



Installation Guide

PTP 820G

RFU-C

System Release 10.9



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# About This User Guide

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

This guide contains the following chapters:

- [Chapter 1: Product description](#)
- [Chapter 2: RFU-C Overview](#)
- [Chapter 3: Installation Components](#)
- [Chapter 4: Cable Installation and Grounding](#)
- [Chapter 5: Generic Installation Procedures](#)
- [Chapter 6: RFU-C Configurations](#)

## Contacting Cambium Networks

Support website:	<a href="https://support.cambiumnetworks.com">https://support.cambiumnetworks.com</a>
Main website:	<a href="http://www.cambiumnetworks.com">http://www.cambiumnetworks.com</a>
Sales enquiries:	<a href="mailto:solutions@cambiumnetworks.com">solutions@cambiumnetworks.com</a>
Support enquiries:	<a href="https://support.cambiumnetworks.com">https://support.cambiumnetworks.com</a>
Repair inquiries	<a href="https://support.cambiumnetworks.com">https://support.cambiumnetworks.com</a>
Telephone number list:	<a href="http://www.cambiumnetworks.com/support/contact-support">http://www.cambiumnetworks.com/support/contact-support</a>
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](mailto:support@cambiumnetworks.com).



# Problems and warranty

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## 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

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Cambium Networks systems and equipment provide security parameters that can be configured by the operator based on their particular 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

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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:

	<b>Warning</b> 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:

	<b>Caution</b> 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:

	<b>Note</b> Note text.
---	---------------------------

# Caring for the environment

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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.

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# Chapter 1: Before You Start

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RFU-C is a state-of-the-art Radio Frequency Unit which is fully software configurable and supports a broad range of capacities and interfaces. The RFU supports low to high capacities for traditional voice and Ethernet services, as well as PDH/SDH/SONET or hybrid Ethernet and TDM interfaces.

**Caution**

For the warranty to be honored, install the unit in accordance with the instructions in this manual.

This chapter provides technical information about RFU-C installation. This chapter consists of the following sections:

- [Important Notes](#)
- [Safety Precautions & Declared Material](#)
- [Pre-installation Instructions](#)

## Important Notes

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- 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-C must be installed and permanently connected to protective earth by qualified service personnel in accordance with applicable national electrical codes.

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








- Based on the highest nominal output power of the RFU-C:
- 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.





### Acronyms

- CCDP            Co-Channel Dual Polarization
- IDU Indoor Unit
- OMT            Orthogonal Mode Transducer
- RFU Radio Frequency Unit
- WG Waveguide
- XPD Cross Polar Differentiation
- XPIC            Cross Polarization Interference Cancellation

# Safety Precautions & Declared Material

## General Equipment Precautions

	<p><b>Caution</b></p> <p>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.</p>
	<p><b>Caution</b></p> <p>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.</p>
	<p><b>Caution</b></p> <p>Use of controls, adjustments, or performing procedures other than those specified herein, may result in hazardous radiation exposure.</p>
	<p><b>Caution</b></p> <p>When working with a RFU-C, 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.</p>
	<p><b>Caution</b></p> <p>Machine noise information order - 3. GPSGV, the highest sound pressure level amounts to 70 dB (A) or less, in accordance with ISO EN 7779.</p>
	<p><b>Anti Static</b></p> <p>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 RFU-C RFU 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.</p>
	<p><b>Caution</b></p> <p>In Norway and Sweden:</p> <p>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).</p> <p>Utstyr som er koplet til beskyttelsesjord via nettplugg og/eller via annet jordtilkoplet utstyr – og er tilkoplet 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.</p>

	<p>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.</p>
	<p><b>Caution</b> Précautions générales relatives à l'équipement</p>
	<p><b>Caution</b> 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.</p>
	<p><b>Caution</b> L'usage de RFU-C 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.</p>
	<p><b>Caution</b> 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.</p>



## 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 RFU-C das folgende Stromschlag- und Gefahrenrisiko: Durch Abtrennen einer Stromquelle wird nur ein.

**Caution**

Stromversorgungsmodul abtrennt. 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

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## Packing

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

## Transportation and Storage

The equipment should be prepared for public transportation. The cargo must be kept dry during transportation, in accordance with ETS 300 019-1-2, Class 2.3.

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

If intermediate storing 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 such as 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 must 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](mailto:support@cambiumnetworks.com).

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## Chapter 2: RFU-C Overview

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RFU-C is a state-of-the-art Radio Frequency Unit which is fully software configurable and supports a broad range of capacities and interfaces.

The RFU supports low to high capacities for traditional voice and Ethernet services, as well as PDH/SDH/SONET or hybrid Ethernet and TDM interfaces.

This innovative platform uses an “on-the-fly” upgrade method, whereby network operators only buy capacity as needed, benefiting from savings on initial investments and OPEX.

Traffic capacity throughput and spectral efficiency are optimized with the desired channel bandwidth. For maximum user choice flexibility, channel bandwidths can be selected together with a range of modulations from QPSK to 2048 QAM.

High spectral efficiency is ensured using the same bandwidth for double the capacity, via two carriers, with vertical and horizontal polarizations. This feature is implemented by a built-in XPIC mechanism.

For Ethernet and TDM to Ethernet migration, RFU-C works with the PTP 820G IDU.

When RFU-C operates in co-channel dual polarization (CCDP) mode, using the cross polarization interference canceller (XPIC) algorithm, two carrier signals can be transmitted over a single channel, using vertical and horizontal polarization. This enables double capacity in the same spectrum bandwidth.

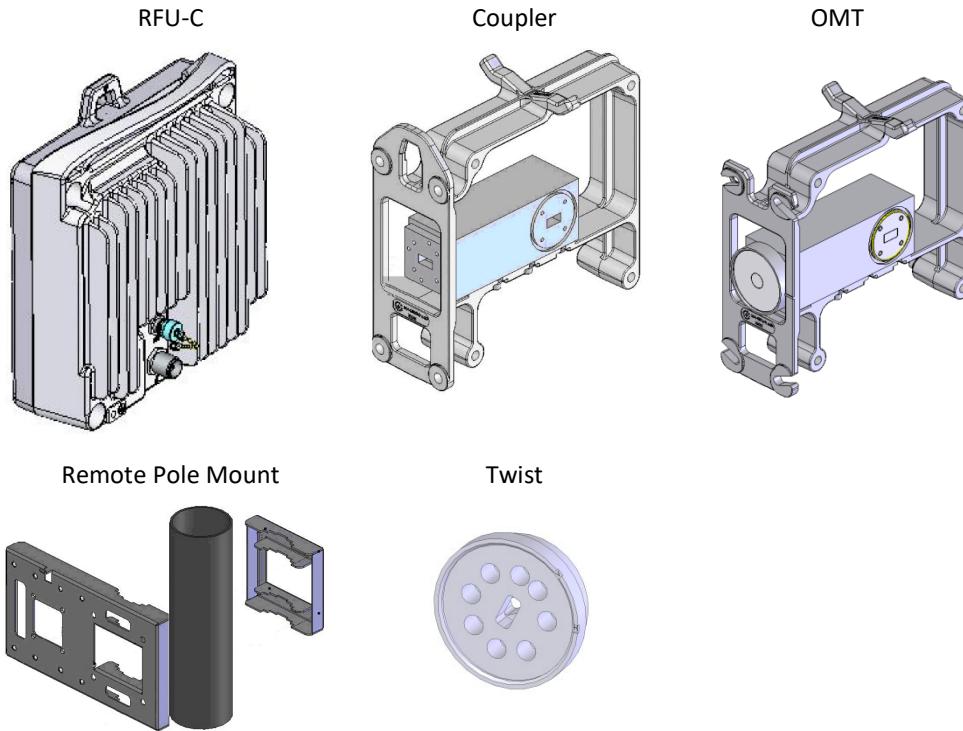
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# Chapter 3: Installation Components

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The following figures show the main components involved in the installation procedures.

**Figure 1** Installation Components



# Available Adapters and Installation Kits

## Component Kits

**Table 1** Component Kits 6 to 13 GHz

Description	6 GHz	7-8 GHz	10-11 GHz	13 GHz
RFU-C Coupler Kit	N060082L145A	N070082L301A	N110082L090A	N130082L058A
RFU-C Symmetrical Couplers Kit	N060082L149A	N070082L305A	N110082L094A	N130082L062A
RFU-C Twist Kit	N060082L148A	N070082L304A	N110082L093A	N130082L061A
RFU-Cxx OMT-DM Kit	N060082L146A	N070082L302A	N110082L091A	N130082L059A

**Table 2** Component Kits 15 to 26 GHz

Description	15 GHz	18 GHz	23 GHz	26 GHz
RFU-C Coupler Kit	N150082L080A	N180082L046A	N230082L037A	N260082L030A
RFU-C Symmetrical Couplers Kit	N150082L084A	N180082L050A	N230082L040A	N260082L033A
RFU-C Twist Kit	N150082L083A	N180082L049A	N230082L036A	
RFU-Cxx-OMT-DM-Kit	N150082L081A	N180082L047A	N230082L038A	N260082L031A

**Table 3** Component Kits 28 to 38 GHz

Description	28-31 GHz	32 GHz	38 GHz
RFU-C Coupler Kit	N280082L040A	N320082L023A	N380082L047A
RFU-C Symmetrical Couplers Kit	N280082L043A	N320082L026A	N380082L051A
RFU-C Twist Kit	N280082L039A		N380082L050A
RFU-Cxx OMT-DM Kit	N280082L041A	N320082L024A	N380082L048A

## Remote Mount Kits

**Table 4** Remote Mount 6 to 13 GHz

Description	6 GHz	7-8 GHz	10-11 GHz	13 GHz
RFU-C REMOTE MOUNT KIT	N060082L003A	N070082L002A	N110082L002A	N130082L002A
RFU-C POLE MOUNT KIT	N000082L121A			

## Unique Installations and Accessories

**Table 5** Unique Installations and Accessories 6 to 38 GHz

Unique Installations and Accessories	6 to 32 GHz	38 GHz
RFU-C 19 in MOUNTING KIT	N000082L071A	NA

## Antenna Circ. Adapters for OMT

**Table 6** Antenna Circ. Adapters for OMT 6- 13 GHz

Antenna Circ. Adapters for OMT	6GHz	7-8GHz	10-11GHz	13GHz
Andrew	N060082L147A	N070082L303A	N110082L092A	N130082L060A
Radio Waves	N060082L154A	N070082L310A	N110082L103A	N130082L068A

**Table 7** Antenna Circ. Adapters for OMT 15- 26GHz

Antenna Circ. Adapters for OMT	15GHz	18GHz	23GHz	26GHz
Andrew	N150082L082A	N180082L048A	N230082L039A	N260082L032A
Radio Waves	N150082L090A	N180082L056A	N230082L046A	N260082L038A

**Table 8** Antenna Circ. Adapters for OMT 15- 26GHz

Antenna Circ. Adapters for OMT	28GHz	32GHz	38GHz
Andrew	N280082L042A	N320082L025A	N380082L049A
Radio Waves	N280082L046A	N320082L029A	N380082L054A

# Antenna Connection

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

- Andrew: VHLP series
- Radiowaves: HP series
- Cambium: CNT 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 be used:

**Table 9** Other antenna types

Frequency		Circ. WG	Rect. WG	Radio Side	Flex WG Side	Flex WG Side	Antenna
Band	Range (GHz)	Diameter	Flange Des.	(Remote) Flange Des.	A Flange Des.	B Flange Des.	(Remote) Flange Des.
6(L/U) GHz	5.8-7.1	31.8 mm	WR137	UDR70	PDR70	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 Networks representative for details.



### Note

Conductive grease must be applied to the screws that connect the RFU-C to the antenna interface.

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# Chapter 4: Cable Installation and Grounding

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## List of Items

**Table 10** Required items for cable installation and grounding

Item	Description	Quantity	Remarks
1	Cable Grounding Kits For 1/4" And 3/8" Cable (P/N 01010419001)	1	

## Procedure

- 1 On the front side of each RFU-C unit, loosen the nut, plain washer, and serrated washer.
- 2 Place the cable lug (supplied with the RFU-C grounding kit) on the screw.
- 3 Secure the cable lug.

**Figure 2** RFU-C Grounding Cable



- 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.
- A 2-Pole circuit breaker, a branch circuit protector, suitably certified in accordance with applicable national code and regulations, rated maximum 20A, shall be installed for full power disconnection in a building installation.
- Any outdoor antenna cable shield shall be permanently connected to protective earth in a building installation.





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## Chapter 5: Generic Installation Procedures

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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 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 tilt, screws should be tightened progressively.

