



Installation Guide

PTP 820E

System Release 11.5



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# Before You Start

## Important Notes

- For the warranty to be honored, install the unit in accordance with the instructions in this manual.
- Any changes or modifications of equipment not expressly approved by the manufacturer could void the user's authority to operate the equipment and the warranty for such equipment.
- PTP 820E is intended for installation in a restricted access location.
- PTP 820E must be installed and permanently connected to protective earth by qualified service personnel in accordance with applicable national electrical codes.
- 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.

## Feedback

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

## Problems and warranty

### Reporting problems

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

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


### Repair and service

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

## Hardware warranty

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

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

	<p><b>Caution</b></p> <p>Using non-Cambium parts for repair could damage the equipment or void warranty. Contact Cambium for service and repair instructions.</p> <p>Portions of Cambium equipment may be damaged from exposure to electrostatic discharge. Use precautions to prevent damage.</p>
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## Security advice

Cambium PTP 820 Networks systems and equipment provide security parameters that can be configured by the operator based on their operating environment. Cambium recommends setting and using these parameters following industry recognized security practices. Security aspects to be considered are protecting the confidentiality, integrity, and availability of information and assets. Assets include the ability to communicate, information about the nature of the communications, and information about the parties involved.


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

## Warnings, cautions, and notes

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


### Warnings

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

	<p><b>Warning</b></p> <p>Warning text and consequence for not following the instructions in the warning.</p>
---	--


## Cautions

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

	<p><b>Caution</b> Caution text and consequence for not following the instructions in the caution.</p>
---	---

## Notes

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

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

## Caring for the environment

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

### In EU countries

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



### Disposal of Cambium equipment

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

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

## Disposal of surplus packaging









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

## In non-EU countries

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




## Safety Precautions & Declared Material

### General Equipment Precautions




	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.
	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.
	Use of controls, adjustments, or performing procedures other than those specified herein, may result in hazardous radiation exposure.
	Use of controls, adjustments, or performing procedures other than those specified herein, may result in hazardous radiation exposure.
	When working with an PTP 820E, 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.
	Machine noise information order - 3. GPSGV, the highest sound pressure level amounts to 70 dB (A) or less, in accordance with ISO EN 7779.
	Static electricity may cause body harm, as well as harm to electronic components inside the device. Anyone responsible for the installation or maintenance of the PTP 820E 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.
	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 kopleet til beskyttelsesjord via nettplugg og/eller via annet jordtilkopleet utstyr – og er tilkopleet et kabel-TV nett, kan forårsake brannfare. For å unngå dette

	<p>skal det ved tilkopling av utstyret til kabel-TV nettet installeres en galvanisk isolator mellom utstyret og kabel-TV nettet.</p> <p>Utrustning som är kopplad till skyddsjord via jordat vägguttag och/eller via annan utrustning och samtidigt är kopplad till kabel-TV nät kan i vissa fall medföra risk för brand. För att undvika detta skall vid anslutning av utrustningen till kabel-TV nät galvanisk isolator finnas mellan utrustningen och kabel-TV nätet</p>
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## Précautions générales relatives à l'équipement

	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.
	L'usage de PTP 820E 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.
	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

	Wenn andere Steuerelemente verwendet, Einstellungen vorgenommen oder Verfahren durchgeführt werden als die hier angegebenen, kann dies gefährliche Strahlung verursachen.
	Beachten Sie beim Arbeiten mit PTP 820E das folgende Stromschlag- und Gefahrenrisiko: Durch Abtrennen einer Stromquelle wird nur ein
	Stromversorgungsmodul abgetrennt. Um die Einheit vollständig zu isolieren, trennen Sie alle Stromversorgungen ab.  Maschinenlärminformations-Verordnung - 3. GPSGV, der höchste Schalldruckpegel beträgt 70 dB(A) oder weniger gemäß EN ISO 7779.

## Pre-Installation Instructions

### Packing

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

### Transportation and Storage

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

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

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

## **Unpacking**

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

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

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

## **Inspection**

Check the packing lists and ensure that correct parts numbers quantities of goods have arrived. Inspect for any damage on the cases and equipment. Report any damage or discrepancy to a Cambium representative, by e-mail or fax.

# Product Hardware Description

## PTP 820E Hardware Overview

PTP 820E features an all-outdoor architecture consisting of a single unit, which can be either directly mounted on the antenna or supplied with an integrated antenna.

	<p><b>Note</b></p> <p>The equipment is type approved and labelled according to the EU's Radio Equipment Directive 2014/53/EU. 'RED' replaced the previous R&amp;TTE Directive 1999/5/EC since 13 June 2017.</p>
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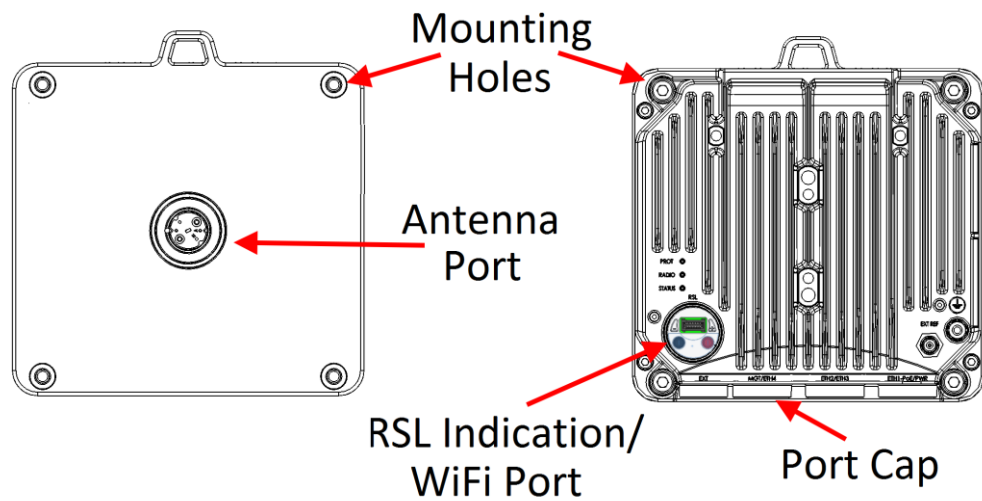


Figure 1: PTP 820E Rear View (Left) and Front View (Right)

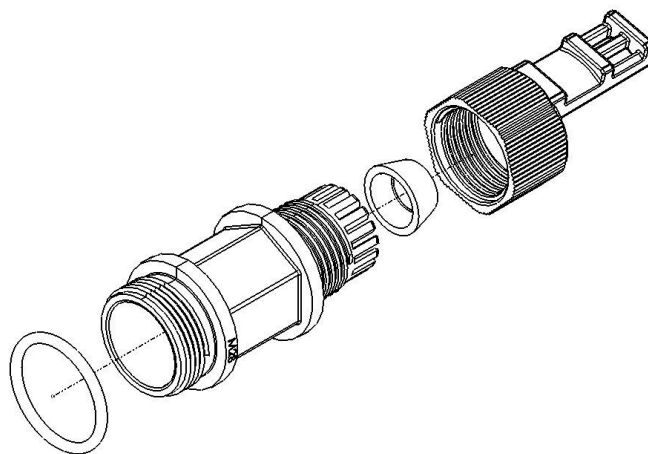




Figure 2: Cable Gland Construction

	<p><b>Note</b></p> <p>The Extension port is smaller than the other ports and requires a special gland.</p>
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## PTP 820E Interfaces

There are two basic PTP 820E hardware versions with the following interface layouts:

- ESE – Two electrical Ethernet interfaces (Port 1 and Port 3) and one optical SFP cage that supports regular and CSFP standards (Port 2).
- ESS – One electrical Ethernet interface (Port 1), an optical SFP cage that supports the regular SFP standard (Port 2), and an optical SFP cage that supports regular and CSFP standards (Port 3).
- ESP – One electrical Ethernet interface for PoE and management (Port 1), an optical SFP cage that supports regular and CSFP standards (Port 2), and an optical SFP cage that can be configured for 1GE or 10GE (Port 3).

	<p><b>Note</b></p> <p>PTP 820E ESP requires System Release 9.7 or higher.</p>
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The following table summarizes the port distribution in each of these variants, with more details on each provided in the following subsections.

Table 1: PTP 820E Port distribution per hardware Model

PTP 820E Variant	Port 1	Port 2	Port 3
ESE	RJ-45: 10/100/1000BaseT  1Gb/s Ethernet Traffic (Eth1) + PoE	SFP cage: SFP, CSFP  1Gb/s Ethernet Traffic (Eth2 + Eth3)	RJ-45: 10/100/1000BaseT  Local management only
ESP	RJ45: 10/100/1000BaseT  Local management + PoE	SFP cage: SFP, CSFP  1Gb/s Ethernet Traffic (Eth2 + Eth3)	SFP cage: SFP/SFP+  1/10Gb/s Ethernet Traffic (Eth1)

The following table provides the part numbers for the PTP 820E unit options.

Table 2: PTP 820E Chassis Part numbers

PTP 820E Variant	Part number	Description
ESE	C800082B006A	PTP 820E Radio, 1Gbps, Hi, TX 81-86GHz, RX 71-76GHz
ESE	C800082B007A	PTP 820E Radio, 1Gbps, Lo, TX 71-76GHz, RX 81-86GHz
ESE	C800082B008A	PTP 820E Radio with 43 dBi ant, 1Gbps, Hi, TX 81-86GHz, RX 71-76GHz



PTP 820E Variant	Part number	Description
ESE	C800082B009A	PTP 820E Radio with 43 dBi ant, 1Gbps, Lo, TX 71-76GHz, RX 81-86GHz
ESP	C800082B002A	PTP 820E Radio, 2.5Gbps, Hi, TX 81-86GHz, RX 71-76GHz
ESP	C800082B003A	PTP 820E Radio, 2.5Gbps, Lo, TX 71-76GHz, RX 81-86GHz
ESP	C800082B004A	PTP 820E Radio with 43 dBi ant, 2.5Gbps, Hi, TX 81-86GHz, RX 71-76GHz
ESP	C800082B005A	PTP 820E Radio with 43 dBi ant, 2.5Gbps, Lo, TX 71-76GHz, RX 81-86GHz

### PTP 820E Interfaces - ESE

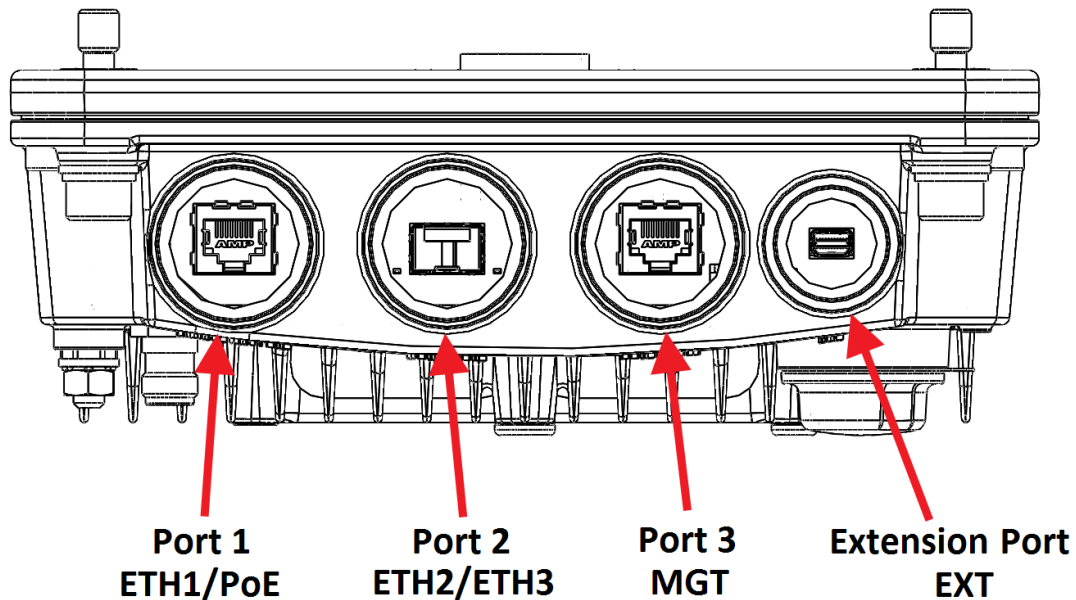


Figure 3: PTP 820E Interfaces - ESE

- Port 1 (Eth1):
  - Electric: 10/100/1000Base-T RJ-45.
  - PoE
- Port 2
  - SFP cage which supports - Regular and CSFP standards
  - Regular SFP provides Eth2
  - CSFP (Dual BiDir SFP) provides Eth2 and Eth3
- Port 3 (MGT):
  - Electric: 10/100/1000Base-T RJ-45.
  - Management port (no traffic)

- Extension Port:
  - XPIC and HSB (planned for future release)
  - Direct connection to CPU by technician

## PTP 820E Interfaces - ESS

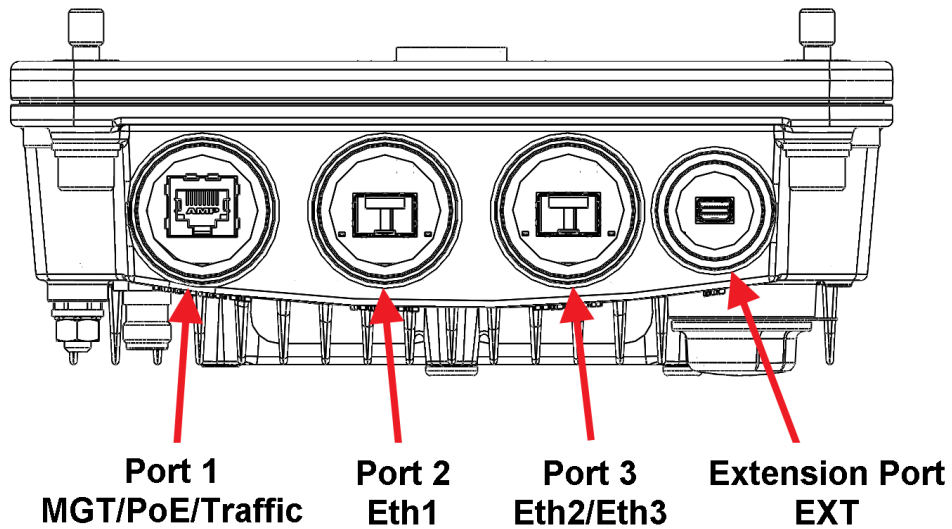


Figure 4: fiPTP 820E Interfaces - ESS

- Port 1 (MGT):
  - Electric: 10/100/1000Base-T RJ-45.
  - PoE or external DC support (adapter)
  - Management
  - 1G Eth traffic
- Port 2 (Eth1)
  - SFP cage which supports Regular SFP standard
- Port 3:
  - SFP cage which supports Regular and CSFP standards
    - Regular SFP provides Eth2
    - CSFP (Dual BiDir SFP) provides Eth2 and Eth3
- Extension Port:
  - XPIC and HSB (planned for future release)
  - Direct connection to CPU by technician

## PTP 820E Interfaces - ESP

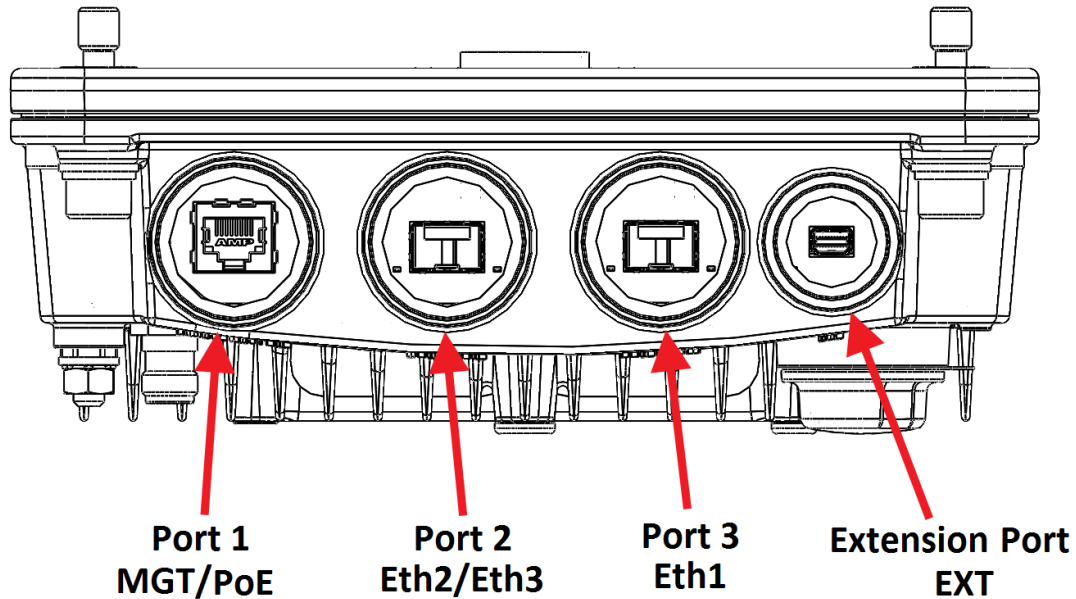


Figure 5: PTP 820E Interfaces - ESP

- Port 1 (MGT):
  - Electric: 10/100/1000Base-T RJ-45.
  - Management port (no traffic)
  - PoE
- Port 2
  - SFP cage which supports - Regular and CSFP standards
  - Regular SFP provides Eth2
  - CSFP (Dual BiDir SFP) provides Eth2 and Eth3
- Port 3 (Eth1):
  - SFP cage which supports SFP+ standard
  - 1GE or 10GE Eth traffic (user-configurable)



### Note

If the port is configured for 1GE, a regular SFP module (rather than SFP+) can be used.

- Extension Port:
  - XPIC and HSB (planned for future release)
  - Direct connection to CPU by technician (see User Guide for details)



### Note

To use the interface in 10GE mode, the third-party switch must be running Pause Frame Flow Control, as defined in IEEE 802.3x. It is also recommended to

configure shapers on the third-party switch to limit the packet flow from the switch to the PTP 820E unit to 2.5 Gbps.

## Common PTP 820E Interfaces

The following interfaces are common to all PTP 820E hardware versions.

- Extension Port (Port 4):
  - XPIC and HSB
  - Direct connection to CPU by technician



### Note

XPIC and HSB are planned for future release.

- Antenna Port – Cambium proprietary flange (flange compliant with UG385/U)
- RSL interface – PTP 820E uses a two-pin connection to measure the RSL level using standard voltmeter test leads:

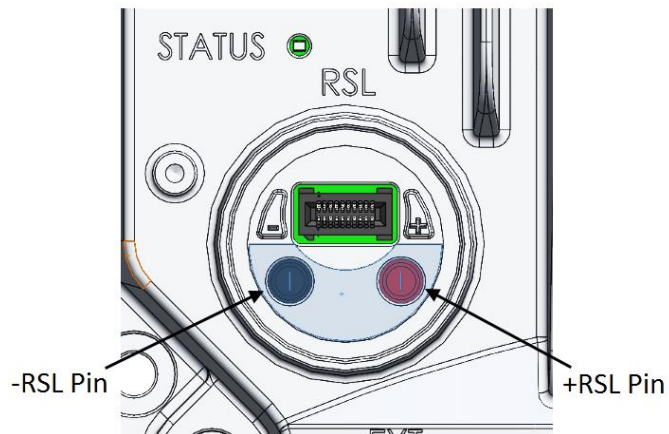


Figure 6: RSL Interface



### Note

The RSL interface includes a docking slot for a WiFi module plugin module. WiFi is hardware-ready and will be supported in future software releases.

- Grounding screw

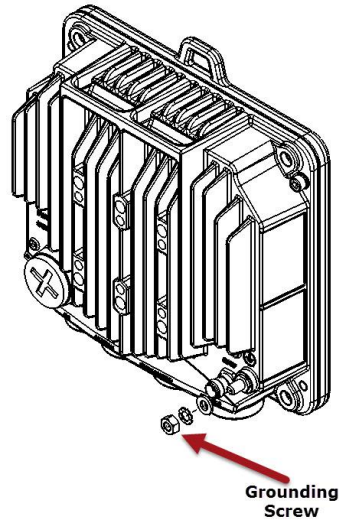


Figure 7: Grounding Screw

## PoE Injector

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

Each PoE Injector kit includes the following items:

- PoE injector
- 2 DC power connectors

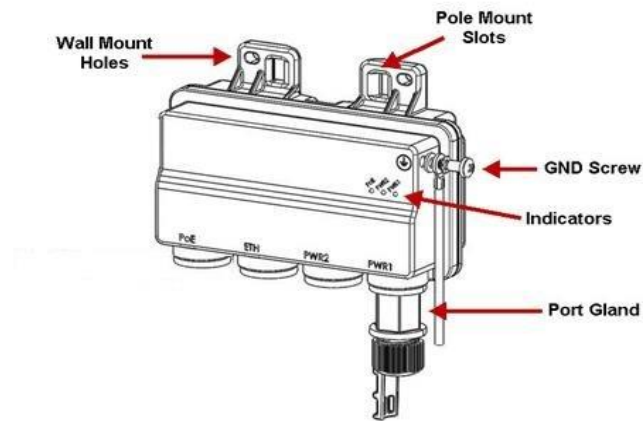


Figure 8: PoE Injector

Two models of the PoE Injector are available:

- PoE\_Inj\_AO\_2DC\_24V\_48V - Includes two DC power ports with power input ranges of -(18-60)V each.
- PoE\_Inj\_AO - Includes one DC power port (DC Power Port #1), with a power input range of -(40-60)V.

## PoE Injector Interfaces

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

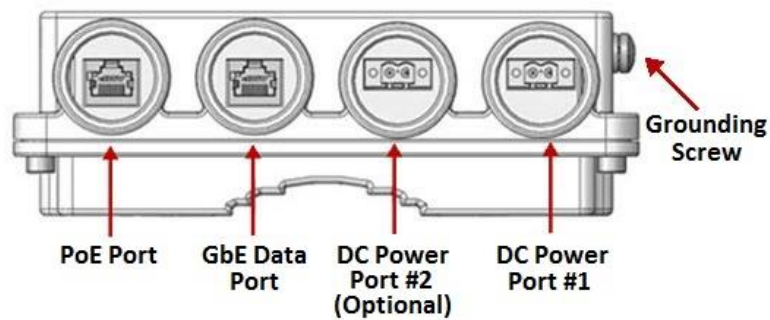


Figure 9: PoE Injector Ports

## Powering with External DC

For configurations in which power is not provided via PoE, a special adaptor (PTP 820 Mini Power Adaptor) is available that enables users to connect a two-wire power connector to the PoE port. This adaptor is located inside of the gland. In such configurations, only one electrical GbE interface is available (MGT).

- N000082L165A PTP 820 Mini Power Adaptor

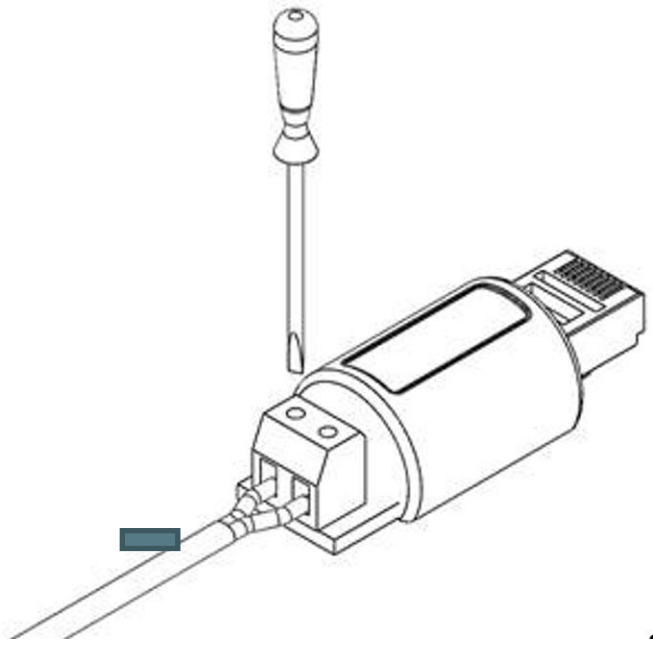


Figure 10: Two-Wire to PoE Power Adaptor

### System Components

The following figures show the main components used in the PTP 820E installation procedures.

<p>Figure 11: PTP 820E</p>	<p>Figure 12: Coupler/Splitter</p>	<p>Figure 13: OMT</p>

Figure 14: PoE Injector	Figure 15: Twist for Coupler/Splitter
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## Adaptors and Installation Kits

Table 3: PTP 820E Accessories

Part number	Description
N800082L003A	PTP 820E Coupler Kit
N800082L002A	PTP 820E Splitter Kit
N800082L001A	PTP 820E OMT Kit
N800082L004A	PTP 820E Flat Antenna Mounting kit

Table 4: PoE Injector

Part number	Description
N000082L022A	PTP 820 PoE Injector all outdoor, redundant DC input, +24VDC support
N000082L020A	PTP 820 PoE Injector 19inch rack mount KIT
N000082L021A	PTP 820 PoE Injector 23inch rack mount KIT


Table 5: Two-Wire to PoE Port Power Adaptor

Part number	Description
N000082L165A	PTP 820 Mini Power Adaptor

## Antenna Connection

Direct Mount:

CommScope (VHLP)

	<p><b>Note</b></p> <p>Appropriate lubricant or grease can be applied to the screws that connect the PTP 820E to the antenna interface.</p>
---	--



## Power Specifications

### Power Input Specifications

Standard Input	-48 VDC nominal
DC Input range	-40.5 to -60 VDC

### Power Consumption Specifications

Unit Configuration	Maximum Power Consumption
Active	43W
Standby	36W

### Power Connection Options

Power Source and Range	Data Connection Type	Connection Length	DC Cable Type / Gage
Ext DC -(40.5 ÷ 60) VDC (Using an RJ-45 to DC cable adaptor)	Optical	≤ 150m	18AWG
	Optical	150m ÷ 300m	14AWG
PoE Injector -(18 ÷ 60) VDC	Electrical	≤ 100m (328ft)	CAT5e (24AWG)

### PoE Injector Power Input

Standard Input	-48 (Optional)
DC Input range	-(18/40.5 to 60) VDC

### Important Notes!

- The unit must only be installed by service personnel.
- The unit must have a permanent connection to protective grounding.
- Port 2 (ETH2/ETH3) does not provide protection from over-voltages on telecommunication networks for host equipment users.
- The RSL interface connector is intended for technician use only.
- Disconnect device (circuit breaker) in the building installation.
- Shall be readily accessible and incorporated external to the equipment.
- The maximum rating of the overcurrent protection shall be up to 6 Amp.

## Environmental Specifications

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

Temperature range for continuous operating temperature with high reliability:

**-33°C (-27°F) to +55°C (131°F)**

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

**-45°C (-49°F) to +60°C (140°F)**

Humidity: **5%RH to 100%RH**

**IEC529 IP66**

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

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

# Cable Installation and Grounding

## Minimum and Maximum Cable Diameter

To fit the gland, the outer cable diameter should be between 6-10 mm. This applies to all glands on both the PTP 820E unit and the PoE Injector.

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

## Grounding the Cables

Cables must be grounded as follows:

- For fiber cables (see **Connecting an Optical Fiber Cable and SFP** on page 43), no grounding is required.
- For DC power cables (see **Connecting a DC Power Cable** on page 50), no grounding is required.
- For Ethernet cables, the shielded Ethernet cable (SF/UTP construction) must be grounded to the antenna tower at the top (next to the RFU), the entry to the indoor cabinet, and every 50m using the kit CAT5E\_gnd\_kit.

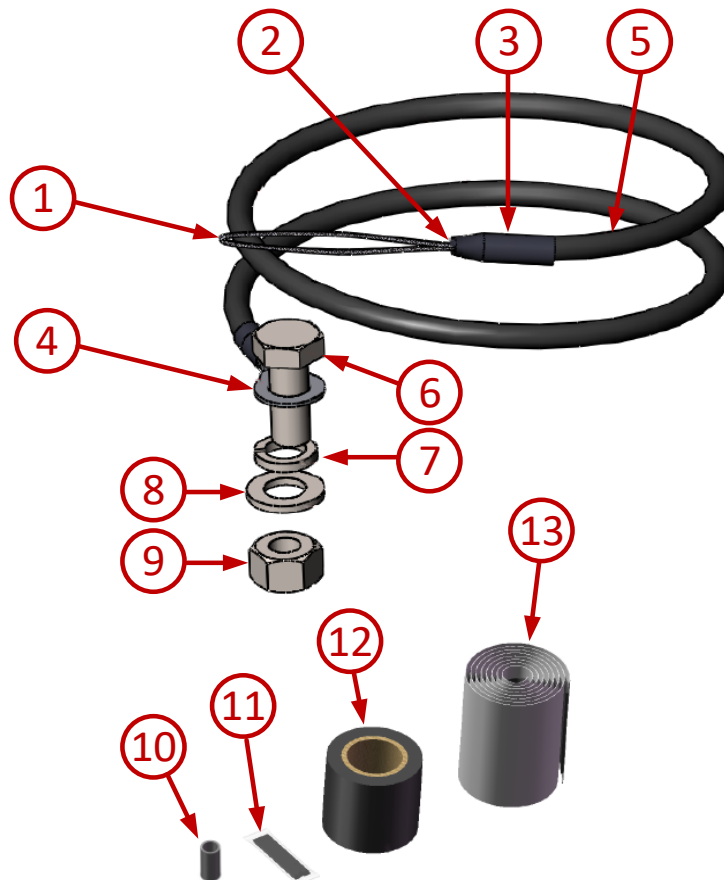


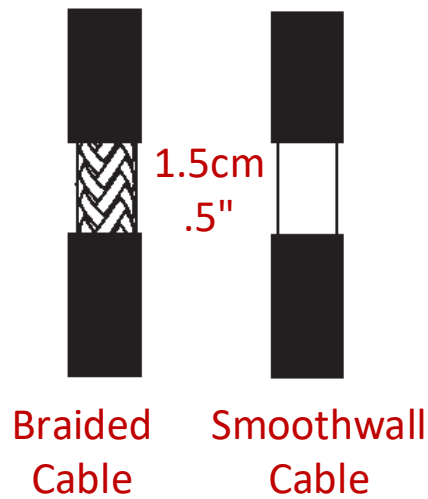
Figure 16: Cable Grounding Kit

Table 6: Cable Grounding Kit

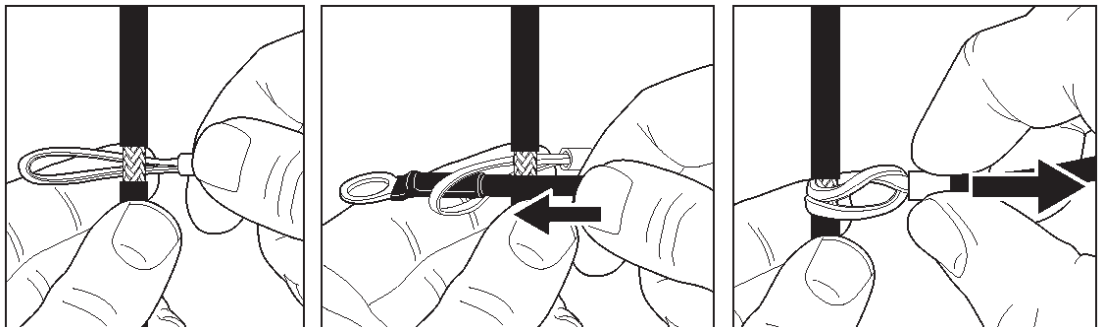
Marketing P/N	Description
N000082L017A	PTP 820 Grounding Kit for CAT5e F/UTP 8mm cable

To connect the grounding kit:

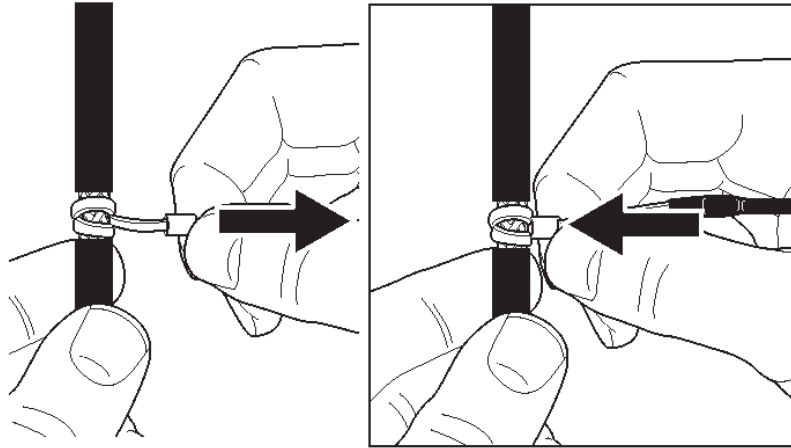
1. Strip the cable jacket about 1.5 cm (.5").



