

Commercial 1000VDC String Inverter

# SOLECTRIA XGI™ 1000

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*Installation and Operation Guide*

Models:           XGI 1000-65/65  
                      XGI 1000-60/65  
                      XGI 1000-60/60



1.	Important Safety Instructions .....	4
1.1	Hazard Symbols .....	4
1.2	Symbols on Labels .....	5
1.3	General Safety Messages .....	6
1.4	Status Panel .....	8
2.	Overview .....	9
2.1	Intended Use .....	9
2.2	Inverter Features .....	10
2.3	Inverter Protections .....	10
2.4	Communication Overview .....	11
2.5	Inverter Diagrams .....	11
2.6	Labels .....	12
2.7	Unpacking .....	13
3.	Installation .....	15
3.1	Installation Sequence Overview .....	15
3.2	Mechanical Installation .....	16
3.3	Electrical Installation AC .....	27
3.4	Electrical Installation DC .....	34
3.5	Communication Installation .....	41
3.6	Communication and I/O Ports (XGI-1000 Only) .....	49
4.	Resealing the Wiring Box .....	50
5.	Startup .....	52
5.2	Startup Steps for a Single Inverter .....	52
6.	Graphical User Interface .....	54
6.1	XGI Terminology .....	54
6.2	Graphical User Interface (GUI) Overview .....	54
6.3	Menu Structure .....	60
7.	Firmware Updates .....	61
8.	Communication Commissioning .....	62
9.	Operation .....	63
9.1	Inverter Start-Up .....	63

- 9.2 Inverter Shutdown ..... 63
- 10. Maintenance and Troubleshooting..... 64
  - 10.1 Event Codes..... 64
  - 10.2 Servicing the Fans..... 69
  - 10.3 WiFi Connection Error..... 70
- 11. Specifications ..... 71
  - 11.1 General Specifications..... 71
  - 11.2 Voltage and Frequency Limits and Trip Times ..... 72
  - 11.3 Temperature and Altitude ..... 74
  - 11.4 Enclosure..... 75
- 12. Options..... 76
  - 12.1 Wiring Box Configurations ..... 76
- 13. Appendix ..... 78
  - 13.1 Warranty and RMA Instructions ..... 78
  - 13.2 Datasheet..... 78
  - 13.3 Contact Information..... 78

## 1. Important Safety Instructions

### 1.1 Hazard Symbols


Indicates a hazardous situation, which, if not avoided, will result in death or serious injury.


Indicates a hazardous situation, which, if not avoided, could result in death or serious injury.


Indicates a hazardous situation, which, if not avoided, could result in minor or moderate injury.


Indicates a hazardous condition, which, if not avoided, could result in property damage.


Indicates important supplementary information to use the product effectively.

## 1.2 Symbols on Labels

Table 1-1 Explanation of Symbols on Labels

SYMBOL	DESCRIPTION
	DC Signal
	AC Signal
	Equipment Ground
	Phase
	Off
	On
	Refer to Operating Instructions
	Caution: Risk of Electric Shock
	Caution: Risk of Electric Shock Timed Discharge

### 1.3 General Safety Messages



#### **DANGER**

**Electric Shock Hazard:** Components with hazardous voltage and energy will electrocute operator. Operator shall avoid touching live components with hazardous voltage and energy..



#### **WARNING**

**Unqualified Operator Hazard:** Operator may cause a hazardous situation by making incorrect installation or wiring connections. A qualified technician shall do all installation and wiring connections to comply with all local, national, and country specific guidelines for safety.

**Electrical Shock Hazard:** Operator may contact components with hazardous voltage and energy. Use proper safety equipment including Personal Protective Equipment (PPE) when de-energizing the unit. De-energize the unit, wait 5 minutes, and verify the absence of voltage before opening the equipment or removing any protective shields.

#### **NOTICE !**

**General Damage to Equipment:** Attempting to service the inverter improperly may result in damage. Contact Yaskawa Solectria Solar Technical Support for maintenance.

#### **INFO ✓**

**Read and Follow Instructions:** Failure to read and follow instructions may void the warranty. Install the inverter according to the instructions in this manual.

## **SAVE THESE INSTRUCTIONS**

**This manual contains important instructions for models:**

**XGI 1000-65/65**

**XGI 1000-60/65**

**XGI 1000-60/60**

### 1.4 Status Panel

The Status Panel consists of five LED icons that provide useful information to the user regarding the current state of the inverter. The Status Panel is shown in Figure 1-1 and the icon symbols are defined in Table 1-2.



Figure 1-1 Status Panel

Table 1-2 Explanation of Symbols on Status Panel

SYMBOL	DESCRIPTION
	<p><b>Ready (Yellow)</b></p> <p><b>On:</b> Inverter is initialized and ready to operate</p> <p><b>Off:</b> Inverter is not ready to operate</p>
	<p><b>Network and Communication (Yellow)</b></p> <p><b>On:</b> Network and communication services are working properly</p> <p><b>Off:</b> Network and communication services are offline</p>
	<p><b>Power (Yellow)</b></p> <p><b>On:</b> Inverter is generating AC power</p> <p><b>Off:</b> Inverter is not generating AC power</p>
	<p><b>Maintenance (Yellow)</b></p> <p><b>On:</b> Inverter requires maintenance or service</p> <p><b>Off:</b> Inverter does not require maintenance or service</p>
	<p><b>Power Fault (Red)</b></p> <p><b>On:</b> Power fault that requires service and may be a hazard</p> <p><b>Off:</b> There is no power fault</p>

## 2. Overview

### 2.1 Intended Use

The SOLECTRIA XGI 1000 is a grid-tied, photovoltaic (PV), three phase inverter, suitable for use in commercial or utility-scale installations. The SOLECTRIA XGI 1000 is an integral part of a typical PV installation, which typically includes PV modules, DC power distribution equipment, a PV inverter, and AC power distribution equipment. The SOLECTRIA XGI 1000 converts solar power (DC) to 480VAC power suitable for use in buildings and back feeding onto the electrical grid. The SOLECTRIA XGI 1000 is an ideal product for use in rooftop, carport, or ground mount installations where quality and performance are paramount.

The SOLECTRIA XGI 1000 is not intended for use in micro-grid or off-grid applications. Although successful integration into AC-couple systems is possible, Yaskawa Solectria Solar does not support or provide guidance for use in this type of application.

The SOLECTRIA XGI 1000 is proudly manufactured in our Buffalo Grove IL facility and is compliant with the Buy American Act (BAA).

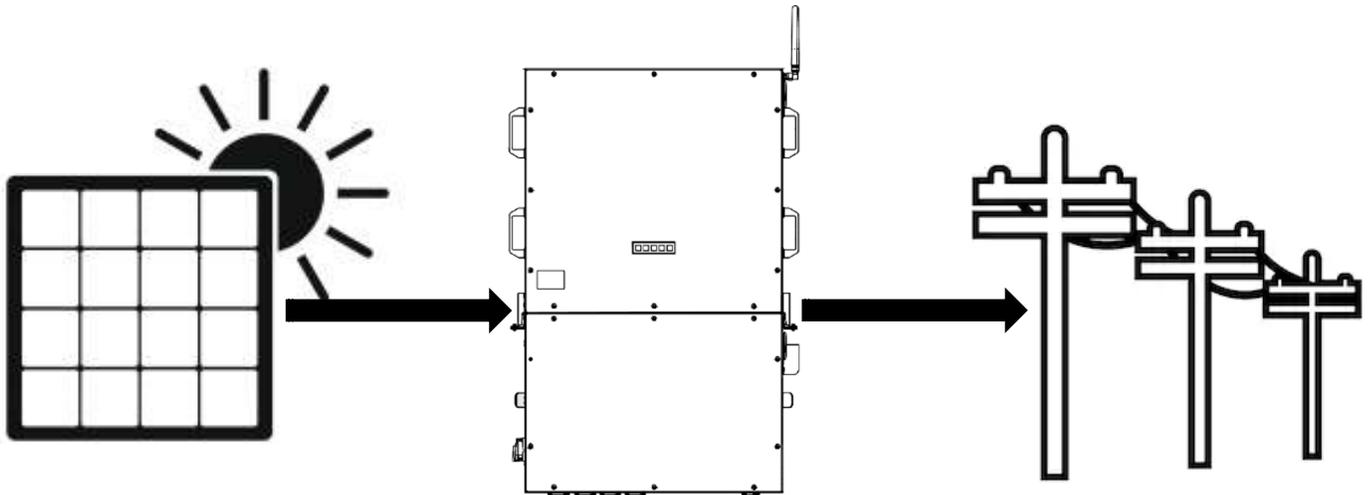


Figure 2-1 Inverter Usage

## 2.2 Inverter Features

<b>CONVERSION TECHNOLOGY</b>	3 - Level
<b>HIGH EFFICIENCY</b>	Max 98.2%, CEC 98%
<b>GRID ADAPTABILITY</b>	Supports multiple grid trip setpoints Adjustable reactive power Adjustable power factor (PF) $\pm 0.85$ Remote power curtailment
<b>ETHERNET CONNECTIVITY</b>	Modbus TCP/IP over Ethernet
<b>USER INTERFACE (UI)</b>	Wifi UI accessible with smart device
<b>MULTICHANNEL MPPT CONFIGURATION</b>	4 MPPT zones 1 MPPT zones
<b>PROTECTIVE ENCLOSURE</b>	NEMA Type 4X Corrosion resistant aluminum Rated for indoor and outdoor use
<b>EASY INTEGRATION</b>	Integrated AC and DC switches 16 fused input positions Accommodates wide range of AC/DC conductors Compatible with approved external combiner boxes

## 2.3 Inverter Protections

<b>DC POLARITY</b>	Reverse polarity protection on DC inputs
<b>SHORT CIRCUIT PROTECTION</b>	
<b>ARC FAULT</b>	DC series arc fault detection
<b>ANTI-ISLANDING</b>	Slip mode anti-islanding detection
<b>OVER VOLTAGE PROTECTION</b>	Integrated input and output over-voltage protection
<b>OVER CURRENT PROTECTION</b>	Input over-current protection
<b>CONTINUOUSLY MONITORED VARIABLES</b>	DC input insulation resistance with respect to ground AC output voltage and frequency Leakage current to ground Internal ambient temperature IGBT module temperature

## 2.4 Communication Overview

The SOLECTRIA XGI 1000 utilizes an advanced communication platform that can be accessed over WIFI using a smart device, or over Ethernet using a PC. This provides the user with a single point of access to all inverters within a network, without needing to travel the site to interact with individual inverters.

The SOLECTRIA XGI 1000 is compatible with Solectria’s SolrenView with no additional hardware required. Yaskawa Solectria also supports integration with other third party monitoring platforms. For a complete list of compatible monitoring visit [www.solectria.com](http://www.solectria.com).

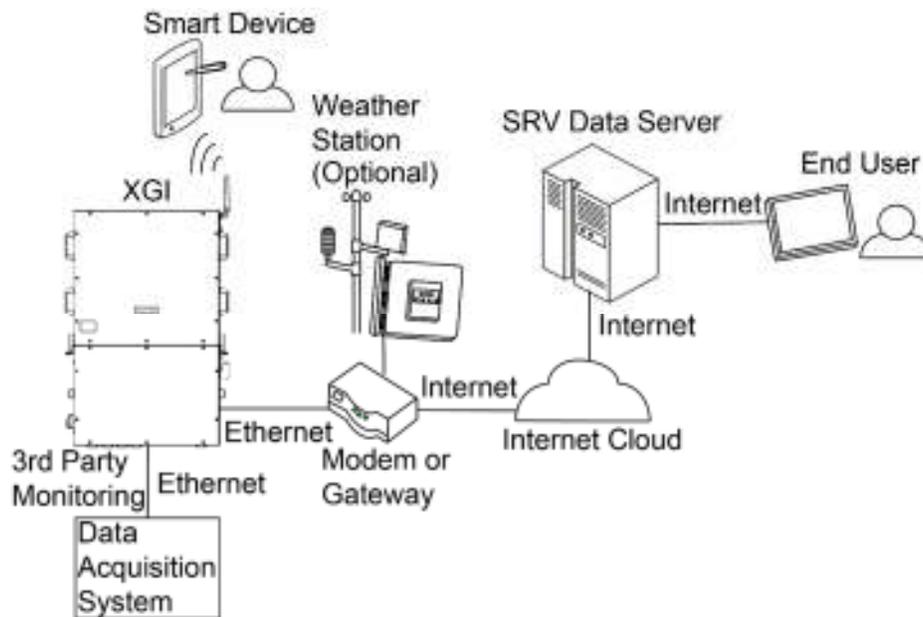


Figure 2-2 Communications Overview

## 2.5 Inverter Diagrams

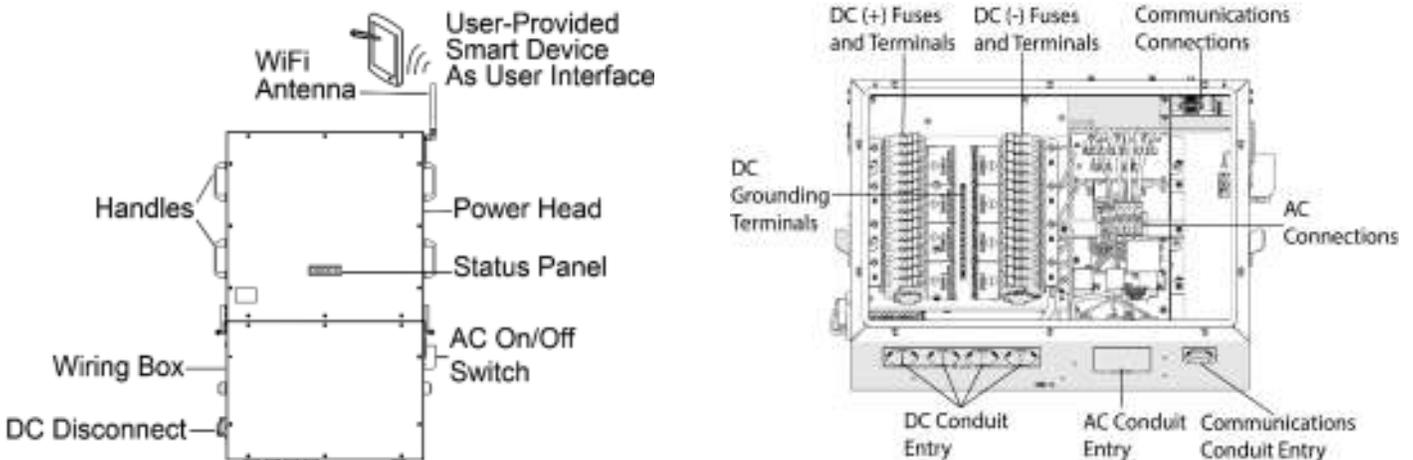


Figure 2-3 SOLECTRIA XGI 1000 Inverter (Left) and Wiring Box (Right)

## 2.6 Labels

The SOLECTRIA XGI 1000 has labels on the Power Head and Wire Box. Both labels are located on the right hand side of the enclosure. Do not deface these labels as they contain important information required for warranty service. The label on the Power Head shows the inverter specifications and FCC compliance, see (Figure 2-7).

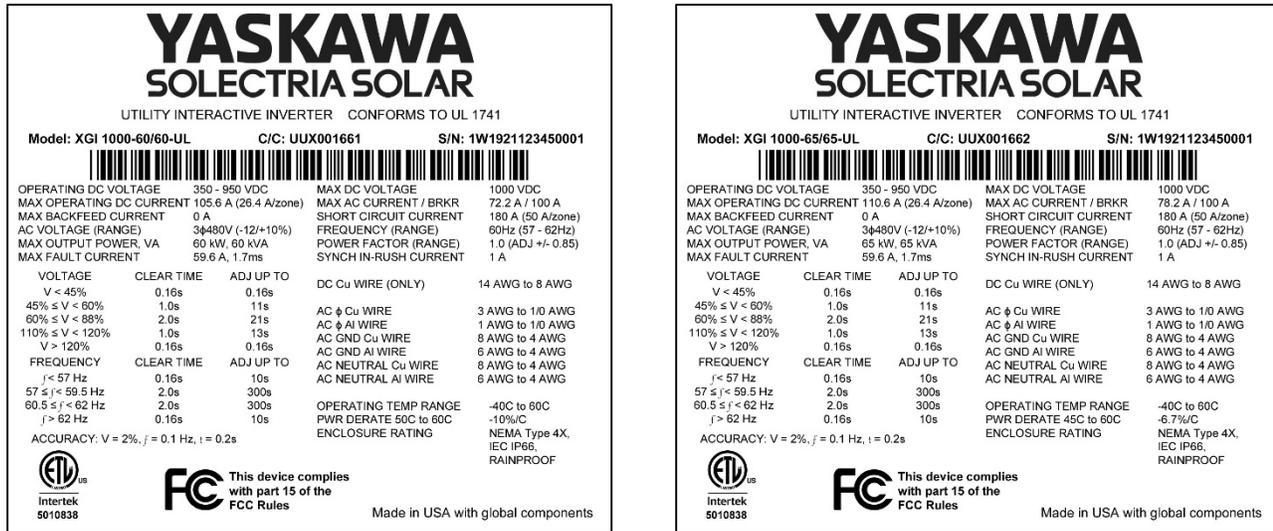


Figure 2-4 Example Power Head Labels for SOLECTRIA XGI 1000-60/60 (Left) and SOLECTRIA XGI 1000-65/65 (Right)

The label on the Wiring Box shows the Model, the order code (C/C), the Enclosure Type, and Serial Number (Figure 2-5).



Figure 2-5 Example Label for XGI 1000 Wiring Box

The Model code contains important information about the Wiring Box configuration; see Table 2-1 for the Model code Matrix.

Table 2-1 Model Matrix

<b>MODEL EXAMPLE: WB-1000-16X15A-L-IND</b>	
<b>MODEL TYPE</b>	WB = Wire Box
<b>VOLTAGE</b>	1000 = 1000VDC
<b>NUMBER OF FUSE POSITIONS</b>	16X = 16 positive fuses, 16 negative fuses
<b>FUSE RATINGS</b>	15A = 15 amp fuses 20A = 20 amp fuses
<b>AC LUG SIZE</b>	L = Large AC lug option, if present
<b>MPPT CONFIGURATION</b>	IND = Independent, 4 MPPT zones COM = Combined, 1 MPPT zones

## 2.7 Unpacking

The SOLECTRIA XGI inverter ships in two boxes, the Wiring Box and the Power Head (ordered separately) secured to a pallet. Prior to installation, be sure to store the packaged inverter(s) out of the elements, the inverter enclosures are not NEMA Type 4X rated until fully installed. Storage temperatures are -40°F to +167°F (-40°C to +75°C). Open the boxes carefully to avoid damaging the contents.

### NOTICE !

**Store Packaged Inverter Properly:** Never expose packaged inverters to rain, water, snow, or other elements that may damage the electronics. The Power Head and Wiring Box are not NEMA Type 4X rated until fully installed. Failure to store the inverters properly will result in property damage that is not covered under warranty.

### INFO ✓

**Do Not Discard Packaging Before Removing all Contents:** There are multiple components in each box, check packaging thoroughly before discarding.

A complete inverter ships with the components show in **Error! Reference source not found.**, and described in Table 2-3.

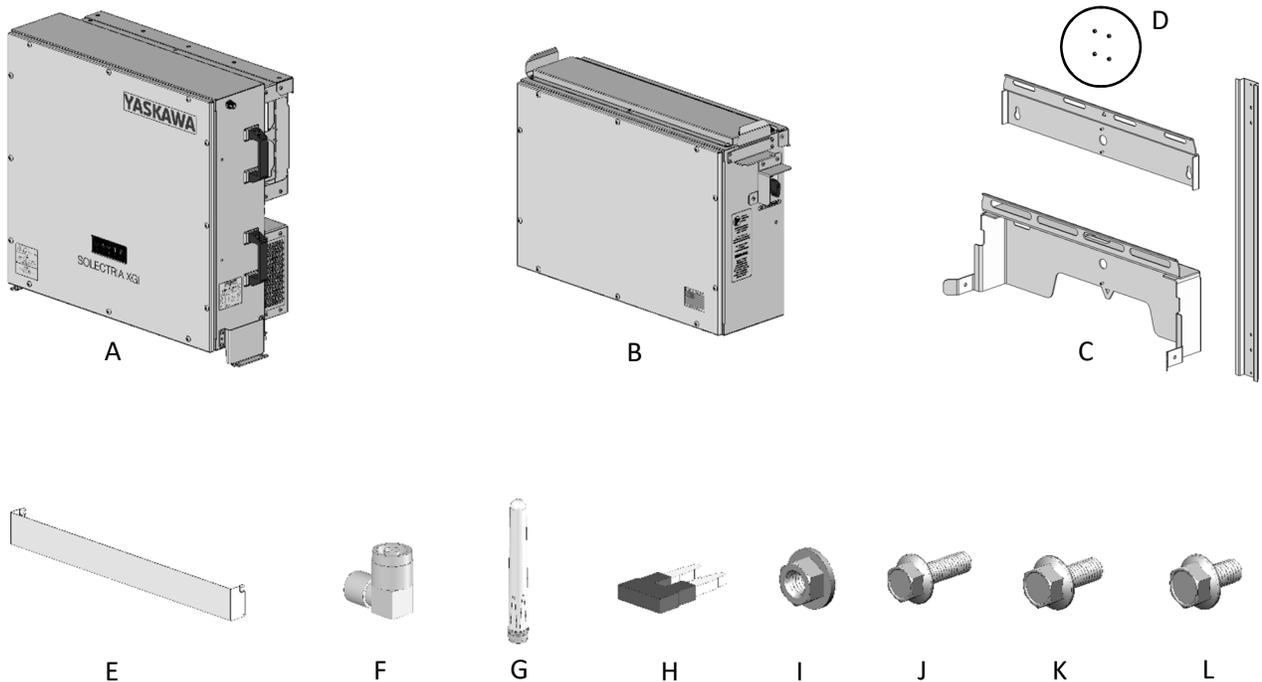


Table 2-2 Contents of Inverter Assembly

IDENTIFIER	PART	QUANTITY	DESCRIPTION
A	Power Head	1	Inverter Power Head, top
B	Wire Box	1	Inverter Wire Box, bottom

<b>C</b>	Mounting Bracket Assembly	1	Mounting Bracket assembly, 3 pieces
<b>D</b>	M5 x 0.8, Nut	4	Mouthing Bracket nut, M5x0.8 SS Nut
<b>E</b>	Shield	1	Front shield, between Power Head and Wire Box
<b>F</b>	Antenna Adapter, WIFI	1	WIFI antenna for GUI
<b>G</b>	Antenna, WIFI	1	90° coaxial WIFI antenna adapter, male to female
<b>H</b>	2-Position Jumper	1	2 position jumper, neutral to ground bonding
<b>I</b>	M5 x 0.8, Nut	4	Inverter Box to Wiring Box, M5x0.8, SS nut
<b>J</b>	M5 x 0.8, Screw	4	Inverter Box to Wiring Box, M5x0.8, 16mm long, SS screw
<b>K</b>	M5 x 0.8, Screw	2	Front shield, M5x0.8, 12mm long, SS screw
<b>L</b>	M6 x 1.0, Screw	2	Mounting Bracket, Wire Box, M6x1.0, 12mm Long, SS screw

Table 2-3 Contents of Boxes

### 3. Installation

Before attempting to install the SOLECTRIA XGI 1000™ read Section 3 in its entirety.