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
- 18-42 GHz: M3/#4-40: 1Nm

### Remote Mount Installation with Imperial Waveguide

#### List of Items

**Table 11** Required items for Remote Mount Installation with Imperial Waveguide

Item	Description	Quantity	Remarks
1	RFU-C RADIO	1	
2	RFU-C REMOTE MOUNT ADAPTOR KIT	1	Up to 15 GHz
3	RFU-C REMOTE POLE MOUNT KIT	1	

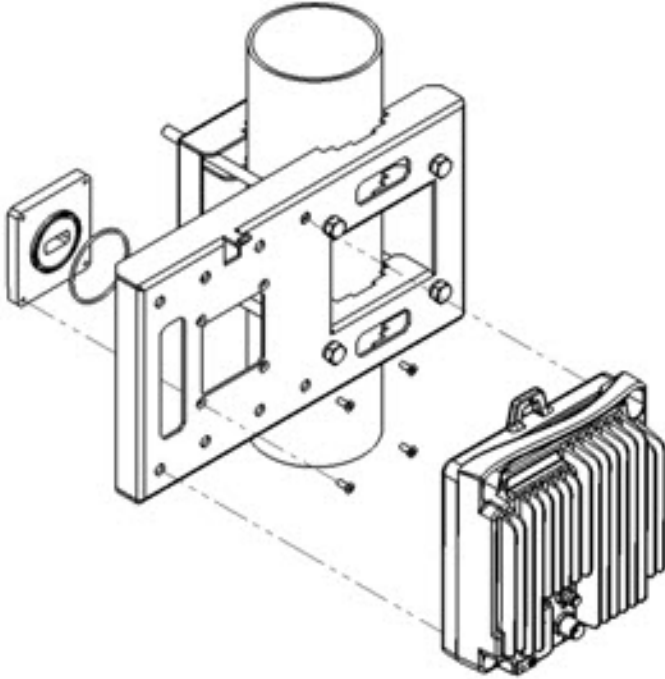
#### Required Tools

- Metric offset hexagon key wrench set
- Imperial offset hexagon key wrench set

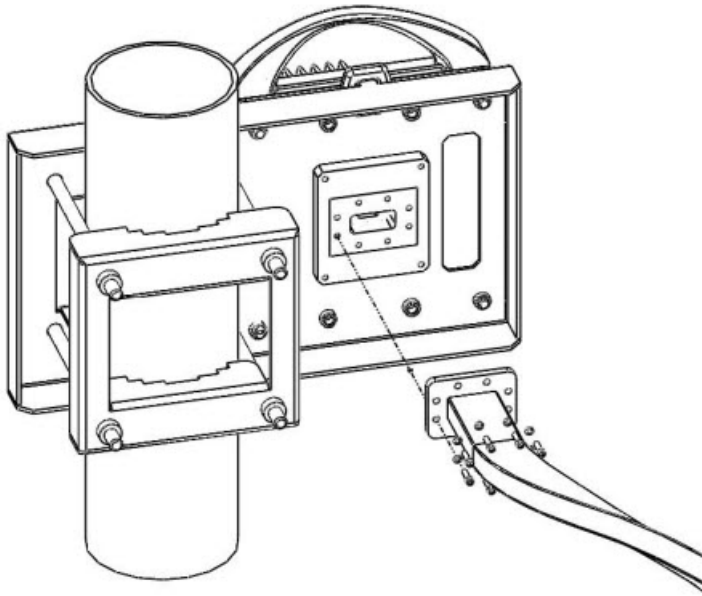
#### Remote Mount Installation – 6-11 GHz

- 1 Mount the RFU-C Adaptor supplied with the RFU-C Adaptor kit on the RFU-C Remote Pole Mount kit using the four flat screws supplied with the RFU-C Adaptor kit.

- 2 Mount the RFU-C using the four captive screws and washers supplied, assembled, in the RFU-C.

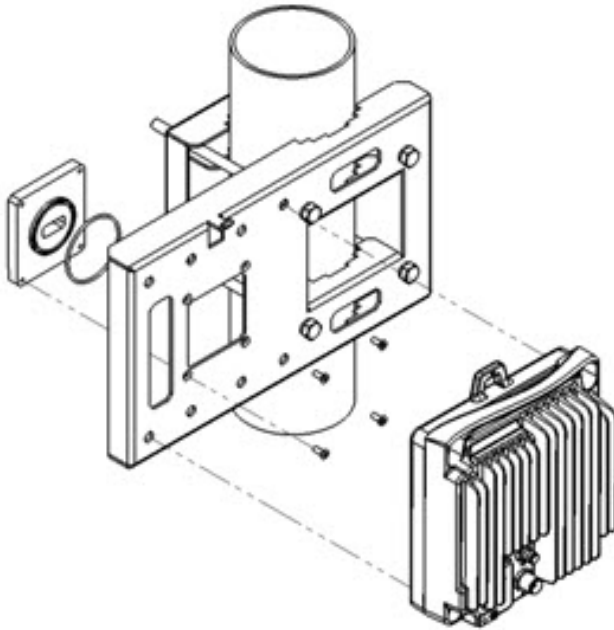


- 3 Connect the Flexible Waveguide and Sealing Gasket supplied with the Flexible Waveguide Imperial kit to the RFU-C Adaptor. Tighten the four screws supplied with the Flexible Waveguide Imperial kit.

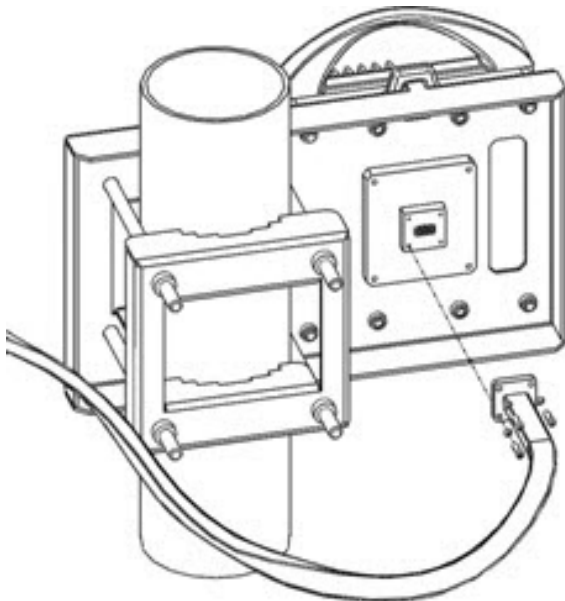


## Remote Mount Installation – 13-15 GHz

- 1 Mount the RFU-C Adaptor supplied with the RFU-C Remote Pole Mount kit using the four flat screws supplied with the RFU-C Adaptor kit.
- 2 Mount the RFU-C using the four captive screws and washers supplied, assembled, in the RFU-C.

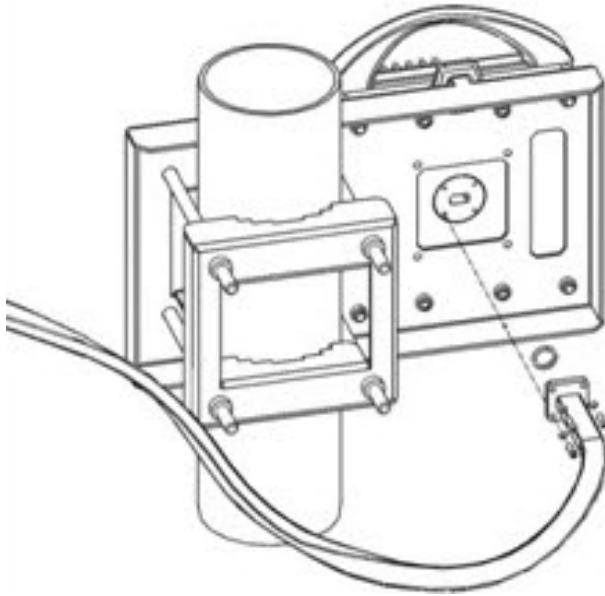


- 3 Connect the Flexible Waveguide and sealing O-Ring supplied with the Flexible Waveguide Imperial kit to the RFU-C Adaptor. Tighten the four screws supplied with the Flexible Waveguide Imperial kit.



## Remote Mount Installation – 18-42 GHz

- 1 Mount the RFU-C Adaptor supplied with the RFU-C Remote Pole Mount kit using the four flat screws supplied with the RFU-C Adaptor kit.
- 2 Mount the RFU-C using the four captive screws and washers supplied, assembled, in the RFU-C.
- 3 Connect the Flexible Waveguide and sealing O-Ring supplied with the Flexible Waveguide Imperial kit. Tighten the four metric screws supplied with the RFU-C Adaptor kit.

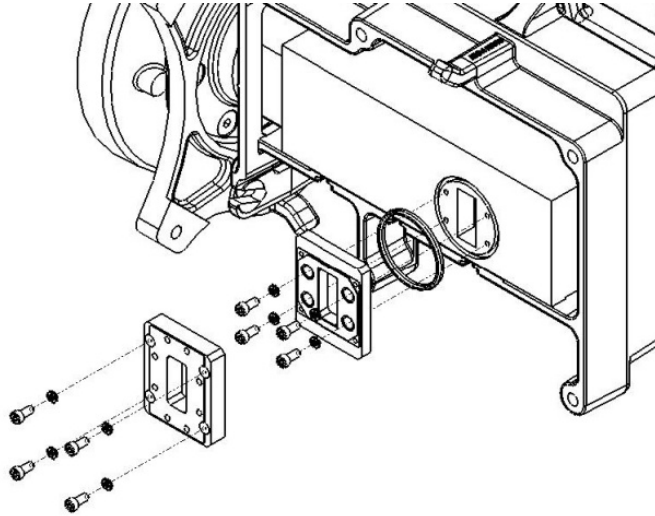


## OMT WG Adaptor Installation

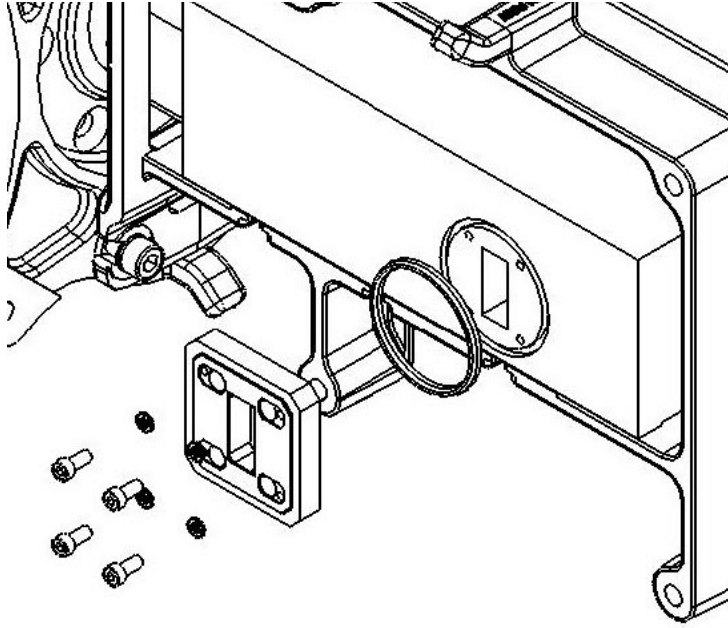
This procedure is applicable for all remote mount configurations that involve an OMT.

**1** For 6GHz (UDR70):

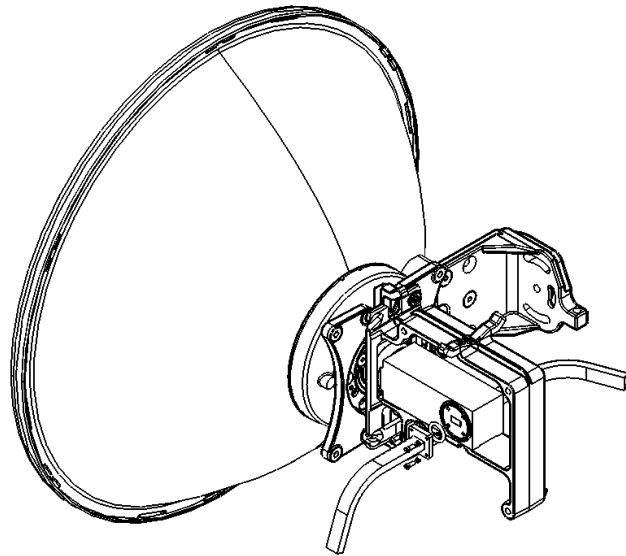
- i Mount the O-Ring supplied with the OMT kit.
- ii Mount OMT Adaptor #1 on the OMT, and tighten using four M4 screws and washers (supplied with the OMT adaptor kit).
- iii Mount OMT Adaptor #2 on OMT Adaptor #1, and tighten using four M4 screws and washers (supplied with the OMT adaptor kit)
- iv Mount the flexible waveguide as usual.

**2** For 7-11 GHz (UBR84 and UBR100):

- i Mount the O-Ring supplied with the OMT kit.
- ii Mount the OMT adaptor, with its installed sealing gasket, on the OMT, and tighten using the four M4 screws and washers supplied with the OMT Adaptor kit.
- iii Mount the flexible waveguide without its gasket (only for the OMT side).



- 3 For 13 GHz (UBR120) to 42 GHz (UG383/U), connect the flexible waveguide and its gasket (supplied with the Flexible WG Kit) directly to the OMT port.



# Chapter 6: RFU-C Configurations



## Note

For the exact marketing models of items described in the List of Items for each configuration, see section [Available Adapters and Installation Kits](#).

## 1+0 Direct Mount Installation

### List of Items

**Table 12** Required items for 1+0 Direct Mount

Item	Description	Quantity	Remarks
1	RFU-C RADIO	1	

### Required Tools

The following tools are required for the RFU-C installation:

- Metric offset hexagon key wrench #6
- Phillips #2 screwdriver

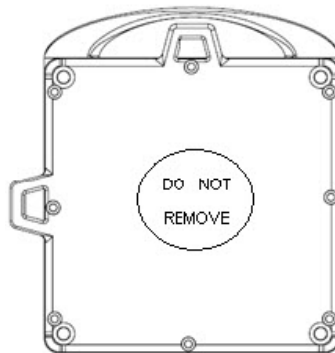
### Procedure

To install the RFU-C in a direct mount 1+0 configuration:



## Caution

Do not remove the transparent pressure window located on the antenna interface.



