SAMSUNG

RT2201-46A
Installation Manual

Describes product installation and requirement procedure.

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Radio Access Network

Document Number: 2600-00NI4IGAA

SNMTC-v3-0312

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 LTE LAA RRH (RT2201-46A) 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**

New and Changed Information

This section describes information that has been added/changed since the previous publication of this manual.

- Caution statements about AC / DC converter are added in the 'While Installing' section and 'After Installing' section.

Revision History

The following table lists all versions of this document.

Document Version	Publication Date	Remarks
1.0	January 2019	First version
2.0	January 2019	-

Organization of This Document

Section	Title	Description
Chapter 1	Before Installation	This chapter introduces RRH and describes the items that should be understood before installation.
Chapter 2	Installing System	This chapter describes the procedures to install the RRH.
Chapter 3	Connecting Cables	This chapter describes the procedures to connect the cables to the installed RRH.
Chapter 4	Inspect the Installation	This chapter describes the procedures of inspecting installation status after the RRH installation and cabling is completed.
Appendix A	Acronyms	This appendix describes the acronyms used in this manual.
Appendix B	Clean the Optical Connectors	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.

Related Documentation

- LTE eNB System Description

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 -48 V DC 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 UL 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 -48 V DC. 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.

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

RRH should be grounded.

Chapter 1 Before Installation

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

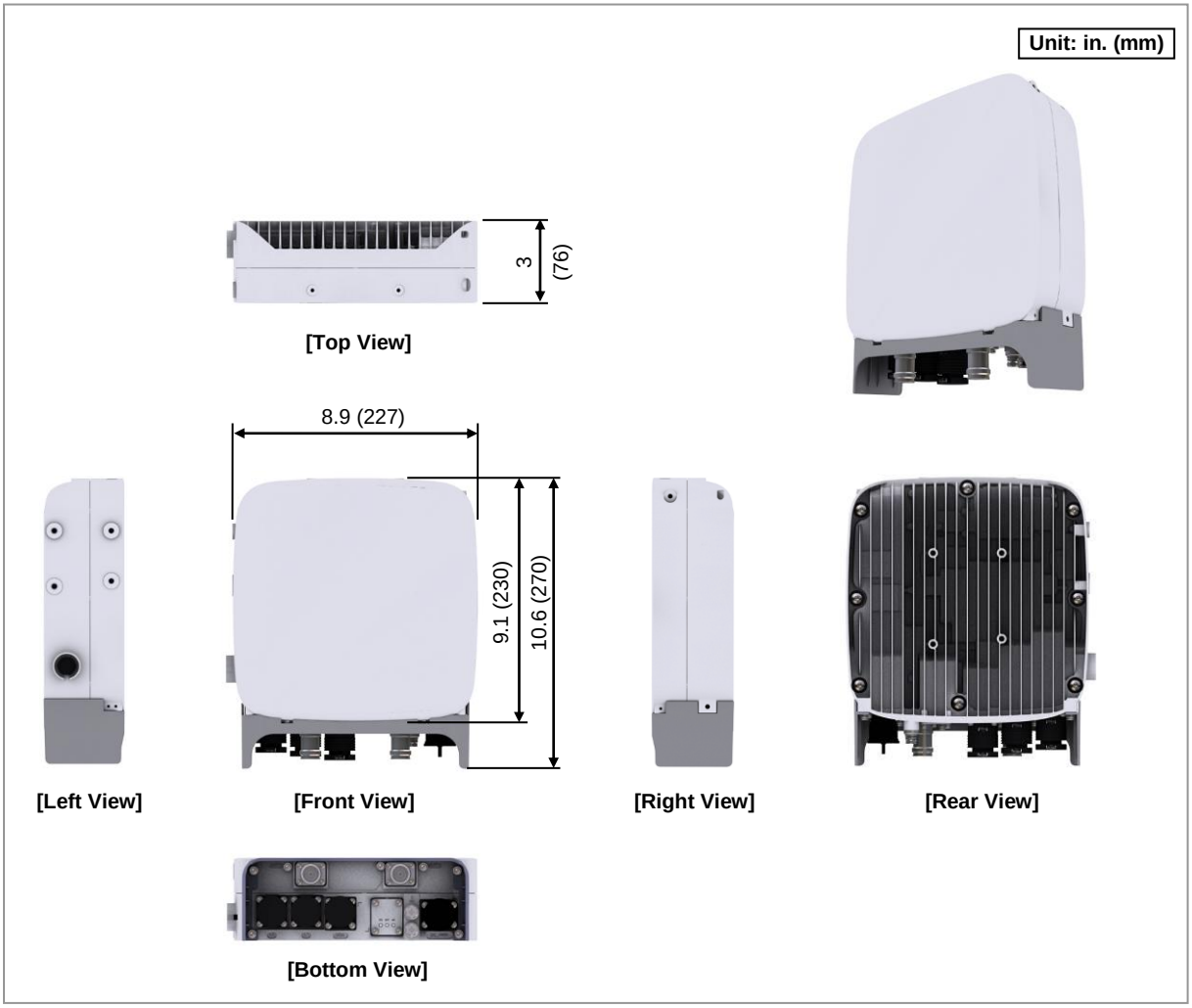
RRH View and External Interface

This section provides the physical structure of the RRH and its interfaces.

RRH View

The figure below depicts the physical structure of the RRH.

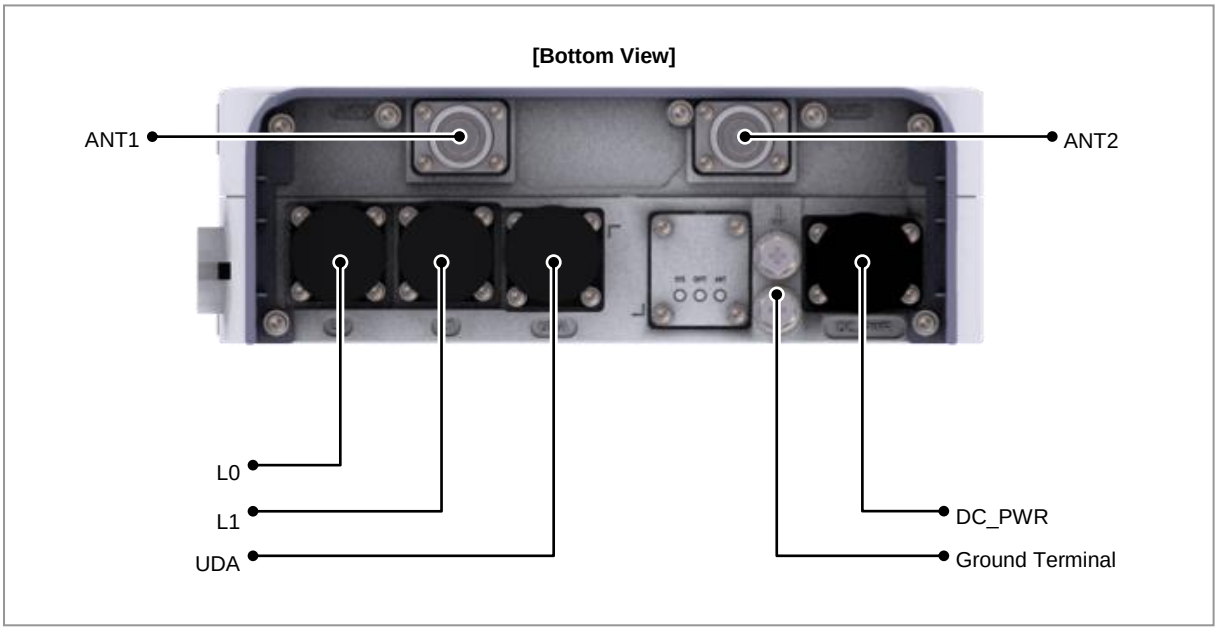
Figure 1. RRH View



RRH External Interface

The figure below depicts the external interface structure of the RRH.

Figure 2. RRH External Interface



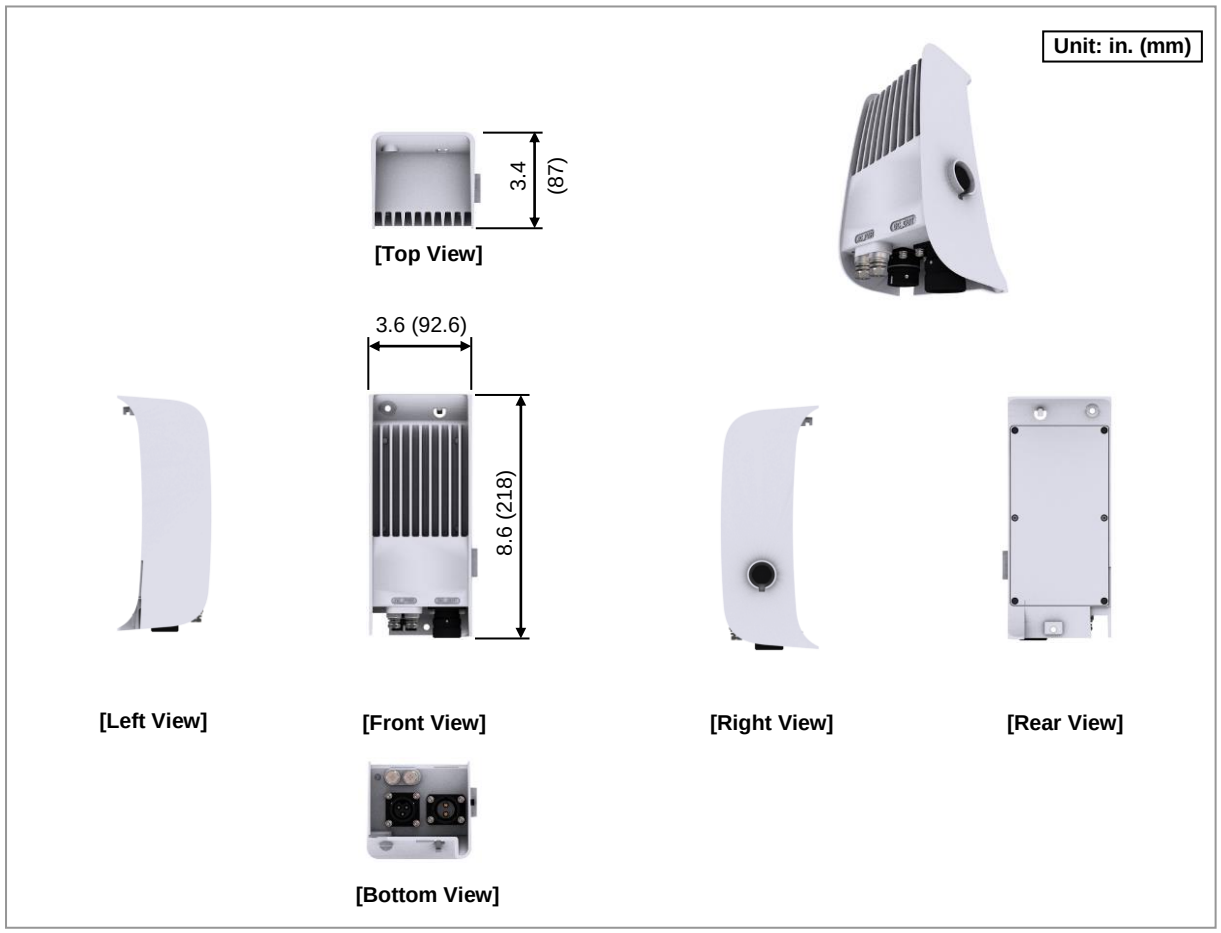
AC-DC Power Unit View and External Interface

This section provides the physical structure of the AC-DC power unit and its interfaces.

AC-DC Power Unit View

The figure below depicts the physical structure of the AC-DC power unit.

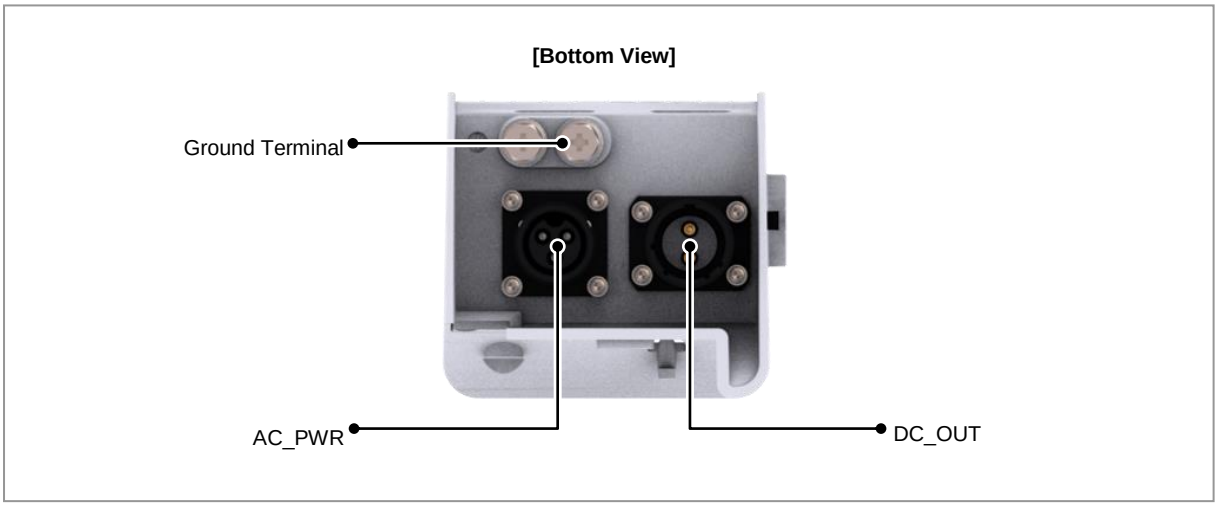
Figure 3. AC-DC Power Unit View



AC-DC Power Unit External Interface

The figure below depicts the external interface structure of the AC-DC power unit.

Figure 4. AC-DC Power Unit External Interface



Specifications

The table below outlines the main specifications of the RRH.

Table 1. RRH Specifications

Item	RT2201-46A
Band	Band 46 (5 GHz)
Frequency	UNII-1: 5150-5250 MHz, UNII-3: 5725-5850 MHz
IBW	80 MHz (limited by 3GPP TS36.300)
OBW	80 MHz
# of Carriers	20 MHz × 4 carriers
RF Chain	2TX/2RX
RF Output Power	2 × 500 mW (UNII-1: EIRP < 36 dBm & EIRP above 30° < 21 dBm, UNII-3: EIRP < 36 dBm)
RX Sensitivity	Typical: -99.2 dBm @ 1Rx (3GPP 36.104 FRC A1-9, Med. Power)
Modulation	QPSK, 16QAM, 64QAM, 256QAM
Input Voltage	-48 V DC (-38 to -57 V DC, 1 SKU), with clip-on AC-DC converter (Option)
Input Current	2.5 A @ - 48 V DC
Power Consumption	About 70 Watt @ 100 % RF load, typical conditions (Based on duty cycle 100 %)
Operating Temperature	-40°C (-40°F) to 55°C (131°F) (w/o solar load)
Cooling	Natural convection
Unwanted Emission	3GPP 36.104 Category A and FCC 47 15.407
Co-existence	Wi-Fi Listening, Listen Before Talk (LBT)
Optic Interface	20 km, 2 ports (9.8 Gbps × 2), SFP, single mode, duplex or Bi-Di
CPRI Cascade	Not supported
# of Antenna Port	2
External Alarm (UDA)	4
RET	Not supported
TMA & built-in Bias-T I/F	Not supported
Mounting Options	Pole, wall, tower, back to back, side by side (for external ant.), 3 RRH with Clip-on Antenna on the pole
Antenna Type	Integrated (Clip-on) antenna (Option), External antenna (Option)
NB-IoT	Not Supported (HW Resource reserved for 1 Guard Band NB-IoT per LTE carrier)
Spectrum Analyzer	Supported
PIM Cancellation	Not supported
5G NR, XRAN	Supported with S/W upgrade
Dimension (W × D × H)	8.9 in. (227 mm) × 3 in. (76 mm) × 9.1 in. (230 mm)
Volume	< 4 L (without antenna), TBD L (with antenna)

Item	RT2201-46A
Weight	About 5 kg (11 lb) (w/o Antenna)

Table 2. AC-DC Power Unit Specifications

Item	AC-DC Power Unit
Input Voltage	90 to 260 V AC
Input Current	1.5 A
Output Voltage	48 V DC ± 5 %
Output Power	Max. 100 W
Surge	± 20 kA (Line to Line, Line to PE)
Operating Temperature (Ambient)	-40 to 55°C
Ingress Protection	IP65
Dimension (W × D × H)	3.6 in. (92.6 mm) × 3.4 in. (87 mm) × 8.6 in. (212.3 mm) (including curve bulge)
Weight	< 2.0 kg

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.

When installing RRH, especially when installing as sector, it must be installed that EIRP is not exceed max 21 dBm at > 30 degree above horizon for outdoor.

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.

When using the AC / DC converter, connect the DC power cable first before connecting the AC power.

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.

When using the AC / DC converter, if servicing of the RRU is required, disconnect the AC power first.

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 3. Basic Installation Tools

Number	Name	Specification	Purpose of Use
1	Torque Driver 	Apply a torque range: 20 to 90 lbf·in	Fastening M6 SEMS
		Apply a torque range: 6 to 22 lbf·in	Fastening M4 Torx Screw
2	Screw Driver Bit	+, No. 3	Fastening M6 SEMS
3	Screw Driver 	+, No. 3	Loosening M6 SEMS
4	Screw Driver Bit 	T10H	Fastening Torx Screw (T10H)
		T20H	Fastening Torx Screw (T20H)
		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 and M10, M12 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
		Apply Hex. bolt head: 17 mm (for 100 to 400 lbf·in)	Tightening M10 hex nut
		Apply Hex. bolt head: 19 mm (for 100 to 400 lbf·in)	Tightening M12 hex nut
7	Spanner 	10 mm	Tightening M6 hex bolt
		13 mm	Tightening M8 hex bolt
		17 mm	Tightening M10 hex nut
		19 mm	Tightening M12 hex nut
8	Tape Measure 	16 ft./150 ft.	Measuring length
9	Power Extension Cable 	100 ft.	Basic tool
10	Level	Normal	Levelling horizontality and

Number	Name	Specification	Purpose of Use
			verticality
11	Hammer Drill 	Normal	Drilling wall
12	Concrete Drill Bit 	14 mm	Setting M10 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	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	RF 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 	M10	Setting M10 anchor
25	Hammer 	Normal	Fixing anchor
26	Optical Connector Cleaner 	For LC Connector	Cleaning Optical Connector
27	Optical Transceiver Removal Tool 	Normal	Separating the Optical Module

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.

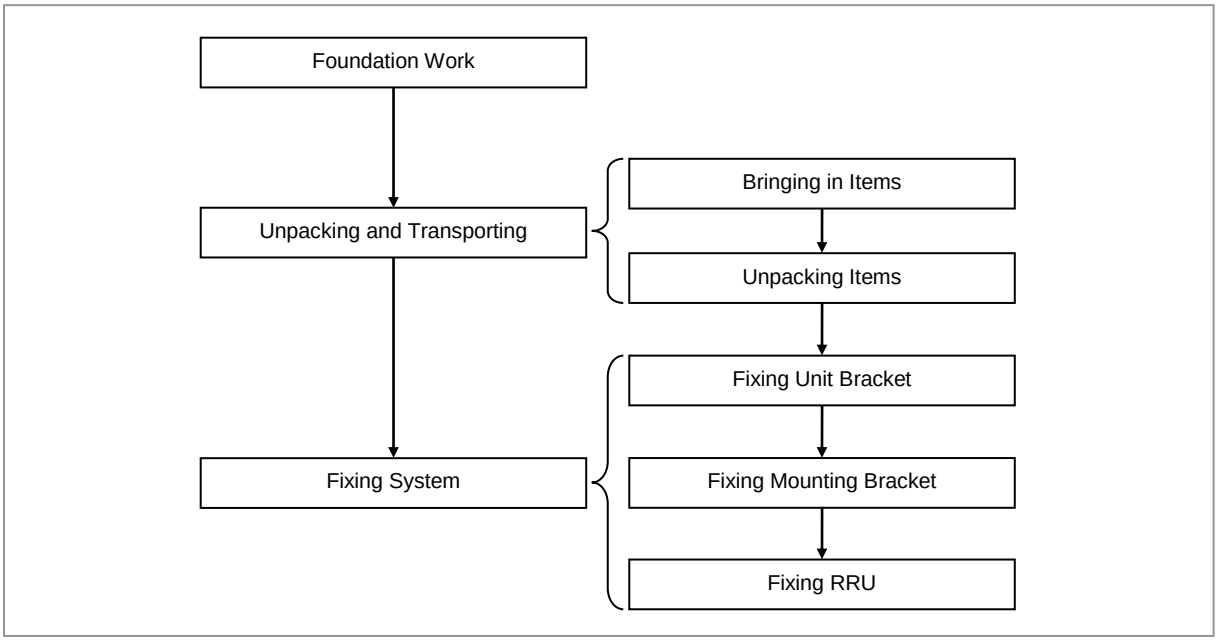
Chapter 2 Installing System

This chapter describes the installation procedures of the RRH.

Installation Procedure

The figure below depicts the overall procedures for installing the RRH.

Figure 5. Procedure to Install the RRH



System Arrangement

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

The recommended clearance for installing the RRH is as follows.

Category	Recommended Distances	Remarks
Front	≥ 32 in. (800 mm)	-
Sides	≥ 8 in. (200 mm)	Standard Installation
Top	≥ 12 in. (300 mm)	-
Bottom	≥ 12 in. (300 mm)	Over the air, without cover
	≥ 16 in. (400 mm)	Over the ground, without cover

Using Tilting and Swiveling Bracket

Figures below depict the recommended distances for each direction of the RRH using the tilting and swiveling bracket for the wall and the pole type installations.

