AirHarmony-1000 Installation Guide

Part Number: UGD-D01006

System Release: 14.1

Revision: A4

Published: August 2015

© Copyright by **Airspan Networks Inc.,** 2015. All rights reserved worldwide.

Legal Notices

The information contained within this document is proprietary and is subject to all relevant copyright, patent and other laws protecting intellectual property, as well as any specific agreements protecting Airspan Networks Inc. rights in the aforesaid information. Neither this document nor the information contained herein may be published, reproduced or disclosed to third parties, in whole or in part, without the express, prior, written permission of Airspan Networks Inc. In addition, any use of this document or the information contained herein for the purposes other than those for which it is disclosed is strictly forbidden.

Airspan Networks Inc. reserves the right, without prior notice or liability, to make changes in equipment design or specifications.

Information supplied by Airspan Networks Inc. is believed to be accurate and reliable. However, no responsibility is assumed by Airspan Networks Inc. for the use thereof nor for the rights of third parties which may be effected in any way by the use of thereof.

Any representation(s) in this document concerning performance of Airspan Networks Inc. product(s) are for informational purposes only and are not warranties of future performance, either expressed or implied. Airspan Networks Inc. standard limited warranty, stated in its sales contract or order confirmation form, is the only warranty offered by Airspan Networks Inc. in relation thereto.

This document may contain flaws, omissions or typesetting errors; no warranty is granted nor liability assumed in relation thereto unless specifically undertaken in Airspan Networks Inc. sales contract or order confirmation. Information contained herein is periodically updated and changes will be incorporated into subsequent editions. If you have encountered an error, please notify Airspan Networks Inc. All specifications are subject to change without prior notice.

Product performance figures quoted within this document are indicative and for information purposes only.

Acknowledgements

© Intel Corporation http://www.intel.com/

© Microsoft Corporation http://www.microsoft.com

Table of Contents

Figures

Tables

Document Information

Abstract

This document details procedures for installing the Airspan's AirHarmony 1000 Indoor-Pico Enterprise-Femto eNodeB variant.

Revision History

Revision Details	Date	Summary of Changes
Rev 0.1	October 2014	• Initial document • Reformatted and revised the document.
Rev A + A1	November 2014	• Updates
Rev A2 +A3	February 2015	• B2B mounting option • Updates
Rev A4	August 2015	• Additional Antenna • Additional content

Warnings and Cautions

Human Exposure to Radio Frequencies

The AirHarmony-1000 antennas should be installed and operated from a minimum safe distance of:

- AirHarmony-1000 with Front Mount Antenna: 2.5m
- AirHarmony-1000 with External Antenna: 2.5m
- AirHarmony-1000 with Smart Beam Antenna (SBA): 0.5m (pending)

Radio Interference

This AirHarmony-1000 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 eNodeBs and/or End Device
- Connect the equipment to an outlet on a circuit different from that to which the power source is connected

Avoiding Radio Interference

Ensure a minimum of 1-meter separation between co-located AirHarmony 1000 units.

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.
- Installation requires special training. The AirHarmony-1000 radio and antenna 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.

Safety

1. Read this guide and follow all operating and safety instructions.
2. Keep all product information for future reference.

3. This product is supplied with a grounding connection which must be connected. Do not defeat this important safety feature.
4. Static sensitive components inside - do not remove the lid or base: No user serviceable parts inside.
5. Position the power cord to avoid possible damage; do not overload wall outlets.
6. Do not place this product on or near a direct heat source, and avoid placing objects on the terminal.
7. To avoid electrical shock do not install this device during adverse conditions such as rain or inclement weather.
8. Use only a damp cloth for cleaning. Do not use liquid or aerosol cleaners. Disconnect the power before cleaning.
9. 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.
10. 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.
11. Installation of the AirHarmony-1000 must be contracted to a professional installer.
12. Disconnect Device. The socket outlet should be easily accessible in case you have to disconnect the device.
13. 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.

Warning of Hazardous Voltages

On AC installations, hazardous voltages exist. Use caution when verifying or working with AC power. Remove metal jewellery 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.

Adherence to European Directive 1999/519/EC

European Council Recommendation 1999/519/EC 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.

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.

Electro-Magnetic Radiation

High Voltage

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. Liquid has been spilled, a foreign object is inside, or the terminal has been exposed to rain.

c. 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-1000 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. The antennas are to be DC grounded, so surge protection is not required. 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 lighting 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 AC wall outlet ground must be connected to the same grounding system as the eNodeB.

DECLARATION OF CONFORMITY

European Community, Switzerland, Norway, Iceland, and Liechtenstein

Declaration of Conformity with Regard to the R&TTE Directive 1999/5/EC

English:

This equipment is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

Deutsch:

Dieses Gerät entspricht den grundlegenden Anforderungen und den weiteren entsprecheneden Vorgaben der Richtlinie 1999/5/EU.

Dansk:

Dette udstyr er i overensstemmelse med de væsentlige krav og andre relevante bestemmelser i Directiv 1999/5/EF.

Español:

Este equipo cumple con los requisitos esenciales asi como con otras disposiciones de la Directive 1999/5/EC.

Greek:

ΜΕ ΤΗΝ ΠΑΡΟΥΣΑ Airspan ΔΗΛΩΝΕΙ ΟΤΙ Ο ΕΞΟΠΛΙΣΜΟΣ ΣΥΜΜΟΡΦΩΝΕΤΑΙ ΠΡΟΣ ΤΙΣ ΟΥΣΙΩΔΕΙΣ ΑΠΑΙΤΗΣΕΙΣ ΚΑΙ ΤΙΣ ΛΟΙΠΕΣ ΣΧΕΤΙΚΕΣ ΔΙΑΤΑΞΕΙΣ ΤΗΣ ΟΔΗΓΙΑΣ 1999/5/ΕΚ.

Français:

Cet appareil est conforme aux exigencies essentialles et aux autres dispositions pertinantes de la Directive 1999/5/EC.

Íslenska:

Þessi búnaður samrýmist lögboðnum kröfum og öðrum ákvæðum tilskipunar 1999/5/ESB.

Italiano:

Questo apparato é conforme ai requisiti essenziali ed agli altri principi sanciti dalla Direttiva 1999/5/EC.

Nederlands:

Deze apparatuur voldoet aan de belangrijkste eisen en andere voorzieningen van richtlijn 1999/5/EC.

Norsk:

Dette utstyret er i samsvar med de grunnleggende krav og andre relevante bestemmelser i EU-directiv 1999/5/EC.

Português:

Este equipamento satisfaz os requisitos essenciais e outras provisões da Directiva 1999/5/EC.

Suomalainen:

Tämä laite täyttää direktiivin 1999/5/EY oleelliset vaatimukset ja on siinä asetettujen muidenkin ehtojen mukainen.

Svenska:

Denna utrustning är i överensstämmelse med de väsentliga kraven och andra relevanta bestämmelser i Direktiv 1999/5/EC.

Român:

Acest echipament este în conformitate cu cerinţele esenţiale şi alte prevederi relevante ale Directivei 1999/5/CE.

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 Power

Table 1: AirHarmony-1000 FCC Maximum Output TX Power

Frequency Band	FCC TX	EIRP	Antenna Gain
2300-2400 MHz	TBDdBm	TBDdBM	12dBi
2496-2 690MHz	39.86dBm	57.86dBm	18dBi

Table 2: AirHarmony-1000 ETSI Maximum Output TX Power

Frequency Band	ETSI TX	EIRP	Antenna Gain
2300-2400 MHz	40dBm	52dBm	12dBi
2496-2 690MHz	40dBm	58dBm	18dBi

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

Power Consumption

AirHarmony-1000 has a Max nominal power consumption of 130W. AirHarmony-1000 power consumption is described in the following table:

Table 3: Power Consumption

Duplex	Tx Power at RF Port (dBm)	Nominal Power Consumption (W)	Power Supply Requirement (W)
FDD	TBD	TBD	TBD
TDD	37	156	200

Antenna System

The following antennas are designed specifically for AirHarmony-1000 deployments. Externally mounted antennas are available for use as well (pending), but are specified separately.

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

Front Mounted Sector Antenna

The front mounted sector antenna is a cross polarized fixed antenna which mounts on the front of the unit in place of the sun-shield.