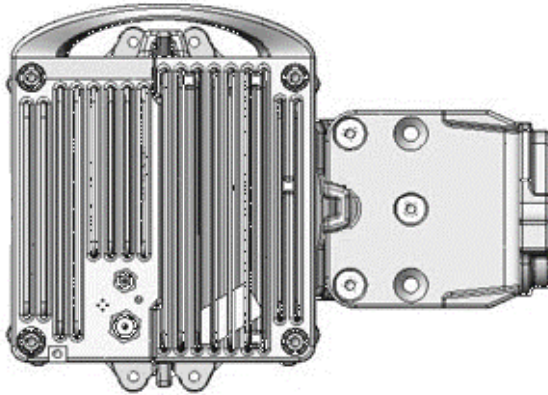
## Note

If necessary, change the antenna polarization by rotating the RFU-C in accordance with the relevant antenna installation guide.

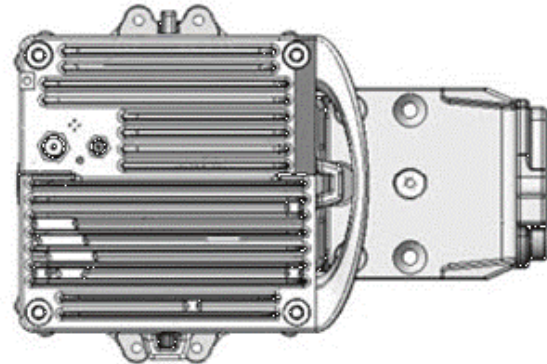
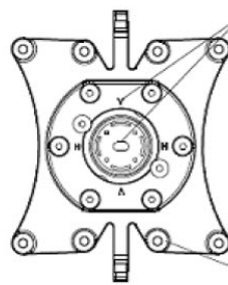


**Figure 3** Vertical and Horizontal Polarisation

Vertical Pole



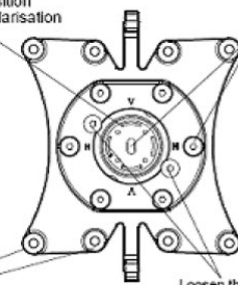
Horizontal Pole

**VERTICALLY POLARISED**

Note Alignment of transition with timing letters on mounting ring

**HORIZONTALLY POLARISED**

Rotate transition to adjust polarisation

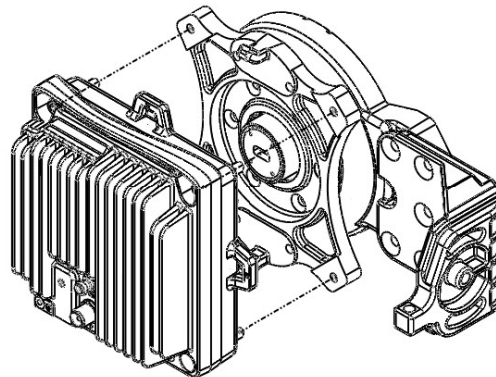


Note Alignment of transition with timing letters on mounting ring

Torque M8 ODU/Coupler hardware to 12Nm.

Loosen the two c'sk screws and remove to adjust polarisation. Make sure the screws seat correctly in the alignment notches on transition rim. Tighten to a torque of 5Nm (3.69 lb-ft)

- 1 Mount the RFU-C on the antenna using the four M8 captive screws and washers that are supplied, assembled, in the RFU-C, and tighten the screws.

**Figure 4** Mounting RFU-C on Antenna**Note**

Make sure the polarization mounting direction of the RFU-C is correct.

## 1+0 Remote Mount Installation

### List of Items

**Table 13** Required items for 1+1 Remote Mount

Item	Description	Quantity	Remarks
1	RFU-C RADIO	1	
2	RFU-C POLE MOUNT KIT	1	
3	RFU-C REMOTE MOUNT ADAPTOR Kit	1	For 6-13 GHz

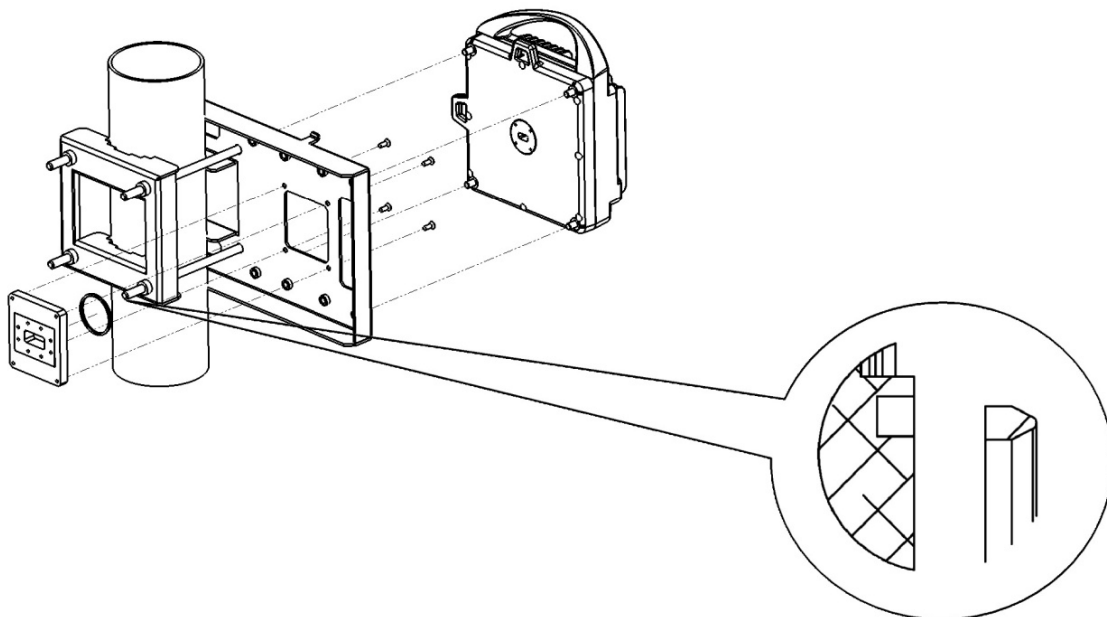
### Required Tools

The following tools are required for the RFU-C installation:

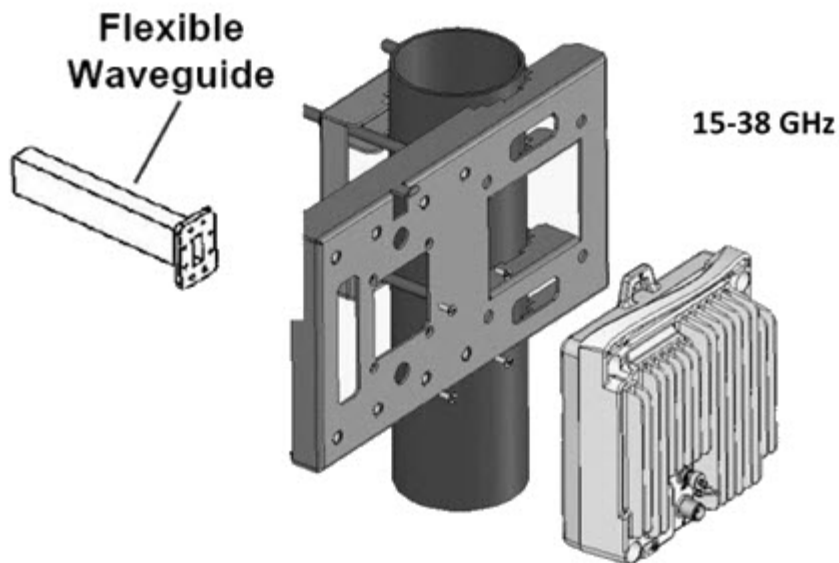
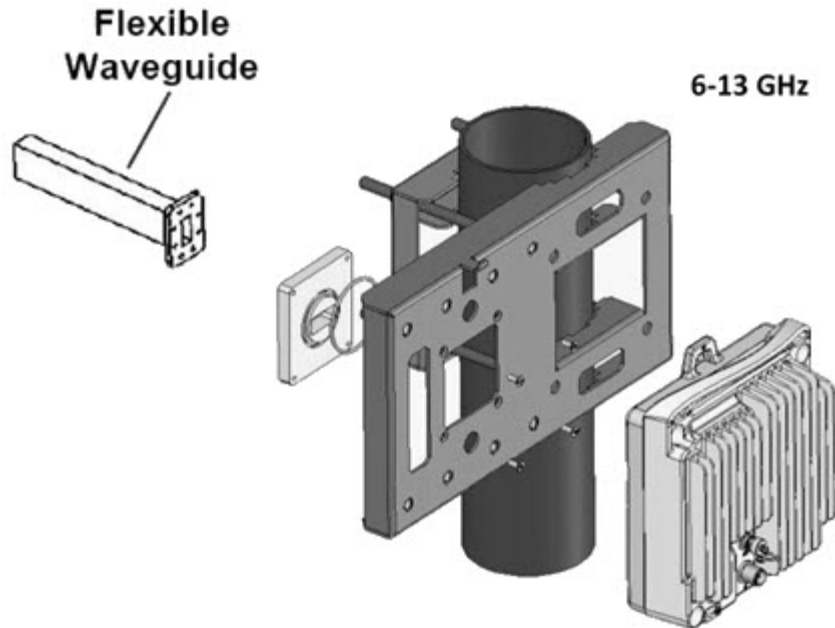
- Metric offset hexagon key wrench #6
- Phillips #2 screwdriver

### Procedure

- 1 For 6-13 GHz installations only, mount the RFU-C remote adaptor and O-Ring to the pole mount using the four flat M5 screws supplied in the RFU-C Remote Mount Adaptor kit, and tighten the screws.
- 2 Mount the RFU-C to the pole mount using the four M8 captive screws and washers supplied, assembled, in the RFU-C, and tighten the screws.



- 3 Place the O-Ring in the flexible waveguide flange groove.
- 4 Place the O-Ring in the other end of the flexible waveguide flange groove.
- 5 Mount the flexible waveguide on the antenna, and tighten the screws and washers.



## 1+1 Direct Mount Installation

### List of Items

**Table 14** Required items for 1+1 Direct Mount

Item	Description	Quantity	Remarks
1	RFU-C RADIO	2	
2	RFU-C COUPLER KIT	1	
3	RFU-C TWIST KIT	1	

### Required Tools

The following tools are required for the RFU-C installation:

- Metric offset hexagon key wrench #6
- Phillips #2 screwdriver
- Metric offset hexagon key wrench #2.5 and #3

### Procedure

In 1+1 direct mount installation, the RFU-C is attached to a coupler. To install a RFU-C in a direct mount 1+1 configuration:

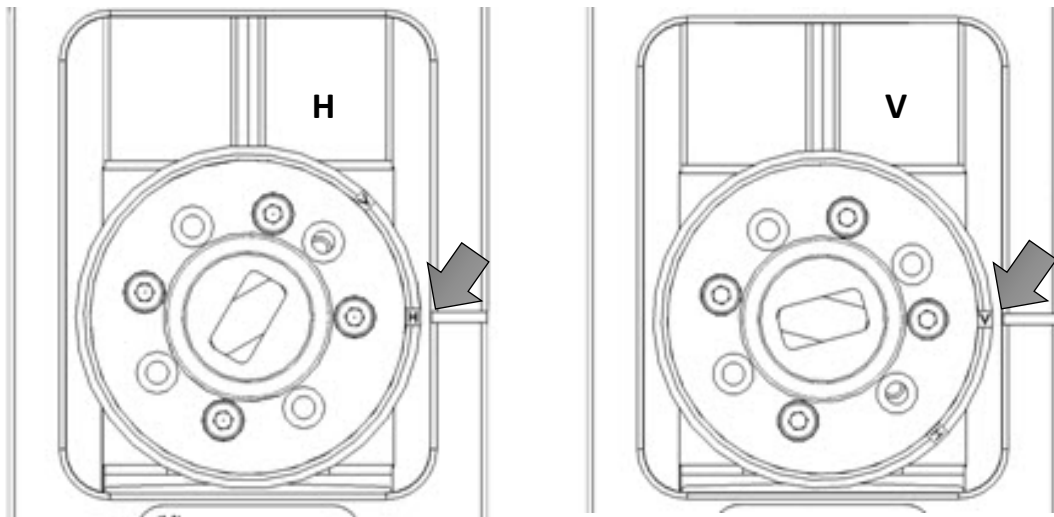
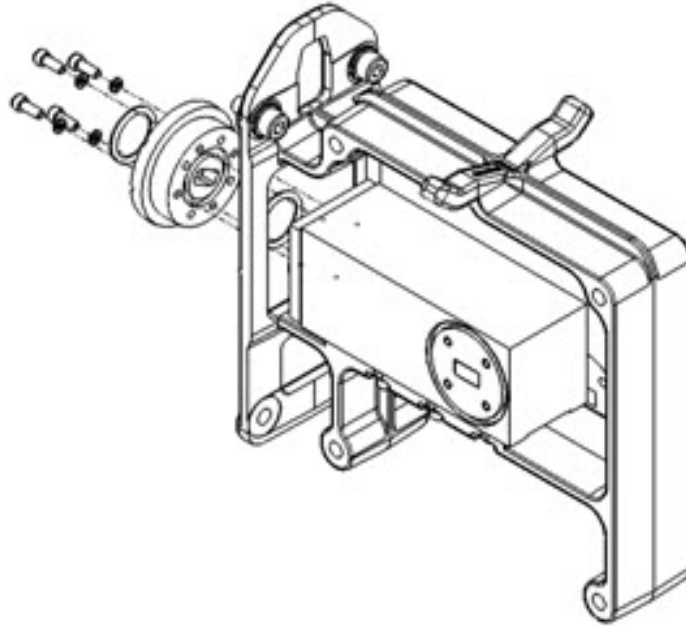


#### Note

For 15 and 18 GHz frequencies, two O-Rings are supplied in the Twist kit and should be mounted in the twist grooves.

