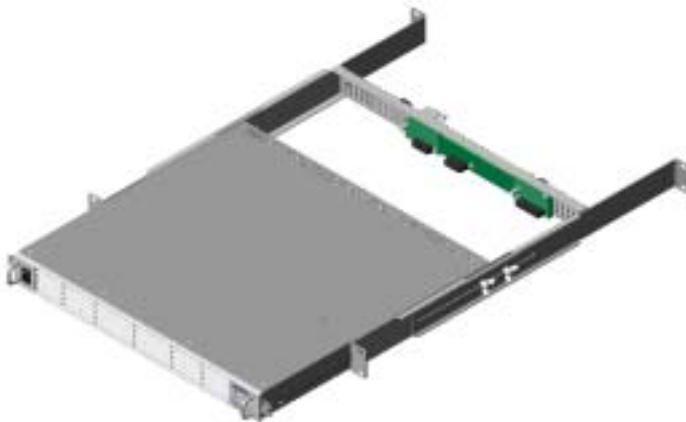


Smart choice for power

xantrex



XDI2048
2kVA/1.5kW

Operating Manual

Xantrex Datacom Inverter

www.xantrex.com

Xantrex Datacom Inverter

XDI2048 2kVA/1.5kW

Operating Manual

About Xantrex

Xantrex Technology Inc. is a world-leading supplier of advanced power electronics and controls with products from 50 watt mobile units to one MW utility-scale systems for wind, solar, batteries, fuel cells, microturbines, and backup power applications in both grid-connected and stand-alone systems. Xantrex products include inverters, battery chargers, programmable power supplies, and variable speed drives that convert, supply, control, clean, and distribute electrical power.

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About This Manual

Purpose

The purpose of this Operating Manual is to provide explanations and procedures for installing, operating, maintaining, and troubleshooting the Xantrex Datacom Inverter.

Scope

The Manual provides safety guidelines, detailed planning and setup information, procedures for installing the inverter, as well as information about operating and troubleshooting the unit.

Audience

The Manual is intended for anyone who needs to install and operate the Xantrex Datacom Inverter. Installers should be certified technicians or electricians.

Organization

This Manual is organized into five chapters and an appendix:

Chapter 1, “Introduction”, Chapter 1 contains an introduction to the XDI Inverter and the Ethernet card. This chapter provides a list of the major features, protections and options included with both the XDI Inverter and the Ethernet card.

Chapter 2, “Rack Mount Frame Assembly and Installation”, Chapter 2 contains information and procedures to assemble and install the rack mount, and install the inverter.

Chapter 3, “Inverter Module Installation and Operation”, Chapter 3 contains information and procedures for installing and using the XDI Inverter.

Chapter 4, “Remote Communication & Monitoring”, Chapter 4 contains information and procedures for using the Ethernet to provide remote communication and monitoring.

Chapter 5, “Troubleshooting”, Chapter 5 contains information and procedures for troubleshooting your XDI Inverter and Ethernet card.

Appendix A, “Specifications”, Appendix A supplies information about specifications for the XDI Inverter and the Ethernet.

Conventions Used

The following conventions are used in this guide.



WARNING

Warnings identify conditions that could result in personal injury or loss of life.



CAUTION

Cautions identify conditions or practices that could result in damage to the unit or other equipment.

Important: These notes describe things which are important for you to know, but not as serious as a caution or warning.

Related Information

You can find more information about Xantrex Technology Inc. as well as its products and services at **www.xantrex.com**

Important Safety Instructions



WARNING

Operate the Inverter in an environment free of flammable gases or fumes. To ensure that the Inverter's safety features are not compromised, use the Inverter as specified in this manual and do not substitute parts or make any unauthorized modifications. Contact the service technician for service and repair help. Repairs must be made by experienced service technicians only.



WARNING

The XDI is intended for installation in a restricted access location. This is an area intended for qualified or trained personnel only, access to which is controlled by a locking mechanism (for example, a key lock or an access card system).



WARNING

Appropriate care and attention must be exercised when connecting any equipment to a DC supply system due to the short circuit energy hazard that exists.



CAUTION

The inverter will operate from a DC source in the range of -40 V to -60 V. The maximum voltage without damage to the unit is -80 V. The source and cabling shall be capable of supplying 45 A continuously for a worst case operating voltage of -40 V. Under overload conditions (maximum 3 kW) the source requirement will be 90 A at -40 V

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1

Introduction

Chapter 1 contains an introduction to the XDI Inverter and the Ethernet card. This chapter provides a list of the major features, protections and options included with both the XDI Inverter and the Ethernet card.

Inverter Information

Description

The Xantrex Datacom Inverter (patent pending) is the most versatile modular rack mounted Inverter system for telecom and industrial applications requiring constant AC power from standard –48 V battery systems. The XDI consists of a 1 U (1.7 in, 73 mm) thin, true sinewave 2000 VA/1500 W inverter module rated for continuous duty, and a compatible 19-inch wide equipment rack mount frame with back-plane mounted connectors. The system is easily scalable by adding parallel-connected modules and can be configured in N+1 single or three-phase arrays for maximum reliability. No single unit is a “master”, and an array of units will tolerate the failure of one or more parallel-connected inverters.

Features and Options

Product Features	<ul style="list-style-type: none">• Compact size (1 U) designed to fit standard 19 in (483 mm) equipment racks• Easily paralleled for N+1 redundant systems• High efficiency and reliability• Power share in parallel system for up to 20 kVA (10 units) of AC power• 3 kW, 4 kVA (5 s) surge capability• Short circuit proof• Rack mounted back plane accommodates DC input and AC output connectors• High performance noise filters on both input and output• 3-year warranty• cCSAus, CE, NEBS LEVEL 3, FCC Class B approvals
Protection Features	<ul style="list-style-type: none">• Input under/over voltage protection• Output under/over voltage protection• Incorrect connection protection• Temperature limit shutdown• Output overload protection
Options	<ul style="list-style-type: none">• Optional TCP/IP enabled Ethernet port card• Optional static transfer switch for added system reliability

Ethernet Information

Description

The internal XDI Ethernet interface allows you to monitor and operate your inverter from a local or remote computer equipped with an Ethernet card.

The Ethernet interface allows monitoring and configuration of the XDI Inverter as well as network settings for the interface card itself. The interaction is done through an HTTP server and a custom Web page served by the Ethernet interface.

A proactive emailing system uses SMTP to inform you that the unit has turned on or a fault condition has occurred.

This section describes the features and specifications of the XDI Ethernet interface card.

Features and Functions

Features

- No special software required to monitor/control XDI Inverter (Simple Web browser will work)
- Easy to use Web page interface
- Automatically sends email when XDI is powered on
- Automatically sends email when XDI shuts down
- Allows remote monitor from any PC with Internet access
- Possible re-use of network cable infrastructure for connections
- Password protected for added security

Programmable Functions

- Output Standby Mode
- Password
- Default IP address
- Gateway IP address
- Sub-Net Mask
- Domain Name Server #1
- Domain Name Server #2
- SMTP Server
- Email Alert Address

Monitor Functions	<ul style="list-style-type: none">• DSP Firmware Version• Manufacturer• Model• Serial Number• Front Panel LED status• Output Voltage• Output Current• Percent Load• Startup State• Current Fault Status• Faults Since Power On
-------------------	--

Part Number and Ordering Information

XDI2048-RM	Includes Inverter Module and Rack Mount Frame. Ready to install into 19 in. (483 mm) standard equipment rack.
XDI2048HV-RM	(“HV” for 230 V/50 Hz output)
XDI2048	Includes Inverter Module only. Ready to insert into a pre-wired Rack Mount Frame.
XDI2048HV	(“HV” for 230 V/50 Hz output)
ENET-XDI	Optional factory-installed TCP/IP enabled Ethernet communications card.
RM-XDI	Includes Rack Mount Frame Assembly. Ready to be installed in a 19 in. (483 mm) standard equipment rack.
RM-1U23	Optional Rack Mount Adapter Kit to mount equipment into a 23 in. (585 mm) standard equipment rack.

2

Rack Mount Frame Assembly and Installation

Chapter 2 contains information and procedures to assemble and install the rack mount, and install the inverter.

This chapter describes the following:

- rack mounting the Inverter
- connecting the DC input power
- connecting the AC load and signal line
- setting up a variety of operating formats

Initial Inspection

When you first receive your unit, perform a quick physical check.

1. Inspect the unit for scratches and cracks, broken switches, connectors, terminals, and missing accessories.
2. Have a service technician check the unit if you suspect internal damage.

If the unit is damaged, save all packing materials and notify the carrier immediately. See instructions in “Packaging for Shipping or Storage” on page 2–3 and “Return Procedure” on page B–4.

Your purchase should ship with the following items:

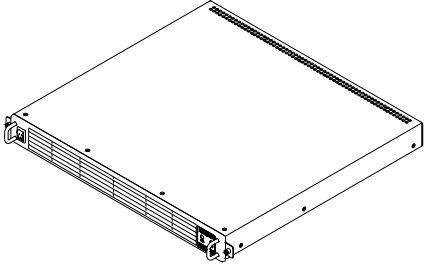
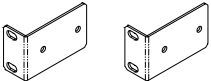
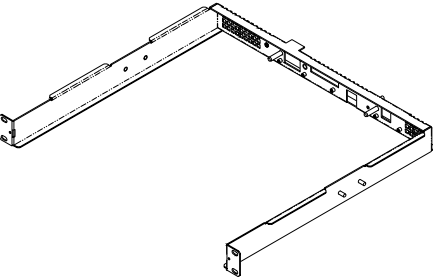
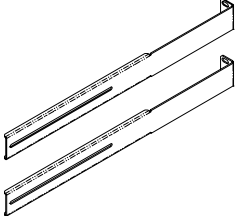

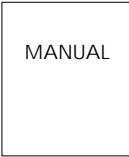
<p>INVERTER MODULE</p> 	<p>RELAY RACK MOUNTING BRACKETS</p> 
<p>RACK MOUNT BACKPLANE</p> 	<p>SLIDING RAILS</p>  <p>OUTPUT STRAIN RELIEF COVER</p>  <p>USER MANUAL</p> 

Figure 2-1 Packing List

Packaging for Shipping or Storage

Follow these instructions to prepare the unit for shipping or storage.

1. When returning the unit or sending it to the service center, attach a tag to the unit stating its model number (available from the front panel label) and its serial number (available from the rear panel label). Give the date of purchase and an invoice number, if you have it, as well as a brief description of the problem. You will need an RMA number to return the unit. See “Return Material Authorization Policy” and “Return Procedure” on page B-4.
2. For storage or shipping, repack the inverter in its original container. If the original container is not available, seal the unit in a plastic bag and then pack it in a 200 lb. (90 kg) test, corrugated cardboard carton large enough to allow 2 in (50 mm) of cushioning material to surround the unit. Use a material such as foam slabs or chips.
3. Label the carton as shown in Figure 2-2.
4. If shipping, mark the address of the service center and your return address on the carton.
5. If storing, stack no more than eight cartons high. Check the storage temperature range and storage altitude specification in “Environmental Specifications” on page A-4.

INVERTER
Model Number: _____
Serial Number: _____
FRAGILE — ELECTRONIC EQUIPMENT

Figure 2-2 Shipping or Storage Carton Label

Introduction

You can use the Inverter in rack-mounted applications. Alternate configurations can be created for custom applications.

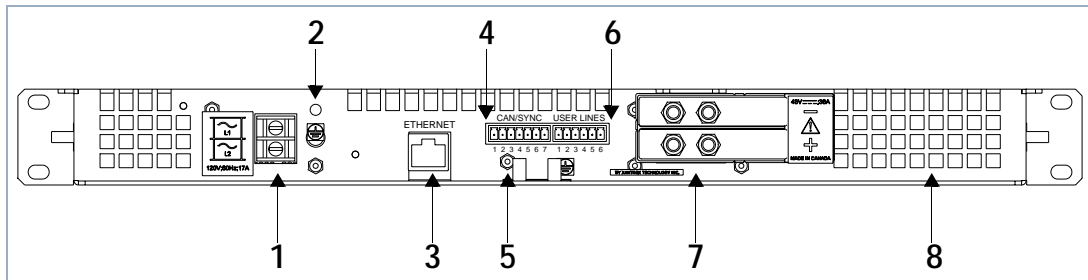


Figure 2-3 Rack Mount Frame Rear View

1. AC Output Terminal Block
2. AC Output Ground Stud
3. Ethernet card (optional)
4. Can/Sync Connector
5. DC Input Ground Stud
6. User Lines Connector
7. DC Input Terminal Block
8. Air Vents



WARNING

The XDI is intended for installation in a restricted access location. This is an area intended for qualified or trained personnel only, access to which is controlled by a locking mechanism (for example, a key lock or an access card system).