Figure 6. RRH Arrangement_1 Sector Pole Type Installation

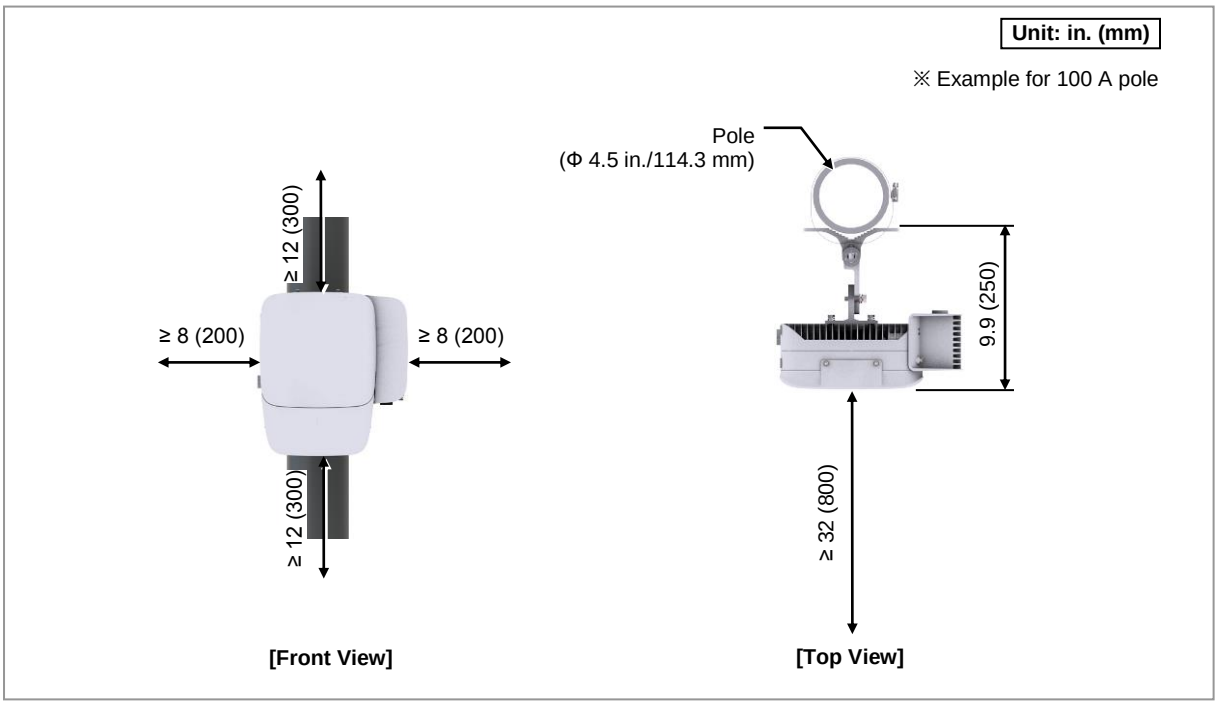


Figure 7. RRH Arrangement_1 Sector Wall Type Installation

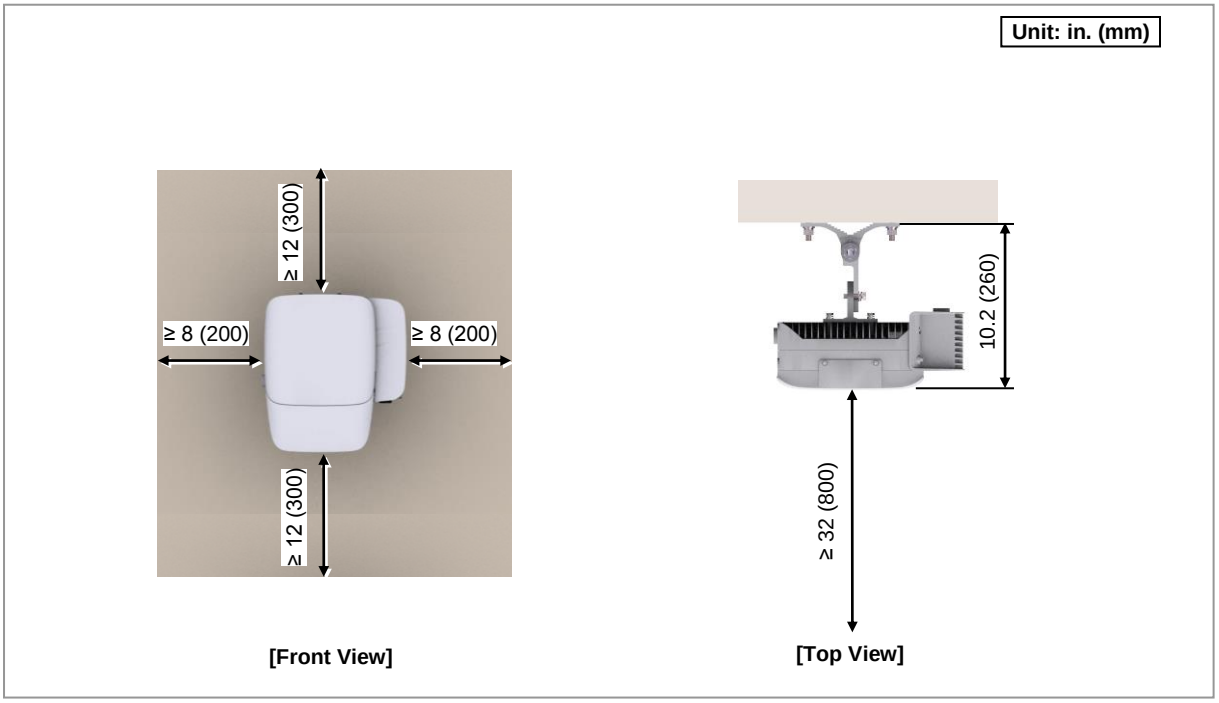


Figure 8. RRH Arrangement_Down Tilting

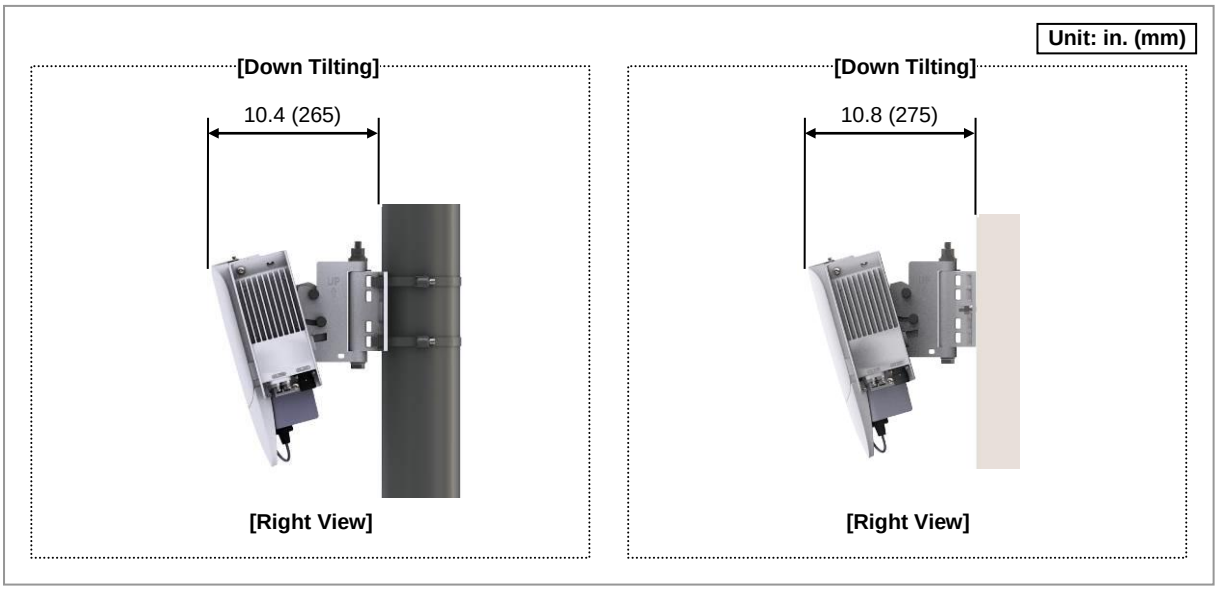


Figure 9. RRH Arrangement_Pole Type Swivelling

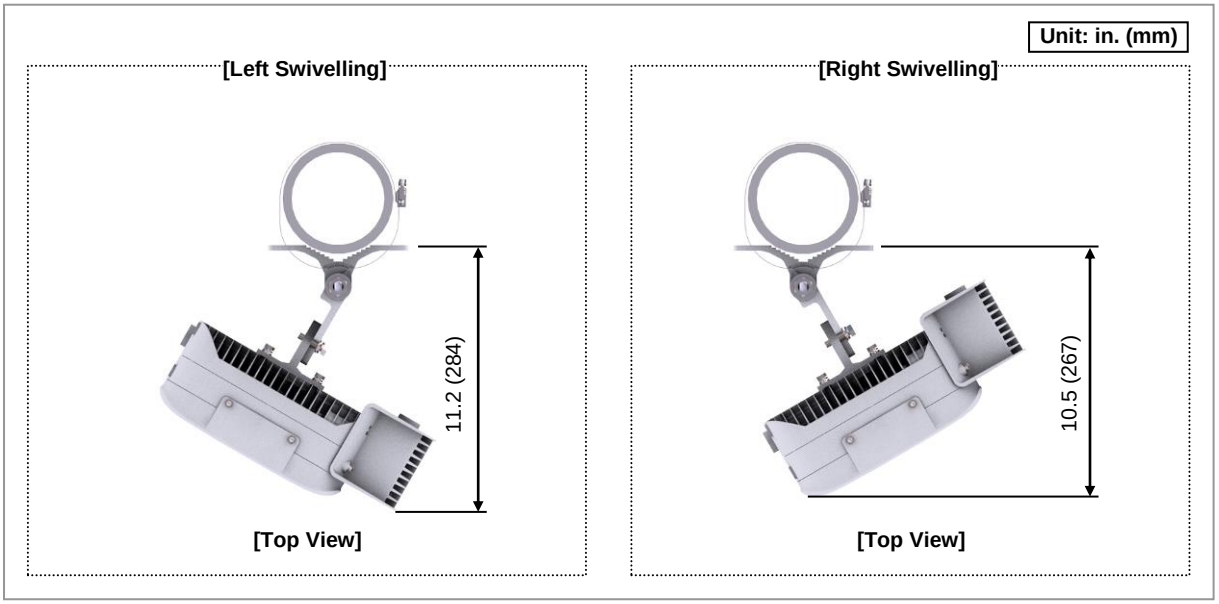
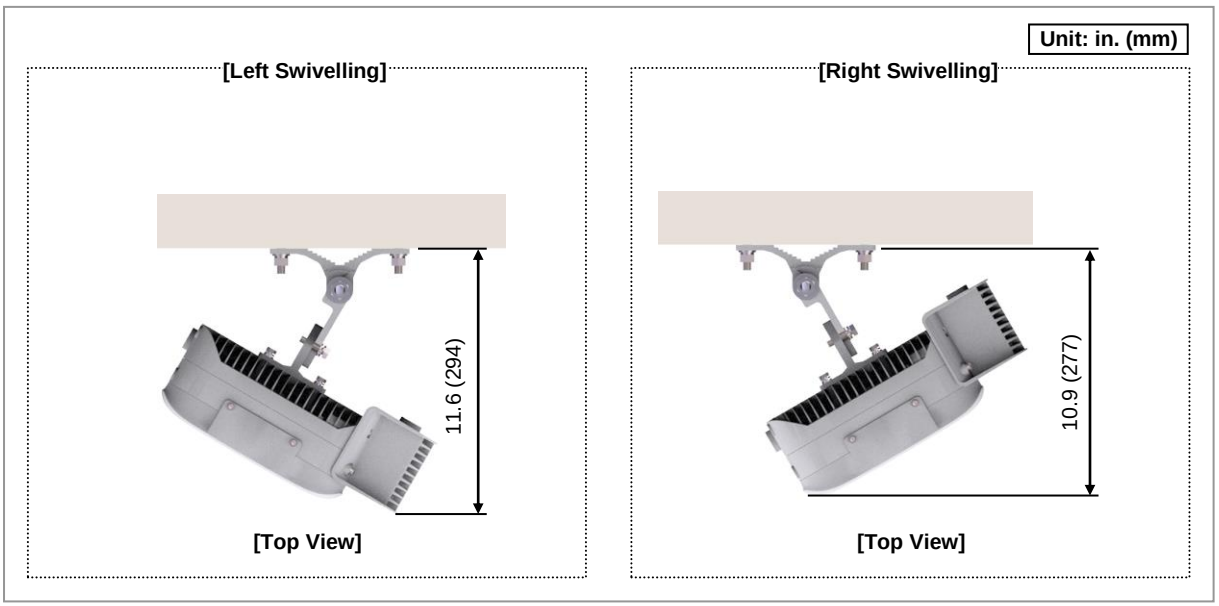


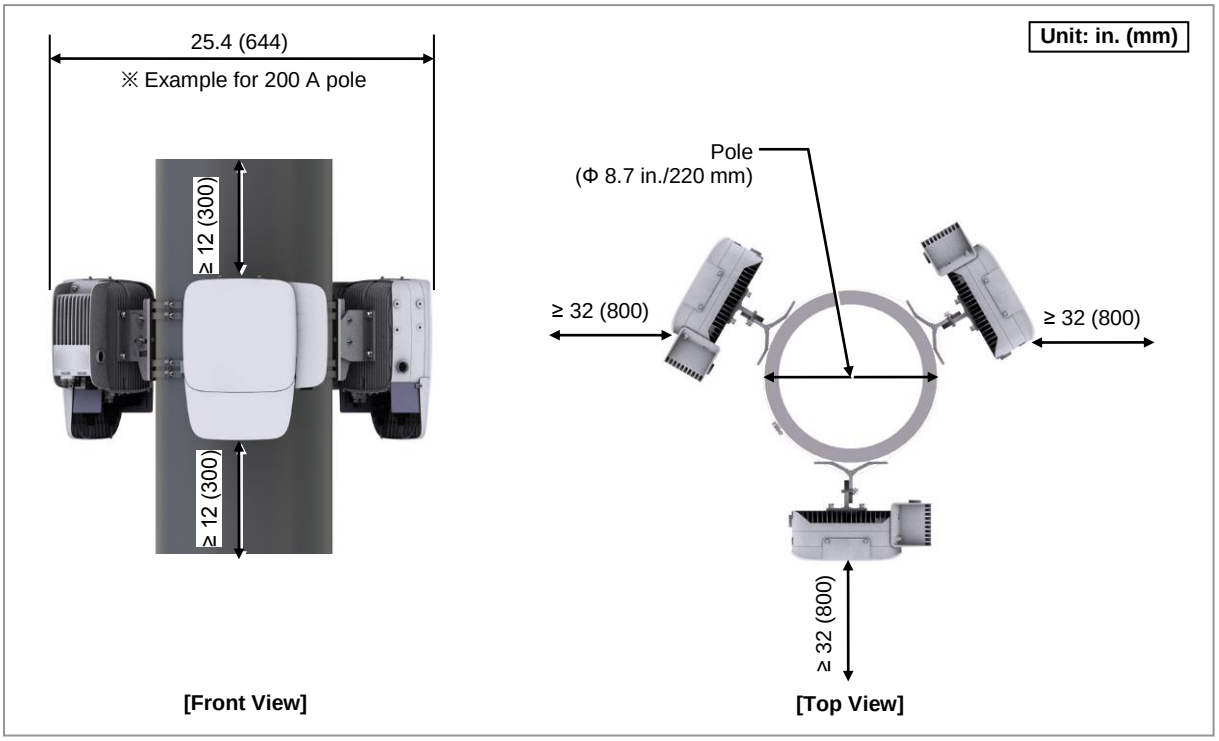
Figure 10. RRH Arrangement_Wall Type Swivelling



Using Tilting Bracket

The figure below depicts the recommended distances for each direction of the RRH using the tilting bracket for the pole type installations.

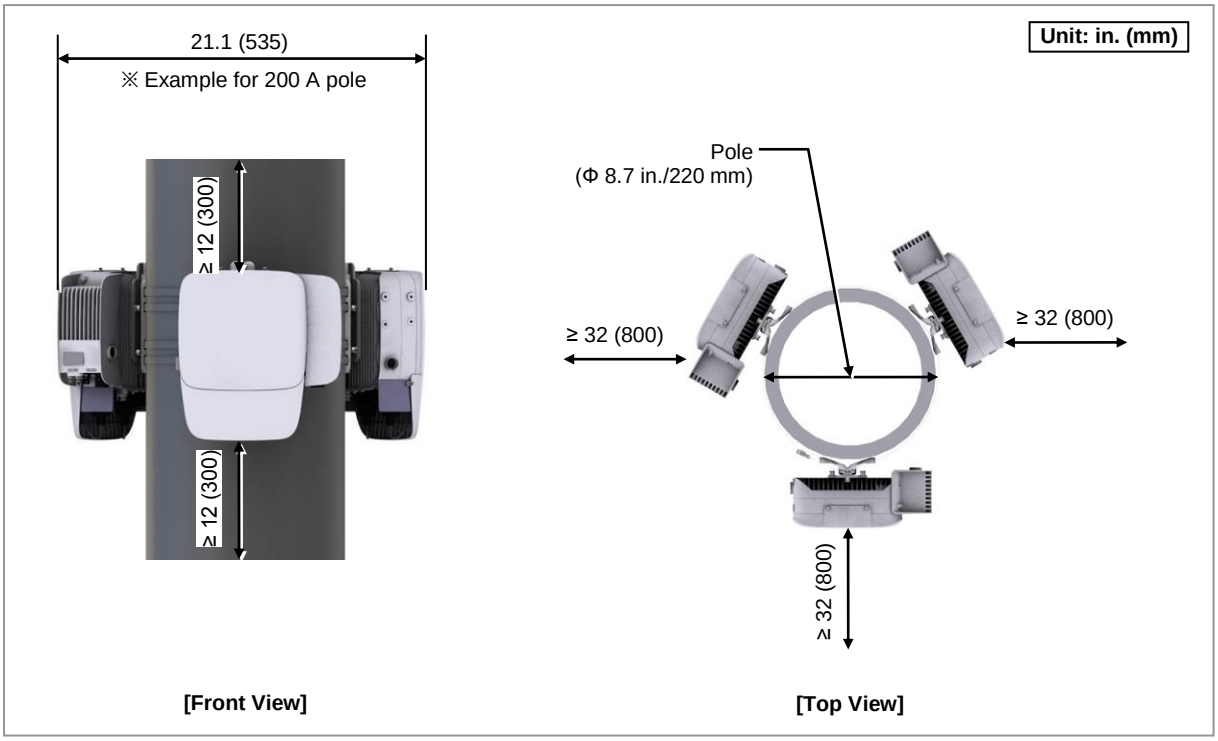
Figure 11. RRH Arrangement_3 Sector Pole Type Installation



Without Tilting Bracket

The figure below depicts the recommended distances for each direction of the RRH without using the tilting bracket.

Figure 12. RRH Arrangement_3 Sector Pole Type Installation



Using Side by Side Bracket

Figures below depict the recommended distances for each direction of the RRH using the side-by-side bracket for the pole type installations.

Figure 13. RRH Arrangement_3 Sector Pole Type Side-by-Side Installation

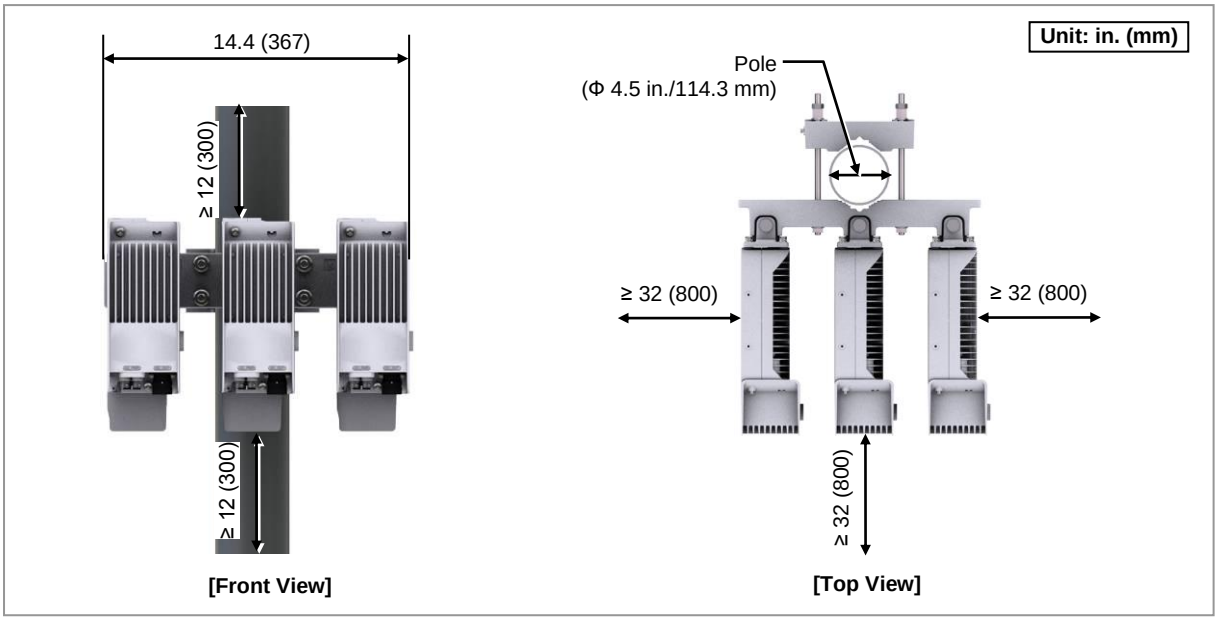
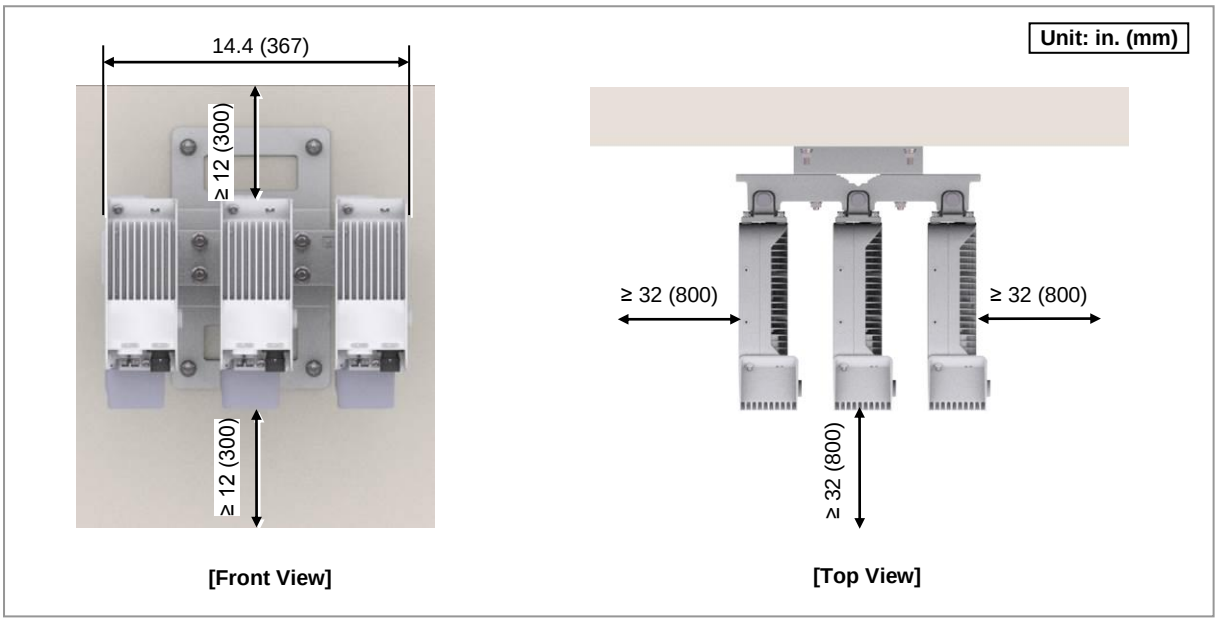


Figure 14. RRH Arrangement_3 Sector Wall Type Side-by-Side Installation



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.

Fixing RRH

This section describes the procedures to fix the RRH by different methods.

Assembling a Clip on Antenna

This section describes the procedure to fix a clip on the antenna of the RRH.

Assembling Clip on Antenna

To fix the clip on the antenna, do the following:

Prerequisites

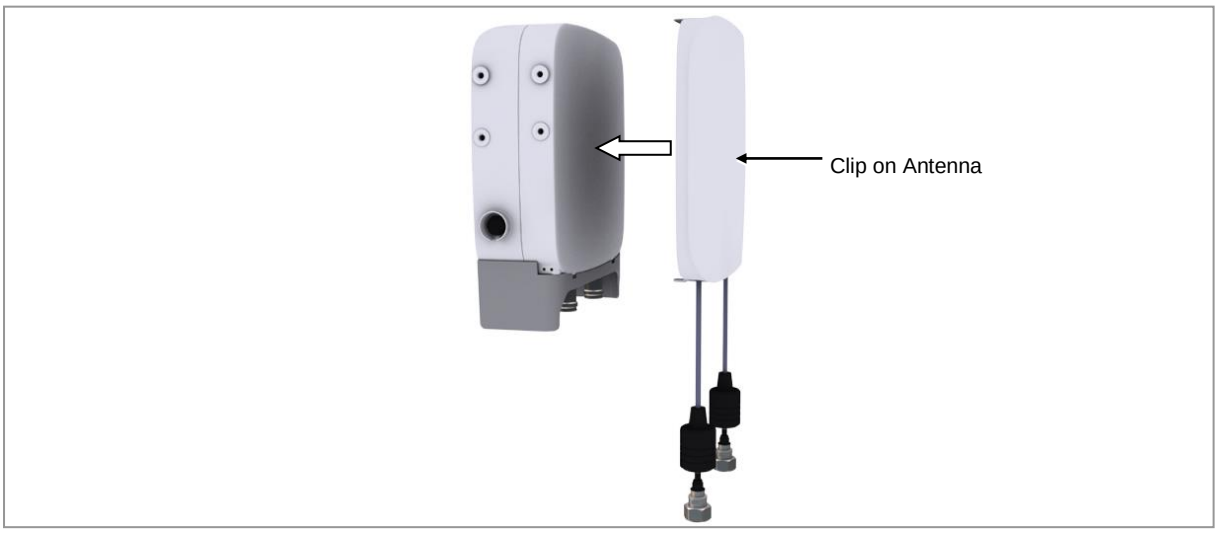
Before proceeding with assembling the clip on antenna, make sure that you have the items mentioned in the table below.

