INTRACOM TELECOM

# WiBAS

## Installation & Cabling

## Base Stations

Edition 3.2

GDC-004/68

Confidential

**The information contained in this document is subject to change without prior notice.**



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# Document Revision History

**Revisions**

This page shows the main changes effected in relation to the previous edition of the *WiBAS™ / WiBAS™ G5 Base Station Installation & Cabling manual.*

| Revisions | |
|---|---|
| Previous Document Edition: | 3.1 |
| **Current Document Edition:** | **3.2** |

**Reasons of change**

The table below shows the main reason for the document change effected in relation to the previous document edition:

| Chapter or Paragraph | Changes |
|---|---|
| Statement: Information to the User (page 6) | Updated. |
| Safety Precautions (page 16) | Updated. |
| Radio Units and Antennas Compatibility Matrix (page 24) | Antenna added (**ANT-IS-2628-2F-C**). |
| Materials (page 26) | Antenna added (**ANT-IS-2628-2F-C**). |
| Installing Radio Units and Antennas (page 81) | Table updated. |
| Tool kit packing materials (pages 85, 99, 107, 120, 130, 134) | Updated. |
| WiBAS OSDR-HUB and Sectoral 90 Integrated Antenna (page 83) | Procedure updated. |
| Prerequisite (pages 100, 109, 122, 131, 136) | Added. |
| WiBAS G5 evo-BS and Parabolic Integrated Antenna, 0.6 m (page 157) | New procedure added. |

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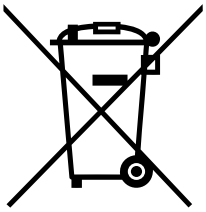
# Equipment Disposal



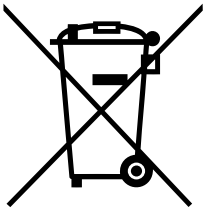
**Disposal of old electrical and electronic equipment (applicable through the European Union and other European countries with separate waste collection systems).**

This symbol, found on this product and any of its parts or on its operating instructions or on its packaging, indicates that electrical and electronic equipment may not be disposed of as unsorted municipal waste. Instead, this product should be handed over to applicable collection points for the recycling of electrical and electronic equipment.

By ensuring the correct disposal of this product, you will help prevent potential negative consequences to the environment and human health, which could otherwise be caused by inappropriate disposal of this product.

By recycling, reusing and other forms of recovery of old electrical and electronic equipment you are making an important contribution to the conservation of natural resources and to the protection of the environment.

For more information about the recycling of this product, please contact your local municipal authorities, municipal waste disposal service or the store where you purchased this product.



**Απόρριψη παλαιών ηλεκτρικών και ηλεκτρονικών συσκευών (ισχύει στην Ευρωπαϊκή Ένωση και άλλες Ευρωπαϊκές χώρες με συστήματα χωριστής συλλογής απορριμμάτων).**

Το σύμβολο αυτό, που απεικονίζεται πάνω στο προϊόν και σε τυχόν εξαρτήματα του ή στο εγχειρίδιο οδηγιών του ή στη συσκευασία του, δείχνει ότι οι ηλεκτρικές και ηλεκτρονικές συσκευές, μετά το πέρας της λειτουργίας τους, δεν θα πρέπει να απορρίπτονται μαζί με τα αστικά απόβλητα. Αντίθετα θα πρέπει να παραδίδονται σε κατάλληλα σημεία συλλογής για την ανακύκλωση των ηλεκτρικών και ηλεκτρονικών συσκευών.

Διασφαλίζοντας τη σωστή απόρριψη αυτού του προϊόντος, συνεισφέρετε στην πρόληψη πιθανών αρνητικών συνεπειών στο περιβάλλον και την ανθρώπινη υγεία, οι οποίες θα μπορούσαν να προκληθούν από την μη ενδεδειγμένη απόρριψη του προϊόντος.

Η ανακύκλωση, επαναχρησιμοποίηση και άλλες μορφές αξιοποίησης των παλαιών ηλεκτρικών και ηλεκτρονικών συσκευών βοηθούν στη διαφύλαξη των φυσικών πόρων και στην προστασία του περιβάλλοντος.

Για περισσότερες πληροφορίες σχετικά την ανακύκλωση αυτού του προϊόντος, παρακαλούμε επικοινωνήστε με τις τοπικές δημοτικές αρχές, την υπηρεσία αποκομιδής αστικών αποβλήτων ή το κατάστημα από το οποίο αγοράσατε το συγκεκριμένο προϊόν.

*Για περισσότερες πληροφορίες, μπορείτε να επικοινωνείτε με το Συλλογικό Σύστημα Εναλλακτικής Διαχείρισης Αποβλήτων Ηλεκτρικού και Ηλεκτρονικού Εξοπλισμού "Ανακύκλωση Συσκευών Α.Ε." (www.electrocycle.gr).*

# Statement: Information to the User

**WiBAS G5 micro-BS and evo-BS**

## Class B equipment

**EN 55022 / EN 55032:**

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

**FCC Part 15.19:**

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) this device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation.

**FCC Part 15.21:**

Changes or modifications made to this equipment, not expressly approved by the party responsible for compliance, could void the user's authority to operate the equipment.

**FCC Part 15.105:**

This equipment has been tested and found to comply with the limits for a **Class B digital device**, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

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

**RF Exposure Statement (for WiBAS G5 evo-BS)**

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. In order to avoid the possibility of exceeding the FCC radio frequency exposure limits, this equipment should be installed and operated with minimum distance **670 cm** between the antenna and your body during normal operation. Users must follow the specific operating instructions for satisfying RF exposure compliance.

*Continued on next page*

# Statement: Information to the User, Continued

**WiBAS G5 micro-BS and evo-BS**, continued

**ICES-003/NMB-003: Statement: Information to the User**
**ICES-003/NMB-003: Déclaration : Informations à l'utilisateur**

ICES-003: This Class B digital apparatus complies with Canadian ICES-003.
Operation is subject to the following two conditions:
(1) This device may not cause interference;
(2) This device must accept any interference, including interference that may cause undesired operation of the device.

NMB-003: Cet appareil numérique de la classe B est conforme à la norme canadienne NMB-003.
L'exploitation est autorisée dans les deux conditions suivantes :
(1) L'appareil ne doit pas produire de brouillage;
(2) L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

**RSS191 Statement: Information to the User**
**RSS191 Déclaration: Informations à l'utilisateur**

**CERTIFICATION NOTE FROM INDUSTRY CANADA:**
While this equipment meets the technical requirements for its operation in its rated paired block arrangement, this block arrangement is different than the 40 + 40 MHz block arrangement prescribed in documents RSS-191 and SRSP-324.25. The operation of this equipment IS NOT permitted if the out-of-band and spurious emission limits are not met at the edge of any contiguous licensed spectrum. It should be noted that all current relevant spectrum policies, licensing procedures and technical requirements are still applicable. For additional information, please contact the local Industry Canada office.

**REMARQUE D'HOMOLOGATION D' INDUSTRIE CANADA:**
Bien que ce matériel respecte les exigences techniques pour son fonctionnement selon l'arrangement spécifié de paires de blocs, cet arrangement de bloc est différent de l'arrangement de bloc 40 + 40 MHz prescrit dans le CNR-191 et PNRH-324,25. Le fonctionnement de cet équipement N'EST PAS permis si les limites de rayonnement hors-bande et non essentiel ne sont pas respectées à l'extrémité de tout spectre licencié contigu. Il est à noter que toutes les politiques, procédures de délivrance de permis et exigences techniques demeurent applicables. Pour plus de renseignements, veuillez contacter le bureau local d'Industrie Canada.

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# Statement: Information to the User, Continued

**OSDR and WiBAS G5 dual-BS**

## Class A equipment

**EN 55022 / EN 55032:**

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

**Warning:** This is a Class A product according to EN 55022/EN 55032.

Operation of this equipment in a residential environment could cause radio interference in which case the user may be required to take adequate measures.

**FCC Part 15.19:**

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

**FCC Part 15.21:**

Changes or modifications made to this equipment, not expressly approved by the party responsible for compliance, could void the user's authority to operate the equipment.

**FCC Part 15.105:**

This equipment has been tested and found to comply with the limits for a **Class A digital device**, pursuant to part 15 of the FCC rules.

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.
This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own.

*Continued on next page*

# Statement: Information to the User, Continued

**PONE-OD-DC**

## Class B equipment

**EN 55022 / EN 55032:**

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

**FCC Part 15.19:**

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

**FCC Part 15.21:**

Changes or modifications made to this equipment, not expressly approved by the party responsible for compliance, could void the user's authority to operate the equipment.

**FCC Part 15.105:**

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

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

**PONE-OD67-AC and POE-HP-OD67-DC**

## Class B equipment

**EN 55022 / EN 55032:**

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

# Declaration of Conformity

**English**

Hereby, Intracom S.A. Telecom Solutions declares that the product **WiBAS™** is CE marked in compliance with the essential requirements of the Radio Equipment Directive **2014/53/EU**, Eco Design Directives **2009/125/EC**, **2017/1369/EU**, RoHS directive **2011/65/EU**, **2015/863/EU** and relevant amendments of the above directives.

The full text of the EU declaration of conformity is available at the following URL: http://emc.intracom-telecom.com/en/start.htm

# Δήλωση Συμμόρφωσης

**Ελληνικά**

Με την παρούσα, η Intracom A.E. Τηλεπικοινωνιακών Λύσεων δηλώνει ότι το προϊόν **WiBAS™** συμμορφώνεται με τις απαιτήσεις της οδηγίας Ραδιοεξοπλισμού **2014/53/ΕΕ**, Οικολογικού Σχεδιασμού **2009/125/ΕΚ**, **2017/1369/ΕΕ**, οδηγίας RoHS **2011/65/ΕΕ**, **2015/863/ΕΕ** και λοιπών τροποποιήσεων των παραπάνω οδηγιών.

Το πλήρες κείμενο της δήλωσης συμμόρφωσης (EU) είναι διαθέσιμο στην ακόλουθη διεύθυνση URL: http://emc.intracom-telecom.com/en/start.htm

# Table of Contents

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# 1. Introduction

## About this Document

**Scope**

The scope of this document is to provide detailed instructions to the installation and cabling of the following wireless **PtMP** Base Station products:

- **WiBAS™ OSDR-HUB**
- **WiBAS™ G5 micro-BS**
- **WiBAS™ G5 evo-BS**(1)
- **WiBAS™ G5 dual-BS**

Note **OSDR** is an **O**utdoor **S**oftware-**D**efined **R**adio platform.
The same radio unit, based on software running **is capable** to operate, as follows:

- **PtMP** Base Station: WiBAS™ OSDR-HUB.
- **PtMP** Terminal Station: WiBAS™ OSDR-TS.
- **PtP** Node: OmniBAS™ OSDR.

**Target audience**

This document is addressed to certified technicians with wireless equipment knowledge and skills concerning the following:

- Outdoor Radio Unit pole / tower / wall installation.
- Antenna with mounting kit installation.
- Preparation & Termination of: Ethernet & Grounding cables.
- Laying and Installation of: Ethernet, Fiber Optic & Grounding cables.
- Testing Ethernet cables using Ethernet testers.

**Reference manuals**

The listed reference manuals in the table below maybe are useful during installation process:

- WiBAS™ System Description.
- WiBAS™ Product Catalog.
- WiBAS™ Startup & Commissioning.
- OmniBAS™ IDU Installation.
- Lightning & Surge Protection for Intracom Telecom Radios – Installation Practices.
- Lightning & Surge Protector (LSP) Datasheet.

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(1) **Also available in PtP mode.**

# About this Document, Continued

**Conventions**

This document applies to the following conventions:

- **Arial Bold blue** fonts are used for order codes.
- Arial Blue underline fonts are used for document references.
- **Arial Bold black** fonts are used for indicating important information or paragraph header.

This symbol means **DANGER**. The purpose of this symbol is to warn you that any wrong action can cause bodily injury or even death.

This symbol means **CAUTION**. The purpose of this symbol is to prevent you from performing an action that might result in damage of the equipment.


The purpose of this symbol is to protect you from unauthorized entry to the site and damage your equipment.


A note calls your attention to important supplementary information.

A hint denotes helpful piece of advice or practical suggestion.

# Safety Precautions

**RF exposure assessment**

## Introduction

Any Radio Equipment is emitting Radio Frequency (RF) Radiation through its antenna which may be integrated to the equipment or not. It is important to follow any local, national or international regulation during installation and operation of the Radio Equipment to avoid radiation hazards.

## Regulations

A lot of countries have issued and follow their own regulations but others adopted European or international regulations, standards or guidelines.

In Europe, some countries follow the recommendations included in 1999/519/EC directive which is based on the guidelines document published by the International Commission on Non-Ionizing Radiation Protection (ICNIRP). Other countries have issued their own regulations for this purpose.

The above mentioned European Directive provides the reference levels (limits) for assessment of the human exposure to electromagnetic fields based on health effects. European Union, FCC (US) and Industry Canada Reference Levels for microwave frequencies applied to INTRACOM Telecom equipment are given in the following table (Table 1).

Table 1: RF Exposure Reference Levels

| Regulation | Frequency Range | Power Density | Notes |
|---|---|---|---|
| 1999/519/EC | 2-300 GHz | 10 W/m$^2$ | General Public |
| FCC 1.1310 | 1.5-100 GHz | 1 mW/cm$^2$ (10 W/m$^2$) | General Public |
| FCC 1.1310 | 1.5-100 GHz | 5 mW/cm$^2$ (50 W/m$^2$) | Occupational |
| IC RSS-102 | 6-150 GHz | 1 mW/cm$^2$ (10 W/m$^2$) | General Public |
| IC RSS-102 | 6-150 GHz | 5 mW/cm$^2$ (50 W/m$^2$) | Occupational |

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# Safety Precautions, Continued

**RF exposure assessment**, continued

### RF Exposure General Guidelines for equipment installation

As a general rule it is expected that the highest level of emission would be in line of sight and in close vicinity of the antenna. Additional requirements for the installation of equipment shall be as follows:

- The equipment should be located in such a way to prevent the public from accessing the area where the RF Radiation exceeds the regulation limits. For this, a compliance boundary is determined, based on its radio characteristics. Outside this area the RF radiation levels are below the reference levels (limits).
- Operation and maintenance personnel, which have to work within the RF radiation compliance boundary area, should be informed about the source of radiation and should have the capability to power off the radio equipment before entering the compliance boundary area.
- The compliance boundary area should be defined by a relevant warning sign or physical barrier.

### Radiation Exposure Assessment – Compliance Boundary Calculation

In order to calculate the RF exposure compliance boundary around a Radio Equipment and its antenna, a theoretical approach is described below. As the installation environment could be complex, i.e obstacles causing reflections or scattering, soil conditions etc., this approach may be used to provide a rough estimation of the expected exposure in power flux density on a certain point. More precise estimations can be feasible if detailed knowledge of the installation environment is available. In some cases a safety factor can be used to increase the level of confidence.

The power flux density *S* can be calculated using the following formula:

$$S = P * G_{num} / (4 * r^2 * \pi)$$

where,

- **P** = is the maximum power at the antenna port of the Radio Equipment,
- $\mathbf{G_{num}}$ = is the numerical gain of the antenna,
- **r** = is the distance between the antenna and the point of interest.

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# **Safety Precautions**, Continued

**RF exposure assessment**, continued

| Product | WiBAS™ G5 evo-BS 24 GHz | | |
|---|---|---|---|
| Antenna Type | HG | SG | Omni |
| Antenna Diameter (m) | 0.24 | 0.24 | 0.212 |
| Antenna Gain (dBi) | 19 | 14.8 | 10 |
| **Compliance Boundary (m)** | | | |
| General Public | **0.20** | **0.20** | **0.10** |
| Occupational | **0.10** | **0.10** | **0.10** |

| Product | WiBAS™ G5 evo-BS 26 GHz | |
|---|---|---|
| Antenna Type | SG | Omni |
| Antenna Diameter (m) | 0.24 | 0.212 |
| Antenna Gain (dBi) | 15.2 | 10 |
| **Compliance Boundary (m)** | | |
| General Public | **0.20** | **0.10** |
| Occupational | **0.10** | **0.10** |

| Product | WiBAS™ G5 evo-BS 28 GHz | | |
|---|---|---|---|
| Antenna Type | HG | SG | SG |
| Antenna Diameter (m) | 0.24 | 0.24 | 0.25 |
| Antenna Gain (dBi) | 19 | 15.5 | 13.5 |
| **Compliance Boundary (m)** | | | |
| General Public | **0.50** | **0.30** | **0.30** |
| Occupational | **0.20** | **0.20** | **0.20** |

| Product | WiBAS G5 evo-BS 28 GHz | |
|---|---|---|
| Antenna Type | Omni | Parabolic (PtP) |
| Antenna Diameter (m) | 0.212 | 0.653 |
| Antenna Gain (dBi) | 10 | 42.8 |
| **Compliance Boundary (m)** | | |
| General Public | **0.20** | **6.70** |
| Occupational | **0.10** | **3.00** |

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# Safety Precautions, Continued

**RF exposure assessment**, continued

### RF Radiation Safety Information

This equipment complies with:
Cet équipement est conforme:

- ISED RSS-102
- FCC title 47 part 1.1310
- EMF Exposure Directive (1999/519/EC)

Radiation exposure limits set forth for an uncontrolled environment. This equipment (antenna) should be installed and operated with minimum distance between the radiator & the human body as depicted in the tables below. This distance provides additional safety margin for the product minimizing exposure to microwaves and is calculated as the worst case scenario (maximum transmitter power / antenna with maximum gain).
Limites d'exposition aux rayonnements établies pour un environnement non contrôlé. Cet équipement (antenne) doit être installé et utilisé avec une distance minimale entre le radiateur et le corps humain, comme indiqué dans les tableaux ci-dessous. Cette distance fournit une marge de sécurité supplémentaire pour le produit en minimisant l'exposition aux micro-ondes et est calculée comme le pire des cas (puissance d'émission maximale / antenne avec gain maximal). Ces calculs ont été effectués conformément à :

These calculations were done in accordance with:
Ces calculs ont été effectués conformément à :

- FCC Radio Frequency Exposure Methods & Limits 2.1091, 1.1310
- Health Canada Safety Code 6 / Industry Canada RSS 102
  - https://www.canada.ca/en/health-canada/services/health-risks-safety/radiation/occupational-exposure-regulations/
  - https://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/h_sf06129.html
- EMF Exposure Directive (99/519/EC)

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# Safety Precautions, Continued

## General

- Do not install or operate this system in the presence of flammable gases or fumes. Operating any electrical instrument in such an environment is a safety hazard.
- Outdoor units and antennas 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 the product warranty and may expose the end user or the service provider to legal and financial liabilities.
- INTRACOM S.A. TELECOM SOLUTIONS and its resellers or distributors are not liable for injury, damage or violation of regulations associated with the installation of outdoor units, antennas or any other accessory related to the radios.
- Appropriate labeling should exist at points with high risk of contact with hazardous voltage.
- A list with emergency phone numbers (e.g. medical assistance numbers) should be displayed at easy-to-view positions at the installation site.
- Also, recommended are for safety purposes, a fire detection system and fire extinguishers (installed at easy-to-access points) inside the installation premises.
- This equipment must be permanently earthed for protection and functional purposes.
- Changes or modifications to the radio equipment, antennas and installation accessories not expressly approved by INTRACOM S.A. TELECOM SOLUTIONS or the party responsible for compliance could void the user's permission to operate the equipment.