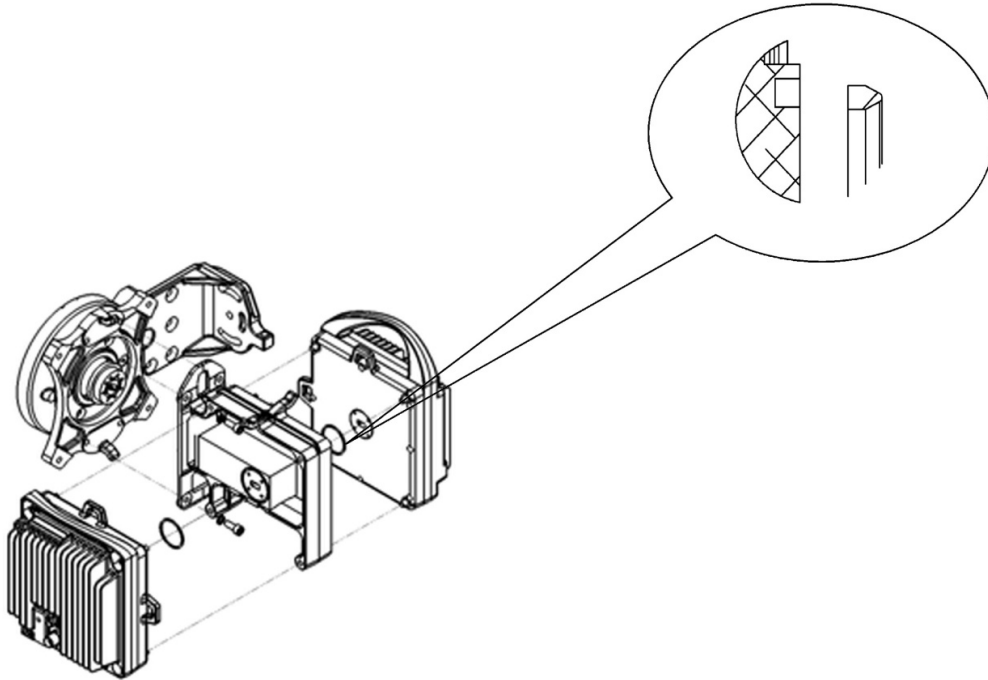
For 6 GHz frequency, a gasket is used instead of an O-Ring. The gasket should be mounted between the twist and the RFU-C Coupler kit.

- 1 Mount the twist to the coupler using the O-Ring and four screws supplied in the Twist kit, and tighten the screws.

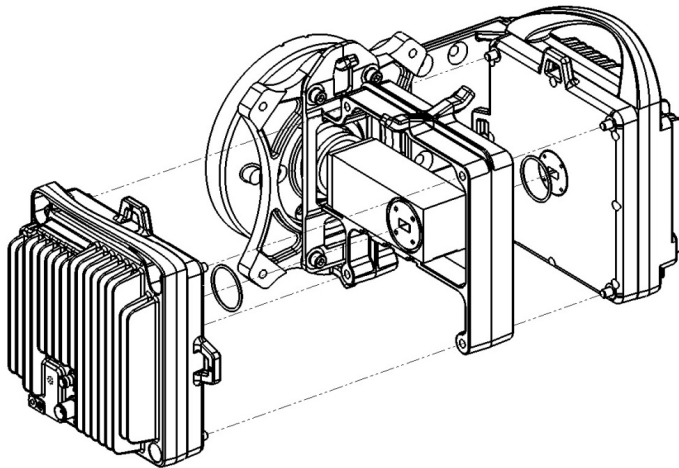
**Caution**

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

- 2 Mount the coupler radio on the antenna using the four M8 screws and washers supplied with the RFU-C Coupler kit, and tighten the screws
- 3 Mount the two O-Rings supplied with the RFU-C Coupler kit, as shown in the following figure.



- 4 Mount the RFU-C to the body of the coupler using the four M8 captive screws and washers that are supplied, assembled, in the RFU-C, and tighten the screws.



## 1+1 Remote Mount Installation

### List of Items

**Table 15** Required items for 1+1 Remote Mount

Item	Description	Quantity	Remarks
1	RFU-C RADIO	2	
2	RFU-C POLE MOUNT KIT	1	
3	RFU-C COUPLER KIT	1	
4	RFU-C FLEXIBLE WG KIT	1	

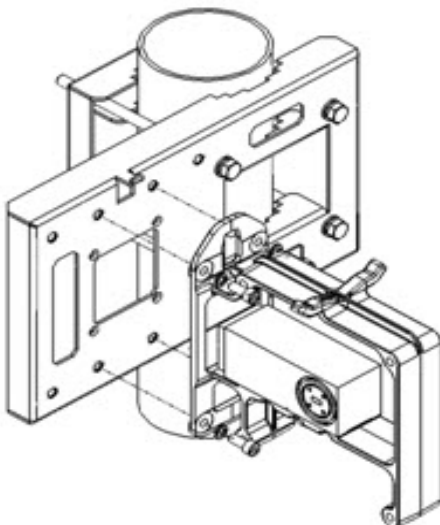
### Required Tools

- Metric offset hexagon key wrench 6
- Metric offset hexagon key wrench 3
- Metric offset hexagon key wrench #2.5 and #3

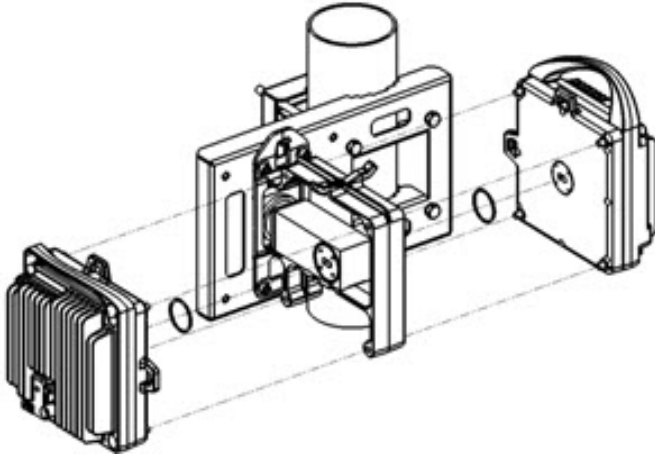
### Procedure

In 1+1 remote mount installation, the RFU-C radios are attached to a coupler, while the coupler is connected to the antenna via flexible WG. To install the RFU-C in a remote mount 1+1 configuration:

- 1 Mount the RFU-C coupler to the RFU-C pole mount bracket using the four M8 screws and washers supplied with the RFU-C Coupler kit, and tighten the screws.



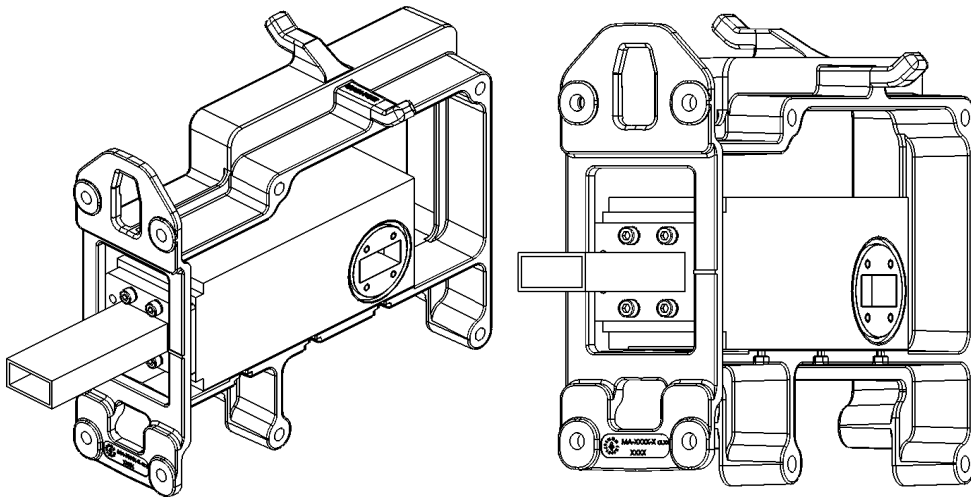
- 2 Mount the two O-Rings supplied with the Coupler kit, according to the Coupler kit instructions.
- 3 Mount the RFU-C on the body of the coupler using the four M8 captive screws and washers that are supplied, assembled, in the RFU-C, and tighten the screws.



- 4 Place the O-Ring in the flexible waveguide flange groove.
- 5 Mount the flexible waveguide on the coupler, and tighten the screws and washers.

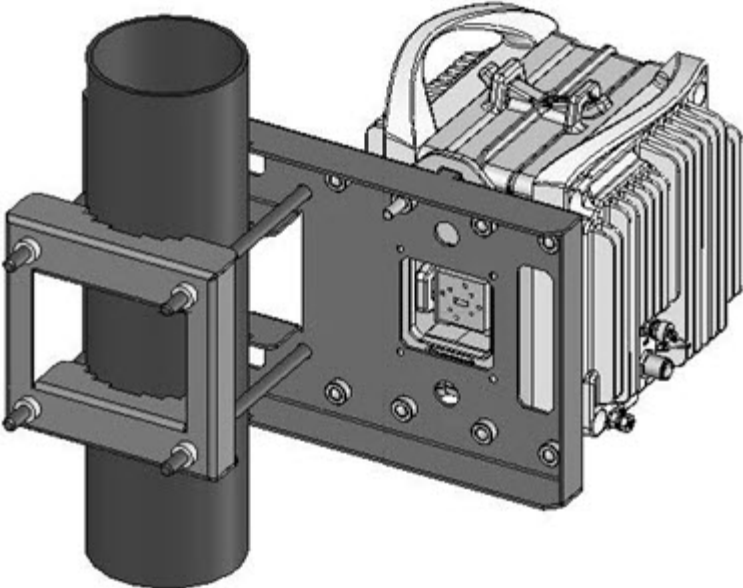
**Note**

For 6 GHz, only 4 screws should be used, as shown in the pictures below..



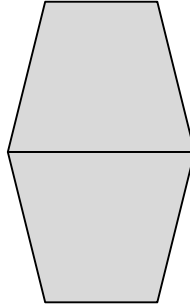
- 6 Place the O-Ring in the other end of the flexible waveguide flange groove.
- 7 Mount the flexible waveguide on the antenna, and tighten the screws and washers.





## 2+0 Dual Polarization – Direct Mount Installation

CCDP



### List of Items

**Table 16** Required items for 2+0 Dual Polarization - Direct Mount

Item	Description	Quantity	Remarks
1	ANTENNA OMT ADAPTOR	1	
2	RFU-Cxx-OMT-DM-Kit	1	
3	RFU-C RADIO	2	One is optional if using item #4 or #5
4	RFU-C OMT ADAPTOR KIT	1	Optional (for 6, 7-8 and 10-11Ghz)
5	RFU-C OMT SHORT PLATE	1	Optional

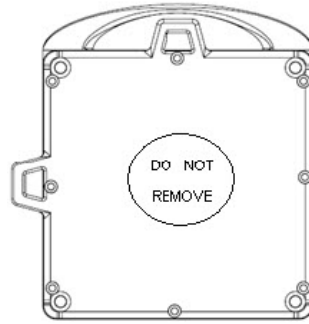
### Required Tools

- Metric offset hexagon key wrench 6
- Metric offset hexagon key wrench 3

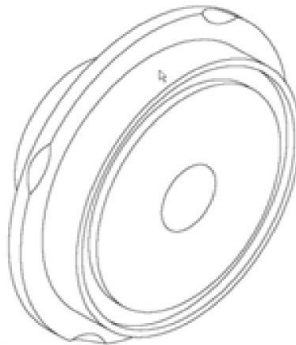


#### Caution Procedure

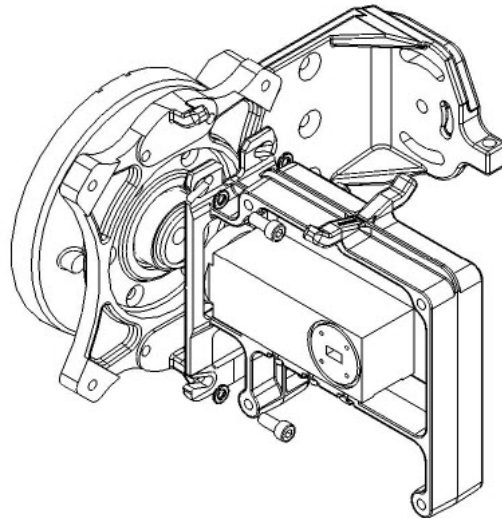
Do not remove the transparent pressure window located on the antenna interface or the Mylar film on the OMT ports.

