Cambium Networks™

INSTALLATION GUIDE

PTP 850C

Release 13.1

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Contents

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.
- PTP 850C is intended for installation in a restricted access location.
- PTP 850C must be installed and permanently connected to protective earth by qualified service personnel in accordance with applicable national electrical codes.
- Site grounding is the responsibility of the operator or owner of the site. It is critical that all site components be properly grounded in accordance with the specific site requirements and applicable industry standards and best practices. Ground resistance must be no more than 5 ohms. Any higher resistance may lead to equipment malfunction and affect the product's warranty.

Safety Precautions & 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 PTP 850C:

- The public exposure of compliance boundary distance is 4.1m. This is the worst case for the highest nominal output power, using 11GHz frequency band antennas up to 3 feet, using 13GHz frequency band antennas up to 2 feet, and using 6-8, 15-26, and 38GHz frequency bands and antennas up to 1 feet. For all other configurations, the compliance boundary distance is 0.
- The occupational exposure of compliance boundary distance is 0.5m. This is the worst case for the highest nominal output power, using 11/13 GHz frequency bands and antennas up to 1 ft. For all other configurations, the compliance boundary distance is 0.

Note:

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

Warning:

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.

Warning:

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.

Warning:

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

Warning:

When working with an PTP 850C, 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.

Warning:

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

Warning:

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 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.
- 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.

Caution:

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 850C 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.

Précautions générales relatives à l'équipement

AVERTISSEMENT :

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.

AVERTISSEMENT :

L’usage de PTP 850C 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.

AVERTISSEMENT :

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

WARNUNG:

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

WARNUNG:

Beachten Sie beim Arbeiten mit PTP 850C das folgende Stromschlag- und Gefahrenrisiko: Durch Abtrennen einer Stromquelle wird nur ein

WARNUNG:

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 should 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. Report any damage or discrepancy to a Cambium representative, by e-mail or fax.

Product Hardware Description

PTP 850C Hardware Overview

PTP 850C features an all-outdoor dual-carrier architecture consisting of a single unit directly mounted on the antenna.

Figure 1 *PTP 850C Rear View (Left) and Front View (Right)*

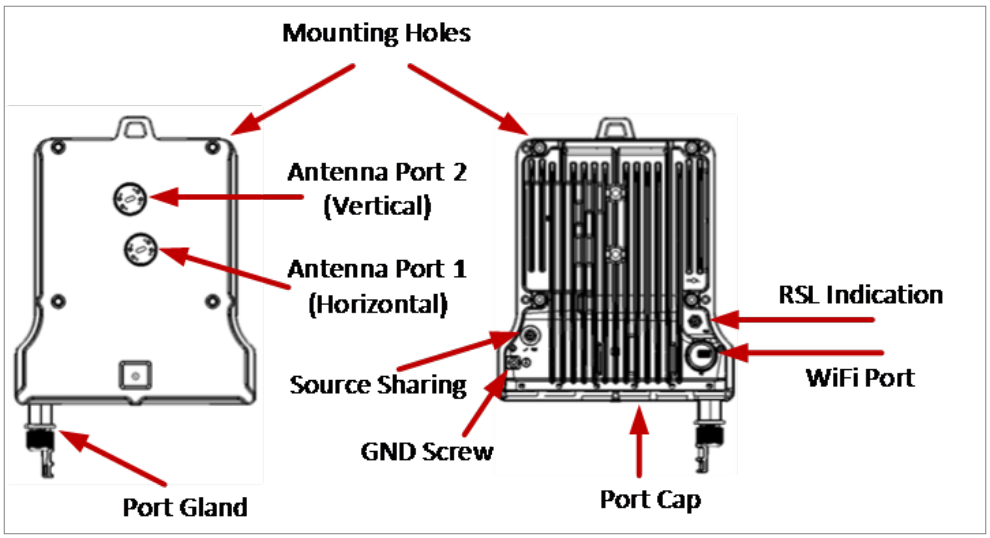
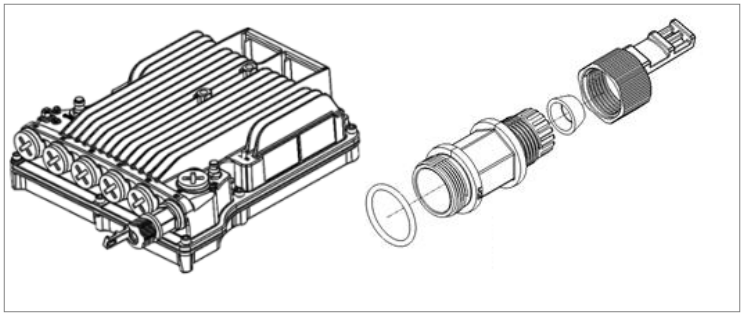


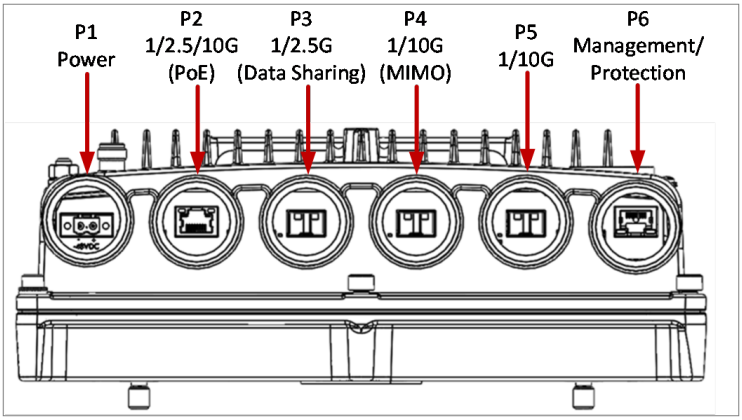
Figure 2 *Cable Gland Construction*



PTP 850C Interfaces

The following figure shows the traffic, management, and power interfaces on the PTP 850C.

Figure 3 *PTP 850C Interfaces*



- Port 1 – Power Interface (-48V)
- Port 2 (Eth 1):
  - RJ-45: 1000BASE-T, 2.5GBASE-T, 10GBASE-T
  - PoE
- Port 3 (Eth 2):
  - SFP cage which supports SFP standard
  - Optical: 1000BASE-X, 2.5GBASE-X
  - Optical: 1/2.5GE
- Port 4 (Eth 3):
- SFP cage which supports SFP+ standard
- Optical: 1000BASE-X, 10GBASE-X
- Optical: Cambium proprietary MIMO interface, if this port serves as an extension port for data sharing. By default, the port is a traffic port unless a MIMO group has been created
- Port 5 (Eth 4):
- SFP cage which supports SFP+ standard
- Optical: 1000BASE-X, 10GBASE-X
- Port 6:
  - RJ-45: 100BASE-T
  - Management and Protection port (no traffic)
- 2 RF Interfaces: Standard interface per frequency band
- RSL interface: BNC connector
- Source sharing: TNC connector
- Grounding screw

Note:

Some limitations on supported interface usage and speed may exist. For details, refer to the Release Notes or Technical Description for the System Release version you are using.

Marketing Models for PTP 850C Radio and Diplexer Units

For frequencies of 6 to 11 GHz, PTP 850C uses the Easy Set technology in which two individual units are ordered: a generic radio unit and a diplexer unit.

For frequencies of 13 to 42 GHz, a single PTP 850C unit is ordered, consisting of both the radio and the diplexers.

This section explains how to read PTP 850C marketing models, including marketing models for the diplexer unit for 6-11 GHz links. Constructing a marketing model for the purpose of ordering equipment should always be done using a configurator.

Note:

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

Marketing Models for Easy Set PTP 850C Radio and Diplexer Units, 6 to 11 GHz

For frequencies of 6 to 11 GHz, the PTP 850C radio unit and diplexer unit are ordered separately. Using Easy Set technology, the diplexer unit is assembled on the PTP 850C radio unit during link installation in the field. The radio unit is generic; only the diplexer unit (DXU) is sub-band specific, which facilities link planning, ordering, and maintenance as described above.

Table 1 provides the marketing model syntax for the PTP 850C Easy Set radio unit.

Table 2 provides the marketing model syntax for the PTP 850C Easy Set diplexer unit.

Table 1: *PTP 850C Marketing Model Syntax, 6 to 11 GHz (Radio Unit)*

Marketing Model	Description
PTP 850C-ff	PTP 850C, Multicore ff GHz, All-Outdoor, Basic Radio

Table 2: *PTP 850C Marketing Model Syntax, 6 to 11 GHz (Diplexer Unit)*

Marketing Model	Description
DXCff-xxxY-ccWdd-t	Diplexers Unit, ff GHz, Block xxxY, ccWdd, High/Low

Table 3: *PTP 850C Marketing Model Structure– Possible Values (Easy Set - Radio Unit Only)*

Placeholder in Marketing Model	Description	Possible Values
ff	Frequency band	06,07,08,10,11

Table 4: *PTP 850C Marketing Model Structure– Possible Values (Easy Set - Diplexer Unit Only)*

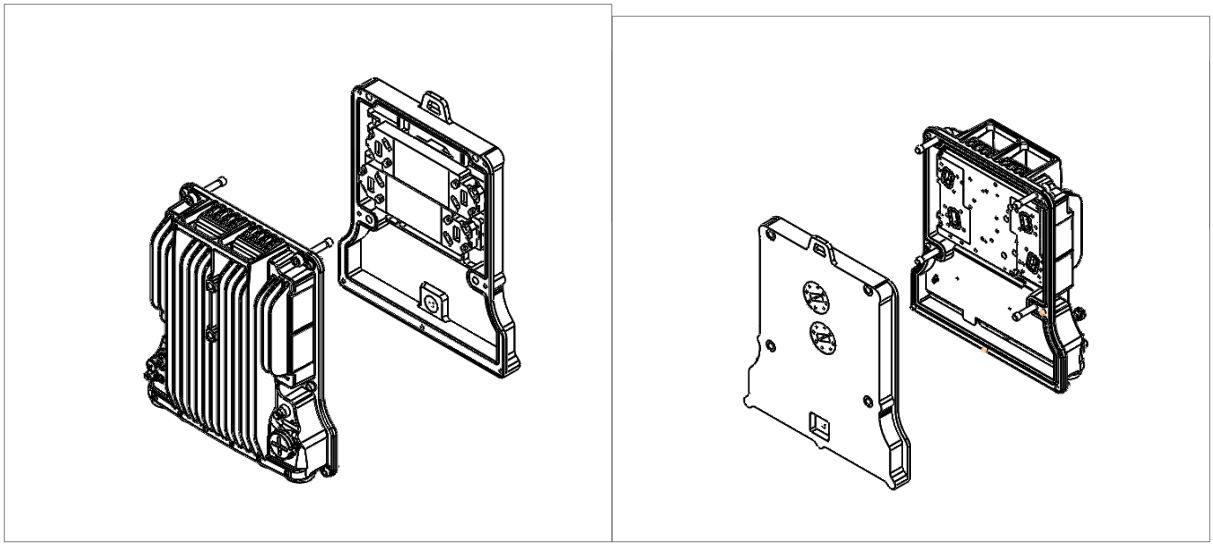
Placeholder in Marketing Model	Description	Possible Values
ff	Frequency band	L6,U6,07,08,10,11
xxxY	TX-RX separation and block indication (Cambium internal)	xxx - TRS 3 figures in [MHz]. Y - Letter to indicate frequency block. Example: 266A The frequency block is a Cambium internal parameter which defines different channelization using the same TRS and frequency band.
ccWdd	Channel indication or LOW/HIGH or blank	{Start ch}W{End ch} Example: 10W15
t	TX low / TX high indication	L – TX Low H – TX high

Table 5 provides examples of specific PTP 850C diplexer unit marketing models based on the syntax described above.

Table 5: *PTP 850S Diplexer Unit Marketing Model Examples*

Marketing Model Example	Explanation
DXCL6-252A-01W04-L	PTP 850C Diplexer Unit, Lower 6 GHz, TRS block 252A, Ch 1 to 4, Tx low
DXC11-500-07W13-H	PTP 850C Diplexer Unit, 11 GHz, TRS block 500, Ch 7 to 13, Tx high

Figure 4 *Radio Unit and Diplexer Uni*



Marketing Model for PTP 850C Unit, 13-42 GHz

When ordering an PTP 850C, a single unit is ordered as a single unit. The following PTP 850C hardware models are available.

Table 6: *PTP 850C Marketing Models*

Marketing Model	TX Range	RX Range
PTP 850C-E-13-266-1W4-H	13002-13141	12745.75-12866
PTP 850C-E-13-266-1W4-L	12745.75-12866	13002-13141
PTP 850C-E-15-420-1W8-H	14921-15145	14501-14725
PTP 850C-E-15-420-1W8-L	14501-14725	14921-15145
PTP 850C-E-18-H-H	19160-19700	18126-18690
PTP 850C-E-18-H-L	18126-18690	19160-19700
PTP 850C-E-23-H	23000-23600	22000-22600
PTP 850C-E-23-L	22000-22600	23000-23600

For availability of other frequencies, check with your Cambium representative.

MultiCore Mediation Devices (MCMD)

The MultiCore Mediation Devices (MCMD) are designed to offer a simple and compact solution for a direct mount installation of the dual-carrier PTP 850C on a standard RFU-C antenna.

PTP 850C is equipped with two antenna ports, which mandates the use of the following MCMDs for direct mount connections. The specific MCMDs depend on the configuration.

The following describes some of the available MCMDs. For a full list of components, refer to System Components.

Note:

MCMDs are not grounded. In order to add grounding, the MCMD can be connected to the PTP 850C using a Grounding Jumper.

Table 7: *MCMD Comparison*

MCMD type	Functionality
Splitter	Combines the two carriers using the same polarization
OMT	Combines the two carriers on alternate polarizations (H,V)

Figure 5 *Splitter*

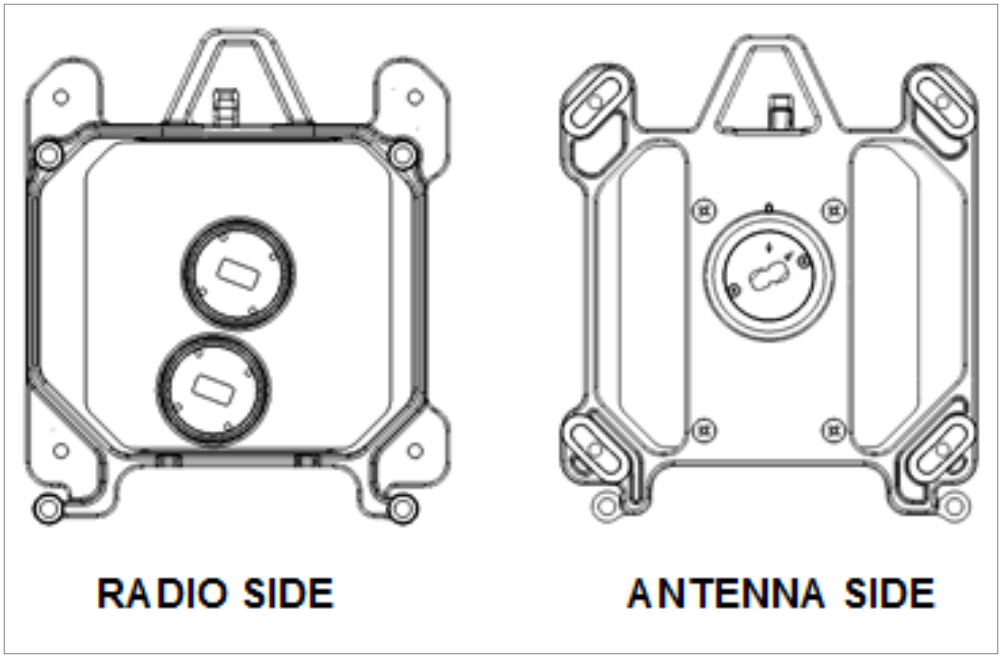
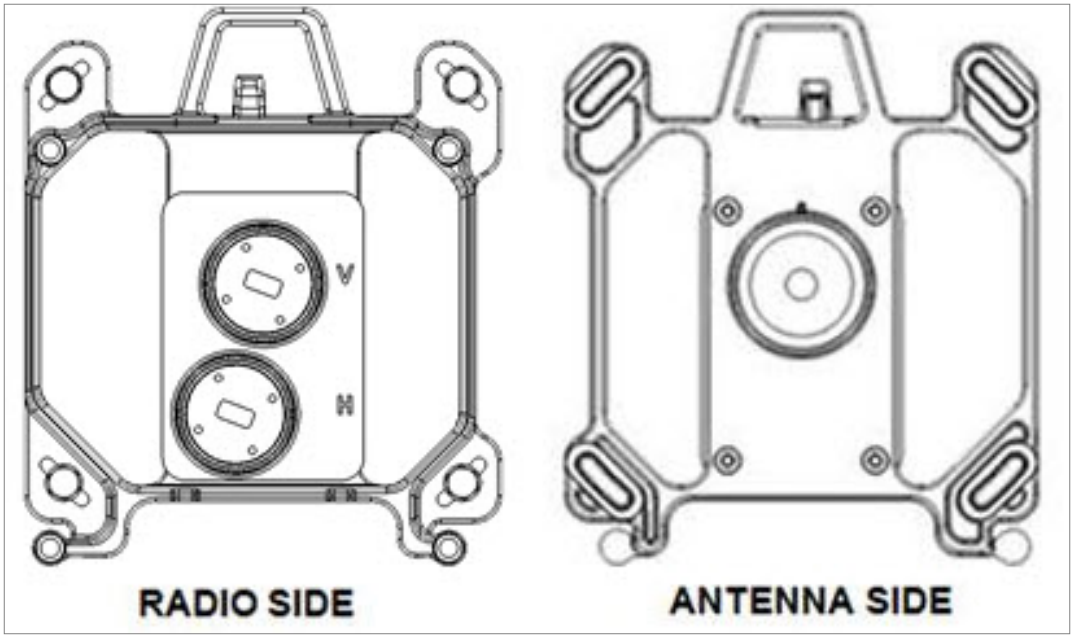


Figure 6 *OMT*



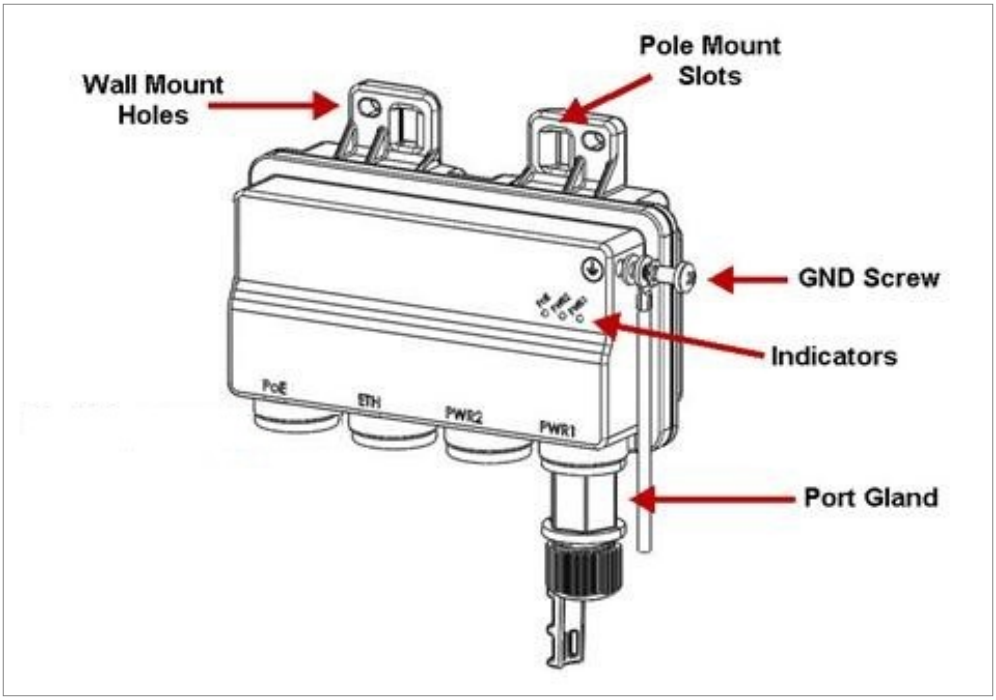
PoE Injector

The PoE injector is an outdoor unit which can be mounted on a wall, pole, or indoor rack.

Each PoE Injector kit includes the following items:

- PoE injector
- 2 DC power connectors

Figure 7 *PoE Injector*



Two models of the PoE Injector are available:

- PoE_Inj_AO_2DC_24V_48V – Includes two DC power ports with power input ranges of -(18-60)V each.
- PoE_Inj_AO – Includes one DC power port (DC Power Port #1), with a power input range of -(40-60)V.

Note:

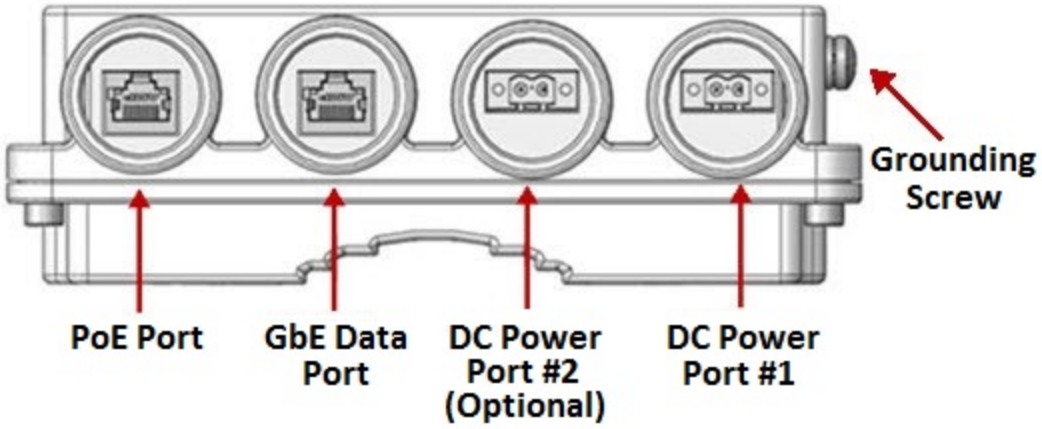
- These PoE injectors cannot be used if the PoE port (P2, Eth1) is set to 10 Gbps mode.

  PoE_Inj_AO can only be used for frequencies of 13 GHz to 42 GHz.

PoE Injector Interfaces

- Power-Over-Ethernet (PoE) Port
- GbE Data Port supporting 10/100/1000Base-T
- DC Power Port 1 -(18-60)V or -(40-60)V
- DC Power Port 2 -(18-60)V
- Grounding screw

Figure 8 *PoE Injector Ports*



System Components

The following figures show the main components used in the PTP 850C installation procedures.

Note:

The availability of the installation components follows the PTP 850C 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.

Figure 9 *PTP 850C*

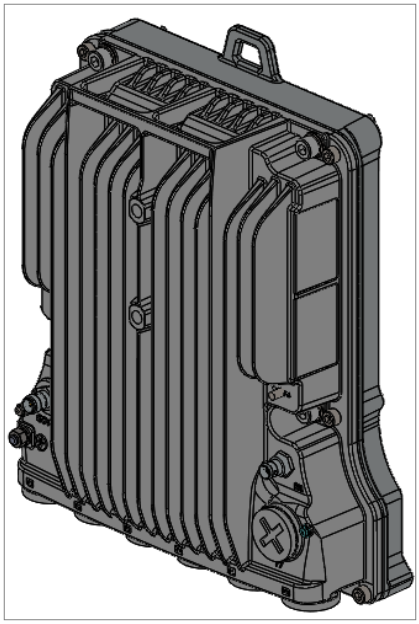


Figure 10 *Dual Core Coupler/Splitter*

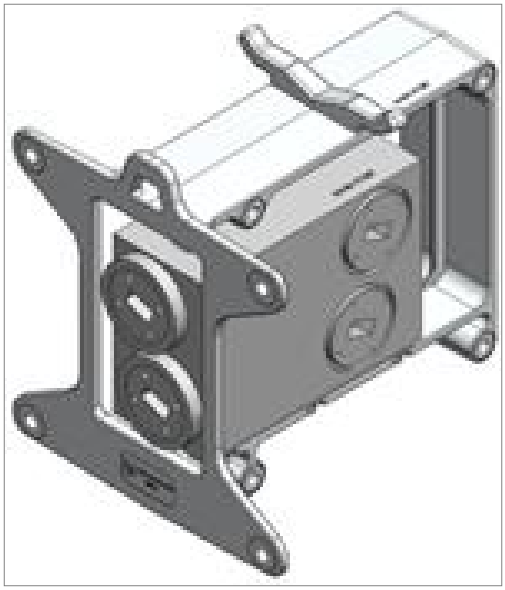


Figure 11 *DC OMT*

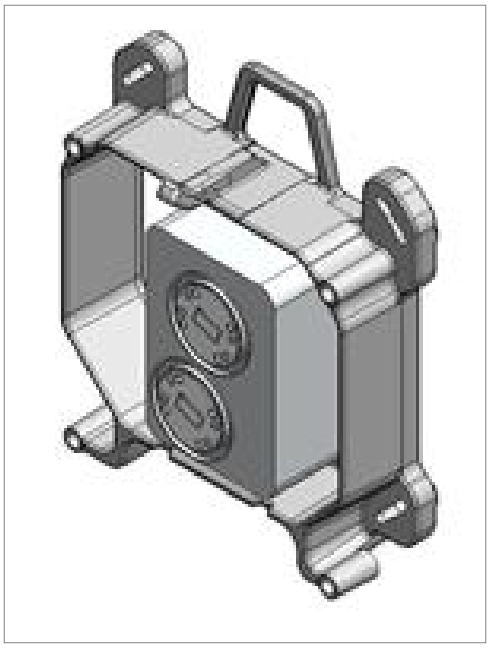


Figure 12 *Remote Pole Mount*

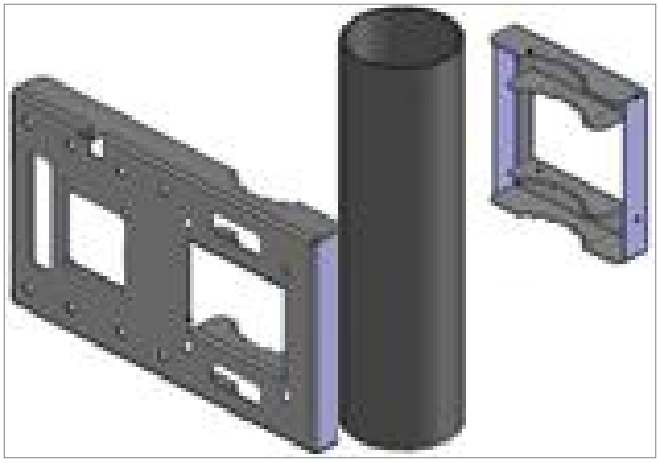


Figure 13 *Remote Dual Pole Mount*

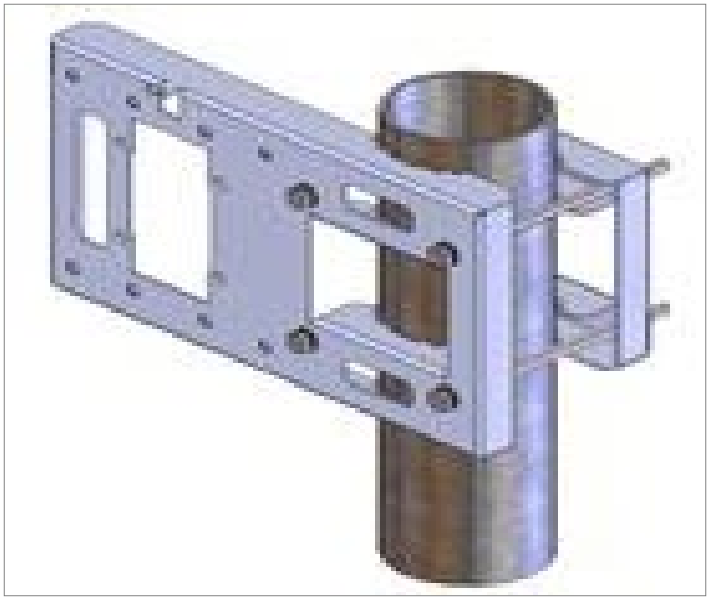


Figure 14 *DC Splitter*

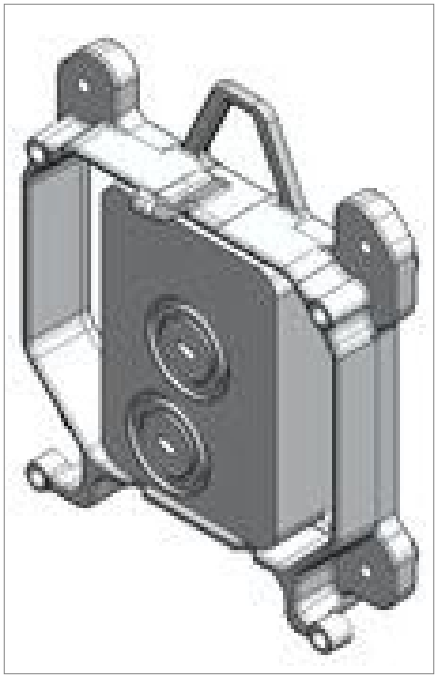
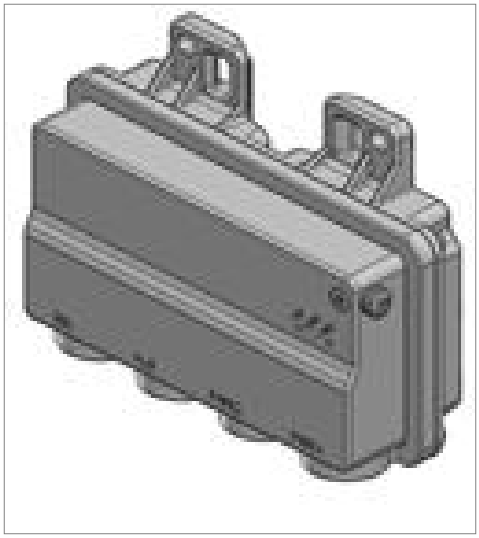


Figure 15 *Adaptor for 13 GH*

Figure 16 *PoE Injector*



Adaptors and Installation Kits

Table 8: *Adaptors and Installation Kits, 6 GHz – 18 GHz*

Description	6 GHz	7-8 GHz	10-11 GHz	13 GHz	15 GHz	18 GHz
PTP 820C DUAL COUPLER KIT	PTP 820C_ DUAL_ CPLR_kit_ 6G	PTP 820C_ DUAL_ CPLR_kit_7-8G	PTP 820C_ DUAL_ CPLR_kit_ 10-11G	PTP 820C_ DUAL_ CPLR_kit_ 13G	PTP 820C_ DUAL_ CPLR_kit_ 15G	PTP 820C_ DUAL_ CPLR_kit_ 18G
PTP 820C DUAL SPLITTER KIT	PTP 820C_ DUAL_ SPLTR_kit_ 6G	PTP 820C_ DUAL_ SPLTR_kit_ 7-8G	PTP 820C_ DUAL_ SPLTR_kit_ 10-11G	PTP 820C_ DUAL_ SPLTR_kit_ 13G	PTP 820C_ DUAL_ SPLTR_kit_ 15G	PTP 820C_ DUAL_ SPLTR_kit_ 18G
PTP 820C SPLITTER KIT	PTP 820C_ SPLT_kit_ 6G	PTP 820C_ SPLT_kit_7-8G	PTP 820C_ SPLT_kit_10-11G	PTP 820C_ SPLT_kit_ 13G	PTP 820C_ SPLT_kit_ 15G	PTP 820C_ SPLT_kit_ 18G
PTP 820C OMT KIT	PTP 820C_ OMT_kit_ 6G	PTP 820C_ OMT_kit_7-8G	PTP 820C_ OMT_kit_10-11G	PTP 820C_ OMT_kit_ 13G	PTP 820C_ OMT_kit_ 15G	PTP 820C_ OMT_kit_ 18G
PTP 820C DUAL CORE KIT	PTP 820C_ DUAL_ CORE_MD_ kit_6G	PTP 820C_ DUAL_ CORE_MD_ kit_7_8G	PTP 820C_ DUAL_ CORE_MD_ kit_10-11G	PTP 820C_ DUAL_ CORE_MD_ kit_13G	PTP 820C_ DUAL_ CORE_MD_ kit_15G	PTP 820C_ DUAL_ CORE_MD_ kit_18G
PTP 820C DC ADAPTOR REMOTE	PTP 820C_ 6G_Rmt_ Mnt_adpt	PTP 820C_ 7-8G_Rmt_ Mnt_adpt	PTP 820C_ 10-11G_Rmt_ Mnt_adpt	PTP 820C_ 13G_Rmt_ Mnt_adpt		

Description	6 GHz	7-8 GHz	10-11 GHz	13 GHz	15 GHz	18 GHz
MOUNT KIT						
PTP 820C DC REMOTE MOUNT OMT ADAPTOR KIT	PTP 820C_ RM_OMT_ 6G_adpt	PTP 820C_ RM_OMT_ 7_8G_adpt	PTP 820C_ RM_OMT_ 10-11G_adpt			

Table 9: *Adaptors and Installation Kits, 23 GHz – 38 GHz*

Description	23 GHz	26 GHz	28-31 GHz	32 GHz	38 GHz
PTP 820C DUAL COUPLER KIT	PTP 820C_ DUAL_CPLR_ kit_23G	PTP 820C_ DUAL_CPLR_ kit_26G	PTP 820C_ DUAL_CPLR_ kit_28G	PTP 820C_ DUAL_CPLR_ kit_32G	PTP 820C_ DUAL_CPLR_ kit_38G
PTP 820C DUAL SPLITTER KIT	PTP 820C_ DUAL_SPLTR_ kit_23G	PTP 820C_ DUAL_SPLTR_ kit_26G	PTP 820C_ DUAL_SPLTR_ kit_28G	PTP 820C_ DUAL_SPLTR_ kit_32G	PTP 820C_ DUAL_SPLTR_ kit_38G
PTP 820C SPLITTER KIT	PTP 820C_ SPLT_kit_23G	PTP 820C_ SPLT_kit_26G	PTP 820C_ SPLT_kit_28G	PTP 820C_ SPLT_kit_32G	PTP 820C_ SPLT_kit_38G
PTP 820C OMT KIT	PTP 820C_ OMT_kit_23G	PTP 820C_ OMT_kit_26G	PTP 820C_ OMT_kit_28G	PTP 820C_ OMT_kit_32G	PTP 820C_ OMT_kit_38G
PTP 820C DUAL CORE KIT	PTP 820C_ DUAL_CORE_ MD_kit_23G	PTP 820C_ DUAL_CORE_ MD_kit_26G	PTP 820C_ DUAL_CORE_ MD_kit_28G	PTP 820C_ DUAL_CORE_ MD_kit_32G	PTP 820C_ DUAL_CORE_ MD_kit_38G

Table 10: *Adaptors and Installation Kits, Remote Mount - 6 GHz – 15 GHz*

Remote Mount	6 GHz	7-8 GHz	10-11 GHz	13 GHz	15 GHz
RFU-C REMOTE MOUNT KIT	RFU-C-PoleMount				
PTP 820C DC REMOTE MOUNT KIT	PTP 820C-Pole-Mount				
RFU-C ADAPTOR REMOTE MOUNT KIT	RFU-C6-RM_ ADAPT	RFU-C7_8-RM_ ADAPT	RFU-C10_11-RM_ADAPT	RFU-C13-RM_ ADAPT	
RFU-C WG Kit	Flx-WG-4FT-6	Flx-WG-4FT-7_ 8	Flx-WG-4FT-10_ 11	Flx-WG-3FT-13	Flx-WG-3FT-15
RFU-C ADAPTOR TO FLEX WG (IMPERIAL) KIT	ADPT_RFU-C6-RM_mill	ADPT_RFU-C7_8-RM_mill	ADPT_RFU-C10_11-RM_mill	ADPT_ RFU-C13-RM_mill	ADPT_ RFU-C15-RM_mill
PTP 820C DC REMOTE	PTP 820C_	PTP 820C_	PTP 820C_RM_		

Remote Mount	6 GHz	7-8 GHz	10-11 GHz	13 GHz	15 GHz
MOUNT OMT ADAPTOR KIT	RM_OMT_ 6G_adpt	RM_OMT_7_ 8G_adpt	OMT_10-11G_ adpt		

Table 11: *Adaptors and Installation Kits, Remote Mount - 18 GHz – 42 GHz*

Remote Mount	18 GHz	23 GHz	26 GHz	28-31 GHz	32 GHz	38 GHz	42 GHz
RFU-C REMOTE MOUNT KIT	RFU-C-PoleMount						
PTP 820C DC REMOTE MOUNT KIT	PTP 820C-Pole-Mount						
RFU-C ADAPTOR REMOTE MOUNT KIT							
RFU-C WG Kit	Flx-WG-3FT-18-26			Flx-WG-3FT-28-38			Flx-WG-3FT-42
RFU-C ADAPTOR TO FLEX WG (IMPERIAL) KIT	ADPT_RFU-C18_26-RM_mill			ADPT_RFU-C28_38-RM_mill			

Table 12: *1500P Adaptors - 6GHz – 23 GHz*

1500P Adaptors	6 GHz	7-8 GHz	10-11 GHz	13 GHz	15 GHz	18 GHz	23 GHz
RFU-C-PHOSPHORUS DM ADAPTOR KIT			ADPT_RFU-C10_11-DM_ 1500P	ADPT_ RFU-C13-DM_1500P	ADPT_ RFU-C15-DM_1500P	ADPT_ RFU-C18-DM_1500P	ADPT_ RFU-C23-DM_1500P

Table 13: *1500P Adaptors - 26 GHz – 42 GHz*

1500P Adaptors	26 GHz	28-31 GHz	32 GHz	38 GHz	42 GHz
RFU-C-PHOSPHORUS DM ADAPTOR KIT	ADPT_RFU-C26-DM_1500P	ADPT_RFU-C28-DM_1500P	ADPT_RFU-C32-DM_1500P	ADPT_RFU-C38-DM_1500P	NA

Table 14: *Imperial to mm Transitions – 6 GHz – 15 GHz*

Imperial to mm Transitions	6 GHz	7-8 GHz	10-11 GHz	13 GHz	15 GHz
RFU-C ADAPTOR KIT TO IMPERIAL ANT.	ADPT_RFU-C6-RM_Imp	ADPT_RFU-C7_8-RM_Imp	ADPT_RFU-C10_11-RM_Imp	ADPT_RFU-C13-RM_Imp	ADPT_RFU-C15-RM_Imp
RFU-C ADAPTOR KIT TO IMP WG	ADPT_RFU-C6-RM_mill	ADPT_RFU-C7_8-RM_mill	ADPT_RFU-C10_11-RM_mill	ADPT_RFU-C13-RM_mill	ADPT_RFU-C15-RM_mill

Table 15: *Imperial to mm Transitions – 18 GHz – 42 GHz*

Imperial to mm Transitions	18 GHz	23 GHz	26 GHz	28-31 GHz	32 GHz	38 GHz	42 GHz
RFU-C ADAPTOR KIT TO IMPERIAL ANT.	ADPT_RFU-C18_26-RM_ Imp			ADPT_RFU-C28_38-RM_ Imp			NA
RFU-C ADAPTOR KIT TO IMP WG	ADPT_RFU-C18_26-RM_ mill			ADPT_RFU-C28_38-RM_ mill			NA

Table 16: *Antenna Circ. Adapters for OMT – 6 GHz – 18 GHz*

Note:

This adapter is not required if the antenna is equipped with a circular feeder. Such antenna will have the following marketing model structure.

Am-size(ft)-freq-CIRC-mnf.

Antenna Circ. Adapters for OMT	6 GHz	7-8 GHz	10-11 GHz	13 GHz	15 GHz	18 GHz
CommScope	RFU-C6-OMT-INT-A	RFU-C7_8-OMT-INT-A	RFU-C10_11-OMT-INT-A	RFU-C13-OMT-INT-A	RFU-C15-OMT-INT-A	RFU-C18-OMT-INT-A
Radio Waves	RFU-C6L-OMT-INT-RW /RFU-C6H-OMT-INT-RW	RFU-C7_8-OMT-INT-RW	RFU-C10_11-OMT-INT-RW	RFU-C13-OMT-INT-RW	RFU-C15-OMT-INT-RW	RFU-C18-OMT-INT-RW
LEAX (Cambium branding)	RFU-C6-OMT-INT-CR1	RFU-C7_8-OMT-INT-CR1	RFU-C10_11-OMT-INT-CR1	RFU-C13-OMT-INT-CR1	RFU-C15-OMT-INT-CR1	RFU-C18-OMT-INT-CR1
Xian Putian (Cambium branding)	RFU-C6-OMT-INT-CR	RFU-C7_8-OMT-INT-CR	RFU-C10_11-OMT-INT-CR	RFU-C13-OMT-INT-CR	RFU-C15-OMT-INT-CR	RFU-C18-OMT-INT-CR
Xian Putian (OEM branding)	RFU-C6-OMT-INT-X	RFU-C7_8-OMT-INT-X	RFU-C10_11-OMT-INT-X	RFU-C13-OMT-INT-X	RFU-C15-OMT-INT-X	RFU-C18-OMT-INT-X

Table 17: *Antenna Circ. Adapters for OMT – 23 GHz – 42 GHz*

Note:

This adapter is not required if the antenna is equipped with a circular feeder. Such antenna will have the following marketing model structure: Am-size(ft)-freq-CIRC-mnf.

Antenna Circ. Adapters for OMT	23 GHz	26 GHz	28 GHz	32 GHz	38 GHz	42 GHz
CommScope	RFU-C23-	RFU-C26-	RFU-C28-	RFU-C32-	RFU-C38-	RFU-C42-

Antenna Circ. Adapters for OMT	23 GHz	26 GHz	28 GHz	32 GHz	38 GHz	42 GHz
	OMT-INT-A	OMT-INT-A	OMT-INT-A	OMT-INT-A	OMT-INT-A	OMT-INT-A
Radio Waves	RFU-C23-OMT-INT-RW	RFU-C26-OMT-INT-RW	RFU-C28-OMT-INT-RW	NA	RFU-C38-OMT-INT-RW	NA
RFU-C23-OMT-INT-CR1	RFU-C26-OMT-INT-CR1	RFU-C28-OMT-INT-CR1	RFU-C32-OMT-INT-CR1	RFU-C38-OMT-INT-CR1	RFU-C42-OMT-INT-CR1	RFU-C23-OMT-INT-CR1
Xian Putian (Cambium branding)	RFU-C23-OMT-INT-CR	RFU-C26-OMT-INT-CR	RFU-C28-OMT-INT-CR	RFU-C32-OMT-INT-CR	RFU-C38-OMT-INT-CR	NA
Xian Putian (OEM branding)	RFU-C23-OMT-INT-X	RFU-C26-OMT-INT-X	RFU-C28-OMT-INT-X	RFU-C32-OMT-INT-X	RFU-C38-OMT-INT-X	NA

Table 18: *PoE Injector*

Marketing Model	Description
PoE_Inj_AO	PoE Injector all outdoor, -48VDC (Default offering)
PoE_Inj_AO_2DC_24V_48V	POE Injector all outdoor, redundant DC input, -48VDC
PoE_Inj_19inch_Rack_Mnt_kit	PoE Injector 19” Rack Mount Kit
PoE_Inj_ETSI_Rack_Mnt_kit	PoE Injector ETSI Rack Mount Kit

Antenna Connection

PTP 850C can be mounted directly for all supported frequencies (13-23 GHz) using the following antenna types (for integrated antennas, specific antennas part numbers are required):

- CommScope: VHLP 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 19: *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.
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					

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 PTP 850C to the antenna interface.

Power Specifications

Electrical Requirements

- -48V DC Nominal
- Maximum current rating 2.222 A

Table 20: *Power Connection Options*

Interface	Cable Type	Recommended Cable	Maximum Length	
			6-11 GHz	13-42 GHz
Optical	Fiber		300m	
Electrical at 1G (with PoE_Inj_AO_2DC_24V_48V or without PoE)	CAT-5e (24 AWG)	CAT5E_SFUTP_Outdoor_100m_drum	100 m	
	CAT-6A (22 AWG)	CAT6A_SFTP_Outdoor_305m_drum		
Electrical at 1G (with PoE_Inj_AO)	CAT-5e (24 AWG)	CAT5E_SFUTP_Outdoor_100m_drum	Not available	80m
	CAT-6A (22 AWG)	CAT6A_SFTP_Outdoor_305m_drum		

Interface	Cable Type	Recommended Cable	Maximum Length	
			6-11 GHz	13-42 GHz
Electrical at 10G (no PoE)	CAT-6A (22 AWG)	CAT6A_SFTP_Outdoor_305m_drum	90m	
DC Power	DC (18 AWG)		50m	60m
	DC (14 AWG)		120m	150m
	DC (12 AWG)		200m	240m

Note:

- 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.
- 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 3 Amp.

Environmental Specifications

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

Temperature range: -33°C (-27°F) to +55°C (131°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

Cable Installation and Grounding

Minimum and Maximum Cable Diameter

To fit the gland, the outer cable diameter should be between 6-10 mm. This applies to all glands on both the PTP 850C unit and the PoE Injector.

Grounding the Cables

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 Ethernet cables, the shielded Ethernet cable (SF/UTP construction) must be grounded to the antenna tower at the top (next to the PTP 850C unit), the entry to the indoor cabinet, and every 50m, using the kit UNIV_GRD_KIT_1/2.

Figure 17 *Cable Grounding Kit*

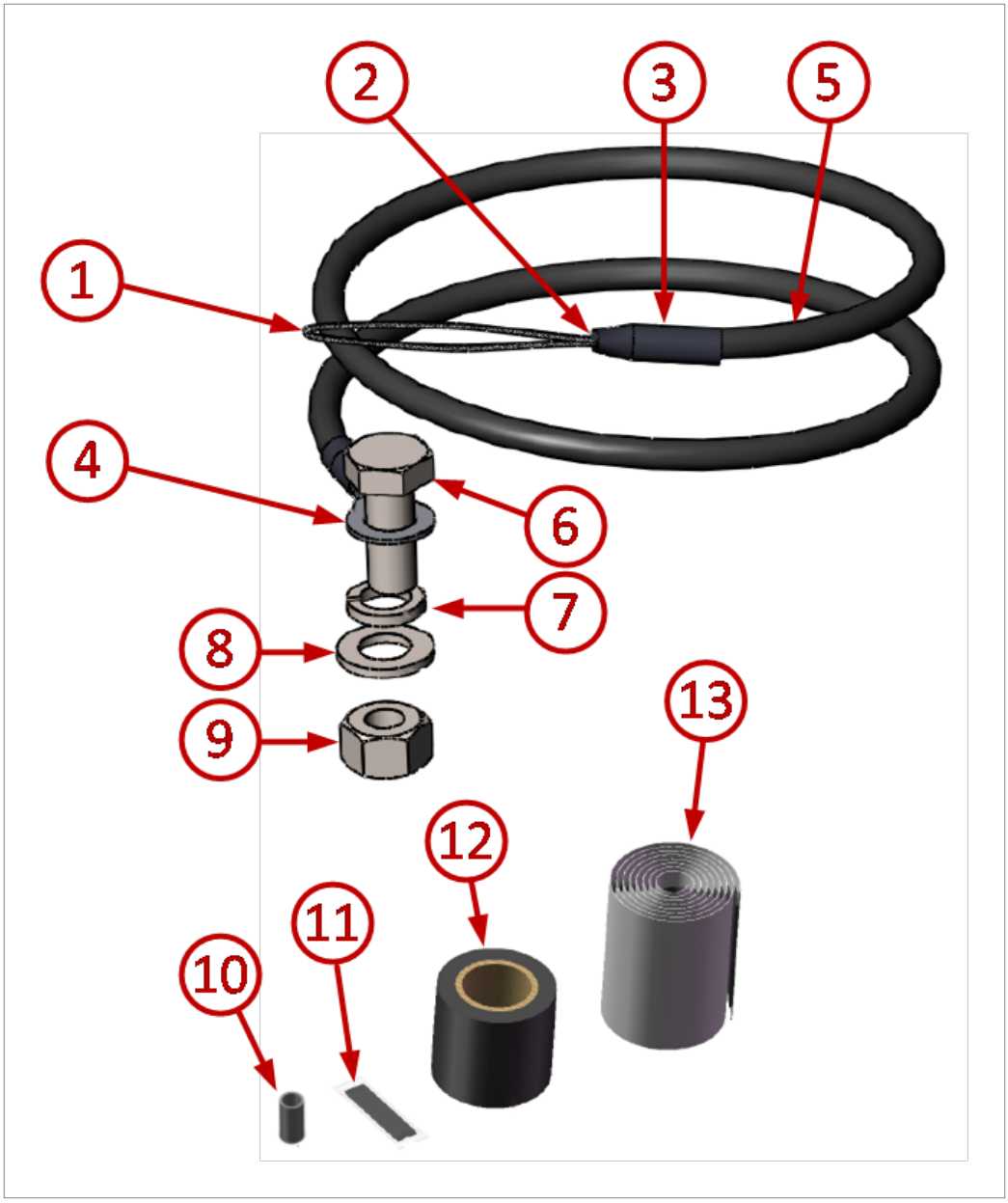
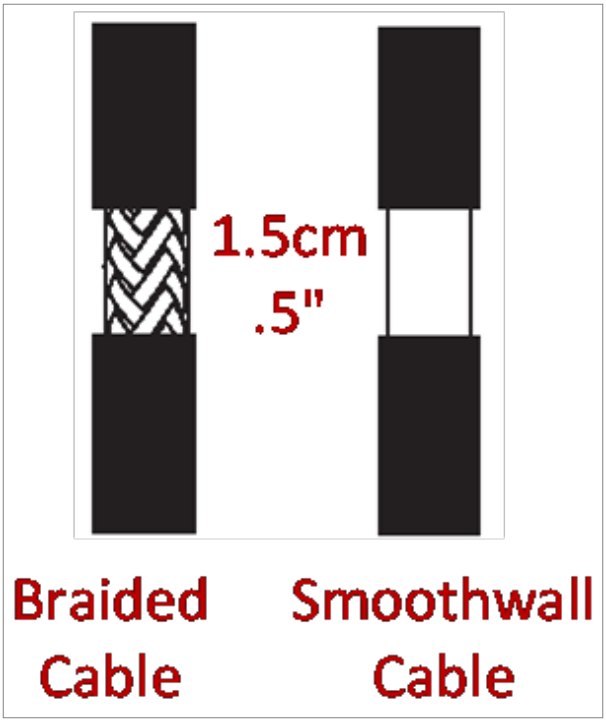


Table 21: *Cable Grounding Kit*

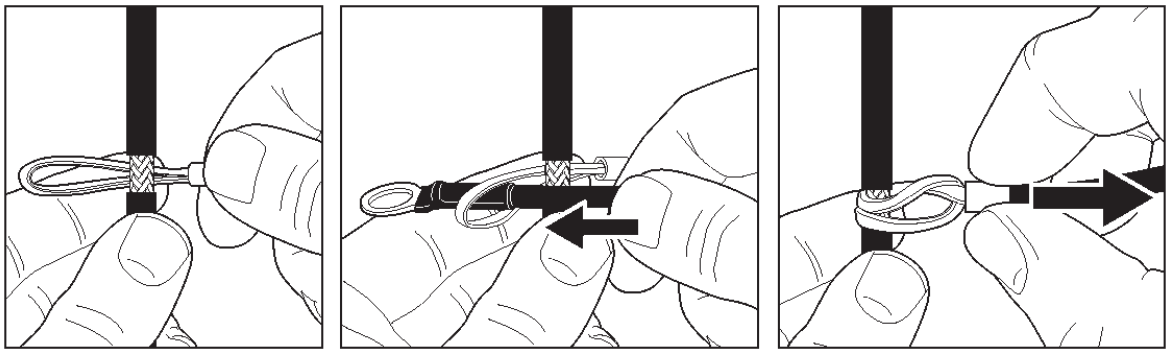
Marketing P/N	Description
UNIV_GRD_KIT_1/2	Universal Grounding Kit up to 1/2” cable

To connect the grounding kit:

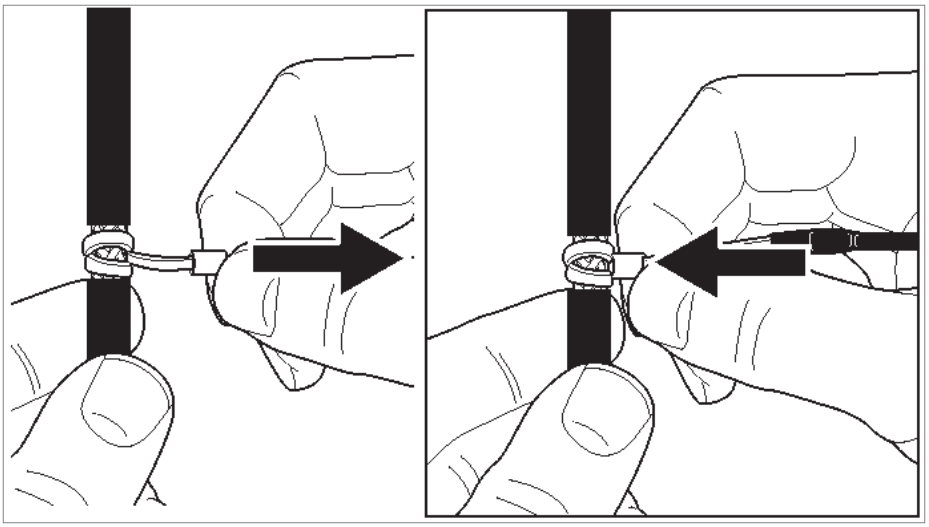
1. Strip the cable jacket about 1.5 cm (.5”).



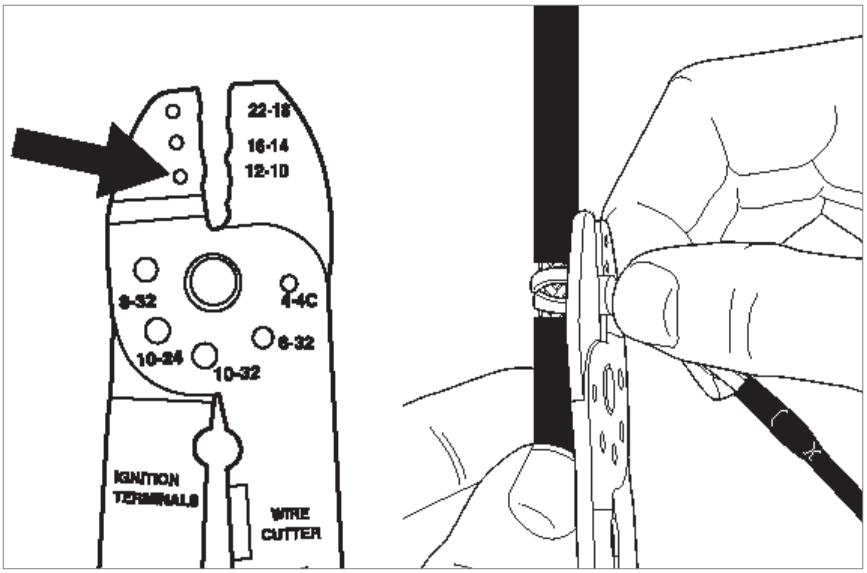
2. Loop the grounding wire’s braid belt (1) around the stripped portion of the cable, insert the rest of the grounding wire (5) through the braid belt, and tighten to form a knot, as shown in the figure below.

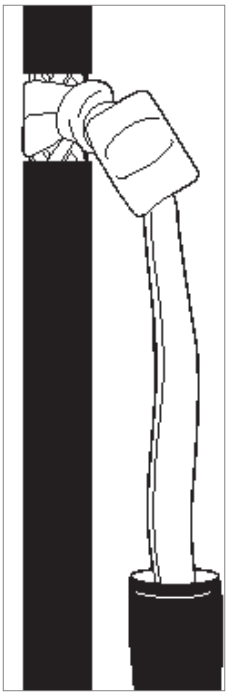


3. Grasp the terminal of the braid belt (2) and slide it flush with the knot around the cable, as shown in the figure below.

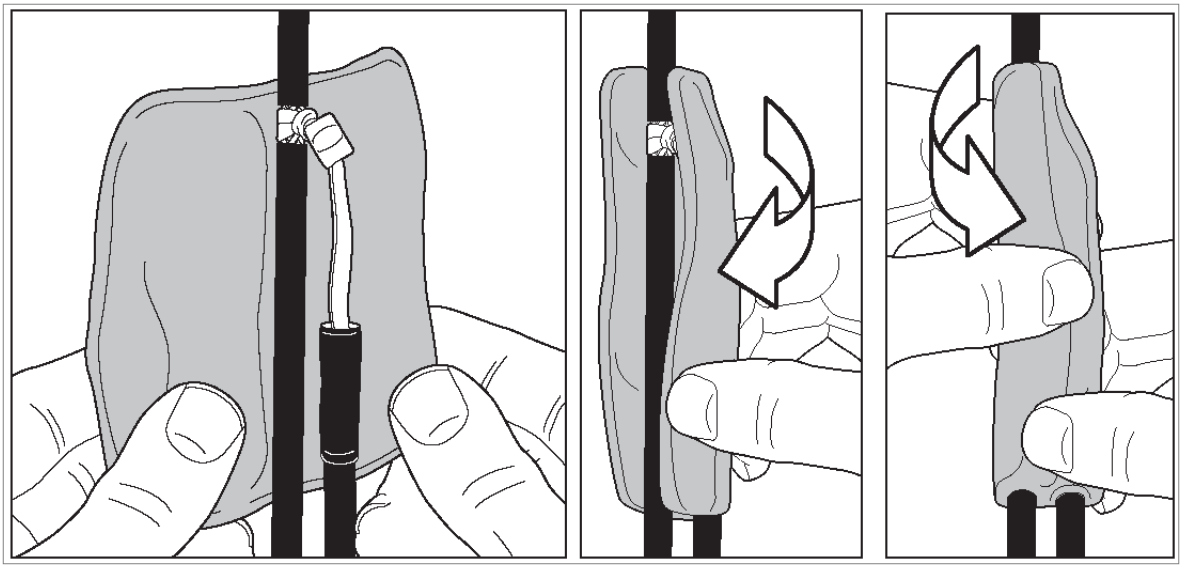


4. Crimp the knotted braid belt (1) and the bare terminal (10) together, as shown in the figures below.

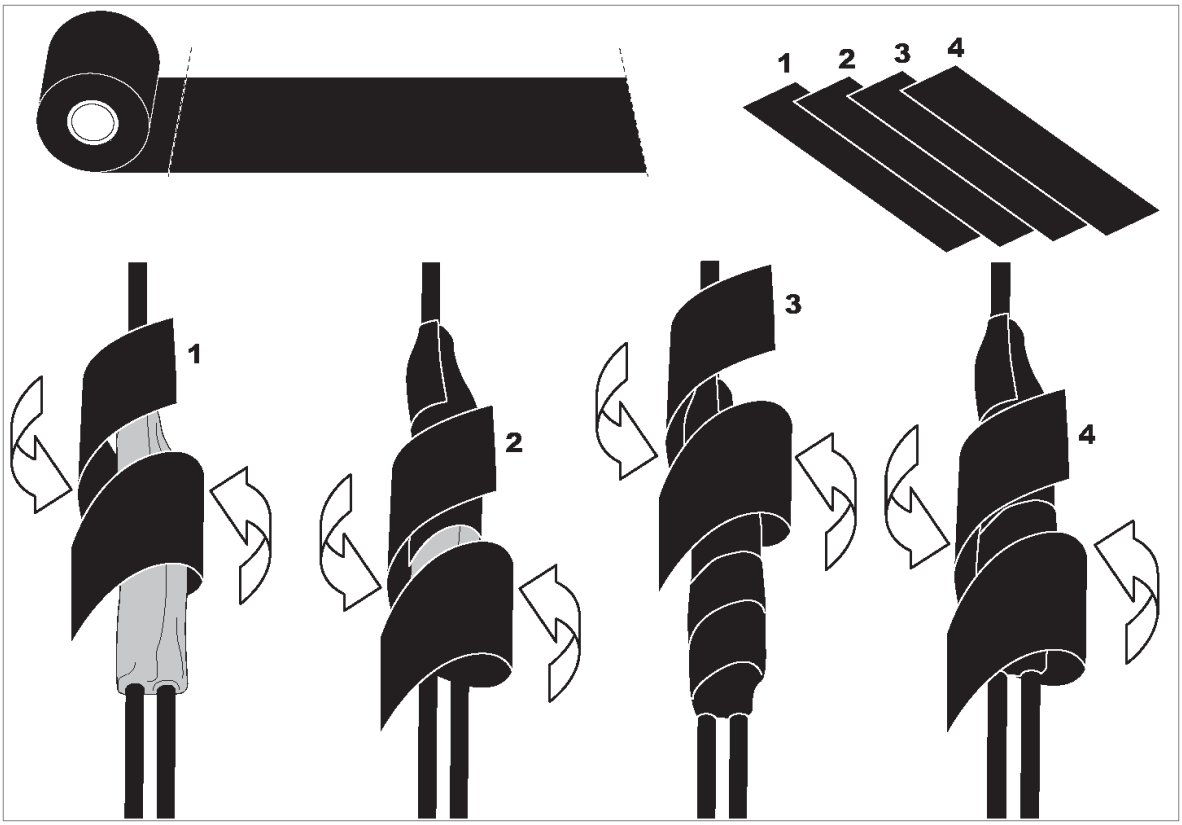


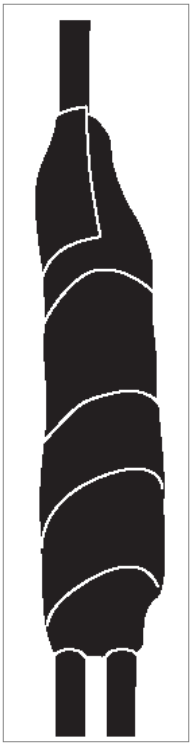


5. Wrap the butyl rubber sealing clay (13) around the cable and the grounding wire, as shown in the figures below.

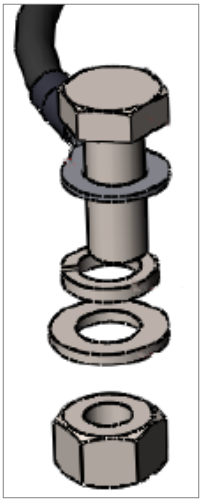


6. Cut four strips of the tape (12), approximately 20 cm (8”) each, and wrap these strips of tape around the butyl rubber sealing clay (13), as shown in the figures below.


1
2
3
4
1
2
3
4



7. Pass the hex bolt (6) through the copper lug at the end of the grounding wire (4), and secure it to the grounding bar using the flat washer (7), the spring washer (8), and the nut (9). Use conductive grease (11) on the bolt and nut to ensure proper contact.



