YASKAWA
SOLECTRIA SOLAR

Commercial 1000VDC String Inverter

SOLECTRIA XGI™ 1000

Installation and Operation Guide

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

1. Important Safety Instructions

1.1 Hazard Symbols

Table 1-1 Hazard Symbols

DANGER	**DANGER** indicates a hazardous situation, which, if not avoided, will result in death or serious injury.
WARNING	**WARNING** indicates a hazardous situation, which, if not avoided, could result in death or serious injury.
CAUTION	**CAUTION** indicates a hazardous situation, which, if not avoided, will result in minor or moderate injury.
NOTICE	**NOTICE** indicates a hazardous condition, which, if not avoided, could result in equipment working abnormally or property loss.
INFO →	**INFO** indicates important supplementary information to use the product effectively.

1.2 Symbols on Labels

Table 1-2 Explanation of Symbols on Labels

	AC Signal
	DC 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.
WARNING	**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 1000-60/60

XGI 1000-60/65

XGI 1000-65/65

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 1-3.

Figure 1-1 Status Panel

Table 1-3 Explanation of Symbols on Status Panel

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

2. Overview

2.1 Inverter Overview

A solar inverter transforms DC power from solar photovoltaic modules into AC power and exports it to the electrical grid, as shown in Figure 2-1. The SOLECTRIA XGI 1000 is a state-of-the-art inverter designed and made in the USA using global components and is compliant with the Buy American Act.

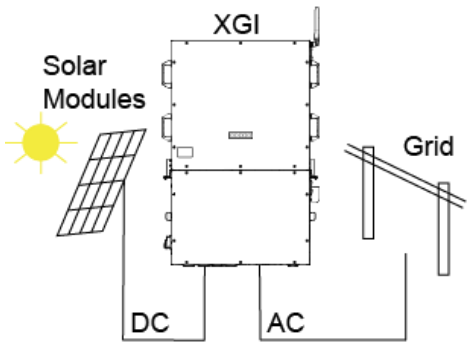


Figure 2-1 Inverter Usage

2.1.1 Inverter Features

- High conversion efficiency using 3-level conversion technology.
  - Max efficiency: 98.2%
  - CEC efficiency: 98%
- Grid adaptability
  - Supports multiple grid trip setting profiles
  - Adjustable reactive power
  - Adjustable power factor (PF) ±0.85
  - Remote power curtailment
- Ethernet connectivity
- WiFi accessible user interface
- Optional 4 MPPTs: Multichannel Maximum Power Point Tracking (MPPT) enables maximum design flexibility and optimizes energy harvest over the life of the system.
- Protective Enclosure: NEMA 4 rated enclosure allows for both indoor and outdoor use.
- Easy integration: Integrated DC and AC disconnect switches and 16 fused input positions allow for installation either with or without additional combiner boxes.

2.1.2 Inverter Protection Features

- Reverse polarity protection on DC inputs
- Short circuit protection
- DC series arc fault detection
- Anti-islanding protection
- Input and output over-voltage protection
- Input over-current protection
- Continuously monitored variables:
    - DC input insulation resistance with respect to ground
    - AC output voltage and frequency
    - Leakage current to ground
    - Internal ambient temperature
    - IGBT module temperature

2.1.3 Communication Overview

Users can communicate with the SOLECTRIA XGI 1000 using a WiFi enabled smart device, such as a laptop, tablet, or smartphone. The SOLECTRIA XGI 1000 monitors internal variables (see Section 5.2.1). This data is sent via a modem or gateway to the Internet cloud. In the cloud, this data is stored on the SRV server where it can be accessed by the end user (additional fee applies). Add-ons such as a weather station and a Data Acquisition System (DAS) are supported using Ethernet cable.

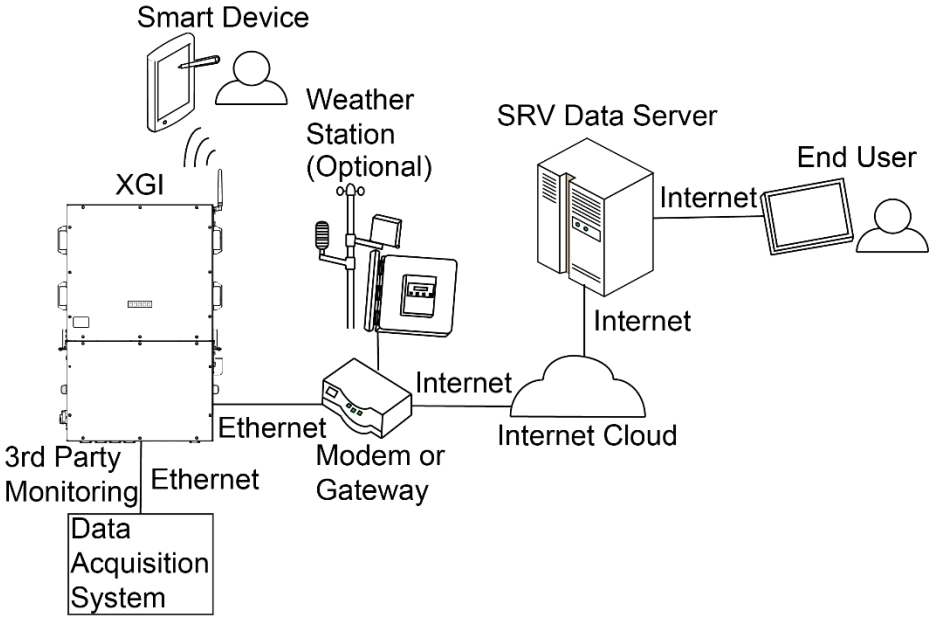


Figure 2-2 Communications Overview

2.1.4 Inverter Diagrams

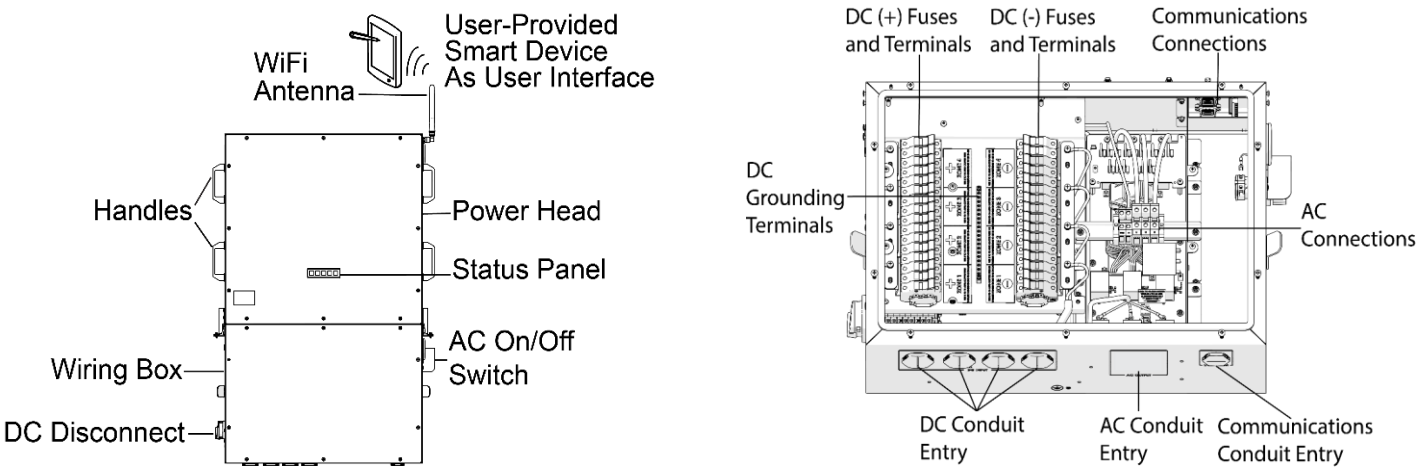


Figure 2-3 SOLECTRIA XGI 1000 Inverter (Left) and Wiring Box (Right)

2.2 Inverter Placement

2.2.1 Inverter Environment

The SOLECTRIA XGI 1000 inverter is rated for outdoor use and will operate properly when exposed to direct sunlight, rain, or snow. To optimize the performance and longevity of the inverter, mount the inverter out of direct sunlight.

INFO→	**Inverter Orientation** It is recommended to install the inverter facing north to minimize direct sun exposure.

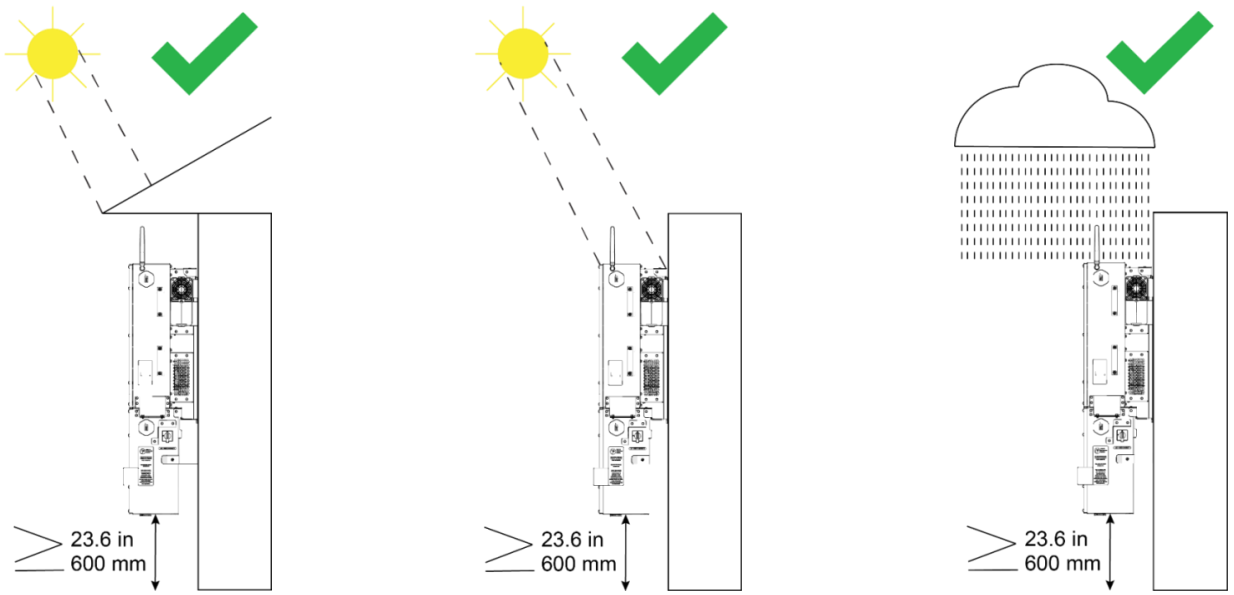


Figure 2-4 Acceptable Inverter Environments (Left to Right): Shaded, Direct Sunlight, and Rain

2.2.2 Inverter Mounting Angle

The acceptable mounting angle range is 5 to 90 degrees measured from horizontal, as shown in Figure 2-5. Make sure the Wiring Box is below the Power Head. Regardless of the installation angle, the bottom edge of the Wiring Box must be parallel to the ground (no side-to-side tilting).

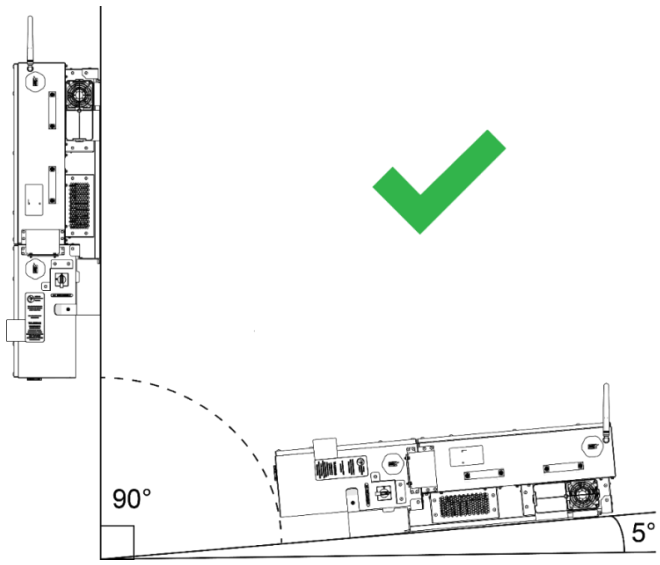


Figure 2-5 Inverter Mounted Correctly Between 5 and 90° from Horizontal and Level to Ground

Do not install the inverter with the Power Head below the Wiring Box nor with the base of the Wiring Box not parallel to ground.

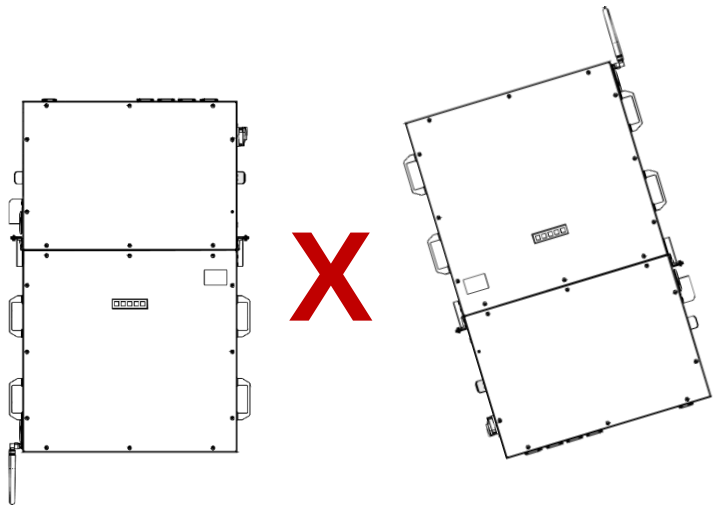


Figure 2-6 Inverter Mounted Incorrectly with Power Head below the Wiring Box (Left) and Not Parallel to Ground (Right)

2.3 Unpacking

The SOLECTRIA XGI inverter is shipped in two boxes. When storing the packaged inverter(s), keep in an area where they will not get damaged or flooded. Storage temperatures are -40°F to +167°F (-40°C to +75°C). Open the boxes carefully to avoid damaging the contents.

Table 2-1 Contents of Boxes

Box 1	Box 2
Power Head	Wiring Box
VF Test Report	Mounting Bracket
One page information sheet for WiFi connection to smart device	Hardware Kit containing: • (4) nuts for assembling the Mounting Bracket. • (3) M6 bolts: (2) for mounting the Power Head to the Wiring Box and (1) for the external DC ground on the Wiring Box. • (4) M5 bolts for mounting the inverter to the bracket. • Antenna for WiFi connection to smart device. • 90 degree coaxial connection for antenna.

2.4 Labels

The label on the Power Head shows the inverter specifications and FCC compliance (Figure 2-7).

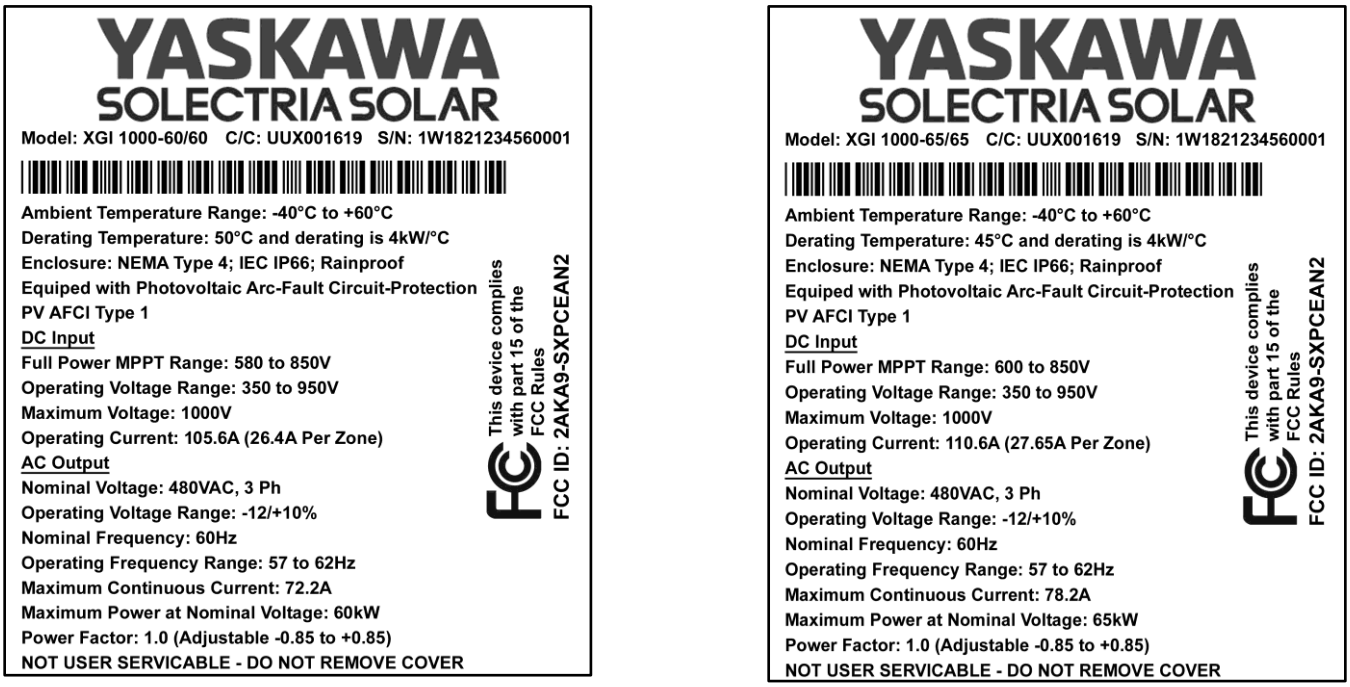


Figure 2-7 Example Power Head Labels for SOLECTRIA XGI 1000-60/60 (Left) and SOLECTRIA XGI 1000-65/65 (Right)

The label on the Wiring Box shows the ratings for the fuses and enclosure (Figure 2-8).

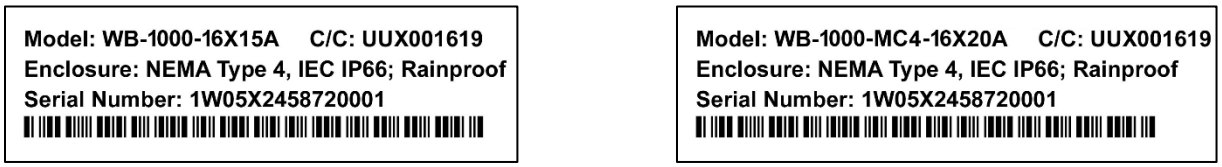


Figure 2-8 Example Wiring Box Labels for Standard Wiring Box with 15A Fuses (Left) and MC4 Wiring Box with 20A Fuses (Right)

3. Installation

3.1 Installation Sequence

1. Install the mounting bracket in the desired location.
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. Ensure that the Power Head connects fully to the Wiring Box.
5. Confirm that the site AC breaker is set to OFF.
6. Remove the cover of the Wiring Box and the plastic shields.
7. Land the AC conductors from the grid in the Wiring Box to the AC terminal block.
8. 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 3.5.5 for more details.
9. Land the communication conductors.
10. Replace the plastic shields and the cover of the Wiring Box.
11. Connect the antenna to the Power Head using the 90 degree coaxial connection.

