Cambium Networks™

INSTALLATION GUIDE

PTP RFU-SX

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.
- RFU-SX is intended for installation in a restricted access location.
- RFU-SX 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 RFU-SX:

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

Note:

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 RFU-SX, 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 RFU-SX 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 RFU-SX 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 RFU-SX 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.

RFU-SX Overview

Note:

For information on feature availability, refer to the Release Notes for the System Release version you are using.

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

With RFU-SX, traffic capacity throughput and spectral efficiency are optimized with the desired channel bandwidth. For maximum user choice flexibility, channel bandwidths from 7-112 MHz can be selected together with a range of modulations. RFU-SX provides a range of modulations from BPSK to 4096 QAM.

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

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

RFU-SX Interfaces

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

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

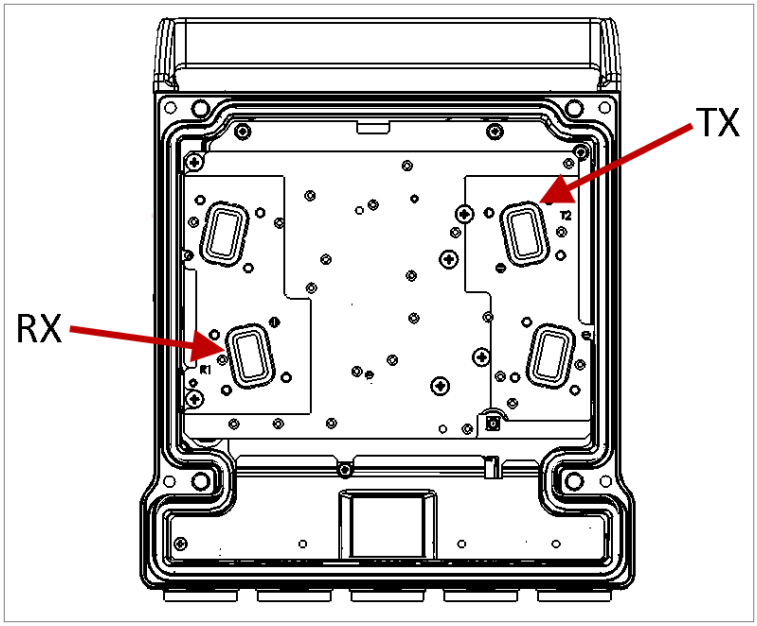


Figure 2: *RFU-SX Rear View (Left) and Front View (Right)*

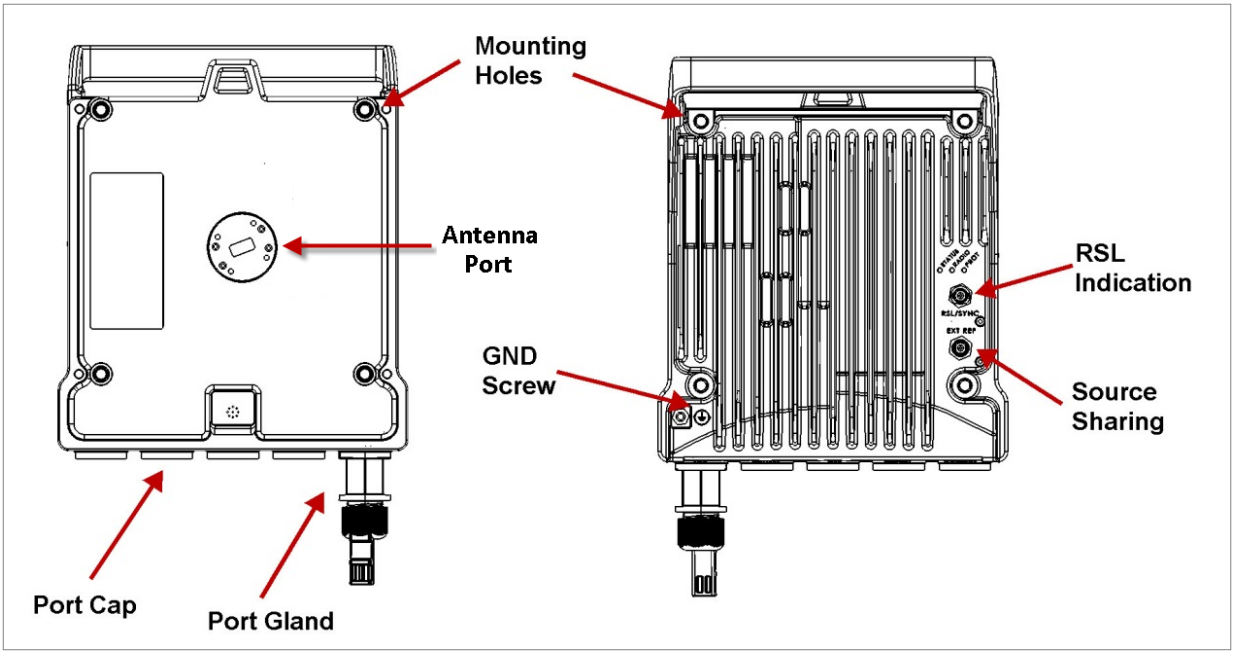
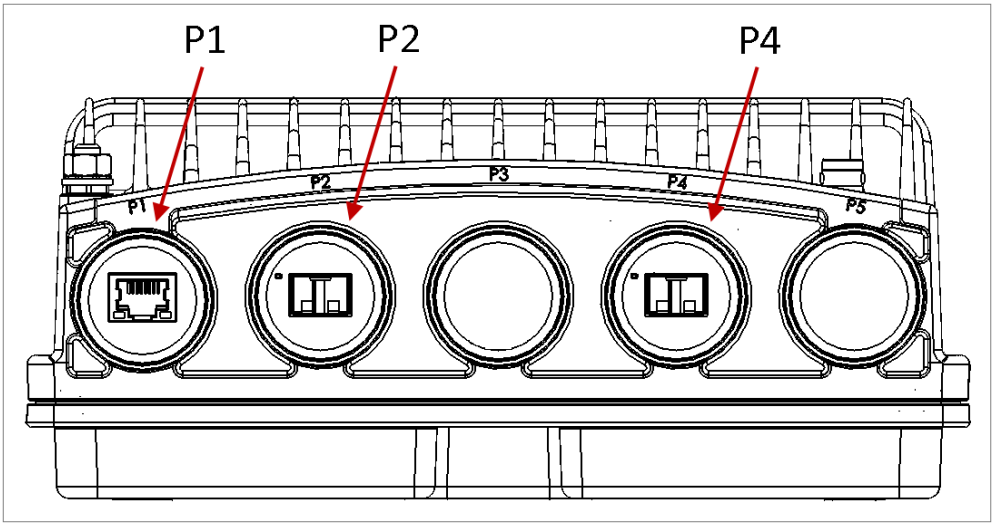


Figure 3: *RFU-SX Interfaces (All Frequency Bands)*



Note:

The voltage at the RSL 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 RSL port is not accurate and should be used only as an aid).

Table 1 *RFU-SX Interfaces*

Interface	Description
P1	PoE / RFU Interface (RJ-45)

Interface	Description
P2	RFU Interface (SFP)
P4	Data Sharing port for XPIC configurations

RFU-SX Marketing Models

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

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

This section explains how to read RFU-SX marketing models, including marketing models for the diplexer unit for 6-15 GHz links. Constructing a marketing model for the purpose of ordering equipment should always be done using a configurator.

Note:

Not all marketing model 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 RFU-SX Radio and Diplexer Units, 6 to 15 GHz

For frequencies of 6 to 15 GHz, the RFU-SX radio unit and diplexer unit are ordered separately. Using Easy Set technology, the diplexer unit is assembled on the RFU-SX 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.

Table 2 provides the marketing model structure for the RFU-SX Easy Set radio unit.

Table 3 provides the marketing model structure for the RFU-SX Easy Set diplexer unit.

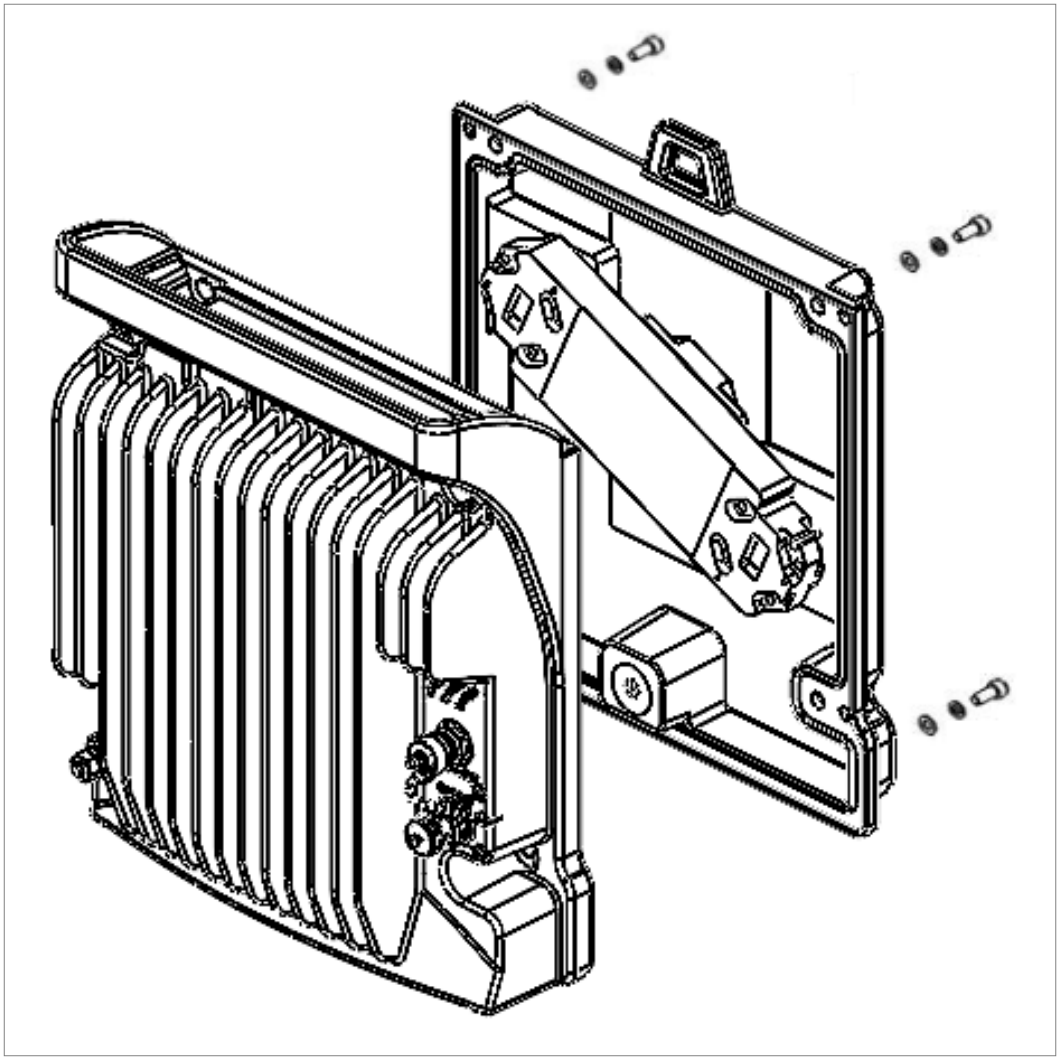
Table 2 *RFU-SX Marketing Model Structure, 6 to 15 GHz (Radio Unit)*

Marketing Model	Description
RFU-SX-ff	RFU-SX, High capacity, Split Mount Radio only, ff GHz

Table 3 *RFU-SX Marketing Model Structure, 6 to 15 GHz (Diplexer Unit)*

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

Figure 4: *Radio Unit and Diplexer Unit*



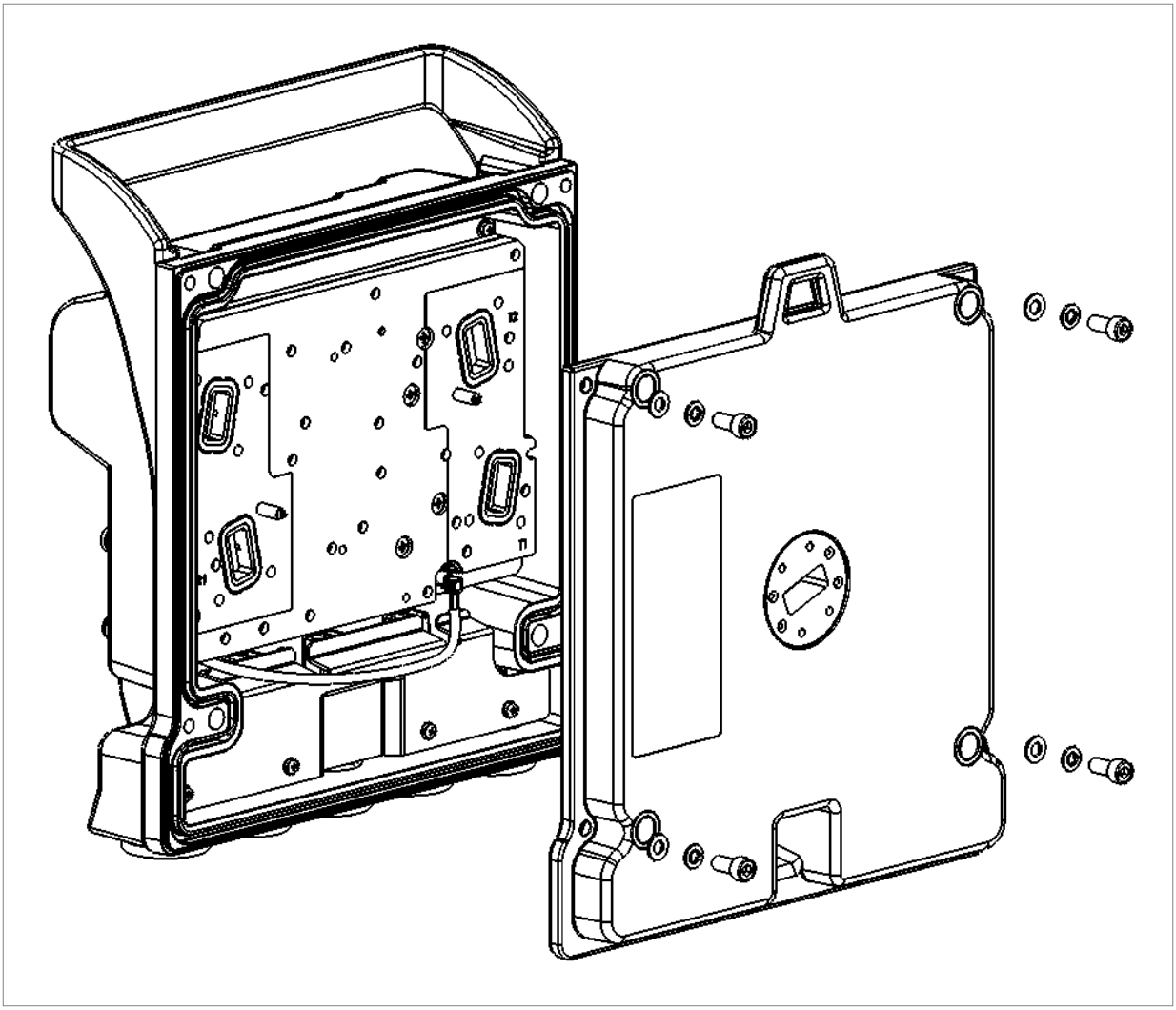


Table 4 *RFU-SX Marketing Model Structure– Possible Values (Easy Set - Radio Unit Only)*

Placeholder in Marketing Model	Description	Possible Values
ff	Frequency band	06,07,08,10,11,13,15

Table 5 *RFU-SX Marketing Model Structure– Possible Values (Easy Set - Diplexer Unit Only)*

Placeholder in Marketing Model	Description	Possible Values
ff	Frequency band	L6,U6,07,08,10,11,13,15
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

Placeholder in Marketing Model	Description	Possible Values
		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 6 provides examples of specific RFU-SX diplexer unit marketing models based on the syntax described above.

Table 6 *RFU-SX Diplexer Unit Marketing Model Examples*

Marketing Model Example	Explanation
DXRSX08-119A-01W03-L	RFU-SX Diplexers Unit, 8GHz, TRS=119MHz, channels 1 to 3, TX low

Marketing Model for RFU-SX Unit, 18-38 GHz

When ordering an RFU-SX, a single unit is ordered according to the following marketing model syntax: *RFU-SX-ff-xxxY-ccWdd-t*.

Table 7 *RFU-SX Marketing Model Structure,18 to 38 GHz*

Marketing Model	Description
RFU-SX-ff-xxxY-ccWdd-t	RFU-SX, High Capacity, Split Mount Radio, ff GHz, Block xxxY, ccWdd, High/Low

Table 8 *RFU-SX Marketing Model Structure– Possible Values*

Placeholder in Marketing Model	Description	Possible Values
ff	Frequency band	18, 23, 24, 26, 28, 32, 36, 38, 42
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	L – TX Low

Placeholder in Marketing Model	Description	Possible Values
	indication	H – TX high

The following are some examples of specific RFU-SX 18 to 38 GHz marketing models based on the syntax specified above.

Table 9 *RFU-SX Marketing Model Examples (18-38 GHz)*

Marketing Model Example	Explanation
RFU-SX-08-119A-01W03-L	RFU-SX Diplexers Unit, 8GHz, TRS=119MHz, two identical Diplexers Uniting channels 1 to 3, TX low

System Components

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

Note:

The availability of the installation components follows the RFU-SX 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.

In many cases, RFU-SX uses the same components as PTP 820S and RFU-C, and the names and marketing models for these components are the same.

Figure 5: *RFU-SX*

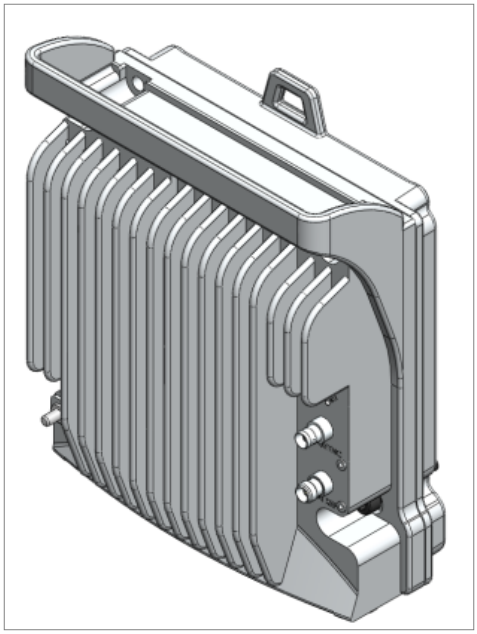


Figure 6: *Coupler/Splitter*

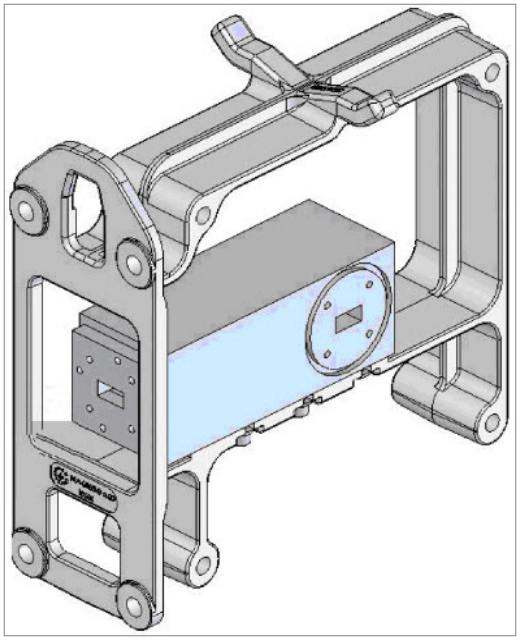


Figure 7: *OMT*

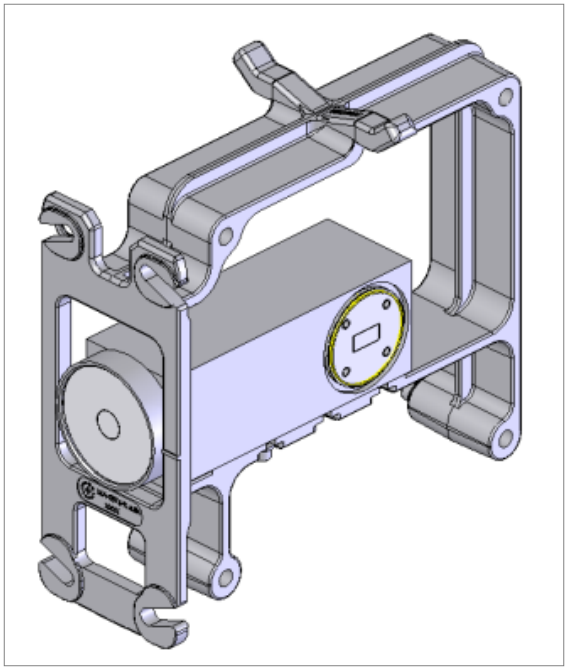


Figure 8: *Remote Pole Mount*

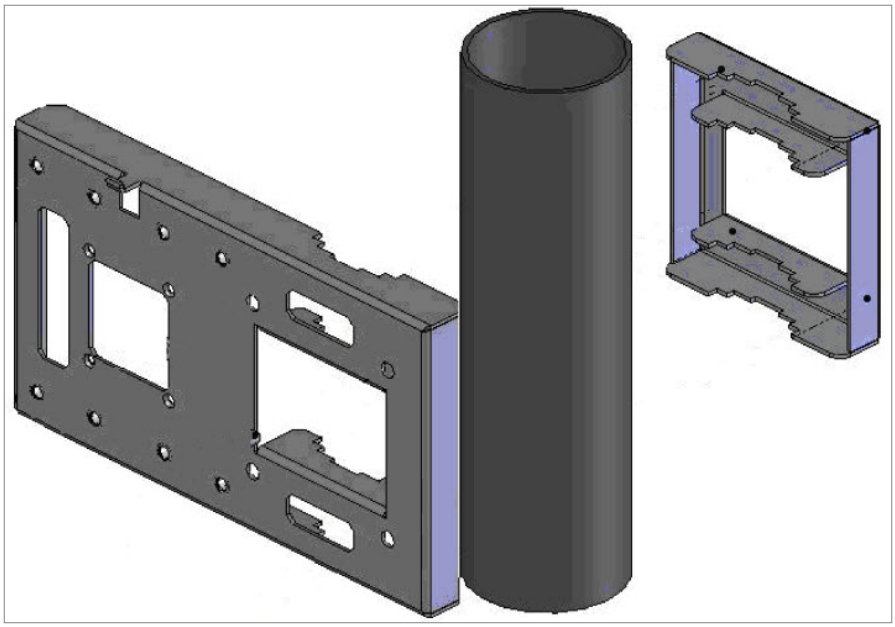


Figure 9: *Remote Dual Pole Remote Mount*

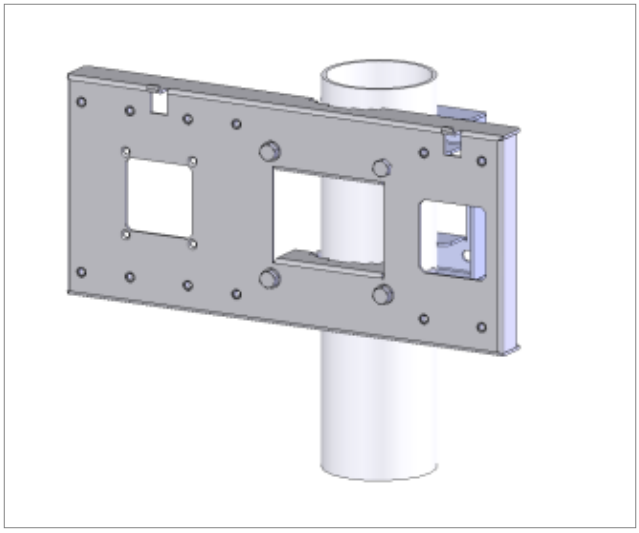
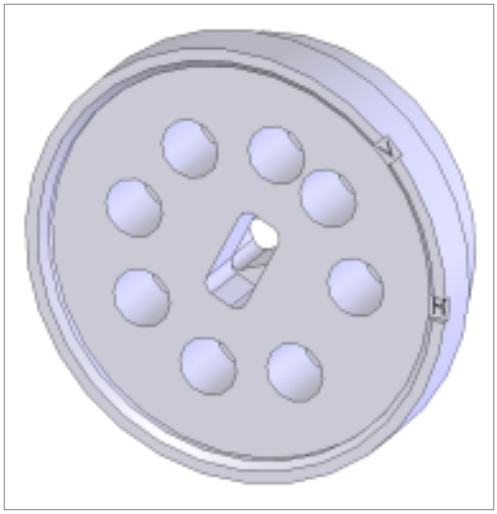


Figure 10: *Twist*



Adaptors and Installation Kits

Description	6 GHz	7-8 GHz	10-11 GHz	13 GHz	15 GHz	18 GHz	23 GHz	26 GHz	28-31 GHz	32 GHz	38 GHz
RFU-C Coupler kit	RFU-C6-CPLR-Kit	RFU-C7_8-CPLR-Kit	RFU-C10_11-CPLR-Kit	RFU-C13-CPLR-Kit	RFU-C15-CPLR-Kit	RFU-C18-CPLR-Kit	RFU-C23-CPLR-Kit		RFU-C26-CPLR-Kit		

Description	6 GHz	7-8 GHz	10-11 GHz	13 GHz	15 GHz		18 GHz	23 GHz	26 GHz	28-31 GHz	32 GHz	38 GHz
RFU-C Splitter (Symmetrical Coupler) Kit	RFU-C6-Sym-cplr-kit	RFU-C7_8-Sym-cplr-kit	RFU-C10_11-Sym-cplr-kit	RFU-C13-Sym-cplr-kit	RFU-C15-Sym-cplr-kit		RFU-C18-Sym-cplr-kit	RFU-C23-Sym-cplr-kit		RFU-C26-Sym-cplr-kit		
RFU-C Twist kit	RFU-C6-TWST-Kit	RFU-C7_8-TWST-Kit	RFU-C10_11-TWST-Kit	RFU-C13-TWST-Kit	RFU-C15-TWST-Kit		RFU-C18-TWST-Kit	RFU-C23_26-TWST-Kit		RFU-C28_32-TWST-Kit		RFU-C38-TWST-Kit
RFU-C OMT kit	RFU-C6-OMT-DM-Kit	RFU-C7_8-OMT-DM-Kit	RFU-C10_11-OMT-DM-Kit	RFU-C13-OMT-DM-Kit	RFU-C15-OMT-DM-Kit		RFU-C18-OMT-DM-Kit	RFU-C23-OMT-DM-Kit	RFU-C26-OMT-DM-Kit	RFU-C28-OMT-DM-Kit	RFU-C32-OMT-DM-Kit	RFU-C38-OMT-DM-Kit
RFU-C Adaptors OMT kit	RFU-C6-OMT-ADAPT	RFU-C7_8-OMT-ADAPT	RFU-C10_11-OMT-ADAPT	NA								
RFU-C Short OMT kit	RFU-C-OMT-SHORT-PLATE											
Remote Mount												
RFU-C Pole Mount kit	RFU-C-PoleMount											
RFU-C	RFU-C6-	RFU-	RFU-	RF								

Description	6 GHz	7-8 GHz	10-11 GHz	13 GHz	15 GHz		18 GHz	23 GHz	26 GHz	28-31 GHz	32 GHz	38 GHz
Adaptor Remote Mount kit	RM_ ADAPT	C7_8-RM_ ADAPT	C10_11-RM_ ADAPT	U-C13-RM_ ADAPT								
RFU-C WG kit (metric)	Flx-WG-4FT-6	Flx-WG-4FT-7_8	Flx-WG-4FT-10_11	Flx-WG-3FT-13	Flx-WG-3FT-15	Flx-WG-3FT-18-26				Flx-WG-3FT-28-38		
RFU-C WG kit (imperial)	WAVEGUIDE-6-4FT	WAVEGUIDE-7_8-4FT	WAVEGUIDE-11-4FT	WAVEGUIDE-13_15GHz		WAVEGUIDE-18_26GHz				WAVEGUIDE-28_38GHz		

Imperial to mm Transitions	6 GHz	7-8 GHz	10-11 GHz	13 GHz	15 GHz	18 GHz	23 GHz	26 GHz	28-31 GHz	32 GHz	38GHz
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	ADPT_RFU-C18_ 26-RM_Imp			ADPT_RFU-C28_38-RM_Imp		
RFU-C Adaptor kit to Imperial 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	ADPT_RFU-C18_ 26-RM_mill			ADPT_RFU-C28_38-RM_mill		

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	23 GHz	26 GHz	28 GHz	32 GHz	38 GHz
CommScope	RFU-	RFU-	RFU-	RFU-	RFU-	RFU-	RFU-	RFU-	RFU-	RFU-	RFU-

Antenna Circ. Adapters for OMT	6 GHz	7-8 GHz	10-11 GHz	13 GHz	15 GHz	18 GHz	23 GHz	26 GHz	28 GHz	32 GHz	38 GHz
	C6-OMT-INT-A	C7_8-OMT-INT-A	C10_11-OMT-INT-A	C13-OMT-INT-A	C15-OMT-INT-A	C18-OMT-INT-A	C23-OMT-INT-A	C26-OMT-INT-A	C28-OMT-INT-A	C32-OMT-INT-A	C38-OMT-INT-A
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	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
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	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

Antenna Connection

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

- ALG Com: PS series
- CommScope: VHLP series
- Prose: S-Wave V series
- Shenglu: SLA 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.

Frequency Band Range (GHz)		Circ. WG Diameter	Rect. WG Flange Des.	Radio Side (Remote) Flange Des.	Flex WG Side A Flange Des.	Flex WG Side B Flange Des.	Antenna (Remote) Flange Des.
6(L/U) GHz	5.8-7.1	31.8 mm	WR137	UDR70	PDR70	PDR70	UDR70
7/8 GHz	7.1-8.5	26 mm	WR112	UBR84	PBR84	PBR84	UBR84

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.
10/11 GHz	10.0-11.7	18 mm	WR90	UBR100	PBR100	PBR100	UBR100
13 GHz	12.7-13.3	15 mm	WR75	UBR120	PBR120	PBR120	UBR120
15 GHz	14.5-15.4	13.5 mm	WR62	UBR140	PBR140	PBR140	UBR140
18 GHz	17.7-19.7	10.5 mm	WR42	UBR220	PBR220	PBR220	UBR220
23 GHz	21.2-23.6	9 mm					
26 GHz	24.5-26.6	8 mm					
28-31 GHz	27.3-29.5	7 mm	WR28	UBR320	PBR320	PBR320	UBR320
32 GHz	31.8-33.4	6.5 mm					
38 GHz	37.0-40.0	5.5 mm					

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

Note:

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

Power Specifications

Electrical Requirements

- Maximum Power Consumption:
  - 11 GHz: 47W
  - 18 GHz: 35W
  - 23 GHz: 35W

Important Notes!

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

Environmental Specifications

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

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

Humidity: 5%RH to 100%RHbIEC529 IP66

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

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

Grounding the RFU-SX

List of Items

Item	Description	Quantity	Marketing Model
1	GROUND CABLE FOR IDU and ODU	1	CBL-GND

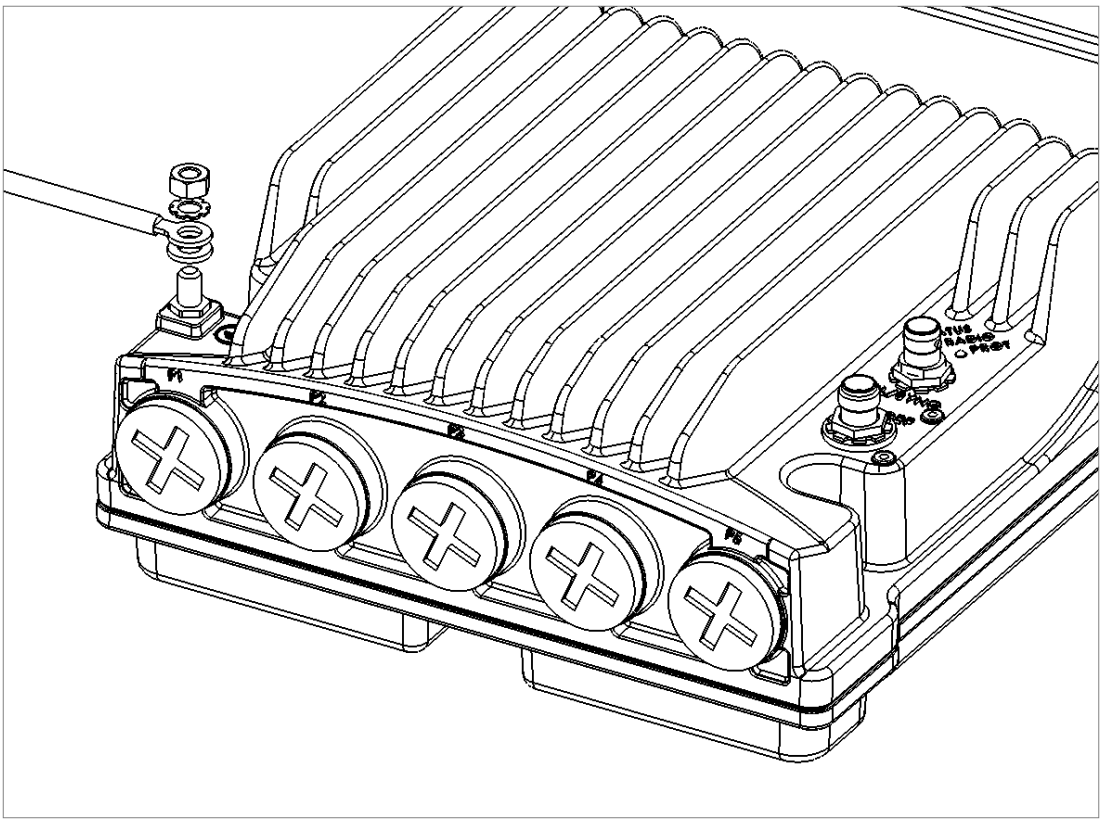
Required Tools

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

Procedure

The grounding of the RFU-SX 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 RFU-SX chassis is 2.5 mΩ or less, but in any case not more than 10 mΩ.

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



2. Place the cable lug (supplied with the RFU-SX 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.

Connecting the Data and Power Cables

RFU-SX can be used with the following IDUs:

- PTP 820N/PTP 820A with TCC-U
- PTP 850GP

Note:

With PTP 820N/PTP 820A, RFU-SX must be connected to the RFU ports on the TCC-U (RFU1/Eth7 and RFU2/Eth8). Since these are RJ-45 ports, this means that only electrical connections are supported in the initial release.

Support for RIC-D connection (RJ-45 and SFP ports) is planned for future release.

PTP 850GP is planned for future release.

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

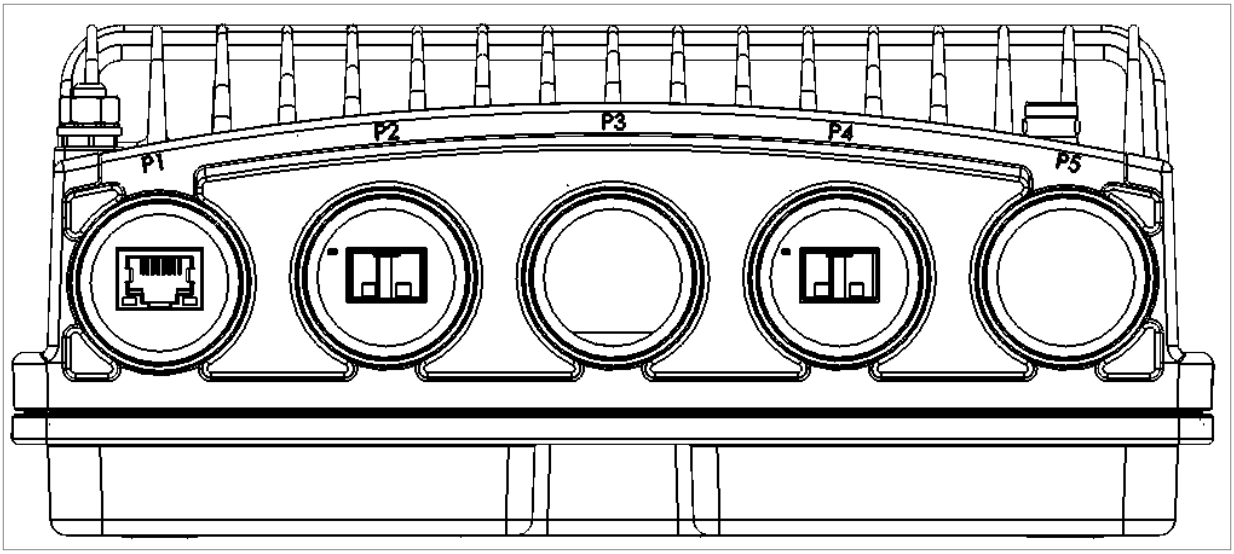
Note:

Connection via optical fiber cables is planned for future release.

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

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

Figure 11: *RFU-SX Data and Power Interfaces (All Frequency Bands)*



In addition, XPIC configurations require two cables between the two units:

- A source sharing cable between the Source Sharing ports (EXT REF). See Figure 12.
- A data sharing cable between P4 on both units.

For a list of available cables, see Section Data Sharing and Source Sharing Cables for XPIC Configurations.

Figure 12: *Source Sharing (EXT REF) Ports*

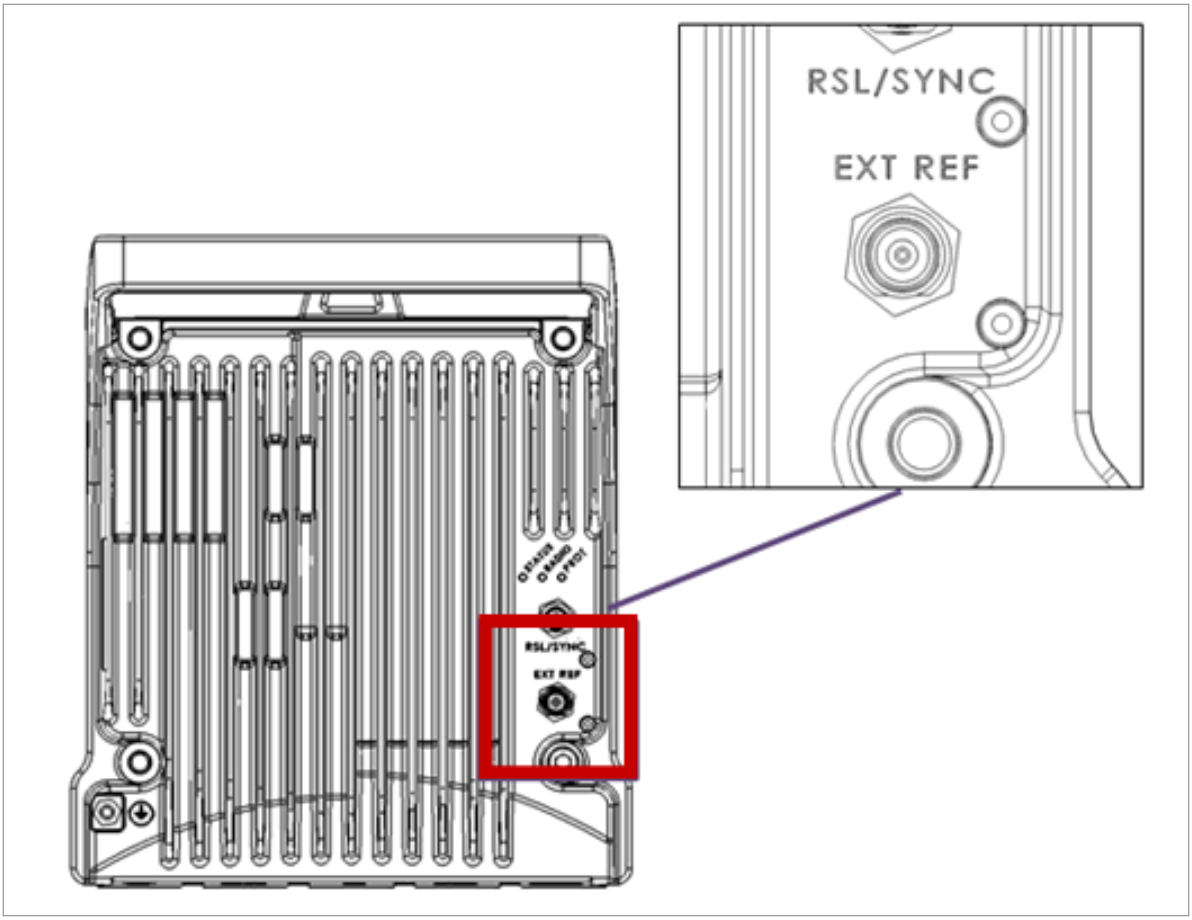


Table 10 *Maximum Cable Length*

Interface	Cable Type	Maximum Length		Comments
		6-11 GHz	13-42 GHz	
Optical	Fiber	300m		
Electrical	CAT-5e (24 AWG)	65m/45m	100m	The smaller numbers only apply when using PoE with both RFU ports of a RIC-D.
	CAT-6a (22 AWG)	110m/80m	150m	
DC Power	DC (18 AWG)	70m	100m	
	DC (14	150m	250m	

Interface	Cable Type	Maximum Length		Comments
		6-11 GHz	13-42 GHz	
	AWG)			
	DC (12 AWG)	250m	300m	

Grounding the Cables

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

Cables must be grounded as follows.

