

Cisco Ultra-Reliable Wireless Backhaul FM HORN

Installation and Configuration Manual

(Formerly Fluidmesh)
Edition 1.0 (For FM-HORN-30, FM-HORN-60 and FM-HORN-90 antennas)

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1. HAZARDOUS CONDITION WARNINGS

Like all other global technology vendors, Fluidmesh is required to comply with all local health and government regulations in the locations in which we operate. This includes meeting radio frequency (RF) exposure limits for our products.

Our equipment is tested in accordance with regulatory requirements as a condition to our ability to market and sell in any given jurisdiction. As an equipment manufacturer, Fluidmesh defers to expert national and international health organizations responsible for guidance on the safety of RF signals, specifically the US Food and Drug Administration (FDA), Health Canada, the World Health Organization (WHO), and other national and global health agencies.

In May 2019, the FDA stated that there is "no link between adverse health effects and exposure at or under the current RF energy exposure limit", and that the current FCC RF exposure limits are sufficient to insure the safety of users.

If any Fluidmesh hardware unit breaks down or malfunctions, emits smoke or an unusual smell, if water or other foreign matter enters the unit enclosure, or if the unit is dropped onto a hard surface or damaged in any way, power off the unit immediately and contact an authorized Fluidmesh Networks dealer for assistance.

If you are adjusting and/or controlling a Fluidmesh device using control software such as the RACER™ interface or the device's local Configurator interface, do not make configuration changes unless you know with certainty that your changes will not negatively impact people or animals in the vicinity of the device and its antennas.

1.1. Radio-frequency transmission hazard



WARNING

The system shown in this manual is designed to be installed and operated in a way that avoids contact with the antennas by human beings. The legislation quoted in this section is designed to reduce overall exposure of human beings to RF radiation.

This section gives minimum separation distances between antennas and humans. It is strongly recommended that the system be installed in a location where these minimum separation distances can be maintained at all times.

United States: This system has been evaluated for RF exposure for humans, in accordance with FCC regulation CFR 47 Part 2.1091. To maintain compliance, the minimum separation distance from the antenna to general bystanders is 20cm/7.9in. (all FM Ponte kit and x200 radio transceivers), or 21cm/8.3 in. (all FM1300 Otto and x500 radio transceivers).

Canada: This system has been evaluated for RF exposure for humans, in accordance with ISED regulation RSS-102. To maintain compliance, the minimum separation distance from the antenna to general bystanders is 20cm/7.9in. for all Fluidmesh radio transceivers.

Europe / Australia / New Zealand: This system has been evaluated for RF exposure for humans, in accordance with standard EN 62232. To maintain compliance, the minimum separation distance from the antenna to general bystanders is 20cm/7.9in. for all Fluidmesh radio transceivers.

Before activating any device capable of transmitting RF signals, make sure that all persons and animals are protected from possible RF exposure.

Make sure that all RF feeds are securely connected to an appropriate antenna. Never activate any RF-capable device that is not connected to an antenna.

2. Reporting mistakes and recommending improvements

You can help improve this manual.

If you find any mistakes, or if you know of a way to improve the procedures that are given, please let us know by E-mailing your suggestions to documentation@fluidmesh.com.

3. Introduction

This manual gives field-level installation instructions for installing Fluidmesh antennas. It is intended for use by wireless networking professionals who have been tasked with installing Fluidmesh radio antennas.

To prevent personal injury and equipment damage, and to ensure optimum network performance:

- Install all network hardware where it cannot be physically damaged.
- Shield all network hardware from salt water and chemical spray.
- Keep a safe distance from all RF-radiating devices when such devices are powered on, make sure that all persons and animals are protected from possible RF exposure before activating any device capable of transmitting RF signals, and do not stand in line with powered RF-radiating devices.
- Make sure that all RF feeds are securely connected to an appropriate antenna before activating any device capable of transmitting RF signals.

3.1. FM-HORN-series antennas

The HORN 30, HORN 60 and HORN 90 antennas are scalar horn antennas for applications that feature closely located clients with potential for null-zone issues.