Location, Mounting and Ventilation

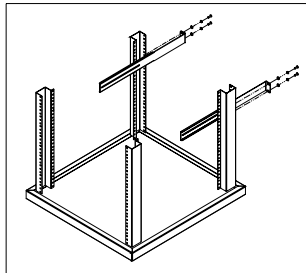
When you install the Inverter into a rack, allow cooling air to reach the ventilation inlets. At the same time, do not block the air exhaust. See “Electrical Specifications” on page A-2 for the operating altitude specification and the operating ambient temperature range measured at the unit case.

The inverter is designed to fit into a standard 19 in. (483 mm) equipment rack. Mounting brackets are included which allow the unit to be mounted in either cabinet style racks or relay racks.

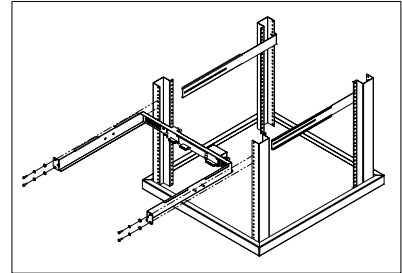
Installation Into Cabinet Style Equipment Racks

For installation into a cabinet style equipment rack, the backplane is secured using two sliding rails as shown below.

1. Assemble the Sliding Rails



2. Assemble the Backplane



3. Secure the Backplane

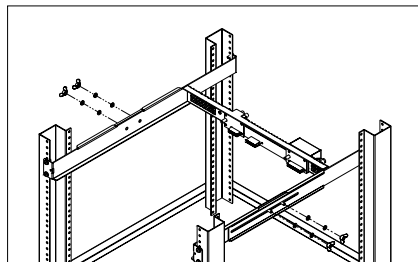


Figure 2-4 Installing into Cabinet Style Racks

Installation into Relay Racks

Use the supplied mounting brackets to secure the backplane in a relay rack.

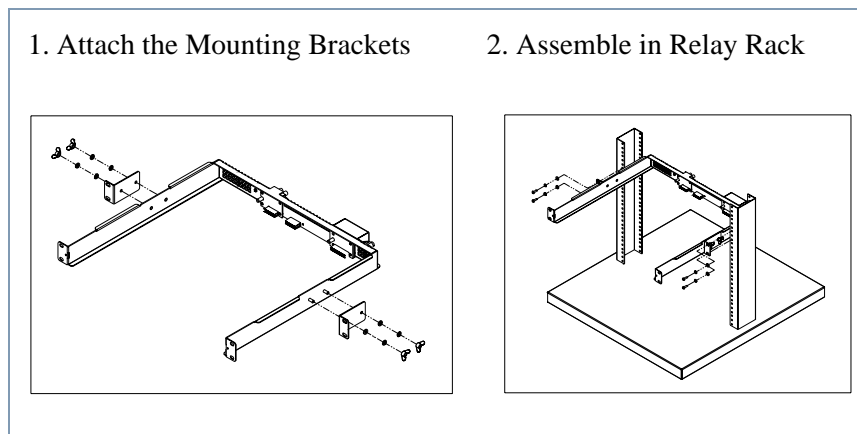


Figure 2-5 Installing into Relay Racks

DC Input Power



CAUTION

The inverter will operate from a DC source in the range of -40 V to -60 V. The maximum voltage without damage to the unit is -80 V. The source and cabling shall be capable of supplying 45 A continuously for a worst case operating voltage of -40 V. Under overload conditions (maximum 3 kW) the source requirement will be 90 A at -40 V

Input Connector and Cables

The XDI input connector is a 2-pole, double lug terminal block with separate double studs for the ground connection. A minimum of 6 AWG copper conductor (rated 85°C minimum) is the recommended wire gauge for all three input cables.

DC Input Wire Connection

Important: The following procedure should be used as a guide only. Ensure that the installation complies with the specific wiring rules applicable to your country or area of jurisdiction.

The DC input wiring should be routed through a 60 A circuit breaker for each inverter used. This provides additional disconnect options and adds to safety. A 2-pole breaker is recommended, but should a single pole be used, it should be mounted in the negative side of the input wiring.

To connect DC input wires from the breaker:

1. Ensure DC breaker is de-energized.
2. Strip 7/16 in. (11 mm) off the positive, negative and ground cables and install a standard two hole compression lug (hole diameter: 0.25 in. (6 mm)) on each cable.
 - Burndy part #: YA6CL2TC14
 - T&B part #: 54205
 - Hendry part #: 06117-01
3. Remove the supplied nut and washer on the ground studs and install and secure the ground connection.

4. Note the polarity on the input connector as indicated and fasten the positive and negative cable ends onto the terminal block using the brass screws and washers provided. Tighten both securely. See Figure 2-6.
5. The DC input wiring should be appropriately restrained to the equipment rack to provide strain relief.



WARNING

Appropriate care and attention must be exercised when connecting any equipment to a DC supply system due to the short circuit energy hazard that exists.



WARNING

It is critical that the wires be stripped the right length so that the insulator enters the connector.



WARNING

To avoid the risk of a short-circuit hazard, bare wire must NOT protrude past the connector.

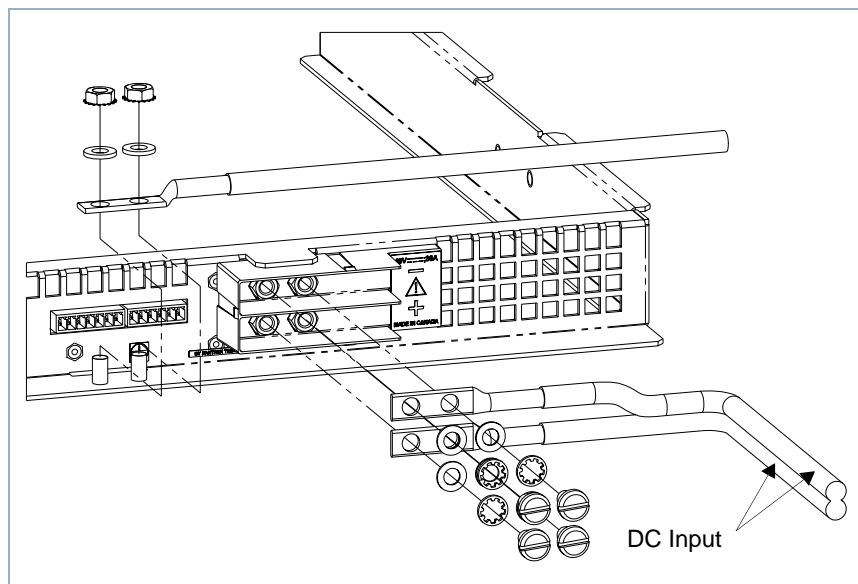


Figure 2-6 Connecting the Input Wires

AC Load and Signal Line Connection

Important: The following procedure should be used as a guide only. Ensure that the installation complies with the specific wiring rules applicable to your country or area of jurisdiction.

AC Output Connector

This is a two terminal barrier strip for use with up to #12 AWG wire. The two terminals, L1 & L2 are floating outputs, L1 or L2 can be grounded to simulate a neutral conductor. The barrier strip will accept a maximum lug width of 0.32 in. (8.1 mm). The recommended torque on the screw is 9 in-lbs.

Load Wiring

When selecting load wiring, consider the following factors:

- Current carrying capacity of the wire
- Maximum wire length
- Maximum ambient temperature
- Noise effects on signal lines

Use the table below as a guide to help identify wiring requirements for permanent connection to an AC distribution box. The distribution box shall include a 2 pole appropriately rated circuit breaker in series with each inverter used in an array of units. The guide below applies for up to 2.5m long load terminations. Consider other means such as bus bar distribution for longer runs.

AC Output Voltage	Wire
120	Minimum 3 x 16 AWG (2 wire plus safety ground), stranded copper 105°C, 300 V
220-230	Minimum 3 x 16 AWG (2 wire plus safety ground), stranded copper 105°C, 300 V

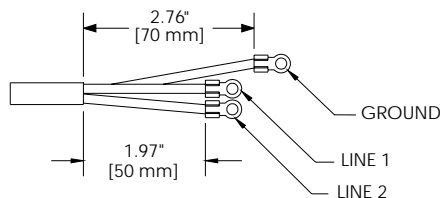
Load Connection



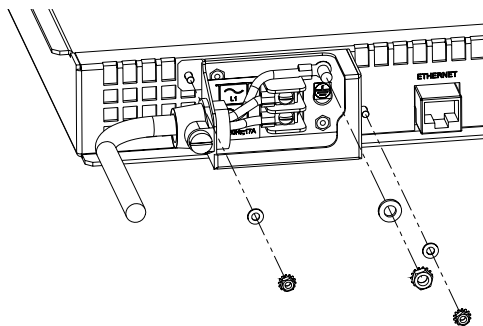
WARNING

Exercise caution when making connections to a rack in an existing installation. Ensure all input and output breakers are de-energized and that adjacent racks are also powered down.

1. If necessary, remove the output cover by loosening the two securing nuts. Release the clamp on the strain relief and insert one end of the load wire
2. Strip and install appropriately sized spade or ring terminals on the two load lines. Only use a ring type terminal for the safety ground connection.



3. Loosen or remove the two screws on the barrier strip and insert the load connections noting polarity if neutral is chosen. Tighten screws to secure.
4. Connect the safety ground wire to the ground stud provided. The ground stud accepts a 0.2 in. (5 mm) #10 diameter ring terminal.
5. Route the load wires inside the cover to prevent pinching but with a sufficient service loop. Replace cover and secure. Tighten clamping screw on strain relief to secure wire in place.



User Line Connection

Overview

The User-line interface provides basic remote control and monitoring on the Inverter using TTL logic signals. The available signals are an Inverter on/off input, fault and Inverter-on flags as well as a configurable auxiliary line. The aux output can only be configured when the Ethernet option card is installed. The user lines are optically isolated with typical source/sink capability of 10 mA. To prevent damage to this interface, do not exceed 40 mA of source/sink current.



CAUTION

Do not bias this port more than 50 V DC to chassis.

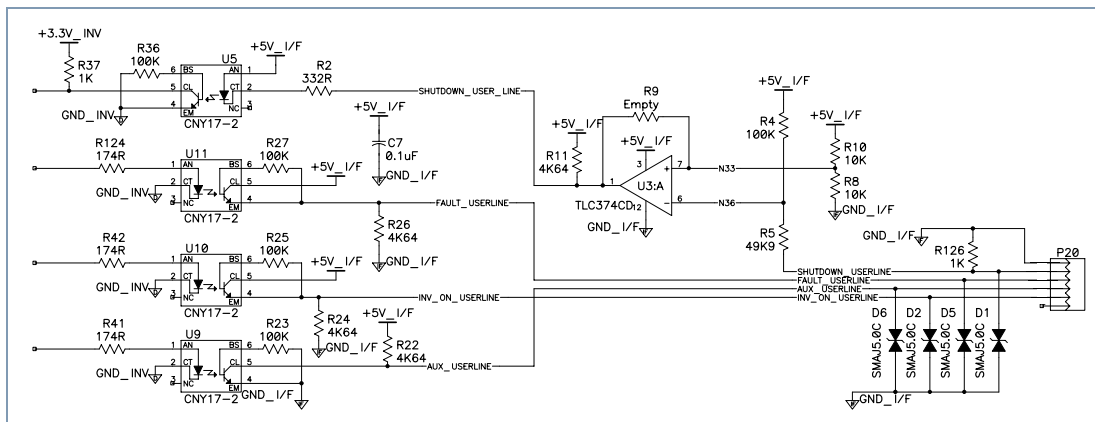


Figure 2-7 User Lines Schematic

User Line Connector

The user-line is a 6-position wire clamp connector adjacent to the DC input connector. Table 2-1 lists user functions and associated terminal numbers.

User Line Wiring

Use twisted pairs of 22-24 AWG for connections. Before making any connections, ensure power to the rack has been disconnected. Carefully route the wires away from high power load cables to minimize noise effects on signal integrity.

User Line Connection

Use this table to wire appropriate signals.

Table 2-1 User Line Connection

Terminal	Label	I/O	Logic Level	Function
1	User line return	GND	GND	GND reference
2	User shutdown	Input	Active high	Shuts down inverter
3	Fault Flags	Output	Active high	Inverter faults
4	AUX flag	Output	N/A	User configurable
5	Inverter flag	Output	Active high	Inverter on-line
6	Not used	N/A	N/A	N/A

User line voltages are below:

Inputs	
High	1.25 V to 5 V
Low	0.0 V to 1.25 V
Outputs	
High	5 V
Low	1.5 V max.