- For fiber cables (see Connecting an Optical Fiber Cable and SFP), no grounding is required.
- For DC power cables (see Connecting a DC Power Cable), no grounding is required.
- For CAT-5e/CAT-6 cables (see Connecting a CAT-5e or CAT-6 Data Cable), the shielded Ethernet cable (SF/UTP construction) must be grounded to the antenna tower at the top (next to the RFU), the entry to the indoor cabinet, and every 50m using the kit UNIV_GRD_KIT_1/2.

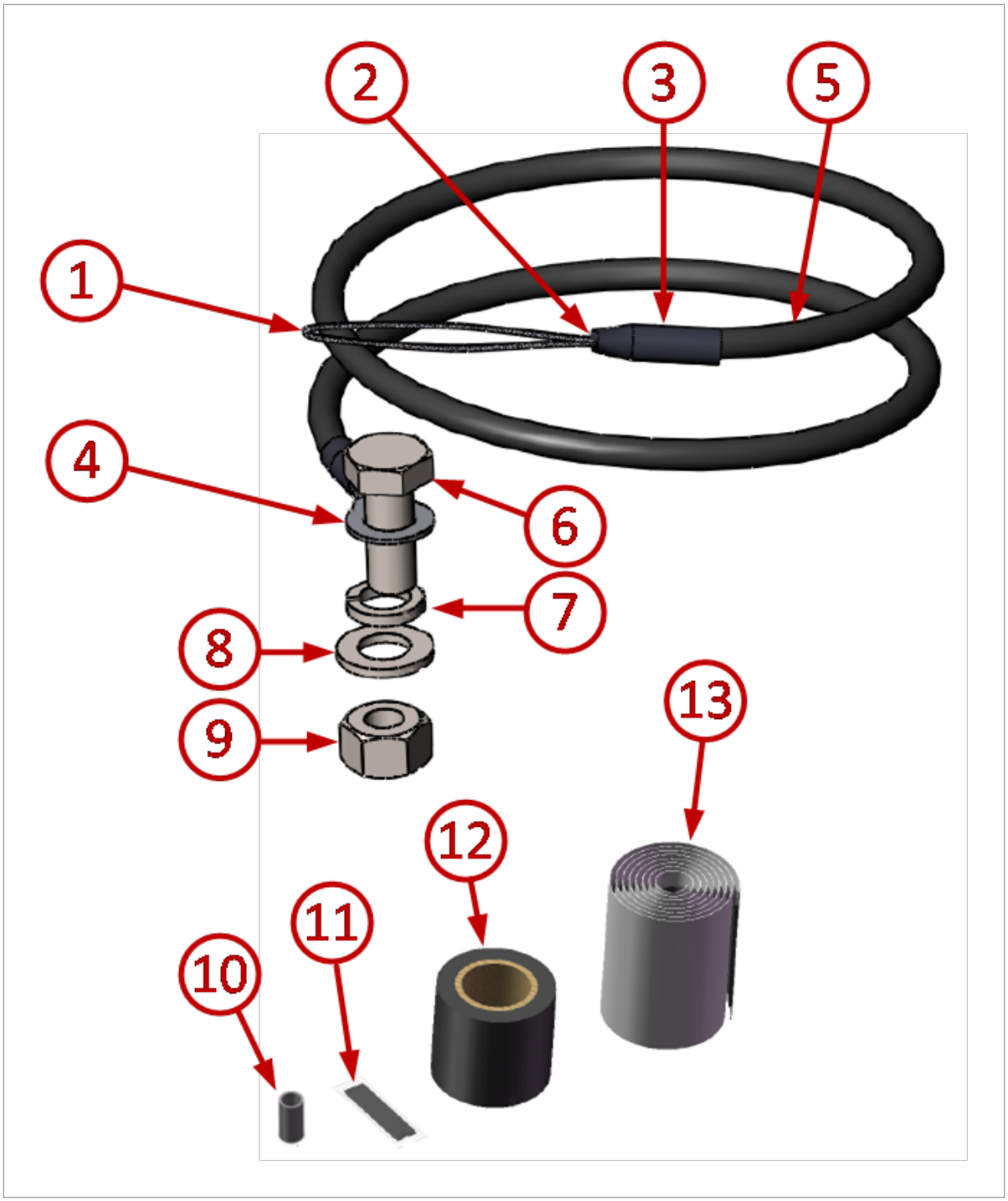
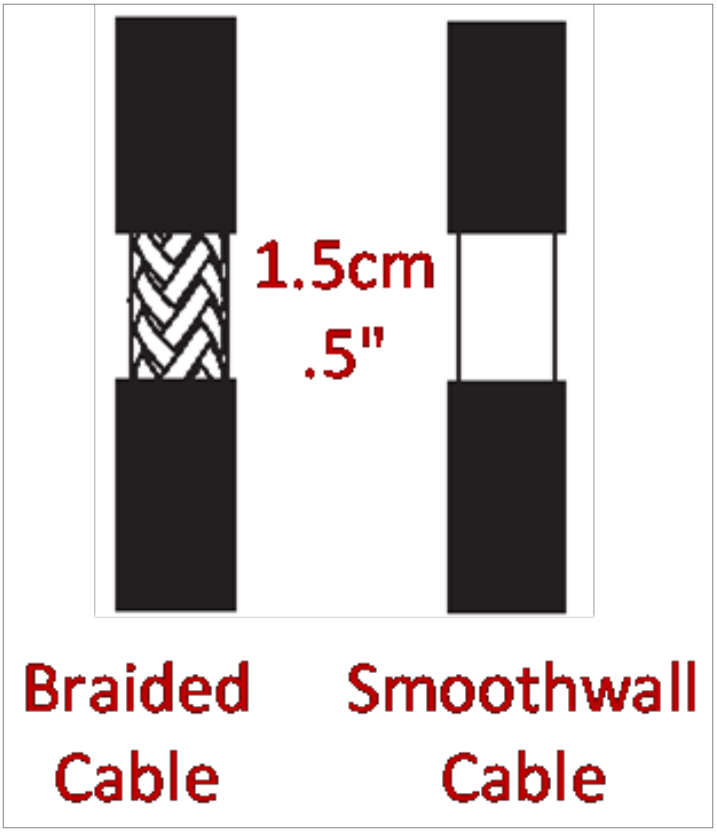


Table 11 *Cable Grounding Kit*

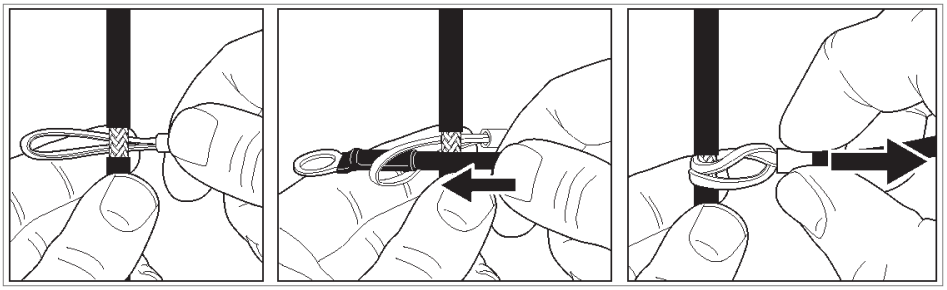
Marketing Model	Description
UNIV_GRD_KIT_1/2	Universal Grounding Kit up to 1/2” cable

To connect the grounding kit:

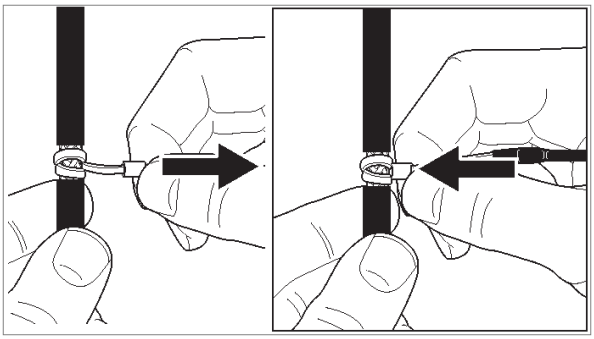
1. Strip the cable jacket about 1.5 cm (.5”).



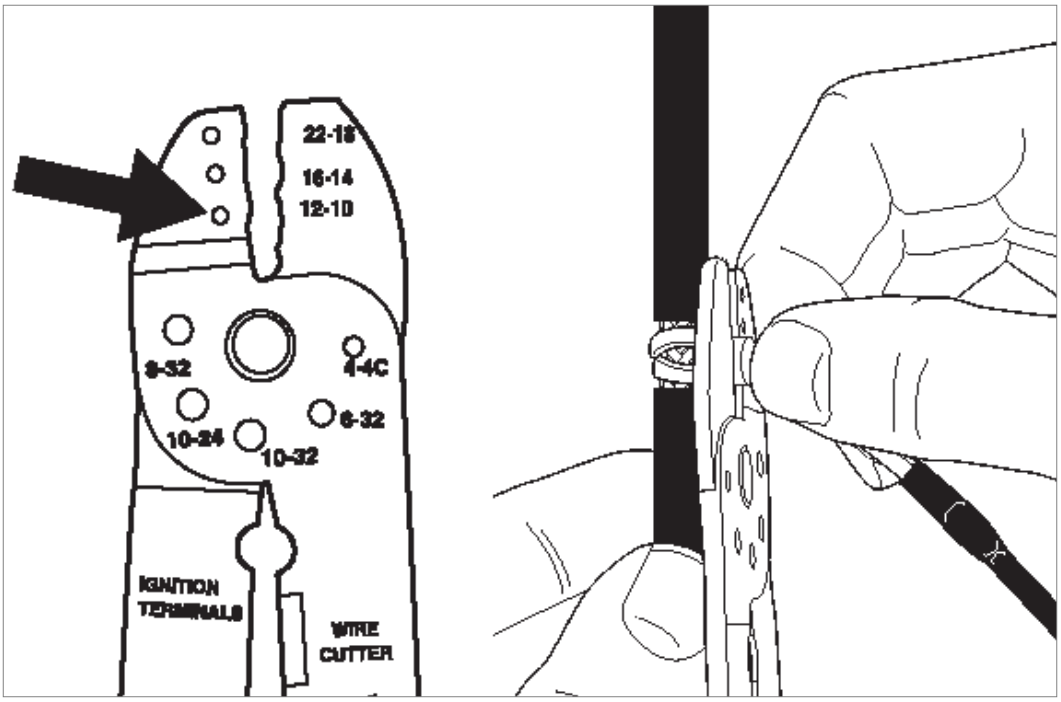
2. Loop the grounding wire’s braid belt (1) around the stripped portion of the cable, insert the rest of the grounding wire (5) through the braid belt, and tighten to form a knot, as shown in the figure below.

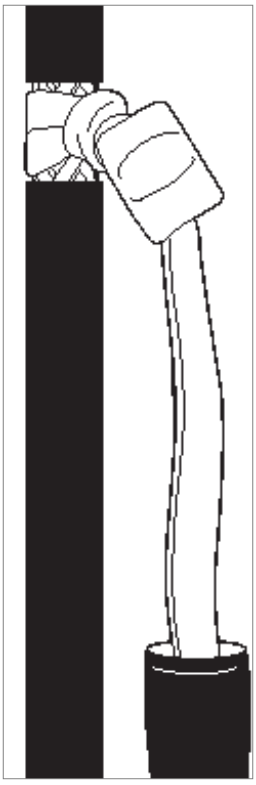


3. Grasp the terminal of the braid belt (2) and slide it flush with the knot around the cable, as shown in the figure below.

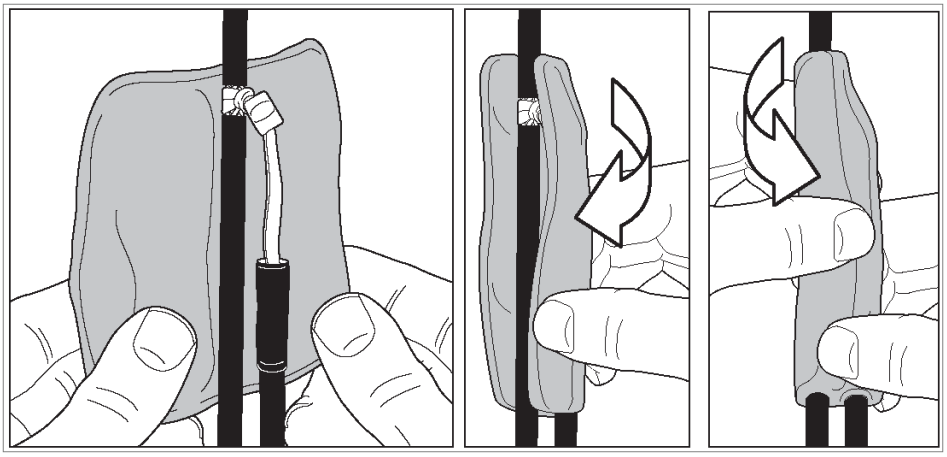


4. Crimp the knotted braid belt (1) and the bare terminal (10) together, as shown in the figures below.

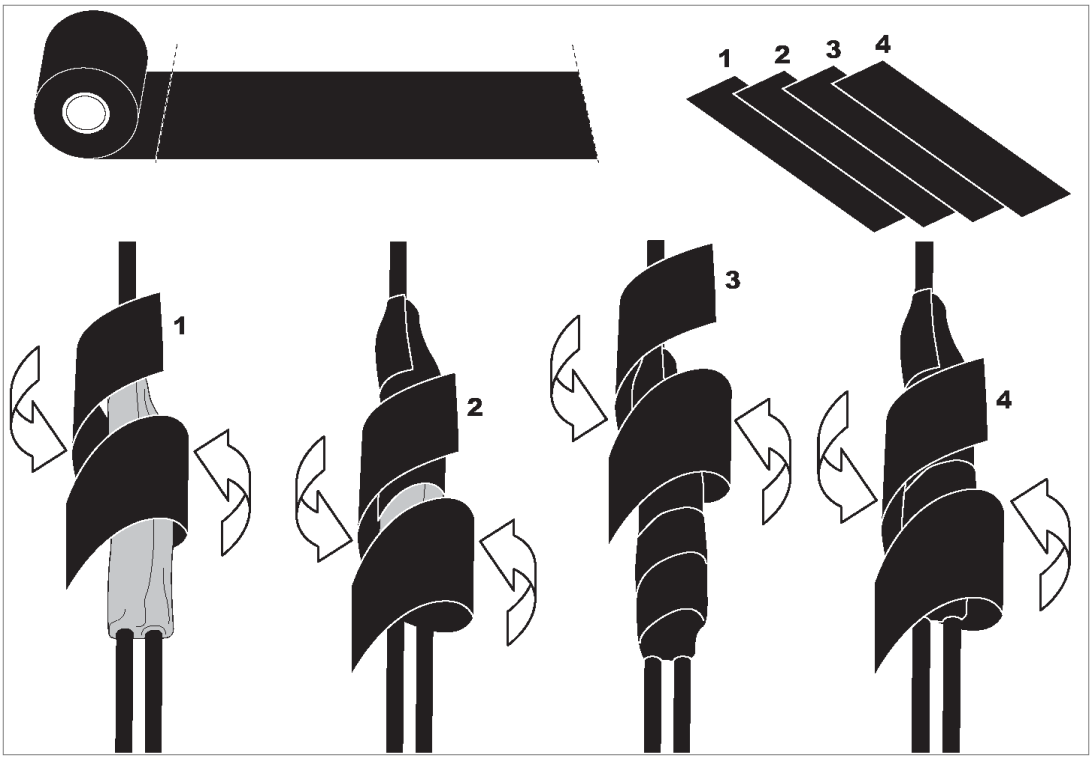


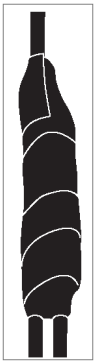


5. Wrap the butyl rubber sealing clay (13) around the cable and the grounding wire, as shown in the figures below.

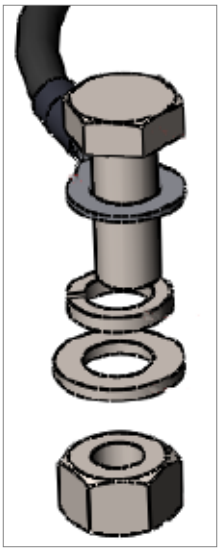


6. Cut four strips of the tape (12), approximately 20 cm (8”) each, and wrap these strips of tape around the butyl rubber sealing clay (13), as shown in the figures below.





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.



Power Source

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

DC power can be from -40.5 to -59 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 user power supply GND must be connected to the positive pole in the RFU-SX power supply.
Any other connection may cause damage to the system.

Note:

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

Surge Protection

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

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

Available Cable Options

Fiber Optic Cables - Single Mode

Table 12 *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
N000082L187A	CABLE,FO,DUAL LC/LC,15M,SM,55mm OPEN END,M28 GLAND,ARMORED,O
N000082L139A	CABLE,FO,DUAL LC/LC,30M,SM,55mm OPEN END,M28 GLAND,ARMORED,O
N000082L140A	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
N000082L141A	CABLE,FO,DUAL LC/LC,80M,SM,55mm OPEN END,M28 GLAND,ARMORED,O
N000082L142A	CABLE,FO,DUAL LC/LC,100M,SM,55mm OPEN END,M28 GLAND,ARMORED
N000082L143A	CABLE,FO,DUAL LC/LC,150M,SM,55mm OPEN END,M28 GLAND,ARMORED

Fiber Optic Cables - Multi Mode

Table 13 *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
N000082L193A	CABLE,FO,DUAL LC/LC,20M,MM,55mm OPEN END,M28 GLAND,ARMORED
N000082L194A	CABLE,FO,DUAL LC/LC,30M,MM,55mm OPEN END,M28 GLAND,ARMORED,O
N000082L195A	CABLE,FO,DUAL LC/LC,50M,MM,55mm OPEN END,M28 GLAND,ARMORED,O

Marketing Model	Description
N000082L196A	CABLE,FO,DUAL LC/LC,80M,MM,55mm OPEN END,M28 GLAND,ARMORED,O
N000082L197A	CABLE,FO,DUAL LC/LC,100M,MM,55mm OPEN END,M28 GLAND,ARMORED
N000082L198A	CABLE,FO,DUAL LC/LC,150M,MM,55mm OPEN END,M28 GLAND,ARMORED
N000082L199A	CABLE,FO,DUAL LC/LC,200M,MM,55mm OPEN END,M28 GLAND,ARMORED

DC Cable and Connectors

Table 14 *DC Cable and Connector*

Marketing Model	Description
N000082L165A	RJ45 to TB POWER ADAPTOR WITH PROTECTION. WITHOUT FUSE
Outdoor_DC_cbl_2x18AWG_drum	CABLE,305M,OUTDOOR_DC_CBL_2X18AWG_DRUM
OUTDOOR_DC_CBL_2X14AWG_ DRUM	CABLE,MATERIAL,2x14AWG,305M (1000ft),OUTDOOR

Data Sharing and Source Sharing Cables for XPIC Configurations

Table 15 *Cables for External XPIC Configurations*

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

Ethernet Cable and Specifications

The Ethernet cables used with the RFU-SX should meet the following specifications.

Note:

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

Table 16 *Outdoor CAT-5e Cable Specifications – Electrical Requirements*

Cable type	**CAT-5e SFUTP**, 4 pairs, according to ANSI/TIA/EIA-568-B-2
Stranding	Solid
Conductors	Bare copper wires, 24AWG
Conductors Resistance	Maximum 94Ω/km
Impedance	100Ω
Voltage rating	700V
Shielding	Tinned copper Braid (Coverage: >=80%) + Aluminum Foil applied longitudinally

Table 17 *Outdoor CAT-6A Cable Specifications – Electrical Requirements*

Cable type	**CAT-6A SFTP**, 4 pairs, according to ANSI/TIA/EIA-568-B-2
Stranding	Solid
Conductors	Annealed bare copper solid wires, 22AWG
Conductors Resistance	Maximum 55Ω/km
Impedance	100Ω
Voltage rating	700V
Shielding	Annealed Tinned Copper Braid (Coverage: >=80%) + Aluminum Foil applied longitudinally

Table 18 *Outdoor Ethernet Cable – RJ-45 Connector Pinout*

Pin #	Wire Color Legend	Signal
1	 White/Orange	TX+
2	 Orange	TX-
3	 White/Green	RX+

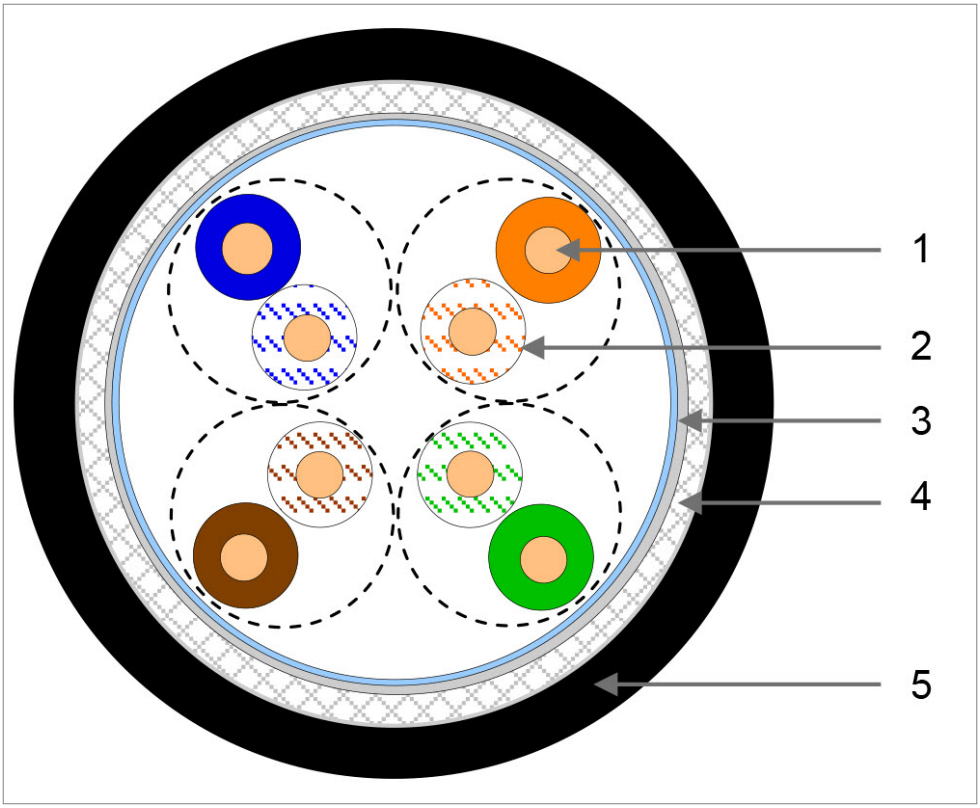
Pin #	Wire Color Legend	Signal
4	 Blue	TRD2+
5	 White/Blue	TRD2
6	 Green	RX-
7	 White/Brown	TRS3+
8	 Brown	TRD3-

Table 19 *Outdoor CAT-5e and CAT-6A Cables Specifications – Mechanical/ Environmental Requirements*

Jacket	UV resistant
Outer diameter	6-10 mm
Operating and storage temperature	-40^{0}C to 85^{0}C
Flammability rating	According to UL-1581 VW1, IEC 60332-1
RoHS	According to Directive/2002/95/EC

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

Figure 13: *Cable Design*



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

The following Ethernet cables can be ordered from Cambium. It is strongly recommended to source the CAT-6A cable from Cambium.

Table 20 *CAT-5e 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
N000082L016A	CABLE,MATERIAL,CAT-5E,SFUTP,4X2X24AWG,UV RESISTANCE,100M
CAT5E_SFUTP_Outdoor_ 305m_drum	CABLE,MATERIAL,CAT-5E,SFUTP,4X2X24AWG,UV RESISTANCE,305M

Marketing Model	Description
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_Arm_305m_drum	CABLE,MATERIAL,CAT-5E,FTP,4X2X24AWG,ARMORED,UV RESIST,305M
N000082L172A	CABLE,MATERIAL,CAT-6A,SFTP,4X2X22AWG,UV RESISTANCE,305M

Outdoor DC Cable Specifications

Table 21 *Outdoor DC Cable Specifications – Electrical Requirements*

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

Table 22 *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, Marketing Model 'Outdoor Ties' or cable clamps. When using the T-Rups kit, take special care to apply the proper amount of force in order to avoid damage to the cable. This is especially important for optical (SFP) cables.

The following cable clamps are available:

Table 23 *Cable Clamps*

Marketing Model	Item Description
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 RFU-SX unit is supplied with one gland kit that contains two glands. If additional glands are required, they must be ordered separately, in kits of five glands each.

Table 24 *Glands Kit*

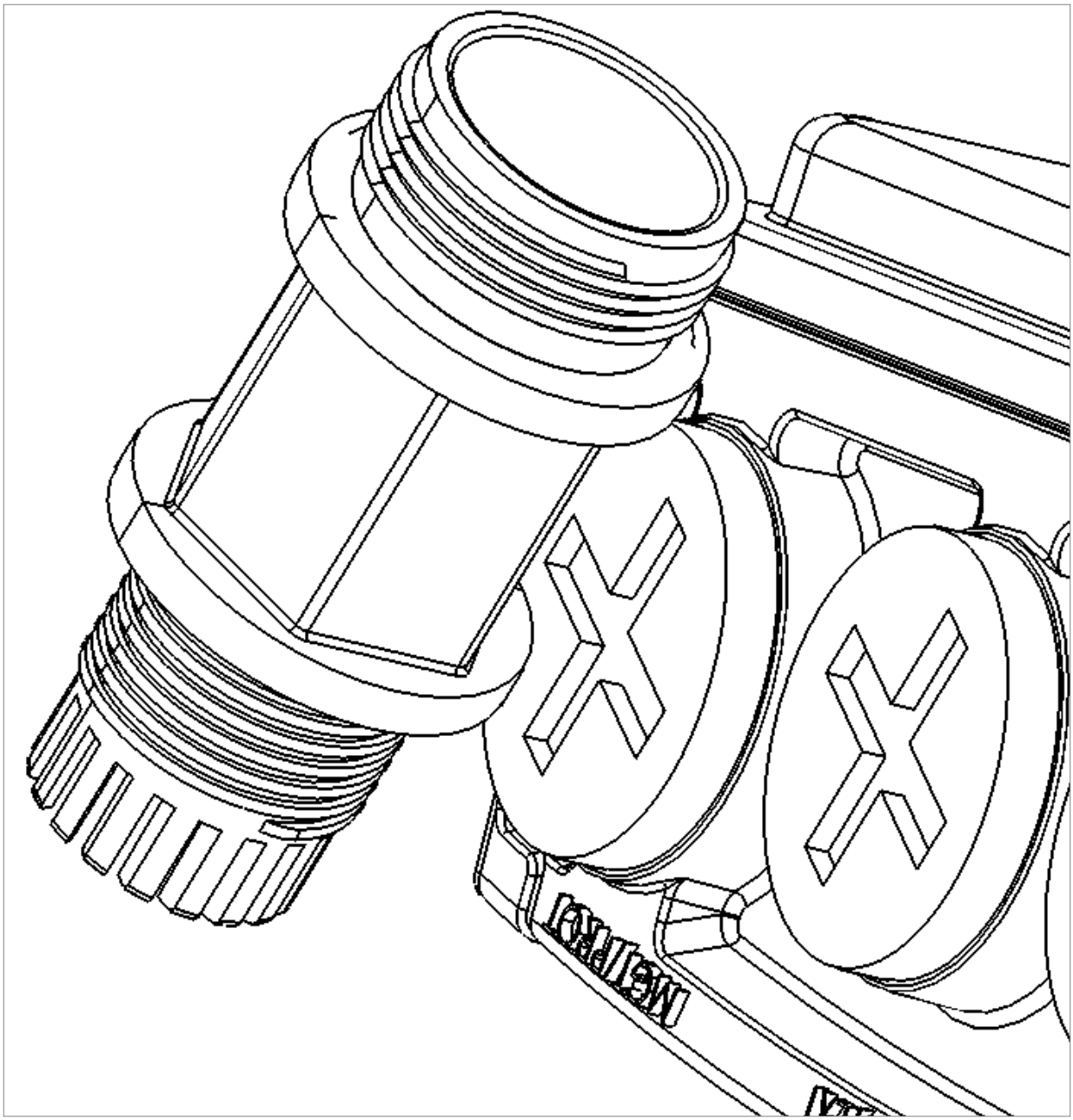
Marketing Model	Marketing Description
N000082L014A	KIT 5pcs of M28 GLAND (AA-0597-0)

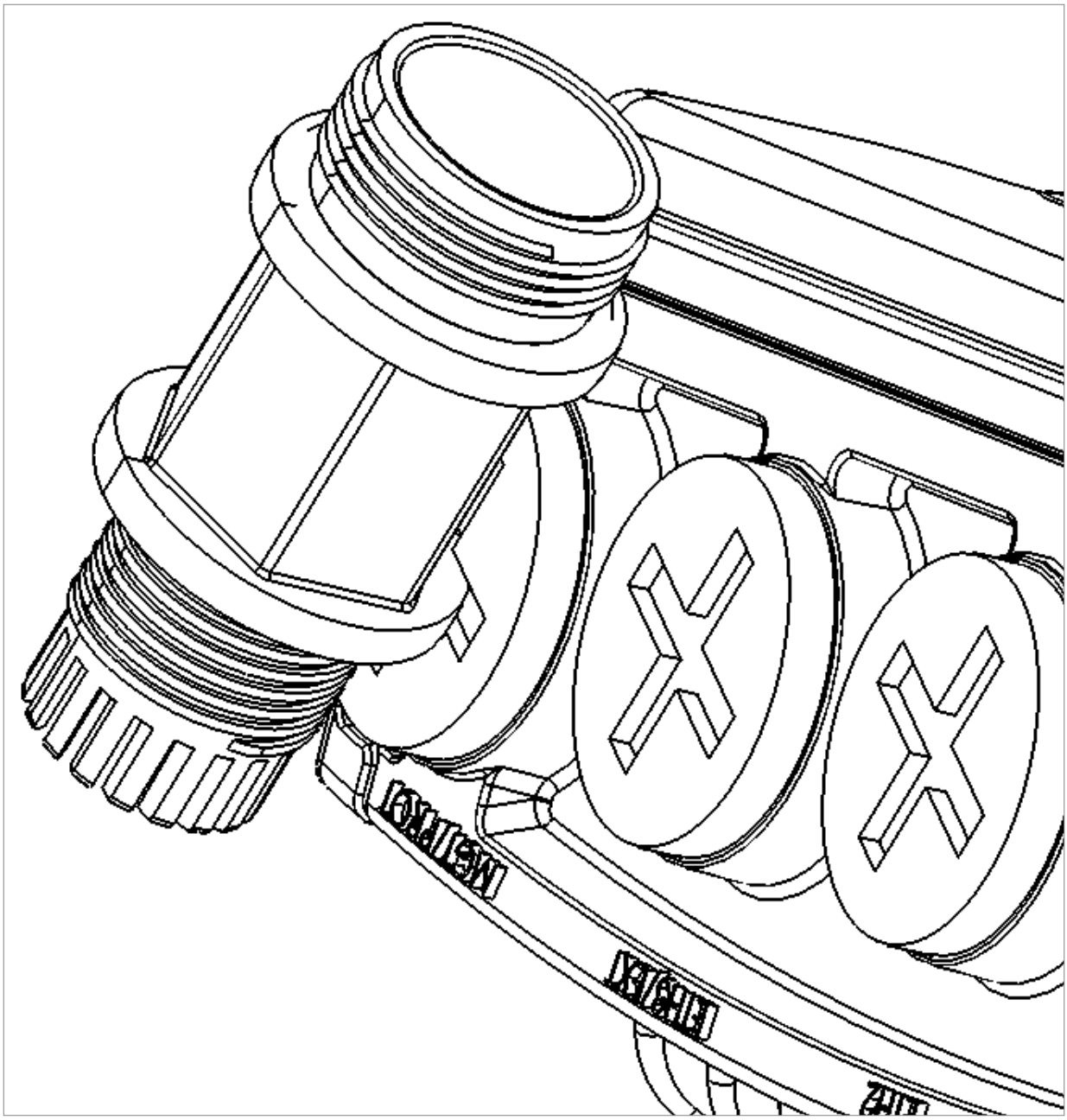
In addition, gland caps can be ordered to protect the cable and connector from damage when elevating the cable and gland to the RFU-SX unit. See Step 5 in Section General Installation Procedure. Gland caps are ordered separately, in kits of 10 caps each.

Table 25 *Gland Caps*

Marketing Model	Marketing Description
N800082L009A	KIT 10pcs of M28 Gland Cap With Hook (AA-0678-0)

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

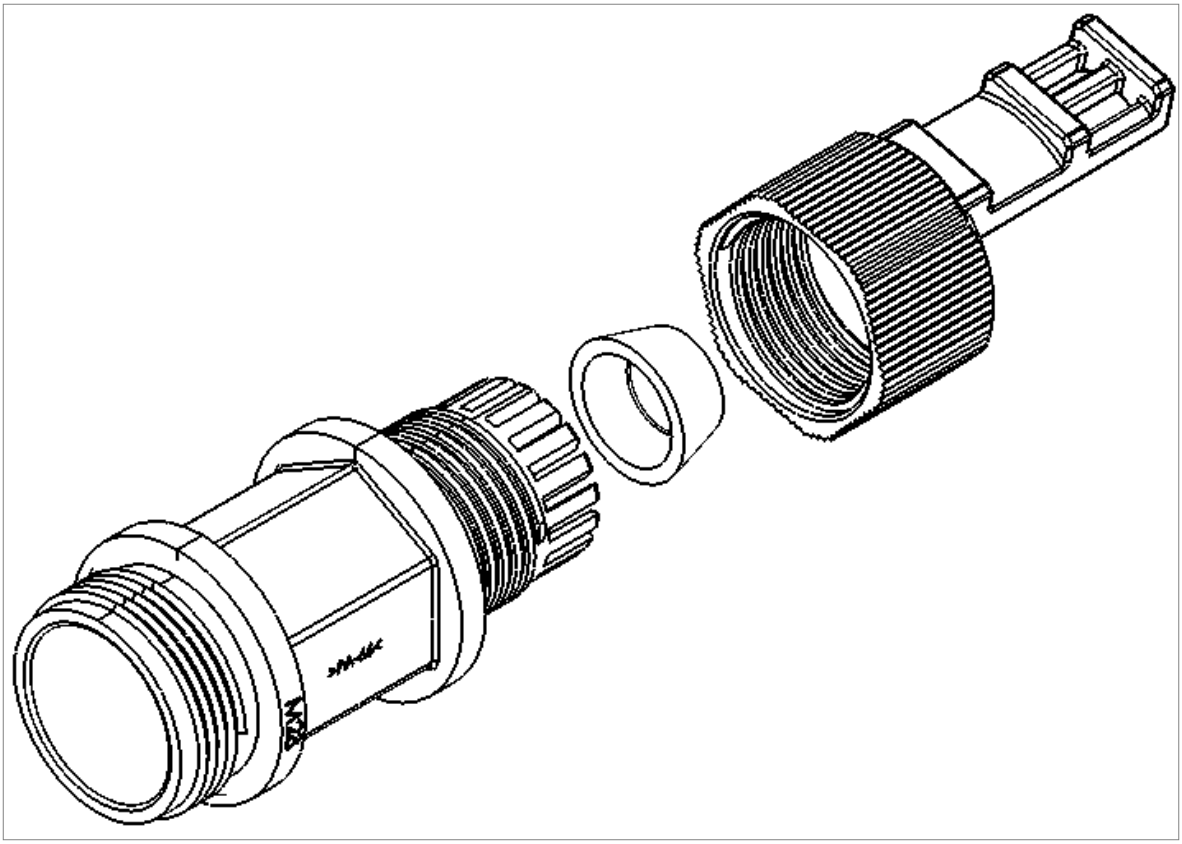




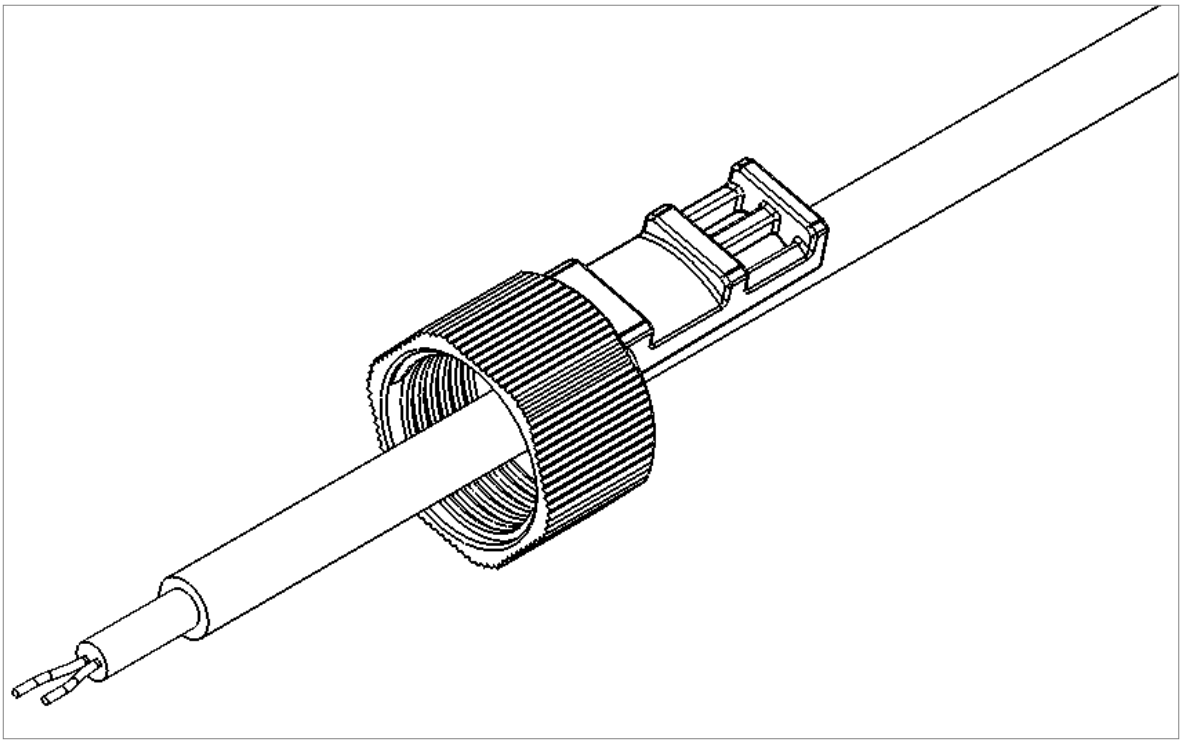
General Installation Procedure

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

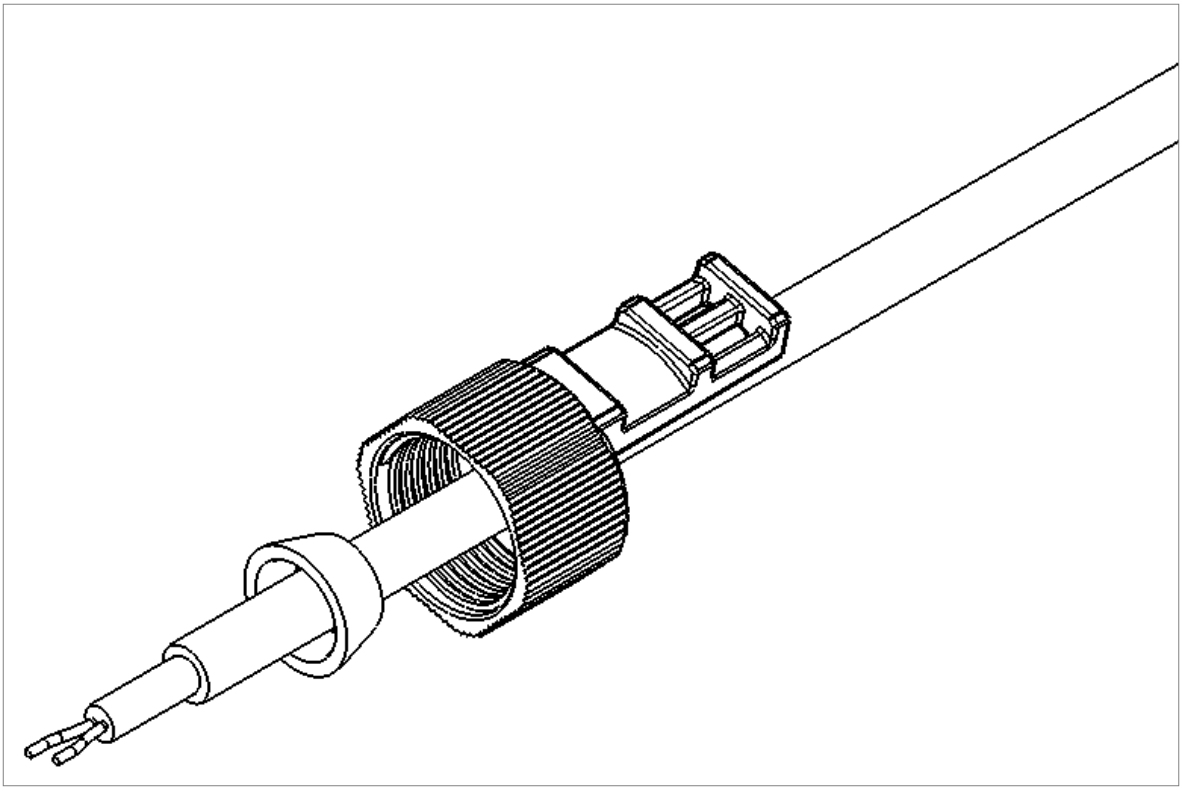
1. Before inserting a cable, you must disassemble the gland cap and gland rubber from the gland body.



