



Cisco Aironet 2.4 GHz and 5 GHz Dual-Band Polarization-Diverse Directional Array Antenna (AIR-ANT2566D4M-R)

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Overview

This section describes the Cisco Aironet 2.4 GHz and 5 GHz Dual-Band Polarization-Diverse Directional Array Antenna (AIR-ANT2566D4M-R), and provides electrical specifications and mounting instructions.

The AIR-ANT2566D4M-R antenna is a four-port polarization-diverse array that operates over the 2.4 GHz and 5 GHz Wi-Fi bands. It ships with an articulating mount for use on flat surfaces and masts, and is adjustable in both horizontal and vertical planes. The radome can be painted using commonly available non-conductive spray paints, such as Krylon or Rust-Oleum.

The antenna is designed for use in indoor and outdoor environments with an approved Cisco Aironet access point that requires four dual-band antennas.

Technical Specifications

Antenna Type	Dual-Band Polarization Diverse Directional Array	
Operating Frequency Ranges	2.4-2.5 GHz	5.15-5.925 GHz

Antenna Type	Dual-Band Polarization Diverse Directional Array	
Nominal Input Impedance	50 Ohms	50 Ohms
Voltage Standing Wave Ratio (VSWR)	2:1	2:1
Peak Gain	6 dBi	6 dBi
Polarization (Ports A & C)	Vertical	Vertical
Polarization (Ports B & D)	Horizontal	Horizontal
Nominal Elevation Plane 3-dB Beamwidth	65 Degrees	60 Degrees
Nominal Azimuth Plane 3-dB Beamwidth	65 Degrees	55 Degrees
Front-to-Back Ratio	> 12 dB	> 20 dB
Connector Type	RP-TNC (with coupling ring)	
Cable Length	3 foot	
Length	10 in. (25.4 cm)	
Width	10 in. (25.4 cm)	
Height	1.61 in. (4.1 cm)	
Weight	2.5 lbs. (1.13 kg)	
Water/Foreign Body Ingress	IP67	
Operational Wind	100 MPH	
Operating Temperature Range	-40° C to 75° C	
Storage Temperature Range	-40° C to 85° C	