3.2 Mounting the Inverter

3.2.1 Inverter Dimensions and Spacing

The dimensions of the inverter are shown in Figure 3-1.

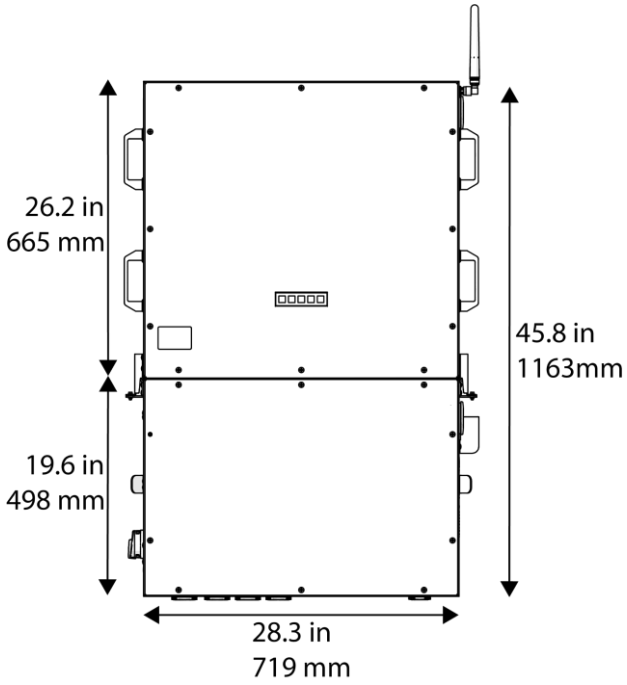


Figure 3-1 Inverter Dimensions

Space the inverters no closer than shown in Figure 3-2 for thermal exhaust and wiring clearance. Keep this area free from debris, plants, and other obstructions.

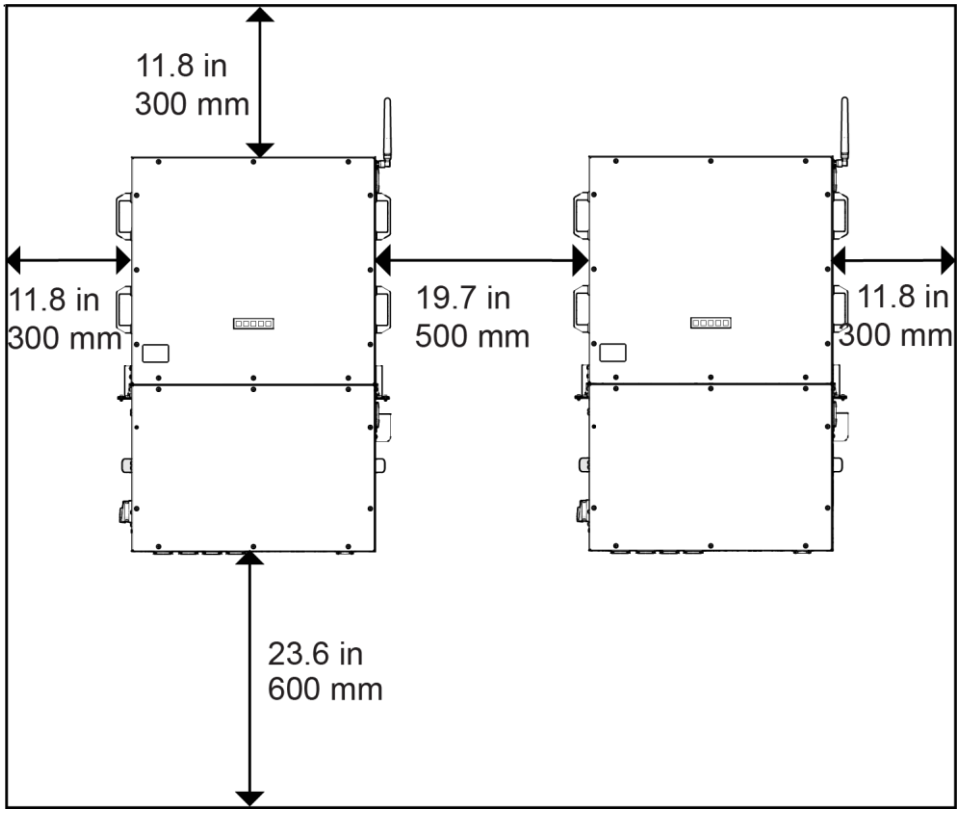


Figure 3-2 Inverter Minimum Spacing

3.2.2 Mounting

Mount the bracket to a flat surface capable of supporting 186 lbs. (84.4 kg). Acceptable surfaces include concrete, drywall, or other nonflammable surface as long as they can support the weight specified. Structural integrity of the mounting surface is the responsibility of the installer.

The Mounting Bracket comes in three pieces. Align the holes at the center of the top and bottom pieces with the studs on the middle piece. Use the four nuts to connect the pieces and tighten them. See Figure 3-3.

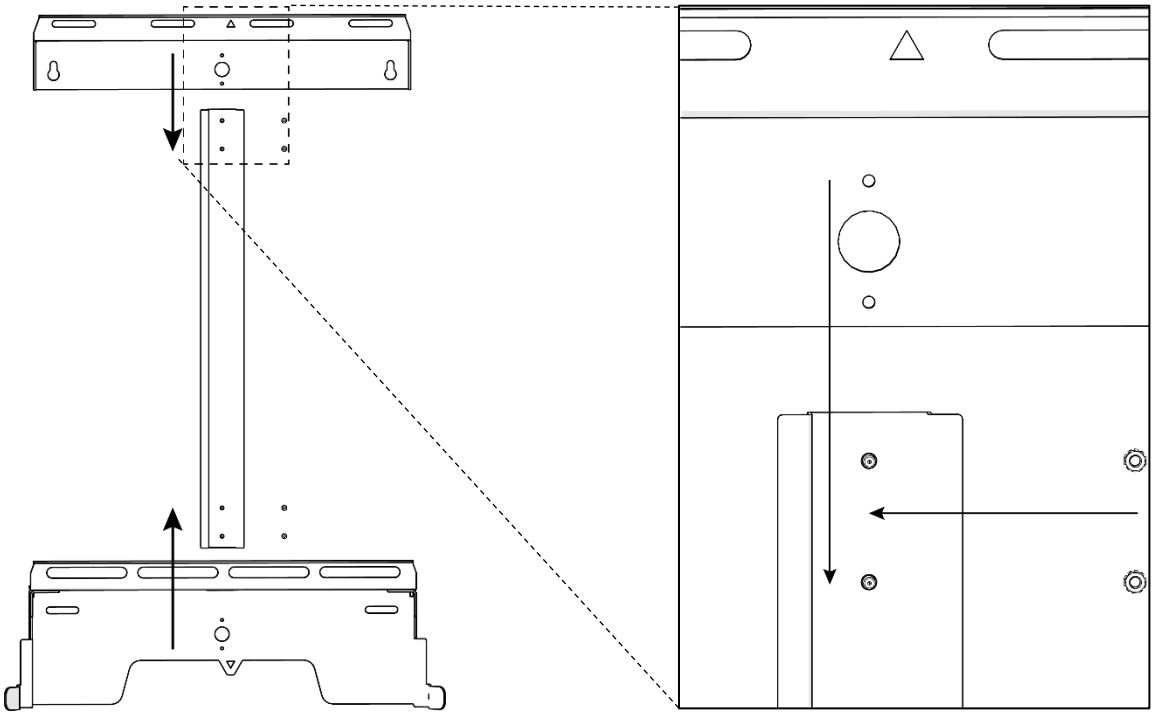


Figure 3-3 Bracket Assembly

Use M10 or 7/16 in. bolts to attach the mounting bracket to the mounting surface. Use 4 bolts corresponding to the holes shown in Figure 3-4. In the background, the inverter is visible in gray for alignment purposes. The top of the mounting bracket is 19.7 in (502 mm) below the top of the inverter. Torque the bolts as necessary to support the weight, depending on the material of the mounting surface.

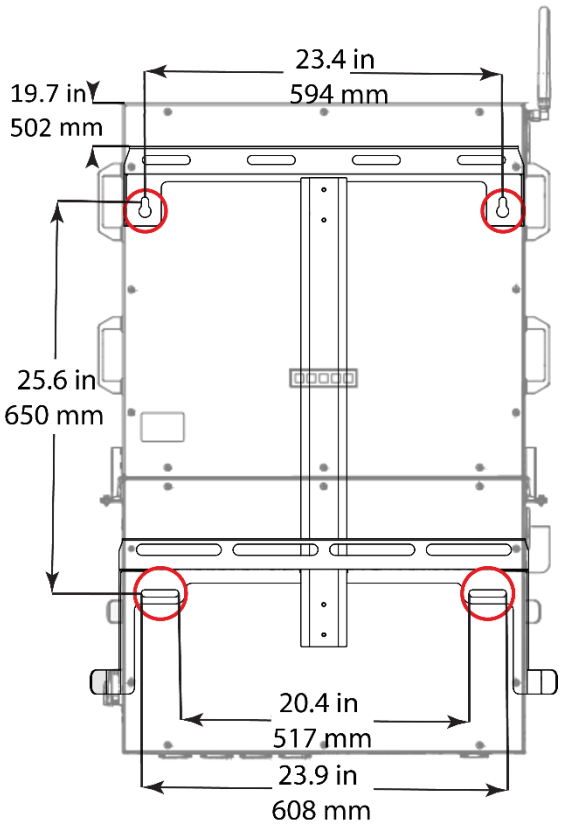


Figure 3-4 Mounting Bracket

Place the Wiring Box onto the Mounting Bracket and use 2 of the M6 bolts to attach them. The holes are located on the sides of the Wiring Box and Mounting Bracket, as shown in Figure 3-5. Torque the connections to 40 in-lbs. (4.5 N-m).

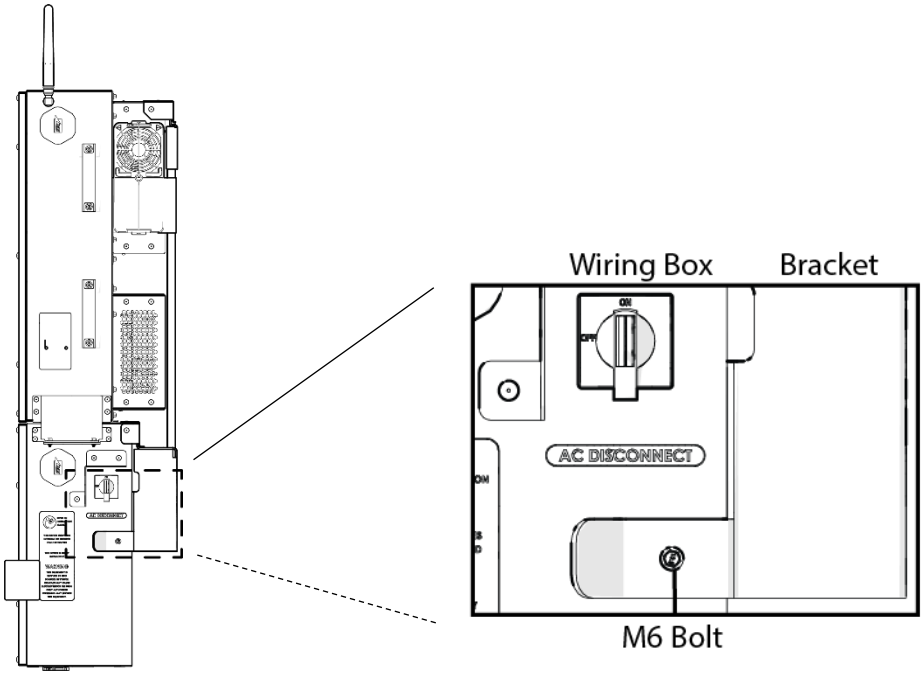


Figure 3-5 M6 Connecting Bolt (Right Side Shown)

Install the remaining M6 bolt to the bottom of the Wiring Box for the Auxiliary Equipment Grounding Connection as shown in Figure 3-6.

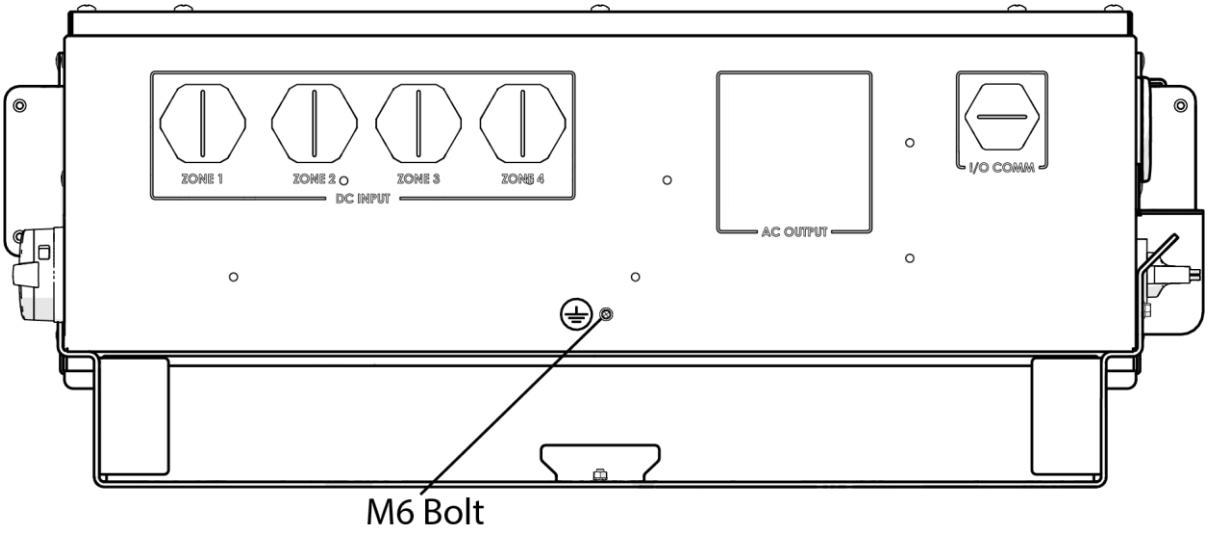


Figure 3-6 M6 Ground Connection Bolt

⚠ 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.

Place the Power Head on top of the Wiring Box. Position the Power Head so that it aligns with the Wiring Box. The Power Head will slide into place, using the metal guide pins to align with the Wiring Box. Use the four M5 bolts to connect the Power Head to the Wiring Box as shown in Figure 3-7. Use two screws on the left side and the other two screws on the right side. Torque the connections to 20 in-lbs. (2.3 N-m).

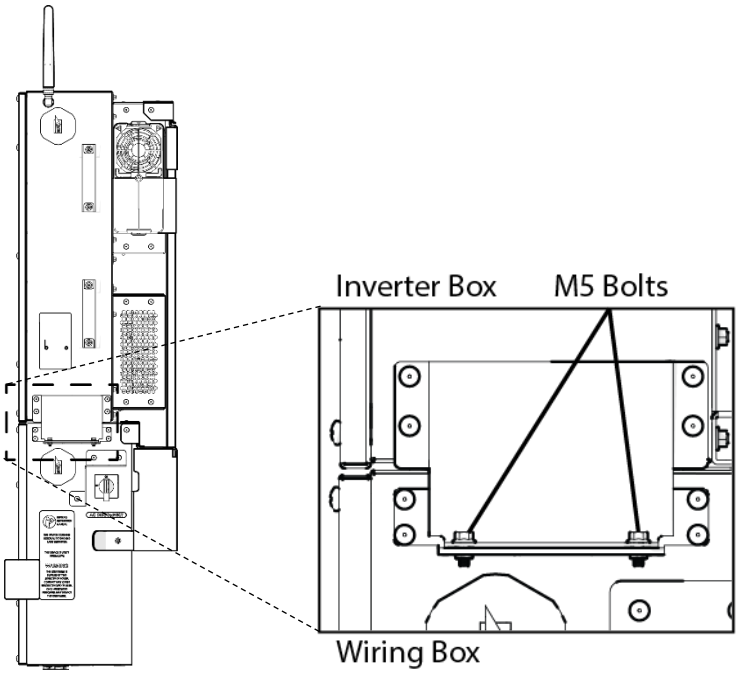


Figure 3-7 M5 Connecting Bolts (Right Side Shown)

3.3 Wiring

3.3.1 Tools Needed for AC and DC Connections

- 3/16 in or 4.75mm slot torque driver (AC Connections)
- #2 Phillips-head torque driver (DC + and – Connections)
- Multimeter (AC and DC Connections)

3.3.2 Power Connections

Use 90°C minimum rated conductors. Connections are rated for both 75°C and 90°C terminal temperatures. With longer wire runs, the use of larger conductors than those required by Code can help minimize voltage drop.

3.3.3 Remove Cover on Wiring Box

Use a #2 Phillips-head screwdriver to remove the 10 screws from the cover of the Wiring Box in the location, as shown in Figure 3-8.

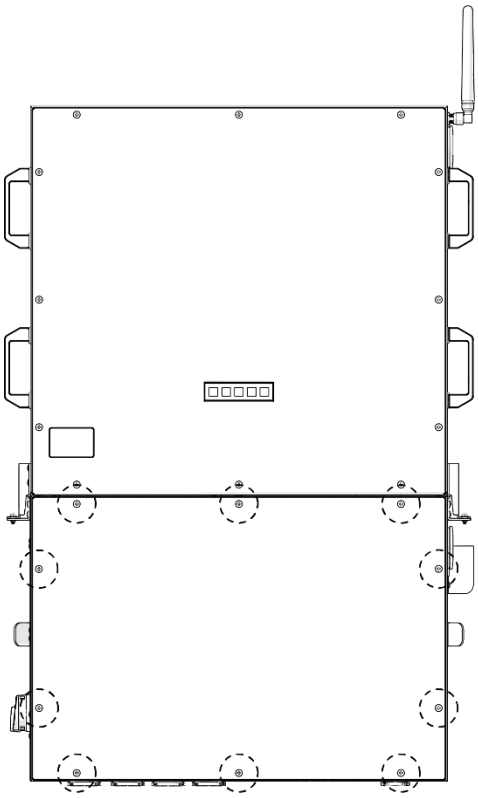


Figure 3-8 Remove Wiring Box Screws

3.3.4 Remove Plastic Shields

The Plastic Shields are a safety feature to protect the user from hazardous conditions when the inverter is running. These must be removed prior to landing the AC and DC conductors in the Wiring Box.

