

OSDR

Outdoor Software-Defined
Radio (OSDR) platform



Installation & Cabling Manual

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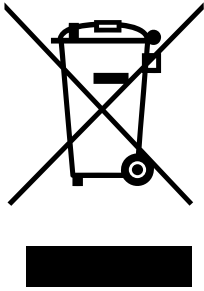
Document Revision History

Previous Edition:	2.2
Current Edition:	3.0

Reasons of Change

M = Modified, A = Added, R = Removed	Details
New materials (M) (A) New installation procedures (A)	• Sectoral 26/28/32 GHz antenna • Sectoral 10.5 GHz antenna • Parabolic antenna 10.5/26/28/32 GHz • M20 gland • Outdoor AC PoNE • Indoor AC PoNE • XPOL tool kit
Contents restructure (M)	Document optimization
Revised installation instructions (M)	• OSDR to sectoral/parabolic antenna • OSDR to panel antenna • Panel antenna mounting kit • ETH cable installation • Optical cable installation • Power injectors installation • Sectoral antenna pole space requirements

Equipment Disposal



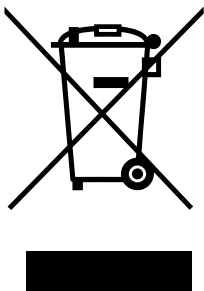
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Η ανακύκλωση, επαναχρησιμοποίηση και άλλες μορφές αξιοποίησης των παλαιών ηλεκτρικών και ηλεκτρονικών συσκευών βοηθούν στη διαφύλαξη των φυσικών πόρων και στην προστασία του περιβάλλοντος.

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Hereby, Intracom S.A. Telecom Solutions declares that the products **OmniBAS™ & WiBAS™** are CE marked in compliance with the essential requirements and other relevant provisions of the Radio Equipment Directive 2014/53/EU, Eco Design Directives 2009/125/EC, 2010/30/EU and with the requirements of the RoHS directive 2011/65/EU.

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

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1. Introduction

About this Document

Scope of Document

The scope of this document is to provide detailed instructions on the installation and cabling of **OSDR** (Outdoor Software-Defined Radio platform) wireless product.



This document applies for installation of all available operation modes: PtMP Hub⁽¹⁾, PtMP TS⁽²⁾ and PtP Node⁽³⁾.

Target audience

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

- Outdoor Radio Unit Installation (pole installation).
- Antenna installation.
- Preparation & Termination of: Ethernet & Grounding cables.
- Laying and Installation of: Ethernet, Fiber Optic & Grounding cables.
- Testing Ethernet cables using Ethernet cable testers.

Reference manuals

The reference manuals are listed below:

Item	Description
1	Lightning & Surge Protection for Intracom Telecom Radios – Installation Practices.
2	OSDR Product Catalog.
3	OSDR System Description.
4	Lightning & Surge Protector (LSP) Datasheet.
5	WiBAS™-Connect Installation.
6	OSDR Commissioning.

Continued on next page

⁽¹⁾ WiBAS™ OSDR Hub.

⁽²⁾ WiBAS™ OSDR Terminal Station (TS). For WiBAS™-Connect refer to item 5 of the [Reference manuals](#).

⁽³⁾ OmniBAS™-OSDR.

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

Locally applicable national and international RF safety requirements must be adhered to when installing the OSDR / antenna system.

Please refer to local regulatory authorities for advice on compliance.

As guidance, for an OSDR 10.5 / 26 / 28 / 32 GHz:

According to EN 50385 and the relative EU Directives (1999/519/EC - general public environment & 2004/40/EC – occupational environment) the OSDR / antenna, should be installed in a location such that it is not possible for workers or members of the public, in the normal course of their work or everyday activities, to gain access closer in front of the antenna than the specified distances in the table below.

The values of the table are given for OSDR at max power and max gain 60 cm terminal antenna.

BAND (GHz)	DISTANCE (meters)			
	WORKER		PUBLIC	
	PtMP Hub	PtMP TS or PtP Node	PtMP Hub	PtMP TS or PtP Node
26 / 28 / 32	0.5	2.55	1	5.1
10.5		1.25		2.5

Continued on next page

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 or antennas.
 - 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 hung at easy-to-view positions.
 - 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 this equipment not expressly approved by INTRACOM S.A. TELECOM SOLUTIONS or the party responsible for compliance could void the user's authority to operate the equipment.
-



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.



Equipment Access

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

The equipment premises is intended to be installed in restricted access.

Continued on next page

Safety Precautions, Continued



Proper Grounding Installation & Equipotential Bonding

Never power on OSDR 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.
-



Local AC Power Source

Ensure that:

- Safety requirements require a single pole circuit-breaker to be employed between the local power DC source and **outdoor AC PoNE**.
 - The circuit breaker must disconnect the mains phase of the AC power.
 - For circuit breaker requirements refer to [Circuit breakers](#) on page [49](#).
-



Local DC Power Source

Ensure that:

- Safety requirements require a single pole circuit-breaker to be employed between the local power DC source and **outdoor DC PoNE**.
 - The circuit-breaker must control (open / close) the negative (-) V pole of the power supply.
 - The positive pole (+) V of the Local DC Power Source, which the wire of DC power cable is terminated on, is grounded.
 - For circuit breaker requirements refer to [Circuit breakers](#) on page [49](#).
-



AC & DC Power Supply Cables

Ensure that:

- Power source cables must be tested for short circuits, open circuit or wrong wiring before installed.
 - The ground wire of the AC power source cable must be connected to the protective earth (ground) point of the mains electricity installation.
-

Continued on next page

Safety Precautions, Continued



Proper Connection of Power Injector

Never connect the Gigabit Ethernet (S-FTP) cables coming from the OUT receptacle of power injector to network switches / routers / laptops.

There is risk of network devices failure due to potential power that is carrying inside the cable.

Connect the OUT receptacle of power injectors to electrical GbE port of radio unit as described in current manual.



Proper Radio Unit Power Up

Do not plug / unplug:

The Ethernet cable to / from the radio unit when the power injector operates (powering through power injector).

There is risk of radio unit failure.

Always ensure that the power supply source / power injector is OFF before plugging / unplugging.



Laser Radiation

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

2. Materials

Scope This chapter describes all the available materials for OSDR installation.

Topics The chapter includes the following topics:

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Mounting Kits	12
Cables	15
Cable Glands and Holder	18
Power Injectors	19
SFP	21
Ancillaries	22
Others	23

OSDR

Radio unit



Oder Code	Description
OSDR-OB-U-DSDS-SB	Full outdoor software defined radio, 10.5/26/28/32 GHz, FDD, GbE. Operation Modes: PtMP Hub, PtMP TS, PtP Node.

Antennas

Antenna types

#	Photo	Description
A		Antenna, sectoral 90°, integrated, 26/28/32 GHz. Includes: • Mounting kit. • Greasing paste. • Installation leaflet.
B		Antenna, sectoral 90°, integrated, 10.5 GHz. Includes: • Mounting kit. • Greasing paste. • Installation leaflet.
C		Antenna, parabolic, 0.3 m, integrated, 10.5/26/28/32 GHz. Includes: • Mounting kit. • Greasing paste. • Installation leaflet.
D		Antenna ⁽¹⁾ , panel, 10.5 GHz. For installation requires the following order codes: • OSDR-ANT-MNT (mounting kit). • GRS-PST (greasing paste).



For antennas order codes please refer to item 2 of [Reference manuals](#) on page 3.

⁽¹⁾ Extra bolts and leaflet concerns only WiBAS™-Connect installation.

Mounting Kits

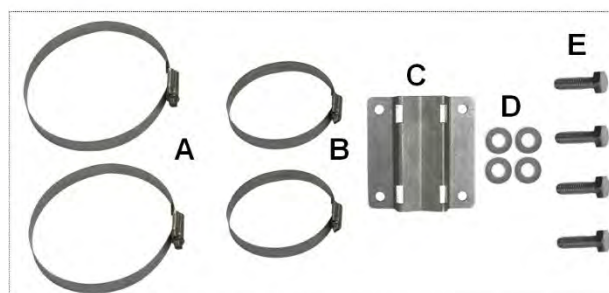
Mounting kit for panel antenna



Oder Code	Description
OSDR-ANT-MNT	Pole/Wall mounting kit for panel antenna 10.5 GHz (pole diameter 48 mm up to 60 mm).

Pole adaptation bracket for panel antenna

Oder Code	Description
INST-ADAPT	Pole adaptation bracket for panel antenna 10.5 GHz (pole diameter 61 mm up to 120 mm). OSDR-ANT-MNT is required for mounting panel antenna 10.5 GHz.



#	Items Description	Qty	Details
A	Hose clamp.	2	For pole diameter 101 mm up to 120 mm.
B	Hose clamp.	2	For pole diameter 61 mm up to 100 mm.
C	Bracket.	1	Pole adaptation bracket.
D	Washers.	4	M8 washers (DIN125A), stainless.
E	Screws.	4	M8x25 hex-headed screw (DIN933), stainless.

Continued on next page

Mounting Kits, Continued

Hooks for panel
antenna



Oder Code	Description
OSDR-PL-ANT-KIT	Hooks for panel antenna 10.5 GHz.

Pole mounting
bracket for
outdoor DC
PoNE



Oder Code	Description
INST-PONE-PL	Mounting bracket for pole installation of PONE-OD-DC power injector (pole diameter 50 to 120 mm / steel hose clamp diameter 64 to 140 mm).

Pole mounting
bracket for
outdoor AC
PoNE



Oder Code	Description
INST-PONE-PL2	Mounting bracket for pole installation of PONE-OD67-AC power injector (pole diameter 50 to 120 mm / steel hose clamp diameter 64 to 140 mm). Note 2 x screws and lock washers are used. The third set (screw and lock washer) is for spare purpose.

Continued on next page

Mounting Kits, Continued

Pole hose clamps

Stainless steel hose clamp for pole installation of **ETH-SRG-OD68** lightning surge protector (one **ETH-SRG-OD68** requires 2 clamps).



The following table shows the available hose clamps:

Item	Order Code	Description
A	ST-CL64-140	Ø 64-140 mm, width = 14.2 mm. For Ø 48-100 mm pole diameter.
B	ST-CL102-178	Ø 102-178 mm, width = 14.2 mm. For Ø 75-149 mm pole diameter.
C	ST-CL172-248	Ø 172-248 mm, width = 14.2 mm. For Ø 150-229 mm pole diameter.
D	ST-CL242-318	Ø 242-318 mm, width = 14.2 mm. For Ø 230-300 mm pole diameter.

Cables

RSSI cable

Order Code / Photo	Description
CAB-RSSI-BNC 	RSSI cable, male BNC to 2 x banana plugs, 75 Ω for measuring OSDR receive signal level in volts (voltmeter is required).

Grounding kit

Order Code / Photo	Description
GND-KIT16-OD 	Grounding kit for OSDR and outdoor AC PoNE. Includes: • 2 x meter yellow/green grounding cable, 16 mm² stranded • 450 V • Heat shrinkable tube, black, d = 9.5 mm x 4.8 mm. • 1 x M5 terminal lug for 16 mm² grounding cable stranded • 1 x M8 terminal lug for 16 mm² grounding cable stranded

Grounding cable

Order Code / Photo	Description
GND-CAB6-ID 	Grounding cable, per meter, yellow/green, 6 mm ² , stranded, 450 V for outdoor DC PoNE.

Ethernet S-FTP cable

Order Code / Photo	Description
ETH-CAB-SFTP 	Shielded Ethernet cable Cat5E (S-FTP), 4 x 2 x AWG24, black, UV-rated, per meter.

Continued on next page

Cables, Continued

Power supply
cables for
outdoor power
injectors

#	Order Code / Photo	Description
A	AC-PWR-CAB 	AC power bulk cable ⁽¹⁾ , 3 x 0.75 mm² , 0.6 / 1 kV, stranded, UV-rated, industrial type, outdoor use, per meter. Used for powering of outdoor AC PoNE (PONE-OD67-AC).
B	DC-PWR-CAB-2 	DC power cable, 2 x 2.5 mm² , PVC, 1 kV, outdoor use, per meter. Used for powering of outdoor DC PoNE (PONE-OD-DC).

Continued on next page

⁽¹⁾ AC connector (**ST-CONN-AC**) is required for cable termination.

Cables, Continued

Fiber optic cables

Prefabricated connectorized fiber optic cables for outdoor use, DX, 2 x LC/PC-LC/PC, available in multi-mode (MM) & single mode (SM) in different lengths.



#	Order Code	Cable Length (m)
A	FBROPTMM-025	25
B	FBROPTMM-050	50
C	FBROPTMM-100	100
D	FBROPTMM-150	150
E	FBROPTMM-200	200
F	FBROPTSM-025	25
G	FBROPTSM-050	50
H	FBROPTSM-100	100
I	FBROPTSM-150	150
J	FBROPTSM-200	200

Cable Glands and Holder

M20 and M25 glands and holders

#	Order Code / Photo	Details
A	M20-GLAND 	OSDR M20 gland for Ethernet cable.
B	OSDR-HOLD-2 	Cable holder for fastening 2 x M20-GLAND (includes 2 x tie wraps: L = 100 mm, D = 18 mm, W = 2.5 mm).
C	M25-GLAND 	OSDR M25 gland for Fiber optic cable.
D	OSDR-HOLD-5 	Cable holder for fastening 4 x M20-GLAND and 1 x M25-GLAND (includes 5 x tie wraps: L = 100 mm, D = 18 mm, W = 2.5 mm).

Continued on next page

Power Injectors

Indoor power injectors

#	Order Code / Photo	Description
A	POE-AC75-ID 	Indoor AC POE – 75 W (Wall installation materials are not included).
B	POE-ID-AC72 	Indoor AC POE – 72 W (Wall installation materials are not included).
C	POE-AC56-IDH 	Indoor AC POE – 56 W (Wall installation materials are not included).
D	IDU-O4P 	Indoor OmniBAS™-4P (provides PoNE-enabled interfaces to up to 4 x OSDR units through 4 x GbE interfaces).

Power Injectors, Continued

Outdoor power injectors

#	Order Code / Photo	Description
A	PONE-OD-DC 	Outdoor DC PoNE – 60 W - For wall installation the package includes: – 4 x screws and wall plugs. – 1 x M4 grounding terminal (for terminating 6 mm² grounding cable (GND-CAB6-ID)). - For pole installation the INST-PONE-PL is required.
B	PONE-OD67-AC 	Outdoor AC PoNE – 62.7 W - For wall installation the package includes: – 1 x M5 grounding steel nut (for terminating 16 mm² grounding cable (GND-KIT16-OD)). – 2 x M20 steel cable glands (for Ethernet cable (ETH-CAB-SFTP) with RJ-45 (ST-RJ45) connector). – 1 x AC power connector (for terminating AC power supply cable (AC-PWR-CAB)). – 2 x washers, screws and wall plugs. - For pole installation the INST-PONE-PL2 is required.

SFP

Electrical SFP module

Oder Code / Photo	Description
SFP-ELGFE-IN 	Electrical SFP for 10/100/1000 Base-T operation.

Optical SFP module



#	Order Code	Description
A	SFP-MM-500M	SFP, multi-mode, up to 500 m, 1.25 Gbit/s, 850 nm.
B	SFP-SM-10KM	SFP, single mode, up to 10 Km, 1.25 Gbit/s, 1310 nm.
C	SFP-SM-40KM	SFP, single mode, up to 40 Km, 1.25 Gbit/s, 1310 nm.
D	SFP-SM-80KM	SFP, single mode, up to 80 Km, 1.25 Gbit/s, 1550 nm.

Ancillaries

Others

Item	Order Code / Photo	Description
A	CAB-TIE-UV 	Cable tie, 500 x 12.5 mm, black, UV-resistant. One tie is recommended per cable meter.
B	ST-RJ45 	RJ-45 connector, shielded for S-FTP cable termination (ETH-CAB-SFTP).
C	ETH-SRG-OD68 	Outdoor lightning surge protector with IP68 ingress protection for Ethernet lines (one ETH-SRG-OD68 protects one Ethernet line). Grounding An M4 grounding screw is pre-installed on the device for connection with 16 mm ² grounding cable. Can be combined with GND-KIT16-OD (not included).

Others

Tool kit

Item	Order Code / Photo	Description
A	SEC-ANT-XPOL-KIT 	Tool kit for adjusting the antenna verticality with respect to the ground.

Tools

Item	Order Code / Photo	Description
A	CRIMP-TOOL-S 	Hand crimping tool for RJ-45 connector (ST-RJ45).
B	TOOL-M20 	Optional tool for M20 gland. Used for installation of: • OSDR 2 x M20 glands side-by-side • Outdoor AC power injector (PONE-OD67-AC) M20 gland.

3. Before Starting the Installation

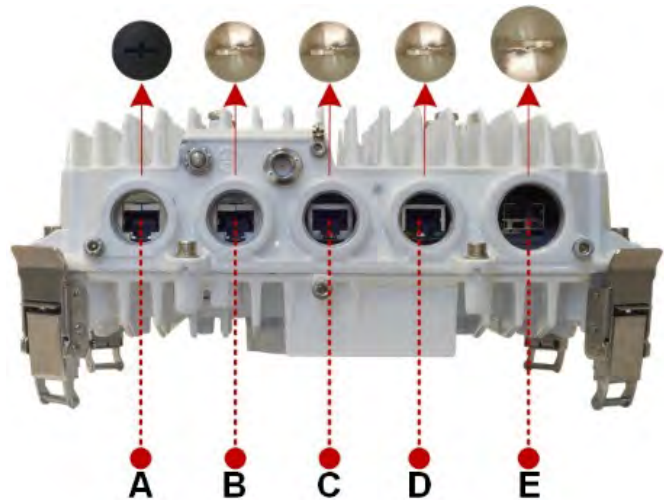
Scope	This chapter describes all the prerequisites that must be considered prior to installing the OSDR equipment.
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Topics	The chapter includes the following topics:
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3.1. Radio Unit View

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 (OSDR 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.

Continued on next page

Radio Unit View, Continued

Label

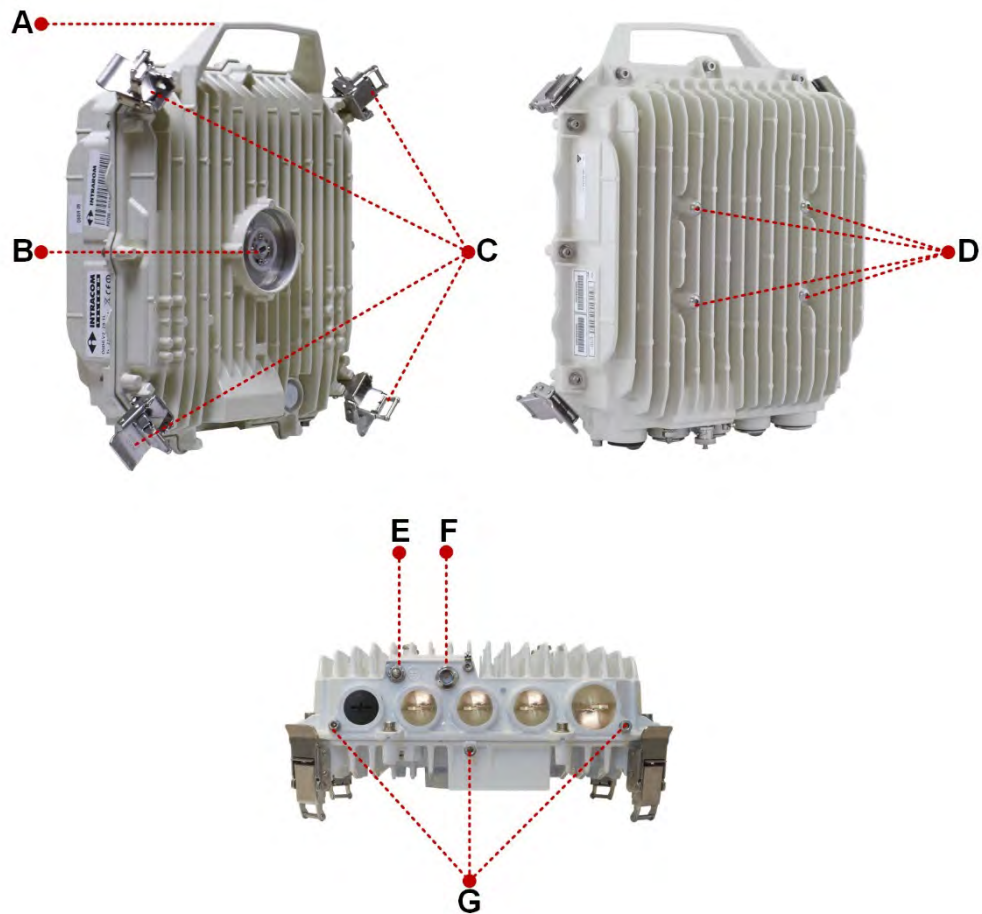


#	Description
1	Product description.
2	Frequency band.
3	OSDR determination as <u>L</u> ow or <u>H</u> igh in the link pair.
4	Duplex spacing (MHz).
5	Sub-band (01 up to 18).
6	Transmit frequencies.
7	Receive frequencies.

Continued on next page

Radio Unit View, Continued

Other points



#	Marking	Description	Use
A	-	Anchor point	To carry OSDR unit.
B	-	Wave guide	To install antenna feeder.
C	-	Clamps	To mount antenna.
D	-	Female threads for M5 screws.	To install mounting kit for panel antenna.
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.
G	-	Female threads for screws.	To install cable holder.

3.2. Radio Unit Cabling

Introduction

This topic describes the cabling overview, as follows:

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Gigabit ETH cable for service Traffic, Inband Management and Powering	29
Fiber Optic cable for service Traffic and Inband Management / Gigabit Ethernet (S-FTP) cable for service Powering	37



The following instructions refers to cabling overview **without** using any additional device for lightning surge protection.

Gigabit ETH cable for service Traffic, Inband Management and Powering

Cable length restriction

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

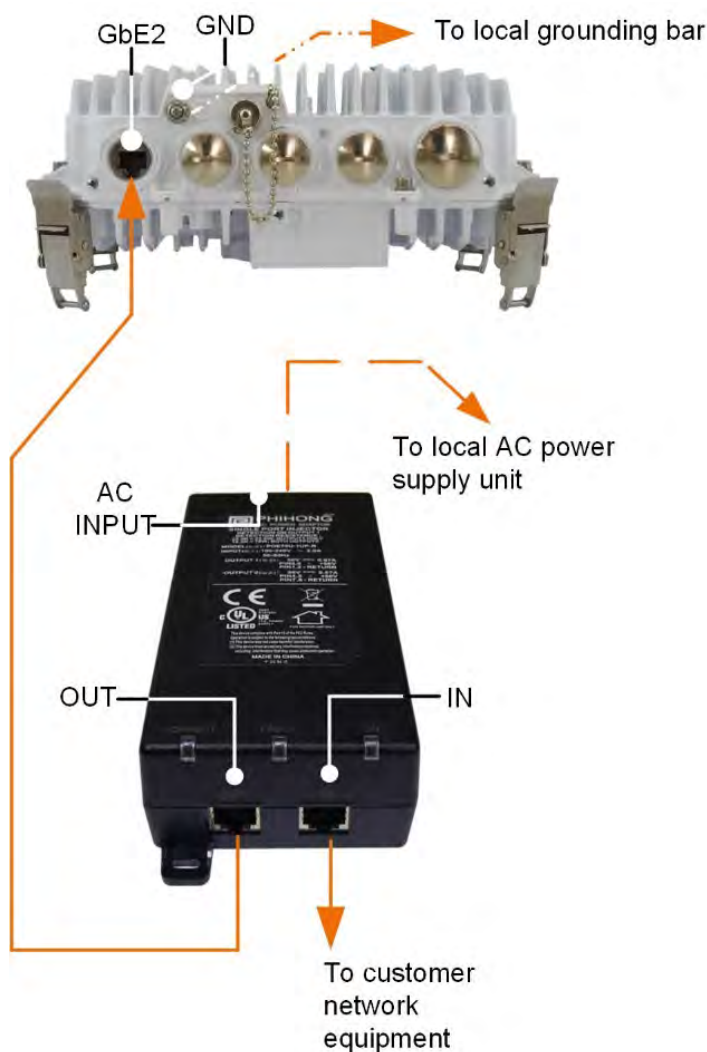
The **maximum length** of Gigabit Ethernet (S-FTP) cable (Cat5E or Cat6), between **OSDR receptacle (GbE2)** and **customer network receptacle** cannot exceed 100 meters.

