



AirHarmony-4200 DC Installation Guide

Internal Filters

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Acknowledgements



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Document Information

Abstract

This document details procedures for installing the Airspan's AirHarmony-4200 DC, with internal filters, a mini-Macro class eNodeB variant and its place in the Airspan product suite. This document is intended for qualified personnel with a working knowledge of LTE.

Revision History

Revision Details	Date	Summary of Changes
Rev 0.1, 0.2	November 2016	- Initial document – draft - comments
Rev A	November 2016	- Updated drawings - Publish
Rev A1	November 2017	Power Input – DC addition
Rev A2	May 2018	Antenna ports
Rev A3	March 2019	Modified Minimum Safety Distance
Rev A4	March 2019	- Updated EU Directive - Added "Airspan FCC-specific" notes

This document is available at: [AirHarmony 4200 DC Internal Filters Installation Guide](#)

Warnings and Cautions

Human Exposure to Radio Frequencies

The AirHarmony-4200 DC Internal Filters antennas should be operated from a minimum safe distance of 90 Cm (35.43 inches).

Radio Interference

The AirHarmony-4200 DC Internal Filters 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 on and off, the technician is encouraged to try to correct the interference by performing one or more of the following measures:

- Re-orientate or relocate the unit
- Increase separation between the units and/or End Devices
- Connect the equipment to an outlet on a circuit different from that to which the power source is connected

Modifications

Any changes and modifications to this device that are not expressly approved by Airspan Networks may void the user's authority to operate the equipment.

General

- Only qualified personnel should be allowed to install, replace, and service the equipment.
- The device cannot be sold retail, to the general public or by mail order. It must be sold to operators.
- Installation must be controlled.
- **Installation must be performed by licensed professionals according to FCC 96.39.**
- Installation requires special training. The AirHarmony-4200 should be installed **ONLY** by experienced installation professionals who are familiar with local building and safety codes and, wherever applicable, are licensed by the appropriate government regulatory authorities. Failure to do so may void Airspan's product warranty and may expose the end user or the service provider to legal and financial liabilities. Airspan and its resellers or distributors are not liable for injury, damage or violation of regulations associated with the installation of outdoor units or antennas.
- The device is to be installed in a Restricted Access Location.
- Installation is restricted to non-marine type area environments.
- Surge Arrestors and Transient Voltage Surge Suppressors installed external to the ITE are required to comply with the appropriate CEC/NEC requirements.

Général

- Seul le personnel qualifié peut être autorisé pour installer ou remplacer l'équipement ainsi qu'effectuer les opérations de maintenance pour cet équipement.

- L'équipement ne peut pas être vendu en grande distribution ou par commande via email à destination du public. Il doit être vendu aux opérateurs de télécommunications.
- Son installation doit être contrôlée
- **Son Installation doit être effectuée par des professionnels autorisés selon FCC 96.39.**
- Son installation requiert une formation spécifique du personnel. L'AirHarmony-4200, radio et antenne doit être installée UNIQUEMENT par des installateurs professionnels expérimentés et ayant une connaissance des constructions locales et règles de sécurité, ainsi que, dès que nécessaire, disposant d'un accord des autorités gouvernementales de régulation. Toute infraction à ces obligations peut annuler la garantie délivrée par Airspan pour ces produits et peut exposer l'utilisateur final ou le fournisseur de services à des dommages légaux et financiers.
- Airspan et ses revendeurs ou ses distributeurs ne sont pas responsables des blessures, dommages ou violations de la régulation en vigueur liés à l'installation du système extérieur ou des antennes.
- L'Équipement doit être installé dans une zone à accès réduit et contrôlé.
- L'installation est limitée aux environnements de type non-marin.
- Parafoudres et Protections contre les surtensions transitoires doivent être installés à l'extérieur de l'équipement ITE sont tenus de se conformer aux exigences relatives aux normes CEC/NEC concernées

Important Safety Instructions

- Read and Save these instructions
- This Installation Guide contains instructions and warnings that should be followed during installation, and operation.
- Failure to follow these instructions could cause bodily injury and/or product failure

Safety

1. Read this guide and follow all operating and safety instructions.
2. Keep all product information for future reference.
3. Static sensitive components inside - do not remove the lid or base: No user serviceable parts inside.
4. Position the power cord to avoid possible damage, do not overload circuits.
5. Do not place this product on or near a direct heat source, and avoid placing objects on the terminal.
6. To avoid electrical shock do not install this device during adverse conditions such as rain or inclement weather.
7. Use only a damp cloth for cleaning. Do not use liquid or aerosol cleaners. Disconnect the power before cleaning.
8. The units should not be located too near power lines or other electrical power circuits, where it can come into contact with such power lines or circuits.
9. The radio transceiver must be properly grounded to protect against power surges and accumulated static electricity. It is the user's responsibility to install this device in accordance with the local electrical codes.
10. Installation of the AirHarmony-4200 DC Internal Filters must be contracted to a professional installer.
11. The circuit breaker should be easily accessible in case you have to disconnect the device.
12. When installed in the final configuration, the product must comply with the applicable Safety Standards and regulatory requirements of the country in which it is installed. If necessary, consult with the appropriate regulatory agencies and inspection authorities to ensure compliance.

Securite

1. Lire attentivement ce guide et suivre les instructions d'utilisation et de sécurité.
2. Des composants sensibles a électricité statique sont utilisés à l'intérieur. Ne pas retirer le coffre ou la base. Aucune pièce a l'intérieur est d'utilité pour l'utilisateur.
3. La connexion "terre" doit être effectuée en priorité et avant d'effectuer les connexions à la source d'alimentation (phase et neutre).
4. Positionner le cordon d'alimentation de façon à éviter des dommages potentiels. Ne pas surcharger les circuits.
5. Ne pas placer ce produit sur ou à proximité d'une source directe de chaleur et éviter de placer des objets sur le terminal.
6. Afin d'éviter des problèmes électriques, ne pas installer cet équipement au cours d'évènements climatiques difficiles comme averses ou météo non clémente.
7. Utiliser uniquement chiffon de coton pour nettoyage. Ne pas utiliser de produits liquides ou d'aérosols. Déconnecter le produit de la source d'alimentation avant nettoyage.

8. L'unité ne doit pas être située trop près de lignes électriques ou autres circuits de puissance, avec lesquels il pourrait entrer en contact.
9. L'émetteur radio doit être correctement relié à la terre afin de le protéger contre les surtensions ou accumulation d'électricité statique. L'utilisateur est tenu responsable de l'installation du produit conformément aux règles électriques en vigueur localement.
10. L'installation de AirHarmony-4000 DC doit être contractualisée avec un installateur professionnel.
11. L'interrupteur de circuit électrique doit être facilement accessible afin de pouvoir déconnecter l'équipement.
12. Lors de l'installation de la configuration finale, le produit doit être conforme aux Standards de Sécurité en vigueur ainsi qu'aux exigences réglementaires du pays dans lequel il est installé. Si nécessaire, consulter les agences réglementaires appropriées, ainsi que les autorités chargées de l'inspection afin de garantir la conformité.

Warning of Hazardous Voltages

On AC installations, hazardous voltages exist. Use caution when verifying or working with AC power. Remove metal jewelry that could come into contact with AC power.

On DC sections, short-circuiting the low voltage, low impedance circuits can cause severe arcing that may result in burns or eye damage. Remove rings, watches etc. to avoid shorting DC circuits.

Note: Airspan products do not contain hazardous substances (as defined in UK Control of Substances Hazardous to Health Regulations 1989 and the Dangerous Substances Regulations 1990). At the end of any Airspan products life cycle, the customer should consult with Airspan to ensure that the product is disposed of in conformance with the relevant regulatory requirements.

Attention aux Voltages Hasardeux

Sur les installations de réseau électrique de type courant alternatif (CA), des voltages hasardeux peuvent survenir. Garder une Attention particulière lors d'une vérification ou de travaux sur réseau électrique CA. Retirer tous bijoux en métal qui pourraient entrer en contact avec l'alimentation ou le réseau CA.

Sur les portions de réseau électrique de type courant continu (CC), un circuit basse impédance peut causer de sérieux arcs électriques qui pourraient brûler ou endommager les yeux. Retirer bagues, anneaux, montres etc... afin d'éviter les court-circuit sur le réseau CC.

Adherence to European Directive 2014/53/EU

European Council Recommendation 2014/53/EU details basic restrictions and reference levels on human exposure to electromagnetic fields as advised by the ICNIRP. Adherence to these recommended restrictions and reference levels should provide a high level of protection as regards the established health effects that may result from exposure to electromagnetic fields.

Airspan equipment is compliant with CE and R&TTE regulations and can be operated in all EU (European Union) locations listed below:

Country Code			
BE	EL	LT	PT
BG	ES	LU	RO
CZ	FR	HU	SI
DK	HR	MT	SK
DE	IT	NL	FI
EE	CY	AT	SE
IE	LV	PL	UK

Warning Symbols

The following symbols may be encountered during installation or troubleshooting. These warning symbols mean danger. Bodily injury may result if you are not aware of the safety hazards involved in working with electrical equipment and radio transmitters. Familiarize yourself with standard safety practices before continuing.



Caution, hot surface



Caution



Electro-Magnetic
Radiation



DC

Service Information

Refer all repairs to qualified service personnel. Do not modify any part of this device, as this will void the warranty.