Note: When using a front mounted antenna, external antennas cannot be used.

Note: When using external antennas, the sun-shield must be used.

Table 4: Front Mounted Sector Antenna Parameters

Parameter	2.x GHz		3.x GHz
Frequency	2.3–2.7	2.3–2.7	3.3–3.8
Polarization	Dual Slant ±45°	Dual Slant ±45°	Dual Slant ±45°
Polarization discrimination	18 dB	15 dB	>15 dB
Boresight gain	12 dBi	7.5 dBi	11.5 dBi
Azimuth HPBW	65°	90° ± 10°	65°
Elevation HPBW	22°	20°	22°
Electrical tilt	-1°	N/A	-1°
Grounding	DC GND	DC GND	DC GND

SelectaBeam Multi-beam Antenna

The SelectaBeam SC-800 provides four direction beams and an omnidirectional pattern covering 360° in azimuth. Beam selection is achieved via a digital control interface.

Table 5: Omni Antenna Parameters

Parameter	2.x GHz
Frequency	2.3–2.7
Polarization	Dual Slant ±45°
Polarization discrimination	16 dB
Boresight gain	2.0 dBi
Peak gain	7.5 dBi
Azimuth HPBW	Omni-Directional
Elevation HPBW	20°
Electrical tilt	N/A
Grounding	DC GND

AirHarmony-1000 Antenna Usage Options

AirHarmony-1000 comes in a range of frequency variants that can be mounted with different antenna options and formats. Initially deliveries are of the Front Mount Antenna variant.

A typical sector installation will have a cross-polar sector antenna fitted directly to the front of the AirHarmony-1000 main unit. (This is attached instead of the sun-shield in other variants - pending).

Figure 1: AirHarmony-1000 with front mounted antenna and AirHarmony-1000 with sun-shield

About This Document

Purpose

This guide provides the workflow and step-by-step procedures for Installing the AirHarmony-1000. These procedures include:

- Verify prerequisites
- Install wall / pole mount
- Install the AirHarmony-1000
- Install the AC/DC converter
- Connect and manage cables

Intended Audience

This guide is intended for persons who are responsible for installing the AirHarmony-1000 equipment.

These persons should have a working knowledge of the equipment.

Document Conventions

This document uses the following typographic conventions.

Table 6: Typographic Conventions

Convention	Element
Blue underlined text	Cross-reference links.
Bold text	Keyboard buttons and GUI elements.
Command	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.
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 1000 and its installation.
Getting Started	Provides workflows for initial install and workflow.
Verifying Prerequisites	Lists the hardware, software, and client requirements for installation.
AirHarmony-1000 Installation	Describes how to install AirHarmony-1000.
Install the AC/DC converter	AC/DC converter installation
Connect and Manage Cables	Describes how to connect the cables.
Job Sheet	Provides information that aids users in performing the installation.
Checklist	Provides an overview of the high–level steps involved in the workflow.
Abbreviations	Lists the abbreviations used in this document and their expansions.

Related Reading

The following documents contain related information:

- AirHarmony-1000 Hardware Product Specification
- AirHarmony-1000 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.

Main Operations

Airspan Communications Ltd.
Capital Point
33 Bath Road
Slough, Berkshire
SL1 3UF, United Kingdom
Tel: +44-1895-467-100

Worldwide Headquarters

Airspan Networks Inc.
777, Yamato Road, Suite 105
Boca Raton, FL 3341-4408, USA
Tel: +1 561 893 8670

Airspan Encourages Comments

Airspan welcomes any feedback and suggestions that help to improve the quality of the documentation. Send your feedback to documentfeedback@airspan.com.

1 Introduction

This section provides a descriptive overview of the Airspan's AirHarmony-1000 Micro / Pico eNodeB variant and its place in the Airspan product suite.

1.1 AirHarmony-1000

AirHarmony-1000 is part of Airspan's carrier-class 4G Micro eNodeB family. AirHarmony-1000 supports 3GPP's Long Term Evolution (LTE) eNodeB specifications, providing high-speed data and mobility in order to meet the demands of the Broadband Wireless Access market.

AirHarmony-1000 is a compact, easy to install Micro / Pico-cell, allowing an operator to deploy LTE broadband services using existing Street Furniture (e.g. street lamps, power poles, etc…)

AirHarmony-1000 employs Software Defined Radio (SDR) technology, together with two transmit and receive paths, antennas and a GPS receiver - all in a highly integrated, physically small and light, All-Outdoor package, targeted to blend seamlessly into the urban environment. This very compact outdoor product minimizes physical footprint, power consumption and operator OPEX.

AirHarmony-1000 will support a wide array of frequencies and channel sizes, able to operate in both licensed and unlicensed bands. Frequencies and channel sizes will be added regularly.

AirHarmony-1000 implements dual 37 dBm (2 x 5W) transmitters with the availability of several optional integral antennas and external antennas connectivity.

AirHarmony-1000 fully supports the standard LTE (Uu/S1/X2) interfaces.

All Airspan eNodeB products, including AirHarmony-1000, 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.

Note: For management please refer to the AirHarmony-1000 LTE Commissioning Manual as well as the Netspan User Manual.

1.1.1 Deployment

A highly flexible and scalable 4G Base Station, the AirHarmony-1000 is capable of supporting LTE profiles across multiple frequency bands.

Note: The following is for illustration only; actual layout may differ as infrastructure is installation-specific.

Note: AirHarmony-1000 must be properly grounded according with NEC and other local safety code requirements.

Figure 2: AirHarmony-1000 assembled with Front Mount antenna and GPS

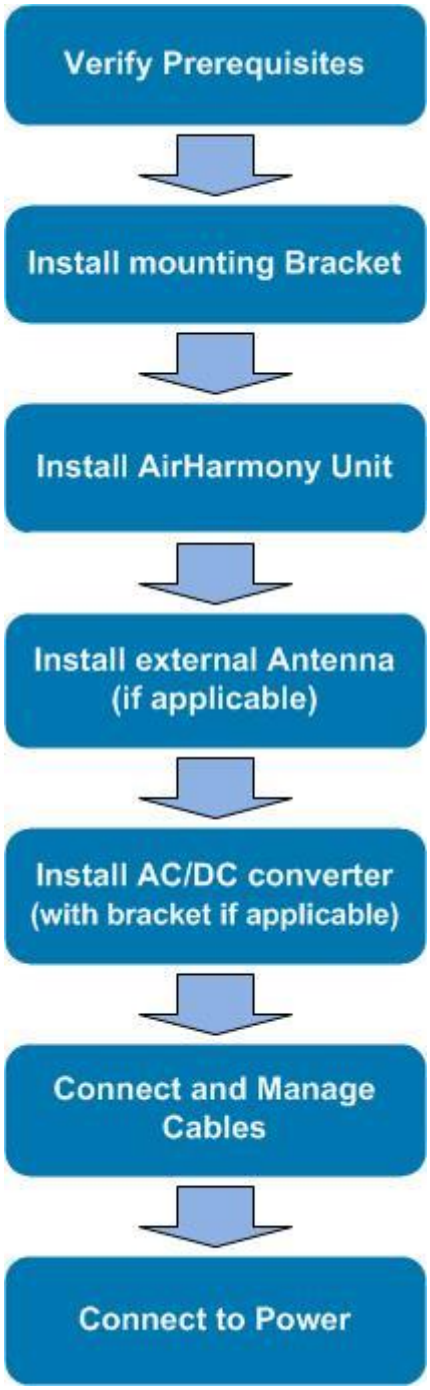
Note: The illustration above displays the GPS connected directly to the top of the unit; there is also a remote GPS antenna option.

2 Getting Started

2.1 Workflow of Installation

The Workflow to install the AirHarmony-1000 is shown in the following diagram:

Figure 3: Workflow



Caution: Antennas must be connected and attached before AirHarmony-1000 is powered on.

2.2 AirHarmony-1000 Installation Checklist

Plan the installation of the AirHarmony-1000 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-1000, 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-1000, an IP connection to a Netspan server is required.

3.2 Verify Installation Requirements

3.2.1 Verify the Tools

Note: AirHarmony-1000 variants with front mounted, Sunshield (pending) and Switched Beam (pending) antennas come pre-assembled from the production line.

