



Installation Guide

PTP 820

RFU-D

System Release 10.9



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About This Installation Guide

This guide describes the RFU-D installation procedures and provides additional information concerning system parts and frequency bands.

This guide contains the following chapters:

- [Chapter 1](#) : Before You Start
- [Chapter 2](#) : RFU-D Overview
- [Error! Reference source not found.](#) [Error! Reference source not found.](#)
- [Chapter 4](#) : Connecting the Data and Power Cables
- [Chapter 5](#) : Generic Installation Procedures
- [Chapter 6](#) : Installation Procedures per Configuration Type
- [Chapter 7](#) : RFU-D LEDs
- [Chapter 8](#) : Installing RFU-D on Third-Party Antenna Adaptors

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Support website:	<ul style="list-style-type: none">• http://www.cambiumnetworks.com/support
Main website:	<ul style="list-style-type: none">• http://www.cambiumnetworks.com
Sales enquiries:	<ul style="list-style-type: none">• solutions@cambiumnetworks.com
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Repair inquiries	<ul style="list-style-type: none">• rma@cambiumnetworks.com
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Address:	Cambium Networks Limited, Linhay Business Park, Eastern Road, Ashburton, Devon, UK, TQ13 7UP

Purpose

Cambium Networks Point-To-Point (PTP) documents are intended to instruct and assist personnel in the operation, installation and maintenance of the Cambium PTP equipment and ancillary devices. It is recommended that all personnel engaged in such activities be properly trained.

Cambium disclaims all liability whatsoever, implied or express, for any risk of damage, loss or reduction in system performance arising directly or indirectly out of the failure of the customer, or anyone acting on the customer's behalf, to abide by the instructions, system parameters, or recommendations made in this document.

Cross references

References to external publications are shown in italics. Other cross references, emphasized in blue text in electronic versions, are active links to the references.

This document is divided into numbered chapters that are divided into sections. Sections are not numbered but are individually named at the top of each page, and are listed in the table of contents.

Feedback

We appreciate feedback from the users of our documents. This includes feedback on the structure, content, accuracy, or completeness of our documents. Send feedback to support@cambiumnetworks.com.

Problems and warranty

Reporting problems

If any problems are encountered when installing or operating this equipment, follow this procedure to investigate and report:

- 1 Search this document and the software release notes of supported releases.
- 2 Visit the support website.
- 3 Ask for assistance from the Cambium product supplier.
- 4 Gather information from affected units, such as any available diagnostic downloads.
- 5 Escalate the problem by emailing or telephoning support.

Repair and service

If unit failure is suspected, obtain details of the Return Material Authorization (RMA) process from the support website.

Hardware warranty

Cambium's standard hardware warranty is for one (1) year from date of shipment from Cambium Networks or a Cambium distributor. Cambium Networks warrants that hardware will conform to the relevant published specifications and will be free from material defects in material and workmanship under normal use and service. Cambium shall within this time, at its own option, either repair or replace the defective product within thirty (30) days of receipt of the defective product. Repaired or replaced product will be subject to the original warranty period but not less than thirty (30) days.

To register PTP products or activate warranties, visit the support website. For warranty assistance, contact the reseller or distributor.



Caution

Using non-Cambium parts for repair could damage the equipment or void warranty. Contact Cambium for service and repair instructions.

Portions of Cambium equipment may be damaged from exposure to electrostatic discharge. Use precautions to prevent damage.

Security advice

Cambium Networks systems and equipment provide security parameters that can be configured by the operator based on their operating environment. Cambium recommends setting and using these parameters following industry recognized security practices. Security aspects to be considered are protecting the confidentiality, integrity, and availability of information and assets. Assets include the ability to communicate, information about the nature of the communications, and information about the parties involved.

In certain instances Cambium makes specific recommendations regarding security practices, however the implementation of these recommendations and final responsibility for the security of the system lies with the operator of the system.

Warnings, cautions, and notes

The following describes how warnings and cautions are used in this document and in all documents of the Cambium Networks document set.

Warnings

Warnings precede instructions that contain potentially hazardous situations. Warnings are used to alert the reader to possible hazards that could cause loss of life or physical injury. A warning has the following format:



Warning

Warning text and consequence for not following the instructions in the warning.

Cautions

Cautions precede instructions and are used when there is a possibility of damage to systems, software, or individual items of equipment within a system. However, this damage presents no danger to personnel. A caution has the following format:



Caution

Caution text and consequence for not following the instructions in the caution.

Notes

A note means that there is a possibility of an undesirable situation or provides additional information to help the reader understand a topic or concept. A note has the following format:



Note

Note text.

Caring for the environment

The following information describes national or regional requirements for the disposal of Cambium Networks supplied equipment and for the approved disposal of surplus packaging.

In EU countries

The following information is provided to enable regulatory compliance with the European Union (EU) directives identified and any amendments made to these directives when using Cambium equipment in EU countries.



Disposal of Cambium equipment

European Union (EU) Directive 2002/96/EC Waste Electrical and Electronic Equipment (WEEE)

Do not dispose of Cambium equipment in landfill sites. For disposal instructions, refer to <http://www.cambiumnetworks.com/support>

Disposal of surplus packaging

Do not dispose of surplus packaging in landfill sites. In the EU, it is the individual recipient's responsibility to ensure that packaging materials are collected and recycled according to the requirements of EU environmental law.

In non-EU countries

In non-EU countries, dispose of Cambium equipment and all surplus packaging in accordance with national and regional regulations.

Chapter 1 : Before You Start

Important Notes

- For the warranty to be honored, install the unit in accordance with the instructions in this manual.
- Any changes or modifications of equipment not expressly approved by the manufacturer could void the user's authority to operate the equipment and the warranty for such equipment.
- RFU-D is intended for installation in a restricted access location.
- RFU-D must be installed and permanently connected to protective earth by qualified service personnel in accordance with applicable national electrical codes.

Safety Precautions and Declared Material

Public and Occupational Boundary Distances Under Article 3.1(a) of the RE Directive

Based on the highest nominal output power of the RFU-D:

- The public exposure of compliance boundary distance is 4.8m.
- The occupational exposure of compliance boundary distance is 1.2m. This is the worst case for the highest nominal output power, using 10-13 GHz frequency bands and antennas up to 1 ft. For all other configurations, the compliance boundary distance is 0.

Note that even when the compliance boundary is a non-zero value, this only applies within the bore sight of the antenna dish. Therefore, during work within and close to the front of the antenna, make sure the transmitters are turned off. As long as the transmitters are turned off during any work on the system, the occupational exposure limit is not of concern to workers operating in or around the parabolic dish antenna.

General Equipment Precautions



Caution

To avoid malfunctioning or personnel injuries, equipment or accessories/kits/plug-in unit installation, requires qualified and trained personnel. Changes or modifications not expressly approved by Cambium Networks could void the user's authority to operate the equipment.



Caution

Where special cables, shields, adapters and grounding kits are supplied or described in this manual, these items must be used, to comply with the FCC regulations.

**Caution**

Use of controls, adjustments, or performing procedures other than those specified herein, may result in hazardous radiation exposure.

**Caution**

When working with a RFU-D, note the following risk of electric shock and energy hazard: Disconnecting one power supply disconnects only one power supply module. To isolate the unit completely, disconnect all power supplies.

**Caution**

Machine noise information order - 3. GPSGV, the highest sound pressure level amounts to 70 dB (A) or less, in accordance with ISO EN 7779.

**Anti Static**

Static electricity may cause body harm, as well as harm to electronic components inside the device. Anyone responsible for the installation or maintenance of the PTP 820G RFU-A must use an ESD Wrist Strap. ESD protection measures must be observed when touching the unit. To prevent damage, before touching components inside the device, all electrostatic must be discharged from both personnel and tools.

**Caution**

In Norway and Sweden:

Equipment connected to the protective earthing of the building installation through the mains connection or through other equipment with a connection to protective earthing – and to a cable distribution system using coaxial cable, may in some circumstances create a fire hazard. Connection to a cable distribution system has therefore to be provided through a device providing electrical isolation below a certain frequency range (galvanic isolator, see EN 60728-11).

Utstyr som er koplet til beskyttelsesjord via nettplugg og/eller via annet jordtilkoplede utstyr – og er tilkoplede et kabel-TV nett, kan forårsake brannfare. For å unngå dette skal det ved tilkopling av utstyret til kabel-TV nettet installeres en galvanisk isolator mellom utstyret og kabel-TV nettet.

Utrustning som är kopplad till skyddsjord via jordat vägguttag och/eller via annan utrustning och samtidigt är kopplad till kabel-TV nät kan i vissa fall medföra risk för brand. För att undvika detta skall vid anslutning av utrustningen till kabel-TV nät galvanisk isolator finnas mellan utrustningen och kabel-TV nätet.

Précautions générales relatives à l'équipement



Caution

L'utilisation de commandes ou de réglages ou l'exécution de procédures autres que celles spécifiées dans les présentes peut engendrer une exposition dangereuse aux rayonnements.



Caution

L'usage de PTP 820G RFU-A s'accompagne du risque suivant d'électrocution et de danger électrique : le débranchement d'une alimentation électrique ne déconnecte qu'un module d'alimentation électrique. Pour isoler complètement l'unité, il faut débrancher toutes les alimentations électriques.



Caution

Bruit de machine d'ordre - 3. GPSGV, le plus haut niveau de pression sonore s'élève à 70 dB (A) au maximum, dans le respect de la norme ISO EN 7779.

Allgemeine Vorsichtsmaßnahmen für die Anlage



Caution

Wenn andere Steuerelemente verwendet, Einstellungen vorgenommen oder Verfahren durchgeführt werden als die hier angegebenen, kann dies gefährliche Strahlung verursachen.



Caution

Beachten Sie beim Arbeiten mit PTP 820G RFU-A das folgende Stromschlag- und Gefahrenrisiko: Durch Abtrennen einer Stromquelle wird nur ein.



Caution

Stromversorgungsmodul abgetrennt. Um die Einheit vollständig zu isolieren, trennen Sie alle Stromversorgungen ab.

Maschinenlärminformations-Verordnung - 3. GPSGV, der höchste Schalldruckpegel beträgt 70 dB(A) oder weniger gemäß EN ISO 7779.

Pre-installation Instructions

Packing

The equipment must be packed and sealed in moisture absorbing bags.

Transportation and Storage

The equipment cases are prepared for shipment by air, truck, railway and sea, suitable for handling by forklift trucks and slings. The cargo must be kept dry during transportation, in accordance with ETS 300 019-1-2, Class 2.3. For sea-transport, deck-side shipment is not permitted. Carrier-owned cargo containers should be used.

It is recommended that the equipment be transported to the installation site in its original packing case.

If intermediate storage is required, the packed equipment must be stored in a dry and cool environment, and out of direct sunlight, in accordance with ETS 300 019-1-1, Class 1.2.

Unpacking

The equipment is packed in sealed plastic bags and moisture absorbing bags are inserted. Any separate sensitive product, i.e. printed boards, are packed in anti-static handling bags. The equipment is further packed in special designed cases.

Marking is done according to standard practice unless otherwise specified by customers. The following details should be marked:

- Customers address
- Contract No
- Site name (if known)
- Case No

Inspection

Check the packing lists and ensure that correct parts numbers quantities of goods have arrived. Inspect for any damage on the cases and equipment. Please report any damage or discrepancy to Cambium Networks support by e-mailing to support@cambiumnetworks.com.

Chapter 2 : RFU-D Overview

The RFU-D brings MultiCore features and capabilities to split-mount configurations. RFU-D incorporates two modems, which are connected to the IDU via a single SFP or RJ-45 interface.

RFU-D's MultiCore design enables it to support MultiCore capacity-boosting features such as XPIC and MIMO. Operators using RFU-D RFUs can incorporate these features in aggregation site nodes to increase spectral efficiency and capacity, while minimizing the site's footprint.

Because of RFU-D's MultiCore design, operators can use it to overcome backbone deployment limitations by using the advanced features supported by RFU-D. For example, Advanced Frequency Reuse (AFR) enables operators to reuse the same frequency within the same site with angular separation as narrow as 15°, using Class 3 antennas. 4x4 MIMO enables operators to increase capacity fourfold over a specific channel bandwidth.



Note

For information on feature availability, refer to the Release Notes for the PTP 820 software you are using.

RFU-D operates in the frequency range of 6-38 GHz. RFU-D supports low to high capacities for traditional voice and Ethernet services, as well as PDH/ or hybrid Ethernet and TDM interfaces.

With RFU-D, traffic capacity throughput and spectral efficiency are optimized with the desired channel bandwidth. For maximum user choice flexibility, channel bandwidths from 14-112 MHz can be selected together with a range of modulations. RFU-D provides a range of modulations from QPSK to 4096 QAM.

Using Cambium's Easy Set technology, a RFU-D consists of a generic radio unit and a diplexer unit. For 6 to 15 GHz, the diplexer unit is field-replaceable, which means it can be replaced without replacing the radio unit. The generic radio unit covers an entire frequency band. It is the diplexer unit, which is passive, that determines the sub-band coverage for the entire integrated RFU-D unit. This provides operators with major benefits in terms of both deployment time and maintenance.

For 18 to 38 GHz, the diplexer unit is preassembled with the RFU-D and cannot be replaced in the field.

RFU-D Interfaces

The following figures show the RFU-D TX and RX interfaces.

Figure 1: RFU-D Radio Interfaces (6 to 15 GHz)

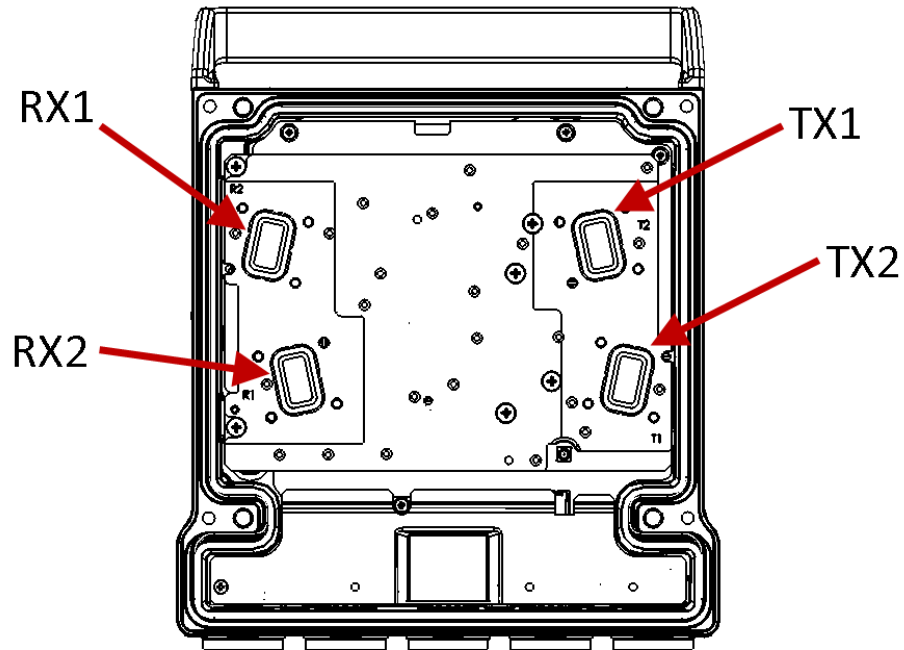


Figure 2: RFU-D Antenna Interfaces (6 to 38 GHz)

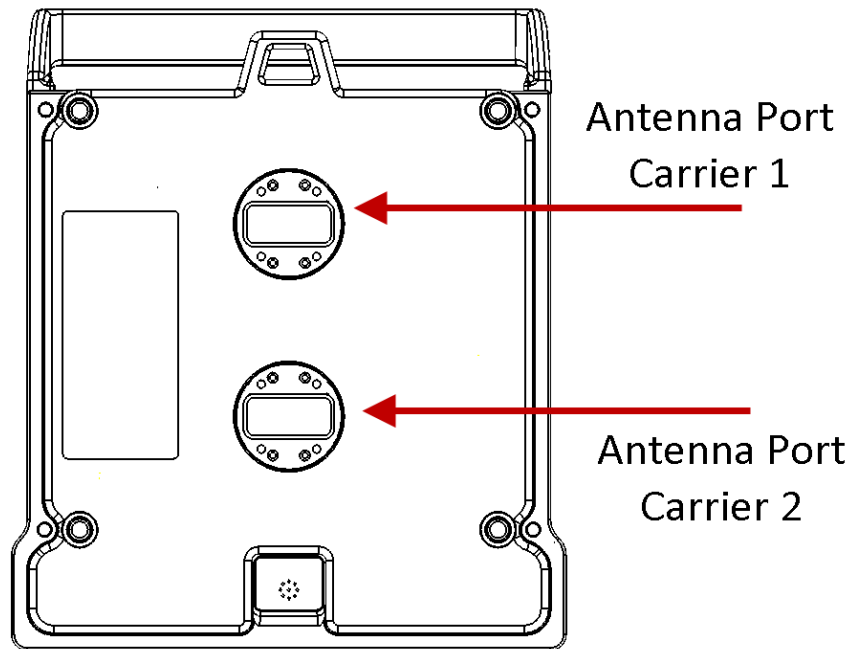


Figure 3: RFU-D Front Side Interfaces (All Frequency Bands)

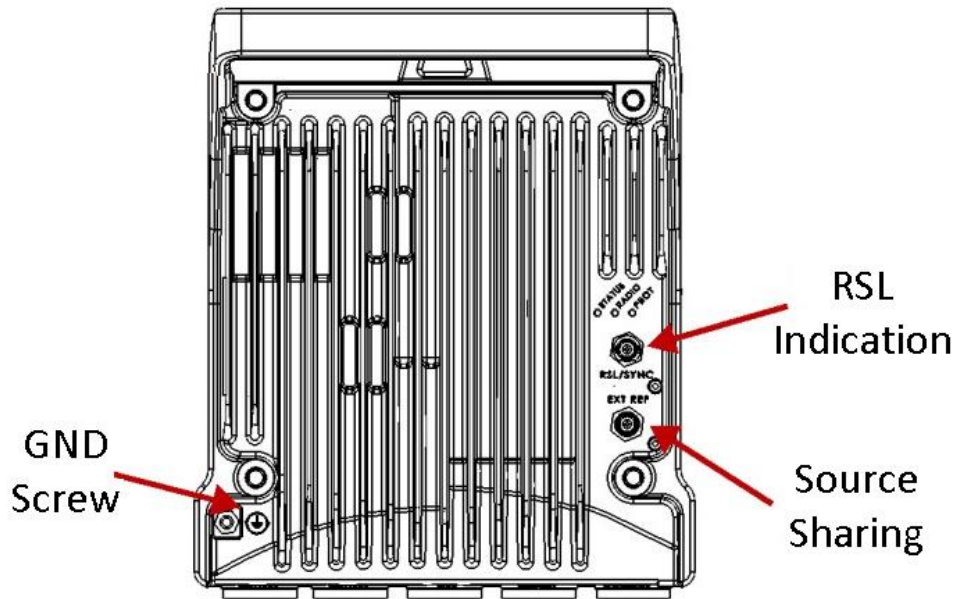


Figure 4: RFU-D Interfaces (All Frequency Bands)

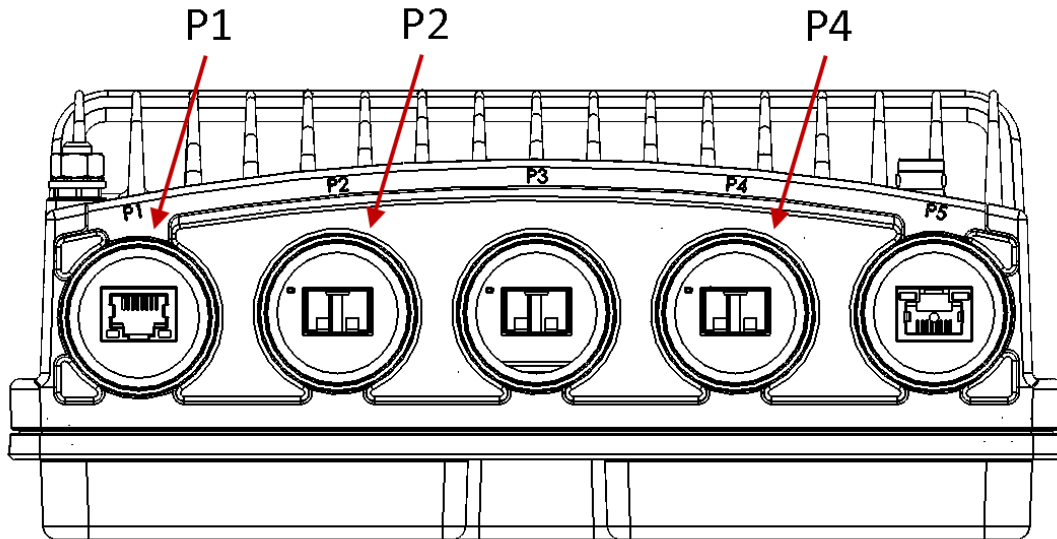


Table 1: RFU-D Interfaces

Interface	Description
P1	PoE / RFU Interface (RJ-45)
P2	RFU Interface (SFP)
P4	MIMO Interface

RFU-D Part Numbers

For frequencies of 6 to 15 GHz, RFU-D uses the Easy Set technology in which the radio and the diplexer unit are delivered as separate units.

For frequencies of 18 to 38 GHz, the RFU-D unit is delivered as one unit, consisting of both the radio and the diplexers.

This section explains how to read RFU-D Part Numbers, including Part Numbers for the diplexer unit for 6-15 GHz links. Constructing a Part Number for the purpose of ordering equipment should always be done using a configurator.



Note

Not all Part Number fields are always necessary to define a valid Part Number. If a specific field is not applicable, it should be omitted.

Marketing Models for Easy Set RFU-D Radio and Diplexer Units, 6 to 15 GHz

For frequencies of 6 to 15 GHz, the RFU-D radio unit and diplexer unit are ordered separately. Using Easy Set technology, the diplexer unit is assembled on the RFU D radio unit during link installation in the field. The radio unit is generic; only the diplexer unit (DXU) is sub-band specific, which facilitates link planning, ordering, and maintenance as described above.

Table 2 provides the Part Number structure for the RFU-D Easy Set radio unit.

Table 3 provides the Part Number structure for the RFU-D Easy Set diplexer unit.

Table 2: RFU-D Part Number Structure, 6 to 15 GHz (Radio Unit)

Part Number	Description
C060082R240A	PTP 820 RFU-D, Dual TX, 6 GHz, Split, Basic Radio
C070082R326A	PTP 820 RFU-D, Dual TX, 7 GHz, Split, Basic Radio
C080082R176A	PTP 820 RFU-D, Dual TX, 8 GHz, Split, Basic Radio
C110082R150A	PTP 820 RFU-D, Dual TX, 11 GHz, Split, Basic Radio
C130082R076A	PTP 820 RFU-D, Dual TX, 13 GHz, Split, Basic Radio
C150082R096A	PTP 820 RFU-D, Dual TX, 15 GHz, Split, Basic Radio

Table 3: RFU-D Part Number Structure, 6 to 15 GHz (Diplexer Unit)

Part Number	Description
N060082L247A	PTP 820 RFU-D Diplexer, L6 GHz, TR 252A, CH1W4, Hi, 6179.415-6304.015MHz

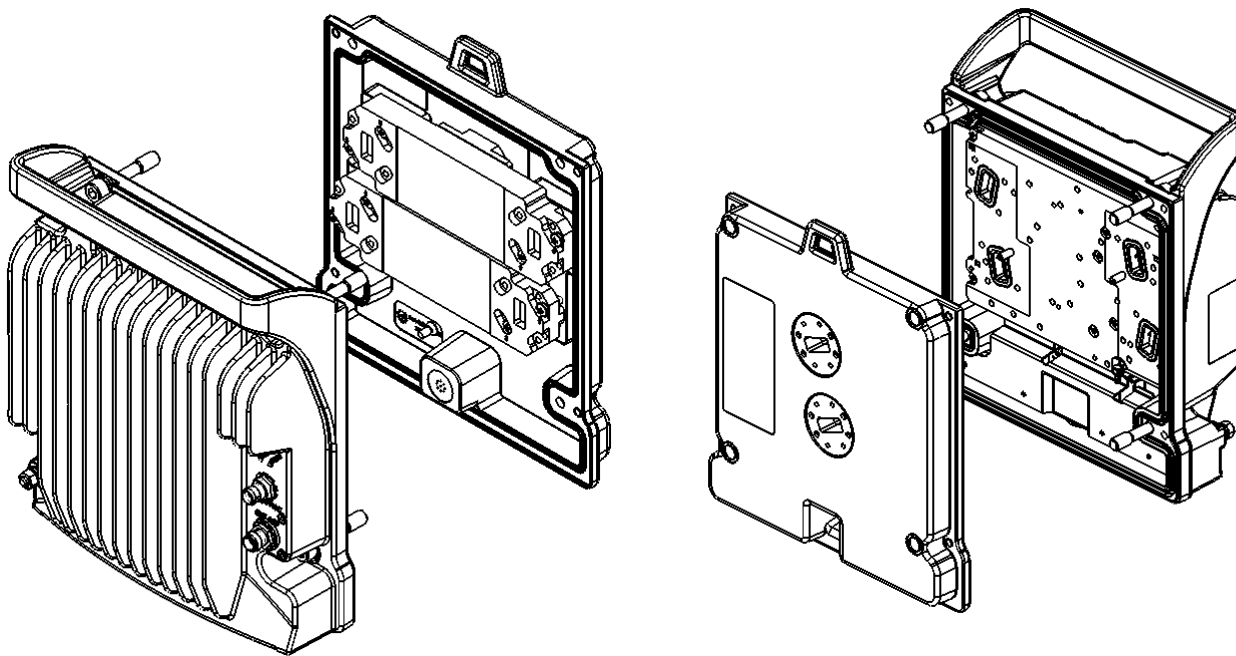
Part Number	Description
N060082L248A	PTP 820 RFU-D Diplexer,L6 GHz, TR 252A, CH1W4, Lo,5927.375-6051.975MHz
N060082L249A	PTP 820 RFU-D Diplexer,L6 GHz, TR 252A, CH3W6, Hi,6238.715-6363.315MHz
N060082L250A	PTP 820 RFU-D Diplexer,L6 GHz, TR 252A, CH3W6, Lo,5986.675-6111.275MHz
N060082L251A	PTP 820 RFU-D Diplexer,L6 GHz, TR 252A, CH5W8, Hi,6298.015-6422.615MHz
N060082L252A	PTP 820 RFU-D Diplexer,L6 GHz, TR 252A, CH5W8, Lo,6045.975-6170.575MHz
N060082L253A	PTP 820 RFU-D Diplexer,U6 GHz, TR160A,Ch1W6,Hi,6707.5-6772.5MHz
N060082L254A	PTP 820 RFU-D Diplexer,U6 GHz, TR160A,Ch1W6,Lo,6537.5-6612.5MHz
N060082L255A	PTP 820 RFU-D Diplexer,U6 GHz,TR160A,Ch7W12,Hi,6767.5-6832.5MHz
N060082L256A	PTP 820 RFU-D Diplexer,U6 GHz,TR160A,Ch7W12,Lo,6607.5-6672.5MHz
N060082L257A	PTP 820 RFU-D Diplexer,U6 GHz,TR160A,Ch13W16,Hi,6827.5-6872.5MHz
N060082L258A	PTP 820 RFU-D Diplexer,U6 GHz,TR160A,Ch13W16,Lo,6667.5-6712.5MHz
N060082L259A	PTP 820 RFU-D Diplexer,U6 GHz, TR 340A, CH1W4, Hi,6781-6939MHz
N060082L260A	PTP 820 RFU-D Diplexer,U6 GHz, TR 340A, CH1W4, Lo,6441-6599MHz
N060082L261A	PTP 820 RFU-D Diplexer,U6 GHz, TR 340A, CH5W8, Hi,6941-7099MHz
N060082L262A	PTP 820 RFU-D Diplexer,U6 GHz, TR 340A, CH5W8, Lo,6601-6759MHz
N070082L346A	PTP 820 RFU-D Diplexer,7 GHz, TR 154A, CH1W2, Hi,7580.5-7639.5MHz
N070082L347A	PTP 820 RFU-D Diplexer,7 GHz, TR 154A, CH1W2, Lo,7426.5-7485.5MHz
N070082L348A	PTP 820 RFU-D Diplexer,7 GHz, TR 154A, CH2W3, Hi,7608.5-7667.5MHz

Part Number	Description
N070082L349A	PTP 820 RFU-D Diplexer,7 GHz, TR 154A, CH2W3, Lo,7454.5-7513.5MHz
N070082L350A	PTP 820 RFU-D Diplexer,7 GHz, TR 154A, CH3W4, Hi,7636.5-7695.5MHz
N070082L351A	PTP 820 RFU-D Diplexer,7 GHz, TR 154A, CH3W4, Lo,7482.5-7541.5MHz
N070082L352A	PTP 820 RFU-D Diplexer,7 GHz, TR 154A, CH4W5, Hi,7664.5-7723.5MHz
N070082L353A	PTP 820 RFU-D Diplexer,7 GHz, TR 154A, CH4W5, Lo,7510.5-7569.5MHz
N070082L354A	PTP 820 RFU-D Diplexer,7 GHz, TR 161A, CH1W2, Hi,7284-7343MHz
N070082L355A	PTP 820 RFU-D Diplexer,7 GHz, TR 161A, CH1W2, Lo,7123-7182MHz
N070082L356A	PTP 820 RFU-D Diplexer,7 GHz, TR 161A, CH3W4, Hi,7340-7399MHz
N070082L357A	PTP 820 RFU-D Diplexer,7 GHz, TR 161A, CH3W4, Lo,7179-7238MHz
N070082L358A	PTP 820 RFU-D Diplexer,7 GHz, TR 245A, CH1W4, Hi,7671.5-7786.5MHz
N070082L359A	PTP 820 RFU-D Diplexer,7 GHz, TR 245A, CH1W4, Lo,7426.5-7541.5MHz
N070082L360A	PTP 820 RFU-D Diplexer,7 GHz, TR 245A, CH5W8, Hi,7783.5-7898.5MHz
N070082L361A	PTP 820 RFU-D Diplexer,7 GHz, TR 245A, CH5W8, Lo,7538.5-7653.5MHz
N080082L180A	PTP 820 RFU-D Diplexer,8 GHz, TR 119A, CH1W3, Hi,8396.5-8455.5MHz
N080082L181A	PTP 820 RFU-D Diplexer,8 GHz, TR 119A, CH1W3, Lo,8277.5-8336.5MHz
N080082L182A	PTP 820 RFU-D Diplexer,8 GHz, TR 119A, CH4W6, Hi,8438.5-8497.5MHz
N080082L183A	PTP 820 RFU-D Diplexer,8 GHz, TR 119A, CH4W6, Lo,8319.5-8378.5MHz
N080082L184A	PTP 820 RFU-D Diplexer,8 GHz, TR 311A, CH1W4, Hi,8043.52-8163.47MHz
N080082L185A	PTP 820 RFU-D Diplexer,8 GHz, TR 311A, CH1W4, Lo,7732.2-7852.15MHz

Part Number	Description
N080082L186A	PTP 820 RFU-D Diplexer,8 GHz, TR 311A, CH5W8, Hi,8162.12-8282.07MHz
N080082L187A	PTP 820 RFU-D Diplexer,8 GHz, TR 311A, CH5W8, Lo,7850.8-7970.75MHz
N110082L151A	PTP 820 RFU-D Diplexer,11 GHz, TR 500, CH1W6, Hi,11185-11485MHz
N110082L152A	PTP 820 RFU-D Diplexer,11 GHz, TR 500, CH1W6, Lo,10695-10955MHz
N110082L153A	PTP 820 RFU-D Diplexer,11 GHz, TR 500, CH2W7, Hi,11225-11485MHz
N110082L154A	PTP 820 RFU-D Diplexer,11 GHz, TR 500, CH2W7, Lo,10735-10995MHz
N110082L155A	PTP 820 RFU-D Diplexer,11 GHz, TR 500, CH3W8, Hi,11265-11525MHz
N110082L156A	PTP 820 RFU-D Diplexer,11 GHz, TR 500, CH3W8, Lo,10775-11035MHz
N110082L157A	PTP 820 RFU-D Diplexer,11 GHz, TR 500, CH4W9, Hi,11305-11585MHz
N110082L158A	PTP 820 RFU-D Diplexer,11 GHz, TR 500, CH4W9, Lo,10815-11095MHz
N110082L159A	PTP 820 RFU-D Diplexer,11 GHz, TR 500, CH5W10, Hi,11345-11605MHz
N110082L160A	PTP 820 RFU-D Diplexer,11 GHz, TR 500, CH5W10, Lo,10855-11115MHz
N110082L161A	PTP 820 RFU-D Diplexer,11 GHz, TR 500, CH6W12, Hi,11385-11705MHz
N110082L162A	PTP 820 RFU-D Diplexer,11 GHz, TR 500, CH6W12, Lo,10895-11205MHz
N110082L163A	PTP 820 RFU-D Diplexer,11 GHz, TR 500, CH7W13, Hi,11425-11725MHz
N110082L164A	PTP 820 RFU-D Diplexer,11 GHz, TR 500, CH7W13, Lo,10915-11207MHz
N130082L077A	PTP 820 RFU-D Diplexer,13 GHz, TR 266, CH5W8, Hi,13127-13246MHz
N130082L078A	PTP 820 RFU-D Diplexer,13 GHz, TR 266, CH5W8, Lo,12858-12990MHz
N130082L079A	PTP 820 RFU-D Diplexer,13 GHz, TR 266, CH1W4, Hi,13002-13141MHz
N130082L080A	PTP 820 RFU-D Diplexer,13 GHz, TR 266, CH1W4, Lo,12745.75-12866MHz
N130082L081A	PTP 820 RFU-D Diplexer,13 GHz, TR 266A, CH3W5, Hi,13073-13185MHz
N130082L082A	PTP 820 RFU-D Diplexer,13 GHz, TR 266A, CH3W5, Lo,12807-12919MHz

Part Number	Description
N150082L097A	PTP 820 RFU-D Diplexer,15 GHz, TR 420, CH1W8, Hi,14921-15145MHz
N150082L098A	PTP 820 RFU-D Diplexer,15 GHz, TR 420, CH1W8, Lo,14501-14725MHz
N150082L099A	PTP 820 RFU-D Diplexer,15 GHz, TR 420, CH8W15, Hi,15117-15341MHz
N150082L100A	PTP 820 RFU-D Diplexer,15 GHz, TR 420, CH8W15, Lo,14697-14921MHz
N150082L101A	PTP 820 RFU-D Diplexer,15 GHz, TR 728, CH1W4, Hi,15229-15375MHz
N150082L102A	PTP 820 RFU-D Diplexer,15 GHz, TR 728, CH1W4, Lo,14500-14647MHz

Figure 5: Radio Unit and Diplexer Unit



System Components

The following figures show the main components used in the RFU-D installation procedures.



Note

The availability of the installation components follows the RFU-D frequency rollout as stated in the published roadmap.

The presence of a specific component in this manual does not indicate that it is available for ordering. Please consult with your respective pre-sales engineer for specific component availability.

Note that in many cases, RFU-D uses the same components as PTP 820C, and the names and Part Numbers for these components are the same.

