



AURORA® TRIO Photovoltaic Inverters

The Manual: PVI-10/12-I-OUTD

AURORA TRIO Model Number

Rated Output Power

PVI-10.0-I-OUTD-(S/S1/S2)-US/CAN-xxx-yy

10kW_{RMS}

PVI-12.0-I-OUTD-(S/S1/S2)-US/CAN-xxx-yy

12kW_{RMS}



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PART 1: INTRODUCTION & SAFETY

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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 TRIO Inverter, please contact Power-One Customer Service at 877-261-1374.

USEFUL INFORMATION AND SAFETY REGULATIONS

1.0 FOREWORD

This manual contains important instructions for the Power-One AURORA® TRIO Inverter that must be followed during installation and maintenance of this inverter.

This grid-tied inverter operates only when properly connected to the AC distribution network and requires the services of qualified technical personnel to connect only after receiving appropriate approvals, as required by the local authority having jurisdiction.

This document is not intended to replace any local, state province, federal, or national laws, regulation or codes applicable to the installation and use of the inverter, including without limitation applicable electrical safety codes. All installations must conform to the laws, regulations, codes and standards applicable in the jurisdiction of installation. Power-One assumes no responsibility for the compliance or noncompliance with such laws or codes in connection with the installation of the inverter.


KEEP ALL DOCUMENTS IN A SAFE PLACE!

2.0 INTRODUCTION

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® TRIO Photovoltaic (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.





2.1 Target Group

 CAUTION:	For safety reasons only a qualified technician, who has received training and/or has demonstrated skills and knowledge in construction and in operation of this unit, can install this inverter.
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This manual is for qualified installers and/or licensed technicians who know and understand the National Electric Code and other applicable local code regulations. For a list of certified contractors to help install this unit, please contact Power-One's Customer Service department at 877-261-1374.

2.2 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"W x 8.7"D 99 lb	These models do not have integrated DC and AC switches or the associated switchbox; in this case, the installer must provide these disconnect switches externally.
	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	This model has a small switchbox. This small switchbox version is being phased 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	This model has a large switchbox. It has an integrated DC switch and dual 3-string fused combiners.
	PVI-10.0/12.0-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	This model has two available versions, both have integrated DC and AC switches, and new version is provisioned with dual 3-string fused combiners

- There are three grid-voltage options:
 - 208 models are for connection to a 208 $V_{RMS}/3\emptyset$ grid
 - 480 models are for connection to a 480 $V_{RMS}/3\emptyset$ grid
 - 600 models are for connection to a 600 $V_{RMS}/3\emptyset$ grid
- There are two array ground reference options:
 - **Negative Ground** (NG) models have the negative side of the PV array referenced to ground.
 - **Positive Ground** (PG) models have the positive side of the PV array referenced to ground and can be operated only with the two MPPT channels in parallel mode.

Table 0-1, below, shows feature data encoded into the part numbers.

Table 0-1: Part Number Coding Information											
Product Series		Output Power		Isolation Type		Disconnect Switch Options		Use Location		Grid Voltage Option	PV Array Ground Reference Option
PVI	-	10.0	-	I		S2	-	US	-	480	NG
PVI => Aurora PV Inverter Platform		10.0 => 10kW 12.0 =>		I => With high frequency isolation transformer		[Empty] => No switchbox [US/S/S1/S2] => w/ integral		US=> Designed for North America		208=> 208V/3 \emptyset 3W OR 4W* 480=> 480V/ 3 \emptyset 3W OR 4W	NG=> Negative referenced PG=> Positive

		12kW			DC disconnect switch [S2] => w/integral AC and DC switches		CAN=> Designed for Canada		480=> 480V/ 3Ø 3W OR 4W 600=> 600V/ 3Ø-4W		referenced
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, 480V grid with negative grounding. *Switchable											

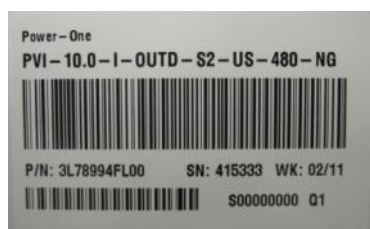
The available versions are as listed below:

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

2.2.1 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



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

2.2.2 Warranty Information

After inspecting the AURORA TRIO 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.

2.3 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.

2.4 MAINTENANCE AND SERVICE

The AURORA TRIO 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.

2.5 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.

2.6 STORAGE OF THIS INFORMATION

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

2.7 ADDITIONAL INFORMATION

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








3.0 SAFETY

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.
 NOTE:	Contain 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.


3.1.2 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
	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.

	<p>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</p>
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3.2 GENERAL INSTALLATION WARNINGS

 WARNING:	<ul style="list-style-type: none"> The AURORA TRIO 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.
	<ul style="list-style-type: none"> 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.
	<ul style="list-style-type: none"> This grid-tied inverter system operates only when properly connected to the AC-distribution network. Before connecting the services of AURORA TRIO to the power distribution grid, contact the local power distribution grid company. This connection must be made only by qualified technical personnel to connect, and only after receiving appropriate approvals, as required by the local authority having jurisdiction.
	<ul style="list-style-type: none"> In order to minimize the potential of a shock hazard due to hazardous voltages, cover the entire solar array with dark material prior to connecting the array to any equipment.
	<ul style="list-style-type: none"> The Power-One AURORA TRIO Inverter is designed and tested according to international safety requirements (UL 1741/IEEE 1547), but as with all electrical and electronic equipment, certain precautions must be observed and followed during installation.
	<ul style="list-style-type: none"> Keep this documentation in the immediate vicinity of the AURORA TRIO Inverter. It must be accessible for approved technical service and maintenance personnel at any time.
	<ul style="list-style-type: none"> Basic safety rules require using qualified and trained personnel possessing the skills necessary for assembly, mounting, start-up and operation of the product.


3.2.1 Assembly Warnings

 WARNING:	<ul style="list-style-type: none"> 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.
	<ul style="list-style-type: none"> Assemble the inverter per the instructions in this manual. Use care when choosing installation location and adhere to specified cooling requirements.
	<ul style="list-style-type: none"> Unauthorized removal of necessary protections, improper use, incorrect installation and operation may lead to serious safety and shock hazards and/or equipment damage.

3.2.2 Electrical Connection Warnings

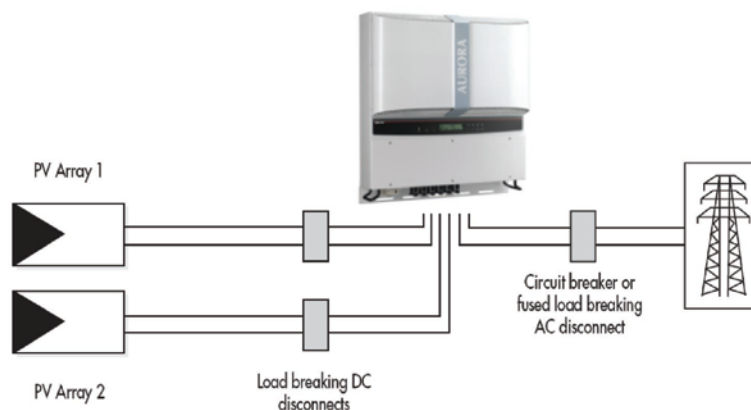
 WARNING:	<ul style="list-style-type: none"> Make all electrical connections (e.g. conductor termination, fuses, PE connection, etc.) in accordance with prevailing regulations. When working with the inverter powered on, adhere to all prevailing safety regulations to minimize risk of accidents.
	<ul style="list-style-type: none"> 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.

3.2.3 Operation Warnings


 WARNING:	<ul style="list-style-type: none"> Anytime the inverter has been disconnected from the power network, use extreme caution as some components can retain charge sufficient to create a shock hazard; to minimize occurrence of such conditions, comply with all corresponding safety symbols and markings present on the unit and in this manual.
	<ul style="list-style-type: none"> Ensure all covers and doors are closed and secure during operation.
	<ul style="list-style-type: none"> 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.






3.3 APPROPRIATE USAGE

The AURORA TRI0 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 TRI0 Inverter is suitable for outdoor installation only.



3.4 SAFETY INSTRUCTIONS

 DANGER:	<p>Be sure all flammable materials including construction items are away from the unit. Do not install the inverter in or near potentially explosive areas.</p>
--	---


 DANGER:	<p>Normally grounded conductors may be ungrounded and energized when a ground-fault is indicated.</p> <ul style="list-style-type: none">• Risk of electric shock• Test before touching• Work on the AURORA TRIO inverter must be carried out by qualified personnel.
 WARNING:	<p>Do not connect an AURORA TRIO Inverter to the electrical distribution grid until after receipt of a letter of authorization from the authority having jurisdiction.</p>
 WARNING:	<p>Install the AURORA TRIO Inverter in accordance with the electrical standards prescribed by the applicable National Electric Code and/or by other local codes and regulations.</p>
 CAUTION:	<p>The inverter weight is about 120lbs and is susceptible to tipping. It requires two or more persons to mount to bracket. Use proper lifting techniques to avoid personal injury.</p>
 CAUTION:	<p>Cuts and scratches due to sharp edges inside the AURORA TRIO Inverter. Please use gloves and eye protection when working on this unit.</p>

3.5 LOCATION OF SAFETY NOTICES

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

PART 2: UNPACK & SELECT INSTALL LOCATION

1.0 UNPACK AND INSPECT

 WARNING	<ul style="list-style-type: none"> • 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.
--	--

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 TRIO Inverter, please perform the following check:

- Inspect the shipping container for any external damage.
- Inventory the contents against the listing of Table 0-1 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 0-1: 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	

1.2 Selecting The Installation Location

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 0-1 shows the recommended minimum clearances around the inverter.
6. When possible, mount the AURORA TRIO Inverter vertically. For other mounting orientations consult with Power-One.
7. Tilted mounting ($\pm 5^\circ$ from vertical) is acceptable, but will reduce heat dissipation and may result in self-derating.

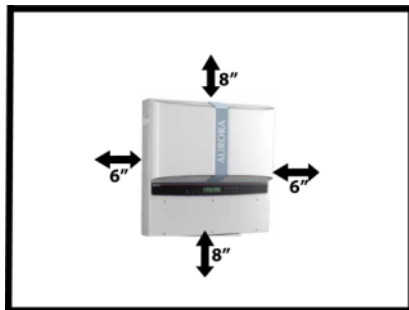


Figure 0-1 - Minimum Clearances around the AURORA Inverter



WARNING


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



Figure 0-2a Recommended Arrangement
For installation of AURORA TRIO Inverter



Figure 0-2b Unacceptable Arrangement
For installation of AURORA TRIO Inverter

 NOTE	<p>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.</p> <p>When the ambient temperature rises above 113°F/ 45°C the inverter may self-derate the output power.</p> <p>For full power of AURORA TRIO Inverter (no derating), be sure the airflow through the heat sink is clear. Blockages will result in less than expected power output.</p>
---	---

PART 3: MOUNTING & WIRING

Section 1:

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

Section 2A:

PVI-10/12-I-OUTD-S-US/CAN-XXX (without fuse holders)

Section 2B:

PVI-10/12-I-OUTD-S1-US/CAN-XXX (with fuse holders)

Section 3A:

PVI-10/12-I-OUTD-S2-US/CAN-XXX (without fuse holders)

Section 3B:

PVI-10/12-I-OUTD-S2-US/CAN-XXX (with fuse holders)

Section 4:

WIRING DETAILS

Read and apply all safety warnings when performing these tasks.



SECTION 1: PVI-10/12-I-OUTD-US/CAN No Switchbox Version

1: 1.0 NAMEPLATE

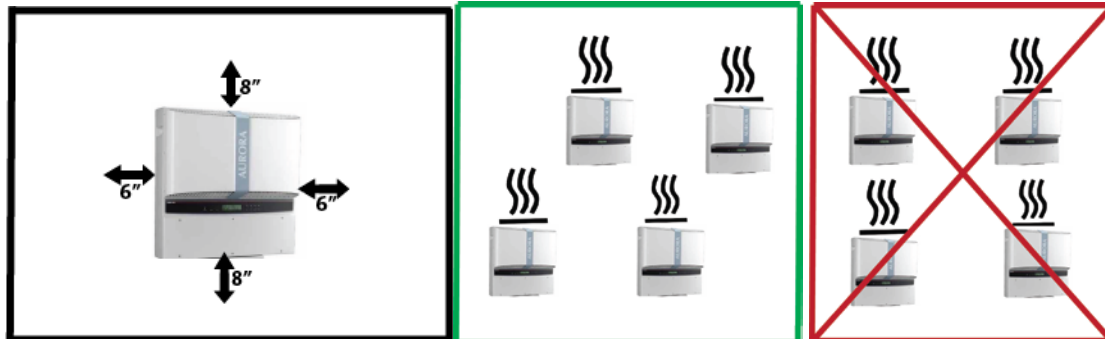
The nameplate shown above is affixed to the inverter and provides the following information:

- 5) Manufacturer code
- 6) Model code
- 7) Serial number
- 8) Week/Year of production



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

1: 2.0 UNIT MOUNTING PVI-10/12-I-OUTD-US/CAN-XXX-YY



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**.

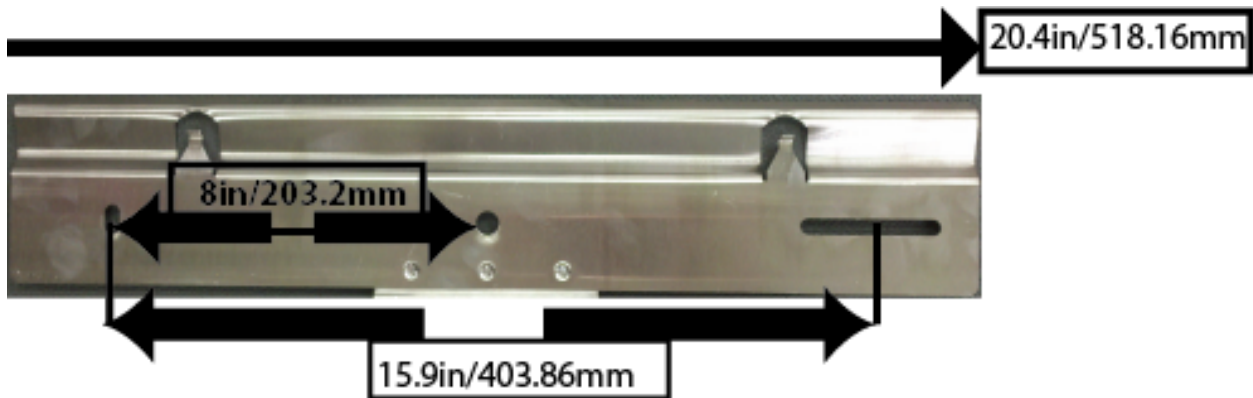


Figure 1: 01a- Bracket and Measuring Details

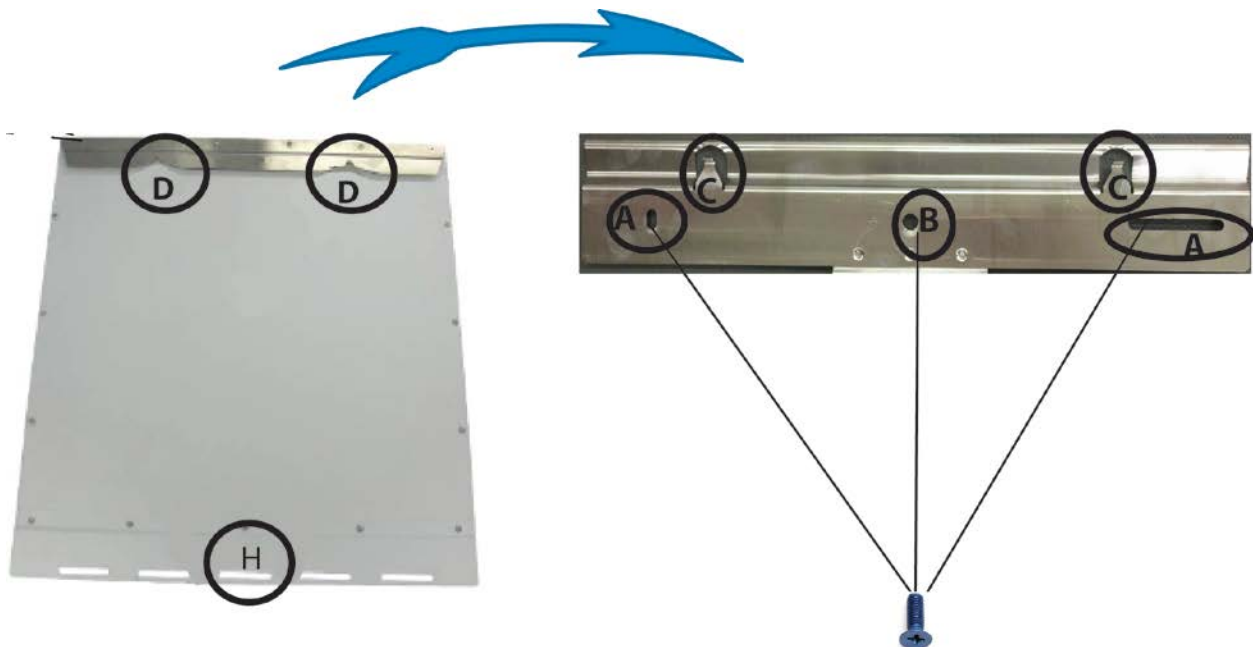


Figure 1: 01b- Bracket and Mounting Details

1: 3.0 INSTALLATION PVI-10/12-I-OUTD-US/CAN-XXX-YY

3.1 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 1:02 below.

- To remove the front cover of the inverter compartment, loosen the six captive screws indicated 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.

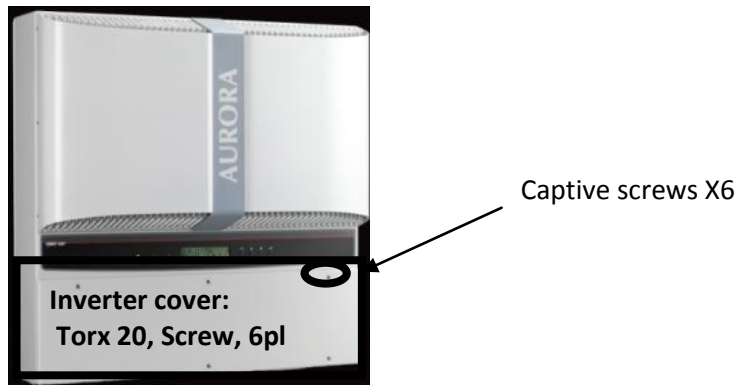




Figure 1:02- Location of Front Access Panels

1: 3.2 Electrical Wiring and Connections PVI-10/12-I-OUTD-US/CAN-XXX-YY

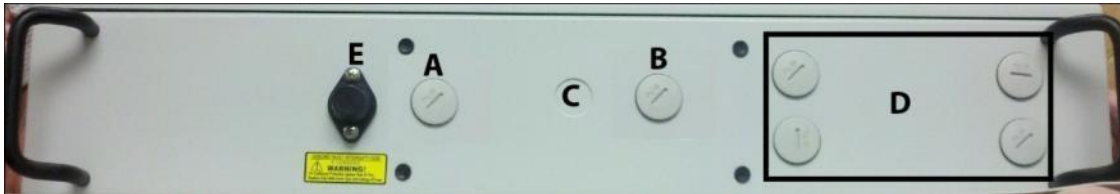
 DANGER	<ul style="list-style-type: none"> This section is dedicated to <u>initial</u> installation wiring of the AURORA TRIO Inverter and assumes the unit has been physically mounted in its final location, but not yet wired. If the inverter has been previously wired and connected to the PV array and/or the AC grid, refer to Part 4: Operations & Start-Up for proper disconnect procedures.
---	---

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

 WARNING	<ul style="list-style-type: none"> 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 TRIO 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: <ul style="list-style-type: none"> 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 data sheet in Part 7 for more details. An automatic over-current device (e.g., circuit breaker) must be used between the AURORA Inverter and the distribution grid.
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3.2.2 Field Wiring –Knockout Details PVI-10/12-I-OUTD-US/CAN-XXX-YY

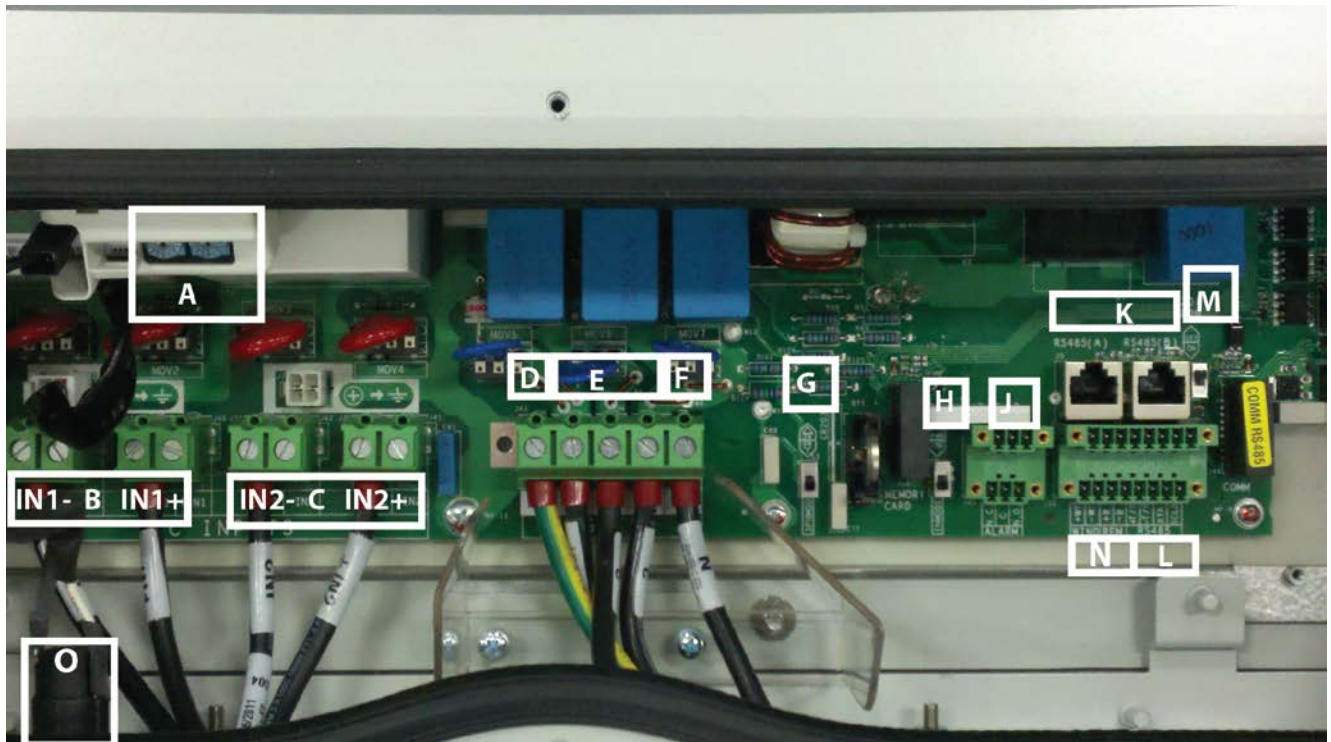



Code Location	Description	Code Location	Description
A	DC Power Cable Knockouts; 1", ¾" trade size.	D	Signal Cable Knockouts; ½" trade size
B	AC Power Cables Knockouts 1", ¾" trade size	E	GFD Fuse Holder
C	Ground Cable Knockouts; 1/2" trade size		

Figure 1:03 Chassis Layout

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

 WARNING	<ul style="list-style-type: none"> It is the responsibility of the installer to provide external disconnect switches and Over Voltage Current Devices (OCPD) as required by National Electric Codes and other prevailing regulations. Use care when accessing the DC array and AC grid wiring and associated terminals as this version has no integrated disconnects 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.
--	--



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 ϕ AC Grid Output Terminals	Note 2 below	M	RS485 Termination Switch	See Signal Connection Section for more detail
F	3 ϕ 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 3 ϕ 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.

Figure 1:04 Wiring Connection Details for PVI-10/12-I-OUTD-US/CAN-XXX

3.2.3 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: 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: 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 in Figure 1:01.

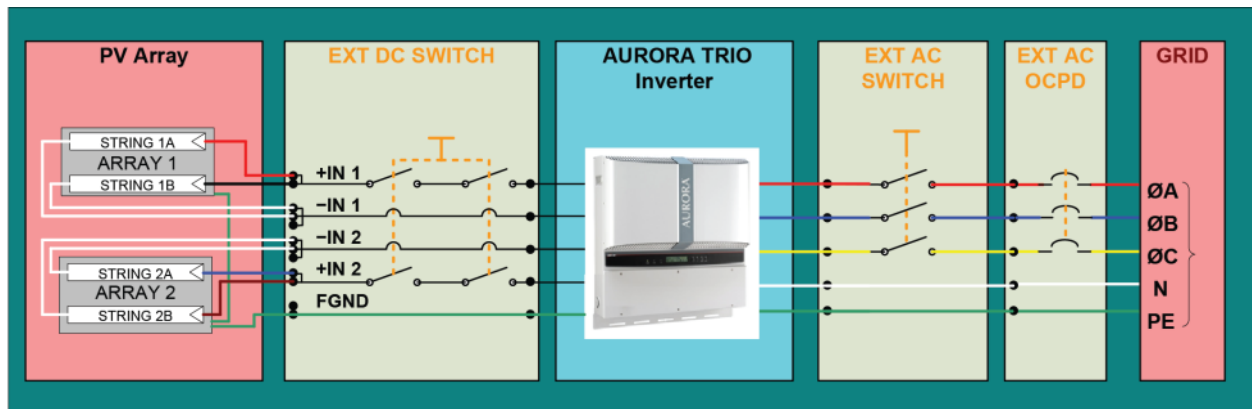

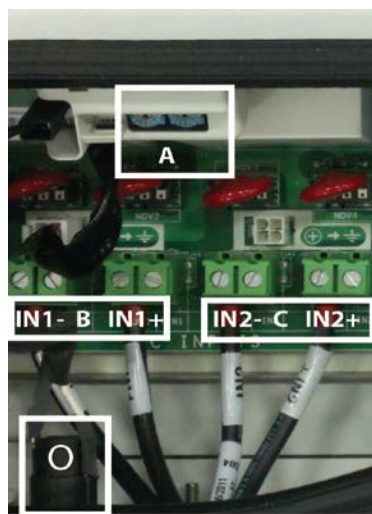


Figure 1: 05 Electrical Connection Diagram PVI-10/12-I-OUTD-US-XXX-NG

1. Refer to Figure 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.

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

 WARNING	<ul style="list-style-type: none"> 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.
---	---



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 <ol style="list-style-type: none"> 1. Terminals accept wire range #12-#4AWG torque to 13in-lb. 2. GFD fuse is accessed externally 		

Figure 1:06 DC Array Connections PVI-10/12-I-OUTD-US/CAN-XXX

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.