Table 4. Parts and Tools for Assembling Clip on Antenna on RRH

Category	Description		
Parts	Clip on Antenna		1 EA
	Fasteners	M4 × L10 Torx Screw	4 EA
Recommended Torque Value	M4 Torx Screw		13 lbf·in
	4.3-10(Plus) Male Connector		44 lbf·in
Working Tools	• Torque Wrench (10 to 50 lbf·in) • Torque Driver (6 to 22 lbf·in.) • Screw Driver Bit (T20H) • Torque Wrench Spanner Head (apply Hex. head: 22 mm)		

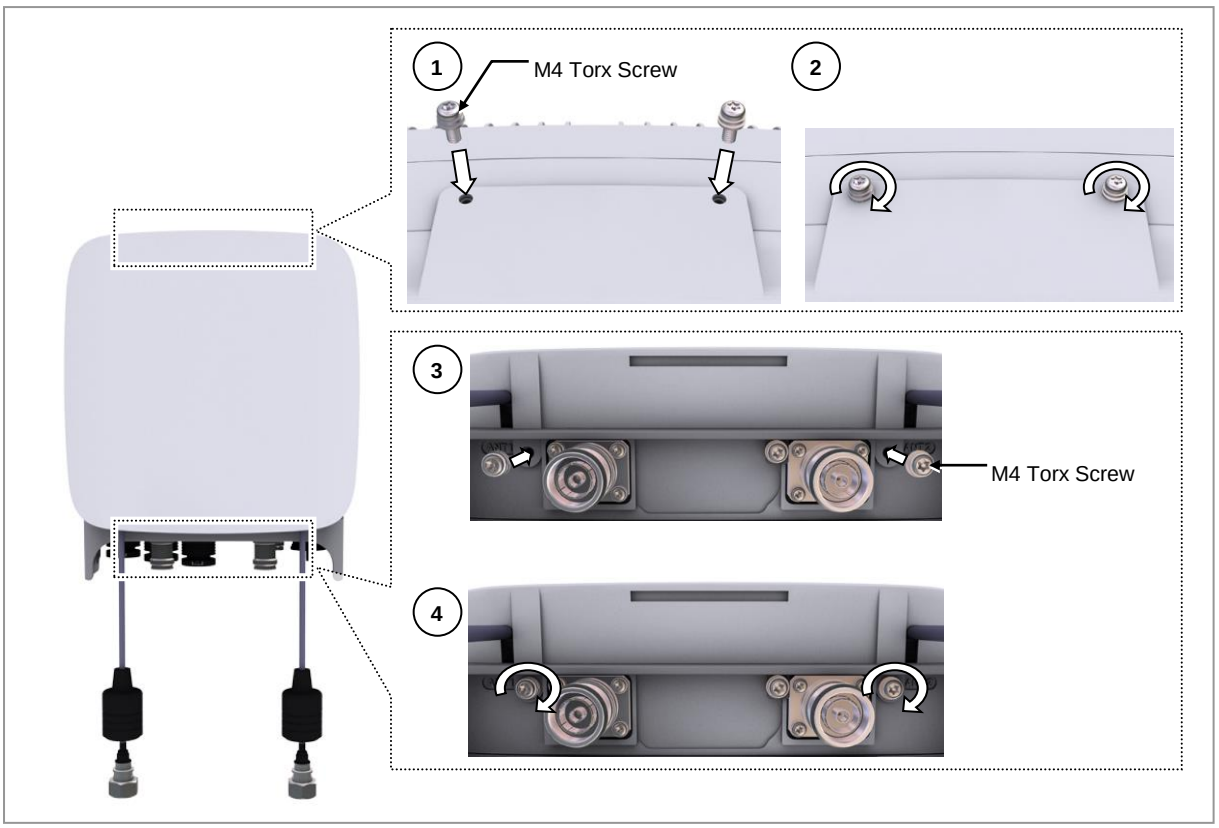
1 Place the clip on the antenna in front of the RRH.

Figure 15. Assembling Clip on Antenna (1)



2 Fix the clip on antenna using fasteners.

Figure 16. Assembling Clip on Antenna (2)



3 Insert the port seal to the RRH ANT 1, 2 port.

When inserting the port seal to RRH ANT port, take care of the direction.
- The screw thread of port seal should be downwards.

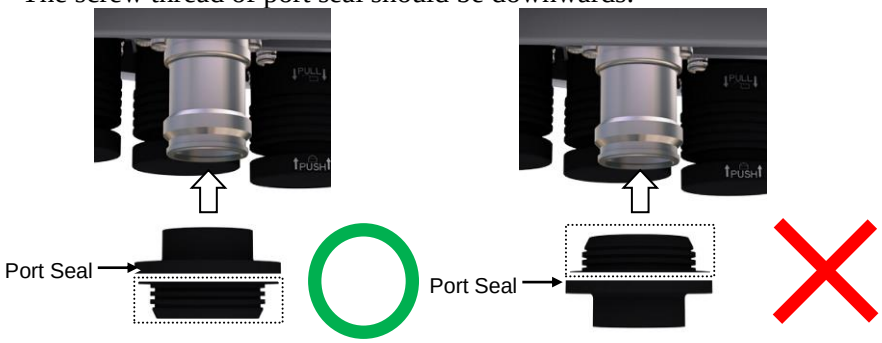
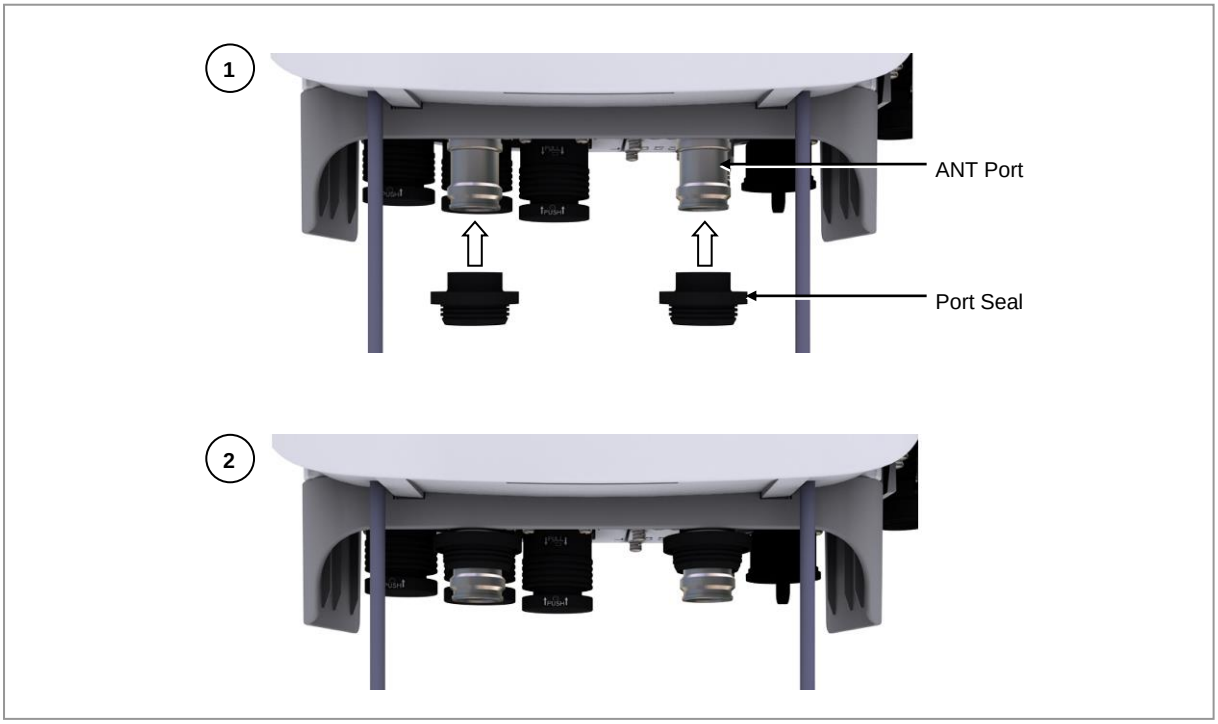
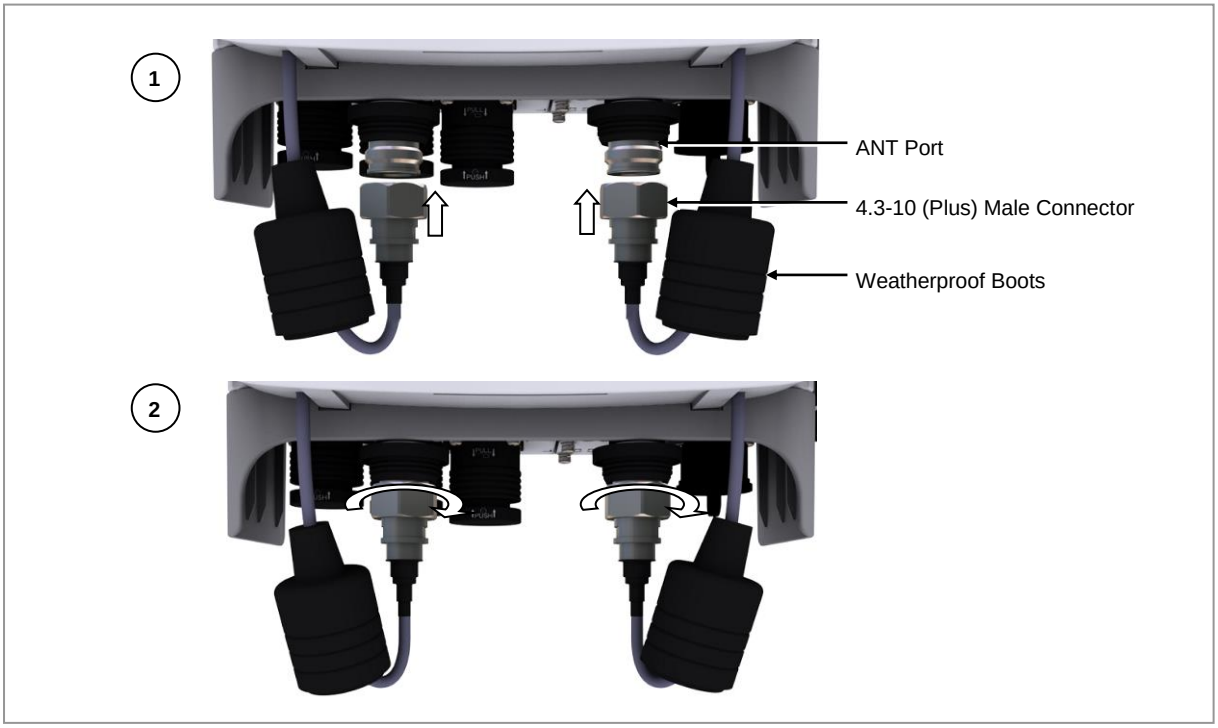


Figure 17. Assembling Clip on Antenna (3)



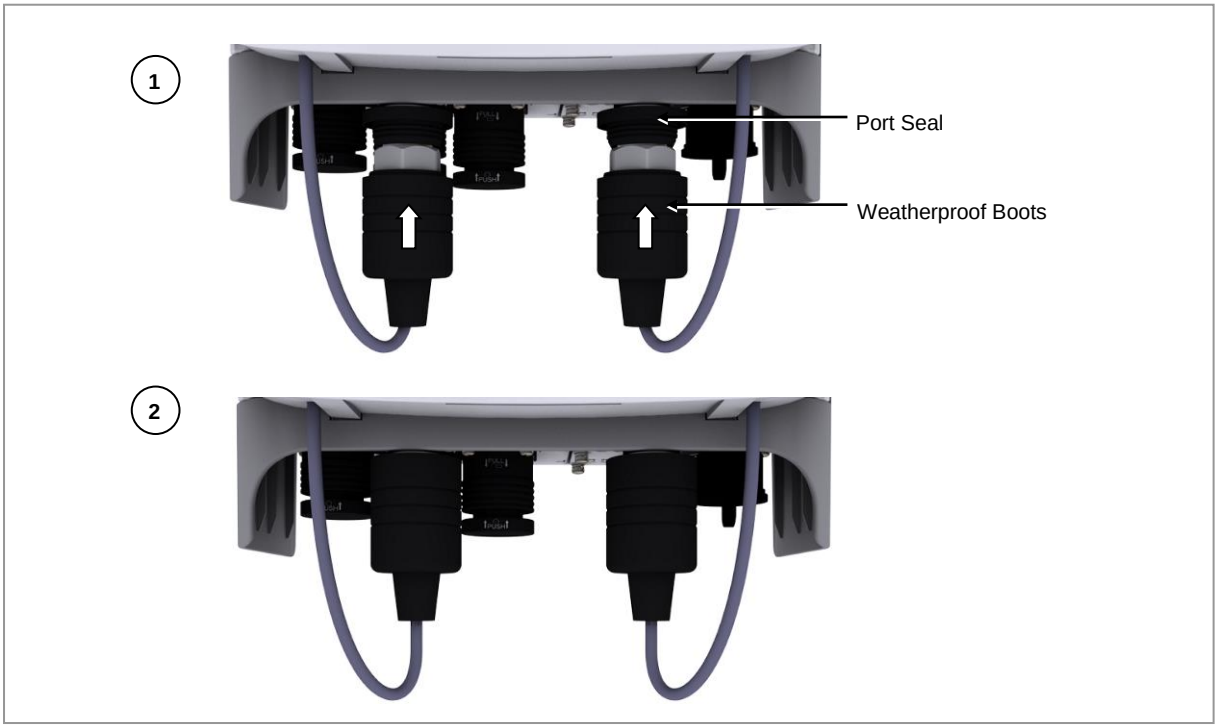
4 Connect the RF connector of clip on the antenna to the RRH ANT 1, 2 port.

Figure 18. Assembling Clip on Antenna (4)



5 Push weatherproof boots up to the port seal.

Figure 19. Assembling Clip on Antenna (5)



Assembling an AC-DC Power Unit

This section describes the procedure to fix the AC-DC power unit on the RRH.

Assembling the Clip on Antenna

To fix the AC-DC power unit, do the following:

Prerequisites

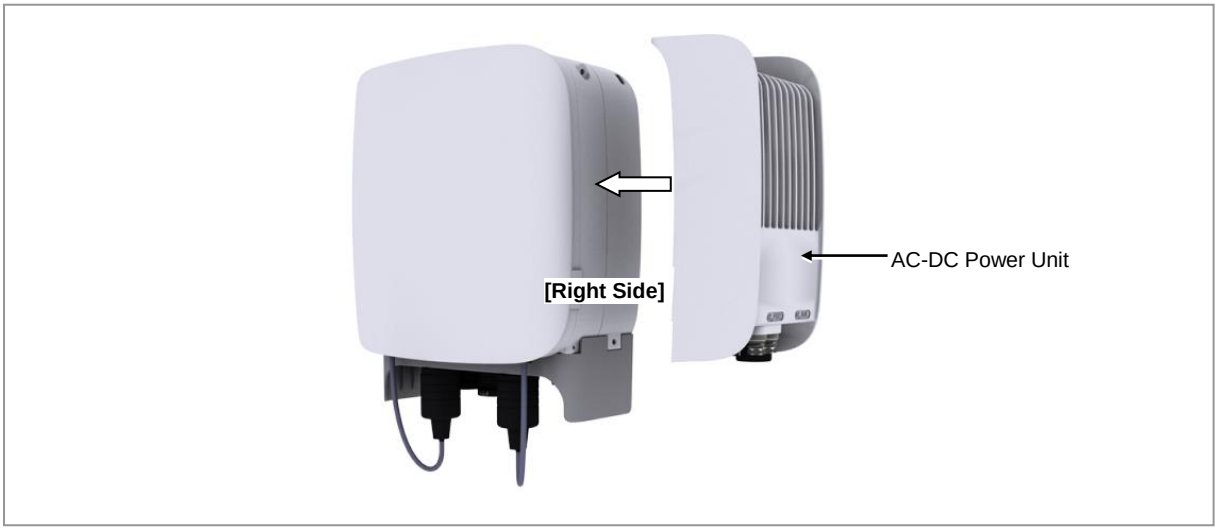
Before proceeding with assembling the AC-DC power unit make sure that you have the items mentioned in the table below.

Table 5. Parts and Tools for Assembling AC-DC Power Unit on RRH

Category	Description		
Parts	AC-DC Power Unit		1 EA
	Fasteners	M5 × L16 Torx Screw	2 EA
Recommended Torque Value	M5 Torx Screw		25 lbf·in
Working Tools	• Torque Driver (20 to 90 lbf·in.) • Screw Driver Bit (T25H)		

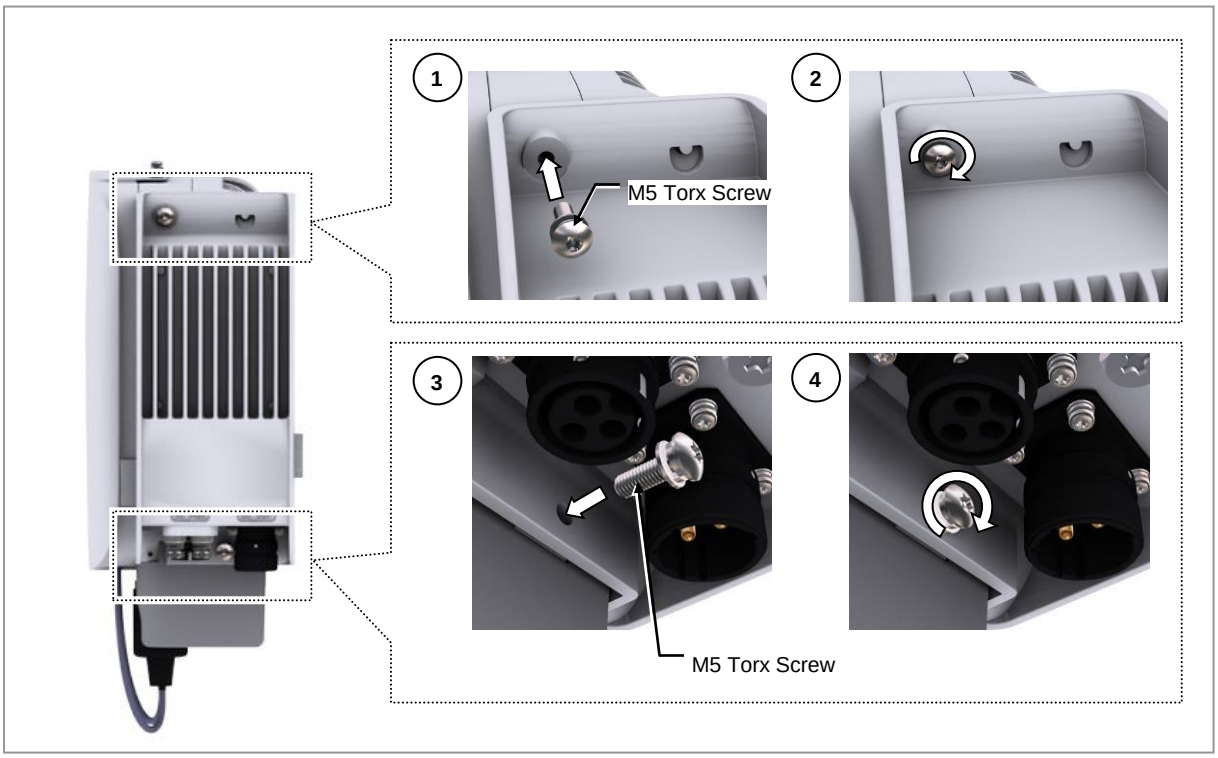
1 Place an AC-DC power unit to the right side of RRH.

Figure 20. Assembling AC-DC Power Unit (1)



2 Fix the AC-DC power unit using fasteners.

Figure 21. Assembling AC-DC Power Unit (2)



Using a Tilting and Swiveling Bracket

This section describes the procedure to fix the unit bracket using the tilting and swiveling bracket.

Fixing Unit Bracket

These instructions for mounting a unit bracket to the RRH apply to all installation types.

To fix the unit bracket, do the following:

Prerequisites

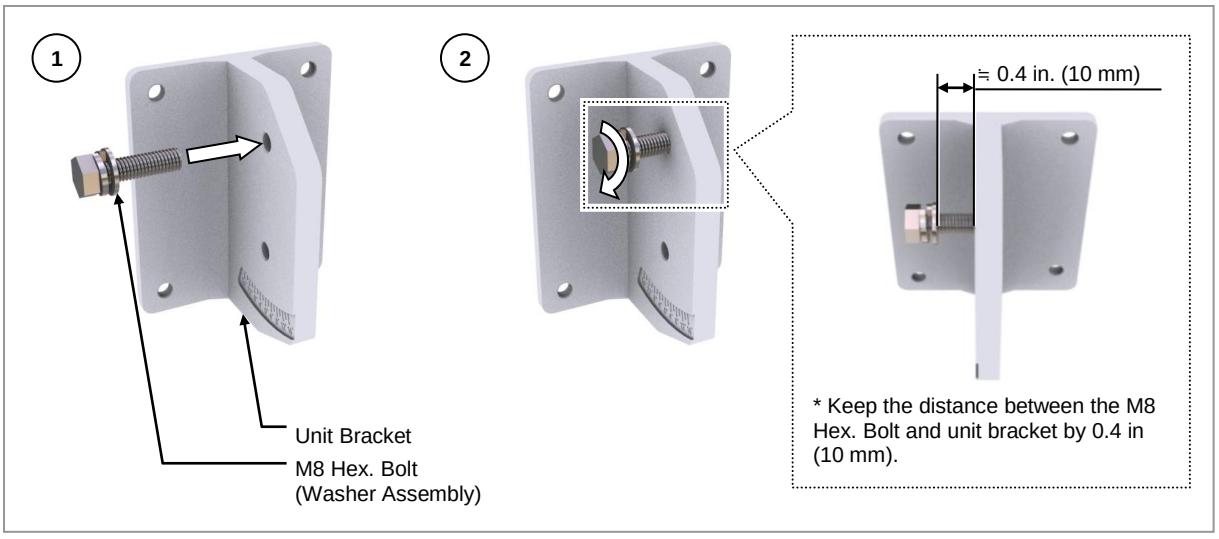
Before proceeding with fixing the unit bracket, make sure that you have the items mentioned in the table below.