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# Safety Precautions, Continued

### Working on the Building's Roof

**During stormy weather, do not perform any mechanical assembling or antenna installation / alignment works on the building's roof.**

The metal structure of towers / masts is prone to lightning.

### Proper Grounding Installation

**Never power on any equipment unless you have completed the grounding installation.**

There is risk of equipment failure and / or electrical shock. Ensure that:

- The grounding system measures an appropriate path resistance as specified by local regulations.
- An appropriate grounding bar (or terminal) exists at the proximity of each equipment installation position.
- The equipment is intended to be installed in location only where the equipotential bonding has been applied.

### ESD Protection

When using SFP, then the product is a Class 1 laser product.


### Equipment Access

Only trained, authorized personnel should have access to the installed equipment.

### Hot Surfaces

Do not touch the outer surface of the equipment during operation without proper personal protection.

Allow unit to cool (after switch off) before servicing.

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# Safety Precautions, Continued

## Local power Source

- **AC:**

– Safety requirements require a single pole circuit-breaker to be employed between the local AC power source and power injector.

– The circuit breaker[(1)] must disconnect the mains phase of the AC power source.

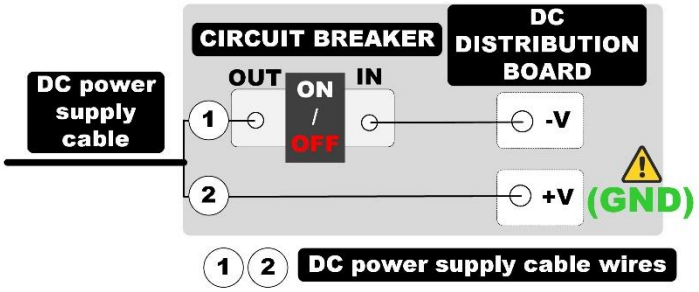
**Note** If the plug of power supply cord is intended to be the power disconnect device of the equipment **(not recommended)**, arrange in the installation to connect the equipment to a socket-outlet installed close to the power injector and easily accessible.

- **DC:**

– Safety requirements require a single pole circuit-breaker[(2)] to be employed between the local DC power source and power injector.

– The positive **(+) V** pole of the local DC power source must be **grounded**.

– The **circuit breaker** must control (open / close) the negative **(-) V** pole of the DC power source.




## Power Supply Cable

- **AC:**

– Power source cables must be tested for short circuits, open circuit or wrong wiring before installed.

– The **ground wire** of the AC cable must be connected to the protective earth (ground) point of the mains electricity installation.

- **DC:**

– Power source cables must be tested for short circuits, open circuit or wrong wiring before installed

– The **positive wire** of the DC cable must be connected to the protective earth (ground) point of the mains electricity installation (see picture above).

*Continued on next page*

[(1)] Single-pole MCB 6 A, 230 V AC (voltage rating), C-curve (for Industrial Applications).
[(2)] Single-pole MCB 6 A, 72 VDC (voltage rating), C-curve (for Industrial Applications).

# Safety Precautions, Continued

### Power Injector

**Ethernet cable:**

Connect the OUT receptacle of power injector to the proper receptacle of the radio unit, as described in this manual. Do not connect the power injector's OUT receptacle to network switches / routers / laptops. **There is risk of damaging the network devices** due to potential power that is carried inside the Ethernet cable.

### Radio Unit Powering

The radio units powering is performed through power injector only (for details how to power up the radio unit refer to *WiBAS™ / WiBAS™ G5 Startup & Commissioning manual*).

Do not plug / unplug the Ethernet cable to / from the radio unit when the power injector operates. **There is risk of damaging the radio unit.** Always ensure that the power supply source / power injector is OFF before plugging / unplugging.

# Radio Units and Antennas Compatibility Matrix

WiBAS™ solution provides high flexibility, through a wide variety of compact Base Station radio units combined with multiple antenna options facilitating demanding coverage scenarios. The following table presents a compatibility matrix between the radio units form factors and the available antennas.

For detailed description of the antenna order codes please refer in page 26.

| | | Radio Units Frequency (GHz) – Form Factor | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | WiBAS™ OSDR-HUB | | | | WiBAS™ G5 | | |
| | | | | | | dual-BS | micro-BS | evo-BS |
| | | 10.5 | 26 | 28 | 32 | 28 | 28 | 24.25-29.50 |
| Antenna Order Codes | BRA-1090H-I | √(1) | - | - | - | - | - | - |
| | BRA-1090V-I | √(1) | - | - | - | - | - | - |
| | HANT262890-DP-MB | - | - | - | - | √(1) | - | - |
| | HANT262890H | - | - | - | - | - | √(2) | √(2) |
| | HANT262890V | - | - | - | - | - | √(2) | √(2) |
| | HANT2690H-MB | - | √(1) | - | - | - | - | √(1) or (2) |
| | HANT2690V-MB | - | √(1) | - | - | - | - | √(1) or (2) |
| | HANT2690H-HG-MB | - | √(1) | - | - | - | - | √(1) or (2) |
| | HANT2690V-HG-MB | - | √(1) | - | - | - | - | √(1) or (2) |
| | HANT2890H-MB | - | - | √(1) | - | - | √(1) or (2) | √(1) or (2) |
| | HANT2890V-MB | - | - | √(1) | - | - | √(1) or (2) | √(1) or (2) |
| | HANT2890H-HG-MB | - | - | √(1) | - | - | √(1) or (2) | √(1) or (2) |
| | HANT2890V-HG-MB | - | - | √(1) | - | - | √(1) or (2) | √(1) or (2) |
| | HANT28180H | - | - | - | - | - | √(2) | √(2) |
| | HANT28180V | - | - | - | - | - | √(2) | √(2) |
| | HANT28180H-MB | - | - | √(1) | - | - | - | - |
| | HANT28180V-MB | - | - | √(1) | - | - | - | - |
| | HANT2628360V | - | √(3) | √(3) | - | - | √(2) | √(2) |
| | HANT3290H | - | - | - | √(4) | - | - | - |
| | HANT3290V | - | - | - | √(4) | - | - | - |
| | ANT-IS-2628-2F-C | - | - | - | - | - | - | √(1) |

(1) Mounting kit from antenna package.
(2) Mounting kit with order code **MTK-DMA-BX.**
(3) Mounting kit with order code **OSDR-360-ANT-MNT-KIT** and adaptation plate with order code **OSDR26-360-ANT-ADAPT-KIT** or **OSDR28-360-ANT-ADAPT-KIT**.
(4) Mounting kit with order code **OSDR-ANT-MNT.**

# 2. Materials

**Scope**

This chapter describes the installation materials of the following wireless equipment:

- **WiBAS™ OSDR-HUB**
- **WiBAS™ G5 micro-BS**
- **WiBAS™ G5 evo-BS**
- **WiBAS™ G5 dual-BS**

Note For each material there is an extensive packing list description to the respective installation procedure.

**Radio units**

One of the following radio units, depending on site-specific RF planning requirements:

- WiBAS™ OSDR-HUB radio unit 10.5 / 26 / 28 / 32 GHz (**OSDR-OB-U-DSDS-SB**).
- WiBAS™ G5 micro-BS radio unit 28 GHz (**WMBS-28-L-1008-SB**).
- WiBAS™ G5 evo-BS radio unit 24.25 - 29.50 GHz (**WG5-EVO-BS-LB-UB**).
- WiBAS™ G5 dual-BS radio unit 28 GHz (**WG5-DUAL-BS-L-1008-SB**).

Note The order codes for radio units are indicatives.

For the complete list of order codes refer to the respective product catalog (see Reference manuals).

*Continued on next page*

# **Materials**, Continued

**Antennas** One of the following antennas, depending on site-specific RF planning requirements:

- WiBAS™ OSDR-HUB integrated radio antenna, 10.5 GHz, 90° sectorized, horizontal polarization. Pole mounting kit is included (**BRA-1090H-I**).
- WiBAS™ OSDR-HUB integrated radio antenna, 10.5 GHz, 90° sectorized, vertical polarization. Pole mounting kit is included (**BRA-1090V-I**).
- WiBAS™ G5 dual-BS radio antenna, 24.25 - 29.50 GHz, 90° sectorized, dual polarization. Pole mounting kit is included (**HANT262890-DP-MB**).
- WiBAS™ G5 micro-BS / evo-BS radio antenna, 15.5 dBi, 24.25 - 29.5 GHz, 90° sectorized, horizontal polarization (**HANT262890H**).
- WiBAS™ G5 micro-BS / evo-BS radio antenna, 15.5 dBi, 24.25 - 29.5 GHz, 90° sectorized, vertical polarization (**HANT262890V**).
- WiBAS™ OSDR-HUB radio antenna, 26 GHz, 90° sectorized, horizontal polarization. Pole mounting kit is included (**HANT2690H-MB**).
- WiBAS™ OSDR-HUB radio antenna, 26 GHz, 90° sectorized, vertical polarization. Pole mounting kit is included (**HANT2690V-MB**).
- High Gain WiBAS™ OSDR-HUB radio antenna, 19 dBi, 24.50 - 26.50 GHz, 90° sectorized, horizontal polarization. Pole mounting kit is included (**HANT2690H-HG-MB**).
- High Gain WiBAS™ OSDR-HUB radio antenna, 19 dBi, 24.50 - 26.50 GHz, 90° sectorized, vertical polarization. Pole mounting kit is included (**HANT2690V-HG-MB**).
- WiBAS™ OSDR-HUB radio antenna, 28 GHz, 90° sectorized, horizontal polarization. Pole mounting kit is included (**HANT2890H-MB**).
- WiBAS™ OSDR-HUB radio antenna, 28 GHz, 90° sectorized, vertical polarization. Pole mounting kit is included (**HANT2890V-MB**).
- High Gain WiBAS™ OSDR-HUB radio antenna, 90° sectorized, 19 dBi, 27.5 - 29.5 GHz, horizontal polarization. Pole mounting kit is included (**HANT2890H-HG-MB**).
- High Gain WiBAS™ OSDR-HUB radio antenna, 90° sectorized, 19 dBi, 27.5 - 29.5 GHz, vertical polarization. Pole mounting kit is included (**HANT2890V-HG-MB**).
- WiBAS™ G5 micro-BS / evo-BS radio antenna, 13.5 dBi, 28 GHz, 180° sectorized, horizontal polarization (**HANT28180H**).
- WiBAS™ G5 micro-BS / evo-BS radio antenna, 12 dBi, 28 GHz, 180° sectorized, vertical polarization (**HANT28180V**).
- WiBAS™ OSDR-HUB radio antenna, 28 GHz, 180° sectorized, horizontal polarization. Pole mounting kit is included (**HANT28180H-MB**).
- WiBAS™ OSDR-HUB radio antenna, 28 GHz, 180° sectorized, vertical polarization. Pole mounting kit is included (**HANT28180V-MB**).
- WiBAS™ Base Station radio antenna, 10 dBi, 24.5 - 29.5 GHz, 360° coverage, vertical polarization (**HANT2628360V**).
- WiBAS™ OSDR-HUB radio antenna, 32 GHz, 90° sectorized, horizontal polarization (**HANT3290H**).
- WiBAS™ OSDR-HUB radio antenna, 32 GHz, 90° sectorized, vertical polarization (**HANT3290V**).
- WiBAS™ G5 evo-BS radio antenna, 42.8 dBi, 28 GHz, parabolic, vertical or horizontal polarization, 0.3 m (**ANT-IS-2628-2F-C**).

*Continued on next page*

# **Materials**, Continued

| | |
|---|---|
| **Antenna adaptation kits** | One of the following antenna adaptation kits, depending on site-specific antenna requirements:<br>• Antenna adaptation kit for 26 GHz (**OSDR26-360-ANT-ADAPT-KIT**).<br>• Antenna adaptation kit for 28 GHz (**OSDR28-360-ANT-ADAPT-KIT**). |
| **Pole mounting kits** | One of the following pole mounting kits, based on site-specific mounting kit requirements:<br>• Pole mounting kit – for poles 48 mm to 100 mm (**MTK-DMA-BX**).<br>• Pole mounting kit – for poles 48 mm to 100 mm (**OSDR-360-ANT-MNT-KIT**).<br>• Pole mounting bracket – for poles 50 mm to 120 mm (**INST-PONE-PL**).<br>• Pole mounting bracket – for poles 50 mm to 120 mm (**INSTPONE-PL2**).<br>• Pole mounting bracket – for poles 25.5 mm to 101.6 mm (**INSTPOE-PL3**). |
| **Pole hose clamps** | One of the following pole hose clamps, based on site-specific pole requirements:<br>• Stainless steel hose clamp – for poles 48 mm to 100 mm (**ST-CL64-140**).<br>• Stainless steel hose clamp – for poles 75 mm to 149 mm (**ST-CL102-178**).<br>• Stainless steel hose clamp – for poles 150 mm to 229 mm (**ST-CL172-248**).<br>• Stainless steel hose clamp – for poles 230 mm to 300 mm (**ST-CL242-318**). |

*Continued on next page*

# **Materials**, Continued

| | |
|---|---|
| **Power injectors** | One of the following power injectors, depending on site-specific powering requirements:<br><br>• AC POE injector, indoor, 56 watt (**POE-AC56-IDH**).<br>• AC POE injector, indoor, 60 watt (**POE-AC60-ID**).<br>• AC PONE injector, outdoor, 67 watt (**PONE-OD67-AC**).<br>• AC POE injector, indoor, 72 watt (**POE-ID-AC72**).<br>• AC POE injector, indoor, 75 watt (**POE-AC75-ID**).<br>• AC POE injector, outdoor, 120 watt (**POE-HP-OD-AC**).<br>• AC POE injector, indoor, 150 watt (**POE-AC112-ID**).<br>• DC PONE injector, outdoor, 60 watt (**PONE-OD-DC**).<br>• DC PONE injector, outdoor, 114 watt (**POE-HP-OD67-DC**). |
| **OmniBAS indoor units with POE capability** | One of the following indoor units with POE capability, depending on site-specific powering requirements:<br><br>• DC PONE injector, indoor (**IDU-O4P**).<br>• DC PONE injector, indoor (**IDU-O10P**).<br>• OmniBAS™-8W/4Wv2 PTP WOE (wireline elect/optical) modem (**MOD-O8-MO**). |
| **Grounding kit** | The following grounding kit, depending on site-specific equipment requirements:<br><br>• Grounding kit (**GND-KIT16-OD**). |

*Continued on next page*

# **Materials**, Continued

**Cables**

One of the following cables, depending on site-specific cabling requirements:

- Ethernet cable, shielded, Cat5E (SF/UTP) (**ETH-CAB-SFTP**).

- AC power supply cable - 3 x 0.75 $mm^2$ (**AC-PWR-CAB**).
- DC power supply cable - 2 x 1 $mm^2$ (**DC-PWR-CAB-1**).
- DC power supply cable - 2 x 2.5 $mm^2$ (**DC-PWR-CAB-2**).
- DC power supply cable - 2 x 2.5 $mm^2$ (**DC-PWR-CAB-3**).

- Grounding cable, indoor use - 6 $mm^{2,}$ (**GND-CAB6-ID**).

- Fiber optic cable, prefabricated, outdoor use - Multi-Mode (MM) & Single Mode (SM) in different lengths meters, as below:
  - 002 (**FBROPTMM-002**).
  - 005 (**FBROPTMM-005**).
  - 025 (**FBROPTMM-025**).
  - 050 (**FBROPTMM-050**).
  - 100 (**FBROPTMM-100**).
  - 150 (**FBROPTMM-150**).
  - 200 (**FBROPTMM-200**).
  - 002 (**FBROPTSM-002**).
  - 005 (**FBROPTSM-005**).
  - 025 (**FBROPTSM-025**).
  - 050 (**FBROPTSM-050**).
  - 100 (**FBROPTSM-100**).
  - 150 (**FBROPTSM-150**).
  - 200 (**FBROPTSM-200**).

