INSTALLATION GUIDE

FortiAP-HD-444KN Wireless Access Point

Model Number:
FortiAP-HD-444KN

Release Number: 2.0

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Safety Warnings

The FortiAP-HD-444KN Wireless Access Point installation must be performed by certified technicians only and in compliance with all local/state/federal safety requirements. All warnings and information in this manual should be read and understood before proceeding with installation. Any noncompliance by the user voids the warranty of the product.

General Safety

You can be killed or injured if performing antenna installation near electrical power lines. Carefully read and follow all instructions in this guide. Ensure that there are no high voltage or electrical fields nearby.

Working Aloft Warning

When working on tower or roof, individuals must wear safety belts. Tools must be tied to the individual using them. Workers below must wear safety helmets.

Lightning Activity Warning

Make sure not to connect or disconnect cables during periods of lightning activity. A surge protective device should be installed to prevent potential damage from very high surges, for instance, the peak surges caused by lightning.

Explosive Device Proximity Warning

Do not operate network devices close to explosive merchandise or in explosive environments, for example, in the vicinity of a gas station.

Antenna Placement Warning

Do not install any antenna near overhead power lines or other electric light, or where the antenna can come into contact with such circuits.

Grounding Warning

Protect your FortiAP-HD-444KN Wireless Access Point by installation of grounding lines. The ground connection must be complete before connecting power to the FortiAP-HD-444KN Wireless Access Point enclosure. The requirement of grounding is to make sure the resistance is less than 5 ohm between the ground termination point to grounding tier.

Power Installation Warning

The installation of the power switch must be performed by a certified technician. The power switch is not supplied with the FortiAP-HD-444KN Wireless Access Point. The power cord must be assembled by a certified technician, and the final assembly must comply with related requirements.

Solar Irradiation and High Temperature Protection

Pay attention to the level of sunlight, which can increase the working temperature of the FortiAP-HD-444KN Wireless Access Point to higher than specifications allow.

Chapter 1: Overview

This document provides information and procedures required to install and configure the FortiAP-HD-444KN Wireless Access Point into a WLAN installation and is intended for certified system installers, system administrators, and network operators.

The WLAN system is designed for high density deployments. It comprises of the following main components:

- FortiAP-HD-444KN Wireless Access Point (AP)
- Access Controller (AC)
- BaseCamp™ Wireless Management System

Dependencies

The installation and configuration of the FortiAP-HD-444KN AP depends on the following components:

- Access Controller
- Fortinet Networks Wireless Management System
- DHCP Server

FortiAP-HD-444KN Package Contents

The FortiAP-HD-444KN package contains the following item:

- One FortiAP-HD-444KN access point
- One GPS antenna
- Set of 4 mounting screws
- QR card

> The professional installer is responsible for procuring the wall/ceiling/anchors, and safety systems, as required by the local/state/ federal authorities, governing the installation of the FortiAP-HD-444KN Wireless Access Point.

Additional Item

The following additional item is to be purchased separately:

- Access Controller

The Fortinet Wireless Management System is bundled along with the Access Controller.