CAN/SYNC Connector

Overview

The CAN/SYNC connector provides access to functions necessary for operation of multiple units in parallel, series or three phase. The connector is a 7-position wire clamp adjacent to the user-line. Two sets of signals are provided on this connector:

- Can-bus: Paralleled units relay data necessary to achieve load sharing between units using this arbitration bus. The protocol used is proprietary hence cannot be and should not be interfaced to different products.
- Sync-lines: Used to configure and synchronize units in parallel, series or 3 phase.

Specifications:

Maximum number of units	10
Bus Speed	1 Mb/sec
Termination	120 Ω 1/4 W
Addresses	1 to 10

CAN/SYNC Connection

Table 2-2 outlines the pinout of the terminal. See connection schemes for wiring method applicable to your requirements.

CAN/SYNC Wiring

Due to high bus speed, use shielded twisted pairs of 22-24 AWG for improved noise immunity. Before making any connections, ensure power to the rack has been disconnected. Carefully route the wires away from high power load cables to minimize noise effects on signal integrity.

Table 2-2 CAN/SYNC Pin-out

Terminals	Function
1	Return/GND
2	CAN-LO
3	CAN-HI
4	Return/GND
5	SYCN-OUT 240 degrees
6	SYCN-OUT 120 degrees
7	SYCN-OUT 0 degrees

Connection Schemes



CAUTION

Before attempting any connections, ensure power to rack is off by de-energizing input and output circuit breakers.

This section covers the realization of different output configurations available with this product line.

Stand-Alone Operation

A 120 Ohm resistor should be connected across the CAN-hi and CAN-lo terminals to properly terminate the bus. No other connections to this port are necessary for single unit operation.

Parallel Operation

When operated in this mode, up to ten XDI inverters can operate on a single bus by daisy chaining the canbus lines. Any additional units above this will still operate autonomously and not participate in load sharing arbitration. At power-up, the first ten units to access the bus acquire a unique I.D. each, beyond which no more I.D.s are made available. No unique master exists in a parallel system. All units continuously execute a complex algorithm to determine the load current based on the number of units online and the highest individual current. This ensures no interruption to the load should any unit in the system fail or is turned off.

Connection

- Make connections to the CAN/SYNC connector using its screw-type wire clamps. It may be necessary to remove the mating connector to facilitate connections to the terminal. Daisy chain the CAN-bus lines across all units in parallel (i.e. all CAN-hi terminals are connected together and likewise for CAN-lo). 120 Ohm terminating resistors must be connected across the CAN terminals of the first and last units in the chain.
- Also daisy chain the “SYNC-OUT 0” and “return” terminals on the connector. This provides phase lock between paralleled units. See Figure 2-8.

Split Phase Operation

Use this scheme to extend the output voltage. No more than two units should be connected in series though more can be added in parallel with either series unit.

To connect two units for split voltage, proceed as follows:

- First ensure power to the rack has been disconnected. make connections to the CAN/SYNC connector using its screw-type wire clamps. It may be necessary to remove the mating connector to facilitate connections to the terminal
- Start with the phase synchronizing lines on the CAN/SYNC connector. Wire the “SYNC_OUT 0” and “RETURN” of the first unit in the top phase to those of the first unit in the bottom phase.
- To add units in parallel on either top or bottom phase, see “Parallel Operation” on page 2–15 for wiring details.
- To create the Split-voltage between the top phase and bottom phase, connect the L2 terminals of the first group to L1 terminals of the second group. This node must also be connected to safety ground.
- This leaves L1 of top phase and L2 of bottom phase as the output terminals. These should be connected to the load or distribution bus using a suitably rated circuit breaker.

Load Terminal Voltage	Output Voltage	
	120 V model	230 V model
Terminal - Terminal (L1-L2)	240	460
Terminal - Chassis (L1-GND or L2-GND)	120	230

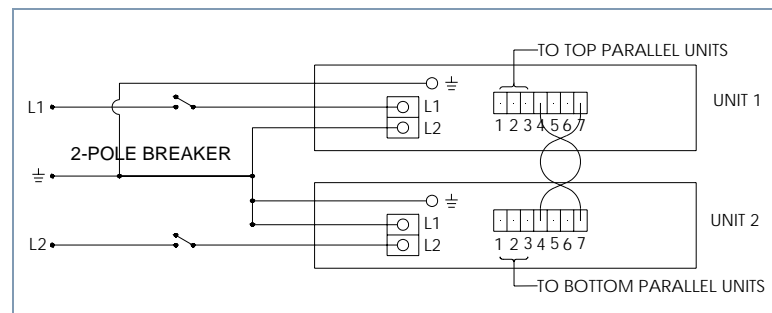


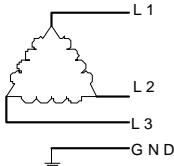
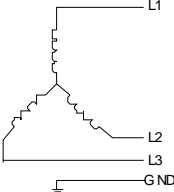
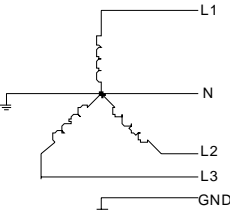
Figure 2-9 Split-Phase Operation

Three Phase Operation

Overview

XDI inverters can be configured for 3-phase operation where necessary. Synchronizing signals are used to achieve this functionality, precisely phase locking the units at 120 phase displacement. For single units this results in a 6kVA 3-phase source but up to 2 more units can be added to each phase to increase capacity. (See “Parallel Operation” on page 2–15 for wiring details.) The units can be configured for 3-phase, 4-wire or 3-phase, 3-wire depending on the load setup.

Table 2-3 3-Phase Configurations

Wiring Configuration	Circuit	Output Terminals	Model Voltage	
			120 V	230 V
3-phase, 3-wire (DELTA)		Line/Phase Voltage	120	230
3-phase, 3-wire (Y)		Line Voltage	208	230
3-phase, 4-wire (Y)		Phase Voltage	120	230
		Line Voltage	208	398

3-Phase Synchronization and Signal Wiring

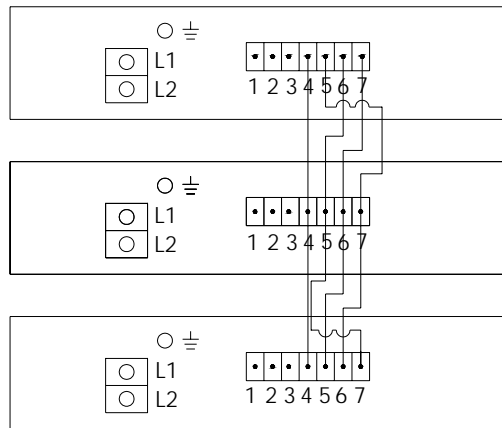


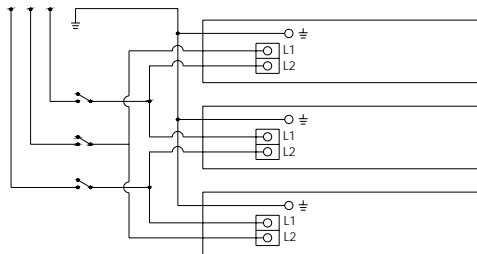
Figure 2-10 3-Phase Sync Connection

Refer to Table 2-2 for the signal pinouts.

To achieve proper three-phase output, units configured for each phase need to be wired to the appropriate phase. Extra care should be exercised when multiple paralleled units are also wired for 3-phase operation. In this case it is advisable to group all parallel inverters belonging to the same phase together in a rack.

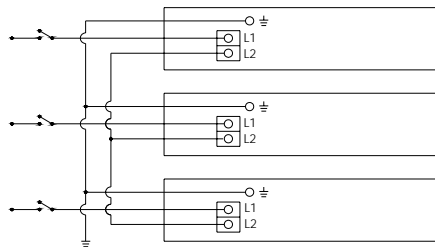
- First ensure power to the rack has been disconnected. Make connections to the CAN/SYNC connector using its screw-type wire clamps. It may be necessary to remove the mating connector to facilitate connections to the terminal.
- Twisted bundles of four multi-colored wires should be used for easier identification.
- Start with unit in Phase-1, wire from “SYNC-OUT 0” in this phase to “SYNC-OUT 120” of Phase-2 and “SYNC-OUT 240” of Phase-3.
- Next, Connect a different color wire from “SYNC-OUT 120” of Phase-1 to “SYNC-OUT 240” of phase-2 and “SYNC-OUT 0” of Phase-3.
- Connect a different color wire from “SYNC-OUT 240” of Phase-1 to “SYNC-OUT 0” of phase-2 and “SYNC-OUT 120” of Phase-3.
- Lastly, connect all “RETURN” lines together.
- See section on “Parallel Operation” on page 2–15 to connect additional units to each phase.

3-Phase, 3-Wire Delta Output Wiring



- All outputs should be wired through an appropriately rated circuit breaker.
- On Phase-1, Connect terminal L1 to phase-3 Terminal L2.
- On phase-1, connect terminal L2 to phase-2 terminal L1.
- On phase-2, connect terminal L2 to phase-3 terminal L1.

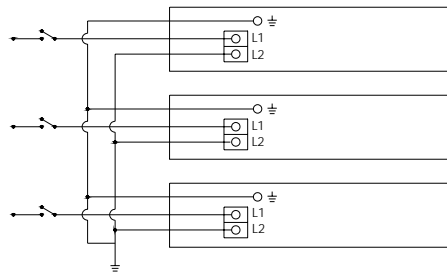
3-Phase, 3-Wire Y-Connection Output Wiring



- All outputs should be wired through an appropriately rated circuit breaker.
- Connect L2 terminals of the three phases to a common bus.
- Wire L1 of phase-1 to Line-1 output.
- Wire L1 of phase-2 to Line-2 output.
- Wire L1 of phase-3 to Line-3 output.

3-Phase, 4-Wire Y-Connection Output Wiring

This scheme is the same as the preceding with the addition of a neutral connection.



- All outputs should be wired through an appropriately rated circuit breaker.
- Connect L2 terminals of the three phases to the neutral bus.
- Connect L1 of phase-1 to Line-1 output.
- Connect L1 of phase-2 to Line-2 output.
- Connect L1 of phase-3 to Line-3 output.

Ethernet Port

Network connection to each inverter module is made through a standard RJ-45 connector mounted on the rack mount frame assembly.

3

Inverter Module Installation and Operation

Chapter 3 contains information and procedures for installing and using the XDI Inverter.

This chapter describes the following:

- installing the inverter
- setting up the inverter
- protections and alarms
- maintaining the inverter

Installation into Rack Mount Frame



WARNING

During the installation or removal of the inverter, ensure that the power switch (see Figure 3-2) is in the off position.

Installing

To install an inverter module, slide it into a pre-wired rack mount frame until the mounting ears are flush with the front of the rack. In order to prevent the inverter from being accidentally displaced from its proper position, apply the captive screws.

The mating of the inverter with the rack mount frame should be established without excessive force. If the unit does not slide into the rack mount frame completely, please verify that the rack mount frame was assembled and installed into the equipment rack according to “Installation Into Cabinet Style Equipment Racks” on page 2–5 or “Installation into Relay Racks” on page 2–6.

The inverter is a forced air cooled device. Please observe that the air intake and exhaust are not blocked (refer to “Initial Inspection” on page 2–2).

Please refer to Figure 3-1.

