IONizer 4300 Series
Hardware Installation Guide

Apprion Incorporated

March 2009

Revision History

Date	Document Revision	Author(s)
January 2009	Version 1	David Cote
February 2009	Version 2	David Cote
March 2009	Version 3 Updated antenna co-location information	David Cote

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Audience

This document describes Apprion™ Incorporated's (Apprion's) IONizer Installation instructions and is intended for the following audiences:

Apprion Employees (Full time and Contract)

This document is a product of the Apprion Engineering team and may be used to help other Apprion employees gain a better understanding of the IONizer installation process.

Apprion Services Group

This document is intended for use by the Apprion Services Group to aid in the installation of IONizer devices.

Apprion's Outsourced Documentation Team

This document is intended to serve as input for other customer/partner-facing documentation that may be produced by Apprion's outsourced documentation team.

This document is Apprion PROPRIETARY AND CONFIDENTIAL.

Conventions

Item	Description
Arial Bold	Menu Instructions (**Device > View Devices**)
	Tab Names (**View Devices**)
	Buttons (**Submit**)
Bold	Field Name (**Device Type**)
	Note
`Courier Type`	Keystroke Entry (`Search Term`)
	Command Line Examples (`activate_config`)
Italic	Names of referenced documents (*ION User Guide*)

How to Use this Guide

This guide provides basic instructions on how to install and wire an IONizer device. You should real ALL chapters for important information before attempting the installation.

Chapter 1
IONizer Device Overview

Introduction

This guide provides information on how to install Apprion™ IONizer devices. The IONizer provides an integrated set of modular hardware and software services that facilitate creation, control and monitoring of secure device networks for the modern plant. The IONizer is a wireless transceiver that serves as the center point of an independent wireless network, or as the connection point between wireless and wired networks. Designed for the industrial applications market, IONizer models are IEEE 802.11a/b/g/i/j compliant depending on the radios installed. This platform is specifically designed to address the wireless connectivity needs of high-security industrial environments.

All IONizer devices are remotely configured and all can take on one or more forms within the network. This means that each IONizer can be configured to suit client requirements.

This guide deals with installation only. Configuration instructions are provided in the *IONizer Reference Guide*.

IONizer 4300 Series Models

These devices are designed for use in ATEX Zone 1, Category 2 hazardous locations defined by the ATEX directive. All wiring (and conduit connections) to the unit must conform to the recommended practices per affected local and country electrical code.

The IONizers in this series come in different configurations. All IONizer s use 48V Power over Ethernet (PoE) or 24V external power. The IONizer 4320 is identical to the 4300 but also contains an embedded WiHART gateway.

Configurations are based on model number. Models in this series include:

- IONizer 4300-200 (Single Radio)
- IONizer 4300-220 (Two Radios)
- IONizer 4320-200 (Single Radio, Embedded WiHART)
- IONizer 4320-220 (Two Radios, Embedded WiHART)

FCC regulations require that IONizer devices be professionally installed by an installer certified by the National Association of Radio and Telecommunications Engineers or

equivalent institution.

Safety Information

The FCC, with its action in Docket 96-8 has adopted a safety standard for human exposure to radio frequency (RF) electromagnetic energy emitted by FCC certified equipment. When used with approved Apprion antennas, the IONizer 4300 products meet the uncontrolled environmental limits found in OET-65 and ANSI C95.1, 1991. Proper installation of this radio product according to the instructions found in this guide will result in user exposure that is substantially below the FCC recommended limits.

CAUTION: Do not touch or move antenna(s) while the unit is transmitting or receiving.

CAUTION: Do not hold any component containing a radio such that the antenna is very close to, or touching any exposed parts of the body, especially the face and eyes, while transmitting.

CAUTION: Do not operate the radio or attempt to transmit data unless the antenna is connected. Damage could occur.

WARNING: Do not operate a portable transmitter near unshielded blasting caps or in an explosive environment unless it is a type specifically qualified for such use.

WARNING: To comply with FCC RF exposure compliance requirements, the antennas used with the IONizer must be installed with a minimum separation distance of 25.26 cm from all persons, except the 16 dBi Sector Antenna (Apprion P/N 89-1186-000) and the 19 dBi Directional Antenna (Apprion P/N 89-1187-000) which must be installed with a minimum separation distance of 48.97 cm from all persons.

The 16 dBi Sector Antenna (Apprion P/N 89-1186-000) and the 19 dBi Directional Antenna (Apprion P/N 89-1187-000) are to be used for Point-to-Point operation only.

Antennas must not be co-located or operated in conjunction with any other antenna transmitter unless separated by 20 cm or greater.

WARNING: The IONizer 4300 is intended for local (intra-building) connections only and is not designed or evaluated for direct connections to the public telecommunications/cable distribution systems. Cable and Ethernet connections should be made in accordance to the National Electrical Code (NEC). For example, one of the following should be true:

- Cable runs are located in the same building as the unit
- Cable runs through air between buildings are less than 140 feet (42 m), and are not routed near power lines
- Cable runs between buildings are buried

- Cable runs between buildings are in underground conduit, where a continuous metallic cable shield or a continuous metallic conduit containing the cable is bonded to each building grounding electrode system.

These options come from the US National Electrical Code, Sections 800.10, 800.12, 800.31, 800.32, 800.33, and 800.40.

CAUTION: 5150 – 5250 MHz frequency band is for indoor use only.

CAUTION: High power radar devices are the primary users in the 5250 – 5350 MHz and 5650 – 5850 MHz frequency bands. These radar devices may cause interference and/or damage to LELAN devices.

CAUTION: Risk of explosion if battery is replaced by an incorrect type. Replace only with Snap-On battery assemblies that are designed for use with the Texas Instrument M4T32-BR12SH6 module. Dispose of used batteries according to the manufacturer's instructions.

Compliance

This equipment has been tested and found to comply with the European Telecommunications Standard ETS 300 328. This standard covers Wideband Data Transmission Systems referred to in CEPT recommendation T/R 10.01. This type of equipment is designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed in accordance with the instruction guide, may cause harmful interference to radio communications.

This equipment complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interferences, and (2) This device must accept any interference received, including interference that may cause undesired operation.

Chapter 2
Installation Preparation

Overview

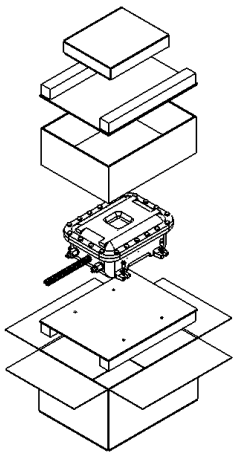
This chapter describes the installation process and what you'll need to successfully mount and connect an IONizer at your site.

Preparation

The IONizers come packaged in specialized shipping containers, each designed for the type of IONizer ordered.