Table 7. Minimum Hardware Requirements

Tool	Use
Large flat bladed screwdriver	securing the pole straps
10mm or 13/32 inch wrench	for securing flange nuts
Large pliers	Tightening cable glands - To fit 15mm

3.2.2 Verify the Parts and Kits

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

Table 8. Parts & Kits

Installation Kit / Part	Part No.	Consisting of:	Note:
AirHarmony 1000 2.5 GHz (B38, B41), Conn	HAR10-CN-U41-B01D	AirHarmony 1000 2.496 - 2.69 GHz (B38, B41), Connectorized, Fiber BH	DC output - 16AWG x 4 connected to AirHarmony 1000 DC connector
AirHarmony 1000, 2.3 GHz (B40), Front	HAR10-FM-U40-B01D	AirHarmony 1000 Front Mount, 2.3 GHz (B40), Fiber Backhaul, DC	DC output - 16AWG x 4 connected to AirHarmony 1000 DC connector
AirHarmony 1000, 2.3 GHz (B40), Conn	HAR10-CN-U40-B01D	AirHarmony 1000 Connectroized, 2.3 GHz (B40), Fiber Backhaul, DC	DC output - 16AWG x 4 connected to AirHarmony 1000 DC connector
AirHarmony 1000 universal wall & pole mounting kit	HAR10-U-PMK-1	Wall / pole mounting bracket for the AirHarmony + 4 bands	
GPS Antenna	GPS-ANT-3	GPS Antenna	
GPS Kit	GPS-HAR-KIT-1	GPS antenna, bracket, 16m cable and surge protection kit	For remote GPS antenna installation

Installation Kit / Part	Part No.	Consisting of:	Note:
Lightning/Surge protector (part of GPS Kit)	N/A – part of GPS Kit	Lightning protection 0-4 GHz 90V TNC(M/F)- L-COM Current: 5KA Voltage: 1000V +/- 20% Power / Resistance: 50ohm Operating Temp: -55 - 85	
AC/DC Outdoor Power Converter Kit	HAR10-ACDC-KIT-ODUL-1	▪ Wall & Pole mounting for AC/DC Converter ▪ Mounting bracket for AC/DC converter. ▪ Serratub Maxi Clamp, band 12mm wide + quick adjust lock, 50-215mm pole dia. ▪ Sems Pan Hd M4x10 DIN 7985 with Plain&Spring Washers, St St, A2 ▪ AC/DC Converter 48V, 240W, 90-305Vac, IP67, -30/+70C, EN60950-1 SYN-PSU-ODUL-AC-2 ▪ DC side cable is pre-connected to the AirHarmony-1000 DC plug. Cable length is 300/1000mm ▪ AC side cable 3 wires (brown, blue & green). Cable length 300mm. should be connected to the AC cable by using the weather-proof cable joiner. ▪ AC cable weather-proof cable joiner - SYN-PWR-JOIN-1	AC/DC converter supplied pre-connected to the DC plug. DC cable length is 300mm or 1000mm. AC joiner and mounting kit are to be assembled during field installation.
AC Cable	CBL-AC-3x18AWG-1	AC Cable, 3x 18AWG per meter, (white, black & green)	
Grounding Cable	CBL-GND-1M-1	Grounding cable per meter (green)	
Grounding Lug	CON-LUG-GND-1	Ring Terminal for 6AWG grounding cable. (M6 x 8mm screw)	
DC Power cable v1, 10m	PWR-10-MF-1	DC Power cable	Alternative to the AC/DC converter kit. Additional lengths will be defined as required.

Installation Kit / Part	Part No.	Consisting of:	Note:
Outer Fiber Cables (various lengths)	▪ FIB-FA-10-LC-SM-1 10M ▪ FIB-FA-15-LC-SM-1 15M ▪ FIB-FA-30-LC-SM-1 30M ▪ FIB-FA-50-LC-SM-1 50M ▪ FIB-FA-75-LC-SM-1 75M ▪ FIB-FA-100-LC-SM-1 100M ▪ FIB-FA-150-LC-SM-1 150M FIB-FA-200-LC-SM-1 200M	Outdoor fiber cable is available in 8 different lengths	
PVC Insulation tape	PVC-INS-TAPE-1	20m, Black 19mm width	
Self-amalgamating waterproof tape	S-AMAL-WP-TAPE-1	10m, Black 25mm width	
Airspan Recommends:			
Finisar SFP Transceiver	FTLF1318P3BTL 1000BASE-LX	Tested and approved by Airspan. Available from Airspan if required.	

Table 9: AirHarmony-1000 additional items

Additional Common Accessories (not provided by Airspan)
Cable ties

3.2.3 Power Supply

AirHarmony-1000 supports direct connection to DC power source (-48V DC):

- Operational Voltage Range: -40.5 to -57 VDC
- Transient Voltage: +150V (ETR283)

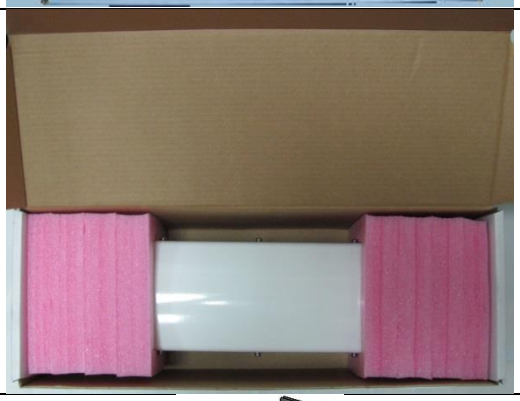
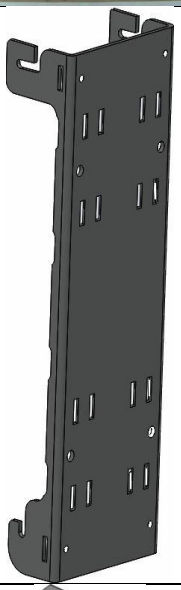
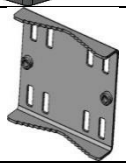
AC power feed is also available, using an AC/DC power converter offered by Airspan.

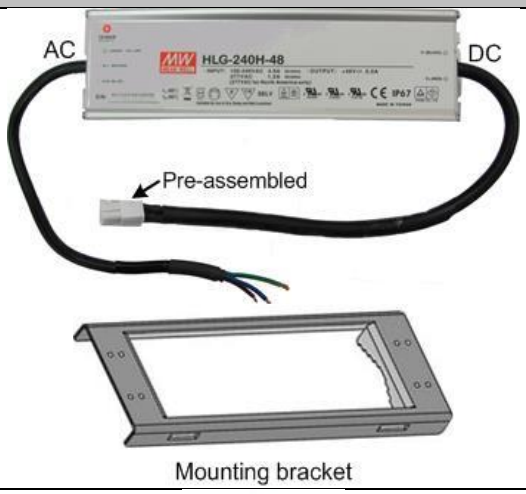
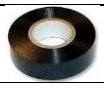
3.2.4 Verify Components

The following figures display various AirHarmony-1000 components and accessory kits.

Note: AirHarmony-1000 variants with front mounted, Sunshield (pending) and Switched Beam (pending) antenna come factory pre-assembled. Verify order and requirements to ensure the correct unit type is being installed.

Table 10: AirHarmony-1000 Components

Parts	Images
AirHarmony-1000 Unit (with front mounted antenna) in typical packing box HAR10-FM-U40-B01D	
AirHarmony-1000 Unit (with Sunshield) in typical packing box (Pending) HAR10-CN-U40-B01D	
Universal mounting plate HAR10-U-PMK-1	
Pole Clamps X 2 (included in above)	

Parts	Images
AC/DC Outdoor Power Converter Kit - HAR10-ACDC-KIT-OD-1 Kit includes: ▪ PSU (shown) ▪ Mounting bracket + hardware ▪ Circular connectors (male & female) Serratub Maxi Clamp (2)	
GPS antenna - GPS-ANT-2	
AC cable (3x18AWG)	
Outer Fiber Cables (ASX Optical cables in 8 available lengths)	
Ground cable with grounding lug (**Note** that the cable is ordered per meter and the lug is ordered separately. Crimping is done by the user)	
PVC Insulation tape	
Self-Amalgamating Tape	

AirHarmony-1000 is shown below from the Ethernet termination and RF port end views respectively. Copper Ethernet connection is currently unsupported.