#### **WARNING**

**Read These Instructions:** Failure to follow these installation instructions may result in personal injury or death. Read this section in its entirety before attempting to install a SOLECTRIA XGI 1000.

#### **NOTICE !**

**Improper Installation Will Void Warranty:** This section includes important information regarding the proper installation environment and mechanical and electrical requirements. Failure to follow these instructions will void the warranty.

This Installation Section is broken into four sub-sections, Mechanical Installation,

#### **INFO ✓**

**Antenna Orientation:** the WIFI antenna must remain vertical, regardless of the installation angle.

Electrical Installation AC, Electrical Installation DC, and Communication Installation. Each subsection begins with general requirements and guidelines which must be considered when designing a system and planning the installation. Each subsection is concluded with detailed systematic instructions to install the SOLECTRIA XGI 1000™.

#### 3.1 Installation Sequence Overview

1. Assemble and install the Mounting Bracket.
2. Install the Wiring Box to the bottom portion of the mounting bracket.

#### **CAUTION**

**Lifting Heavy Object Hazard:** Proper lifting technique must be used in order to avoid injuries. Use a two-man lift to install the Power Head.

3. Install the Power Head on the mounting bracket above the Wiring Box.
4. Connect the Power Head and Wiring Box together.
5. Connect the antenna to the Power Head using the 90 degree coaxial connection.
6. Confirm that the site AC breaker is set to OFF.
7. Remove the cover of the Wiring Box and the plastic shields.
8. Land the AC conductors from the grid in the Wiring Box to the AC terminal block ensuring a Positive Phase rotation.
9. Land the input PV circuit conductors in the Wiring Box by connecting to either;
  - a. The DC fuse holders
  - b. The DC input zone bus bars (for use with external combiner boxes only), see Section 3.4.6 for more details.

10. Land the communication conductors.
11. Install conduit foam in all conduit entrances.
12. Replace the plastic shields and the cover of the Wiring Box.

### 3.2 Mechanical Installation

#### 3.2.1 Inverter Environment

The SOLECTRIA XGI 1000 is equipped with a NEMA Type 4X rated, Polyester Powder-Coated Aluminum enclosure suitable for outdoor installation in many different climates. Select the mounting location appropriately taking into consideration, snow, wind, rain, direct sun, pests, vegetation growth, and any other local environmental conditions. To increase the products life span, it's recommended that the inverter be installed out of direct sunlight; for example, under a shade structure, on a north facing building, or on north facing racking. Never install inverters in areas that are prone to flooding, standing water, prolonged snow coverage, or near explosive or flammable materials.

#### **WARNING**

**Exposure or Fire Hazard:** Electrical devices can cause fires. Never install in areas prone to explosive gasses, liquids, or in close proximity to flammable materials.

#### **NOTICE !**

**Installation Must Maintain NEMA Type 4X Rating:** It is the responsibility of the installer to maintain the NEMA Type 4X rating of the enclosure. Failure to maintain the NEMA Type 4X rating will void the warranty.

#### **NOTICE !**

**Improper Installation Will Void Warranty:** Never install the inverter in areas that are prone to flooding, standing water, or prolonged snow coverage. It is important to ensure the cooling fans and exhaust remain clear from obstructions at all times.

#### **INFO ✓**

**Temperature Derating:** The SOLECTRIA XGI 1000™ is rated for a wide range of operating temperatures. When installed in environments that may experience ambient temperatures near or above the maximum rated temperature 122F (50C) (XGI-100 60/60), or 113F (45C) (XGI-100 60/65, XGI-100 65/65), it is best to keep the inverter out of direct sunlight to minimize temperature de-rating and extend product life.

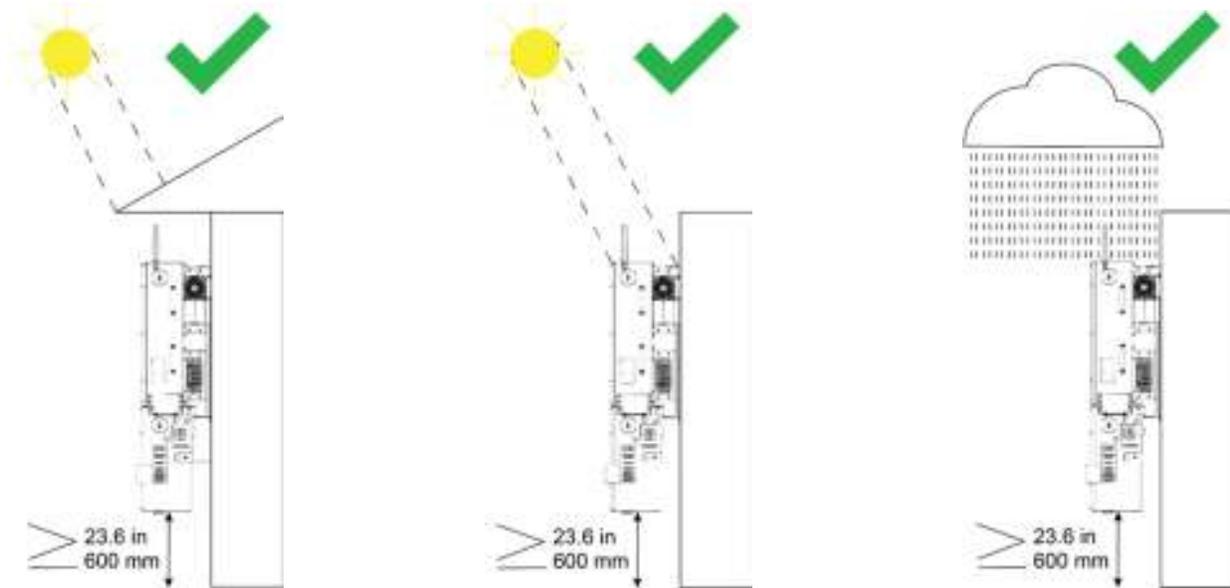


Figure 3-1 Acceptable Inverter Environments (Left to Right): Shaded, Direct Sunlight, and Rain

### 3.2.2 Inverter Mounting Angle and Orientation

The SOLECTRIA XGI 1000™ must be installed vertically. When possible install inverters under cover or in a north facing orientation.

The inverter Power Head must be installed above the inverter Wire Box, never install the inverter upside down. The bottom edge of Wiring Box must remain horizontal (perpendicular to a plumb line), no side-to-side tilting is permitted.

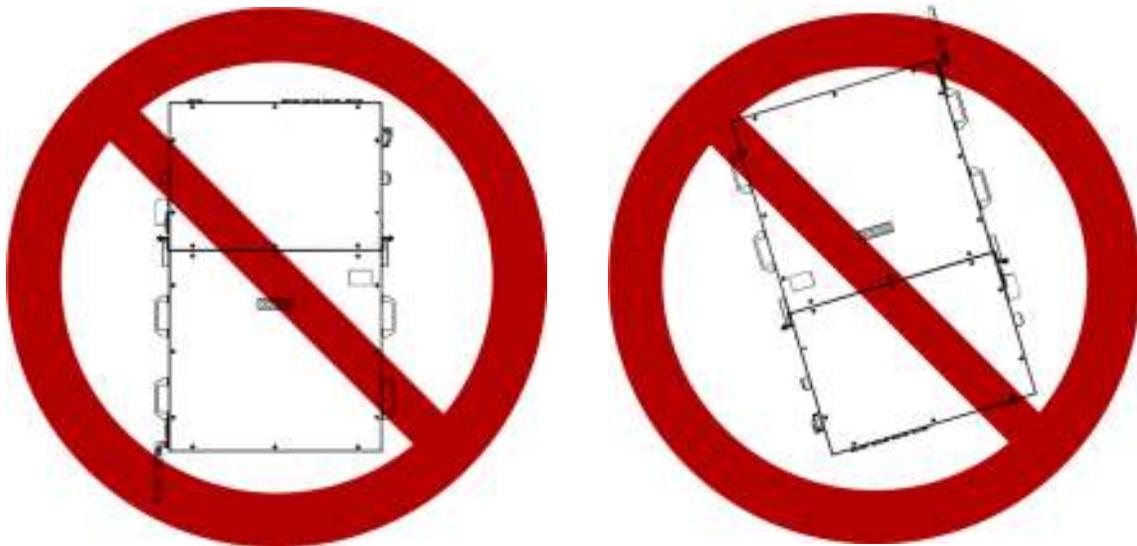


Figure 3-2 Inverter Mounted **INCORRECTLY** with Power Head below the Wiring Box, upside down (Left) and Not Parallel to Ground, tilted (Right)

### 3.2.3 Inverter Dimensions

The dimensions of the SOLECTRIA XGI 1000™ are shown in Figure 3-3. For a more detailed drawing, visit [www.solectria.com](http://www.solectria.com) to download the Customer Interface Drawing, available as a .pdf or .dwg.

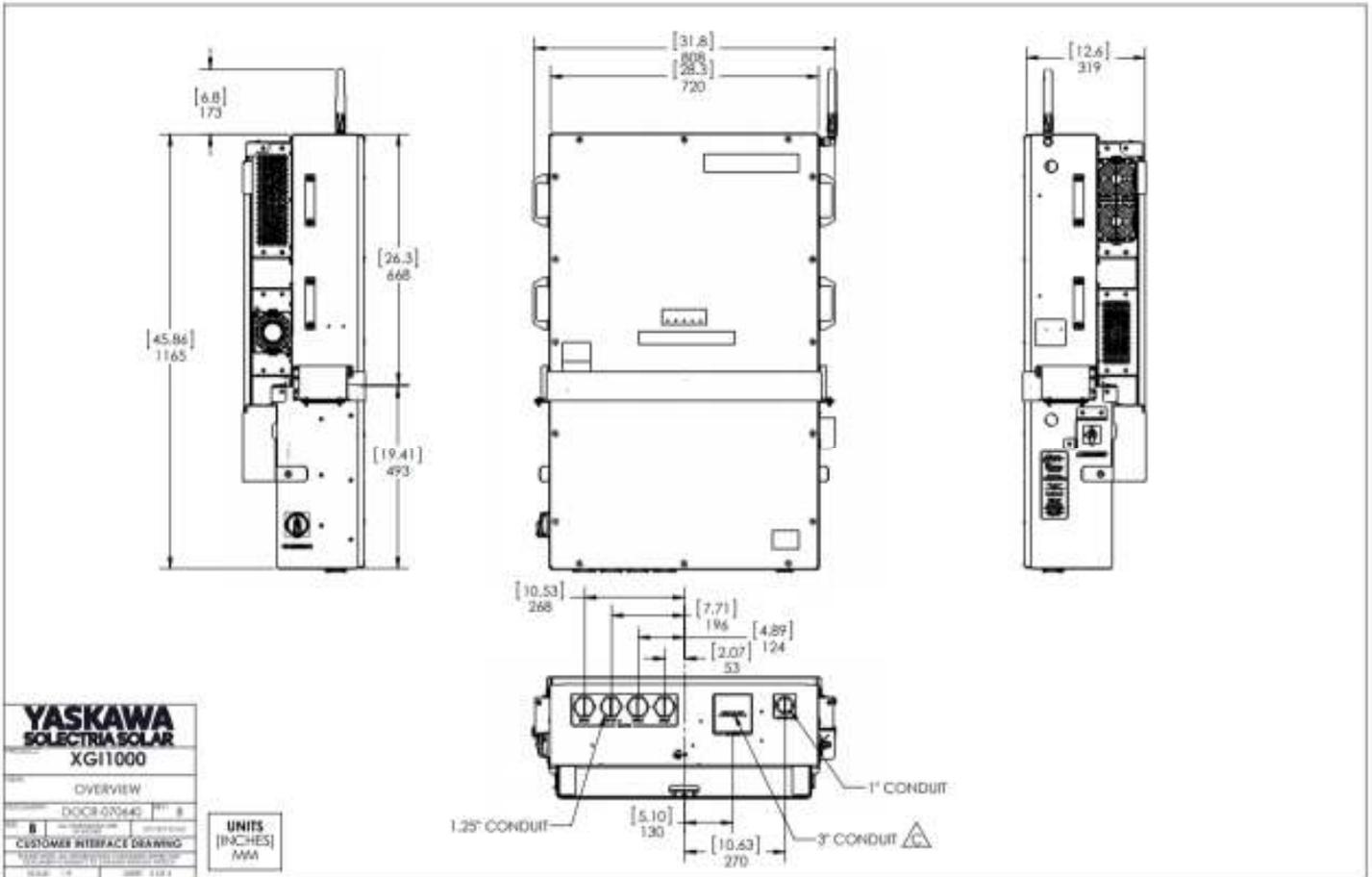


Figure 3-3 Inverter Dimensions

### 3.2.4 Inverter Spacing

It is important to allow ample spacing for ventilation, wire management, and service. The minimum spacing requirements are shown in the following sections for different installation types. Always keep the clearance area (designated with a dashed line) free from debris, plants, and other obstructions.

#### NOTICE !

**Improper Installation Will Void Warranty:** The requirements defined in this section are the minimum allowable clearances. In areas that experience deep snows, heavy rain, excessive heat, or excessive vegetation growth, it may be necessary to increase spacing. It is the responsibility of the installer to ensure the clearance area remains free from debris, plants, and other obstructions at all times.

#### 3.2.4.1 Flat Surface, Vertical

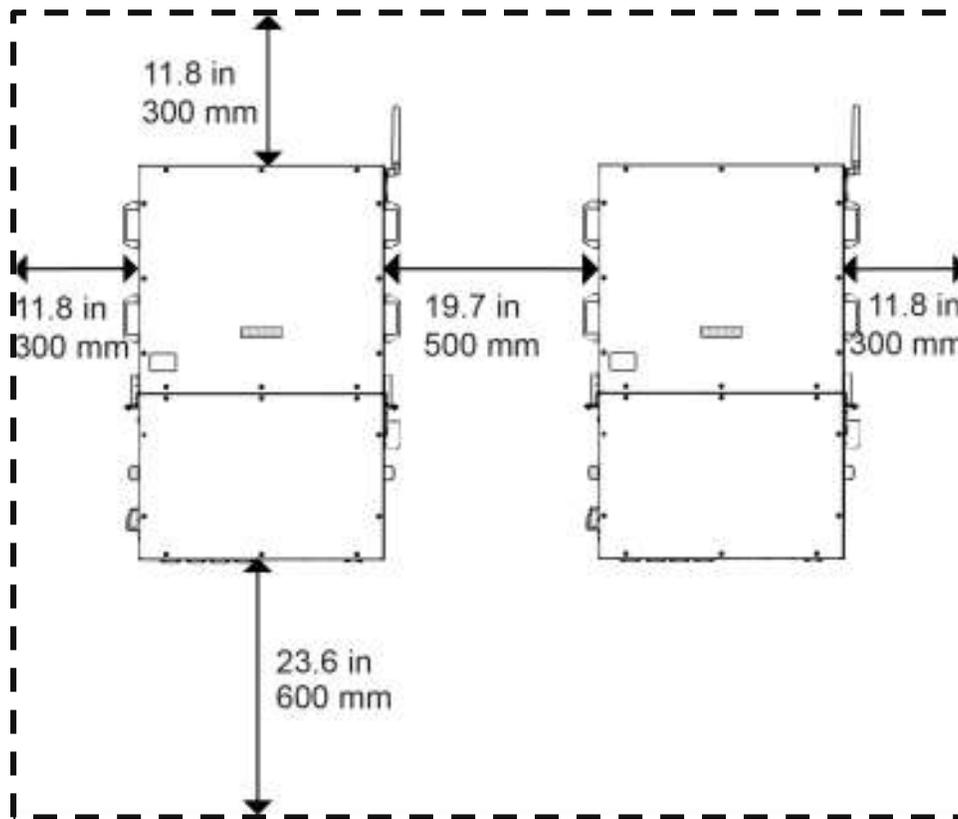


Figure 3-4 Inverter Minimum Spacing, and Clearance Area

### 3.2.5 Mounting

A mounting bracket is provided with each SOLECTRIA XGI 1000™, shown in Figure 3-5. Direct mounting to any surface without using the provided mounting bracket is not permitted. The mounting bracket must be securely attached to a structurally sound, flat surface. Acceptable surfaces include; U-channel metal racking (such as Unistrut), concrete, or other non-flammable surfaces.

The total installed weight of the SOLECTRIA XGI 1000™ is 186 lbs (84.4kg). It is the responsibility of the installer to perform a structural analysis of the intended mounting surface.

#### **NOTICE !**

##### **Improper Installation Will Void Warranty**

- **Always use the provided mounting bracket secured to a structurally sound surface.**
- Never modify the inverter Power Head or Wiring Box enclosure, doing so will void the warranty

#### **CAUTION**

##### **Improper Installation may result in Property Damage or Personal Injury**

- **Never install the inverter directly to drywall unless attached to a structural member.**
- Installing the inverter without the mounting bracket may result in property damage or personal injury.

The Mounting Bracket has four (4) holes, shown in Figure 3-5, to allow the mounting bracket to be secured the substrate. Use M10 or 7/16<sup>th</sup> mounting fasteners (not included), torque to the proper specifications.

#### **INFO ✓**

**Mounting Hardware is Not Included:** The SOLECTRIA XGI 1000™ is not supplied with fasteners to attach the Mounting Bracket to the substrate. These must be purchased separately.

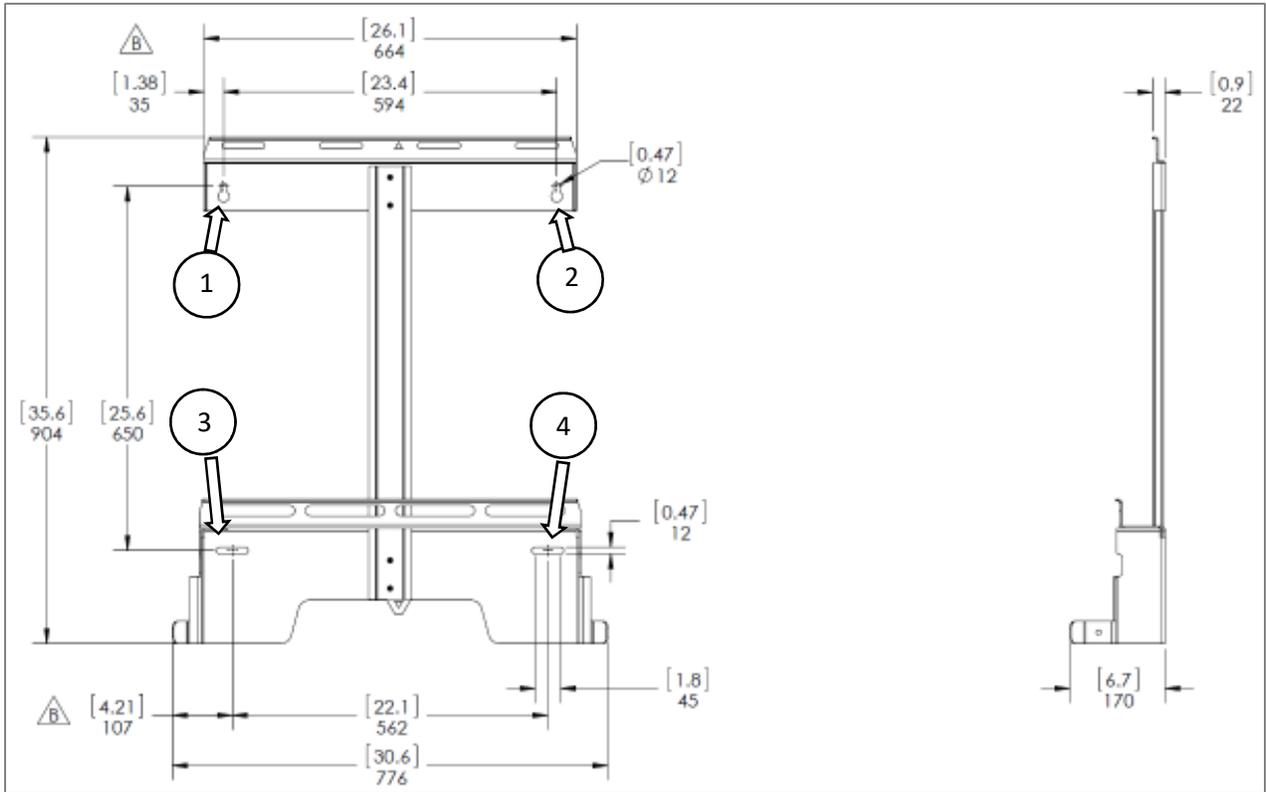


Figure 3-5 Mounting Bracket, mounting holes

### 3.2.6 Mechanical Installation, Method

Table 3-1 Tools Required

TOOL	DESCRIPTION
8MM SOCKET	8mm socket
10MM SOCKET	10mm socket
10MM CRESCENT WRENCH	10mm crescent wrench
TORQUE WRENCH	For use with 8mm and 10mm sockets, capable of 20 in-lbs and 40 in-lbs

#### 3.2.6.1 Assemble and Install Mounting Bracket

The Mounting Bracket assembly includes three (3) pieces of sheet metal (A, B, C) and four (4) M5 x 0.8 SS nuts (D), as shown in Figure 3-6.

