IONizer 4200 Series
Hardware Installation Guide

Apprion Incorporated

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Revision History

Date	Document Revision	Author(s)
January 09	Version 1	David Cote
February 09	Version 2 Updated antenna information	David Cote
March 09	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 detailed instructions on how to install and wire an IONizer device. You should read 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 4200 Series Models

IONizers in the 4200 Series are designed for use in Class I, Division 2 hazardous locations as defined in the National Electrical Code (NFPA 70:2005), particularly NEC Article 500.5 (B)(2). All wiring (and conduit connections) to the unit must conform to the recommended practices in NEC Article 501.10 or 505.15 as applicable. These devices are also ATEX Zone 2, Category 3 compliant.

These IONizers can be ordered with a single radio or two radios. In addition, some models in the series are equipped with embedded WiHART functionality. Power is supplied using 48V PoE or 24VDC.

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 4200 models 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.

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.

WARNING: Do not open an IONizer when an explosive atmosphere may be present.

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 must not cause harmful interference and (2) This device must accept any interference received, including interference that may cause undesired operation.

Chapter 2
Installation Preparation

Overview

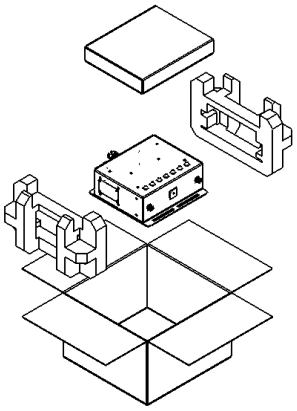
This chapter describes the installation process and what you'll need to successfully mount and connect an IONizer at your site.

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.



4200 Series

- IONizer 4200 or 4220
- Mounting Hardware (2 U-bolts with associated hardware, 4 wall anchor bolts)
- Wire nuts (for 24 VDC installation)
- Manual
- Product Registration and Warranty Cards

Note: *IONizer 4200 Series devices have two internally connected WAN and LAN cables routed out of the unit's conduit opening. In addition, two 24VDC cables are also routed through the same opening. Cables are to be routed through conduit during installation.*

Additional orderable accessories include:

- Antenna(s) based on configuration
- Power over Ethernet (PoE) Injector with AC Power Cord
- Multiple length PoE cable
- Additional Ethernet cable
- 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: 4200-200, 4200-220, 4220-200, and 4220-220.*

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 no 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. When mounted indoors, the unit should be grounded to the building's earth ground via a connection to the external grounding stud (if practical). 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.

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

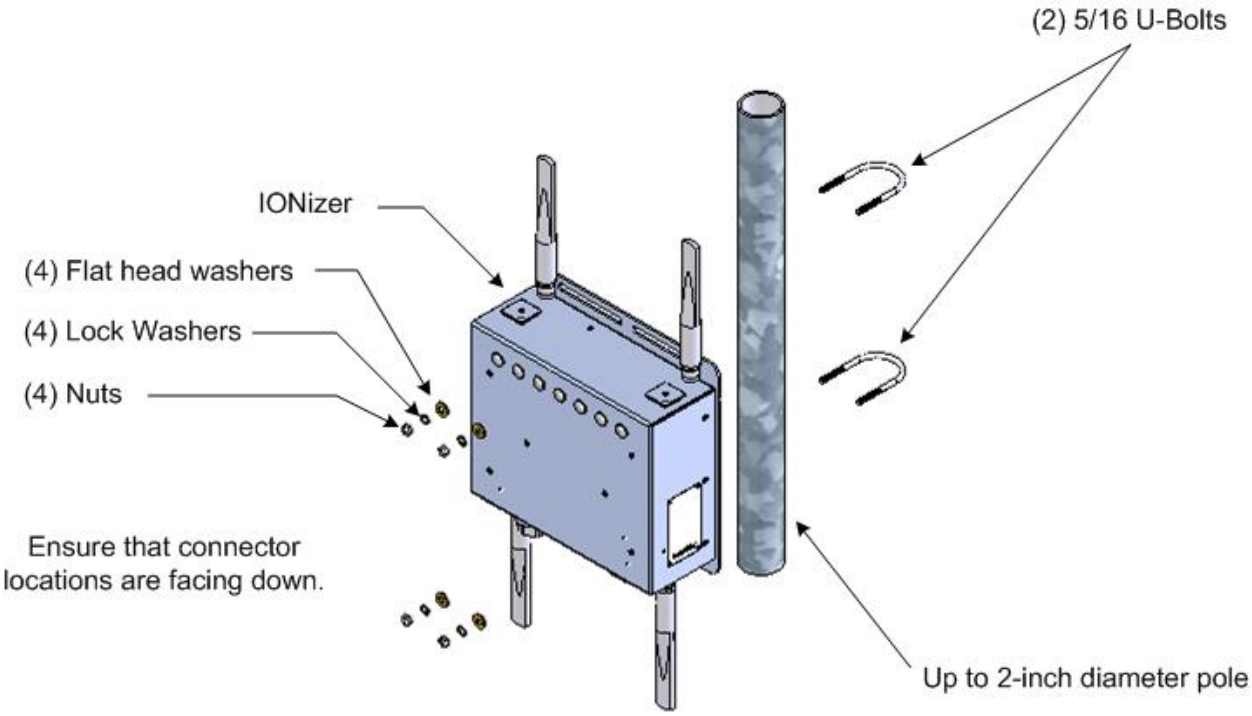
4200 Series

Requirements

- 3/8-inch torque wrench
- ½-inch socket head
- (2) 5/16 U-bolts (supplied)
- (4) Lock Washers (supplied)
- (4) Flat head washers and nuts (supplied)

The IONizer can be mounted on vertical poles up to 2 inches in diameter using the U-bolt hardware provided with the device. The device must be mounted in the correct orientation with device connectors on the bottom facing the ground.