Remove the DC plastic shield, shown in blue in Figure 3-9.

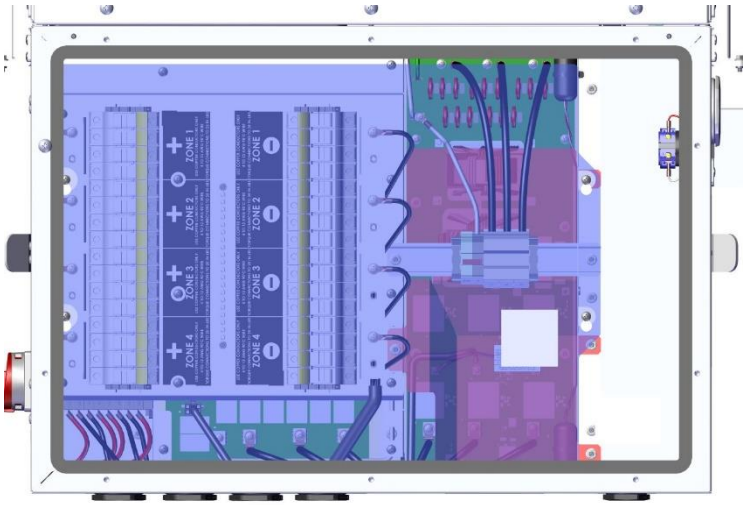


Figure 3-9 Wiring Box with Cover Removed

Remove the AC plastic shield, shown in red in Figure 3-10.

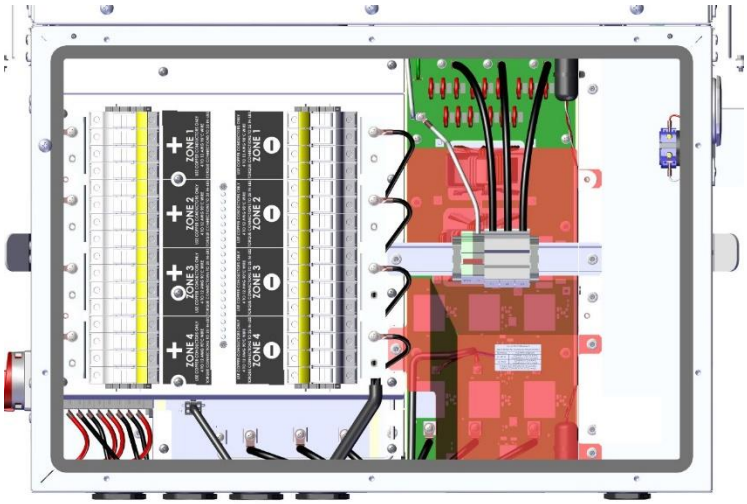


Figure 3-10 Wiring Box with Cover and DC Shield Removed

The Wiring Box will now have all connections available for wiring. See Figure 3-11 for locations of all connections.

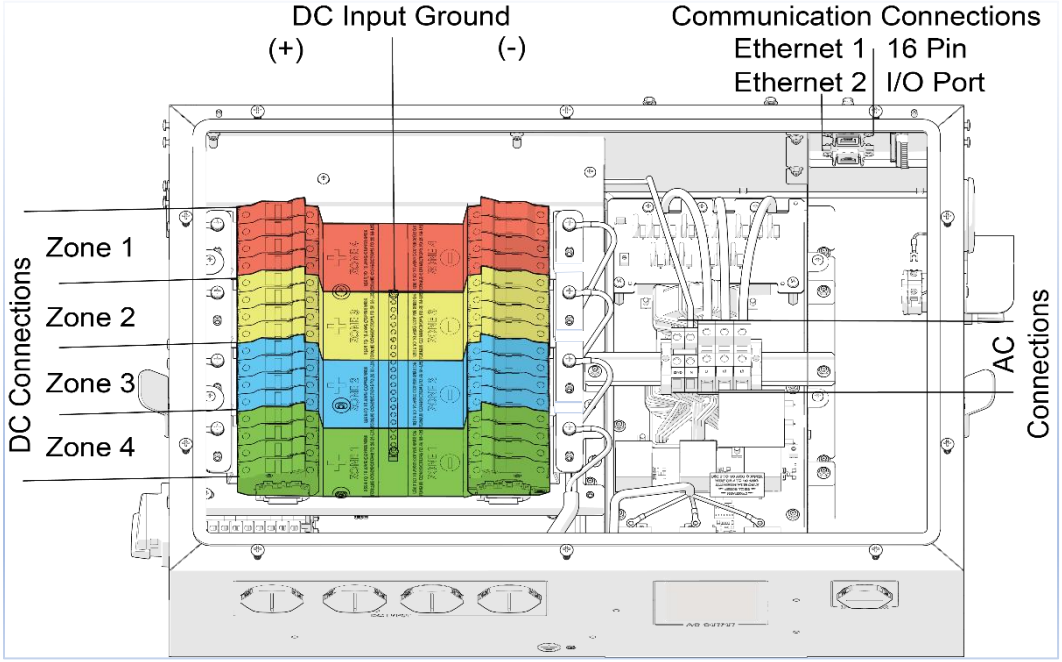


Figure 3-11 Wiring Box Connections

3.4 AC Connection

Turn the AC Switch OFF before wiring. The switch is located on the right side of the wiring box, see Figure 2-3.

⚠ WARNING	**Turn AC Switch to OFF** Verify the absence of AC voltage.

3.4.1 Transformer Configurations

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 transformer that has a grounded Wye configuration on the inverter side (see Figure 3-12 for correct configuration and Figure 3-13 for incorrect configuration). The neutral conductor is used by the inverter for voltage sensing and does not carry current. Therefore, the size of the neutral conductor may be reduced to the same size (not smaller) as the EGC. Acceptable service configurations are depicted in Figure 3-12.

It is permissible to connect the neutral terminal of the inverter to ground inside the inverter wiring box through the use of a jumper. In this configuration, no neutral conductor is required. If terminated properly this connection will not impact the function of the inverter or create an unsafe condition. Ultimate approval of such configuration lies with the authority having jurisdiction (AHJ).

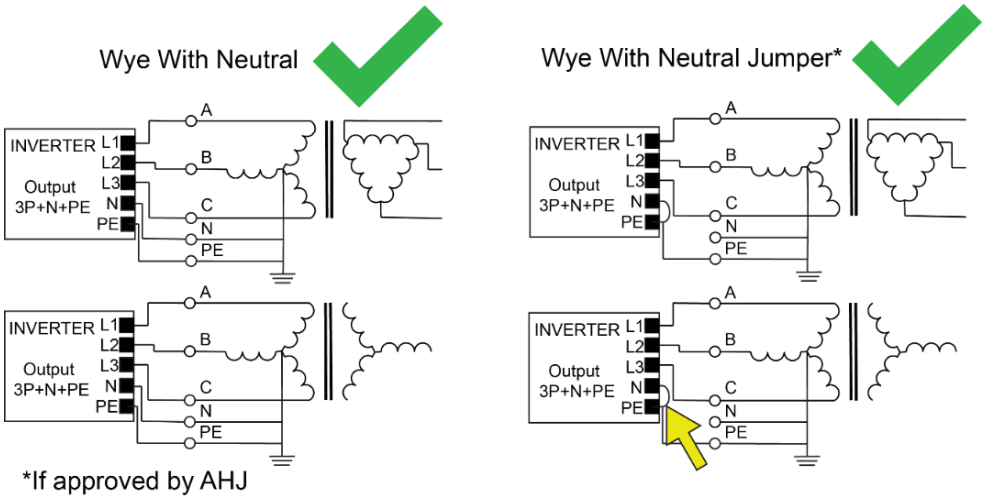


Figure 3-12 Permitted Transformer Configurations

A jumper between Ground and Neutral may be used if:

- Use of a jumper is approved by the AHJ (required)
- There is no accessible Neutral wire

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 void the warranty.

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

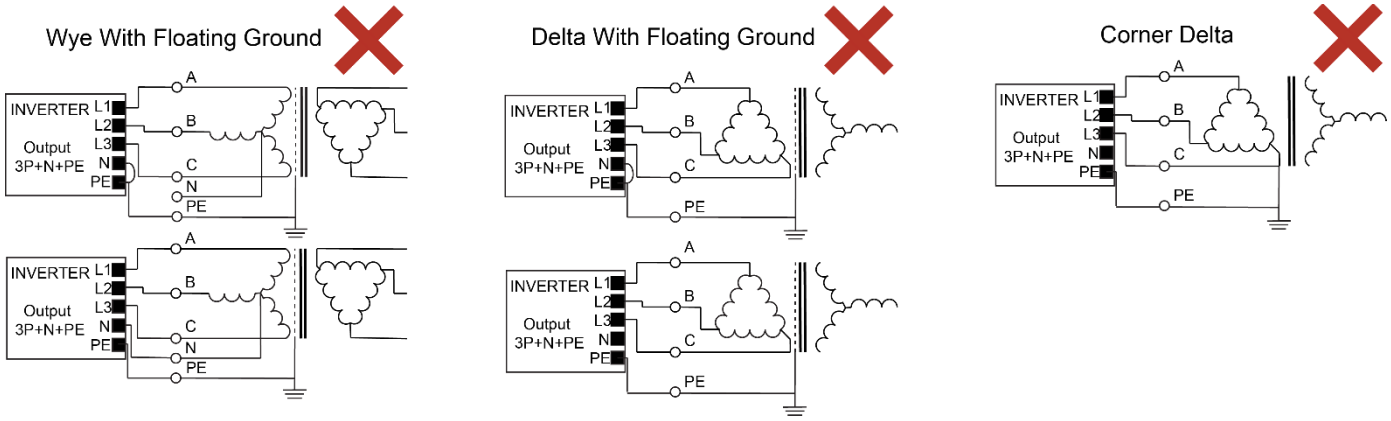


Figure 3-13 Transformer Configurations Not Permitted

3.4.2 AC Connection Specifications

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 3-1in addition to local electrical codes.

Table 3-1 AC Connection Specifications

	Wire Material	Standard Wiring Box	Large AC Terminal (-L) Wiring Box
AC output (L1, L2, L3) conductors	Copper	3 to 1/0AWG (26.7 to 50 mm^2)	3 to 3/0AWG (26.7 to 85 mm^2)
	Aluminum	1 to 1/0 AWG (42.4 to 50 mm^2)	1 to 3/0 AWG (42.4 to 85 mm^2)
Neutral (Not a current carrying conductor: Can be sized equal to or larger than the EGC)	Copper	8 to 4 AWG (8.4 to 21.2 mm^2)	6 to 1/0 AWG (13.3 to 50 mm^2)
	Aluminum	6 to 4 AWG (13.3 to 21.2 mm^2)	6 to 1/0 AWG (13.3 to 50 mm^2)
Equipment Grounding Conductor (EGC)	Copper	8 to 4 AWG (8.4 to 21.2 mm^2)	6 to 1/0 AWG (13.3 to 50 mm^2)
	Aluminum	6 to 4 AWG (13.3 to 21.2 mm^2)	6 to 1/0 AWG (13.3 to 50 mm^2)

⚠ DANGER	**Electric Shock Hazard** Components with hazardous voltage and energy can electrocute the operator. Ensure that AC power does not flow into inverter. Verify with a multimeter.

Turn AC Switch OFF before wiring. Wire the AC Connections as shown below. Torque all AC connections according to Table 3-2 with the 3/16 in (4.75mm) slot torque driver, as shown in Figure 3-14.

Table 3-2 AC Torque Specification

	Phase Wires	Ground	Neutral
Standard Wiring Box	25 in-lbs (2.8 N-m)	25 in-lbs (2.8 N-m)	25 in-lbs (2.8 N-m)
Large AC Terminal (-L) Wiring Box	80 in-lbs (9.0 N-m)	25 in-lbs (2.8 N-m)	25 in-lbs (2.8 N-m)

When using aluminum conductors it is important to prepare the conductors properly to prevent oxidation. Follow the steps below to prepare and landing the wires one wire at a time.

a) Remove the oxidation from the connection area of the aluminum conductors.
b) Immediately apply neutral dielectric grease, such as Noalox, and connect the cable to the terminal.
c) If the connection is not made within 30 seconds of applying the grease, repeat this process as an oxidized layer may have formed on top of the conductor. This oxidized layer is a poorer conductor than the greased aluminum.

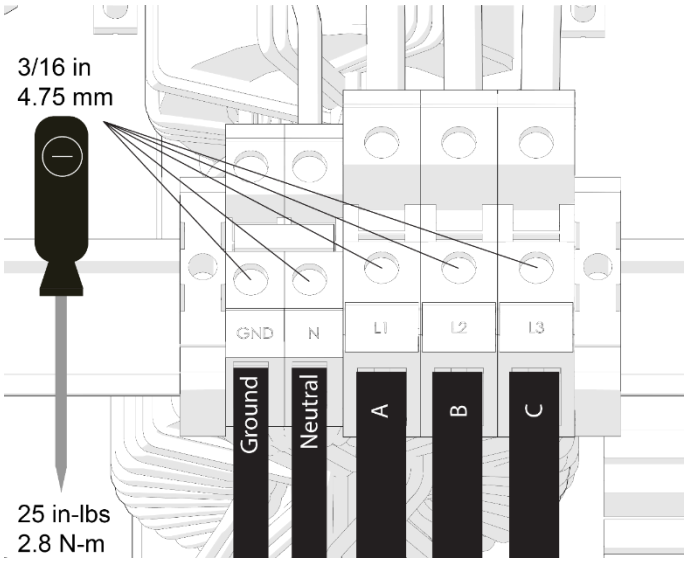


Figure 3-14 AC Connections

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 void the warranty.

3.4.3 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
AC Breaker Size	100 A (3 pole)	100 A (3 pole)	100 A (3 pole)	100 A (3 pole)

3.5 DC Connection

3.5.1 MPPT Zones

The SOLECTRIA XGI 1000 inverter is equipped with four separate MPPT 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 3-11 for a detailed layout of the wiring compartment.

The SOLECTRIA XGI 1000 is capable of operating with all MPPT zones tracking independently (Individual Mode) or in unison (Parallel Mode). Individual Mode provides design flexibility when dealing with different array orientations, shading, or string sizing. Parallel mode can be used when all strings connected to the inverter are of similar lengths. In some circumstances parallel mode may allow the designer to maximize the DC/AC ratio.

The SOLECTRIA XGI 1000 wire box must be ordered from the factory pre-configured in either Individual Mode or Parallel Mode. This is not field configurable. SOLECTRIA XGI 1000 powerheads are field configurable using the HMI during commissioning.

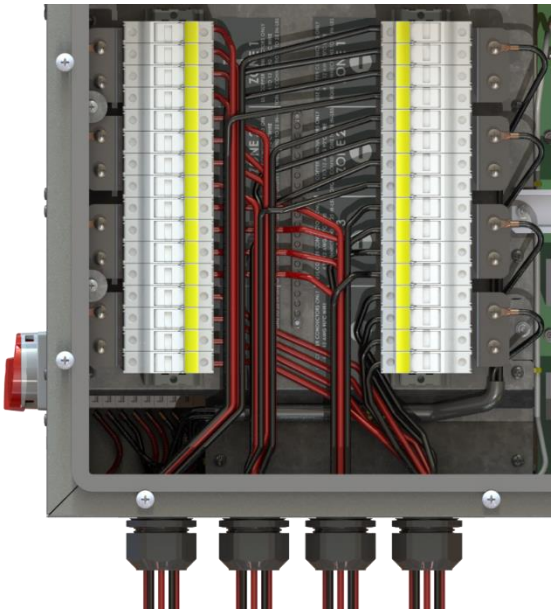


Figure 3-15 Wiring from Modules to Inverter Directly

3.5.2 String Sizing

NOTICE	**DC Overload** Exceeding the recommended DC to AC ratio may cause damage to the unit, and will void the warranty. Size strings according to information in this section and the applicable codes.

Each zone has four inputs, each with a positive and negative side. Connect the same number of PV modules in each string landed in the same zone. Use the string sizing tool (https://solectria.com/support/string-sizing-tool/) as a guide to help determine appropriate string lengths. It is the responsibility of the system designer to perform all string sizing calculations to ensure proper operation and code compliance.

3.5.2.1 Parallel Mode

For factory configured Parallel Mode installations, perform the calculations based on the total inverter nameplate power rating. With a maximum DC/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** Note that for any application that may experience higher than 1000 W/m^2 on a regular basis, a smaller DC/AC ratio is recommended

The Maximum Short Circuit Current (Isc rating of all strings multiplied by 1.25) must be less than 180 A for Parallel Mode (Equation 3.2).

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

$$\sum \boldsymbol{I_{SC}} * \mathbf{1.25} \leq \mathbf{180}\boldsymbol{A} \quad \text{(Parallel Mode)} \quad \textbf{(3.2)}$$

3.5.2.2 Individual Mode

For factory configured Individual Mode. The maximum DC/AC ratio in Individual 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** Note that for any application that may experience higher than 1000 W/m^2 on a regular basis, a smaller DC/AC ratio is recommended

The Maximum Circuit Current (combined Isc rating of all strings in the MPPT zone multiplied by 1.25) must be less than 50A (Equation 3.3).

$$\sum \boldsymbol{I_{SC}} * \mathbf{1.25} \leq \mathbf{50A} \quad \text{(Individual Mode)} \quad \textbf{(3.3)}$$

NOTICE	**DC/AC Ratio and Current Limits** Both DC/AC ratio and current limits must be observed. Failure to meet these requirements may result in damage and void the warranty.

3.5.2.3 String Mismatch

To ensure optimal performance the number of modules per string should be equal within a given MPPT zone (Individual Mode) or across all zones (Parallel Mode). Individual Mode and Parallel Mode must be specified when ordering the wiring box.

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.

