SYN-UG-007 Rev 1

AirSynergy Equipment Installation Guide

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1 About This Guide

This section discusses the purpose, intended audience, conventions, referenced documentation and organisation for this guide.

1.1 Purpose

This guide provides the workflow and step-by-step procedures for Installation of the AirSynergy equipment. These procedures include:

- Verify Prerequisites
- Install the AirSynergy Radio equipment
- Install the PSU equipment
- Connect and manage cables

1.2 Intended Audience

This guide is intended for persons who are responsible for installing the AirSynergy equipment. These persons should have a working knowledge of the equipment.

1.3 Conventions

This document uses the following informational conventions.

Icon	Description
	Checkpoint: Marks a point in the workflow where there may be an exit or branch to some other procedure. At each ***Checkpoint*** the reason for an exit or branch is given along with specific directions to locate the entry point in the other procedure.
	Reference: Gives a resource in the workflow that may be needed to complete a procedure along with specific directions to use the resource.
	Caution: Describes a possible risk and how to lessen or avoid the risk.
	Advice: Provides a recommendation based on best practice.
	Note: Provides useful information.

1.4 Organisation of this Guide

This guide is organised into the following Sections:

- About this Guide
- Introduction
- Get Started
- Verify Prerequisites
- Install the AirSynergy Radio equipment
- Install the PSU equipment
- Connect and manage cables
- Appendixes

2 Introduction

This section provides a descriptive overview of the product.

2.1 General Overview

AirSynergy equipment comes in a range of frequency variants that can be mounted with different antenna options

Figure 1 – Typical AirSynergy with sun shield mounted on street pole

2.1.1 Sector Antenna arrangement

A typical sector installation will have a cross- polar sector antenna fitted directly to the front of the AirSynergy main unit. (This is fitted instead of the sun-shield).

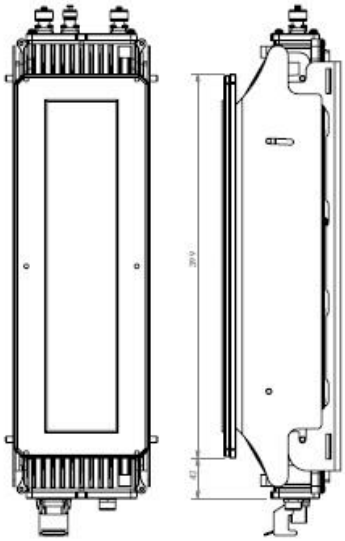

Figure 2 – AirSynergy with front sector antenna fitted

3 Get Started

3.1 Workflow of Installation

The workflow required to install the AirSynergy equipment is shown in the following diagram:

Figure 2 – Workflow of AirSynergy Installation

3.2 Installation Checklist

Plan the installation of the AirSynergy Unit by using the Installation Checklist in Appendix A.

4 Verify Prerequisites

4.1 Verify Site Requirements

To set up the AirSynergy for connection to Netspan, a PC will be required.

4.2 Verify Safety Requirements

Read and follow all warning notices and instructions marked on the product or included in this manual.

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.

Ascertain the radiation hazards when working in an environment close to other antennas and Electromagnetic fields, e.g. working on towers with other microwave transmitters etc. and act accordingly.

4.2.1 Warn 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 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.

Caution: Any modifications to this device not expressly authorised by the manufacturer could void the users' authority to operate this device.

4.2.2 Adhere to European Directive 1999/519/EC

European Directive 1999/519/EC details basic restrictions and reference levels on human exposure to electromagnetic fields as advised by the ICNIRP. The directive states that 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 such fields.