Packaging Content

Contents of the package depend on the IONizer purchased.



4300 Series

- IONizer 4300 or 4320
- Wire Nuts (for 24 VDC installation)
- Manual
- Product Registration and Warranty Cards

Note: *IONizer 4300 Series devices have internally connected WAN and LAN cables routed out of the unit's conduit opening. In addition, units will also have two 24 V power wires coming from the same*

opening. Cables are to be routed through conduit during installation. 4320 units have only one Ethernet (WAN) cable available.

Additional orderable accessories include:

- Power over Ethernet (PoE) Injector with AC Power Cord
- Antenna(s) based on configuration
- Specialized mounting brackets and hardware

Inspect the unit for any damage or missing items. Contact your Apprion service representative for support.

Ensure that the nameplate on the IONizer your purchased indicates the correct model ordered.

Note: *Models that use this nameplate include: 4300-200, 4300-220, 4320-200, and 4320-220.*

Chapter 3
Installation Guidelines

Overview

The IONizer is intended to be installed as part of a complete wireless design solution. IONizer's can be mounted just about anywhere including high posts to achieve the best results.

This chapter provides basic guidelines that pertain to each device.

Basic Guidelines

- Cable routed through conduit has a maximum length restriction of 300 feet (91 meters).
- To comply with FCC RF exposure compliance requirements, the antennas used with the IONizer must be installed with a minimum separation distance of 25.26 cm from all persons, except the 16 dBi Sector Antenna (Apprion P/N 89-1186-000) and the 19 dBi Directional Antenna (Apprion P/N 89-1187-000) which must be installed with a minimum separation distance of 48.97 cm from all persons.
- The 16 dBi Sector Antenna (Apprion P/N 89-1186-000) and the 19 dBi Directional Antenna (Apprion P/N 89-1187-000) are to be used for Point-to-Point operation only.
- Antennas must not be co-located or operated in conjunction with any other antenna transmitter unless separated by 20 cm or greater.
- Installation must be performed using authorized cables and/or connectors provided with the device or available from the manufacturer/distributor for use with this device.
- Changes or modification not expressly approved by the manufacturer or responsible party for the FCC compliance could void the user's authority to operate this equipment.
- Maintenance is limited to the external enclosure surface and cable connections. At no time should the unit be opened.
- IONizer's mounted outdoors must be grounded with a connection of 1 OHM or less leading from the external grounding stud to earth ground. Follow all national, local, and plant electrical codes.
- IONizer's must be properly grounded before making any other power and signal connections.
- Ionizer's must always be grounded in a hazardous location as defined by the NEC or applicable local and country codes.
- Apprion IONizers are to be mounted vertically with their WAN and LAN connections at the bottom of the device. This protects the connections from the elements and allows any lettering

to be properly viewed. On 4300 models, connectors must be at the bottom to allow the protective door to be opened properly.

- External antenna connections should be protected from lightning surges via a lightning arrestor device. Install Apprion's approved male to female N-Type connector lightning arrestor (P/N 74-1282-000) with the protected direction towards the IONizer and the surge direction towards the detachable antenna.
- The lightning arrestor must be properly grounded with a recommended 6AWG wire (green/yellow striped color code recommended) crimped to the supplied compression ring tongue terminal. Use the proper hardware stack-up sequence per the part's enclosed instructions.
- Screw on type antennas and surge protectors are to have their connections covered with a vulcanizing silicon UV resistant tape after assembly. This protects the components from corrosion and protects the enclosure from water ingress.

Chapter 4
Mounting Methods

Overview

This chapter describes various mounting methods. Your actual installation will dictate the actual way your device is mounted.

Pole Mounting

4300 Series

Requirements

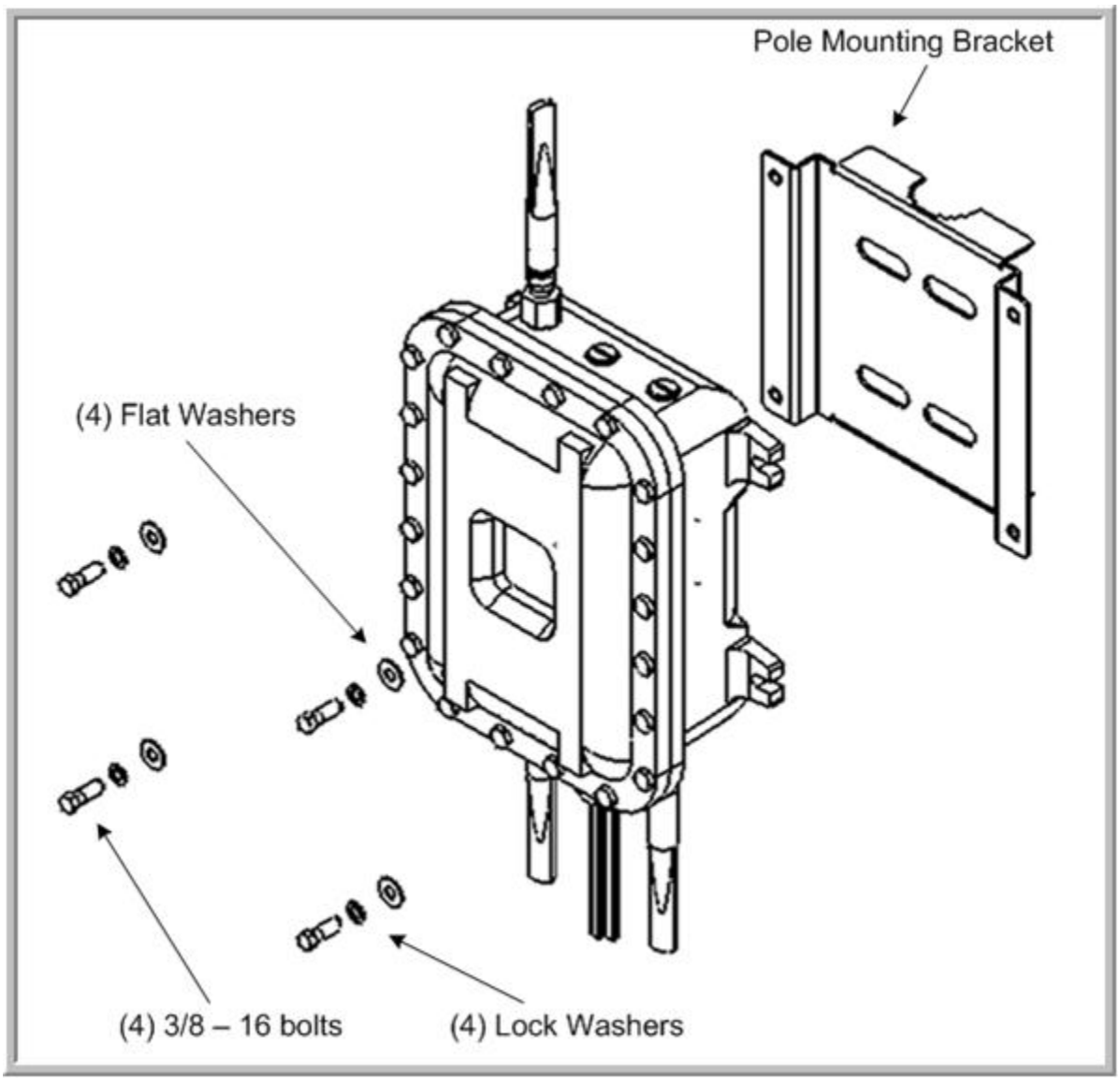
- 3/8-inch torque wrench
- ½-inch socket head
- (2) 3/8-inch U-bolts with hardware
- (4) 3/8-inch flat head washers
- (4) 3/8-inch lock washers
- (4) 3/8-16 bolts