These antennas include mounting brackets that allow them to be mounted on antenna masts with outside diameters of between 0.59" (15mm) and 3.4" (86mm).

4. Installation

4.1. Environmental rating

Fluidmesh HORN-series antennas are designed to withstand adverse environmental conditions, up to and including those specified by ingress protection (IP) rating IP55.

4.2. General installation practices to follow and avoid

When installing and adjusting an antenna in any scenario that uses Fluidmesh hardware, install and adjust the antenna according to the following recommendations.



NOTE

Not all recommendations listed in this section will apply to all antennas.

- Make sure the antenna and its transceiver unit are properly grounded (earthed) to prevent the antenna and transceiver from accumulating static electricity or producing sparks. If the antenna and/or transceiver are mounted in a flammable environment, stray sparks could ignite the flammable materials, causing an explosion and/or flash fire.
- Wherever practically possible, keep all antenna cabling runs under 10 feet (three metres). Radio signals conducted through antenna cabling before being transmitted from an antenna suffer from a phenomenon called signal attenuation. The signal gradually dissipates along the length of the cable due to electrical resistance before being transmitted from the antenna, reducing signal amplitude.
- Do not bend or kink antenna cabling. Kinks and bends may cause breaks and/or narrow points in the cable's electrical conductor, resulting in degraded signal amplitude.
- Be sure to comply with the minimum and maximum co-location distances specified by Fluidmesh for each antenna type. This helps avoid co-location interference (in which the radio transmissions from two or more antennas partially cancel each other out).
- Note that during test and adjustment of stationary antennas, an antenna placement adjustment of between four and five feet (1.2m to 1.5m) may be needed.
- A signal quality test and adjustment must always be done during an installation to verify signal quality and amplitude. If the test and adjustment procedure is not done, the installation is at risk of under-performing due to poor line-of-sight and other factors.

- If applicable, avoid installing antennas inside audio loudspeaker enclosures. The proximity of a radio antenna to the metal in speaker bodies causes degraded performance due to radio reflections. In addition, the energy of radio (microwave) transmissions that strike metal is partially or completely dissipated as a flow of electrons, requiring higher transmission power to broadcast a viable signal. Non-metallic loudspeaker enclosures made of polycarbonate or other plastics, enclosures painted with non-metallic paint, and antennas mounted under or behind shrouds are all acceptable.
- Avoid installing antennas on or close to metal surfaces, metal beams and similar. This helps to avoid radio reflections and dissipation.

4.3. Contents of the kit

The antenna kit contains the following components:

4.3.1. FM-HORN

- 1x FM-HORN antenna, with main mounting bracket pre-installed.
- 1x crescent bracket.
- 2x M8x75 hex-head bolts.

4.4. Installing the antenna



IMPORTANT

When connecting an antenna to a radio unit, only use shielded co-axial antenna cables of type LMR 240 or better.