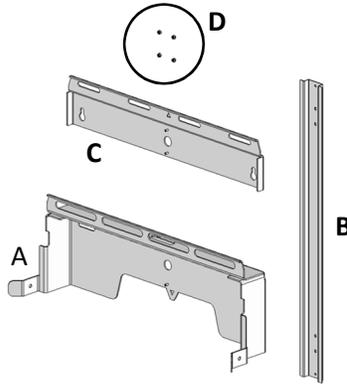


Figure 3-6, Mounting Bracket Assembly

Align the holes of sheet metal (B) with the studs on sheet metal (A) and (C) as shown in Figure 3-7. Use four (4) M5 x 0.8 SS (D) nuts to fasten the three pieces together. Using an 8mm socket, torque to 20 in-lbs. (2.3 N-m).

Install the assembled Mounting Bracket on the desired surface using four (4) M10 or 7/16 inch fasteners (F) (not included), torque specifications are the responsibility of the installer.

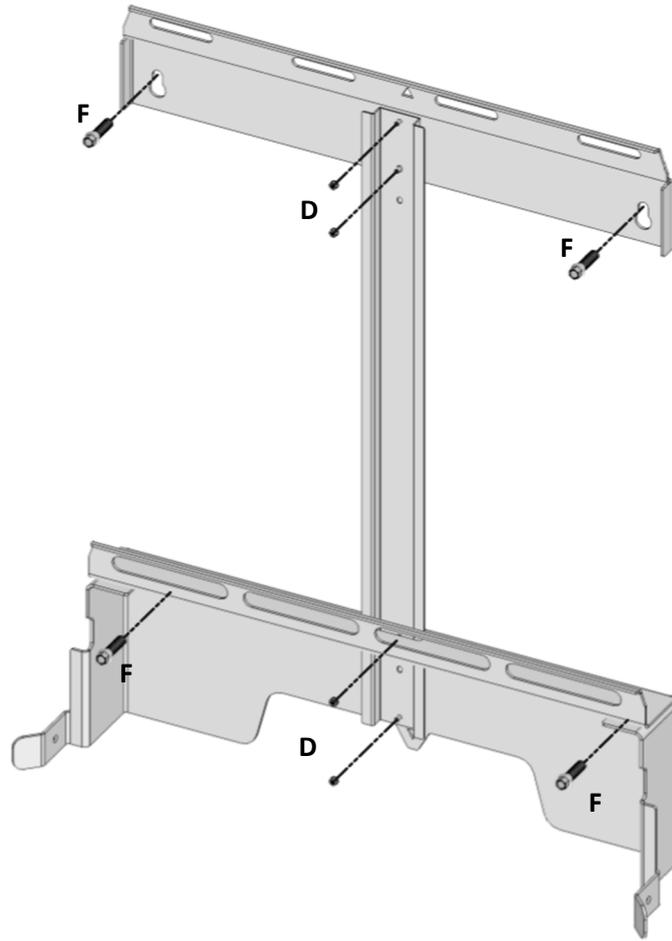


Figure 3-7 Bracket Assembly

### 3.2.6.2 Install Wiring Box

## NOTICE !

**Never Leave Wiring Box Installed without a Power Head: The Wire Box is not designed to be installed without the Power Head. Leaving the Wire Box installed without the powerhead will lead to water ingress, which is not covered under warranty.**

Place the Wire Box onto the Mounting Bracket and align the PEMs on the Wire Box with the clearance holes on the Mounting Bracket as shown in Figure 3-8. Use two (2) M6 x 1.0, 12mm screws to secure it in place, torque the screws to 40 in-lbs. (4.5 N-m) using a 10mm socket.

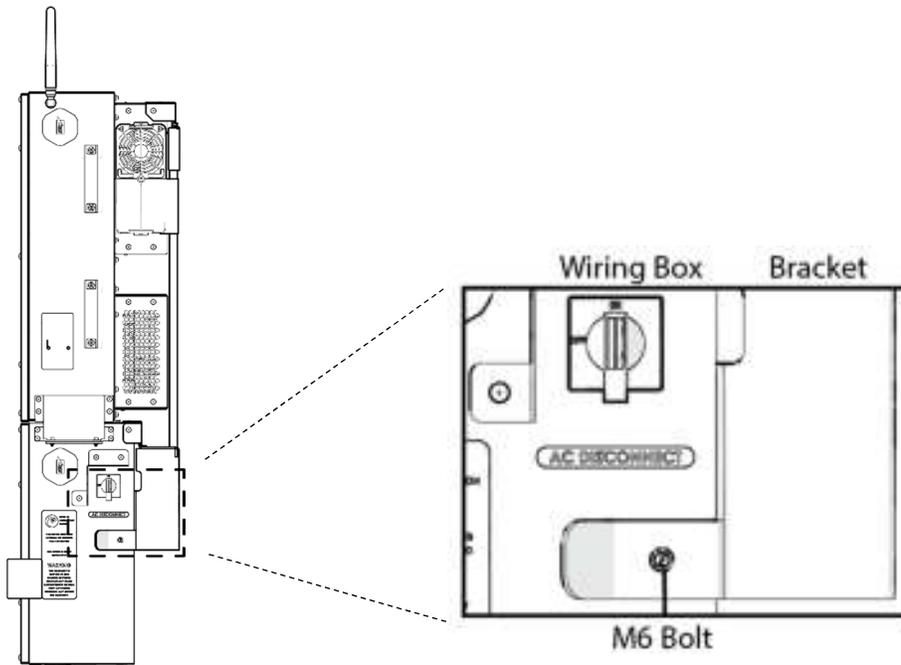


Figure 3-8 M6 Connecting Bolt (Right Side Shown)



Install one (1) M6 x 1.0, 12mm screw in the bottom of the Wire Box for the external auxiliary equipment grounding connection, as shown in Figure 3-9. If this connection will have a conductor landed, leave screw finger tight, otherwise torque to 40 in-lbs. (4.5 N-m) using a 10mm socket.

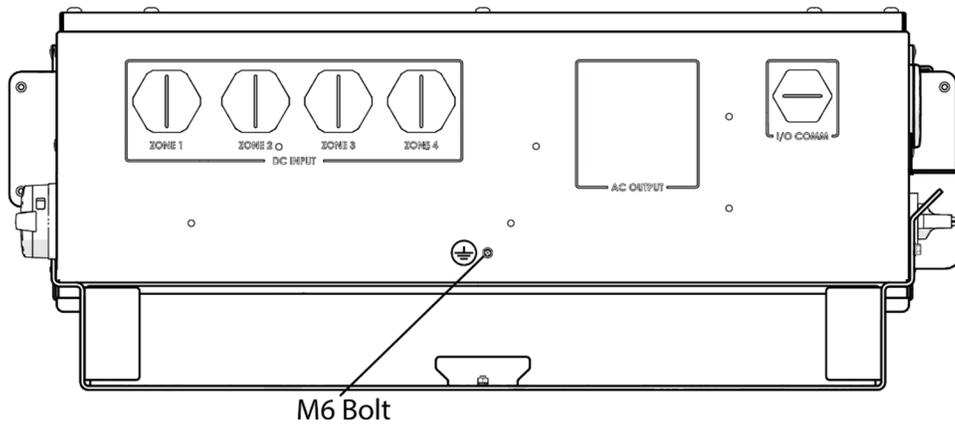


Figure 3-9 M6 Ground Connection Bolt

### 3.2.6.3 Install the Power Head

#### **CAUTION**

**Lifting Heavy Object Hazard:** Proper lifting technique must be used in order to avoid injuries.

Use a two-man lift to install the Power Head.

#### **NOTICE !**

**Carefully Align the Power Head with Wire Box:** For ease of installation the Power Head and Wire Box are designed with a blind mate connector using a series of guiding brackets and pins. It is important to carefully mate the Power Head and Wire Box together to avoid damaging the electrical connections in the blind mate connector. Installing the Power Head in a misaligned position, or with too much force may damage the equipment permanently. Damage caused by improper installation is not covered under warranty.

Using a two-man lift, position the Power Head on top of the Wire Box. Align the Power Head and Wire Box using the metal bracket and guide pins. The Power Head should slide into position. Gentle downward pressure may be necessary to fully seat the Power Head onto the Wire Box.

Use four (4) M5 x 0.8, 16mm bolts and four (4) M5 x 0.8, nuts to secure the Power Head to the Wire Box as shown in Figure 3-10. Insert bolts from the top and nuts from the bottom of the bracket. Use two (2) screw/nut assemblies on each side of the inverter. Using an 8 mm socket and wrench, torque to 20 in-lbs. (2.3 N-m).

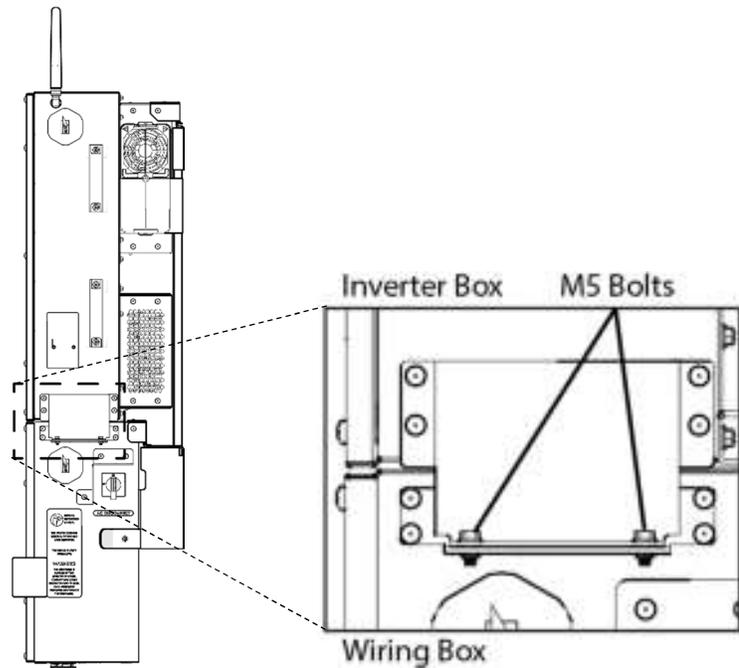


Figure 3-10 M5 Connecting Bolts (Right Side Shown)

### 3.2.6.4 Install Antenna

Attach the antenna to the 90° coaxial antenna adapter, do not over tighten. Connect the antenna assembly to the inverter Power Head, ensure that the antenna remains vertical regardless of the inverter mounting angle.

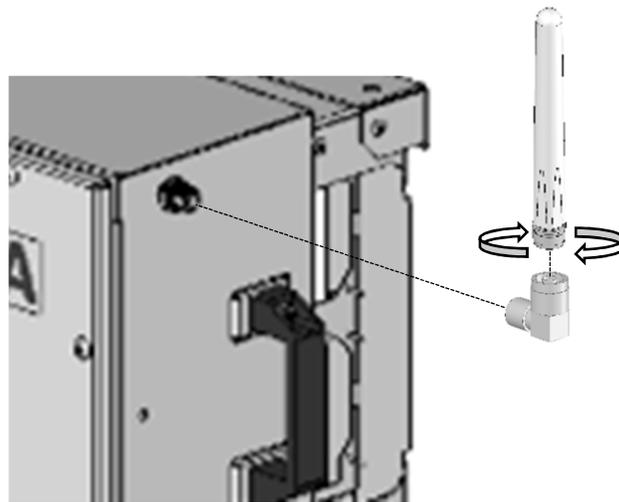


Figure 3-11 Assemble and Install Antenna

## INFO ✓

**Antenna Orientation:** the WIFI antenna must remain vertical, regardless of the installation angle.

### 3.3 Electrical Installation AC

The SOLECTRIA XGI 1000™ is a 480VAC, 60Hz, 3-phase grid tied inverter with clockwise phase rotation. The inverter will not operate when installed to any other grid voltage or frequency. This section includes important information regarding the AC grid connection, wiring requirements, and installation instructions.

#### 3.3.1 Transformer Configurations

### ! CAUTION

**Improper Transformer Configuration:** Inverter will not run and may have hazardous current. Connect transformer in specified configurations only (see Figure 3-12).

### NOTICE !

**480 VAC, 60Hz, Grid Grounded Wye ONLY:** The inverter is only rated for 480 VAC, 60Hz, 3-Phase grounded Wye. Installing the inverter on any other electrical grid will damage the inverter and void the warranty.

### INFO ✓

**Grid Mismatch:** If the grid does not match the requirements of the inverter, the inverter will not start. Check with your local electric utility before selecting a grid profile. The system must comply with National Electrical Code ANSI/NFPA 70 and with all local rules and safety regulations before the inverter can be operated.

The inverter must be connected to a 480VAC, 60Hz, grounded Wye electrical grid. If the installation location does not meet these requirements, an isolation transformer may be used.

The inverter side of the transformer must have a grounded Wye configuration. See Figure 3-12 for approved transformer configurations, all other configurations are not permitted. Figure 3-13 shows examples of transformers that are not acceptable.

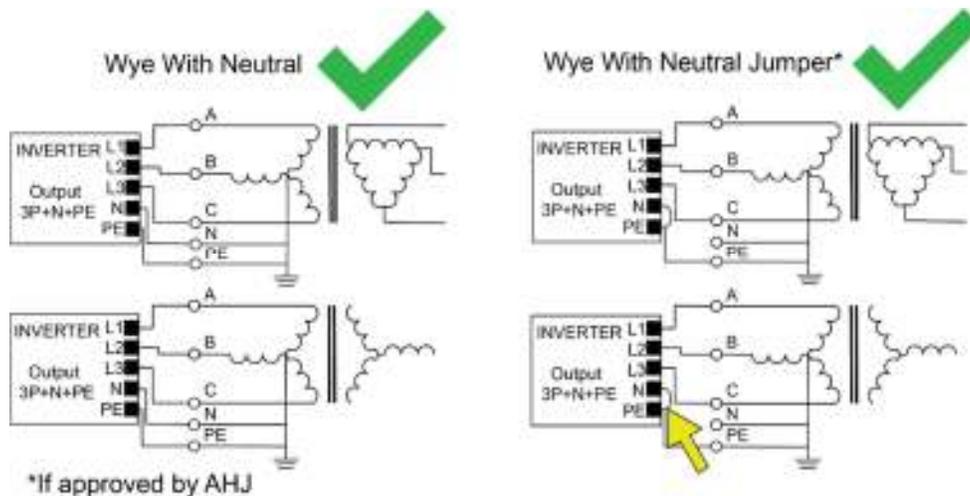


Figure 3-12 Permitted Transformer Configurations

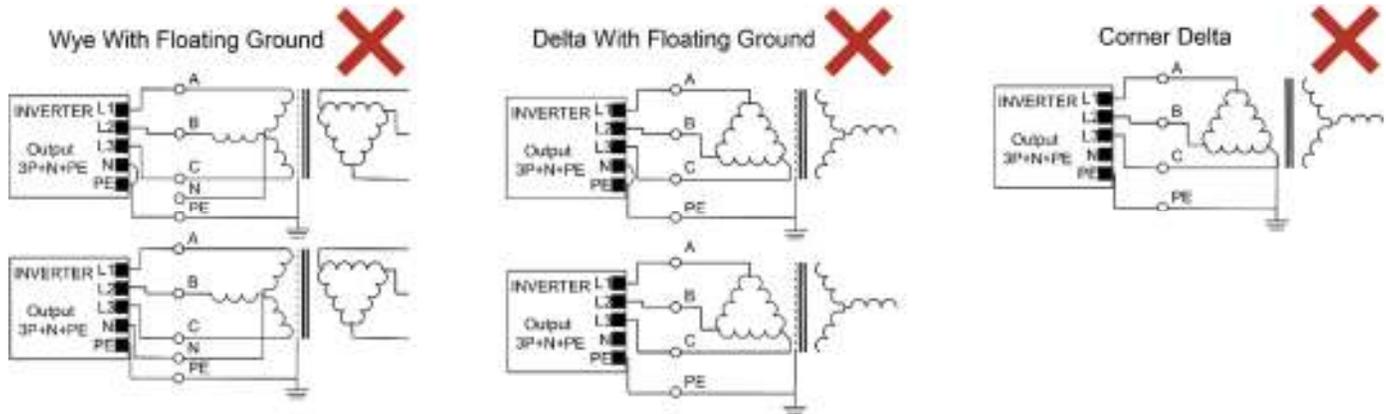


Figure 3-13 Transformer Configurations NOT Permitted

### 3.3.2 Neutral Requirements

The neutral conductor is used by the inverter for voltage sensing only and does not carry current. Therefore, the neutral conductor size may be reduced to a size no smaller than the ECG.

Depending on the authority having jurisdiction (AHJ), it is permissible to install the provided neutral to ground jumper. In this configuration, no neutral conductor is required. If terminated properly, this connection will not affect the function of the inverter. Always check with the AHJ before removing the neutral conductor and installing the neutral to ground jumper.

## NOTICE !

**Neutral to Ground Jumper:** Do not use a jumper between neutral and ground if the neutral conductor is connected. Using a jumper with then neutral conductor connected may result in damage and void the warranty.

### 3.3.3 AC Conductor Specifications

Yaskawa Solectria requires the use of 90°C minimum rated conductors.

With longer wire runs, the use of larger conductors than those required by the NEC can help minimize voltage drop and increase system efficiency.

The AC connections consist of 3 phases (L1, L2, and L3), ground, and neutral. Conductors must be rated for a minimum of 600 V. Use conductors in accordance with Table 3-2

Table 3-2 AC Connection Specifications

	WIRE MATERIAL	STANDARD WIRE BOX	LARGE AC TERMINAL (-L) WIRE BOX
<b>AC OUTPUT (L1, L2, L3) CONDUCTORS</b>	Copper	3 to 1/0 AWG (26.7 to 50 mm <sup>2</sup> )	3 to 3/0 AWG (26.7 to 85 mm <sup>2</sup> )
	Aluminum	1 to 1/0 AWG (42.4 to 50 mm <sup>2</sup> )	1 to 3/0 AWG (42.4 to 85 mm <sup>2</sup> )
<b>NEUTRAL</b>	Copper	8 to 4 AWG (8.4 to 21.2 mm <sup>2</sup> )	6 to 1/0 AWG (13.3 to 50 mm <sup>2</sup> )
	Aluminum	6 to 4 AWG (13.3 to 21.2 mm <sup>2</sup> )	6 to 1/0 AWG (13.3 to 50 mm <sup>2</sup> )
<b>EQUIPMENT GROUNDING CONDUCTOR (EGC)</b>	Copper	8 to 4 AWG (8.4 to 21.2 mm <sup>2</sup> )	6 to 1/0 AWG (13.3 to 50 mm <sup>2</sup> )
	Aluminum	6 to 4 AWG (13.3 to 21.2 mm <sup>2</sup> )	6 to 1/0 AWG (13.3 to 50 mm <sup>2</sup> )

### 3.3.3.1 AC Breaker Specifications

The SOLECTRIA XGI 1000™ series inverter requires a 100 A, 3-pole AC breaker, see Table 3-3.

Table 3-3 AC Breaker Specifications

	XGI 1000-50/60	XGI 1000-60/60	XGI 1000-60/65	XGI 1000-65/65
<b>AC BREAKER SIZE</b>	100 A (3 pole)			

### 3.3.4 Use of Aluminum Conductors

The AC terminals in the SOLECTRIA XGI 1000™ are dual rated by UL for use with copper or aluminum conductors. When using aluminum conductors it is important to prepare the conductors properly to prevent oxidation and overheating. Follow the steps below to prepare and land the conductors.

- a) Strip insulation from the aluminum conductor.
- b) Remove the oxidation from the connection area of the aluminum conductor using a wire brush or other abrasive means.
- c) Immediately apply a UL listed oxide-inhibiting compound.
- d) Land the conductor on the appropriate terminal and torque to the proper value, see Table 3-5.

## NOTICE !

**Use of Aluminum Conductors:** Special care must be taken when using aluminum conductors. Failure to properly prepare and maintain aluminum conductors can result in overheating and property damage. Damage caused by improper use of aluminum conductors will void the warranty.

### 3.3.5 Electrical Installation AC, Method

**DANGER**

**Electric Shock Hazard:** Components with hazardous voltage and energy will electrocute operator. Operator shall avoid touching live components with hazardous voltage and energy. Verify the absence of voltage using an appropriately rated multimeter.

**Always Wear Proper PPE:** The proper Personal Protective Equipment (PPE) must be worn while working in close proximity of hazardous voltage and energy.

**Conduit Installation:** All conduit connections must be made in such a way as to maintain the NEMA Type 4 rating of the enclosure. Failure to maintain the NEMA rating will void the warranty.