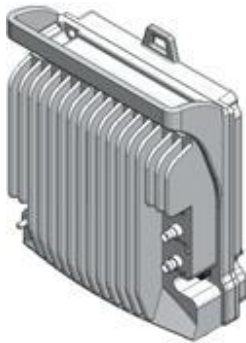


Figure 6: RFU-D

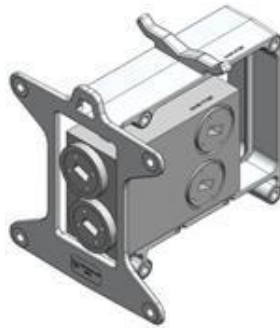


Figure 7: Dual Coupler/Splitter

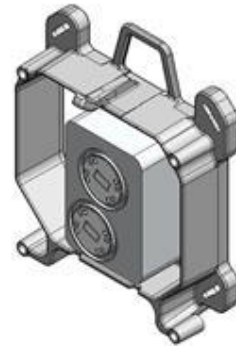


Figure 8: OMT



Figure 9: Remote Pole Mount

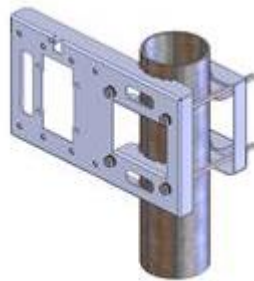


Figure 10: Remote Dual Pole Mount

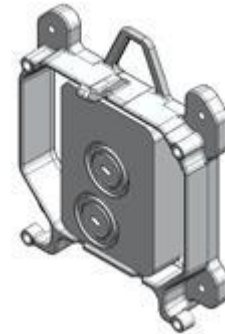


Figure 11: Splitter



Figure 12: PTP 820C Remote Mount Adaptor

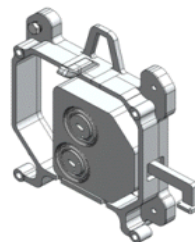


Figure 13: Dual Core Mediation Device

Adaptors and Installation Kits

N000082L166A	PTP 820C-HP/RFU-D-HP Remote Mount kit
N060082L231A	PTP 820C-HP/RFU-D-HP Remote Mount Adaptor,6 GHz
N110082L144A	PTP 820C-HP/RFU-D-HP Remote Mount Adaptor,11 GHz
N070082L338A	PTP 820C-HP/RFU-D-HP Remote Mount Adaptor,7-8 GHz
N060082L232A	PTP 820C-HP/RFU-D-HP Splitter,6 GHz
N110082L145A	PTP 820C-HP/RFU-D-HP Splitter,11 GHz
N070082L339A	PTP 820C-HP/RFU-D-HP Splitter,7-8 GHz
N060082L226A	PTP 820C-HP/RFU-D-HP OMT,6 GHz
N070082L340A	PTP 820C-HP/RFU-D-HP OMT,7-8 GHz
N110082L141A	PTP 820C-HP/RFU-D-HP OMT,11 GHz
N060082L244A	PTP 820C-HP/RFU-D-HP OMT Plate Adaptor, 6 GHz
N110082L148A	PTP 820C-HP/RFU-D-HP OMT Plate Adaptor, 11 GHz
N070082L341A	PTP 820C-HP/RFU-D-HP OMT Plate Adaptor, 7-8 GHz
N060082L227A	PTP 820C-HP/RFU-D-HP Dual Coupler,6 GHz
N110082L142A	PTP 820C-HP/RFU-D-HP Dual Coupler,11 GHz
N070082L342A	PTP 820C-HP/RFU-D-HP Dual Coupler,7-8 GHz
N060082L228A	PTP 820C-HP/RFU-D-HP Dual Splitter,6 GHz
N110082L143A	PTP 820C-HP/RFU-D-HP Dual Splitter,11 GHz
N070082L343A	PTP 820C-HP/RFU-D-HP Dual Splitter,7-8 GHz
N060082L233A	PTP 820C-HP/RFU-D-HP Dual Circulator,6 GHz
N110082L146A	PTP 820C-HP/RFU-D-HP Dual Circulator,11 GHz
N070082L344A	PTP 820C-HP/RFU-D-HP Dual Circulator,7-8 GHz
N060082L234A	PTP 820C-HP/RFU-D-HP Space Diversity Kit,6 GHz
N110082L147A	PTP 820C-HP/RFU-D-HP Space Diversity Kit,11 GHz
N070082L345A	PTP 820C-HP/RFU-D-HP Space Diversity Kit,7-8 GHz
N000082L167A	PTP 820C HP/RFU-D-HP 19in Rack Mounting Kit
N110082L090A	PTP 820 RFU-C 10_11GHz Coupler KIT
N110082L091A	PTP 820 RFU-C 10_11GHz OMT DM KIT
N110082L092A	PTP 820 RFU-C 10_11GHz OMT Interface-Andrew
N110082L104A	PTP 820 RFU-C 10_11GHz OMT Interface-CNT
N110082L103A	PTP 820 RFU-C 10_11GHz OMT Interface-Radiowave
N110082L093A	PTP 820 RFU-C 10_11GHz Twist Adaptor KIT
N130082L058A	PTP 820 RFU-C 13GHz Coupler KIT
N130082L059A	PTP 820 RFU-C 13GHz OMT DM KIT
N130082L060A	PTP 820 RFU-C 13GHz OMT Interface-Andrew
N130082L069A	PTP 820 RFU-C 13GHz OMT Interface-CNT
N130082L068A	PTP 820 RFU-C 13GHz OMT Interface-Radiowave
N130082L061A	PTP 820 RFU-C 13GHz Twist Adaptor KIT
N150082L080A	PTP 820 RFU-C 15GHz Coupler KIT
N150082L081A	PTP 820 RFU-C 15GHz OMT DM KIT
N150082L082A	PTP 820 RFU-C 15GHz OMT Interface-Andrew
N150082L091A	PTP 820 RFU-C 15GHz OMT Interface-CNT

N150082L090A	PTP 820 RFU-C 15GHz OMT Interface-Radiowave
N150082L083A	PTP 820 RFU-C 15GHz Twist Adaptor KIT
N180082L046A	PTP 820 RFU-C 18GHz Coupler KIT
N180082L047A	PTP 820 RFU-C 18GHz OMT DM KIT
N180082L048A	PTP 820 RFU-C 18GHz OMT Interface-Andrew
N180082L057A	PTP 820 RFU-C 18GHz OMT Interface-CNT
N180082L056A	PTP 820 RFU-C 18GHz OMT Interface-Radiowave
N180082L049A	PTP 820 RFU-C 18GHz Twist Adaptor KIT
N230082L036A	PTP 820 RFU-C 23_26GHz Twist Adaptor KIT
N230082L037A	PTP 820 RFU-C 23GHz Coupler KIT
N230082L038A	PTP 820 RFU-C 23GHz OMT DM KIT
N230082L039A	PTP 820 RFU-C 23GHz OMT Interface-Andrew
N230082L047A	PTP 820 RFU-C 23GHz OMT Interface-CNT
N230082L046A	PTP 820 RFU-C 23GHz OMT Interface-Radiowave
N260082L030A	PTP 820 RFU-C 26GHz Coupler KIT
N260082L031A	PTP 820 RFU-C 26GHz OMT DM KIT
N260082L032A	PTP 820 RFU-C 26GHz OMT Interface-Andrew
N260082L039A	PTP 820 RFU-C 26GHz OMT Interface-CNT
N260082L038A	PTP 820 RFU-C 26GHz OMT Interface-Radiowave
N280082L039A	PTP 820 RFU-C 28_32GHz Twist Adaptor KIT
N280082L040A	PTP 820 RFU-C 28GHz Coupler KIT
N280082L041A	PTP 820 RFU-C 28GHz OMT DM KIT
N280082L042A	PTP 820 RFU-C 28GHz OMT Interface-Andrew
N280082L047A	PTP 820 RFU-C 28GHz OMT Interface-CNT
N280082L046A	PTP 820 RFU-C 28GHz OMT Interface-Radiowave
N320082L023A	PTP 820 RFU-C 32GHz Coupler KIT
N320082L024A	PTP 820 RFU-C 32GHz OMT DM KIT
N320082L025A	PTP 820 RFU-C 32GHz OMT Interface-Andrew
N320082L030A	PTP 820 RFU-C 32GHz OMT Interface-CNT
N380082L047A	PTP 820 RFU-C 38GHz Coupler KIT
N380082L048A	PTP 820 RFU-C 38GHz OMT DM KIT
N380082L049A	PTP 820 RFU-C 38GHz OMT Interface-Andrew
N380082L055A	PTP 820 RFU-C 38GHz OMT Interface-CNT
N380082L054A	PTP 820 RFU-C 38GHz OMT Interface-Radiowave
N380082L050A	PTP 820 RFU-C 38GHz Twist Adaptor KIT
N060082L145A	PTP 820 RFU-C 6GHz Coupler KIT
N060082L146A	PTP 820 RFU-C 6GHz OMT DM KIT
N060082L147A	PTP 820 RFU-C 6GHz OMT Interface-Andrew
N060082L155A	PTP 820 RFU-C 6GHz OMT Interface-CNT
N060082L154A	PTP 820 RFU-C 6GHz OMT Interface-Radiowave
N060082L148A	PTP 820 RFU-C 6GHz Twist Adaptor KIT
N070082L301A	PTP 820 RFU-C 7_8GHz Coupler KIT
N070082L302A	PTP 820 RFU-C 7_8GHz OMT DM KIT
N070082L303A	PTP 820 RFU-C 7_8GHz OMT Interface-Andrew

N070082L311A	PTP 820 RFU-C 7_8GHz OMT Interface-CNT
N070082L310A	PTP 820 RFU-C 7_8GHz OMT Interface-Radiowave
N070082L304A	PTP 820 RFU-C 7_8GHz Twist Adaptor KIT
N110082L002A	PTP 820 RFU-C ADPT 10_11GHz Remote Mount Adaptor - UBR100
N130082L002A	PTP 820 RFU-C ADPT 13GHz Remote Mount Adaptor - UBR120
N060082L003A	PTP 820 RFU-C ADPT 6GHz Remote Mount Adaptor - UDR70
N070082L002A	PTP 820 RFU-C ADPT 7_8GHz Remote Mount Adaptor - UBR84
N000082L121A	PTP 820 RFU-C Pole Mount kit
N070082L305A	PTP 820 RFU-C SPLITTER KIT 7_8GHz (UBR84)
N110082L094A	PTP 820 RFU-C SPLITTER KIT 11GHz (UBR100)
N130082L062A	PTP 820 RFU-C SPLITTER KIT 13GHz (UBR120)
N150082L084A	PTP 820 RFU-C SPLITTER KIT 15GHz (UBR140)
N180082L050A	PTP 820 RFU-C SPLITTER KIT 18GHz (UBR220)
N230082L040A	PTP 820 RFU-C SPLITTER KIT 23GHz (UBR220)
N260082L033A	PTP 820 RFU-C SPLITTER KIT 26GHz (UBR220)
N060082L149A	PTP 820 RFU-C SPLITTER KIT 6GHz (UDR70)
N110082L080A	PTP 820C DUAL COUPLER KIT 10-11GHz
N130082L054A	PTP 820C DUAL COUPLER KIT 13GHz
N150082L076A	PTP 820C DUAL COUPLER KIT 15GHz
N180082L042A	PTP 820C DUAL COUPLER KIT 18GHz
N230082L032A	PTP 820C DUAL COUPLER KIT 23GHz
N260082L026A	PTP 820C DUAL COUPLER KIT 26GHz
N280082L035A	PTP 820C DUAL COUPLER KIT 28GHz
N380082L043A	PTP 820C DUAL COUPLER KIT 38GHz
N060082L135A	PTP 820C DUAL COUPLER KIT 6GHz
N070082L292A	PTP 820C DUAL COUPLER KIT 7-8GHz
N110082L081A	PTP 820C DUAL SPLITTER KIT 10-11GHz (UBR100)
N130082L055A	PTP 820C DUAL SPLITTER KIT 13GHz (UBR120)
N150082L077A	PTP 820C DUAL SPLITTER KIT 15GHz (UBR140)
N180082L043A	PTP 820C DUAL SPLITTER KIT 18GHz (UBR220)
N230082L033A	PTP 820C DUAL SPLITTER KIT 23GHz (UBR220)
N260082L027A	PTP 820C DUAL SPLITTER KIT 26GHz (UBR220)
N280082L036A	PTP 820C DUAL SPLITTER KIT 28GHz (UBR320)
N060082L136A	PTP 820C DUAL SPLITTER KIT 6GHz (UDR70)
N070082L293A	PTP 820C DUAL SPLITTER KIT 7-8GHz (UBR84)
N380082L044A	PTP 820C DUALSPLITTER KIT 38GHz (UBR320)
N110082L082A	PTP 820C OMT KIT 10-11GHz
N130082L056A	PTP 820C OMT KIT 13GHz
N150082L078A	PTP 820C OMT KIT 15GHz
N180082L044A	PTP 820C OMT KIT 18GHz
N230082L034A	PTP 820C OMT KIT 23GHz
N260082L028A	PTP 820C OMT KIT 26GHz
N280082L037A	PTP 820C OMT KIT 28GHz
N380082L045A	PTP 820C OMT KIT 38GHz

N060082L137A	PTP 820C OMT KIT 6GHz
N070082L294A	PTP 820C OMT KIT 7-8GHz
N110082L083A	PTP 820C SPLITTER KIT 10-11GHz
N130082L057A	PTP 820C SPLITTER KIT 13GHz
N150082L079A	PTP 820C SPLITTER KIT 15GHz
N180082L045A	PTP 820C SPLITTER KIT 18GHz
N230082L035A	PTP 820C SPLITTER KIT 23GHz
N260082L029A	PTP 820C SPLITTER KIT 26GHz
N280082L038A	PTP 820C SPLITTER KIT 28GHz
N380082L046A	PTP 820C SPLITTER KIT 38GHz
N060082L138A	PTP 820C SPLITTER KIT 6GHz
N070082L295A	PTP 820C SPLITTER KIT 7-8GHz
N800082L003A	PTP 820E Coupler Kit
N800082L001A	PTP 820E OMT Kit
N800082L002A	PTP 820E Splitter Kit
N110082L011A	PTP820 Dragonwave Antenna Adaptor for Cambium, 11GHz
N130082L004A	PTP820 Dragonwave Antenna Adaptor for Cambium, 13GHz
N180082L009A	PTP820 Dragonwave Antenna Adaptor for Cambium, 18GHz
N230082L002A	PTP820 Dragonwave Antenna Adaptor for Cambium, 23GHz
N110082L004A	PTP820 Radiowave Antenna Conversion kit Exalt -> Cambium, 11 GHz, 2ft
N180082L002A	PTP820 Radiowave Antenna Conversion kit Exalt -> Cambium, 18 GHz, 2ft
N110082L005A	PTP820 Radiowave Antenna Conversion kit, 11 GHz, 3ft
N110082L006A	PTP820 Radiowave Antenna Conversion kit, 11 GHz, 4ft
N110082L007A	PTP820 Radiowave Antenna Conversion kit, 11 GHz, 6ft
N180082L003A	PTP820 Radiowave Antenna Conversion kit, 18 GHz, 3ft
N180082L004A	PTP820 Radiowave Antenna Conversion kit, 18 GHz, 4ft
N180082L005A	PTP820 Radiowave Antenna Conversion kit, 18 GHz, 6ft
N060082L235A	PTP820 Radiowave Antenna Conversion kit, 6 GHz, 3ft
N060082L236A	PTP820 Radiowave Antenna Conversion kit, 6 GHz, 4ft
N060082L237A	PTP820 Radiowave Antenna Conversion kit, 6 GHz, 6ft
N110082L126A	PTP820 REMEC interface Antenna Adaptor Kit, 11 GHz, Dual Pol
N110082L125A	PTP820 REMEC interface Antenna Adaptor Kit, 11 GHz, Single Pol
N180082L063A	PTP820 REMEC interface Antenna Adaptor Kit, 18 GHz, Dual Pol
N180082L062A	PTP820 REMEC interface Antenna Adaptor Kit, 18 GHz, Single Pol
N230082L070A	PTP820 REMEC interface Antenna Adaptor Kit, 23 GHz, Dual Pol
N060082L217A	PTP820 REMEC interface Antenna Adaptor Kit, 6 GHz, Single Pol
N180082L064A	PTP820 SIAE interface Antenna Adaptor Kit, 18 GHz, Single Pol
N110082L003A	PTP 820 Andrew Valuline Antenna Convert kit, 11GHz
N130082L003A	PTP 820 Andrew Valuline Antenna Convert kit, 13GHz
N150082L001A	PTP 820 Andrew Valuline Antenna Convert kit, 15GHz
N180082L001A	PTP 820 Andrew Valuline Antenna Convert kit, 18GHz
N230082L001A	PTP 820 Andrew Valuline Antenna Convert kit, 23GHz
N260082L001A	PTP 820 Andrew Valuline Antenna Convert kit, 26GHz
N280082L001A	PTP 820 Andrew Valuline Antenna Convert kit, 28GHz

N320082L001A	PTP 820 Andrew Valuline Antenna Convert kit, 32GHz
N380082L001A	PTP 820 Andrew Valuline Antenna Convert kit, 38GHz
N060082L004A	PTP 820 Andrew Valuline Antenna Convert kit, 6GHz
N070082L003A	PTP 820 Andrew Valuline Antenna Convert kit, 7GHz

Antenna Connection

RFU-D can be mounted directly for all frequencies (6-38 GHz) using the following antenna types (for integrated antennas, specific antennas are required):

- Cambium Am series
- CommScope: VHLP series
- RFS: SB/SC series
- Xian Putian: WTC/WTG series

For remote mount installations, the following Flexible Waveguide flanges should be used (millimetric). The same antenna type (integrated) as indicated above can be used (recommended).

Other antenna types using the flanges listed in the table below may also be used.

Table 17: Antenna Flanges

Frequency Band	Range (GHz)	Circ. WG Diameter	Rect. WG Flange Des.	Radio Side (Remote) Flange Des.	Flex WG Side A Flange Des.	Flex WG Side B Flange Des.	Antenna (Remote) Flange Des.
6(L/U) GHz	5.8-7.1					PDR70	UDR70
7/8 GHz	7.1-8.5	26 mm	WR112	UBR84	PBR84	PBR84	UBR84
10/11 GHz	10.0-11.7	18 mm	WR90	UBR100	PBR100	PBR100	UBR100
13 GHz	12.7-13.3	15 mm	WR75	UBR120	PBR120	PBR120	UBR120
15 GHz	14.5-15.4	13.5 mm	WR62	UBR140	PBR140	PBR140	UBR140
18 GHz	17.7-19.7	10.5 mm	WR42	UBR220	PBR220	PBR220	UBR220
23 GHz	21.2-23.6	9 mm					
26 GHz	24.5-26.6	8 mm					
28-31 GHz	27.3-29.5	7 mm	WR28	UBR320	PBR320	PBR320	UBR320
32 GHz	31.8-33.4	6.5 mm					
38 GHz	37.0-40.0	5.5 mm					

If a different antenna type (CPR flange) is used, a flange adaptor is required. Please contact your Cambium representative for details.



Note

Appropriate lubricant or grease can be applied to the screws that connect the RFU-D to the antenna interface.

Power Specifications

Electrical Requirements

- Maximum Power Consumption: 75W (RFU-only)

Important Notes!

- The unit must only be installed by service personnel.
- The unit must have a permanent connection to protective grounding.
- The RSL interface connector is intended for technician use only.
- When using an external power source, the disconnect device (circuit breaker) in the building installation:
 - Shall be readily accessible and incorporated external to the equipment.
 - The maximum rating of the overcurrent protection shall be up to 6 Amp.

Environmental Specifications

Operating: ETSI EN 300 019-1-4 Class 4.1

Temperature range for continuous operating temperature with high reliability:

-33°C (-27°F) to +55°C (131°F)

Temperature range for exceptional temperatures; tested successfully, with limited margins:

-45°C (-49°F) to +60°C (140°F)

Humidity: 5%RH to 100%RH

IEC529 IP66

Storage: ETSI EN 300 019-1-1 Class 1.2

Transportation: ETSI EN 300 019-1-2 Class 2.3

Chapter 3 : Grounding the RFU-D

List of Items

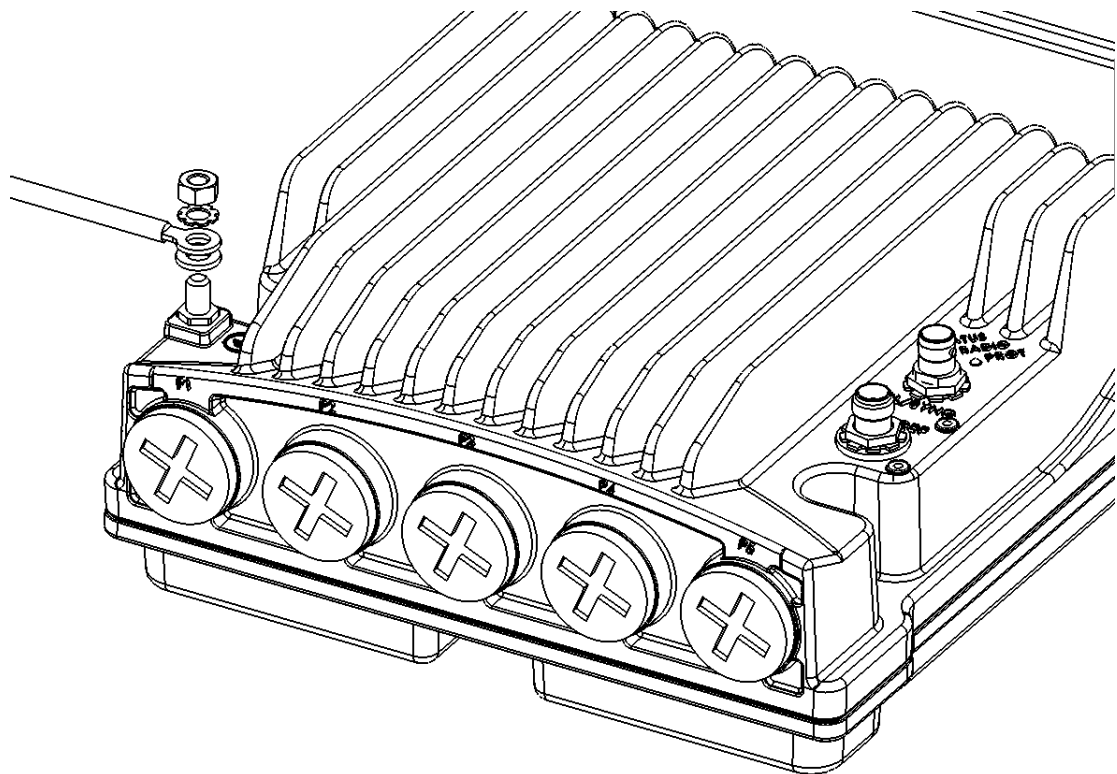
Item	Description	Quantity	Remarks
1	CBL-GND	1	

Required Tools

- Metric offset wrench key wrench #3
- Metric wrench 10mm

Procedure

1. On the front of each RFU-D unit, loosen the nut, plain washer, and serrated washer from the GND stud, using the metric offset hexagon key and the wrench.



2. Place the cable lug (supplied with the RFU-D grounding kit) in place on the screw.
3. Secure the cable lug.
4. The second side of the GND cable should be connected to the main ground bar or terminal ground bar of the site.
5. Perform a resistance test between the 2 lugs of the GND cable. Verify that the result is 0-2 ohms.



Note

The unit's earthing screw terminal shall be permanently connected to protective earth in a building installation in accordance with applicable national code and regulations by a service person.

Any outdoor antenna cable shield shall be permanently connected to protective earth in a building installation.

Chapter 4 : Connecting the Data and Power Cables

RFU-D is connected to the IDU via a standard CAT-5e or preferably CAT-6/6a cable, with RJ-45 connectors on the RFU and an RJ-45 connector on the IDU. They can also be connected to the IDU over optical fiber cables via the optical (SFP) RFU connection on the IDU.

When using a CAT-5e or CAT-6 cable, the cable can carry both the data and the DC power required for the RFU-D. The CAT-5e or CAT-6 cable is connected to P1.

When using an optical fiber cable, an external DC power cable is required to supply power to the RFU. The DC power cable is connected to the P1 interface using an adaptor, and the optical fiber cable is connected to P2.



Note

P4 is reserved for future use with MIMO configurations.

Figure 14: RFU-D Data and Power Interfaces (All Frequency Bands)

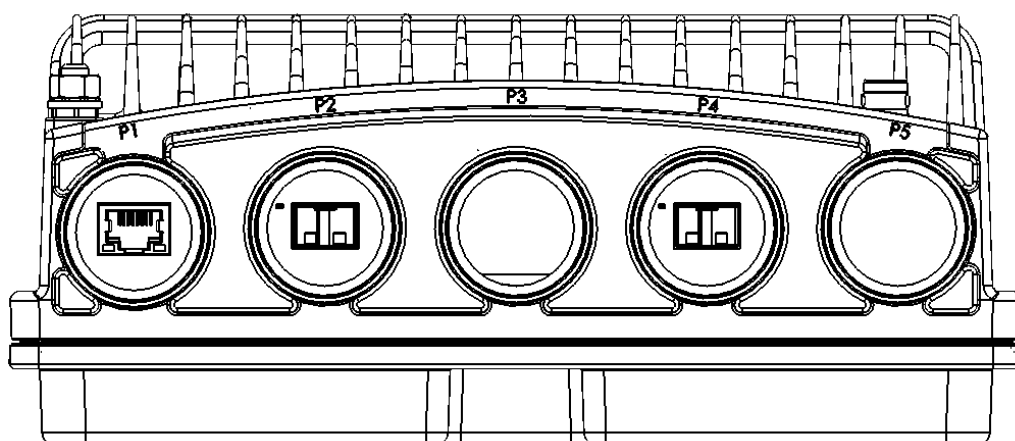


Table 18: Maximum Cable Length

Interface	Cable Type	Maximum Length	
		6-11 GHz	13-38 GHz
Optical	Fiber		300m
Electrical	CAT-5e (24 AWG)	65m	100m
	CAT-6a (22 AWG)	110m	150m
DC Power	DC (18 AWG)		100m
	DC (12 AWG)		101m-300m

Grounding the Cables

To fit the gland, the outer cable diameter should be between 6-10 mm.

To fit the grounding clamp, the outer diameter of CAT5E or CAT6A Ethernet cables must be between 6-7.1mm.

Cables must be grounded as follows.

- For fiber cables (see [Connecting an Optical Fiber Cable and SFP](#)), no grounding is required.
- For DC power cables (see [Connecting a DC Power Cable](#)), no grounding is required.
- For CAT-5e/CAT-6 cables (see [Connecting a CAT-5e or CAT-6 Data Cable](#)), the shielded Ethernet cable (SF/UTP construction) must be grounded to the antenna tower at the top (next to the RFU), the entry to the indoor cabinet, and every 50m using the kit CAT5E_gnd_kit.



Table 19: Cable Grounding Kit

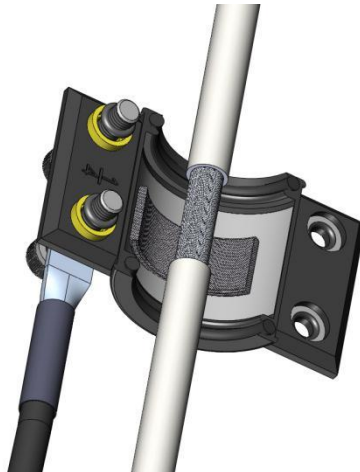
Part Number	Description
N000082L017A	PTP 820 Grounding Kit for CAT5e F/UTP 8mm cable

To connect the grounding kit:

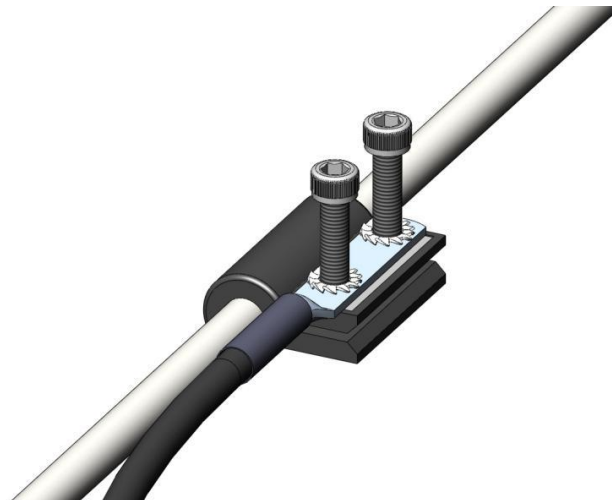
1. Strip the cable jacket.



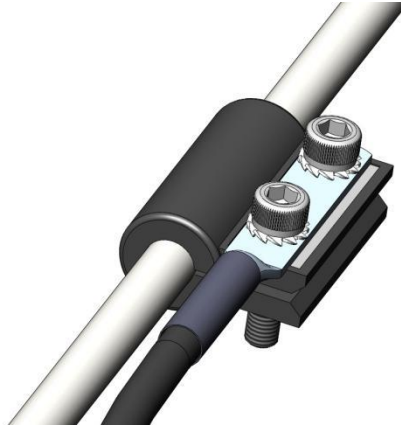
2. Place the cable in the middle of the grounding bracket.



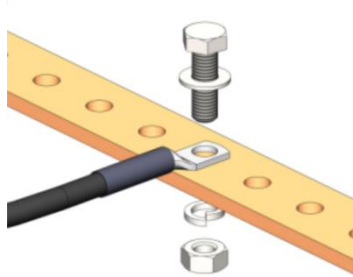
3. Close the grounding bracket around the cable.



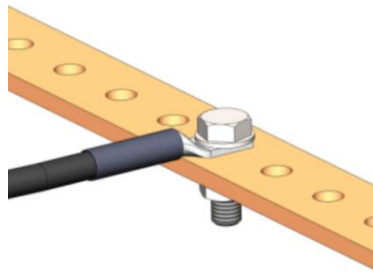
4. Tighten the two screws to secure the grounding bracket around the cable.



5. Install the grounding lug on the grounding bar, or directly to the tower.



6. Tighten the grounding lug.



Power Source

When selecting a power source, the following must be considered:

DC power can be from -40.5 to -59 VDC.

Recommended: Availability of a UPS (Uninterrupted Power Source), battery backup, and emergency power generator.

The power supply must have grounding points on the AC and DC sides.



Caution

The user power supply GND must be connected to the positive pole in the RFU-D power supply.

Any other connection may cause damage to the system!



Note

For the warranty to be honored, you must install the RFU-D in accordance with the instructions above.

Surge Protection

RFU-D includes built-in surge protection for its RJ-45 power and data port (P1). RFU-D's surge protection implementation for this port complies with EN61000-4-5, Class 4 , provided the DC or CAT-5e/CAT-6 cable was prepared according to the instructions in Connecting a CAT-5e or CAT-6 Data Cable.

In areas in which severe lightning conditions are likely to occur, it is strongly recommended to add additional protection by placing lightning protectors on the CAT-5e or CAT-6 cable, near the connection point with the RFU-D unit.

Available Cable Options

Fiber Optic Cables - Single Mode

Table 20: Cable Grounding Kit

Part Number	Description
N000082L139A	PTP 820 Optical CABLE, SM, 30m
N000082L140A	PTP 820 Optical CABLE, SM, 50m
N000082L141A	PTP 820 Optical CABLE, SM, 80m
N000082L142A	PTP 820 Optical CABLE, SM, 100m
N000082L143A	PTP 820 Optical CABLE, SM, 150m

Fiber Optic Cables - Multi Mode

DC Cable and Connector

Table 21: DC Cable and Connector

Part Number	Description
N000082L019A	PTP 820 Outdoor_DC_cbl_2x18AWG_drum
N000082L065A	PTP 820 DC Connector

Cables for MIMO Connections

Table 22: Cables for MIMO Connections

Part Number	Description
N000082L063A	PTP 820C, CABLE, SFP,4x4MIMO_DATA_SHARING_KIT_10M
N000082L138A	PTP 820C, CABLE, SFP,4x4MIMO_DATA_SHARING_KIT_20M
N000082L064A	PTP 820C, SOURCE_SHARING_10M
N000082L137A	PTP 820C, SOURCE_SHARING_20M
N000082L060A	PTP 820C MIMO or Prot management cable 10m
N000082L136A	PTP 820C MIMO or Prot management cable 20m

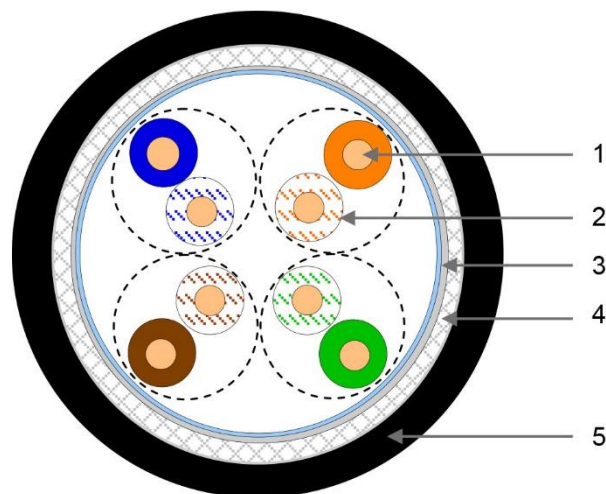
Cat-5e Cable and Specifications

This cable has the following specifications:

- Suitable for:
 - Fast Ethernet
 - Gigabit Ethernet
 - PoE

Cable Design – The numbers in the figure below refer to the items listed beneath the figure.

Figure 15: Cable Design



- [1] Conductor
- [2] Insulation
- [3] Screen: Alu/Pet foil. Alu outside
- [4] Tinned copper braid
- [5] Jacket

Table 23: CAT-5e Cable Color Code

Pair	Wire A	Wire B
1	WHITE-blue	BLUE
2	WHITE-orange	ORANGE
3	WHITE-green	GREEN
4	WHITE-brown	BROWN

Outdoor CAT-5e Cable Specifications

Table 24: Outdoor CAT-5e Cable Specifications - Electrical Requirements

Cable type	CAT-5e SFUTP, 4 pairs, according to ANSI/TIA/EIA-568-B-2
Wire gage	24 AWG
Stranding	Solid
Voltage rating	70V
Shielding	Tinned copper Braid (Coverage: >=80%) + Aluminum Foil

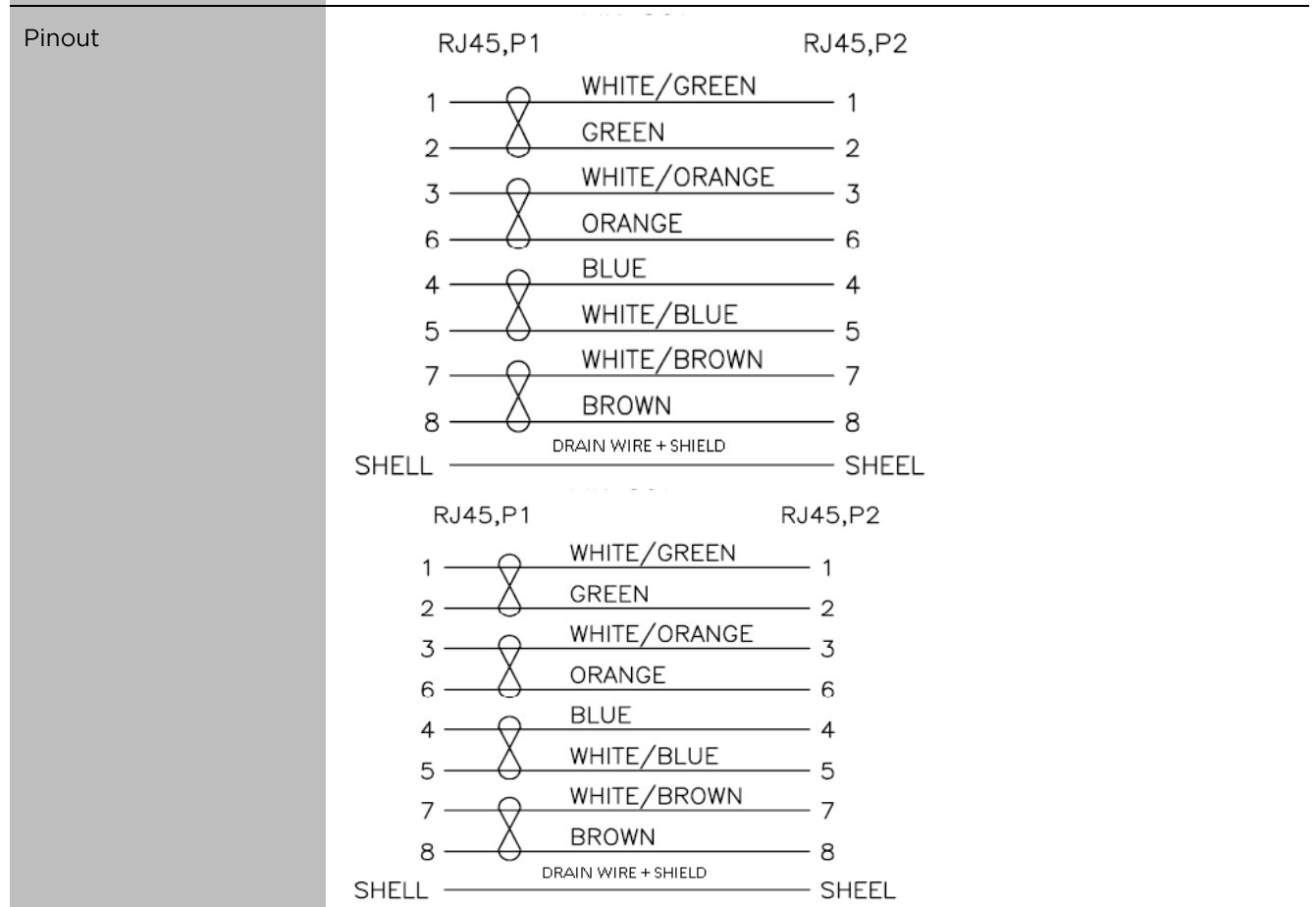


Table 25: Outdoor CAT-5e Cable Specifications – Mechanical/ Environmental Requirements

Jacket	UV resistant
Outer diameter	6-7.1 mm (in order to be compatible with the grounding clamp, CAT5E_gnd_kit)
Operating and Storage temperature range	-40°C - 85°C
Flammability rating	According to UL-1581 VW1, IEC 60332-1
RoHS	According to Directive/2002/95/EC

Outdoor DC Cable Specifications

Table 26: Outdoor DC Cable Specifications – Electrical Requirements

Cable type	2 tinned copper wires
Wire gage	18 AWG (for ≤150m (492ft) installations, optical connections) 14 AWG (for 150m ÷ 300m (492ft ÷ 984ft) installations, electrical connections)
Stranding	stranded
Voltage rating	600V
Spark test	4KV
Dielectric strength	2KV AC min

Table 27: Outdoor DC Cable Specifications – Mechanical/ Environmental Requirements

Jacket	UV resistant
Outer diameter	7-10 mm
Operating and Storage temperature range	-40°C - 85°C
Flammability rating	According to UL-1581 VW1, IEC 60332-1
RoHS	According to Directive/2002/95/EC

Securing the Cables

All cables should be secured at every meter on-site using either a T-Rups kit, Part Number 'Outdoor Ties' or cable clamps. When using the T-Rups kit, take special care to apply the proper amount of force in order to avoid damage to the cable. This is especially important for optical (SFP) cables.

