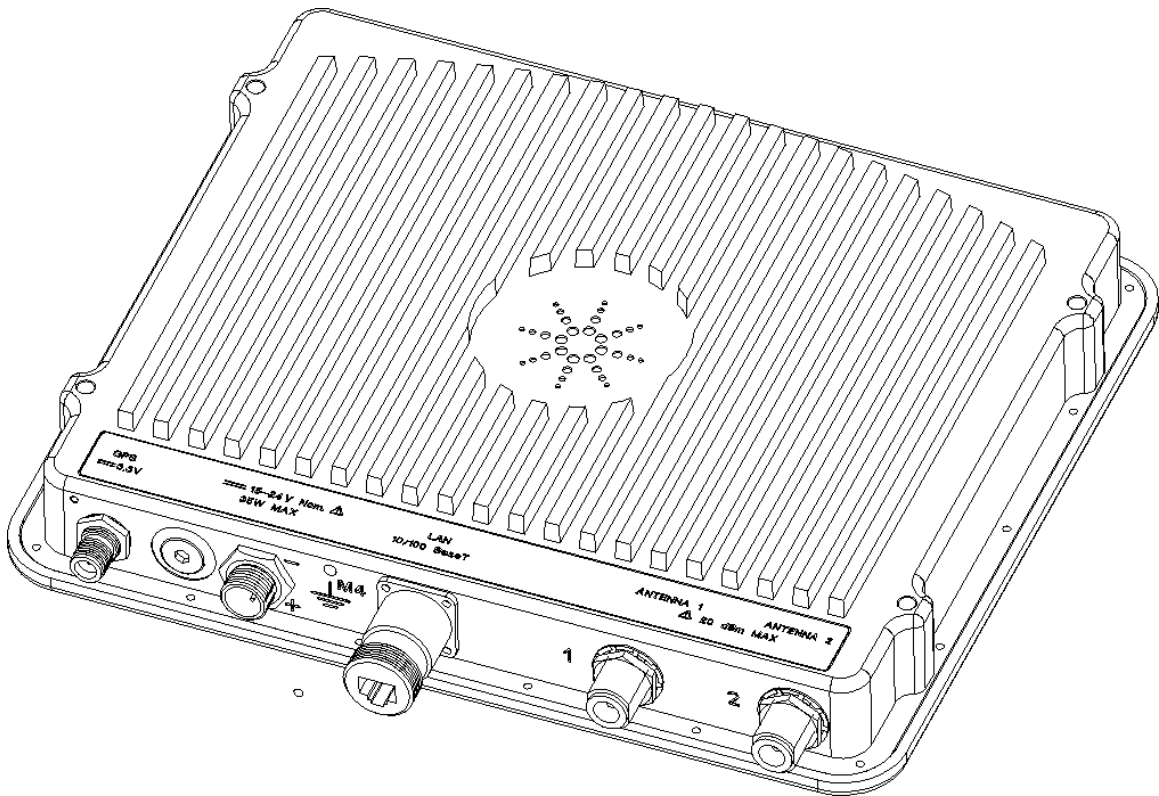


# N6841A Installation Guide



Part Number: N6841-90002

Printed in U.S.A.

Print Date: September 2010

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# Contents

- 1. Other Manuals ..... 3
- 2. Important Safety Instructions ..... 4
  - 2.1. Servicing Information ..... 5
  - 2.2. Regulatory Information ..... 5
- 3. The Minnow Receiver at a Glance..... 6
  - 3.1. Technical Specifications..... 6
- 4. Preparing for Installation..... 7
  - 4.1. What’s in the Package ..... 7
    - 4.1.1. Power Supply..... 8
  - 4.2. Site Survey ..... 10
  - 4.3. Tool List..... 10
  - 4.4. Mounting Strategies..... 11
- 5. Mounting Instructions ..... 12
  - 5.1. Wall Mounting Instructions ..... 12
  - 5.2. Pole and Tower Mounting Instructions ..... 15
  - 5.3. Installing the Antenna Cables ..... 20
  - 5.4. Preparing the Ethernet Cable ..... 21
- 6. Installing the RF Sensor Software ..... 23
- 7. Verifying the operation of the RF Sensor ..... 24
  - 7.1. Power-On Self Test ..... 24
  - 7.2. Verifying Operation Using the SMT ..... 24
- 8. Maintaining the Agilent RF Sensor..... 25

# 1. Other Manuals

This table lists other manuals pertinent to the N6841A RF Sensor.

<b>Part Number</b>	<b>Title</b>	<b>Publication Date</b>
N6841-90000	Quick Install Guide	September 2010
N6841-90001	RF Sensor Software User Guide	September 2010
N6841-90003	Instructions - LAN Connector	May 2009
N6854-90000	Geolocation Server User Guide	September 2010
N6851-90005	Application Programming Overview	August 2010

## 2. Important Safety Instructions

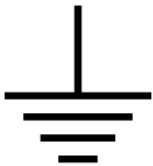
Be aware of these safety symbols found on the Agilent RF Sensor and in the Agilent RF Sensor documents:



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.



The hand within a triangle and crossed by a bar is intended to alert the user to the hazard of electrostatic discharge. Use the proper preventative measures, including grounding yourself, before working with the RF Sensor.



The grounding symbol shows the location on the Agilent RF Sensor where all cable grounds must terminate and an earth ground must be connected.



### Caution:

- Read these instructions.
- Follow all instructions in this manual.
- Heed all warnings.
- Do not defeat the safety purpose of grounding.
- Keep a copy of these instructions.
- Use the Agilent RF Sensor only as specified in these manuals.

## **2.1. Servicing Information**

Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as when an antenna cable or Ethernet cable or connector is damaged, the unit has dropped from height, the receiver's casing has been opened, or the device does not operate normally.

## **2.2. Regulatory Information**

All Agilent Technologies Inc. devices are designed to be compliant with rules and regulations in locations they are sold and will be labeled as required. Any changes or modifications to Agilent equipment, not expressly approved by Agilent, could void the user's authority to operate the equipment.

When Agilent devices are professionally installed, the Radio Frequency Output Power will not exceed the maximum allowable limit for the country of operation.

Unauthorized modifications or attachments could cause equipment damage and may violate regulations.

### 3. The Minnow Receiver at a Glance

Below is a table of the Minnow Receiver’s physical, electrical, and data characteristics.

#### 3.1. Technical Specifications

<b>Physical Specifications</b>	
Dimensions	Width: 291.80mm Height: 245.73 mm (casing only) 268.93 mm (casing and connectors) Depth: 53.70 mm
Housing	Aluminum Case
Weight	3.7 kg (8.2 lbs)
Wind Loading	Max 158 N (35.6 lbs) @ 160 kph (100 mph)
Rack mounting	½ width 19 inch rack 2U height (requires additional air flow for cooling)
<b>Environmental Specifications</b>	
Temperature	-15°C to 55°C (Operating not in direct sunlight),
Humidity	15% to 95% Non-condensing
Altitude	21000 feet/6096 m @50°C (Operating)
Wind Loading	Max 158 N (35.6 lbs) @ 160 kph (100 mph)
Electrostatic Discharge	15kV (air) @ 50% rh, 8kV (contact) @ 50% r
Enclosure Rating	IP67 (for ingress of dust & water)
<b>Electrical Specifications</b>	
Operating Voltage	15–24Vdc (Nominal)
Power Consumption	25 Watts (Nominal), 30 Watts (Maximum)
<b>Optional Power Supply</b>	
Input Voltage	90 to 264 Vrms at 50/60 Hz
Rated Output Voltage	15 VDC (Nominal) @ 4 amps
<b>Antenna Specifications</b>	
RF Inputs	2 Type N (50 Ω) electronically switched inputs (for diversity or multi-band antennas)



## 4. Preparing for Installation

The N6841A RF Sensor must be installed by a trained professional or systems integrator who is familiar with RF planning issues and regulatory limits defined by the governing body of the country in which the unit will be installed. This section lists the required equipment and model numbers and explains how to prepare the installation site.