Mounting Diagram



Nut torque range is 25 to 30 inch pounds. Attach antenna cables after the device is mounted.

Wall Mounting

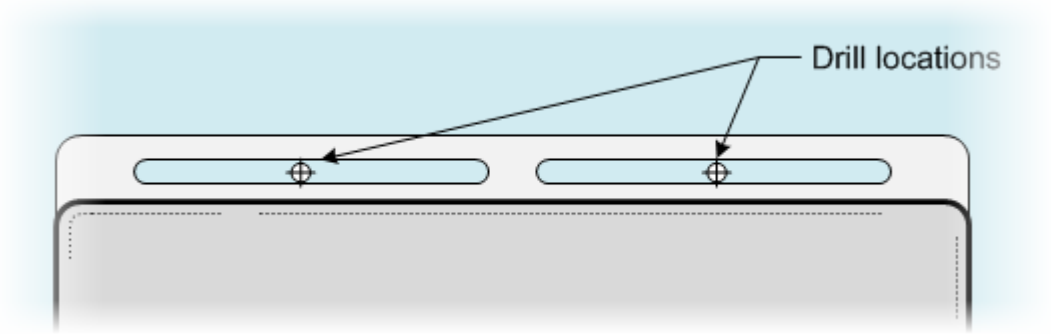
4200 Series

Requirements

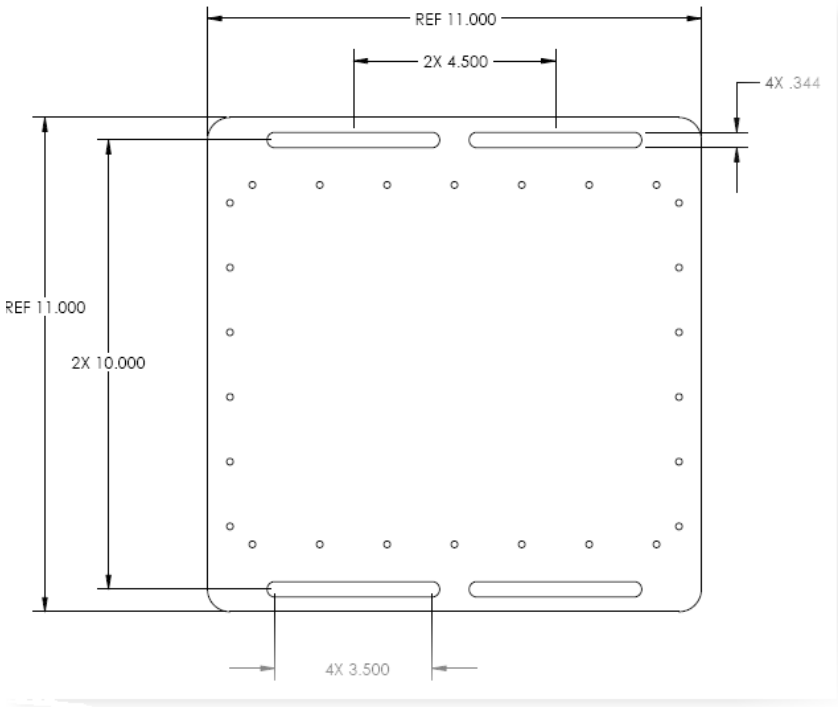
- (4) ¼-inch anchor screws (ELCO ¼-inch x 1-inch or equivalent)
- (4) ¼-inch flat washers
- 3/8-inch power drill
- ¼-inch drill bit
- Phillips head screwdriver