Item Identification

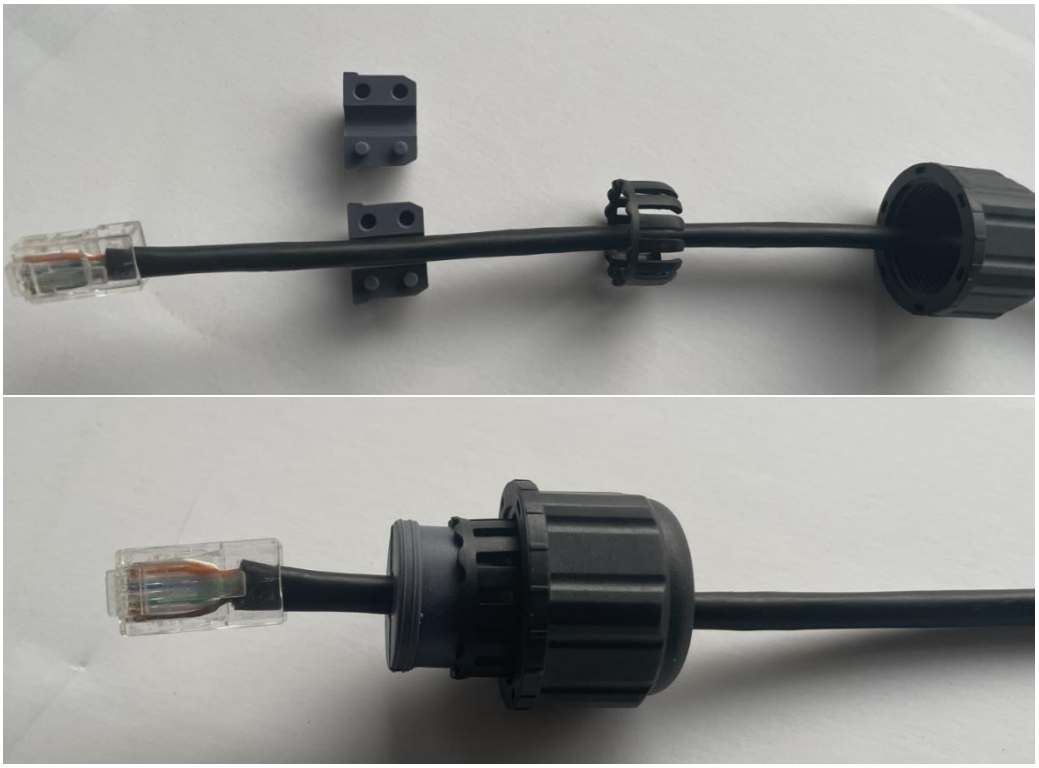
The following photos show the mounted side view of the FortiAP-HD-444KN access point.

Figure 1: FortiAP-HD-444KN AP - Side view

Connector and Cabling Options

In both indoor and outdoor installations, an approved compatible Ethernet RJ45 plug must be used to connect the FortiAP-HD-444KN cable gland to maintain the IP67 rating.

Figure 2: RJ45 Plug Assembly on IP67 cable gland



Chapter 2: Installing FortiAP-HD-444KN

This section provides information required to install the FortiAP-HD-444KN access point.

Professional Installation

- This FortiAP-HD-444KN product is designed for specific application and must be installed by a qualified personal who has RF and related rule knowledge. The general user shall not attempt to install or change the setting.
- Proper grounding and surge protectors may be required in outdoor installations.
- This FortiAP-HD-444KN product should not be connected to an Ethernet network with outside plant routing.

Installation Location

- The product shall be installed at a location where the radiating antenna can be kept 71 cm from nearby person in normal operation condition to meet regulatory RF exposure requirement.
- The installation applies to outdoor operation.
- Please carefully select the installation position and make sure that the final output power does not exceed the limit set force in relevant rules. The violation of the rule could lead to serious federal penalty.

Antennas

- Use only the antenna(s) that have been approved by the manufacturer. The non-approved antenna(s) may produce uwanted spurious or excessive RF transmitting power that may lead to the violation of FCC limit and is prohibited.
- For an outdoor access point operating in the band 5150 – 5250 MHz, the maximum e.i.r.p at any evelation angel above 30 degree from the horizon must not exceed 21 dBm.

WARNING: Please carefully select the installation position and make sure that the final output power does not exceed the limit set force in the relevant rules. The violation of the rule could lead to serious federal penalty.

The FortiAP-HD-444KN AP has two sets of primary mounting holes and one set of secondary mounting holes at the bottom of the chassis for attaching third-party mounting systems:

Third-Party Mounting System Installation

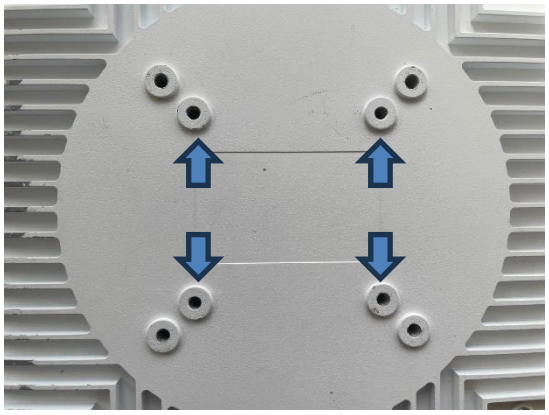
The installer or user assumes all liabilities unless the installation methods are explicitly stated in a warranty agreement between Fortinet, Inc. and the third-party installer.