Grounding the PTP 850C Unit

Note:

The PTP 850C is internally grounded on the positive (+) side.

The grounding of the PTP 850C and the PoE must be connected with a grounding cable to the closest main grounding point. The grounding cable must be at least 6 AWG or wider. The recommended length of the grounding cable is up to 2 meters, but in any case not more than 6 meters. The recommended resistance between the tower's main grounding point and the PTP 850C chassis is 2.5 mΩ or less, but in any case not more than 10 mΩ.

If a PoE is used, the recommended resistance between the tower's main grounding point and the PoE chassis is:

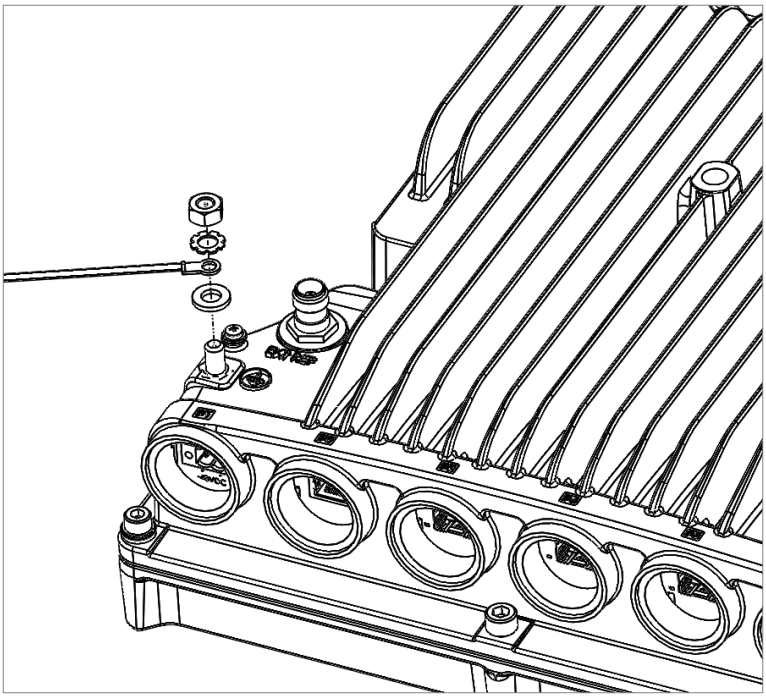
- If the PoE is installed outdoors: 2.5 mΩ or less, but in any case not more than 10 mΩ.
- If the PoE is installed indoors: 5 mΩ or less.

Required Tools

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

Procedure

1. On the front of each PTP 850C 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 PTP 850C 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

Power Source

The power cable must be plugged into the unit before turning on the external power.

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

DC power can be from -40.5 VDC to -60 VDC.

Note:

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 positive pole of the PTP 850C is grounded internally in the PTP 850C unit. Therefore, the customer power supply grounding must be connected to the positive pole in the PTP 850C's power supply. Any other connection may cause damage to the system.

For the warranty to be honored, you must install the PTP 850C in accordance with the instructions above.

Surge Protection

PTP 850C includes built-in surge protection for its Ethernet and power interfaces. PTP 850C's surge protection implementation complies with surge immunity standard IEC 61000-4-5, level 4, provided the Ethernet cables were prepared according to the instructions in Connecting the Ethernet Cable.

However, when using an electrical SFP connection with CAT5 or CAT6 Ethernet cable, internal surge protection is not present and an external surge protector is recommended. It is recommended to use the surge protector described in Table 22.

Note: To provide maximum protection, make sure to prepare the Ethernet cables according to the instructions in Connecting the Ethernet Cable and to ground the cables in accordance with the instructions in Grounding the Cables.

In areas in which severe lighting conditions are likely to occur, it is strongly recommended to add additional protection by placing surge protectors on all electrical Ethernet cables, near the connection points with the PTP 850C unit.

The following surge protector is available from Cambium.

Note:

This surge protector cannot be used with P2 when P2 is configured to 10 Gbps.

Table 22: *Surge Protector*

Marketing Model	Item Description
Outdoor/LPU/GBE	Outdoor Lightning Protection Unit for 10/100/1000Base-T PoE

Available Cable Options

Fiber Optic Cables - Single Mode

Table 23: *Fiber Optic Cables - Single Mode*

Marketing Model	Description
PTP 820_FO_SM_LC2LC_ARM_ 7m	CABLE,FO,DUAL LC/LC,7M,SM,55mm OPEN END,M28 GLAND,ARMORED,OU
PTP 820_FO_SM_LC2LC_ARM_	CABLE,FO,DUAL LC/LC,15M,SM,55mm OPEN END,M28

Marketing Model	Description
15m	GLAND,ARMORED,O
PTP 820_FO_SM_LC2LC_ARM_30m	CABLE,FO,DUAL LC/LC,30M,SM,55mm OPEN END,M28 GLAND,ARMORED,O
PTP 820_FO_SM_LC2LC_ARM_50m	CABLE,FO,DUAL LC/LC,50M,SM,55mm OPEN END,M28 GLAND,ARMORED,O
PTP 820_FO_SM_LC2LC_ARM_70m	CABLE,FO,DUAL LC/LC,70M,SM,55mm OPEN END,M28 GLAND,ARMORED,O
PTP 820_FO_SM_LC2LC_ARM_80m	CABLE,FO,DUAL LC/LC,80M,SM,55mm OPEN END,M28 GLAND,ARMORED,O
PTP 820_FO_SM_LC2LC_ARM_100m	CABLE,FO,DUAL LC/LC,100M,SM,55mm OPEN END,M28 GLAND,ARMORED
PTP 820_FO_SM_LC2LC_ARM_150m	CABLE,FO,DUAL LC/LC,150M,SM,55mm OPEN END,M28 GLAND,ARMORED

Fiber Optic Cables - Multi Mode

Table 24: *Fiber Optic Cables - Multi Mode*

Marketing Model	Description
PTP 820_FO_MM_LC2LC_ARM_7m	CABLE,FO,DUAL LC/LC,7M,MM,55mm OPEN END,M28 GLAND,ARMORED,OU
PTP 820_FO_MM_LC2LC_ARM_15m	CABLE,FO,DUAL LC/LC,15M,MM,55mm OPEN END,M28 GLAND,ARMORED,O
PTP 820_FO_MM_LC2LC_ARM_20m	CABLE,FO,DUAL LC/LC,20M,MM,55mm OPEN END,M28 GLAND,ARMORED
PTP 820_FO_MM_LC2LC_ARM_30m	CABLE,FO,DUAL LC/LC,30M,MM,55mm OPEN END,M28 GLAND,ARMORED,O
PTP 820_FO_MM_LC2LC_ARM_50m	CABLE,FO,DUAL LC/LC,50M,MM,55mm OPEN END,M28 GLAND,ARMORED,O
PTP 820_FO_MM_LC2LC_ARM_80m	CABLE,FO,DUAL LC/LC,80M,MM,55mm OPEN END,M28 GLAND,ARMORED,O
PTP 820_FO_MM_LC2LC_ARM_100m	CABLE,FO,DUAL LC/LC,100M,MM,55mm OPEN END,M28 GLAND,ARMORED
PTP 820_FO_MM_LC2LC_ARM_150m	CABLE,FO,DUAL LC/LC,150M,MM,55mm OPEN END,M28 GLAND,ARMORED
PTP 820_FO_MM_LC2LC_ARM_200m	CABLE,FO,DUAL LC/LC,200M,MM,55mm OPEN END,M28 GLAND,ARMORED

DC Cable and Connector

Table 25: *DC Cable and Connector*

Marketing Model	Description
Outdoor_DC_cbl_2x18AWG_drum	CABLE,305M,OUTDOOR_DC_CBL_2X18AWG_DRUM
PTP 820C_DC_Conn	PTP 820C_DC_Conn

Cables for Link Bonding Configurations

Table 26: *Cables for Link Bonding Configurations*

Marketing Model	Description
Data_SHARING_CBL_1m	Fiber Protocols cable, 1m
Data_SHARING_SM_CBL_1m	Fiber Data sharing cable, SM, 1m
Data_SHARING_CBL_5m	Fiber Protocols cable, 5m
Data_SHARING_SM_CBL_7m	Fiber Data sharing cable, 7m
Data_SHARING_CBL_10m	Fiber Protocols cable, 10m
Data_SHARING_SM_CBL_10m	Fiber Data sharing cable, 10m
Data_SHARING_CBL_20m	Fiber Protocols cable, 20m
Data_SHARING_CBL_30m	Fiber Protocols cable, 30m

Cables for MIMO Connections

Table 27: *Cables for MIMO Connections*

Marketing Model	Description
DATA_SHRNG_KIT_5m	CABLE,SFP,4x4MIMO_DATA_SHARING_KIT_5M
DATA_SHRNG_KIT_10m	CABLE,SFP,4x4MIMO_DATA_SHARING_KIT_10M
DATA_SHRNG_KIT_20m	CABLE,SFP,4x4MIMO_DATA_SHARING_KIT_20M
DATA_SHRNG_KIT_30m	CABLE,SFP,4x4MIMO_DATA_SHARING_KIT_30M
SOURCE_SHARING_5M	Source_Sharing_5m
SOURCE_SHARING_10M	Source_Sharing_10m
SOURCE_SHARING_20M	Source_Sharing_20m
SOURCE_SHARING_30M	Source_Sharing_30m

Marketing Model	Description
PTP 820_MIMO_Prot_ mng_cbl_1m	PTP 820C MIMO or Prot management cable 1m
PTP 820_MIMO_Prot_ mng_cbl_5m	PTP 820C MIMO or Prot management cable 5m
PTP 820_MIMO_Prot_ mng_cbl_10m	PTP 820C MIMO or Prot management cable 10m
PTP 820_MIMO_Prot_ mng_cbl_20m	PTP 820C MIMO or Prot management cable 20m
PTP 820_MIMO_Prot_ mng_cbl_30m	PTP 820C MIMO or Prot management cable 30m
PTP 820_MIMO_Prot_ mng_spltr	PTP 820C MIMO or Prot management odu spltr

Ethernet Cable and Specifications

Table 28: *Ethernet Cable and Specifications*

Marketing Model	Description
CAT5E_SFUTP_Outdoor_ 50m	CABLE,RJ45 TO RJ45 STR 50M,CAT-5E,ETHER,UV RES
CAT5E_SFUTP_Outdoor_ 75m	CABLE,RJ45 TO RJ45 STR 75M,CAT-5E,ETHER,UV RES
CAT5E_SFUTP_Outdoor_ 305m_drum	CABLE,MATERIAL,CAT-5E,SFUTP,4X2X24AWG,UV RESISTANCE,305M
CAT5E_Arm_50m	CABLE,RJ45 TO RJ45 STR,50M,CAT-5E,M28 GLAN,ARM,UV RESISTANCE
CAT5E_Arm_70m	CAT5E_Arm_75mCABLE,RJ45 TO RJ45 STR,70M,CAT-5E,M28 GLAN,ARM,UV RESISTANCE
CAT5E_SFUTP_Outdoor_ 100m_drum	
CAT5E_Arm_305m_drum	CABLE,MATERIAL,CAT-5E,FTP,4X2X24AWG,ARMORED,UV RESIST,305M
CAT6A_SFTP_Outdoor_ 305m_drum	CABLE,MATERIAL,CAT-6A,SFTP,4X2X22AWG,UV RESISTANCE,305M

Note:

It is strongly recommended to source the CAT-6A cable from Cambium.

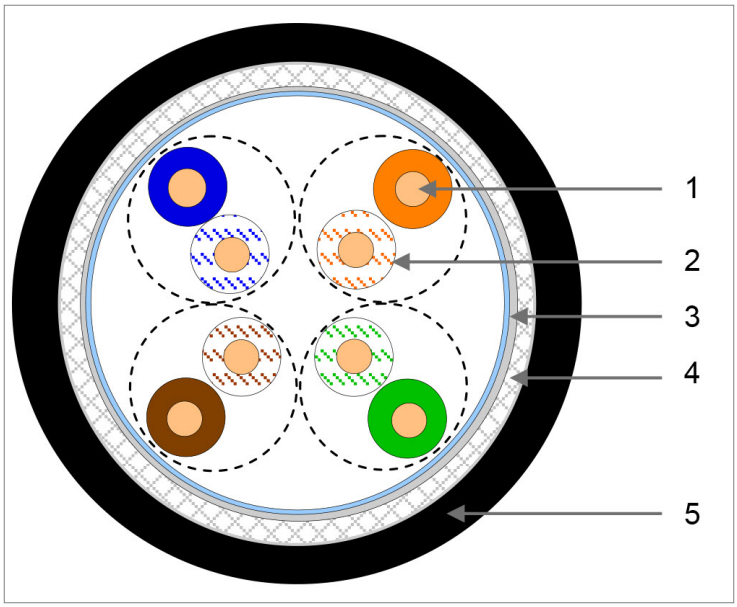
This cable has the following specifications:

Suitable for:

- Fast Ethernet
- Gigabit Ethernet
- PoE

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

Figure 18 *Cable Design*



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

Table 29: *Ethernet 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 Ethernet Cable Specifications

Table 30: *Outdoor Ethernet 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 31: *Outdoor Ethernet Cable – RJ-45 Connector Pinout*

Pin #	Wire Color Legend	Signal
1	 White/Orange	TX+
2	 Orange	TX-
3	 White/Green	RX+
4	 Blue	TRD2+
5	 White/Blue	TRD2
6	 Green	RX-
7	 White/Brown	TRS3+
8	 Brown	TRD3-

Table 32: *Outdoor Ethernet Cable Specifications – Mechanical/ Environmental Requirements*

Jacket	UV resistant
Outer diameter	6-10 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

Note:

It is strongly recommended to source CAT-6A cable from Cambium.

Outdoor DC Cable Specifications

Table 33: *Outdoor DC Cable Specifications – Electrical Requirements*

Cable type	2 tinned copper wires
Wire gage	See Power Specifications
Stranding	stranded
Voltage rating	600V
Spark test	4KV
Dielectric strength	2KV AC min

Table 34: *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, P/N Outdoor Ties (SI-0027-0) 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.

The following cable clamps are available:

Table 35: *Cable Clamps*

It is strongly recommended to source the CAT-6A cable from Cambium.

Part Number	Marketing Model	Item Description
SI-1231-0	Fiber_clamp_6cbl_4.0-7.0mm	DUAL FEADER CLAMP FOR 4.0-7.0mm CABLE 6 WAY.

Special Instructions for use of Glands

Note:

Each PTP 850C unit is supplied with two glands. If additional glands are required, they must be ordered separately, in kits of five glands each.

Table 36: *Glands Kit*

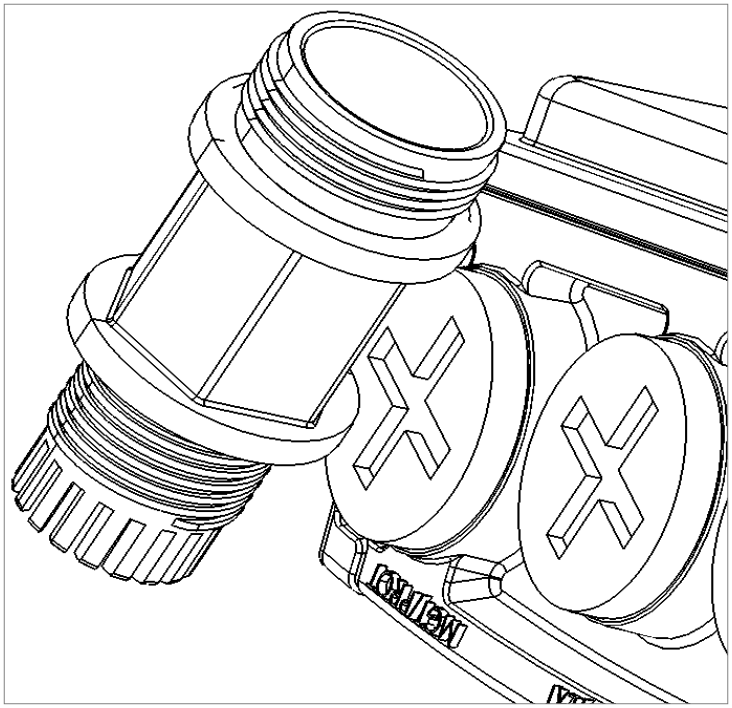
Marketing Model	Marketing Description
PTP 820_Glands_kit	PTP 820_Glands_x5_kit

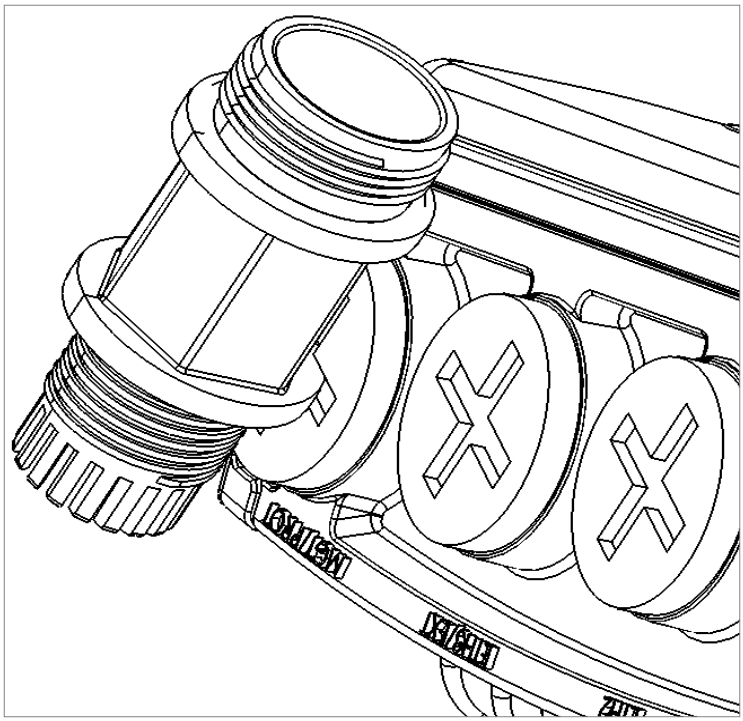
In addition, gland caps can be ordered to protect the cable and connector from damage when elevating the cable and gland to the radio unit. See Step 5 in Section General Installation Procedure. Gland caps are ordered separately, in kits of 10 caps each.

Table 37: *Gland Caps*

Marketing Model	Marketing Description
Cable_Prot_10Caps_kit	Cable protective caps kit 10 pcs, PTP 820C/S/E

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

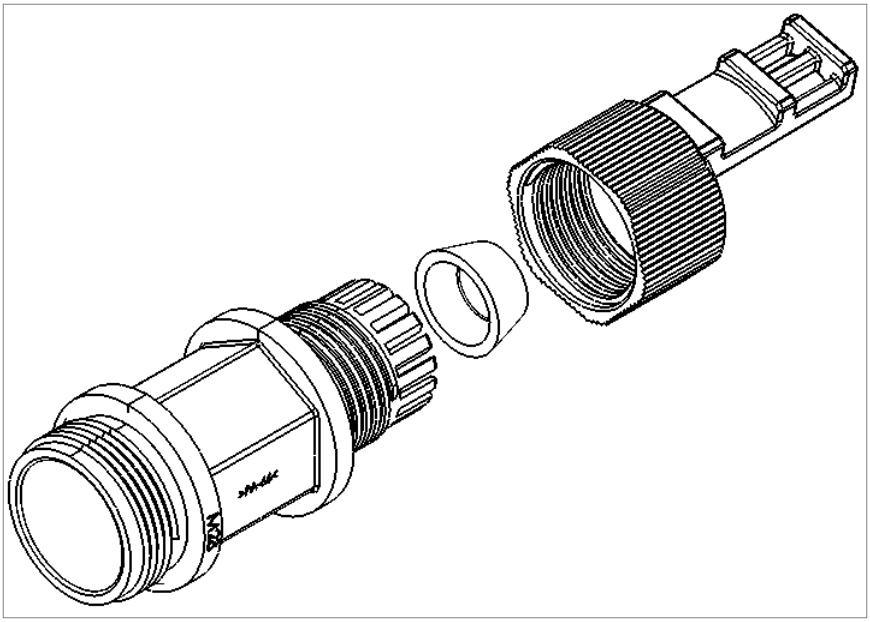




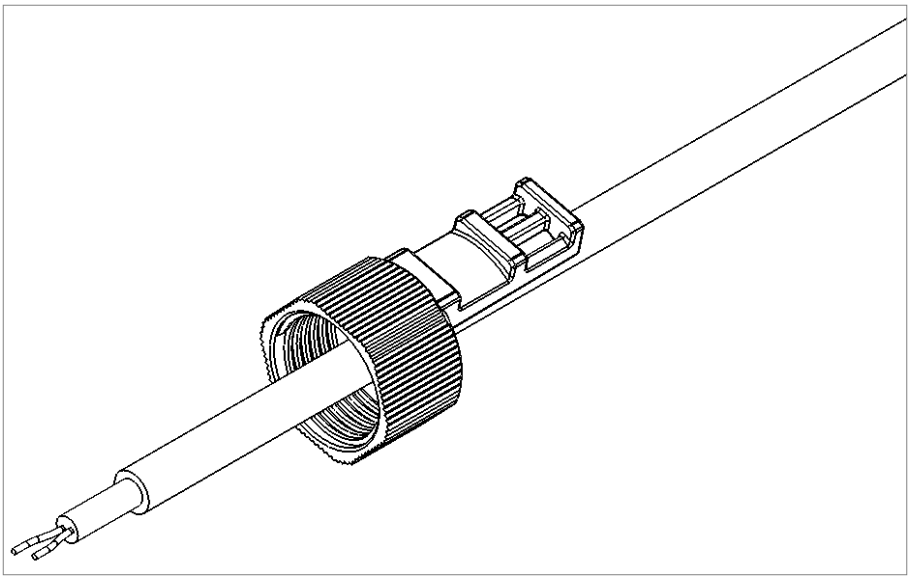
General Installation Procedure

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

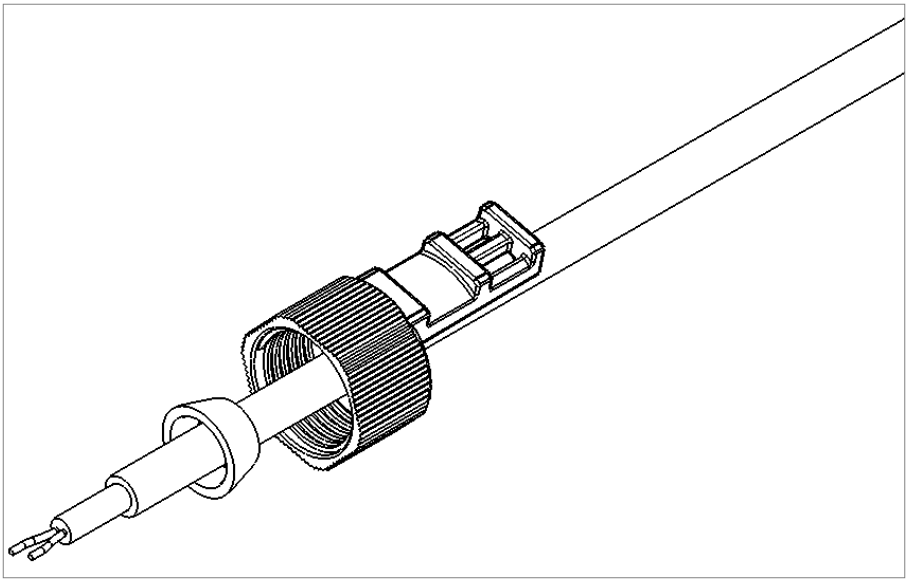
1. Before inserting a cable, you must disassemble the gland cap and gland rubber from the gland body.



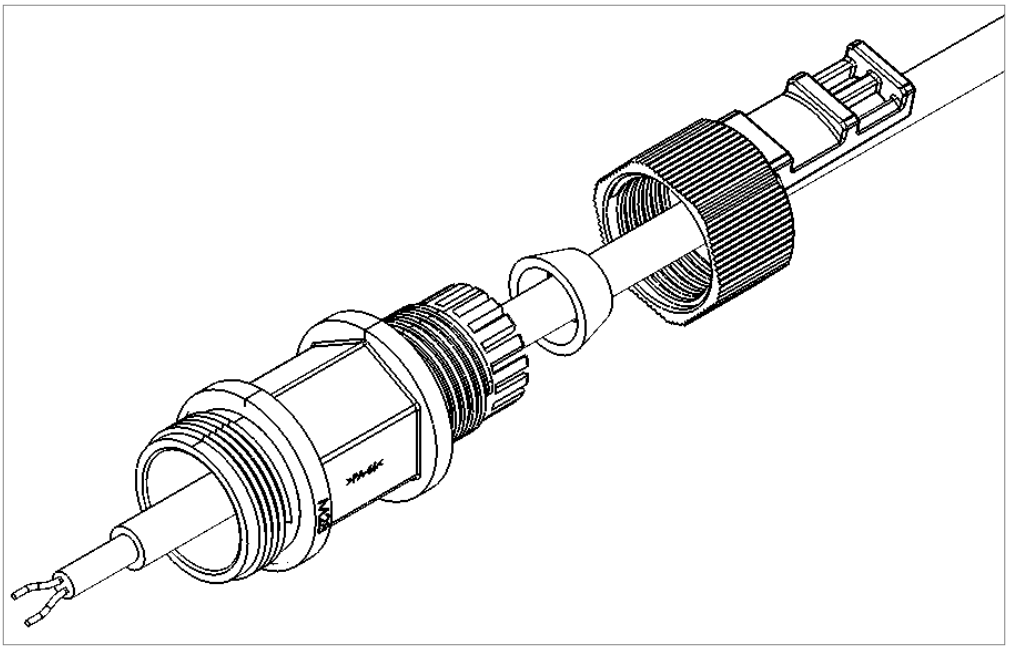
2. Slide the gland cap into the cable.



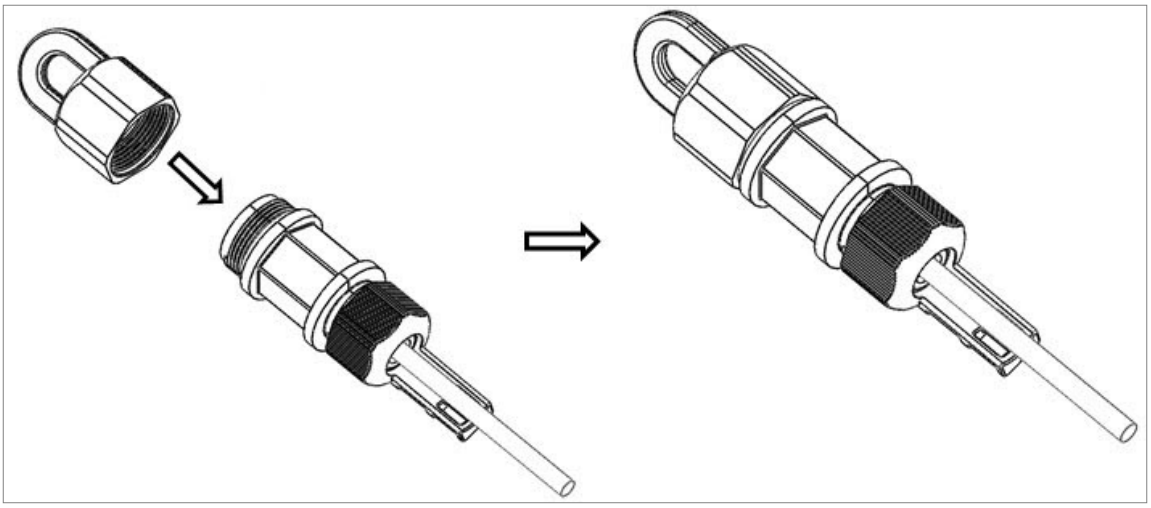
3. Slide the gland rubber into the cable.



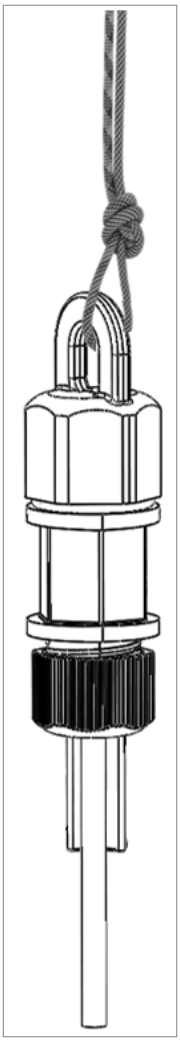
4. Slide the cable into the body of the gland. If you are using a gland cap (see Step 5), make sure to leave enough space for the gland cap to fit into the gland without disturbing the cable.



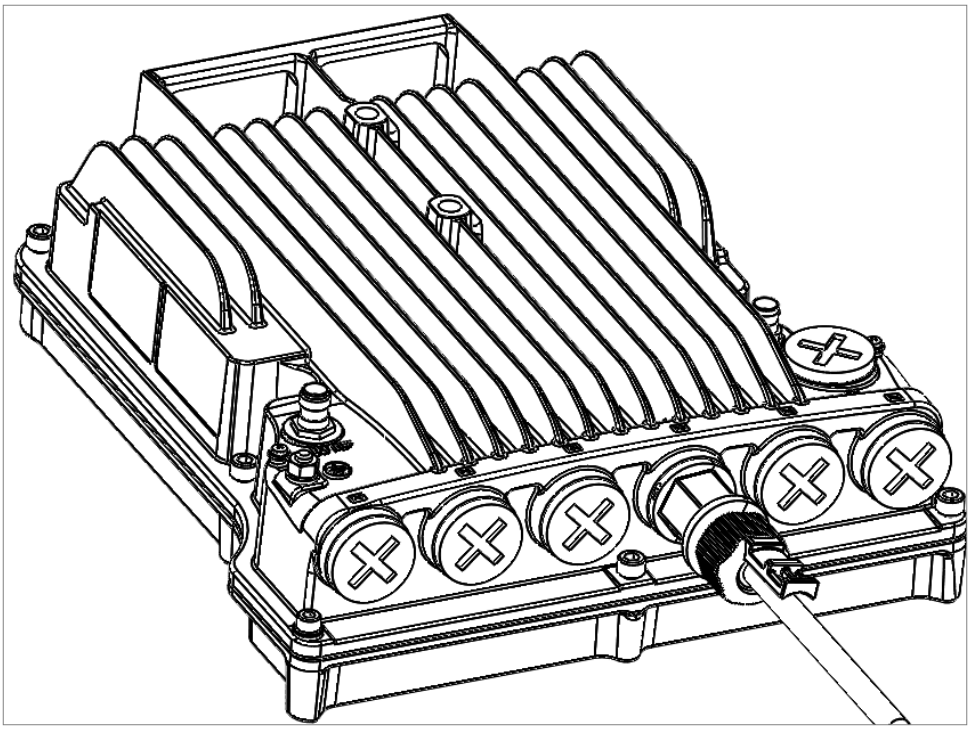
5. Optionally, after securing the cable into the body of the gland, you can close the other side of the gland with an M28 gland cap. The gland cap protects the cable and connector from damage when elevating the cable and gland to the radio unit.



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 radio unit. Before screwing the gland into the radio unit, 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 radio unit, 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 radio unit until there is full contact between the gland and the radio unit.



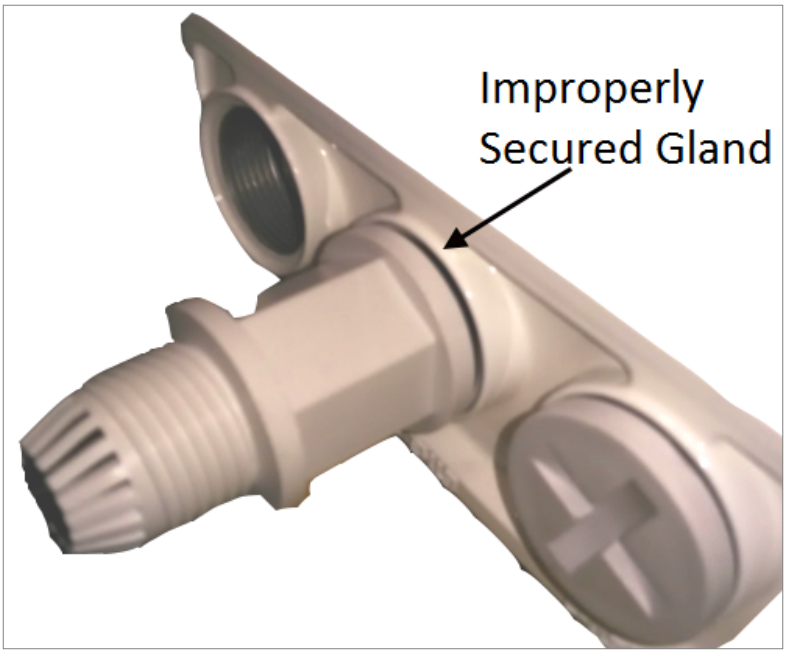
Note:

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!

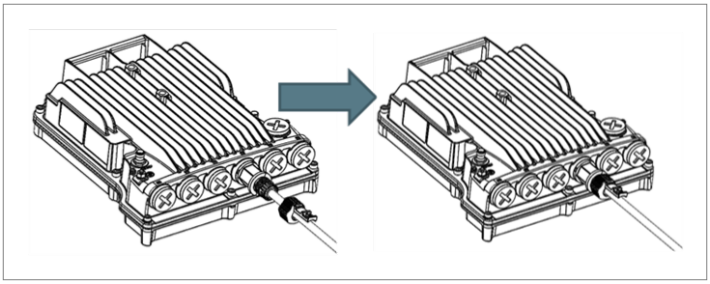


11. Tighten the rear portion of the gland onto the main part of the gland and make sure that the main part of the gland does not have an additional swivel after the rear portion is secured.

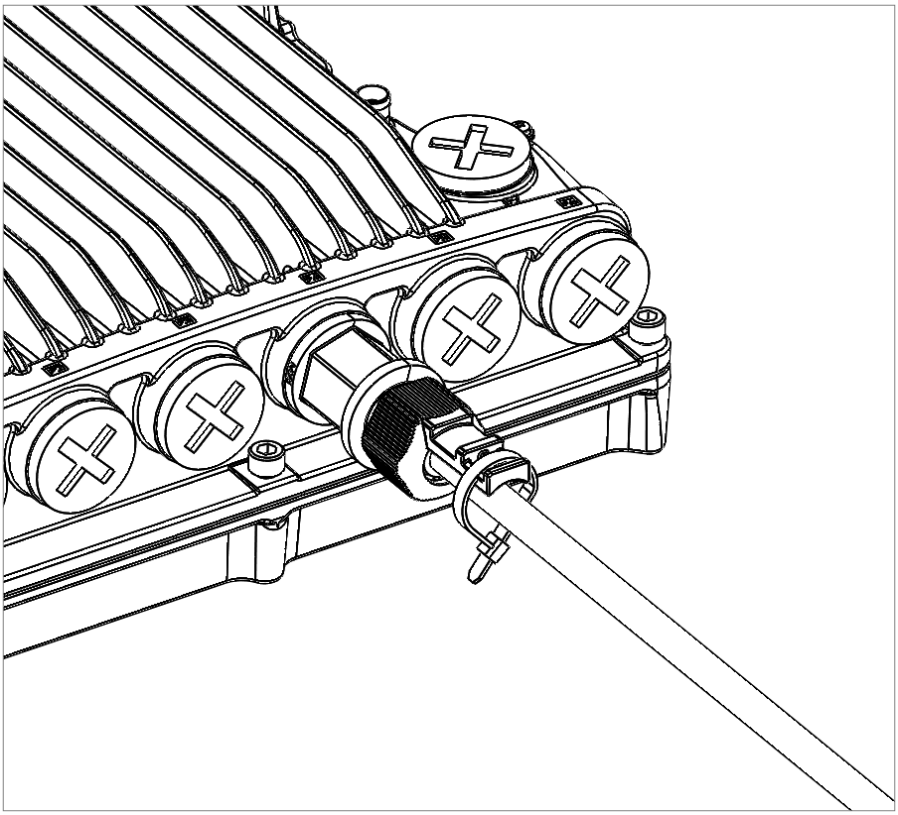
Note:

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

Table 38: *Tightening the Front Portion of the Gland and Tightening the Rear Portion of the Gland*



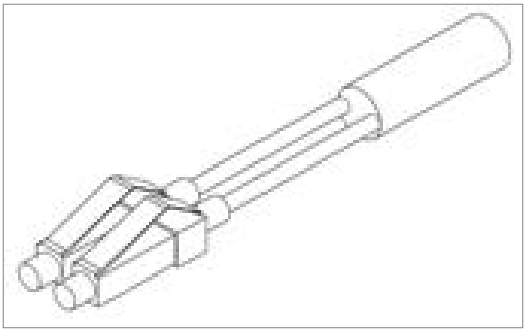
12. Secure the cable to the lip of the gland using a tie wrap.



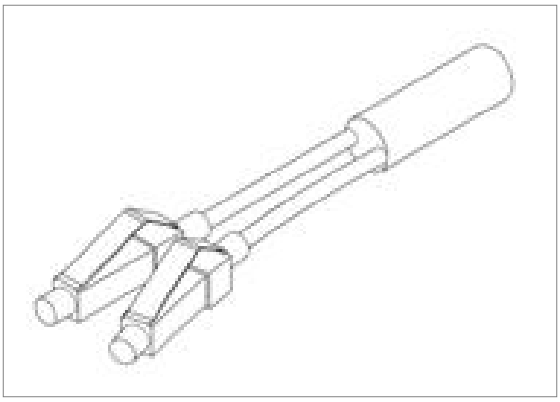
Connecting an Optical Fiber Cable and SFP

To connect an optical fiber cable and the SFP transceiver:

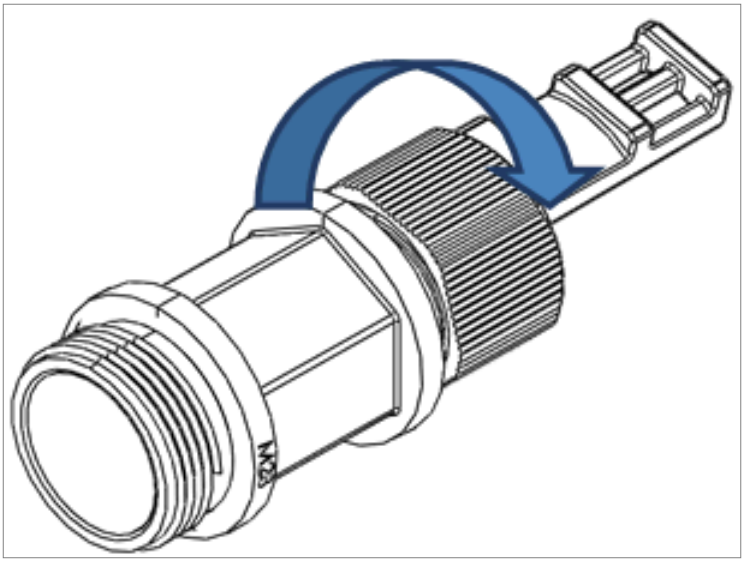
1. Use a pre-assembled cable.

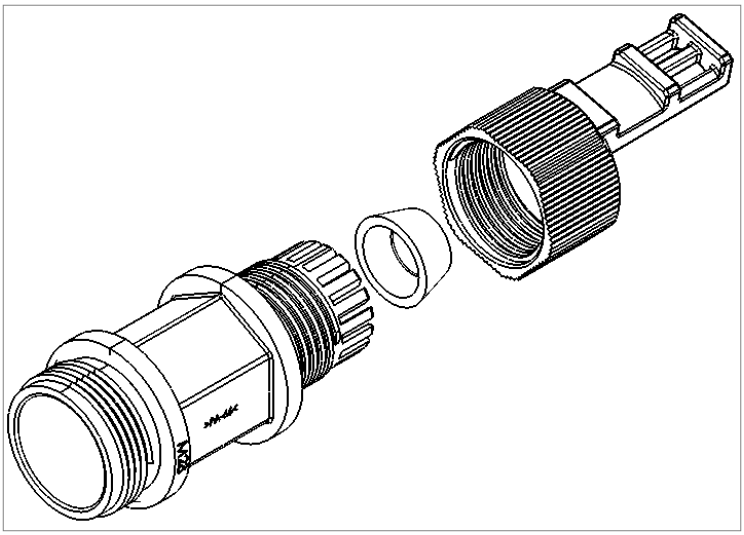


2. Split the connector into two separate LC connectors (one for each fiber).

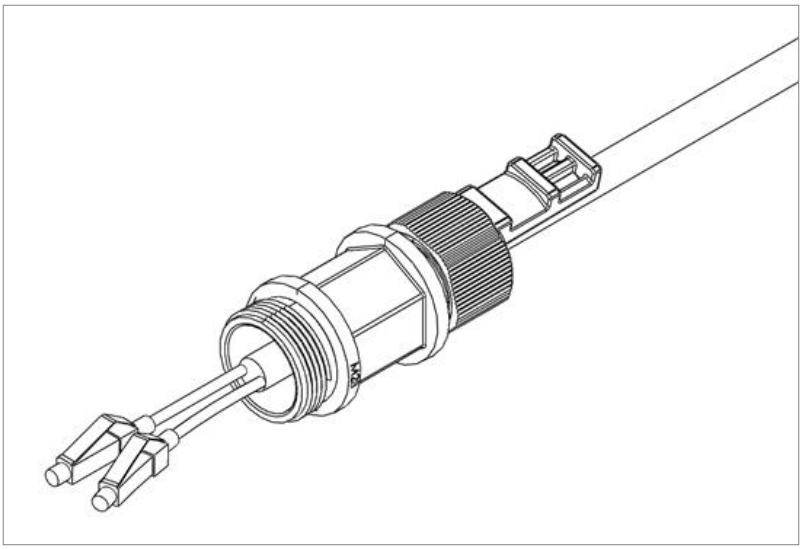


3. Remove the gland cap and rubber from the gland body.





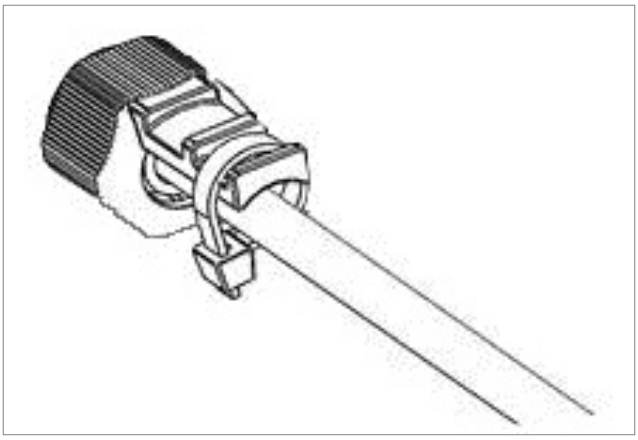
4. Slide the gland cap into the cable.
5. Slide the rubber into the cable.
6. Insert the fibers with the connectors one by one into the cable gland.



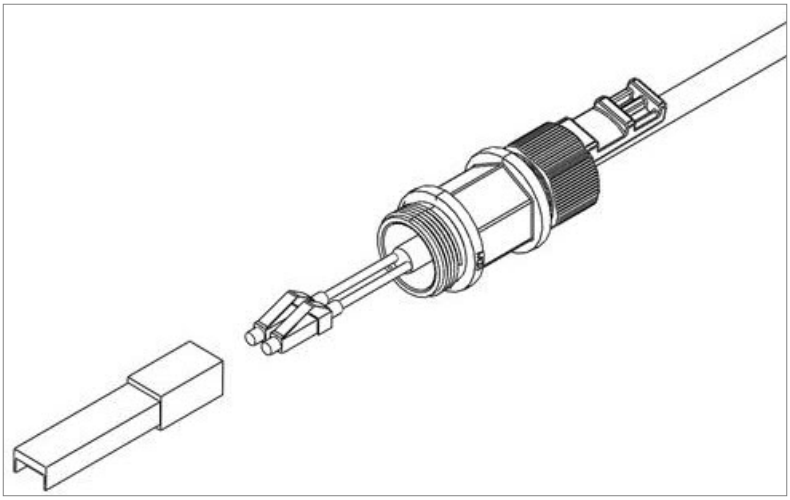
7. Secure the cable to the lip of the gland using a tie wrap.

Note:

If you are raising the cable to a radio unit on a tower, this step is crucial to prevent the cable from slipping from the gland, which could damage the connector.



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

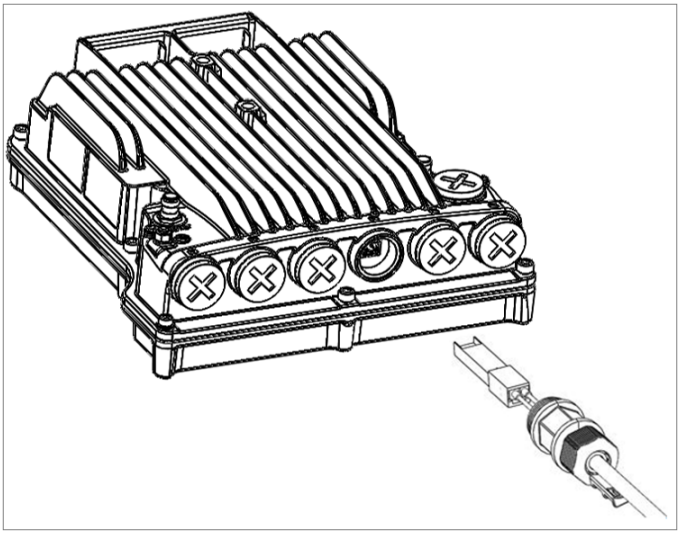


9. Remove the tie wrap securing the cable to the gland.

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 PTP 850C connector.



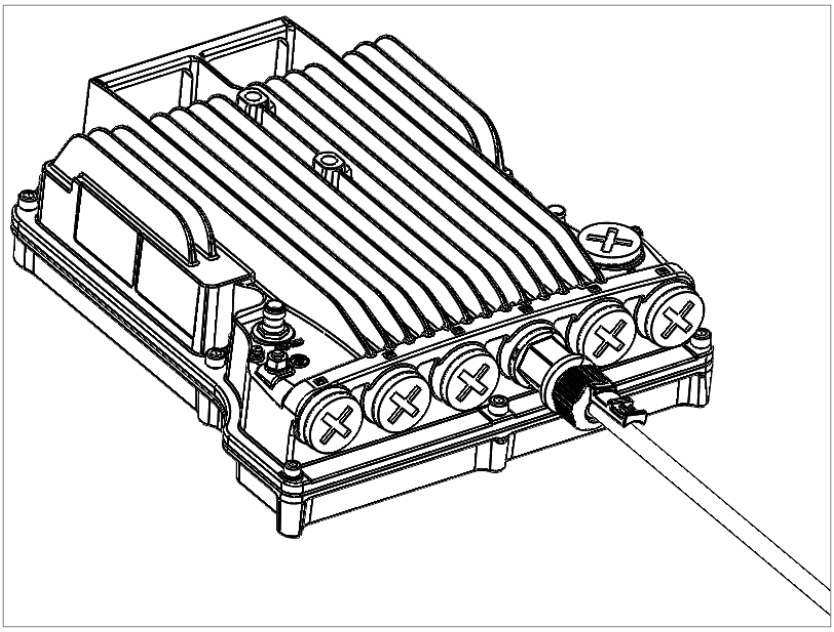
11. Tighten the gland to the radio unit until there is full contact between the gland and the radio unit.
12. Tighten the gland cap.

Note:

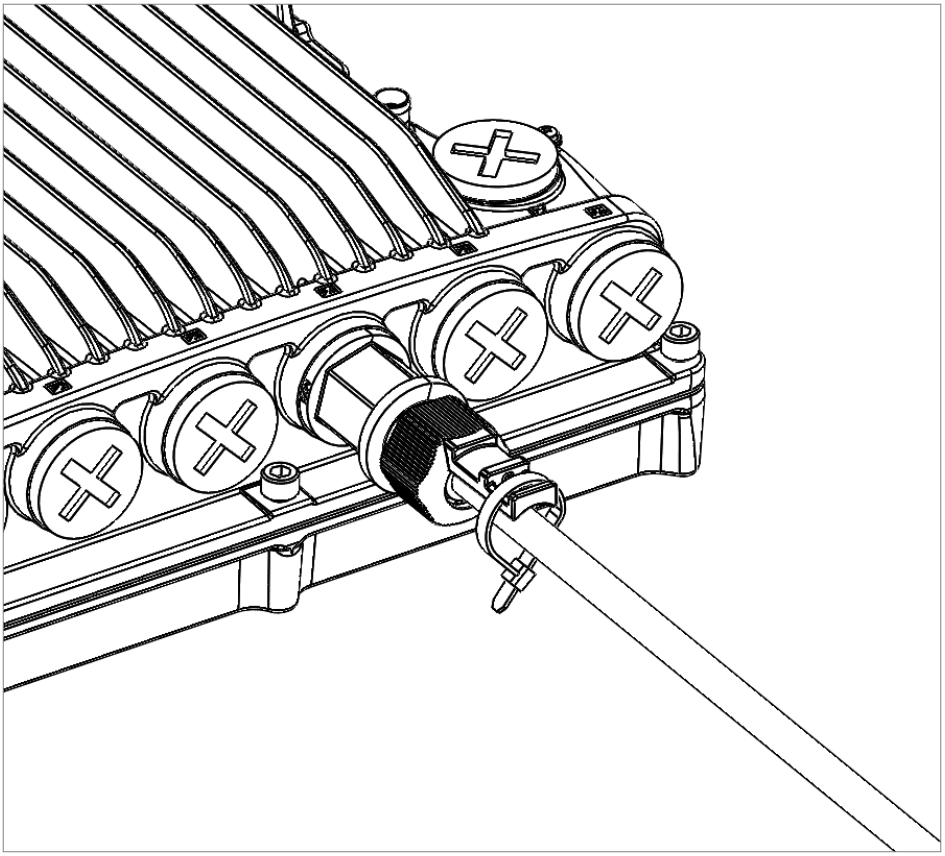
Before tightening the gland, make sure the gland is aligned with the tapped hole in the unit.

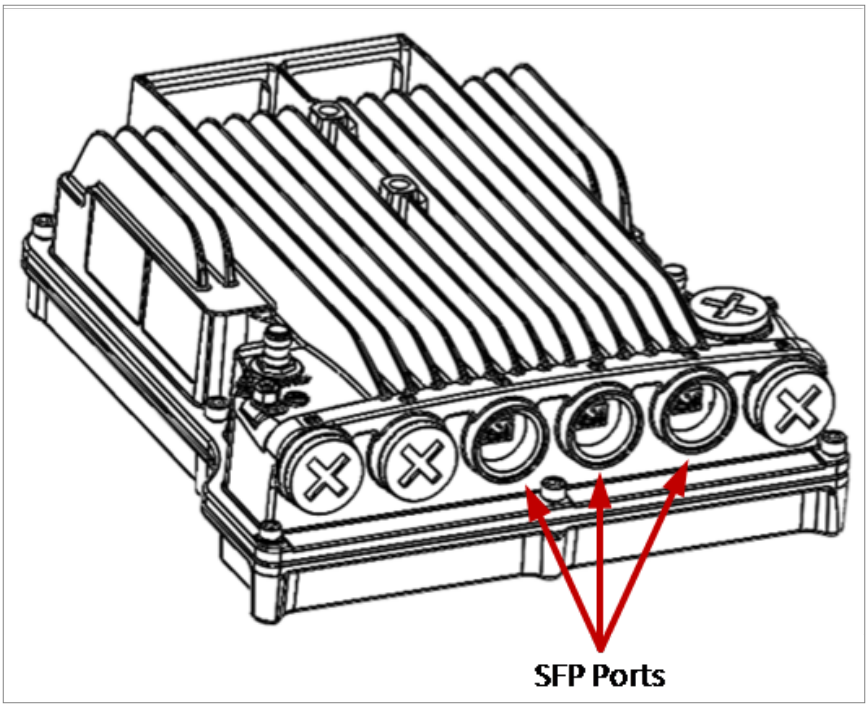
Tightening the gland at an angle can ruin the thread on the gland and prevent proper sealing of the interface Tighten the gland gently and make sure there is no resistance. If there is resistance, stop immediately, thread out the gland, and verify that the gland threads are not damaged. Then, tighten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

If the gland thread is damaged do not use it!



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





Note:

The pictures above show an optical cable being connected to P4. Optical cables can also be used with SFP ports P3 and P5, as shown below.

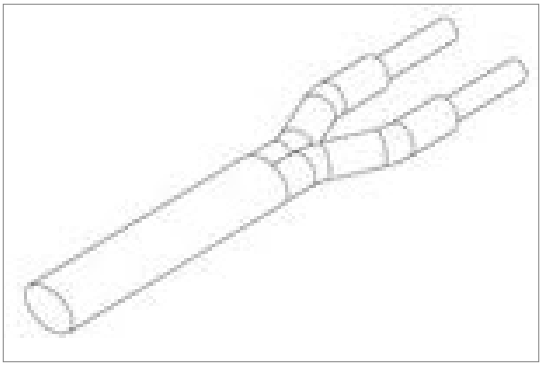
Connecting a DC Power Cable

Note:

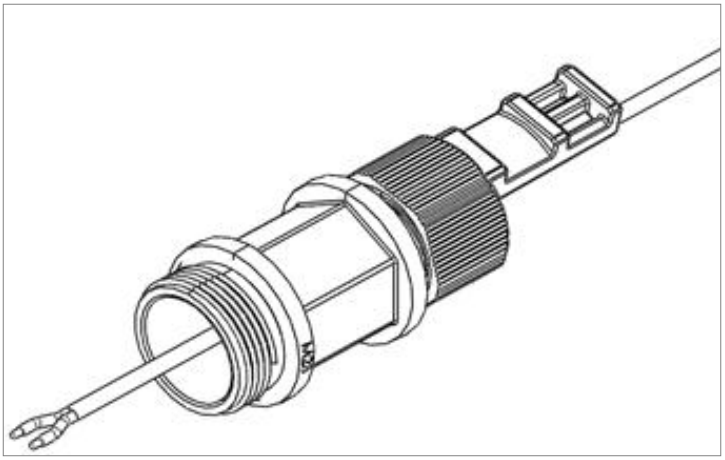
The DC power cable and connector must be ordered separately. See DC Cable and Connector.

To connect a DC power cable:

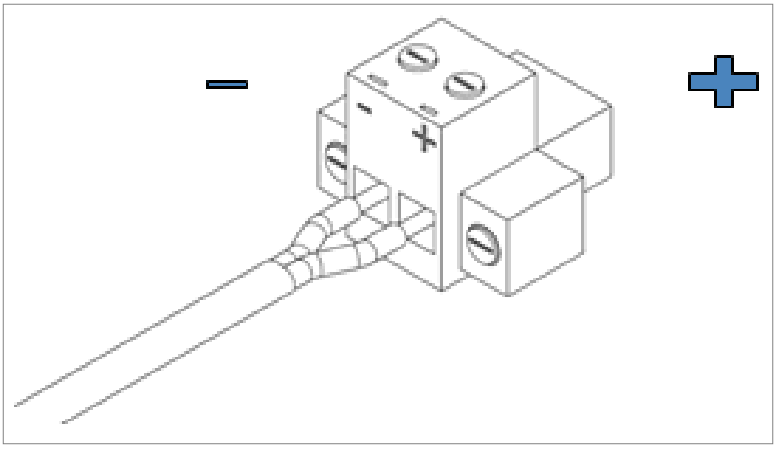
1. Strip off 45 mm from the cable jacket.
2. Expose 10 mm at the edge of each of the two wires.



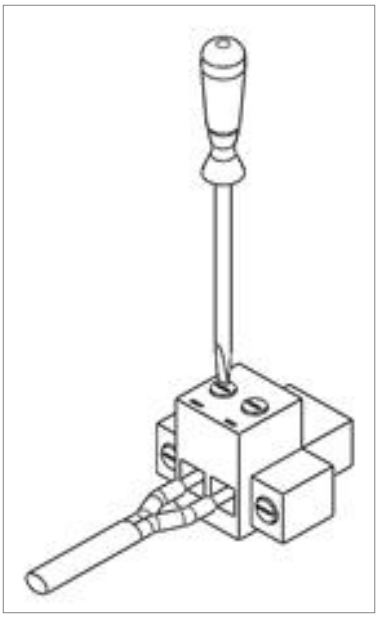
3. Insert the power cable into the gland.



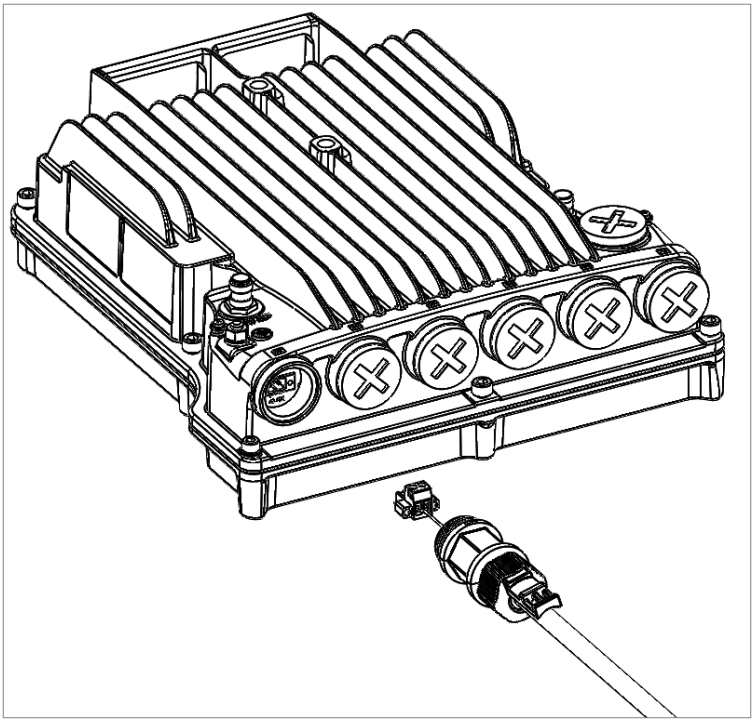
4. Insert the power cable wires into the power connector.
5. Insert the power cable wires into the power connector. Match “+” to the 0V wire and “-“ to the -48V wire.



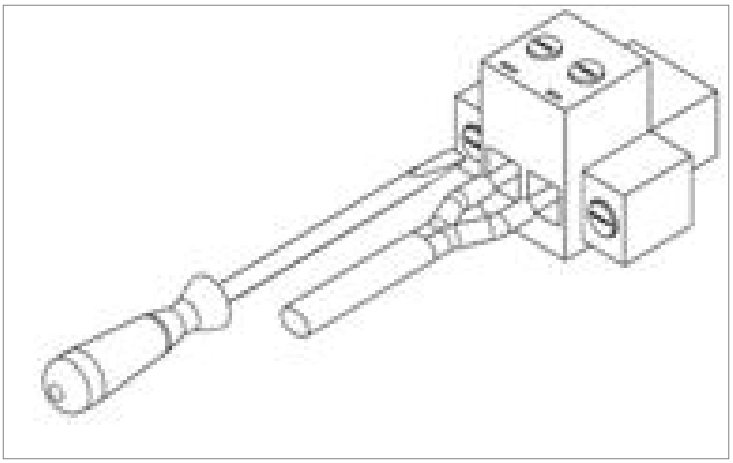
6. Tighten the two top screws.



7. Plug the power cable with connector into the PTP 850C power connector.



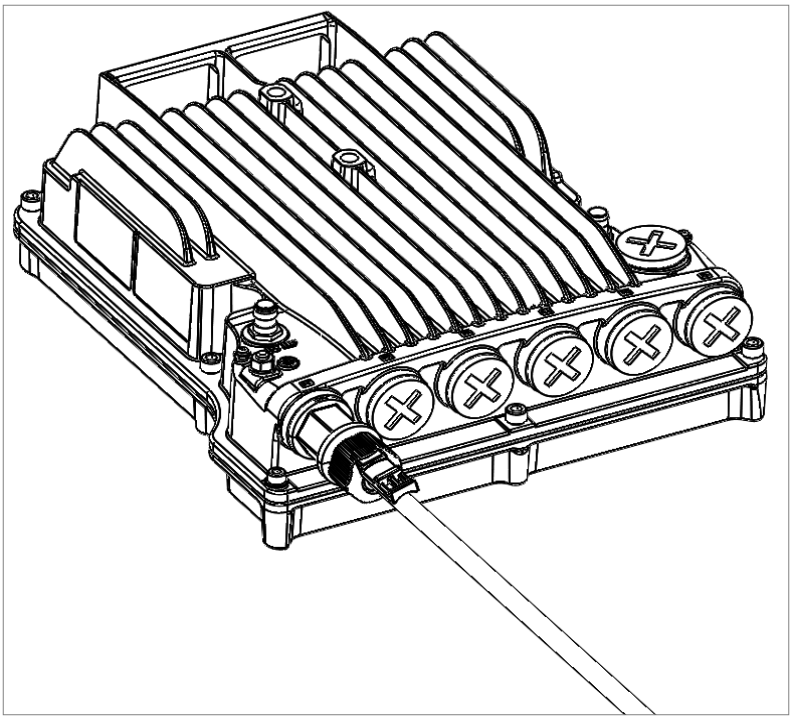
8. Tighten the two front screws.



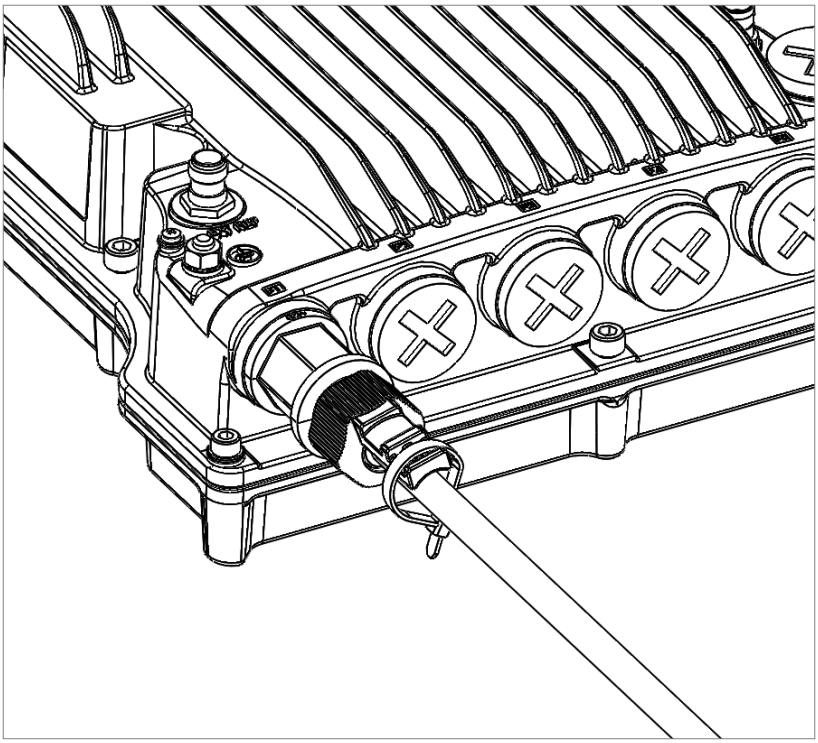
9. Screw the gland into the radio unit.