Caution: To ensure safe and durable wiring, installation of the Minnow Receiver must follow appropriate electrical and building codes. Follow the National Electrical Code (NEC) requirements, unless local codes in your area take precedence over the NEC code.

### 4.1. *What's in the Package*

What is included in the package:

- N6841A RF Sensor.
- Mounting bracket kit.
- Ethernet LAN cable weatherproof boot.
- Ethernet connectors.
- Certificate of compliance.
- Quick Install Procedure.
- Software CD.
- GPS antenna (optional).
- GPS antenna Cable (optional).
- Power connector (optional)
- Power cable weatherproof connector.
- +15VDC power supply (optional).

### 4.1.1. Power Supply

The N6841A RF Sensor can come with an optional indoor AC power supply. The power supply is Agilent PN N6841-64501. This power supply has a 1.8 meter (6 foot), country-specific AC cord. Additionally, the power supply has a 1.8 meter (6 foot) DC power cord. Therefore, the RF Sensor site must have a mains connection within 3.8 meters (12 feet).

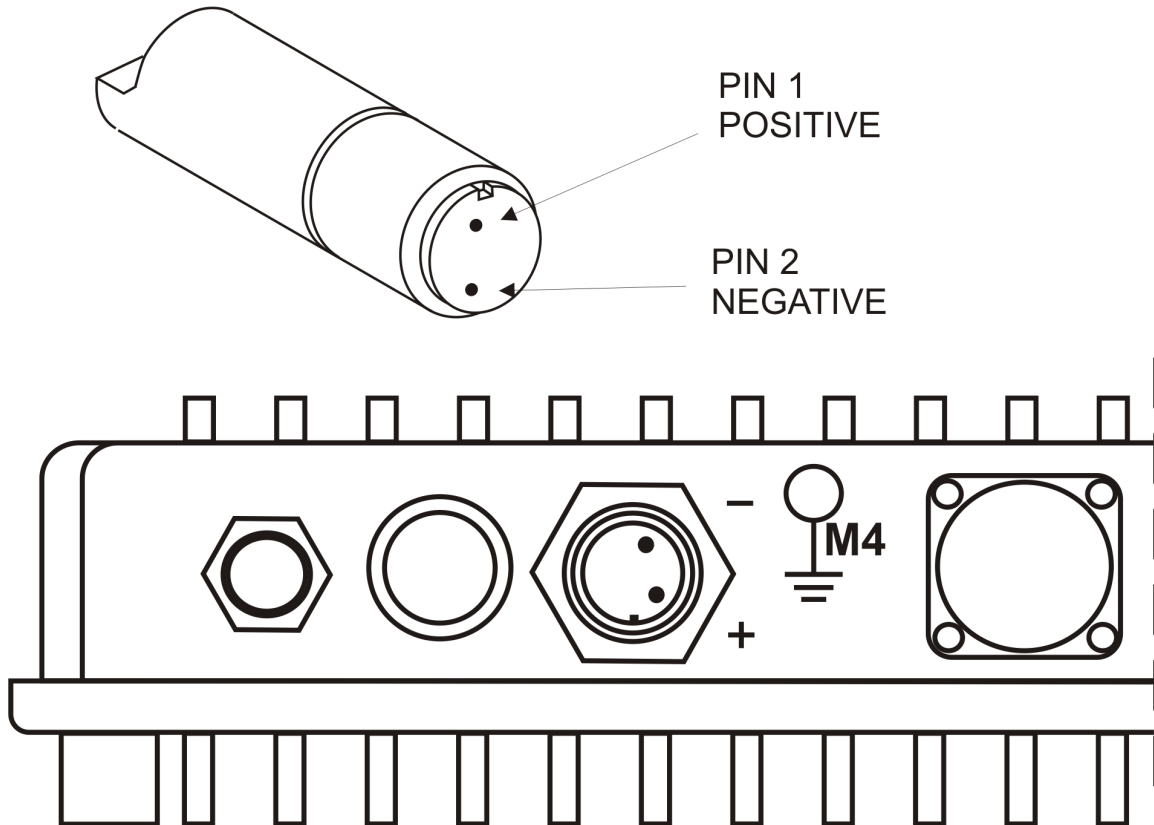
If your installation is not using the optional indoor power supply:

- Use a power supply with appropriate voltage, current and environmental ratings.
- Use a power cable with appropriate environmental ratings, and with conductors properly sized for the length of run, to ensure the voltage at the sensor is not below the minimum 15V.

The provided connector has solder cups, and will work for up to 16 AWG wire size, and an outside cable diameter of .22-.25 inch (5.6-6.3 mm).

The following illustration shows the polarity of the power connector plug and the connection on the RF Sensor casing.

## POWER CONNECTOR



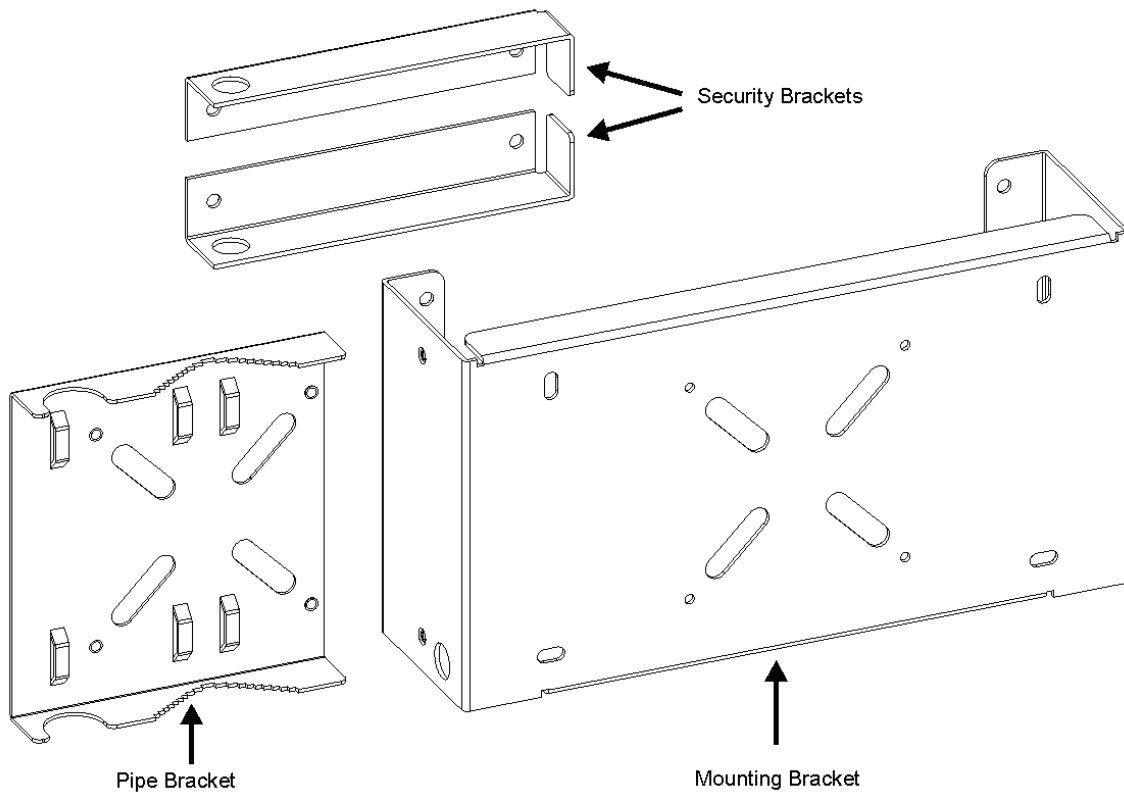
### Mounting Kit

The N6841A RF Sensor comes with a mounting kit that allows it to be installed in both indoor and outdoor locations. Included in the kit are:

**Mounting Bracket**—Used by itself, this bracket allows the Sensor to be wall mounted.

**Pipe Bracket**—Connected to the Mounting Bracket, the Pipe Bracket allows the Sensor to be mounted on either a horizontal or vertical pipe. To mount the sensor to a pipe with a diameter equal to or less than 60mm (2 3/8 inches), use a U-bolt of the appropriate size. To mount the sensor to a pipe with a diameter greater than 60mm (2 3/8 inches), use a hose clamp of the appropriate size.