3.2.5 Ac Grid Connections PVI-10/12-I-OUTD-US/CAN-XXX-YY

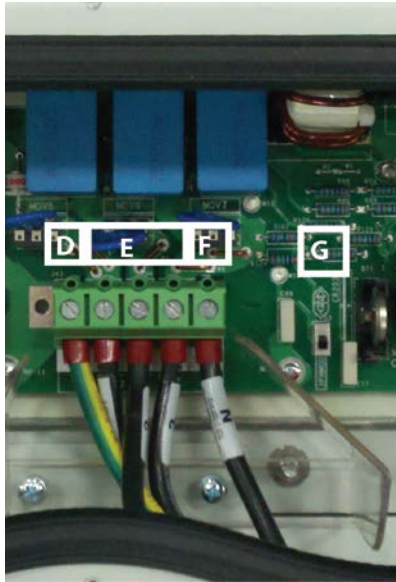


Figure 1:07 AC Grid Connections

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					

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.

Once de-energized, connect the AC wiring to the AC grid terminals as shown in Figure 1:07.

- 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.
- 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.

3.2.6 Signal Wiring Connections -PVI-10/12-I-OUTD-US/CAN-XXX-YY

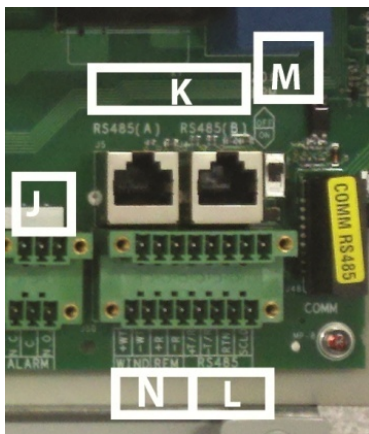


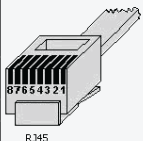
Figure 1:08 Signal Configuration Connections

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.

3.2.6.1 Connect RS485 Monitoring Cable

- If using CAT5 cable for monitoring connections, connect RJ45 plug to the end of the cable as shown in Table 3a 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.
- 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.

	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 3a: RJ45 Connectors

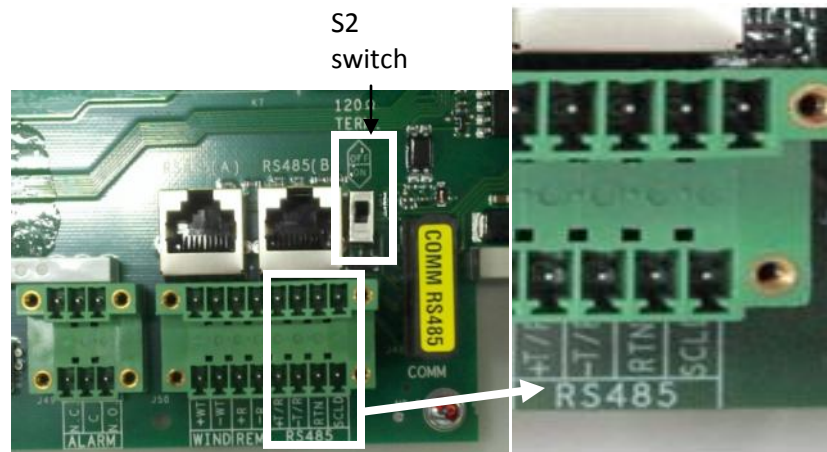


Figure 1:09: Standard RS 485 Connection

1: 3.3 CONFIGURATION PVI-10/12-I-OUTD-US/CAN-XXX-NG

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.

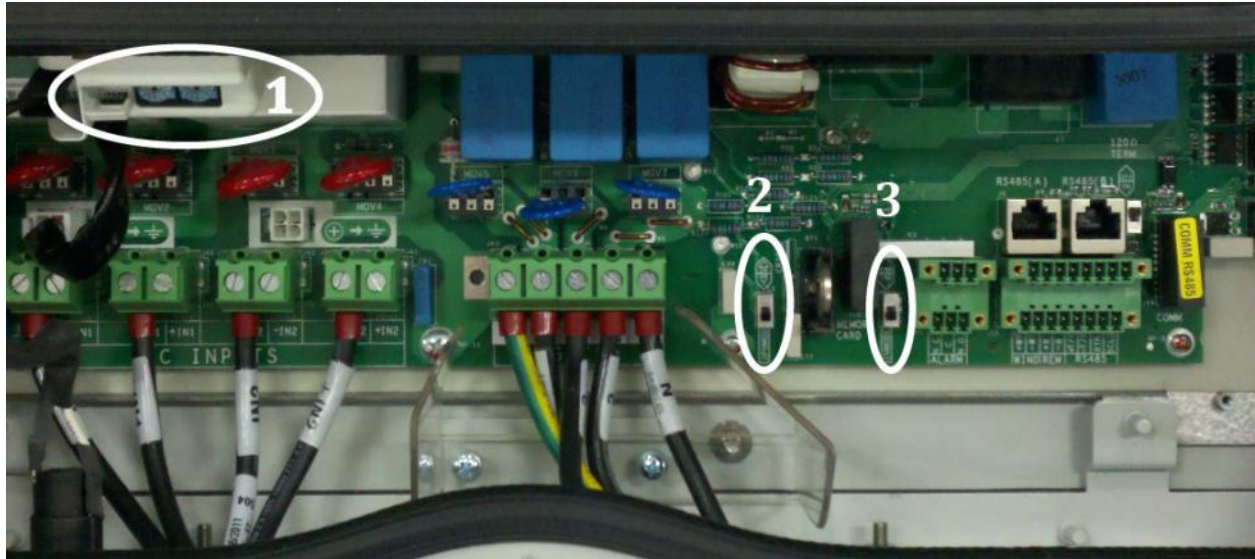
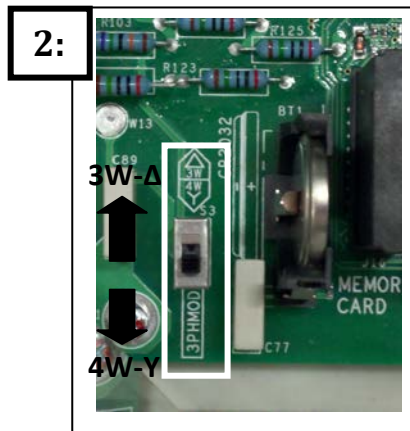


Figure 1:10- Configuration Settings

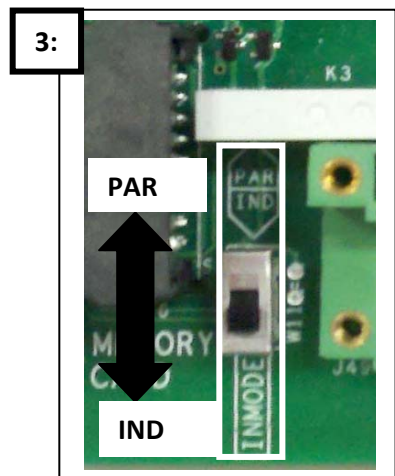
COUNTRY CODE SELECTOR



3PHMOD SWITCH



PAR/IND INMODE SWITCH



3.3.1 Selecting The Country Code

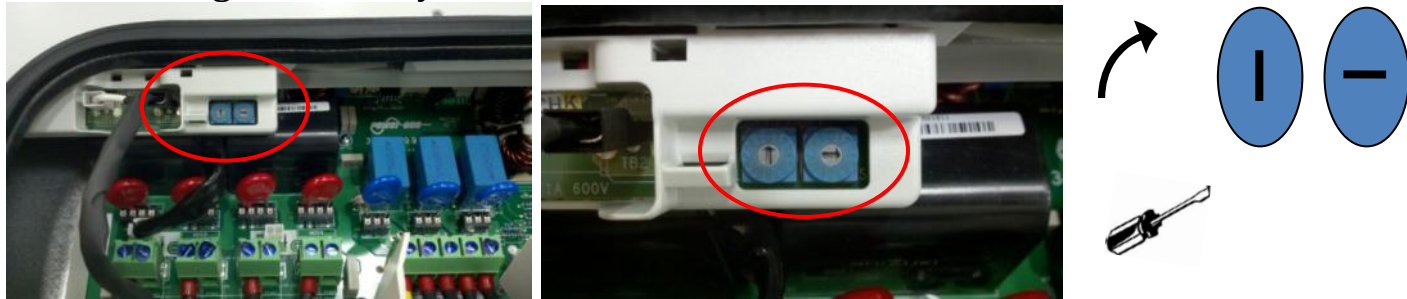


Figure 1: 11- Selector Switches for choice of Country Code.

The inverter has a two selector switches (see Figure 1:11) enables 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.

3.3.2 Grid-Type Configuration: Three-Phase Mode Switch

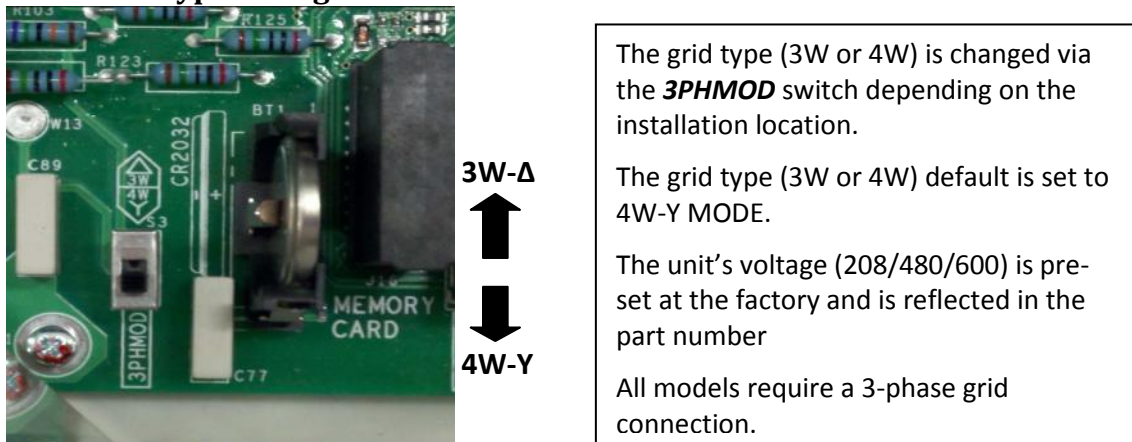


Figure 1:12 Grid-Type Configuration; 3W-Δ/ 4 W-Y

3.3.3 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.

3.3.3.1 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 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 TRIO Inverter to independent mode configuration, re-install the front panel (apply 13.2 in-lbs of torque to each of the 4 screws).

- This unit is default set to the independent mode: IND

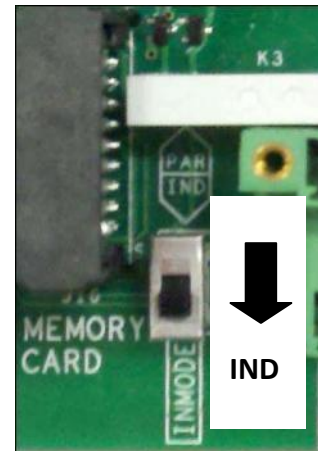


Figure 1:13: INMODE switch set to IND mode

3.3.3.2 Parallel Connection

To operate the inverter in the single MPPT mode:

- Place switch “INMODE” (shown in Figure 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 14b using two #10 AWG jumper wires (1 black and 1 red cable) to connect the input.

- After switching the AURORA TRIO Inverter to parallel mode configuration, re-install the front panel (apply 13.2 in-lbs of torque to each of the 4 screws).

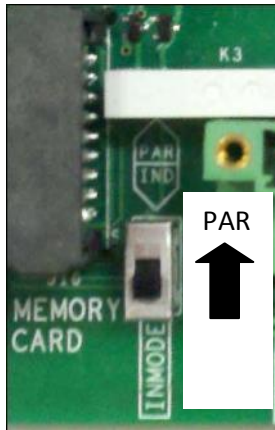


Figure 14a: INMODE switch set to PAR mode



Figure 14b: Add Jumpers for Parallel MPPT Input Configuration



WARNING

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

SECTION 2: PVI-10/12-I-OUTD-S-US/CAN



Section 2a:
PVI-10/12-I-OUTD-S-US/CAN-XXX
Without fuse holders



Section 2b:
PVI-10/12-I-OUTD-S1-US/CAN-XXX
With fuse holders



SECTION 2a: PVI-10/12-I-OUTD-S-US/CAN* Without fuse holders

*The PVI-10/12-I-OUTD-S-US/CAN will be replaced by the PVI-10/12-I-OUTD-S1-US/CAN in 2012.

2a: 1.0 NAMEPLATE

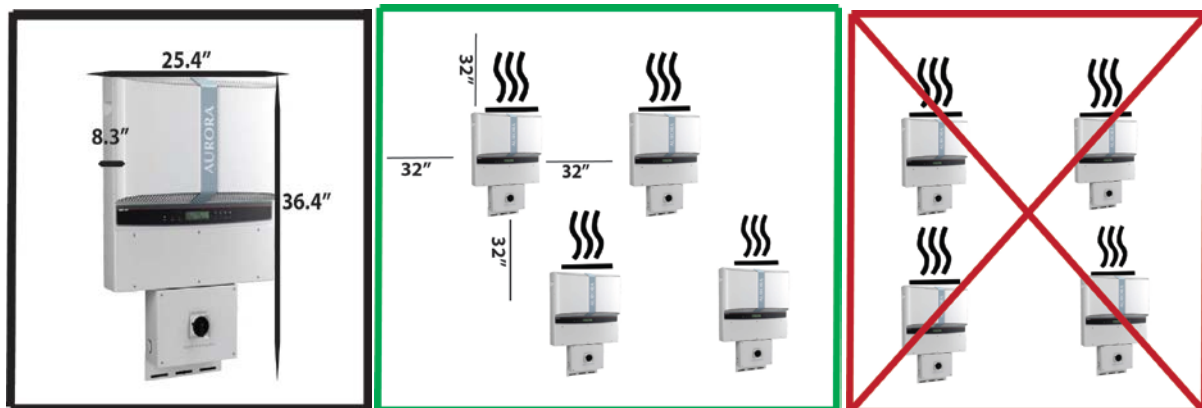
The nameplate shown above is affixed to the inverter and provides the following information:

- 9) Manufacturer code
- 10) Model code
- 11) Serial number
- 12) Week/Year of production



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

2a: 2.0 MOUNTING PVI-10/12-I-OUTD-S-US/CAN-XXX-YY



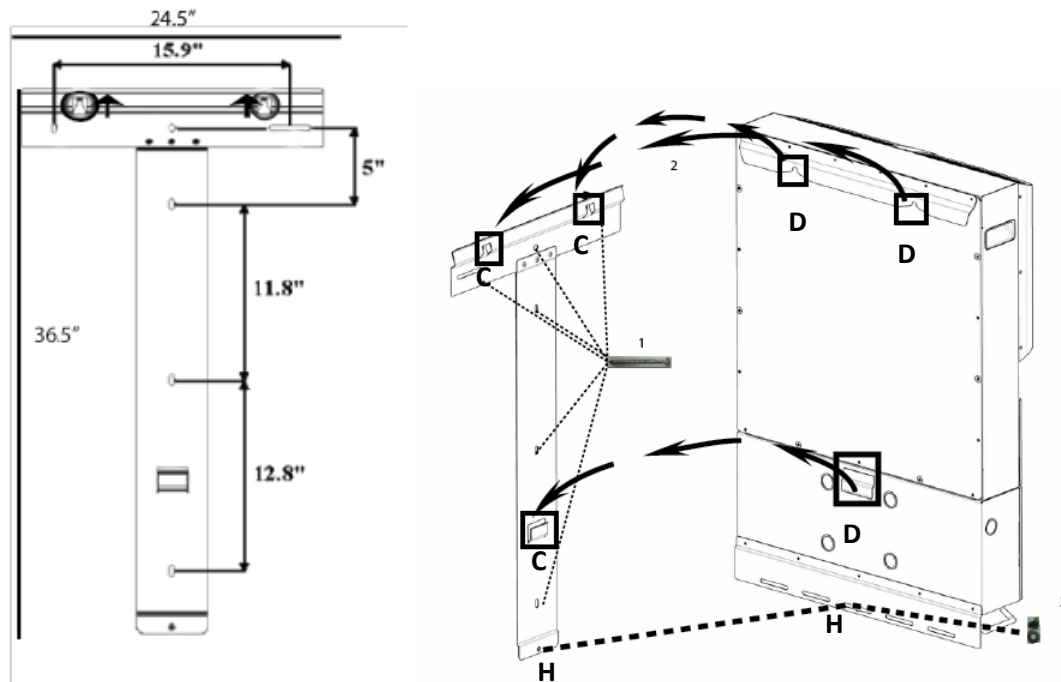


Figure 2:01 Bracket and Mounting Details

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)

2a: 3.0 INSTALLATION PVI-10/12-I-OUTD-S-US/CAN-XXX-YY

3.1 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 captive screws indicated using the Torx screwdriver provided.
- To remove the front cover of the **switchbox** Figure 2:02, 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 2:02- Location of Front Access Panels

3.2 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 TRIO 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.

3.2.1 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.



3.2.2 Field Wiring-Knockout- Details PVI-10/12-I-OUTD-S-US/CAN-XXX-YY

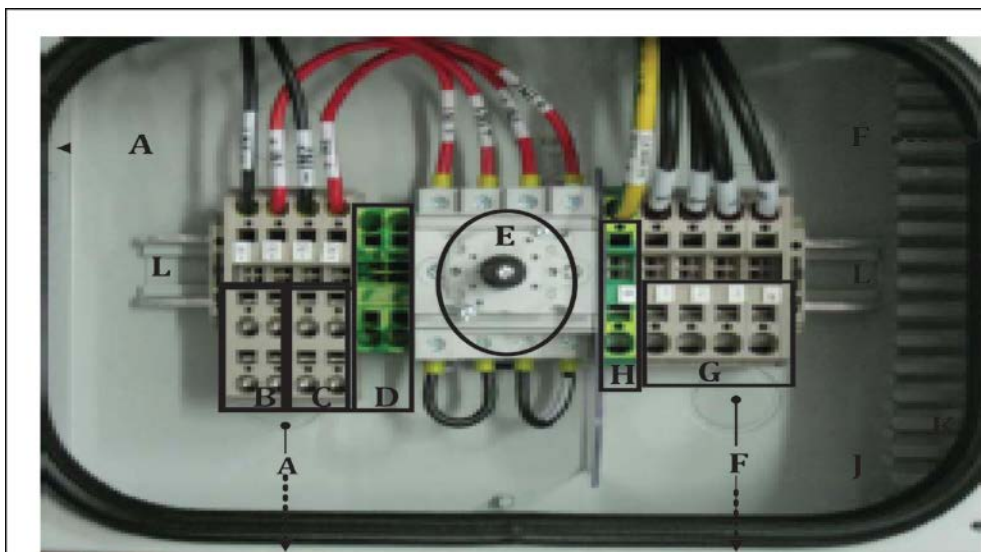
To access the wiring components inside the switchbox shown in Figure 2:04, loosen the four cover panel captive screws shown in Figure 2:02, and remove the cover panel.



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

Figure 2:03 DC Switchbox Chassis Layout

 WARNING	<p>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.</p> <p>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.</p>
 WARNING	<p>The -S Version (PVI-10/12-I-OUTD-S-US/CAN-XXX-YYY) switchbox disconnects the DC current from the photovoltaic panels when the switch is in "OFF" position. It DOES NOT disconnect the AC connection to the grid. To disconnect the inverter from the AC grid, an AC switch (not included in this AURORA TRIO switchbox) must be disconnected.</p> <p>Due to the high voltage present on the power cable in the switchbox, ALWAYS disconnect the switchbox from the DC power cables, as described in the Part 4: Operations, prior to working on the cables.</p>





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					

Figure 2:04 Switchbox Wiring Connections Details (PVI-10/12-I-OUTD-S-US/CAN-XXX-NG Version)

3.2.3 Initial Electrical Connections PVI-10/12-I-OUTD-S-US/CAN-XXX-NG

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

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. 3-phase, 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.
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.

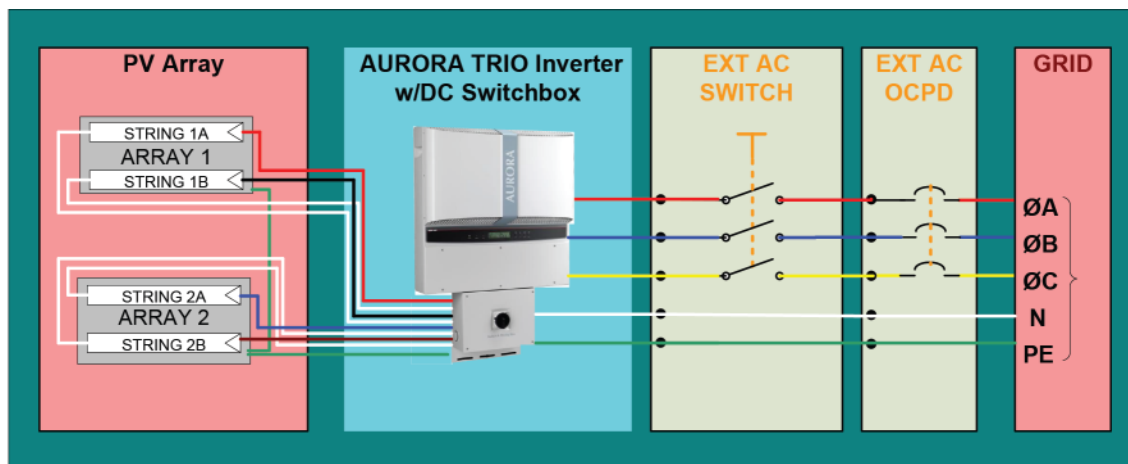


Figure 2:05: Electrical Connection Diagram PVI-10/12-I-OUTD-S-US/CAN-XXX-NG

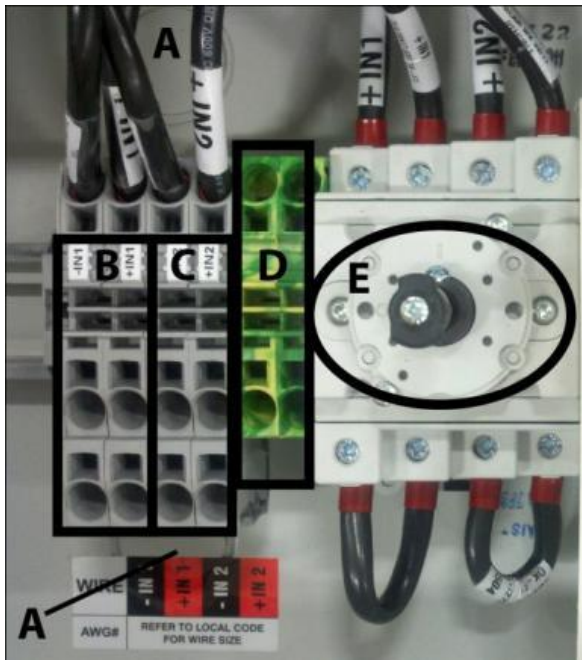
1. Refer to the photo of Figure 2:03 and locate the designated entry locations for the conduits from the DC array and to the AC grid.
2. Make sure the appropriate knockouts are employed for the use specified in order to maintain required spacing between wiring groups.

3.2.4 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.



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

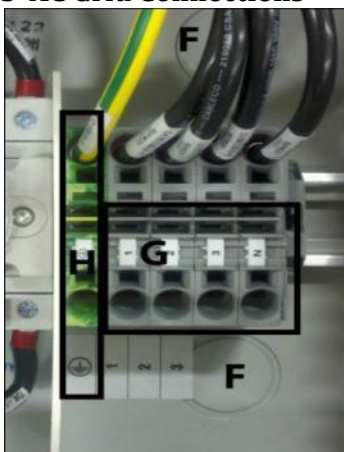
Notes:


- 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.

3.2.5 AC Grid Connections



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:

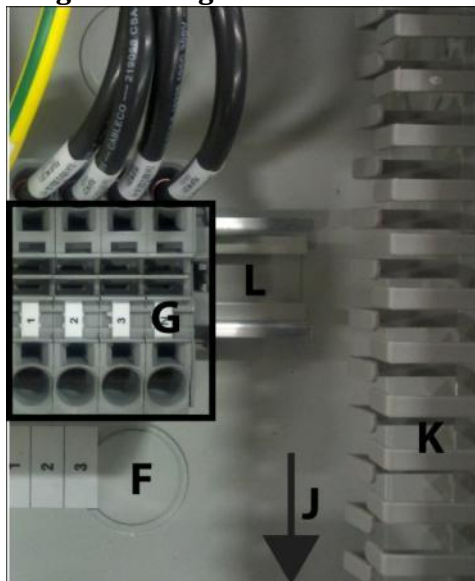
1. Terminal accepts up to #4AWG
2. 3W or 4W via 3PHMOD switch setting.

Figure 2:07-AC Grid Connection

- 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 is to be 3W, the Neutral conductor does not need not 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.

3.2.6 Signal Wiring Connections



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	

Figure 2:08 Signal Wire Routing

- 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.

3.2.6.1 Connect RS485 Monitoring Cable

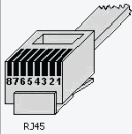
	Pin #	Signal Name	Description	Notes
	1,2,6,8	N/U	-	-
	3	+TR	+ Data Line	1
	4	+R	Remote OFF	2
	5	-TR	- Data Line	1
	7	RTN	Signal Return	1
1. Required for RS485 communication 2. Required or Remote OFF control 3. Common reference for logical signals				

Table 3: RJ45 Connectors

The Manual:
PVI-10/12-I-OUTD-(US,S,S1,S2)-US/CAN

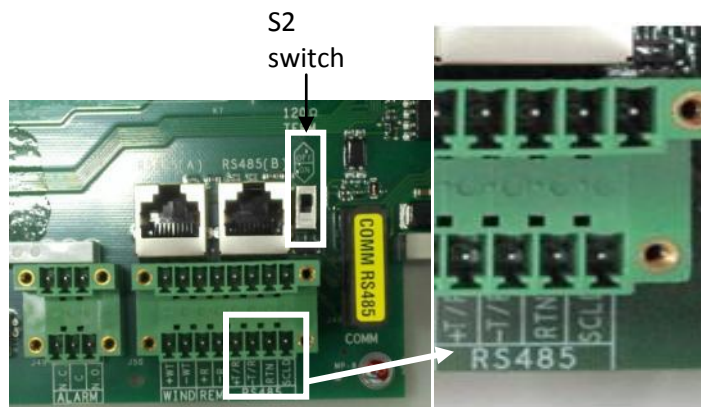


Figure 2:09: Standard RS485 connection

- a. If using CAT5 cable for monitoring connections, connect RJ45 plug to end of cable as shown in table 3, and plug into RJ45 jack shown in Table 3; a second jack is in parallel to accommodate daisy chaining of communication line to other inverters.
- b. If using standard multi-wire cable locate the mating connector (hardware bag) and connect the three RS-485 leads. Plug connector into position shown in Table 3; second connector is to facilitate daisy chaining. See Table 3 and Figure 2:09 or refer to the multi-system wiring section.

2a: 3.3 DC INPUT CONFIGURATION PVI-10/12-I-OUTD-S-US/CAN-XXX-NG

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.