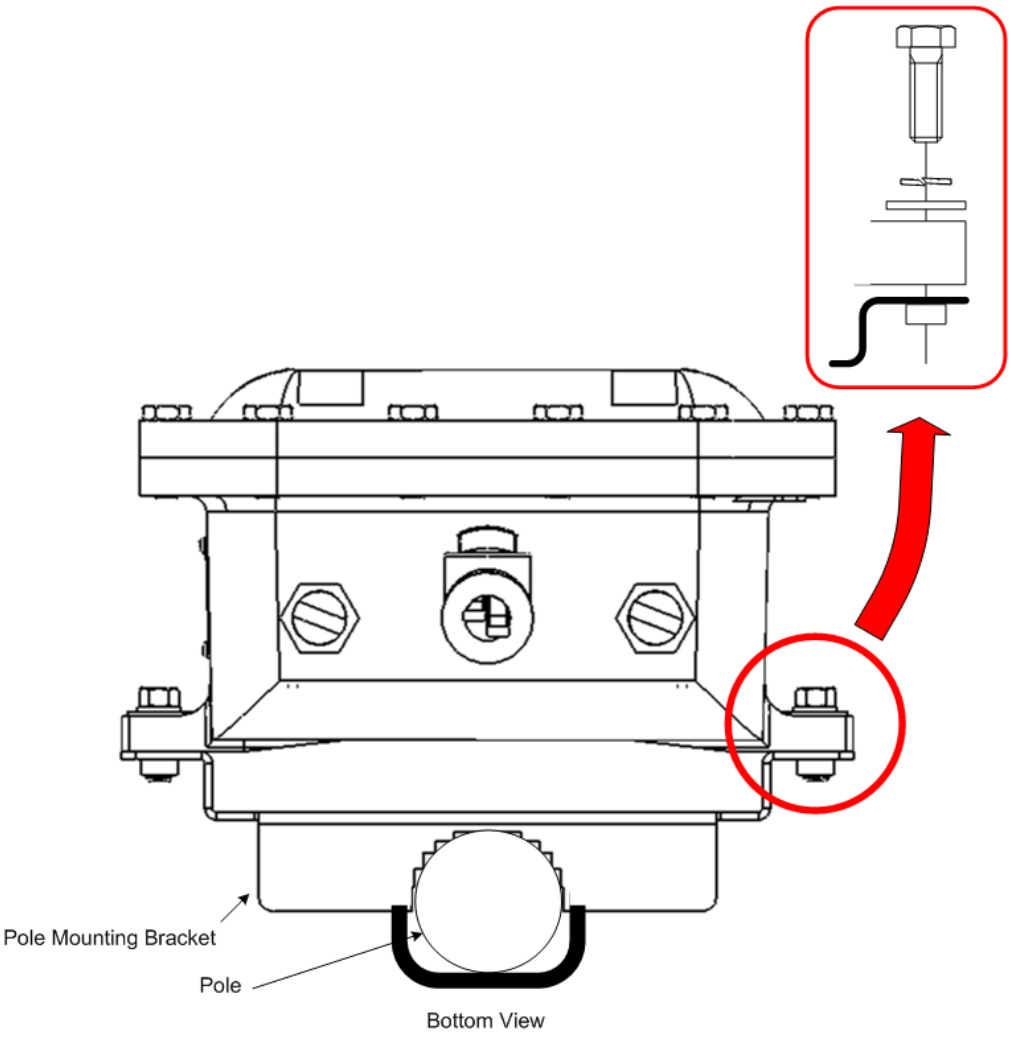
The IONizer 4300 Series units can be mounted on a vertical pole up to 2 inches in diameter using a separately orderable pole mounting bracket. The pole mounting bracket is shipped with all of the necessary hardware.

Important: *The pole mounting bracket must be secured to the pole prior to connecting the IONizer to the bracket. The bracket is secured to the pole using two U-bolts and supplied hardware.*

Once the pole mounting bracket is mounted to the pole, mount the IONizer to the bracket as shown. Make sure the device is in the correct orientation with the connectors on the bottom facing the ground.

Mounting Diagram





Torque bolts between 25 and 30 inch pounds. Attach antennas after the device is mounted.