**Figure 5** Do not remove the transparent pressure window

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

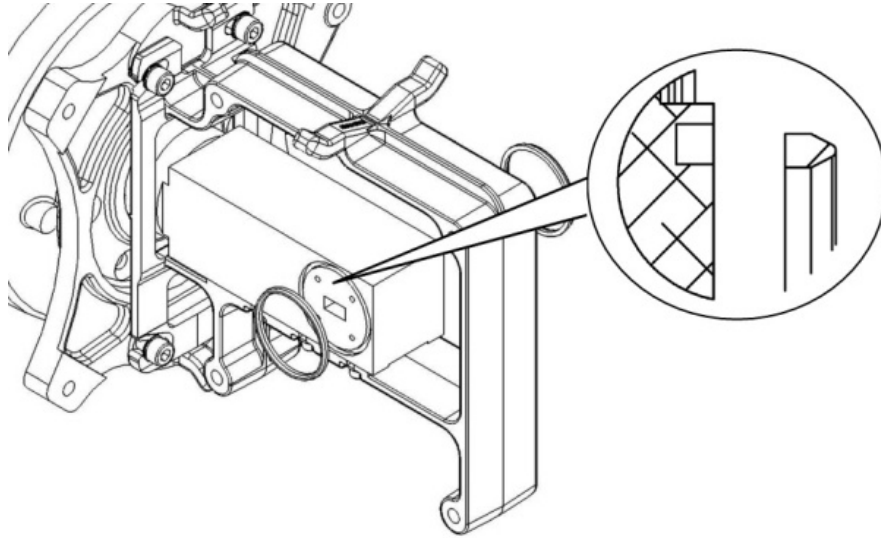


- 2 Mount the OMT kit on the antenna using the four M8 screws and washers supplied with the OMT kit. Do not tighten them yet, to enable rotation of the entire assembly.



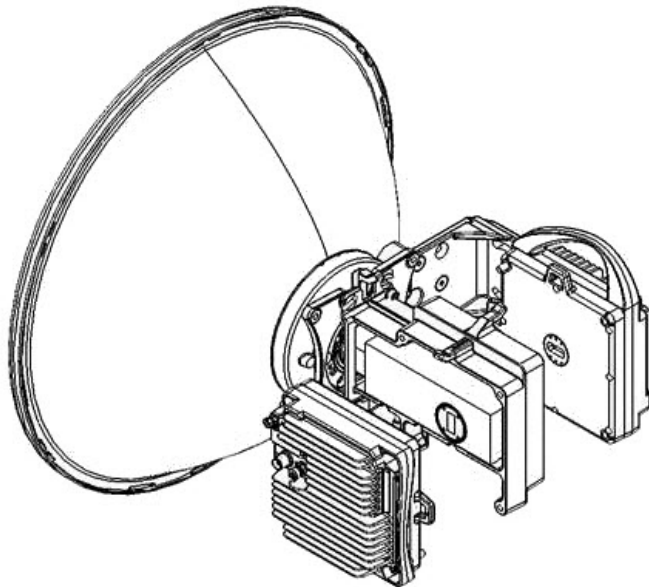
- 3 Mount the two O-Rings supplied with the OMT kit on the OMT body. Make sure the mounting direction is correct, as shown in the section view.

**Figure 6** Mounting both RFUs



- 4 Mount both RFUs, using the four M8 captive screws and washers supplied, assembled, in the RFU-C, through the radio and OMT holder, and tighten the screws. Make sure the polarization mounting direction is correct.

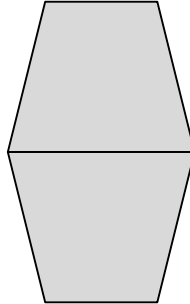
**Figure 7** Tilting the entire assembly



- 5 Tilt the entire assembly, as described in the XPIC link alignment procedure, to achieve maximum XPD (Cross Polar Differentiation). After link alignment, tighten the four M8 screws left open in step 2 above.

## 2+0 Dual Polarization – Remote Mount Installation

CCDP



When remote configuration is required, the OMT is attached directly to the antenna and the RFUs are installed remotely, using flexible waveguides.

### List of Items

**Table 17** Required items for 2+0 Single Polarization - Direct Mount Symmetrical Couplers

Item	Description	Quantity	Remarks
1	ANTENNA OMT ADAPTOR	1	
2	RFU-Cxx-OMT-DM-Kit	1	
3	RFU-C RADIO	1 or 2	1 for upgrade ready configuration
4	RFU-C OMT ADAPTOR KIT	1 or 2	For 6, 7-8 and 10-11Ghz - 1 for upgrade Ready configuration
5	RFU-C OMT SHORT PLATE	1	Optional – For upgrade ready configuration
6	FLEXIBLE WG KIT	1 or 2	1 for upgrade ready configuration
7	RFU-C POLE MOUNT	1 or 2	1 for upgrade ready configuration
8	RFU-C REMOTE MOUNT ADAPTOR KIT	1 or 2	For 6 to 13GHz – 1 for upgrade ready configuration

## Required Tools

- Metric offset hexagon key wrench 6
- Metric offset hexagon key wrench 3

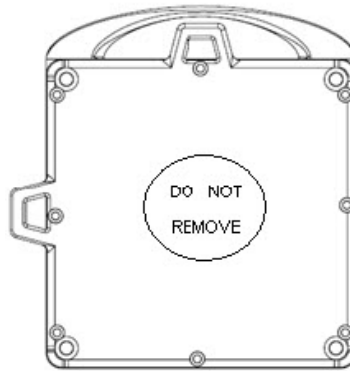
## Procedure



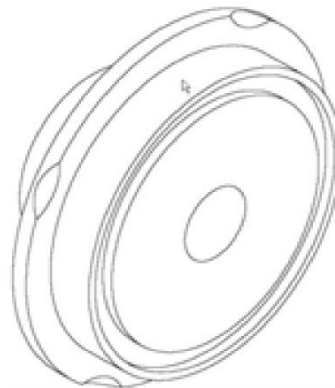
### Caution

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

1



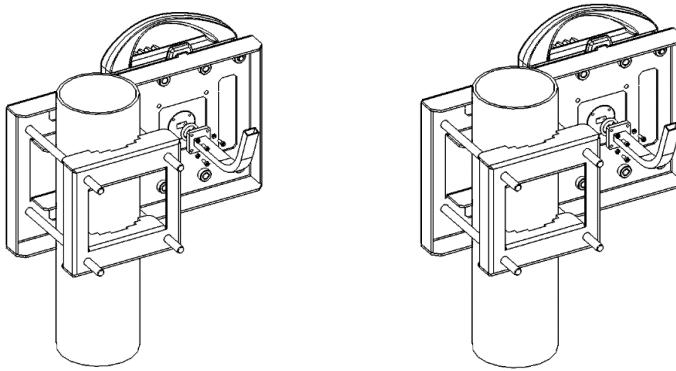
- 1 Prior to the installation, follow the antenna manufacturer's instructions to switch to circular adaptor (remove the existing rectangular transition, swap the O-Ring, and install the circular transition instead).



- 2 Mount the OMT kit on the antenna using the four M8 screws and washers supplied with the OMT kit. Do not tighten them yet, to enable rotation of the entire assembly.

## OMT WG Adaptor Installation

- 1 Connect the flexible waveguides to the OMT ports either directly or using a suitable adaptor as explained in [OMT WG Adaptor Installation](#) on page 5-4.
- 2 Connect the other end of the flexible waveguide to the RFU-C Radio port.

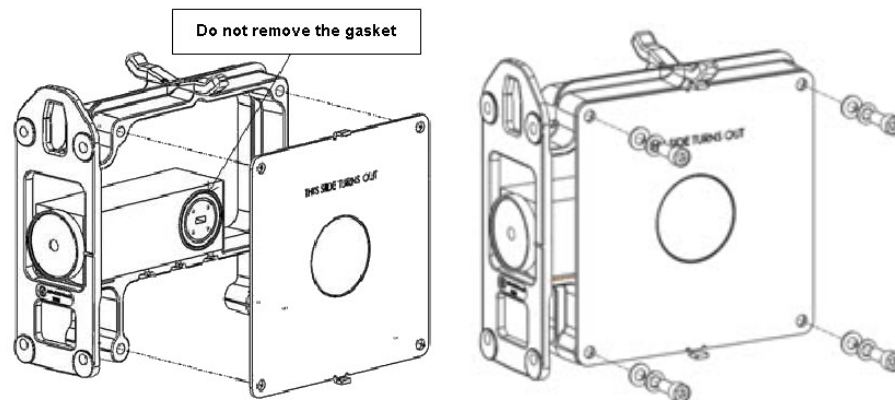


## 1+0 Ready for 2+0 Dual Polarization – Direct Mount Installation

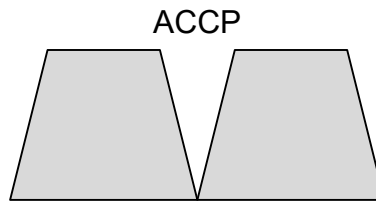
If you are installing a 1+0 configuration and you want to be prepared to upgrade to a 2+0 configuration (for double capacity), a protective “short” can be used to terminate the unused port. Later, when an additional RFU is installed on the second port, the short should be removed.

The following steps describe the required items and procedures for the installation.

- 1 Place the Plate in front of the coupler holder.
- 2 Tighten the plate to the **upgradable port side with the M8 screws and washers** supplied with the RFU-C coupler short plate kit using 21.4 NM torque.



## 2+0 Single Polarization – Direct Mount Installation – Symmetrical Couplers



### List of Items

**Table 18** Required items for 2+0 Single Polarization - Direct Mount Symmetrical Couplers

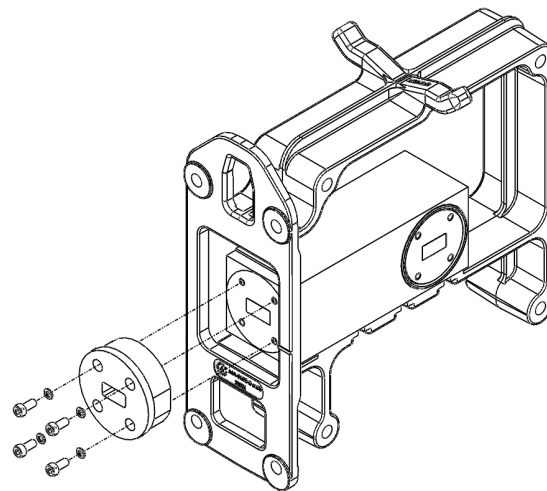
Item	Description	Quantity	Remarks
1	RFU-C RADIO	2	
2	RFU-C SYMMETRICAL COUPLER KIT	1	
3	RFU-C TWIST KIT	1	

### Required Tools

- Metric offset hexagon key wrench #2.5, #3 and #6.

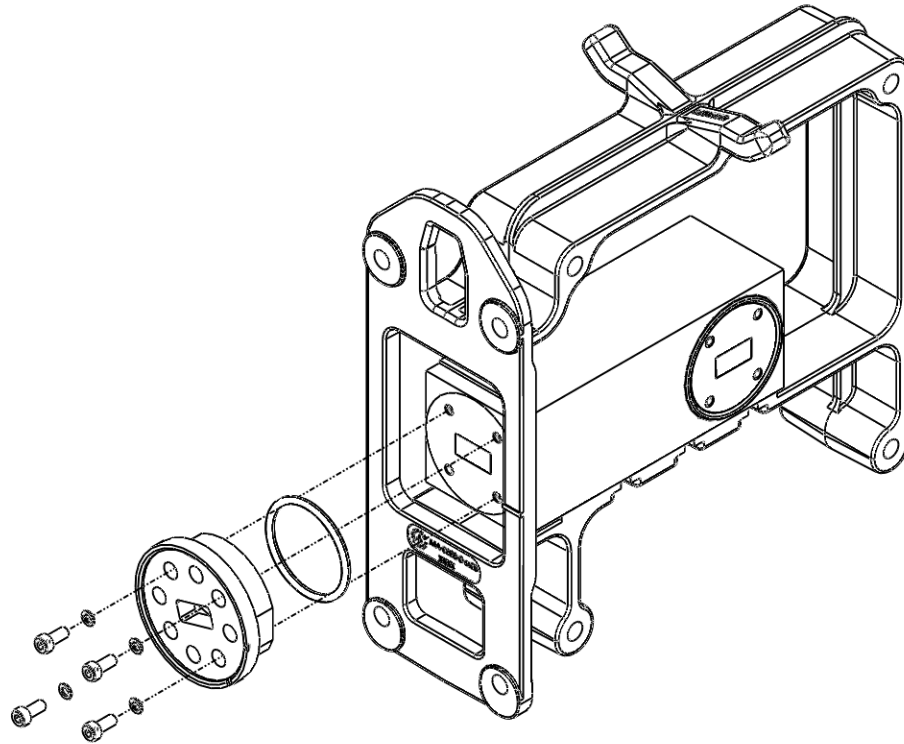
### Procedure

- 1 Remove the Extender from the Symmetrical Coupler by opening and removing the four M4 screws and washers, as shown in following figure.