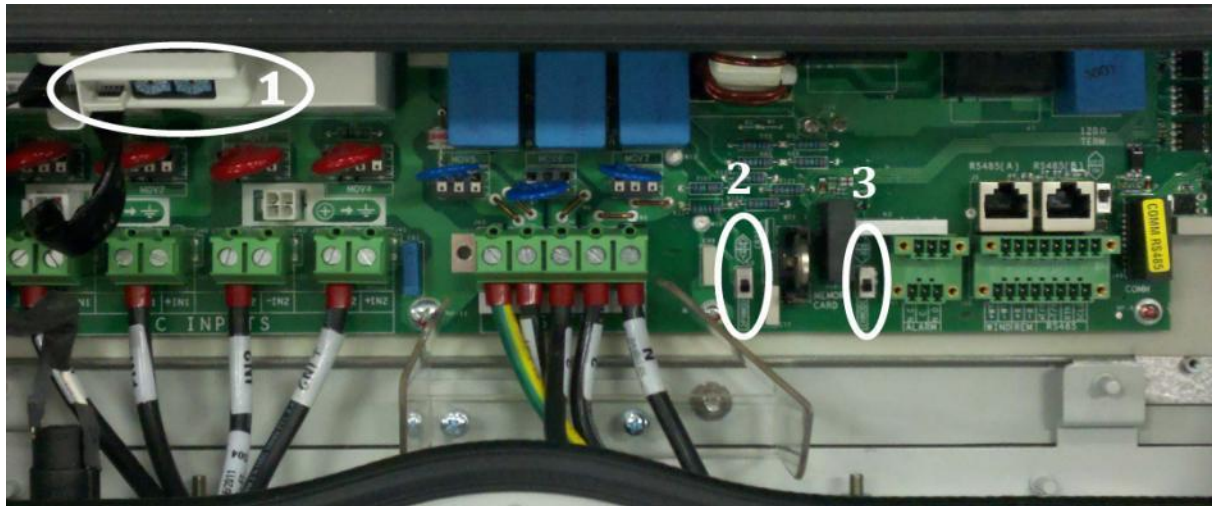


Figure 2:10: Configuration Settings

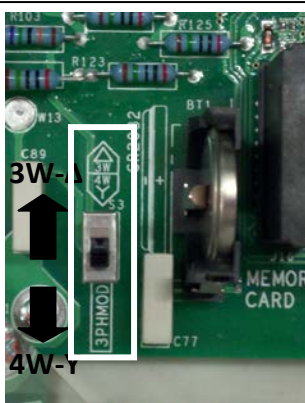
COUNTRY CODE SELECTOR

1:



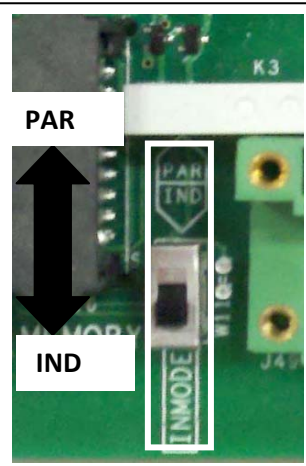
3PHMOD SWITCH

2:



PAR/IND INMODE SWITCH

3:



3.3.1 SELECTING THE COUNTRY CODE

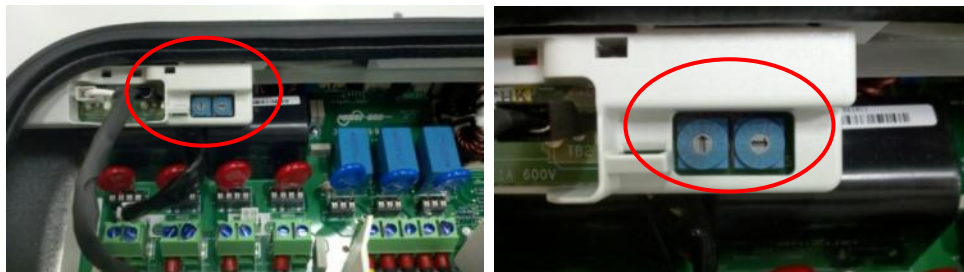
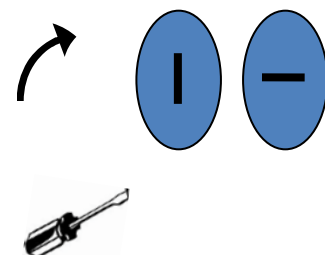


Figure 2:11- Selector Switches for Choice of Country Code.



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:

3. To access the selector switches remove the inverter front panel as explained in Figure 2:02
4. 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.
	WARNING	Before selecting the inverter grid standard on the, accurately identify the required utility grid standard.

3.3.2 Grid-Type Configuration:Three-Phase Connection Selection:

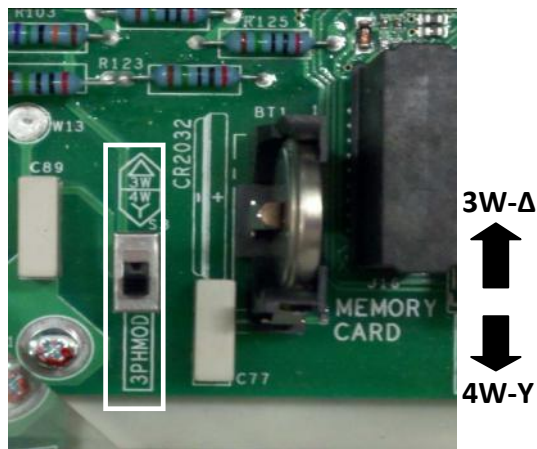


Figure 2:12: Phase configuration; 3W-Δ/ 4W- Y

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 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.

3.3.3 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.

3.3.3.1 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 TRIO Inverter to independent mode configuration, re-install the front panel (apply 13.2 in-lbs of torque to each of the 4 screws).

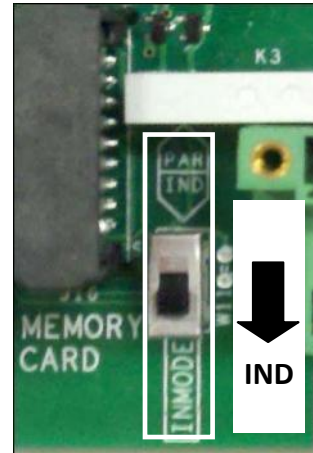


Figure 2:13: Independent MPPT Configuration Switch

3.3.3.2 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 TRIO Inverter to parallel mode configuration, re-install the front panel (apply 13.2 in-lbs of torque to each of the 4 screws).

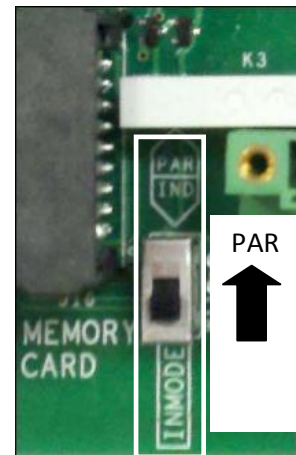


Figure 2:14a: Parallel MPPT Configuration Switch





SECTION 2b: PVI-10/12-I-OUTD-S1-US/CAN-XXX With fuse holders

*The PVI-10/12-I-OUTD-S1-US/CAN version will be replacing the PVI-10/12-I-S-OUTD-US/CAN version in 2012. The PVI-10/12-I-OUTD-S1-US/CAN version has dual 3-string fused combiners provisioned as standard equipment.

2b: 1.0 NAMEPLATE



Sample product nameplate (PVI-10.0-I-OUTD-S-US-208-NG-12A)

2b: 2.0 MOUNTING PVI-10/12-I-OUTD-S1-US/CAN-XXX-YY

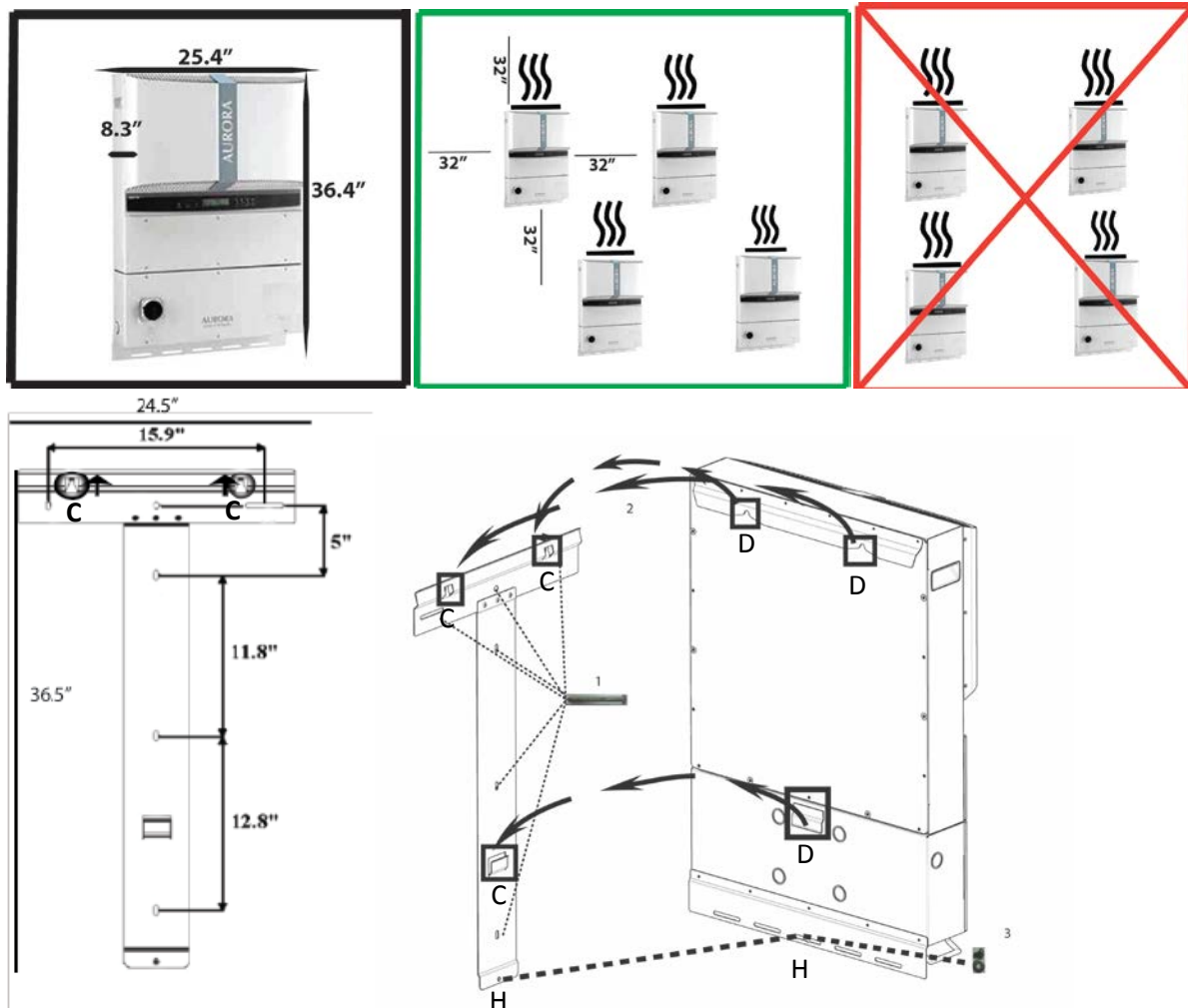


Figure 3:01- Bracket and Mounting Details

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.

2b:

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

3.1 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

2b:


3.2 ELECTRICAL WIRING AND CONNECTIONS PVI-10/12-I-OUTD-S1-US/CAN-XXX

 DANGER	<ul style="list-style-type: none"> This section is dedicated to <u>initial</u> installation wiring of the AURORA TRIO 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.
---	---

2b:

3.3 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	<ul style="list-style-type: none"> 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 TRIO 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: <ul style="list-style-type: none"> 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 data sheet information in Part 9: The Appendix An automatic over-current device (e.g., circuit breaker) must be used between the AURORA Inverter and the distribution grid.
--	--

3.3.1 Field Wiring-Knockout- Details PVI-10/12-I-OUTD-S1-US/CAN-XXX-YY

The AURORA TRIO PVI-10/12-I-OUTD-S1-U/CAN-xxx suffix is provisioned with a switchbox containing integral DC and AC disconnect switches as shown in Figure 3:03.



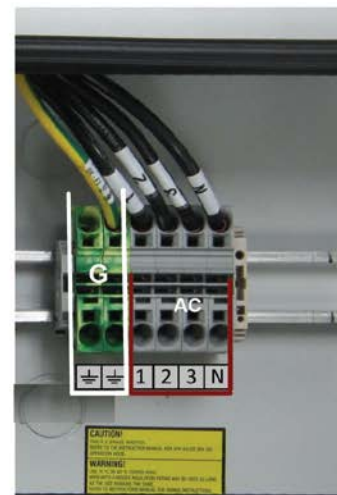
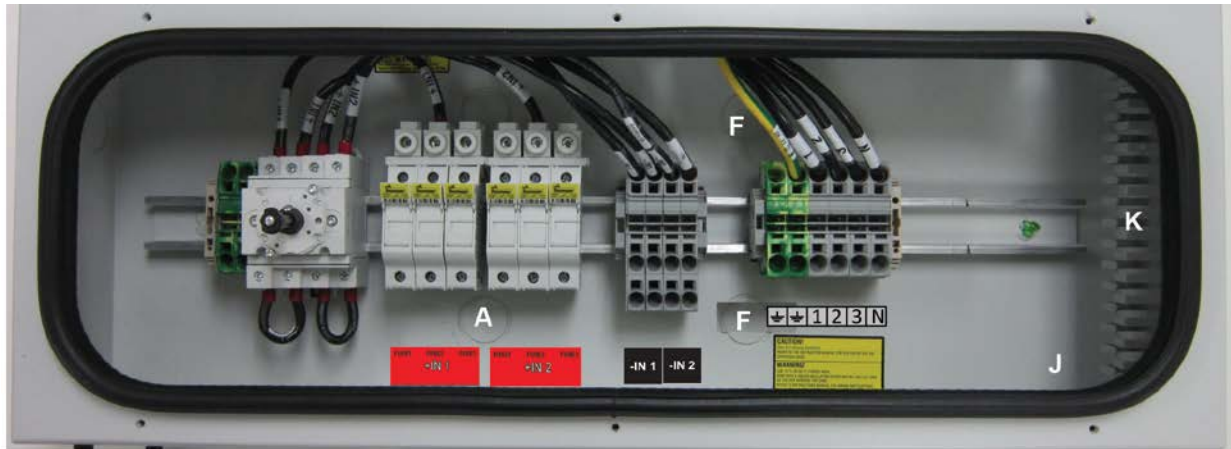
Code	Description	Code	Description
A	DC Power cable KO's, 2pl shown; trade size 3/4", 1"	D	Ground cable KO 1/2" trade size.
B	DC Switch	E	Ground Cable KO 1/2" trade size, 4pl.
C	AC Power Cable KO's, 2 pl shown; trade size 3/4", 1"		

Figure 3:03: AC+DC Switchbox Chassis Layout PVI-10/12-I-OUTD-S1-US/CAN-XXX-YY



WARNING

- 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.
- 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.




Location Code	Details		Location Code	Details	
A	DC Array conduit entry (KOs, 3 places)	KO for ¾" and 1" trade size	F	AC grid conduit entry (4 places)	KO for ¾" and 1" trade size
D	Array PE Ground	Note 1	G	Main Ground	Note 2
E	DC Switch		AC	Grid Output Terminals 1, 2, 3, N	Note 3,4
+IN1	DC Array MPPT 1 F1, F2, F3	Note 2			
-IN1	DC Array MPPT 1 NEG Returns	Note 1	J	RS485 cable conduit entry	½" trade size KO
+IN2	DC Array MPPT 2 F4, F5, F6	Note 2	K	Plastic conduit to segregate signal cables	
-IN2	DC Array MPPT 1 NEG Returns	Note 1	BTx	Busbar Terminals 1, 2, 3, 4	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 to #4AWG.
4. Grid connection can be either 3W or 4W; set 3PHMOD switch accordingly.
5. Bus bar Terminals BT1, BT3, BT4, BT6 are used for various input wiring configurations.

Figure 3:04: PVI-10/12-I-OUTD-S1-US/CAN-XXX version switchbox, showing internal component locations

3.3.2. 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.
--	--

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 3:05
- Relevant wiring connections are shown in Figure 3:04

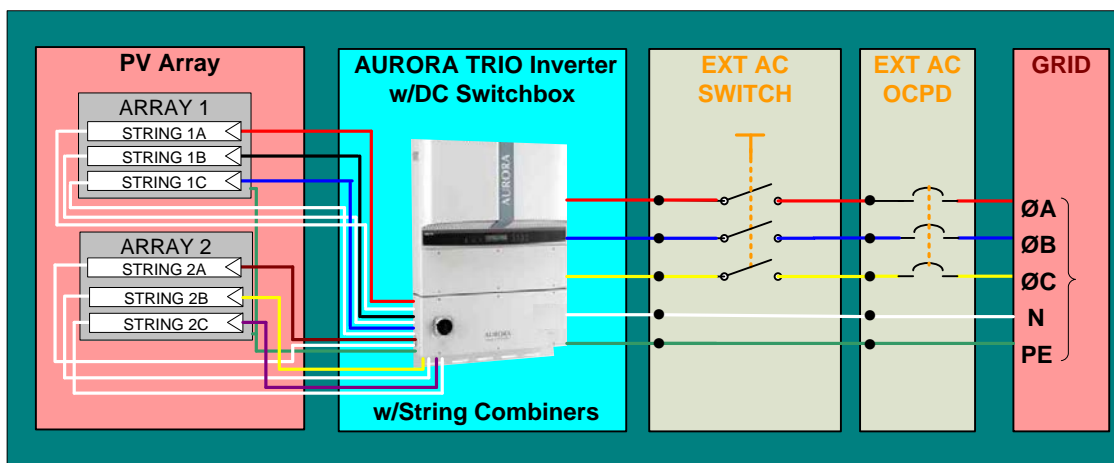



Figure 3:05- Electrical Connection Diagram

1. 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.
2. Make sure the appropriate knock-outs are employed for the use specified in order to maintain required spacing between wiring groups.

3.3.3 DC Array Connections

 WARNING:	<ul style="list-style-type: none"> • 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.
---	---

Location Code	Details		<p>Notes:</p> <ol style="list-style-type: none"> 1. All array wiring terminals are spring pressure type and can accommodate a wire size range of #20-#6 AWG. 2. Combiner fuse holders F1-F6 use screw terminals and 3. Bus bar Terminals BT1, BT3, BT4, BT6 are used for various input wiring configurations.
A	DC Array conduit entry (KOs, 3 places)	KO for ¾" and 1" trade size	
D	Array PE Ground	Note 1	
E	DC Switch		
+IN1	DC Array MPPT 1 F1, F2, F3	Note 2	
-IN1	DC Array MPPT 1 NEG Returns	Note 1	
+IN2	DC Array MPPT 2 F4, F5, F6	Note 2	
-IN2	DC Array MPPT 1 NEG Returns	Note 1	



Figure 3:06- DC Array Connection

- 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 **PARallel mode** jumpers must be connected in two places:
- 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.

3.3.4 AC Grid Connections

Location Code	Details	
G	Main Ground	Note 1
AC	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.		

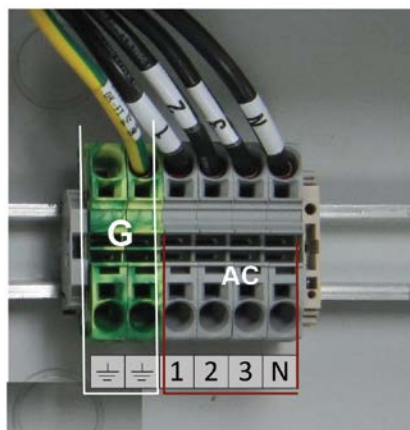


Figure 3:07 AC Grid Connections

- 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 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.

3.3.5 Signal Wiring Connections –PVI-10/12-I-OUTD-S1-US/CAN-XXX-NG



Code	Details	
J	RS485 Cable conduit entry (KOs)	½" trade size
K	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 K, 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, and plug into RJ45 jack shown in Table 03. A second jack is available to accommodate daisy chaining of communication line to other inverters.

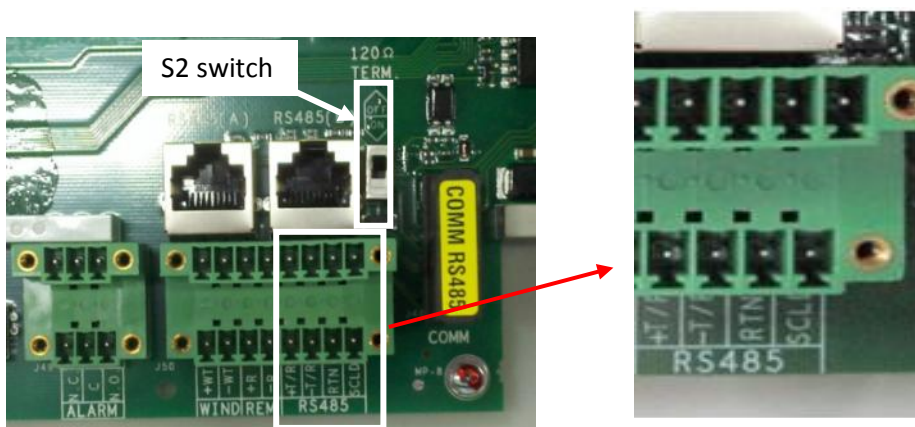


Figure 3:09: Standard RS485 connection

3: 3.4 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.

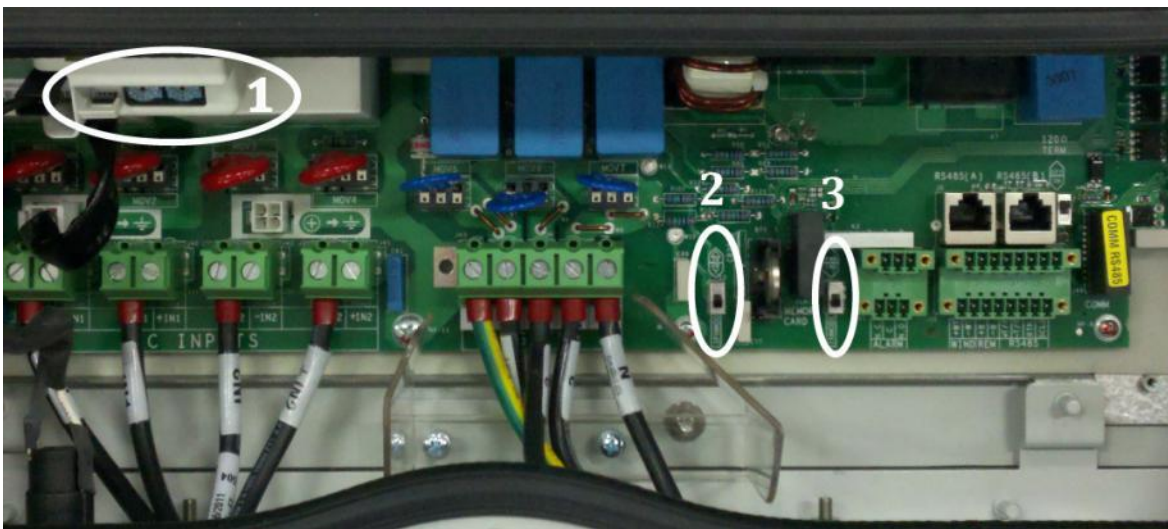
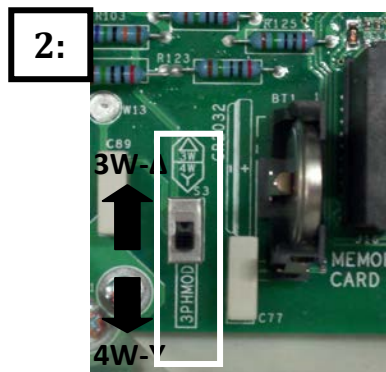


Figure 2:10: Configuration Settings

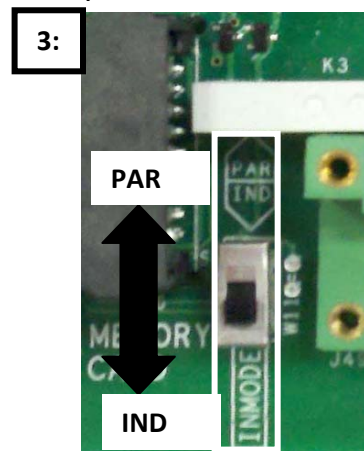
COUNTRY CODE SELECTOR



3-PHMOD SWITCH



PAR/IND INMODE SWITCH



3.4.1 Selecting The Country Code



Figure 3:11- Selector Switches for Choice of Country Code

The inverter has a two-selector switch (see Figure 3:11). 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:

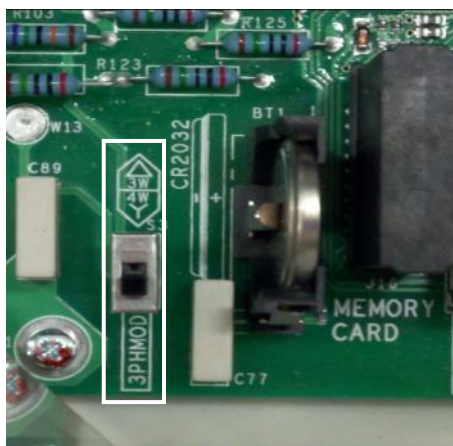
1. To access the selectors remove the inverter front panel as explained in Figure 2:02
2. Ensure the dials are set to [0,4], change if necessary.



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.

3.4.1 Phase Connection Selection PVI-10/12-I-OUTD-S1-US/CAN-XXX-YY:



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 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.

Figure 3:12- Grid configuration; 3W-Δ/ 4W-Y

3.4.2 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.

3.4.2.1 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.
- Ensure the parallel jumpers shown in Figure 3:14b, are **not present**.
- After switching the AURORA TRIO Inverter to independent mode configuration, re-install the front panel (apply 13.2 in-lbs of torque to each of the 6 screws).

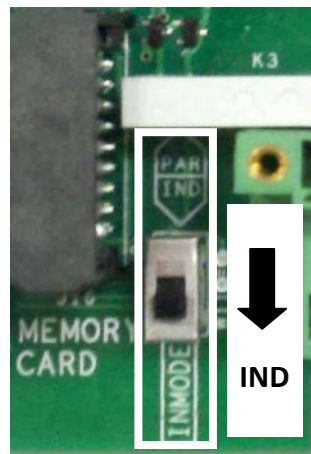


Figure 3:13- INDEPENDENT mode switch configuration

3.4.2.2 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 6 screws).