Procedure

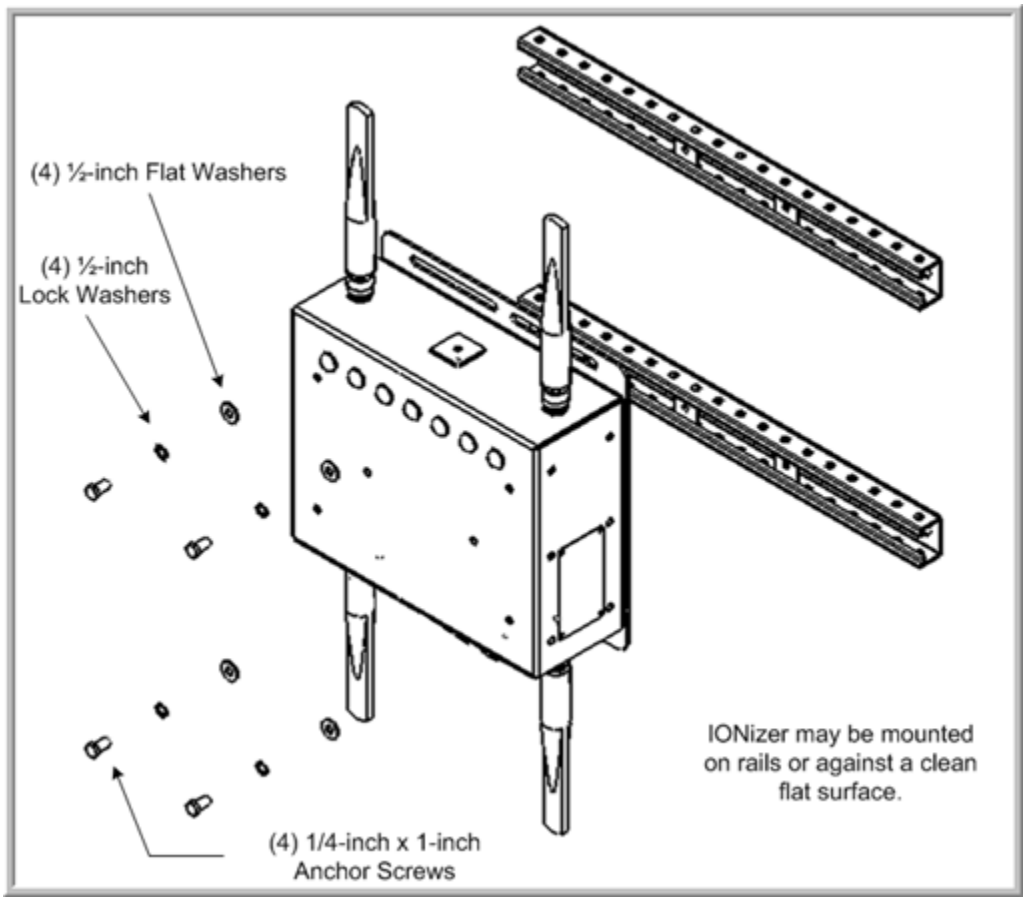
1. Ensure that the surface is clean and free of loose debris.
2. Use the device as a template using the mounting slots to mark screw locations on the mounting surface.



The exact dimensions are displayed in the following diagram:



3. Drill pilot holes using the recommended drill bit size.
4. Mount the device to the surface using the anchor screws and flat washers per manufacturer's instructions. The flat head washers should be between the unit mounting flange and the anchor screw head.
5. You can also mount the IONizer on rails as shown:



6. Seal antenna connections (see instructions).

Note: *The IONizer 4020 contains an embedded WiHART gateway which requires its own antenna (P/N 89-1584-000). This antenna must be attached to antenna Port 3. The ports are silkscreened on the IONizer casing.*

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
Grounding and Cabling the IONizer

Overview

This chapter provides grounding and cabling information for IONizers in the 4200 Series.

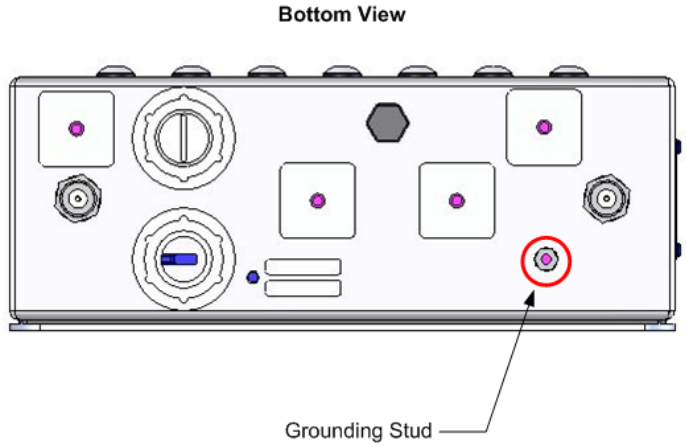
Grounding

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.

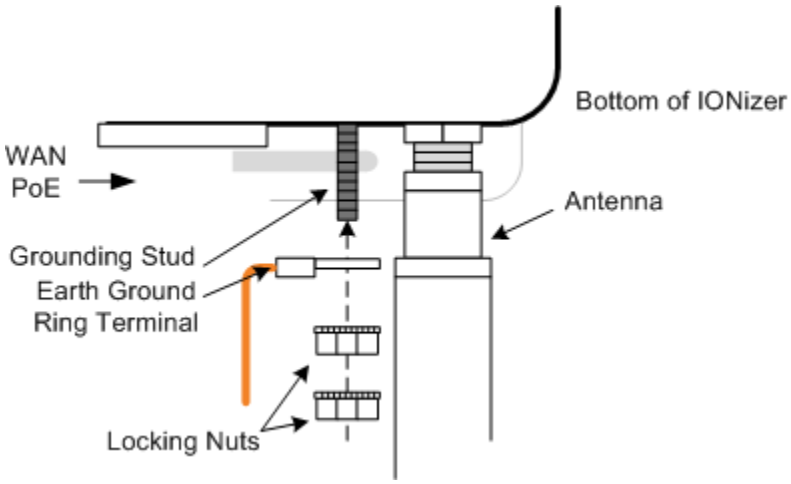
Note: *Ensure that the connection to a proper earth ground is made by certified and authorized personnel. The ground must conform to all applicable codes and regulations. The materials required to connect to a proper earth ground are defined by local conditions and must be procured locally to ensure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

Grounding Procedures (IONizer 4200, 4220)

The grounding stud is located on the bottom of the IONizer at the location shown:



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

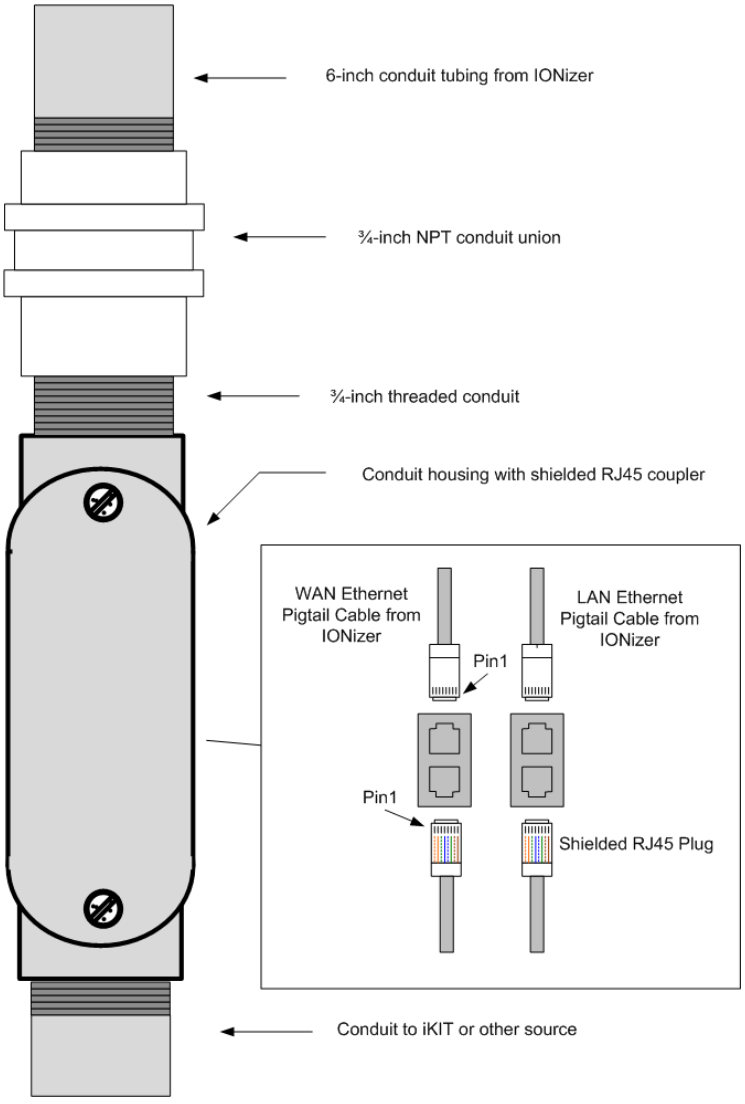


The bottom of the IONizer may look slightly different depending on the specific model. However, the grounding stud on these models is always basically in the same location.

IONizer 4200

This IONizer is designed for hazardous locations and all wiring connections must be enclosed in conduit. The IONizer 4100 uses Power over Ethernet (PoE) or 24V power. Two cables protrude from the conduit opening at the bottom of the unit (cables are hardwired inside the IONizer). Each cable is terminated with an RJ45 connector. In addition, two additional cables are provided for the 24V option. If the 24VDC option is not used, the wires must be terminated and secured out of the way. See Using 24 VDC from an iKIT" in this chapter for more info.

The following diagram shows the recommended cabling for this device:



Note: *Two additional wires protrude from the same opening to provide a 24 VDC power option. See "Using 24VDC with an iKIT" in this chapter if you are using the 24 VDC option to power the Ionizer.*