Figure 4: AirHarmony-1000 Unit, bottom termination

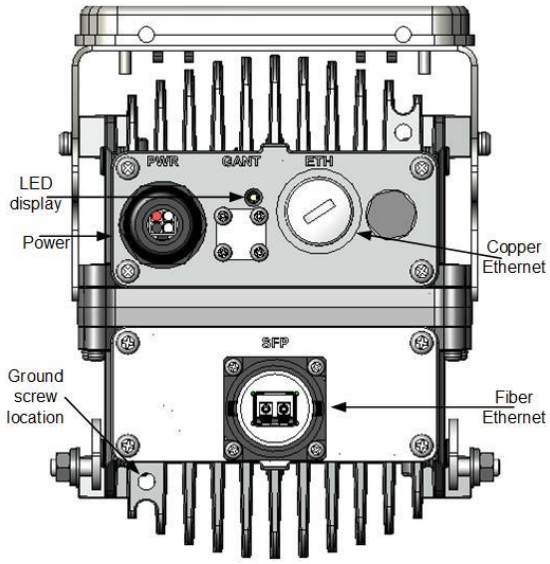
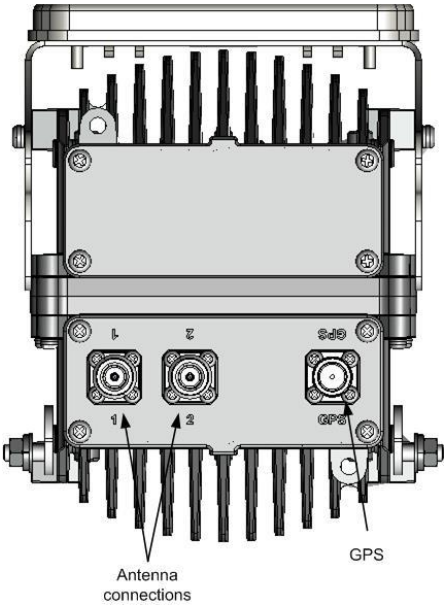


Figure 5: AirHarmony-1000 Unit, Top, RF ports



3.2.5 Physical Dimensions

AirHarmony-1000 is in an all outdoor enclosure.

Table 11. AirHarmony-1000 Physical Dimensions

Variant	Dimensions (H x W x D)	Comment
Initial Deliveries - Front Mount (**only**)		

Variant	Dimensions (H x W x D)	Comment
Front Mount Antenna	549 x 142 x 228 mm / 21.6 x 5.6 x 9.0 in.	The physical dimensions exclude connectors
Future Deliveries		
Connectorized (with sunshield) (pending)	549 x 142 x 203 mm / 21.6 x 5.6 x 8.0 in.	The physical dimensions exclude connectors
SBA (with sunshield) (pending)	770 x 142 x 203 mm / 30.3 x 5.6 x 8.0 in.	
Weight		
Main unit (Connectorized)	11 kg (24.25 lb)	
Universal mounting bracket (Including pole straps)	925 g (2.04 lb)	
Sun-shield	575 g (1.27 lb)	
Front mount antenna & plate	1.35 kg (2.98 lb)	
SBA Antenna	1 Kg (2.20 lb) (pending)	

3.2.6 Environmental

Note: AirHarmony-1000 is not meant to be used in a Marine environment.

AirHarmony 1000 meets the following environmental requirements:

- ETSI EN 300-019-1-4 Operational (non-weather protected equipment)
- ETSI EN 300-019-1-1 Storage (weather protected, not temperature controlled locations)
- ETSI EN 300-019-1-2 Transportation

Table 12. AirHarmony 1000 Environment Compliance

Type	Details	Standard Compliance
Operating temperature	-40°C to 55°C	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 4000m @ 30°C	ETSI 300 019 1-4
Solar radiation	1120 W/m2	ETSI 300 019 1-4

4 Before Installation of AirHarmony-1000

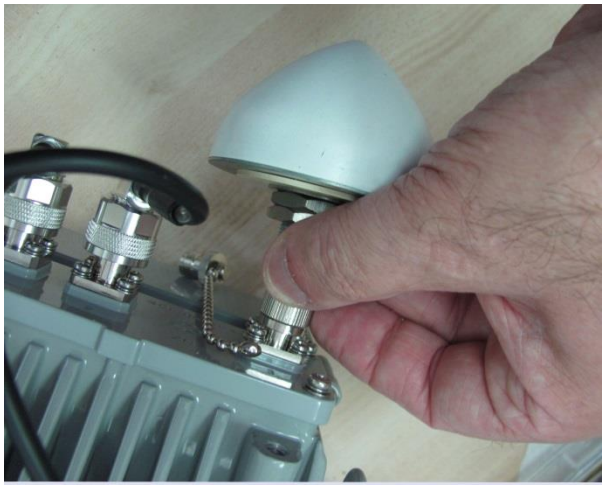
Prior to installation of the AirHarmony either on a pole or a wall the GPS antenna should be connected and the all antenna connections should be weather-proofed.

4.1 Connection of GPS Antenna

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

1. Remove the protective dust cap from the GPS antenna jack prior to mounting on the AirHarmony-1000.
2. Align the GPS jack with the plug attached to the top panel on the AirHarmony-1000.
3. 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 the antenna connections both the GPS connection and the RF connections.

4.2 Weather-proofing of 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: It is good practice to weather-proof the antenna connections both the GPS connection and the RF connections.

The RF connectors on the Front Mount Antenna variant arrive pre-connected. Weather-proofing is best done at this stage to give easier access to the connections.

1. Verify a secure connection of the RF cable between the antenna and the appropriate RF connection on the top of the unit.

Figure 7: Verify connection of RF cable

Caution: Do not over-tighten the RF connector. RF failures can result when the RF connector is over-tightened.

Figure 8: Weather-proof the connection

2. Weather-proofing of the connections is mandatory. This is done with a layer of self-amalgamating tape followed by an over layer of PVC tape. Both the self-amalgamating tape and the PVC tape are available from Airspan.
3. Verify the RF connector is completely weather-proof.

5 Installing AirHarmony-1000

Install the AirHarmony-1000 eNodeB by pole mount or wall mount. AirHarmony-1000 is mounted on a pole or wall with its pre-installed antenna (front mount or SBA variants (pending)) or in close proximity to its external antenna (connectorized variant). Take care to install the mounting plate the correct way up. This is with the slot openings in the bracket at the top edges as shown below.

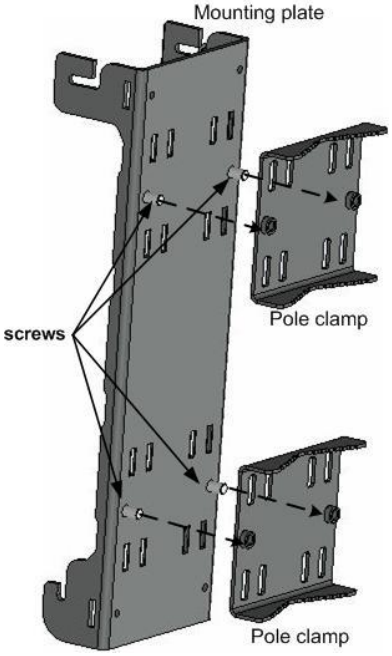
Caution: Proper local rigging and hoisting practices should be followed when installing the AirHarmony-1000.

5.1 Pole Mount Assembly

The following images show the pole mount assembly.

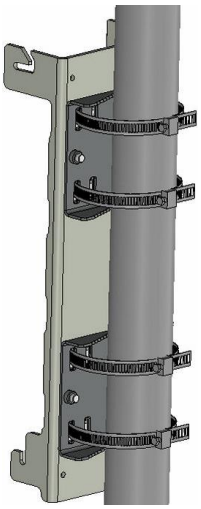
1. Prepare the mounting plate by assembling the pole clamps in the provided threaded holes with the provided M8X20 Hex Cap screws.

Figure 9: Pole mounting assembly preparation



2. Insert the clamp straps through the slots in the mounting plate passing them through the pole clamps.

Figure 10: Mounting plate on pole



3. Position mounting plate on the pole with slots facing up.
4. Feed clamp bands through the quick release locking mechanisms and wrap around pole.