4.3 Verify Installation Requirements

4.3.1 Verify the Tools

Table 1 - AirSynergy installation tools

Tools
Small flat blade Screwdriver
Large Flat Bladed Screwdriver
20mm wrench or small Pipe wrench
10mm wrench
Wire strippers
Wire cutters
Small cross-head screwdriver
Ring terminals crimp tool
Tilt-meter (if accurate downtilt needs to be set)
Krone punch-down tool

4.3.2 Verify the Parts and Kits

Table 2 – AirSynergy installation parts and kits

Installation Kit / Part:	Installation Kit details	Note:
AirSynergy mounting	1 x AirSynergy Universal Mounting Plate	
	1 x Sun Shield	
	1 x Sector Antenna mounting plate with fixing kit	4 M4 nuts 4 M4 flat washers 4 M4 spring washers 4 M5 SEMs
	1 x Sector Antenna (front mounting)	

Connecting cables	CAT5e	External grade 25m with Weather hood pre-fitted
	Earthing cable	M6 Lug at each end

Table 3 - AirSynergy additional items

Additional items (not provided by Airspan)
Cable ties
Self amalgamating tape
Black PVC tape
Ring terminal for earth strap, M6
Earth strap cable (4mm), yellow and green cable

Table 4 – Antenna and feeder kits

Installation Kit / Part	Note
Antenna / Feeder (not always provided by Airspan)	Antenna and feeder
	Short feeder tail length of 0.5 to 1.5m x2

Table 5 - AirSynergy additional items

Additional items (not provided by Airspan)
Cable ties
Self-amalgamating tape
Black PVC tape
Ring terminal for earth strap, M6
Earth strap cable (4mm), yellow and green cable

4.3.3

4.3.4 Verify Components

AirSynergy

- AirSynergy connectorised unit

Figure 3 – AirSynergy connectorised unit with sunshield

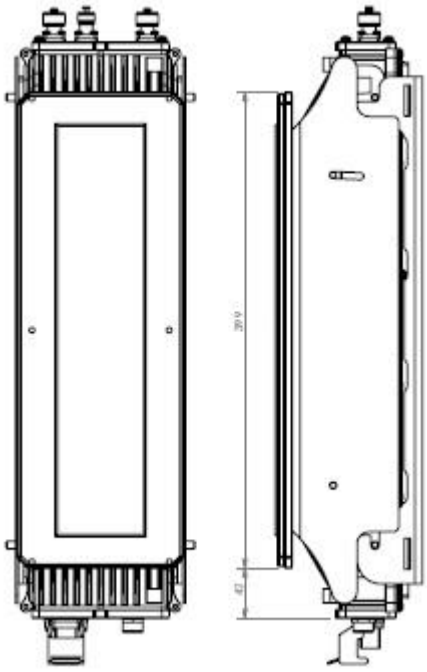

Figure 4 – AirSynergy unit with front sector antenna fitted

5 Install the AirSynergy mounting plate

5.1 Mount the AirSynergy Universal Mounting Plate

The AirSynergy is normally mounted on a pole (in close proximity to its external antenna if not using the AirSynergy front mounted Antenna. Take care to install the mounting plate the correct way up so that the AirSynergy unit will fit with the PoE connector pointing downwards.

Figure 5 – AirSynergy mounting plate and fixings

Figure 6 – Feed clamp bands through the quick release locking mechanisms

Figure 7 – Press down the locking mechanism with the slack band fed through

Figure 8 – Tighten clamps with large flat blade screwdriver

Figure 7 – AirSynergy mounting plate installed (large diameter concrete pole)

6 Fit Front sector antenna to AirSynergy

The AirSynergy unit can be used either with a sector antenna mounted directly on the front or with a remotely attached RF antenna.

6.1 Mount Front antenna to the AirSynergy unit

To mount the front antenna , perform the following steps:

Add text here to describe the mounting of the antenna to the front mount plate, securing of the antenna cables with cable ties and the fitting of the antenna plus front mount plate to the front of the AirSynergy unit.

Figure 8 – AirSynergy front mount antenna and front mount plate

Figure 9 – Connecting the antenna RF cables

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

Weather-proofing of the RF N type connectors with weather-proofing tapes. (self amalgamating followed by a layer of balck PVC tape.