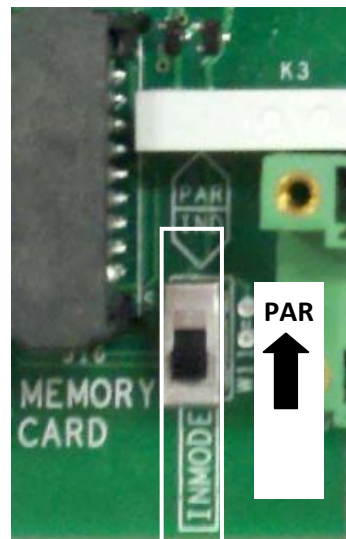


Figure 3:14a: Parallel Mode switch configuration

The Manual:
PVI-10/12-I-OUTD-(US,S,S1,S2)-US-XXX-YY

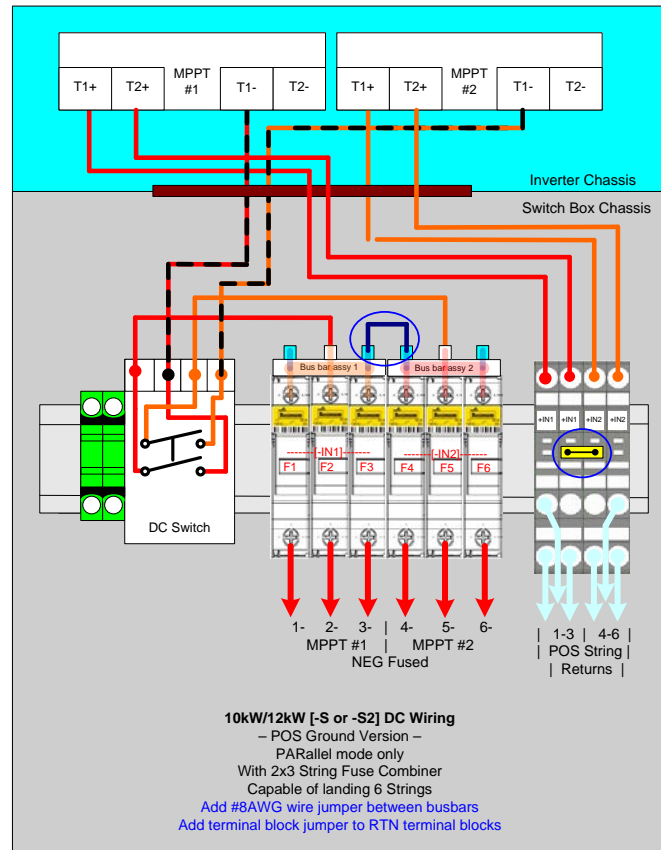


Figure 3:14b: Large switchbox with combiners showing jumpers (circled) required for Parallel MPPT Input Connection

SECTION 3: PVI-10/12-I-OUTD-S2-US/CAN-XXX



SECTION 3a:
PVI-10/12-I-OUTD-S2-US/CAN-XXX
Without fuse holders



SECTION 3b:
PVI-10/12-I-OUTD-S2-US/CAN-XXX
With fuse holders

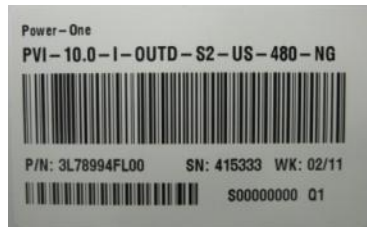


SECTION 3a:

PVI-10/12-I-OUTD-S2-US/CAN-XXX

Without fuse holders

3a: 1.0 NAMEPLATE



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

3a: 2.0 MOUNTING PVI-10/12-I-OUTD-S2-US-XXX-YY

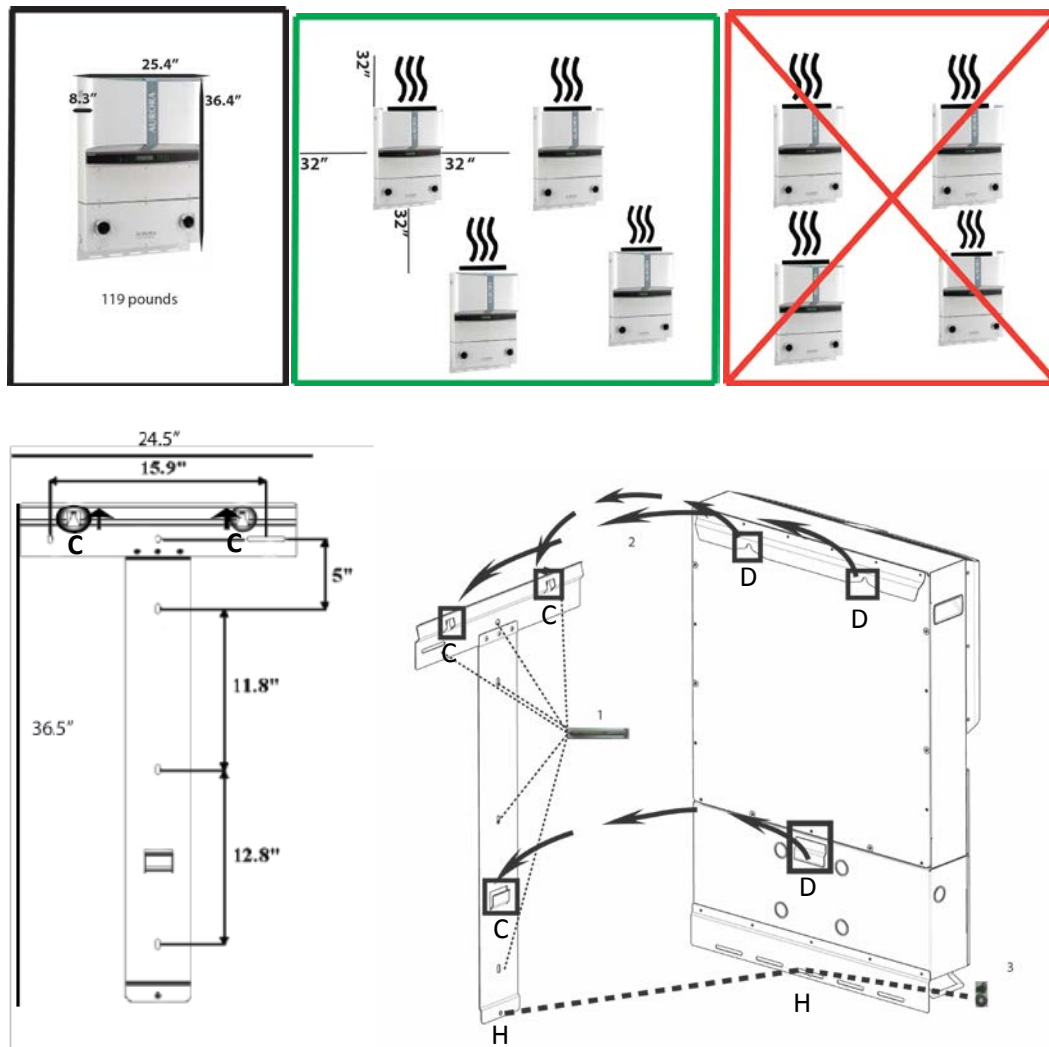


Figure 3:01- Bracket and Mounting Details

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.

3a:

3.0 INSTALLATION PVI-10/12-I-OUTD-S2-XXX-YY

3.1 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

3a:

3.2. ELECTRICAL WIRING AND CONNECTIONS PVI-10/12-I-OUTD-S2-US-XXX-YY



DANGER

- This section is dedicated to initial installation wiring of the AURORA TRIO 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.

3.2.1 CONSIDERATIONS BEFORE PERFORMING ELECTRICAL CONNECTIONS

PVI-10/12-I-OUTD-S2-US-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.

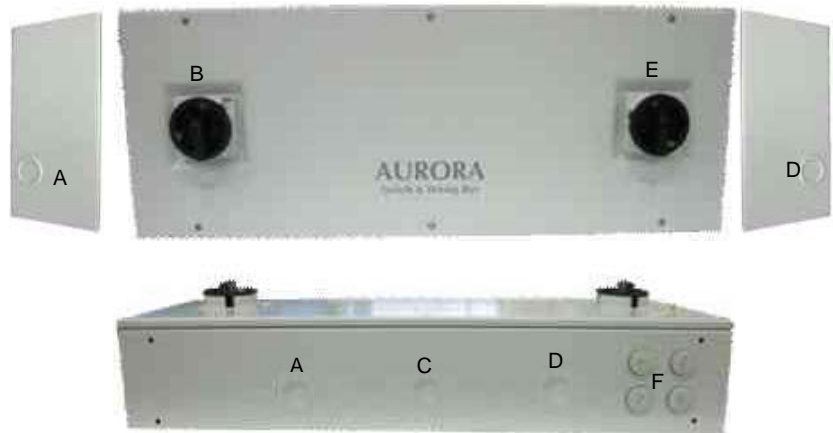


WARNING

- 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 TRIO 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 data sheet information in Part 9: The Appendix
- An automatic over-current device (e.g., circuit breaker) must be used between the AURORA Inverter and the distribution grid.

3.2.2 Field Wiring-Knockout- Details PVI-10/12-I-OUTD-S2-US-XXX-YY

The AURORA TRIO PVI-10/12-I-OUTD-S2-US-xxx suffix is provisioned with a switchbox containing integral DC and AC disconnect switches as shown in Figure 3:03.



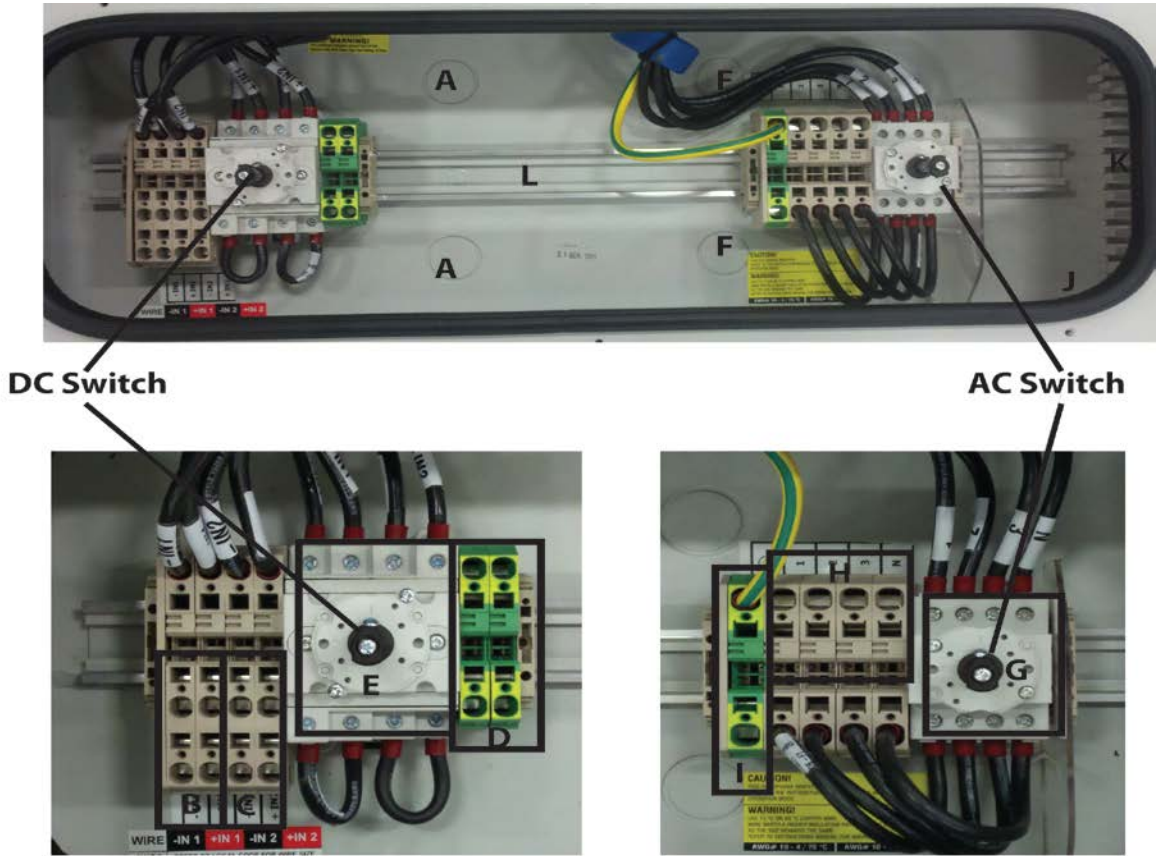
Code	Description	Code	Description
A	DC Power cable KO's, 2pl shown; trade size 3/4", 1"	D	AC Power Cable KOs, 2 pl shown; trade size 1"
B	DC Switch	E	AC Switch
C	Ground cable KO 1/2" trade size.	F	Signal cable KOs: 1/2: trade size

Figure 3:03: AC+DC Switchbox Chassis Layout PVI-10/12-I-OUTD-S2-XXX-YY



WARNING

- 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.
- 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-XXX-NG model.



Location Code	Details		Location Code	Details	
A	DC Array conduit entry (KOs, 4 places)	¾" and 1" trade size	H	Grid Output Terminals	Note 3,4
B	DC Array MPPT 1 input	Note 1	I	Main Ground	Note 3
C	DC Array MPPT 2 Input	Note 1	J	RS485 cable conduit entry (KOs)	½" trade size
D	Array PE Ground	Note 1	K	Plastic conduit for signal cables	
E	DC Switch	Note 2	L	DIN rails for accessories	Note 5
F	AC grid conduit entry (Kos 4 places)	¾" and 1" trade size			
G	AC Grid switch	3Ø/4wire			
Notes:					
1. All array wiring terminals are spring pressure type and can accommodate a wire range of #20-#6 AWG.					
2. Jumpers shown on switch are used to connect switch segments for 600V operation.					

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 3PHMOD switch accordingly.
5. DIN rail can be used to add 3-fuse combiner kit when greater than two strings per MPPT is required.

Figure 3:04: PVI-10/12-I-OUTD-S2-US-XXX version switchbox, showing internal component locations

3.2.3. Initial Electrical Connections – PVI-10/12-I-OUTD-S2-XXX-NG



DANGER:

If the unit has been previously wired and energized, refer to Part 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-S2-US-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

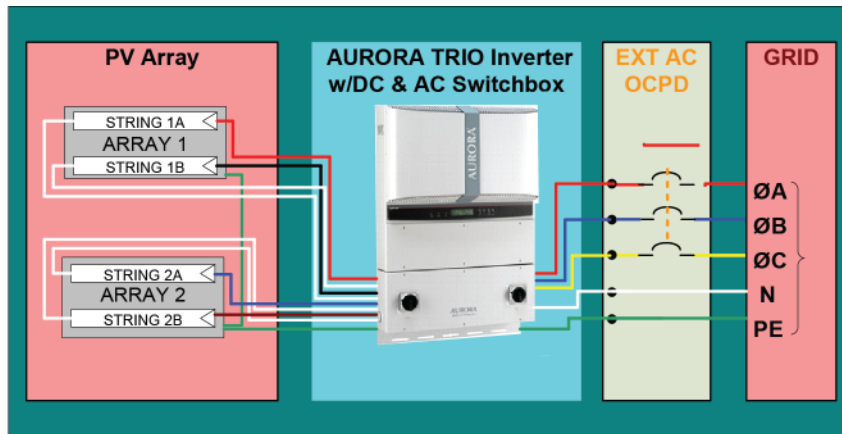


Figure 3:05- Electrical Connection Diagram

1. 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.
2. Make sure the appropriate knock-outs are employed for the use specified in order to maintain required spacing between wiring groups.

3.2.4 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.

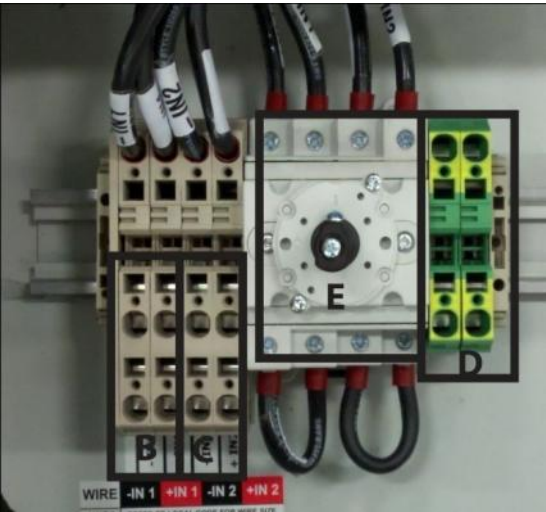


Figure 3:06- DC Array Connection

Location Code	Details	
B	DC Array MPPT 1 input	
C	DC Array MPPT 2 Input	Note 1
D	Array PE Ground	Note 1
E	DC Switch	Note 2
Notes:		
1. All array wiring terminals are spring pressure type and can accommodate #20-#6 AWG.		
2. Jumpers shown used to connect segments of DC switch for 600V operation		

- 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.

3.2.5 AC Grid Connections

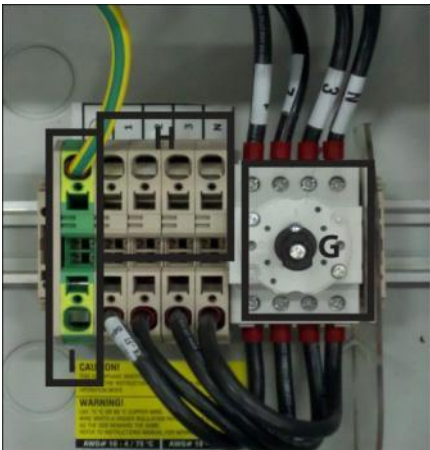
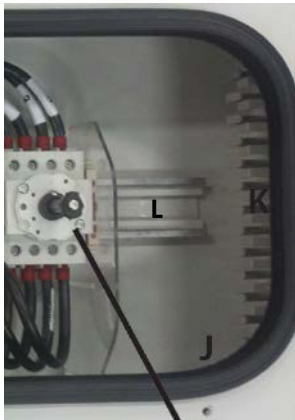


Figure 3:07 AC Grid Connections

Location Code	Details	
G	AC Grid switch	3 ϕ /4wire
H	Grid Output Terminals	Note 1, 2
I	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		

- 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.
 - c. 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.
 - d. 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.

3.2.6 Signal Wiring Connections –PVI-10/12-I-OUTD-S2-XXX-NG



AC Switch

Figure 3:08 Signal Wire Routing

Code	Details	
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 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, and plug into RJ45 jack shown in Table 03. A second jack is available to accommodate daisy chaining of communication line to other inverters.
 - b). If using standard multi-wire cable locate the mating connector (hardware bag) and connect the three RS-485 leads. Plug connector into position shown in Table 03; second connector is to facilitate daisy chaining. See Table 03 and Figure 2:09 or refer to the multi-system wiring section.

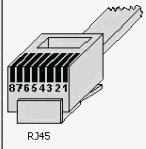
	Pin #	Signal Name	Description	Notes
	1,2,6,8	N/U	-	-
	3	+TR	+ Data Line	1
	4	+R	Remote OFF	2
	5	-TR	- Data Line	1
	7	RTN	Signal Return	1
1. Required for RS485 communication 2. Required or Remote OFF control 3. Common reference for logical signals				

Table 03: RJ45 Connectors

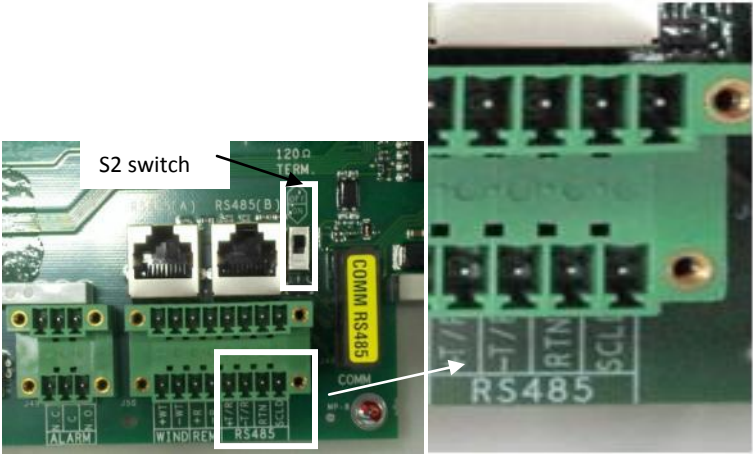


Figure 3:09: Standard RS485 connection

3a: 3.3 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.

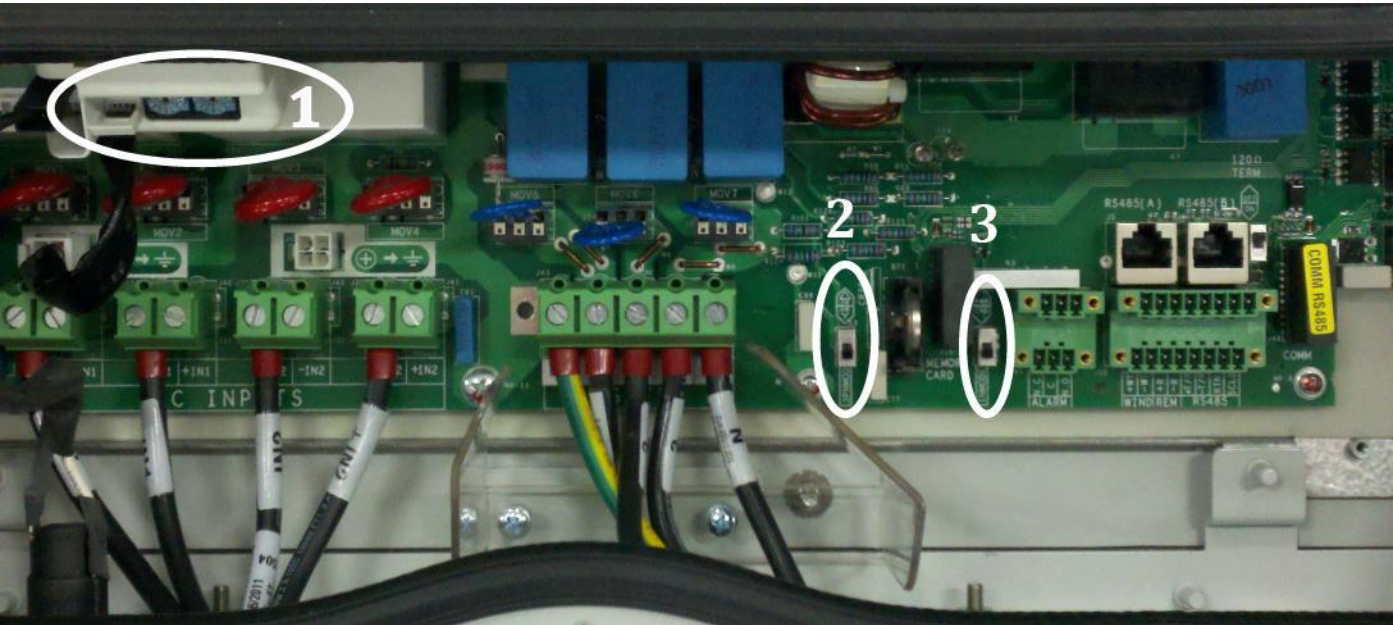
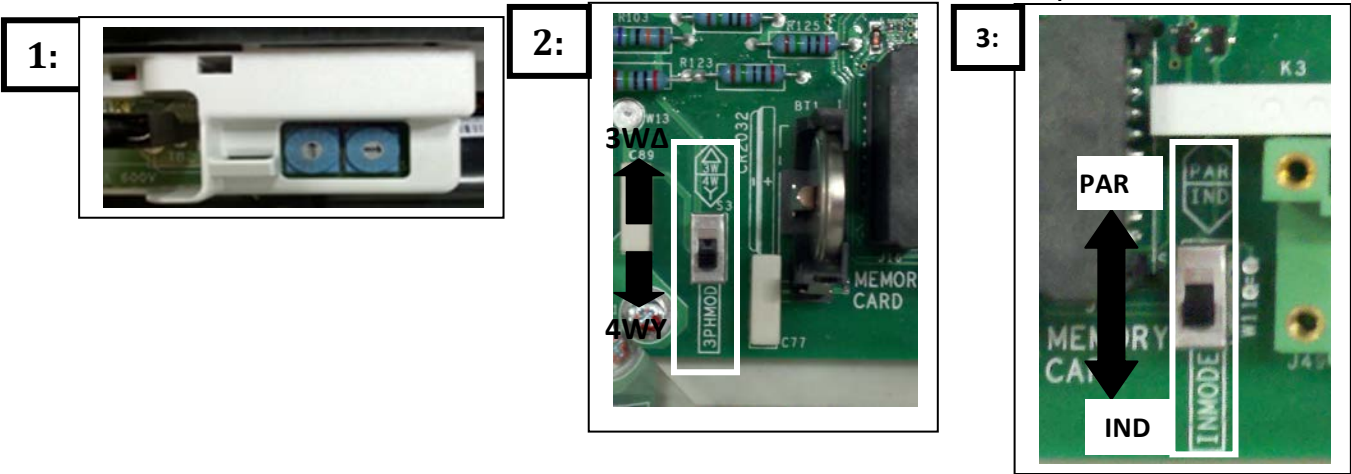


Figure 2:10: Configuration Settings

COUNTRY CODE SELECTOR

3PHMOD SWITCH

PAR/IND INMODE SWITCH



3.3.1 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.



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.

3.3.2 Grid Type Connection: Three-Phase Selection

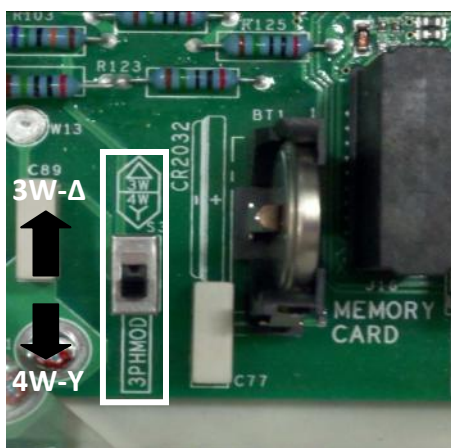


Figure 3:12- Grid-type configuration; 3W-Δ/ 4 W-Y

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 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.

3.3.3 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.

3.3.3.1 Independent Connection

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

- Place switch “INMOD” switch (shown in Figure 3:13) in the “IND” (default position) position to configure the inverter controls in the independent mode.
- Ensure the parallel jumper wiring (see Figure 3:14b), **is not present**.
- After switching the AURORA TRIO Inverter to independent mode configuration, re-install the front panel (apply 13.2 in-lbs of torque to each of the 6 screws).

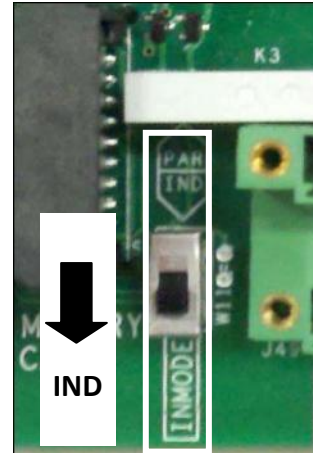


Figure 3:13- Independent Configuration Switch

3.3.3.2 Parallel Connection

To operate the inverter in the single MPPT mode:

- Place switch INMODE switch (shown in Figure 3:14a) in the “PAR” in order to configure the inverter controls in parallel mode.
- Add wire jumper (#8 AWG) between bus bar terminals BT3 and BT4
- Add terminal block jumper between as shown in Figure 14b using two #10 AWG jumper wires (1 black and 1 red cable) to connect the input.
- After switching the AURORA TRIO Inverter to parallel mode configuration, re-install the front panel (apply 13.2 in-lbs of torque to each of the 6 screws).