Disconnect the power to this product and return it for service if the following conditions apply:

- a. The terminal does not function after following the operating instructions outlined in this manual.
- b. The product has been dropped or the housing is damaged.

Locate the serial number of the terminal and record this on your registration card for future reference. Also record the MAC address, located on the product sticker.

UL Information

- The equipment must be properly grounded according with NEC and other local safety code requirements.
- Reminder to all the BWA system installers: Attention to Section 820-40 of the NEC which provides guidelines for proper grounding and, in particular, specifies that the cable ground shall be connected to the grounding system of the building, as close to the point of cable entry as is practical.
- AirHarmony-4200 DC is designed to operate in environmental conditions complying with IP66 and relevant standards.

Lightning Protection

WARNING: The following notes are general recommendations for the system. The wireless equipment should be installed by a qualified professional installer and must follow local and national codes for electrical grounding and safety. Failure to meet safety requirements and/or use of non-standard practices and procedures could result in personal injury and damage to equipment. A direct lightning strike may cause serious damage even if these guidelines are followed.

All outdoor wireless equipment is susceptible to lightning damage from a direct hit or induced current from a near strike. Lightning protection and grounding practices in local and national electrical codes serve to minimize equipment damage, service outages, and serious injury. Reasons for lightning damage are summarized as:

- Poorly grounded tower/antenna sites that can conduct high lightning strike energy into equipment.
- Lack of properly installed lightning protection equipment that can cause equipment failures from lightning induced currents.

A lightning protection system provides a means by which the energy may enter earth without passing through and damaging parts of a structure. A lightning protection system does not prevent lightning from striking; it provides a means for controlling it and preventing damage by providing a low resistance path for the discharge of energy to travel safely to ground. Improperly grounded connections are also a source of noise that can cause sensitive equipment to malfunction.

A good tower grounding system disperses most of the surge energy from a tower strike away from the building and equipment.

To limit the equipment damage due to a lightning strike, the following practices are recommended for the wireless system:

- Provide direct grounding from the antenna mounting bracket, the radio and antenna and the lightning/surge protectors to the same ground point at the base of the tower or a ground bus on the building. Use the grounding screws on the antenna bracket and the radio and antenna for terminating the ground wires.
- The circuit ground must be connected to the same grounding system as the eNodeB.

Outdoor Ethernet Cabling

- Ethernet cable connected to should be outdoor grade with UV protection.
- Use shielded out CAT5e (minimum) cabled terminated with metallic RJ45 connectors.
- In order to protect the indoor unit, install surge protection circuits on all copper cables on their entrance to the building.
- Surge protection circuit must use a minimum 16AWG grounding cable.

DECLARATION OF CONFORMITY

Declaration of Conformity with Regard to the R&TTE Directive 2014/53/EU

Czech:

Airspan tímto prohlašuje, že tento přístroj je ve shodě se základními požadavky a dalšími příslušnými ustanoveními směrnice 2014/53 / EU.

Danish:

Undertegnede, Airspan erklærer hermed, at følgende udstyrsenhed opfylder de væsentlige krav og andre relevante krav i direktiv 2014/53 / EF.

Deutsch:

Hiermit erklärt Airspan, dass die Produkteinheit die grundlegenden Anforderungen und anderen relevanten Bestimmungen der Richtlinie 2014/53 / EU erfüllt.

Estonian:

Käesolevaga kinnitab Airspan, et seadme seade vastab direktiivi 2014/53 / EL oluliste nõuetele ja muudele kõnealuse direktiivi asjakohastele sätetele.

English:

This equipment is in compliance with the essential requirements and other relevant provisions of Directive 2014/53/EU.

Español:

Por medio de este Airspan, declara que la unidad cumple con los requisitos esenciales y cualquier otra disposición aplicable o exigible de la Directiva 2014/53 / UE.

Greek:

ΜΕ ΤΗΝ ΠΑΡΟΥΣΑ ΠΡΟΔΙΑΓΡΑΦΗ, η Airspan ΔΗΛΩΝΕΤΑΙ ότι η μονάδα συμμορφώνεται με τις ουσιώδεις απαιτήσεις και τις λοιπές σχετικές διατάξεις της οδηγίας 2014/53 / ΕΕ.

Français:

Airspan déclare par la présente que l'appareil est conforme aux exigences essentielles et aux autres dispositions pertinentes de la directive 2014/53 / UE.

Italiano:

Con la presente Airspan dichiara che questa unità è conforme ai requisiti essenziali e alle altre disposizioni pertinenti stabilite dalla direttiva 2014/53 / UE.

Latvian:

Ar šo Airspan paziņo, ka vienība atbilst Direktīvas 2014/53 / ES būtiskajām prasībām un citiem attiecīgajiem noteikumiem;

Lithuanian:

Šis „Airspan“ pareiškia, kad šis įrenginys atitinka esminius Direktyvos 2014/53 / ES reikalavimus ir kitas nuostatas.

Nederlands:

Airspan verklaart hierbij dat de apparaateenheid voldoet aan de essentiële vereisten en andere relevante bepalingen van richtlijn 2014/53 / EU.

Maltese:

Hawnhekk, Airspan, tiddikjara li din l-unità tikkonforma mar-rekwiżiti essenzjali u dispożizzjonijiet rilevanti oħra li jinsabu fid-Direttiva 2014/53 / UE.

Hungarian:

Alulírott, az Airspan kijelenti, hogy az egység megfelel a 2014/53 / EU irányelv vonatkozó alapvető követelményeinek és egyéb követelményeinek.

Polish:

Niniejszym Airspan oświadcza, że urządzenie jest zgodne z zasadniczymi wymaganiami i innymi odpowiednimi postanowieniami dyrektywy 2014/53 / UE.

Português:

Airspan declara que esta unidade está em conformidade com os requisitos essenciais e outras disposições da Diretiva 2014/53 / UE.

Slovenian:

Airspan izjavlja, da je ta enota skladna z bistvenimi zahtevami in drugimi ustreznimi določbami Direktive 2014/53 / EU.

Slovak:

Airspan týmto vyhlasuje, že tento prístroj spĺňa základné požiadavky a všetky príslušné ustanovenia Smernice 2014/53 / EÚ.

Suomalainen:

Airspan vakuuttaa täten, että laitteen tyyppi on direktiivin 2014/53 / EU olennaisten vaatimusten ja muiden asiaankuuluvien säännösten mukainen.

Swedish:

Därmed intygar Airspan att denna enhet överensstämmer med de väsentliga egenskapskraven och andra relevanta bestämmelser som anges i direktiv 2014/53 / EU.

Íslenska:

Airspan lýsir hér með yfir að þessi eining uppfylli grunnkröfur og aðrar kröfur tilskipunar 2014/53 / ESB.

Norsk:

Airspan erklærer herved at utstyrsenheden oppfyller grunnleggende krav og andre relevante krav i direktiv 2014/53 / EU.

Român:

Airspan declarăm pe propria răspundere că produsul produsului respectă cerințele esențiale și alte prevederi aplicabile din Directiva 2014/53 / UE.

The Declaration of Conformity related to this product can be obtained from PLM@Airspan.com.

GPS Compliance

The GPS is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC."

The GPS complies with the following EMC Common Regulatory Testing standards:

- EN55022: Radiated and Conducted Emissions
- CISPR 22: Class B
- EN 50081-1: Generic Emissions Class B
- EN 50082-1: Generic Immunity Class B
- EN 61000-4-2: Electrostatic Discharge Immunity
- EN 61000-4-3: Radiated RF EM Field Immunity Test
- EN 61000-4-4: Electrical Fast Transient/Burst Test
- EN 61000-4-6: Conducted Immunity
- EN 61000-4-8: Magnetic Field Immunity

Note: A GPS is recommended for synchronizing between LTE sectors.

Note: An optional GPS Lightning/Surge protector is available from Airspan when installing the GPS antenna in a remote location for lightning prone deployments.

Maximum Output TX Total Power

Table 1: AirHarmony-4200 DC Internal Filter FCC Maximum Output TX Total Power

Frequency Band (MHz)	FCC		Antenna Gain (dBi)
	TX (dBm)	EIRP (dBm)	
B48 3550-3700	32	50	18

Note: The AirHarmony 4200 DC Internal Filters requires operation using an Airspan FCC-specific version of Netspan acting as a CBRS Domain Proxy.

Table 2: AirHarmony-4200 DC Internal Filter ETSI Maximum Output TX Total Power

Frequency Band (MHz)	ETSI		Antenna Gain (dBi)
	TX (dBm)	EIRP (dBm)	
3400-3600	37	TBD	18

Caution: Do not set maximum output TX power to higher than local regulations.

Power Consumption - Supply and Current

AirHarmony-4200 DC Internal Filters supports direct connection to DC power source.

DC Power Source requirements are:

- Operational Voltage Range: -40.5 to -57 VDC Max, 8A Max
- Safety approved (certified) according to IEC/EN/UL 60950-1
- Transient Voltage: +150V (ETR283)
- The use of other power sources may impair safety

AC power feed is also available, using an AC/DC power converter offered by Airspan.

Note: For more details on the offered AC/DC converter (sold separately), please contact your nearest Airspan sales representative.