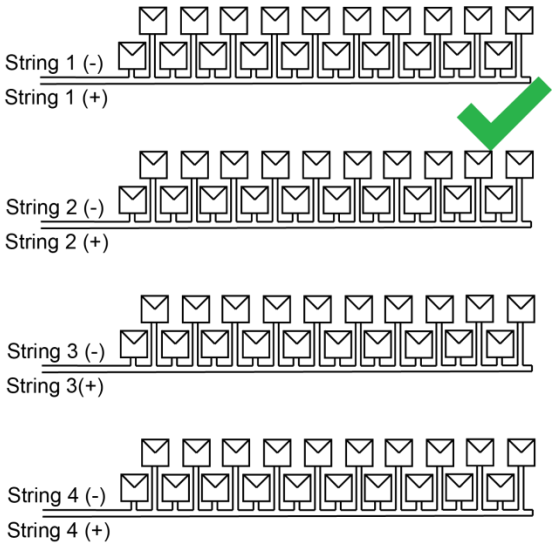


Figure 3-16 Matched String Sizes within a Zone or Inverter

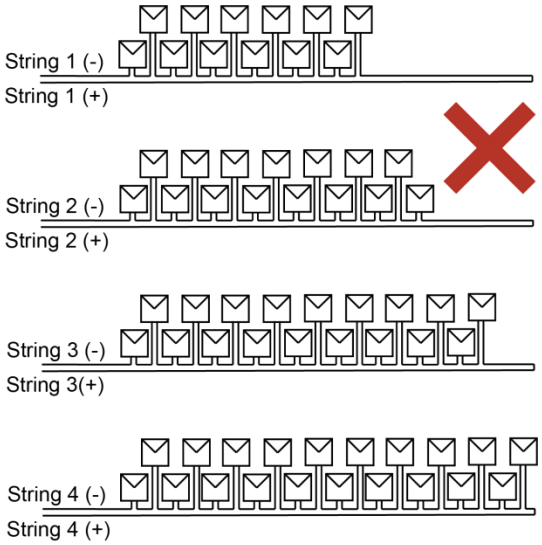


Figure 3-17 Mismatched String Sizes within a Zone Zone or Inverter

3.5.3 DC Connection Specifications

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

Table 3-4 DC Input Specifications

DC Input	XGI 1000-60/60	XGI 1000-60/65	XGI 1000-65/65
Maximum Power Input Voltage Range	580-850 VDC	600-850 VDC	600-850 VDC
Operating Voltage Range (MPPT)	350-950 VDC	350-950 VDC	350-950 VDC
Maximum Operating Input Current	105.6 A (26.4 A per zone)	105.6 A (26.4 A per zone)	110.6 A (27.65 A per zone)
Maximum Operating PV Power (per MPPT zone)*	15.3 kW	15.3 kW	16.6 kW
Maximum Rated PV Input (per MPPT zone)*	22.5 kW	22.5 kW	24.4 kW
Absolute Maximum Input Voltage	1000 VDC	1000 VDC	1000 VDC
Number of MPP Tracking Zones**	4 / 1	4 / 1	4 / 1
Number of PV Source Circuits (Fused Inputs)	4 per MPPT zone; 16 total	4 per MPPT zone; 16 total	4 per MPPT zone; 16 total
Maximum PV Current (Isc x 1.25) per zone/single zone	50 A/180 A	50 A/180 A	50 A/180 A
Maximum Recommended DC-to-AC Ratio	1.5	1.5	1.5

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

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

Depending on the option purchased, the Wiring Box will come with 15 A or 20 A fuses installed in the fuse holders. See the label on the wiring box for fuse size.

25 A and 30 A fuses can be purchased separately and installed. Use Littelfuse SPF025 for 25 A fuses and SPF030 for 30 A fuses. Note that with 30 A fuses, skip every other fuse position. Yaskawa Solectria Solar does not sell these fuses.

3.5.4 Wiring DC Conductors

DANGER	**Electric Shock Hazard** Components with hazardous voltage and energy will electrocute operator. Verify the absence of DC voltage and current.

WARNING	**Turn DC Disconnect to OFF** Verify the absence of DC voltage and current.

WARNING	**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.

NOTICE	**Use Correct Fuses** Make sure to size the fuses according to all NEC requirements. If using 30 A fuses, skip every other fuse holder – DO NOT place 30 A fuses next to each other.

To connect to the fuse holders, wire connections as shown in Figure 3-18. The positive connections 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.

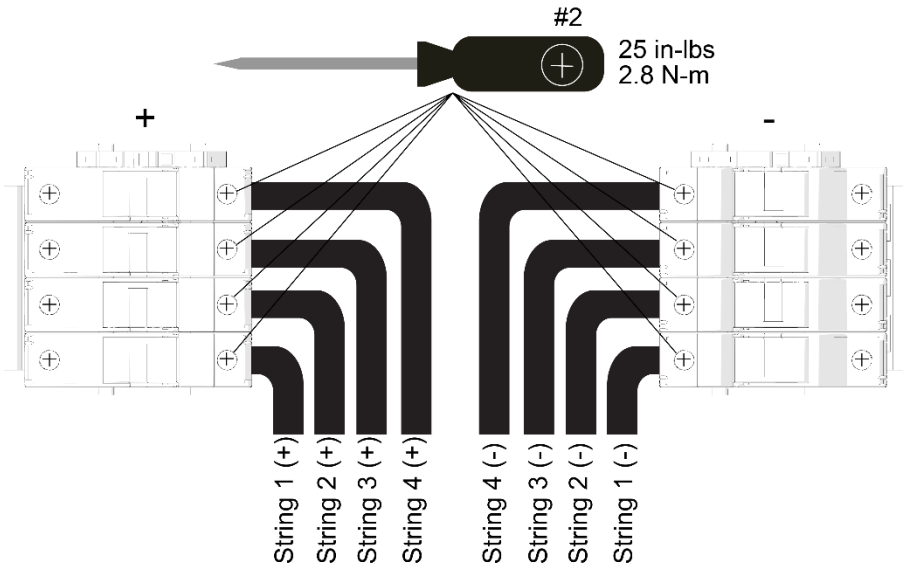


Figure 3-18 DC Connections for Single Zone (Fused Connection)

3.5.5 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 combined output conductors coming from the combiner box must be landed on separate MPPT zone buses. Use proper ring terminals rated for the conductor size and an M6 screw. Use M6 screws as shown in Figure 3 16. Torque connections to 30 in-lbs (3.4 N-m) with a #2 Phillips head torque driver.

NOTICE	**External Combiner Boxes** Use of an external combiner box is prohibited, doing so will result in permanent damage and void the warranty.

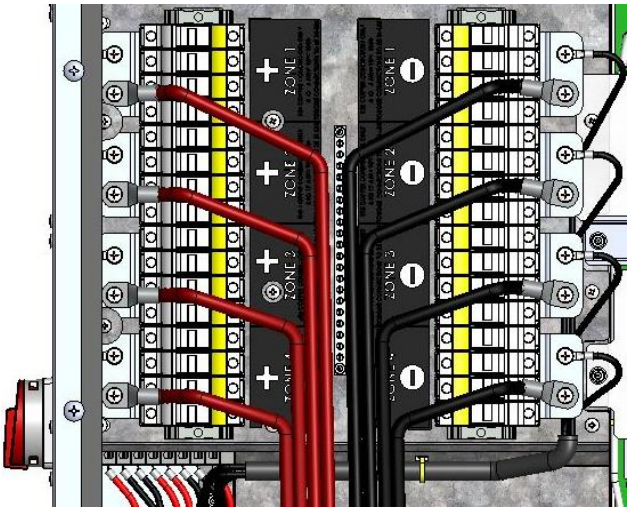


Figure 3-19 DC Connections for Use with Combiner Box

3.6 Communications Connections

3.6.1 Communications Network

Connection to the Internet is strongly recommended for the SOLECTRIA XGI inverter. An internet connection will provide the user with several important features including: automatic firmware updates, remote diagnostics, troubleshooting, and give access for Yaskawa Solectria Solar Technical Support & Service.

The gateway or cellular modem should have a direct Ethernet connection to one inverter in order to benefit from the remote capabilities inherent to the inverter and to receive remote firmware updates. See Figure 3-20. The inverter uses Modbus TCP/IP over Ethernet Cat 6 Shielded cable.

INFO→	**Ethernet Cat 6 Shielded Cable** It is important to use Cat 6 Shielded cable to ensure communication speeds are optimized. Solar PV inverters

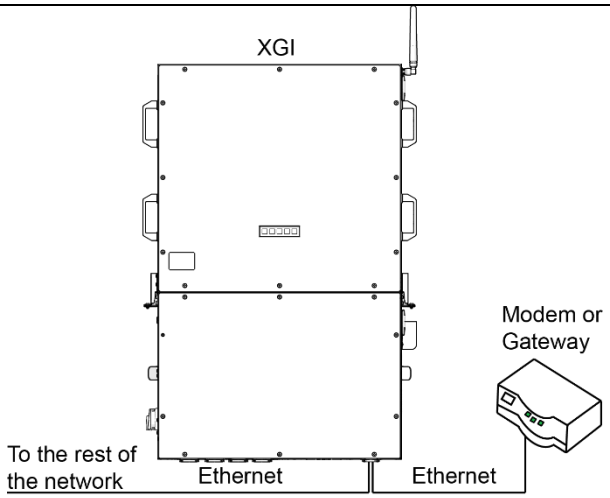


Figure 3-20 Connection to the Gateway

The SOLECTRIA XGI 1000 is compatible with SolrenView and third-party Data Acquisition Systems (DAS). When using SolrenView monitoring no additional hardware is required, every inverter has a built in DAS. Only Ethernet connections are supported for third-party DASs. Figure 3-21 shows a sample network with a DAS and a Weather Station.

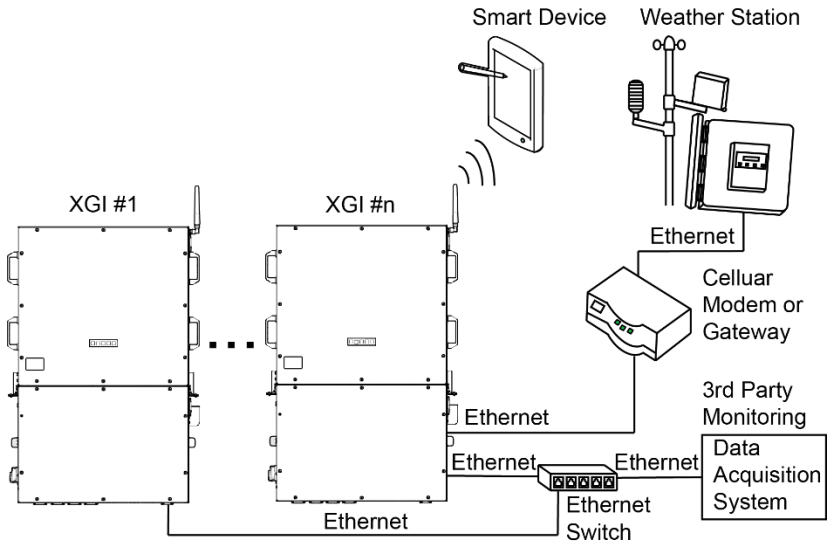


Figure 3-21 Sample Network Configurations with Weather Station and DAS

3.6.2 Connecting Multiple Inverters

To connect multiple inverters together, set up an Ethernet daisy chain (see Figure 3-22), star configuration using Ethernet switches, or a tree configuration (mixed network) (see Figure 3-23).

- The maximum number of inverters in any single daisy chain is 50 inverters.
- When using star configuration architecture, the maximum number of inverters from one end of a daisy chain to the end of any other daisy chain must not exceed 50 inverters.

Use a shielded Cat6 cable with max length 328 ft. (100m) for all ethernet connections.

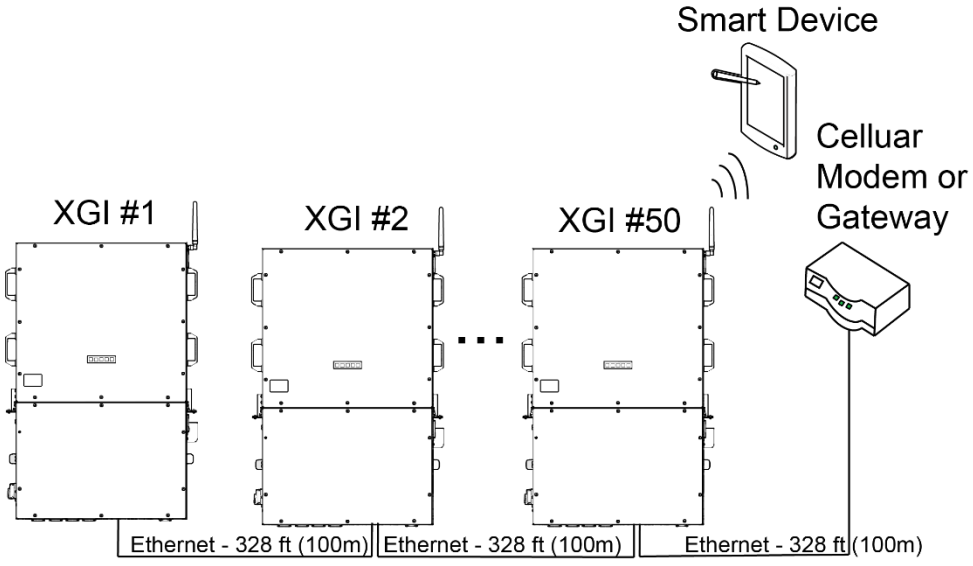


Figure 3-22 SOLECTRA XGI Inverters Connected with Ethernet Daisy Chain

In a star configuration, up to 100 inverters can be connected. Mixed networks can support up to 100 inverters providing none of the individual daisy chains contain more than 50 inverters. If longer distances are required, fiber optics can be used with an appropriate switch.

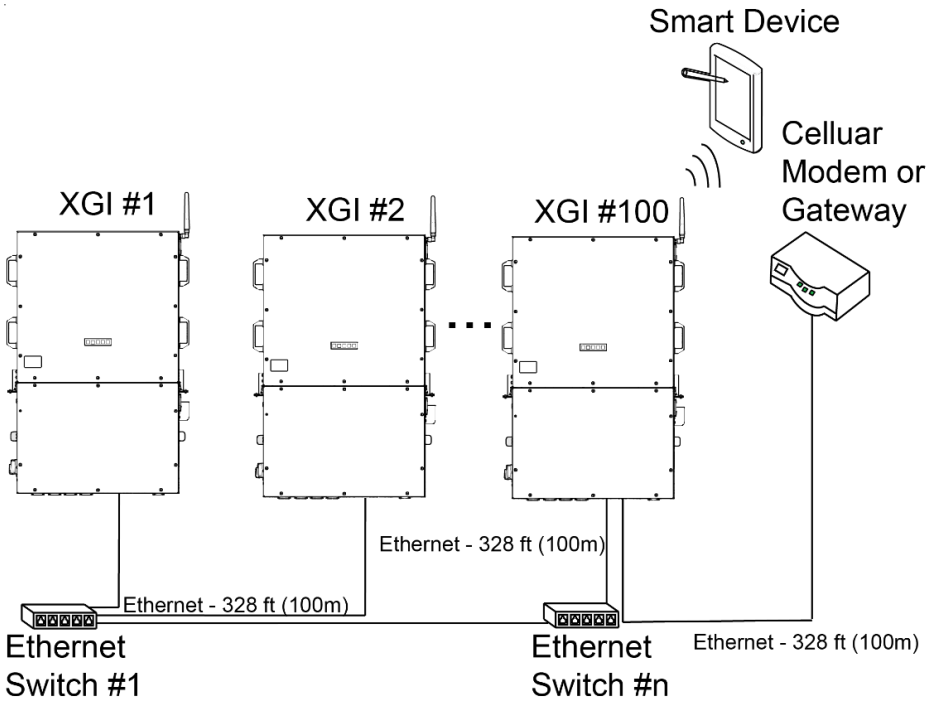


Figure 3-23 SOLECTRIA XGI Inverters Connected with Ethernet Switches in a Star Configuration

3.6.3 Connector and Ports

The SOLECTRIA XGI has a 16–pin I/O port with connector and 2 interchangeable Ethernet Ports (see Figure 3-24).

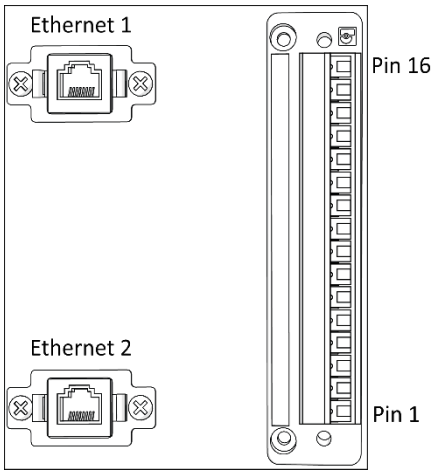


Figure 3-24 Communications Connections and Ports: 2 Ethernet Ports (Left) and 16 Pin I/O Port with Connector (Right)

Table 3-5 Pin Map for 16 Pin I/O Connector

Pin	Input/ Output	Function	Description/Notes
1 - 6	Reserved		
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	Reserved		
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 3-6 Connection Specifications for 16 Pin I/O Connector

Wire Size	28-16 AWG (0.08-1.5 mm2)
Torque	5 in-lbs. (0.56 N-m)
Torque Screwdriver Size	5/64 in. (2 mm)

3.6.4 Antenna Mounting

Mount the antenna as shown in Figure 3-25. The antenna must be oriented vertically.

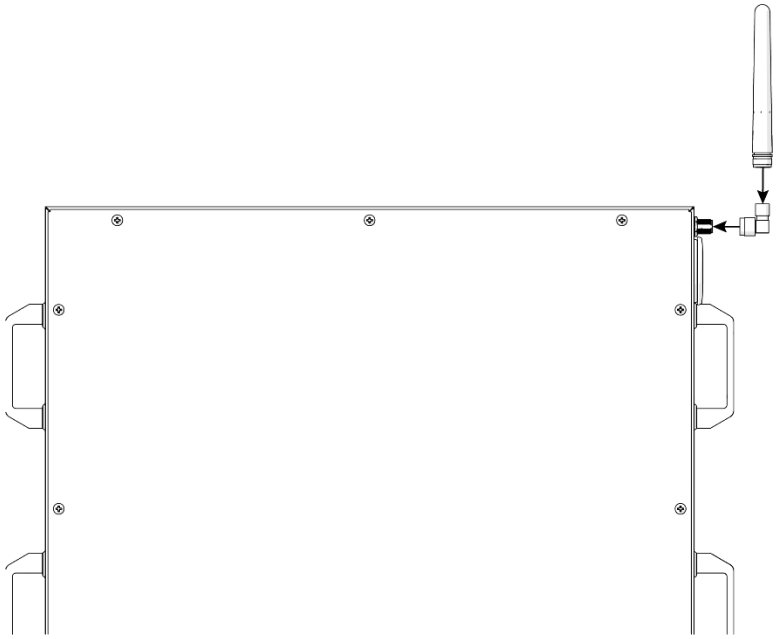


Figure 3-25 Mounting the Antenna

INFO→	**Antenna Angle** The antenna must maintain a vertical orientation regardless of the angle of the inverter.

3.6.5 Third-Party Data Acquisition System (DAS) Connection

NOTICE	**Ethernet Only Connection** The XGI 1000 series inverter only supports Ethernet connections to a 3rd party DAS.

Connect the inverters to a third-party DAS via an Ethernet connection. For sites with daisy-chained inverters, the DAS and the modem or gateway must be at opposite ends of the chain, with all the inverters in the middle. For a star configuration of inverters using Ethernet switches, the DAS should attach to a switch.

Always make sure the gateway or cellular modem has a direct Ethernet connection to one inverter.

3.6.6 Weather Station Connection (Optional)

Only use weather stations that connect using Ethernet. The weather station must connect to the modem or gateway.