Table 3-4 Electrical Installation AC, Tools Required

TOOL	DESCRIPTION
<b>SLOTTED SCREW DRIVER</b>	3/16" or 4.75mm slotted screw driver
<b>#3 PHILLIPS-HEAD TORQUE DRIVER</b>	#3 Phillips-head torque driver, capable of 30 in/lbs
<b>#2 PHILLIPS-HEAD TORQUE DRIVER</b>	#2 Phillips-head torque driver, capable of 10 in/lbs
<b>MULTIMETER</b>	1000VDC/480VAC CAT III Multimeter

Figure 3-14 shows the locations for all AC and DC terminations in the Wire Box.

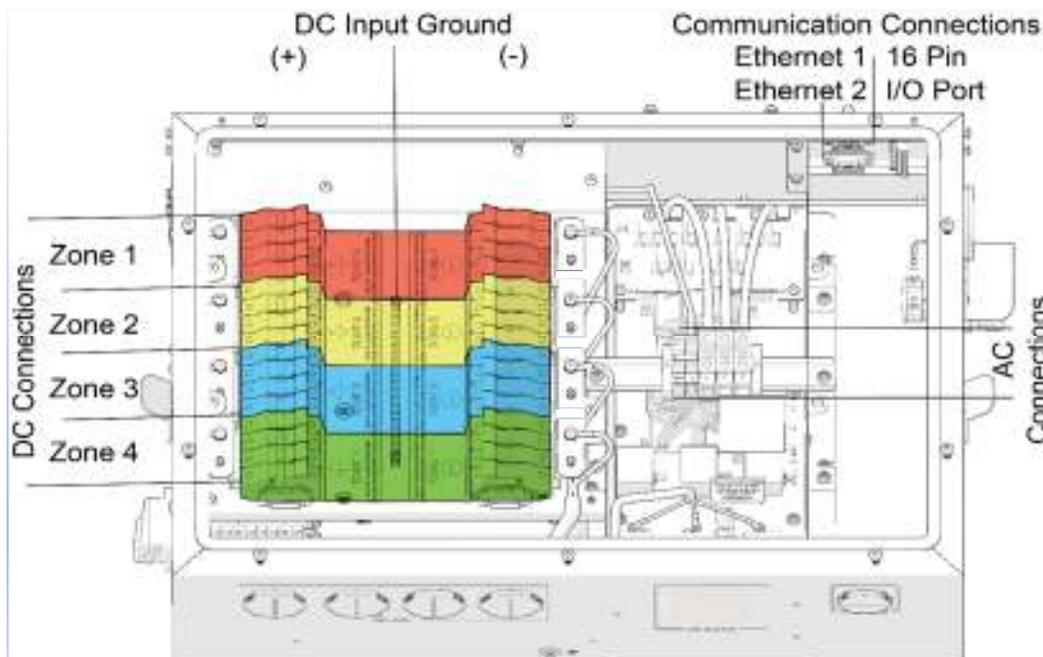


Figure 3-14 Wiring Box Connections (Independent Mode configuration shown)

Turn the AC and DC Switch OFF before opening the Wire Box.

### 3.3.5.1 Remove Wire Box Cover

Use a #3 Phillips-head screwdriver to remove the ten (10) screws from the cover of the Wire Box as shown in Figure 3-15.

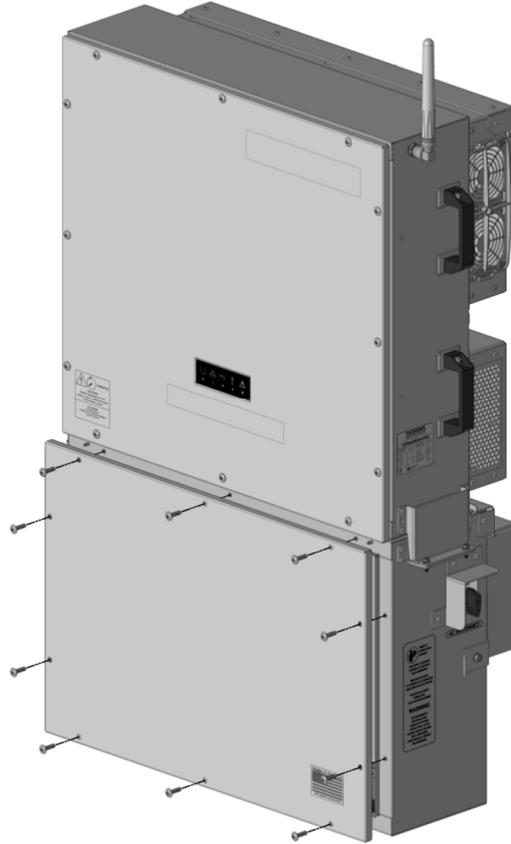


Figure 3-15 Remove Wire Box Cover Screws

### 3.3.5.2 Remove Plastic Safety Shield

Remove the DC plastic shield, by loosening four (4) screws with a #2 Phillips-head screwdriver as shown in Figure 3-16. *The screws do not need to be completely removed.* Slide the plastic cover to the right and remove, set aside in a safe place for reinstallation. Figure 3-16 shows the wiring box with plastic shield highlighted.

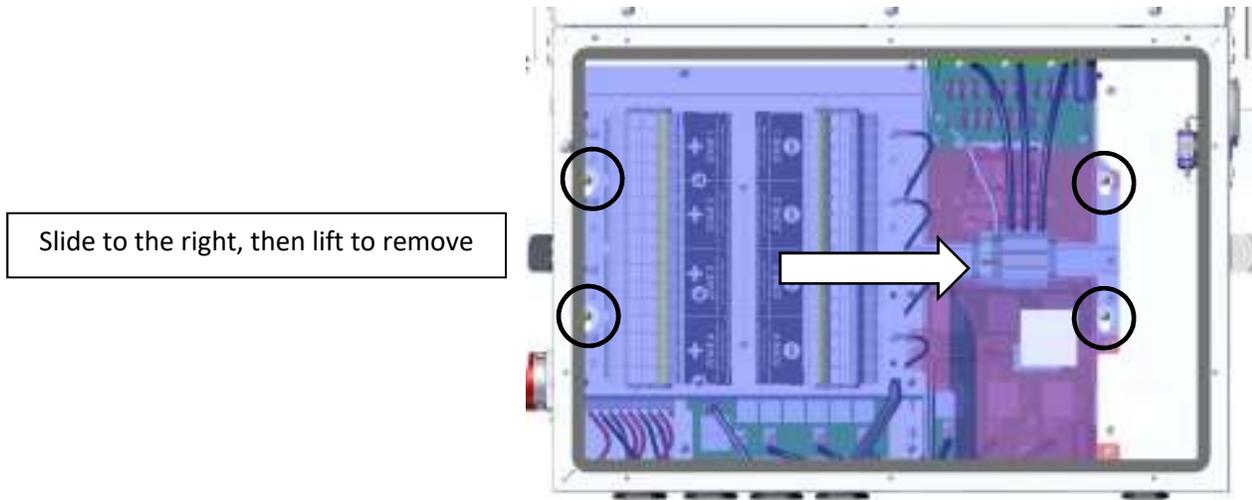


Figure 3-16 Wiring Box with Cover Removed

### 3.3.5.3 AC Connection

- Ensure the AC Switch is in the OFF position before wiring.
- Ensure the external AC breaker is in the OFF position before wiring.

## ! WARNING

**Turn AC Switch to OFF:** Verify the absence of AC voltage prior to landing any conductors.

**Turn the external AC breaker OFF:** Verify the absence of AC voltage prior to landing any conductors.

Land the ECG in the left most terminal block, see Figure 3-17. Using a 4.75mm flat head screw driver, torque to the proper value, reference Table 3-5.

If required, land the neutral conductor in the terminal block, see Figure 3-17. Using a 4.75mm flat head screwdriver, torque to the proper value, reference Table 3-5.

## NOTICE !

**Neutral to Ground Jumper:** Do not use a jumper between ground and Neutral if the Neutral conductor is connected. Using a jumper with the Neutral conductor connected may result in damage and will void the warranty.

Land the three (3) AC conductors, Phase 1 (A), Phase 2 (B), and Phase 3 (C) left to right ensuring a clockwise phase rotation. Using a 4.75mm flat head screwdriver, torque to the proper value, reference Table 3-5.

**INFO ✓**

**Clockwise Phase Rotation:** Ensure the inverter is installed with a clockwise phase rotation. A counterclockwise phase rotation will prevent the inverter from running. If the inverter reports a PLL (Phase Lock Loop) error or the frequency/voltage measurements seem incorrect, check your phase rotation. Swapping any two AC conductors will reverse the phase rotation.

Table 3-5 AC Torque Specification

	PHASE WIRES	GROUND	NEUTRAL
<b>STANDARD WIRING BOX</b>	25 in-lbs (2.8 N-m)	25 in-lbs (2.8 N-m)	25 in-lbs (2.8 N-m)
<b>LARGE AC TERMINAL (-L) WIRING BOX</b>	80 in-lbs (9.0 N-m)	25 in-lbs (2.8 N-m)	25 in-lbs (2.8 N-m)

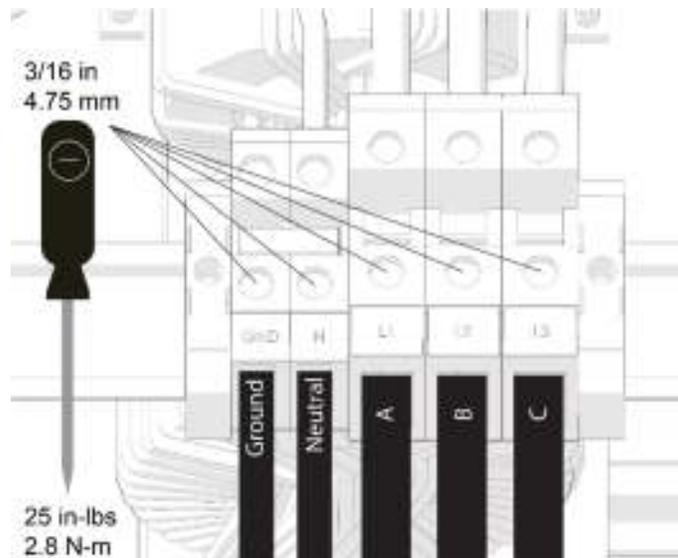


Figure 3-17 AC Connections

### 3.4 Electrical Installation DC

The SOLECTRIA XGI 1000™ provides design flexibility for the installer and designer. The inverter supports a DC/AC ratio of 1.5 and Wire Box options that offer either one or four MPPT zones. It is important to consider the installation type, environmental conditions, PV modules, and string sizing before selecting a Wire Box option. The following section provides important information regarding the DC input specifications, wiring requirements, and installation instructions.

#### 3.4.1 MPPT Zones

The SOLECTRIA XGI 1000™ is equipped with four separate fused zones. Each zone can accommodate up to four PV strings. All positive conductors must be landed in the fuse holders on the left side of the wiring box; all negative conductors must be landed on the right side fuse holders. Both positive and negative conductors are fused. See Figure 3-14 for a detailed layout of the wiring compartment.

The SOLECTRIA XGI 1000™ is available in configurations with all zones MPP tracking independently (Independent Mode) or in parallel (Combined Mode). Independent Mode provides design flexibility when dealing with different array orientations, shading, or string sizing. Combined Mode can be used when all strings connected to the inverter are of identical lengths. In some circumstances Combined Mode may allow the designer to maximize the DC to AC ratio.

The SOLECTRIA XGI 1000™ Wire Box must be ordered from the factory pre-configured as either Independent Mode or Combined Mode. The MPPT zone configuration of the Wire Box is not field configurable. SOLECTRIA XGI 1000™ Power Heads are field configurable using the HMI during commissioning.

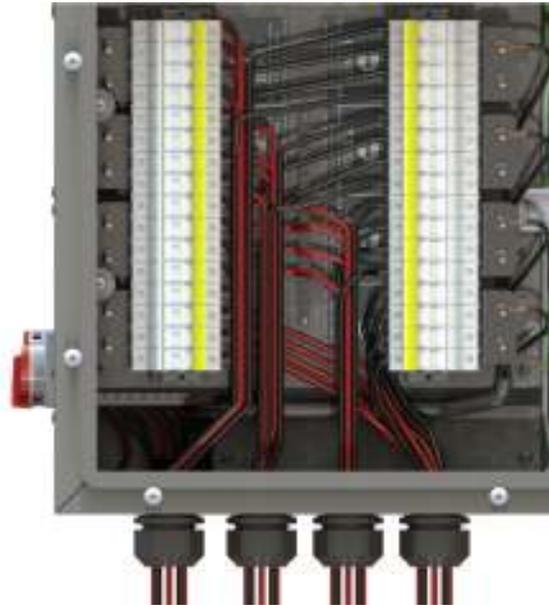


Figure 3-18 Wiring from Modules Directly to Inverter

### 3.4.2 PV String Sizing

#### NOTICE !

**DC Overload:** Exceeding the recommended DC to AC ratio may damage the inverter and will void the warranty. Size strings according to information in this section and all applicable electrical codes.

**DC/AC Ratio and Current Limits:** Both DC to AC ratio and  $I_{sc}$  limits must be observed. Failure to meet these requirements may result in damage and will void the warranty.

Each MPPT zone has four inputs, and each input has a positive and a negative side, both are fused. Connect the same number of PV modules in each string landed in the same zone. The string sizing tool (<https://solectria.com/support/string-sizing-tool/>) can be used as a guide to help determine appropriate string lengths. It is the responsibility of the system designer to perform all string sizing calculations, and overall array sizing to ensure proper operation and code compliance.

#### 3.5.2.1 Combined Mode

For factory configured Combined Mode installations, perform the calculations based on the total inverter nameplate power rating. With a maximum DC to AC ratio of 1.5 at STC conditions (Equation 3.1), a user can connect up to 90 kW (XGI 1000-60/60 & XGI 1000-60/65), and 97.5 kW (XGI 1000-65/65).

#### NOTICE !

**High Irradiance Installations:** In applications that may experience higher than 1000 W/m<sup>2</sup> on a regular basis, it is recommended to reduce the DC to AC ratio.

The Maximum Short Circuit Current ( $I_{sc}$  rating of all strings multiplied by 1.25) must be less than 180 A for Combined Mode (Equation 3.2).

$$\frac{kW_{DC}}{kW_{AC}} \leq 1.5 \text{ at STC} \quad (3.1)$$

$$\sum I_{SC} * 1.25 \leq 180A \quad (\text{Combined Mode}) \quad (3.2)$$

#### 3.5.2.2 Independent Mode

For factory configured Independent Mode. The maximum DC/AC ratio in Independent Mode follows Equation 3.1 on a per MPPT zone basis. Each zone's maximum input power is 22.5 kW (XGI 1000-60/60 and XGI 1000-60/65) and 24.4 kW (XGI 1000-65/65).

#### NOTICE !

**High Irradiance Installations:** In applications that may experience higher than 1000 W/m<sup>2</sup> on a regular basis, it is recommended to reduce the DC to AC ratio.

The Maximum Short Circuit Current (combined  $I_{sc}$  rating of all strings in the MPPT zone multiplied by 1.25) must be less than 50A (Equation 3.3).

$$\sum I_{SC} * 1.25 \leq 50A \quad (\text{Independent Mode}) \quad (3.3)$$

### 3.4.3 String Mismatch

To ensure optimal performance, the number of modules per string should be equal within a given MPPT zone (Independent Mode) or across all zones (Combined Mode). When ordering, select the Wire Box model with the desired operating mode: Independent Mode or Combined Mode.

## ! WARNING

**Unequal String Lengths and Module Mismatch:** Unequal string lengths and significant module mismatch can result in the flow of current between strings connected in parallel. Opening fuses under load can cause a hazardous condition. It is strongly recommended to avoid unequal string lengths and module mismatch.

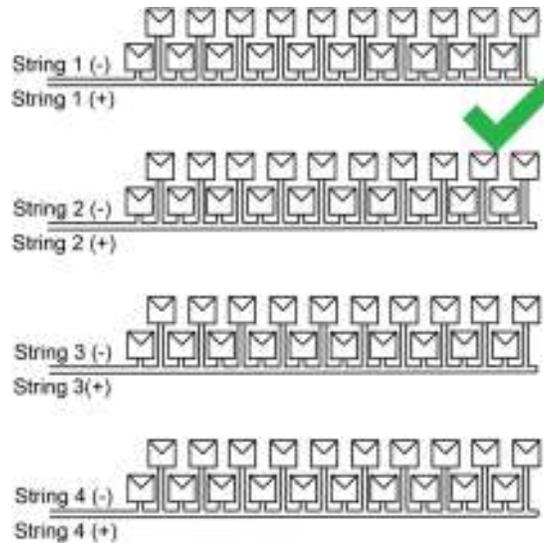


Figure 3-19 Matched String Sizes within a Zone or Inverter

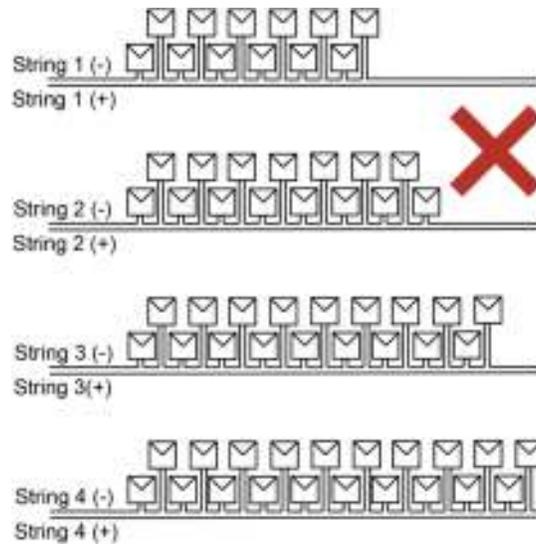


Figure 3-20 Mismatched String Sizes within a Zone or Inverter

### 3.4.4 DC Connection Specifications

The voltage rating of the DC conductors must meet or exceed 1000VDC. When connecting to the fuse holders, use copper PV conductors. Fuse holders can accommodate conductor sizes ranging from 14 to 8 AWG (2.5 to 8.4 mm<sup>2</sup>). All electrical conductors must meet the requirements of the NEC and local electrical codes.

Table 3-6 DC Input Specifications

DC INPUT	XGI 1000-60/60	XGI 1000-60/65	XGI 1000-65/65
<b>MAXIMUM POWER INPUT VOLTAGE RANGE</b>	580-850 VDC	600-850 VDC	600-850 VDC
<b>OPERATING VOLTAGE RANGE (MPPT)</b>	350-950 VDC	350-950 VDC	350-950 VDC
<b>MAXIMUM OPERATING INPUT CURRENT</b>	105.6 A (26.4 A per zone)	105.6 A (26.4 A per zone)	110.6 A (27.65 A per zone)
<b>MAXIMUM OPERATING PV POWER (PER MPPT ZONE)*</b>	15.3 kW	15.3 kW	16.6 kW
<b>MAXIMUM RATED PV INPUT (PER MPPT ZONE)*</b>	22.5 kW	22.5 kW	24.4 kW
<b>ABSOLUTE MAXIMUM INPUT VOLTAGE</b>	1000 VDC	1000 VDC	1000 VDC
<b>NUMBER OF MPP TRACKING ZONES**</b>	4 / 1	4 / 1	4 / 1
<b>NUMBER OF PV SOURCE CIRCUITS (FUSED INPUTS)</b>	4 per MPPT zone; 16 total	4 per MPPT zone; 16 total	4 per MPPT zone; 16 total
<b>MAXIMUM PV CURRENT (ISC X 1.25) PER ZONE/SINGLE ZONE</b>	50 A/180 A	50 A/180 A	50 A/180 A
<b>MAXIMUM RECOMMENDED DC-TO-AC RATIO</b>	1.5	1.5	1.5

\* Limits apply only to inverters in Independent Mode, for inverters operating in Combined Mode multiply limits by 4.

\*\* Number of MPP Tracking Zones must be specified at the time of order.

### 3.4.5 PV Fuses

The SOLECTRIA XGI 1000™ is purchased with factory installed 15 A or 20 A fuses. See the label on the wiring box for fuse size. 25 and 30 Amp fuses can be purchased separately and installed. Use Littelfuse SPF025 for 25 A fuses and SPF030 for 30 A fuses. Yaskawa Solectria does not supply fuses.

When using 30A fuses, never install PV inputs in two adjacent fuse positions.

## NOTICE !

**30A Fuse:** When using 30A fuses, skip every other fuse position. Never install PV inputs in two adjacent fuse holders. Doing so may result in overheating and damage to the inverter, and will void the warranty.

### 3.4.6 External Combiner Boxes

The SOLECTRIA XGI 1000™ is compatible with external combiner boxes when operating in **Independent Mode ONLY**. The external combiner box **MUST have four separate zones**. The zone output conductors coming from the combiner box must be landed on separate MPPT zone buses in the XGI 1000 Wire Box. Use proper ring terminals rated for the conductor size and an M6 screw, as shown in Figure 3-19. Torque connections to 30 in-lbs (3.4 N-m) with a #2 Phillips head torque driver.

