SAMSUNG

5G NR Pico HRU Installation Manual

HT5H01

Describes product installation and requirement procedure.

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disRadio Access Network

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This manual should be read and used as a guideline for properly installing and/or operating the product. Owing to product variations across the range, any illustrations and photographs used in this manual may not be a wholly accurate depiction of the actual products you are using.
This manual may be changed for system improvement, standardization and other technical reasons without prior notice.
Samsung Networks documentation is available at http://www.samsungdocs.com

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Preface

This manual describes how to install a Samsung 5G NR Pico HRU(Hybrid Radio Unit, HT5H01) and how to connect its cables.

Conventions in this Document

Samsung Networks product documentation uses the following conventions.

Symbols

Symbol	Description
	Indicates a task.
	Indicates a shortcut or an alternative method.
	Provides additional information.
	Provides information or instructions that you should follow to avoid service failure or damage to equipment.
	Provides information or instructions that you should follow to avoid personal injury or fatality.
	Provides antistatic precautions that you should observe.

Menu Commands

menu | command

This indicates that you must select a command on a menu, where **menu** is the name of the menu, and **command** is the name of the command on that menu.

File Names and Paths

These are indicated by a bold typeface. For example:

Copy **filename.ext** into the **/home/folder1/folder2/bin/** folder.

User Input and Console Screen Output Text

- The input and output text is presented in the Courier New font. For example, `context <designated epc-context-name>`
- The CLI command is presented in capital letters and Courier New, bold style. For example, Type the **`RTRV-NE-STS`** command in the input field.
- The YANG object is presented in the small letters and boldface. For example, **eutran-cell-conf-idle**

Revision History

The table below outline all the versions of this document:

Document Version	Publication Date	Remarks
1.0	July 2019	First version

Organization of This Document

Section	Title	Description
Chapter 1	Before Installation	This chapter introduces Pico HRU and describes the items that should be understood before installation.
Chapter 2	Installing System	This chapter describes the procedures to install the Pico HRU.
Chapter 3	Connecting Cables	This chapter describes the procedures to connect the cables to the installed Pico HRU.
Chapter 4	Inspect the Installation	This chapter describes the procedures of inspecting installation status after the Pico HRU installation and cabling is completed.
Appendix A	Acronyms	This appendix describes the acronyms used in this manual.
Appendix B	Cleaning Optical Connector	This appendix describes the procedure of cleaning the optical connector and cleaning tool.
Appendix C	Standard Torque	This appendix describes the standard torque when fastening the bolt.

Personal and Product Safety

This product safety information includes European directives, which you must follow. If these do not apply in your country, please follow similar directives that do apply in your country.

Electrical

The product is designed to operate from a AC supply and is therefore classified as Safe Extra Low Voltage (SELV) equipment.

All structural parts are grounded and all input and outputs have built-in isolation from the network. All input and output ports that connect to external power sources are designed to meet relevant national safety requirements.

The product contains hazardous energy levels as defined by EN 60950. Care must be taken when maintaining this equipment as injury to personnel or damage to the equipment could result from mistakes. Maintenance should only be carried out by trained and competent engineers who are familiar with the relevant procedures and instructions.

Lasers

The product is fitted with optic modules rated as Class 1 radiation-emitting devices under EN 60825-1. During installation, operation, and maintenance, never look into the end of an optical fiber directly or by reflection either with the naked eye or through an optical instrument. Do not operate equipment with exposed fiber connectors-cover these with fiber cables or blanking caps. Do not remove equipment covers during operation unless requested to do so in the documentation. Carry out normal safety precautions when trimming fibers during installation.

Manual Handling

Care should be taken when handling equipment. Give due consideration to the weight of the equipment, the physical capability of the individual(s) handling the equipment, and movements such as twisting, bending and stooping, which could lead to skeletal and muscular injuries.

Installation

Installation must be carried out by trained and competent engineers only. All relevant safety measures should be taken to ensure equipment is not connected to live power and transmission sources during installation. Equipment must be correctly installed in order to meet the relevant safety standards and approval conditions.

Each power feed to the unit requires a separate fused feed from the provided power supply. The cable between the power distribution point and the installed equipment must have a minimum cross-sectional area of 2.5 mm^2.

Maintenance

Maintenance must only be carried out by a suitably trained and competent technician. All safety instructions must be carefully observed at all times. Equipment covers should not be removed while live power and transmission is connected unless in a controlled environment by trained technicians.

Fire

The product is powered from a AC supply. To protect against fire, the equipment is fused.

Environment

The product must be operated in an environment with the specified relative humidity and ambient temperature ranges.

Keep all liquids away from the equipment as accidental spillage can cause severe damage.

Anti-Static Precautions

The circuit boards and other modules in the product are sensitive to and easily damaged by static electricity. If any card or sub-assembly is removed from the unit, the following anti-static precautions must be observed at all times:

- Service personnel must wear anti-static wrist straps.
- Circuit boards and sub-assemblies must be placed on ground conductive mats or in conductive bags.
- All tools must be discharged to ground before use.
- The anti-static wrist strap and cord must be checked at regular intervals for their suitability for use.

Grounding

To comply with UL 60950, the equipment must be connected to a safety grounding point via a permanent link. Grounding points are located on the product for this purpose. Always connect the ground cable before fitting other cables. The product must remain grounded continuously unless all connections to the power supply and data network are all removed.

If equipment is grounded through a cabinet or rack, make sure it is done so properly.

Power Supply Connection

Power connections and installation of associated wiring must be carried out by a suitably qualified technician.

Only devices that comply with all relevant national safety requirements should be connected to the unit's power supply inlets. Other usage will invalidate any approval given to this equipment.

Connection of this equipment to devices that are not marked with all relevant national safety requirements may produce hazardous conditions on the network.

When the power supply is obtained by a rectifier/safety isolation transformer, the supply must meet the requirements of UL 60950 providing double/reinforced insulation between hazardous voltages and SELV/TNV circuits. Any battery must be separated from hazardous voltages by reinforced insulation.

Indirect Connection

Before indirectly connecting any equipment to another device through a shared power supply, ALWAYS seek advice from a competent engineer.

Devices that are not marked according to the relevant national safety standards may produce hazardous conditions on the network.

Product Disposal

To reduce the environmental impact of products, Samsung has joined WEEE compliance activities.

The WEEE symbol on the product indicates that the product is covered by the European Directive 2002/96/CE for the disposal of Waste Electrical and Electronic Equipment (WEEE). This means that the product should be disposed of separately from the municipal waste stream via designated collection facilities appointed by the government or the local authorities. This will help prevent potential negative consequences for the environment and human health. Please check the terms and conditions of the purchase contract for information about correct disposal.

California USA Only

This Perchlorate warning applies only to primary CR (Manganese Dioxide) Lithium coin cells in the product sold or distributed ONLY in California USA

‘Perchlorate Material-special handling may apply, See www.dtsc.ca.gov/hazardouswaste/perchlorate.’

FCC Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

Keep a safe distance (1.5m) between the base station antenna and people. Do not co-locate nor operate in conjunction with any other antenna or transmitter for the protection of general public from exposure to radio frequency electromagnetic field

Equipment Markings

This marking on the product, accessories or literature indicates that the product and its electronic accessories (e.g. charger, headset, and USB cable) should not be disposed of with other household waste at the end of their working life. To prevent possible harm to the environment or human health from uncontrolled waste disposal, please separate these items from other types of waste and recycle them responsibly to promote the sustainable reuse of material resources.

Household users should contact either the retailer where they purchased this product, or their local government office, for details of where and how they can take these items for environmentally safe recycling.

Business users should contact their supplier and check the terms and conditions of the purchase contract. This product and its electronic accessories should not be mixed with other commercial wastes for disposal.

Protective earth

Pico HRU should be grounded.

Chapter 1 Before Installation

This chapter introduces the Pico HRU system and describes the items that you should know before installation.

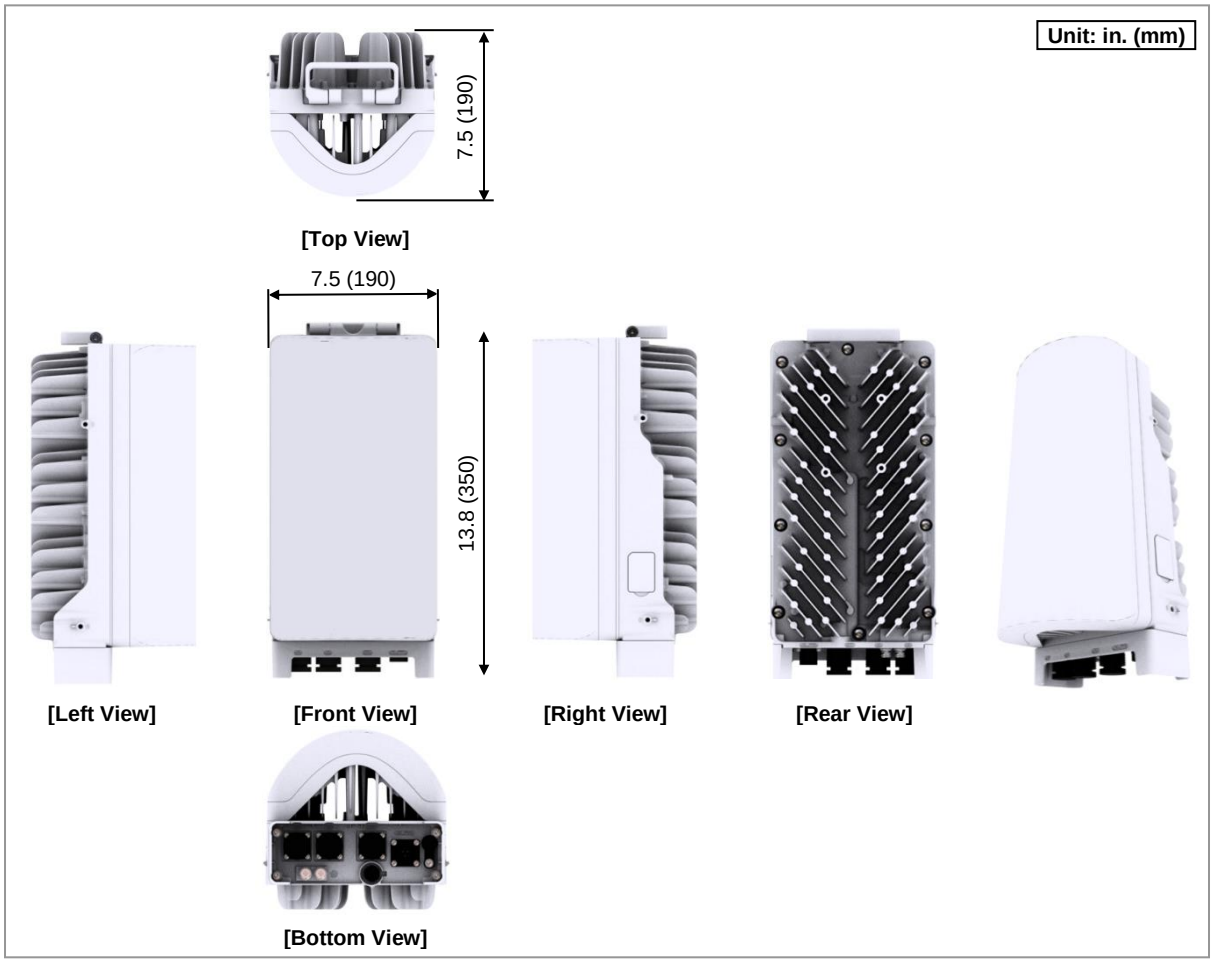
Pico HRU View and External Interface

This section provides the physical structure of the Pico HRU and its interfaces.

Pico HRU View

The figure below depicts the physical structure of the Pico HRU:

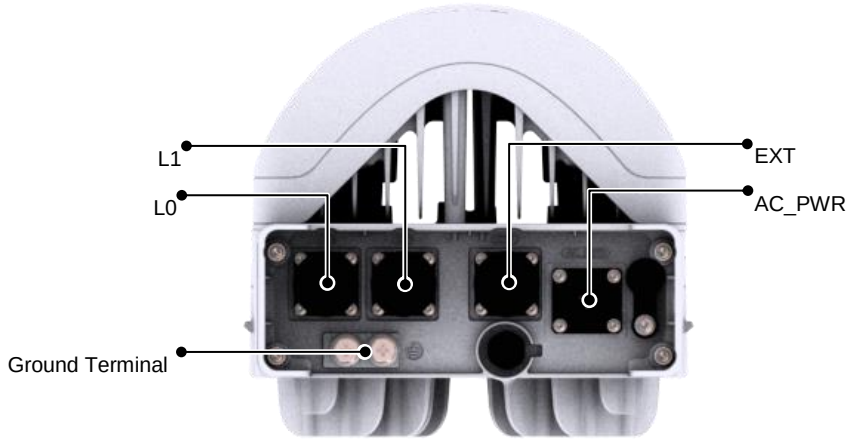
Figure 1. ***Pico HRU View***



Pico HRU External Interface

The figure below depicts the external interface structure of the Pico HRU:

Figure 2. ***Pico HRU External Interface***



[Bottom View]

Specifications

The table below outlines the main specifications of the Pico HRU:

Table 1. ***Specifications***

Item		HT5H01	
		Pico HRU 1Unit	Pico HRU 2Unit
Technology		5G NR	
Operating Frequency		37 to 40 GHz (3GHz)	
Instantaneous Bandwidth		1,400 MHz	
Operating Bandwidth		[Aug. '19] . E// DU by 10G link: 100MHz 2T2R . Samsung DU by 25G link: 400MHz 2T2R [Dec. '19] . E// DU by 25G link: 300MHz 2T2R . Samsung DU by 25G link: 400MHz 2T2R [Mar. '20] . E// DU by 25G link: 400MHz 2T2R (TBD) . Samsung DU by 25G link: 800MHz 2T2R	[Aug. '19] . E// DU by 10G link: 200MHz 2T2R . Samsung DU by 25G link: 400MHz 2T2R [Dec. '19] . E// DU by 25G link: 600MHz 2T2R . Samsung DU by 25G link: 600MHz 2T2R [Mar. '20] . E// DU by 25G link: 800MHz 2T2R (TBD) . Samsung DU by 25G link: 800MHz 2T2R
Antenna	Configuration	• Data Channel: 2Tx/2Rx	
	Element	• 512AE(Tx + Rx)	• 1024AE(Tx + Rx)
	Gain	• Max. 20dBi	
RF Output Power		EIRP 47 dBm/Path, 50 dBm/Unit (Antenna Gain: 20 dBi)	
Input Voltage		100~240V AC	
Input Current		2.07 A @ 110 V AC	
LED		Total: 1 EA (3 Status w/different colors)	
Operational Temperature		-30~55℃ w/ solar load (Wind speed 1.5m/s)	
Humidity		-5 to 100 % RH, condensing, not to exceed 30 g/m^3 absolute humidity	
IP rating		IP65	
EMC		FCC Part 15	
Safety		UL 60950-1, UL 60950-22	
RF		FCC Part 30	
Numerology		Data SCS 120kHz / SSB SCS 120kHz and 240kHz	
Modulation (DL/UL)		64QAM / 64QAM	
EVM		< 8% @ 64QAM, all temperature	
OTA Rx Sensitivity [1)]		-106.2dBm @ room temperature, -105.2dBm @ all temperature (66RB, 95MHz)	
Spurious Emission		3GPP, FCC CFR 47 Part 30.203	
Function Split		Option 7-2x	

Item	HT5H01	
	Pico HRU 1Unit	Pico HRU 2Unit
Fronthaul I/F	eCPRI 25/10Gbps x 1	eCPRI 25/10Gbps x 2
Cooling Method	Natural convection cooling	
Installation	Pole/Wall	
Dimension (W × H × D)	7.5 x 13.8 x 7.5 in. (190 x 350 x 190 mm)	
Volume	11.2L	
Weight	9.9kg (22lb)	19.8kg (44lb, 2Units)

[1)] w/ Samsung DU Connection

Cautions for Installation

Observe the safety instructions described in this section when installing the system.

Installation should be done in accordance with the applicable local electric codes.

Before Installing

Before starting the installation, ensure the following:

- Post warning signs in areas where high-voltage cables are installed.
- Post 'off limit' signs in areas where accidents are most expected.
- Use guardrails or fences to block open areas such as ditches, open roof areas, and scaffolds.

Install the system in the restricted access area.

While Installing

During installation, ensure the following:

The system power must be cut off before installing.

Ensure that the power switch of the power supply is off when installing the system. Installing the system with power on may cause system damage or fatal human injury when connecting or disconnecting cables.

Ensure that workers wear protection gloves and goggles to prevent injury from debris while drilling holes in a wall or ceiling.

Do not wear accessories such as watches and rings to prevent electrical shock.

Cover unused ports with a cap. This prevents foreign substances from entering into the unused ports.

To prevent foreign substances, outdoor air, and moisture from entering the cable inlet (including cable gland and conduit), finish the inlet as follows:
- Unused inlet: Use the hole finishing materials including cap and rubber packing.
- Cable-installed inlet: After cable installation, block any space in the inlet with tape, compressed sponge, rubber packing, and silicone.

After Installing

After installation, remove any debris produced during the work and clean up the

installation site.

In the system, the laser beam light runs through the optical cable. The workers must handle the optical cables with care as the laser beam can seriously damage the eyes.

Ensure that the workers do not damage installed cables while cleaning the system.

While cleaning the power supply device, take precaution that the device does not come in contact with foreign objects that may cause power failure.

Installation Tools

The basic tools required for installation are listed in the table below. The additional tools required for each site need to be identified and arranged during a site survey before starting the installation.

Table 2. ***Basic Installation Tools***

Number	Name	Specification	Purpose of use
1	Torque Driver 	Apply a torque range : 20 to 90 lbf·in	Fastening M6 SEMS
2	Screw Driver Bit	+, No. 3	Fastening M6 SEMS
3	Screw Driver 	+, No. 3	Loosening M6 SEMS
4	Torx Driver Bit 	T25H	Fastening Torx Screw (T25H)
5	Torque Wrench 	Apply a torque range: 10 to 50 lbf·in	Tightening M6 Hex. bolt
		Apply a torque range: 100 to 400 lbf·in	Tightening M8 Hex. bolt
6	Torque Wrench Spanner Head 	Apply Hex. bolt head: 10 mm (for 10 to 50 lbf·in)	Tightening M6 Hex. bolt
		Apply Hex. bolt head: 13 mm (for 100 to 400 lbf·in)	Tightening M8 Hex. bolt
7	Spanner 	10 mm	Loosening M6 Hex. bolt
		13 mm	Loosening M8 Hex. bolt
8	Tape Measure 	16 ft./150 ft.	Measuring length
9	Power Extension Cable 	100 ft.	Basic tool
10	Level 	Normal	Levelling horizontality and verticality

Number	Name	Specification	Purpose of use
11	Hammer Drill 	Normal	Drilling wall
12	Concrete Drill Bit 	12 mm	Setting M8 Anchor
13	Cable Cutter 	0.24-1.26 in. (6-32 mm)	Cutting cable
14	Crimping Tool 	14 AWG-4 AWG (1.5 to 16 mm^2)	Crimping pressure terminal
15	Wire Stripper 	Apply cable thickness: 1.5 to 6.2 in. (4 to 16 mm)	Removing cable sheath
16	Nipper 	Basic Tool	Cutting cable
17	Flush cutter 	Basic Tool	For cutting cable tie
18	Industrial Scissor 	Basic Tool	Cutting
19	Knife 	Basic Tool	Cutting
20	Multi tester 	Digital Pocket Tester	Checking voltage and current to detect cable disconnection
21	Fiber Optical Test Set 	Wave length: 1310 nm, 1550 nm (single mode) 850 nm, 1310 nm (multi-mode)	Checking optical level
22	Antenna Alignment Tool 	-	Checking azimuth and tilting
23	Heating Gun 	50°C to 300°C	Shrinking the feeder cable tube

Number	Name	Specification	Purpose of use
24	Anchor Punch 	M8	Setting M8 anchor
25	Hammer 	Normal	Fixing anchor

The required installation tools may vary depending on the site conditions.
In addition to the basic tools, protractor, ladder, safety equipment, and cleaning tools must also be arranged, considering the site conditions.

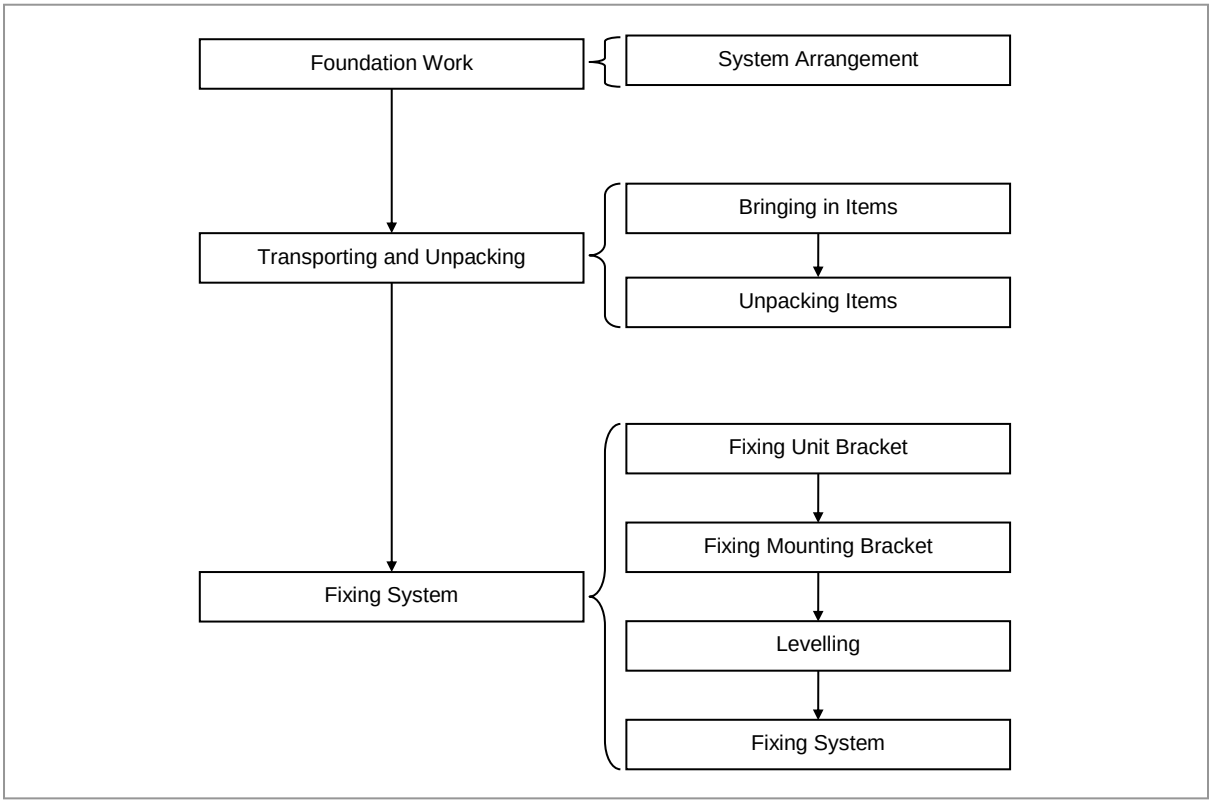
Chapter 2 Installing System

This chapter describes the installation procedures of the Pico HRU.

Installation Procedure

The figure below depicts the overall procedures for installing the Pico HRU:

Figure 3. ***Procedure to Install the Pico HRU***



Foundation Work

System Arrangement

A minimum distance must be secured around the Pico HRU, in each direction for installation and maintenance.

Figure 4. ***Pico HRU Arrangement_ Pole Type 1Unit Installation***

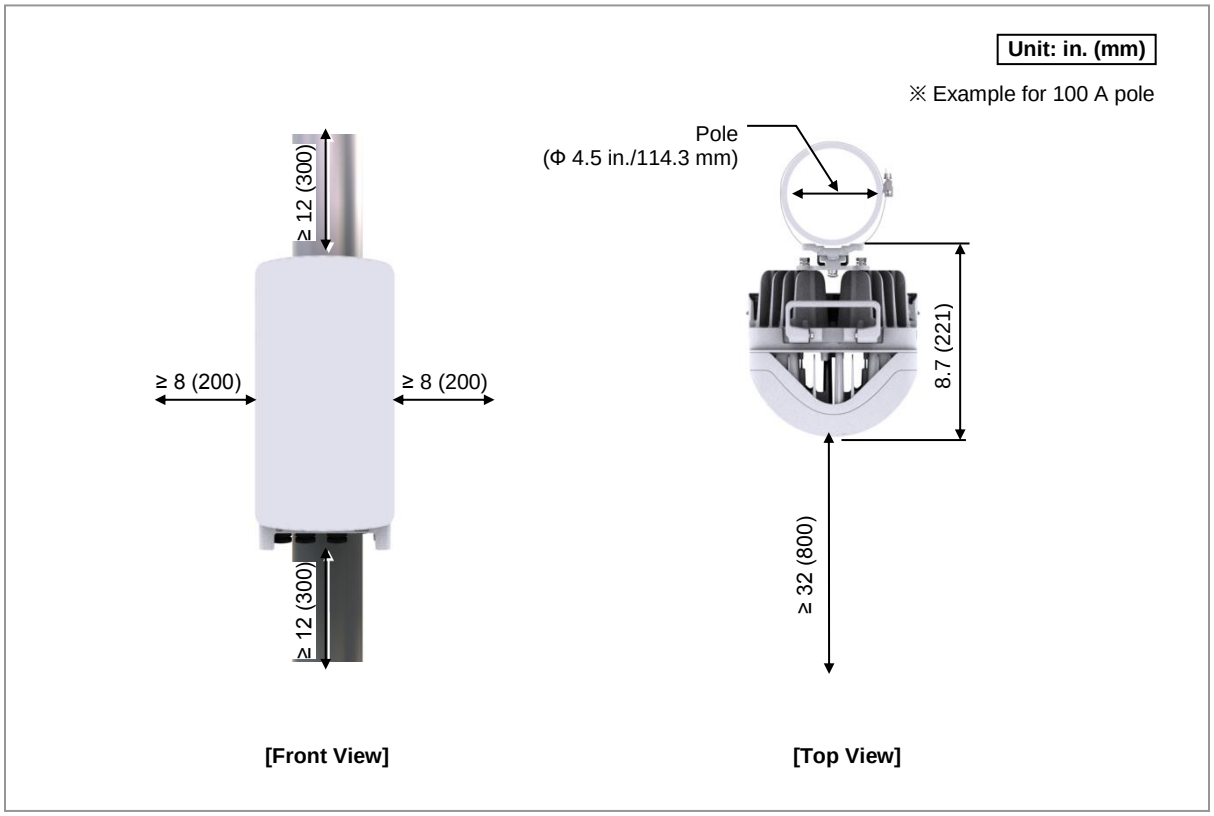


Figure 5. ***Pico HRU Arrangement_ Pole Type with 180°wrap around cover Installation***

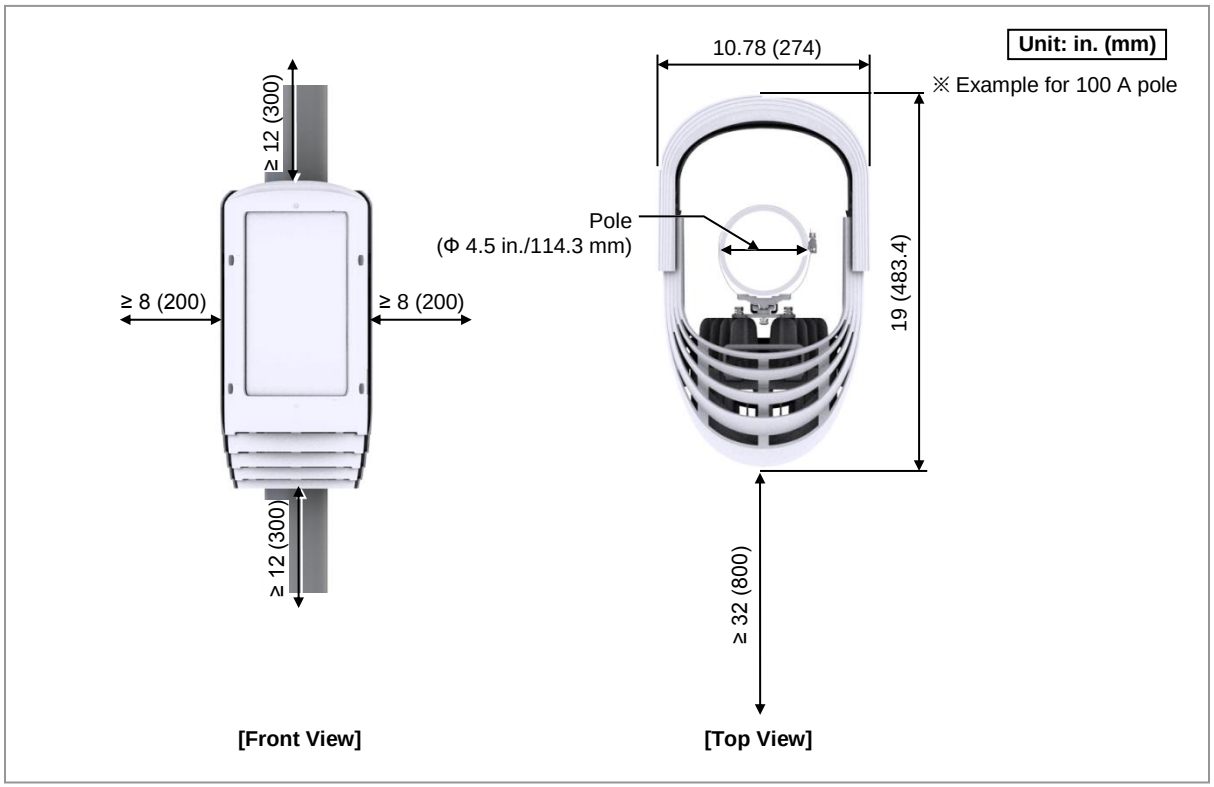


Figure 6. ***Pico HRU Arrangement_ Pole Type 2Unit Installation***

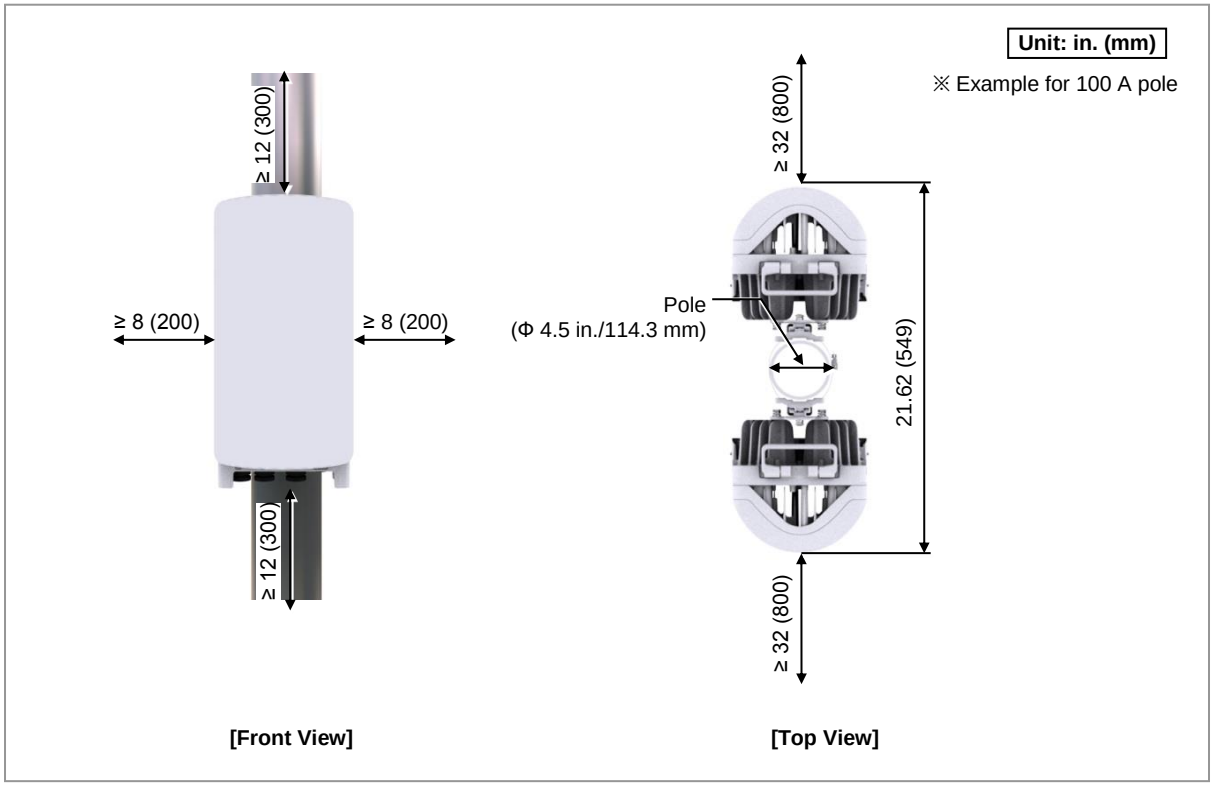


Figure 7. ***Pico HRU Arrangement_ Pole Type with 360°wrap around cover Installation***

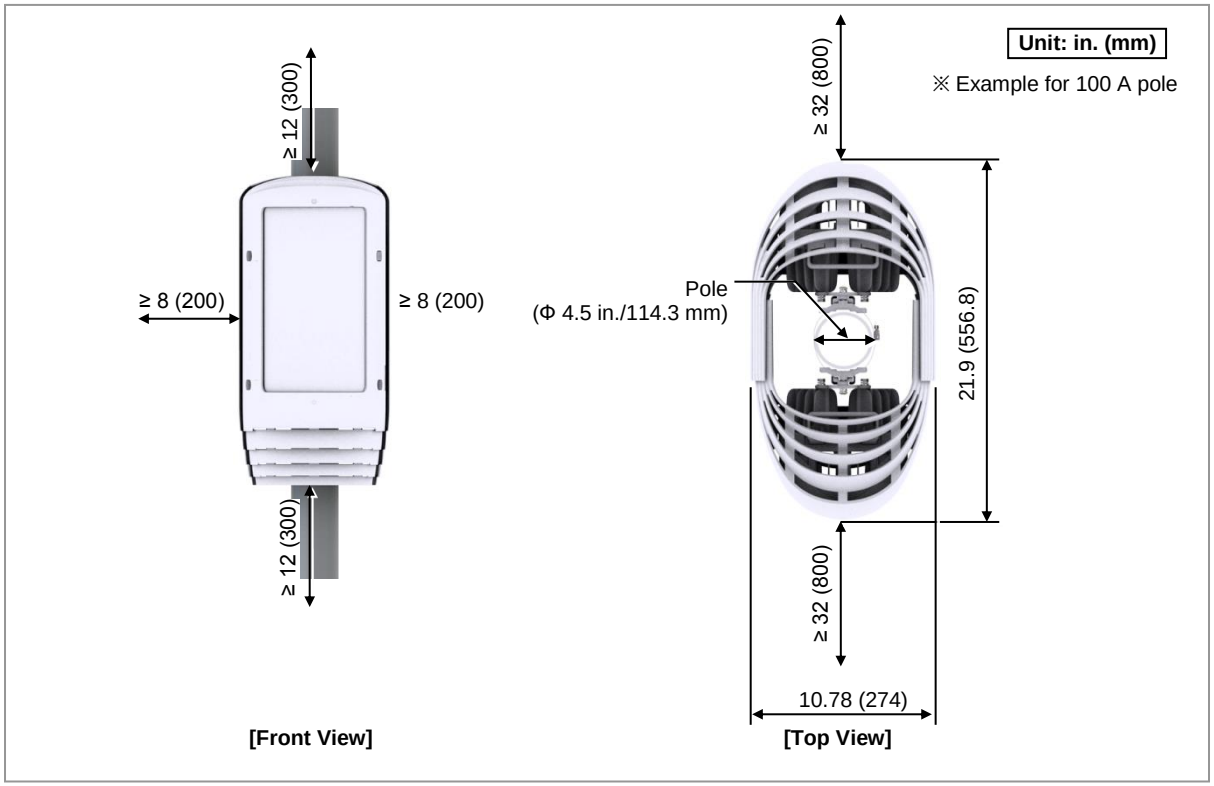


Figure 8. ***Pico HRU Arrangement_ Wall Type Installation***

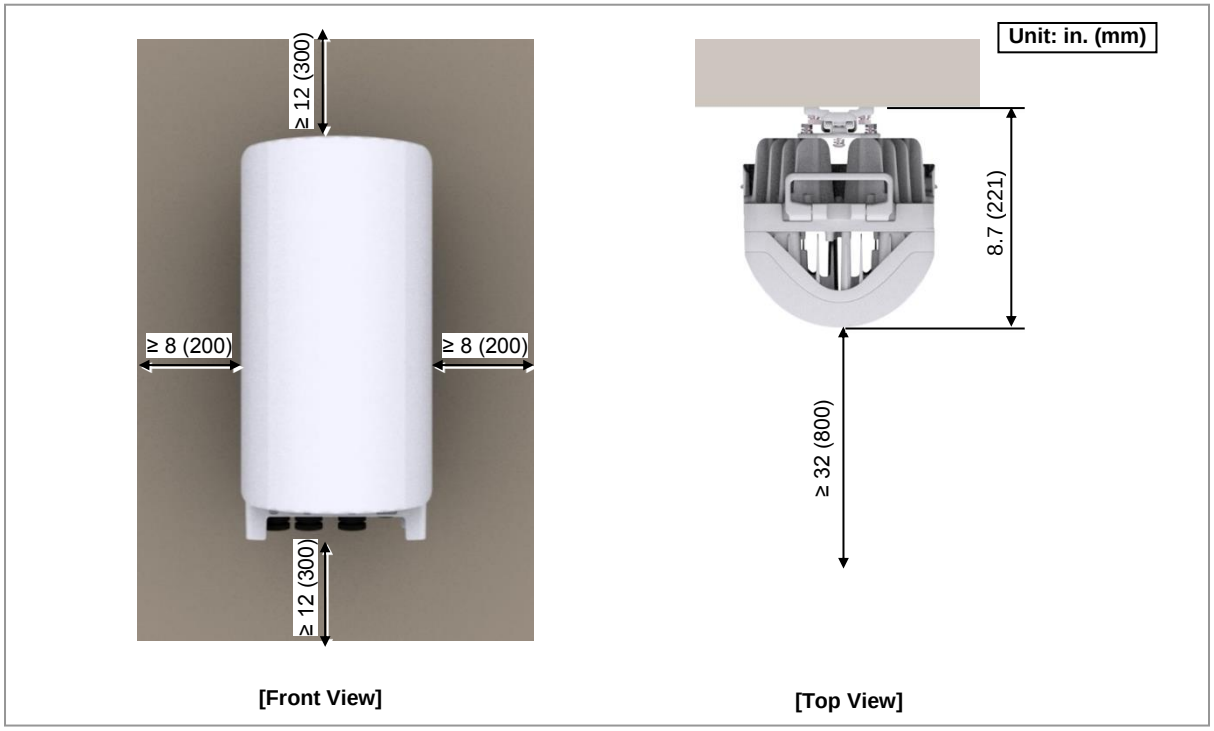
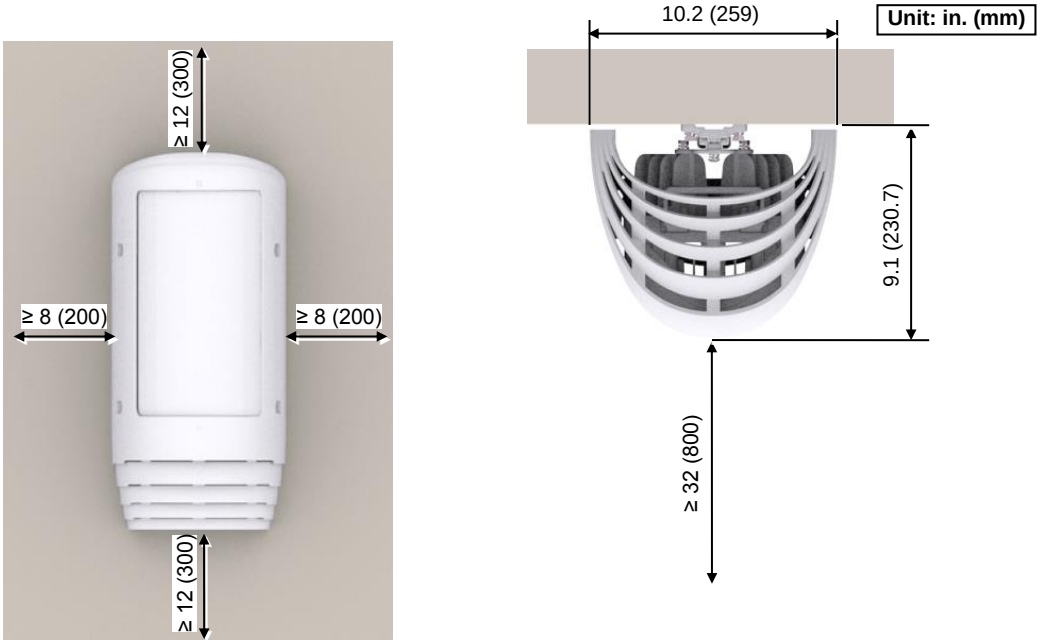


Figure 9. ***Pico HRU Arrangement_ Wall Type with 180° wrap around cover Installation***



[Front View] **[Top View]**

Transporting and Unpacking

This section describes how to transport the items to the installation place and provides the procedure to unpack cabinets and other components.