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.



10. Tighten the gland cap.
11. Secure the cable to the gland with a tie wrap.



Connecting the Ethernet Cable

If you need to assemble the Ethernet cable, follow the instructions in section Preparing the Ethernet Cable and Plug-in Field, then proceed to section Connection of Ethernet Cable to PTP 850C.

If you using a pre-assembled Ethernet cable, follow the instructions in section Preparing the Ethernet Cable Already Assembled, then proceed to section Connection of Ethernet Cable to PTP 850C.

Note:

To ensure proper grounding and connectivity, it is recommended to use pre-assembled Ethernet cables.

Preparing the Ethernet Cable and Plug-in Field

Note:

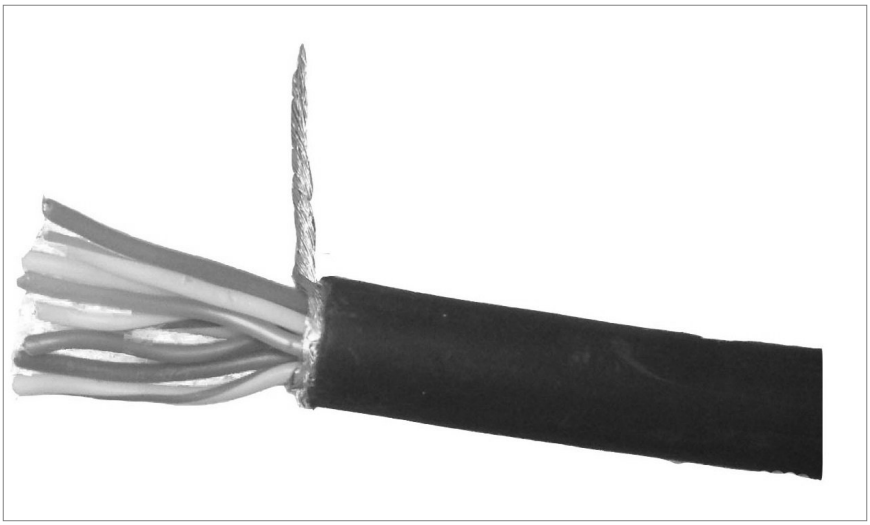
To ensure proper grounding, the RJ-45 plug must be shielded, with a crimping tail.

Table 39: *Materials for Preparing Ethernet Data Cables*

Marketing Part Numbers	Description
CAT5E_SFUTP_Outdoor_50m	CABLE,RJ45 TO RJ45 STR 50M,CAT-5E,ETHER,UV RES
CAT5E_SFUTP_Outdoor_75m	CABLE,RJ45 TO RJ45 STR 75M,CAT-5E,ETHER,UV RES
CAT5E_SFUTP_Outdoor_100m_ drum	CABLE,MATERIAL,CAT-5E,SFUTP,4X2X24AWG,UV RESISTANCE,100M
CAT5E_SFUTP_Outdoor_305m_ drum	CABLE,MATERIAL,CAT-5E,SFUTP,4X2X24AWG,UV RESISTANCE,305M
PTP 820_Glands_kit	KIT 5pcs of M28 GLAND (AA-0597-0)
UNIV_GRD_KIT_1/2	Universal Grounding Kit up to 1/2” cable
GBE_connector_kit	RJ45 CAT5E CONNECTORS AND BOOTS KIT (package of 10 connectors)
Cat6a_connector	CONN,FOR CABLE,RJ45,T568A,FOR CAT6a 22-24AWG

To prepare the Ethernet cable and plug-in field:

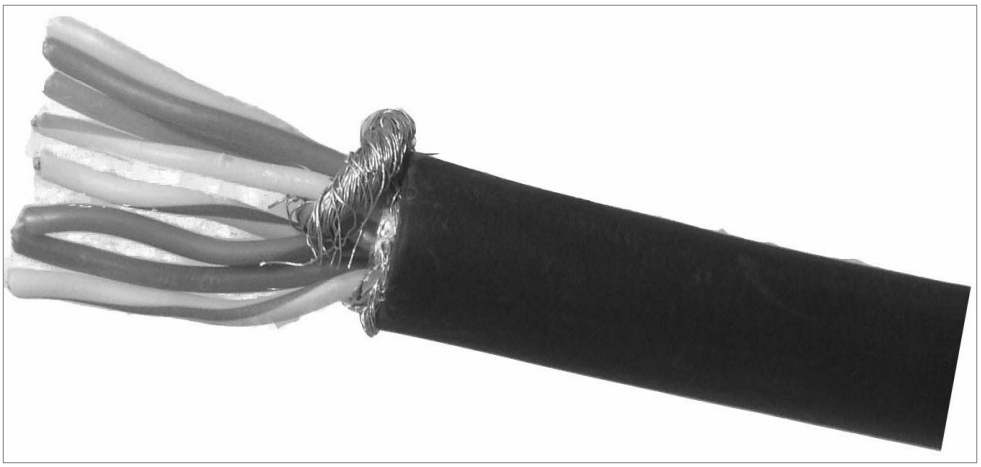
1. Prepare the gland and insert the cable, as described in General Installation Procedure.
2. Strip off approximately 45 mm of the outer insulation jacket from the CAT5E cable.
3. Do not strip off the end of the cable shield, but rather, twist the shield to form a braid.



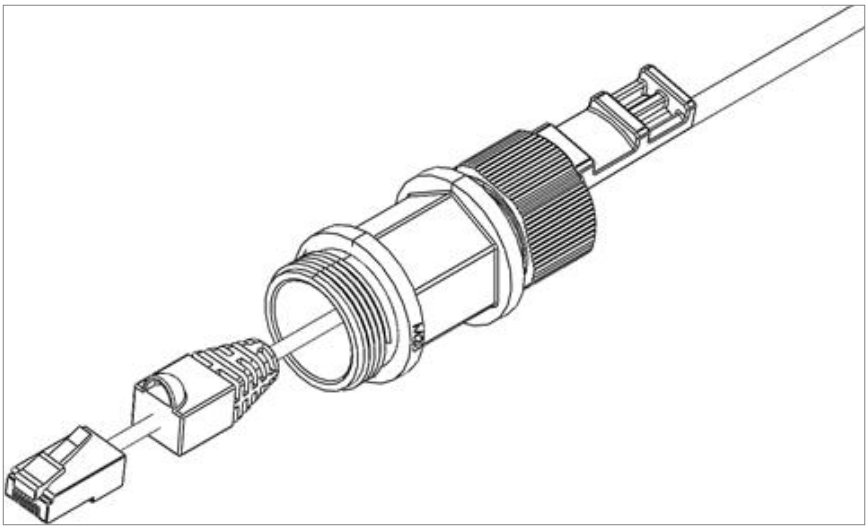
4. Roll back the foil shield insulation and wrap the drain wire around the foil. Do not remove any insulation from the conductors.
5. Align the colored wires.

> **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 Outdoor Ethernet Cable Specifications. The sheath of the Ethernet 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.

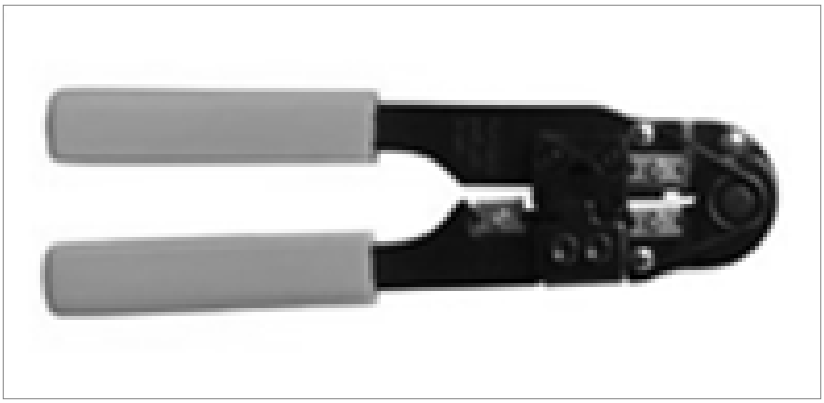


10. Wrap the twisted braid firmly around the cable jacket and let the crimping tail of the RJ45 plug envelop it.

Note:

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

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 CAT5E plug cover on the connector plug.

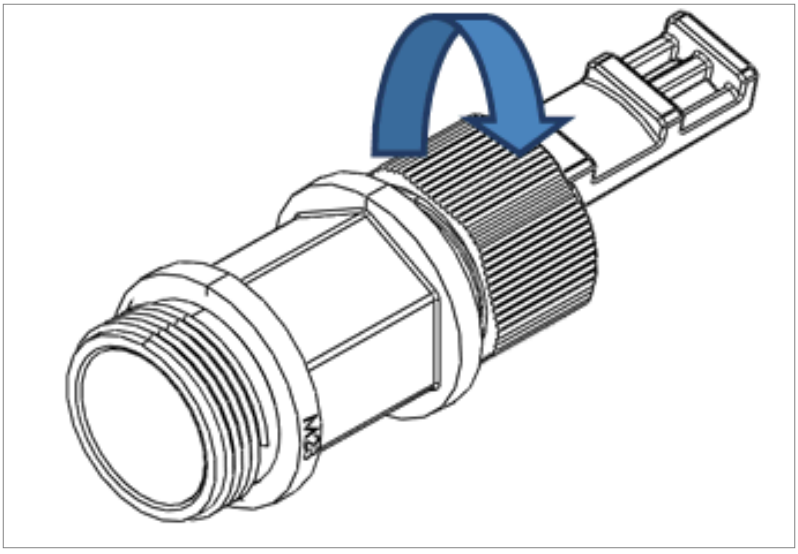
Note:

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.

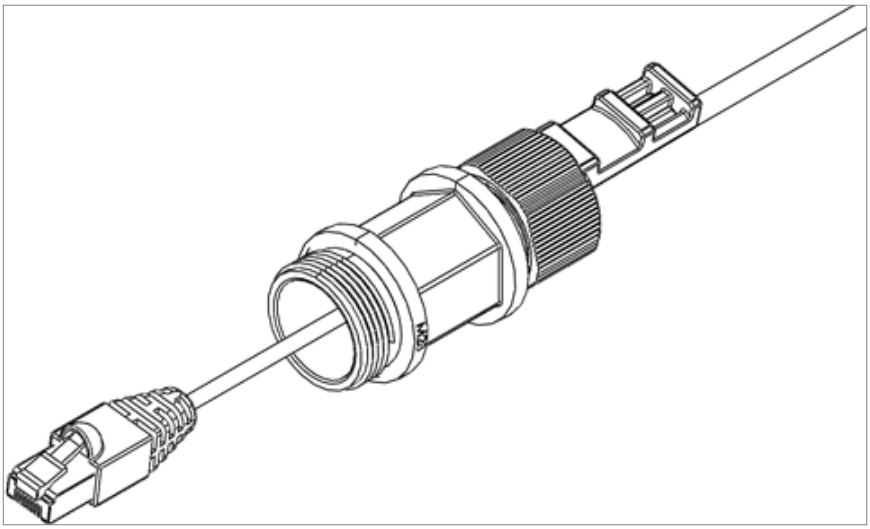
Preparing the Ethernet Cable Already Assembled

To prepare the Ethernet cable already assembled:

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



2. Insert the CAT5E cable into the gland cap and into the rubber gland.



3. Insert the CAT5E cable into the gland body.

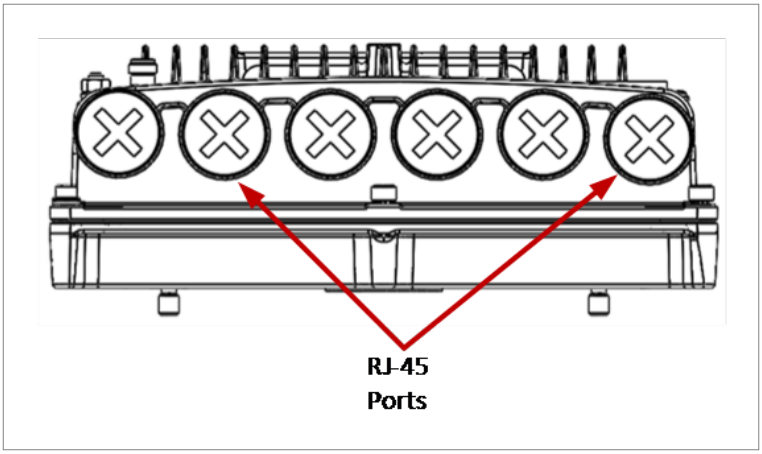
Connection of Ethernet Cable to PTP 850C

To connect the Ethernet cable to the PTP 850C:

1. Remove the relevant cap from the PTP 850C radio. You can use the side of the gland to unscrew the cap.

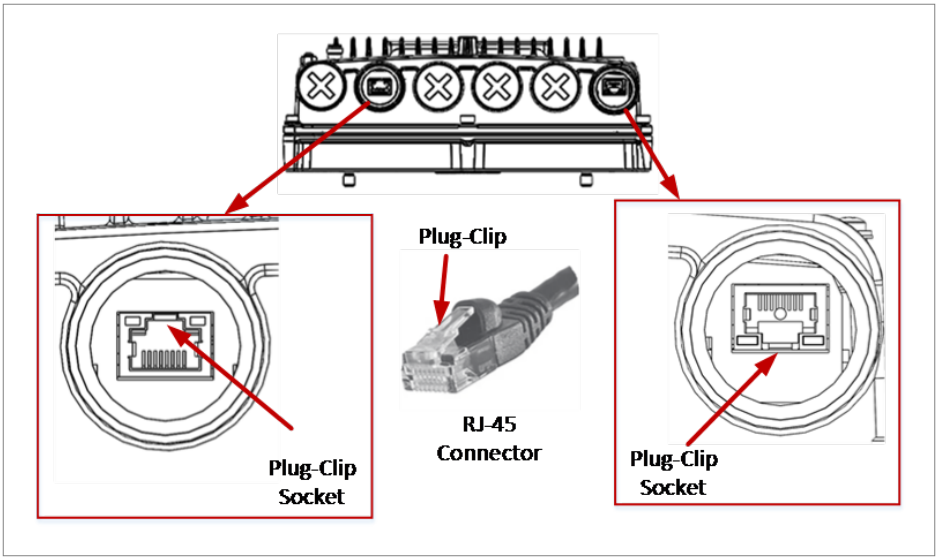
Note:

Ethernet cables can be connected to the two RJ-45 ports, P2 and P6

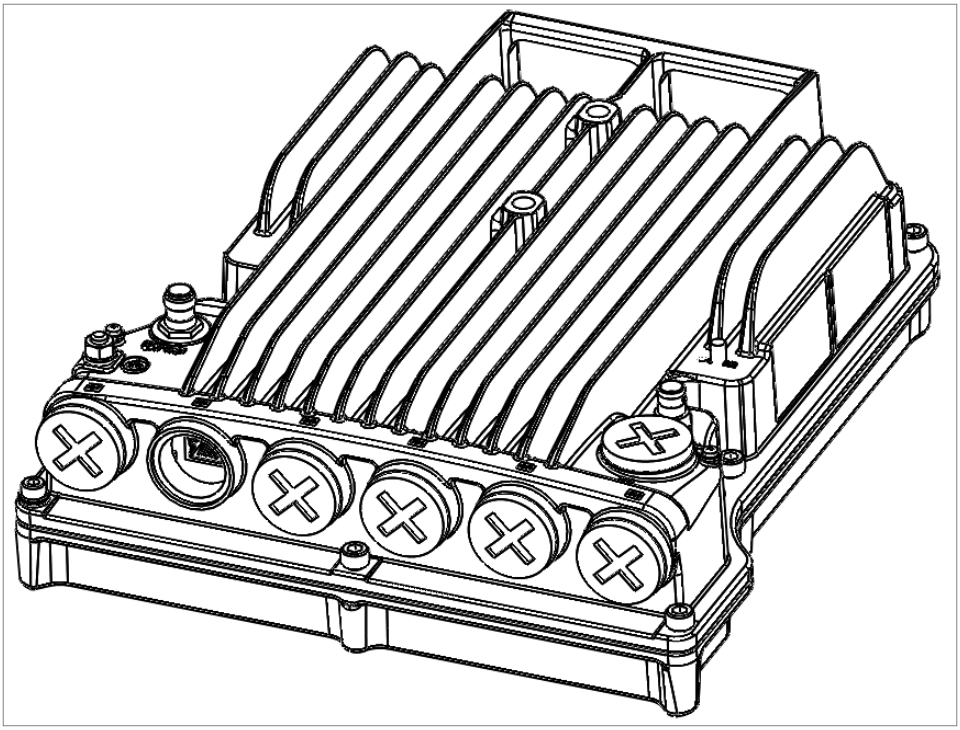


Note:

Although P2 and P6 are both RJ-45 ports, they have a different orientation, as shown in the following figure. When inserting the RJ-45 plug into the connector, you must position the plug in the correct direction so that the plug-clip is directed towards the plug-clip socket on the RJ-45 port of the PTP 850C.



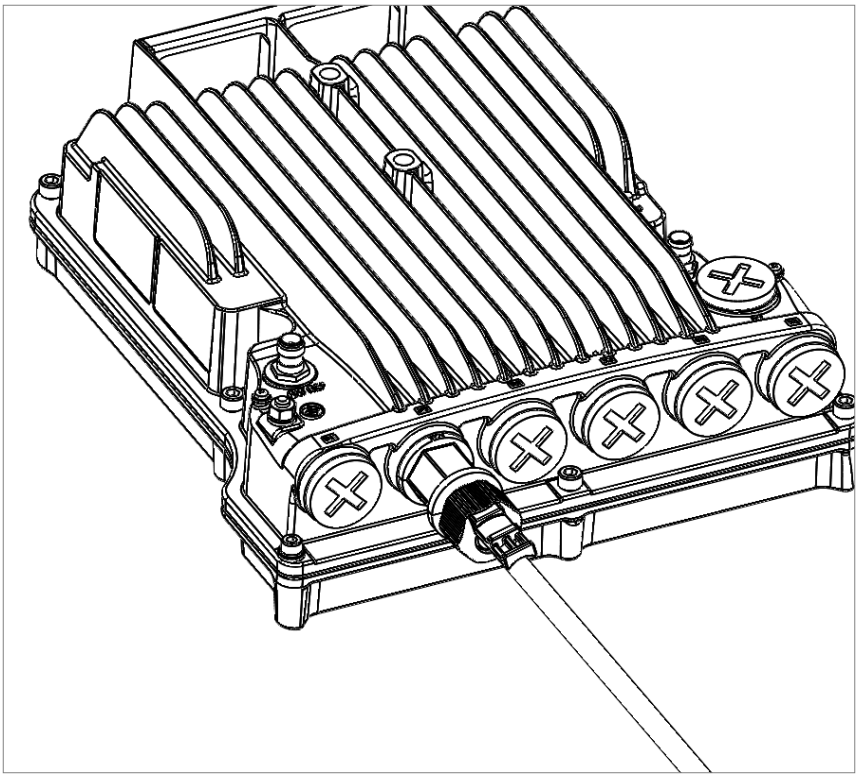
2. Connect the CAT5E cable to the PTP 850C.



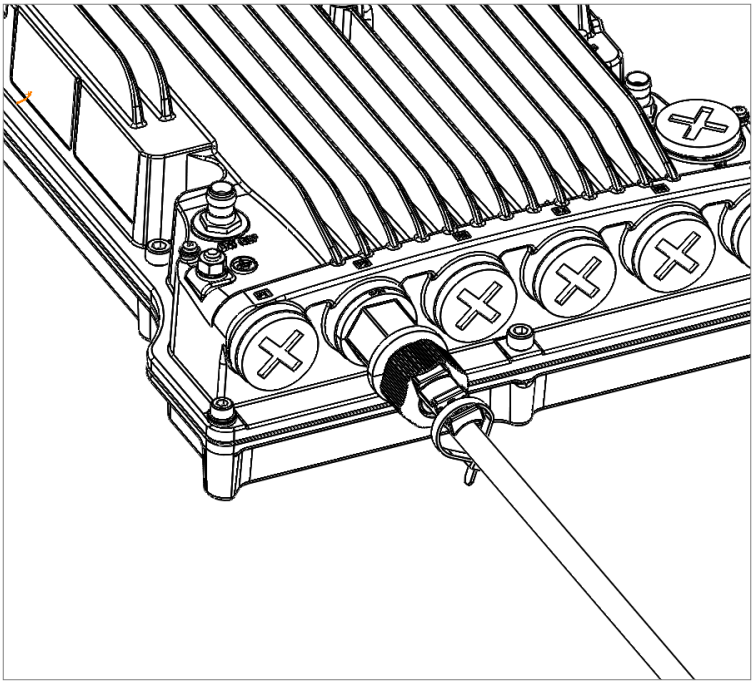
3. Screw the gland into the radio unit.

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.



Management Connection for 4x4 MIMO and 1+1/2+2 HSB Configurations

In 4x4 MIMO and all HSB protection configurations, two Y-splitter cables and a special signaling cable must be used to connect the management ports (MGT/PROT) of the two PTP 850C units and provide management access to each unit.

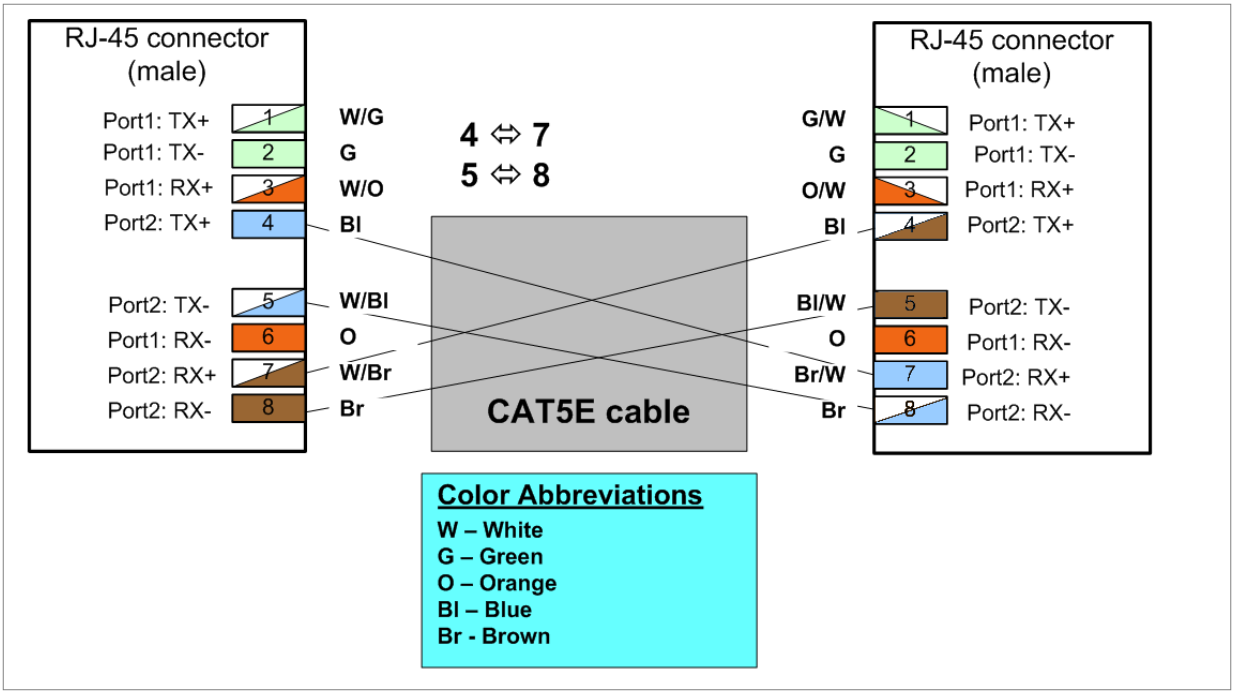
The MIMO/Protection signaling cables are available pre-assembled from Cambium in various lengths, but users can also prepare them in the field.

The following sections explain how to prepare and connect these cables.

Preparing a MIMO/Protection Signaling Cable

The MIMO/Protection signaling cables require the following pinouts.

Figure 19 *MIMO/Protection Signaling Cable Pinouts*



Note:

Other than the pinout connection described above, the cable should be prepared according to the cable preparation procedure described in Connecting the Ethernet Cable.

Connecting the MIMO/Protection Splitters and Protection Signaling Cable

Each splitter has three ports:

- System plug (“Sys”) – The system plug should be connected to the PTP 850C’s management port.
- Management port (“Mng”) – A standard CAT5E cable should be connected to the splitter’s management port in order to utilize out-of-band (external) management.

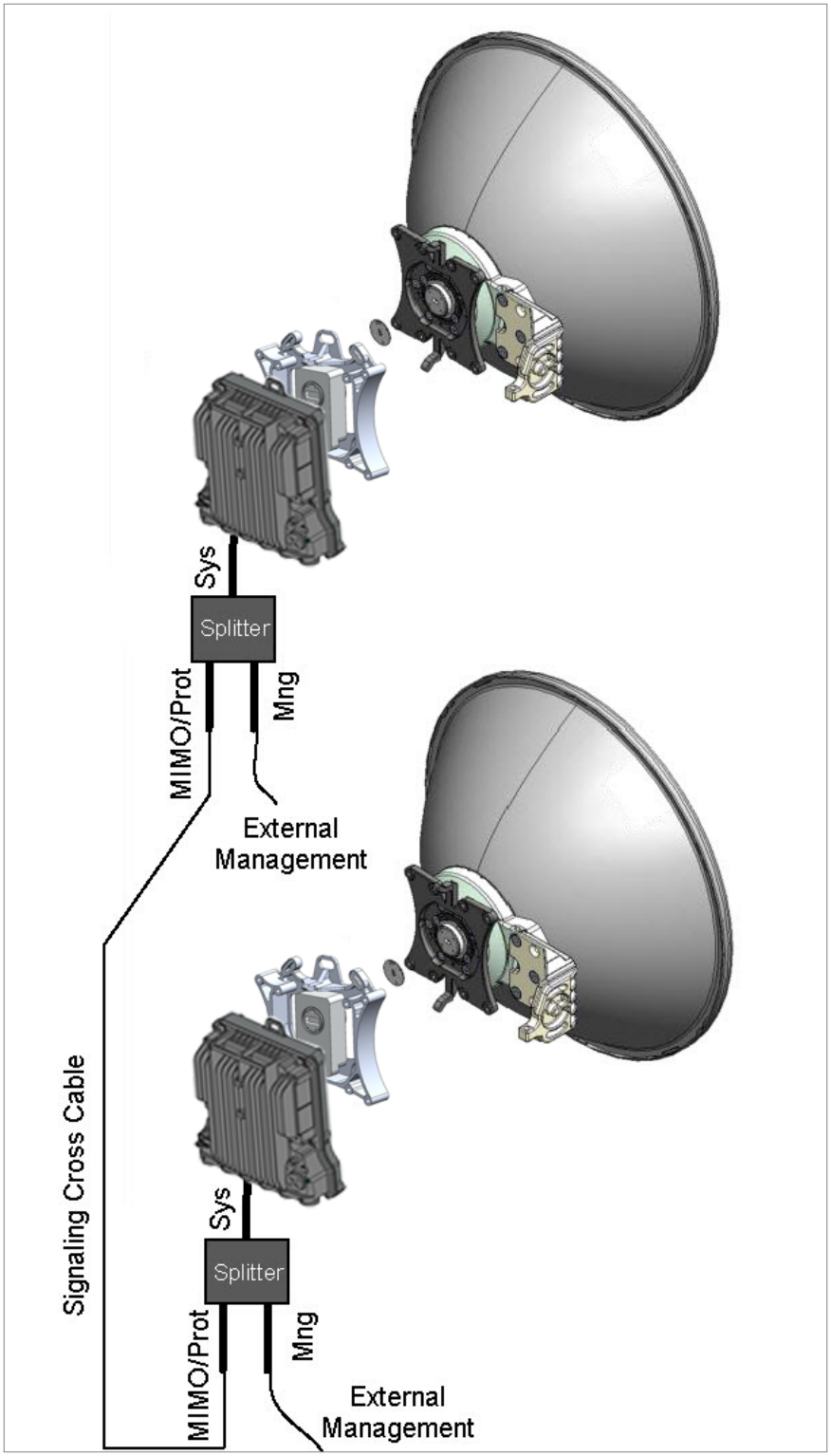
Note:

Even for systems that use in-band management, initial configuration of a 4x4 MIMO and any HSB protection configuration must be performed manually using out-of-band management.

- MIMO/Protection signaling port (“MIMO/Prot”) – A MIMO/Protection signaling cross cable, as described above, should be connected between this port and the other “MIMO/Prot” port of the second splitter on the mate PTP 850C unit.

The following figure demonstrates a 4x4 MIMO configuration in which both PTP 850C units are connected to an external management station and to each other, using two splitters.

Figure 20 *4x4 MIMO or HSB Protection Configuration with External Management*



PoE Injector Installation and Connection

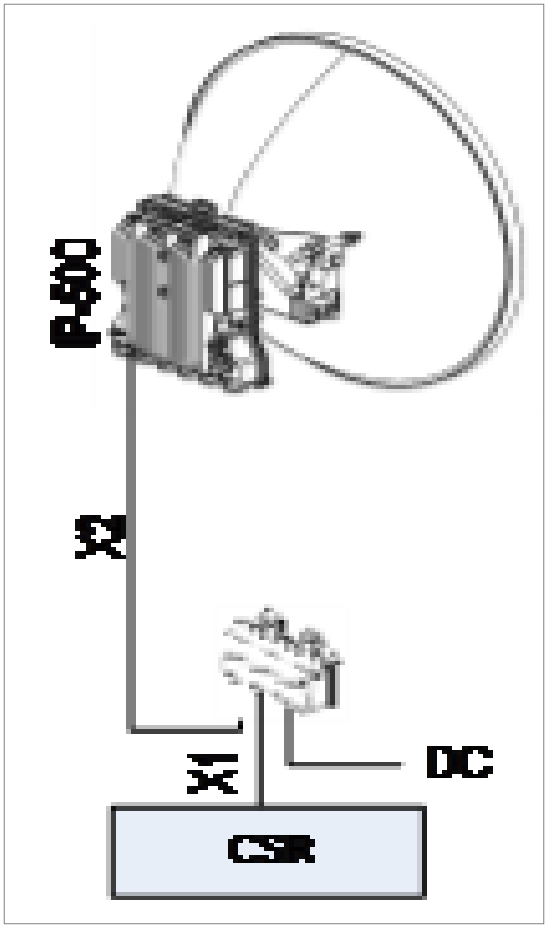
PoE Injector Cable Connection

The PoE Injector cables are connected similar to the PTP 850C.

- To connect the Ethernet (CAT5E) cable to the PoE or Data port, refer to Connection of Ethernet Cable to PTP 850C.
- To connect the DC power cable to the power port or dual feed port, refer to Connecting a DC Power Cable. This cable is not supplied with the PoE Injector.
- The total length of the cable between the PTP 850C port and the Switch/Router the device is connected to should not exceed 100m/328ft. This length includes the connection between the PTP 850C and the PoE Injector (X1 + X2 ≤ 100m/328ft in the figure below).

Note:

The length of the cable connecting the customer equipment to the PoE injector should not be longer than 10m (according to ANSI/TIA-568 standard).



Note:

For the warranty to be honored, the connection must be through the glands only. Do not open the PoE injector box cover.

PoE Injector Grounding

To ground the PoE Injector:

1. On the right side of each PoE Injector, loosen the screw, plain washer, and serrated washer.
2. Place the cable lug (supplied with the PoE injector kit) between the plain and serrated washer.
3. Tighten the screw.
4. Perform a resistance test between the 2 lugs of the GND cable. Verify that the result is 0-2 ohms.

PoE Injector Wall Mount Installation

List of Items

Item	Description	Quantity	Remarks
1	PoE Injector	1	
1	Glands Kit	1	For outdoor installations.

Note:

Glands are required for outdoor installations. The glands kit (three or five glands) is not supplied with the PoE Injector, and must be ordered separately.

Glands Kit

Marketing Model	Marketing Description
PTP 820_3xGlands_kit	PTP 820_3xGlands_kit
PTP 820_Glands_kit	PTP 820_Glands_x5_kit

Required Tools

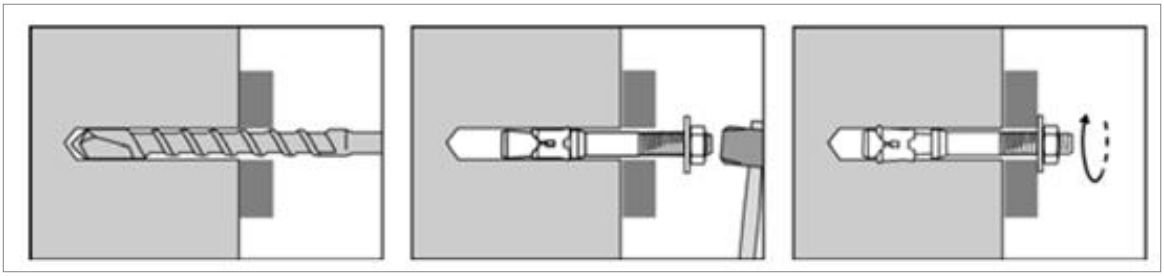
- Metric offset wrench key wrench set
- Hammer
- Drilling Machine

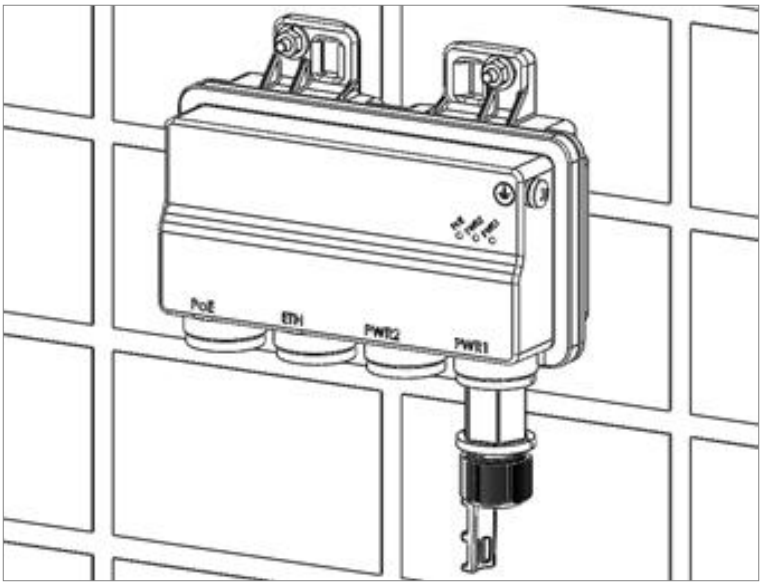
Procedure

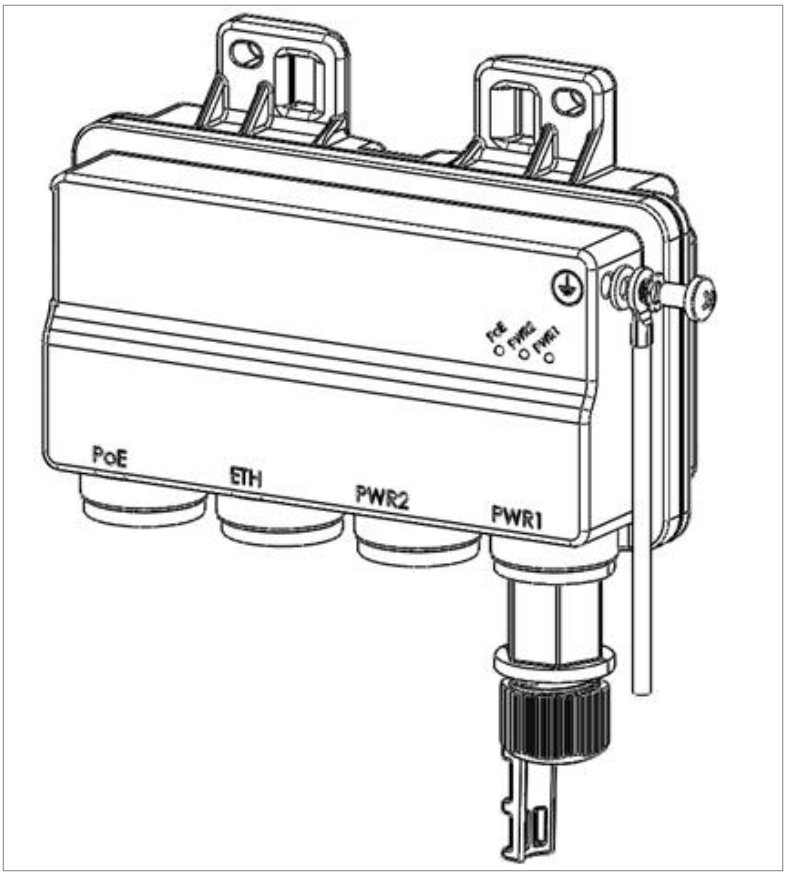
1. Mount and tighten the PoE Injector to a wall using two M6 bolts and anchors. The M6 bolts and anchors must be purchased separately.

> **Note**:
>
> Use Anchor Stainless Steel with flanged Hexagonal nut M6X70.

2. Drill two 6mm diameter holes with 100mm distance between the centers of the holes.
3. Insert the anchors with the bolts.
4. Place the washers on the bolt.
5. Tighten the nuts.




PoE
ETH
PWR2
PWR1


PoE
ETH
PWR2
PWR1

PoE Injector Pole Mount Installation

List of Items

Item	Description	Quantity	Remarks
1	PoE Injector	1	

Required Tools

- Slot Screwdriver

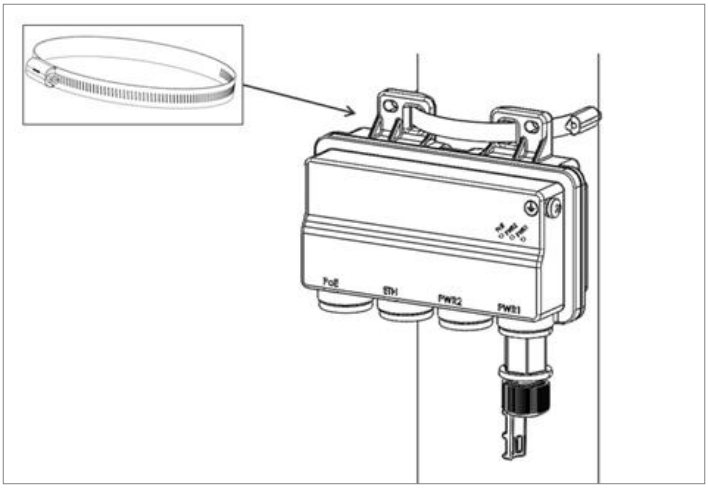
Procedure

To mount the PoE Injector on a pole:

1. Mount and tighten the PoE Injector to a pole with a diameter of 114 mm using a stainless steel hose clamp.
2. Pass the hose clamp through the pole mount slots.

> **Note**:
>
> The Hose Clamp is not supplied with PoE injector kit.

3. Attach the PoE injector to the pole.
4. Connect the ends of the hose clamp.
5. Tighten the hose clamp using the captive screw.



PoE Injector 19” Rack Installation

List of Items

Item	Description	Quantity	Remarks
1	PoE Injector	1	
2	PoE Injector 19” Rack Mount Kit	1	

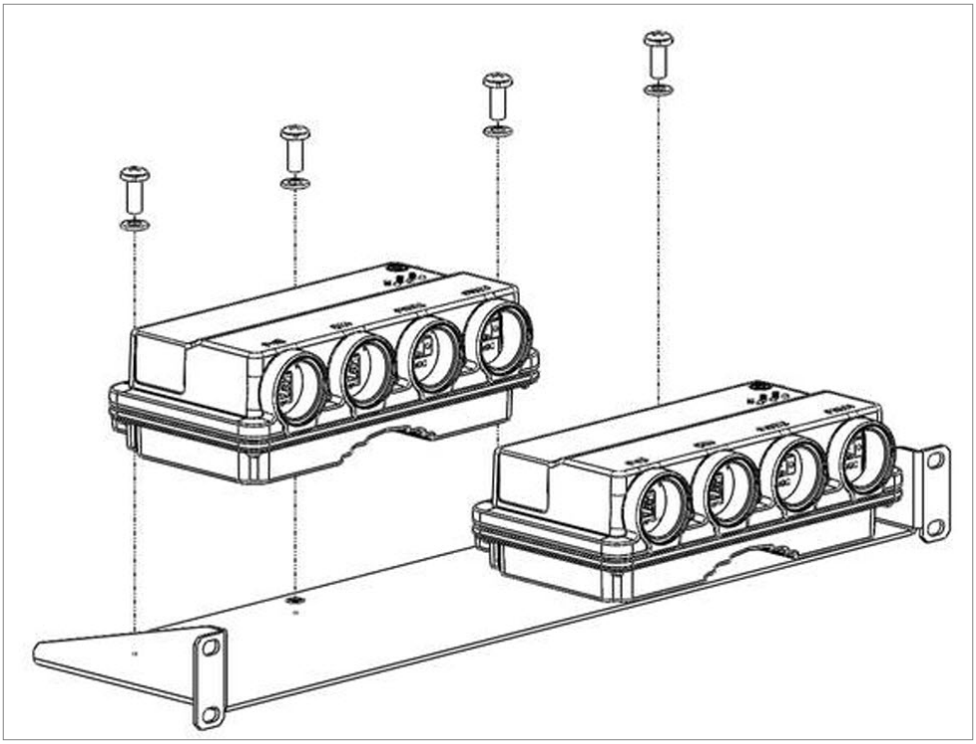
Required Tools

- Philips Screwdriver

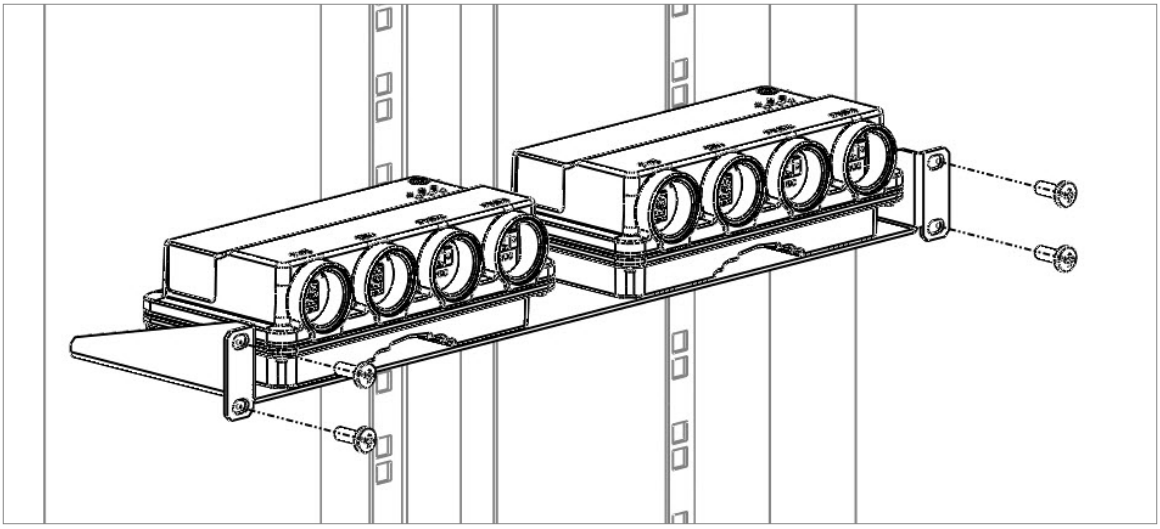
Procedure

To mount the PoE Injector on a rack:

1. Mount the PoE Injector to a 19” rack using a 19” rack adaptor.
2. Mount the PoE Injector on the 19” adaptor through the wall mounting holes, using M6 screws and washers.



3. Mount the 19” rack adaptor to a 19” rack using four M6 screws and cage nuts.



PoE Injector ETSI Rack Installation

List of Items

Item	Description	Quantity	Remarks
1	PoE Injector	1	
2	PoE Injector ETSI Rack Mount Kit	1	

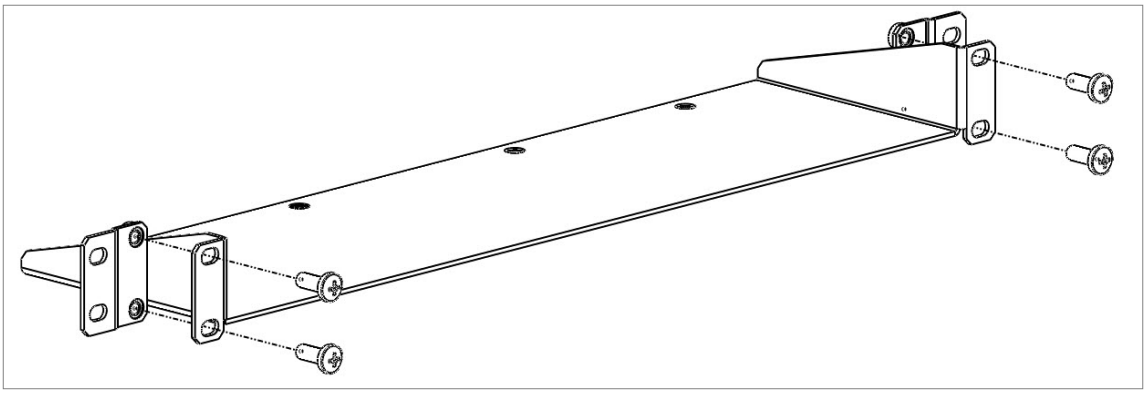
Required Tools

- Philips Screwdriver

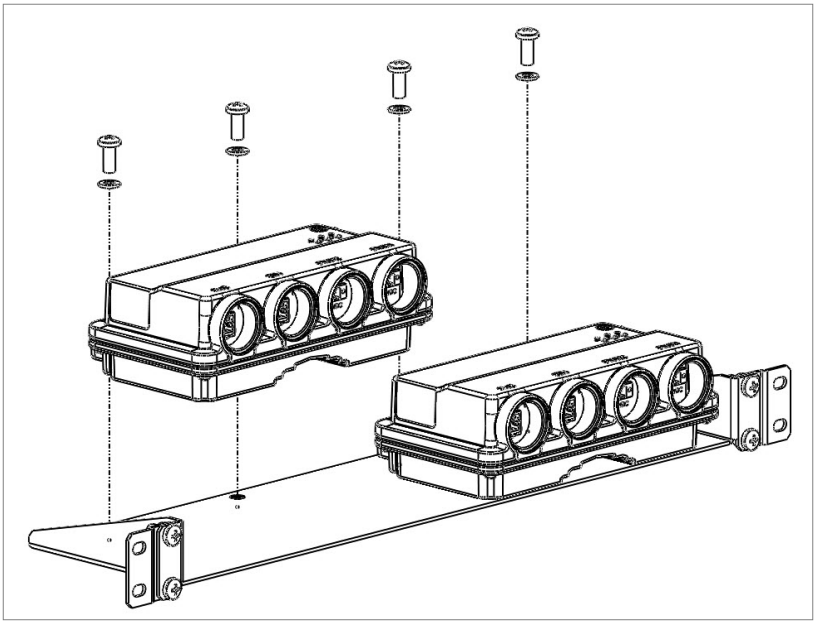
Procedure

To mount the PoE Injector to an ETSI rack:

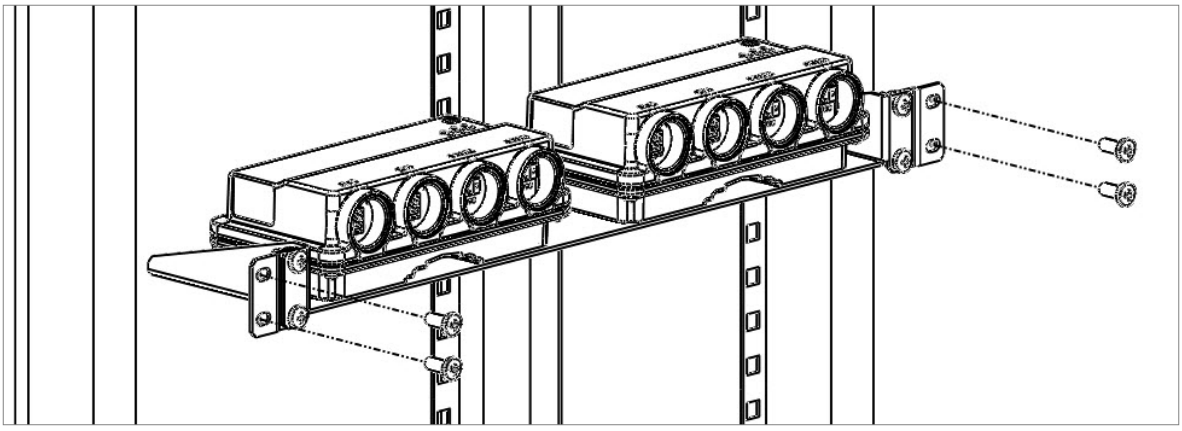
1. Mount the PoE Injector to an ETSI rack using a 19” rack adaptor and ETSI adapting ears.
2. Connect the ETSI adapting ears to a 19” rack adaptor using four M6 screws.



3. Mount the PoE Injector on the adaptor through the wall mounting holes using M6 screws and washers.



4. Mount the 19” rack adaptor with the ETSI ears on the ETSI rack using four M6 screws and cage nuts.



Note:

For this type of installation, a 2RU space is required.

Generic Installation Procedures

General Notes Concerning All Installation Procedures

Since the PTP 850C architecture is of a Dual Core nature, each dual core configuration can be considered as single core configuration hardware ready for its dual core counterpart. Therefore, you should follow the same procedure for 2+0 SP installation, if you want to install a 1+0 SP HW ready for 2+0 SP.

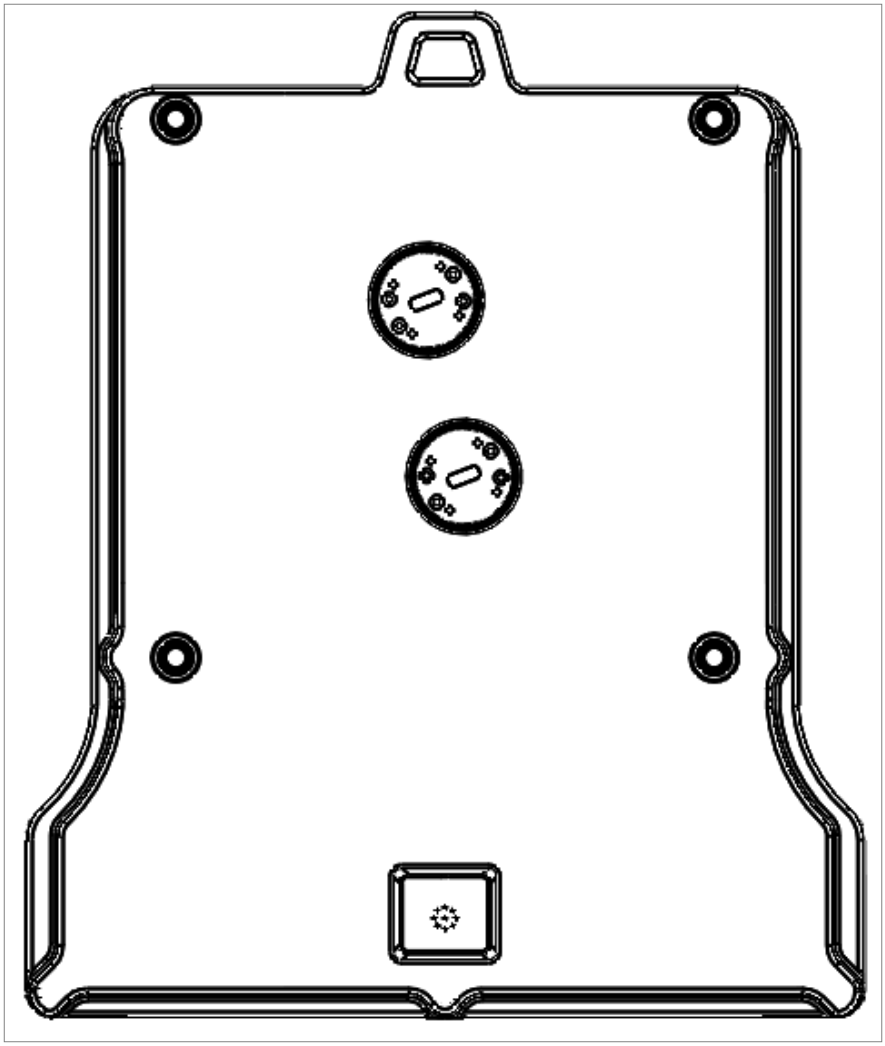
One of the major benefits of the PTP 850C and the dual core architecture is that upgrading can be done remotely by uploading the correct software license.

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.

Note:

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

Figure 21 *Transparent Pressure Windows*



XPIC-Ready 1+0 Links

When installing a 1+0 link which is hardware ready for 2+0 Dual Polarization (XPIC), make sure to plan and install the link as if it is immediately being configured as an XPIC link. This includes both link budget calculation and hardware installation.

The OMT must be carefully aligned according to the XPIC alignment procedure. Use activation key Demo Mode to activate the second radio interface for purposes of alignment. After completing alignment, install the regular activation key and configure the PTP 850C unit for 1+0 operation.

Failure to follow these steps may limit your ability to upgrade a 1+0 link to a 2+0 XPIC link at a later date from a remote location.

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
- 13-15 GHz: M4/#8-32: 2.5 Nm
- 18-23 GHz: M3/#4-40: 1 Nm

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 11 GHz, the PTP 850C 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	PTP 850C Basic Radio Unit	1	
2	PTP 850C Diplexer Unit	1	

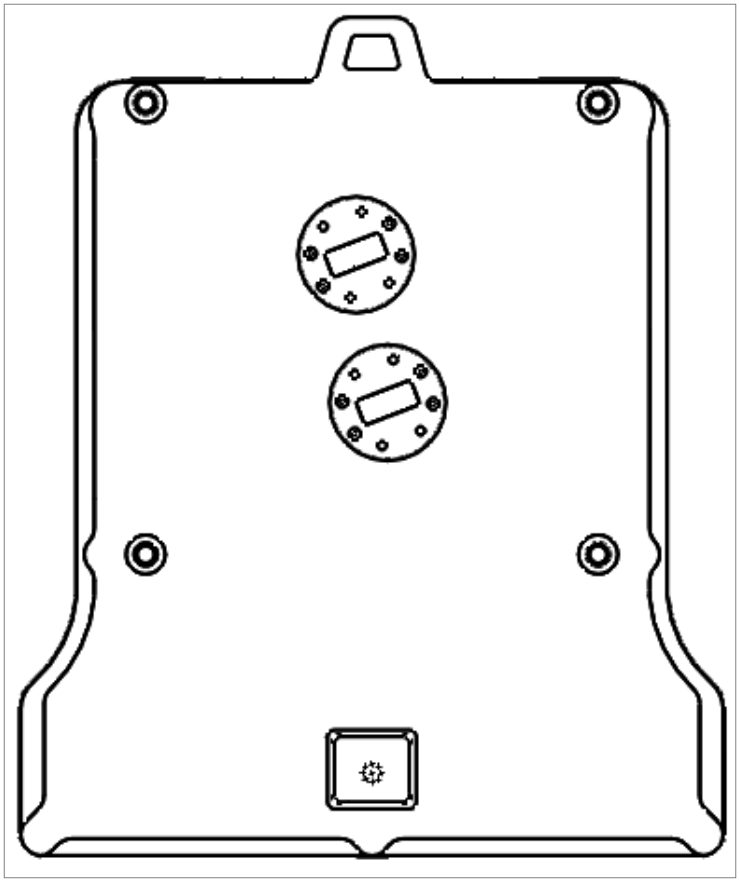
Required Tools

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

Procedure

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

Figure 22 *Transparent Pressure Windows*

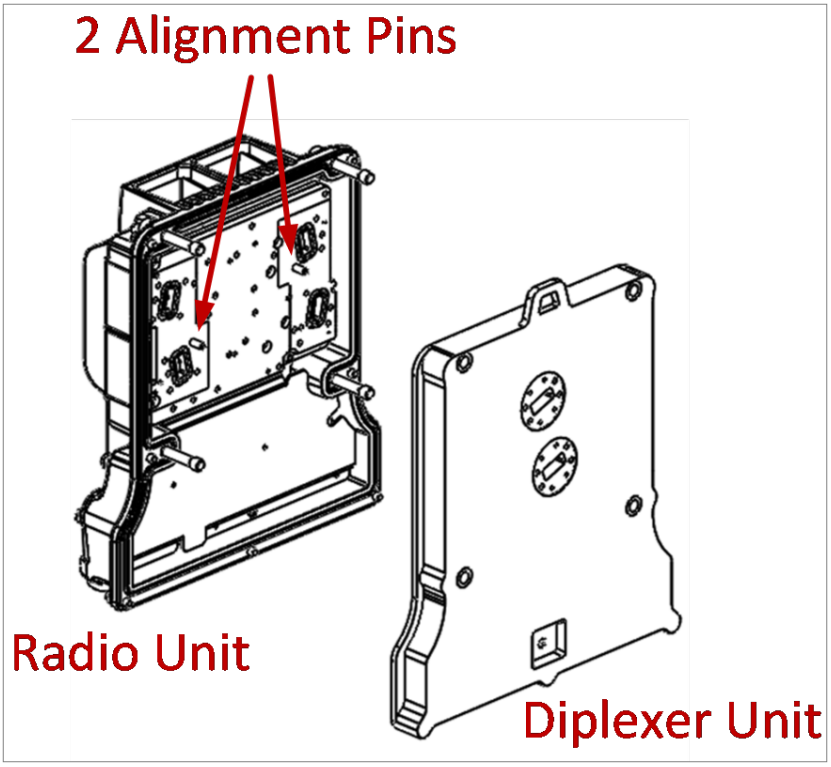


1. Align the diplexer unit to the radio unit using the two alignment pins located on the TRX ports of the radio unit and secure the diplexer unit to the radio unit using the seven M5 captive screws which are pre-assembled on the radio unit.

Note:

Make sure the small blue cable is straight and tucked underneath the diplexers so that it does not interfere with the assembly.

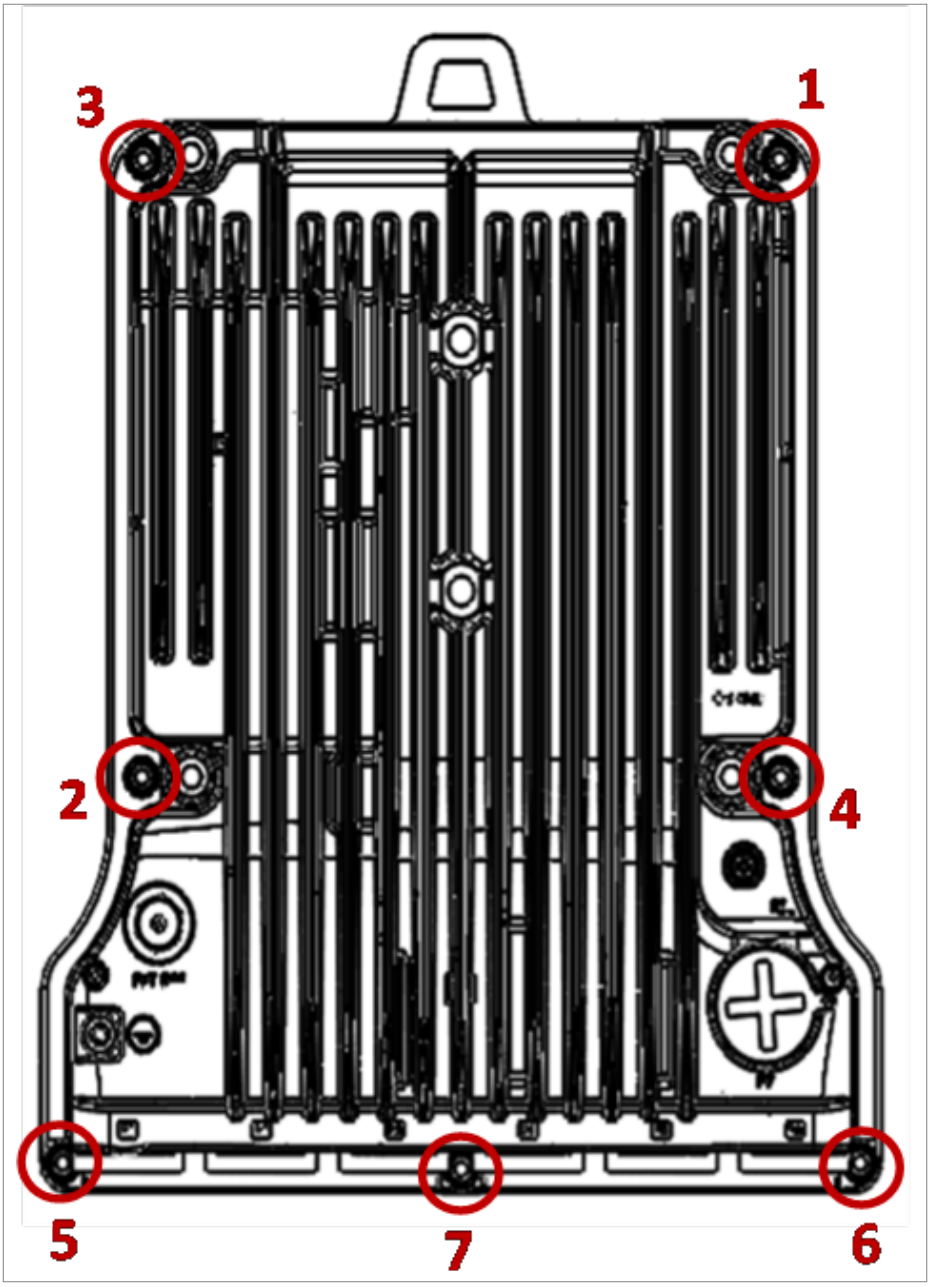
Figure 23 *Attaching the Diplexer*



Note:

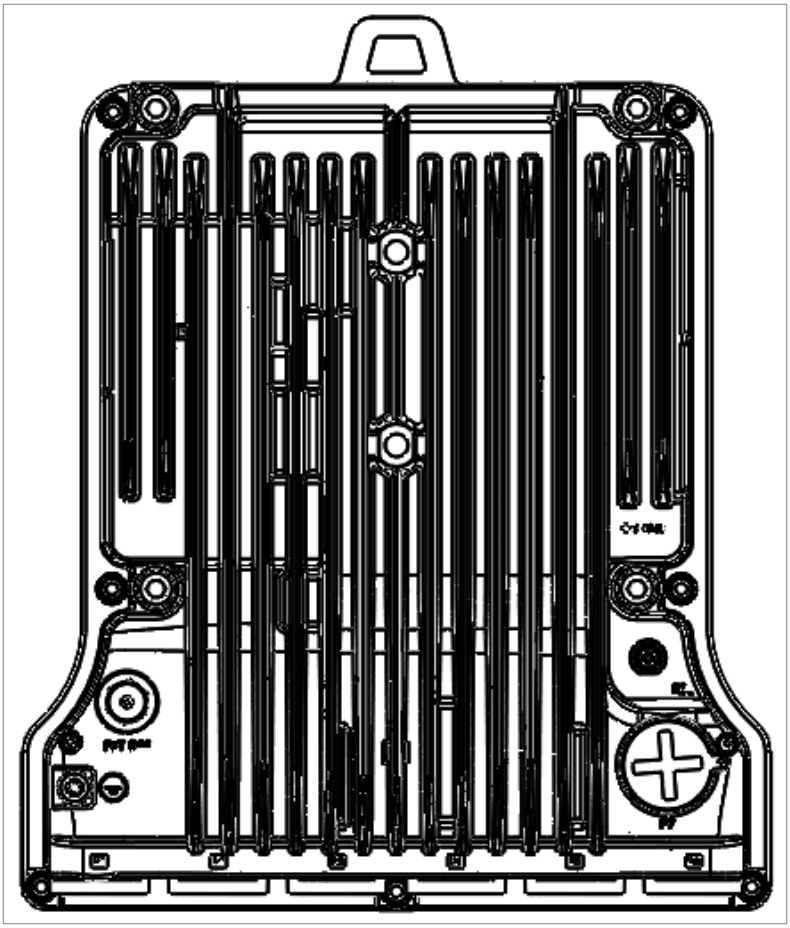
Make sure to tighten the M5 captive screws in diagonal order, in two stages. First, partially tighten the screws starting with the upper right and proceeding according to the order in the figure below. Then, finish tightening the screws in the same order.