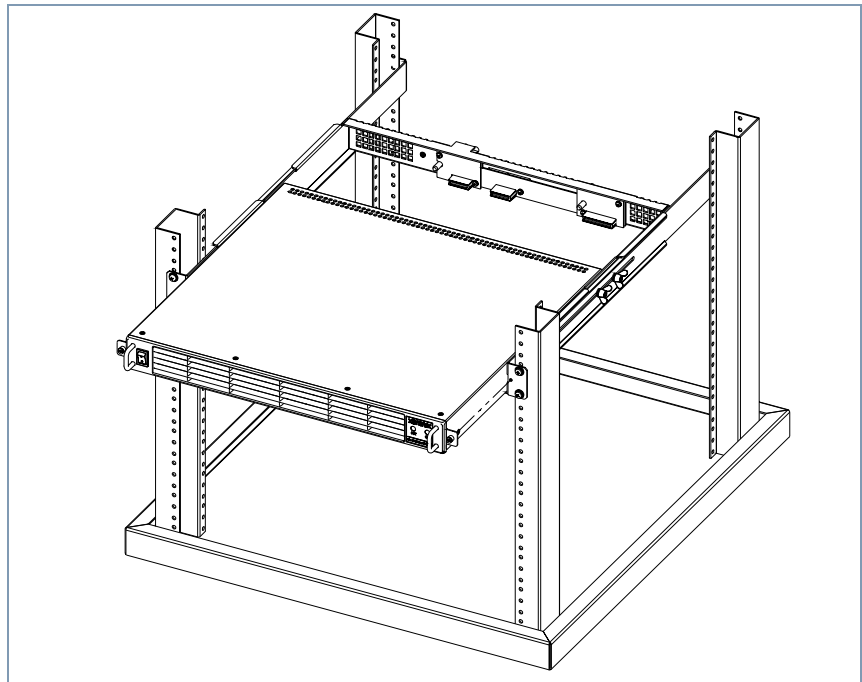


Figure 3-1 Installing an Inverter into a Rack

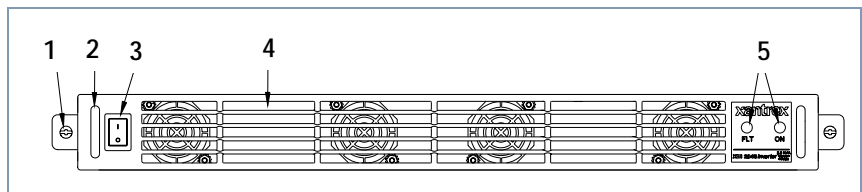


Figure 3-2 Inverter Front Panel

1. Captive Screw
2. Handle
3. Power Switch
4. Air Intake Vents
5. "Fault" and "ON" LED's

Uninstalling

To uninstall the inverter module, release the captive screws and slide the module out.

Operation of Inverter Module

Theory of Operation

The XDI is a digitally controlled power converter. It provides galvanic isolation from the DC input to the AC output. The isolation stage is a resonant full-bridge converter and the inversion stage is a highly efficient class D amplifier (patent pending).

Depending on the rack wiring, inverters can operate in stand-alone, parallel, 3-phase or split-phase mode. Details on rack wiring are in Chapter 2.

When paralleled there is no master unit and each unit adjusts its own power level for best power sharing.

The user interface lines and the optional Ethernet provide a convenient way to remotely control and monitor the status of each Inverter in the rack.

All user lines (see Figure 2-3) as well as communication lines between the units (CANbus and synchro lines - see Figure 2-3) are isolated from the input DC and output AC power potential.

System Startup

Turn the front panel switch (see Figure 3-2) to the ON position to enable the inverter.

At power-on, the unit enters into a self-diagnostic mode to check that the inverter is functioning correctly and no alarm conditions exist. During this short delay (about 10 seconds), the “Standby/ON” Indicator (see Figure 3-2) will flash green. Once the unit has completed its self-diagnosis and everything is functioning correctly, by default the inverter output will turn on. The “Standby/ON” indicator will remain solid green and the power will be delivered to the output AC terminals (see Figure 2-3).

Standby Mode

This low power state allows your inverter to recommence operation quickly but conserves power in the meantime. In this mode the output to your inverter remains OFF and the green “Standby/ON” LED (see Figure 3-2) on the front panel flashes. The “Standby” mode can be initiated via the user interface lines (see Figure 2-3) or via an optional Ethernet connection.

Please note that during the self diagnostic mode, the flashing of the green LED is with approximately 50% duty cycle. During the standby mode the flashing is significantly slower (with approximately 10% duty cycle, this is referred to as “short flash”).

Cooling Fans

To improve operating efficiency and extend fan lifespan, fan speed is controlled by the XDI’s microprocessor. When the XDI’s internal temperatures are below a safe threshold the fans will remain off. As the internal temperatures rises, fan speed will smoothly increase to the maximum.

User Interface

Front Panel

Table 3-1 Front Panel LED Functions

Red LED	Green LED	Function
ON	OFF	A continuously incompatible operating condition exists and an alarm has tripped. See “Protections and Alarms” on page 3–7). The inverter is automatically turned off until the fault/alarm has been cleared.
OFF	ON	Regular operating conditions. Output is on and delivering power.
OFF	fast flashing	Self-Diagnostic mode. Prior to enabling the inverter the unit always performs a self-check and diagnostics.
OFF	slow-short flash	Stand-by mode.

User Lines

The port with user lines is located at the rear panel of the rack mount frame (Figure 2-3). See Figure 2-7. The following table lists the signals:

Table 3-2 User Line Pins

Pin	Name	Function
1	User_Ground	All user lines are referenced to user_gnd. User_gnd is isolated from both the input DC power and the output AC power.
2	Shut_Down	This is an input pin. The input impedance is 100 Ω in parallel with 20 pF. A logic high (1.25 V to 5 V) would set the inverter into Standby Mode (see page 3–5). If pin 2 is floating, the internal pull_down resistor of 100 Ω will force a logic “0” and this pin becomes inactive.
3	Fault_Flag	This is an output pin. A logic high (5 V) indicates that an alarm has tripped. The output of the inverter is, therefore, disabled.
4	Auxiliary_Line	This is an output pin. The functionality of this user line is factory preset. It can be user configured if the Ethernet option is installed.
5	Inverter_On	This is an output pin. A logic high (5 V) indicates that the inverter is in an “on” state and delivering AC power to the AC output power terminal.

Protections and Alarms

Overview

The Digital Signal Processor (DSP) in the inverter continuously monitors a number of parameters for purposes of protecting the power source, load, inverter and user from hazardous conditions. Fuses on the DC input and AC output provide additional hardware fault protection. An alarm is triggered whenever a fault is detected. The protective action in the case of a fault is to turn the inverter off. The inverter then enters a self-diagnosis loop until the fault causing the alarm clears. This also clears the alarm in the fault register and allows the inverter to resume normal operation. If an alarm is tripped the fault flag on the user port as well as the red front panel indicator will be active. When equipped with the Ethernet option, the actual fault condition causing the alarm can be queried.

Input Voltage Protection

The inverter will continuously operate from an input source in the range of -35 to -75 Vdc. Should the input voltage fall outside this range for more than 4 seconds, the inverter output is disabled and internal relays open to isolate the load and source. In this condition, the red LED on the front panel is lit and fault flag on the user port is set high. The inverter resumes normal operation as soon as the input is within acceptable limits for 2 seconds.

Output Voltage Protection

The output is monitored for conditions potentially damaging to the inverter or load. A voltage exceeding 140 Vac (263 Vac for the 230 V model) at the inverter output for over 1 second, or a voltage below 80 V (154 Vac for the 230 V model) for more than 5 seconds will cause the inverter to shut down and open the internal load relay. This fault condition is reported by setting the fault flag on the user port and fault LED on the front panel. The DSP continues to check for compatible output conditions before enabling the inverter and switching to “on-line” status.

Overload Protection

The inverter will deliver the rated load power continuously at the rated ambient temperature. It will also reliably operate up to 1600 Watts without further restriction on the maximum ambient temperature. The internal temperatures of critical components monitored by the DSP will determine operating time at this overload range. Beyond 1600 Watts, the DSP computes the power and extrapolates the operating time at that power level before shutting down. The maximum overload rating is 3000 Watts for 5 seconds. After each overload trip event, the inverter re-starts after a 10-second pause. Should three such events occur within a 2-minute interval, the inverter shuts down permanently. Normal operation can be restored by clearing the alarm (see “To Clear an Alarm” on page 3–11) or using the front panel switch.

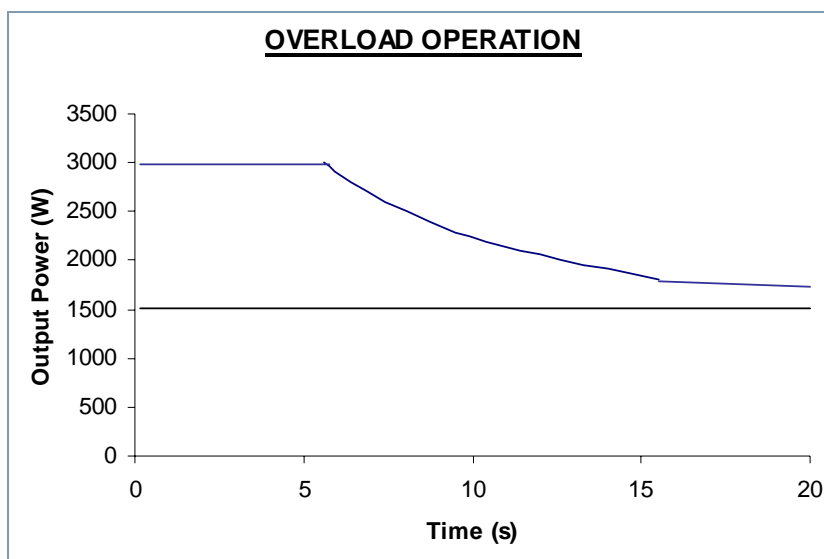


Figure 3-3 Overload curve

Over Temperature Protection (OTP)

This feature protects critical components from failure due to temperature stress should a fan fail or the ambient temperature or internal temperature exceed acceptable levels. This module also controls the fans, turning them on when internal temperatures exceed 35°C and increasing fan speed in proportion to increase in temperature. When an OTP event occurs, the Inverter shuts down and the fault flag is set on the front panel and user-line port. Fans maintain operation at maximum speed until internal heat-sink temperatures drop below 70°C at which point the inverter re-starts.

Short-circuit Protection

The inverter output is short-circuit proof. The DSP detects a sustained short-circuit (greater than 2 seconds) and shuts down the inverter to protect the load. The inverter will attempt to power the load a total of three times in a 4-second window before permanently shutting down. After clearing the load fault, normal operation can be restored (see “To Clear an Alarm” on page 3–11).

Over-Current protection

The inverter can reliably deliver up to 50 A of peak current without tripping any protections. Two levels of protections are provided. The first level of protection is hardware based, providing peak current clipping at 50 A. Should the current exceed this (e.g. in the event of severe back-feed) the DSP forces the inverter to skip a line cycle. Three consecutive line cycle skips will force a reset of the inverter where the output is temporarily disabled for about 4 seconds or until the back-feed falls away.

Internal Diagnostics

Upon power-up or fault event, the inverter executes a sequence of internal diagnostics checking for compatible conditions at the DC input, output and selected internal modules. Different alarms cause execution of differing diagnostic sequences. All preceding fault conditions are continuously monitored as part of the internal diagnostics routine. In addition, the internal bus voltage, which is the inverter voltage source is also monitored. The diagnostic module checks to ensure this is within limits at start-up and continuously during normal operation. A failure of this bus sets the fault flag on the front panel and user-line port and disables the inverter. Normal operation resumes when within limits.

Fuses and Grounding

The inverter is equipped with non-user replaceable, internal fuses for fault protection. The input fuse (fuse F1) is rated at 60 A, 170 Vdc, 100 kA 1R and positioned in the return path. Both L1 and L2 output ports are protected with slow acting fuses (fuses F2 and F3). The fuse ratings are model dependant and as follows:

XDI2048 120 V output: 20 A 250 V

XDI2048 230 V output: 12 A 250 V

Grounding studs are provided adjacent to the DC input and AC output ports. The equipment must be grounded at these locations as required by end applications and local regulations. See Chapter 2, “Rack Mount Frame Assembly and Installation” for connection details.

Incorrect Connection Protection

- Input contactor will not close for normal startup with reverse polarity input connection.
- The output contactor will not close if AC back feed is detected on power up or if a unit is unable to synchronize to the AC bus.
- The output fuse will open for output faults not covered by internal protection circuitry.

Output (AC) Alarm

The following conditions will cause an output alarm:

- Output overload
- Output short circuit
- Output Over-voltage
- Over-temperature
- Module failure

When such a condition exists,

1. The red FAULT indicator located on the front panel is turned on,
2. The open collector “Fault” alarm output is energized,
3. The output contactor is opened and the inverter output is disabled.
Except in the case of an Output Overload when the module will continue to run for a short period, depending on the overload power, prior to shutdown.

To Clear an Alarm

Depending on the cause of the alarm, the alarm may be cleared automatically as soon as the fault condition has elapsed. In some cases, the alarm is cleared by:

- cycling the ON/OFF switch on the rear panel,
- toggling the Shut_Down user line,
- or toggling between Standby and Active buttons on the Web Browser interface (if Ethernet Option is being used).