**Security Brackets**—Connected to the Sensor, they allow the Sensor to be secured to the Mounting Bracket with padlocks. These brackets also bear the weight of the Sensor while the final screws are installed.



## **4.2. Site Survey**

Due to variations in component configuration, placement, and physical environment, each installation is unique. Before installing the Minnow Receiver, perform a site survey to determine the optimum placement of units for maximum range, coverage, and network performance. Consider also the availability of power and network connections. Consider the following factors when performing a site survey:

- Antenna type and placement—Proper antenna configuration is a critical factor in maximizing radio range. As a general rule, range increases in proportion to gain and antenna height measured from the ground.
- Availability of power—The N6841A can come with a 15—24 VDC indoor power supply. A user-supplied 24 VDC Class 2 or LPS rated power supply is required for longer runs. Ensure that there is a mains connection close enough for the power supply.
- Ethernet connection—The N6841A comes with a waterproof Ethernet cable connector housing and Ethernet connectors. The customer must supply a standard Ethernet (Cat5) cable.

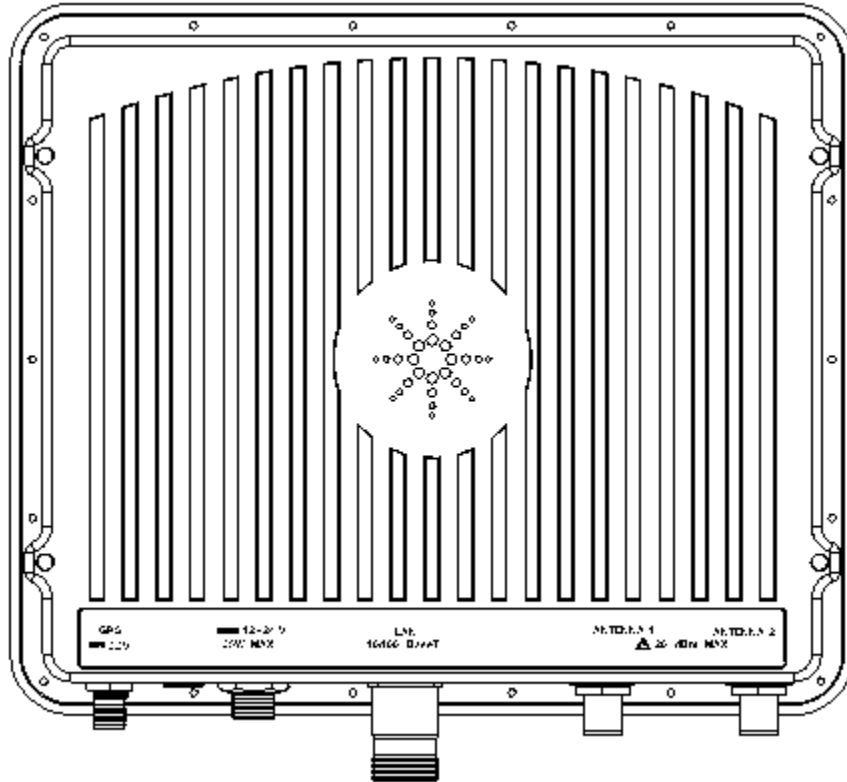
## **4.3. Tool List**

To install the Minnow Receiver, you will need the following tools.

- 10 mm box wrench.
- #2 Pozidrive or Phillips screwdriver (for the ground screw.)
- Wall mounting only: the appropriate connectors for the specific wall type.
- Wood pole mounting only: two 5/8-inch diameter, 3-inch long lag bolts
- Tower mounting only: supply stainless or galvanized steel channel stock and 1/2-inch or 5/8-inch nuts, bolts, and washers to connect to the tower arm.

#### 4.4. Mounting Strategies

The Minnow RF Receiver is designed to be mounted either indoors or outdoors, on a wall or a vertical or horizontal pipe or strut. The Minnow Receiver is installed in the position shown in Figure 1. Note that unit is installed so that the antenna and LAN connectors are positioned facing down.



When choosing mounting locations, consider the available mounting structures and unit clearance. The Minnow Receiver should always be mounted with the top of the unit horizontal and level, and with the antenna and internet connectors facing downward.

The user should supply shielding in hot climates if the unit is to be mounted where it will receive direct sunlight.



You must provide clearance room for transient arrestors and grounding connections.

## 5. Mounting Instructions

This section describes the steps needed to install the RF Sensor in various locations.

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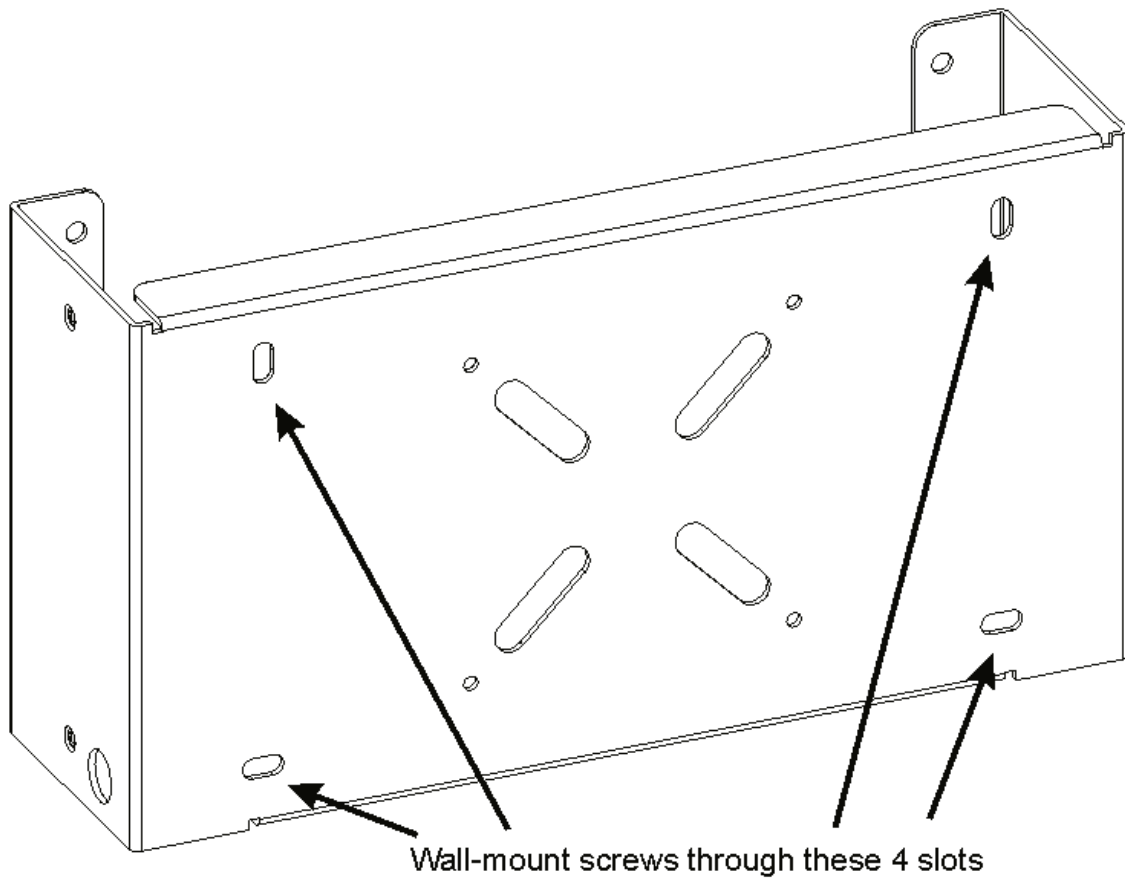
**Note:** Before you install an RF Sensor, make a note of the Sensor's serial number (located on the lower front of the housing, near the LAN connector). This is especially helpful if you are installing the RF Sensor so that the serial number plate is hidden or obscured in the final installation.