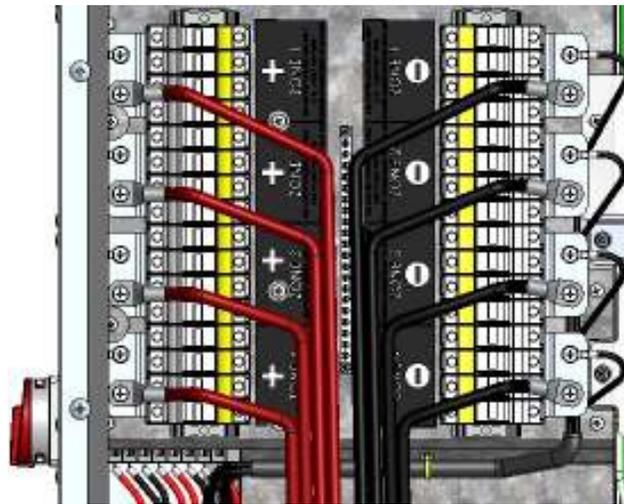


Figure 3-21 DC Connections for Use with External Combiner Box

### 3.4.7 Electrical Installation DC, Method

 **DANGER**

**Electric Shock Hazard:** Components with hazardous voltage and energy will electrocute operator. Operator shall avoid touching live components with hazardous voltage and energy. Verify the absence of voltage using an appropriately rated multimeter.

**Always Wear Proper PPE:** The proper Personal Protective Equipment (PPE) must be worn while working in close proximity of hazardous voltage and energy.

**Conduit Installation:** All conduit connections must be made in such a way as to maintain the NEMA rate of the enclosure. Failure to maintain the NEMA rating will void the warranty.

 **WARNING**

**Turn AC Switch to OFF:** Verify the absence of AC voltage prior to landing any conductors.

**Turn the external AC breaker OFF:** Verify the absence of AC voltage prior to landing any conductors.

**Open Fuse Holders:** Verify the absence of DC voltage and current.

**NOTICE !**

**Check Polarity of DC Inputs:** DC inputs with the wrong polarity may cause damage to the inverter. Check for proper polarity with a multimeter.

**Use Correct Fuses:** Make sure to size the fuses according to NEC requirements. If using 30 A fuses, skip every other fuse holder – DO NOT place 30 A fuses in adjacent fuse holders.

Table 3-7 DC Electrical Installation DC, Tools Required

TOOL	DESCRIPTION
#3 PHILLIPS-HEAD TORQUE DRIVER	#3 Phillips-head torque driver, capable of 30 in/lbs
#2 PHILLIPS-HEAD TORQUE DRIVER	#2 Phillips-head torque driver, capable of 10 in/lbs
MULTIMETER	1000VDC/480VAC CAT III Multimeter

Verify that the PV conductors are completely isolated from the PV array prior to landing any conductors in the inverter. Open the Wire Box following the instructions presented in Section 3.3.5.1 through 3.3.5.2. Open all PV fuse holders prior to landing any conductors.

Land each PV conductor to the proper fuse holder as shown in Figure 3-22. Positive conductors are on the left and the negative on the right. Strings should be wired and labeled in decrementing order (top to bottom). Torque connections to 25 in-lbs (2.8 N-m) with a #2 Phillips-head torque driver.

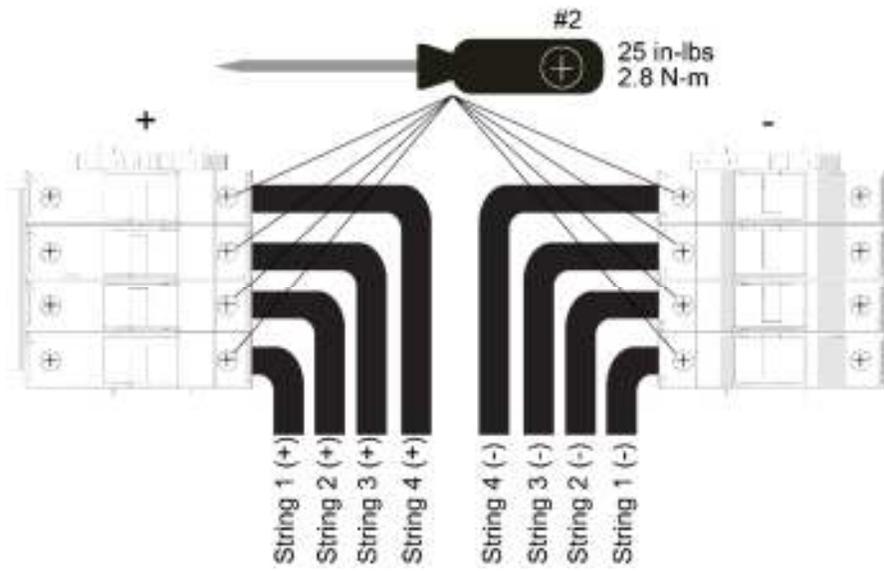


Figure 3-22 DC Connections for Single Zone (Fused Connection)

### 3.5 Communication Installation

The SOLECTRIA XGI inverters utilize an advanced communication platform that can be accessed over WiFi using a smart device, or over Ethernet using a PC.

The SOLECTRIA XGI inverters are compatible with Solectria's SolrenView with no additional hardware required. Yaskawa Solectria Solar also supports integration with other third-party monitoring platforms.

This section includes important information regarding communication design requirements, wiring requirements, and installation instructions.

#### 3.5.1 Connection to the Internet

Connection to the Internet is strongly recommended for SOLECTRIA XGI inverters. An internet connection will provide the user with several important features including:

- ✓ Automatic firmware updates.
- ✓ Remote diagnostics & troubleshooting.
- ✓ Access for Yaskawa Solectria Solar Technical Support & Service.
- ✓ Access to the user interface via the Remote Access Portal (RAP) (with subscription, optional).
- ✓ Remote monitoring via SolrenView (with optional subscription,).

#### 3.5.2 Communication Conductors

All communication conductors must utilize **Ethernet Cat 6 Shielded cable**. The shield must be terminated properly to provide connection with ground.

#### INFO ✓

**Ethernet Cat 6 Shielded Cable:** Solar PV inverters create an electrically noisy environment that can disrupt inverter communication. It is important to use Cat 6 Shielded cable to ensure that communication is not interrupted.

**Separate Communication Conductors from Power Conductors:** Never run communication conductors in the same conduit as power conductors. It is important to keep communication conductors away from power conductors to reduce noise. If power conductors must intersect with communication conductors, it is preferable to have the intersection at a 90 degree angle.

#### 3.5.3 Connecting Multiple Inverters

The SOLECTRIA XGI inverters can be connected in groups referred to as **Clusters**. Each XGI Inverter Cluster is defined as a group of inverters connected over Ethernet with one **Gateway Inverter** connected to the onsite LAN. The Gateway Inverter is automatically self-configured when it obtains a DHCP address from a DHCP server or when it can be manually programmed using a static IP. Once the Gateway Inverter is configured, the Cluster becomes its own private LAN or **Cluster LAN** protected by a built-in firewall. DHCP or manual static IP configuration is required to form multiple clusters on a single LAN.

XGI Inverters can be clustered using Ethernet daisy chains (Figure 3-23), mixed networks using Ethernet switches (Figure 3-24), or any combination to form a multi-cluster configuration (Figure 3-25).

- The maximum number of inverters in any single daisy chain is 50 inverters.
- When using star or mixed network configurations, the maximum number of inverters from one end of a daisy chain to the end of any other daisy chain within a given Cluster must not exceed 50 inverters.
- The maximum number of inverters in any Cluster must not exceed 50.
- Use shielded Cat6 Ethernet cable ONLY.
- The maximum length between any two devices is 328 ft. (100m) for all inverter Ethernet connections.
- Fiber optic cables can be used for 'long-haul' communication runs with the use of an appropriate switch/converter.

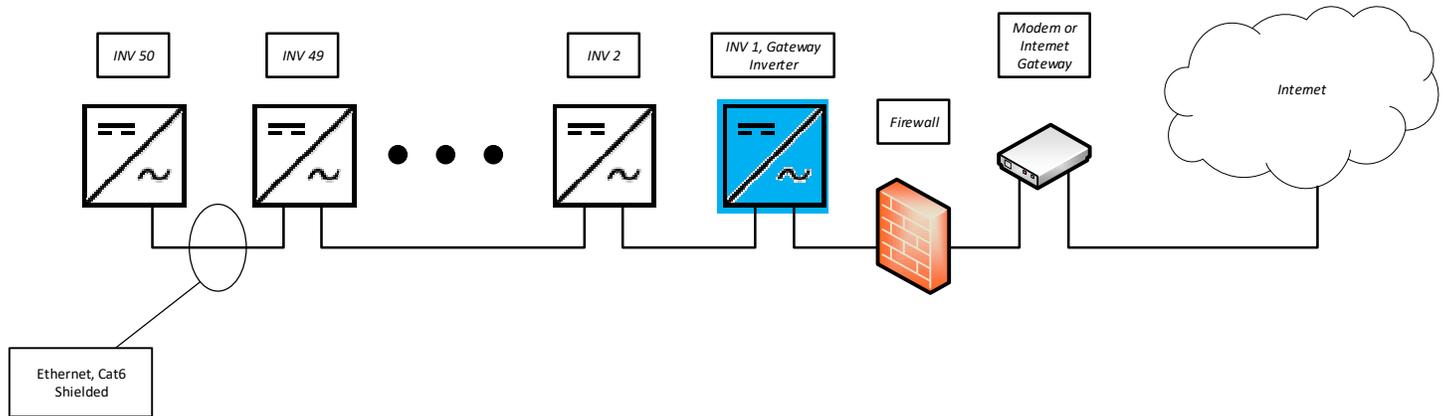


Figure 3-23 Ethernet daisy chain

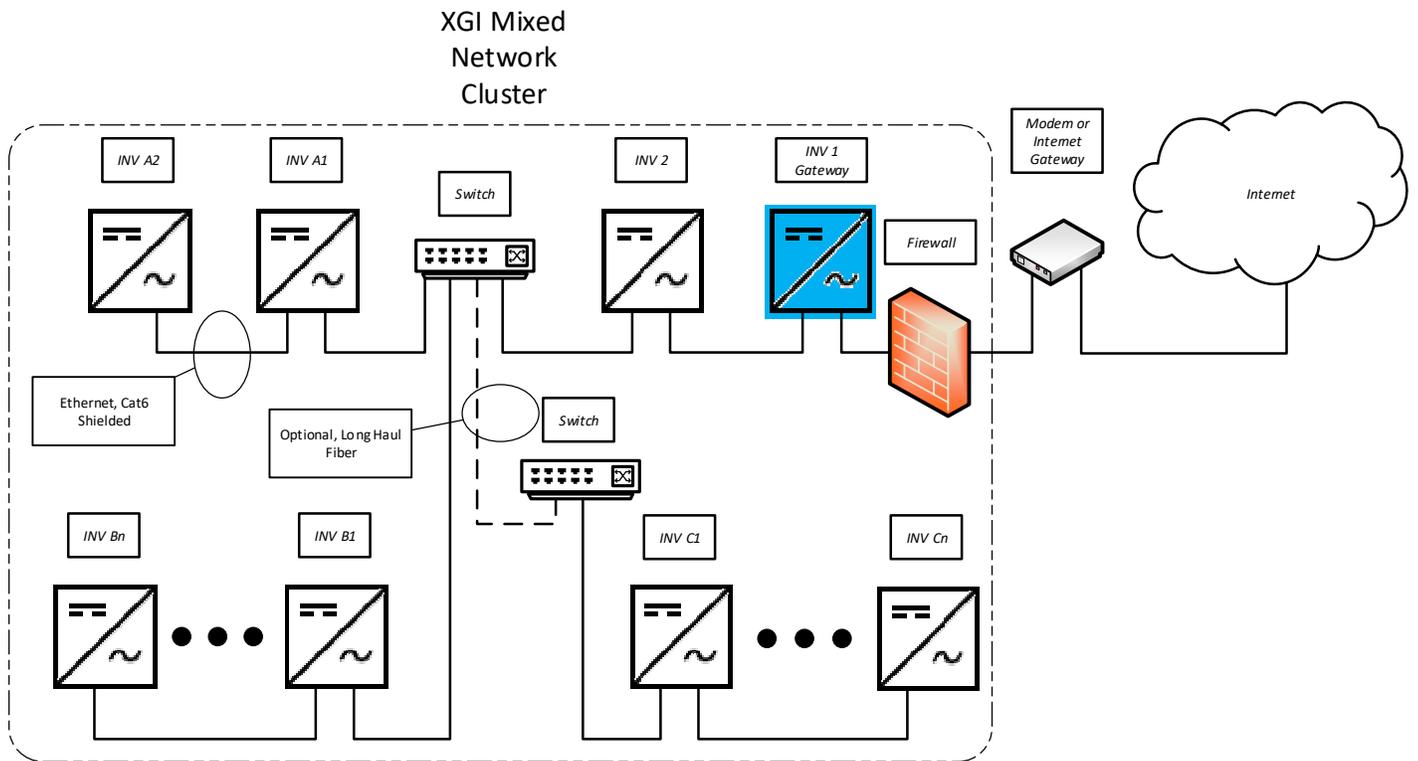


Figure 3-24 Mixed network

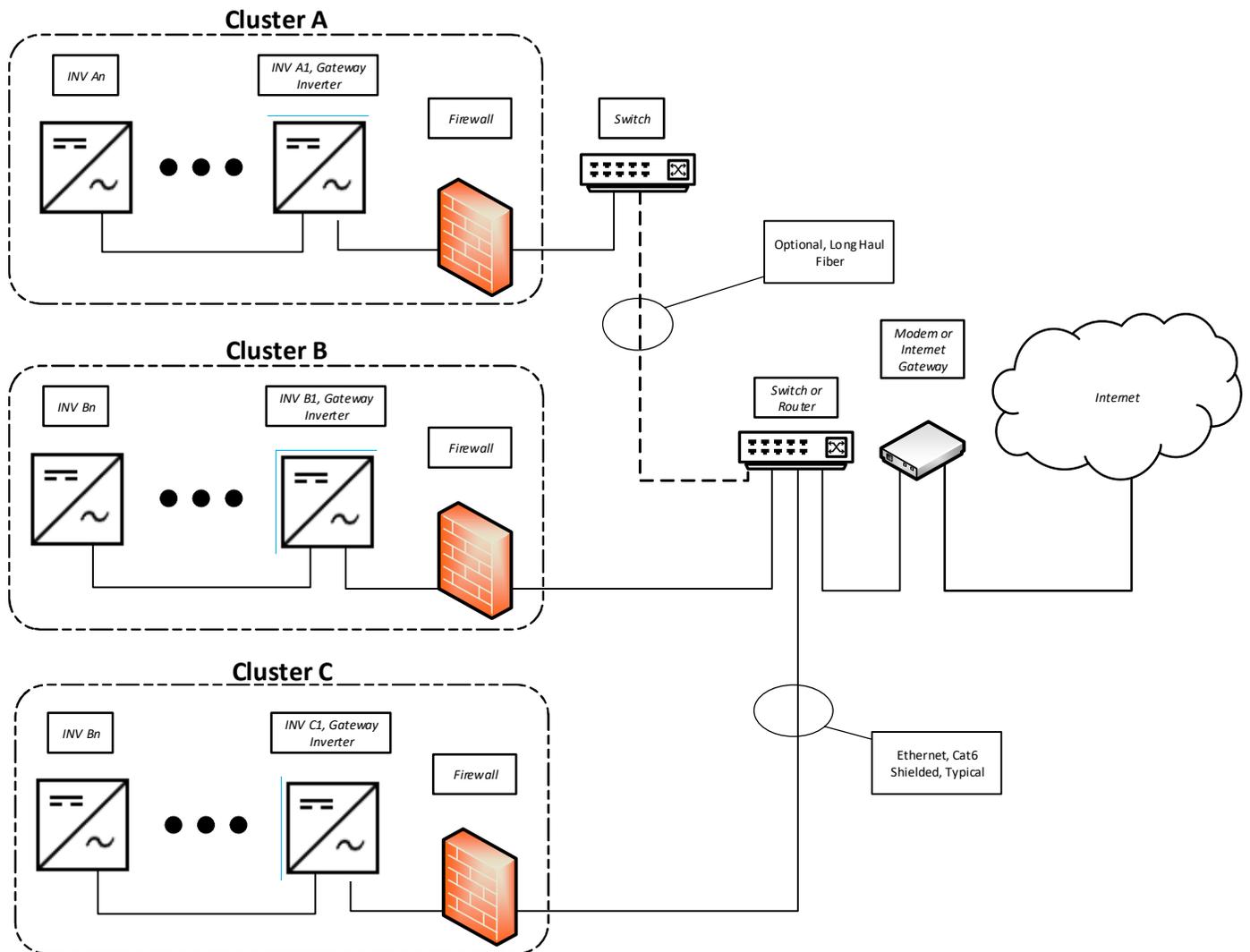


Figure 3-25 Multi-Cluster site

### 3.5.4 XGI Gateway Inverters Firewall

SOLECTRIA XGI inverters have a robust built-in firewall that is automatically established on the Gateway Inverter after receiving an IP address assigned via a DHCP or through manual static IP configuration. This act of establishing a firewall also designates an inverter as a **Gateway Inverter**. Once this firewall is established unauthorized inbound or outbound communication is not permitted through the Gateway Inverter.

### 3.5.5 Networking with Other Devices

Networking with other Ethernet based devices including revenue grade meters, tracking systems, weather stations, etc. should only be done outside of the inverter Cluster LAN, or outside of the Inverter Gateway Firewall; see Figure 3-26.

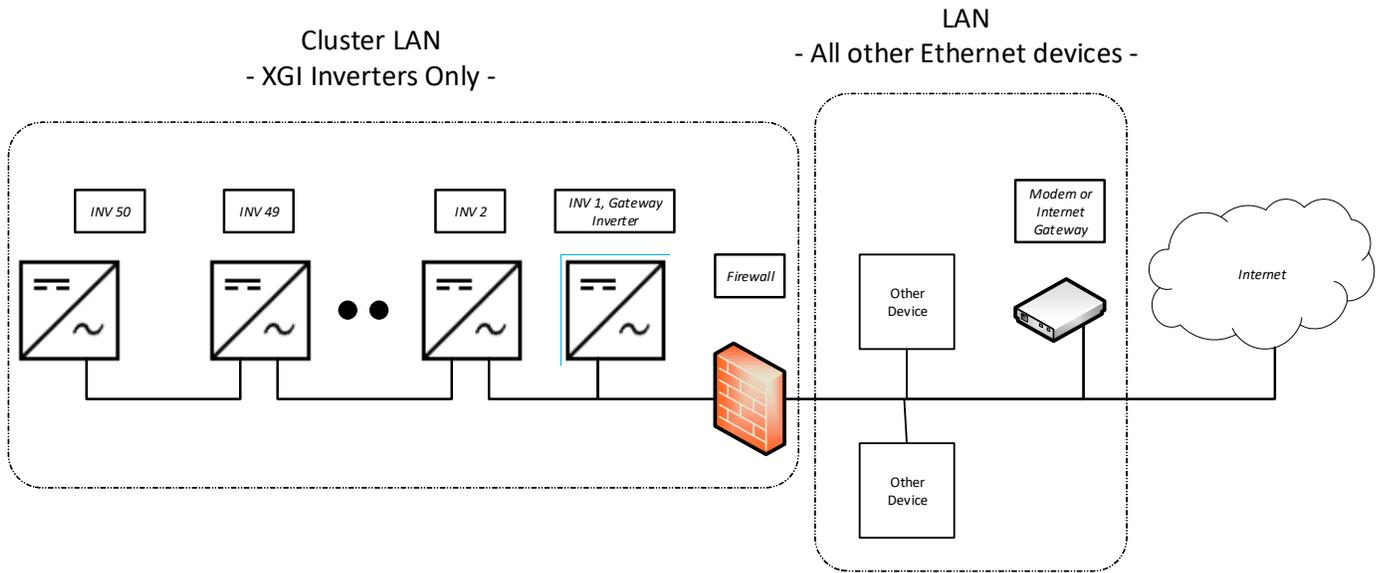


Figure 3-26 Networking with Other Devices

### 3.5.6 Monitoring Compatibility

The SOLECTRIA XGI is compatible with SolrenView and third-party Data Acquisition Systems (DAS). When using SolrenView monitoring no additional hardware is required. When connecting with third-party monitoring providers, Ethernet connections must be used; RS485 is **not** supported.

When integrating SOLECTRIA XGI inverters with third-party monitoring platforms, one of the following methods **MUST** be employed in order for the third-party DAS to reach each inverter as an Endpoint Device; 1. Port forwarding, 2. Static Routing (discussed in detail in Section 3.5.7.) Be sure to consult with the monitoring provider before installation.

### 3.5.7 Third-Party Data Acquisition System (DAS) Connection

## NOTICE !

**Ethernet Only Connection:** The XGI 1000 series inverter only supports Ethernet connections to a third-party DAS.

Connect the third-party DAS to the onsite LAN, outside of the Cluster LAN(s). Connecting a third-party DAS inside the Cluster LAN will block communication to the DAS outside of the Cluster LAN.

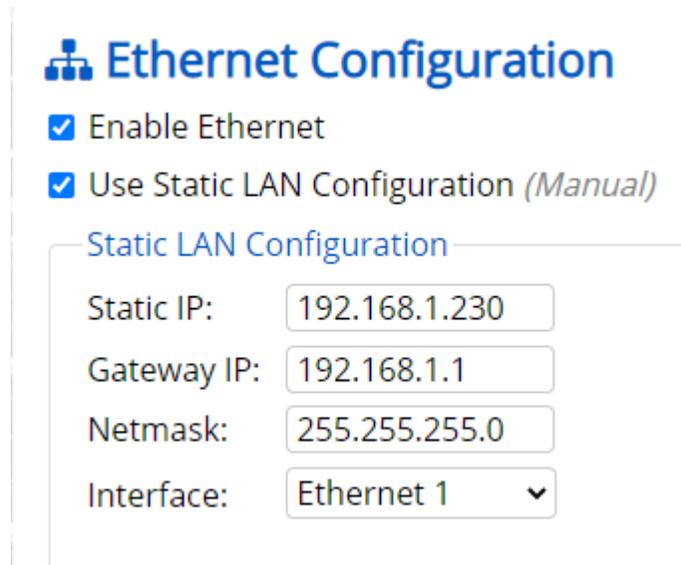
If DHCP is not enabled on the LAN, a static IP assignment for the GUI must be configured. When using DHCP consider using a reserved DHCP address.