Azimuth and Elevation Radiation Patterns

Figure 1: 2.4 GHz Horizontal

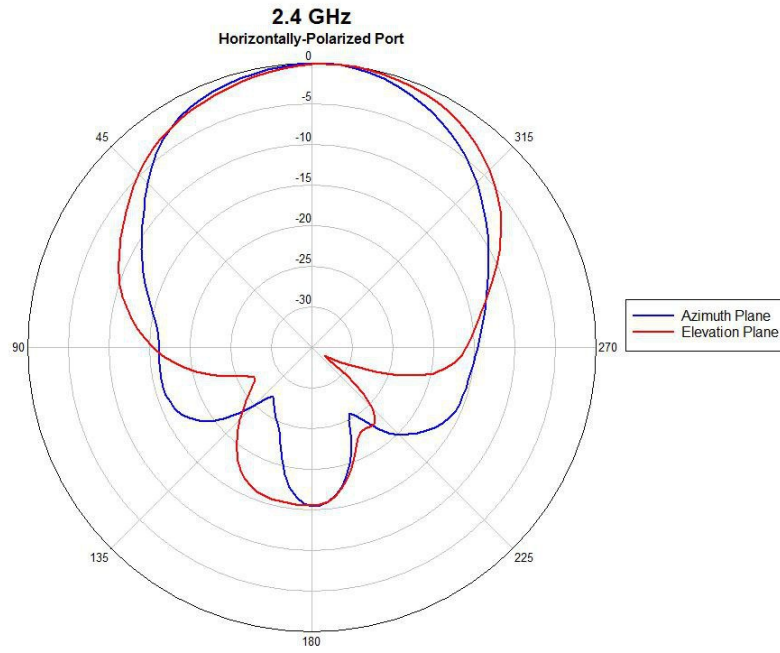


Figure 2: 2.4 GHz Vertical

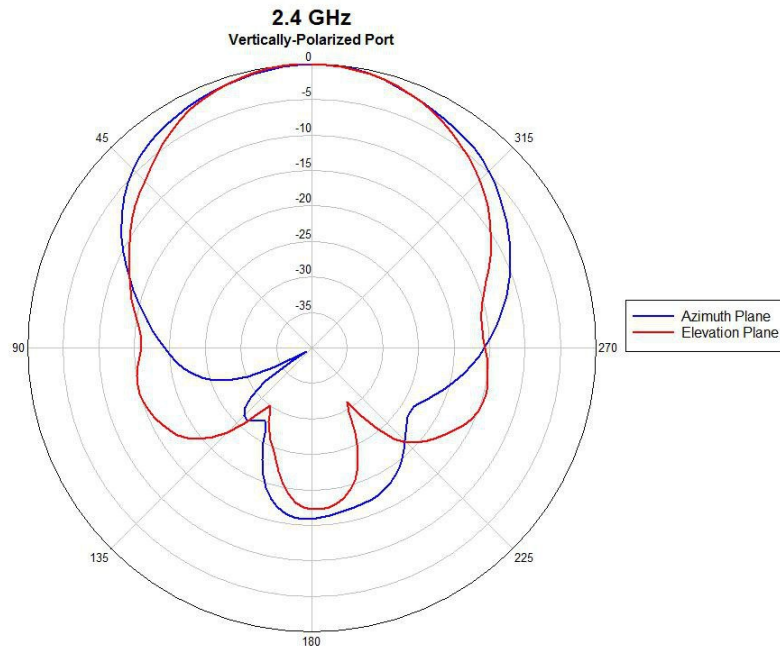


Figure 3: 5 GHz Horizontal

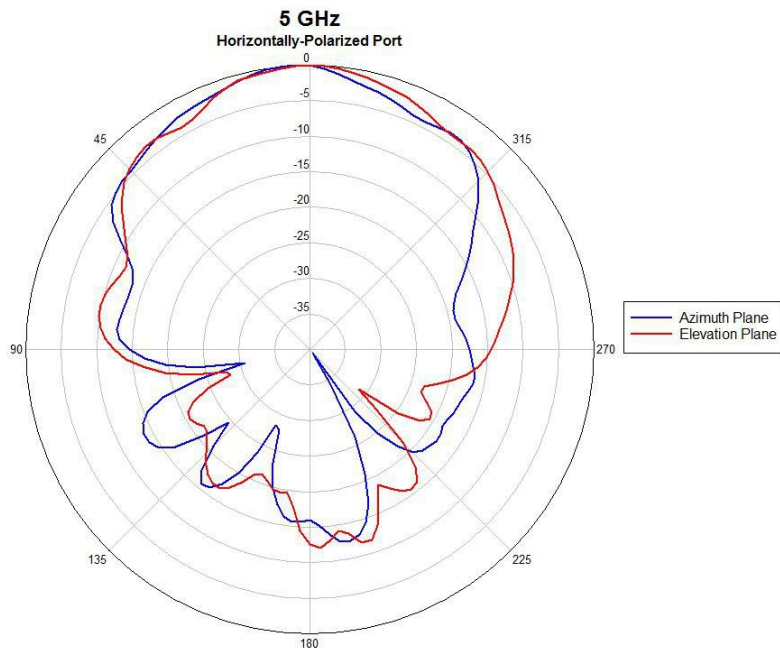
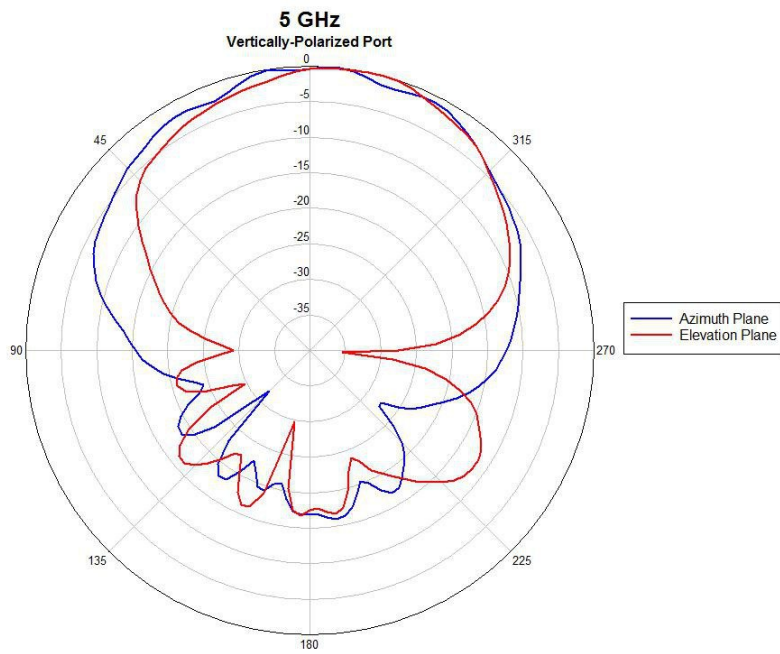
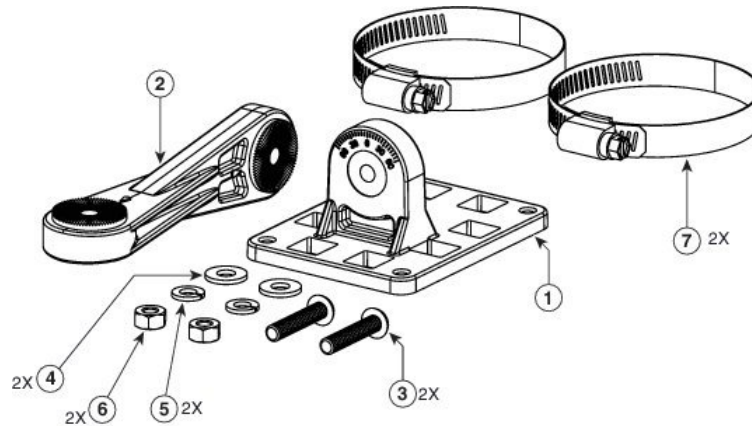