Figure 11: Assemble clamp bands (4 required)

5. Wrap the band to properly fit on the pole. Press down locking mechanism with band excess fed through the mechanism.

Figure 12: Press down locking mechanism

6. Align and position each of the 4 pole clamps. Tighten the clamp bands with large flat screwdriver in place.

Figure 13: Tighten clamp bands

7. Mounting plate is installed and ready for AirHarmony-1000 mounting.

Figure 14: Pole mounting – exploded view

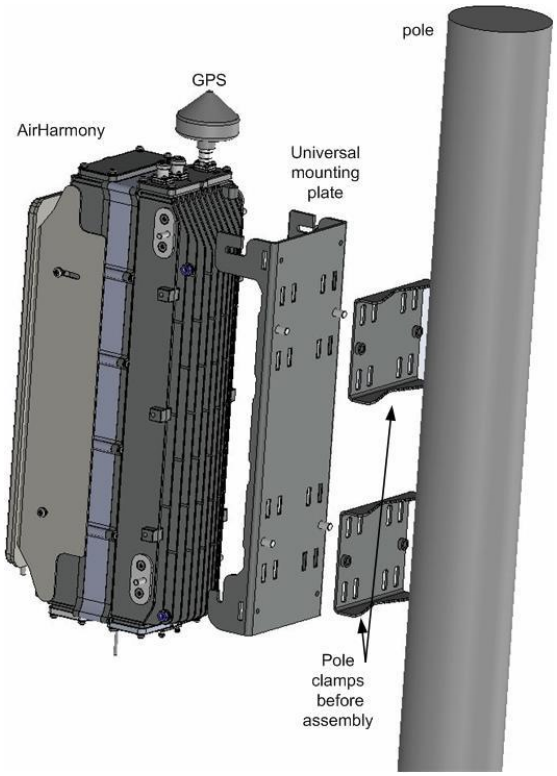
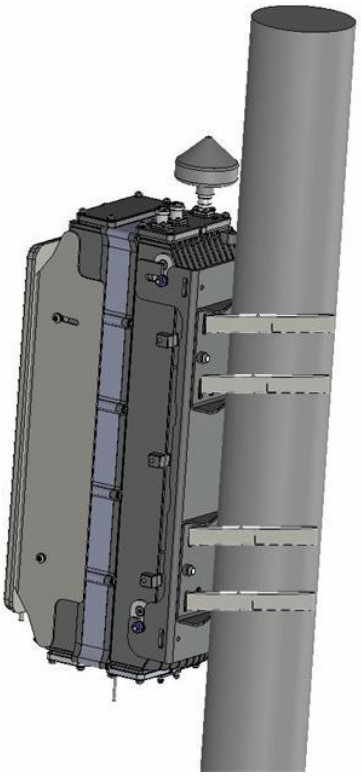


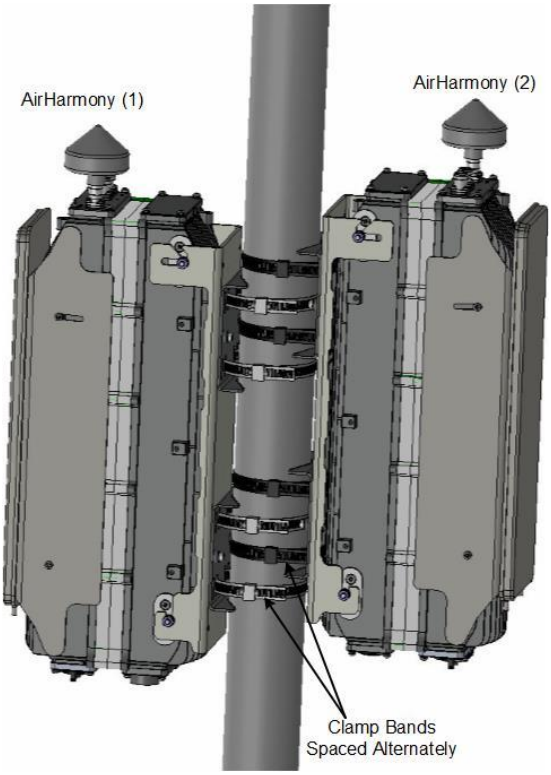
Figure 15: Mounted on pole



5.1.1 Installing AirHarmony-1000 Back-to-Back

In the event you want to deploy two (2) AirHarmony-1000(s) on the same pole – back-to-back, then the installation must be performed so that the clamp bands used to secure the units to the pole do not interfere with the clamp bands of the other unit. Each unit is installed separately as explained above in Installing AirHarmony-1000. The clamp bands are installed with a small deviation to each other as displayed below:

Figure 16: Back-2-Back Assembly



The difference in height between the installed units after installation will be 40mm.

Note: The Universal Mounting plate for each AirHarmony-1000 must be mounted on the pole prior to assembling the AirHarmony-1000 units.

Assemble each unit's AC/DC Converter as explained in AC/DC Converter Pole Mount Assembly with the same deviation of the clamp bands.

5.2 Wall Mount Assembly

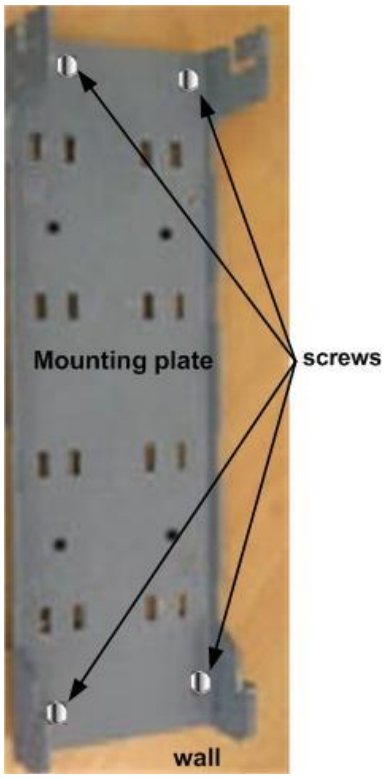
The following images show the wall mount assembly.

1. Position mounting plate against the wall with slots facing up. Be sure to position the wall mounting plate straight with **level mounting** to ensure the unit sits evenly.

Figure 17: Positioning wall mounting plate

2. Mark the wall through the holes on the wall mount at the required height.
3. Attach the mounting plate to the wall using wall plugs (x4) rated for at least 8-10 Kg per fastener.

Figure 18: Wall mounting plate fastened on wall



Note: Wall plugs (x4) and necessary hardware are **not** supplied by Airspan and are the responsibility of the installer. Recommended minimum 8mm dia. with appropriate wall plugs according to field conditions.

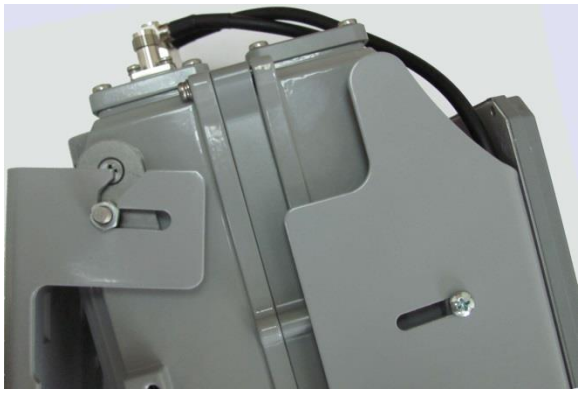
5.3 Securing AirHarmony-1000 to the Mounting Plate

Note: The following procedure shown with the Front-Mount antenna variant as shown below.

To mount AirHarmony-1000 to the mounting plate, perform the following:

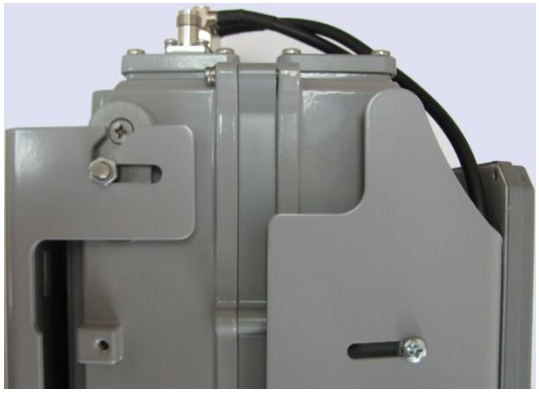
1. Loosely fit the flange nuts on the studs protruding from the sides of the unit.