> The network coverage depends on the location and position of the FortiAP-HD-444KN access point.

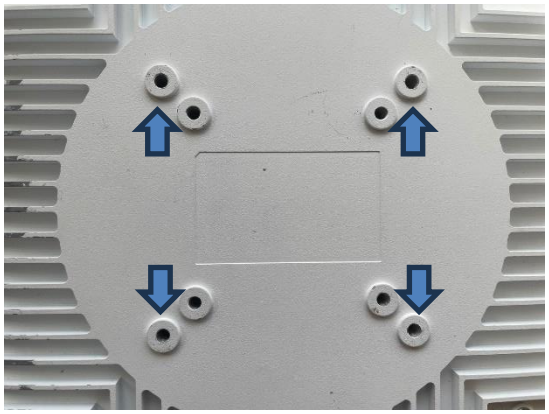
The FortiAP-HD-444KN AP has two sets of primary mounting holes and one set of secondary mounting holes at the bottom of the chassis for attaching third-party mounting systems:

> For added safety, use one set of the primary mounting holes and one set of secondary mounting holes for installing a third-party mounting system.

The inner set of primary mounting holes are 75 mm apart in both the horizontal and vertical directions and are tapped with a **M4 x 0.7 mm** thread pattern to a depth of 10 mm.

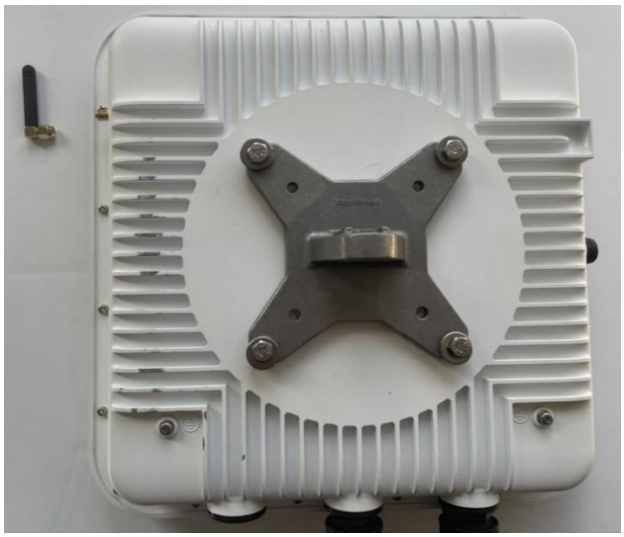
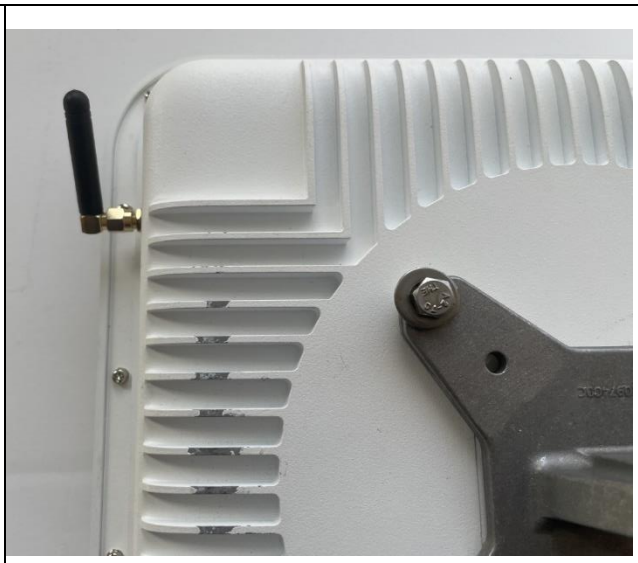


The outer set of primary mounting holes are 100 mm apart in both the horizontal and vertical directions and are tapped with a **M6 x 1.0 mm** thread pattern to a depth of 10 mm.



Installing GPS antenna

The external GPS antenna must be installed using standard SMA torque NRench. Use a 5⁄16 inch torque NRench is required for this antenna, set to 3–5 in·lbf (0.3 to 0.6 N·m).