**ETH & SFP glands**

One of the following cables gland, depending on site-specific cabling requirements:

- M20 gland used to protect S-FTP cable entry to WiBAS™OSDR-HUB RJ-45 receptacle (**M20-GLAND**).
- M25 gland used to protect cable entry to WiBAS™OSDR-HUB SFP cage input (**M25-GLAND**).
- SFP gland & extension set for WiBAS™ G5 micro-BS / evo-BS (**SFP-HOOD-OBX**).
- M20 gland used to protect S-FTP cable entry to WiBAS™ G5 dual-BS RJ-45 receptacle (**ETH-HOOD-GX**).

*Continued on next page*

# **Materials**, Continued

**SFPs**

One of the following SFP, depending on site-specific traffic requirements:

- Electrical SFP for 10/100/1000 Base-T operation (**SFP-ELGFE-IN**).

- Optical SFP, multi-mode, up to 500 m, 1.25 Gbit/s, 850 nm (**SFP-MM-500M**).
- Optical SFP, single mode, up to 10 Km, 1.25 Gbit/s, 1310 nm (**SFP-SM-10KM**).
- Optical SFP, single mode, up to 40 Km, 1.25 Gbit/s, 1310 nm (**SFP-SM-40KM**).
- Optical SFP, single mode, up to 80 Km, 1.25 Gbit/s, 1550 nm (**SFP-SM-80KM**).
- Optical SFP+, multi-mode, up to 300 m, 10 GBase-SR/SW, 10 Gbit/s, LC duplex, INDL, 850 nm (**SFPX-MM-300M**).
- Optical SFP+, single mode, up to 10 Km, 10 GBase-LR, 10 Gbit/s, LC duplex, INDL, 1310 nm (**SFPX-SM-10KM**).
- Optical SFP+, single mode, up to 40 Km, 10 GBase-ER, 10 Gbit/s, LC duplex, INDL, 1550 nm (**SFPX-SM-40KM**).
- Optical SFP+, single mode, up to 80 Km, 10 GBase-ZR, 10 Gbit/s, LC duplex, INDL, 1550 nm (**SFPX-SM-80KM**).

*Continued on next page*

# **Materials**, Continued

**Others**

One of the following items, depending on site-specific installation requirements:

- Shielded RJ-45 connector for Ethernet cable Cat5E industrial, **(ETH-CAB-SFTP)** termination.
- DC power supply connector, 2 sockets, screw type cable terminals, IP67, UV rated, industrial (**UL-ST-CONN-SCR-DC**).
- Cable holder for fastening 2 x **M20-GLAND** with cables (**OSDR-HOLD-2**).
- Cable holder for fastening 4 x **M20-GLAND** and 1 x **M25-GLAND** with cables (**OSDR-HOLD-5**).
- Optional multiple cable holder (includes tie wraps with: L = 100 mm, D = 18 mm and W = 2.5 mm) (**CBL-HLDR-GX**).
- Universal antenna alignment tool (**SEC-ANT-XPOL-KIT**).
- Cable tie - 500 x 12.5 mm (**CAB-TIE-UV**).
- Outdoor lightning surge protector with IP68 ingress protection for Ethernet line (**ETH-SRG-OD68**).
- Tool kit for adjusting the sectoral antenna verticality with respect to the ground (**SEC-ANT-XPOL-KIT**).
- Hand crimping tool for RJ-45 connectors (**ST-RJ45** and **ST-RJ45-CAT6**) termination (**CRIMP-TOOL-S**).
- Optional tool for M20 gland (**TOOL-M20**).
- External GPS module kit for WiBAS™ G5 evo-BS TDD base station sectors (**WG5-GPS-MOD-KIT**). Pole Mounting kit included (One per radio).

# 3. Before Starting the Installation

**Scope**

This chapter describes all the prerequisites that must be considered prior to installing the following wireless equipment:

- **WiBAS™ OSDR-HUB**
- **WiBAS™ G5 micro-BS**
- **WiBAS™ G5 evo-BS**
- **WiBAS™ G5 dual-BS**

# 3.1. Radio Unit Connection Points

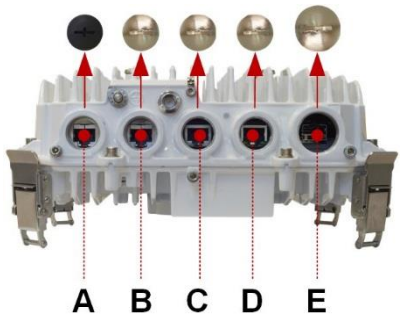
**Introduction**

This section describes all the available connection points of the following wireless equipment:

- **WiBAS™ OSDR-HUB**
- **WiBAS™ G5 micro-BS**
- **WiBAS™ G5 evo-BS**
- **WiBAS™ G5 dual-BS**

## WiBAS OSDR-HUB

**Receptacles**




| # | Marking | Description | Use |
|---|---|---|---|
| A | **GbE2** | Gigabit Ethernet, Electrical RJ-45 (100/1000 Base-T). | To connect Ethernet (S-FTP) cable for traffic / inband management and power via power injector. |
| B | **FE** | Fast Ethernet, RJ-45 (100 Base-T). | To connect Ethernet (S-FTP) cable for outband management / power via power injector. |
| | **PROTECT** | | To connect Ethernet (S-FTP) cable for protection (Hub (1+1)). |
| C | **-** | - | Reserved for future use. |
| D | **-** | - | Reserved for future use. |
| E | **GbE1** | Gigabit Ethernet, SFP cage. | To connect SFP module (electrical / optical) for traffic and inband management. |

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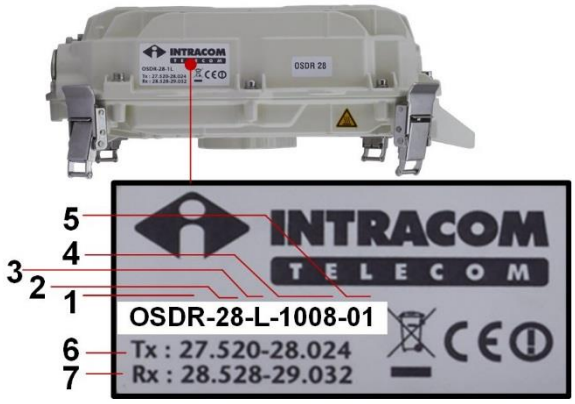
# **WiBAS OSDR-HUB**, Continued

**Label**




| # | Description |
|---|---|
| 1 | Product description. |
| 2 | Frequency band. |
| 3 | OSDR determination as **L**ow or **H**igh in the link pair. |
| 4 | Duplex spacing (MHz). |
| 5 | Sub-band (01, 02). |
| 6 | Transmit frequencies. |
| 7 | Receive frequencies. |

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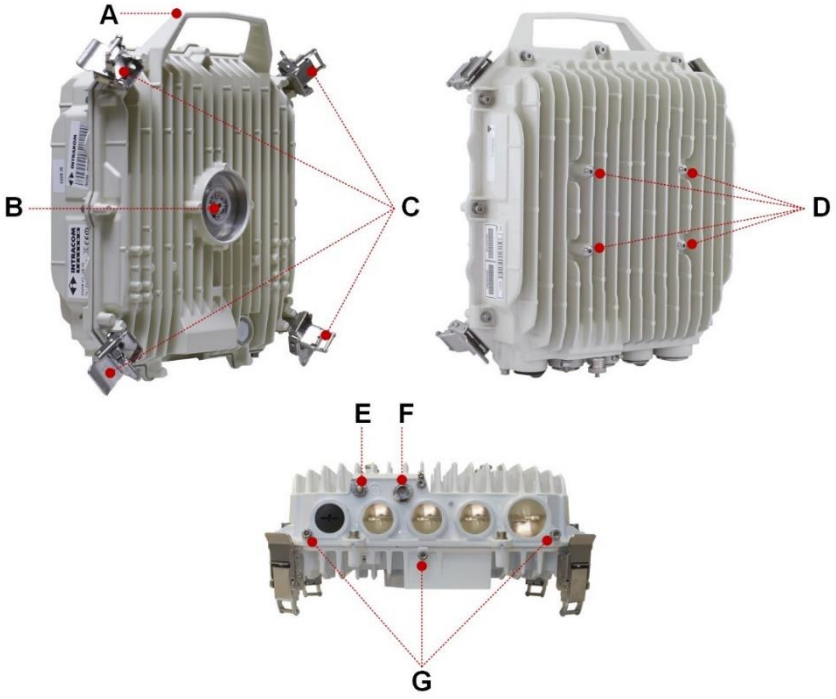
# **WiBAS OSDR-HUB**, Continued

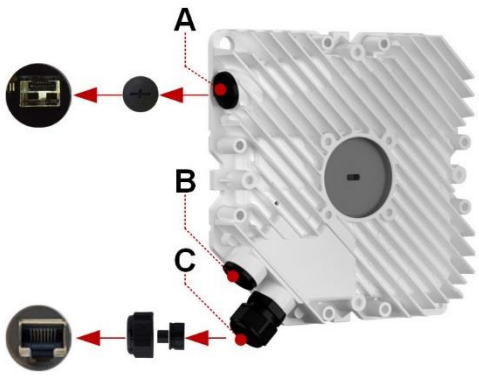
**Other points**




| # | Marking | Description | Use |
|---|---|---|---|
| A | - | Anchor point. | To fit lanyard for lifting to the pole. |
| B | - | Wave guide flange. | To install antenna feeder. |
| C | - | Latches. | To mount antenna. |
| D | - | Female threads for M5 screws. | To install mounting kit (**OSDR-360-ANT-MNT-KIT**). |
| E | **GND** | Enclosure grounding terminal. | To connect 16 $mm^2$ grounding cable. |
| F | **RSSI** | Receive signal level indication. | To connect the RSSI cable for measuring receive signal in volts (used only when the radio unit is in Terminal Station mode). |
| G | - | Female threads for screws. | To install cable holder. |

# WiBAS G5 micro-BS / evo-BS

**Receptacles**




| # | Marking | Description | Use |
|---|---|---|---|
| **A** | **GbE1** | Gigabit Ethernet, SFP cage. | To connect SFP module (electrical / optical) for carrying:<br>• traffic<br>• inband management. |
| **B** | **-** | Ethernet, Electrical RJ-45 (proprietary pin-out). | External GNSS module. |
| **C** | **GbE2** | Gigabit Ethernet, Electrical RJ-45 (100/1000 Base-T). | To connect Ethernet (S-FTP) cable for carrying:<br>• traffic<br>• inband management<br>• superimposed DC power via power injector. |

*Continued on next page*

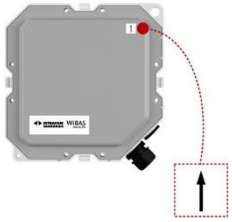
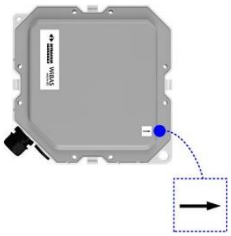
# WiBAS G5 micro-BS / evo-BS, Continued

**Label for WiBAS G5 micro-BS**

| PRODUCT Label |
|---|
|  |



| ITEM | Order Code Description |
|---|---|
| **1** | Product description (**W**iBAS™ G5 **m**icro-**BS**). |
| **2** | Frequency band (GHz). |
| **3** | WiBAS™ G5 micro-BS determination as **L**ow in the link pair. |
| **4** | Duplex spacing 1008 (MHz). |
| **5** | Sub-band (01, 02) |

| ORIENTATION Label | |
|---|---|
| **VERTICAL** | **HORIZONTAL** |
|  |  |

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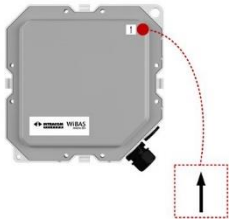
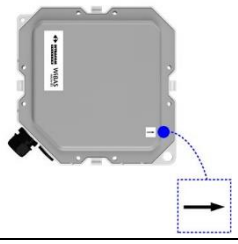
# WiBAS G5 micro-BS / evo-BS, Continued

**Label for WiBAS G5 evo-BS**

| PRODUCT Label |
|---|
|  |

| ITEM | Order Code Description |
|---|---|
| **1** | Product description (WiBAS™ G5 evo-BS). |
| **2** | Denotes Lower and Upper band support, as follows:<br>24-26 = 24.25 GHz - 26.50 GHz<br>26-28 = 26.50 GHz - 28.50 GHz<br>27-29 = 27.50 GHz - 29.50 GHz |

| ORIENTATION Label | |
|---|---|
| **VERTICAL** | **HORIZONTAL** |
|  |  |

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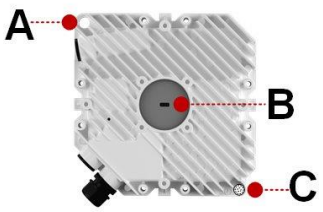
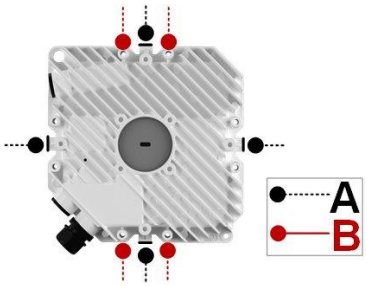
# WiBAS G5 micro-BS / evo-BS, Continued

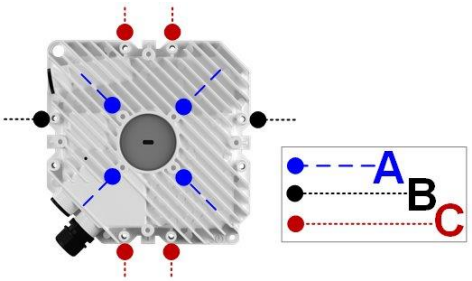
**Other points**




| # | Marking | Details | Use |
|---|---|---|---|
| **A** | - | Anchor point. | To fit lanyard for lifting to the pole. |
| **B** | - | Wave guide flange. | To connect antenna (**HANT28180H-MB** - **HANT28360V**) feeder. |
| **C** | **GND** | Grounding. | To connect 16 $mm^2$ grounding cable (**GND-KIT16-OD**). |



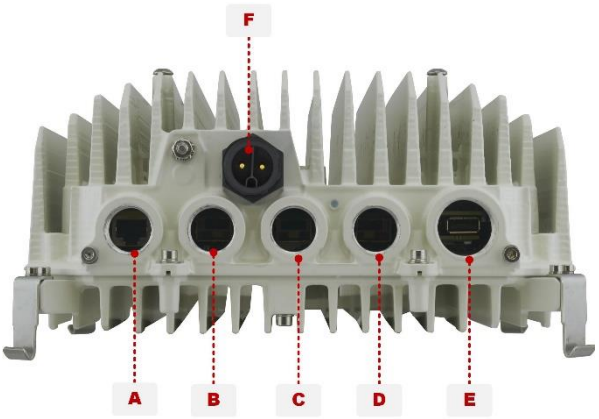

| # | Marking | Details | Use |
|---|---|---|---|
| **A** | - | Hook features. | To install sectoral antenna (**HANT28180H**) with latches. |
| **B** | - | Female threads for M5 screws. | To connect elevation bracket of **MTK-DMA-BX** mounting kit. |




| # | Marking | Details | Use |
|---|---|---|---|
| **A** | - | Female threads for M5 screws. | To install Omni antenna (**HANT28360V**) feeder. |
| **B** | - | Female threads for M5 screws. | To install Omni antenna (**HANT28360V**) safety collar. |
| **C** | - | Female threads for M5 screws. | To connect elevation bracket of **MTK-DMA-BX** mounting kit. |

# WiBAS G5 dual-BS

**Receptacles**




| # | Marking | Details | Use |
|---|---|---|---|
| A | **GbE#1** | Ethernet, electrical R-J45 (100/1000 Base-T). | To connect a Gigabit Ethernet (SF/UTP) cable for traffic / inband management / superimposed DC power (POE input). |
| B | **GbE#2** | SFP1 cage. | To connect a Fiber optic cable for traffic. |
| C | **GbE#3** | SFP2 cage. | |
| D | **GbE#4** | SFP3 cage. | Reserved for future use. |
| E | **USB** | Type A USB interface. | Engineering port. |
| F | **PSU** | Powering of the unit / connection to a -48 V DC power supply. | To connect DC power connector.  There is polarity concern. **Please refer** to DC-PWR-CAB-3 cable termination overview for WiBAS G5 dual-BS |

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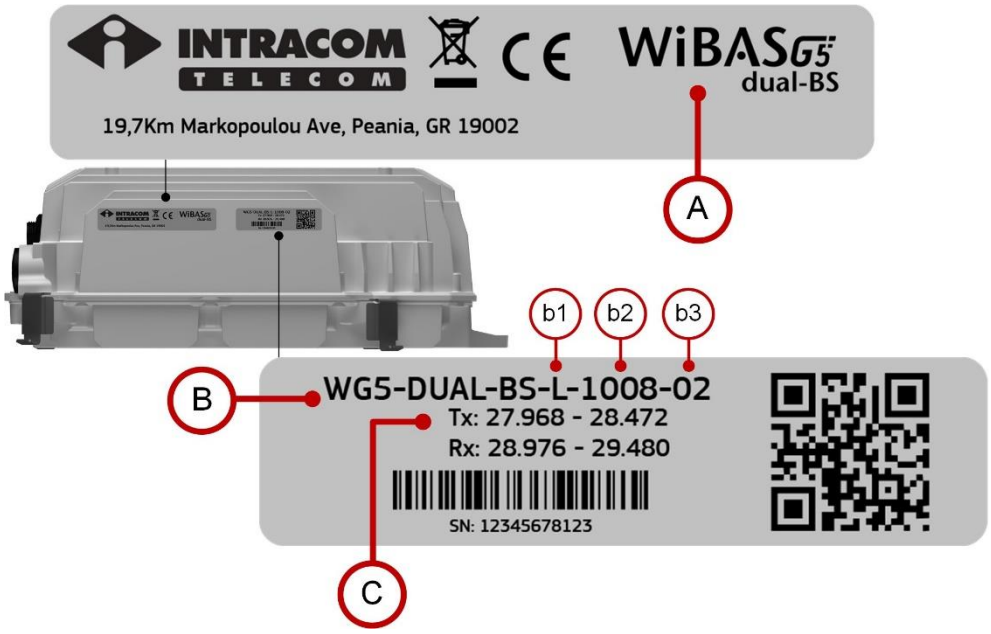
# **WiBAS G5 dual-BS**, Continued