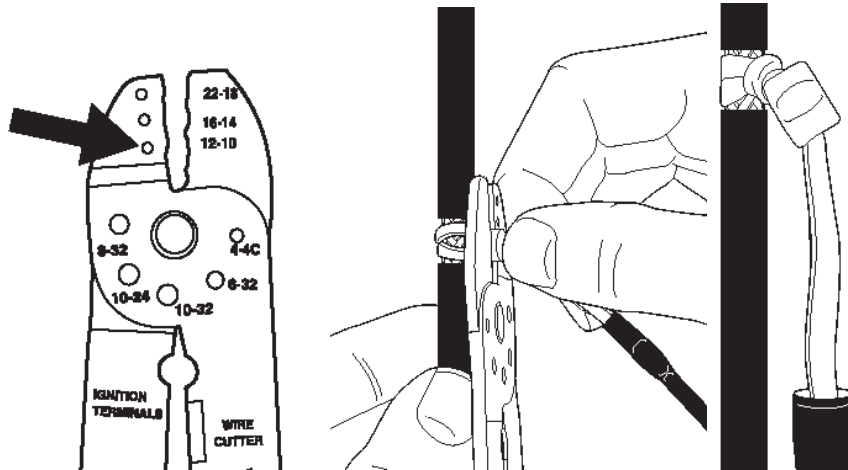
2. Loop the grounding wire's braid belt (1) around the stripped portion of the cable, insert the rest of the grounding wire (5) through the braid belt, and tighten to form a knot, as shown in the figure below.



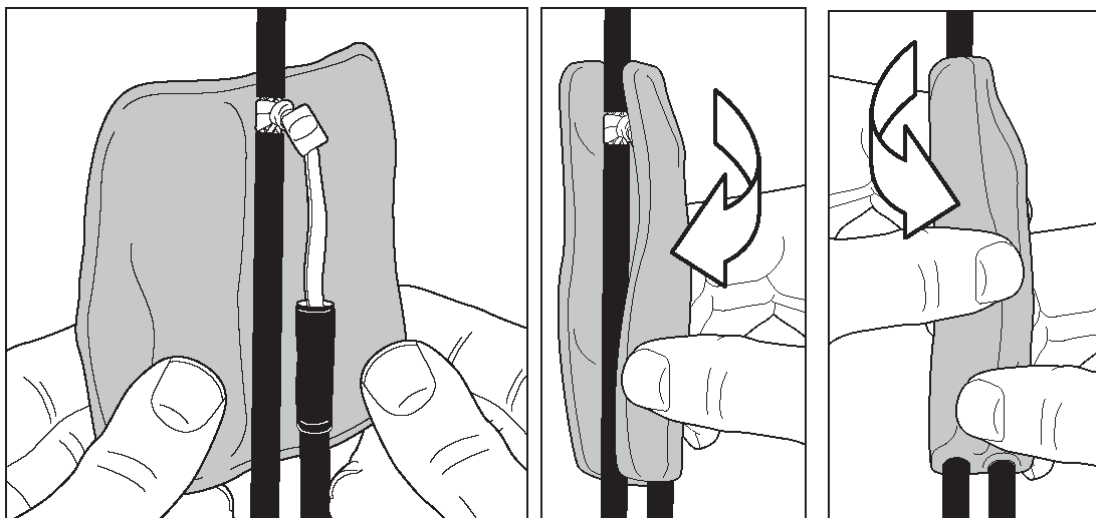
- Grasp the terminal of the braid belt (2) and slide it flush with the knot around the cable, as shown in the figure below.



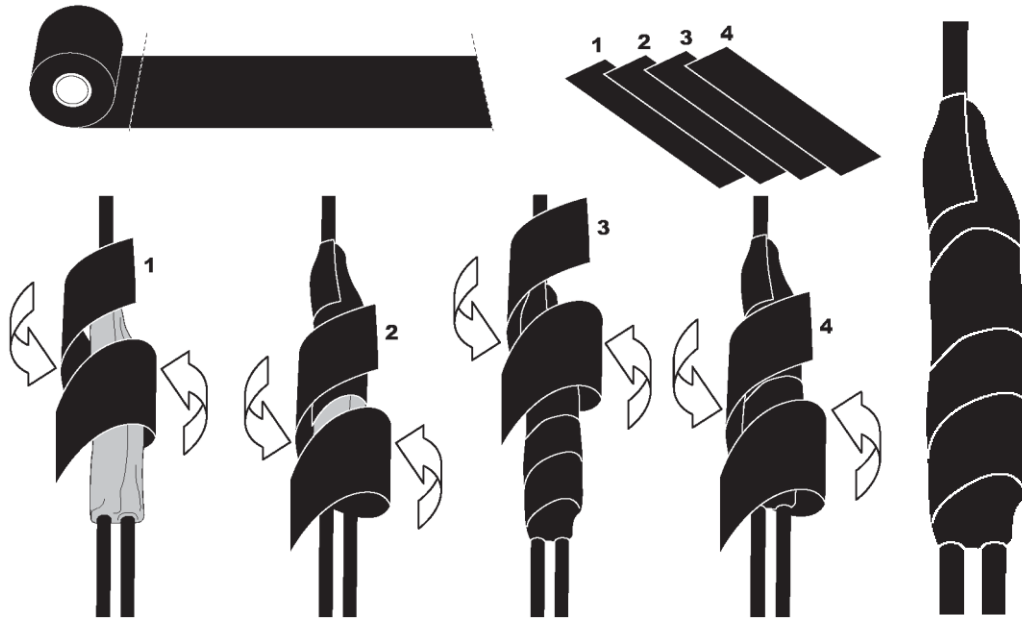
- Crimp the knotted braid belt (1) and the bare terminal (10) together, as shown in the figures below.



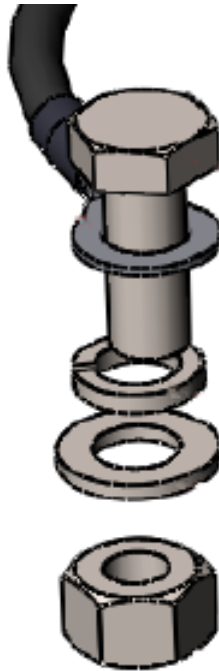
- Wrap the butyl rubber sealing clay (13) around the cable and the grounding wire, as shown in the figures below.



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.



## Grounding the PTP 820E Unit

### Required Tools

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

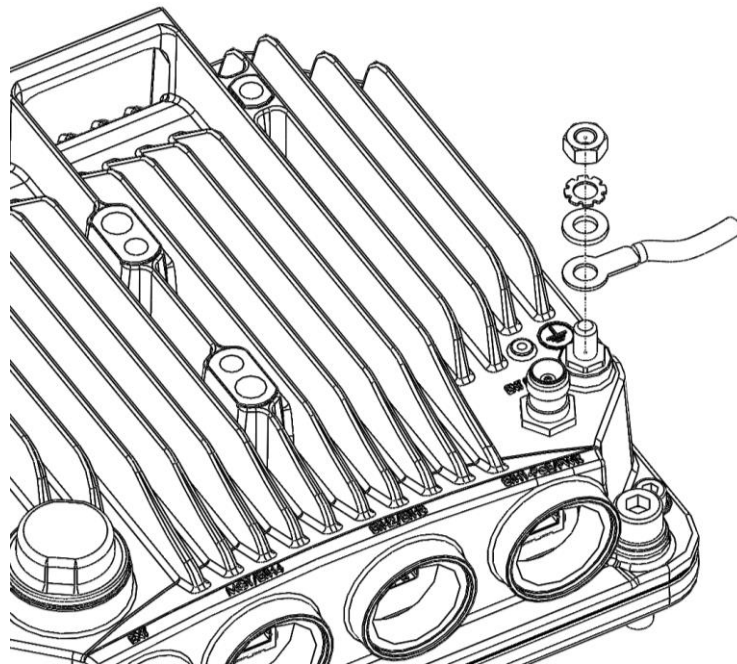
### Procedure

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


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

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

1. On the front of each PTP 820E unit, loosen the nut, plain washer, and serrated washer from the GND stud, using the metric offset hexagon key and the wrench.



2. Place the cable lug (supplied with the PTP 820E 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.

	<p><b>Note</b></p> <p>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.</p> <p>A 2-pole circuit breaker, a branch circuit protector, suitably certified in accordance with applicable national code and regulations, rated maximum 20A, shall be installed for full power disconnection in a building installation.</p> <p>Any outdoor antenna cable shield shall be permanently connected to protective earth in a building installation.</p>
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## Power Source


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

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

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

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

	<p><b>Caution</b></p> <p>The user power supply GND must be connected to the positive pole in the PTP 820E power supply. Any other connection may cause damage to the system!</p>
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	<p><b>Note</b></p> <p>For the warranty to be honored, you must install the PTP 820E in accordance with the instructions above.</p>
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## Surge Protection

PTP 820E includes built-in surge protection for its Ethernet and power interfaces. PTP 820E's surge protection implementation complies with surge immunity standard IEC 61000-4-5, level 4, provided the Ethernet cables were prepared according to the instructions in **Connecting the Ethernet Cable**.

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

In areas in which severe lighting conditions are likely to occur, it is strongly recommended to add additional protection by placing lightning protectors on all electrical Ethernet cables, near the connection points with the PTP 820E unit.



The following surge protector is available from Cambium Networks.

Table 7 Surge Protector

Marketing Model	Item Description
C000000L033A	Gigabit Surge Suppressor (56V), 10/100/1000 BaseT

## Available Cable Options

### Fiber Optic Cables – Single Mode

Part number	Item Description
N000082L139A	PTP 820 Optical CABLE,SM, 30m
N000082L140A	PTP 820 Optical CABLE,SM, 50m
N000082L141A	PTP 820 Optical CABLE,SM, 80m
N000082L142A	PTP 820 Optical CABLE,SM, 100m
N000082L143A	PTP 820 Optical CABLE,SM, 150m
N000082L186A	PTP 820 Optical CABLE,SM, 2.2m
N000082L187A	PTP 820 Optical CABLE,SM, 10m
N000082L188A	PTP 820 Optical CABLE,SM, 20m
N000082L189A	PTP 820 Optical CABLE,SM, 200m
N000082L190A	PTP 820 Optical CABLE,SM, 300m

### Multi-Mode, DC Cable and Connector

Marketing P/N	Description
N000082L019A	PTP 820 Outdoor_DC_cbl_2x18AWG_drum, 305m
N000082L169A	PTP 820 Outdoor_DC_cbl_2x14AWG_drum, 305m
N000082L165A	PTP 820 Mini Power Adaptor
N000082L191A	PTP 820 Optical CABLE,MM, 2.2m
N000082L192A	PTP 820 Optical CABLE,MM, 10m
N000082L193A	PTP 820 Optical CABLE,MM, 20m
N000082L194A	PTP 820 Optical CABLE,MM, 30m

Marketing P/N	Description
N000082L195A	PTP 820 Optical CABLE,MM, 50m
N000082L196A	PTP 820 Optical CABLE,MM, 80m
N000082L197A	PTP 820 Optical CABLE,MM, 100m
N000082L198A	PTP 820 Optical CABLE,MM, 150m
N000082L199A	PTP 820 Optical CABLE,MM, 200m
N000082L200A	PTP 820 Optical CABLE,MM, 300m

## Ethernet Cable and Specifications

Marketing P/N	Description
N000082L016A	PTP 820 CAT5E Outdoor 100m drum

This cable has the following specifications:

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

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

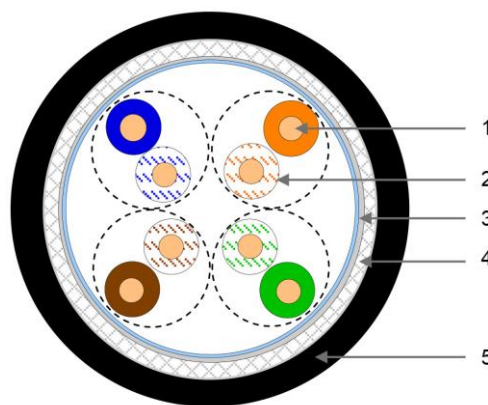


Figure 17: Cable Design

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

Table 8: Ethernet Cable Color Code

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

## Outdoor Ethernet Cable Specifications

Table 9: Outdoor Ethernet Cable Electrical Requirements

Cable type	CAT-5e SFUTP, 4 pairs, according to ANSI/TIA/EIA-568-B-2
Wire gage	24 AWG
Stranding	Solid
Voltage rating	70V
Shielding	Braid + Foil
Pinout	<p style="text-align: center;">RJ45,P1 <span style="float: right;">RJ45,P2</span></p> <p>1 — WHITE/GREEN — 1</p> <p>2 — GREEN — 2</p> <p>3 — WHITE/ORANGE — 3</p> <p>6 — ORANGE — 6</p> <p>4 — BLUE — 4</p> <p>5 — WHITE/BLUE — 5</p> <p>7 — WHITE/BROWN — 7</p> <p>8 — BROWN — 8</p> <p>SHELL — DRAIN WIRE + SHIELD — SHELL</p>

Table 10: Outdoor Ethernet Cable Mechanical/Environmental Requirements

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

## Outdoor DC Cable Specifications

Table 11: Outdoor DC Cable Electrical Requirements

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

Table 12: Outdoor DC Cable Mechanical/Environmental Requirements

Jacket	UV resistant
Outer diameter	7-10 mm
Operating & 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 or cable clamps. When using the T-Rups kit, take special care to apply the proper amount of force in order to avoid damage to the cable. This is especially important for optical (SFP) cables.

## Special Instructions for use of Glands



### Note

Each PTP 820E unit is supplied with two glands. If additional glands are required, they must be ordered separately, in kits of five glands each.

Table 13: Glands Kit

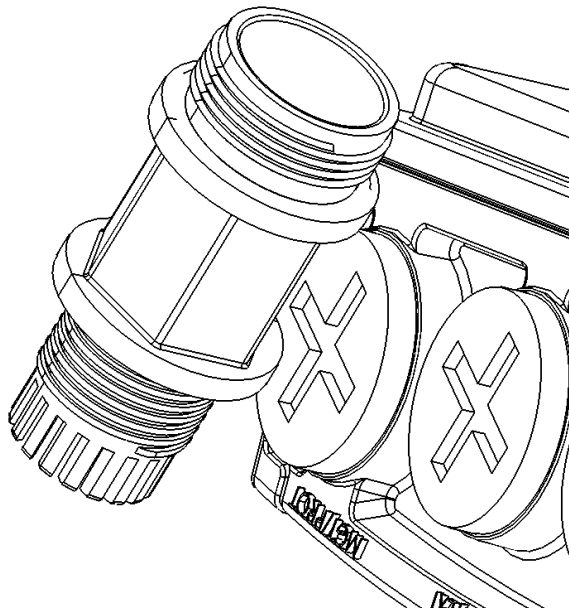
Part number	Marketing Description
N000082L014A	PTP 820 Glands_x5_KIT

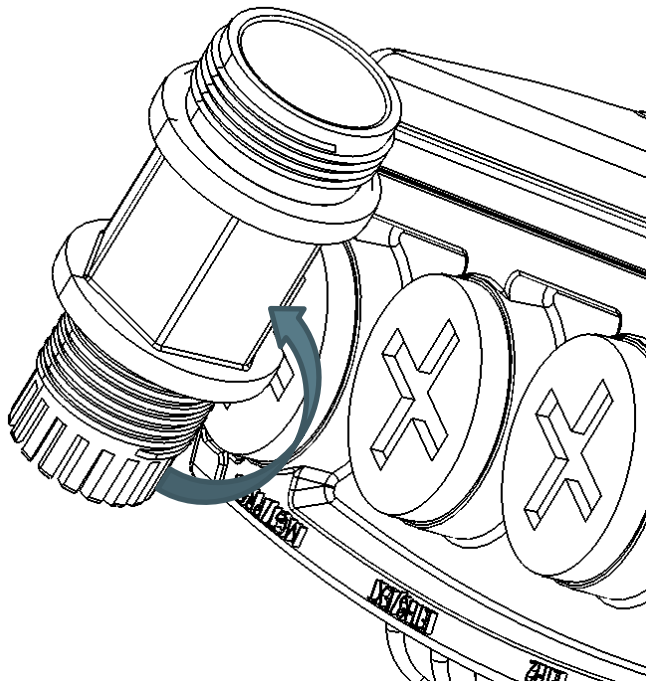
In addition, gland caps can be ordered to protect the cable and connector from damage when elevating the cable and gland to the radio unit. See Step 5 in Section 3.8.1, **General Installation Procedure**. Gland caps are ordered separately, in kits of 10 caps each.

Table 14: Gland Cap

Part number	Marketing Description
N800082L009A	PTP 820E Cable Protection Cap (Qty 10)

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





## General Installation Procedure

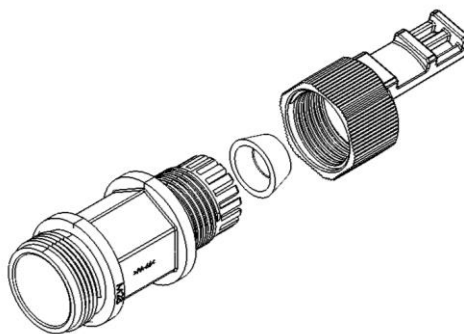
This procedure applies to all cable types and explains how to install the cables using long glands. The gland is supplied assembled.

When using the power adaptor (see section 2.2, **PTP 820E Interfaces**), perform these steps to prepare the cable:

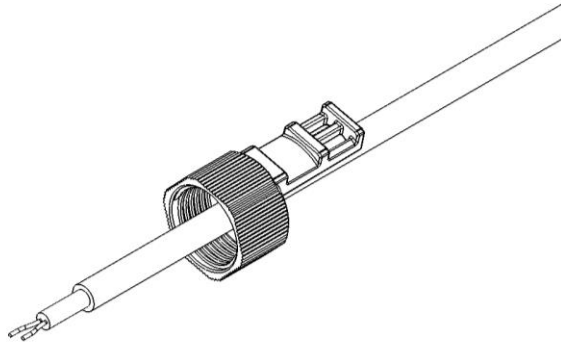
1. Strip off a maximum of 20 mm from the cable jacket.
2. Expose 10 mm at the edge of each of the two wires.

For all installations, perform the following steps:

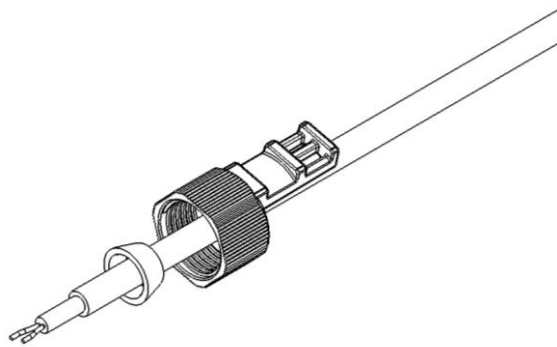
1. Before inserting a cable, you must disassemble the gland cap and gland rubber from the gland body.



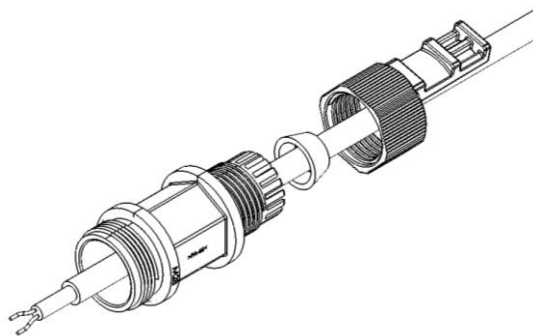
2. Slide the gland cap into the cable.



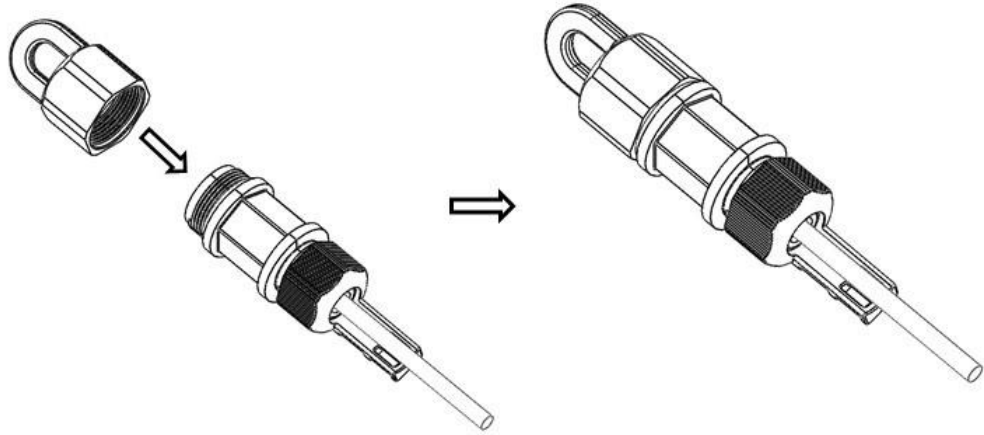
3. Slide the gland rubber into the cable.



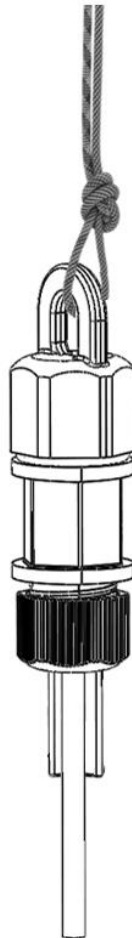
4. Slide the cable into the body of the gland. If you are using a gland cap (see Step 5), make sure to leave enough space for the gland cap to fit into the gland without disturbing the cable.



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

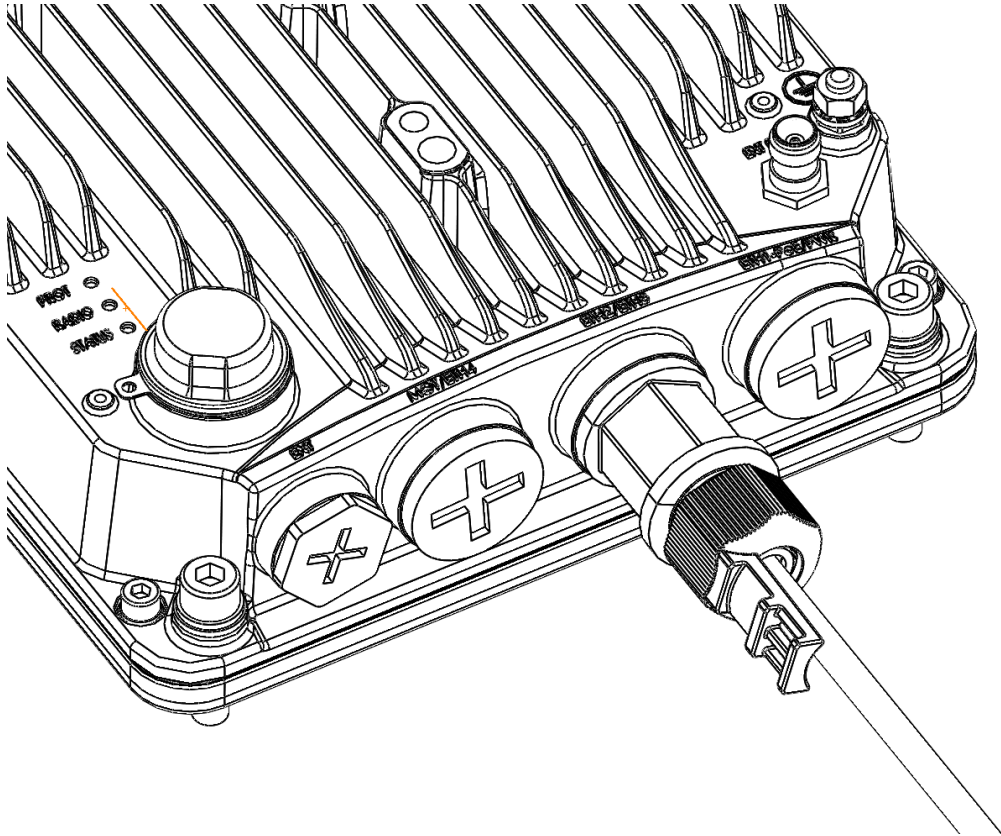


6. The M28 gland cap has hook on top. After attaching the gland cap to the gland, you can connect a rope to the hook and use this to lift the gland and cable up to the radio unit. Before screwing the gland into the radio unit, you must remove the gland cap.





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



**Note**

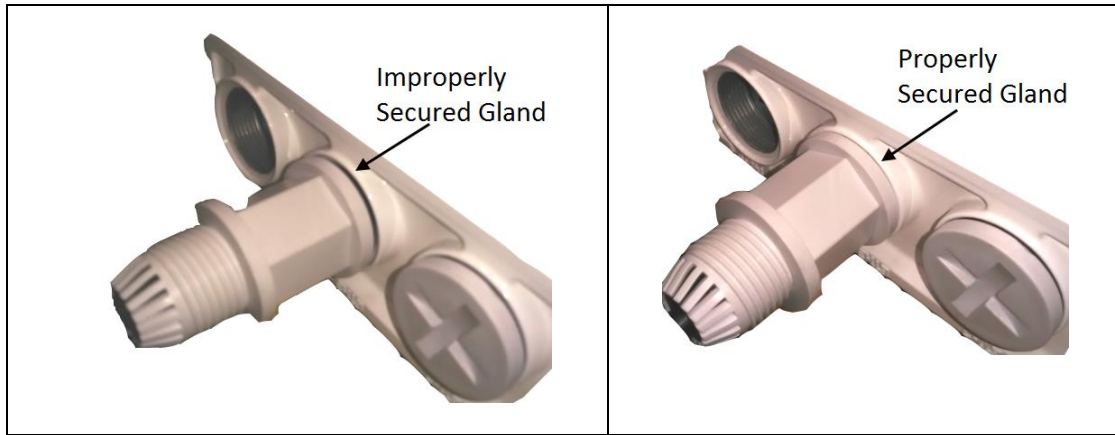
Before tightening the gland, make sure the gland is aligned with the tapped hole in the unit. Tightening the gland at an angle can ruin the thread on the gland and prevent proper sealing of the interface.

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




**Note**

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



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

	<p><b>Note</b></p> <p>If the main portion of the gland is rotated while the rear portion is seizing the cable, this may ruin the cable connector.</p>
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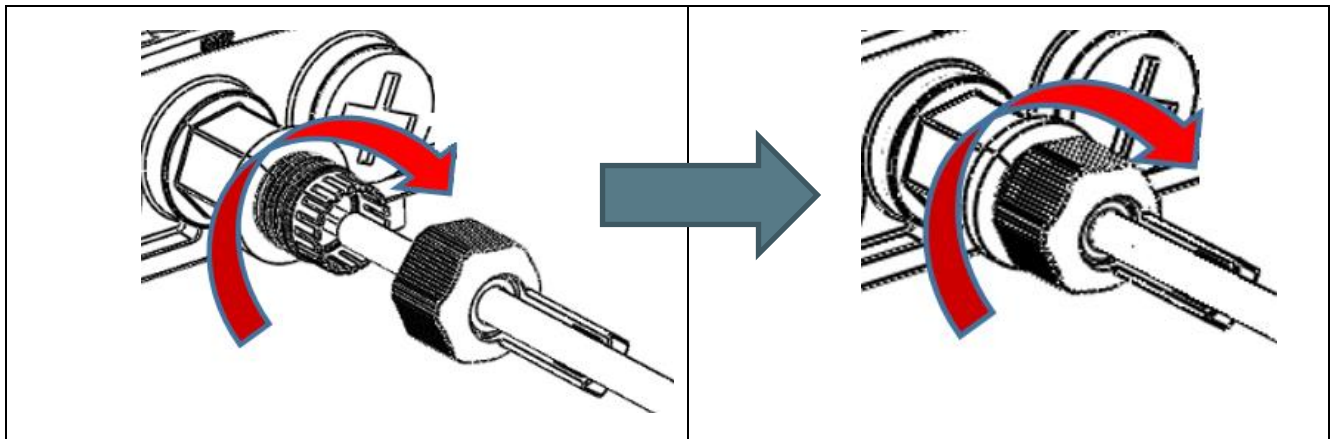
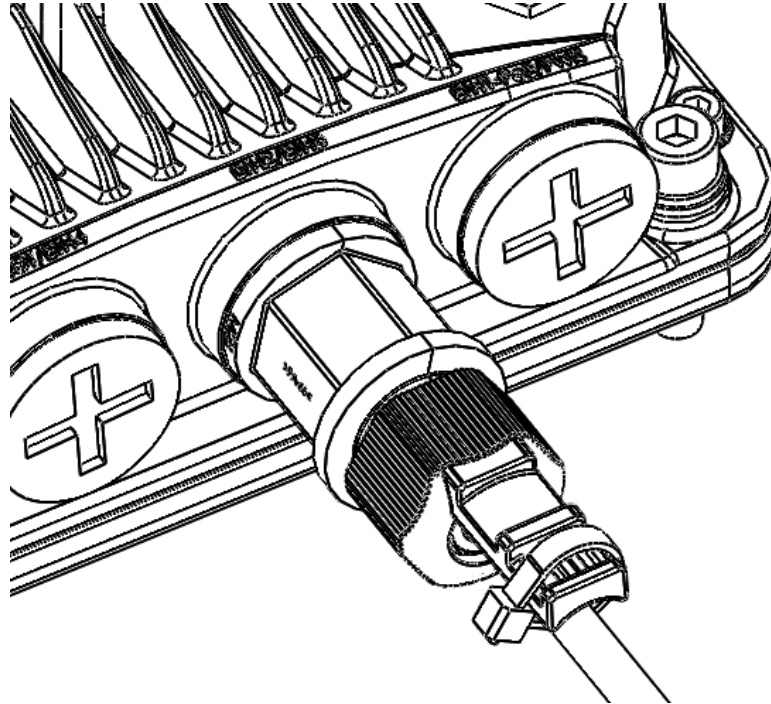


Figure 18: Tightening the Front Portion of the Gland

Figure 19: 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

### Types of SFPs

The PTP 820E includes an SFP cage that supports regular SFP and CSFP standards:

- Regular SFP provides a single Ethernet interface: ETH2. This interface uses two optical fiber cables (one for TX and one for RX).
- CSFP (Dual BiDi SFP) provides two Ethernet interfaces: ETH2 and ETH3. These interfaces use a single optical fiber cable per interface, multiplexing TX and RX on the same cable using different wavelengths for TX and RX.

When a Dual BiDi CSFP is used, a single-fiber BiDi CSFP must be used for the third party equipment connected to the CSFP ports, with opposite wavelengths for TX and RX. The following table provides an example of a valid CSFP-SFP pair in which TX=1310nm and RX=1490nm for the CSFP connected to the PTP 820E, and TX=1490nm and RX=1310nm for the SFP connected to the third party equipment.

Table 15: CSFP - SFP Compatibility Example

Part number	Description
N800082L010A	PTP 820 CSFP, 1310nm Tx/1490nm Rx, SM, EXT TEMP
N800082L011A	PTP 820 CSFP, 1490nm Tx/1310nm Rx, SM, EXT TEMP

The following table lists recommended SFP modules that can be used with PTP 820E.

Table 16: SFP Module Recommendations

Part number	Item Description
N000082L072A	PTP 820 SFP Optical 1000Base-SX,EXT TEMP
N000082L059A	PTP 820 SFP Optical 1000Base-LX,EXT TEMP
N000082L117A	PTP 820 SFP Electric Int 1000Base-T,EXT TEMP

The following table lists recommended CSFP modules that can be used with PTP 820E.

Table 17: CSFP Module Recommendations

Part number	Item Description
N800082L010A	PTP 820 CSFP, 1310nm Tx/1490nm Rx, SM, EXT TEMP
N800082L011A	PTP 820 CSFP, 1490nm Tx/1310nm Rx, SM, EXT TEMP

The following table lists recommended SFP modules that can be used with third party equipment connected to a CSFP module on the PTP 820E.

Table 18: SFP Module Recommendations for Third Party Equipment

Part number	Item Description
N800082L010A	PTP 820 CSFP, 1310nm Tx/1490nm Rx, SM, EXT TEMP
N800082L011A	PTP 820 CSFP, 1490nm Tx/1310nm Rx, SM, EXT TEMP

The following table lists recommended SFP+ modules that can be used with the 10G port on an ESP model.

Table 19: Approved 10 GbE SFP+ Modules

Part number	Item Description
N800082L013A	PTP 820 SFP+, 1310nm,SM, 10Gbit, Industrial Grade
N800082L012A	PTP 820 SFP+, 850nm,MM, 10Gbit, Industrial Grade



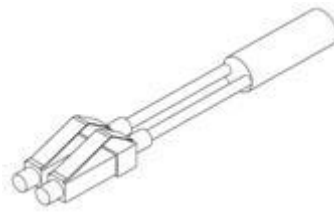
**Note**

Cambium recommends the use of SFP and SFP+ modules certified by Cambium, as listed above.