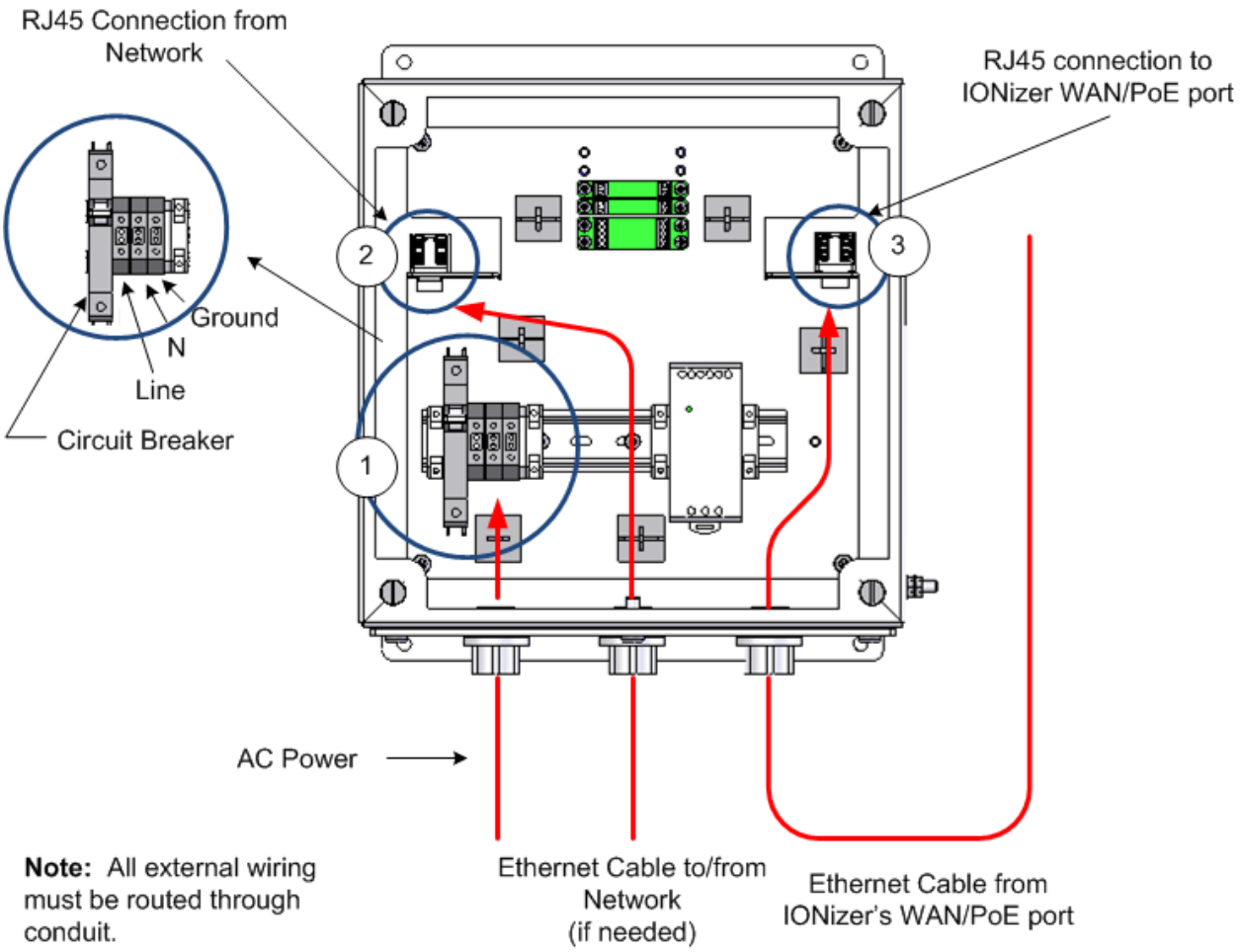
As shown, a 6-inch conduit tube is connected to the conduit opening on the IONizer. Both cables should be routed through this tube.

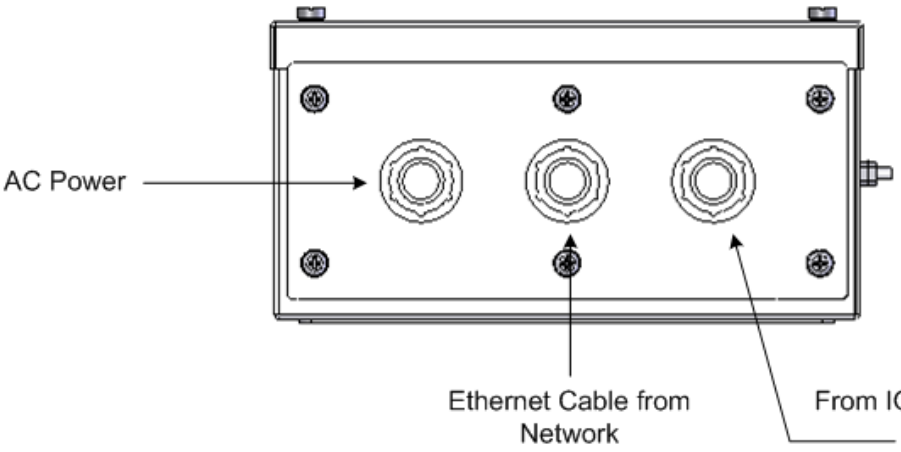
A ¾-inch Conduit union is then connected to the 6-inch conduit tube. This union allows for easily disconnection of the IONizer from the remainder of the conduit cabling.

A ¾-inch threaded conduit nub is used between the conduit union and the conduit housing. The conduit housing is also designed for easy disconnection for the conduit cabling system. This housing contains two RJ45 couplers. These couples are used to form a connection from the PoE source and the hardwired WAN and LAN cables.

Using 48V PoE from an iKIT

The IONizer can also be connected to an Apprion iKIT which also supplies power and Ethernet. The iKIT provides a convenient way to cable an IONizer especially in areas where power and network cabling is a long distance from the IONizer. This method provides PoE but also provides surge and lightning protection for data and power. See the appropriate *iKIT Installation Guide* for complete iKIT details.





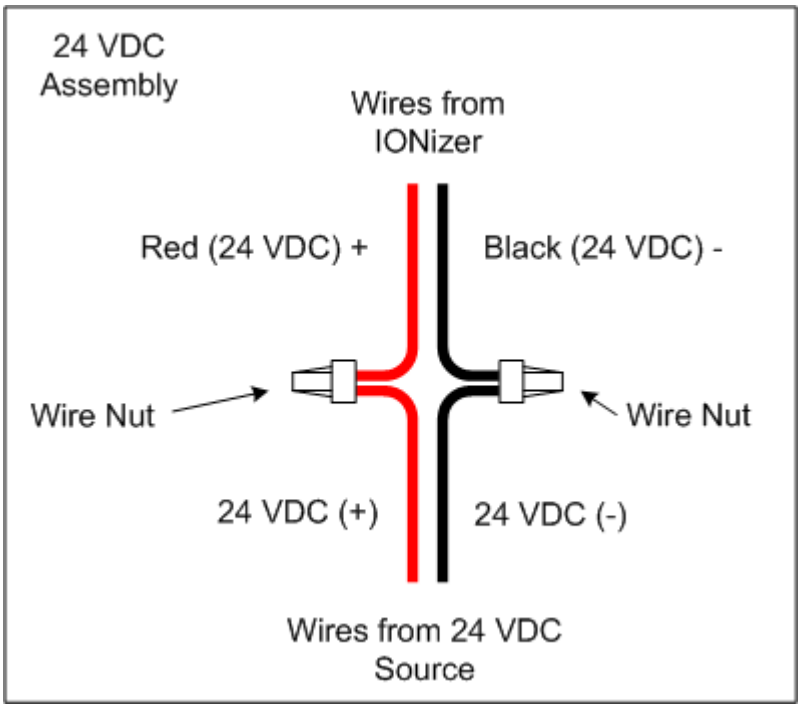
Note: *This iKIT is designed for hazardous locations and has a stainless-steel enclosure. This iKIT must use conduit for ALL connections (not shown in this diagram). Refer to the specific iKIT Installation Guide*