**Label**

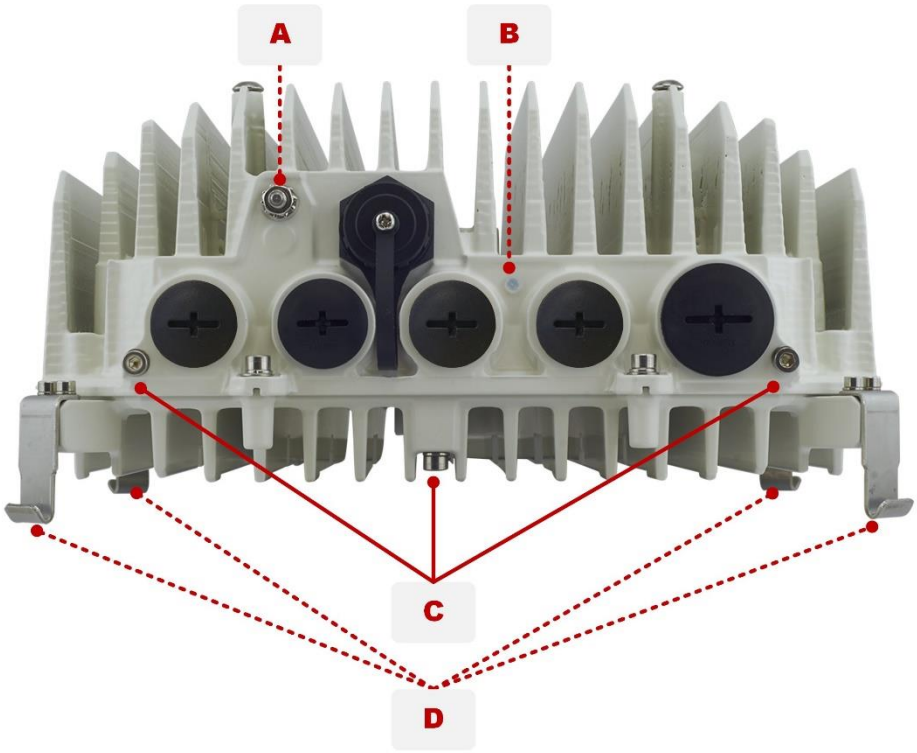


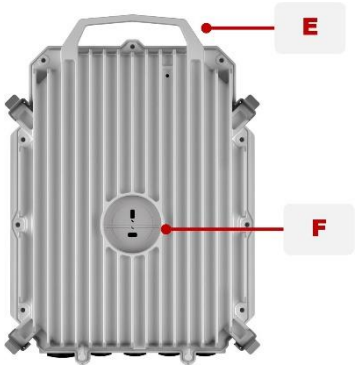

| # | Description |
|---|---|
| **A** | Product description. |
| **B** | Order code details:<br>**b1**: Link determination (**L**ow or **H**igh)<br>**b2**: Duplex spacing (MHz).<br>**b3**: Sub-band. |
| **C** | Transmit and receive frequency. |

*Continued on next page*

# **WiBAS G5 dual-BS**, Continued

**Other points**




| # | Marking | Details | Use |
|---|---|---|---|
| A | **GRD** | Enclosure grounding terminal. | To connect M5 grounding lug. |
| B | **STAT** | Multi-functioning LED. | To provide visual indication of system status during operation. |
| C | **-** | M4 screws. | To install cable holder. |
| D | **-** | Hooks. | To attach radio unit onto the antenna. |
| E | **-** | Handle. | To carry radio unit. |
| F | **-** | Wave guide port. | To connect antenna feeder. |

# 3.2. Radio Unit Cabling Overview

**Introduction**

This section describes all the available cabling connections of the following wireless equipment:

- **WiBAS™ OSDR-HUB**
- **WiBAS™ G5 micro-BS**
- **WiBAS™ G5 evo-BS**
- **WiBAS™ G5 dual-BS**

The cabling overview described in topics , as follows:



**Precaution**

The section describes the cabling overview **without** using any additional device for lightning surge protection.

For additional information regarding surge protection refer to Lightning and surge protection on page 74.

*Continued on next page*

# Radio Unit Cabling Overview, Continued

**External equipment for powering**

The following list shows the external equipment which is used for external powering:

### External powering using Power Injector

| Order Code | Type | | WiBAS™ Base Station | | |
|---|---|---|---|---|---|
| | AC | DC | OSDR -HUB | G5 micro-BS G5 evo-BS | G5 dual-BS |
| POE-AC56-IDH | ✓ | ✗ | ✓ | ✓ | ✗ |
| POE-AC60-ID | ✓ | ✗ | ✓ | ✓ | ✗ |
| PONE-OD67-AC | ✓ | ✗ | ✓ | ✓ | ✗ |
| POE-ID-AC72 | ✓ | ✗ | ✓ | ✓ | ✗ |
| POE-AC75-ID | ✓ | ✗ | ✓ | ✗ | ✗ |
| POE-AC112-ID | ✓ | ✗ | ✗ | ✗ | ✓ |
| POE-HP-OD-AC | ✓ | ✗ | ✗ | ✗ | ✓ |
| PONE-OD-DC | ✗ | ✓ | ✓ | ✓ | ✗ |
| POE-HP-OD67-DC | ✗ | ✓ | ✗ | ✗ | ✓ |

### External powering using OmniBAS™ IDU with POE capability

| Order Code | Type | | WiBAS™ Base Station | | |
|---|---|---|---|---|---|
| | AC | DC | OSDR -HUB | G5 micro-BS G5 evo-BS | G5 dual-BS |
| IDU-O4P | ✗ | ✓ | ✓ | ✓ | ✗ |
| IDU-O10P | ✗ | ✓ | ✓ | ✓ | ✗ |
| OmniBAS™ 4W/8W IDU | ✗ | ✓ | ✓ | ✓ | ✗ |

# Gigabit ETH cable for service Traffic, Inband Management and Powering

**Ethernet cable length restrictions**

The Gigabit Ethernet (S-FTP) cable for service traffic, inband management and external powering applies to the following restriction:

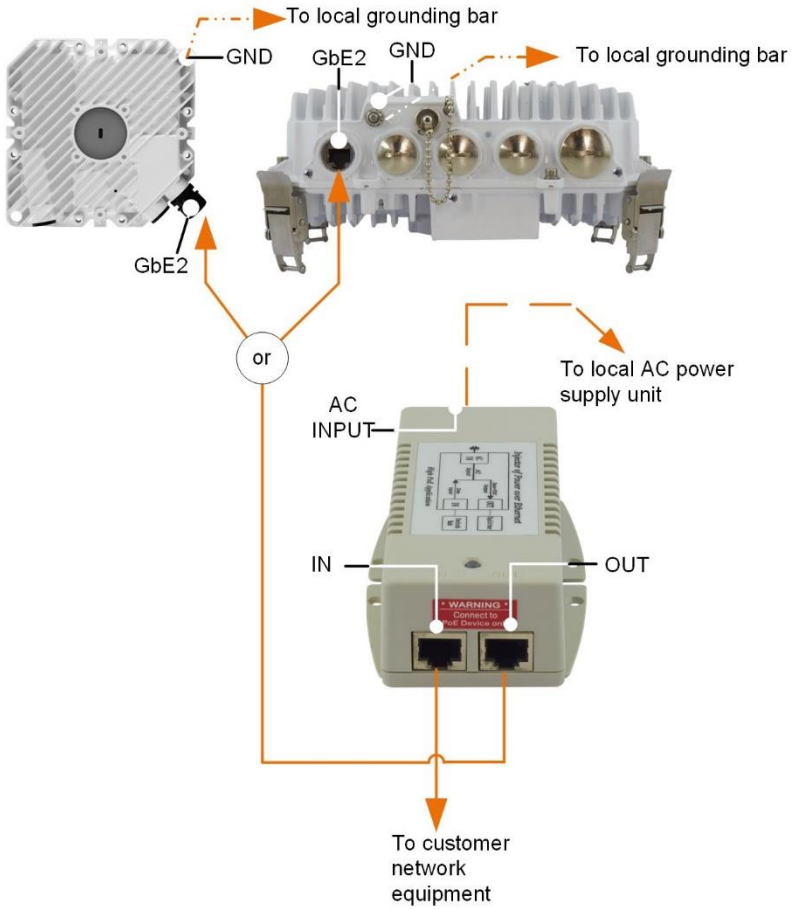
The **maximum length** of Gigabit Ethernet (S-FTP) cable (Cat5E or Cat6), between **WiBAS™ receptacles** and **customer network receptacle** cannot exceed 100 meters.

*Continued on next page*

# Gigabit ETH cable for service Traffic, Inband Management and Powering, Continued

**AC power injector**

The following schematic shows a cabling overview of **WiBAS™ OSDR-HUB** and **WiBAS™ G5 micro-BS** / **evo-BS** when powering is through power injector with order code **POE-AC56-IDH:**



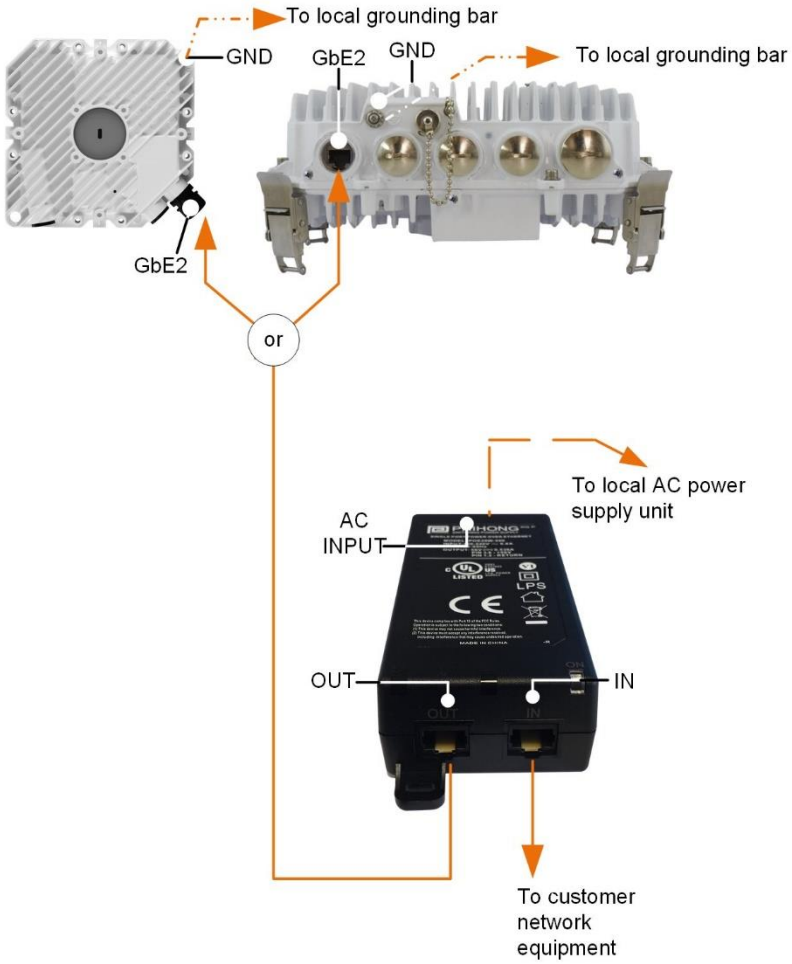

| Marking | Cable Type |
|---|---|
| GbE2, OUT | Gigabit Ethernet (S-FTP) cable for traffic, inband management and superimposed DC power. |
| IN | Gigabit Ethernet (S-FTP) cable for traffic and inband management. |
| AC INPUT | AC power supply cord. |
| GND | Grounding cable 16 $mm^2$. |

*Continued on next page*

# Gigabit ETH cable for service Traffic, Inband Management and Powering, Continued

**AC power injector**, continued

The following schematic shows a cabling overview of **WiBAS™ OSDR-HUB** and **WiBAS™ G5 micro-BS** / **evo-BS** when powering is through power injector with order code **POE-AC60-ID:**



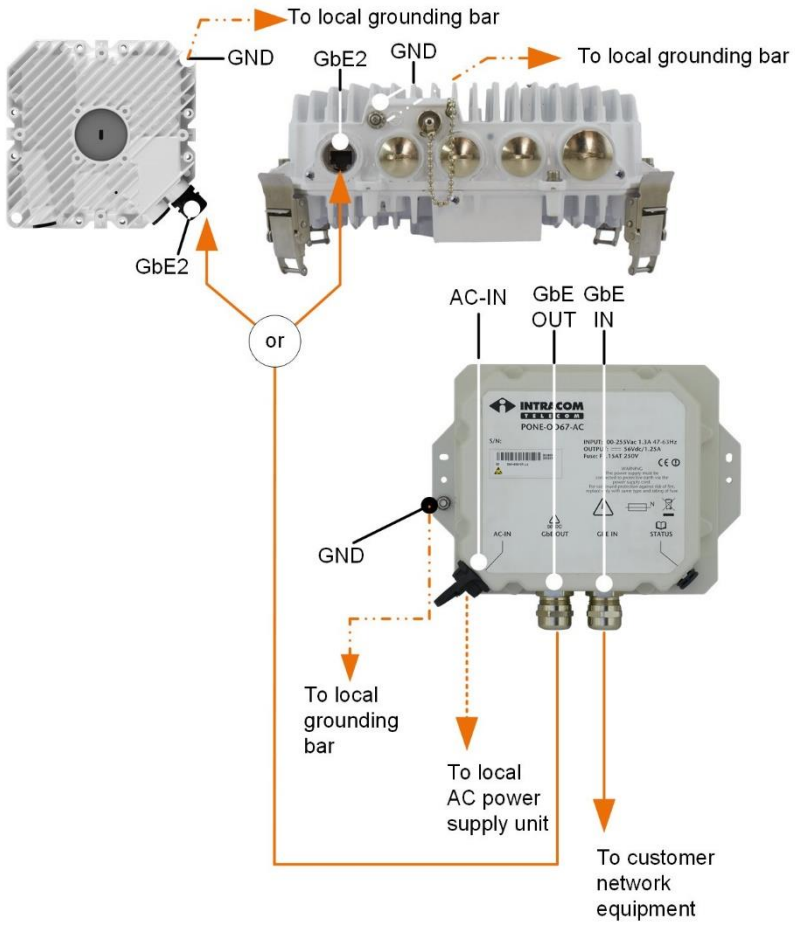

| Marking | Cable Type |
|---|---|
| GbE2, OUT | Gigabit Ethernet (S-FTP) cable for traffic, inband management and superimposed DC power. |
| IN | Gigabit Ethernet (S-FTP) cable for traffic and inband management. |
| AC INPUT | AC power supply cord. |
| GND | Grounding cable 16 $mm^2$. |

*Continued on next page*

# Gigabit ETH cable for service Traffic, Inband Management and Powering, Continued

**AC power injector**, continued

The following schematic shows a cabling overview of **WiBAS™ OSDR-HUB** and **WiBAS™ G5 micro-BS** / **evo-BS** when powering is through power injector with order code **PONE-OD67-AC:**



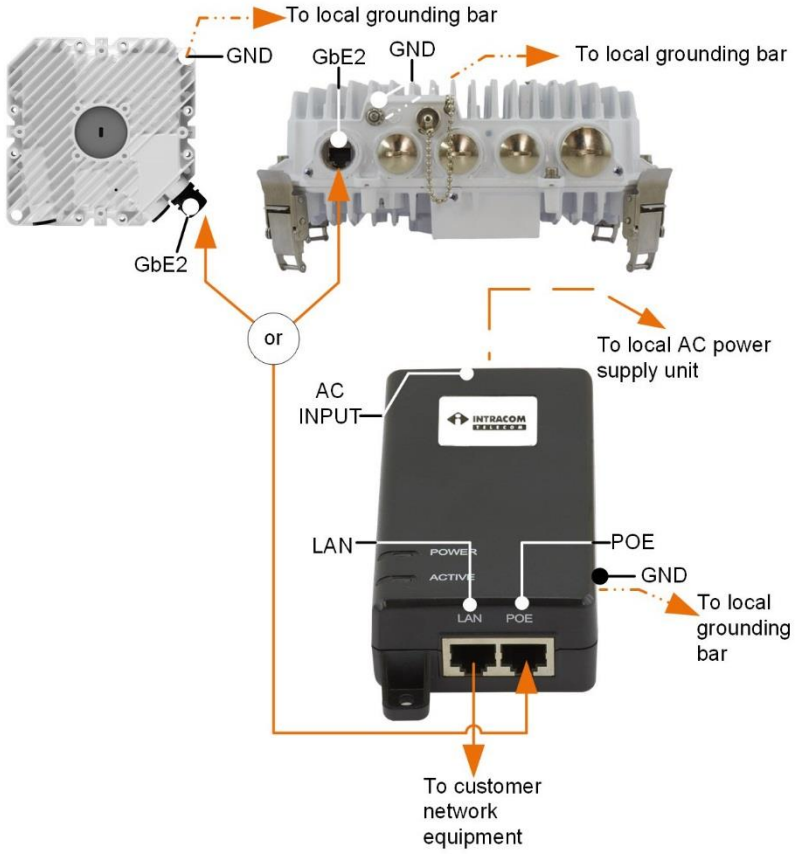

| Marking | Cable Type |
|---|---|
| GbE2, GbE OUT | Gigabit Ethernet (S-FTP) cable for traffic, inband management and superimposed DC power. |
| GbE IN | Gigabit Ethernet (S-FTP) cable for traffic and inband management. |
| AC-IN | AC power supply cable. |
| GND | Grounding cable 16 $mm^2$. |