3.7 Reseal Wiring Box

3.7.1 Replace Plastic Shields

Replace the AC Shield and then the DC Shield, in the same way they were removed in Section 3.3.4.

3.7.2 Replace Cover

Put the cover back on the Wiring Box. Use a #2 Phillips-head torque driver to tighten the cover screws to 25 in-lbs (2.8 N-m).

INFO→	**Torque to Specified Value** Overtightening the screws may warp the cover or strip the screws.

4. Startup

4.1 Startup Checklist

4.1.1 Mechanical Installation

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

4.1.2 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.

4.1.3 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.

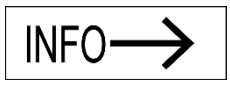
Test the polarity of DC inputs and confirm they are proper. See DC Connections.

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

4.2 Startup Steps for a Single Inverter

	**Electrical Shock Hazard** Installer may come into contact with components that have hazardous voltage and energy potential. Use proper safety equipment when energizing the inverter.

Follow these instructions when turning on a single inverter.

	**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.

5. User Interface

5.1 User Interface Overview

The Status Panel provides inverter status information but does not provide the user the ability to control the inverter. The inverter can be controlled by a laptop computer connected by Ethernet or WiFi, or a smart device such as a smartphone, connected via WiFi.

The User Interface provides the operator a "hands off" means to observe and modify the inverter settings and access the inverter.

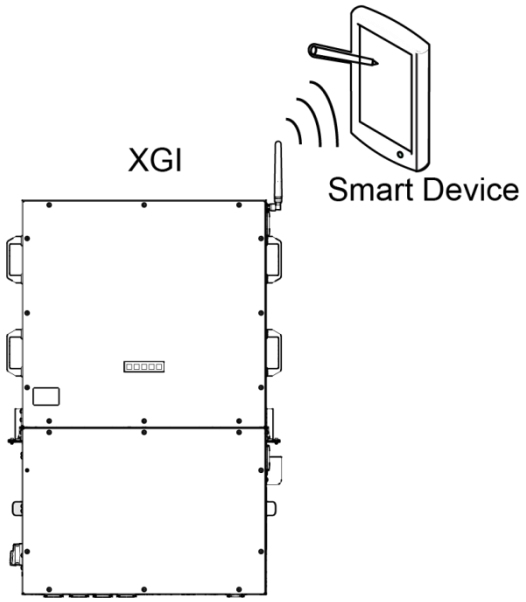


Figure 5-1 Inverter with Smart Device Connected by WiFi

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 3-11).

To access the inverter using WiFi, connect the smart device or laptop to the WiFi network (see Table 5-1 Default Network Credentials for default SSID). Note that the network is not an Internet access point.

Table 5-1 Default Network Credentials

WiFi SSID (default)	Password (Case Sensitive)
XGI-00-006	Solectria

If this network is not visible on the list of networks, bring the smart device or laptop closer to the inverter. The range is up to 75 ft of direct line of site.

By accessing the network, all inverters that are part of the network are accessible.

5.1.1 Inverter List

The Inverter List shows a register of all the inverters linked to the same WiFi network to which the laptop or smart device is connected. These inverters are said to comprise a *cluster*. Each XGI cluster consists of a maximum of 50 or 100 inverters depending upon connection type, see Section 3.6.2. To access the Inverter List, connect to the cluster's WiFi network and then open a browser to "xgi.solar".

The Inverter List displays the names, serial numbers, IP addresses, and status of the inverters registered to the cluster. Below is an example Inverter List and a chart that explains the symbols. Note that the inverter in **bold** is the inverter to which the user is connected.

The Inverter List is separate from the Reference List, which is managed by the customer. Changes to the inverters in the cluster will affect the inverters on the Reference List only. See Sections 5.2.3.6 and Figure 5-33 for how to change and setup the Reference List.

To navigate to a particular inverter, select the name of the inverter by clicking it.

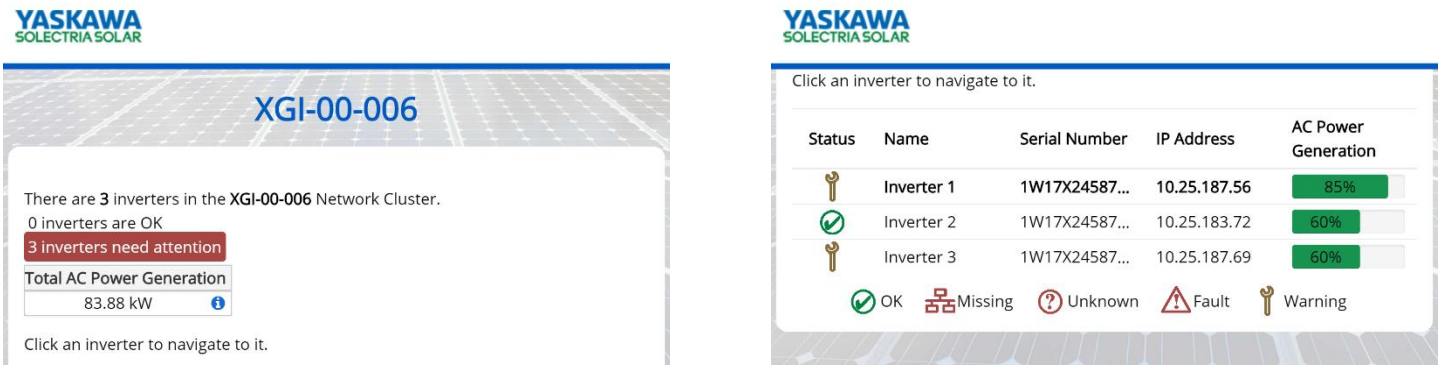


Figure 5-2 Inverter List Example

Table 5-2 Explanation of Symbols in User Interface

Symbol	Explanation
	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.
	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 5-2 Inverter List, several nodes are worth noting.

- **Inverter 1:** This node, indicated in **bold**, is the inverter that the smart device or laptop last accessed and it is operating normally. All other nodes communicate through it.
- **Inverter 2:** This node is an inverter that is operating normally.
- **Inverter 1 and Inverter 3:** These inverters have issues but are still producing power.

For more information regarding diagnosis of communication issues see the Section 7.

5.1.2 Inverter Home Page

Each inverter has a home page (see Figure 5-3) 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 actual inverter.

Figure 5-3 Inverter Home Page (Observer Mode)

Selecting the inverter status icons will give their current state, as shown in Figure 5-4.

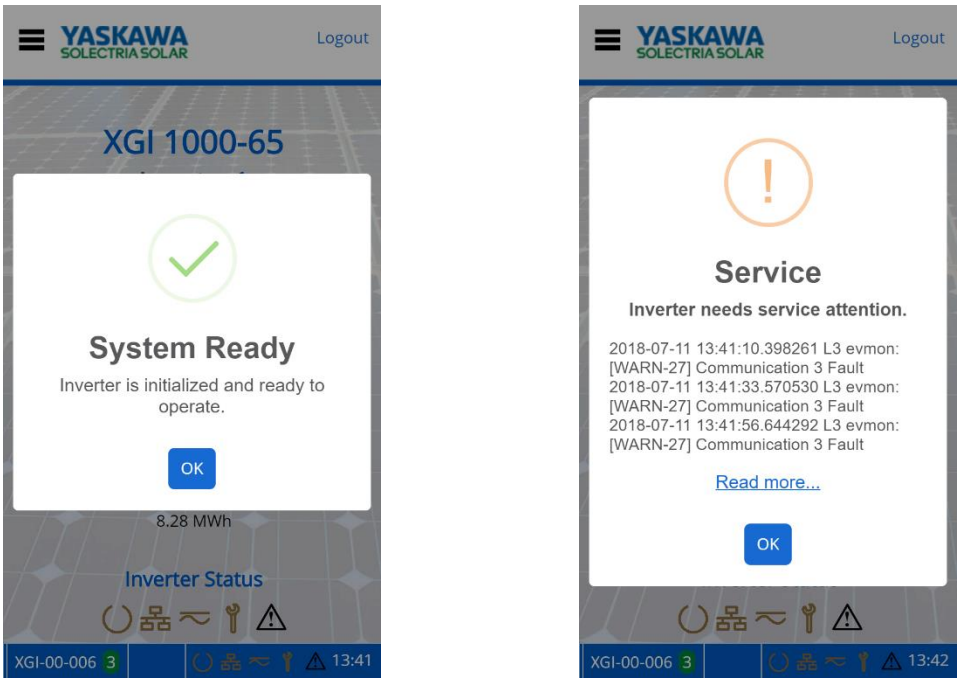


Figure 5-4 Current Status with Network and Communication Working and Maintenance with an Event

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.

5.1.3 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 5-3 shows the credentials needed to login as an *administrator*.

Table 5-3 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 or when the browser is closed for all browsers except Google Chrome. When using the Google Chrome browser, it is recommended that the user intending to log out by closing the browser manually log out before closing the browser.

Figure 5-5 shows the Drop-Down Menu in *observer mode*.

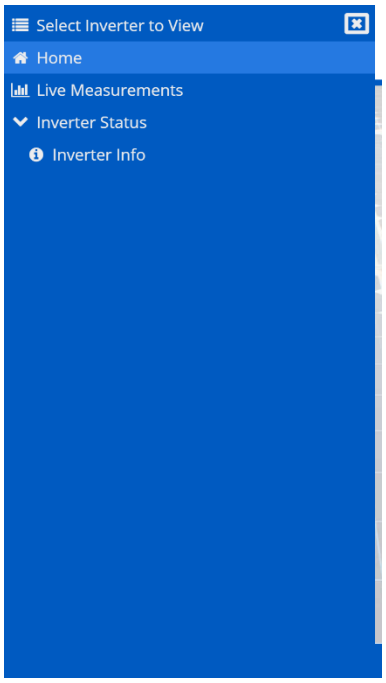


Figure 5-5 Inverter Status Page with Drop-Down Menu (Observer Mode)

5.1.3.1 Inverter Menu

Figure 5-6 shows the top two levels of the inverter menu. Inverter Configuration and its sub-menus are only available in *administrator* mode and are shown in blue. To access the sub-menu items like Inverter Info, select Inverter Status and the sub-menu will appear.

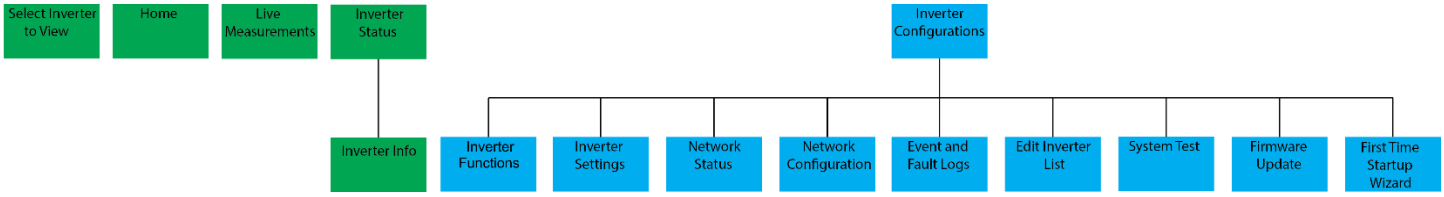


Figure 5-6 Inverter Menu Top Two Levels

The “Select Inverter to View” button returns to the inverter list; the “Home” button returns to the inverter’s home screen (Figure 5-2).

5.2 Menu Screens

5.2.1 Live Measurements

This screen allows a user in either *observer* or *administrator* mode to view the following measurements.

Table 5-4 Live Measurement Menu Structure

Section	Subsection	Measurement
AC Measurements	*Energy*	*Today's Energy*
		Lifetime Energy
	Power	*Active Power*
	Voltage	*A-N*
		B-N
		C-N
		A-B
		B-C
		C-A
	Current	*A*
		B
		C
	Frequency	*Frequency*
DC Measurements	*Power*	*Input 1*
		Input 2
		Input 3
		Input 4
	Voltage	*Input 1*
		Input 2
		Input 3
		Input 4
	Current	*Input 1*
		Input 2
		Input 3
		Input 4
Temperature		*Internal*
		Heat Sink

The DC inputs correspond to the MPPT zones referenced in MPPT Zones.

Live Measurements screenshots are shown in Figure 5-7.

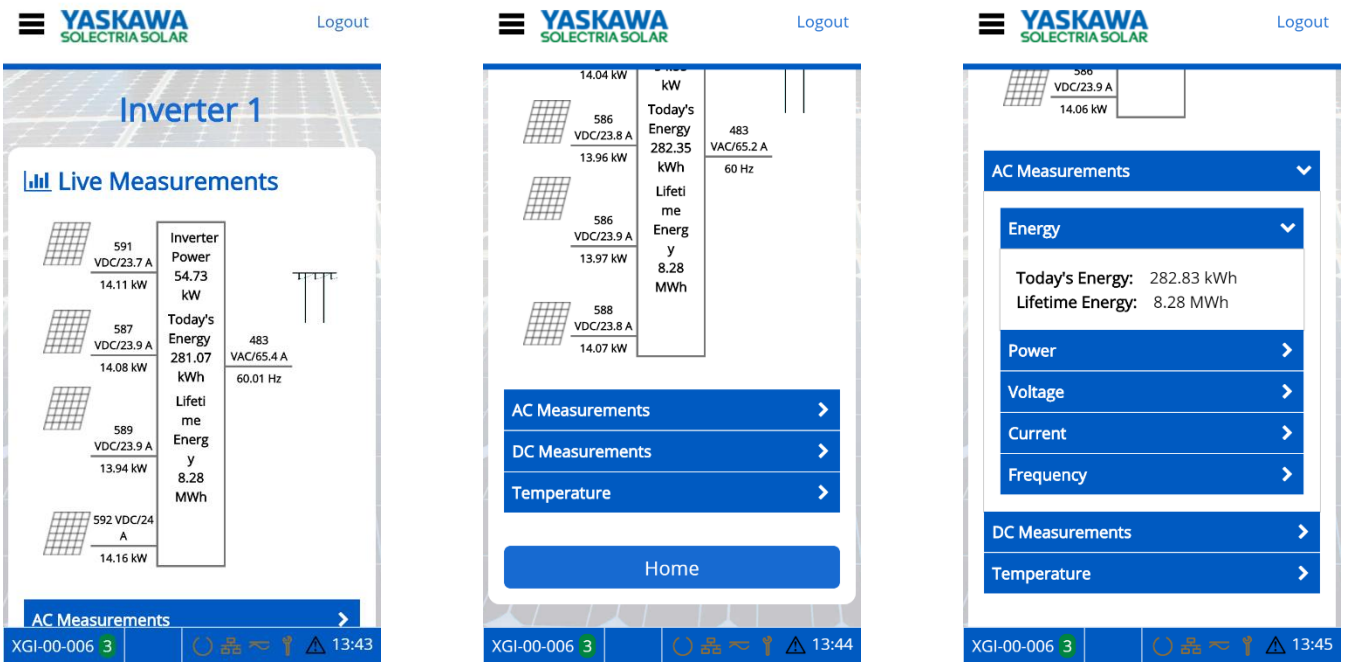


Figure 5-7 Live Measurements

5.2.2 Inverter Status

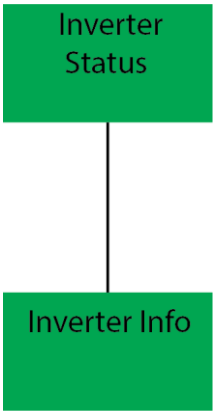


Figure 5-8 Inverter Status Sub-Menu

5.2.2.1 Inverter Info

This screen allows a user in *observer* or *administrator* mode to view critical details about the inverter.

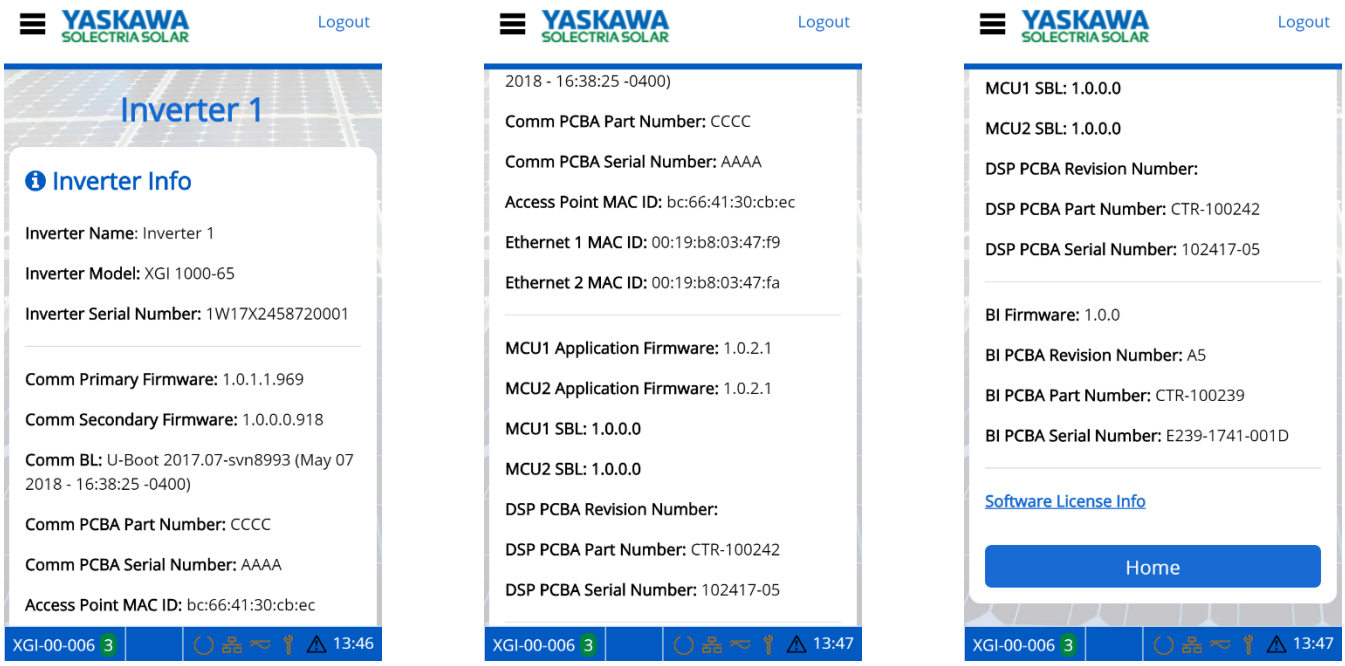


Figure 5-9 Inverter Info Page

5.2.3 Inverter Configurations

Note that for any configuration, if the user attempts to enter a value that is not supported, the user interface will reject the value and show an error message to the right of the value. All Inverter Configuration submenus are only accessible in *administrator* mode.