for more information. There are also a number of different iKITs available for different applications. Talk to your Apprion Sales Representative.

Using 24 VDC from an iKIT

The IONizer can be powered by 24 VDC. The 24 VDC wires are hard wired inside the IONizer and protrude from the same conduit opening as the WAN and LAN cables. Connections are made in the same area as the Ethernet cables to the IONizer (inside the conduit housing). These wires must be connected to 24 VDC cables coming from an iKIT or 24 VDC source. Refer to the appropriate iKIT installation Guide for instructions on how to configure 24VDC inside the iKIT.

The use of wire nuts is suggested. Termination of the 24 VDC wires can be done based on common industry practices per local and national electrical codes.



IONizer 4220

The IONizer 4220 (WiHART) models are wired the same way as the 4200 models. The only exception if that there is only one Ethernet (WAN) cable on all embedded WiHART models.

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
- 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 4200 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

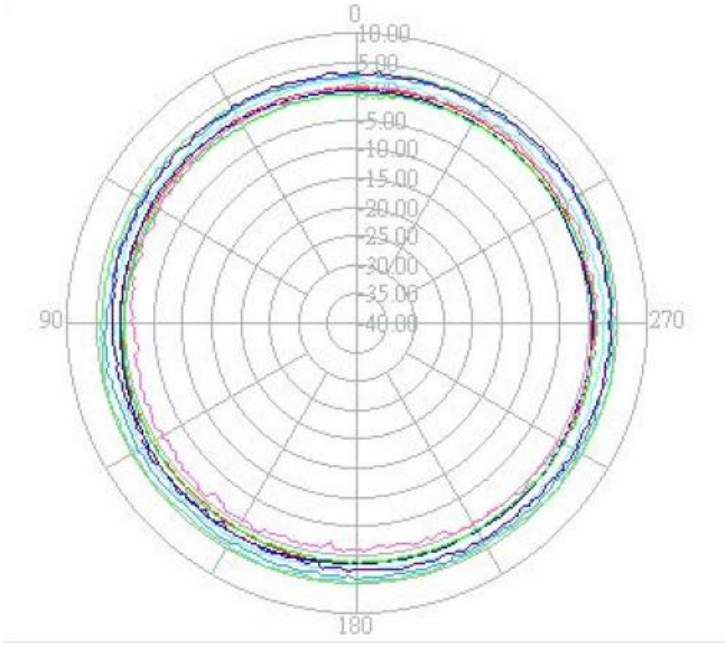
over a wide temperature range and degrades very slowly in sunlight. The tape can be removed by cutting it away with a sharp knife.

Approved Antennas

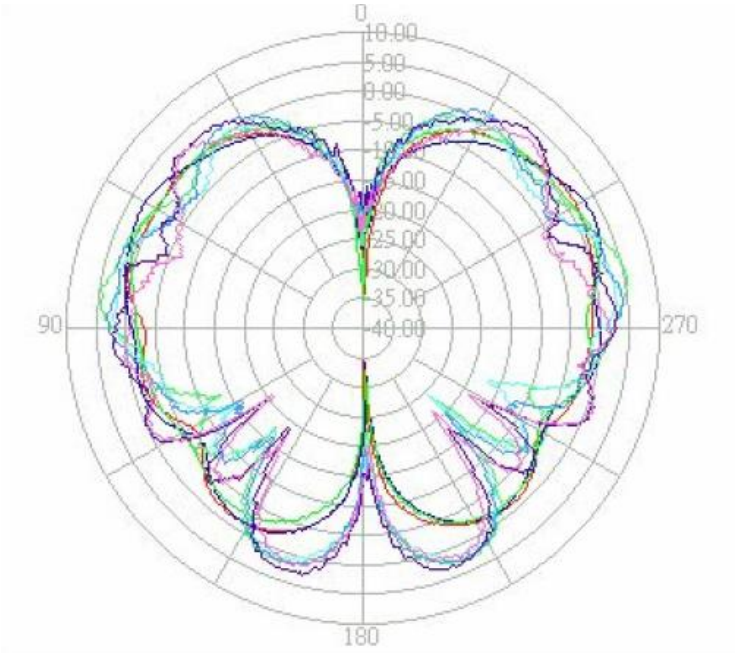
The following sections provide information on Apprion approved antennas for use with IONizer and provides specifications on each.