Special Instructions for use of Glands



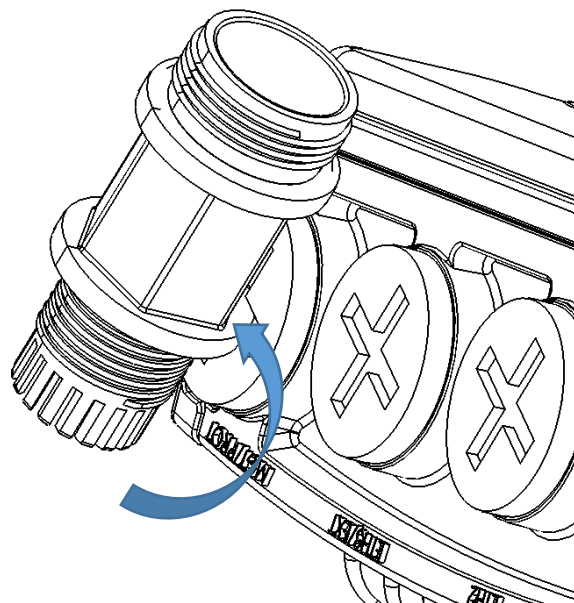
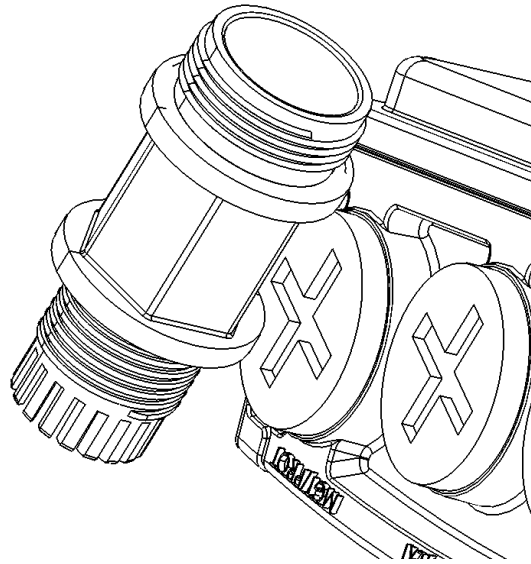
Note

Each RFU-D unit is supplied with one gland. If additional glands are required, they must be ordered separately, in kits of five glands each.

Table 29: Glands Kit[†]

Part Number	Description
N000082L014A	PTP 820 Glands_x5_KIT

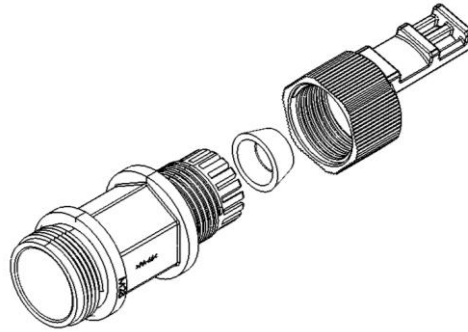
In order to remove the plastic plugs for the unit, you can use the flange of supplied glands to disconnect them. See figures below.



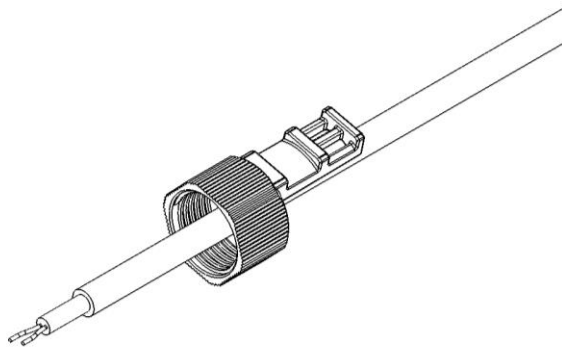
General Installation Procedure

This procedure applies to all cable types and explains how to install the cables using long glands. The gland is supplied assembled.

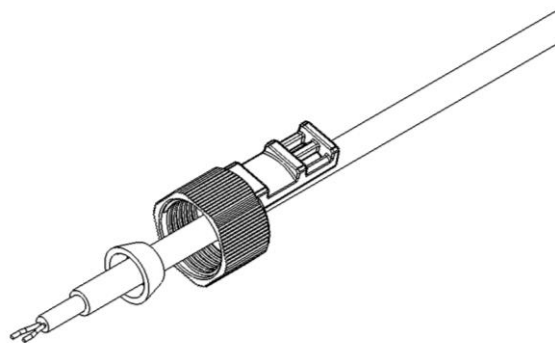
1. Before inserting a cable, you must disassemble the gland cap and gland rubber from the gland body.



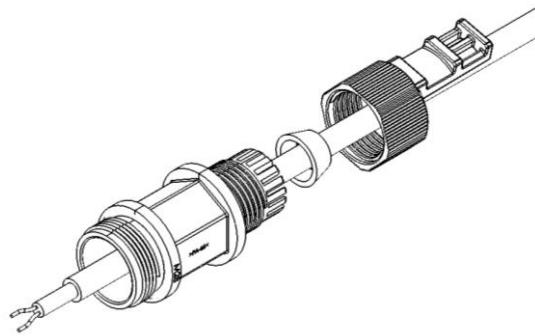
2. Slide the gland cap into the cable.



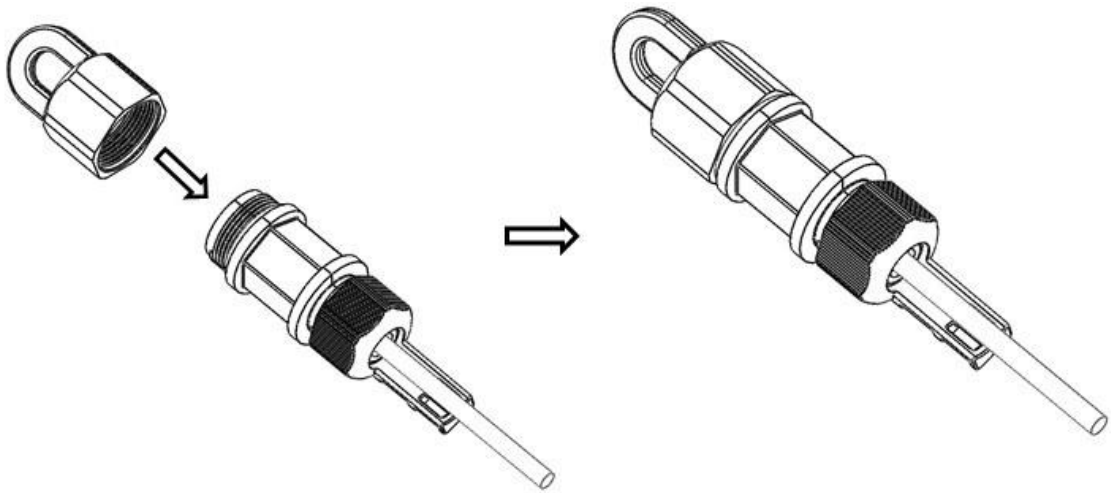
3. Slide the gland rubber into the cable.



4. Slide the cable into the body of the gland. If you are using a gland cap (see Step 5), make sure to leave enough space for the gland cap to fit into the gland without disturbing the cable.



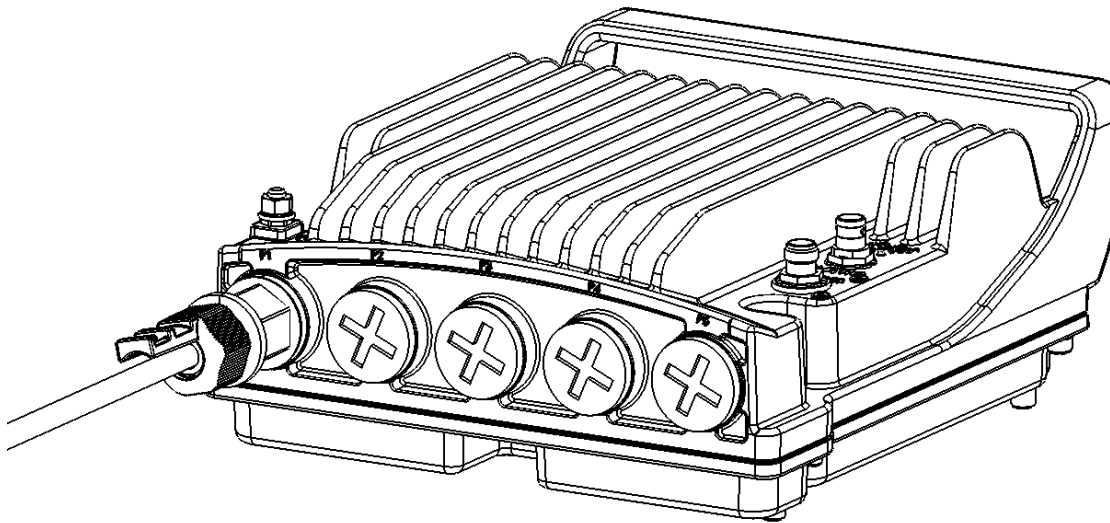
5. Optionally, after securing the cable into the body of the gland, you can close the other side of the gland with an M28 gland cap. The gland cap protects the cable and connector from damage when elevating the cable and gland to the RFU.



6. The M28 gland cap has a hook-on top. After attaching the gland cap to the gland, you can connect a rope to the hook and use this to lift the gland and cable up to the RFU. Before screwing the gland into the RFU, you must remove the gland cap.



- 7 If you used an M28 gland cap to close the gland when raising the gland and cable to the RFU, remove the gland cap from the gland at this point by unscrewing the cap.
- 8 Connect the cable to the port.
- 9 Screw the gland into the RFU until there is full contact between the gland and the RFU.



Note

Before tightening the gland, make sure the gland is aligned with the tapped hole in the unit. Tightening the gland at an angle can ruin the thread on the gland and prevent proper sealing of the interface.

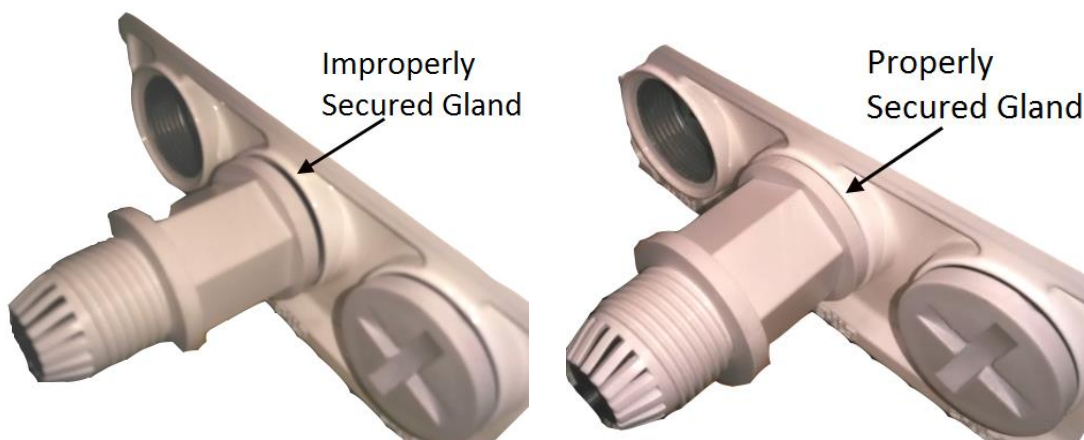
- 10 Insert the main part of the gland into the thread in the radio body and tighten until there is full contact, and the gasket is fully contained between the gland and the radio and cannot be seen. Tighten the gland gently and make sure there is no resistance. If there is resistance, stop immediately, and thread out the gland. Verify that the gland thread is not damaged and tighten the gland again.



Note

Pay attention that the gland rubber is properly located and not damaged during the tightening of the gland cap.

If the gland thread is damaged do not use it!



- 11 Tighten the rear portion of the gland onto the main part of the gland and make sure that the main part of the gland does not have an additional swivel after the rear portion is secured.



Note

If the main portion of the gland is rotated while the rear portion is seizing the cable, this may ruin the cable connector.

Figure 16: Tightening the Front Portion of the Gland

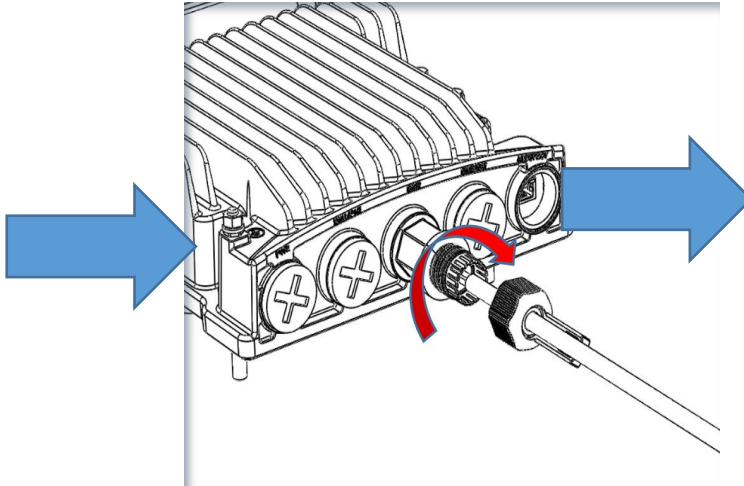
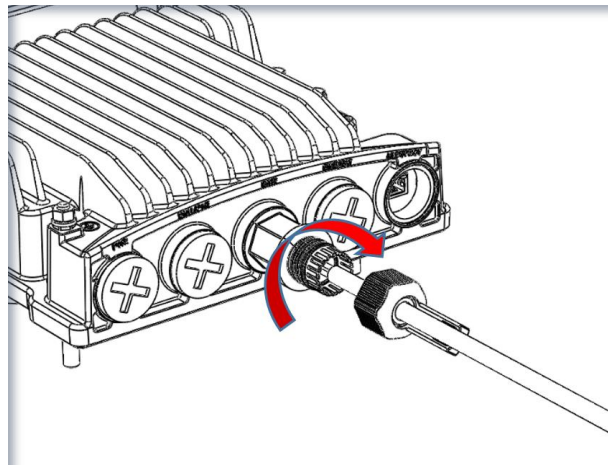
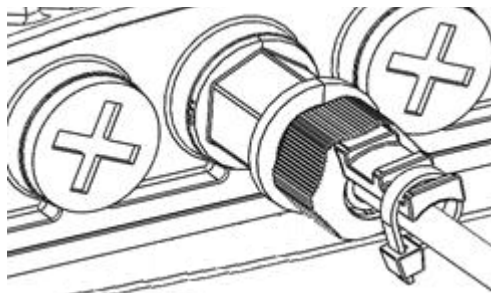


Figure 17: Tightening the Rear Portion of the Gland



12 Secure the cable to the lip of the gland using a tie wrap.

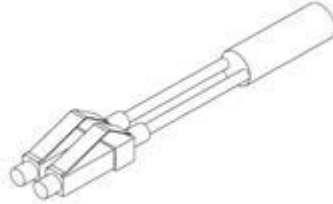


Connecting an Optical Fiber Cable and SFP

When using an optical fiber cable, the cable must be inserted in port P2. A separate DC power cable must be used to connect the RFU-D to an external power source. See Connecting a DC Power Cable.

To connect an optical fiber cable and the SFP transceiver:

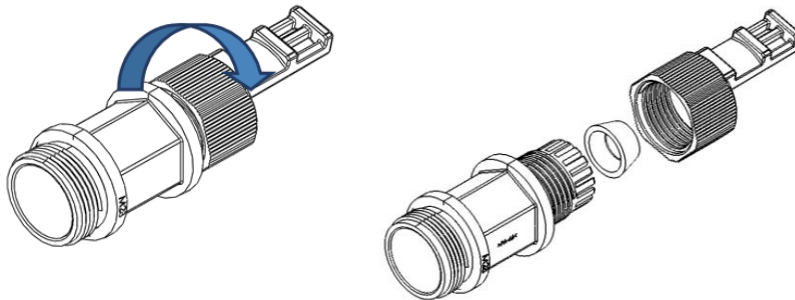
1. Use a pre-assembled cable.



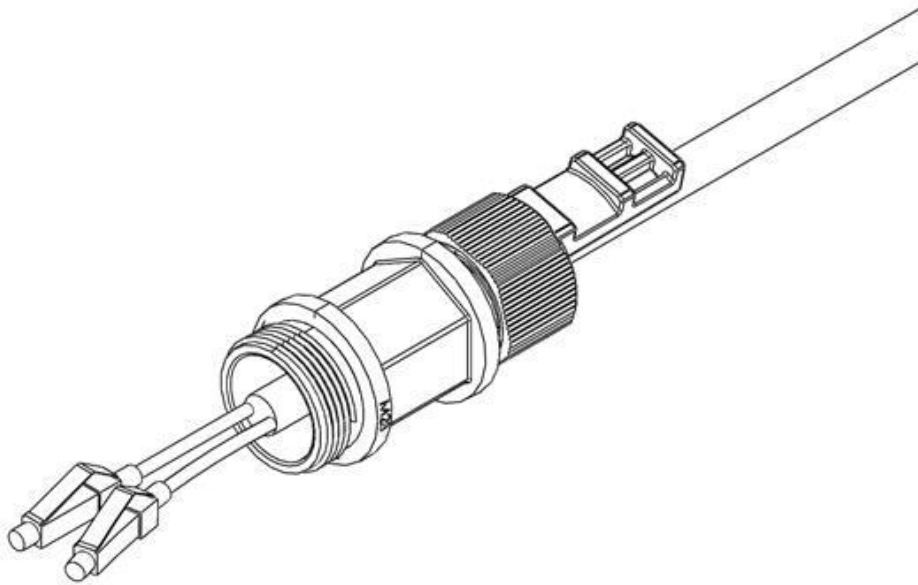
2. Split the connector into two separate LC connectors (one for each fiber).



3. Remove the gland cap and rubber from the gland body.



4. Slide the gland cap into the cable.
5. Slide the rubber into the cable.
6. Insert the fibers with the connectors one by one into the cable gland.

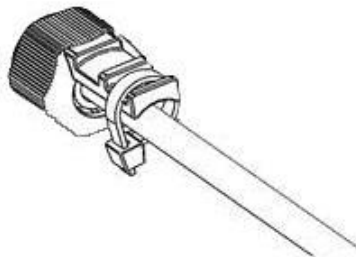


7. Secure the cable to the lip of the gland using a tie wrap.

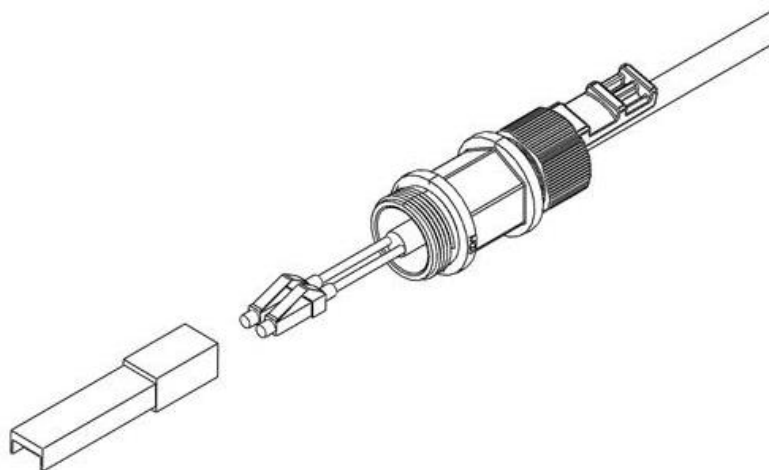


Note

If the main portion of the gland is rotated while the rear portion is seizing the cable, this may ruin the cable connector



8. Connect the fibers to the SFP transceiver. Listen for the “click” to ensure that they are fully inserted.



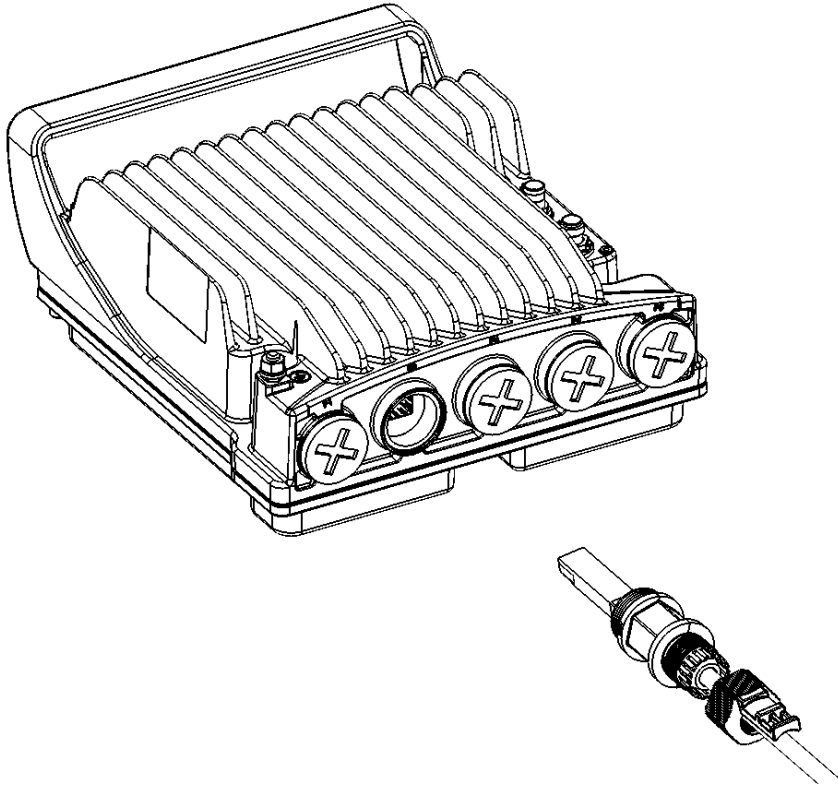
9. Remove the tie wrap securing the cable to the gland.



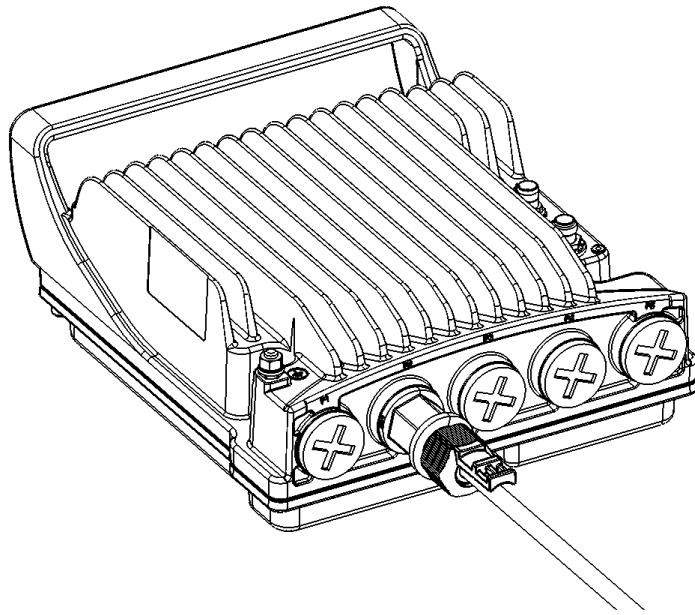
Note

A new tie wrap must be used to secure the cable to the gland at the end of the procedure, as described in Step 13.

10. Connect the connector into the RFU-D connector.



11. Tighten the gland to the RFU until there is full contact between the gland and the RFU.



12. Tighten the gland cap.

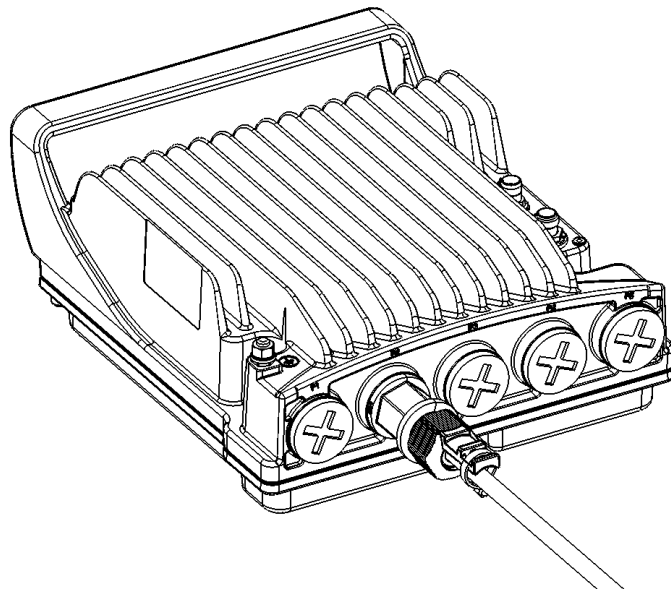


Note

Before tightening the gland, make sure the gland is aligned with the tapped hole in the unit. Tightening the gland at an angle can ruin the thread on the gland and prevent proper sealing of the interface. Tighten the gland gently and make sure there is no resistance. If there is resistance, stop immediately, thread out the gland, and verify that the gland threads are not damaged. Then, tighten the gland again.

If the gland thread is damaged do not use it.

13. Secure the cable to the gland using a tie wrap.



Connecting a DC Power Cable

When the RFU-D is connected to the IDU via an optical fiber cable, a DC power cable must be connected to the P1 interface to provide power from an external power source to the RFU. A special power connector is used with the cable, as described in Steps 4 and 5.

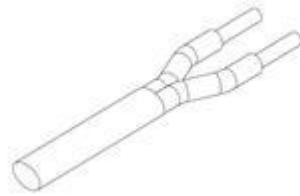


Note

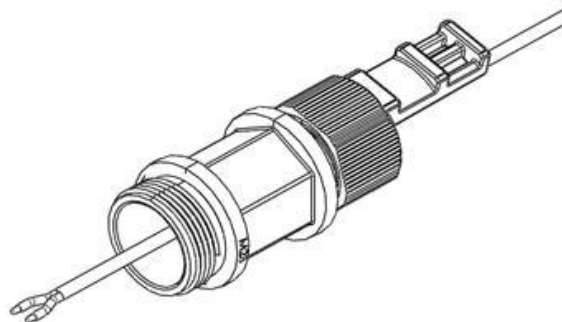
The DC power cable and connector must be ordered separately. See DC Cable and Connector.

To connect a DC power cable:

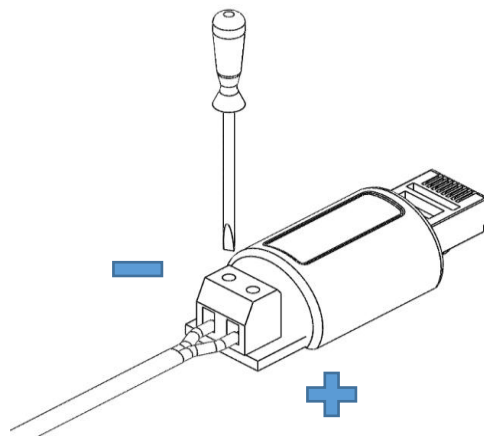
1. Strip off 45 mm from the cable jacket.
2. Expose 10 mm at the edge of each of the two wires.



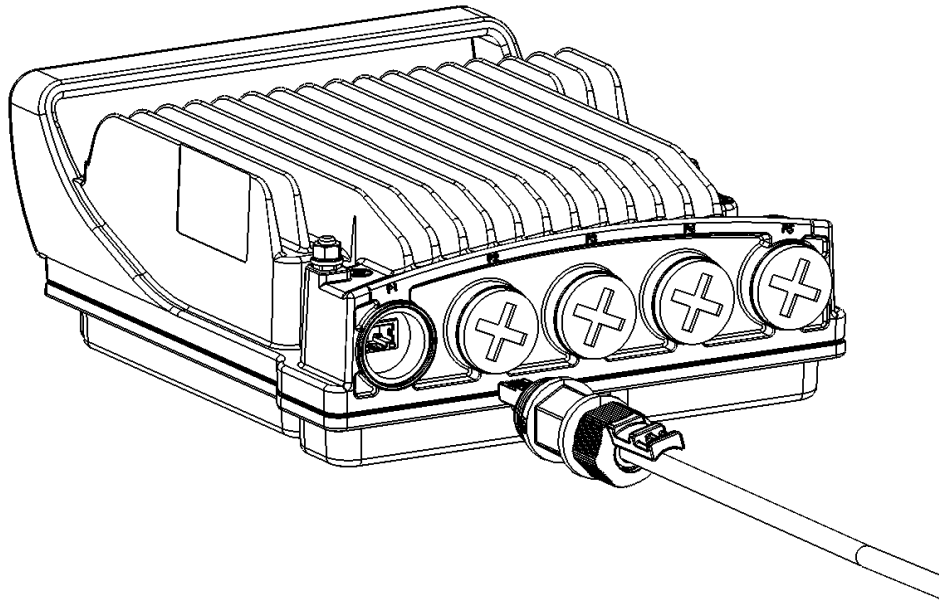
3. Insert the power cable into the gland.



4. Insert the power cable wires into the power connector.
5. Insert the power cable wires into the power connector. Match "+" to the 0V wire and "-" to the -48V wire, and tighten the screws with a flat screwdriver.



6. Plug the power cable with connector into the P1 port.

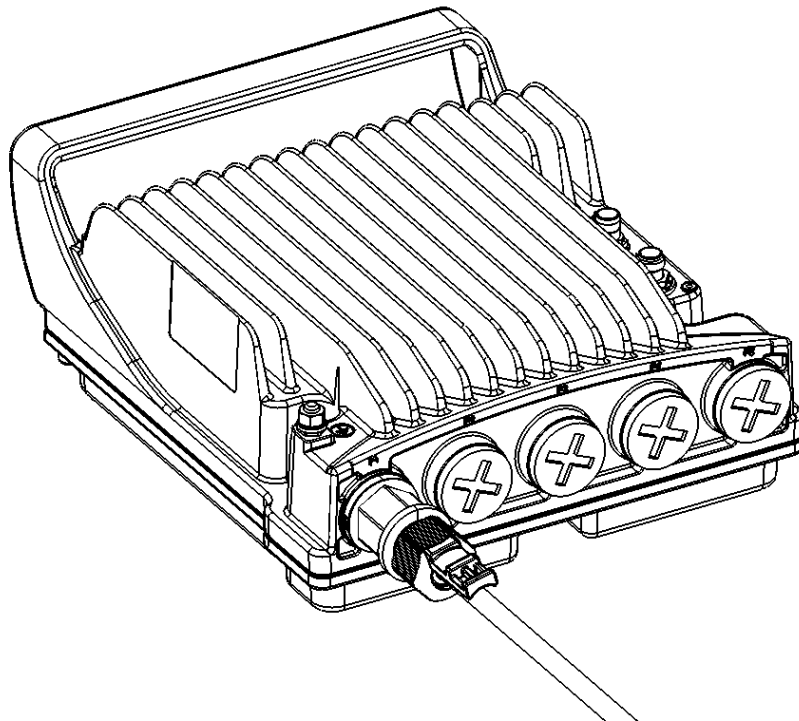


7. Screw the gland into the RFU.



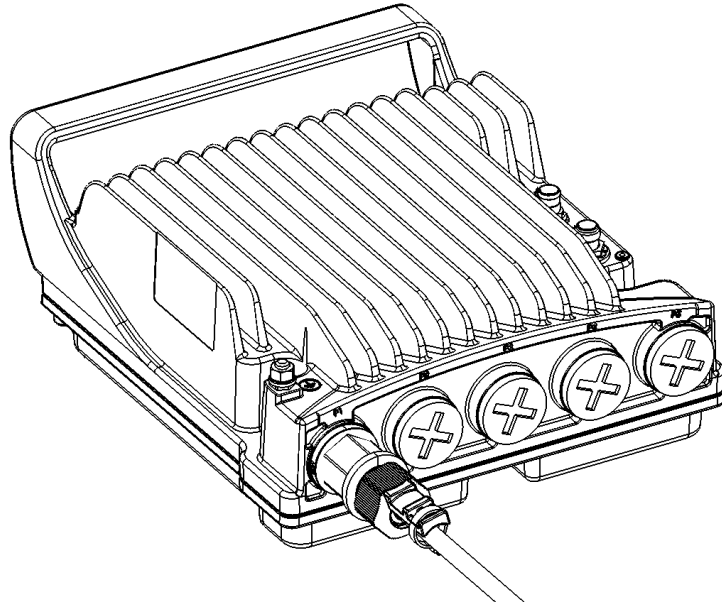
Note

Before tightening the gland, make sure the gland is even with the cover. Tighten the gland gently and make sure there is no resistance. If there is resistance, stop immediately and verify that the gland is not being inserted at an angle. Tightening the gland at an angle can ruin the thread on the gland and prevent proper sealing of the interface.



8. Tighten the gland cap.

9. Secure the cable to the gland with a tie wrap.



Connecting a CAT-5e or CAT-6 Data Cable

If you need to assemble the CAT-5e or CAT-6 cable, follow the instructions in section 4.9.1, Preparing the CAT-5e or CAT-6 Cable and Plug-in Field, then proceed to section 4.9.3, Connection of CAT-5e or CAT-6 Cable to RFU-D.

If you are using a pre-assembled CAT-5e or CAT-6 cable, follow the instructions in section 4.9.2, Preparing the CAT-5e or CAT-6 Data Cable Already Assembled, then proceed to section 4.9.3, Connection of CAT-5e or CAT-6 Cable to RFU-D.



Note

To ensure proper grounding and connectivity, it is recommended to use pre-assembled CAT-5e or CAT-6 cables.

Preparing the CAT-5e or CAT-6 Cable and Plug-in Field



Note

To ensure proper grounding, the RJ-45 plug must be shielded, with a crimping tail.

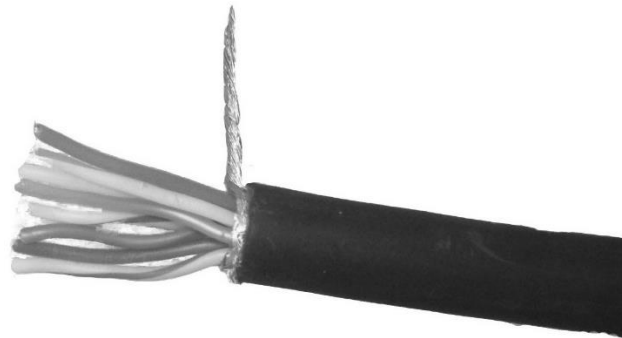


Table 30: Materials for Preparing Ethernet Data Cables

Part Number	Description
N000082L016A	PTP 820 CAT5E Outdoor 100m drum
N000082L172A	PTP 820 CAT6A Outdoor Cable 305m drum
N000082L014A	PTP 820 Glands_x5_KIT
N000082L017A	PTP 820 Grounding Kit for CAT5e F/UTP 8mm cable
N000082L073A	PTP 820 GBE_Connector_kit

To prepare the CAT-5e or CAT-6 cable and plug-in field:

1. Prepare the gland and insert the cable, as described in General Installation Procedure.
2. Strip off approximately 45 mm of the outer insulation jacket from the CAT-5e or CAT-6 cable.
3. Do not strip off the end of the cable shield, but rather, twist the shield to form a braid.



4. Roll back the foil shield insulation and wrap the drain wire around the foil. Do not remove any insulation from the conductors.
5. Align the colored wires.



Note

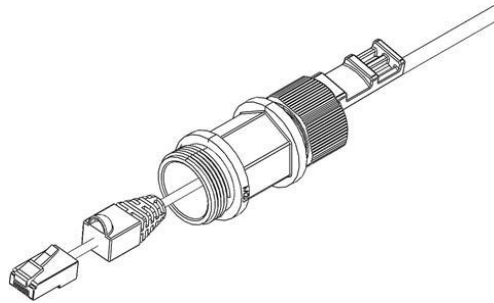
Cord colors should be matched to the same pins on both ends of the cable.

6. Trim all wires to the same length. About 12 mm on the left should be exposed from the inner sheath.

7. Separate the wires and place the twisted shield between the separated wires.



8. Insert the wires into the RJ45 plug. Verify that each wire is fully inserted into the front of the RJ45 plug and in the correct order, according to the pinouts shown in Section 4.4.6, Outdoor CAT-5e Cable Specifications. The sheath of the CAT-5e or CAT-6 cable should extend into the plug by about 13 mm and held in place by the crimp.
9. Extend the cable jacket with the shield into the connector about 5 mm for strain relief and shielding connection.



10. Wrap the twisted braid firmly around the cable jacket and let the crimping tail of the RJ45 plug envelop it.



Note

To ensure proper grounding, it is essential that the twisted braid be firmly connected to the RJ45 plug.