Table 3: Power Consumption

Duplex	Tx Power at RF Port (dBm)	Power Source	Nominal Power Consumption (W)	MAX Power Consumption with PoE (Instantaneous)	MAX Current with PoE (Instantaneous) (A)	PoE Maximum Power Consumption (W)	Power Supply Requirements (W)
TDD	4 x 39-40	DC	265	387	4.30	60	400
TDD	4 x 36-37	DC	265	387	4.30	60	400

Antenna System

AirHarmony-4200 DC comes in a range of frequency variants that can be mounted with different antenna options and formats. A typical installation will have a cross-polar sector or dual slant antenna connected to the appropriate RF port of the AirHarmony-4200 DC variant unit. Various antennas are designed specifically for AirHarmony-4200 DC deployments; specifications are available from Airspan separately.

External Antenna

The externally mounted antennas should be a dual slant or cross polarized fixed antennas which is connected via DIN connectors located on the AirHarmony-4200 DC unit. The antennas should be mounted to its appropriate mounting facility.

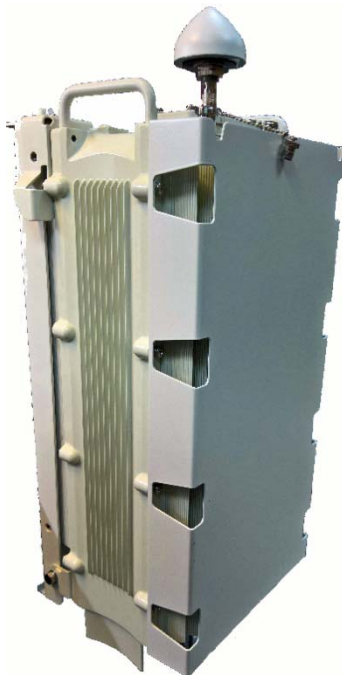
AirHarmony-4200 DC, can also support SBA configuration which can be mounted directly to the unit or remotely. The current permitted antenna type is as specified below:

Table 4: AW3014 Omni Antenna

Frequency Range (MHz)	Antenna Gain (dBi)	Type
3300MHz – 3800MHz	18	Dual Port, +/-45° Polarization, Fixed Tilt

Note: For a list of compatible external antennas, please contact your nearest Airspan Sales representative.

Figure 1: AirHarmony-4200 DC Internal Filters



About This Document

Purpose

This guide provides the workflow and step-by-step procedures for installing the Airspan's AirHarmony-4200 DC Internal Filters Macro-class eNodeB variant. These procedures include:

- Verify prerequisites
- Mount GPS
- Install Mounting bracket
- Mount iRelay (if applicable)
- Mount Antenna (external antenna)
- Connect and manage cables

Intended Audience

This guide is intended for persons who are responsible for installing the AirHarmony-4200 DC Internal Filter unit.

These persons should have a working knowledge of the equipment.

AirHarmony can be tightly integrated with Airspan's iBridge and iRelay transport solutions. AirHarmony-4200 DC Internal Filters supports an integrated PoE interface which powers and connects either iBridge, iRelay, or a third party WiFi Access Point. This configuration creates a single piece installation that supports full end to end IPv6 plug and play deployment by just adding power. For more details please refer to the iBridge and iRelay product specifications.

Document Conventions

This document uses the following typographic conventions.

Table 5: Typographic Conventions

Convention	Element
<u>Blue</u> underlined text	Cross-reference links.
Bold text	Keyboard buttons and GUI elements.
<code>Command</code>	Command names or phrases.
Computer output	Text displayed by the computer.
Hyperlinks	Website and e-mail addresses.
Danger	Signifies a hazardous situation—if not avoided—will cause death or serious injury. Describes how to avoid it.

Convention	Element
Warning	Signifies a hazardous situation—if not avoided—can cause death or serious personal injury. Describes how to avoid it.
Caution	Signifies a hazardous situation—if not avoided—can void the product warranty, and cause property damage. Describes how to avoid it.
Important	Provides necessary information to explain a task.
Note	Provides additional information.
Tip	Provides helpful hints.

Document Organization

Chapter	Contents
Introduction	Provides a comprehensive overview of AirHarmony-4200 DC Internal Filters and its installation.
Getting Started	Provides workflows for initial install and workflow.
Verifying Prerequisites	Lists the hardware, software, and client requirements for installation.
AirHarmony-4200 DC Internal Filters Installation	Describes how to install AirHarmony-4200 DC Internal Filters unit.
GPS Installation	Describes how to install the GPS antenna.
Connect and Manage Cables	Describes how to connect the cables.
Job Sheet	Provides information that aids users in performing the installation.
Abbreviations	Lists the abbreviations used in this document and their expansions.

Related Reading

The following documents contain related information:

AirHarmony-4200 Hardware Product Specification

Airspan LTE Commissioning Manual

Customer Care Help Desk

Airspan's *Customer Care Help Desk* offers prompt and efficient customer support services.

Note: To avail Airspan's *Customer Care Help Desk* support, you must be a registered user and must have a valid support contract. To register, click [here](#) and fill the **Registration** form.

To create and update issue logs, send e-mails to [Customer Care Help Desk](#). Once you submit your issue, the system generates a new issue and sends an issue number for your reference. The system uses this issue number to categorize and store e-mails under the appropriate issue.

To help *Customer Care Help Desk* identify your issue, include the issue number and your *Customer Care Helpdesk* account details in all further communications.

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Airspan Encourages Comments

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1 Introduction

This section provides a descriptive overview of the Airspan's AirHarmony-4200 DC Internal Filters a Macro-class eNodeB variant and its place in the Airspan product suite.

This document is intended for readers with LTE working knowledge.

All information in this document is for general information only, and is subject for change without notice.

1.1 AirHarmony-4200 DC Internal Filters

AirHarmony-4200 DC Internal Filters is part of Airspan's carrier-class LTE Advanced small cell eNodeB family. AirHarmony-4200 DC Internal Filters is a Mini-Macro class product that supports 3GPP's Long Term Evolution (LTE) eNodeB specifications, providing high-speed data, mobility, Voice over LTE, and broadcast/multicast services in order to meet the demands of the LTE Mobile Carriers.

AirHarmony-4200 DC Internal Filters is a compact, easy to install Mini-Macro class eNodeB, allowing an operator to deploy LTE broadband services using existing infrastructure or Street Furniture (e.g. street lamps, power poles, building rooftop or sides etc...)

AirHarmony-4200 DC Internal Filters employs Software Defined Radio (SDR) technology, together with two transmit and receive paths for each sector and a GPS antenna and receiver – all in a highly integrated, physically small and light, All-Outdoor package, targeted to blend seamlessly into the urban environment. This compact outdoor product minimizes physical footprint, power consumption and operator OPEX.

AirHarmony 4200 implements 4 RF channels which can be operated as a dual sector / dual carrier 2x2 MIMO or as a single sector, single carrier 4x4 MIMO.

AirHarmony 4200 fully supports the standard LTE (Uu/S1/X2) interfaces.

All Airspan eNodeB products, including AirHarmony-4200 DC Internal Filters, are interoperable with a rich portfolio of 3rd party end user devices, including many handsets, indoor UEs, outdoor UEs and USB dongles from several ODMs, using various chipsets. For an updated of interoperability list, please contact your nearest Airspan Sales Representative.

Additionally, AirHarmony-4200 DC Internal Filters units can be tightly integrated with Airspan's iBridge and iRelay transport solutions. AirHarmony-4200 DC Internal Filters units supports an integrated PoE interface which powers and connects either iBridge, iRelay, or a third party Wi-Fi Access Point. This configuration creates a single installation that fully supports end to end IPv6 plug and play deployment by just adding power. For more details please refer to the iBridge and iRelay product specifications.

Note: For management please refer to the Airspan LTE Commissioning Manual as well as Netspan manuals.

Note: The AirHarmony 4200 DC Internal Filters requires operation using an Airspan FCC-specific version of Netspan acting as a CBRS Domain Proxy.

1.2 Deployment

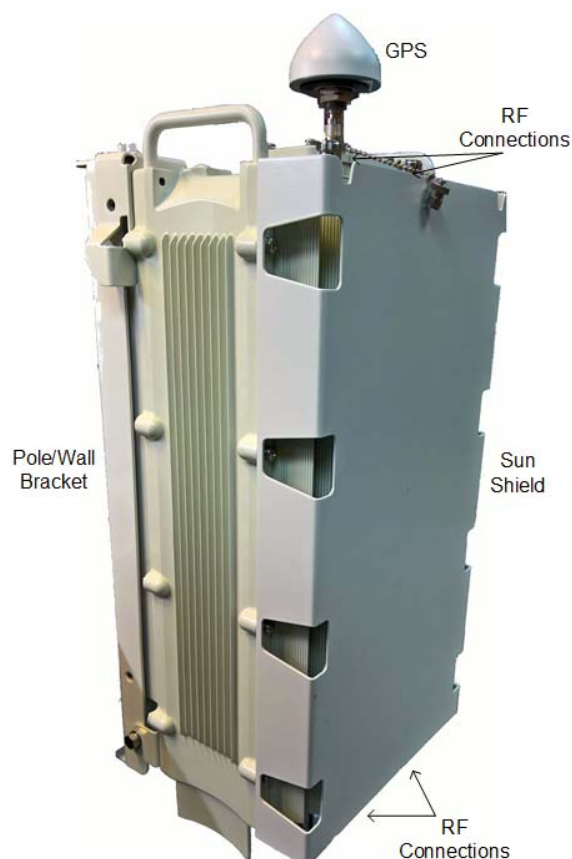
A highly flexible and scalable 4G Base Station, the AirHarmony-4200 DC Internal Filters is capable of supporting LTE profiles across multiple frequency bands.