Continued on next page

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

Cabling overview using AC POE

The following schematic shows a cabling overview of OSDR radio unit when powering is through an **indoor AC POE (75W)**:



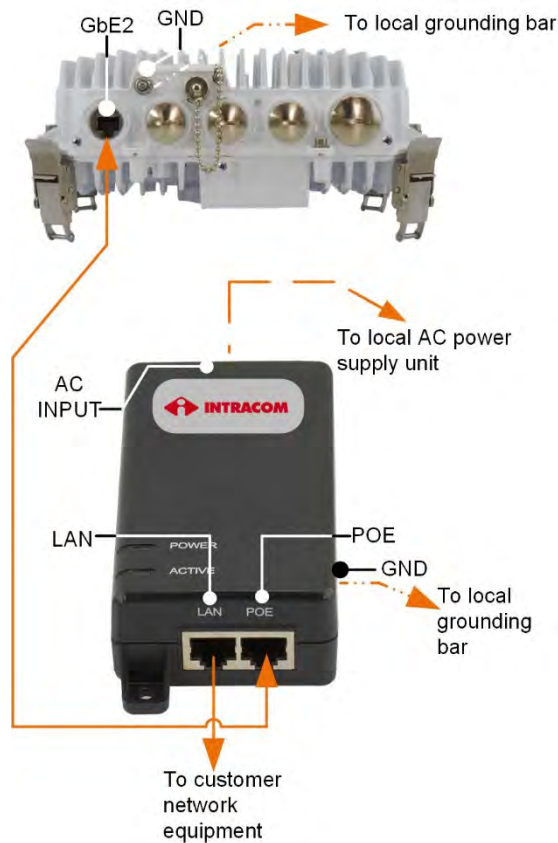
Marking	Cable Type
GbE#2 and OUT	Gigabit Ethernet (S-FTP) cable for traffic, inband management and superimposed DC power.
IN	Gigabit Ethernet (S-FTP) cable for traffic and inband management.
AC INPUT	AC power supply cord.
GND	Grounding cable 16 mm ² for radio unit.

Continued on next page

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

Cabling overview using AC POE, continued

The following schematic shows a cabling overview of OSDR radio unit when powering is through an **indoor AC POE (72W)**:



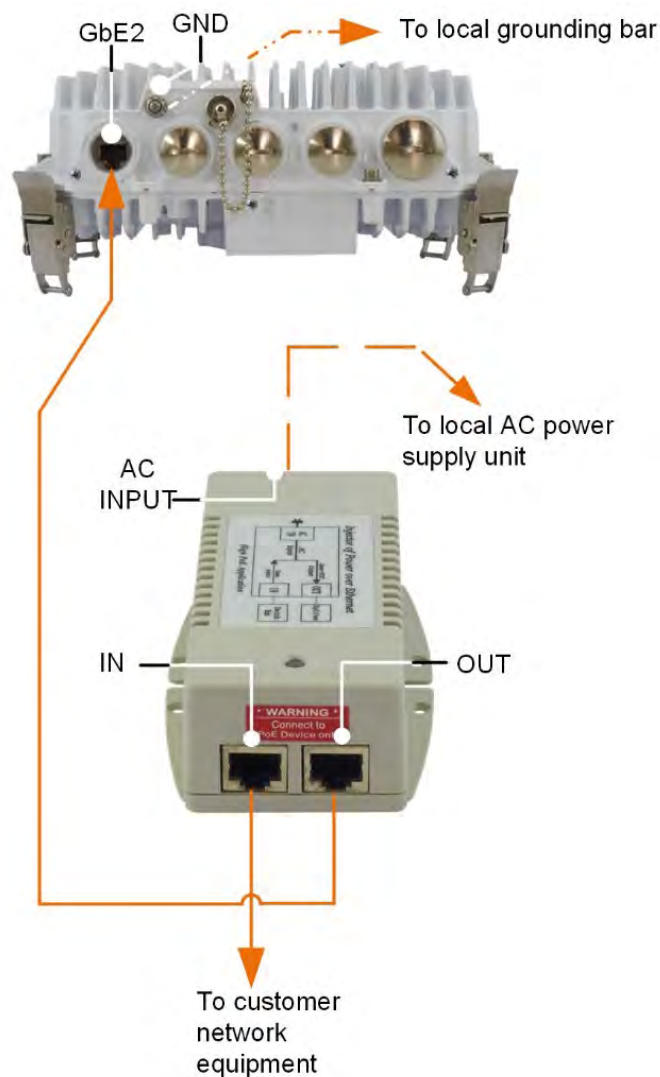
Marking	Cable Type
GbE#2 and POE	Gigabit Ethernet (S-FTP) cable for traffic, inband management and superimposed DC power.
LAN	Gigabit Ethernet (S-FTP) cable for traffic and inband management.
AC INPUT	AC power supply cord.
GND	Grounding cable 16 mm ² for radio unit and 6 mm ² for POE.

Continued on next page

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

Cabling overview using AC POE, continued

The following schematic shows a cabling overview of OSDR radio unit when powering is through an **indoor AC POE (56W)**:



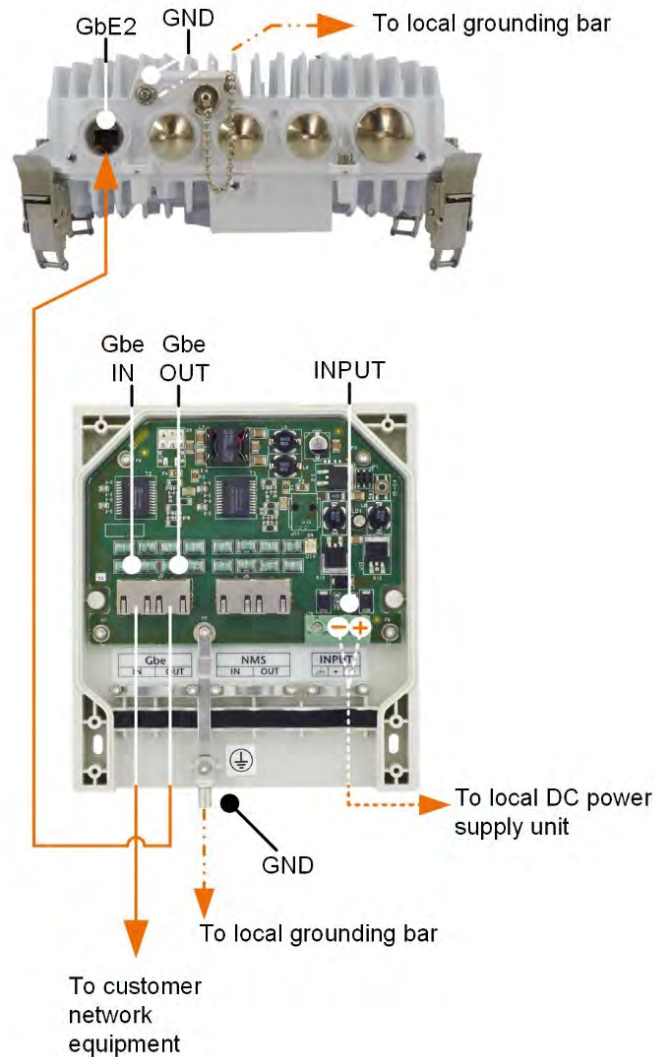
Marking	Cable Type
GbE#2 and OUT	Gigabit Ethernet (S-FTP) cable for traffic, inband management and superimposed DC power.
IN	Gigabit Ethernet (S-FTP) cable for traffic and inband management.
AC INPUT	AC power supply cord.
GND	Grounding cable 16 mm ² for radio unit.

Continued on next page

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

Cabling overview using DC PoNE

The following schematic shows a cabling overview of OSDR radio unit when powering is through an **outdoor DC PoNE**:



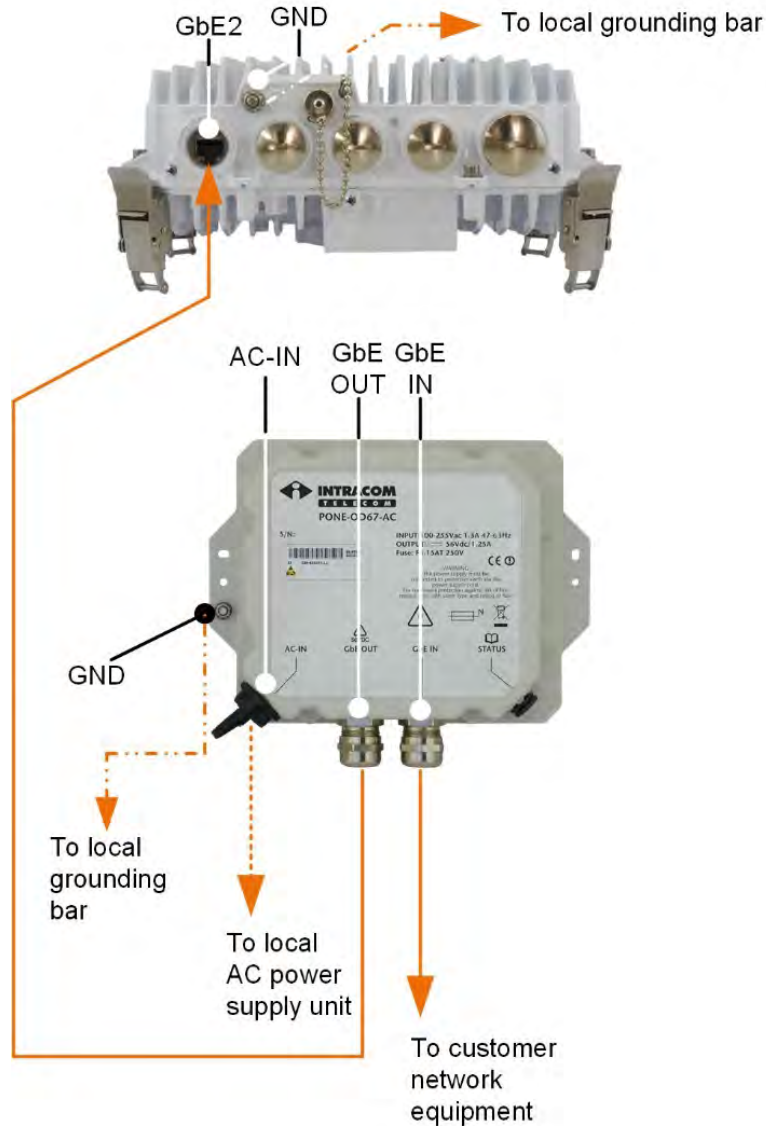
Marking	Cable Type
GbE#2 and Gbe#OUT	Gigabit Ethernet (S-FTP) cable for traffic, inband management and superimposed DC power.
Gbe#IN	Gigabit Ethernet (S-FTP) cable for traffic and inband management.
INPUT	DC power supply cable.
GND	Grounding cable 16 mm ² for radio unit and 6 mm ² for PoNE.

Continued on next page

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

Cabling overview using DC PoNE, continued

The following schematic shows a cabling overview of OSDR radio unit when powering is through an **outdoor AC PoNE**:



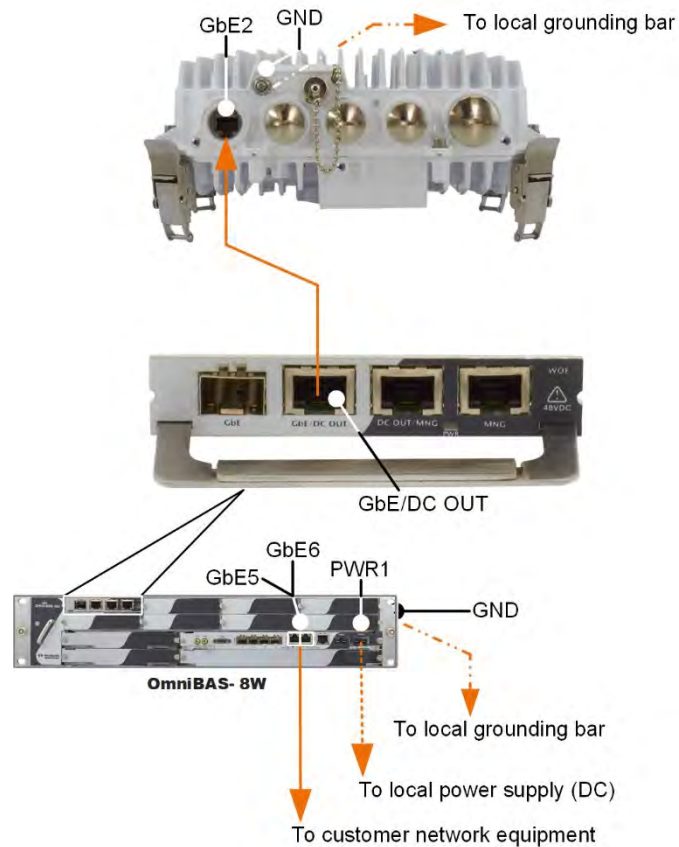
Marking	Cable Type
GbE#2 and GbE#OUT	Gigabit Ethernet (S-FTP) cable for traffic, inband management and superimposed DC power.
GbE#IN,	Gigabit Ethernet (S-FTP) cable for traffic and inband management.
AC-IN	AC power supply cable.
GND	Grounding cable 16 mm ² .

Continued on next page

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

Cabling overview using DC PoNE, continued

The following schematic shows a cabling overview of OSDR radio unit when powering is through an **indoor OmniBAS™ 4W/8W**:



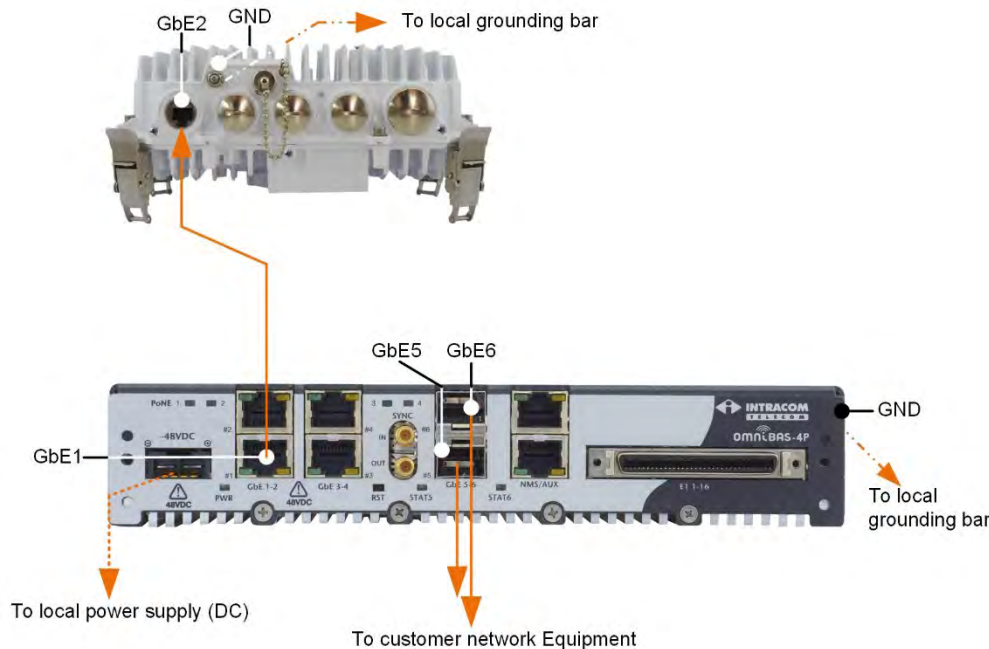
Marking	Cable Type
GbE#2 and GbE/DC OUT	Gigabit Ethernet (S-FTP) cable for traffic, inband management and superimposed DC power.
GbE#5-6	Gigabit Ethernet (S-FTP) cable for traffic and inband management.
INPUT	DC power supply cable.
GND	Grounding cable 16 mm ² for radio unit and 4 mm ² for OmniBAS™ – 4W/8W.
PWR1	OmniBAS™ – 4W/8W DC power supply cable.

Continued on next page

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

Cabling overview using DC PoNE, continued

The following schematic shows a cabling overview of OSDR radio unit when powering is through an indoor OmniBAS™ 4P:



Marking	Cable Type
GbE#1 (OmniBAS™-4P) and GbE#2	Gigabit Ethernet (S-FTP) cable for traffic, inband management and superimposed DC power.
GbE#5, 6	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 mm² for radio unit and 4 mm² for OmniBAS™ – 4W/8W.
-48VDC	OmniBAS™ – 4P DC power supply cable.

Fiber Optic cable for service Traffic and Inband Management / Gigabit Ethernet (S-FTP) cable for service Powering

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

Fiber Optic cable for service Traffic and Inband Management / Gigabit Ethernet (S-FTP) cable for service Powering, Continued

Gigabit Ethernet (S-FTP) cable length restriction – when AC POE is used

The Gigabit Ethernet (S-FTP) cable for service external powering applies to the following restriction:

The **maximum length** of Gigabit Ethernet (S-FTP) cable (Cat5E or Cat6), between **OSDR receptacle (GbE2 or FE)** and **power injector receptacle (POE or OUT)** cannot exceed 200 meters (1 x 200 meter cable).



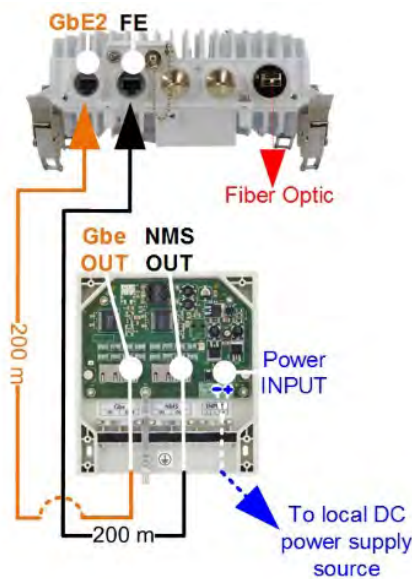
For complete cabling overview refer to [Cabling overview using AC POE](#) on page 39.

Gigabit Ethernet (S-FTP) cable length restriction – when DC PoNE is used

The Gigabit Ethernet (S-FTP) cable for service external powering applies to the following restriction:

The **maximum length** of Gigabit Ethernet (S-FTP) cable (Cat5E or Cat6), between **OSDR receptacle (GbE2 or FE)** and **power injector receptacle (Gbe OUT/NMS OUT for PONE-OD-DC or DC OUT/MNG – GbE/DC OUT for OmniBAS™-8W or GbE1/GbE2 for OmniBAS™-4P)** cannot exceed 200 meters (requires 2 x 200 meter cables in parallel).

See below an example using **PONE-OD-DC**



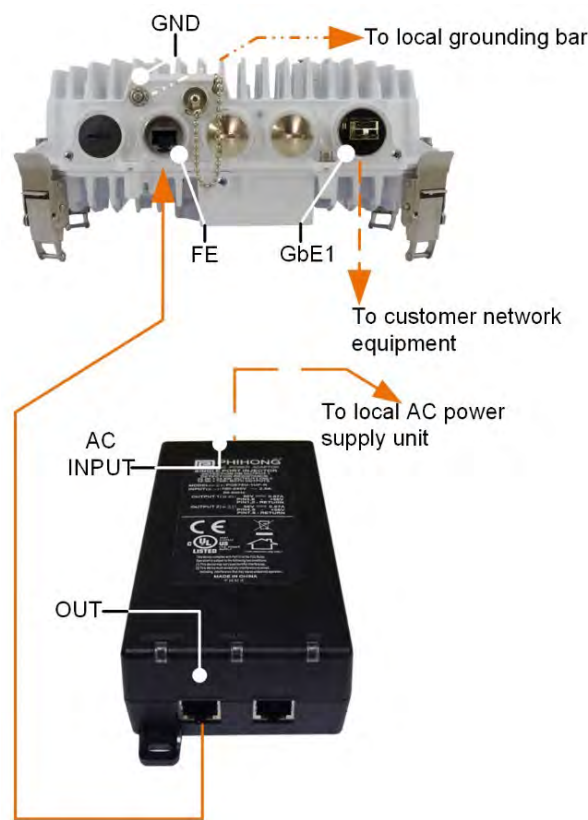
For complete cabling overview refer to [Cabling overview using DC PoNE](#) on page 42.

Continued on next page

Fiber Optic cable for service Traffic and Inband Management / Gigabit Ethernet (S-FTP) cable for service Powering, Continued

Cabling overview using AC POE

The following schematic shows a cabling overview of OSDR radio unit when powering is through an **indoor AC POE (75W)**:



Marking	Cable Type
FE and OUT	Gigabit Ethernet (S-FTP) cable for superimposed DC power.
GbE#1	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.



External powering can be provided either by GbE2 or FE.

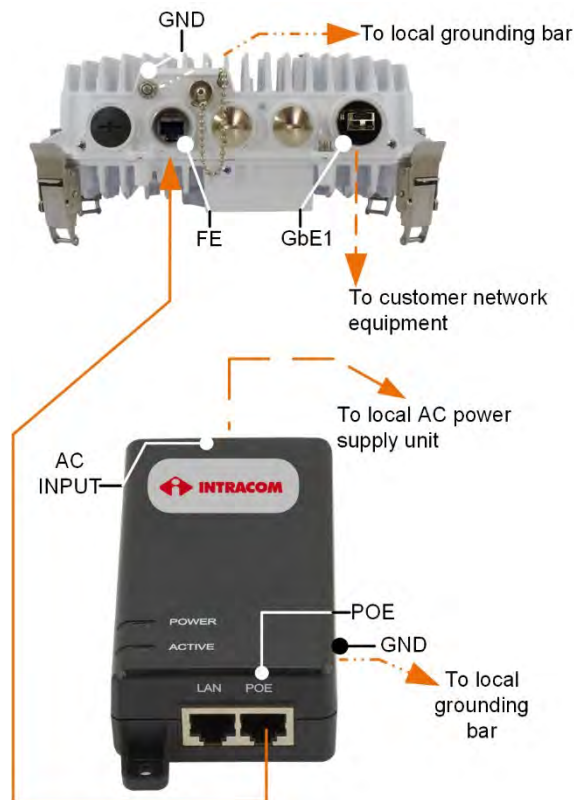
For GbE2 powering see [Gigabit ETH cable for service Traffic, Inband Management and Powering](#) on page 29.

Continued on next page

Fiber Optic cable for service Traffic and Inband Management / Gigabit Ethernet (S-FTP) cable for service Powering, Continued

Cabling overview using AC POE, continued

The following schematic shows a cabling overview of OSDR radio unit when powering is through an **indoor AC POE (72W)**:



Marking	Cable Type
FE and POE	Gigabit Ethernet (S-FTP) cable for superimposed DC power.
GbE#1	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.



External powering can be provided either by GbE2 or FE.

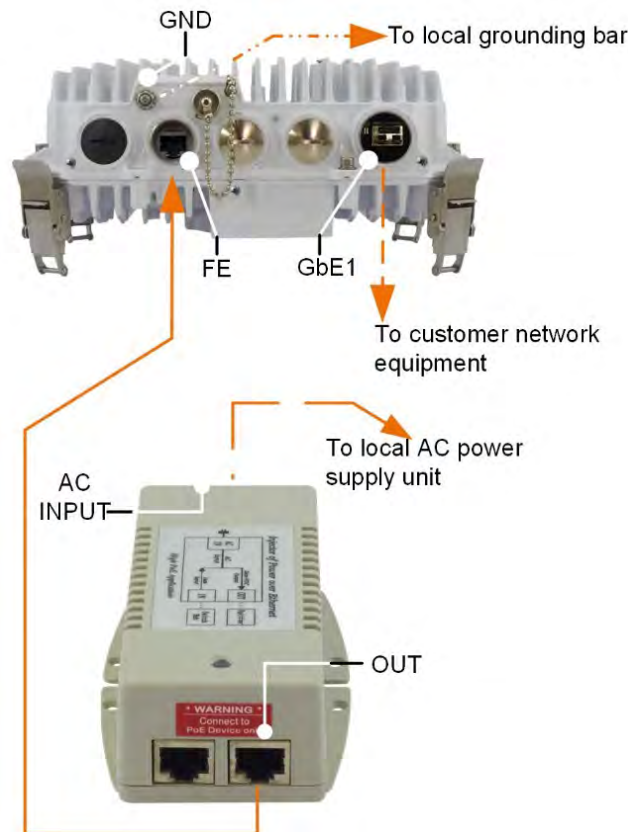
For GbE2 powering see [Gigabit ETH cable for service Traffic, Inband Management and Powering](#) on page 29.

Continued on next page

Fiber Optic cable for service Traffic and Inband Management / Gigabit Ethernet (S-FTP) cable for service Powering, Continued

Cabling overview using AC POE, continued

The following schematic shows a cabling overview of OSDR radio unit when powering is through an **indoor AC POE (56W)**:



Marking	Cable Type
FE and OUT	Gigabit Ethernet (S-FTP) cable for superimposed DC power.
GbE#1	Fiber Optic cable with Optical SFP module for traffic and inband management.
AC INPUT	AC power supply cord.
GND	Grounding cable 16 mm ² .



External powering can be provided either by GbE2 or FE.

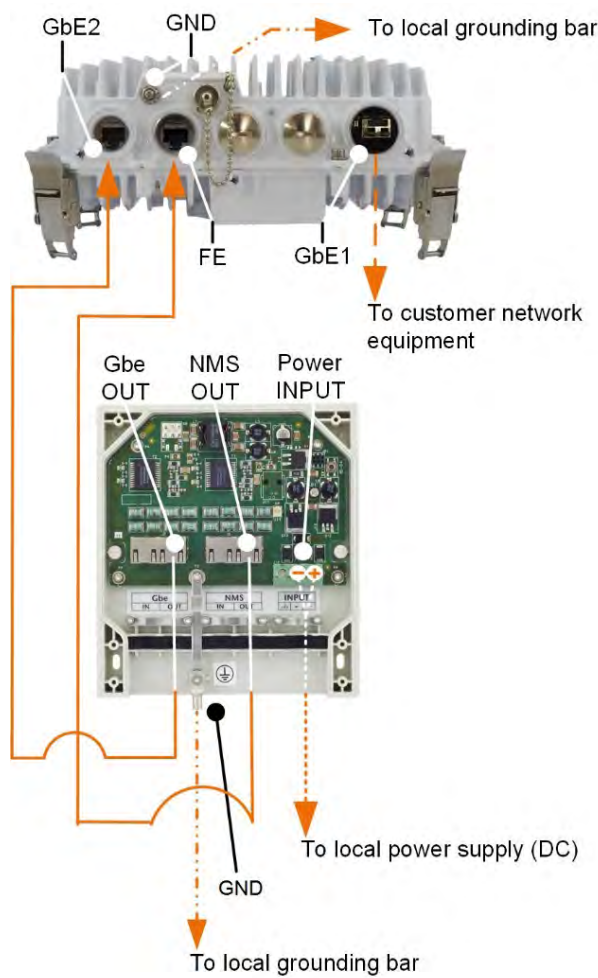
For GbE2 powering see [Gigabit ETH cable for service Traffic, Inband Management and Powering](#) on page 29.