Bringing in Items

Ensure the following at each stage of transportation of the items:

- Before moving a system, check storage place for the system and remove obstacles in advance.
- When carrying the system:
  - Fasten the system firmly to the transport vehicle or carrier to prevent damage to the system from a vibration or shock.
  - Use an elevator to prevent accidents. However, if the system must be carried by people, ensure there are enough people to carry the system.
- The system must not be shocked physically.
- The system should be protected from dust, moisture, and static electricity.

Unpacking

To unpack the items, ensure the following:

- The items must be packed until they reach the installation place.
- The items are classified in accordance with each job specification and stored at a place that does not interfere with working.
- Unpacked systems must be installed immediately. If immediate installation of the systems is not planned, the systems must be stored in the installation place temporarily.
- Unpack only external packing, leaving the internal packing in unpacked status.
- Unpack the inner packaging after each system is placed on its installation location.
- Dispose by-products (packaging waste) in accordance with waste management rules. Do not recycle the by-products.

Pico HRU Handling

When transporting the Pico HRU, hold the handle at the side of the Pico HRU (no tool is needed for holding the handle.). After finishing the Pico HRU fixation, turn the handle back.

The figure below depicts the position and direction of movement of the handle:

Figure 10. ***Using a Handle to transport an Pico HRU***

Fixing Pico HRU

This section describes the procedures to fix the Pico HRU.

Fixing Unit Bracket

The instructions for mounting a unit bracket to the Pico HRU apply to all installation types.

To fix the unit bracket without tilting bracket, do the following:

Prerequisites

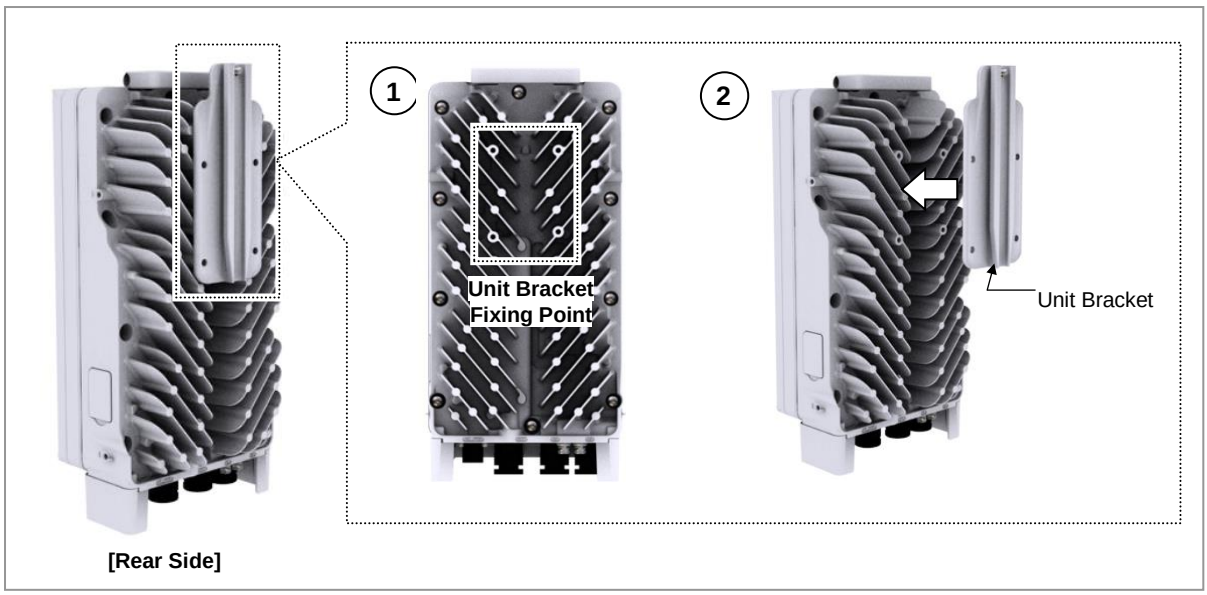
Before proceeding with fixing the unit bracket on the Pico HRU, make sure that you have the items mentioned in the table below:

Table 3. ***Parts and Tools for Fixing Unit Bracket on Pico HRU***

Category	Description		
Parts	Unit Bracket		1 EA
	Fasteners	M6 × L20 Hex. bolt (Washer assembly)	4 EA
Recommended Torque Value	M6 Hex. bolt		43 lbf·in
Working Tools	• Torque Wrench (10 to 50 lbf·in) • Torque Wrench Spanner Head (apply Hex. head: 10 mm)		

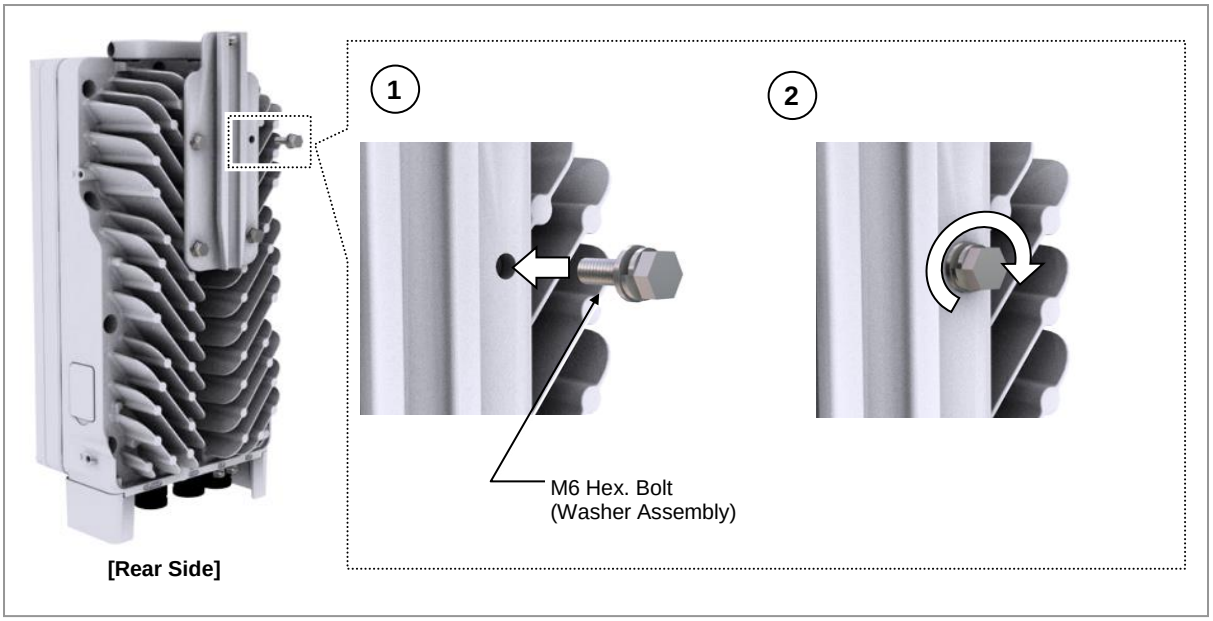
1 Check the position for mounting the unit bracket on the back of the Pico HRU and place it in that position.

Figure 11. ***Fixing Unit Bracket (1)***



2 Fix the unit bracket using the fasteners.

Figure 12. ***Fixing Unit Bracket (2)***



Fixing Pole Type

The standard of the pole on which the mounting bracket can be attached using steel bands is 90 A to 200 A.

Fixing Mounting Bracket for 1Unit Installation

To fix the mounting bracket on the pole, do the following:

Prerequisites

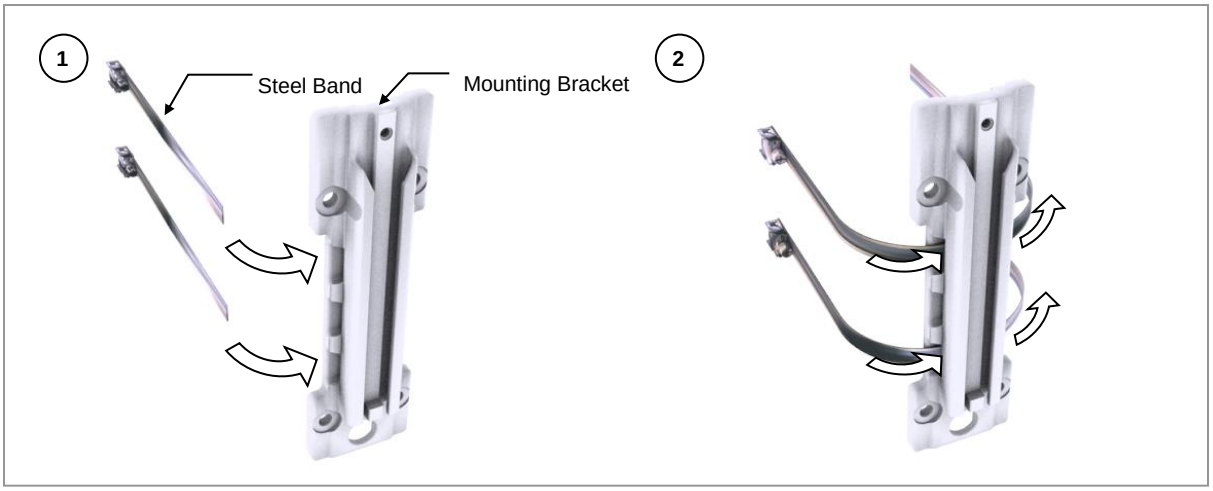
Before proceeding with fixing the mounting bracket for 1unit pole type, make sure that you have the items mentioned in the table below:

Table 4. ***Parts and Tools for Fixing Mounting Bracket on the Pole***

Category	Description		
Parts	Mounting Bracket		1 EA
	Fasteners	Steel Band	2 EA
Recommended Torque Value	Steel Band Fixing Screw		48.5 lbf·in
Working Tools	• Torque Driver (20 to 90 lbf·in) • Screw Driver Bit ('+', No. 3) • Antenna Alignment Tool		

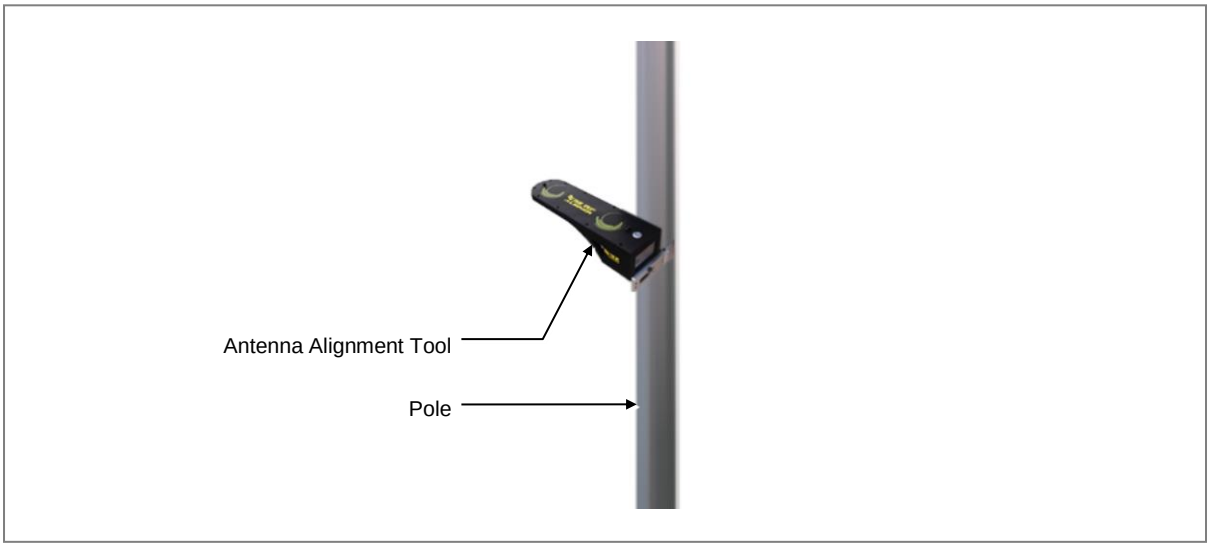
1 Pass the steel band through the fixing hole of the mounting bracket.

Figure 13. ***Fixing Mounting Bracket on the Pole for 1Unit Installation (1)***



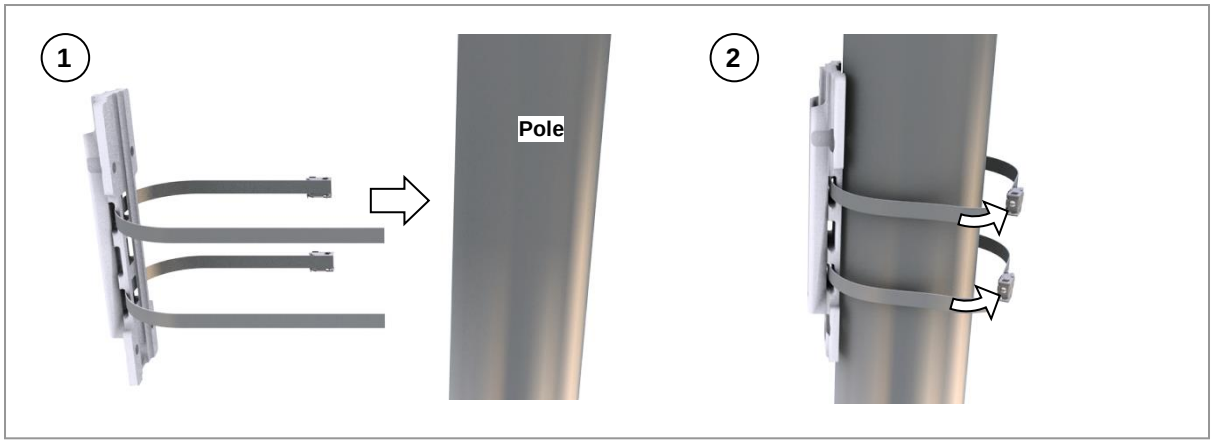
2 Use the antenna alignment tool to determine the azimuth of the Pico HRU to be installed on the pole.

Figure 14. ***Fixing Mounting Bracket on the Pole for 1Unit Installation (2)***



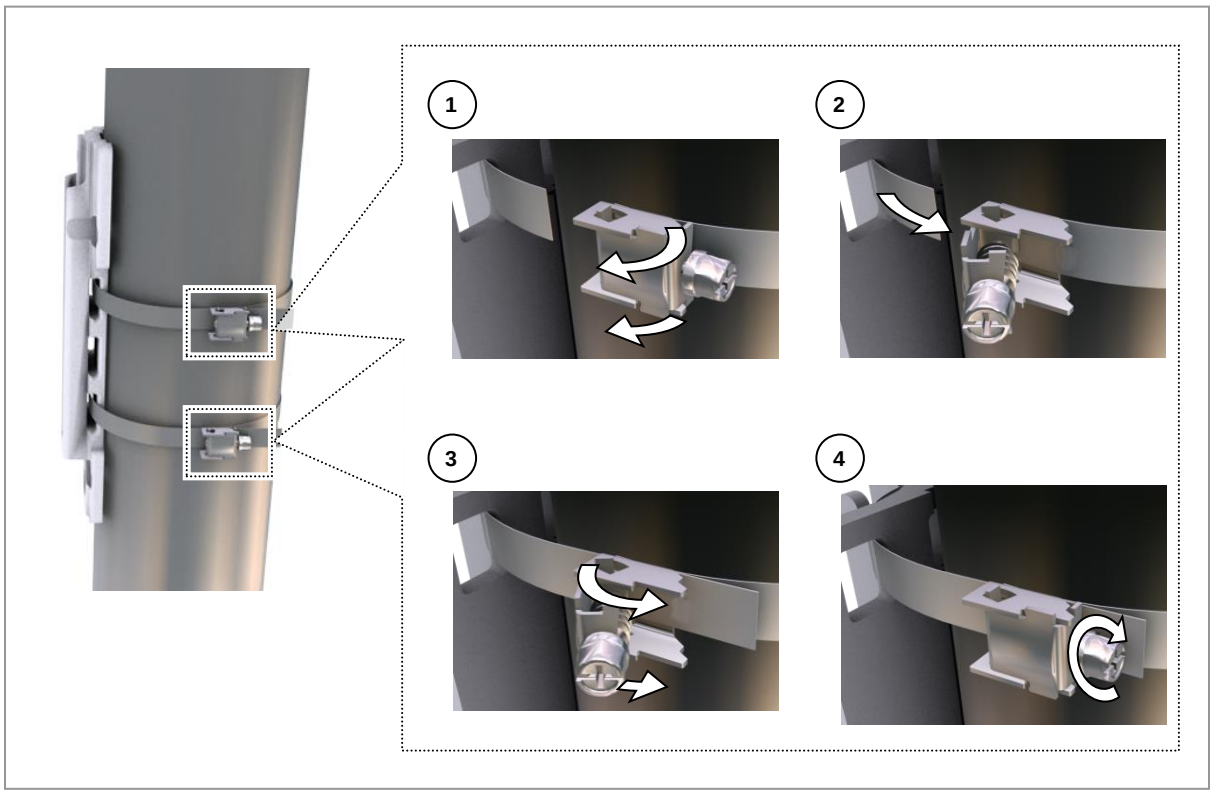
3 Place the mounting bracket to the pole.

Figure 15. ***Fixing Mounting Bracket on the Pole for 1Unit Installation (3)***



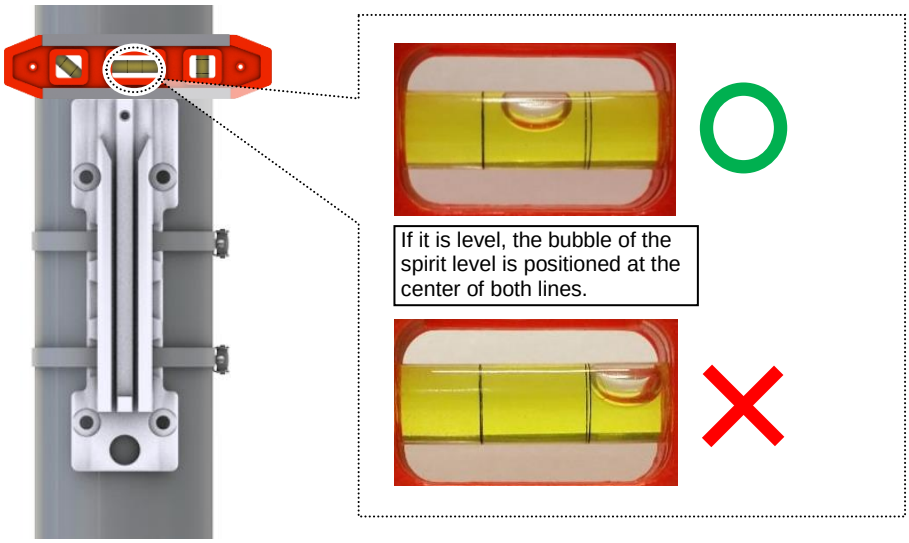
4 Fix the mounting bracket to the pole using the steel band.

Figure 16. ***Fixing Mounting Bracket on the Pole for 1Unit Installation (4)***



5 Check the level of mounting bracket on the pole and adjust the level.

Figure 17. ***Fixing Mounting Bracket on the Pole for 1Unit Installation (5)***



When fixing the mounting bracket on the pole, be sure to check the level of bracket. After finishing the installation, adjust the level minutely.

When poor leveling happens, adjust the position of fasteners used to fix the mounting bracket.

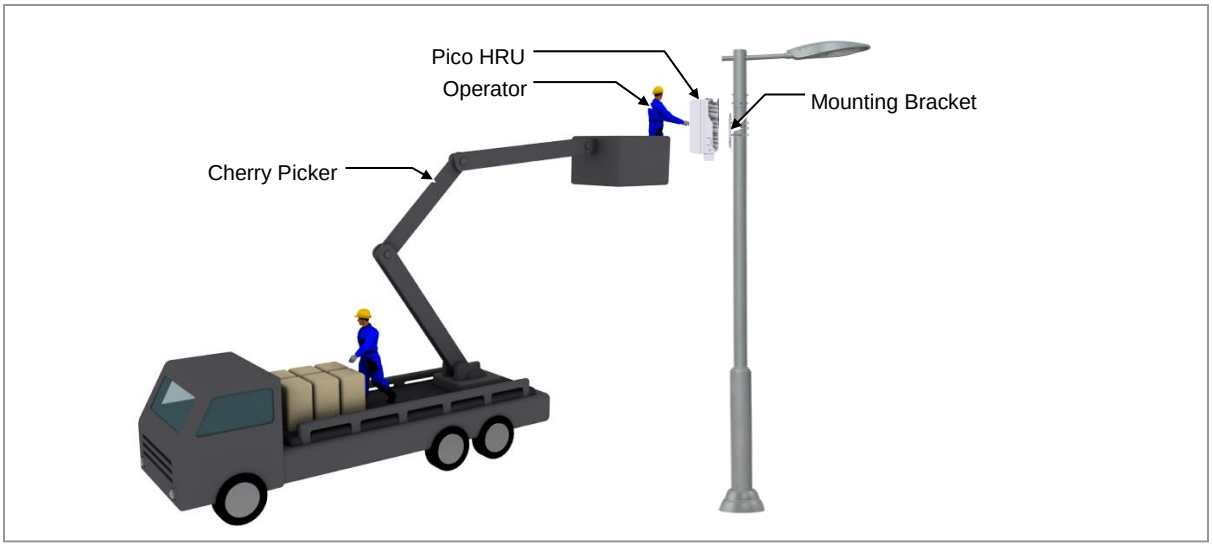
After fixing the steel band, push the remainder of band inside the mounting bracket

Lifting Pico HRU

To lift the Pico HRU, do the following:

1 Lifting with a cherry picker.

Figure 18. ***Lifting Pico HRU***



Fixing Pico HRU on the Pole

To fix the Pico HRU on the pole, do the following:

Prerequisites

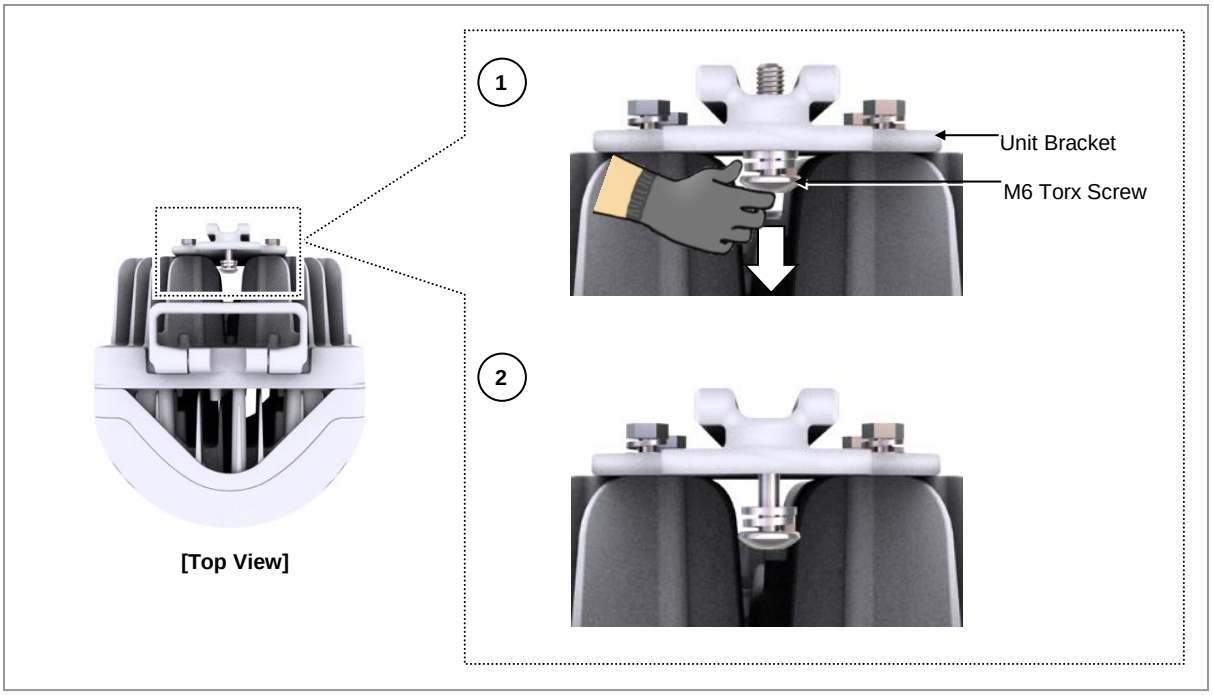
Before proceeding with fixing the Pico HRU on the pole, make sure that you have the items mentioned in the table below:

Table 5. ***Tools for Fixing Pico HRU on the Pole***

Category	Description	
Recommended Torque Value	M6 Torx Screw	43 lbf·in
Working Tools	• Torx Driver Bit (T25H) • Torque Driver (20 to 90 lbf·in)	

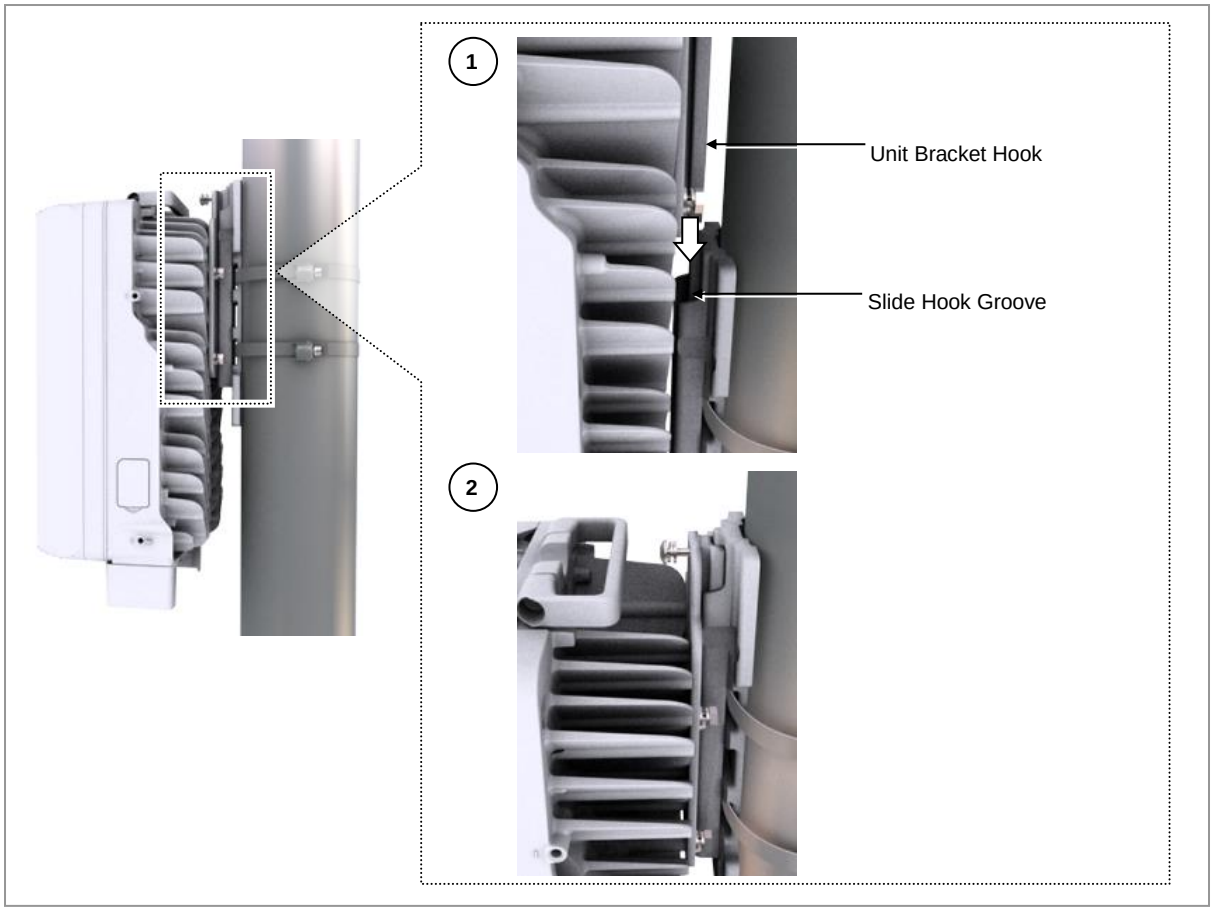
1 Pull out the fastening materials so that they do not get out from the fixing groove of the unit bracket. Do not pull out completely.

Figure 19. ***Fixing Pico HRU on the Pole for 1Unit Installation (1)***



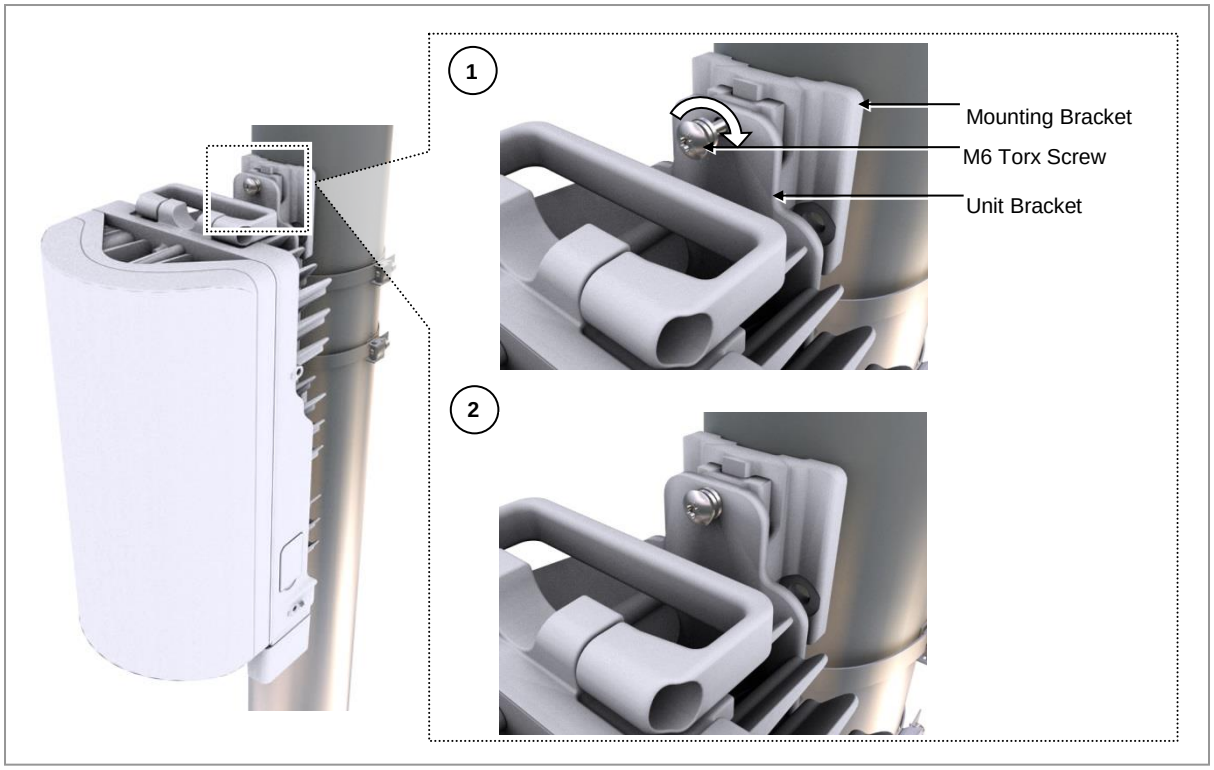
2 Align the hook of the unit bracket on the back of the Pico HRU with the slide hook groove of the mounting bracket, and then push it down.