Note: AirHarmony-4200 DC Internal Filters must be properly grounded (16AWG minimum) according to NEC and other local safety code requirements.

Warning: Required - circuit breaker for AC power source (when used) -16A for EU installation and 20A for US installation.

Warning: Required - circuit breaker for DC power source (when used). Maximum 10A.

Figure 2: AirHarmony-4200 DC Internal Filters unit



1.3 Related AirHarmony 4200 DC Internal Filters Variants

This document is related to AirHarmony 4200 DC Internal Filters variants. The following table lists the relevant variants:

Table 6: AirHarmony 4200 DC Variants

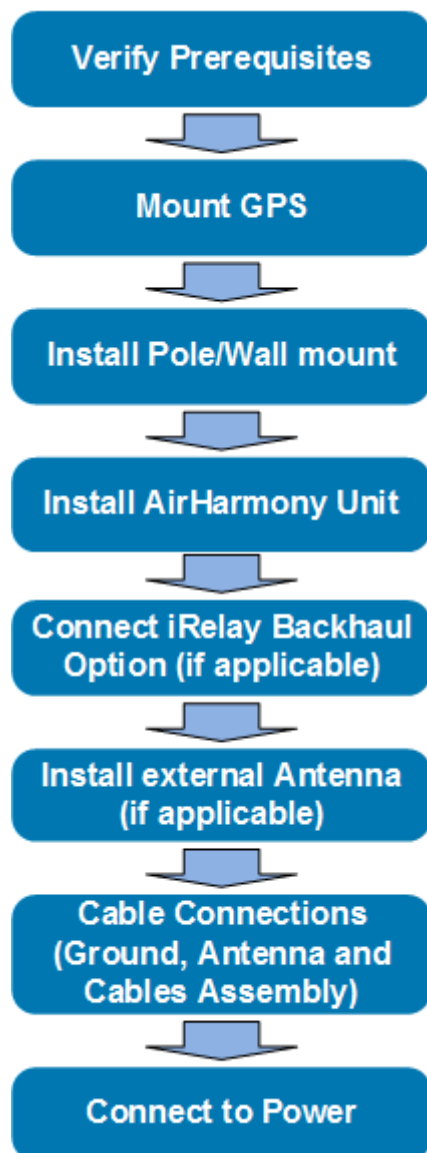
Band	Product Code	Description	DL Freq. (MHz)	UL Freq. (MHz)	Duplex Mode	Max Channel BW (MHz)	Dual Carrier	Tx/Rx Conf.	Filters/Duplexers
42	HAR42-CN-U42-B06DP	AirHarmony 4200 3400-3600 MHz (B42), Connectorized w Internal Filters 2x Fiber + 2x Copper, PoE, DC	3400-3600	3400-3600	TDD	20	Yes	2x 2x2, 4x4	Internal Filters
48 (CBRS)	HAR42-CN-U48-B06DP	AirHarmony 4200 3550-3700 MHz (B48), Connectorized w Internal Filters 2x Fiber + 2x Copper, PoE, DC	3550-3700	3550-3700	TDD	20	Yes	2x 2x2, 4x4	Internal Filters

2 Getting Started

2.1 Workflow of Installation

The Workflow to install the AirHarmony-4200 DC Internal Filters is displayed in the following diagram:

Figure 3: Workflow



Caution: Antennas must be connected and attached before AirHarmony-4200 DC Internal Filters unit is powered on.

2.2 AirHarmony-4200 DC Internal Filters Installation Checklist

Plan the installation of the AirHarmony-4200 DC by using the Installation Checklist, which you can find as a removable job aid in [Appendix A](#) for this guide.

3 Verifying Prerequisites

Prior to installing the AirHarmony-4200 DC Internal Filter unit, verify the required safety, power, tools, parts and components. This chapter includes the hardware, software, and client requirements for installation.

Important: Set up requirements for the installation is detailed in the **Job Sheet**, see [Appendix A](#).

3.1 Verifying Site Requirements

To set up the AirHarmony-4200 DC Internal Filter unit, an IP connection to a Netspan server is required.

3.2 Verify Installation Requirements

Verify the Tools

Table 7. Minimum Hardware Requirements

Tool	Use
#13 wrench	for securing the M8 Hex Head bolts on the Pole/wall mount
1/2" Socket Wrench	For 5/16" Hex head (Lag) bolts when wall mounting

Verify the Parts and Kits

Note: Verify your order and requirements to ensure the correct unit type is being installed.

Table 8. Parts & Kits

Installation Kit / Part	Part No.	Airspan No.	Consisting of:	Image
AirHarmony 4200 3.5GHz (B42)	HAR42-CN-U42-B06DP	TBD	AirHarmony 4200 3400 - 3600MHz (B42), Connectorized w Internal Filters 2x Fiber + 2x Copper, PoE, DC	
AirHarmony 4200 3.6Hz (B48)	HAR42-CN-U48-B06DP	TBD	AirHarmony 4200 3550 - 3700MHz (B48), Connectorized w Internal Filters 2x Fiber + 2x Copper, PoE, DC	
AirHarmony 4200 universal wall & pole mounting kit	HAR40-U-PMK-2	903-03-261	- Pole/wall mount bracket - Screws for connecting the unit 4 bands for pole mounting – supports dia. Range 64 mm (2.5 in) > 362 mm (14.25 in)	
Optional AC / DC Power Converter – Available from Airspan				
AC/DC Indoor power converter	AC-DC-IDU-Air4G-W24	133-00-061	AC/DC Power Converter for AirHarmony-4200 DC	
GPS Antenna				
GPS Antenna	GPS-ANT-3	350-05-009	GPS Antenna with built-in high, interference rejection	
Or				
GPS Antenna Kit	GPS-HAR-KIT-1	903-00-125	AirHarmony GPS Kit (including antenna, bracket and 80cm cable)	
DC Cables				
Type-IC DC Power Cable - 10m	PWR-10-INST-2	N/A	Type-IC DC Power Cable	
Type-IC DC Power Cable - 15m	PWR-15-INST-2	N/A	Type-IC DC Power Cable	
Type-IC DC Power Cable - 30m	PWR-30-INST-2	N/A	Type-IC DC Power Cable	

Installation Kit / Part	Part No.	Airspan No.	Consisting of:	Image
Type-IC DC Power Cable - 50m - special order	PWR-50-INST-2	N/A	Type-IC DC Power Cable	
Type-IC DC Power Cable - 75m - special order	PWR-75-INST-2	N/A	Type-IC DC Power Cable	
Full AXS SM Fiber Cable				
Full AXS SM Fiber Cable 5m, Outdoor LC/DPX to LC, IP67	FIB-FA-5-LC-SM-1	686-00-016		
Full AXS SM Fiber Cable 7.5m, Outdoor LC/DPX to LC, IP67	FIB-FA-7.5-LC-SM-1	686-00-017		
Full AXS SM Fiber Cable 15m, Outdoor LC/DPX to LC, IP67	FIB-FA-15-LC-SM-1	686-00-015		
Full AXS SM Fiber Cable 30m, Outdoor LC/DPX to LC, IP67	FIB-FA-30-LC-SM-1	686-00-009		
Full AXS SM Fiber Cable 50m, Outdoor LC/DPX to LC, IP67	FIB-FA-50-LC-SM-1	686-00-010		
Full AXS SM Fiber Cable 75m, Outdoor LC/DPX to LC, IP67	FIB-FA-75-LC-SM-1	686-00-011		
Full AXS SM Fiber Cable 100m, Outdoor LC/DPX to LC, IP67	FIB-FA-100-LC-SM-1	686-00-012		
Full AXS SM Fiber Cable 150m, Outdoor LC/DPX to LC, IP67	FIB-FA-150-LC-SM-1	686-00-013		