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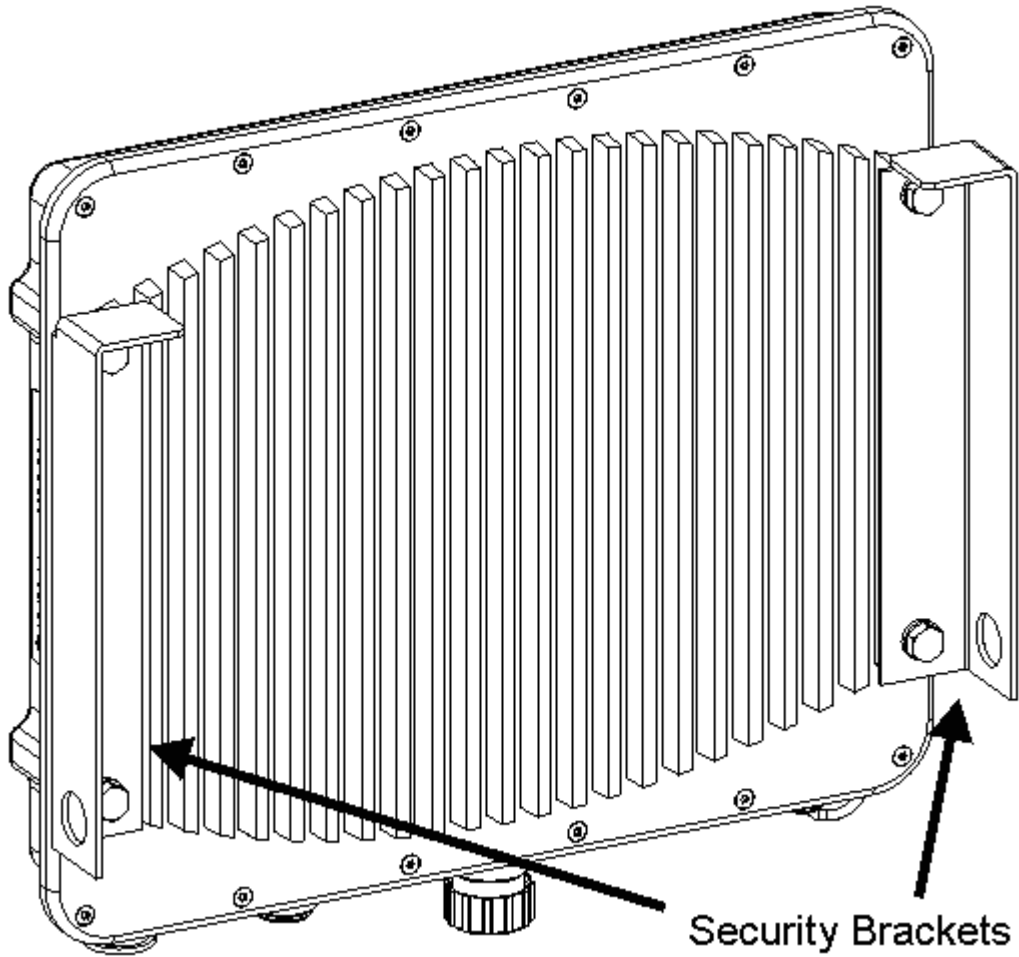
### 5.1. Wall Mounting Instructions

To install the RF Sensor to a wall, use the following steps:

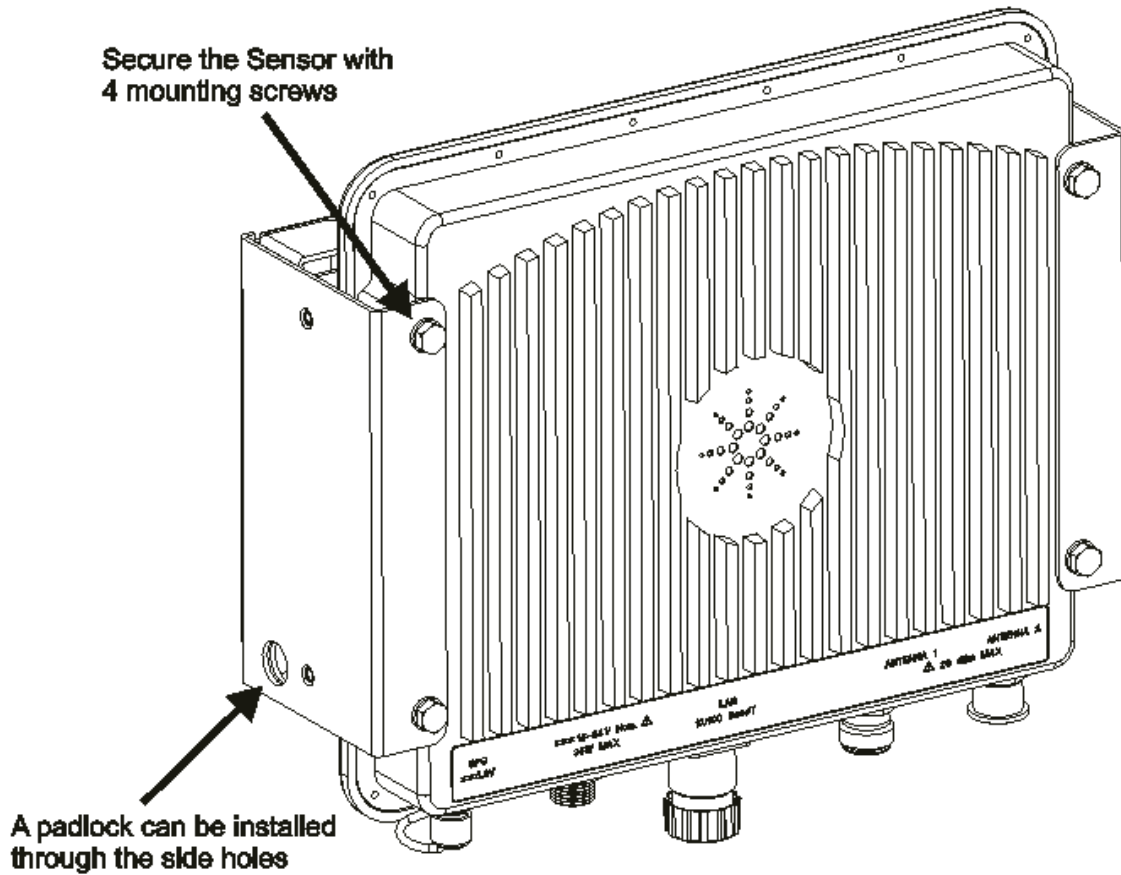
1. Place the base bracket of the Mounting Kit against the wall at the desired location.
2. Mount the base bracket to the wall with the appropriate customer-supplied screws and washers. Use the four mounting screw holes on the base bracket. These slotted holes accept screws up to 6.3mm (1/4 inch).