Figure 19: Lift unit to top of mounting plate



2. Hook the studs into the top slots of the mounting plate.

Figure 20: unit engages into slots on the top of mounting plate



3. With the studs engaged in the top slots raise the unit slightly until the bottom studs also drop into their respective slots.

Figure 21: AirHarmony-1000 unit engaged into the bottom slots

4. Tighten the flange nuts (4 places) to the required degree of down-tilt.
5. Check and tighten all flange nuts.

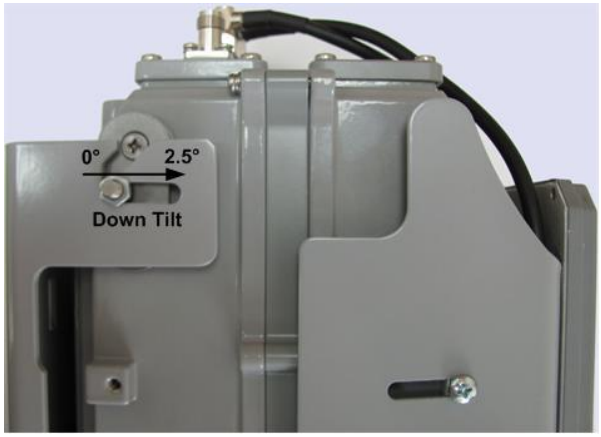
5.4 Front Mount Antenna Tilt Adjustment

On the Front Mount Antenna variant it is possible, after assembly to adjust the front mounted antenna tilt-down. There are adjustment slots located on the sides of unit body and on the sides of the front mounted antenna mounting plate.

Note: Combined tilt adjustment of both the unit body and the antenna yield a maximum down-tilt of 7.5°. The antenna has an electrical fixed down-tilt of 1°.

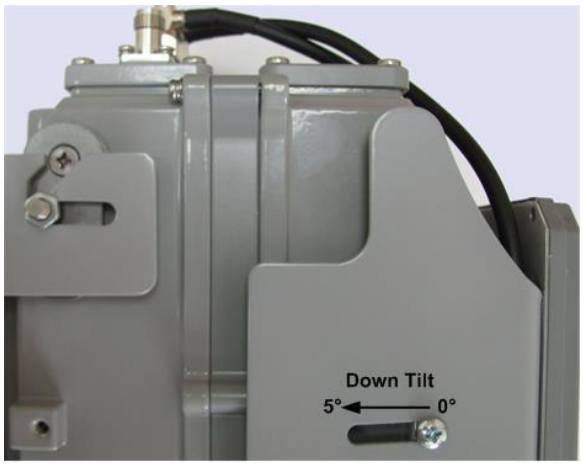
1. Slightly loosen the upper flange nuts (2) where the unit is fixed to the wall/pole mounting bracket.

Figure 22: Tilt adjustment body



2. Slightly loosen the upper screws (2) where the front mount antenna is fixed to the unit.

Figure 23: Tilt adjustment antenna



3. After adjusting to the required tilt amount tighten both flange nuts and both screws. The antenna has an electrical fixed down-tilt of 1°.

5.5 LED Display

A single tri-color LED (Green/Red/Orange) appears at the bottom of the unit, providing unit status indication. When powering up refer to the following table for indication of current status:

Table 13: LED display

Name	Color	Status	Description
Powering Up	Orange	On Continuously	Till the SW starts loading
Software loading	Green	Blinking (3Hz)	While SW is loading
Normal Operation	Green	On Continuously	Normal operation (no alarm)
Major Alarm	Red	Blinking (3Hz)	Service **not** affected
Critical Alarm or Sector OOS	Red	On Continuously	

5.6 Connecting the Ground Cable

Connect the ground cable after attaching the grounding lug (optionally supplied by Airspan – CBL-GND-1M-1 and CON-LUG-GND-1) to the M6 threaded connection on the bottom of the main body casting.

Note: Cutting the Ground cable to the required length and crimping the grounding lug is performed by the Installer.

Note: The ground cable is available per meter. The lug can also be used for securing the ground cable to the other side.

Note: The ground surface is bare metal and needs no preparation.

Note: Prior to insertion apply No-Ox or other approved anti-oxidation agent.

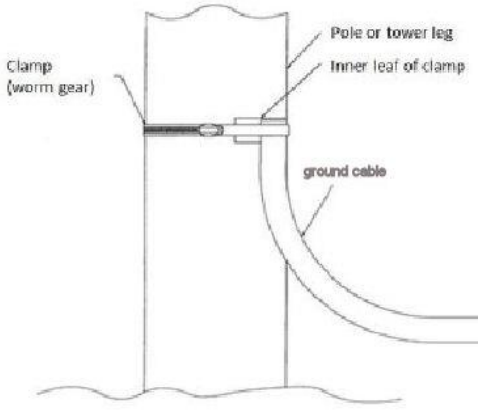
This ground cable should be connected to a protection ground bar or clamped directly to a steel structure. A direct earth ground connection is required for the surge protection devices inside the AirHarmony-1000 to be effective.

1. Remove grounding screw and slip the ring terminal end of the ground cable onto the screw prior to re-setting into the threaded hole.

Figure 24: Attaching ground cable to AirHarmony-1000

2. Connect the ground cable to the protection ground bar using suitable crimp lugs. Alternatively use a clamp to bond the ground cable to the mounting pole or to the tower structure.

Figure 25: attach ground cable to pole (example)



Note: Above drawing is for illustration only – use locally approved method for grounding.

Note: For wood pole installations, a 5/8" x 8' ground rod should be installed immediately adjacent to the wood pole and the #6 AWG stranded conductor extended down to the ground rod and connected using and approved method (Exothermic or split bolt).

Note: When installing a protection ground take care to use suitable metal combinations to avoid or minimize galvanic corrosion.

5.7 Installing AC/DC Converter

The AC/DC power converter kit can be optionally supplied by Airspan.

The kit includes the following:

- AC/DC power converter with cables on both AC and DC side. The DC side comes pre-connected to the AirHarmony-1000 DC plug and the AC side arrives with 3 bare wires.
- Waterproof cable joiner to connect the AC side with the AC cable
- Mounting bracket for pole mounting of AC/DC converter

The AC/DC Converter can be mounted on a pole (with the supplied mounting bracket) or on a wall. The AC/DC Converter should be mounted in close proximity to the AirHarmony-1000 so as to facilitate the proper connection.

5.7.1 AC/DC Converter Pole Mount Assembly

The following images show the pole mount assembly.

1. Insert the clamp straps through the slots in the mounting bracket.
2. Position mounting bracket on the pole with notched edges towards the pole.
3. Feed clamp bands through the quick release locking mechanisms and wrap around pole.

Figure 26: Assemble clamp bands (2 required)

4. Wrap the band to properly fit on the pole. Press down locking mechanism with band excess fed through the mechanism.

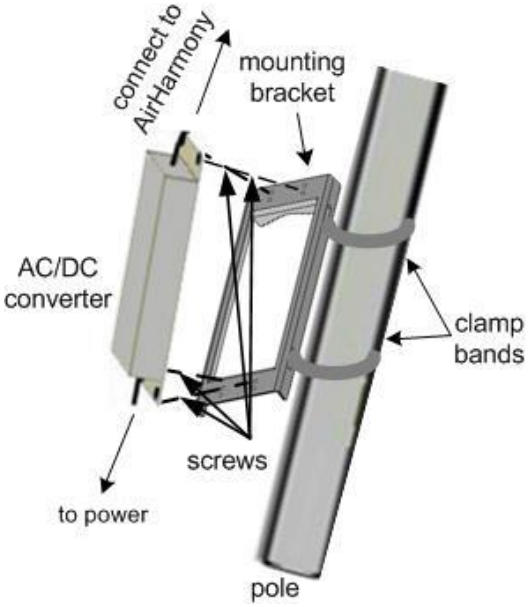
Figure 27: Press down locking mechanism

5. Align and position each of the 2 clamps. Tighten the clamp bands with large flat screwdriver in place.

Figure 28: Tighten clamp bands

6. Mounting bracket is installed and ready for AC/DC Converter mounting.
7. Align the 4 mounting slots located on the flange of the AC/DC Converter with the 4 threaded holes on the mounting bracket.
8. Insert the 4 pan head screws (supplied) and tighten.