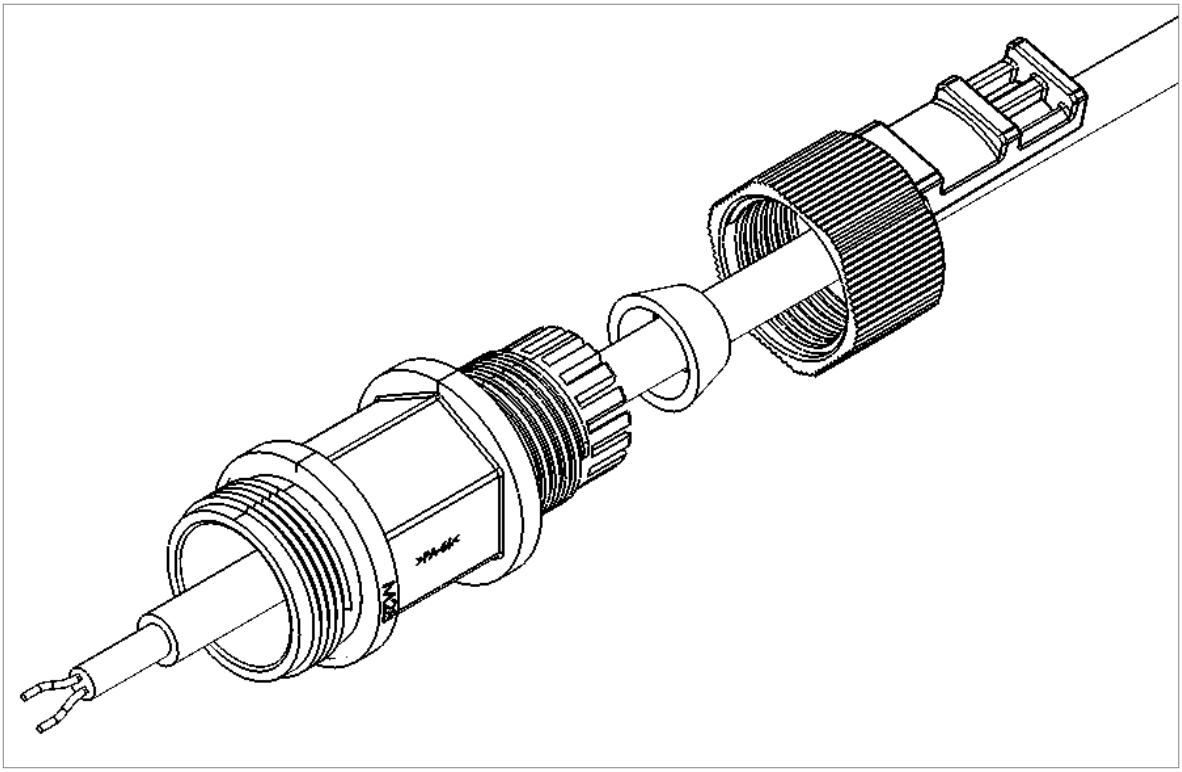
2. Slide the gland cap into the cable.



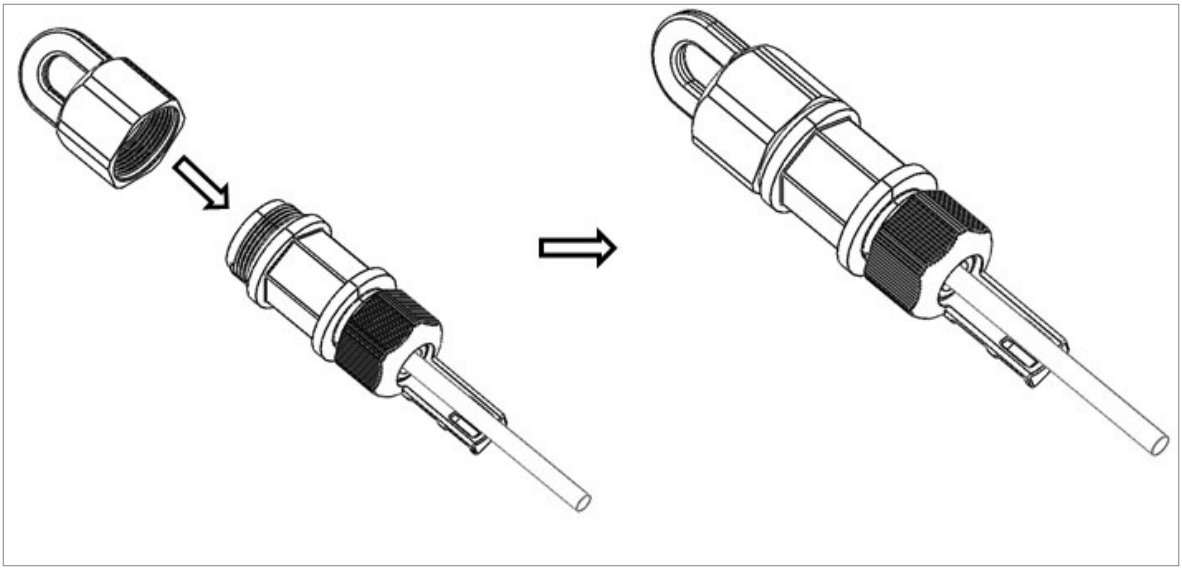
3. Slide the gland rubber into the cable.



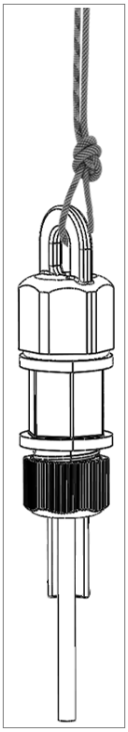
4. Slide the cable into the body of the gland. If you are using a gland cap (see Step 5), make sure to leave enough space for the gland cap to fit into the gland without disturbing the cable.



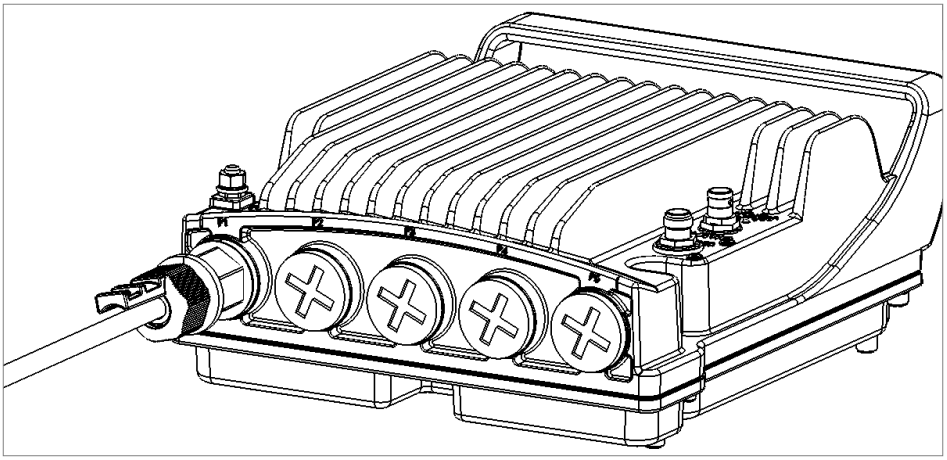
5. 5 Optionally, after securing the cable into the body of the gland, you can close the other side of the gland with an M28 gland cap. The gland cap protects the cable and connector from damage when elevating the cable and gland to the RFU.



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



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



Note:

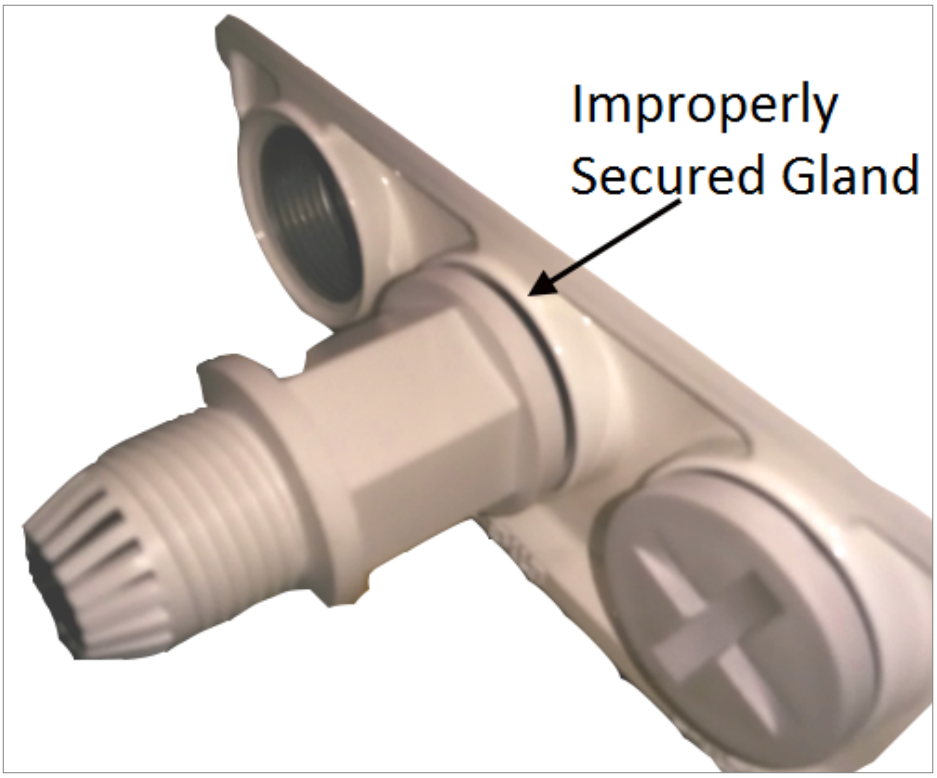
Before tightening the gland, make sure the gland is aligned with the tapped hole in the unit. Tightening the gland at an angle can ruin the thread on the gland and prevent

proper sealing of the interface.

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

Note:

Pay attention that the gland rubber is properly located and not damaged during the tightening of the gland cap.
If the gland thread is damaged do not use it!



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

Note:

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

Figure 14: *Tightening the Front Portion of the Gland*

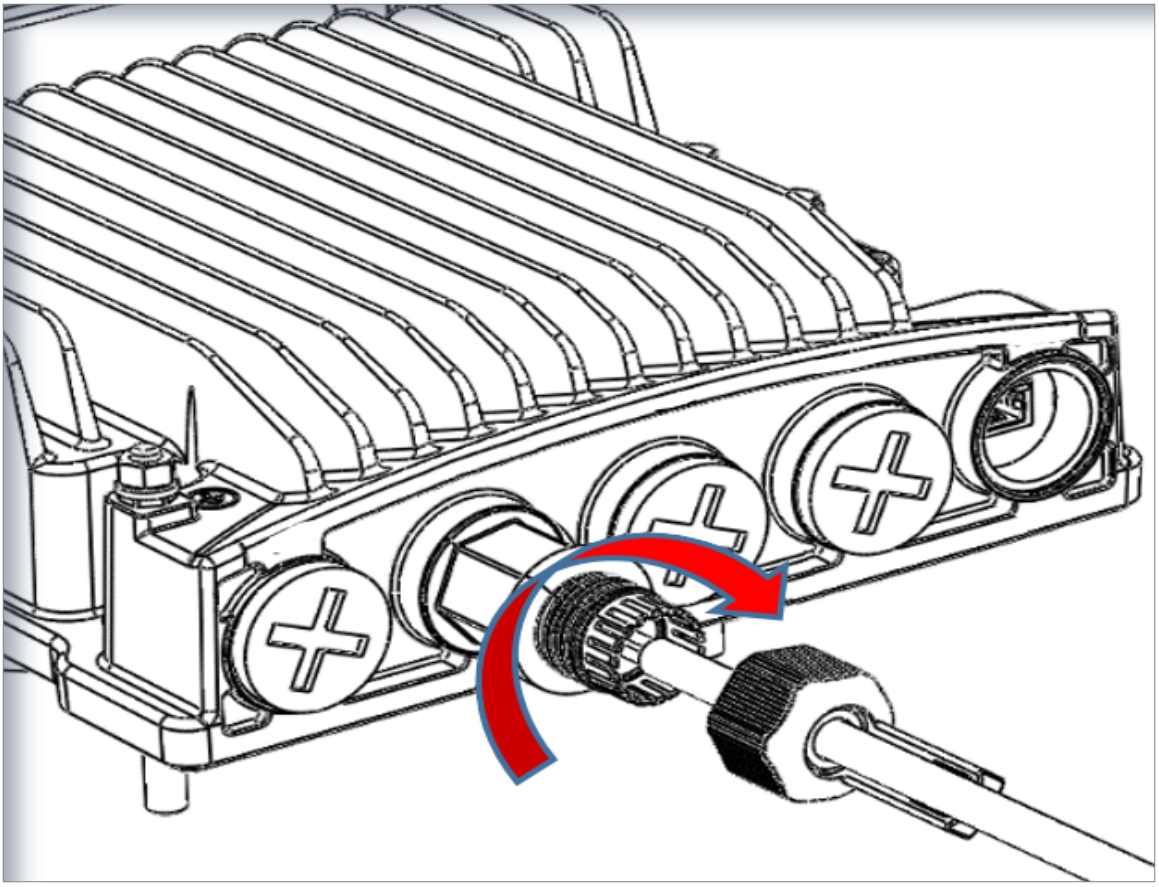
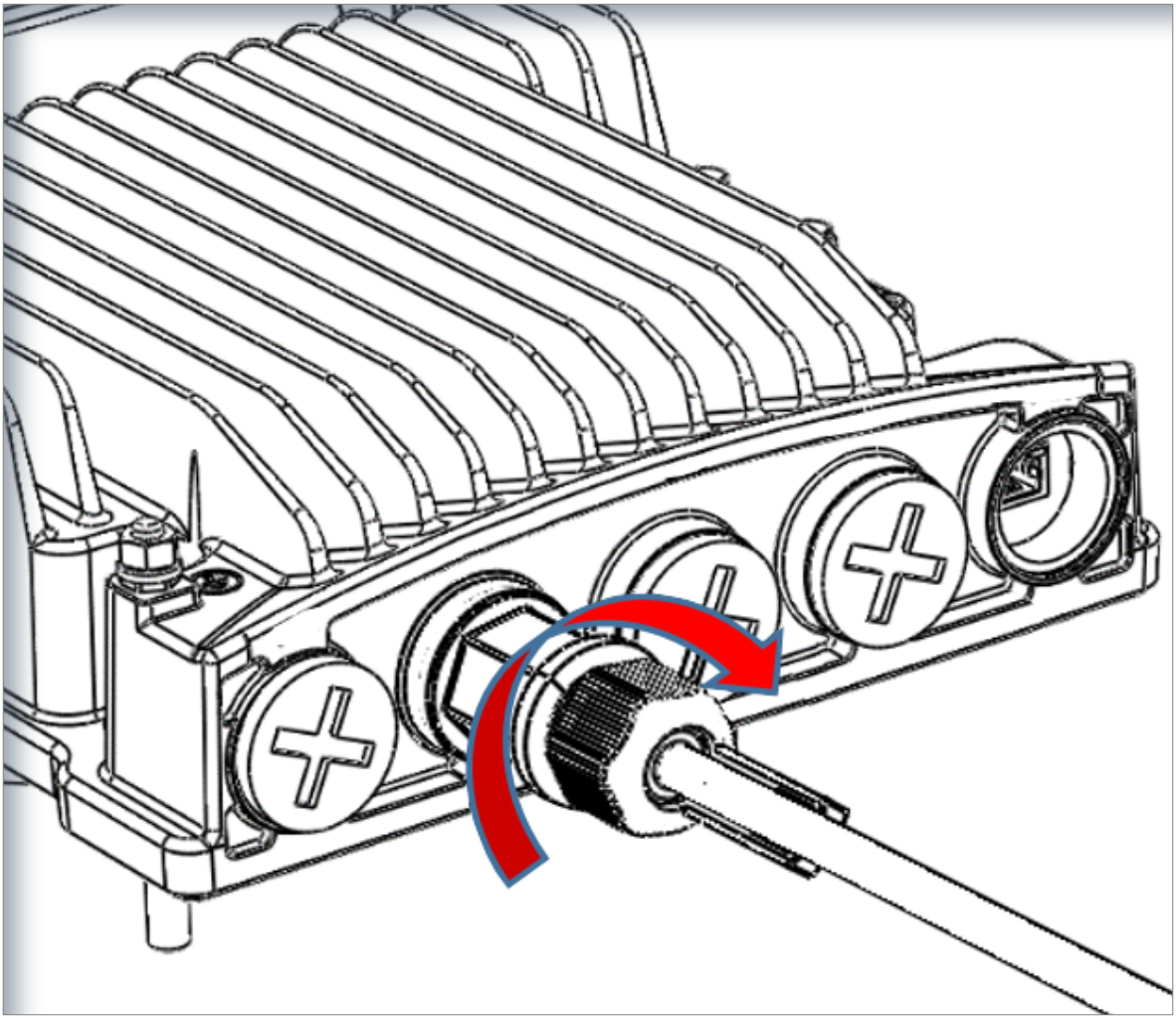
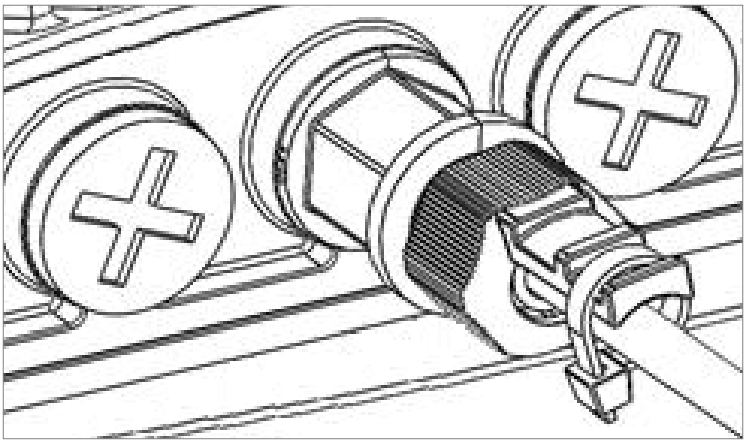


Figure 15: *Tightening the Rear Portion of the Gland*



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

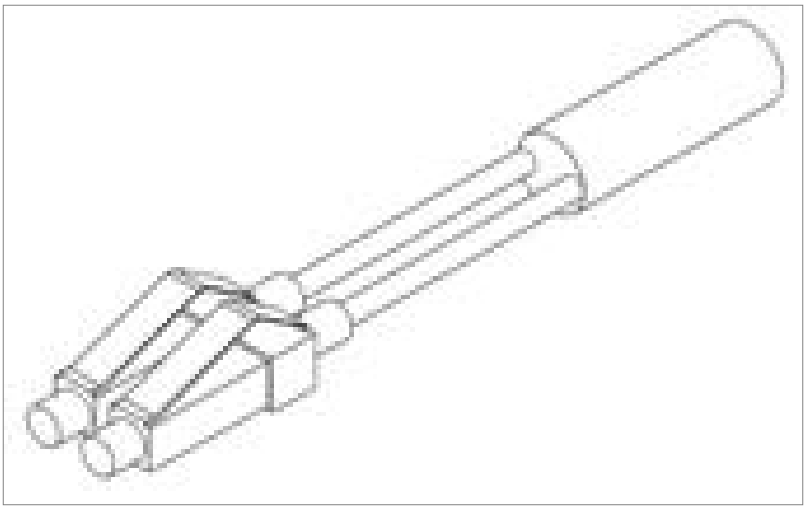


Connecting an Optical Fiber Cable and SFP

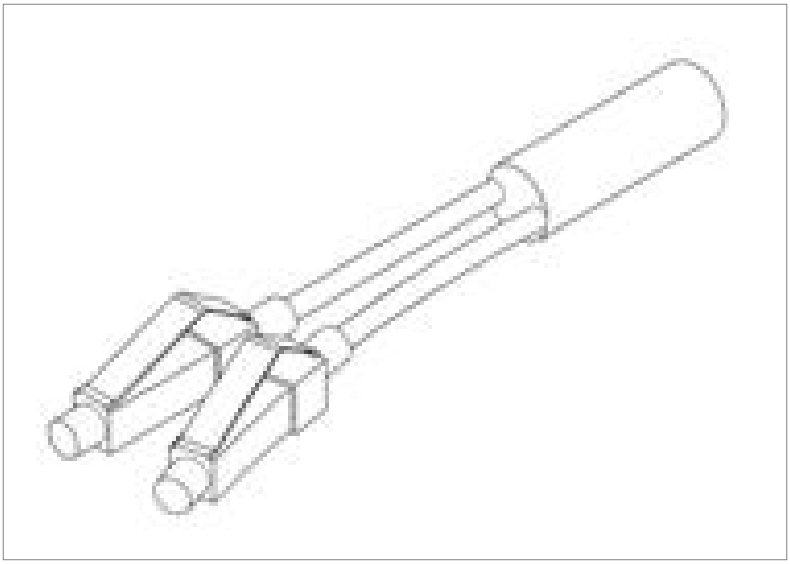
When using an optical fiber cable, the cable must be inserted in port P2. A separate DC power cable must be used to connect the RFU-SX to an external power source. See Connecting a DC Power Cable .

To connect an optical fiber cable and the SFP transceiver:

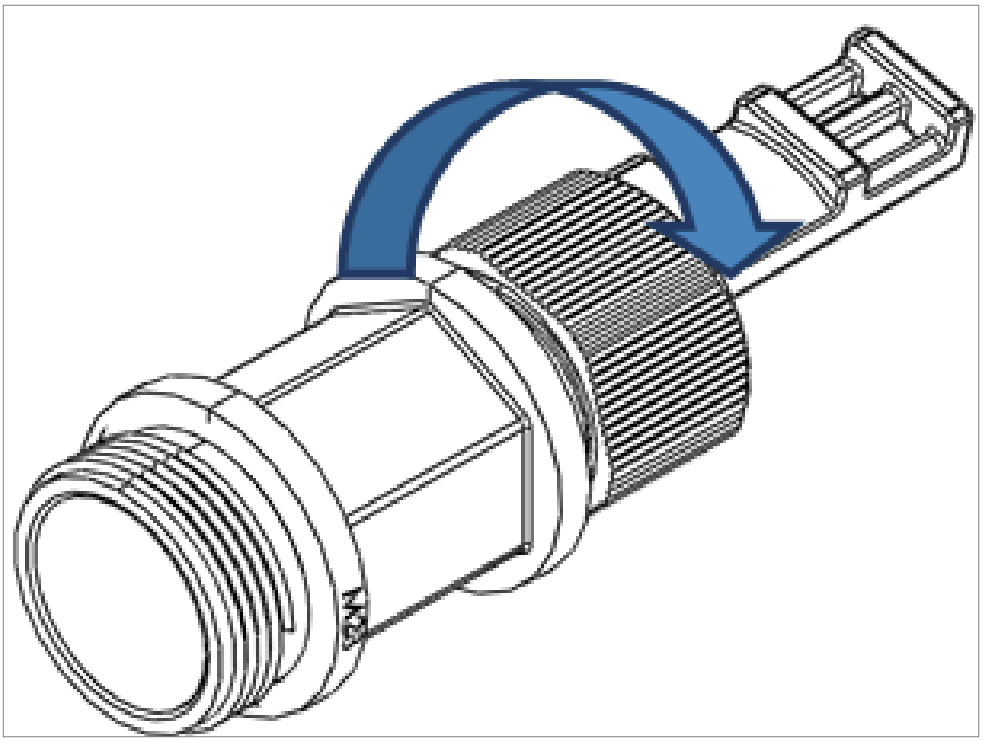
1. Use a pre-assembled cable.

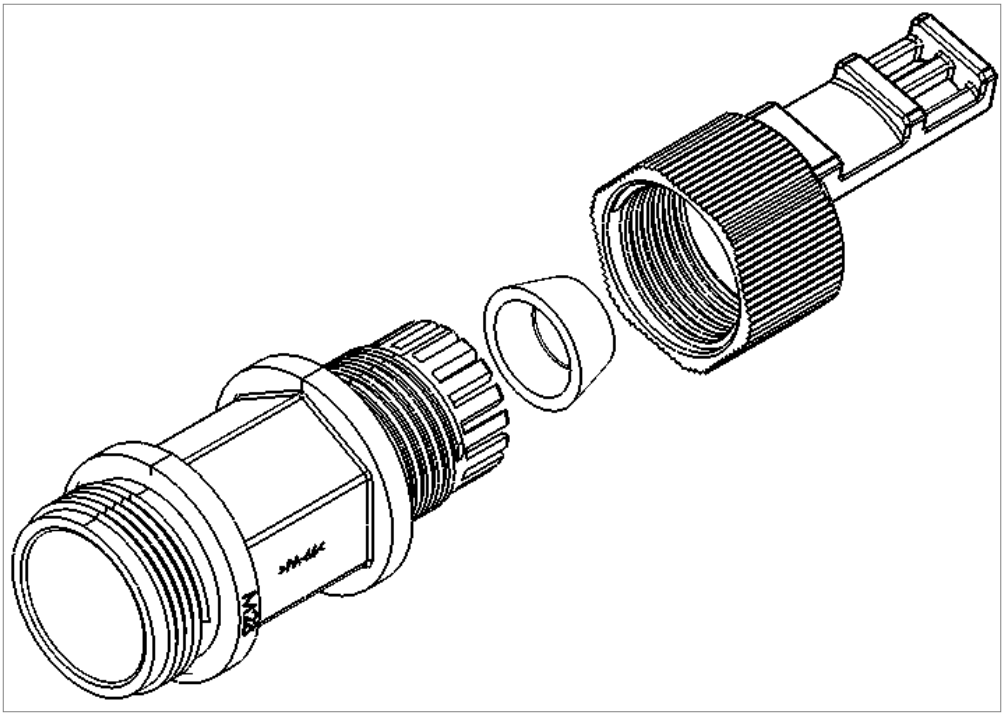


2. Split the connector into two separate LC connectors (one for each fiber).

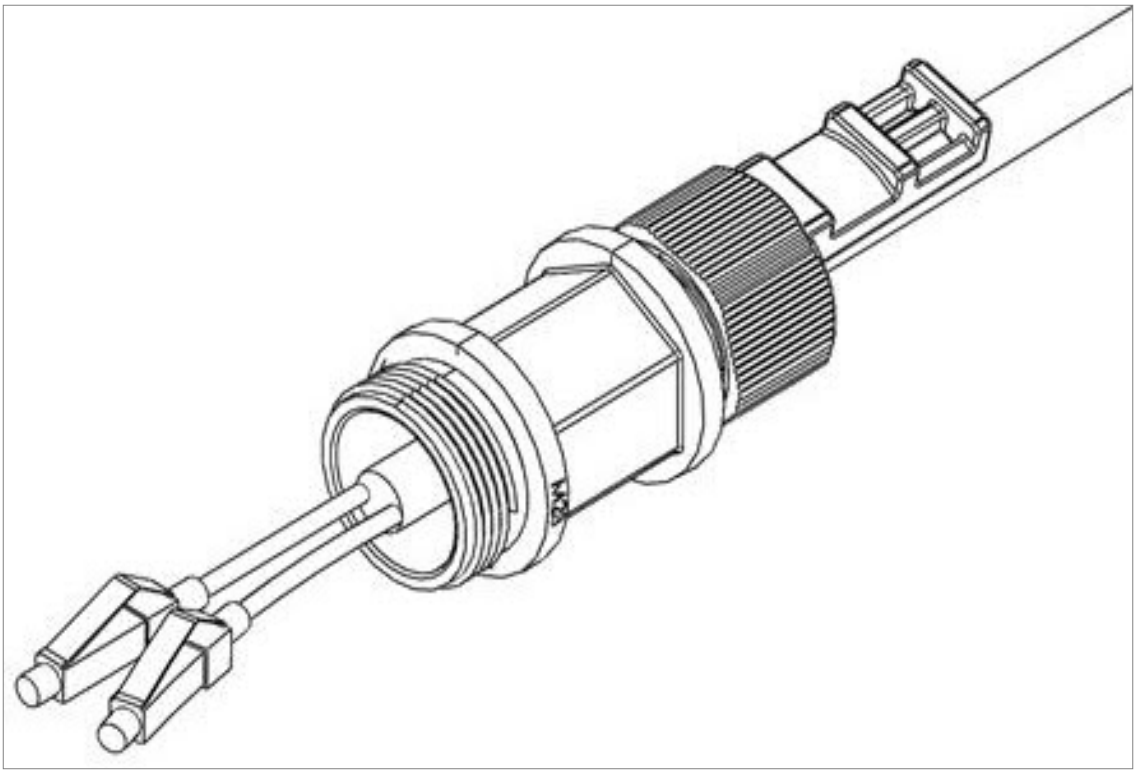


3. Remove the gland cap and rubber from the gland body.





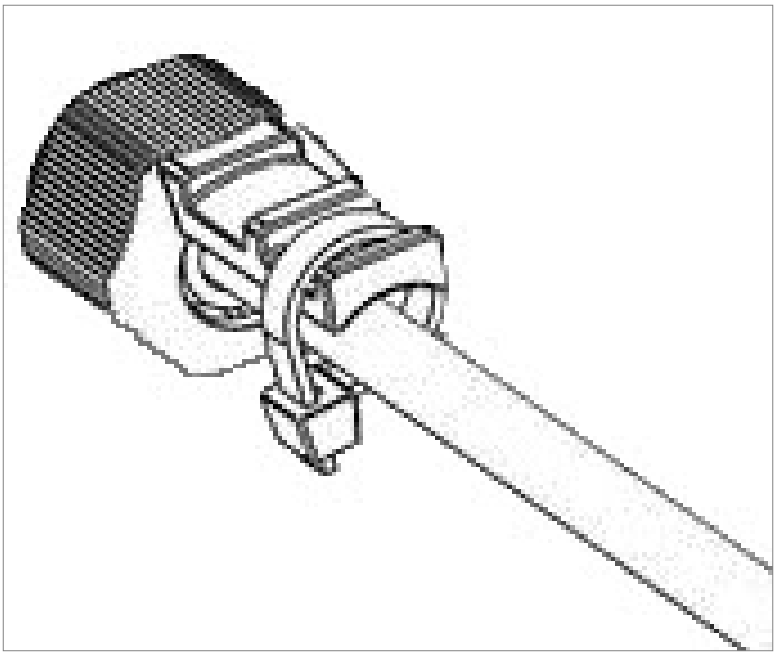
4. Slide the gland cap into the cable.
5. Slide the rubber into the cable.
6. Insert the fibers with the connectors one by one into the cable gland.



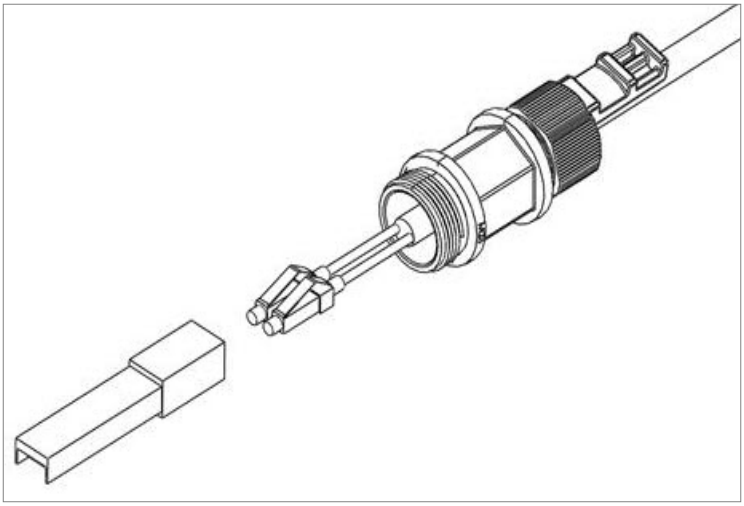
7. Secure the cable to the lip of the gland using a tie wrap.

Note:

If you are raising the cable to an RFU 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.

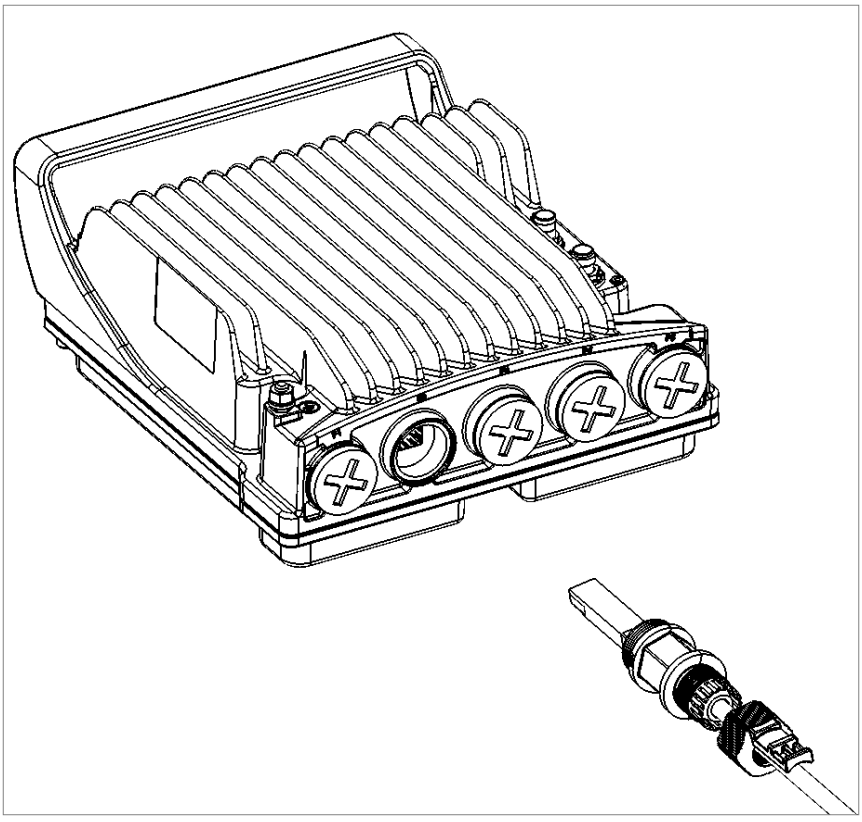


9. Remove the tie wrap securing the cable to the gland.

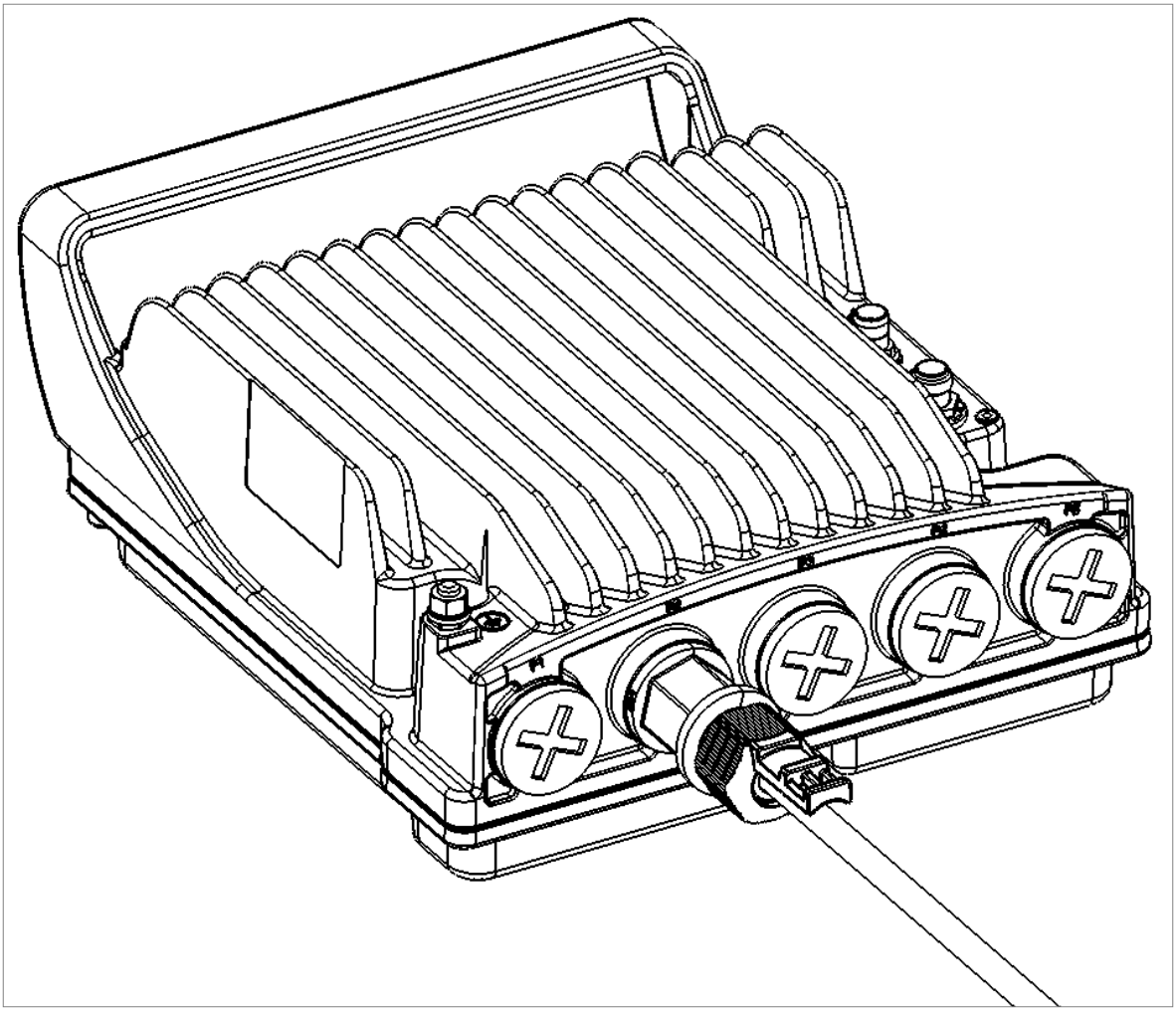
Note:

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 RFU-SX connector.



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



12. Tighten the gland cap.

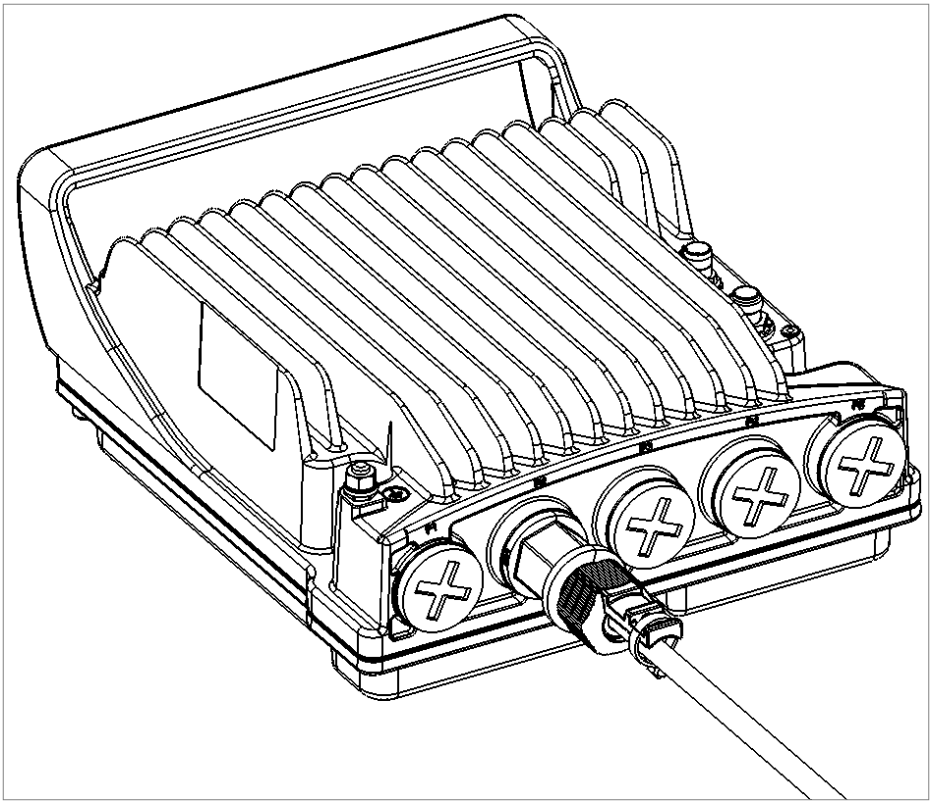
Note:

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

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

If the gland thread is damaged do not use it!