Figure 20. ***Fixing Pico HRU on the Pole for 1Unit Installation (2)***



3 Fix the unit bracket to the mounting bracket using the fastener.

Figure 21. ***Fixing Pico HRU on the Pole for 1Unit Installation (3)***



Fixing Mounting Bracket for 2Unit Installation

To fix the mounting bracket on the pole, do the following:

Prerequisites

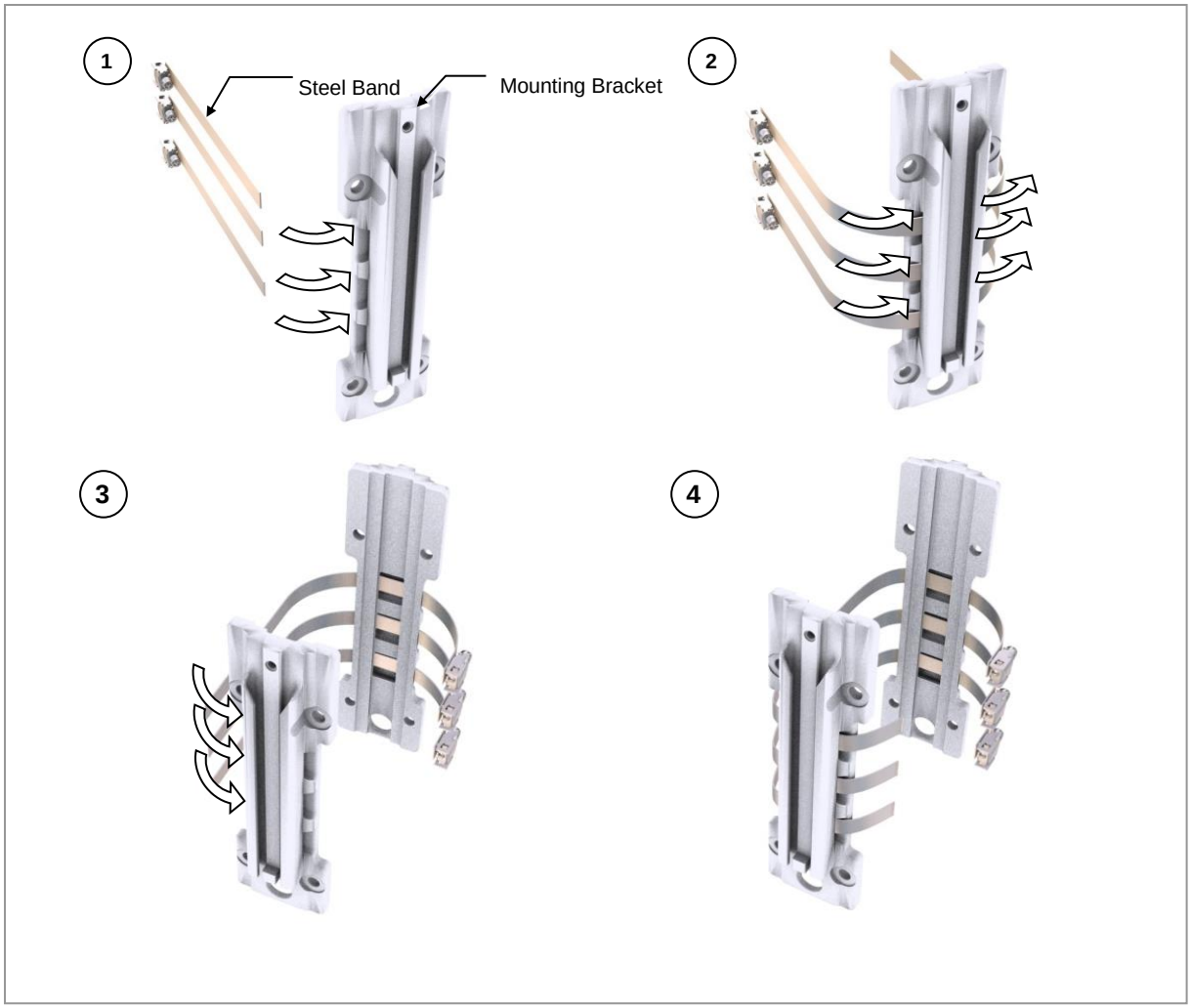
Before proceeding with fixing the mounting bracket for 2unit installation of pole type, make sure that you have the items mentioned in the table below:

Table 6. ***Parts and Tools for Fixing Mounting Bracket on the Pole***

Category	Description		
Parts	Mounting Bracket		2 EA
	Fasteners	Steel Band	3 EA
Recommended Torque Value	Steel Band Fixing Screw		48.5 lbf·in
Working Tools	• Torque Driver (20 to 90 lbf·in) • Screw Driver Bit ('+', No. 3) • Antenna Alignment Tool		

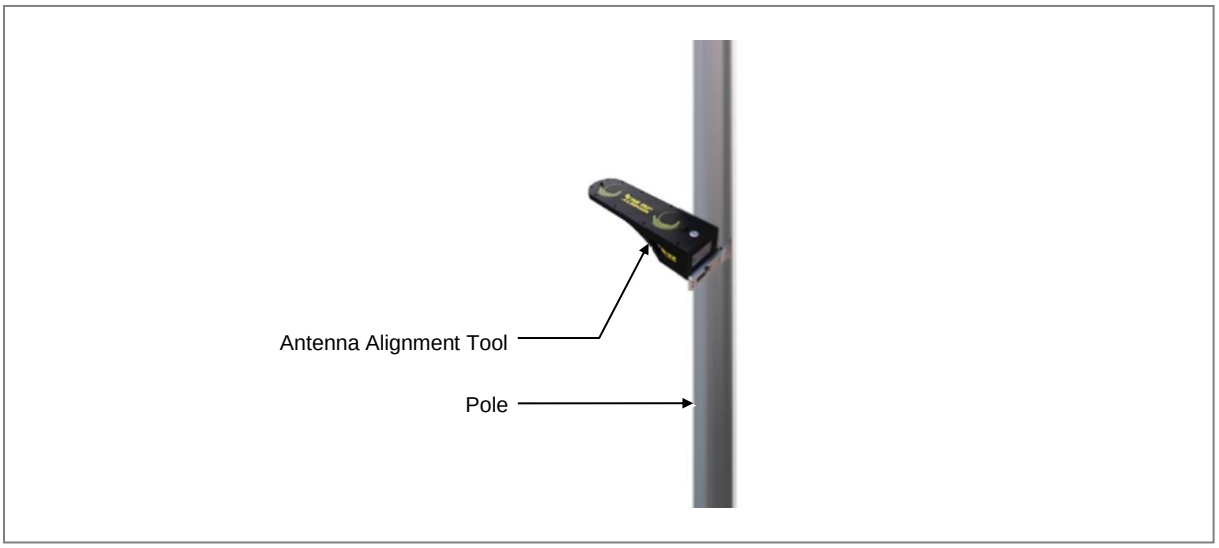
1 Pass the steel band through the fixing hole of the mounting brackets.

Figure 22. ***Fixing Mounting Bracket on the Pole for 2Unit Installation (1)***



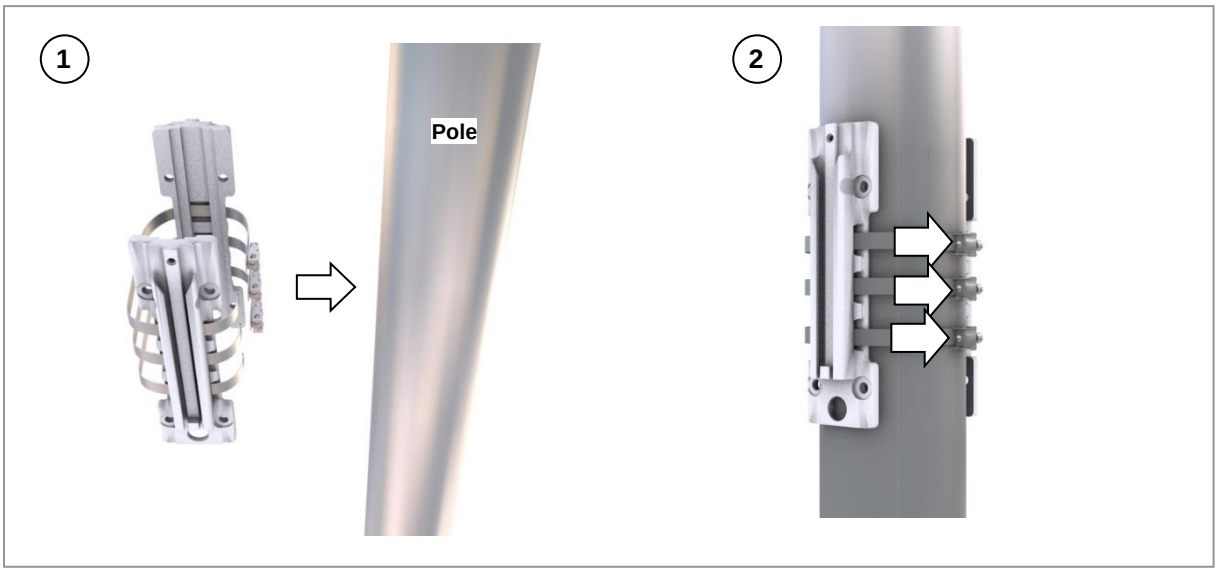
2 Use antenna alignment tool to determine the azimuth of the Pico HRU to be installed on the pole.

Figure 23. ***Fixing Mounting Bracket on the Pole for 2Unit Installation (2)***



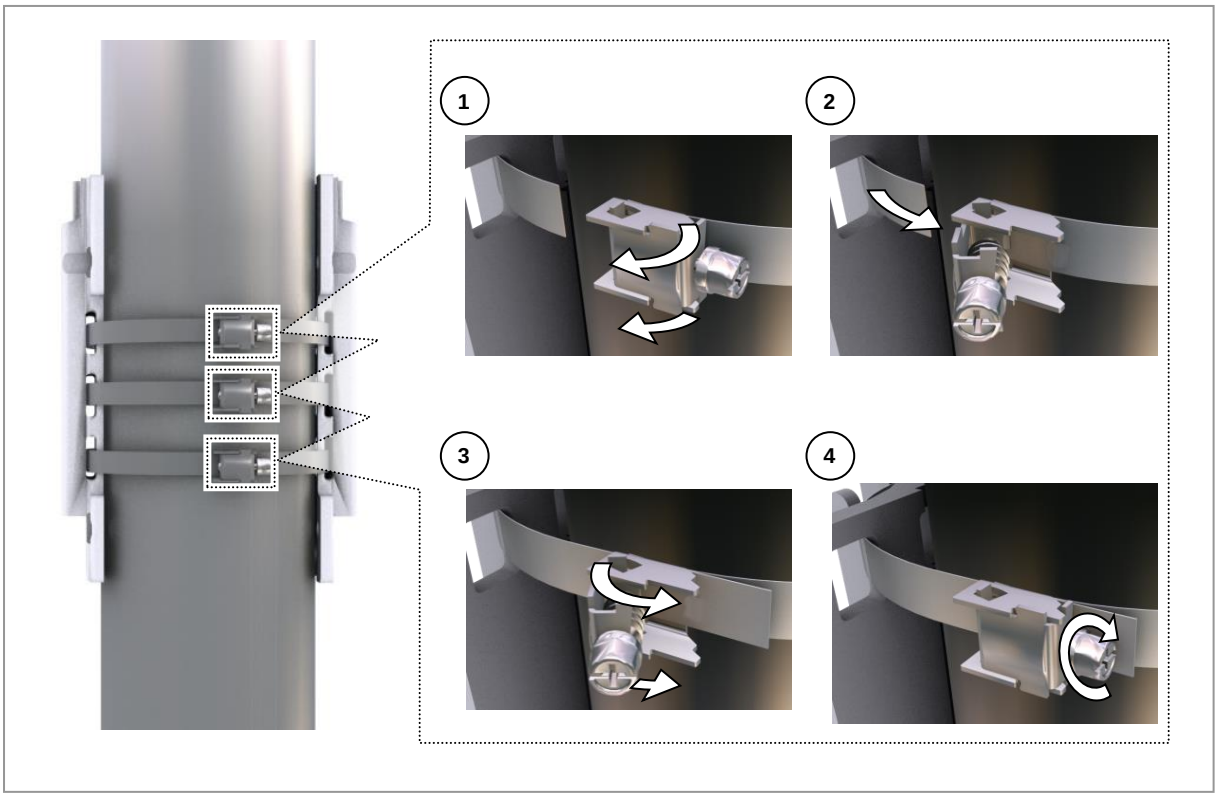
3 Place the mounting brackets to the pole.

Figure 24. ***Fixing Mounting Bracket on the Pole for 2Unit Installation (3)***



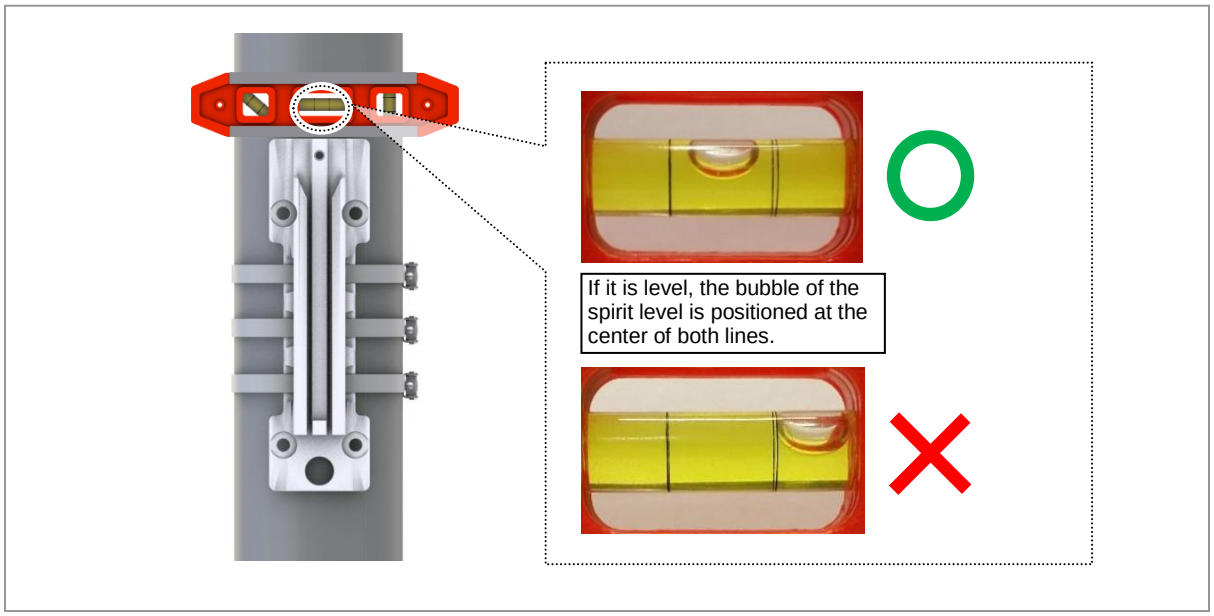
4 Fix the mounting brackets to the pole using the steel band.

Figure 25. ***Fixing Mounting Bracket on the Pole for 2Unit Installation (4)***



5 Check the level of each mounting brackets on the pole and adjust the level.

Figure 26. ***Fixing Mounting Bracket on the Pole for 2Unit Installation (5)***



When fixing the mounting bracket on the pole, ensure to check the level of bracket. After finishing the installation, adjust the level minutely.

When poor leveling happens, adjust the position of fasteners used to fix the mounting bracket.

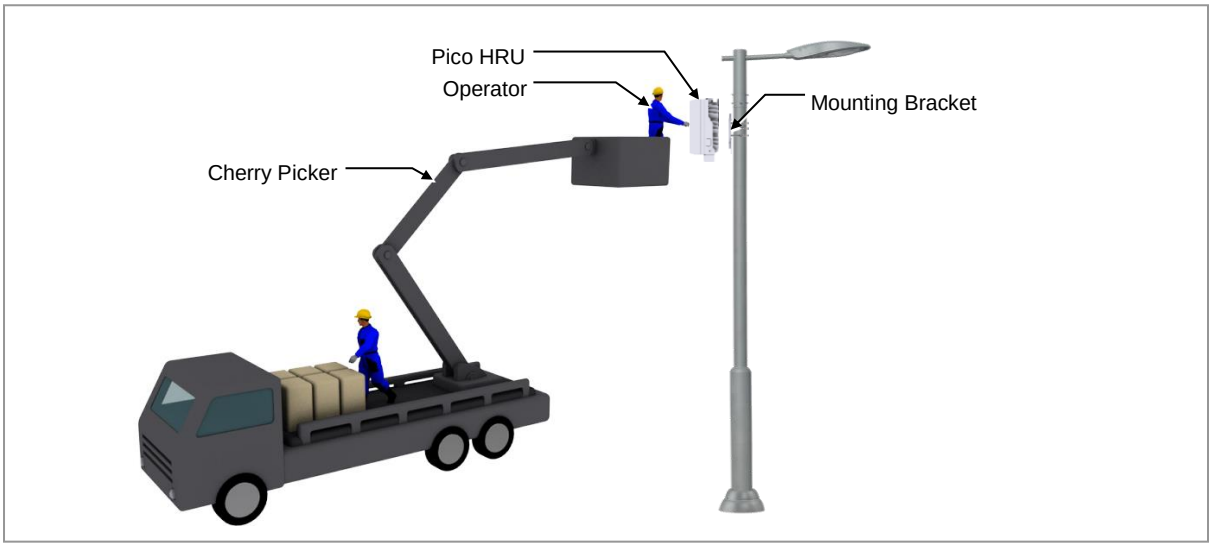
After fixing the steel band, push the remainder of band inside the mounting bracket

Lifting Pico HRU

To lift the Pico HRU, do the following:

1 Lifting with a cherry picker.

Figure 27. ***Lifting Pico HRU***



Fixing Pico HRUs on the Pole

To fix the Pico HRU on the pole, do the following:

Prerequisites

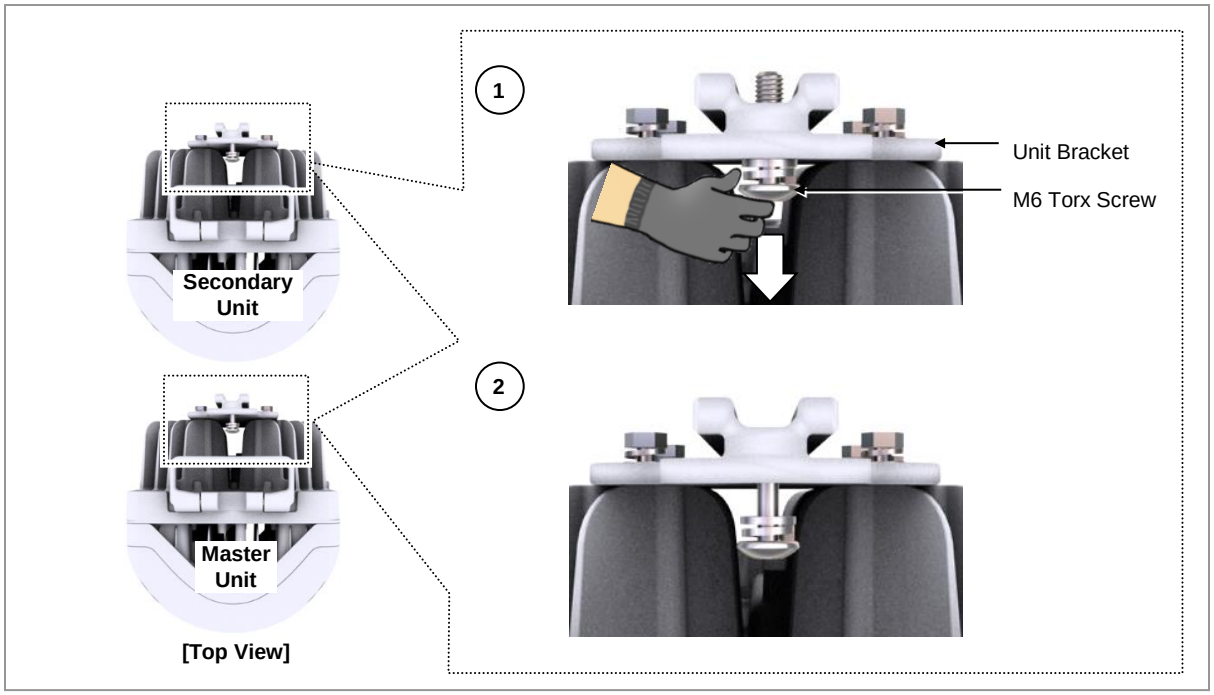
Before proceeding with fixing the Pico HRU on the pole, make sure that you have the items mentioned in the table below:

Table 7. ***Tools for Fixing Pico HRUs on the Pole***

Category	Description	
Recommended Torque Value	M6 Torx Screw	43 lbf·in
Working Tools	• Torx Driver Bit (T25H) • Torque Driver (20 to 90 lbf·in)	

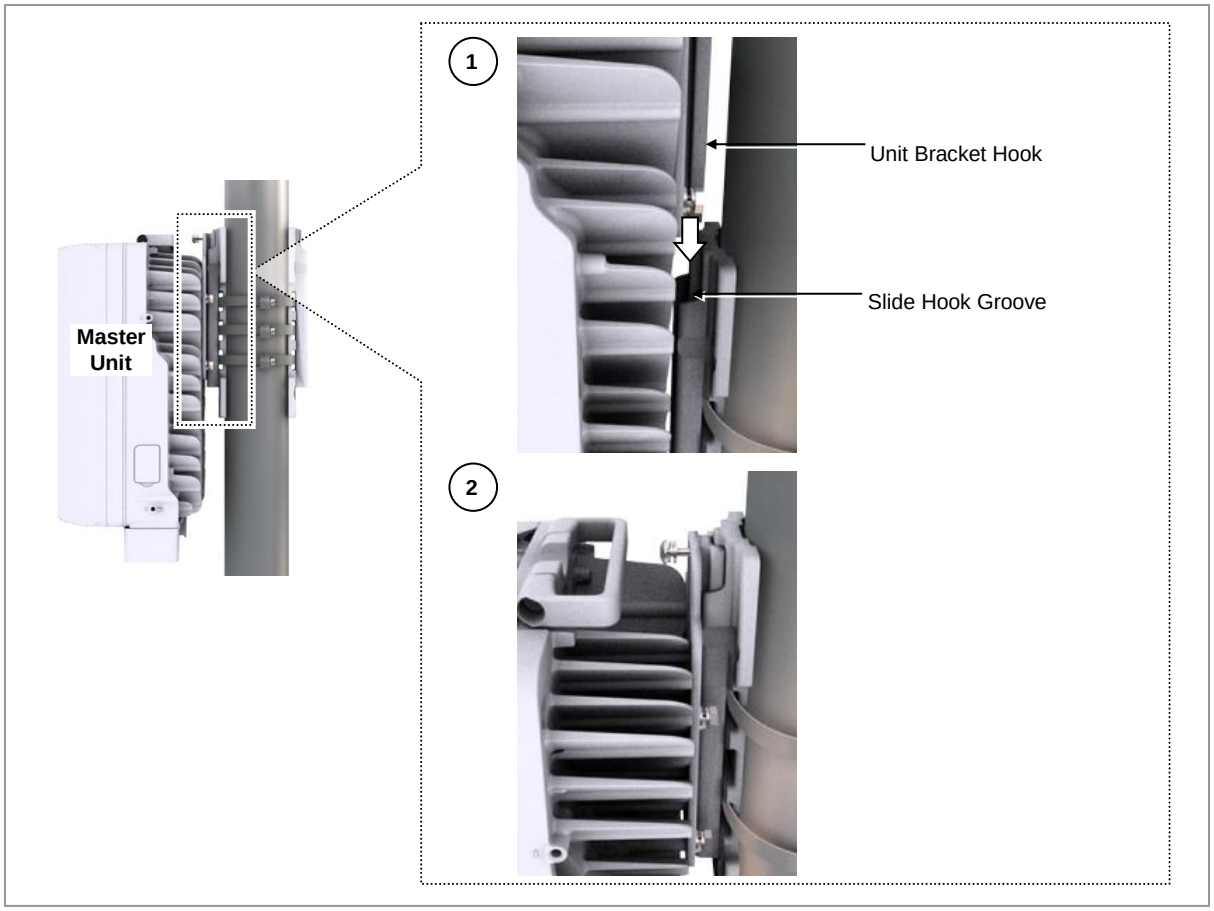
1 Pull out the fastening materials so that they do not jut out from the fixing groove of the unit bracket. Do not pull out completely.

Figure 28. ***Fixing Pico HRUs on the Pole for 2Unit Installation (1)***



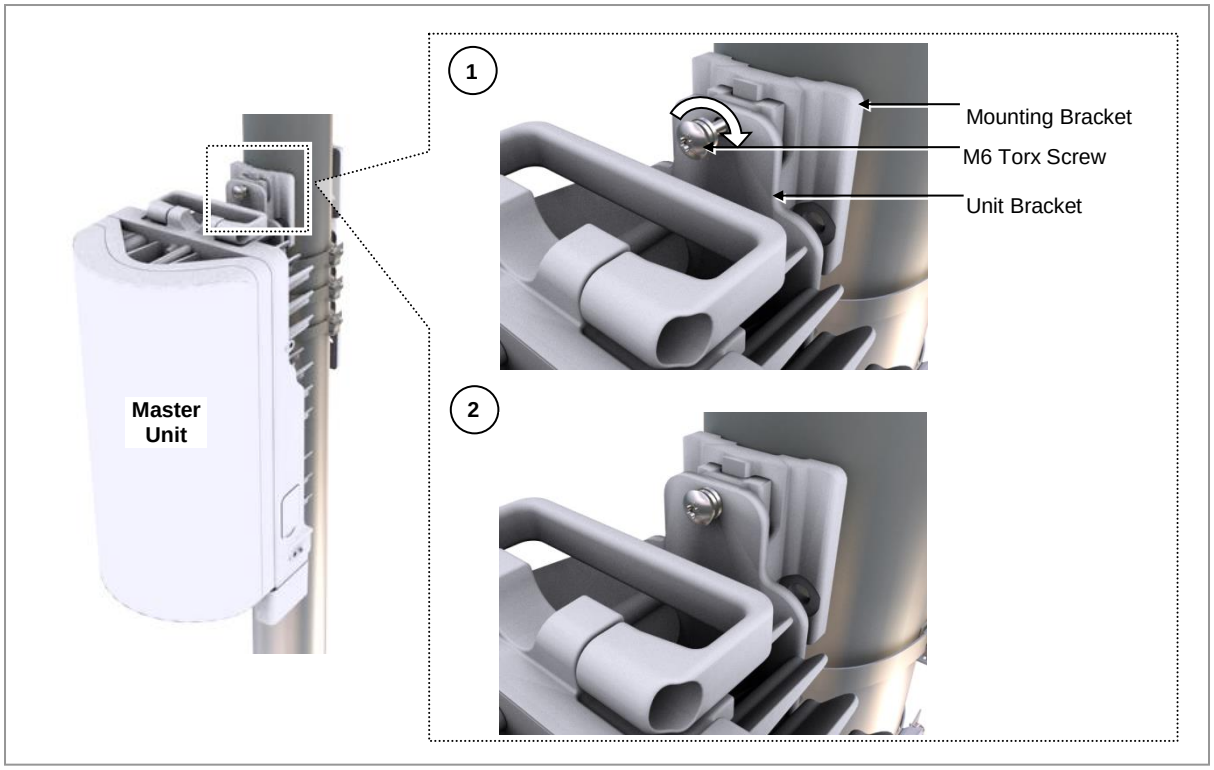
2 Align the hook of the unit bracket on the back of the Pico HRU master unit with the slide hook groove of the mounting bracket, and then push it down.

Figure 29. ***Fixing Pico HRUs on the Pole for 2Unit Installation (2)***



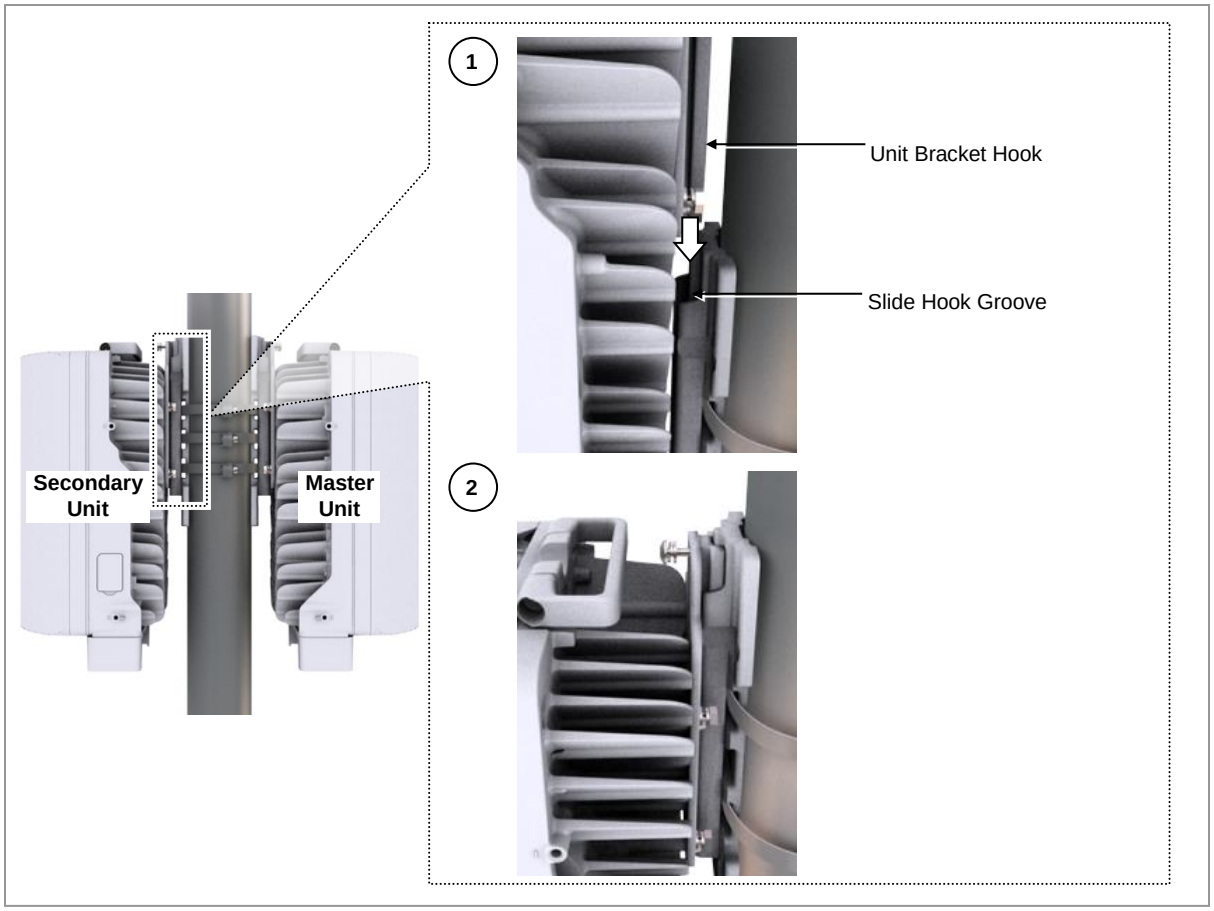
3 Fix the unit bracket of the Pico HRU Master unit to the mounting bracket using the fastener.

Figure 30. ***Fixing Pico HRUs on the Pole for 2Unit Installation (3)***



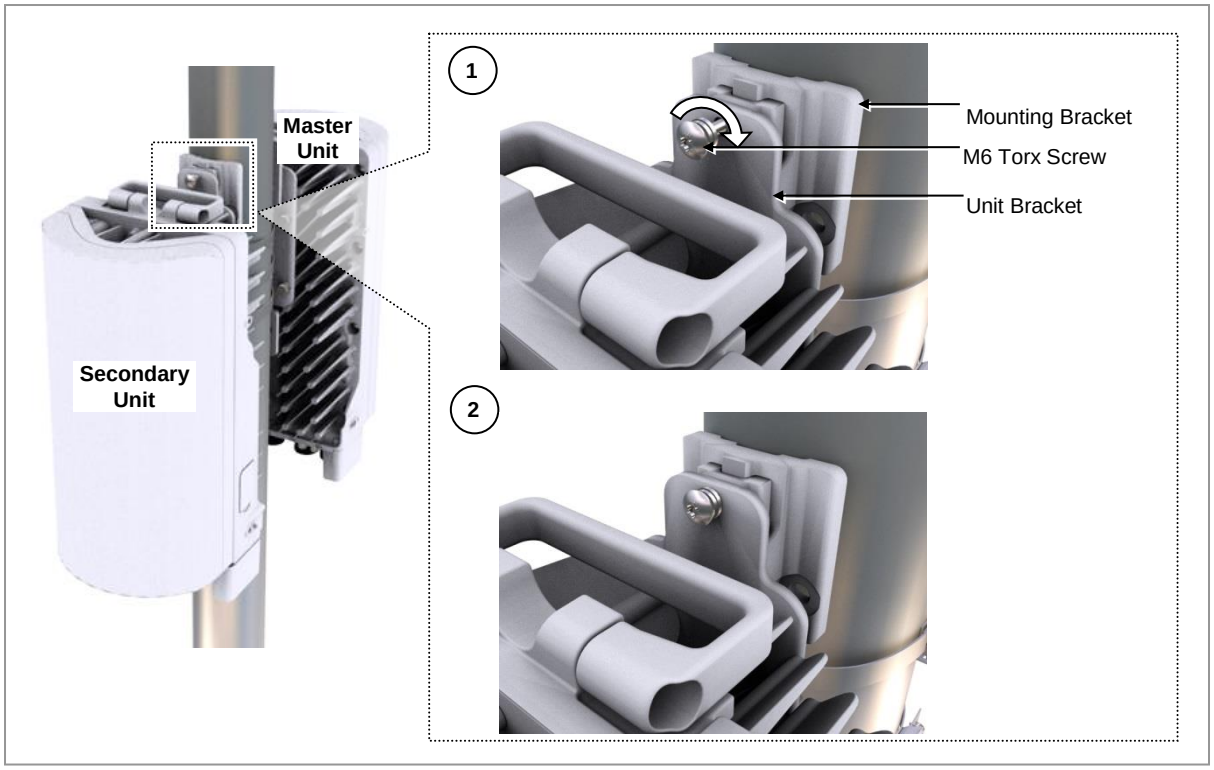
4 Place the unit bracket on the fixing grooves of the mounting bracket and push the unit bracket down to fix the Pico HRU Secondary unit in place.

Figure 31. ***Fixing Pico HRUs on the Pole for 2Unit Installation (4)***



5 Fix the unit bracket of the Pico HRU Secondary unit to the mounting bracket using fastener.

Figure 32. ***Fixing Pico HRUs on the Pole for 2Unit Installation (5)***



Fixing wall Type

This section describes the procedures for fixing the system on the wall.

Marking

To marking, do the following:

Prerequisites

Before proceeding with the marking, make sure that you have items mentioned in the following table

Table 8. ***Tools for Marking***

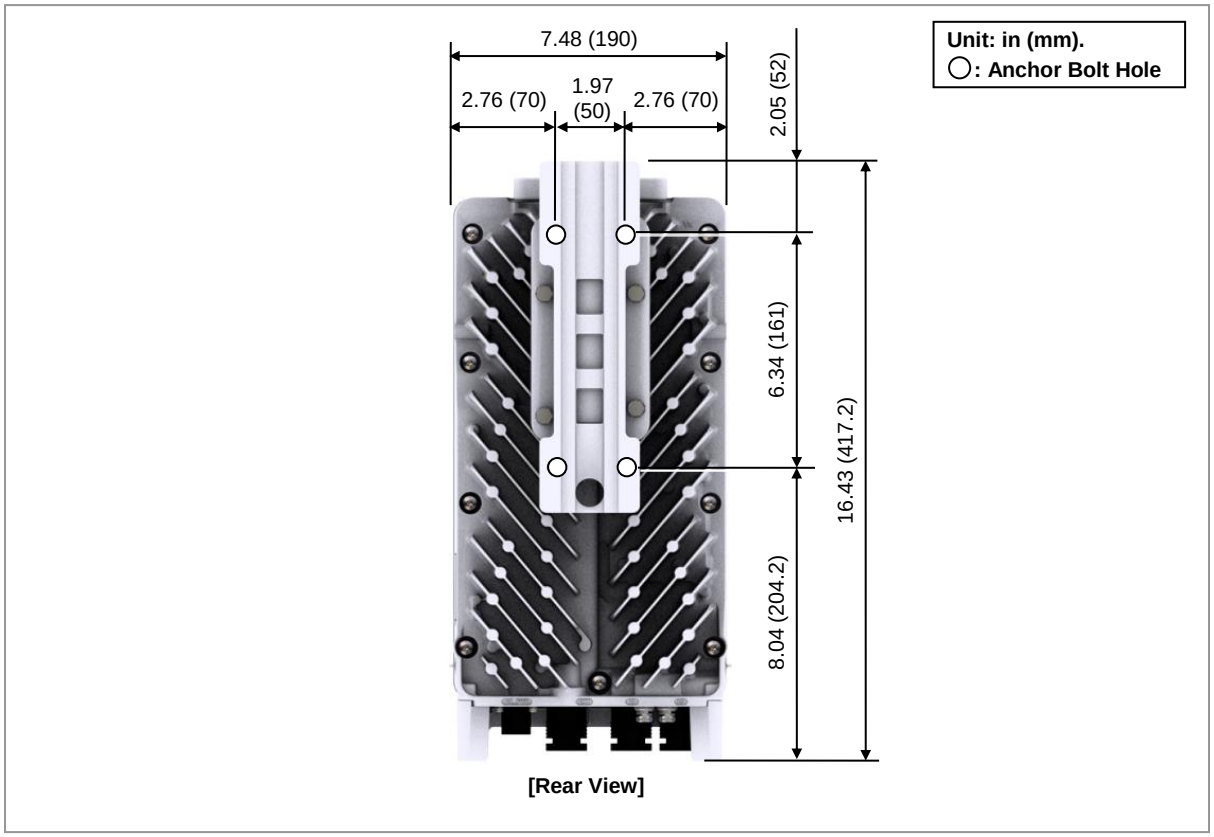
Category	Description
Working Tools	• Tape Measure • Permanent Marker • Level

To mount the system on a wall, perform the leveling test by referring to System Leveling to check the positions are marked to be horizontal or vertical before drilling. If the result shows they are not horizontal or vertical, modify the marking positions.