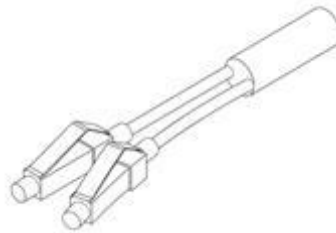
## Connecting Optical Fiber to SFPs

To connect an optical fiber cable and the SFP transceiver:

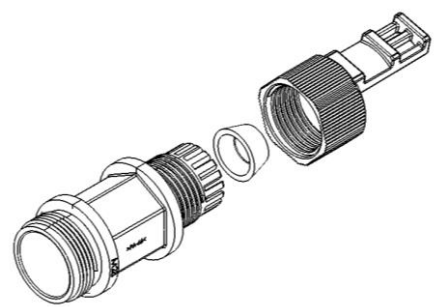
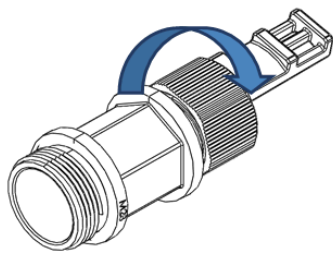
1. Use a pre-assembled cable.



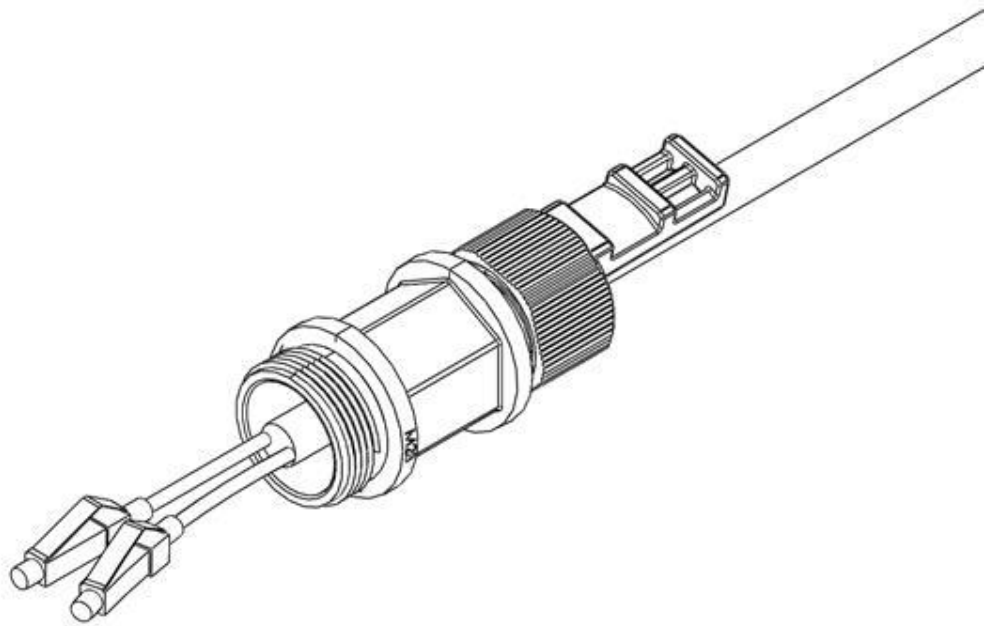
2. Split the connector into two separate LC connectors (one for each fiber).




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

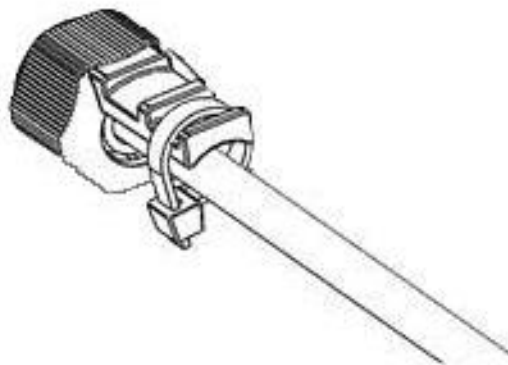


4. Slide the gland cap into the cable.
5. Slide the rubber into the cable.
6. Insert the fibers together with the connectors into the cable gland.

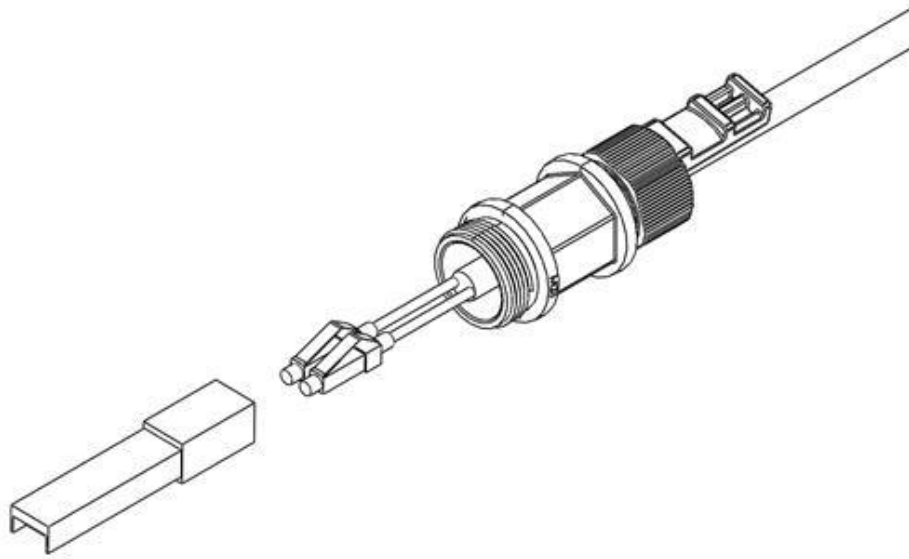


7. Secure the cable to the lip of the gland using a tie wrap.


	<p><b>Note</b></p> <p>If you are raising the cable to a radio unit on a tower, this step is crucial to prevent the cable from slipping from the gland, which could damage the connector.</p>
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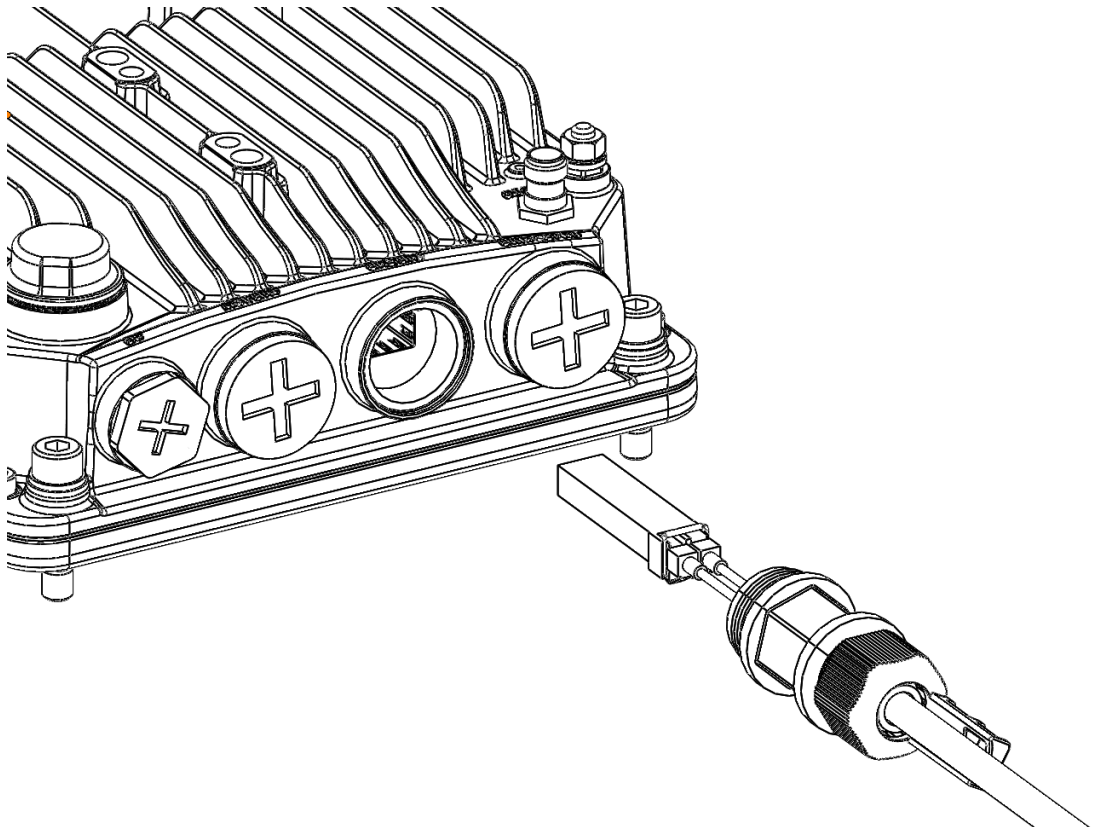
8. Connect the fibers to the SFP transceiver. Listen for the “click” to ensure that they are fully inserted.




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

	<p><b>Note</b> 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.</p>
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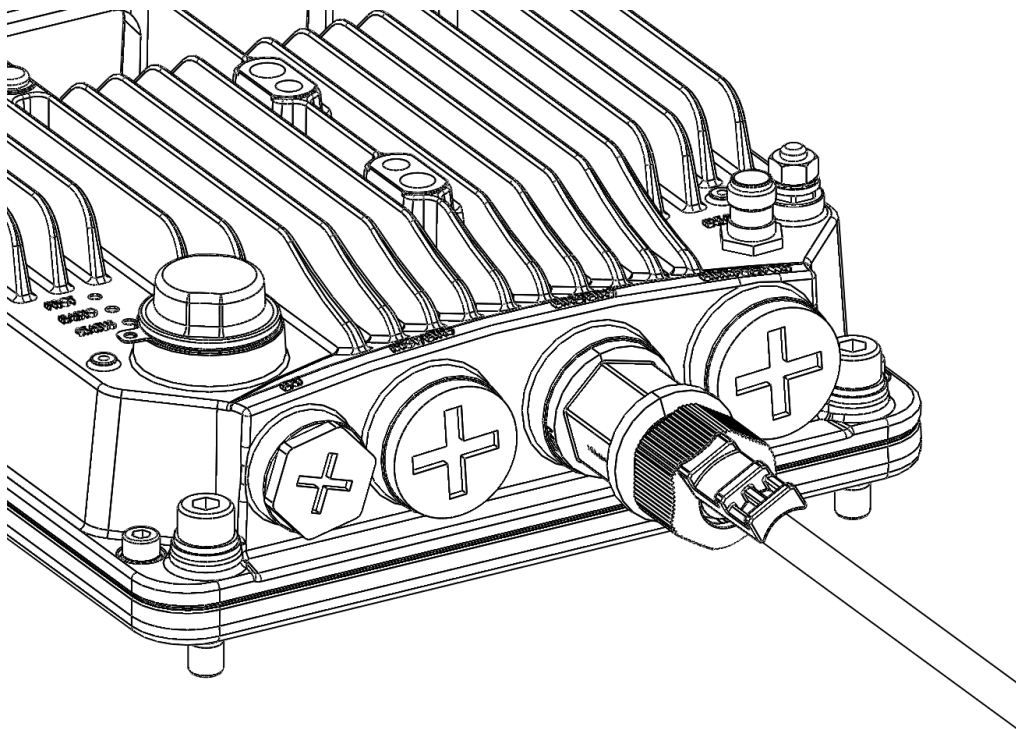
10. Connect the connector into the PTP 820E connector.



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

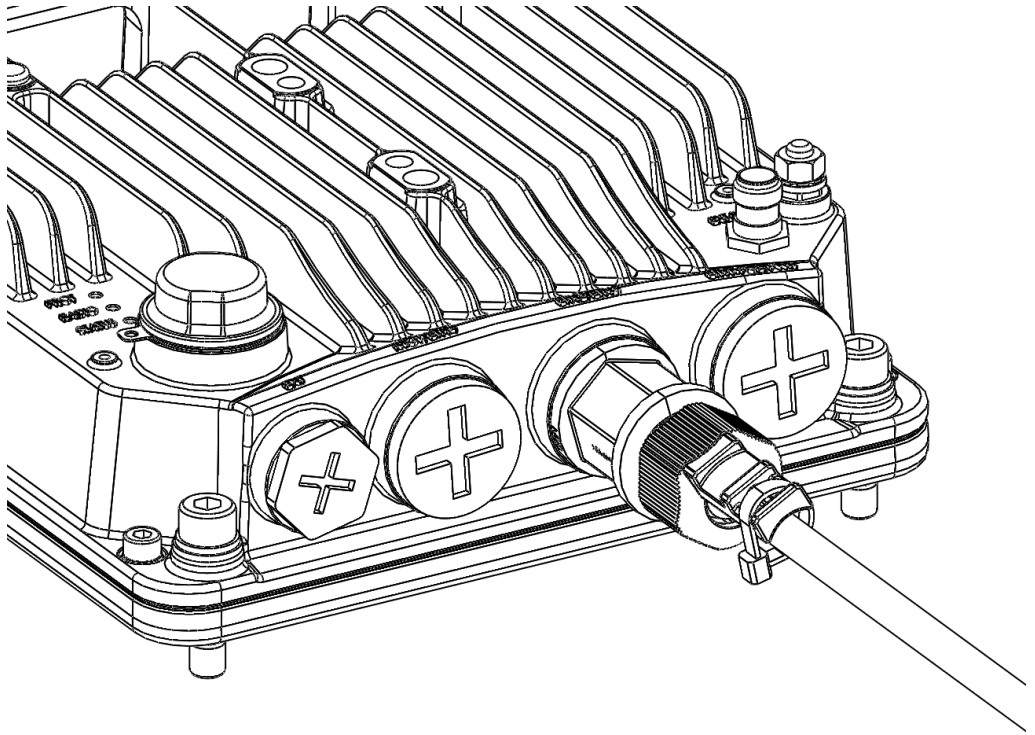
	<p><b>Note</b></p> <p>Before tightening the gland, make sure the gland is aligned with the tapped hole in the unit.</p> <p>Tightening the gland at an angle can ruin the thread on the gland and prevent proper sealing of the interface. Tighten the gland gently and make sure there is no resistance. If there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

If the gland thread is damaged do not use it!



- 1 Secure the cable to the gland using a tie wrap.





## Connecting a DC Power Cable

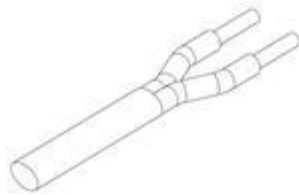


### Note

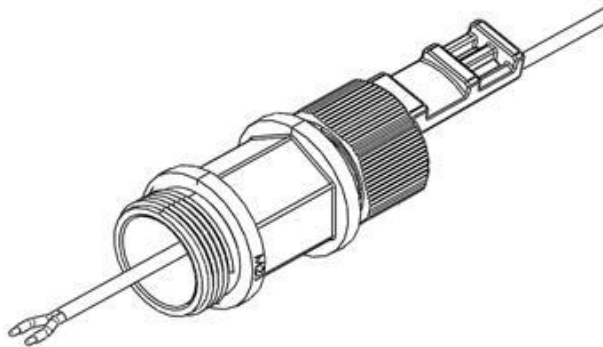
The DC power cable and connector must be ordered separately. See **DC Cable and Connector** on page 33.

To connect a DC power cable:

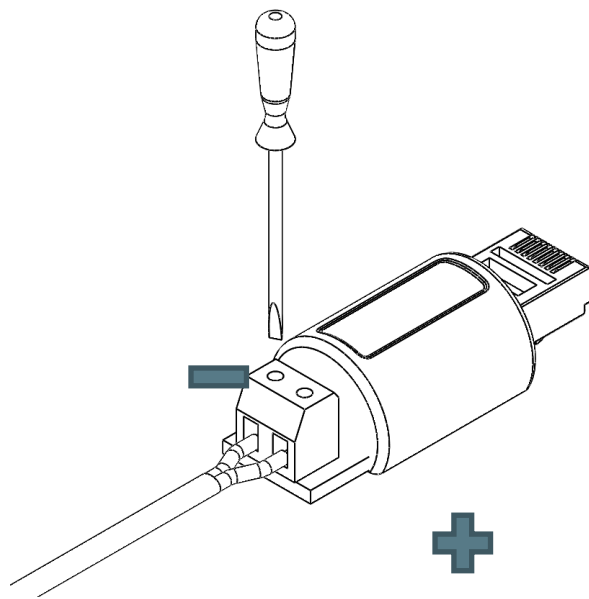
1. Strip off 45 mm from the cable jacket.
2. Expose 10 mm at the edge of each of the two wires.



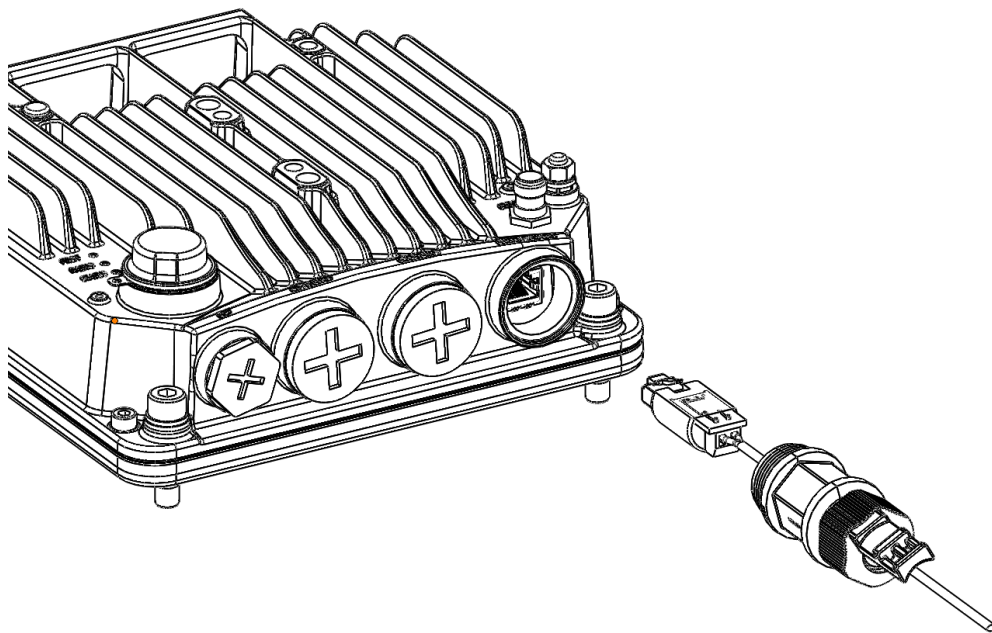
3. Insert the power cable into the gland.




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.

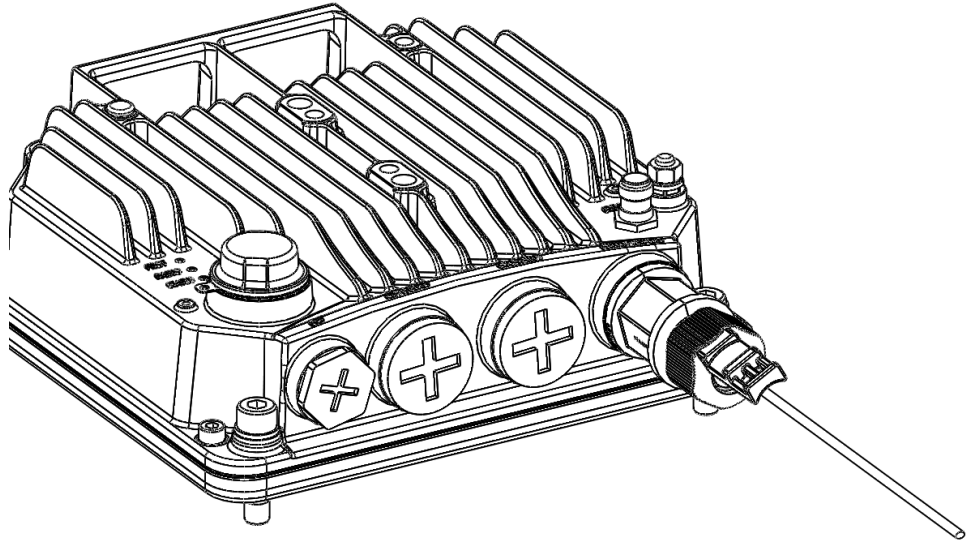


6. Plug the power cable with connector into the PTP 820E power connector.

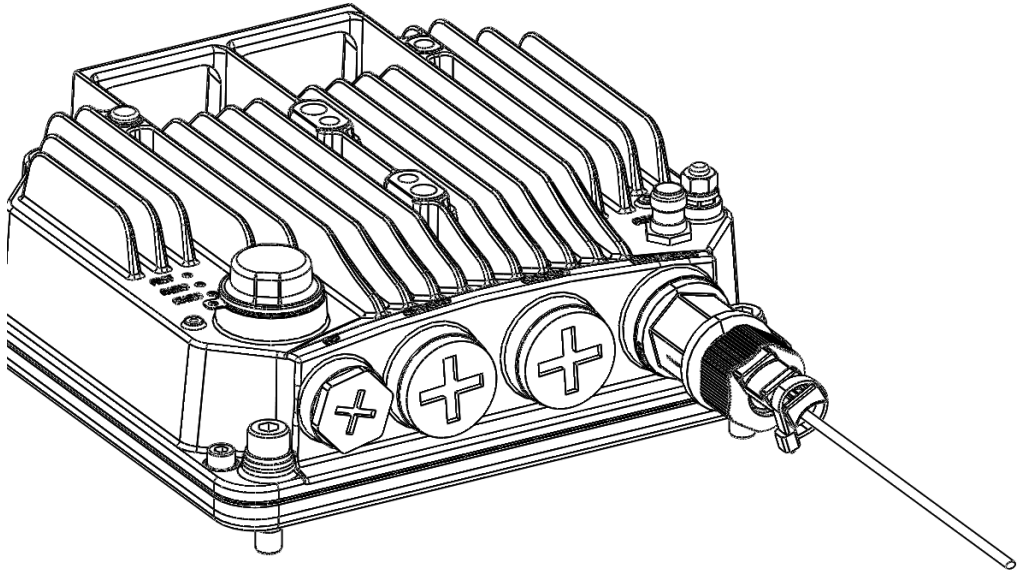


7. Screw the gland into the radio unit.

	<p><b>Note</b></p> <p>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.</p>
---	--



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



## Connecting the Ethernet Cable

If you need to assemble the Ethernet cable, follow the instructions in section 3.11.1, **Preparing the Ethernet Cable and Plug-in Field**, then proceed to section 3.11.3, **Connection of Ethernet Cable to PTP 820E**.

If you using a pre-assembled Ethernet cable, follow the instructions in section 3.11.2, **Preparing the Ethernet Cable Already Assembled**, then proceed to section 3.11.3, **Connection of Ethernet Cable to PTP 820E**.



### Note

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

## Preparing the Ethernet Cable and Plug-in Field



### Note

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



Table 20: Materials for Preparing Ethernet Data Cables

Marketing P/N	Description
N000082L016A	PTP 820 CAT5E Outdoor 100m drum
N000082L014A	PTP 820 Glands_x5_KIT
N000082L017A	PTP 820 Grounding Kit for CAT5e F/UTP 8mm cable
N000082L073A	PTP 820 GBE_Connector_kit


To prepare the Ethernet cable and plug-in field:

1. Prepare the gland and insert the cable, as described in **General Installation Procedure** on page 38.
2. Strip off approximately 45 mm of the outer insulation jacket from the CAT5E cable.

3. Do not strip off the end of the cable shield, but rather, twist the shield to form a braid.



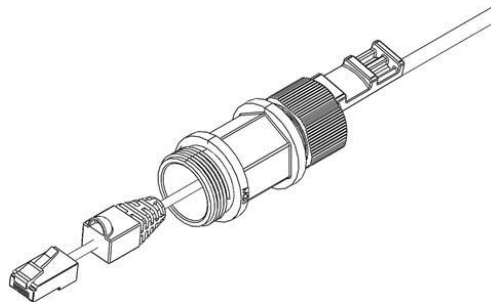
4. Roll back the foil shield insulation and wrap the drain wire around the foil. Do not remove any insulation from the conductors.
5. Align the colored wires.

	<p><b>Note</b> Cord colors should be matched to the same pins on both ends of the cable.</p>
---	--


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



8. Insert the wires into the RJ45 plug. Verify that each wire is fully inserted into the front of the RJ45 plug and in the correct order, according to the pinouts shown in Section 3.6.5, Outdoor Ethernet Cable Specifications. The sheath of the Ethernet cable should extend into the plug by about 13 mm and held in place by the crimp.
9. Extend the cable jacket with the shield into the connector about 5 mm for strain relief and shielding connection.



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

	<p><b>Note</b></p> <p>To ensure proper grounding, it is essential that the twisted braid be firmly connected to the RJ45 plug.</p>
---	--




**Twisted Braid Enveloped  
by Crimping Tail**

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



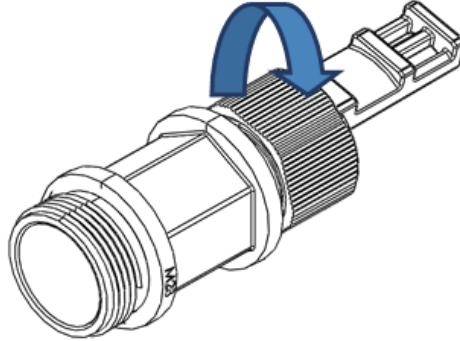
12. Verify that the wires ended up the correct order and that the wires extend to the front of the RJ45 plug and make good contact with the metal contacts in the RJ45 plug.
13. Push back the CAT5E plug cover on the connector plug.

	<p><b>Note</b></p> <p>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.</p>
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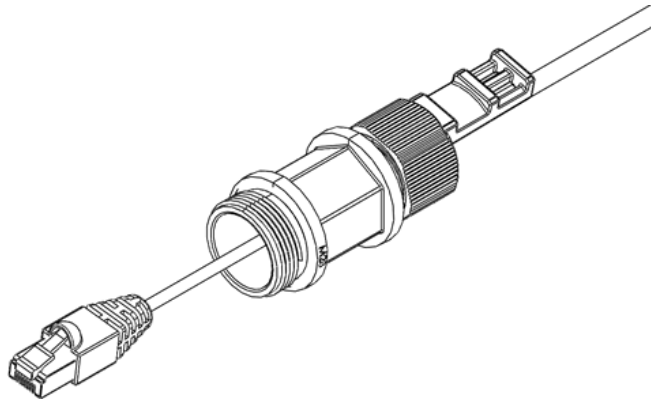
## Preparing the Ethernet Cable Already Assembled

To prepare the Ethernet cable already assembled:

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



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

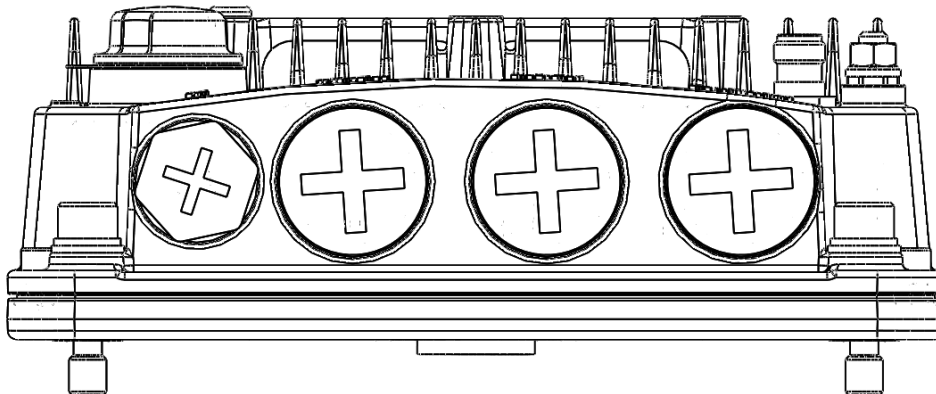


3. Insert the CAT5e cable into the gland body.

## Connection of Ethernet Cable to PTP 820E

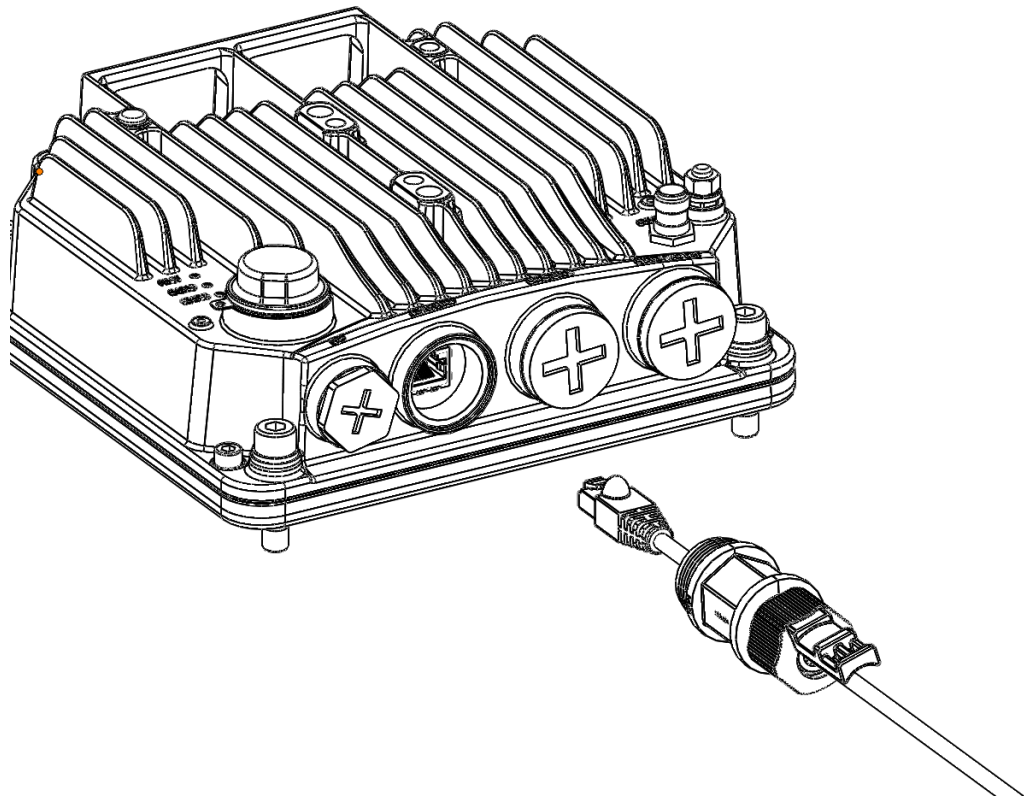
To connect the Ethernet cable to the PTP 820E:

1. Remove the relevant cap from the PTP 820E radio. You can use the side of the gland to unscrew the cap.



2. Connect the CAT5E cable to the PTP 820E.



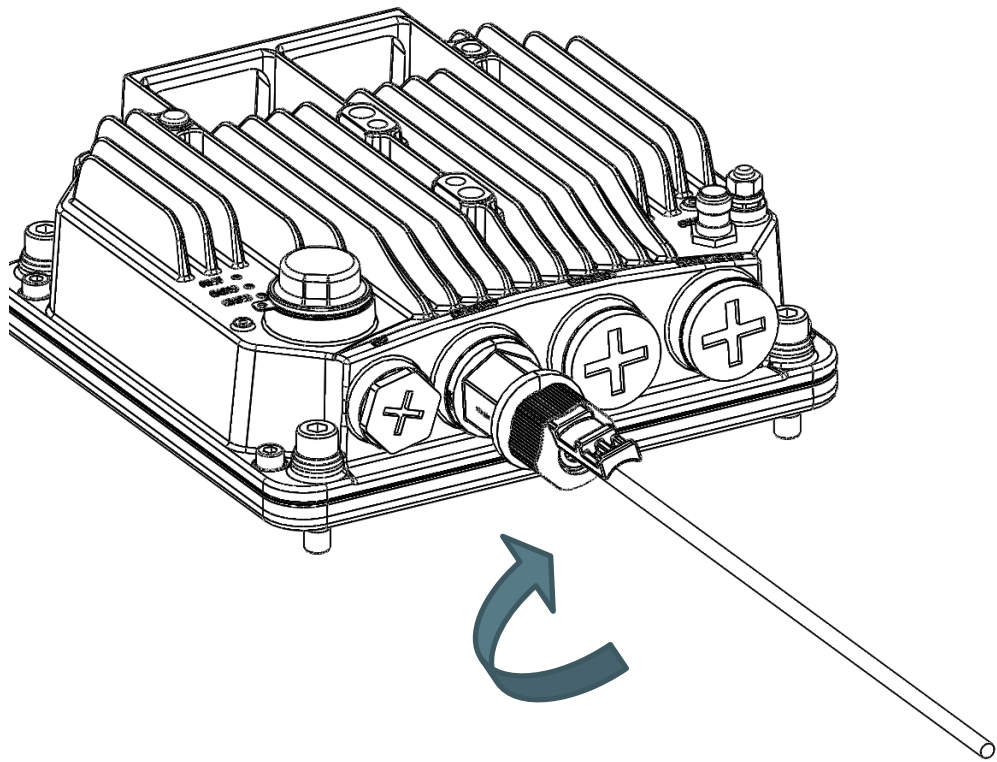


3. Screw the gland into the radio unit.

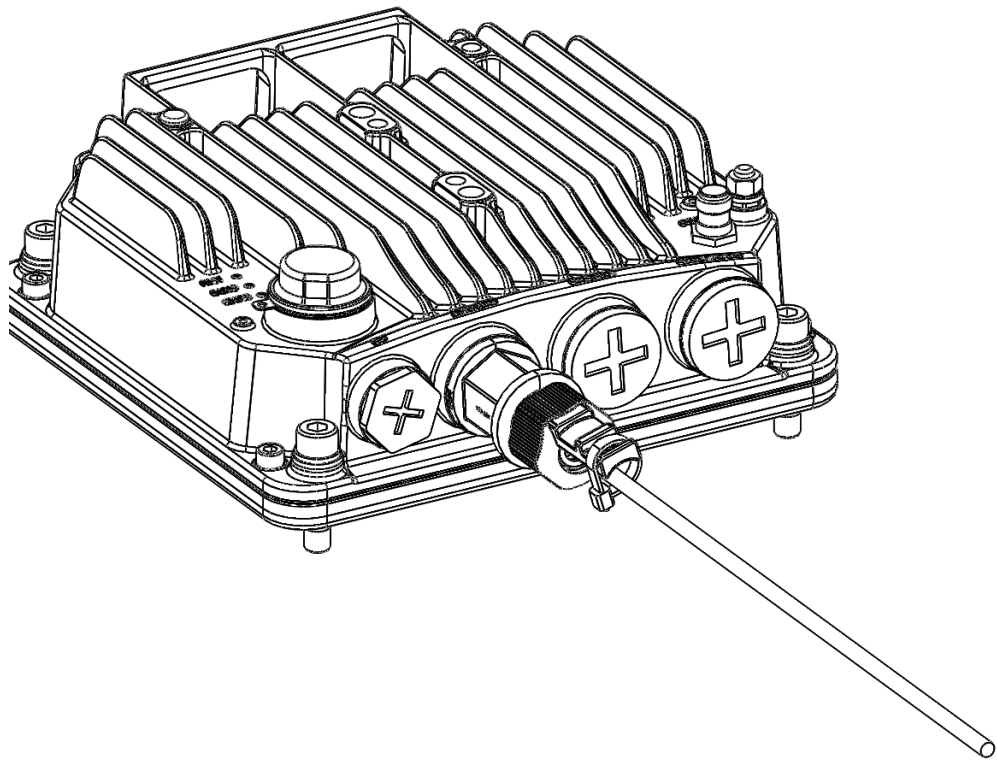


**Note**

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



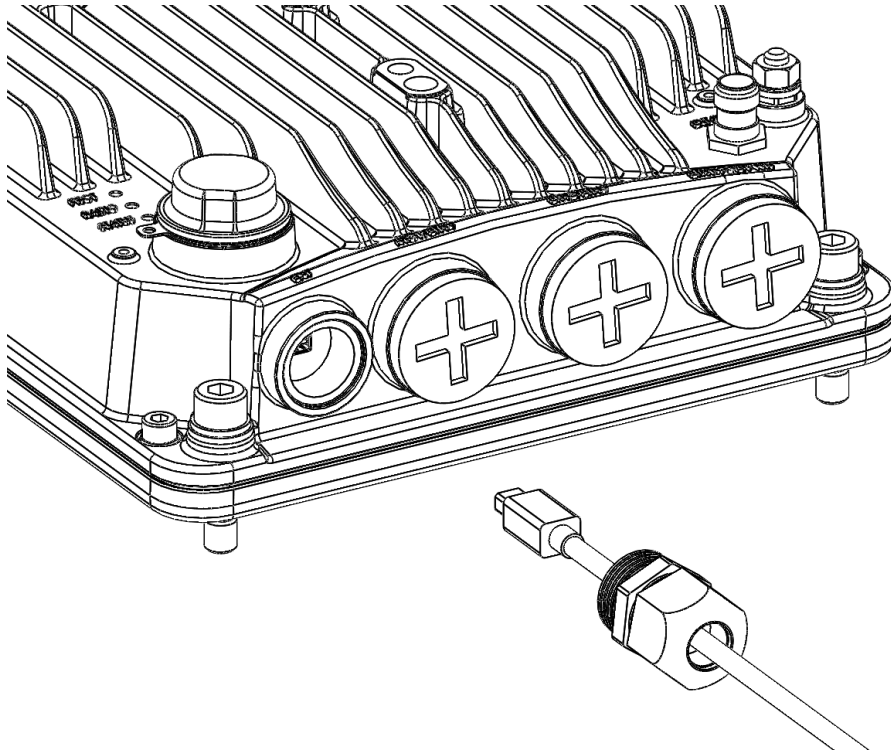
4. Tighten the gland cap.
5. Secure the cable to the gland using a tie wrap.



## Connection of Extension Cable to PTP 820E

This cable is supplied with the glands attached. It is used to connect two PTP 820E radios in XPIC and HSB configurations. To connect the Extension cable to the PTP 820E:

1. Remove the hexagon cap from the PTP 820E radio. You can use a flat screwdriver or a wrench to open the cap.
2. Connect the CAT5e cable to the PTP 820E.

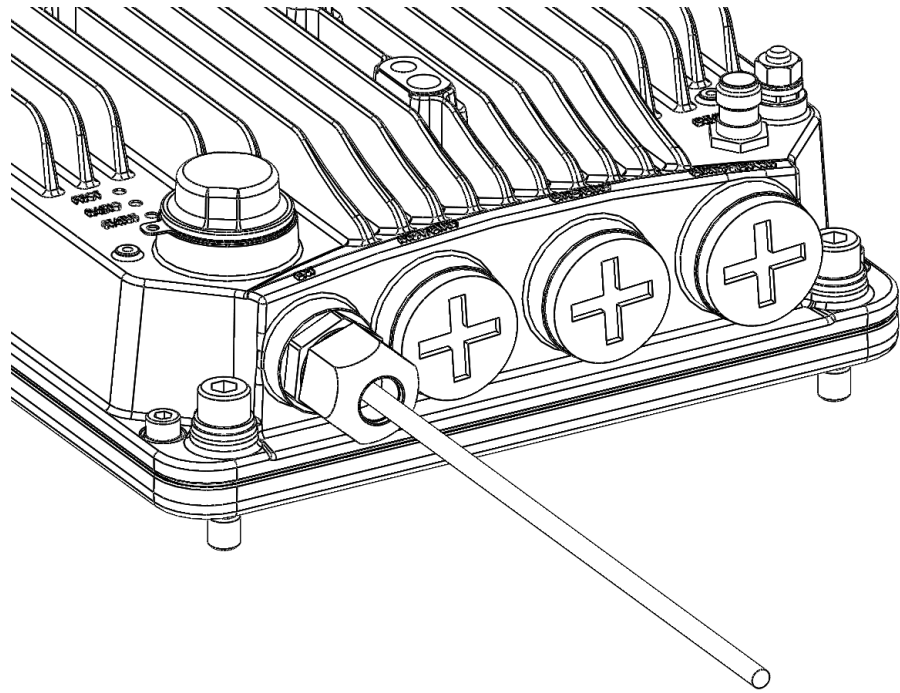


3. Screw the gland into the radio unit.



### Note

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




4. Tighten the gland cap.
5. Connect the other side of the cable to the other PTP 820E following steps 1-4.

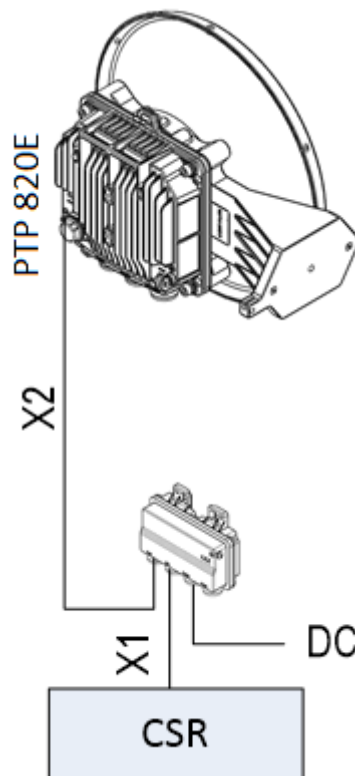
# PoE Injector Installation and Connection


## PoE Injector Cable Connection

The PoE Injector cables are connected similar to the PTP 820E cables.

- To connect an Ethernet (CAT5e) cable to the PoE port, refer to **Connection of Ethernet Cable to PTP 820E** on page 56.
- To connect a DC power cable to the power port, refer to **Connecting a DC Power Cable** on page 50. This cable is not supplied with the PoE Injector.
- The total length of the cable between the PTP 820E port and the Switch/Router the device is connected to should not exceed 100m/328ft. This length includes the connection between the PTP 820E and the PoE Injector ( $X1 + X2 \leq 100\text{m}/328\text{ft}$  in the figure below).

	<p><b>Note</b></p> <p>The length of the cable connecting the customer equipment to the PoE injector should not be longer than 10m (according to ANSI/TIA-568 standard).</p>
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	<p><b>Note</b></p> <p>For the warranty to be honored, the connection must be through the glands only. Do not open the PoE injector box cover.</p>
---	---

## PoE Injector Grounding

To ground the PoE Injector:

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

## PoE Injector Wall Mount Installation

### List of Items

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



#### Note

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

### Glands Kit

Part number	Marketing Description
N000082L014A	PTP 820 Glands_x5_KIT

### Required Tools

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

### Procedure

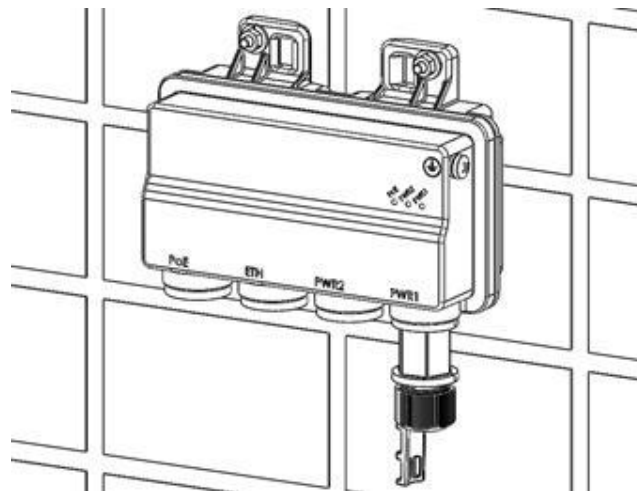
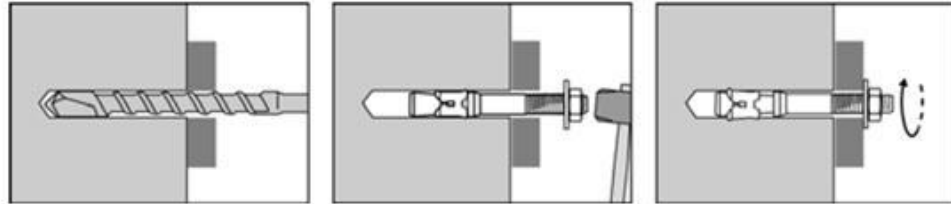
1. Mount and tighten the PoE Injector to a wall using two M6 bolts and anchors. The M6 bolts and anchors must be purchased separately.

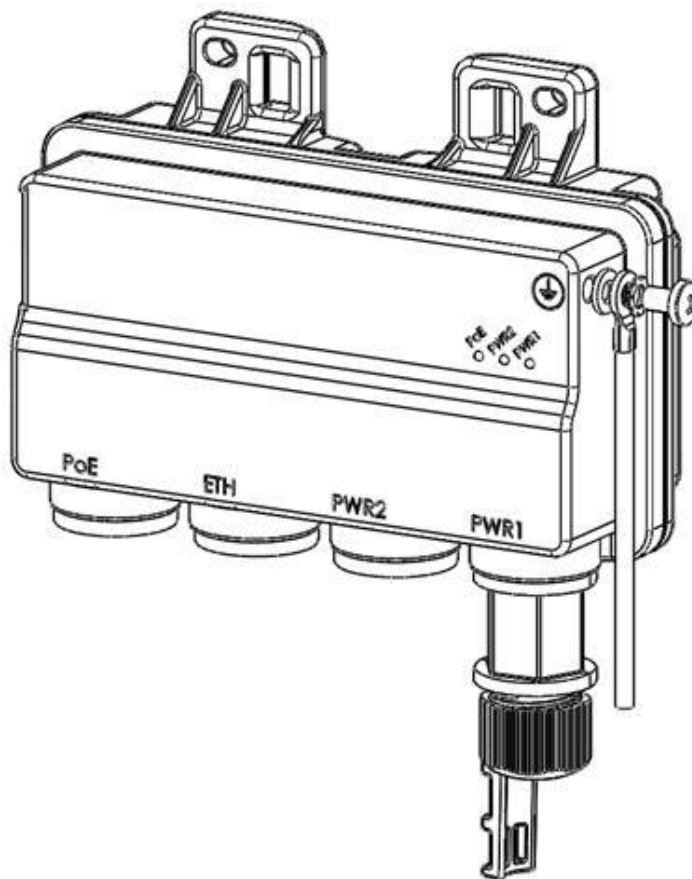


#### Note

Use Anchor Stainless Steel with flanged Hexagonal nut M6X70.

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





## PoE Injector Pole Mount Installation

### List of Items

Item	Description	Quantity	Remarks
1	PoE Injector	1	


### Required Tools

- Slot Screwdriver

### Procedure

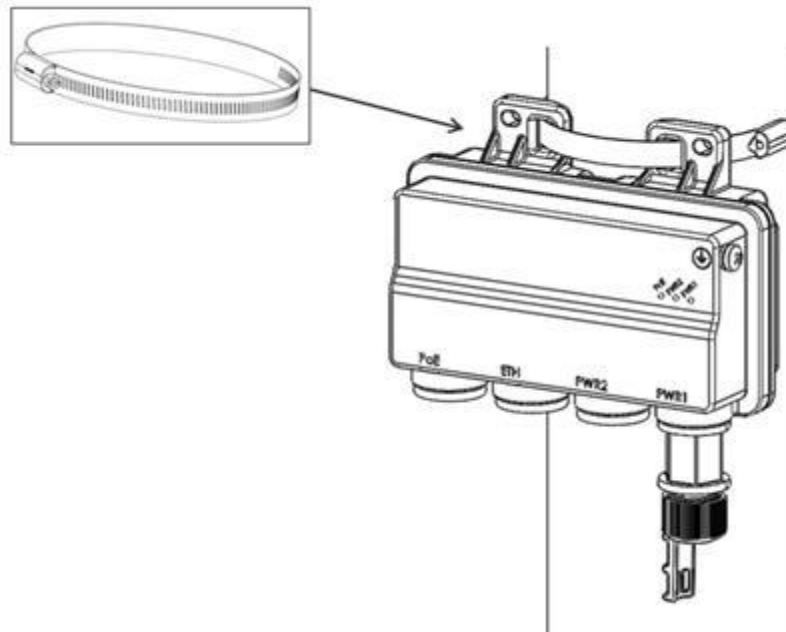
To mount the PoE Injector on a pole:

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

	<p><b>Note</b> The Hose Clamp is not supplied with PoE injector kit.</p>
---	--



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



## PoE Injector 19" Rack Installation

### List of Items

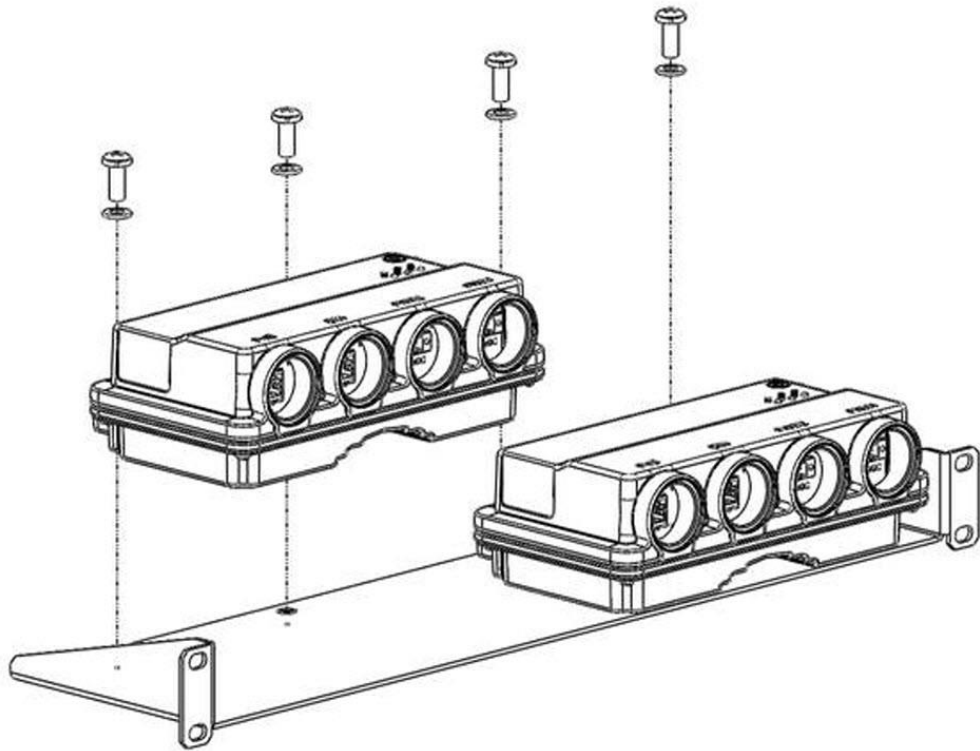
Item	Description	Quantity	Remarks
1	PoE Injector	1	
2	PoE Injector 19" Rack Mount Kit	1	

### Required Tools

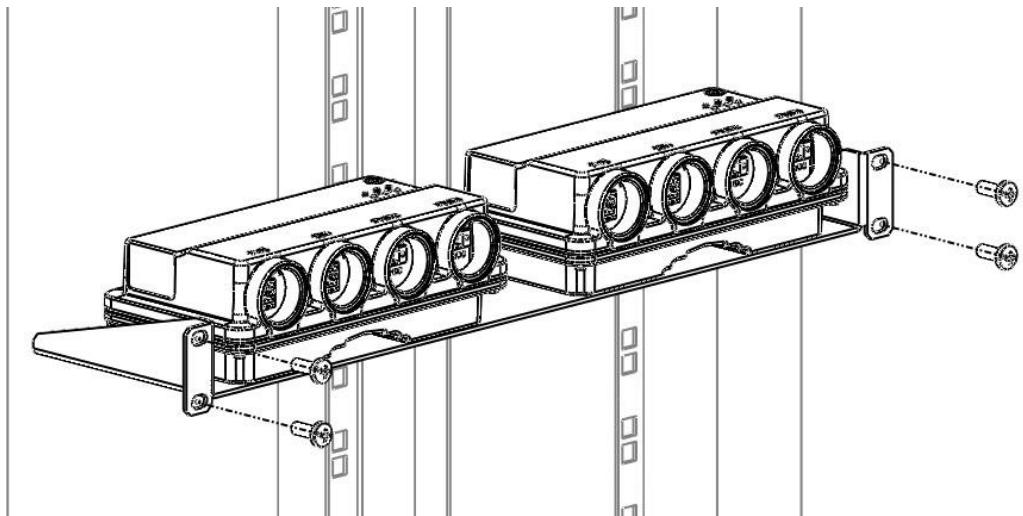
- Philips Screwdriver

To mount the PoE Injector on a rack:

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



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



## PoE Injector ETSI Rack Installation

### List of Items

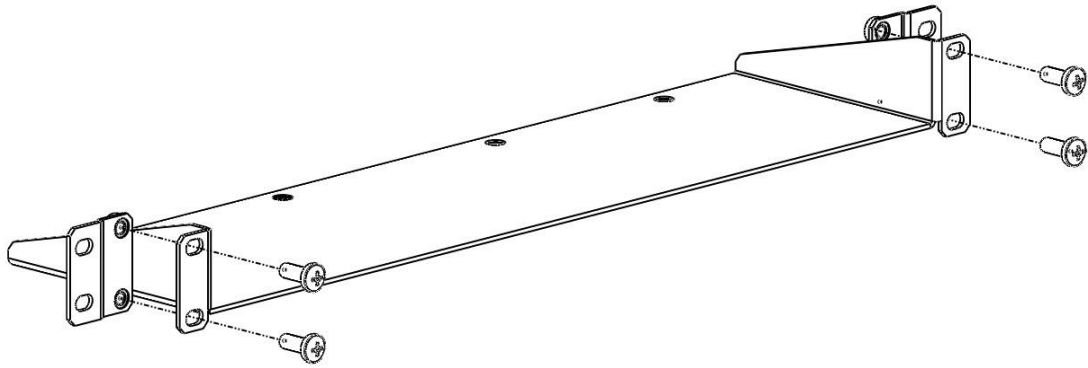
Item	Description	Quantity	Remarks
1	PoE Injector	1	
2	PoE Injector ETSI Rack Mount Kit	1	

### Required Tools

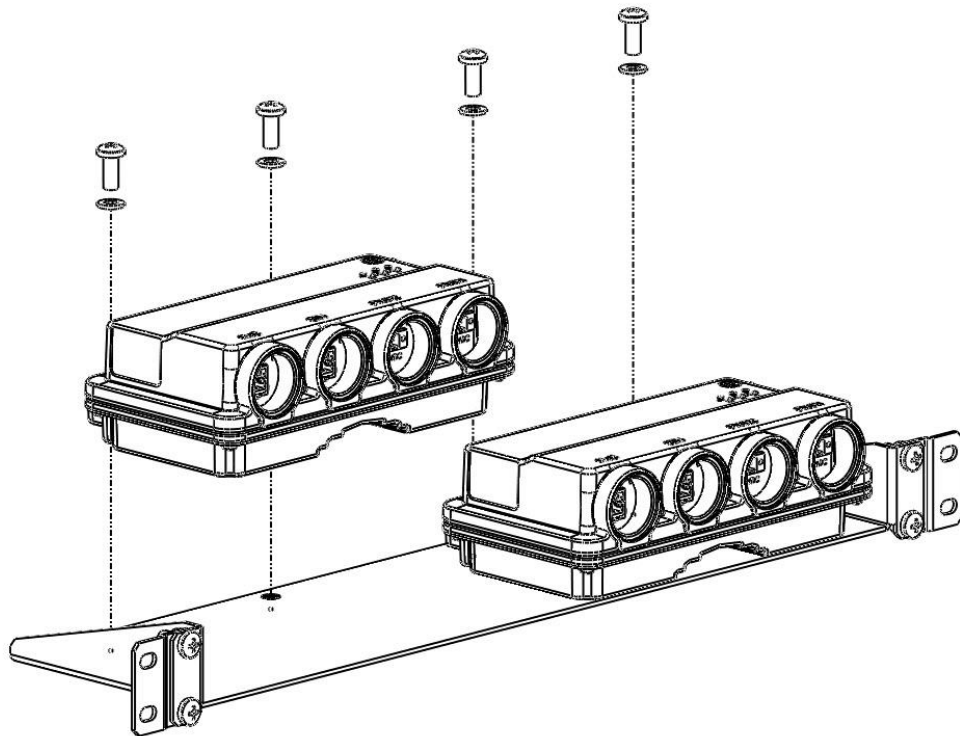
- Philips Screwdriver

To mount the PoE Injector to an ETSI rack:

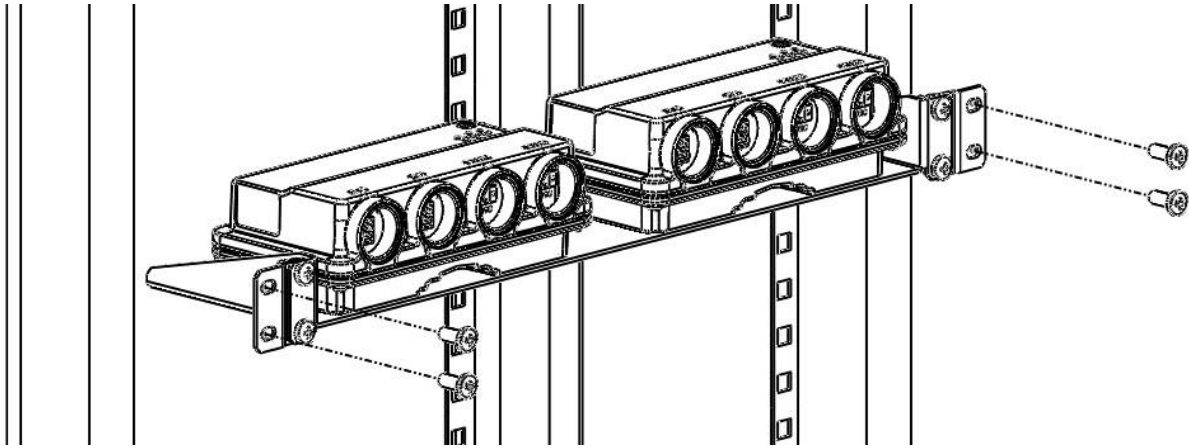
1. Mount the PoE Injector to an ETSI rack using a 19" rack adaptor and ETSI adapting ears.
2. Connect the ETSI adapting ears to a 19" rack adaptor using four M6 screws.



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



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



**Note**

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

# Installation Procedure and Antenna Alignment - 1+0 with 43 dBi Flat Antenna and Standard Alignment Device (Class 2 Antennas)

## Pole Mount Assembly and Installation

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

### List of Items

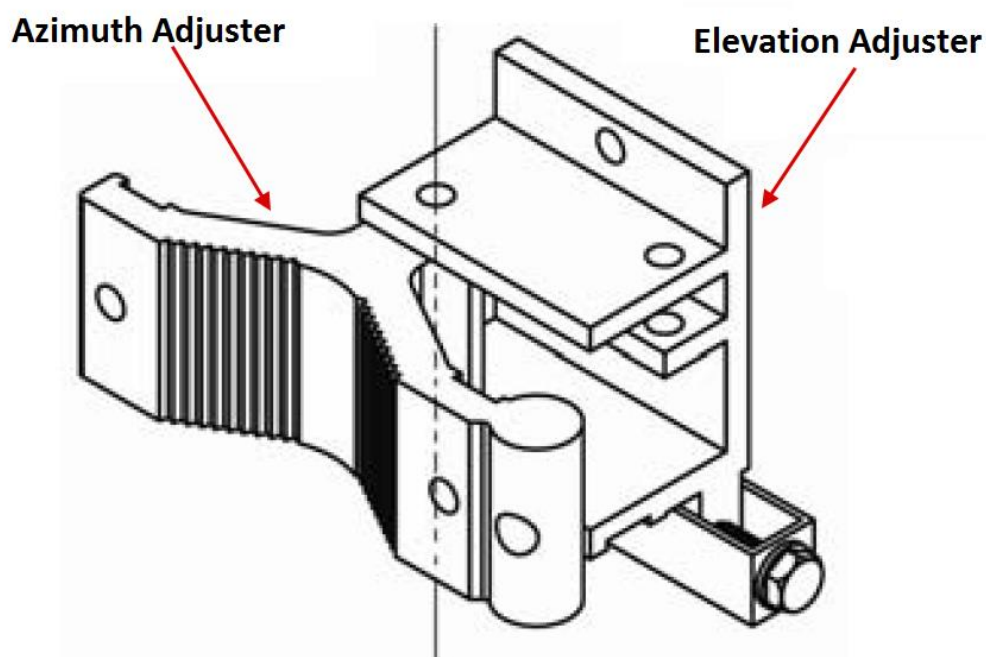
Item	Description	Quantity	Remarks
1	PTP 820E Mounting kit for the PTP 820E	1	
2	PTP 820E Radio	1	

### Required Tools

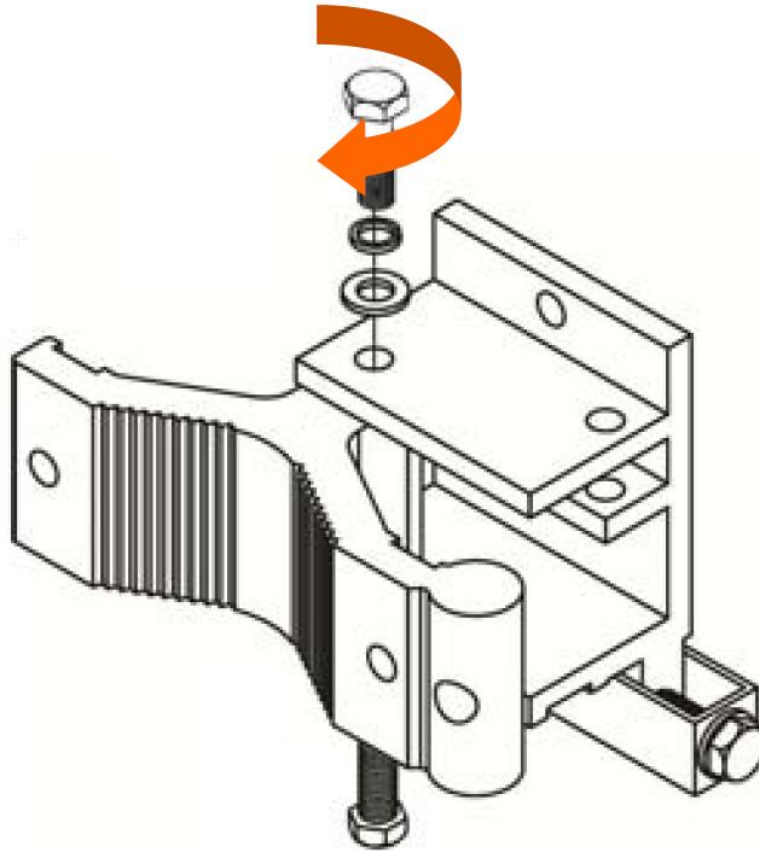
- Torque wrench with socket key wrench inch set
- Torque wrench with socket key wrench metric set
- Torque wrench with open metric wrench set

### Procedure

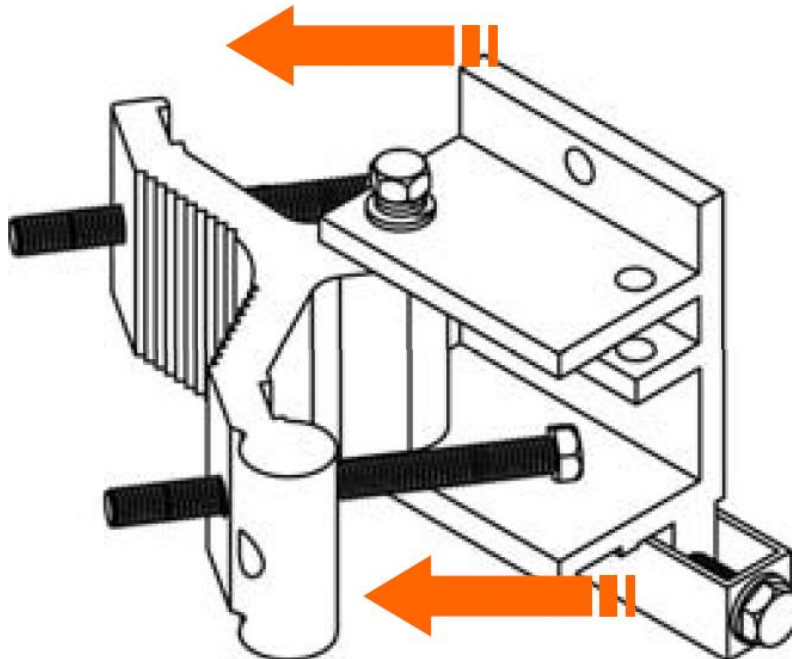
1. Align the azimuth adjuster and the elevation adjuster.



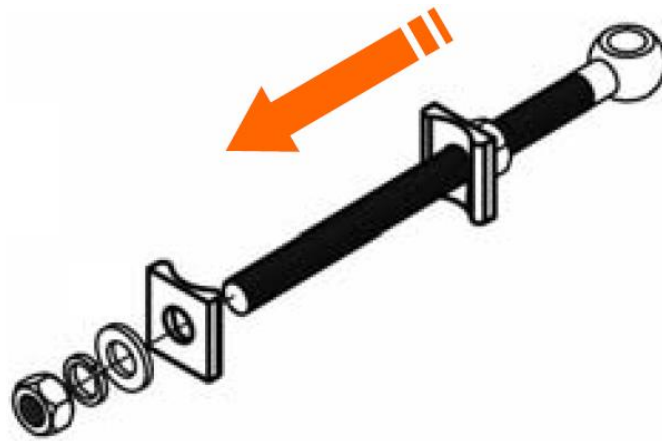
2. Connect the azimuth and elevation adjusters with two sets of M10x30 bolts, nuts, spring washers, and flat washers. Do not tighten the bolts at this point in the installation.