- 2 Mount the twist to the Circulator/Symmetrical Coupler using the O-Ring and four screws supplied in the Twist Kit. Tighten the screws.

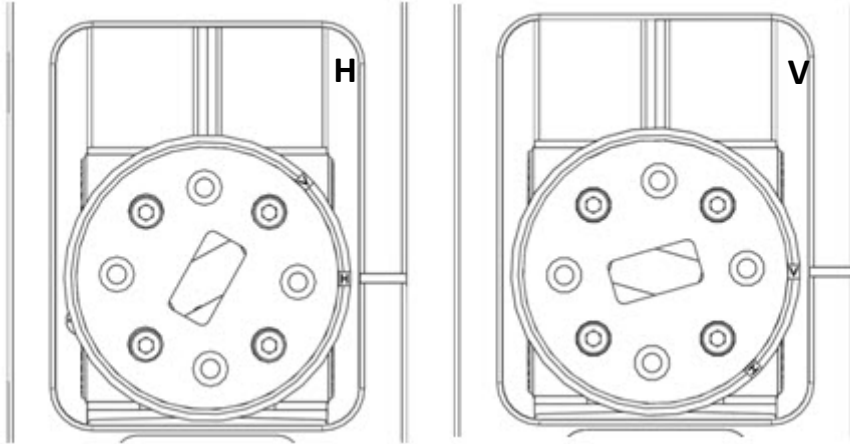
**Note**

For 15 and 18 GHz frequencies, two O-Rings are supplied in the Twist Kit and should be mounted in the twist grooves.

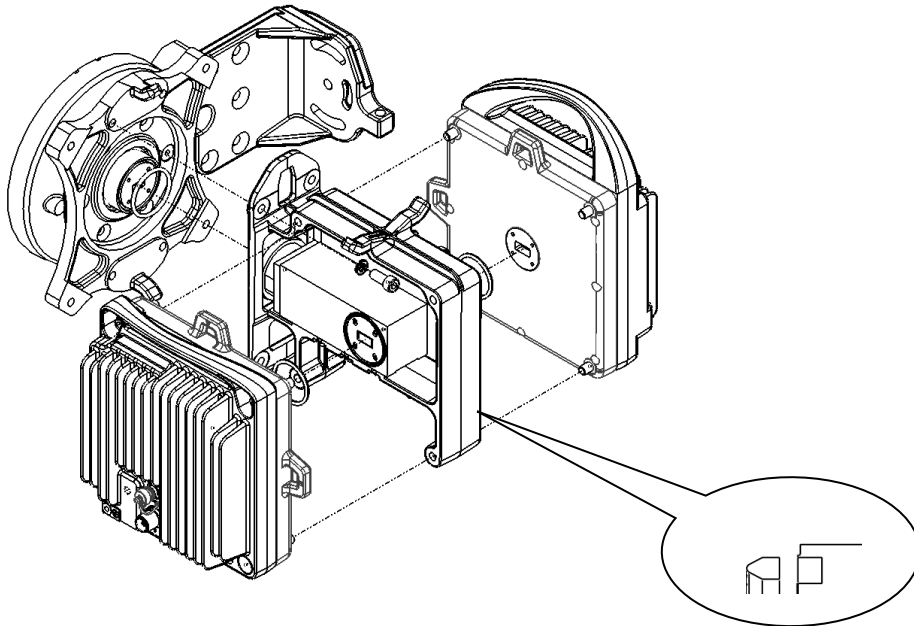
For 6 GHz frequency, a gasket is used instead of an O-Ring. The gasket should be mounted between the twist and the RFU-C Circulator/Symmetrical Coupler Kit.

**Caution**

Make sure the polarization mounting direction of the twist to the RFU-C circulator / symmetrical coupler is according to the antenna polarization.

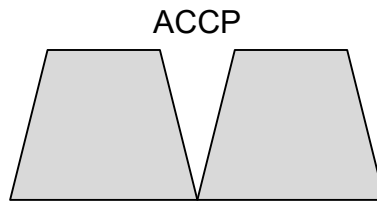


- 3 Mount the Circulator/Symmetrical Coupler on the antenna using the four M8 screws and washers supplied with the RFU-C Circulator/Symmetrical Coupler Kit, and tighten the screws.
- 4 Mount the two O-Rings supplied with the RFU-C Circulator/Symmetrical Coupler Kit.
- 5 Mount the two RFU-C radios to the body of the Circulator/Symmetrical Coupler using the four M8 captive screws and washers that are supplied assembled in the RFU-C, and tighten the screws.

**Note**

RFU-C mounting screws and washers can be supplied either assembled on the RFU-C, or as a part of the RFU-C Kit.

## 2+0 Single Polarization – Direct Mount Installation – Asymmetrical Couplers



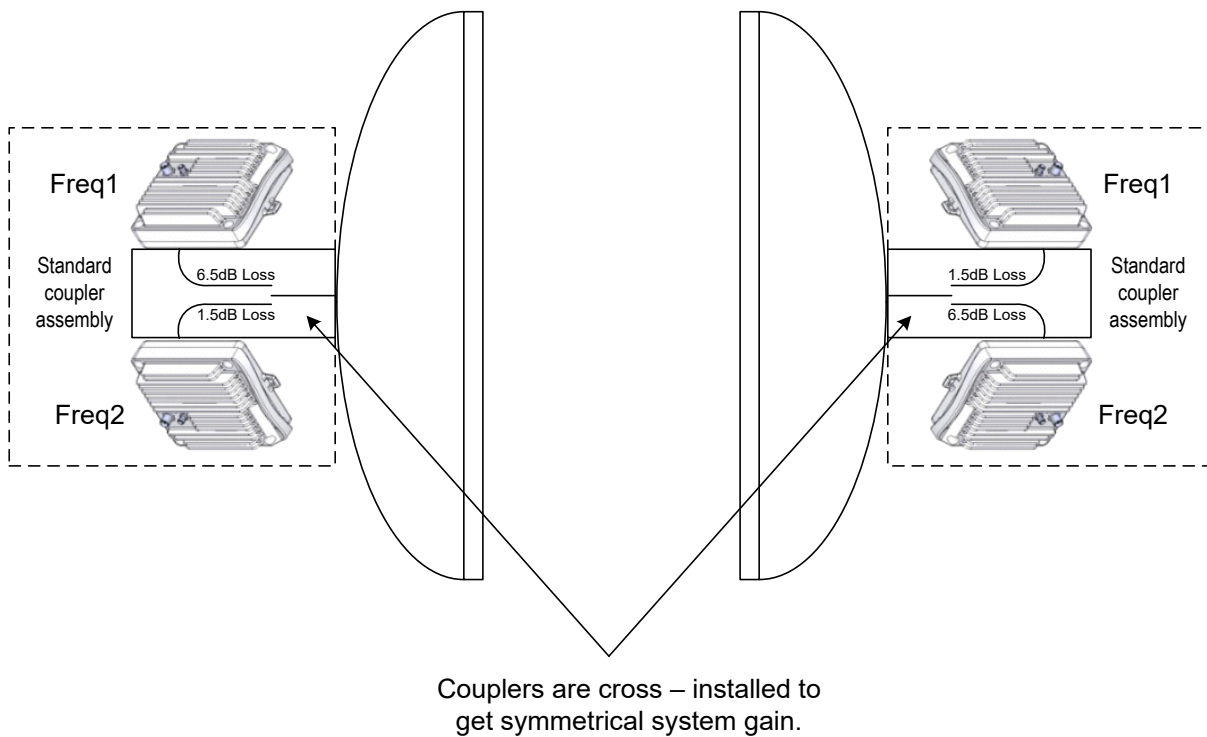
For detailed installation procedures, refer to [1+1 Direct Mount Installation](#) on page 6-11.



**Caution**

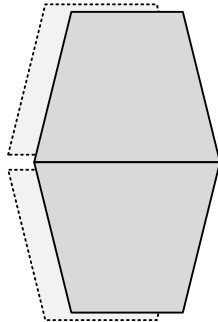
When using asymmetrical couplers for a 2+0 single polarization configuration, make sure to cross-install the RFU-C units for an even system gain between both channels.

**Figure 8** Asymmetrical Couplers



## 2+2 Dual Polarization – Remote Mount Installation

CCDP - Protected

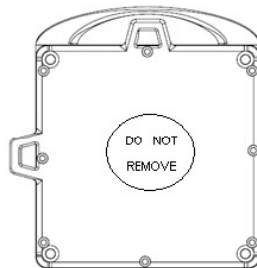


### List of Items

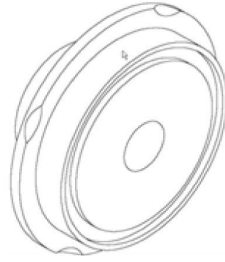
Item	Description	Quantity	Remarks
1	RFU-C RADIO	4	
2	RFU-C COUPLER KIT	2	
3	RFU-C DUAL POLE REMOTE MOUNT KIT	1	
4	RFU-CXX-OMT-DM-KIT	1	
5	FLEXIBLE WAVEGUIDE KIT	2	

### Procedure

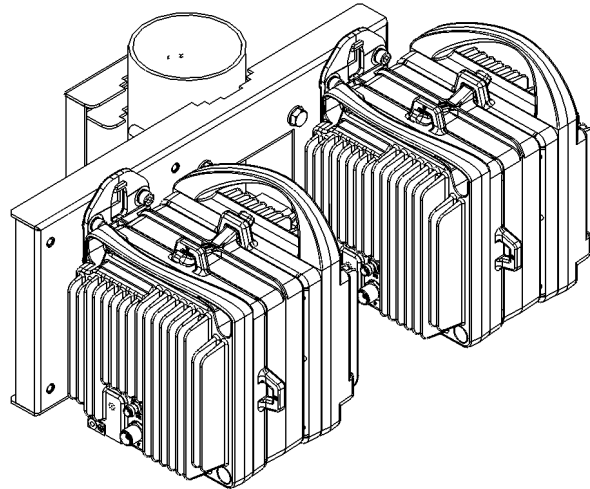
**Important!** Do not remove the transparent pressure window located on the antenna interface or the Mylar film on the OMT ports.



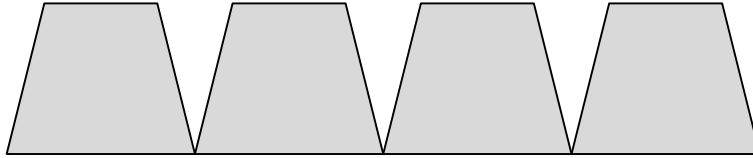
- 1 Prior to the installation, follow the antenna manufacturer's instructions to switch to circular adaptor (remove the existing rectangular transition, swap the O-Ring, and install the circular transition instead).



- 2 Mount the OMT kit on the antenna using the four M8 screws and washers supplied with the OMT kit. Do not tighten them yet, to enable rotation of the entire assembly.
- 3 For 6 GHz to 11 GHz, connect the waveguide adaptors as described in *OMT WG Adaptor Installation* on page **Error! Bookmark not defined.**
- 4 For 13 GHz (UBR120) to 42 GHz (UG383/U), connect the flexible waveguide and its gasket (supplied with the Flexible WG Kit) directly to the OMT port.
- 5 Connect the other end of the flexible waveguide to each RFU-C Coupler port mounted on the RFU-C Dual Pole Remote Mount Kit.



## 4+0 Single Polarization – Remote Mount Installation



### List of Items

Item	Description	Quantity	Remarks
1	RFU-C RADIO	4	
2	RFU-C SYMMETRICAL COUPLERS KIT	3	
3	RFU-C - REMOTE MOUNT KIT FOR 4+0	1	

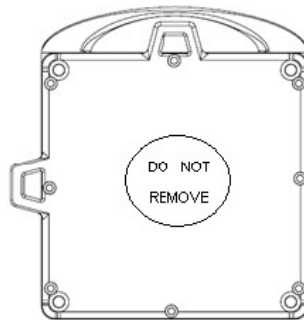
### Required Tools

- Metric offset hexagon key wrench #2.5, #3, #6 and #8.Procedure

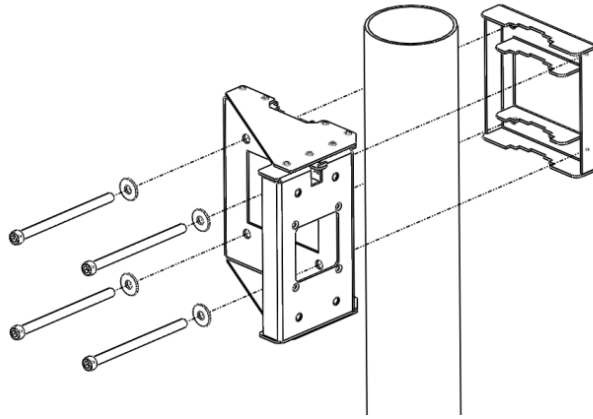


#### Note

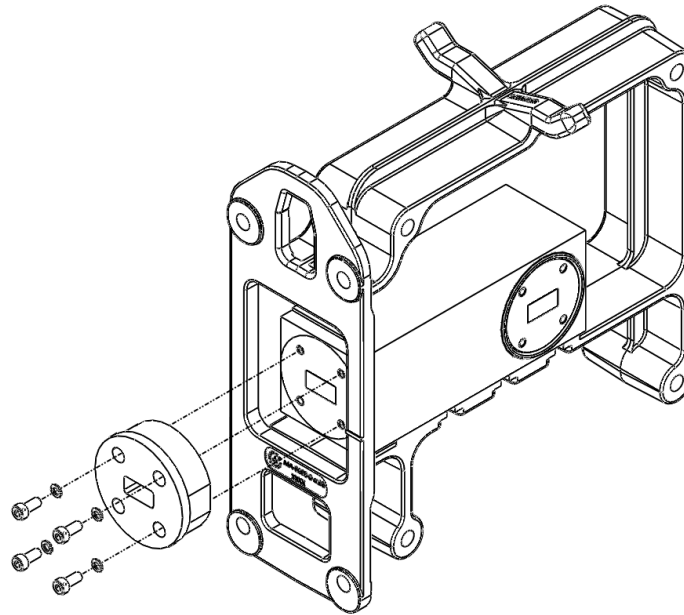
Do not remove the transparent pressure window located on the antenna interfaces.