4.4.1. Installing a HORN-series antenna

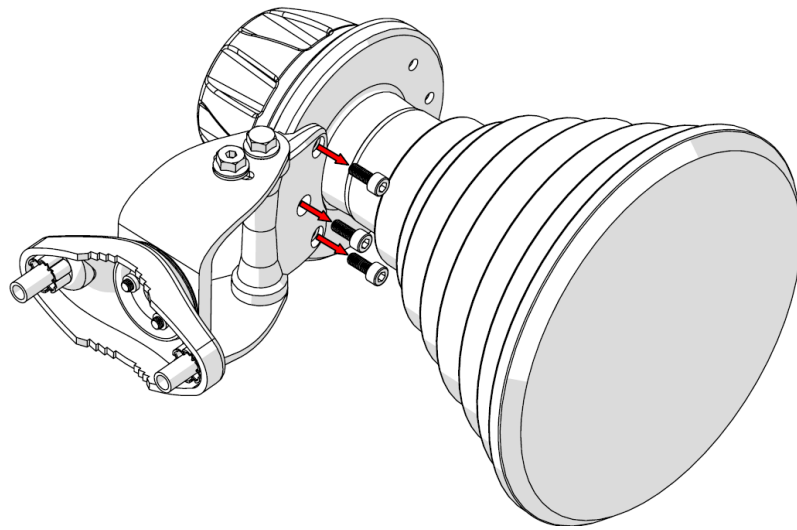


IMPORTANT

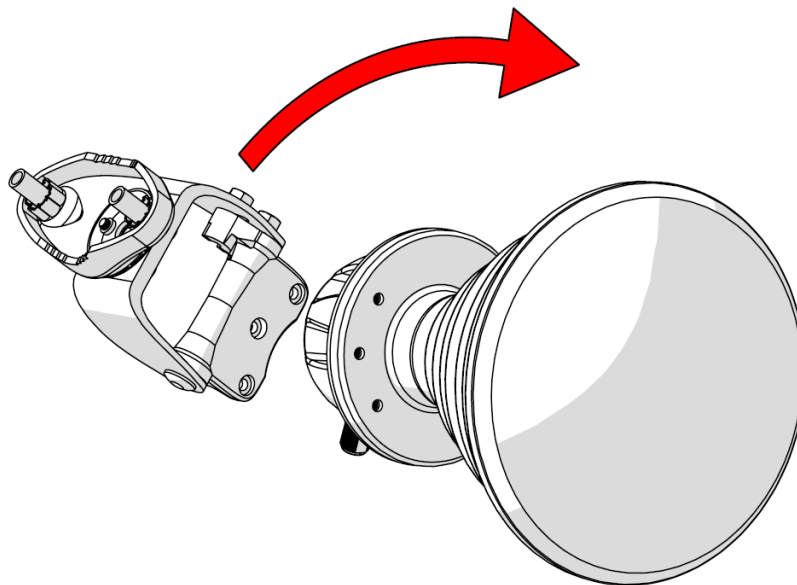
The antenna's cable connectors must always face *down*.

HORN-series antennas are factory-assembled for installation to the *left* of a utility pole. If you want to install an FM-HORN to the *right* of a utility pole, remove and re-install the main mounting bracket by doing the steps that follow:

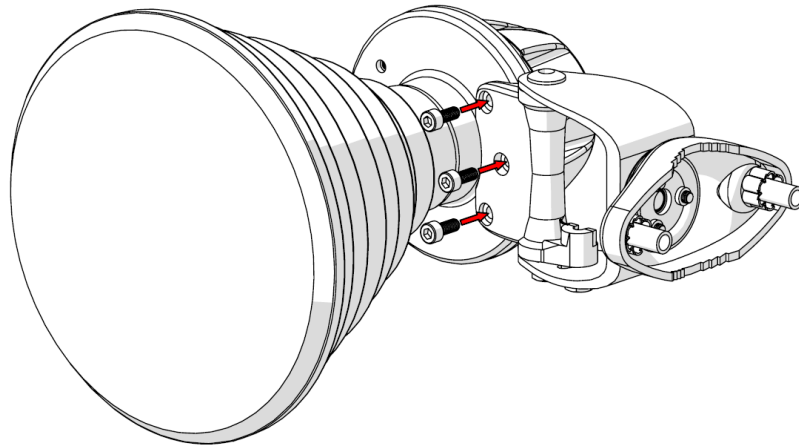
1. Remove the three cap screws from the main mounting bracket (below).