**Twisted Braid Enveloped
by Crimping Tail**

11. Crimp the RJ45 plug with the crimp tool. Make sure the twisted shield is crimped firmly to the RJ45 plug.



12. Verify that the wires ended up the correct order and that the wires extend to the front of the RJ45 plug and make good contact with the metal contacts in the RJ45 plug.
13. Push back the CAT-5e or CAT-6 plug cover on the connector plug.



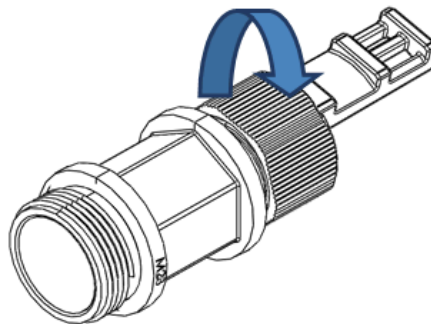
Note

It is recommended that the newly prepared cable be tested with a Cable Analyzer such as the FLUKE DTX-1800 (or the equivalent), to make sure the cable complies with ANSI/TIA/EIA-568-B-2. Make sure to verify both connectivity and grounding continuity at both ends of the cable.

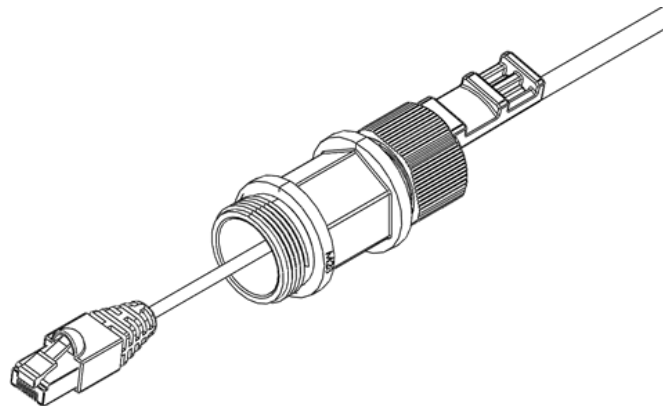
Preparing the CAT-5e or CAT-6 Data Cable Already Assembled

To prepare the CAT-5e or CAT-6 cable already assembled:

1. Release the gland cap and the gland rubber slightly.



2. Insert the CAT-5e or CAT-6 cable into the gland cap and into the rubber gland.

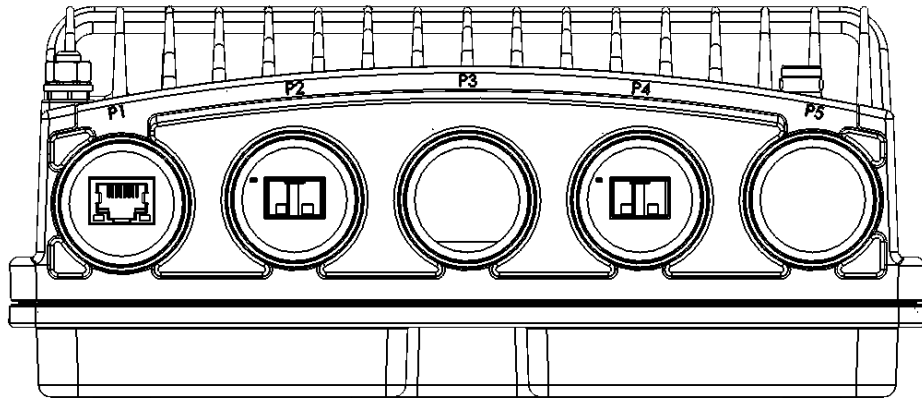


3. Insert the CAT-5e or CAT-6 cable into the gland body.

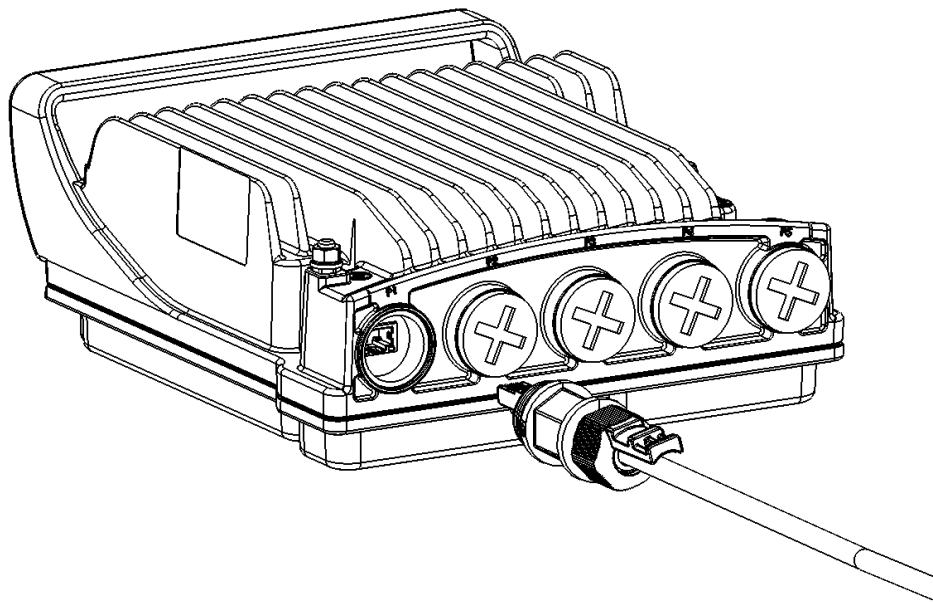
Connection of CAT-5e or CAT-6 Cable to RFU-D

To connect the CAT-5e or CAT-6 cable to the RFU-D:

1. Remove the relevant cap from the RFU-D radio. You can use the side of the gland to unscrew the cap.



2. Connect the cable to the RFU-D.

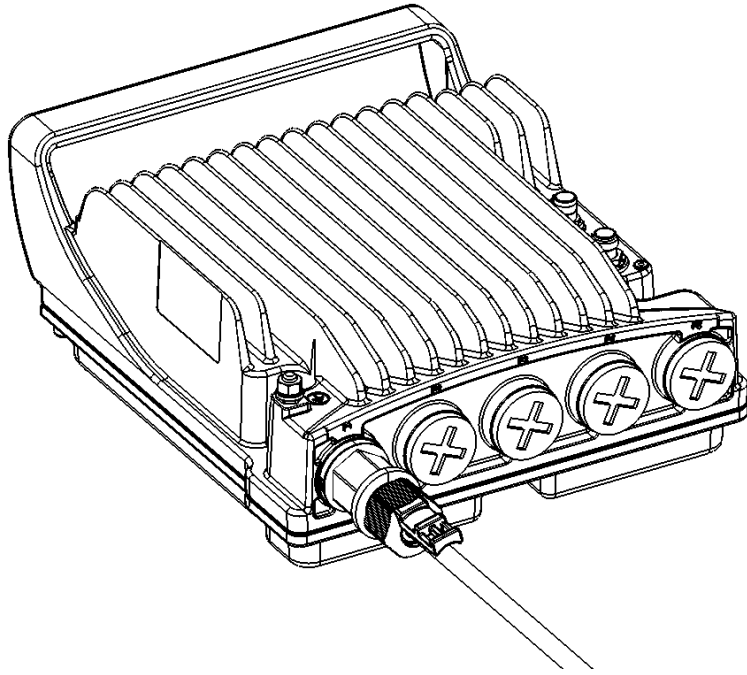


3. Screw the gland into the RFU.

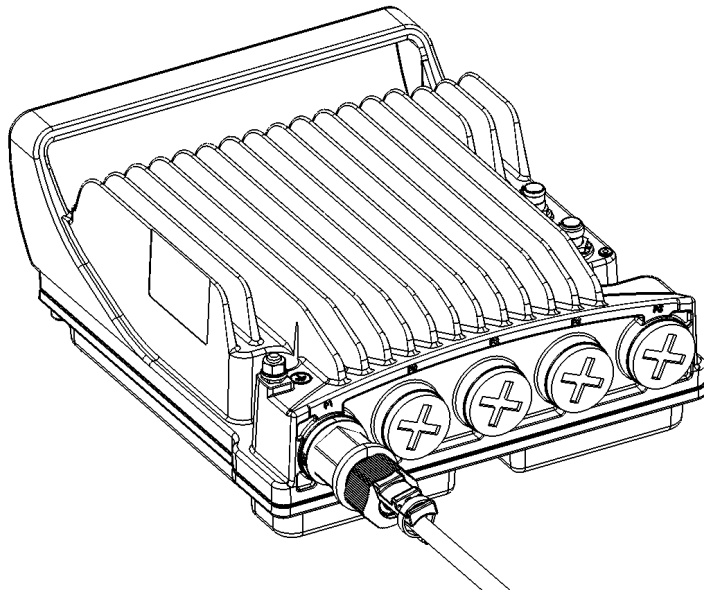


Note

Before tightening the gland, make sure the gland is even with the cover. Tighten the gland gently and make sure there is no resistance. If there is resistance, stop immediately and verify that the gland is not being inserted at an angle. Tightening the gland at an angle can ruin the thread on the gland and prevent proper sealing of the interface.



4. Tighten the gland cap.
5. Secure the cable to the gland using a tie wrap.



Chapter 5 : Generic Installation Procedures

Before starting an installation, use a leveler to make sure that the poles are 100% vertical. You need to check both sides of each pole at 90 degrees separation. This is a critical step in any link but most important when installing MIMO or XPIC.

Torque Requirements

When tightening the captive screws, use 20 Nm torque for radio-antenna, radio-mediation device, and mediation device-antenna connections. In order to avoid misalignment, screws should be tightened progressively.

For installing the diplexer unit on the radio, use 5 Nm torque.

When fastening a waveguide to the radio or mediation device, use the following torque, according to frequency and screw type:

- 6 GHz: M5/10-32: 3.5 Nm
- 7/8-15 GHz: M4/8-32: 2.5 Nm
- 18-38 GHz: M3/4-40: 1Nm
- In addition, when connecting the diplexer to the radio and the radio to the mediation device, screws should be cross-tightened gradually. In other words, partially tighten one screw, then partially tighten the opposite screw. For example, if you start with the screw on the upper left, proceed to the screw on the lower right, then the upper right, then the lower left. Tighten each screw partially, then in the same order, tighten the screws further until each screw is fully tightened.
-

Installing the Diplexer Unit on the Radio

For frequencies of 6 to 15 GHz, the RFU-D and Diplexer Unit are delivered as two separate components: a generic radio unit and a diplexer unit. This section explains how to attach the diplexer unit to the radio unit.



Note

Mounting of the diplexer unit to the radio unit should be performed by certified personnel in a clean, temperature and humidity-controlled environment.

List of Items

Item	Description	Quantity	Remarks
1	RFU-D Basic Radio Unit	1	
2	RFU-D Diplexer Unit	1	

Required Tools

- Torque Wrench with Metric Hexagon Socket Key Wrench #4 (Allen Key)

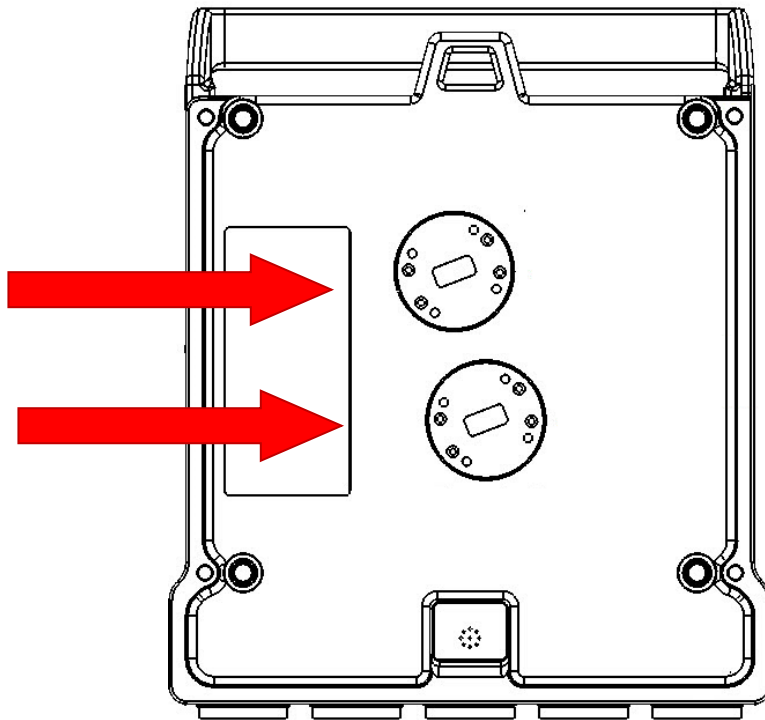
Procedure



Note

Do not remove the transparent pressure windows located on the antenna interfaces.

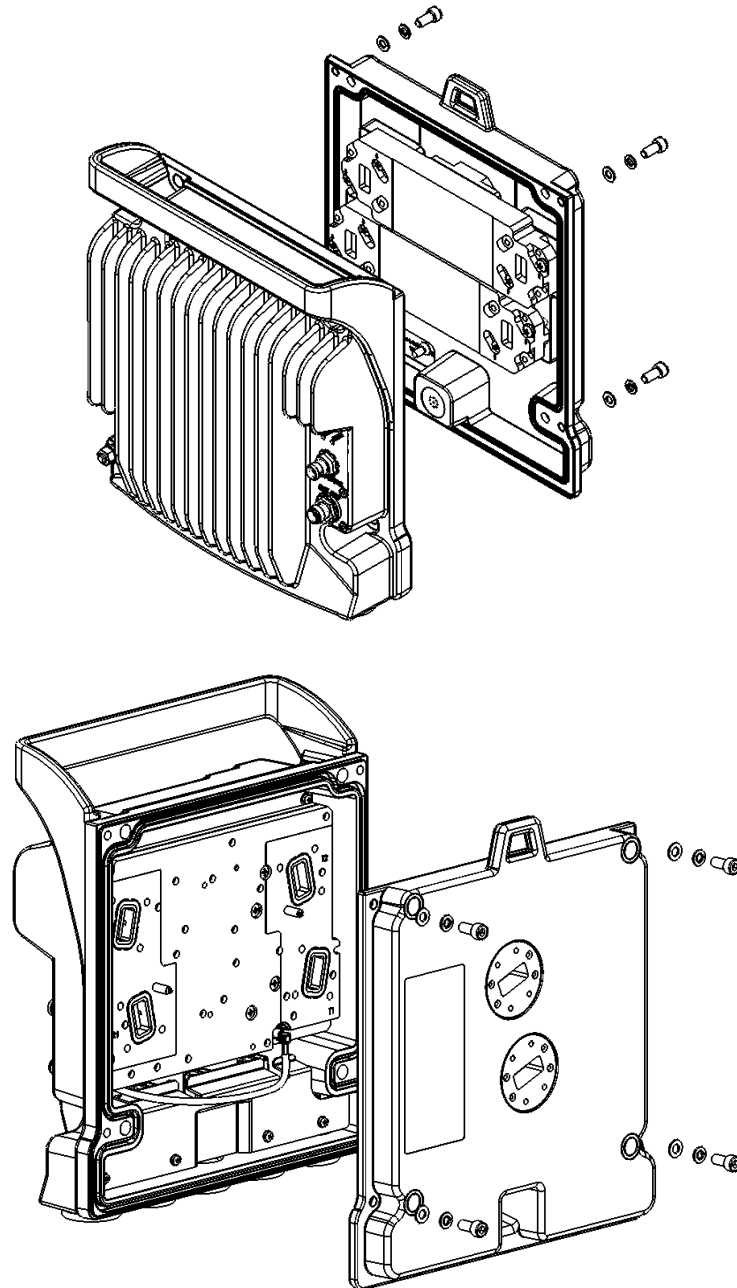
Figure 18: Transparent Pressure Windows



1. Prior to the installation, remove the sticker which is covering the diplexer ports on cover + diplexer unit and the sticker that is covering the TRX ports on the basic radio unit.

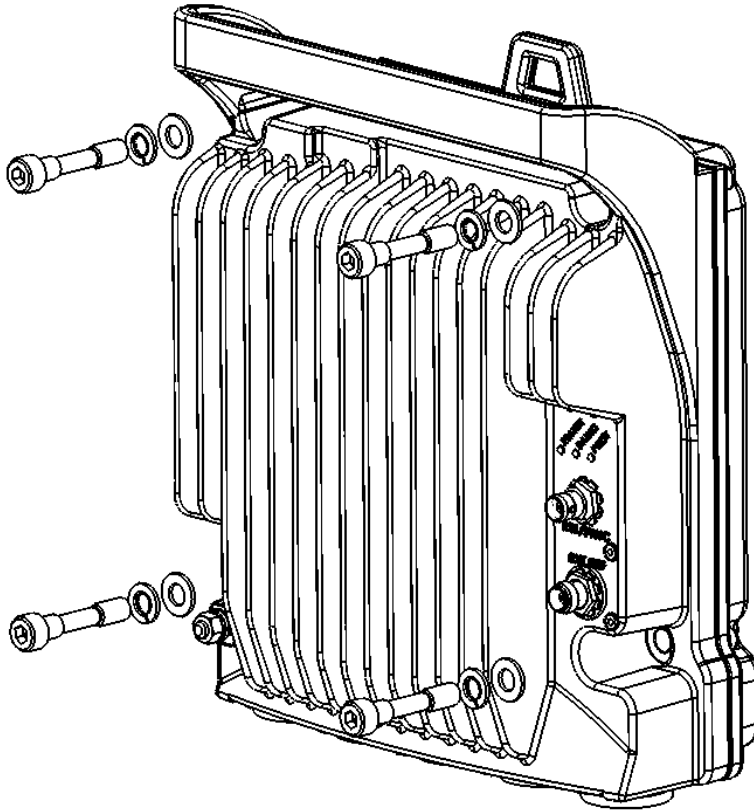
2. Align the RFU-D diplexer unit to the RFU-D radio unit using the two alignment pins located on TRX ports of RFU-D radio unit and secure using the four M5 screws supplied with the RFU-D radio unit.

Figure 19: Attaching the Diplexer



3. Mount the four M8 screws and washers supplied with the RFU-D radio unit.

Figure 20: Mounting the Screws and Washers



4. Proceed to install the RFU-D in the desired configuration, as described in Chapter 6.

Chapter 6 : Installation Procedures per Configuration Type



Note

Some of the configurations described in this section may not be supported in every PTP 820 software. For up-to-date information about which configurations are supported, refer to the Release Notes for the PTP 820 software you are using.

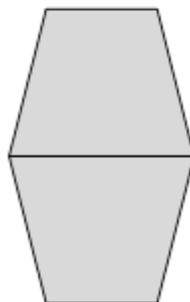
2+0 Dual Polarization Direct Mount



Note

This procedure can also be used for 1+0 DP HW ready for 2+0 DP configuration.

CCDP



List of Items

Item	Description	Quantity	Remarks
1	RFU-D Radio	1	
2	PTP 820C OMT kit	1	
3	CIRC./CIRC. Adaptor	1	Per Antenna Vendor

Required Tools

- Metric offset hexagon key set
- Metric wrench key set

Insertion Loss

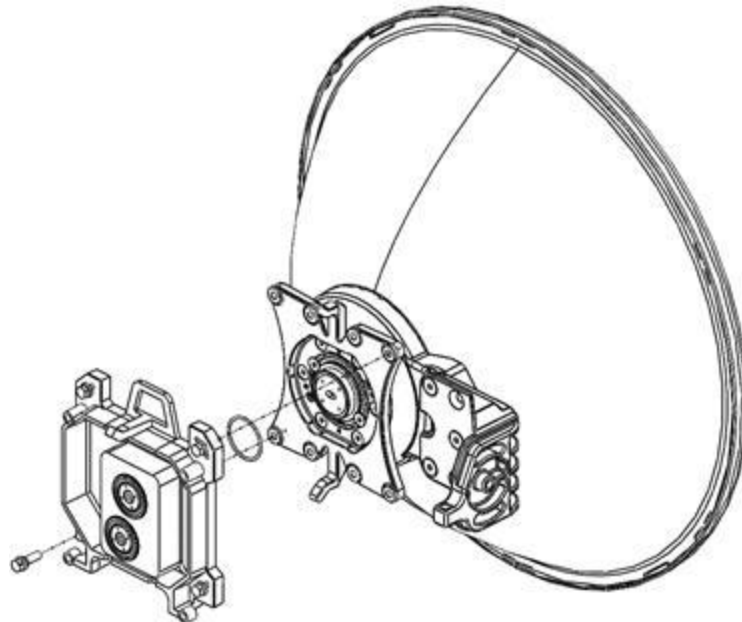
Mediation Devices	Signal Path / Remarks	Insertion Loss [dB]					
		6-8 GHz	11 GHz	13-15 GHz	18 GHz	23-26 GHz	28-38 GHz
	Each RFU-D antenna port to Mediation device	0.3	0.3	0.3	0.3	0.5	0.5
OMT	antenna port						

Procedure

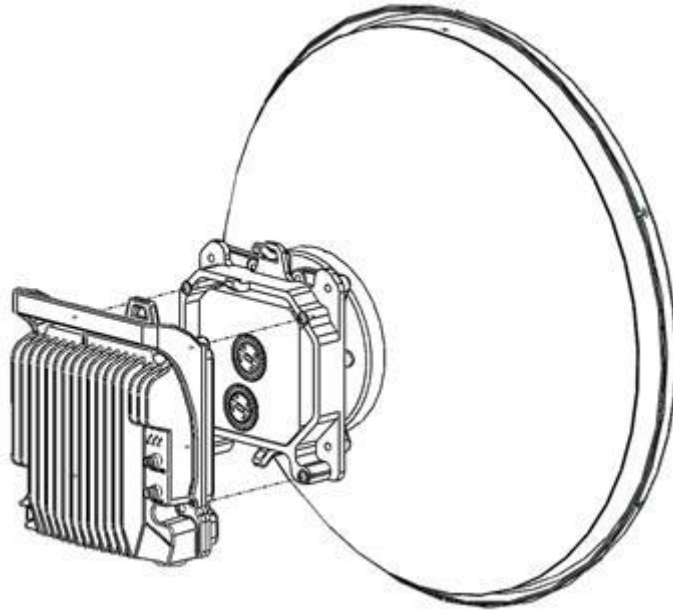
1. Prior to the installation, follow the antenna manufacturer's instructions to use the circular adaptor. (Remove the existing rectangular transition, swap the O-ring, and install the circular transition instead.)



2. Connect the OMT Kit to the antenna and secure it with four screws. Verify the existence of the O-ring.



3. Connect the RFU-D radio to the PTP 820C OMT kit using the four M8 captive screws and washers supplied and tighten the screws.



2+0 Dual Polarization Remote Mount

This procedure is for use with Interface antennas, up to six feet.

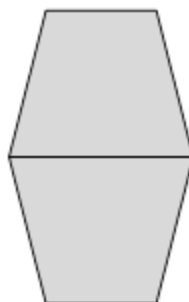
For standard interface antennas (six feet and larger), no OMT and no Circ./Circ. Adaptor are used, and the flexible waveguides are connected directly to the antenna flanges. For instructions how to connect the waveguides to the antenna flanges, refer to the antenna vendor's documentation.



Note

This procedure can also be used for 1+0 DP HW ready for 2+0 DP configurations.

CCDP



List of Items

Item	Description	Quantity	Remarks
1	RFU-D Radio	1	
2	PTP-820C OMT kit	1	Not used for standard interface antennas (six feet and larger).

Item	Description	Quantity	Remarks
3	RFU-C WG Kit	2	
4	PTP 820C DC Remote Mount Kit	1	
5	PTP 820C REMOTE MOUNT ADAPTOR KIT	1	From 6-13GHz
6	Circ./Circ. Adaptor	1	Per Antenna Vendor. Not used for standard interface antennas (six feet and larger).

Required Tools

- Metric offset hexagon key set
- Metric wrench key set
- Phillips #1, #2 screwdriver

Insertion Loss

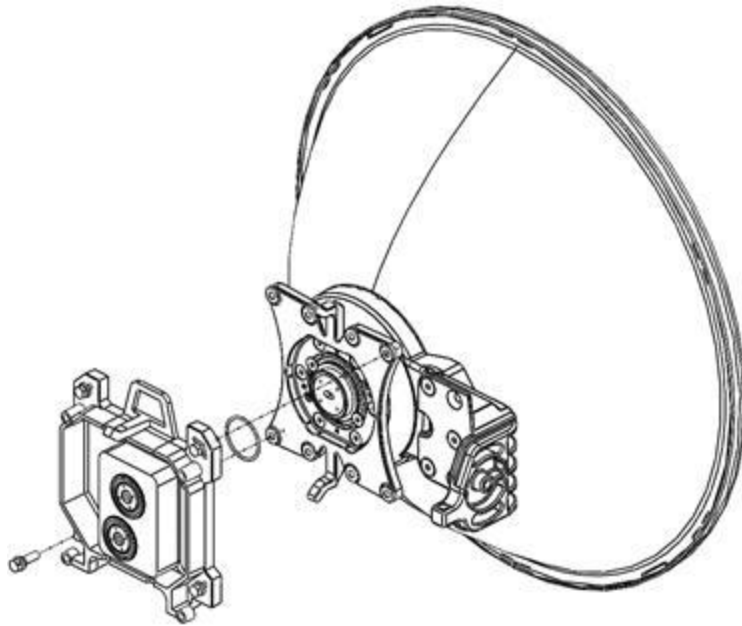
Mediation Devices	Signal Path / Remarks	Insertion Loss [dB]					
		6-8 GHz	11 GHz	13-15 GHz	18 GHz	23-26 GHz	28-38 GHz
OMT	Each RFU-D antenna port to Mediation device antenna port	0.8	0.8	1.5	1.5	1.7	2.0

Common Installation

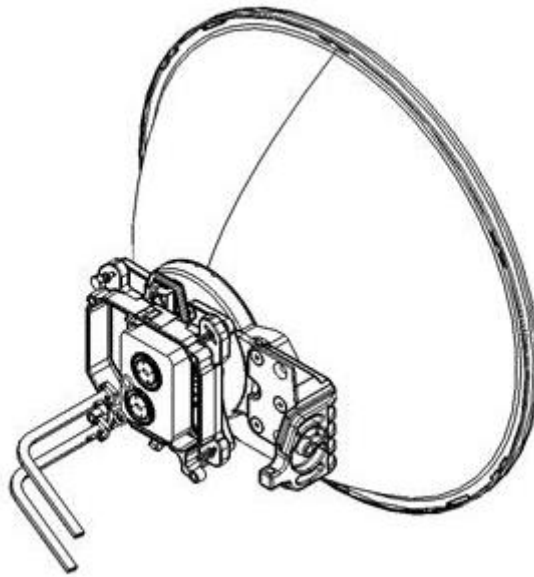
1. Prior to the installation, follow the antenna manufacturer's instructions to use the circular adaptor. (Remove the existing rectangular transition, swap the O-ring, and install the circular transition instead.)



2. Connect the OMT Kit to the antenna and secure it with four screws. Verify the existence of the O-ring.

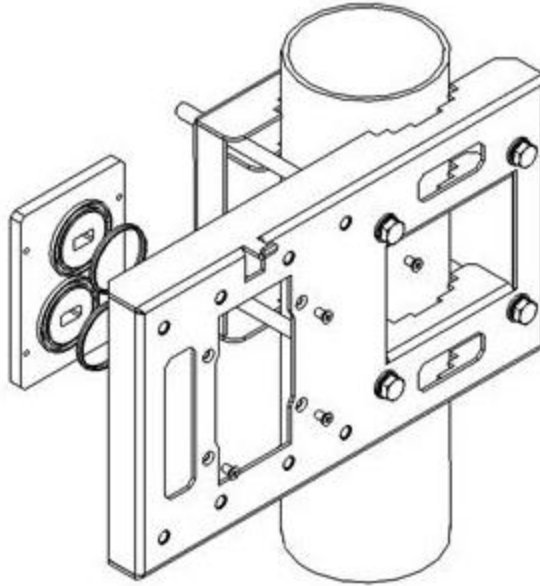


3. Mount and tighten the O-ring and the Flexible WG to the PTP 820C OMT ports using the four screws supplied with the Flexible WG kit.

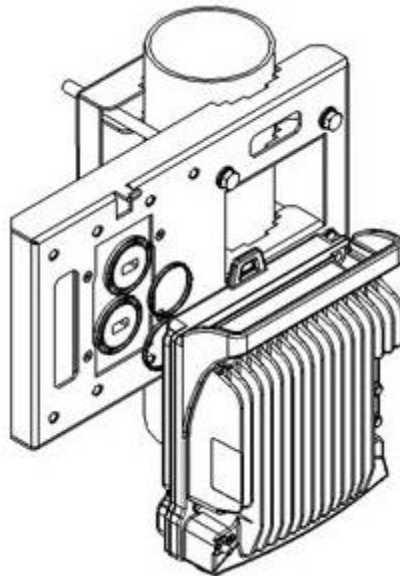


6-13 GHz

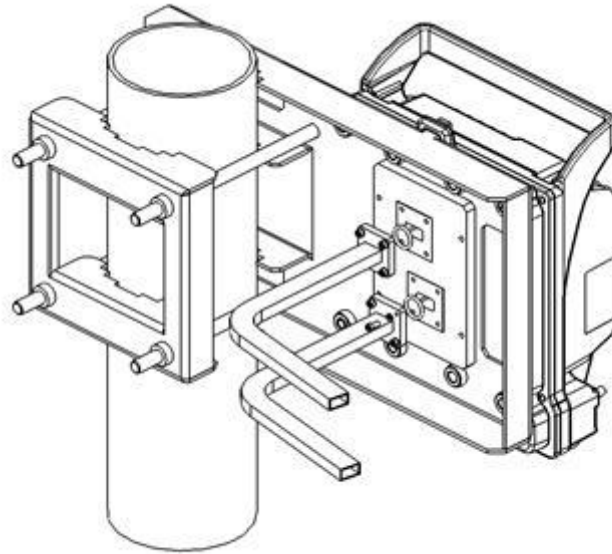
1. Mount and tighten the PTP 820C Remote Mount Adaptor plate (supplied in PTP 820C Remote Mount Adaptor kit) to the PTP 820C Pole Mount using the four flat screws supplied with the PTP 820C Adaptor Remote Mount kit.



2. Mount and tighten the RFU-D to the PTP 820C Pole Mount using the four captive screws and washers that are supplied with the RFU-D. Pay attention that the O-rings are mounted on the PTP 820C Remote Mount Adaptor.

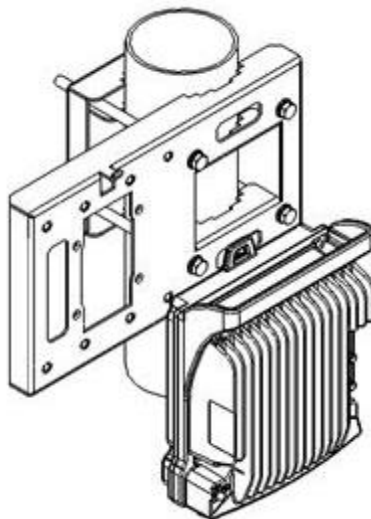


3. Mount and tighten both Flexible WGs with their O-ring to the PTP 820C Remote Mount Adaptor ports using the four screws supplied with each Flexible WG kit.

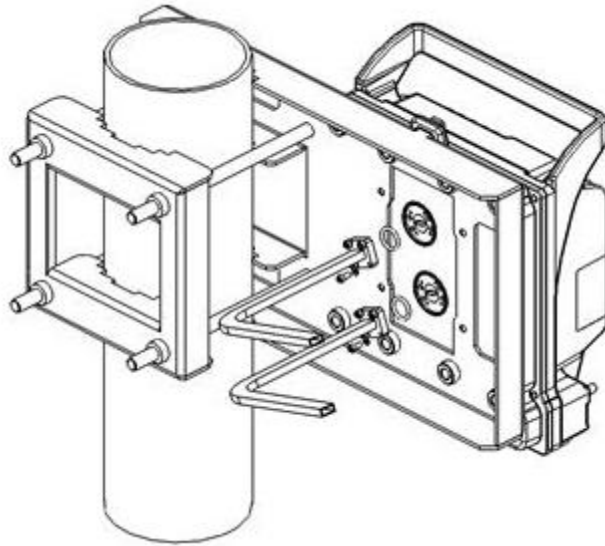


L15-38 GHz

1. Mount and tighten the RFU-D to the PTP 820C Pole Mount using the four screws assembled on the RFU-D.



2. Mount and tighten the O-ring and the Flexible WG to RFU-D radio ports using the four screws supplied with the Flexible WG kit.

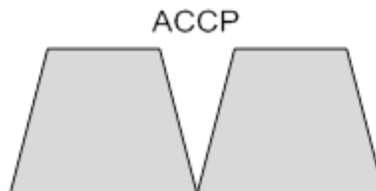


2+0 Single Polarization Direct Mount



Note

This procedure can also be used for 1+0 SP HW ready for 2+0 SP configuration.



List of Items

Item	Description	Quantity	Remarks
1	RFU-D Radio	1	
2	PTP 820C Splitter kit	1	

Required Tools

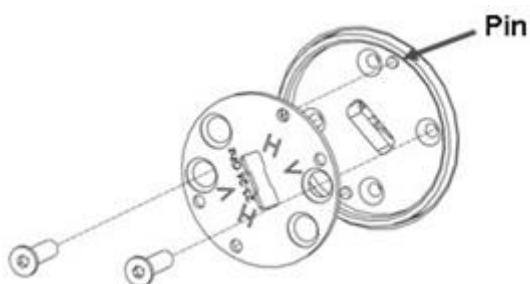
- Metric offset hexagon key set
- Phillips #1, #2 screwdriver

Insertion Loss

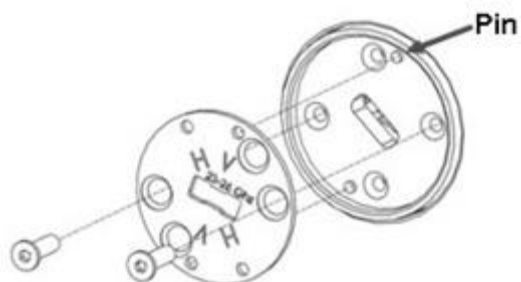
Mediation Devices	Signal Path / Remarks	Insertion Loss [dB]					
		6-8 GHz	11 GHz	13-15 GHz	18 GHz	23-26 GHz	28-38 GHz
Splitter	Radio to antenna port	3.5	3.5	3.5	3.7	3.7	4.0

Procedure

- Adjust the twist on the Splitter Kit. Perform one of the following steps, according to the required polarization (horizontal or vertical).
 - For horizontal polarization, locate the holes above and below the letter "H" on the pins and fasten the two screws.

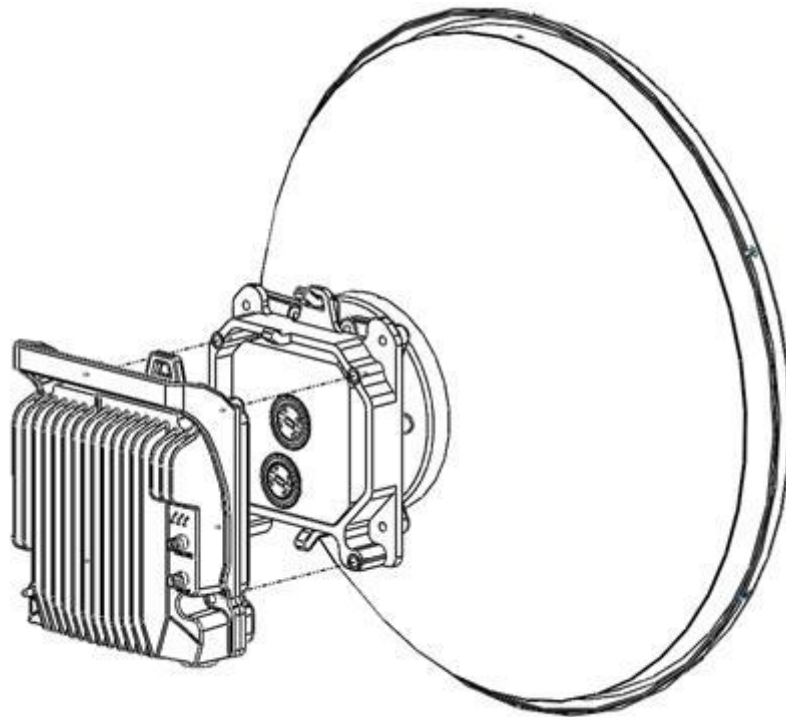


- For vertical polarization, locate the holes above and below the letter "V" on the pins and fasten the two screws.



- Mount and tighten the PTP 820C Splitter Kit on the antenna using the four M8 screws and washers.

3. Mount and tighten the RFU-D to the PTP 820C Splitter Kit using the four M8 captive screws and washers supplied.

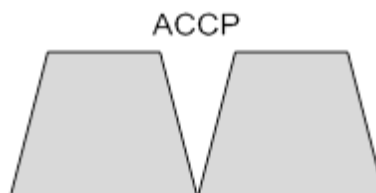


2+0 Single Polarization Remote Mount



Note

This procedure can also be used for 1+0 SP HW ready for 2+0 SP configurations.