Figure 24 *Tightening the Screws on the Radio Unit*



2. Make sure the four M8 installing screws are assembled on the radio unit.

Figure 25 *M8 Installing Screws*



3. Proceed to install the PTP 850C in the desired configuration, as described in Installation Procedures per Configuration Type.

PTP 850C DC Pole Mount Procedure

Note:

The pole diameter range for pole mount installations is 8.89 cm – 11.43 cm (3.5 inches – 4.5 inches).

List of Items

Item	Description	Quantity	Remarks
1	PTP 820C DC POLE MOUNT KIT	1	
2	PTP 820C DC REMOTE MOUNT ADAPTOR KIT	1	13GHz

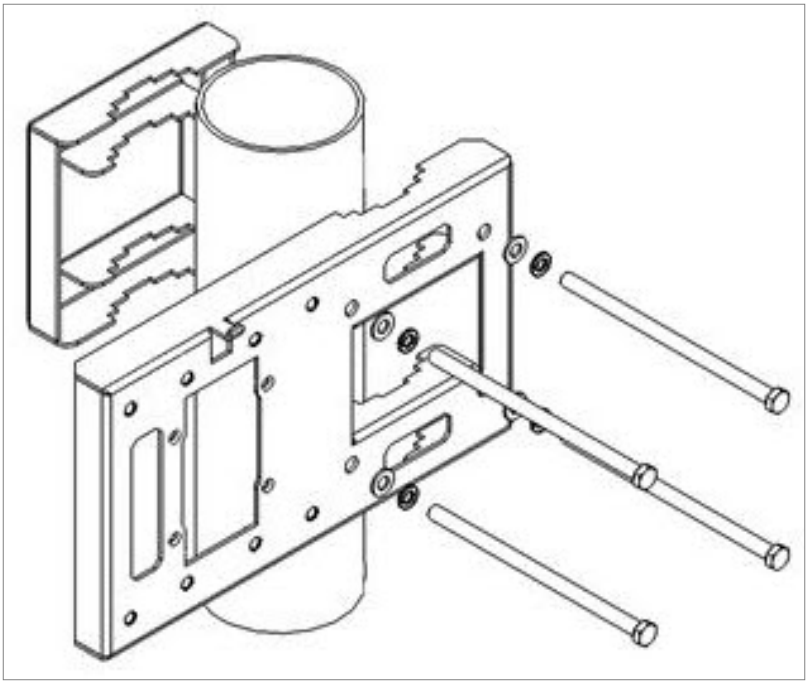
Required Tools

- Metric offset wrench key wrench set

Procedure

To install the PTP 850C pole mount:

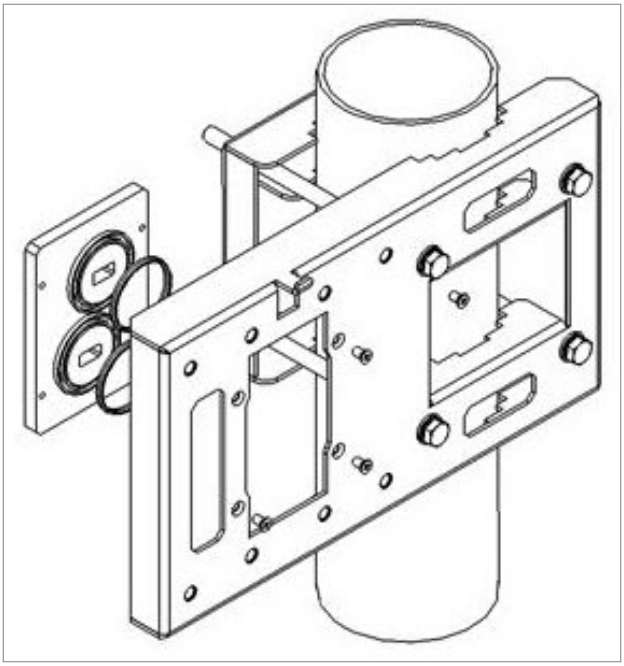
1. Mount and tighten the PTP 850C DC pole mount to a pole with a diameter of 114 mm using the four washers and screws supplied with the PTP 850C DC pole mount kit.



2. For 13 GHz Only

   Mount and tighten the PTP 850C Remote Mount Adaptor plate (supplied in PTP 850C Adaptor Remote Mount kit) to the PTP 850C Pole Mount using the four flat screws supplied with the PTP 850C

Adaptor Remote Mount kit.



Remote Mount Installation for Single Polarization with an Imperial Waveguide

List of Items

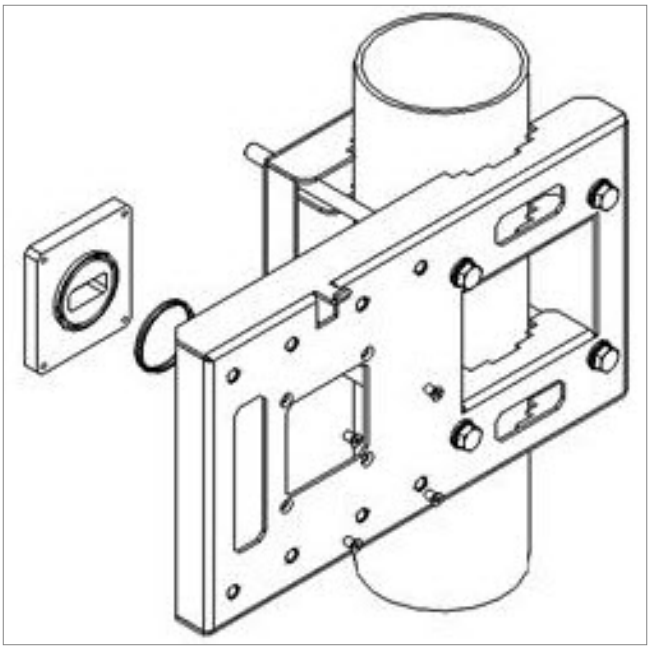
Item	Description	Quantity	Remarks
1	PTP 850C RADIO	1	
2	RFU-C ADAPTATION KIT TO FLEXIBLE WG IMPERIAL	1	13 GHz only
3	RFU-C REMOTE POLE MOUNT KIT	1	
4	PTP 820C SPLITTER KIT	1	

Required Tools

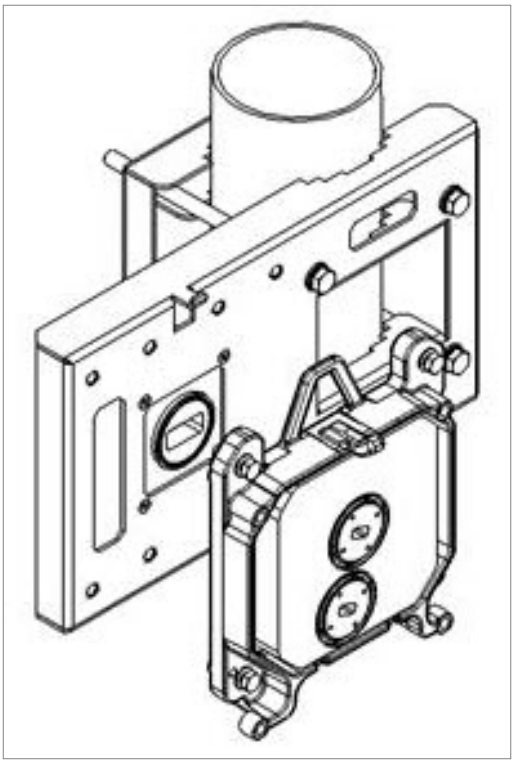
- Metric offset hexagon key wrench set
- Imperial offset hexagon key wrench set
- Phillips #1, #2 screwdriver

13 GHz Installation Procedure

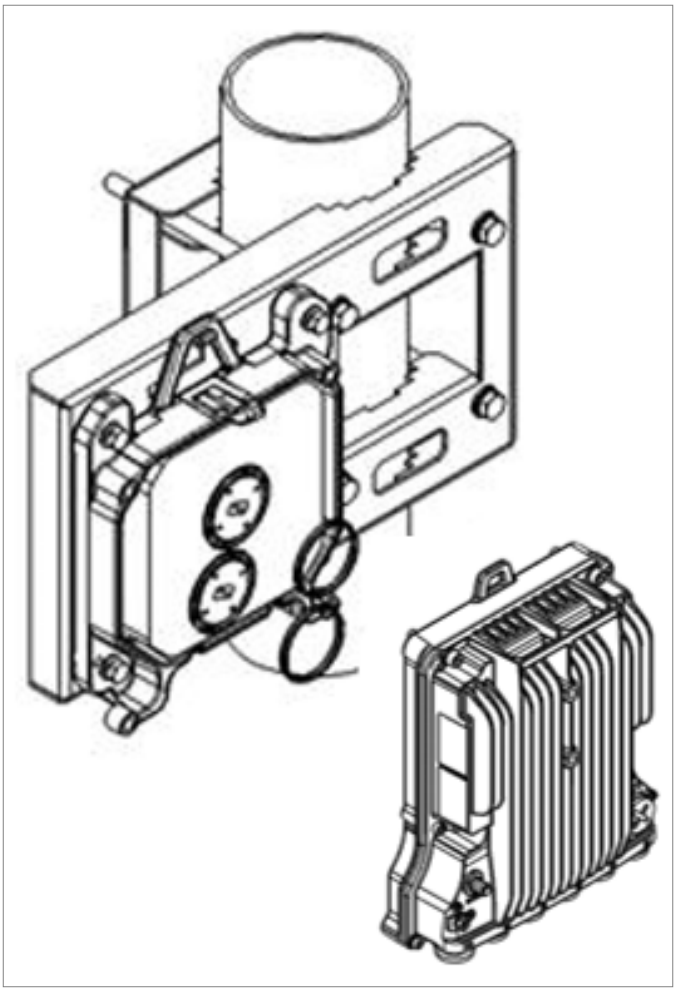
1. Mount and tighten the RFU-C Adaptor plate (supplied in RFU-C Adaptation kit to Flexible WG Imperial) to the RFU-C Remote Pole Mount using the four flat screws supplied with the RFU-C Adaptation kit to Flexible WG Imperial.



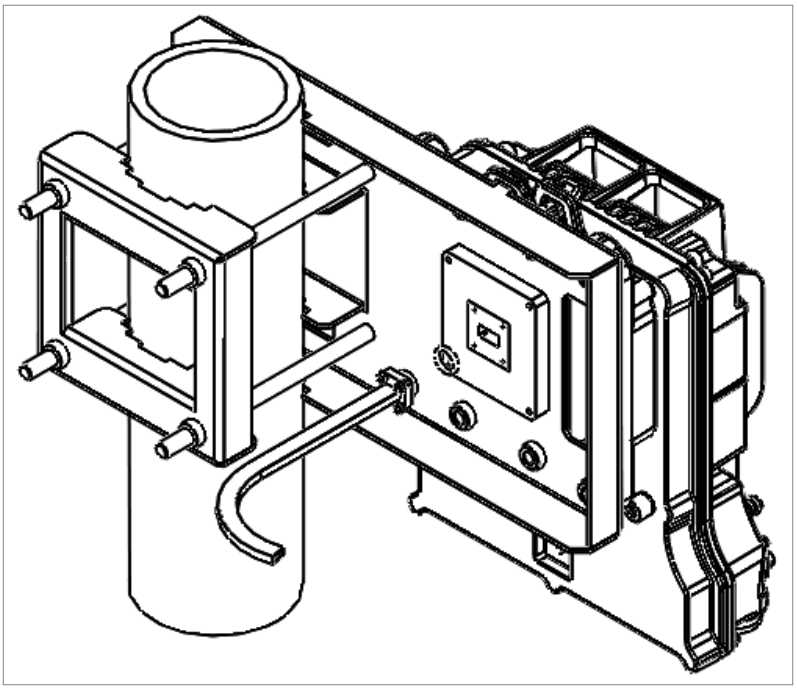
2. Mount and tighten the PTP 820C Splitter to the RFU-C Remote Pole Mount using the four captive screws and washers that are assembled to the PTP 820C Splitter kit.



3. Mount and tighten the PTP 850C radio to the PTP 820C Splitter using the four captive screws and washers that are assembled to the PTP 850C radio. Pay attention that the O-rings are mounted on the PTP 820C Splitter kit.

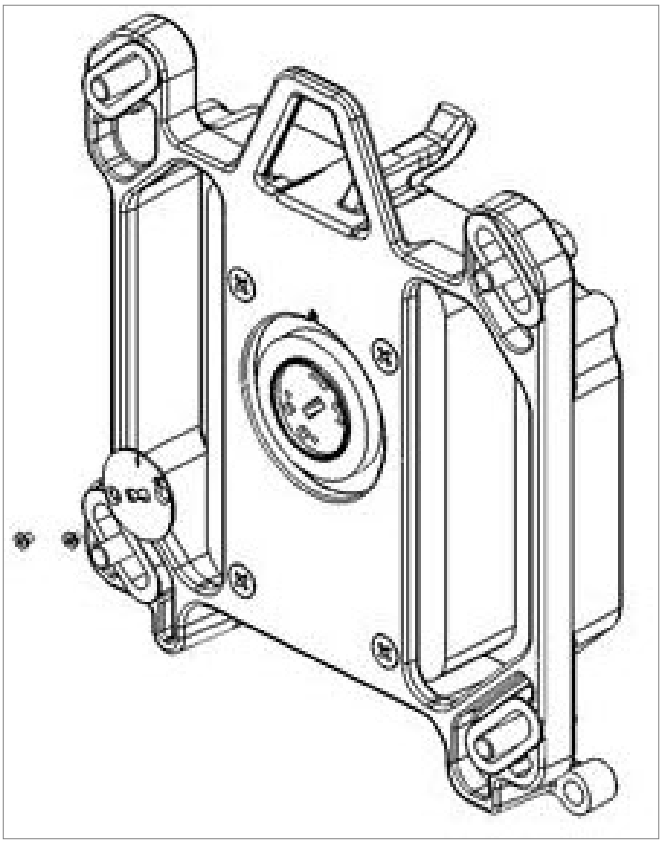


4. Connect the Flexible Waveguide and Sealing Gasket supplied with the Flexible Waveguide Imperial Kit to the RFU-C Adaptor plate. Tighten the four screws supplied with the Flexible Waveguide Imperial Kit.

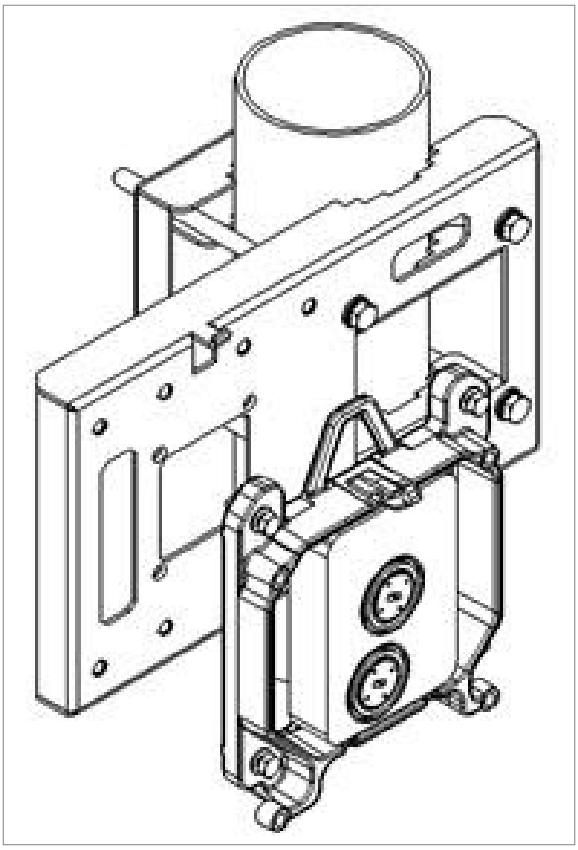


15-23 GHz Installation Procedure

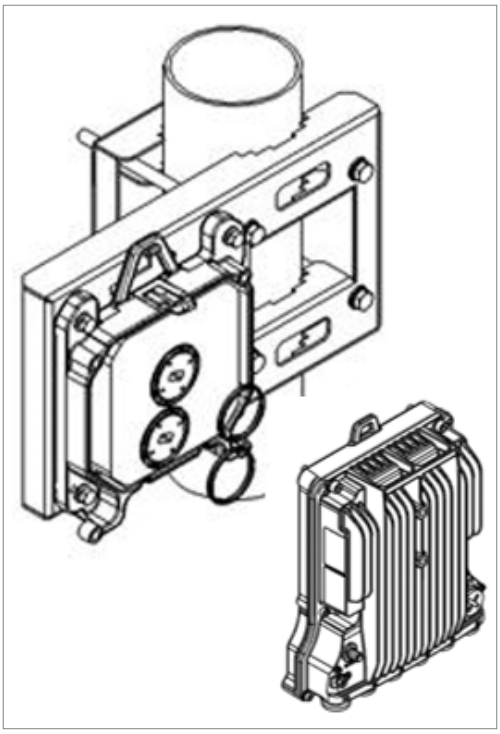
1. Loosen the two screws, and remove the twist plate from the PTP 820C Splitter.



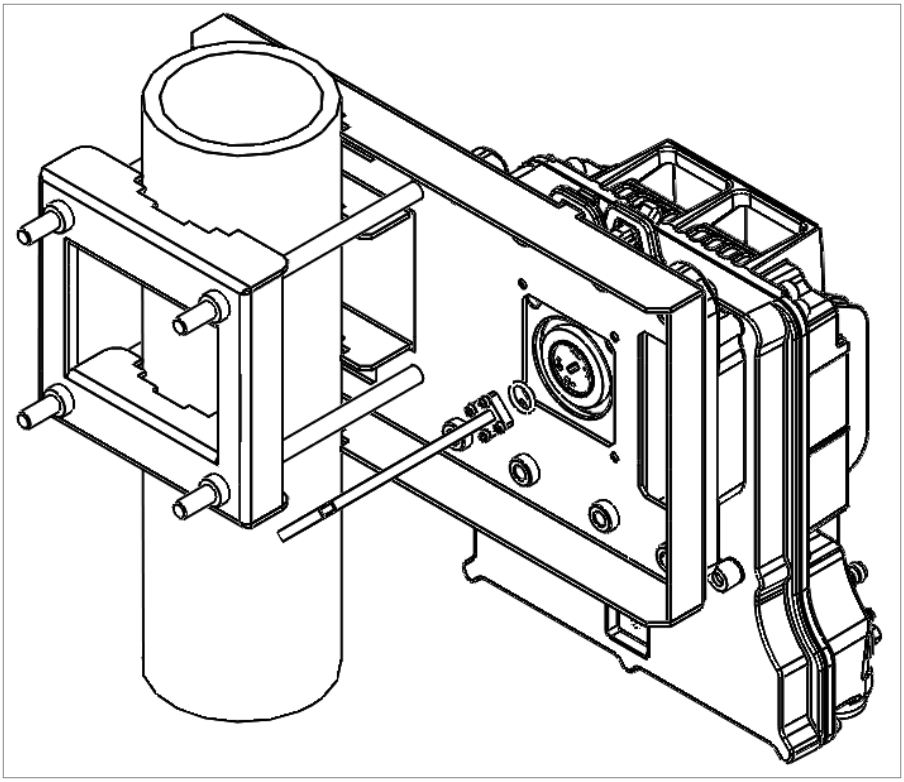
2. Mount and tighten the PTP 820C Splitter to the RFU-C Remote Pole Mount using the four captive screws and washers that are assembled to the PTP 820C Splitter kit.

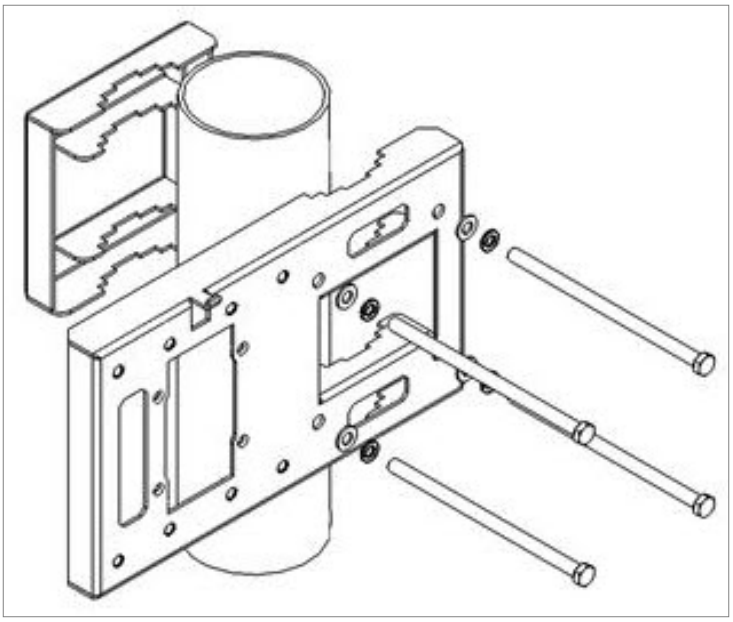


3. Mount and tighten the PTP 850C radio to the PTP 820C Splitter using the four captive screws and washers that are assembled to the PTP 850C radio. Make sure the O-rings are mounted on the PTP 820C Splitter kit.



4. Connect the Flexible Waveguide and Sealing O-ring supplied with the Flexible Waveguide Imperial Kit to the IP20-C Splitter kit. Tighten the four screws supplied with the RFU-C Adaptation kit to the Flexible Waveguide Imperial.





Installation Procedures per Configuration Type

Note:

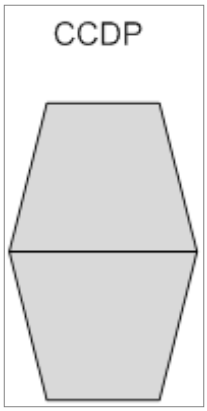
For instructions on configuring Multiband with PTP 850C and PTP 850EX, see Section Multiband Configurations. For instructions on configuring Multiband with PTP 850E and PTP 850C, refer to the Installation Guide for PTP 850E.

In addition to the Link Bonding configurations described in this manual, PTP 850C can also be used in Link Bonding configurations with PTP 820N and PTP 820A. The physical configuration of the PTP 850C is the same as for standalone 1+0 and 2+0 PTP 850C configurations, as described in this manual. However, cables for transferring traffic and protocol data between the PTP 820N/PTP 820A and the PTP 850C must be connected according to the instructions in the User Guide for PTP 820N and PTP 820A, System Release 11.7.5 and later.

2+0 Dual Polarization Direct Mount

Note:

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



List of Items

Item	Description	Quantity	Remarks
1	PTP 850C RADIO	1	
2	PTP 820C OMT kit	1	
3	CIRC./CIRC. ADAPTOR	1	Per Antenna Vendor

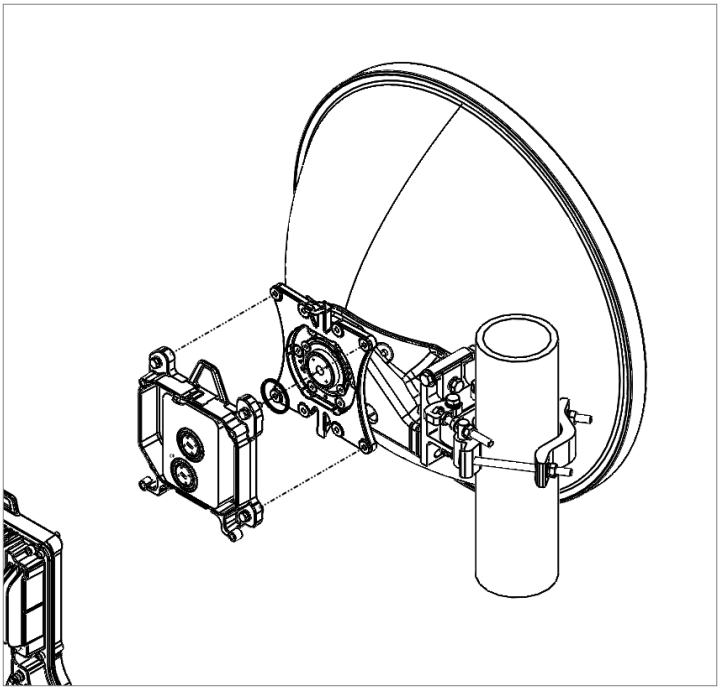
Required Tools

- Metric offset hexagon key set
- Metric wrench key set

Procedure

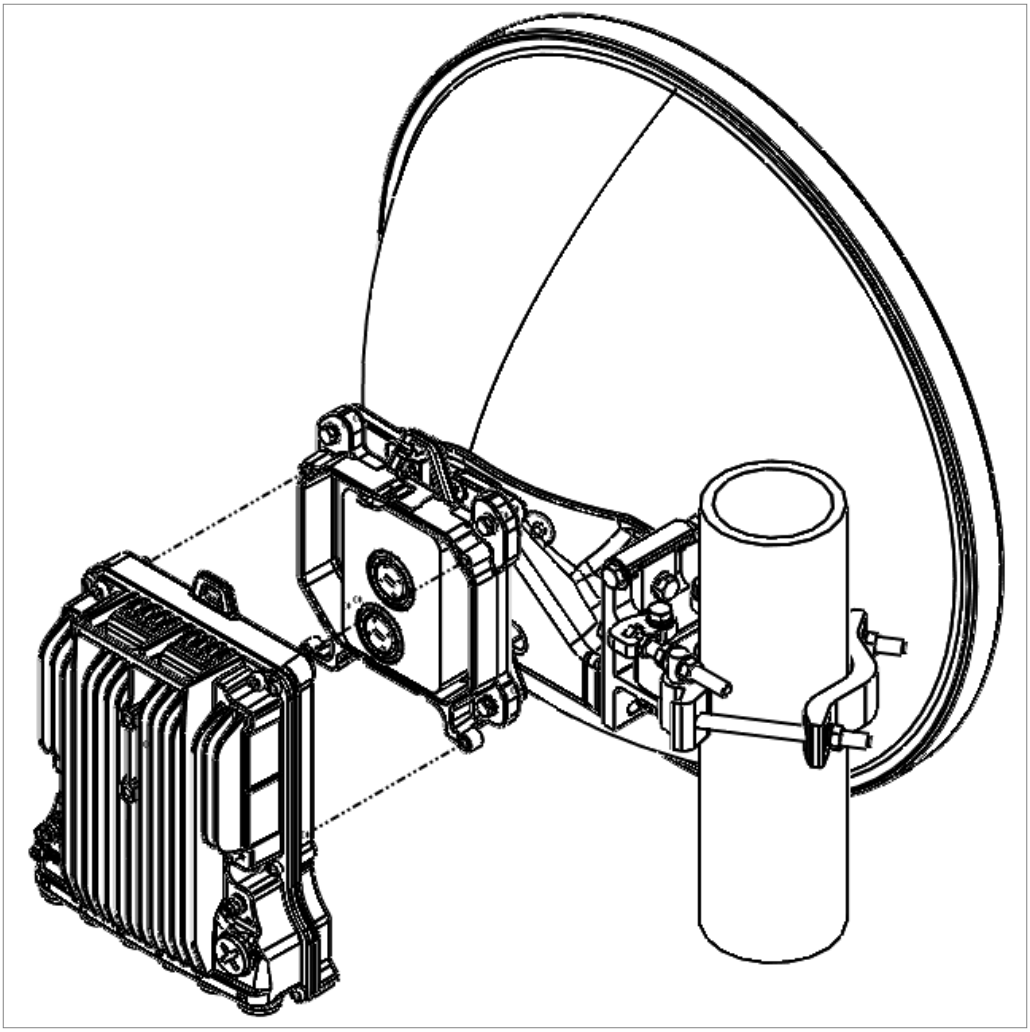
1. Prior to the installation, follow the antenna manufacturer's instructions to use the circular adaptor. (Remove the existing rectangular transition, swap the O-ring, and install the circular transition instead.)

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



3. Connect the PTP 850C DC radio to the OMT Kit using the four M8 captive screws and washers

supplied, and tighten the screws.



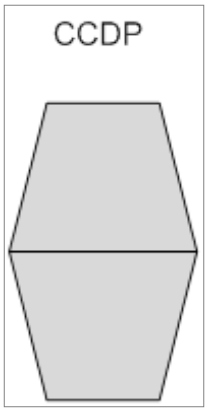
2+0 Dual Polarization Remote Mount

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.



List of Items

Item	Description	Quantity	Remarks
1	PTP 850C RADIO	1	
2	PTP 820C OMT kit	1	Not used for standard interface antennas (six feet and larger).
3	FLEXIBLE WG KIT	2	
4	PTP 820C DC POLE MOUNT KIT	1	
5	PTP 820C DC REMOTE MOUNT ADAPTOR KIT	1	13 GHz only
6	Circ./Circ. Adaptor	1	Per Antenna Vendor. Not used for standard interface antennas (six feet and larger).

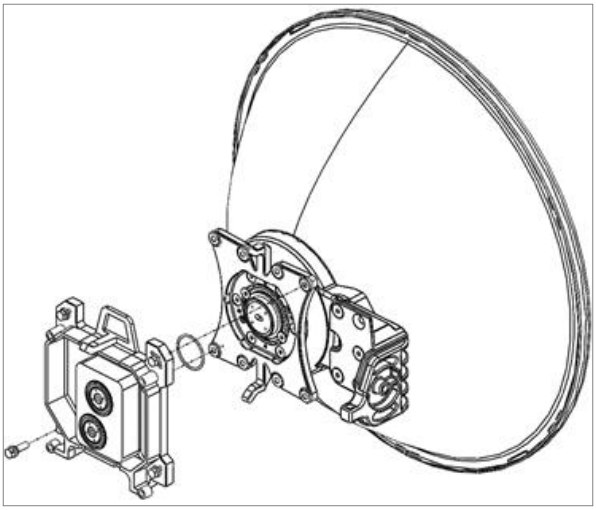
Required Tools

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

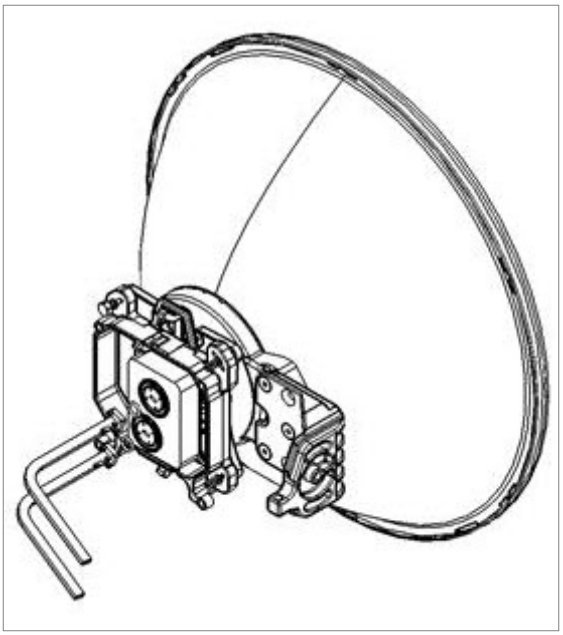
Common Installation

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.

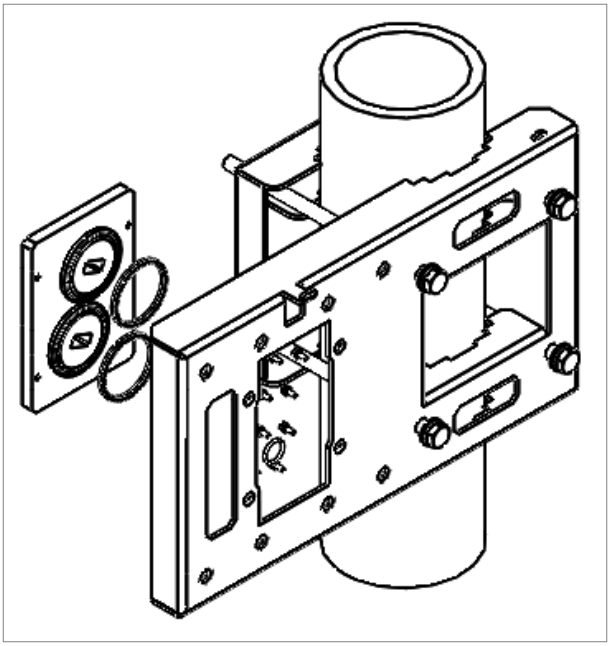


3. Mount and tighten the O-ring and the Flexible WG to PTP 820C OMT ports using the four screws supplied with the Flexible WG kit.

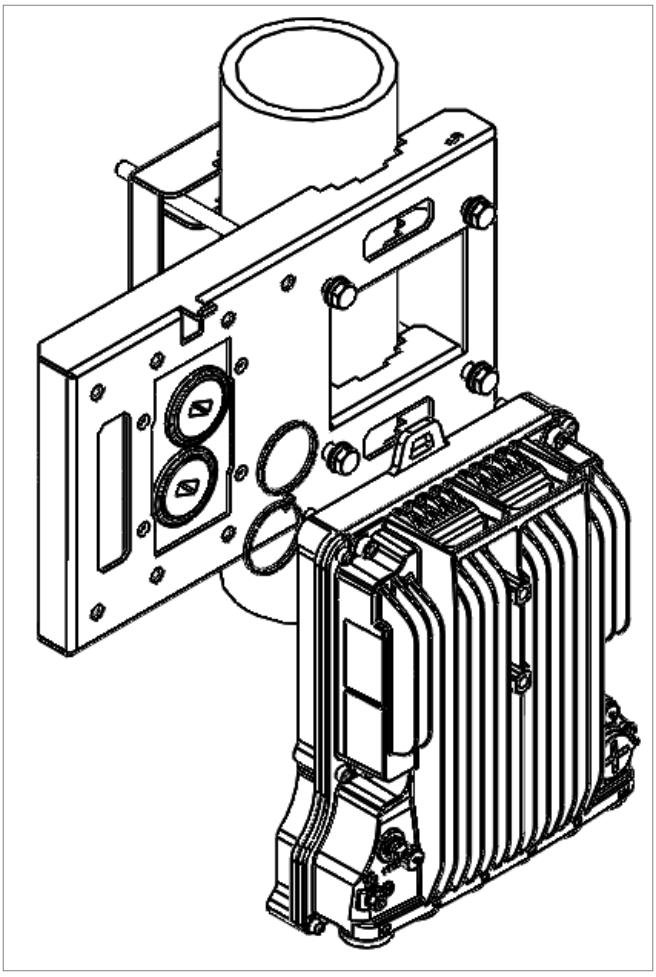


13 GHz

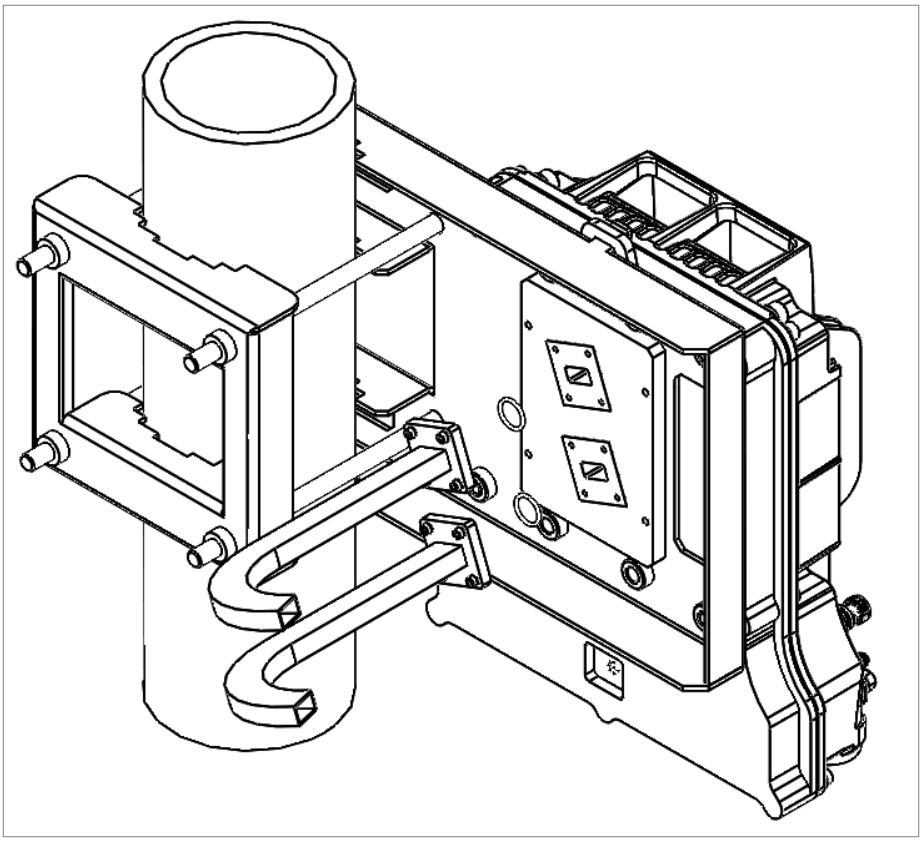
1. Mount and tighten the PTP 820C Remote Mount Adaptor plate (supplied in PTP 820C Adaptor Remote Mount kit) to the PTP 820C Pole Mount using the four flat screws supplied with the PTP 820C Adaptor Remote Mount kit.



2. Mount and tighten the PTP 850C to the PTP 820C Pole Mount using the four captive screws and washers that are supplied with the PTP 850C. Pay attention that the O-rings are mounted on the PTP 820C Remote Mount Adaptor.

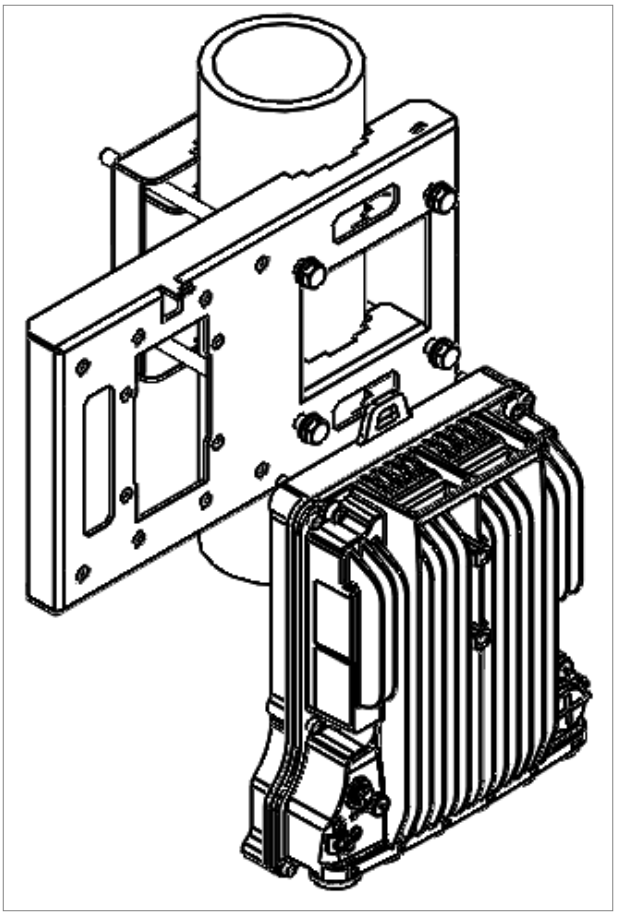


3. Mount and tighten both Flexible WGs with their O-ring to the PTP 820C Remote Mount Adaptor ports using the four screws supplied with each Flexible WG kit.

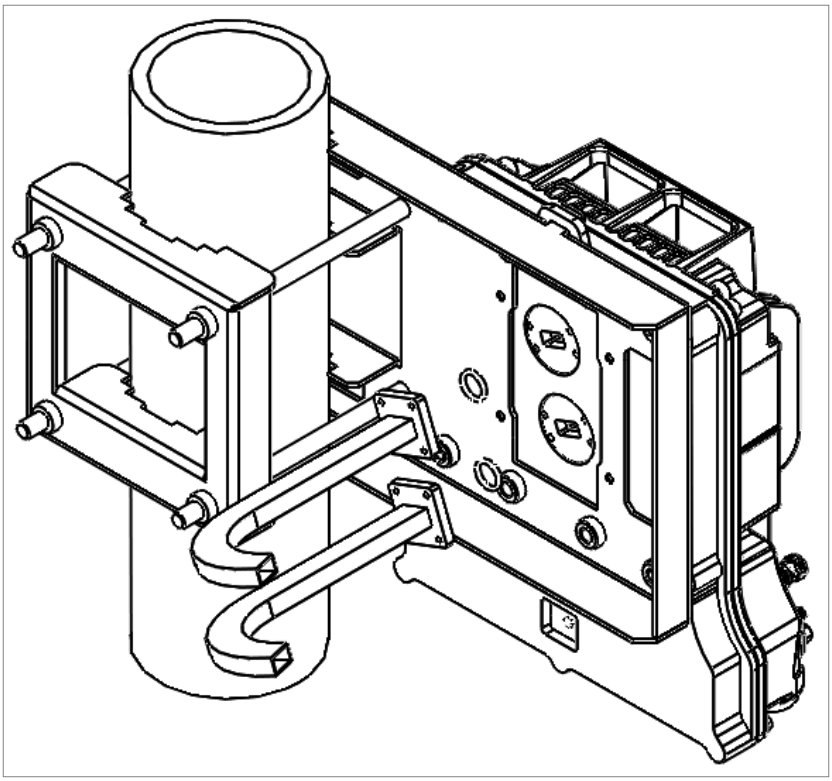


15-23 GHz

1. Mount and tighten the PTP 850C to the PTP 820C DC Pole Mount using the four screws assembled on the PTP 850C.



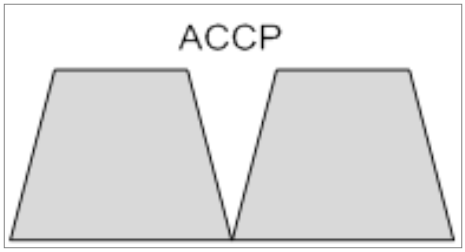
2. Mount and tighten the O-ring and the Flexible WG to PTP 850C radio ports using the four screws supplied with the Flexible WG kit.



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

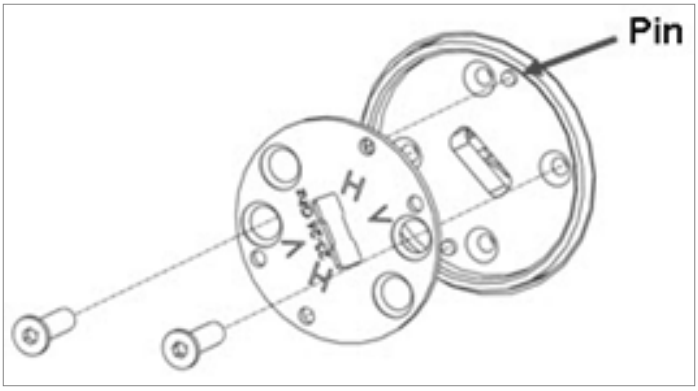
Item	Description	Quantity	Remarks
1	PTP 850C RADIO	1	
2	PTP 820C Splitter KIT	1	

Required Tools

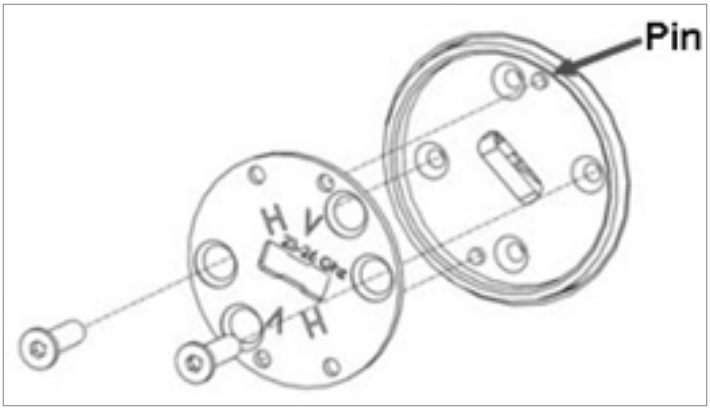
- Metric offset hexagon key set
- Phillips #1, #2 screwdriver

Procedure

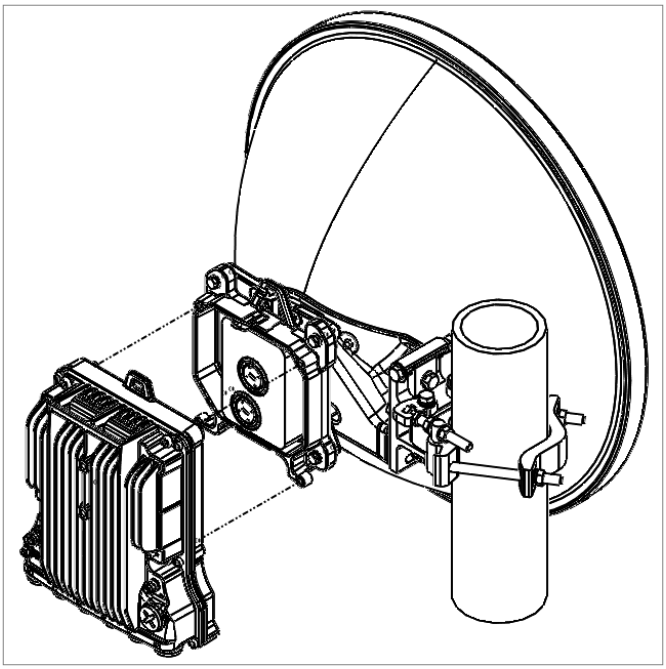
1. Adjust the twist on the Splitter Kit. Perform one of the following steps, according to the required polarization (horizontal or vertical).
   - For horizontal polarization, locate the holes above and below the letter “H” on the pins and fasten the two screws.

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

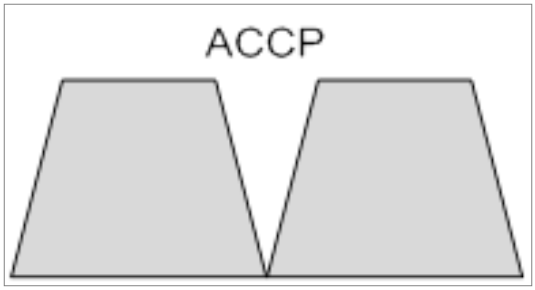
2. Mount and tighten the PTP 820C Splitter Kit on the antenna using the four M8 screws and washers.
3. Mount and tighten the PTP 850C to the PTP 820C Splitter Kit using the four M8 captive screws and washers supplied.



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

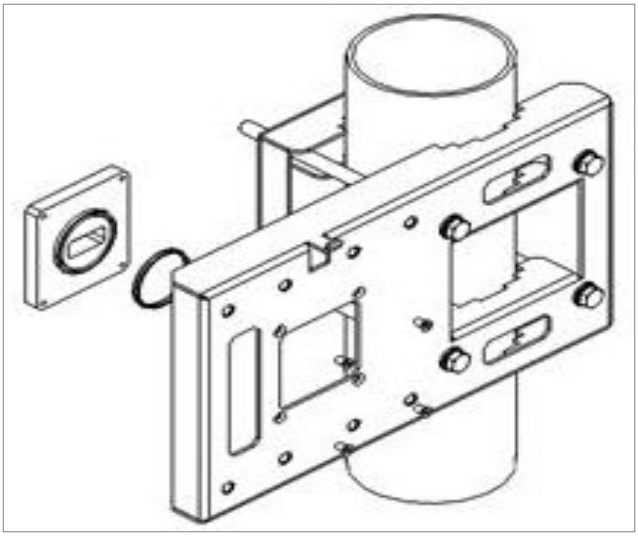
Item	Description	Quantity	Remarks
1	PTP 850C RADIO	1	
2	RFU-C ADAPTOR REMOTE MOUNT KIT	1	13 GHz only
3	RFU-C POLE MOUNT KIT	1	
4	PTP 820C SPLITTER KIT	1	
5	FLEXIBLE WG KIT	1	

Required Tools

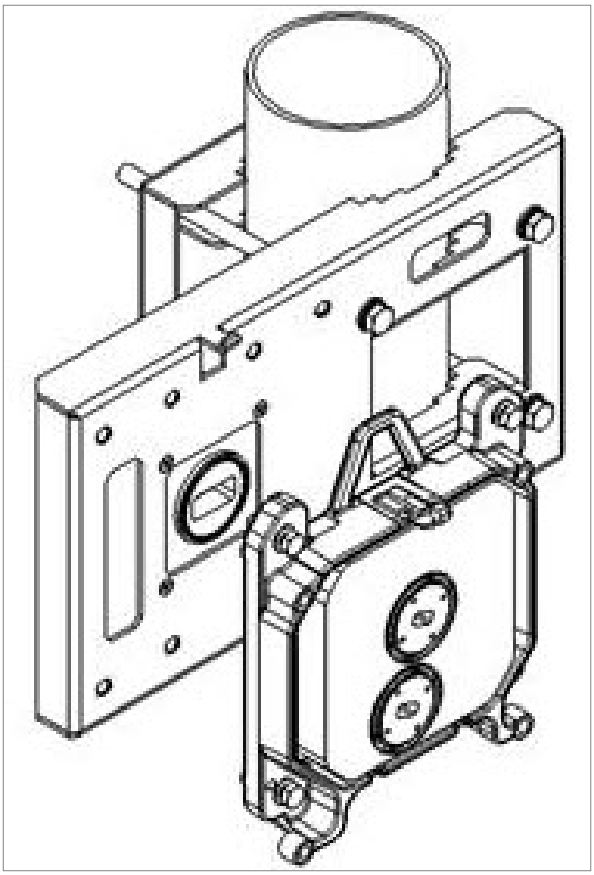
- Metric offset hexagon key wrench set
- Phillips #1, #2 screwdriver
- Metric wrench key set

13 GHz

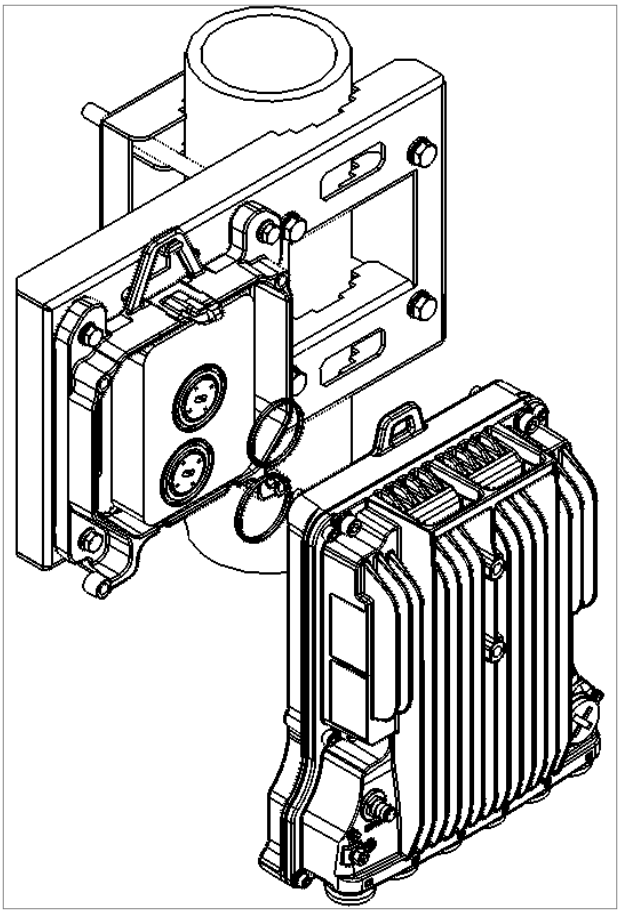
1. Mount and tighten the RFU-C Remote Mount Adaptor plate (supplied in RFU-C Adaptor Remote Mount kit) to the RFU-C Pole Mount using the four flat screws supplied with the RFU-C Adaptor Remote Mount kit.



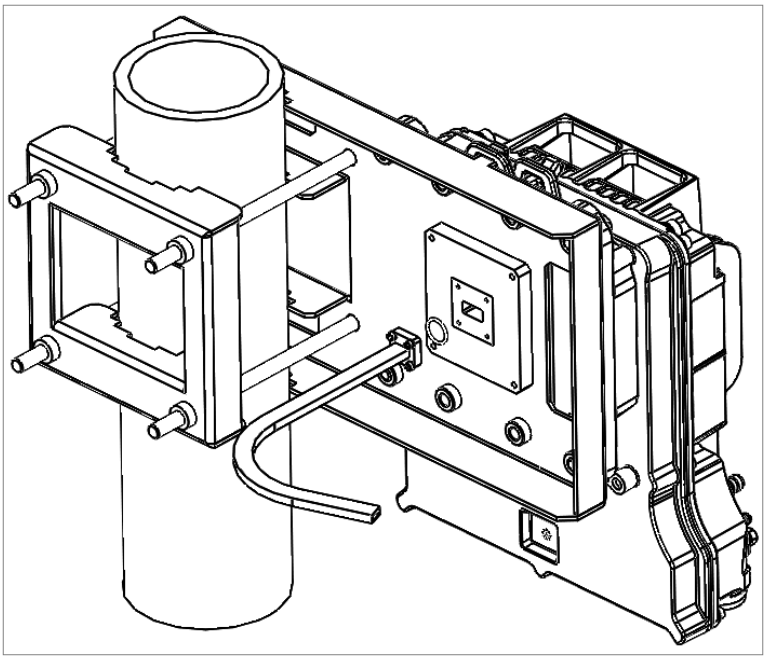
2. Mount and tighten the PTP 820C Splitter to the RFU-C Pole Mount using the four captive screws and washers that are assembled to the PTP 820C Splitter kit.



3. Mount and tighten the PTP 850C to the PTP 820C Splitter using the four captive screws and washers that are assembled to the PTP 850C radio. Pay attention that the O-rings are mounted on the PTP 820C Splitter kit.

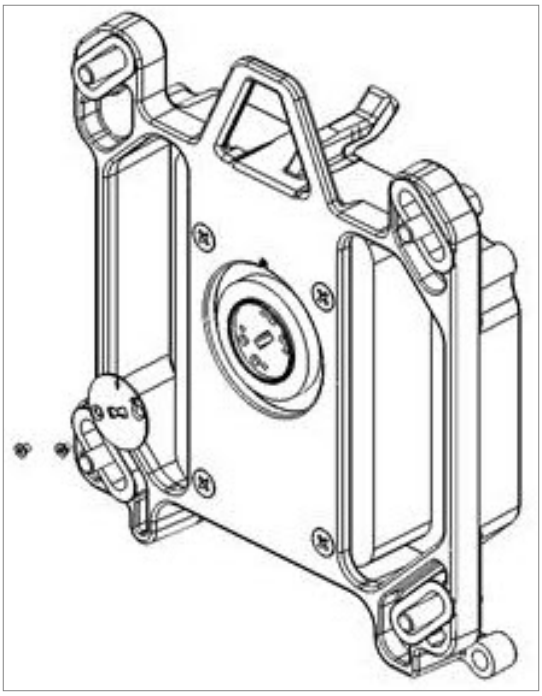


4. Connect the Flexible Waveguide and Sealing Gasket supplied with the Flexible Waveguide Kit to the RFU-C Adaptor plate. Tighten the four screws supplied with the Flexible Waveguide Kit.

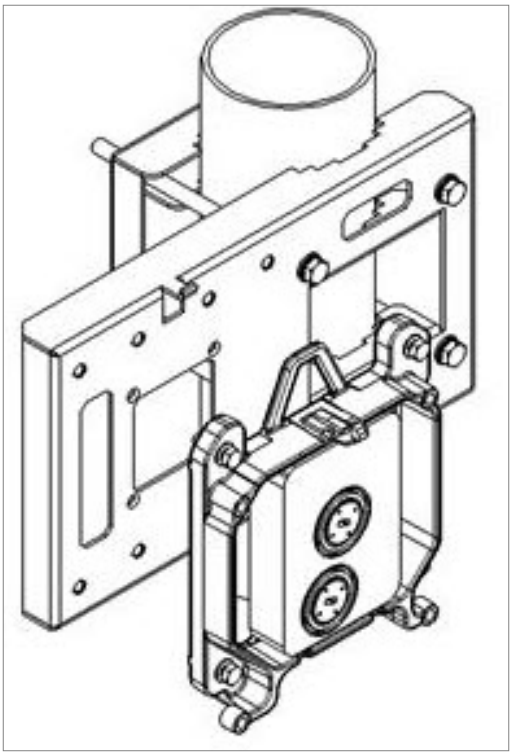


15-23 GHz

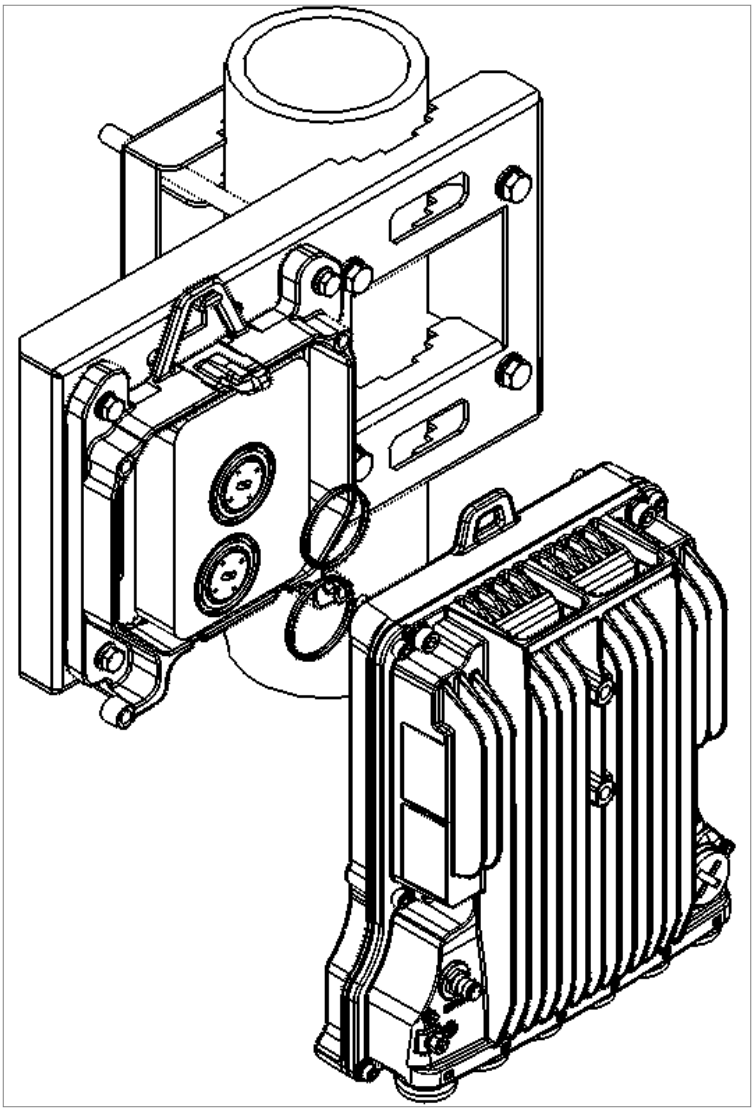
1. Loosen the two screws and remove the twist plate from the PTP 820C Splitter.



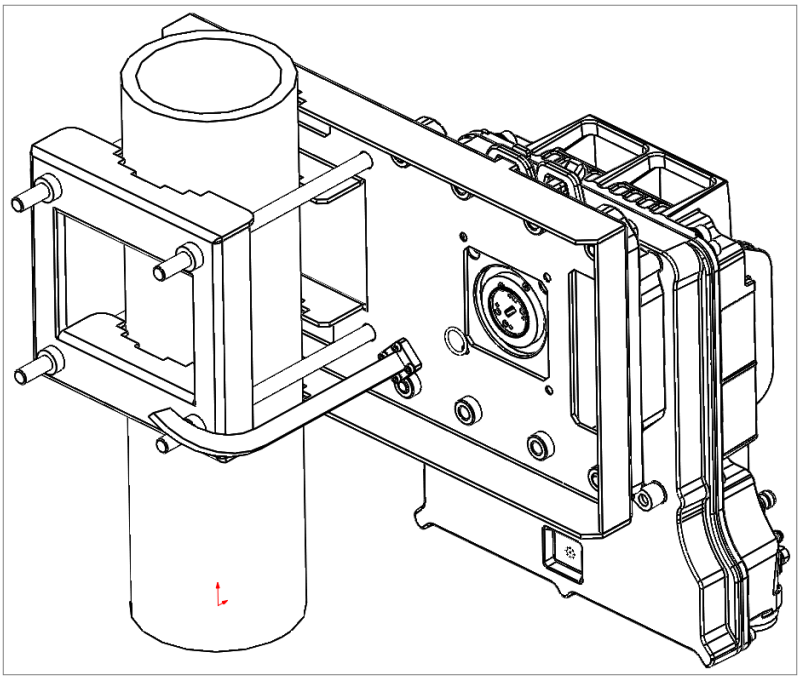
2. Mount and tighten the PTP 820C Splitter to the RFU-C Pole Mount using the four captive screws and washers that are assembled to the PTP 820C Splitter kit.