When the position where the system will be placed is determined, place the system on that position and then mark the positions where anchor bolts will be fixed. This will reduce marking error range.

1 Check the location and anchor hole distances for fixing the system.

Figure 33. ***Pico HRU Dimensions for Wall Type Installation***



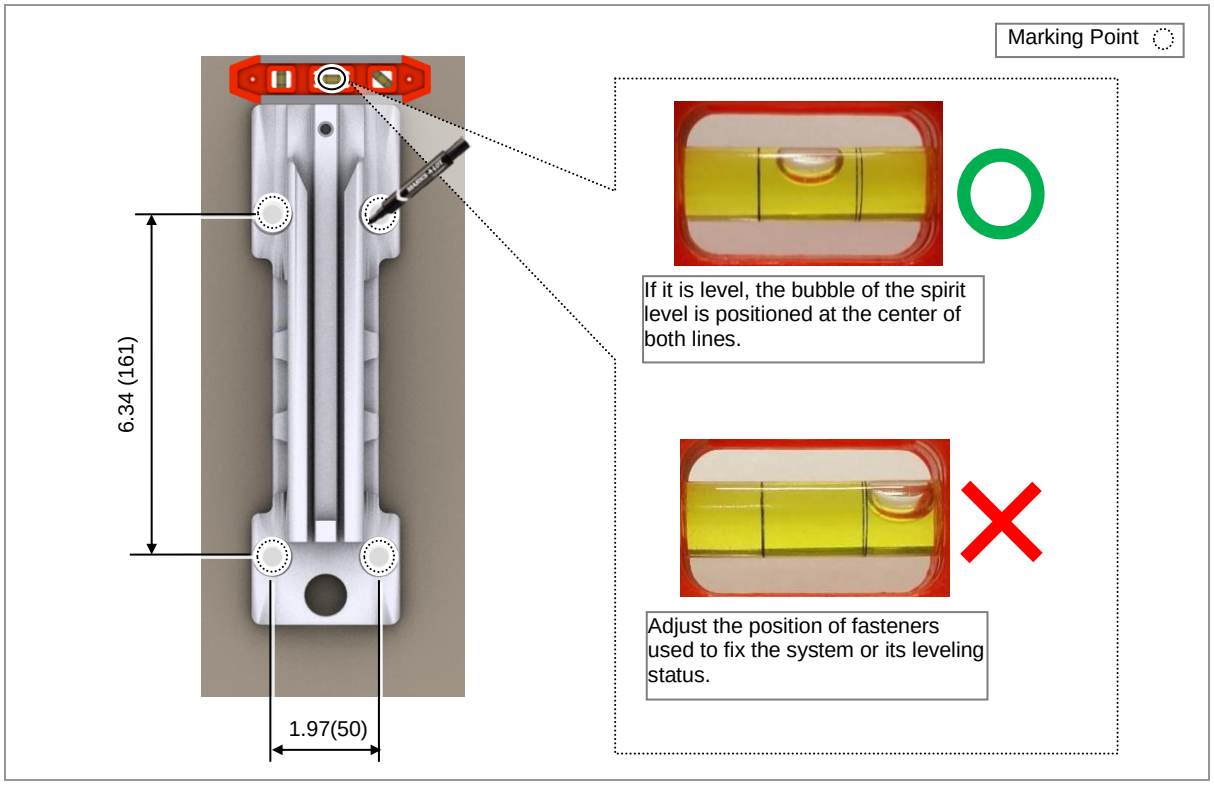
2 Place a bracket assembly on the fixing location.

3 Check the level of wall mounting bracket and adjust the marking and level.

4 Mark the anchor holes on a wall.

When fixing the wall mounting bracket on a wall, be sure to check the level of bracket. After finishing the installation, operator can adjust the level minutely.

Figure 34. ***Example of Marking Use the Wall Mounting Bracket***



Drilling & Anchoring

To drill an anchor hole, do the following:

Prerequisites

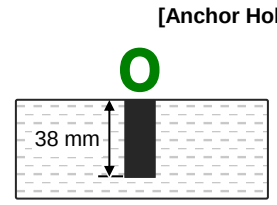
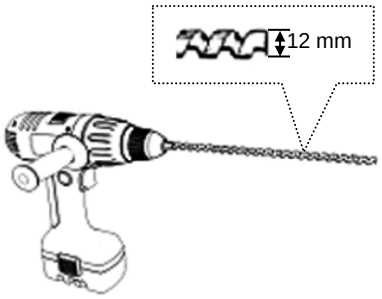
Before proceeding with the drilling & anchoring process, make sure that you have items mentioned in the following table

Table 9. ***Parts and Tools for Drilling & Anchoring***

Category	Description	
Parts	M8 x L35 Strong Anchor	4EA
Woking Tools	• Hammer Drill • Drill Bit (12 mm) • Vacuum Cleaner • Hammer • Anchor Punch (for M8 Strong Anchor)	

Table 10. ***Anchor Bolt Drill Bits and Hole Depth***

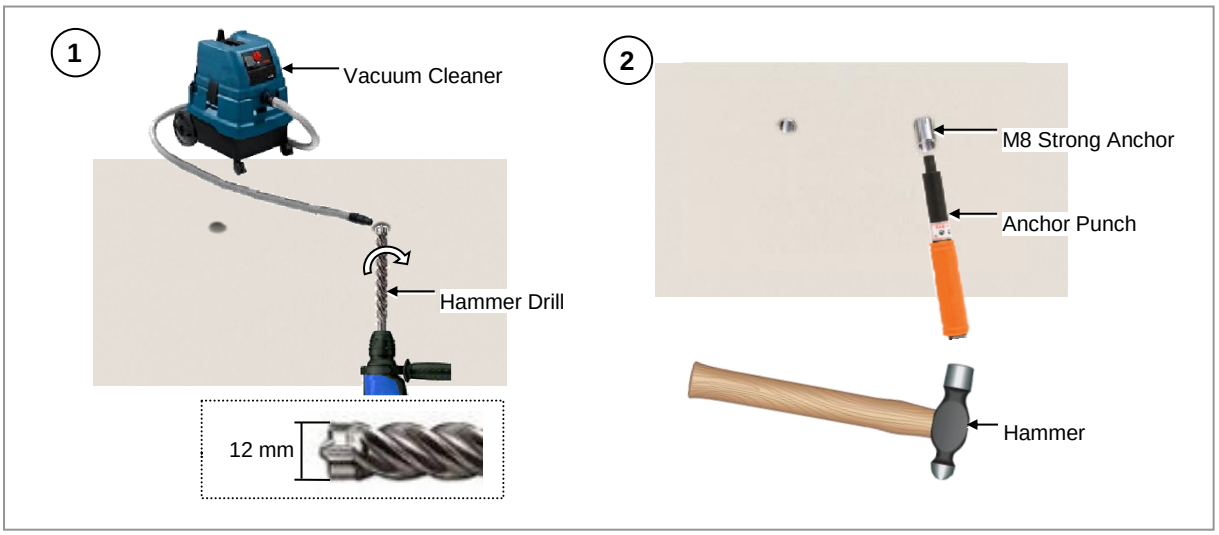
Category	Anchor Bolt	Drill Bits	Hole Depth
Pico HRU(Wall Type)	M8	12 mm	38 mm

Category	Anchor Bolt	Drill Bits	Hole Depth
 * Remove the debris from the drilled hole.			

1 Drill anchor holes at marked points with removing dust from the holes using a cleaner.

2 Fix Strong anchors to the holes drilled on the wall.

Figure 35. ***Drilling & Anchoring Example***



Fixing Mounting Bracket

To fix the mounting bracket on the wall, do the following :

Prerequisites

Before proceeding with fixing the mounting bracket wall type, make sure that you have the items mentioned in the table below.

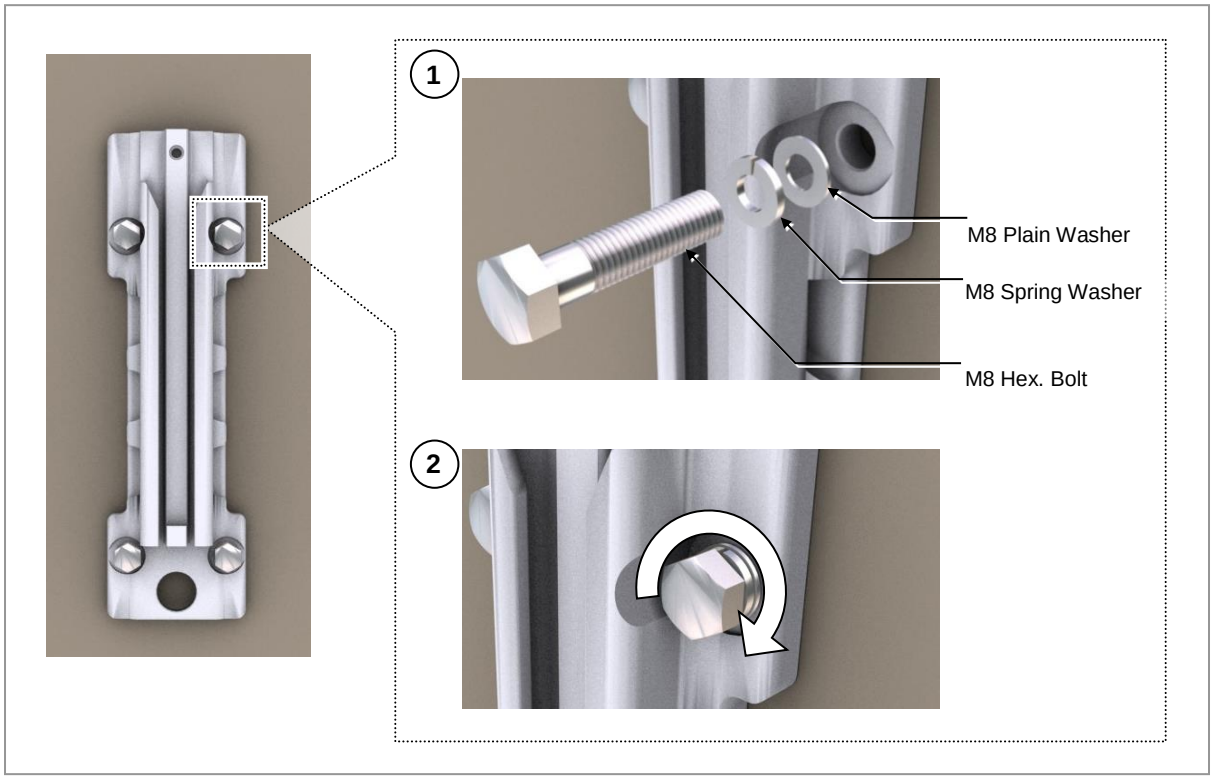
Table 11. ***Parts and Tools for fixing Mounting Bracket_Wall Type Installation***

Category	Description		
Parts	Mounting Bracket Assembly		1 EA
	Fastener	M8 Strong Anchor Assembly (Strong anchor is used in previous procedure)	4 SET
		• M8 Strong Anchor	4 EA
		• M8 Plain Washer	4 EA

Category	Description		
		• M8 Spring Washer • M8 Hex. Bolt	4 EA 4 EA
Recommended Torque Value	M8 Hex. Bolt		110 lbf·in
Working Tools	• Torque Wrench (100 to 400 lbf·in) • Torque Wrench Spanner head (apply Hex. head: 13 mm)		

1 Place the mounting bracket assembly on the wall.

Figure 36. ***Fixing Mounting Bracket_Wall Type***



2 Fix the mounting bracket assembly using fasteners.

Fixing Pico HRU

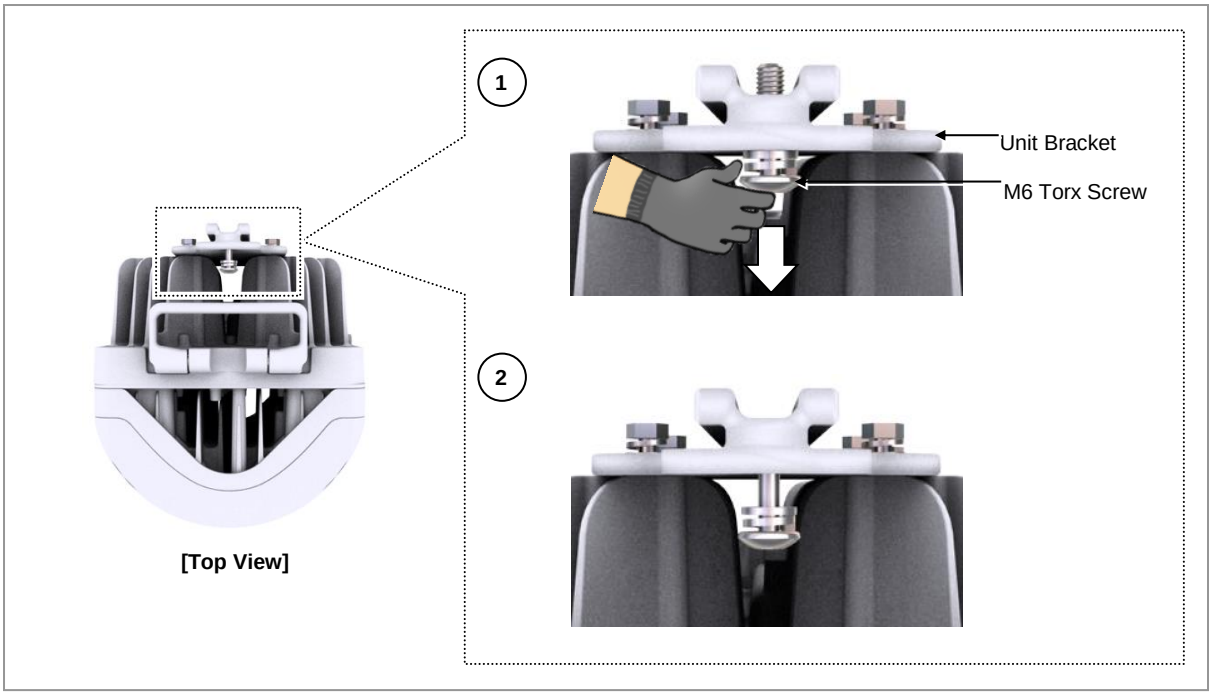
The method for installing the Pico HRU.

Table 12. ***Tools for Fixing Pico HRU on the Wall***

Category	Description	
Recommended Torque Value	M6 Torx Screw	43 lbf·in
Working Tools	• Torx Driver Bit (T25H) • Torque Driver (20 to 90 lbf·in)	

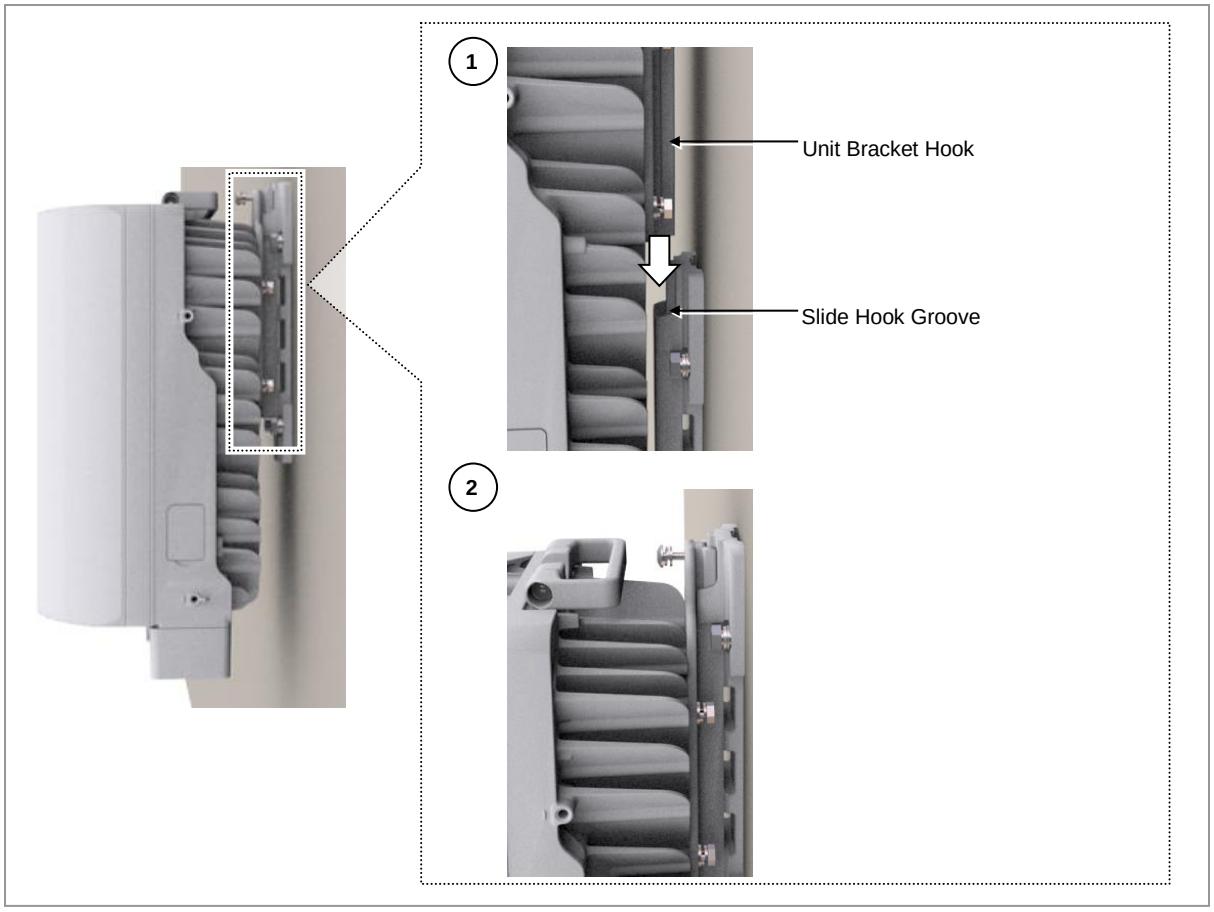
1 Pull out the fastening materials so that they do not get out from the fixing groove of the unit bracket. Do not pull out completely.

Figure 37. ***Fixing Pico HRU_ Wall Type (1)***



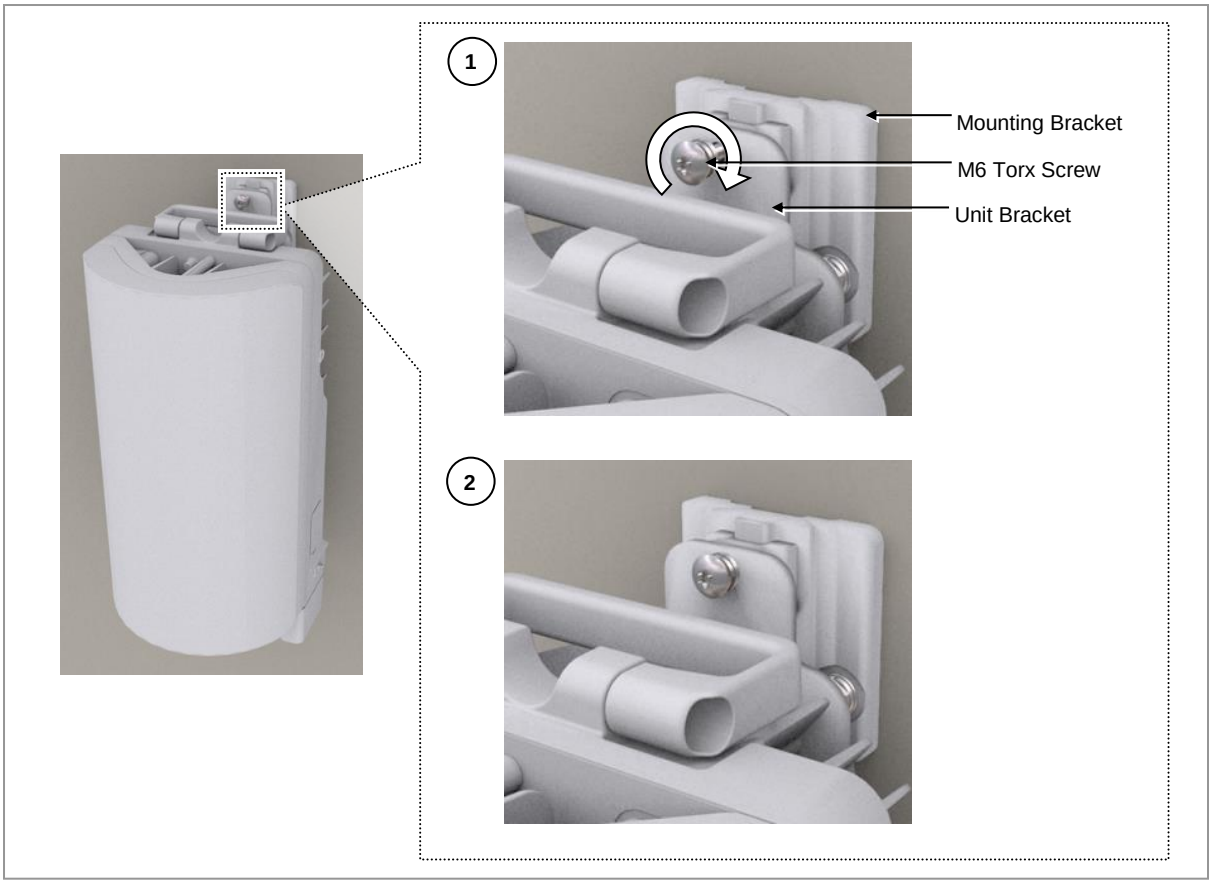
2 Place the unit bracket on the fixing grooves of the mounting bracket and push the unit bracket down to fix the Pico HRU in place.

Figure 38. ***Fixing Pico HRU_Wall Type (2)***



3 Fix the unit bracket to the mounting bracket using the fastener.

Figure 39. ***Fixing Pico HRU_Wall Type (3)***



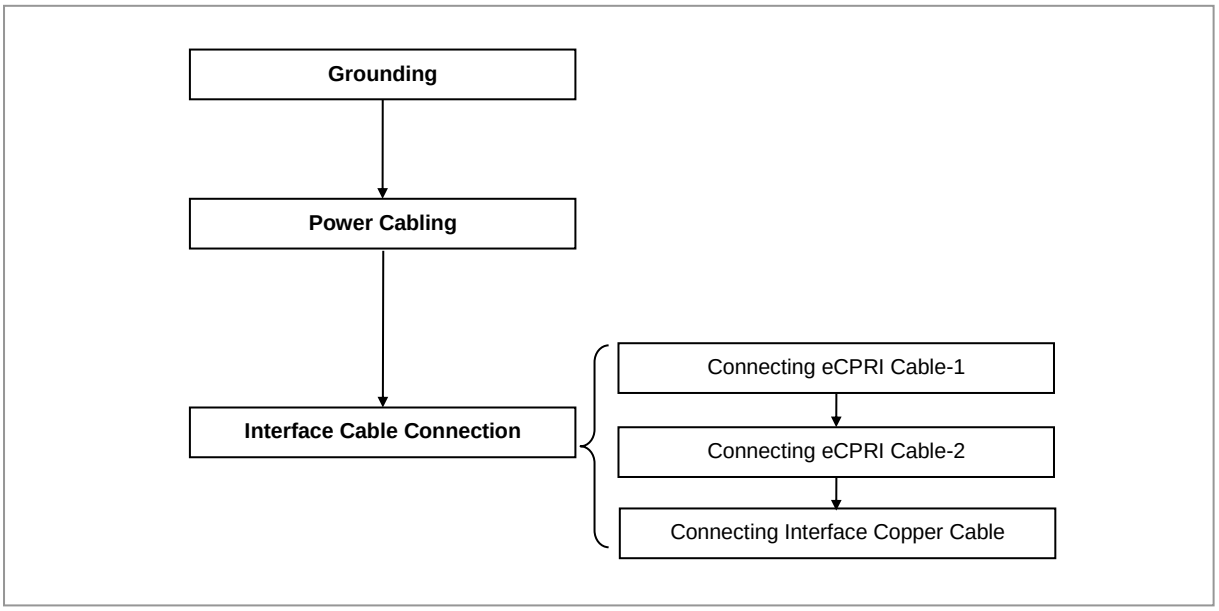
Chapter 3 Connecting Cables

This chapter describes the procedures to connect cables to the Pico HRU system and to label the cables.

Cabling Procedure

The figure below depicts the procedure to connect system cables:

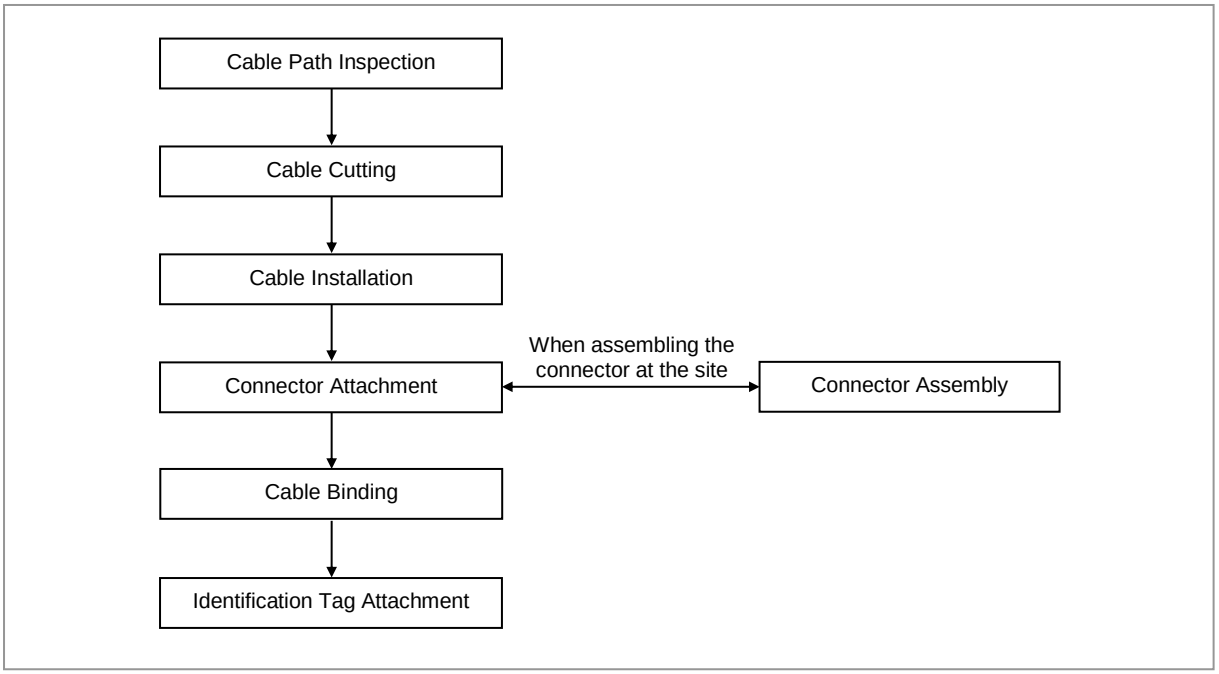
Figure 40. ***Procedure to Connect System Cable***



Guidelines for Cable Connections

The figure below depicts the sequence of operations for connecting cables to the system:

Figure 41. ***Cable Connection Procedure***



When cutting the cable after installation, ensure that the connector is disconnected. The cable installation while the connector is connected to the system may cause contact failure, or damage to the assembled connector and the cable, due to cable tension or operator mistakes.

The sequence of cable cutting and installation of the cable workflow can be changed depending on the field situation such as cutting after installing or installing after cutting.

Cable Path Inspection

When installing the cable that interconnects rectifier, Main Ground Bar (MGB), backhaul device, and so on within the system, the cable path, length, and cable installation method must be inspected.

To inspect the cable path, ensure the following.

- A minimum cable length must be selected, so that the length does not affect the cable installation and maintenance.

- The cable must be placed in a location where the cable is not damaged by external factors such as power line, flooding, and footpaths.
- In areas where the cable may be damaged by external factors, ensure that measures are taken to prevent damage to the cable, such as cable tray, ducts, and flexible pipe.

Cable Cutting

Measure the exact distance after carefully checking the route, and cut the cable using a cutting tool.

To cut the cable, follow these guidelines:

- Cut the cable to the length determined in the Cable Path Inspection step.
- Use a dedicated cable cutting tool.
- Cut the cable at right angles.
- Be careful to keep the cable away from moisture, iron, lead, dust, or other foreign material when cutting.
- Remove any foreign material attached to the cable using solvent and a brush.

Cable Installation

This process involves running the cable along the cabling path to the target connector of the system or an auxiliary device. This is done after cable path inspection and cable cutting are completed.

To install the cable, follow these guidelines:

- Be careful not to damage the cable.
- If the cable is damaged, cut out the damaged section before installing, or replace the cable.
- Run the cable so that it is not tangled. In particular, when installing the cable from a horizontal section to a vertical section, be careful not to reverse the upper and lower lines of the cable.
- Always use the maximum curvature radius possible, and ensure that the minimum curvature radius specification is complied with.
- If the cable needs to be protected, use suitable protective cover such as PVC channel, spiral sleeve, flexible pipe, and cable rack.
- Install the DC power cable and the data transmission cable away from the AC power cable to prevent electromagnetic induction.

The table below outlines the recommended minimum allowed cable bend radius for different types of cables:

Table 13. ***Recommended Minimum Allowed Cable Bending Radius***

No	Type	Allowed Cable Bending Radius

No	Type	Allowed Cable Bending Radius	
1	Ground Cable	8 × OD	
2	Power Cable	Operation: 8 × OD	Installation: 12 × OD
3	Optical Cable (Outdoor)	Operation: 10 × OD	Installation: 20 × OD
4	S-FTP Cable	Operation: 5 × OD	Installation: 10 × OD

* If cable bending radius limits are specified by the manufacturer, then comply with those specified bending radius limits.

※ OD: Outer Diameter

Connector Attachment

This process involves assembling a connector to an installed cable or to a device on the site.

Follow these guidelines when attaching the connector.

- Ensure operator is fully aware of the connector assembly method before assembling the connector. Assemble the connector in accordance with its pin map.
- Each connector has a hook to prevent its core positions from being changed.
- Check the corresponding grooves before connecting the connector to another connector.
- Use a weather proof tape at the connector connection for cables that are installed outdoor, such as feeder lines, to prevent water leakage and corrosion from occurring at the part exposed to the outside.
- Connect each cable of the connector assembly in a straight line.
- Be careful when connecting the cable so that contact failure does not occur at the connector connection due to tension.

Cable Binding

This process involves fixing and arranging an installed cable using binding thread, cable ties, binding wire, and ram clamps.

Follow these guidelines when binding a cable.

- Be careful not to damage the cable during binding.
- Use proper cable binding tools according to the target location (indoor or outdoor) and the type of the cable (power supply cable, optical cable, or feeder line).
- Ensure the cutting sections of the cable tie and the binding line are not exposed to the outside. This may cause damage to the cables or personal injury.
- Cut off the remainder of the cable thread by leaving about 50 mm of extra length to prevent the knot from easily getting untied.
- If there is a chance of contact-failure to occur in the connector connection due

to tension, bind the cable at the closest location to the connector.

Identification Tag Attachment

This process involves attaching a marker cable tie, a nameplate, and a label to both ends of a cable (connections to a connector) to identify the use of the cable and the cabling path.

Follow these guidelines when attaching an identification tag.

- When installing the cable outdoor, use relief engraving and coated labels to prevent the markings from being erased.
- Since the form and attachment method for identification tags are different for each provider, consult with the provider before attaching the tags.

When connecting the cables, always connect the ground cable first. If a worker contacts the equipment, connects a cable, or performs maintenance without connecting the ground cable, the system can be damaged or the worker may be injured due to static electricity and short circuit.

When performing cable work for the system, proceed with the ground work before any other work to prevent errors occurring due to static electricity and other reasons.

After completing cable installation, unused ports must be capped.

Ensure the work is done by personnel properly trained for the cabling job.

Cabling Diagram

The figure below depicts the different cabling options of the Pico HRU:

Figure 42. ***Cable Diagram***

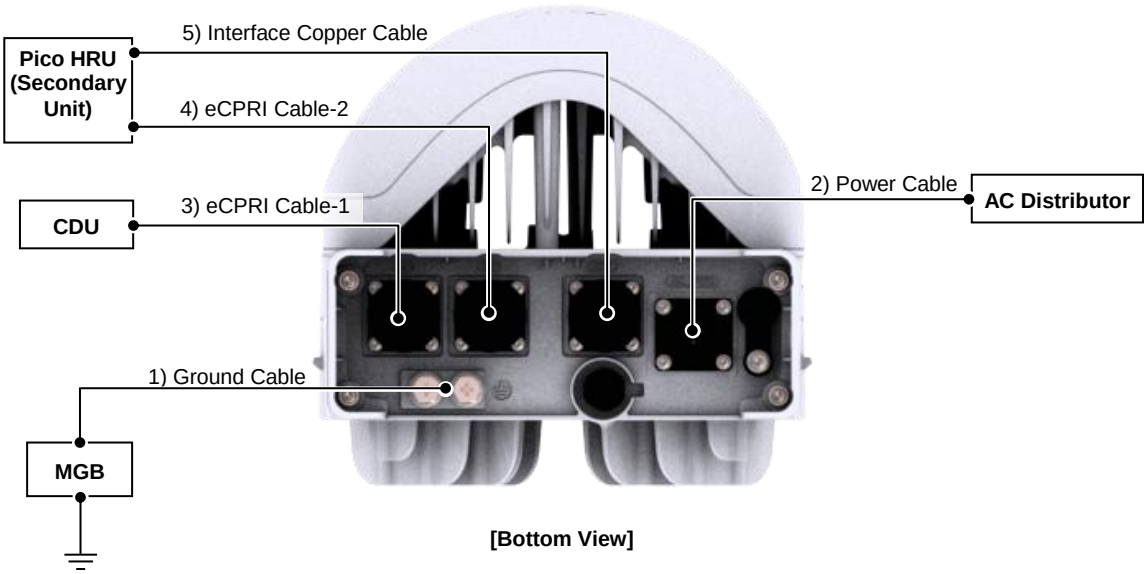


Table 14. ***Pico HRU Connection Cable***

From	To	Cable
MGB	Pico HRU	**1** Ground Cable Assembly : 6 AWG × 1C
Pico HRU	AC Distributor	**2** Power Cable Assembly : 14 AWG × 3C
	CDU	**3** eCPRI Cable-1 Assembly : Single Mode, for Outdoor Type
	Other Pico HRU (Secondary Unit)	**4** eCPRI Cable-2 Assembly : Duplex Type, for Outdoor Type
		5 Interface Copper Cable Assembly

The inlet hole finishing method of external equipment must be done after consultation with operation company, if the cable is connected to external equipment, such as optical distribution box.
- Cables: Power cable, eCPRI cables, and Interface Copper cable

Grounding

To comply with UL 60950, the equipment must be connected to a safety grounding point via a permanent link. Grounding points are located on the product for this purpose. Always connect the ground cable before fitting other cables. The product must remain grounded continuously unless all connections to the power supply and data network are all removed.

If equipment is grounded through a cabinet or rack, make sure it is done so properly

Connect the ground cable first. In cabling, the connection of cables without the connection to the ground cable may cause damage of the equipment or bodily injury to personnel.

The purposes of the ground construction are as follows:

- To prevent human life and the system from over-current, over-voltage, and lightning.
- To provide a discharge path for surge voltage generated by lightning and power switch.
- To protect the system from static electricity.
- To eliminate or minimize the high-frequency potential in the system housing.
- To provide a conductor for the balance and stability of high-frequency current.
- To stabilize the potential of the circuit against the ground.

Connecting Ground Cable

To connect a ground cable, do the following:

Prerequisites

Before proceeding with connecting the ground cable, make sure that you have the items mentioned in the table below:

Table 15. ***Parts and Tools for Connecting Ground Cable***

Category	Description	
Installation Section	MGB to Pico HRU Ground Terminal	
Cable	6 AWG × 1C (Ground Cable Assembly)	
Bending Radius	8 × OD	
Heat Shrink Tube (Spec/Color/Length)	Φ 0.47 in. (12 mm)/Clear/1.96 in. (50 mm)	
Pressure Terminal	MGB	Checking MGB specifications per site and preparing connecting parts
	Pico HRU	6 AWG, 2 Hole, 90°, Hole diameter: 1/4 in. (6.4 mm), Hole distance: 5/8 in. (16 mm)
Fastener	MGB	Checking MGB specifications per site and preparing connecting parts
	Pico HRU	M6 × L14 SEMS (Hex.+)/2 EA

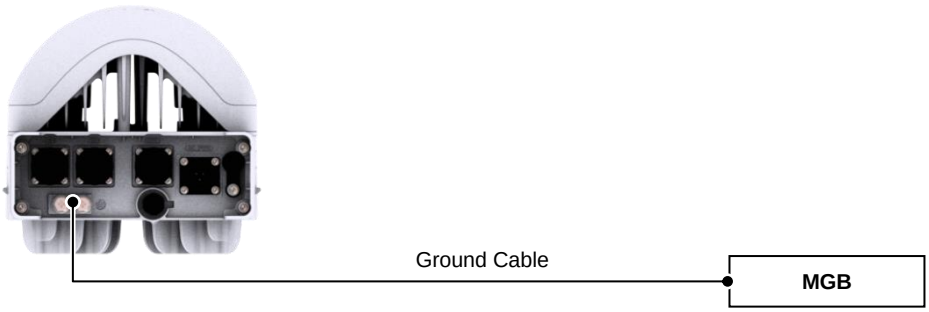
Category	Description	
Recommended Torque Value	M6 SEMS	43 lbf·in
Working Tools	• Cable Cutter • Wire Stripper • Crimping tool • Heating Gun • Nipper • Screw Driver (‘+’, No. 3) • Torque Driver (20 to 90 lbf·in.) • Screw Driver Bit (‘+’, No. 3)	

For the pressure terminals of the cable, the UL listed products or equivalent must be used.
For example, Manufacturer-Panduit
- HRU: 6 AWG Pressure Terminal (LCD6-14AF-L)

It is recommended to apply antioxidant (ex. No-Oxide 2 oz) to prevent oxidation before connecting the pressure terminal.