2. Rotate the main mounting bracket to the opposite side of the antenna body (below).

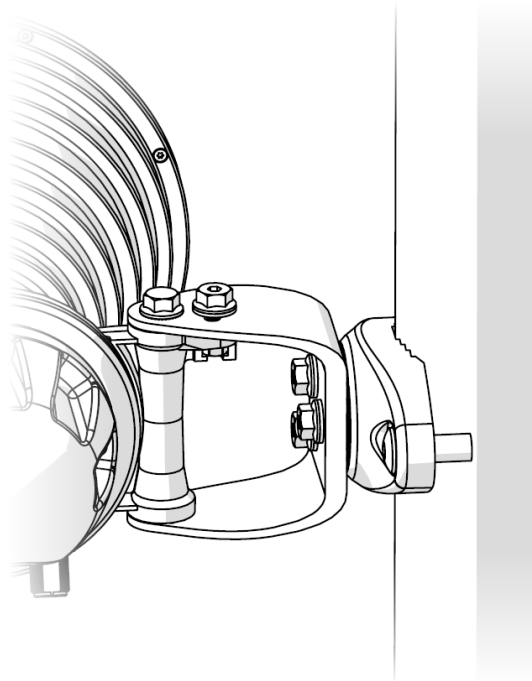


3. Re-install the three cap screws (below).

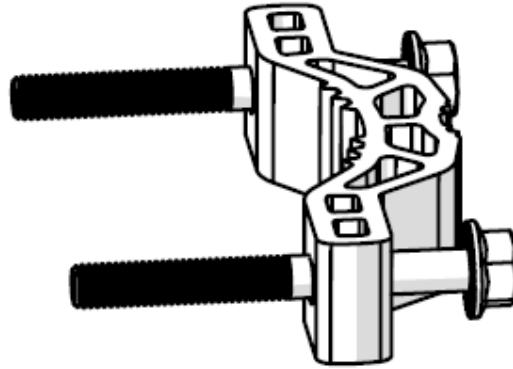


To install a HORN-series antenna on a vertically-oriented utility pole, do the following steps:

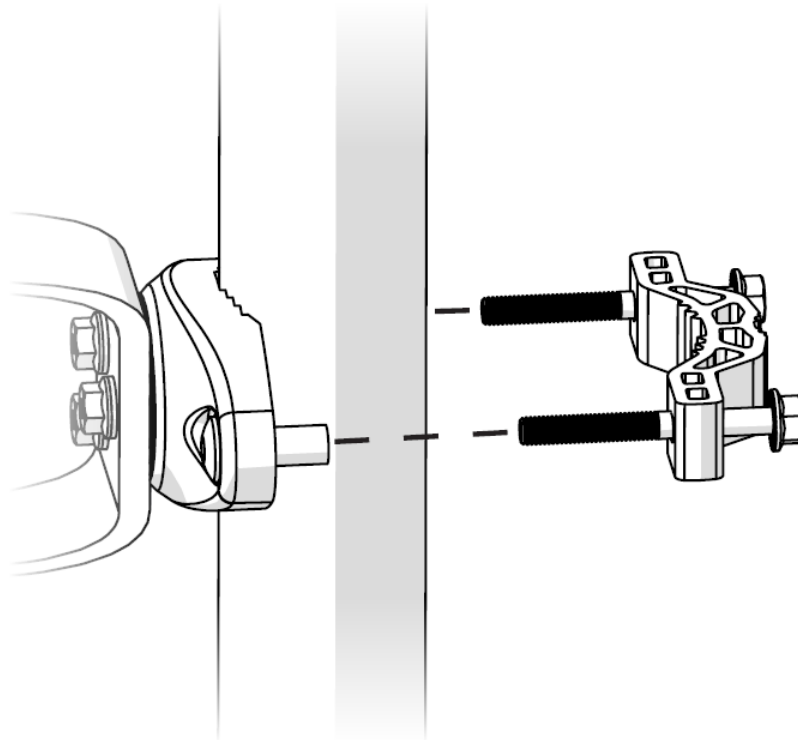
1. Decide where on the utility pole the antenna must be mounted, taking easy access and line-of-sight into account.
2. Make sure the antenna's cable connectors are facing down.
3. Place the main mounting bracket securely against the utility pole, with the concave surface of the bracket aligned with the outer curve of the pole (below).