3. Secure left and right security brackets to the Sensor housing with four each of the M6 screws, flat washers, and lock washers included in the Mounting Kit. Install the brackets as shown so that the open side faces towards the unit's bottom (towards the power and antenna connectors.)



4. Gently slide the Sensor into the mounting bracket until the left and right security brackets rest on the main brackets.



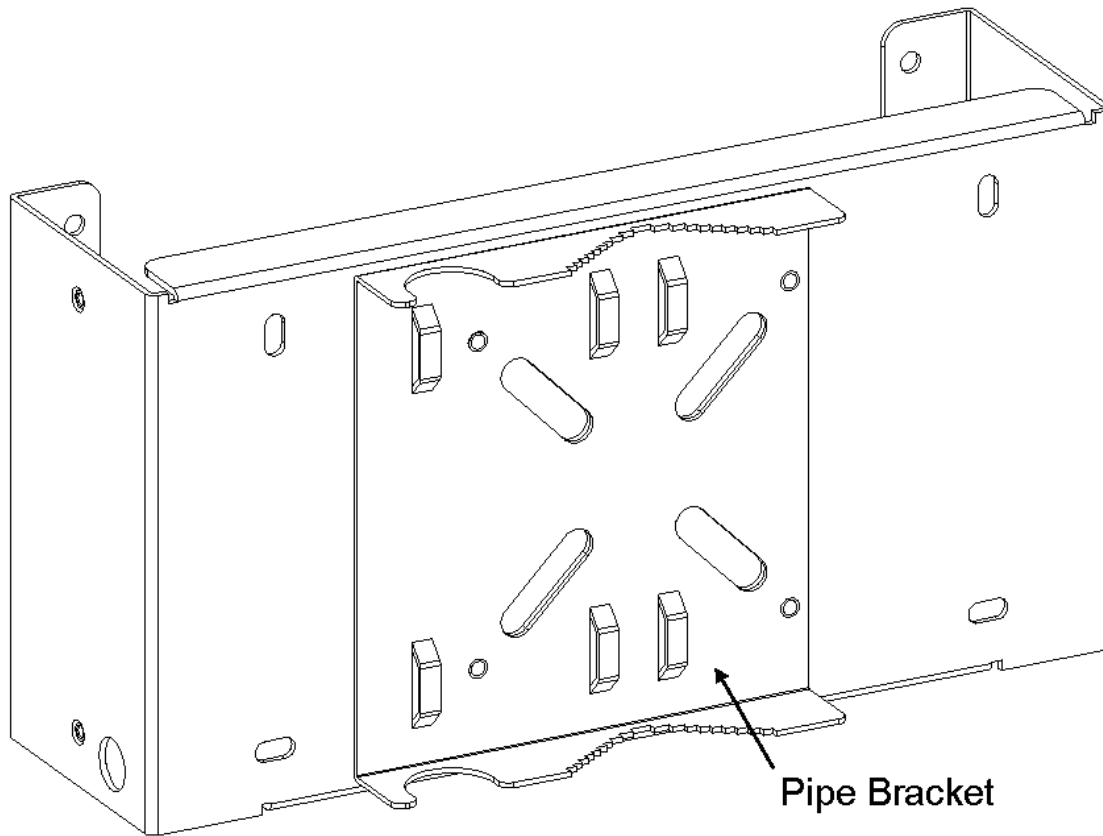
5. Secure the Sensor with four each of the M6 screws, flat washers, and lock washers included in the Mounting Kit.
6. If desired, insert a padlock through the Mounting Bracket's side holes to secure the Sensor.



## **5.2. Pole and Tower Mounting Instructions**

To mount the RF Sensor to a pipe, use the following steps:

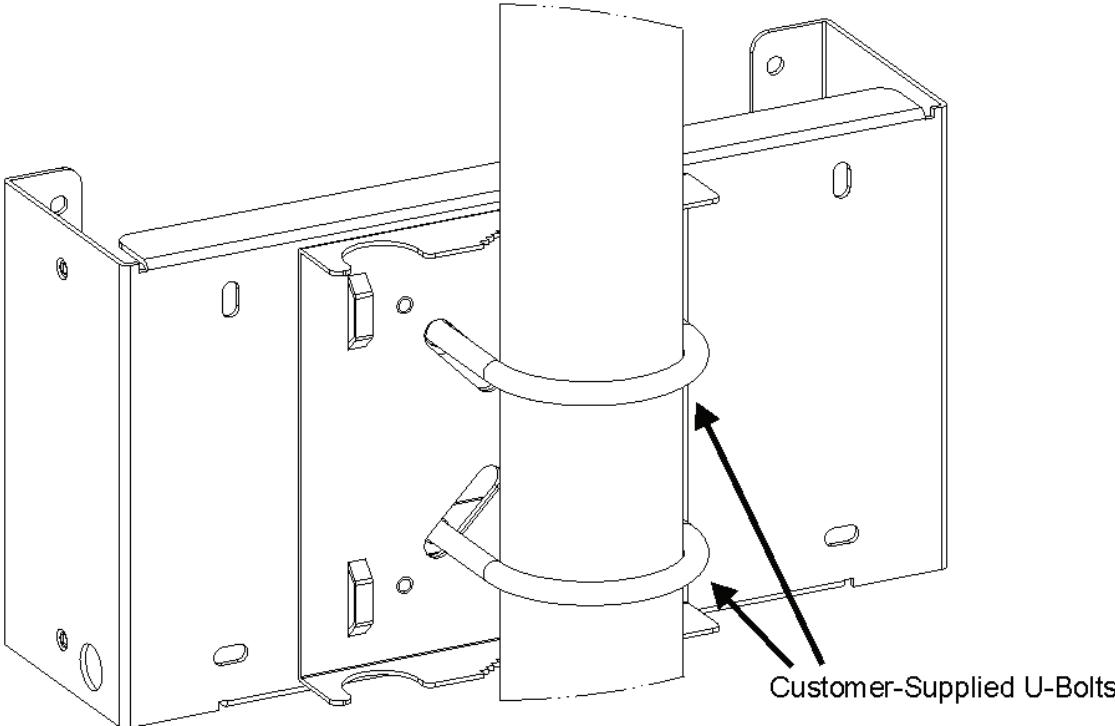
1. Place the pipe bracket to the Mounting Bracket, placing the four pipe bracket studs through the proper holes in the Mounting Bracket.



Note that the illustration shows the pipe bracket installed for a vertical pipe mount, but the pipe bracket can be rotated 90 degrees and installed so that the sensor can be mounted on a horizontal pipe.