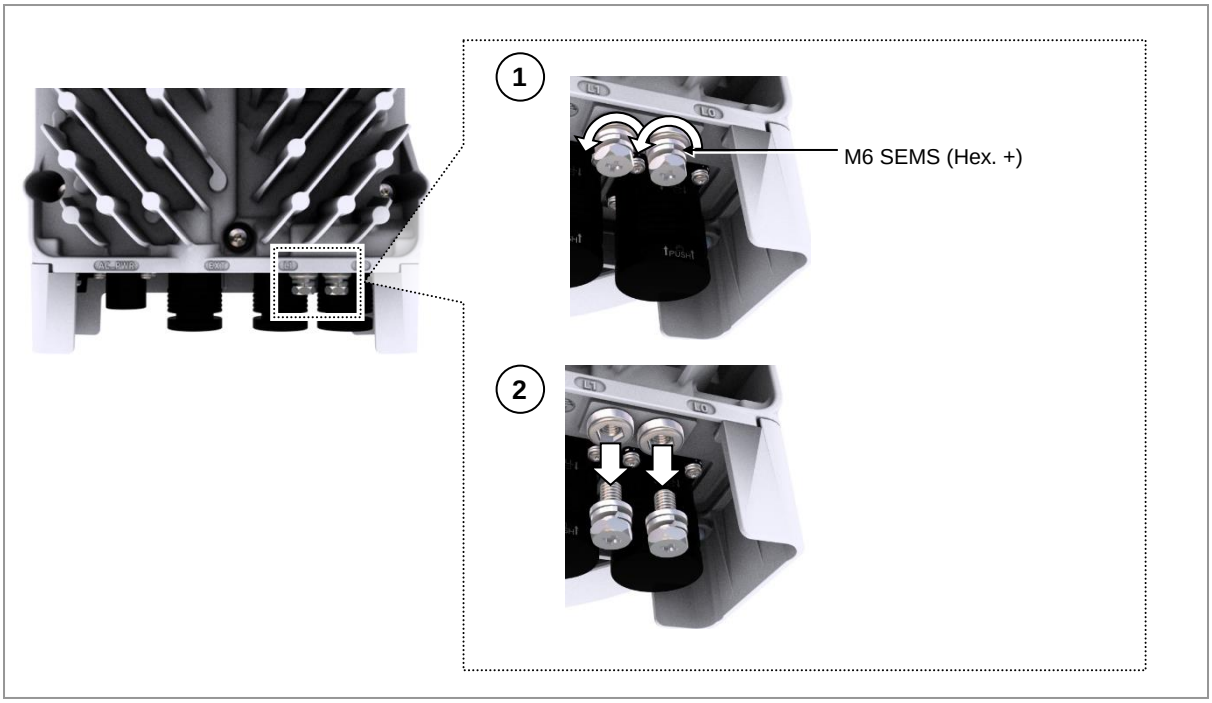
1 Install the ground cable from the MGB to the Pico HRU ground terminal, as shown in figure below:

Figure 43. ***Connecting Ground Cable (1)***



2 Assemble a pressure terminal and a heat shrink tube at the end of the Pico HRU ground cable.

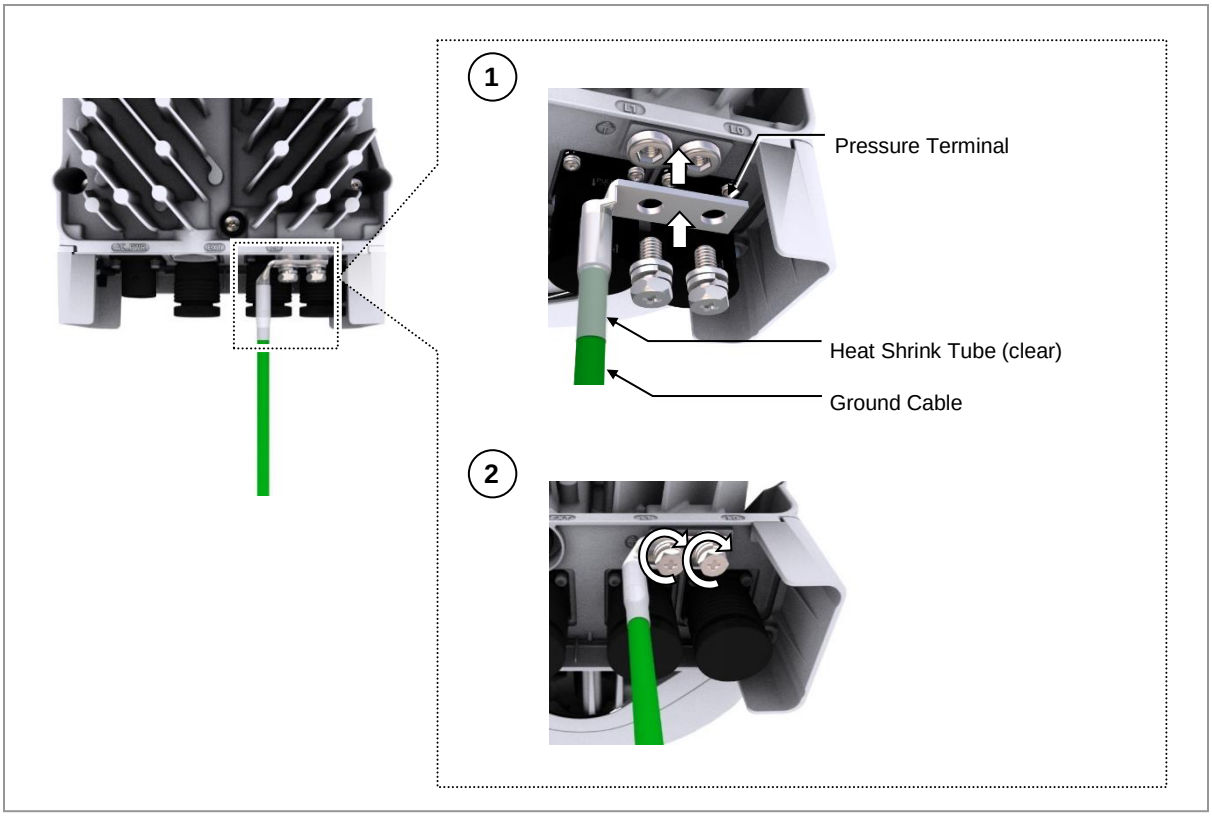
Figure 44. ***Connecting Ground Cable (2)***



3 Align the pressure terminal to the mounting hole of the Pico HRU ground terminal.

4 Firmly fix the pressure terminal onto the Pico HRU ground terminal using fasteners.

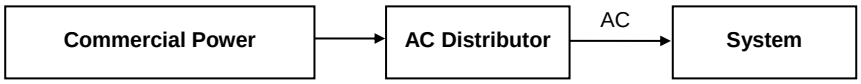
Figure 45. ***Connecting Ground Cable (3)***



Power Cabling

The figure below depicts the elements of a power supply device:

Figure 46. ***Power Equipment Elements***



Since power is applied to the system where the power cable is connected by manipulating the circuit breaker of the rectifier, ensure to check the rectifier breaker is turned off (open) before connecting the power cable to the power connector. If the system is installed while the circuit breaker is on, the worker may get critically injured if the cable is connected in the wrong way.

Handling the power cable incorrectly may damage the rack or cause an electric short-circuit through the cable. Ensure the power switch of the rectifier or the system is turned off before handling the power.

The fasteners for power cable must be tightly secured to prevent electrical accidents.

The heat-resistant temperature of the power cable should be 90℃ or more.

Install the power cable to the power port of the system by considering the radius of curvature of its cable specification and then cut the cable. If the operator installs the cable after cutting, there may be length difference among the core wires at the end of the cable because of cable curvature. This may result in poor contact after the cable is connected to the power port.

If you turn the power on and off rapidly (within 1 s), the counter electromotive force caused by cable inductance can damage the system.

Connecting more than one power cable together may increase power loss.

It must be verified that the rectifier or the power distributor has an output voltage within the specified system input range before the power line is connected.

When using AC power cable, it is possible to use up to 70 m. However, the distance is under the condition that the cable is installed normally. When the condition changes, the distance changes.

Install a circuit breaker to a rectifier (or power distributor) for the stable power. The capacity of the circuit breaker is 6 A. (Use UL listed circuit breakers.)

Connecting Power Cable

To connect a power cable, do the following:

Prerequisites

Before proceeding with connecting the power cable, make sure that you have the items mentioned in the table below:

Table 16. ***Parts and Tools for Connecting Power Cable***

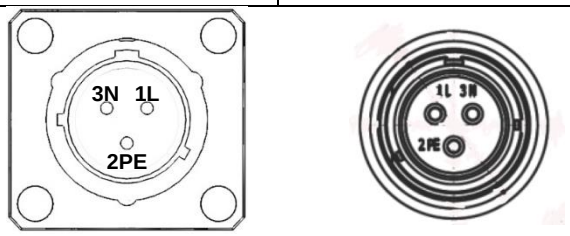
Category	Description	
Installation Section	AC Distributor to Pico HRU power port	
Cable	14 AWG × 3C (Power cable assembly) (The color of the core wire can be changed according to the specification of the cable used.)	
Bending Radius	Operation: 8 × OD	Installation: 12 × OD
Connector	AC Distributor	Check specifications of AC distributor output terminal per site and prepare fasteners.
	Pico HRU (AC)	JONHON, DY6T1203SNFM-05 to Open
Working Tools	• Cable Cutter • Wire Stripper • Compressor	

Category	Description
	• Heating Gun • Nipper

The table below outlines the power cable connector pin map:

Table 17. ***AC Power Cable/Connector Pin Map***

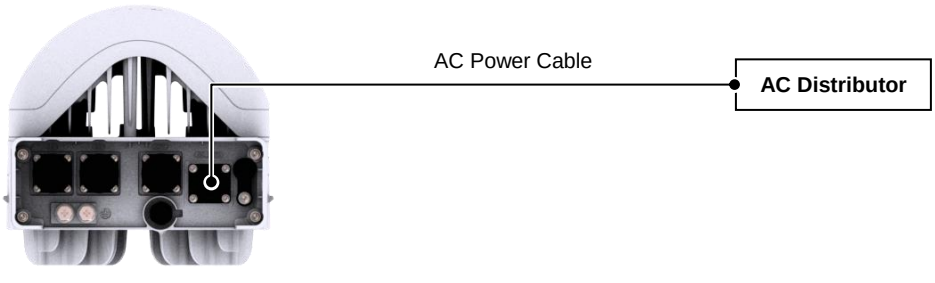
Power Connector Pin Number	Color
1L	Black
2PE	Green
3N	White



[System Side] **[Cable Side]**

1 Install the power cable from the distributor to the Pico HRU.

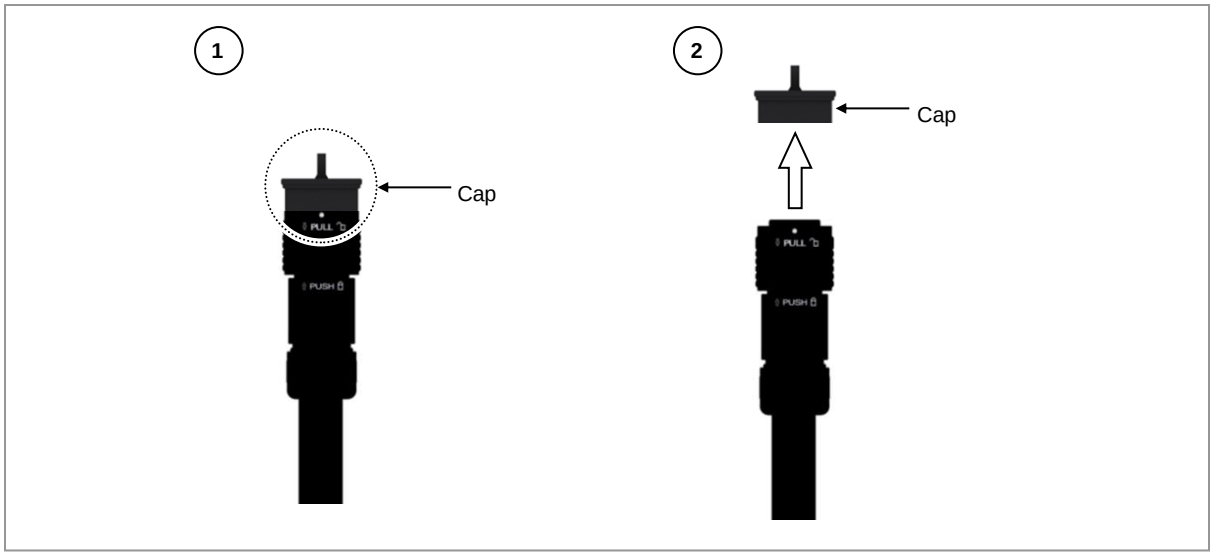
Figure 47. ***Connecting Power Cable (1)***



[Bottom View]

2 Separate the cap from the cable side connector.

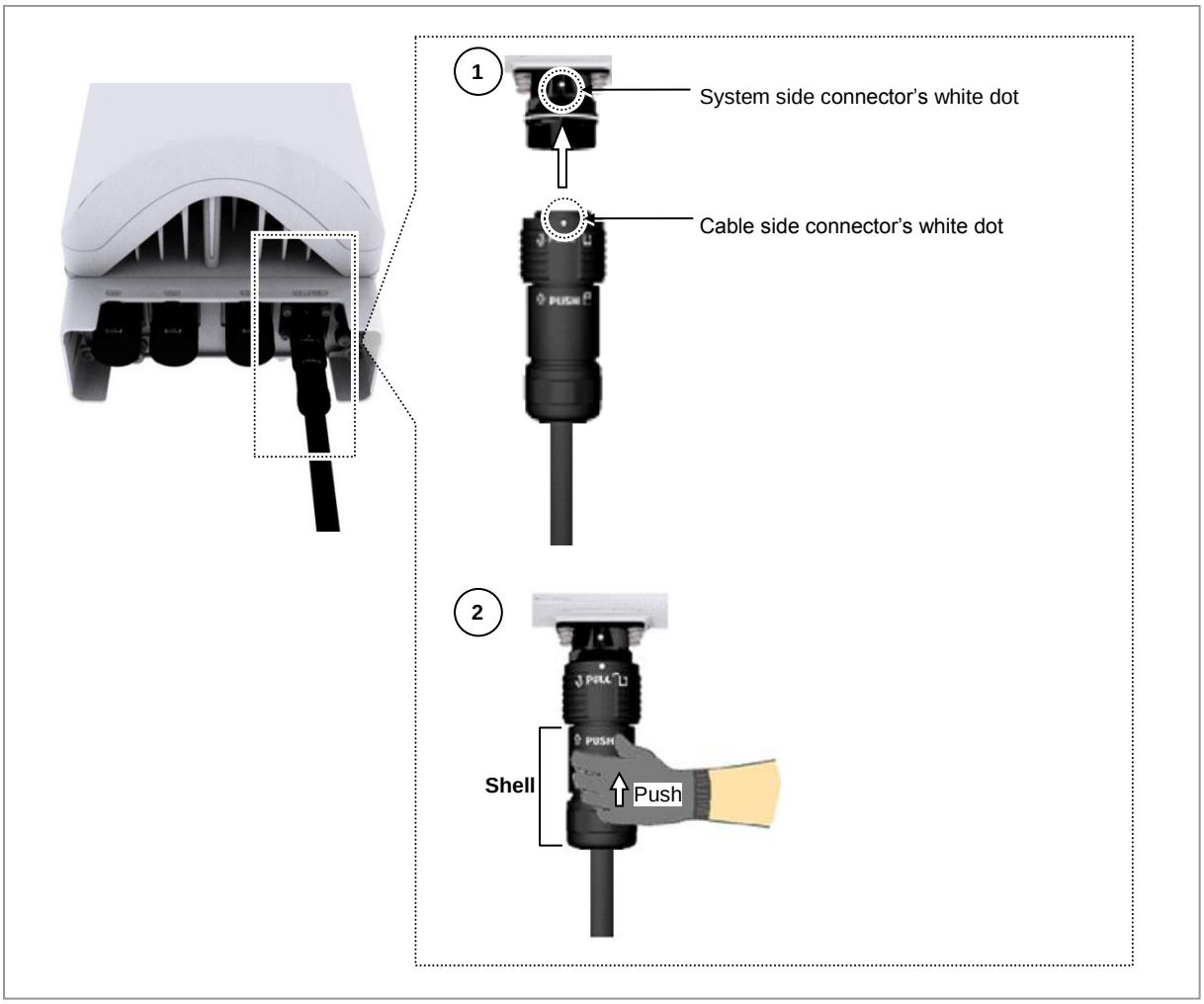
Figure 48. ***Connecting Power Cable (2)***



3 Insert the connector aligning white dot of the cable side connector and white dot of the system side connector.

4 When inserting the connector, push the shell to upper side.

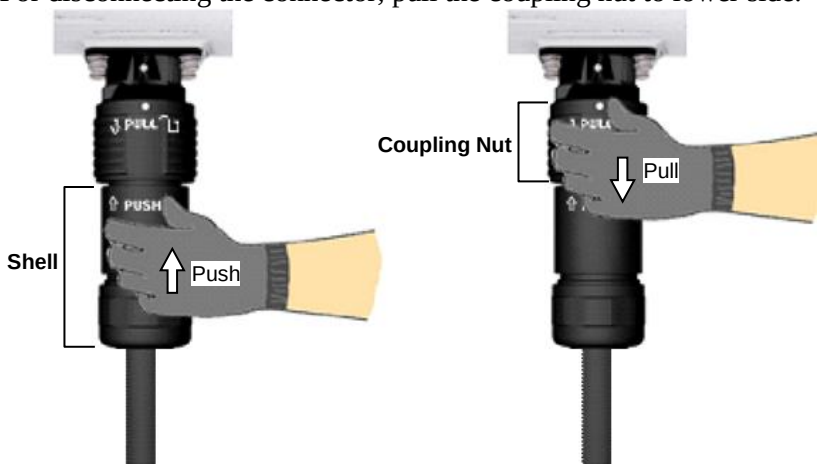
Figure 49. ***Connecting Power Cable (3)***



When the connector is fastened tight, the white line on the system side connector becomes invisible.

[White Line is invisible] **[White Line is visible]**

The method for connecting or disconnecting the power connector is as follows:
- For connecting the connector, push the shell to upper side.
- For disconnecting the connector, pull the coupling nut to lower side.



Interface Cable Connection

Remove/Insert Optical Module

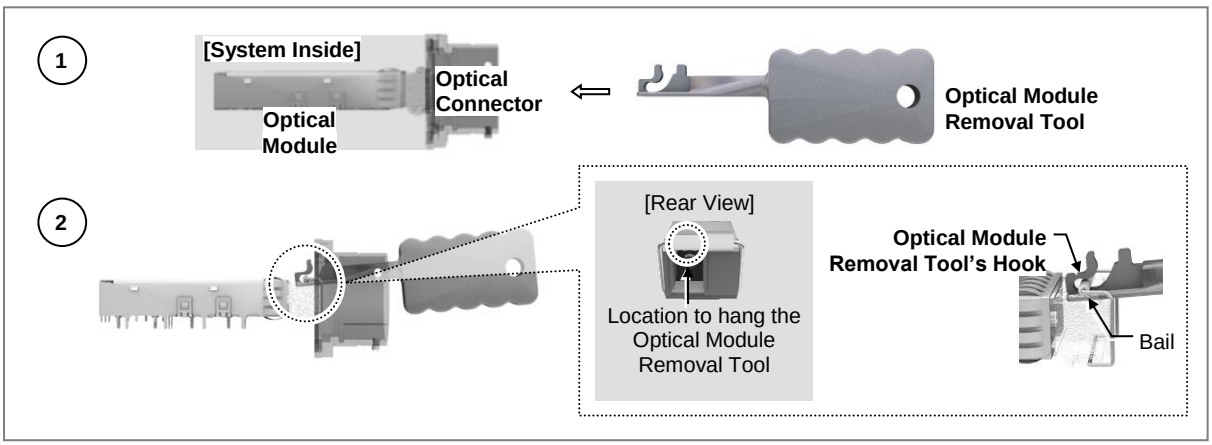
If the optical module needs to be removed or inserted before connecting the cable, follow the below process.

Port quantity (Duplex / BiDi) and Bail of Optical module may differ from the figure.

To remove optical module, do the following:

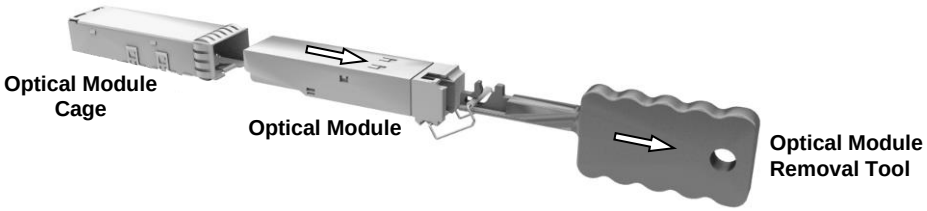
1 Hang the optical transceiver removal tool's hook on the optical module's bail within the system.

Figure 50. ***Optical Module Removal (1)***

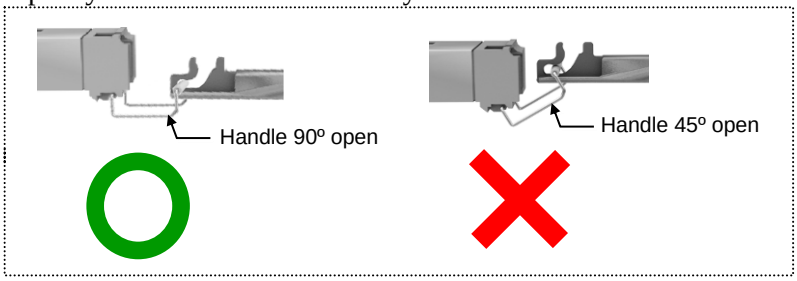


2 Completely remove the optical module from the optical module cage by pulling the optical module removal Tool.

Figure 51. ***Optical Module Removal (2)***



When desorbing an optical module, use a dedicated tool (optical module desorption tool) to remove the handle by opening it for about 90°.
When the optical module is detached without using the dedicated tool, the optical module may be jammed and the handle may be damaged due to a lack of opening capacity of the minimum necessary handle.



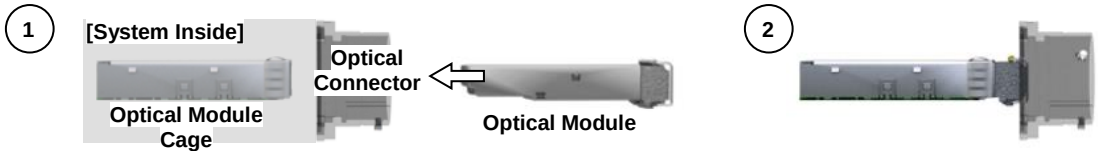
3 Remove the optical module and the jig by pressing the optical module Removal Tool's hook grip.

Figure 52. ***Optical Module Removal (3)***

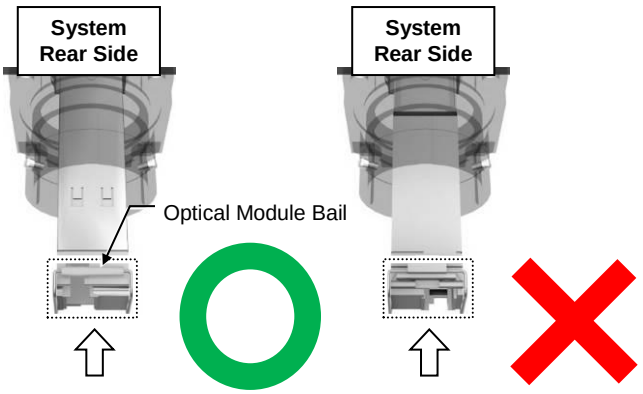
To inset optical module, do the following:

Push the optical module into the optical module cage within the connector.

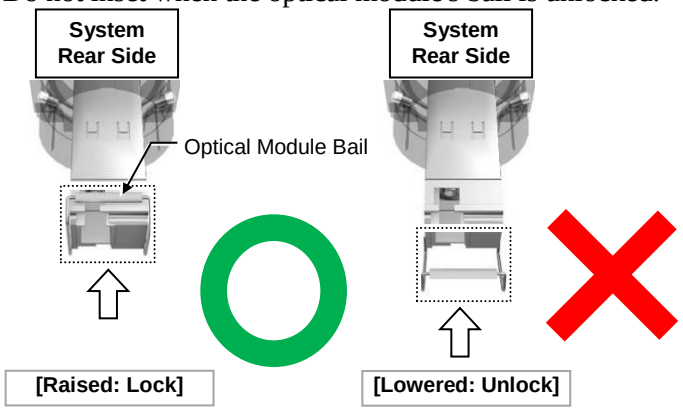
Figure 53. ***Optical Module Insert***



Inset the optical module's bail, facing the rear of the system, to the port.



Do not inset when the optical module's bail is unlocked.



This section describes the procedures to connect the interface cables.

Connecting eCPRI Cable-1

To connect a eCPRI cable-1, do the following:

Prerequisites

Before proceeding with connecting the eCPRI cable-1, make sure that you have the items mentioned in the table below:

Table 18. ***Parts and Tools for eCPRI Cable-1 Connection***

Category	Description	
Installation Section	CDU to Pico HRU L0 Port	
Cable	eCPRI Cable Assembly (Single Mode, for Outdoor Type)	
Bending Radius	Operation: 10 × OD	Installation: 20 × OD
Connector	Pico HRU_L0	JONHON, PDLC03T05(LC/UPC)
	CDU	Check specifications of external device output terminal per site and prepare fasteners.

Category	Description
Working Tools	Optical Connector Cleaner

PDLC03T05, Jonhon

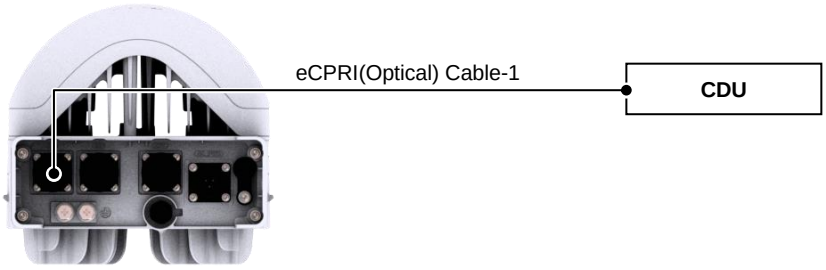
The light from the laser beam runs through the optical cable. Handle the optical cables carefully, as the exposure to the laser beam can seriously injure worker's eye.

Remove the cap of the optical connector before connecting.
- Before connecting the optical cable, check if the ferrule of the connector is soiled. Be careful to keep the cutting section away from dust or foreign material. If the cable is soiled with foreign material, do not blow to remove them.
- Make sure to clean the connector in accordance with the cleaning directions described in 'Appendix: Clean the Optical Connectors'.
- Do not touch the ferrule at the end of optical cable because it is easy to be damaged.

[Before Removing Cap] **[After Removing Cap]**

1 Install the eCPRI(Optical) cable from the CDU to the Pico HRU L0 port.

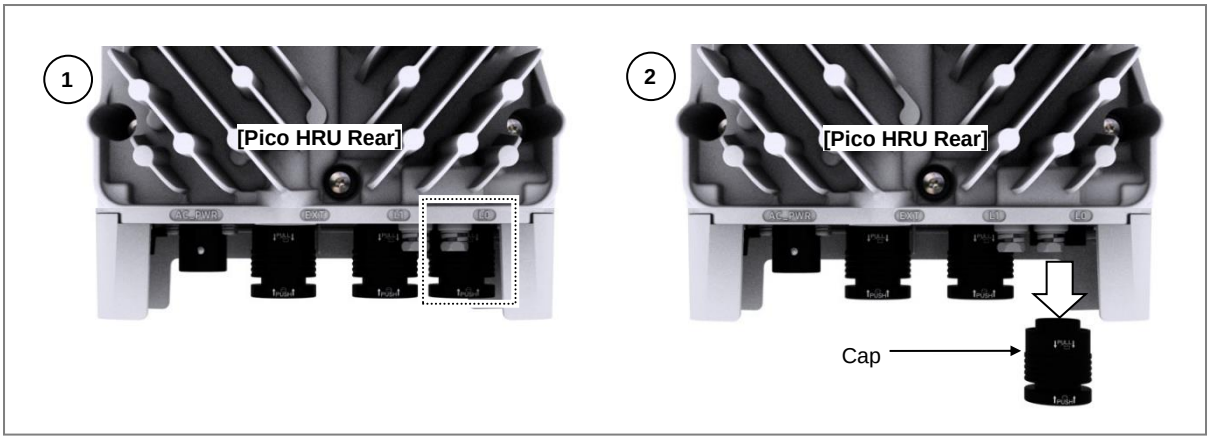
Figure 54. ***Connecting eCPRI Cable-1 (1)***



[Bottom View]

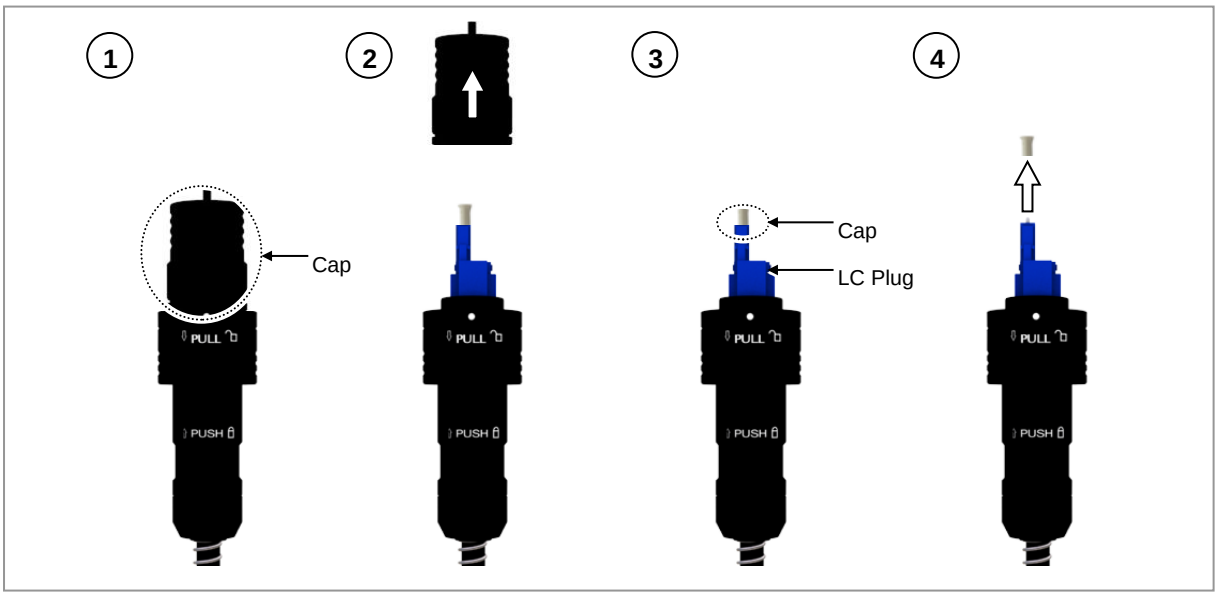
2 Separate the cap from the Pico HRU cables side connector.

Figure 55. ***Connecting eCPRI Cable-1 (2)***



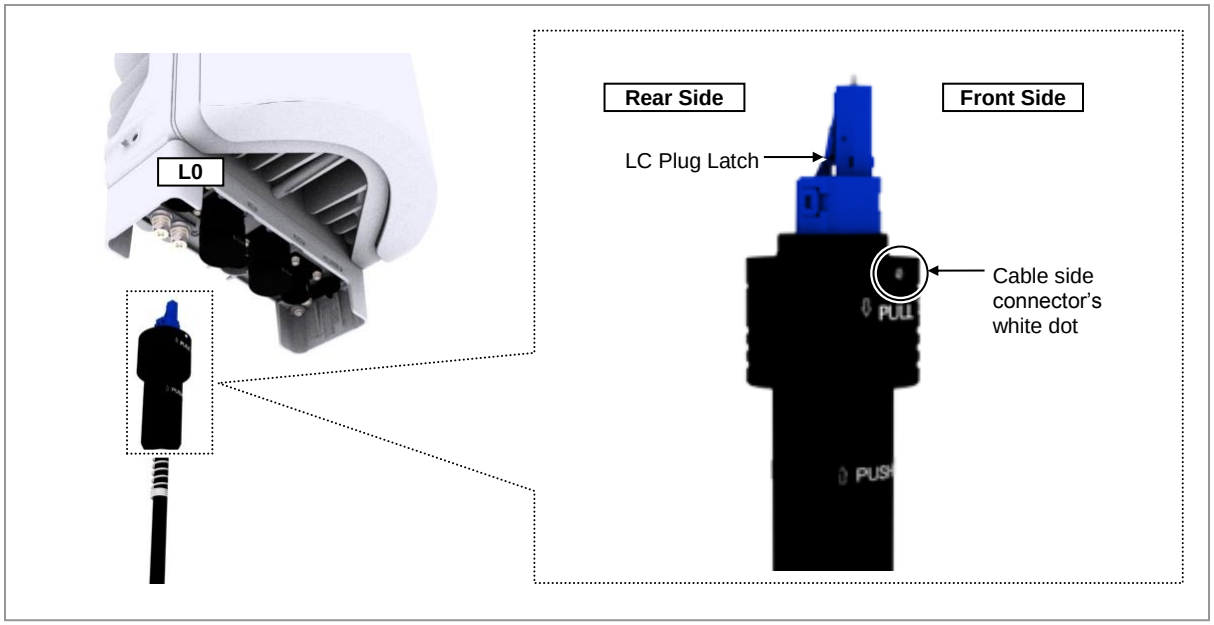
3 Separate the cap form the cable side connector.

Figure 56. ***Connecting eCPRI Cable-1 (3)***



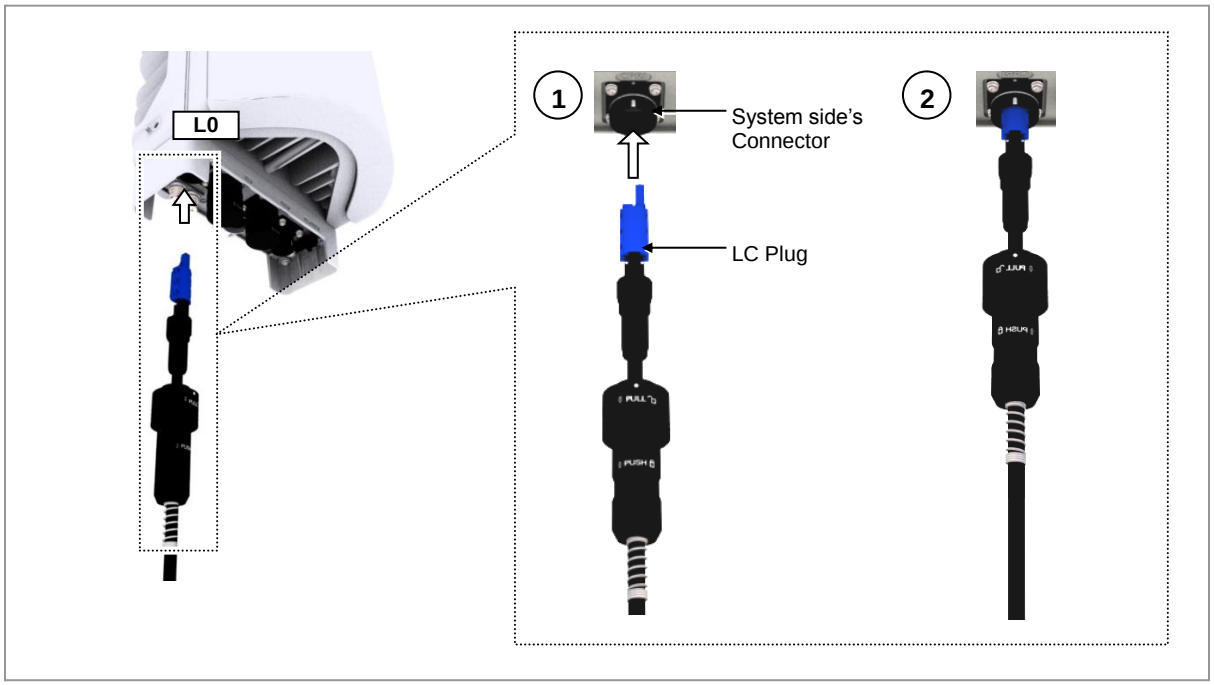
4 The latch of cable side connector should be toward the rear side.