List of Items

Item	Description	Quantity	Remarks
1	RFU-D Radio	1	
2	RFU-C Adaptor Remote Mount Kit	1	From 6-13 GHz
3	RFU-C Remote Mount Kit	1	
4	PTP 820C Splitter Kit	1	
5	RFU-C WG Kit	1	

Required Tools

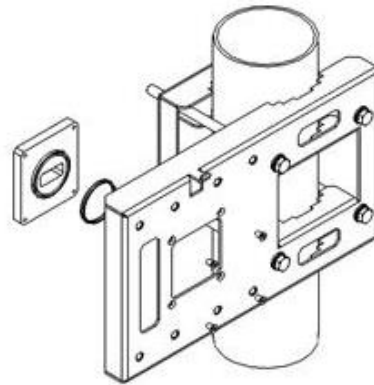
- Metric offset hexagon key wrench set
- Phillips #1, #2 screwdriver
- Metric wrench key set

Insertion Loss

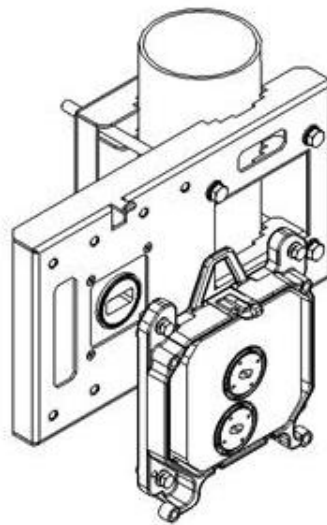
Mediation Devices	Signal Path / Remarks	Insertion Loss [dB]					
		6-8 GHz	11 GHz	13-15 GHz	18 GHz	23-26 GHz	28-38 GHz
Splitter and one WG	Radio to antenna port	4.0	4.0	4.7	4.9	5.2	5.5

6-13 GHz

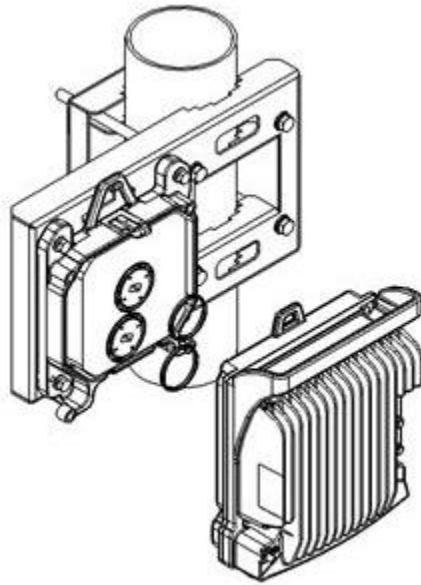
1. Mount and tighten the RFU-C Remote Mount Adaptor plate (supplied in RFU-C Adaptor Remote Mount kit) to the RFU-C Pole Mount using the four flat screws supplied with the RFU-C Adaptor Remote Mount kit.



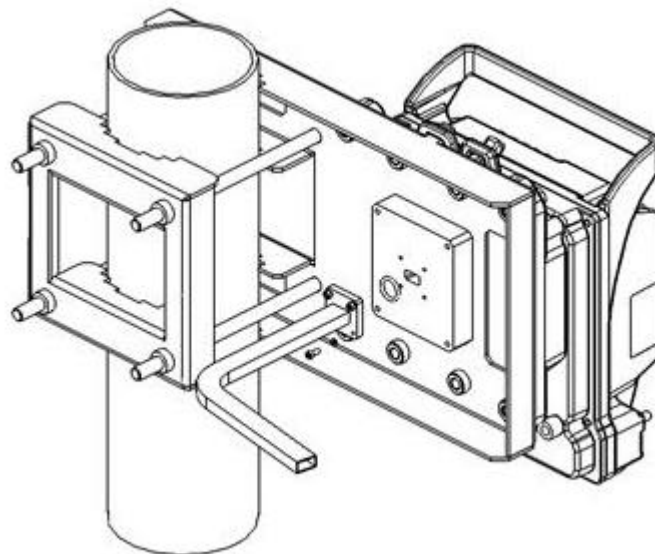
2. Mount and tighten the PTP 820C Splitter to the RFU-C Pole Mount using the four captive screws and washers that are assembled to the PTP 820C Splitter kit.



3. Mount and tighten the RFU-D to the PTP 820C Splitter using the four captive screws and washers that are assembled to the RFU-D radio. Pay attention that the O-rings are mounted on the PTP 820C Splitter kit.

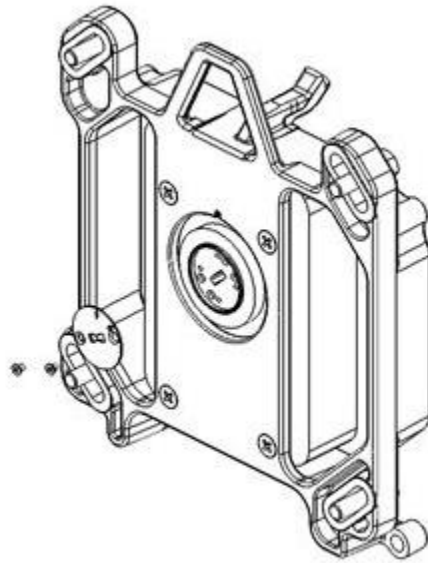


4. Connect the Flexible Waveguide and Sealing Gasket supplied with the Flexible Waveguide Kit to the RFU-C Adaptor plate. Tighten the four screws supplied with the Flexible Waveguide Kit.

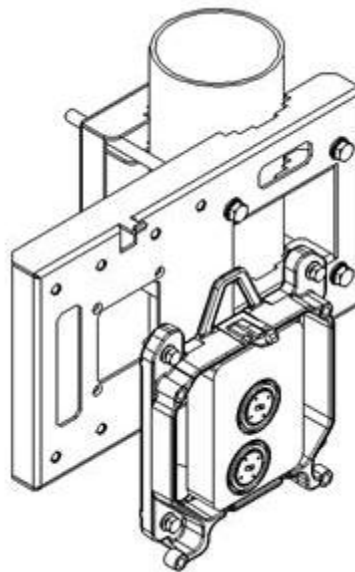


15-38 GHz

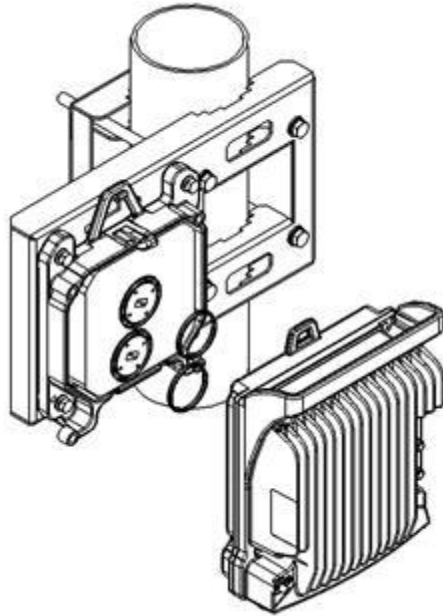
1. Loosen the two screws and remove the twist plate from the PTP 820C Splitter.



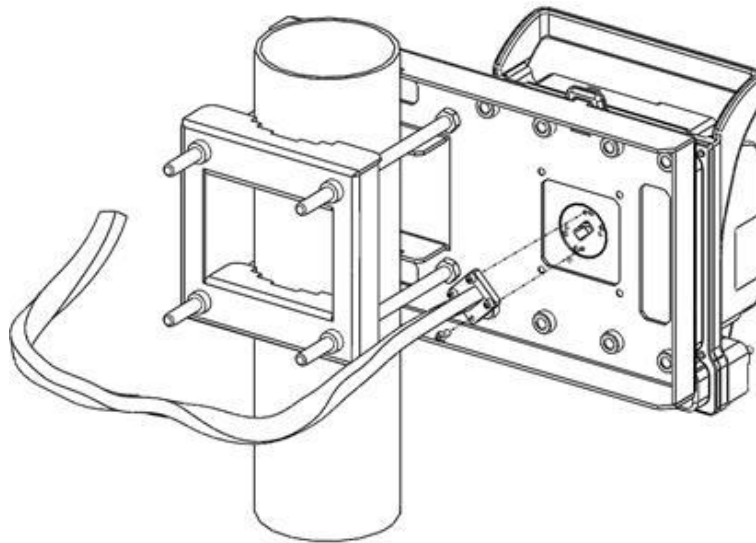
2. Mount and tighten the PTP 820C Splitter to the RFU-C Pole Mount using the four captive screws and washers that are assembled to the PTP 820C Splitter kit.



3. Mount and tighten the RFU-D to the PTP 820C Splitter using the four captive screws and washers that are assembled to the RFU-D. Pay attention that the O-rings are mounted on the PTP 820C Splitter kit.



4. Connect the Flexible Waveguide and Sealing Gasket supplied with the Flexible Waveguide Kit to the PTP 820-C Splitter kit. Tighten the four screws supplied with the Flexible Waveguide kit.



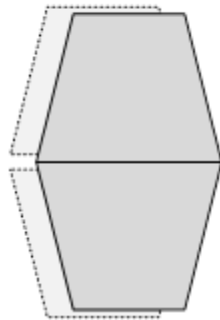
2+2 HSB Dual Polarization Direct Mount



Note

This procedure can also be used for 2 x 1+1 HSB DP HW ready for 2+2 HSB DP configurations.

CCDP - Protected



List of Items

Item	Description	Quantity	Remarks
1	RFU-D Radio	2	
2	PTP 820C OMT Kit	1	
3	PTP 820C Dual Coupler Kit	1	
4	CIRC./CIRC. Adaptor	1	Per Antenna Vendor

Required Tools

- Metric offset hexagon key set
- Metric wrench key set

Insertion Loss

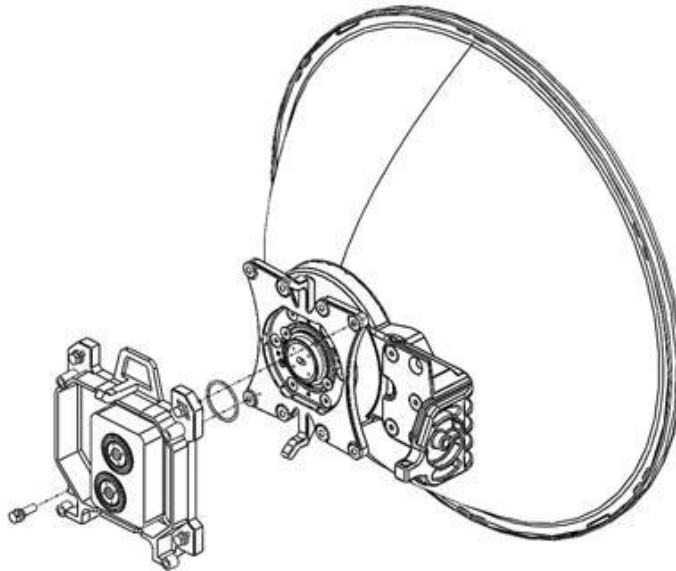
Mediation Devices	Signal Path / Remarks	Insertion Loss [dB]					
		6-8 GHz	11 GHz	13-15 GHz	18 GHz	23-26 GHz	28-38 GHz
Splitter and one WG	Main Paths	1.6	1.6	1.6	1.9	1.9	2.5
	Secondary Paths	6.2	6.2	6.2	6.3	6.3	6.5

Procedure

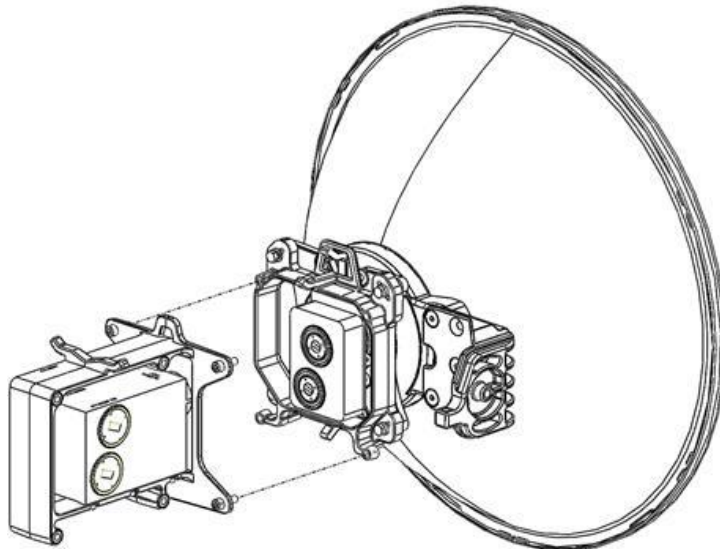
1. Prior to the installation, follow the antenna manufacturer's instructions to use the circular adaptor. (Remove the existing rectangular transition, swap the O-ring, and install the circular transition instead.)



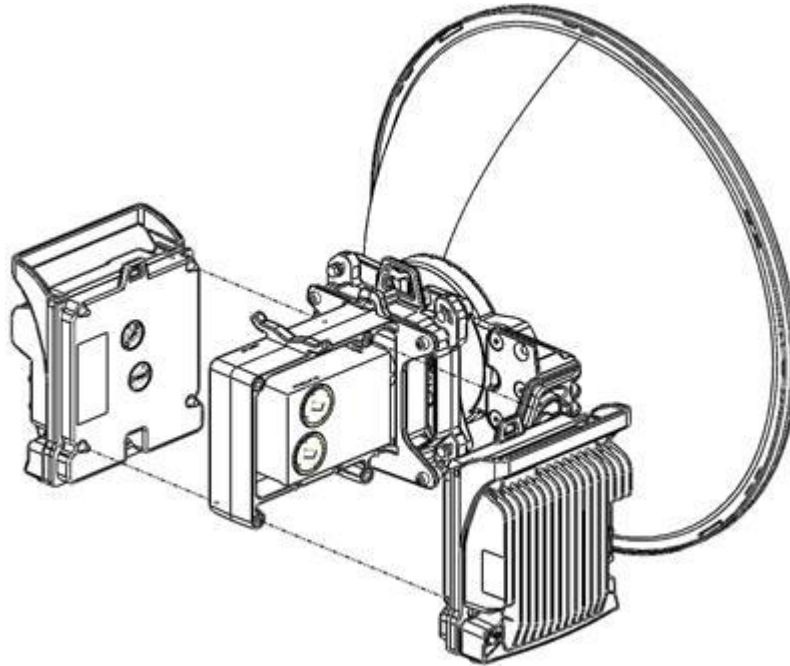
2. Connect the PTP 820C OMT Kit to the antenna and secure it with four screws. Verify existence of the O-ring.



3. Connect the PTP 820C Dual Coupler Kit to the OMT Kit using four M8 screws and washers and tighten the screws.



4. Mount and tighten the RFU-D unit to both sides of the PTP 820C Dual Coupler kit using the supplied captive screws and washers. Pay attention that the O-rings are correctly mounted on the radio ports of the PTP 820C Dual Coupler.



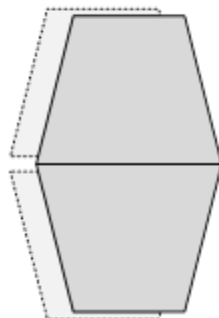
2+2 HSB Dual Polarization Remote Mount



Note

This procedure can also be used for 2x 1+1 HSB DP HW ready for 2+2 HSB DP configurations.

CCDP - Protected



List of Items

Item	Description	Quantity	Remarks
1	RFU-D Radio	2	
2	PTP 820C OMT Kit	1	

Item	Description	Quantity	Remarks
3	PTP 820C Dual Coupler Kit	1	
4	RFU-C WG Kit	2	
5	PTP 820C DC Remote Mount Kit	1	
6	PTP 820C Remote Mount Adaptor Kit	1	From 6-13GHz
7	CIRC./CIRC. ADAPTOR	1	Per Antenna Vendor

Required Tools

- Metric offset hexagon key set
- Metric wrench key set
- Phillips #1, #2 screwdriver

Insertion Loss

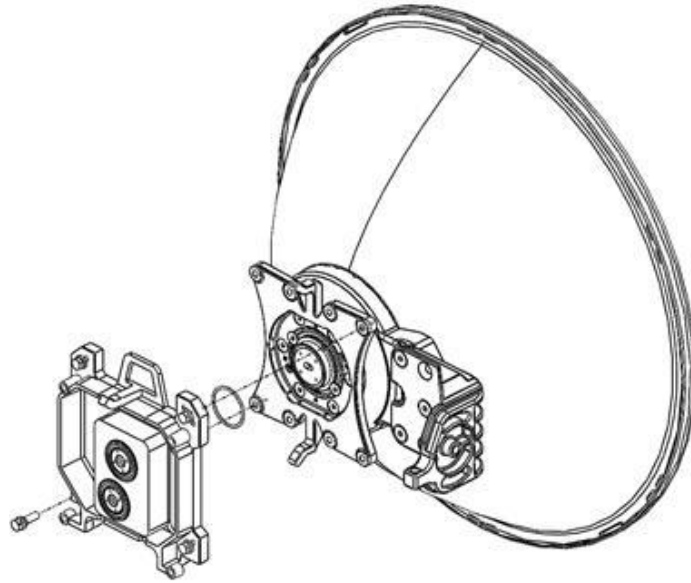
Mediation Devices	Signal Path / Remarks	Insertion Loss [dB]					
		6-8 GHz	11 GHz	13-15 GHz	18 GHz	23-26 GHz	28-38 GHz
Double Coupler, OMT and two WGs	Main Paths	2.1	2.1	2.8	3.1	3.4	4
	Secondary Paths	6.7	6.7	7.4	7.5	7.8	8

Common Installation

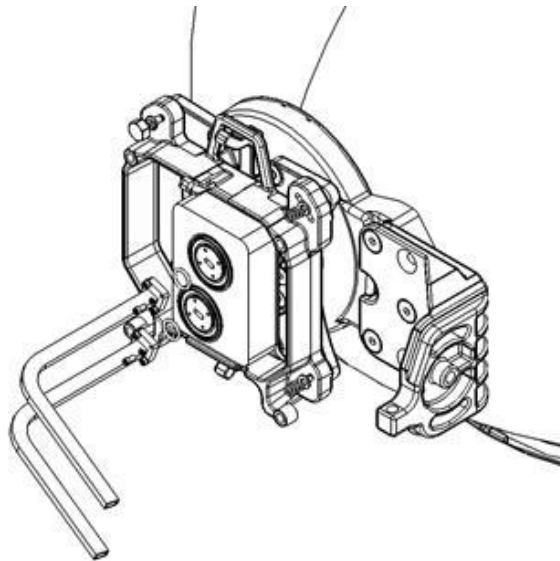
1. Prior to the installation, follow the antenna manufacturer's instructions to use the circular adaptor. (Remove the existing rectangular transition, swap the O-ring, and install the circular transition instead.)



2. Connect the OMT Kit to the antenna and secure it with four screws. Verify the existence of the O-ring.

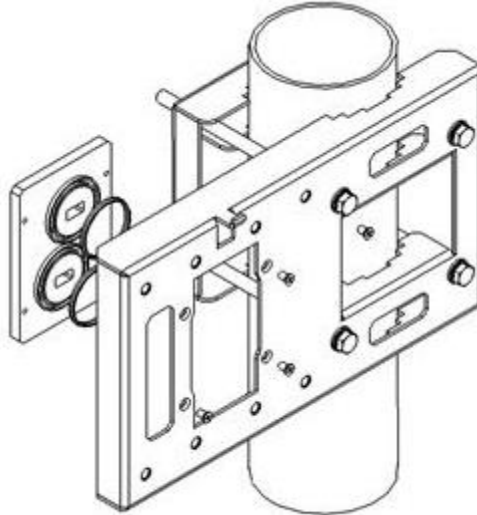


3. Mount and tighten the O-ring and the Flexible WG to PTP 820C OMT ports using the four screws supplied with the Flexible WG kit.

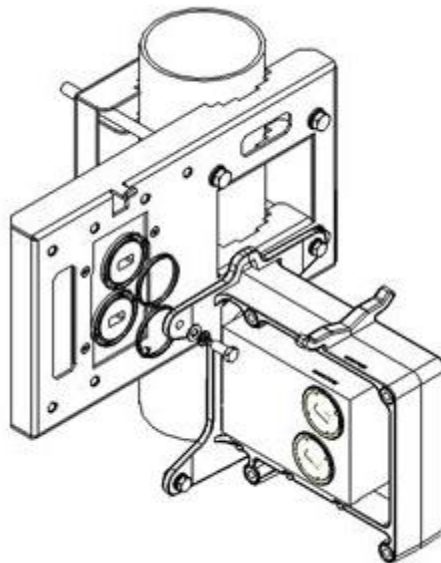


6-13 GHz

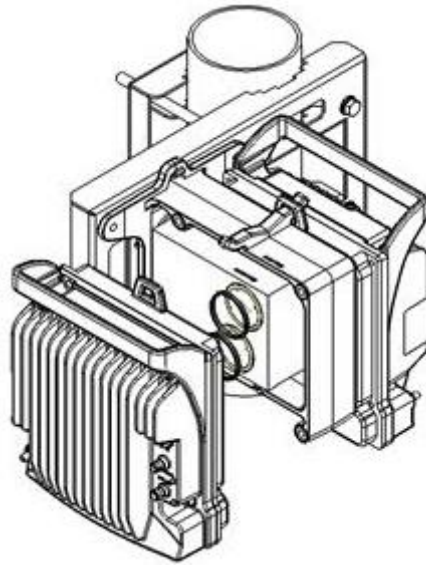
1. Mount and tighten the PTP 820C Remote Mount Adaptor plate (supplied in PTP 820C Remote Mount Adaptor kit) to the PTP 820C Pole Mount using the four flat screws supplied with the PTP 820C Adaptor Remote Mount kit.



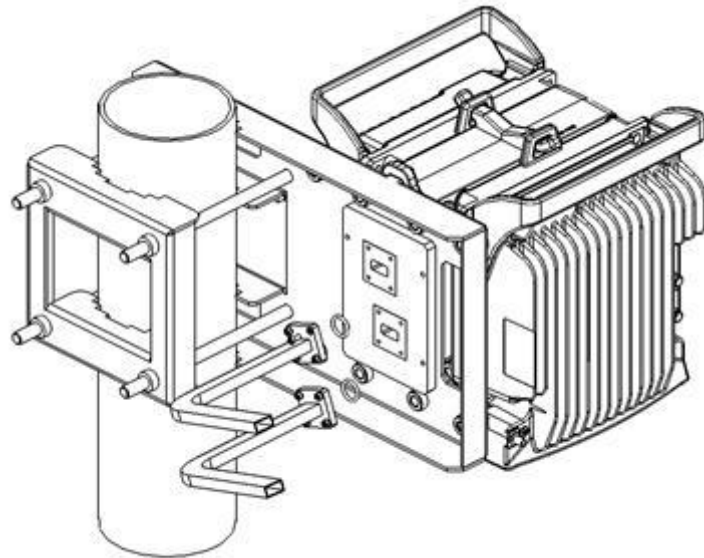
2. Mount and tighten the PTP 820C Dual Coupler to the PTP 820C Pole Mount using the four screws and washers that are supplied with the PTP 820C Dual Coupler kit. Pay attention that the O-rings are mounted on the PTP 820C Remote Mount Adaptor.



3. Mount and tighten the RFU-D radios on each side of the PTP 820C Dual Coupler using the screws assembled on RFU-D radio. Pay attention that the O-rings are correctly assembled on the radio port of the PTP 820C Dual Coupler.

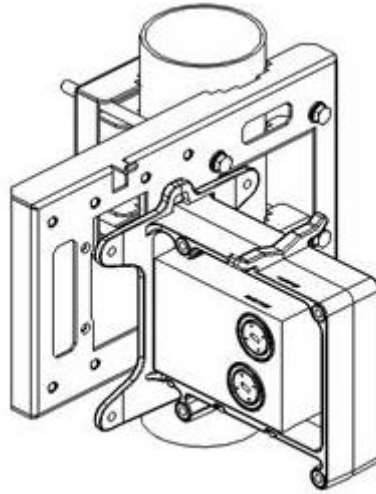


4. Connect both Flexible Waveguides and Sealing Gaskets supplied with each Flexible Waveguide Kit to the PTP 820C Dual Coupler antenna ports. Tighten the screws and washers supplied with the Flexible Waveguide Kit.

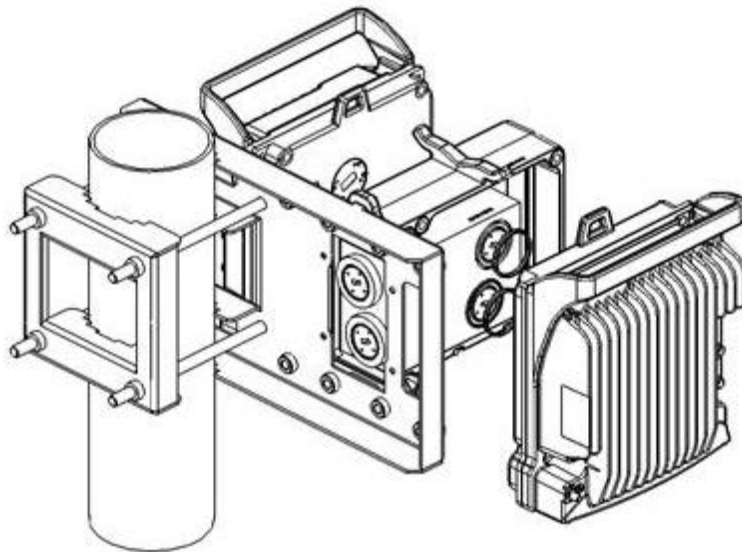


15-38 GHz

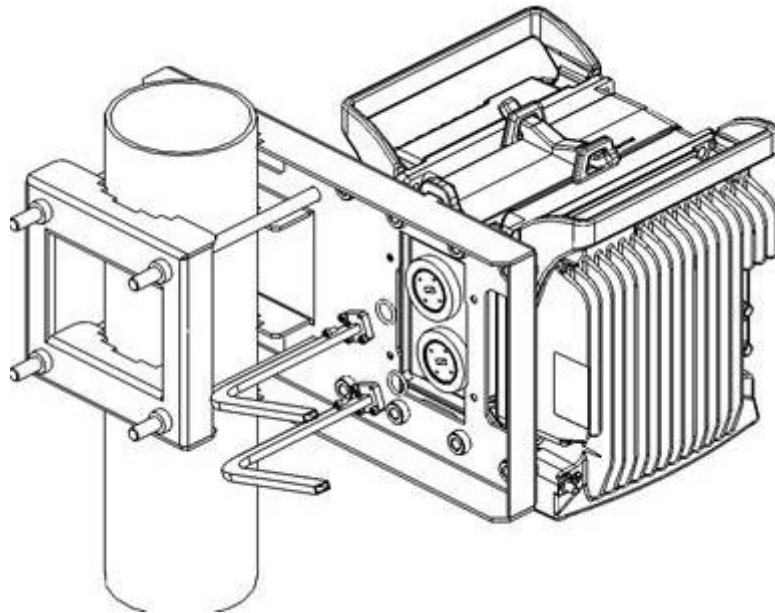
1. Mount and tighten the PTP 820C Dual Coupler to the PTP 820C Pole Mount using the four screws and washers supplied with PTP 820C Dual Coupler kit.



2. Mount and tighten the RFU-D radios on each side of the PTP 820C Dual Coupler using the screws assembled on RFU-D radio. Pay attention that the O-rings are correctly assembled on the radio port of the PTP 820C Dual Coupler.



3. Mount the O-ring and the Flexible WG to PTP 820C Dual Coupler ports using the four screws supplied with the Flexible WG kit.

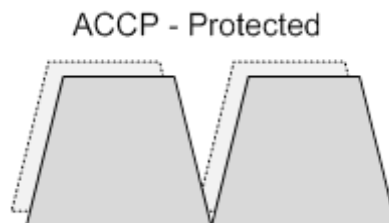


2+2 HSB Single Polarization Direct Mount



Note

This procedure can also be used for 2 x 1+1 HSB SP HW ready for 2+2 HSB SP configurations.



List of Items

Item	Description	Quantity	Remarks
1	RFU-D Radio	2	
2	PTP 820C Splitter Kit	1	
3	PTP 820C Dual Coupler Kit	1	

Required Tools

- Metric offset hexagon key set
- Metric wrench key set

- Phillips #1 screwdriver

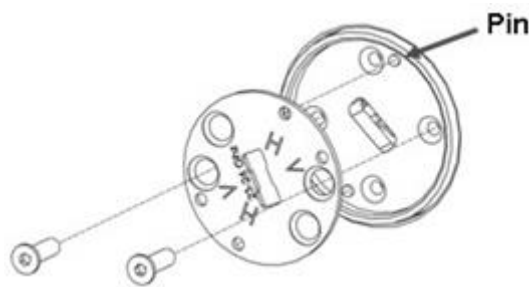
Insertion Loss

Mediation Devices	Signal Path / Remarks	Insertion Loss [dB]					
		6-8 GHz	11 GHz	13-15 GHz	18 GHz	23-26 GHz	28-38 GHz
Double Coupler and Splitter	Main Paths	4.9	4.9	4.9	5.3	5.3	6
	Secondary Paths	9.5	9.5	9.5	9.7	9.7	10

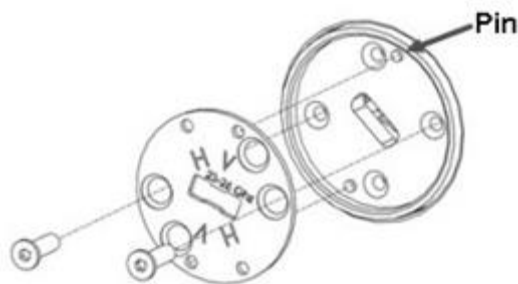
Procedure

1. Adjust the twist on the Splitter Kit. Perform one of the procedures below, according to the required polarization (horizontal or vertical).

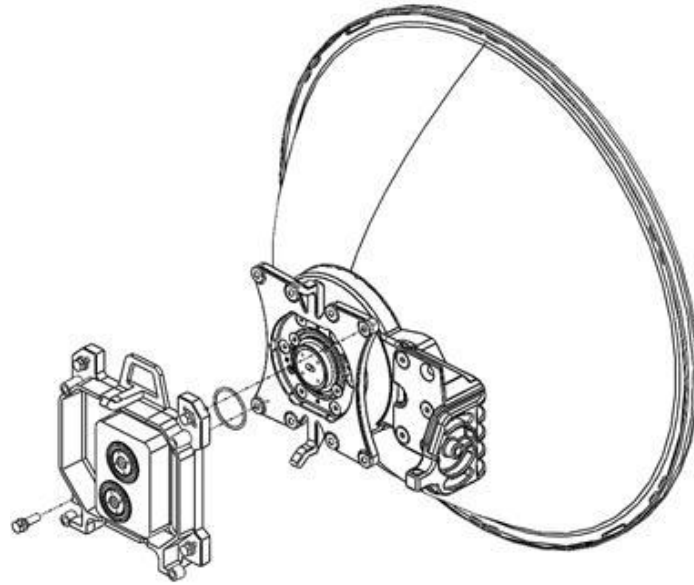
Horizontal polarization: Locate the holes above and below the letter "H" on the pins and fasten the two screws.



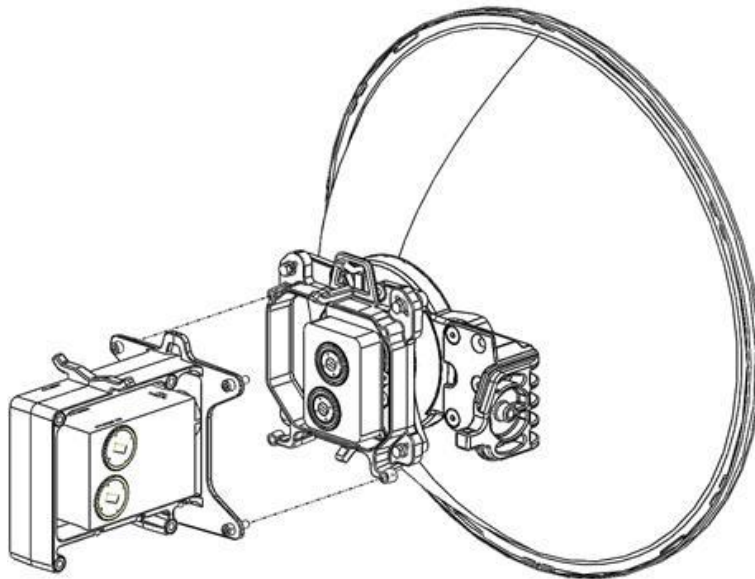
Vertical polarization: Locate the holes above and below the letter "V" on the pins and fasten the two screws.



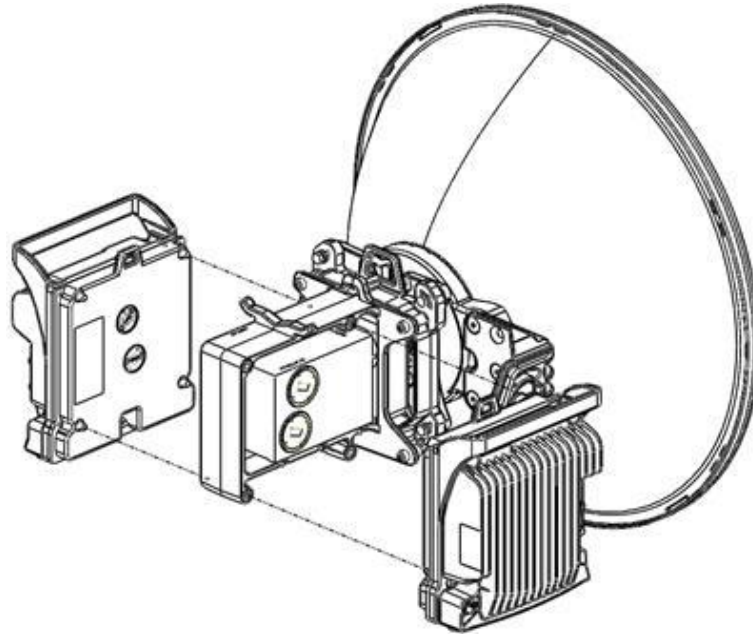
2. Mount the Splitter Kit on the antenna using four M8 screws and washers and tighten the screws.



3. Connect the PTP 820C Dual Coupler Kit to the PTP 820C Splitter Kit using four M8 screws and washers and tighten the screws.



4. Connect an RFU-D unit to both sides of the PTP 820C Dual Coupler kit using the supplied captive screws and washers and tighten the screws.



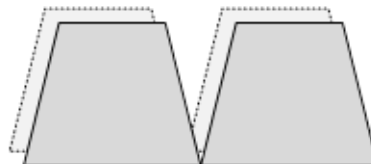
2+2 HSB Single Polarization Remote Mount



Note

This procedure can also be used for 2 x 1+1 HSB SP HW ready for 2+2 HSB SP configuration.

ACCP - Protected



List of Items

Item	Description	Quantity	Remarks
1	RFU-D Radio	2	
2	PTP 820C Splitter Kit	1	
3	PTP 820C Dual Coupler Kit	1	
4	RFU-C WG Kit	2	
5	RFU-C Remote Mount Kit	1	

Item	Description	Quantity	Remarks
6	RFU-C Adaptor Remote Mount Kit	1	From 6-13 GHz

Required Tools

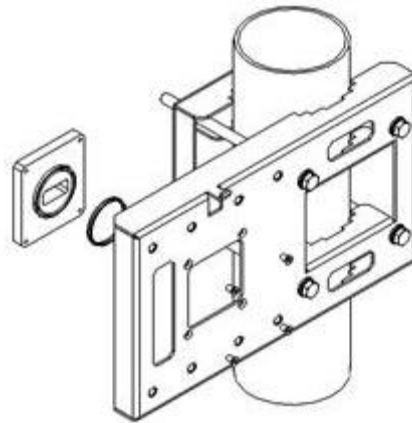
- Metric offset hexagon key set
- Metric wrench key set
- Phillips #1, #2 screwdriver

Insertion Loss

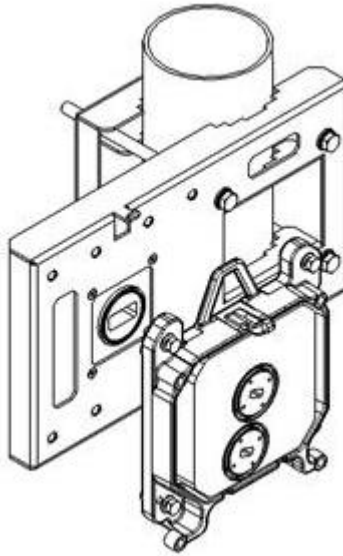
Mediation Devices	Signal Path / Remarks	Insertion Loss [dB]					
		6-8 GHz	11 GHz	13-15 GHz	18 GHz	23-26 GHz	28-38 GHz
Double Coupler, Splitter and WG	Main Paths	5.4	5.4	6.1	6.5	6.8	7.5
	Secondary Paths	10	10	10.7	10.9	11.2	11.5

6-13 GHz

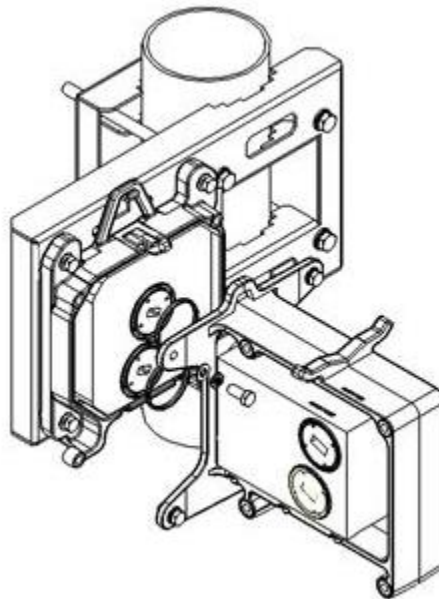
1. Mount and tighten the RFU-C Remote Mount Adaptor plate (supplied in RFU-C Adaptor Remote Mount kit) to the RFU-C Pole Mount using the four flat screws supplied with the RFU-C Adaptor Remote Mount kit.