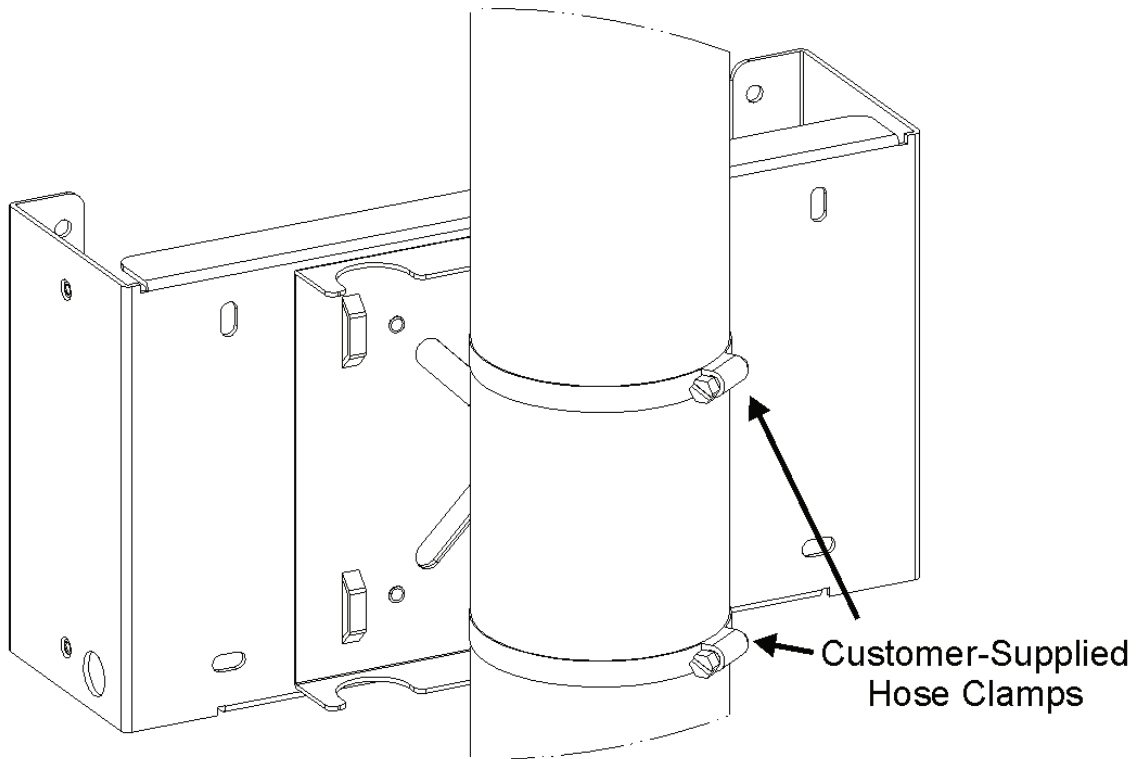
2. Secure the pipe bracket to the Sensor Mounting Bracket using 4 M4 lock nuts.

- 3. To mount to a pipe smaller than 60mm (2 3/8 inches), mount bracket to pipe using customer-supplied U-bolts and backing plates.



## N6841A Installation Guide

4. To mount to a pipe larger than 60mm (2 3/8 inches), mount bracket to pipe using customer-supplied hose clamps. Pass the clamps through the raised slots on the pipe mounting bracket and around the pipe.

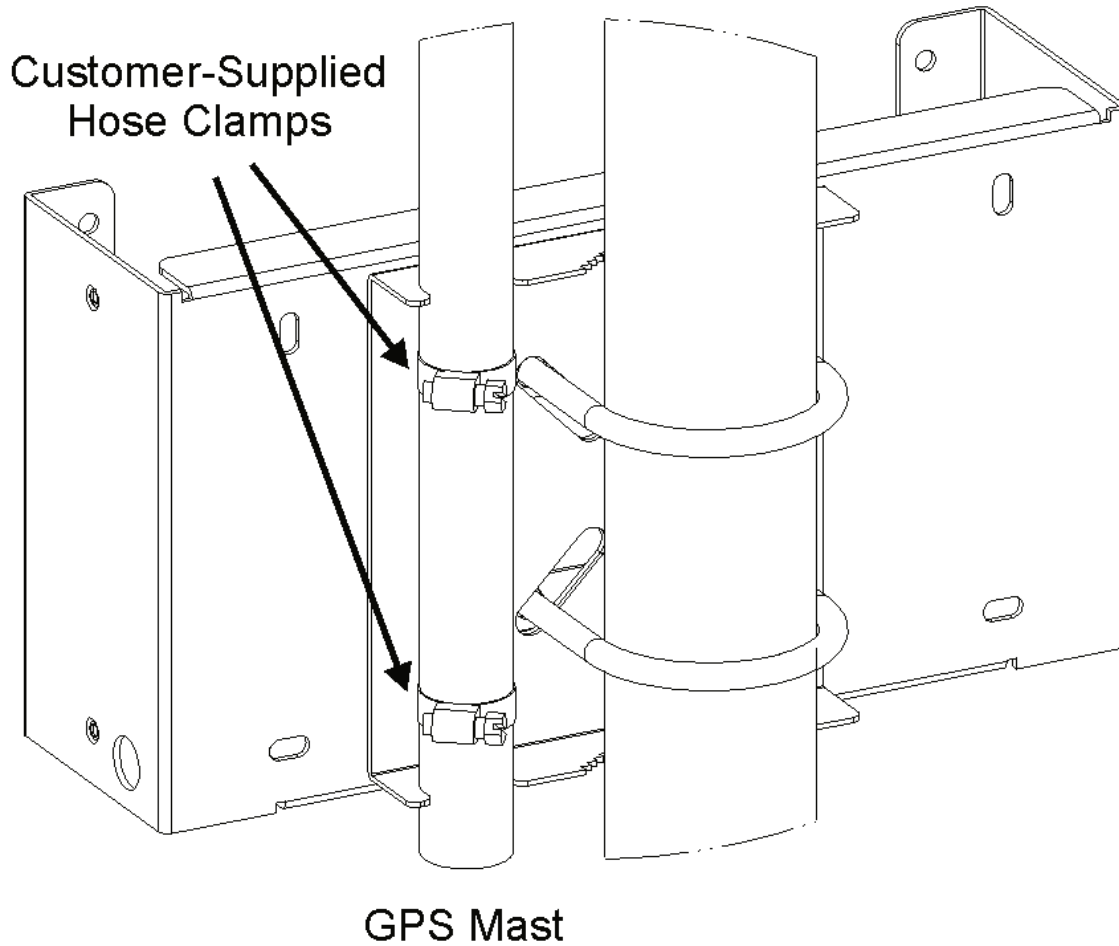


5. To add an optional GPS mast, secure the mast to the notch on the pipe bracket using customer-supplied hose clamps. The notch fits a 26 mm (1.05 inch) diameter pipe (3/4 inch nominal.)