Figure 57. ***Connecting eCPRI Cable-1 (4)***



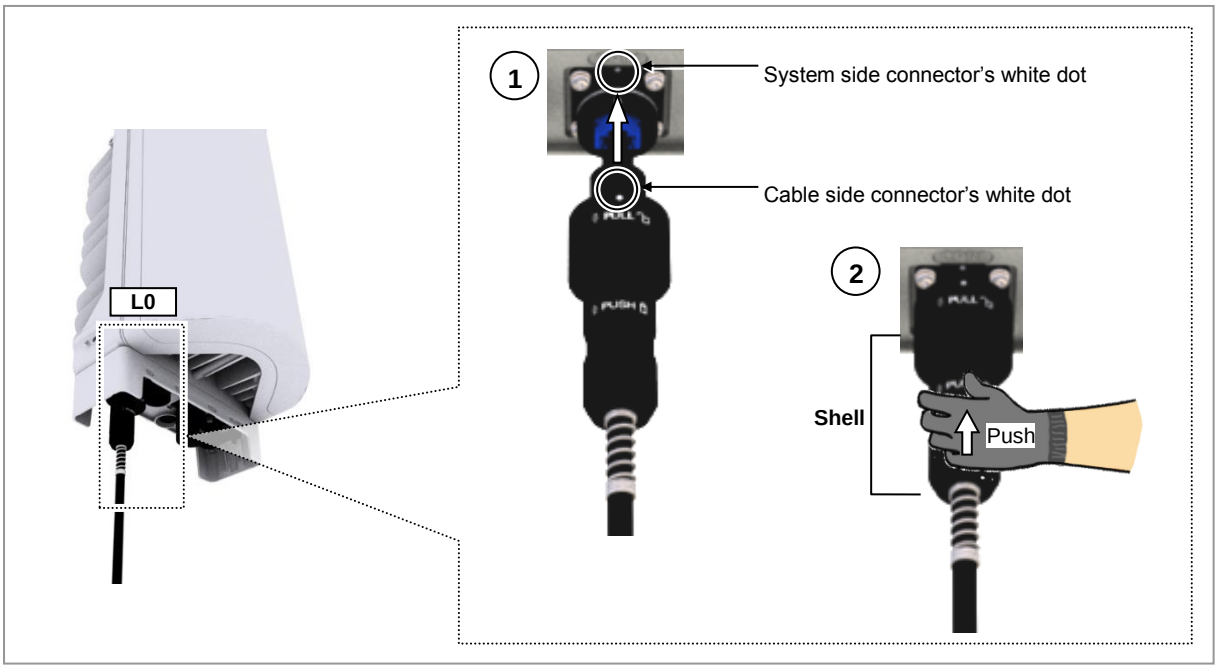
5 Insert the LC plug to the system side's connector.

Figure 58. ***Connecting eCPRI Cable-1 (5)***



6 Insert the connector aligning the cable side connector's white dot and system side connector's white dot. When inserting the connector, push the shell to upper side.

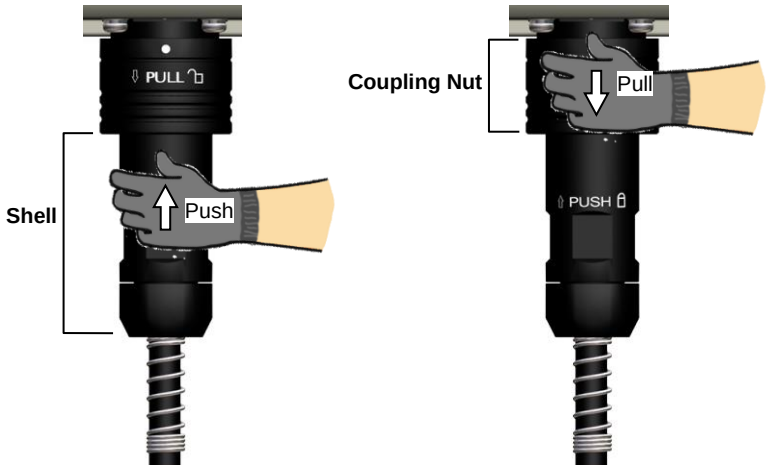
Figure 59. ***Connecting eCPRI Cable-1 (6)***



When the connector is fastened tight, the white line on the system side connector should be invisible (or hidden).

[White Line is invisible] **[White Line is visible]**

The The method for connecting/disconnecting the eCPRI connector is as follows:
- For connecting the connector, push the shell to upper side.
- For disconnecting the connector, pull the coupling nut to lower side.



Removing the eCPRI Cable-1

1 Prepare the following components:

Table 19. ***Tools for Removing the eCPRI Cable-1***

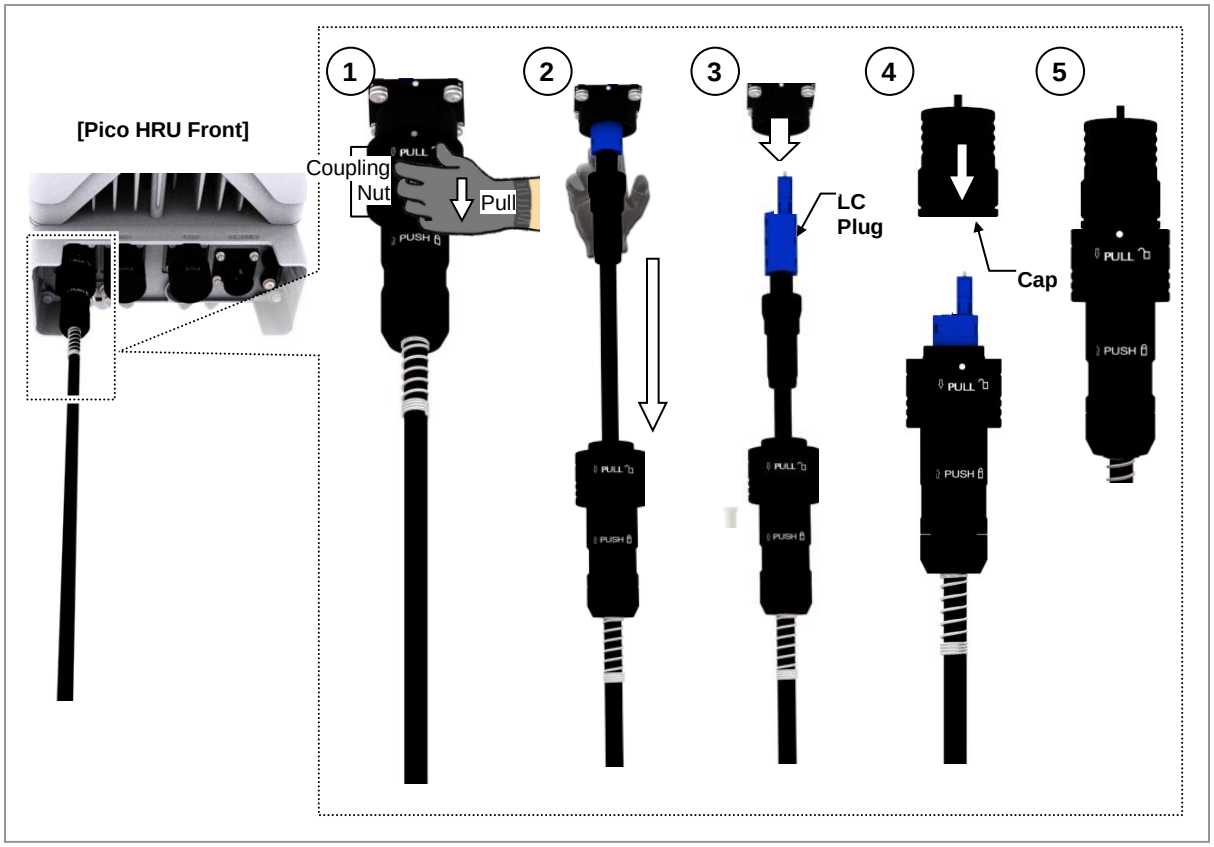
Category	Description
Working Tools	• Nipper • Screw Driver(-)

2 Disconnect the cable from the system by pulling the eCPRI connector coupling nut towards the bottom of the system.

3 Unlock the latch of the LC plug by hand or using a screwdriver (-) and then remove the cable.

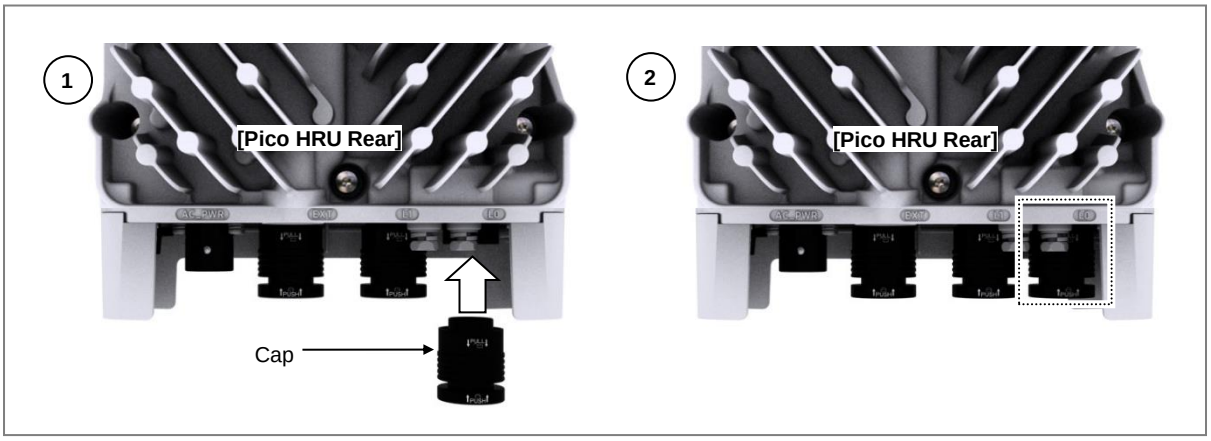
4 Fit the cap onto the removed eCPRI connector.

Figure 60. ***Removing the eCPRI Cable-1 (1)***



5 Fit the cap onto the system connector.

Figure 61. ***Removing the eCPRI Cable-1 (2)***



1) When removing the eCPRI Cable-1, be sure to release the lock beforehand by pressing the LC plug latch.
2) Avoid touching the ferrule (white part) at the tip of the connector since it can be easily damaged. It must be sealed using the cap.
3) When removing or storing the cable, be sure to keep it at no less than its

minimum bending radius and free from externally caused damage.

Connecting eCPRI Cable-2

To connect a eCPRI cable-2, do the following:

Prerequisites

Before proceeding with connecting the eCPRI cable-2, make sure that you have the items mentioned in the table below:

Table 20. ***Parts and Tools for eCPRI Cable-2 Connection***

Category	Description	
Installation Section	Other Pico HRU to Pico HRU L1 Port	
Cable	eCPRI Cable Assembly (Multi Mode, for Outdoor Type)	
Bending Radius	Operation: 10 × OD	Installation: 20 × OD
Connector	Pico HRU_L1	JONHON, PDLC03T05 (DLC/UPC)
	Other Pico HRU	PDLC03T05 (DLC/UPC)
Working Tools	Optical Connector Cleaner	

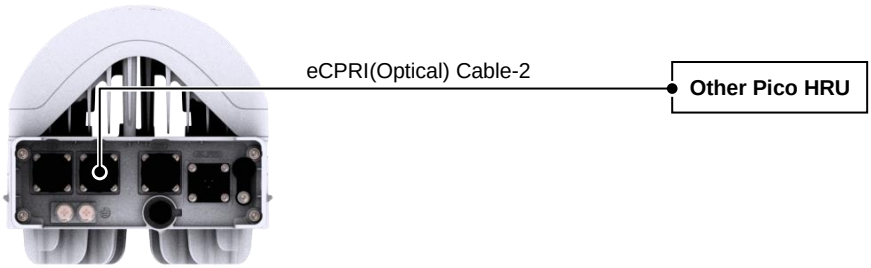
The light from the laser beam runs through the optical cable. Handle the optical cables carefully, as the exposure to the laser beam can seriously injure worker's eye.

Remove the cap of the optical connector before connecting.
- Before connecting the optical cable, check if the ferrule of the connector is soiled. Be careful to keep the cutting section away from dust or foreign material. If the cable is soiled with foreign material, do not blow to remove them.
- Make sure to clean the connector in accordance with the cleaning directions described in 'Appendix: Clean the Optical Connectors'.
- Do not touch the ferrule at the end of optical cable because it is easy to be damaged.

[Before Removing Cap] [After Removing Cap]

1 Install the eCPRI cable-2 from the other Pico HRU to the Pico HRU L1 port.

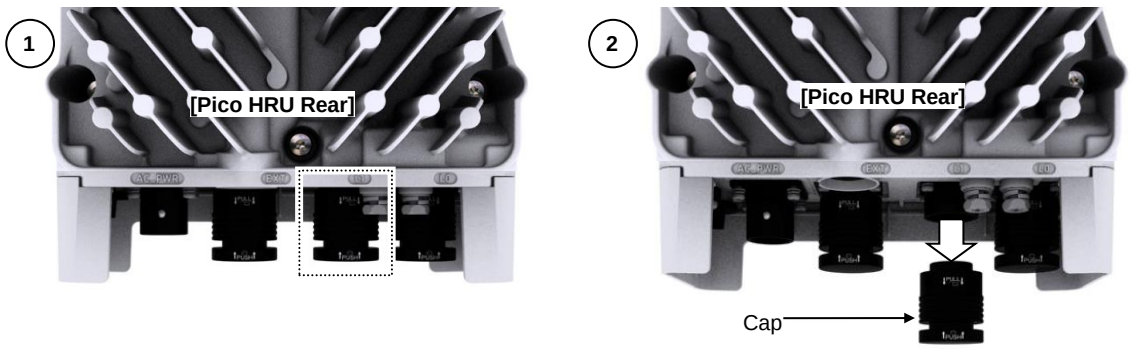
Figure 62. ***Connecting eCPRI Cable-2 (1)***



[Bottom View]

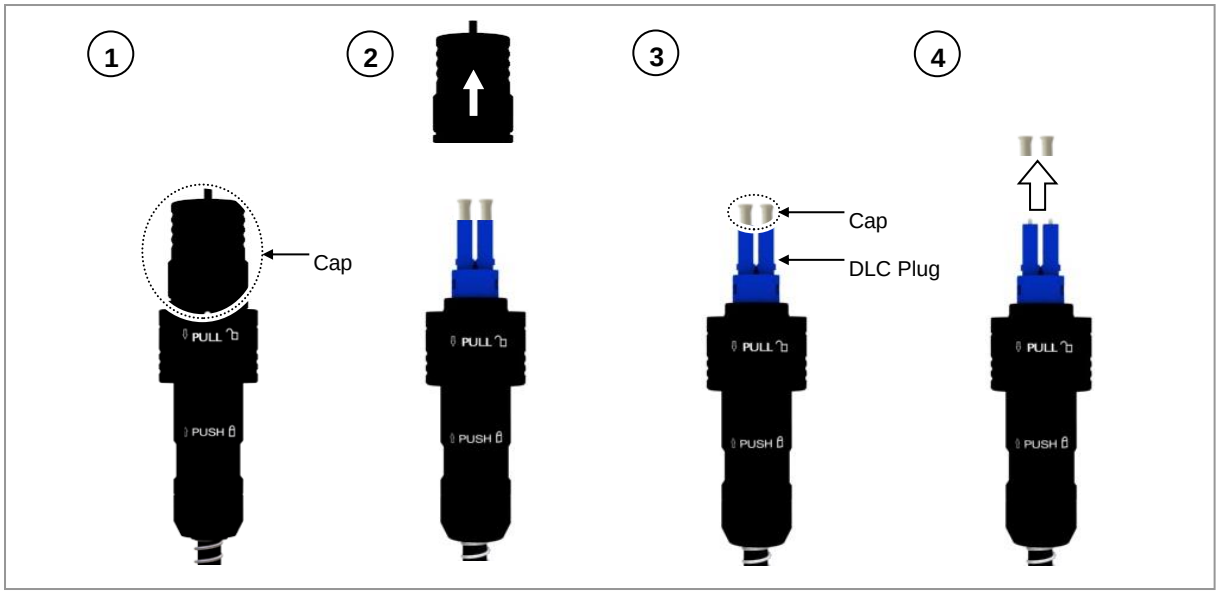
2 Separate the cap from the Pico HRU cables side connector.

Figure 63. ***Connecting eCPRI Cable-2 (2)***



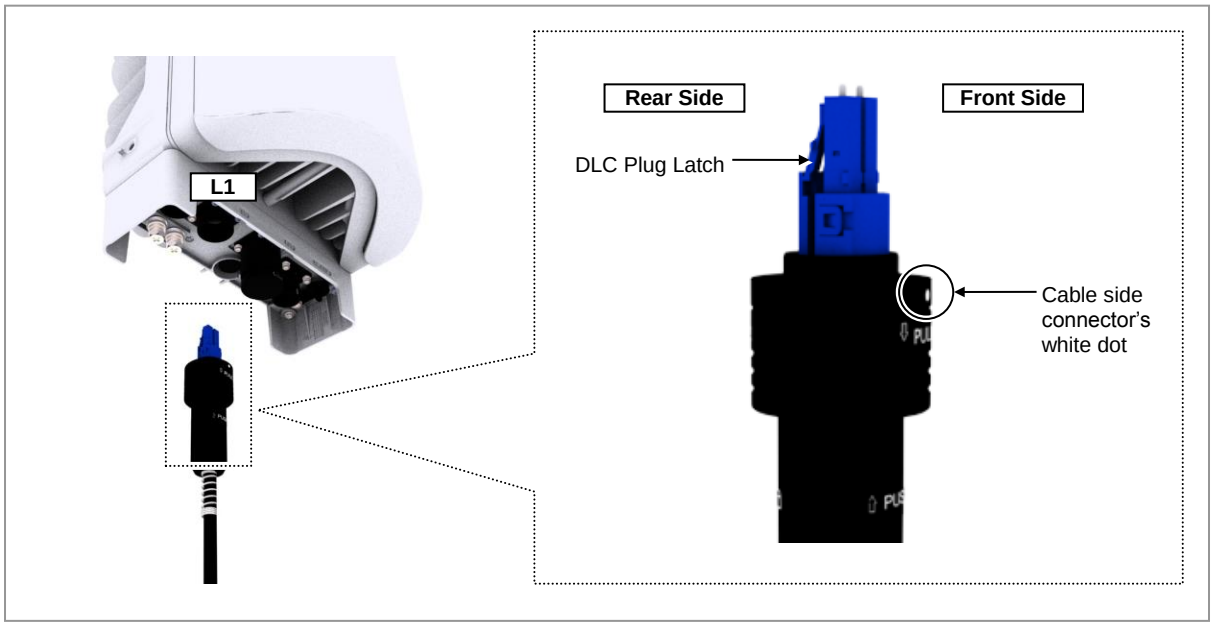
3 Separate the cap from the system side connector (L1 port).

Figure 64. ***Connecting eCPRI Cable-2 (3)***



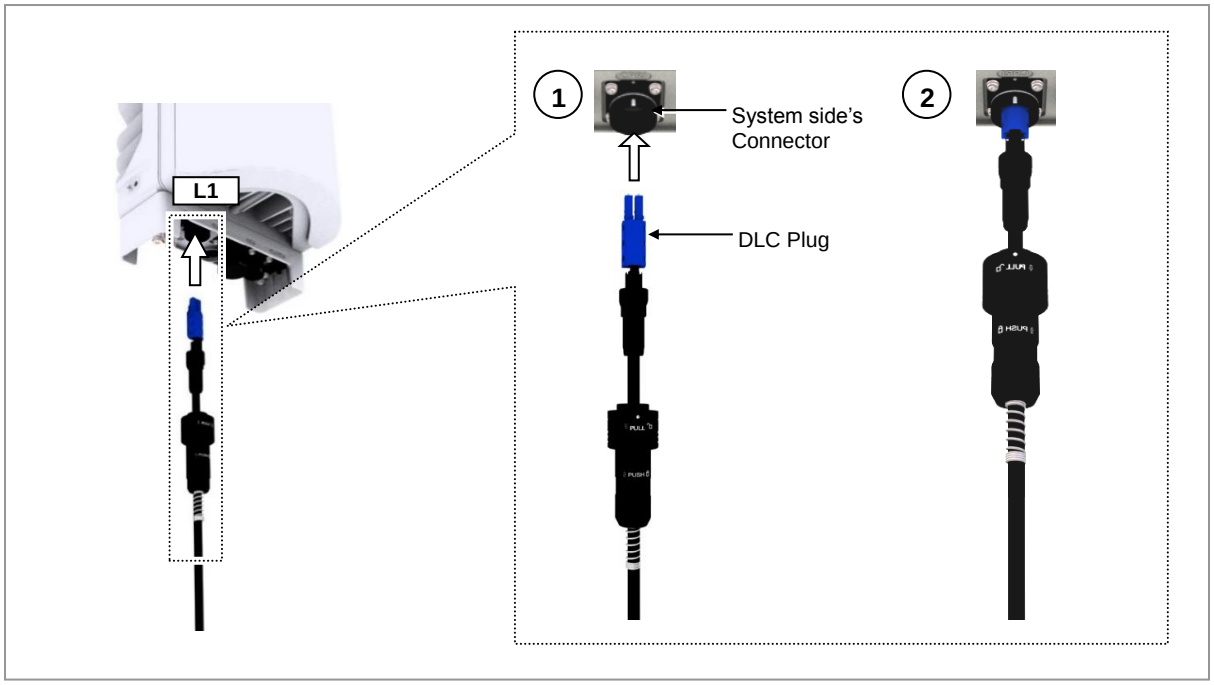
4 The latch of cable side connector should be toward the rear side

Figure 65. ***Connecting eCPRI Cable-2 (4)***



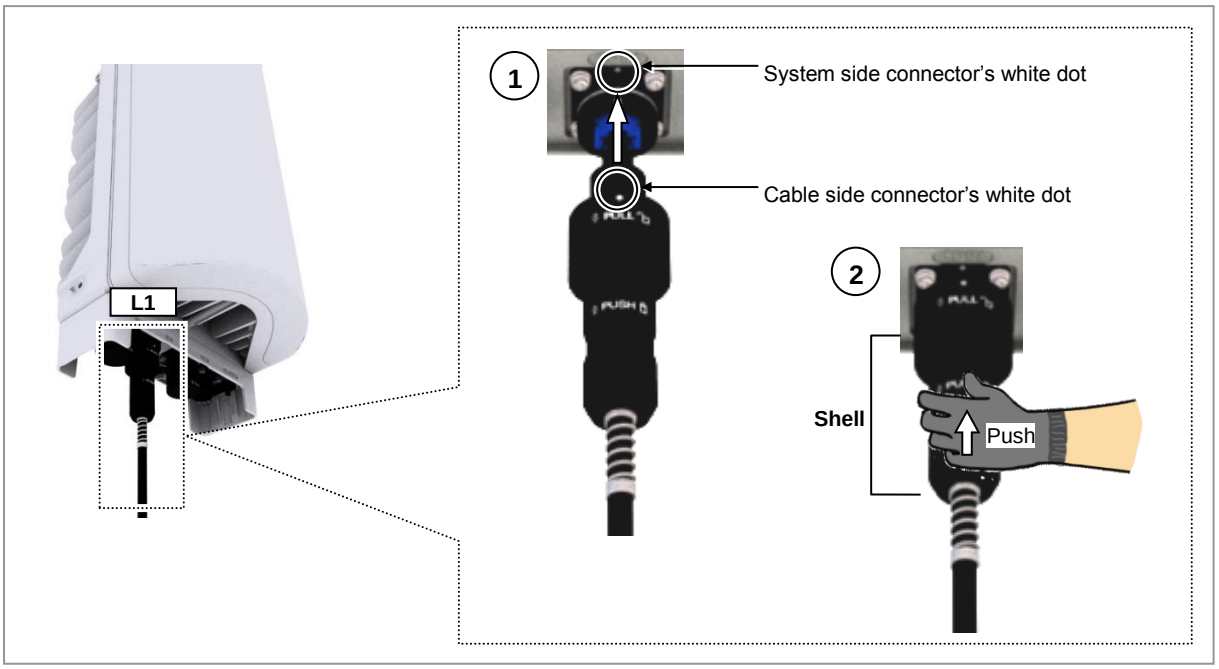
5 Insert the DLC plug to the system side's connector.

Figure 66. ***Connecting eCPRI Cable-2 (5)***

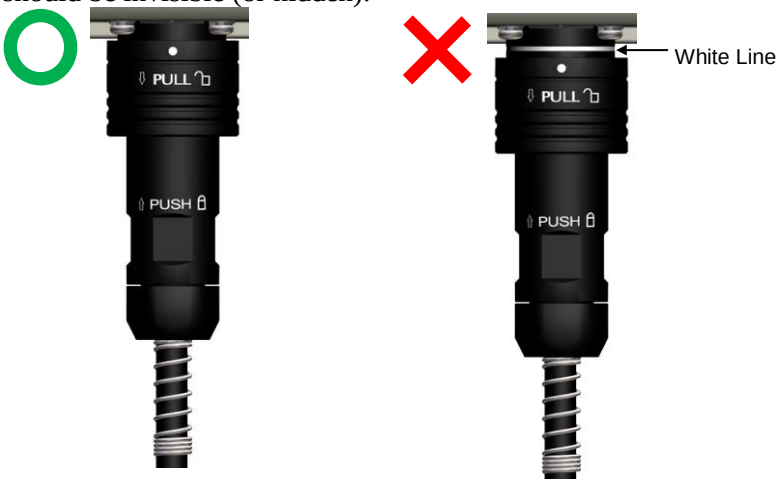


6 Insert the connector aligning the cable side connector's white dot and system side connector's white dot. When inserting the connector, push the shell to upper side.

Figure 67. ***Connecting eCPRI Cable-2 (6)***

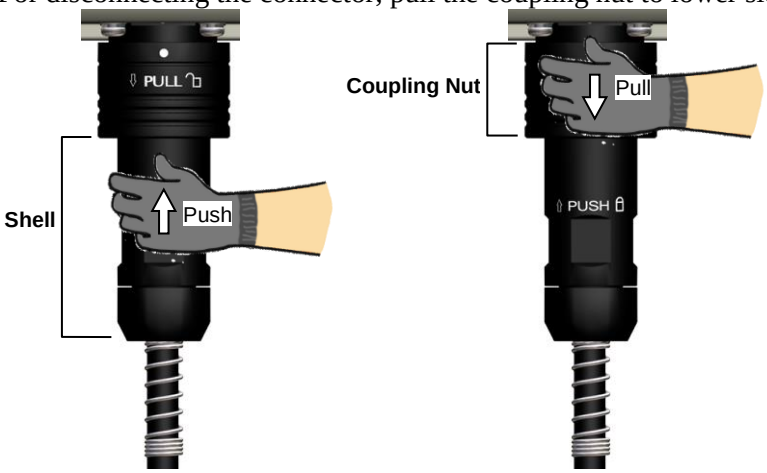


When the connector is fastened tight, the white line on the system side connector should be invisible (or hidden).



[White Line is invisible] **[White Line is visible]**

The The method for connecting/disconnecting the eCPRI connector is as follows:
- For connecting the connector, push the shell to upper side.
- For disconnecting the connector, pull the coupling nut to lower side.



Removing the eCPRI Cable-2

1 Prepare the following components:

Table 21. ***Tools for Removing the eCPRI Cable-2***

Category	Description
Working Tools	• Nipper • Screw Driver(-)

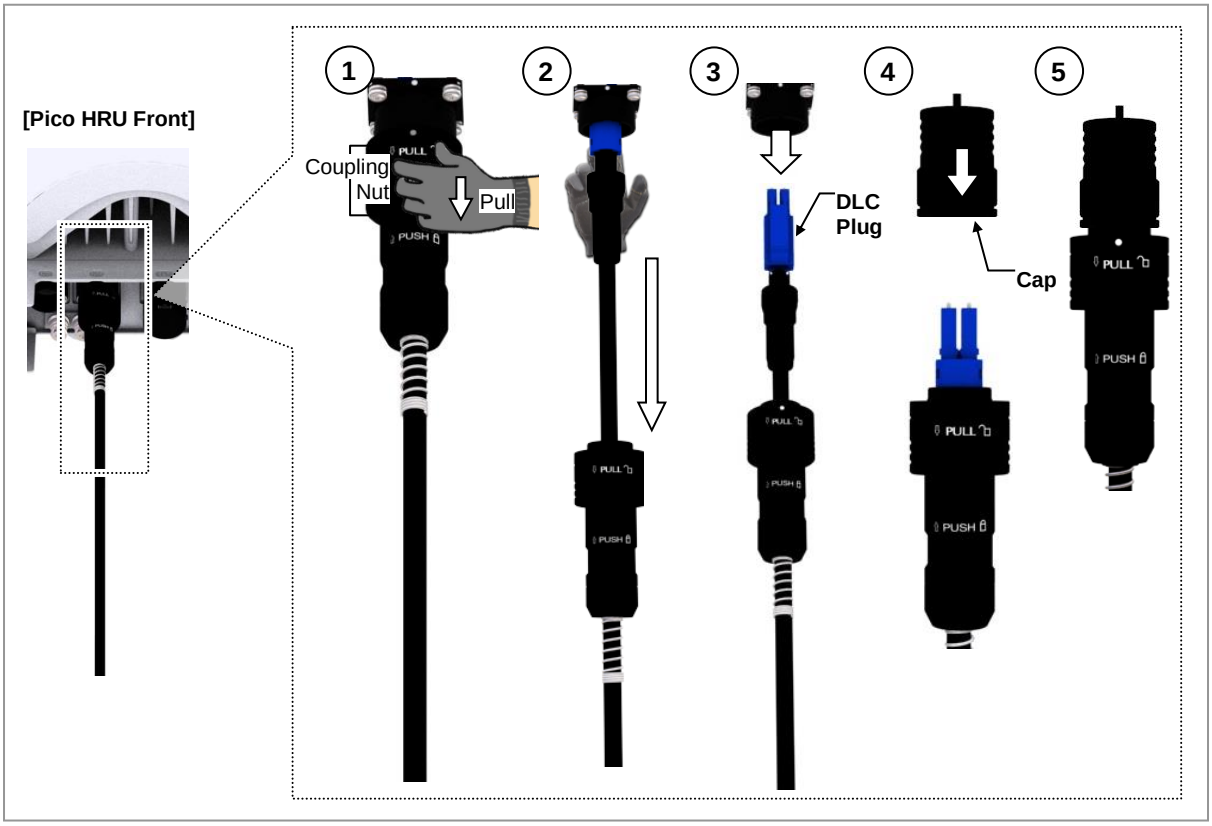
2 Disconnect the cable from the system by pulling the eCPRI connector

coupling nut towards the bottom of the system.

3 Unlock the latch of the DLC plug by hand or using a screwdriver (-) and then remove the cable.

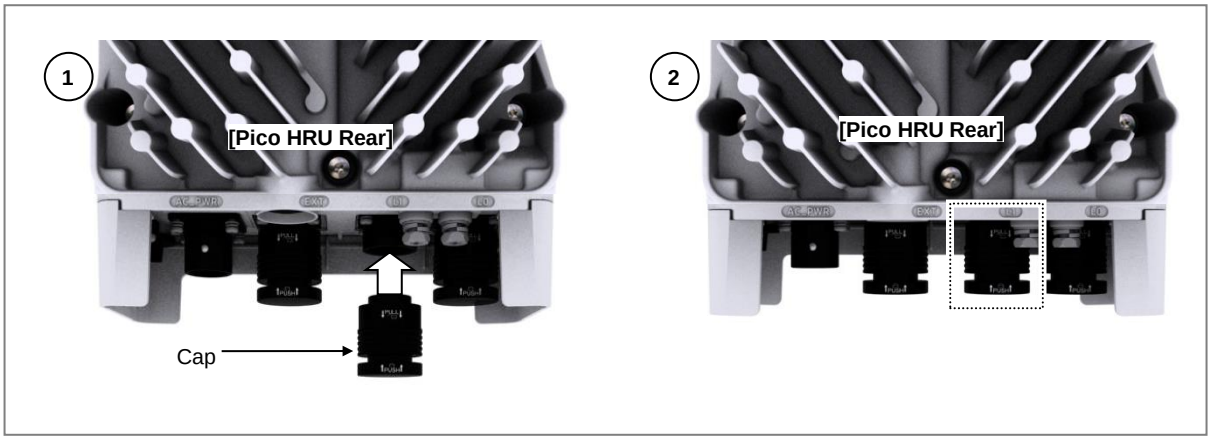
4 Fit the cap onto the removed eCPRI connector.

Figure 68. ***Removing the eCPRI Cable-2 (1)***



5 Fit the cap onto the system connector.

Figure 69. ***Removing the eCPRI Cable-2 (2)***



1) When removing the eCPRI Cable-2, be sure to release the lock beforehand by pressing the DLC plug latch.
2) Avoid touching the ferrule (white part) at the tip of the connector since it can be easily damaged. It must be sealed using the cap.
3) When removing or storing the cable, be sure to keep it at no less than its minimum bending radius and free from externally caused damage.

Connecting Interface Copper Cable

To connect a Interface cable, do the following:

Prerequisites

Before proceeding with connecting the Interface cable, make sure that you have the items mentioned in the table below:

Table 22. ***Parts and Tools for Connecting Interface Copper Cable***

Category	Description	
Installation Section	Pico HRU EXT Port to other Pico HRU	
Cable	Interface Copper Cable Assembly (S-FTP Cat.5e)	
Bending Radius	Operation: 5 × OD	Installation: 10 × OD
Connector	Pico HRU	JONHON, Push Pull Type, RJ45MF-CT-07
	Other Pico HRU	JONHON, Push Pull Type, RJ45MF-CT-07
Working Tools	• Cable Cutter • Wire Stripper • Nipper • LAN Tool	

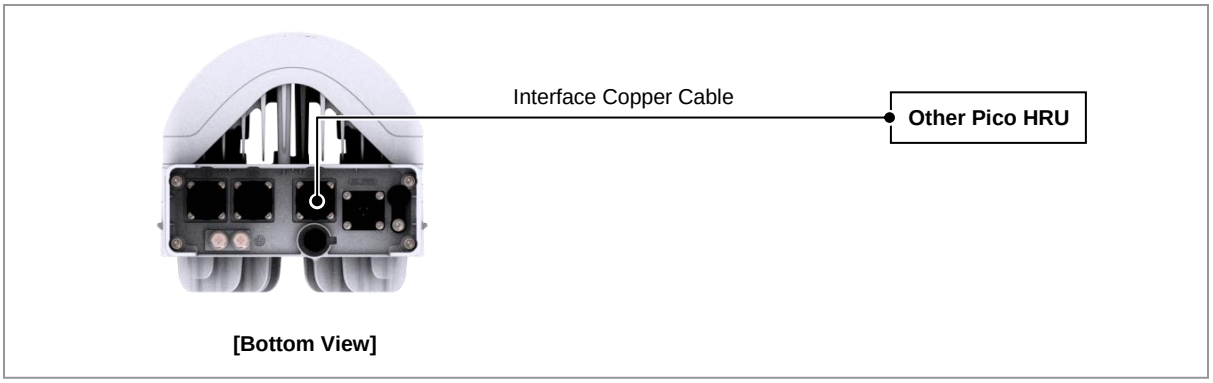
The table below outlines the Interface Copper Cable pin map:

Table 23. ***Interface Copper Cable Pin Map***

System Side	Color Map	Description
1	White/Orange	1
2	Orange	3
3(NC)	N/C	2(NC)
4	Blue	4
5	White/Blue	6
6	Green	5
7	White/Brown	8
8	Brown	7

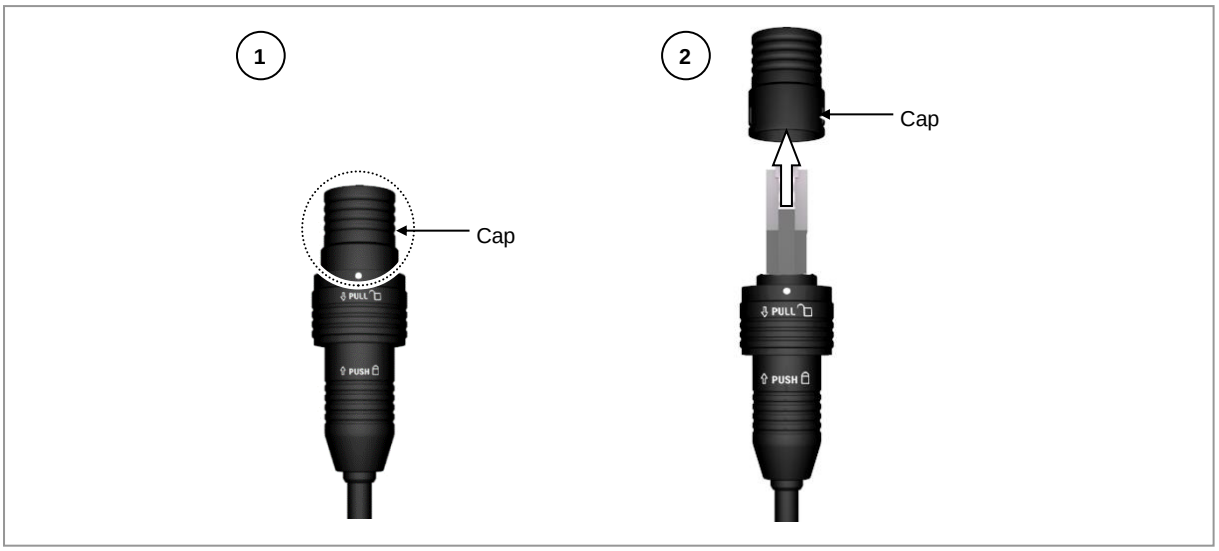
1 Install the Interface Copper cable from the external alarm device to the Pico HRU.