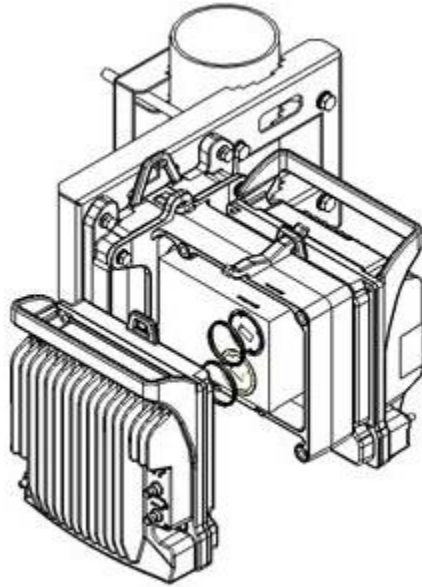
2. Mount and tighten the PTP 820C Splitter to the RFU-C Pole Mount using the four captive screws and washers that are assembled to the PTP 820C Splitter kit.



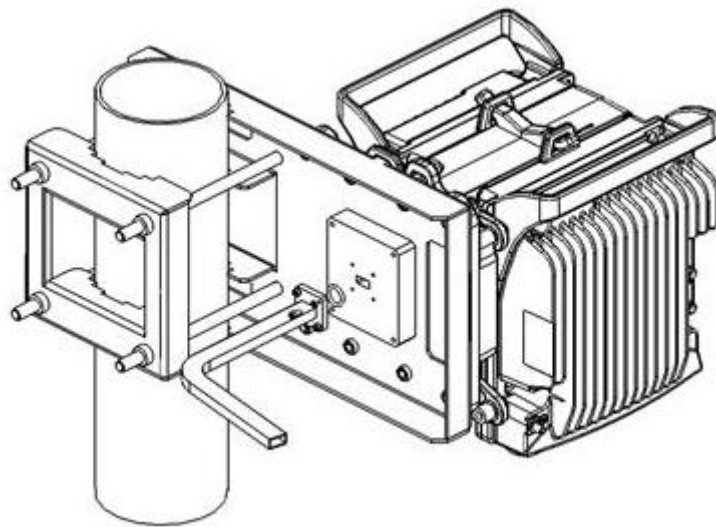
3. Mount and tighten the PTP 820C Dual Coupler to the PTP 820C Splitter using the four captive screws and washers that are supplied with the PTP 820C Dual Coupler kit. Pay attention that the O-rings are mounted on the PTP 820C Splitter.



4. Mount and tighten the RFU-D radio to the PTP 820C Dual Coupler using the four screws and washers that are assembled to the RFU-D radio. Pay attention that the O-rings are mounted on the PTP 820C Dual Coupler.

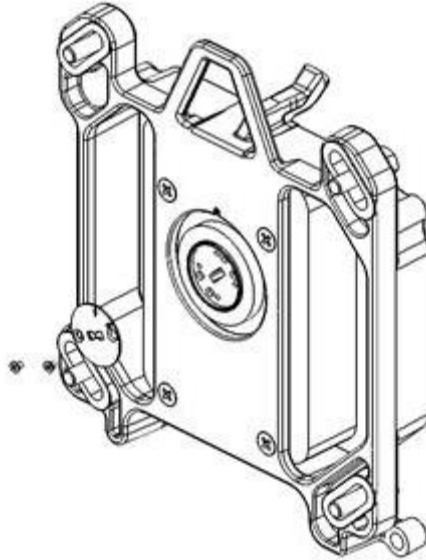


5. Connect the Flexible Waveguide and Sealing Gasket supplied with the Flexible Waveguide Kit to the RFU-C Adaptor plate. Tighten the four screws supplied with the Flexible Waveguide Kit.

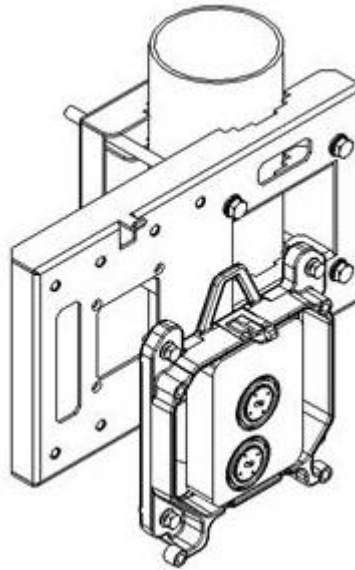


15-38 GHz

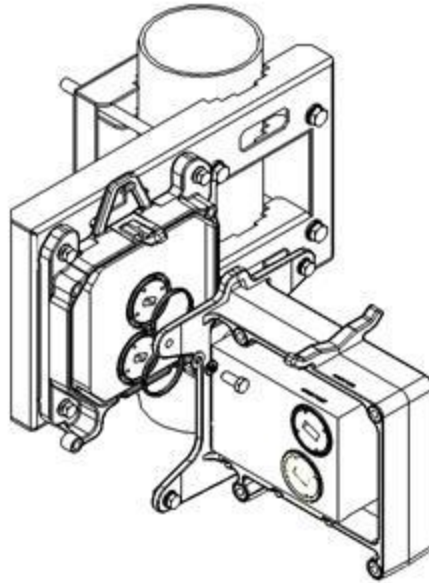
1. Loosen the two screws and remove the twist plate from the PTP 820C Splitter.



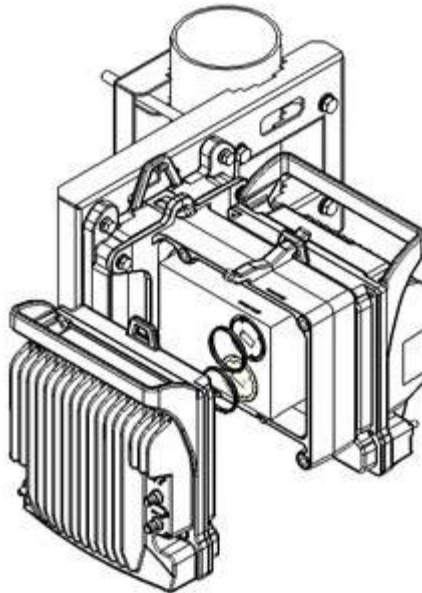
2. Mount and tighten the PTP 820C Splitter to the RFU-C Pole Mount using the four captive screws and washers that are assembled to the PTP 820C Splitter kit.



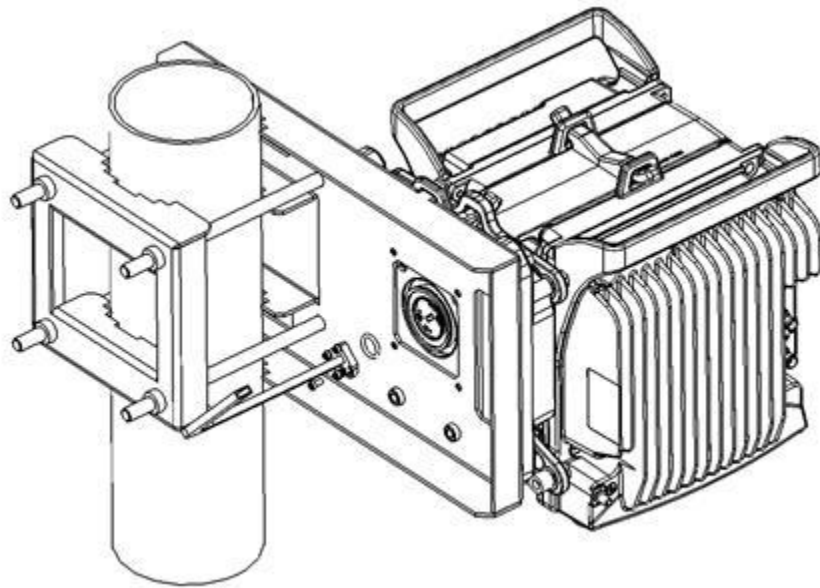
3. Mount and tighten the PTP 820C Dual Coupler to the PTP 820C Splitter using the four captive screws and washers that are supplied with the PTP 820C Dual Coupler kit. Pay attention that the O-rings are mounted on the PTP 820C Splitter.



4. Mount and tighten the RFU-D radio to the PTP 820C Dual Coupler using the four screws and washers that are assembled to the RFU-D radio. Pay attention that the O-rings are mounted on the PTP 820C Dual Coupler.



5. Connect the Flexible Waveguide and Sealing Gasket supplied with the Flexible Waveguide Kit to the PTP 820C Dual Coupler antenna port. Tighten the four screws supplied with the Flexible Waveguide kit.

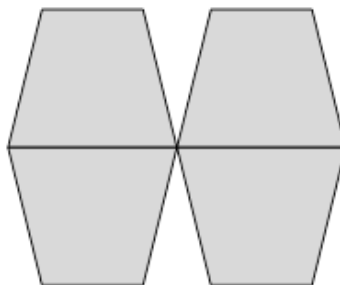


2 x 2+0 Dual Polarization Direct Mount



Note

This procedure can also be used for 2+0 DP HW ready for 2 x 2+0 DP configurations.



List of Items

Item	Description	Quantity	Remarks
1	RFU-D Radio	2	
2	PTP 820C OMT Kit	1	
3	PTP 820C DUAL COUPLER or PTP 820C Splitter Kit	1	
4	CIRC./CIRC. Adaptor	1	Per Antenna Vendor

Required Tools

- Metric offset hexagon key set
- Metric wrench key set

Insertion Loss

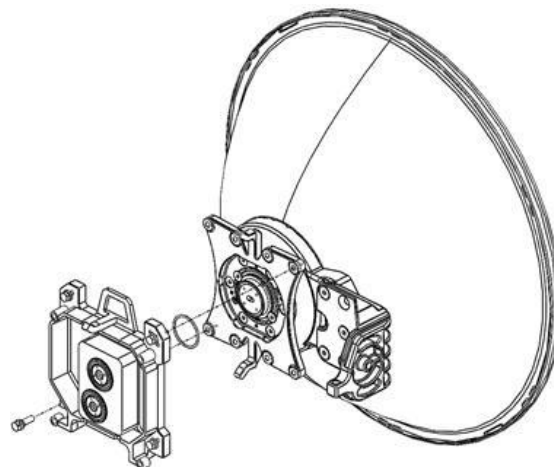
Mediation Devices	Signal Path / Remarks	Insertion Loss [dB]					
		6-8 GHz	11 GHz	13-15 GHz	18 GHz	23-26 GHz	28-38 GHz
Double Splitter and OMT	Radio to antenna port	3.8	3.8	3.8	4	4.2	4.5

Procedure

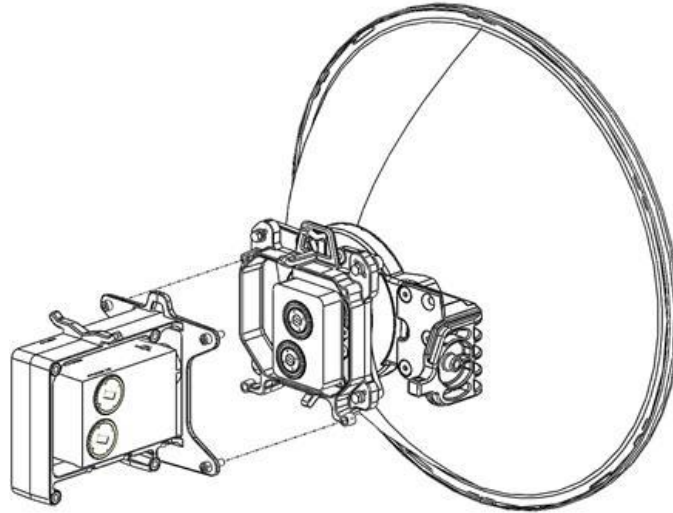
1. Prior to the installation, follow the antenna manufacturer's instructions to use the circular adaptor. (Remove the existing rectangular transition, swap the O-ring, and install the circular transition instead.)



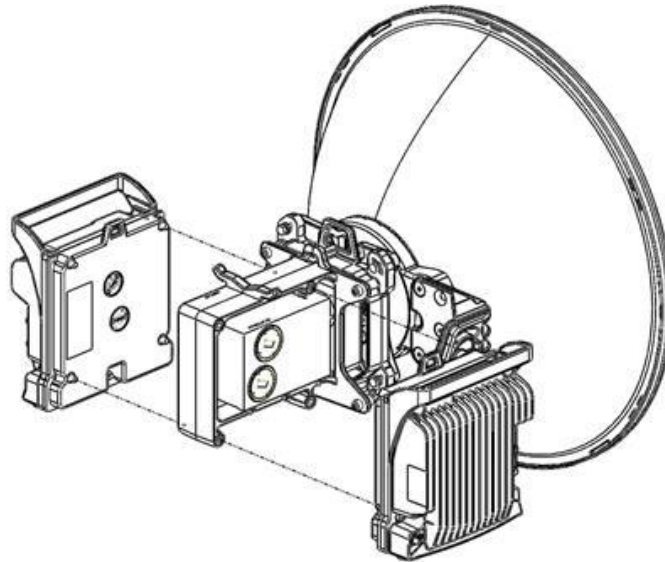
2. Connect the PTP 820C OMT Kit to the antenna and secure it with four screws. Verify existence of the O-ring.



3. Connect the PTP 820C Dual Coupler Kit to the OMT Kit using four M8 screws and washers and tighten the screws.



4. Mount and tighten the RFU-D unit to both sides of the PTP 820C Dual Coupler kit using the supplied captive screws and washers. Pay attention that the O-rings are correctly mounted on the radio ports of the PTP 820C Dual Coupler.

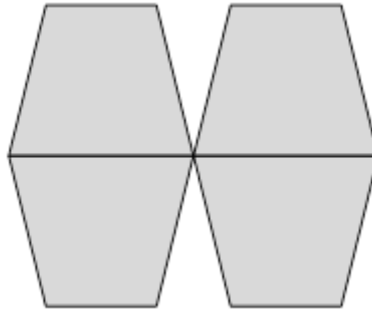


2 x 2+0 Dual Polarization Remote Mount



Note

This procedure can also be used for 2 x 1+0 DP HW ready for 2 x 2+0 DP configurations.



List of Items

Item	Description	Quantity	Remarks
1	RFU-D Radio	2	
2	PTP 820C OMT Kit	1	
3	PTP 820C Dual Coupler or PTP 820C Dual Splitter Kit	1	
4	RFU-CWG Kit	2	
5	PTP 820C DC Remote Mount Kit	1	
6	PTP 820C Remote Mount Adaptor Kit	1	From 6-13GHz
7	CIRC./CIRC. Adaptor	1	Per Antenna Vendor

Required Tools

- Metric offset hexagon key set
- Metric wrench key set
- Phillips #1, #2 screwdriver

Insertion Loss

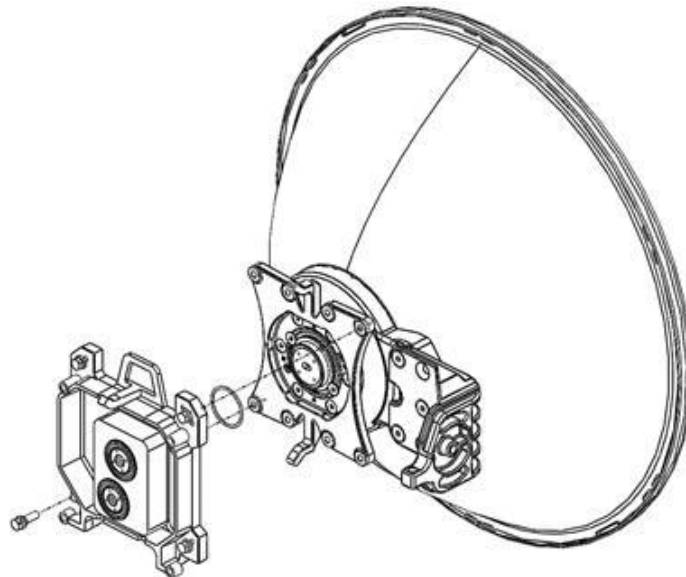
Mediation Devices	Signal Path / Remarks	Insertion Loss [dB]					
		6-8 GHz	11 GHz	13-15 GHz	18 GHz	23-26 GHz	28-38 GHz
Double Splitter, OMT and two WGs	Radio to antenna port	4.3	4.3	5	5.2	5.7	6

Common Installation Procedure

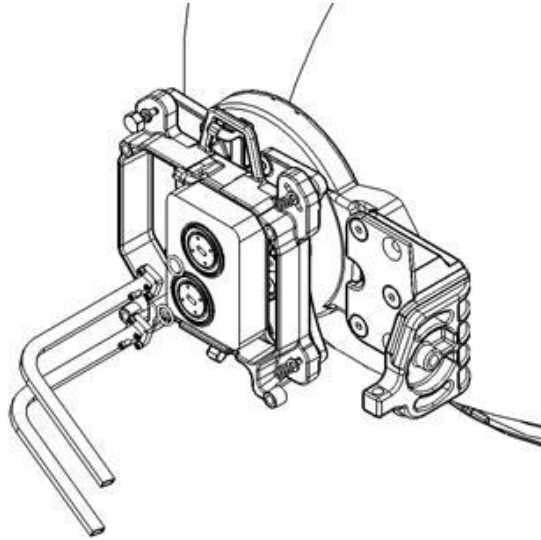
1. Prior to the installation, follow the antenna manufacturer's instructions to use the circular adaptor. (Remove the existing rectangular transition, swap the O-ring, and install the circular transition instead.)



2. Connect the OMT Kit to the antenna and secure it with four screws. Verify the existence of the O-ring.

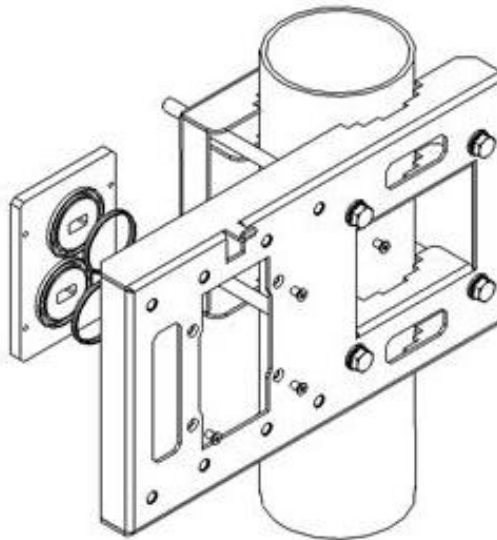


3. Mount and tighten the O-ring and the Flexible WG to PTP 820C OMT ports using the four screws supplied with the Flexible WG kit.

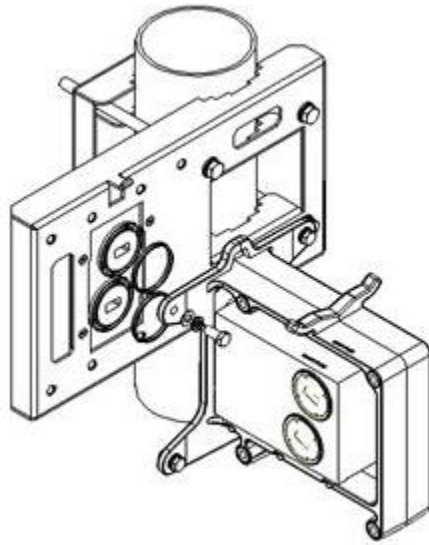


6-13 GHz

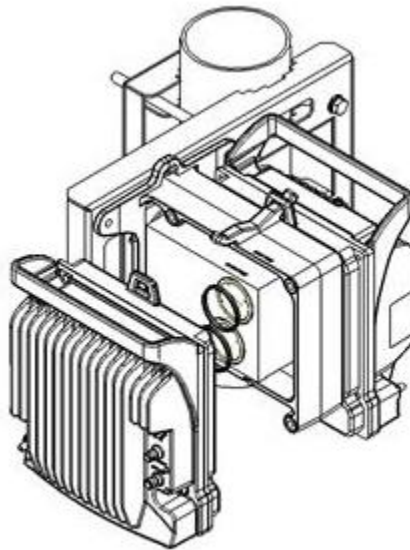
1. Mount and tighten the PTP 820C Remote Mount Adaptor plate (supplied in the PTP 820C Remote Mount Adaptor kit) to the PTP 820C Pole Mount using the four flat screws supplied with the PTP 820C Adaptor Remote Mount kit.



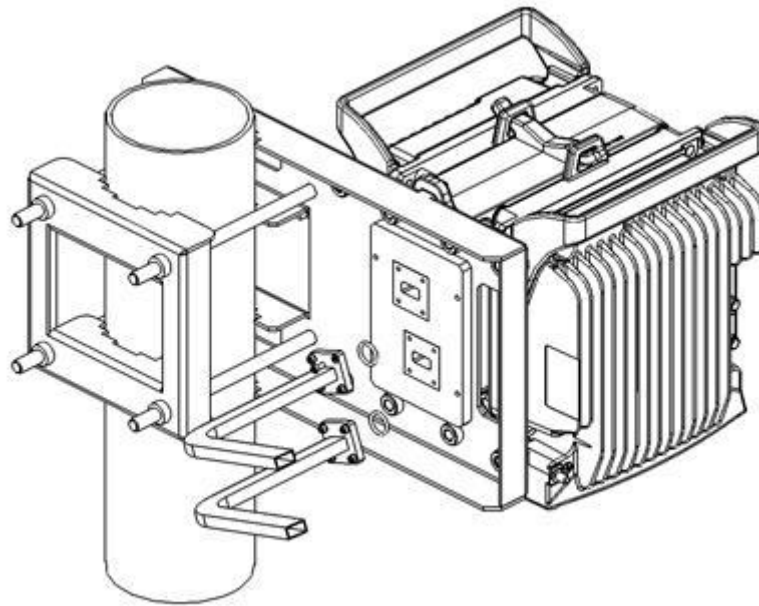
2. Mount and tighten the PTP 820C Dual Coupler to the PTP 820C Pole Mount using the four screws and washers that are supplied with the PTP 820C Dual Coupler kit. Pay attention that the O-rings are mounted on the PTP 820C Remote Mount Adaptor.



3. Mount and tighten the RFU-D radios on each side of the PTP 820C Dual Coupler using the screws assembled on RFU-D radio. Make sure that the O-rings are correctly assembled on the radio port of the PTP 820C Dual Coupler.

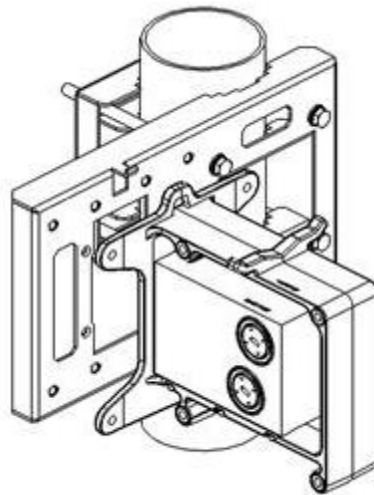


4. Connect both Flexible Waveguides and Sealing Gaskets supplied with each Flexible Waveguide Kit to the PTP 820C Dual Coupler antenna ports. Tighten the screws and washers supplied with the Flexible Waveguide Kit.

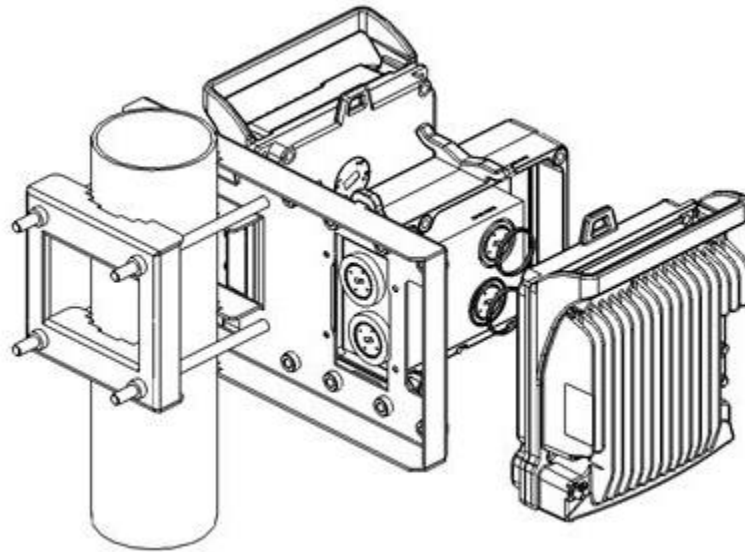


15-38 GHz

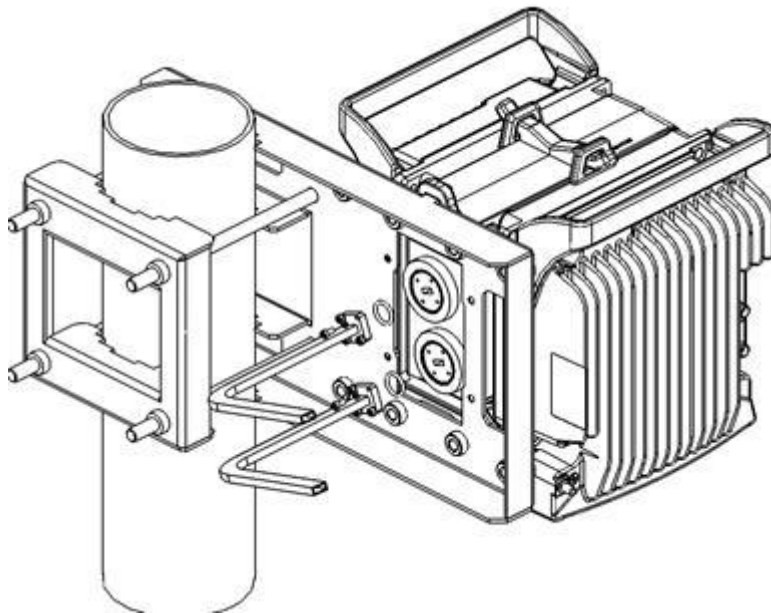
1. Mount and tighten the PTP 820C Dual Coupler to PTP 820C Pole Mount using the four screws and washers supplied with PTP 820C Dual Coupler kit.



2. Mount and tighten the RFU-D radios on each side of the PTP 820C Dual Coupler using the screws assembled on RFU-D radio. Pay attention that the O-rings are correctly assembled on the radio port of the PTP 820C Dual Coupler.



3. Mount the O-ring and the Flexible WG to PTP 820C Dual Coupler ports using the four screws supplied with the Flexible WG kit.

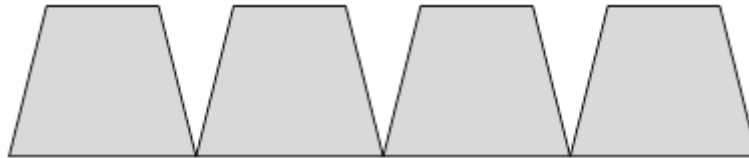


2 x 2+0 Single Polarization Direct Mount



Note

This procedure can also be used for 2 x 1+0 SP HW ready for 2 x 2+0 SP configurations.



List of Items

Item	Description	Quantity	Remarks
1	RFU-D Radio	2	
2	PTP 820C Splitter Kit	1	
3	PTP 820C Dual Splitter Kit	1	

Required Tools

- Metric offset hexagon key set
- Metric wrench key set
- Phillips #1 screwdriver

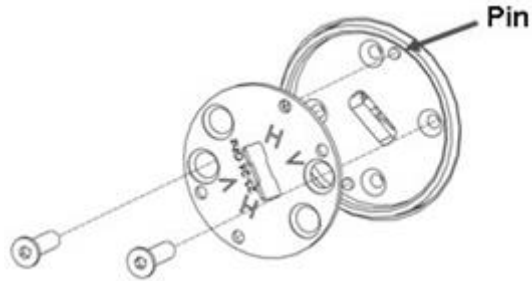
Insertion Loss

Mediation Devices	Signal Path / Remarks	Insertion Loss [dB]					
		6-8 GHz	11 GHz	13-15 GHz	18 GHz	23-26 GHz	28-38 GHz
Double Splitter and splitter	Radio to antenna port	7	7	7	7.4	7.4	8

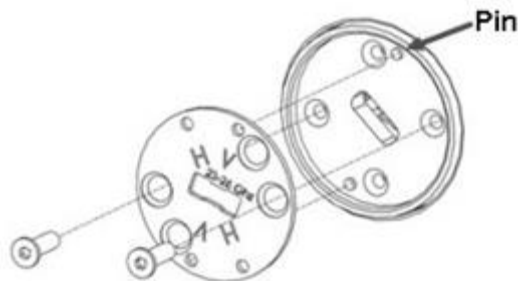
Procedure

1. Adjust the twist on the PTP 820C Splitter Kit. Perform one of the procedures below according to the required polarization

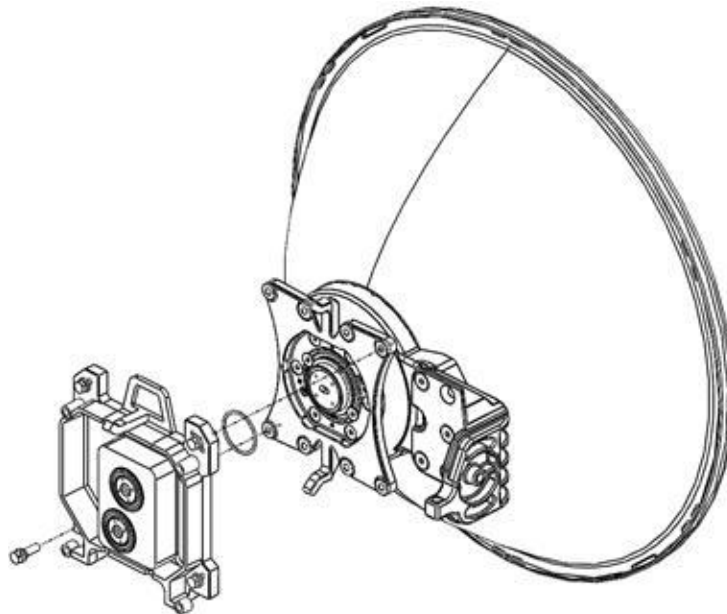
Horizontal polarization: Locate the holes above and below the letter "H" on the pins and fasten the two screws.



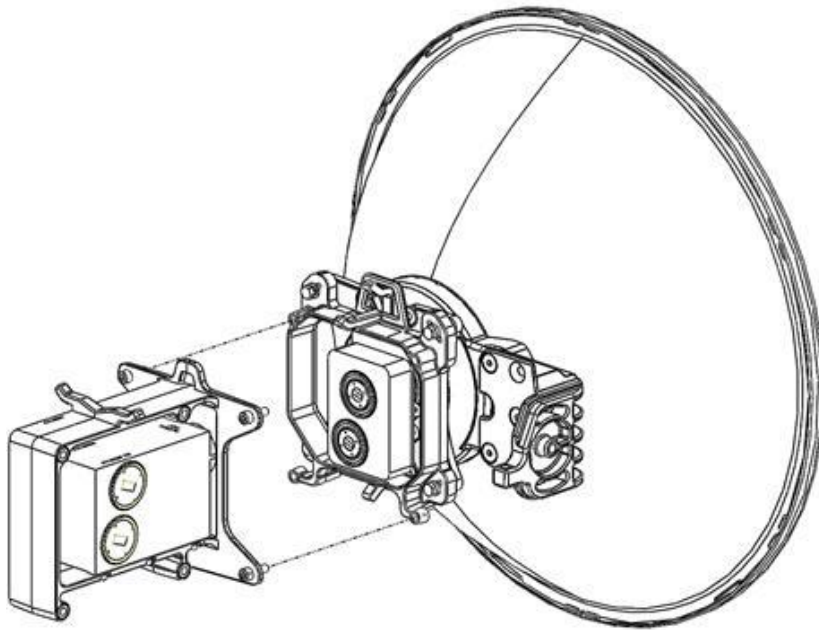
Vertical polarization: Locate the holes above and below the letter "V" on the pins and fasten the two screws.



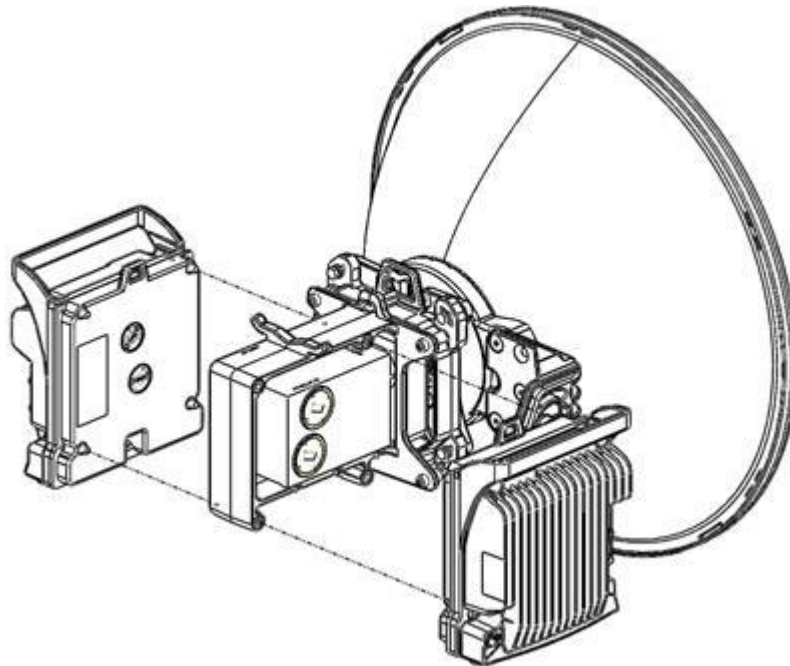
2. Mount the Splitter Kit on the antenna using four M8 screws and washers and tighten the screws.



3. Connect the PTP 820C Dual Coupler Kit to the PTP 820C Splitter Kit using four M8 screws and washers and tighten the screws.



4. Connect an RFU-D unit to both sides of the PTP 820C Dual Coupler kit using the supplied captive screws and washers and tighten the screws.

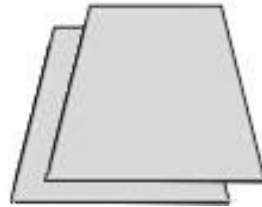


2x2 LoS MIMO Direct Mount



Note

This procedure can also be used for 1+0 SD configurations.



List of Items

Item	Description	Quantity	Remarks
1	RFU-D Radio	1	
2	PTP 820C Dual Core Kit	1	
3	RFU-CWG Kit	1	Optional
4	Coax to WG Kit	1	Optional

Required Tools

- Metric offset hexagon key set
- Phillips #1, #2 screwdriver

Insertion Loss

Mediation Devices	Signal Path / Remarks	Insertion Loss [dB]					
		6-8 GHz	11 GHz	13-15 GHz	18 GHz	23-26 GHz	28-38 GHz
Dual Core Mediation Device and WG	Radio to antenna (upper path)	0.2	0.2	0.2	0.3	0.3	0.5
	WG port to second antenna	Frequency band and WG length (antenna separation) dependent.					

Procedure

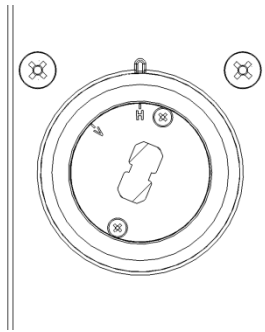
1. Adjust the twist on the dual core kit according to the required polarization.



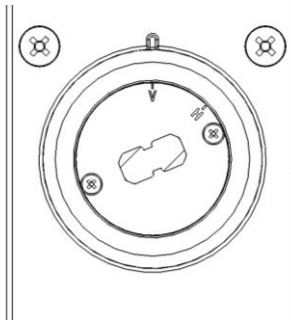
Note

Make sure the polarization mounting direction of the twist to the dual core is according to the antenna polarization.

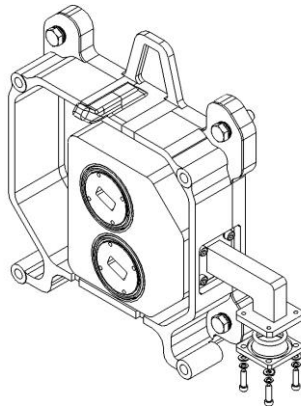
- For horizontal polarization, locate the holes above and below the letter "H" on the pins and fasten the two screws.