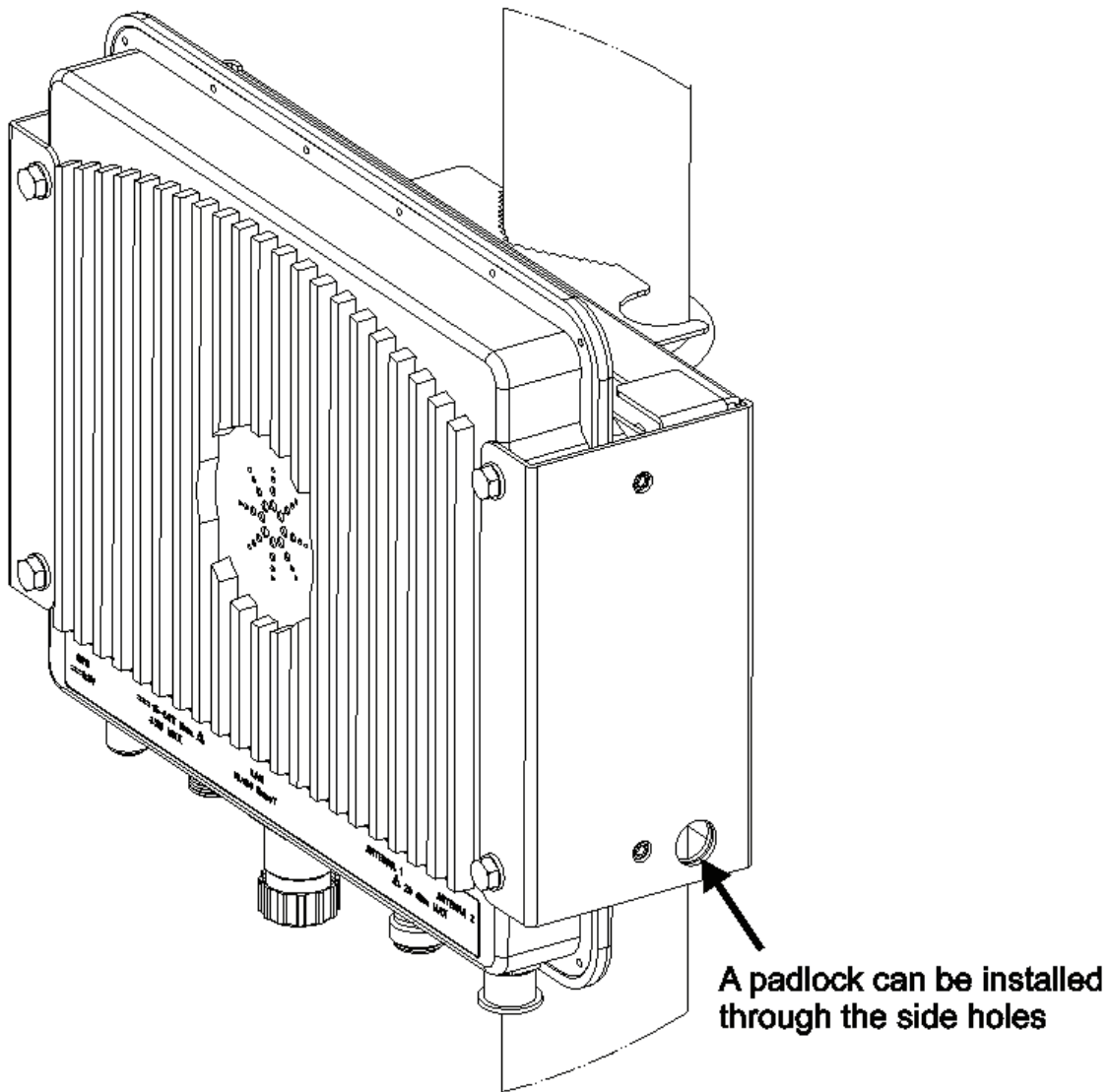
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Note: The GPS mast can be attached with the pipe bracket only if the mounting pipe is vertical. If you are mounting the Sensor to a horizontal pipe; some other method must be used to mount the GPS mast.

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6. Gently lower the Sensor into the mounting bracket until the left and right security brackets rest on the Mounting Bracket.

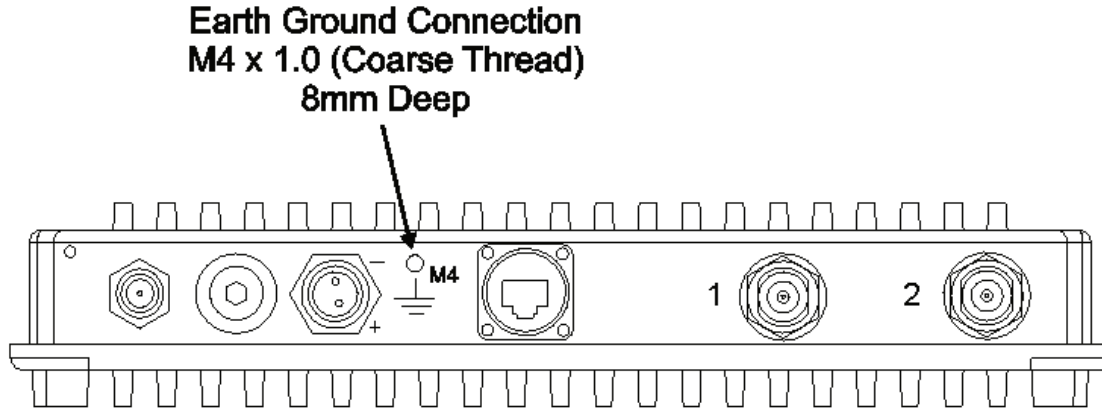


7. Secure the sensor with four M6 screws, flat washers, and lock washers.
8. If desired, insert a padlock through the Mounting Bracket's side holes to secure the Sensor.

### 5.3. Installing the Antenna Cables

Refer to the instructions that are provided with the antenna. In all cases, install in a manner consistent with good practices and local electrical codes.

Ground all antenna connections to the Sensor’s ground connection point, shown in the following illustration.



	<p>4kV of ESD protection is provided for bare antenna connections. Protecting bare antennas from human touch and other ESD sources will improve reliability.</p>
	<p>Transient arrestors are required when the antennas are mounted outdoors, or when the system is potentially subject to lightning surges. (Hyperlink Technologies AL6-NMNFB-9 or equivalent.)</p>

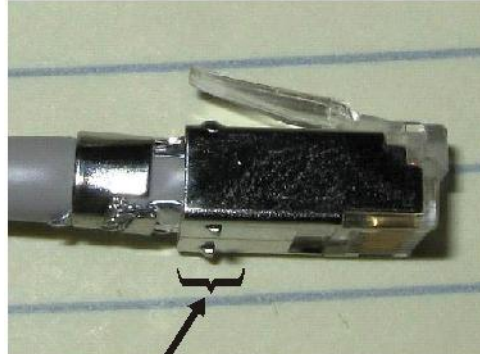
## 5.4. Preparing the Ethernet Cable

The RF Receiver's Ethernet connector will accept any standard 8P8C (RJ45) plug. However, to use the weatherproof boot in outdoor installations, the RF Receiver end of the Ethernet cable must use a connector that does not have a bump, flange, or tabs in the crimp section.

The illustration below shows an incompatible RJ45 plug and a compatible RJ45 plug.