Figure 4: 5 GHz Vertical



Contents of the Antenna and Bracket Kit

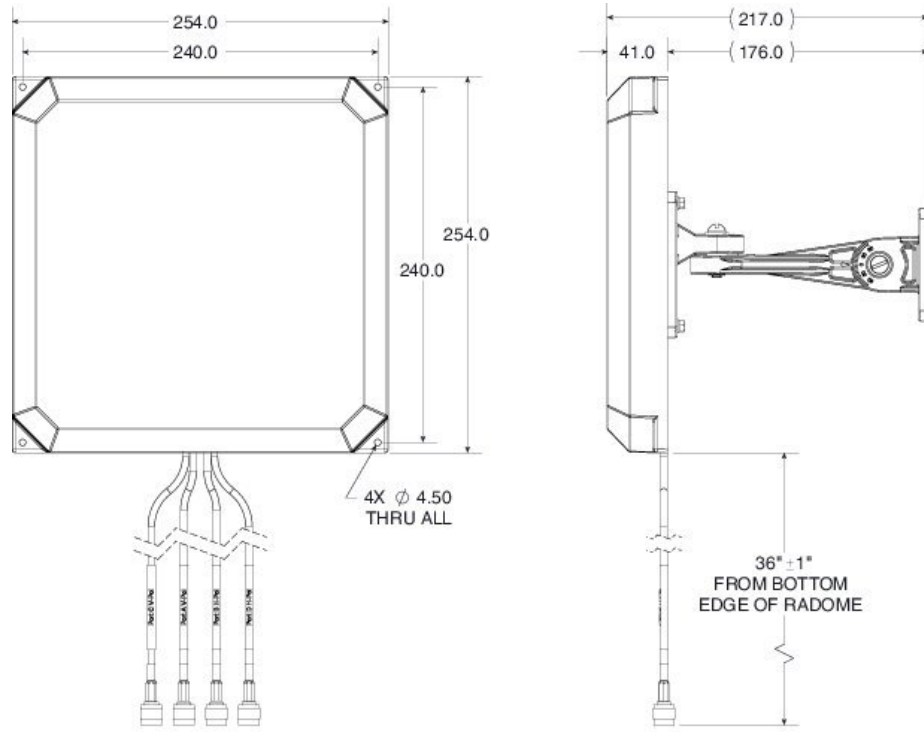


1	One of two articulating mount flanges required for the installation. The other flange comes attached to the back of the antenna.
2	Articulating mount arm.
3	1/4 20 x 1.25-inch stainless steel screws. Two are included in the kit.
4	1/4 inch flat washers. Two are included in the kit.
5	1/4-inch split-lock washers. Two are included in the kit.
6	1/4-20 Hex nuts. Two are included in the kit.
7	One of two worm-gear type hose clamps. Each has a range of 50–135mm