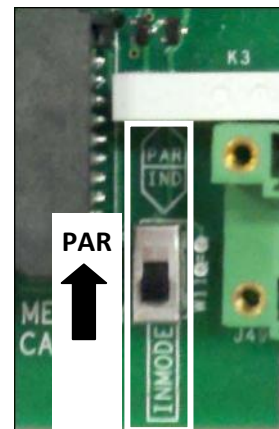


Figure 3:14a: Parallel Mode Configuration Switch

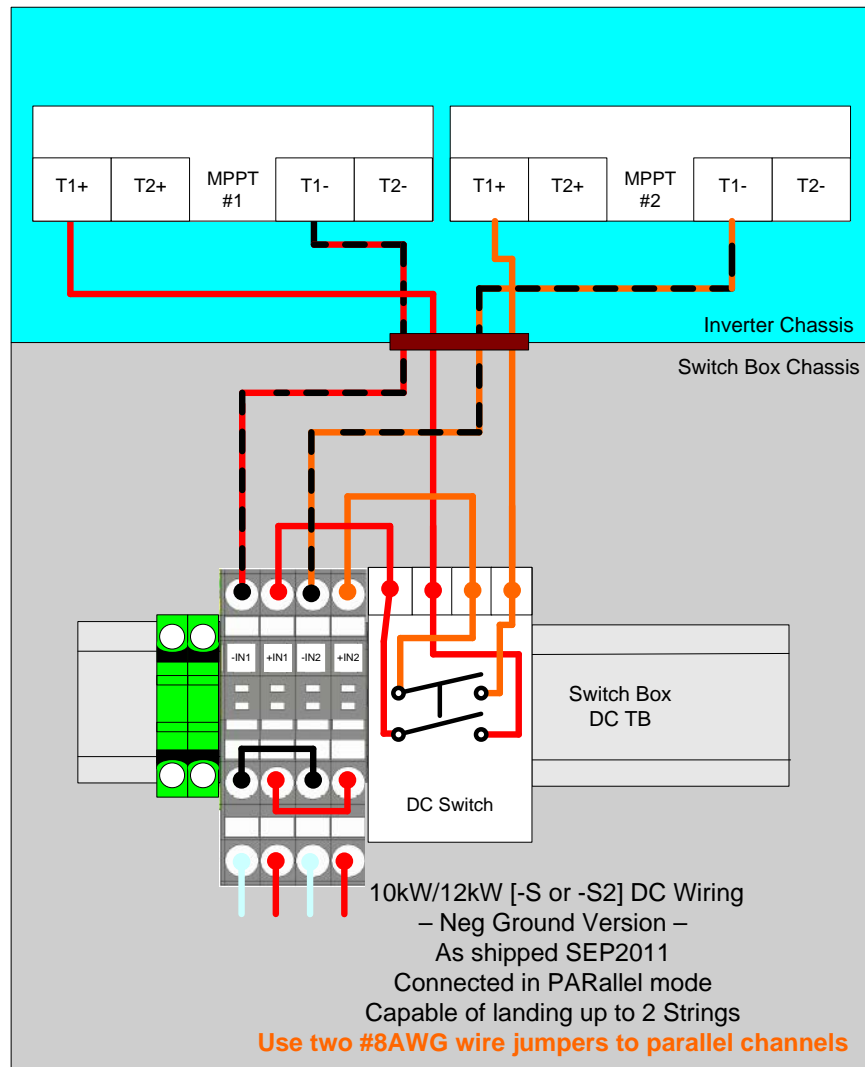
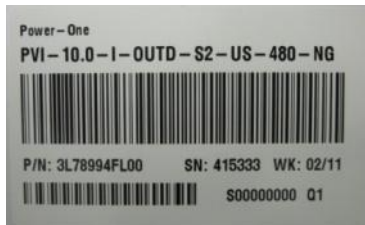


Figure 3:14b: Jumpers for Parallel MPPT Input Connection



SECTION 3b: PVI-10/12-I-OUTD-S2-US/CAN-XXX With fuse holders

3b: 1.0 NAMEPLATE



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

3b: 2.0 MOUNTING PVI-10/12-I-OUTD-S2-US/CAN-XXX-YY

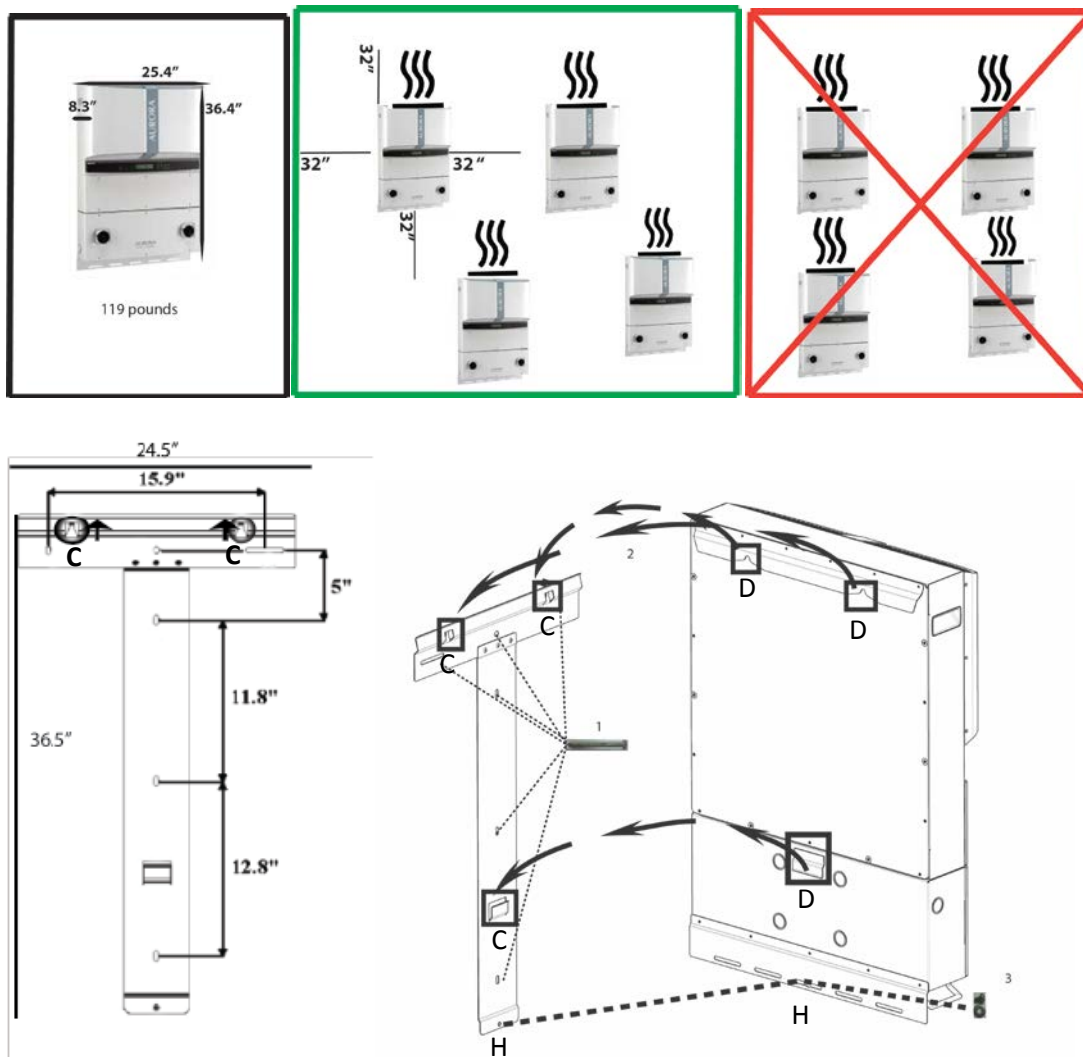


Figure 3:01- Bracket and Mounting Details

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.

3b: 3.0 INSTALLATION PVI-10/12-I-OUTD-S2-US/CAN-XXX-YY

3.1 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


3b: 3.2. ELECTRICAL WIRING AND CONNECTIONS PVI-10/12-I-OUTD-S2-US/CAN-XXX-YY

 DANGER	<ul style="list-style-type: none"> This section is dedicated to <u>initial</u> installation wiring of the AURORA TRIO 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.
---	---

3.2.1 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	<ul style="list-style-type: none"> 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 TRIO 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: <ul style="list-style-type: none"> 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 data sheet information in Part 9: The Appendix An automatic over-current device (e.g., circuit breaker) must be used between the AURORA Inverter and the distribution grid.
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3.2.2 Field Wiring-Knockout- Details PVI-10/12-I-OUTD-S2-US/CAN-XXX-YY

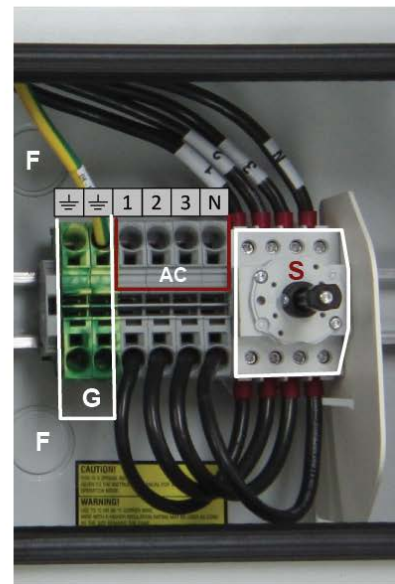
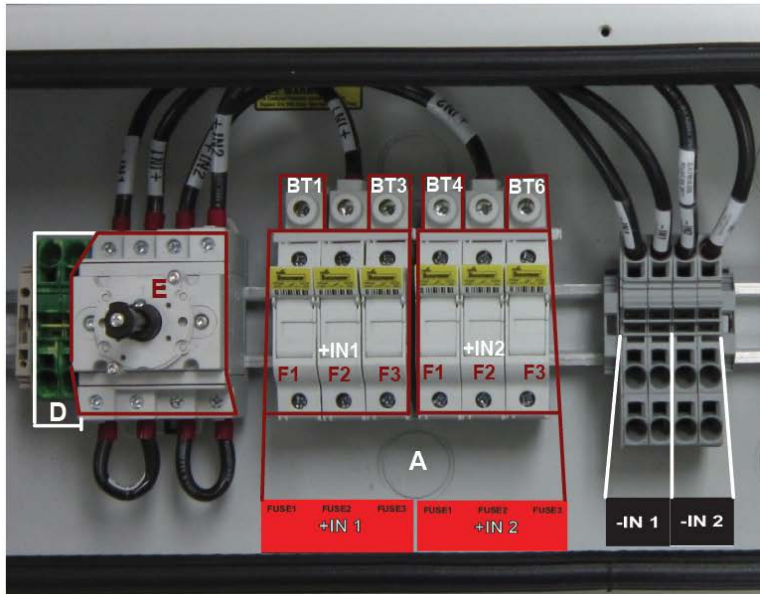
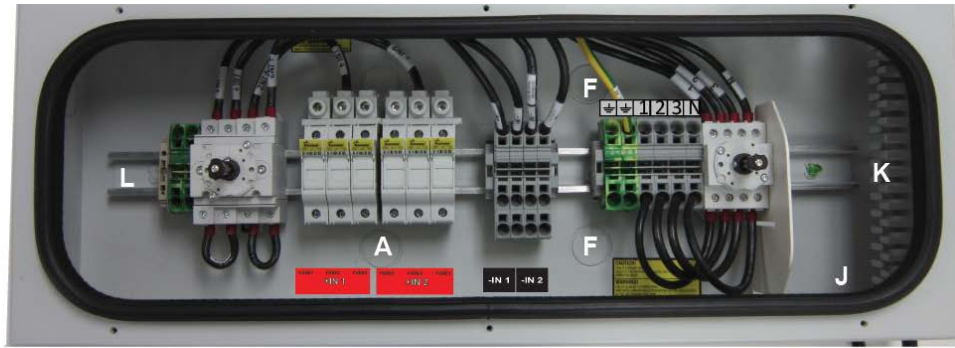
The AURORA TRIO PVI-10/12-I-OUTD-S2-US/CAN-xxx suffix is provisioned with a switchbox containing integral DC and AC disconnect switches as shown in Figure 3:03.



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 1/2" trade size.	F	Signal cable KOs: 1/2: trade size

Figure 3:03: AC+DC Switchbox Chassis Layout PVI-10/12-I-OUTD-S2-US/CAN-XXX-YY

 WARNING	<ul style="list-style-type: none"> 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. 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.
--	--



Location Code	Details		Location Code	Details	
A	DC Array conduit entry (KOs, 4 places)	$\frac{3}{4}$ " and 1" trade size	H	Grid Output Terminals	Note 4,3
B	DC Array MPPT 1 input	Note 1	I	Main Ground	Note 1
C	DC Array MPPT 2 Input	Note 1	J	RS485 cable conduit entry (KOs)	$\frac{1}{2}$ " trade size
D	Array PE Ground	Note 1	K	Plastic conduit for signal cables	
E	DC Switch	Note 2	L	DIN rails for accessories	Note 6
F	AC grid conduit entry (Kos 4 places)	$\frac{3}{4}$ " and 1" trade size	H	Grid Output Terminals	Note 4,5
G	AC Grid switch	3 ϕ /4wire			


Notes:

- All array wiring terminals are spring pressure type and can accommodate a wide range of #20-#6 AWG.

2. Jumpers shown used to series-connect segments of the DC switch for 600V operation.
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 3PHMOD switch accordingly.:
5. DIN rail can be used to add 3-fuse combiner kit when greater than two strings per MPPT is required.

Figure 3:04: PVI-10/12-I-OUTD-S2-US/CAN-XXX version switchbox, showing internal component locations

3.2.3. Initial Electrical Connections – PVI-10/12-I-OUTD-S2-US/CAN-XXX-NG

	DANGER: If the unit has been previously wired and energized, refer to Part 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-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

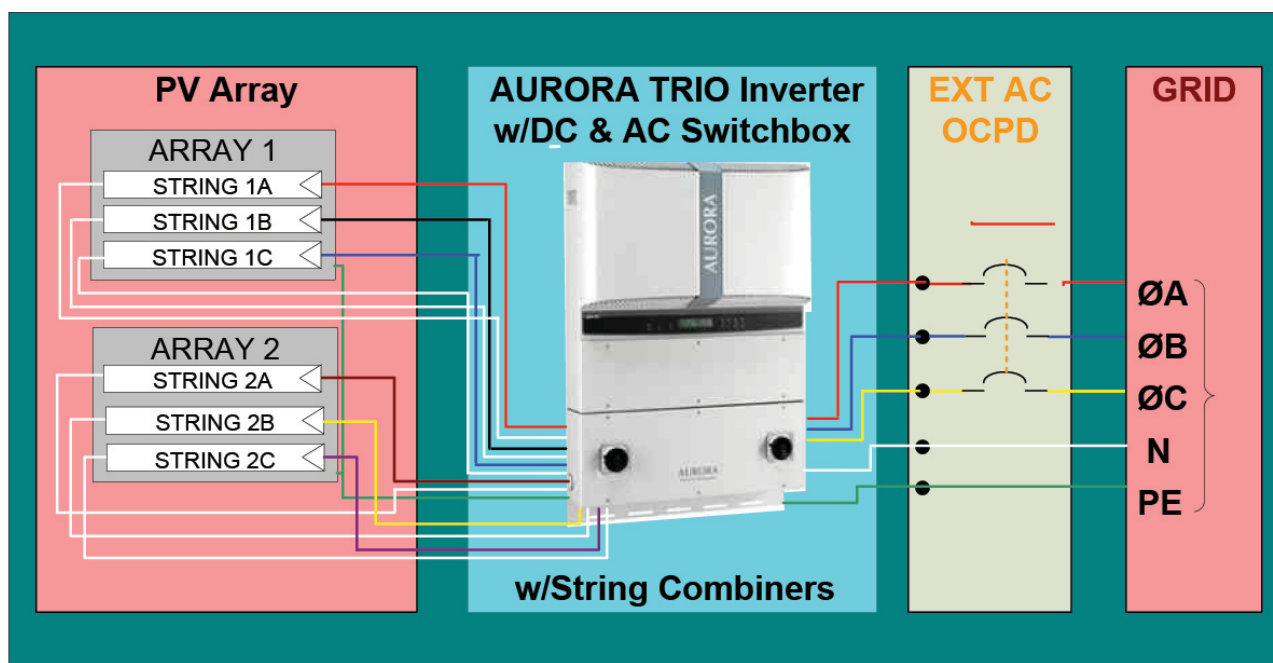



Figure 3:05- Electrical Connection Diagram

3. 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.
4. Make sure the appropriate knock-outs are employed for the use specified in order to maintain required spacing between wiring groups.

3.2.4 DC Array Connections

 WARNING:	<ul style="list-style-type: none"> 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.
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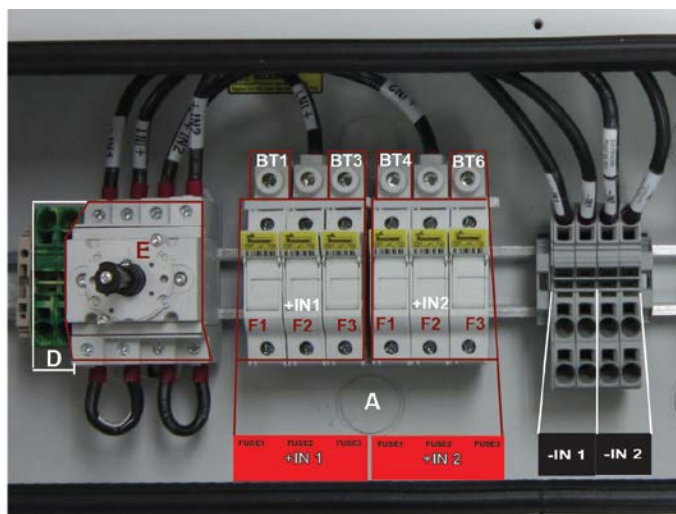


Figure 3:06- DC Array Connection

Location Code	Details	
A	DC Array conduit entry (KOs, 3 places)	KO for ¾" and 1" trade size
D	Array PE Ground	Note 1
E	DC Switch	
+IN1	DC Array MPPT 1 F1, F2, F3	Note 2
-IN1	DC Array MPPT 1 NEG Returns	Note 1
+IN2	DC Array MPPT 2 F4, F5, F6	Note 1
-IN2	DC Array MPPT 1 NEG Returns	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 and type. See legend on fuseholder for details 3. Bus 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.

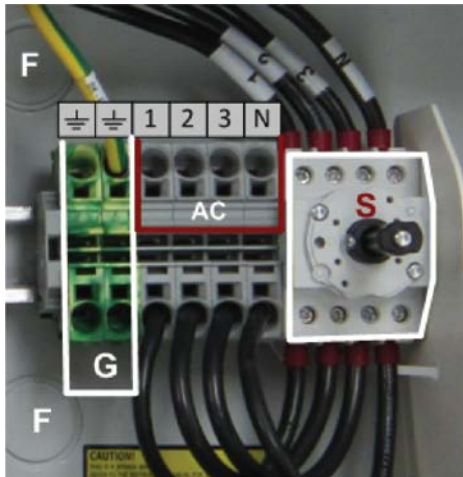
- If the array is designed for the parallel MPPT input mode, ensure the jumpers shown in Figure 3:12 are in place.
- Ensure the MPPT mode switch is in the correct position to match the array design.



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.

3.2.5 AC Grid Connections



Location Code	Details	
G	Main Ground	Note 1
AC	Grid Output Terminals 1, 2, 3, N	Note 1,2
S	AC Grid Disconnect switch	3 ϕ /4wire
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 3:07 AC Grid Connections

- 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.
 - e. 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.
 - f. 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.

3.2.6 Signal Wiring Connections –PVI-10/12-I-OUTD-S2-US/CAN-XXX-NG



Code	Details	
J	RS485 Cable conduit entry (KOs)	½" trade size
K	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 K, 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, and plug into RJ45 jack shown in Table 03. A second jack is available to accommodate daisy chaining of communication line to other inverters.
 - b). If using standard multi-wire cable locate the mating connector (hardware bag) and connect the three RS-485 leads. Plug connector into position shown in Table 03; second connector is to facilitate daisy chaining. See Table 03 and Figure 2:09 or refer to the multi-system wiring section.
 - c). Refer to section 04 for details to set RS485 address

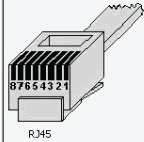
	Pin #	Signal Name	Description	Notes
	1,2,6,8	N/U	-	-
	3	+TR	+ Data Line	1
	4	+R	Remote OFF	2
	5	-TR	- Data Line	1
	7	RTN	Signal Return	1
1. Required for RS485 communication 2. Required or Remote OFF control 3. Common reference for logical signals				

Table 03: RJ45 Connectors

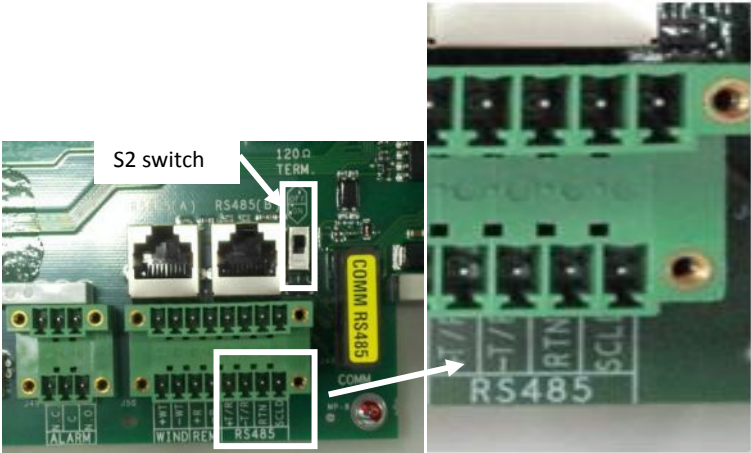


Figure 3:09: Standard RS485 connection

3b: 3.3 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.

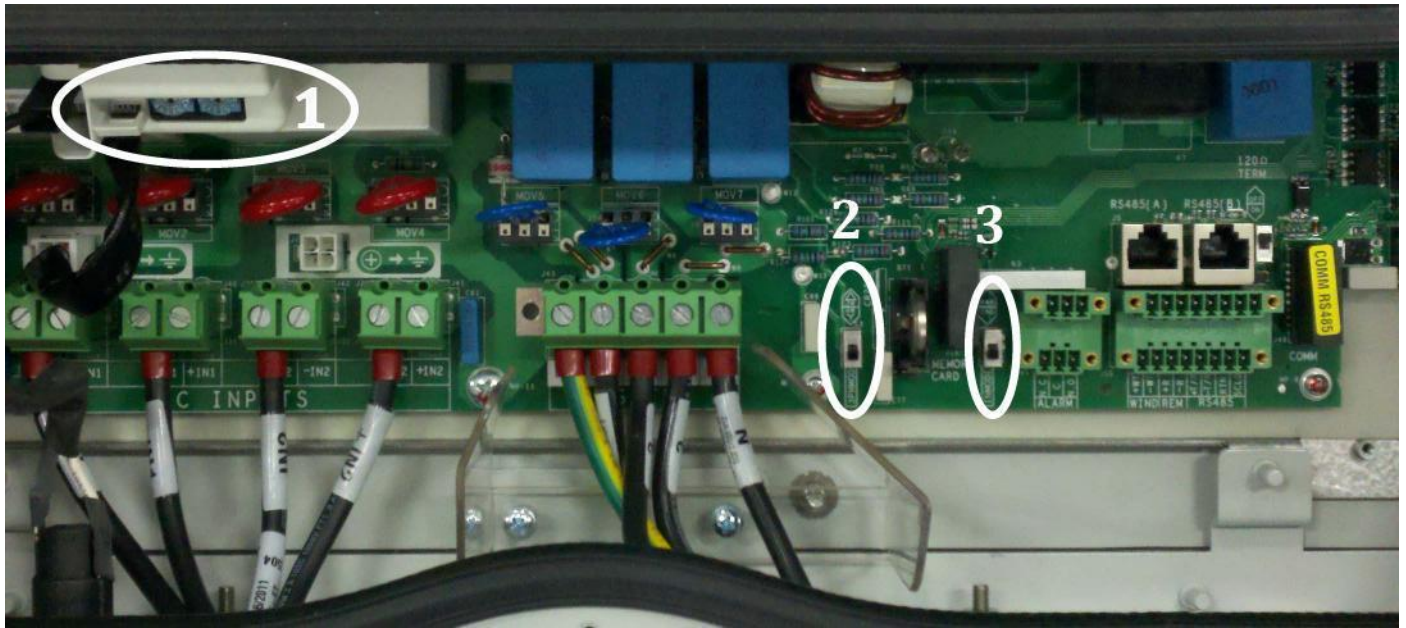
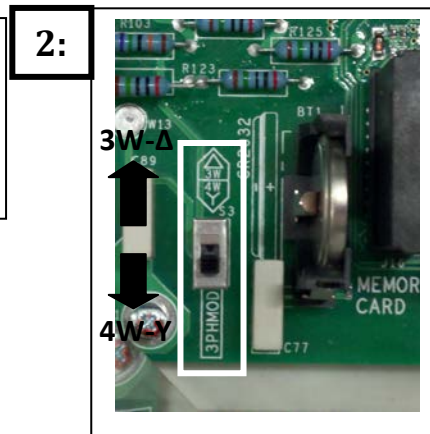


Figure 2:10: Configuration Settings

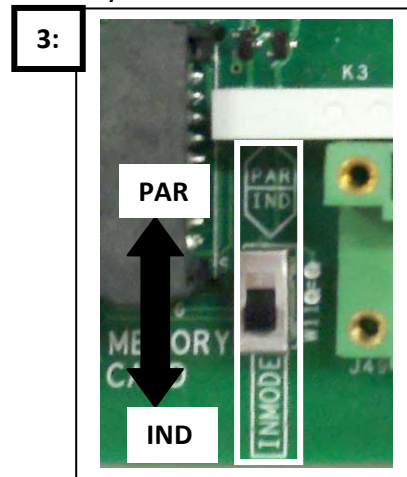
COUNTRY CODE SELECTOR



3-PHMOD SWITCH



PAR/IND INMODE SWITCH



3.3.1 Selecting The Country Code

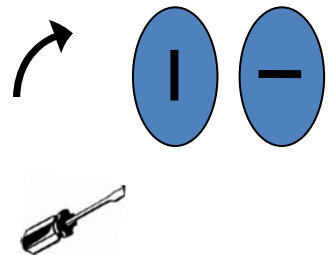
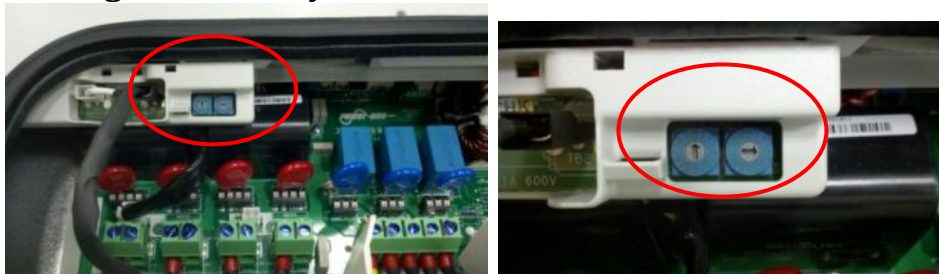




Figure 3:11- Selector Switches for choice of Country Code

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.