Figure 29: Pole mounting – exploded view



5.7.2 AC/DC Converter Wall Mount Assembly

The following images show the wall mount assembly. The converter can be fastened directly to a wall utilizing the holes on the unit body (4 places).

Note: For the wall mount assembly the mounting bracket is **not** required.

Note: The AC/DC converter can be mounted horizontally if required.

1. Position AC/DC Converter against the wall in close proximity to the AirHarmony-1000 so as to facilitate the proper connection.
2. Mark the wall through the holes on the AC/DC Converter at the required height.
3. Attach the AC/DC Converter to the wall using screws and wall plugs (x4) rated for at least 8-10 Kg per fastener.

Figure 30: Wall mount – exploded view

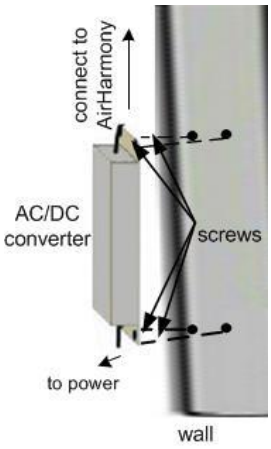


Figure 31: Wall mount

Note: Wall plugs (x4) and necessary hardware are **not** supplied by Airspan and are the responsibility of the installer. Recommended minimum 8mm dia. with appropriate wall plugs according to field conditions.

6 Cable Connections

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***.

6.1 Connecting the AC/DC Power Converter to AirHarmony-1000

The DC Connector comes pre-assembled on the AC/DC Converter, as shown below:

Figure 32: AC/DC Converter with DC power connector

6.1.1 Power Cable Preparation

The Power cable is connected to the AirHarmony-1000 using a Gland connector assembled on the bottom panel of the unit.

1. Remove the connector by unscrewing the body from the AirHarmony-1000, using the Gland wrench.
2. Pass the pre-assembled connector through the tail nut, gland seal, body and rubber seal of the connector casing as shown below. Do not tighten the tail nut.

Figure 33: DC Power connector pre-assembled on converter

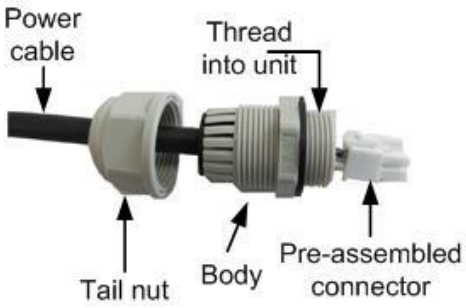
Note The connector is attached inside the weather protected area of the enclosure and is not subjected to water/moisture therefore the use of die-electric gels is not required.

3. Connect the DC power cable connector to the female connector outlet inside the unit.

Figure 34: Power connection - on bottom panel of AirHarmony-1000

4. Screw the gland connector plug securely into the body cavity of the unit using the provided Gland wrench.
5. Tighten the tail nut on to the body forcing the seal to compress around the power cable using the (provided) Gland wrench.

Figure 35: Power cable assembly



Caution: Do not over tighten the gland connector or the tail nut. The gland nut should be tightened to a torque of no more than 3.3 Nm (2.43 lb-ft) max.

Note: When securing the cable verify 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.

Figure 36: Power cable attached to AirHarmony-1000

6.2 Wiring AC Power Cable on the AC/DC Converter

Advice: It is good practice to label both ends of the cable to identify which AirHarmony-1000 unit it is connected to.

Advice: 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.

Note: This is a waterproof connection therefore the use of die-electric gels is not required.

The power cable is available in various lengths as required.

Figure 37: Waterproof connector exploded view

1. Route and bring the unterminated end of the AC power cable to the location of the AC/DC converter.
2. Strip back and remove the outer sheath to expose the inner brown, blue and green insulated wires to a length of 3cm (1.18 in). Then strip back 6mm (0.24 in) of the inner core insulation.

Figure 38: AC power cable preparation

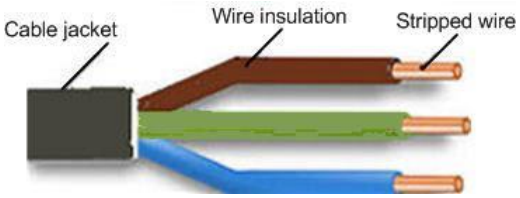


Figure 39: Waterproof connector separated

3. Thread the prepared cable end through the gland, washer, sealing ring and body of the connector.

Figure 40: Connector on cable

4. Secure the prepared ends of the cable into the head part of the connector.

5. Secure the prepared ends of the power cable into the head part of the connector (male part with visible pins).

Figure 41: Secure cable to connector

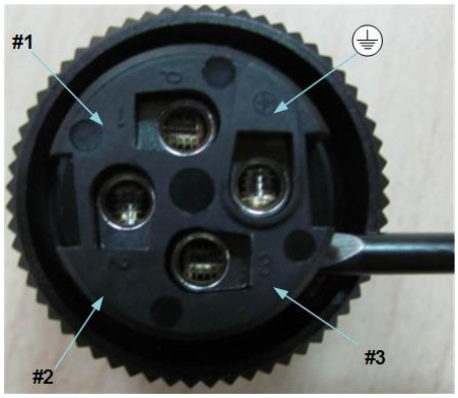
6. Insert and secure the **brown** wire into position **1** and the **blue** wire into position **2** and **green** wire into position ⏚ (earth ground).

Figure 42: Power cable wires assembled

Note: Individual connection numbers are marked on each part of the connector.

Note: Set screw maximum recommended tightening torque of 0,3 Nm.

Figure 43: Numbered connector contacts



7. Assemble the parts of the connector and tighten the gland to provide a waterproof seal.

Figure 44: Assemble and tighten

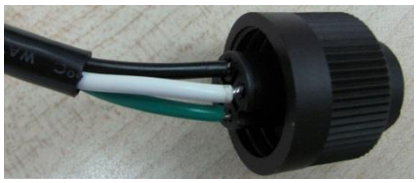
6.3 Wiring AC Power Input Cable

1. Cut the AC power cable to the required length.
2. Prepare the ends of the AC/DC converter cable and thread the connector parts over the cable.
3. Secure the prepared ends of the drop cable into the head part of the connector (female part).

Figure 45: AC/DC converter cable connector assembly

4. Insert and secure the **white** wire into position **1** and the **black** wire into position **2** and **green** wire into position ⏚ (earth ground).

Figure 46: AC/DC converter wires assembled



5. Assemble the parts of the connector and tighten the gland to provide a waterproof seal.

Figure 47: Assemble and tighten

6. Fasten the 2 parts of the connector together and tighten to make a waterproof seal.
7. 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 48: Connector assembled and tightened

6.4 Fiber Ethernet (SFP) Cable Installation

The Fiber Ethernet Small form-factor pluggable transceiver (SFP) must be connected to the AirHarmony -1000 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.

The Outdoor fiber cable is available in 8 different lengths from 10m to 200m.

Note: Airspan recommends to test the fibers prior to installation (using FOA's standard testing industry standards).

Note: Airspan recommends to clean the fibers according to standard procedure (using FOA's cleaning guidance).

6.4.1 SFP Cable Connection

Figure 49: 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 50: 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 51: 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 52: Slide over and click

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

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

6.5 Copper Ethernet Cable Installation

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

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.

6.5.1 Hardware Requirements

The following are the cable and connectors available from Airspan.