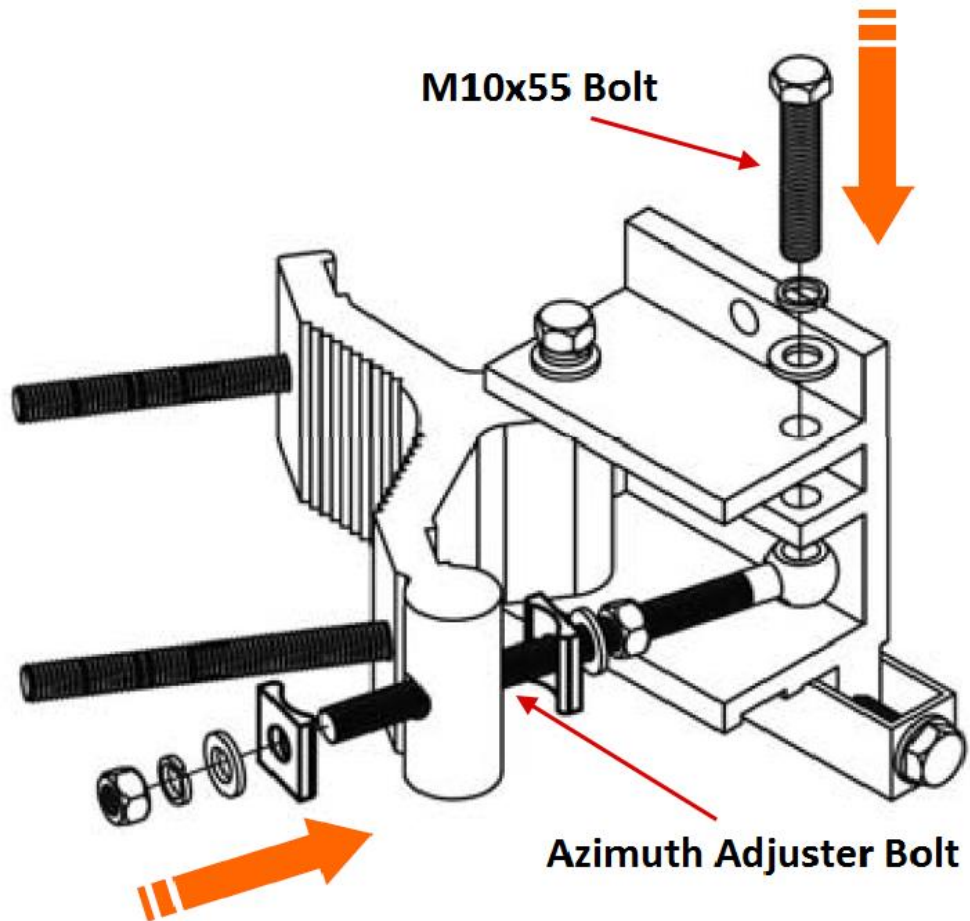
3. Insert two M10x130 bolts on the azimuth adjuster.



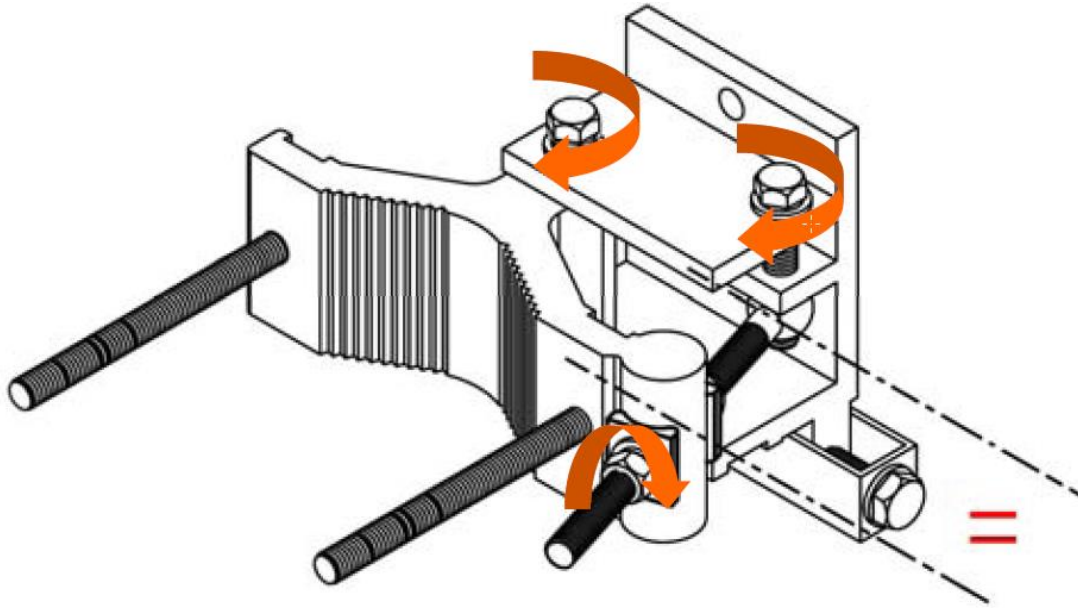
4. Remove the nuts, spring washers, flat washers, and square cushion block from the azimuth adjuster bolt.



5. Insert the azimuth adjuster bolt onto the azimuth adjuster.
6. Rotate the azimuth adjuster to connect the azimuth adjuster bolt with the elevation adjuster with an M10x55 bolt, spring washers, and flat washers, and install the nuts, washers, and square cushion block removed in Step 4 on the azimuth adjuster bolt.



7. Tighten all the bolts, as shown in the following figure.



8. Mount and tighten the pole mount to a pole with a diameter of 114 mm using the two washers and screws supplied with the PTP 820E integrated antenna pole mount kit.

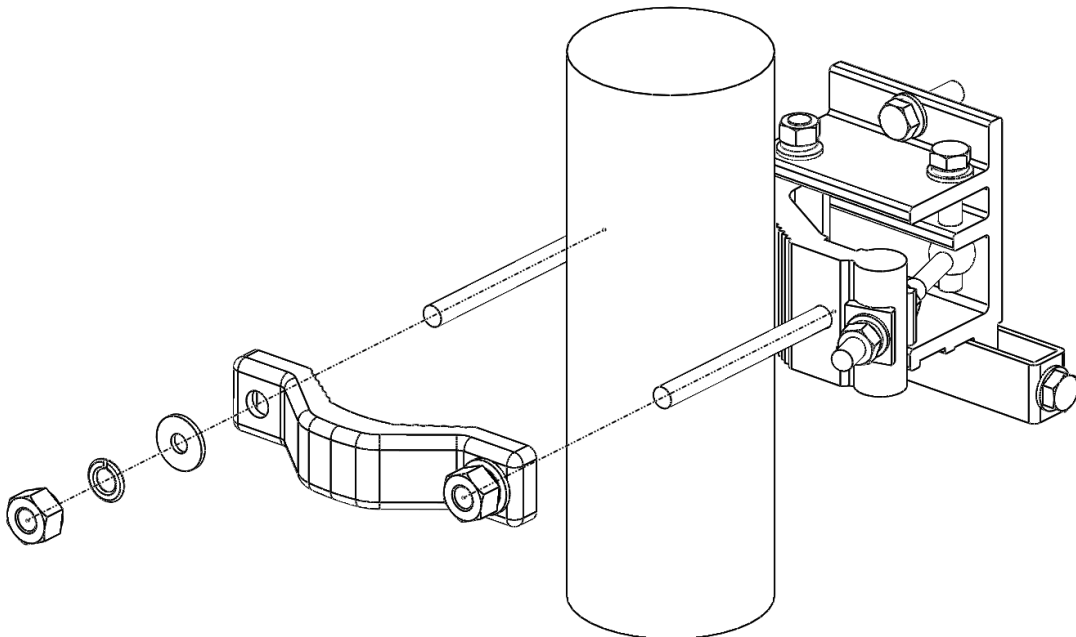


Figure 20: Mount Pole Mount to Pole

## Radio and Antenna Installation

### List of Items

Item	Description	Quantity	Remarks
1	PTP 820E RADIO with 43 dBi FLAT ANTENNA	1	



## Required Tools

The following tools are required for the PTP 820E installation:

- Metric torque wrench #13 and #16

## Procedure

When you order a PTP 820E with a 43 dBi flat antenna, the radio and antenna are delivered together as a single unit. The polarization is determined by the placement of the radio-antenna unit. To comply with Class 2 RPE pattern, the unit must be installed in a diamond-shaped position, so that the vertical polarization is either 45° to the right (V+45) or 45° to the left (V-45). The letters “A” and “B” are placed on the upper corners of the radio to help the installer to position the unit with the correct polarization.

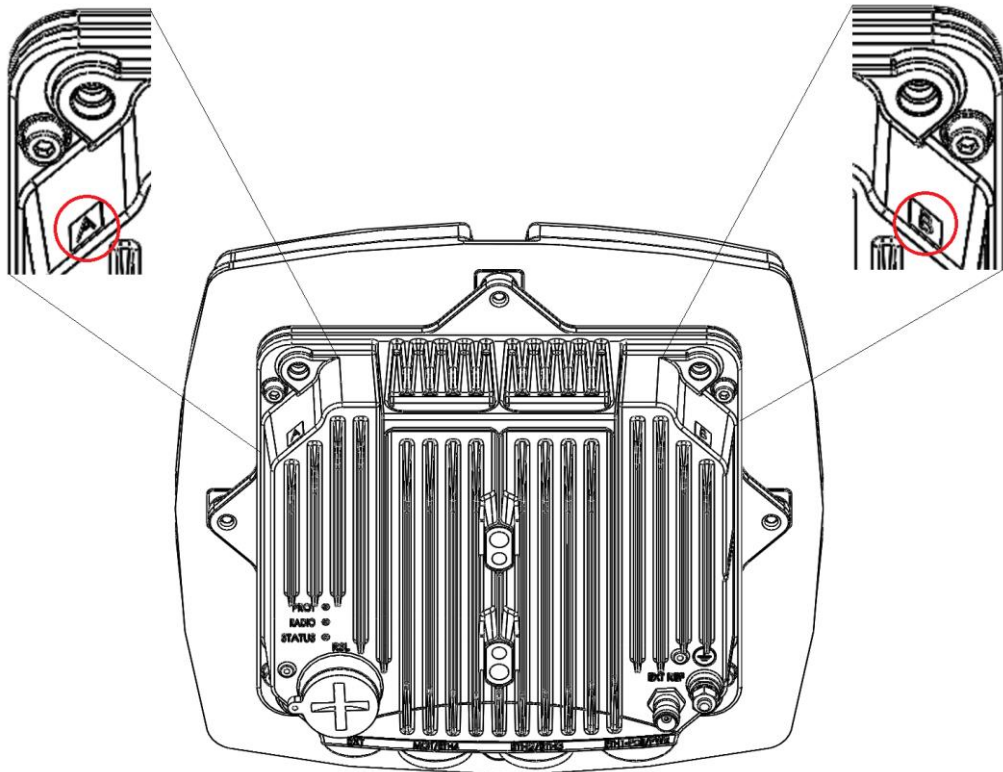


Figure 21: PTP 820E Radio with 43 dBi Flat Antenna -Polarization Labels

In a V+45° installation, the letter A on the unit must be on top. In a V-45° installation, the letter B on the unit must be on top. The following figures show each type of installation.

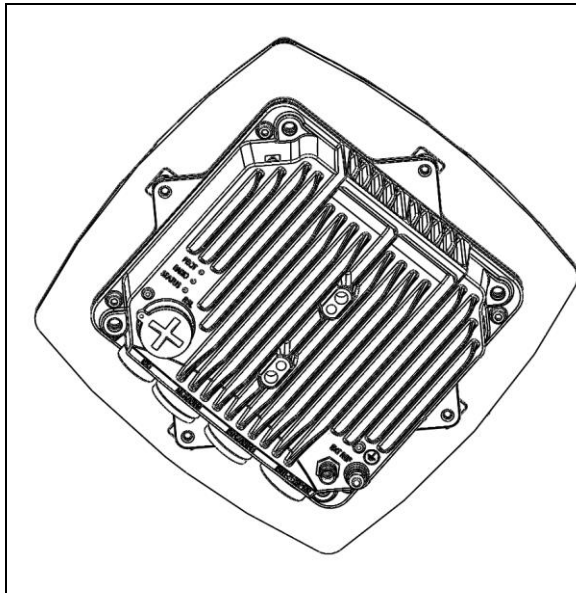


Figure 22: V+45° Polarization

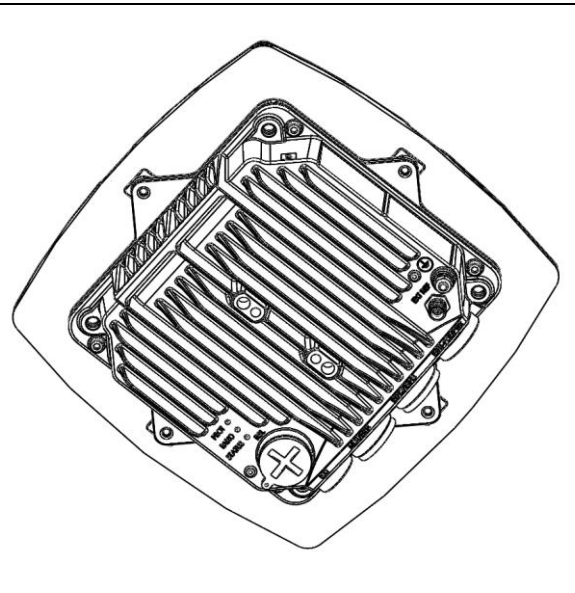
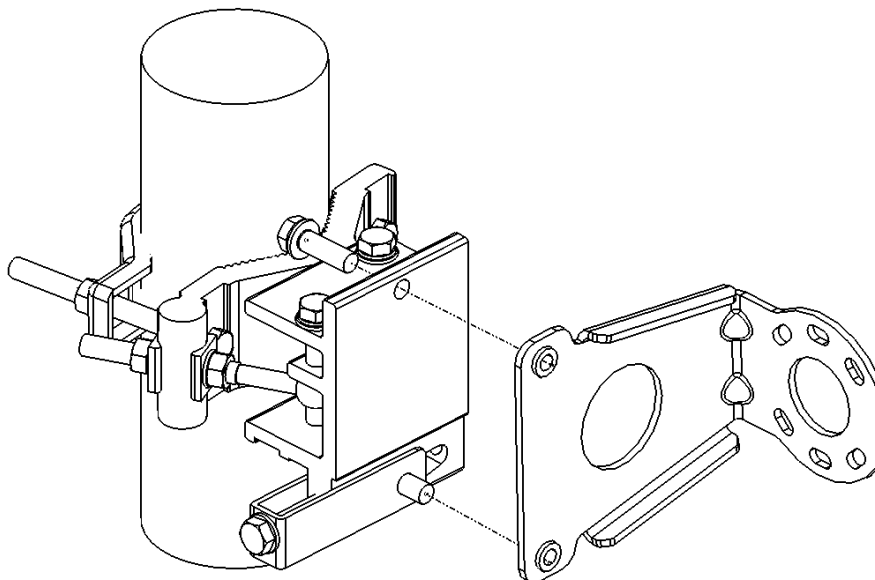


Figure 23: V-45° Polarization

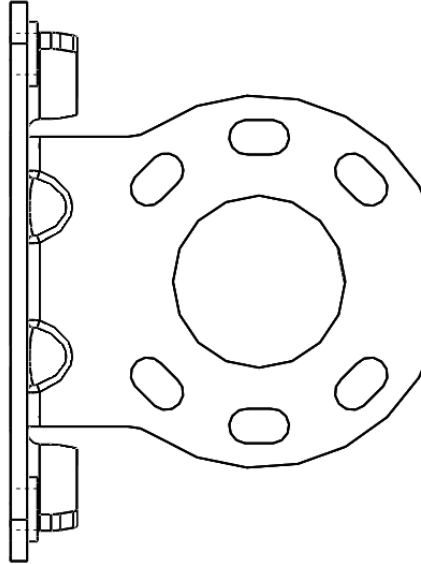
The units in a link must be placed so that they are in a position that is a mirror image of the unit at the other side of the link. For example, if the unit at the local site is installed with a V+45° polarization, the unit at the remote site must be installed with a V-45° polarization, and vice versa.

To install a PTP 820E with a 43 dBi flat antenna:

1. Attach the L-bracket provided with the PTP 820E to the pole mount.



2. Attach the radio to the L-bracket according to the correct polarization, with the pole behind the radio, and tighten the two captive screws. The installation angle depends on whether you are installing the radio with a V+45° polarization, a V-45° polarization, or vertical polarization.



The following figures show the various polarization options. The first figure shows a V+45° polarization, with the letter A on top and the gland pointing down and to the left. The second figure shows a V-45° polarization, with the letter B on top and the gland pointing down and to the right. The third figure shows a vertical polarization.

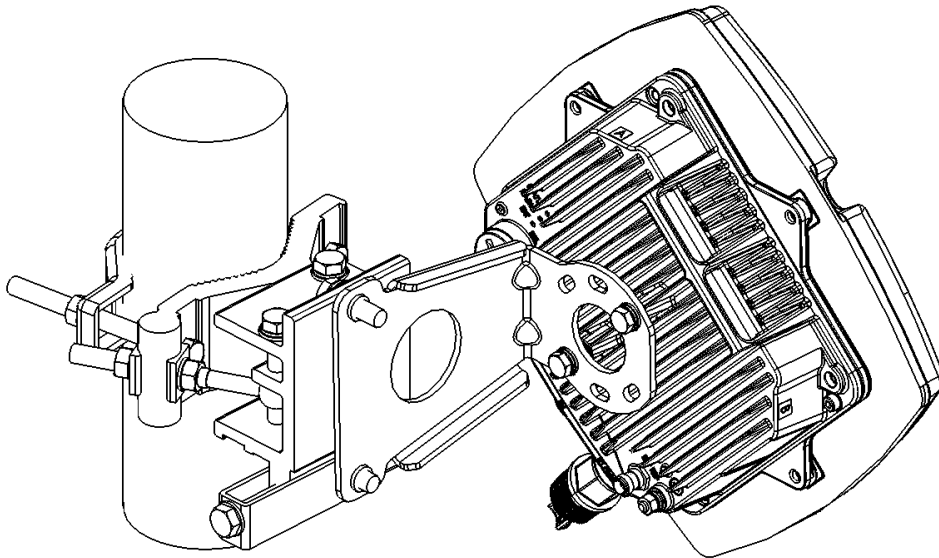


Figure 24: V+45° Polarization (A on Top)

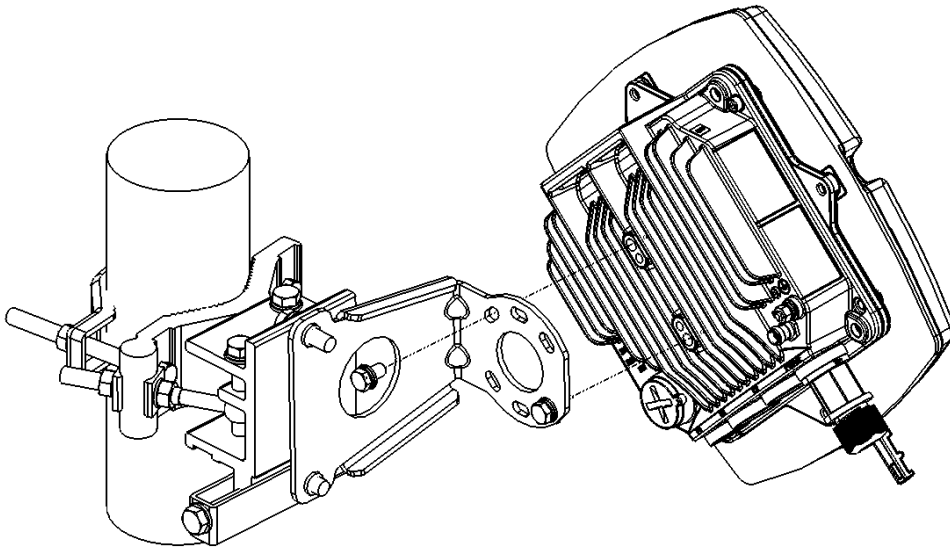


Figure 25: V-45° Polarization (B on Top)

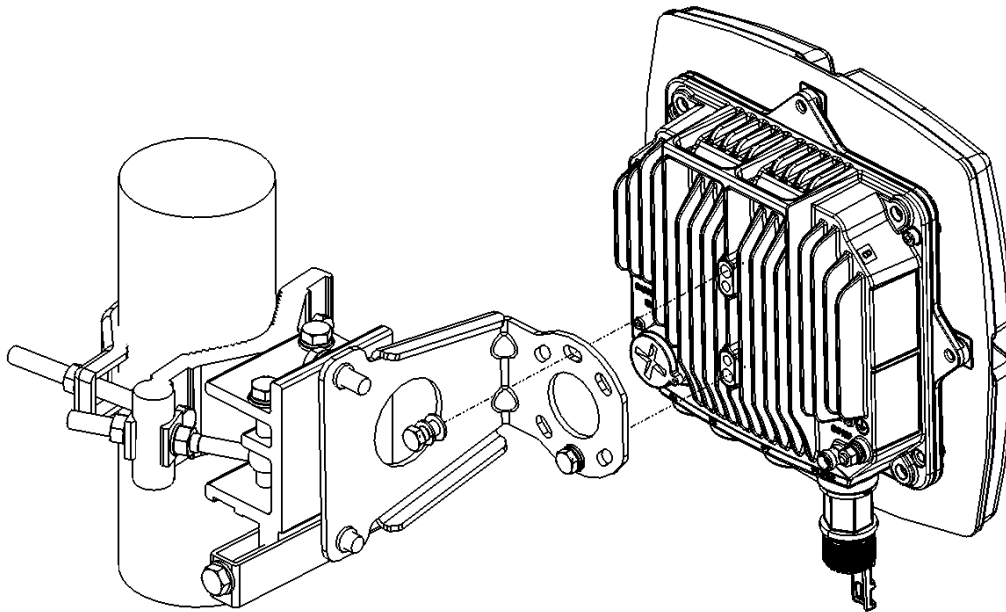


Figure 26: Vertical Polarization

3. When looking at a complete link the radios should be aligned in the same direction. This means the radios face each other in a mirror image, as shown in the following figure.

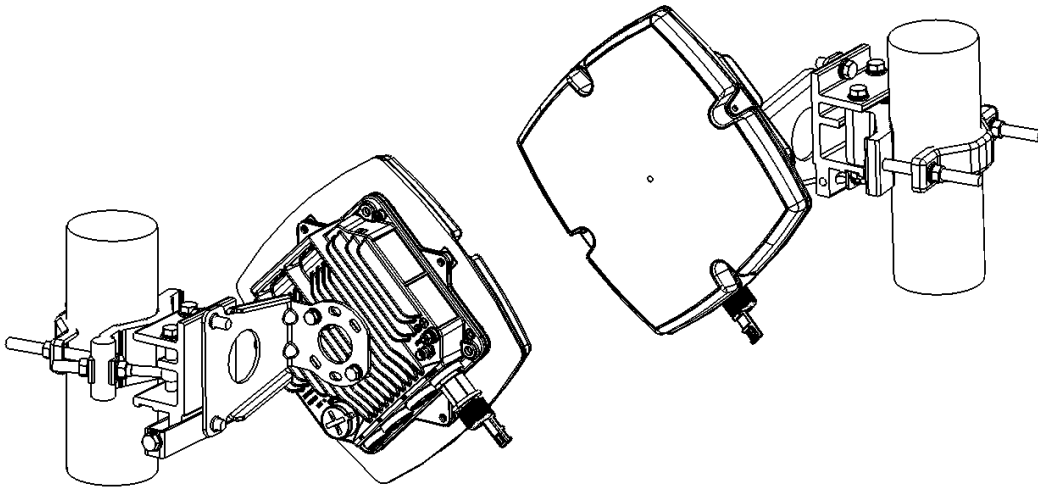
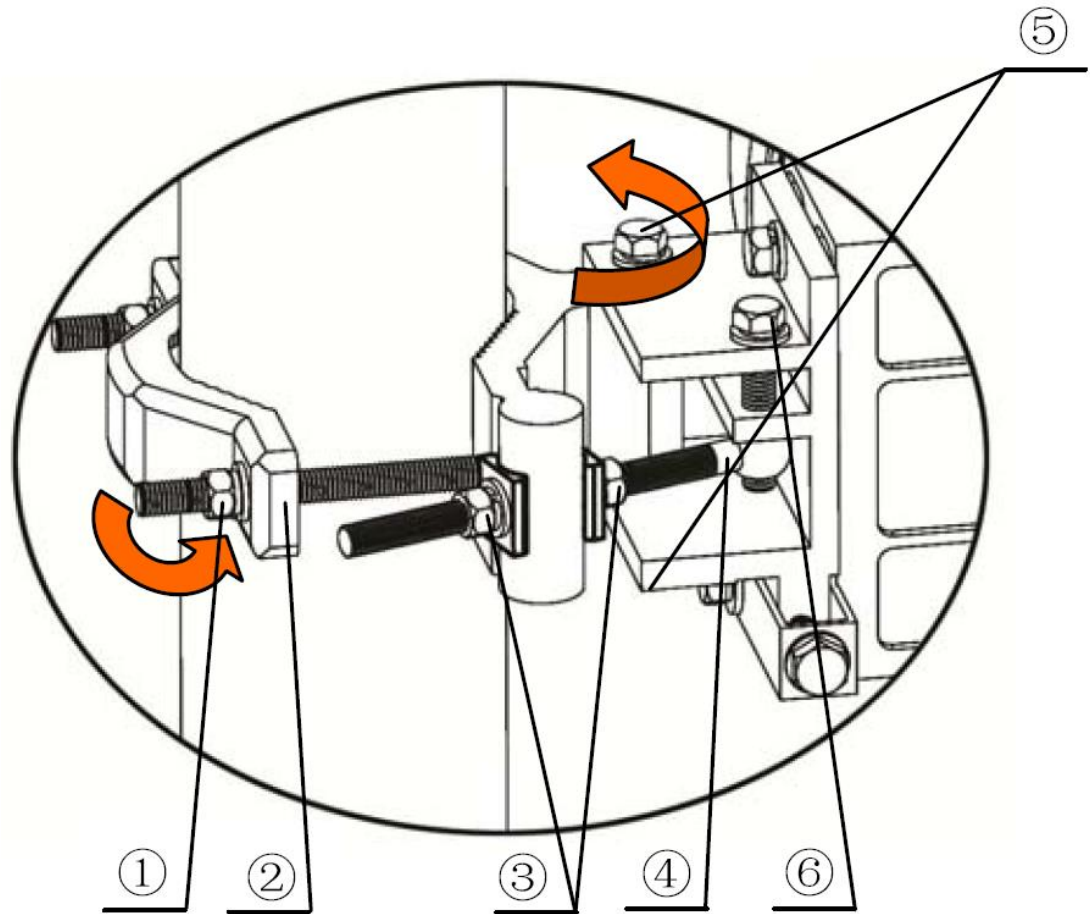


Figure 27: Complete Link - V-45° Polarization at Local Site (Left), V+45° Polarization at Remote Site (Right)

## Performing Antenna Alignment Using the Standard Alignment Kit

You can perform adjustments to the azimuth and elevation of the antenna by turning bolts on the pole mount.

## Adjusting the Antenna's Azimuth



### Large-Scale Azimuth Adjustment

To perform large-scale azimuth adjustment:

1. Loosen the two nuts (① in the figure above) on the clamp (② in the figure above) on the pole mount.
2. Push the pole mount softly, by hand. The pole mount is adjustable 360° around the pole.

### Fine Azimuth Adjustment

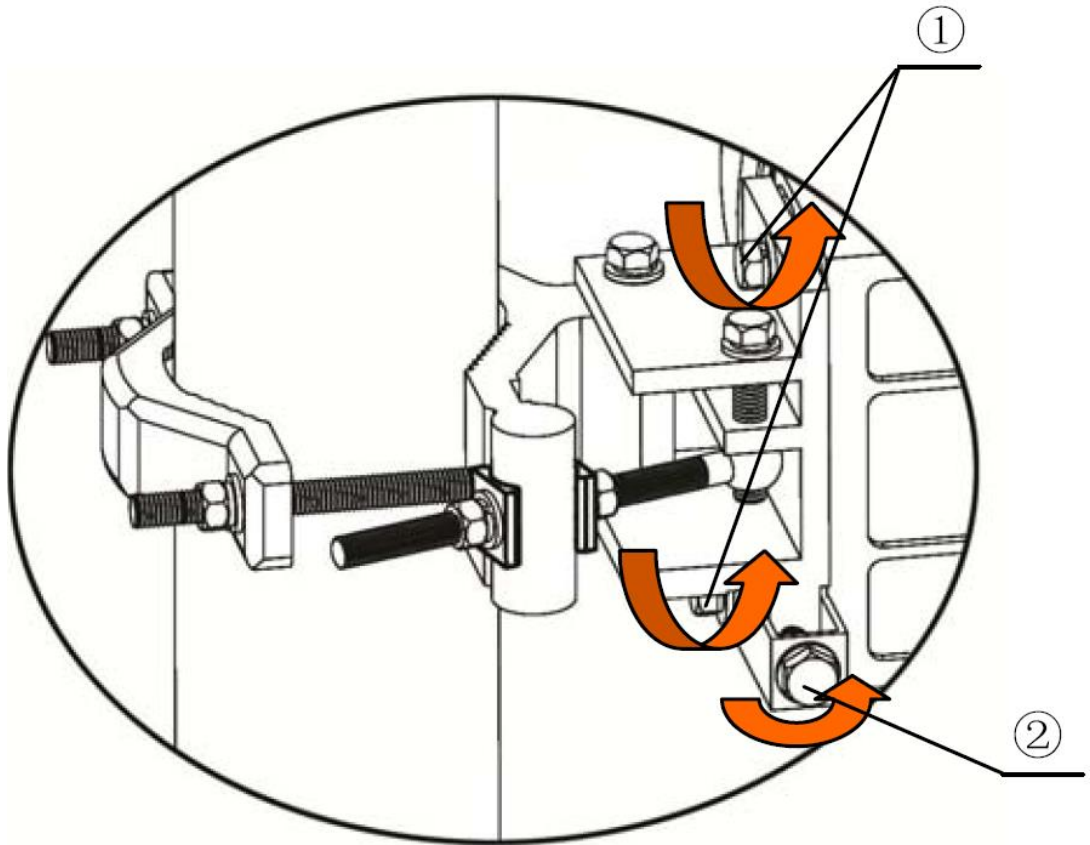
To perform fine azimuth adjustment:

1. Loosen the top and bottom fixed bolts on the azimuth axis (⑤ in the figure above).
2. Loosen the two nuts and bolts (③ and ⑥ in the figure above) on the fine adjusting bolt (④ in the figure above).
3. Move the adjusting nut (③ in the figure above) slowly backwards and forwards to adjust the antenna azimuth within 315°.
4. Tighten the top and bottom fixed bolts and the nuts and bolts on the fine adjusting bolt.

## Adjusting the Antenna's Elevation

To adjust the elevation of the antenna:

1. Loosen the top and bottom bolts that connect the pole mount to the antenna adaptor (① in the figure below).
2. Rotate the elevation adjusting bolt (② in the figure below) to adjust the antenna's elevation within 315°.
3. Tighten the top and bottom bolts connecting the pole mount to the antenna adaptor. The recommended torque for these bolts is 25 Nm.



# Installation Procedure and Antenna Alignment – 1+0 with 43 dBi Flat Antenna and Enhanced Alignment Device (Class 3 Antennas)

When you order a PTP 820E with a 43 dBi flat antenna, the radio and antenna are delivered together as a single unit. The polarization is determined by the placement of the radio-antenna unit.