Table 6. Parts and Tools for Fixing Unit Bracket on RRH

Category	Description		
Parts	Unit Bracket		1 EA/RRH
	Fasteners	M6 × L20 Hex. bolt (Washer assembly)	4 EA/RRH
		M8 × L30 Hex. bolt (Washer assembly)	1 EA/RRH
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) • Spanner (apply hex head: 13 mm)		

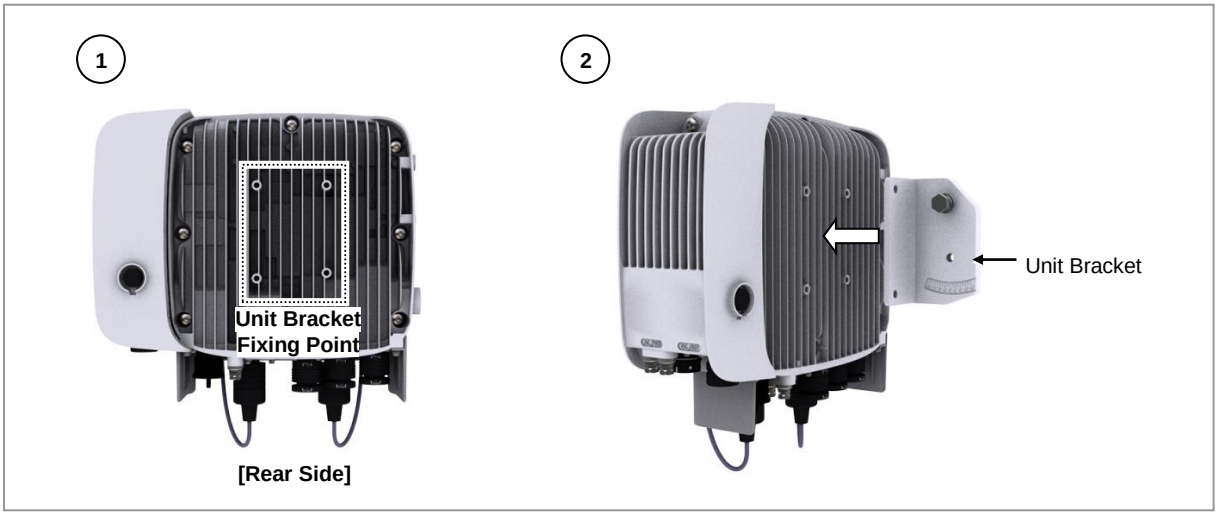
1 Inset the M8 hex bolt to the unit bracket temporarily.

Figure 22. Fixing Unit Bracket (1)



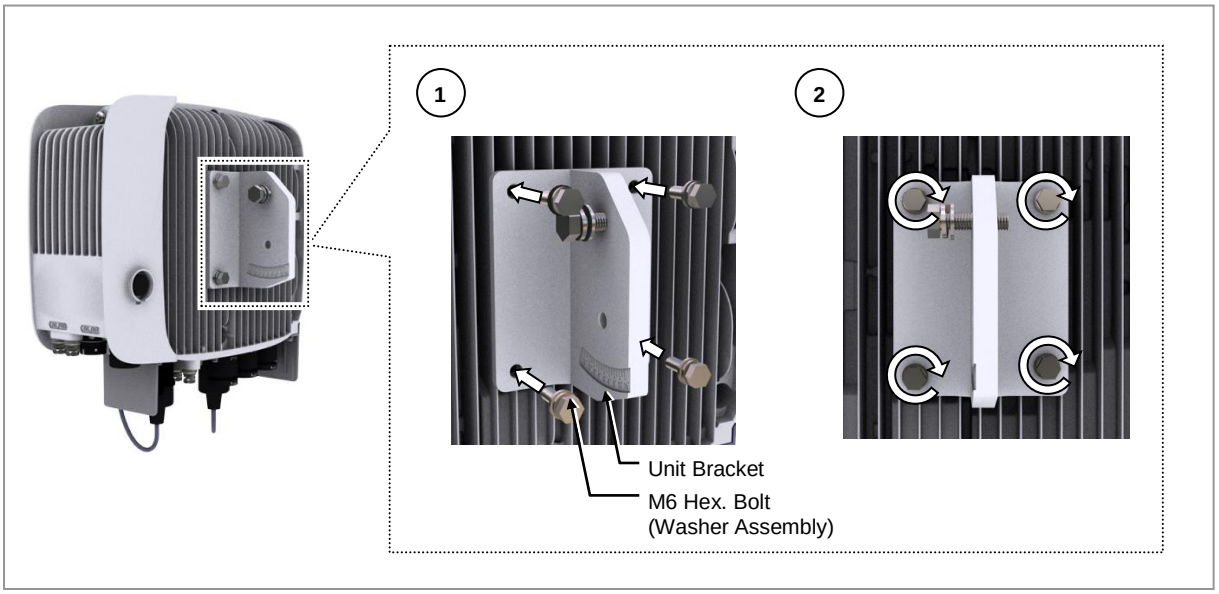
2 Check the position for mounting the unit bracket on the back of the RRH and place it in that position.

Figure 23. Fixing Unit Bracket (2)



3 Fix the unit bracket using fasteners.

Figure 24. Fixing Unit Bracket (3)



Fixing Pole Type_1 Sector

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

The standard of the pole on which the mounting bracket can be attached using steel bands is 50 A to 125 A. (When installing on a pole of 125 A or more, the steel band should be replaced.)

Assembling Mounting Bracket

To assemble the mounting bracket for 1 sector, do the following:

Prerequisites

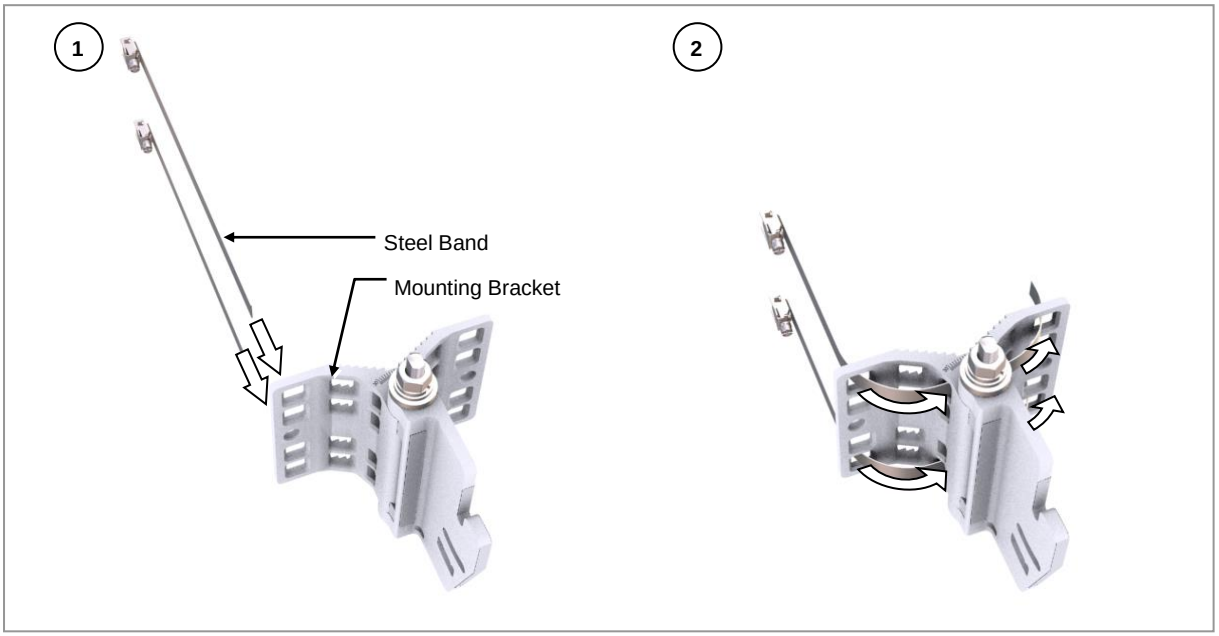
Before proceeding with assembling the mounting bracket for 1-sector, make sure that you have the items mentioned in the table below.

Table 7. 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		

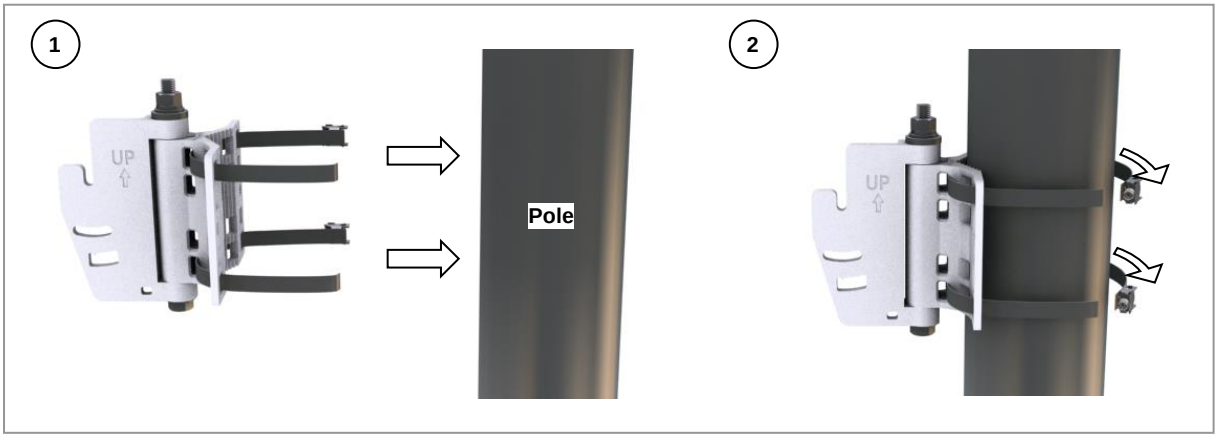
1 Pass the steel band through the fixing hole of the mounting bracket.

Figure 25. Fixing Mounting Bracket on the Pole (1)



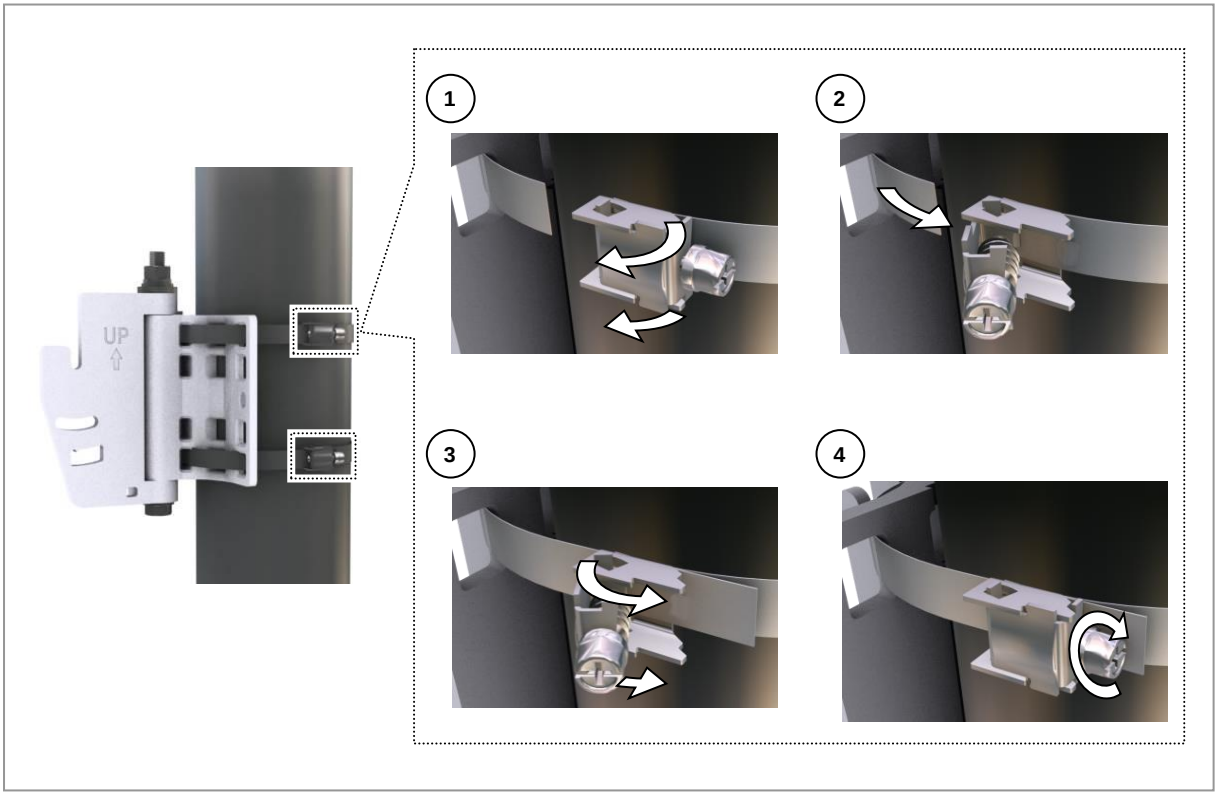
2 Place a mounting bracket to the pole.

Figure 26. Fixing Mounting Bracket on the Pole (2)



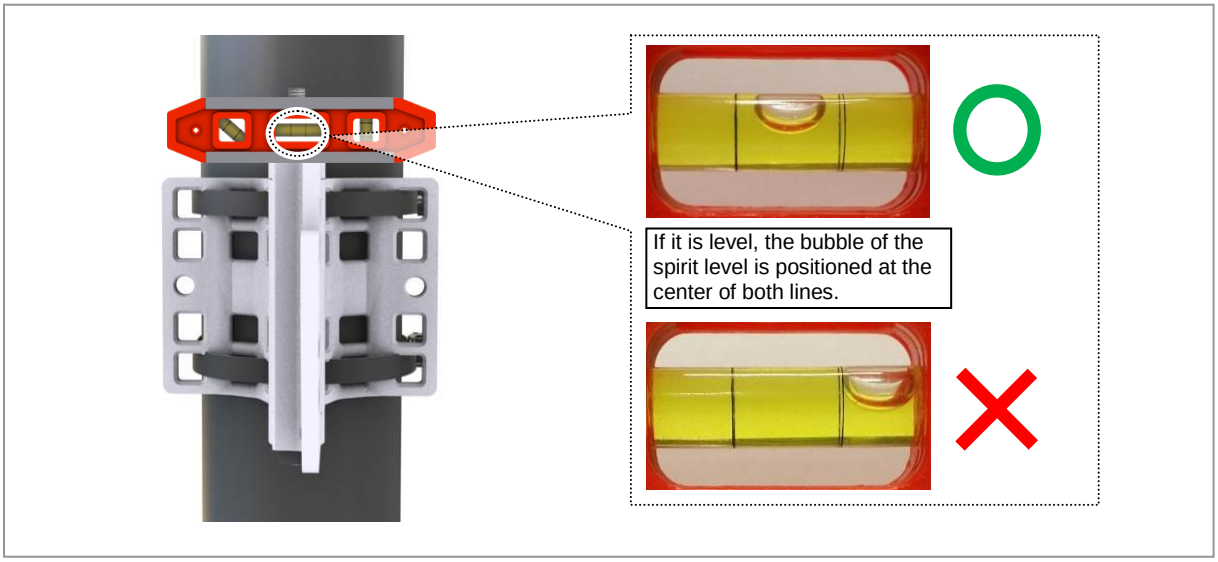
3 Fix the mounting bracket to the pole using the steel band.

Figure 27. Fixing Mounting Bracket on the Pole (3)



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

Figure 28. Fixing Mounting Bracket on the Pole (4)



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.

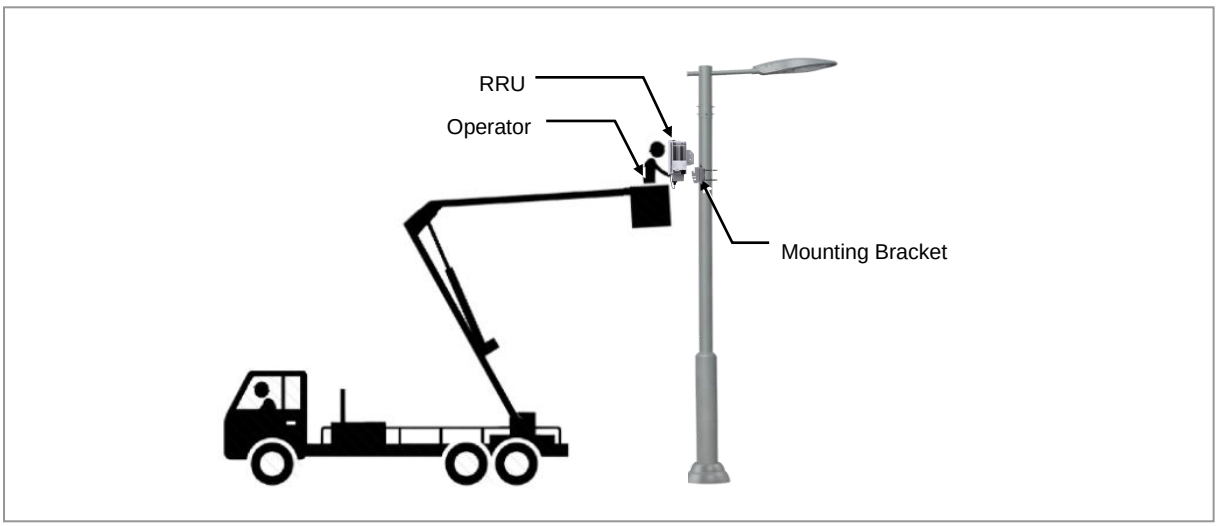
After fixing the steel band, push the remainder of band inside the mounting bracket

Lifting RRH

To lift the RRH, do the following:

- Lift with a cherry picker.

Figure 29. Lifting RRH



Fixing RRH on the Pole

To fix the RRH on the pole, do the following:

Prerequisites

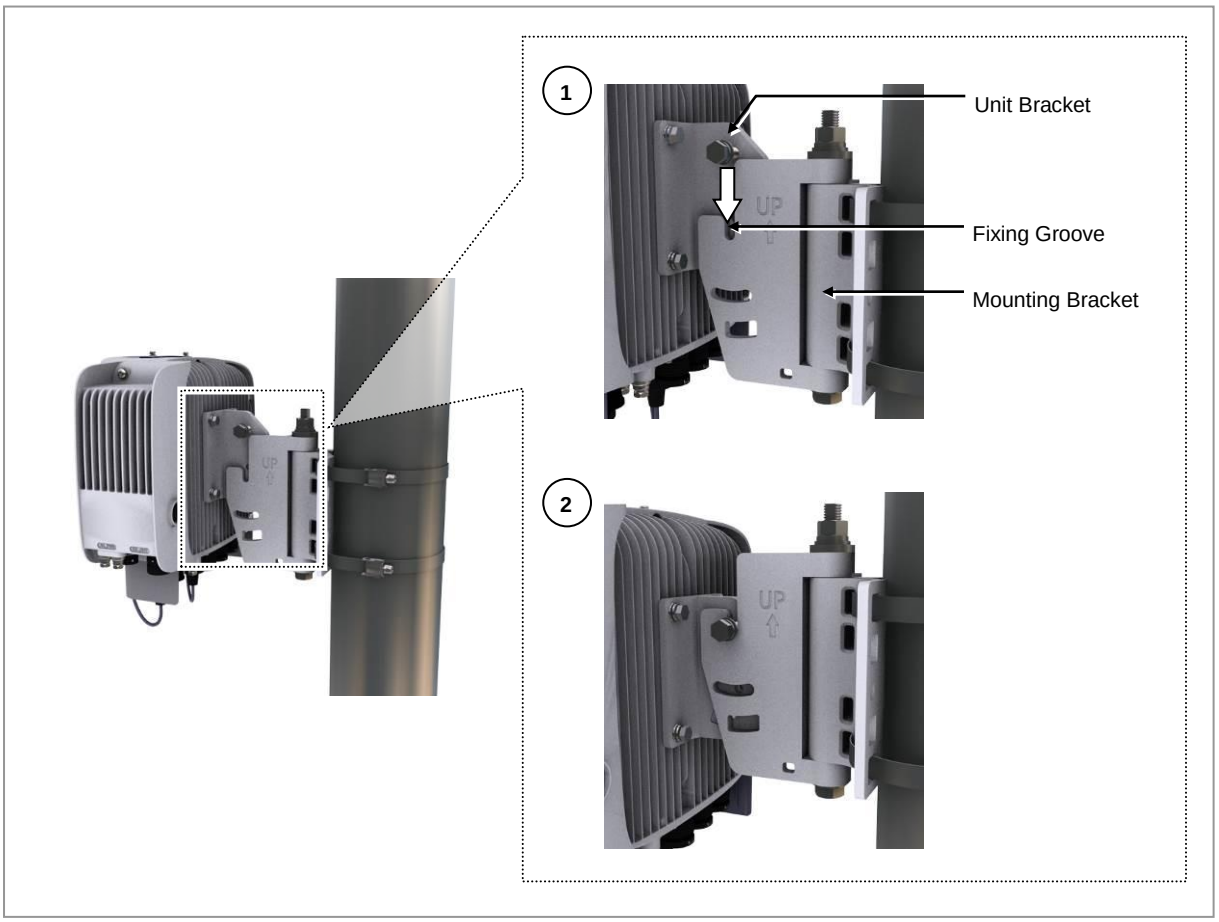
Before proceeding with fixing the RRH on the pole, make sure that you have the items mentioned in the table below.

Table 8. Parts and Tools for Fixing RRH on the Pole

Category	Description	
Fasteners	M8 × L30 Hex. bolt (Washer assembly)	1 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) • RF Alignment Tool	

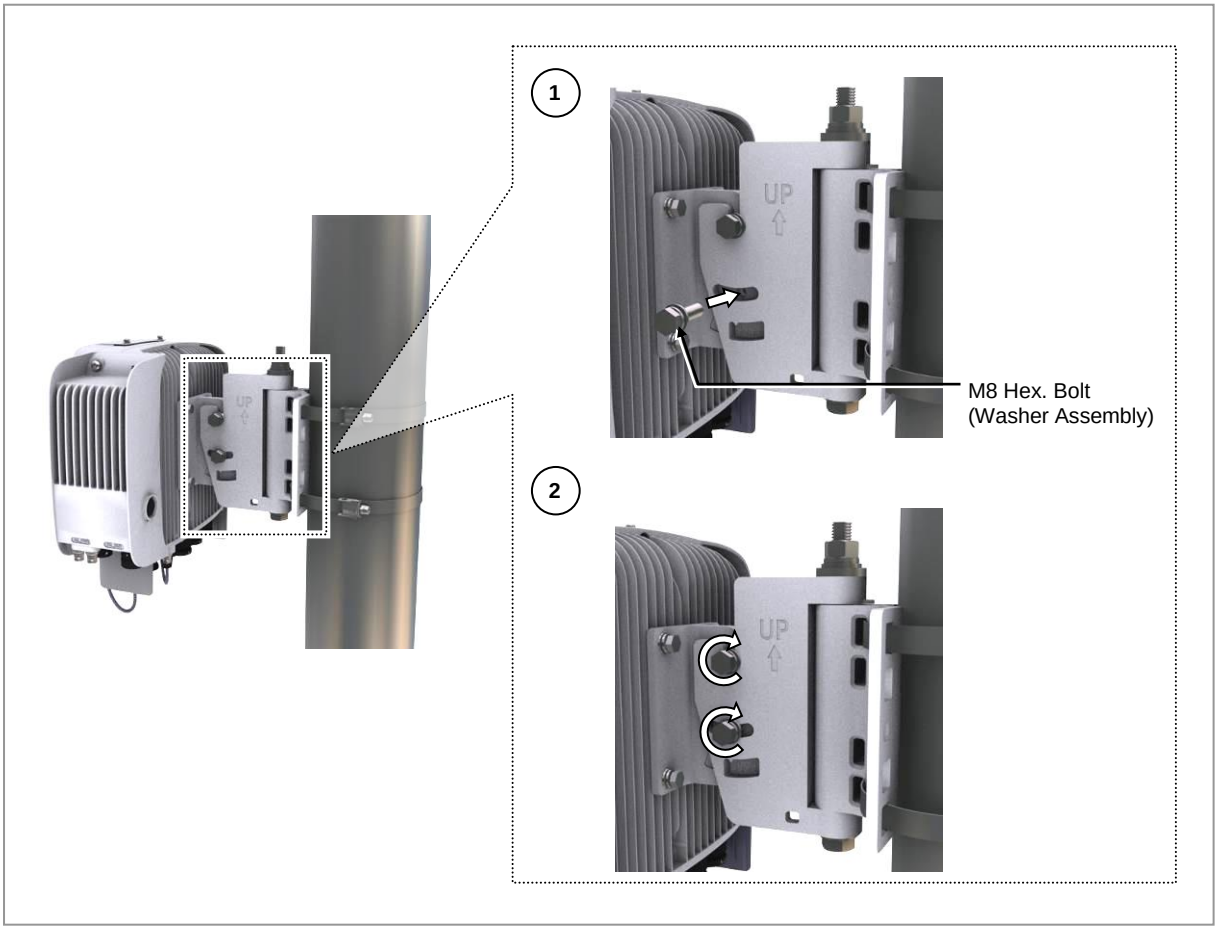
1 Place the unit bracket on the fixing groove of the mounting bracket.