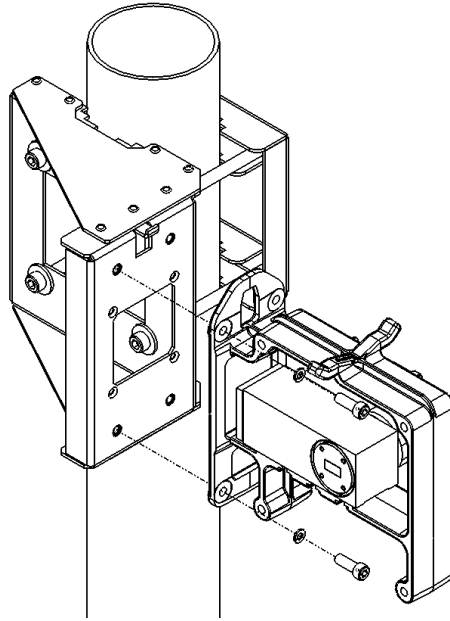
- 1 Mount the Pole mount brackets, by tightening four M10 screws and washers (supplied with the RFU-C-Remote Mount kit for 4+0).



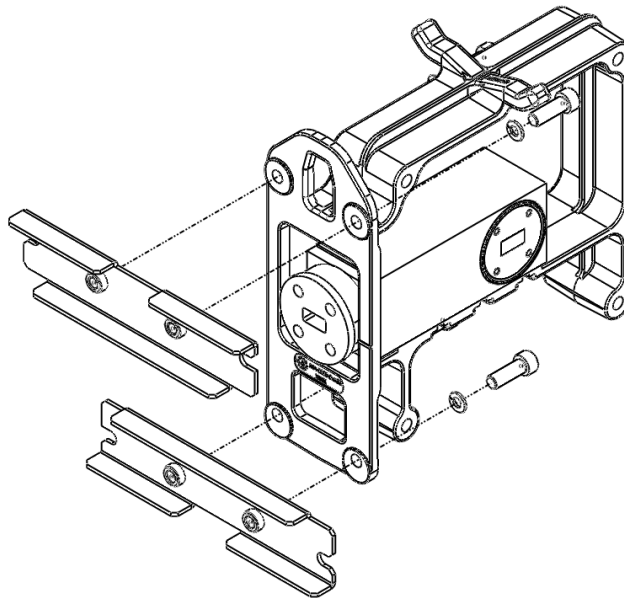
- 2 Remove the Extender from one RFU-C Symmetrical Coupler by opening and removing the four M4 screws and washers, as shown in following figure:



- 3 Mount the RFU-C Symmetrical Coupler, without the Extender part, to the RFU-C Pole mount bracket, by tightening four M8 screws and washers (supplied with the RFU-C Coupler kit).

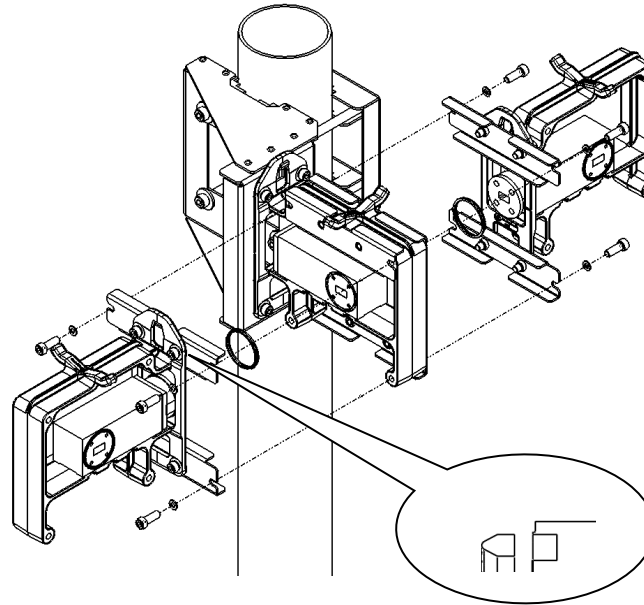


- 4 Mount two adaptor brackets (supplied in the RFU-C Remote Mount for 4+0 kit) to the RFU-C Symmetrical coupler by tightening four M8 screws and washers (screws are supplied in the RFU-C-Pole Mount for 4+0). Repeat the operation for both RFU-C Symmetrical couplers.



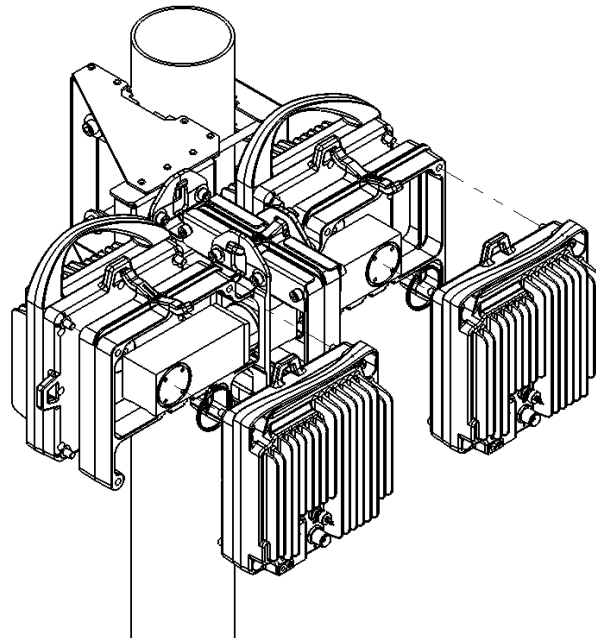
- 5 Mount the two O-Rings (supplied in the RFU-C Symmetrical Coupler kit). Mount the two RFU-C Symmetrical couplers to the third one. For each RFU-C Symmetrical coupler, use four M8 screws and washers (supplied in the RFU-C Symmetrical Coupler kit).



**Note**

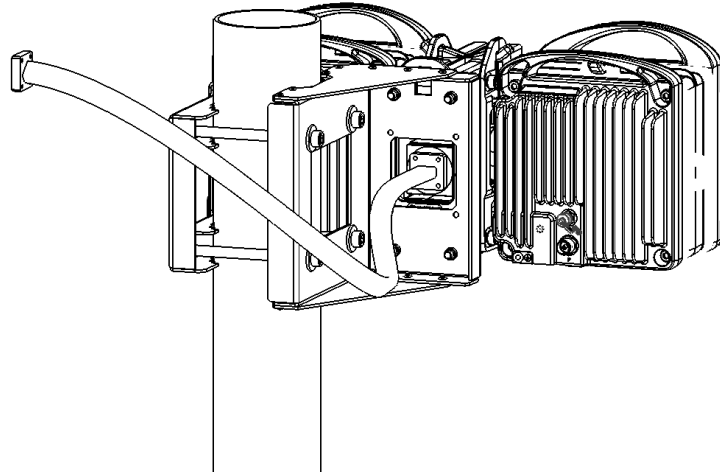
The O-ring is mounted with the flat bottom facing coupler.

- 6 Mount the two O-Rings (supplied in the RFU-C Symmetrical coupler kit).
- 7 Mount the two RFU-C radio units on each RFU-C Symmetrical coupler by tightening the four M8 captive screws and washers (supplied assembled in the RFU-C radio).

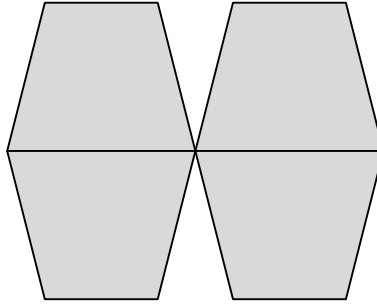
**Note**

RFU-C mounting screws and washers can be supplied either assembled on the RFU-C, or as a part of RFU-C kit.

- 8 Connect the flexible waveguide to the RFU-C Symmetrical coupler using the O-Ring and screws (supplied with the Flexible Waveguide kit). Connect the other end of the flexible waveguide to the antenna.



## 4+0 Dual Polarization – Remote Mount Installation



### List of Items

Item	Description	Quantity	Remarks
1	RFU-C RADIO	4	
2	RFU-C SYMMETRICAL COUPLER KIT	2	
3	RFU-CXX-OMT-DM-KIT	1	
4	RFU-C DUAL POLE REMOTE MOUNT KIT	1	
5	FLEXIBLE WAVEGUIDE KIT	2	

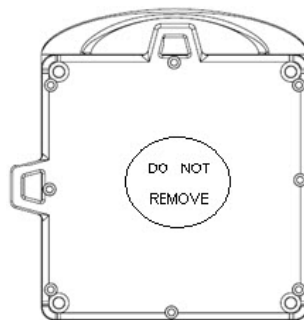
### Required Tools

- Metric offset hexagon key wrench #2.5, #3, #6 and #8.Procedure

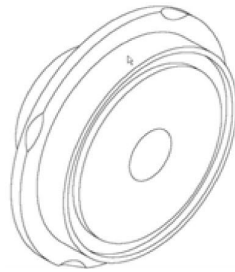
### Procedure

The procedure is similar to the 2+2 dual polarization procedure, except that here, symmetrical couplers are used instead of asymmetrical couplers.

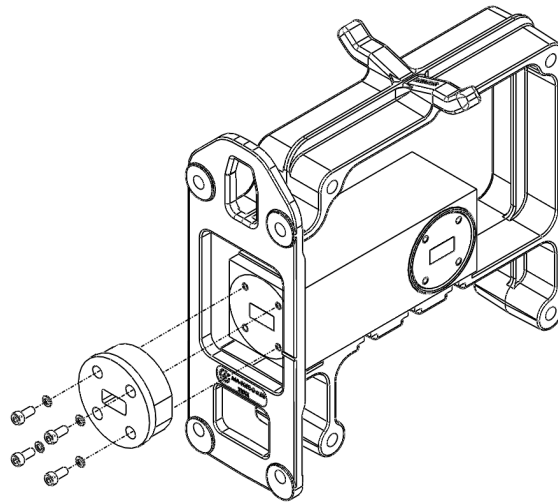
**Important!** Do not remove the transparent pressure window located on the antenna interface or the Mylar film on the OMT ports.



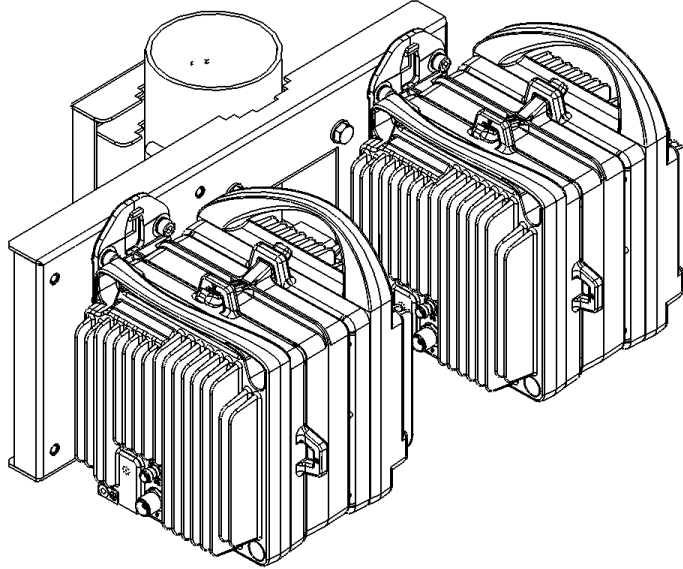
- 1 Prior to the installation, follow the antenna manufacturer's instructions to switch to a circular adaptor (remove the existing rectangular transition, swap the O-Ring, and install the circular transition instead).



- 2 Mount the OMT kit on the antenna using the four M8 screws and washers supplied with the OMT kit. Do not tighten them yet, to enable rotation of the entire assembly.
- 3 For 6 GHz to 11 GHz, connect the waveguide adaptors as described in *OMT WG Adaptor Installation* on page **Error! Bookmark not defined.**
- 4 For 13 GHz (UBR120) to 42 GHz (UG383/U), connect the flexible waveguide and its gasket (supplied with the Flexible WG Kit) directly to the OMT port.
- 5 Mount the pole mount brackets by tightening four M10 screws and washers (supplied with the RFU-C-Remote Mount kit FOR 4+0).
- 6 Remove the Extender from the RFU-C symmetrical coupler by opening and removing the four M4 screws and washers. Repeat this operation for both RFU-C symmetrical couplers.