Continued on next page

Fiber Optic cable for service Traffic and Inband Management / Gigabit Ethernet (S-FTP) cable for service Powering, Continued

Cabling overview using DC PoNE

The following schematic shows a cabling overview of OSDR radio unit when powering is through an **outdoor DC PoNE**:



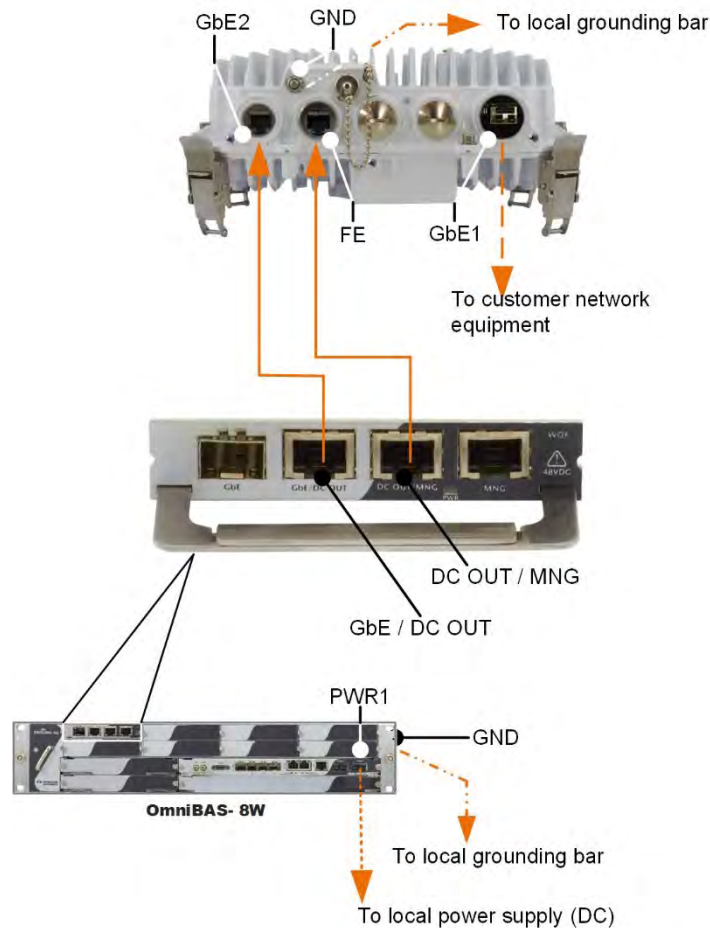
Marking	Cable Type
GbE#2, FE, NMS#OUT and Gbe OUT	Gigabit Ethernet (S-FTP) cable for superimposed DC power.
GbE#1	Fiber Optic cable with Optical SFP module for traffic and inband management.
INPUT	DC power supply cable.
GND	Grounding cable (16 mm ² for radio and 6 mm ² for PoNE).

Continued on next page

Fiber Optic cable for service Traffic and Inband Management / Gigabit Ethernet (S-FTP) cable for service Powering, Continued

Cabling overview using DC PoNE, continued

The following schematic shows a cabling overview of OSDR radio unit when powering is through an **indoor OmniBAS™ 4W/8W**:



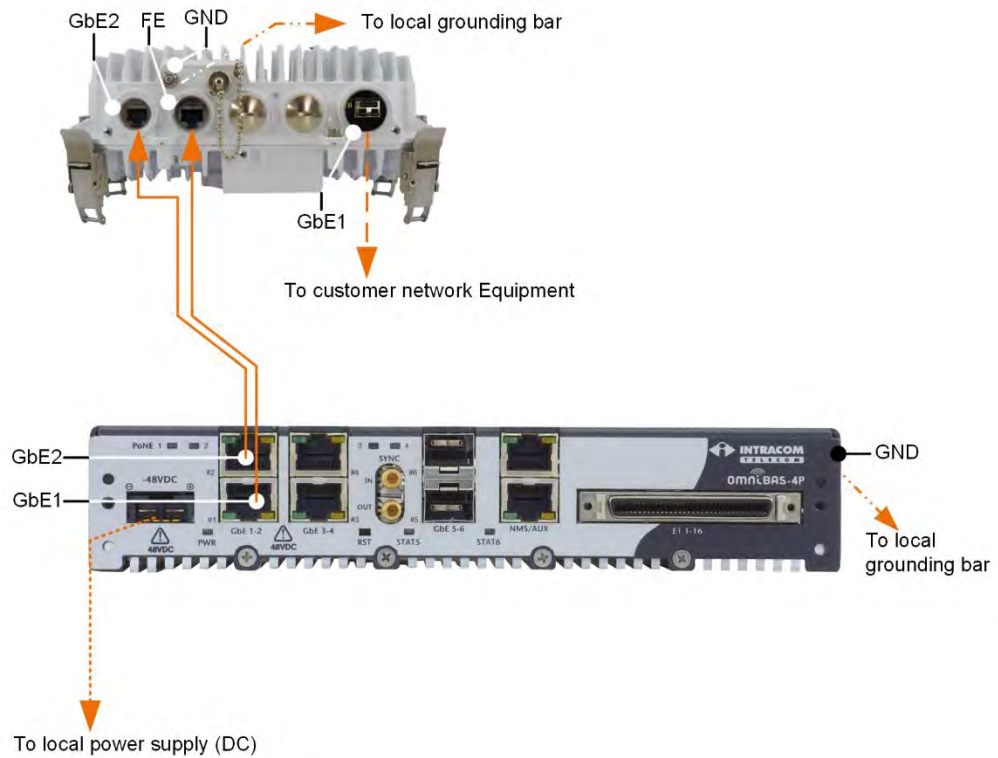
Marking	Cable Type
GbE#2, FE, GbE/DC OUT and DC OUT/MNG	Gigabit Ethernet (S-FTP) cable for superimposed DC power.
GbE#1	Fiber Optic cable with Optical SFP module for traffic and inband management.
INPUT	DC power supply cable.
GND	Grounding cable (16 mm ² for radio unit and 4 mm ² for OmniBAS™ – 4W/8W).
PWR1	OmniBAS™ – 4W/8W DC power supply cable.

Continued on next page

Fiber Optic cable for service Traffic and Inband Management / Gigabit Ethernet (S-FTP) cable for service Powering, Continued

Cabling overview using DC PoNE, continued

The following schematic shows a cabling overview of OSDR radio unit when powering is through an indoor OmniBAS™ 4P:



Marking	Cable Type
GbE#1 - GbE#2 (OmniBAS™-4P) & GbE#2 - FE (OSDR)	Gigabit Ethernet (S-FTP) cable for superimposed DC power.
GbE#1 (OSDR)	Fiber Optic cable with Optical SFP module for traffic and inband management.
GND	Grounding cable 16 mm² for radio unit and 4 mm² for OmniBAS™ – 4W/8W.
-48VDC	OmniBAS™ – 4P DC power supply cable.

3.3. Installation Tools

Prerequisites It is installer responsibility to provide the tools for equipment installation.

Equipment installation

Item	Tool / Photo	Description
1		Adjustable torque U-wrench tool (up to 29 mm opening and supporting max tightening torque 40 Nm). Used for tightening screws and nuts.
2		Adjustable torque wrench tool with bits (supporting max tightening torque 20 Nm). Used for tightening screws and nuts.
3		Set of allen keys. Used for radio polarization change and cable holder installation.
4		Digital inclinometer with magnetic base. Used for sectoral antennas alignment works.
5		13 mm wrench. Used for sectoral antenna verticality works.

Continued on next page

Installation Tools, Continued

Cables Termination

Type of cables to be terminated:

- Ethernet (S-FTP) cable.
- AC & DC power supply cables for outdoor power injectors.
- 6mm² and 16 mm² outdoor yellow/green grounding cables.

Item	Tool / Photo	Description
1		Blade.
2		Cable cutter.
3		Pliers (long nose).
4		See order code CRIMP-TOOL-S on page 23 .
5		Ethernet cable tester.
6		Crimping tool for 6 mm ² and 16 mm ² grounding cable.
7		Hot air gun.
8		Soldering iron.
9		Solder.

Specific works

Item	Tool / Photo	Description
1		Drill machine with 5 mm bit. Used for wall installation of outdoor power injectors.
2		See order code TOOL-M20 on page on page 23 .

3.4. 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 (Hub – TS).
- 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.

Continued on next page

Site Prerequisites, Continued

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.

Network port distributors

- Suitable electrical network port distributor should be available.
- The exact location of the network port distributor, as well as the network ports to reserve, should be known prior to installing the equipment.
- 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:

- To make a protective earth connection, use the grounding point located close to the radio unit.
- A grounding point (designated GND) should be located close to the mounting position of the radio unit (**0 to 2 m**).
- The grounding point must be connected to grounding cable at least **16 mm²** diameter.
- An appropriate, low-resistance grounding system as specified by the local regulations is required.
- 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 [Lightning & Surge protection](#).

Continued on next page

Site Prerequisites, Continued

Lightning & Surge protection



A: For Ethernet (S-FTP) Cables:

Lighting surge protection device (LSP) is required to minimize possibility of equipment damage to any equipment connected to the unit from lighting induced surges.

For LSP device installation refer to [Reference manuals](#) item 4 on page 3.

B: Power Supply Cables (for power injector):

A power surge protection device (PSP) is required to minimize possibility of equipment damage from lightning induced surges or power supply surges.

For PSP device installation refer to [Reference manuals](#) item 1 on page 3.

For LSP and PSP details and instructions refer to [Reference manuals](#) item 1 on page 3.

Circuit breakers

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

Powering Type	Required Circuit Breaker
Powering via indoor AC PoE	• single-pole MCB 6 A • 230 V AC (voltage rating) • C-curve (for Industrial Applications)
Powering via outdoor DC PoNE	• single-pole MCB 6 A • min 72 V DC (voltage rating) • C-curve (for Industrial Applications)
Powering via outdoor AC PoNE	• single-pole MCB 6 A • 230 V AC (voltage rating) • C-curve (for Industrial Applications)



If the plug of power supply cord is intended to be the power disconnect device of the equipment, arrange in the installation to connect the equipment to a socket-outlet installed close to the power injector and easily accessible.

Continued on next page

Site Prerequisites, Continued

Pole installation

- The pole construction should be rust free and strong enough to handle the weight and restrict movement due to air pressure.
 - Should be perfectly perpendicular to allow correct alignment of the antenna.
 - 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.
-

4. Installation Procedures

Installation procedure overview

This chapter describes the mechanical installation and cabling of the OSDR equipment.

The following tables shows with order all the necessary steps for installation completion:

Action	Description	Page	Photo
1	Radio Unit and Antenna	52	
2	Radio Unit Grounding Cable	76	
3	Radio Unit Ethernet (S-FTP) Cable	77	
4	Power Injector	82	
5	Radio Unit Optical Cable (Optional)	83	
6	Radio Unit Cable Holder	88	

4.1. Radio Unit and Antenna

Sectoral and Parabolic Antenna

Introduction Apply this procedure for installing the OSDR to sectoral/parabolic antenna.



For sectoral antennas the procedure includes the alignment steps, also.



The antenna is capable to be installed in both side of the pole. The following photos are indicative of the installation in the left orientation of the sectoral/parabolic models.

Prerequisites



It is very important to mount the antenna exactly as described to INSTALLATION INSTRUCTION LEAFLET (included in the antenna package).

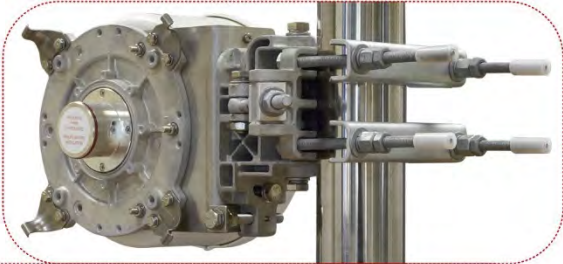
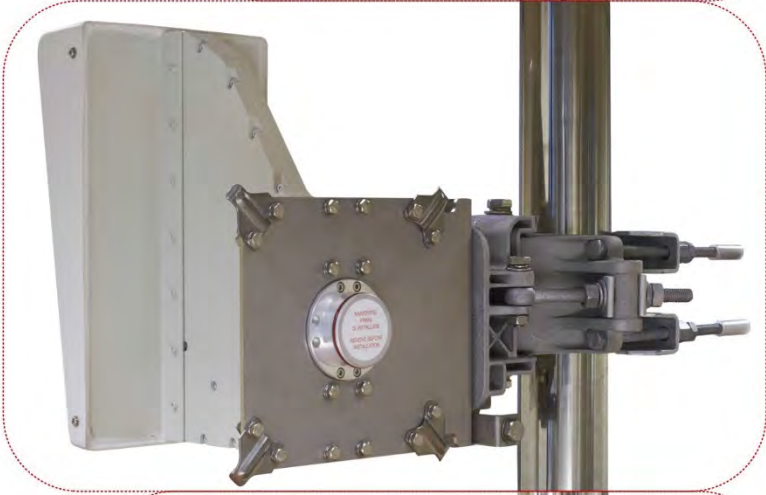
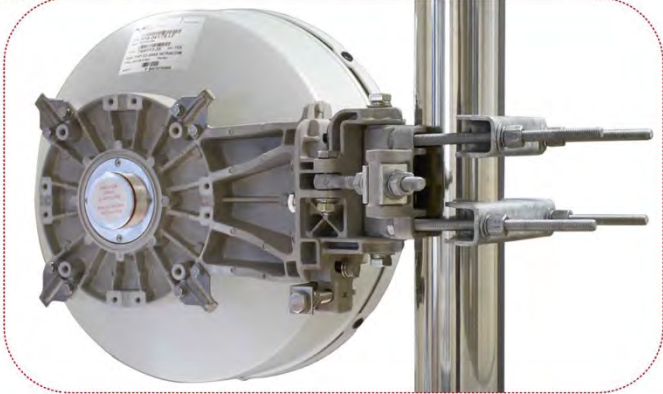
Tools and materials

#	Description
Tools	• Adjustable torque U-wrench. • Allen key.
Materials	OSDR and antenna.

Continued on next page

Sectoral and Parabolic Antenna, Continued

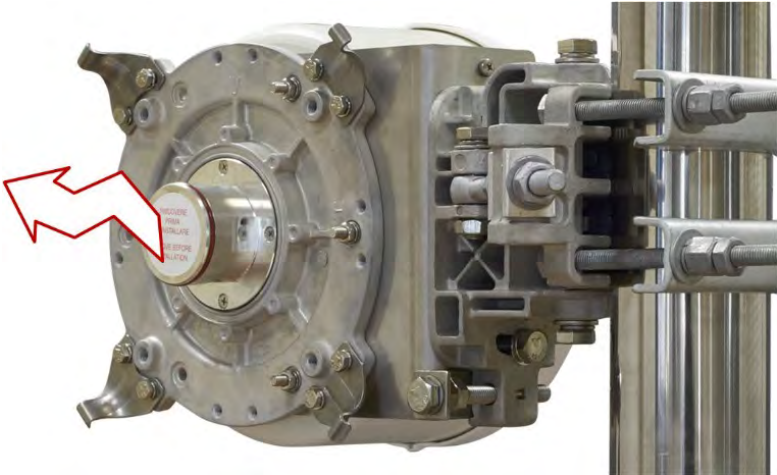
Procedure To **install** the OSDR onto the sectoral/parabolic antenna and to **perform antenna alignment**, proceed as follows:

Step	Action
1	The antenna installation should look as follows. Sectoral 26/28/32 GHz  Sectoral 10.5 GHz  Parabolic 10.5/26/28/32 GHz 

Continued on next page

Sectoral and Parabolic Antenna, Continued

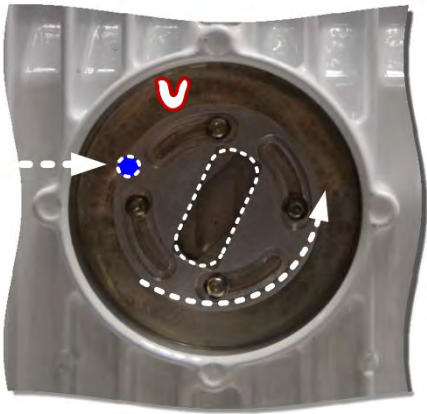
Procedure,
continued

Step	Action
2	Remove antenna protection label from the feeder, as shown below. 

Continued on next page

Sectoral and Parabolic Antenna, Continued

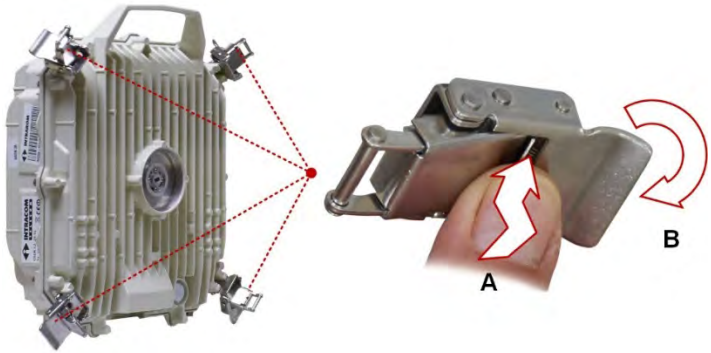
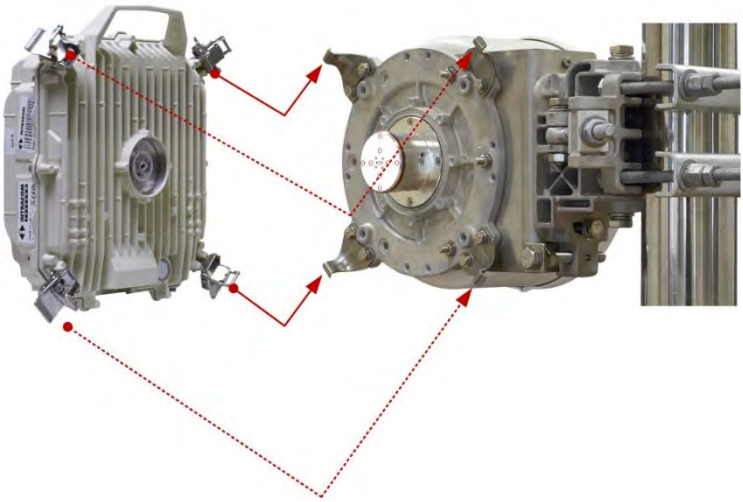
Procedure, continued

Step	Action
3	Radio unit and antenna should be adjusted for common polarization, as shown below. If the LINK polarization is VERTICAL then the feeders should be remained, as shown below: OSDR 10.5 GHz  Sectoral antenna 10.5 GHz  OSDR 26/28 GHz  Sectoral antenna 26/28 GHz  Parabolic antenna 26/28 GHz  If the LINK polarization is HORIZONTAL, use the allen key to loosen the four screws at the waveguide port of the OSDR (do not remove the screws) and then TURN the polarizer, as shown below: OSDR  Note How to change antenna polarization refer to antenna installation leaflet.  Do not over tighten the screws. Apply maximum tightening torque 0.6 Nm. Note The misalignment of slots between the movable part and the stationary part of the radio waveguide port is intentional and does not indicate a problem.

Continued on next page

Sectoral and Parabolic Antenna, Continued

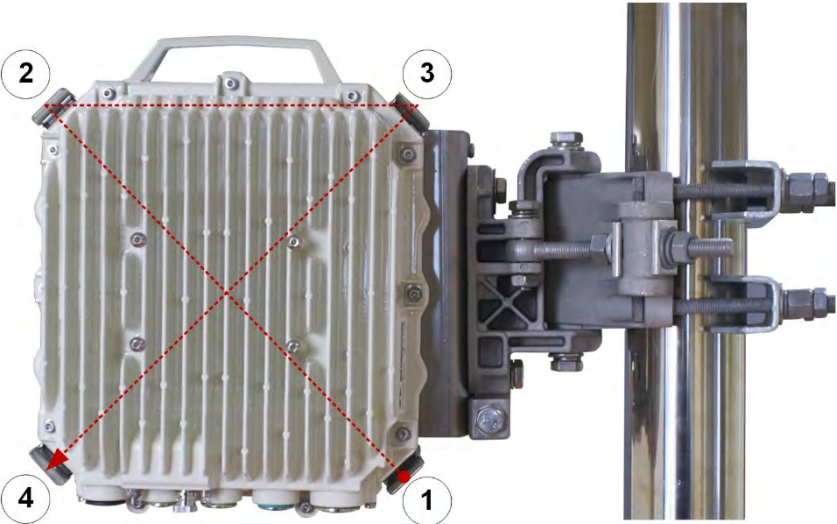
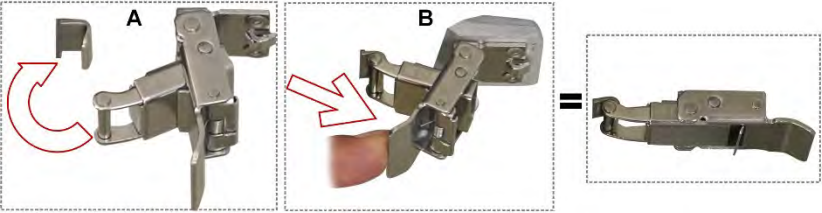
Procedure,
continued

Step	Action
4	Lubricate the O-ring with silicone grease, as shown below.  • For parabolic antenna continue to step 5. • For sectoral antenna 26/28/32 GHz go to step 8. • For sectoral antenna 10.5 GHz go to step 19.
5	Unlock the four clamps of the radio unit,, as shown below. 
6	Mount the OSDR onto the antenna, as shown below. 

Continued on next page

Sectoral and Parabolic Antenna, Continued

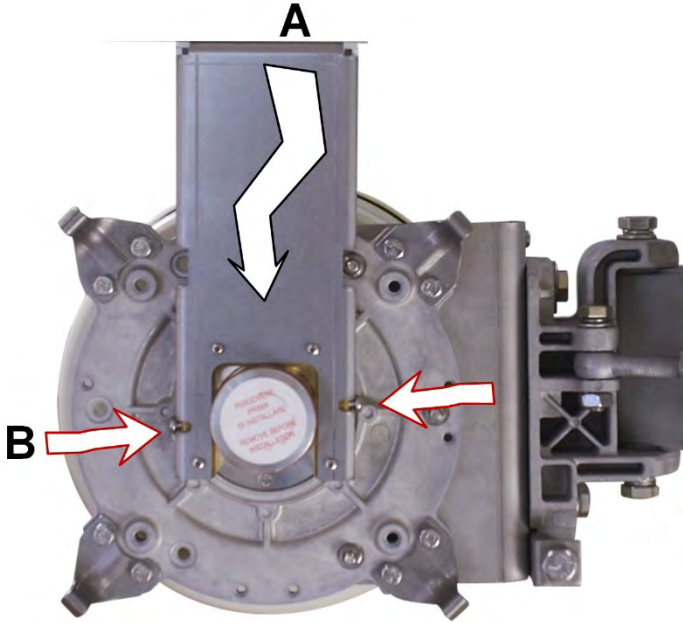
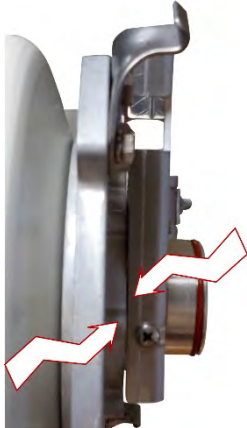
Procedure,
continued

Step	Action
7	Lock and secure all four clamps according to the pattern below.  Details of Clamps closing  End of procedure for parabolic antenna.  Note For parabolic antenna alignment refer to item 6 of Reference manuals on page 3.