 <p>DANGER:</p>	<p>Normally grounded conductors may be ungrounded and energized when a ground-fault is indicated.</p> <ul style="list-style-type: none"> • Risk of electric shock • Test before touching • Work on the AURORA TRIO inverter must be carried out by qualified personnel.
 <p>WARNING:</p>	<p>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.</p>

3.4.1 Grid-Type Configuration: Phase Connection Selection

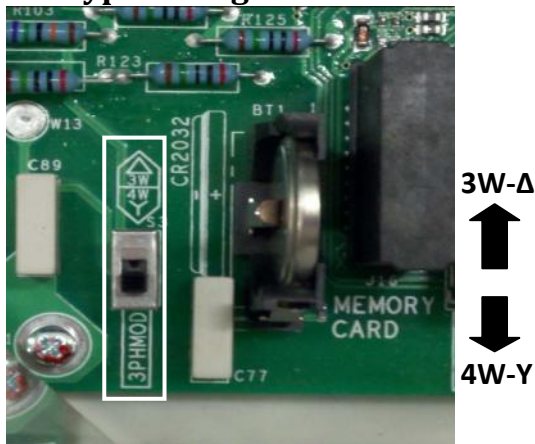


Figure 3:12- Grid-Type configuration; 3W-Δ/ 4W-Y

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 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.

3.4.2 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 2.10, above). The following sections show how to connect the inverter in either the INdependent or PARallel mode.

3.4.2.1 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.

- Ensure the parallel jumpers shown in Figure 3:14b, are **not present**.
- After switching the AURORA TRIO Inverter to independent mode configuration, re-install the front panel (apply 13.2 in-lbs of torque to each of the 6 screws).

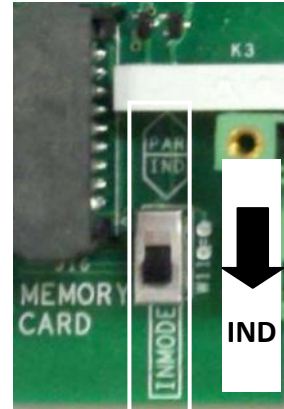


Figure 3:13- INDependent mode switch configuration Switch

3.4.2.2 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 6 screws).

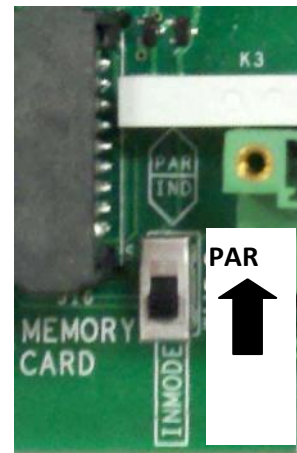


Figure 3:14a: Parallel Mode Configuration Switch

The Manual:
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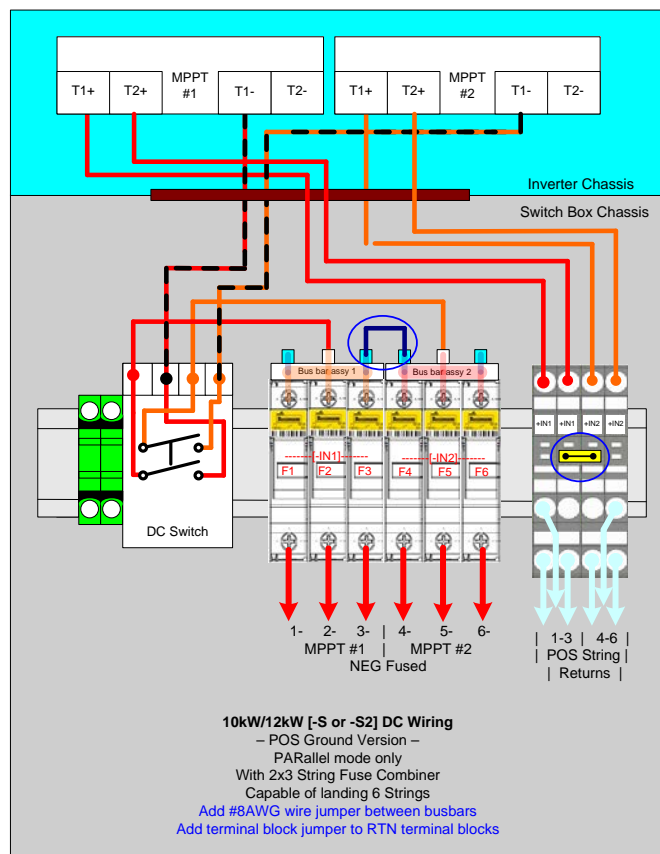


Figure 3:14b: Jumpers installed for Parallel MPPT Input Connection

SECTION 4: WIRING DETAILS

4: 1.0 AC AND DC WIRING AND OVER CURRENT PROTECTION


 WARNING	Before selecting the grid standard on the unit, check accurately what is the necessary standard.
--	--

Table 0-1: 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	#20-#6 AWG	Screw terminal block	Rated temperature	#20-#6 AWG	Screw terminal block
Wire Size Range	13 in-lb		Wire Size Range	13 in-lb	
Tightening Torque			Tightening Torque		
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 0-2: Wiring Details for [-S Small Switchbox] version [-S2-no Combiner] 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	#12-#4 AWG	Per manufacturers rating	Rated temperature	#12-#4 AWG	Per manufacturers rating
Wire Size Range	NR	Pressure Clamp	Wire Size Range	NR	Pressure Clamp
Tightening Torque			Tightening Torque		
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 0-3: Wiring Details for
[-S1 Large Switchbox] version
[-S2-with Combiner] version**

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	90° C	
	#12-#4 AWG	Per mfr's rating	Rated temperature Wire Size Range Tightening Torque	#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

4.1.2 Fused Combiners and Array Connections

The [-S/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.

Figures 1 and 2 below show wiring and necessary jumpers for typical [-NG] and [-PG] configurations.

Note that the positive ground version can **only** be operated in the **PAR**allel input mode configurations.

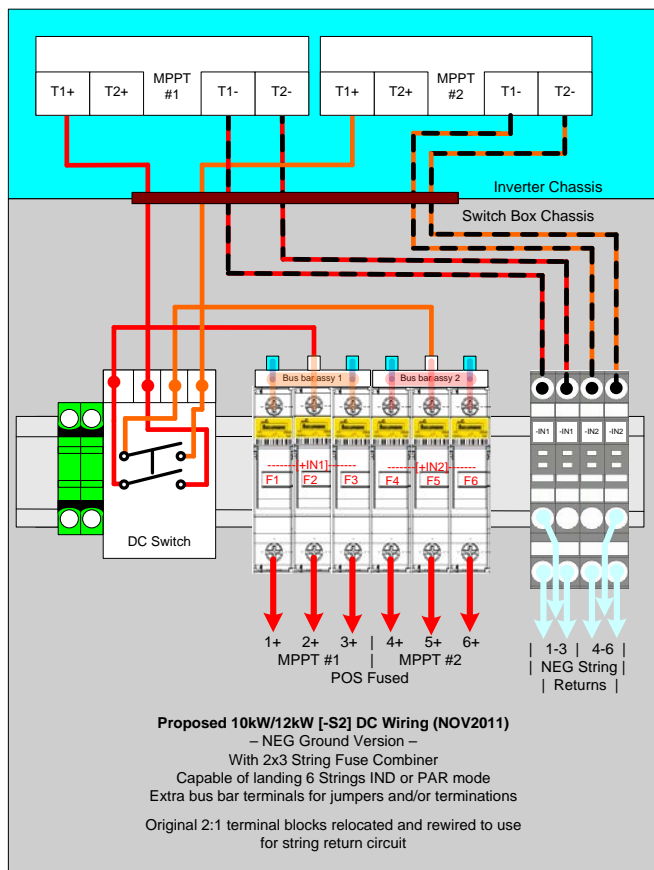


Figure 1: Hardware and connections for [-NG] inverter connection

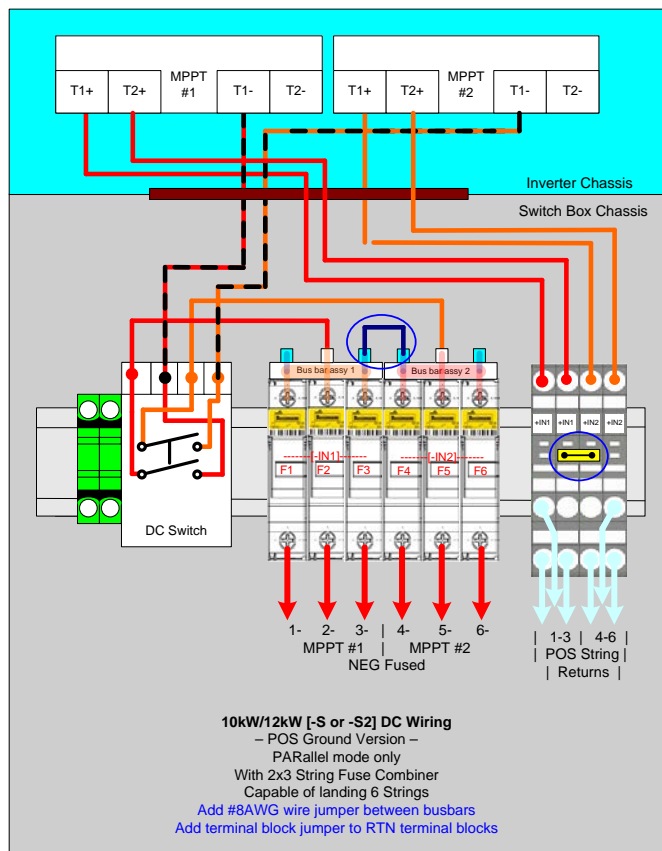
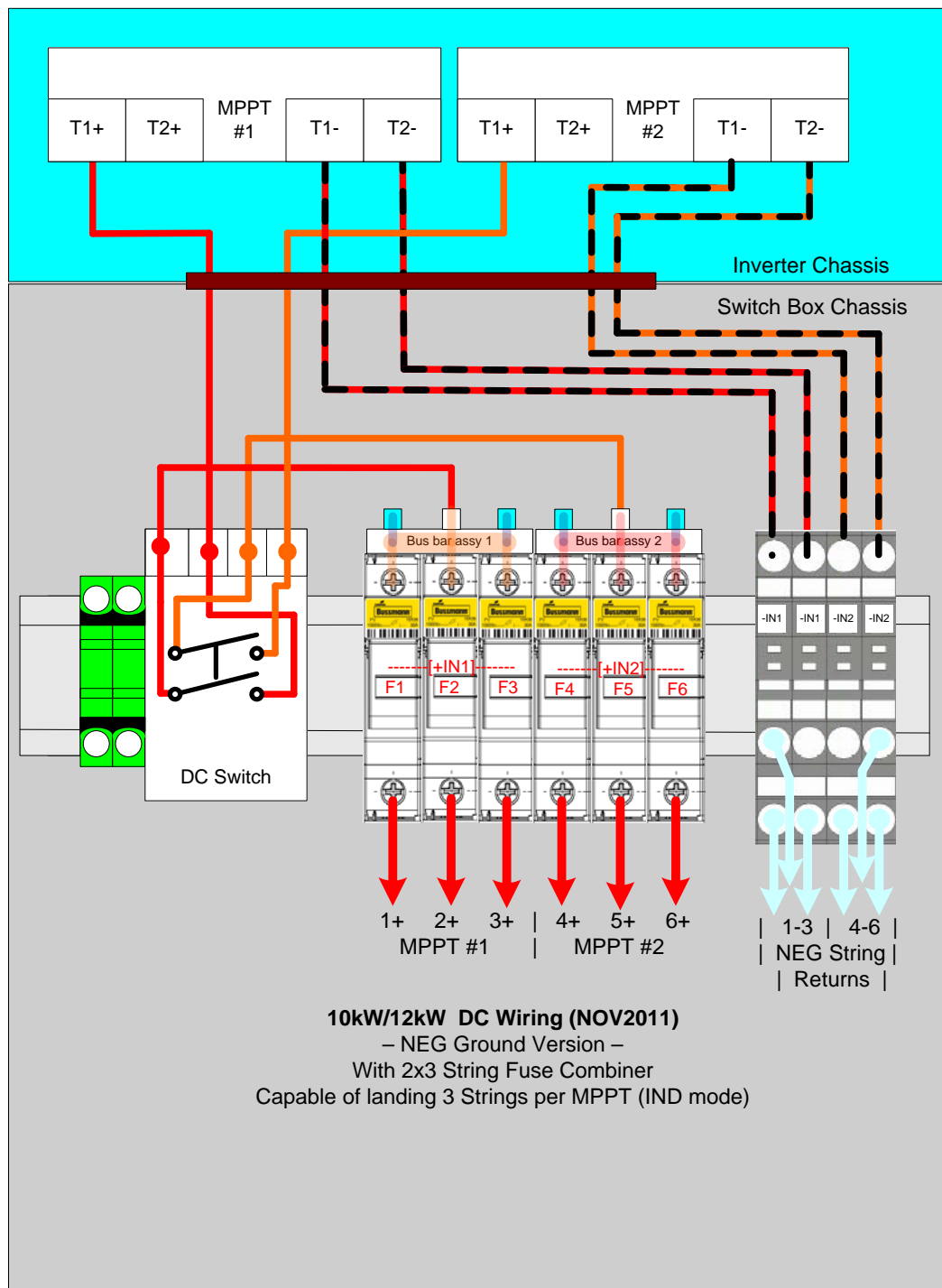
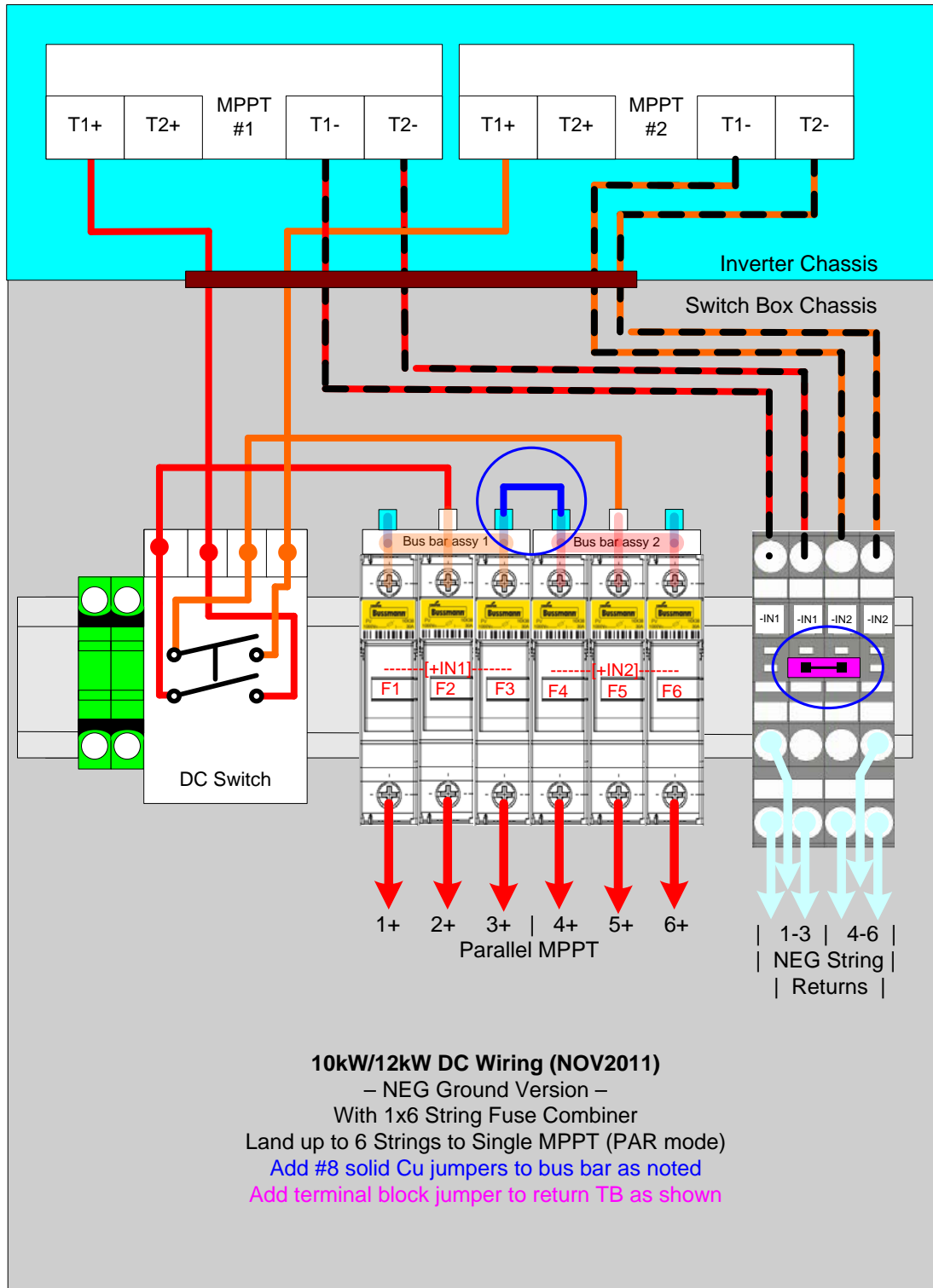


Figure 2: Hardware and connections for [-PG] inverter connection

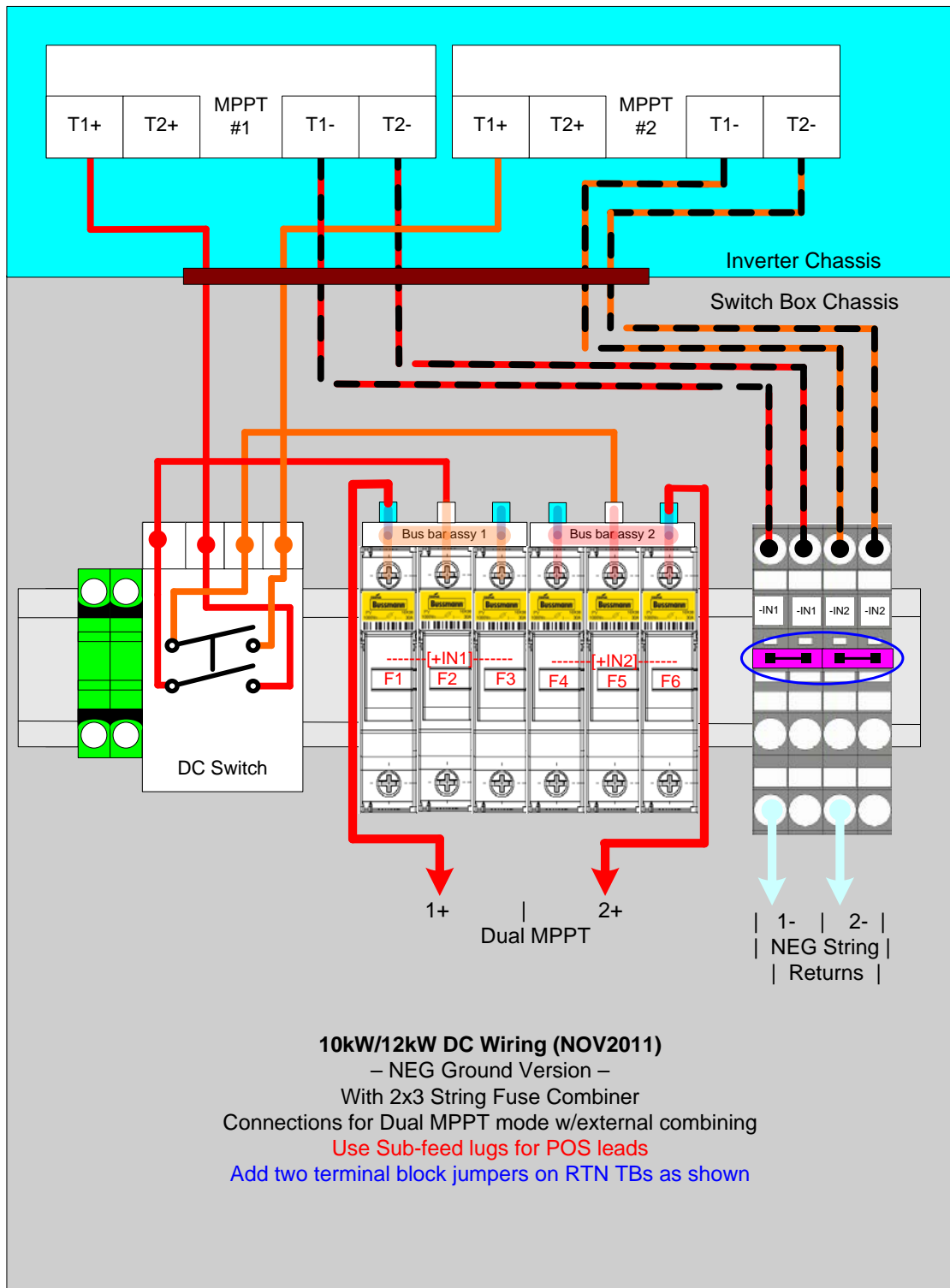
The following figures detail various allowable string configurations based the switch box hardware.



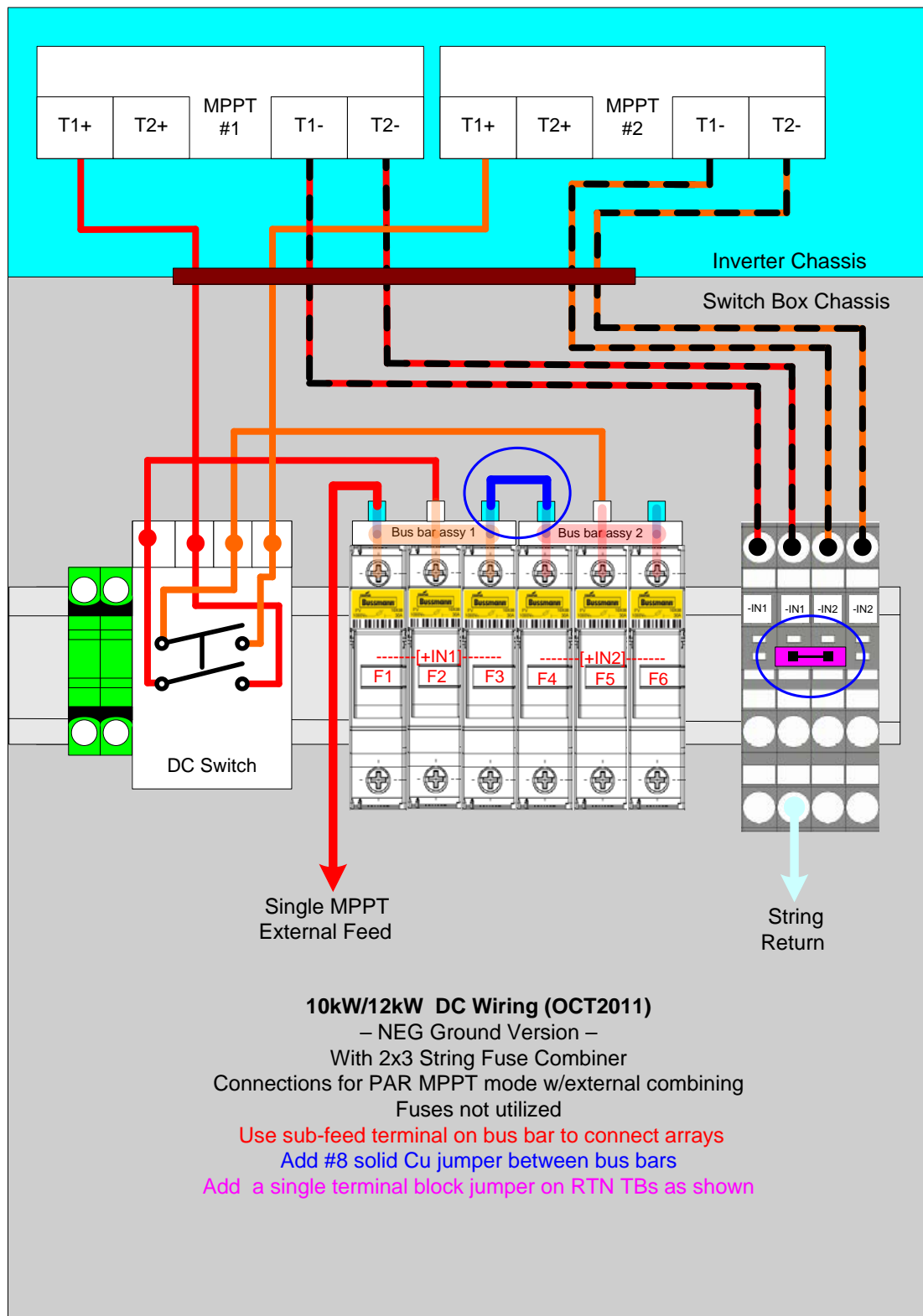
Scenario #3: In-switchbox combining (dual 3-string configuration) up to six strings using dual (IND) MPPT Configuration



Scenario #4: In-switchbox combining (6x1) up to six strings using single (PAR) MPPT Configuration (requires bus bar jumper and single terminal block jumper)



Scenario #5: External combining of up to six strings using dual (IND) MPPT Configuration (requires two terminal block jumpers)



Scenario #6: External combining of up to six strings using single (PAR) MPPT Configuration (Requires busbar jumper and one terminal block jumper)

4: 1.2 MULTI-UNIT CONFIGURATION

1.2.1 Daisy Chain

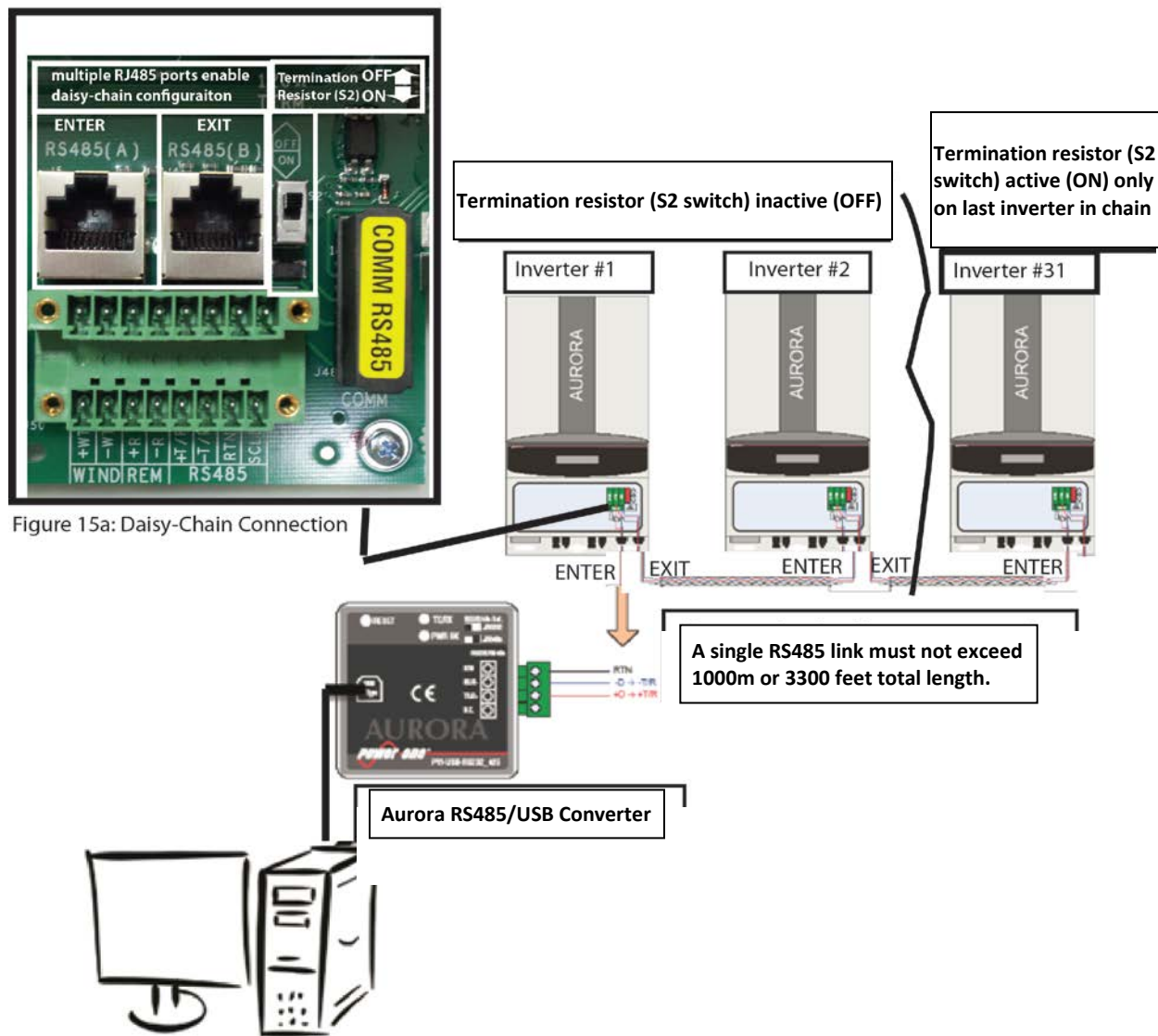


Figure 15b: Daisy-Chain Configuration

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". See shown in Figure 15a and 15b

1.2.1.1 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.