*Continued on next page*

# Gigabit ETH cable for service Traffic, Inband Management and Powering, Continued

**AC power injector**, continued

The following schematic shows a cabling overview of **WiBAS™ OSDR-HUB** and **WiBAS™ G5 micro-BS** / **evo-BS** when powering is through power injector with order code **POE-ID-AC72:**



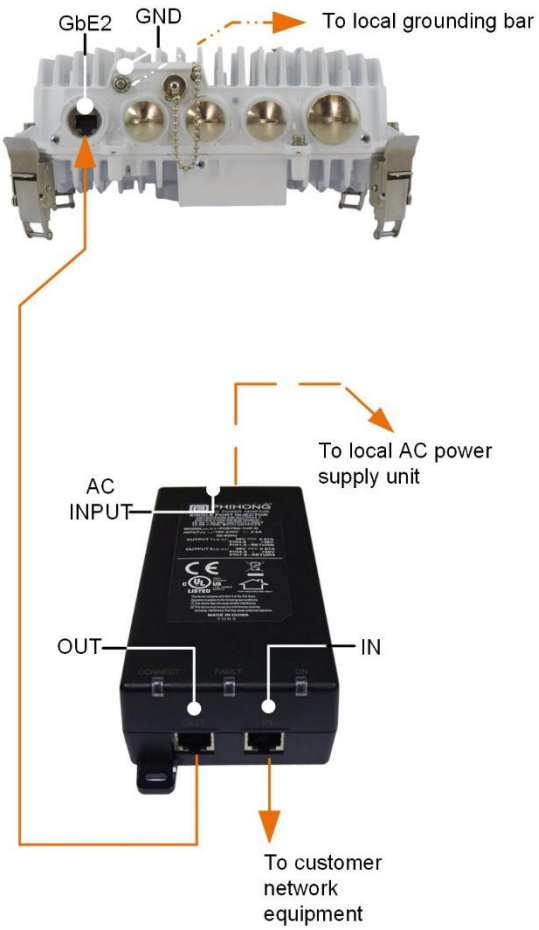

| Marking | Cable Type |
|---|---|
| GbE2, POE | Gigabit Ethernet (S-FTP) cable for traffic, inband management and superimposed DC power. |
| LAN | Gigabit Ethernet (S-FTP) cable for traffic and inband management. |
| AC INPUT | AC power supply cord. |
| GND | Grounding cable 16 $mm^2$ for radio unit and 6 $mm^2$ for **POE-ID-AC7.** |

*Continued on next page*

# Gigabit ETH cable for service Traffic, Inband Management and Powering, Continued

**AC power injector**, continued

The following schematic shows a cabling overview of **WiBAS™ OSDR-HUB** when powering is through power injector with order code **POE-AC75-ID:**



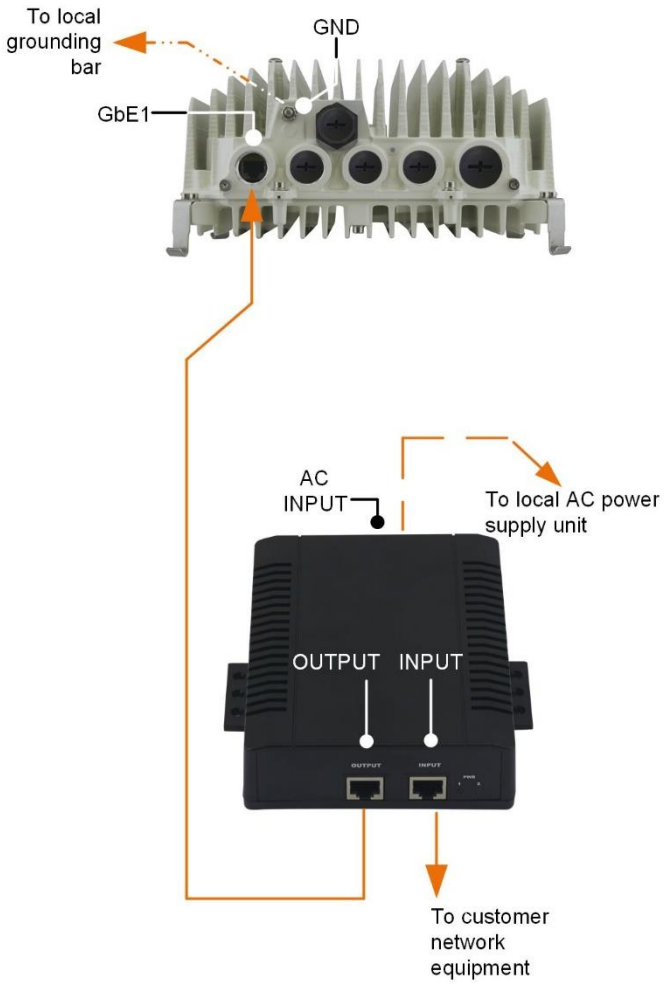

| Marking | Cable Type |
|---|---|
| GbE2, OUT | Gigabit Ethernet (S-FTP) cable for traffic, inband management and superimposed DC power. |
| IN | Gigabit Ethernet (S-FTP) cable for traffic and inband management. |
| AC INPUT | AC power supply cord. |
| GND | Grounding cable 16 $mm^2$. |

*Continued on next page*

# Gigabit ETH cable for service Traffic, Inband Management and Powering, Continued

**AC power injector**, continued

The following schematic shows a cabling overview of **WiBAS™ G5 dual-BS** when powering is through power injector with order code **POE-AC112-ID:**



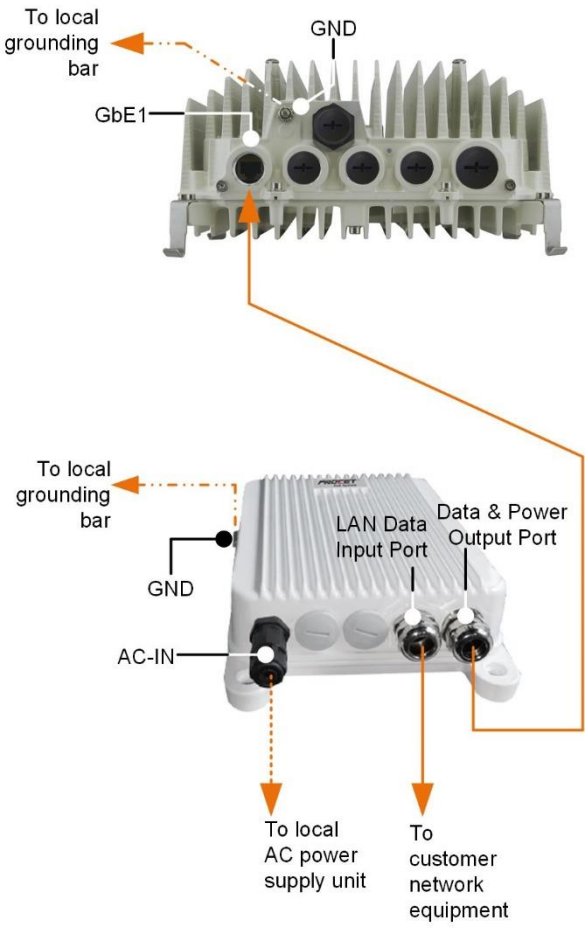

| Marking | Cable Type |
|---|---|
| GbE1, OUTPUT | Gigabit Ethernet (S-FTP) cable for traffic, inband management and superimposed DC power. |
| INPUT | Gigabit Ethernet (S-FTP) cable for traffic and inband management. |
| AC INPUT | AC power supply cord. |
| GND | Grounding cable 16 $mm^2$. |

*Continued on next page*

# Gigabit ETH cable for service Traffic, Inband Management and Powering, Continued

**AC power injector**, continued

The following schematic shows a cabling overview of **WiBAS™ G5 dual-BS** when powering is through power injector with order code **POE-HP-OD-AC:**



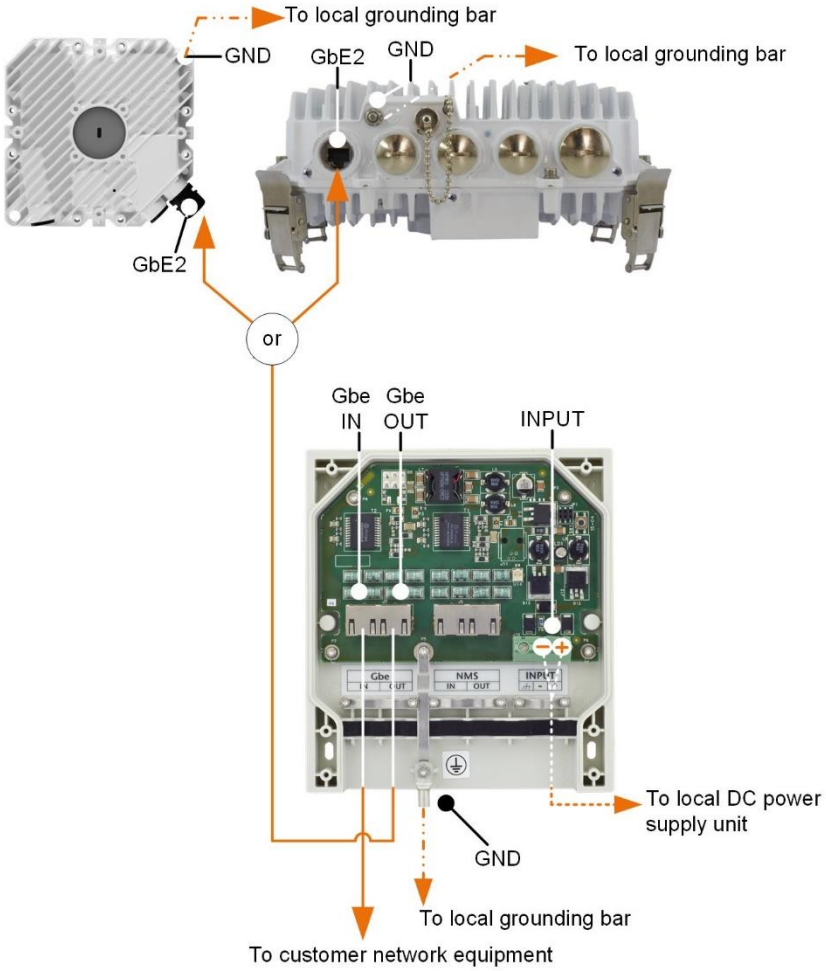

| Marking | Cable Type |
|---|---|
| GbE1, OUTPUT | Gigabit Ethernet (S-FTP) cable for traffic, inband management and superimposed DC power. |
| INPUT | Gigabit Ethernet (S-FTP) cable for traffic and inband management. |
| AC INPUT | AC power supply cord. |
| GND | Grounding cable 16 $mm^2$. |

*Continued on next page*

# Gigabit ETH cable for service Traffic, Inband Management and Powering, Continued

**DC power injector**

The following schematic shows a cabling overview of **WiBAS™ OSDR-HUB** and **WiBAS™ G5 micro-BS** / **evo-BS** when powering is through power injector with order code **PONE-OD-DC:**



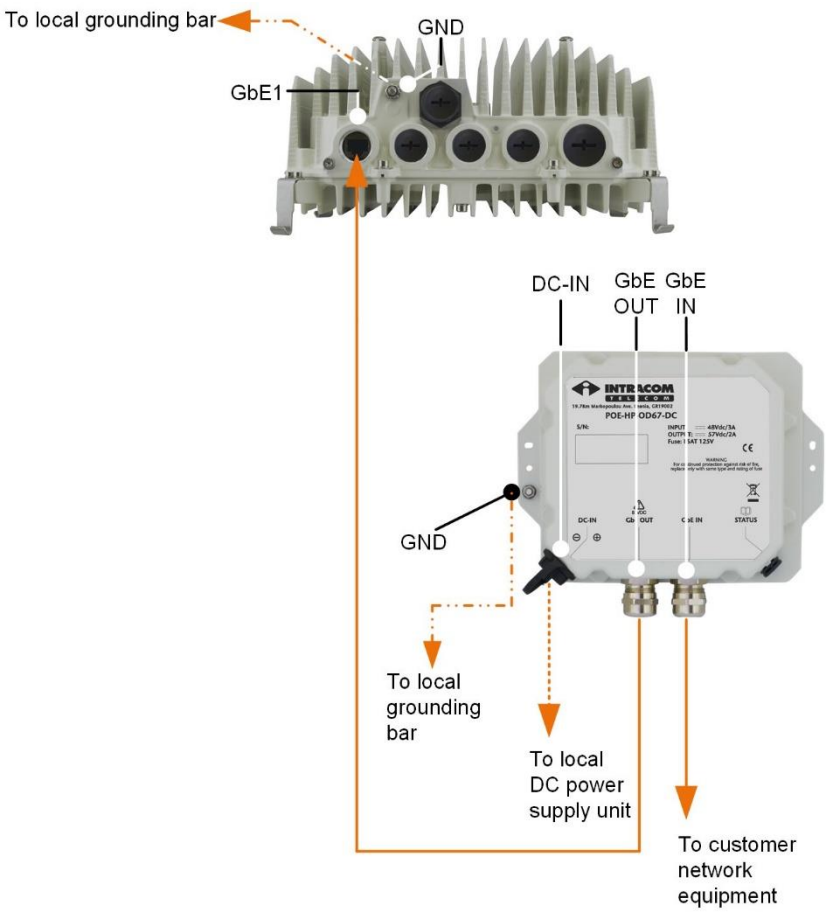

| Marking | Cable Type |
|---|---|
| GbE2, Gbe OUT | Gigabit Ethernet (S-FTP) cable for traffic, inband management and superimposed DC power. |
| Gbe IN | Gigabit Ethernet (S-FTP) cable for traffic and inband management. |
| INPUT | DC power supply cable. |
| GND | Grounding cable 16 $mm^2$ for radio unit and 6 $mm^2$ for **PONE-OD-DC**. |

*Continued on next page*

# Gigabit ETH cable for service Traffic, Inband Management and Powering, Continued

**DC power injector**, continued

The following schematic shows a cabling overview of **WiBAS™ G5 dual-BS** when powering is through power injector with order code **POE-HP-OD67-DC:**



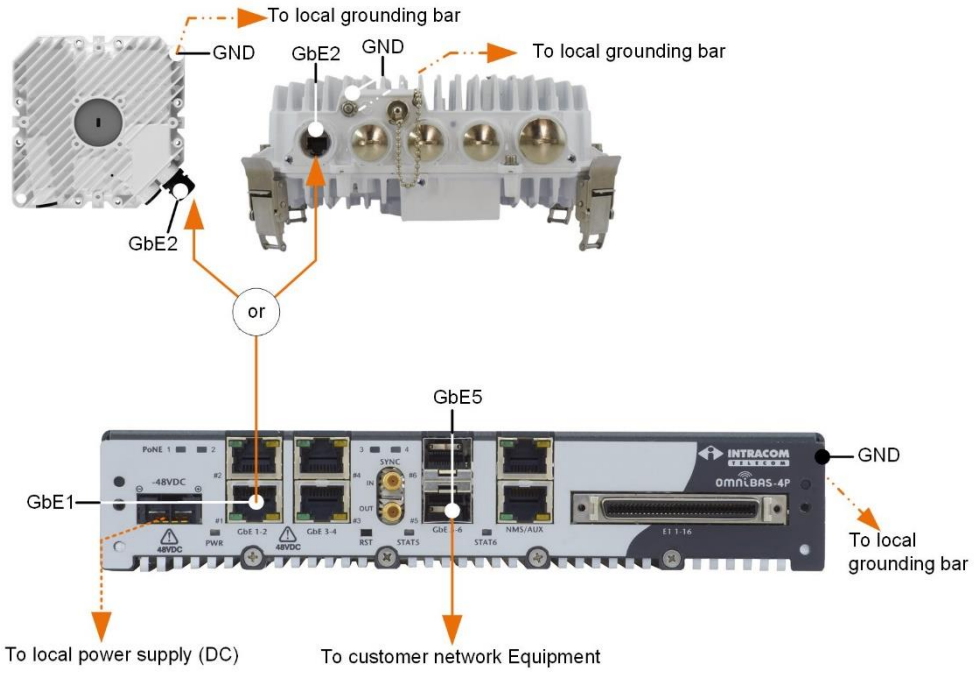

| Marking | Cable Type |
|---|---|
| GbE1, GbE OUT | Gigabit Ethernet (S-FTP) cable for traffic, inband management and superimposed DC power. |
| GbE IN | Gigabit Ethernet (S-FTP) cable for traffic and inband management. |
| DC-IN | DC power supply cable. |
| GND | Grounding cable 16 $mm^2$. |

*Continued on next page*

# Gigabit ETH cable for service Traffic, Inband Management and Powering, Continued

**IDU with POE capability**

The following schematic shows a cabling overview of **WiBAS™ OSDR-HUB** and **WiBAS™ G5 micro-BS** / **evo-BS** when powering is through IDU with POE capability and order code **IDU-O4P:**