3. Mount and tighten the PTP 850C to the PTP 820C Splitter using the four captive screws and washers that are assembled to the PTP 850C. 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 IP20-C Splitter kit. Tighten the four screws supplied with the Flexible Waveguide kit.



4+0 Link Bonding, Direct Mount

List of Items

Item	Description	Quantity	Remarks
1	PTP 850C RADIO	2	
2	PTP 820C OMT KIT	1	
3	PTP 820C DUAL SPLITTER KIT	1	
4	SFP+10GBASE-SR10-EXT-TEMP or SFP+10GBASE-LR10-EXT-TEMP	4	SFP transceiver for Traffic connection between units (P3 and P5)
5	Optical Cables for transmitting traffic and protocols between units	1 or 2	See Cables for Link Bonding Configurations **Note**: Some configurations can use a single cable for traffic and protocols. For details, refer to the User Guide for the System Release release you are using.

Note:

If a non-circular antenna interface is used, add a circular adaptor to this list of items, as described in Step 1.

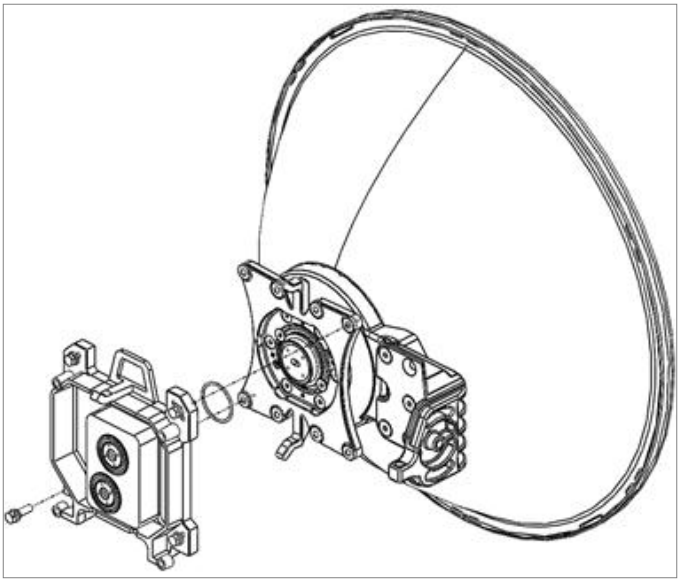
Required Tools

- Metric offset hexagon key set
- Metric wrench key set

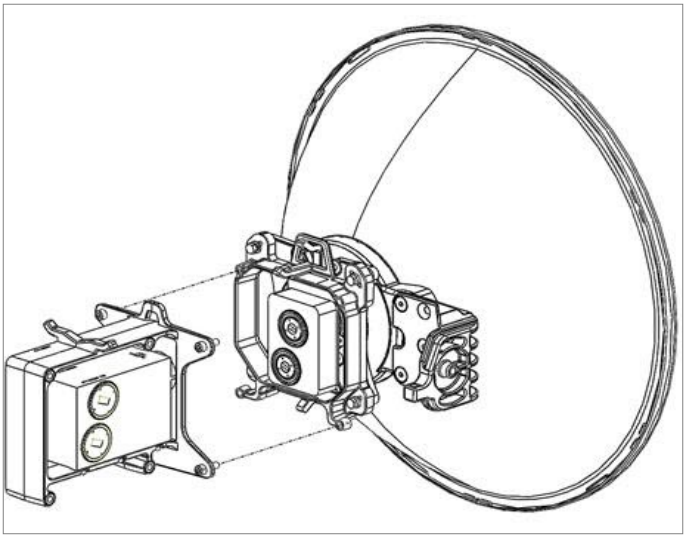
Procedure

1. If an antenna with a non-circular antenna interface is used, then 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.)

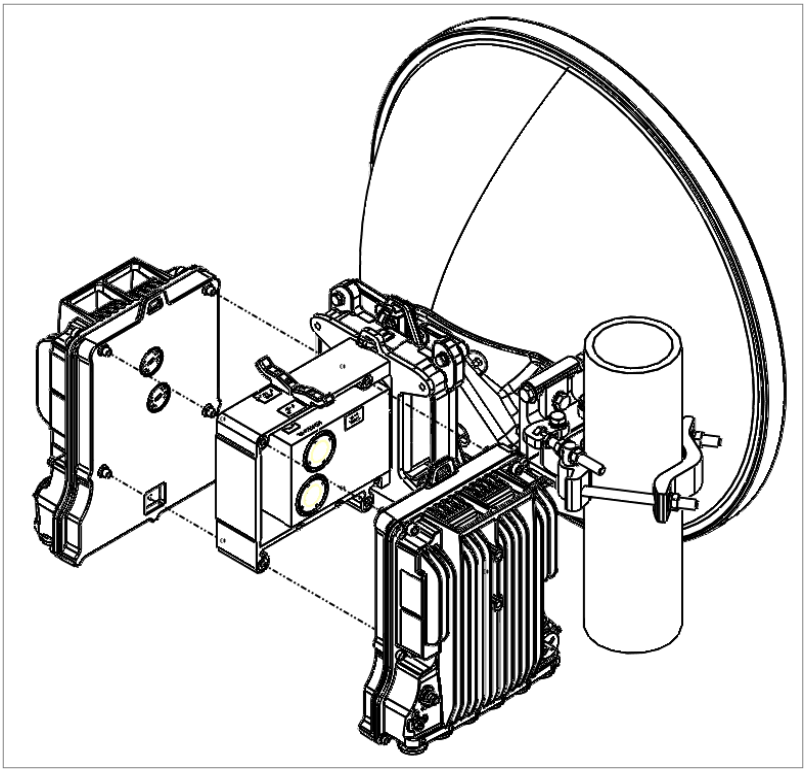
2. Connect the PTP 820C OMT Kit to the antenna and secure it with four screws. Verify existence of the O-ring.



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



4. Mount and tighten the PTP 850C radio unit to both sides of the Dual Splitter 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 Splitter.



5. P3 requires a special SFP transceiver (SFP+10GBASE-SR10-EXT-TEMP or SFP+10GBASE-LR10-EXT-TEMP) in order to support the Protocols connection between the two units. Make sure to use this SFP

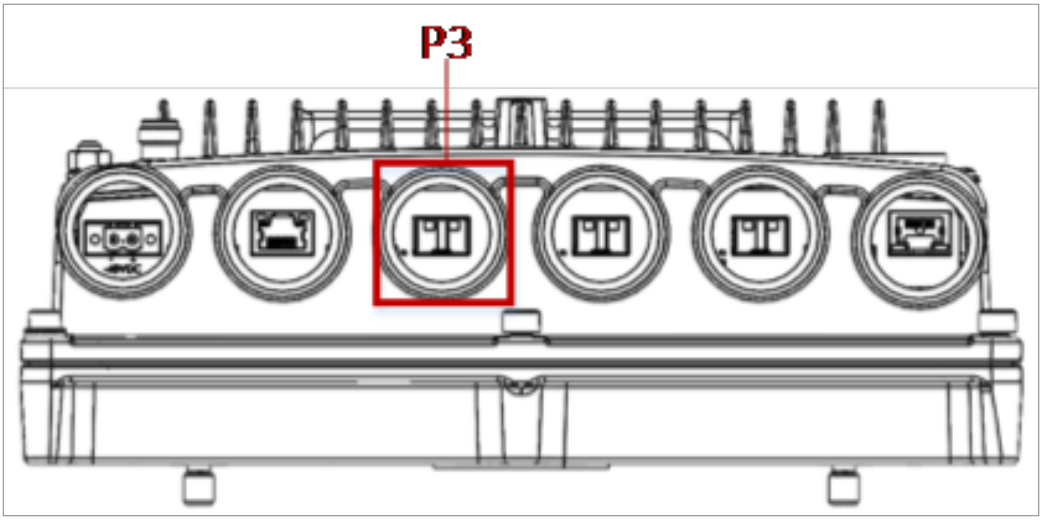
transceiver in P3.

Note:

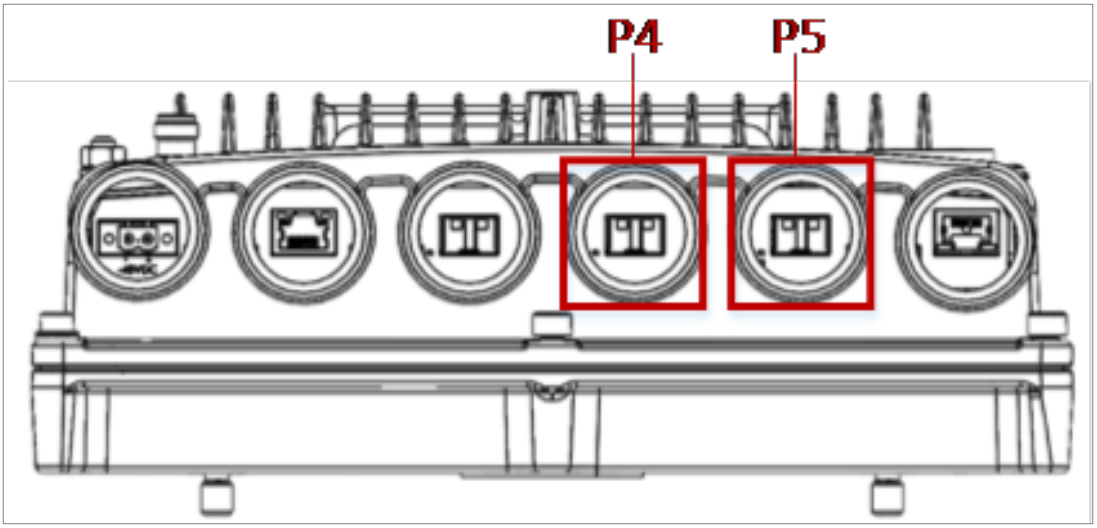
Alternatively, you can also use SFP-3.7G-SX-EXT-TEMP.

Some configurations do not require a separate Protocols cable between the unit. In these configurations, L2 protocol data is transmitted between the devices via the same cable that carries traffic. For details, refer to the User Guide for the System Release version you are using.

6. P5 requires a special SFP transceiver (SFP+10GBASE-SR10-EXT-TEMP or SFP+10GBASE-LR10-EXT-TEMP) in order to support the Traffic connection between the two units. Make sure to use this SFP transceiver in P5.
7. Connect the Protocols cable between P3 of both units. The interface should be configured to 2.5 Gbps on both PTP 850C units.



8. Connect the Traffic cable between P4 or P5 of both units. The interface should be configured to 10 Gbps on both PTP 850C units.



4+0 Link Bonding, Remote Mount

List of Items

Item	Description	Quantity	Remarks
1	PTP 850C RADIO	2	
2	PTP 820C OMT KIT	1	
3	PTP 820C OMT Adaptor	1	6-11 GHz only
4	PTP 820C DUAL SPLITTER KIT	1	
5	FLEXIBLE WG KIT	2	
6	PTP 820C DC POLE MOUNT KIT	1	
7	PTP 820C DC REMOTE MOUNT ADAPTOR KIT	1	6-13 GHz only
8	SFP+10GBASE-SR10-EXT-TEMP or SFP+10GBASE-LR10-EXT-TEMP	4	SFP transceiver for Protocols and Traffic connection between units (P3 and P5)
9	Optical Cables for transmitting traffic and protocols between units	1 or 2	See Cables for Link Bonding Configurations **Note**: If some configurations can use a single cable for traffic and protocols. For details, refer to the User Guide for the System Release release you are using.

Note:

If a non-circular antenna interface is used, add a circular adaptor to this list of items, as described in Step 1.

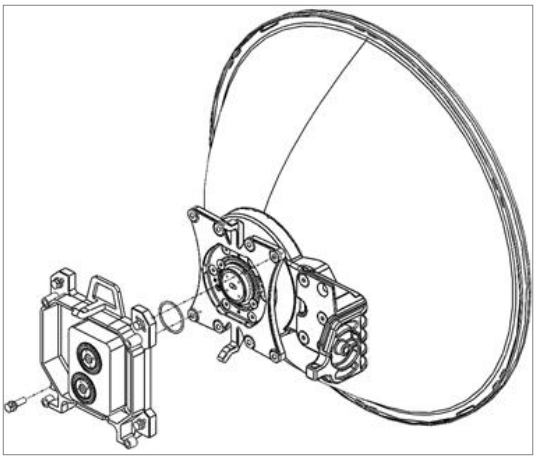
Required Tools

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

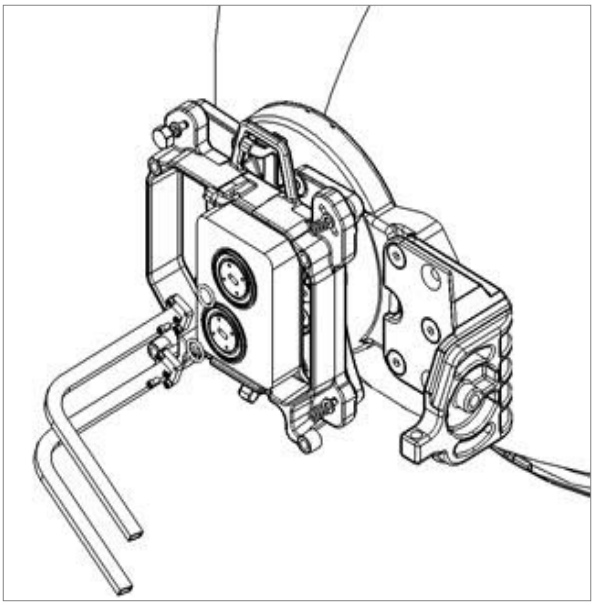
Procedure

1. If an antenna with a non-circular antenna interface is used, then 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.)

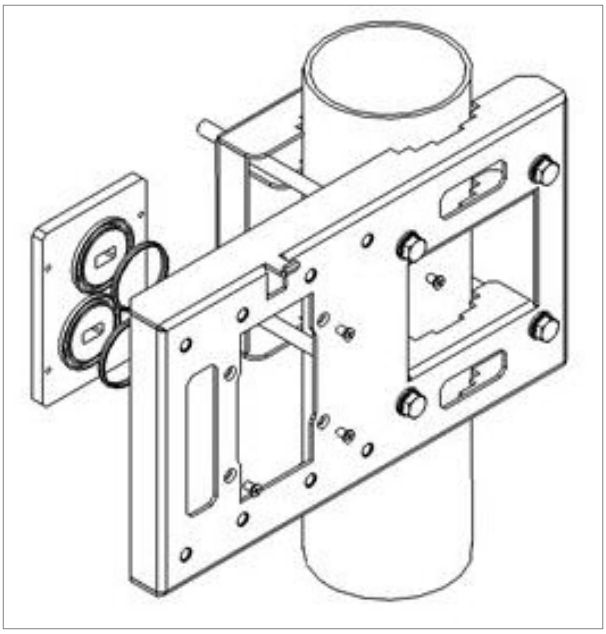
2. Connect the OMT Kit to the antenna and secure it with four screws. Verify the existence of the O-ring.



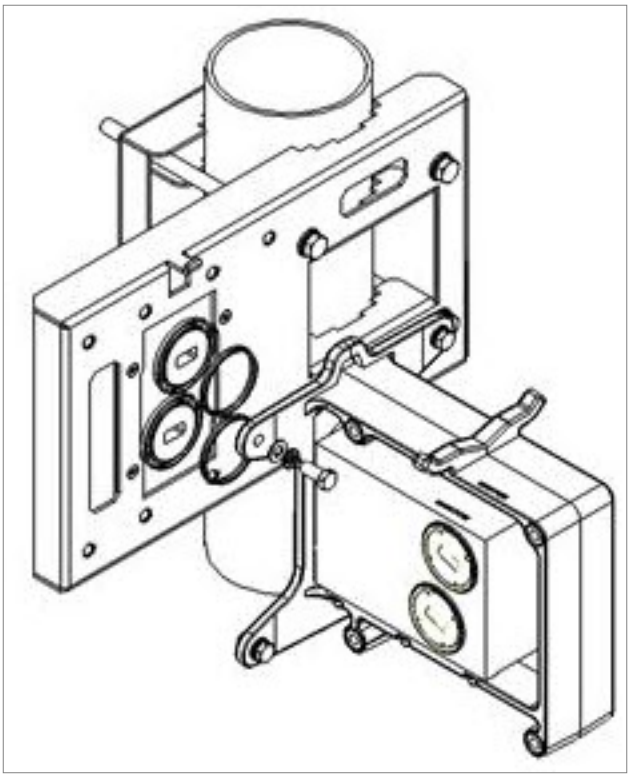
3. For each OMT, mount and tighten the O-ring and the Flexible WG to the PTP 820C OMT ports or the OMT adaptor ports using the four screws supplied with the Flexible WG kit.



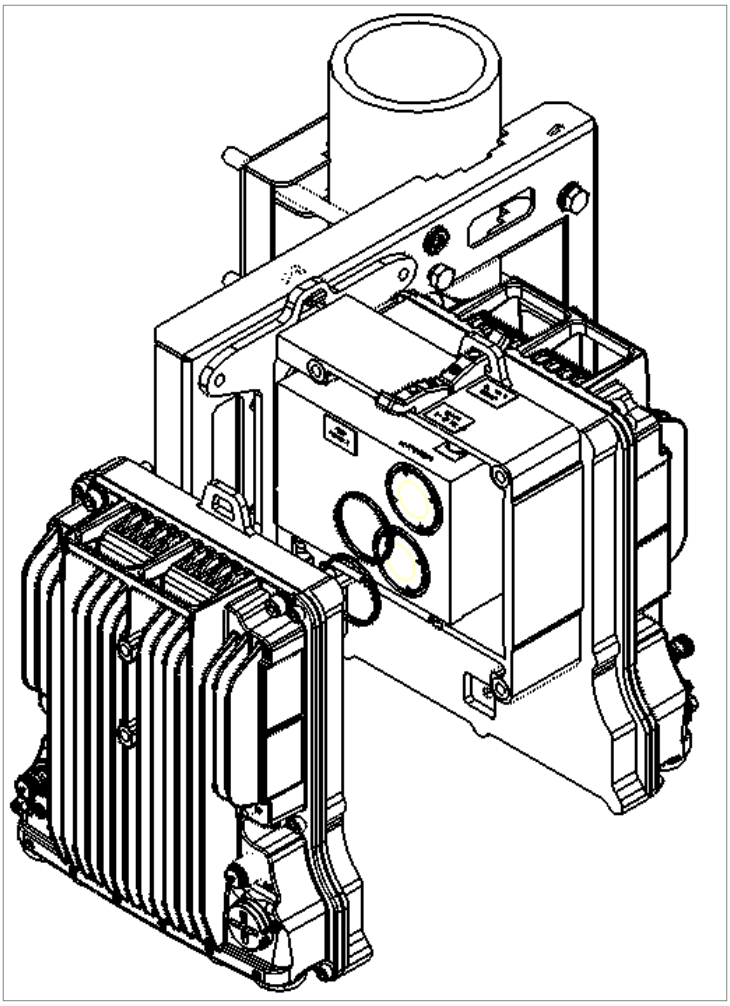
4. For 6-13 GHz only, for each PTP 850C unit, mount and tighten the PTP 820C Remote Mount Adaptor plate (supplied in PTP 820C Adaptor Remote Mount kit) to the PTP 820C Pole Mount using the four flat screws supplied with the PTP 820C Adaptor Remote Mount kit.



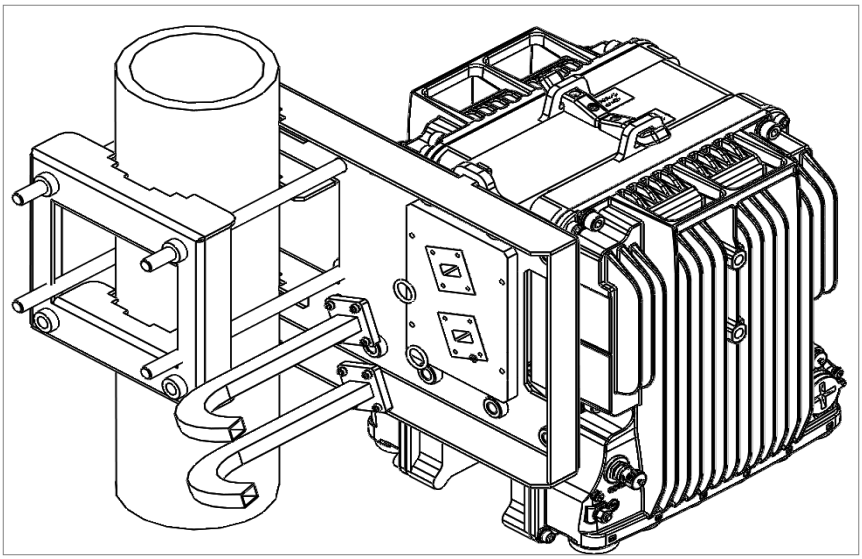
5. Mount and tighten the PTP 820C Dual Splitter to the PTP 820C Pole Mount or Pole Mount Adaptor plate using the four screws and washers that are supplied with the PTP 820C Dual Splitter kit. Pay attention that the O-rings are mounted on the PTP 820C Remote Mount Adaptor.



6. Mount and tighten the PTP 850C radios on each side of the PTP 820C Dual Splitter using the screws assembled on PTP 850C radio. Pay attention that the O-rings are correctly assembled on the radio port of the PTP 820C Dual Splitter.



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



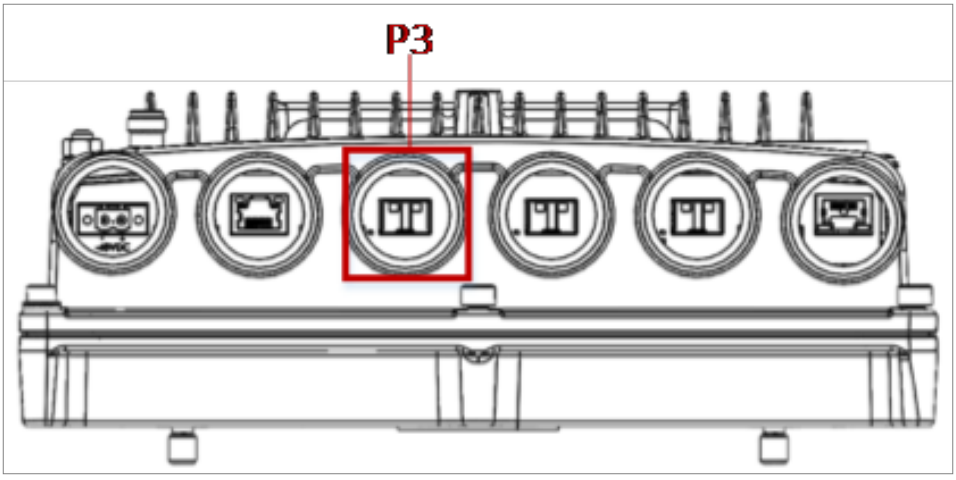
8. P3 requires a special SFP transceiver (SFP+10GBASE-SR10-EXT-TEMP or SFP+10GBASE-LR10-EXT-TEMP) in order to support the Protocols connection between the two units. Make sure to use this SFP transceiver in P3.

Note:

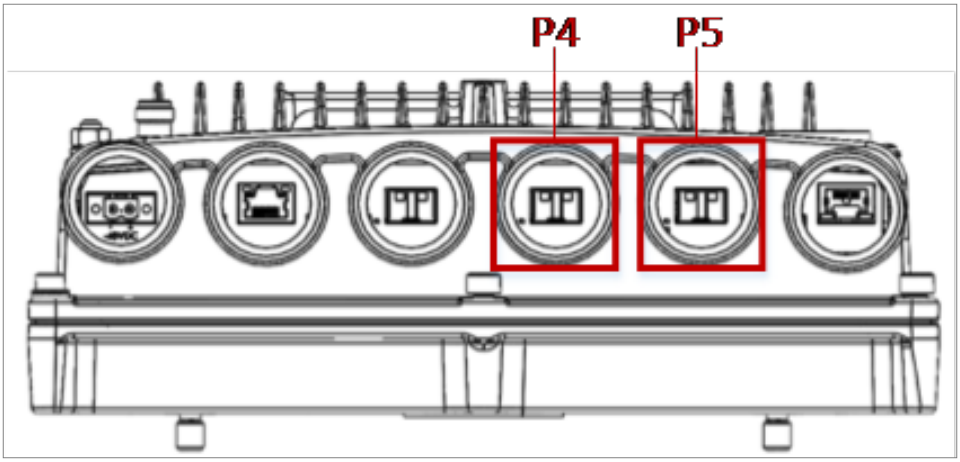
Alternatively, you can also use SFP-3.7G-SX-EXT-TEMP.

Some configurations do not require a separate Protocols cable between the unit. In these configurations, L2 protocol data is transmitted between the devices via the same cable that carries traffic. For details, refer to the User Guide for the System Release version you are using.

9. P5 requires a special SFP transceiver (SFP+10GBASE-SR10-EXT-TEMP or SFP+10GBASE-LR10-EXT-TEMP) in order to support the Traffic connection between the two units. Make sure to use this SFP transceiver in P5.
10. Optionally, connect the Protocols cable between P3 of both units. The interface should be configured to 2.5 Gbps on both PTP 850C units.



11. Connect the Traffic cable between P4 or P5 of both units. The interface should be configured to 10 Gbps on both PTP 850C units.



Link Bonding with PTP 850C and PTP 820C or PTP 820C-HP

List of Items

Item	Description	Quantity	Remarks
1	PTP 850C Radio	1	
2	PTP 820C Radio or PTP 820C-HP Radio	1	
3	SFP-GE-SX-EXT-TEMP	4	SFP transceiver for traffic and protocol connections between units
4	Optical Cables for transmitting traffic and protocols between units	1 or 2	See Cables for Link Bonding Configurations Note: If some configurations can use a single cable for traffic and protocols. For details, refer to the User Guide for the System Release release you are using.
For remaining items, refer to the instructions for the configuration you are installing in this Installation Guide, and the PTP 820C Installation Guide or the PTP 820C-HP Installation Guide.			

Procedure

In the case of PTP 850C and PTP 820C, the units are connected to a single antenna using a Dual Coupler and an OMT. You can use the same instructions as for a 4+0 Link Bonding configuration using two PTP 850C units, with the exception that SFP-GE-SX-EXT-TEMP is used as the SFP transceiver for the traffic and protocol connections.

- 4+0 Link Bonding, Direct Mount
- 4+0 Link Bonding, Remote Mount

In the case of PTP 850C and PTP 820C-HP, separate antennas must be used. Install each unit in a 2+0 or 1+0 configuration. For PTP 820C-HP, see the Installation Guide for PTP 820C-HP for instructions.

After following the relevant instructions, connect the Protocols and Traffic cables between the two units as follows:

1. Connect the Protocols cable between
   - PTP 850C with PTP 820C (ESS hardware version) or PTP 820C-HP – P4 or P5
   - PTP 850C with PTP 820C (ESX hardware version) – P2
   - PTP 820C (ESS hardware version) – P4
   - PTP 820C (ESX hardware version) – P2
   - PTP 820C-HP – P3

   Note:

   Some configurations do not require a separate Protocols cable between the unit. In these configurations, L2 protocol data is transmitted between the devices via the same cable that carries traffic. For details, refer to the User Guide for the System Release version you are using.

2. Connect the LB traffic cable between:
   - PTP 850C: P3
   - PTP 820C: P3
   - PTP 820C-HP: P2

   The interface should be configured to 1 Gbps on both units.

Figure 26 *Protocols Cable – PTP 850C (with PTP 820C ESS or PTP 820C-HP)*

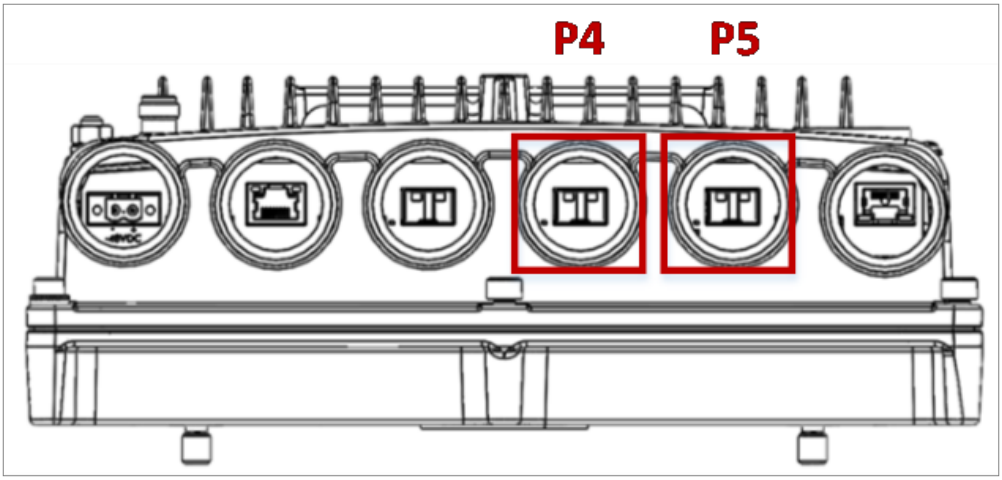


Figure 27 *Protocols Cable – PTP 850C (with PTP 820C ESX)*

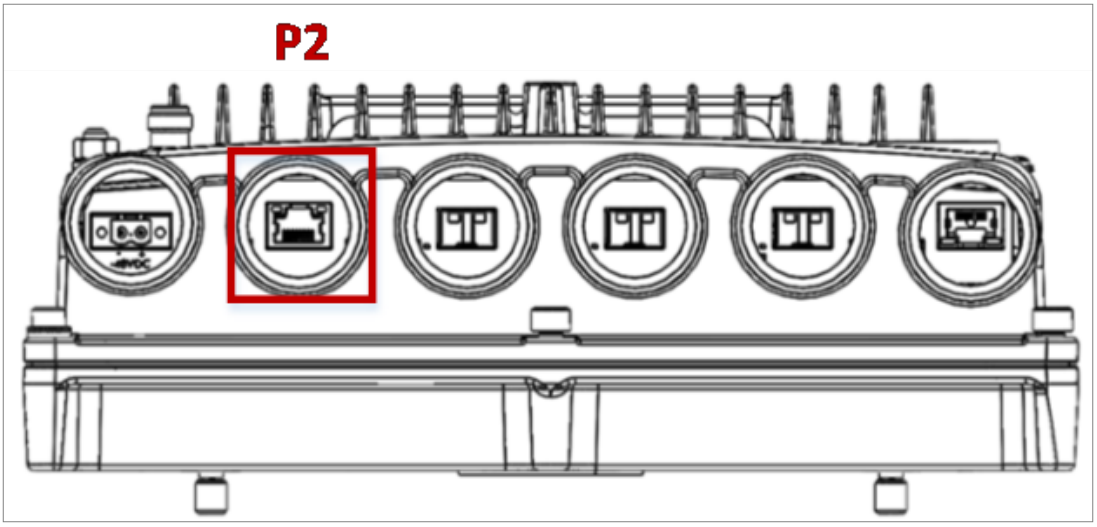


Figure 28 *Protocols Cable – PTP 820C (ESS)*

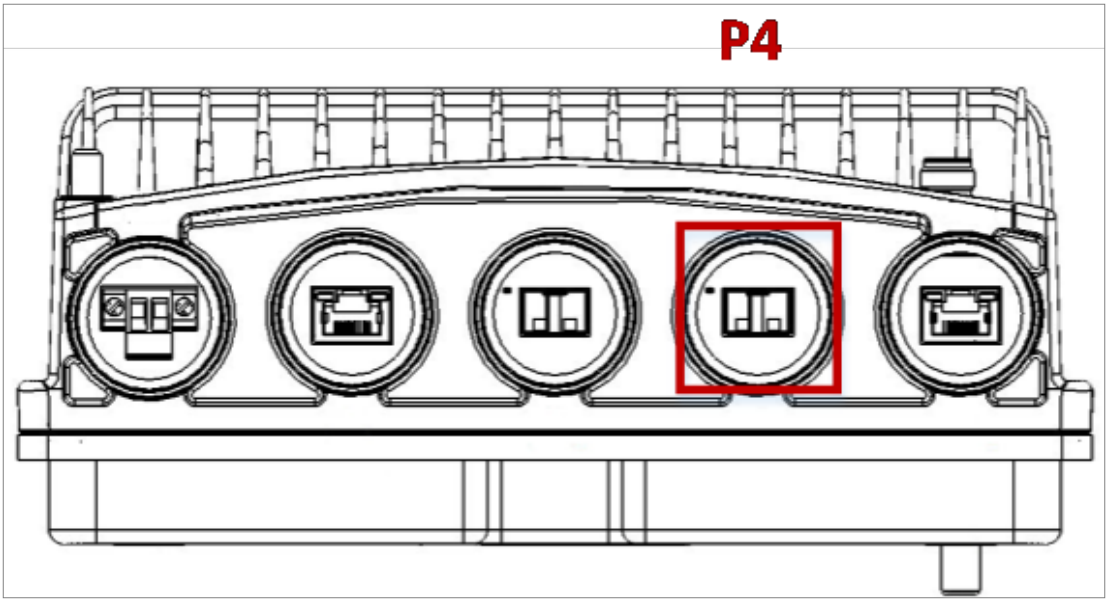


Figure 29 *Protocols Cable – PTP 820C (ESX)*

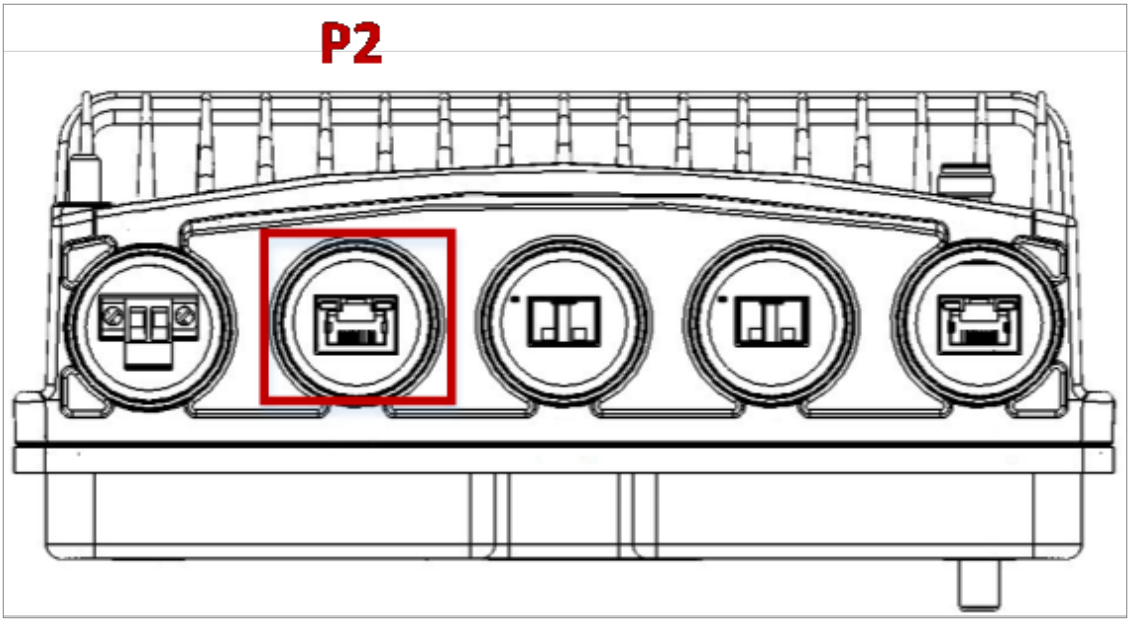
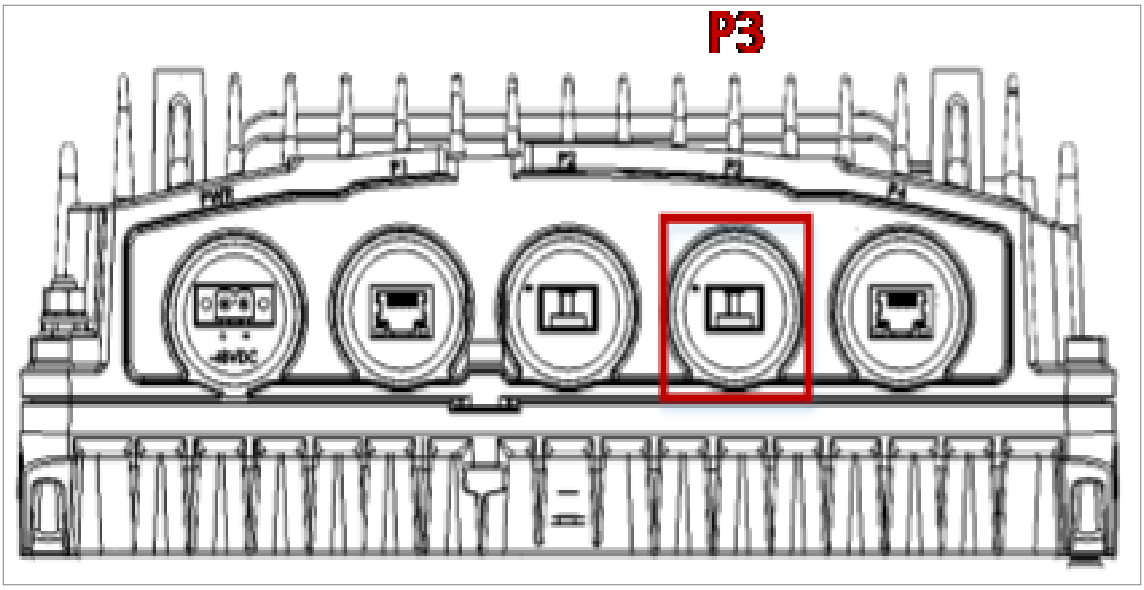


Figure 30 *Protocols Cable – PTP 820C-HP*



3. Connect the Traffic cable between:
   - PTP 820C: P3
   - PTP 820C-HP: P2

   The interface should be configured to 1 Gbps on both units.

Figure 31 *Traffic Cable – PTP 850C*

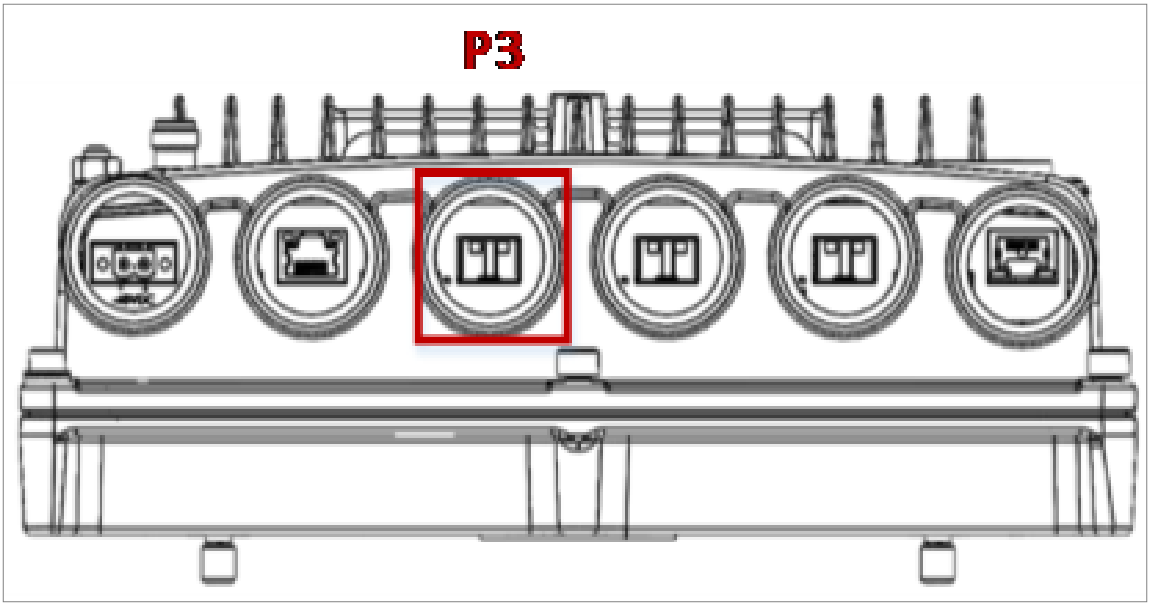


Figure 32 *Traffic Cable – PTP 820C*

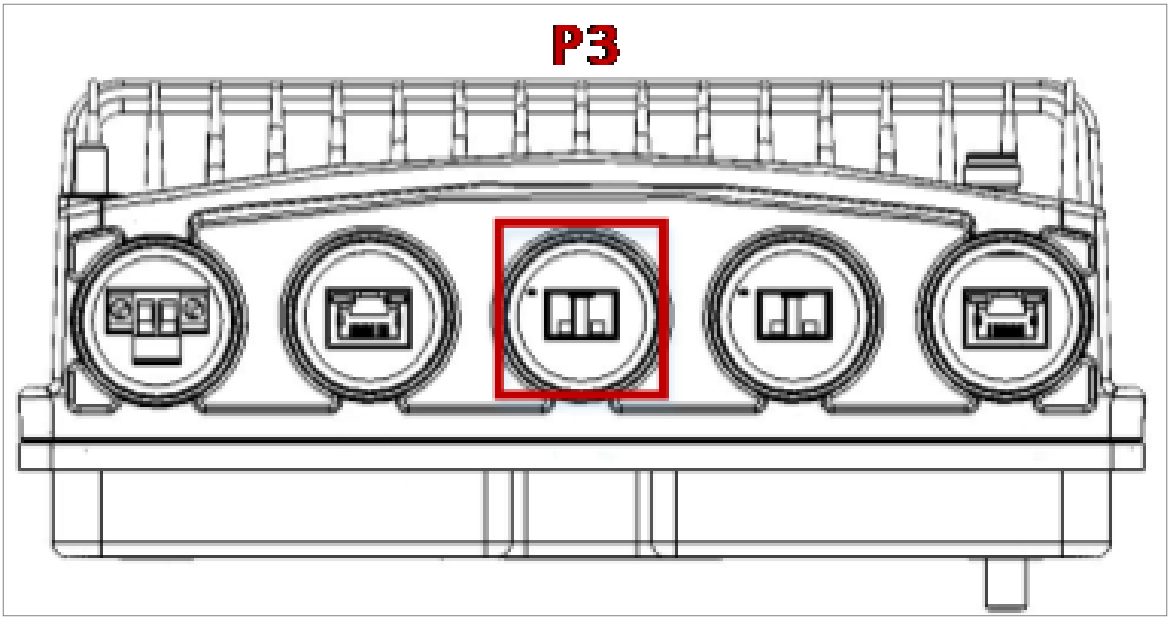
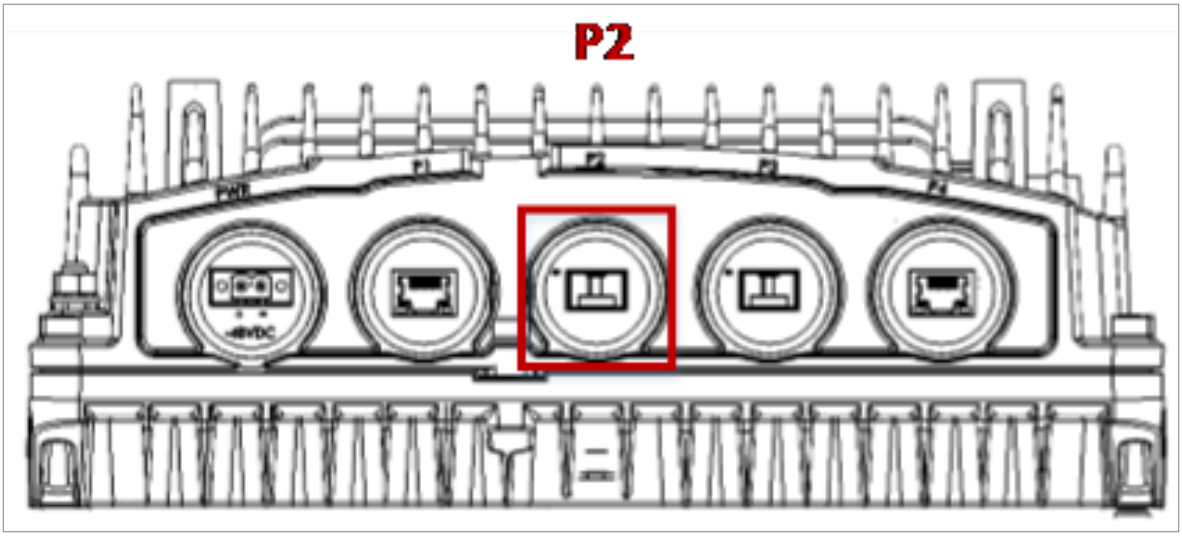


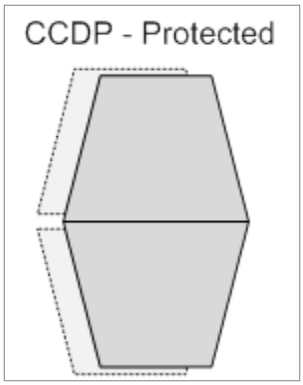
Figure 33 *Traffic Cable – PTP 820C-HP*



2+2 HSB Dual Polarization Direct Mount

Note:

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



List of Items

Item	Description	Quantity	Remarks
1	PTP 850C RADIO	2	
2	PTP 820C OMT KIT	1	
3	PTP 820C DUAL COUPLER KIT	1	
4	CIRC./CIRC. ADAPTOR	1	Per Antenna Vendor

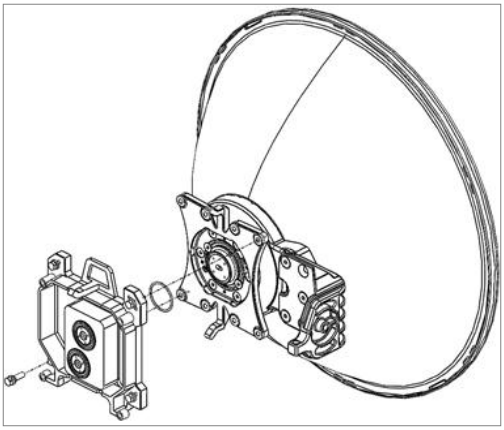
Required Tools

- Metric offset hexagon key set
- Metric wrench key set

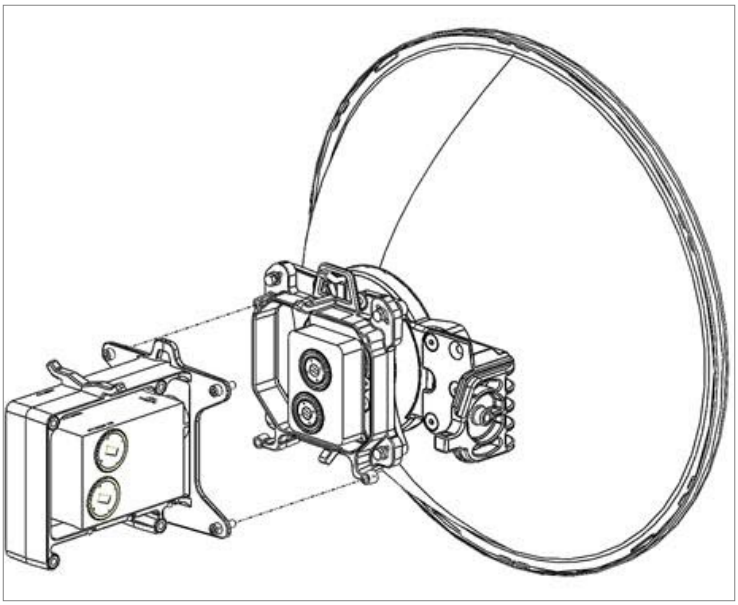
Procedure

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.)

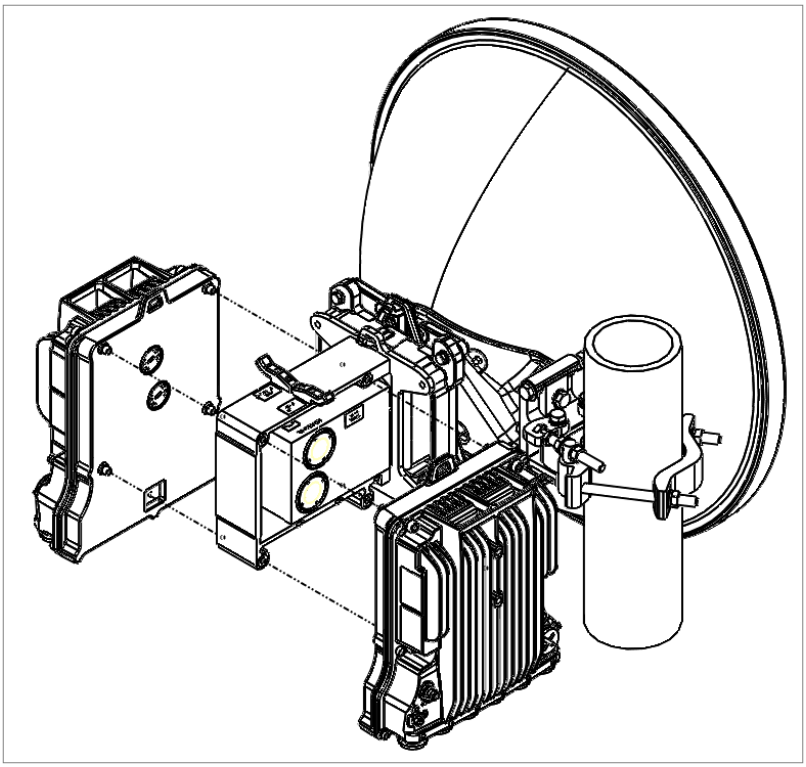
2. Connect the PTP 820C OMT Kit to the antenna and secure it with four screws. Verify existence of the O-ring.



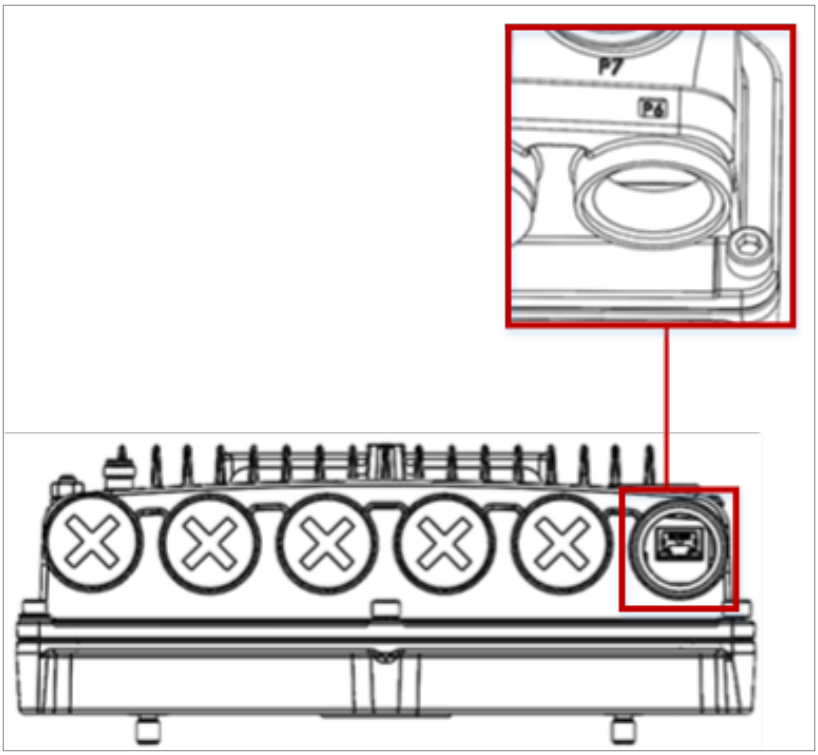
3. Connect the PTP 820C Dual Coupler Kit to the OMT Kit using four M8 screws and washers, and tighten the screws.



4. Mount and tighten the PTP 850C DC radio unit to both sides of the 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.



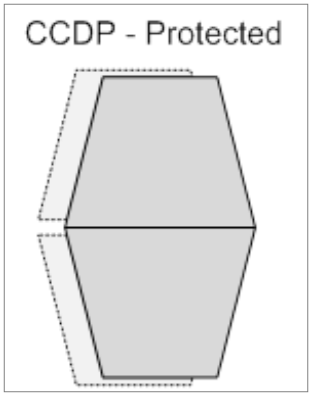
5. Connect the MIMO signaling cable between the management ports of both units. For additional instructions on preparing and connecting this cable, refer to Preparing a MIMO/Protection Signaling Cable.



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.



List of Items

Item	Description	Quantity	Remarks
1	PTP 850C RADIO	2	
2	PTP 820C OMT KIT	1	

Item	Description	Quantity	Remarks
3	PTP 820C DUAL COUPLER KIT	1	
4	FLEXIBLE WG KIT	2	
5	PTP 820C DC POLE MOUNT KIT	1	
6	PTP 820C DC REMOTE MOUNT ADAPTOR KIT	1	13 GHz only
7	CIRC./CIRC. ADAPTOR	1	Per Antenna Vendor.

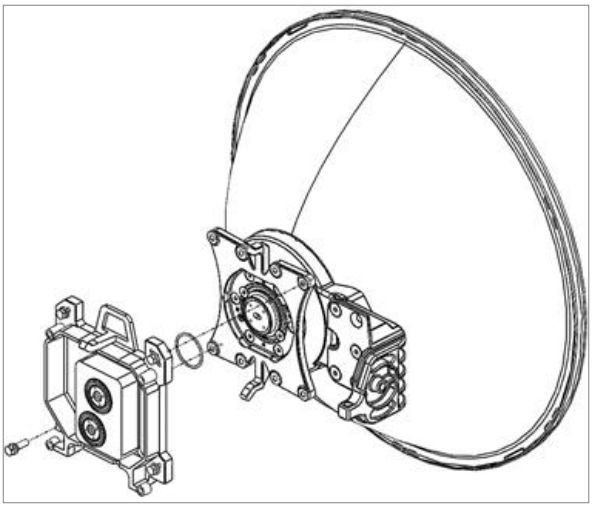
Required Tools

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

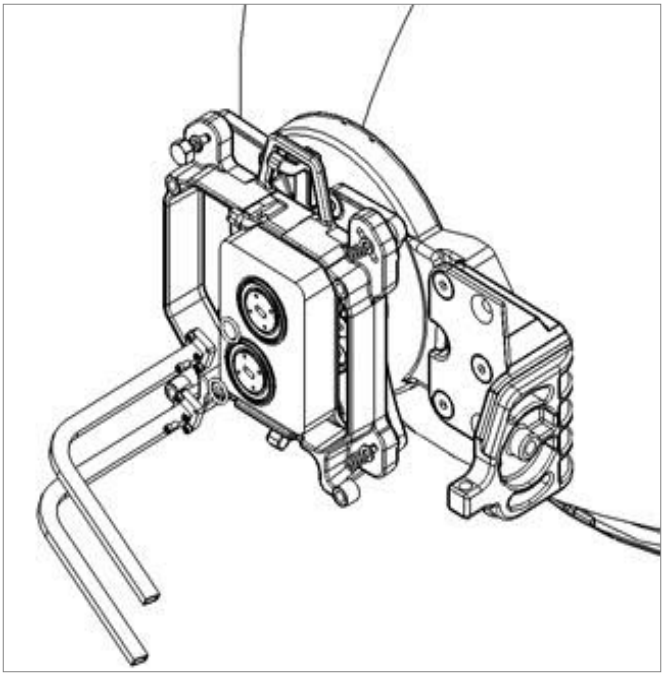
Common Installation

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.)

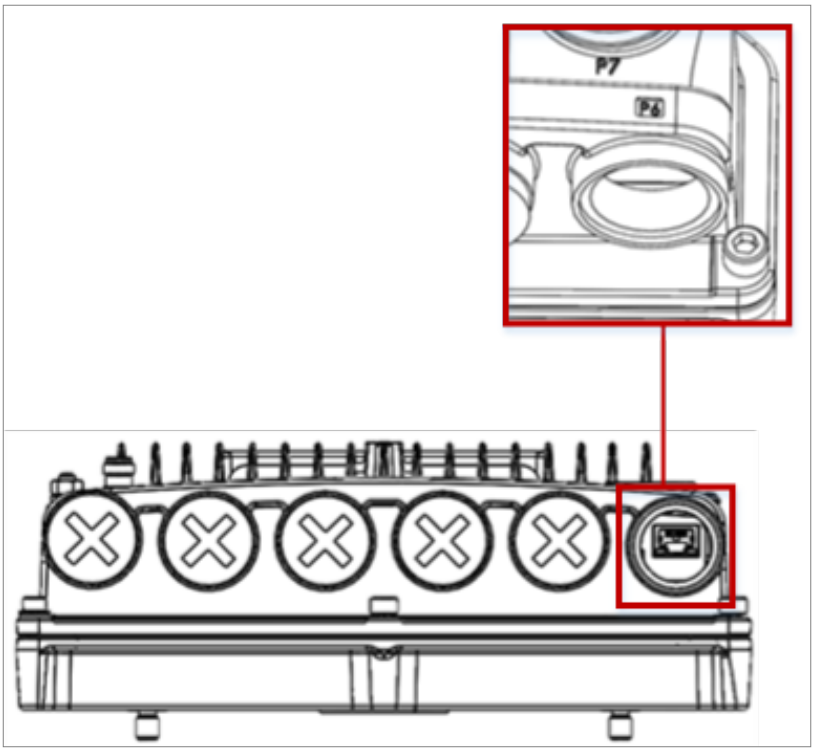
2. Connect the OMT Kit to the antenna and secure it with four screws. Verify the existence of the O-ring.



3. Mount and tighten the O-ring and the Flexible WG to PTP 850C OMT ports using the four screws supplied with the Flexible WG kit.

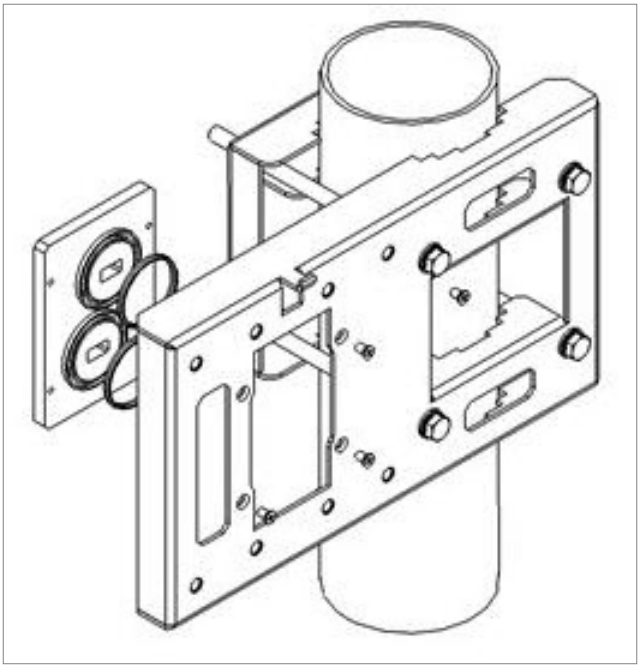


4. Connect the protection signaling cable between the management ports of both units. For additional instructions on preparing and connecting this cable, refer to Preparing a MIMO/Protection Signaling Cable.

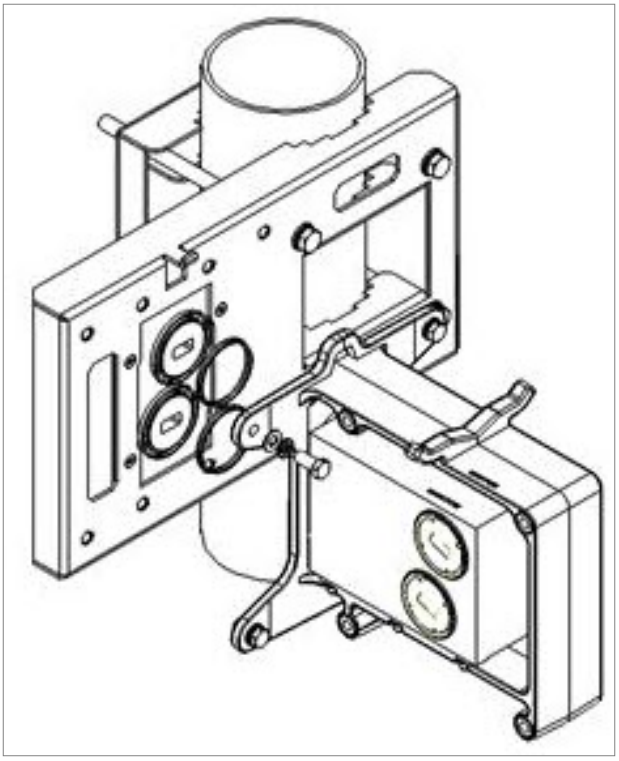


13 GHz

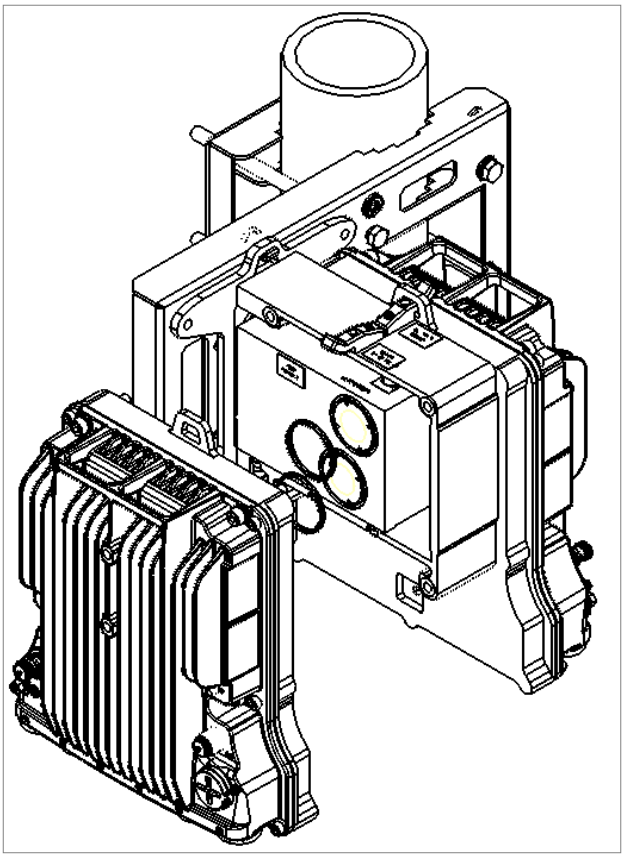
1. Mount and tighten the PTP 820C Remote Mount Adaptor plate (supplied in PTP 820C Adaptor Remote Mount kit) to the PTP 820C Pole Mount using the four flat screws supplied with the PTP 820C Adaptor Remote Mount kit.