Connecting FortiAP-HD-444KN

Perform this procedure to connect the FortiAP-HD-444KN to the network.

A. Network supports PoE++ power (802.3bt)

1. Attach one RJ45 plug to RJ45 receptacle (10GbE or 5GbE port) on the FortiAP-HD-444KN AP chassis.

2. Connect the opposite end of the Ethernet cable to a PoE++ (802.3bt) source □ (PoE++ injector/midspan/switch).

   When injector in midspan is used, connect the data port to an Ethernet switch port.

3. Verify PoE++ source is providing power and Ethernet switch port has established link with the port.

B. Network supports PoE+ power (802.3at)

1. Attach the two RJ45 plugs to RJ45 receptacle on the FortiAP-HD-444KN AP chassis.

2. Connect the opposite ends of both the Ethernet cables to a PoE+ (802.3at) source □ (PoE+ injector/midspan/switch).

   When injectors in midspan are used, connect the data port to an Ethernet switch port.

3. Verify PoE+ source is providing power and Ethernet switch port has established link with both ports.

Chapter 3: Configuring FortiAP-HD-444KN

This section provides information and procedures required to configure the FortiAP-HD-444KN series AP.

Logging into BaseCamp

Perform this procedure to log into BaseCamp.

1. Log into BaseCamp URL, https://<AC IP address> using the following credentials:
   - Username: admin@admin.com
   - Password: admin

   Welcome to BaseCamp page is displayed.

Configuring FortiAP-HD-444KN Access Point

Perform this procedure to configure the FortiAP-HD-444KN series AP.

1. Configure the POE+/++ ports of the L2/L3 switch as access ports with untagged PVID.

   The PoE+/++ source must identify itself as PoE+/++ capable using the 2-event classification method. For more information on configuring the FortiAP-HD-444KN series APs that are connected to POE+/++ sources that support a discovery protocol, see Configuring FortiAP-HD-444KN series AP to Work with Discovery Protocol.

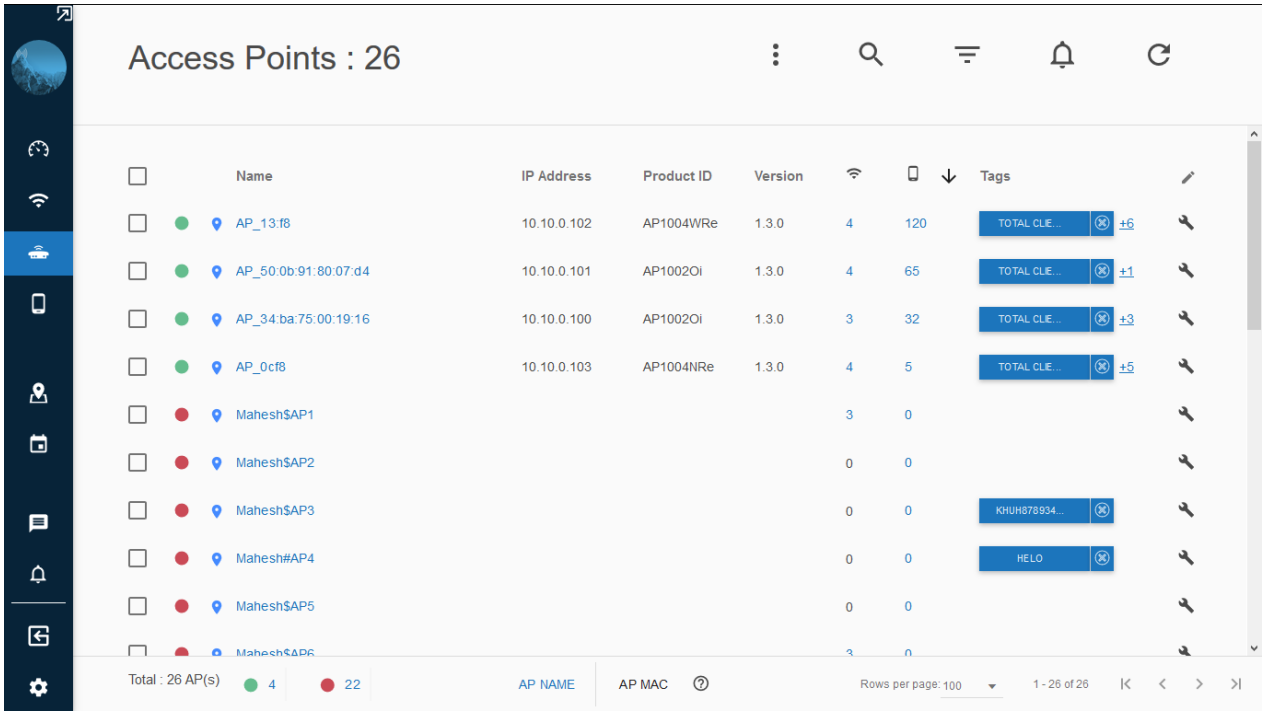
2. Connect the FortiAP-HD-444KN Access Point to a POE+/++ source.