Maintenance

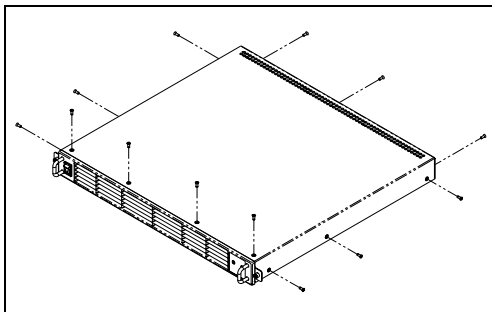
Periodic Cleaning

Whenever a unit is removed from operation, clean the outside surfaces with a weak solution of soap and water. If required, use low-pressure compressed air to blow dust from in and around components on the printed circuit boards.

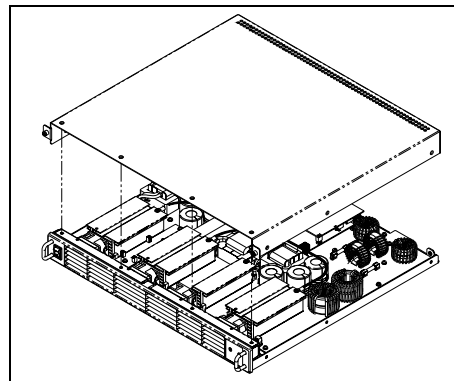
Fan Filter Replacement

The XDI is fitted with disposable fan filters which prevent the entry of dust and debris into the unit. These filters should be inspected every six months. When the filters become dirty they can be replaced as shown in Figure 3-4.

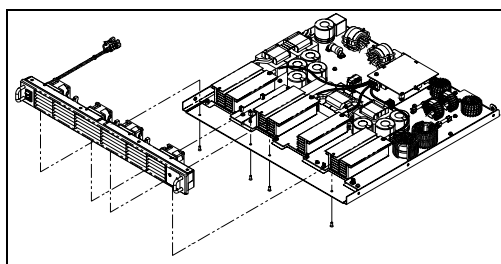
1. Unscrew the Cover



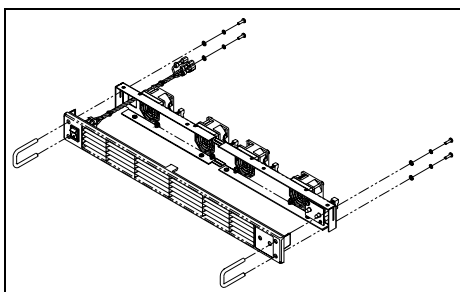
2. Remove the Cover



3. Remove the Fan Bracket



4. Remove the Front Panel



5. Remove the Fan and Fan Filters

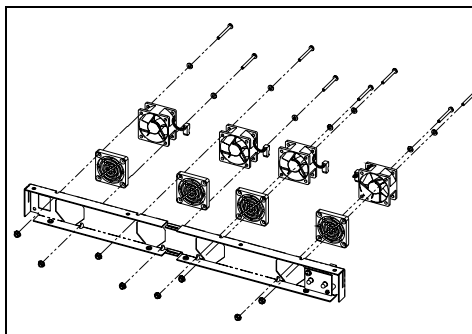


Figure 3-4 Replacing the Fan Filters

4

Remote Communication & Monitoring

Chapter 4 contains information and procedures for using the Ethernet to provide remote communication and monitoring.

This chapter describes the following:

- setting up the computer and inverter for the first time
- using the Ethernet to remotely communicate with the inverter
- setting up and using the Web interface

Introduction

When installed, the optional TCP/IP enabled Ethernet communications card and user interface provides remote monitoring and ON/STBY control of a Xantrex Datacom Inverter module.

Web-enabled User Interface

- Provides monitoring capability: Pout, Vout, Iout, On/Stby Status, Inverter model/version, and Fault Condition (if exists)
- Provides control capability: Remote On/Stby control of inverter
- Provides pro-active Fault Alarm: Emails SRQ to user-specified email address
- Output Current, Iout
- On/Stby Status
- Inverter model/version
- Fault Condition Query

Initial Setup

Introduction

To use the XDI Inverter Ethernet Interface Card, you must have the following equipment:

- A compatible model of inverter
- CAT5/CAT5e patch cable if you want to connect over the network
- Computer with Ethernet installed
- Web browser program

The Ethernet interface is usually installed in the inverter at the factory. Your local distributor or service center can also install the interface, especially for use in a previously-purchased inverter already on site. The Ethernet interface card will be configured with default settings (Table 4-1).

Important: The only way to configure the interface card is through the Ethernet port using TCP/IP protocol. Therefore, the Ethernet interface must be set up properly the first time. Once it is setup, the parameters (such as, password and IP address) should be saved in a safe place. Table 4-2 is provided to record your settings after they have changed.

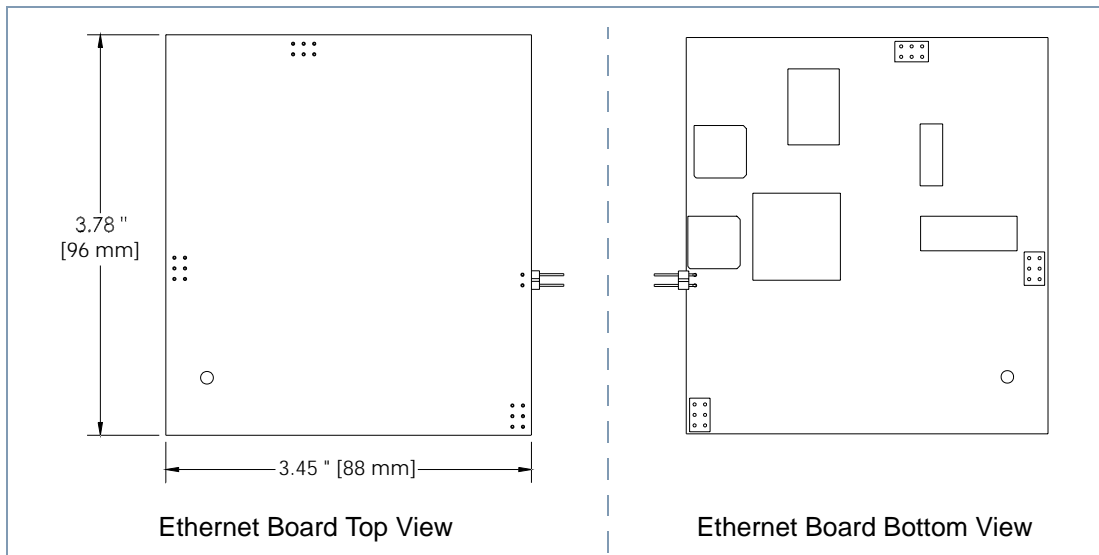


Figure 4-1 Ethernet Interface PCB

How to Setup For the First Time

Hardware Setup

In order to communicate to the XDI Ethernet for the first time, you will need a CAT5/CAT5e cable and a computer with an Ethernet adapter installed.

Setting up to configure for the first time:

1. Wire up the rack mount assembly as stated in Chapter 2.
2. Connect to the unit as shown in Figure 4-2, “First Time Setup Connections” on page 4-4.
3. Turn on the inverter.
4. Configure the computer’s Ethernet adapter settings (contact Network Administrator).
5. Open your Web browser and go to the default IP address (Table 4-1).

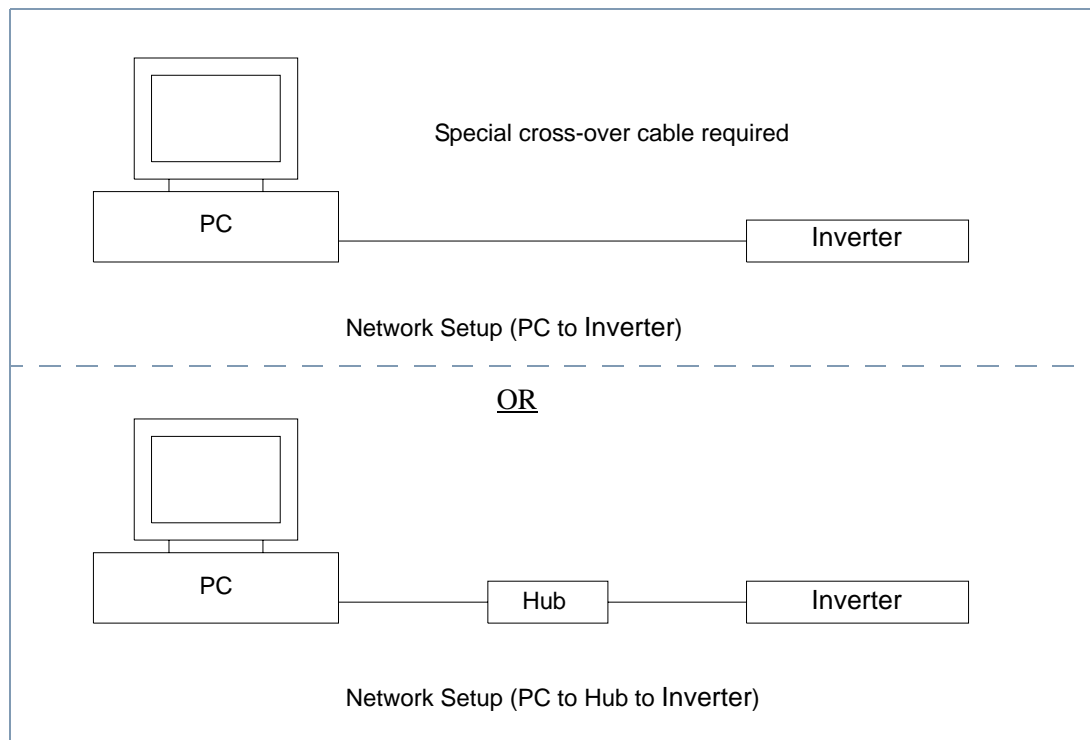


Figure 4-2 First Time Setup Connections

Ethernet Setup

You must run a Web browser to communicate and configure the XDI Ethernet. Microsoft Internet Explorer or Netscape Communicator are such examples.

Important: Ensure that the unit's IP address is unique on the network. Ensure the computer's IP address and sub-net mask are compatible with the unit's. (contact network administrator for details).

Configure Ethernet settings:

1. Run your Web browser program.
2. In the address box type in the "Default IP" (Table 4-1).
3. Select the "Setup" link located on the upper left hand side.
4. Configure the Ethernet settings to your unique setup (see "Setup Page" on page 4-15).

Table 4-1 Default Settings

Setting	Default Value
Default IP	192.168.1.1
Gateway IP	0.0.0.0
Sub-Net Mask	255.255.255.0
Domain Name Server 1	0.0.0.0
Domain Name Server 2	0.0.0.0
SMTP (email) Server	none
Email Alert Address	none
Password	12345

Important: Be careful when you change the network settings. If they are changed to a value where communication can not be established any more, a hard reset must be done (see "Resetting" on page 4-6).

You can use Table 4-2 to record your own settings.

Table 4-2 User Configured Settings

Setting	Value
Default IP	
Gateway IP	
Sub-Net Mask	
Domain Name Server 1	
Domain Name Server 2	
SMTP (email) Server	
Email Alert Address	
Password	

Resetting

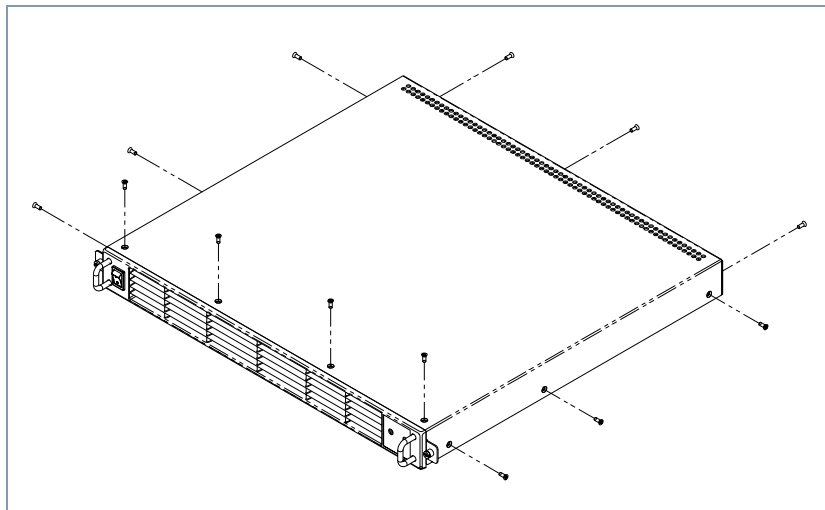
To reset the Ethernet settings the cover will have to be removed to put a jumper onto the control card. When the Ethernet is reset, its settings will be changed to the default values as shown in Table 4-3.