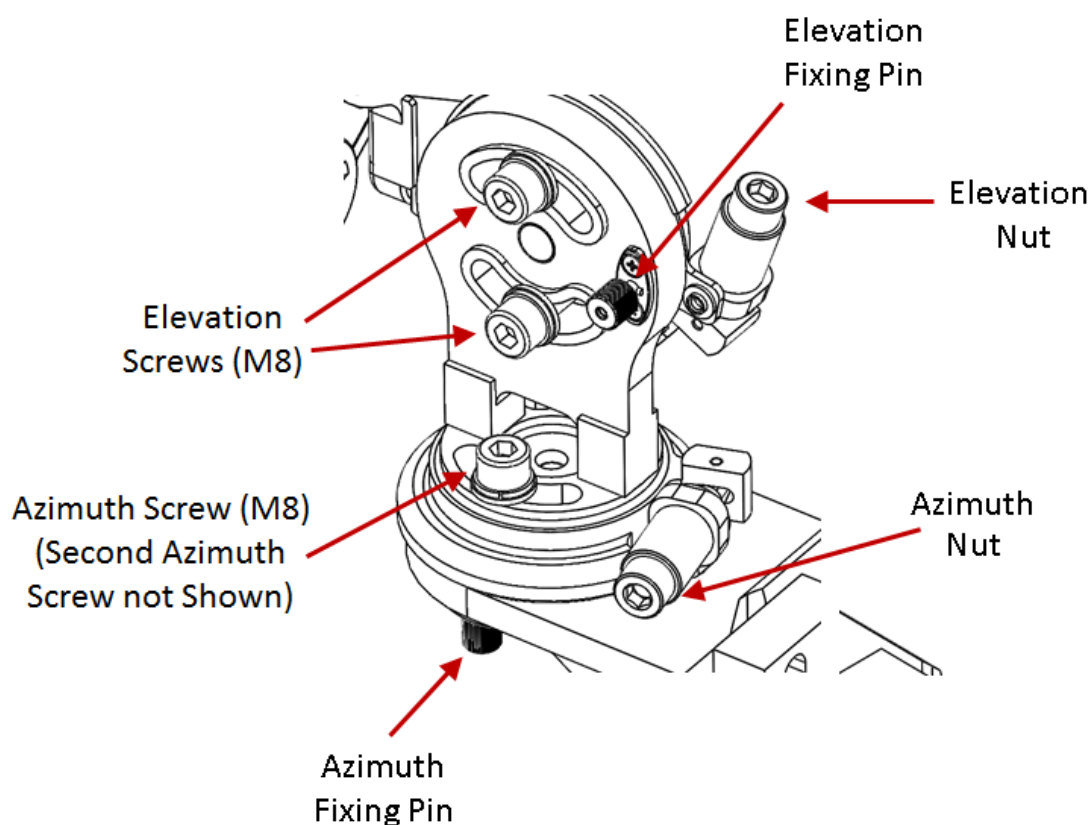


Figure 28: Installation and Alignment Device – Azimuth and Elevation Adjustment Tools

The installation and alignment device enables you to easily adjust the antenna's azimuth and elevation, in gross and fine intervals. Gross alignment enables you to adjust the azimuth and elevation in 15° increments. Fine alignment enables you to make more precise adjustments by turning the Azimuth and Elevation nuts such that each  $\frac{1}{4}$  turn is equal to an adjustment of 0.25°.

There are two M8 Elevation Screws and two M8 Azimuth screws, as shown in **Figure 28**. Before starting the alignment, make sure these screws are securely in place so they will not fall out during the procedure, but not too tight, so as to enable you to manually adjust the azimuth and elevation to the approximate position you want, before performing exact antenna alignment as described in the following sections.



Upon delivery, the installation and alignment device is aligned 45° downward (elevation) and straight ahead (azimuth).

You can adjust the azimuth up to 45° in either direction by manually turning the azimuth base.

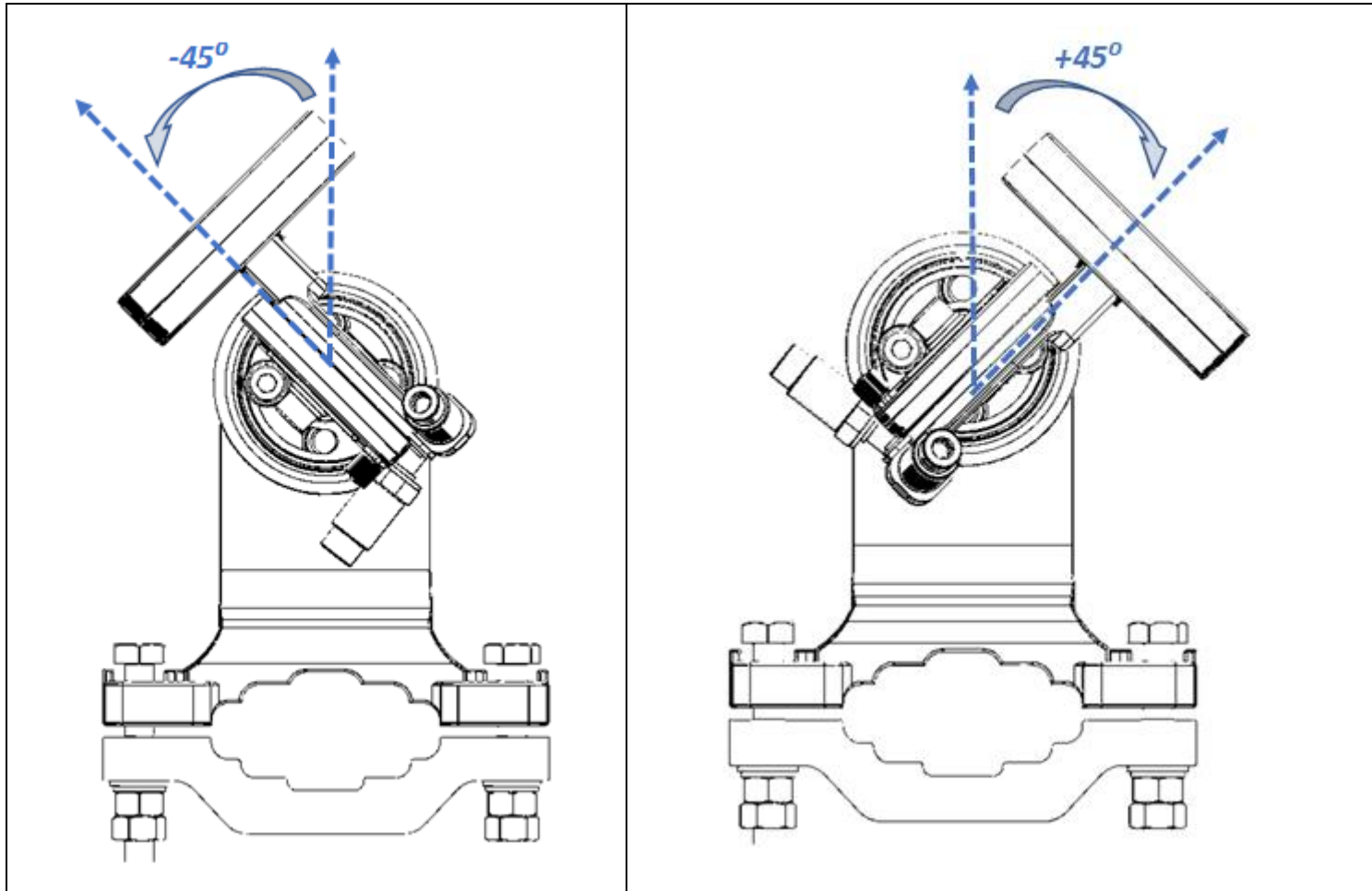


Figure 29: Installation and Alignment Device - Azimuth Range

For wall mount installations, you can adjust the azimuth an additional 45° in either direction by changing the placement of the Azimuth Screws. This enables you to adjust the azimuth a full 90° in either direction. See **Extending the Azimuth Range**.

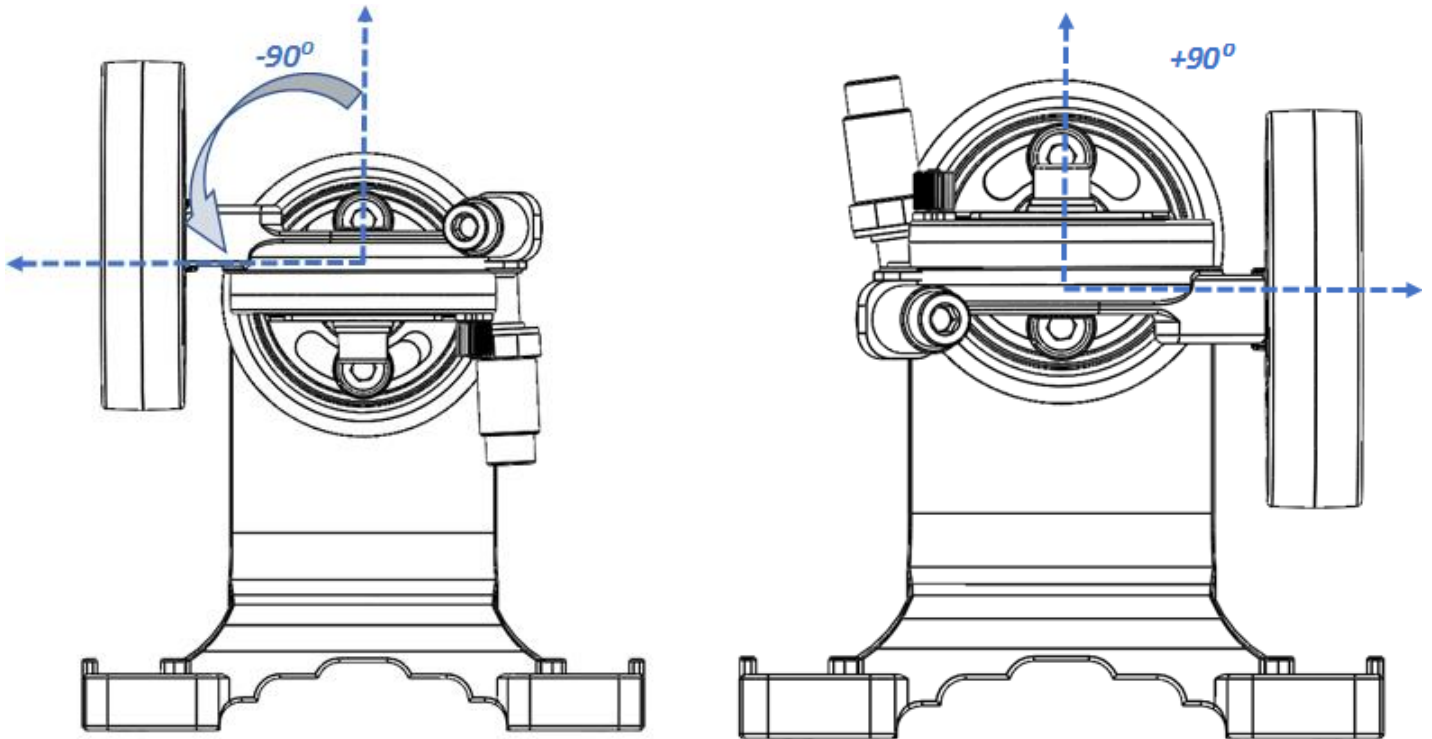


Figure 30: Installation and Alignment Device - Extended Azimuth Range

You can adjust the elevation from the delivery position of 45° downward to a position as far as 45° upward. Be sure to attach the PTP 820E radio and antenna to the installation and alignment device **before** adjusting the elevation, otherwise the weight of the radio and antenna might accidentally reduce the elevation angle.

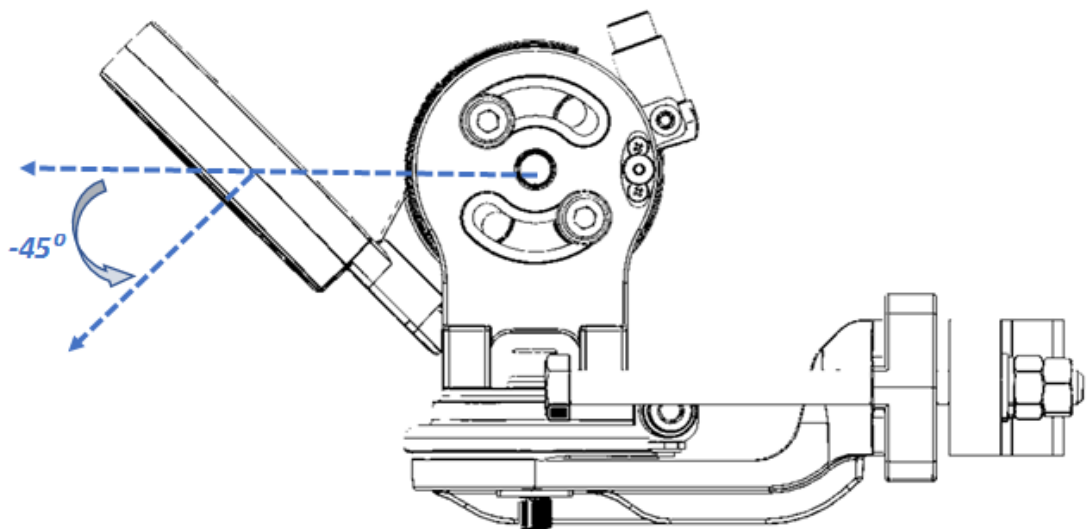


Figure 31: Installation and Alignment Device – Delivery Elevation (45° Downward)

You can adjust the elevation upwards as far as 45° upward.

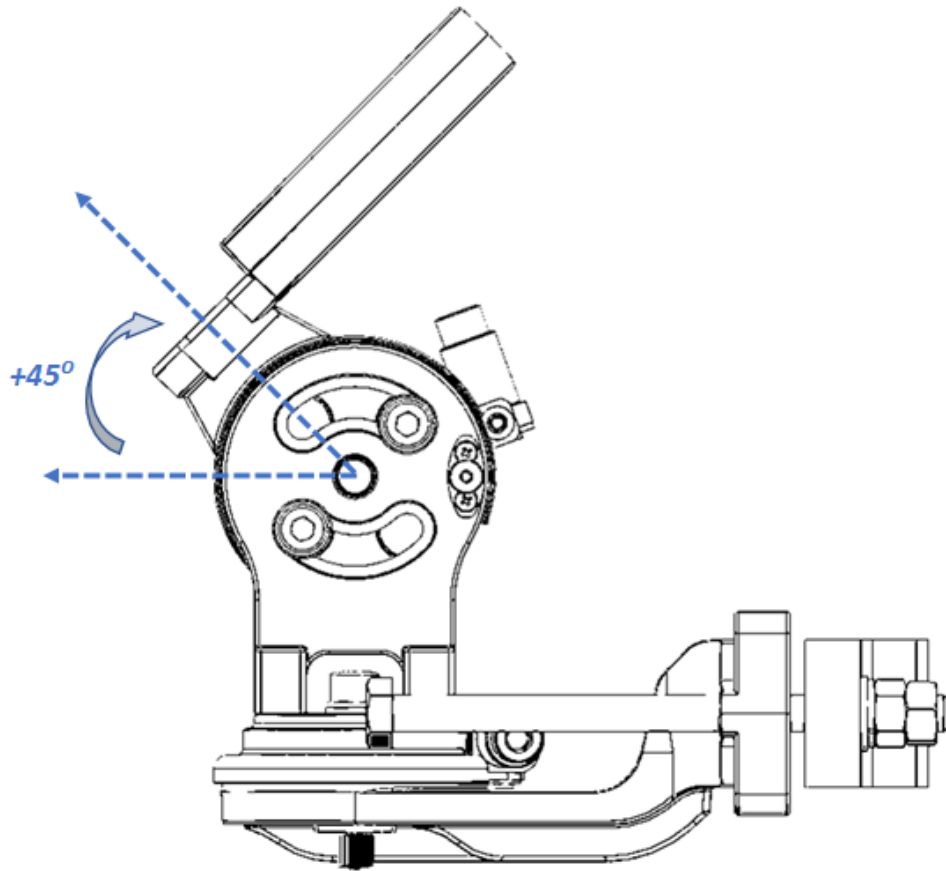



Figure 32: Installation and Alignment Device – Highest Elevation (45° Upward)

## Pole Mount Assembly and Installation

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

	<p><b>Note</b></p> <p>The PTP 820E radio can be assembled on the installation and alignment device on the ground, prior to attaching the device to the pole mount, if the logistics of the location make this more feasible than attaching the radio afterwards. See Attaching the PTP 820E to the Installation and Alignment Device.</p>
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### List of Items

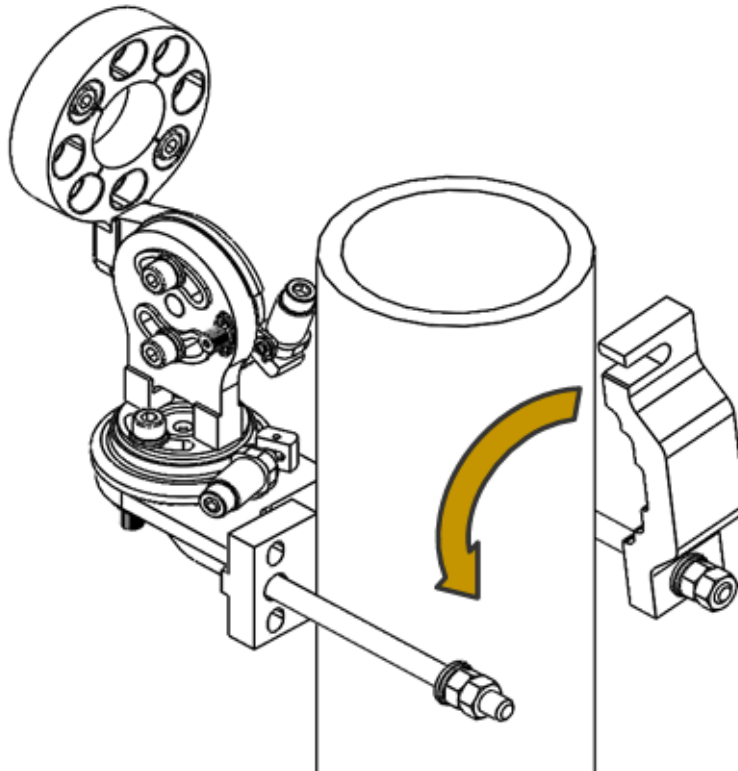
Item	Description	Quantity	Remarks
1	PTP 820E Flat Antenna Mounting Kit	1	
2	PTP 820E radio with 43 dBi Flat Antenna	1	

## Required Tools

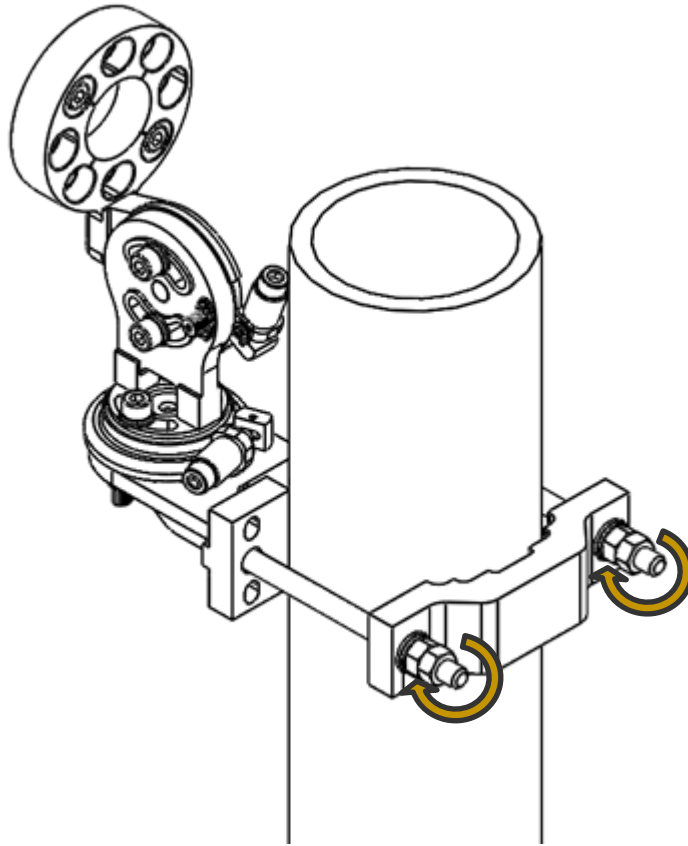
- Socket key wrench inch set
- Socket key wrench metric set
- Open metric wrench set

## Procedure

1. Open the outer bracket to slide the installation and alignment device onto the pole, then close the bracket as shown in the figure below.



- To secure the installation and alignment device to the pole, tighten the four nuts on the outer bracket, two on each side as shown in the figure below.



## Wall Mount Assembly and Installation


This section contains instructions for installing a mounting kit on a wall. A mounting kit should only be installed on a concrete wall that is capable of supporting weight of at least 15 kg.

Item	Description	Quantity	Remarks
1	PTP 820E Flat Antenna Mounting Kit	1	
2	PTP 820E radio with 43 dBi Flat Antenna	1	
3	Anchor screws M8x70	4	Not supplied with mounting kit
4	M8x45 screws	4	Not supplied with mounting kit
5	M8 spring washer	4	Not supplied with mounting kit

Item	Description	Quantity	Remarks
6	M8 flat washer	4	Not supplied with mounting kit

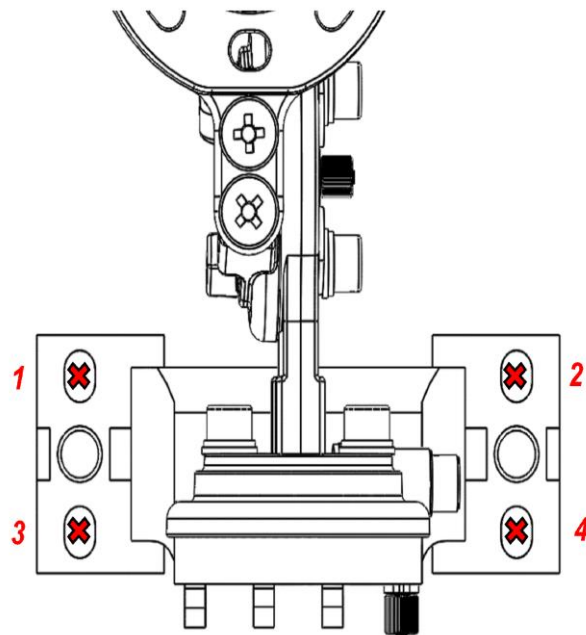
### Required Tools

- Appropriate key wrench for the M8x45 screws
- A drilling machine

	<p><b>Note</b></p> <p>In wall mount assembly, the 4 M10 nuts, 2 M10 flat and spring washers, 2 M10x150 screws, and the rear bracket that are supplied with the mounting kit are not used.</p>
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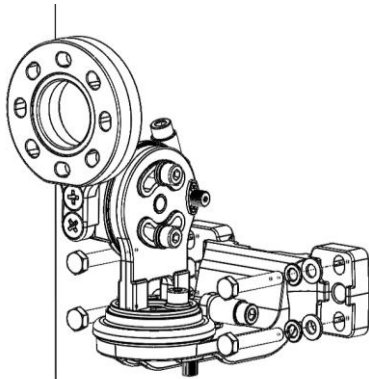
### Procedure

1. Place the mounting kit on the wall and mark four screws positions.



2. Remove the bracket and drill four holes into the wall.
3. Insert the anchor screws into the wall.

4. Place the mounting kit in front of the 4 anchor screws and tighten the 4 M8 screws, spring washers, and flat washers to secure the mounting device to the wall.



## Attaching the PTP 820E to the Installation and Alignment Device

1. Connect the PTP 820E unit to the installation and alignment device, using the two M8 screws and washers supplied with the installation and alignment kit. Attach the PTP 820E according to the desired polarization, as shown in the figures below. Note that:
  - For vertical polarization, the upper screw must be approximately 2:00 to the right, the lower screw must be approximately 8:00 to the left, and the RSL interface should be at approximately 9:00 to the left.
  - For horizontal polarization, the upper screw must be approximately 10:00 to the left, the lower screw must be approximately 4:00 to the right, and the RSL interface should be at the bottom.

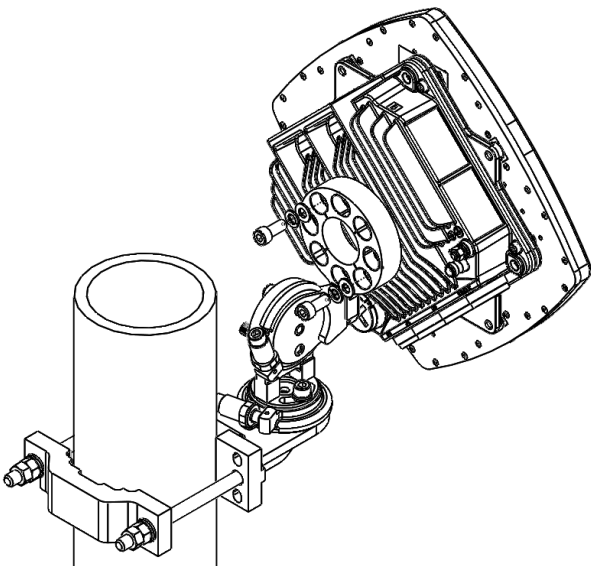


Figure 33: Horizontal Polarization - Radio and Installation and Alignment Kit

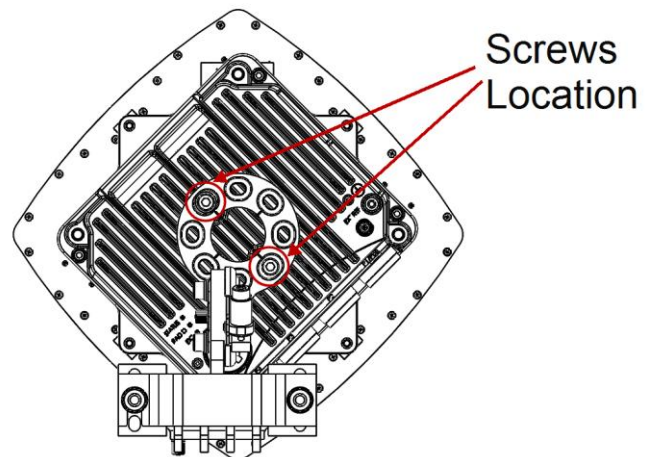


Figure 34: Horizontal Polarization - Screws Location

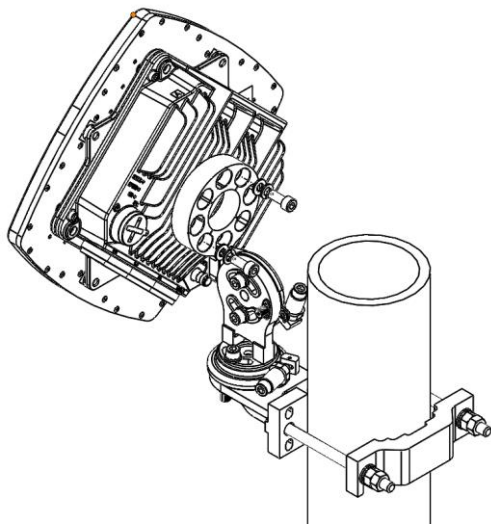


Figure 35: Vertical Polarization - Radio and Installation and Alignment Kit

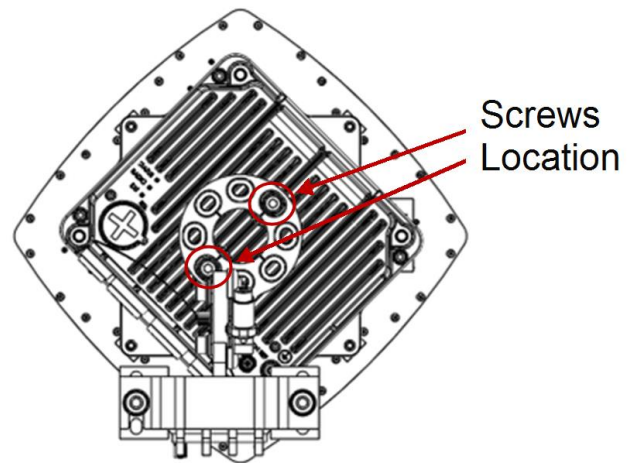



Figure 36: Vertical Polarization - Screws Location

## Performing Antenna Alignment Using the Enhanced Alignment Kit

You can easily adjust the azimuth and elevation of the antenna using a number of screws and nuts located on the installation and alignment device (**Figure 28**).

### Adjusting the Antenna Azimuth

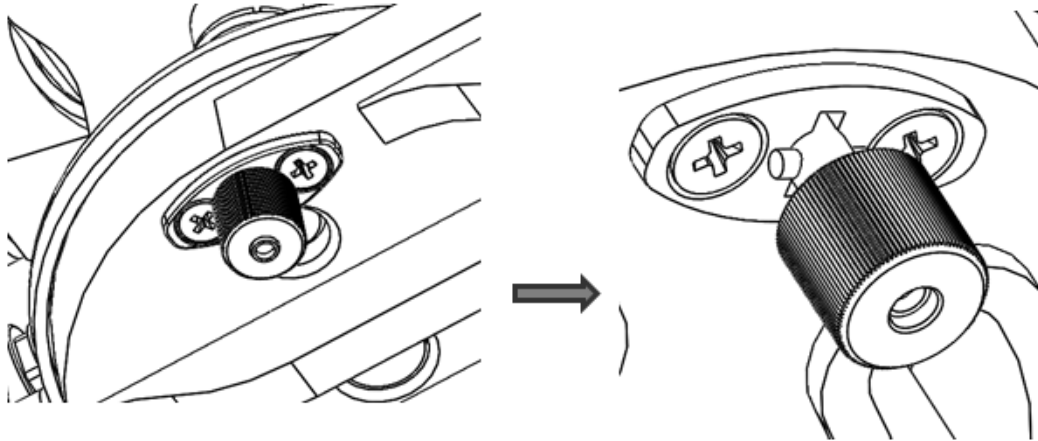
	<p><b>Note</b></p> <p>For wall-mount installations, if it is necessary to adjust the azimuth by more than 45°, you must first adjust the position of the Azimuth Screws. See Extending the Azimuth Range.</p>
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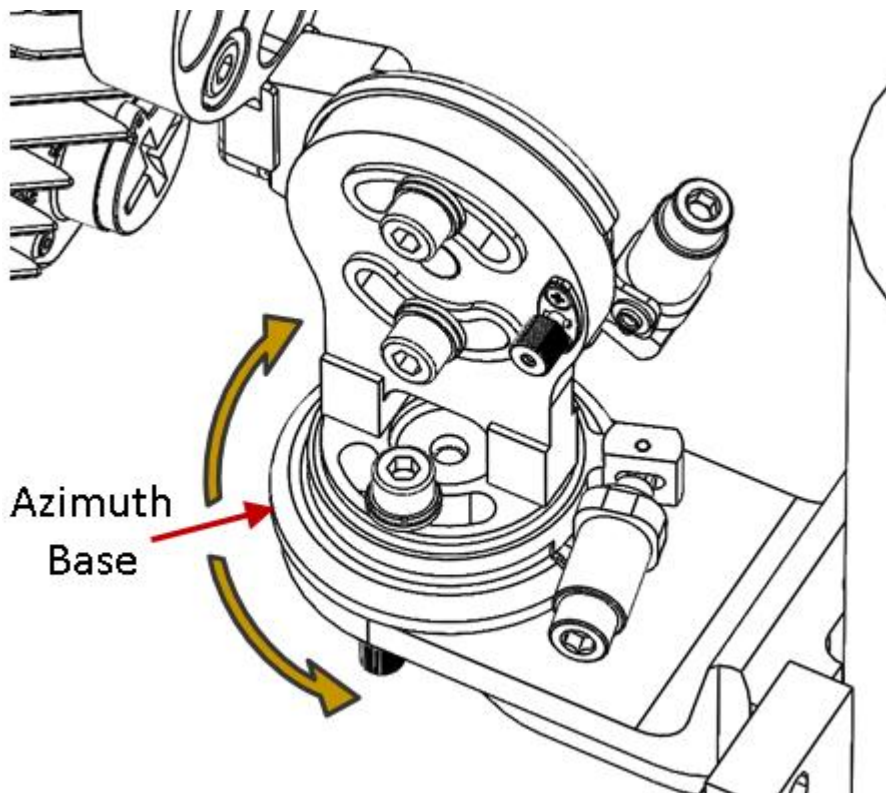
## Performing Gross Azimuth Adjustment

To adjust the antenna azimuth:

1. Loosen the Azimuth Fixing Pin (Figure 28) by pulling it gently out of its groove and rotating it counter-clockwise.

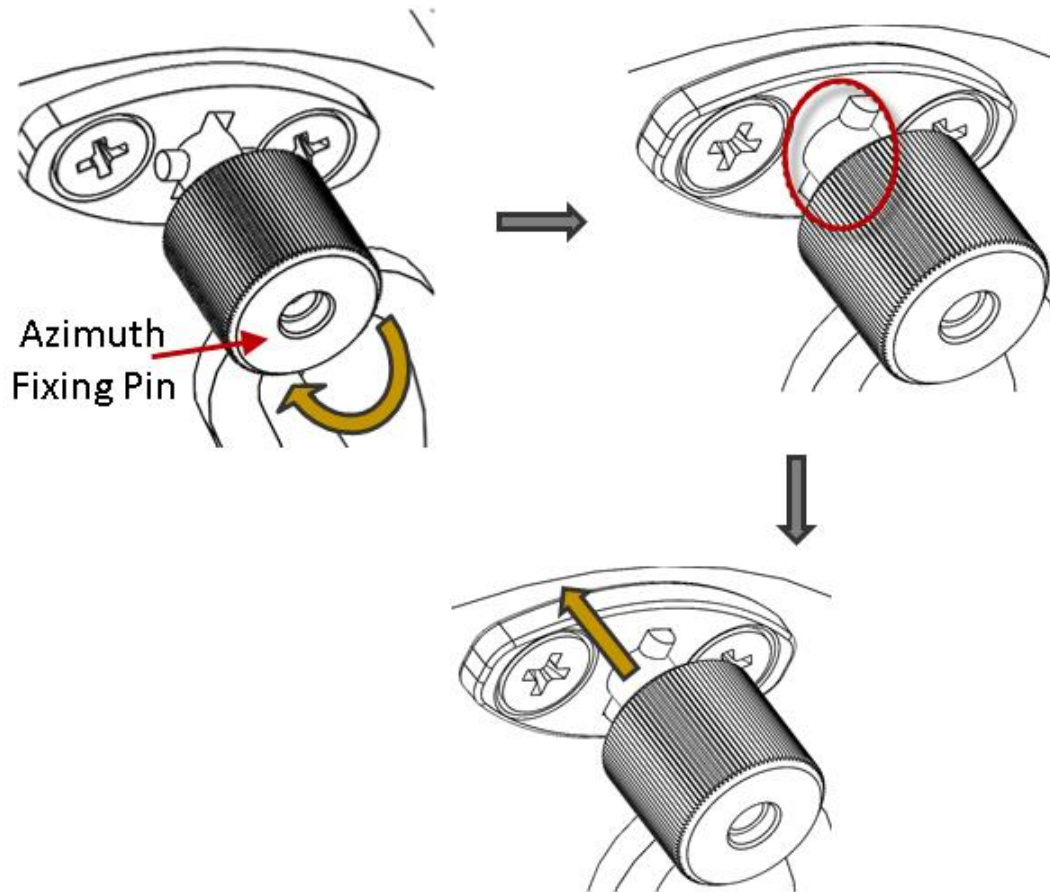


2. Manually adjust the azimuth base to its required location.



3. Once the azimuth base has been adjusted to its approximate location, lock the azimuth fixing pin by rotating the pin clockwise until it appears to be aligned with its groove. At this point, you must adjust the azimuth base until the fixing pin slips into its groove. There are notches within the device that enable you to adjust the azimuth in 15° increments. You can then perform fine azimuth adjustment as described below.