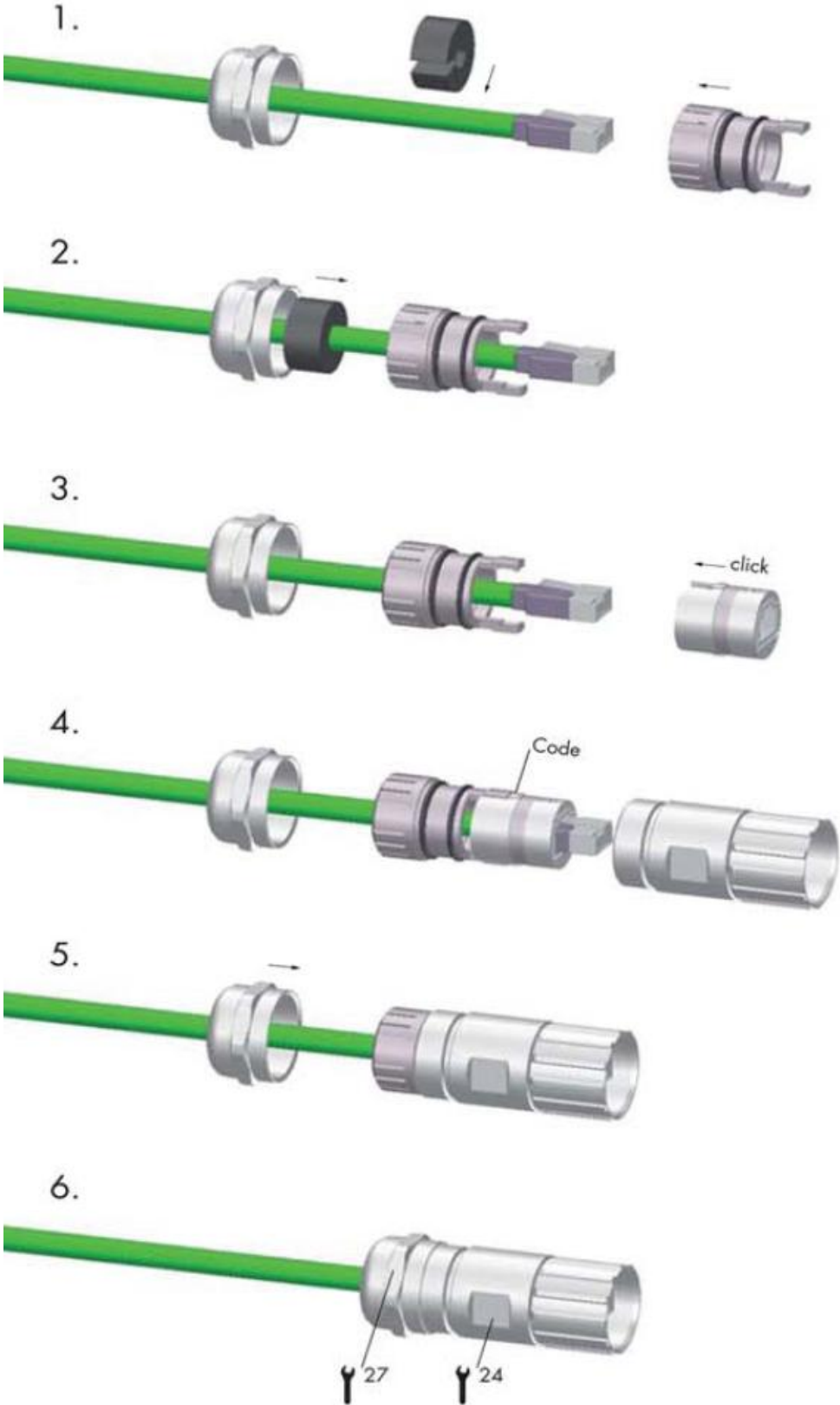
**Bump (Incompatible)**



**Tangs (Flatten with Pliers)**

The following illustrations show how to install the Ethernet connector's waterproof boot.

Assemble the weatherproof boot as shown in the following illustration:





## 6. Installing the RF Sensor Software

The software to operate the Agilent RF Sensor is provided on the software DVD included in the RF Sensor package. The software consists of:

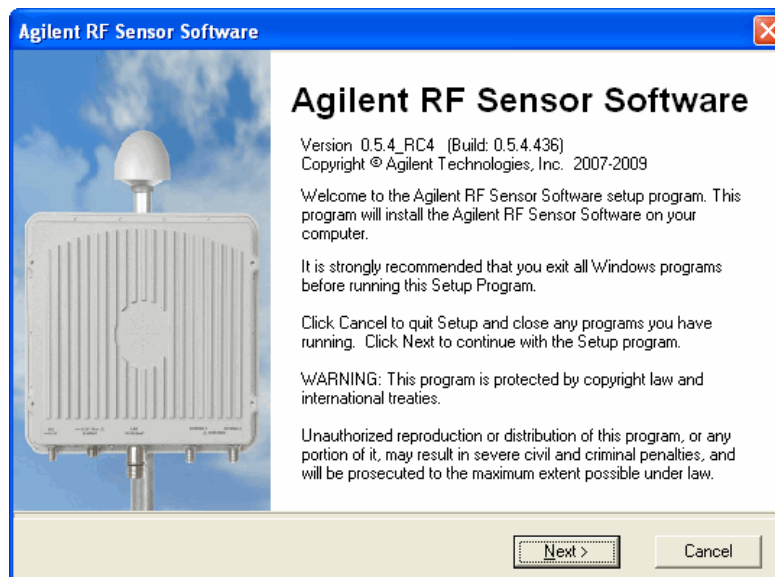
**SMT**—the Sensor Management Tool allows you to verify a sensor’s status, configure a sensor, reboot a sensor, and launch sensor programs. The SMT communicates with a server using the SMS.

**SMS**—the Sensor Management Server handles requests from the SMT and maintains a database entry for every sensor it manages.

**SAL**—the Sensor Access Library, an API allowing you to include sensor access calls in user-written programs.

To install the RF Sensor Software, use the following steps:

1. Place the DVD in the DVD drive of the laptop or workstation that you will use to control the sensor.
2. If the PC has the autorun option enabled, the software installation program starts automatically. If the autorun option is disabled, from the DVD drive, run the program `\winnt\setup.exe`.



3. Click the “Next” button to continue the installation.
4. Select the destination folder for the installation, then click the “Next” button to continue the installation.
5. Click the “Next” button to begin the installation process.
6. When the installation process is complete, verify that the program appears in the Windows Start menu.

## 7. Verifying the operation of the RF Sensor

Because the Agilent RF Sensor has no external switches, lights, or other indicators, there are two methods to ensure that the sensor is correctly completing the power-up sequence. These two methods, the Power-on self test and the Sensor Management Tool are described below.

### 7.1. Power-On Self Test

When power is applied to the Agilent RF Sensor, it performs a quick test of some of its major functions. If the sensor fails one of the self-tests, it emits a set of audible beeps, indicating which test the sensor failed. The tests are:

- PCI test—If the sensor fails this test, it emits one long beep.
- Capture SDRAM test—This test performs a quick write/read test of the sensor’s capture SDRAM. If the sensor fails this test, it emits two long beeps.
- LO Unlock test—This test verifies that all the LO oscillators can sweep through their tuning ranges without unlock. If the sensor fails this test, the sensor emits four long beeps.

### 7.2. Verifying Operation Using the SMT

The SMT was designed to control Agilent RF Sensors, and so it provides the best verification that a sensor is operating. For more complete information on using the RF Sensor Software, refer to the manual *RF Sensor Software User Guide*.

This method of connecting to the RF sensor requires either a Ethernet crossover cable or a Ethernet hub or switch.

1. Using an Ethernet crossover cable, connect the sensor directly to the workstation or laptop on which you have installed the RF Sensor software.

Or,

Connect to the sensor to the workstation or laptop using an Ethernet hub or switch.

2. Start your copy of SMT.
3. If necessary, set the SMS preferences to “localhost.”

---

**Note:** While connected to an RF Sensor directly you cannot launch Surveyor or block tools.

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4. Click on the Configuration icon.
5. Select the Discover Sensors tab on the right hand side of the window.
6. At the bottom of the window, click the “Find Available Sensors” button.
7. The sensor’s information, including its IP address, is displayed in the Discovered Sensor list.

## 8. Maintaining the Agilent RF Sensor

The Agilent RF Sensor is designed to be very low maintenance. The Sensor has no user-serviceable components; nor does it have any physically accessible adjustments. Do not open the sensor case.

To maintain the RF sensor, it should be checked occasionally to verify that it has not accumulated excessive dust, dirt, or sand. It should be cleaned of any bird droppings with a damp cloth. Ensure that the cooling fins are not blocked by twigs or wind-borne debris.



Do not clean the RF Sensor with pressurized water.