Figure 30. Fixing RRH on the Pole (1)

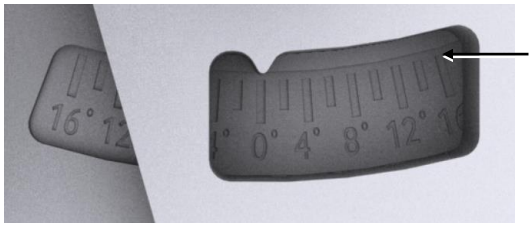


2 Fix the RRH using fasters.

Figure 31. Fixing RRH on the Pole (2)



When installing the RRH, the tilting angle pointer of the unit bracket should point to 0°.



[Angle pointer position for unit bracket with 0° tilt when installing the RRU]

3 By using the RF alignment tool, check the tilt and the azimuth and adjust when there is an issue.

For detail instructions on how to use the RF alignment tool, refer to the User Manual supplied by each manufacturer.

Fixing Wall Type_1Sector

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

Fixing Mounting Bracket

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

Prerequisites

Before proceeding with fixing the mounting bracket for 1-sector on the wall, make sure that you have the items mentioned in the table below.

Table 9. Tools for Marking

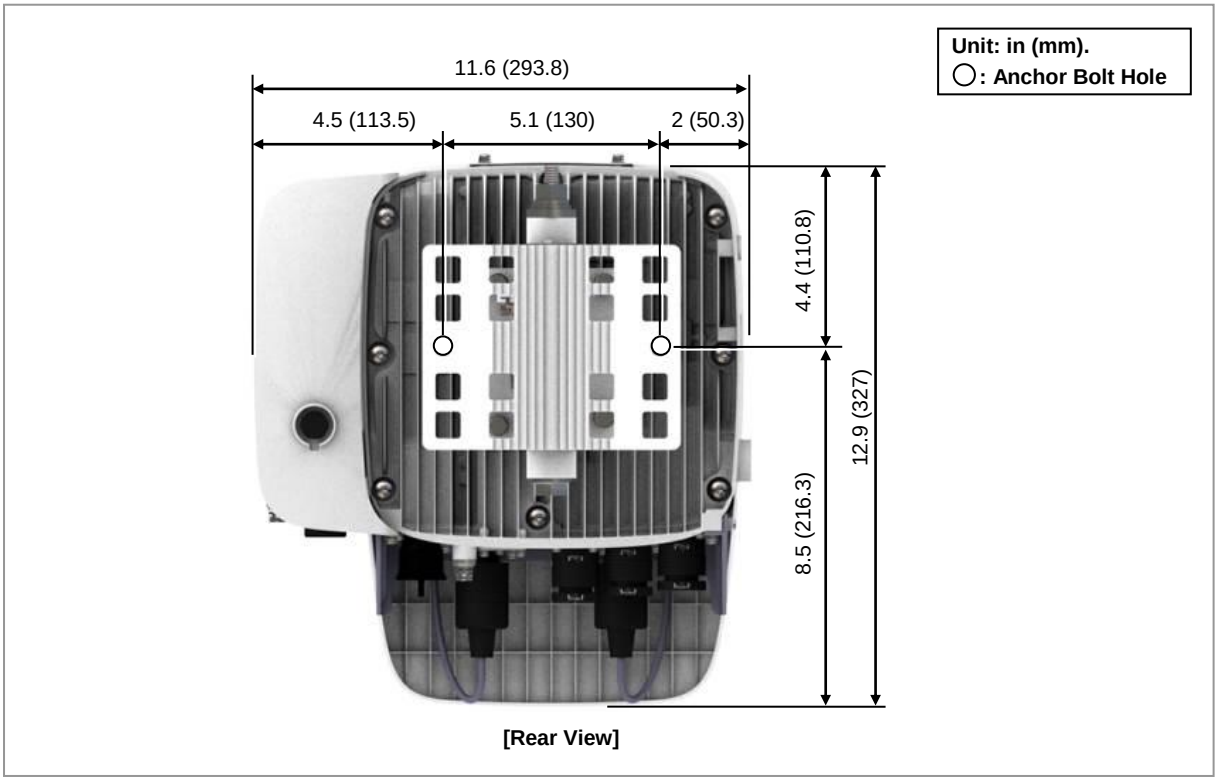
Category	Description
Working Tools	• Tape Measure • Permanent Maker • Level

To mount the system on a wall, perform the leveling test by referring to the 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 distance between the location for fixing the RRH and the anchor bolt hole.

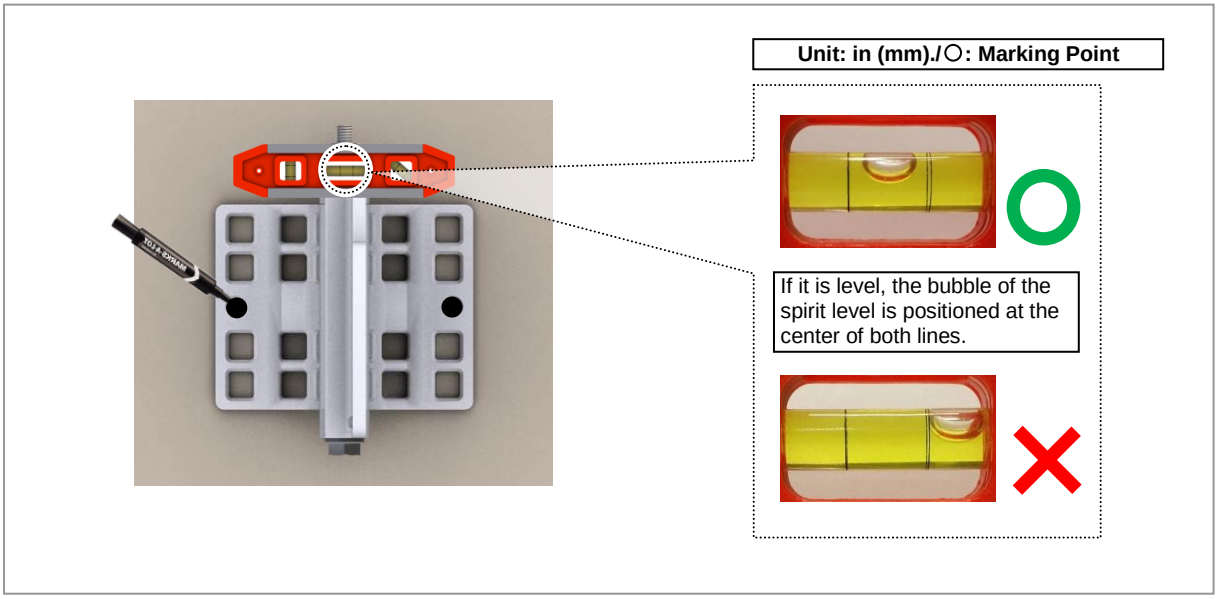
Figure 32. RRH Marking Dimensions



2 Place a mounting bracket on the fixing location, and then check the level status using a level and adjust the level of bracket assembly.

3 If the level status is normal, mark the anchor bolt holes on a wall.

Figure 33. Marking



4 To drill an anchor hole, do the following:

Prerequisites

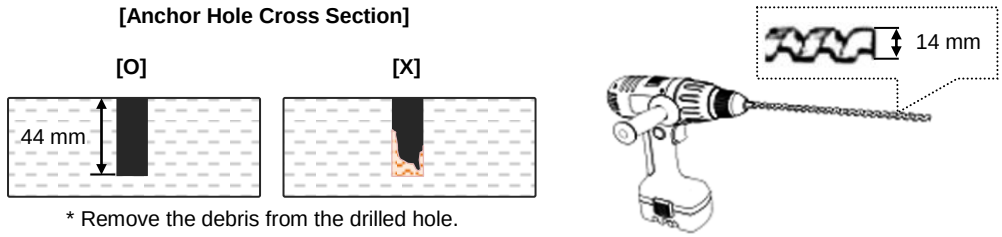
Before proceeding with the drilling process, make sure that you have items mentioned in the table below.

Table 10. Parts and Tools for Drilling

Category	Description
Woking Tools	• Hammer Drill • Concrete Drill Bit (14 mm) • Vacuum Cleaner

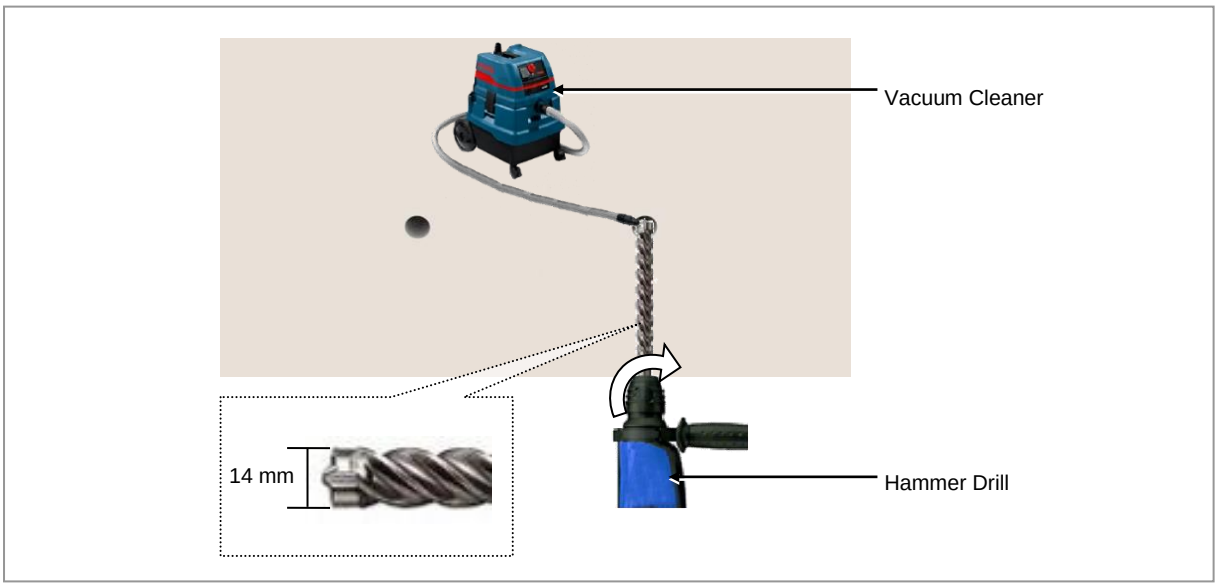
Table 11. Anchor Bolt Drill Bits and Hole Depth

Category	Anchor Bolt	Drill Bits	Hole Depth
RRH (Wall Type)	M10	14 mm	44 mm



Drill the anchor holes at the marked points. Remove dust from the holes using a vacuum cleaner.

Figure 34. Drilling



Fixing Mounting Bracket on the Wall

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

Prerequisites

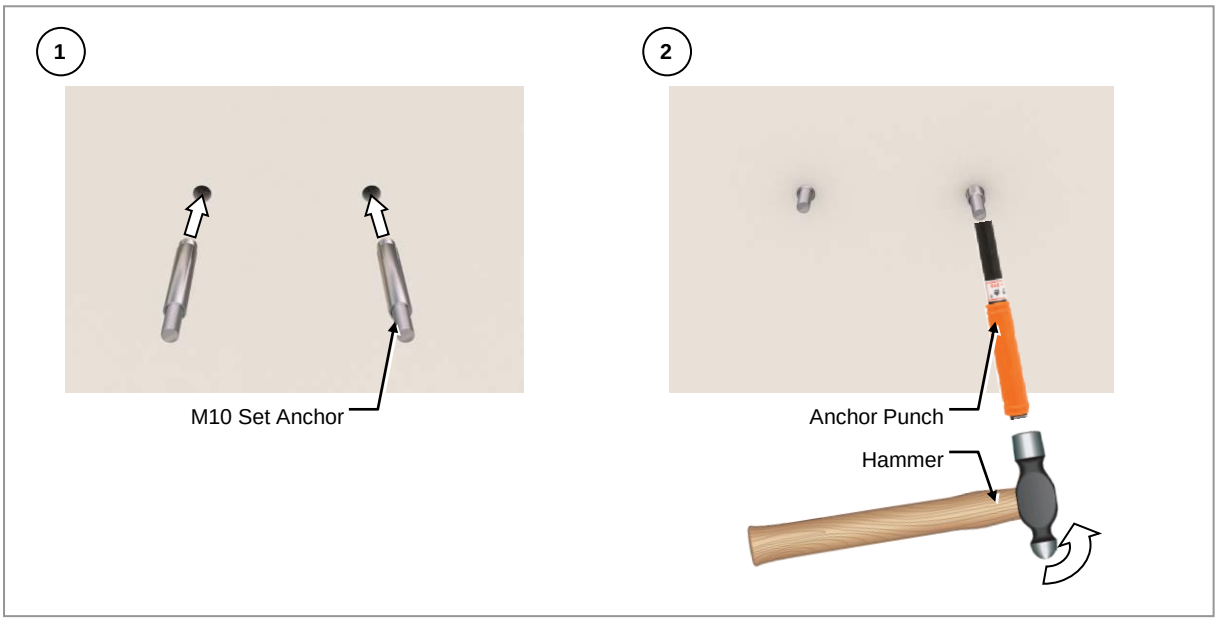
Before proceeding with fixing the mounting bracket for 1-sector on the wall, ensure that you have the items mentioned in the table below.

Table 12. Parts and Tools for Fixing Mounting Bracket on the Wall

Category	Description		
Parts	Mounting Bracket		1 EA
	Fasteners	M10 Set Anchor Assembly • M10 Set Anchor • M10 Plain Washer • M10 Spring Washer • M10 Hex. Nut	2 Set 1 EA/set 1 EA/set 1 EA/set 1 EA/set
Recommended Torque Value	M10 Hex. Nut		217 lbf·in
Working Tools	• Torque Wrench (100 to 400 lbf·in) • Torque Wrench Spanner head (apply hex head: 17 mm) • Spanner (17 mm) • Hammer • Anchor Punch (for M10 set anchor bolt)		

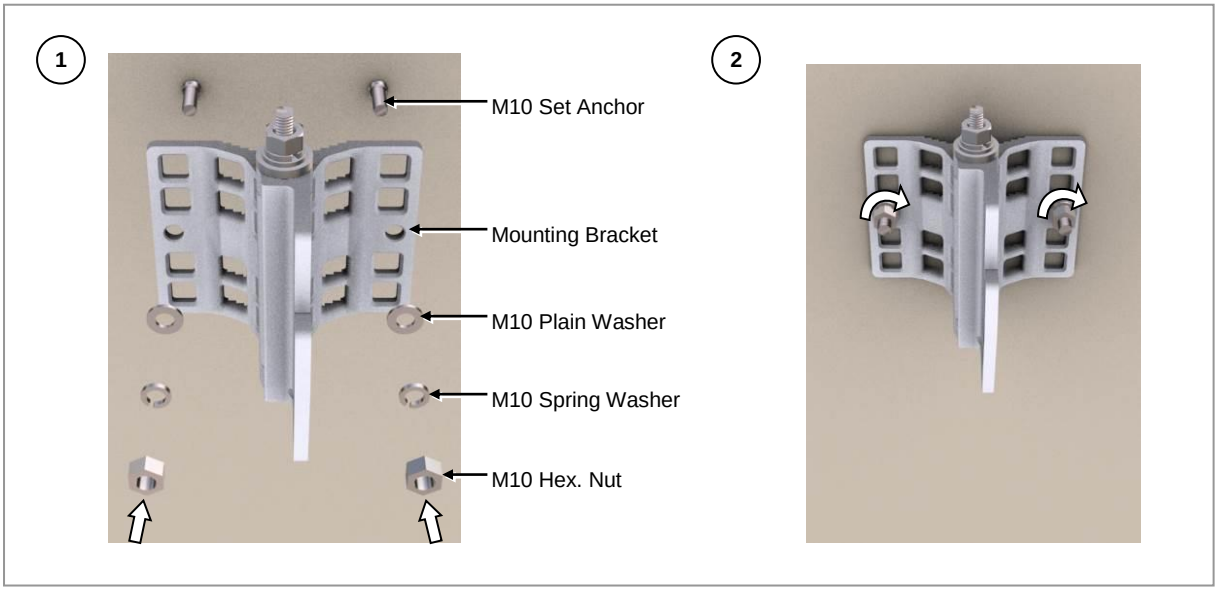
1 Fix the anchor to the drilled hole.

Figure 35. Fixing Mounting Bracket on the Wall (1)



2 Place the mounting bracket on the wall and fix it using fasteners.

Figure 36. Fixing Mounting Bracket on the Wall (2)



Fixing RRH on the Wall

To fix the RRH on the wall, do the following:

Prerequisites

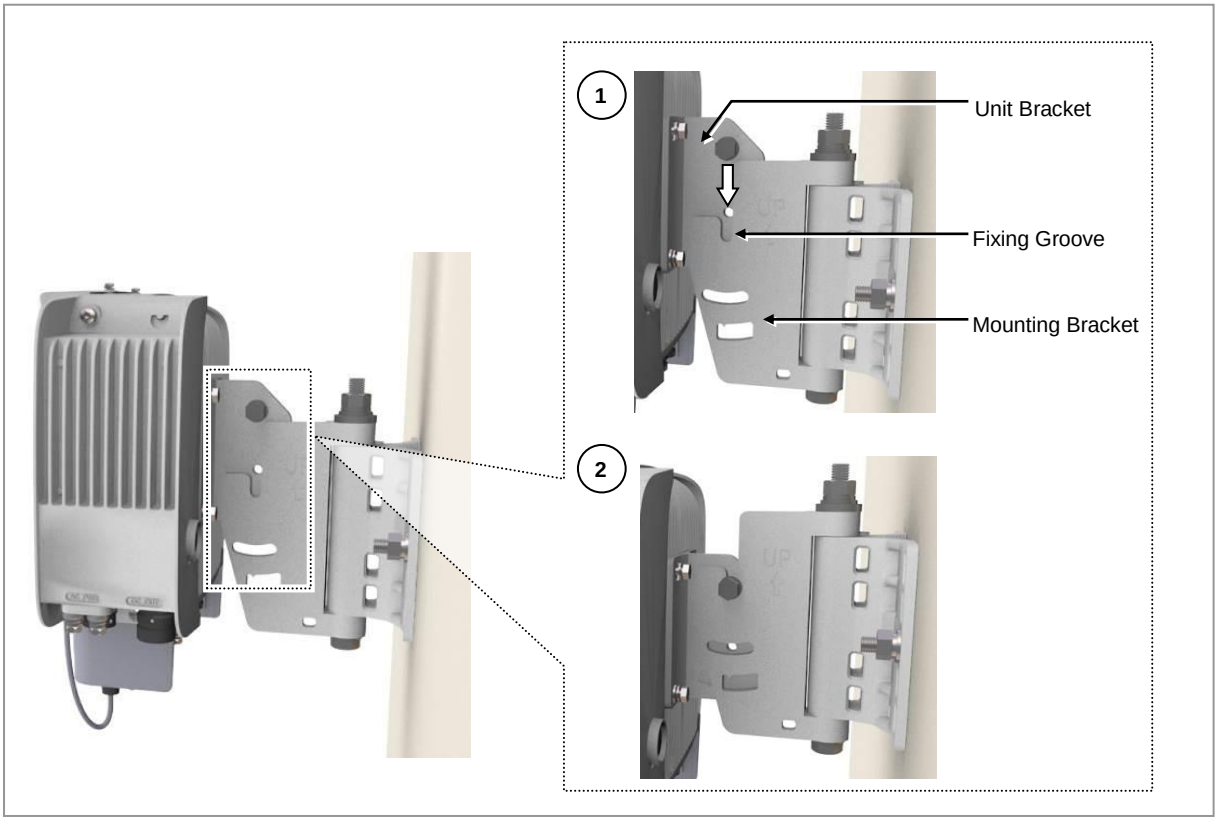
Before proceeding with fixing the RRH on the wall, ensure that you have the items mentioned in the table below.

Table 13. Parts and Tools for Fixing RRH on the Wall

Category	Description	
Fasteners	M8 × L30 Hex. bolt (Washer assembly)	1 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) • RF Alignment Tool	

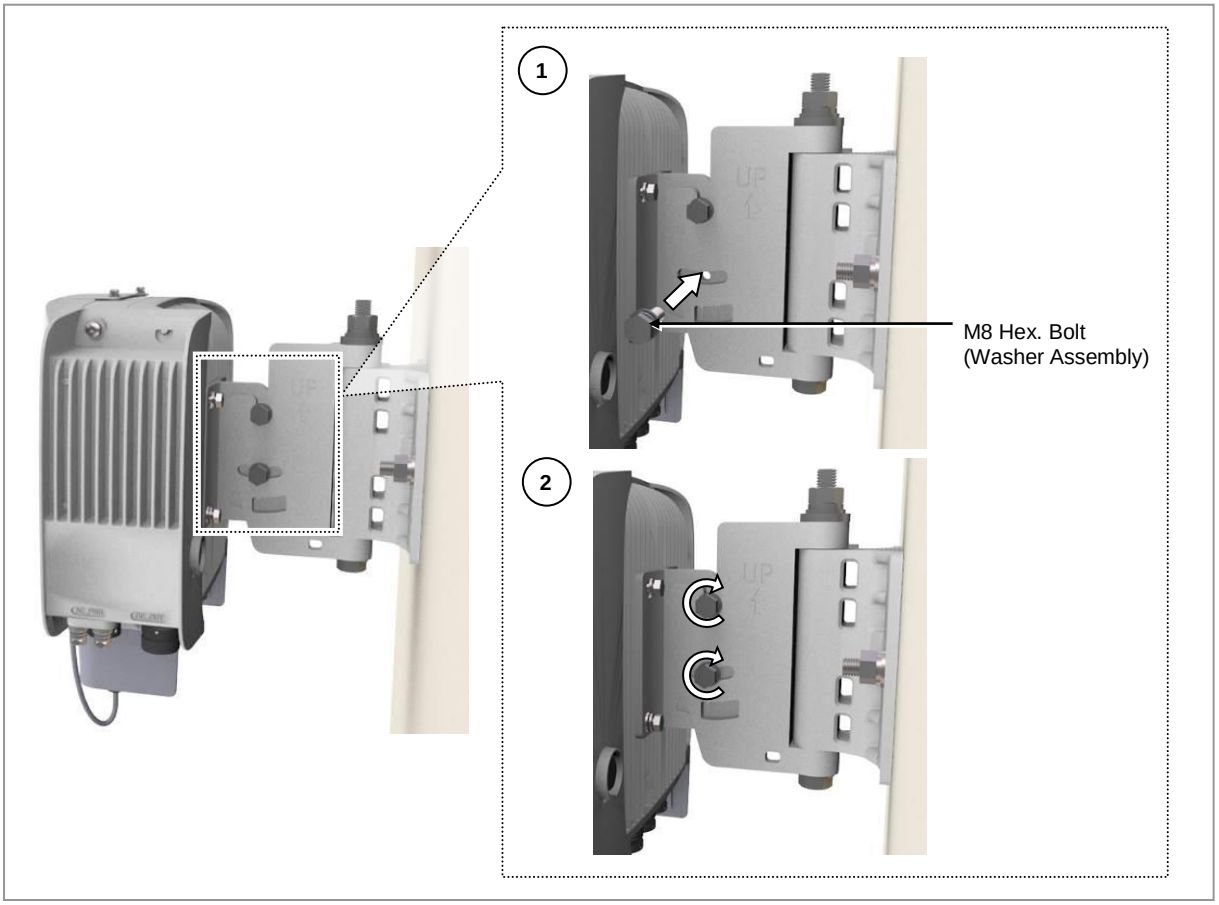
1 Place the unit bracket on the fixing groove of the mounting bracket.

Figure 37. Fixing RRH on the Wall (1)



2 Fix the RRH using the fasters.

Figure 38. Fixing RRH on the Wall (2)



3 By using the RF alignment tool, check the tilt and the azimuth and adjust when there is an issue.

For detail instructions on how to use the RF alignment tool, refer to the User Manual supplied by each manufacturer.