Wall Mounting

4300 Series

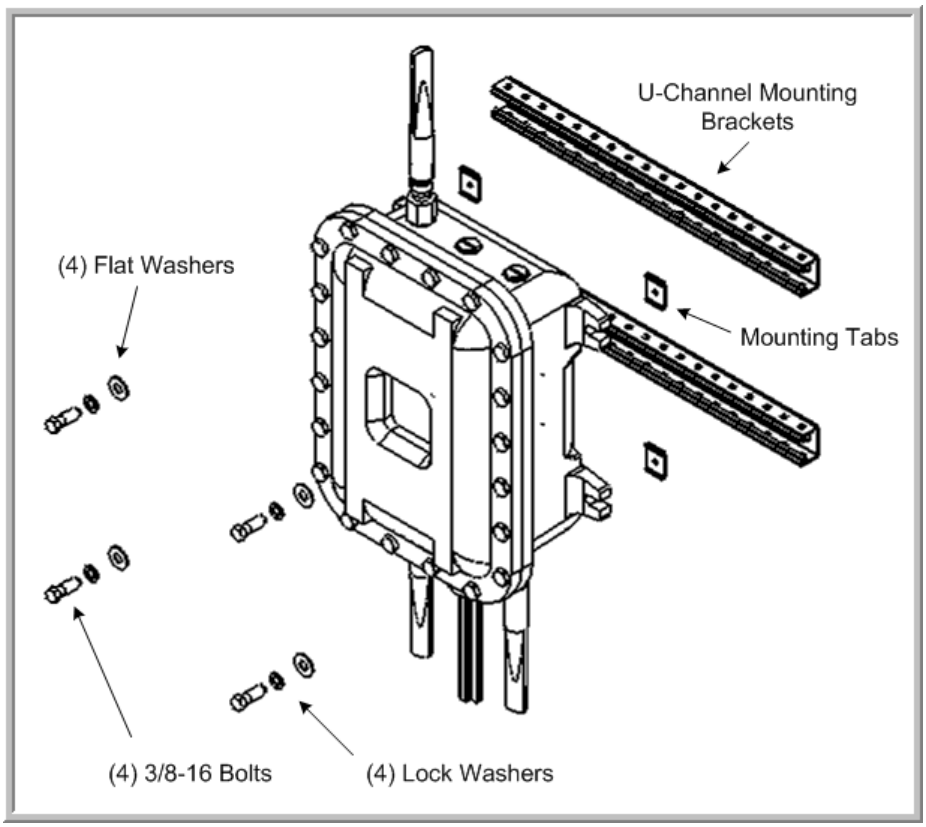
Requirements

- (2) U-channel mounting brackets
- (4) Mounting tabs
- (4) 3/8-inch lock washers
- (4) 3/8-inch flat washers
- (4) 3/8-16 bolts
- Drill bit

- Phillips head screwdriver

Procedure

1. Ensure that the surface is clean and free of loose debris.
2. Insert the mounting tabs into the U-channel mounting bracket and position them to align with the mounting flanges on the IONizer casing.
3. Use a bolt, lock washer, and flat washer on all four corners of the Ionizer. Ensure that the bold threads through the mounting tabs and are securely attached. Torque bolts between 25 to 30 inch pounds.
4. Mount the U-channel mounting brackets to a flat surface.



5. Attach antennas. See Appendix A for a list of approved antennas and basic instructions on how to secure the antennas to the IONizer.
6. Seal antenna connections (see instructions).

Note: *The IONizer 4320 contains an embedded WiHART gateway which requires a special antenna (P/N 89-1584-000). This antenna must be connected to the Port 3 antenna port.*

Sealing Antenna Connections

Antenna connections should be sealed to protect them from exterior harsh environments. Use a self-amalgamating poly isobutylene tape, which over a period of time adheres to itself and forms a single amalgameted rubber molding that conforms to the shape of the item its covering. Once the tape is in place for several hours, the rubber molding is resistant to water and most solvents. It remains stable over a wide temperature range and degrades very slowly in sunlight. The tape can be removed by cutting it away with a sharp knife.

Chapter 5
Cabling the IONizer

Overview

How you cable the IONizer depends on the model you purchased. The 4300 Series IOnizers are designed for hazardous locations and therefore have different cabling requirements such as running cable through conduit. Other models are designed to house WiHART gateways. This chapter describes the cabling requirements for each model.

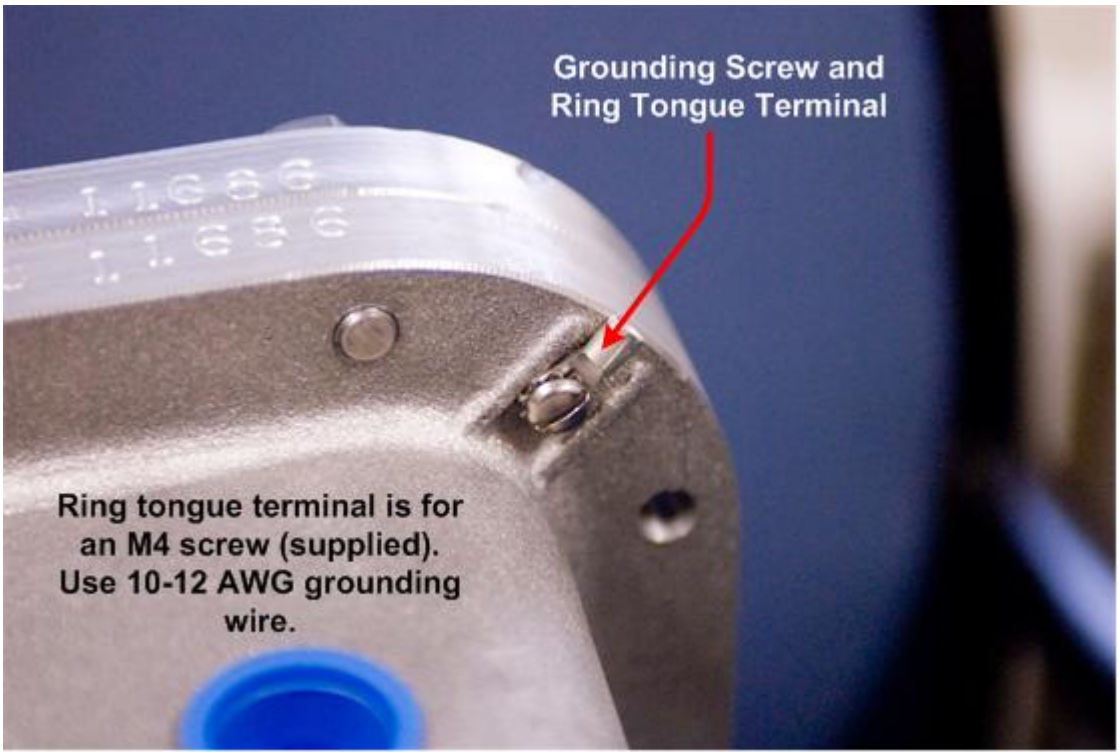
Grounding

All IONizers must be properly grounded before making power and signal connections. Apprion recommends a UL Listed #10 AWG wire that is suitable for this purpose, and a ring tongue terminal, Panduit P/N P10-8R or equivalent. The terminal is to be crimped to the wire using the correct crimping tool as recommended by the terminal manufacturer. The torque rating on the nut is 8 to 10 inch pounds. The wire should be kept as short as possible while using grounding practices that are compliant with local codes and practices.

Note: *Ensure that the connection to a proper earth ground is made by certified and authorized personnel. The ground must conform to all applicable codes and regulations. The materials required to connect to a proper earth ground are defined by local conditions and must be procured locally to ensure that the correct safety environment is achieved.*

Grounding Procedure

The grounding connection is in the same location on all 4300 Series IONizers.