Figure 70. ***Connecting Interface Copper Cable (1)***



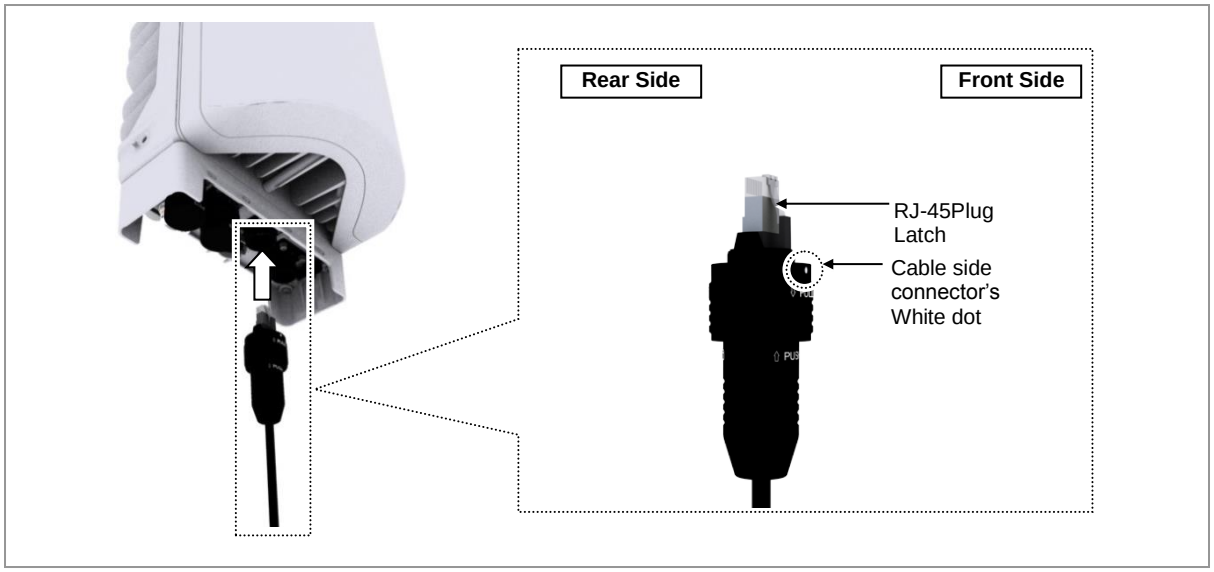
2 Separate the cap from the cable side connector.

Figure 71. ***Connecting Interface Copper Cable (2)***



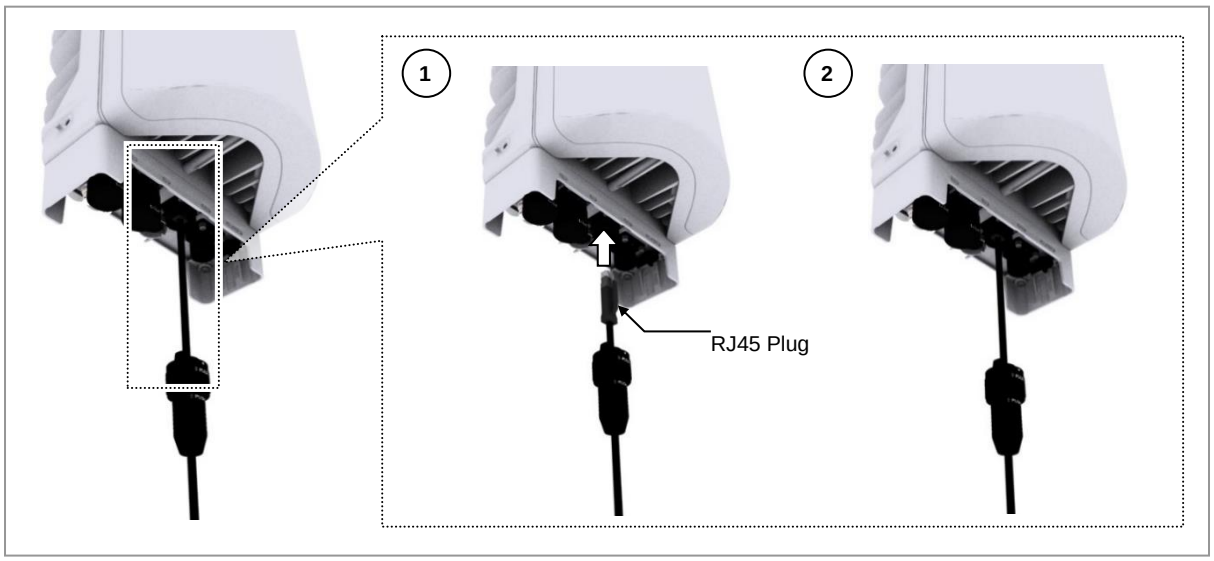
3 The latch of cable side connector should be toward the front of the system.

Figure 72. ***Connecting Interface Copper Cable (3)***



4 Insert the RJ-45 plug to the system side connector.

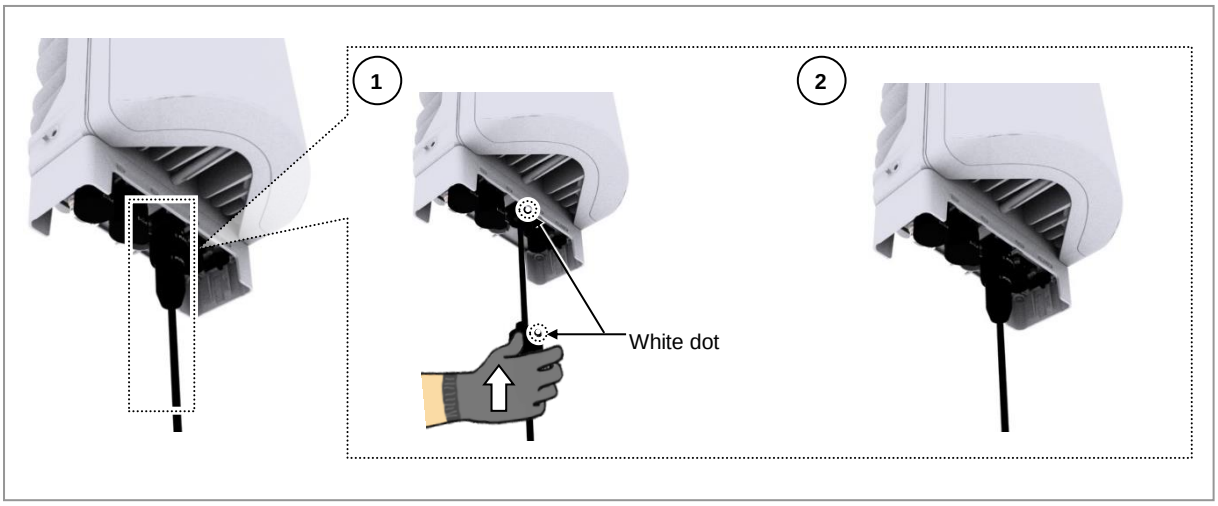
Figure 73. ***Connecting Interface Copper Cable (4)***



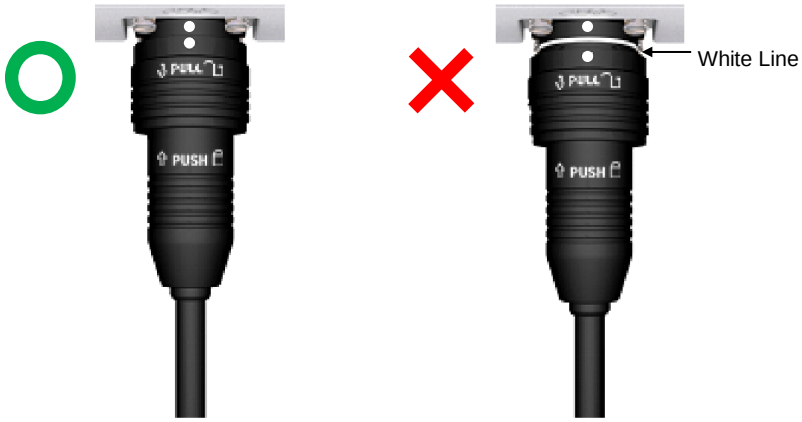
5 Insert the connector aligning white dot of the cable side connector and white dot of the system side connector.

6 When inserting the connector, push the shell to the system side.

Figure 74. ***Connecting Interface Copper Cable (5)***

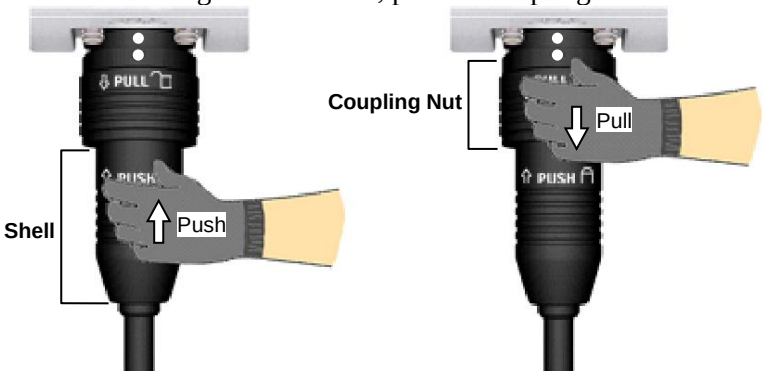


When the connector is fastened tight, the white line on the system side connector becomes invisible.



The method for connecting or disconnecting the backhaul (RJ45) connector is as follows:

- For connecting the connector, push the shell to upper side.
- For disconnecting the connector, pull the coupling nut to lower side.



Remove Interface Copper Cable

1 Prepare the following components:

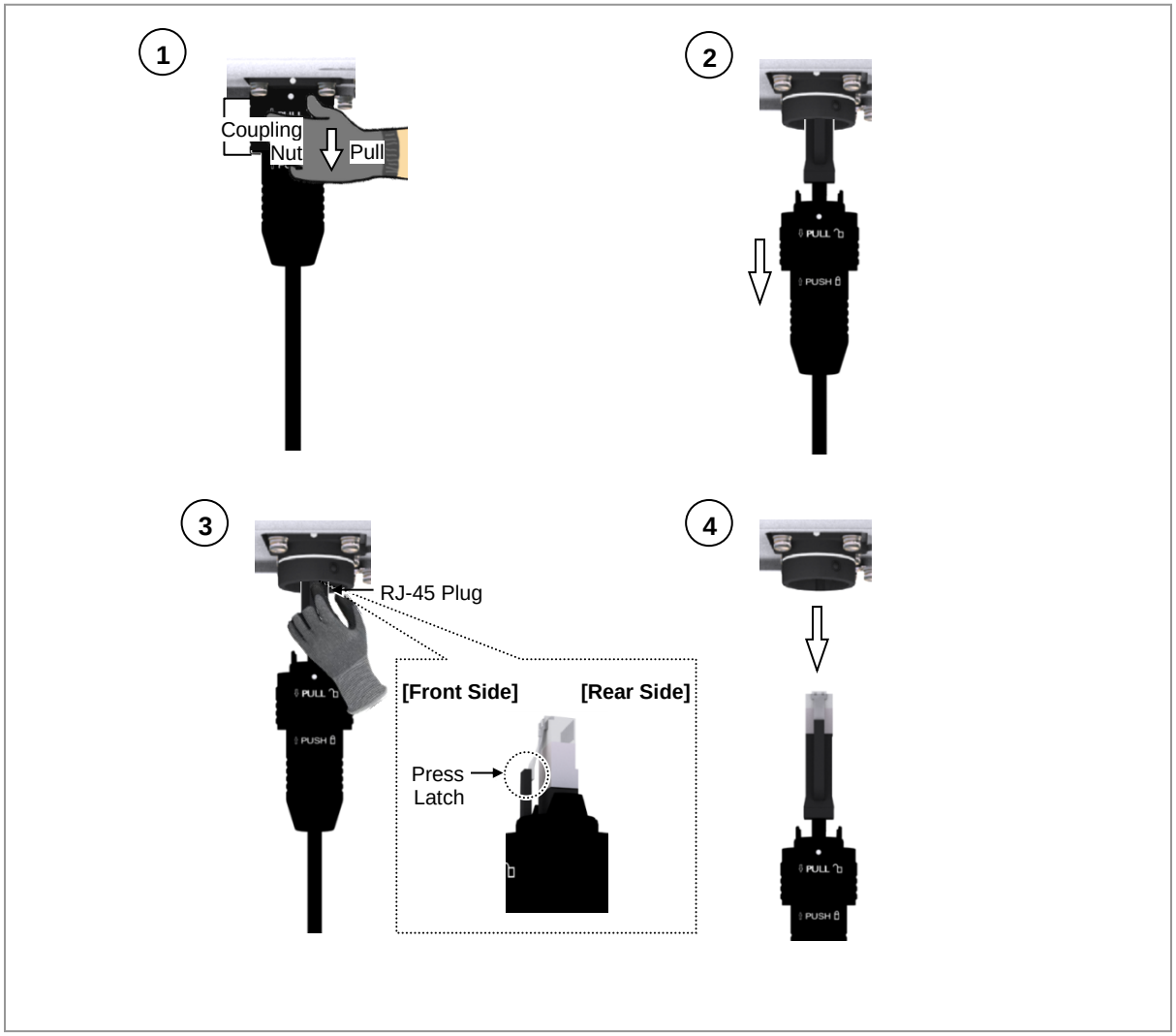
Table 24. ***Tools for Removing the Interface Copper Cable; Push Pull Type***

Category	Description
Working Tools	• Nipper • Screw Driver(-)

2 Disconnect the cable by pulling the connector's coupling nut towards the bottom of the system.

3 Unlock the latch of the RJ-45 plug using your hand or a screwdriver (-) and then remove the cable.

Figure 75. ***Removing the Interface Copper Cable;Push Pull Type (1)***



4 Fit the caps onto the removed cable connector and the system connector.

Figure 76. ***Removing the Interface Copper Cable; Push Pull Type (2)***

1) When removing the interface copper cable, be sure to release the lock beforehand by pressing the RJ-45 plug latch.
2) Once the cable has been removed, it must be sealed using the cap.
3) When removing or storing the cable, be sure to keep it at no less than its minimum bending radius and free from externally caused damage.

Fixing 180° Wrap around cover on the Pole

To fix the 180° wrap around cover on the pole, do the following:

Prerequisites

Before proceeding with 180° wrap around cover on the pole (1 unit installation), make sure that you have the items mentioned in the table below:

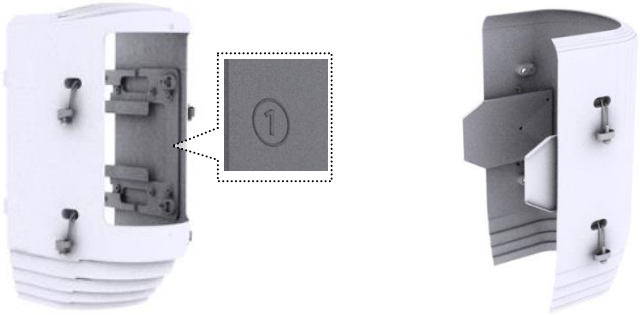
Once you have connected the cable to the system, install the wrap-around cover.

Be sure to position the handle horizontally before installing the wrap-around cover.

Table 25. ***Parts and Tools for Fixing 180° wrap around cover on the Pico HRU***

Category	Description		
Parts	Wrap Around Cover_Small		1 EA
	Wrap Around Cover_Rear		1 EA
	Fasteners	M6 Torx Screw (attached to the cover)	8 EA
Recommended Torque Value	M6 Torx Screw		43 lbf·in
Working Tools	• Torque Driver (20 to 90 lbf·in) • Torx Driver Bit (T25H)		

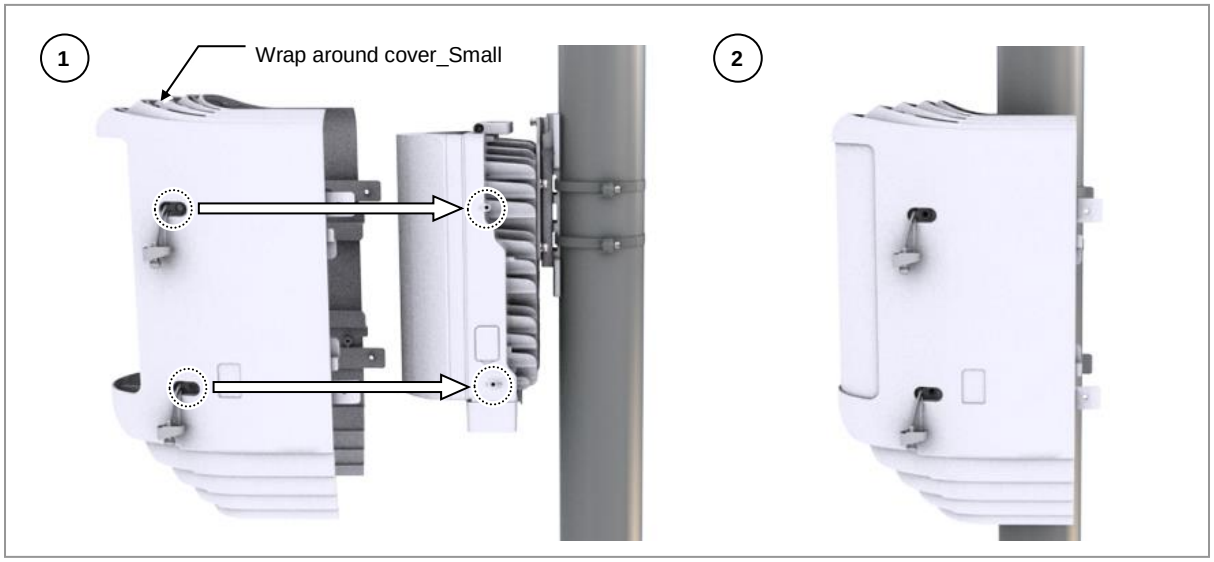
The 180° wrap-around cover looks as follows:



[Wrap Around Cover_Small] **[Wrap Around Cover_Rear]**

1 Align the fixing holes of the wrap-around cover_small with the fixing holes on the left and right side of the Pico HRU.

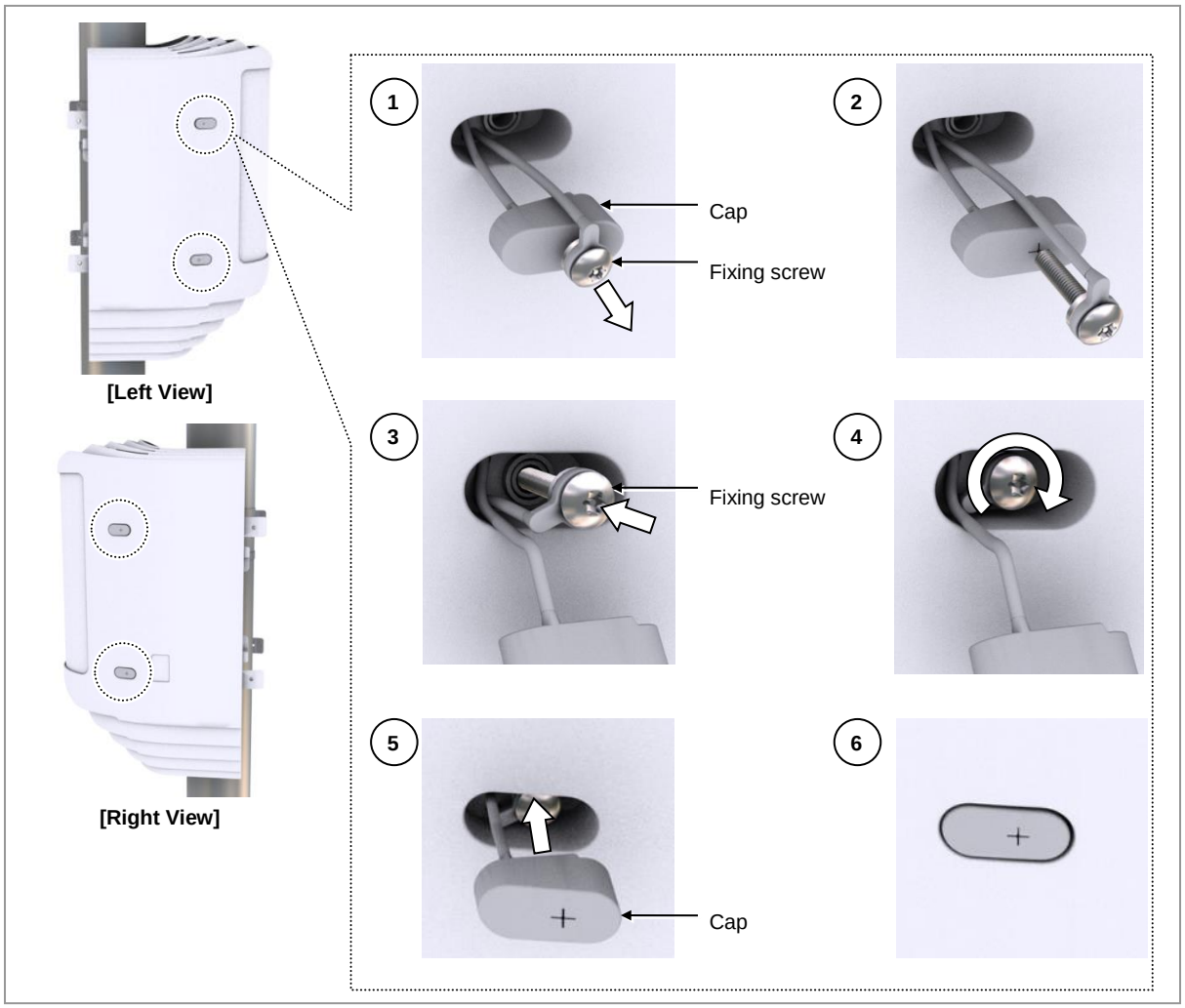
Figure 77. ***Fixing 180° Wrap Around Cover on the Pico HRU (1)***



2 Fix the cover by detaching the fixing screws from the caps.

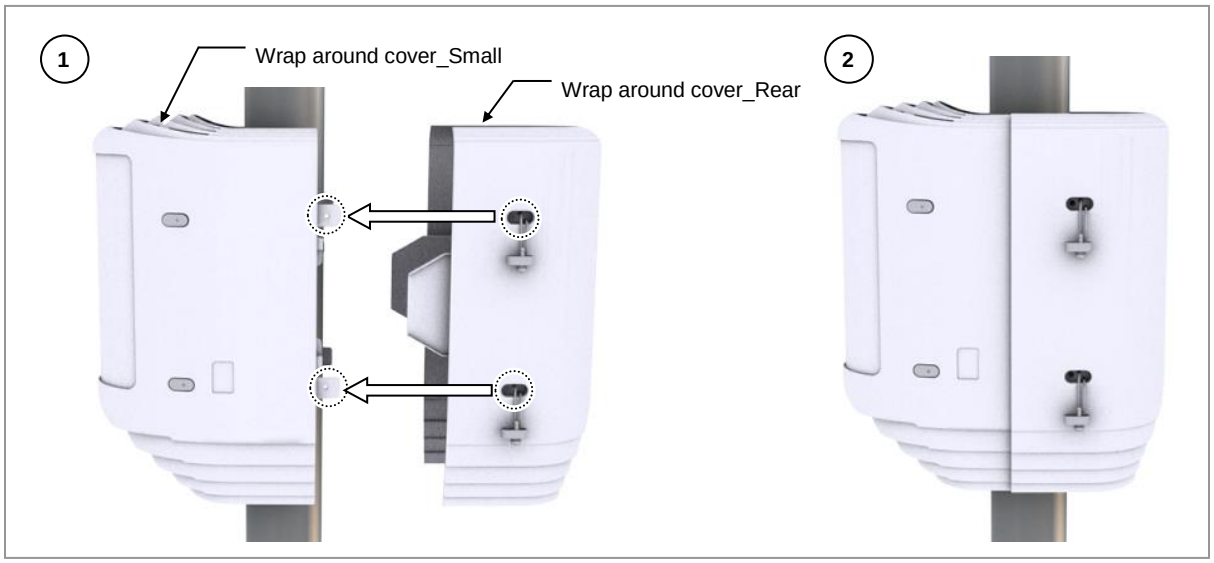
3 After tightening the fixing screws, insert the caps back into their holes.

Figure 78. ***Fixing 180° Wrap Around Cover on the Pico HRU (2)***



4 Align the fixing holes of the wrap-around cover_rear with the fixing holes on the left and right side of the wrap-around cover_small.

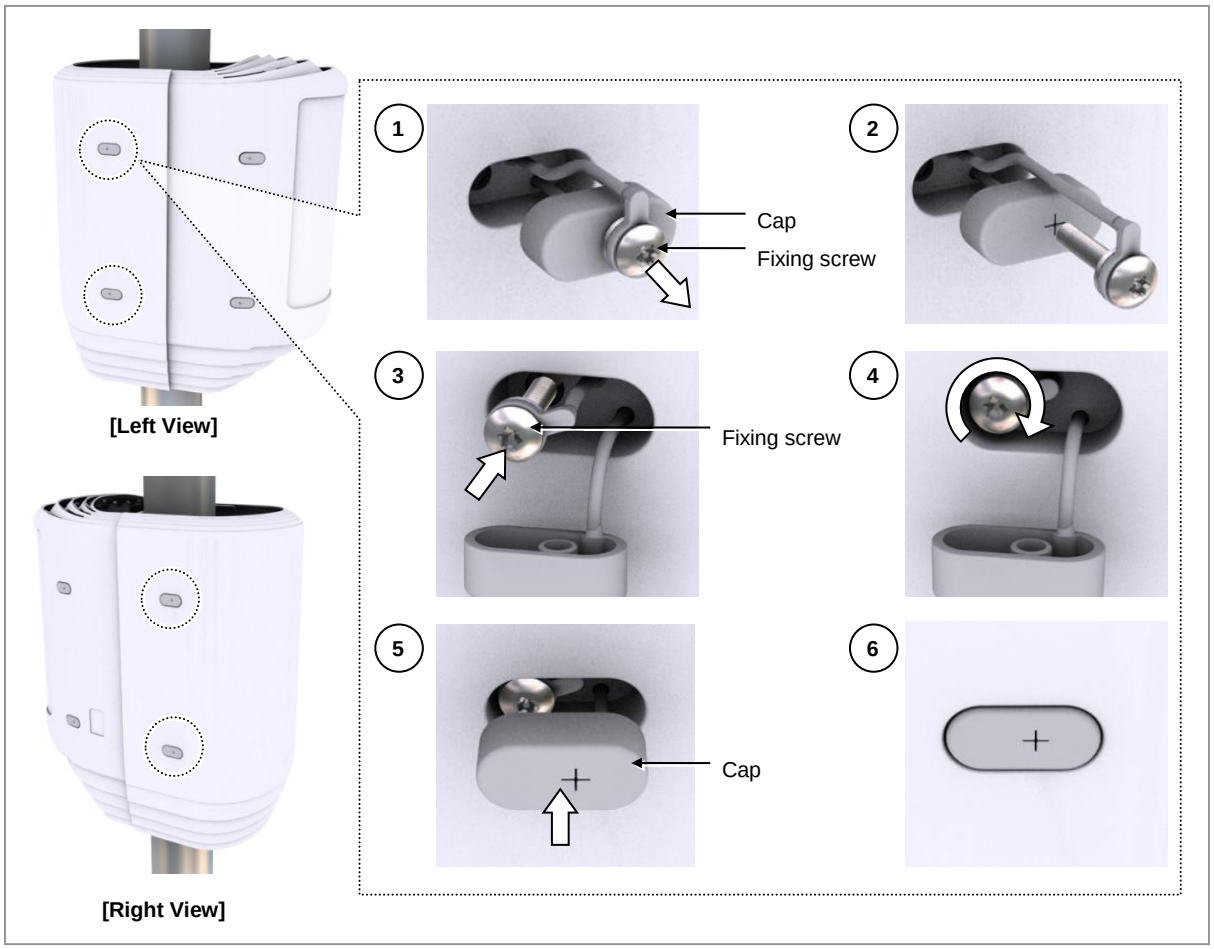
Figure 79. ***Fixing 180° Wrap Around Cover on the Pico HRU (3)***



5 Fix the cover by detaching the fixing screws from the caps.

6 After tightening the fixing screws, insert the caps back into their holes.

Figure 80. ***Fixing 180°Wrap Around Cover on the Pico HRU (4)***



Fixing 360° Wrap around cover on the Pole

To fix the 360° wrap around cover on the pole, do the following:

Prerequisites

Before proceeding with 360° wrap around cover on the pole (2unit installation), make sure that you have the items mentioned in the table below:

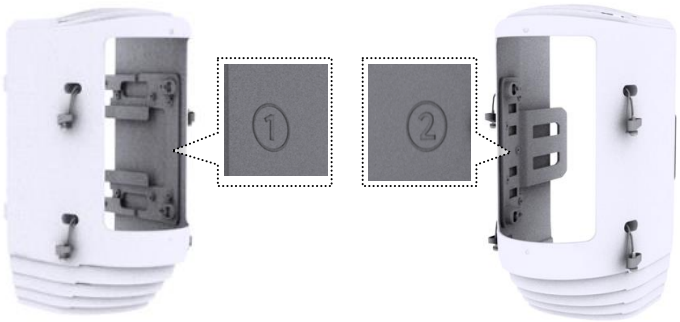
Once you have connected the cable to the system, install the wrap-around cover.

Be sure to position the handle horizontally before installing the wrap-around cover.

Table 26. ***Parts and Tools for Fixing 360˚wrap around cover on the Pico HRU***

Category	Description		
Parts	Wrap Around Cover_Small		1 EA
	Wrap Around Cover_Large		1 EA
	Fasteners	M6 Torx Screw (attached to the cover)	8 EA
Recommended Torque Value	M6 Torx Screw		43 lbf·in
Working Tools	• Torque Driver (20 to 90 lbf·in) • Torx Driver Bit (T25H)		

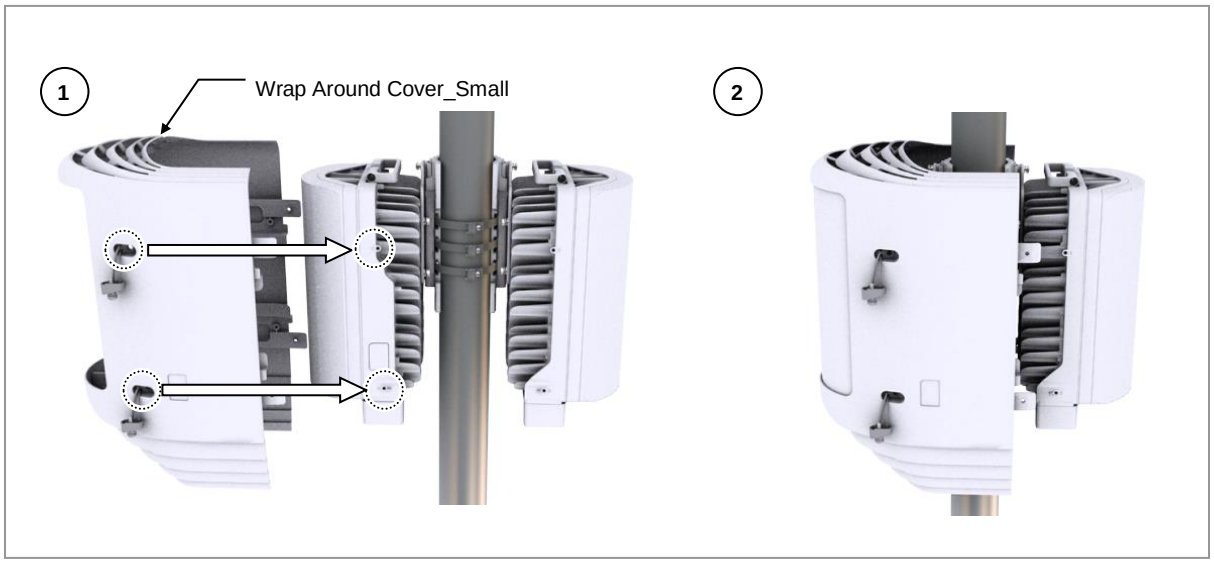
The 360° wrap-around cover looks as follows:



[Wrap Around Cover_Small] **[Wrap Around Cover_Large]**

1 Align the fixing holes of the wrap-around cover_small with the fixing holes on the left and right side of the Pico HRU.

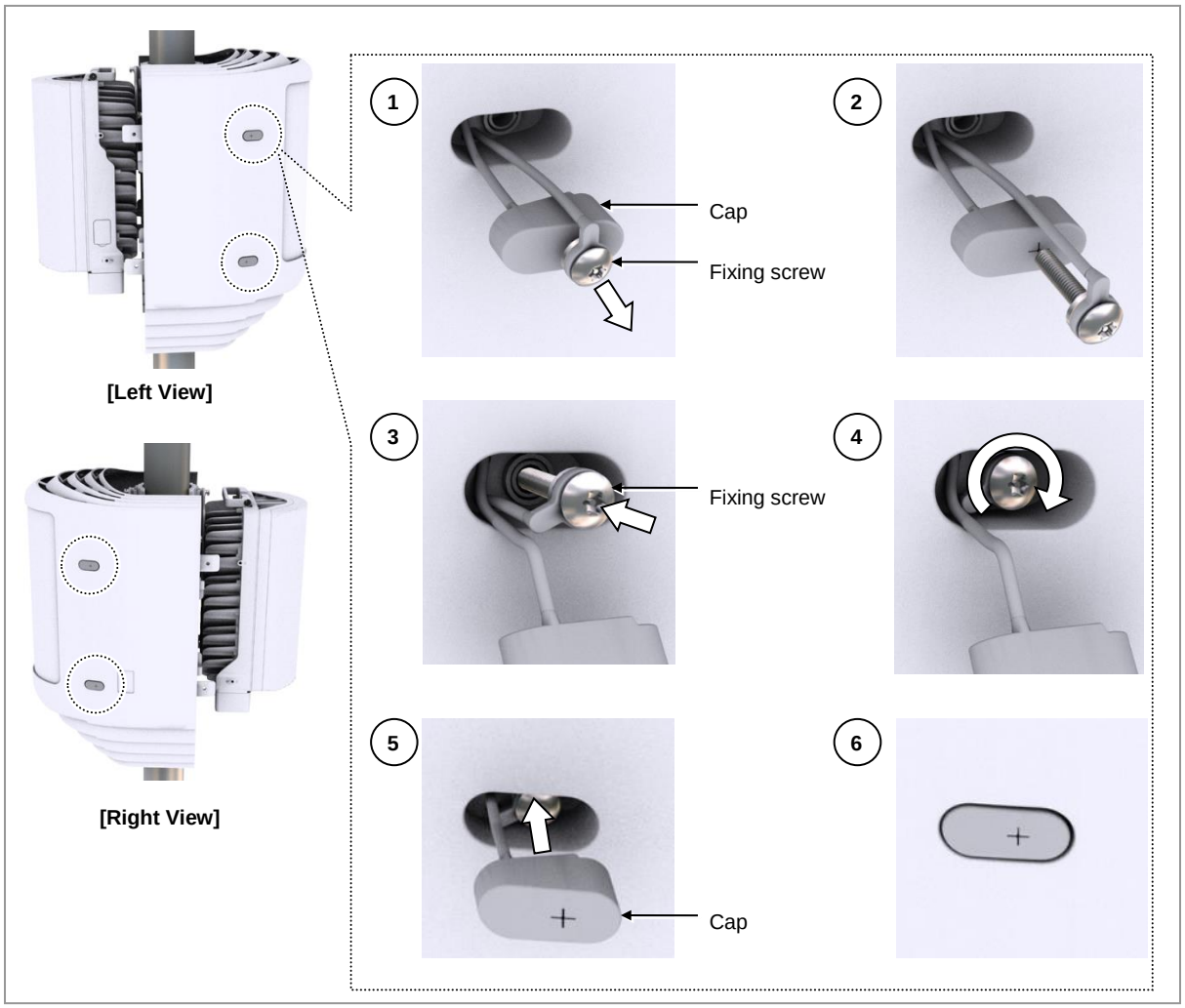
Figure 81. ***Fixing 360° Wrap Around Cover on the Pico HRU (1)***



2 Fix the cover by detaching the fixing screws from the caps.

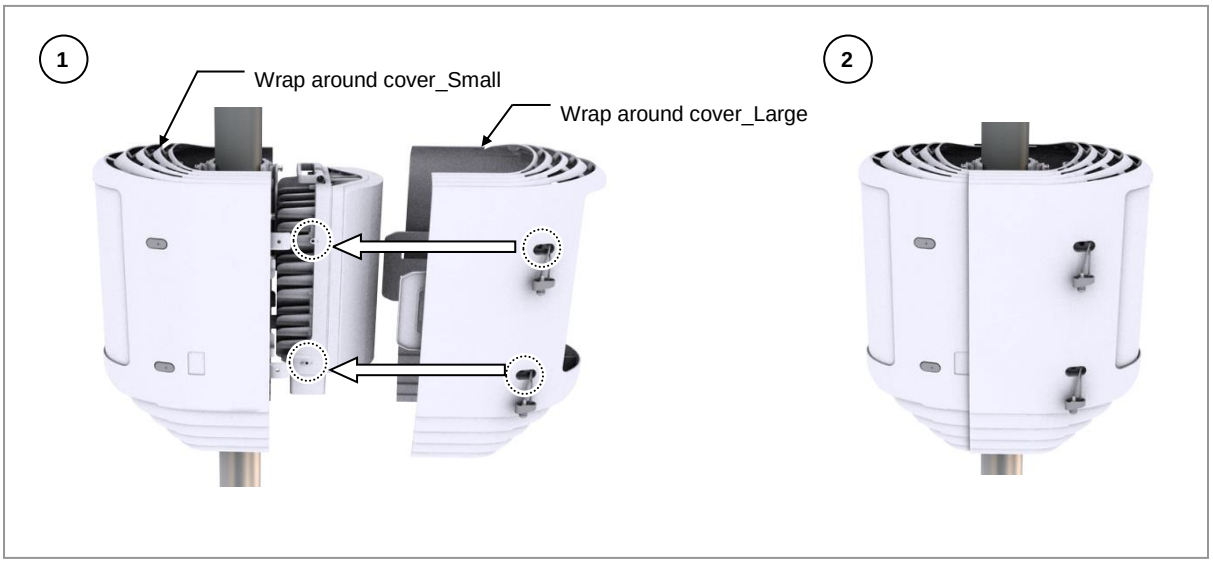
3 After tightening the fixing screws, insert the caps back into their holes.