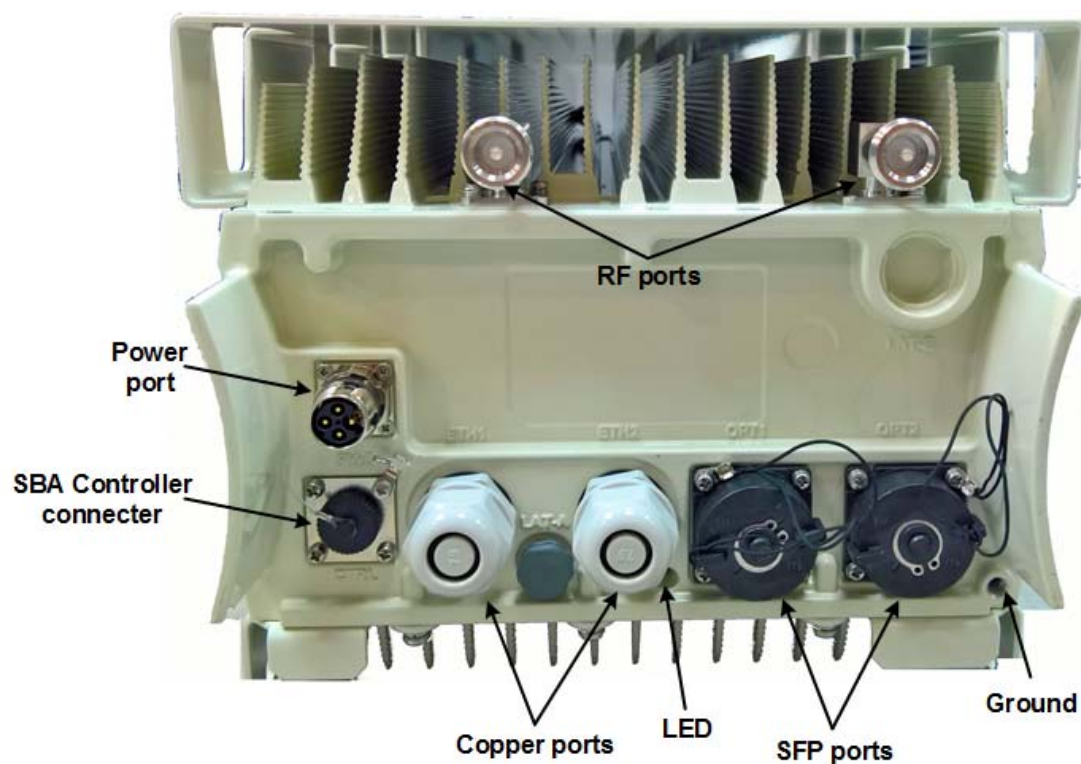
Installation Kit / Part	Part No.	Airspan No.	Consisting of:	Image
Full AXS SM Fiber Cable 200m, Outdoor LC/DPX to LC, IP67	FIB-FA-200-LC-SM-1	686-00-014		

Panels

The following figures display the AirHarmony-4200 DC Internal Filters bottom and top panels.

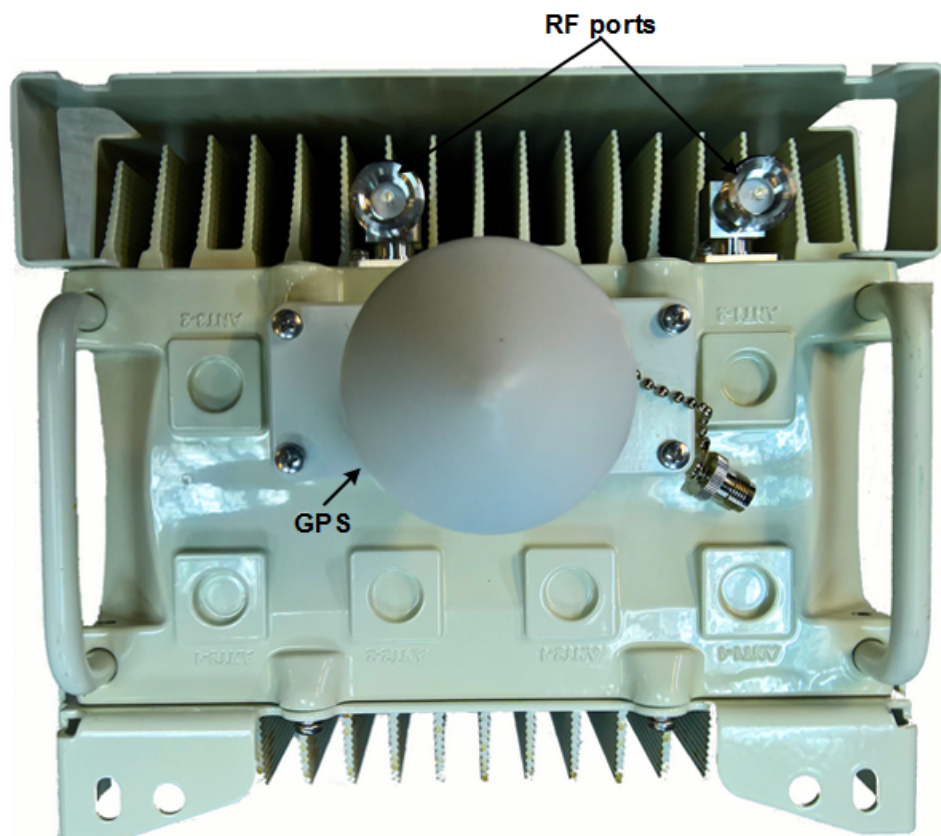
The following displays the AirHarmony-4200 DC's bottom panel.

Figure 4: AirHarmony-4200 DC Internal Filters Unit, Bottom panel



The following displays the AirHarmony-4200 DC's Internal Filters unit top panel.

Figure 5: AirHarmony-4200 DC Internal Filters Unit, Top panel



Physical Dimensions

AirHarmony-4200 DC Internal Filters unit is in an all outdoor enclosure.

Table 9: AirHarmony-4200 DC Physical Dimensions

Variant	Dimensions (H x W x D)
AirHarmony-4200 DC Internal Filters	509 x 236 x 210 mm / 20.0 x 9.3 x 8.3 in.
Weight	
Main Unit	20 Kg / 44 Lbs.
Universal mounting bracket	3 Kg / 6.6 Lbs.

Environmental

AirHarmony-4200 DC Internal filters unit meets the following environmental requirements:

- GR-63 Storage and Transportation
- ETSI EN 300-019-1-4 Operational (non-weather protected equipment)
- ETSI EN 300-019-1-1 Storage (weather protected, non-temperature controlled locations)
- ETSI EN 300-019-1-2 Transportation

Table 10: AirHarmony-4200 DC Environment Compliance

Type	Details	Standard Compliance
Operating temperature	-40°C to 55°C / -40°F to 131°F	ETSI 300 019 1-4
Operating humidity	5% - 100% non-condensing	ETSI 300 019 1-4
Storage temperature	-40°C to 70°C	N/A
Storage humidity	5% - 100% non-condensing	ETSI 300 019 1-4
Rain and dust ingress protection	IP66	N/A
Operational altitude	70-106 kPa as well as: From -60m to 1800m @ 40°C From 1800m to 4200m @ 30°C	ETSI 300 019 1-4
Solar radiation	1120 W/m ²	ETSI 300 019 1-4

4 Installing AirHarmony-4200 DC

Note: Proper clearance is required for proper placement of the AirHarmony unit on pole or wall. 500 mm clearance on bottom, 300 mm clearance on top and 100 mm clearance on sides and back from other objects in the vicinity.

Install the AirHarmony-4200 DC eNodeB by pole/wall mount. AirHarmony-4200 DC is mounted on a pole or wall in close proximity to its external antenna (connectorized variant).

Remove the AirHarmony from its packaging in preparation for mounting.

Caution: Proper local rigging and hoisting practices should be followed when installing the AirHarmony-4200 DC on pole or wall.

4.1 Connecting the GPS Antenna

Prior to installation of the AirHarmony the GPS antenna should be connected and after it is recommended that the connection should be weather-proofed.

The following describes the connection of the GPS antenna which is installed directly to the top of the unit.

13. Remove the protective dust cap from the GPS antenna jack prior to mounting on the AirHarmony-4200 DC.
14. Align the GPS jack with the plug on the top panel on the AirHarmony-4200 DC.
15. Attach the GPS antenna to the TNC connector on the unit.

Figure 6: Attaching GPS antenna to unit



Caution: Take care not to over tighten so as not to damage the threads.

Note: It is good practice to weather-proof all the antenna connections. This is done with a layer of self-amalgamating tape followed by an over layer of PVC tape. The weather-proofing the GPS connection is best done at this stage to give easier access to the

connections.

4.2 Pole/Wall Mount Assembly

Install the AirHarmony-4200 DC eNodeB by pole/wall mount. AirHarmony-4200 DC is mounted on a pole or wall in close proximity to its external antenna (connectorized variant).

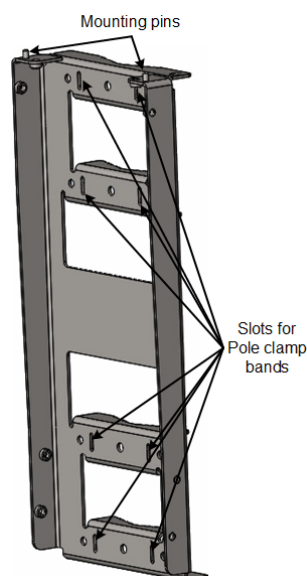
Caution: Proper local rigging and hoisting practices should be followed when installing the AirHarmony-4200 DC.

Mounting on a Pole

The following images show the pole mount assembly on a pole.

Caution: Take care to install the Pole/Wall mounting plate in the correct orientation. Verify that the mounting pins are facing upwards as shown below.

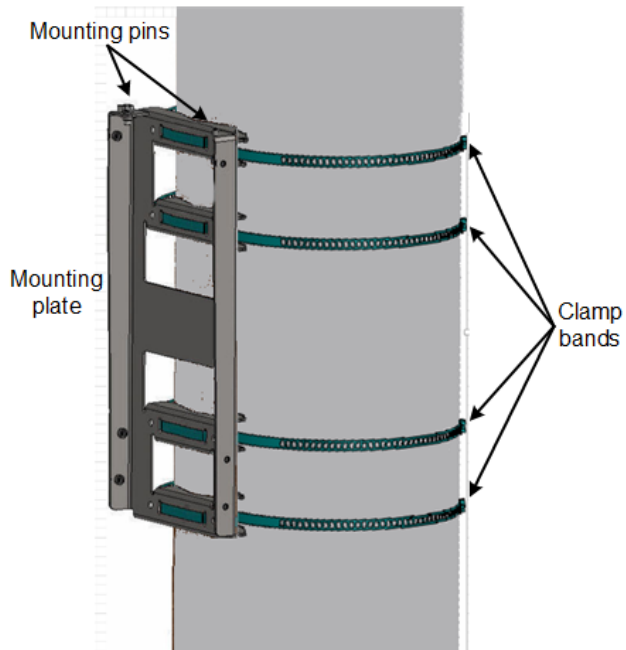
Figure 7: Pole/Wall mounting plate (w/o bolt)



1. Select the location on the pole to mount the AirHarmony-4200 DC. You can attach the AirHarmony-4200 DC to any pole from 1-7/8 to 16 inches (47.6 to 406.4 mm) in diameter.
2. Insert the clamp straps (supplied) through the slots in the mounting plate passing them through the pole clamps.
3. Insert the clamp bands by passing them through the slots in the mounting plate, in four (4) places.