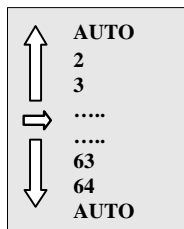
STEP 1: Using the appropriate cable, connect all the Aurora Inverter units according to the “daisy-chain” cabling method ENTER- EXIT. Make sure to respect the correspondence between all the signals. See Figure 15.

STEP 2: Locate the S2 switch. See Figure 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.

4.1.3 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 2:15 shows how to connect multiple units into a daisy-chain configuration.

SOFTWARE:

Included in the shipment of the AURORA TRIO 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 these instructions:

1.3.1 Install 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 determine 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: 0.1 COMMISSIONING

The procedure for commissioning AURORA TRIO 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.

4.1.0 INVERTER START-UP and OPERATION



WARNING

- Do not place any items on the AURORA TRIO Inverter during operation.
- Do not touch the heat sink when the inverter is operating, as some parts may be hot and cause burns.

1.1 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

The green 'Power' LED indicates that the ARUROA Inverter is operating correctly.

Power-One Initializing...
Please wait...

Missing Grid

Initializing stops until grid is found or settings are changed to match voltage.
Possible error codes:
W007: Grid Under Frequency
W006: Grid Over Frequency
W005: Output Under Voltage
W004: Output Over Voltage

If DC = > 200V

If DC = < 200V

Next connections..
2 sec

Waiting Sun...

Inverter is waiting for the sun/wind.
Possible error codes:
E002: Input Under Voltage
W011: Sun Low
E013: Wrong Mode (PAR/IND)

Unit cycles through various screens while connecting.



= Inverter OK. Cycles through Inverter statistics



= Error/Alert/Warning
May see any of the remaining error codes

Fault Description

Ground Fault

The yellow 'FAULT' LED indicates that the AURORA Inverter has detected a fault condition. A fault description will appear on the display. See troubleshooting section of this manual or contact Power-One Technical Support.

Red GFI Ground Fault on the DC side of the system.
Press ESC to restart
See troubleshooting section to help or contact Power-One Technical Support.

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.

1.2 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

1.3 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.

1.4 POWER-DOWN PROCEDURES

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



WARNING

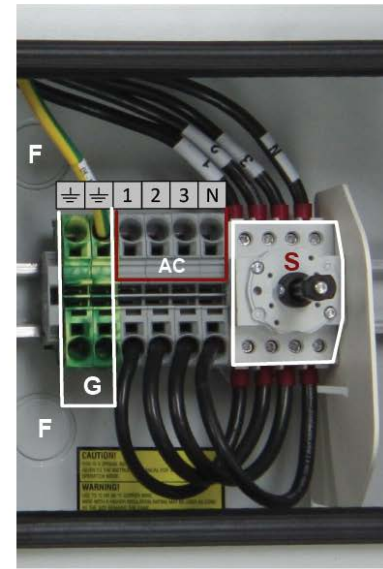
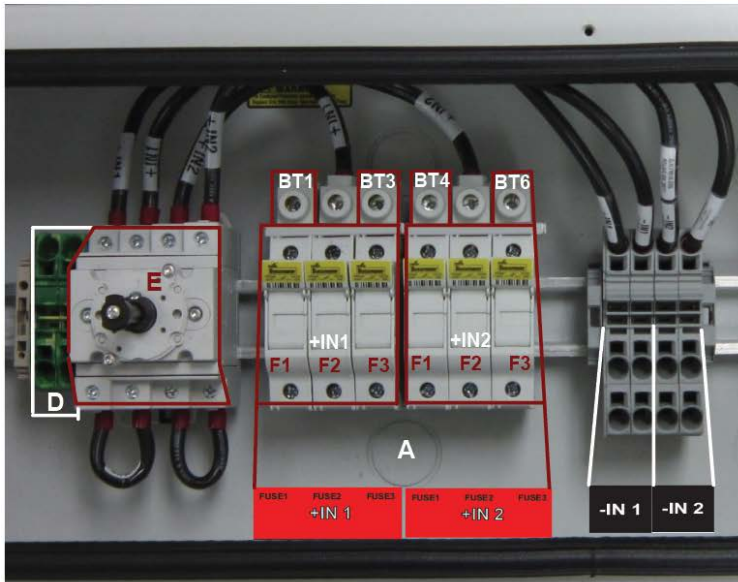
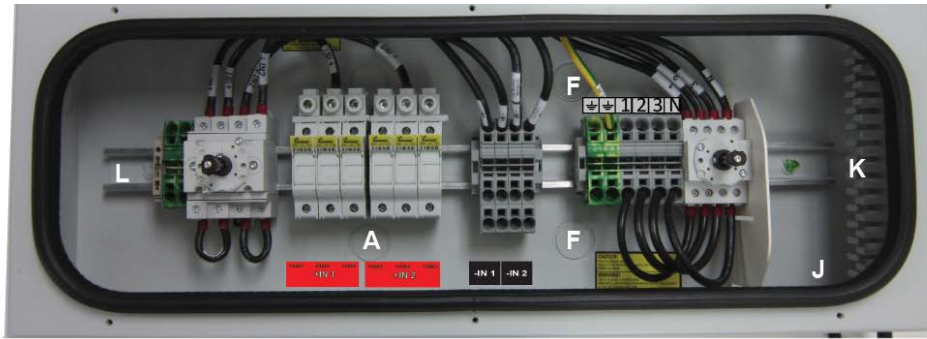
Before performing any operation on the switchbox power input, ALWAYS perform the appropriate disconnection procedure outlined below.

1.4.1 Disconnection Of Aurora Inverters



Captive screws X6

Figure 4:02: Location of Front Access Panels



Location Code	Details		Location Code	Details	
A	DC Array conduit entry (KOs, 3 places)	Note 1	F	AC grid conduit entry (4 places)	Note 1
D	Array PE Ground	Note 2	G	Main Ground	Note 4
E	DC Switch		AC	Grid Output Terminals 1, 2, 3, N	Note 4,5
+IN1	DC Array MPPT 1: F1, F2, F3	Note 3	S	AC Grid Disconnect switch	3ø/4wire
-IN1	DC Array MPPT 1: NEG Returns	Note 2	J	RS485 cable conduit entry	½" trade size KO
+IN2	DC Array MPPT 2: F4, F5, F6	Note 3	K	Plastic conduit to segregate signal cables	
-IN2	DC Array MPPT 1: NEG Returns	Note 2	BTx	Busbar Terminals 1, 2, 3, 4	Note 4

Notes:

1. KOs for ¾" and 1" trade size
2. All array wiring terminals are spring pressure type and can accommodate a wire size range of #20-#6 AWG.
3. Fuse holders F1-F6 have screw terminals. Wire size and torque level depends on wire type and size - see fuseholder legend.
4. All grid wiring terminals are spring pressure type and can accommodate wire size #12-#4 AWG.
5. Grid connection can be either 3W or 4W; set 3PHMOD switch accordingly.
6. KOs for 1/2" trade size

Figure 4:03: PVI-10/12-I-OUTD-US /CAN-Wiring Connection Details

Refer to Figure 4:03 Wiring Connection Details for the following procedure:

Step 1: Disconnect from the AC Grid by one of the following methods:

- a. Turn-off the external AC switch
- b. Turn-off the Over Current Protection Device (circuit breaker)

Step 2: Disconnect the inverter from the PV array by turning off the external DC disconnect switch connect the DC cable to the terminal block on the PCB. Be sure respecting marking (+In1, -In1, +In2, -In2) and carefully check the correct polarity of the DC cable.

Step 3: Remove the inverter cover seem (Figure 4:02). Using a voltmeter, check voltage levels at the DC input terminals and the AC output cables to ensure no hazardous voltages are present.

4: 2.0 OPERATIONS: USER INTERFACE, MONITORING AND DATA TRANSMISSION

2.1 USER INTERFACE MODE

Normally, the AURORA Trio 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 Trio 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.

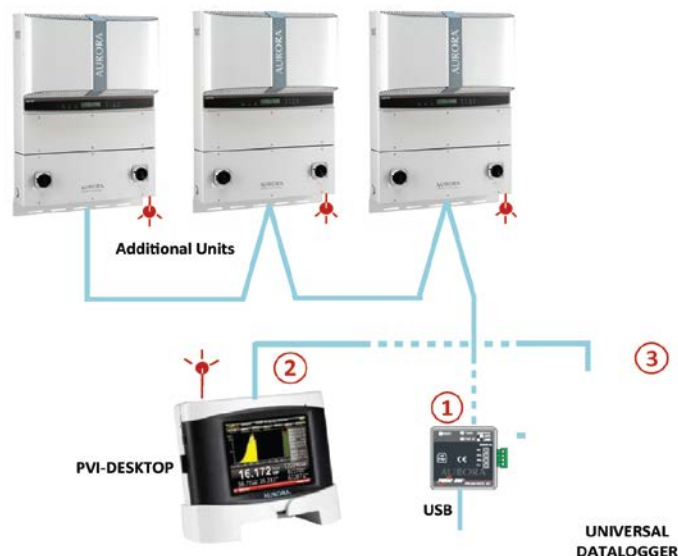


Figure 04:4- Data Transmission Options

2.2 DATA TYPES AVAILABLE

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

2.2.1 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. Please check the Power-One website at www.power-one.com for the latest updated version.

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

2.2.2 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.

2.3 LED INDICATORS

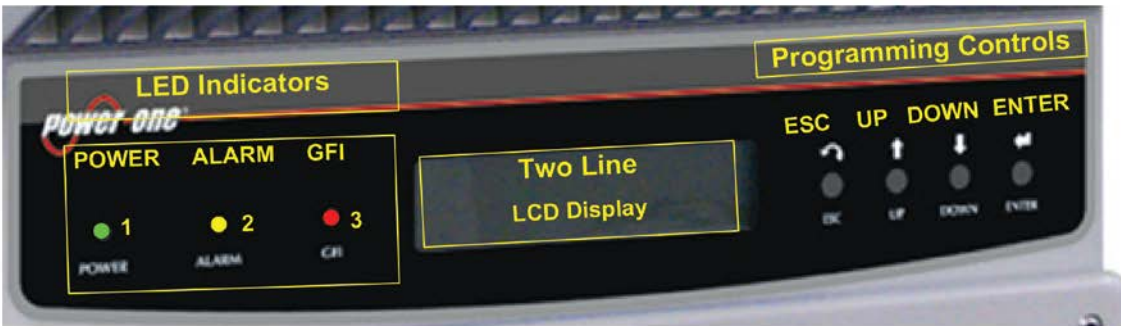



Figure 4:05: Location of the buttons and LEDs

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:	<p>Normally grounded conductors may be ungrounded and energized when a ground-fault is indicated.</p> <ul style="list-style-type: none">• Risk of electric shock• Test before touching• Work on the AURORA TRIO 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 flashing

	LED STATUS	OPERATIONAL STATUS	NOTES
1	1: green: <input checked="" type="checkbox"/> 2: yellow: <input checked="" type="checkbox"/> 3: red: <input checked="" type="checkbox"/>	AURORA self-disconnects during night-time	Input voltage less than 90 Vdc at both inputs
2	1: green: <input checked="" type="checkbox"/> 2: yellow: <input checked="" type="checkbox"/> 3: red: <input checked="" type="checkbox"/>	AURORA Inverter initialization, settings loading, and waiting for grid check	It is in transition status while operating conditions are being checked.
3	1: green: <input checked="" type="checkbox"/> 2: yellow: <input checked="" type="checkbox"/> 3: red: <input checked="" type="checkbox"/>	AURORA Inverter is powering the grid	Standard machine operation (search for maximum power point or constant voltage)
4	1: green: <input type="checkbox"/> 2: yellow: <input type="checkbox"/> 3: red: <input checked="" type="checkbox"/>	System insulation device faulty	Leakage to ground found
5	1: green: <input checked="" type="checkbox"/> 2: yellow: <input checked="" type="checkbox"/> 3: red: <input checked="" type="checkbox"/>	Defect – fault!!!	The fault can be inside or outside the inverter. See the alarm appearing on the LCD display.
6	1: green: <input checked="" type="checkbox"/> 2: yellow: <input checked="" type="checkbox"/> 3: red: <input checked="" type="checkbox"/>	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: <input checked="" type="checkbox"/> 2: yellow: <input checked="" type="checkbox"/> 3: red: <input checked="" type="checkbox"/>	Grid disconnection	Indicates a missing grid condition


☒ LED off

☐ Any of the above conditions



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).

2.4 MESSAGES AND ERROR CODES

 DANGER:	<p>Normally grounded conductors may be ungrounded and energized when a ground-fault is indicated.</p> <ul style="list-style-type: none"> • Risk of electric shock • Test before touching • Work on the AURORA TRIO 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 AURORA TRIO 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.

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)

Table 4:01 Messages and Error Codes

2.5 LCD DISPLAY

2.5.1 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).

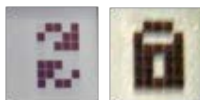
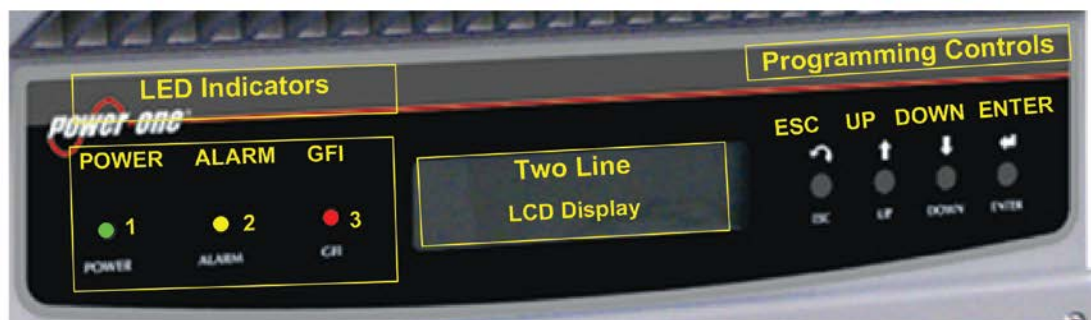


Figure A

Figure A- 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.

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.

Fgrid	60.17 Hz
In range	

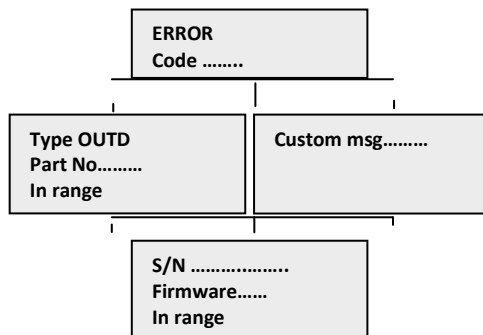
- 6) If the measured instant values of voltage (point 4) and frequency (point 5) are outside the allowed range, the following screens are scrolled alternately:

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

2.5.2 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 (Section 1.2):

- Missing grid
- Waiting sun

2.5.3 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'.

Type OUTD PN-----

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

S/N----- xxxxxx FW rel. C.0.1.1

3A)

E-da	0 Wh
\$-da	0.0 EUR

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

4A)

E-tot	-----
E-par	0 KWh EUR

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

5A)

P-out	0 W
T-boost1	- °C

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	W
Ppk-DayW

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	197 V
Vgrid Avg	0 V

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

8A)

Igrid	0.8 A
Fgrid	60.18 Hz

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

9A)

Vin1	0 V
I in1	0.0 A

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

10A)

Vin2	0 V
I in2	0.0 A

- 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.

Vin	0 V
I in	0.0 A

11A)

Pin 1	0 W
Pin 2	0 W

- 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.

Pin	0 W
-----	-----

12A)

Ileak	7 mA
-------	------

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

Inverter OK Wed 17 May 11 23

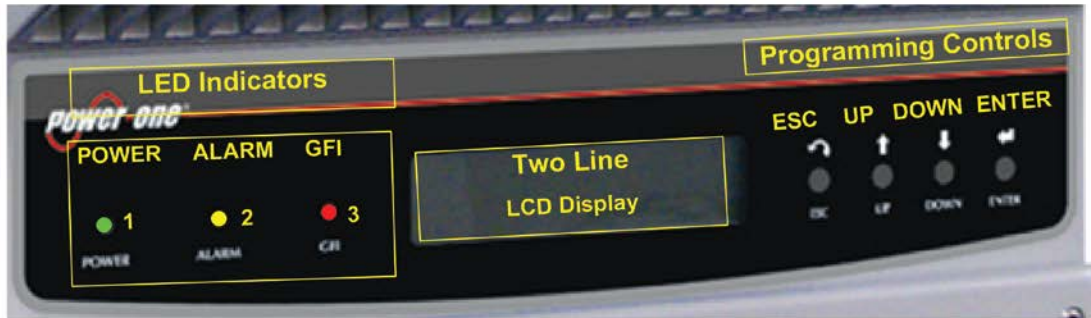
If all items described above tested OK, the inverter shows a corresponding message in the display top line along with the date and time. Clock malfunctioning or other non- function-related faults (meaning faults that do not affect the inverter's ability to generate energy) are shown in the second line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

2.5.4 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 0.
- Press ENTER (4th key from display) to open the selected submenu.

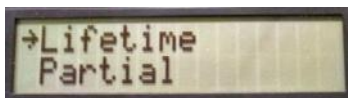
Note 4:01- Display Key Operation

2.5.5 Statistics

Select the STATISTICS menu to display the following sub-menu:

⇒ Lifetime
Partial
Today
Last 7 days
Last Month
Last 30 Days
Last 365 Days
User period

The display shows only 2 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:



2.5.6 Lifetime

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

Time	h
E-tot	KWh
Val.	EUR
CO2	kg

- Time: Lifetime operation time
- E-tot: Total energy produced
- Val. : Economic gain
- CO₂: CO₂ saving compared to fossil fuels

2.5.7 Partial

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

Time	h
E-par	KWh
Ppeak	W
Val.	EUR
CO2	kg

- 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.*
- CO₂: CO₂ 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.

TODAY

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

E-tod	KWh
Ppeak	W
Val.	EUR
CO2	kg

- E-tod: Total energy produced during the day.
- Ppeak: Peak power value achieved during the day.

- Val. : Economic gain during the day.
- CO₂: CO₂ saving for the day compared to fossil fuels.

2.5.8 Last 7 days

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

E-7d	KWh
Val.	EUR
CO2	kg

- E-7d: Total energy output over the last 7 days.
- Val. : Economic gain over the last 7 days.
- CO₂: CO₂ saving over the last 7 days compared to fossil fuels.

2.5.9 Last Month

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

E-mon	KWh
Val.	EUR
CO2	kg

- E-mon: Total energy output this month.
- Val. : Economic gain this month.
- CO₂: CO₂ saving this month compared to fossil fuels.

LAST 30 DAYS

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

E-30d	KWh
Val.	EUR
CO2	kg

- E-30d: Total energy output over the last 30 days.
- Val. : Economic gain over the last 30 days.
- CO₂: CO₂ saving over the last 30 days compared to fossil fuels.

2.5.10 Last 365 Days

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

E-365	KWh
Val.	EUR
CO2	kg

- 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.

2.5.11 User Period

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

User period

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

Start 23 June
End 28 August

- 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:

Data err

2.5.12 Settings

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

Password

Password
0000

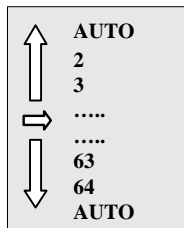
- To enter this menu, the correct four digit password must be entered.
 - At initial set up, enter the default password [0000] unless the default password has been modified by the user (per Note 4:01) in which case, enter the correct user password.
 - Follow instructions below to enter password digits 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**:

⇒ Address
Display Set
Service
New Password
Cash
Time
Language
Vstart
Alarm
Remote Control
UV Prot.time
MPPT
Alarm Message

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 sub-menus (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 sub-menu. The following section provides descriptions of each of the available sub-menus.

2.5.13 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.



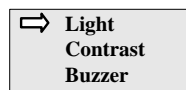
If desired, the RS485 address can be selected automatically by the system. This function is active when **AUTO** is selected from the address list.

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



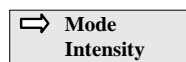
2.5.14 Display Set

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

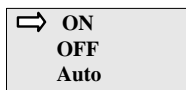


The following sections describe the available settings:

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



- 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.

2.5.15 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.

2.5.16 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).

2.5.17 Cash

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

Name	EUR
Val/KWh	00.50

- **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.

2.5.18 Time

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

Time	14:21
Date	17 May 2006

2.5.19 Language

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

⇒ English
Italiano

2.5.20 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.

VStart1	200V
---------	------

2.5.21 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 sub-menu:

⇒ Production
Fault

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 panel as shown in Figure 4:05.

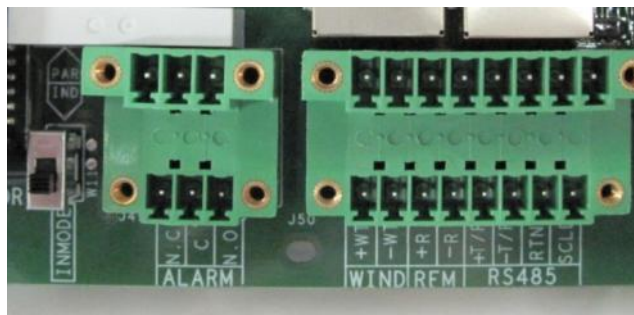


Figure4:06: Alarm contact terminal block

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.

2.5.22 Remote Control

Selecting this function accesses the remote ON/OFF 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 4:06. 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.



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



2.5.23 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].

2.5.24 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 3 options (LOW, MEDIUM, HIGH). The default setting is LOW.

MPPT Amplitude
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.

MPPT scan En/Dis
Enable

- Scan Interval - allows setting of the time interval between scans when system searches for real maximum power point. The default setting is 15 minutes.

Scan Interval
15 min

2.5.25 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:

Alarm message

After selecting the function, press [ENTER] to open the associated sub-menu.

⇒ Enable/Disable
Compose message

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

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

⇒ Enable message
Disable message

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

⇒ Enable/Disable
Compose

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

Message row 1:

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

Message row 2:

- 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.

2.5.26 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).

3.0 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: 1.0 TROUBLESHOOTING

AURORA TRIO 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.

1.2 LED INDICATORS

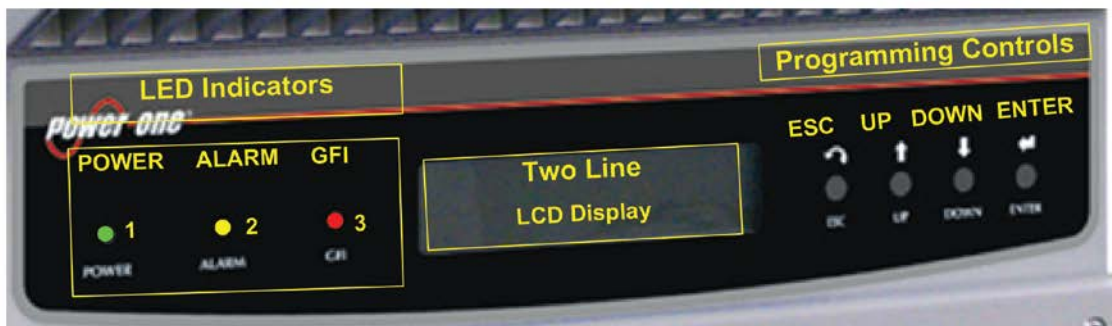


Figure 5:01- Location of the buttons and LEDs

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


4. 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....**'
5. The yellow 'FAULT' LED indicates that the AURORA Inverter has detected a fault condition. A fault description will appear on the display.
6. 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.
7. 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).

1.3 MESSAGES and ERROR CODES

 DANGER:	<p>Normally grounded conductors may be ungrounded and energized when a ground-fault is indicated.</p> <ul style="list-style-type: none"> • Risk of electric shock • Test before touching • Work on the AURORA TRIO 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 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 or configuration. However, some of the (E) codes may require you to contact Aurora 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.

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	Grid UF	W007	//	Output Underfrequency

			-Contact Power-One Technical Support				
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 Technical Support-possible.	-----	//	E025	Riso Low (Log Only)
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		//	E034	Interlock Fail (Not Used)

			inverter reset*- contact Power-One Technical Support.				
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.