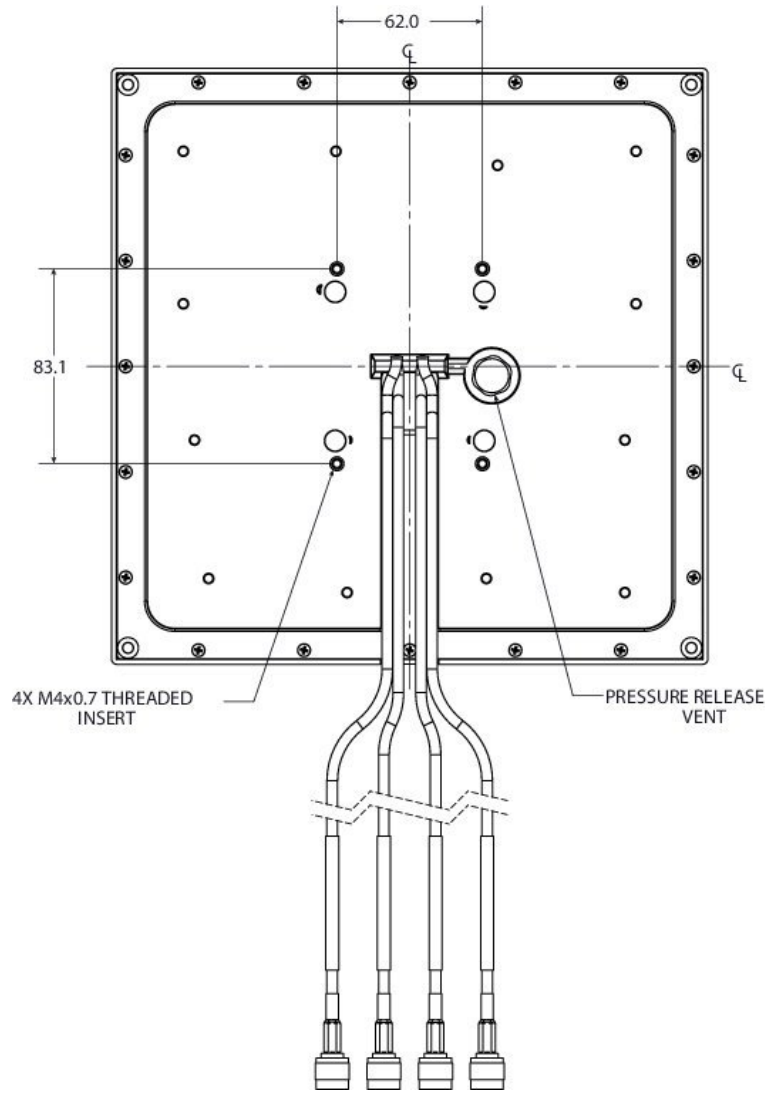
Dimensions of the Antenna and Brackets

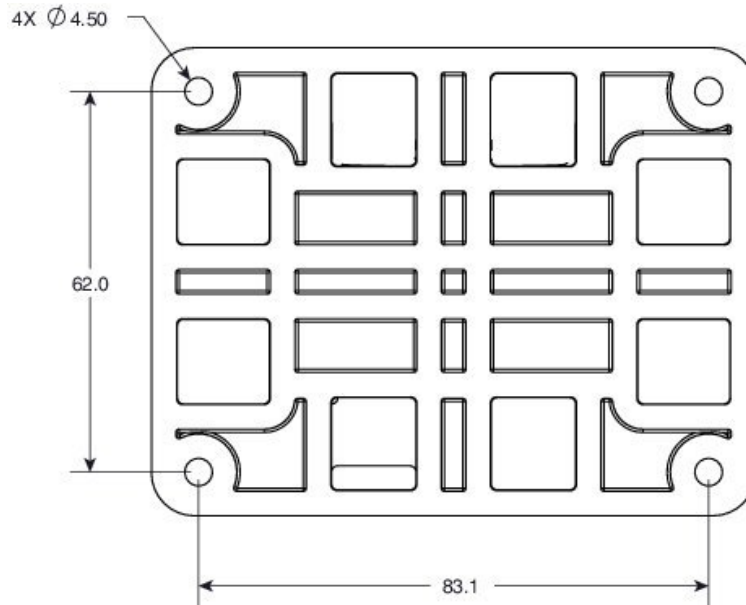
The dimensions noted in the following illustrations are all in mm, unless noted otherwise.