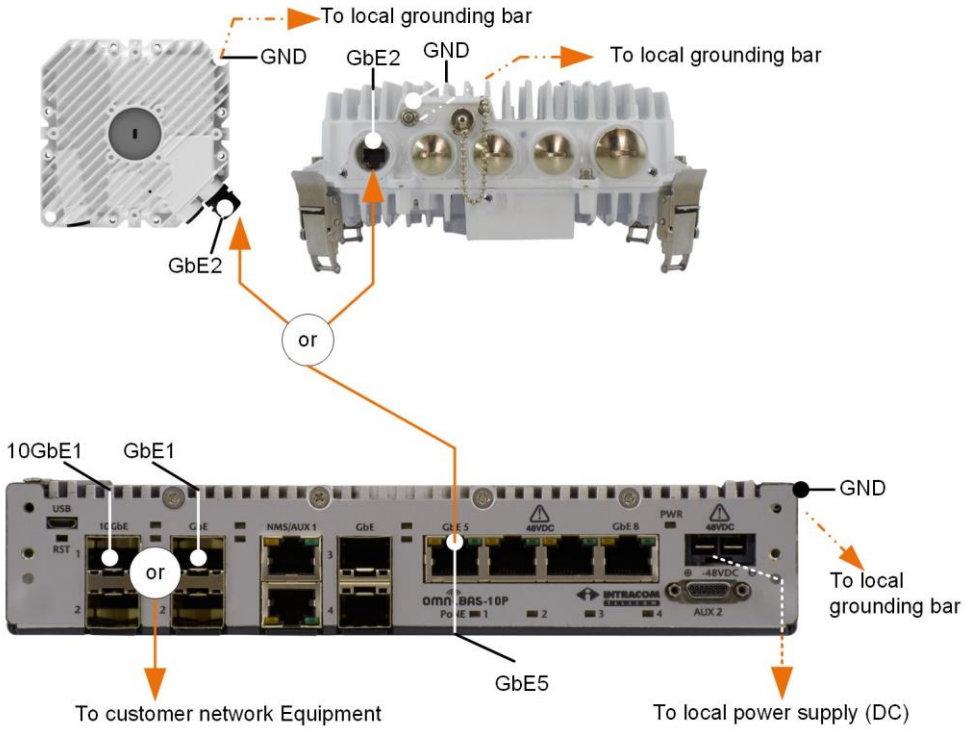

| Marking | Cable Type |
|---|---|
| GbE2, GbE1 | Gigabit Ethernet (S-FTP) cable for traffic, inband management and superimposed DC power. |
| GbE5 | Gigabit Ethernet (S-FTP) cable with Gigabit Ethernet Electrical SFP module **or** Fiber Optic cable with Optical SFP module for providing traffic and inband management to customer network equipment. |
| GND | Grounding cable 16 $mm^2$ for radio unit and 4 $mm^2$ for **IDU-O4P**. |
| -48VDC | **IDU-O4P** DC power supply cable. |

*Continued on next page*

# Gigabit ETH cable for service Traffic, Inband Management and Powering, Continued

**IDU with POE capability**, continued

The following schematic shows a cabling overview of **WiBAS™ OSDR-HUB** and **WiBAS™ G5 micro-BS** / **evo-BS** when powering is through IDU with POE capability and order code **IDU-O10P:**



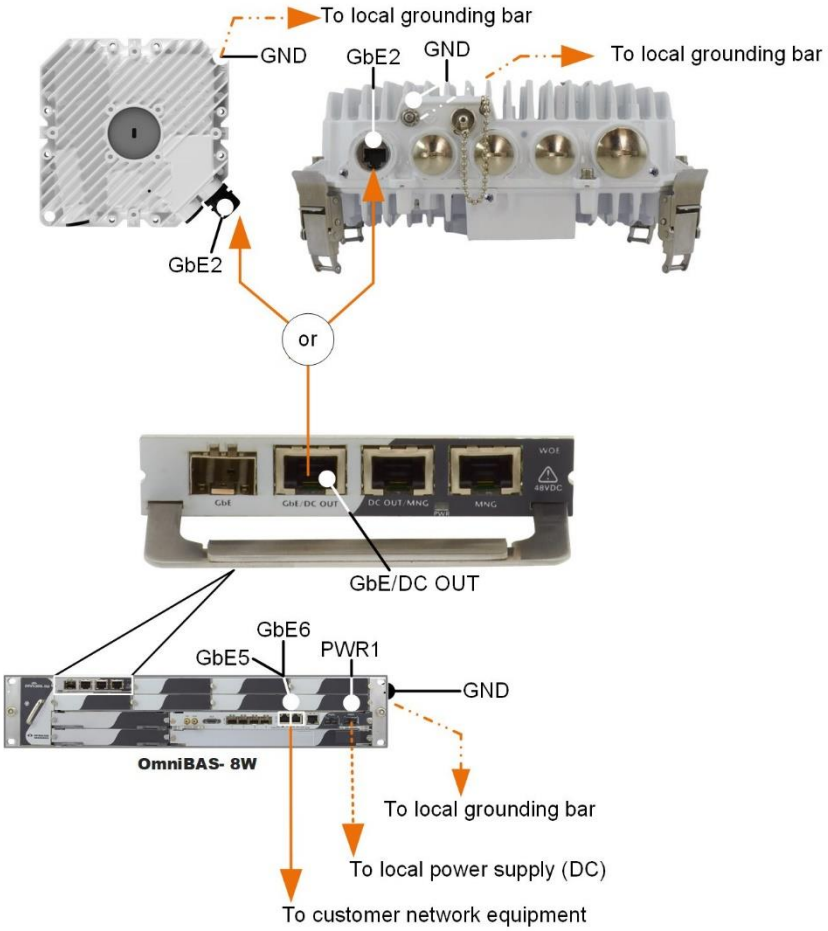

| Marking | Cable Type |
|---|---|
| GbE5 | Gigabit Ethernet (S-FTP) cable for traffic, inband management and superimposed DC power. |
| GbE2,<br>10GbE1<br>GbE1 | Gigabit Ethernet (S-FTP) cable with Gigabit Ethernet Electrical SFP module **or** Fiber Optic cable with Optical SFP module for providing traffic and inband management to customer network equipment. |
| GND | Grounding cable 16 $mm^2$ for radio unit and 4 $mm^2$ for **IDU-O10P**. |
| -48VDC | **IDU-O10P** DC power supply cable. |

*Continued on next page*

# Gigabit ETH cable for service Traffic, Inband Management and Powering, Continued

**IDU with POE capability**, continued

The following schematic shows a cabling overview of **WiBAS™ OSDR-HUB** and **WiBAS™ G5 micro-BS** / **evo-BS** when powering is through IDU with POE capability and modem order code **MOD-O8-MO:**



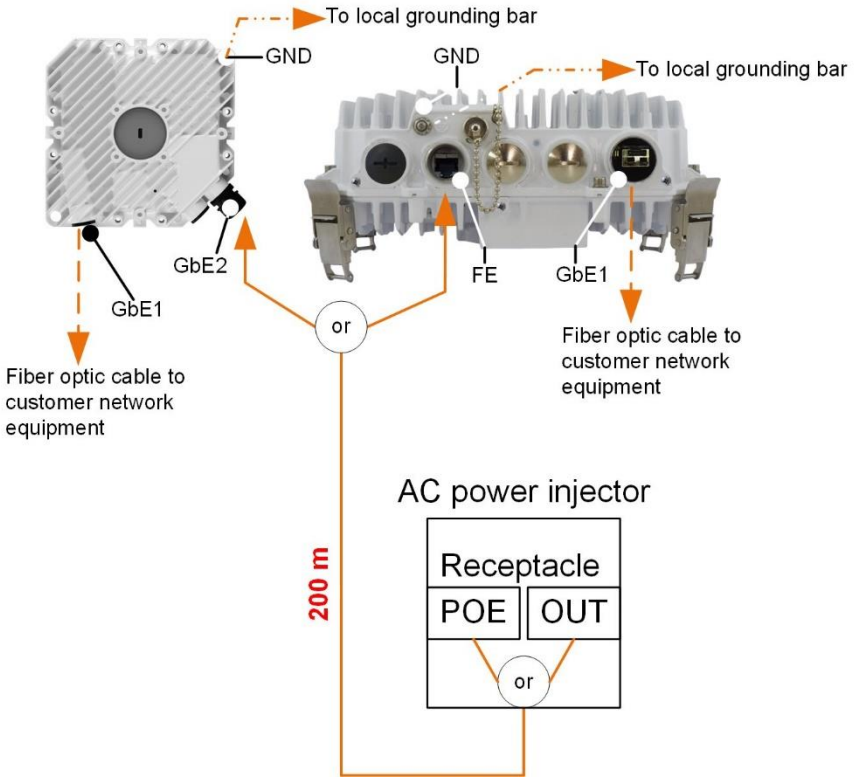

| Marking | Cable Type |
|---|---|
| GbE2, GbE/DC OUT | Gigabit Ethernet (S-FTP) cable for traffic, inband management and superimposed DC power. |
| GbE5-6 | Gigabit Ethernet (S-FTP) cable for traffic and inband management. |
| GND | Grounding cable 16 $mm^2$ for radio unit and 4 $mm^2$ for **OmniBAS™ 4W/8W IDU**. |
| PWR1 | **OmniBAS™ 4W/8W IDU** DC power supply cable. |

# Gigabit ETH cable for service Powering / Fiber Optic cable for service Traffic, Inband Management

**Ethernet cable length restrictions**

The Gigabit Ethernet (S-FTP) cable for service external powering through **AC power injector** applies to the following restriction:

The maximum length of Gigabit Ethernet (S-FTP) cable (Cat5E or Cat6), between **WiBAS™ Base Stations** receptacle and **power injector** receptacles **cannot exceed 200 meters** (requires **1 x 200 meter cable**).

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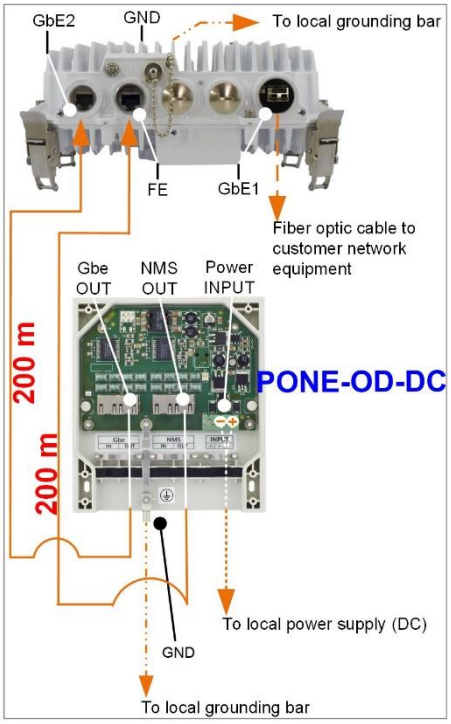
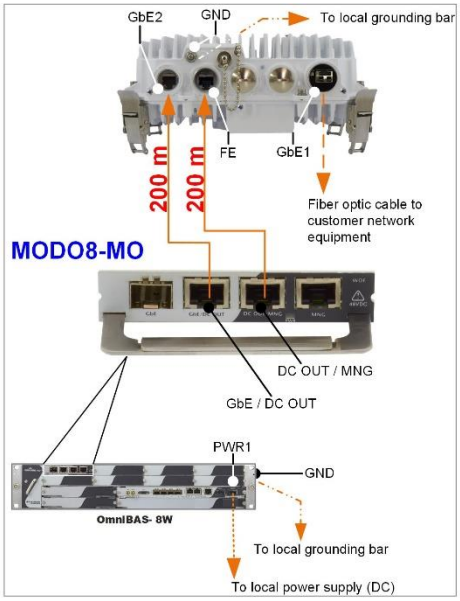
# Gigabit ETH cable for service Powering / Fiber Optic cable for service Traffic, Inband Management, Continued

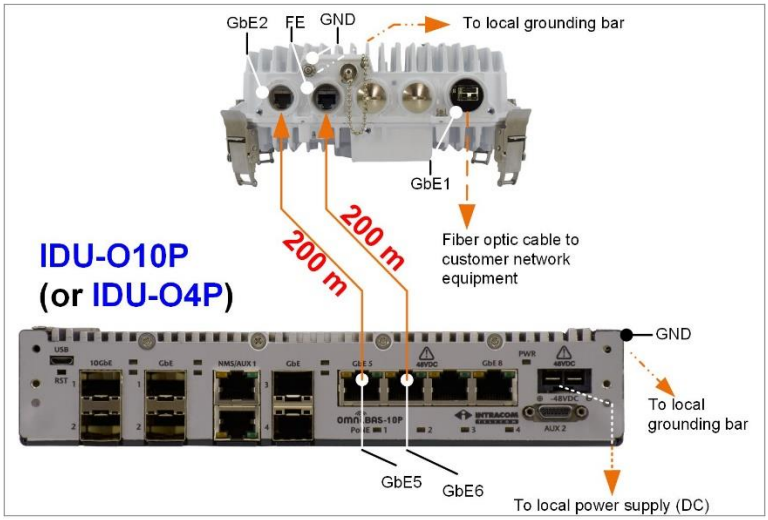
**Ethernet cable length restrictions**, continued

The Gigabit Ethernet (S-FTP) cable for service external powering through **DC power injector** applies to the following restriction:

The maximum length of Gigabit Ethernet (S-FTP) cable (Cat5E or Cat6), between **WiBAS™ OSDR-HUB** receptacles and **power injector** receptacles, **cannot exceed 200 meters** (requires **2 x 200 meter cables in parallel**):

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# Gigabit ETH cable for service Powering / Fiber Optic cable for service Traffic, Inband Management, Continued

**Fiber optic cable length restrictions**

The following tables shows the maximum length of optical fiber cables in combination with the SFP type:

**Optical Fiber Cable Lengths combined with Gigabit Ethernet SFP:**

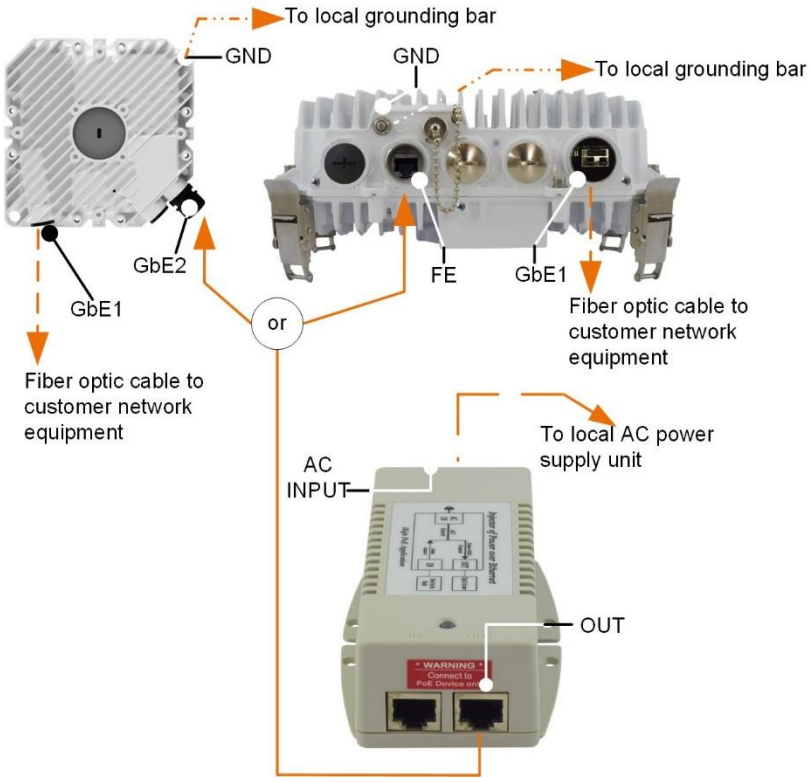
| Optical Fiber Cable Type | SFP Details / Order Code | Max Length (m) |
|---|---|---|
| Single mode | 1000 Base-LX | 5,000 |
| | 1000 Base-LX10 **(SFP-SM-10KM)** | 10,000 |
| | 1000 Base-EX **(SFP-SM-40KM)** | 40,000 |
| | 1000 Base-ZX **(SFP-SM-80KM)** | 80,000 |
| OM1 (62.5/125) Multi-mode | 1000 Base-SX **(SFP-MM-500M)** | 275 |
| OM2 (50/125) Multi-mode | | 550 |

*Continued on next page*

# Gigabit ETH cable for service Powering / Fiber Optic cable for service Traffic, Inband Management, Continued

**AC power injector**

The following schematic shows a cabling overview of **WiBAS™ OSDR-HUB** and **WiBAS™ G5 micro-BS** / **evo-BS** when powering is through power injector with order code **POE-AC56-IDH:**



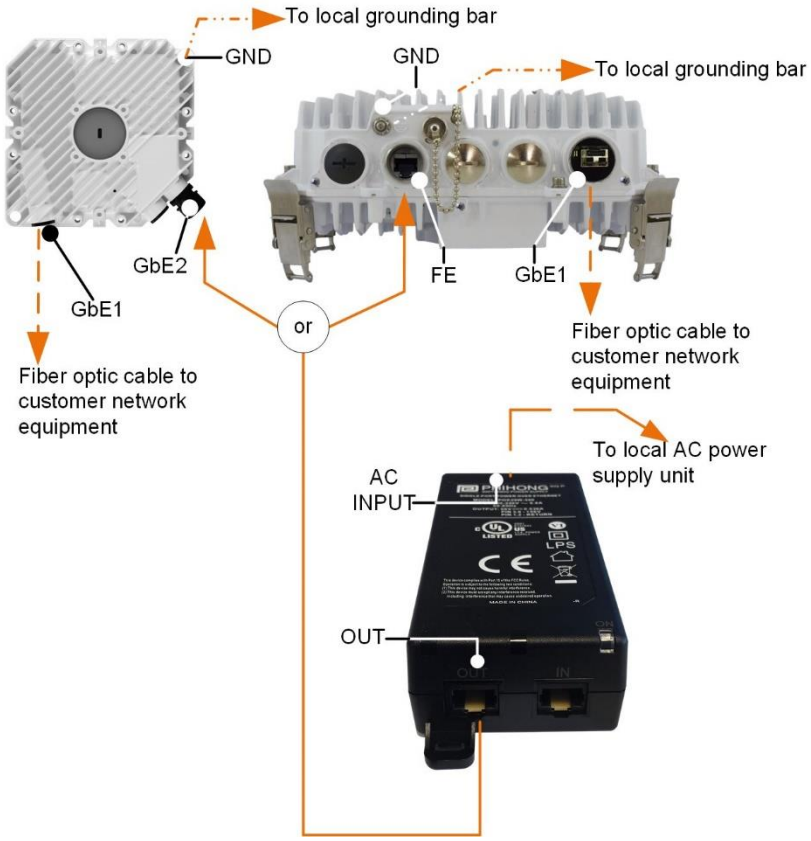

| Marking | Cable Type |
|---|---|
| GbE2, FE, OUT | Gigabit Ethernet (S-FTP) cable for superimposed DC power. |
| GbE1 | Fiber Optic cable with Optical SFP module for traffic and inband management. |
| AC INPUT | AC power supply cord. |
| GND | Grounding cable 16 $mm^2$. |