5.2.3.1 Inverter Functions

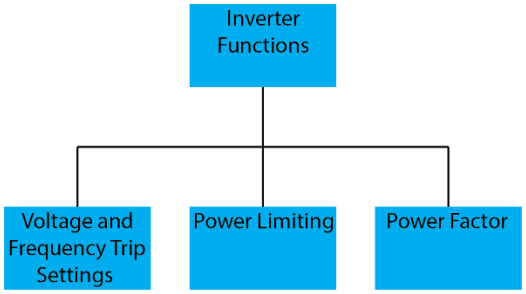


Figure 5-10 Inverter Functions Sub-Menu

5.2.3.1.1 Voltage and Frequency Trip Settings

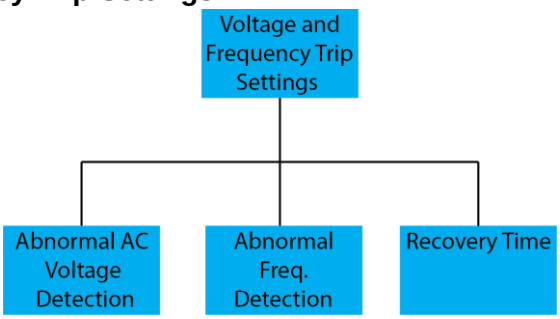


Figure 5-11 Voltage and Frequency Trip Settings Sub-Sub-Menu

5.2.3.1.1.1 Abnormal AC Voltage Detection

This feature allows a user in *administrator* mode to set the ride through trip points for abnormal high and low voltages.

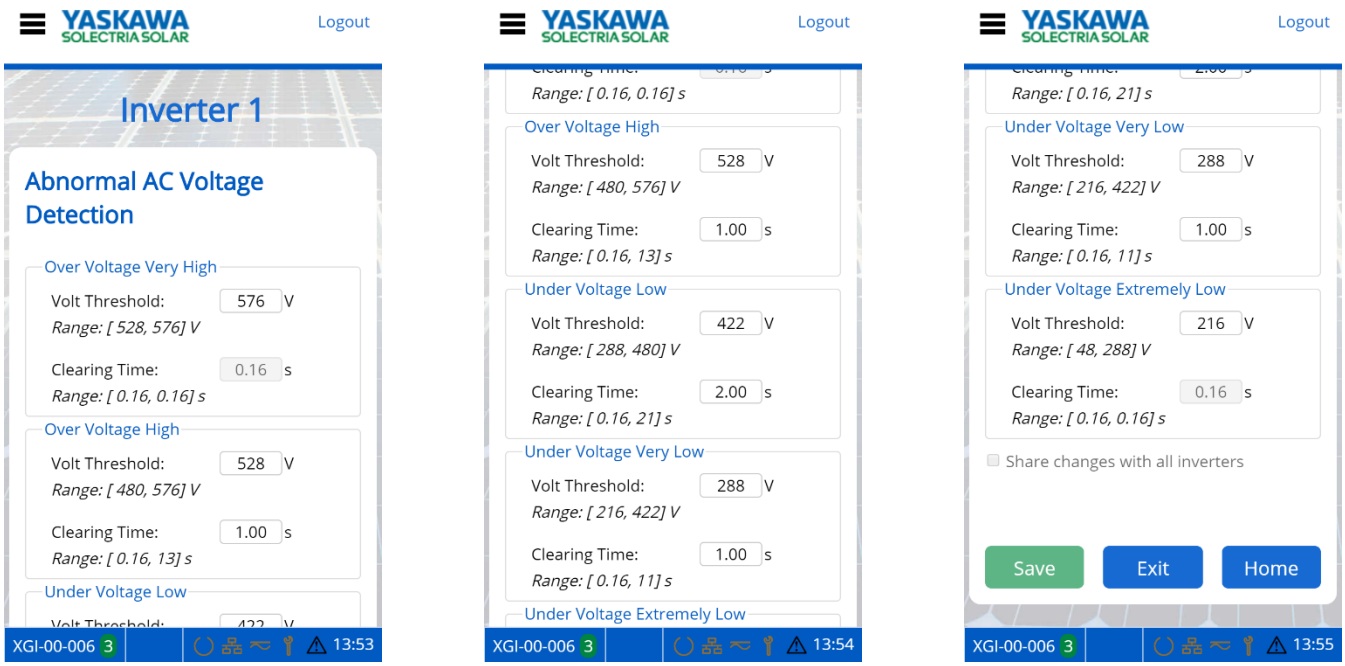


Figure 5-12 Abnormal AC Voltage Detection

5.2.3.1.1.2 Abnormal AC Frequency Detection

This feature allows a user in *administrator* mode to set the trip points for abnormal high and low frequencies.

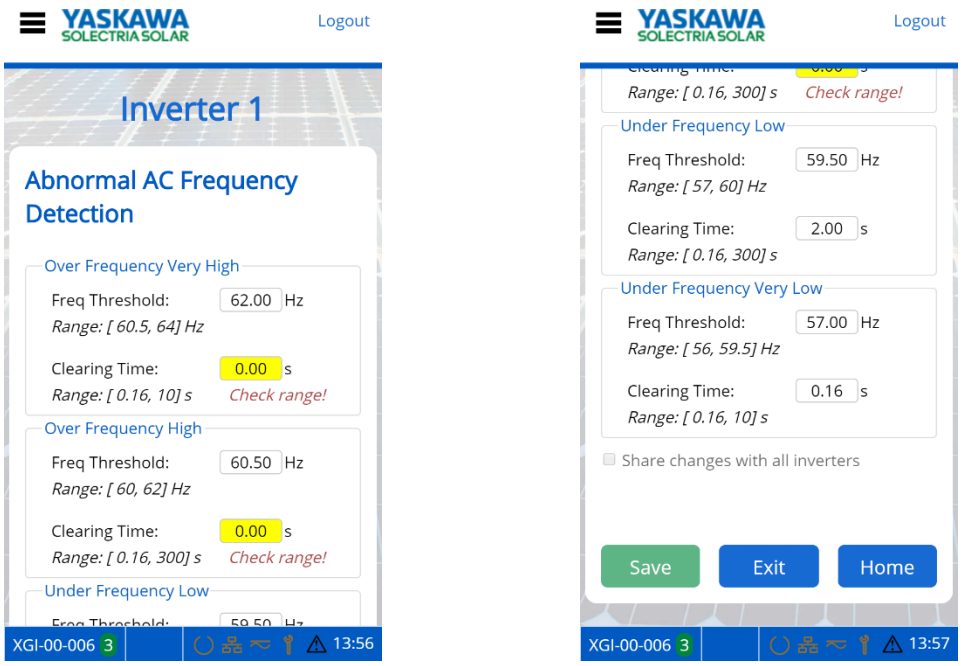


Figure 5-13 Abnormal AC Frequency Detection

5.2.3.1.1.3 Recovery Time

This feature allows a user in *administrator* mode to set the time to recover from an abnormal frequency or voltage event that causes the inverter to trip. Default is 300 s or 5 minutes.

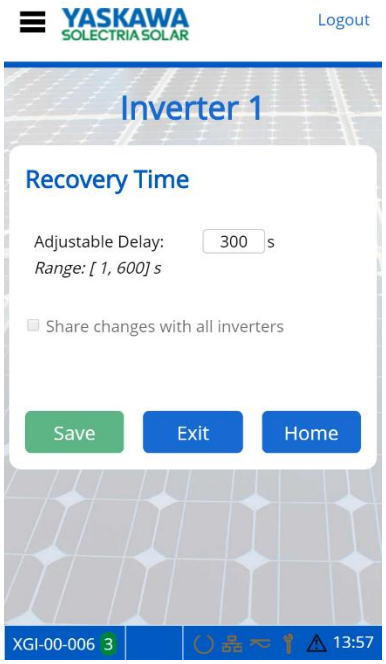


Figure 5-14 Recovery Time

5.2.3.1.2 Power Limiting

This feature allows a user in *administrator* mode to curtail real power as a percent of name plate real power output.

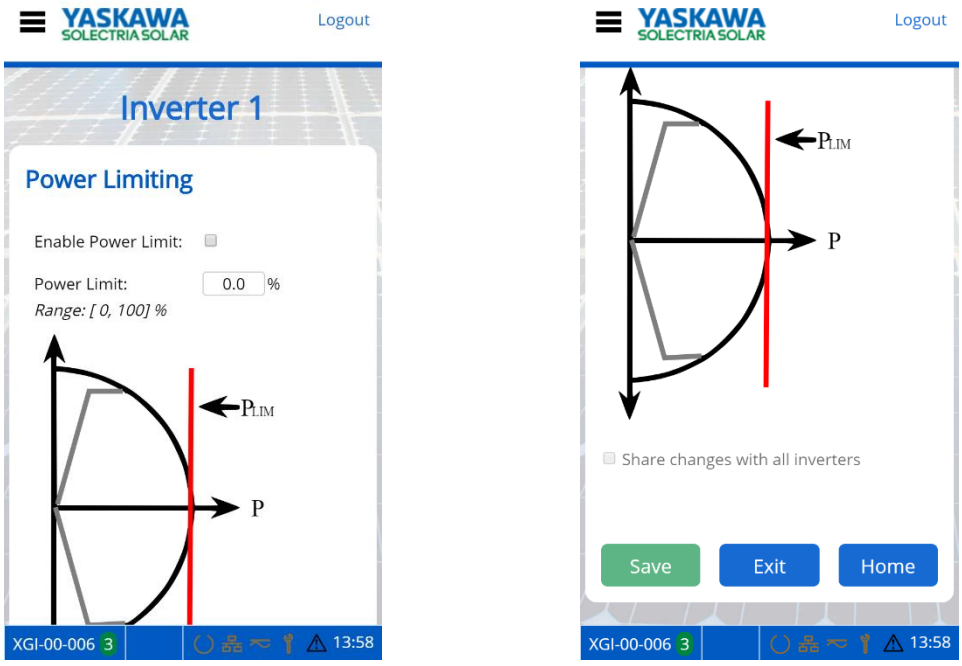


Figure 5-15 Power Limiting

5.2.3.1.3 Power Factor

This feature allows a user in *administrator* mode to control reactive power by setting the power factor.

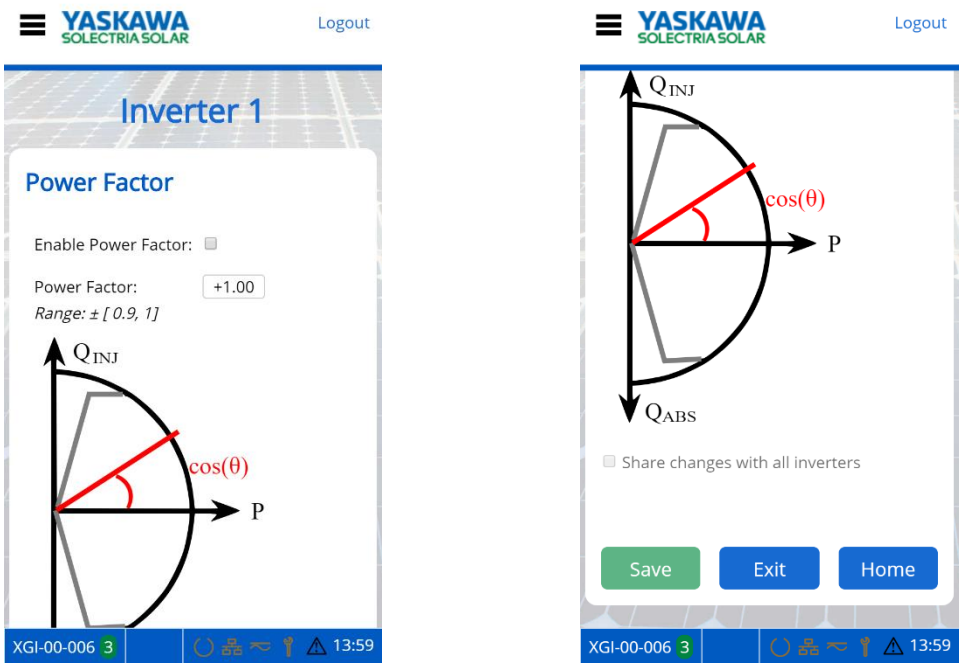


Figure 5-16 Power Factor

5.2.3.2 Inverter Settings

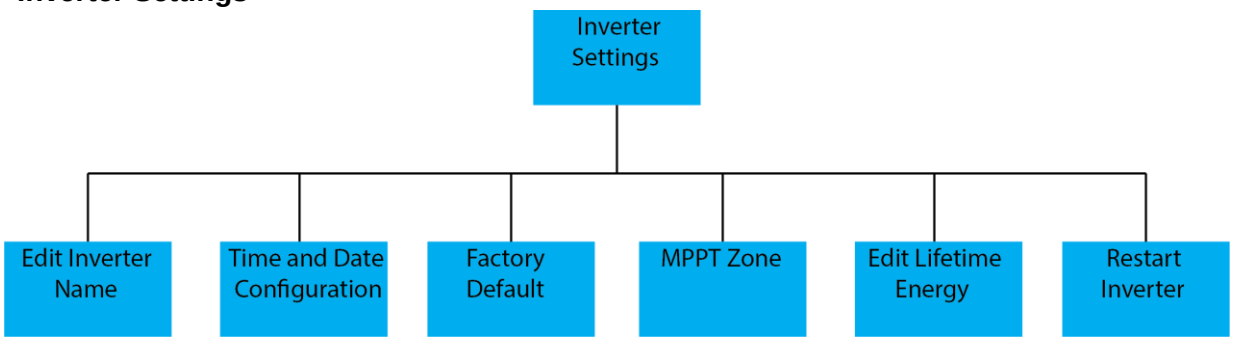


Figure 5-17 Inverter Settings Sub-Menu

5.2.3.2.1 Edit Inverter Name

This screen allows a user in *administrator* mode to name or rename an inverter.

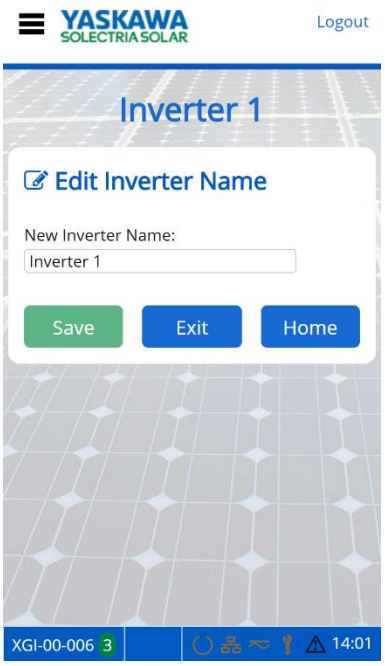


Figure 5-18 Edit Inverter Name

5.2.3.2.2 Time and Date Configurations

This screen allows a user in *administrator* mode to set the time and date.

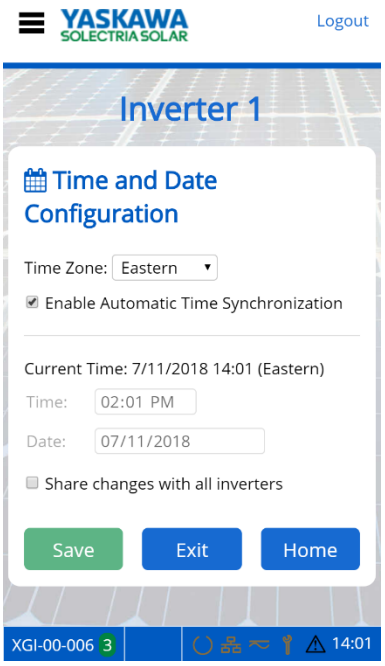


Figure 5-19 Time and Date Configurations

5.2.3.2.3 Factory Default

This screen allows a user in *administrator* mode to reset all inverter settings to their factory default.

Figure 5-20 Factory Default

NOTICE	**Factory Reset with 4 MPPT Zones** The factory reset will return the inverter to the default state of 1 MPPT zone. Re-install the jumper or change the selection to individual zones.

5.2.3.2.4 MPPT Zones

This screen allows a user in *administrator* mode to set the number of MPPT Zones. For MPPT Zones, refer to Section 3.5 DC Connections for the hardware connections.

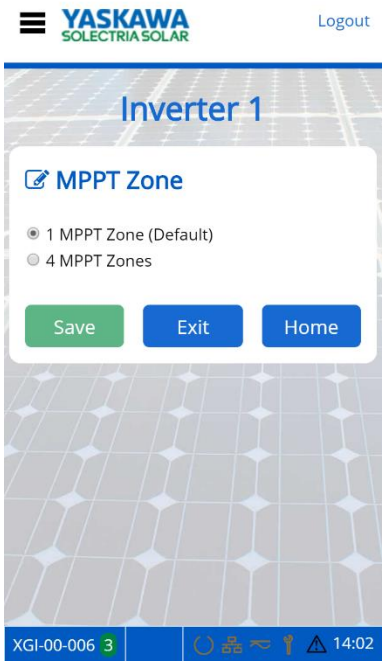


Figure 5-21 MPPT Zones

5.2.3.2.5 Edit Lifetime Energy

This screen allows a user in *administrator* mode to edit the lifetime energy of the inverter.

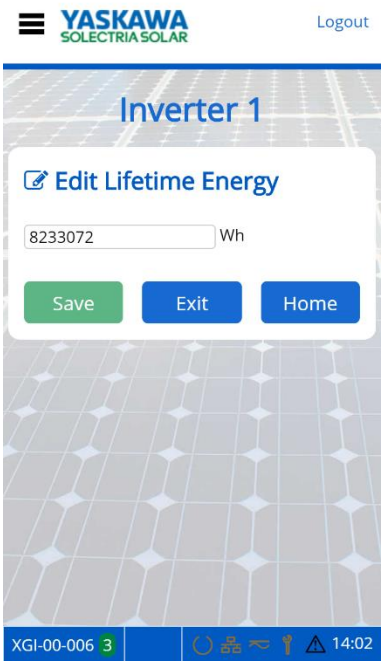


Figure 5-22 Edit Lifetime Energy

5.2.3.2.6 Restart Inverter

This screen allows a user in *administrator* mode to restart the inverter.

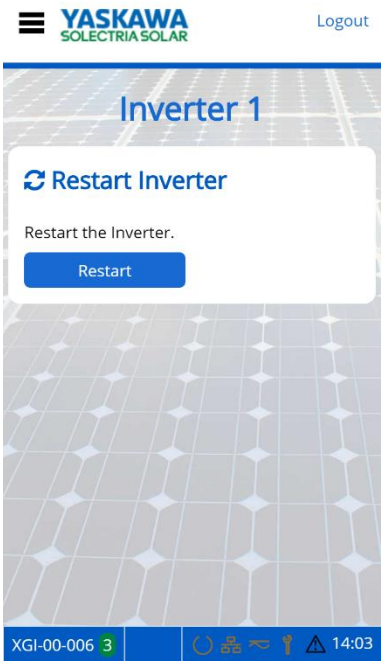


Figure 5-23 Restart Inverter

5.2.3.3 Network Status

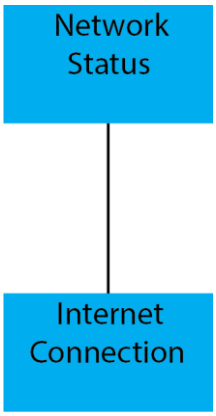


Figure 5-24 Network Status Sub-Menu

5.2.3.3.1 Internet Connection Status

This screen allows a user in *administrator* mode to see the status of the connections to the Internet, SolrenView data server, and the firmware update server.