4. Tighten the clamp bands with large flat screwdriver.

Figure 8: Mounting plate mounted

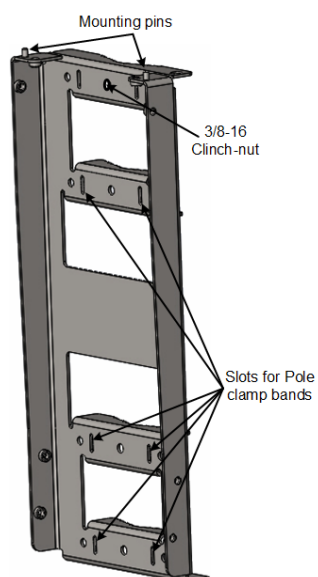


Mounting on a Wooden Pole

Airspan provides an additional mounting alternative specifically for a wooden pole. The following images show the pole mount assembly on a wooden pole.

Caution: Take care to install the Pole/Wall mounting plate in the correct orientation. Verify that the mounting pins are facing upwards as shown below.

Figure 9: Pole/Wall mounting plate



1. Select the location on the pole to mount the AirHarmony-4200 DC. You can attach the AirHarmony-4200 DC to any pole from 1-7/8 to 16 inches (47.6 to 406.4 mm) in diameter.
2. Determine where to position the mounting plate on the pole and mark where to drill for insertion of the 3/8-16 through-bolt.

Note: Threaded rod and necessary hardware are **not** supplied by Airspan and are the responsibility of the installer.

3. Drill a minimum 7/16" hole to accept the 3/8-16 threaded rod.
4. Thread the 3/8-16 threaded rod into the provided clinch-nut attached on the Pole/Wall mounting plate.
5. Holding the mounting plate (with the attached threaded rod) pass the 3/8-16 threaded rod through the drilled hole in the pole.
6. Install on the exposed thread that protrudes from pole a flat washer, split washer, and then a 3/8"-16 hex nut and tighten.
7. Insert the clamp bands (supplied) by passing them through the slots in the mounting plate, in three (3) places.
8. Tighten the clamp bands with large flat screwdriver.

Figure 10: Mounting plate on pole

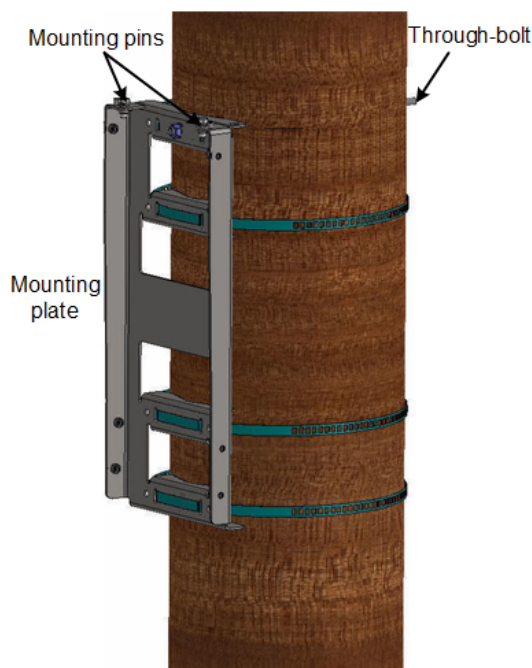
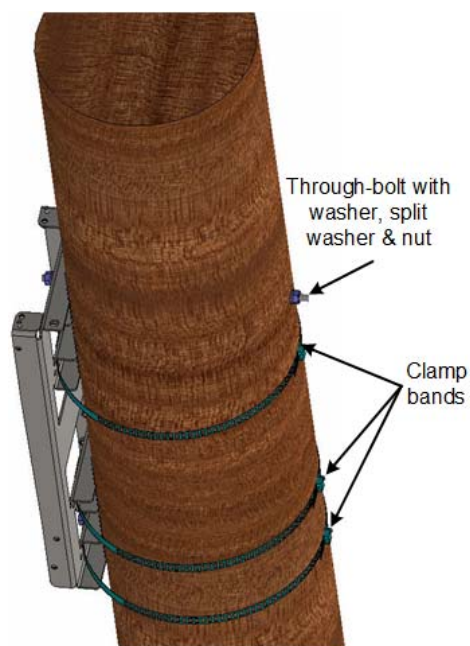


Figure 11: Through-bolt & Mounting plate



Mounting plate is installed and ready for AirHarmony-4200 DC mounting.

Mounting on a Wall

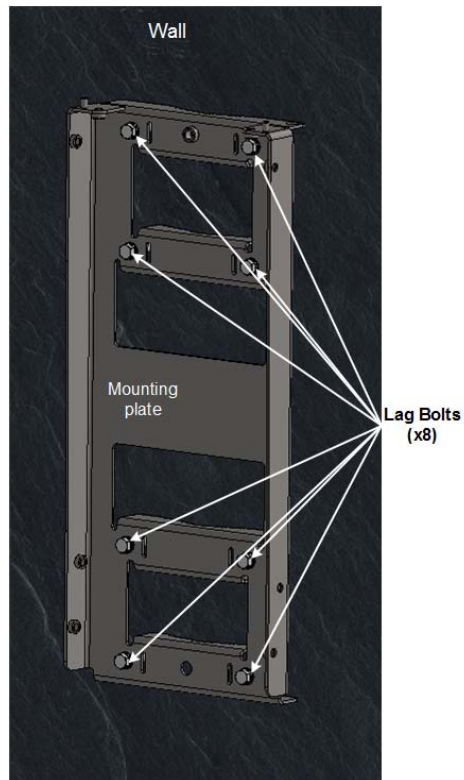
The following images show the wall mount assembly.

Caution: Take care to install the Pole/Wall mounting plate in the correct orientation. Verify that the mounting pins are facing upwards as shown below.

1. Position mounting plate against the wall with mounting pins facing up. Be sure to position the wall mounting plate straight with **level mounting** to ensure the unit sits evenly.
2. Mark the wall through the holes on the wall mount at the required height.
3. Attach the mounting plate to the wall using Lag bolts (x8 recommended).

Note: Lag bolts (x8) and necessary hardware are **not** supplied by Airspan and are the responsibility of the installer. Recommended minimum 5/16 x 4" dia. (8mm x 100mm) with appropriate plugs according to field conditions.

Figure 12: Mounting Plate on Wall



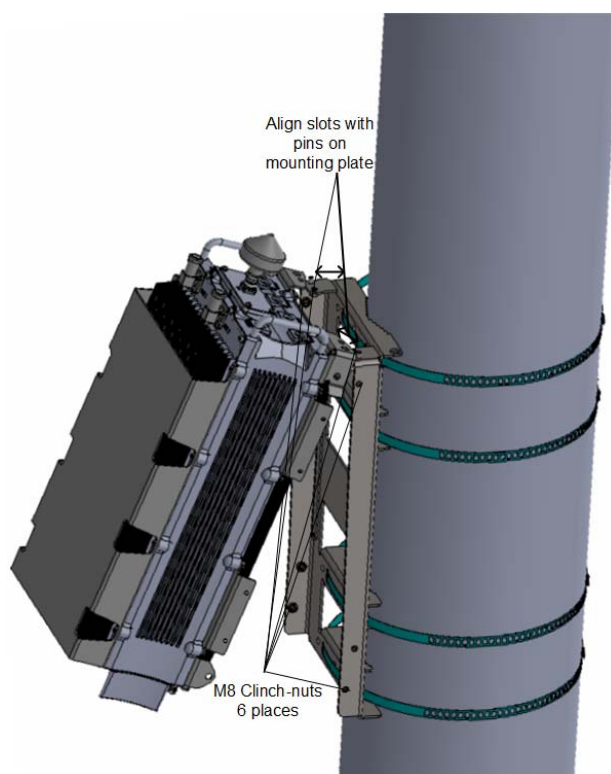
4.3 Securing AirHarmony-4200 DC to the Mounting Plate

Caution: Proper local rigging and hoisting practices should be followed when installing the AirHarmony-4200 DC on pole or wall.

To mount AirHarmony-4200 DC to the mounting plate, perform the following:

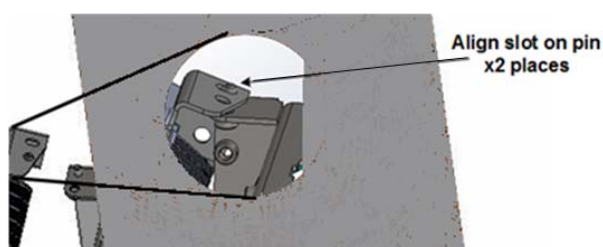
1. Lift up the AirHarmony-4200 DC unit and hook the slotted holes onto the mounting pins (studs) on the top of the mounting plate.