To reset the Ethernet:

1. Remove the XDI unit from it's rack mount.
2. Remove the top cover (Figure 4-3, "Removing Unit's Top Cover" on page 4-7).
3. Place a jumper on SW2 (Figure 4-4, "Ethernet Reset Jumper" on page 4-8).
4. Replace top cover.
5. Apply power to the XDI by putting it back into the rack mount and turning the unit on.
6. Wait 10 seconds.
7. Remove the XDI from the rack mount.
8. Remove the top cover.
9. Remove the jumper on SW2.
10. Replace the top cover.

Table 4-3 Reset Settings

Setting	Reset Value
Default IP	192.168.1.1
Gateway IP	0.0.0.0
Sub-Net Mask	255.255.255.0
Domain Name Server 1	0.0.0.0
Domain Name Server 2	0.0.0.0
SMTP (email) Server	not changed
Email Alert Address	not changed
Password	12345

**Figure 4-3** Removing Unit's Top Cover

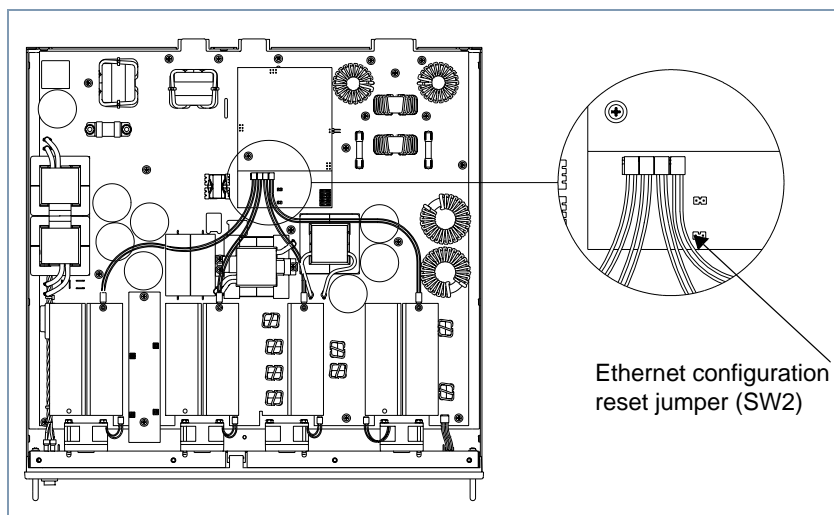


Figure 4-4 Ethernet Reset Jumper

Operating Instructions

Introduction

The Ethernet interface card allows you to monitor/configure settings using a Web page. It also adds email functionality to the XDI. The unit will automatically send an email when it is powered up or when there is a fault condition.

This section describes how the Web page and email works.

Network Connection

This configuration is used when you want to communicate to one or more XDI inverters over a network. In order to use network connection the network settings on the XDI's Ethernet interface card must be configured properly. Chapter 2 describes how to configure the network settings for the first time.

Setting up to communicate using network connection:

1. Wire up the rack mount assembly as stated in the XDI manual.
2. Connect the XDI to a network.
3. Turn on the inverter.
4. Wait for an email that will be sent to the configured "Email Alert Address".
5. Run a Web browser program on the computer.
6. In the address box of your browser, type in the configured IP address sent in the email.

Important: Each XDI Ethernet on the network will allow only one Web browser to access its Web page at any one time.

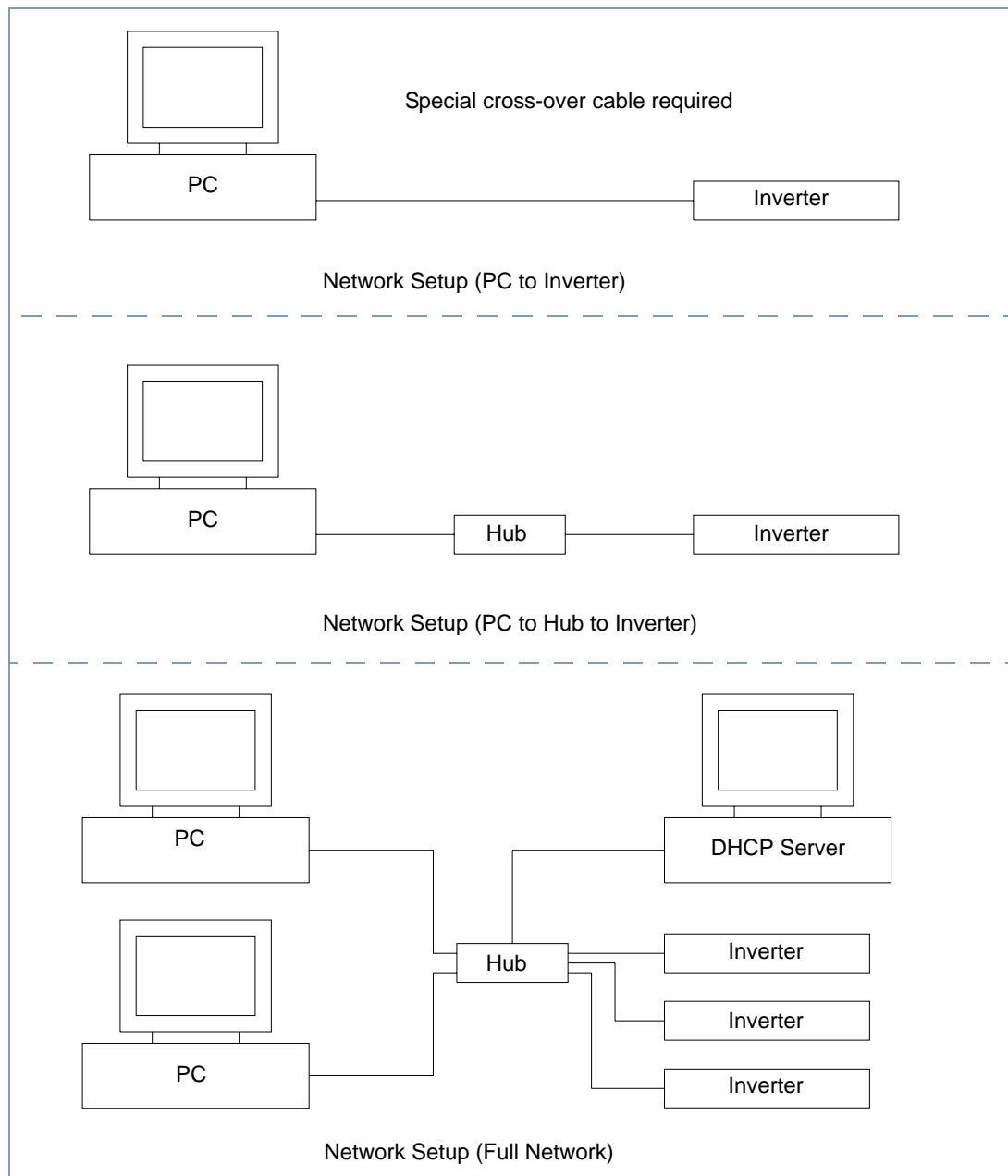


Figure 4-5 Network Setup

Using DHCP

A DHCP server is used to obtain a dynamic IP that is unique on the network. To enable DHCP, set the default IP to “0.0.0.0”. On power up the Ethernet interface card will request a unique IP address from the DHCP server which it will set as its active IP address.

If the “SMTP (email) Server” and “Email Alert Address” is setup properly the Ethernet interface card will send an email with the obtained IP address to be used on your Web browser.

On power up, if the default IP address is set to “0.0.0.0” the “Gateway IP” will be reset to “0.0.0.0” as well so that it could obtain a valid gateway IP. This is done to facilitate the use of the XDI on different networks when using DHCP. If the default IP is static, the gateway IP is left unchanged.

Important: If you set the default IP to “0.0.0.0” and you connect a computer directly to the inverter (without a DHCP server), the unit’s active IP will also be “0.0.0.0” and communication to the inverter will not be possible.

To correct the problem, connect the inverter back onto the network using DHCP or reset the Ethernet (see “Resetting” on page 4–6).

What Power On Does

During power on the Ethernet interface card takes approximately 8 seconds to initialize. If a DHCP server is used, the card resets the gateway IP and attempts to get a new active IP and gateway. Once initialization is completed, the card will attempt to enable its Web server. It will do so for the next minute. If successful, it attempts to send an email to the configured “Email Alert Address” using the configured “SMTP Server” (see “Network Connection” on page 4–9).

Password

The Web page interface is password protected. See “Password” on page 4–12 for the default password. The Web page uses the industry standard MD5 algorithm to authenticate the remote user.

Network configurations (Default IP, SMTP Server etc.) are protected with one password (at+iRPG) and all other settings (for example, Monitor Refresh Rate and Standby) are protected by another (at+iWPWD). For simplicity, the Web interface will set both passwords to the same value. Therefore, when you try to change a parameter, a password prompt may appear twice. After submitting a password you can freely change parameters for 10 minutes.

Figure 4-6, “Password Confirmation Boxes” on page 4–12 shows the screen that will appear when both passwords are needed. There may be only one box at other times. Enter the previously saved password into both boxes and select “Submit”.

Passwords must be 4 to 10 characters long. To disable the password enter a new password with blanks in the Setup Page (see page 4–15).

Important: If you forget the password, you can reset all the parameters by following the procedure described in “Resetting” on page 4–6.

Passwords	
Password required to change iChip's parameter values.	
Password (AT+iRPG) :	<input type="text"/>
Password required to change device parameter values.	
WEB password (AT+iWpwd):	<input type="text"/>
<input type="button" value="Submit"/>	

Figure 4-6 Password Confirmation Boxes

Automatic Power-On Email

When the inverter is turned on, it will attempt to send an email to the configured “Email Alert Address” using the configured “SMTP Server”.

Contents of the email:

From: XDI <serial number>

To: <Email Alert Address>

Subject: Unit powered on

Body:

IP address: <IP_address>

How to Use the Web Interface

To communicate to the Web interface the active IP must be entered into the “Address” box of your Web browser. i.e. “192.168.1.1”. The “Manage page” will be displayed and it will contain links to monitor and setup the inverter. You will have access to the “Manage page”, described on page 4–14, the “Setup page”, described on page 4–15, and the “Monitor page”, described on page 4–17.

Manage Page

The “Manage page” is the first page of the Web page. It contains information about the inverter as well as buttons to put the unit into or out of standby mode.



Figure 4-7 Manage Page of Web Interface

Table 4-4 Manage Page of Web Interface

Object	Description
Active Button	Puts the unit into active mode. The inverter’s output is enabled.
Standby Button	Puts the unit into standby mode. The inverter’s output is disabled.
DSP Firmware Version	Current version of the inverter’s control DSP firmware.
Manufacturer	inverter manufacturer
Serial Number	Programmed inverter serial number
Manage Link	Link to same page
Monitor Link	Link to Monitor Page
Setup Link	Link to Setup Page

Setup Page

The “Setup page” allows the user to set the Ethernet interface card’s network setting, email settings and refresh rate. It is important that the network settings are correct to ensure proper communication.

Important: Contact Network Administrator for more information.

The screenshot displays the Xantrex XDI Power Manager web interface. The top header includes the Xantrex logo and the title 'XDI Power Manager'. A sidebar on the left contains navigation links: 'Manage', 'Monitor', and 'Setup'. The 'Setup' link is highlighted, and the corresponding 'Setup' page is displayed. This page contains several configuration fields: 'Page Refresh Rate' with a dropdown menu currently set to 'Don't Auto Refresh'; 'Active IP' with an empty text box; 'Default IP' with the value '192.168.1.1'; 'Gateway IP' with the value '0.0.0.0'; 'Sub-Net Mask' with the value '255.255.255.0'; 'Domain Name Server #1' with the value '0.0.0.0'; 'Domain Name Server #2' with the value '0.0.0.0'; 'SMTP (Email) Server' with an empty text box; 'Email Alert Address' with an empty text box; 'Web Password' with a masked input (****); and 'Confirm' with a masked input (****). A 'Submit' button is located at the bottom left of the form area.