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



Connecting a DC Power Cable

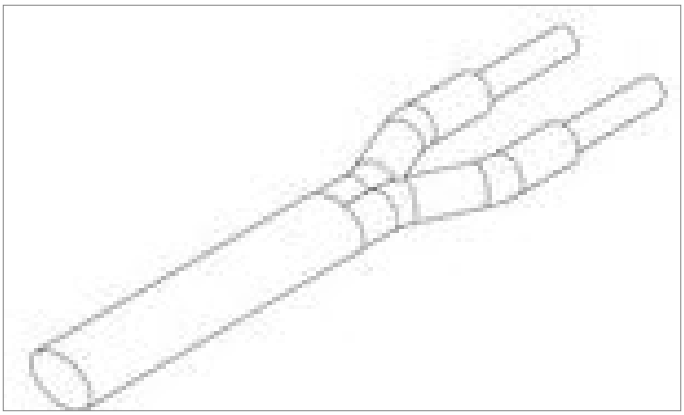
When the RFU-SX is connected to the IDU via an optical fiber cable, a DC power cable must be connected to the P1 interface to provide power from an external power source to the RFU. A special power connector is used with the cable, as described in Steps 4 and 5.

Note:

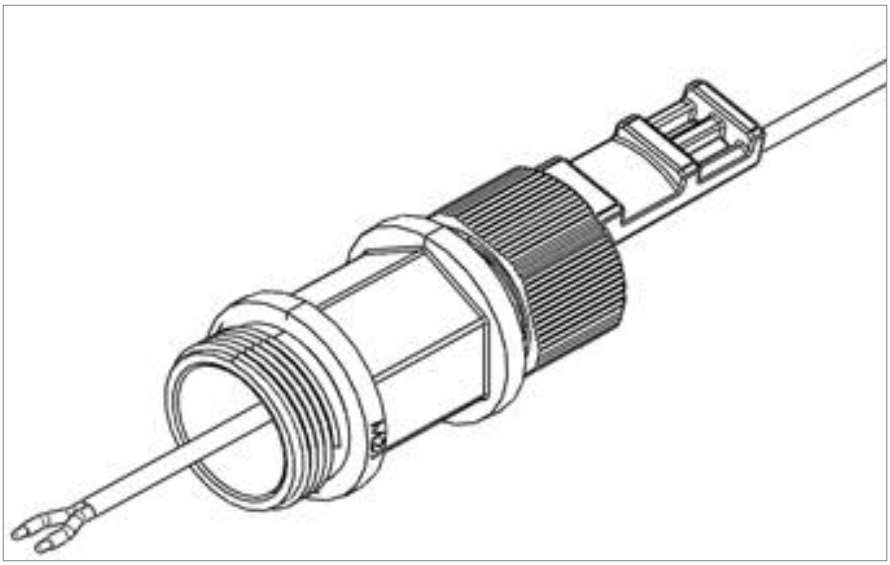
The DC power cable and connector must be ordered separately. See DC Cable and Connectors.

To connect a DC power cable:

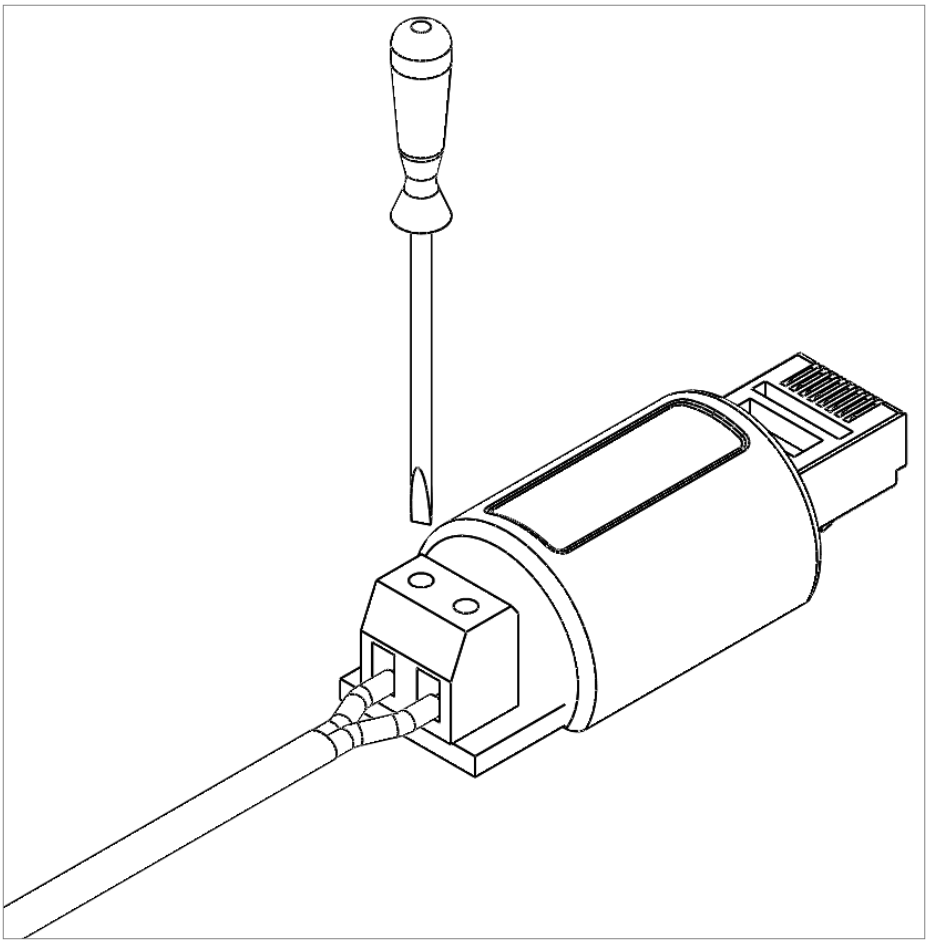
1. Strip off 45 mm from the cable jacket.
2. Expose 10 mm at the edge of each of the two wires.



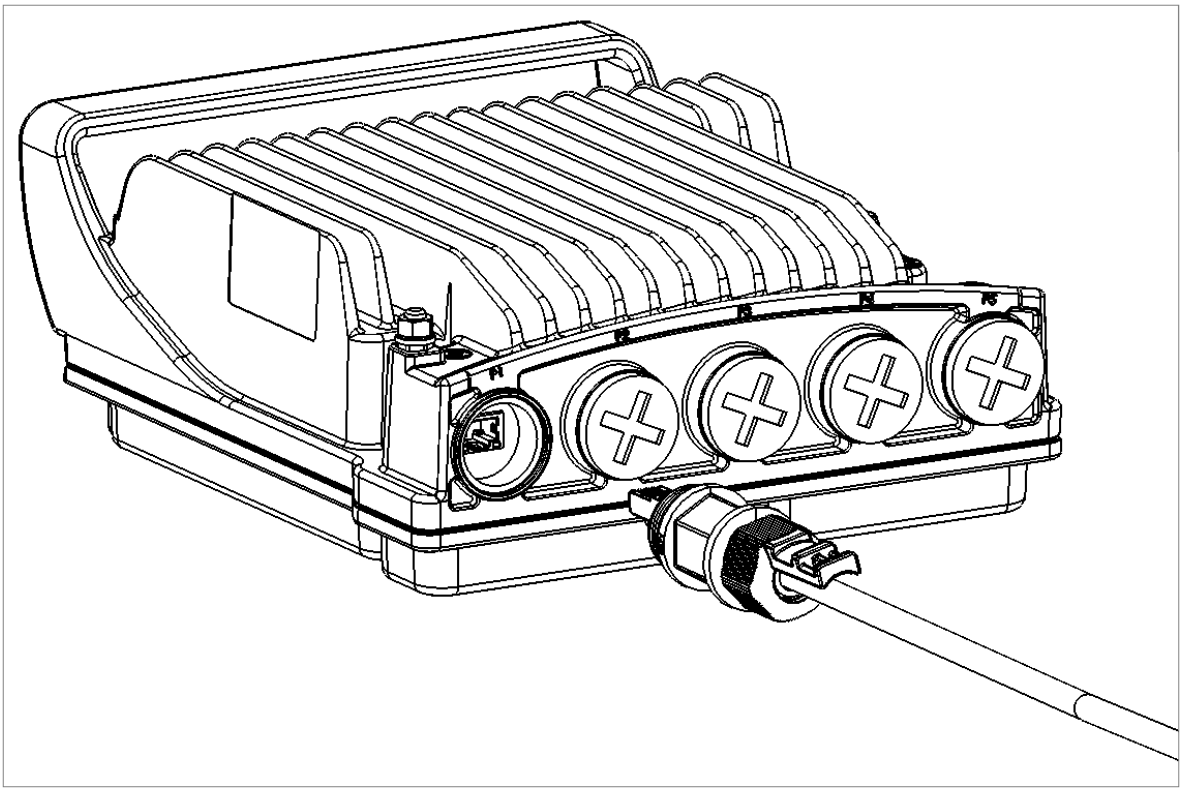
3. Insert the power cable into the gland.



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



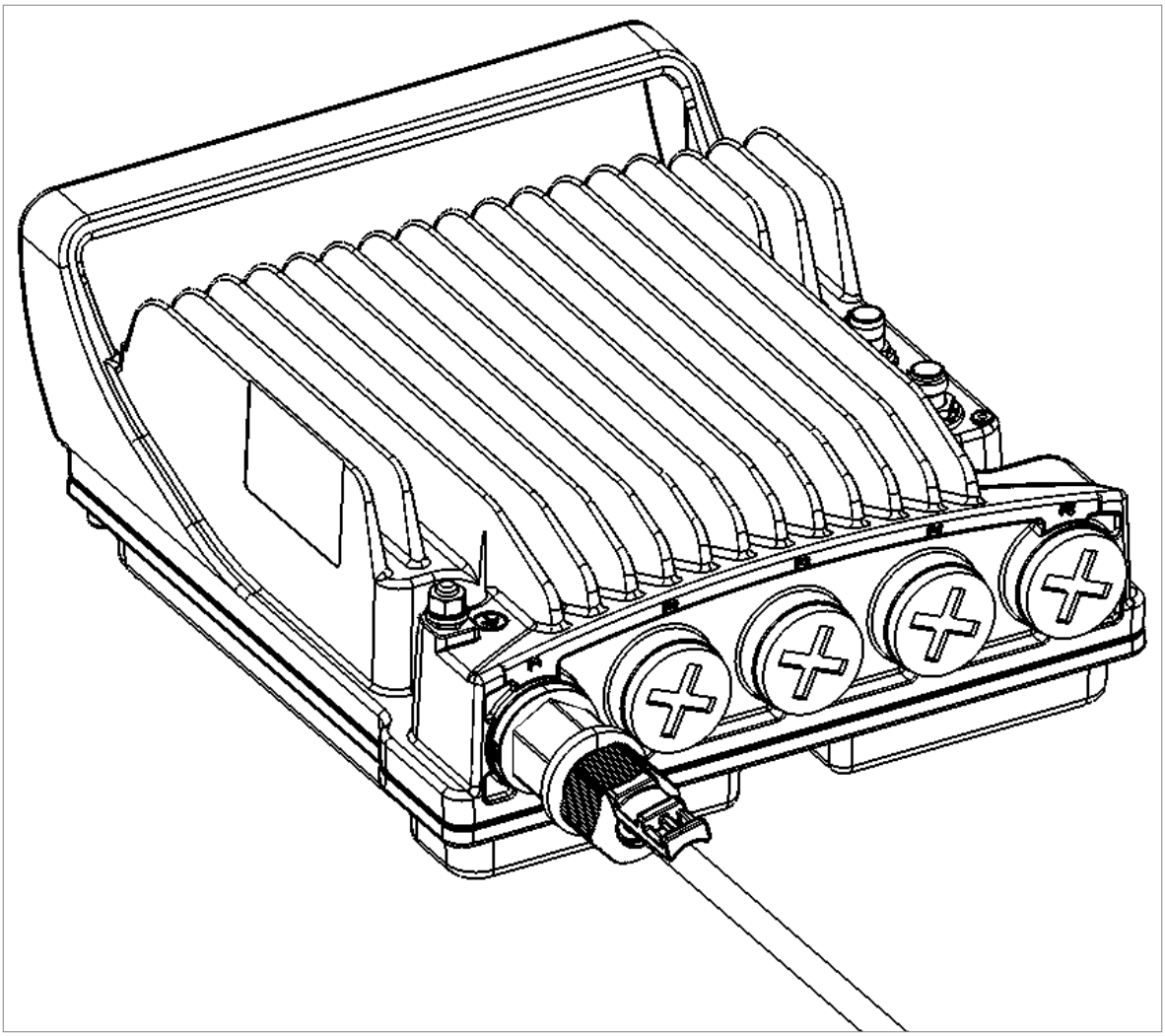
6. Plug the power cable with connector into the P1 port.



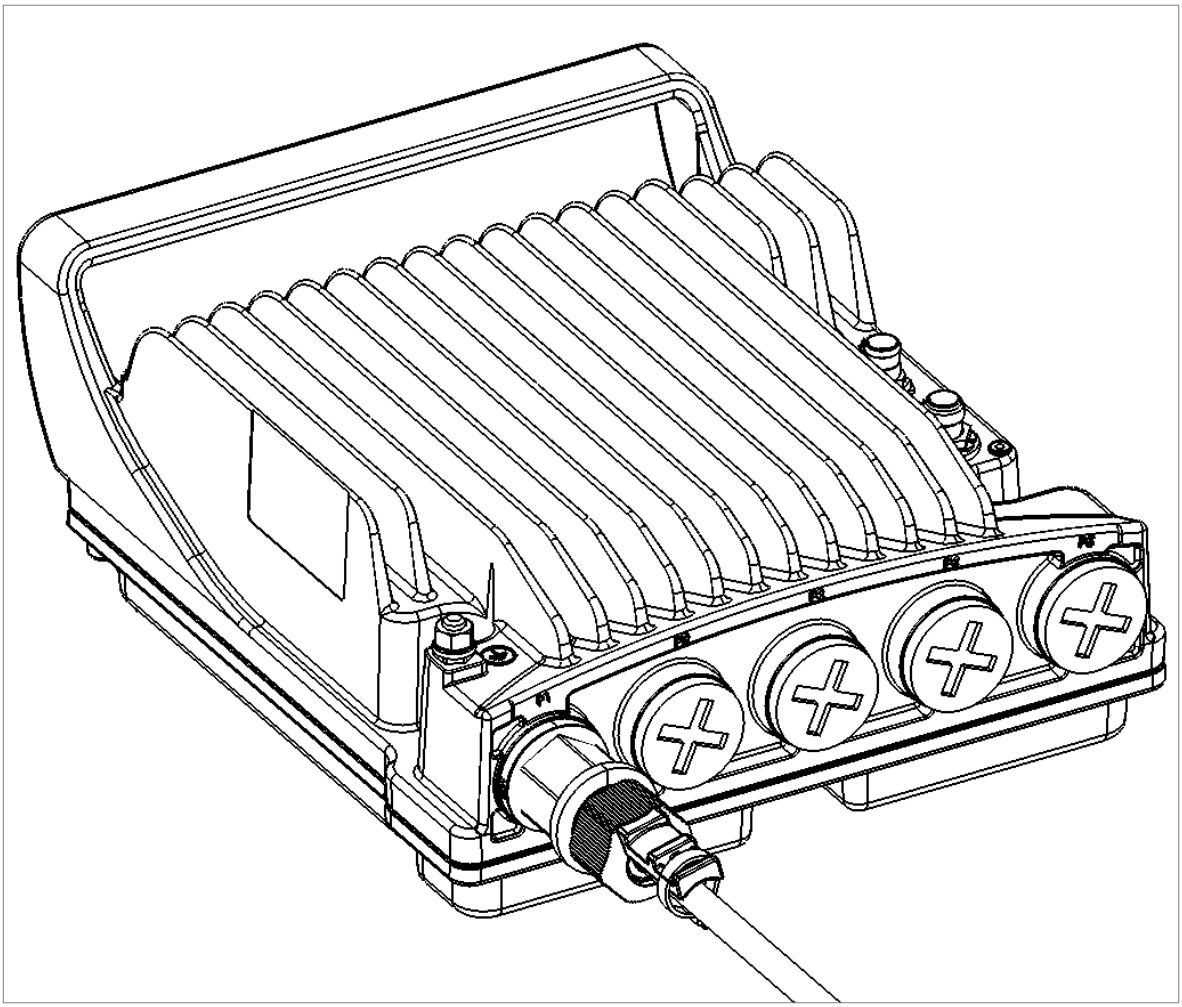
7. Screw the gland into the RFU.

Note:

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



8. Tighten the gland cap.
9. Secure the cable to the gland with a tie wrap.



Connecting a Coaxial Power Cable

You can power the RFU-SX using a coaxial cable with an N-type connector. This requires a special adaptor that converts the N-type connector to a two-wire DC connector that can be used with the standard RFU-SX gland and power connector to connect to the RFU-SX's P1 interface.

Table 26 *N-Type to DC Cable Adaptor*

Marketing Model	Description
N-type_to_48V_DC_adaptor	DC POWER ADAPTOR N-type to DC Cable (Open End) 14AWG,30cm

Note:

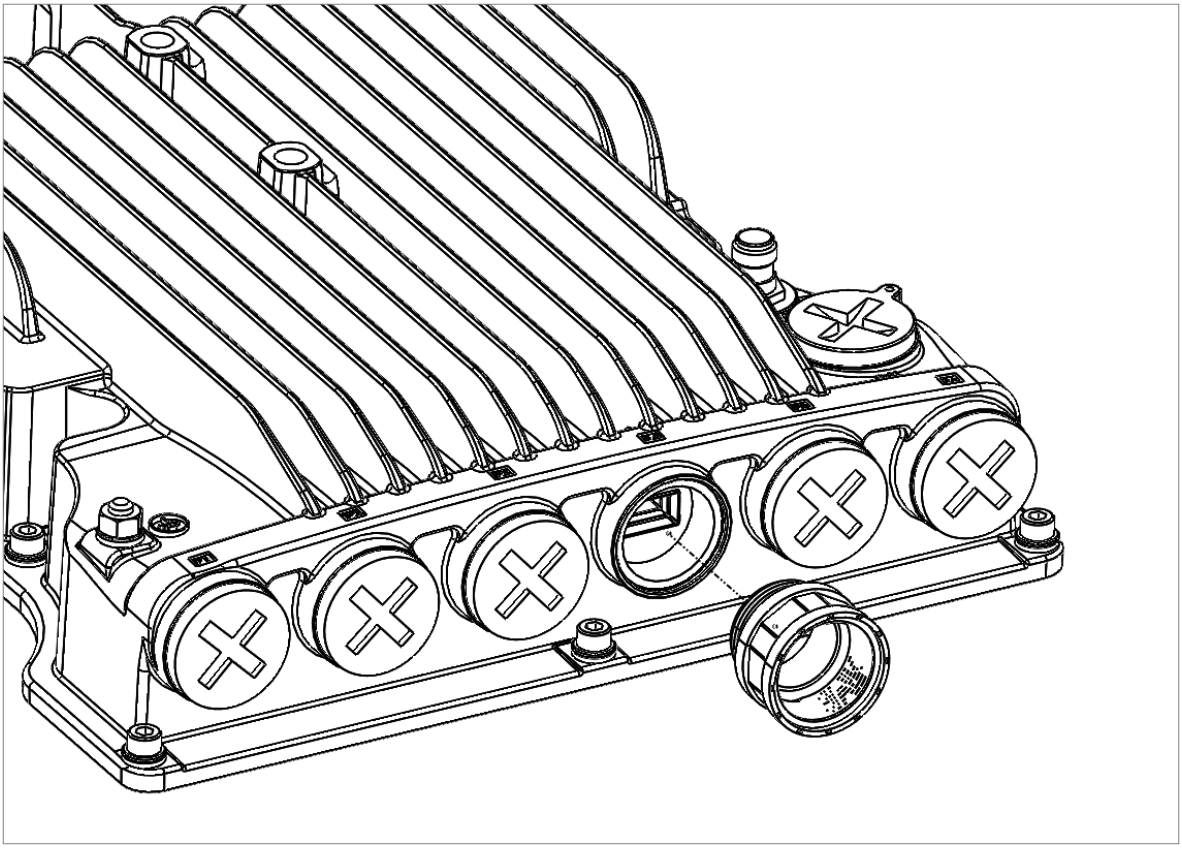
The DC power connector must be ordered separately. See DC Cable and Connectors.

To connect a coaxial power cable with an N-type connector:

1. Connect a gland extender to the power port (P1) until there is full contact between the gland extender and the RFU.

Note:

The gland extender must be ordered separately (*MA-3566-0*).

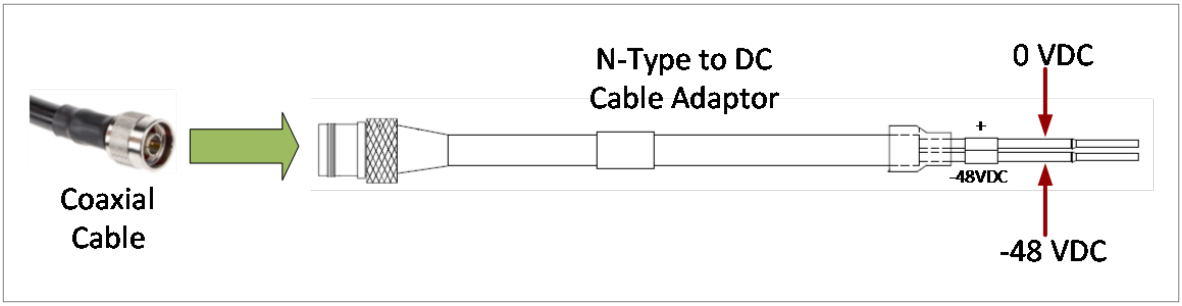


Before tightening the gland extender, make sure the gland extender is aligned with the tapped hole in the unit.

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

If the gland extender thread is damaged do not use it!

2. Connect the N-type end of the coaxial cable to the N-Type to DC Cable Adaptor.



3. Use shrink wrap or tape to seal the connection between the end of the coaxial cable and the adaptor. It is very important to ensure that this connection is water-tight. You can either use weatherproof shrink-wrap or butyl rubber tape with vinyl electrical tape. These options and their marketing models are listed in Table 27.

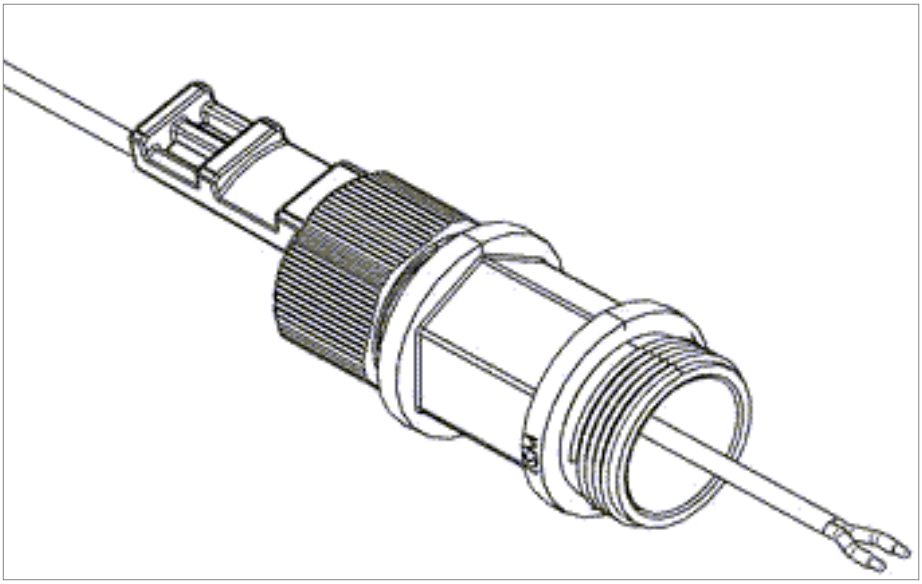
Note:

If the N-type connector is angled, you will need to use tape rather than shrink wrap to seal the connection and ensure that it is water-tight. In addition, for angled connections, make sure to secure both the cable and the adaptor such that there is no pressure on the connection.

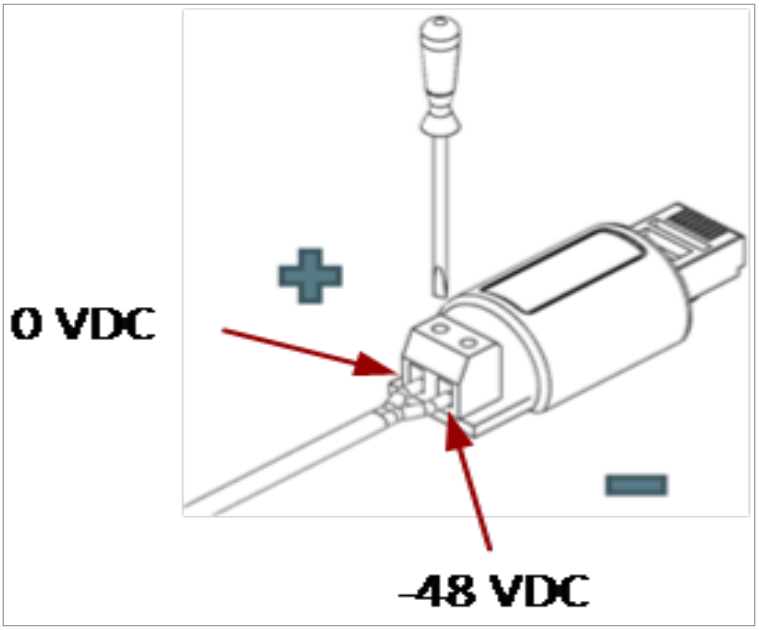
Table 27 *Materials for Watertight Connection of Coaxial Cable and Adaptor*

Marketing Model	Description
Weatherproof shrink 6mm	Cold Shrink Tubing from 24mm to 6mm, L=210mm
Butyl Rubber Tape 24 in	Butyl Rubber Tape, 24 in
Vinyl Electrical Tape Scotch	Commercial Grade Vinyl Electrical Tape.Scotch 700

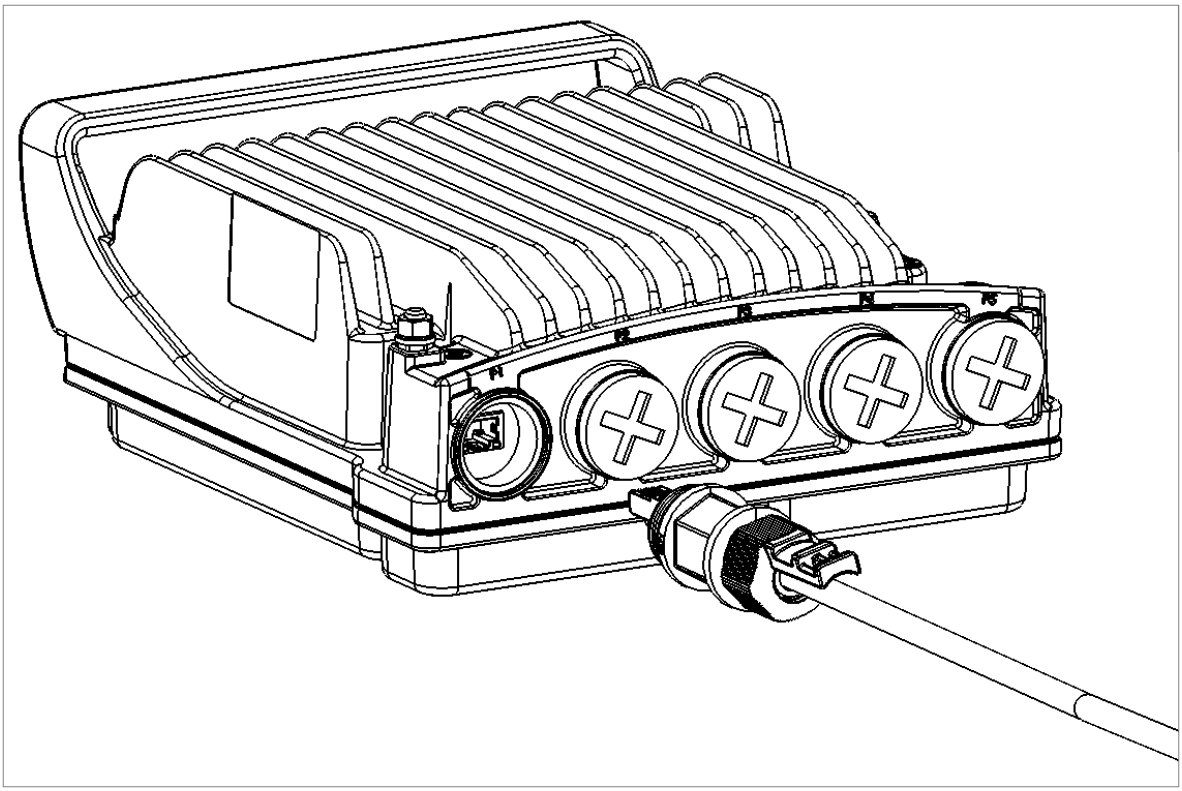
4. Insert the power cable into the gland.



5. Insert the power cable wires into the power connector. Connect the wire marked -48 VDC to pin #1 (-) of the power adaptor. Connect the wire marked 0 VDC to pin #2 (+) of the power adaptor. Tighten the screws with a flat screwdriver.



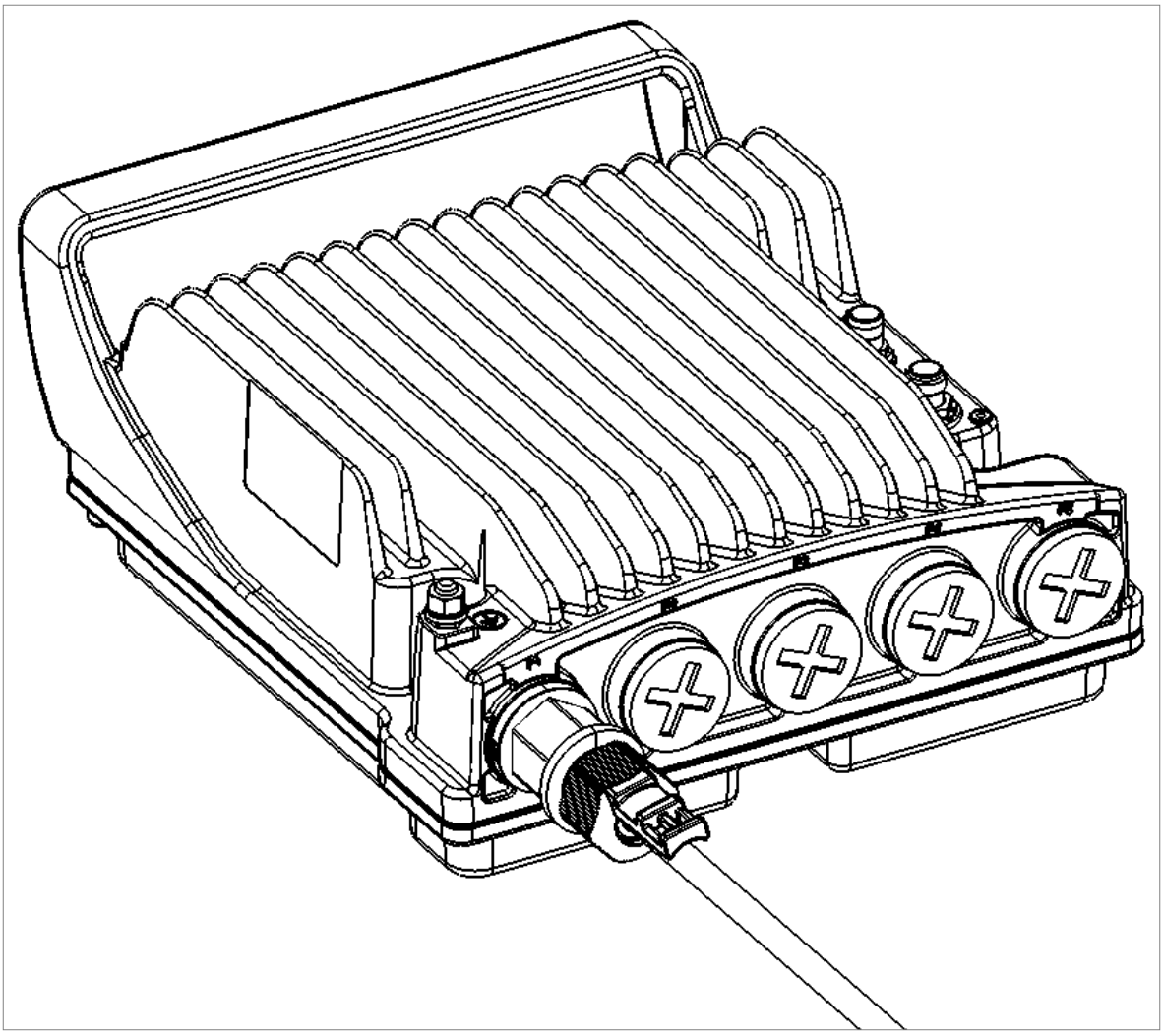
6. Plug the power cable with connector into the P1 port.



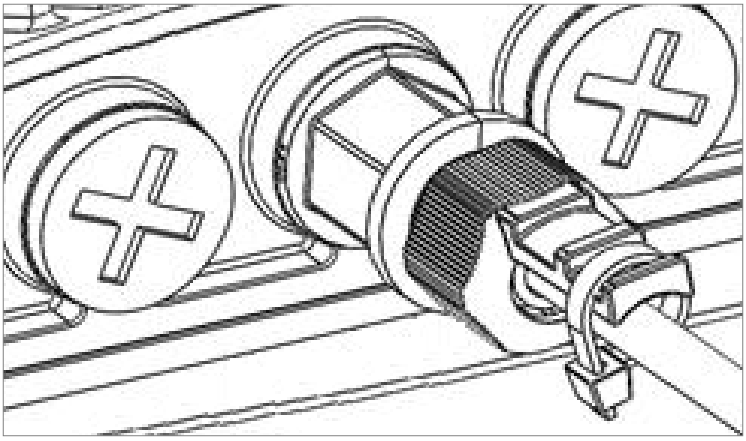
7. Screw the gland into the RFU.

Note:

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



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



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

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

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

Note:

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

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

Note:

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

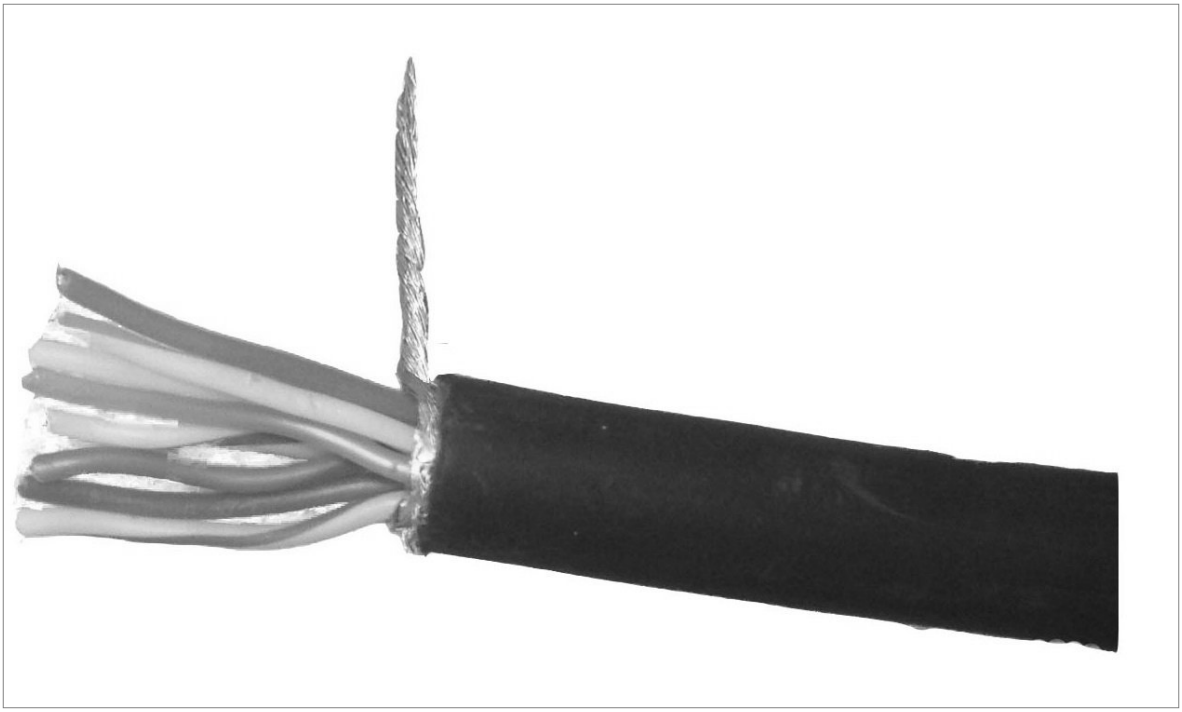
Table 28 *Materials for Preparing Ethernet Data Cables*

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
N000082L016A	PTP 820 CAT5E Outdoor 100m drum
CAT5E_SFUTP_Outdoor_305m_drum	CABLE,MATERIAL,CAT-5E,SFUTP,4X2X24AWG,UV RESISTANCE,305M
N000082L014A	PTP 820 Glands_x5_KIT
N000082L173A	Universal Grounding Kit up to 1/2” cable
N000082L073A	PTP 820 GBE_Connector_kit

Use the appropriate connector according to the cable type used. For the PoE connection (P1) , the cable type depends on the cable length. For details see Maximum Cable Length.

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

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

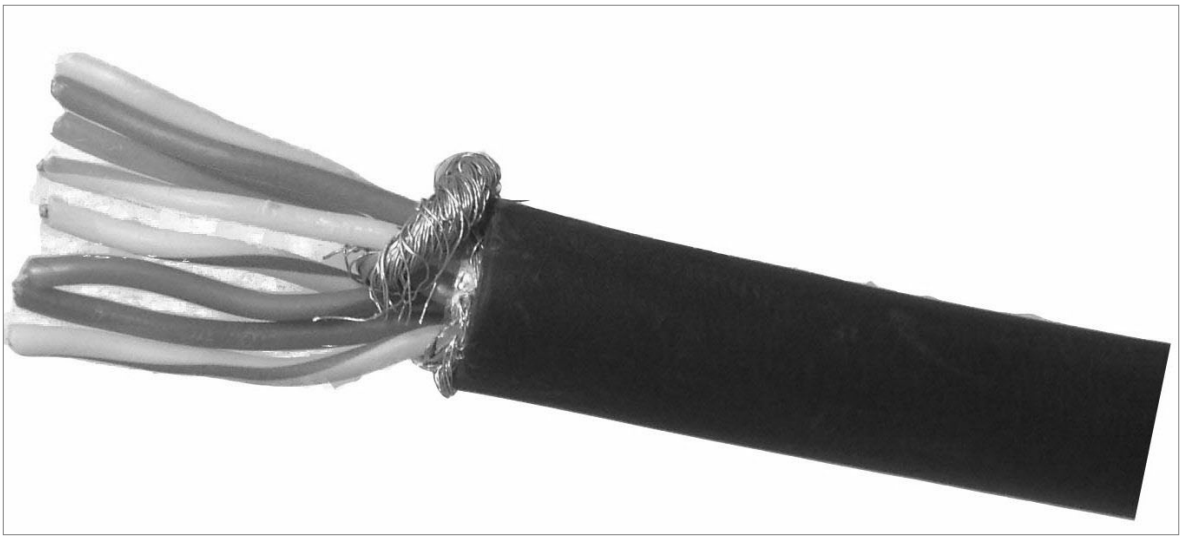


4. Roll back the foil shield insulation and wrap the drain wire around the foil. Do not remove any insulation from the conductors.
5. Align the colored wires.

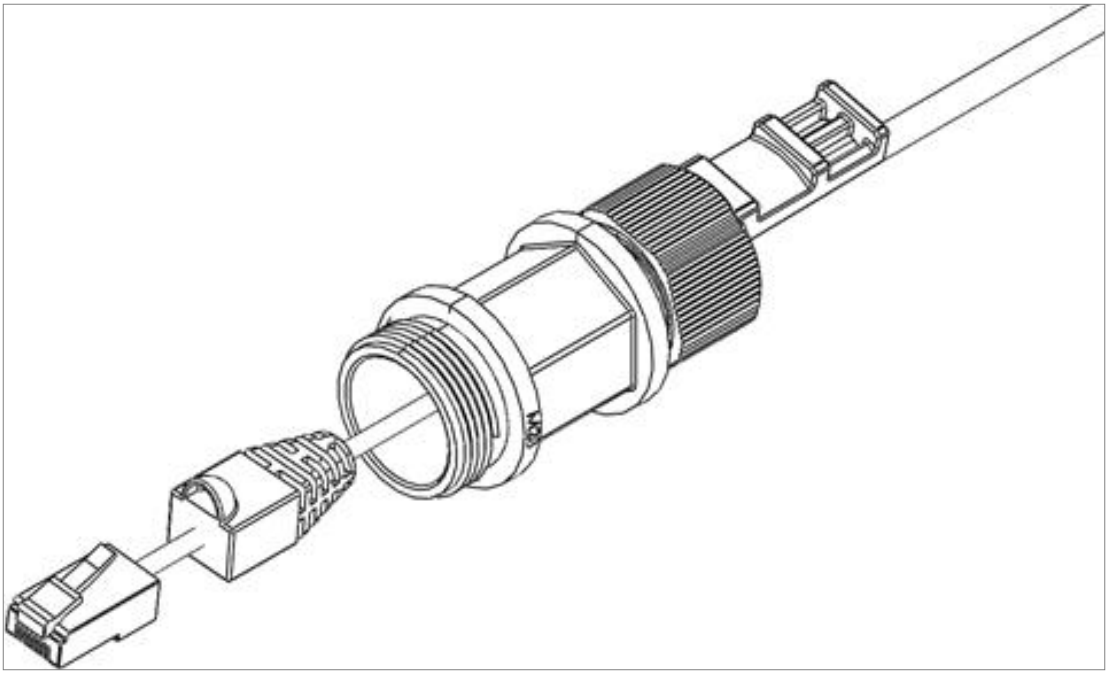
Note:

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

6. Trim all wires to the same length. About 12 mm on the left should be exposed from the inner sheath.
7. Separate the wires and place the twisted shield between the separated wires.