To allow a third-party DAS (or any other device) to access inverters within a cluster(s) and treat all inverters as Endpoint Devices, *Port Forwarding* or *Static Routing* must be used.

### 3.5.7.1 Static IP Configuration, Gateway Inverter

Gateway inverters can be manually configured using a static IP. It is important to identify which Ethernet Port is configured with the static IP and ensure this is connected to the LAN. Once a static IP is configured the port will no longer function as a Cluster connection.

Login to the desired gateway inverter and navigate to **Inverter Configuration** → **Network Configuration** → **Advanced Network Configuration** → **Ethernet Configuration**. Enter the desired **Static IP, Gateway IP, Netmask, and Interface**. See Figure 3-27



The screenshot shows the 'Ethernet Configuration' web interface. At the top, there is a blue header with a network icon and the text 'Ethernet Configuration'. Below this, there are two checked checkboxes: 'Enable Ethernet' and 'Use Static LAN Configuration (Manual)'. Underneath, a section titled 'Static LAN Configuration' contains four input fields: 'Static IP' with the value '192.168.1.230', 'Gateway IP' with '192.168.1.1', 'Netmask' with '255.255.255.0', and 'Interface' with a dropdown menu showing 'Ethernet 1'.

Figure 3-27 Static IP Configuration

### 3.5.7.2 Port Forwarding

Port forwarding is easily configured with most third-party monitoring providers. Make sure to consult with your monitoring provider before implementing. When Port Forwarding is implemented, a third-party DAS can address each inverter using the *Gateway Inverter External IP* and the specified port for the inverter with the cluster. The *Gateway Inverter External IP* is assigned to the Gateway Inverter via the DHCP or configured manually using a static IP.

#### 3.5.7.2.1 Port Forwarding, Reserved DHCP IP Address

Before configuring Port Forwarding on the Gateway inverters(s) it is important to work with your network administrator to ensure that the gateway IP address(es) are fixed. If using DHCP consider using a reserved lease. If the IP address of the gateway inverter changes communication to the cluster is fail.

The IP address assigned to the Gateway Inverters(s) must be in a different subnet than internal Cluster IPs within the Cluster LAN.

#### 3.5.7.2.2 Port Forwarding, Configuring the Gateway Inverter

To configure Port Forwarding, first **Enable External Modbus Access** by selecting the check box using the GUI of the desired Gateway Inverter.

By default the Gateway Inverter will detect and recommend an IP/Subnet from which external devices are allowed through the Inverter Gateway Firewall. For security purposes the user is encouraged to enter the most restrictive value,

with preference given to the specific IP address of the external device (DAS). Up to two IP/Subnet pairs can be entered on each gateway.

## NOTICE !

**CYBER SECURITY!** Configuring an entire IP subnet will not only allow the desired DAS device but would also enable all the other devices (authorized or unauthorized) in the subnet to be able to access the Inverter cluster LAN. Use the most restrictive settings possible.



Figure 3-28 Enabling external Modbus access, Port Forwarding

**Enable/Configure Rules** for Port forwarding by selecting the check box. Enter all of the desired Ports in the right most column. Ports must be between and 1702-1752.

**Port Forwarding**

Using port forwarding, modbus client may access modbus service of each inverter inside the cluster by connecting to inverter's active LAN IP.  
Alternatively, client can connect to each inverter's internal Cluster IP by [static routing](#).

\*Enable/Configure Rules (Active Rules: 12)

Enter the external port number under **External Access** to map to specific inverter's service.

Status	Name	Serial Number	Internal Access	External Access
<input checked="" type="checkbox"/>	Inverter_1	1S19Z5859010001	10.36.193.64 :502	192.168.21.20:1702 *
<input checked="" type="checkbox"/>	Inverter_3	1S19Z5859010004	10.36.193.103 :502	192.168.21.20:1703 *
<input checked="" type="checkbox"/>	Inverter_6	1W1911750480006	10.71.238.119 :502	192.168.21.20:1704 *
<input checked="" type="checkbox"/>	Inverter_9	1W1911820450006	10.71.238.127 :502	192.168.21.20:1705 *
<input checked="" type="checkbox"/>	Inverter_2	1S17X2458720001	10.71.238.203 :502	192.168.21.20:1706 *
<input checked="" type="checkbox"/>	Inverter_10	1S19Z5859010007	10.71.238.227 :502	192.168.21.20:1707 *
<input checked="" type="checkbox"/>	Inverter_11	1S19Z5859010003	10.71.239.141 :502	192.168.21.20:1708 *
<input checked="" type="checkbox"/>	Inverter_8	1W1963120620004	10.71.242.172 :502	192.168.21.20:1709 *
<input checked="" type="checkbox"/>	Inverter_7	1W1953099470006	10.71.242.175 :502	192.168.21.20:1710 *
<input checked="" type="checkbox"/>	Inverter_12	1S19Z5859010008	10.71.243.30 :502	192.168.21.20:1711 *
<input checked="" type="checkbox"/>	Inverter_5	1W1963120610004	10.71.243.51 :502	192.168.21.20:1712 *
<input checked="" type="checkbox"/>	Inverter_4	1W1953099460002	10.71.244.48 :502	192.168.21.20:1713 *

### 3.5.7.2.3 Port Forwarding, DAS Configuration

The External Access IP and respective Port settings must be configured on the third-party monitoring platform or DAS. This will allow the DAS to query the desired inverter properly.

### 3.5.7.3 Static Routing

To implement Static Routing the XGI Gateway Inverter(s) will need to be configured and a static routing rule will need to be added to the LAN.

Once implemented, inverters can easily be addressed as an Endpoint Device by a DAS or other external device using the Inverter Cluster IP address and port 502, for example: 10.78.125.31:502. Inverter Cluster IPs can be configured; see Section 3.5.8.

#### 3.5.7.3.1 Static Routing, Configuring the Gateway Inverter

To configure Static Routing first **Enable External Modbus Access** by selecting the check box using the GUI of the desired Gateway Inverter.

By default the Gateway Inverter will detect and recommend an IP/Subnet from which external devices are allowed through the Inverter Gateway Firewall. For security purposes the user is encouraged to enter the most restrictive value, with preference given to the specific IP address of the external device (DAS). Up to two IP/Subnet pairs can be entered on each gateway.



Figure 3-29 Enabling external Modbus access, static routing

### 3.5.7.3.2 Static Routing, Entering Static Routing Rule on LAN

A static routing rule can be implemented on any permanently installed device on the LAN. Most commonly this is configured on the Internet Gateway Modem/Router or the third-party DAS (if feature is provided).

To enter the static routing rule, the following information is required:

- Destination Network:
  - The Gateway Inverter Cluster IP Address. Obtained from the landing page of the GUI
- MASK: Cluster LAN mask
  - Determined by the IP address within the Cluster LAN. By default this is 255.0.0.0, but can be more restrictive if custom inverter Cluster IPs are configured.
- Gateway IP: Gateway Inverter External IP Address
  - Listed as **Active LAN IP** on the **Modbus Access Configuration** page, see Figure 3-29

The method of entering static routing rules varies depending on the device or operating system, for more information work with your IT professional.

### 3.5.8 Manage Cluster IP Address

The internal Cluster IP Address are automatically assigned to each XGI inverter at the factory. If desired the IP address can be managed and statically assigned. Supported ranges include 10.0.0.1 – 10.255.255.254 & 192.168.0.1 – 192.168.0.254.

## NOTICE !

**Internal Cluster IPs:** In most applications the internal cluster IPs are only used for communication behind the Gateway Inverters. Exceptions include: (1) utilizing **Static Routing**, and (2) when no gateway inverter is configured (this is not recommended.)

Login to the inverter using the Admin credentials and navigate to **Inverter Configurations → Network Configurations → Advance Network Configurations → Network Cluster Configurations**. Select the check box **Manage cluster Ip addresses** and edit the **Cluster IPs** as desired, see Figure 1-1.

Click **Save** to store the changes.

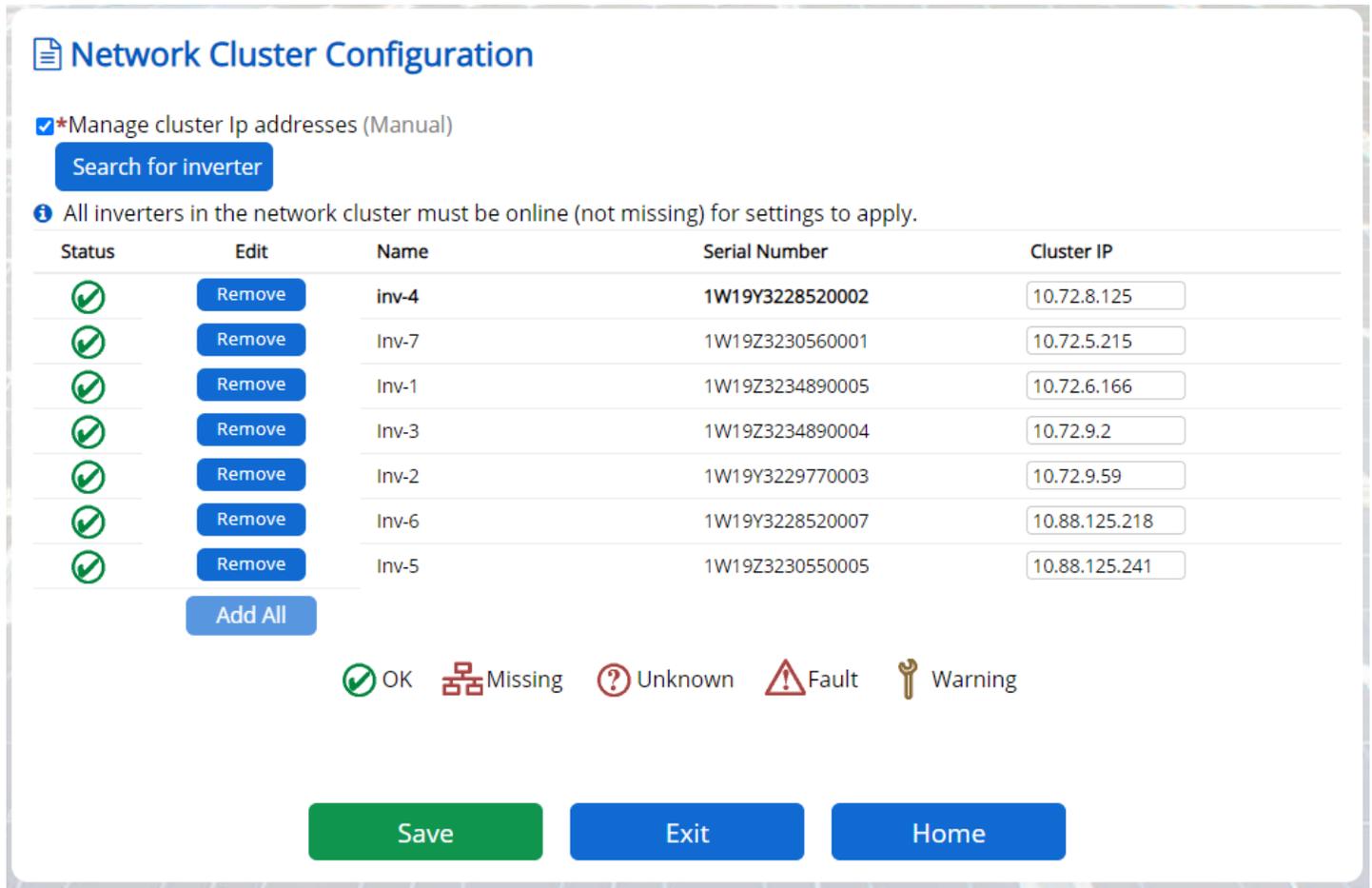


Figure 3-30 Manage IP Configuration

### 3.6 Communication and I/O Ports (XGI-1000 Only)

The SOLECTRIA XGI has a 16-pin I/O port and two interchangeable Ethernet Ports (see Figure 3-31). These connections are located in the right hand compartment within the Wire Box.

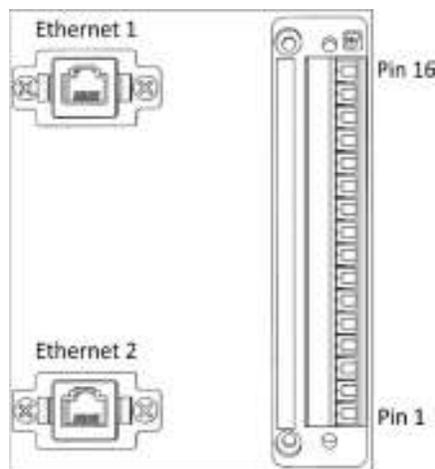


Figure 3-31 Communications Connections and Ports: 2 Ethernet Ports (Left) and 16 Pin I/O Port with Connector (Right)

Table 3-8 Pin Map for 16 Pin I/O Connector

PIN	INPUT/ OUTPUT	FUNCTION	DESCRIPTION/NOTES
1 - 6			<i>Reserved</i>
7	Input	Return for remote shutdown	24 VDC signal will shut down and keep inverter in shutdown mode. Opto-isolated means that the control (remote shutdown) is electrically separated from the device (inverter).
8	Input	Remote shutdown (opto-isolated)	
9 - 14			<i>Reserved</i>
15	Output	Return for 24 VDC	Requires operation of auxiliary power supply for the inverter
16	Output	Source for 24 VDC, 0.5 ADC for auxiliary devices	

Table 3-9 Connection Specifications for 16 Pin I/O Connector

<b>WIRE SIZE</b>	<b>28-16 AWG (0.08-1.5 MM2)</b>
<b>TORQUE</b>	5 in-lbs. (0.56 N-m)
<b>TORQUE SCREWDRIVER SIZE</b>	5/64 in. (2 mm)

### 3.6.1 Weather Station Connection (Optional)

Only use weather stations that connect using Ethernet. As with all other non-inverter Ethernet devices, these should be connected outside of the Cluster LANs.

## 4. Resealing the Wiring Box

**⚠ WARNING**



**Condensation and Water Ingress Will Cause Damage:** The Solectria XGI™ inverter has a NEMA Type 4X enclosure. If not properly installed all Type 4X enclosures are susceptible to water ingress and condensation that will damage

critical components. The Solectria XGI™ inverter is equipped with a GORE® Vent designed to minimize the risk of condensation.

**IMPORTANT:** After installation and before the inverter is operational the risk of condensation is greatest. To manage moisture during this time it may be necessary to use a desiccant package (not included). The desiccant package should be placed in the Wiring Box in lower right corner near the communication conduit entrance. The inverter **MUST** have both covers properly installed, and all conduit entrances **MUST** be sealed with electrically rated conduit foam to restrict airflow. Follow the manufactures recommendations.

**WATER INGRESS WILL VOID WARRANTY:** It is the responsibility of the installer to maintain a dry, moisture free inverter enclosure, water ingress is not covered under warranty.

#### 4.1.1 Install Conduit Foam

All conduit entrances must be sealed conduit foam. Ensure to use a product that is listed for use in electrical applications. Polywater® ATF™ Spray Foam Sealant is an excellent option. Follow the manufactures recommendations when sealing conduit entrances.

#### 4.1.2 Replace Plastic Shields

Replace the AC Shield and then the DC Shield, in the same way they were removed in Section 3.3.5.2.

#### 4.1.3 Replace Cover

Put the cover back on the Wiring Box. Use a #3 Phillips-head torque driver to tighten the cover screws to 25 in-lbs (2.8Nm).

## 5. Startup

### 5.1.1 Mechanical Installation

Make sure the mounting bracket is securely installed and all fasteners are tightened to the torque specifications. See [Mounting the Inverter](#).

### 5.1.2 Electrical Connections

Make sure all conductors are landed on the correct terminals.

Make sure all connections are tightened to torque specifications. See [AC Connections](#) and [DC Connections](#).

Make sure the DC Switch on the inverter is in the “OFF” position.

Make sure the AC Switch on the inverter is in the “OFF” position.

### 5.1.3 Electrical Check

Make sure the AC circuit breaker is properly sized.

Test the AC voltage and confirm that it is within the normal operating range.

Check the AC phase rotation, must be Clockwise.

Test the polarity of DC inputs and confirm they are proper. See [DC Connections](#).

Make sure the open circuit voltage of input strings is less than 1000VDC.

## 5.2 Startup Steps for a Single Inverter

### WARNING

**Electrical Shock Hazard:** Installer may come into contact with components that have hazardous voltage and energy potential.

**PPE:** Use proper safety equipment when energizing the inverter

### INFO

**Quick Start Guide** For more details regarding communication commissioning, see the communication Quick Start Guide.

1. Turn ON the site AC breaker for the inverter.
2. Complete the connection of the input PV source circuits (close the fuse holders).
3. Turn ON the AC switch on the inverter.
4. Turn ON the DC switch on the inverter.
5. Verify that the Status Panel illuminates Ready and neither Maintenance nor Power Fault is illuminated.
  - a. If the LEDs do not match the description above, see [Maintenance and Troubleshooting](#).
  - b. Verify that the Status Panel illuminates Ready, Network and Communications, and Power.
6. Connect to the gateway inverter’s WiFi network, XGI-00-006 (see [User Interface Overview](#)).

- a. Select the gateway node (in blue) at the top of the list.
  - b. Log in to the inverter (see [Inverter Page](#)).
  - c. Select the "[First Time Start Wizard](#)" from the menu under "Inverter Configurations".
  - d. Follow the instructions of the "First Time Start Wizard".
7. Measure output current to verify that the inverter is operating.

## 6. Graphical User Interface

The XGI series of inverters operate on an advanced communication platform that provides the operator with an unparalleled level of access and control. The user interface is designed to be intuitive and easy to use, however, it is important to understand the supported network topologies and some XGI specific terminology that is used within this document. The reader is encourage to review and understand Section 6.1 before proceeding.

### 6.1 XGI Terminology

This section discusses terminology that is used throughout this document.

#### 6.1.1 XGI Cluster

The **XGI Cluster** or simply **Cluster** refers to a group of XGI inverters connected together via Ethernet that share one single common Cluster **Gateway Inverter**. The Cluster forms its own LAN, protected from the rest of the onsite network by a built in firewall. Clusters can be configured using daisy chains, star networks, or mixed networks (See Section 3.5.3 for more details) providing flexibility during design and installation.

All inverters within a Cluster are accessible via the GUI which can be accessed by connecting to any inverter within a given Cluster.

#### INFO ✓

##### **Inter-Inverter Communication Over Ethernet Only**

All XGI inverters are equipped with a WiFi antenna which is used to tether a smart device to the inverter or Cluster. Inverters do not communicate to each other over WiFi, all inter-inverter communication is over Ethernet only.

#### 6.1.2 XGI Gateway Inverter

Every XGI Cluster has one, and only one, XGI **Gateway Inverter**. The Gateway Inverter functions as the master to the rest of the inverters within the Cluster, controlling communication with other devices outside of the Cluster including; access to the local DAS, internet, remote access portal, firmware update server etc.

The Cluster Gateway Inverter is automatically configured when obtains a External LAN IP address it obtains a DHCP assigned IP address from the LAN router. If there is no DHCP server onsite, a Gateway Inverter will not be configured. Without a Gateway Inverter, much of the built-in functionality is disabled including; remote firmware updates, automatic firmware updates, SolrenView Monitoring, remote diagnostics, and the Remote Access Portal.

### 6.2 Graphical User Interface (GUI) Overview

The Graphical User Interface (User Interface, or GUI) is accessed using a Laptop PC, PC, or Smart Device. The XGI inverters can be controlled over WiFi, Ethernet, or via an encrypted remote connection (Remote Access Portal available with subscription, optional.)

#### INFO ✓

**No Built in Keypad:** To provide a more robust GUI and remove a common failure point, the XGI does not contain a built in keypad. The XGI has an LED Status Panel that provides a visual indication of the inverter status but **does not** allow the user to control the inverter.

The GUI provides the operator a “hands off” means to observe and modify the inverter settings and access all inverters within a Cluster from a single point of connection.

Typically when onsite, the preferred means of connection is using a smart phone, tablet, or PC connected over WiFi for ease of use. Specific operations require, or may be better suited for, an Ethernet connection. Table 6-1 lists common activities and the preferred/required connection type.

Table 6-1, Supported and preferred connection method

ACTIVITY	SUPPORTED CONNECTIONS	PREFERRED CONNECTION
UPDATING FIRMWARE	Ethernet	Ethernet is required
COMMUNICATION COMMISSIONING	Ethernet or WiFi	Ethernet
TROUBLESHOOTING COMS	Ethernet or WiFi	Ethernet
TROUBLESHOOTING INVERTERS	Ethernet or WiFi	WiFi
GENERAL INVERTER INTERACTION	Ethernet or WiFi	WiFi

### 6.2.1 Connecting to the Inverter, Ethernet

To access the inverter using Ethernet, connect an Ethernet cable from the laptop to the inverter. The Ethernet port is located inside the wiring box (see Figure 3-14). Wait 15 seconds for the laptop to obtain an IP address from the XGI Inverter, DHCP must be enabled on the PC connected to the inverter. Once the laptop recognizes the Ethernet connection, open your preferred web browser (example Firefox or Chrome) and type “xgi.solar” in the address bar, then click Enter to navigate to the website. The laptop should establish a connection with the inverter and display the GUI.