Continued on next page

Sectoral and Parabolic Antenna, Continued

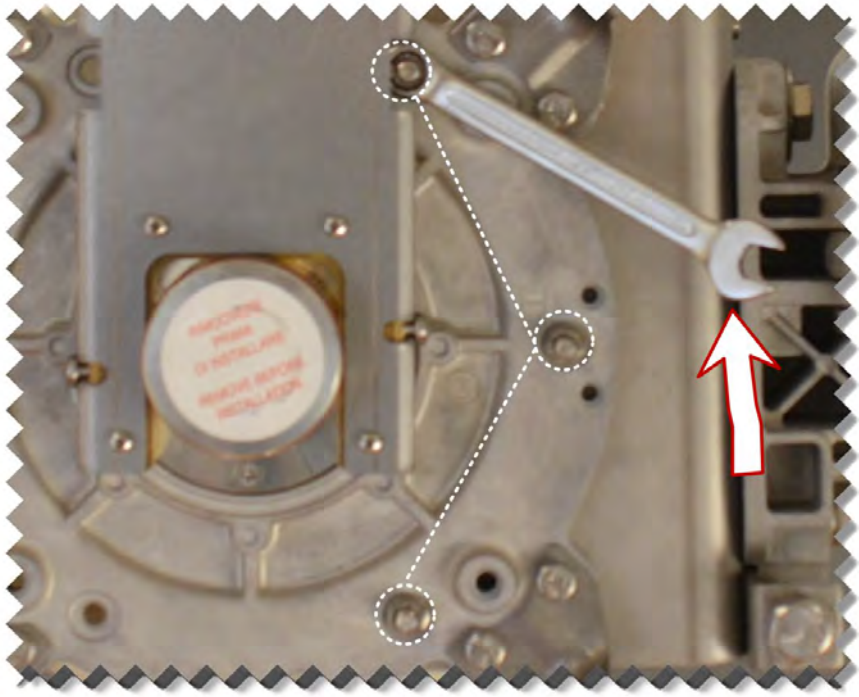
Procedure, continued

Step	Action
8	Perform the following actions: A: Mount the tool onto the antenna radio wave feeder, as shown below. B: Use the cross screwdriver to screw the bolts and then fully tighten.  Do not over tighten.   Make sure no any gap between tool and antenna, as shown below. 

Continued on next page

Sectoral and Parabolic Antenna, Continued

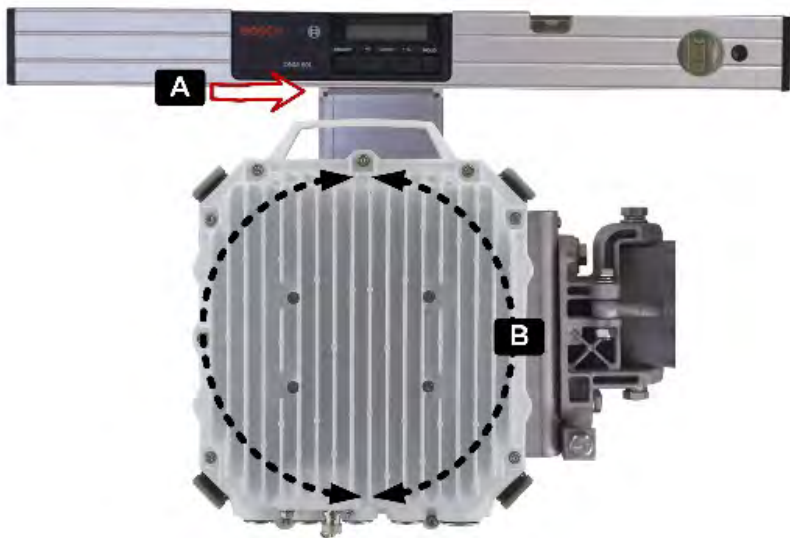
Procedure, continued

Step	Action
9	Use the U-wrench key (13 mm) to loosen the 3 nuts, as shown below (do not remove the nuts). 
10	Install the OSDR onto the antenna as described to steps 5, 6 and 7.

Continued on next page

Sectoral and Parabolic Antenna, Continued

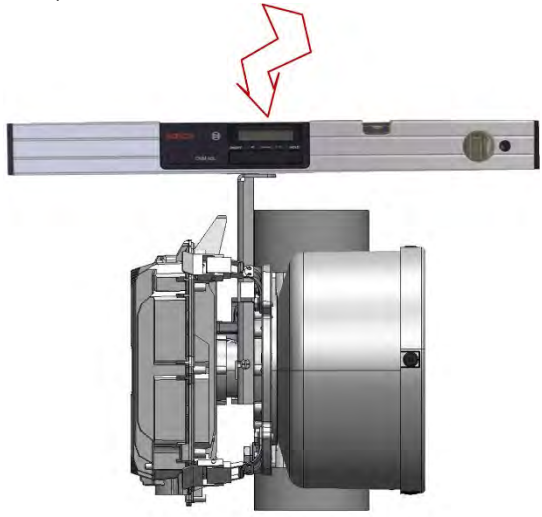
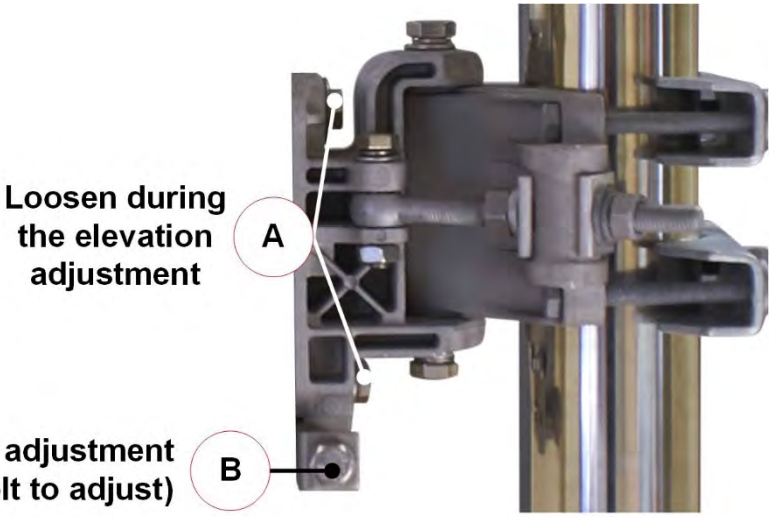
Procedure, continued

Step	Action
11	To correct the antenna verticality with respect to the ground, perform the following actions: A: Place the inclinometer, as shown below: B: Rotate (left-right) the radio unit till the inclinometer digital indicator reaches 0 degrees.  The diagram illustrates the process of adjusting the antenna's verticality. It shows a silver inclinometer with a digital display and a bubble level. A red arrow labeled 'A' points to the inclinometer being placed on top of the antenna's mounting bracket. Below, the antenna unit is shown with a dashed circle and arrows labeled 'B' indicating its rotation around its vertical axis.
12	Remove the OSDR.
13	Tighten the three M10 nuts (see step 9). DO NOT remove the XPOL tool.  Do not over tighten. - For maximum tightening torque please follow the antenna installation leaflet (available in package).

Continued on next page

Sectoral and Parabolic Antenna, Continued

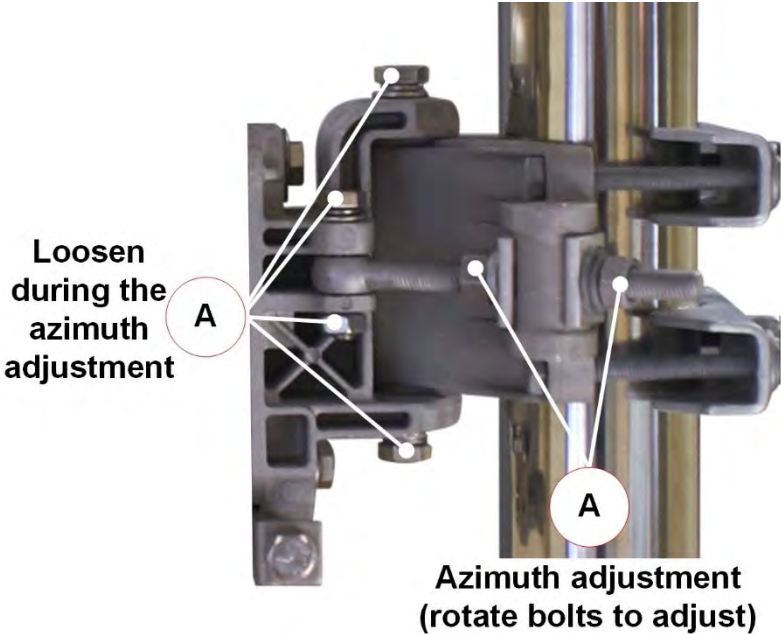
Procedure, continued

Step	Action
14	Install the OSDR onto the antenna as described to steps 5, 6 and 7.
15	To correct the elevation angle for matching with the RF planning data, perform the following actions: A: Place the inclinometer, as shown below.  B: Use the U-wrench tool to perform elevation adjustment, as shown below. Perform adjustment till the inclinometer reaches the tilt provided by RF planning.  C: All elevation nuts and bolts should be tightened.  • Do not over tighten. • For maximum tightening torque please follow the antenna installation leaflet (available in package).

Continued on next page

Sectoral and Parabolic Antenna, Continued

Procedure, continued

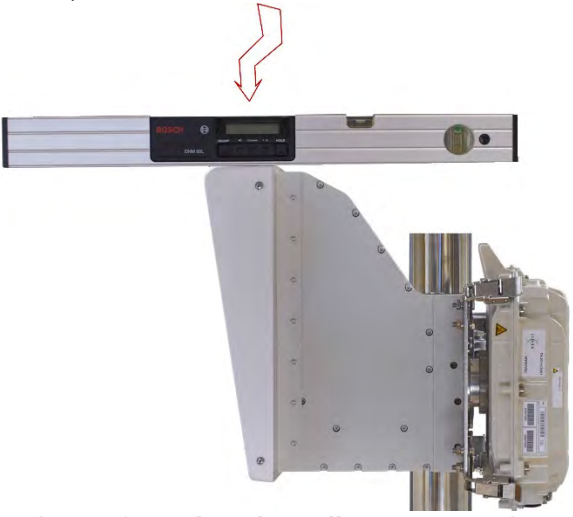
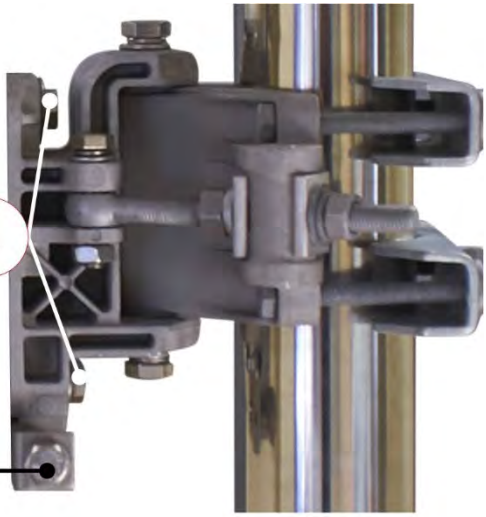
Step	Action
16	Remove the OSDR and the XPOL tool.
17	Install the OSDR onto the antenna as described to steps 5, 6 and 7.
18	Use the U-wrench tool to perform azimuth adjustment⁽¹⁾, as shown below.   • Do not over tighten. • For maximum tightening torque please follow the antenna installation leaflet (available in package). End of procedure for sectoral 26/28/32 GHz.

Continued on next page

⁽¹⁾ The values must be taken from RF planning team.

Sectoral and Parabolic Antenna, Continued

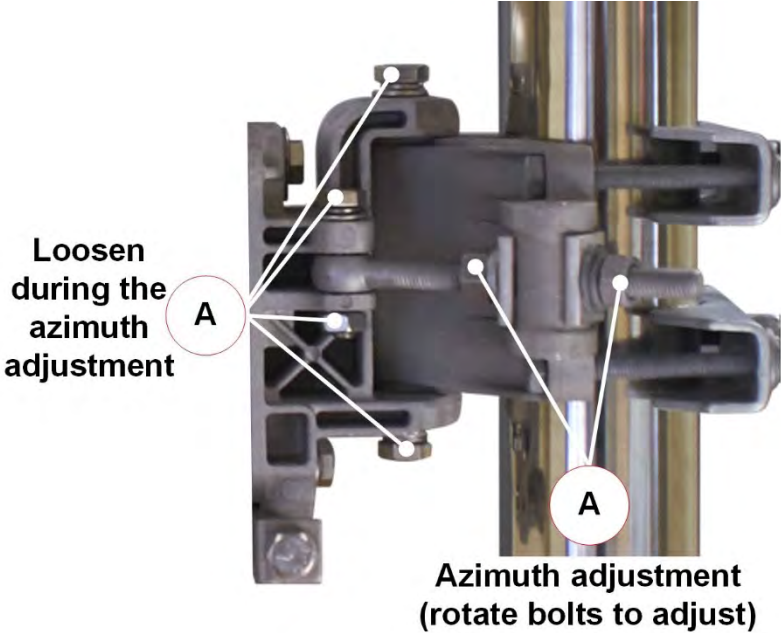
Procedure, continued

Step	Action
19	Install the OSDR onto the antenna as described to steps 5, 6 and 7.
20	To correct the elevation angle for matching with the RF planning data, perform the following actions: A: Place the inclinometer, as shown below.  B: Use the U-wrench tool to perform elevation adjustment, as shown below. Perform adjustment till the inclinometer reaches the desirable RF planning value.  Loosen during the elevation adjustment Elevation adjustment (rotate bolt to adjust) C: All elevation nuts and bolts should be tightened.  • Do not over tighten. • For maximum tightening torque please follow the antenna installation leaflet (available in package).

Continued on next page

Sectoral and Parabolic Antenna, Continued

Procedure, continued

Step	Action
21	Use the U-wrench tool to perform azimuth adjustment⁽¹⁾, as shown below.   • Do not over tighten. • For maximum tightening torque please follow the antenna installation leaflet (available in package). End of procedure for sectoral 10.5 GHz.

End of procedure.

⁽¹⁾ The values must be taken from RF planning team.

Panel Antenna

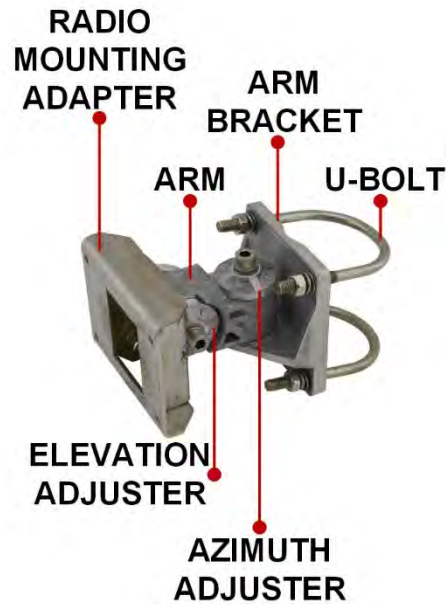
Introduction This topic describes the following procedures:

Description	See Page
Mounting kit installation procedure	66
Panel antenna installation procedure	71

Tools and materials

#	Description
Tools	• Adjustable torque U-wrench. • Adjustable torque wrench with bit (hexagon male and cross). • Allen key.
Materials	• OSDR-ANT-MNT. • OSDR-PL-ANT-KIT. • GRS-PST. • OSDR. • Panel antenna.

Mounting kit overview

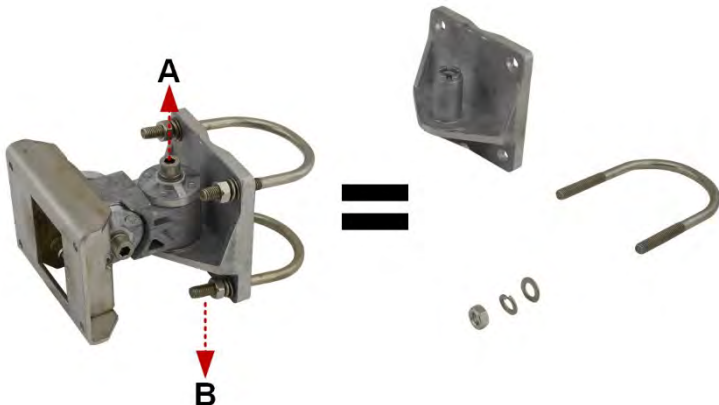
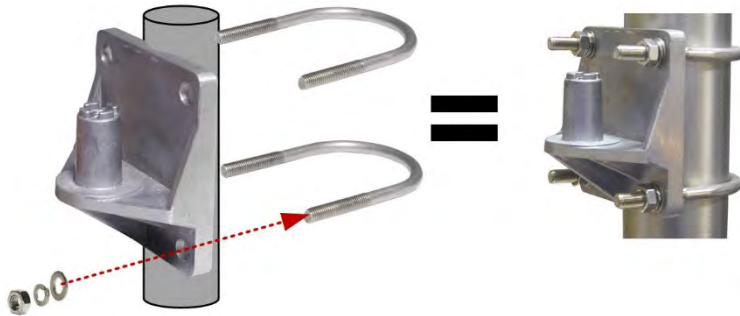


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Panel Antenna, Continued

Mounting kit installation procedure

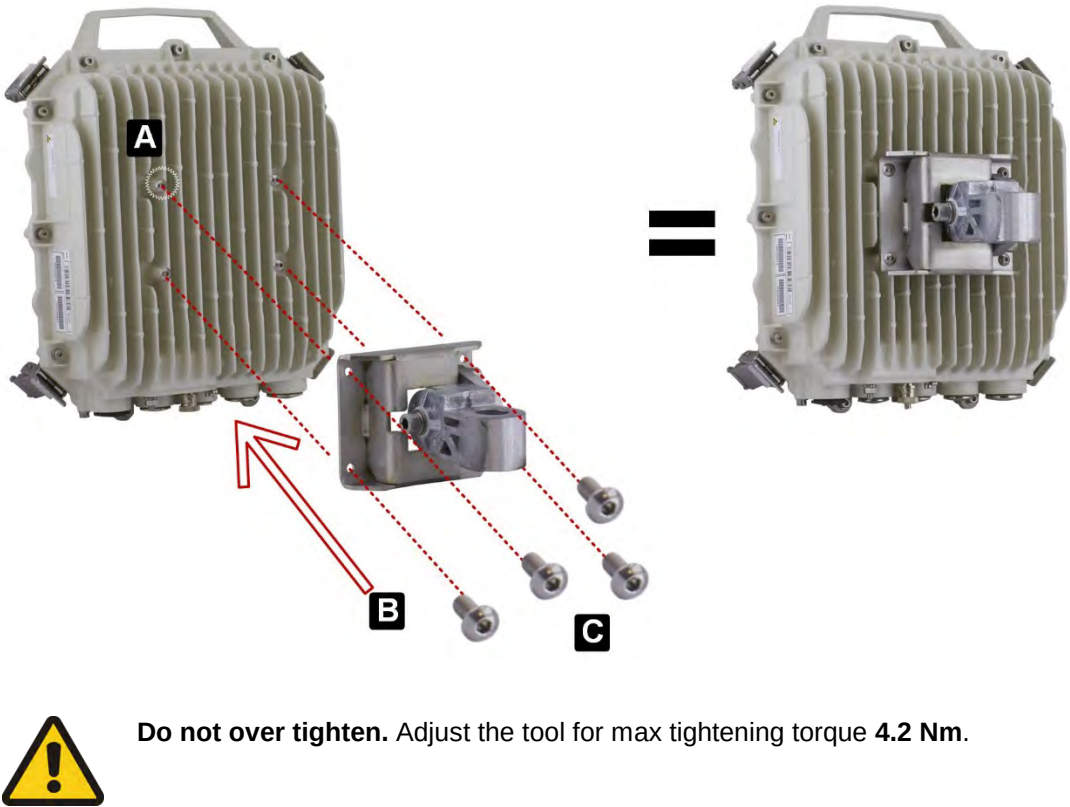
To install the mounting kit, proceed as follows:

Step	Action
1	Perform the following actions: A: Unscrew the azimuth adjuster screw. B: Release the u-bolts. 
2	Place the arm bracket to the pole and install the two U-bolts, as shown below. Use the U-wrench to tighten (washer, lock washer and nut).   Do not over tighten. Adjust the tool for max tightening torque 15 Nm.

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Panel Antenna, Continued

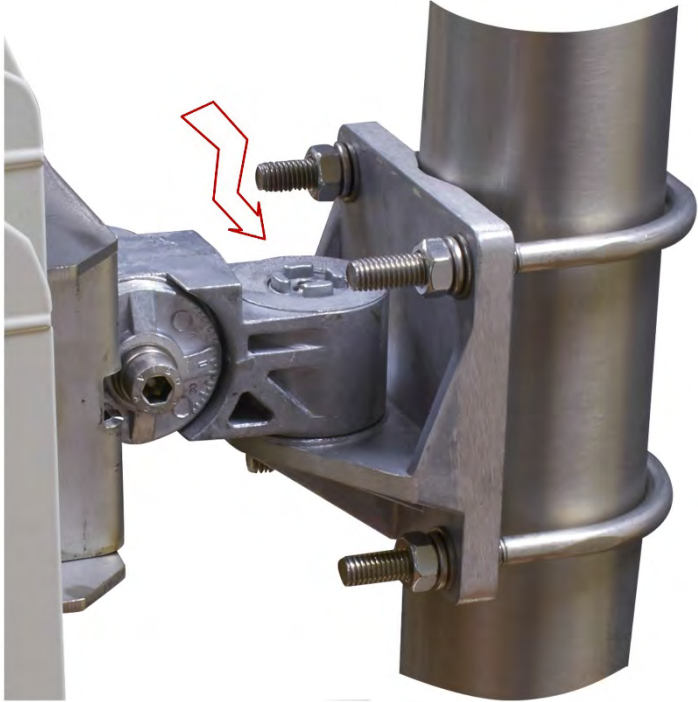
Mounting kit installation procedure, continued

Step	Action
3	Perform the following actions: A: Unscrew the four screws. B: Place the radio mounting adapter onto the OSDR, as shown below. C: Install and screw the four screws.   Do not over tighten. Adjust the tool for max tightening torque 4.2 Nm.

Continued on next page

Panel Antenna, Continued

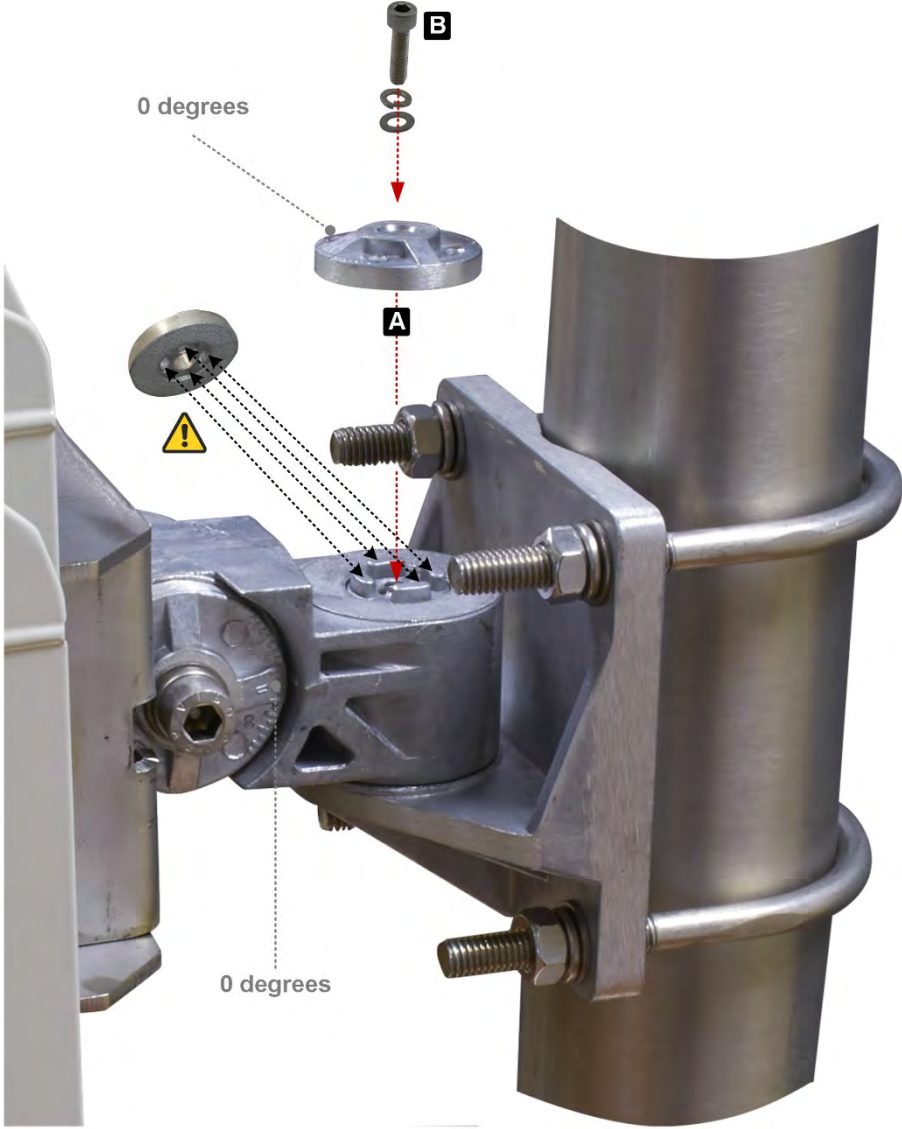
Mounting kit
installation
procedure,
continued

Step	Action
4	Insert arm into the arm bracket, as shown below. 

Continued on next page

Panel Antenna, Continued

Mounting kit installation procedure, continued

Step	Action
5	Perform the following actions: A: Install the azimuth adjuster (taking into account the caution), as shown below. B: Install the azimuth adjuster bolt, as shown below (washer, lock washer and bolt). 

Continued on next page

Panel Antenna, Continued

Mounting kit installation procedure, continued

Step	Action
6	Use the adjustable wrench to fully tighten the adjuster bolt.  Do not over tighten. Adjust the tool for max tightening torque 20 Nm. The installation should look as follows. 