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

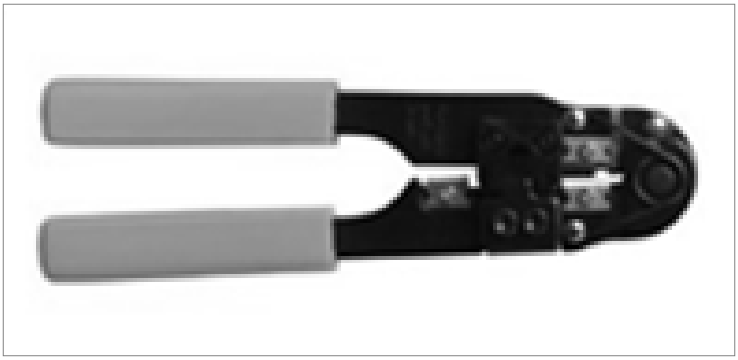


10. Wrap the twisted braid firmly around the cable jacket and let the crimping tail of the RJ45 plug envelop it.

Note:

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

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



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

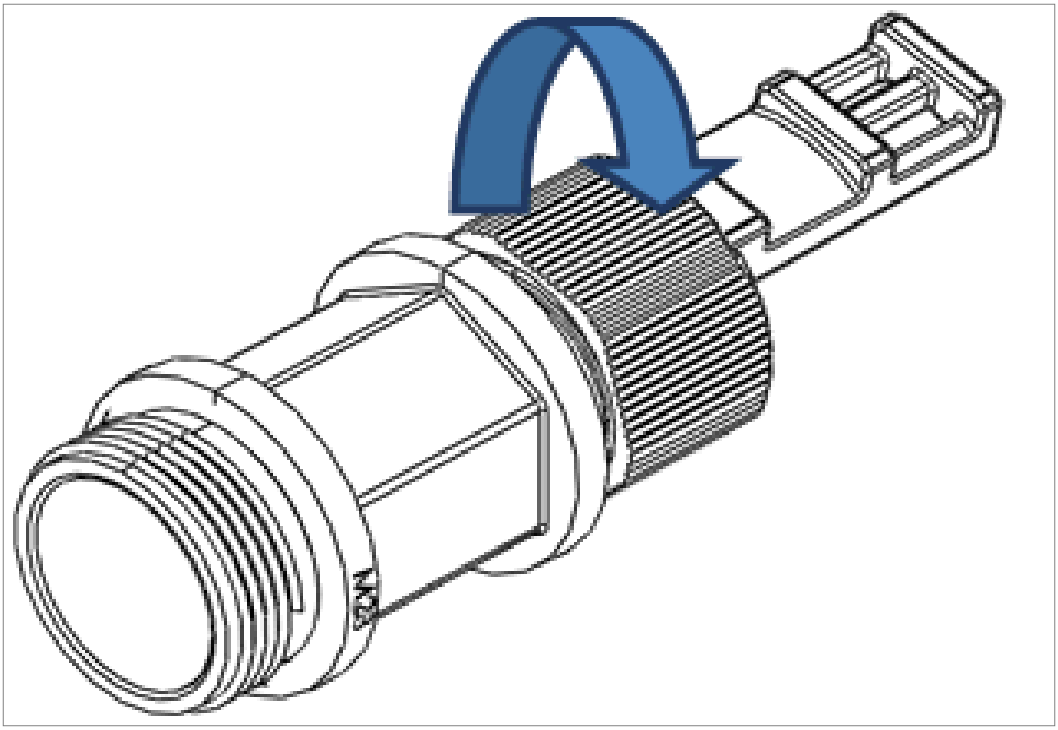
Note:

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

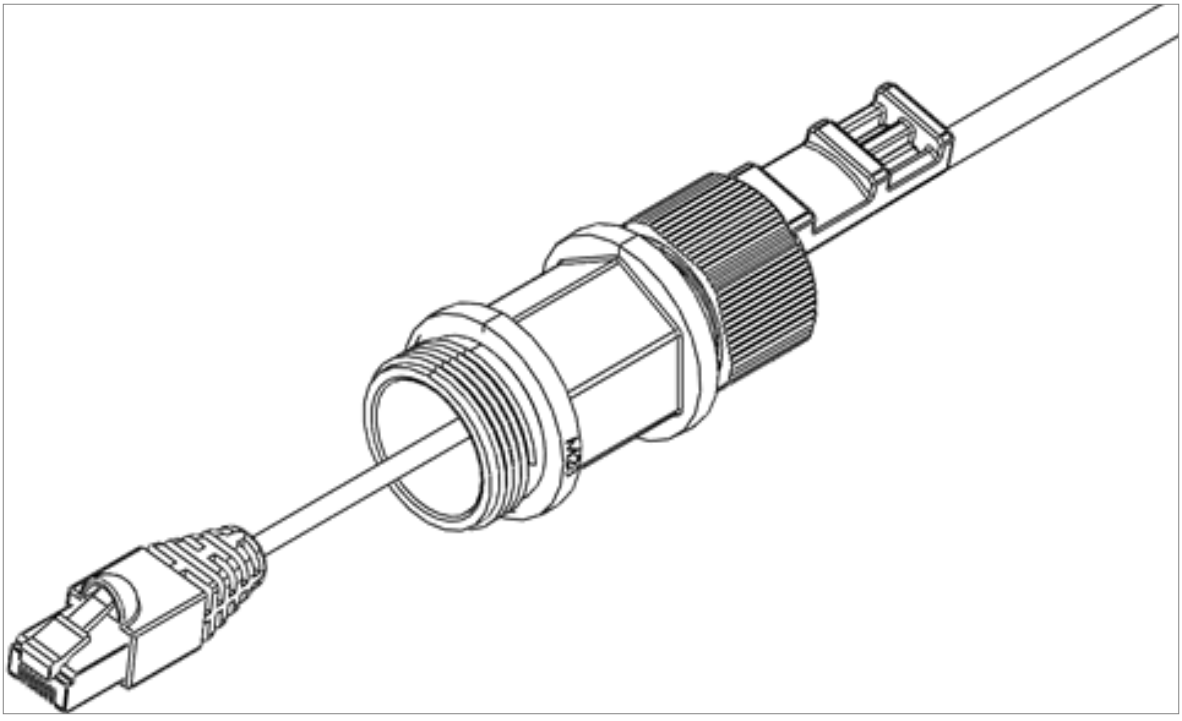
Preparing the CAT-5e or CAT-6 Data Cable Already Assembled

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

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



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

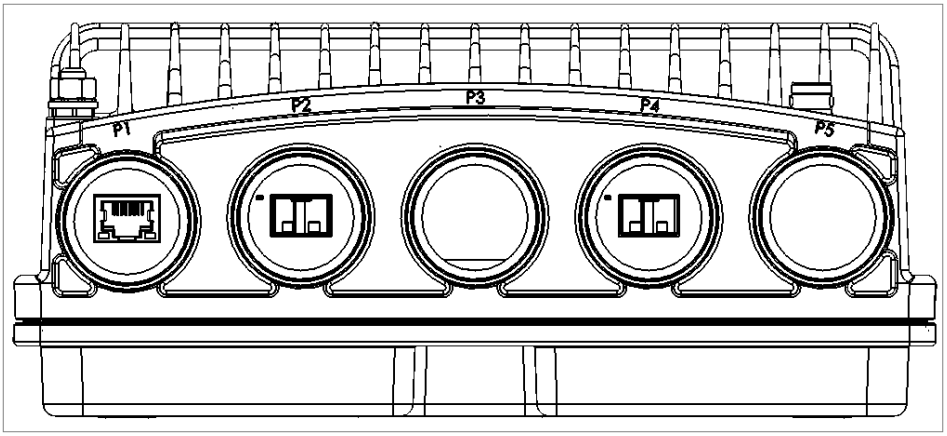


3. Insert the CAT-5e or CAT-6 cable into the gland body.

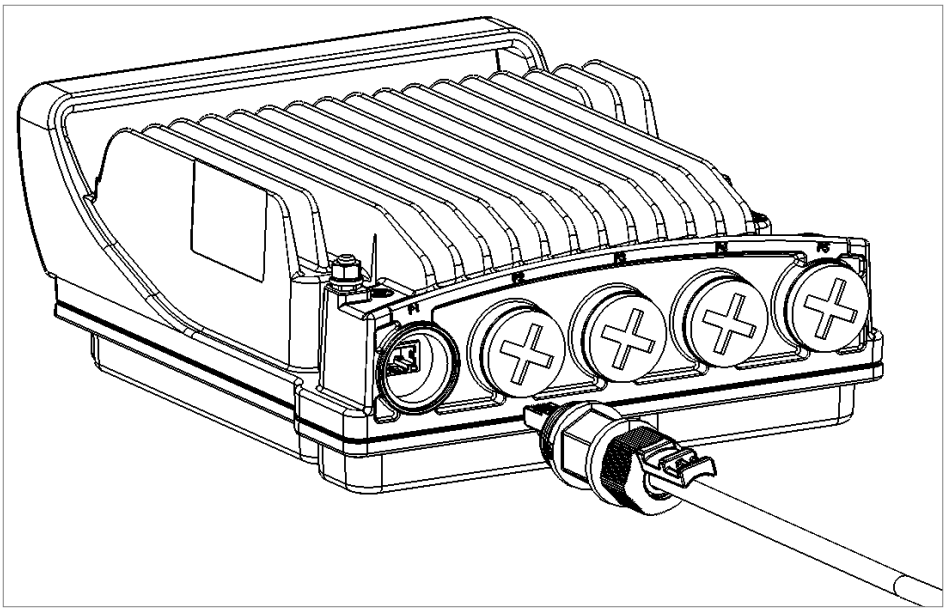
Connection of CAT-5e or CAT-6 Cable to RFU-SX

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

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



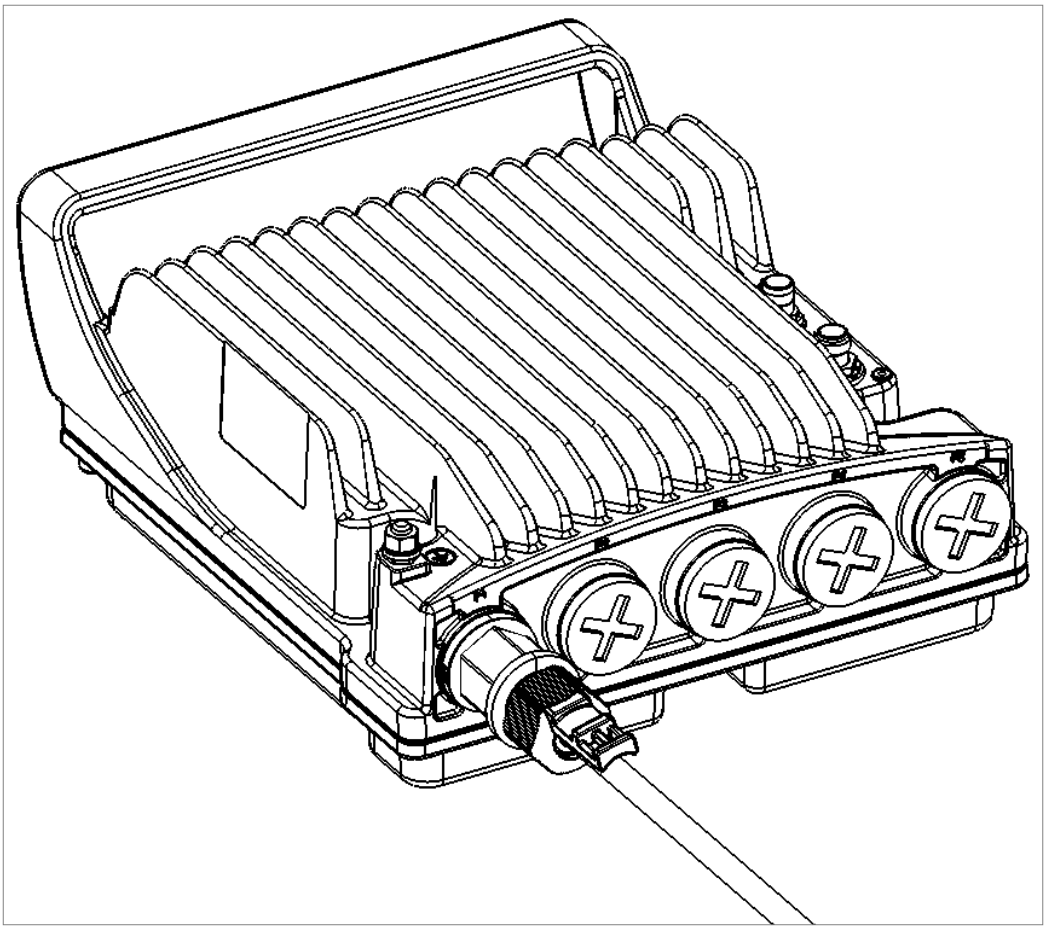
2. Connect the cable to the RFU-SX.



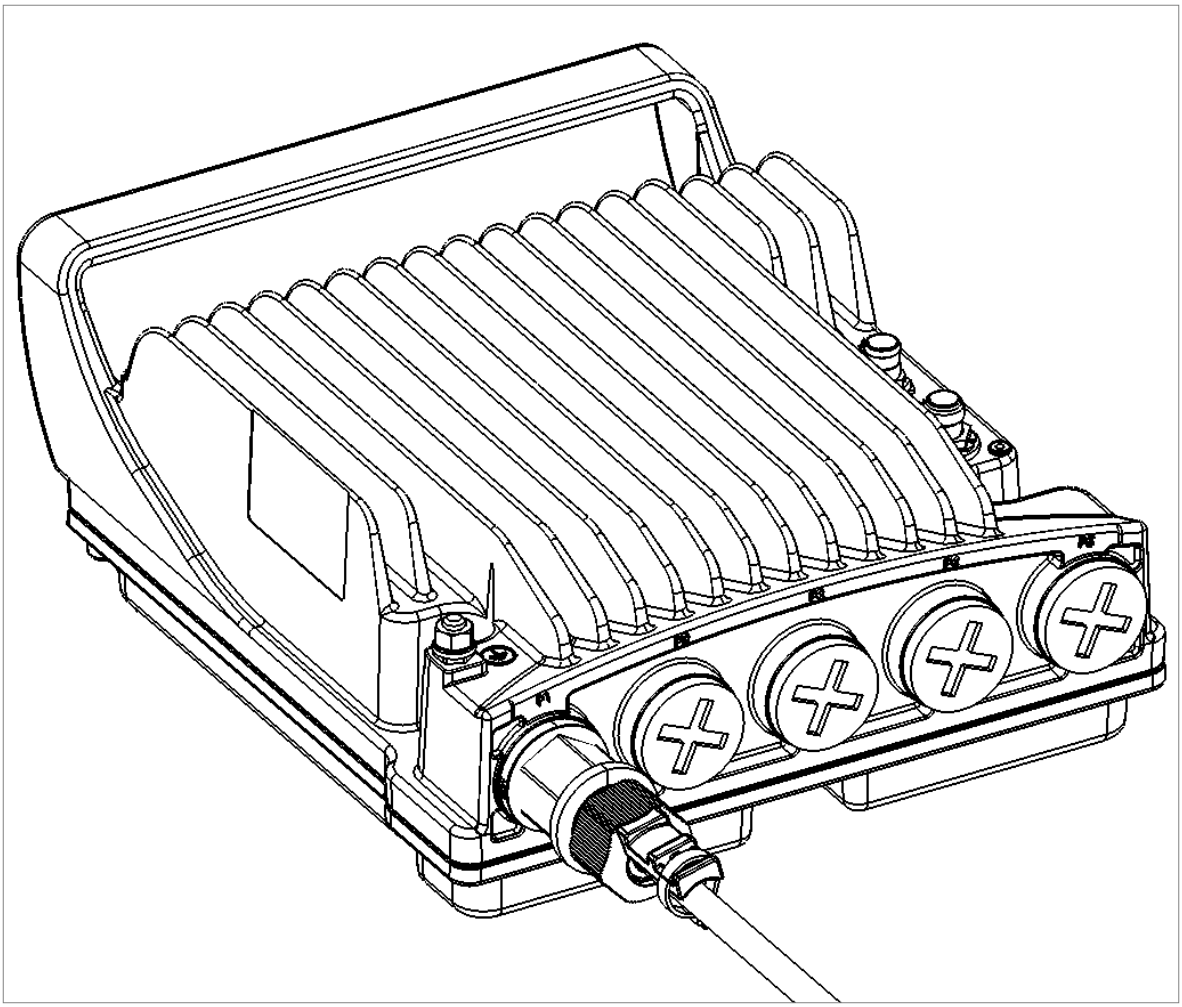
3. Screw the gland into the RFU.

Note:

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



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



Checking Electrical Ethernet Cables

Note:

This procedure cannot be used when the RFU is connected to the IDU via RFU2/Eth8 on the TCC-U front panel.

When using electrical Ethernet cables to connect the RFU with the IDU, it is strongly recommended to run a special CLI command to check that the cable is functioning properly. This command is recommended for electrical cables longer than 10m.

To run this command, you must first enter radio-unit view for the RFU you want to check. To enter radio-unit view, enter the following command in root view:

```
root> radio unit slot <slot> port <port>
```

For example, to check the cable connected to RFU interface 1 of a RIC-D in slot 5, enter the following command:

```
root> radio unit slot 5 port 1
radio-unit [5/1]>
```

Once you are in radio-unit view, enter the following command to run the cable checking operation:

```
radio-unit [x/x]>cable-bist-run
```

Note:

Running this command affects traffic and resets the RFU. If you need to run the command a second time, you must wait until the RFU comes back up. This usually takes from three to five minutes.

After running the cable-bist-run command, and once the RFU comes back up, it is recommended to run the following command (also in radio-unit view), to ensure that traffic is passing through the cable and interfaces properly:

```
radio-unit [x/x]> show counters
```

The result of the cable-bist-run command should be Pass in every row. If any Fail result occurs, the following troubleshooting steps are recommended:

1. Run the test again, after the RFU comes back up.
2. Verify that the cable is physically secure. You should be able to lightly move or shake the cable without triggering an alarm in the system.

If the test continues to produce Fail results, perform the following additional troubleshooting steps:

1. Verify that all grounding has been properly installed according to the Installation Guide for the RFU you are using, including both RFU grounding and cable grounding.
2. Verify that the cable specifications are consistent with the cable specifications listed in the Installation Guide for the RFU you are using.
3. Verify that the RJ-45 connection was installed in according with the instructions for connecting Cat5e cables described in the Installation Guide for the RFU you are using.
4. Replace the cable.

RFU-SX Startup Troubleshooting Procedure

It normally takes about two minutes from power-up until the RFU-SX is up and operational. During this time, the RFU resets itself several times as the RFU software aligns itself with the IDU software.

If after two minutes the Operational Status of the slot connected to the RFU is not **Up**, or if the Status LED on the RFU-SX has not stabilized on Green, the following steps should be performed *together*:

- Restart the RIC-D connected to the problematic RFU-SX. This is performed in the Chassis Configuration page of the Web EMS or by using the following CLI command:

  ```
  root> platform shelf-manager card reset slot <slot>
  ```

- Physically disconnect the power to the RFU, wait five seconds, then reconnect the power.

Wait another two minutes for the Operational Status of the RFU-SX to stabilize as **Up**. If again the RFU-SX fails to stabilize, it is recommended to wait an additional 20 minutes for the automatic recovery mechanism to establish the IDU-RFU connection.

Generic Installation Procedures

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

Torque Requirements

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

When fastening components, use the following torque, according to screw type:

- M3: 0.97 Nm
- M4: 2.27 Nm
- M5: 4 Nm
- M8: 16.3 Nm ±0.6 Nm

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

- 6 GHz: M5/#10-32: 3.5 Nm
- 7/8-15 GHz: M4/#8-32: 2.5 Nm
- 18-38 GHz: M3/#4-40: 1 Nm

When changing the orientation of the twist, use torque of 0.9 ± 0.1 Nm when fastening the two screws on the twist.

Installing the Diplexer Unit on the Radio

For frequencies of 6 to 15 GHz, the RFU-SX 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.

In addition, when connecting the diplexer to the radio, the 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.

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	Marketing Model
1	RFU-SX Basic Radio Unit	1	See Section RFU-SX Marketing Models
2	RFU-SX Diplexer Unit	1	See Section RFU-SX Marketing Models

Required Tools

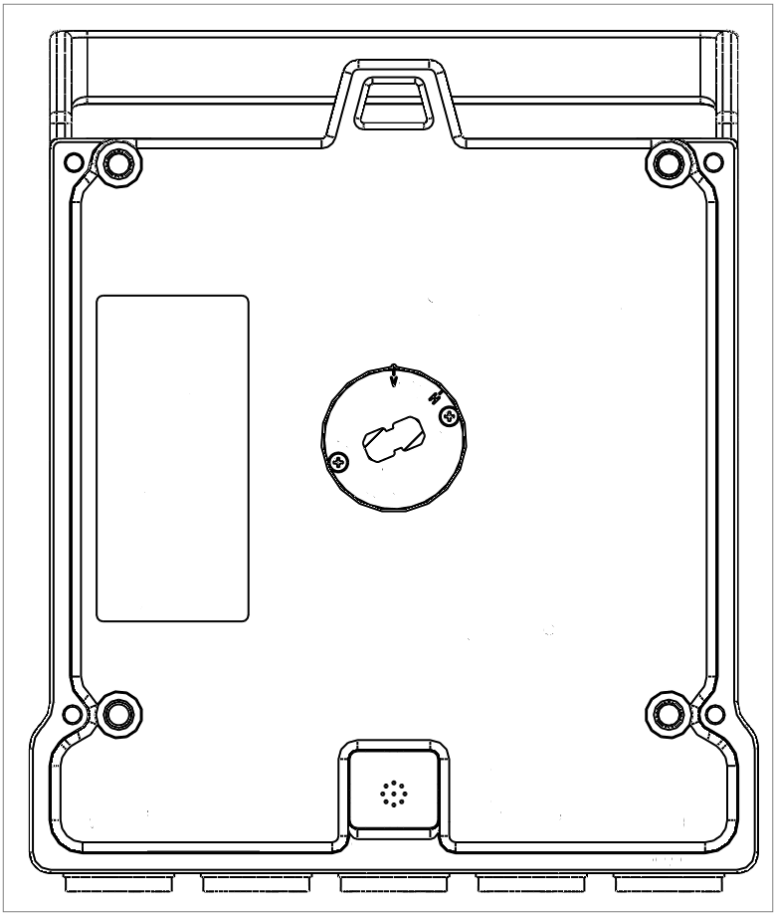
- Torque Wrench With Metric Hexagon Socket Key Wrench #4 (Allen Key)

Procedure

Note:

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

Figure 16: *Transparent Pressure Windows*



Note:

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

Figure 17: *Horizontal / Vertical Pole*

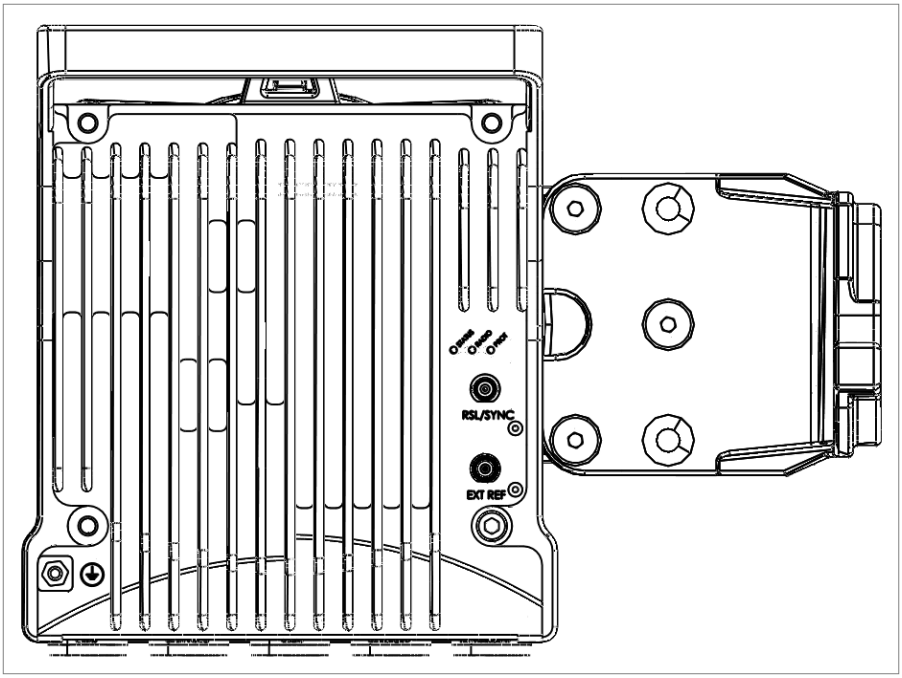
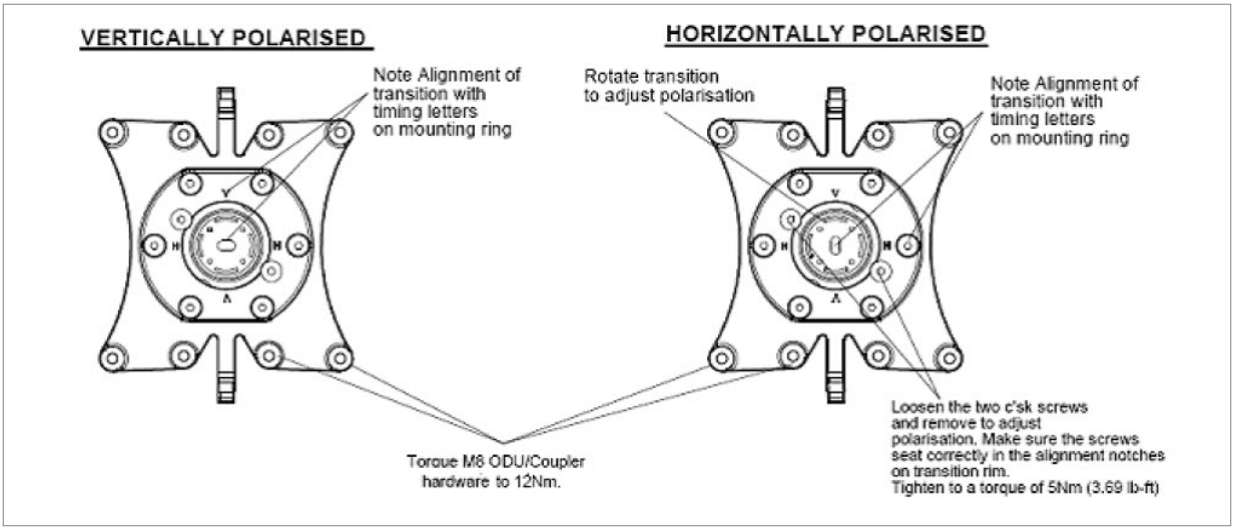
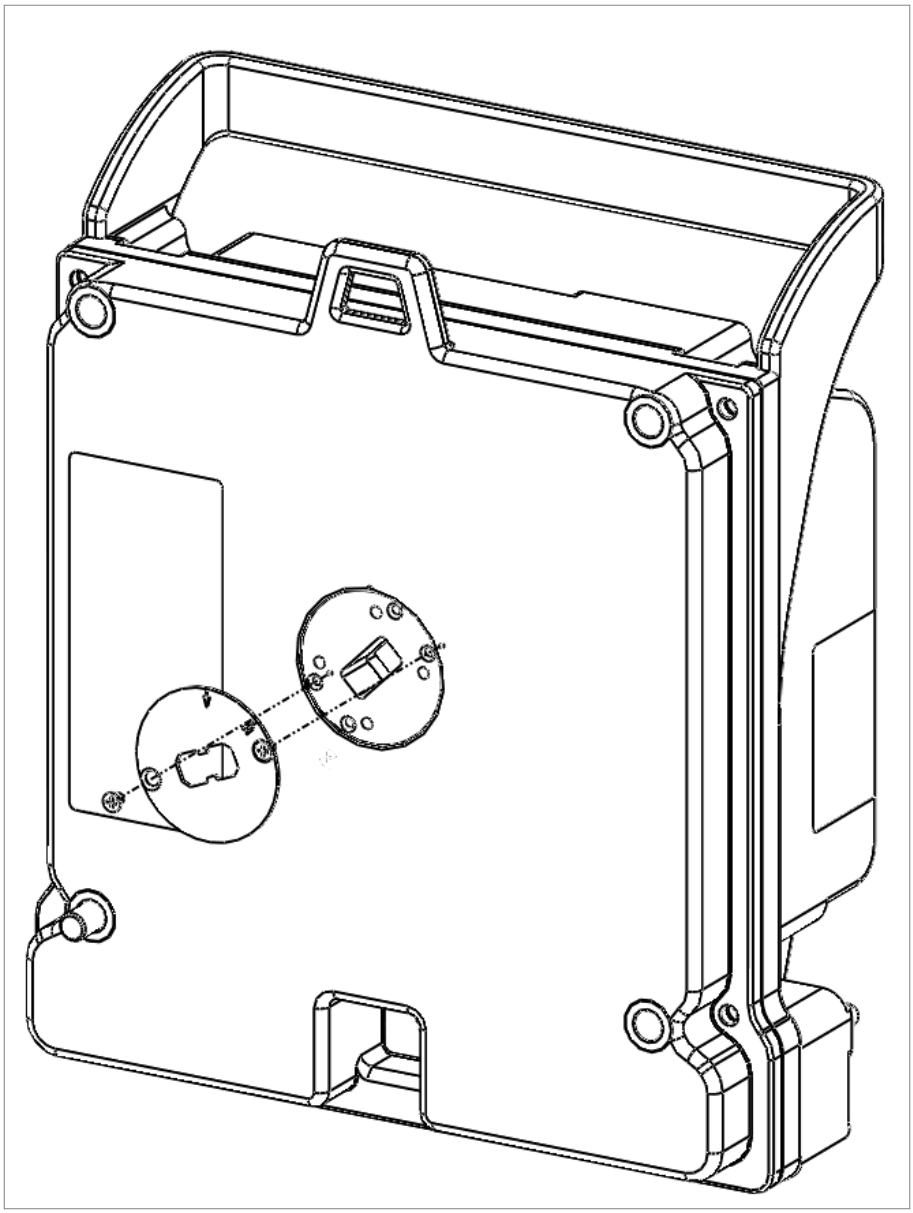
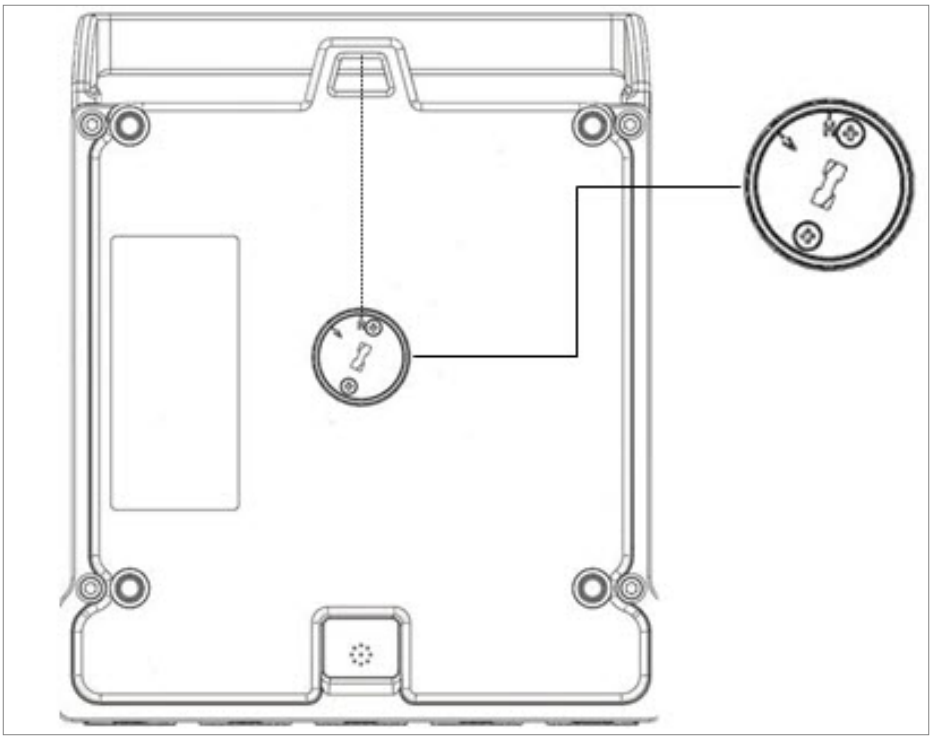


Figure 18: *Twist Orientation*

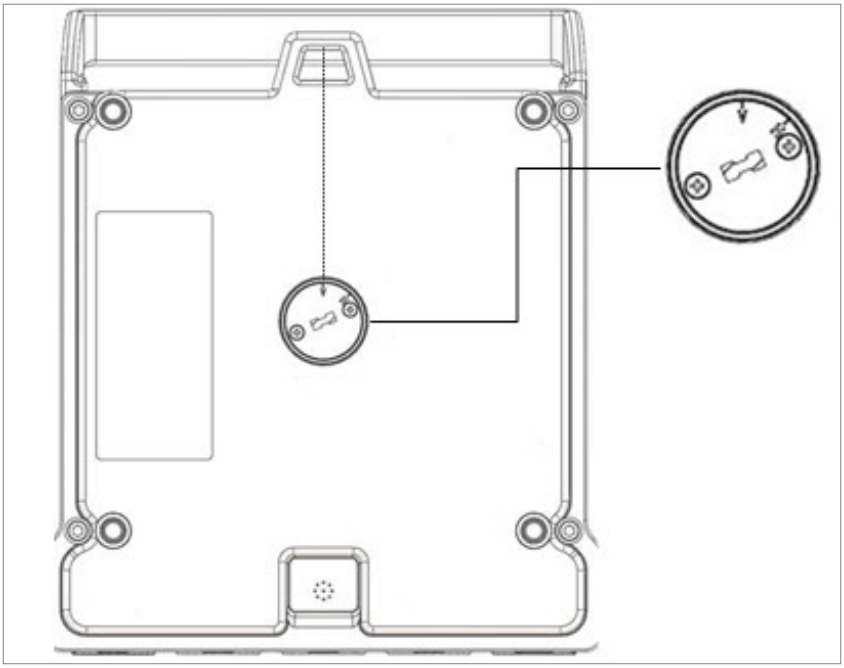




- For horizontal polarization, locate the twist with the letter “H” vertical to the hook cover and fasten the two screws.



- For vertical polarization, locate the twist with the letter “V” vertical to the hook cover and fasten the two screws.



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

2. Align the RFU-SX diplexer unit to the RFU-SX radio unit using the two alignment pins located on TRX ports of RFU-SX radio unit and secure using the four M5 screws supplied with the RFU-SX radio unit. Pay attention to the following important points:
    - Both the diplexer and the radio have sealing gaskets built in, as shown in the following figure. When you connect the diplexer to the radio, make sure both gaskets are sitting properly in their grooves, with no twists or tensions.
    - Make sure the small blue cable is straight and tucked underneath the diplexers so that it does not interfere with the assembly.

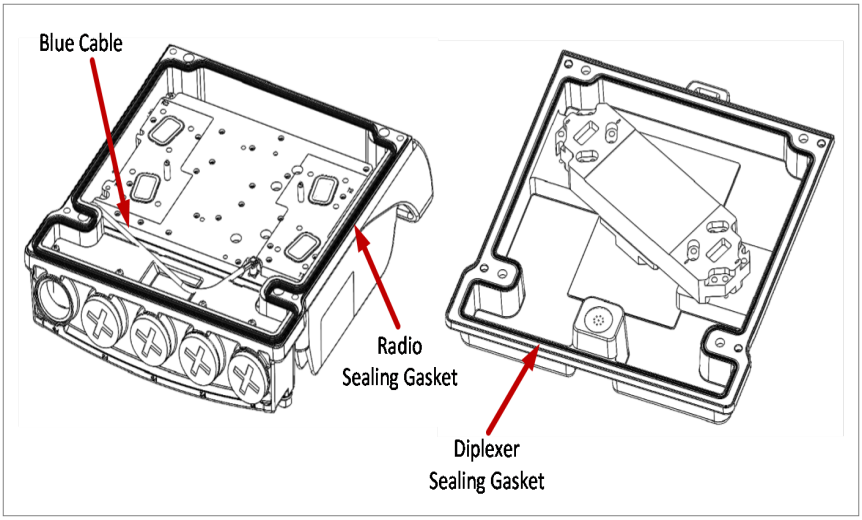
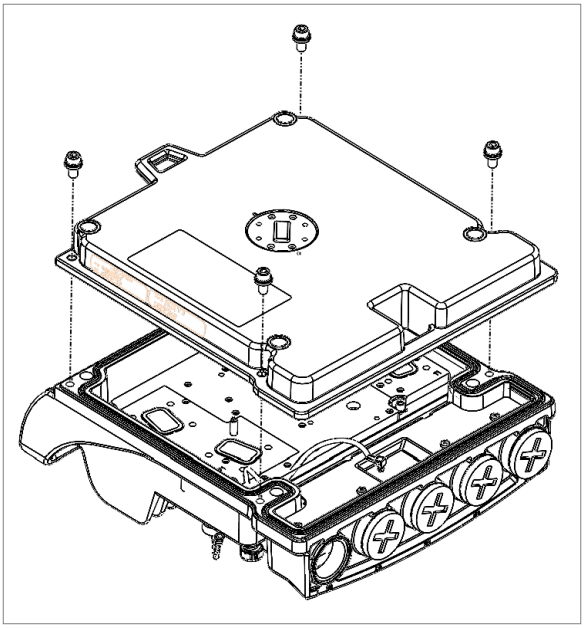
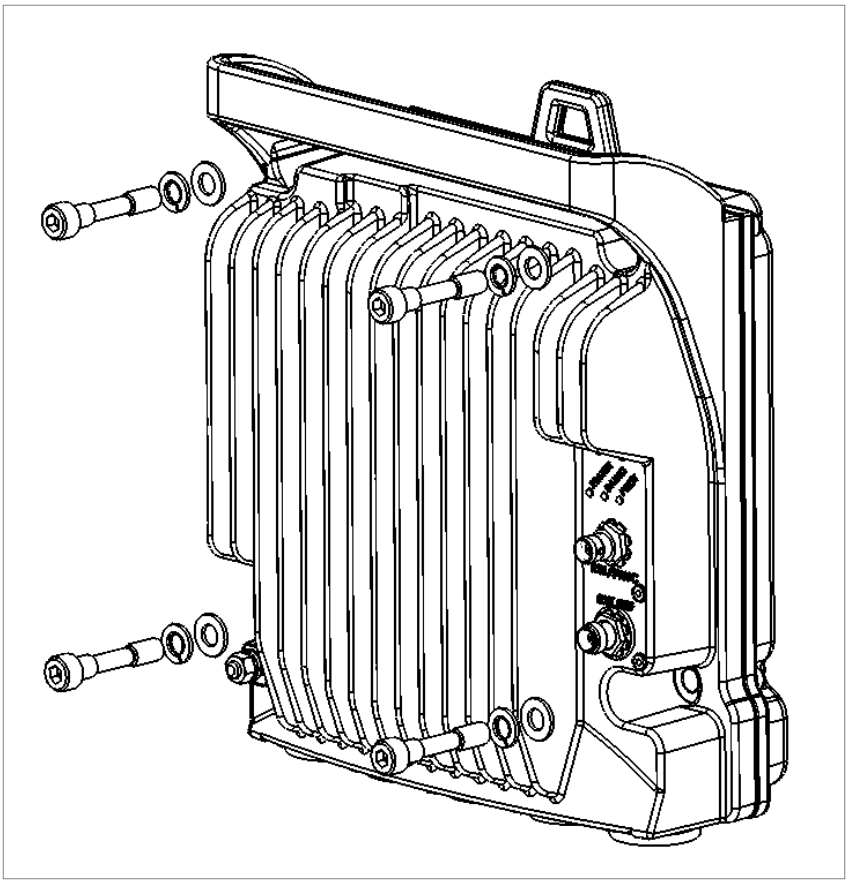


Figure 19: *Attaching the Diplexer*



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

Figure 20: *Mounting the Screws and Washers*



4. Proceed to install the RFU-SX in the desired configuration, as described in Installation Procedures per Configuration Type.