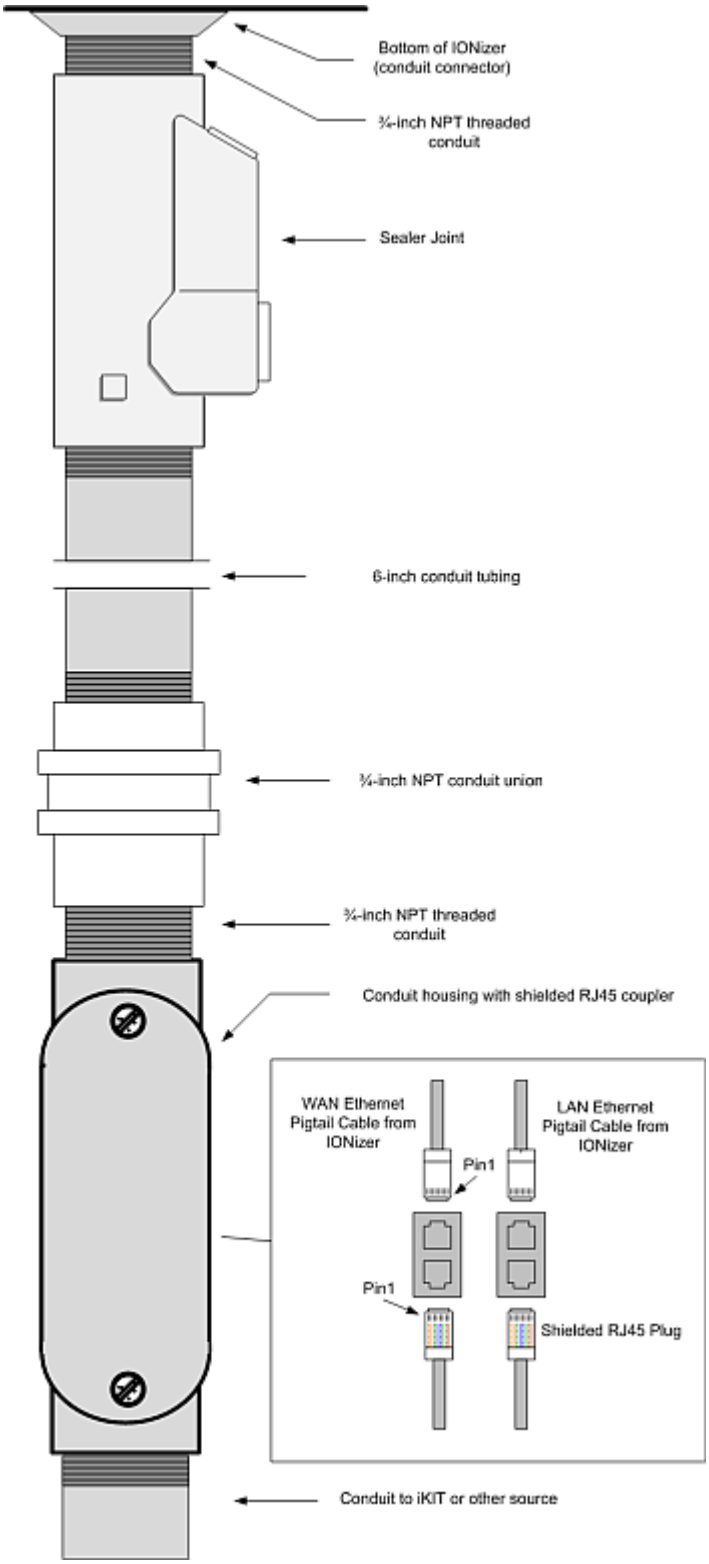


Attach the earth ground wire (not supplied) to the ring terminal attached to the IONizer's grounding stud. Ensure that the ring tongue terminal is seated against the IONizer's outer case.

IONizer 4300

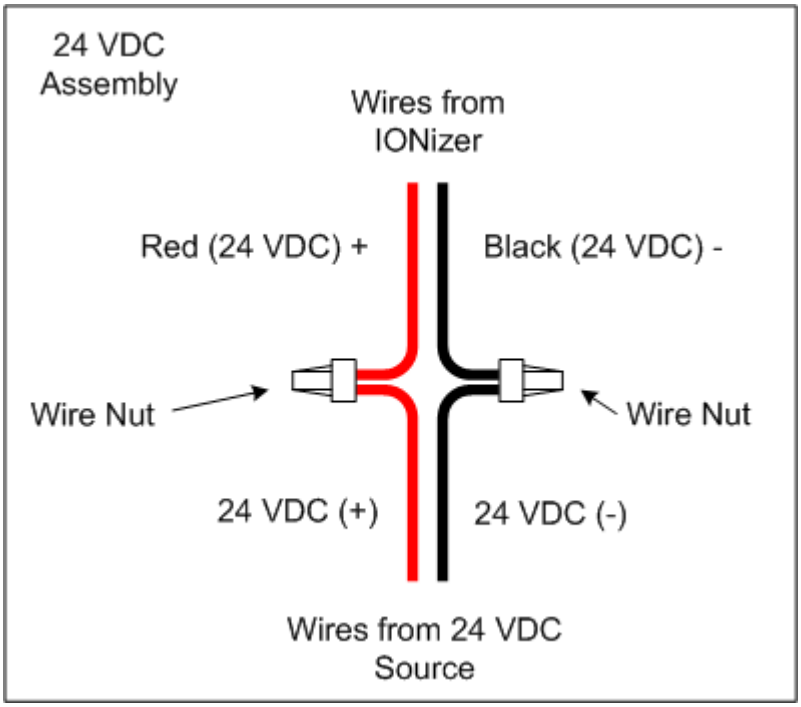
These devices are designed for use in ATEX ZONE1, Category 2 hazardous locations as defined in the ATEX directive. All wiring (and conduit connections) to the unit must conform to the recommended practices of affected local and county electrical codes.

Two Cat 5 cables protrude from the conduit opening at the bottom of the unit (cable is hardwired inside the IONizer in 24-inch length). Cable ends are marked with a "W" for WAN and "L" for LAN for ease of identification. Two other wires are available for 24V. The two Ethernet cables are terminated with an RJ45 connector. The following diagram shows the required conduit and cable connections:



If you are using the 24 VDC power option, you'll need to make the appropriate power connections. 24 VDC power wires must be run up through the conduit. Two 24 VDC wires are also hard wired inside the IONizer and connections between wires protruding from the IONizer and those providing the power

source are made inside the conduit housing. The following diagram shows how the connections should be made:



IONizer 4320 Cabling Notes

The IONizer 4320 contains a WiHART Gateway. Cabling and conduit requirements are exactly the same as the IONizer 4300 with the exception being that the IONizer 4320 will NOT have a LAN Ethernet Pigtail cable as shown in the previous diagram.