Tilting

LAA RRH (RT2201-46A) should do not up tilting.

The instructions for tilting the RRH apply to all installation types.

The adjustable tilting range is as follows:
- Down tilting: 0° to 16°

To adjust the RRH tilting, do the following:

Prerequisites

Before proceeding with adjusting the RRH tilting, make sure that you have the

items mentioned in the table below.

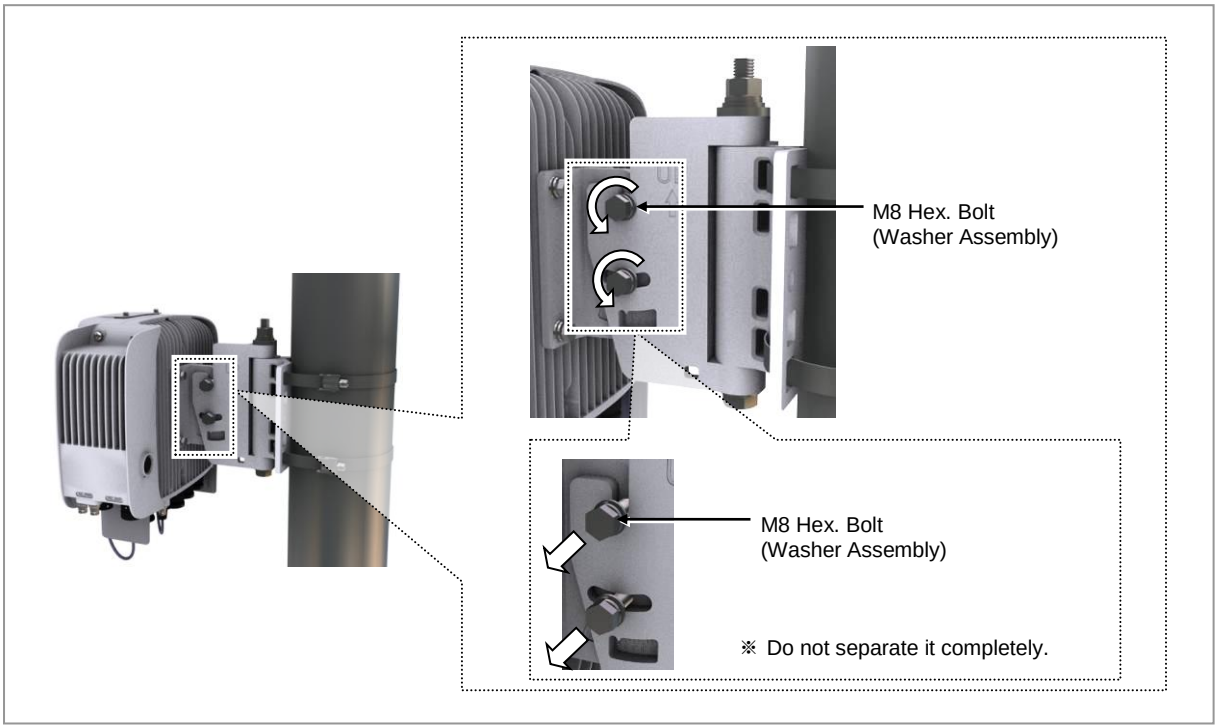
Table 14. Tools for Tilting RRH

Category	Description	
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) • Spanner (13 mm) • RF Alignment Tool	

1 Loosen the RRH by turning M8 hex bolt of mounting bracket two or three times counterclockwise.

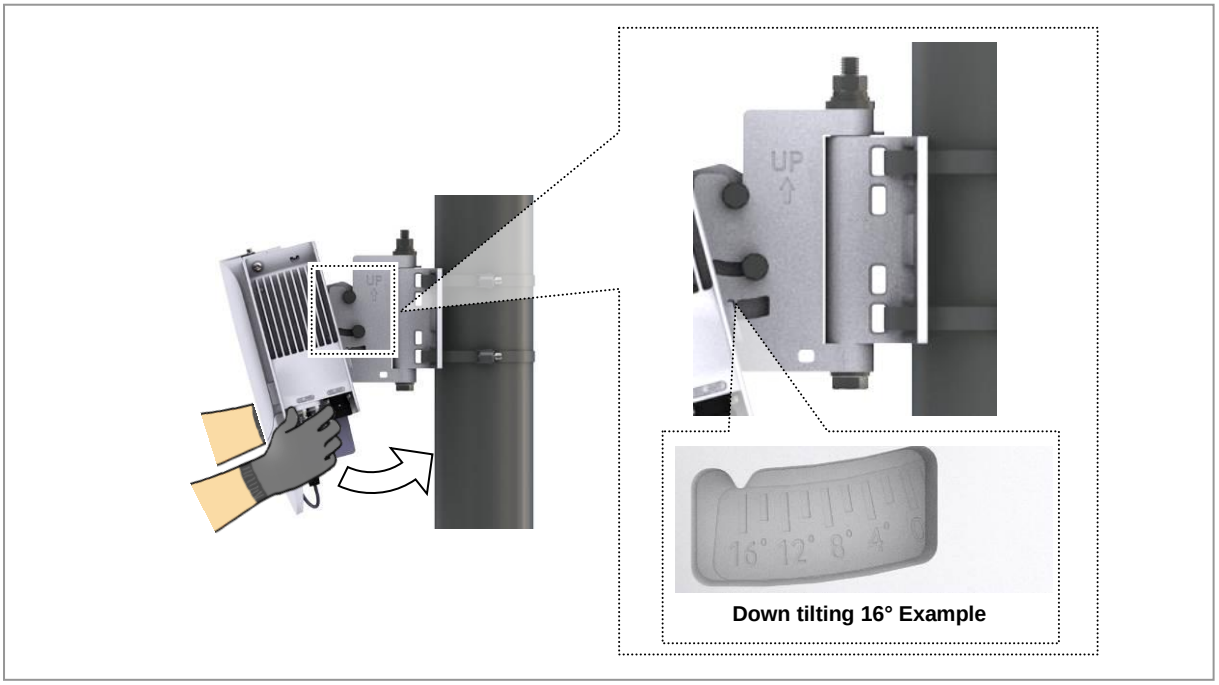
Do not separate it completely.

Figure 39. RRH Tilting Adjustment (1)



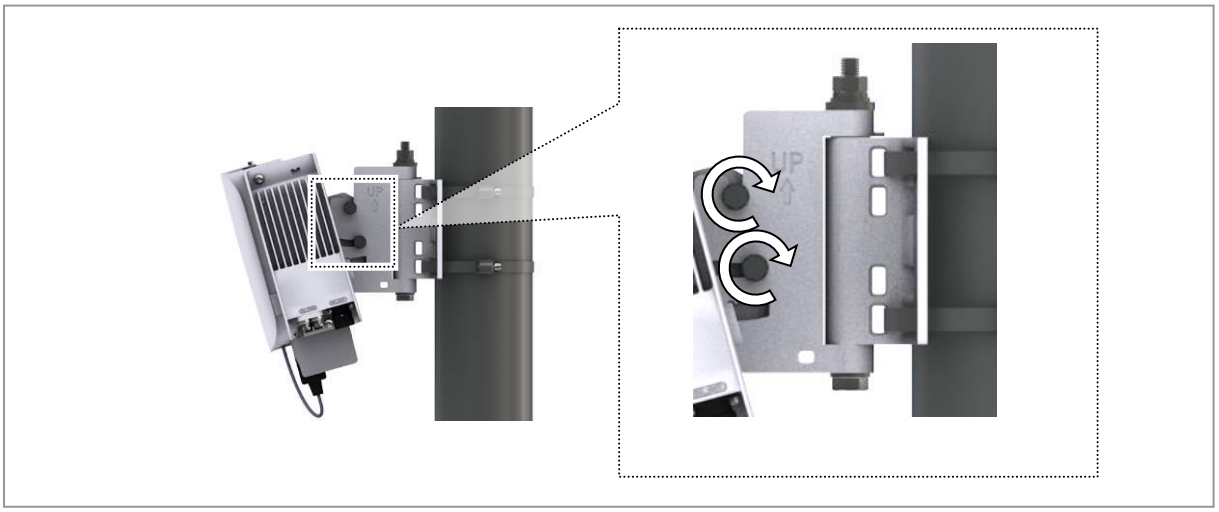
2 Push the RRH down to adjust the tilting angle.

Figure 40. RRH Tilting Adjustment (2)



3 Fix the RRH using the working tools.

Figure 41. RRH Tilting Adjustment (3)



4 By using the RF alignment tool, check the tilt and the azimuth and adjust when there is an issue.

For detail instructions on how to use the RF alignment tool, refer to the User Manual supplied by each manufacturer.

Swiveling

The instructions for swiveling the RRH apply to all installation types.

The adjustable swivelling is as follows:
- Left Swivelling: 0° to 30°
- Right Swivelling: 0° to 30°

To adjust the RRH swivelling, do the following:

Prerequisites

Before proceeding with swivelling the RRH, make sure that you have the items mentioned in the table below.

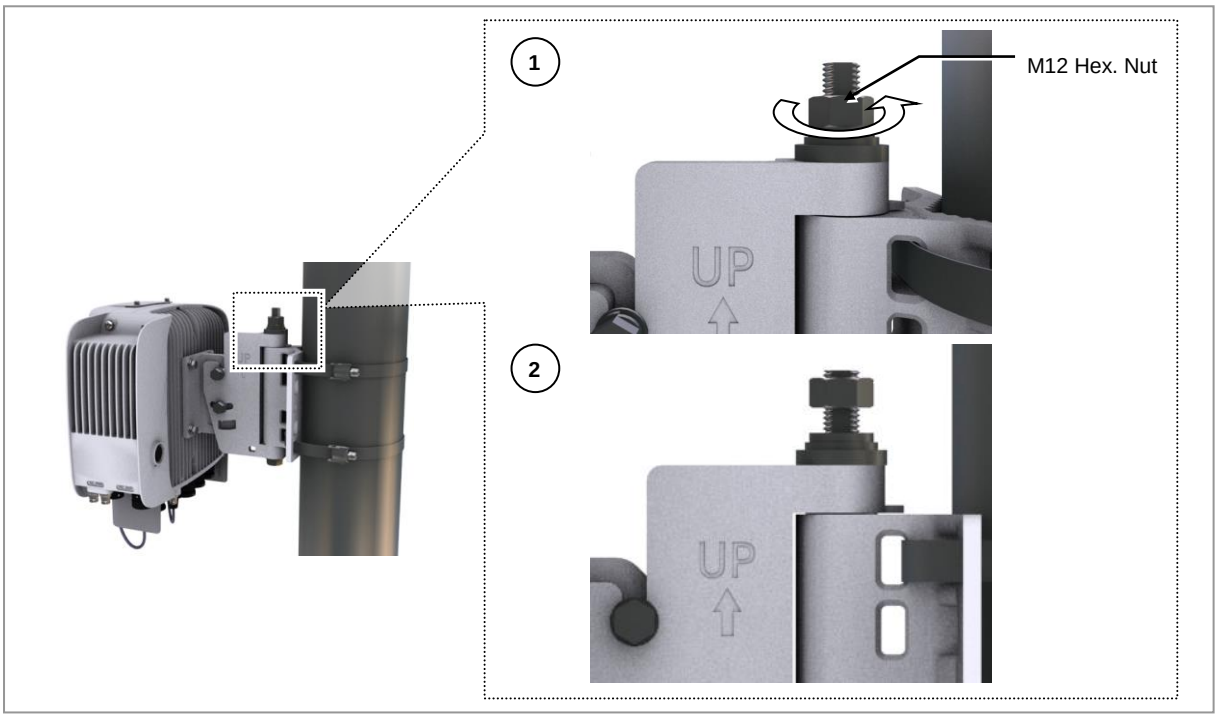
Table 15. Tools for Swiveling RRH

Category	Description	
Recommended Torque Value	M12 Hex. nut	372 lbf·in
Working Tools	• Torque Wrench (100 to 400 lbf·in) • Torque Wrench Spanner Head (apply hex head: 19 mm) • Spanner (19 mm) • RF Alignment Tool	

1 Loosen the RRH by turning M12 hex nut of mounting bracket two or three times counter clockwise.

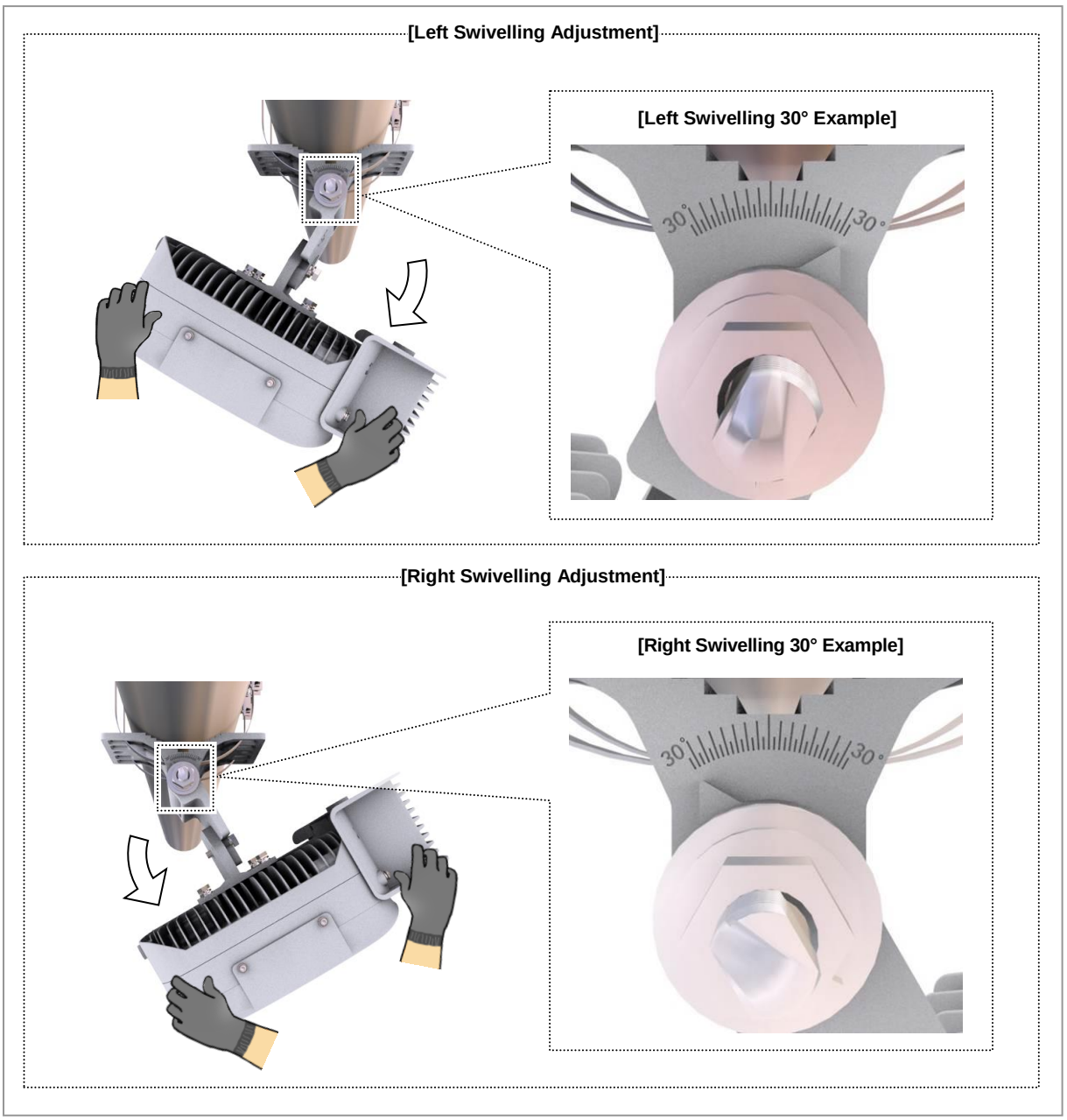
Do not separate it completely.

Figure 42. RRH Swivelling Adjustment (1)



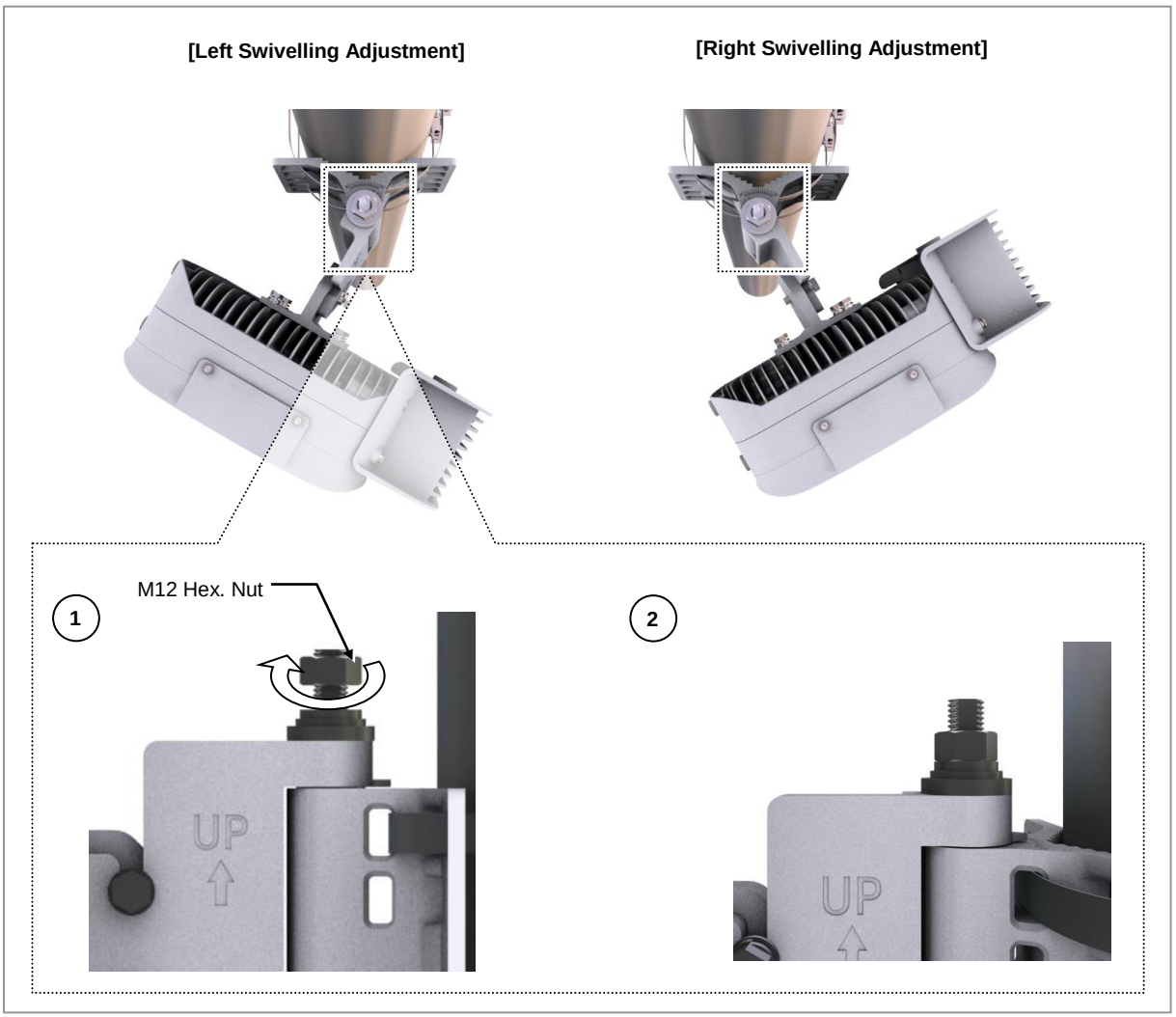
2 Pull the RRH left/right to adjust the swiveling angle.

Figure 43. RRH Swivelling Adjustment (2)



3 Fix the RRH using working tools.

Figure 44. RRH Swivelling Adjustment (3)



4 By using the RF alignment tool, check the tilt and the azimuth and adjust when there is an issue.

For detail instructions on how to use the RF alignment tool, refer to the User Manual supplied by each manufacturer.

Using the Tilting Bracket

This section describes the procedure to fix the unit bracket using the tilting bracket.

Fixing Unit Bracket

These instructions for mounting a unit bracket to the RRH apply to all installation types.

To fix the unit bracket, do the following:

Prerequisites

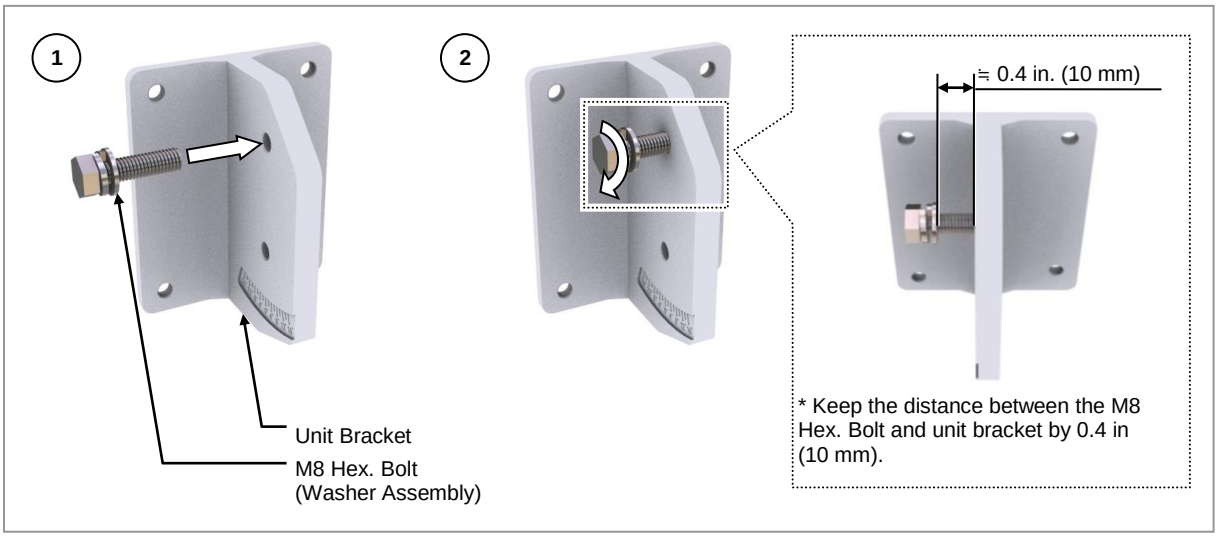
Before proceeding with fixing the unit bracket, make sure that you have the items mentioned in the table below.

Table 16. Parts and Tools for Fixing Unit Bracket on RRH

Category	Description		
Parts	Unit Bracket		1 EA/RRH
	Fasteners	M6 × L20 Hex. bolt (Washer assembly)	4 EA/RRH
		M8 × L30 Hex. bolt (Washer assembly)	1 EA/RRH
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) • Spanner (apply hex head: 13 mm)		

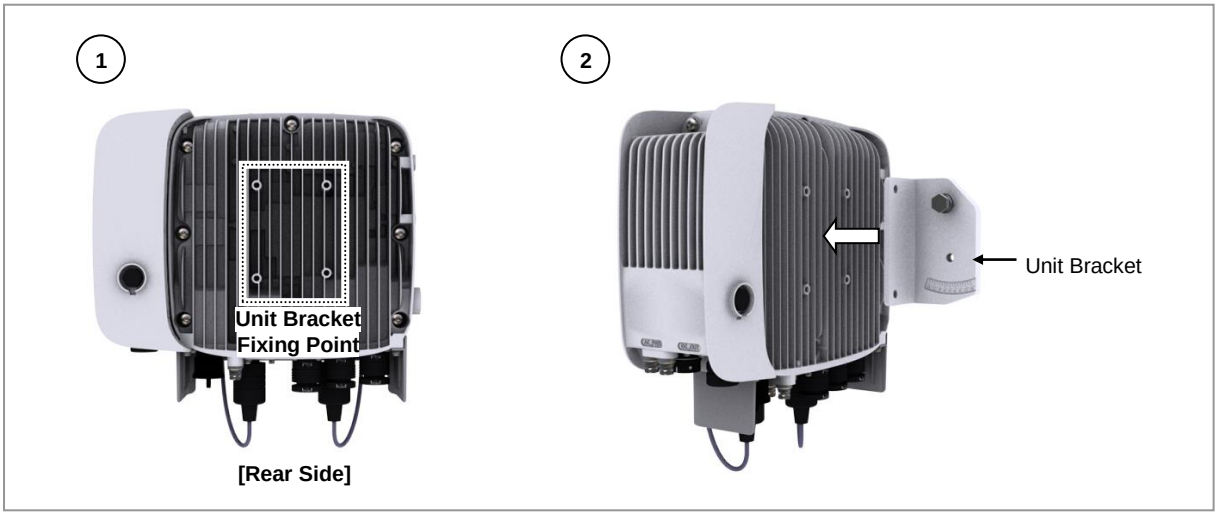
1 Inset the M8 hex bolt to the unit bracket temporarily.