Pole Mount Installation

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

RFU-SX Pole Mount Procedure

List of Items

Item	Description	Quantity	Marketing Model
1	RFU-C POLE MOUNT KIT	1	RFU-C-POLEMOUNT

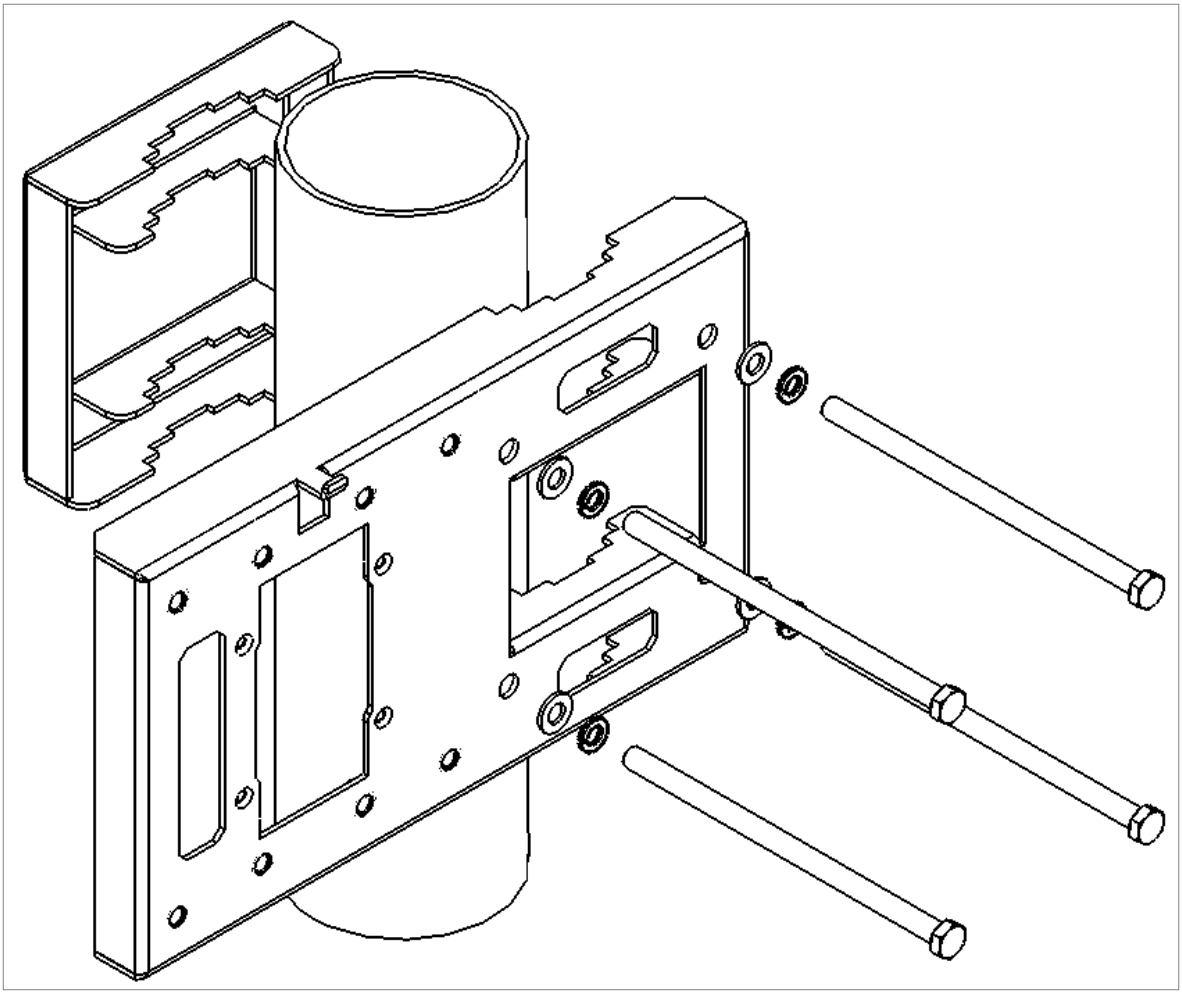
Required Tools

- Metric offset wrench key wrench set

Procedure

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

Figure 21: *Mount Pole Mount to Pole*



Remote Mount Installation for Single Polarization with an Imperial Waveguide

List of Items

Item	Description	Quantity	Marketing Model
1	RFU-SX RADIO	1	See Section RFU-SX Marketing Models
2	RFU-C ADAPTOR TO FLEX WG (IMPERIAL) KIT	1	ADPT_RFU-ff-RM_mill

Item	Description	Quantity	Marketing Model
3	RFU-C ADAPTOR REMOTE MOUNT KIT	1	RFU-ff-RM_ADAPT
4	FLEXIBLE WAVEGUIDE IMPERIAL KIT	1	WAVEGUIDE-fgf-xFT

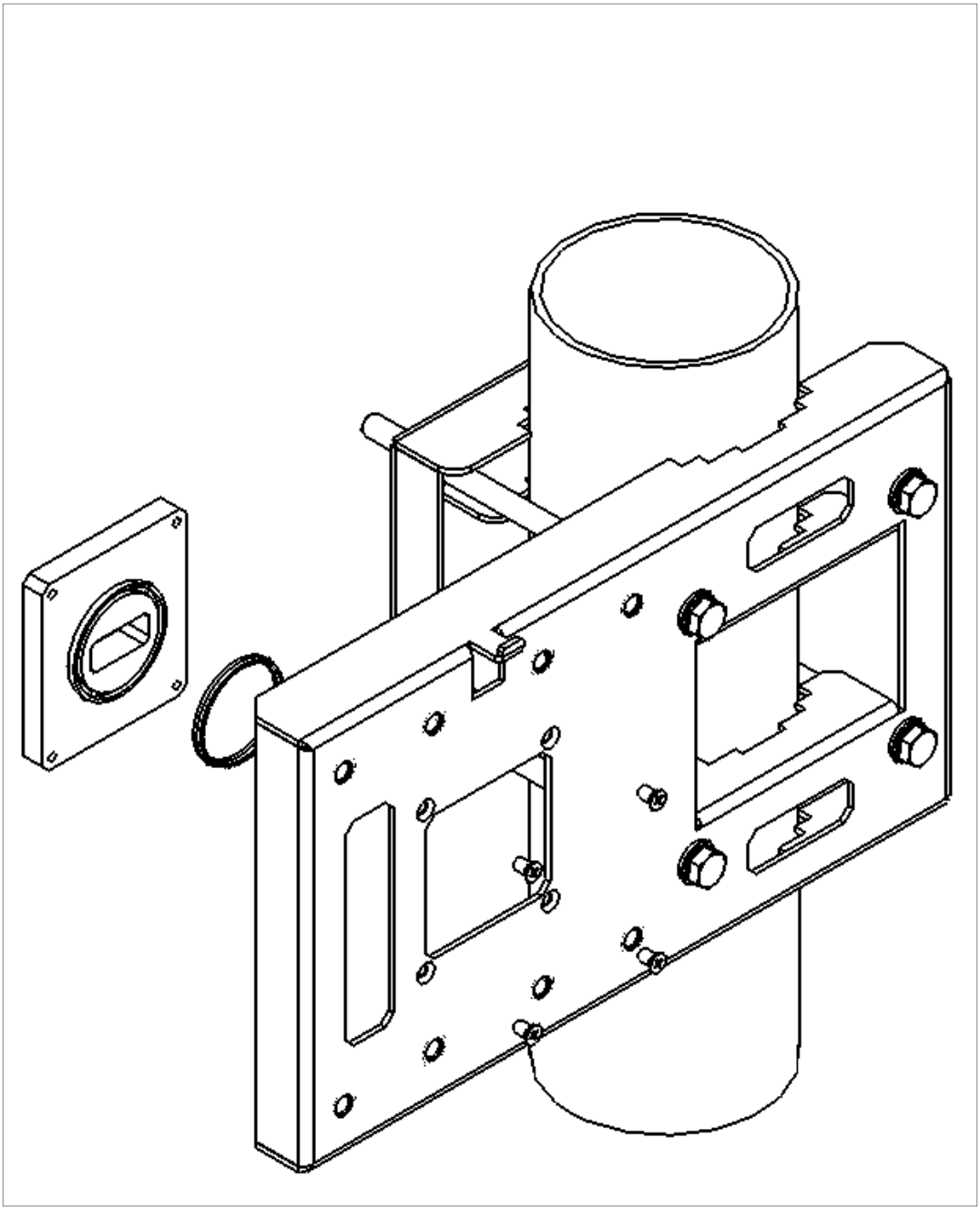
Required Tools

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

6-15GHz

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.

Figure 22: *Mount PTP 820S to Remote Pole Mount*

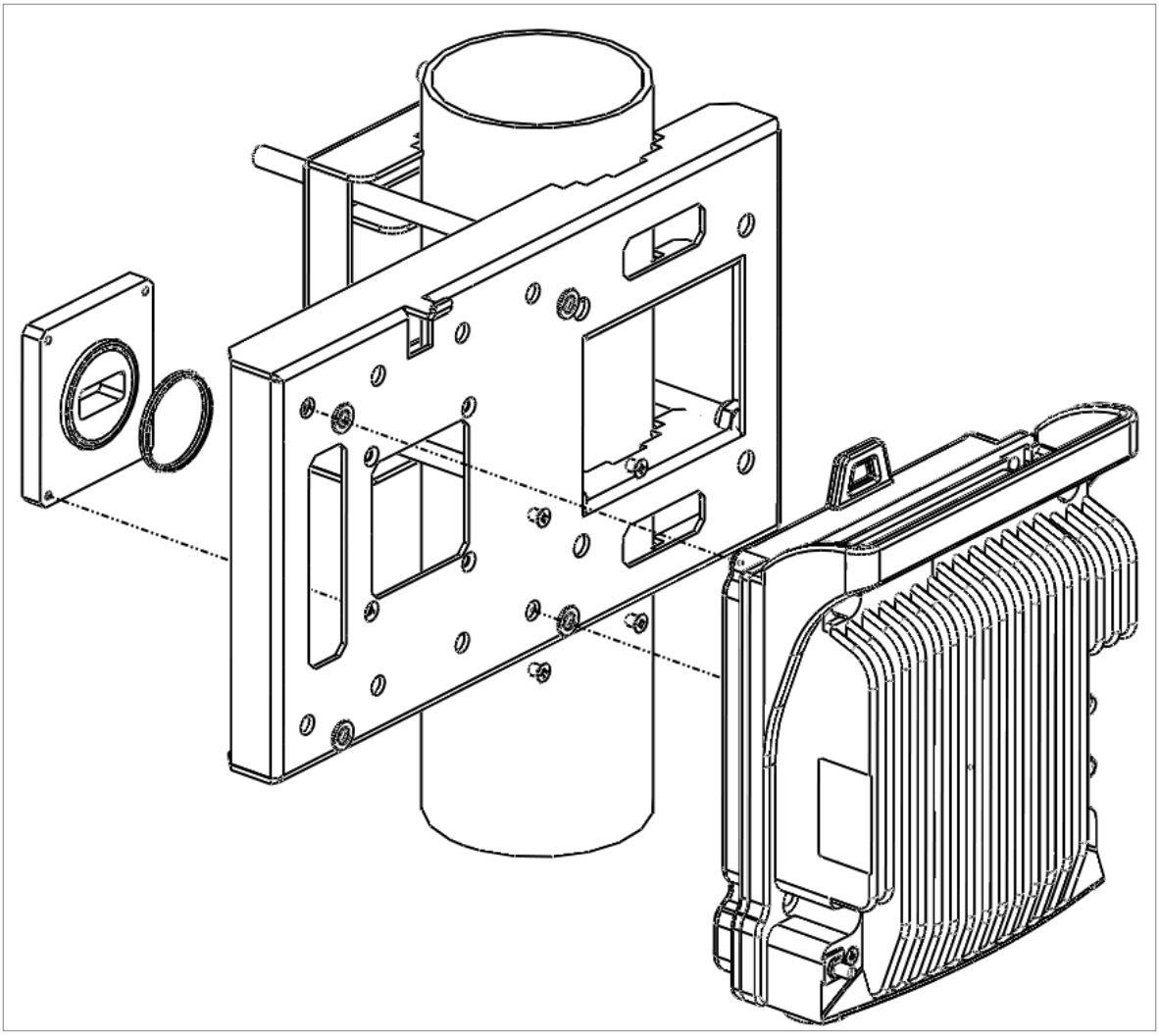


2. Mount and tighten the RFU-SX radio to the RFU-C Adaptor plate using the four captive M8 screws and washers that are assembled to the RFU-SX radio. Pay attention that the O-rings are mounted on the RFU-C Adaptor plate. Make sure to cross-tighten the screws gradually. In other words, partially tighten 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.

Note:

Use torque of 16.3 Nm ±0.6 Nm.

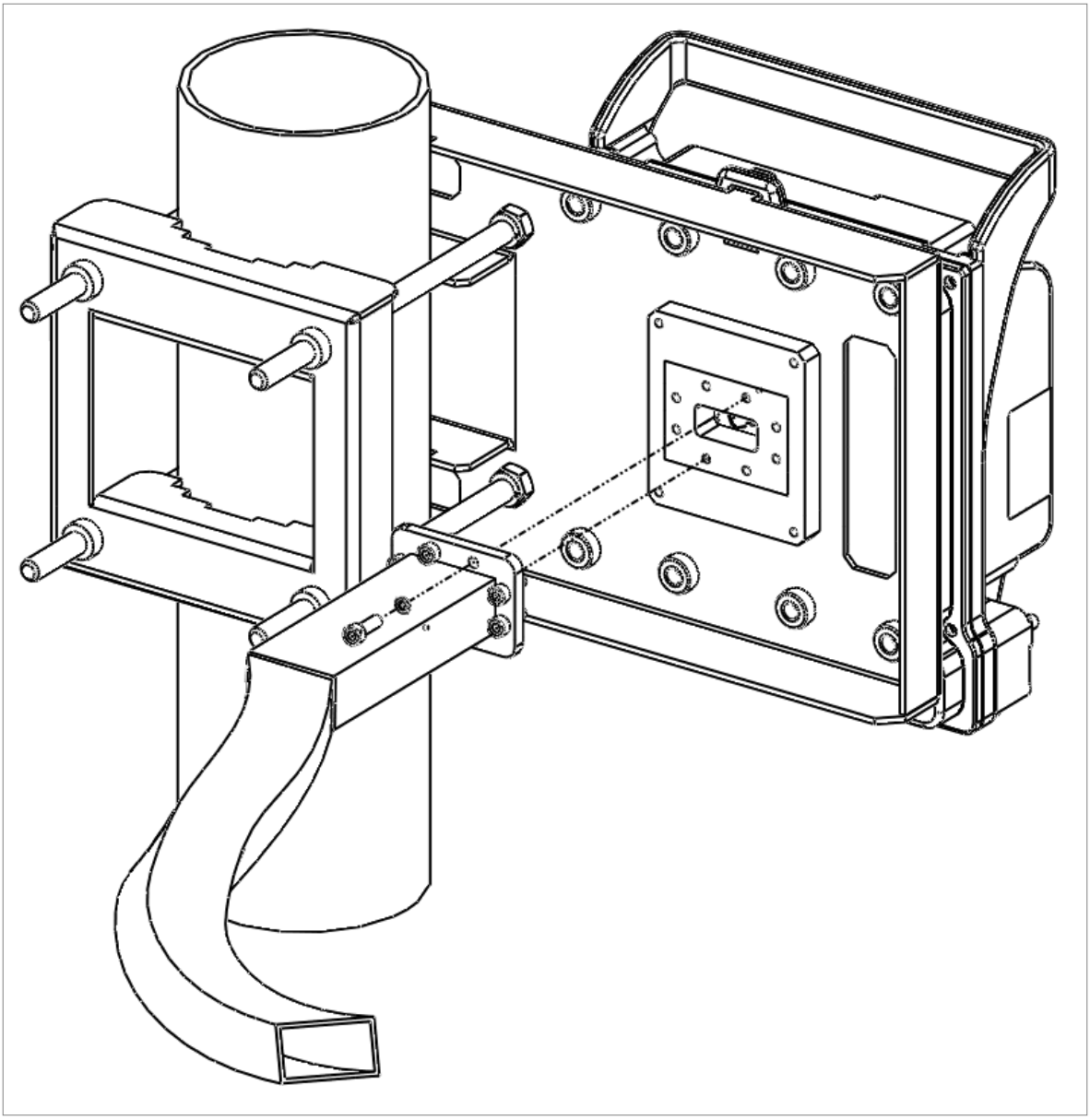


3. Connect the Flexible Waveguide and Sealing Gasket supplied with the Flexible Waveguide Imperial Kit to the RFU-C Adaptor plate. Tighten the four screws supplied with the Flexible Waveguide Imperial Kit. . Make sure to cross-tighten the screws gradually. In other words, partially tighten one screw, 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.

Note:

Use torque of 16.3 Nm ±0.6 Nm.

Figure 23: *Connect Flexible Waveguide and Sealing Gasket to RFU-C Adaptor Plate*



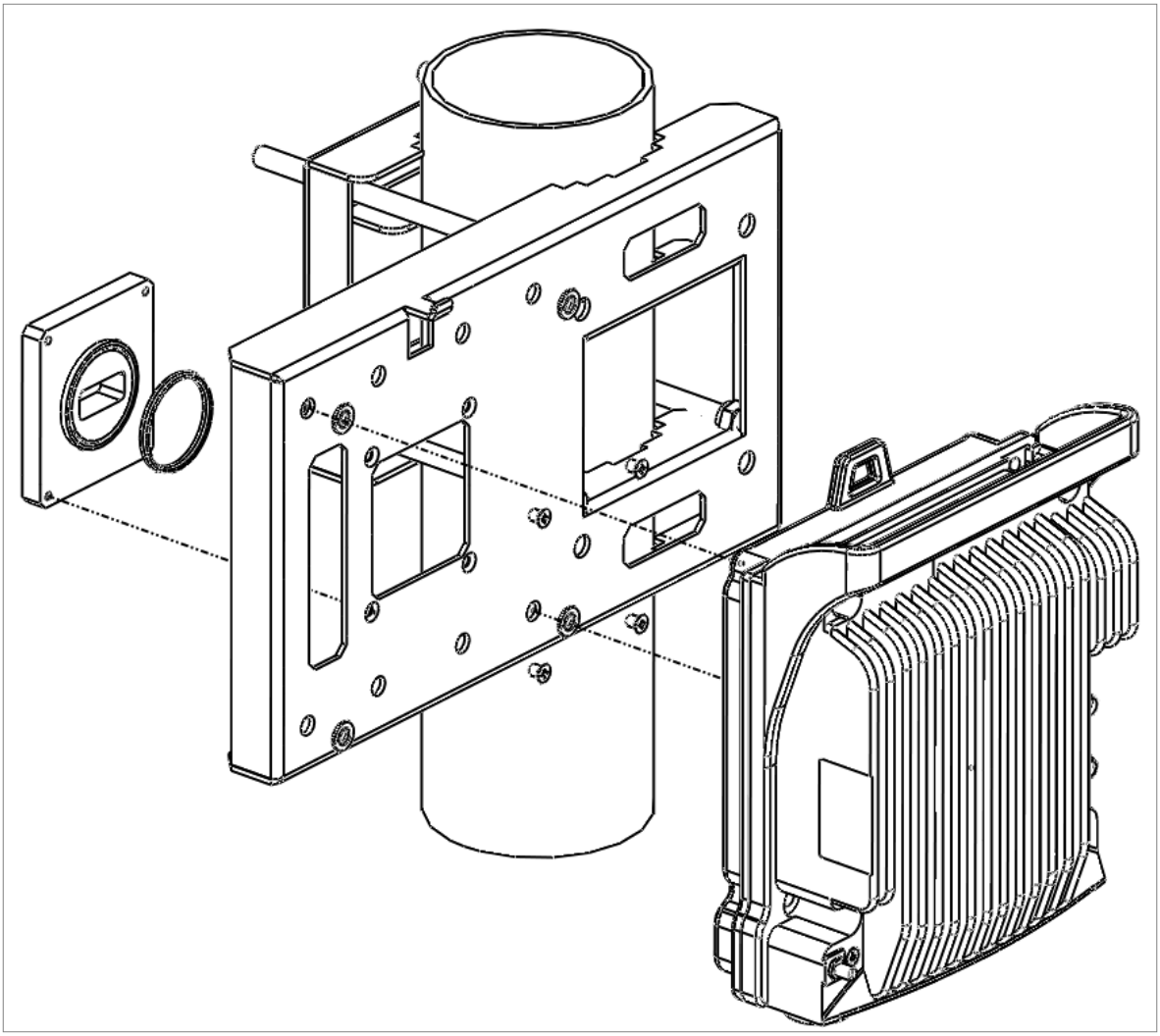
Remote Mount Installation with an Imperial Waveguide – 13-15 GHz

1. Mount the RFU-C Adaptor supplied with the RFU-C Remote Pole Mount kit using the four flat screws supplied with the RFU-C Adaptor kit.
2. Mount the RFU-SX using the four M8 captive screws and washers supplied, assembled, in the RFU-SX. Make sure to cross-tighten the screws 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

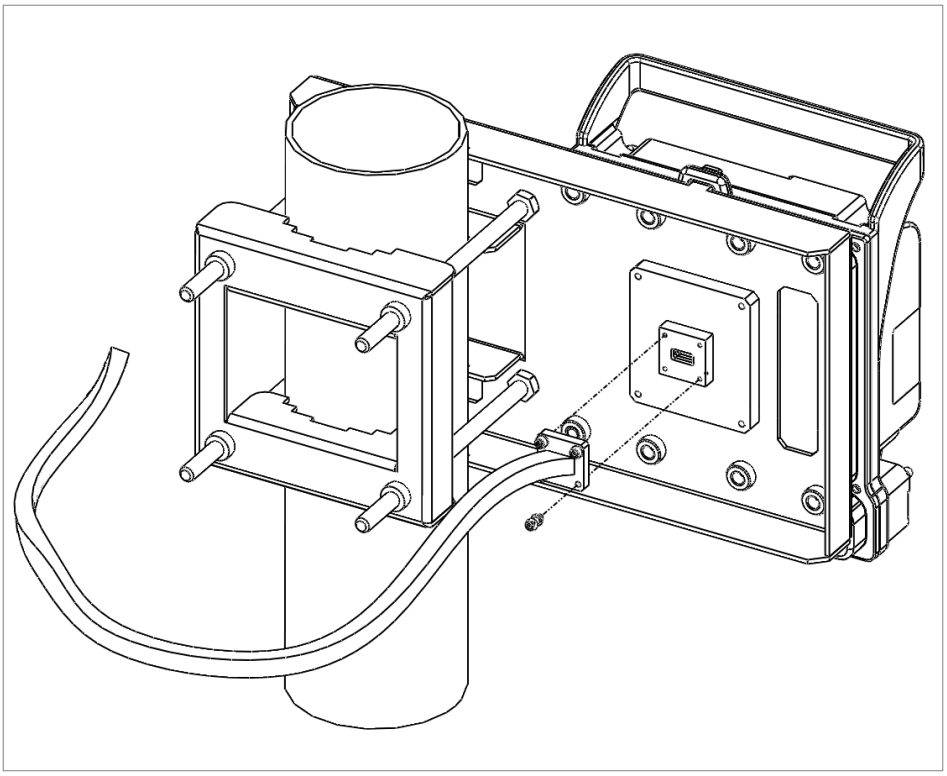
to the screw on the lower right, then the upper right, then the lower left. Tighten each screw partially, then in the same order, tighten the screws further until each screw is fully tightened.

Note:

Use torque of 16.3 Nm ±0.6 Nm.

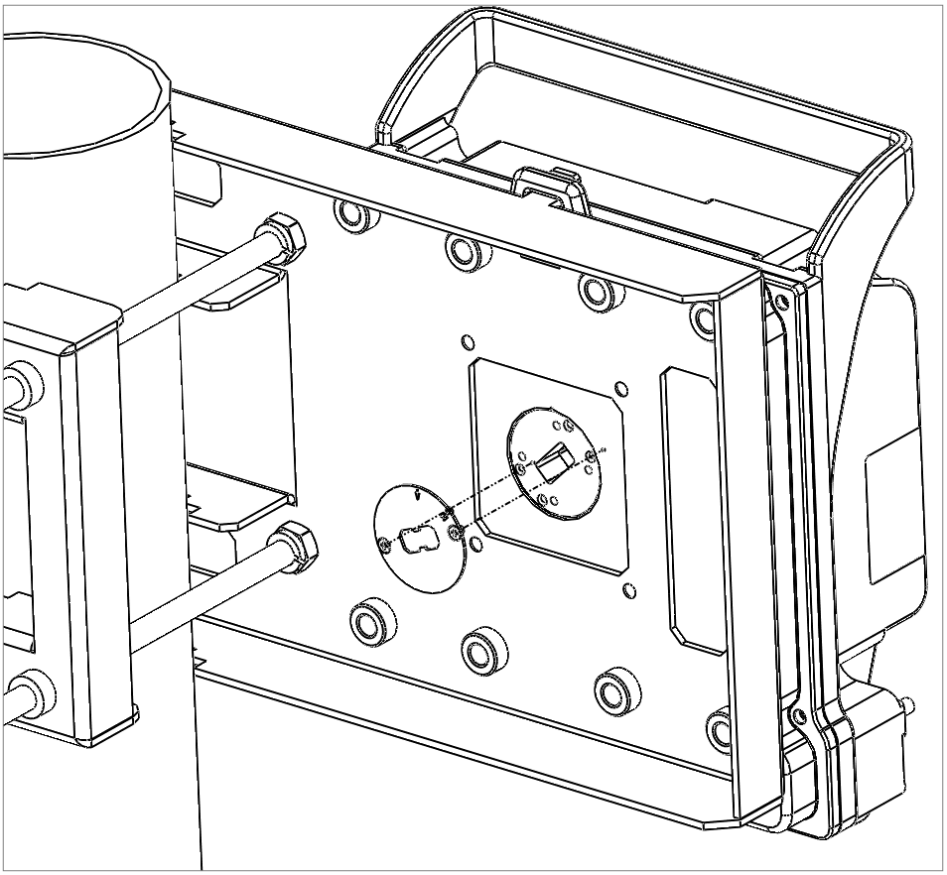


3. Connect the Flexible Waveguide and sealing O-Ring supplied with the Flexible Waveguide Imperial kit to the RFU-C Adaptor. Tighten the four screws supplied with the Flexible Waveguide Imperial kit.



Remote Mount Installation with an Imperial Waveguide – 18-38 GHz

1. Loosen the 2 screws, and remove the twist.

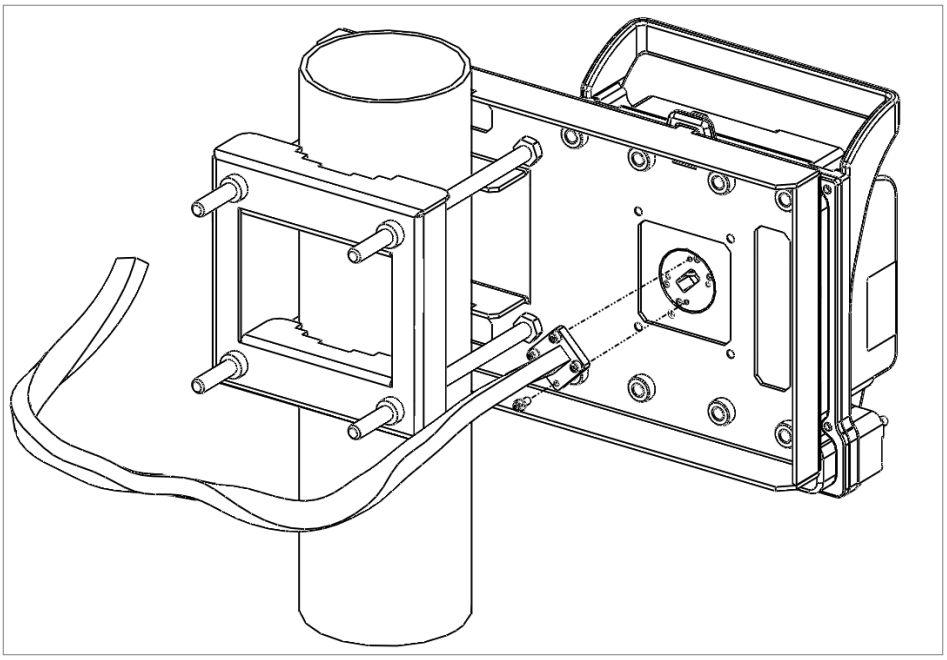


2. Mount the RFU-SX Radio to the RFU-C Pole Mount Bracket using the four M8 captive screws and washers supplied, assembled, in the RFU-SX. Make sure to cross-tighten the screws gradually. In other words, partially tighten one screw, then partially tighten the opposite screw. For example, if you start 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.

Note:

Use torque of 16.3 Nm ±0.6 Nm.

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



Installation Procedures per Configuration Type

Note:

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

1+0 Direct Mount Installation

List of Items

Item	Description	Quantity	Marketing Model
1	RFU-SX	1	See Section RFU-SX Marketing Models

Required Tools

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

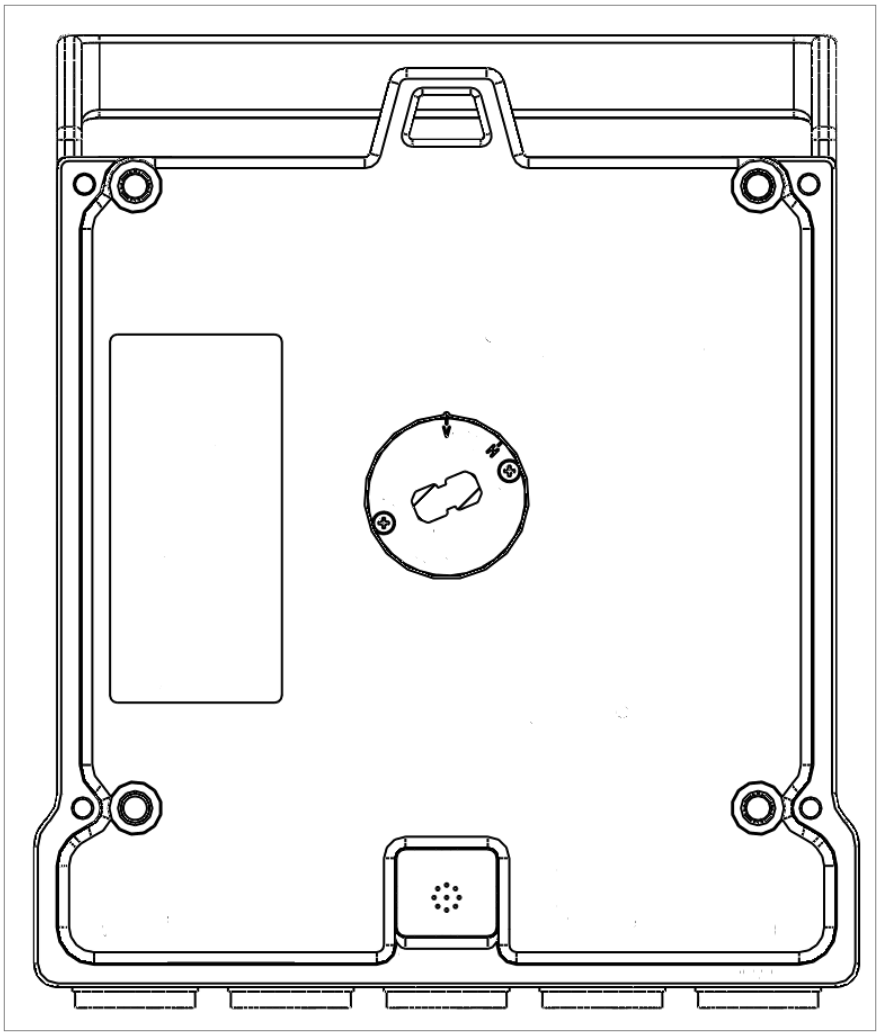
- Metric offset hexagon key wrench #6
- Phillips #2 screwdriver

Procedure

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

Note:

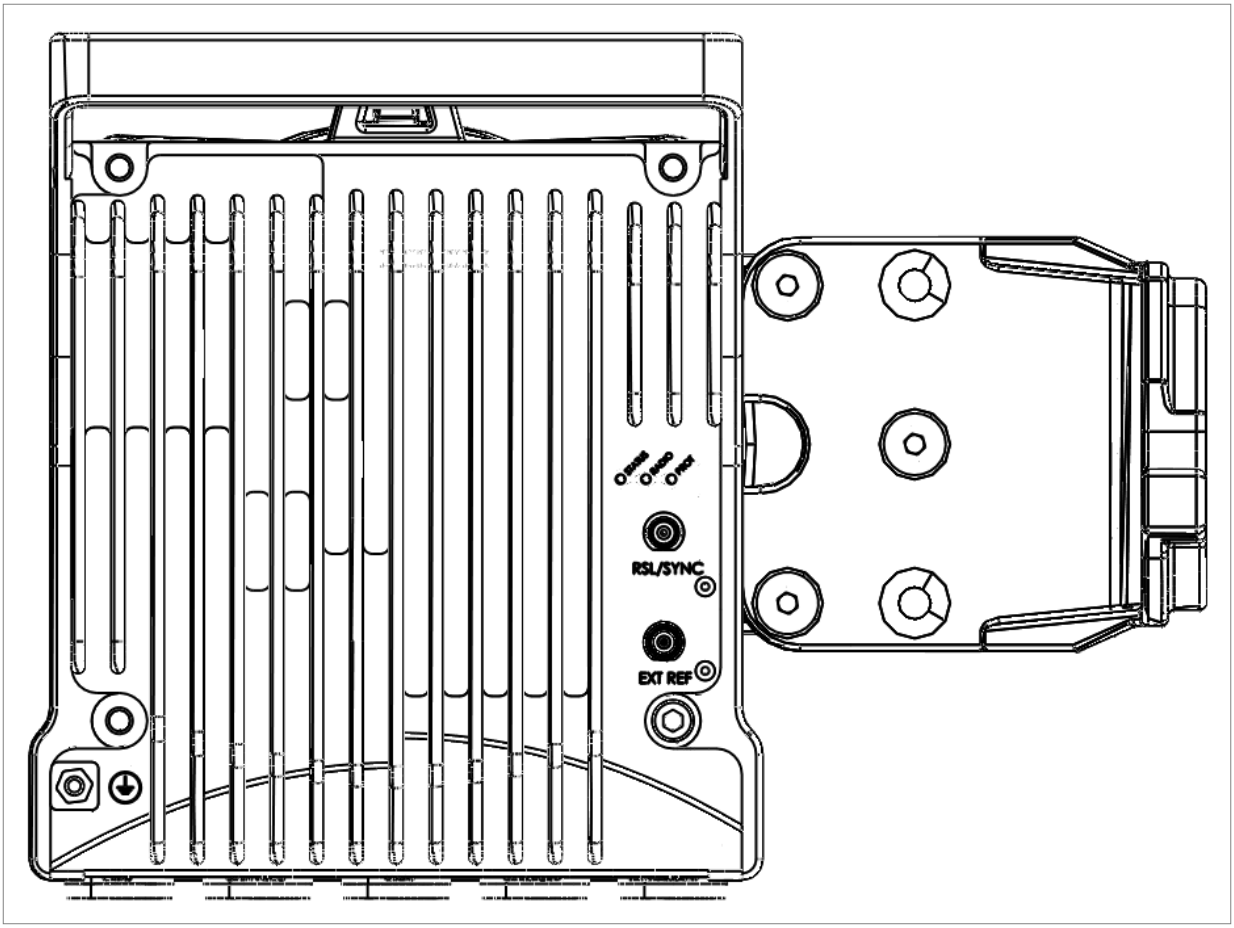
Do not remove the transparent pressure window located on the antenna interface.



Note:

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

Figure 24: *Horizontal / Vertical Pole*



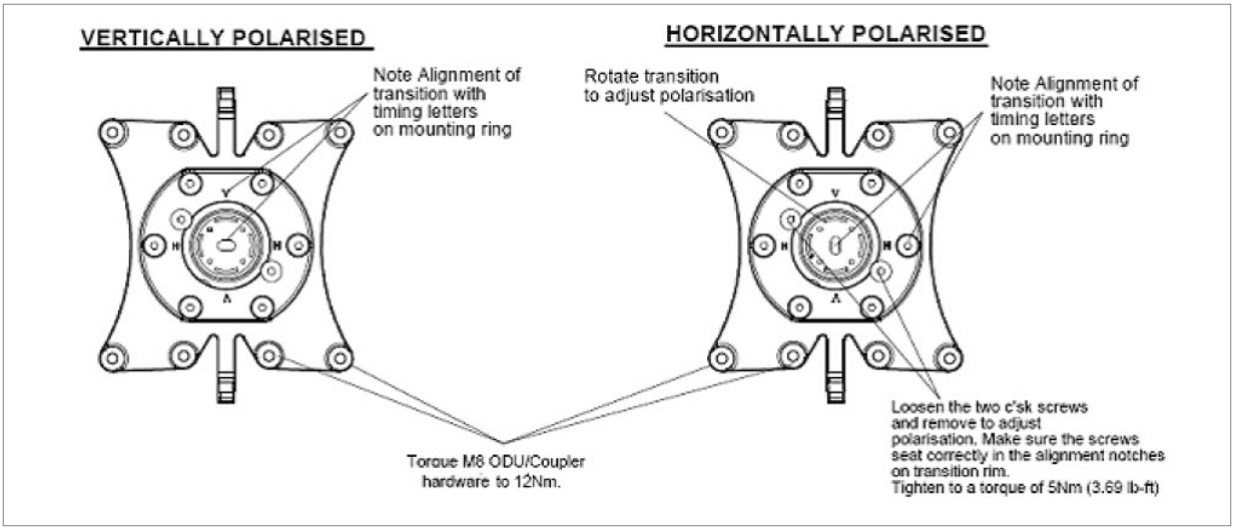
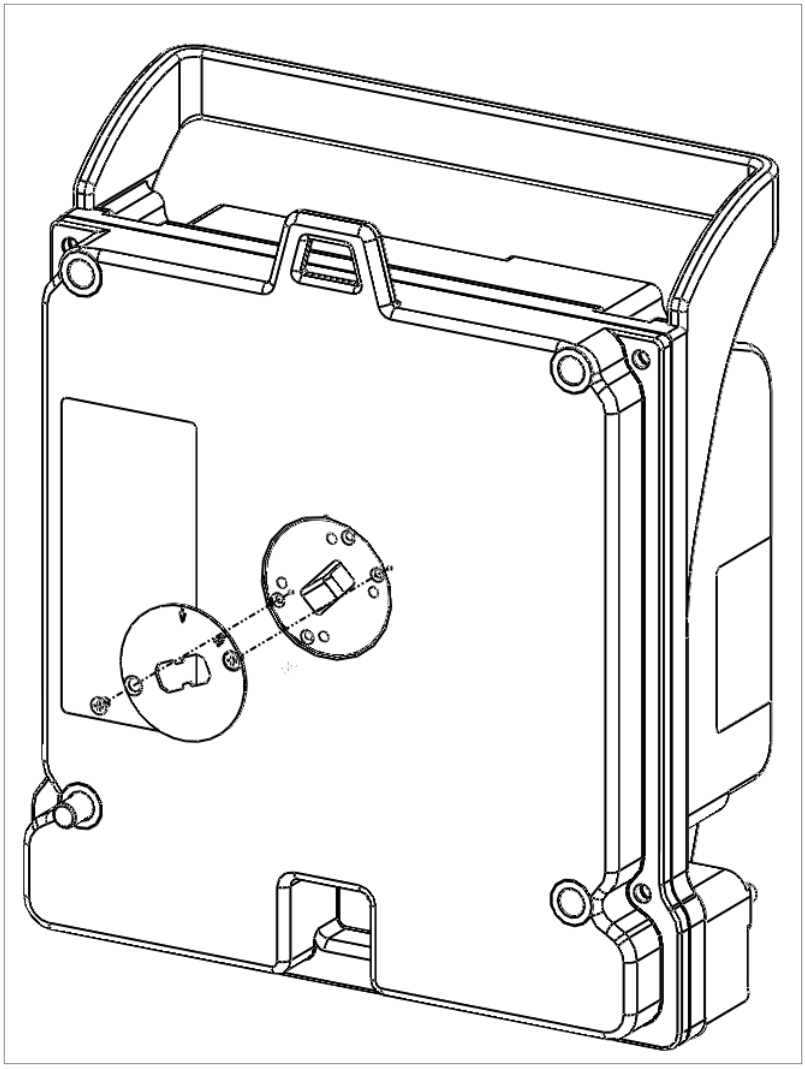
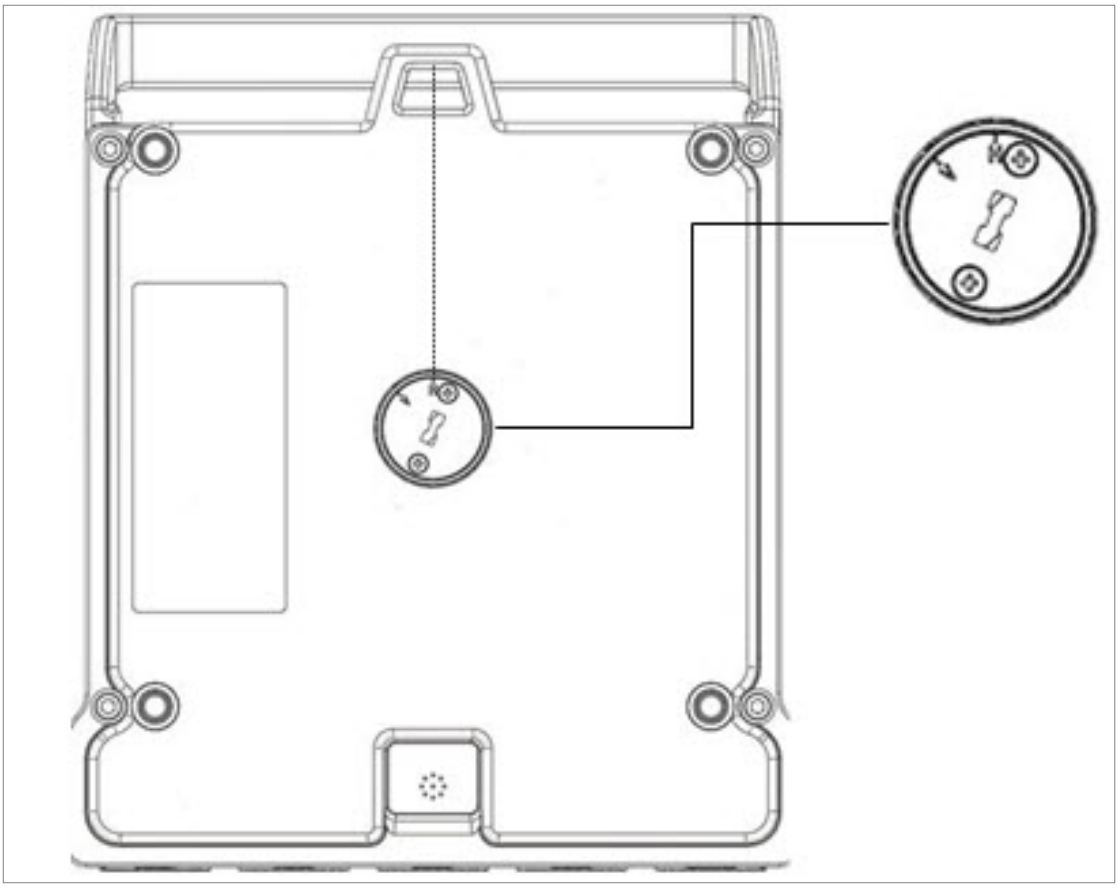


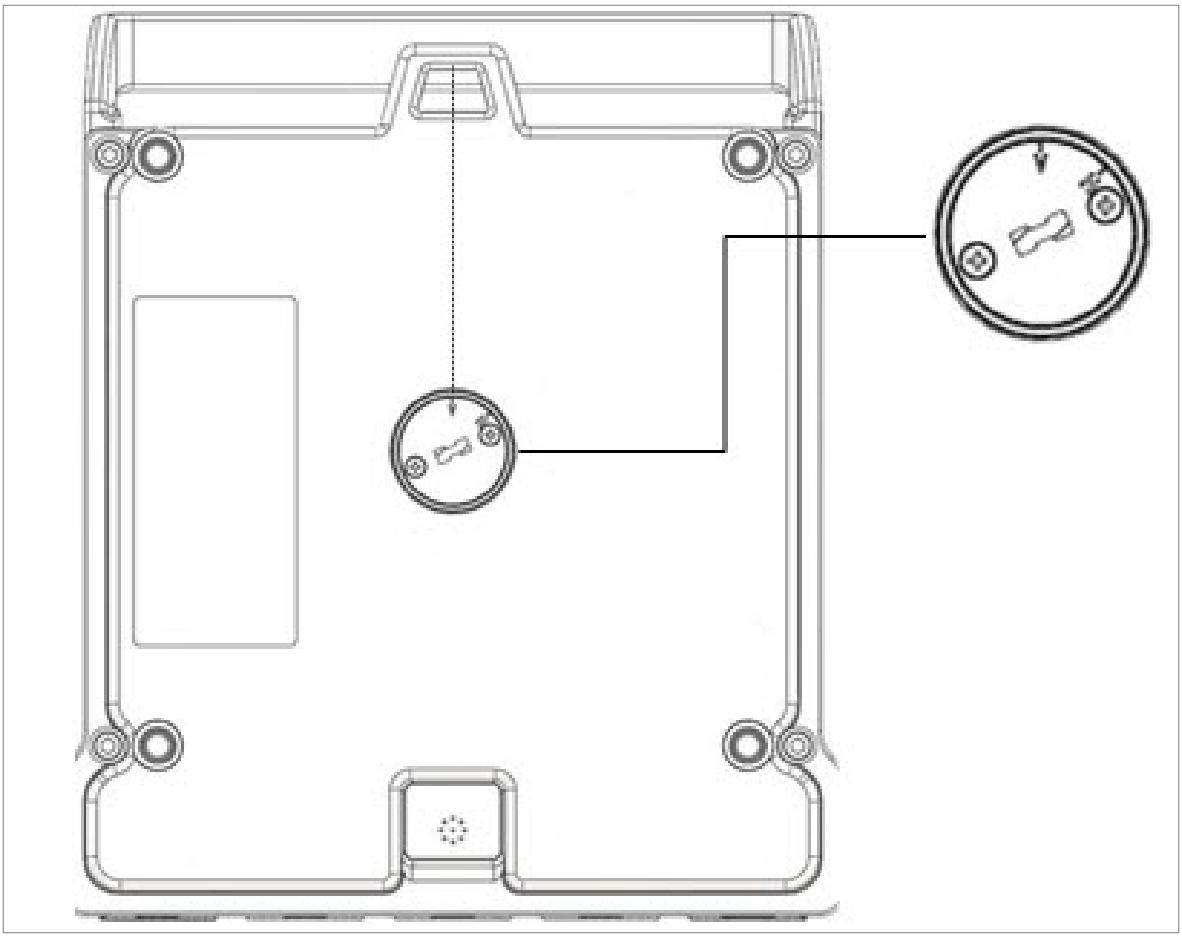
Figure 25: *Twist Orientation*



- For horizontal polarization, locate the twist with the letter “H” vertical to the hook cover and fasten the two screws.