Appendix A
Approved Antennas

Basic Antenna Installation Information

- Screw on antennas until hand-tight.
- The IONizer supports various antenna types. Antennas that ship with the units are based on orders
- Unauthorized antennas may cause damage to the device
- To comply with FCC RF exposure compliance requirements, the antennas used with the IONizer must be installed with a minimum separation distance of 25.26 cm from all persons, except the 16 dBi Sector Antenna (Apprion P/N 89-1186-000) and the 19 dBi Directional Antenna (Apprion P/N 89-1187-000) which must be installed with a minimum separation distance of 48.97 cm from all persons.
- The 16 dBi Sector Antenna (Apprion P/N 89-1186-000) and the 19 dBi Directional Antenna (Apprion P/N 89-1187-000) are to be used for Point-to-Point operation only.
- Antennas must not be co-located or operated in conjunction with any other antenna transmitter unless separated by 20 cm or greater.
- Installation must be performed using authorized cables and/or connectors provided with the device or available from the manufacturer/distributor for use with this device.
- Changes or modifications not expressly approved by the manufacturer or responsible party for this FCC compliance could void the user's authority to operate this equipment
- When installing authorized antennas, make sure that the N-Type connector is free of dirt and moisture. The installer should properly ground themselves to minimize the chance of electrostatic discharge or arc.

WARNING: *Potential electrostatic charging hazard.*

CAUTION: *During all servicing and maintenance activities, the antennas must be handled with extreme caution to minimize possible electrostatic discharge (ESD) and arcing events.*

CAUTION: *Antennas installed with IONizer 4300 models should be mounted in a location where they are not subjected to winds in order to minimize the build-up of charge and potential arcing of the antennas.*

Sealing Antenna Connections

Antenna connections should be sealed to protect them from exterior harsh environments. Use a self-amalgamating poly isobutylene tape, which over a period of time adheres to itself and forms a single amalgameted rubber molding that conforms to the shape of the item its covering. Once the tape is in

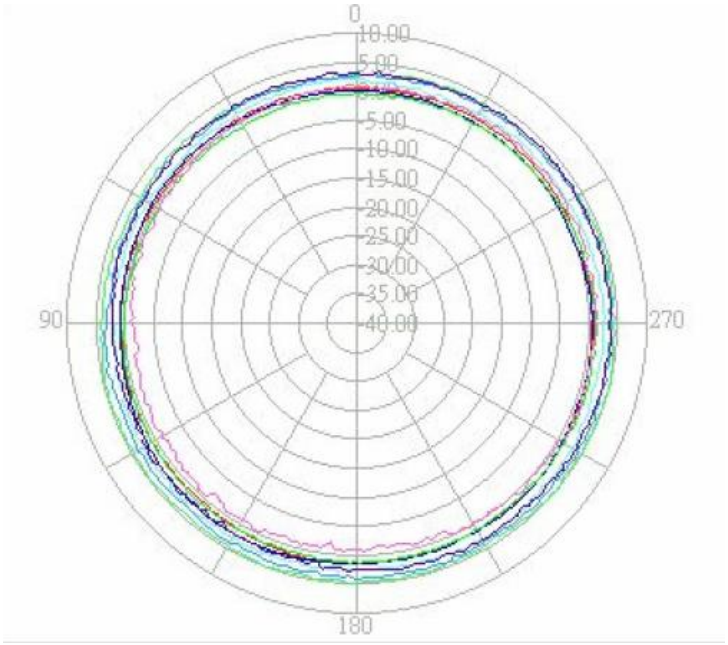
place for several hours, the rubber molding is resistant to water and most solvents. It remains stable over a wide temperature range and degrades very slowly in sunlight. The tape can be removed by cutting it away with a sharp knife.

Approved Antennas

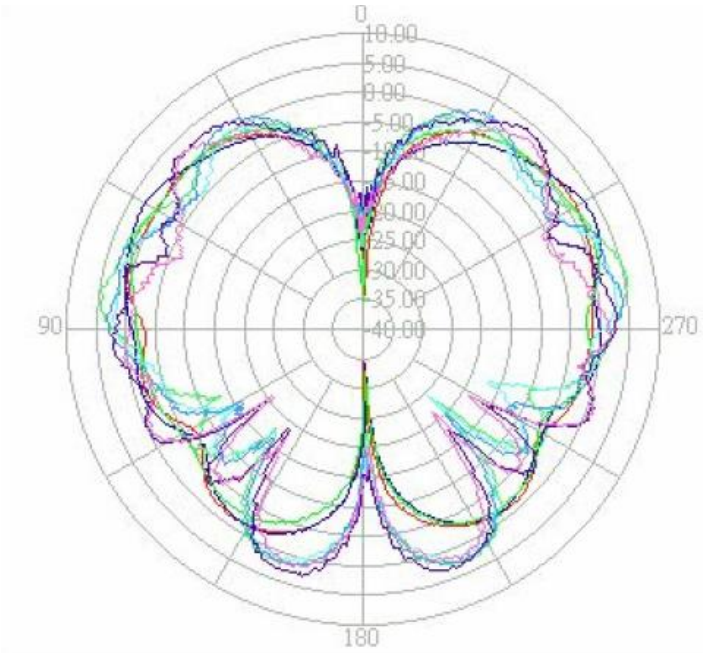
The following sections provide information on Apprion approved antennas for use with IONizer and provides specifications on each.

Omni-Directional Antennas

Dual Band Omni (Standard – 89-1584-000)	
	Typical VSWR: 2.0:1 max.
	Impedance: 50 Ohm
	Polarization: Linear
	Input Power: 10W
	Rated Wind Velocity: 125 mph (56 m/sec)
	Operating Temperature: -10° C min. to +70° max.
	Connector: Type N Male
	Frequency: 2400 – 5850 MHz
	Gain: 2 dBi at 2400 MHz/4 dBi at 5725 MHz
	Horizontal/Vertical BW: 30° at 2.4GHz, 15° at 5 GHz
	Weight: 0.8 lbs. (0.4kg)
	Dimensions: 7.6” x 0.5” (193mm x 12.7D mm)