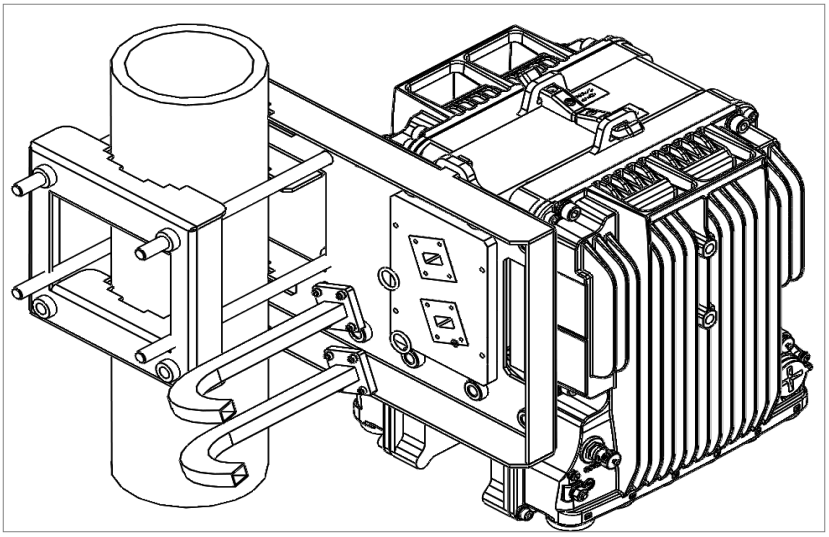
2. Mount and tighten the PTP 820C Dual Coupler to the PTP 820C Pole Mount using the four screws and washers that are supplied with the PTP 820C Dual Coupler kit. Pay attention that the O-rings are mounted on the PTP 820C Remote Mount Adaptor.



3. Mount and tighten the PTP 850C radios on each side of the PTP 820C Dual Coupler using the screws assembled on PTP 850C radio. Pay attention that the O-rings are correctly assembled on the radio port of the PTP 820C Dual coupler.

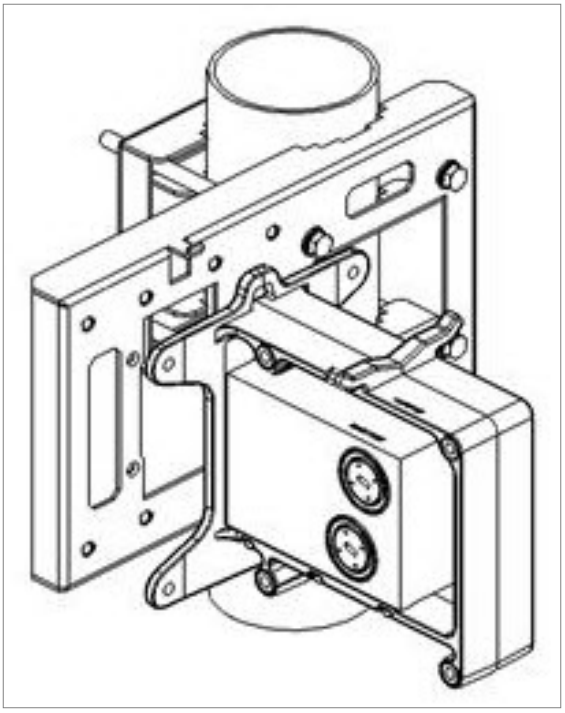


4. Connect both Flexible Waveguides and Sealing Gaskets supplied with each Flexible Waveguide Kit to the PTP 820C Dual Coupler antenna ports. Tighten the screws and washers supplied with the Flexible Waveguide Kit.

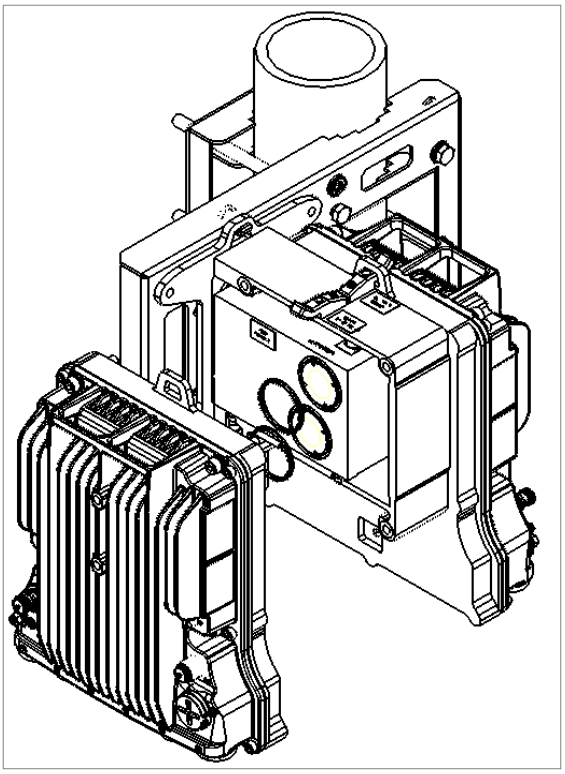


15-23 GHz

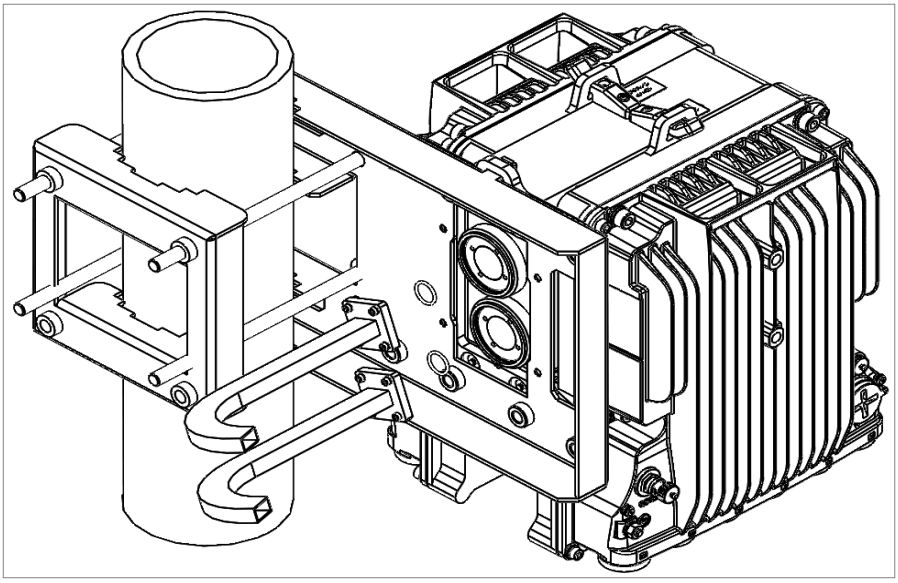
1. Mount and tighten the PTP 820C Dual Coupler to PTP 820C DC Pole Mount using the four screws and washers supplied with PTP 820C Dual Coupler kit.



2. Mount and tighten the PTP 850C radios on each side of the PTP 820C Dual Coupler using the screws assembled on PTP 850C radio. Pay attention that the O-rings are correctly assembled on the radio port of the PTP 820C Dual coupler.



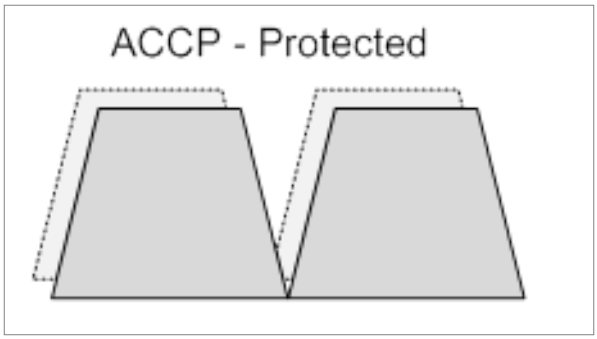
3. Mount the O-ring and the Flexible WG to PTP 820C Dual Coupler ports using the four screws supplied with the Flexible WG kit.



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	PTP 850C RADIO	2	
2	PTP 820C SPLITTER KIT	1	
3	DUAL COUPLER KIT	1	

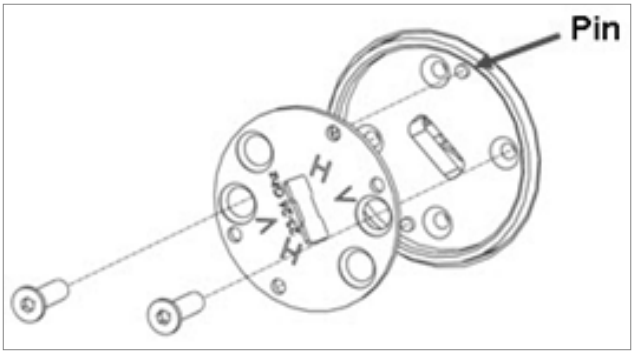
Required Tools

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

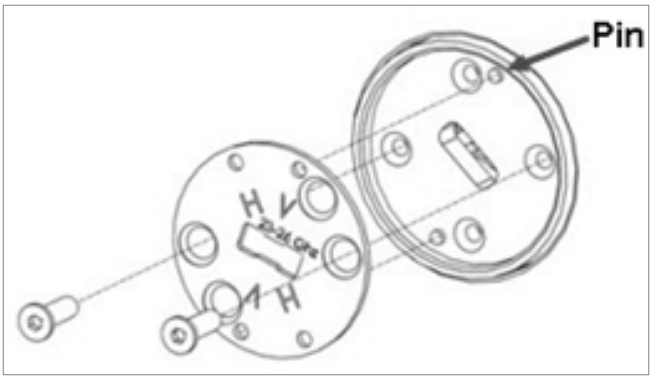
Procedure

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

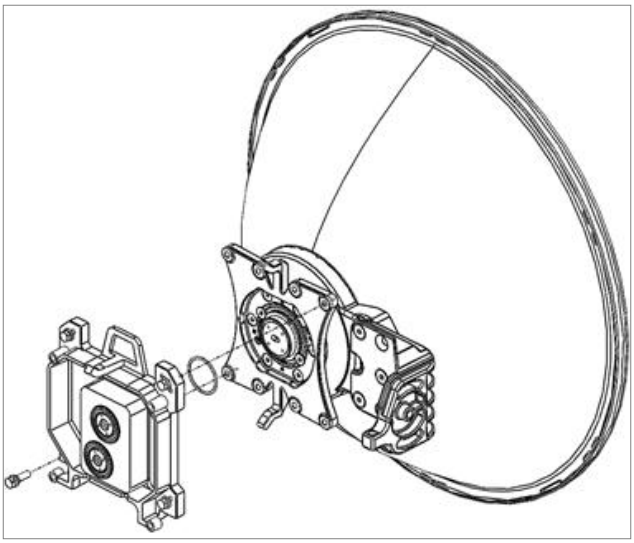
   Horizontal polarization: Locate the holes above and below the letter “H” on the pins and fasten the two screws.

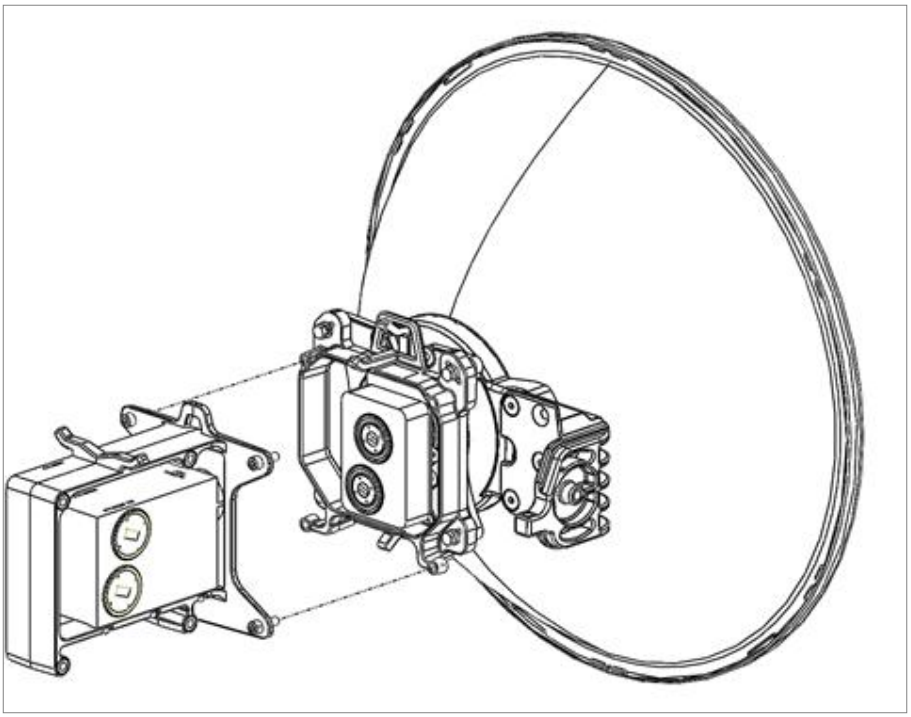
   Vertical polarization: Locate the holes above and below the letter “V” on the pins and fasten the two screws.



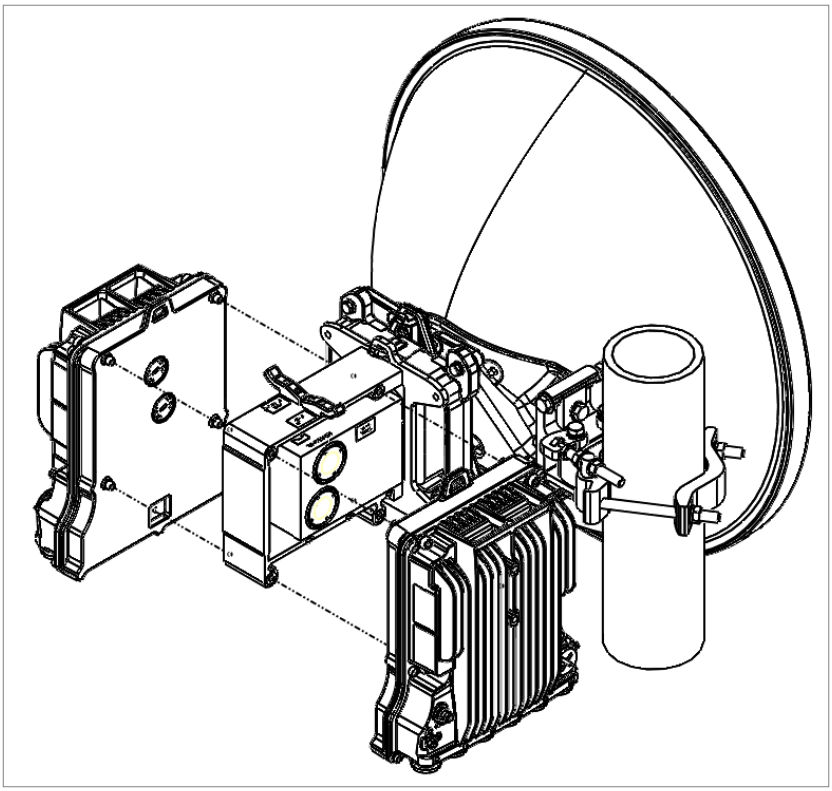
2. Mount the Splitter Kit on the antenna using four M8 screws and washers and tighten the screws.



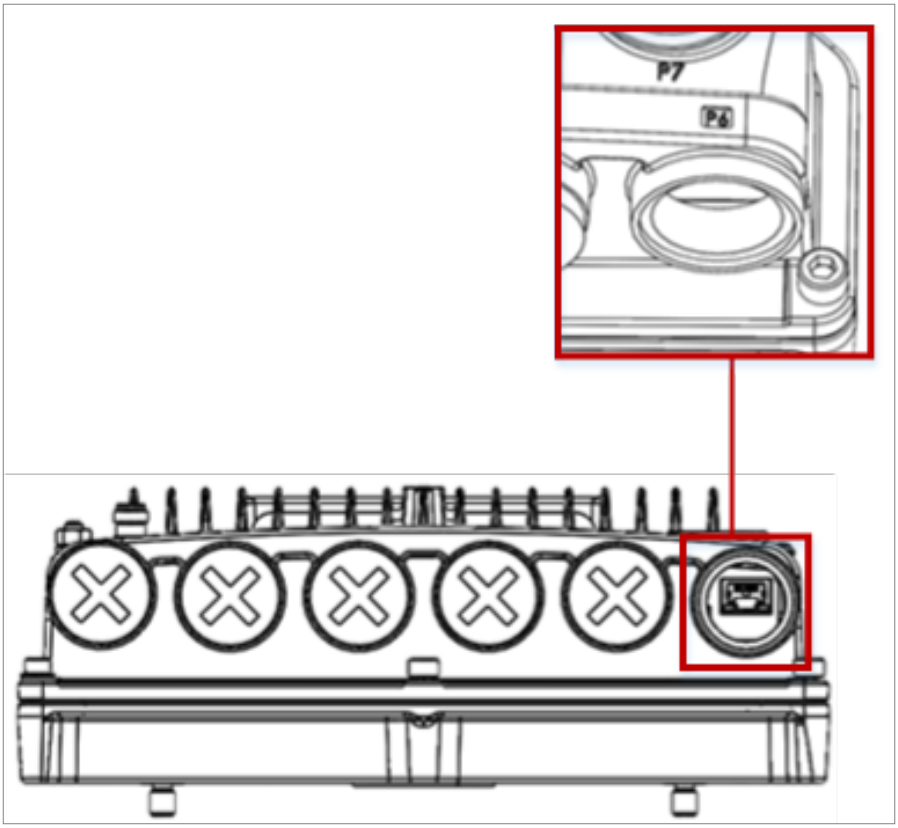
3. Connect the PTP 820C Dual Coupler Kit to the PTP 820C Splitter Kit using four M8 screws and washers and tighten the screws.



4. Connect the PTP 850C DC radio unit to both sides of the Dual Coupler Kit using the supplied captive screws and washers and tighten the screws.



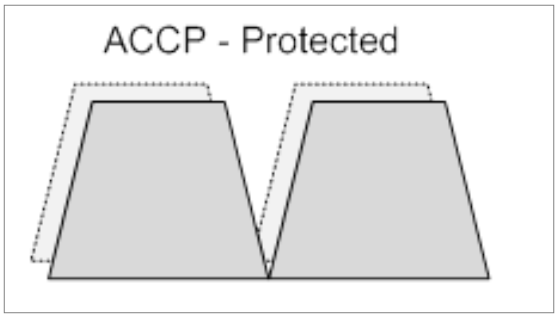
5. Connect the protection signaling cable between the management ports of both units. For additional instructions on preparing and connecting this cable, refer to Preparing a MIMO/Protection Signaling Cable.



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 configurations.



List of Items

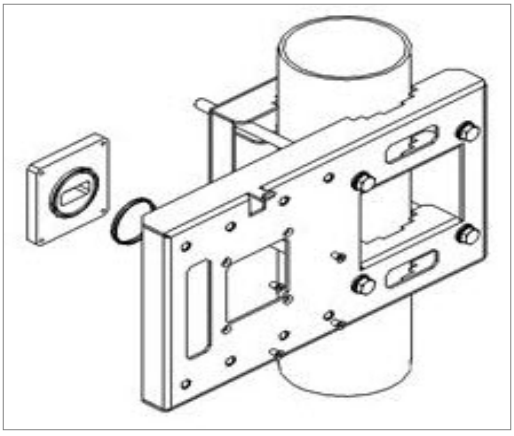
Item	Description	Quantity	Remarks
1	PTP 850C RADIO	2	
2	PTP 820C SPLITTER KIT	1	
3	PTP 820C DUAL COUPLER KIT	1	
4	FLEXIBLE WG KIT	2	
5	RFU-C POLE MOUNT KIT	1	
6	RFU-C REMOTE MOUNT ADAPTOR	1	13 GHz only

Required Tools

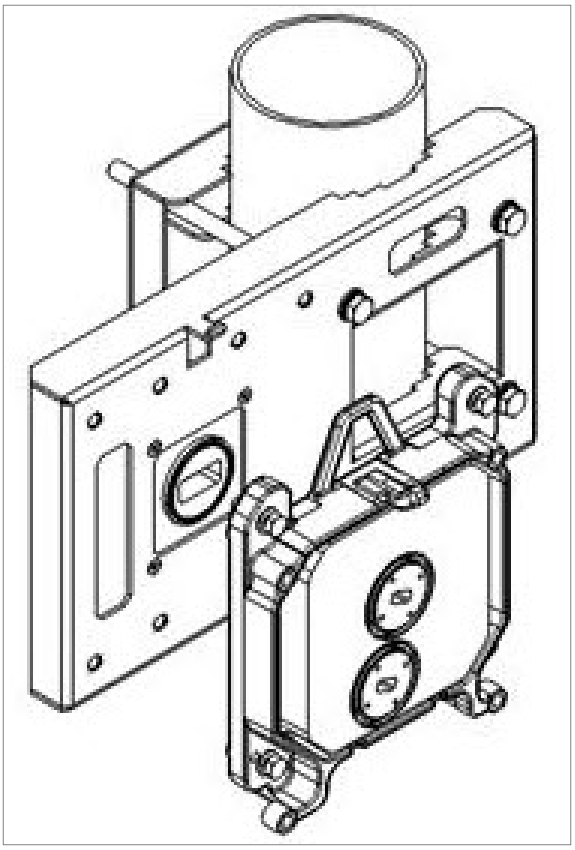
- Metric offset hexagon key set
- Metric wrench key set
- Phillips #1, #2 screwdriver

13 GHz

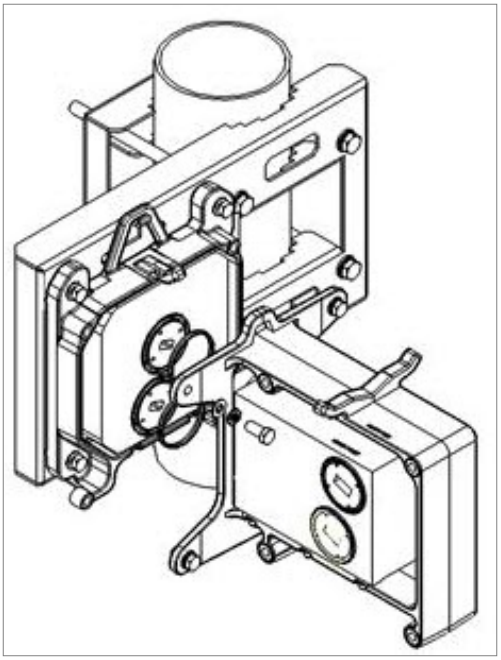
1. Mount and tighten the RFU-C Remote Mount Adaptor plate (supplied in RFU-C Adaptor Remote Mount kit) to the RFU-C Pole Mount using the four flat screws supplied with the RFU-C Adaptor Remote Mount kit.



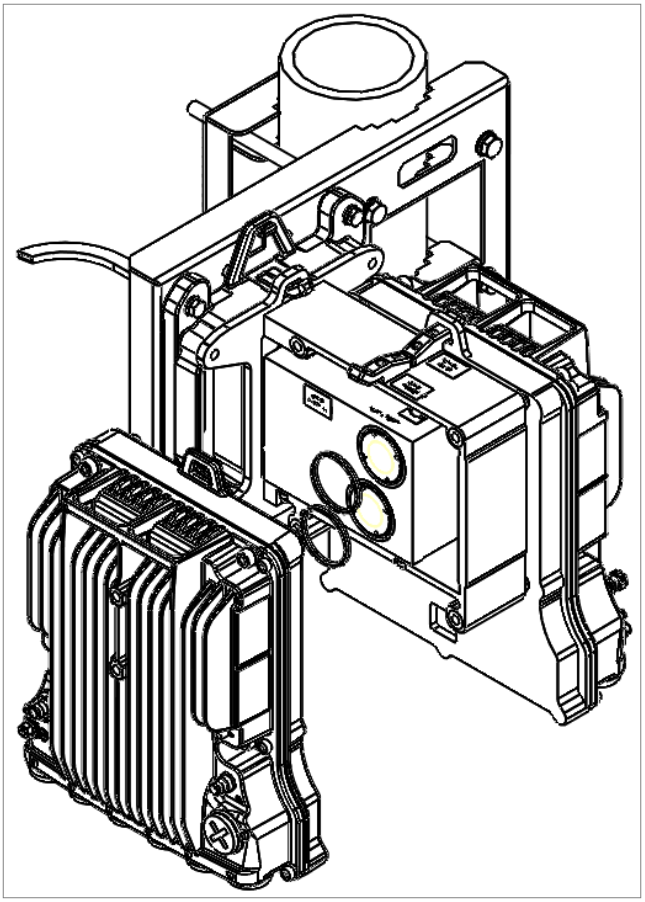
2. Mount and tighten the PTP 820C Splitter to the RFU-C Pole Mount using the four captive screws and washers that are assembled to the PTP 820C Splitter kit.



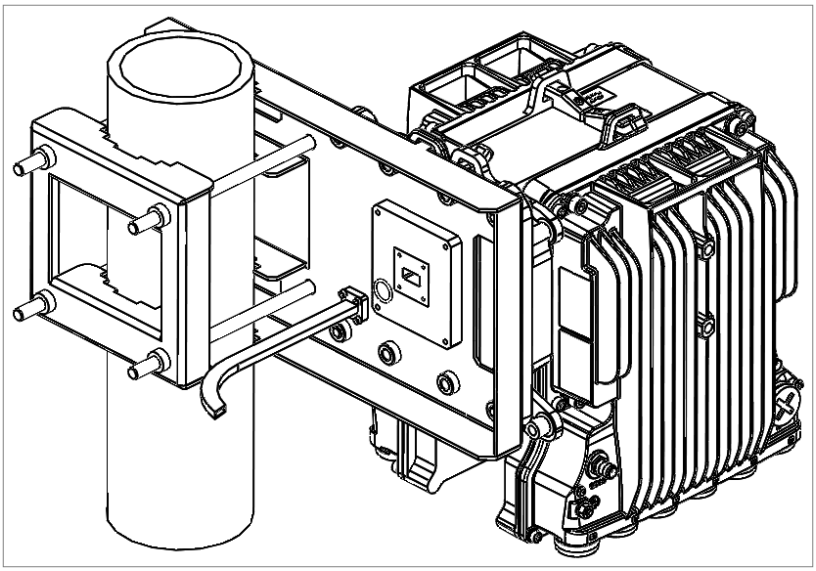
3. Mount and tighten the PTP 820C Dual Coupler to the PTP 820C Splitter using the four captive screws and washers that are supplied with the PTP 820C Dual Coupler kit. Pay attention that the O-rings are mounted on the PTP 820C Splitter.



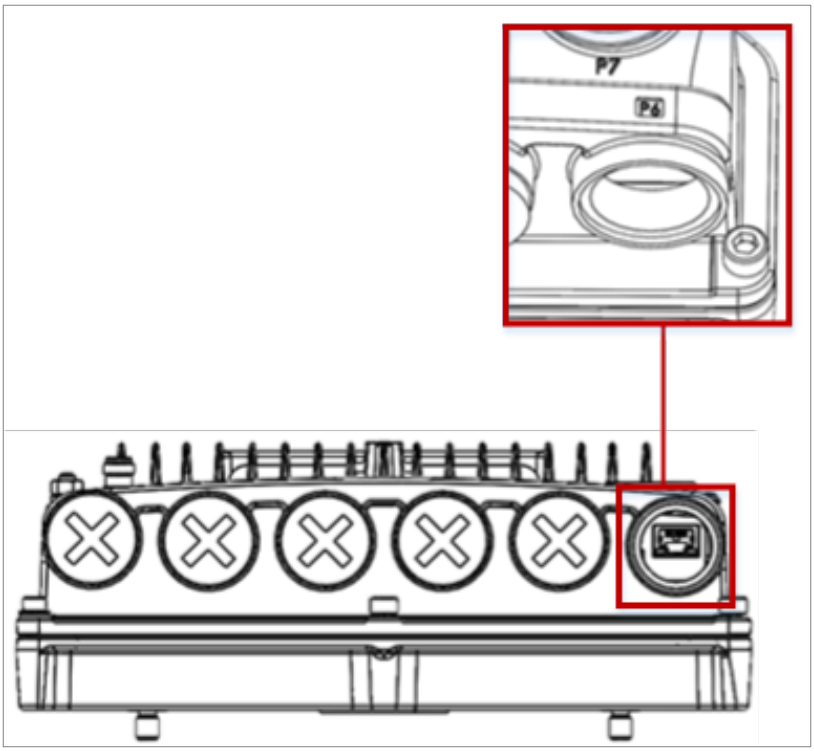
4. Mount and tighten the PTP 850C Radio to the PTP 820C Dual Coupler using the four screws and washers that are assembled to the PTP 850C Radio. Pay attention that the O-rings are mounted on the PTP 820C Dual Coupler.



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.

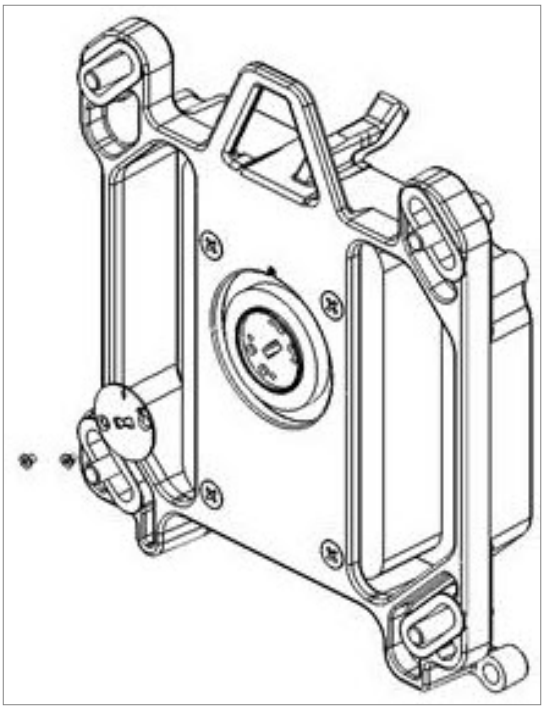


6. Connect the protection signaling cable between the management ports of both units. For additional instructions on preparing and connecting this cable, refer to Preparing a MIMO/Protection Signaling Cable.

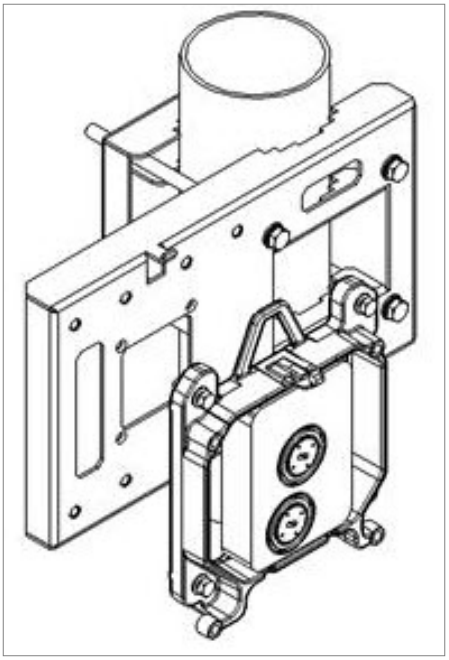


15-23 GHz

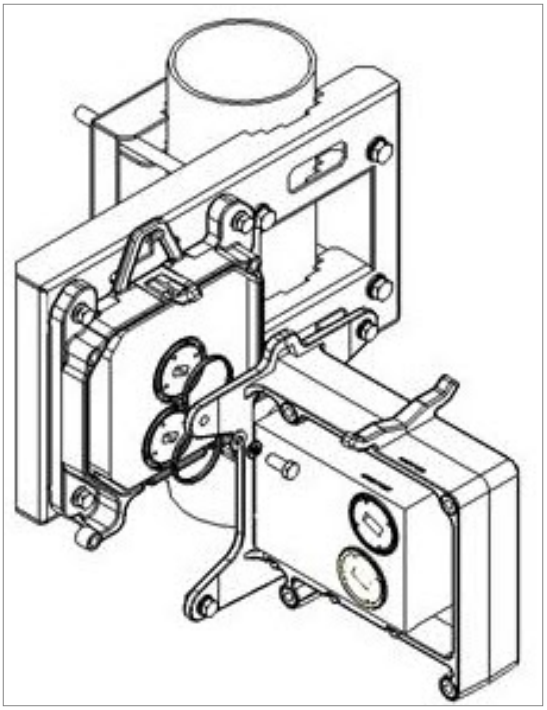
1. Loosen the two screws, and remove the twist plate from the PTP 820C Splitter.



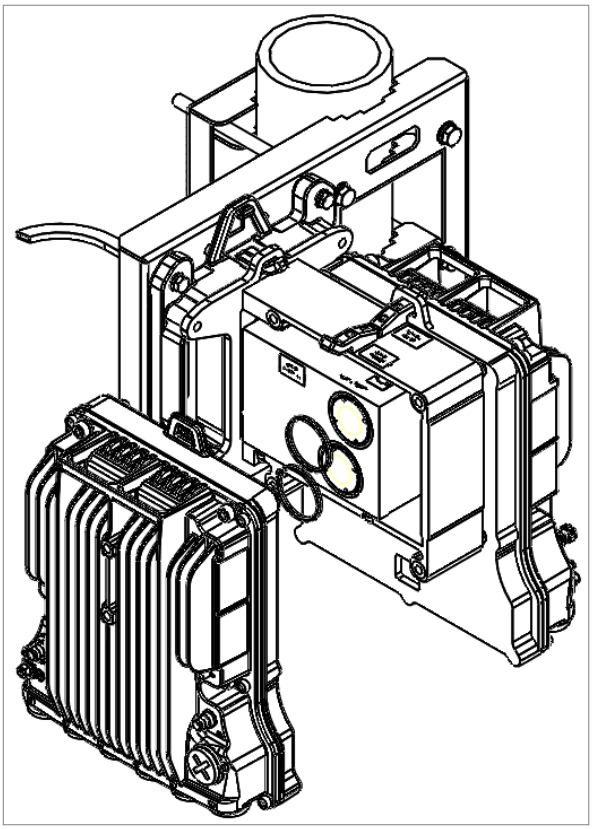
2. Mount and tighten the PTP 820C Splitter to the RFU-C Pole Mount using the four captive screws and washers that are assembled to the PTP 820C Splitter kit.



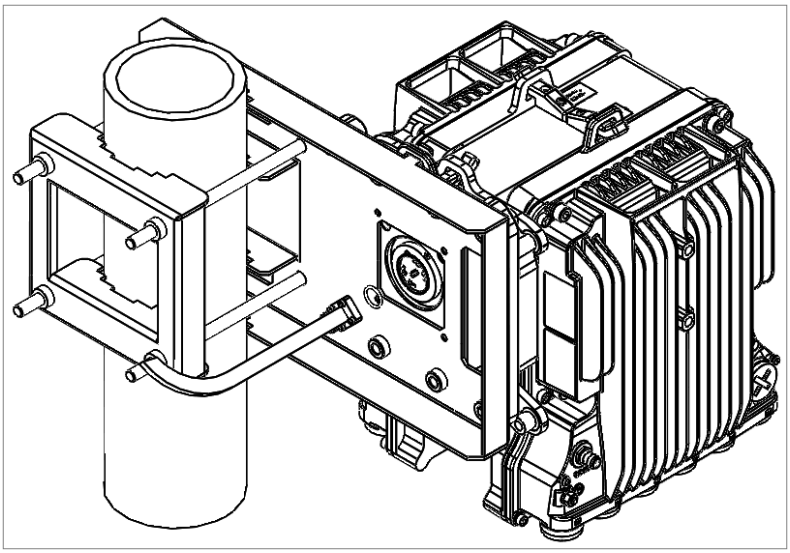
3. Mount and tighten the PTP 820C Dual Coupler to the PTP 820C Splitter using the four captive screws and washers that are supplied with the PTP 820C Dual Coupler kit. Pay attention that the O-rings are mounted on the PTP 820C Splitter.



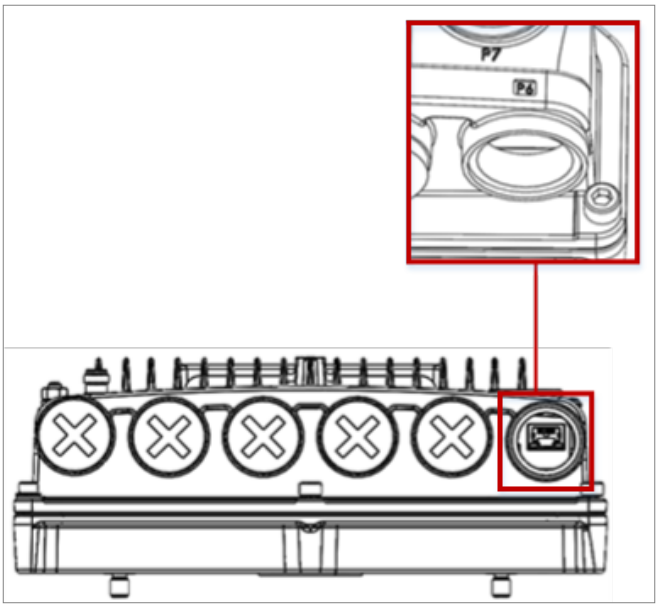
4. Mount and tighten the PTP 850C Radio to the PTP 820C Dual Coupler using the four screws and washers that are assembled to the PTP 850C radio. Pay attention that the O-rings are mounted on the PTP 820C Dual Coupler.



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.



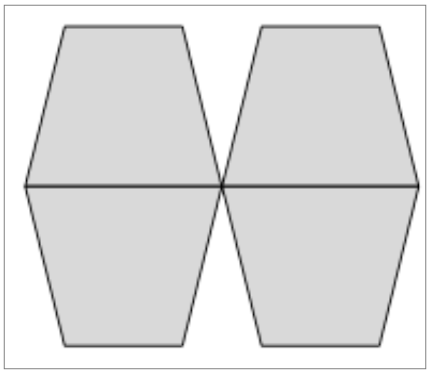
6. Connect the protection signaling cable between the management ports of both units. For additional instructions on preparing and connecting this cable, refer to Preparing a MIMO/Protection Signaling Cable.



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	PTP 850C RADIO	2	
2	PTP 820C OMT KIT	1	
3	PTP 820C DUAL COUPLER or SPLITTER KIT	1	
4	CIRC./CIRC. ADAPTOR	1	Per Antenna Vendor

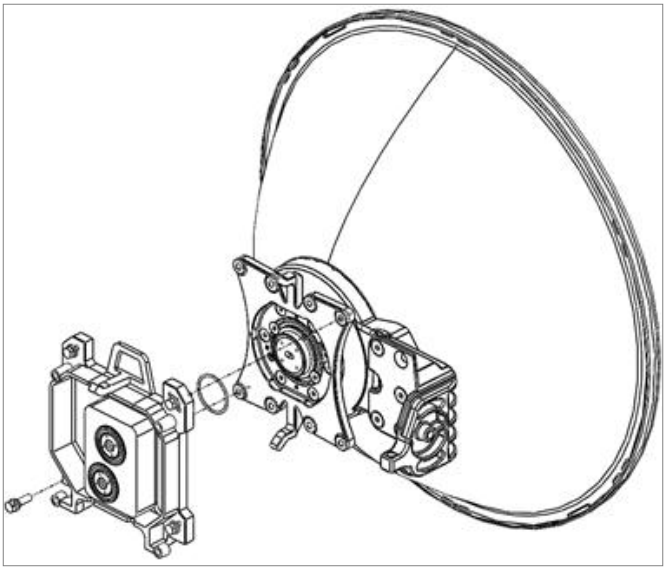
Required Tools

- Metric offset hexagon key set
- Metric wrench key set

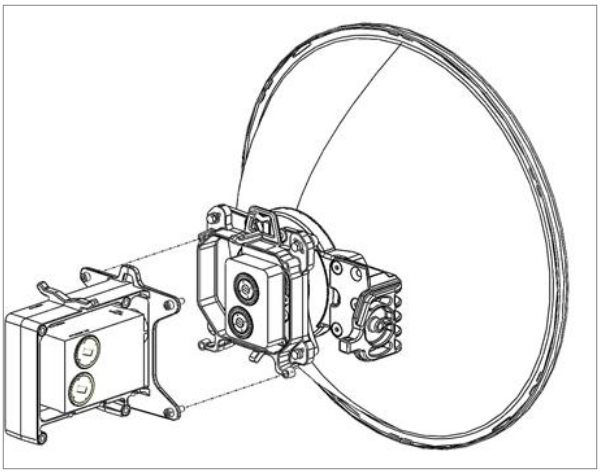
Procedure

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.)

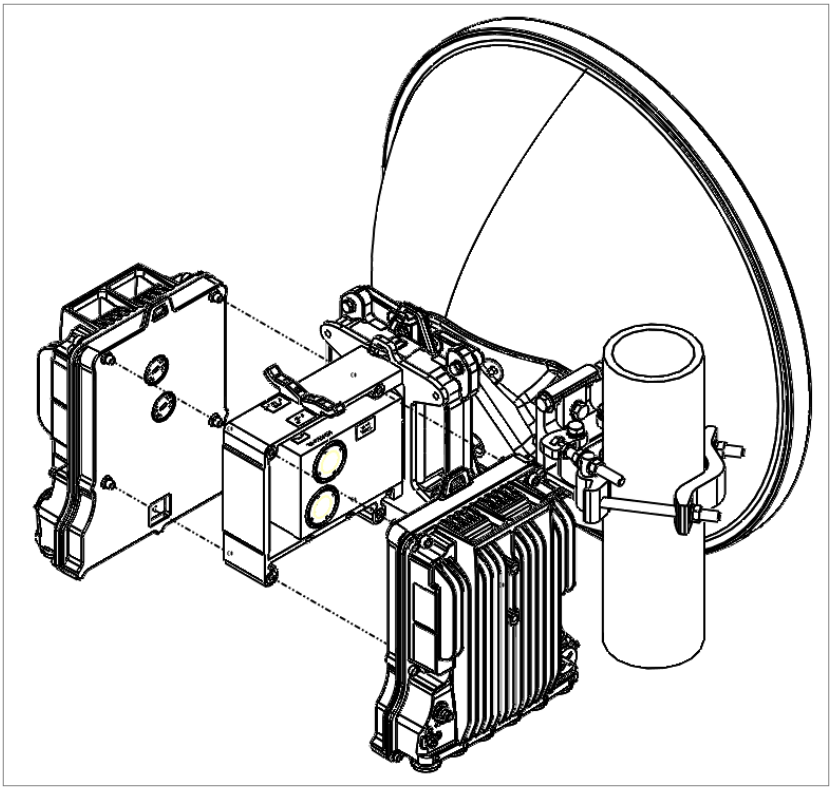
2. Connect the PTP 820C OMT Kit to the antenna and secure it with four screws. Verify existence of the O-ring.



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



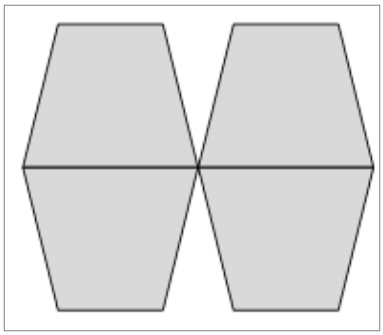
4. Mount and tighten the PTP 850C DC radio unit to both sides of the Dual Coupler Kit using the supplied captive screws and washers. Pay attention that the O-rings are correctly mounted on the radio ports of the PTP 820C Dual Coupler.



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	PTP 850C RADIO	2	
2	PTP 820C OMT KIT	1	
3	PTP 820C DUAL COUPLER OR DUAL SPLITTER KIT	1	
4	FLEXIBLE WG KIT	2	
5	PTP 820C DC POLE MOUNT KIT	1	
6	PTP 820C DC REMOTE MOUNT ADAPTOR KIT	1	13 GHz only
7	CIRC./CIRC. ADAPTOR	1	Per Antenna Vendor

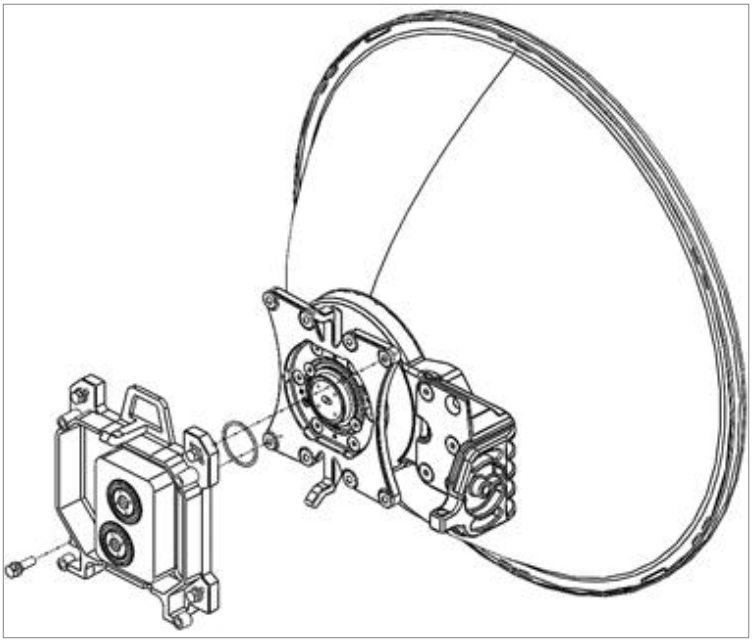
Required Tools

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

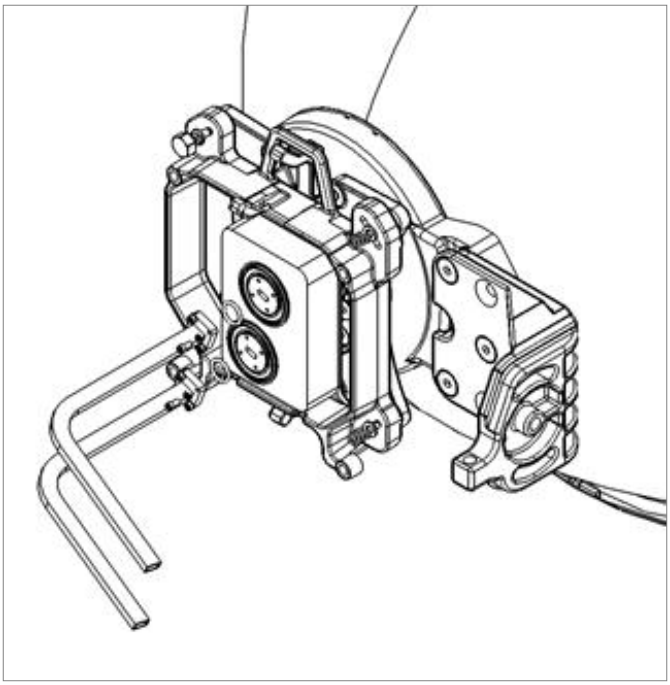
Procedure

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.

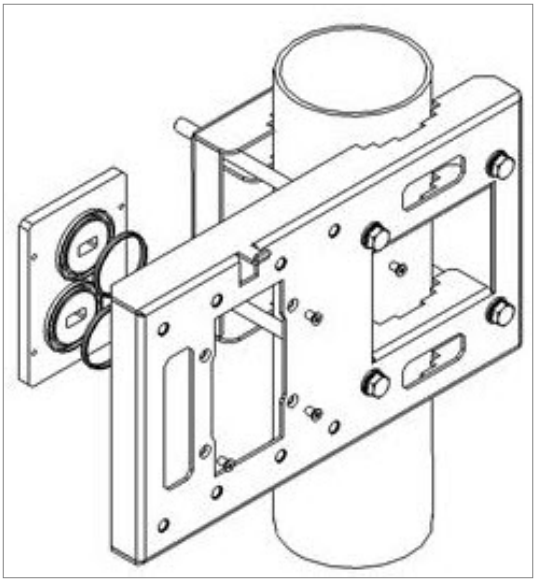


3. Mount and tighten the O-ring and the Flexible WG to PTP 820C OMT ports using the four screws supplied with the Flexible WG kit.

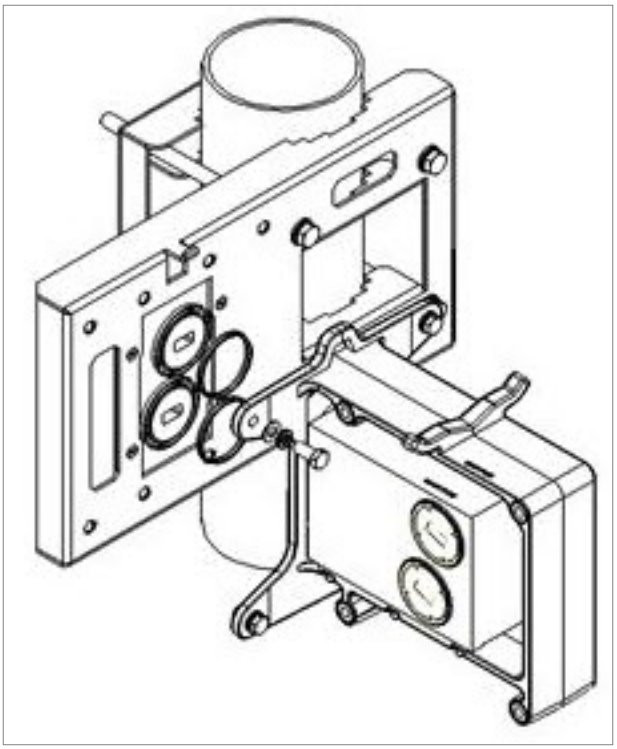


13 GHz

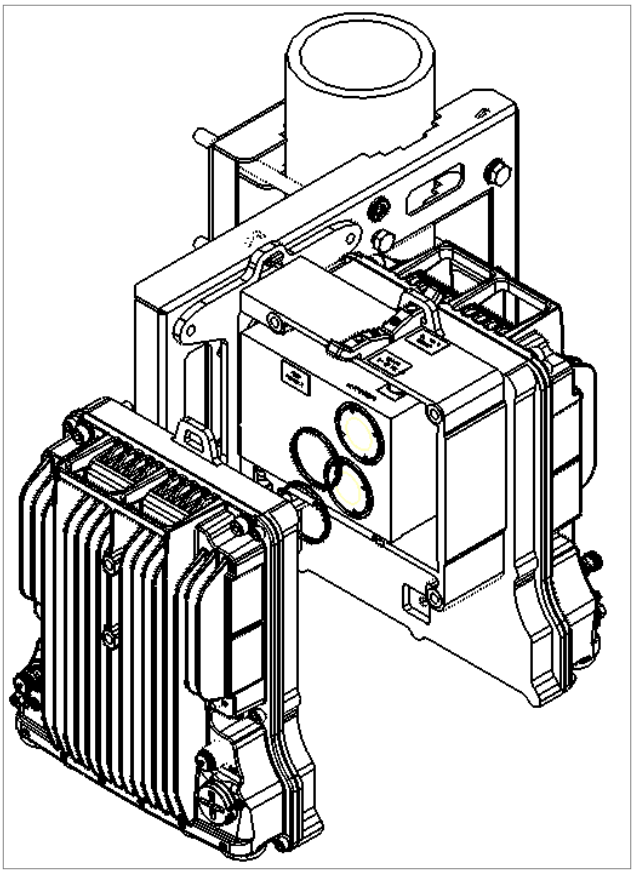
1. Mount and tighten the PTP 820-C Remote Mount Adaptor plate (supplied in PTP 820C Adaptor Remote Mount kit) to the PTP 820C Pole Mount using the four flat screws supplied with the PTP 820C Adaptor Remote Mount kit.



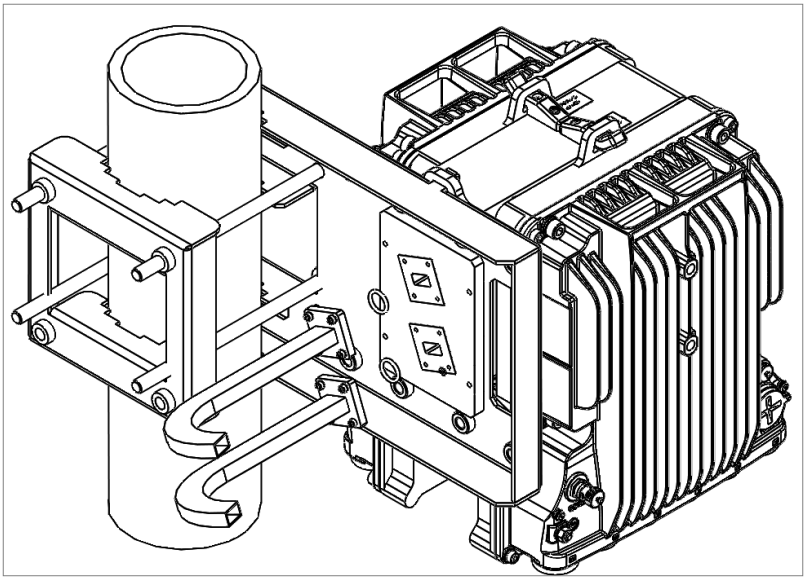
2. Mount and tighten the PTP 820C Dual Coupler to the PTP 820C Pole Mount using the four screws and washers that are supplied with the PTP 820C Dual Coupler kit. Pay attention that the O-rings are mounted on the PTP 820C Remote Mount Adaptor.



3. Mount and tighten the PTP 850C radios on each side of the PTP 820C Dual Coupler using the screws assembled on PTP 850C radio. Make sure that the O-rings are correctly assembled on the radio port of the PTP 820C Dual Coupler.

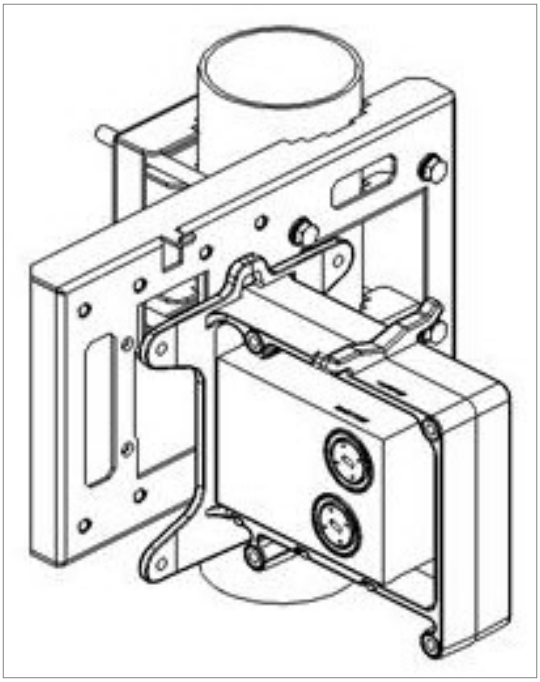


4. Connect both Flexible Waveguides and Sealing Gaskets supplied with each Flexible Waveguide Kit to the PTP 820C Dual Coupler antenna ports. Tighten the screws and washers supplied with the Flexible Waveguide Kit.

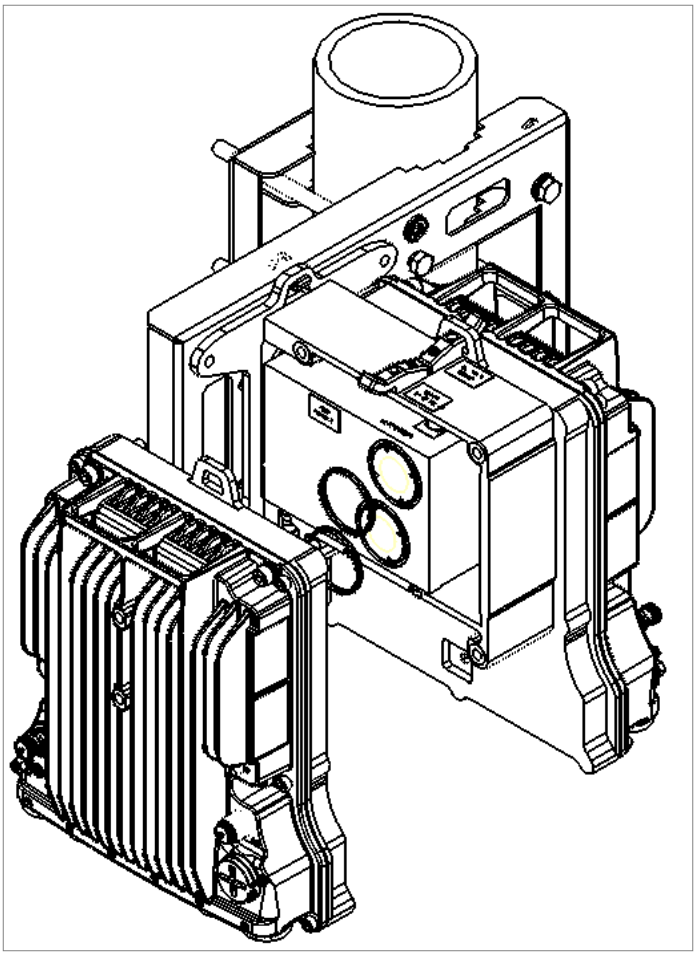


15-23 GHz

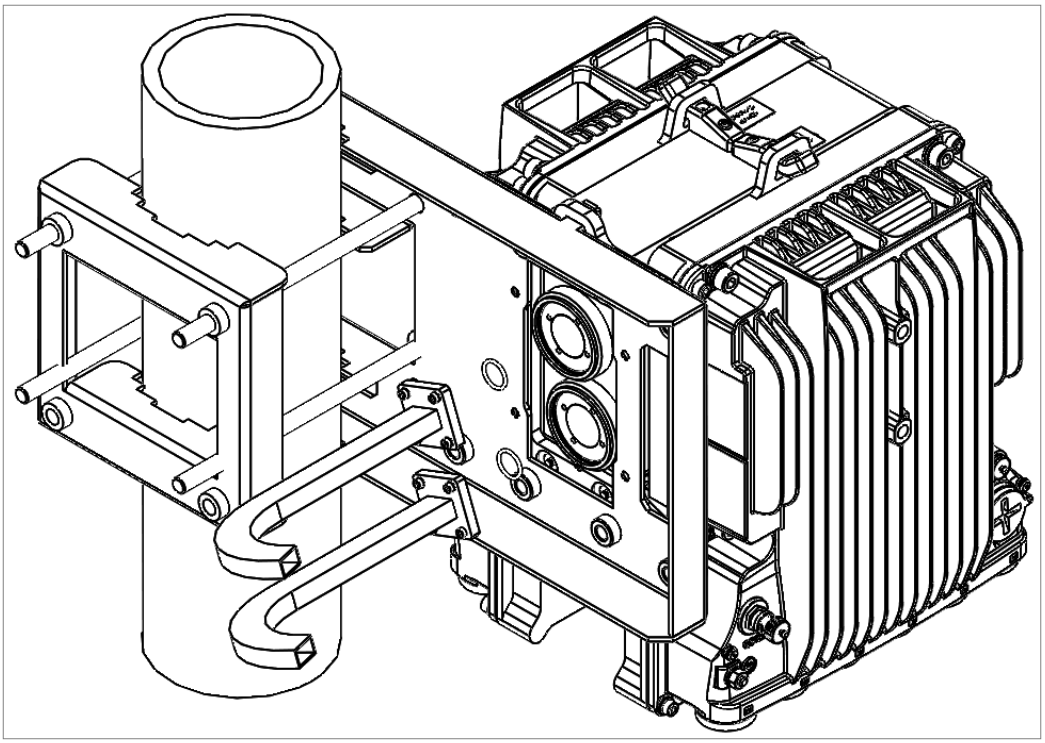
1. Mount and tighten the PTP 820C Dual Coupler to PTP 820C DC Pole Mount using the four screws and washers supplied with PTP 820C Dual Coupler kit.



2. Mount and tighten the PTP 850C radios on each side of the PTP 820C Dual Coupler using the screws assembled on PTP 850C radio. Pay attention that the O-rings are correctly assembled on the radio port of the PTP 820C Dual Coupler.



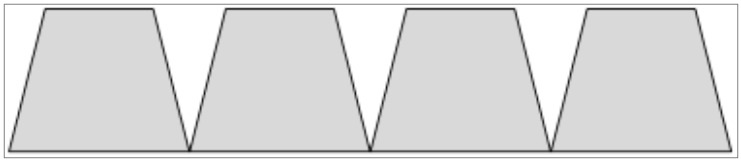
3. Mount the O-ring and the Flexible WG to PTP 820C Dual Coupler ports using the four screws supplied with the Flexible WG kit.