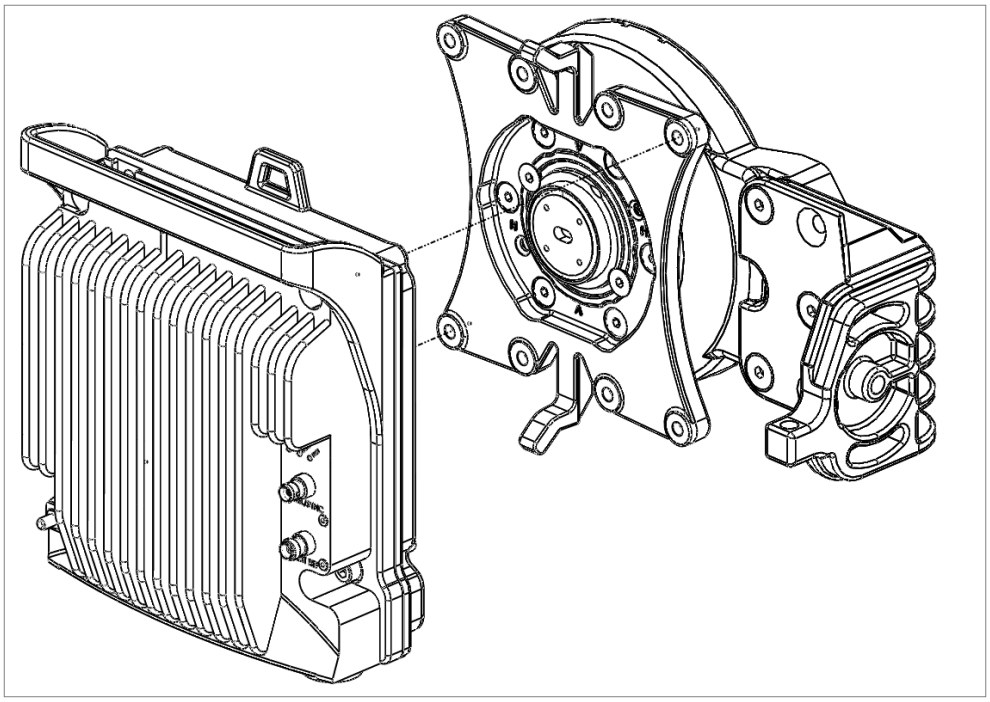
- For vertical polarization, locate the twist with the letter “V” vertical to the hook cover and fasten the two screws.



Mount the RFU-SX on the antenna using the four M8 captive screws and washers that are supplied, assembled, in the RFU-SX, and tighten the screws. Make sure to cross-tighten the screws 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.

Note:

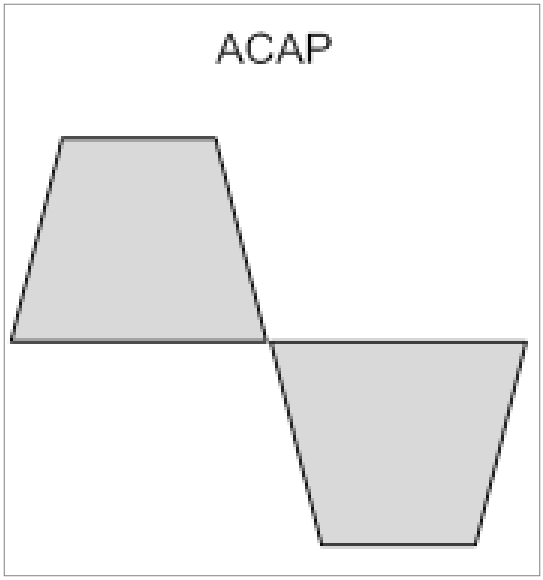
Use torque of 16.3 Nm ±0.6 Nm.



Note:

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

2+0 Dual Polarization (XPIC) Direct Mount



List of Items

Item	Description	Quantity	Marketing Model
1	RFU-SX	2	See Section RFU-SX Marketing Models
2	RFU-C OMT kit	1	RFU-ff-OMT-DM-Kit
3	Data Sharing Cable	1	See Section Data Sharing and Source Sharing Cables for XPIC Configurations
4	Source Sharing Cable	1	See Section Data Sharing and Source Sharing Cables for XPIC Configurations

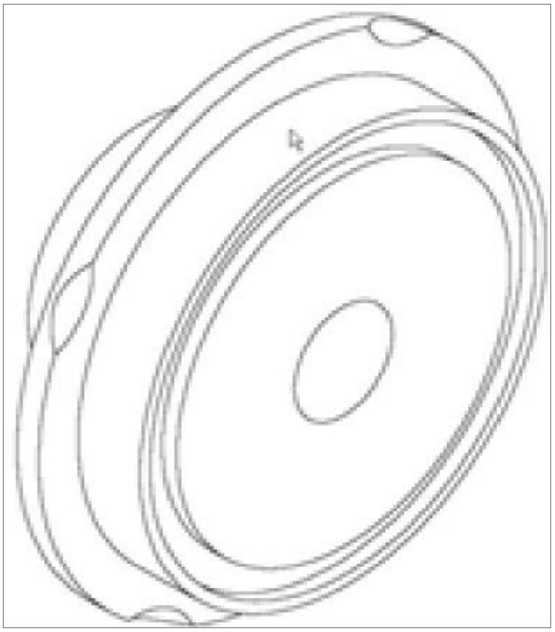
Required Tools

- Metric offset hexagon key set
- Metric wrench key set

Procedure

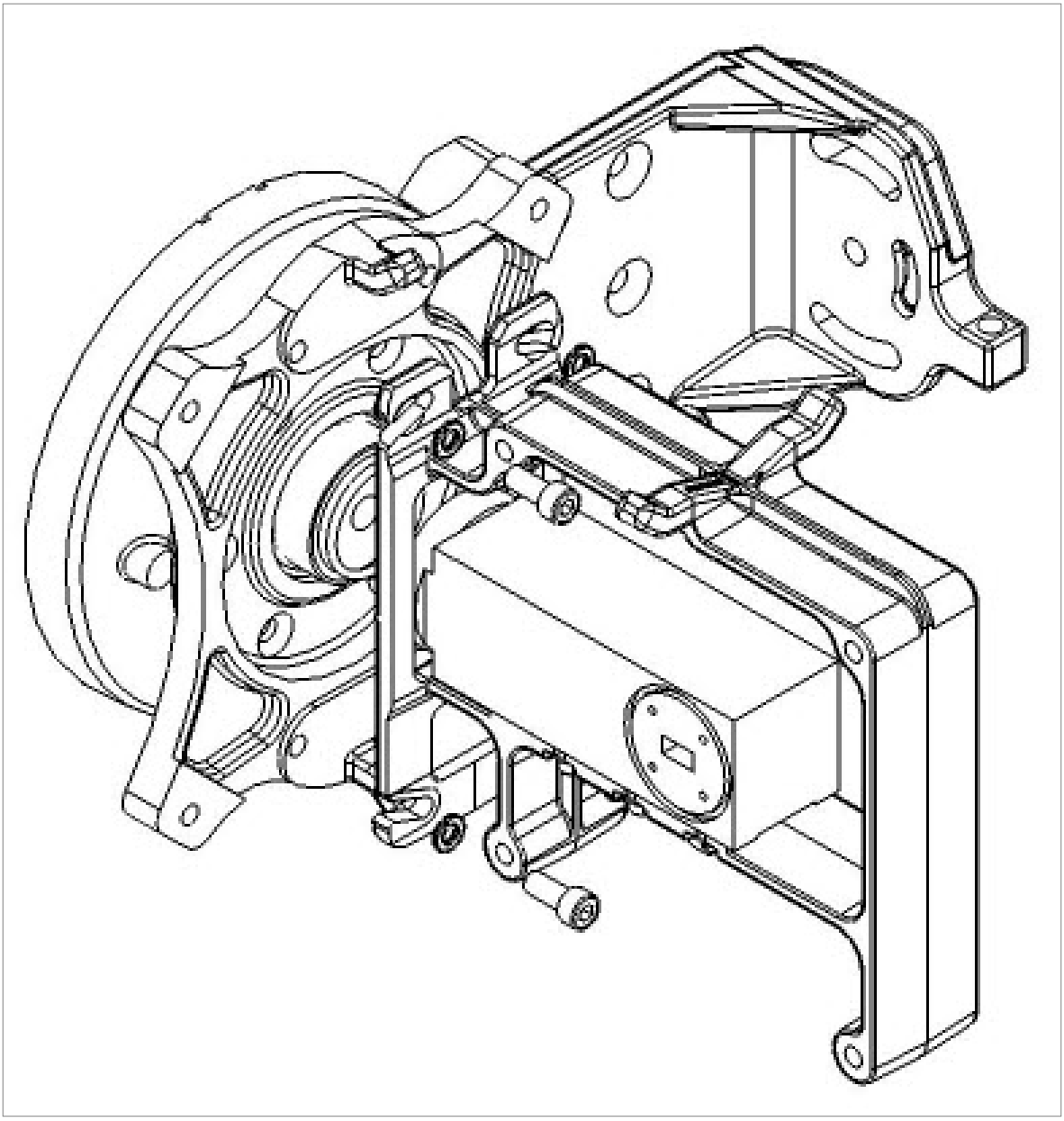
1. Prior to the installation, follow the antenna manufacturer's instructions to use the circular adaptor. (Remove the existing rectangular transition, swap the O-ring, and install the circular transition instead.)

   Figure 26: *Circular Adaptor*

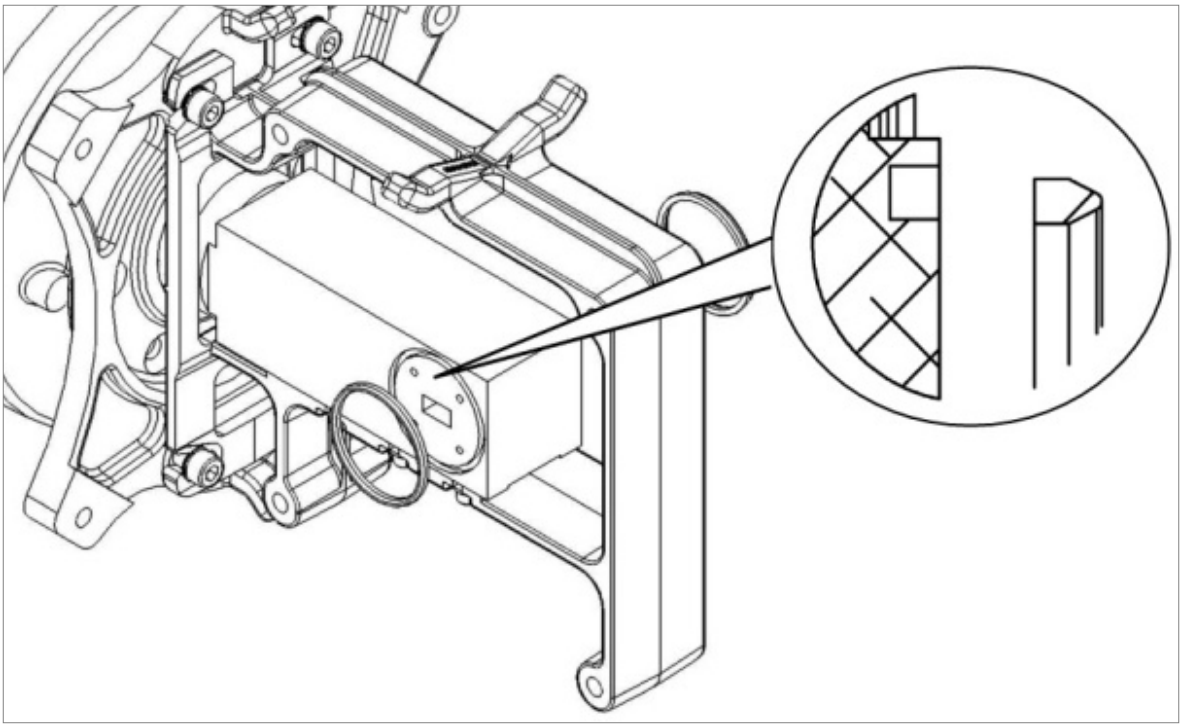
   

2. Connect the RFU-C OMT Kit to the antenna and secure it with four screws. Verify the existence of the O-ring.

Figure 27: *Connect OMT Kit to Antenna*



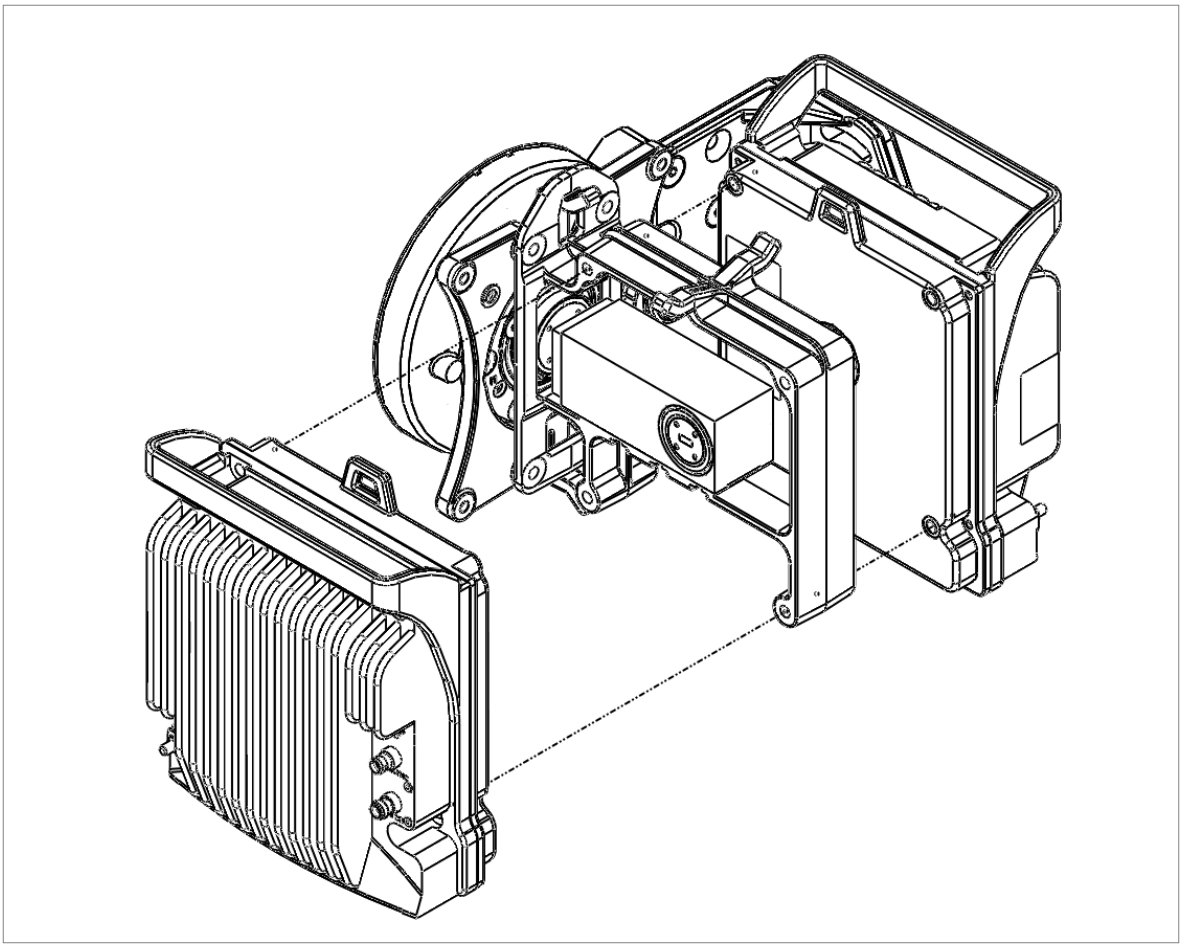
3. Mount the two O-Rings supplied with the RFU-C OMT kit on the OMT body. Make sure the mounting direction is correct, as shown in the section view.



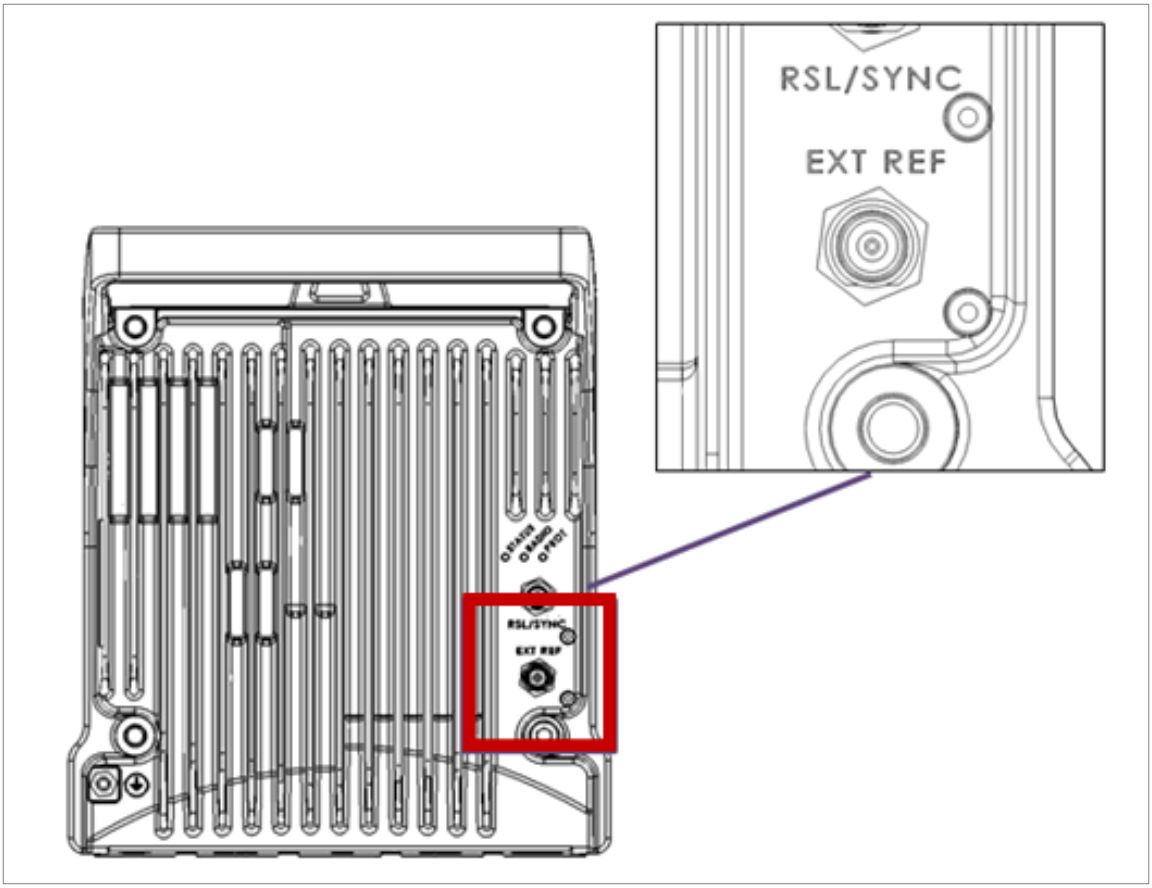
4. Mount both RFUs, using the four M8 captive screws and washers supplied, assembled, in the RFU-SX, through the radio and OMT holder, and tighten the screws. Make sure the polarization mounting direction is correct. Make sure to cross-tighten the screws gradually. In other words, partially tighten one 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.

Note:

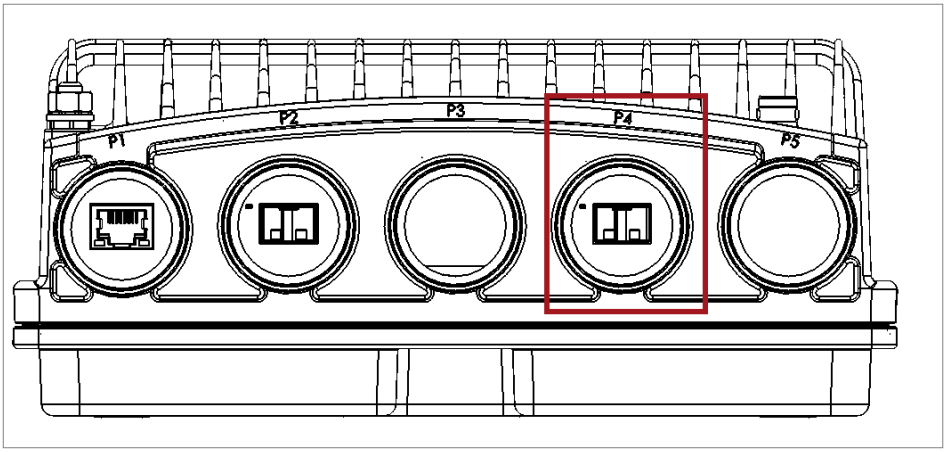
Use torque of 16.3 Nm ±0.6 Nm.



5. Connect the source sharing cable between both Source Sharing ports (EXT REF). The maximum torque for connecting this cable to the radio is 5Lb.in (0.5N.m).



6. Connect the data sharing cable between both P4 radio connectors.

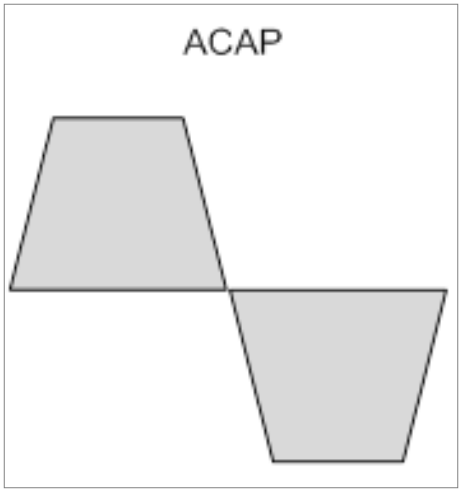


7. Tilt the entire assembly to achieve maximum XPD (Cross Polar Differentiation). After link alignment, tighten the four M8 screws left open in Step 2 above. Make sure to cross-tighten the screws gradually. In other words, partially tighten one screw, then partially tighten the opposite screw. For example, 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.

Note:

Use torque of 16.3 Nm ±0.6 Nm.

2+0 Dual Polarization (XPIC) Remote Mount



List of Items

Item	Description	Quantity	Marketing Model
1	RFU-SX	2	See Section RFU-SX Marketing Models
2	RFU-C OMT kit	1	RFU-ff-OMT-DM-Kit
3	Flexible WG kit	2	Flx-WG-xFT-ff
4	RFU-C Pole Mount kit	1	RFU-C-POLEMOUNT
5	RFU-C Remote Mount Adaptor kit	1	RFU-ff-RM_ADAPT Note: Only required from 6-13GHz
6	Data Sharing Cable	1	See Section Data Sharing and Source Sharing Cables for XPIC Configurations
7	Source Sharing Cable	1	See Section Data Sharing and Source Sharing Cables for XPIC Configurations

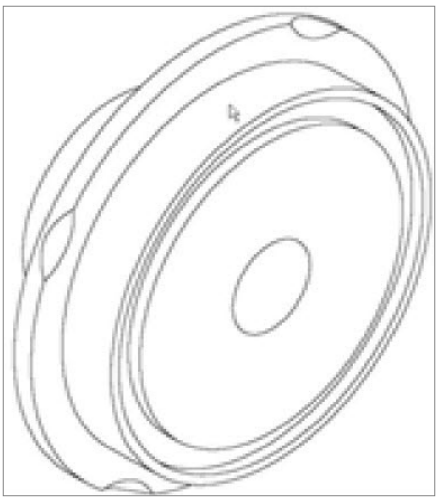
Required Tools

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

Procedures

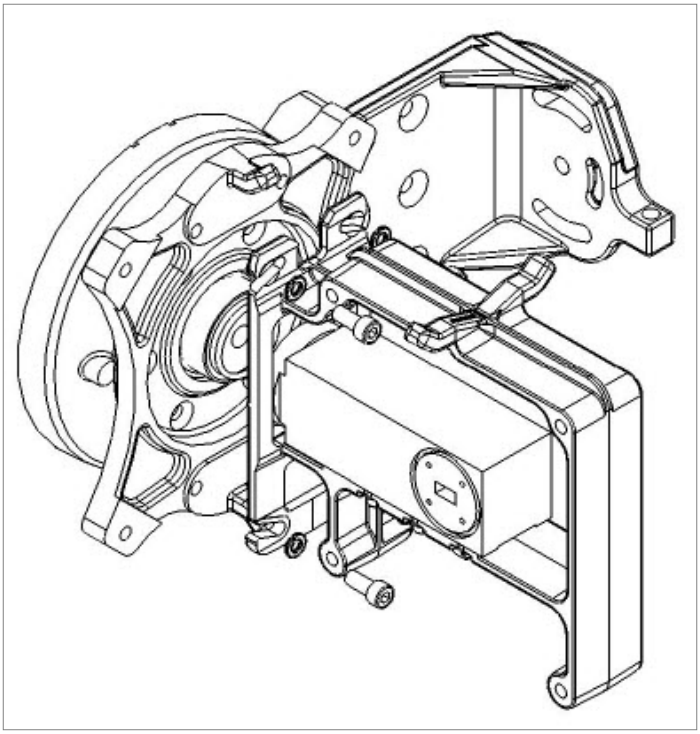
1. Prior to the installation, follow the antenna manufacturer's instructions to use the circular adaptor. (Remove the existing rectangular transition, swap the O-ring, and install the circular transition instead.)

   Figure 28: *Circular Adaptor*

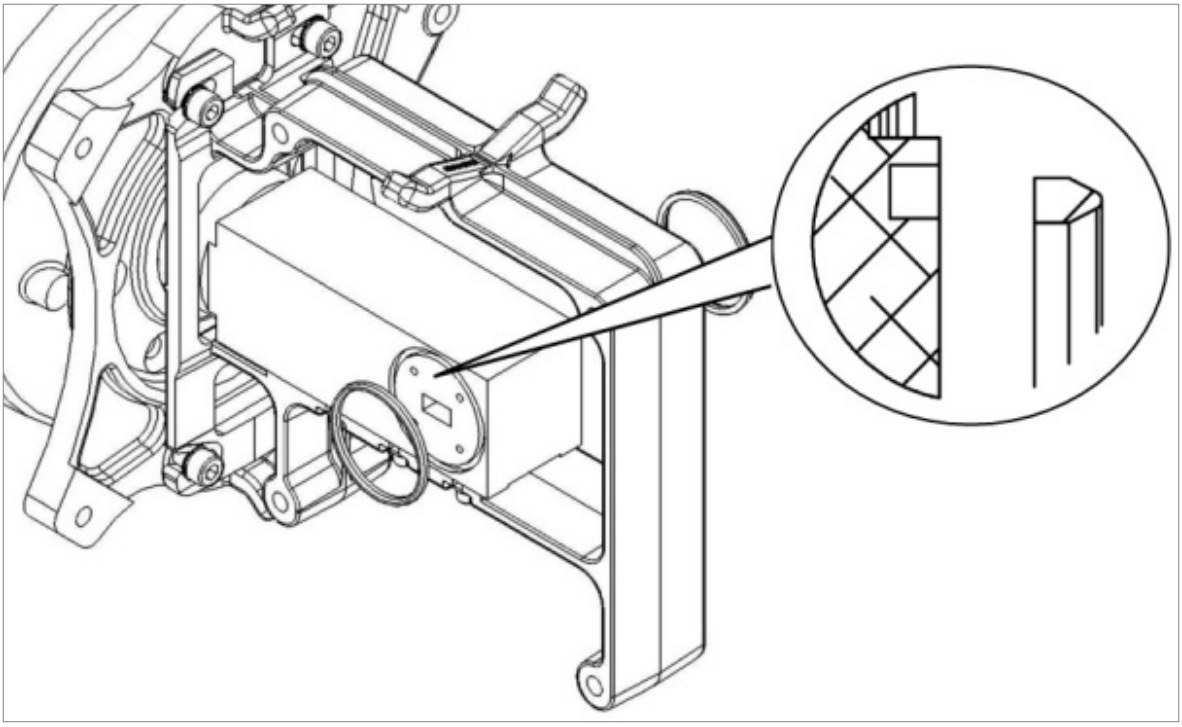
   

2. Connect the RFU-C OMT to the antenna and secure it with four screws. Verify the existence of the O-ring.

   Figure 29: *Connect OMT Kit to Antenna*

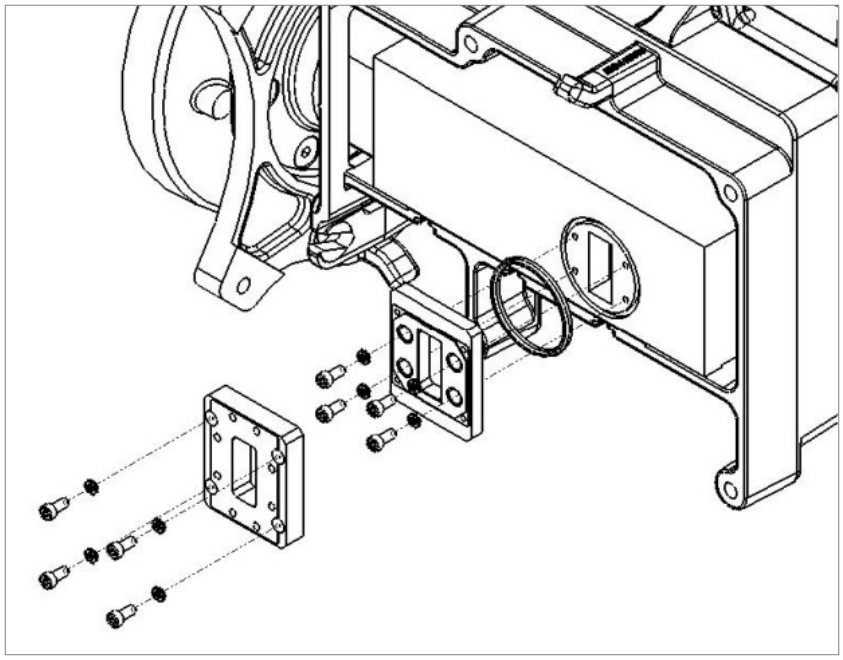
3. Mount the two O-Rings supplied with the RFU-C OMT kit on the OMT body. Make sure the mounting direction is correct, as shown in the section view.



4. Connect the flexible waveguide and any necessary adaptors, as described below per frequency:
   - For 6 Ghz (UDR70):
     a. Mount the O-Ring supplied with the OMT kit.
     b. Mount OMT Adaptor #1 on the OMT, and tighten using four M4 screws and washers (supplied with the OMT adaptor kit).
     c. Mount OMT Adaptor #2 on OMT Adaptor #1, and tighten using four M4 screws and washers (supplied with the OMT adaptor kit).

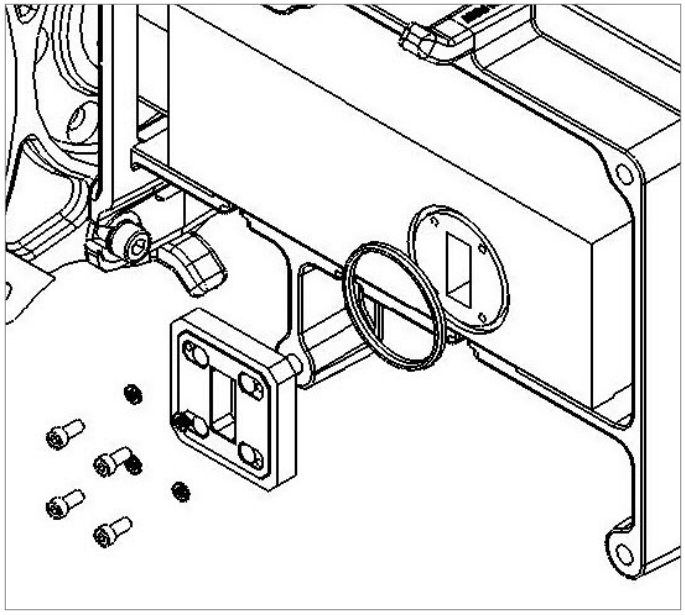
Note:

For M4 screws, use torque of 2.27 Nm ±0.1 Nm.



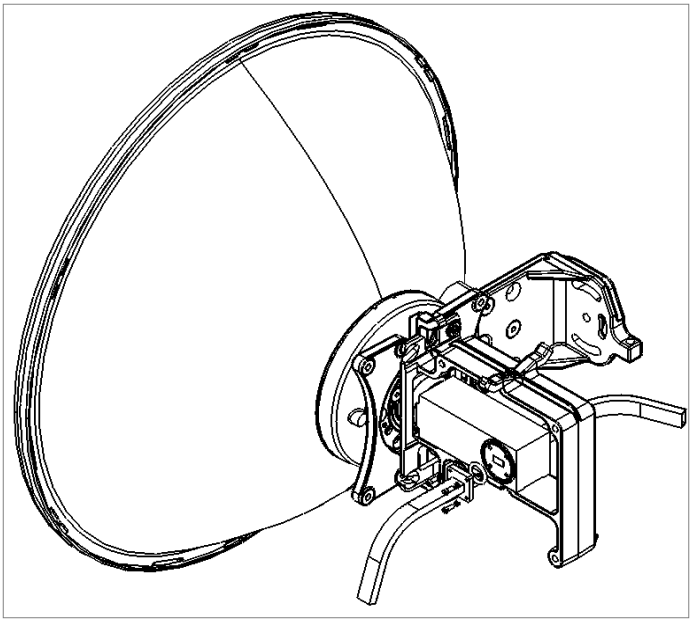
d. Mount the flexible waveguide as usual.

- For 7-11 GHz (UBR84 and UBR100):
  a. Mount the O-Ring supplied with the OMT kit.
  b. Mount the OMT adaptor, with its installed sealing gasket, on the OMT, and tighten using the four M4 screws and washers supplied with the OMT Adaptor kit.

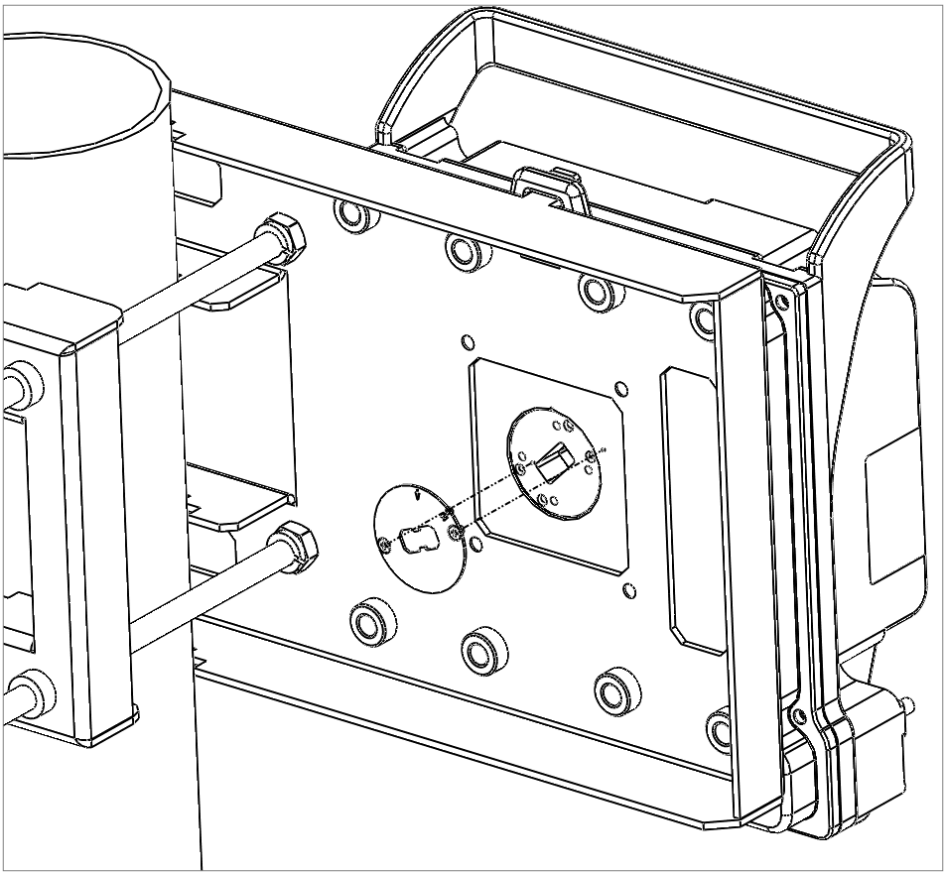


c. Mount the flexible waveguide without its gasket (only for the OMT side).