   Once powered up, the FortiAP-HD-444KN Access Point requests an IP address from the DHCP server. This process may take up to 90 seconds.

3. Verify if the FortiAP-HD-444KN was assigned an IP address by doing one of the following:

   - Review the DHCP logs on the DHCP server
   - Log into BaseCamp to review the status in the **Access Points** page

   Along with the IP address, the FortiAP-HD-444KN receives the IP address of the Access Controller and establishes a connection with it.



4. The FortiAP-HD-444KN is manufactured with a default country code. During the discovery phase of the FortiAP-HD-444KN, the Access Controller verifies the country code of the FortiAP-HD-444KN before allowing it to join the network.

   - If the country code registered in the non-volatile memory of the FortiAP-HD-444KN and the country code locked into the Access Controller software match, the FortiAP-HD-444KN is allowed to jointhe network.
   - If an FortiAP-HD-444KN is detected with a generic country code, the Access Controller registers the FortiAP-HD-444KN by overwriting the generic country code with the locked country code from the BaseCamp configuration. After updating the country code, the FortiAP-HD-444KN is automatically rebooted allowing it to join the network.
   - If the FortiAP-HD-444KN is set with a different country code, the FortiAP-HD-444KN is quarantined and not allowed to join the network.

> The transmitters on the radio modules in the FortiAP-HD-444KN are disabled when the country code is in generic state, or when the FortiAP-HD-444KN is quarantined.

5. The default mode of operation for the FortiAP-HD-444KN is **Outdoor**. BaseCamp allows certified technicians with the appropriate privileges provided by the manufacturer to reconfigure the mode of operation to **Indoor** when the FortiAP-HD-444KN is installed in indoor locations.

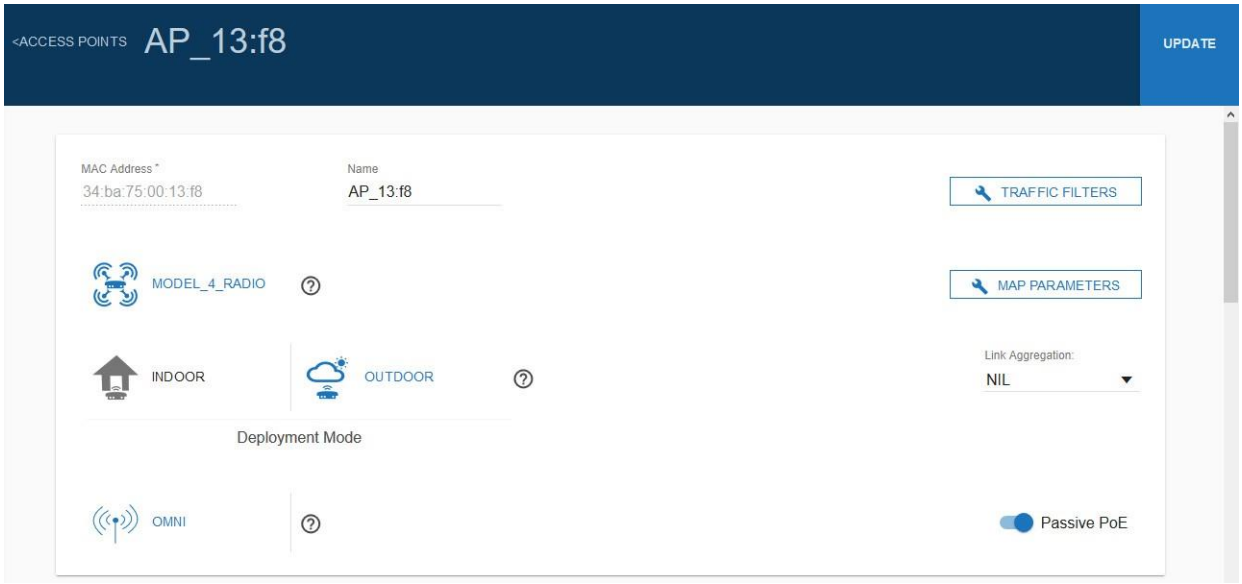
   a. From the BaseCamp navigation pane, click **Access Points**.