Dimensions of the Antenna and Brackets



05/30/03





General Safety Precautions



Warning

This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Use the statement number provided at the end of each warning to locate its translation in the translated safety warnings that accompanied this device. **Statement 1071**



Warning

Do not work on the system or connect or disconnect cables during periods of lightning activity. **Statement 1001**



Warning

Do not locate the outdoor antenna near overhead power lines or other electric light or power circuits, or where it can come into contact with such circuits. When installing the antenna, take extreme care not to come into contact with such circuits, as they may cause serious injury or death. For proper installation and grounding of the antenna, please refer to national and local codes (for example, U.S.:NFPA 70, National Electrical Code, Article 810, Canada:Canadian Electrical Code, Section 54). **Statement 1052**



Warning

In order to comply with FCC radio frequency (RF) exposure limits, antennas should be located at a minimum of 7.9 inches (20 cm) or more from the body of all persons. **Statement 332**

Each year hundreds of people are killed or injured when attempting to install an antenna. In many of these cases, the victim was aware of the danger of electrocution, but did not take adequate steps to avoid the hazard.

**Warning**

For your safety, and to help you achieve a good installation, please read and follow these safety precautions. **They may save your life!**

For your safety, read and follow these safety precautions.

- If you are installing an antenna for the first time, for your own safety as well as others, seek professional assistance. Your Cisco sales representative can explain which mounting method to use for the size and type antenna you are about to install.
- Before you install an antenna, contact your Cisco account representative to explain which mounting method to use for the size and type of antenna that you are about to install.
- Find someone to help you—installing an antenna is often a two-person job.
- Select your installation site with safety, as well as performance, in mind. Remember that electric power lines and phone lines look alike. For your safety, assume that any overhead line can kill you.
- Contact your electric power company. Tell them your plans and ask them to come look at your proposed installation.
- Plan your installation carefully and completely before you begin. Each person involved in an installation should be assigned to a specific task, and should know what to do and when to do it. One person should be in charge of the operation to issue instructions and watch for signs of trouble.
- When installing your antenna, follow these guidelines:
 - Do not use a metal ladder.
 - Do not work on a wet or windy day.
 - Do dress properly—wear shoes with rubber soles and heels, rubber gloves, and a long-sleeved shirt or jacket.
- If the assembly starts to drop, move away from it and let it fall. Because the antenna, mast, cable, and metal guy wires are all excellent conductors of electrical current, even the slightest touch of any of these parts to a power line completes an electrical path through the antenna and the installer.
- If any part of the antenna system should come in contact with a power line, do not touch it or try to remove it yourself. Call your local power company to have it removed safely.
- If an accident should occur with the power lines, call for qualified emergency help immediately.

General Installation Guidelines and Tips for Optimal Performance

This section contains the following:

Installation Guidelines

**Caution**

For outside installations, make sure you do not mount the antenna upside down or block the bottom of the antenna at the cable exit. The correct mounting position is with the cable pointing down (towards the ground) so that any moisture will drain through the antenna drain holes. The antenna ships with a yellow mounting instruction label temporarily attached to the antenna radome.

The following instructions are common to most mast mounted installations. For specific installation instructions for each antenna, see the antenna data-sheet and the router hardware installation guide.

- Assemble your new antenna on the ground or a level surface at the installation site.
- Connect its coaxial cable while you are on the ground and attach the antenna to the mast.
- Ensure that the mast does not fall as you raise or remove it. Use a durable non-conductive rope secured at each two foot level as the mast is raised. Have an assistant tend the rope, ready to pull the mast clear of any hazards (such as power lines) should it begin to fall.
- Use the mounting bracket provided with the antenna.
- If the installation will use guy wires:
 - Install guy anchor bolts.
 - Estimate the length of guy wire and cut it before raising the mast.
 - Attach guy wires to a mast using guy rings.
- Carefully connect the antenna and mast assembly to its mounting bracket and tighten the clamp bolts.
 - In the case of a guyed (tall, thin mast) installation, you must have at least one assistant to hold the mast upright while the guy wires are attached and tightened to the anchor bolts.
- Attach a “DANGER” label at eye level on the mast.
- Install ground rods to remove any static electricity buildup and connect a ground wire to the mast and ground rod. Use ground rods designed for that purpose, not a spare piece of pipe.

Unused Antenna Ports

Port plugs must be installed in any unused antenna ports.

The weatherproof caps on the connectors protect the router interior from environmental elements including water, heat, cold, and dust. They are installed on unused ports before the router is shipped.

When you install a new antenna in a port with an N-connector:

- Chassis-mounted antennas—Remove the weather proof cap before installing a chassis-mounted antenna.
- External antennas—Remove weatherproof cap, then connect the supported Cisco cable to the connector.