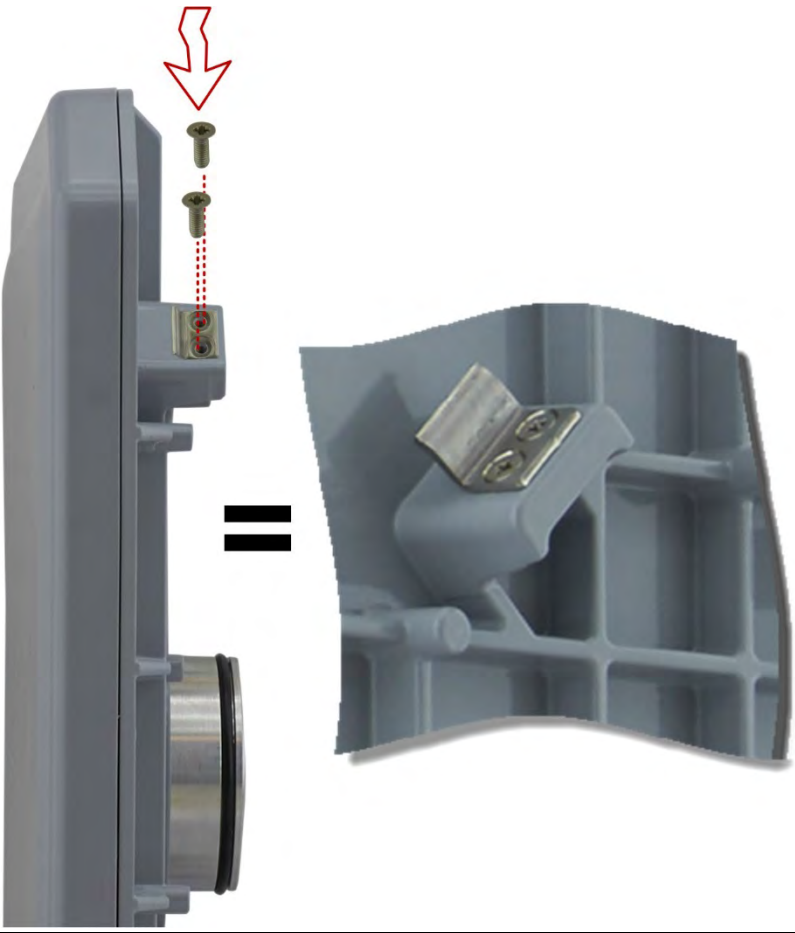
End of procedure.

Continued on next page

Panel Antenna, Continued

Panel antenna
installation
procedure

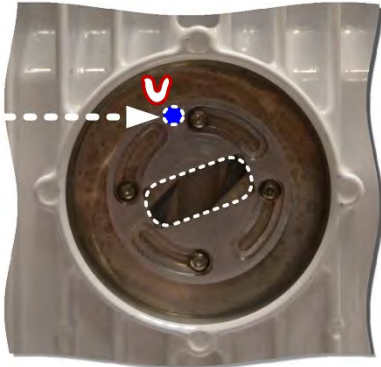
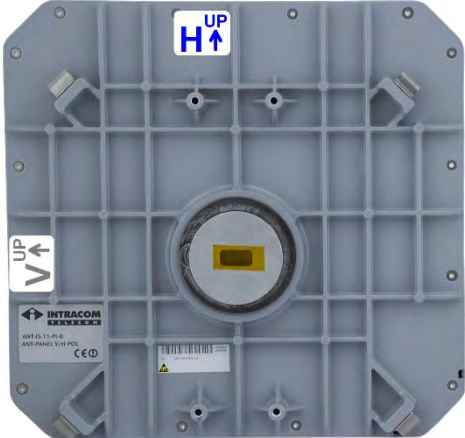
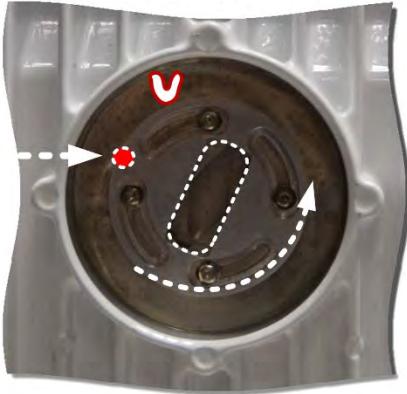
To install the panel antenna to OSDR, proceed as follows:

Step	Action
1	Install the antenna hooks (x 4), as shown below. 

Continued on next page

Panel Antenna, Continued

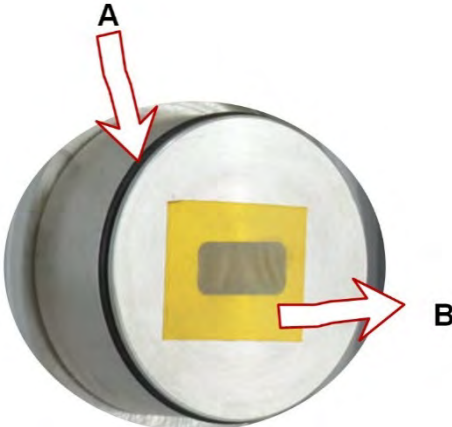
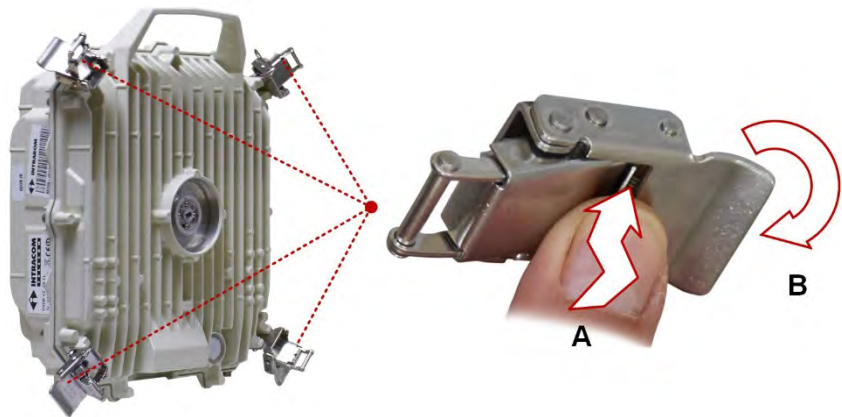
Panel antenna installation procedure, continued

Step	Action
2	Radio unit and antenna should be adjusted for common polarization. If the LINK polarization is HORIZONTAL then the feeders should be remained, as shown below: OSDR 10.5 GHz   If the LINK polarization is VERTICAL, use the allen key to loosen the four screws at the waveguide port of the radio (do not remove the screws) and then TURN the polarizer, as shown below: OSDR 10.5 GHz    The terminal station polarization at 10.5 GHz (radio-panel antenna) is specific and applicable to this case only.  Do not over tighten the screws. Apply maximum tightening torque 0.6 Nm.  Note The misalignment of slots between the movable part and the stationary part of the radio waveguide port is intentional and does not indicate a problem.

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Panel Antenna, Continued

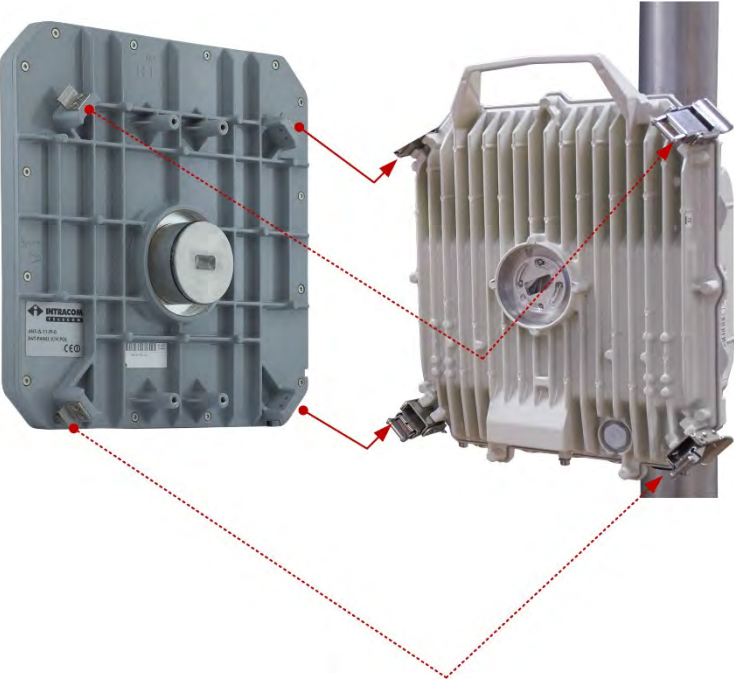
Panel antenna
installation
procedure,
continued

Step	Action
3	Perform the following actions: A: Lubricate the O-ring with silicone grease. B: Remove antenna protection plastic sticker from the feeder. 
4	Unlock the four radio unit clamps, as shown below. 

Continued on next page

Panel Antenna, Continued

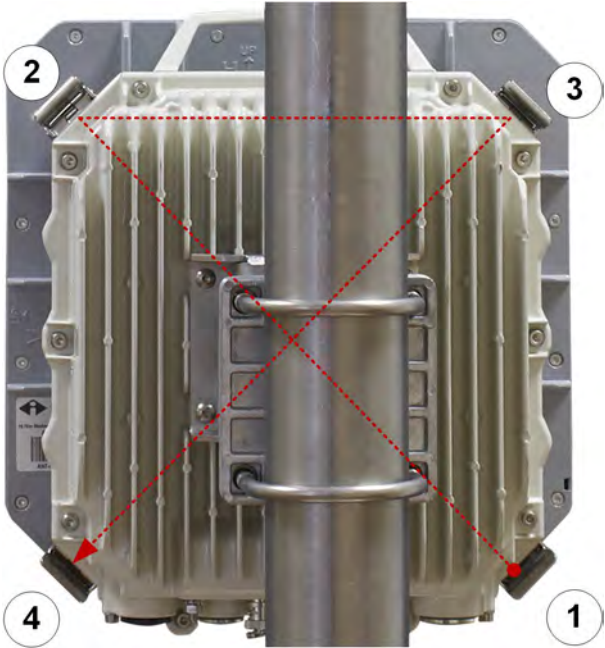
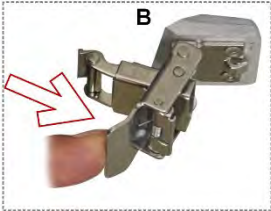
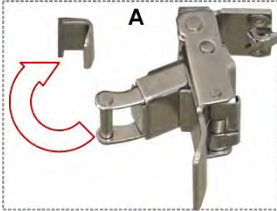
Panel antenna
installation
procedure,
continued

Step	Action
5	Mount the panel antenna onto the OSDR, as shown below. 

Continued on next page

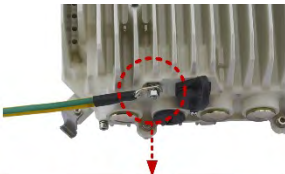
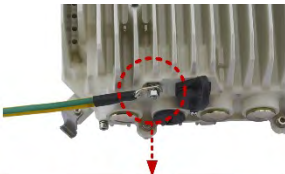
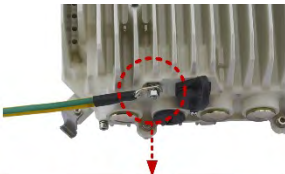
Panel Antenna, Continued

Panel antenna
installation
procedure,
continued

Step	Action
6	Lock and secure all four clamps according to the pattern below.  Details of Clamps closing 

End of procedure

4.2. Radio Unit Grounding Cable

Introduction	Apply this procedure for installing the grounding cable to OSDR grounding terminal.						
Prerequisites	How to terminate a grounding cable please refer to Appendix D: Cables Termination .						
Tools and materials	<table><tr><th>#</th><th>Description</th></tr><tr><td>Tools</td><td>Adjustable torque U-wrench.</td></tr><tr><td>Materials</td><td>GND-KIT16-OD</td></tr></table>	#	Description	Tools	Adjustable torque U-wrench.	Materials	GND-KIT16-OD
#	Description						
Tools	Adjustable torque U-wrench.						
Materials	GND-KIT16-OD						
Procedure	To install the grounding cable to OSDR, proceed as follows: <table><tr><th>Step</th><th>Action</th></tr><tr><td>1</td><td> Use the tool to remove the M5 nut and one spring washer. Then install the cable, as shown below.   Use the adjustable U-wrench to tighten the M5 nut.  Do not over tighten. Adjust the tool for max tightening torque 4.2 Nm.  After completion of OSDR installation do not forget to install the other end of the grounding cable to grounding bar. </td></tr></table> End of procedure.	Step	Action	1	Use the tool to remove the M5 nut and one spring washer. Then install the cable, as shown below.   Use the adjustable U-wrench to tighten the M5 nut.  Do not over tighten. Adjust the tool for max tightening torque 4.2 Nm.  After completion of OSDR installation do not forget to install the other end of the grounding cable to grounding bar.		
Step	Action						
1	Use the tool to remove the M5 nut and one spring washer. Then install the cable, as shown below.   Use the adjustable U-wrench to tighten the M5 nut.  Do not over tighten. Adjust the tool for max tightening torque 4.2 Nm.  After completion of OSDR installation do not forget to install the other end of the grounding cable to grounding bar.						

4.3. Radio Unit Ethernet (S-FTP) Cable

Introduction Apply this procedure for installing the Ethernet (S-FTP) cable with M20 gland to OSDR receptacle (GbE2 or FE).

Prerequisites How to terminate an Ethernet (S-FTP) cable please refer to [Appendix D: Cables Termination](#).

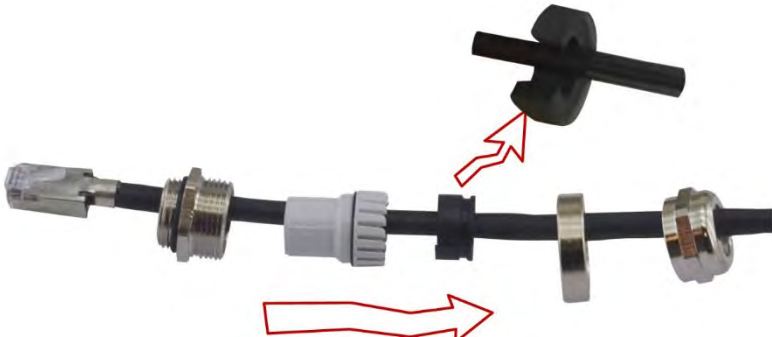
Tools and materials

#	Description
Tools	Adjustable torque U-wrench.
Materials	• M20-GLAND. • Terminated Ethernet (S-FTP) cable to RJ-45 jack.

Continued on next page

Radio Unit Ethernet (S-FTP) Cable, Continued

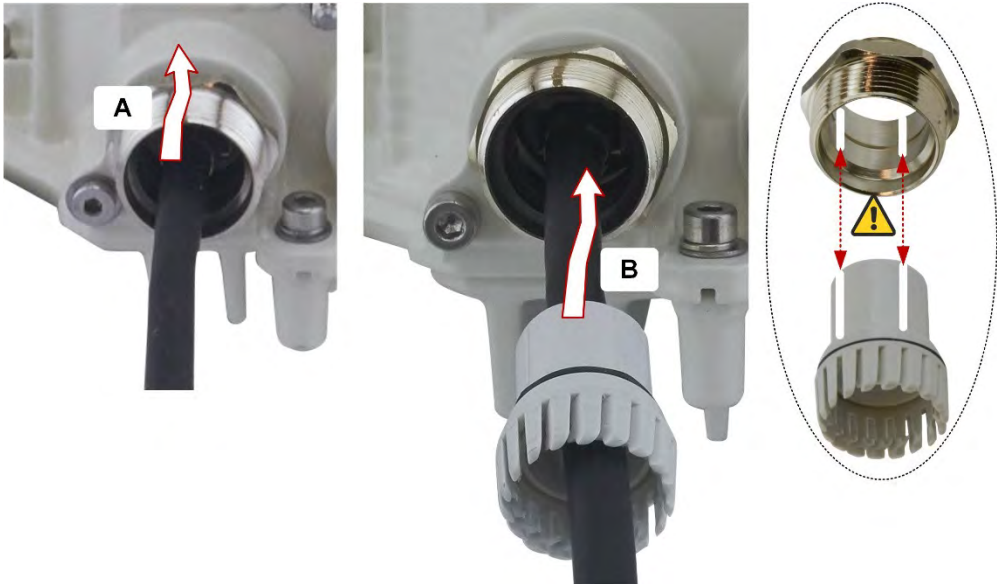
Procedure To install the Ethernet cable with M20 gland to OSDR receptacle (GbE2 or FE), proceed as follows:

Step	Action
1	Remove the protective cap (plastic for GbE2 or metallic for FE). 
2	Disassemble the M20-GLAND parts, as shown below.  Body (M20 Thread)  Claw  Seal  Ring  Sealing Nut
3	Pass the cable through the parts of gland, as shown below. The seal shown below is split-type for easy installation and removal. 

Continued on next page

Radio Unit Ethernet (S-FTP) Cable, Continued

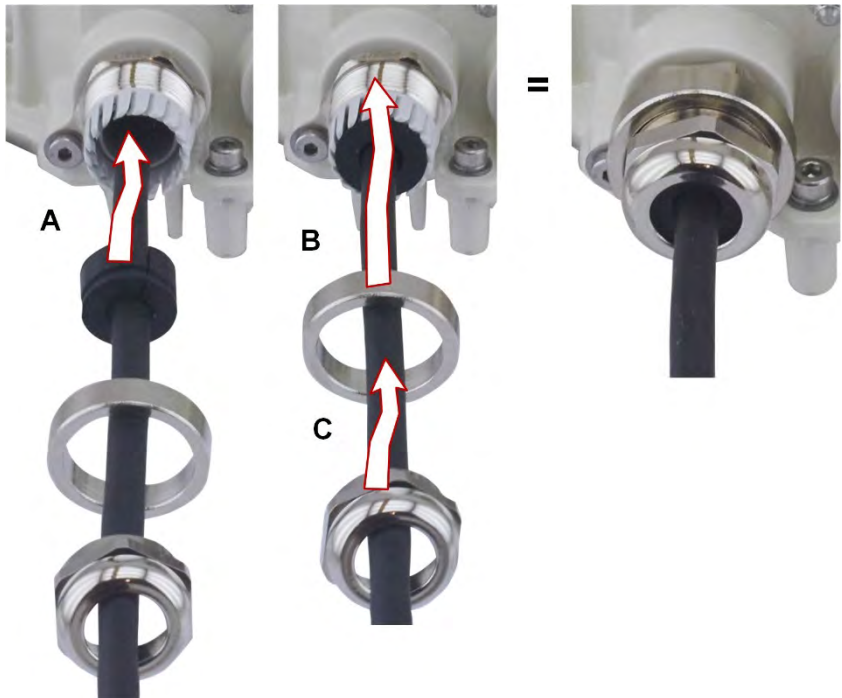
Procedure, continued

Step	Action
4	Plug the RJ-45 jack into the GbE2 port of the OSDR.  Listen for a “click” when inserting. This verifies that the jack has been inserted properly. 
5	Perform the following actions: A: Screw the body into the OSDR thread. B: Insert claw into the body (taking into account the caution).  Do not over tighten. Adjust the tool for max tightening torque 7 Nm.  Align the designated points. Misaligning of parts will cause damage. 

Continued on next page

Radio Unit Ethernet (S-FTP) Cable, Continued

Procedure,
continued

Step	Action
6	Perform the following actions: A: Insert the seal into “pressure fingers” of claw. B: Insert the O-ring. C: Screw the sealing nut. Use the adjustable torque U-wrench to fully tighten.  The ring protects from overtightening. 

Continued on next page

Radio Unit Ethernet (S-FTP) Cable, Continued

Procedure,
continued

Step	Action
7	Install the cable holder, as described to Radio Unit Cable Holder on page 88 .

End of procedure.



Take care when you unplug the RJ-45 jack. The latter is locked into the mating receptacle.

After removing the gland parts of the cable use the flat-headed screwdriver to extract the RJ-45 jack by pressing the clip upwards, as shown below:



4.4. Power Injector

For power injectors installation refer to [Appendix C: Power Injector Installation](#) on page [96](#).

4.5. Radio Unit Optical Cable (Optional)

Introduction

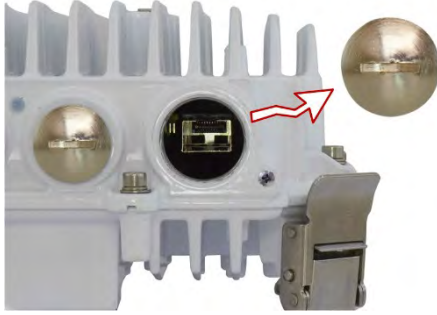
Apply this procedure for installing the Fiber Optic cable with M25 gland to OSDR receptacle (GbE1).

Tools and materials

#	Description
Tools	Adjustable torque U-wrench.
Materials	• M25-GLAND. • Fiber Optic cable. • SFP module.

Procedure

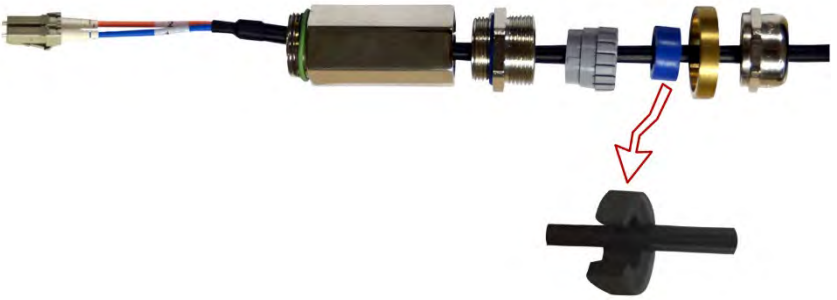
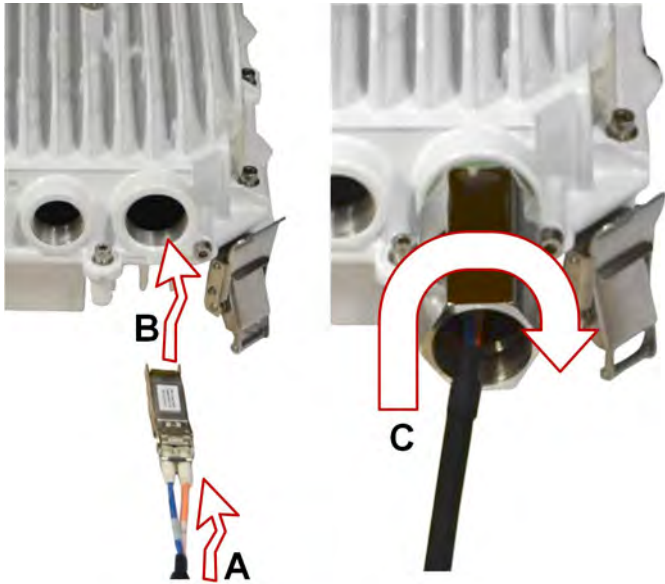
To install the Fiber Optic cable with M25 gland to OSDR receptacle (GbE1), proceed as follows:

Step	Action
1	Remove the metallic protective cap. 
2	Disassemble the M25-GLAND parts, as shown below.  - Extension (M25 Thread) - Body (M25 Thread) - Claw - Seal - Ring - Sealing Nut

Continued on next page

Radio Unit Optical Cable (Optional), Continued

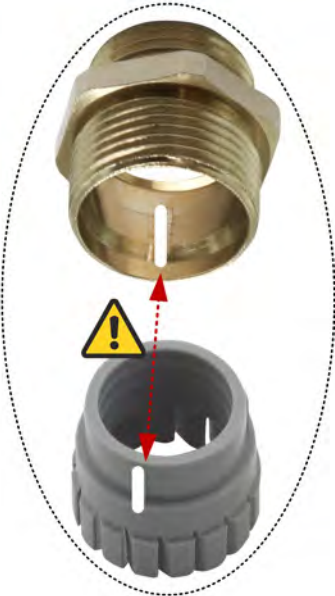
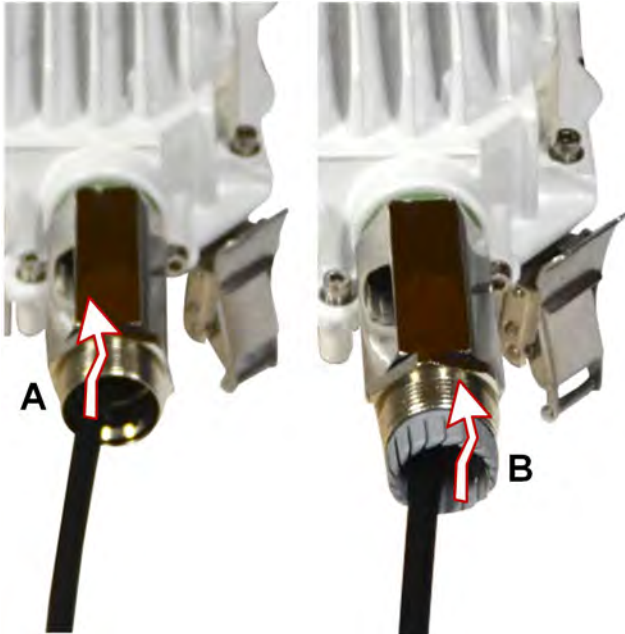
Procedure,
continued

Step	Action
3	Pass the cable through the parts of gland, as shown below. The seal shown below is split-type for easy installation and removal. 
4	Perform the following actions: - A: Install the fiber optic cable into the SFP module. - B: Plug the SFP module into the OSDR SFP cage. - C: Install the body extension.   Do not over tighten. Adjust the tool for max tightening torque 10 Nm.