   b. From the list of Access Points, click the Configure icon of the FortiAP-HD-444KN.

c. Modify the **Deployment Mode**:

- Indoor
- Outdoor

d. Click **UPDATE**.



Configuring FortiAP-HD-444KN to Work with Discovery Protocol

In some cases, a POE+/++ ethernet switch requires a Discovery Protocol such as LLDP and CDP to request additional power above the 15.4 W PoE PSE limit. In such cases, the POE+/POE++ PSE source must be configured to override the Discovery Protocol and force the PoE+/POE++ PSE source to provide at least 22.5 W/51W of PoE+/POE++ power.

Perform this procedure to configure the AP to work with Discovery Protocol.

> **Use extreme caution.** This is a manual mode of operation. There is no action taken by the FortiAP-HD-444KN, if PoE+ power is interrupted. Even a single port losing PoE+ power may result in an overload on the port.

1. In the WMS **Access Point** menu, set the **Forced POE+ Power** selection to flag the FortiAP-HD-444KN access point to ignore the POE+ status.

   The FortiAP-HD-444KN AP automatically resets when the new **Forced POE+ Power** selection configuration is saved. All the FortiAP-HD-444KN hardware resources are available after rebooting the FortiAP-HD-444KN.

Chapter 4: FortiAP-HD-444KN Coverage

This section provides information on deployment options for optimal coverage from the FortiAP-HD-444KN access point.

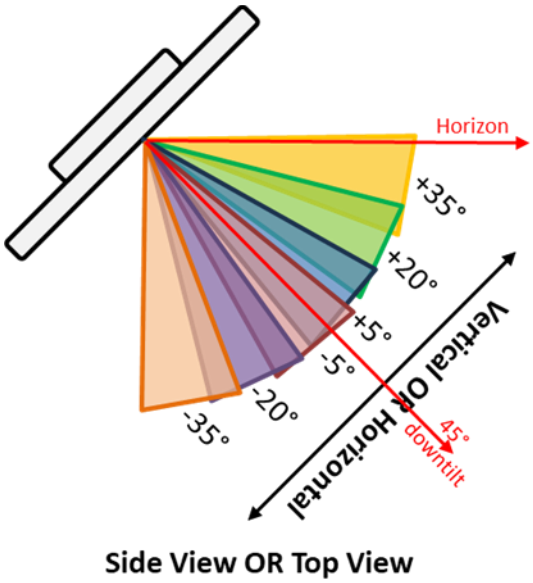
FortiAP-HD-444KN Radiation Pattern

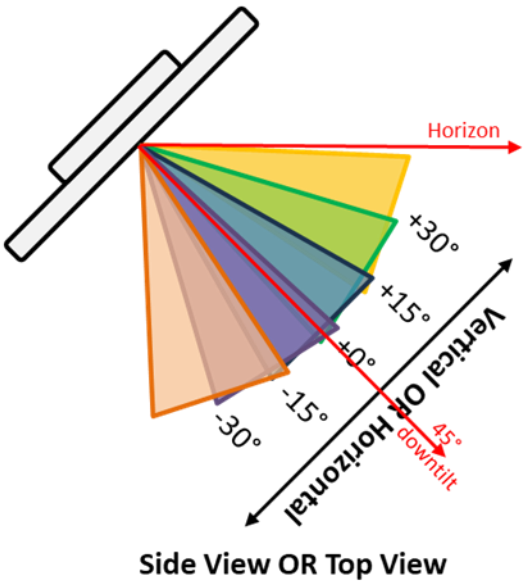
The unique design of the FortiAP-HD-444KN provides flexibility for various mounting positions and coverage footprints for all bands including UNII-1/2A/2C/3/5/7. With coverage distances up to 75ft, the FortiAP-HD-444KN provides ubiquitous coverage via its omni-directional radiation pattern with the unique ability to customize specific coverage footprints based on RF or venue requirements. In addition, custom narrow-band filtering is available to provide complete band-to-band RF isolation.