Figure 13: Lift unit and fit the slotted holes unto studs on top of mounting plate



The following displays a close up of the Pin (stud) alignment.

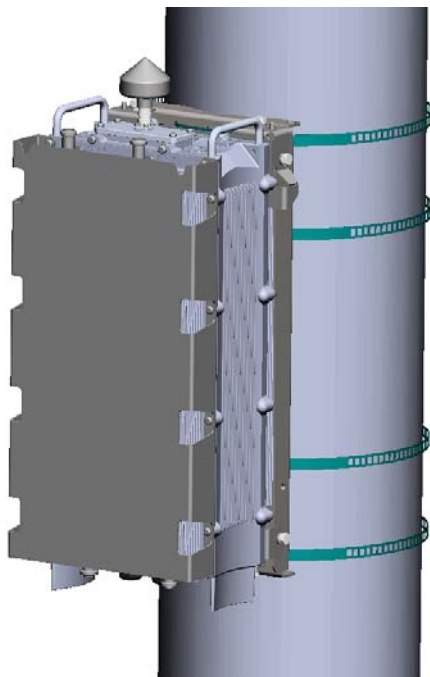
Figure 14: Align Pins



2. Lean the bottom of the unit into the mounting plate until the six (6) holes are aligned with the six (6) M8 clinch-nuts on the mounting plate. There are two (2) on the top, near the mounting pins and two (2) on either side of the mounting plate for a total of six (6) .
3. Once aligned insert the supplied M8x20 Hex head bolt with a split washer and a flat washer into each clinch-nut.
4. Check and tighten all six (6) M8x20 Hex head bolts.

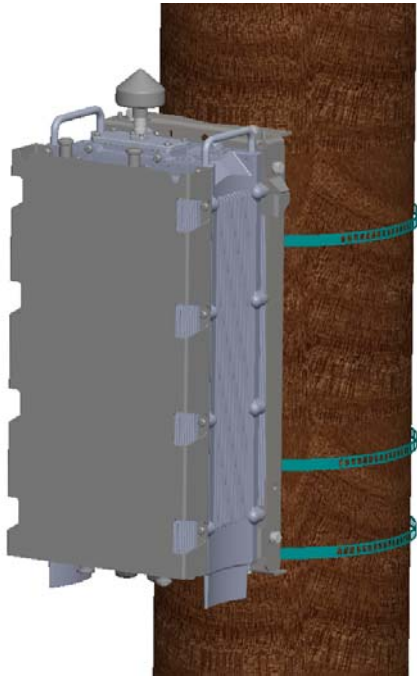
The following displays the AirHarmony-4200 DC being mounted on a non-wooden pole.

Figure 15: AirHarmony mounted on concrete Pole



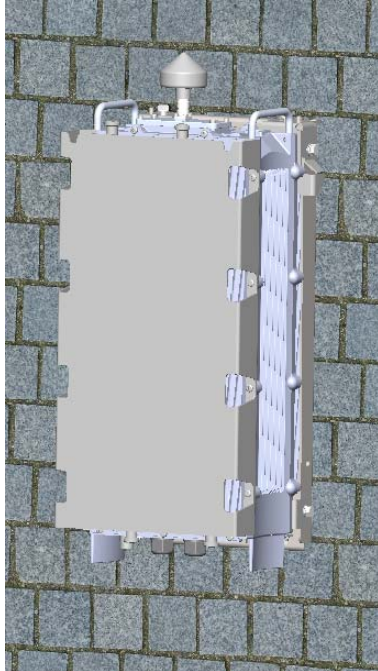
The following displays the AirHarmony-4200 DC mounted on a wooden pole.

Figure 16: AirHarmony mounted Wooden Pole



The following displays the AirHarmony-4200 DC mounted on a wall.

Figure 17: AirHarmony mounted on a Wall



5 AirHarmony-4200 DC Connections

This section describes grounding procedure, cable preparation and connections and external antenna assembly.

5.1 Grounding

The AirHarmony-4200 DC requires a secure ground connection. The ground cable should be connected with the grounding screw fitted with a flat washer and lock washer to the bottom of the chassis clearly marked with the universal ground symbol as shown below. The grounding screw (M6 x 16) is pre-installed during assembly.

Figure 18: Grounding



The cable should be grounded and bonded according to international or local standards.

5.2 Remote Antenna Assembly

The AirHarmony-4200 DC unit is be used with a remotely attached antenna.

For installation of a remotely mounted antenna follow the antenna manufacturer's instructions and connect the antenna to the AirHarmony-4200 DC External Duplexers' RF connectors (female DIN 4.1/9.5 connector) using the appropriate cables with a male DIN 4.1/9.5 connector.

Caution: Take care not over tighten the RF connector. The connector nut should be tightened to a nominal torque of no more than 10.0 Nm (1.47 lb-ft). RF failures can result when the RF connector is over-tightened.

Connecting RF Jumper Cables to External Antenna

The following describes how to connect the antenna cables to the External Duplexers.

1. Attach, connect and secure the RF cable between the external antenna and the appropriate RF connection on the top of the External Duplexers.

Caution: Antennas must be connected and attached before AirHarmony is powered on.

Caution: Power down AirHarmony prior to disconnecting antenna.

Note:

- First Sector/Carrier antenna should be connected to the top antenna ports.
- Second Sector/Carrier antenna should be connected to the top antenna ports.

Antennas for each sector can be either Directional or Omni.

2. Weather-proof the RF connections.

Note: The above is also applicable for **replacement** assembly.

Weather-proofing the Antenna Connections

Weather-proofing of all the connections is required. This is done with a layer of self-amalgamating tape followed by an over layer of PVC tape. The weather-proofing is best done at this stage to give easier access to the connections.

Note: Weather-proofing is best done at the assembly stage to give easier access to the connections. Weather-proofing is to be done to all RF connectors.

Verify the RF connectors are completely weather-proof.

5.3 Cable Connections

Note: The following images are for illustration purposes only. The actual tools or hardware may differ according to manufacturer.

Copper Ethernet Cable Assembly

The following demonstrates the recommended assembly instructions, hardware and tool requirements for the proper Ethernet cable assembly of the Ethernet Category 5e (enhanced) (CAT5e) cable used by Airspan products.

The Ethernet cable is connected using a standard RJ45 connector protected by a harsh environment protective casing.

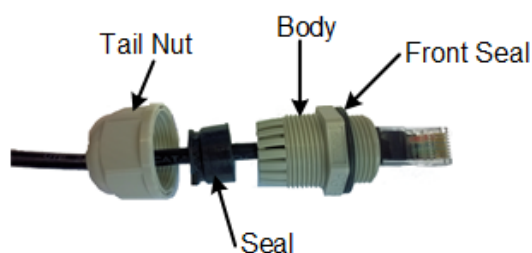
The Copper Ethernet cable is connected to the AirHarmony-4200 DC using a Gland connector assembled on the bottom panel of the unit, as shown below.

Figure 19: Gland connector - copper



1. Remove the Gland connector by unscrewing the body from the AirHarmony-4200 DC, using the (supplied) Gland wrench.
2. Pass the prepared Ethernet cable through the tail nut, gland seal, body and front seal of the connector casing as shown below. Do not tighten the tail nut.

Figure 20: Ethernet Cable through connector



3. Seat the RJ45 connector plug securely into the body cavity of the AirHarmony-4200 DC
4. Tighten the Gland body into to the threaded hole on the bottom of the AirHarmony-4200 DC.
5. Tighten the tail nut on to the body using the included Gland wrench, forcing the seal compress around the cable.
6. Once the connector is properly installed, the cable should be positioned and secured to minimize stress on the cable.

5.4 Fiber Ethernet (SFP) Cable Installation

The Fiber Ethernet Small form-factor pluggable transceiver (SFP) must be connected to the AirHarmony -4200 DC using an outdoor fiber cable. The optical connection enables a one-hand installation of the connector. This enables the users to easily remove and replace the SFP transceiver

module which eliminates the need to open the unit and expose its contents to hazardous weather conditions.

Note: Airspan recommends using the Finisar - FTLF1318P3BTL 1000BASE-LX which has been tested and approved by Airspan. Available from Airspan if required.

SFP Cable Connection

Figure 21: LC duplex cable assembly



1. Remove the protective dust cap from the connector housing assembled on the unit.
2. Line up the SFP transceiver module with the port and slide it into the port.
3. Connect the cable connector onto the board connector.

Figure 22: Cable connector hook up to the board connector



4. Verify that the locking latch on the cable connector is engaged on the board connector.
5. Slide the inner housing and ground shield (if present) over the cable and over the molding.

Figure 23: Slide on inner housing



Note: Check that there no space between the inner housing and mounting flange. Check and remove any debris that might interfere with the connection.

6. Slide the outer shell over the inner housing and turn the outer bayonet shell 1/4 turn clockwise, until it clicks into place.
-

Figure 24: Slide over and click



Note: The shell should be hand tightened only. Do NOT use tools to tighten the shell.

Once the connector is properly installed, the cable should be positioned and secured to minimize stress on the cable and connector.

