1) Concentric EKOs 3/4", 1" Back: (2) Concentric EKOs 3/4", 1", (2) Concentric EKOs 3/4", 1"		Bottom: (1) 1/2" EKO,(2) 1" pluggable opening, (4) 1/2" pluggable openings / Left and Right Side: (1) Concentric EKOs 3/4", 1" Back: (2) Concentric EKOs 3/4", 1", (2) Concentric EKOs 3/4", 1"		
Mounting System		Wall Brackett		Wall Brackett		
Ground Fault Detector Fuse Size/ Type	A/V / mm	1/600/10x38		1/600/10x38		
Optional String Combiner Fuse Size/Type	A, A/V / mm	12, 15/600/10x38		12, 15/600/10x38		
DC Switch Current Rating (Per Contact)	A	32		32		
Safety						
Isolation Level		Isolated - High Frequency transformer		Isolated - High Frequency transformer		
Safety and EMC Standard		UL1741, CSA22.2 #107.1-01		UL1741, CSA22.2 #107.1-01		
Safety Approval		,CSA$_{us}$		,CSA$_{us}$		
Warranty						
Standard Warranty	Years	10		10		
Extended Warranty	Years	15 & 20		15 & 20		
Available Models						
Standard		PVI-10.0-I-OUTD-US-208-NG	PVI-10.0-I-OUTD-US-480-NG	PVI-10.0-I-OUTD-CAN-208-NG	PVI-10.0-I-OUTD-CAN-480-NG	PVI-10.0-I-OUTD-CAN-480-NG
With DC Switch and DC Fuses		PVI-10.0-I-OUTD-S1-US-208-NG	PVI-10.0-I-OUTD-S1-US-480-NG	PVI-10.0-I-OUTD-S1-CAN-208-NG	PVI-10.0-I-OUTD-S1-CAN-480-NG	PVI-10.0-I-OUTD-S1-CAN-480-NG
With AC and DC Switches and DC Fuses		PVI-10.0-I-OUTD-S2-US-208-NG	PVI-10.0-I-OUTD-S2-US-480-NG	PVI-10.0-I-OUTD-S2-CAN-208-NG	PVI-10.0-I-OUTD-S2-CAN-208-NG	PVI-10.0-I-OUTD-S2-CAN-208-NG