Tips for Optimal Performance

Because the antenna transmits and receives radio signals, they are susceptible to RF obstructions and common sources of interference that can reduce throughput and range of the device to which they are connected. Follow these guidelines to ensure the best possible performance:

- Mount the antenna to utilize its propagation characteristics. One way to do this is to orient the antenna vertically and mount it as high as possible.
- Keep the antenna away from metal obstructions such as heating and air-conditioning ducts, large ceiling trusses, building superstructures, and major power cabling runs. If necessary, use a rigid conduit to lower the antenna away from these obstructions.
- The density of the materials used in the building construction determines the number of walls the signal must pass through and still maintain adequate coverage. Consider the following before choosing the location to install your antenna:
 - Paper and vinyl walls have very little affect on signal penetration.
 - Solid and pre-cast concrete walls limit signal penetration to one or two walls without degrading coverage.

- Concrete and wood block walls limit signal penetration to three or four walls.
 - A signal can penetrate five or six walls constructed of drywall or wood.
 - A thick metal wall causes signals to reflect off, causing poor penetration.
 - A chain link fence or wire mesh spaced between 1 and 1 1/2 in. (2.5 and 3.8 cm) acts as a harmonic reflector that blocks a 2.4-GHz radio signal.
- Install the antenna away from microwave ovens and 2-GHz cordless phones. These products can cause signal interference because they operate in the same frequency range as the device your antenna is connected to.
 - Install the antenna in a vertical orientation to maximize signal propagation.

Site Selection

Before attempting to install your antenna, determine where you can best place the antenna for safety and performance.

Follow these steps to determine a safe distance from wires, power lines, and trees.

1. Measure the height of your antenna.
2. Add this length to the length of the structure on which you are mounting the antenna and then double this total for the minimum recommended safe distance.



Caution If you are unable to maintain this safe distance, stop and get professional help.

Generally, the higher an antenna is above the ground, the better it performs. Good practice is to install your antenna about 5 to 10 foot (1.5 to 3 m) above the roof line and away from all power lines and obstructions. If possible, find a mounting place directly above your wireless device so that the lead-in cable can be as short as possible.

Installing the Antenna

You can install the antenna on a wall or ceiling (must be a flat surface), or on a pole with a minimum diameter of 2 inches (5.08 cm) and a maximum diameter of 5 inches (12.7 cm). The antenna and one mounting flange are connected together when shipped.

To install the antenna:

1. Decide on a mounting location. See the [Deciding on a Mounting Location, on page 12](#).
2. Ensure that you have the requisite tools and fasteners ready. See the [Tools and Equipment Required, on page 12](#).
3. Proceed with mounting the antenna. When mounting the antenna, assemble the bracket hardware, connect the antenna and bracket to the mounting surface, and adjust the antenna orientation.

The mounting options available are:

1. Mount on a wall or ceiling.
2. Mount on a pole or mast.
3. Flush mount on a wall without mount brackets.
4. (Optional) Paint the antenna.

Deciding on a Mounting Location

The antenna should be mounted clear of any obstructions to the side or front of the enclosure, which contains the radiating elements. Keep in mind that this antenna should be aimed at the intended coverage area. Therefore, you should mount the antenna such that the desired mechanical tilt is achieved. If possible, mount the antenna near the access point so that you can use the shortest possible connecting cables.


Caution

For outdoor installations, install the antenna with cables exiting downward. This will help prevent water from accumulating around the cable exit points.

Tools and Equipment Required


Warning

The fasteners and the mounting surface should be capable of maintaining a minimum pullout force of 150 pounds (68 kg) to support the weight of the antenna and bracket along with the potential wind loading on the antenna.


Warning

The pole or mast must be rigid enough to hold the weight of the antenna along with the associated forces produced by wind loads. Also, the pole or mast must be structurally strong enough to withstand the clamping force of the hose clamps.

Before you start with mounting the antenna, go through the mounting procedure for each kind of installation and ensure that you have all tools and fasteners mentioned therein ready. The following is a general list of fasteners and tools which are not included in the antenna and brackets kit.