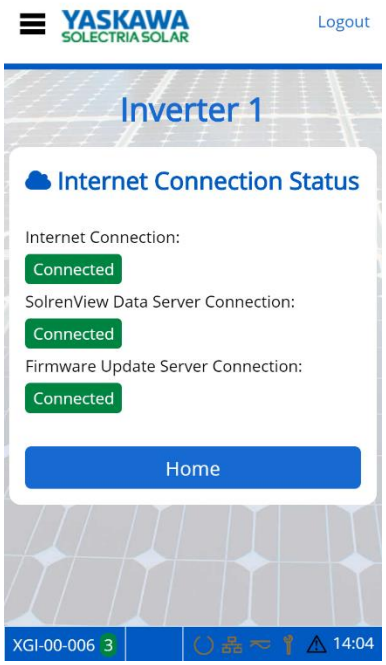


Figure 5-25 Internet Connection Status

5.2.3.4 Network Configuration

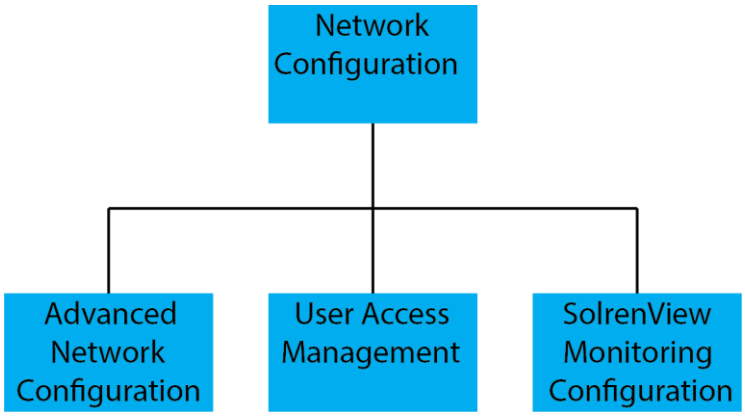


Figure 5-26 Network Configuration Sub-Menu

5.2.3.4.1 Advanced Network Configuration

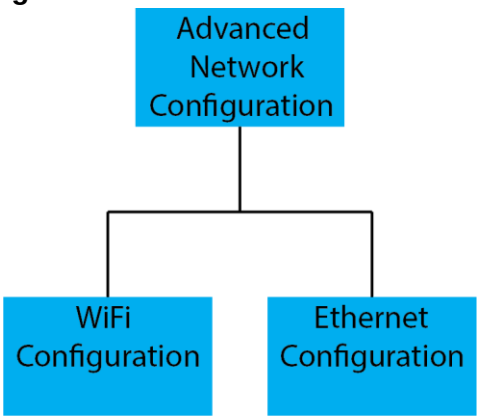


Figure 5-27 Advanced Network Configuration Sub-Sub-Menu

5.2.3.4.1.1 WiFi Configuration

This screen allows a user in *administrator* mode to define the SSID for a cluster of inverters. The SSID has 3 components: Site ID, Cluster ID, and Channel. The format of the SSID becomes [Site ID]-[Cluster ID]-[Channel], as shown at the bottom **Your New WiFi Network Name (SSID).**

Site ID: Used to define a unique name to identify the site.

Cluster ID: Used to define a unique name for separate clusters on a single site. For large sites separate the inverters into multiple clusters with each cluster having a unique ID.

Channel: Used to select a WiFi channel, choose from the drop-down menu. If the network seems slower than accessing a page when connected to the Internet, try changing the channel as the channel selected may have other devices on it. Use of a WiFi analyzer tool or app may help.

The WiFi Network can be disabled by deselecting the “Enable your WiFi network” check box.

NOTICE	**Disabling WiFi Network** Do not disable the WiFi unless you have a computer with an Ethernet cable attached to the inverter as all WiFi communications will cease once disabled.

These changes apply to all inverters in the detected cluster unless the “Save your changes to all inverters in the cluster” checkbox is deselected.

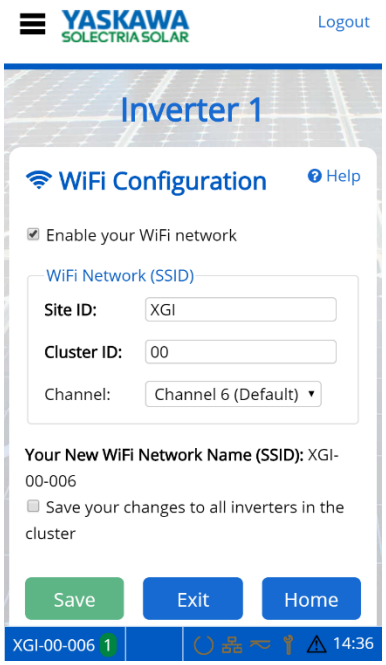


Figure 5-28 WiFi Configuration

5.2.3.4.1.2 Ethernet Configuration

This screen allows a user in *administrator* mode to enable or disable Ethernet connectivity.

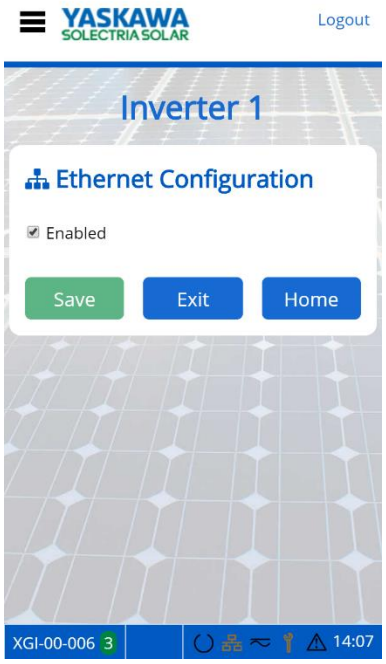


Figure 5-29 Ethernet Configuration

NOTICE	**Disabling Ethernet Network** Do not disable the Ethernet unless you are connected through WiFi as all Ethernet communications will cease once disabled.

5.2.3.4.2 User Access Management

This screen allows a user in *administrator* mode to change the default password for *administrator* access to all inverters in the cluster. An email address and internet connection is required for recovery if the user forgets the password.

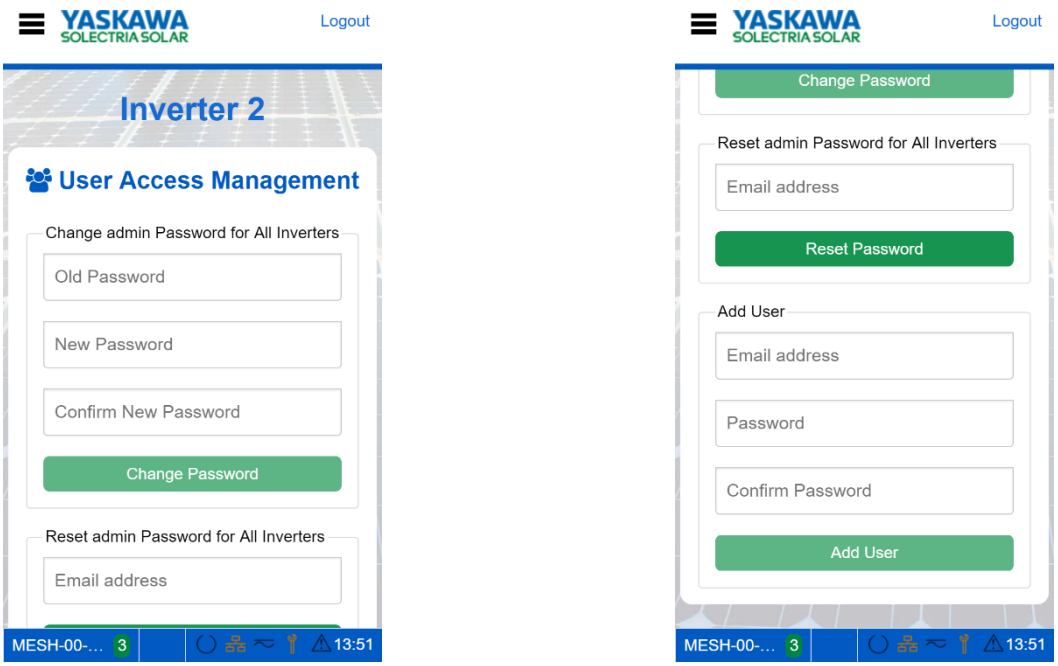


Figure 5-30 User Access Management

5.2.3.4.3 SolrenView Monitoring Configuration

This screen allows a user in *administrator* mode to enable SolrenView Monitoring. Note that SolrenView Monitoring requires a subscription (Additional fee applies).

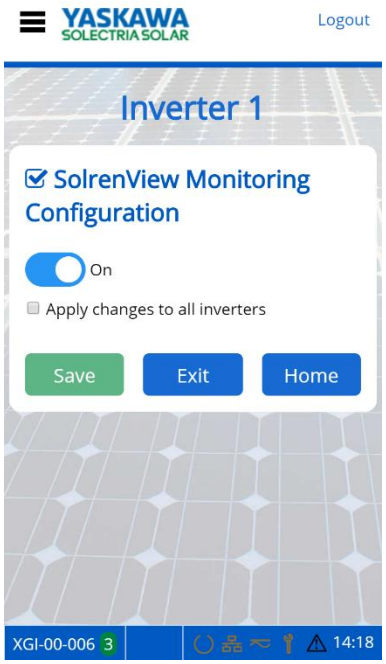


Figure 5-31 SolrenView Monitoring Configuration

5.2.3.5 Event and Fault Logs

This screen allows a user in *administrator* mode to view the event and fault logs.

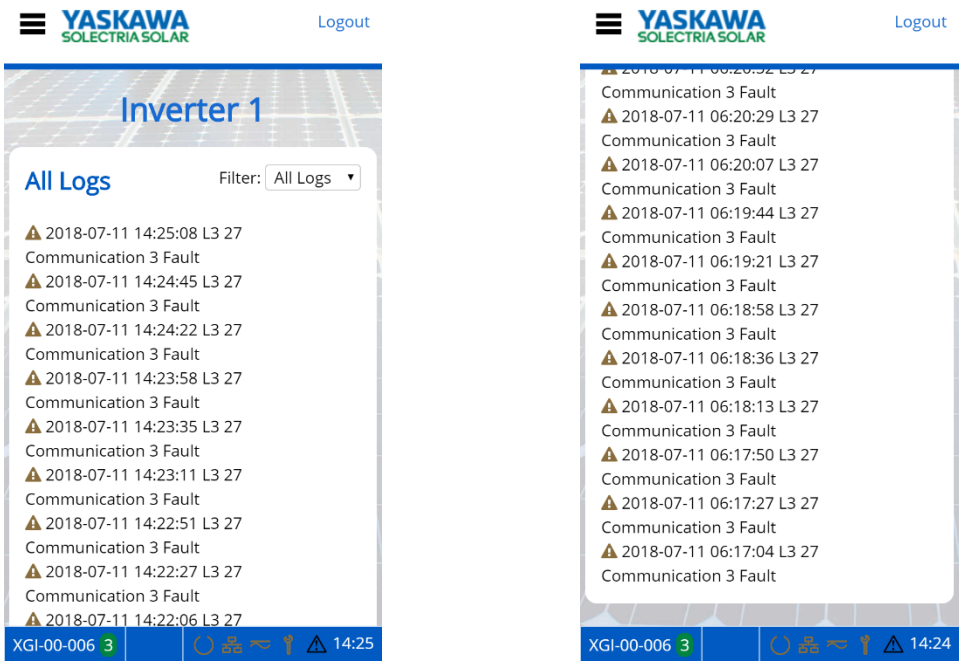


Figure 5-32 Events and Fault Logs

5.2.3.6 Edit Inverter List

This screen allows a user in *administrator* mode to add or remove inverters from the Reference List. A new inverter must be shown on the Inverter List to add to the network.

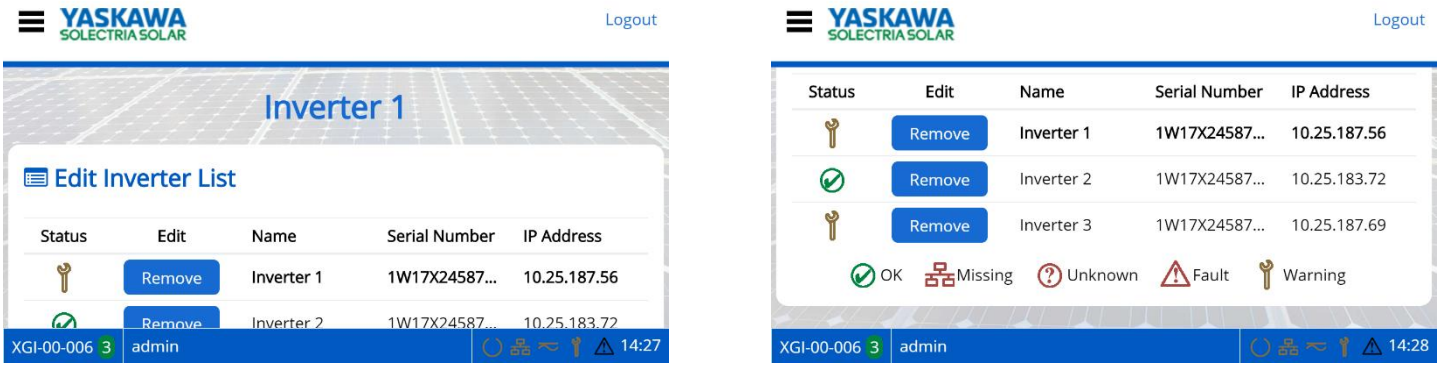


Figure 5-33 Edit Inverter List

In Figure 5-33 there are no inverters with network issues, but 2 with warnings.

If the inverter one of the inverters is no longer part of the network, it can be removed by clicking **Remove**. If it is taken from the site before it is removed from the cluster, it will show up as Missing. If an inverter is added to the site and shows up with the Unknown symbol, click the **Add** button to add it to the cluster. These changes will update the Inverter List.

5.2.3.7 System Test

This screen allows a user in *administrator* mode to run the Arc Fault Self-Test. Hit Reset after conducting the test.

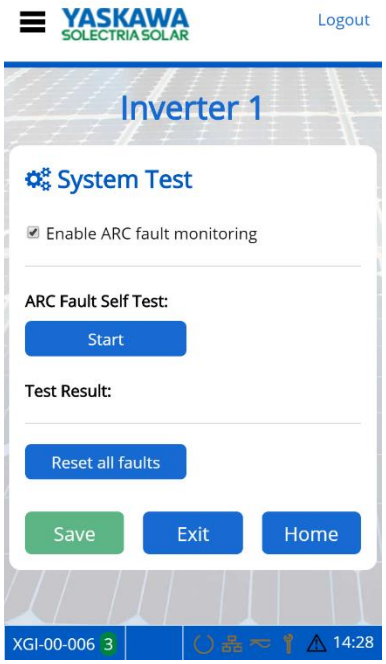


Figure 5-34 System Test

5.2.3.8 Firmware Update

This screen allows a user in *administrator* mode to update the firmware.

The SOLECTRIA XGI 1000 series inverter supports both local and remote firmware updates. Remote updates are performed automatically from the Yaskawa Solectria Solar server or by request through our technical support department by calling (978-683-9700 ext 2). Remote firmware updates require an internet connection.

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

By default, Enable Automatic Remote Firmware update is selected. The inverter will check for firmware updates and download automatically if one is available. The firmware will only be downloaded once to the gateway inverter and then distributed across the rest of the network. On the following morning, all inverters will perform a self-update. During the self-update the inverters may not produce power. Updates are completed in the early AM once PV power has stabilized but prior to peak production to reduce lost revenue. The firmware download is a small file of only incremental bits making its data usage minimal.

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 Owner will be responsible for performing any firmware updates.

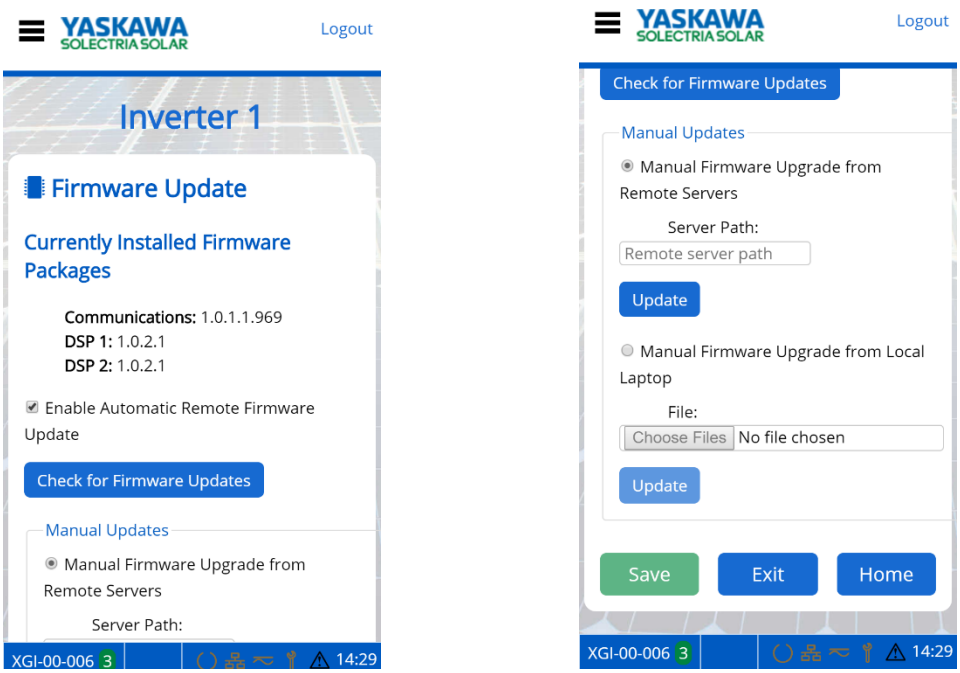


Figure 5-35 Firmware Update

5.2.3.9 First Time Startup Wizard

The First Time Startup Wizard is accessible when in *Administrator Mode* and is designed to aid the user in configuring the site communication and network settings.

For more information on the First Time Startup Wizard, refer to the Quick Startup Guide shipped with the inverter.