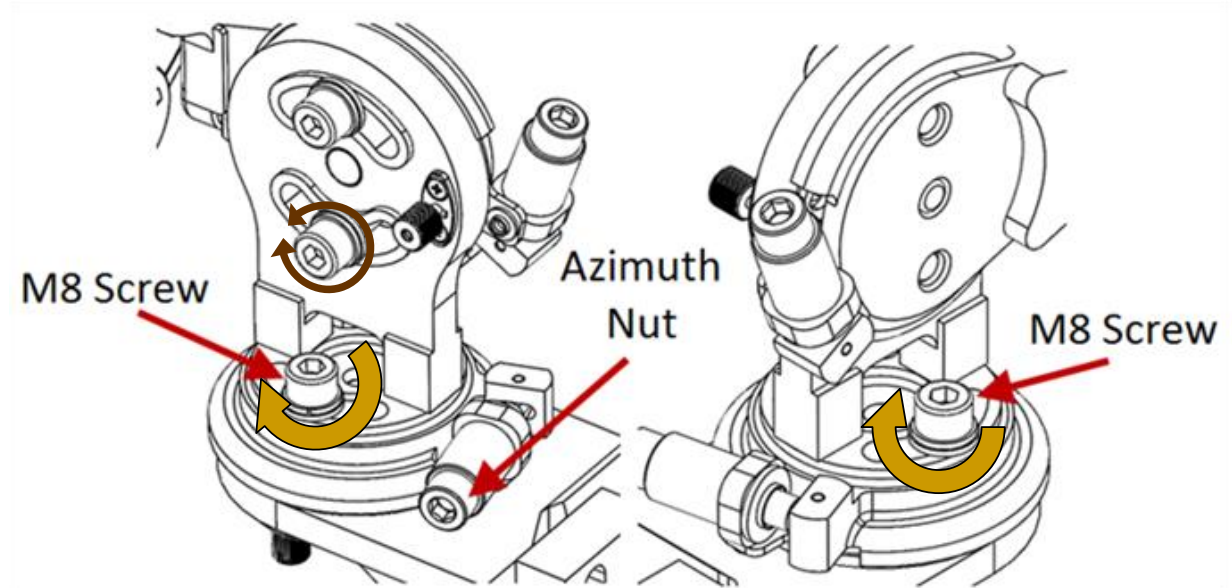
You will hear a click when the pin slips into the groove.



## Performing Fine Azimuth Adjustment

To perform fine azimuth alignment:

1. Turn the Azimuth Nut (Figure 28), either by hand or using a key wrench, for fine tuning of the azimuth. Each  $\frac{1}{4}$  turn is equal to an adjustment of  $0.25^\circ$ .
2. Tighten the two M8 Azimuth Screws connected to the azimuth base.



## Extending the Azimuth Range

To extend the azimuth range beyond 45° in either direction:

1. Manually rotate the azimuth base 45° in the direction you want to align the azimuth.
2. Remove the two Azimuth Screws.

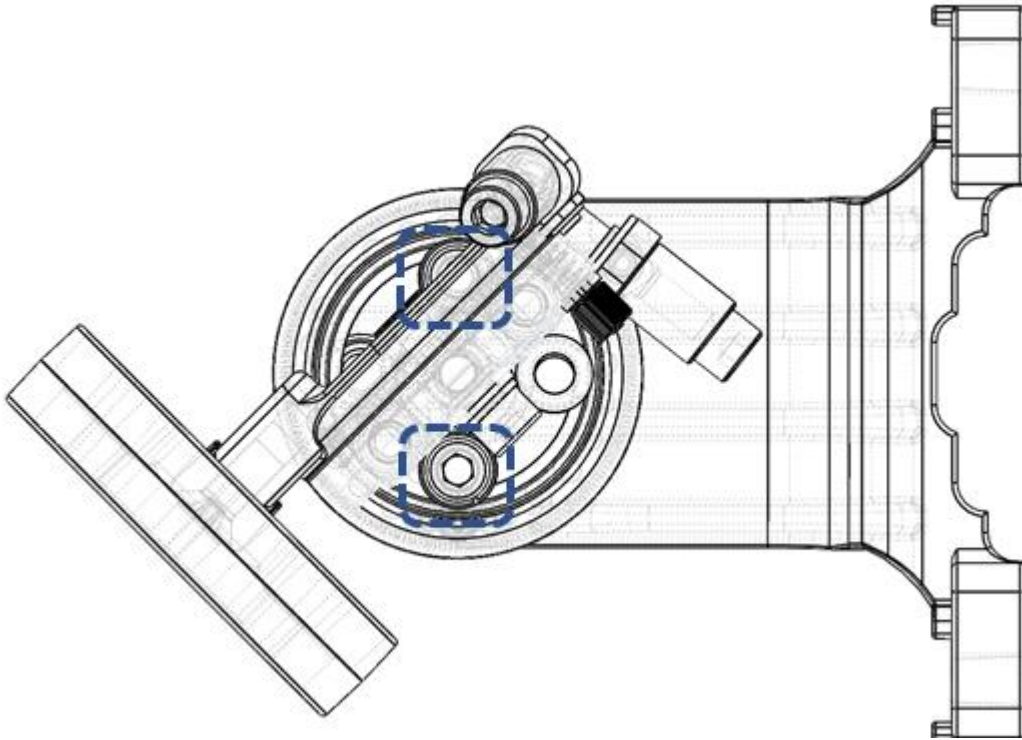


Figure 37: Azimuth Screws - Top View (Azimuth 45° to the Right)

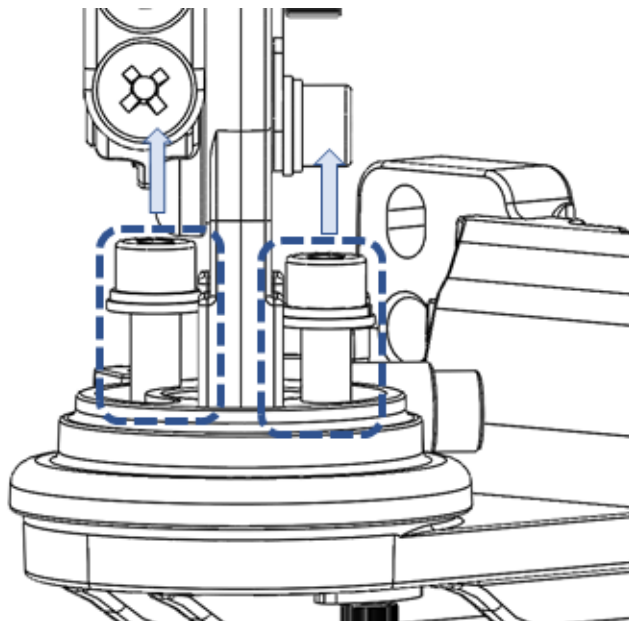


Figure 38: Removing the Azimuth Screws (Side View)

3. Insert the Azimuth Screws in the holes opposite their previous locations. For example, if you are adjusting the azimuth to the left, move the Azimuth Screw to the left of the device from the left hole to the right hole and move the Azimuth Screw to the right of the device from the right hole to the left hole, as shown in **Figure 37** and **Figure 39**. This will place the azimuth at an angle of 45° to the left or 45° to the right.

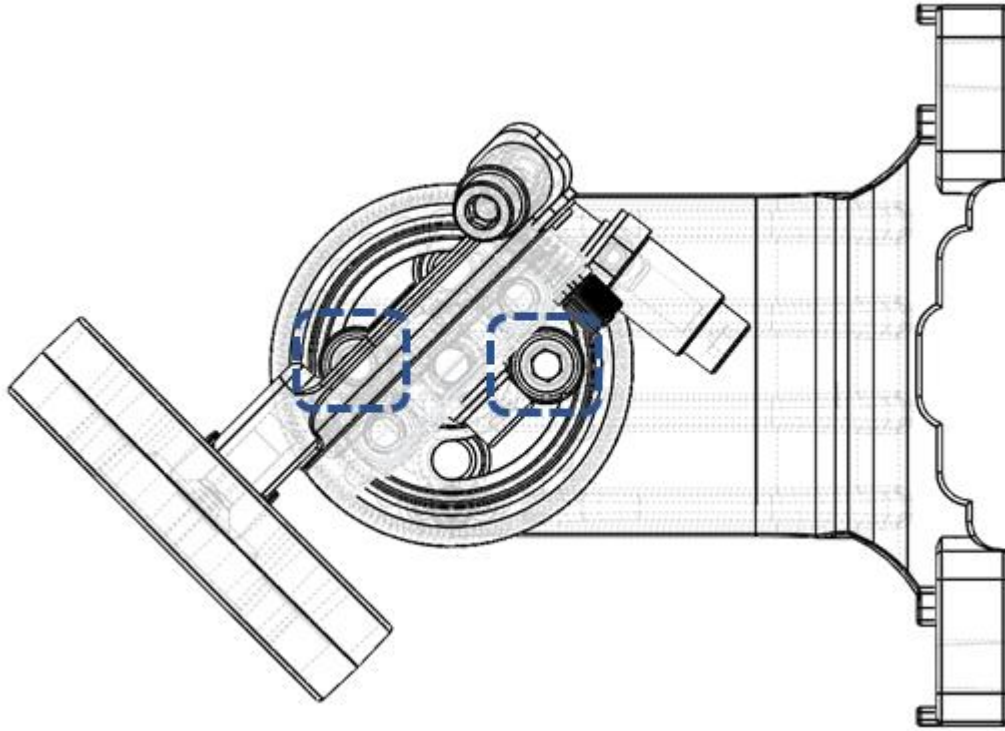


Figure 39: Azimuth Screws in New Placement - Top View (Azimuth 45° to the Right)

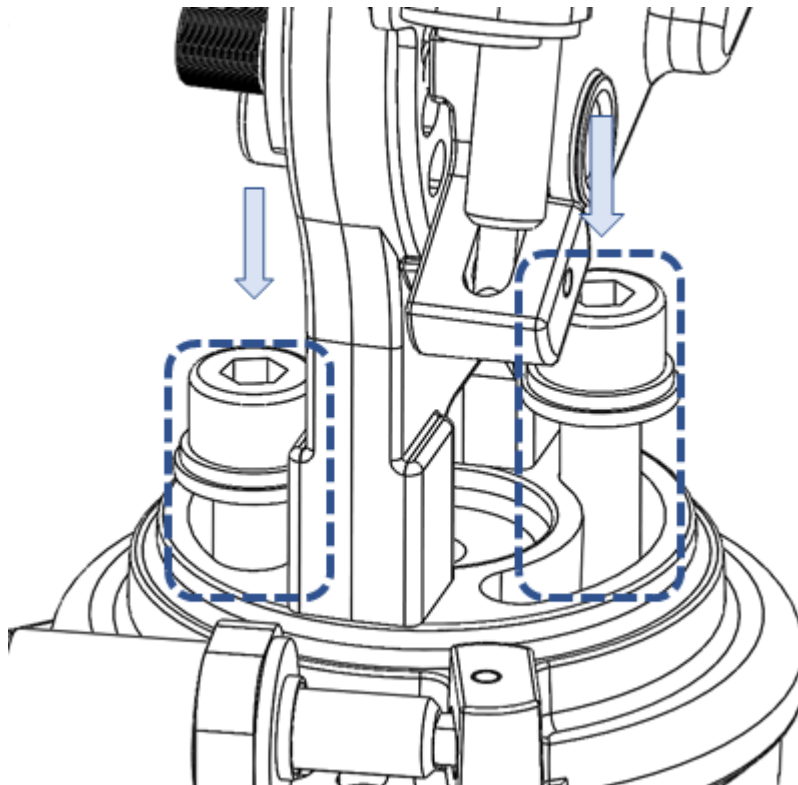


Figure 40: Repositioning the Azimuth Screws (Side View)

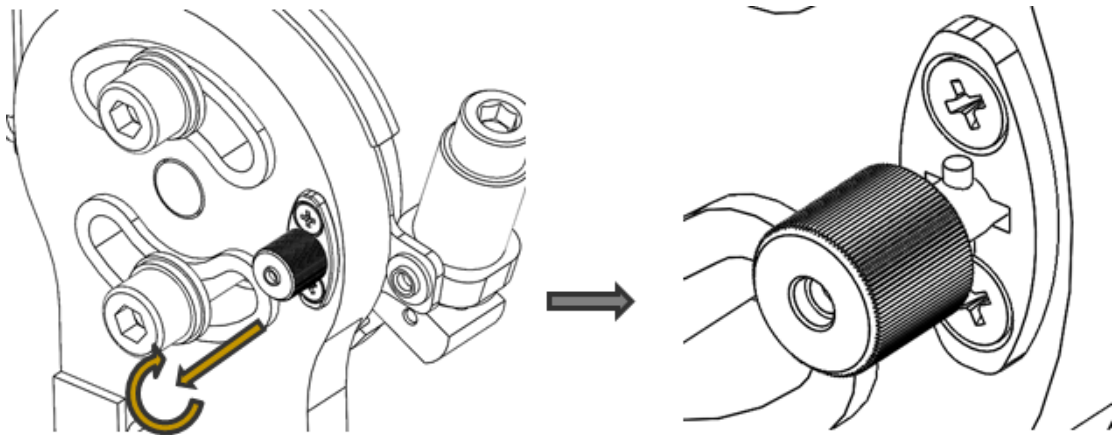
4. Tighten the two Azimuth Screws by hand, leaving them free enough so that you can manually rotate the azimuth base.
5. Follow the procedures in Performing Gross Azimuth Adjustment and Performing Fine Azimuth Adjustment to further adjust the azimuth from the 45° angle created by repositioning the Azimuth Screws.

## Adjusting the Antenna Elevation

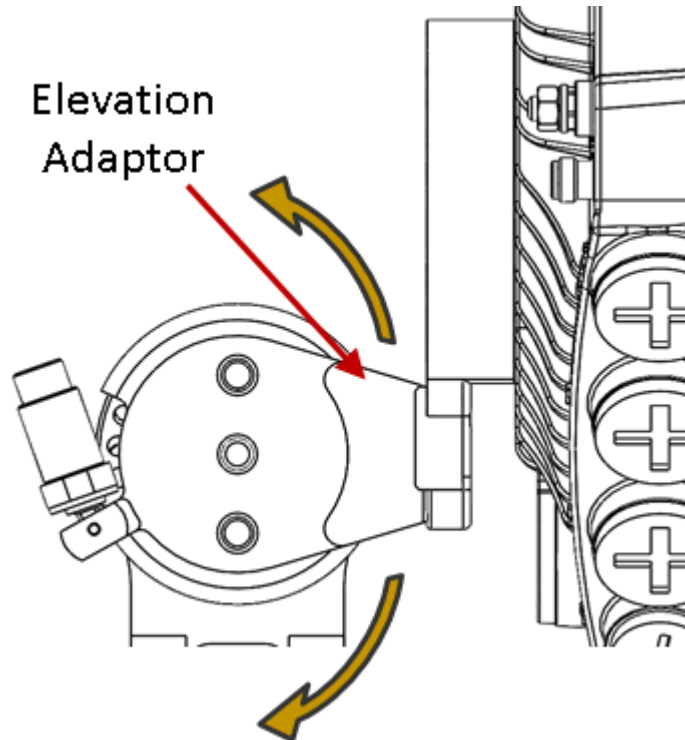
### Performing Gross Elevation Adjustment

To perform gross adjustment of the antenna elevation:

1. Loosen the Elevation Fixing Pin (Figure 28) by pulling it gently out of its groove and rotating it counter-clockwise.

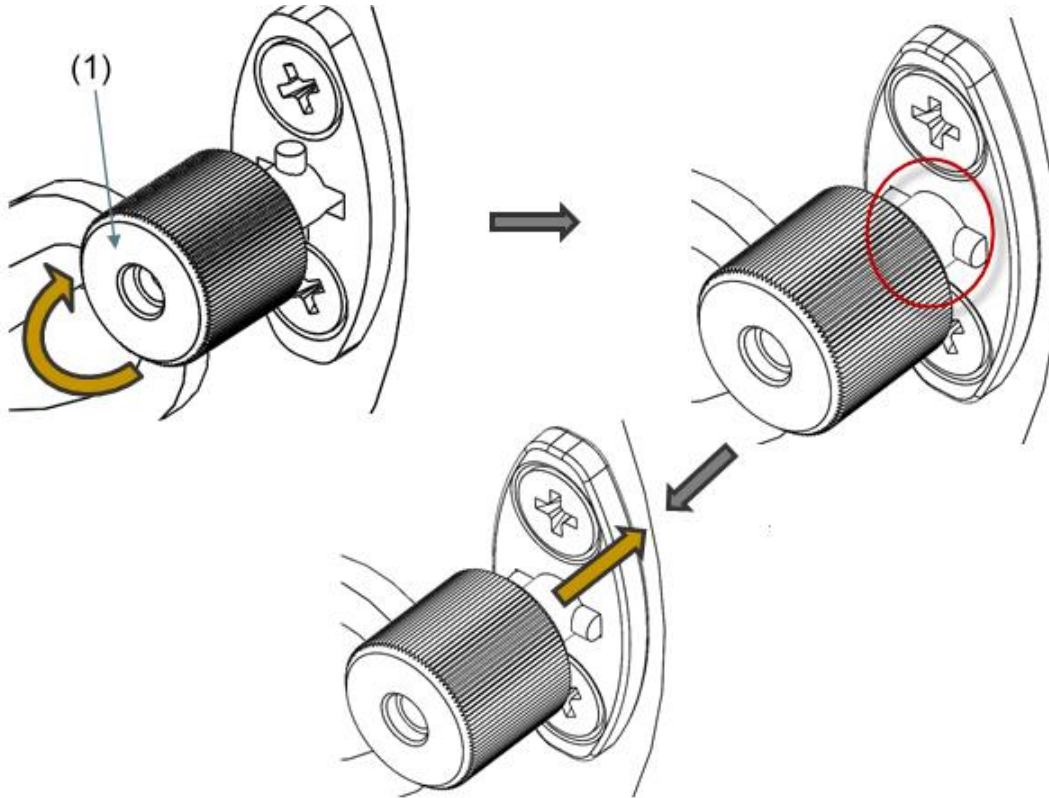


2. Move the Elevation Adaptor to the required location.



3. Once the Elevation Adaptor has been adjusted to its approximate location, lock the elevation fixing pin by rotating the pin clockwise until it appears to be aligned with its groove. At this point, you must adjust the Elevation Adaptor until the fixing pin slips into its groove. There are notches within the device that enable you to adjust the elevation in 15° increments. You can then perform fine elevation adjustment as described below.

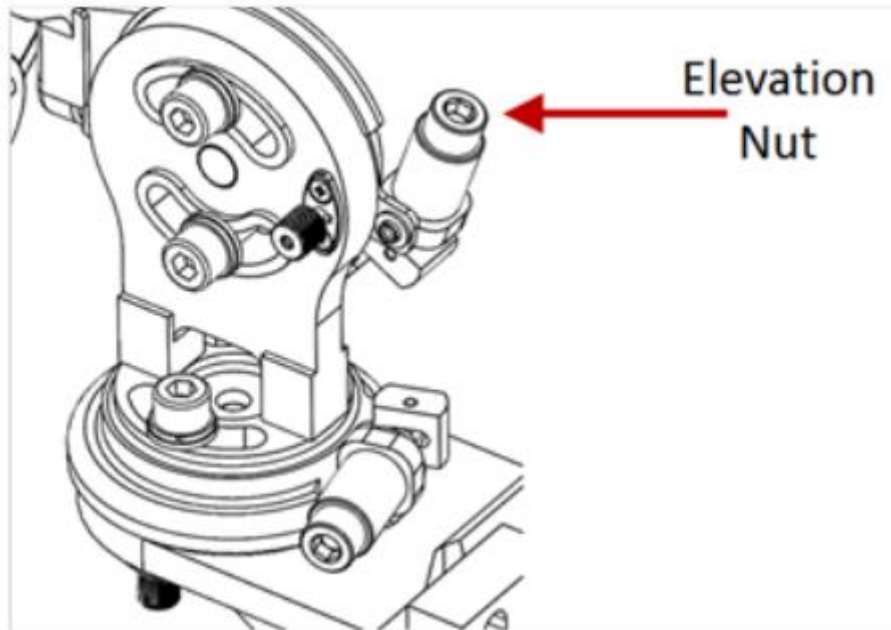
You will hear a click when the pin slips into the groove.



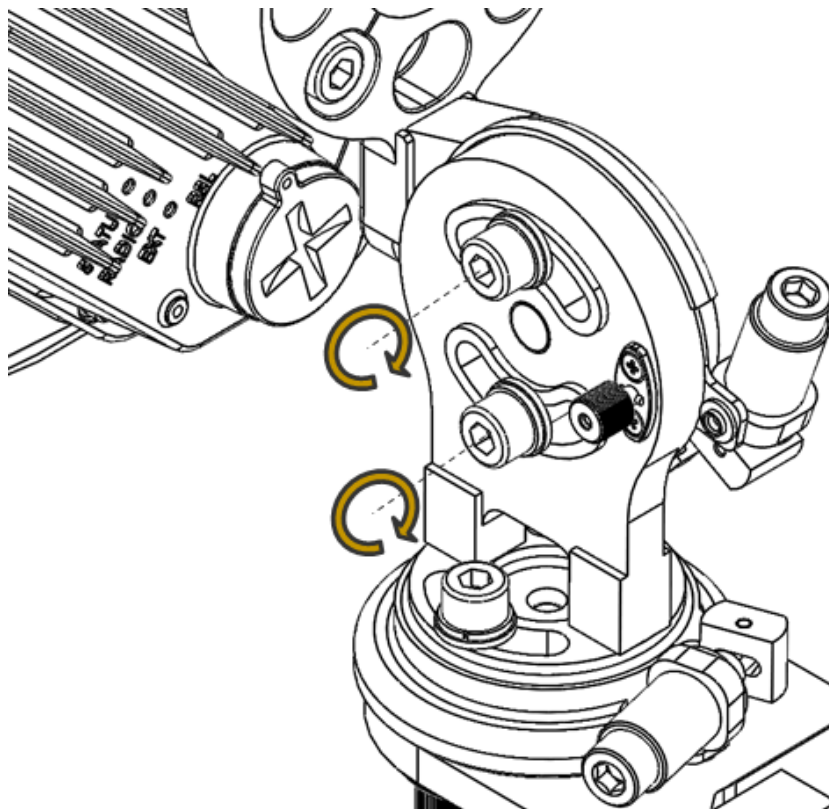
## Performing Fine Elevation Adjustment

To perform fine elevation alignment:

1. Turn the Elevation Nut (Figure 28), either by hand or using a key wrench, for fine tuning of the elevation. Each  $\frac{1}{4}$  turn is equal to an adjustment of  $0.25^\circ$ .



2. Tighten the two M8 Elevation Screws connected to the Elevation Adaptor.





# Direct Mount Configurations

## 1+0 Direct Mount Installation

### List of Items

Item	Description	Quantity	Remarks
1	PTP 820E RADIO	1	


### Required Tools

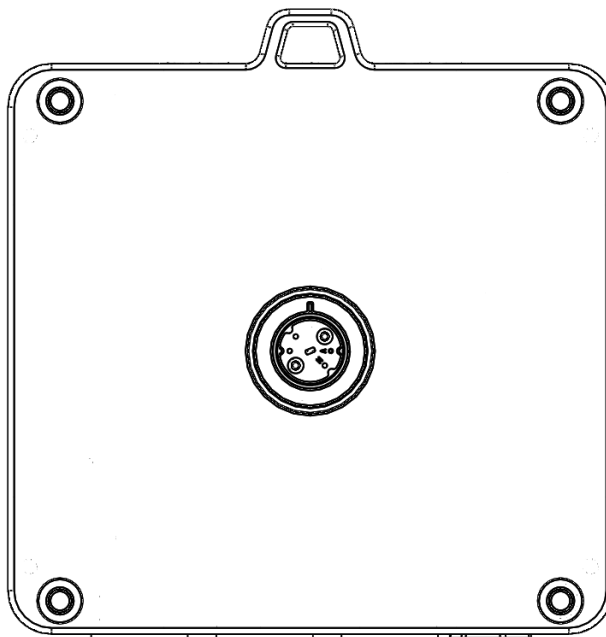
The following tools are required for the PTP 820E installation:

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

### Procedure

To install the PTP 820E in a direct mount 1+0 configuration:

	<p><b>Note</b> Do not remove the transparent pressure window located on the antenna interface.</p>
---	--





**Note**

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

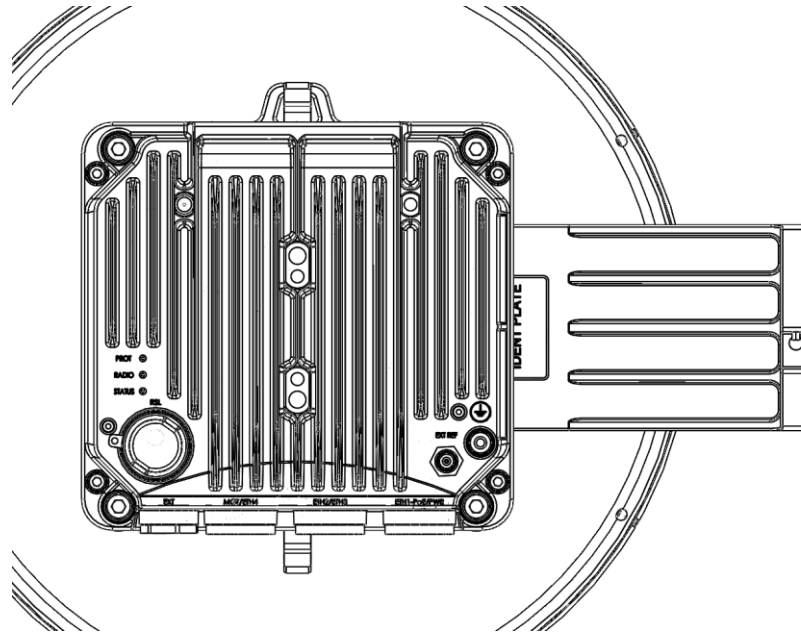
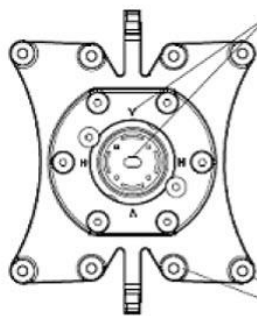


Figure 41: Horizontal / Vertical Pole

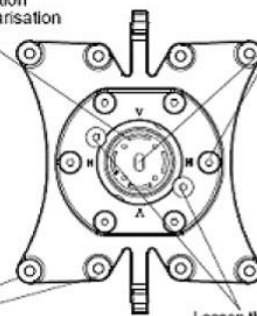
**VERTICALLY POLARISED**



Note Alignment of transition with timing letters on mounting ring

**HORIZONTALLY POLARISED**

Rotate transition to adjust polarisation

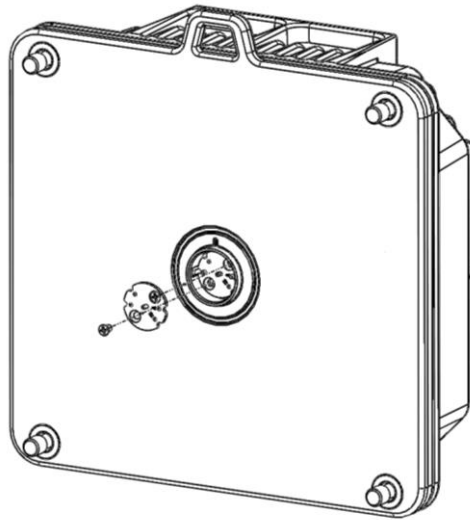


Note Alignment of transition with timing letters on mounting ring

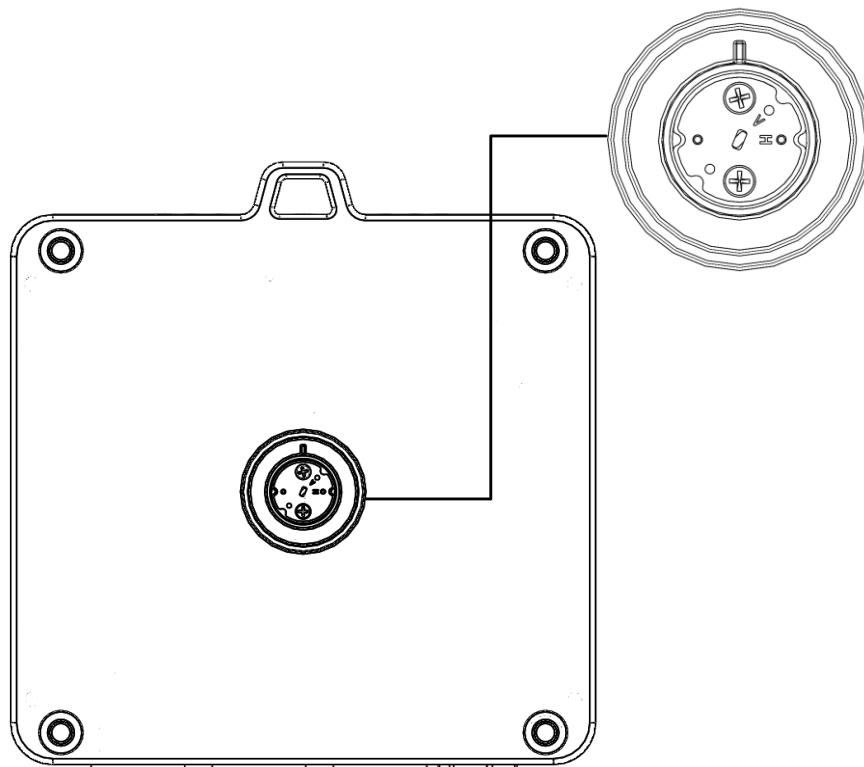
Torque M8 ODU/Coupler hardware to 12Nm.