<b>INFO ✓</b>
<p><b>Having trouble connecting to the XGI over Ethernet?</b></p> <ul style="list-style-type: none"> <li>• Verify that the laptop has connected to the XGI network, look at the LEDs on your Ethernet port to ensure they are illuminated. If no lights are on or flashing check your Ethernet cable and connection.</li> <li>• Ensure DHCP is enabled on your PC.</li> <li>• Try closing your web browser and re-opening a new session.</li> <li>• Check to make sure the XGI network LED is illuminated. The inverter takes approximately 5 minutes to fully boot up, if connecting after a recent power cycle wait 5 minutes and try again.</li> <li>• IP Conflict, it is possible that the network as an IP conflict between the internal Cluster LAN and the site LAN. If the cluster IPs are in the same or over lapping subnet a conflict may prevent the inverter from connecting.</li> </ul>

### 6.2.2 Connecting to the Inverter, WiFi

To access the inverter using WiFi, connect the smart device or laptop to the WiFi network (see Table 6-2 Default Network Credentials for default SSID). Wait 15 seconds for the laptop to obtain an IP address from the XGI Inverter. Open your

preferred web browser (example Firefox or Chrome) and type **xgi.solar** in the address bar, then click Enter to navigate to the website. The laptop should establish a connection with the inverter and display the GUI.

Table 6-2 Default Network Credentials

WIFI SSID (DEFAULT)	PASSWORD (CASE SENSITIVE)
XGI-00-006	Solectria

INFO ✓

**Having trouble connecting to the XGI over WiFi?**

- Verify that the laptop has connected to the XGI network, look at the network and internet connections on your PC or smart device to ensure you are connected to the correct WiFi network
- Try getting closer to the inverters WiFi antenna. The XGI provides a strong WiFi signal with 75ft and direct line of site
- Ensure the WiFi antenna is connected to the inverter
- Try closing your web browser and re-opening a new session
- Check to make sure the XGI network LED is illuminated. The inverter takes approximately 5 minutes to fully boot up, if connecting after a recent power cycle wait 5 minutes and try again

### 6.2.3 Inverter List

The Inverter List is the default display shown when first logging into an XGI network cluster. The Inverter List shows a register of all the inverters connected together via Ethernet with one common Gateway Inverter. These inverters are said to comprise a **Cluster**. To access the Inverter List, connect to any inverter within the Cluster using Ethernet or WiFi, open a browser and navigate to [xgi.solar](http://xgi.solar).

The Inverter List displays the names, serial numbers, Cluster IP addresses, and status of the all inverters registered to the Cluster, or currently connected to the Cluster, see Figure 6-1. To navigate to a particular inverter, select the name of the inverter by clicking it.

The gateway symbol denotes which inverters is configured as the gateway.



Figure 6-1 Inverter List Example

Table 6-3 Explanation of Symbols in User Interface

<i>Symbol</i>	<i>Explanation</i>
	Inverter OK: This indicates that the inverter is on the Reference List and functioning normally.
	Inverter Missing: This indicates that the inverter is on the Reference List but is undetected.
	Inverter Unknown: This indicates that the inverter detected is not on the Reference List. This icon is overridden if a Fault or warning is present.
	Inverter Fault: This indicates that the inverter has an inverter issue and cannot produce power.
	Inverter Warning: This indicates that the inverter has an issue but can produce power.

In the sample inverter list in Figure 6-1 Inverter List, several nodes are worth noting.

- **Inverter 2.1:** This inverter, indicated in **bold**, is the inverter that the smart device or laptop last accessed and it is operating normally.
- **Inverter 2.2:** This inverter is the Gateway Inverter, denoted with the gateway symbol .

### 6.2.4 Inverter Home Page

Each inverter has a home page (see Figure 6-2) that shows an overview of the inverter. It displays the inverter name, serial number, time, current AC power being produced, energy produced for the day and total lifetime energy produced. Lower on the page is the inverter status, which mirrors the LED Status Panel on the inverter.



Figure 6-2 Inverter Home Page (Observer Mode)

Selecting the inverter status icons will give their current state, as shown in Figure 6-3.

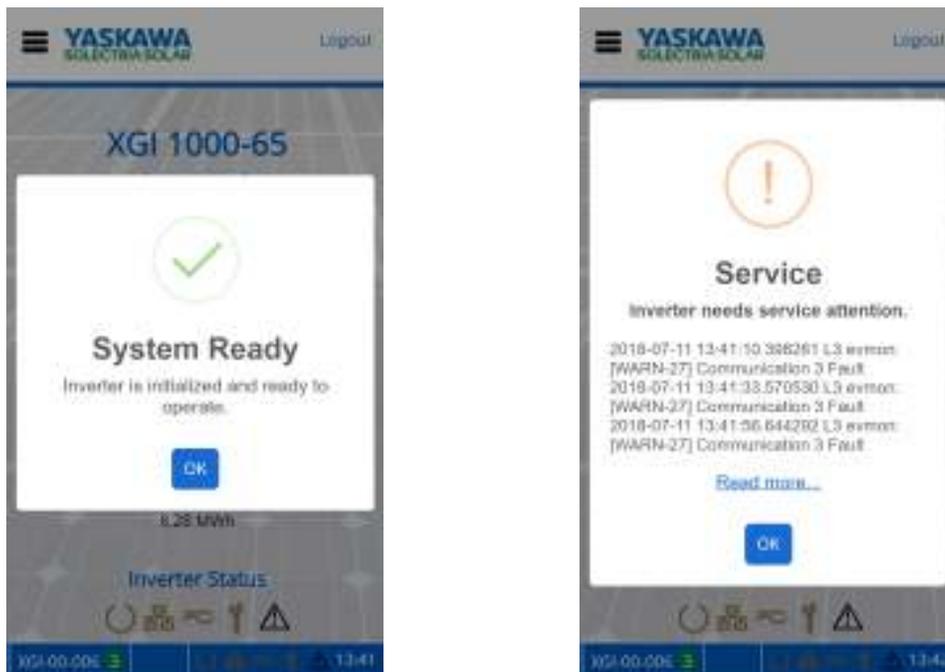


Figure 6-3 Current Status with Network and Communication Working and Maintenance with an Event

The menu button is located in the upper left corner, represented by three horizontal lines (≡). When clicked, a drop-down menu appears. In the upper right is a Login/Logout button.

### 6.2.5 Logging In

Before logging in, the user interface is in *observer* mode. Logging in is necessary to view and access the Inverter Configurations options in the menu in *administrator* mode. Everything that is accessible in *observer* mode is also accessible in *administrator* mode. If the Logout button is pressed in *administrator* mode, the user returns to *observer* mode. Table 6-4 shows the credentials needed to login as an *administrator*.

Table 6-4 Default Login Credentials

DEFAULT USER NAME (CASE SENSITIVE)	DEFAULT PASSWORD (CASE SENSITIVE)
admin	SolectriaSolar

The inverter will log the user out automatically after it is idle for 30 minutes.

### 6.2.6 Changing Settings

Changing settings or configurations in the GUI is easy and intuitive. Most pages allow the user to enter text, numbers, select check boxes, or actuate sliders. Once a setting or configuration has been adjusted use the **Save** button to save any changes.

Many fields have ranges that guide the user to input acceptable data.

The **Exit** button can be used to “escape” or back up to the previous page.

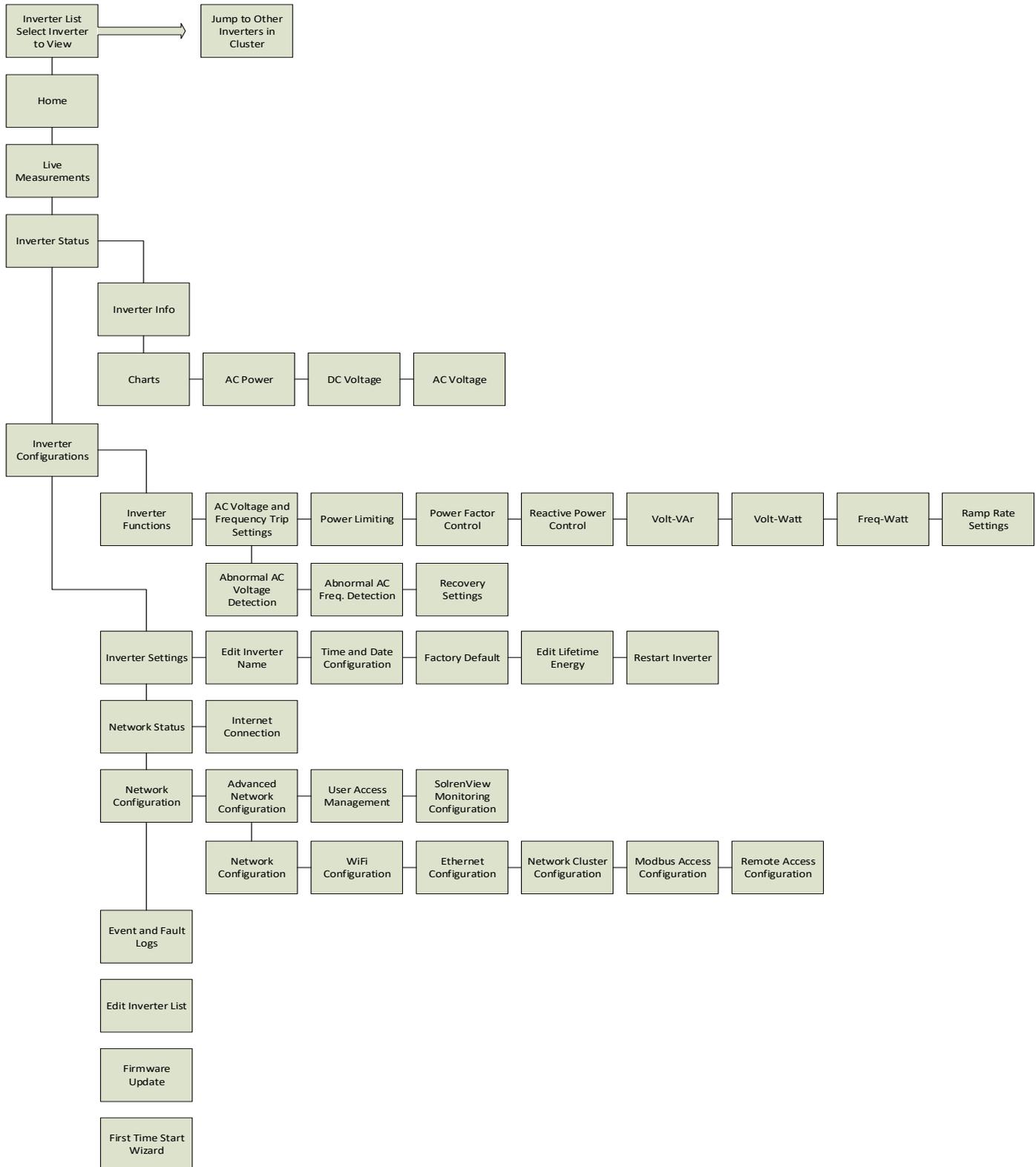
The **Home** button can be used to “escape” or back up to the Home page.

### **6.2.7 Help**

Many of the pages within the GUI feature a **Help** section containing important information regarding the particular settings or functions. Make sure to review the Help sections where applicable.

### 6.3 Menu Structure

This menu structure is subject to change as firmware updates are released.



## 7. Firmware Updates

SOLECTRIA XGI inverters support local and remote firmware updates. Remote updates are performed automatically from the Yaskawa Solectria Solar server or manually via the Remote Access Portal (with subscription).

Local firmware updates can be performed with a laptop and an Ethernet cable.

### 7.1.1.1 Automatic Remote Firmware Updates

By default, Automatic Remote Firmware updates are enabled. When selected, the inverter will check for firmware updates and download automatically if one is available. The firmware will be downloaded to the gateway inverter and then distributed across the rest of the network. On the following morning (or after a power cycle), all inverters will perform a self-update. During the self-update the inverters may not produce power. Updates generally occur in the early AM once PV power has stabilized but prior to peak production, reducing lost revenue.

Having the Enable Automatic Remote Firmware update unchecked is not recommended as product improvements may have occurred since the purchase of the product. If the user disables this feature, the site operator will be responsible for performing any firmware updates.

### 7.1.1.2 Manual Firmware Updates, Locally

Manual firmware updates performed locally should be performed with a PC and an Ethernet connection. Firmware updates over WiFi are not supported.

### 7.1.1.3 Manual Firmware Updates, Remote Server

Users that choose not to enable remote firmware updates, but still have onsite internet access can initiate a one-time firmware updates from our remote servers. Remote server paths can be found on our website [www.solectria.com](http://www.solectria.com) or by contacting technical support at 978-386-9700x2

### 7.1.1.4 Manual Firmware Updates, Remote Access Portal

Manual firmware updates are supported on the Remote Access Portal. For more information regarding the Remote Access Portal and manual remote firmware updates, see *Remote Access Portal Installation and Operations Manual*.

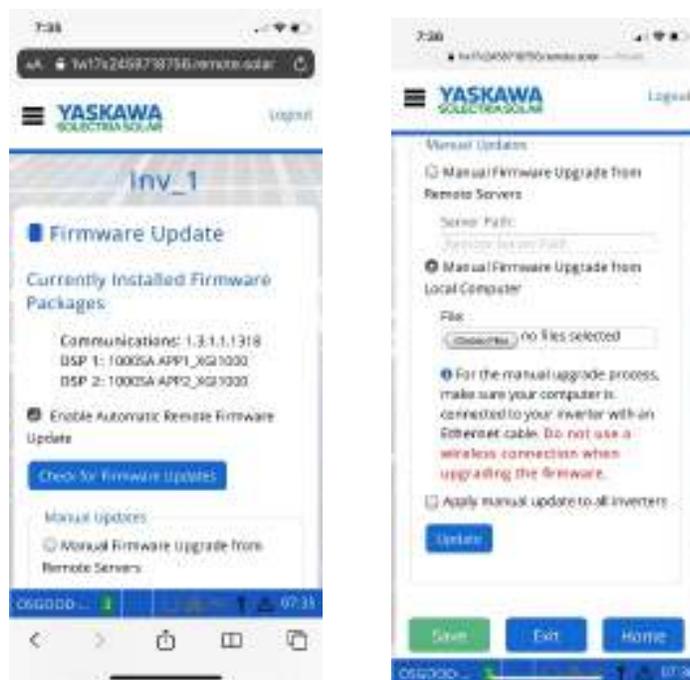


Figure 7-1 Firmware Update

## 8. Communication Commissioning

Once all inverters are installed and energized, the XGI communications can be commissioned. Before proceeding ensure that the following conditions are met:

- ✓ All inverters energized, (DC voltage)
- ✓ All inverters are connected via Ethernet in a supported network topology
- ✓ All gateway inverters are connected to the LAN with DHCP enabled
- ✓ Internet access is available on the LAN (if applicable)

### 8.1.1.1 Connect to the Cluster

Connect to the desired Cluster over Ethernet or WiFi using a smart device. If connecting over Ethernet be sure not to disrupt the daisy chain or star network, always connect to an inverter at the end of a chain.

### INFO ✓

**Don't Break the Chain!** When connecting to a Cluster over Ethernet during the commissioning process it is important that the Cluster LAN remain intact. Always connect to an open port on one of the XGI inverters at the end of a daisy chain as not to disconnect any inverters from the Cluster.

### 8.1.1.2 Verify Communication

On the Landing Page, verify that all expected inverters appear on the Inverter List. If inverters are missing, check wiring, and ensure that all inverters have been powered on for a minimum of 10 minutes.

## INFO ✓

**Discovery:** When inverters are connected in a Cluster it may take up to 10 minutes for all inverters to discover each other.

### 8.1.1.3 Startup Wizard

Run the **Startup Wizard** by logging into one of the inverters and selecting **Startup Wizard** from the main menu.

#### 8.1.1.3.1 Name the Inverters

Enter a name for each inverter on the list.

#### 8.1.1.3.2 Configure the Reference List

**Add** or **Remove** the inverters from the reference list. This list consists of all inverters that are currently communicating in the Cluster AND inverters that were previously added to the Reference List.

#### 8.1.1.3.3 Select the Time Zone

Select the desired Time Zone from the dropdown list.

#### 8.1.1.3.4 Choose a Cluster Name, SSID

A Cluster Name or SSID consists of three parts; the Site Name, Cluster ID, and WiFi channel. The Cluster Name generated in this step will determine the WiFi SSID or WiFi network name.

## 9. Operation

### 9.1 Inverter Start-Up

#### Automatic Start-Up:

The inverter will start up automatically when the output voltage and power from the PV array meet the required values and the AC grid is within the normal operating limits.

#### Manual Start-Up:

On the inverter page of the user interface, click the **Connect to Grid** button to turn the inverter ON.

### 9.2 Inverter Shutdown

#### Automatic Shutdown:

The inverter will shut down automatically when the output voltage and power of the PV array are lower than the required values and when the AC grid is outside its normal operating limits.

#### Manual Shutdown:

On the inverter page of the user interface, click the Disconnect from Grid button to turn the inverter OFF.

## 10. Maintenance and Troubleshooting

### 10.1 Event Codes

There are three levels of event codes: Critical event, Warning event, and Information event.

#### 10.1.1 Critical Events

Critical events: the inverter will cease producing AC power and cannot self-recover. This is indicated by the inverter illuminating both the red Power Fault LED (triangle) and the yellow Maintenance LED (wrench). Note that some of these Critical events can create a hazardous situation, indicated by **DO NOT TOUCH**.

 <b>DANGER</b>
<b>Ground Fault Hazard:</b> Inverter enclosure is an electrical hazard.
<b>DO NOT TOUCH:</b> any equipment (including, but not limited to: the inverter, the PV array disconnect switch the PV array combiners, the PV panels, or the PV racking system). Immediately contact the installer or another qualified person to locate and repair the source of the ground fault.

Table 10-1 Critical Event Codes

CRITICAL EVENT CODE	DISPLAY MESSAGE	DESCRIPTION	TROUBLESHOOTING
1	Software Parameter Load Failure	An attempt to remotely download software parameters has failed.	Attempt to update the firmware and power cycle the inverter. Contact Technical Support.
2	Internal Communication 1 Failure	Internal communication failure detected.	Attempt to update the firmware and power cycle the inverter. Contact Technical Support.
3	Internal Communication 2 Failure	Internal communication failure detected.	Attempt to update the firmware and power cycle the inverter. Contact Technical Support.
4	ARC Fault Detected	A DC series arc fault has been detected in the PV array.	Inspect for and repair damage to the PV array and DC wiring. Clear the ARC Fault and retest. Contact Technical Support.
5	AC Contactor Failure	One or both of the AC grid contactors has failed. Contactors may fail open or closed.	Power cycle the inverter. If the inverter does not clear the error, contact Technical Support.
6	Critical Over Temperature	Internal hardware temperature has exceeded the allowable limits.	Check to ensure external fans are clear of debris and are operating. -If external fans are not operating. Contact Technical Support, fans may need to be replaced.
7	Ground Fault, Excessive Leakage Current	A ground fault condition has been detected. Leakage current is greater than the allowable limit. Check the	<b>DO NOT TOUCH</b> any equipment (including, but not limited to: the inverter, the PV array disconnect

		array for an unintentional reference to ground.	switch the PV array combiners, the PV panels, or the PV racking system). Immediately contact the installer or another qualified person to locate and repair the source of the ground fault.
8	Ground Fault, Isolation Resistance Low	A ground fault condition has been detected. Insolation resistance between the DC conductors and ground is below the allowable limit. Check the array for an unintentional reference to ground.	<b>DO NOT TOUCH</b> any equipment (including, but not limited to: the inverter, the PV array disconnect switch the PV array combiners, the PV panels, and the PV racking system). Immediately contact the installer or another qualified person to locate and repair the source of the ground fault.
9	Critical Internal Hardware Failure	A critical hardware failure has been detected to the inverter powertrain.	Power cycle the inverter. If the inverter does not clear the error, contact Technical Support.
10	Ground Fault Detection Self Check Failure	Ground fault detection circuitry is damaged or has malfunctioned.	Power cycle the inverter. If the inverter does not clear the error, contact Technical Support.
11	Operational Self Check Failure	Inverter self-diagnostic check has failed during operation. Inverter requires service.	Power cycle the inverter. If the inverter does not clear the error, contact Technical Support.
12	Startup Self Check Failure	Inverter self-diagnostic check has failed at startup. Inverter requires service.	Power cycle the inverter. If the inverter does not clear the error, contact Technical Support.
...			
32		Reserved	

### 10.1.2 Warning Events

Warning events indicate that the inverter is not producing AC power but can self-recover if conditions causing the event cease. This is indicated by the inverter Status Panel illuminating the yellow Maintenance LED (wrench).