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)

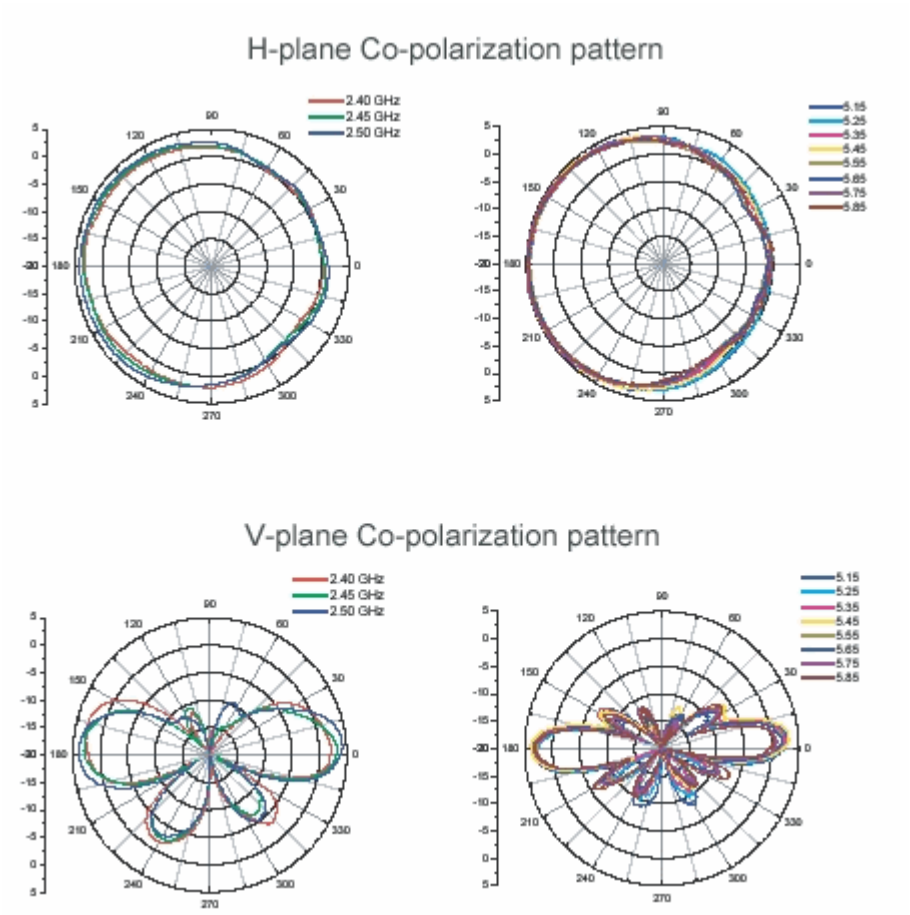


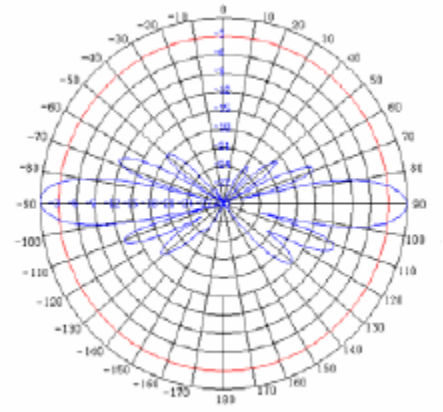
Vertical H-Plane



Horizontal E-Plane

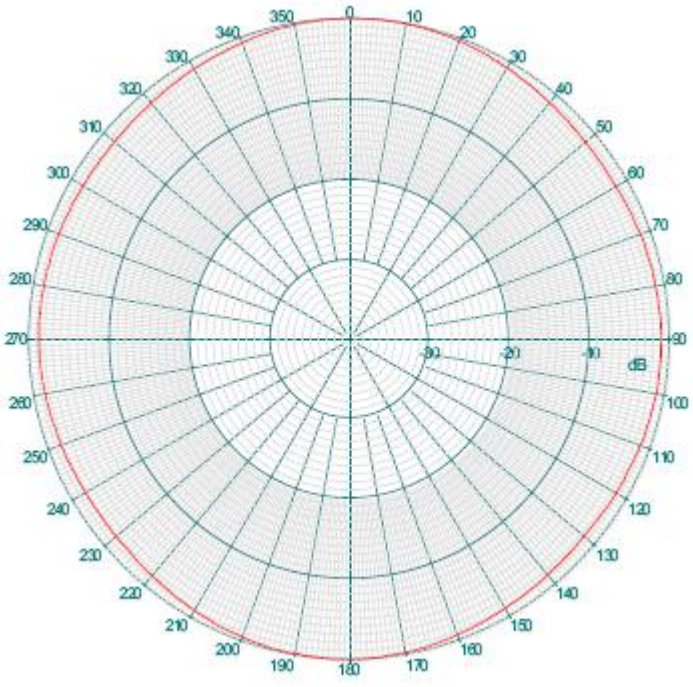
Dual Band Omni (Standard – 89-1088-000)	
	Typical VSWR: 2.0:1 max.
	Impedance: 50 Ohm
	Polarization: Vertical/Linear
	Input Power: 2W
	Rated Wind Velocity: 125 mph (56 m/sec)
	Operating Temperature: -40° C min. to +70° max.
	Connector: Type N Male
	Frequency: 2400 – 2485 MHz
	Gain: 7 dBi at 5150 – 5875 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)