Continued on next page

Radio Unit Optical Cable (Optional), Continued

Procedure, continued

Step	Action
5	Perform the following actions: A: Screw the body into the body extension thread. B: Insert claw into the body (taking into account the caution).  Do not over tighten. Adjust the tool for max tightening torque 10 Nm. Align the designated points. Misaligning of parts will cause damage.

Continued on next page

Radio Unit Optical Cable (Optional), Continued

Procedure, continued

Step	Action
6	Perform the following actions: A: Insert the seal into “pressure fingers” of claw. B: Insert the O-ring. C: Screw the sealing nut. Use the adjustable torque U-wrench to fully tighten. The ring protects from overtightening.

Continued on next page

Radio Unit Optical Cable (Optional), Continued

Procedure,
continued

Step	Action
7	Install the cable holder, as described to Radio Unit Cable Holder on page 88 .

End of procedure.



Take care when you unplug the fiber optic connector.

The latter is locked into the SFP and must be extracted first (with the tip of a flat-headed screwdriver) after removing the gland parts from the lower part of OSDR.

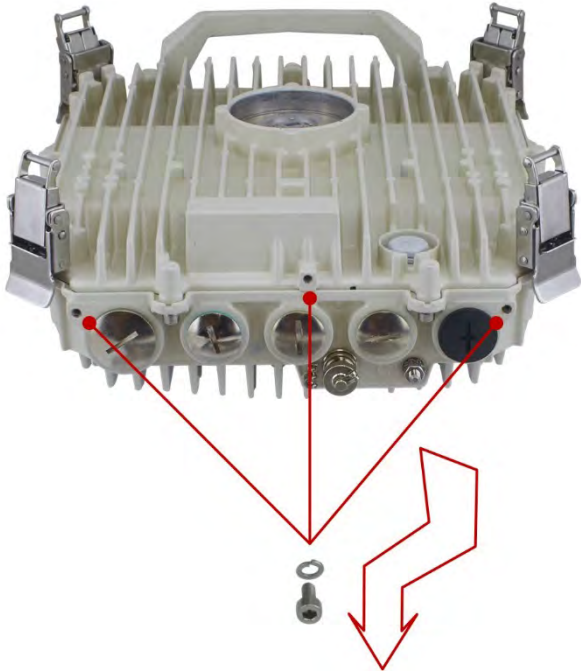


4.6. Radio Unit Cable Holder

Introduction Apply this procedure for installing the cable holder to OSDR.

Tools and materials	#	Description
	Tools	Adjustable torque wrench with hexagon male bit
	Materials	OSDR-HOLD-2 or OSDR-HOLD-5

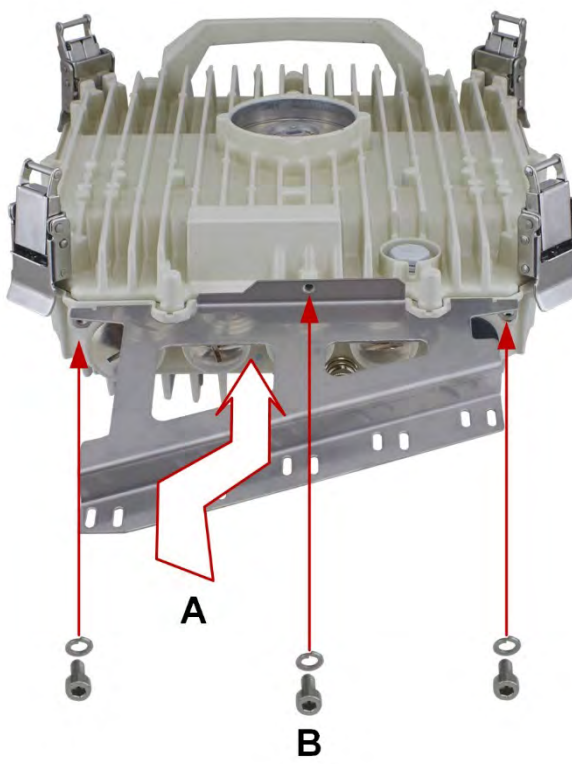
Procedure To install the cable holder, proceed as follows:

Step	Action
1	Use the tool to remove the three screws with lock washers, as shown below. 

Continued on next page

Radio Unit Cable Holder, Continued

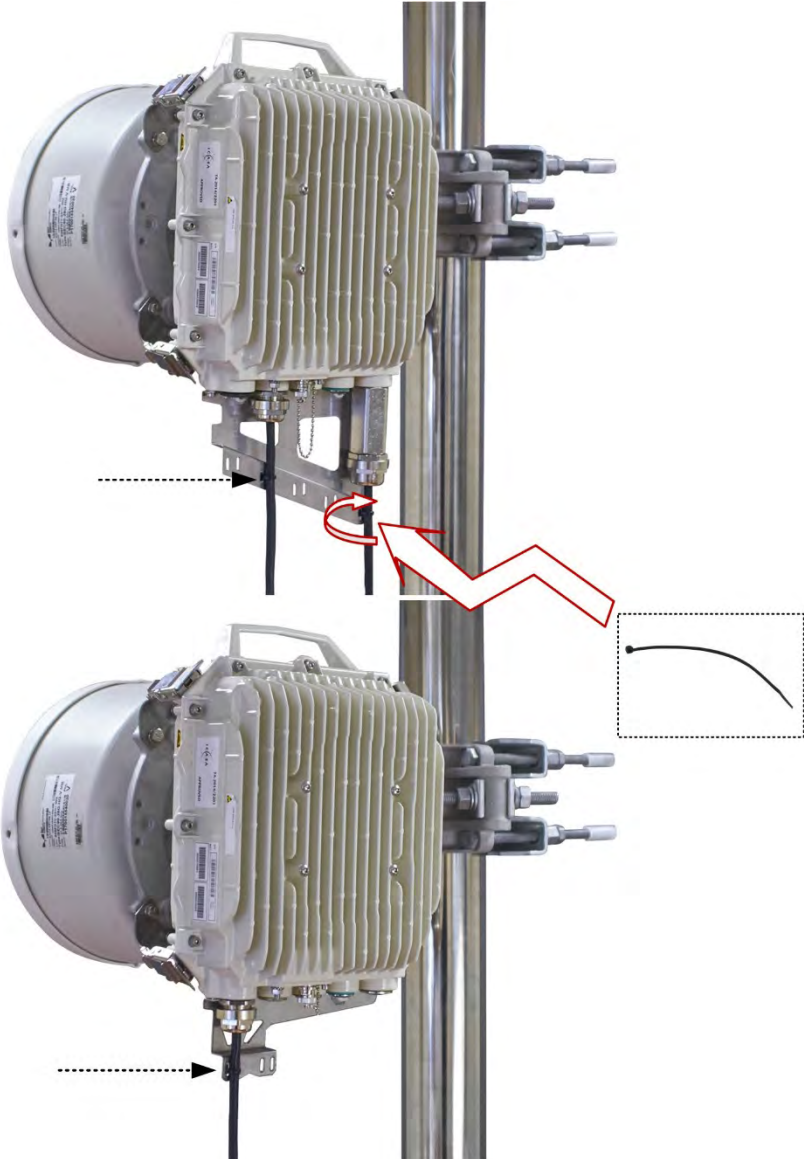
Procedure,
continued

Step	Action
2	Perform the following: A: Attach the holder to radio. B: Use the tool to install the three lock washers and screws, as shown below.  Do not over tighten. Adjust the tool for max tightening torque 2 Nm.
3	Install cables and glands. How to install refer to the following: • Radio Unit Ethernet (S-FTP) Cable on page 77. • Radio Unit Optical Cable (Optional) on page 83.

Continued on next page

Radio Unit Cable Holder, Continued

Procedure,
continued

Step	Action
4	Use the tie wraps to tighten the cable, as shown below. 

End of procedure.



Do not forget to install the OSDR grounding cable.

Appendix A: Adaptation Kit Installation

Pole Installation

Introduction Apply this procedure for installing the adaptation kit onto the pole.

Tools and materials

#	Description
Tools	• Adjustable torque U-wrench. • Adjustable torque wrench with hexagon female bit.
Materials	INST-ADAPT .

Continued on next page

Pole Installation, Continued

Procedure

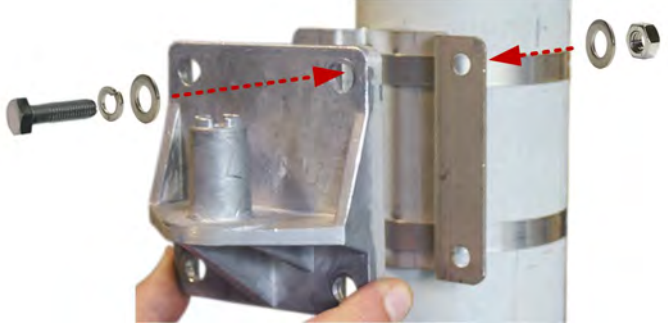
To install adaptation kit onto the pole, proceed as follows:

Step	Action
1	Choose the proper hose clamps based on the pole diameter.
2	Pass through the clamps to bracket, as shown below: 
3	Choose the correct position onto the pole to install the adaptation bracket. 
4	Use the tool to tighten.   Do not over tighten. Adjust the tool for tightening torque, as follows: • min 5.5 Nm. • max 7.0 Nm.

Continued on next page

Pole Installation, Continued

Procedure,
continued

Step	Action
5	Install the arm bracket onto the adaptation bracket, as shown below.   Do not over tighten. Adjust the tool for max tightening torque 15 Nm.

End of procedure

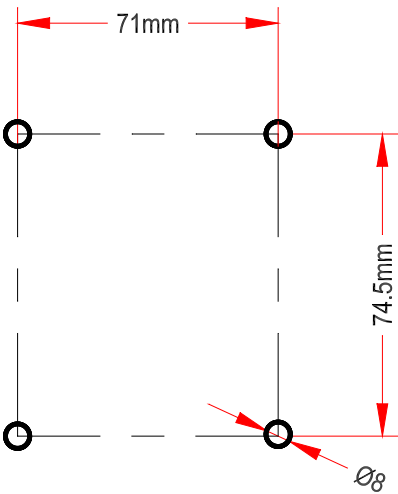
Appendix B: Mounting Kit Wall Installation

Wall Installation

Introduction Apply this procedure for installing the mounting kit onto the wall.

Tools and materials	#	Description
	Tools	Adjustable torque U-wrench.
	Materials	OSDR-ANT-MNT .

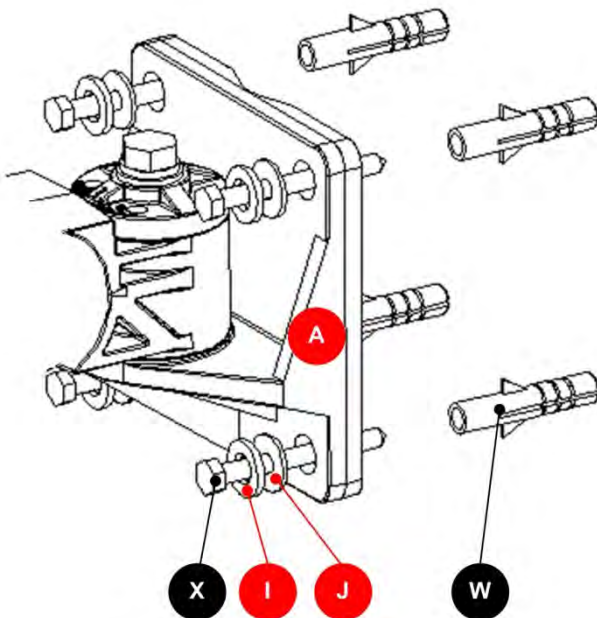
Procedure To install radio unit to sectoral/parabolic antenna, proceed as follows:

Step	Action
1	Use a drilling machine (fitted with an 8 mm drill bit) and the following drill template to drill the holes in the wall surface, as shown below. 

Continued on next page

Wall Installation, Continued

Procedure,
continued

Step	Action																		
2	Insert items (W, A, J, I X) with order, as shown below:  The items X, W listed below are not provided: <table><tr><th>Item</th><th>Description</th><th>Qty</th></tr><tr><td>X</td><td>Wood screw 5 x 50 mm, hex-headed, DIN571</td><td>4</td></tr><tr><td>I</td><td>Lock washer M5, stainless</td><td>4</td></tr><tr><td>J</td><td>Washer M5, stainless.</td><td>4</td></tr><tr><td>A</td><td>Arm Bracket</td><td>1</td></tr><tr><td>W</td><td>Wood plug 8 mm, plastic, type B.</td><td>4</td></tr></table>	Item	Description	Qty	X	Wood screw 5 x 50 mm, hex-headed, DIN571	4	I	Lock washer M5, stainless	4	J	Washer M5, stainless.	4	A	Arm Bracket	1	W	Wood plug 8 mm, plastic, type B.	4
Item	Description	Qty																	
X	Wood screw 5 x 50 mm, hex-headed, DIN571	4																	
I	Lock washer M5, stainless	4																	
J	Washer M5, stainless.	4																	
A	Arm Bracket	1																	
W	Wood plug 8 mm, plastic, type B.	4																	
3	Use the adjustable U-wrench tool item 4 to fully tighten the four screws (item X) to secure the arm bracket on the wall surface. Do not over tighten.																		

End of procedure.

Appendix C: Power Injector Installation

Topics

The chapter includes the following topics:

Description	See Page
Outdoor DC PoNE	97
Outdoor AC PoNE	105
Indoor AC POE	112

Outdoor DC PoNE

Introduction Apply this procedure for installing the outdoor DC PoNE onto the pole and wall.

Precautions Before starting the installation make sure all the following precautions:



- The power at the input of PoNE box must be measured in the range of **-40.5 V DC** to **-57.5 V DC**.
 - Refer to [Safety Precautions](#) on page [5](#).
-

Minimum input voltage versus S-FTP cable length

When the DC voltage at the input of the PoNE is below **41 V** for Cat6 cable and **41.7 V** for Cat5E then the **length** of Gigabit Ethernet (S-FTP) cable (Cat5E or Cat6), between **OSDR receptacles** and **PoNE receptacles**, cannot reach more than 100 meters.

The following table shows the maximum S-FTP cable length versus the voltage at the input of the PoNE for Cat5E and Cat6 cable types:

Input voltage to the PoNE (V DC)	max length of Cat6 S-FTP cable (m)	max length of Cat5E S-FTP cable (m)
40.5	90.00	75.00
40.75	95.00	80.00
41	100.00	85.00
41.25	100.00	90.00
41.5	100.00	95.00
41.75	100.00	100.00
42-57.5	100.00	100.00



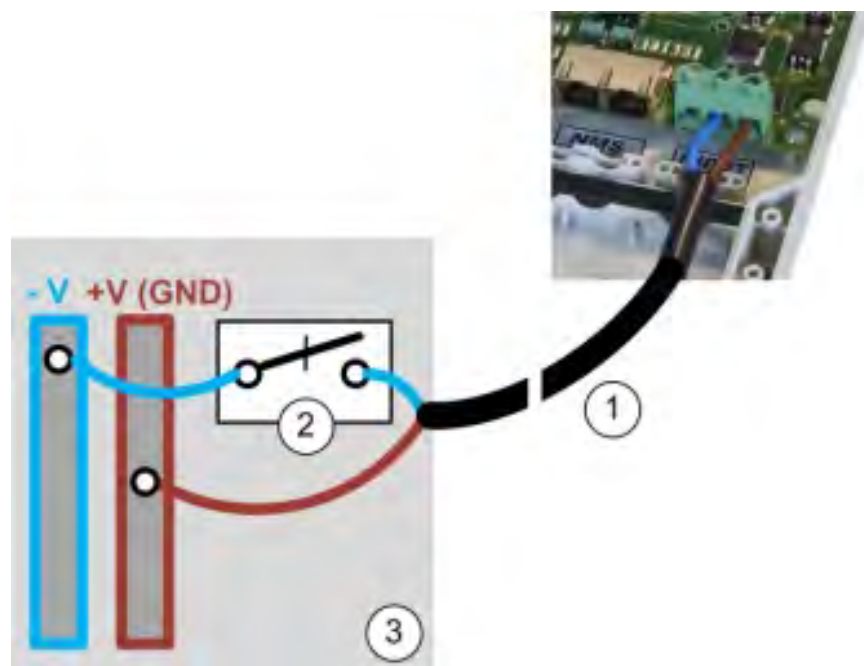
The restriction is applied because of the following reasons:

- the **PONE-OD-DC** injector combines power and data passively and
 - the voltage drop on the S-FTP cable will result in the voltage at the input of the DC power module of the radio unit to be less than the min allowable value for operation. Higher input voltage need to be applied to ensure proper powering of the radio.
-

Continued on next page

Outdoor DC PoNE, Continued

Connection
diagram

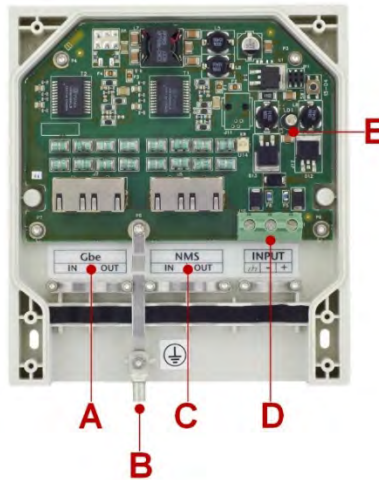


No	Description
1	DC power supply cable.
2	Single pole Circuit.
3	Local DC power distributor.

Continued on next page

Outdoor DC PoNE, Continued

Equipment overview



#	Marking	Details	Use
A	Gbe IN / Gbe OUT	Gigabit Ethernet 100/1000 Base-T, Electrical (RJ-45).	Gbe IN: To connect the Gigabit Ethernet (S-FTP) cable for carrying: • traffic • inband management towards to customer network. Gbe OUT: To connect the Gigabit Ethernet (S-FTP) cable for carrying: • traffic • inband management • superimposed DC power towards to radio unit.
B	GND	Grounding terminal.	To connect the grounding cable.
C	NMS IN / NMS OUT	Ethernet 100 Base-T, Electrical (RJ-45).	NMS IN: To connect the Gigabit Ethernet (S-FTP) cable for carrying: • outband management to customer network. NMS OUT: To connect the Gigabit Ethernet (S-FTP) cable for carrying: • outband management • superimposed DC power towards to radio unit.
D	INPUT	Screw type terminals.	To connect the DC power supply cable (from the local DC power source).
E	-	Multi-functioning LED.	To provide radio unit status during operation.

Continued on next page

Outdoor DC PoNE, Continued

Tools and materials

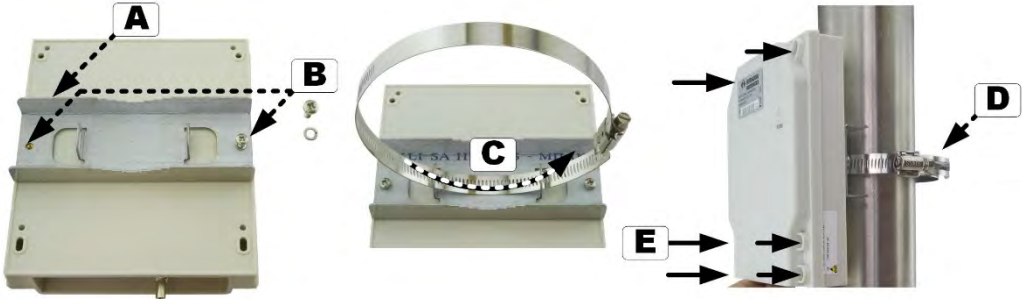
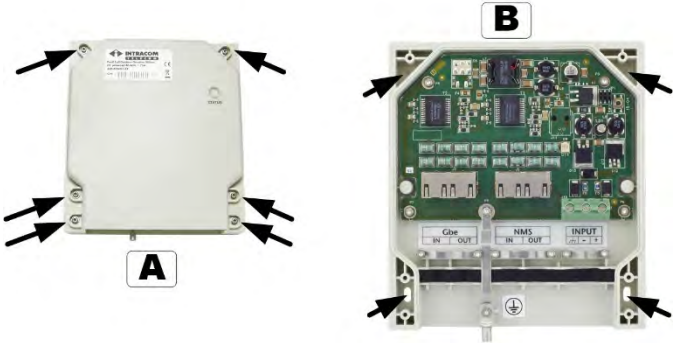
#	Description
Tools	Adjustable torque wrench with all bits.
Materials	• INST-PONE-PL. • PONE-OD-DC. • Ethernet (S-FTP) cable terminated to RJ-45 jack. • Grounding cable terminated to 6 mm² lug.

Continued on next page

Outdoor DC PoNE, Continued

Pole and wall installation procedure

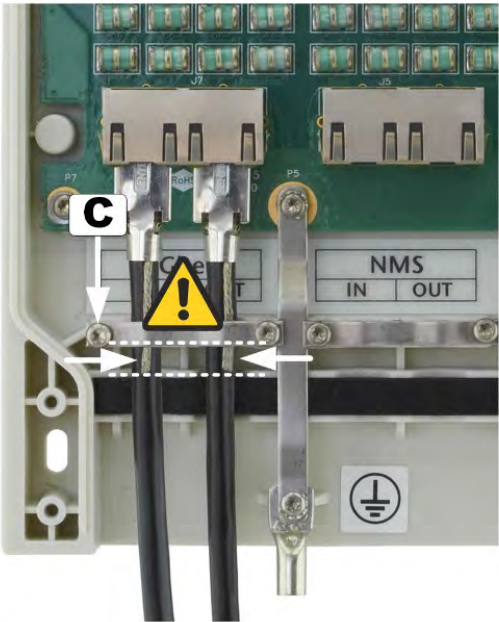
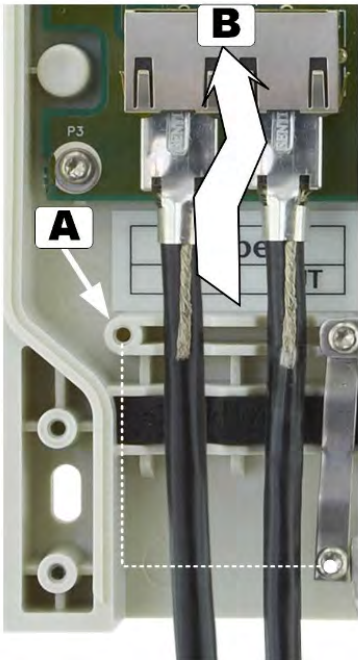
For mechanical installation and cabling of outdoor DC PoNE, proceed as follows:

Step	Action
1	Pole installation: A Attach the plate onto rear side of PonE, as shown below. B: Install lock washer and screw. Then use the cross headed screwdriver to fully tighten. C: Pass the hose clamp through the plate holes. D: Install the PonE onto pole. Use the tool with M5 deep socket to tighten.  Do not over tighten. Adjust the tool for max tightening torque 2 Nm. E: Use the tool with TORX T10 bit to remove the six screws. Then detach the PonE cover for installing the cables. Be careful not to drop the screws while removing.  Wall Installation: A: Perform step E as describes the above procedure. B: Perform the following: - Position the device on the wall surface and using a pencil mark the drill points. With the drill machine (fitted with 5 mm bit), drill four holes on the wall surface, at a depth of 45 mm. - Install the four supplied wall plugs and using the cross headed screwdriver and tighten the four screws. 