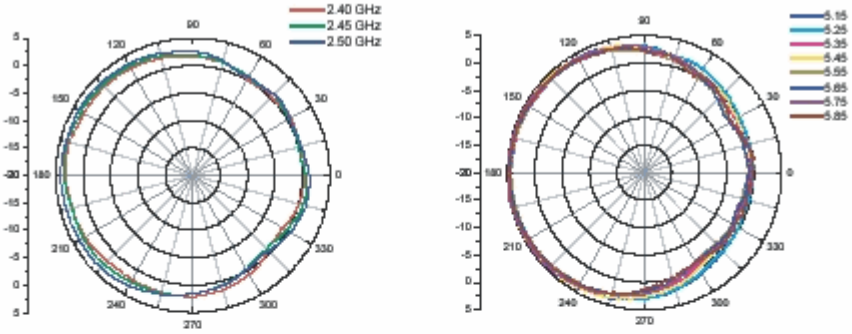
Vertical H-Plane



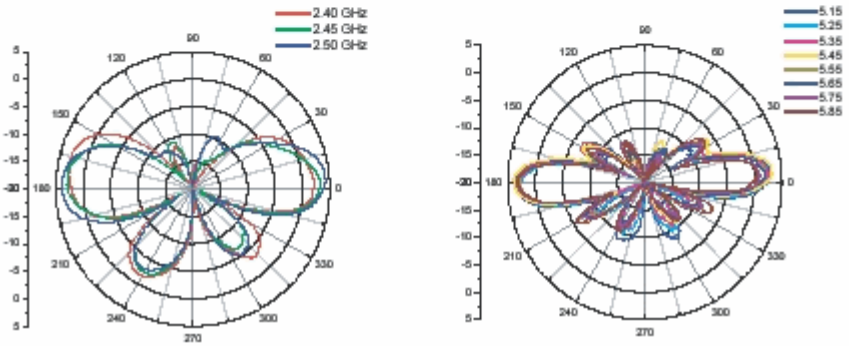
Horizontal E-Plane

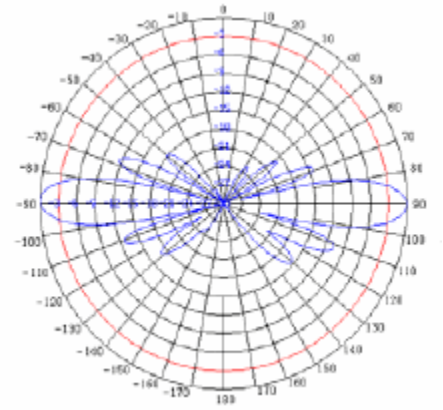
Dual Band Omni (Standard – 89-1088-000)	
	Typical VSWR: 2.0:1 max.
	Impedance: 50 Ohm
	Polarization: Vertical/Linear
	Input Power: 2W
	Rated Wind Velocity: 125 mph (56 m/sec)
	Operating Temperature: -40° C min. to +70° max.
	Connector: Type N Male
	Frequency: 2400 – 2485 MHz
	Gain: 7 dBi at 5150 – 5875 MHz/4.5 dBi at 2400 – 2500 MHz
	Horizontal/Vertical BW: 30° at 2.4GHz, 15° at 5 GHz
	Weight: 0.8 lbs. (0.4kg)
	Dimensions: 27” x 0.6” (685mm x 15mm)

H-plane Co-polarization pattern



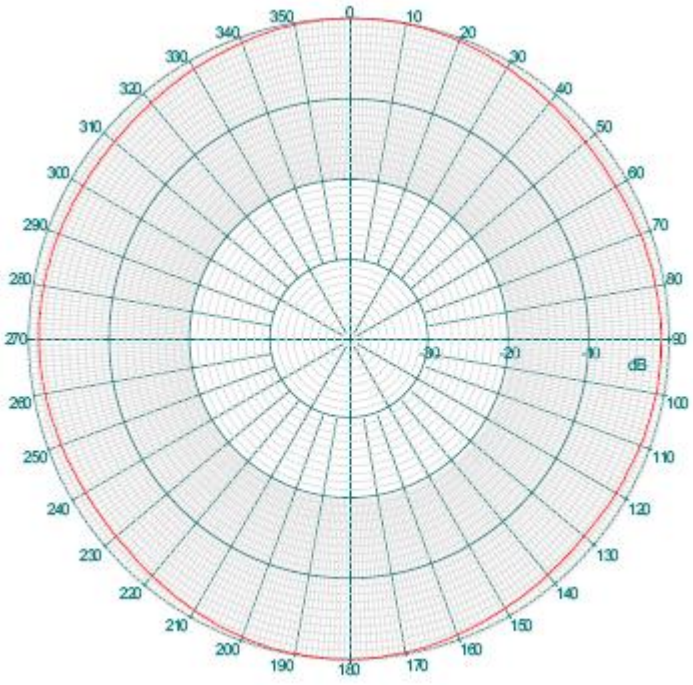
V-plane Co-polarization pattern



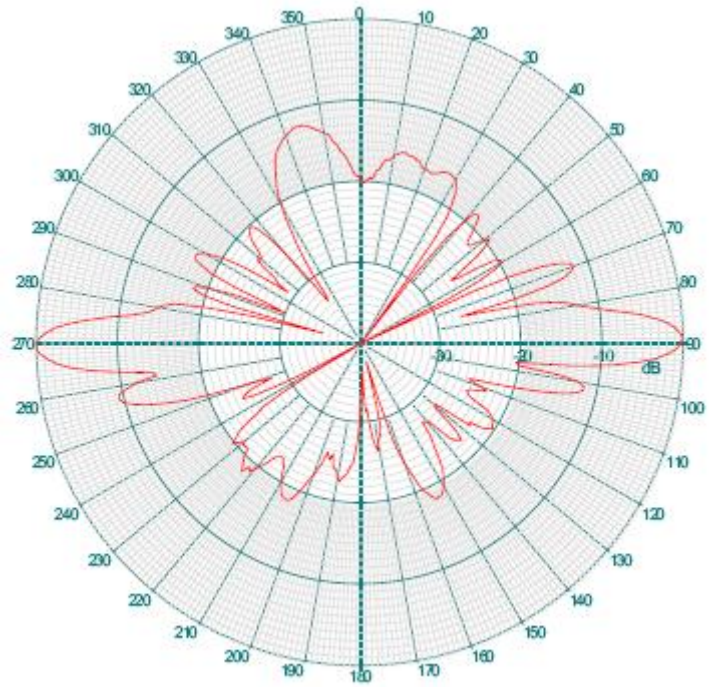
9 dBi Mesh Vertically Polarized Omni (89-1183-000)	
	Typical VSWR: 1.5:1
	Impedance: 50 OHM
	Input Power: 10 W
	Rated Wind Velocity: 125 mph (56 m/sec)
	Operating Temperature: -40° C min. to +70°C max.
	Connector: Type N Male
	Frequency: 2400 – 2485 MHz
	Gain: 9dBi
	Vertical BW: 14°
	Weight: 0.8 lbs. (0.4kg)
	Dimensions: 27” x 0.6” (690mm x 15mm)
	

10 dBi Mesh Vertically Polarized Omni (89-1184-000)	
	Typical VSWR: 2.0:1
	Impedance: 50 OHM
	Input Power: 10W
	Rated Wind Velocity: 125 mph (56 m/sec)
	Operating Temperature: -30°C min. to +65°C max.
	Connector: Type N Male
	Frequency: 4900 – 5875 MHz
	Gain: 10 dBi
	3 dB Beamwidth – Elevation: 8°
	3 dB Beamwidth –Azimuth : Omnidirectional
	Weight: 0.4 lbs. (0.18 kg)
	Dimensions: 19.6” x 1.0” (497 x 25.4mm)