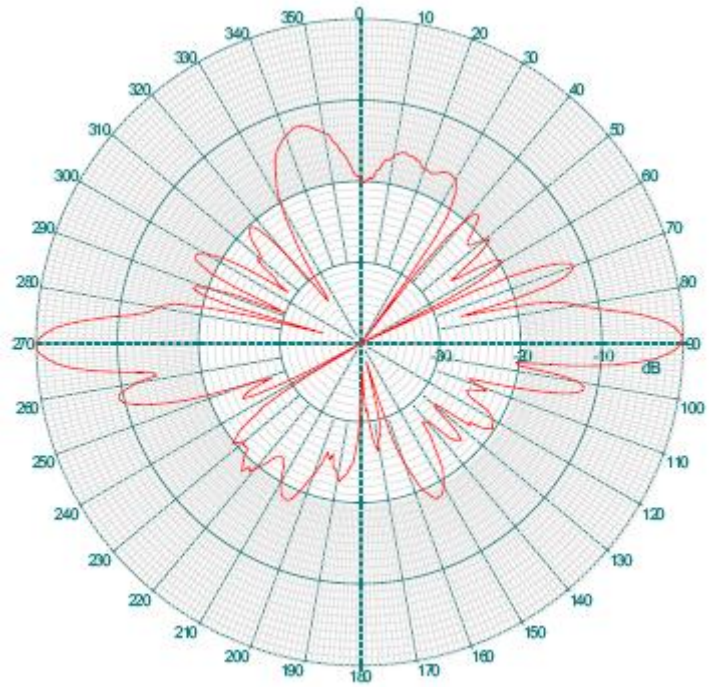
9 dBi Mesh Vertically Polarized Omni (89-1183-000)	
	Typical VSWR: 1.5:1
	Impedance: 50 OHM
	Input Power: 10 W
	Rated Wind Velocity: 125 mph (56 m/sec)
	Operating Temperature: -40° C min. to +70°C max.
	Connector: Type N Male
	Frequency: 2400 – 2485 MHz
	Gain: 9dBi
	Vertical BW: 14°
	Weight: 0.8 lbs.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

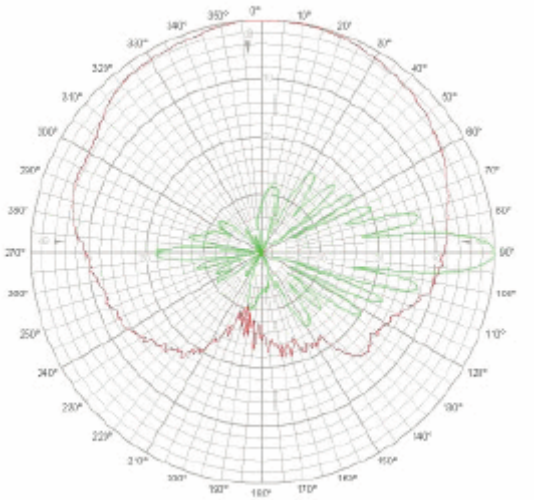
H Plane

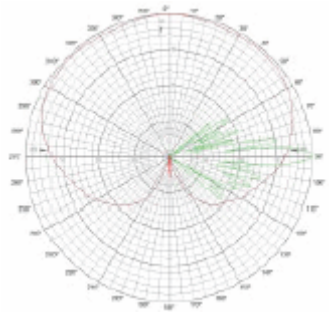


E Plane

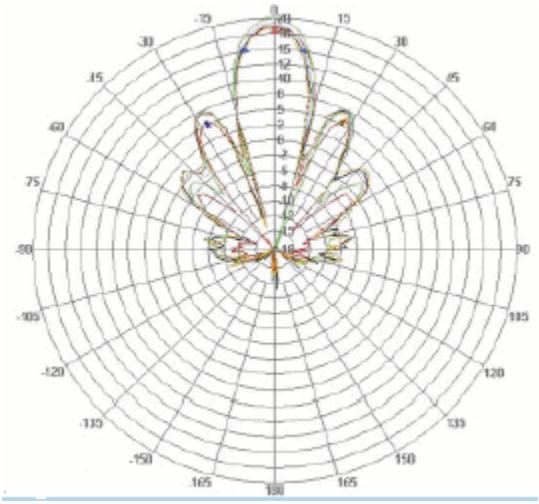


Polarized Antennas

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 4200 Series:**
	11.00 inches (279.4mm) x 11.00 inches (279.4mm) x 4.00 inches (101.6mm)
Weight:	**IONizer 4200 Series:**
	6 lbs. (2.7 kg) 8 lbs. (3.6 kg shipping weight)
Housing:	**IONizer 4200 Series:**
	NEMA Type 4X (IP67) Rated Aluminum Chassis
	Paint: Urethane Powder Coat
	Silicone Rubber Gasket
Operating Temperature Range:	**IONizer 4200 Series:**
	-30C to 60C
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 4200:**
	Class I, Division 2
	CSA Listed to UL1604 for use in Class I, Division 2 (Zone2), Groups A, B, C, D
	CSA Certified to CSA C22.2 No. 213 for use in Class I, Division 2 (Zone 2), Groups A, B, C, D
	EN60079-15 and EN50020 (ATEX Zone 2, Category 3)
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.