Figure 45. Fixing Unit Bracket (1)



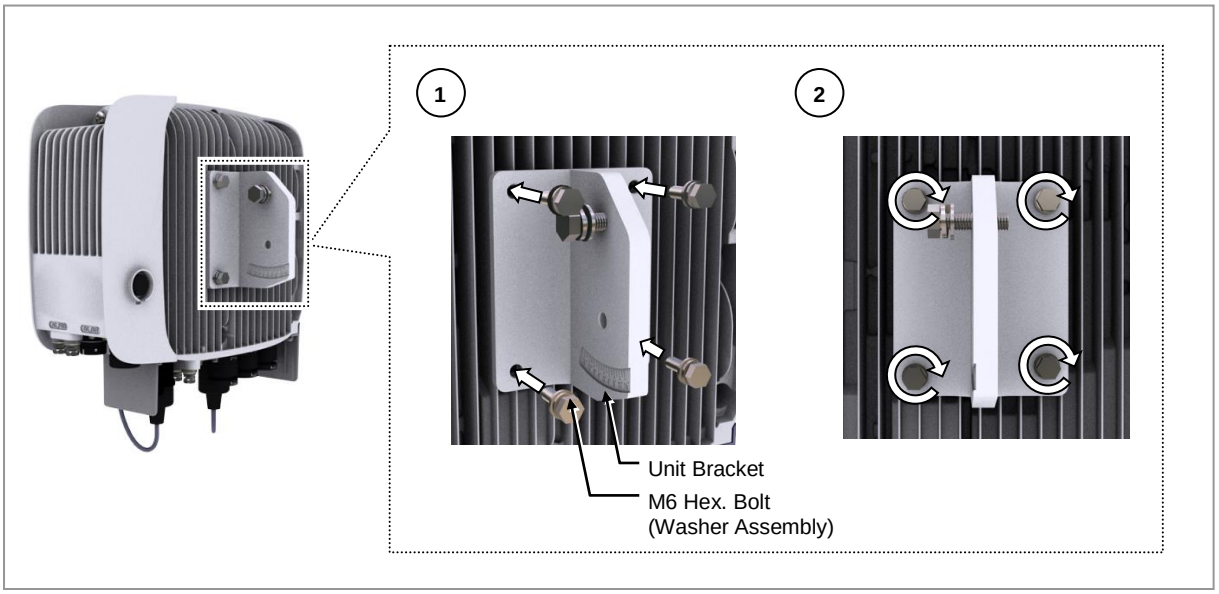
2 Check the position for mounting the unit bracket on the back of the RRH and place it in that position.

Figure 46. Fixing Unit Bracket (2)



3 Fix the unit bracket using fasteners.

Figure 47. Fixing Unit Bracket (3)



Assembling Mounting Bracket for 3 Sector Pole Type

To assemble the mounting bracket for 3-sector, do the following:

Prerequisites

Before proceeding with assembling the mounting bracket for 3sector, make sure that you have the items mentioned in the table below.

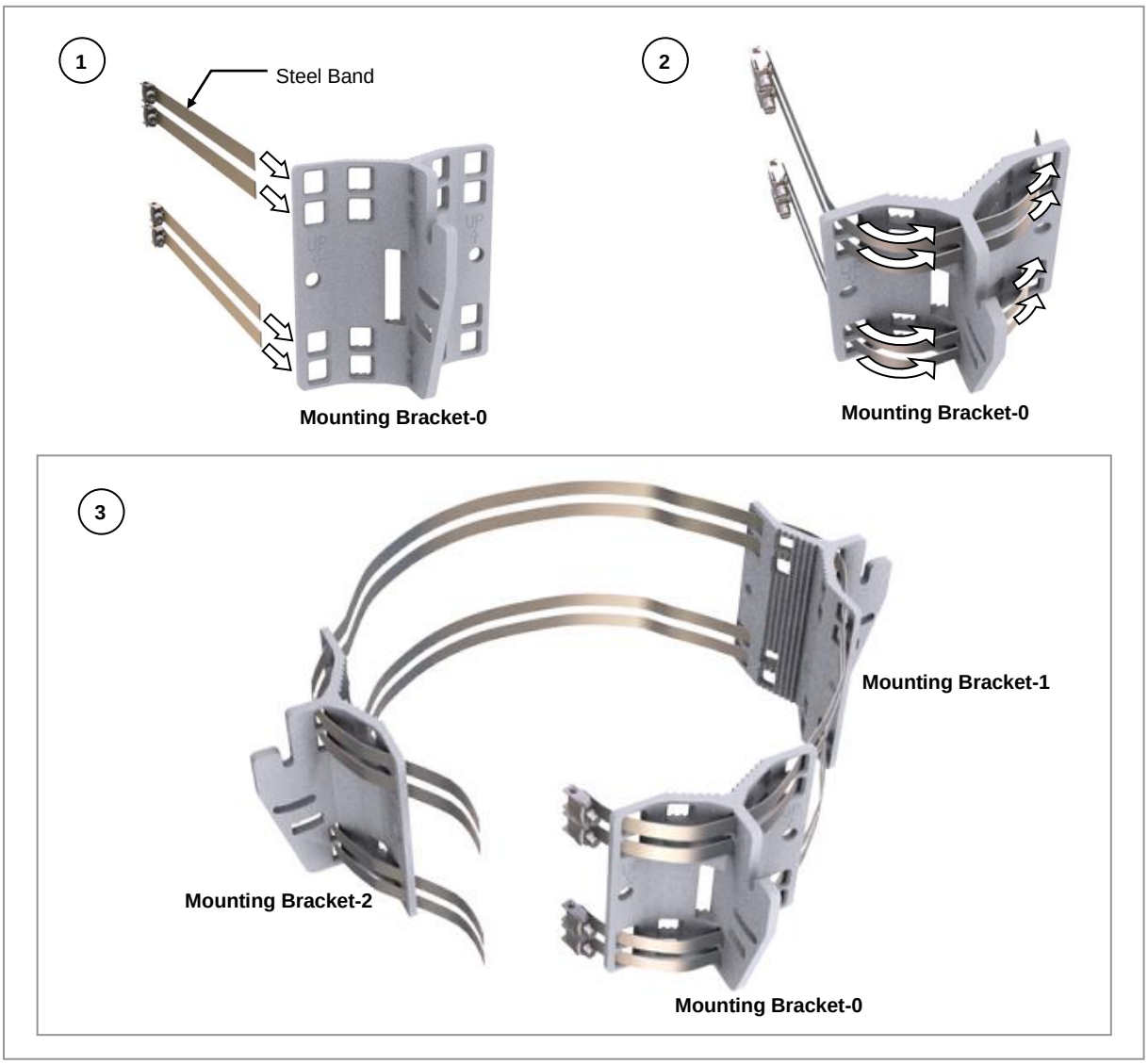
3 RRHs can be installed when the pole diameter is more than 8 in. (200 A, 220 mm) to 12 in. (300 A, 320 mm).

Table 17. Parts and Tools for Fixing Mounting Bracket on the Pole

Category	Description		
Parts	Mounting Bracket		3EA
	Fasteners	Steel Band	4EA
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		

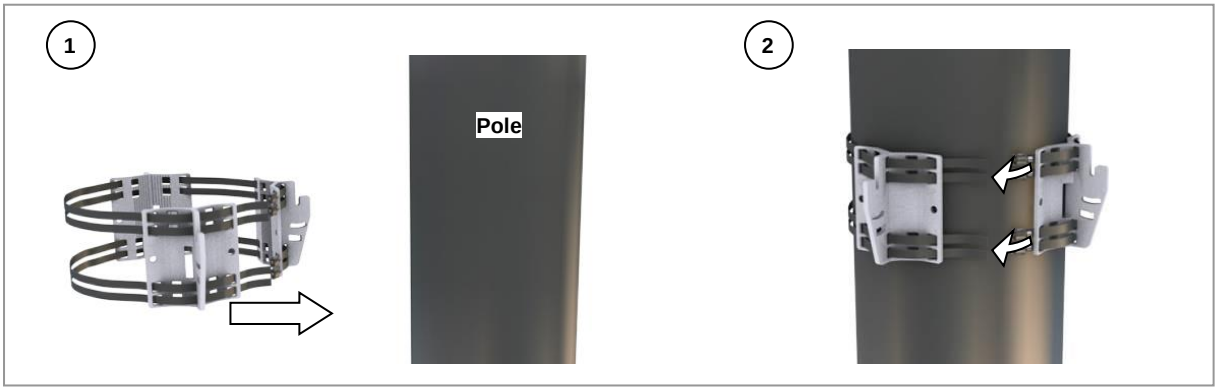
1 Pass the steel band through the fixing hole of the mounting brackets.

Figure 48. Fixing Mounting Bracket on the Pole (1)



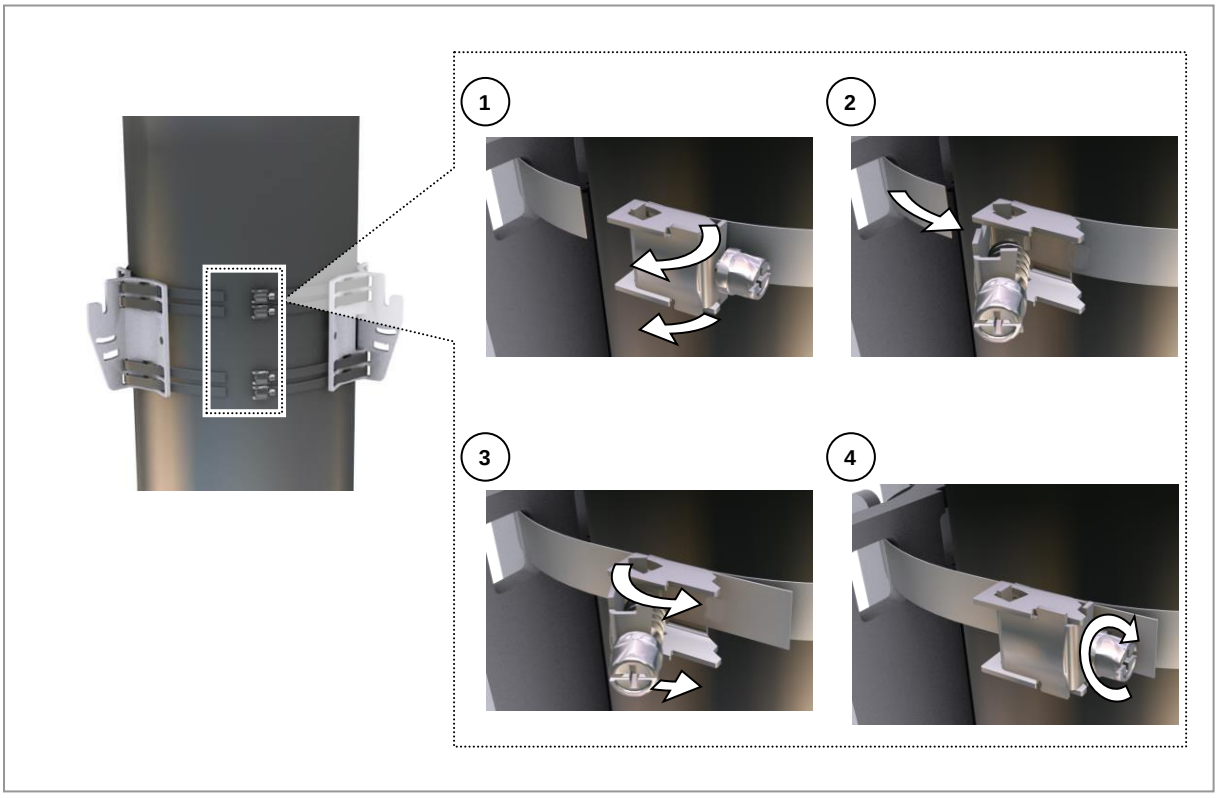
2 Place mounting brackets to the pole.

Figure 49. Fixing Mounting Bracket on the Pole (2)



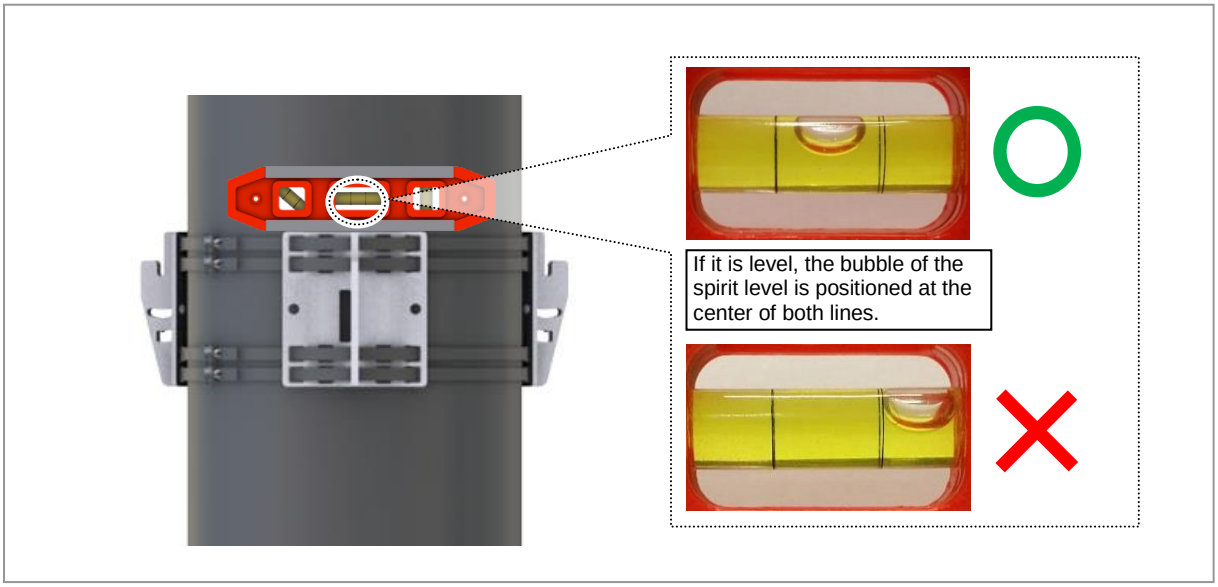
3 Fix the mounting brackets to the pole using the steel band.

Figure 50. Fixing Mounting Bracket on the Pole (3)



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

Figure 51. Fixing Mounting Bracket on the Pole (4)



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 to fix the mounting bracket.

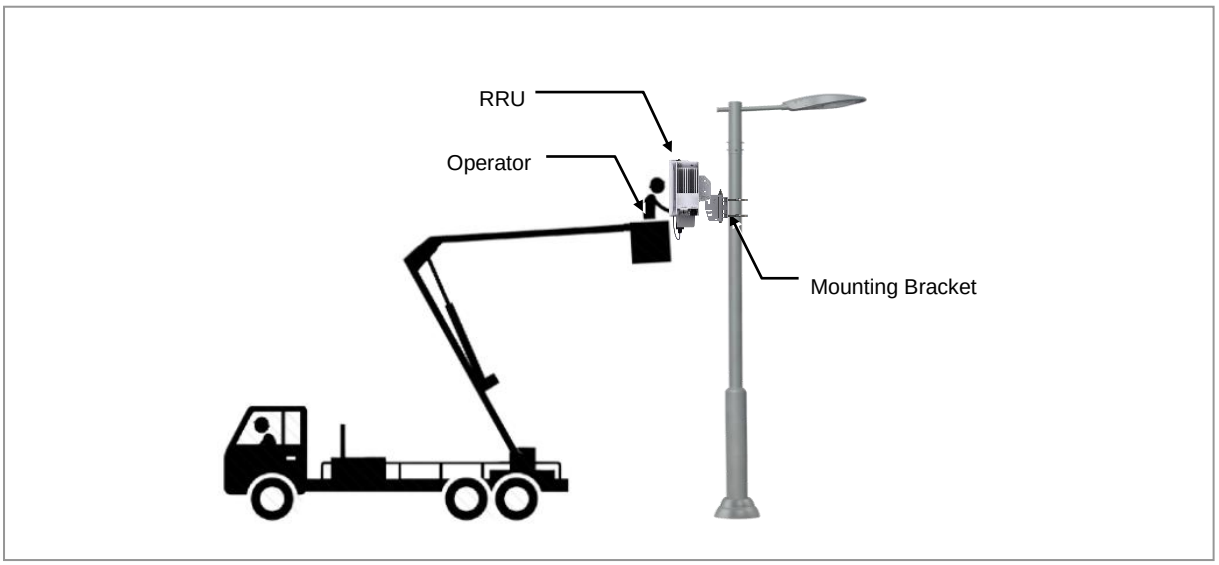
After fixing the steel band, push the remainder of band inside the mounting bracket

Lifting RRH

To lift the RRH, do the following:

- Lift with a cherry picker.

Figure 52. Lifting RRH



Fixing RRHs on the 3 Sector Pole Type

To fix the RRH on the pole, do the following:

Prerequisites

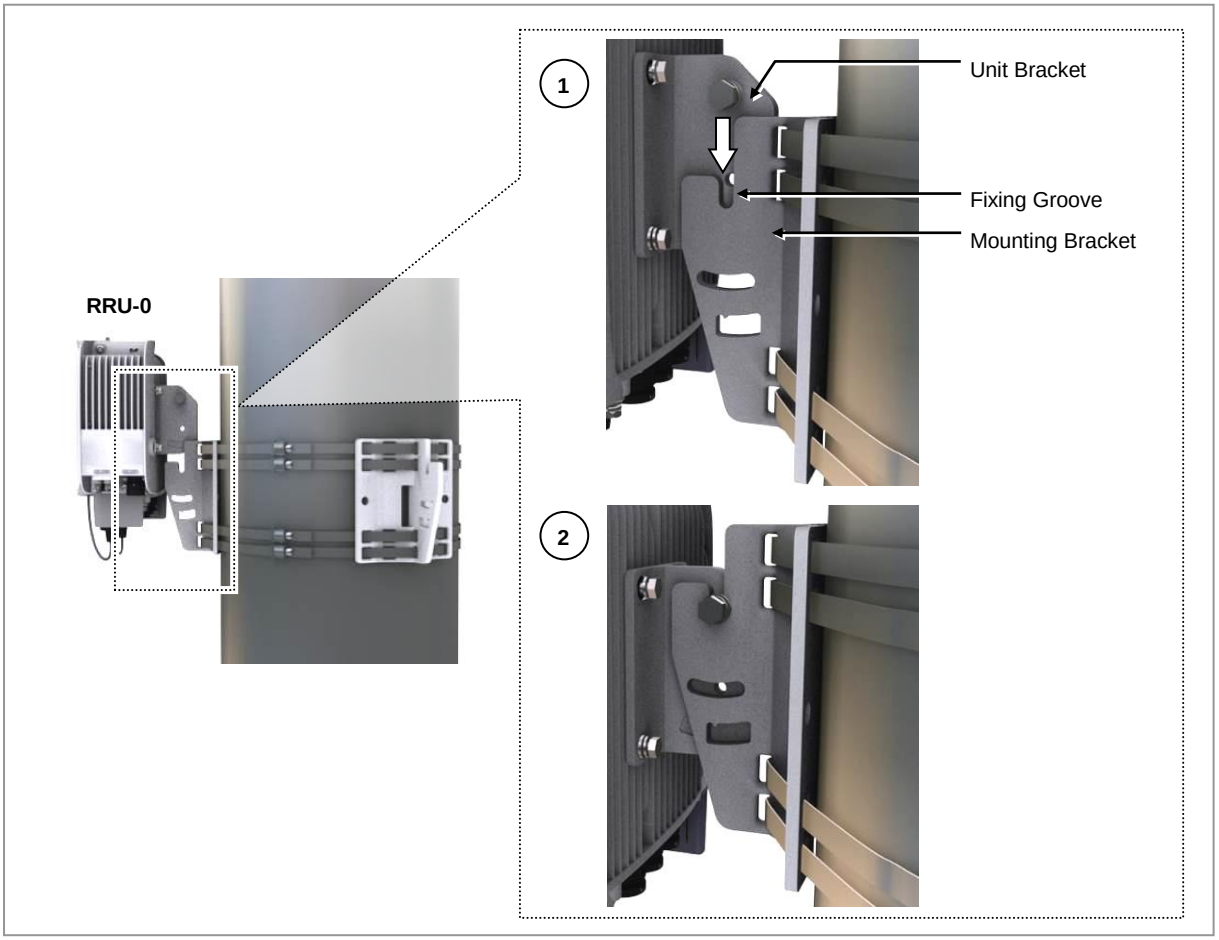
Before proceeding with fixing the RRH on the pole, make sure that you have items mentioned in the table below.

Table 18. Parts and Tools for Fixing RRH on the 3Sector Pole Type

Category	Description	
Fasteners	M8 × L30 hex bolt (Washer assembly)	1 EA/RRH
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) • Antenna Alignment Tool	

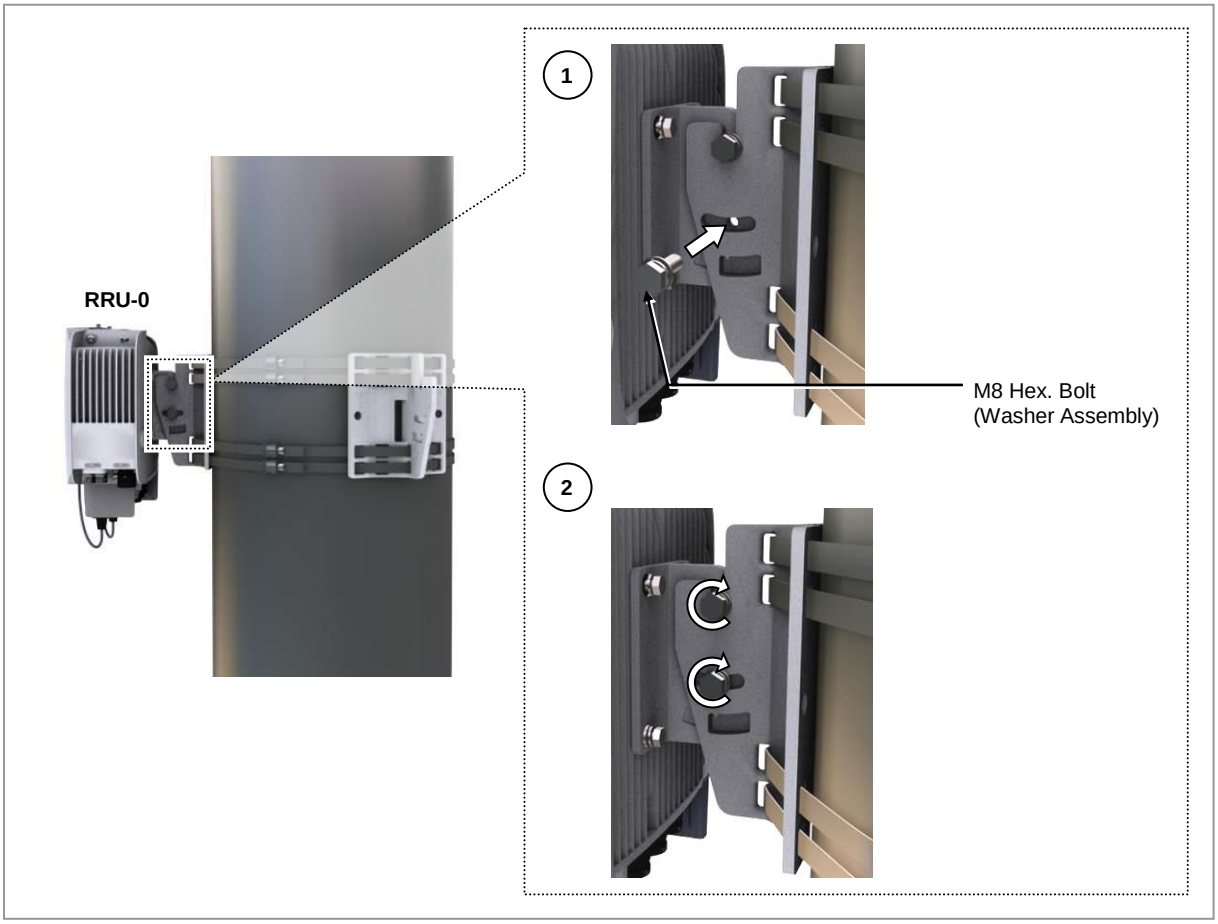
1 Place the unit bracket of RRH-0 on the fixing groove of the mounting bracket.