Table 10-2 Warning Event Codes

WARNING EVENT CODE	DISPLAY MESSAGE	DESCRIPTION	TROUBLESHOOTING
1	Internal Over Current/ Over Voltage	Software has detected an over voltage or over current event. Power production will temporarily be affected.	Power cycle the inverter. If the inverter does not clear the error, contact Technical Support.
2	Phase Lock Loop Failure	Inverter has failed to synchronize with the grid. Power production will temporarily be affected.	Power cycle the inverter. If the inverter does not clear the error, contact Technical Support.
3	Islanding Detected	An islanding condition has been detected. The inverter will cease production until the event has ended.	Using a CAT III multi-meter verify the AC voltage. If an islanding condition (no AC voltage) is identified check all

			AC fuses or breakers. Inspect the AC conductors for damage. If AC voltage is present and the inverter will not grid connect contact Technical Support.
<b>4</b>	Open Phase Detected	Open AC phase condition has been detected.	Using a CAT III multi-meter verify the AC voltage. If a phase loss is identified check all AC fuses or breakers. Inspect the AC conductors for damage. If no phase loss is identified contact Technical Support.
<b>5</b>	AC Low Frequency 1 Detected	AC low frequency region 1 detected.	Using a CAT III multi-meter verify the AC frequency. If there is a discrepancy of greater than 2% between the measured results and the frequency reported by the inverter contact Technical Support, otherwise wait for the grid conditions to improve.
<b>7</b>	AC High Frequency 1 Detected	AC high frequency region 1 detected.	Using a CAT III multi-meter verify the AC frequency. If there is a discrepancy of greater than 2% between the measured results and the frequency reported by the inverter contact Technical Support, otherwise wait for the grid conditions to improve.
<b>9</b>	AC Low Voltage 1 Detected	AC low voltage region 1 detected.	Using a CAT III multi-meter verify the AC voltage. If there is a discrepancy of greater than 2% between the measured results and the voltage reported by the inverter contact Technical Support, otherwise wait for the grid conditions to improve.
<b>12</b>	AC High Voltage 1 Detected	AC high voltage region 1 detected.	Using a CAT III multi-meter verify the AC voltage. If there is a discrepancy of greater than 2% between the measured results and the voltage reported by the inverter contact Technical Support, otherwise wait for the grid conditions to improve.
...			
<b>24</b>	Operation Failure	Communication processor has a critical fault.	Power cycle the inverter. If the inverter does not clear the error, contact Technical Support.
<b>25</b>	Communication 1 Fault	Communication processor initialization fault.	Power cycle the inverter. If the inverter does not clear the error, contact Technical Support.

<b>26</b>	Communication 2 Fault	Communication processor application fault.	Power cycle the inverter. If the inverter does not clear the error, contact Technical Support.
<b>27</b>	Communication 3 Fault	Communication processor hardware fault.	Power cycle the inverter. If the inverter does not clear the error, contact Technical Support.
<b>28</b>	Network Fault	A network connection has failed.	Check to make sure the Ethernet connections are firmly seated. Check the Wi-Fi antennas, ensure they are vertically mounted.
<b>29</b>	Software Update Fault	Communication processor software update fault.	Power cycle the inverter. If the inverter does not clear the error, contact Technical Support.
<b>30</b>	Unauthorized Network Access	An unauthorized attempt to access the network has occurred.	Check whether there have been any malicious attempts to access the inverter network.
<b>31</b>	Invalid Configuration Request	An external request to adjust setting beyond the allowable limits.	Check that the value being entered is acceptable and re-enter.
<b>32</b>		Reserved	

### 10.1.3 Information Events

Information events will not cause the inverter to cease producing AC power and are provided for reference. There is no LED for these events.

Table 10-3 Information Event Codes

INFO EVENT CODE	DISPLAY MESSAGE	DESCRIPTION	TROUBLESHOOTING
1	Power Derating, Temperature	Inverter output power is reduced due to the internal operating temperature of the inverter.	Check to make sure all external fans are operating, replace fans if necessary. Make sure the ambient temperature is within normal operating conditions.
2	Power Derating, Customer Command	Inverter output power is reduced in response to user command.	Verify that that a request has been made to de-rate the inverter. If this request has not been made, contact Technical Support.
3	Remote Shutdown Command	Remote shutdown command was issued from the GUI	Connect the inverter to the grid using the GUI
4	Shutdown Command from AC Switch	Shutdown command was received by the AC Switch	Turn on the AC switch
5	Shutdown command from Digital Inputs	The shutdown command was received by the digital inputs	Remove digital signal to shut inverter down.
...		Reserved	
32		Reserved	

## 10.2 Servicing the Fans

Three fans are user serviceable. All fans are located and accessible on the sides of the inverter. There are two DC fans accessible on the right side of the inverter underneath the antenna, and one AC fan is accessible on the left side at the bottom of Power Head. The AC and DC fans are different parts and cannot be interchanged. To access the fans, remove the screw with a #2 Phillip head screwdriver and press the tabs together to remove the assembly. See Figure 10-1 to remove the DC Fans and the AC Fan.

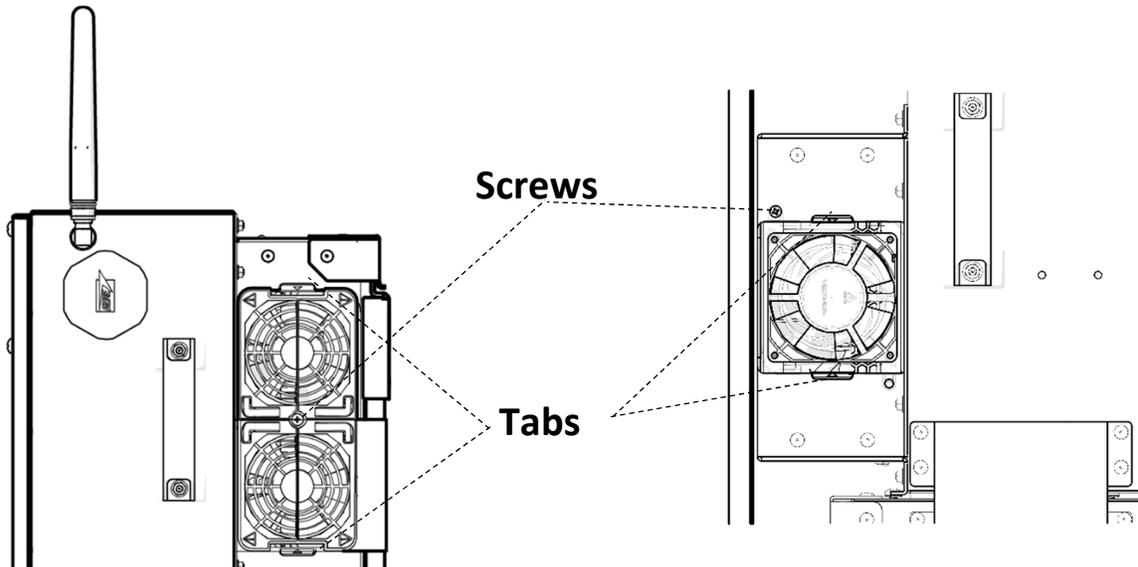


Figure 10-1 DC Fans (Left) and AC Fan (Right)

On the top of the fans, there are two arrows at a 90° angle. Fan alignment is based on the arrow that points in the direction that the fan blows, as shown on the left side in Figure 10-2.

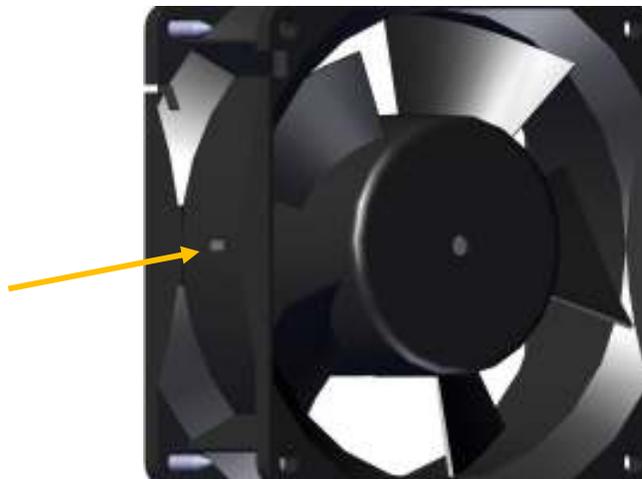


Figure 10-2 Fan Picture with Arrow Showing the Direction of Airflow

### **10.2.1 DC Fans**

Align both fans so the fans blow INTO the inverter. The arrow will be pointed into the inverter and the label will not be visible. After servicing the fans, replace the assembly and torque the screw to 20 in-lbs (2.3 N-m). See Figure 10-1 to remove the DC fans.

ELC-100275

### **10.2.2 AC Fan**

Align the fan so the fan blows OUT of the inverter. The arrow will be pointed out of the inverter and the label will be visible. After servicing the fan, replace the assembly and torque the screw to 20 in-lbs (2.3 N-m). See Figure 10-1 to remove the AC fan.

ELC-100397

## **10.3 WiFi Connection Error**

When connecting to the inverter, if the xgi.solar page gives a “page not found” error, disable mobile data on the smart device.

# 11. Specifications

## 11.1 General Specifications

Table 11-1 General Specifications

	XGI 1000-60/60	XGI 1000-60/65	XGI 1000-65/65
<b>MAX INPUT VOLTAGE</b>		1000 VDC	
<b>FULL POWER INPUT VOLTAGE RANGE</b>	580 to 850 VDC	600 to 850 VDC	
<b>OPERATING VOLTAGE RANGE</b>		350 – 950 VDC	
<b>MAX OPERATING INPUT CURRENT PER INVERTER</b>	105.6 A	105.6 A	110.4 A
<b>MPP TRACKERS</b>		1 or 4, configurable (1 by default)	
<b>MAX OPERATING INPUT CURRENT PER MPPT ZONE</b>	26.4 A	26.4 A	27.6 A
<b>MAX PV CURRENT (ISC X 1.25)</b>		50 A per zone or 180 A combined	
<b>MAX INPUT BACK-FEED</b>		0 A	
<b>OUTPUT POWER FACTOR</b>		Unity > 0.99; Adjustable from -0.85 to +0.85	
<b>GRID TYPE</b>		3 Phase Wye with Ground and Neutral	
<b>NOMINAL OUTPUT VOLTAGE</b>		480 VAC	
<b>NOMINAL FREQUENCY</b>		60 Hz	
<b>OUTPUT VOLTAGE RANGE</b>		-12/+10%	
<b>FREQUENCY RANGE</b>		57-62 Hz	
<b>MAX OUTPUT CURRENT</b>	72.2 A	78.2 A	78.2 A
<b>MAX OUTPUT POWER</b>	60 kW	60 kW	65 kW

### 11.2 Voltage and Frequency Limits and Trip Times

All models of the SOLECTRIA XGI 1000 comply with IEEE1547a-2014 requirements. The tables below show its standard settings.

Table 11-2 Default Voltage Limits and Trip Times

VOLTAGE RANGE	VOLTAGE SETPOINT	CLEARING TIME
<b>V &lt; 45%</b>	V = 45%	0.16 s
<b>45% &lt;= V &lt; 60%</b>	V = 60%	1.0 s
<b>60% &lt;= V &lt; 88%</b>	V = 88%	2.0 s
<b>88% &lt;= V &lt; 110%</b>	N/A	No trip
<b>110% &lt;= V &lt;= 120%</b>	V = 110%	1.0 s
<b>V &gt; 120%</b>	V = 120%	0.16 s

Table 11-3 Frequency Limits and Trip Times

FREQUENCY RANGE	FREQUENCY SETPOINT	TRIP TIME
<b>F &lt; 57 HZ</b>	F = 57 Hz	0.16 s
<b>57 HZ &lt;= F &lt; 59.5 HZ</b>	F = 59.5 Hz	2.0 s
<b>59.5 HZ &lt;= F &lt; 60.5 HZ</b>	N/A	No trip
<b>60.5 HZ &lt;= F &lt;= 62 HZ</b>	F = 60.5 Hz	2.0 s
<b>V &gt; 62 HZ</b>	F = 62 Hz	0.16 s

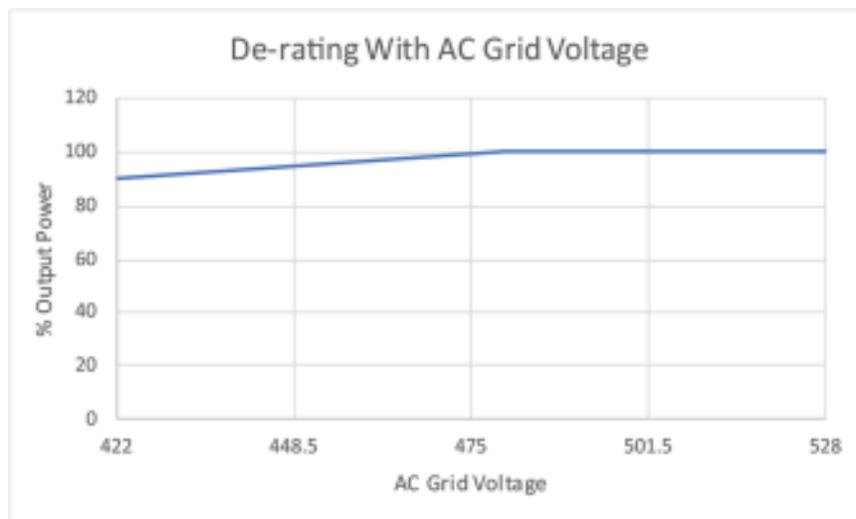


Figure 11-1 Derating with AC Voltage

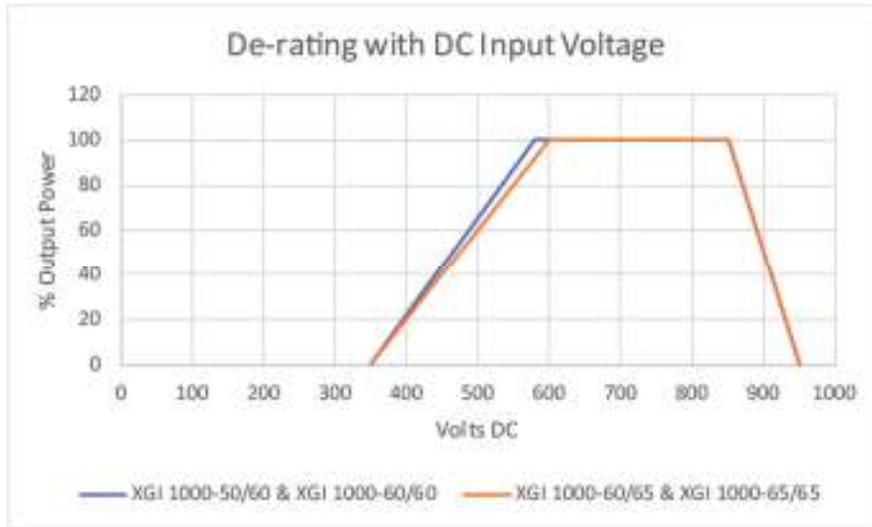


Figure 11-2 Derating with DC Voltage

### 11.3 Temperature and Altitude

Table 11-4 Normal Temperature Ranges

	XGI 1000-50/60 AND XGI 1000-60/60	XGI 1000-60/65 AND XGI 1000-65/65
<b>AMBIENT TEMPERATURE RANGE</b>	-40°F to +140°F (-40°C to +60°C)	
<b>DERATING TEMPERATURE</b>	122°F (50°C)	113°F (45°C)
<b>STORAGE TEMPERATURE RANGE</b>	-40°F to +167°F (-40°C to +75°C)	

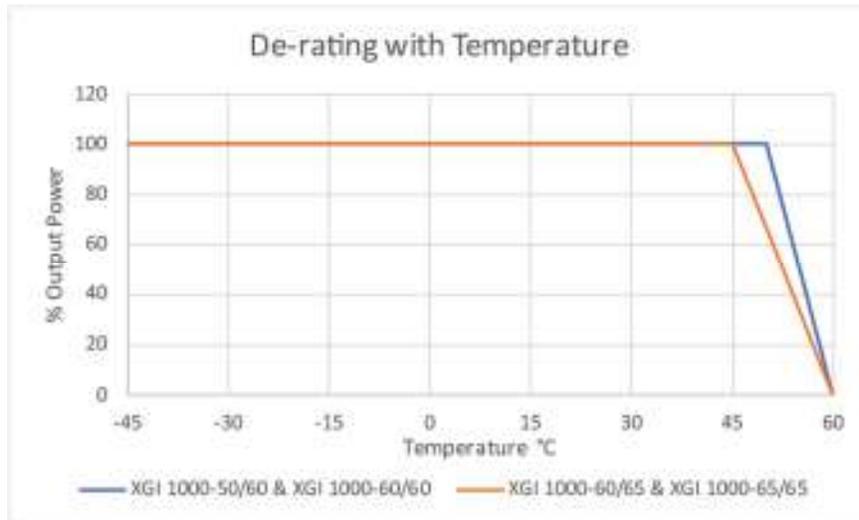


Figure 11-3 Derating with Temperature

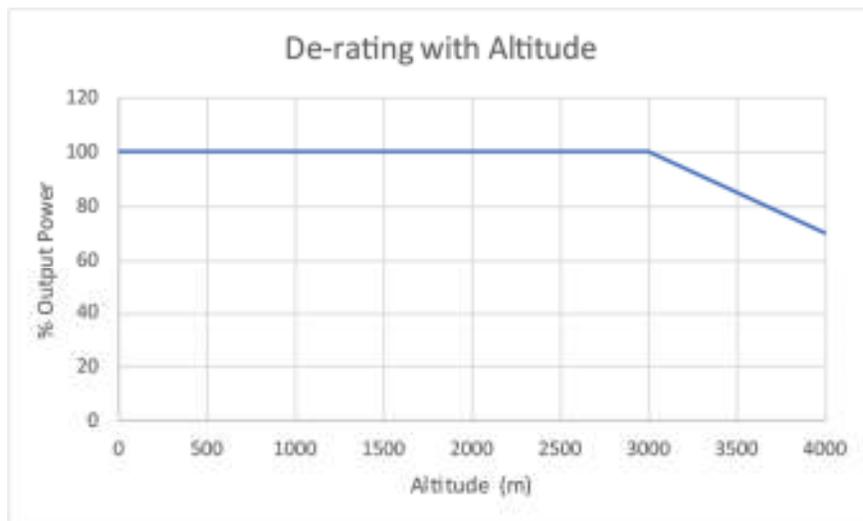


Figure 11-4 Derating with Altitude (All Models)

## 11.4 Enclosure

Table 11-5 Enclosure Information

ENCLOSURE RATING	NEMA TYPE 4
<b>DIMENSIONS</b>	45.8 in x 28.3 in x 11.6 in (1163 x 719 x 295 mm)
<b>WEIGHT</b>	Power Head: 117 lbs (53.07 kg) Wiring Box: 49 lbs (22.22 kg) Mounting Bracket: 20 lbs (9.07 kg)
<b>MOUNTING ANGLE RANGE</b>	5-90° from Horizontal
<b>ENCLOSURE FINISH AND TYPE</b>	Powder Coated Aluminum

## 12. Options

### 12.1 Wiring Box Configurations

The Wire Box comes in several versions. Each version can be ordered in Combined Mode or Independent Mode.

Table 12-1 AC Connection Specifications

	WIRE MATERIAL	STANDARD WIRING BOX	LARGE AC TERMINAL (-L) WIRING BOX
<b>AC OUTPUT (L1, L2, L3) CONDUCTORS</b>	Copper	3 to 1/0 AWG (26.7 to 50 mm <sup>2</sup> )	3 to 3/0 AWG (26.7 to 85 mm <sup>2</sup> )
<b>NEUTRAL (NOT A CURRENT CARRYING CONDUCTOR: CAN BE SIZED EQUAL TO OR LARGER THAN THE EGC.)</b>	Aluminum	1 to 1/0 AWG (42.4 to 50 mm <sup>2</sup> )	1 to 3/0 AWG (42.4 to 85 mm <sup>2</sup> )
	Copper	8 to 4 AWG (8.4 to 21.2 mm <sup>2</sup> )	6 to 1/0 AWG (13.3 to 50 mm <sup>2</sup> )
<b>EQUIPMENT GROUNDING CONDUCTOR (EGC)</b>	Aluminum	6 to 4 AWG (13.3 to 21.2 mm <sup>2</sup> )	6 to 1/0 AWG (13.3 to 50 mm <sup>2</sup> )
	Copper	8 to 4 AWG (8.4 to 21.2 mm <sup>2</sup> )	6 to 1/0 AWG (13.3 to 50 mm <sup>2</sup> )
	Aluminum	6 to 4 AWG (13.3 to 21.2 mm <sup>2</sup> )	6 to 1/0 AWG (13.3 to 50 mm <sup>2</sup> )

#### 12.1.1 Standard Configuration

The Standard Wiring Box is shown in Figure 12-1. See Table 12-1 for allowed AC conductor sizes.



Figure 12-1 Standard Wiring Box

### 12.1.2 Large AC Terminal Configuration

The Large AC Terminal Wiring Box, as shown in Figure 12-2, is the Standard Wiring Box with larger AC Terminals, allowing for larger AC wires to be used. See Table 12-1 for allowed AC conductor sizes.

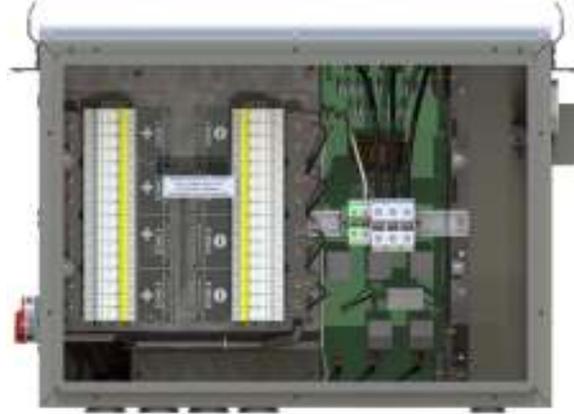


Figure 12-2 Wiring Box with Large AC Terminal

## 13. Appendix

### 13.1 Warranty and RMA Instructions

For all warranty information, please visit:

<http://solectria.com/support/documentation/warranty-information/grid-tied-inverter-warranty-letter/>

### 13.2 Datasheet

<https://solectria.com/support/documentation/inverter-datasheets/xgi-1000-datasheet/>

### 13.3 Contact Information

Table 13-1 Contact Information

TELEPHONE	<b>978.683.9700</b>
FAX	978.683.9702
SALES SUPPORT	inverters@solectria.com
TECHNICAL SUPPORT & SERVICE	978.683.9700x2
WEBSITE	www.solectria.com