Figure 4-8 Setup Page of Web Interface

Table 4-5 Setup Page of Web Interface

Object	Description
Monitor Page Refresh Rate	The rate at which to automatically refresh the monitor page (The Refresh Data link on the “Monitor Page” should be selected for the new refresh rate to take effect.)
Active IP	Inverter’s active IP address
Default IP	Set this value to a static IP if desired or set it to 0.0.0.0 to use a DHCP server.
Gateway IP	Address for network gateway
Sub-Net Mask	Identifies which portion of IP address is the network ID and which portion is the host ID
Domain Name Server #1	IP address to common name translator #1
Domain Name Server #2	IP address to common name translator #2
SMTP (email) Server	Address of network email server
Email Alert Address	Email address used to send alert messages
Web Password	Text to change to a new password (4–10 characters long) Leave empty to disable password
Password Confirm	Confirmation of new password
Submit	Updates the Ethernet interface card with the above configuration
Manage Link	Link to Setup Page
Monitor Link	Link to Monitor Page
Setup Link	Link to same page

Monitor page

The “Monitor page” shows the current status of the Inverter. It displays the output measurements, output conditions and faults.

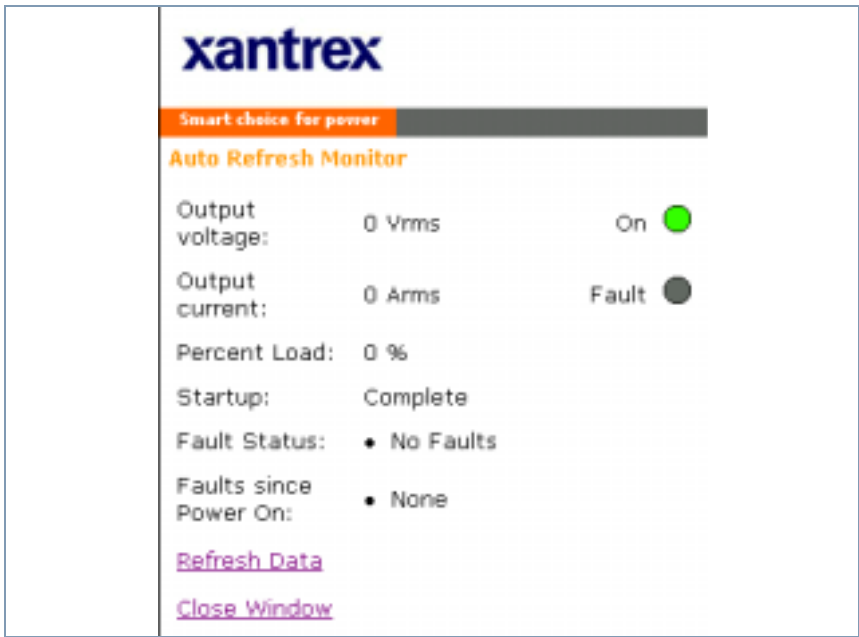


Figure 4-9 Monitor Page of Web Interface

Table 4-6 Monitor Page of Web Interface

Object	Description
Output Voltage	Last measured output voltage (Vrms)
Output Current	Last measured output current (Arms)
Percent Load	Last measured percent load (%). Indicates percentage of load being drawn from the inverter with respect to maximum load capability
Startup	Status of startup sequence
Fault Status	List of current faults of the inverter (see Table 4-7 on page 4-19)
Faults Since Power On	List of faults that have occurred since power up (see Table 4-7)
On LED	Indicates state of the inverter: Green – Inverter is operating normally Yellow – Inverter is running startup sequence, or in standby mode Off – Inverter’s output is disabled because a fault has occurred.
Fault LED	Indicates fault condition: Red – Inverter has a fault condition Off – Inverter is operating normally
Refresh Data Link	Updates all the data on the page. Select this every time the “Monitor Page Refresh Rate” parameter has been changed.
Close Window Link	Closes the page

Automatic Shutdown Email

When the inverter shuts down due to a fault or a user shutdown, the Ethernet interface will attempt to send an email to the configured “Email Alert Address” using the configured “SMTP Server” (see “Network Connection” on page 4–9).

Contents of the email:

From: XDI <serial number>

To: <Email Alert Address>

Subject: Unit has shutdown

Body:

Serial # <Serial> at <IP> has shutdown. <Shutdown_Code>

The shutdown code list is a list of decimal values that represent specific shutdown conditions (Table 4-7, “Shutdown Code” on page 4–19) currently exhibited by the inverter. Each shutdown code is separated by a space.

Important: By the time you have received the email, if the inverter has shutdown due to a fault, the inverter may have already corrected the problem.

Table 4-7 Shutdown Code

Code	Fault Description
16	Reserved
15	Reserved
14	Reserved
13	Input stage voltage out of range
12	DC link stage over voltage
11	Output stage over voltage
10	Multiple output stage over current
9	Output overload
8	Synchronization error
7	Over temperature
6	Output disabled via interlock
5	Output disabled via interface command
4	Output disabled by user. (To enable, toggle interlock or interface command)
3	DC link stage under voltage
2	Output stage under voltage
1	Output stage over current

Important: Refer to “Protections and Alarms” on page 3–7 for a more detailed description of faults.

5

Troubleshooting

Chapter 5 contains information and procedures for troubleshooting your XDI Inverter and Ethernet card.

User Diagnostics

If your XDI is not performing as described in this manual, run through the procedures and checks in this section before calling your service technician. These procedures are confined to operator-level functions only and do not require cover-off servicing.

Emergency Shutdown

In an emergency, carry out both of these steps:

1. Shut the inverter off immediately.
2. Isolate the power source by turning off the input and output breakers.

Unusual or Erratic Operation

If the inverter displays any unusual or erratic operation, follow these steps:

1. Shut the inverter off immediately.
2. Disconnect the load by turning off the output breaker or load switch.
3. Test the inverter with no load. Check front panel LED status against Table 3-1 on page 3–6 and “Protections and Alarms” on page 3–7.
4. If the tests show that the power supply is functioning normally, check that load, programming, and monitoring connections and circuits.

Refer to Table 5-1, “Inverter Diagnostics” on page 5–3 and Table 5-2, “Ethernet Diagnostics” on page 5–4 for more detailed user diagnostics.

If the problem is not solved by following this procedure, or if the unit fails to operate correctly after additional diagnostics in Table 5-1 and Table 5-2, call your service technician.

Diagnostic Guide

Table 5-1 Inverter Diagnostics

Symptom	Check	Further Checks and Corrections
No output. No front panel indication.	Is input breaker and power to rack enabled?	Check for availability of power source.
	Is unit fully recessed and secured in rack?	See Chapter 2.
	Is power switch ON?	Beyond scope of user troubleshooting. Service required.
Red LED on. No output	Is input voltage within working range?	Verify input voltage is within - 35 V to - 75 V
	Are fans operating continuously at high speed?	Check if ambient temperature is within 0 – 50°C.
	Internal module fault.	Beyond scope of user troubleshooting. Service required.
Unit cycles on/off. Green LED - steady blink briefly each time prior to turning on.	Check for load fault.	Ensure no overload or short circuit condition is present at output.
	Internal module fault?	Beyond scope of user troubleshooting. Service required.
No output. Green LED - short blink at a slow rate (approx. 1/ sec.)	Unit in shut down?	Check status of signal on shutdown pin on user port or query same status using Ethernet if equipped with one.
	Is unit fully recessed and secured in rack?	If connectors don't make full contact, the unit remains shutdown. See Chapter 2.
	Internal module fault.	Beyond scope of user troubleshooting. Service required.

Table 5-2 Ethernet Diagnostics

Symptom	Check	Further Checks and Corrections
IP address doesn't work	1. Static IP already being used by another device on the network	1. Change the static IP to an unused address
	2. DHCP server failed to assign IP	2. IP was not configured to 0.0.0.0 to use DHCP server Check with IT to see if DHCP server working properly
	3. Connected to 100baseT only hub	3. Connect to 10baseT or 10/100baseT hub
	4. Another computer on the network is accessing the Web page	4. Close the Web page on the other computer and retry
Email was not sent on power up or fault condition	1. Network traffic is high	1. Wait a few minutes for the email to be sent
	2. Network settings are incorrect	2. Recheck the "SMTP server" and "Email Alert Address" settings in the Setup page
	3. XDI failed to connect to computer or network	3. See suggestions for troubleshooting when IP address doesn't work
Monitor page is not updating	1. Auto refresh rate is set to "Don't auto refresh"	1. Change the "Page Refresh Rate" setting on the setup page and click "Submit"
	2. Monitor page has not yet refreshed	2. Click on the "Refresh Data" link on the monitor page
Can not change any settings on Web page	1. Password is incorrect	1. Set the correct password in the password box (see "Password" on page 4-12)
Pictures missing on Web page	1. Web browser failed to cache pictures on the first try due to traffic	1. Clear the Web browser's cache. Usually in the options stating clearing temporary files.

Important: Cycling the power on the inverter may automatically fix the problem. If the problem still persists, try to reset the Ethernet interface card settings by doing a hard reset as stated in "Resetting" on page 4-6.

A

Specifications

Appendix A supplies information about specifications for the XDI Inverter and the Ethernet.

Inverter Specifications

Electrical Specifications

Input Voltage, Current, Power, Frequency Ranges

Nominal Input	- 48 VDC
Input Range	- 40 to - 60 V (meets all specification)
Safe Input Range	± 80 Vdc (will not damage unit)
Maximum Input Current	90 A (at 40 V in, max 3 kW surge output, 5 s max)
Nominal input Current	36 A (at 48 V input, 1500 W output)
Maximum Input Current Ripple	< 1% Input Current
DC Side Voice Band Noise Limit	less than 32 dBrc (C-message weighting)
Over Current Protection	electronic limit on input boost converter stage, 60 A fuse on DC input Inverter stage output fuse for extreme faults
Inrush Current Controlled	40 A typical at 48 V < (2x I_{rated})

Output Voltage, Current, Power, Frequency Ranges

Waveform	True Sinusoidal
THD	< 3% Typical for linear loads
Output Voltage	120 Vac/60 Hz 230 Vac/50 Hz
Voltage Regulation	< -10%/+4% over full operating range
Frequency Stability	$\pm 0.05\%$
Frequency Accuracy	60/50 Hz $\pm 0.1\%$
Fully Isolated	input to output
Power Rating	2 kVA/1.5 kW Max, over full operating temperature range
Peak Output Current Into Nonlinear Load	50A _{pk} maximum for 120VAC 25A _{pk} maximum for 230VAC

Power Factor	<ul style="list-style-type: none"> • linear – powers all loads with 0 leading to 0 lagging PF • stable with constant power type loads like Power factor corrected power supplies • non-linear – powers rectified loads with up to 2.8 Crest Factor at full load
Motor Starting	4 kVA output for 5 s maximum

Specifications

Efficiency	<ul style="list-style-type: none">• Minimum 85% efficiency at full power, peak efficiency 89%• No load draw: less than 60 W
Start Up Behavior	<ul style="list-style-type: none">• Hot-Swap capable, with controlled inrush current• No arcing of connectors when unit inserted or withdrawn• Output phase locked to parallel connected units prior to power up• Smooth balancing of power with parallel connected units.

Regulatory Approvals

CE EMC Directive requirements FCC Part 15 Class B radiated and conducted limits.

NEBS LEVEL 3

120 V, 60Hz: Certified to CAN/CSA C22.2 No. 60950-00 and UL60950, 3rd Ed. and carries the cCSAus mark. Complies with FCC Part 15, Subpart B, Class B (radiated and conducted emissions.)

230 V, 50Hz: Carries CE mark and complies with the Low Voltage Directive and EN60950. Complies with the specific requirements of both EN55022 (emissions) and EN55024 (immunity).