*Continued on next page*

# Gigabit ETH cable for service Powering / Fiber Optic cable for service Traffic, Inband Management, Continued

**AC power injector**, continued

The following schematic shows a cabling overview of **WiBAS™ OSDR-HUB** and **WiBAS™ G5 micro-BS** / **evo-BS** when powering is through power injector with order code **POE-AC60-ID:**



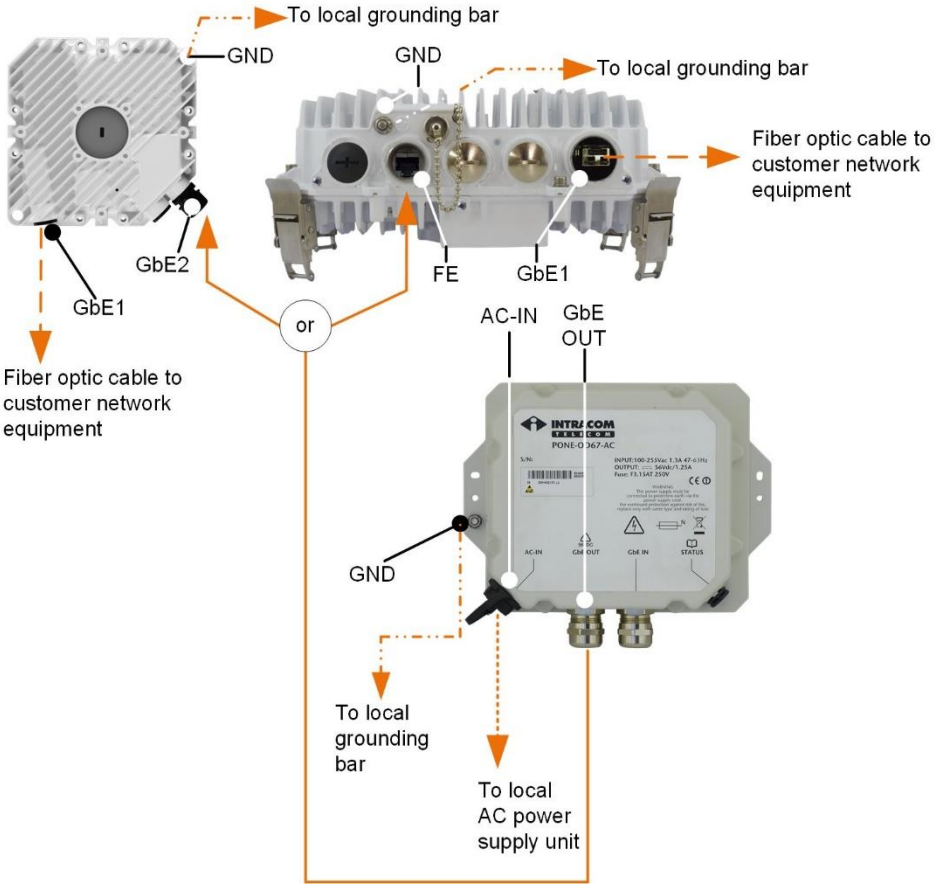

| Marking | Cable Type |
|---|---|
| GbE2, OUT | Gigabit Ethernet (S-FTP) cable for superimposed DC power. |
| GbE1 | Fiber Optic cable with Optical SFP module for traffic and inband management. |
| AC INPUT | AC power supply cord. |
| GND | Grounding cable 16 $mm^2$. |

*Continued on next page*

# Gigabit ETH cable for service Powering / Fiber Optic cable for service Traffic, Inband Management, Continued

**AC power injector**, continued

The following schematic shows a cabling overview of **WiBAS™ OSDR-HUB** and **WiBAS™ G5 micro-BS** / **evo-BS** when powering is through power injector with order code **PONE-OD67-AC:**



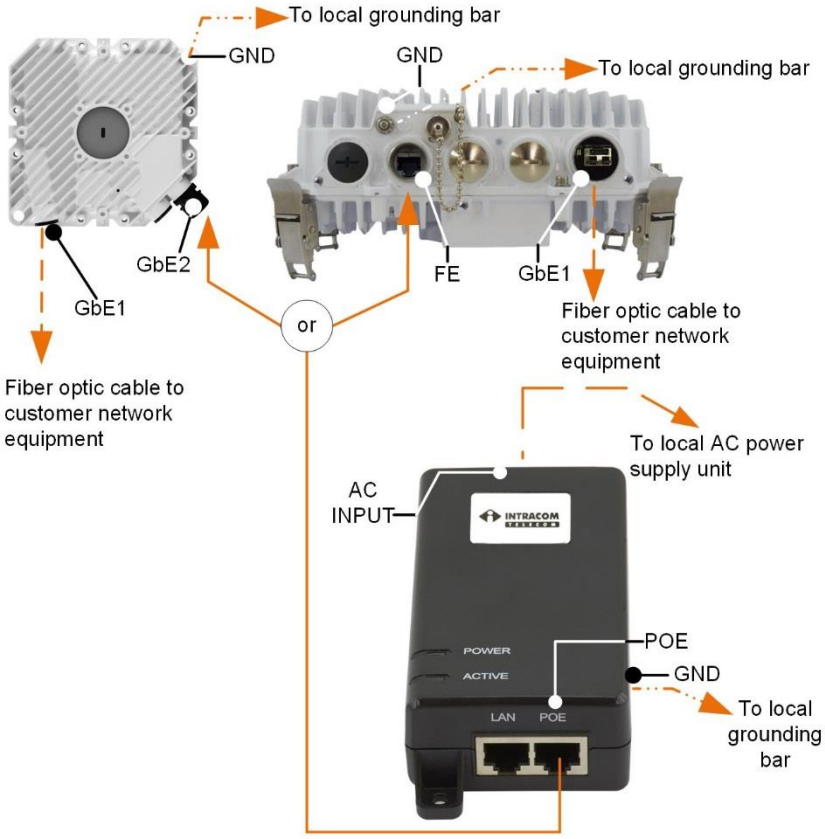

| Marking | Cable Type |
|---|---|
| GbE2, FE GbE OUT | Gigabit Ethernet (S-FTP) cable for traffic, inband management and superimposed DC power. |
| GbE1 | Fiber Optic cable with Optical SFP module for traffic and inband management. |
| AC-IN | AC power supply cable. |
| GND | Grounding cable 16 $mm^2$. |

*Continued on next page*

# Gigabit ETH cable for service Powering / Fiber Optic cable for service Traffic, Inband Management, Continued

**AC power injector**, continued

The following schematic shows a cabling overview of **WiBAS™ OSDR-HUB** and **WiBAS™ G5 micro-BS** / **evo-BS** when powering is through power injector with order code **POE-ID-AC72:**



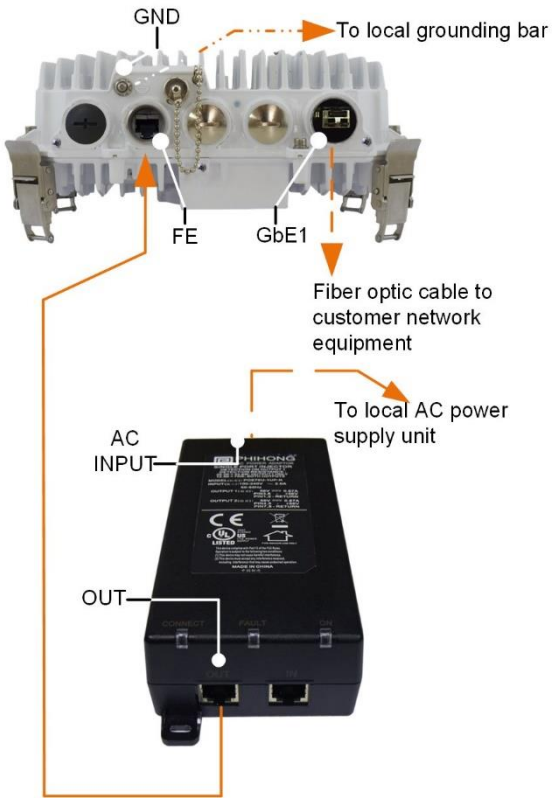

| Marking | Cable Type |
|---|---|
| GbE2, FE, POE | Gigabit Ethernet (S-FTP) cable for superimposed DC power. |
| GbE1 | Fiber Optic cable with Optical SFP module for traffic and inband management. |
| AC INPUT | AC power supply cord. |
| GND | Grounding cable 16 $mm^2$ for radio unit and 6 $mm^2$ for **POE-ID-AC72**. |

*Continued on next page*

# Gigabit ETH cable for service Powering / Fiber Optic cable for service Traffic, Inband Management, Continued

**AC power injector**, continued

The following schematic shows a cabling overview of **WiBAS™ OSDR-HUB** when powering is through power injector with order code **POE-AC75-ID:**



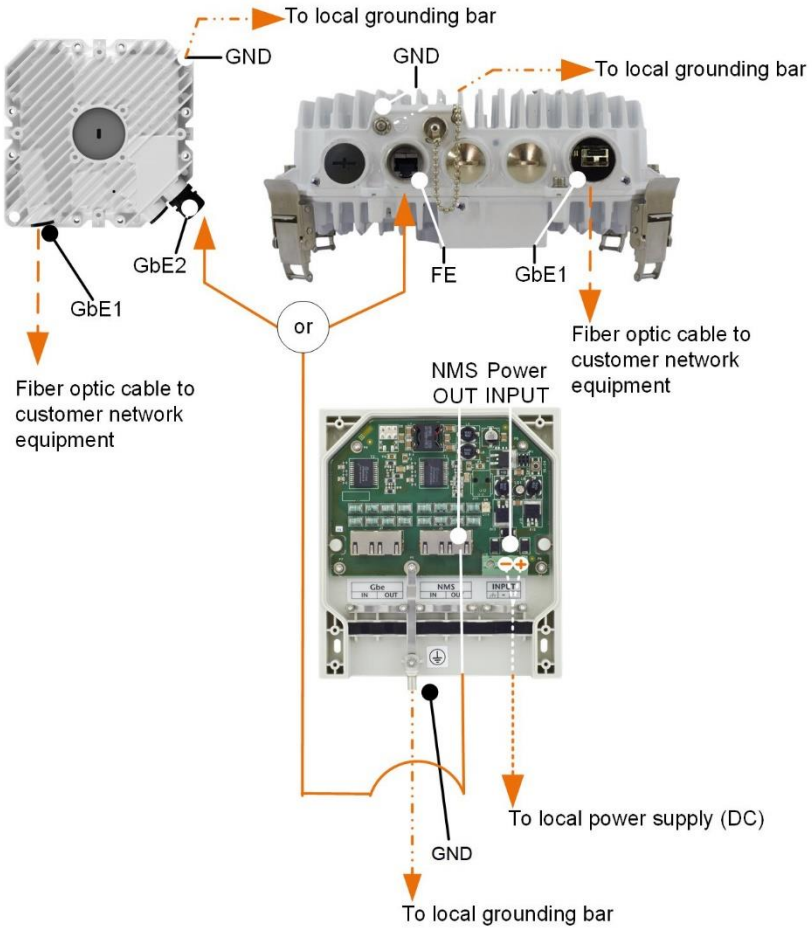

| Marking | Cable Type |
|---|---|
| FE, OUT | Gigabit Ethernet (S-FTP) cable for superimposed DC power. |
| GbE1 | Fiber Optic cable with Optical SFP module for traffic and inband management. |
| AC INPUT | AC power supply cord. |
| GND | Grounding cable 16 $mm^2$. |

*Continued on next page*

# Gigabit ETH cable for service Powering / Fiber Optic cable for service Traffic, Inband Management, Continued

**DC power injector**

The following schematic shows a cabling overview of **WiBAS™ OSDR-HUB** and **WiBAS™ G5 micro-BS** / **evo-BS** when powering is through power injector with order code **PONE-OD-DC:**



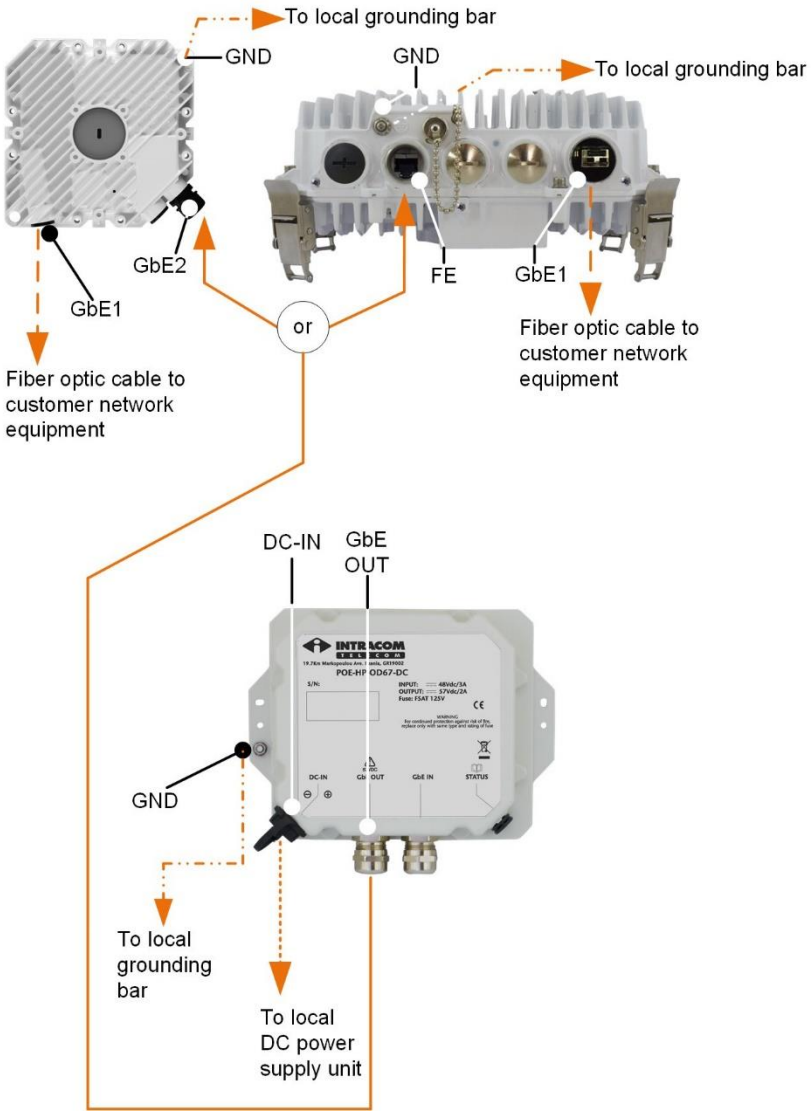

| Marking | Cable Type |
|---|---|
| GbE2, FE, NMS OUT | Gigabit Ethernet (S-FTP) cable for superimposed DC power. |
| GbE#1 | Fiber Optic cable with Optical SFP module for traffic and inband management. |
| INPUT | DC power supply cable. |
| GND | Grounding cable 16 $mm^2$ for radio unit and 6 $mm^2$ for **PONE-OD-DC**. |

*Continued on next page*

# Gigabit ETH cable for service Powering / Fiber Optic cable for service Traffic, Inband Management, Continued

**DC power injector**, continued

The following schematic shows a cabling overview of **WiBAS™ OSDR-HUB** and **WiBAS™ G5 micro-BS** / **evo-BS** when powering is through power injector with order code **POE-HP-OD67-DC:**



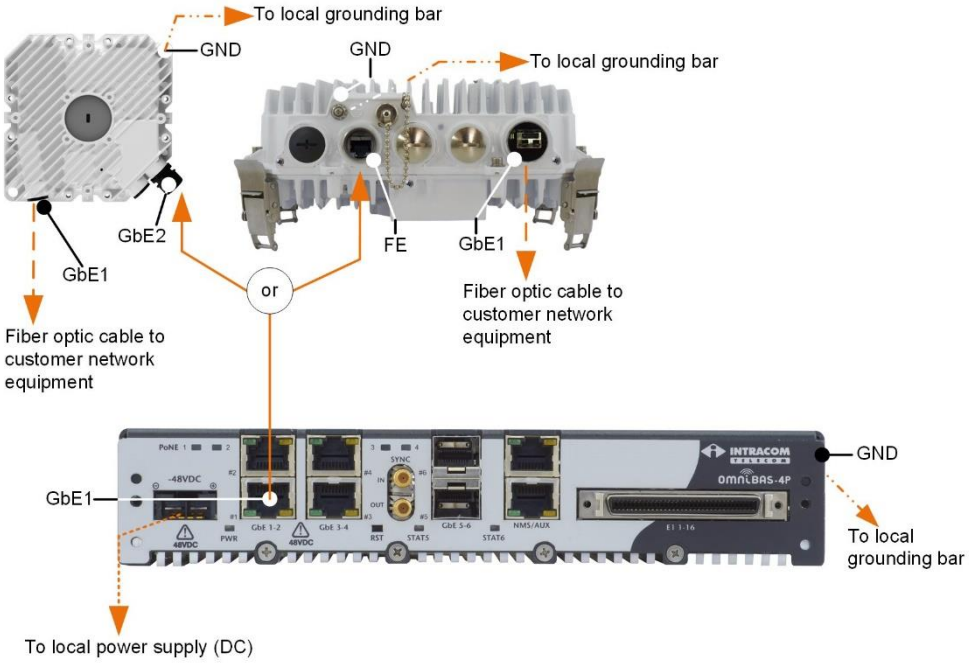

| Marking | Cable Type |
|---|---|
| FE<br>GbE OUT | Gigabit Ethernet (S-FTP) cable for traffic, inband management and superimposed DC power. |
| GbE1 | Fiber Optic cable with Optical SFP module for traffic and inband management. |
| DC-IN | DC power supply cable. |
| GND | Grounding cable 16 $mm^2$. |