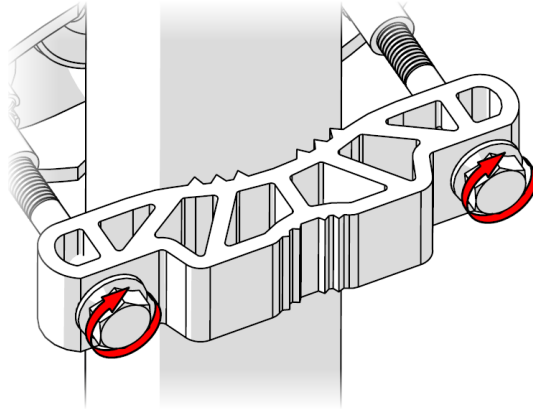
4. Place a hexagonal screw through each hole of the crescent bracket (below).



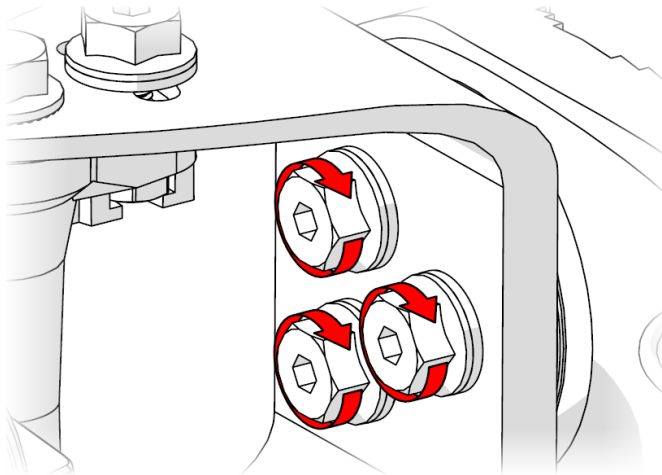
5. Place the crescent bracket over the main mounting bracket, inserting the threaded ends of the hex-head bolts into the holes of the main mounting bracket (below).



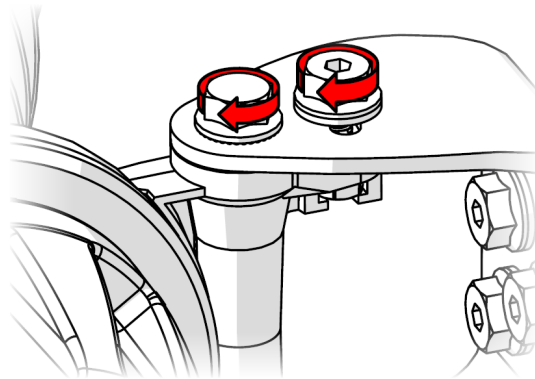
6. Coat the threads of the M8x75 hex-head bolts with a light coat of anti-sieze thread lubricant.
7. Screw the threaded ends of both of the hexagonal screws into the captive nuts on the main mounting bracket (below). Do not fully tighten the screws at this time.



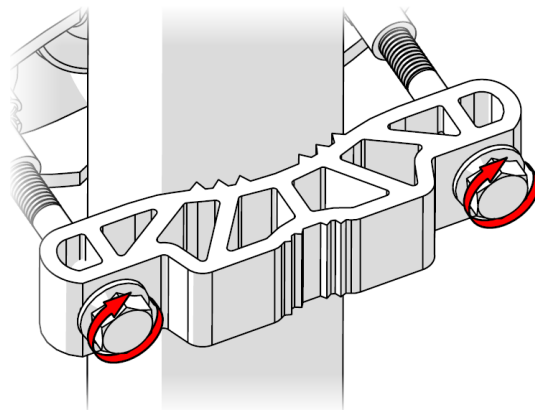
8. Make sure that the antenna is facing in the correct direction.
9. Aim the antenna assembly in the vertical plane by pivoting the antenna body up or down as needed.
10. Tighten the vertical-adjustment screws on the main mounting bracket (below).



11. Aim the antenna assembly in the horizontal plane by pivoting the antenna body left or right as needed.
12. Tighten the horizontal-adjustment screws on the main mounting bracket (below).



13. Fully tighten the M8x75 hex-head bolts (below).



14. Check that all fasteners are fully tightened.



CAUTION

Do not over-tighten the screws or nuts. This could damage antenna components and/or the utility pole.