Table 14: Hardware

Airspan Part Number	Description
CAT5e-STP-305M-R	CAT5e Ethernet Cable, 305M (1000ft), STP, Reel
RJ45-ETH-SHLD-CONN	RJ45 Ethernet Connector, Shielded

6.5.2 Tool Requirements

Table 15: Tools

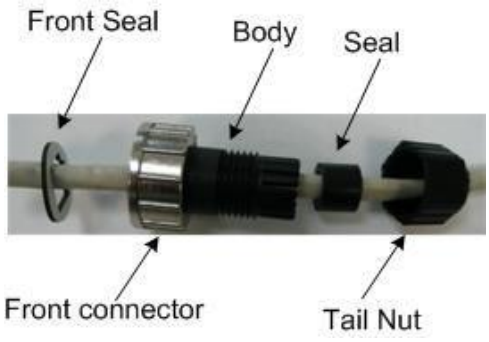
Tool	Recommended (or equivalent)	Image (examples)
Wire Cutters/snips	Standard	
CAT5e Jacket Strippers	Fluke Networks UTP/STP Adjustable Cable Stripper and Cutter – Model # - 11230002	
RJ45 Crimping Tool	Fluke Networks Modular Crimper RJ45 - Model # - 11212530	
Ethernet Cable Tester	Standard	

6.5.3 Assembly Instructions

In order to properly assemble the Ethernet cable follow the steps listed below:

1. Unroll the required length of Ethernet cable (CAT5e) and add a little extra wire, just in case.
2. Cut the required length of the cable.
3. Prior to stripping, pass the cable thru the tail nut, seal, body, front connector, and front seal (self-stick) of the connector casing.

Figure 53: Ethernet cable thru connector

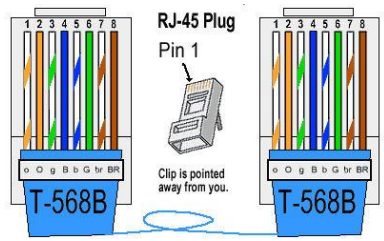


4. Peal and stick the front seal on the collar of the connector body.
5. Carefully strip the outer sheath insulation back 1- 2 inches using the Jacket strippers. Roll back the foil shield insulation and the drain wire. Do not remove any insulation from the conductors.

Figure 54: Ethernet cable stripped

6. Untwist the pairs to within 1/8" of the jacket. Arrange the wires according to TIA/EIA 568B standards. Flatten and align the wires.

Figure 55: RJ45 wire positioning



7. Make one straight cut across all the wires, with the wire snips.

Figure 56: cable trimmed

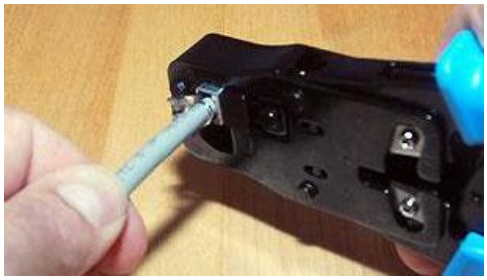
8. Hold the connector in front of you with the locking tab down. Orient the wires so connector Pin 1 aligns with cable Pin 1, etc.
9. Grip the wires and sheath between thumb and forefinger to hold them together.
10. Gently slide the wires into the RJ45 plug until they begin to “track” into the inner channels of the plug.

Figure 57: RJ45 plug assembly

11. Push the wires all the way into the RJ45 connector until the front of the wires butt against the front of the connector (inside). Visually inspect to verify that the wires are fully inserted.

12. Insert cable/connector assembly into the crimping tool and crimp until all pins are set and the ratchet lever is released.

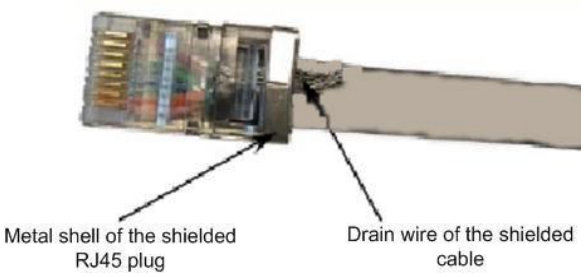
Figure 58: RJ45 crimping



Note: All pins should be fully compressed and of equal height after crimping.

13. Place the drain wire of the cable thru the metal shell of the shielded plug.
14. Crimp the drain wire to the metal shell of the shielded plug with the crimping tool.

Figure 59: Crimped cable



15. Seat the RJ45 connector plug securely into the body cavity.
16. With an Ethernet cable tester, test to verify the proper connectivity of the cable.
17. Tighten the tail nut on to the body forcing the seal to compress around the cable.

Figure 60: RJ45 assembled

7 Additional Installations (Non-Standard)

7.1 Front Antenna Assembly

Note: The following section is included for **spare-parts** or **replacement** assembly instructions as front mounted antenna variants come factory pre-assembled.

The AirHarmony-1000 unit can be used either with a sector antenna mounted directly on the front or with a remotely attached antenna. The following describes the installation procedure for the front mounted antenna.

For installation of a remotely mounted antenna follow the antenna manufacturer's instructions and connect the antenna to the AirHarmony-1000 using the appropriate cables. (Weather-proofed N-type Heliax RF cables (ordered separately).

Note: When a front mounted antenna is not attached to the unit (remote antenna) a Sunshield should be attached. Variants utilizing remotely attached antennas come factory pre-assembled with a sunshield.

To mount the front antenna, perform the following:

1. Fit the antenna to the (antenna) mounting plate. The four (4) studs on the back of the antenna pass through the front face of the mounting plate and are secured with the 4 sets of M4 nuts and washers (flat and split) included in the kit. Carefully position the lead RF cables and secure them in place to the eyelets on the back of the mounting plate with the provided cable ties. The cables are formed with a cross-over at the bottom.

Note: It is recommended to place some packing material under the unit while assembling to protect it from scratches.

2. Attach the assembled front mounted antenna with the bracket to the AirHarmony-1000 unit using the M5 SEMs (2 on each side) and connect the RF cables to the N type RF ports on the top of the AirHarmony-1000.

Note: The plate is mounted with the side slots towards the top so that the required tilt-down can be set.

Figure 61: Attaching front mount antenna assembly to AirHarmony-1000

7.2 Connecting RF Jumper Cables to External Antenna

Note: Variants utilizing remotely attached antennas are factory pre-assembled with a sunshield.

For installation of a remotely mounted antenna follow the antenna manufacturer's instructions and connect the antenna to the AirHarmony-1000 using the appropriate cables. (Weather-proofed N-type Heliax RF cables (ordered separately).

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

Figure 62: Connecting RF cable

Caution: Do not over-tighten the RF connector. RF failures can result when the RF connector is over-tightened.

Figure 63: Weather-proof the connection

2. Weather-proofing of the RF N type connections is recommended. This is done with a layer of self-amalgamating tape followed by an over layer of PVC tape.

Verify the RF connector is completely weather-sealed.

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-1000 installation.

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-1000 unit ○ Mounting bracket and pole clamps ○ AC/DC converter ○ GPS Antenna ○ Self-amalgamating tape ○ Black PVC tape ○ Weather-proofing of the connections with a layer of self-amalgamating tape followed by an over layer of PVC tape. ○ SFP cable assembly
Tool Requirements (For further information, see Verify the Tools.)
○ Large flat screw driver for pole clamps ○ Small flat blade screw driver (insulated shaft recommended) ○ Medium Philips head screw driver ○ 13mm wrench or small pipe wrench ○ 10mm wrench for unit mounting flange nuts ○ Knife ○ pliers ○ Small side cutters ○ Tweezers (or fine blade long nose pliers) ○ Wire strippers ○ Tilt-meter
Required Ancillary Equipment
○ Laptop PC for initial configuration ○ cable for temporary connection of the lap top

B Checklist

During installation, review and perform all the steps on this checklist (in the given order). This checklist is meant for the person who performs the AirHarmony-1000 installation. It includes the high–level steps involved in the installation process.

Tip: To make sure you complete all the tasks, detach or print this checklist and use it as a job aid. After performing, check off each task.

Procedure	Action	Check If Performed
Verify the prerequisites	Verify the site requirements.	☐
	Verify the installation requirements.	☐
	Verify the tool requirements.	☐
	Verify the parts & kits required.	☐
AirHarmony-1000 installation	Install the mounting bracket.	☐
	Install AC/DC converter on mounting bracket (if required)	☐
	Install AirHarmony-1000 on the mounting bracket.	☐
Connect & manage Cables	Connect to copper Ethernet (if applicable)	☐
	Connect the fiber Ethernet (if applicable)	☐
Connect power system	Connect power	☐

C Abbreviations

Term	Expansion
3GPP	3rd Generation Partnership Project, responsible for LTE
ABS	Almost Blank Subframe
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

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
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
WEEE	Waste Electrical and Electronic Equipment