*All data is subject to change without notice

**Capability enabled at power-factor of +/-.995 and with sufficient DC power available.

***Inverter can be field configured to output up to 110% of rated power under certain conditions

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TECHNICAL DATA	VALUES	PVI-12.0-I-OUTD-US	PVI-12.0-I-OUTD-CAN	
Nominal Output Power	W	12000	12000	12000
Maximum Output Power	W	13200**	12000***	12000***
Rated Grid AC Voltage	V	480	480	600
Input Side (DC)				
Number of Independent MPPT Channels		2; programmable as a single paralleled input	2; programmable as a single paralleled input	
Maximum Usable Power for Each Channel	W	6800	6800	
Absolute Maximum Voltage (Vmax)	V	520	520	
Start- Up Voltage (Vstart)	V	200 (Adj. 120-350)	200 (Adj. 120-350)	
Full Power MPPT Voltage Range	V	250-470	250-470	
Operating MPPT Voltage Range	V	0.7 x Vstart-520	0.7 x Vstart.-520	
Maximum Current (Idcmax) for both MPPT in Parallel	A	50	50	
Maximum Usable Current per Channel	A	25	25	
Maximum Short Circuit Current Limit per Channel	A	29	29	
Number of Wire Landing Terminals per Channel		Standard version: 2; -S1/-S2 version: 3	Standard version: 2; -S1/-S2 version: 3	
Array Wiring Termination Type		Terminal Block, Pressure Clamp, 20AWG-6AWG	Terminal Block, Pressure Clamp, 20AWG-6AWG	
Output Side (AC)				
Grid Connection Type		3Ø/4W+Ground	3Ø/4W+Ground	3Ø/3W or 4W+Ground
Adjustable Voltage Range (Vmin-Vmax)	V	422-528	422-528	528-660
Grid Frequency	Hz	60	60	
Adjustable Grid Frequency Range	Hz	57-63	57-63	
Maximum Current (Iac max)	A_{RMS}	16.0	16.0	12.8
Power Factor		>0.995 (+/-0.9)	>0.995 (+/-0.9)	
Total Harmonic Distortion At Rated Power	%	<2	<2	
Grid Wiring Termination Type		Terminal Block, Pressure Clamp, 12AWG-4AWG	Terminal Block, Pressure Clamp, 12AWG-4AWG	
Protection Devices				
Input				
Reverse Polarity Protection		Yes	Yes	
Over-Voltage Protection Type		Varistor, 2 for each channel	Varistor, 2 for each channel	
PV Array Ground Fault Detection		GFDI (GFD fuse) per UL1741/NEC690.5 (A)	GFDI (GFD fuse) per UL1741/NEC690.5 (A)	
Output				
Anti-Islanding Protection		Meets UL1741/IEEE1547 requirements	Meets UL1741/IEEE1547 requirements	
Over-Voltage Protection Type		3 + gas arrester Varistor, One per line + spark gap to Ground	3 + gas arrester Varistor, One per line + spark gap to Ground	
Efficiency				
Maximum Efficiency	%	97.3	97.3	
CEC Efficiency	%	97.0	97.0	
Operating Parameters				
Feed-In Power Threshold	W_{RMS}	30	30	
Stand-by Consumption	W_{RMS}	< 8	< 8	
Communication				
User-Interface (Display)		16 Characters X 2 lines LCD display	16 Characters X 2 lines LCD display	
Remote Monitoring (1xRS485 incl.)		AURORA-UNIVERSAL (opt.)	AURORA-UNIVERSAL (opt.)	
Wired Local Monitoring (1xRS485 incl.)		PVI-USB-RS485_232 (opt.), PVI-DESKTOP (opt.)	PVI-USB-RS485_232 (opt.), PVI-DESKTOP (opt.)	
Wireless Local Monitoring		PVI-DESKTOP (opt), with PVI-RADIO MODULE (opt)	PVI-DESKTOP (opt), with PVI-RADIO MODULE (opt)	
Environmental				
Ambient Air Operating Temperature Range	F(°C)	-13 to +140 (-25 to +60) Derating above +113 (+45)	-13 to +140 (-25 to +60) Derating above +113 (+45)	
Ambient Air Storage Temperature Range	F(°C)	-40 to +176 (-40 to +80)	-40 to +176 (-40 to +80)	
Relative Humidity	%RH	0-100 condensing	0-100 condensing	
Acoustic Noise Emission Level	db (A) @1m	<50	<50	
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	28.2" x 25.4" x 8.7" / 716mm x 645mm x 222mm // 37.7" x 25.4" x 8.7" / 958mm x 645mm x 222mm (-S/-S1/-S2 version)	28.2" x 25.4" x 8.7" / 716mm x 645mm x 222mm // 37.7" x 25.4" x 8.7" / 958mm x 645mm x 222mm (-S/-S1/-S2 version)	
Unit Weight	lbs(kg)	101(45.8) (US version); 107(48.5) (S1 version); 114(51.7)(S2 version)	101(45.8) (US version); 107(48.5) (S1 version); 14(51.7)(S2 version)	
Shipping Weight	lbs(kg)	with pallet: 254(<115); without pallet: 143 (<65)	with pallet: 254(<115); without pallet: 143 (<65)	
Conduit Connections		Bottom: (1) 1/2" EKO,(2) 1" pluggable opening, (4) 1/2" pluggable openings / Left and Right Side: (1) Concentric EKOs 3/4", 1" Back: (2) Concentric EKOs 3/4", 1", (2) Concentric EKOs 3/4", 1"	Bottom: (1) 1/2" EKO,(2) 1" pluggable opening, (4) 1/2" pluggable openings / Left and Right Side: (1) Concentric EKOs 3/4", 1" Back: (2) Concentric EKOs 3/4", 1", (2) Concentric EKOs 3/4", 1"	
Mounting System		Wall Brackett	Wall Brackett	
Ground Fault Detector Fuse Size/ Type	A/V / mm	1/600/10x38	1/600/10x38	
Optional String Combiner Fuse Size/Type	A, A/V / mm	12, 15/600/10x38	12, 15/600/10x38	
DC Switch Current Rating (Per Contact)	A	32	32	
Safety				
Isolation Level		Isolated - High Frequency transformer	Isolated - High Frequency transformer	
Safety and EMC Standard		UL1741, CSA22.2 #107.1-01	UL1741, CSA22.2 #107.1-01	
Safety Approval		cCSAus	cCSAus	
Warranty				
Standard Warranty	Years	10	10	
Extended Warranty	Years	15 & 20	15 & 20	
Available Models				
Standard		PVI-12.0-I-OUTD-US-480-NG	PVI-12.0-I-OUTD-CAN-480-NG	PVI-12.0-I-OUTD-CAN-480-NG
With DC Switch and DC Fuses		PVI-12.0-I-OUTD-S1-US-480-NG	PVI-12.0-I-OUTD-S1-CAN-480-NG	PVI-12.0-I-OUTD-S1-CAN-600-NG
With AC and DC Switches and DC Fuses		PVI-12.0-I-OUTD-S2-US-480-NG	PVI-12.0-I-OUTD-S2-CAN-480-NG	PVI-12.0-I-OUTD-S2-CAN-600-NG