5.5 Connecting the DC Power Cable to AirHarmony-4200 DC

Danger: Hazardous voltage! Before working, ensure that the power is removed from the power connection cables. When the system is powered on, ***do not touch the power terminals.***

Tip: It is good practice to label both ends of the cable to identify which AirHarmony-4200 DC unit it is connected to.

Tip: It is good practice to leave a spare loop of cable (approximately 0.5m). This will allow for easier wiring and will allow the cable to be re-terminated if necessary in the future.

The power cable is connected to the AirHarmony-4200 DC connector (marked PWR) on the bottom panel of the unit.

Power Input – DC

Caution: Verify the Power Cable Polarity is correct according to the unit's specification.

Caution: It is important that the power connector is attached at the correct end or damage to the connector/equipment will result.

Note: Check Power Supply for proper polarization.

Note: Airspan supplies two (2) types of cable, either black wire and white wire cable or black wire and blue wire cable. The cables' specs are identical only the colors are different.

Figure 25: DC Power Connection

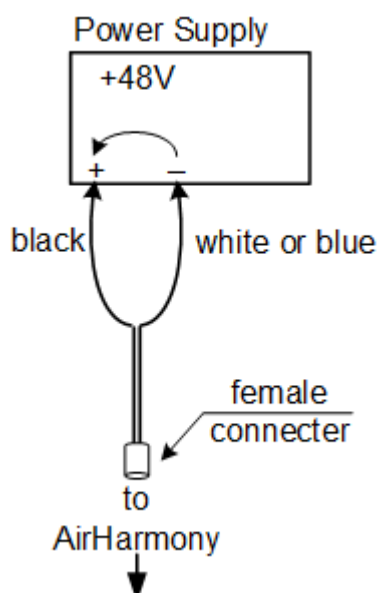
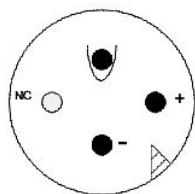


Figure 26: Power Connector – Bottom Panel



Connecting the DC Power Cable to AirHarmony

1. Plan the position of the DC power cable run from the AirHarmony unit to the power supply unit. The DC power cable is offered in various lengths, to fit different deployments.
2. Uncoil the cable and secure the connector just below the AirHarmony unit.

Note: When securing the cable make sure there is no tension on the connector so that it is easy to disconnect and re-connect for future maintenance actions.

Caution: The internal plastic parts of the mating connector are keyed. Take care to align these by visual inspection or by gently rotating the connector body until the key way sections align and the pins go in before tightening the locking ring.

3. Position the pins correctly, the connector is secured to the unit with a locking ring that is screwed into place. Use firm hand pressure only, the connector has a built in sealing ring.

Figure 27: attaching power cable to AirHarmony



AC/DC Power Converter – Optional

This section provides a description of the external AC/DC Power converter – Optional, available from Airspan.

The third-party external AC/DC Power Converter is an optional unit that connects to the AirHarmony-4200 DC in the event there is no -48VDC availability at the site.

Note: Airspan recommends using the AC/DC Power Converter for the AirHarmony-4200 DC. Available from Airspan if required.

Figure 28: Optional AC/DC Converter



AC/DC Power Converter

Table 11: AC/DC Converter Specifications

Model Type DC	Details
DC Voltage	48V
Rated Current	12.5A
Current Range	0 ~ 12.5A
Rated Power	600W
Voltage Adj. Range	41 ~ 56V
Safety Standards	UL60950-1, TUV EN60950-1 approved
EMI Conduction & Radiation	Compliance to EN55022 (CISPR22) Class B

A Job Sheet

This job sheet enables the users to keep track of their installation. It covers all the prerequisites required for accomplishing the AirHarmony-4200 DC installation.

Table 12: Job Sheet

Site Requirements	
	Pole or wall for installation identified Position on pole or wall identified Pole access restrictions (highway regulations, other services on pole, power pole) Method of reaching pole positions (ladders, Elevated work platform) AC main fuse block available for AC/DC converter (where needed) Configuration programming details known Point of connection for Ethernet (if applicable) All equipment items available at the installation site: • Main AirHarmony-4200 DC unit • GPS Antenna • Mounting bracket, through-bolt and pole clamps, or bolts if wall mount • Copper Ethernet or SFP cable assembly • Weather-proofing of the connections with a layer of self-amalgamating tape followed by an over layer of PVC tape.
Tool Requirements	
(For further information, see Verify the Tools.)	
	Large flat screw driver Small flat blade screw driver (insulated shaft recommended) Medium Philips head screw driver 13 mm wrench
Required Ancillary Equipment	
	Laptop PC for initial configuration Cable for temporary connection of the laptop
Other installed materials	
	Cable ties Labels (good to have)

B Abbreviations

Term	Expansion
3GPP	3rd Generation Partnership Project, responsible for LTE
ABS	Almost Blank Subframes
ACS	Adjacent Channel Selectivity is a measurement of a receiver's ability to process a desired signal while rejecting a strong signal in an adjacent frequency channel. ACS is defined as the ratio of the receiver filter attenuation on the assigned channel frequency to the receiver filter attenuation on the adjacent channel frequency.
AWGN	Additive White Gaussian Noise is a channel model in which the only impairment to communication is a linear addition of white noise with a constant spectral density and a Gaussian distribution of amplitude.
BER	Bit Error Rate
CN	Core Network
CP	Cyclic Prefix
CTC	Convolution Turbo Code is a high-performance forward error correction (FEC) code
dB	Decibel. A logarithmic unit used to describe a ratio (such as power ratio in radio telecommunications)
dBm	An abbreviation for the power ratio in decibels (dB) of the measured power referenced to one milliwatt (mW). It is used as a convenient measure of absolute power because of its capability to express both very large and very small values in a short form.
eNodeB	Evolved Node B, is the element in E-UTRAN of LTE.
ESP	Encapsulating Security Payloads (ESP) provide confidentiality, data-origin authentication, connectionless integrity, an anti-replay service (a form of partial sequence integrity), and limited traffic-flow confidentiality
E-UTRAN	Evolved UMTS Terrestrial Radio Access Network, is the air interface of 3GPP's Long Term Evolution.
EVM/RCE	The Error Vector Magnitude or EVM (sometimes also called Receive Constellation Error or RCE) is a measure used to quantify the performance of a digital radio transmitter or receiver. It is measured in dB or percentage (%) – the lower the better.
FDD	Frequency-Division Duplexing. A transceiver mode where the transmitter and receiver operate at different carrier frequencies.
GNSS	Global Navigation Satellite System is a term used to describe a satellite navigation system with global coverage. There are currently two fully operational GNSSs – the US GPS and the Russian GLONASS
GTP-U	GPRS Tunneling Protocol for User data is a relatively simple IP based tunneling protocol which permits many tunnels between each set of end points
HPBW	Half Power BandWidth is the angular separation in an antenna, in which the magnitude of the radiation pattern decreases by 50% (or -3 dB) from the peak of the main beam
ICS	In-channel selectivity is a measure of the receiver's ability to receive a wanted signal at its assigned Resource Block locations in the presence of an interfering signal
IPSec	Internet Protocol Security is a protocol suite for securing Internet Protocol (IP) communications by authenticating and encrypting each IP packet of a communication session

Term	Expansion
LED	Light Emitting Diode
LTE	Long Term Evolution
MAC	Medium Access Controller – responsible for several functions such Error Correction, Packet (De)Multiplexing, etc...
MBSFN	Multicast-Broadcast Single Frequency Network is an LTE feature designed to deliver services such as Mobile TV using the LTE infrastructure, and is expected to be a competitor to DVB-H-based TV broadcast
MCS	Modulation and Coding Scheme
MME	Mobility Management Entity is the key control-node for the LTE access-network. It is responsible, among other things for idle mode UE tracking and paging procedure including retransmissions
MTBF	Mean Time Between Failures
OFDMA	Orthogonal Frequency-Division Multiple Access (OFDMA) is a multi-user version of OFDM digital modulation scheme, used for eNodeB transmissions to UEs
PDCP	Packet Data Convergence Protocol. A Sub-Layer in LTE responsible for IP Header (De)Compression, etc...
PDU	Protocol Data Unit
PTP	Precision Time Protocol is used to synchronize clocks throughout a network. In this document, PTP is referring to IEEE1588-2008 protocol
RB	Resource Block
RLC	Radio Link Control. A Sub-Layer in LTE responsible for Ack/Nack, error correction, packet reordering, etc...
ROHS	Restriction Of Hazardous Substances
RRM	Radio Resource Management is used to cover all functions that are related to the assignment and sharing of radio resources among UEs
S-GW	Serving Gateway. A Core entity in the LTE EPC architecture responsible for routing and forwarding user data packets, while also acting as the mobility anchor for the user plane during inter-eNodeB handovers and as the anchor for mobility between LTE and other 3GPP technologies
SBA	Switched Beam Antenna
SC-FDMA	Single-Carrier FDMA is a frequency-division multiple access scheme, dealing with the assignment of multiple users to a shared communication resource. Used in LTE for UE transmissions to the eNodeB
SCTP	Stream Control Transmission Protocol is a reliable transport layer protocol, ensuring in-sequence transport of messages with congestion control like TCP
SDR	Software Defined Radio
TDD	Time-Division Duplexing. A transceiver mode where the transmitter and receiver operate on the same carrier frequency
UE	User Equipment. The end user in LTE
WEEE	Waste Electrical and Electronic Equipment