Table 5:01 Messages and Error Codes

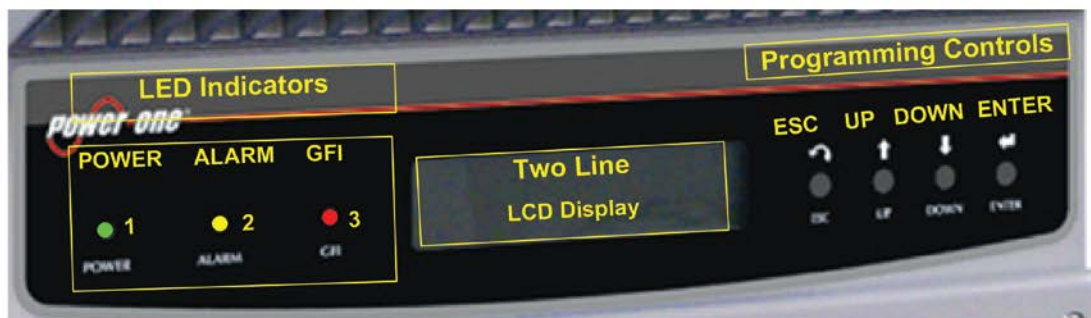
1.4 LCD DISPLAY

1.4.1 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:



6) 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.

7) 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.

Fgrid	60.17 Hz
In 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)

1.5 FIRST PHASE- ELECTRIC PARAMETER CHECK

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 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:

1.6 THE POWER-ONE SERVICE CALL

INFORMATION ON AURORA TRIO 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: 1.0 MAINTENANCE

The AURORA TRIO 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.


1.1 SHUT-DOWN PROCEDURE

There are three options for shutting down the inverter:

- 4) 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.
- 5) Disconnect the DC input by turning-off the associated disconnect switch and waiting for the UV port time out
- 6) Disconnect the grid, by turning-off its associated disconnect switch and reduce DC input to less than 130 Vdc.

1.2 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 switchbox power input, ALWAYS perform the appropriate disconnection procedure outlined below.
--	--

1.2.1 Disconnection Of Aurora Trio Inverter

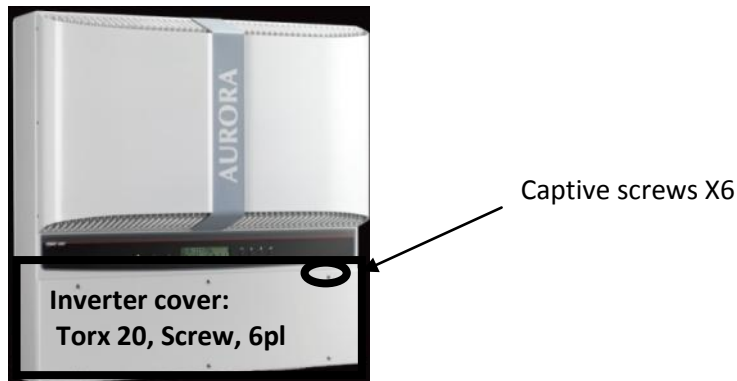
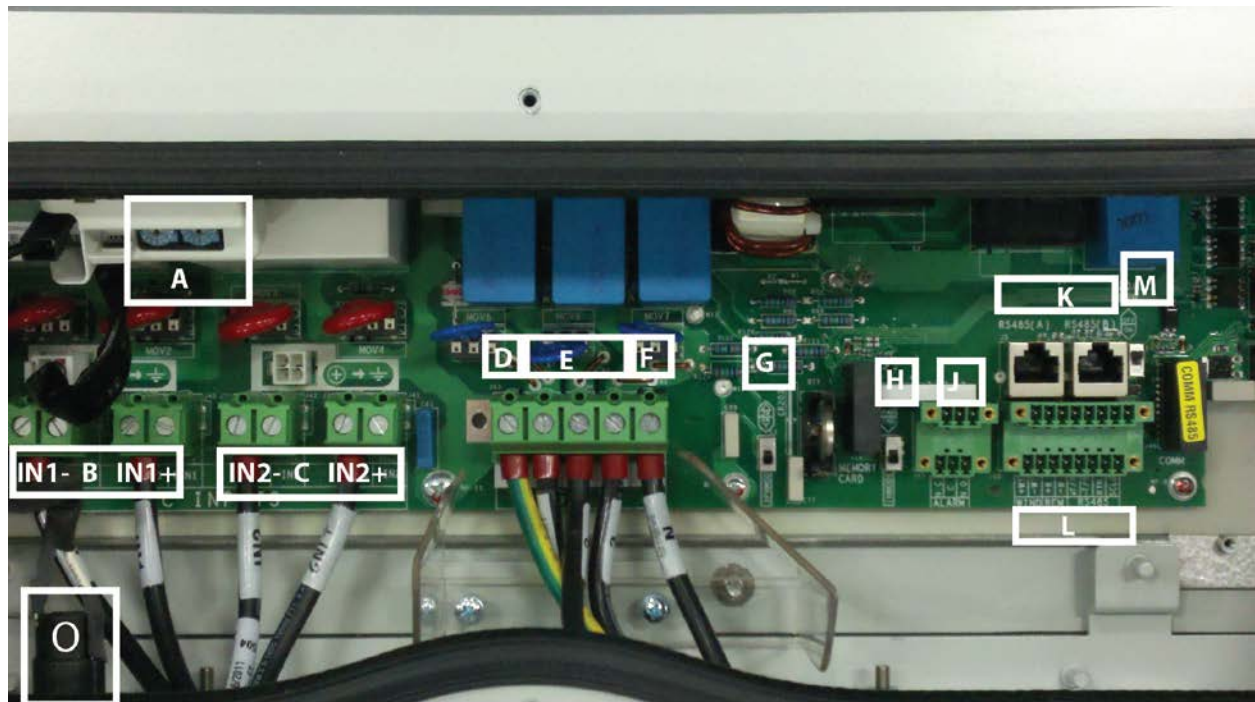



Figure 6:01- Location of Front Access Panels




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 ϕ AC Grid Output Terminals	Note 2 below	M	RS485 Termination Switch	See Signal Connection Section for more detail
F	3 ϕ 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 3 ϕ Mode Selector	Choose 3W or 4W Grid	O	GFD Fuse	

		Connection			
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

1.3 GROUND FAULT DETECTOR FUSE REPLACEMENT

 DANGER:	<p>Normally grounded conductors may be ungrounded and energized when a ground-fault is indicated.</p> <ul style="list-style-type: none"> • Risk of electric shock • Test before touching • Work on the AURORA TRIO inverter must be carried out by qualified personnel.
--	--

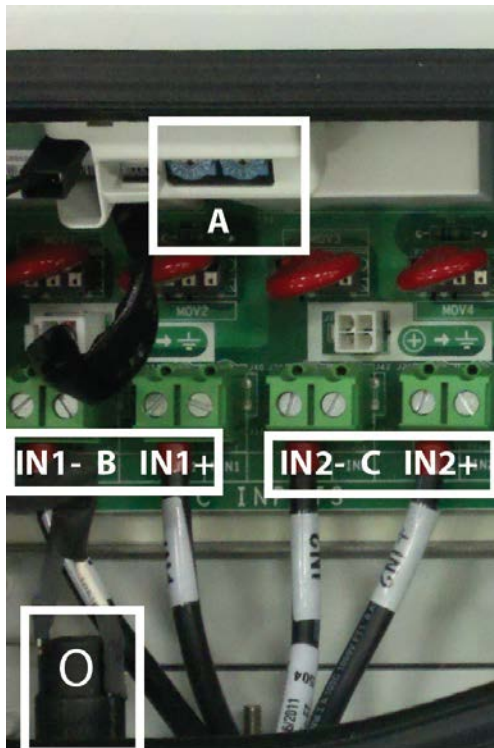




Figure 6:03 GFD Fuse Location O

 WARNING	<p>Before performing any operation on the switchbox power input or on the inverter, ALWAYS perform the disconnection procedure as explained in Section 1.0.</p>
--	---

The AURORA TRIO, 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 TRIO-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)

1.4 CR2032 LITHIUM BATTERY REPLACEMENT

	WARNING <ul style="list-style-type: none">• 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 TRIO 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.

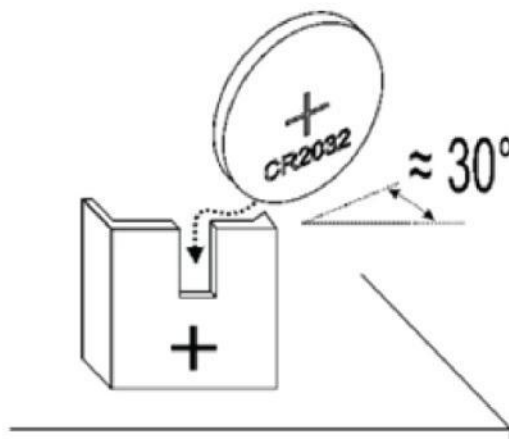
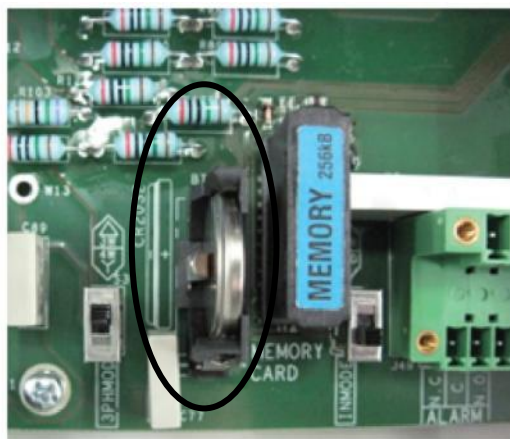



Figure 6:04 Lithium Battery Replacement

PART 7: THE APPENDIX

1.0 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.
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Technical Data	Values	PVI-10.0-I-OUTD-US/CAN		
Rated Grid AC Voltage	V	208	480	600
Input Side (DC)				
Maximum Usable Power for Each Channel	W	6800	6800	6800
MPPT Voltage Range	V	220-470	220-470	220-470
Start- Up Voltage	V	Default: 200 (Adjustable 120-350)	Default: 200 (Adjustable over range 120-350)	Default: 200 (Adjustable over range 120-350)
Absolute Maximum Voltage (Vmax)	V	520	520	520
Maximum Current (Idcmax) for both MPPT in Parallel	A	48	48	48
Maximum Usable Current per Channel	A	24	24	24
Number of Wire Landing Terminals per Channel		Standard version: 2 Switch box version: 2 or 3	Standard version: 2 Switch box version: 2 or 3	Standard version: 2 Switch box version: 2 or 3
Number of Independent MPPT Channels		Two; programmable as a single paralleled input	Two; programmable as a single paralleled input	Two; programmable as a single paralleled input
Array Wiring Termination		Terminal block, pressure clamp, 90° C terminals	Terminal block, pressure clamp, 90° C terminals	Terminal block, pressure clamp, 90° C terminals
Output Side (AC)				
Grid Standard		3-phase/3W or 3-phase/4W/Y (programmable)	3-phase/3W or 3-phase/4W/Y (programmable)	3-phase/3W or 3-phase/4W/Y (programmable)
Nominal Power	W	10000	10000	10000
Voltage Range (Vmin-Vmax)	V	183-228 -12%/+10% V _{AC,R} (Per UL 1741)	422-528 -12%/+10% V _{AC,R} (Per UL 1741)	528-660 -12%/+10% V _{AC,R} (Per UL 1741)
Grid Frequency; Range**	Hz	60; (59.3-60.5)	60; (59.3-60.5)	60; (59.3-60.5)

The Manual:
PVI-10/12-I-OUTD-(US,S,S1,S2)-US/CAN

Maximum Current (Iac, max)	A	30.0	14.0	10.6
Power Factor		>0.995 (+/-0.9)	>0.995 (+/-0.9)	>0.995 (ADJ. +/-0.9)
Total Harmonic Distortion At Rated Power	%	THD <2	THD<2	THD<2
Derated Power at 60°C/140°F	kWRMS	7250	8960	9600
Efficiency				
Maximum Efficiency	%	96.5	97.3	97.3
CEC Efficiency	%	96.0	97	97
Operating Parameters				
Consumption in Stand By (Night) (Feed-In Power Threshold)	WRMS	30	30	30
Consumption During Operation (Stand-by Consumption)	WRMS	less than 8.0	less than 8.0	less than 8.0
Topology		Isolated - High Frequency transformer	Isolated - High Frequency transformer	Isolated - High Frequency transformer
Mechanical Specifications				
Enclosure rating	in/mn	NEMA 4X	NEMA 4X	NEMA 4X
Cooling		Natural Convection	Natural Convection	Natural Convection
Conduit Connections		2ea x 3/4"KO trade size, 3 places (side, front, rear) 4ea x 1/2" KO trade size, 2places, bottom (comm)	2ea x 3/4"KO trade size, 3 places (side, front, rear) 4ea x 1/2" KO trade size, 2places, bottom (comm)	2ea x 3/4"KO trade size, 3 places (side, front, rear) 4ea x 1/2" KO trade size, 2places, bottom (comm)
Grid Wiring Termination Type		Screw Terminal Block Single wire, 90°C terminal wiring	Screw Terminal Block Single wire, 90°C terminal wiring	Screw Terminal Block Single wire, 90°C terminal wiring

The Manual:
PVI-10/12-I-OUTD-(US,S,S1,S2)-US/CAN

Dimensions (W/H/D)	in(mm)	Standard (US-no switch box): 25.4/28.2/8.7 (645/716/222) -S or -S2 Version: 25.4/37.7/8.7 (645/958/222)	Standard (US-no switch box): 25.4/28.2/8.7 (645/716/222) -S or -S2 Version: 25.4/37.7/8.7 (645/958/222)	Standard (US-no switch box): 25.4/28.2/8.7 (645/716/222) -S or -S2 Version: 25.4/37.7/8.7 (645/958/222)
Unit Weight	lb(kg)	101(45.8) (US-no switch version) 107(48.5) (S version) 114(51.7)(S2 version)	101(45.8) (US-no switch version) 107(48.5) (S version) 114(51.7)(S2 version)	101(45.8) (US-no switch version) 107(48.5) (S version) 114(51.7)(S2 version)
Shipping Weight	lbs(kg)	with pallet: 254 (<115) without pallet: 143 lb(<65)	with pallet: 254(<115) without pallet: 143(<65)	with pallet: 254(<115) without pallet: 143(<65)
Mounting System		Wall Brackett (Included)	Wall Brackett (Included)	Wall Brackett (Included)
Environmental				
Ambient Air Temperature Range	F(°C)	-13...+140 (-25...+60)	-13...+140 (-25...+60)	-13...+140 (-25...+60)
Noise Emission Level	db (A) @1m	<50	<50	<50
Relative Humidity	%RH	0 to 100 %, condensing	0 to 100 %, condensing	0 to 100 %, condensing
Maximum Operating Altitude without Derating	ft(m)	Full power: 6560(2000); derated operation above	Full power: 6560(2000); derated operation above	Full power: 6560(2000); derated operation above
Protection Devices				
Output				
Anti-Islanding Protection		According to local standard per UL1741/IEEE1547	According to local standard Per UL1741/IEEE1547	According to local standard Per UL1741/IEEE1547
External AC OCPD Rating	ARMS	40	20	15
Over-Voltage Protection Type		3 plus gas arrester Varistor, One per line + spark gap to PE	3 plus gas arrester Varistor, One per line + spark gap to PE	3 plus gas arrester Varistor, One per line + spark gap to PE

Input				
Reverse Polarity Protection		yes, diode	yes, diode	yes, diode
Maximum Short Circuit Current Limit per Channel	A	29	29	29
Over-Voltage Protection Type		Varistor, two for per MPPT	Varistor, two per each MPPT	Varistor, two per each MPPT
PV Array Ground Fault Detection		According to local standard GFDI (GFD fuse) per UL1741/NEC690.5 (A)	According to local standard GFDI (GFD fuse) per UL1741/NEC690.5 (A)	According to local standard GFDI (GFD fuse) per UL1741/NEC690.5 (A)
DC Switch Current Rating (Per Contact)	A/V	32/600	32/600	32/600
Ground Fault Detector Fuse Size/ Type	A/V mm	1/600 10x38	1/600/10x38	1/600/10x38
Optional String Combiner Fuse Size/Type	A, A/V mm	12, 15/600 10x38	12, 15/600/10x38	12, 15/600/10x38
Isolation Level		POS or NEG ground referenced array (version specific)	POS or NEG ground referenced array (version specific)	POS or NEG ground referenced array (version specific)
Safety and EMC Standard		UL1741, CSA22.2 #107.1-01	UL1741, CSA22.2 #107.1-01	UL1741, CSA22.2 #107.1-01
Safety Approval		cCSAus	cCSAus	cCSAus
Features-Communication				
User-Interface (Display)		16 Characters X 2 lines LCD display (Front Panel Chassis Mount)	16 Characters X 2 lines LCD display (Front Panel Chassis Mount)	16 Characters X 2 lines LCD display (Front Panel Chassis Mount)
Remote Monitoring (1xRS485 incl.)		RS485	RS485	RS485
Wired Local Monitoring (1xRS485 incl.)		PVI-DESKTOP (opt) Use included RS485 port and (optional) PVI RS485-USB adaptor with AURORA Communicator Software	PVI-DESKTOP (opt) Use included RS485 port and (optional) PVI RS485-USB adaptor with AURORA Communicator Software	PVI-DESKTOP (opt) Use included RS485 port and (optional) PVI RS485-USB adaptor with AURORA Communicator Software

Wireless Local Monitoring		PVI-DESKTOP (opt), WITH PVI-RADIO MODULE (opt)	PVI-DESKTOP (opt) WITH PVI-RADIO MODULE (opt)	PVI-DESKTOP (opt) WITH PVI-RADIO MODULE (opt)
Standard Warranty	Years	10	10	10
Extended Warranty	Years	15 & 20	15 & 20	15 & 20
Available Models				
For available models and ordering information, see listing in section 2.0 of this manual.				
*All data is subject to change without notice				
** Adjustable low trip point to 57Hz. Contact manufacturer for details				
***Inverter can apply that much current- Breaker will pop				

Technical Data	Values	PVI-12.0-I-OUTD-US/CAN	
Rated Grid AC Voltage	V	480	600
Input Side (DC)			
Maximum Usable Power for Each Channel	W	6800	6800
MPPT Voltage Range	V	250-470	250-470
Start- Up Voltage	V	Default: 200 (Adjustable over range 120-350)	Default: 200 (Adjustable over range 120-350)
Absolute Maximum Voltage (Vmax)	V	520	520
Maximum Current (Idcmax) for both MPPT in Parallel	A	50	50
Maximum Usable Current per Channel	A	25	25
Number of Wire Landing Terminals per Channel		Standard version: 2 Switch box version: 2 or 3	Standard version: 2 Switch box version: 2 or 3
Number of Independent MPPT Channels		Two; programmable as a single paralleled input	Two; programmable as a single paralleled input
Array Wiring Termination		Terminal block, pressure clamp, 90° C terminals	Terminal block, pressure clamp, 90° C terminals

Output Side (AC)			
Grid Standard		3-phase/3W or 3-phase/4W/Y (programmable)	3-phase/3W or 3-phase/4W/Y (programmable)
Nominal Power	W	12000	12000
Voltage Range (Vmin- Vmax)	V	422-528 -12%/+10% V _{AC,R} (Per UL 1741)	528-660 -12%/+10% V _{AC,R} (Per UL 1741)
Grid Frequency; Range**	Hz	60; (59.3-60.5)	60; (59.3-60.5)
Maximum Current (I _{ac} , max)	A	16.0	12.8
Power Factor		>0.995 (+/-0.9)	>0.995 (+/-0.9)
Total Harmonic Distortion At Rated Power	%	THD<2	THD<2
Derated Power at 60°C/140°F	kWRMS	8950	9020
Efficiency			
Maximum Efficiency	%	97.3	97.3
CEC Efficiency	%	97	97
Operating Parameters			
Consumption in Stand By (Night) (Feed-In Power Threshold)	WRMS	30	30
Consumption During Operation (Stand-by Consumption)	WRMS	Less than 8.0	less than 8.0
Topology		Isolated - High Frequency transformer	Isolated - High Frequency transformer
Mechanical Specifications			
Enclosure rating	in/mn	NEMA 4X	NEMA 4X
Cooling		Natural Convection	Natural Convection
Conduit Connections		2ea x 3/4"KO trade size, 3 places (side, front, rear) 4ea x 1/2" KO trade size, 2places, bottom (comm)	2ea x 3/4"KO trade size, 3 places (side, front, rear) 4ea x 1/2" KO trade size, 2places, bottom (comm)

Grid Wiring Termination Type		Screw Terminal Block Single wire, 90°C terminal wiring	Screw Terminal Block Single wire, 90°C terminal wiring
Dimensions (W/H/D)	in(mm)	Standard (US-no switch box): 25.4/28.2/8.7 (645/716/222) -S or -S2 Version: 25.4/37.7/8.7 (645/958/222)	Standard (US-no switch box): 25.4/28.2/8.7 (645/716/222) -S or -S2 Version: 25.4/37.7/8.7 (645/958/222)
Unit Weight	lb(kg)	101(45.8) (US-no switch version) 107(48.5) (S version) 114(51.7)(S2 version)	101(45.8) (US-no switch version) 107(48.5) (S version) 114(51.7)(S2 version)
Shipping Weight	lbs(kg)	with pallet: 254(<115) without pallet: 143 (<65)	with pallet: 254(<115) without pallet: 143(<65)
Mounting System		Wall Brackett (Included)	Wall Brackett (Included)
Environmental			
Ambient Air Temperature Range	F(°C)	-13...+140 (-25...+60)	-13...+140 (-25...+60)
Noise Emission Level	db (A) @1m	<50	<50
Relative Humidity	%RH	0 to 100%, condensing	0 to 100 %, condensing
Maximum Operating Altitude without Derating	ft(m)	Full power: 6560(2000); derated operation above	Full power: 6560(2000); derated operation above
Protection Devices			
Output			
Anti-Islanding Protection		According to local standard Per UL1741/IEEE1547	According to local standard Per UL1741/IEEE1547

External AC OCPD Rating	ARMS	20	20
Over-Voltage Protection Type		3 plus gas arrester Varistor, One per line + spark gap to PE	3 plus gas arrester Varistor, One per line + spark gap to PE
Input			
Reverse Polarity Protection		yes, diode	yes, diode
Maximum Short Circuit Current Limit per Channel	A	29	29
Over-Voltage Protection Type		Varistor, two per each MPPT	Varistor, two per each MPPT
PV Array Ground Fault Detection		According to local standard GFDI (GFD fuse) per UL1741/NEC690.5 (A)	According to local standard GFDI (GFD fuse) per UL1741/NEC690.5 (A)
DC Switch Current Rating (Per Contact)	A/V	32/600	32/600
Ground Fault Detector Fuse Size/ Type	A/V mm	1/600/10x38	1/600/10x38
String Combiner Fuse Size/Type	A, A V/mm	12 & 15 600/10x38	12 & 15 600/10x38
Isolation Level		POS or NEG ground referenced array (version specific)	POS or NEG ground referenced array (version specific)
Safety and EMC Standard		UL1741, CSA22.2 #107.1-01	UL1741, CSA22.2 #107.1-01
Safety Approval		cCSAus	cCSAus
Features-Communication			
User-Interface (Display)		16 Characters X 2 lines LCD display (Front Panel Chassis Mount)	16 Characters X 2 lines LCD display (Front Panel Chassis Mount)
Remote Monitoring (1xRS485 incl.)		RS485	RS485

Wired Local Monitoring (1xRS485 incl.)		PVI-DESKTOP (opt) Use included RS485 port and (optional) PVI RS485-USB adaptor with AURORA Communicator Software	PVI-DESKTOP (opt) Use included RS485 port and (optional) PVI RS485-USB adaptor with AURORA Communicator Software
Wireless Local Monitoring		PVI-DESKTOP (opt) WITH PVI-RADIO MODULE (opt)	PVI-DESKTOP (opt) WITH PVI-RADIO MODULE (opt)
Standard Warranty	Years	10	10
Extended Warranty	Years	15 & 20	15 & 20

1.2 A DESCRIPTION OF THE SYSTEM

AURORA TRIO 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.

1.2.1 Fundamental Elements of a Photovoltaic System: 'STRINGS' and 'ARRAYS'

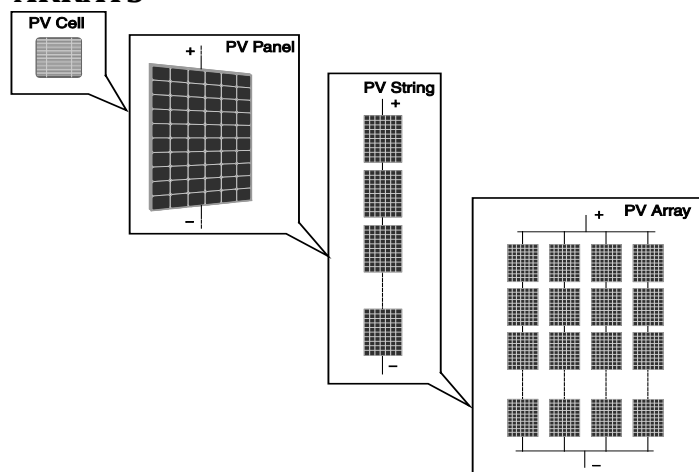


Figure 7:01- Array Composition

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.

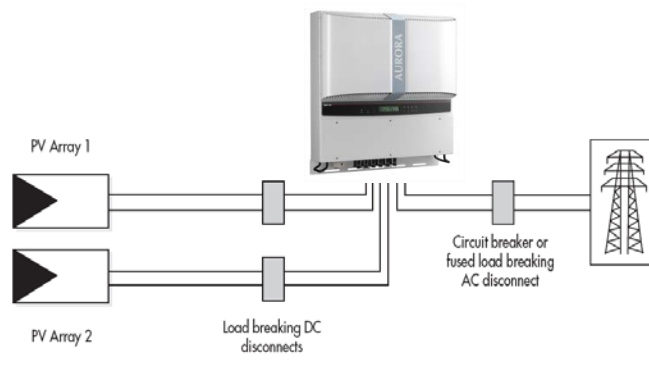


Figure 7:01 - Simplified Diagram of a Photovoltaic System

1.2.2 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 TRIO models are provisioned with two independent inputs, each equipped with its own MPPT circuit that enables the AURORA TRIO 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	<ul style="list-style-type: none">• 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 TRIO Inverter has a maximum allowable input current limit of 24Adc for each MPPT input channel.
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 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.
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1.2.3 Technical Description of AURORA TRIO 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 TRIO 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 TRIOs' 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 TRIO 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.

1.3 PROTECTIVE DEVICES WITHIN THE AURORA TRIO INVERTER

1.3.1 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 TRIO Inverters meet the requirements of all interconnection standards.

1.3.2 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.


1.3.3 Anti-Islanding

When the local utility AC grid fails due to a line fault or otherwise interrupted (e.g., equipment maintenance) the AURORA TRIO 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)

1.3.4 Grounding/Differential Protection Fault

AURORA TRIO 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:	<p>Normally grounded conductors may be ungrounded and energized when a ground-fault is indicated.</p> <ul style="list-style-type: none">• Risk of electric shock• Test before touching• Work on the AURORA TRIO inverter must be carried out by qualified personnel.
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 NOTE:	<p>The protective devices for ground fault detection and control comply with CSA-C22.2 N.107.1-01 and UL Std N.1741.</p>
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1.3.5 ADDITIONAL PROTECTIVE DEVICES

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

- Constant 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 $\geq 158^{\circ}\text{F}$).

1.3.5.1 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.

1.3.5.2 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.

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