*All data is subject to change without notice

**Capability enabled at power-factor of +/-.995 and with sufficient DC power available.

***Inverter can be field configured to output up to 110% of rated power under certain conditions

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7.2 A DESCRIPTION OF THE SYSTEM

AURORA grid-tied inverters provide the capability to supply the utility grid with energy obtained from PV panels. To use the DC generated by a photovoltaic field efficiently, it must be transformed into alternating current (AC) via a conversion process known as DC-AC inversion.

This process is the basis of all grid-tied inverters and is achieved very efficiently by the AURORA Inverter without the use of rotating elements. When the inverter output is connected in parallel to the utility power grid, the alternating current output from the inverter flows directly into the distribution circuit, and is connected in turn to the public distribution utility grid.

The photovoltaic energy system can thus feed all the connected user electrical loads:

- If the energy supply from the photovoltaic system is lower than the user's load requirement, the quantity of energy necessary to guarantee normal functioning of the connected appliances is taken from the public distribution network.
- If the energy supply from the photovoltaic system is greater than the user's load requirement (i.e. an excess of energy is produced) it is sent directly into the public network, thus becoming available to other users.

Depending on prevailing codes and regulations of the installation area, the energy produced can be sold to the utility or credited against future consumption, thereby producing energy savings.

7.2.1 FUNDAMENTAL ELEMENTS OF A PHOTOVOLTAIC SYSTEM: 'STRINGS' AND 'ARRAYS'

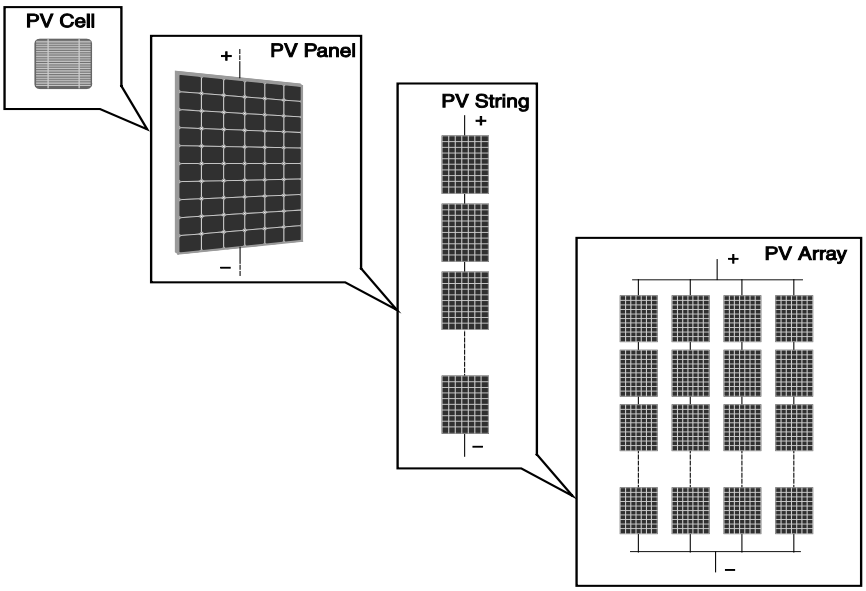

Figure 7.01 - Array Composition

In order to significantly reduce installation costs of the photovoltaic system, especially related to the wiring problem on the inverter DC side and the subsequent distribution on the AC side, the STRING technology was developed. The terminology is as follows:

- A photovoltaic panel is composed of a great number of photovoltaic cells fixed onto a single supporting base.
- A STRING consists of a certain number of panels connected in series.
- An ARRAY is one or more strings connected in parallel.

Large photovoltaic systems can be composed of several arrays, connected to one or more AURORA Inverters.

By maximizing the number of panels in each string, the cost and complexity of the connection systems of the plant can be reduced.