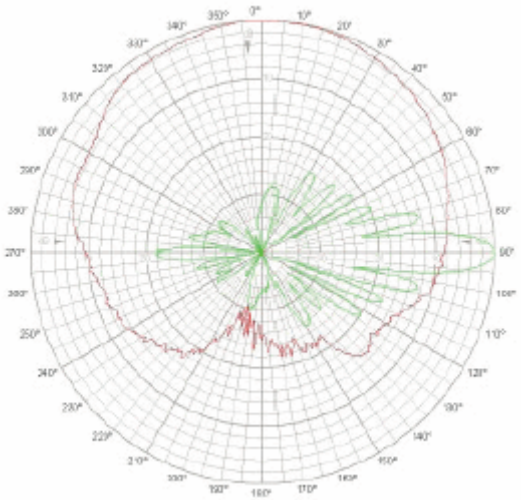
H Plane

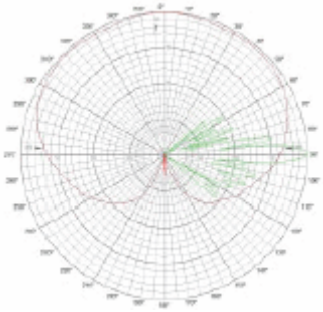


E Plane

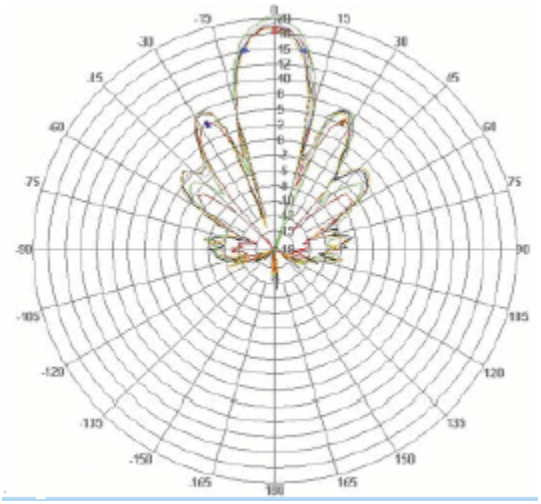


Polarized Antennas

2.5 GHz 120 Degree Wide Band Vertically Polarized Sector Antenna (89-1185-000)	
	Typical VSWR: 1.5:1 Max.
	Impedance: 50 OHM
	Polarization: Vertical/Linear
	Input Power: 50W
	Rated Wind Velocity: 125 mph (56m/sec)
	Operating Temperature: -40°C min. to +70° max.
	Connector: Type N Male
	Frequency: 2300 – 2700 MHz
	Gain: 16 dBi
	Horizontal BW: 120°
	Vertical BW: 9°
	Mechanical Downtilt: 30°
	Weight: 6.65 lbs. (3kg)
	Dimensions: 33.5 x 6.5 x 2.5” (851 x 165 x 64 mm)
	Pole Diameter: 1” (25mm) to 2” (50mm)
	

5.8 GHz 120 Degree Vertically Polarized Sector Antenna (89-1186-000)	
	Typical VSWR: 1.8:1 max.
	Impedance: 50 OHM
	Polarization: Vertical/Linear
	Input Power: 10 W
	Rated Wind Velocity: 125 mph (56 m/sec)
	Operating Temperature: -40°C min. to +70°C max.
	Connector: Type N Male
	Frequency: 5850 MHz
	Gain: 16 dBi
	Horizontal BW: 120°
	Vertical BW: 6°
	Mechanical Downtilt: 15°
	Weight: 2 lbs. (1.3 kg)
	Dimensions: 24.6 x 2.7 x 1.7” (625 x 69 x 43 mm)
	Pole Diameter: 1.5” (38mm) to 3.5” (89mm)
	

Directional Antennas

5.8 GHz Flat Panel Wide Band Antenna (89-1187-000)	
	Typical VSWR: 1.5:1 max.
	Impedance: 50 OHM
	Polarization: Vertical/Linear
	Input Power: 100W
	Rated Wind Velocity: 125 mph (56 m/sec)
	Operating Temperature: -40°C min. to +70°C max.
	Connector: Type N Male
	Frequency: 5850 MHz
	Gain: 19 dBi
	Horizontal BW: 16°
	Vertical BW: 16°
	Cross Polarization: 35 dB
	Front to Back: 30 dB
	Bracket Tilt: 45°
	Weight: 17.6 oz. (0.5 kg)
	Dimensions: 7.5 x 7.5 x 0.8” (190 x 190 x 20 mm)
	Pole Diameter: 1” (25mm) to 2.5” (64mm)
	

Appendix B
IONizer Specifications

Specifications

This appendix lists the IONizer hardware specifications.

Platform Specifications	Custom Intel XScale-IXDP465
	533 MHz with DDR1-266 SDRAM
	128 MB RAM/64 MB Flash
	On-chip Programmable Network Process Engine (NPE)
	On-chip Cryptography Unit
	On-chip MII 10/100 Ethernet MACs
	On-chip IEEE 1588 Hardware Assist
	IEEE 802.11 a/b/g mini-PCI Modules (Typical)
	Expansion (12C/SSP/2xHSS/2x921K UARTs/USB2)
Mechanical Size:	**IONizer 4300 Series:**
	15.38 inches (390.6mm) x 11.38 inches (289mm) x 6.25 inches (158.7mm)
Weight:	**IONizer 4300 Series:**
	40 lbs. (18.14 kg) 45 lbs. (20.41 kg shipping weight)
Housing:	**IONizer 4300 Series:**
	Explosion Proof Copper-free Aluminum Alloy Enclosure NEMA Type 4 (IP66) Rated
Operating Temperature Range:	**IONizer 4300 Series:**
	-20C to +55C
Power Specifications:	48 VDC PoE or 24V power connection
	Maximum Power: 24W
Safety Certifications:	CSAus Listed to UL60950-1 (with UL50 considerations for outdoor use)

	cCSA Certified to CSA C22.2 No. 60950-1 (with CSA C22.2 No. 94 considerations for outdoor use)
	TUV Mark to EN60950-1 (with IEC60950-22 considerations for outdoor use), and Low Voltage Directive (LVD) under CE Mark
Hazardous Location Certifications:	**IONizer 4300:**
	ATEX Directive Zone 1, Category 2
Radio Certifications:	FCC U-NII (Part 15)
	EN 300 328-2 (w/R&TTE Article 3.2 consideration)
	EN 301 893 (w/R&TTE Article 3.2 consideration)
	EN 301 489 (w/R&TTE Article 3.2 consideration)
European Union Directive Info:	EC Declaration of Conformity for all European directives for this product can be found on the Apprion website at www.apprion.com. A hard copy may be obtained by contacting your local sales representative.