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	PTP 850C RADIO	2	
2	PTP 820C Splitter Kit	1	
3	PTP 820C Dual Splitter Kit	1	

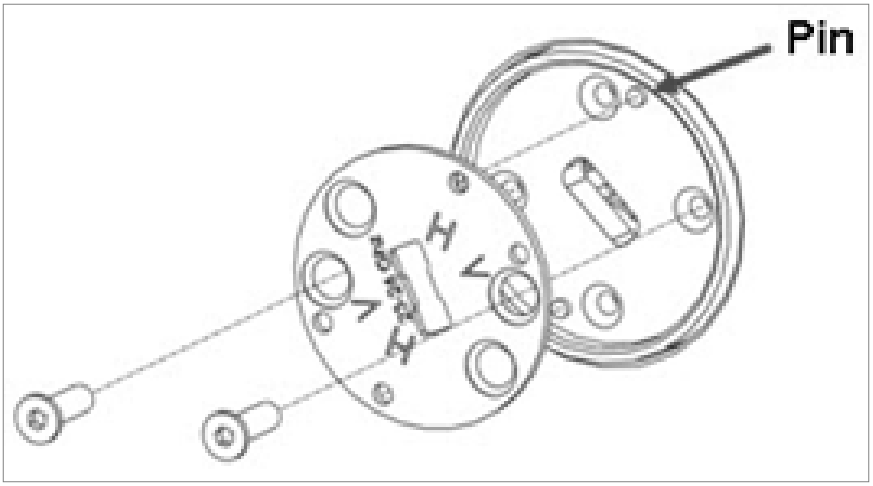
Required Tools

- Metric offset hexagon key set
- Metric wrench key set

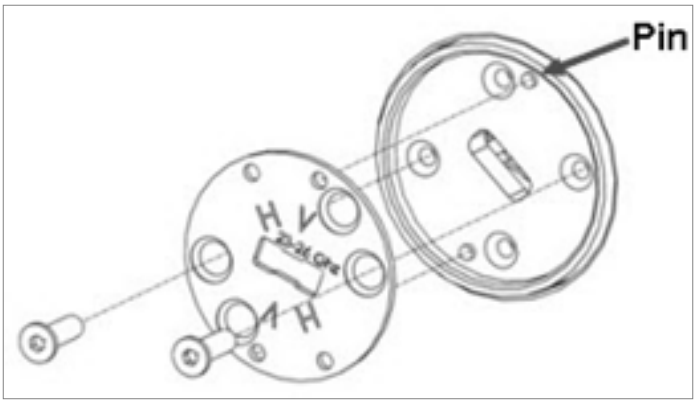
- Phillips #1 screwdriver

Procedure

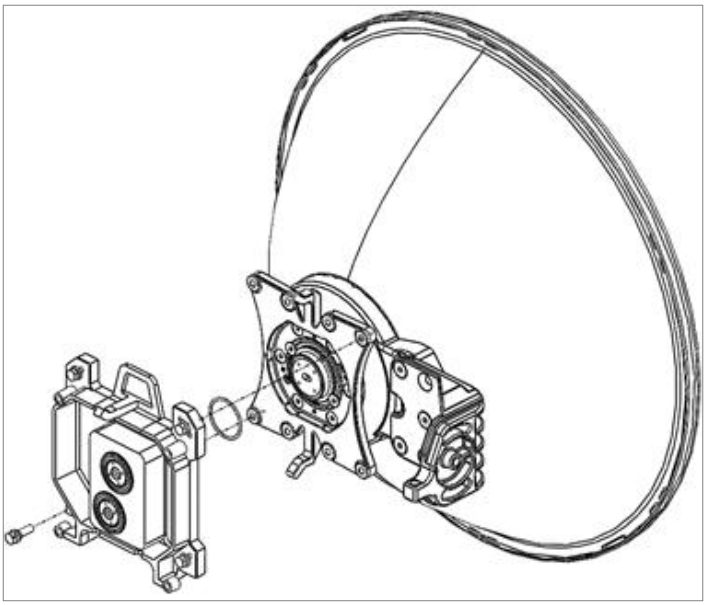
1. Adjust the twist on the PTP 820C Splitter Kit. Perform one of the procedures below according to the required polarization Horizontal polarization: Locate the holes above and below the letter “H” on the pins and fasten the two screws.



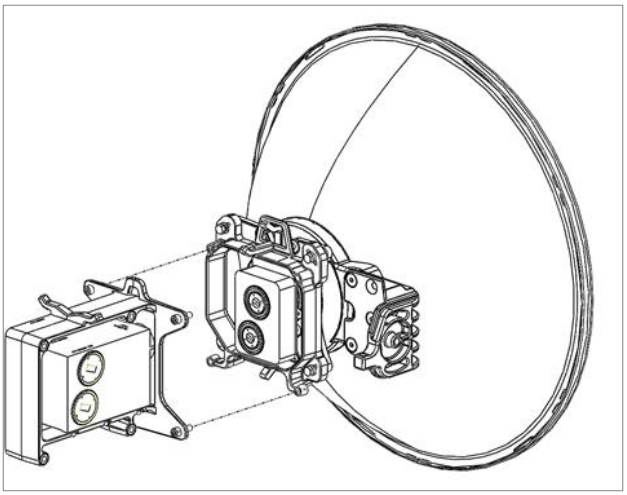
2. Vertical polarization: Locate the holes above and below the letter “V” on the pins and fasten the two screws.



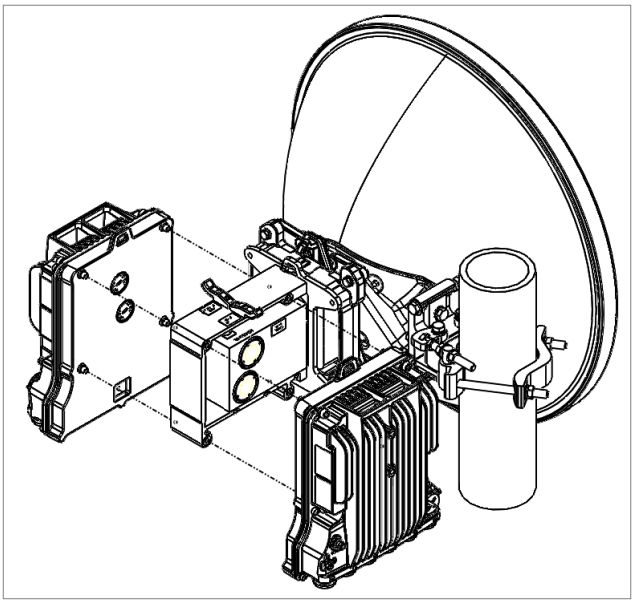
3. Mount the Splitter Kit on the antenna using four M8 screws and washers and tighten the screws.



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



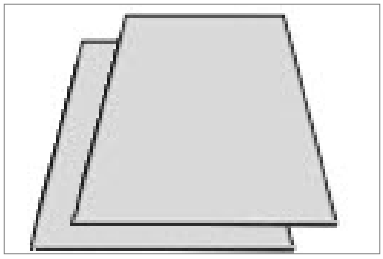
5. Connect the PTP 850C DC radio unit to both sides of the Dual Coupler Kit using the supplied captive screws and washers and tighten the screws.



2x2 MIMO Direct Mount

Note:

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



List of Items

Item	Description	Quantity	Remarks
1	PTP 850C Radio	1	
2	PTP 820C Dual Core Kit	1	
3	Flexible WG Kit	1	Optional
4	Coax to WG Kit	1	Optional

Required Tools

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

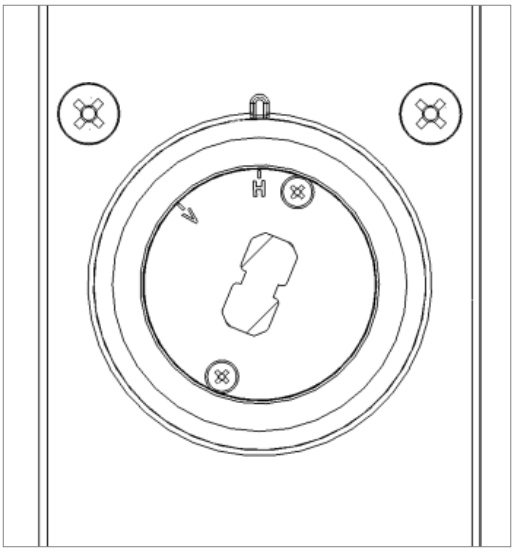
Procedure

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

Note:

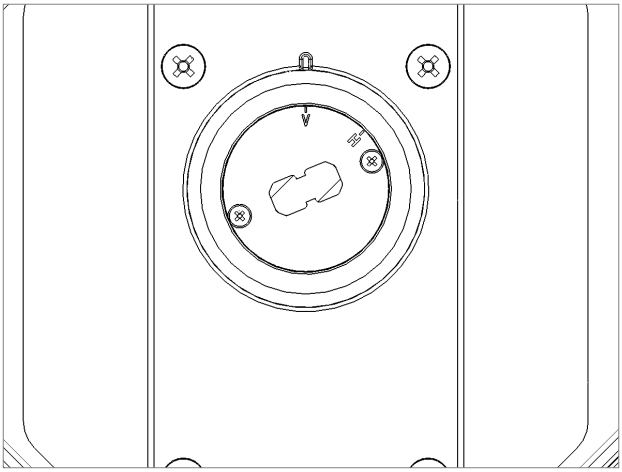
Make sure the polarization mounting direction of the twist to the dual core is according to the antenna polarization.

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

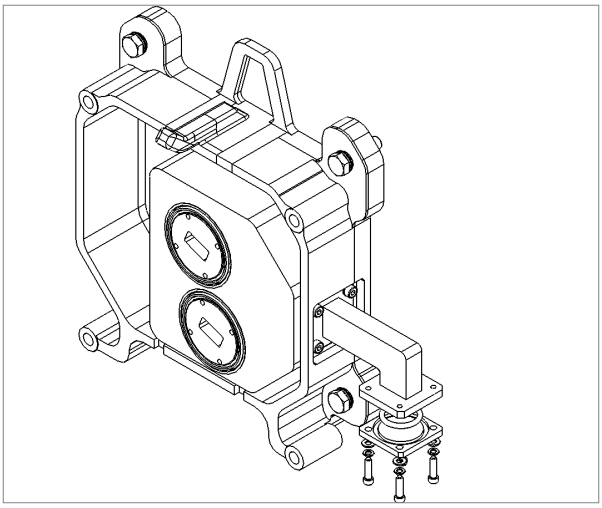


- For vertical polarization, locate the holes above and below the letter “V” on the pins and fasten

the two screws.



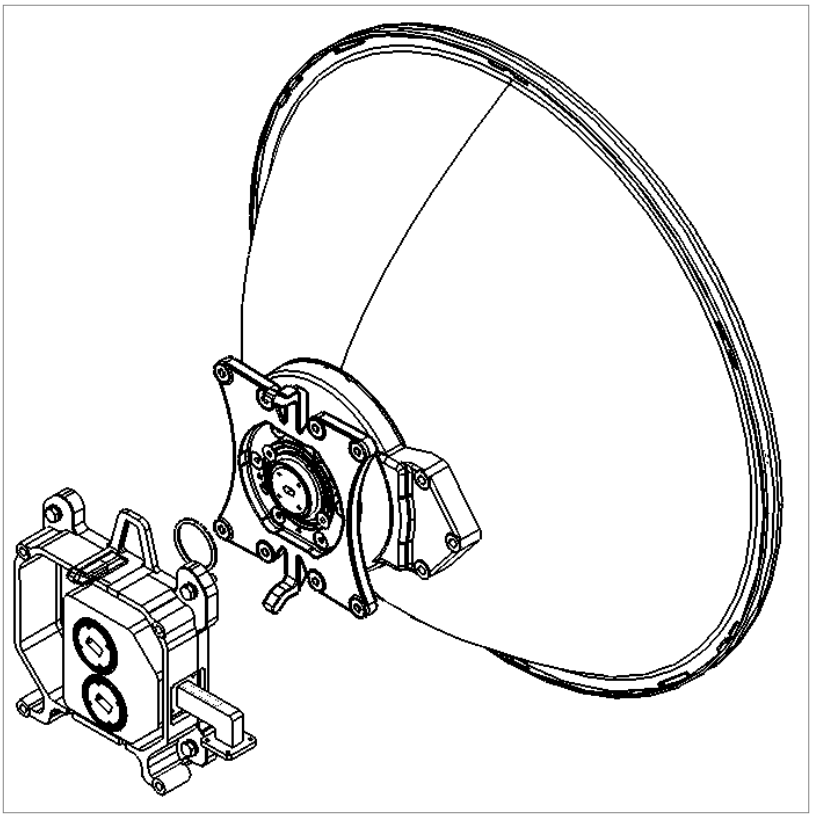
2. If not required, remove the plate assembled to the bended part of the dual core kit.



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

Note:

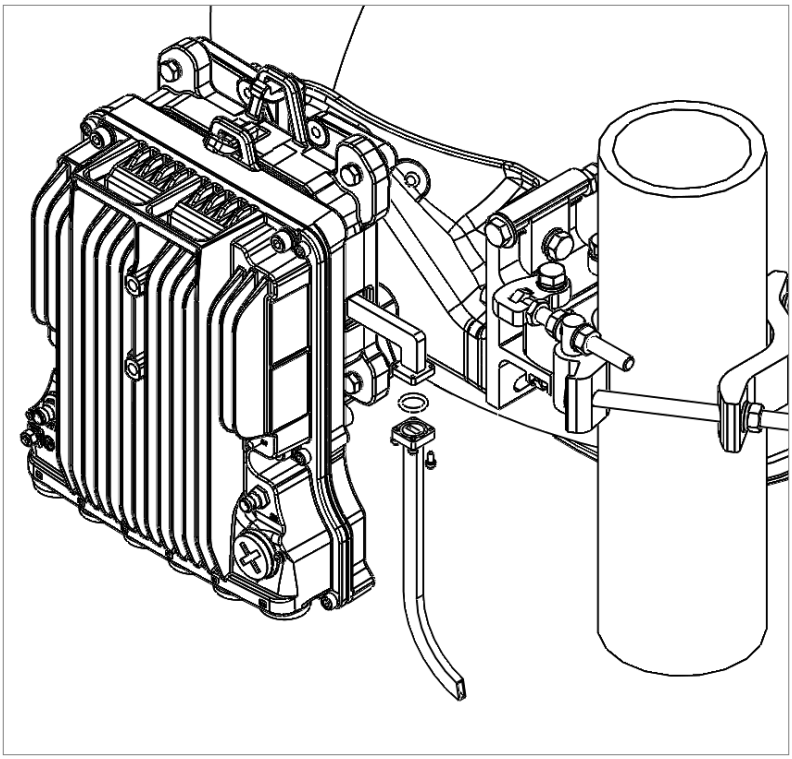
Verify that the O-ring is properly mounted between the antenna transition and the dual core.



4. Connect the PTP 850C radio to the PTP 820C dual core kit using four M8 screws and washers and tighten the screws.

Note:

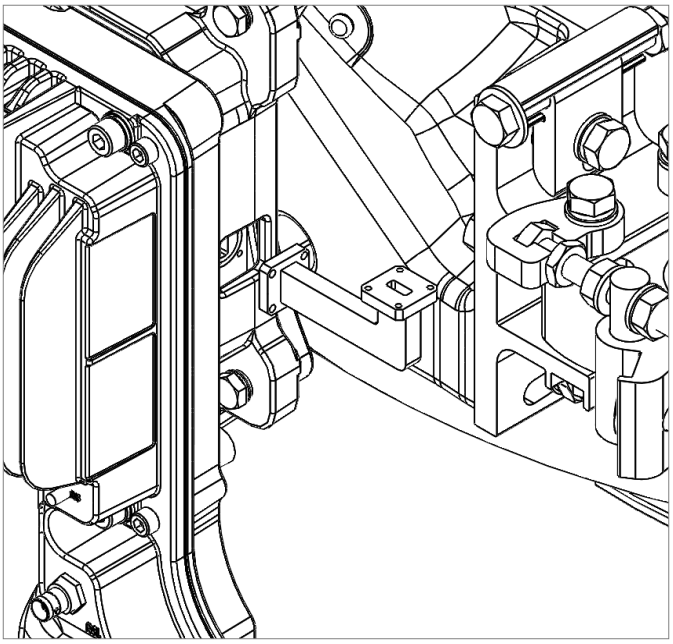
Verify that the O-rings are properly mounted between the dual core and the radio.



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:

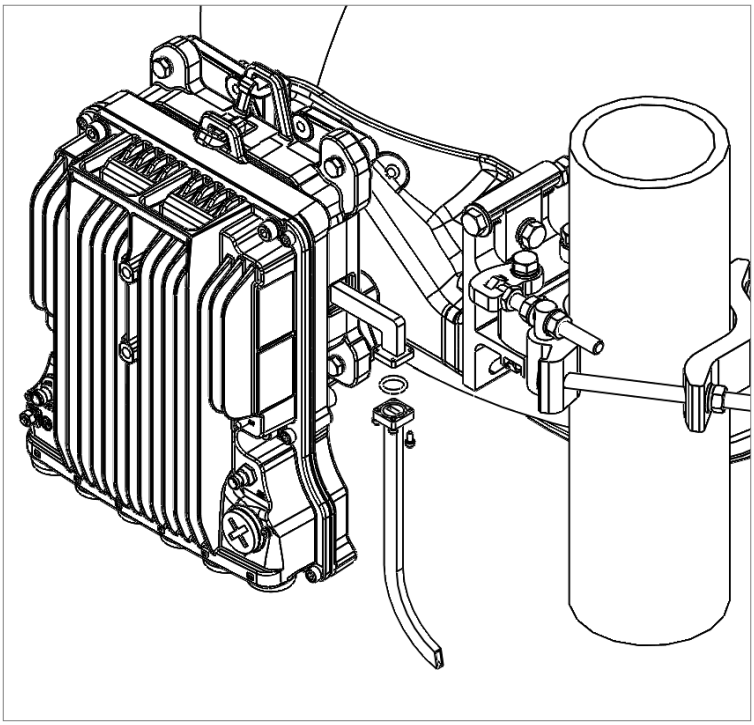
Verify that the O-rings are properly mounted between the dual core and the Coax to WG flange.



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

Note:

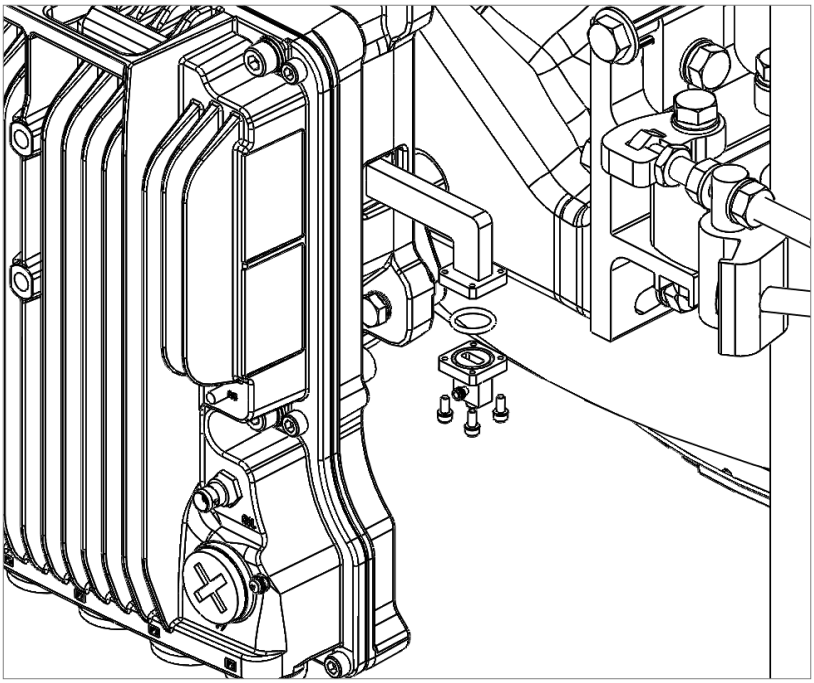
Verify that the O-rings are properly mounted between the dual core and the flexible waveguide flange.



7. 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:

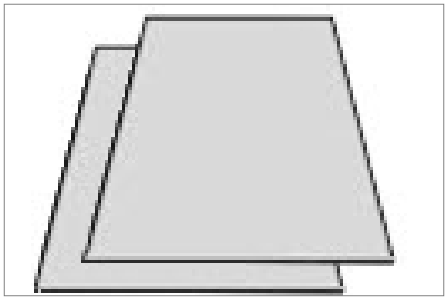
Verify that the O-rings are properly mounted between the dual core and the Coax to WG flange.



2x2 MIMO Remote Mount

Note:

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



List of Items

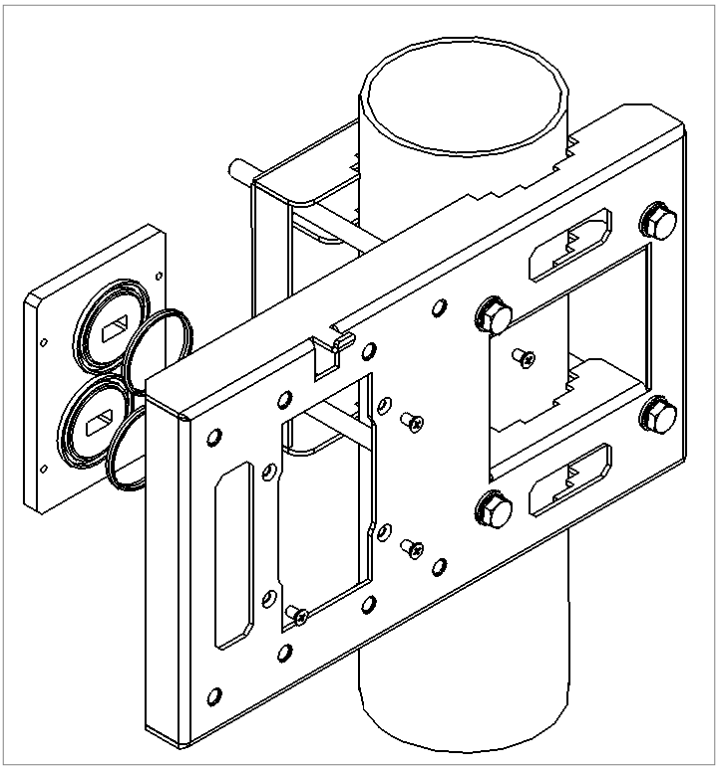
Item	Description	Quantity	Remarks
1	PTP 850C RADIO	1	
2	PTP 820C REMOTE MOUNT ADAPTOR KIT	1	13 GHz only

Required Tools

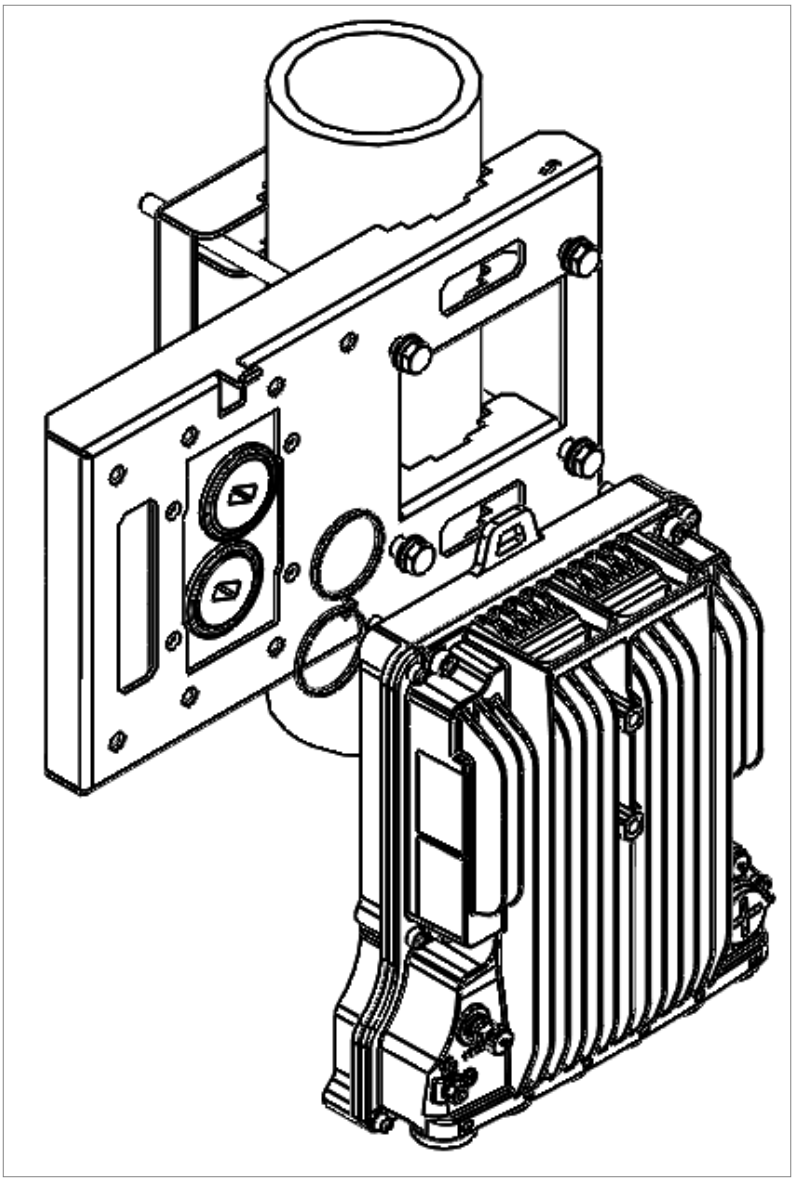
- Metric offset hexagon key set
- Metric wrench key set

For 13 GHz

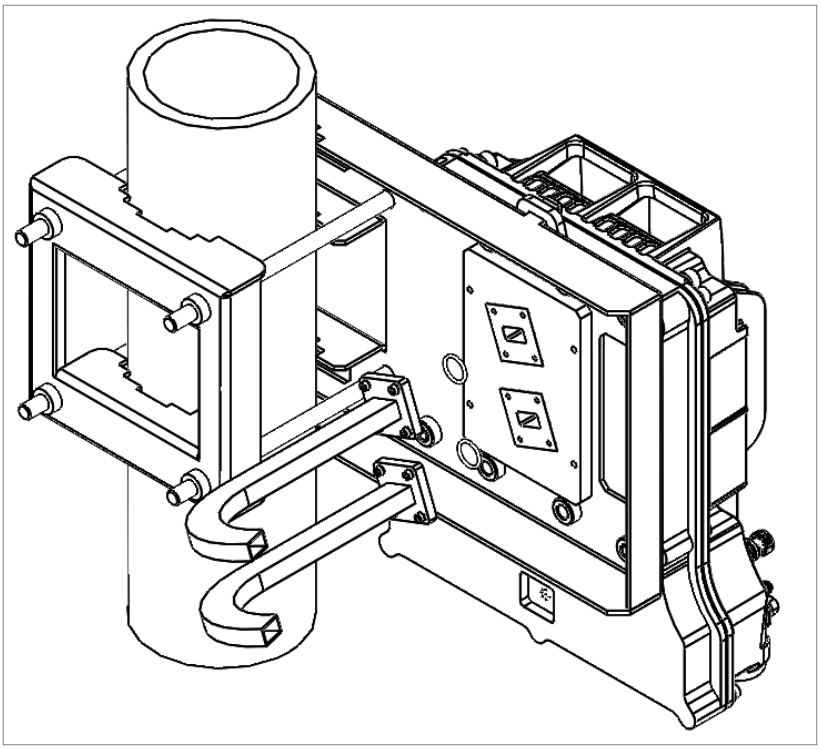
1. Mount and tighten the PTP 820-C Remote Mount Adaptor plate (supplied in PTP 820C Adaptor Remote Mount kit) to the PTP 820C Pole Mount using the four flat screws supplied with the PTP 820C Adaptor Remote Mount kit.



2. Mount and tighten the PTP 850C Radio to the PTP 820C Pole Mount using the four captive screws and washers that are supplied with the PTP 850C Radio. Pay attention that the O-rings are mounted on the PTP 820C Remote Mount Adaptor.

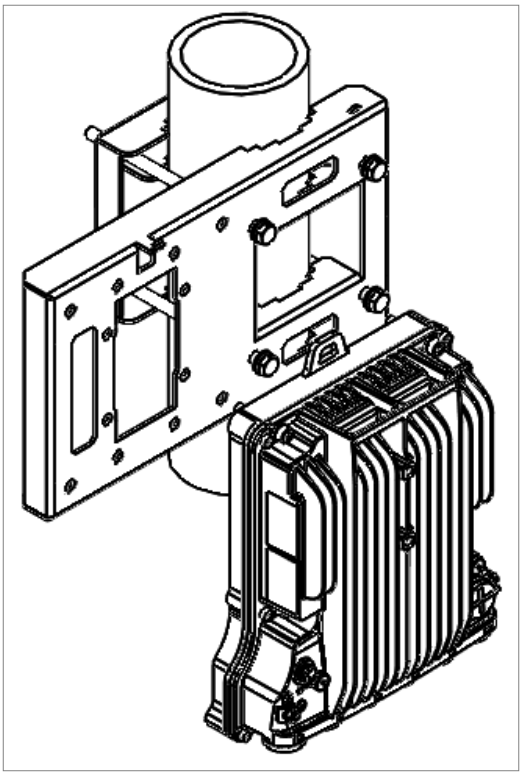


3. Mount and tighten both Flexible WGs with their O-ring to the PTP 820C Remote Mount Adaptor ports using the four screws supplied with each Flexible WG kit.

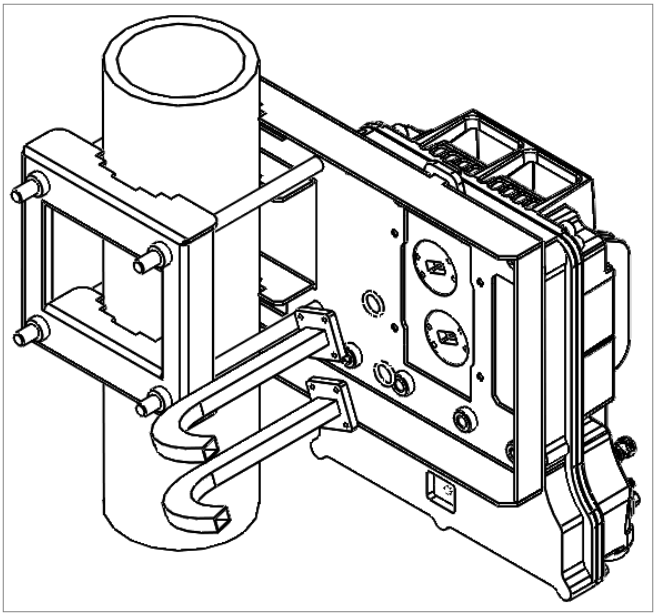


15-23 GHz

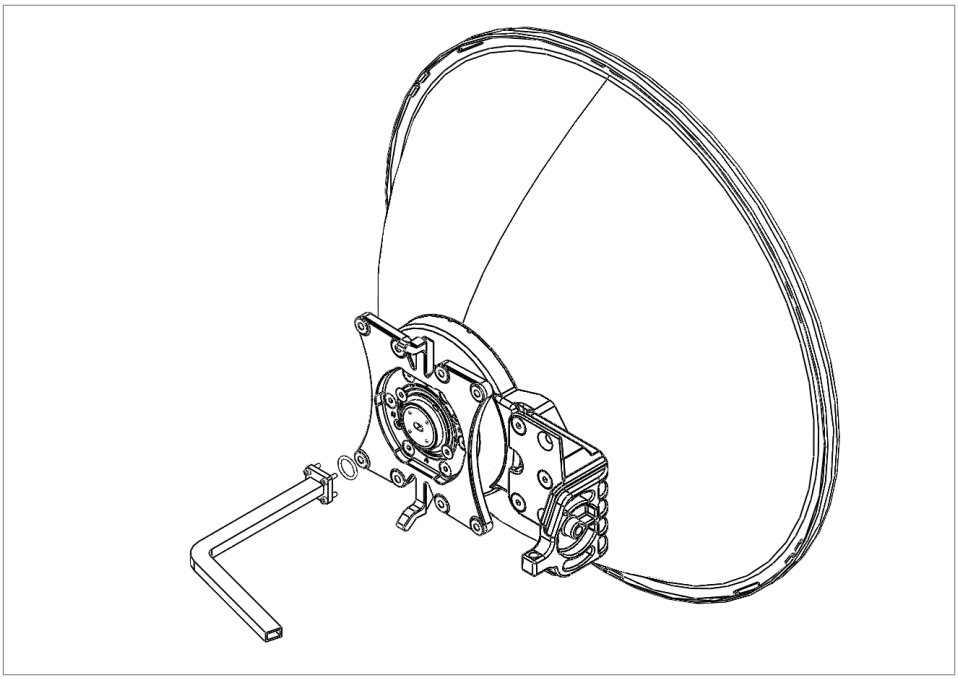
1. Mount and tighten the PTP 850C radio to the PTP 820C DC Pole Mount using the four screws assembled on the PTP 850C radio.



2. Mount and tighten the O-ring and the Flexible WG to PTP 850C 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.

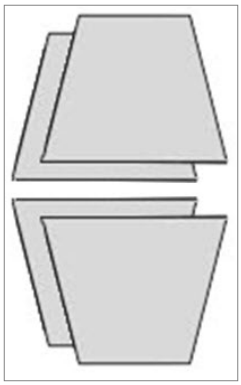


4x4 MIMO Direct Mount

Note:

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

This procedure can also be used for 2+2 SD configurations.



List of Items

Item	Description	Quantity	Remarks
1	PTP 850C RADIO	2	
2	PTP 820C OMT KIT	2	
3	MIMO DATA CABLE	1	
4	SOURCE SHARING CABLE	1	

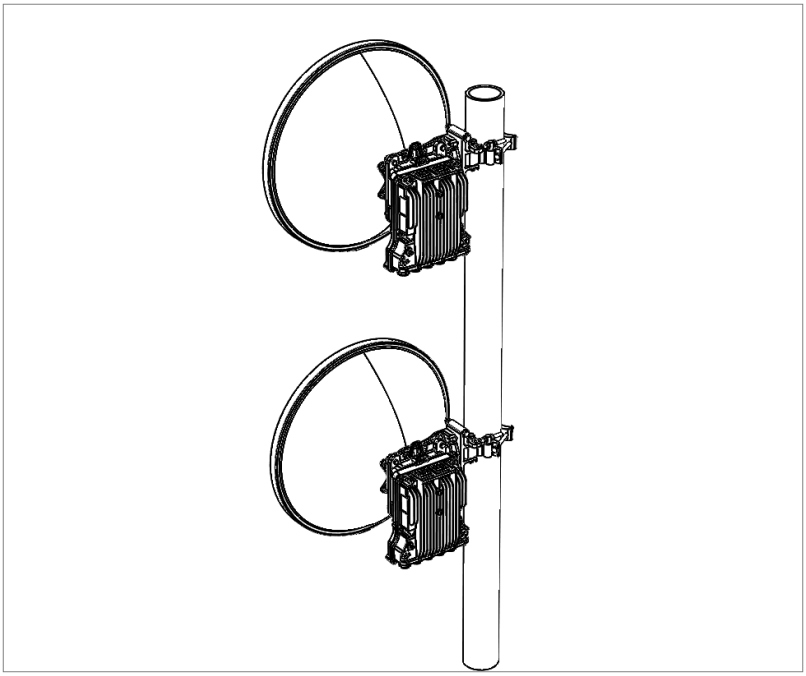
Item	Description	Quantity	Remarks
5	CAT5E MIMO SIGNALING CABLE	1	
6	CIRC./CIRC. ADAPTOR	1	Per Antenna Vendor

Required Tools

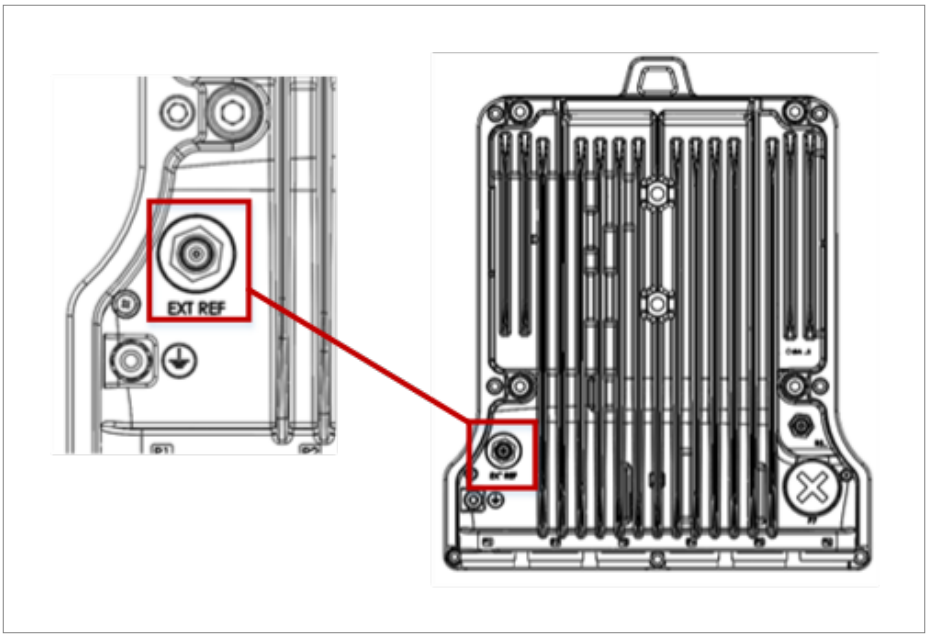
- Metric offset hexagon key set
- Metric wrench key set

Procedure

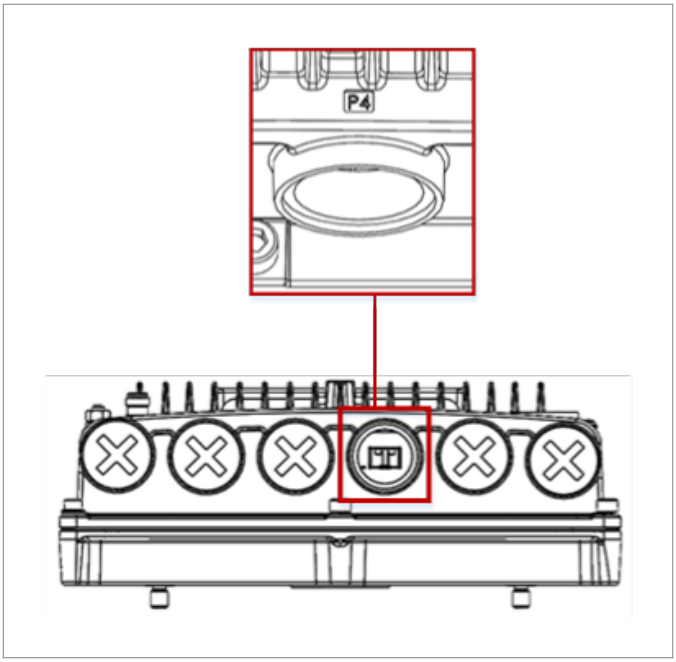
1. For instructions on installation of the PTP 820C OMT and radios, see 2+0 Dual Polarization Direct Mount.



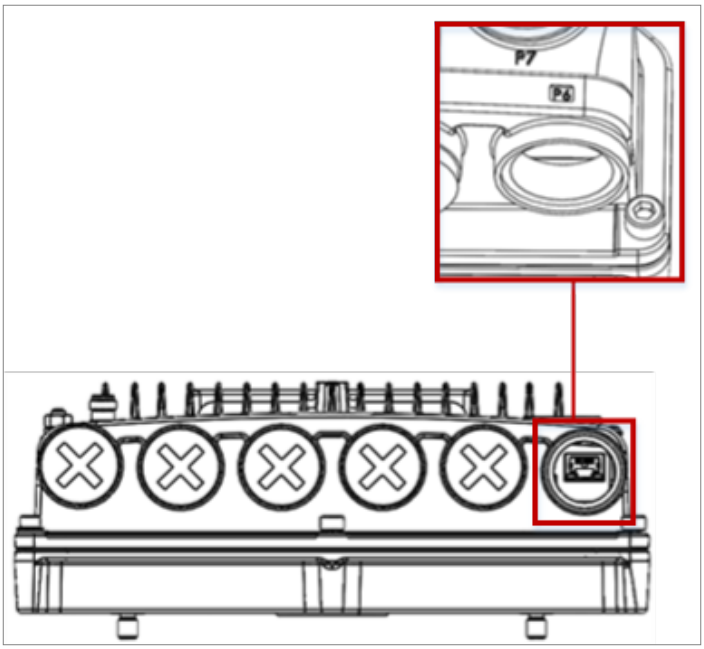
2. Connect the source sharing cable between both EXT REF PTP 850C radio connectors. The maximum torque for connecting this cable to the radio is 5Lb.in (0.5N.m).



3. Connect the MIMO data sharing cable between both of the MIMO (P4) ports on the two PTP 850C units.



4. Connect the MIMO signaling cable between the management ports of both units. For additional instructions on preparing and connecting this cable, refer to Preparing a MIMO/Protection Signaling Cable.



4+0 Dual Polarization, 2+2HSB Single/Dual Polarization Direct Mount

List of Items

Item	Description	Quantity	Remarks
1	PTP 820C Dual Coupler/Splitter/Circulator	1	
2	PTP 820C OMT/Splitter Kit	1	
3	PTP 850C Radios	2	

Required Tools

- Metric offset hexagon key set
- Metric wrench key set

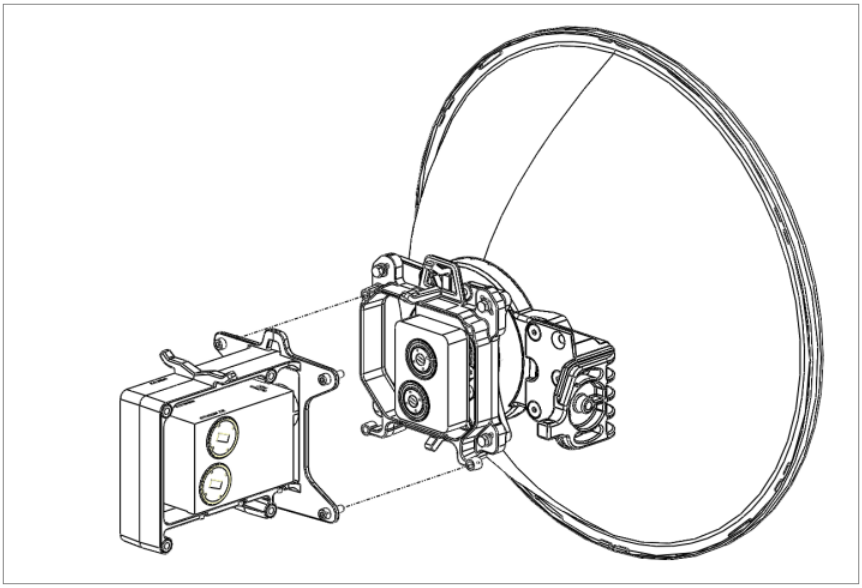
Procedure

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 PTP 850C DC radios 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 Dual Polarization, 2+2HSB Dual Polarization Remote Mount

List of Items

Item	Description	Quantity	Remarks
1	PTP 820C OMT Kit	1	
2	Flexible Waveguide Kit	2	
3	PTP 820C Dual Coupler/Splitter	1	

Required Tools

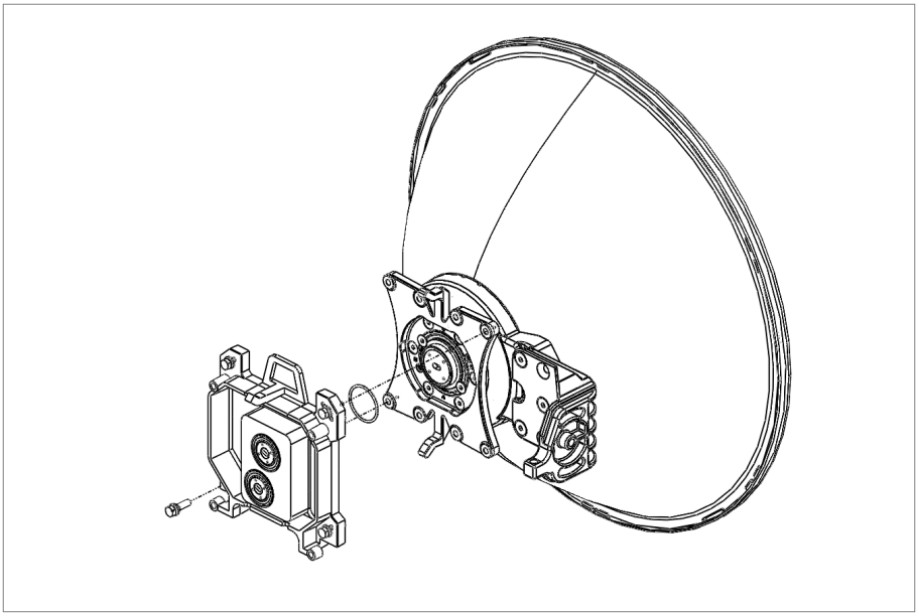
- Metric offset hexagon key set
- Metric wrench key set

Procedure

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

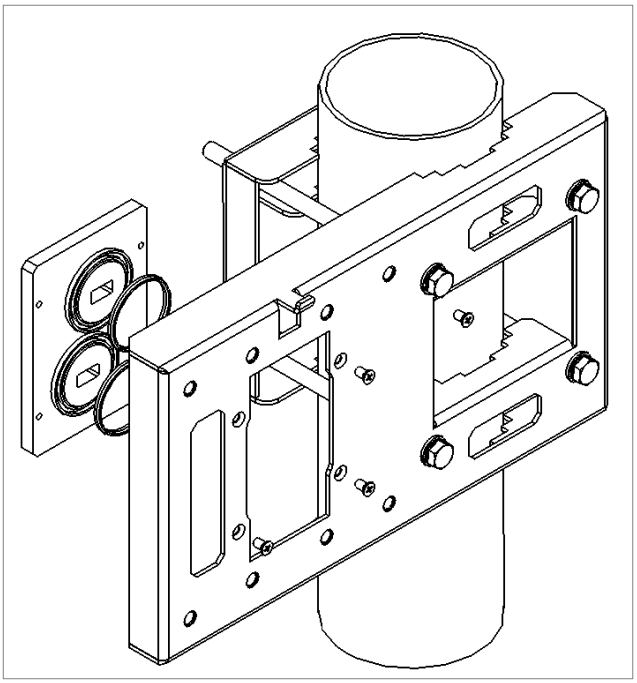
Note:

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

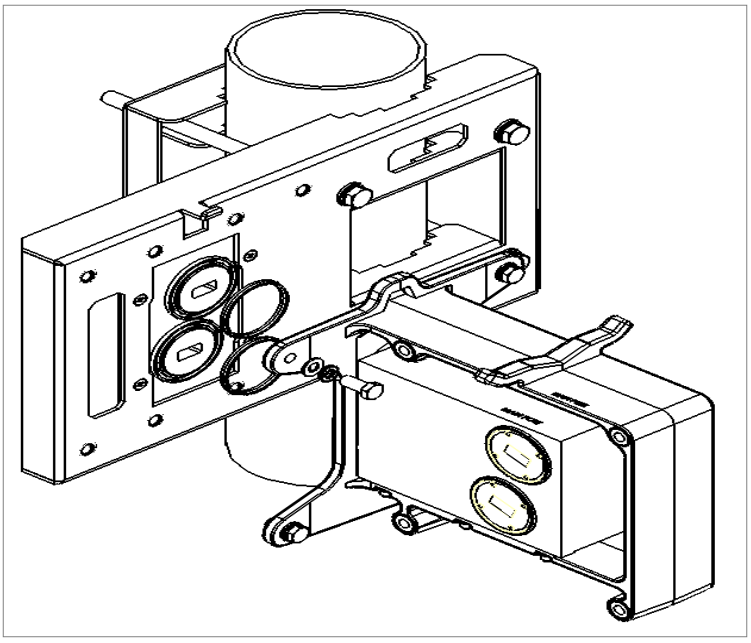


13 GHz

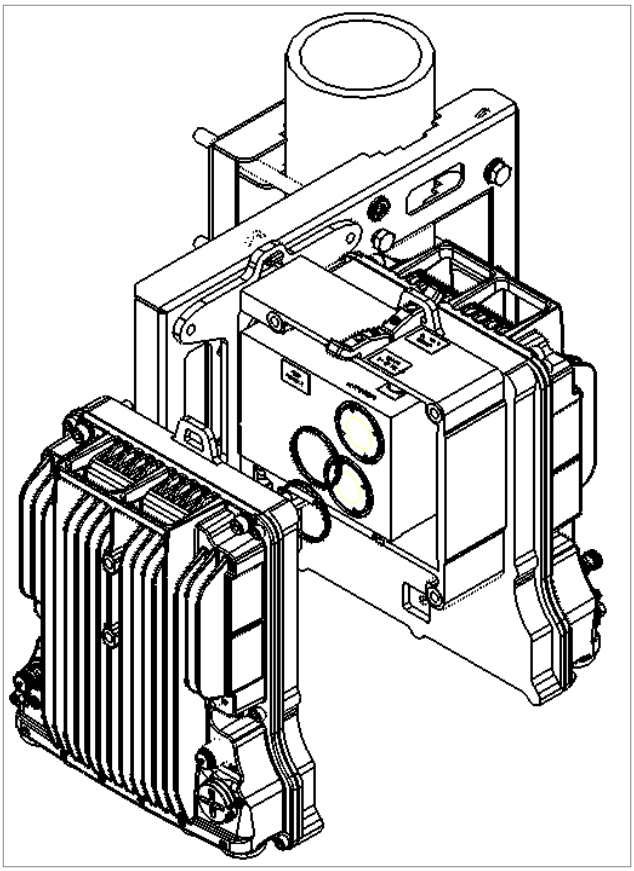
1. Mount and tighten the PTP 820-C Remote Mount Adaptor plate (supplied in PTP 820C Adaptor Remote Mount kit) to the PTP 820C Pole Mount using the four flat screws supplied with the PTP 820C Adaptor Remote Mount kit.



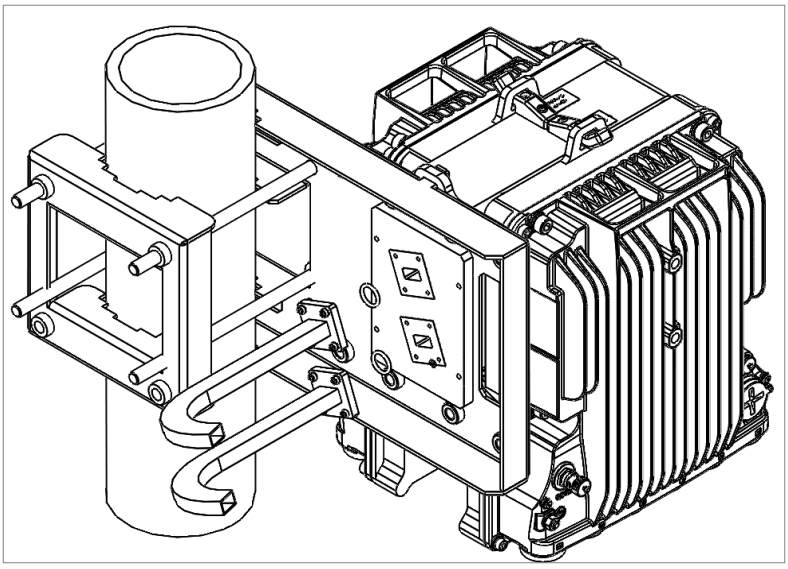
2. Mount and tighten the PTP 820C Dual Coupler to the PTP 820C Pole Mount using the four screws and washers that are supplied with the PTP 820C Dual Coupler kit. Pay attention that the O-rings are mounted on the PTP 820C Remote Mount Adaptor.



3. Mount and tighten the PTP 850C radios on each side of the PTP 820C Dual Coupler using the screws assembled on PTP 850C radio. Make sure that the O-rings are correctly assembled on the radio port of the PTP 820C dual coupler.

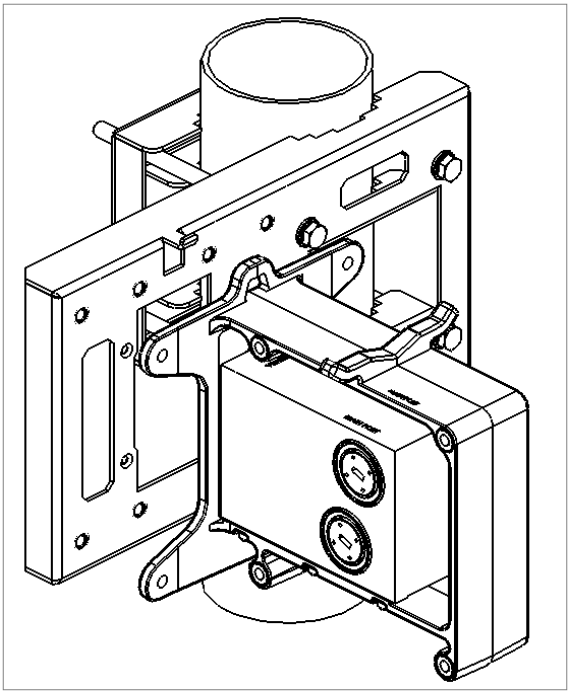


4. Connect both Flexible Waveguides and Sealing Gaskets supplied with each Flexible Waveguide Kit to the PTP 820C Dual Coupler antenna ports. Tighten the screws and washers supplied with the Flexible Waveguide Kit.



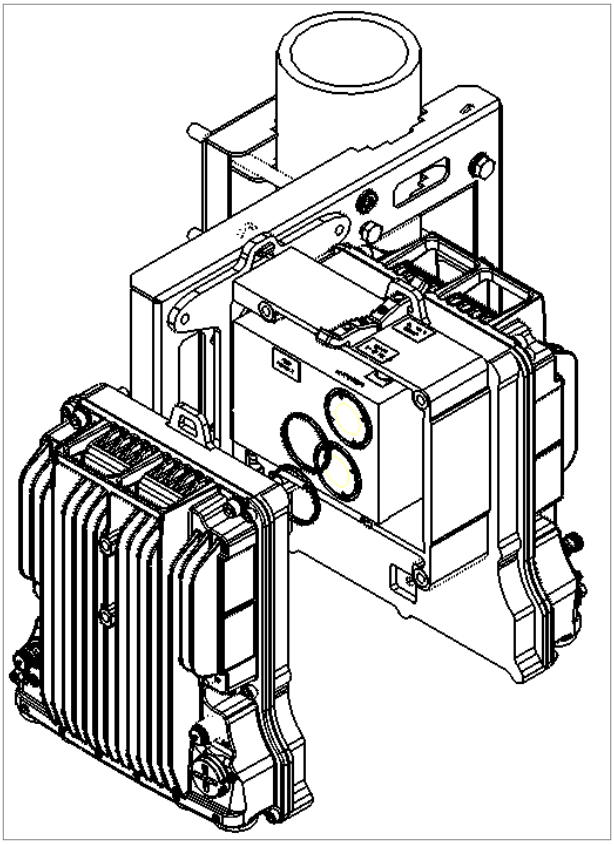
15-23 GHz

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

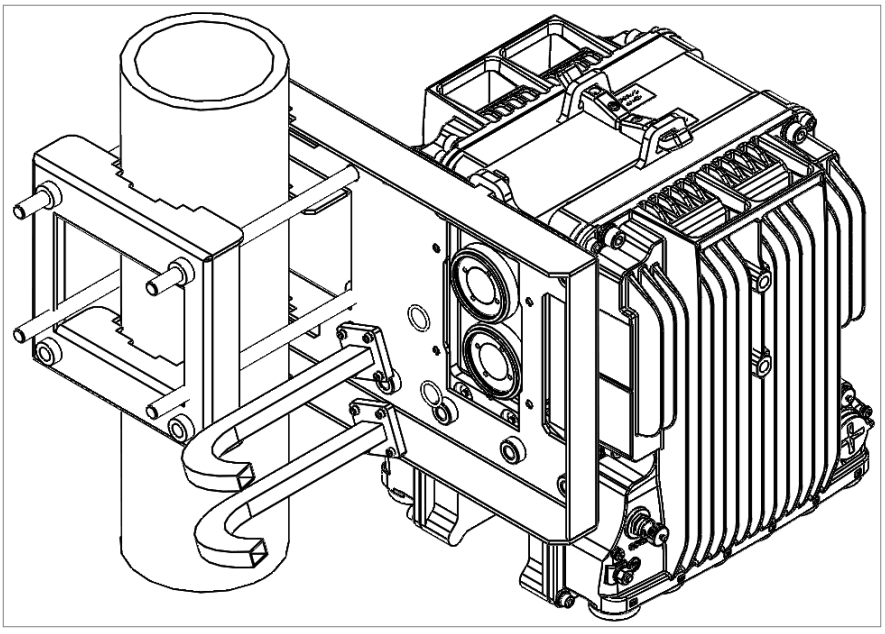


2. Mount and tighten the PTP 850C radios on each side of the PTP 820C Dual Coupler using the screws assembled on the PTP 850C unit. Make sure that the O-rings are correctly assembled on the radio

port of the PTP 820C Dual Coupler.



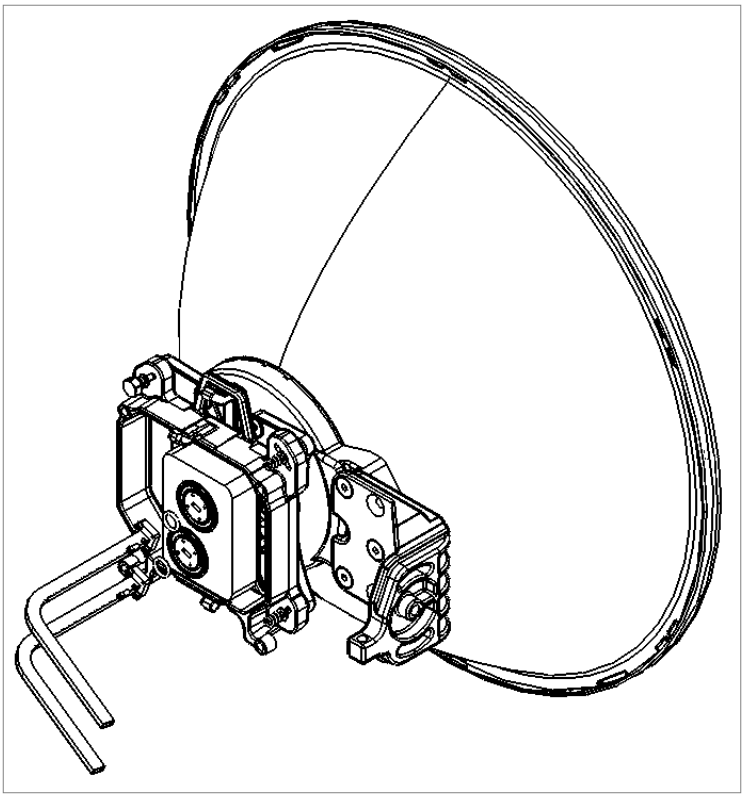
3. Mount the O-ring and the Flexible Waveguides to the PTP 820C Dual Coupler ports using the four screws supplied with the Flexible Waveguide kits.



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:

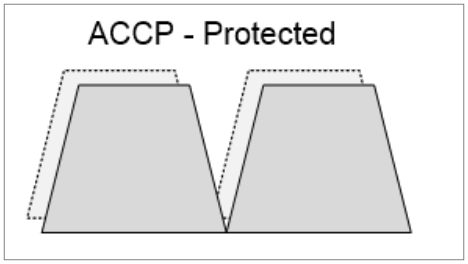
Verify that the O-rings are correctly mounted between the OMT ports and each Flexible Waveguide.



2+2HSB Single Polarization Remote Mount

Note:

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



List of Items

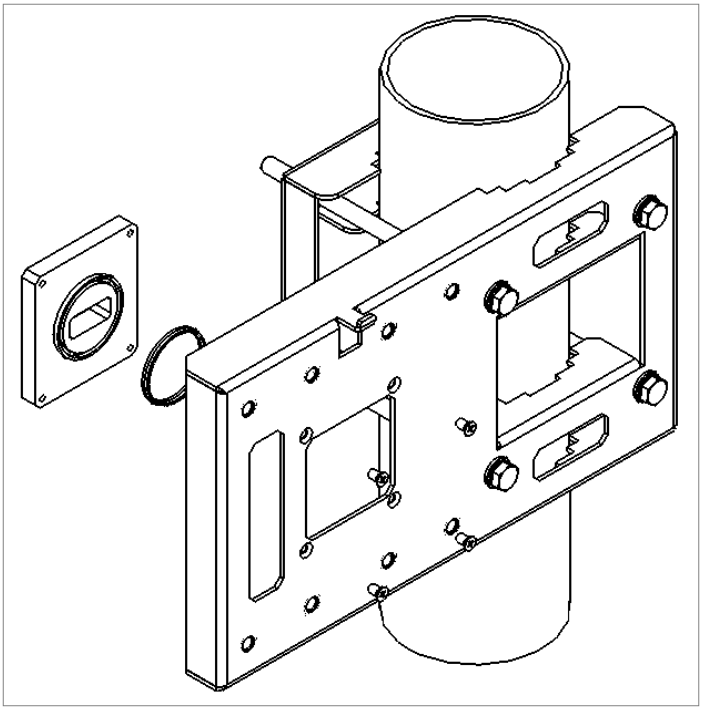
Item	Description	Quantity	Remarks
1	PTP 850C RADIO	2	
2	PTP 820C SPLITTER KIT	1	
3	PTP 820C DUAL COUPLER KIT	1	
4	FLEXIBLE WG KIT	2	
5	RFU-C POLE MOUNT KIT	2	

Required Tools

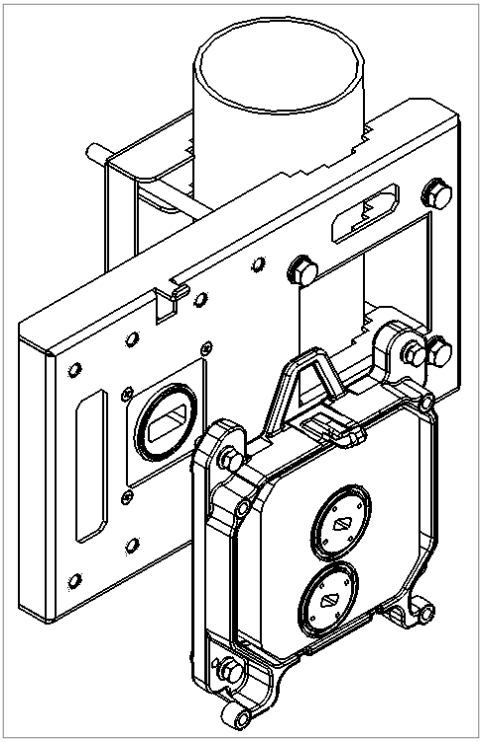
- Metric offset hexagon key set
- Metric wrench key set
- Phillips #1, #2 screwdriver

13 GHz

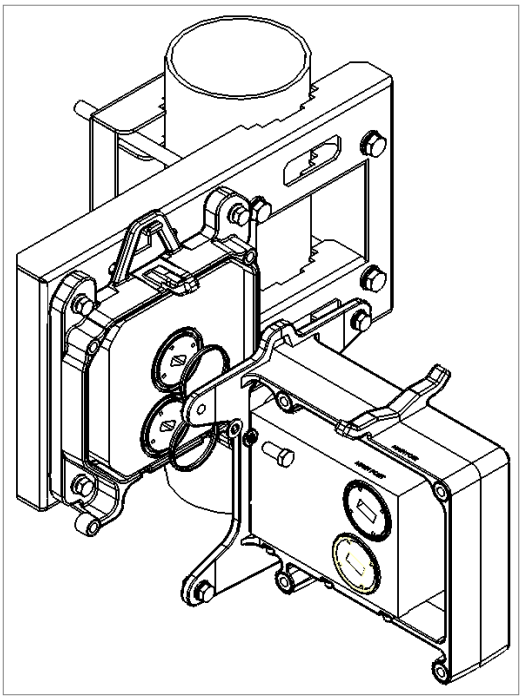
1. Mount and tighten the RFU-C Remote Mount Adaptor plate (supplied in the RFU-C Adaptor Remote Mount kit) to the RFU-C Pole Mount using the four flat screws supplied with the RFU-C Adaptor Remote Mount kit.