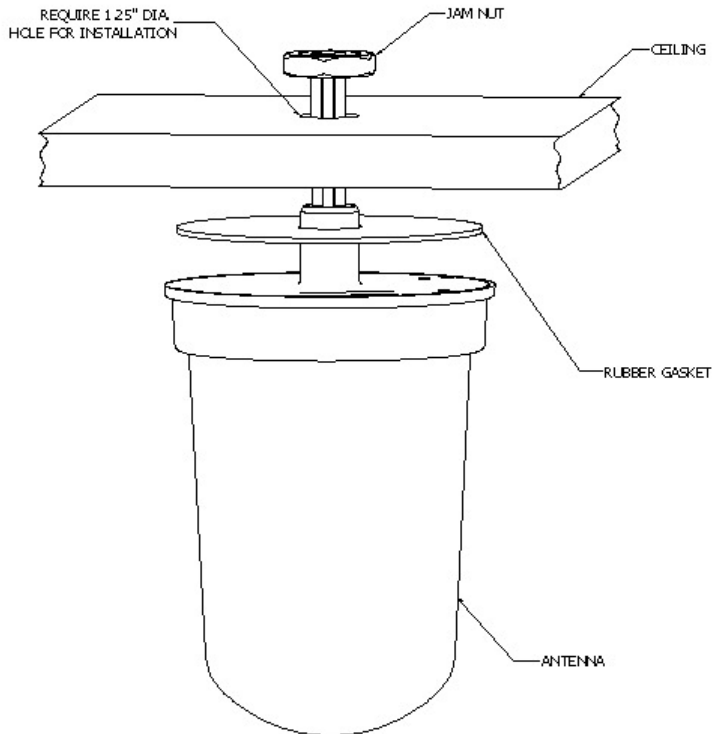
- To loosen and tighten the adjustment bolts on the brackets, you need a flat-blade screwdriver.
- To mount the antenna on a wall or ceiling, you need four mounting 4 mm or #8 screws or bolts and wall anchors.
- To mount the antenna on a pole or mast, you will need either or both of these supplies:
 - Slotted screwdriver to tighten the screws on the hose clamps
 - A 5/16 inch (8mm) socket or box wrench
- You may also need the following tools and equipment, which are not provided as part of the kit:
 - A drill and drill bit
 - A pencil
 - A small mallet or hammer, to hammer
 - A Phillips screwdriver

Mounting on a Ceiling

To mount the antenna on a ceiling, follow these steps:

- Step 1** Drill a hole in the ceiling approximately 1.25 in. in diameter.
- Step 2** Fit the rubber gasket onto the bottom of the antenna.
- Step 3** Insert the antenna shaft through the hole in the ceiling.
- Step 4** Thread the jam nut onto the antenna shaft and tighten.

Figure 5: Mounting on a Ceiling



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Mounting on a Pole or Mast

Follow these steps:



- Note** The pole or mast must be rigid enough to hold the weight of an antenna along with the associated forces produced by wind loads. In addition, the mast must be structurally strong enough to withstand the clamping force of the hose clamps.

- Step 1** Determine the mounting location for the antenna on the pole or mast.

- Step 2** Position and mount the mounting flange bracket on to the pole or mast using the hose clamps provided in the kit. The hose clamps should pass through the slots on the free mounting flange bracket.
- One of the two required articulating mount flange brackets come attached to the back of the antenna. The other flange bracket, included in the kit, is the one used in this step.
- Step 3** Tighten the hose clamps only to the extent that they can hold the flange bracket and the antenna in place until the antenna is positioned at its final position. Use a slotted screwdriver to tighten the screws on the hose clamps.
- Step 4** Assemble the antenna and bracket to the flange bracket.
- Step 5** Position the antenna, mounting bracket, and hose clamps on the mast.
- Step 6** Tighten the hose clamps until the antenna is fully secure on the mast. Ensure that the antenna cannot rotate about the mast.
- Step 7** After the antenna is secured on the mast, adjust the azimuth (side-to-side position) and elevation (up-and-down position) of the antenna. Loosen the adjustment pivot bolts slightly to allow for adjustment.
- Azimuth angle can be adjusted ± 90 degrees (Figure 7) and elevation can be adjusted ± 55 degrees (Figure 8). You can use the azimuth and elevation markings on the articulating mounting arm and the flange brackets as a guide.
- Step 8** After you adjust the antenna position, tighten the adjustment bolts. Tighten all the bolts to not more than 30 lbf.in. (3.4 Nm).
- Step 9** Connect the antenna cables to the access point. The antenna ports are labeled A through D. Connect the antenna port A to connector A on the access point, antenna port B to connector B on the access point, and so on.