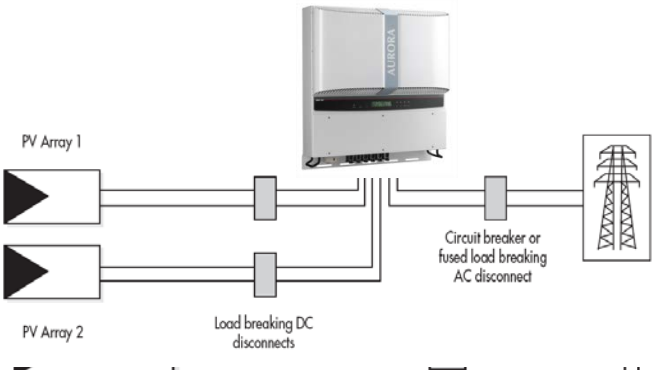

Figure 7.02 - Simplified Diagram of a Photovoltaic System

7.2.2 INVERTER INPUT - THE PHOTOVOLTAIC ARRAY

The input of a photovoltaic (PV) inverter is intended to be connected to a PV array. The input circuitry includes Maximum Power Point Tracking (MPPT) circuitry, which maximizes the output of the PV array under all allowable environmental conditions.

All AURORA models are provisioned with two independent inputs, each equipped with its own MPPT circuit that enables the AURORA Inverter to be connected to two independent arrays that are maximized for output power individually.

The MPPT circuitry has a specific operating range and the arrays must be designed to operate within this range. In order to properly operate the AURORA Inverter, proper array sizing must be completed and the results translated to a connectable system.

Array sizing is based on many variables and must be done for every array, as specifications are dependent on the type and quantity of PV panel used, and environmental factors such as expected high and low ambient temperatures to which the array will be subjected, as well as the orientation of the array panels to the sun.

In addition to properly sizing the array to match the inverter to which it is connected, the sizing of the interconnecting wiring is critical to ensure safe operation and high reliability. In North America, the wire sizing for the array and the grid interconnection are regulated and controlled by electric and building codes. Generally in the US, the National Electric Code (NEC) is used, but some areas use variations to this code. In Canada, the national code is the Electrical Safety Code (ESC); however, there are also local variations to this code (e.g., in Ontario the Ontario Electrical Safety Code (OESC) is the regulating document). The sizing and specification of a PV array requires trained individuals.

Decisions on how to structure a photovoltaic array depend on a number of factors and considerations, such as the type of panels, the available space, the future location of the system, long-term energy production targets, etc. Power-One offers a configuration program (AURORA Stringtool) that can aid the designer in setting

correct dimensioning of a photovoltaic array to match characteristics of AURORA Inverters is available on the Power-One website (http://stringtool.power-one.com/).

Array sizing concerns:

WARNING

To avoid equipment damage, the string voltage must not exceed 520 Vdc for any reason.

The effect of the negative thermal coefficient on the PV module's open circuit voltage causes Over Current (OC) Voltage to occur in conditions of minimum ambient temperature. It is the responsibility of the installer to check the PV generator's configuration before connecting any PV array.

The AURORA Inverter has a maximum allowable input current limit of 24Adc for each MPPT input channel.

NOTE:

The default value of the input voltage required to start the inverter (Vstart) is 200 Vdc; however, this can be set from the control panel over the range between 120 Vdc and 350 Vdc. This voltage level is required for the AURORA Inverter to start its grid connection sequence. Once connected, the inverter will transfer the maximum available power for any Vdc input voltage value in a range between 70% of the value set by Vstart and 520 Vdc to the grid.

7.2.3 TECHNICAL DESCRIPTION OF AURORA INVERTER

The main segments of the design are the independent input DC-DC converters (termed 'boosters', one for each MPPT channel) and the main output inverter. Both of the DC-DC converters and the output inverter operate at a high-switching frequency to enable a compact design and low weight.

These versions of Power-One's AURORA Inverters utilize "high-frequency switching" transformers, to provide a high-level of galvanic isolation between inverter input (array) and output (grid). This circuitry provides galvanic isolation from the secondary (AC side), while maintaining very high performance in terms of energy yield and export.

An AURORA with two independent input DC-DC converters; each converter is typically dedicated to a separate array and has independent Maximum Power Point Tracking (MPPT) circuitry and control. This means that the two arrays can be installed with different positions, facing different directions and with different string lengths; each array is controlled by an MPPT control circuit.

The AURORA's high efficiency and extra large heat dissipation system enables operation at maximum power over a broad range of ambient temperatures.