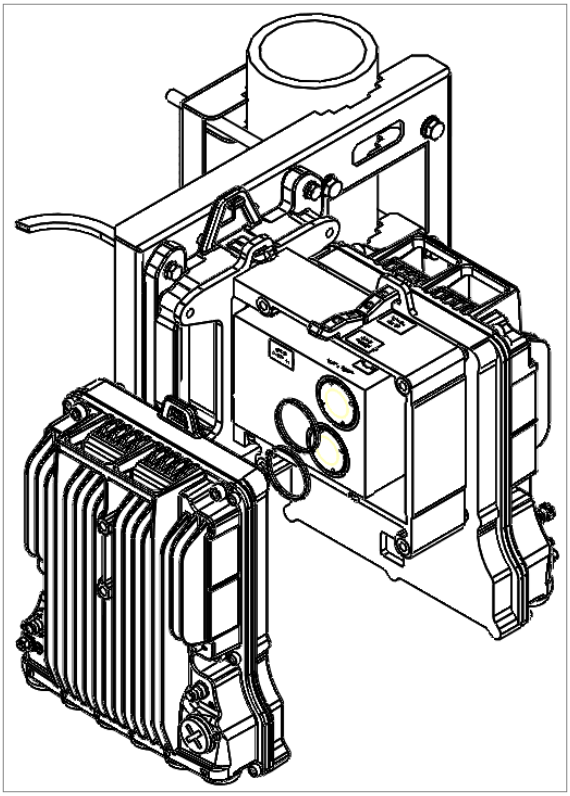
2. Mount and tighten the PTP 820C Splitter to the RFU-C Pole Mount using the four captive screws and washers that are assembled to the PTP 820C Splitter kit.



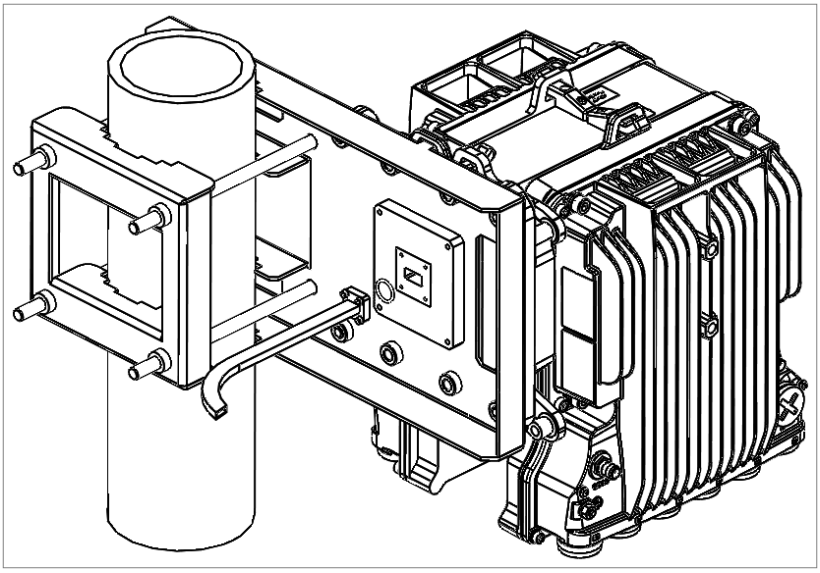
3. Mount and tighten the PTP 820C Dual Coupler to the PTP 820C Splitter using the four captive screws and washers that are supplied with the PTP 820C Dual Coupler kit. Make sure that the O-rings are mounted on the PTP 820C Splitter.



4. Mount and tighten the PTP 850C unit to the PTP 820C Dual Coupler using the four screws and washers that are assembled to the PTP 850C 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.



1+1 HSB-SD

List of Items

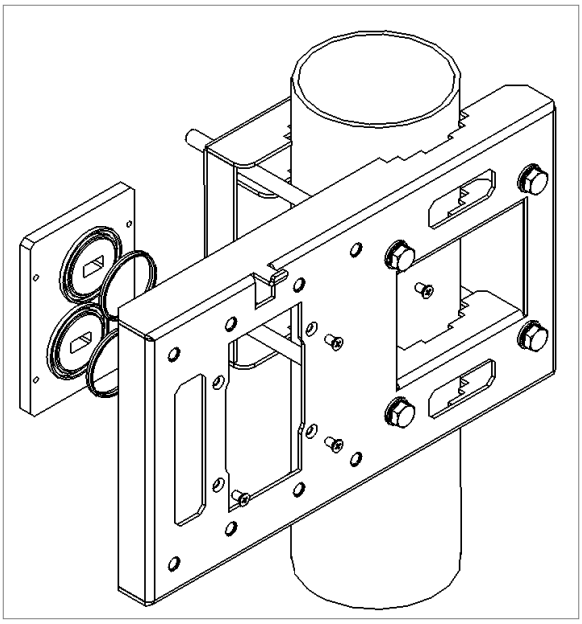
Item	Description	Quantity	Remarks
1	Flexible Waveguide Kit	2	
2	PTP 820C Dual Coupler/Splitter	1	

Required Tools

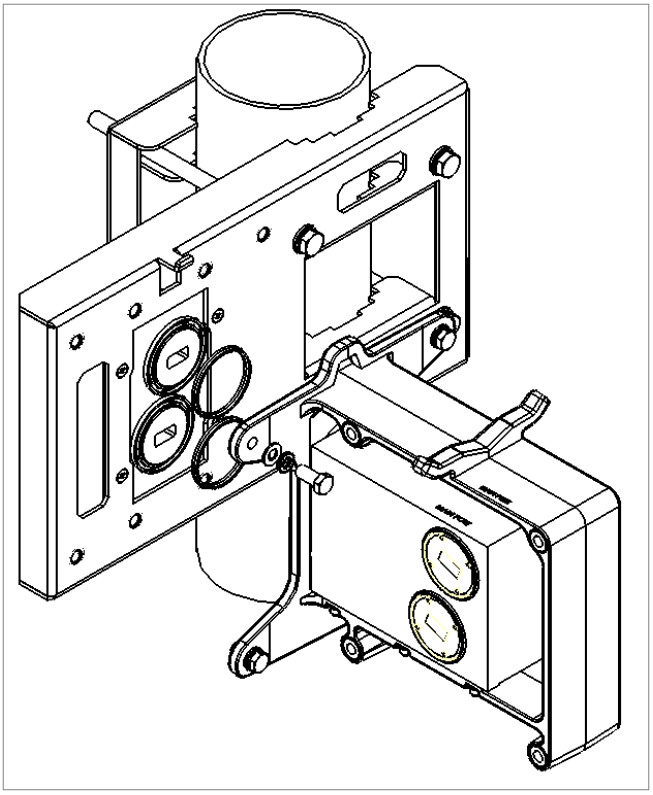
- Metric offset hexagon key set
- Metric wrench key set

13 GHz

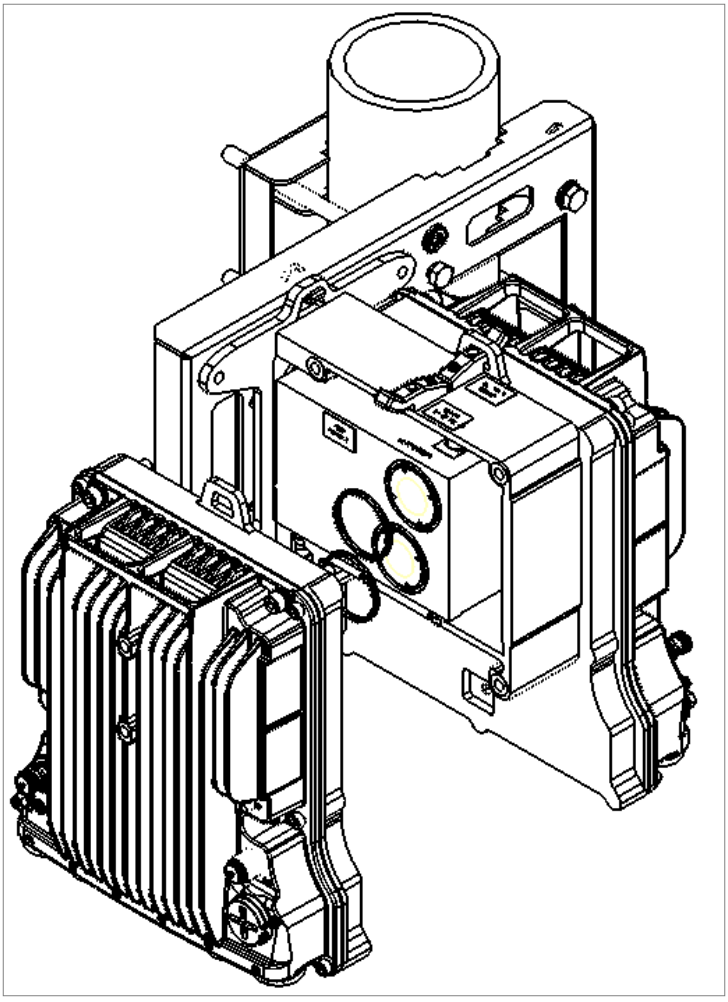
1. Mount and tighten the PTP 820-C Remote Mount Adaptor plate (supplied in PTP 820C Adaptor Remote Mount kit) to the PTP 820C Pole Mount using the four flat screws supplied with the PTP 820C Adaptor Remote Mount kit.



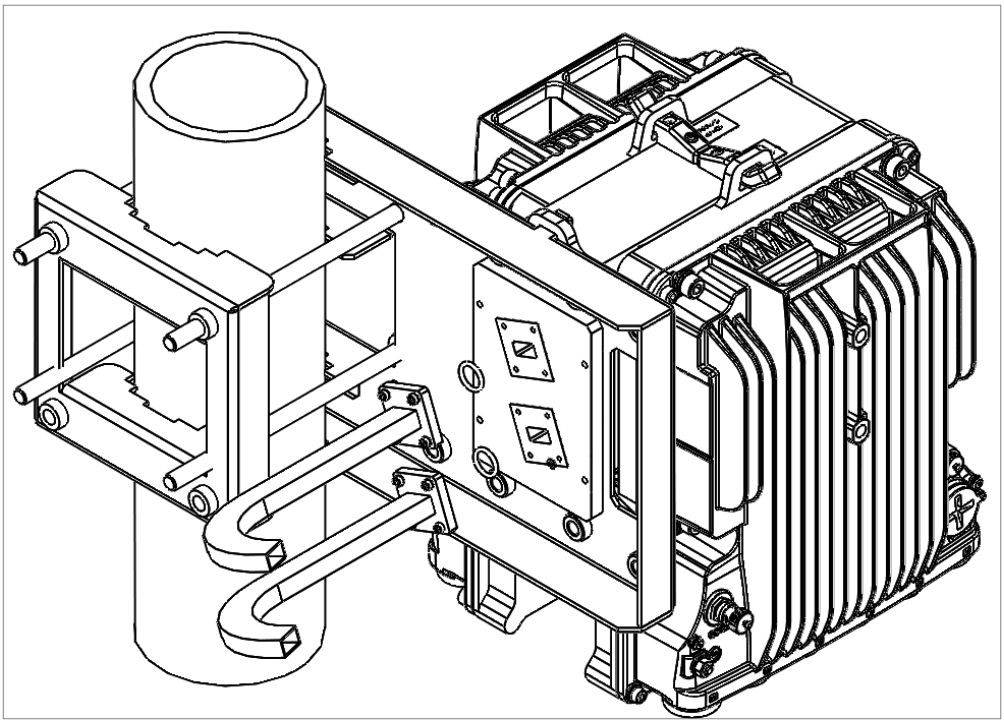
2. Mount and tighten the PTP 820C Dual Coupler to the PTP 820C Pole Mount using the four screws and washers that are supplied with the PTP 820C Dual Coupler kit. Pay attention that the O-rings are mounted on the PTP 820C Remote Mount Adaptor.



3. Mount and tighten the PTP 850C radios on each side of the PTP 820C Dual Coupler using the screws assembled on PTP 850C radio. Make sure that the O-rings are correctly assembled on the radio port of the PTP 820C dual coupler.

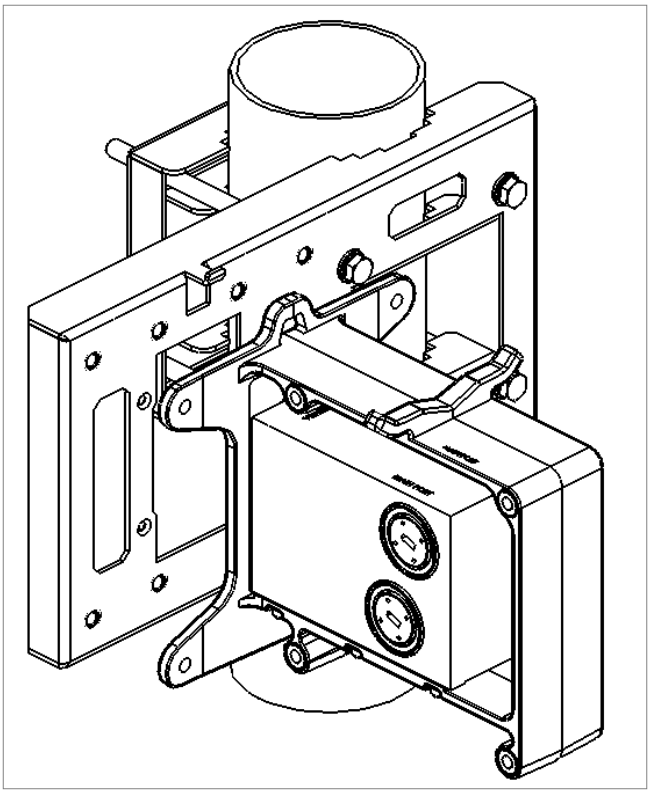


4. Connect both Flexible Waveguides and Sealing Gaskets supplied with each Flexible Waveguide Kit to the PTP 820C Dual Coupler antenna ports. Tighten the screws and washers supplied with the Flexible Waveguide Kit.

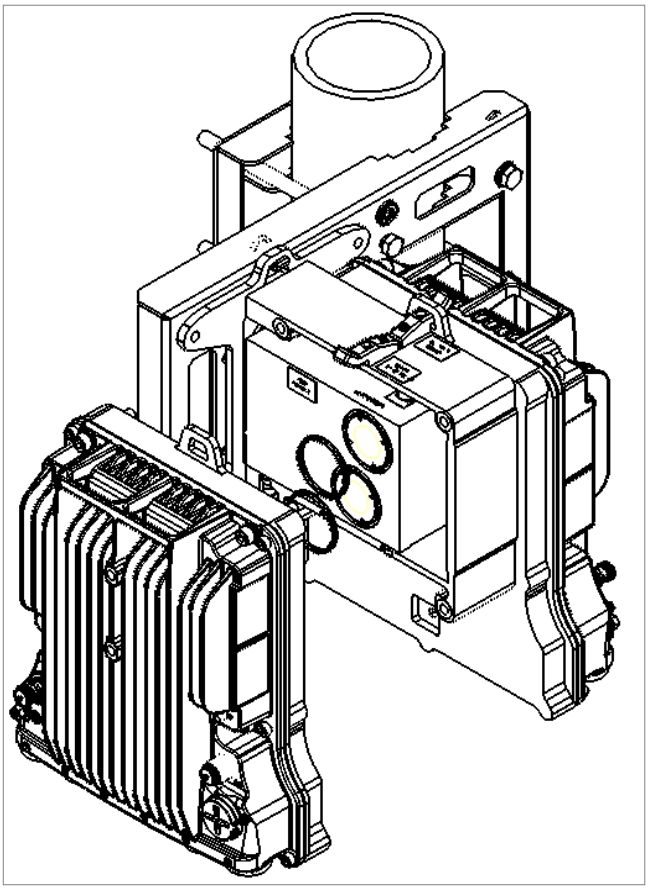


15-23 GHz

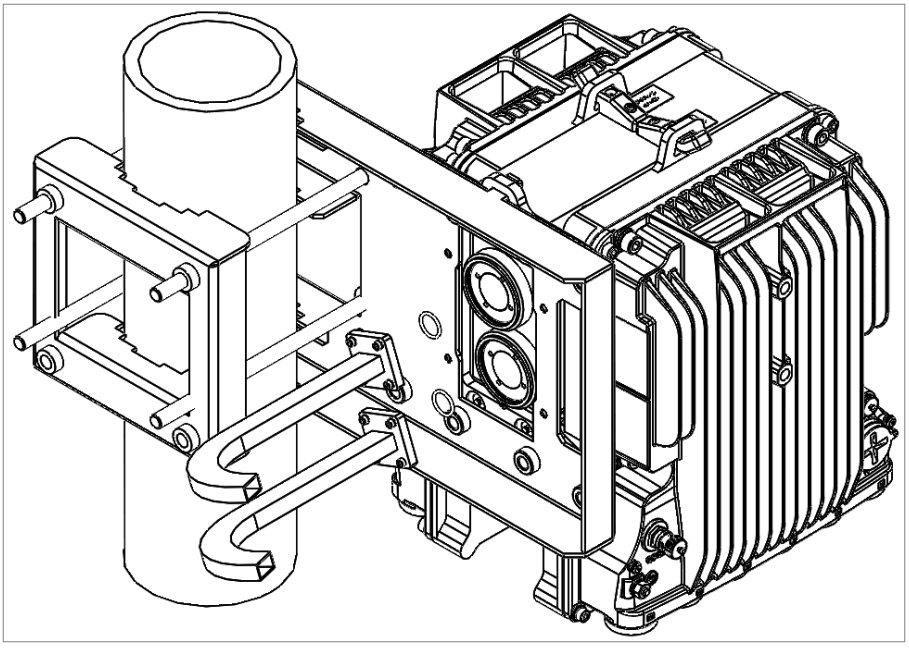
1. Mount and tighten the PTP 820C Dual Coupler to the PTP 820C DC Pole Mount using the four screws and washers supplied with the PTP 820C Dual Coupler kit.



2. Mount and tighten the PTP 850C radios on each side of the PTP 820C Dual Coupler using the screws assembled on the PTP 850C 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 antenna ports on the primary and diversity antennas 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.

AFR 1+0 Hub Site

In an AFR 1+0 configuration, a Multicore PTP 850C unit is deployed at the hub site and two PTP 850C units are deployed in two tail sites.

The hub site utilizes a single PTP 850C unit with two radio carriers. Each carrier is in a link, via its own directional antenna, with a tail site that consists of an PTP 850C 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	PTP 850C RADIO	1	
3	FLEXIBLE WG KIT	2	
4	PTP 820C DC POLE MOUNT KIT	1	
5	PTP 820C DC REMOTE MOUNT ADAPTOR KIT	1	13 GHz only
6	Circ./Circ. Adaptor	1	Per Antenna Vendor. Not used for standard interface antennas (six feet and larger).

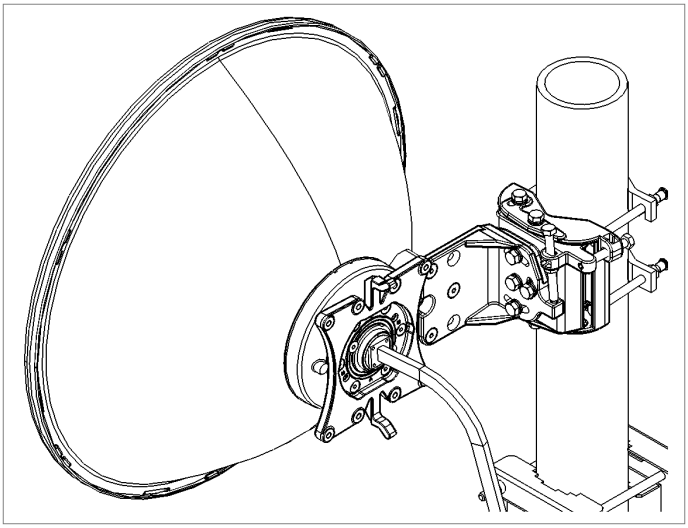
Required Tools

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

Procedure

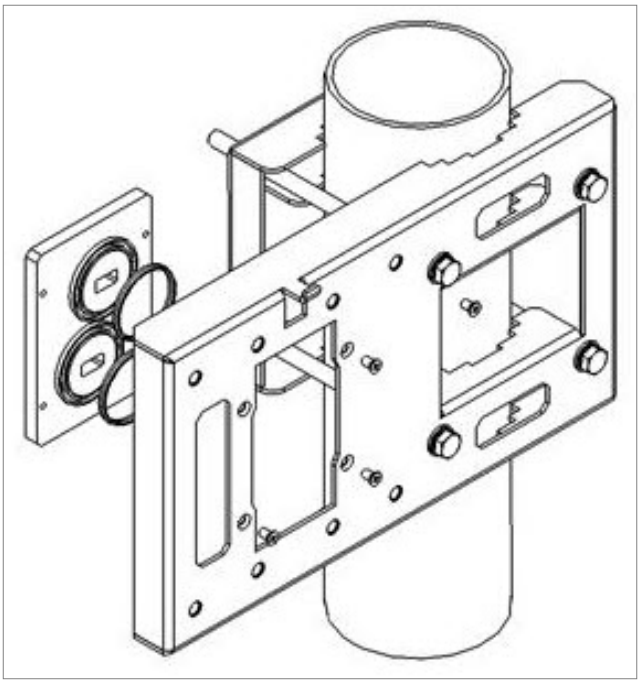
1. Prior to the installation, follow the antenna manufacturer's instructions to use the circular adaptor. (Remove the existing rectangular transition, swap the O-ring, and install the circular transition instead.)

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

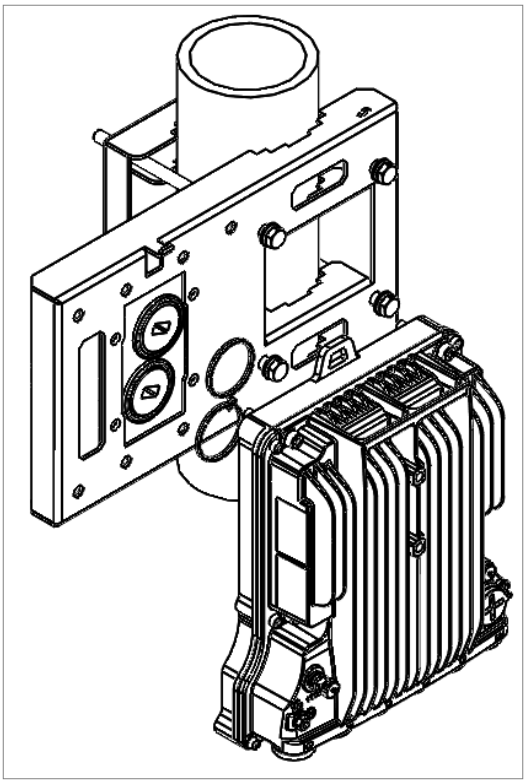


13 GHz

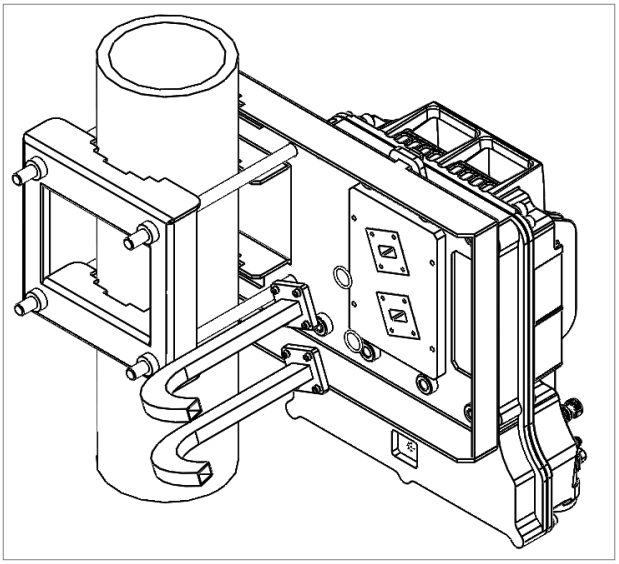
1. Mount and tighten the PTP 820C Remote Mount Adaptor plate (supplied in PTP 820C Adaptor Remote Mount kit) to the PTP 820C Pole Mount using the four flat screws supplied with the PTP 820C Adaptor Remote Mount kit.



2. Mount and tighten the PTP 850C to the PTP 820C Pole Mount using the four captive screws and washers that are supplied with the PTP 850C. Pay attention that the O-rings are mounted on the PTP 820C Remote Mount Adaptor.

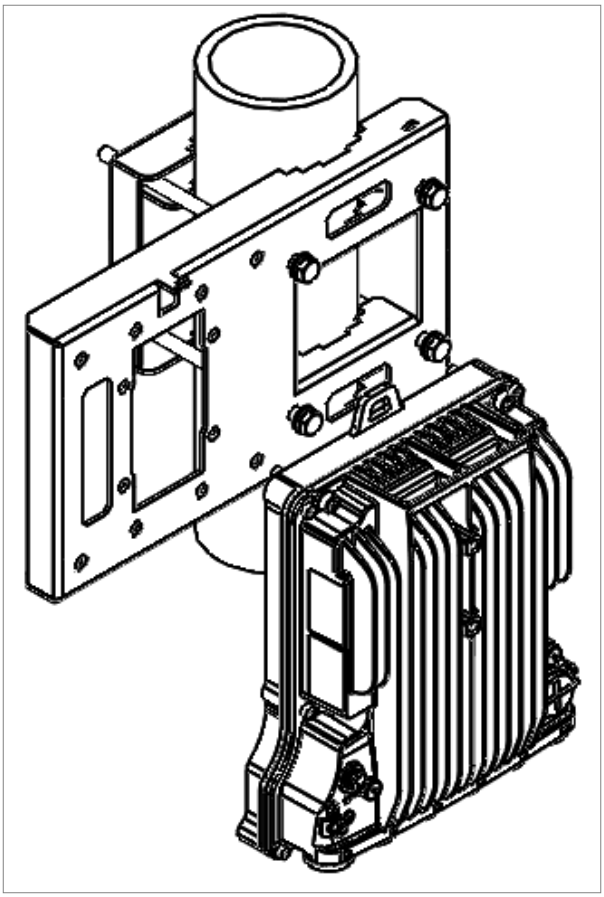


3. Mount and tighten both Flexible WGs with their O-ring to the PTP 820C Remote Mount Adaptor ports using the four screws supplied with each Flexible WG kit.

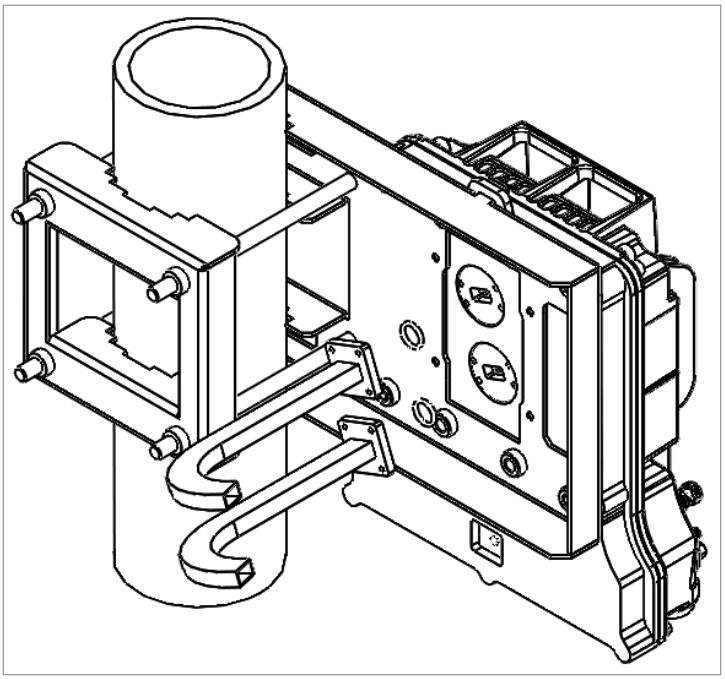


15-23 GHz

1. Mount and tighten the PTP 850C to the PTP 820C DC Pole Mount using the four screws assembled on the PTP 850C.



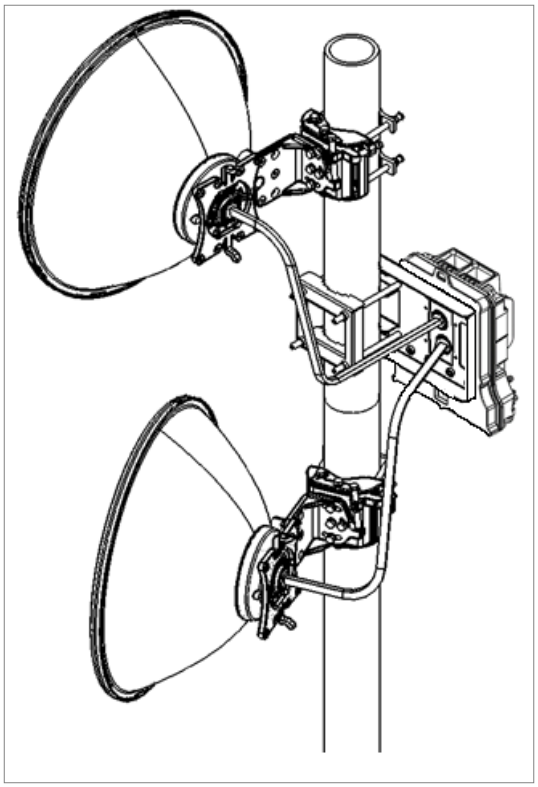
2. Mount and tighten the O-ring and the Flexible WG to PTP 850C radio ports using the four screws supplied with the Flexible WG kit.



Note:

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

The following figure shows the complete installation.



Multiband Configurations

Note:

For instructions on Multiband configurations with PTP 850E and PTP 850C (as attached unit), refer to the Installation Guide for PTP 850E.

PTP 850C can be used in Multiband Link Bonding configurations with PTP 850EX. A special Multiband antenna can be used for these configurations. This antenna transmits and receives both E-band and microwave signals. Both the PTP 850C and the PTP 850EX can be connected to this antenna via direct mount.

The marketing model for Multiband antennas uses the following syntax:

- Am-B3-d-ff/80-pl/ph-vn

Where:

- d – Size of the antenna (1 or 2 ft)
- ff – The microwave band (11, 13, 15, 18, 23, 28, etc.)
- pl – Interface of the microwave antenna
- SP – single polarization (rectangular interface)
- DP – dual polarization (circular interface)
- ph – Interface of the E-Band antenna:
- SP – single polarization (rectangular interface)
- DP – dual polarization (circular interface)
- vn – Antenna Vendor (MT: MTI, A: Commscope, RS: Rosenberger, etc.)

For example, the following marketing model applies to a 2-foot antenna for an 18 GHz Microwave radio together with an E-band device, where both radios are operating with Single Polarization. The manufacturer is MTI.

- Am-2-18/80-SP/SP-MT

For a full list of available Multiband antennas, refer to the Price List or check with your Cambium representative.

If the Multiband antenna is not used, the PTP 850C and PTP 850EX devices can be installed in ordinary 1+0 and/or 2+0 configurations, as described in this Installation Guide and the Installation Guide for PTP 850EX.

Multiband with PTP 850C with 2+0 Single Polarization and PTP 850EX

List of Items

Item	Description	Quantity	Remarks
1	Multiband Antenna	1	Optional.
2	PTP 850C Radio	1	
3	PTP 850EX Radio	1	
4	PTP 820C Splitter Kit	1	
5	Optical Cables for transmitting traffic and protocols between units	1 or 2	See Cables for Link Bonding Configurations. **Note**: If some configurations can use a single cable for traffic and protocols. For details, refer to the User Guide for the System Release release you are using.

Required Tools

The following tools are required for the installation:

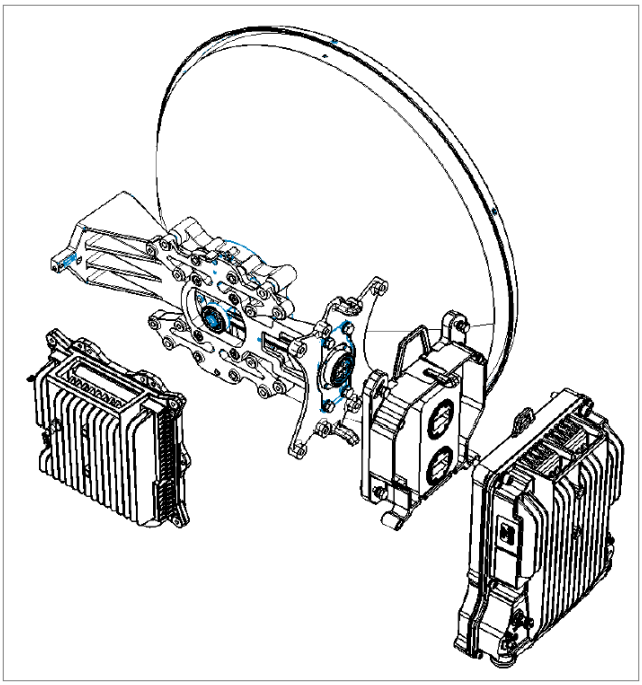
- Metric offset hexagon key set
- Phillips #1, #2 screwdriver

Procedure

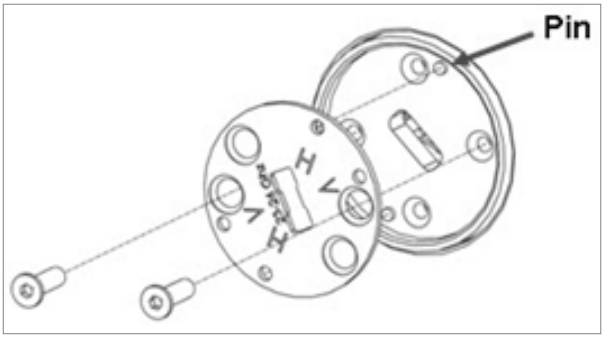
If you are not using a Multiband antenna, install the PTP 850C in an ordinary 2+0 single polarization configuration and install the PTP 850EX in an ordinary 1+0 configuration, as described in the Installation Guide for PTP 850EX.

Once you have installed the units, you must install special SFP transceivers, then Protocols and Traffic cables between the units. For instructions, start at Step 6. of this procedure.

1. Assemble the antenna according to the instructions provided with the antenna.
2. Install the PTP 850EX directly to the back of the antenna, as shown in the figure below.

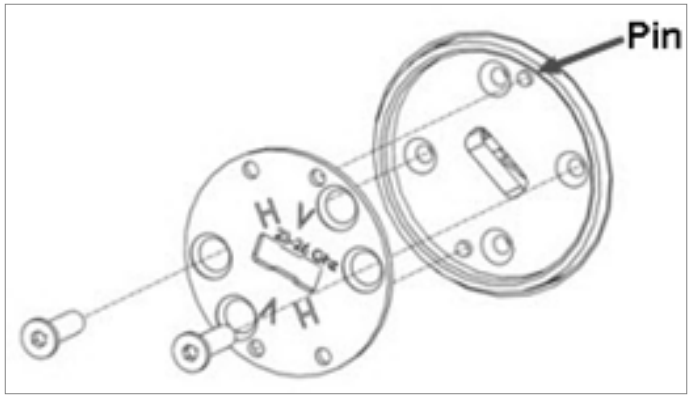


3. Adjust the twist on the PTP 820C Splitter Kit. Perform one of the following steps, according to the required polarization (horizontal or vertical).
    - For horizontal polarization, locate the holes above and below the letter “H” on the pins and fasten the two screws.

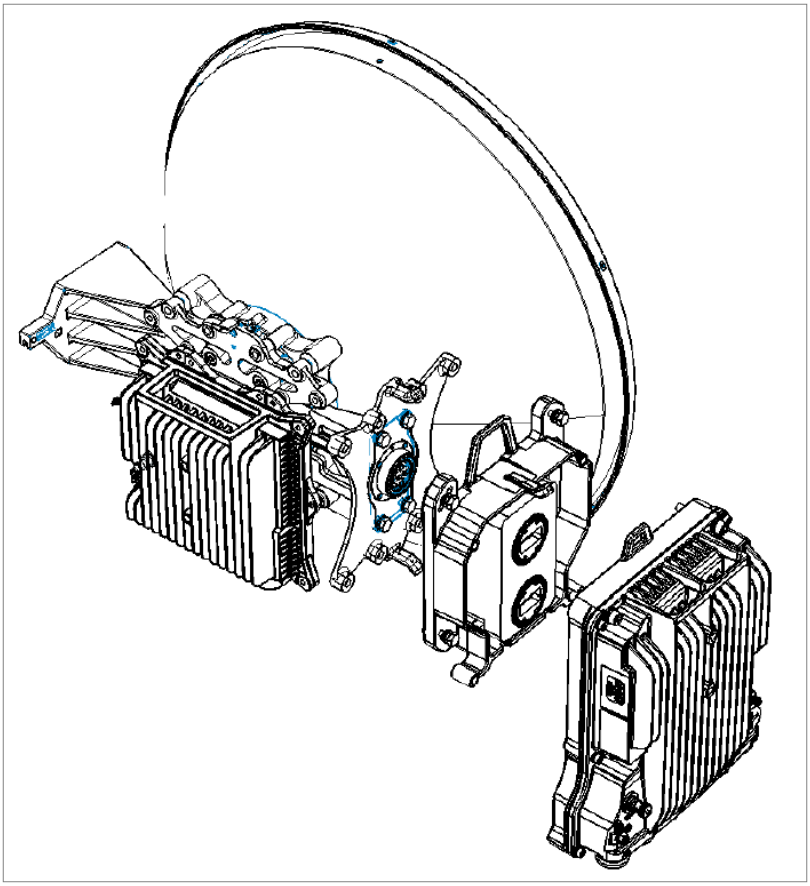


    - For vertical polarization, locate the holes above and below the letter “V” on the pins and fasten

the two screws.



4. Mount and tighten the PTP 820C Splitter Kit at a 90° angle to the antenna using the four M8 screws and washers.
5. Mount and tighten the PTP 850C radio to the PTP 820C Splitter Kit using the four M8 captive screws and washers supplied with the PTP 850C radio.



6. Connect Traffic cable between any two 10 Gbps ports on the PTP 850C and the PTP 850EX. Optionally, connect a separate Protocols cable between any two ports of 1 Gbps or higher. For details

on which configurations require a separate Protocols cable, refer to the User Guide for PTP 850C and PTP 850E. For a list of available cables, see Cables for Link Bonding Configurations.

Multiband with PTP 850E and PTP 850C with 2+0 Dual Polarization

List of Items

Item	Description	Quantity	Remarks
1	Multiband Antenna	1	Optional.
2	PTP 850E Radio	1	
3	PTP 850C Radio	1	
4	PTP 820C OMT Kit	1	
5	Optical Cables for transmitting traffic and protocols between units	1 or 2	See Cables for Link Bonding Configurations. Note that some configurations can use a single cable for traffic and protocols. For details, refer to the User Guide for the System Release release you are using.

Required Tools

The following tools are required for the installation:

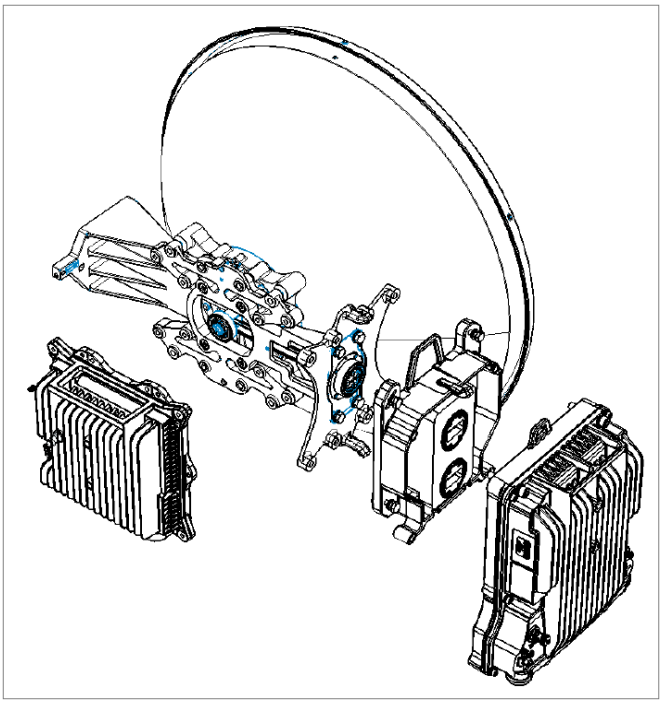
- Metric offset hexagon key set
- Phillips #1, #2 screwdriver

Procedure

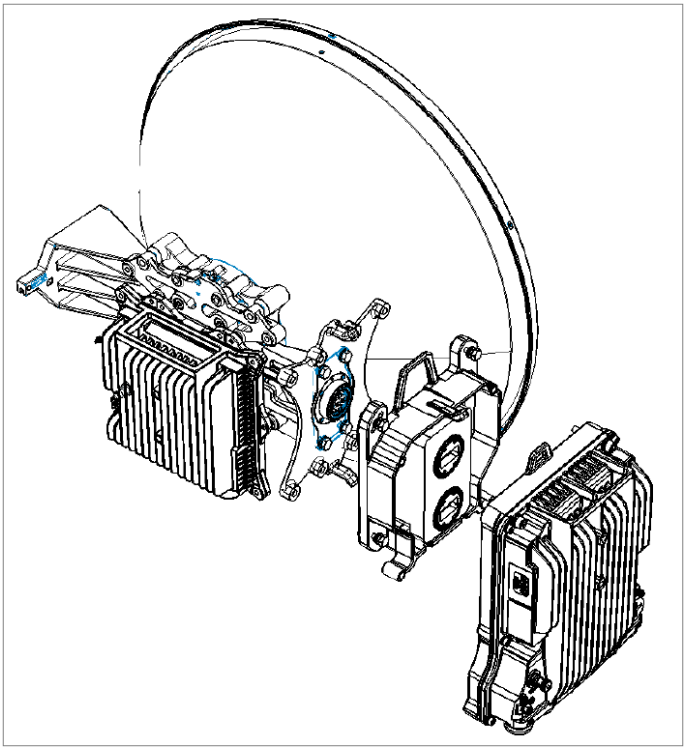
If you are not using a Multiband antenna, install the PTP 850C in an ordinary 2+0 dual polarization configuration and install the PTP 850EX in an ordinary 1+0 configuration, as described in the Installation Guide for PTP 850EX.

Once you have installed the units, you must install special SFP transceivers, then Protocols and Traffic cables between the units. For instructions, start at Step 5 of this procedure.

1. Assemble the antenna according to the instructions provided with the antenna.
2. Install the PTP 850E directly to the back of the antenna, as shown in the figure below. Use the procedure for PTP 850E 1+0 configurations, as described in the Installation Guide for PTP 850E.



3. Connect the PTP 820C OMT Kit to the antenna and secure it with four screws. Verify existence of the O-ring.
4. Mount and tighten the PTP 850C radio to the PTP 820C OMT Kit using the four M8 captive screws and washers supplied with the PTP 850C radio.



5. Connect Traffic cable between any two 10 Gbps ports on the PTP 850C and the PTP 850EX. Optionally, connect a separate Protocols cable between any two ports of 1 Gbps or higher. For details on which configurations require a separate Protocols cable, refer to the User Guide for PTP 850C and PTP 850E. For a list of available cables, see Table 26: Cables for Link Bonding.

Installing PTP 850C on Third-Party Antenna Adaptors

Since the PTP 850C uses the same antennas as PTP 820C and RFU-C, it can utilize the 3rd party mediation devices much in the same way they are used with PTP 820C and 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 cannot be accommodated with either RFU-C, PTP 820C, or PTP 850C.

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 polarization PTP 820C or RFU-C interface. From this moment forth it is ready for any subsequent PTP 850C configuration.

The following tables describe available adaptors:

Table 40: *3rd-Party Adaptors, 6 GHz – 15 GHz*

Other Vendors Antennas	13 GHz	15 GHz	18 GHz	23 GHz
RFU-C - NEC Adaptor kit (PASOLINK NEO)	ADPT_RFU-C13_15-NC_ANT		ADPT_RFU-C18_26-NEC_ANT	
RFU-C - ERICSSON Adaptor kit (RAU1)	ADPT_RFU-C13-ERCS_RAU1_ANT	ADPT_RFU-C15-ERCS_RAU1_ANT	ADPT_RFU-C18-ERCS_RAU1_ANT	ADPT_RFU-C23-26-ERCS_RAU1_ANT
RFU-C - ERICSSON Adaptor kit (RAU2)	ADPT_RFU-C13-ERCS_ANT	ADPT_RFU-C15-ERCS_ANT	ADPT_RFU-C18-ERCS_ANT	ADPT_RFU-C23-ERCS_ANT
RFU-C - SRAL (SIEMENS) Adaptor kit	MK-4162-0	MK-4163-0	ADPT_RFU-C18_26-SRAL_ANT	
RFU-C-NSN (Flexihopper) ADAPTOR KIT	ADPT_RFU-C13-N_ANT	ADPT_RFU-C15-N_ANT	ADPT_RFU-C18_26-N_ANT	
RFU-C - ALU Adapter Kit	ADPT_RFU-C13-ALU_Melody		ADPT_RFU-C18-ALU_Melody	
PTP 820C/S and RFU-C - Dragonwave Adapter Kit	ADPT-		ADPT-	ADPT-

Other Vendors Antennas	13 GHz	15 GHz	18 GHz	23 GHz
	CIRC-RFU-C_13-DW		CIRC-RFU-C_18-DW	CIRC-RFU-C_23-DW
Kit for converting a ValuLine 3 antenna for integration with RFU-C (ValuLine 3 antennas only). For important information on when these kits can be used, see Special Note on Converting ValuLine 3 Antennas.	VINTA-13-CR4	VINTA-15-CR4	VINTA-18-CR4	VINTA-23-CR4

Note:

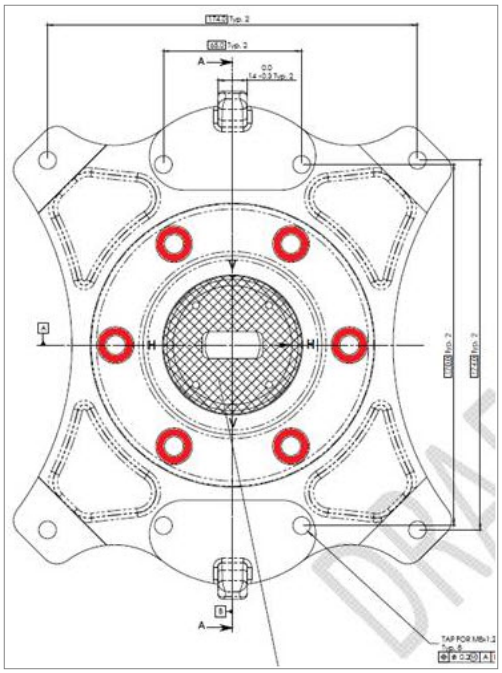
For instructions how to install these third-party adaptors, refer to the RFU-C Installation Guide.

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.



Special Procedure for FIPS-Compliant Installations

PTP 850C can be configured to be FIPS 140-3 level-2 compliant, in specific hardware and software configurations. For a full list of FIPS requirements, refer to the FIPS 140-3 Non-Proprietary Security Policy, available upon request.

Note:

Only certain System Release versions support FIPS. For details, refer to the Release Notes for the System Release version you are using.

It is the responsibility of the user to ensure that the above FIPS requirements are met.

For an PTP 850C node to be FIPS-compliant, the unit must be FIPS-compliant hardware. A FIPS-compliant PTP 850C unit has a unique marketing model ending in the letters AF, in the following format:

- PTP 850C-***-AF

Three special labels, included with the PTP 850C radio kit, must be affixed to a FIPS-compliant PTP 850C unit once the diplexer unit has been attached to the radio unit. These labels are tamper-evident and must be applied in such a way that it is not possible to remove the diplexer unit from the radio unit without also removing a label and leaving evidence that the label was tampered with. The labels must be replaced if the radio or diplexer is replaced. Replacement labels can be ordered from Cambium Networks, part number BS-0341-2. Tamper-evident labels should be inspected for integrity at least once every six months.

Figure 34 *Applying Tamper-Evident FIPS Labels – PTP 850C – Left Side*

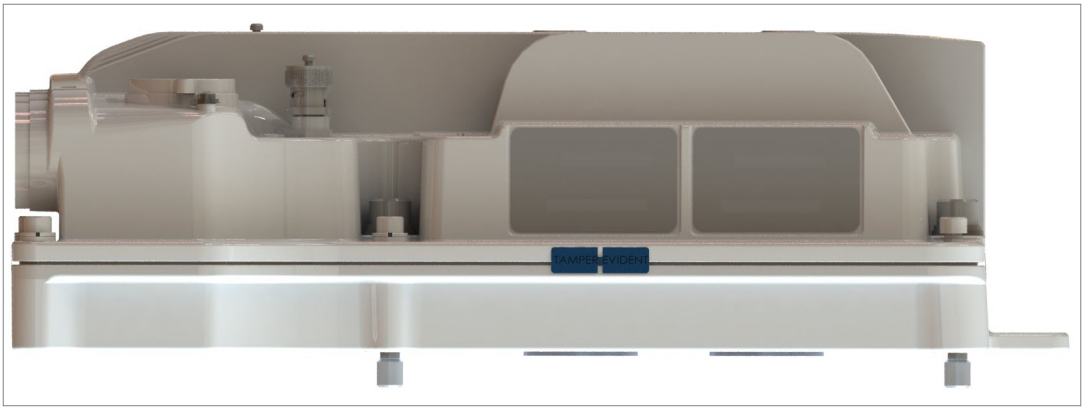
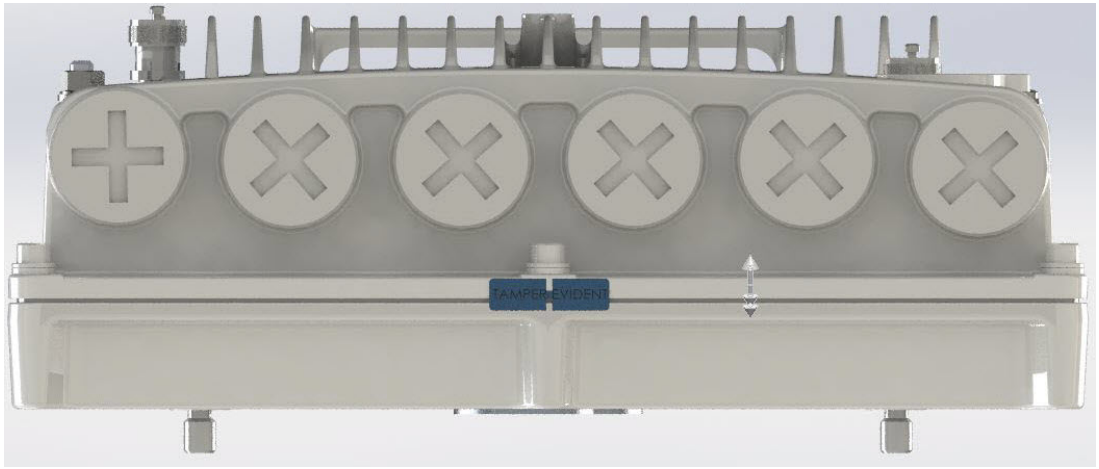


Figure 35 *Applying Tamper-Evident FIPS Labels – PTP 850C – Top*

Figure 36 *Applying Tamper-Evident FIPS Labels – PTP 850C – Bottom*



When applying a FIPS label, make sure to follow these guidelines:

- Use caution to avoid touching the adhesive in such a way as to leave fingerprints and damage the labels.
- The curing time (drying time) for the labels is at least sixty minutes.
- When replacing a label, gently cut the label, replace the module, and apply a new label in place of the previous label.

Appendix A: Acceptance & Commissioning Procedures

This chapter provides Cambium's recommended Acceptance and Commissioning Procedure for PTP 850C. Acceptance and commissioning should be performed after initial setup is complete.

The purpose of this procedure is to verify correct installation and operation of the installed link and the interoperability with customer end equipment.

Cambium's Acceptance and Commissioning procedure includes the following stages:

- Site Acceptance Procedure
- Commissioning of Radio Link

The Site Acceptance Procedure is a checklist that summarizes the installation requirements of the site at which the products were installed.

The commissioning tests cover the required configuration information that should be recorded, and the tests that should be performed on the radio link.

Site Acceptance Procedure

The purpose of the following procedures is to verify that all installation requirements were noted and checked. Following this procedure will ensure proper, long-lasting, and safe operation of the product.

The checklist below summarizes the installation requirements of the site.

SITE ACCEPTANCE CHECKLIST	
1. SITE INFORMATION	
Customer:	
Radio model:	
Site name:	
Site code:	
Radio link code:	
Site address:	
2. ANTENNA MOUNTING	
Antenna mount type:	
Mount is of sufficient height to clear local obstructions	OK
Mount is safely positioned to not cause a safety hazard	OK
Mount is secure and perpendicular	OK

SITE ACCEPTANCE CHECKLIST	
Mount is grounded as per site specifications	OK
All steelwork is Galvanized or Stainless Steel as appropriate	OK
3. ANTENNA	
Antenna type (model and size):	
Antenna is securely fixed to mount	OK
Antenna is grounded as per site specifications	OK
Antenna sway braces are installed correctly (where applicable)	OK
Antenna Radome is securely fitted (where applicable)	OK
Water drain plugs are fitted and removed, as appropriate	OK
Antenna sealing O-Ring is properly fitted and not damaged	OK
Antenna/Launch unit polarization is as per link requirements	OK
4. OUTDOOR UNIT	
Type of ODU mount:	(Direct or Remote mount)
ODU is securely mounted to the antenna or pole	OK
ODU is grounded as per installation instructions	OK
ODU's polarization is as per link requirements	OK
ODU is installed properly and has no physical damage	OK
For Remote-Mount Only:	
Remote mount kit is securely mounted to the pole	OK
Flexible waveguide has no physical damage and connectors are sealed	OK
All flexible waveguide bolts are secured using washers and lock-washers, as appropriate	OK
Flexible waveguide is secured to the pole	OK
6. CAT5/Fiber Optic CABLE	
Overall cable length:	
Cable type:	
CAT5 connectors assembled properly on the cable	OK
Cable connected securely to ODU and IDU	OK
Cable connector is covered by gland and secure by cable tie at the ODU	OK

SITE ACCEPTANCE CHECKLIST	
At the ODU, cable has a service/drip loop to prevent moisture from entering the connector	OK
Cable is secured using suitable restraints to fixed points at regular intervals (0.5 m recommended)	OK
Cable has no sharp bends, kinks, or crushed areas. All bends are per manufacturer specifications	OK
Grounding is as per site specifications	OK
Cable point-of-entry to building/shelter is weather-proof	OK
Cable ends are properly labeled	OK
7. FLEXIBLE WAVEGUIDE	
Overall flexible WG length:	
Flexible WG type:	
Flexible WG is connected securely to ODU and Antenna	OK
Flexible WG connector is weather-proofed (sealed) at the ODU	OK
At the ODU, the flexible WG has a service/drip loop to prevent moisture from entering the connector	OK
Flexible WG is secured using suitable restraints to fixed points at regular intervals (0.5 m recommended)	OK
Flexible WG has no sharp bends, kinks, or crushed areas. All bends are per manufacturer specifications	OK
Flexible WG point-of-entry to building/shelter is weather-proof	OK
Flexible WG ends are properly labeled	
8. DC POWER SUPPLY - Two Inputs	
Measured DC voltage input to the IDU:OK	(-40.5 to -60 VDC)
Power-Supply maximum current:	
Power-Supply is properly grounded	OK
DC power backup type:	
IDU DC connector is secure and the DC input leads are correctly terminated (no bare wires are visible)	OK
IDU DC connector (+) and (GND) leads are shorted and GND is grounded	OK
9. RACK INSTALLATION	

SITE ACCEPTANCE CHECKLIST	
Rack is mounted to the shelter floor with four screws	
Rack is mounted to the shelter wall with two screws	
10. REMARKS/NOTES	
11. GENERAL INFORMATION	Name:
Site accepted by:	Title:
	Company:
	Signature:
	Date:
Site approved by:	Name:
	Title:
	Company:
	Signature:
	Date:

Site Acceptance Checklist Notes

The following notes provide important additional information about the Site Acceptance Checklist.

1. Antenna Mounting
    - Mounting pole is of sufficient height to clear local obstructions, such as parapets, window cleaning gantries, and lift housings.
    - Mounting Pole is of sufficient height, and is safely positioned, so as not to cause a safety hazard. No person should be able to walk in front of, or look directly into the path of the microwave radio beam. Where possible, the pole should be away from the edge of the building.
    - Mounting pole is secure and perpendicular. A pole that is not perpendicular may cause problems during antenna alignment.
    - Mounting pole is grounded as per site specifications. All operators and site owners have specific requirements regarding the grounding of installations. As a minimum, typical requirements are such that any metal structure must be connected to the existing lightning protection ground of the building. Where it extends beyond the 45 degree cone of protection of existing lightning

conductors, additional lightning protectors should be installed.

- All steelwork is Galvanized or Stainless Steel, as appropriate to prevent corrosion.

2. Antenna
    - Antenna is grounded as per site specifications. See the third point in the Antenna Mounting section above.
    - Antenna sway braces are fitted and installed correctly, where applicable. Typically, for an antenna of 1.2 m or larger, an extra sway brace is fitted to the mounting frame of the antenna. This sway brace should not be mounted to the same pole as the antenna, but should be installed directly back to the tower or an alternative point.
    - Antenna Water Drain Plugs are fitted and removed, where appropriate. Some antennas have moisture drain plugs installed at various points around the antenna. The purpose of these plugs is to allow any moisture that forms on the inside of the antenna or radome to drip out and prevent a pool within the antenna. Only the plugs at the bottom of the antenna, after installation, should be removed. All other plugs should be left in position.
3. ODU (Outdoor Unit)
    - The ODU is grounded as per installation instructions. See the third point in the Antenna Mounting section above.
    - The ODU polarization is as per link requirements and matches the polarization of the antenna.
    - The main traffic connections are correctly terminated and crimped as per cable and connector manufacturer instructions. All fiber optic patch leads should be routed carefully and efficiently, using conduits to prevent damage to the cables.
    - All other user terminations are secure and correctly terminated.
    - All labeling is complete as per site requirements. Labeling is specific to each customer. At a site with only one installation, labeling may be unnecessary. However, at sites with multiple installations, correct and adequate labeling is essential for future maintenance operations.

Typical labeling requirements include:

Antenna labels - for link identity and bearing

ODU labels - for link identity, frequency, and polarization

Cat5/Fiber cable labels - for link identity, close to the ODU, switch, and either end of any joint

Switch labels - for link identity

Radio Link Commissioning Procedure

Scope

This section describes the recommended commissioning tests for PTP 850C radio link in a 1+0 configuration.

The purpose of the commissioning tests is to verify correct and proper operation of the product.

Commissioning Test

The following tests should be performed on each installed link.

Link Verification

- Received Signal Level (RSL) is up to +/- 4 dB from the expected (calculated) level at both ends of the link.

Note:

The voltage at the BNC port is 1.XX where XX is the RSL level. For example: 1.59V means an RSL of -59 dBm. Note that the voltage measured at the BNC port is not accurate and should be used only as an aid).

- Radio Bit Error Rate (BER) is $10E^{-11}$ or lower.
- If working with ATPC, ATPC is operating as expected (RSL = reference level).

Ethernet Line Interfaces Test

- Connect Ethernet Packet Analyzer to the GbE port. Use physical loop at remote end (or connect second analyzer). Run Packet Loss test for at least one hour (load rate as per Cambium's specifications for the chosen MRMC).
- Connect Ethernet Packet Analyzer to the FE port. Use physical loop at remote end (or connect second analyzer). Run Packet Loss test for at least one hour (load rate as per Cambium's specifications for the chosen MRMC).

Interoperability Verification

- Connect customer end equipment to the line interfaces, and verify correct operation.
- Further interoperability tests should be performed in accordance with the specific requirements of the connected end equipment.

Management Verification

- Launch the HTTP management and verify that you can manage the link and that you are able to perform changes to the link configuration (frequency channel, Tx power, system name, time & date, etc.)
- Verify that correct parameters are reported when performing the above.
- Verify that there are no active alarms on the link.
- If the management station is located at a remote site (Network Operation Center), verify that the management station can manage the link and receive traps.

PTP 850C Commissioning Log

The Commissioning Log is an integral part of the commissioning procedure and should be filled in for each installed link.

The Commissioning Log gathers all relevant information regarding the installed link and contains a checklist of all recommended commissioning tests.

Maintaining the Commissioning Log is important for tracking your installations, and to provide essential data for Cambium Networks.

Upon completing the Commissioning Log, send the log to Cambium support center at support@Cambium.com.

PTP 850C LINK COMMISSIONING LOG		
1. GENERAL INFORMATION		
Customer:		
Radio model:		
Configuration:		
Radio link code:		
Site 1 name & add:		
Site 2 name & add:		
2. ODU/RFU	Site 1	Site 2
ODU model:		
ODU p/n:		
ODU s/n:		
ODU SW:		
Tx frequency (MHz):		
Rx frequency (MHz):		
Link ID:		
Tx power (dBm):		
ATPC on/off:		
ATPC ref level:		
ODU Polarization:		
3. ANTENNA AND ODU MOUNT		
Antenna vendor and model:		

PTP 850C LINK COMMISSIONING LOG		
Antenna size:		
Mounting type:		
Mounting losses:		
4. LINK PARAMETERS		
Link distance:		
Rain zone:		
Expected RSL (dBm):		
Expected Diversity RSL (dBm):		
RSL Main (dBm):		
RSL Diversity (dBm):		
Deviation from exp?		
RSL ≤4 dB?		
5. COMMISSIONING TESTS		
Line loopback:	Pass	Pass
ODU loopback:	Pass	Pass
Radio BER:	Pass	Pass
FE test:	Pass	Pass
GbE test:	Pass	Pass
6. MANAGEMENT CONFIGURATION		
Eth IP Address:		
Eth IP mask:		
Default router:		
In-band VLAN		
7. REMARKS/NOTES		
8. INSTALLATION INFORMATION		

PTP 850C LINK COMMISSIONING LOG		
Installed by:	Name:	
	Company:	
	Signature:	
	Date:	
Commissioned by:	Name:	
	Company:	
	Signature:	
	Date:	

Cambium Networks

Cambium Networks delivers wireless communications that work for businesses, communities, and cities worldwide. Millions of our radios are deployed to connect people, places, and things with a unified wireless fabric that spans multiple standards and frequencies of fixed wireless and Wi-Fi, all managed centrally via the cloud. Our multi-gigabit wireless fabric offers a compelling value proposition over traditional fiber and alternative wireless solutions. We work with our Cambium certified Connected Partners to deliver purpose built networks for service provider, enterprise, industrial, and government connectivity solutions in urban, suburban, and rural environments, with wireless that just works.

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Technical training	https://learning.cambiumnetworks.com/learn
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