Figure 10 – AirSynergy Front mount antenna connections – applying self amalgamating tape

Apply a layer of self amalgamating tape and a layer of electrical tape to the weather-exposed RF connector.

Figure 12 – AirSynergy antenna connections – applying PVC tape

Ensure the RF connector is completely sealed from the weather.

Figure 13 – AirSynergy antenna with sealed RF connections

Note: It is recommended to place some cardboard or paper under the unit to protect it from scratching.

6.2 Secure AirSynergy and Antenna to pole mount plate

To mount the AirSynergy to the universal mounting plate, perform the following steps:

1. Hook the studs into the top slots of the mounting plate. With the studs engaged in the top slots raise the unit slightly until the bottom studs also drop into their respective slots. Secure the flange nuts (4 positions).

Figure 11 – Lift AirSynergy to top of pole-mount plate

Figure 5 – AirSynergy drops down into slots at the top of pole-mount plate

Figure 16 – Gently lift the AirSynergy body until the bottom studs engage in the bottom slots

Figure 17 – AirSynergy body engaged in the bottom slots

2. The slot arrangement at the top allow the AirSynergy and front mounted antenna to be down-tilted by a few degrees to provide real downtilt or to compensate for the taper angle on the pole. With the flange nuts gently hand tightened the position can be accurately set with tilt-meter on the front face of the AirSynergy unit.

Figure 12 – AirSynergy downtilt adjustment

3. The downtilt angles are not marked by the adjustment slots so a tiltmeter is required to set a specific angle and then tighten the flange nuts ith a 10mm wrench on each stud (4 positions)

Figure 13 – Tighten flange nuts (4 poitions) once the required mounting angle is set

4. There is an option to connect an earthing cable to the M6 screw fixing point at the bottom of the main body casting. This should be connected to a protection ground bar or directly to the steel structure of the power or pole. This is only required in areas of high lightning activity or when the AirSynergy unit is mounted on high exposed roofs or tower structures

5. Connect the earth cable to the protection earth bar using suitable crimp lugs. Alternatively use a TK series clamp to join the earth cable to the steel structure of the mounting pole or tower structure.

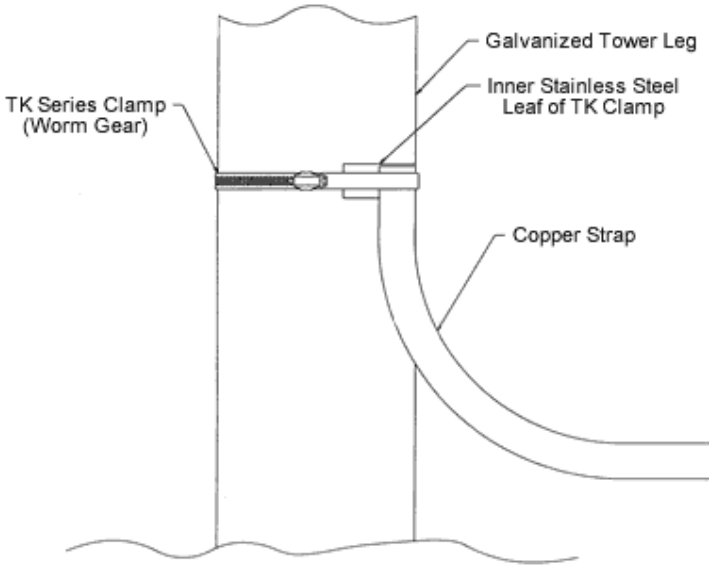

Figure 14 – AirSynergy attach earth cable to pole

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6.3 Install GPS Antenna

6.4 Install GPS antenna for AirSynergy

Note: AirSynergy units without a factory fitted Switching antenna all require a GPS antenna which comes in a kit with a mounting bracket and a 25cm cable. A prime consideration for a GPS antenna is a clear view of the sky, preferably 360 degrees

Install the GPS antenna bracket to the AirSynergy unit using the M6 threaded hole near the top of the main using the fixing. The GPS Antenna is secured to the GPS mounting bracket with large nuts supplied. The short RJ58 RF cable (TNC to TNC connections 25cm long) is fitted to the bottom of the GPS antenna and across to the TNC connection point on the top connection plate of the main unit

6.4.1 Mount the GPS Antenna

The GPS antenna bracket can be optionally mounted on a Pole up to 40mm (1.5"). The Antenna screws on to the 25m threaded tube.