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

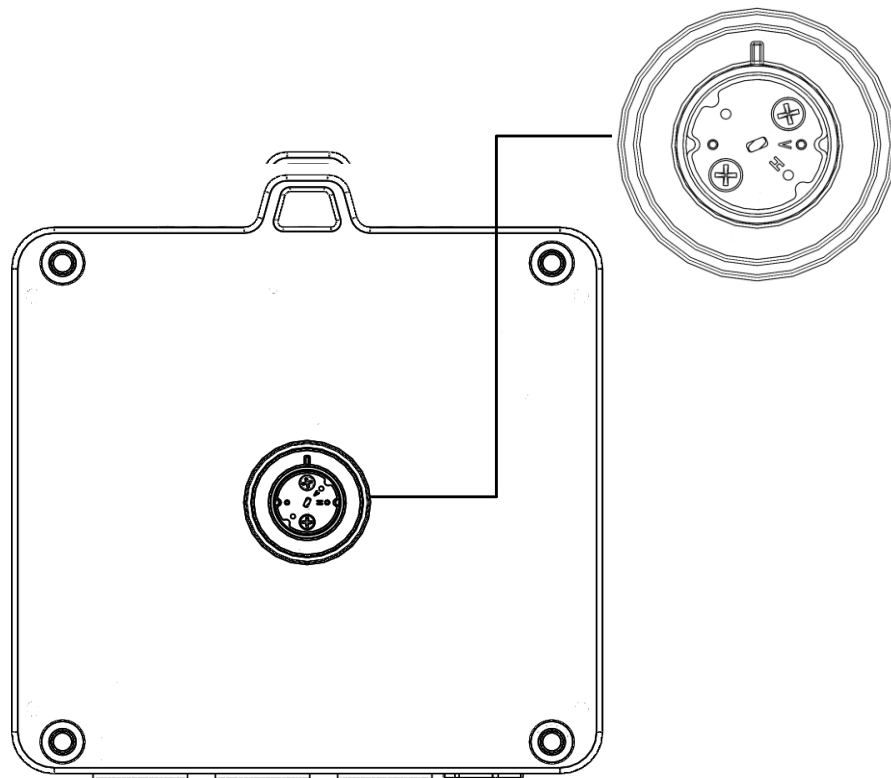
Twist orientation:



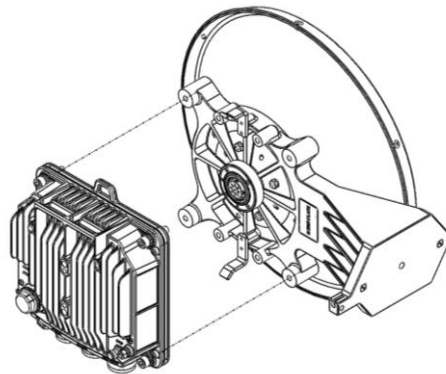
- For horizontal polarization, locate the twist with the letter “H” vertical to the hook cover (at 3:00) and fasten the two screws.



- For vertical polarization, locate the twist with the letter “V” vertical to the hook cover (at 3:00) and fasten the two screws.



1. Mount the PTP 820E on the antenna using the four M8 captive screws and washers that are supplied, assembled, in the PTP 820E, and tighten the screws.



**Note**

Make sure the polarization mounting direction of the PTP 820E is correct.

## 2+0 Single Polarization

### List of Items

Item	Description	Quantity	Remarks
1	PTP 820E Radio	2	
2	PTP 820E Coupler kit	1	For 2+0 SP configurations, use a splitter.
3	RFU-C Twist Kit	1	

### Required Tools

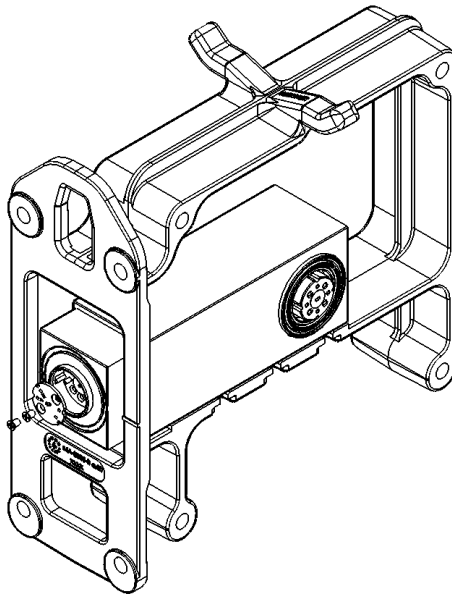
The following tools are required for the installation:

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

### Procedure

To install a PTP 820E in a direct mount 1+1 or 2+0 SP configuration:

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.

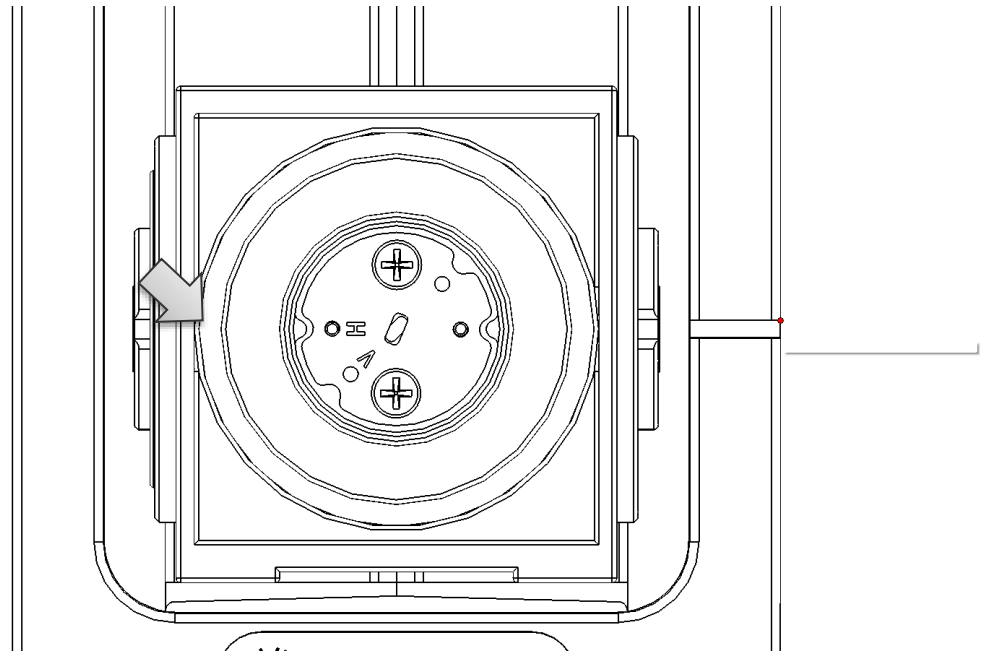


Figure 42: Horizontal Polarization

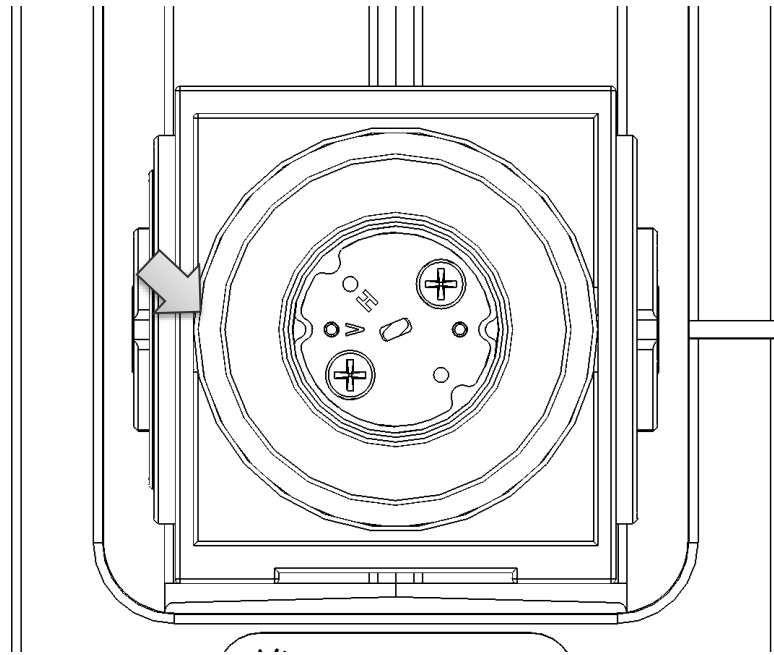
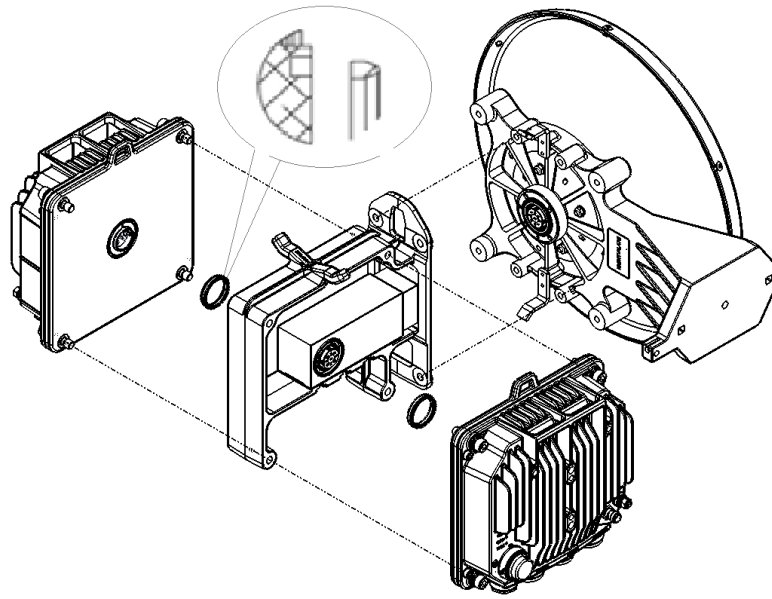
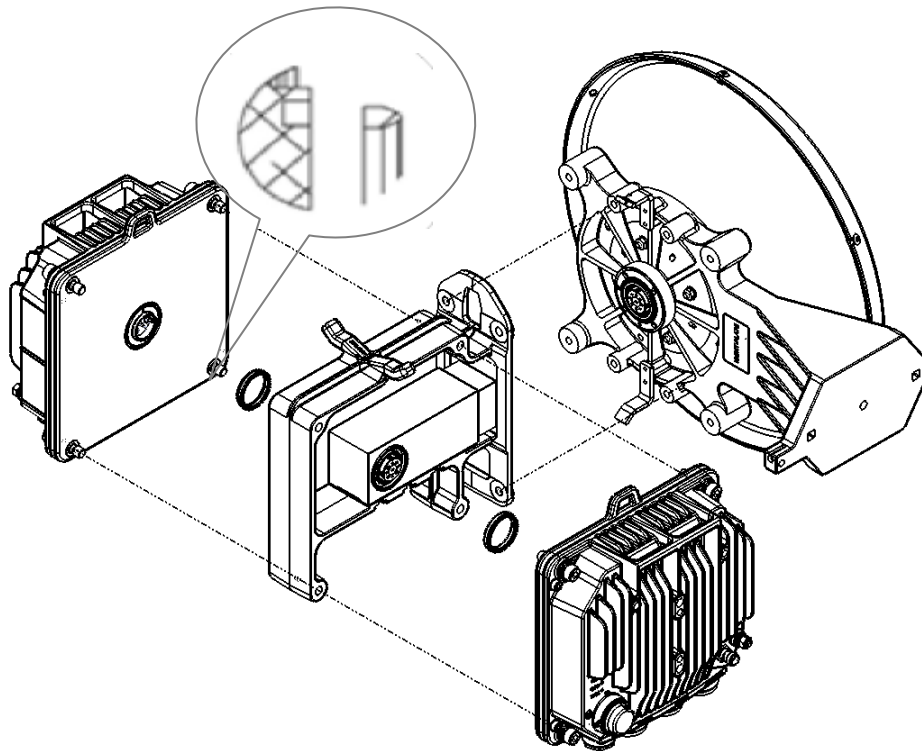


Figure 43: Vertical Polarization

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



4. Mount the PTP 820E to the body of the coupler or splitter using the four M8 captive screws and washers that are supplied, assembled, with the PTP 820E, and tighten the screws.



## 2+0 Dual Polarization

### List of Items

Item	Description	Quantity	Remarks
1	PTP 820E Radio	2	
2	PTP 820E OMT Kit	1	

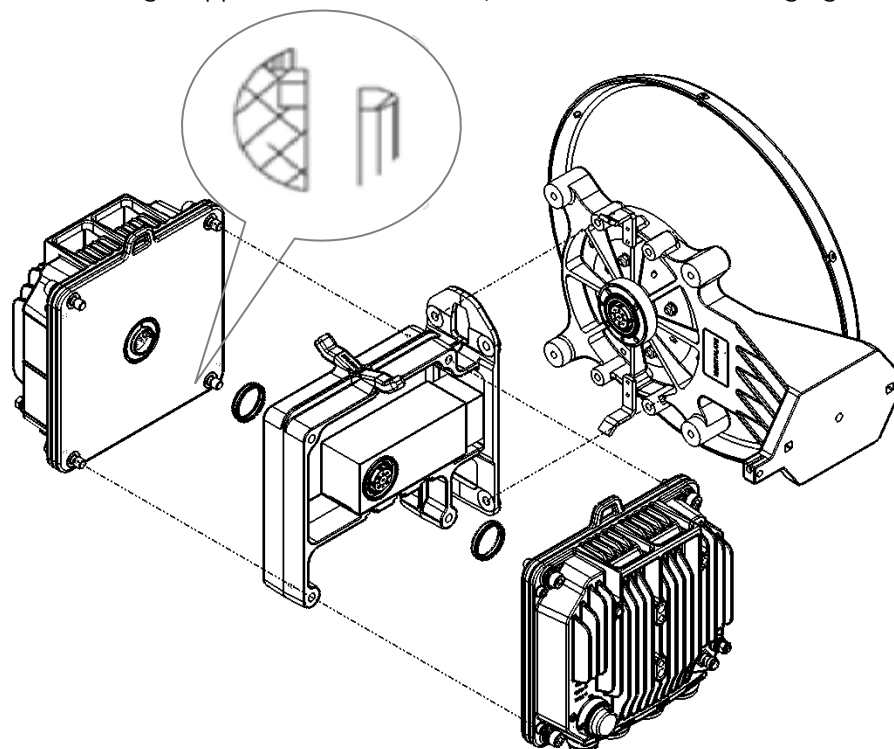
### Required Tools

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

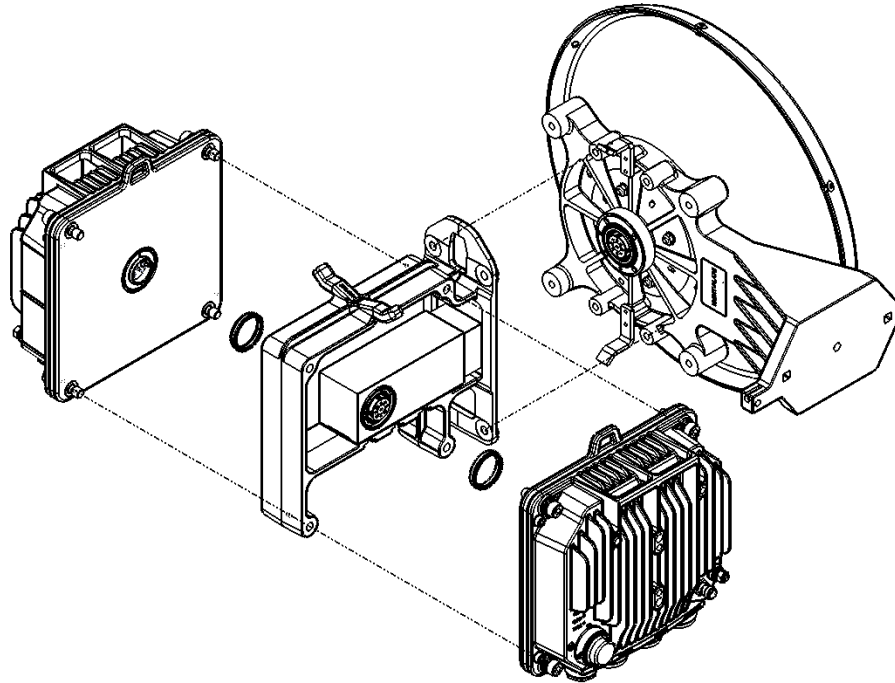
### Procedure

1. Mount the OMT on the antenna using the four M8 screws and washers supplied with the OMT kit and tighten the screws.
2. Mount the two O-Rings supplied with the OMT kit, as shown in the following figure.





3. Change the polarization of one of the PTP 820E radios to 'H' polarization.
4. Mount a PTP 820E radio to each side of the OMT. When mounting the radios, make sure that one side is polarized 'V' and the other side is polarized 'H'. Tighten the radios to the OMT kit using the four M8 captive screws and washers that are supplied, assembled, with the PTP 820E radio.



# Multiband Configurations

PTP 820E can be used in Multiband configurations with PTP 820C, PTP 820S, or third-party microwave radios.

For configurations with PTP 820E and PTP 820C or PTP 820S, a special Multiband antenna can be used. This antenna transmits and receives both E-band and microwave signals. Both units (PTP 820E and PTP 820C or PTP 820S) are connected to this antenna via direct mount.

Table 21: Multiband Antenna Part number

Microwave Frequency	Part number	Description
18 GHz	N800082D006A	PTP 820 2' ANT,SP,18 & 80 GHz multi-band
23 GHz	N800082D007A	PTP 820 2' ANT,SP,23 & 80 GHz multi-band

## Multiband with PTP 820E/PTP 820C/RFU-D with 2+0 Single Polarization

### List of Items

Item	Description	Quantity	Remarks
1	Multiband Antenna	1	Optional. If a third-party antenna is used, simply assemble a 1+0 PTP 820E configuration and a 2+0 SP PTP 820C configuration.
2	PTP 820E Radio	1	
3	PTP 820C Radio	1	
4	PTP 820C Splitter Kit	1	

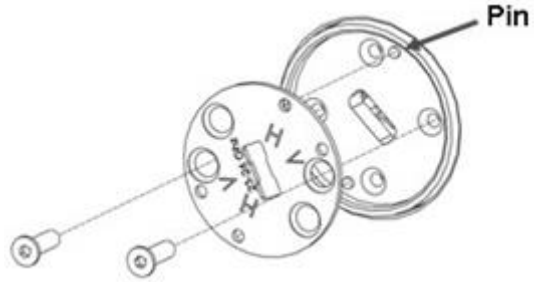
### Required Tools

The following tools are required for the installation:

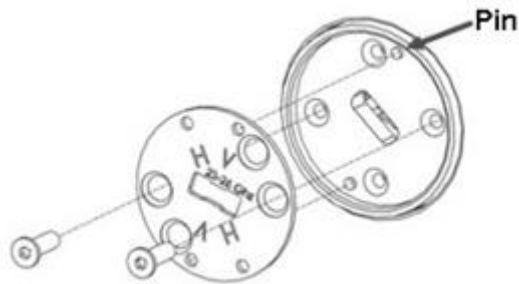
- Metric offset hexagon key set
- Phillips #1, #2 screwdriver

## Procedure

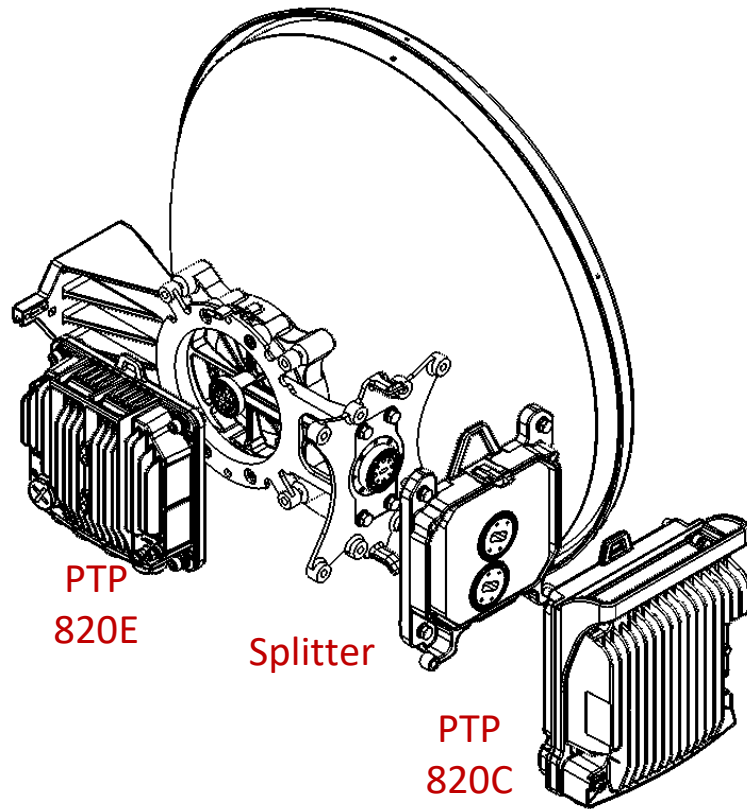
1. Adjust the twist on both the PTP 820E antenna interface and the PTP 820C Splitter. Perform one of the following steps, according to the required polarization (horizontal or vertical).
  - For horizontal polarization, locate the holes above and below the letter “H” on the pins and fasten the two screws.



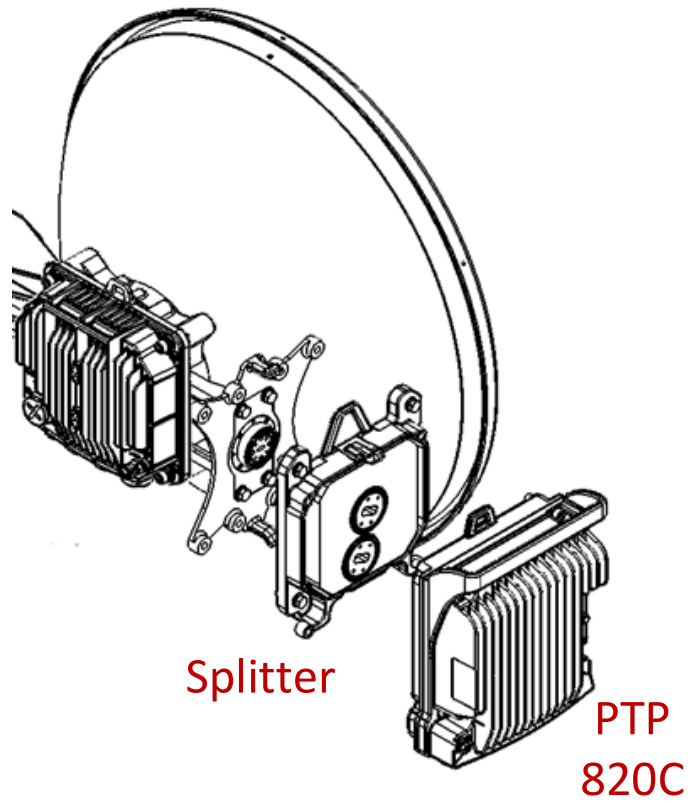
- For vertical polarization, locate the holes above and below the letter “V” on the pins and fasten the two screws.



2. Assemble the antenna according to the instructions provided with the antenna.
3. Install the PTP 820E directly to the back of the antenna, as shown in the figure below. Use the procedure described in **1+O Direct Mount Installation** on page 97.



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



## Multiband with PTP 820E/PTP 820C/RFU-D with 2+0 Dual Polarization

### List of Items

Item	Description	Quantity	Remarks
1	Multiband Antenna	1	Optional. If a third-party antenna is used, simply assemble a 1+0 PTP 820E configuration and a 2+0 DP PTP 820C configuration.
2	PTP 820E Radio	1	
3	PTP 820C Radio	1	
4	PTP 820C OMT Kit	1	
5	CIRC./CIRC. ADAPTOR	1	Per Antenna Vendor

### Required Tools

The following tools are required for the installation:

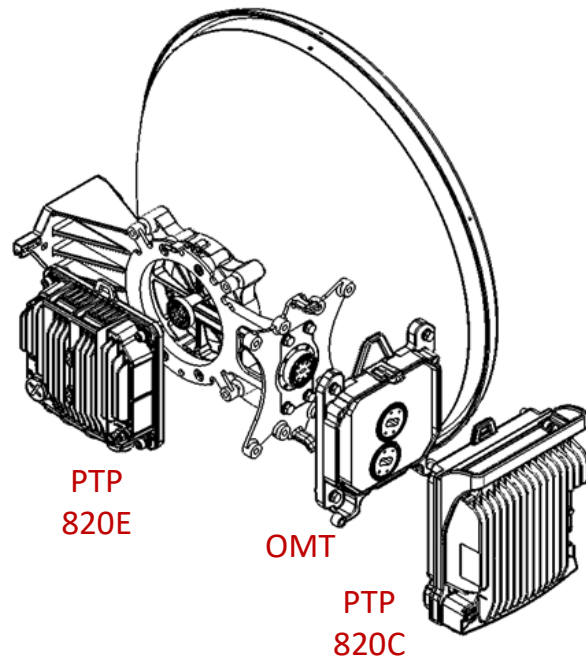
- Metric offset hexagon key set
- Metric wrench key set
- Phillips #2 screwdriver

### Procedure

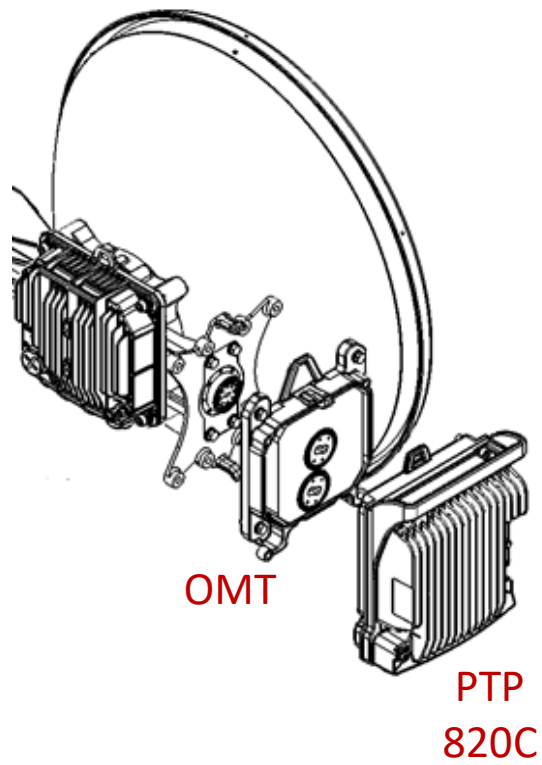
1. Prior to the installation, follow the antenna manufacturer's instructions to use the circular adaptor. Remove the existing rectangular transition, swap the O-ring, and install the circular transition instead.



2. Assemble the antenna according to the instructions provided with the antenna.
3. Install the PTP 820E directly to the back of the antenna, as shown in the figure below. Use the procedure described in **1+0 Direct Mount Installation** on page 97.



4. Connect the OMT at a 90° angle to the antenna and secure it with the four screws supplied with the OMT kit. Verify the existence of the O-ring.
5. Connect the PTP 820C unit to the OMT using the four M8 captive screws and washers supplied with the PTP 820C and tighten the screws.



## Multiband with PTP 820E and 1+0 PTP 820S/RFU-C

### List of Items

Item	Description	Quantity	Remarks
1	Multiband Antenna	1	Optional. If a third-party antenna is used, simply assemble a 1+0 PTP 820E configuration and a 1+0 PTP 820S configuration.
2	PTP 820E Radio	1	
3	PTP 820S Radio	1	

### Required Tools

The following tools are required for the installation:

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

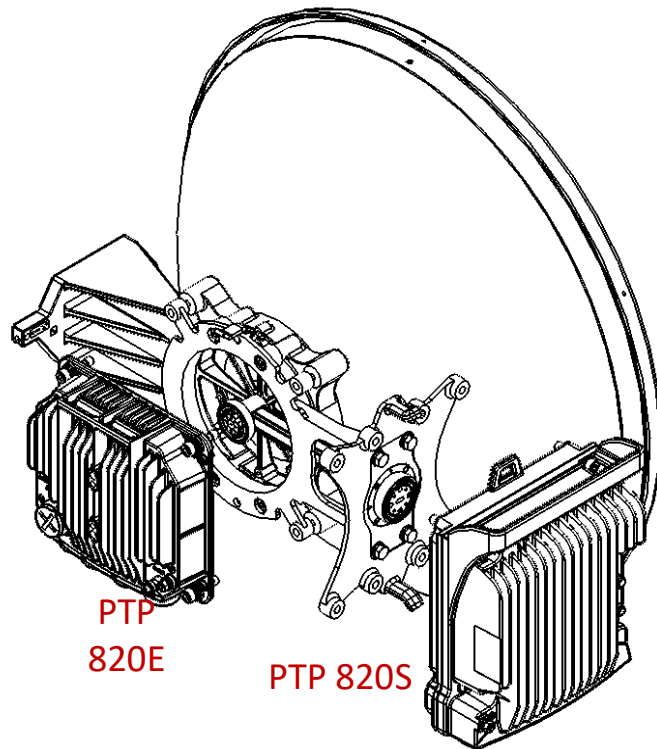
### Procedure

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




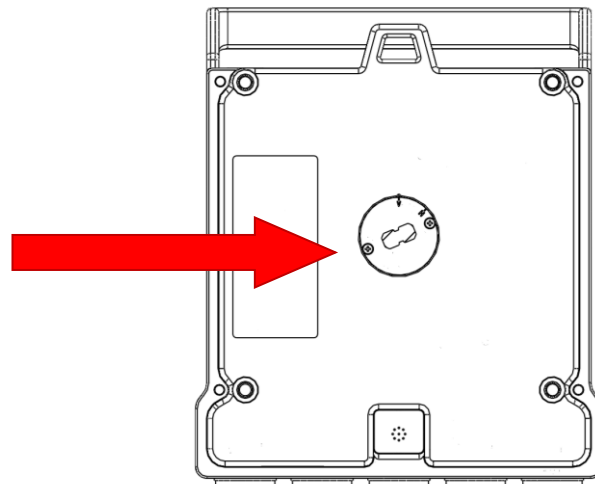
2. Assemble the antenna according to the instructions provided with the antenna.
3. Install the PTP 820E directly to the back of the antenna, as shown in the figure below. Use the procedure described in **1+0 Direct Mount Installation** on page 97.





4. Mount the PTP 820S on the antenna using the four M8 captive screws and washers that are supplied, assembled, with the PTP 820S, and tighten the screws.

	<p><b>Note</b> Do not remove the transparent pressure window located on the antenna interface.</p>
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5. If necessary, change the antenna polarization by rotating the unit in accordance with the relevant antenna installation guide.

6. If necessary, change the polarization of the radios by adjusting the twist. For the PTP 50E, see **1+O Direct Mount Installation** on page 97. For the PTP 820S, see the illustration below. For RFU-C, rotate the entire unit by 90° to change the polarization.

	<p><b>Note</b> When tightening the M3 screws on the twist of the PTP 820S, use torque of 0.6 Nm.</p>
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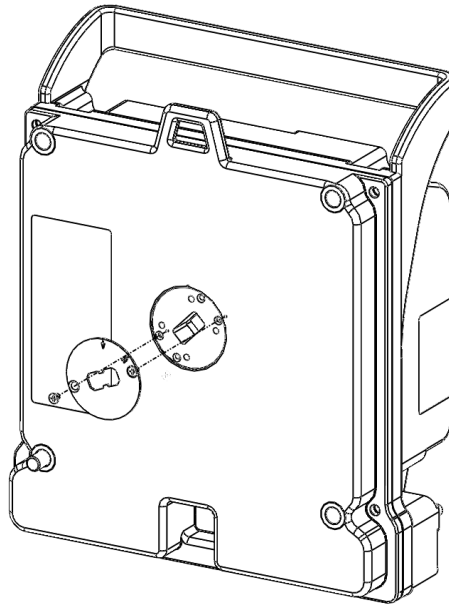
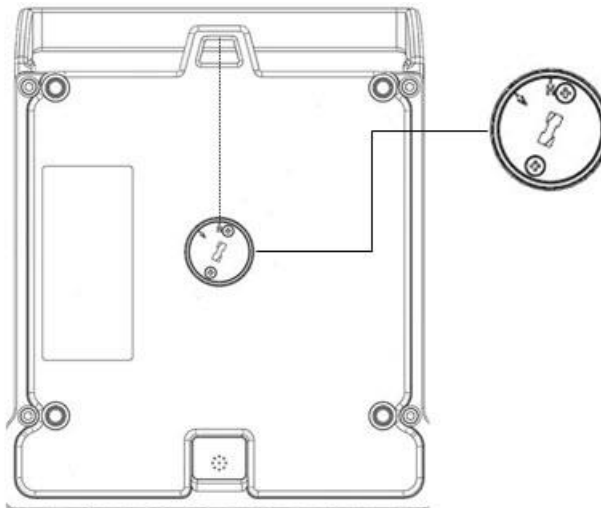


Figure 44: PTP 820STwist Orientation

- 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.