Figure 82. ***Fixing 360° Wrap Around Cover on the Pico HRU (2)***



4 Align the fixing holes of the wrap-around cover_large with the fixing holes on the left and right side of the Pico HRU.

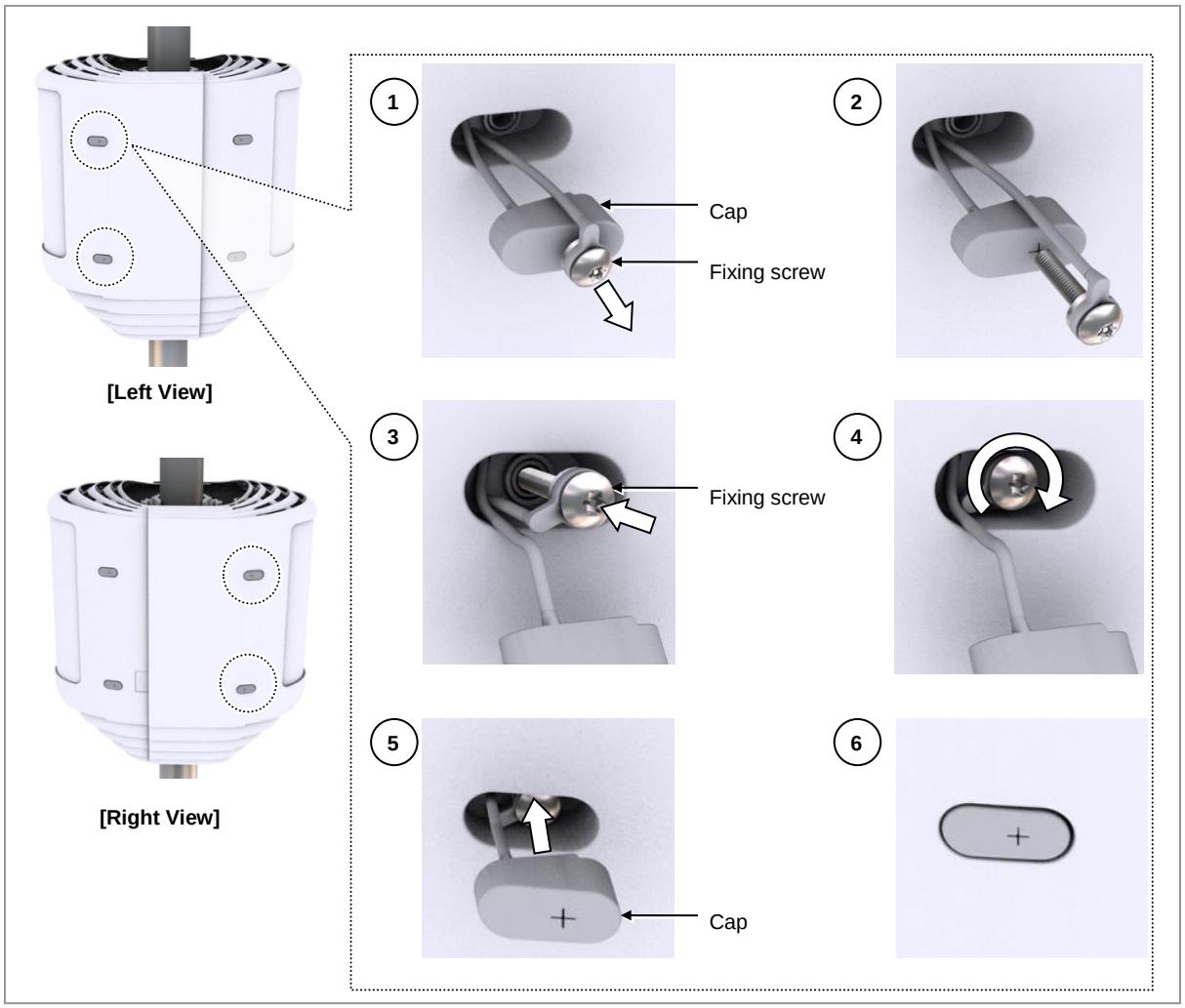
Figure 83. ***Fixing 360° Wrap Around Cover on the Pico HRU (3)***



5 Fix the cover by detaching the fixing screws from the caps.

6 After tightening the fixing screws, insert the caps back into their holes.

Figure 84. ***Fixing 360 °Wrap Around Cover on the Pico HRU (4)***



Fixing 180° Wrap around cover on the Wall

To fix the 180° wrap around cover on the Wall, do the following:

Prerequisites

Before proceeding with 180° wrap around cover on the wall(1unit installation), make sure that you have the items mentioned in the table below:

⚠ Once you have connected the cable to the system, install the wrap-around cover.

⚠ Be sure to position the handle horizontally before installing the wrap-around cover.

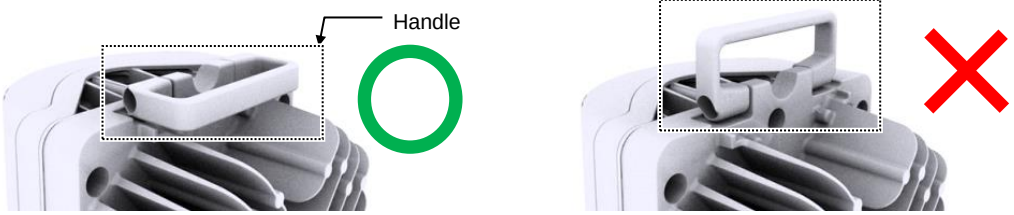


Table 27. ***Parts and Tools for Fixing 180˚wrap around cover on the Wall Type Pico HRU***

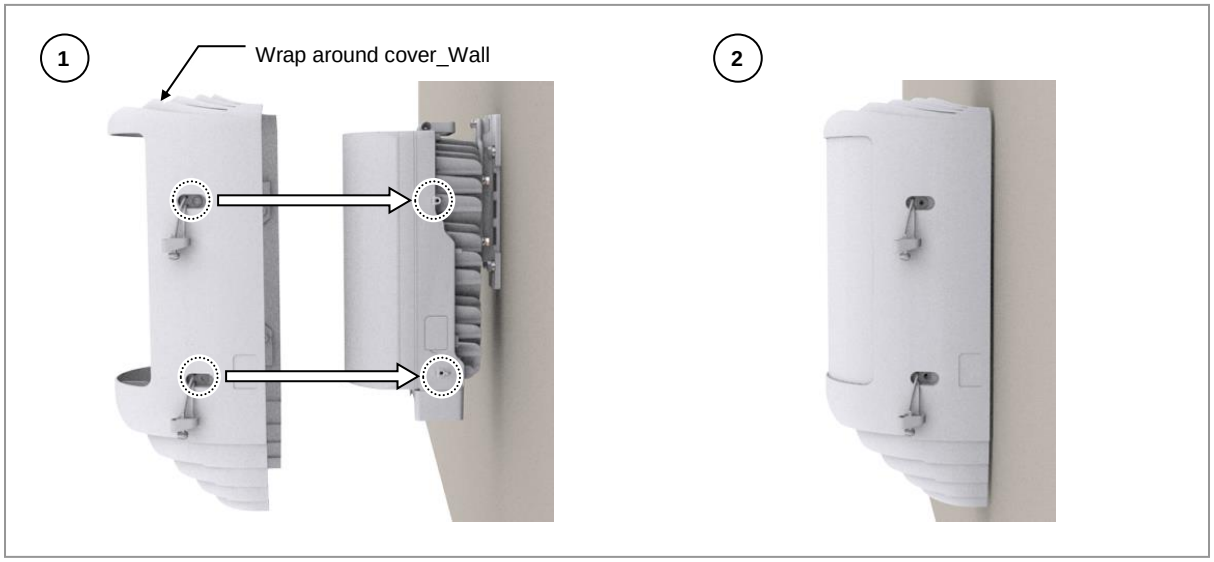
Category	Description		
Parts	Wrap Around Cover_Wall		1 EA
	Fasteners	M6 Torx Screw (attached to the cover)	8 EA
Recommended Torque Value	M6 Torx Screw		43 lbf·in
Working Tools	• Torque Driver (20 to 90 lbf·in) • Torx Driver Bit (T25H)		

The 180° wrap-around cover_wall looks as follows:

[Wrap Around Cover_Wall]

1 Align the fixing holes of the wrap-around cover_wall with the fixing holes on the left and right side of the Pico HRU.

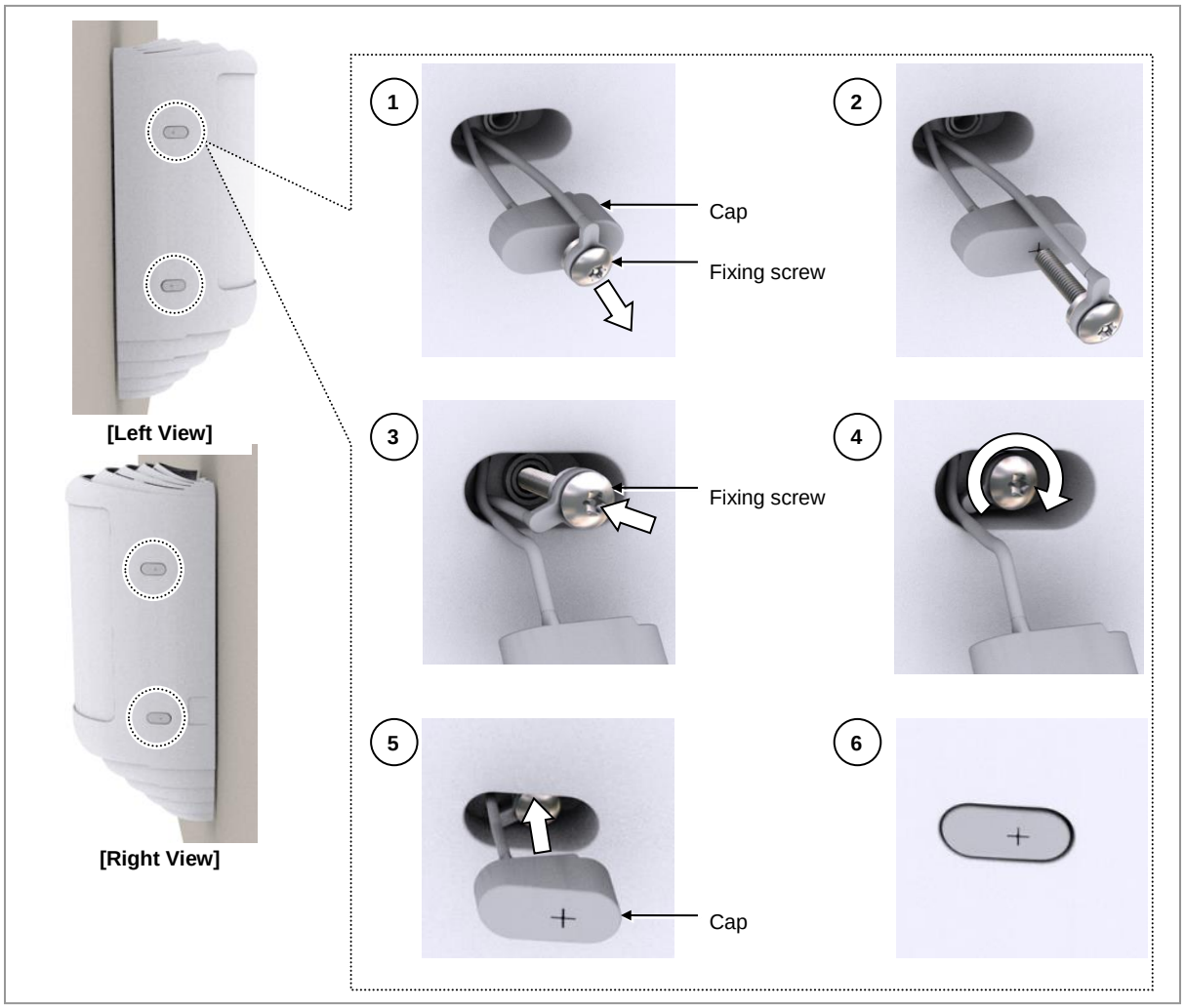
Figure 85. ***Fixing 180° Wrap Around Cover on the Wall Type Pico HRU (1)***



2 Fix the cover by detaching the fixing screws from the caps.

3 After tightening the fixing screws, insert the caps back into their holes.

Figure 86. ***Fixing 180° Wrap Around Cover on the Wall Type Pico HRU (2)***

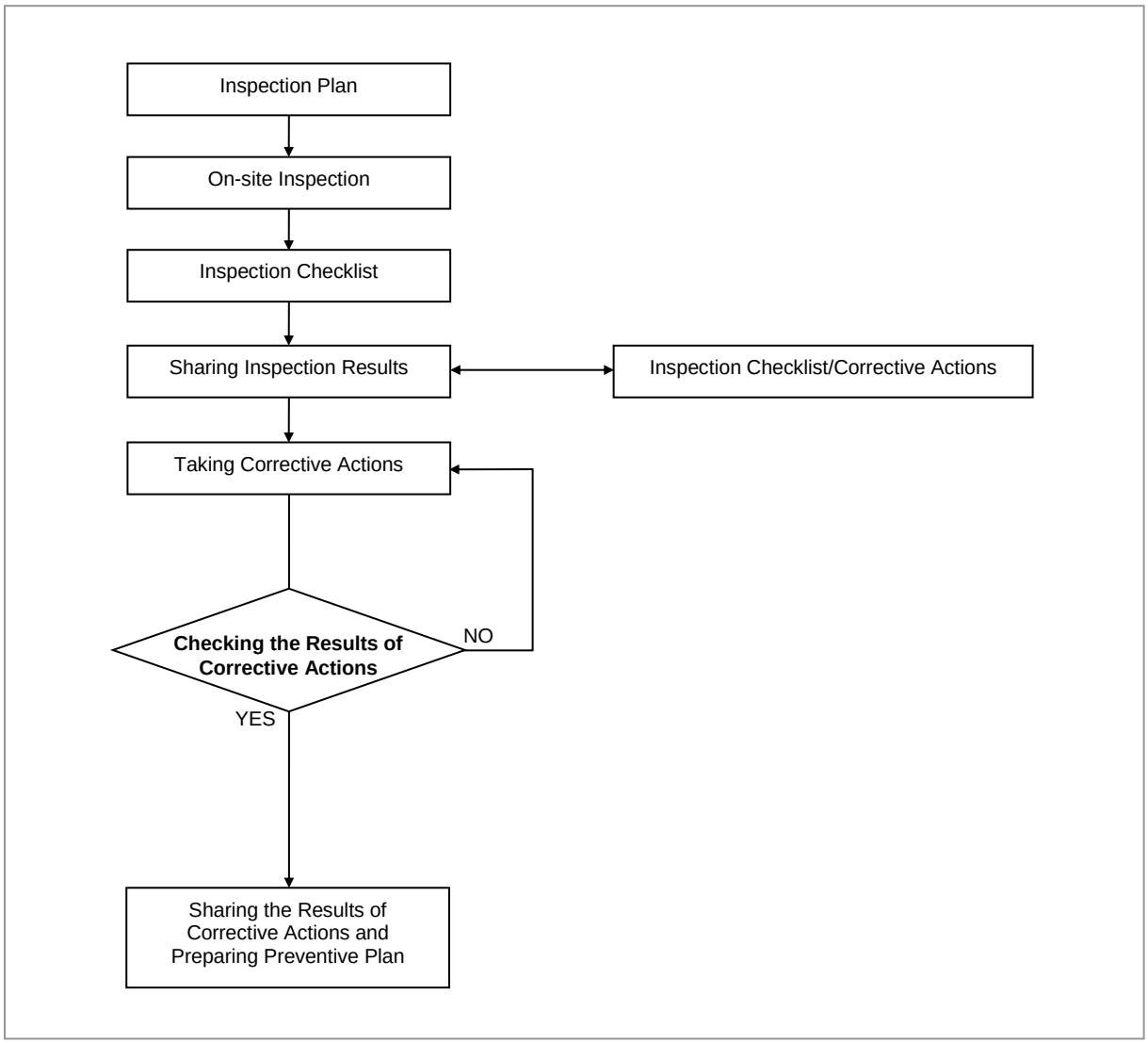


Chapter 4 Inspect the Installation

This chapter describes the procedures to check installation status.

The figure below depicts the overall procedure for inspecting the installation status:

Figure 87. ***Installation Inspection Procedure***



Inspection Plan

Create an inspection sheet per system and select an inspector to set an inspection schedule per site.

On-site Inspection and Inspection Checklist

The on-site inspection is to perform inspection visually or using instruments for each specification, standard, and installation status, based on the inspection checklist at the site where the system is installed.

The inspector must record the results onto the inspection checklist during or after field inspection.

Sharing Inspection Results and Taking Corrective Actions

The inspector must share the inspection results, inspection checklist and corrective actions, with an installation operator. The installation operator must take the corrective actions, if necessary, after reviewing the requirements.

Checking the Results of Corrective Actions

The inspector must check if the corrective actions are properly taken. If they are not sufficient, the inspector must ask the installation operator to take the corrective actions again.

Sharing the Results of Corrective Actions and Preparing Preventive Plan

After the corrective actions are all completed, the inspector must share the results with the installation operator and relevant departments. The inspector must prepare a preventive plan to avoid the reoccurrence of the similar problems.

Construction Situation Checklist

The table below outlines the checklist to inspect the installation of the HRU and other devices.

Table 28. ***Construction Situation Checklist***

Category	Check Items	Criteria	Result	
			Pass	Fail
Installing Equipment	Appearance of equipment and mechanical parts	Equipment damage such as dent, scratch, and crack		
	Placement of equipment and mechanical parts	Maintenance and horizontal/vertical placement		
	Leveling condition of equipment and mechanical parts	Horizontal/vertical status		
	Validity of status and specifications of fastening bolt, nut, and washer	Checking fasteners omission		
		Compliance with assembly order of fasteners		
		Compliance with fastening torque value		
	Insulation status	Checking electrical contact between insulators (insulation resistance tester)		
Power	Installation status of power supply	Power supply capacity		
		Output voltage (tester)		

Category	Check Items	Criteria	Result	
			Pass	Fail
	Installation of circuit breaker	Checking circuit breaker capacity		
	Cable specification	Checking the specification		
		Checking the limit distance		
	Cabling	Cable damage		
		Proper installation route		
		Compliance with the radius of curvature		
	Cable binding status	Binding status		
		Binding interval		
		Checking binding materials		
	Cable connection	Checking cable connection (Pin Map)		
		Input voltage		
		Assembly condition of a pressure terminal and connector		
		Fastening condition of a pressure terminal and connector		
		Checking compliance with fastening torque value		
	Installation status of cable tag	Position		
		Marking content		
		Checking tag installation method		
Other data cables	Cable specification	Checking the specification		
	Cabling	Cable damage		
		Proper installation route		
		Compliance with the radius of curvature		
	Cable binding status	Binding status		
		Binding interval		
		Checking binding materials		
	Cable connection	Checking cable connection (Pin Map)		
		Assembly condition of a connector		
		Fastening condition of a connector		
		Checking compliance with fastening torque value		
	Installation status of cable tag	Position		
		Marking content		
		Checking tag installation method		
		Checking tag installation method		
Others	Reserved ports	Checking port cap fastening status		
	Cable inlet status/Connection of equipment I/O port	Checking fastening status (Conduit/Cable Gland)		
	Cable tray and duct	Checking installation status		
	Status of inside/outside of	Checking the stocking condition (waste		

Category	Check Items	Criteria	Result	
			Pass	Fail
	the equipment and system surrounding area	parts, waste materials, and packing materials)		
Opinion				

Appendix A Acronyms

AC	Alternating Current
CDU	Cabinet Digital Unit
DC	Direct Current
DL	Down Link
eCPRI	Ethernet-based Common Public Radio Interface
HRU	Hybrid Radio Unit
NR	New Radio
MGB	Main Ground Bar
RTN	Return
SELV	Safe Extra Low Voltage
SEMS	pre-asSEMbled washers and screws
S-FTP	Screened-Foiled Twisted Pair
UL	Up Link

Appendix B Cleaning Optical Connector

Introduction

When connecting an optical cable to the system, the performance of the system can be decreased or failures can occur if the core section of an optical connector is dirty due to dust or foreign material. Therefore, you should clean the optical connector before connecting an optical cable to the system.

When using an optical connector cleaner, use the products shown in the example below or their equivalents.

Examples:

Manufacturer-USCONEC (http://www.usconec.com)

- IBC™ Brand Cleaner (P/N: 9393): For LC-LC and MU Connector Cleaning
- IBC™ Brand Cleaner (P/N: 9392): For SC Connector Cleaning
- IBC™ Brand Cleaner (P/N: 12910): For ODC Connector Cleaning

Manufacturer-The Fibers (www.thefibers.com)

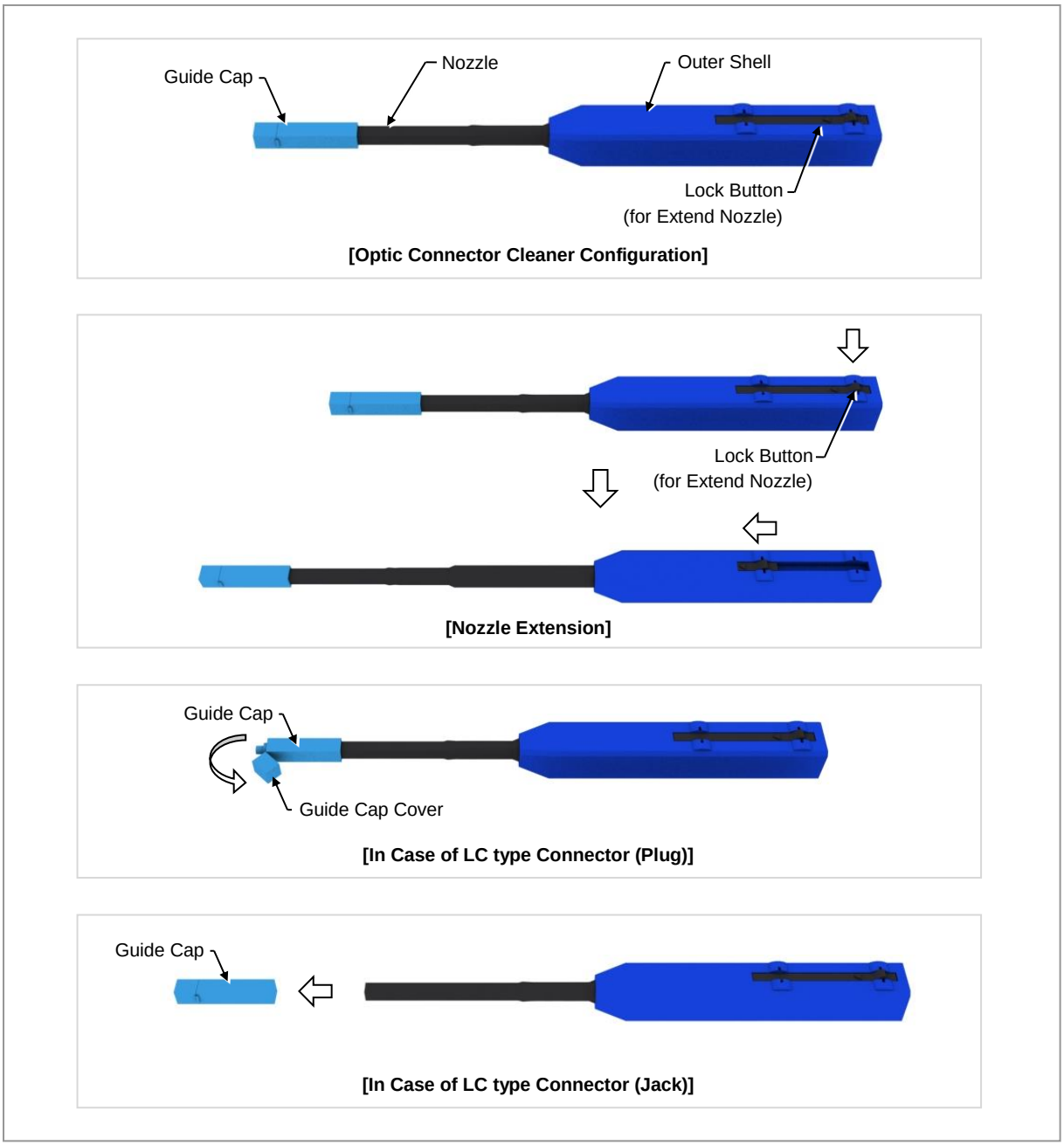
- HuxCleaner 1.25 mm Type: For LC and MU Connector Cleaning
- HuxCleaner 2.5 mm Type: For SC, FC and ST Connector Cleaning

Follow the manufacturer's instructions for cleaning the optical connectors.

Cleaning Optical Module

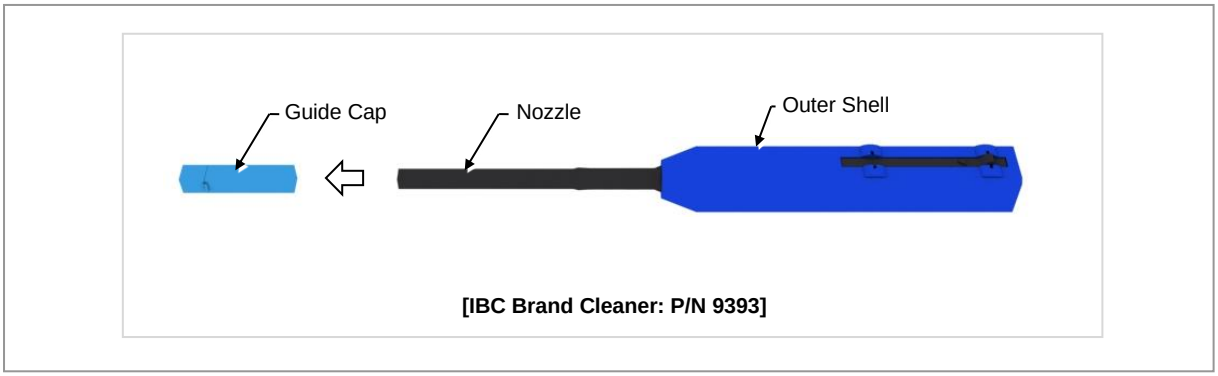
Method that uses IBC™ Brand Cleaner (P/N 9393) for LC connector is as follows:

Figure 88. ***Cleaning Optical Module (1)***



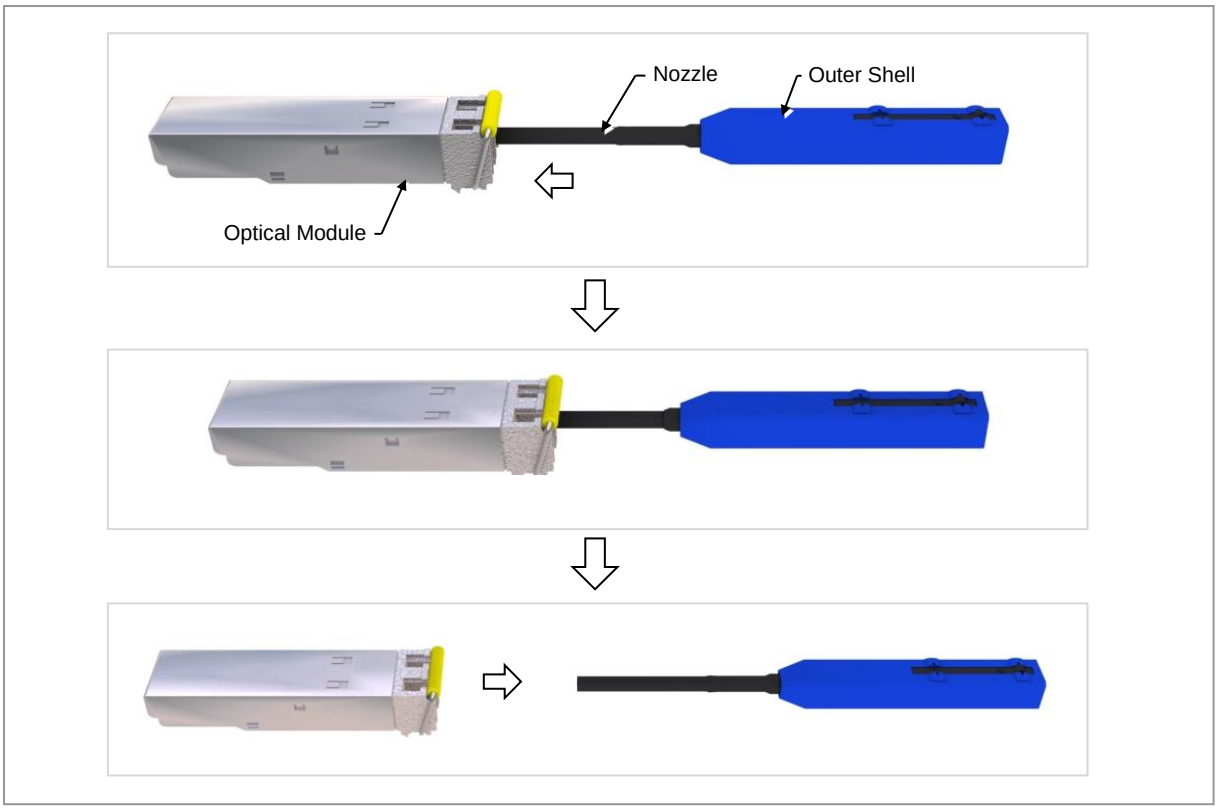
4 To clean the optical module, remove the guide cap from the cleaner (P/N: 9393).

Figure 89. ***Cleaning Optical Module (2)***



5 Insert a cleaner guide cap to every core of the optical module. Clean it by pushing the outer shell toward the nozzle until you hear the sound of the detergent being sprayed. (Repeat once or twice.)

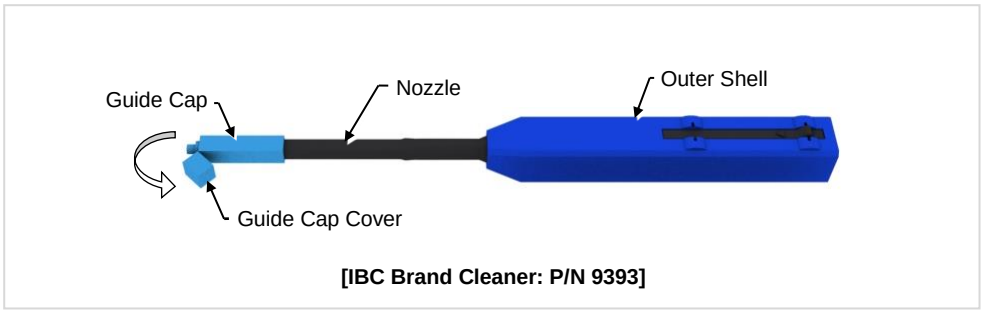
Figure 90. ***Cleaning Optical Module (3)***



Method that uses IBC™ Brand Cleaner (P/N 9393) for LC connector is as follows:

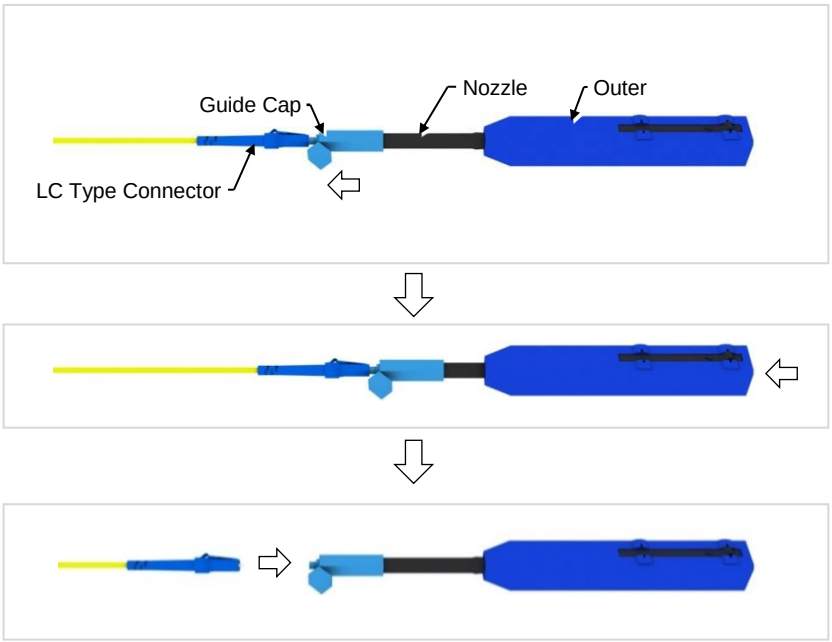
6 Open the guide cap cover of the cleaner (P/N: 9393) to clean the optical cable connector.

Figure 91. ***Cleaning Optical Connector (1)***



7 Insert the cleaner's guide cap into each core of the optical cable connector and push the outer shell towards the nozzle until you hear that the cleaning liquid is sprayed (one or twice).

Figure 92. ***Cleaning Optical Connector (2)***



Measure the Optical Output and Connecting the Optical Connector

To measure the optical output

1 Using an optical power meter check the optical output.

2 If the optical output measurement result meets the reference value, clean the

connector again and connect it.

3 If the measurement result does not meet the reference value, discard the cable, replace it with a new cable, and then clean the new one and connect it to the system.

[LC/PC Plug]

[Optical Power meter]

Appendix C Standard Torque

When fastening the bolt, use the standard torque values provided in tables below for tightening nuts and bolts to prevent damage to the equipment. If the torque value for each connection part is predefined, use the defined value.

Table 29. ***Standard Torque Value for Fastening Bolts***

Bolt Spec.	Torque Value (N·m)	Torque Value (lbf·in)	Torque Value (kgf·cm)
M3	0.63	5.6	6.4
M4	1.5	13	15
M5	2.8	25	29
M6	4.9	43	50
M8	12	110	127
M10	25	217	250
M12	42	372	428

Table 30. ***Brass Bolts Torque Value***

Bolt Spec.	Torque Value (N·m)	Torque Value (lbf·in)	Torque Value (kgf·cm)
M6	2.9	26	30
M8	6.3	56	64

Table 31. ***Connector Connection Torque Value***

Connector	Torque Value (N·m)	Torque Value (lbf·in)	Torque Value (kgf·cm)
SMA connector	0.59	5.2	6
TNC connector	0.88	7.8	9
N-type connector	2	17	20
DIN-type connector	25	217	250
4.3-10-type connector	5	44	51

The torque values can be different, defending on the material, characteristic, and specification of the equipment and fastener. Ensure that you check the proper torque value for each specification of the equipment and the fastener.

SAMSUNG

5G NR Pico HRU
Installation Manual
HT5H01

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