To mount the GPS antenna, perform the following steps:

1. The RJ58 antenna cable is provided with a TNC connector attached at each end. Run the cable from the AirSynergy GPS receiver connection point to the location of the GPS antenna.
2. Thread the TNC connector cable through the threaded tube on the bracket and attach the TNC connector to the Antenna.
3. Connect the tube to the antenna by holding the antenna firm and rotating the bracket around the cable until the thread is fully engaged in the threaded part of the antenna.
4. Connect the bracket to the pole using the two U bolts and tightening with a 10mm spanner.

6.5 Connect PoE cable to the AirSynergy

Pull back the hinged protective dust cover and insert the PoE connector so that the RJ45 connector engages and the Amphenol hood locks into place with the hinged dust cover.

1. Cable and connect:
    - PoE (Power over Ethernet)
    - Protection Ground (An optional grounding cable should be used to connect the AirSynergy metal casting to a suitable grounding point on the tower.)

7 Connect to Power System

> ***Caution:*** **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***.

7.1 Connect PSU Output to PoE injector

7.2 Run cables from the PoE injector to the AirSynergy

a) Use this procedure to terminate the -54V DC supply into the PoE injector

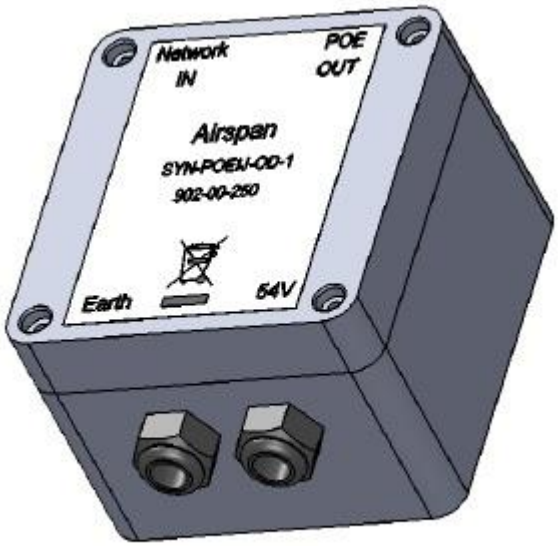

Figure 15 – AirSynergy power supply module and connection to the PoE injector

8 Appendix A

8.1 Review *Job Sheet*

The *Job Sheet* should include the following information:

- **Pole for installation identified**
- **Position on pole identified**
- **Pole access restrictions (highway regulations, other services on pole, power pole)**
- **Method of reaching pole positions (ladders, Elevated work platform)**
- **AC main fuseway available for PSU**
- **Configuration programming details known**
- **Point of connection for Ethernet (if applicable)**
- **All equipment items available at the installation site**
    - **Main AirSynergy unit**
    - **Mounting bracket and pole clamps**
    - **PSU**
    - **PoE injector (with fixing kit)**
    - **Ethernet cable assembly**
    - **GPS Antenna**
    - **GPS antenna installation kit**
    - **Front sector Antenna (if applicable)**
    - **Front sector Antenna mounting bracket ad fixing kit (if applicable)**
    - **External panel antenna (if applicable)**
    - **RF feeder cable tails (if applicable)**
- **Required tools**
    - **Large flat screw driver for pole clamps**
    - **Small flat screwdriver for PoE power terminations**
    - **Small cross-head screwdriver for PoE box lid and fixings for PoE injector and PSU**
    - **20mm wrench or small pipe wrench for RF connections**
    - **10mm wrench for main unit mounting flange nuts**
    - **Side cutters**
    - **Wire strippers**
    - **Krone punch down tool**
    - **Tilt meter to set antenna downtilts**
    - **Ring terminals crimp tool**
- **Required ancilliary equipment**
    - **Lap top PC for initial configuration**
    - **Ethernet cable for temporary connection of the lap top**
- **Other install materials**
    - **Self amalgamating**
    - **Black PVC tape**
    - **Cable ties**
    - **Labels**

- **Whether the system is required to be locked to a GPS timing reference**.