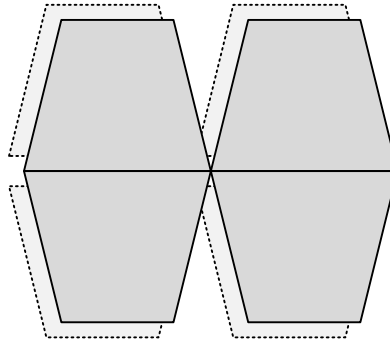


- 7 Mount both RFU-C symmetrical couplers, without the Extender part, to the RFU-C remote mount bracket, by tightening the four M8 screws and washers (supplied with each RFU-C Coupler kit).



- 8 Connect the other end of the flexible waveguide to each RFU-C symmetrical coupler mounted on the RFU-C Remote mount bracket.

## 4+4 Dual Polarization – Remote Mount Installation



### List of Items

Item	Description	Quantity	Remarks
1	RFU-C RADIO	8	
2	RFU-C SYMMETRICAL COUPLER KIT	4	
3	RFU-C - REMOTE MOUNT KIT FOR 4+0	2	
4	RFU-C COUPLER KIT	2	
5	RFU-CXX-OMT-DM-KIT	1	
6	FLEXIBLE WAVEGUIDE KIT	2	

### Required Tools

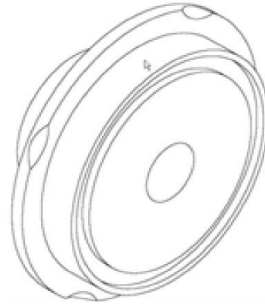
- Metric offset hexagon key wrench #2.5, #3, #6 and #8.

### Procedure

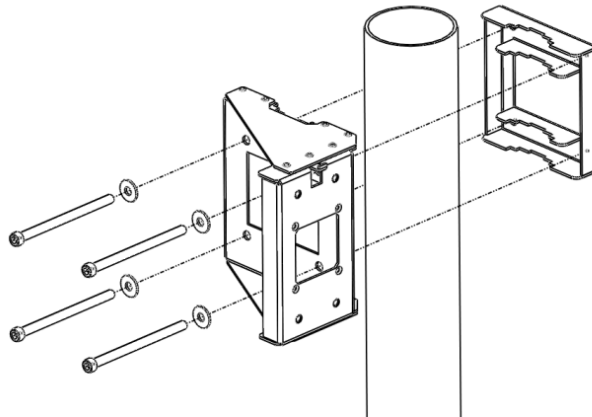
**Important!** Do not remove the transparent pressure window located on the antenna interface or the Mylar film on the OMT ports.



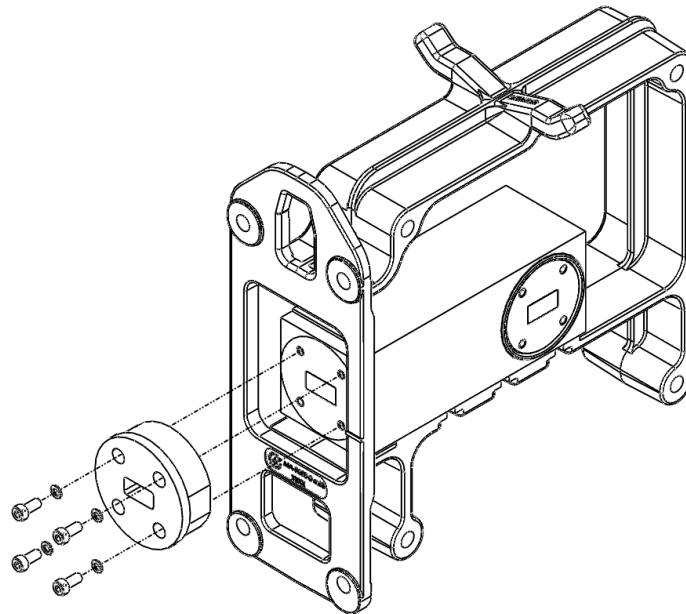
- 1 Prior to the installation, follow the antenna manufacturer's instructions to switch to circular adaptor (remove the existing rectangular transition, swap the O-Ring, and install the circular transition instead).



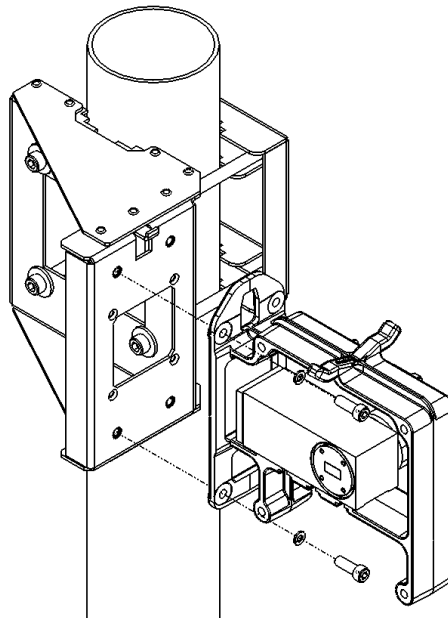
- 2 Mount the OMT kit on the antenna using the four M8 screws and washers supplied with the OMT kit. Do not tighten them yet, to enable rotation of the entire assembly.
- 3 For 6 GHz to 11 GHz, connect the waveguide adaptors as described in *OMT WG Adaptor Installation* on page **Error! Bookmark not defined.**
- 4 For 13 GHz (UBR120) to 42 GHz (UG383/U), connect the flexible waveguide and its gasket (supplied with the Flexible WG Kit) directly to the OMT port.
- 5 Mount the pole mount brackets by tightening four M10 screws and washers (supplied with the RFU-C-Remote Mount kit for 4+0).
- 6 Remove the Extender from RFU-C symmetrical coupler by opening and removing the four M4 screws and washers. Repeat this operation for both RFU-C symmetrical couplers.
- 7 Mount the pole mount brackets by tightening four M10 screws and washers (supplied with the RFU-C-Remote Mount kit for 4+0).



- 8 Remove the Extender from one RFU-C Symmetrical Coupler by opening and removing the four M4 screws and washers, as shown in following figure:

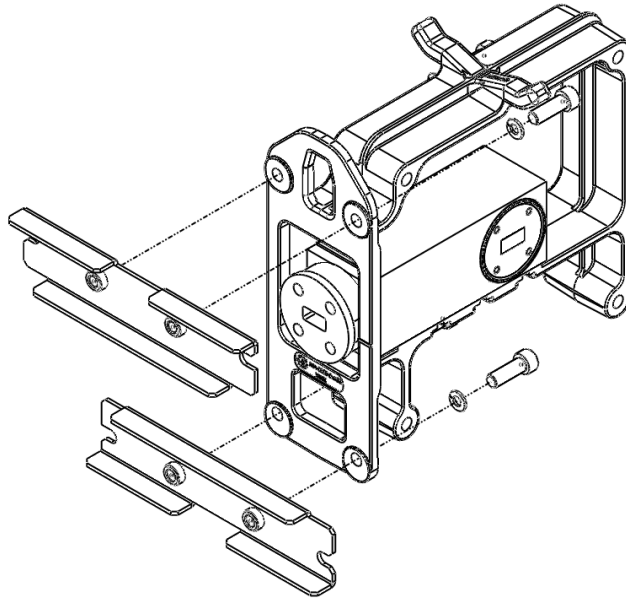


- 9 Mount the RFU-C symmetrical coupler, without the Extender part, to the RFU-C pole mount bracket, by tightening four M8 screws and washers (supplied with the RFU-C Coupler kit).

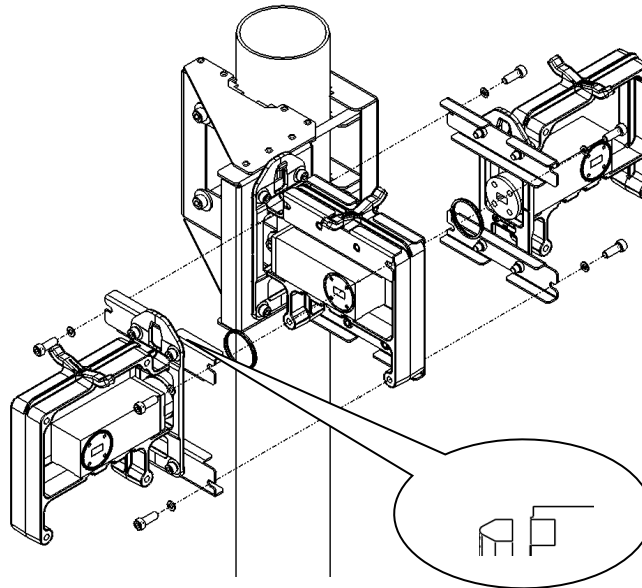




- 10 Mount two adaptor brackets (supplied in RFU-C Remote Mount for 4+0 kit) to the RFU-C symmetrical coupler by tightening the four M8 screws and washers (screws are supplied in the RFU-C-Pole Mount for 4+0). Repeat the operation for both RFU-C symmetrical couplers.

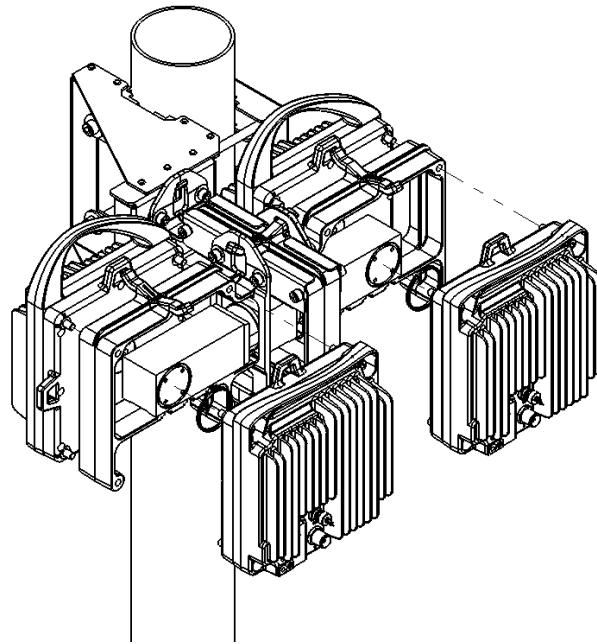


- 11 Mount the two O-Rings (supplied in the RFU-C symmetrical coupler kit). Mount the two RFU-C symmetrical couplers to the third one. For each RFU-C Symmetrical coupler, use four M8 screws and washers (supplied in the RFU-C Symmetrical Coupler kit).

**Note**

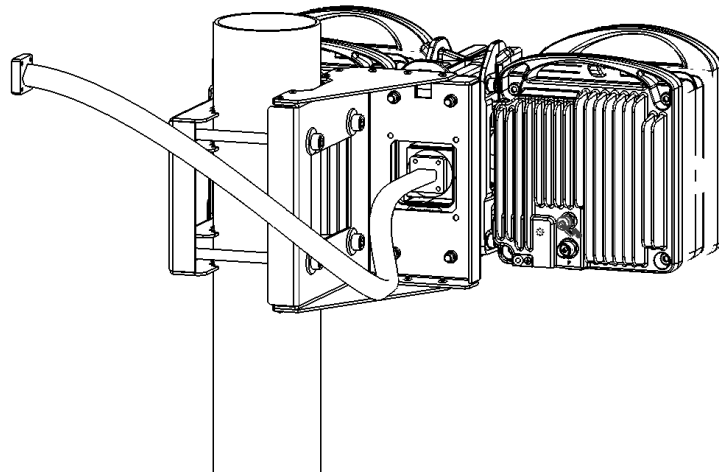
The O-Ring is mounted with the flat bottom facing the coupler.

- 12 Mount the two O-Rings (supplied in the RFU-C Symmetrical Coupler kit). Mount the two RFU-C radio units on each RFU-C symmetrical coupler by tightening the four M8 captive screws and washers (supplied assembled in the RFU-C radio).

**Note**

RFU-C mounting screws and washers can be supplied either assembled on the RFU-C, or as a part of the RFU-C kit.

- 13 Connect the flexible waveguide to the RFU-C Symmetrical coupler using the O-Ring and screws (supplied with the flexible waveguide kit). Connect the other end of the Flexible Waveguide to one radio port polarization of RFU-C OMT.
- 14 Repeat paragraphs 7 through 13 for the second polarization.





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# Appendix

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## Mediation Device Losses

**Table 19** RFU-C Mediation Device Losses

Configuration	Interfaces		6-8 GHz	11 GHz	13-15 GHz	18-26 GHz	28-38 GHz
1+0	Direct Mount	Integrated antenna	0.2	0.2	0.4	0.5	0.5
1+1 HSB		Main Path	1.6	1.6	1.8	1.8	1.8
with asymmetrical coupler	Direct Mount	Secondary Path	6	6	6	6	6
2+0 DP (OMT)	Direct Mount	Integrated antenna	0.5	0.5	0.5	0.5	0.5
2+0/1+1 FD SP		Integrated antenna	3.8	3.8	3.9	4	4



**Note**

The antenna interface is always the RFU-C interface.

If other antennas are to be used, an adaptor with a 0.1 dB loss should be considered.