What to do next

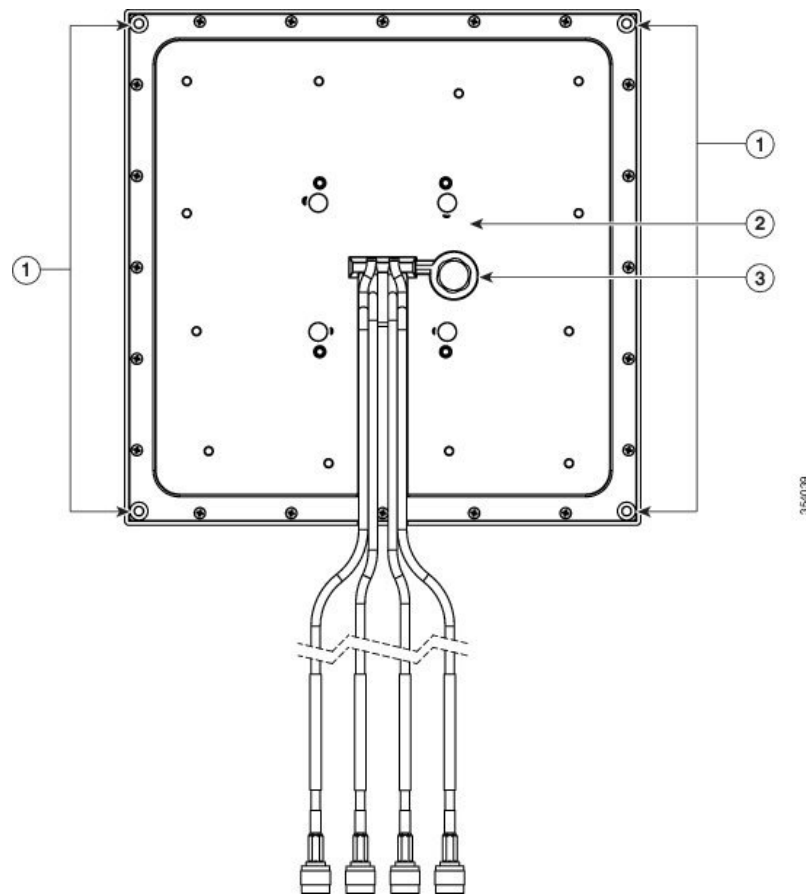
For the recommended cable type, see the Recommended Cable section.

Flush Mounting on a Wall Without Mount Brackets

You can flush mount the antenna on a wall. For this, you will need to discard the articulating mount flange brackets from the installation.

NOTE: The following procedure describes how to mount the antenna on a drywall. If you intend to install your antenna on another surface other than a drywall, the following procedure may vary slightly and you should procure the necessary hardware.

1. Remove the articulating mount flange bracket that comes attached to the back of the antenna.
2. Determine the location where you will mount the antenna.
3. Use the antenna as a template to mark the location of the four mounting holes.
4. Using a drill and #29 drill bit, drill four holes at the locations you have marked. For drywall installations a #29 (0.136 inch or 45 mm) drill bit is enough. Other surfaces may require a different size.
5. Insert 8-inch plastic wall anchors into each hole.
6. Using a mallet or small hammer, properly seat the plastic anchors into the wall.
7. Align the antenna's mounting holes with the anchors.
8. Insert an 8 x 1¼-inch screw, through each mounting hole and into its anchor.
9. Tighten the screws using a Phillips screwdriver. Do not overtighten.
10. Connect the antenna cables to the access point. The antenna ports are labeled A through D. Connect the antenna port A to connector A on the access point, antenna port B to connector B on the access point, and so on.



1	Screw holes for flush mounting on a wall. Each hole takes an 8 x 1¼-inch screw.
2	Spot where the preinstalled articulating flange mount was removed from.
3	Pressure release vent.

Recommended Cable

This antenna comes with four 3 foot long cables with RP-TNC connectors. If you need a longer cable reach, use AIR-CAB005LL-R= to extend the length by an additional 5 feet.



Note A coaxial cable loses efficiency as the frequency increases, resulting in signal loss. The cable should be kept as short as possible because cable length also determines the amount of signal loss (the longer the cable, the greater the loss).

Painting the Antenna

Painting the antenna and the bracket does not affect its performance if you use standard exterior-grade, oil-based, or latex paint. Do not use metallic or metallic-flake paints, which will degrade antenna performance.



Note Before painting the antenna, cover the pressure-release vent on the rear, lower-left of the antenna with masking tape to prevent clogging. Ensure that you remove the tape afterwards.

We recommend that you use Krylon Fusion for Plastic or Rust-Oleum for Plastic (which might require a primer coat). For best results, follow the surface preparation suggestions from the paint manufacturer.

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