The following figure shows the radiation pattern for FortiAP-HD-444KN AP.

> For outdoor installation, the antenna must be positioned at least 45° downward from the vertical position.

Figure 3: FortiAP-HD-444KN *AP Radiation Pattern*





Regulatory Declarations

Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

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

This device and its antennas must not be co-located or operating in conjunction with any other antenna or transmitter.

Important Note:

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

Important Note:

Country Code selection feature are disabled for products marketed to the US/Canada.

IMPORTANT NOTE:

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 71 cm between the radiator & your body.

6SD (Standard Power Access Point)

The operation of this device is prohibited on oil platforms, cars, trains, boats, and aircraft. Operation of transmitters in the 5.925-7.125 GHz band is prohibited for control of or communication with unmanned aircraft systems.

Appendix: Technical Specifications

This section provides technical specifications of the FortiAP-HD-444KN AP.

Mechanical Specifications

The following table provides mechanical specifications of the FortiAP-HD-444KN AP.

Table 1: Mechanical Specifications

	Height	**Width**	**Depth**	**Weight**
FortiAP-HD-444KN	34 mm (14'')	44 mm (18'')	7.6 mm (3'')	4 kg (8.8 lbs)

Operational Requirements

The following table provides operational requirements of the FortiAP-HD-444KN AP.

Table 2: Operational Requirements

Condition	**Input Power Requirement**	**Max Power Consumption**
Max power	48-57 Vdc, 1.25 A, 60 W	45 W Max (~2.56 BTUS/min)
Per port power	48-57 Vdc, 600 mA, 30 W (PoE+ source)	-
	48-57 Vdc, 1250 mA, 60 W (PoE++ source)	-
Operating Condition	**Power Over Ethernet limit**[1]	**AP Limit Worst Case**
802.3at x 1 port[2]	48.0 Vdc @ 531 mA (25.5 W) 57.0 Vdc @ 447 mA (25.5 W)	48 Vdc @ 531 mA (25.5 W Max)
802.3bt x 1 port	48.0 Vdc@ 1.063 A (51 W) 57.0 Vdc @ 895 mA (51 W)	48 Vdc @ 1.063 A (~12.75 W Per Pair/ 51 W Max)
802.3at x 2 ports	48.0 Vdc @ 531 mA (51 W) 57.0 Vdc @ 447 mA (51 W)	48 Vdc @ 531 mA (~25.5 W Per Port /51 W Max)
802.3bt x 2 port	48.0 Vdc @ 531 mA (51 W) 57.0 Vdc @ 447 mA (51 W)	48 Vdc @ 531 mA (~25. 5 W per port/51 W Max)

[1] All power or Ethernet limits are defined as a per pair limit.

[2] Some frequency bands may not be operational in power limited operations.

Environmental Requirements

The following table provides environmental requirements of the FortiAP-HD-444KN AP.

Table 3: Environmental Requirements

Condition	Requirement
Operating temperature	-40 °C to 55 °C (-40 °F to 131°F) plus solar loading **Note:** Allow 20 minutes of start-up time when operating at temperatures below -20 °C.
Storage temperature	-40 °C to 70 °C (-40 °F to 158 °F)
Humidity	5% to 95% non-condensing
Environmental ratings	IP67
Maximum elevation	• Operating: Sea level 55 °C (131 °F) 4,206 m (13,800 ft) at 40 °C (104 °F) • Non-operating: 12,500 m (40,000 ft) at -65 °C (-149 °F)
Mean Time Between Failures (MTBF)	184,874 hours

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Statement of Conditions

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