*Continued on next page*

# Gigabit ETH cable for service Powering / Fiber Optic cable for service Traffic, Inband Management, Continued

**DC power injector**, continued

The following schematic shows a cabling overview of **WiBAS™ OSDR-HUB** and **WiBAS™ G5 micro-BS** / **evo-BS** when powering is through power injector with order code **IDU-O4P:**




| Marking | Cable Type |
|---|---|
| FE, GbE1 (**IDU-O4P**) | Gigabit Ethernet (S-FTP) cable for superimposed DC power. |
| GbE1 (radio unit) | Fiber Optic cable with Optical SFP module for traffic and inband management. |
| GND | Grounding cable 16 $mm^2$ for radio unit and 4 $mm^2$ for **IDU-O4P**. |
| -48VDC | **IDU-O4P** DC power supply cable. |

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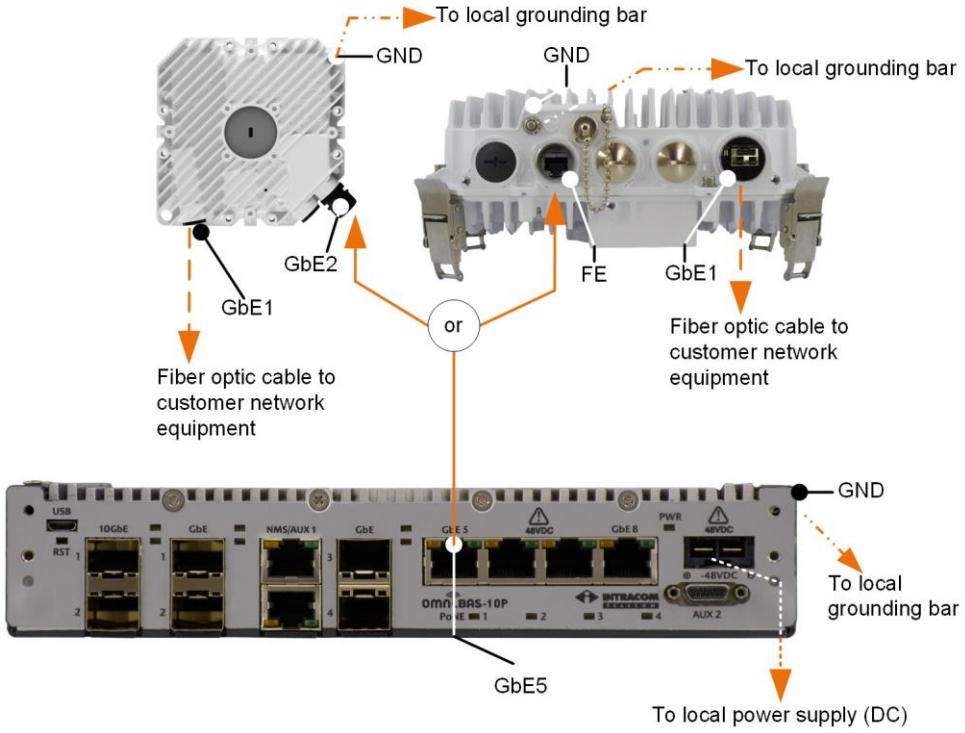
# Gigabit ETH cable for service Powering / Fiber Optic cable for service Traffic, Inband Management, Continued

**DC power injector**, continued

The following schematic shows a cabling overview of **WiBAS™ OSDR-HUB** and **WiBAS™ G5 micro-BS** / **evo-BS** when powering is through power injector with order code **IDU-O10P:**




| Marking | Cable Type |
|---|---|
| FE, GbE5 | Gigabit Ethernet (S-FTP) cable for traffic, inband management and superimposed DC power. |
| GbE1 | Fiber Optic cable with Optical SFP module for traffic and inband management. |
| GND | Grounding cable 16 mm$^2$ for radio unit and 4 mm$^2$ for **IDU-O10P**. |
| -48VDC | **IDU-O10P** DC power supply cable. |

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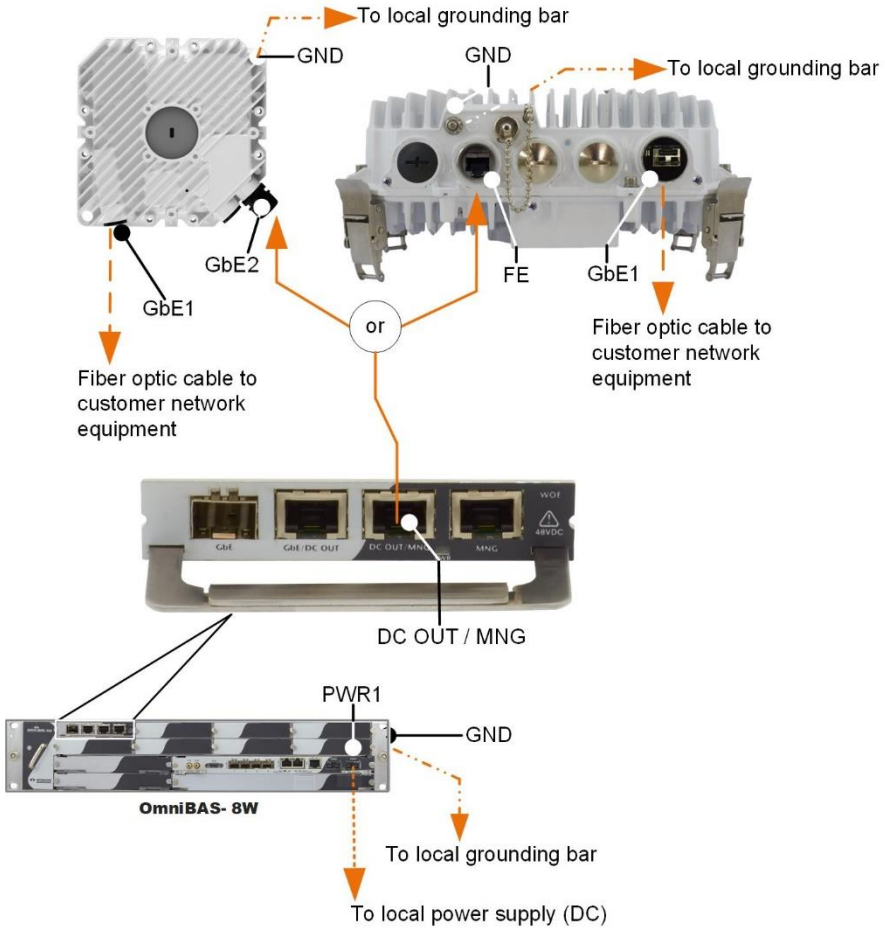
# Gigabit ETH cable for service Powering / Fiber Optic cable for service Traffic, Inband Management, Continued

**DC power injector**, continued

The following schematic shows a cabling overview of **WiBAS™ OSDR-HUB** and **WiBAS™ G5 micro-BS** / **evo-BS** when powering is through power injector with order code **OmniBAS™ 4W/8W IDU:**




| Marking | Cable Type |
|---|---|
| FE, DC OUT/MNG | Gigabit Ethernet (S-FTP) cable for superimposed DC power. |
| GbE1 | Fiber Optic cable with Optical SFP module for traffic and inband management. |
| GND | Grounding cable 16 $mm^2$ for radio unit and 4 $mm^2$ for **OmniBAS™ 4W/8W IDU**. |
| PWR1 | **OmniBAS™ 4W/8W IDU** DC power supply cable. |

# Direct Powering / Fiber Optic cable for service Traffic, Inband Management

**Introduction**

This paragraph describes the cabling overview of WiBAS™ G5 dual-BS when direct powering is used for power and fiber optic cable is used for service traffic and inband management.

**Maximum length of DC power supply cable used for direct powering**

Due to voltage drop along the length of the powering cable and the minimum voltage requirements at the input of the radio power supply, restrictions apply on the length of powering cable **DC-PWR-CAB-3** (2.5 $mm^2$) as follows:

| DC voltage at input of power cable | Lengths (meters) |
|---|---|
| 42 V DC | 60 |
| 44 V DC | 110 |
| 48 V DC | 220 |
| 54 V DC | >300 |

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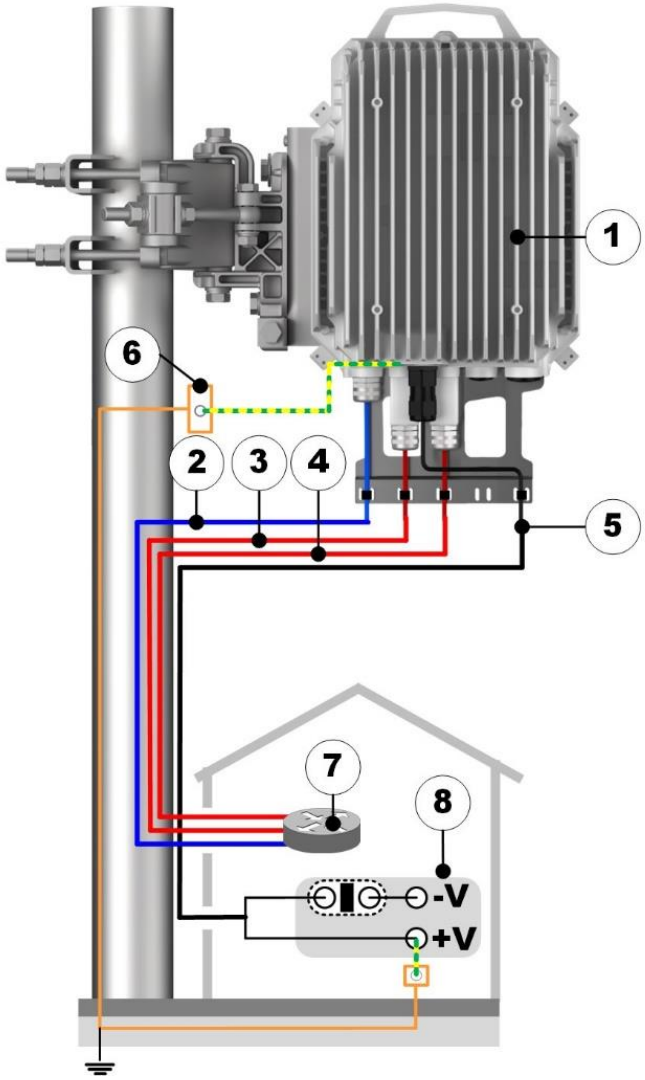
# Direct Powering / Fiber Optic cable for service Traffic, Inband Management, Continued

**Direct powering**




| Marking | Description |
|---|---|
| 1 | WiBAS$^{TM}$ G5 dual-BS with sectoral $90^0$ integrated antenna. |
| 2 | **GbE1** interface for Gigabit Ethernet cable (SF/UTP Cat5E) |
| 3 | **GbE2** interface for fiber optic cable (with SFP module). |
| 4 | **GbE3** interface for fiber optic cable (with SFP module). |
| 5 | 2 x 2.5 mm DC power supply cable. |
| 6 | Site grounding bar for supporting 16 $mm^2$ grounding cable. |
| 7 | Site gateway switch / router. |
| 8 | Site DC power source (and circuit breaker). |

# 3.3. Site Prerequisites

**Site survey**

Site survey should be done before start the installation taking in consideration the following:

**Premises information**

- Site details (address, contact persons, GPS and/or map co-ordinates, etc.).
- Site access and storage information (means of transport, equipment storage and lifting information, etc.).
- Site location maps.

**Network planning**

- Site Coordinates.
- LOS verification (between WiBAS™ Base Stations and WiBAS™ Terminal Stations).
- Rooftop information (height, status, access, dimensions, layout, etc.).
- Information about pre-existing indoor/ outdoor equipment.
- Available mounting space (on the buildings' roofs) to reserve for the installation of the outdoor equipment.

**Site-specific information**

- Mechanical specifications of masts/ towers (type, dimensions/ diameter, material, exterior finishing, etc.).
- Location of appropriate grounding points (bar or terminals).
- Location of appropriate power supply distribution points.
- Location of cable conduits available for routing the cables.
- Location of the network port distributors.
- Total length of the cables required.

**Preparation of the installation premises**

- Access to the installation premises must be facilitated during the installation period.
- Entrances must be large enough to enable the easy transportation of the new equipment.
- The floor must be level, smooth and able to bear the load of the equipment.
- The roof must be engineered to bear the weight of the service personnel and the outdoor equipment.

*Continued on next page*

# Site Prerequisites, Continued

| | |
|---|---|
| **Network port distributors** | • Suitable electrical network port distributor should be available.<br>• The exact location of the network port distributor, as well as the network ports to reserve, should be known prior to installing the equipment.<br>• Also, all the reserved ports on the network port distributors should be qualified and tested before realizing the network connections with the equipment. |
| **Power supply cable routing** | Routing of AC or DC power supply power cable should be implemented as prescribed by the local regulations regarding outdoor electrical installations. |
| **Cable conduits** | Appropriate cable conduits should exist for the routing of installed cables. |
| **Grounding** | Ensure the following:<br>• To make a protective earth connection, use the grounding point located close to the radio unit.<br>• A grounding point (designated GND) should be located close to the mounting position of the radio unit **(0 to 2 m).**<br>• The grounding point must be connected to grounding cable at least **16 mm$^2$** diameter.<br>• An appropriate, low-resistance grounding system as specified by the local regulations is required.<br>• The equipment will be connected to this grounding point, via the supplied grounding cable. This can provides **only** partial protection against Lightning-induced power surges. For more information regarding equipment protection against Lightning-induced power surges please refer to the following paragraph Lightning and surge protection. |
| **Lightning and surge protection** | **A: For Ethernet (SF/UTP) Cables:**<br>Lighting surge protection device (LSP) is required to minimize possibility of equipment damage to any equipment connected to the unit from lighting induced surges.<br><br>**B: Power Supply Cables (for radio unit direct powering):**<br>A power surge protection device (PSP) is required to minimize possibility of equipment damage from lightning induced surges or power supply surges.<br><br>For LSP and PSP details and instructions refer to please refer to **item 1** of Reference manuals on page 14. |

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# Site Prerequisites, Continued

**Circuit breakers**

The following table provides the circuit breakers characteristics for powering of power injectors:

| Order Code | Required Circuit Breaker |
|---|---|
| • **POE-AC75-ID**<br>• **POE-ID-AC72**<br>• **POE-AC60-ID**<br>• **POE-AC56-IDH**<br>• **POE-AC112-ID**<br>• **POE-HP-OD-AC**<br>• **PONE-OD67-AC** | • single-pole MCB 6 A<br>• 230 V AC (voltage rating)<br>• C-curve (for Industrial Applications) |
| • **PONE-OD-DC**<br>• **POE-HP-OD67-DC** | • single-pole MCB 6 A<br>• min 72 V DC (voltage rating)<br>• C-curve (for Industrial Applications) |

**Equipment installation**

- The outdoor equipment, inclusive of the radio transceiver(s) and antenna(s), should be mounted on a mast or on a tower.
- The radio/antenna mounting kit should roughly point to the direction of the opposite unit (based on the site survey data).
- Each radio and antenna unit must be installed according to the radio planning data (height, degrees e.t.c).

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# Site Prerequisites, Continued

**Pole space requirements**

For pole space requirements refer to Appendix C – Antenna Pole Space Requirements.

**Pole diameters**

For pole diameters[1] refer to the paragraphs below:

| Order Code | Pole Diameter |
|---|---|
| **MTK-DMA-BX** | 48 mm to 100 mm |
| **OSDR-360-ANT-MNT-KIT** | |
| **HANT2628360V** | |
| **PONE-OD-DC** | 50 mm to 120 mm |
| **POE-HP-OD67-DC** | |
| **PONE-OD67-AC** | |
| **HANT2690V-MB** or **HANT2690H-MB** | |
| **BRA-1090V-I** or **BRA-1090H-I** | |
| **HANT28180V-MB** or **HANT28180H-MB** | |
| **POE-HP-OD-AC** | 25.5 mm to 101.6 mm |

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[1] Other options ordered separately (see Pole hose clamps ).

# Site Prerequisites, Continued

**Tower or Monopole installation**

If the construction is sensitive to sway angles and twisting then try to install the antenna in a lower height platform (if it is available and LOS is clear) in order to minimize the problem.

- For **pole space requirements** and **applicable pole diameter** refer to antenna installation leaflet.
- The antenna mounting kit should roughly point to the direction of the opposite unit (based on the site survey data).
- Each radio and antenna unit must be installed according to the radio planning data for pole installation (height, degrees e.t.c).
- The outdoor equipment, inclusive of the radio transceiver(s) and antenna(s), should be mounted on a mast or on a tower.
- The pole construction should be rust free and strong enough to handle the weight and restrict movement due to wind velocity (for wind velocity please refer to antenna specifications datasheet).
- The pole longitudinal axis should be perpendicular to the earth's surface (horizontal plane) at the point of installation to allow correct alignment of the antenna.
- An example on how the pole fixing should be implemented is shown below.