- For vertical polarization, locate the holes above and below the letter "V" on the pins and fasten the two screws.



2. If not required, remove the plate assembled to the bended part of the dual core kit.

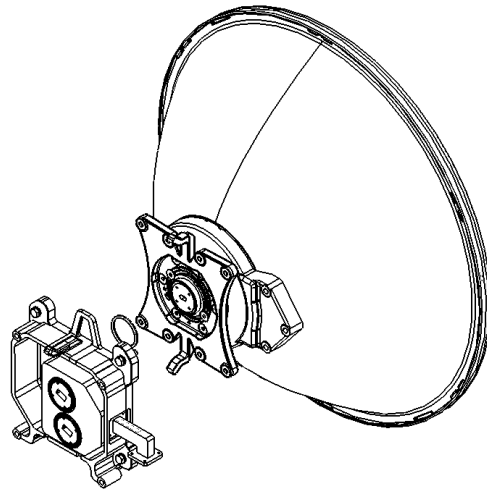


3. Mount and tighten the PTP 820C Dual Core kit on the antenna using the four M8 screws and washers.



Note

Verify that the O-ring is properly mounted between the antenna transition and the dual core.

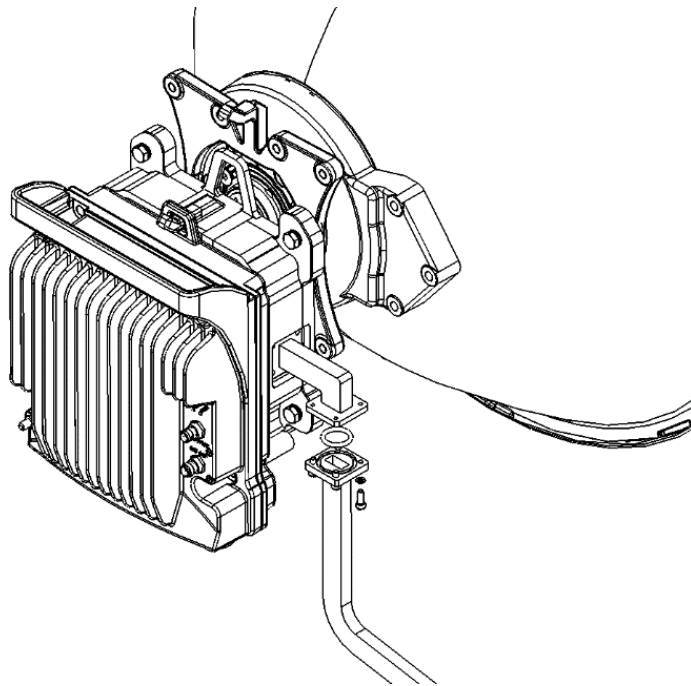


4. Connect the RFU-D radio to the PTP 820C Dual Core kit using four M8 screws and washers and tighten the screws.



Note

Verify that the O-rings are properly mounted between the dual core and the radio.

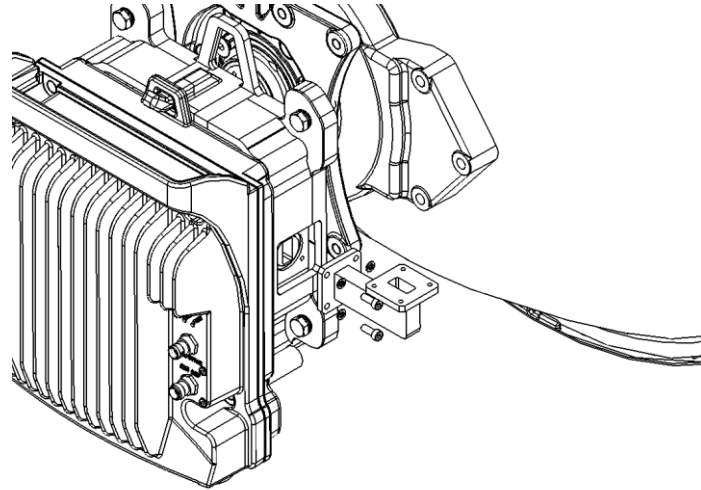


5. You can switch the orientation of the dual core flange connection by removing screws and rotating the bended part. Place back O-ring and tighten back screws.



Note

Verify that the O-rings are properly mounted between the dual core and the Coax to WG flange.

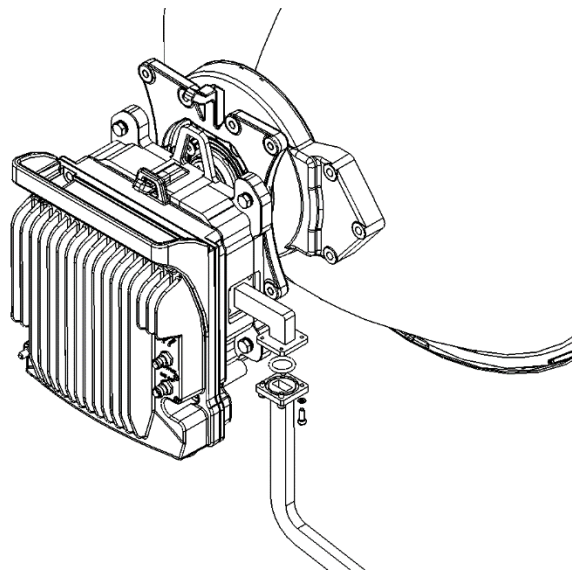


6. Connect the flexible waveguide to the PTP 820C Dual Core kit using the O-ring, screws and washers supplied with flexible waveguide kit and tighten the screws.



Note

Verify that the O-rings are properly mounted between the dual core and the flexible waveguide flange.

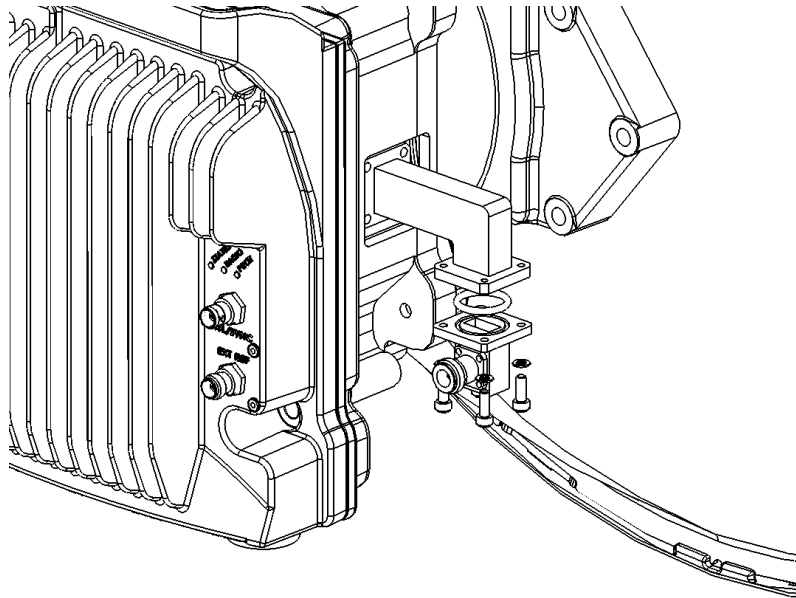


- You can also connect the dual core flange to coax to WG adapter supplied separately. Place O-ring and tighten screws and washers supplied with Coax to WG adapter kit.



Note

Verify that the O-rings are properly mounted between the dual core and the Coax to WG flange.

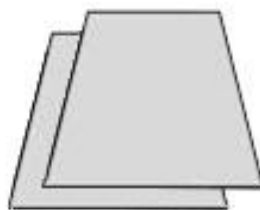


2x2 LoS MIMO Remote Mount



Note

This procedure can also be used for 1+0 SD configurations.



List of Items

Item	Description	Quantity	Remarks
1	RFU-D Radio	1	
2	PTP 820C Remote Mount Adaptor Kit	1	From 6-13GHz

Required Tools

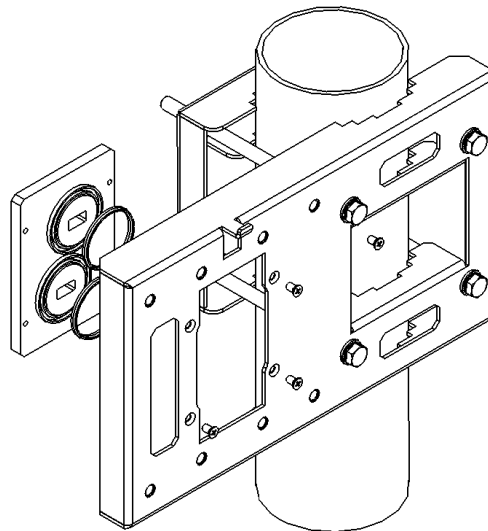
- Metric offset hexagon key set
- Metric wrench key set

Insertion Loss

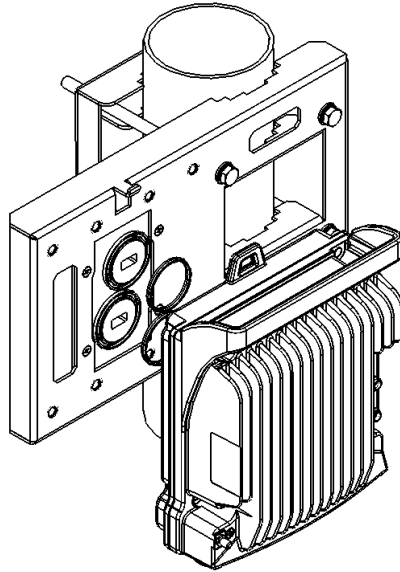
Mediation Devices	Signal Path / Remarks	Insertion Loss [dB]					
		6-8 GHz	11 GHz	13-15 GHz	18 GHz	23-26 GHz	28-38 GHz
WGs	RFU-D antenna port to antenna port	Frequency band and WG length (antenna separation) dependent					

For 6-13 GHz

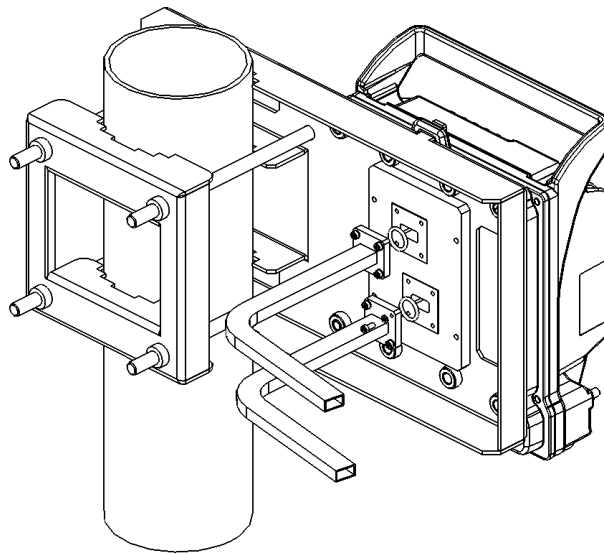
1. Mount and tighten the PTP 820C Remote Mount Adaptor plate (supplied in the PTP 820C Remote Mount Adaptor kit) to the PTP 820C Pole Mount using the four flat screws supplied with the PTP 820C Remote Mount Adaptor kit.



2. Mount and tighten the RFU-D unit to the PTP 820C Pole Mount using the four captive screws and washers that are supplied with the RFU-D unit. Make sure that the O-rings are mounted on the PTP 820C Remote Mount Adaptor.

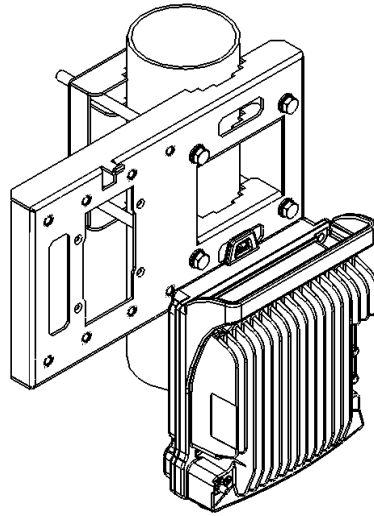


3. Mount and tighten both Flexible WGs with their O-ring to the PTP 820C Remote Mount Adaptor ports using the four screws supplied with each Flexible WG kit.

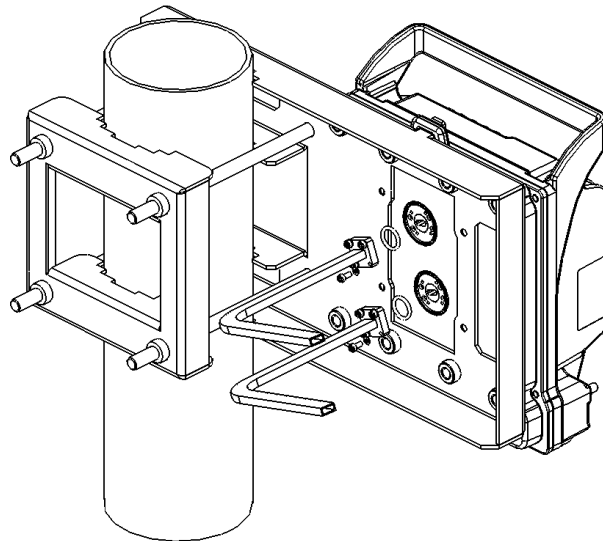


15-38GHz

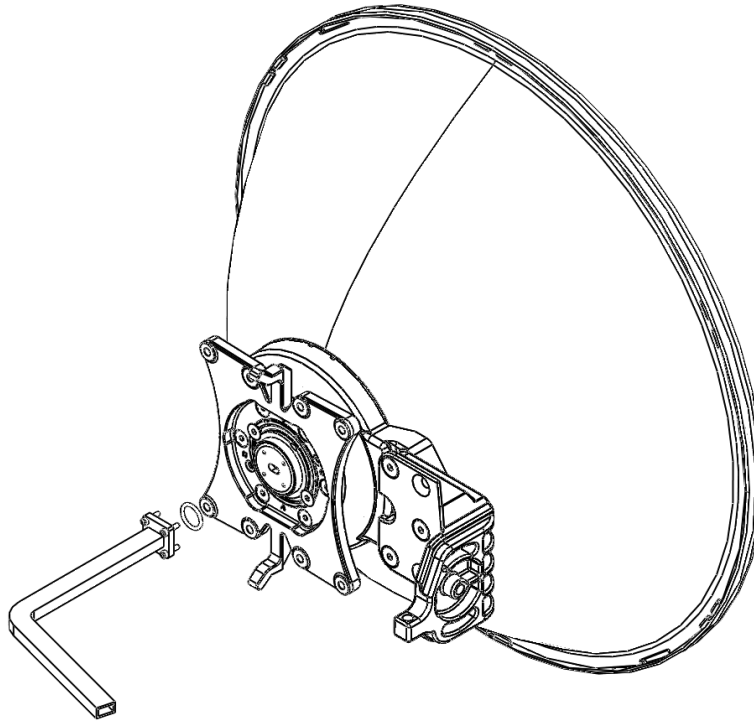
1. Mount and tighten the RFU-D unit to the PTP 820C Pole Mount using the four screws assembled on the RFU-D unit.



2. Mount and tighten the O-ring and the Flexible WG to the RFU-D radio ports using the four screws supplied with the Flexible WG kit.



3. Mount and tighten the O-ring and flexible WG to both antenna ports using the four screws supplied with the flexible WG kit.

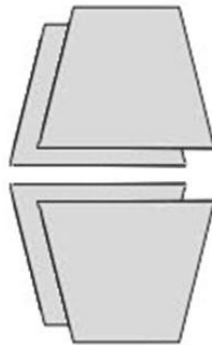


4x4 LoS MIMO Direct Mount



Note

1. This procedure can also be used for 2+0 SP HW ready for 2 x 2+0 SP configurations.
2. This procedure can also be used for 2+2 SD configurations.



List of Items

Item	Description	Quantity	Remarks
1	RFU-D Radio	2	

Item	Description	Quantity	Remarks
2	PTP 820C OMT Kit	2	
3	MIMO Data Cable	1	
4	Source Sharing Cable	1	
5	CIRC./CIRC. Adaptor	1	Per Antenna Vendor

Required Tools

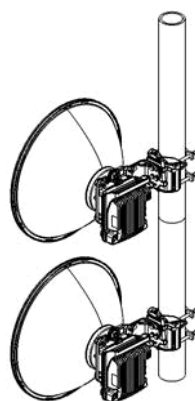
- Metric offset hexagon key set
- Metric wrench key set

Insertion Loss

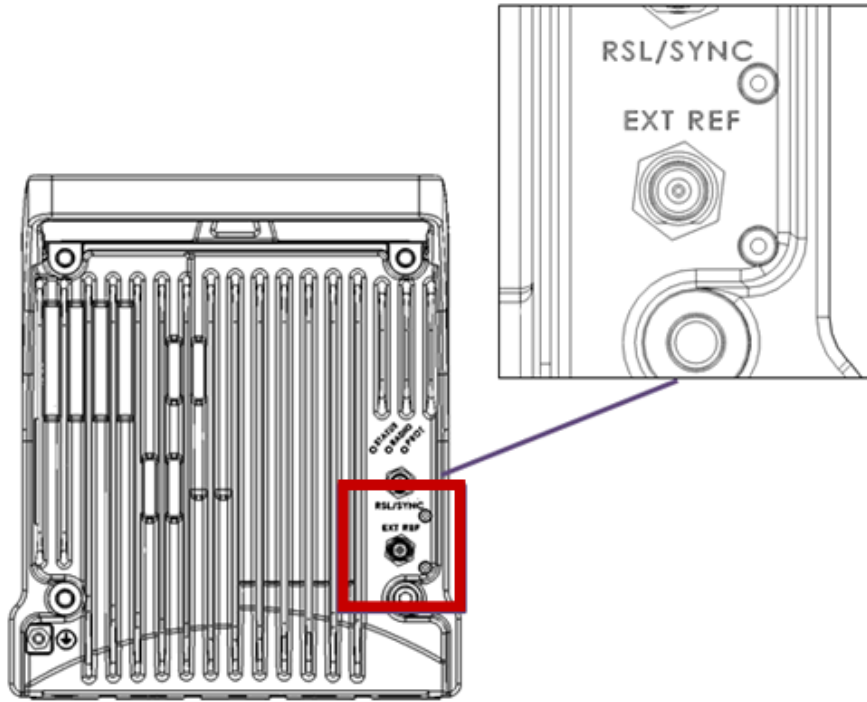
Mediation Devices	Signal Path / Remarks	Insertion Loss [dB]					
		6-8 GHz	11 GHz	13-15 GHz	18 GHz	23-26 GHz	28-38 GHz
OMT for each RFU-D	Each RFU-D antenna port to Mediation device antenna port	0.3	0.3	0.3	0.3	0.5	0.5

Procedure

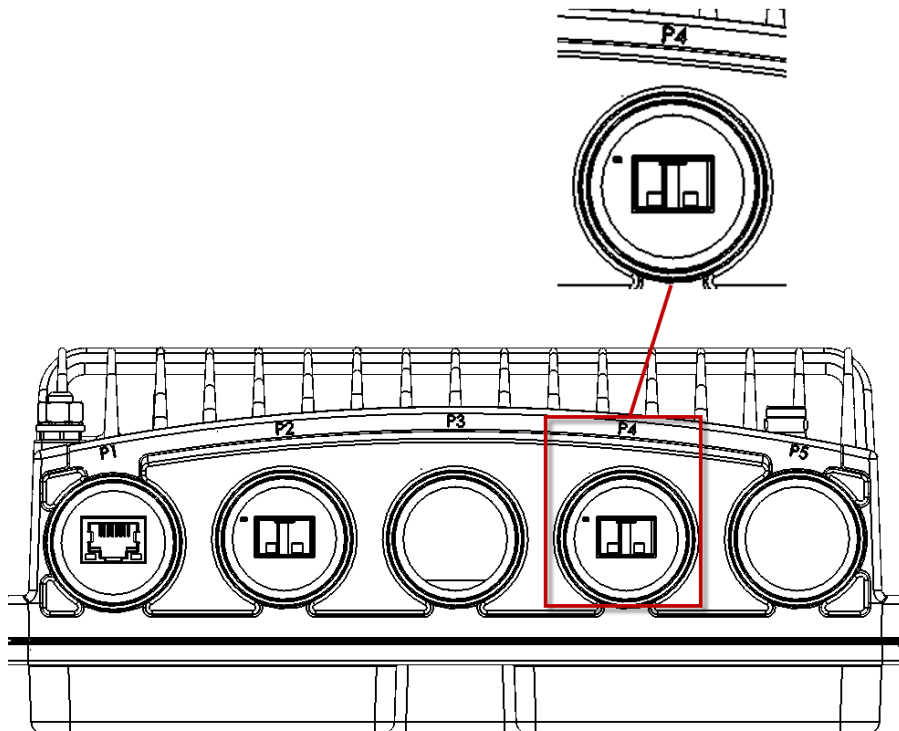
1. For instructions on installation of the PTP 820C OMT and radios, see
2. Note: Some of the configurations described in this section may not be supported in every PTP 820 software. For up-to-date information about which configurations are supported, refer to the Release Notes for the PTP 820 software you are using.
2+0 Dual Polarization Direct Mount.



3. Connect the source sharing cable between both EXT REF connectors on the RFU-D units. The maximum torque for connecting this cable to the radio is 5Lb.in (0.5N.m).



4. Connect the MIMO data sharing cable between both P4 RFU-D radio interfaces.



4+0 Dual Polarization Direct Mount

List of Items

Item	Description	Quantity	Remarks
1	RFU-D Radio	2	
2	PTP 820C Dual Coupler Kit	1	
3	PTP 820C OMT kit or PTP 820C Splitter Kit	1	

Required Tools

- Metric offset hexagon key set
- Metric wrench key set

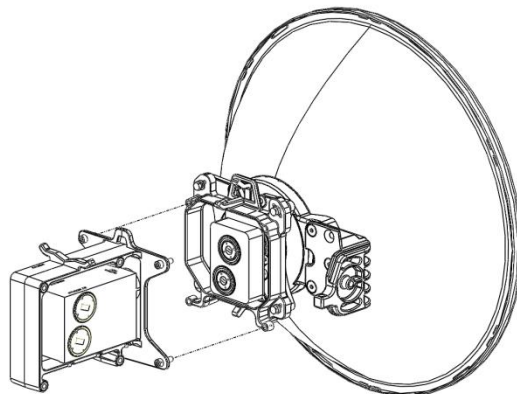
Procedure

1. Once the OMT/Splitter is mounted to the antenna, connect the PTP 820C Dual Coupler/Splitter kit to the OMT kit using four M8 screws and washers, and tighten the screws.



Note

Verify that the O-ring is properly mounted between the OMT/Splitter ports and the Dual Coupler/Splitter.



2. Connect the RFU-D units using the four M8 captive screws and washers supplied, and tighten the screws.



Note

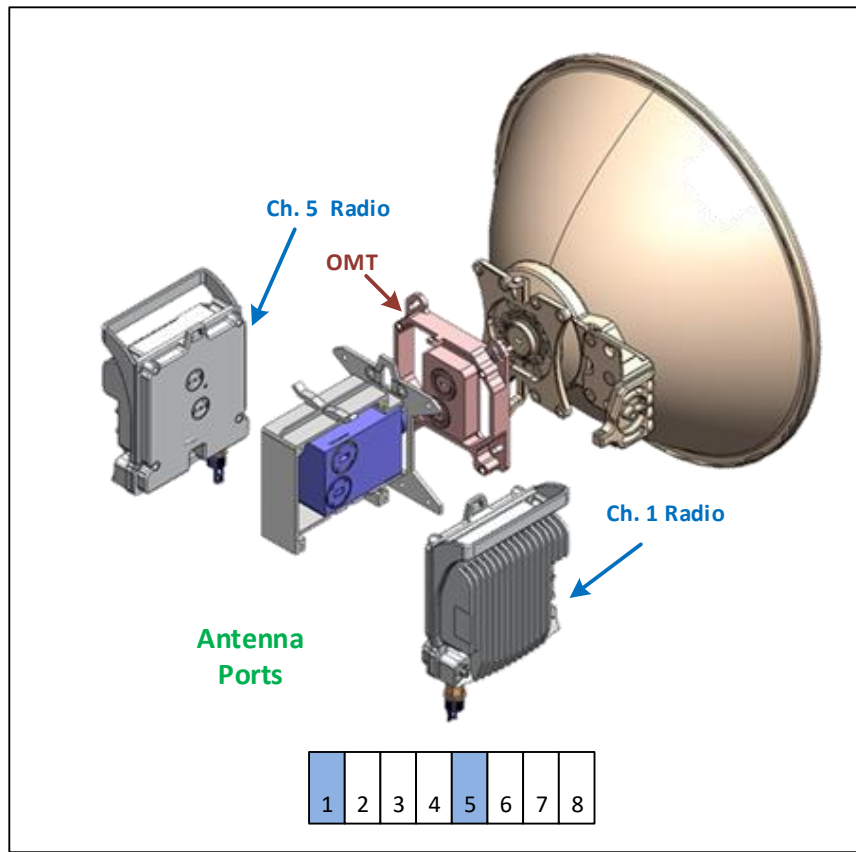
Verify that the O-rings are properly mounted between the Dual Coupler/Splitter ports and the radio.

4+0 with Dual Circulator (6-11GHz) Direct Mount

The following example illustrates a typical configuration, assuming that:

- The regulation specifies a channelization of 8 consecutive 28/38MHz channels (1-8 ch).
- The actual channels in use are channels 1,5.

Figure 21: 4+0 with Dual Circulator (6-11GHz) Direct Mount



4+0 Dual Polarization Remote Mount

List of Items

Item	Description	Quantity	Remarks
1	PTP 820C OMT Kit	1	
2	RFU-C WG Kit	2	
3	PTP 820C Dual Coupler	1	

Required Tools

- Metric offset hexagon key set
- Metric wrench key set

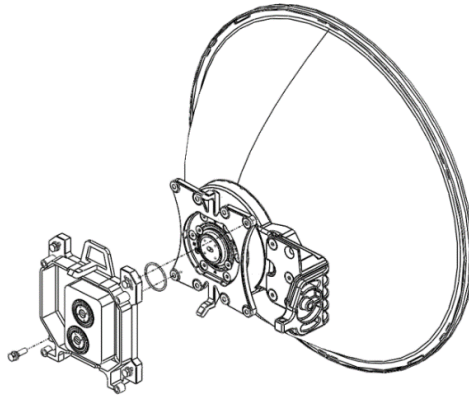
Common Installation

1. Connect the OMT kit to the antenna and secure it with four screws.



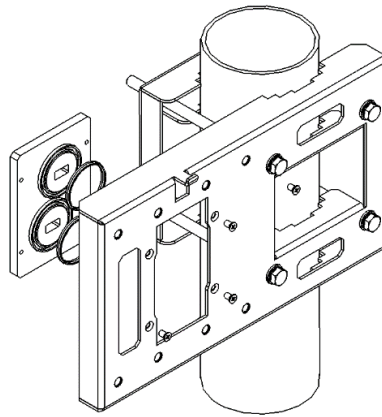
Note

Verify that the O-ring is properly mounted between the antenna transition and the OMT.

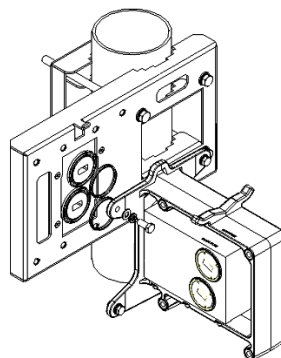


6-13 GHz

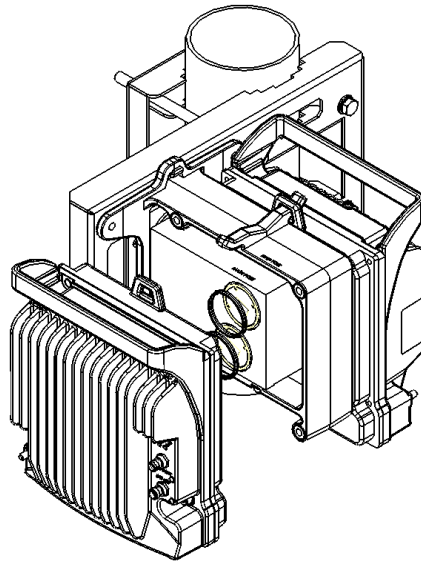
1. Mount and tighten the PTP 820C Remote Mount Adaptor plate (supplied in the PTP 820C Remote Mount Adaptor kit) to the PTP 820C Pole Mount using the four flat screws supplied with the PTP 820C Remote Mount Adaptor kit.



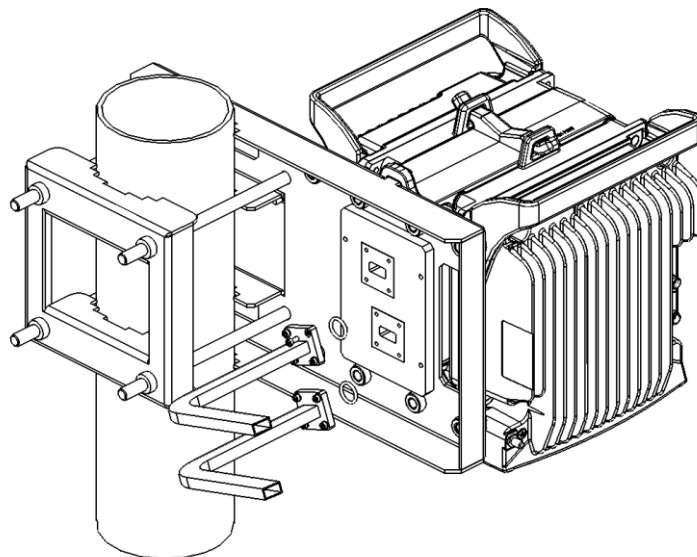
2. Mount and tighten the PTP 820C Dual Coupler to the PTP 820C Pole Mount using the four screws and washers that are supplied with the PTP 820C Dual Coupler kit. Pay attention that the O-rings are mounted on the PTP 820C Remote Mount Adaptor.



3. Mount and tighten the RFU-D units on each side of the PTP 820C Dual Coupler using the screws assembled on RFU-D unit. Make sure that the O-rings are correctly assembled on the radio port of the PTP 820C Dual Coupler.

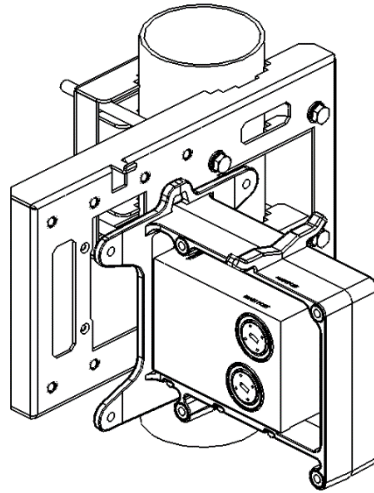


4. Connect both Flexible Waveguides and Sealing Gaskets supplied with each Flexible Waveguide Kit to the PTP 820C Dual Coupler antenna ports. Tighten the screws and washers supplied with the Flexible Waveguide Kit.

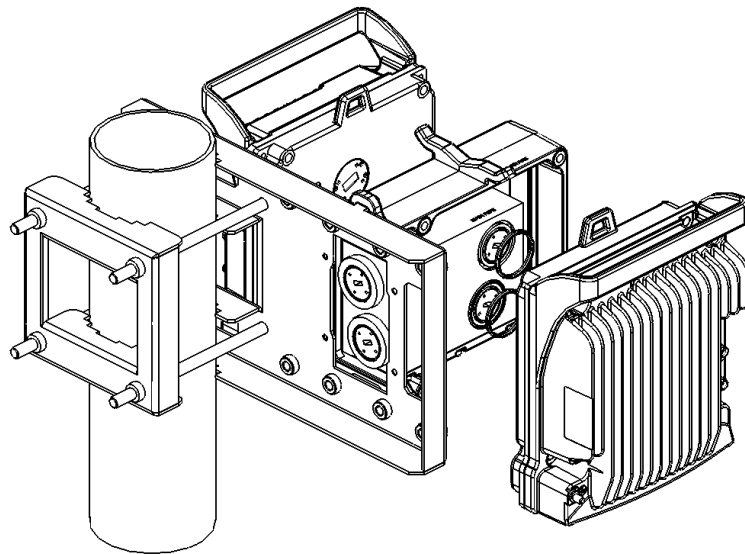


15-38 GHz

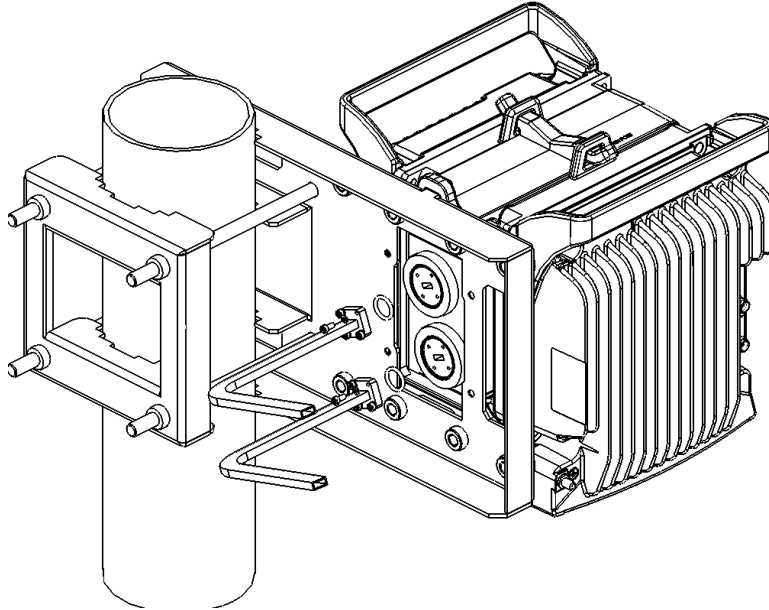
1. Mount and tighten the PTP 820C Dual Coupler to the PTP 820C Pole Mount using the four screws and washers supplied with the PTP 820C Dual Coupler kit.



2. Mount and tighten the RFU-D units on each side of the PTP 820C Dual Coupler using the screws assembled on the RFU-D unit. Make sure that the O-rings are correctly assembled on the radio port of the PTP 820C Dual Coupler.



3. Mount the O-ring and the Flexible Waveguides to the PTP 820C Dual Coupler ports using the four screws supplied with the Flexible Waveguide kits.

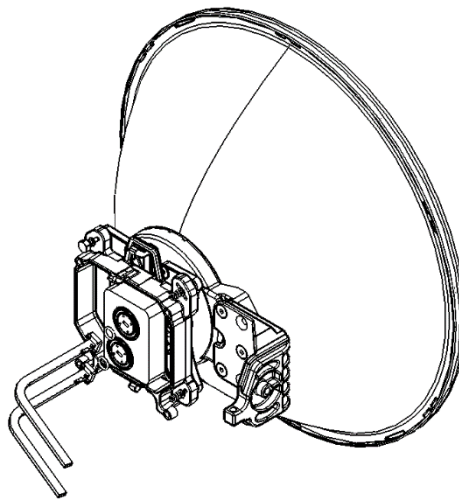


4. Mount and tighten the O-ring and the Flexible Waveguides to the PTP 820C OMT ports using the four screws supplied with the Flexible Waveguide kits.



Note

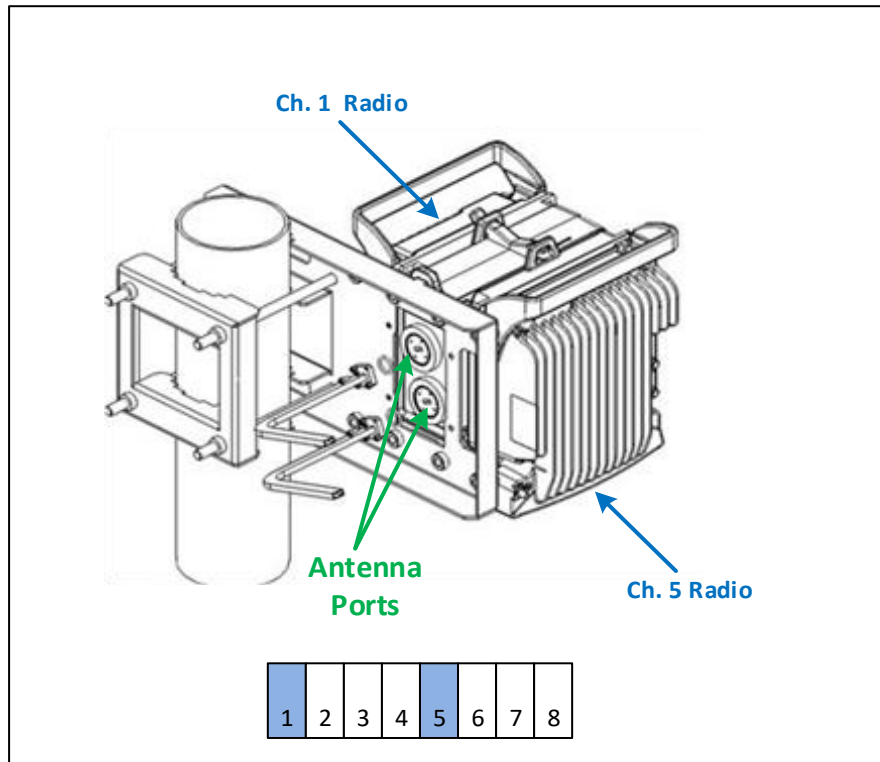
Verify that the O-rings are correctly mounted between the OMT ports and each Flexible Waveguide.