- **A BSID is required for each AirSynergy**. This should be in a format xxxxxx:xxxxxx where x is a decimal digit.

- **Network configuration information for the SDR blade**. This shall include the following information for the front panel and the backplane.
    - **IP Address:** Should only be set if Management IP Mode is set to Static IP Address. See below for Management IP Mode parameter.
    - **Netmask:** Should only be set if Management IP Mode is set to Static IP Address. See below for Management IP Mode parameter.
    - **Default Gateway:** Should only be set if Management IP Mode is set to Static IP Address. See below for Management IP Mode parameter.
    - **Management VLAN:** Specified as either Untagged or Tagged
    - **Management VLAN Tag:** Should only be set if Management VLAN is set to Tagged
    - **Management IP Mode:** Specified as Static IP Address or Obtain IP Address via DHCP
    - **Ethernet Mode:** Specified as Auto-negotiate or Fixed
    - **Ethernet Rate:** Need only be configured if Ethernet Mode is set to Fixed, specified as 10M or 100M.
    - **Ethernet Duplex:** Need only be configured if Ethernet Mode is set to Fixed, specified as Full or Half.
- **SNMP configuration information**. This will allow events from the BS to arrive at the specified Netspan server. This will include the following information:
    - **Read Only Community**: This should be specified to the same value as in Netspan Discovery Parameters (found under Server on Netspan's left hand panel).
    - **Read Write Community**: This should be specified to the same value as in Netspan Discovery Parameters (found under "Server" on Netspan's left hand panel).
    - **Community:** Normally specified to the same value as for Read Only Community.

9 Appendix C – Glossary of Terms

AAA	Authentication, Authorization and Accounting
ARQ	Application Function
ASN	Automatic Repeat reQuest
ASN GW	Access Service Network
	ASN Gateway
BS	Base Station
BWA	Broadband Wireless Access
CPE	Customer Premises Equipment
FDD	Frequency Division Duplex
GUI	Graphical User Interface
HO	Handover/Handoff
IP	Internet Protocol
MAC	Media Access Control
MIMO	Multiple Input Multiple Output
MS	Mobile Station
NLOS	Non Line of Sight
NSP	Network Service Provider
OFDMA	Orthogonal Frequency Division Multiplexing (Multiple Access)
PHY	PHYsical Layer
SDR	Software Defined Radio
TDD	Time Division Duplex
VoIP	Voice over IP

10 Appendix D – Checklist

The Checklist below gives the high-level steps in the Workflow for this procedure. Detach or print this page to use as a job-aid for completing the actions this procedure requires.

Table 3 - Checklist for Procedure

Procedure	Actions	Outcome
1. Verify Prerequisites	Verify site requirements Verify safety requirements Verify installation requirements	All requirements are in place for a successful installation
2. Install AirSynergy universal mounting plate	Install the universal mounting plate Verify connection torque settings	
3. Install AirSynergy on the mounting plate		
4. Connect and manage cables	Connect AirSynergy PoE cable Connect GPS	
5. Connect power system	Connect PSU to PoE injector Connect Power Connect Ethernet backhaul	

11 Appendix E

11.1 Revision History

Revision	Originator	Date	Description
1	J. Forrester	07-2011	

Customer Service Help-Desk for customer service emergency

Airspan Networks have introduced the Airspan Tracker application to enable prompt and efficient Customer Support services.

If you do not have an Airspan Tracker account, please obtain login credentials by filling-in the form in the main page at www.airspan.com/Support Register New Account.

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