- For 13 GHz (UBR120) to 38 GHz (UG383/U), connect the flexible waveguide and its gasket (supplied with the Flexible WG Kit) directly to the OMT port.



5. Loosen the 2 screws, and remove the twist.

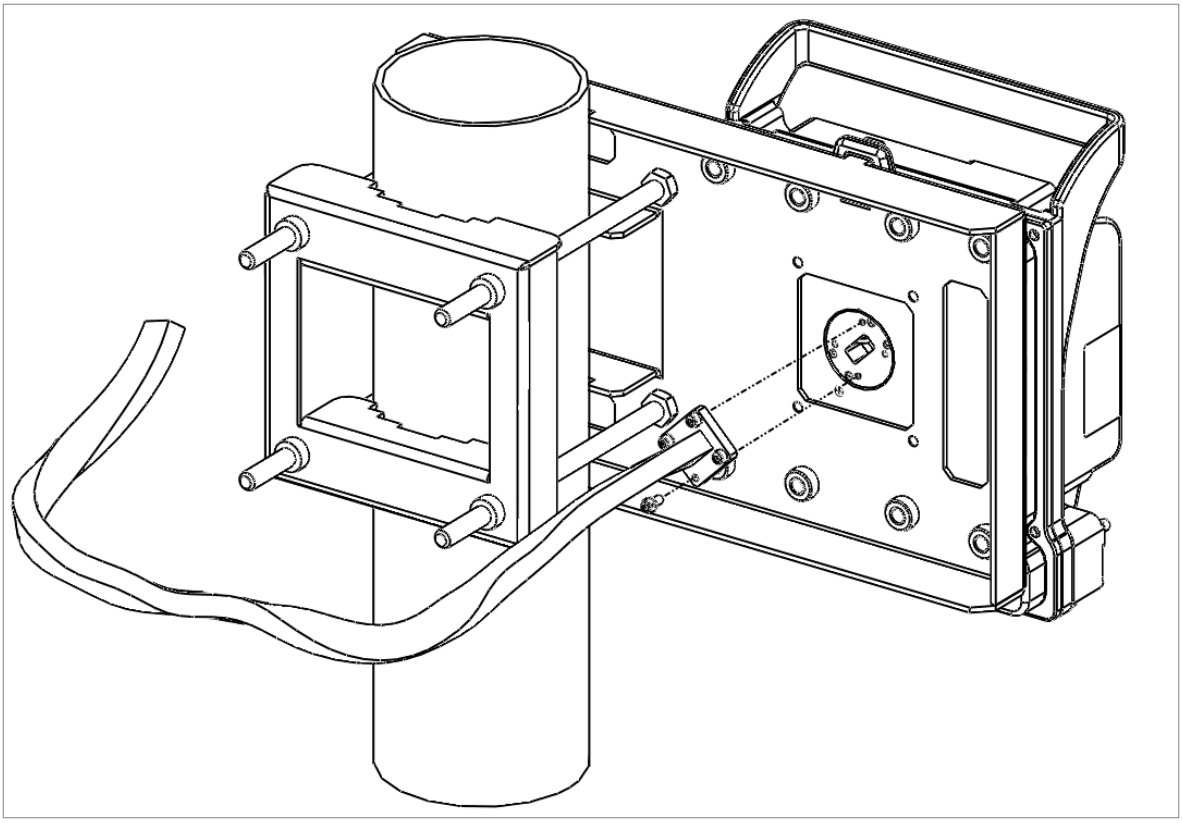


6. Mount the RFU-SX radio to the RFU-C Pole Mount Bracket using the four M8 captive screws and washers supplied, assembled, in the RFU-SX. Make sure to cross-tighten the screws gradually. In other words, partially tighten one screw, then partially tighten the opposite screw. For example, if you start 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.

Note:

Use torque of 16.3 Nm ±0.6 Nm.

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

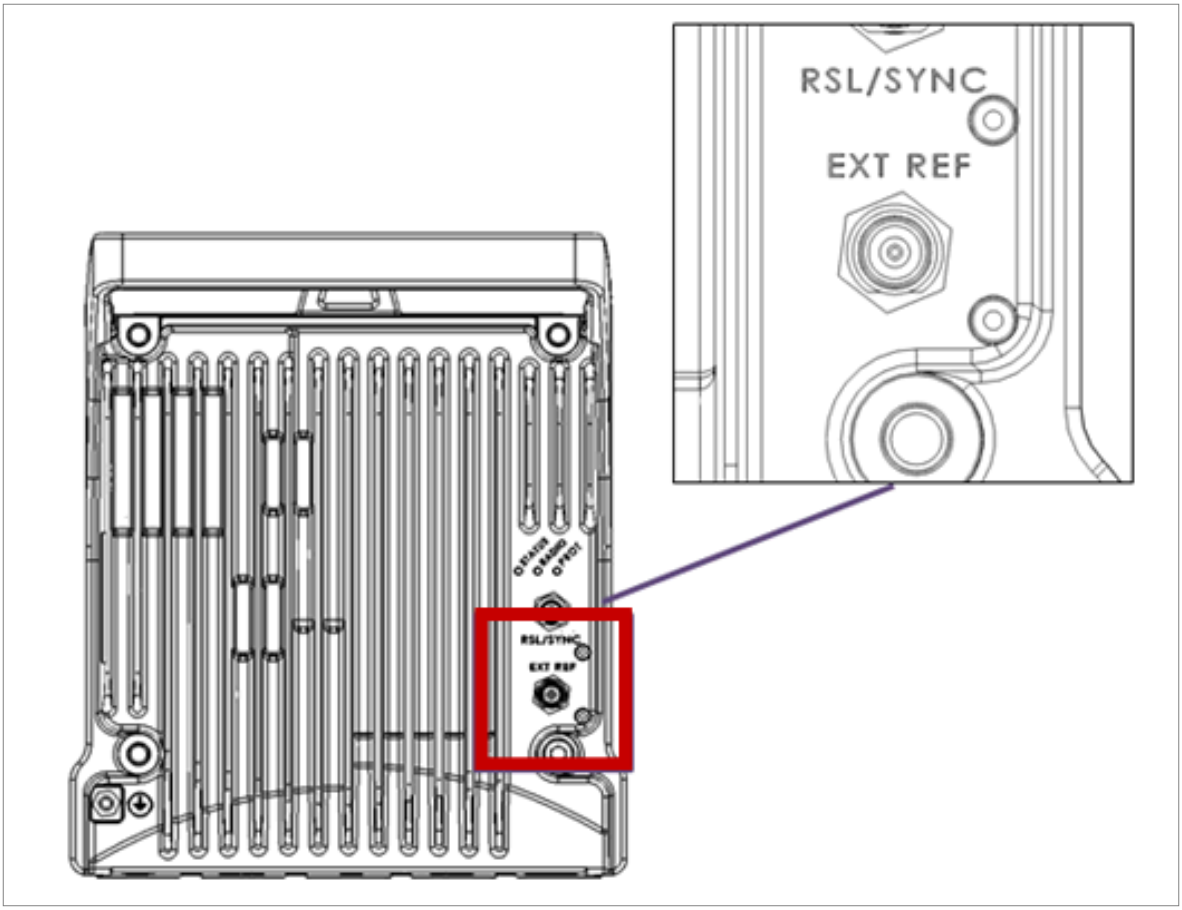


Note:

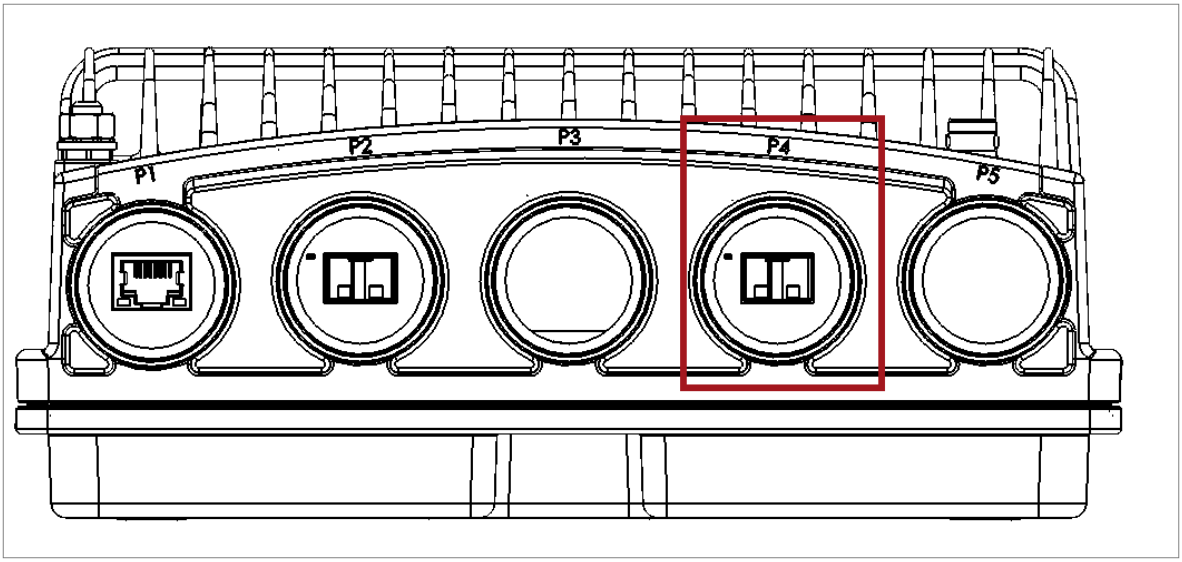
Remote Configuration Frequencies 13-38 GHz do not require adaptors.

Frequencies 6-13 GHz require remote mount adaptors.

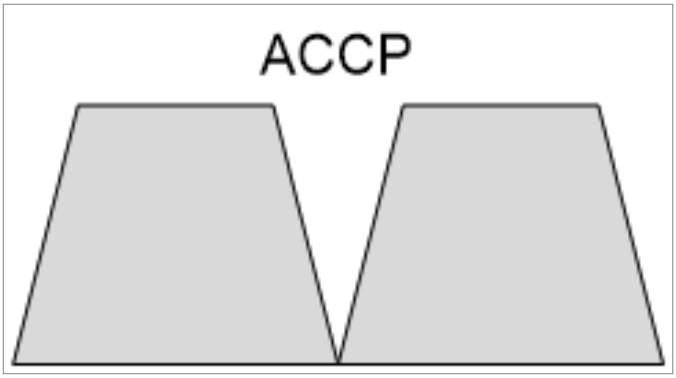
8. Connect the source sharing cable between both Source Sharing ports (EXT REF). The maximum torque for connecting this cable to the radio is 5Lb.in (0.5N.m).



9. Connect the data sharing cable between both P4 radio connectors.



1+1/2+0 Single Polarization Direct Mount



List of Items

Item	Description	Quantity	Marketing Model
1	RFU-SX	2	See Section RFU-SX Marketing Models
2	RFU-C Coupler (1+1) kit or RFU-C Splitter (2+0) kit	1	Coupler: RFU-C6-CPLR-Kit Splitter: RFU-ff-Sym-cplr-kit
3	RFU-C Twist kit	1	RFU-ff-TWST-Kit

Required Tools

The following tools are required for the installation:

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

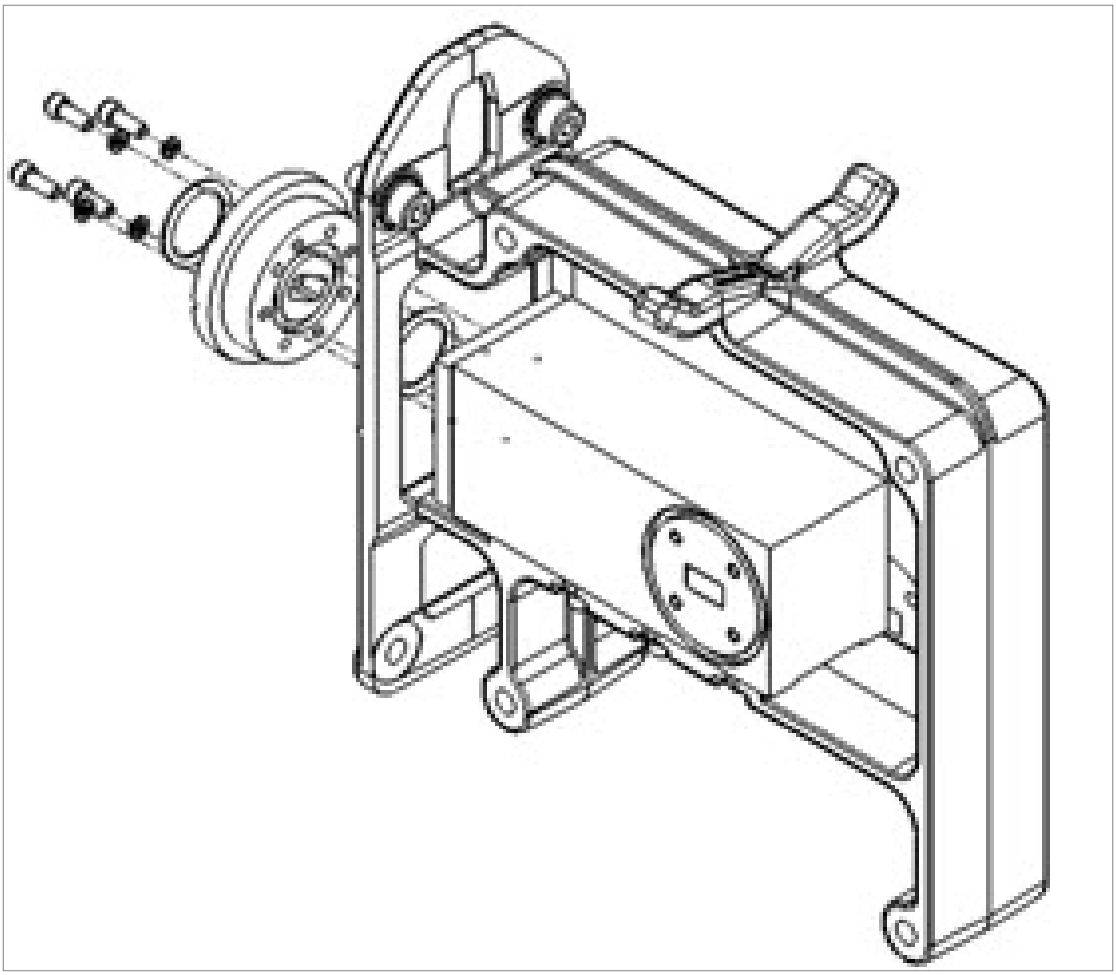
Procedure

Note:

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

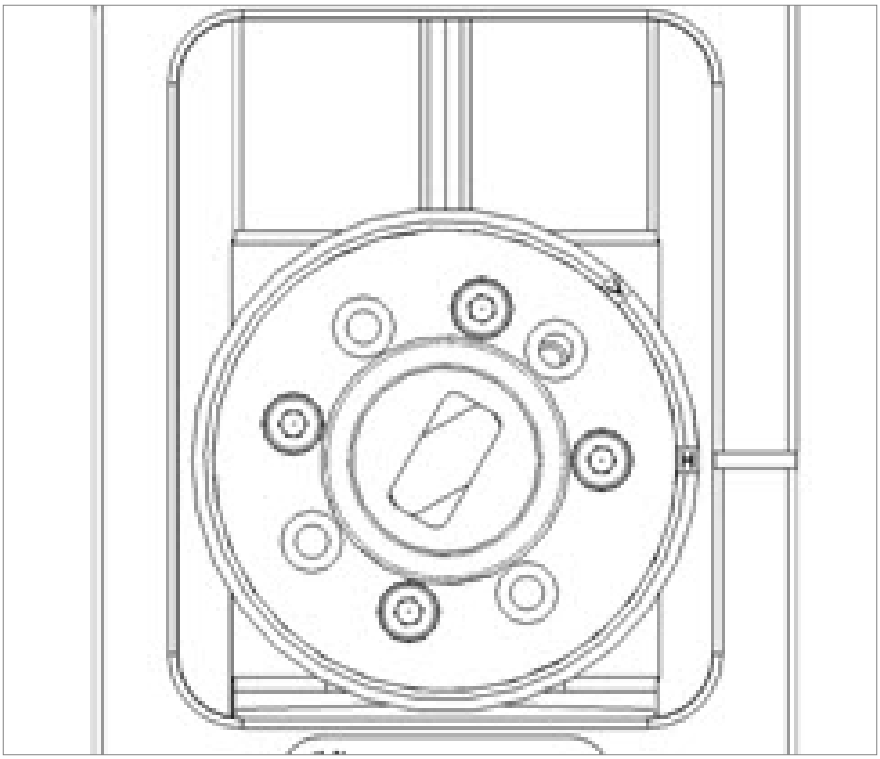
For 6 GHz frequency, a gasket is used instead of an O-Ring. The gasket should be mounted between the twist and the RFU-C Splitter kit.

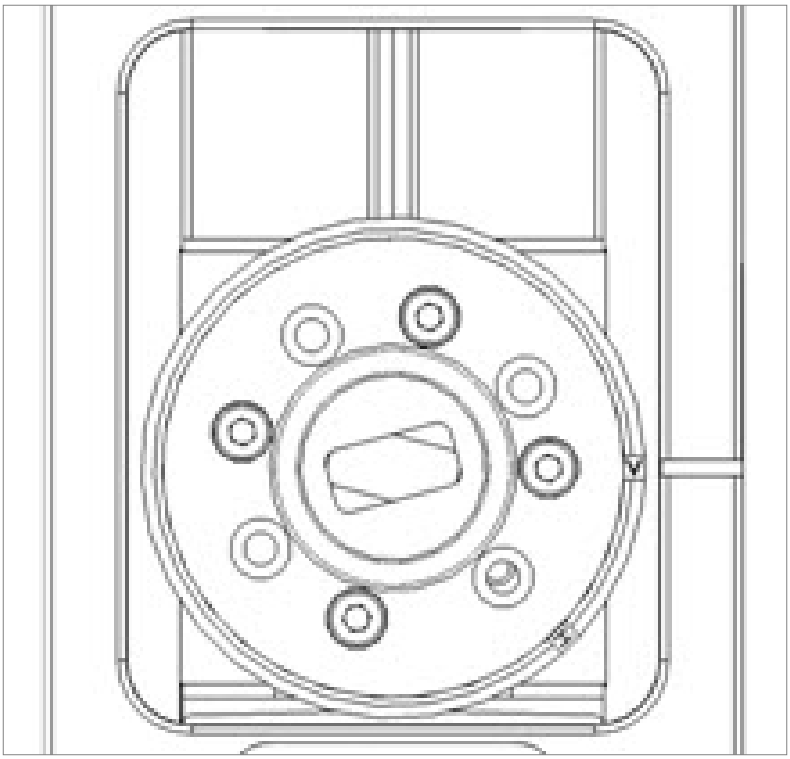
1. Mount the twist to the coupler or splitter using the O-Ring and four screws supplied in the Twist kit, and tighten the screws.



Note:

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





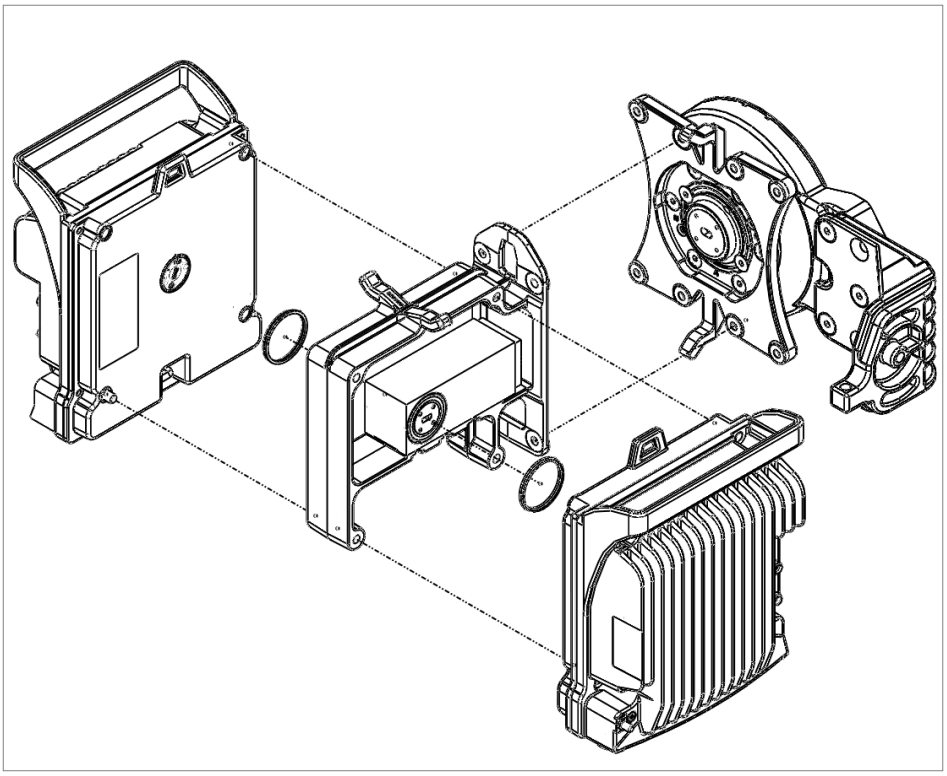
2. Mount the coupler or splitter on the antenna using the four M8 screws and washers supplied with the coupler or splitter kit, and tighten the screws. Make sure to cross-tighten the screws gradually. In other words, partially tighten one screw, then partially tighten the opposite screw. For example, 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.

Note:

Use torque of 16.3 Nm ±0.6 Nm.

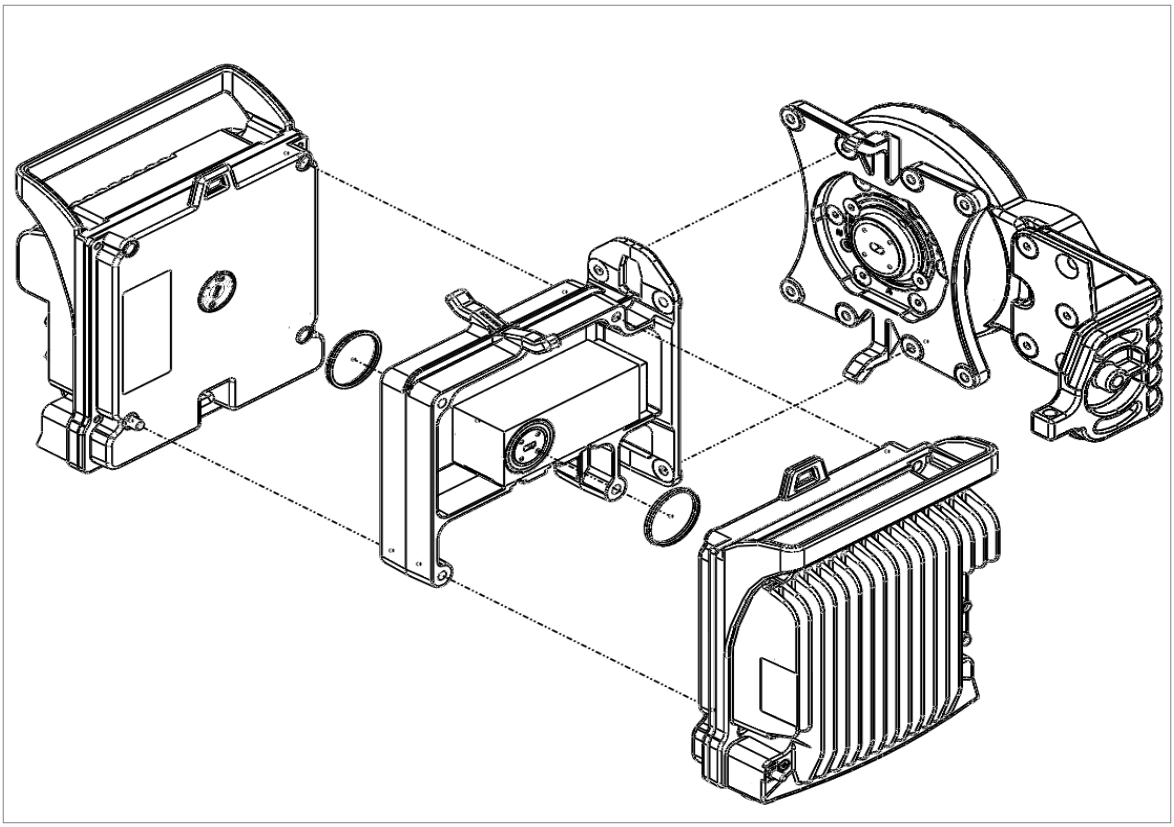
3. Mount the two O-Rings supplied with the coupler or splitter kit, as shown in the following figure.



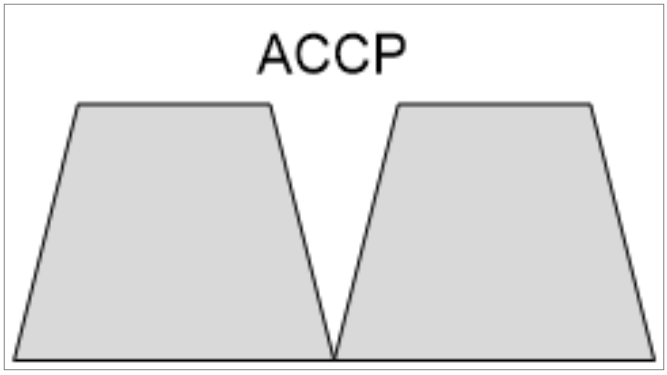
4. Mount the RFU-SX radios to the body of the coupler or splitter using the four M8 captive screws and washers that are supplied, assembled, in each RFU-SX, and tighten the screws. Make sure to cross-tighten the screws gradually. In other words, partially tighten one screw, then partially tighten the 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.

Note:

Use torque of 16.3 Nm ±0.6 Nm.



1+1/2+0 Single Polarization Remote Mount



List of Items

Item	Description	Quantity	Marketing Model
1	RFU-SX	2	See Section RFU-SX Marketing Models
2	RFU-C Pole Mount kit	1	RFU-C-POLEMOUNT
3	RFU-C Coupler (1+1) kit or RFU-C Splitter (2+0) kit	1	Coupler: RFU-C6-CPLR-Kit Splitter: RFU-ff-Sym-cplr-kit

Item	Description	Quantity	Marketing Model
4	Flexible WG Metric kit	1	Flx-WG-xFT-ff

Required Tools

The following tools are required for the installation:

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

Procedure

In 1+1 remote mount installation, the RFU-SX radios are attached to a coupler, while the coupler is connected to the antenna via a flexible WG.

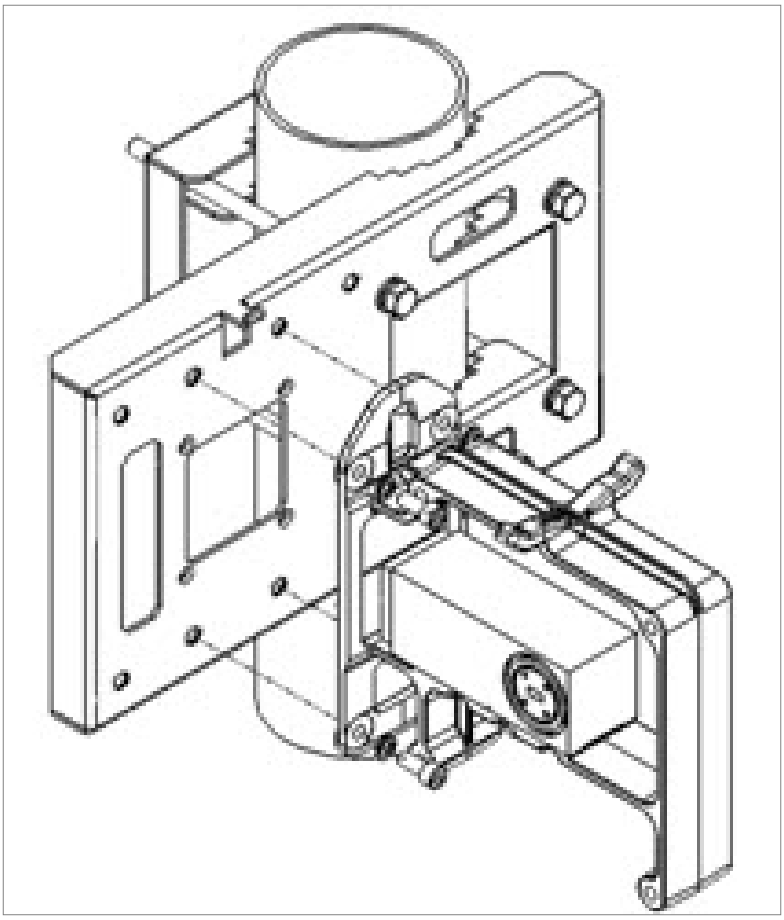
In 2+0 single polarization remote mount installation, the RFU-SX radios are attached to a splitter, while the splitter is connected to the antenna via a flexible WG.

To install the RFU-SX in a remote mount 1+1 or 2+0 configuration:

1. Mount the coupler or splitter to the RFU-C pole mount bracket using the four M8 screws and washers supplied with the coupler or splitter kit, and tighten the screws. Make sure to cross-tighten the screws 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.

Note:

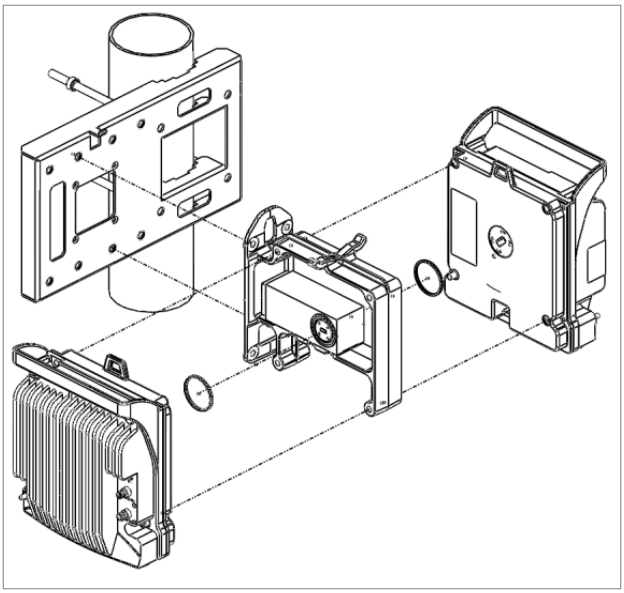
Use torque of 16.3 Nm ±0.6 Nm.



2. Mount the two O-Rings supplied with the coupler or splitter kit.
3. Mount the RFU-SX radios to the body of the coupler or splitter using the four M8 captive screws and washers that are supplied, assembled, in the RFU-SX, and tighten the screws. Make sure to cross-tighten the screws 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.

Note:

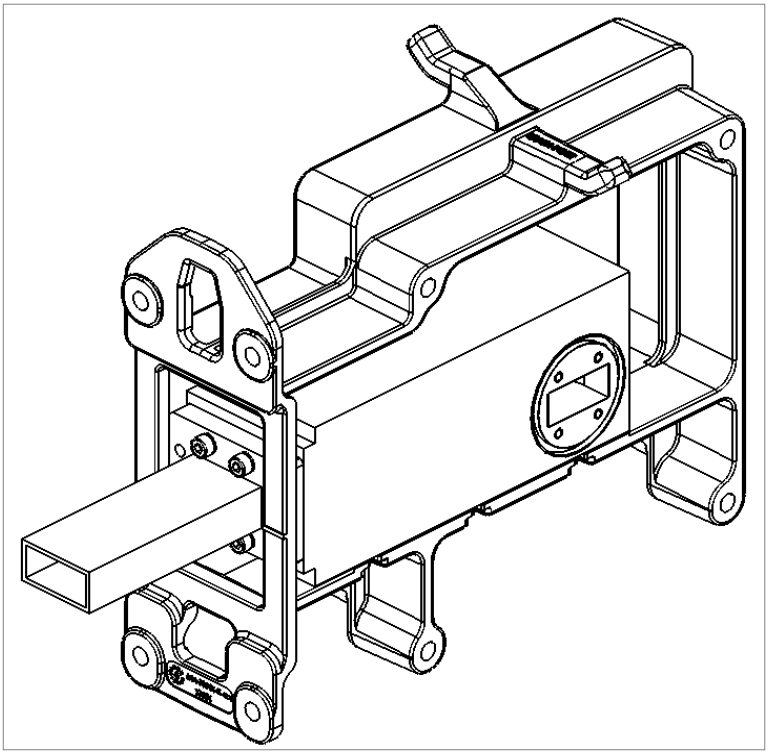
Use torque of 16.3 Nm ±0.6 Nm.

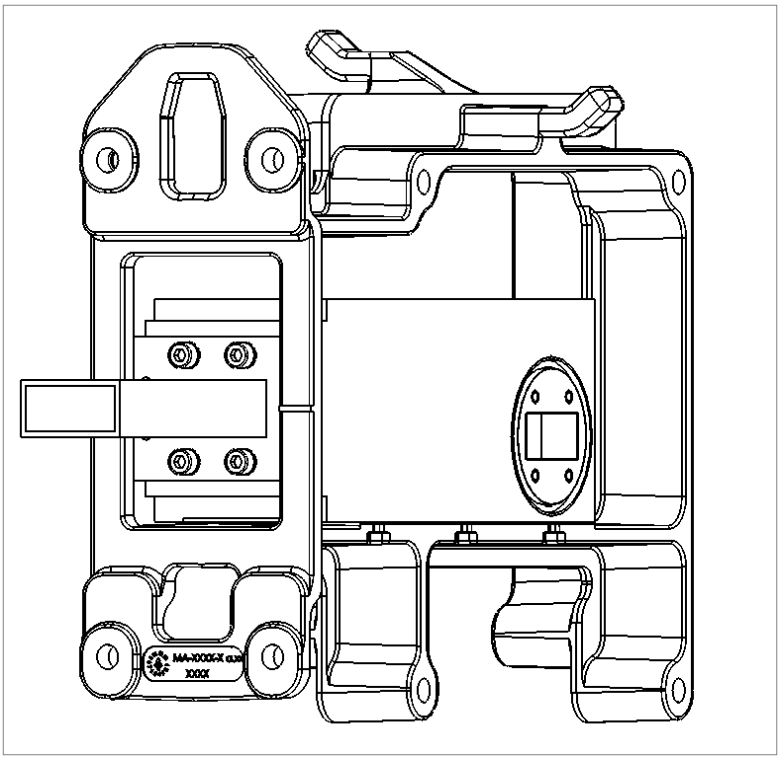


4. Place the O-Ring in the flexible waveguide flange groove.
5. Mount the flexible waveguide on the splitter, and tighten the screws and washers.

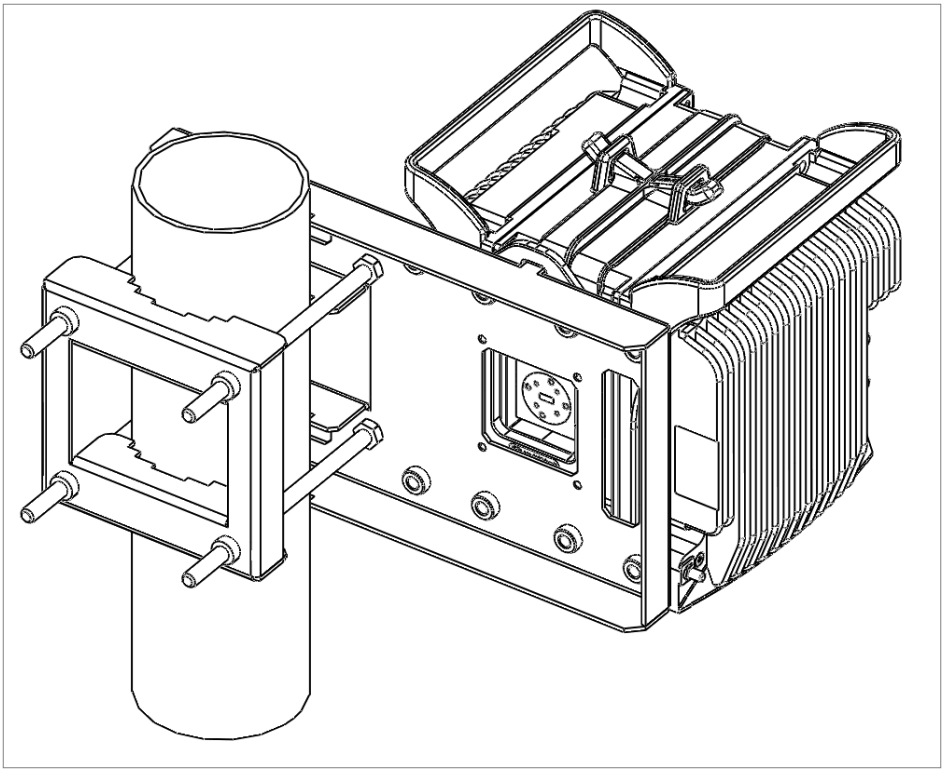
Note:

For 6 GHz, only4 screws should be used, as shown in the pictures below.





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



RFU-SX LEDs

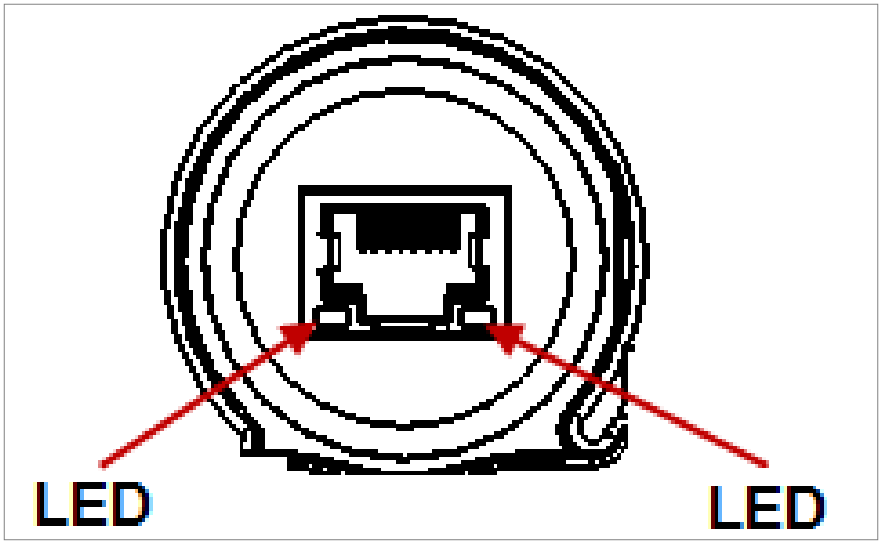
RFU-SX provides the following LEDs to indicate the status of the unit's interfaces, and the unit as a whole:

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

Electrical GbE Interface (RJ-45) LEDs

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

Figure 30: *RFU-SX LEDs – RJ-45 Interface*



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

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

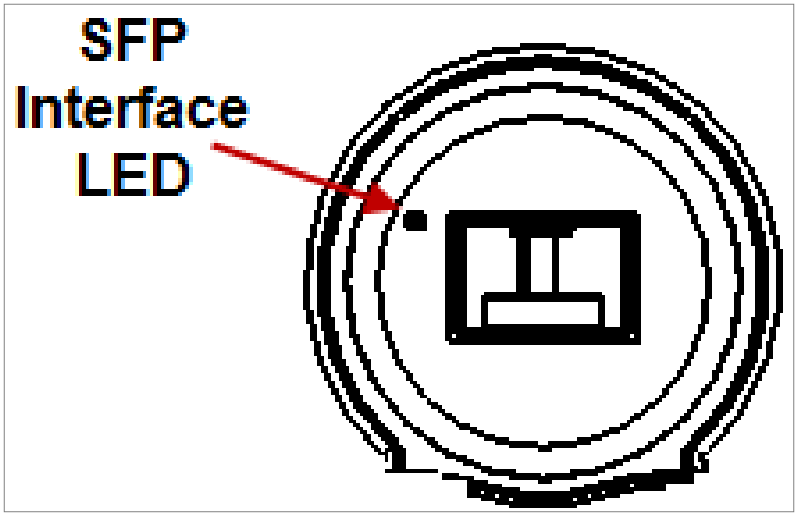
The LED on the right indicates the interface's Admin and cable connection status, and whether there is traffic on the interface:

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

Optical GbE Interface (SFP) LED

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

Figure 31: *RFU-SW LED – SFP Interface*



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

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

Unit LEDs

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

Status LED

The Status LED indicates the power status of the RFU:

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

Radio LED

The Radio LED indicates the status of the radio link:

- **Off** – The radio is off.
- **Green** - The power is on, and all carriers are operational (up).

- **Red** - A loss of frame (LOF), excessive BER, or signal degraded condition exists on the radio.

Prot LED

Reserved for future use.

Cambium Networks

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Warranty	https://www.cambiumnetworks.com/support/standard-warranty/
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