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Outdoor DC PoNE, Continued

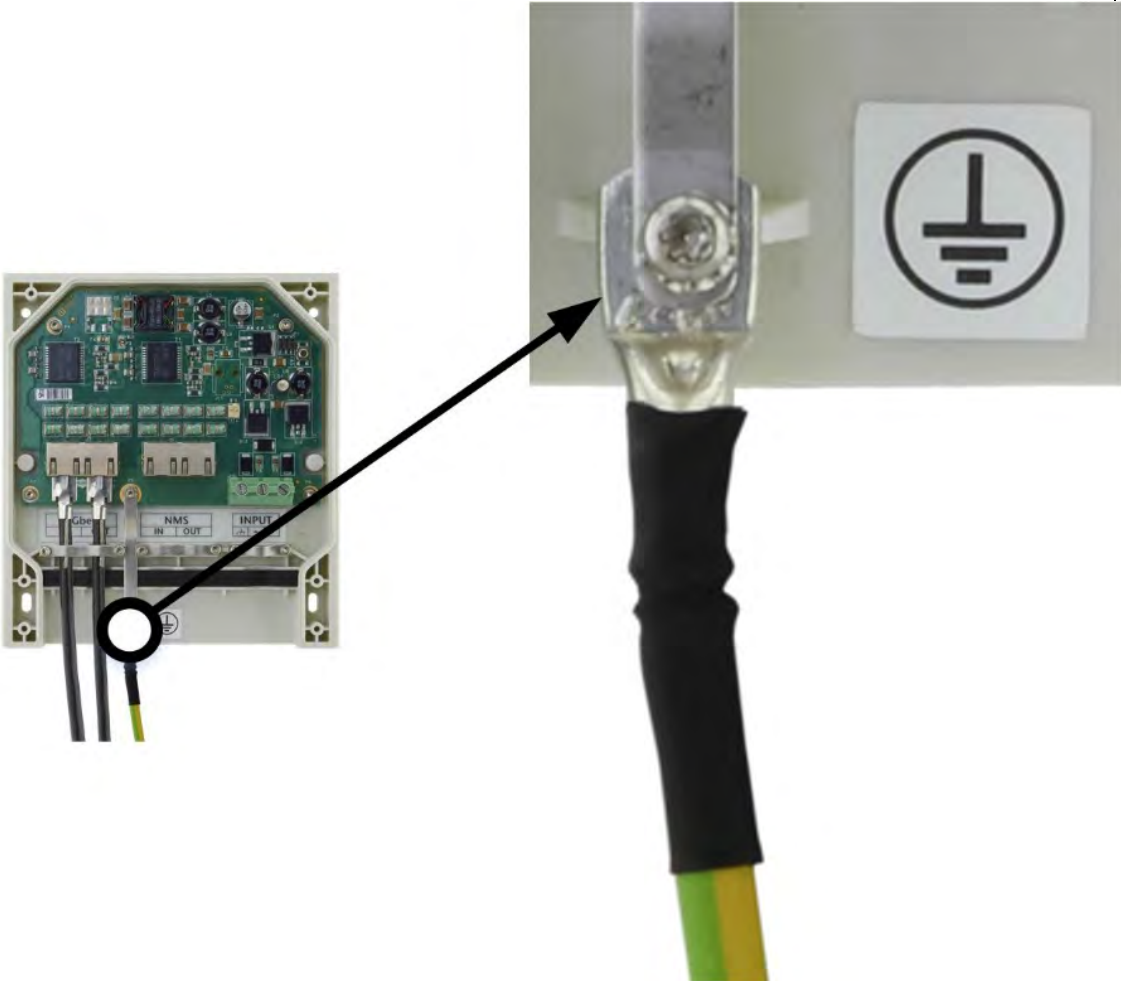
Pole and wall installation procedure, continued

Step	Action
2	Prepare and terminate the Ethernet cables (x 2) as instructed to Appendix D: Cables Termination on page 114. Install the Ethernet cables, as follows: A: Use the tool with TORX T10 bit to remove the clamp screw. Be careful not to drop the screw while removing. B: Plug the Ethernet cables to the Gbe receptacles (OUT: goes to radio unit and IN: goes to customer network). Listen for a “click” when inserting. This verifies that the jack has been inserted properly.  The shielded wires should protrude from clamp about 0.5 cm (as shown below). C: Use the tool with TORX T10 bit to install the clamp for securing the cables in place.  Do not over tighten. Adjust the tool for max tightening torque 0.9 Nm. 

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Outdoor DC PoNE, Continued

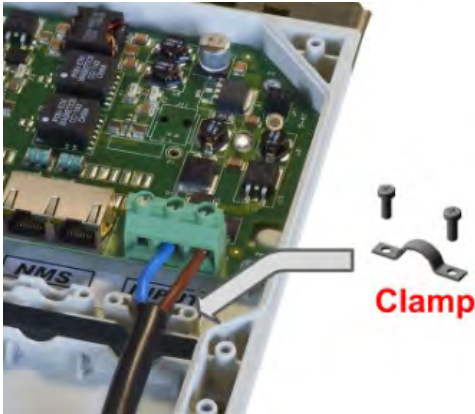
Pole and wall installation procedure, continued

Step	Action
3	Prepare and terminate the grounding cable as instructed to Appendix D: Cables Termination. Use the tool with TORX T10 bit to install the grounding cable, as shown below.  Do not over tighten. Adjust the tool for max tightening torque 0.9 Nm. 

Continued on next page

Outdoor DC PoNE, Continued

Pole and wall installation procedure, continued

Step	Action
4	 Switch-off the local DC power source & the circuit breaker (between PoNE and the local DC power source). Install the power supply cable, as follows: A: Connect the power cable to the local DC power source (Brown wire: +V, blue wire: -V). B: At the other end of the cable, use a blade to strip the wires of the cable, as shown below. Twist strands well to facilitate their insertion into the INPUT receptacle of DC PonE device.  C: Use the tool with TORX T10 bit to remove the clamp and insert the bare ends of the cable into the corresponding positions of the INPUT receptacle, as shown below: Blue wire to INPUT -, Brown wire to INPUT +.  D: Use the flat-headed screwdriver to tighten the INPUT receptacle screws. Do not over tighten. The screws, securing the wire strands into the receptacle, are well isolated each other – no danger for accidental short circuit. D: Use the tool with TORX T10 bit to install the clamp in order to secure the DC power supply cable.  Do not over tighten. Adjust the tool for max tightening torque 0.9 Nm.

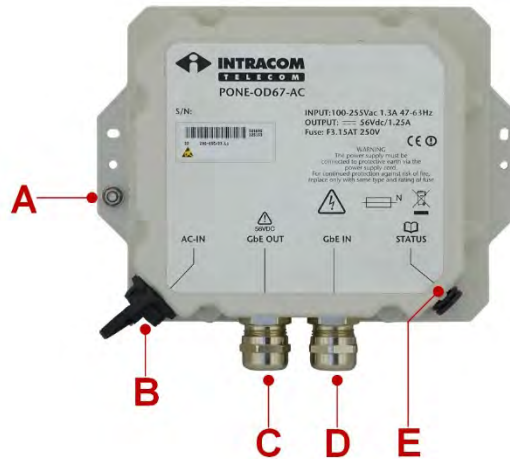
End of procedure.

Outdoor AC PoNE

Introduction

Apply this procedure for installing the outdoor AC PoNE onto the pole and wall.

Equipment overview



#	Marking	Details	Use
A	GRD	Grounding point.	To connect the grounding cable.
B	AC-IN	3-pins AC receptacle.	To connect the AC power supply cable (with AC connector).
C	GbE OUT	Gigabit Ethernet 10/100/1000 Base-T, Electrical (RJ-45).	To connect the Gigabit Ethernet (S-FTP) cable for carrying: • traffic • inband management • superimposed DC power towards to radio unit.
D	GbE IN	Gigabit Ethernet 10/100/1000 Base-T, Electrical (RJ-45).	To connect the Gigabit Ethernet (S-FTP) cable for carrying: • traffic • inband management towards to customer network.
E	STATUS	Multi-functioning LED.	To provide radio unit status during operation.

Continued on next page

Outdoor AC PoNE, Continued

Tools and materials

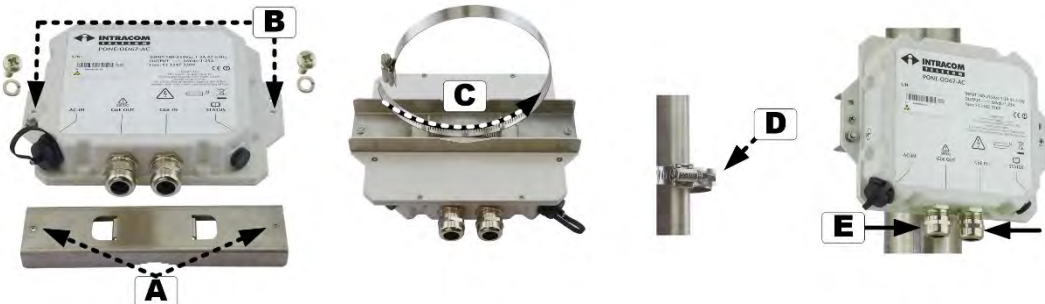
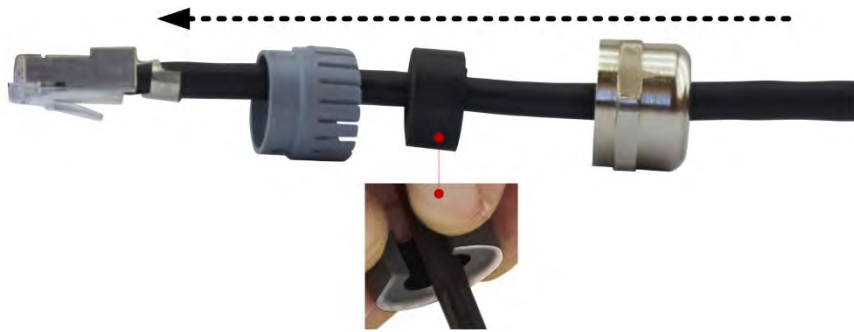
#	Description
Tools	- Adjustable torque U-wrench. TOOL-M20.
Materials	INST-PONE-PL2. PONE-OD67-AC. - Ethernet (S-FTP) cable terminated to RJ-45 jack. - Grounding cable terminated to 16 mm² lug.

Continued on next page

Outdoor AC PoNE, Continued

Pole and wall installation procedure

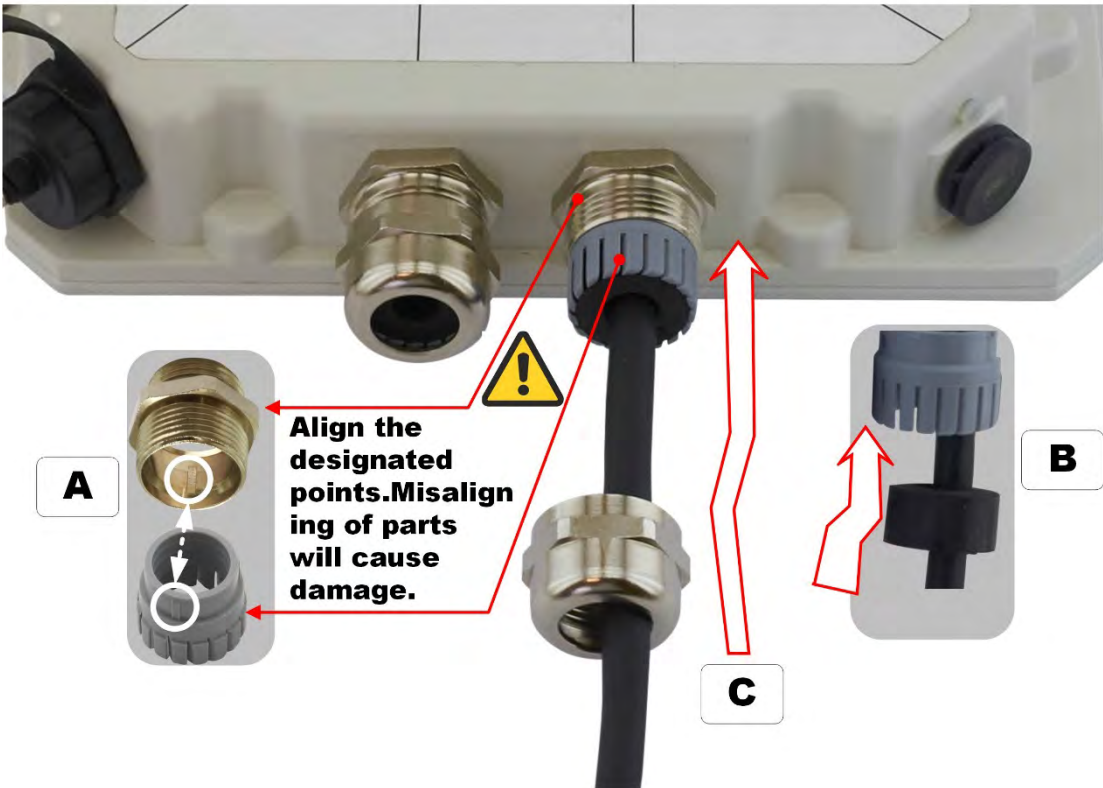
For mechanical installation and cabling of outdoor AC PoNE, proceed as follows:

Step	Action
1	Prepare and terminate the Ethernet cables (x 2) as instructed to Appendix D: Cables Termination on page 114. For pole installation follow this step. For wall installation go to last step. Pole installation: A Attach the plate onto rear side of PonE, as shown below. B: Install lock washer and screw. Then use the cross headed screwdriver to fully tighten. C: Pass the hose clamp through the plate holes. D: Install the PonE onto pole. Use the tool with M5 deep socket to tighten.  Do not over tighten. Adjust the tool for max tightening torque 2 Nm. E: Use the U-wrench to remove the two sealing nuts. Then remove the claw and seal (black item). 
2	Pass the cable through the parts of gland, as shown below:  Plug the Ethernet cables to the GbE receptacles (OUT: goes to radio and IN: goes to customer network). Listen for a “click” when inserting. This verifies that the jack has been inserted properly.

Continued on next page

Outdoor AC PoNE, Continued

Pole and wall installation procedure, continued

Step	Action
3	Perform the following: A: Insert the claw to body taking in consideration the caution below. B: Insert the seal to claw. C: Use the adjustable torque U-wrench to screw the sealing nut to body.  Do not over tighten. Adjust the tool for tightening torque 2 Nm (the final torque will be applied to the next step). 

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Outdoor AC PoNE, Continued

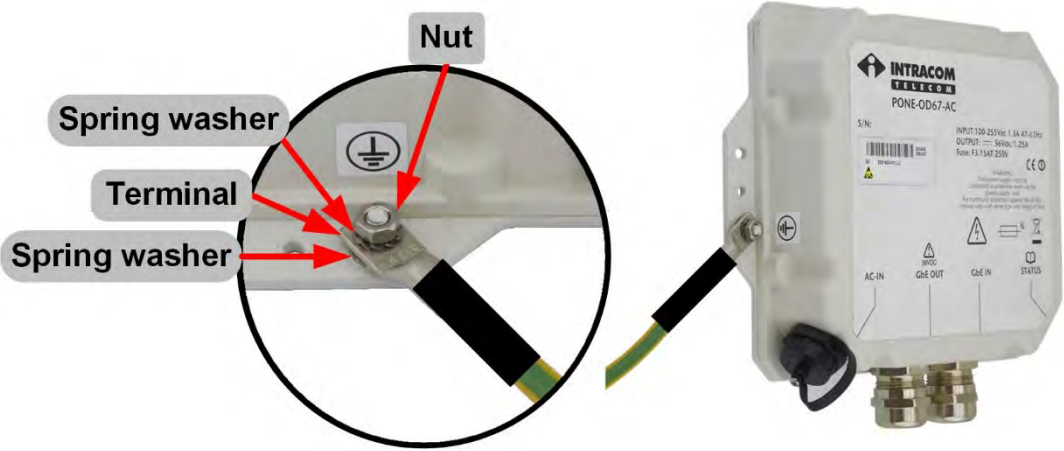
Pole and wall installation procedure, continued

Step	Action
4	Perform the following: A: Set both keys over the sealing nut as shown below. Use the hexagon 24 mm tool to prevent the body receptacle from rotating and loosening. B: Use the adjustable torque U-wrench to screw the sealing nut to body.  Do not over tighten. Adjust the tool for maximum tightening torque 6 Nm.   Take care when you unplug the RJ-45 jack. The latter is locked into the mating receptacle and must be extracted first (with the tip of a flat-headed screwdriver) after removing the gland parts from the lower part of PoNE. 

Continued on next page

Outdoor AC PoNE, Continued

Pole and wall installation procedure, continued

Step	Action
5	Prepare and terminate the grounding cable as instructed to Appendix D: Cables Termination. Install the grounding cable as shown below.  Do not over tighten. Adjust the tool with M5 deep socket for maximum tightening torque 3 Nm. 
6	Prepare and terminate the power supply cable as instructed to Appendix D: Cables Termination. Install the power cable as shown below. 

Continued on next page

Outdoor AC PoNE, Continued

Pole and wall installation procedure, continued

Step	Action
7	Wall installation: Perform the following actions: • Position the device on the wall surface and using a pencil mark the drill points. With the drill machine (fitted with 5 mm bit), drill four holes on the wall surface, at a depth of 45 mm. • Install the 2 supplied wall plugs and using the cross headed screwdriver and tighten the 2 screws. 

End of procedure.

Indoor AC POE

Introduction Apply this procedure for installing the indoor AC POE onto the wall.

Overview



#	Marking	Details	Use
A	INPUT	3-pins AC socket (EU).	To connect the AC power supply cord.
B	LED	Multi-functioning LED.	To provide radio unit status during operation.
C	IN/LAN - OUT/POE	Gigabit Ethernet 10/100/1000 Base-T, Electrical (RJ-45).	IN/LAN: To connect the Gigabit Ethernet (S-FTP) cable for carrying: • traffic • inband management towards to customer network. OUT/POE: To connect the Gigabit Ethernet (S-FTP) cable for carrying: • traffic • superimposed DC power towards to radio unit.
D	GND	Thread for grounding.	To install terminal lug M5 with 6 mm ² grounding cable.

Continued on next page

Indoor AC POE, Continued

Wall installation procedure

PoE is an indoor device only and can be installed as desktop or in a wall surface, as shown below:



Materials for wall mount installation **are not included** on the packing list of the product ((requires wood plugs (5 mm X 25 mm) and wood screws cross-headed (4 mm x 30 mm)).

To install the cables (Ethernet, power and grounding), proceed as follows:

Step	Action
1	Prepare and terminate the Ethernet cables (x 2) as instructed to Appendix D: Cables Termination on page 114 . ONLY for 72 W POE: Prepare and terminate the grounding cable (x 1) as instructed to Appendix D: Cables Termination .
2	Connect the IN/LAN receptacle of the device to customer network.  Connect the OUT/POE receptacle of the device to the correspondence receptacle of the radio unit.
3	Install the IEC plug to the respective input of the PoE and the other plug to the available main socket.

End of procedure.

Appendix D: Cables Termination

Topics

The chapter includes the following topics:

Description	See Page
Ethernet Cable	115
Grounding Cable	120
AC Power Supply Cable	123

Tools and materials

#	Description
Tools	Cables Termination on page 46 .
Materials	ETH-CAB-SFTP terminated to ST-RJ45. GND-KIT16-OD terminated to M5 terminal lug for 16 mm² cable. GND-CAB6-ID terminated to M4 terminal lug for 6 mm² cable. AC-PWR-CAB terminated to AC power connector.

Ethernet Cable

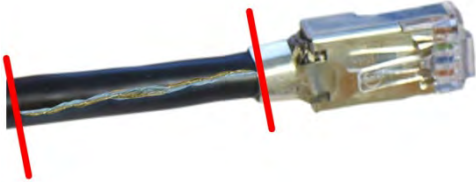
Introduction

Apply this procedure for terminating an Ethernet (S-FTP) cable to RJ-45 connector ([ST-RJ45](#)).

S-FTP cable overview

The equipment to which you connect the cable requires a different way of cable termination.

Mainly there are two types of cable termination, as shown below:

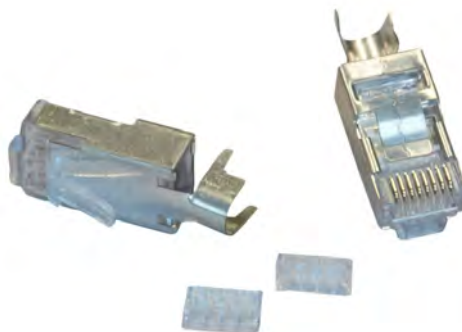
Termination Type	Details / Photo	Equipment to Connect
A	No shield wires exposed 	All, except DC PoNE.
B	Shield wires (twisted) exposed 	DC PoNE only.

RJ45 jack overview

The RJ-45 jack (for terminating the S-FTP cable) is composed of two parts:

- the main body and
- the wire guide (with numbering).

(Photo below shows the parts for a pair of RJ-45 jacks).



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Ethernet Cable, Continued

Ethernet cable termination procedure

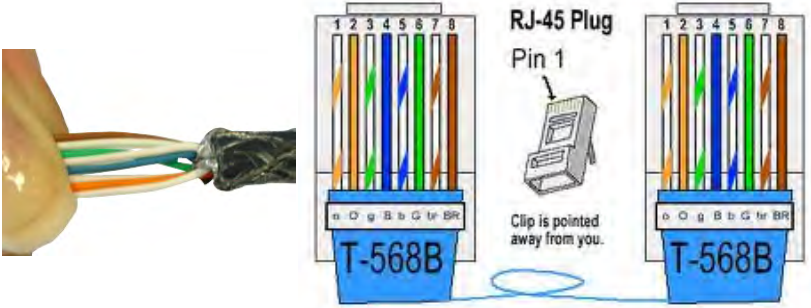
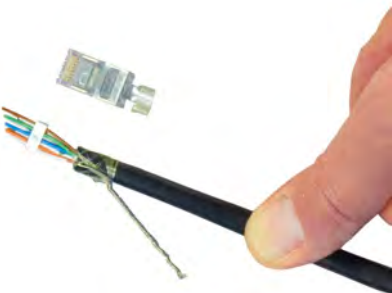
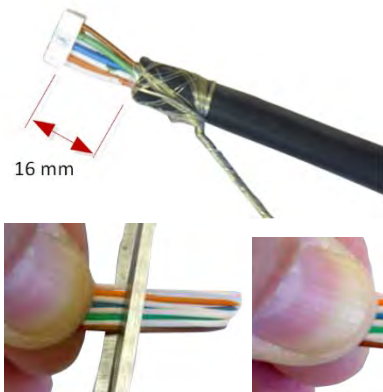
To terminate the cable, proceed as follows:

Step	Action
1	Perform the following: A: For termination type A: Strip 40 mm of outer jacket. For termination type B: Strip 80 mm of outer jacket. B: Fold shield back (over the jacket). C: For termination type A: Twist shield wires together and allow 10 mm of shield to surround jacket's end. For termination type B: Twist shield wires together and allow 20 mm of shield to surround jacket's end. D: Completely remove the exposed foil. For termination type A:  For termination type B: 

Continued on next page

Ethernet Cable, Continued

Ethernet cable termination procedure, continued

2	Untwist wire pairs and arrange according to the T-568 standard straight-through cable, as shown below: 
3	Carefully insert the eight wires into the cavity of the wire guide so that its numbering is visible from the top. 
4	Measure 16 mm from the jacket's end and cut all wires protruding from the guide. 

Continued on next page

Ethernet Cable, Continued

Ethernet cable termination procedure, continued

Step	Action
5	Perform the following: A: Fold back the crimping terminal of the connector. B: Fully insert wire guide and cable into the connector's body until the shield (overlapping the jacket's end) reaches the crimping position. For termination type A:  For termination type B: 
6	Terminate the wires onto the RJ-45 jack. 

Continued on next page

Ethernet Cable, Continued

Ethernet cable termination procedure (continued)

Step	Action
7	With the pliers, bring the terminal of the connector back, over the exposed shield, and press gently around the terminal to form. This will achieve good contact with the shield. For termination type A:  For termination type B: 

Grounding Cable

Introduction

Apply the procedures for terminating grounding cable to grounding lug of the following equipment:

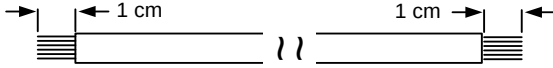
GROUNDING CABLE	
6 mm ²	16 mm ²
outdoor DC PoNE	OSDR radio unit
indoor AC POE 72 W	outdoor AC PoNE

Continued on next page

Grounding Cable, Continued

Grounding cable (16 mm²) termination procedure

To terminate the 16 mm² grounding cable, proceed as follows:

Step	Action
1	Cut the grounding cable (for 16 mm²) according to the distance between equipment and grounding bar.
2	Use the blade to strip 1 cm from each end of the cable, as below: 
3	Perform the following: A: Slide the M5 grounding lug over the wires at one end of the cable and crimp it with the special crimping tool (for 16 mm²). B: Cut the heat shrinkable tube in the middle in two equal pieces in order to use one piece per cable side. C: Slide the one piece of the heat shrinkable tube over the cable. Heat it over rear grounding ring body and down on to cable jacket using the hot air blower.
4	Repeat step 3 for the other end of the cable using the appropriate terminal lug. Eventually both ends should be as follows: • M5 grounding lug (OSDR or outdoor AC PoNE side). • Appropriate grounding lug (grounding bar side). 

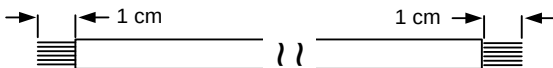
End of procedure.

Continued on next page

Grounding Cable, Continued

Grounding cable (6 mm²) termination procedure

To terminate the 6 mm² grounding cable, proceed as follows:

Step	Action
1	Cut the grounding cable (for 6 mm²) according to the distance between equipment and grounding bar.
2	Use the blade to strip 1 cm from each end of the cable, as below: 
3	Perform the following: A: For DC PoNE: Use the tool with TORX T10 bit to unscrew the terminal ring from PonE, as shown below:  B: Slide the M4 grounding terminal over the wires at one end of the cable and crimp it with the special crimping tool (for 6 mm²). For AC POE: Slide the M5 grounding terminal over the wires at one end of the cable and crimp it with the special crimping tool (for 6 mm²). C: Cut the heat shrinkable tube in the middle in two equal pieces in order to use one piece per cable side. D: Slide the one piece of the heat shrinkable tube over the cable. Heat it over rear grounding ring body and down on to cable jacket using the hot air blower.
4	Repeat step 3 for the other end of the cable using the appropriate terminal lug. Eventually both ends should be as follows: • M4 or M5 grounding terminal • Appropriate grounding lug (grounding terminal side) 
5	Use the tool with TORX T10 bit to screw for securing the ring in place.  Do not over tighten. Adjust the tool for max tightening torque 0.9 Nm.

End of procedure.