4+0 with Dual Circulator (6-11GHz) Remote Mount

The following example illustrates a typical configuration, assuming that:

- The regulation specifies a channelization of 8 consecutive 28/38MHz channels (1-8 ch).
- The actual channels in use are channels 1,5.



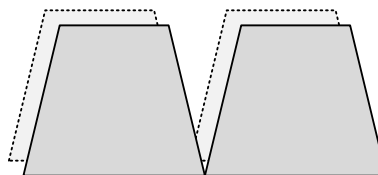
2+2HSB Single Polarization Remote Mount



Note

This procedure can also be used for 1+1HSB SP HW ready for 2+2HSB SP configurations.

ACCP - Protected



List of Items

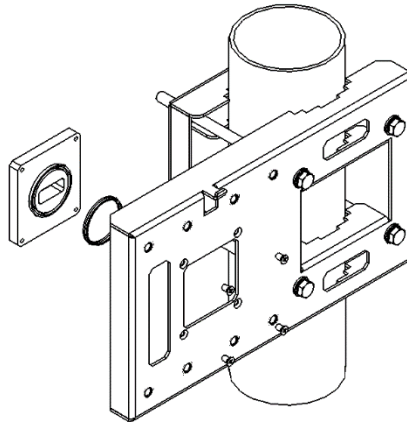
Item	Description	Quantity	Remarks
1	RFU-D Radio	2	
2	PTP 820C Splitter Kit	1	
3	PTP 820C Dual Coupler Kit	1	
4	RFU-C WG Kit	2	
5	RFU-C Remote Mount Kit	2	

Required Tools

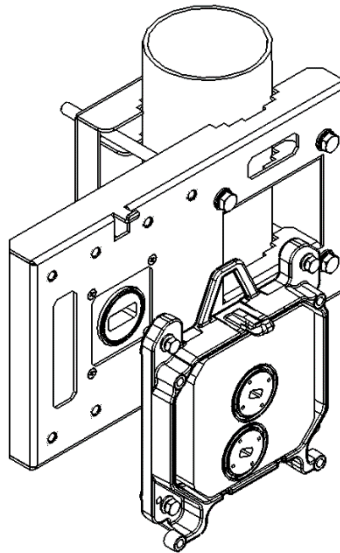
- Metric offset hexagon key set
- Metric wrench key set
- Phillips #1, #2 screwdriver

6-13 GHz

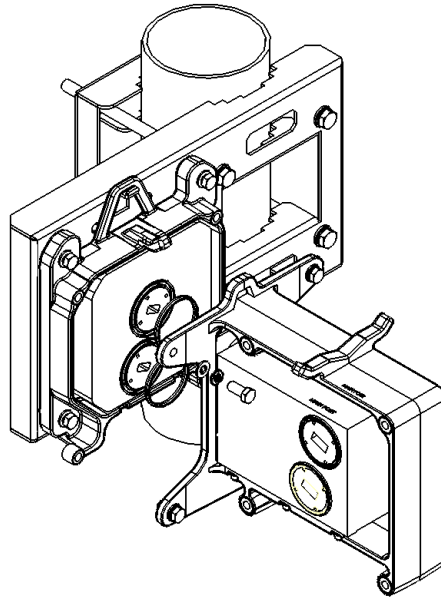
1. Mount and tighten the RFU-C Remote Mount Adaptor plate (supplied in the RFU-C Adaptor Remote Mount kit) to the RFU-C Pole Mount using the four flat screws supplied with the RFU-C Adaptor Remote Mount kit.



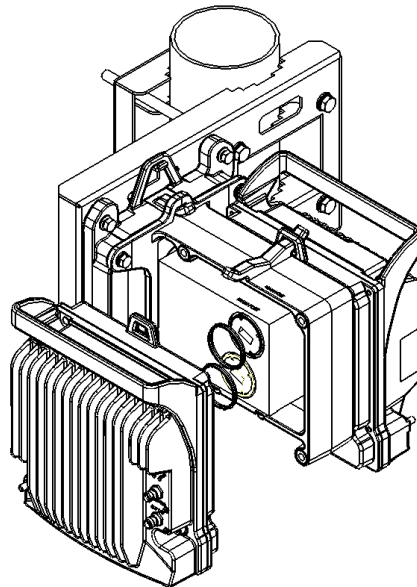
2. Mount and tighten the PTP 820C Splitter to the RFU-C Pole Mount using the four captive screws and washers that are assembled to the PTP 820C Splitter kit.



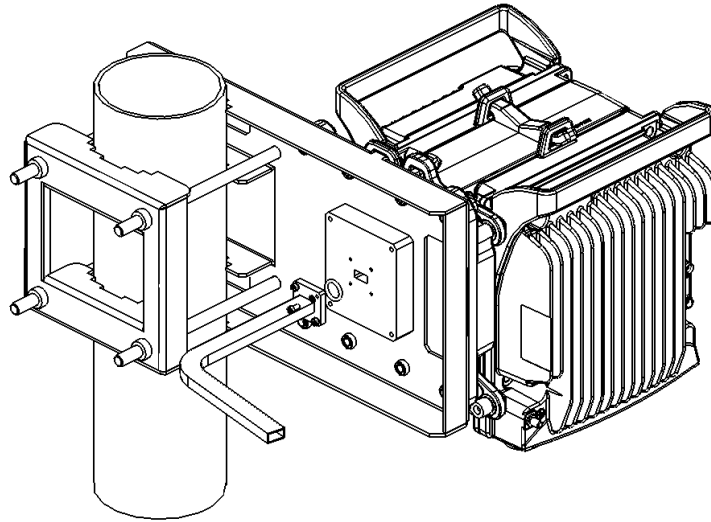
3. Mount and tighten the PTP 820C Dual Coupler to the PTP 820C Splitter using the four captive screws and washers that are supplied with the PTP 820C Dual Coupler kit. Make sure that the O-rings are mounted on the PTP 820C Splitter.



4. Mount and tighten the RFU-D unit to the PTP 820C Dual Coupler using the four screws and washers that are assembled to the RFU-D unit. Make sure that the O-rings are mounted on the PTP 820C Dual Coupler.



5. Connect the Flexible Waveguide and Sealing Gasket supplied with the Flexible Waveguide kit to the RFU-C Adaptor plate. Tighten the four screws supplied with the Flexible Waveguide kit.



8+0 Dual Polarization

List of Items

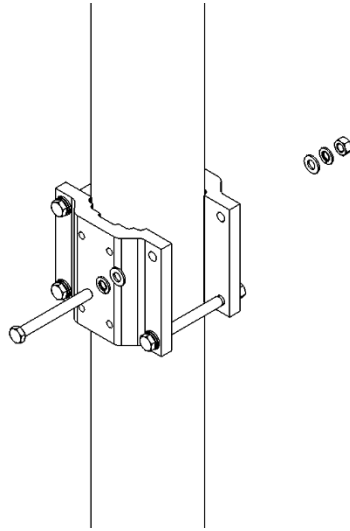
Item	Description	Quantity	Remarks
1	RFU-D Radio	4	
2	PTP 820C_DUAL_CIRC_kit_xxG	2	
3	PTP 820C_MC_DUAL_CIRC_kit_xxG	1	

Required Tools

- Metric offset hexagon key set
- Metric wrench key set

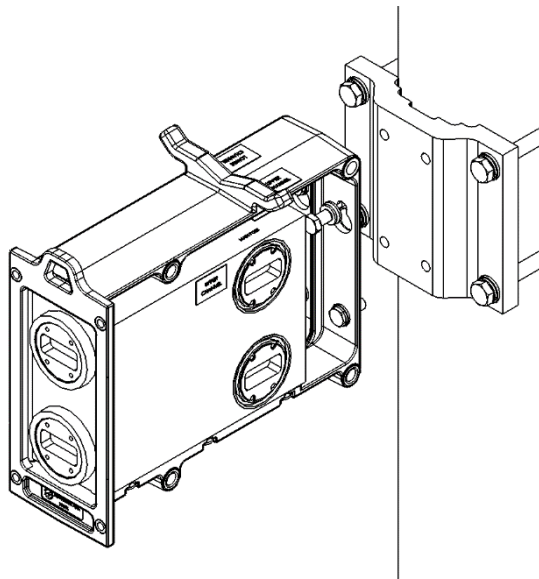
Procedure

1. Mount and tighten the pillar adapter brackets to pole (supplied in the PTP 820C Remote Mount Adaptor kit). Tighten the four M10 Hex screws and washers supplied within the kit.



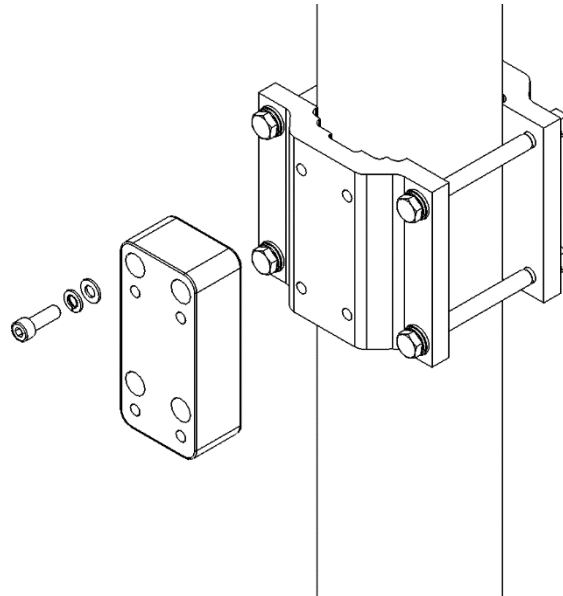
6-8 GHz

1. Mount and tighten the PTP 820C MC Dual Cir to the PTP 820C pillar adapter bracket using the four M8 Hex screws and washers supplied within the kit.

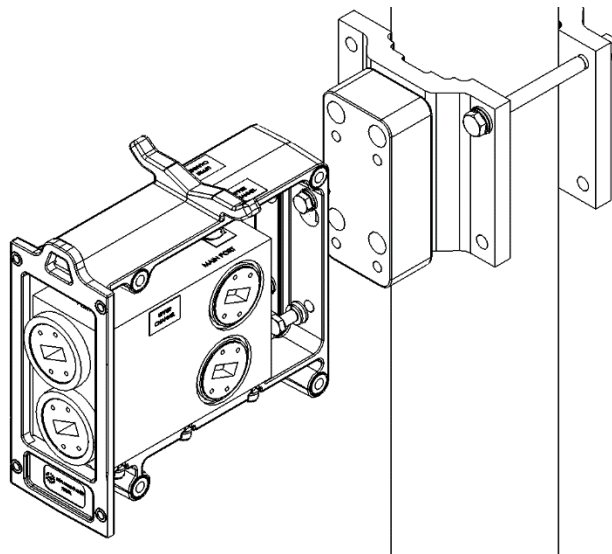


11 GHz only

1. Mount and tighten the PTP 820C MC extender to the PTP 820C pillar adapter bracket using the four M8 Hex screws and washers supplied within the kit.

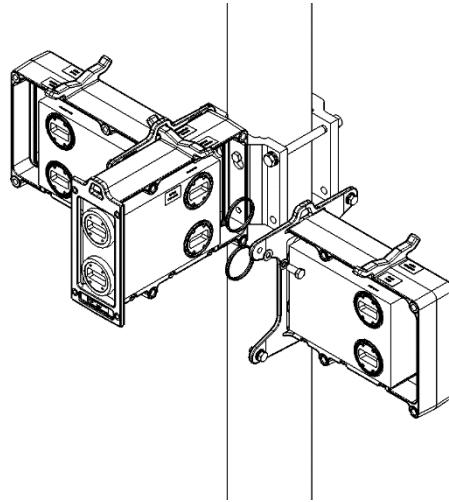


2. Mount and tighten the PTP 820C MC Dual Cir to the PTP 820C MC Extender using the four M8 Hex screws and washers supplied within the kit.

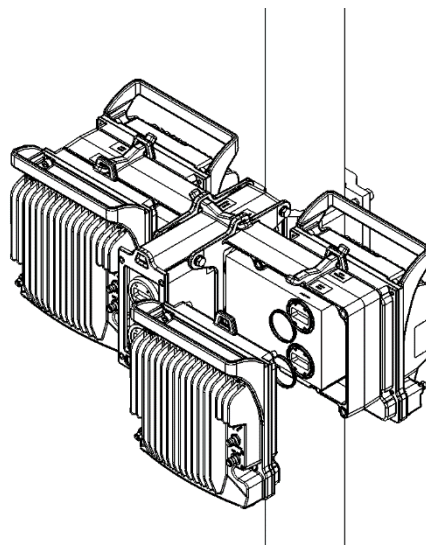


6-11 GHz

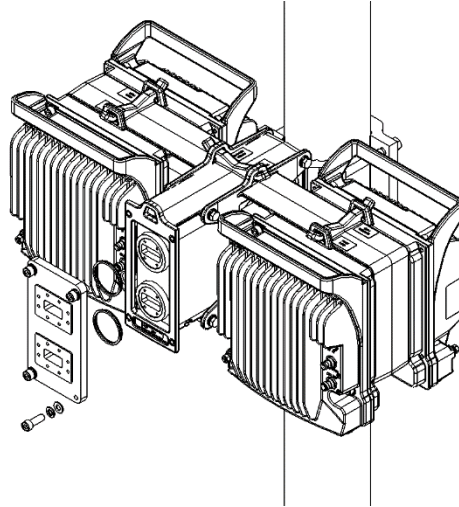
1. Mount and tighten the RFU-D Dual Cir to each side of the PTP 820C MC Dual Circ using the four M8 Hex screws and washers supplied in the PTP 820C Dual Circ kit. Pay attention that the O-rings on the PTP 820C MC Dual Circ are well in place during the mounting.



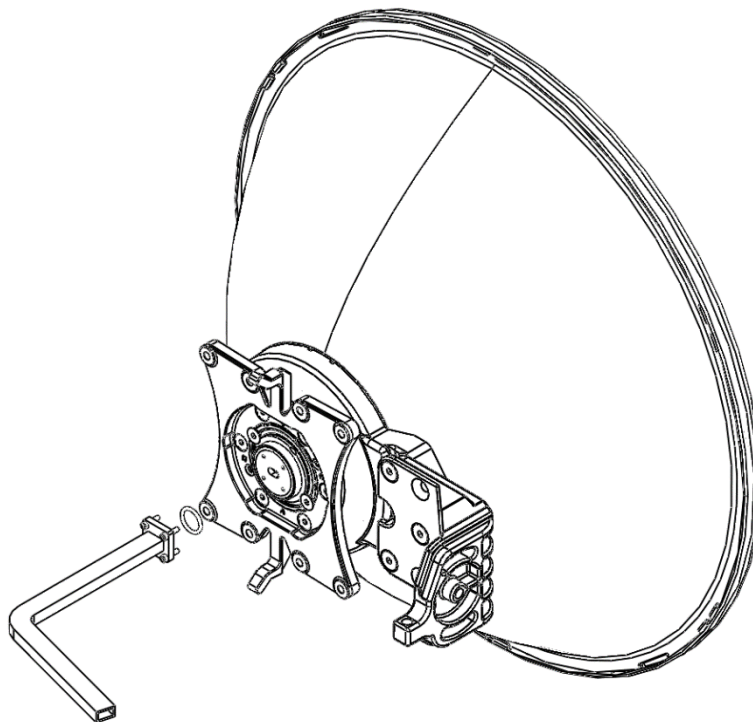
2. Mount and tighten the RFU-D units to each PTP 820C Dual Circ radio port using the four screws assembled on the RFU-D unit. Make sure that the O-rings on the PTP 820C Dual Circ are well in place during the mounting.



3. Mount and tighten the PTP 820C MC Remote mount adapter to the PTP 820C MC Dual Circ antenna ports using the four screws assembled on the RFU-D unit. Pay attention that the O-rings on the PTP 820C MC Remote Mount Adapter are well in place during the mounting.



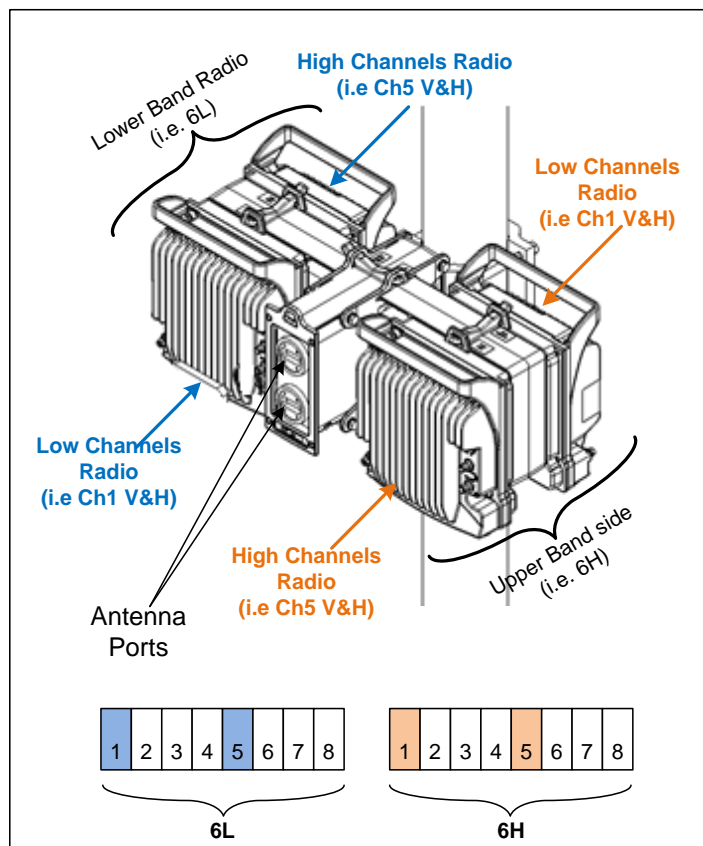
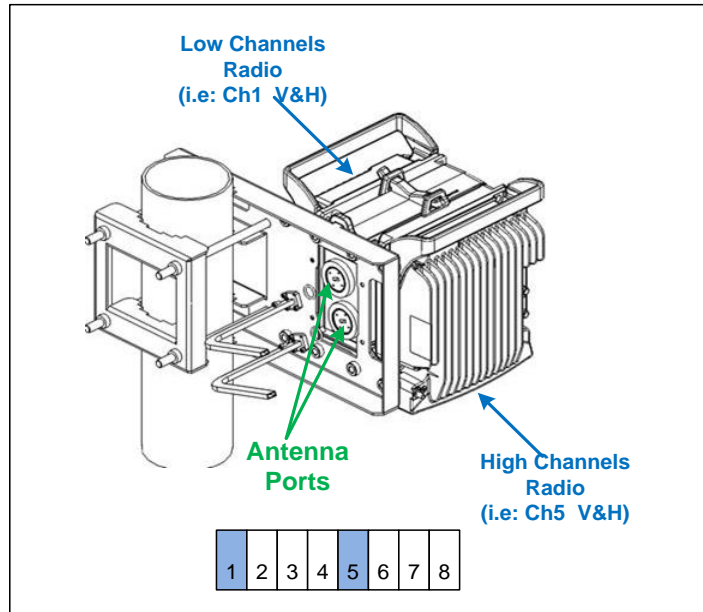
4. Mount and tighten the O-ring and the Flexible WG to the PTP 820C MC Remote mount adapter ports using the four screws supplied with the Flexible WG kit.
5. Mount and tighten the O-ring and flexible WG to both antenna ports using the four screws supplied with the flexible WG kit.



The following example illustrates a typical configuration, assuming:

- The regulation specifies a channelization of 8 consecutive 28/30 MHz channels (1-8ch).
- The actual channels in use are channels 1, 5.

4+0 Configuration



AFR 1+0 Hub Site

In an AFR 1+0 configuration, a RFU-D unit is deployed at the hub site and two RFU-D units are deployed in two tail sites.

The hub site utilizes a single RFU-D unit with two radio carriers. Each carrier is in a link, via its own directional antenna, with a tail site that consists of a RFU-D unit.

**Note**

The links should be located so as to ensure that the two radio paths do not cross.

The tail site unit is installed as a simple 1+0 configuration.

The hub site unit is installed as a remote mount configuration in which two flexible waveguides are used to connect the two Remote Mount Adaptor ports to an antenna. This chapter describes a hub site installation.

For standard interface antennas (six feet and larger), no OMT and no Circ./Circ. Adaptor are used, and the flexible waveguides are connected directly to the antenna flanges. For instructions how to connect the waveguides to the antenna flanges, refer to the antenna vendor's documentation.

List of Items

Item	Description	Quantity	Remarks
1	RFU-D Radio	1	
3	RFU-C WG Kit	2	
4	PTP-820 DC Remote Mount Kit	1	
5	PTP 820C Remote Mount Adaptor Kit	1	From 6-13GHz
6	Circ./Circ. Adaptor	1	Per Antenna Vendor. Not used for standard interface antennas (six feet and larger).

Required Tools

- Metric offset hexagon key set
- Metric wrench key set
- Phillips #1, #2 screwdriver

Insertion Loss

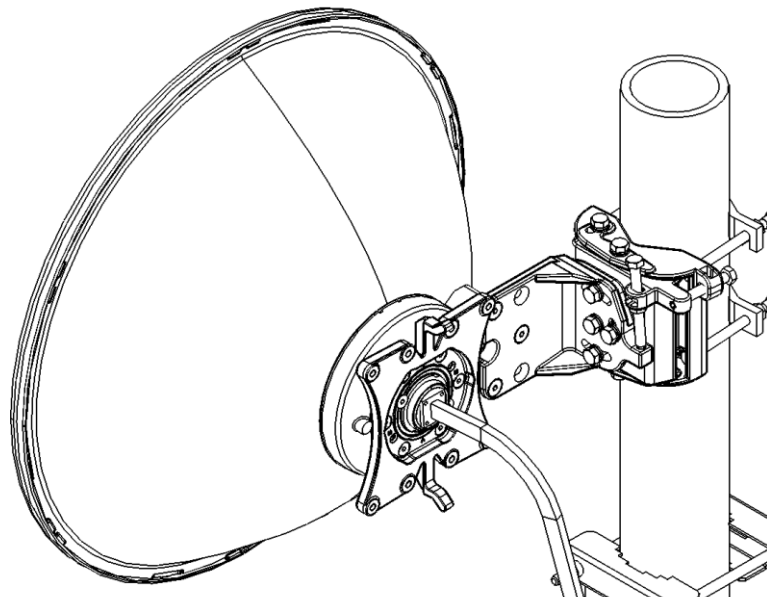
Mediation Devices	Signal Path / Remarks	Insertion Loss [dB]					
		6-8 GHz	11 GHz	13-15 GHz	18 GHz	23-26 GHz	28-38 GHz
Flex WG (1m)	Each RFU-D port to antenna port	0.4	0.5	1.0	1.8	2.7	3.3

Common Installation

1. Prior to the installation, follow the antenna manufacturer's instructions to use the circular adaptor. (Remove the existing rectangular transition, swap the O-ring, and install the circular transition instead.)

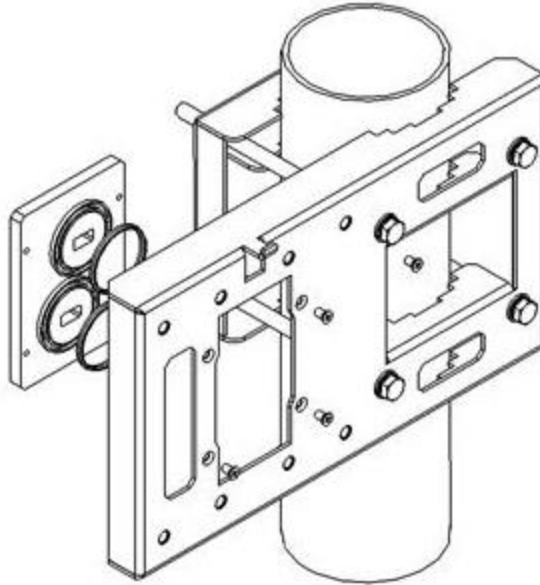


2. Mount and tighten the Flexible WG to the antenna port using the four screws supplied with the Flexible WG kit.

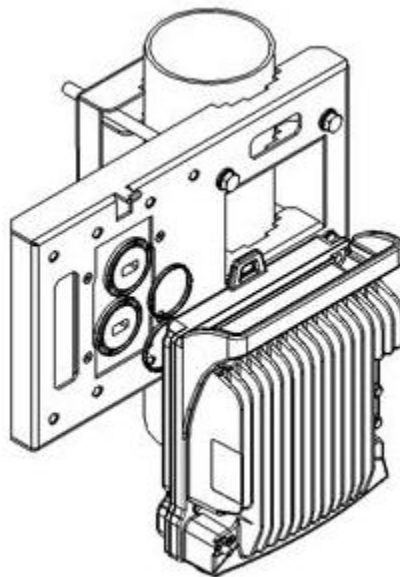


6-13 GHz

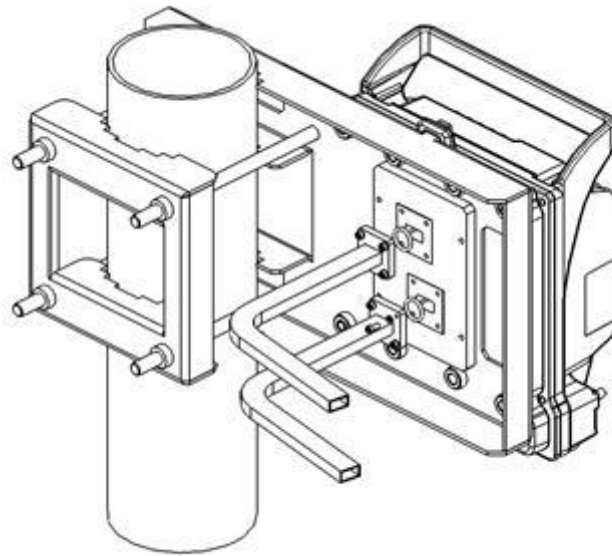
1. Mount and tighten the PTP 820C Remote Mount Adaptor plate (supplied in the PTP 820C Remote Mount Adaptor kit) to the PTP 820C Pole Mount using the four flat screws supplied with the PTP 820C Remote Mount Adaptor kit.



2. Mount and tighten the RFU-D unit to the PTP 820C Pole Mount using the four captive screws and washers that are supplied with the RFU-D unit. Pay attention that the O-rings are mounted on the PTP 820C Remote Mount Adaptor.

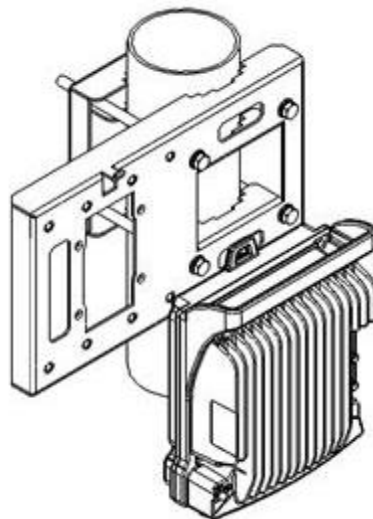


3. Mount and tighten both Flexible WGs with their O-ring to the PTP 820C Remote Mount Adaptor ports using the four screws supplied with each Flexible WG kit.

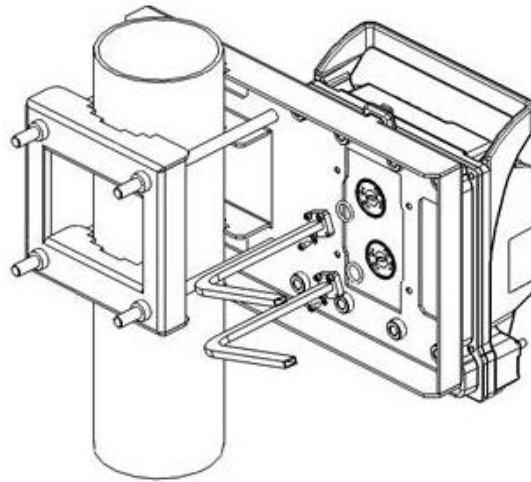


15-38 GHz

1. Mount and tighten the RFU-D RFU to the PTP 820C Pole Mount using the four screws assembled on the RFU-D RFU.



2. Mount and tighten the O-ring and the Flexible WG to the RFU-D radio ports using the four screws supplied with the Flexible WG kit.

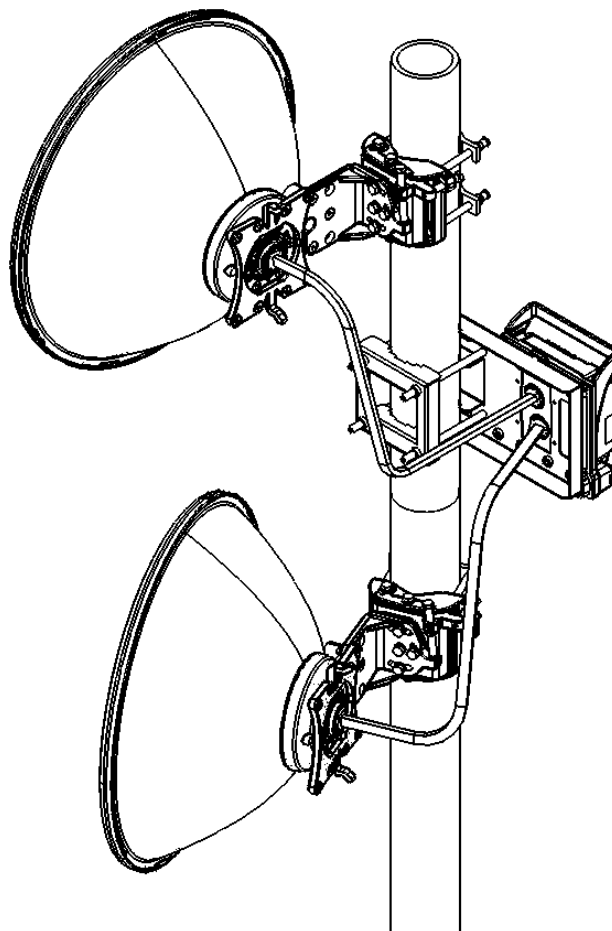


The following figure shows the complete installation.



Note

This figure shows an installation with horizontal polarization. Vertical polarization can also be used. The same polarization must be used for both links.



Chapter 7 : RFU-D LEDs

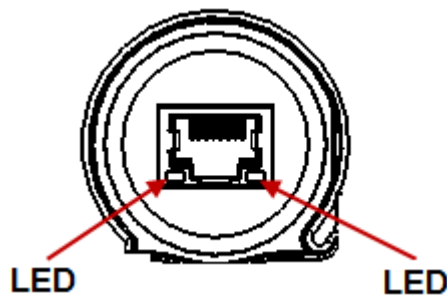
The RFU-D-HP provides the following LEDs to indicate the status of the unit's interfaces, and the unit as a whole:

- Electrical GbE Interface (RJ-45) LEDs
- Optical GbE Interface (SFP) LED
- Status LED
- Prot LED

Electrical GbE Interface (RJ-45) LEDs

There are two Green LEDs on either side of the electrical (RJ-45) interface.

Figure 22: RFU-D LEDs - RJ-45 Interface



The LED on the left indicates the port's Admin state:

- **Off** - Admin is Disabled.
- **Green** - Admin is Enabled.

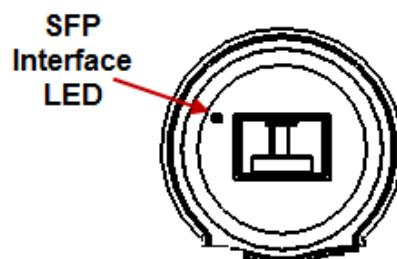
The LED on the right indicates the interface's Admin and cable connection status, and whether there is traffic on the interface:

- **Off** - Admin is Disabled or no cable is connected to the interface.
- **Green** - Admin is Enabled and a cable is connected to the interface.
- **Blinking Green** - Admin is Enabled and a cable is connected to the interface, and there is traffic on the interface.

Optical GbE Interface (SFP) LED

There is a single green LED to the upper left of the SFP interface.

Figure 23: RFU-D LED - SFP Interface



The SFP LED indicates the interface's Admin and cable connection status, and whether there is traffic on the interface:

- **Off** - Admin is Disabled or no cable is connected to the interface.
- **Green** - Admin is Enabled and a cable is connected to the interface.

Unit LEDs

The RFU-D has three LEDs that indicate the status of the radio link and the unit as a whole: Status, Radio, and PROT.

Status LED

The Status LED indicates the power status of the RFU:

- **Off** - The power is off.
- **Red** - The power is on, the system is in initialization phase, and the link to the IDU is not yet up.
- **Green** - The power is on, and the link to the IDU is up.

Radio LED

The Radio LED indicates the status of the radio link:

- **Off** - The radio is off.
- **Green** - The power is on, and all carriers are operational (up).
- **Red** - A loss of frame (LOF), excessive BER, or signal degraded condition exists in at least one carrier.

Prot LED

Reserved for future use.

Chapter 8 : Installing RFU-D on Third-Party Antenna Adaptors

Since the RFU-D uses the same antennas as RFU-C, it can utilize the 3rd party mediation devices much in the same way they are used with RFU-C installations.

Special attention must be taken in assembling these configurations, as the 3rd party adaptors can be used only for single polarization configurations. Dual polarization configurations can be accommodated neither with RFU-C nor with RFU-D.

In general, once the correct 3rd party adaptor has been selected and installed on the antenna, the interface now is identical to a generic single pol. RFU-C interface. From this moment forth it is ready for any subsequent RFU-D configuration.

The following tables describe available adaptors:

N110082L003A	PTP 820 Andrew Valuline Antenna Convert kit, 11GHz
N130082L003A	PTP 820 Andrew Valuline Antenna Convert kit, 13GHz
N150082L001A	PTP 820 Andrew Valuline Antenna Convert kit, 15GHz
N180082L001A	PTP 820 Andrew Valuline Antenna Convert kit, 18GHz
N230082L001A	PTP 820 Andrew Valuline Antenna Convert kit, 23GHz
N260082L001A	PTP 820 Andrew Valuline Antenna Convert kit, 26GHz
N280082L001A	PTP 820 Andrew Valuline Antenna Convert kit, 28GHz
N320082L001A	PTP 820 Andrew Valuline Antenna Convert kit, 32GHz
N380082L001A	PTP 820 Andrew Valuline Antenna Convert kit, 38GHz
N060082L004A	PTP 820 Andrew Valuline Antenna Convert kit, 6GHz
N070082L003A	PTP 820 Andrew Valuline Antenna Convert kit, 7GHz
N110082L004A	PTP820 Radiowave Antenna Conversion kit, 11 GHz, 2ft
N110082L005A	PTP820 Radiowave Antenna Conversion kit, 11 GHz, 3ft
N110082L006A	PTP820 Radiowave Antenna Conversion kit, 11 GHz, 4ft
N110082L007A	PTP820 Radiowave Antenna Conversion kit, 11 GHz, 6ft
N180082L002A	PTP820 Radiowave Antenna Conversion kit, 18 GHz, 2ft
N180082L003A	PTP820 Radiowave Antenna Conversion kit, 18 GHz, 3ft
N180082L004A	PTP820 Radiowave Antenna Conversion kit, 18 GHz, 4ft
N180082L005A	PTP820 Radiowave Antenna Conversion kit, 18 GHz, 6ft
N060082L235A	PTP820 Radiowave Antenna Conversion kit, 6 GHz, 3ft
N060082L236A	PTP820 Radiowave Antenna Conversion kit, 6 GHz, 4ft
N060082L237A	PTP820 Radiowave Antenna Conversion kit, 6 GHz, 6ft



Note

For instructions how to install these third-party adaptors, refer to the RFU-C Installation Guide

Special Note on Converting ValuLine 3 Antennas

Part Numbers for ValuLine 3 antenna conversion kits are valid for most ValuLine 3 antennas, integrated or non-integrated. These conversion kits can also be used to convert CommScope ValuLine 3 antennas with the old Nera Evolution interface to RFU-C. The kits support the majority of CommScope's ValuLine 3 antennas, 1-6ft. However, since there are some unique cases in which CommScope provided special antennas which are not supported by these adaptors, it is recommended that you supply your Cambium representative with a picture of the current antenna (back plain side), in order to confirm the antenna's compatibility prior to implementing this solution.

You can also check the following to determine whether the antenna is compatible with the conversion kit:

- Verify that the antenna is, in fact, a ValuLine 3 antenna.
- Verify that the back plate of the antenna has in its holding plate the six mounting holes shown in red in the figure below.