Two independent *Digital Signal Processors* (DSP) and one central microprocessor control the inverter; and therefore, two independent computers control the grid connection in full compliance with safety standards and regulations.

The AURORA Inverter operating system (program) communicates with all of the sub-systems within the inverter performing necessary data processing, calculations to guarantee optimal performance levels of the system and high-power harvesting in all installation and load conditions, while maintaining full compliance with prevailing safety directives, laws and regulations.

7.3 PROTECTIVE DEVICES WITHIN THE AURORA INVERTER

7.3.1 INVERTER OUTPUT - THE GRID CONNECTION

The inverter converts energy harvested from the PV array into a form that can be transported to the connected AC grid, and by doing so, enables the energy to be used to power grid-loads.
Connections of an inverter to the grid is a very controlled process not only in the actual electrical connection, but the regulatory processes required to gain approval from the controlling utility and other regulatory bodies. AURORA Inverters meet the requirements of all interconnection standards.

7.3.2 DATA TRANSMISSION AND CHECK

The AURORA Inverters have a sophisticated communication capability that enables monitoring of single or multiple inverters over a single communication link. Remote monitoring is implemented over an RS-485-based serial interface using a version of the AURORA Protocol. There is an optional web-based data logging system (AURORA Universal) also available for remote monitoring via the Internet via LAN, or GSM digital modem. The PVI-Desktop is another monitoring option that enables (with the use of the PVI-Radio-module installed in each inverter) the ability to monitor wirelessly operation of up to six inverters within a 1000-foot radius. The PVI desktop is not a web-based monitoring system and is intended for local ('in-house") monitoring applications.

7.3.3 ANTI-ISLANDING

When the local utility AC grid fails due to a line fault or otherwise interrupted (e.g., equipment maintenance) the AURORA must be physically disconnected in a fail-safe manner to protect any personnel working on the network. The AURORA system accomplishes this in full compliance with all prevailing standards and regulations. To avoid any possible operation without the presence of an active grid connection, the AURORA design includes an automatic disconnection protection system called 'Anti-Islanding'. All AURORA models are equipped with an anti-islanding protection system certified to both US and Canadian standards (UL Std N.1741 and CSA-C22.2 N.107.1-01)

7.3.4 GROUNDING/DIFFERENTIAL PROTECTION FAULT

AURORA Inverter has a sophisticated ground protection circuit that continually monitors the ground connection for significant changes in fault current. when a ground fault current sufficient to cause safety hazards is detected, this circuit shuts down the inverter and illuminates a red LED on the front panel indicating a ground fault condition. The AURORA Inverter is equipped with a terminal for the system ground conductors.

DANGER:

Normally grounded conductors may be ungrounded and energized when a ground-fault is indicated.

- **Risk of electric shock**
- **Test before touching**
- **Work on the AURORA Inverter must be carried out by qualified personnel.**

The protective devices for ground fault detection and control comply with CSA-C22.2 N.107.1-01 and UL Std N.1741.

NOTE:

7.3.5

7.3.6 ADDITIONAL PROTECTIVE DEVICES

AURORA Inverter is equipped with additional protections to ensure the safe operation under any circumstances. Such protections include:

- Consistent monitoring of grid voltage to ensure that voltage and frequency remain within the specified operational limits (in accordance with UL 1741 standard);
- Automatic power limitation (derating) controlled by internal temperature monitoring to avoid overheating (heat sink temperature ≥158°F).

7.3.7 POWER DERATING

In order to ensure inverter operation under safe conditions both from the temperature and electrical point of view, the unit automatically decreases power input to the grid. Power derating can occur in two cases:

- **Power reduction due to environmental conditions**

Power reduction and temperature, at which it occurs, depends on many operating parameters other than ambient temperature; such as input voltage, grid voltage, and power available from the photovoltaic panels. AURORA Inverter can thus decrease power output during certain periods of the day according to these parameters.

In any case, the AURORA Inverter ensures maximum power up to 50°C provided it is not directly exposed to the sun.

- **Power reduction due to input voltage**

Necessary conditions for power derating due to environmental conditions and to input voltage can occur at the same time, but in this instance power derating will always consider the lowest value detected.

7.3.8 FCC

The equipment specified in this manual complies with Part 15 of the FCC rules. Operation is subject to following two conditions:

(1) This equipment may not cause harmful interference.
(2) This equipment must accept any interference received, including interference that may cause undesired operation.

7.4 INDEX OF FIGURES AND TABLES