Environmental Specifications

Operating Ambient Temperature	0° (32°F) to +50°C (122°F), no de-rating
Storage Temperature Range	-50° (-58°F) to +85°C (185°F)
Humidity Range	Max 95% non-condensing

Mechanical Specifications

Ventilation	Air intake from front of unit No additional clearance required top or bottom
Mounting	1 U rack height in rack mount frame, no additional clearance required top or bottom Chassis for 19" rack holds 1 module
Weight	22 lbs. (10kg)
Control Connectors on Back Plane	User lines and paralleling signal lines via wire clamp connectors Optional Ethernet port accessible via standard RJ-45 connector
Front Panel Indicators and Switches	Inverter on/off rocker switch Green LED indicates STANDBY MODE when flashing, ON when solid Red LED indicated FAULT
Reliability MTBF	> 100,000 hours Maintenance is minimal, air inlets should be kept free of dust
Reparability	MTTR < 1 minute (for basic module swap)

Dimensions

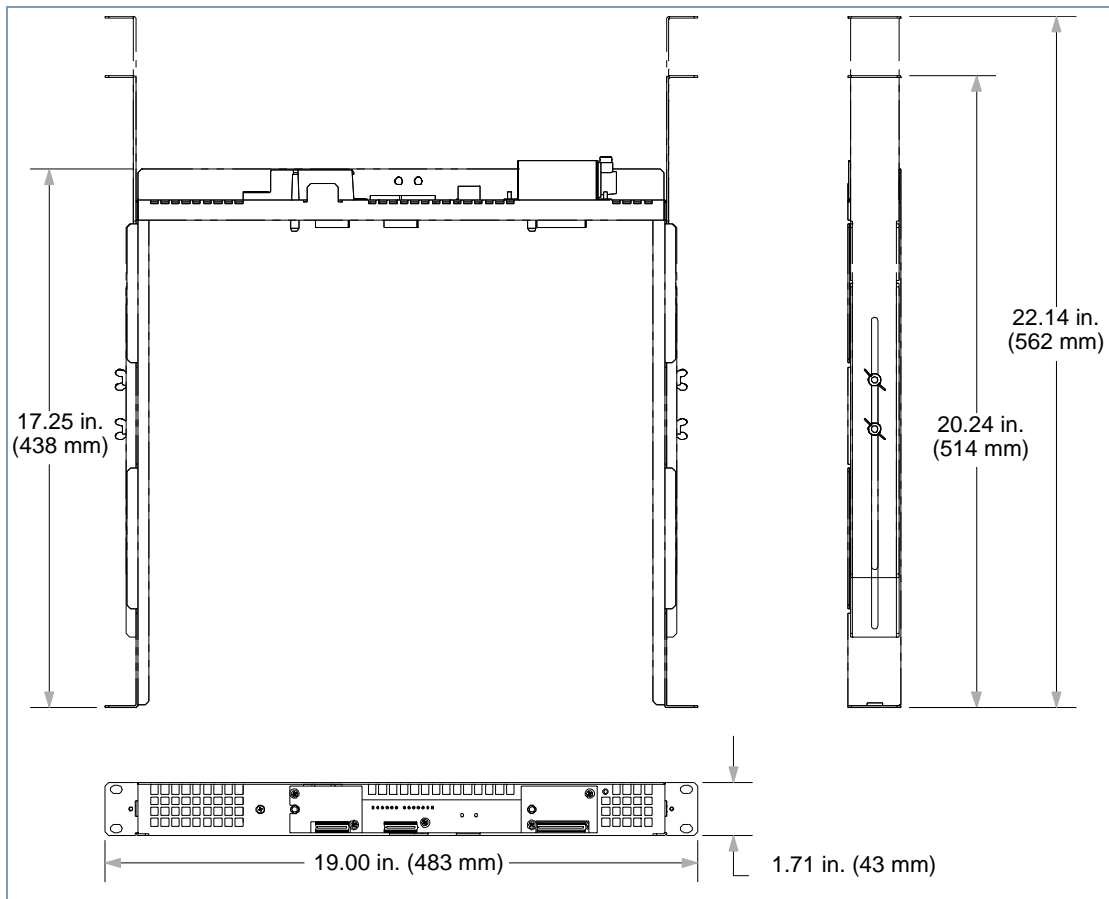


Figure A-1 Inverter and Rack Mount Frame Dimensions

Weight

Inverter: 22 lbs. (10kg)

Rack Mount Frame: 6 lbs (2.7 kg) with sliding rails

Ethernet Specifications

Specifications

The specifications in this section are warranted at $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ unless otherwise specified. All specifications are subject to change without notice.

Readback Resolution	
Voltage	0.1 V
Current	0.1 A
Percent Load	0.1%
Readback Accuracy	
Voltage	0.5 V
Current	0.5 A
Percent Load	5%
Network Wiring Scheme	
10baseT	

Warranty and Product Information

Warranty

What does this warranty cover? This Limited Warranty is provided by Xantrex Technology, Inc. ("Xantrex") and covers defects in workmanship and materials in your Xantrex Datacom Inverter. This warranty period lasts for three (3) years from the date of purchase at the point of sale to you, the original end user customer. You require proof of purchase to make warranty claims.

What will Xantrex do? Xantrex will, at its option, repair or replace the defective product free of charge, provided that you notify Xantrex of the product defect within the Warranty Period, and provided that Xantrex through inspection establishes the existence of such a defect and that it is covered by this Limited Warranty.

Xantrex will, at its option, use new and/or reconditioned parts in performing warranty repair and building replacement products. Xantrex reserves the right to use parts or products of original or improved design in the repair or replacement. If Xantrex repairs or replaces a product, its warranty continues for the remaining portion of the original Warranty Period or 90 days from the date of the return shipment to the customer, whichever is greater. All replaced products and all parts removed from repaired products become the property of Xantrex.

Xantrex covers both parts and labor necessary to repair the product, and return shipment to the customer via a Xantrex-selected non-expedited surface freight within the contiguous United States and Canada. Alaska and Hawaii are excluded. Contact Xantrex Customer Service for details on freight policy for return shipments outside of the contiguous United States and Canada.

How do you get service? If your product requires troubleshooting or warranty service, contact your merchant. If you are unable to contact your merchant, or the merchant is unable to provide service, contact Xantrex directly at:

Telephone: 1 800 670 0707 (toll free North America)
1 360 925 5097 (direct)

Fax: 1 800 994 7828 (toll free North America)
1 360 925 5143 (direct)

Email: customerservice@xantrex.com

Direct returns may be performed according to the Xantrex Return Material Authorization Policy described in your product manual. For some products, Xantrex maintains a network of regional Authorized Service Centers. Call Xantrex or check our website to see if your product can be repaired at one of these facilities.

Warranty

What proof of purchase is required? In any warranty claim, dated proof of purchase must accompany the product and the product must not have been disassembled or modified without prior written authorization by Xantrex.

Proof of purchase may be in any one of the following forms:

- The dated purchase receipt from the original purchase of the product at point of sale to the end user, or
- The dated dealer invoice or purchase receipt showing original equipment manufacturer (OEM) status, or
- The dated invoice or purchase receipt showing the product exchanged under warranty

What does this warranty not cover? This Limited Warranty does not cover normal wear and tear of the product or costs related to the removal, installation, or troubleshooting of the customer's electrical systems. This warranty does not apply to and Xantrex will not be responsible for any defect in or damage to:

- a) the product if it has been misused, neglected, improperly installed, physically damaged or altered, either internally or externally, or damaged from improper use or use in an unsuitable environment;
- b) the product if it has been subjected to fire, water, generalized corrosion, biological infestations, or input voltage that creates operating conditions beyond the maximum or minimum limits listed in the Xantrex product specifications including high input voltage from generators and lightning strikes;
- c) the product if repairs have been done to it other than by Xantrex or its authorized service centers (hereafter "ASCs");
- d) the product if it is used as a component part of a product expressly warranted by another manufacturer;
- e) the product if its original identification (trade-mark, serial number) markings have been defaced, altered, or removed.

Disclaimer

Product

THIS LIMITED WARRANTY IS THE SOLE AND EXCLUSIVE WARRANTY PROVIDED BY XANTREX IN CONNECTION WITH YOUR XANTREX PRODUCT AND IS, WHERE PERMITTED BY LAW, IN LIEU OF ALL OTHER WARRANTIES, CONDITIONS, GUARANTEES, REPRESENTATIONS, OBLIGATIONS AND LIABILITIES, EXPRESS OR IMPLIED, STATUTORY OR OTHERWISE IN CONNECTION WITH THE PRODUCT, HOWEVER ARISING (WHETHER BY CONTRACT, TORT, NEGLIGENCE, PRINCIPLES OF MANUFACTURER'S LIABILITY, OPERATION OF LAW, CONDUCT, STATEMENT OR OTHERWISE), INCLUDING WITHOUT RESTRICTION ANY IMPLIED WARRANTY OR CONDITION OF QUALITY, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE TO THE EXTENT REQUIRED UNDER APPLICABLE LAW TO APPLY TO THE PRODUCT SHALL BE LIMITED IN DURATION TO THE PERIOD STIPULATED UNDER THIS LIMITED WARRANTY.

IN NO EVENT WILL XANTREX BE LIABLE FOR ANY SPECIAL, DIRECT, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, LOSSES, COSTS OR EXPENSES HOWEVER ARISING WHETHER IN CONTRACT OR TORT INCLUDING WITHOUT RESTRICTION ANY ECONOMIC LOSSES OF ANY KIND, ANY LOSS OR DAMAGE TO PROPERTY, ANY PERSONAL INJURY, ANY DAMAGE OR INJURY ARISING FROM OR AS A RESULT OF MISUSE OR ABUSE, OR THE INCORRECT INSTALLATION, INTEGRATION OR OPERATION OF THE PRODUCT.

Exclusions

If this product is a consumer product, federal law does not allow an exclusion of implied warranties. To the extent you are entitled to implied warranties under federal law, to the extent permitted by applicable law they are limited to the duration of this Limited Warranty. Some states and provinces do not allow limitations or exclusions on implied warranties or on the duration of an implied warranty or on the limitation or exclusion of incidental or consequential damages, so the above limitation(s) or exclusion(s) may not apply to you. This Limited Warranty gives you specific legal rights. You may have other rights which may vary from state to state or province to province.

Warning: Limitations On Use

Please refer to your product manual for limitations on uses of the product.

SPECIFICALLY, PLEASE NOTE THAT THE XANTREX DATACOM INVERTER SHOULD NOT BE USED IN CONNECTION WITH LIFE SUPPORT SYSTEMS OR OTHER MEDICAL EQUIPMENT OR DEVICES. WITHOUT LIMITING THE GENERALITY OF THE FOREGOING, XANTREX MAKES NO REPRESENTATIONS OR WARRANTIES REGARDING THE USE OF THE XANTREX DATACOM INVERTER IN CONNECTION WITH LIFE SUPPORT SYSTEMS OR OTHER MEDICAL EQUIPMENT OR DEVICES.

Please note that the Xantrex Datacom Inverter is not intended for use as an uninterruptible power supply and Xantrex makes no warranty or representation in connection with any use of the product for such purposes.

Return Material Authorization Policy

Before returning a product directly to Xantrex you must obtain a Return Material Authorization (RMA) number and the correct factory "Ship To" address. Products must also be shipped prepaid. Product shipments will be refused and returned at your expense if they are unauthorized, returned without an RMA number clearly marked on the outside of the shipping box, if they are shipped collect, or if they are shipped to the wrong location.

When you contact Xantrex to obtain service, please have your instruction manual ready for reference and be prepared to supply:

- The serial number of your product
- Information about the installation and use of the unit
- Information about the failure and/or reason for the return
- A copy of your dated proof of purchase

Record these details in "Information About Your System" on page B-4.

Return Procedure

1. Package the unit safely, preferably using the original box and packing materials. Please ensure that your product is shipped fully insured in the original packaging or equivalent. This warranty will not apply where the product is damaged due to improper packaging.
2. Include the following:
 - The RMA number supplied by Xantrex Technology, Inc. clearly marked on the outside of the box.
 - A return address where the unit can be shipped. Post office boxes are not acceptable.
 - A contact telephone number where you can be reached during work hours.
 - A brief description of the problem.
3. Ship the unit prepaid to the address provided by your Xantrex customer service representative.

If you are returning a product from outside of the USA or Canada In addition to the above, you **MUST** include return freight funds and are fully responsible for all documents, duties, tariffs, and deposits.

If you are returning a product to a Xantrex Authorized Service Center (ASC) A Xantrex return material authorization (RMA) number is not required. However, you must contact the ASC prior to returning the product or presenting the unit to verify any return procedures that may apply to that particular facility.

Out of Warranty Service

If the warranty period for your Xantrex Datacom Inverter has expired, if the unit was damaged by misuse or incorrect installation, if other conditions of the warranty have not been met, or if no dated proof of purchase is available, your inverter may be serviced or replaced for a flat fee.

To return your Xantrex Datacom Inverter for out of warranty service, contact Xantrex Customer Service for a Return Material Authorization (RMA) number and follow the other steps outlined in “Return Procedure” on page B-4.

Payment options such as credit card or money order will be explained by the Customer Service Representative. In cases where the minimum flat fee does not apply, as with incomplete units or units with excessive damage, an additional fee will be charged. If applicable, you will be contacted by Customer Service once your unit has been received.

Information About Your System

As soon as you open your Xantrex Datacom Inverter package, record the following information and be sure to keep your proof of purchase.

- ☐ Serial Number _____
- ☐ Purchased From _____
- ☐ Purchase Date _____

Xantrex Technology Inc.

1 800 670 0707 Tel toll free NA
1 360 925 5097 Tel direct

1 800 994 7828 Fax toll free NA
1 360 925 5143 Fax direct

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