AC Power Supply Cable

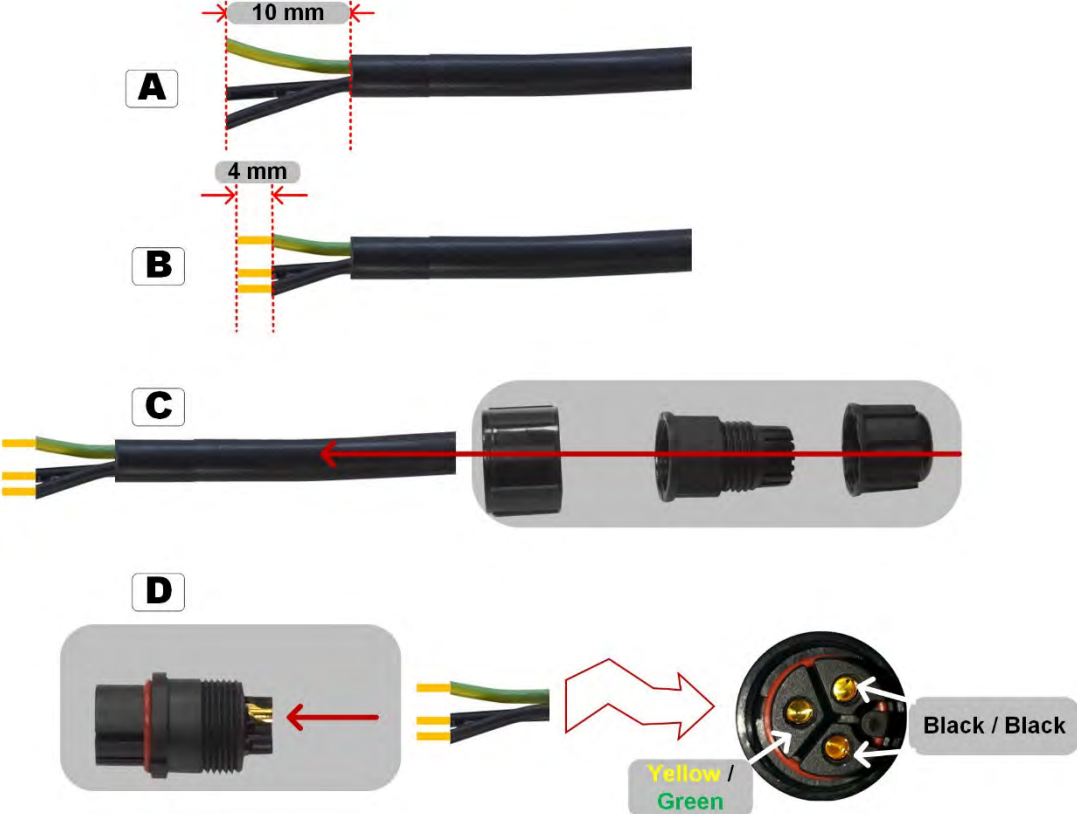
Introduction

Apply this procedure for terminating AC power supply cable to AC power connector for outdoor AC PoNE.

Continued on next page

AC Power Supply Cable, Continued

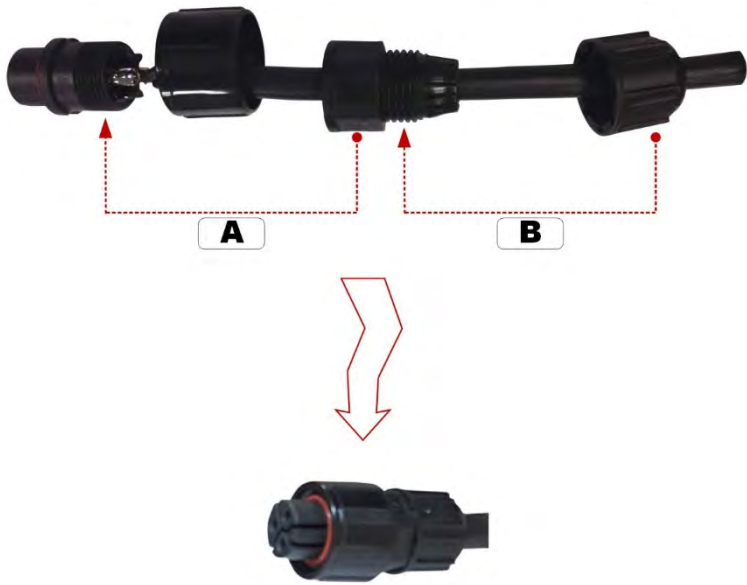
Procedure To terminate the AC power supply cable to AC power connector of outdoor AC PoNE, proceed as follows:

Step	Action
1	Perform the following actions: A: Strip approx. 10 mm from the cable's outer sheath. B: Strip approx. 4 mm from each wire insulation. C: Pass the cable through the parts of gland. D: Solder the 3 pins to the connector taking in consideration the following: • The Yellow/Green wire must be soldered to the pin shown below (white arrow). • The remaining two black wires are for live (L) and neutral (N). Both wires must be soldered to the other two pins. There is no polarity concern regarding these two specific wires. 

Continued on next page

AC Power Supply Cable, Continued

Procedure, continued

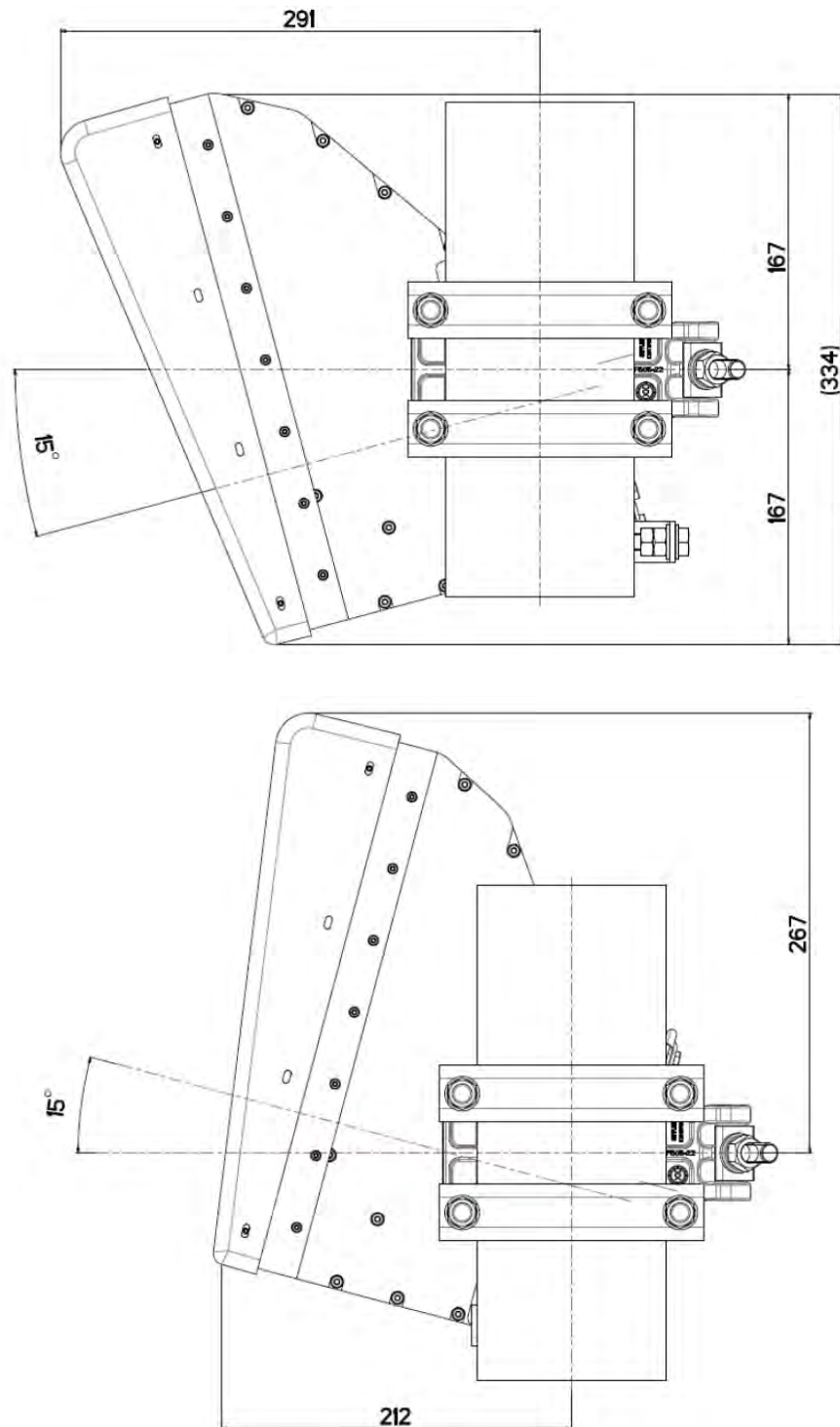
Step	Action
2	Assemble the connector by tightening the parts together, as shown below: 

End of procedure.

Appendix E: Sectoral Antenna Pole Space Requirements

10.5 GHz Antenna

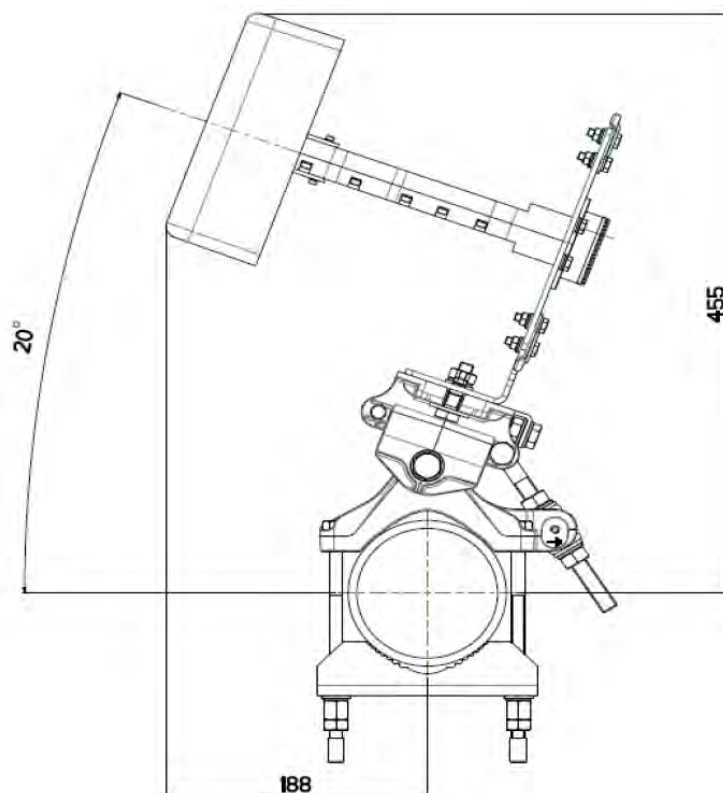
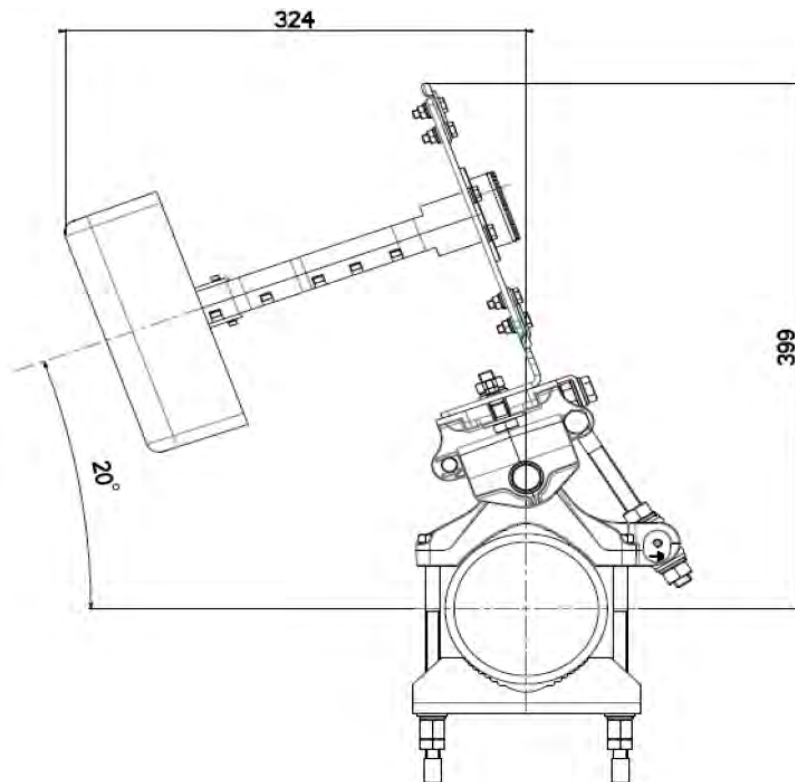
Elevation axis
(in mm)



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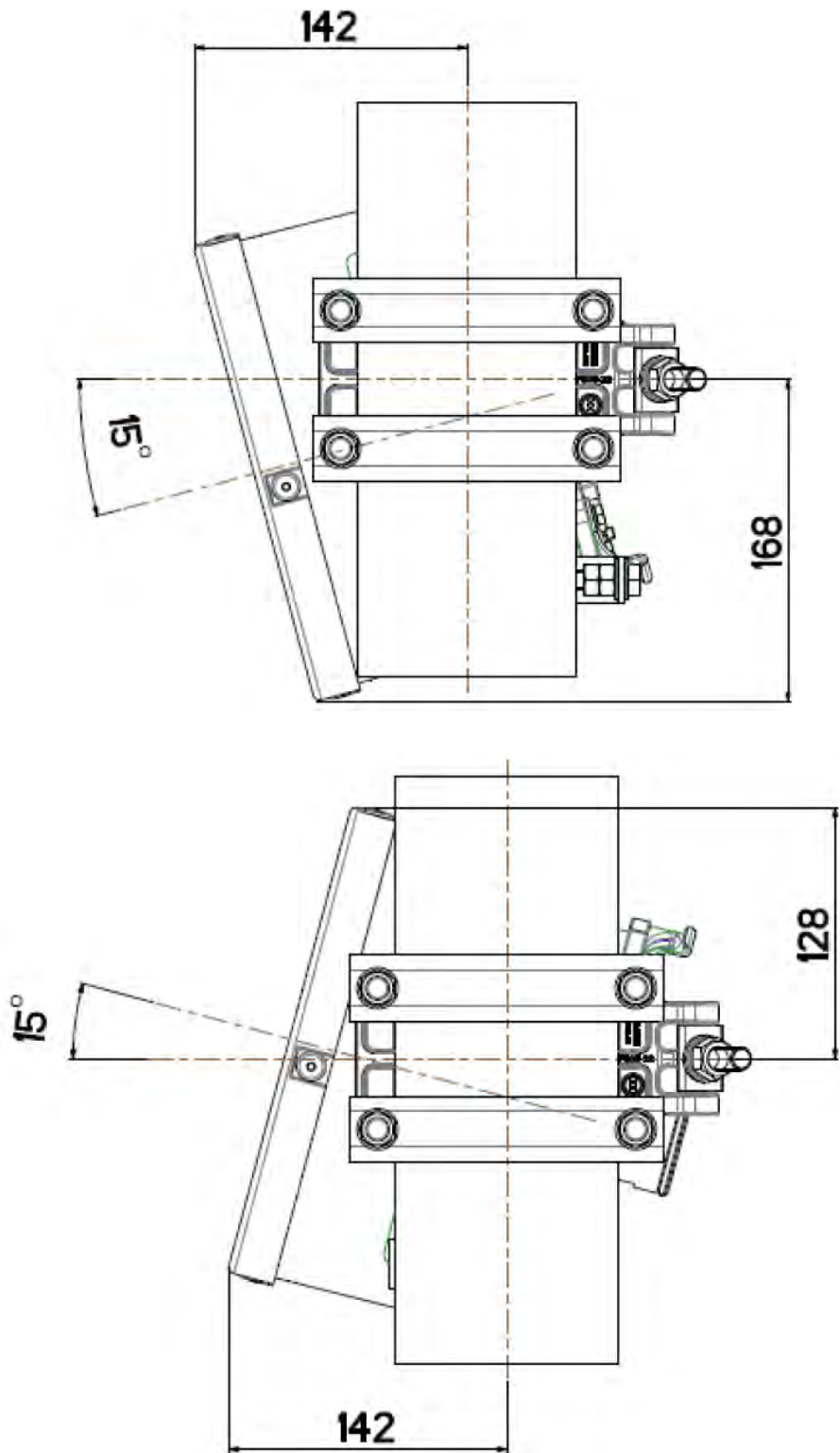
10.5 GHz Antenna, Continued

Azimuth axis
(in mm)



26/28/32 GHz Antenna

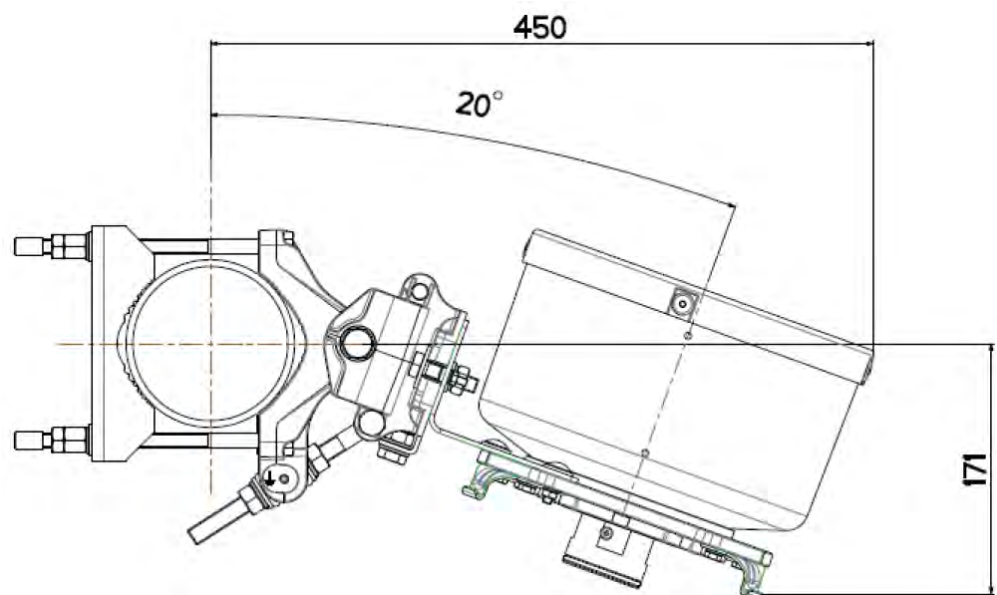
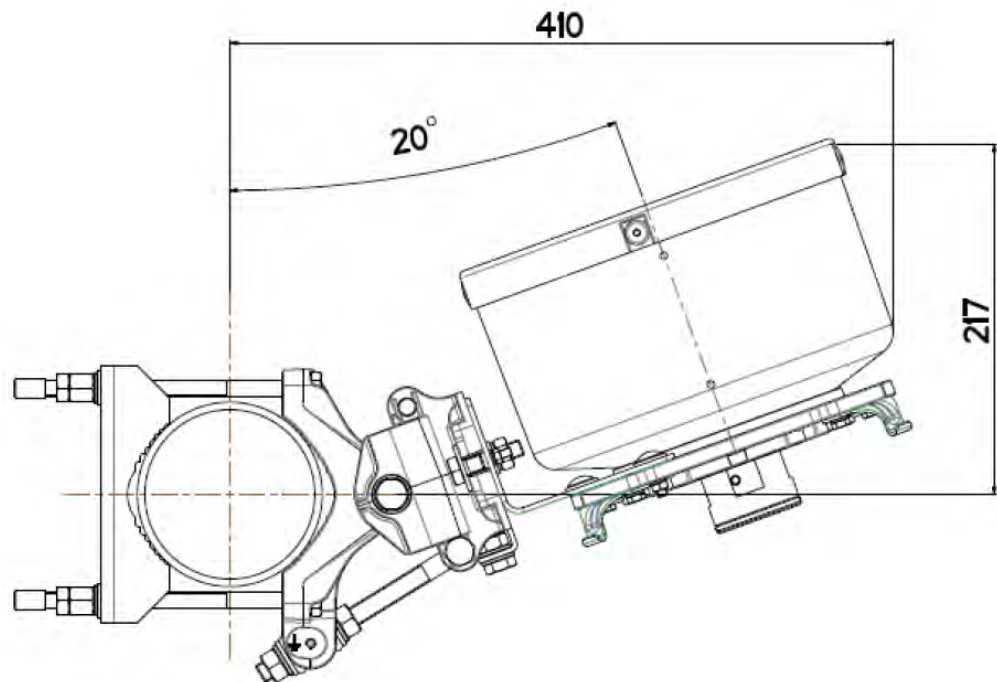
Elevation axis
(in mm)



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26/28/32 GHz Antenna, Continued

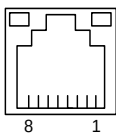
Azimuth axis
(in mm)



Appendix F: Receptacles Pin Out

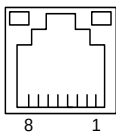
Radio Unit

GbE

Scope	For Traffic / Power.
Type	RJ-45 Female (100/1000 Base-T electrical).
Pin out	

Pin	Signal	Description
1	Transmit and Receive Data A+	Input / Output
2	Transmit and Receive Data A-	Input / Output
3	Transmit and Receive Data B+	Input / Output
4	Transmit and Receive Data C+	Input / Output
5	Transmit and Receive Data C-	Input / Output
6	Transmit and Receive Data B-	Input / Output
7	Transmit and Receive Data D+	Input / Output
8	Transmit and Receive Data D-	Input / Output

FE

Scope	For outband / Power.
Type	RJ-45 Female (10/100/ Base-T electrical).
Pin out	

Pin	Signal	Description
1	Transmit and Receive Data A+	Input / Output
2	Transmit and Receive Data A-	Input / Output
3	Transmit and Receive Data B+	Input / Output
4	Transmit and Receive Data C+	Input / Output
5	Transmit and Receive Data C-	Input / Output
6	Transmit and Receive Data B-	Input / Output
7	Transmit and Receive Data D+	Input / Output
8	Transmit and Receive Data D-	Input / Output

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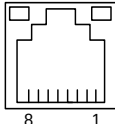
Radio Unit, Continued

SFP

Scope	For GbE optical data traffic connection.
Type	SFP cage (1000 Base-X fiber).

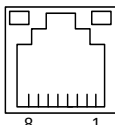
Outdoor DC PoNE

Gbe IN

Scope	For connection of GbE electrical data traffic.
Type	RJ-45 Female (10/100/1000 Base-T electrical).
Pin out	

Pin	Signal	Description
1	Transmit and Receive Data A+	Input / Output
2	Transmit and Receive Data A-	Input / Output
3	Transmit and Receive Data B+	Input / Output
4	Transmit and Receive Data C+	Input / Output
5	Transmit and Receive Data C-	Input / Output
6	Transmit and Receive Data B-	Input / Output
7	Transmit and Receive Data D+	Input / Output
8	Transmit and Receive Data D-	Input / Output

Gbe OUT

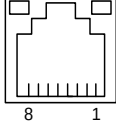
Scope	For connection of GbE electrical data traffic, and PoNE (Power on Ethernet) output.
Type	RJ-45 Female (10/100/1000 Base-T electrical).
Pin out	

Pin	Signal	Description
1	Transmit and Receive Data A+ + Power+	Input / Output
2	Transmit and Receive Data A- + Power+	Input / Output
3	Transmit and Receive Data B+ + Power-	Input / Output
4	Transmit and Receive Data C+ + Power+	Input / Output
5	Transmit and Receive Data C- + Power+	Input / Output
6	Transmit and Receive Data B- + Power-	Input / Output
7	Transmit and Receive Data D+ + Power-	Input / Output
8	Transmit and Receive Data D- + Power-	Input / Output

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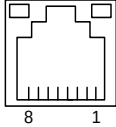
Outdoor DC PoNE, Continued

NMS IN

Scope	For connection of outband management input.
Type	RJ-45 Female (10/100 Base-T electrical).
Pin out	

Pin	Signal	Description
1	Transmit and Receive Data A+	Input / Output
2	Transmit and Receive Data A-	Input / Output
3	Transmit and Receive Data B+	Input / Output
4	Transmit and Receive Data C+	Input / Output
5	Transmit and Receive Data C-	Input / Output
6	Transmit and Receive Data B-	Input / Output
7	Transmit and Receive Data D+	Input / Output
8	Transmit and Receive Data D-	Input / Output

NMS OUT

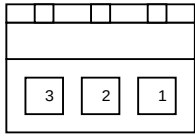
Scope	For connection of outband management and PonE (Power on Ethernet) output.
Type	RJ-45 Female (10/100 Base-T electrical).
Pin out	

Pin	Signal	Description
1	Transmit and Receive Data A+ + Power+	Input / Output
2	Transmit and Receive Data A- + Power+	Input / Output
3	Transmit and Receive Data B+ + Power-	Input / Output
4	Transmit and Receive Data C+ + Power+	Input / Output
5	Transmit and Receive Data C- + Power+	Input / Output
6	Transmit and Receive Data B- + Power-	Input / Output
7	Transmit and Receive Data D+ + Power-	Input / Output
8	Transmit and Receive Data D- + Power-	Input / Output

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Outdoor DC PoNE, Continued

INPUT

Scope	For connection of –48 V dc power supply voltage.
Type	Three poles power receptacle.
Pin out	

Pin	Signal	Description
1	Power Supply Return (GND)	Input
2	–48 V dc, nominal (40 V dc to 60 V dc)	Input
3	Optionally Earth Ground	Input

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