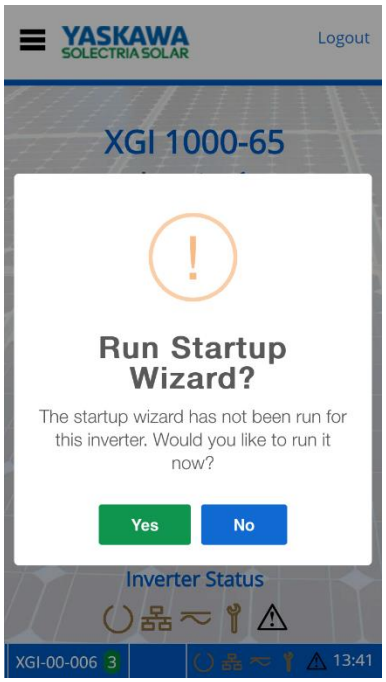


Figure 5-36 Prompt to Run the First Time Startup Wizards

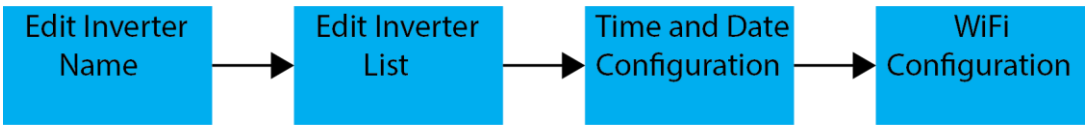


Figure 5-37 First Time Startup Wizard Sequence

See Edit Inverter Name, Edit Inverter List, Time and Date Configurations, and WiFi Configuration for details on the screens that comprise the First Time Startup Wizard.

6. Operation

6.1 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.

6.2 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.

7. Maintenance and Troubleshooting

If an inverter is not running correctly, the Status Panel will show there is an issue. When the inverter is working normally, the first 3 LEDs are illuminated (Ready, Network and Communications, and Power) and the last 2 are off (Maintenance and Power Fault). If the Maintenance LED or the Maintenance and Power Fault LEDs are illuminated, the inverter requires attention.

Figure 7-1Status Panel

The User Interface will also show when an inverter is not running correctly. When the inverter is working correctly, the inverter list will show a green checkmark next to the inverter.

7.1 Event Codes

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

7.1.1 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**.

DANGER	**Ground Fault Hazard** Inverter enclosure is an electrical hazard. **DO NOT TOUCH** 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 7-1 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 array for an unintentional reference to ground.	**DO NOT TOUCH** 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.
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.	**DO NOT TOUCH** 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	

7.1.2 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 7-2 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.
4	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.
5	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.
6	AC Very Low Frequency 2 Detected	AC low frequency region 2 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.

7	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.
8	AC Very High Frequency 2 Detected	AC high frequency region 2 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.
9	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.
10	AC Very Low Voltage 2 Detected	AC low voltage region 2 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.
11	AC Extremely Low Voltage 3 Detected	AC low voltage region 3 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.
12	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.

13	AC Very High Voltage 2 Detected	AC high voltage region 2 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.
…			
25	Communication 1 Fault	Communication processor initialization fault.	Power cycle the inverter. If the inverter does not clear the error, contact Technical Support.
26	Communication 2 Fault	Communication processor application fault.	Power cycle the inverter. If the inverter does not clear the error, contact Technical Support.
27	Communication 3 Fault	Communication processor hardware fault.	Power cycle the inverter. If the inverter does not clear the error, contact Technical Support.
28	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.
29	Software Update Fault	Communication processor software update fault.	Power cycle the inverter. If the inverter does not clear the error, contact Technical Support.
30	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.
31	Invalid Configuration Request	An external request to adjust setting beyond the allowable limits.	Check that the value being entered is acceptable and re-enter.
32		Reserved	

7.1.3 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 7-3 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.
…			
32		Reserved	

7.2 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 7-2 to remove the DC Fans and the AC Fan.

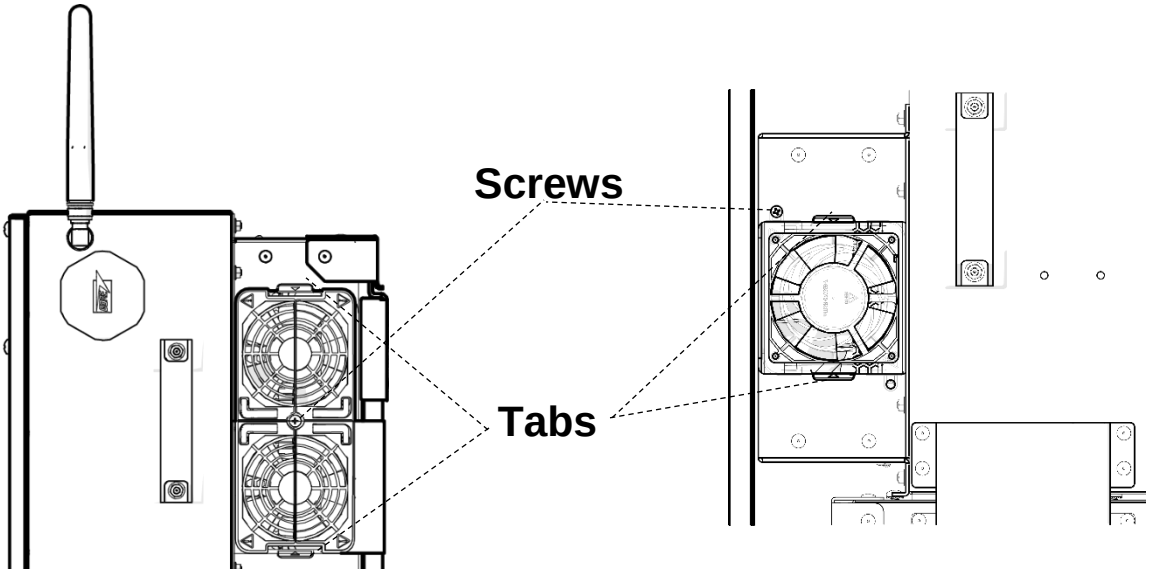


Figure 7-2 DC Fans (Left) and AC Fan (Right)

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 7-3.

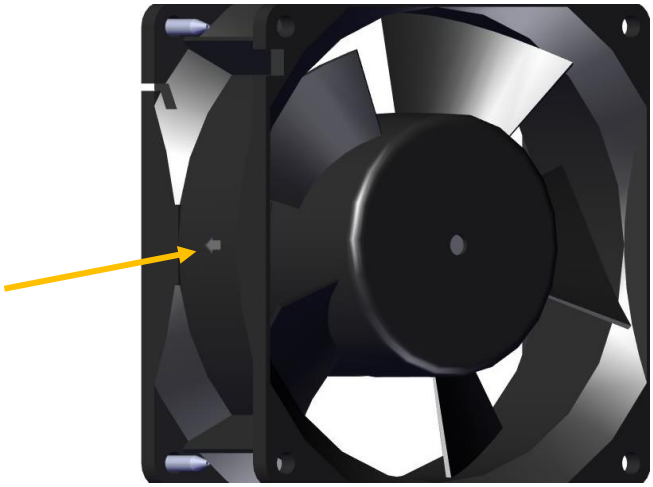


Figure 7-3 Fan Picture with Arrow Showing the Direction of Airflow

7.2.1 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 7-2 to remove the DC fans.

7.2.2 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 7-2 to remove the AC fan.

7.3 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.

8. Specifications

8.1 General Specifications

Table 8-1 General Specifications

	XGI 1000-60/60	XGI 1000-60/65	XGI 1000-65/65
Max Input Voltage	1000 VDC		
Full Power Input Voltage Range	580 to 850 VDC	600 to 850 VDC	
Operating Voltage Range	350 – 950 VDC		
Max Operating Input Current per Inverter	105.6 A	105.6 A	110.4 A
MPP Trackers	1 or 4, configurable (1 by default)		
Max Operating Input Current per MPPT zone	26.4 A	26.4 A	27.6 A
Max PV Current (Isc x 1.25)	50 A per zone or 180 A combined		
Max Input Back-feed	0 A		
Output Power Factor	Unity > 0.99; Adjustable from -0.85 to +0.85		
Grid Type	3 Phase Wye with Ground and Neutral		
Nominal Output Voltage	480 VAC		
Nominal Frequency	60 Hz		
Output Voltage Range	-12/+10%		
Frequency Range	57-62 Hz		
Max Output Current	72.2 A	78.2 A	78.2 A
Max Output Power	60 kW	60 kW	65 kW

8.2 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 8-2 Default Voltage Limits and Trip Times

Voltage Range	Voltage Setpoint	Clearing Time
V < 45%	V = 45%	0.16 s
45% <= V < 60%	V = 60%	1.0 s
60% <= V < 88%	V = 88%	2.0 s
88% <= V < 110%	N/A	No trip
110% <= V <= 120%	V = 110%	1.0 s
V > 120%	V = 120%	0.16 s

Table 8-3 Frequency Limits and Trip Times

Frequency Range	Frequency Setpoint	Trip Time
F < 57 Hz	F = 57 Hz	0.16 s
57 Hz <= F < 59.5 Hz	F = 59.5 Hz	2.0 s
59.5 Hz <= F < 60.5 Hz	N/A	No trip
60.5 Hz <= F <= 62 Hz	F = 60.5 Hz	2.0 s
V > 62 Hz	F = 62 Hz	0.16 s

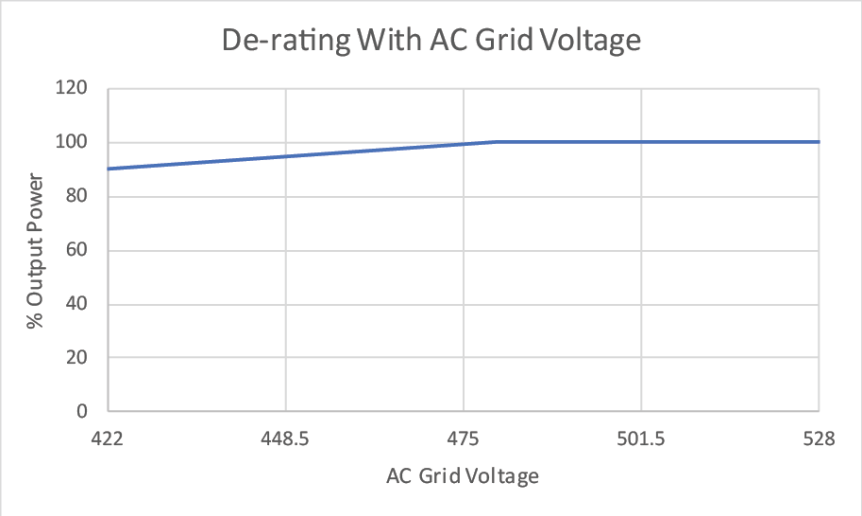


Figure 8-1 Derating with AC Voltage

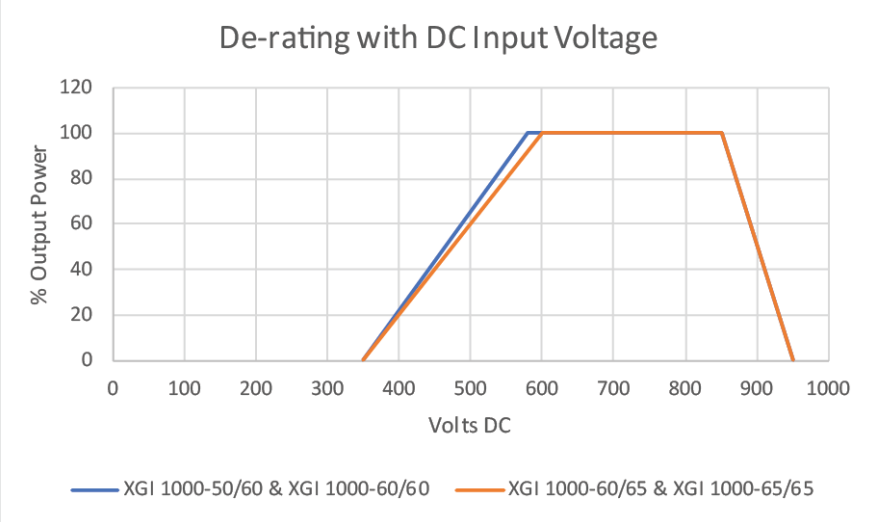


Figure 8-2 Derating with DC Voltage

8.3 Temperature and Altitude

Table 8-4 Normal Temperature Ranges

	XGI 1000-50/60 and XGI 1000-60/60	XGI 1000-60/65 and XGI 1000-65/65
Ambient Temperature Range	-40°F to +140°F (-40°C to +60°C)	
Derating Temperature	122°F (50°C)	113°F (45°C)
Storage Temperature Range	-40°F to +167°F (-40°C to +75°C)	

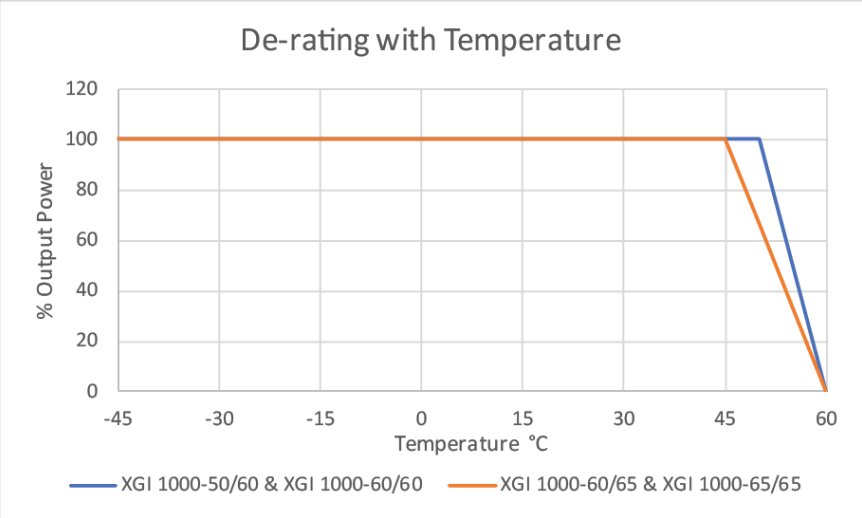


Figure 8-3 Derating with Temperature

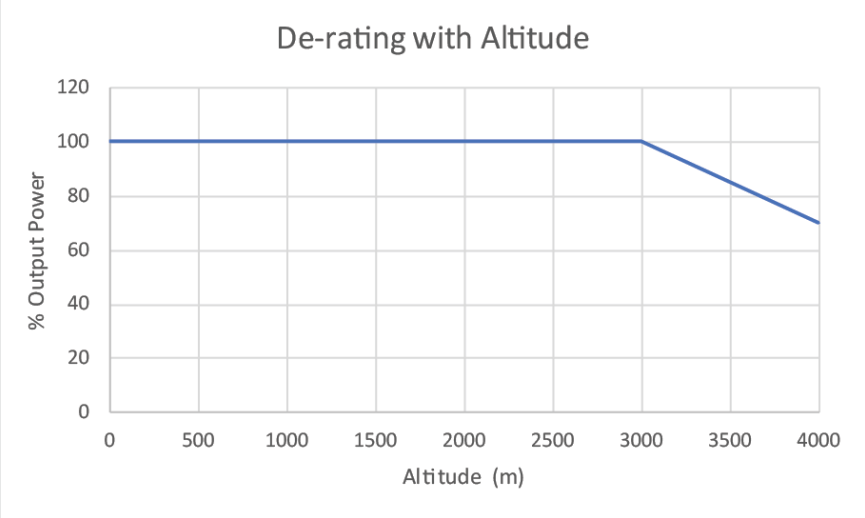


Figure 8-4 Derating with Altitude (All Models)

8.4 Enclosure

Table 8-5 Enclosure Information

Enclosure Rating	NEMA Type 4
Dimensions	45.8 in x 28.3 in x 11.6 in (1163 x 719 x 295 mm)
Weight	Power Head: 117 lbs (53.07 kg) Wiring Box: 49 lbs (22.22 kg) Mounting Bracket: 20 lbs (9.07 kg)
Mounting Angle Range	5-90° from Horizontal
Enclosure Finish and Type	Powder Coated Aluminum

9. Options

9.1 Wiring Box Configurations

The Wiring Box comes in several versions. Each version can be ordered in Parallel Mode or Independent Mode.

Table 9-1 AC Connection Specifications

	Wire Material	Standard Wiring Box	Large AC Terminal (-L) Wiring Box
AC output (L1, L2, L3) conductors	Copper	3 to 1/0AWG (26.7 to 50 mm^2)	3 to 3/0AWG (26.7 to 85 mm^2)
	Aluminum	1 to 1/0 AWG (42.4 to 50 mm^2)	1 to 3/0 AWG (42.4 to 85 mm^2)
Neutral (Not a current carrying conductor: Can be sized equal to or larger than the EGC.)	Copper	8 to 4 AWG (8.4 to 21.2 mm^2)	6 to 1/0 AWG (13.3 to 50 mm^2)
	Aluminum	6 to 4 AWG (13.3 to 21.2 mm^2)	6 to 1/0 AWG (13.3 to 50 mm^2)
Equipment Grounding Conductor (EGC)	Copper	8 to 4 AWG (8.4 to 21.2 mm^2)	6 to 1/0 AWG (13.3 to 50 mm^2)
	Aluminum	6 to 4 AWG (13.3 to 21.2 mm^2)	6 to 1/0 AWG (13.3 to 50 mm^2)

9.1.1 Standard Configuration

The Standard Wiring Box is shown in Figure 9-1. See Table 9-1 for allowed AC conductor sizes.

Figure 9-1 Standard Wiring Box

9.1.2 Large AC Terminal Configuration

The Large AC Terminal Wiring Box, as shown in Figure 9-2, is the Standard Wiring Box with larger AC Terminals, allowing for larger AC wires to be used. See Table 9-1 for allowed AC conductor sizes.

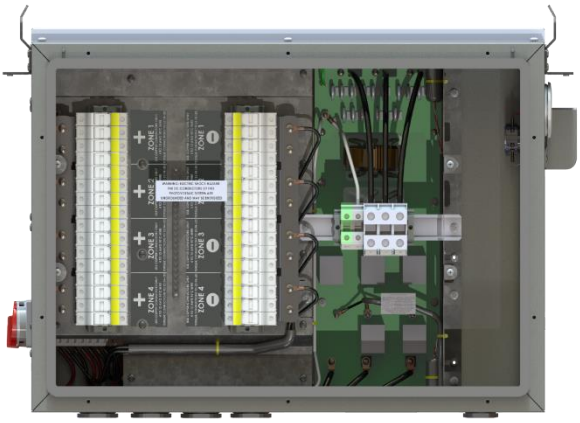


Figure 9-2 Wiring Box with Large AC Terminal

10. Appendix

10.1 Warranty and RMA Instructions

For all warranty information, please visit:

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

10.2 Datasheet

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

10.3 Contact Information

Table 10-1 Contact Information

Telephone	978.683.9700
Fax	978.683.9702
Sales Support	inverters@solectria.com
Technical Support & Service	978.683.9700x2
Website	www.solectria.com