15. Waterproof the Type N female interface connectors of the antenna by wrapping PTFE thread-sealing tape around the connector threads. Use enough tape to ensure a watertight seal.
16. Screw the Type N male interface connectors of the antenna cables into the Type N female interface connectors of the antenna.

5. Specifications

The table below contains the general specifications for the antenna.

5.1. HORN-series antenna specifications

Table 1. HORN-30, HORN-60 and HORN-90 specifications

	Dimensions (in millimetres)	Mass	Working frequency range	Gain	Polarization
FM- HORN-30	305 x 300 x 216	2.3 Kg (5.1 lbs)	5180 MHz to 6100 MHz	18.5 dBi	Dual linear horizontal and vertical
FM- HORN-60	273 x 178 x 151	1.6 Kg (3.5 lbs)	5180 MHz to 6100 MHz	13.2 dBi	Dual linear horizontal and vertical
FM- HORN-90	273 x 156 x 151	1.6 Kg (3.5 lbs)	5180 MHz to 6100 MHz	10 dBi	Dual linear horizontal and vertical

6. Notices and copyright



WARNING

Installation of Fluidmesh hardware devices and their supporting infrastructure must be done by suitably qualified personnel only. In some countries, installation by a certified electrician may be required.

Fluidmesh hardware installations must comply with all applicable local legislation.



WARNING

Never disassemble a Fluidmesh hardware device to any extent that is not described in the relevant device user's manual. Fluidmesh devices contain no user-serviceable parts. Disassembling a Fluidmesh hardware device will invalidate the device warranty, and may compromise the operational integrity of the device.

On some Fluidmesh radio transceiver devices, the lower access cover must be removed to gain access to the hardware *Reset* button. Do not operate a radio transceiver device for extended periods if its lower access cover has been removed.



WARNING

To avoid danger from non-ionizing radiation and/or electric shock and/or high-intensity laser or LED light sources, be sure to install the unit only in a location with restricted access.



WARNING

To avoid danger from electric shock, do not expose the unit to water or high humidity if the unit is powered ON, or if any access covers have been removed from the unit enclosure.

Do not place liquid-filled objects on or above the unit.

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7.14. General

This Agreement shall not be governed by the 1980 U.N. Convention on Contracts for the International Sale of Goods. Rather, this Agreement shall be governed by the laws of the State of Illinois, including its Uniform Commercial Code, without reference to conflicts of laws principles. You agree to the exclusive jurisdiction and venue of the State and Federal courts in Illinois, United States.

This Agreement is the entire agreement between you and Fluidmesh, and supersedes any other communications or advertising with respect to the Fluidmesh Firmware and accompanying documentation. If any provision of this Agreement is held invalid or unenforceable, such provision shall be revised to the extent necessary to cure the invalidity or unenforceability, and the remainder of the Agreement shall continue in full force and effect.

This Agreement and all documents, notices, evidence, reports, opinions and other documents given or to be given under this Agreement (collectively with this Agreement, 'Documents') are and will be written in the English language only. In the event of any inconsistency between any Document in the English language and any translation of it into another language, the English-language Document shall prevail. If you are acquiring the Fluidmesh Firmware on behalf of any part of the U.S. Government, the following provisions apply: The Fluidmesh Firmware and accompanying documentation are deemed to be 'commercial computer software' and 'commercial computer software documentation' respectively, pursuant to DFAR Section 227.7202 and FAR 12.212(b), as applicable. Any use, modification, reproduction, release, performance, display or disclosure of the Fluidmesh Firmware and/or the accompanying documentation by the U.S. Government or any of its agencies shall be governed solely by the terms of this Agreement and shall be prohibited except to the extent expressly permitted by the terms of this Agreement. Any technical data provided that is not covered by the above provisions is deemed to be 'technical data-commercial items' pursuant to DFAR Section 227.7015(a). Any use, modification, reproduction, release, performance, display or disclosure of such technical data shall be governed by the terms of DFAR Section 227.7015(b).

Fluidmesh is a trademark of Cisco Systems in the United States and worldwide.

8. Contact us

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