Figure 53. Fixing RRHs on the 3Sector Pole Type (1)

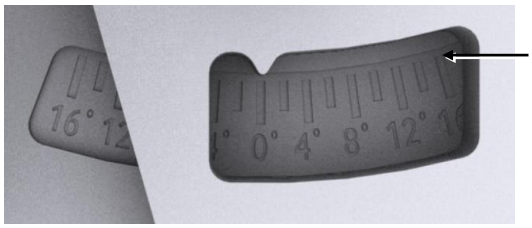


2 Fix the RRH-0 using the fasters.

Figure 54. Fixing RRHs on the 3Sector Pole Type (2)



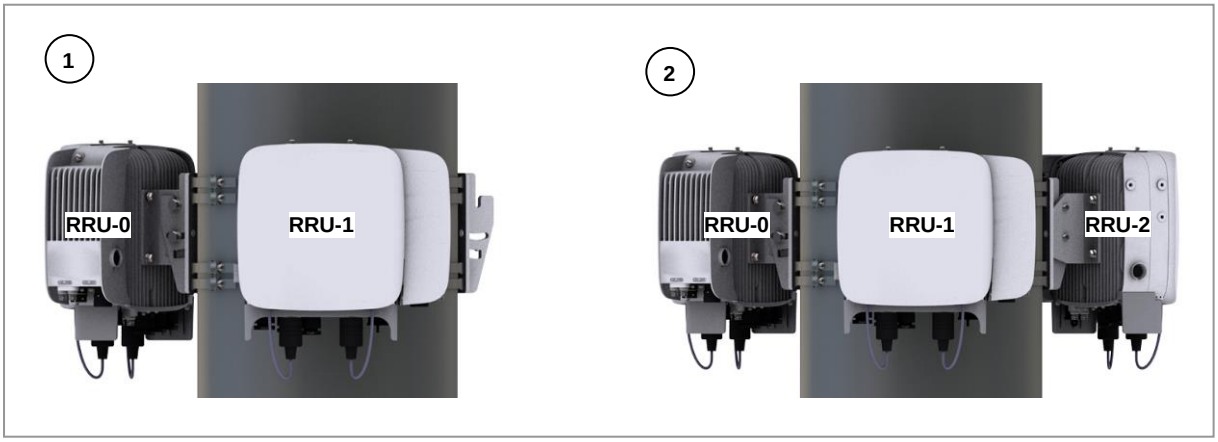
When installing the RRH, the tilting angle pointer of the unit bracket should point to 0°.



[Angle pointer position for unit bracket with 0° tilt when installing the RRU]

3 Fix RRH-1 and RRH-2 in the same way as the RRH-0.

Figure 55. Fixing RRHs on the 3Sector Pole Type (3)



4 By using the RF alignment tool, check the tilt and the azimuth and adjust when there is an issue.

For detail instructions on how to use the RF alignment tool, refer to the User Manual supplied by each manufacturer.

Without the Tilting Bracket

This section describes the procedures to fix the unit bracket and the mounting bracket.

Fixing Unit Bracket

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

Prerequisites

Before proceeding with fixing the unit bracket on the RRH, make sure that you have the items mentioned in the table below.

Table 19. Parts and Tools for Fixing Unit Bracket on RRH

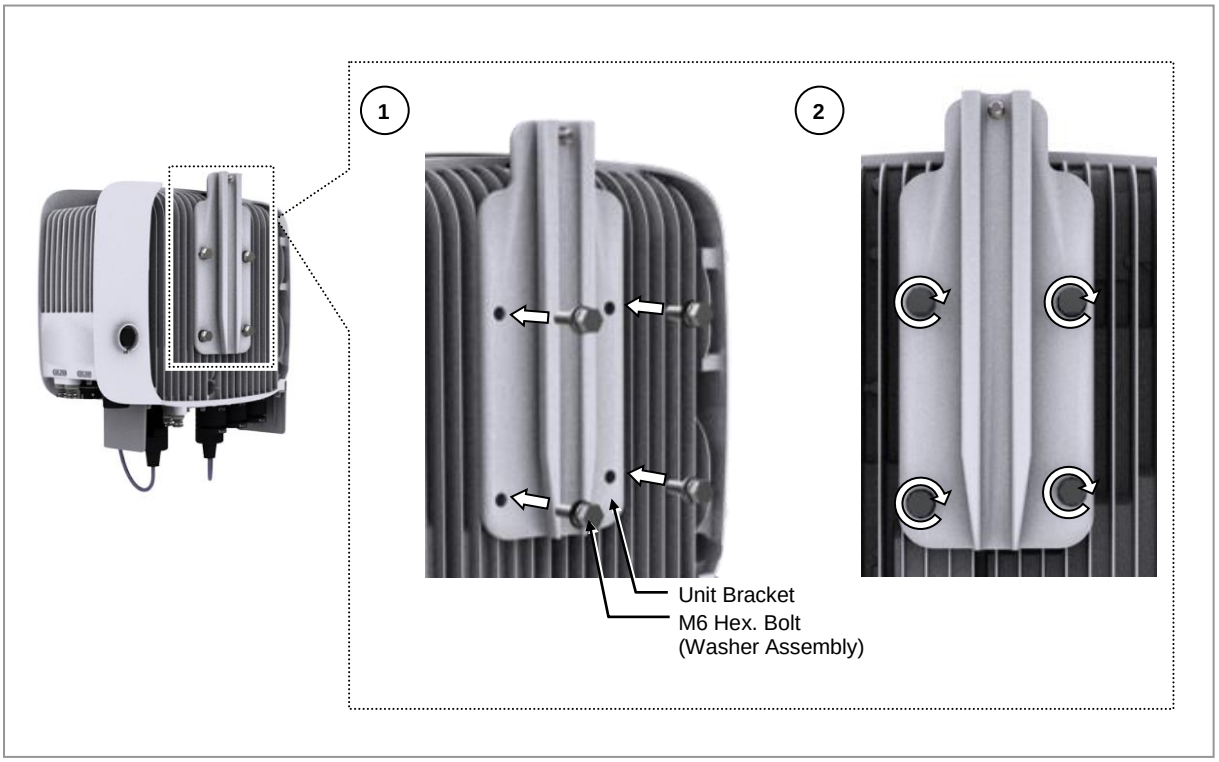
Category	Description		
Parts	Unit Bracket		1 EA/RRH
	Fasteners	M6 × L20 Hex. bolt (Washer assembly)	4 EA/RRH
Recommended Torque Value	M6 Hex. bolt		43 lbf·in
Working Tools	• Torque Wrench (10 to 50 lbf·in) • Torque Wrench Spanner Head (apply Hex. head: 10 mm)		

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

Figure 56. Fixing Unit Bracket (1)

2 Fix the unit bracket using the fasteners.

Figure 57. Fixing Unit Bracket (2)



Fixing Pole Type

3 RRHs can be installed when the pole diameter is more than 8 in. (200 A, 220 mm) to 12 in. (300 A, 320 mm).

Fixing Mounting Bracket for 3 Sector

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

Prerequisites

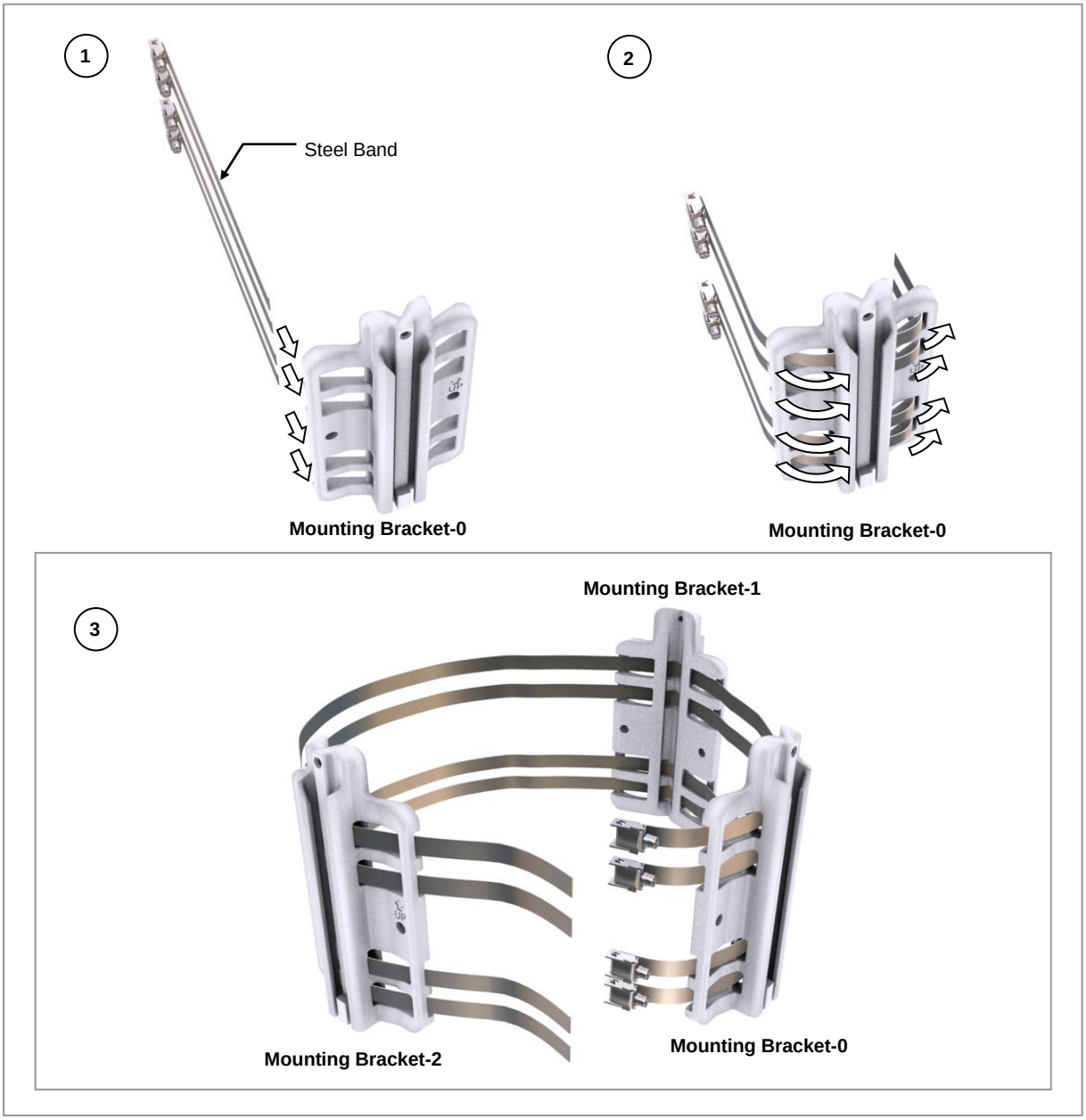
Before proceeding with fixing the mounting bracket 3 sector pole type, make sure that you have the items mentioned in the table below.

Table 20. Parts and Tools for Fixing Mounting Bracket on the Pole

Category	Description		
Parts	Mounting Bracket		3 EA
	Fasteners	Steel Band	4 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		

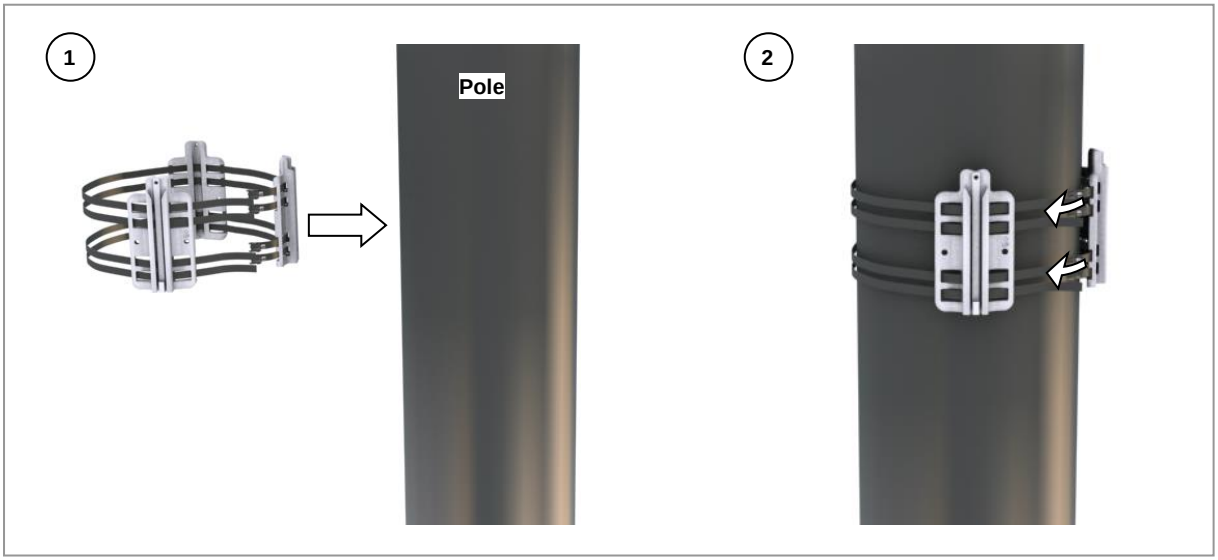
1 Pass the steel band through the fixing hole of the mounting brackets.

Figure 58. Fixing Mounting Bracket on the Pole (1)



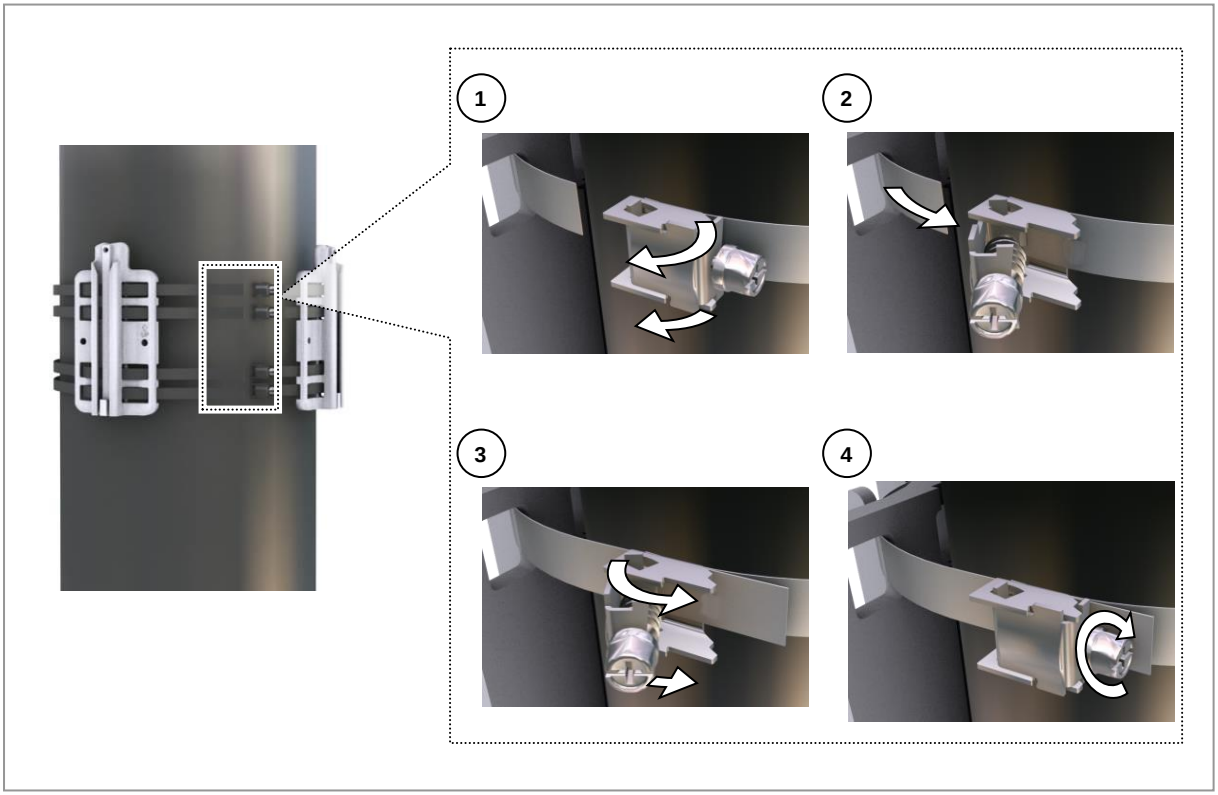
2 Place mounting brackets to the pole.

Figure 59. Fixing Mounting Bracket on the Pole (2)



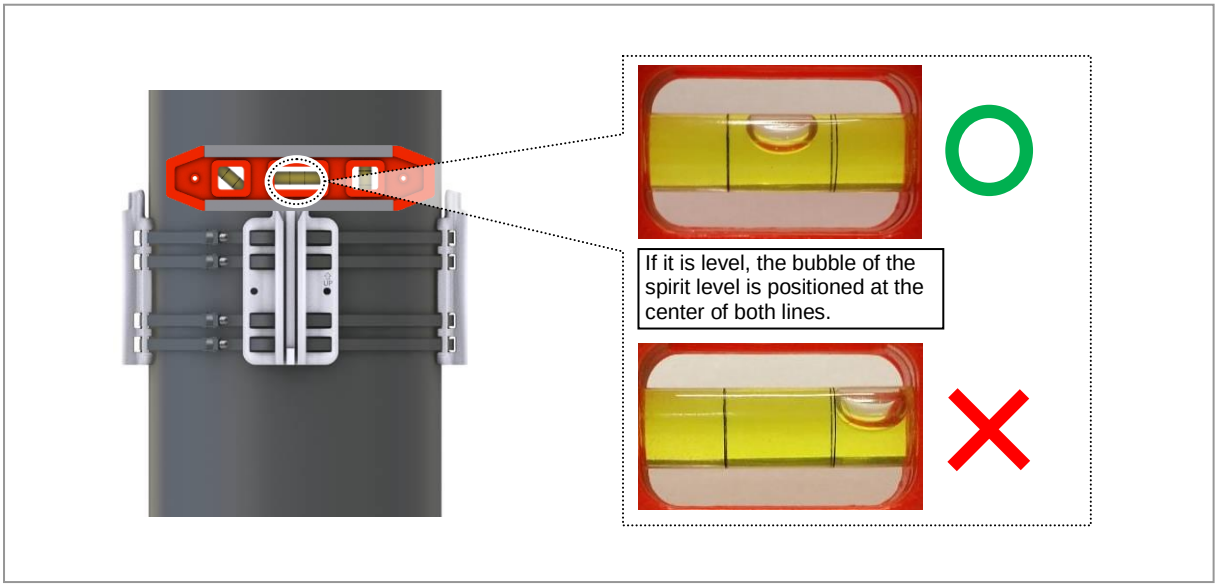
3 Fix the mounting brackets to the pole using the steel band.

Figure 60. Fixing Mounting Bracket on the Pole (3)



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

Figure 61. Fixing Mounting Bracket on the Pole (4)



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 to fix the mounting bracket.

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

Fixing RRHs on the Pole

To fix the RRH on the pole, do the following:

Prerequisites

Before proceeding with fixing the RRH on the pole, make sure that you have the items mentioned in the table below.

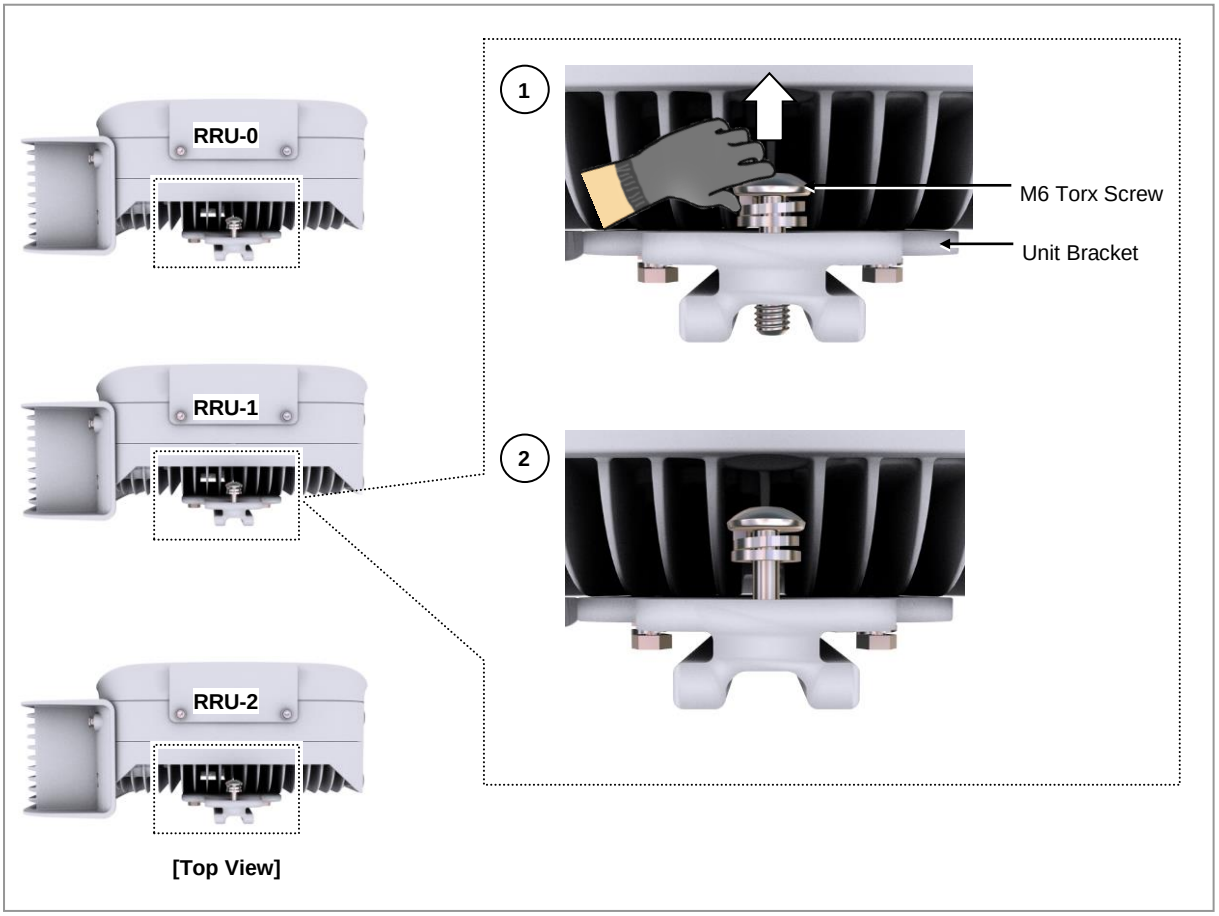
Table 21. Tools for Fixing RRHs on the Pole

Category	Description	
Recommended Torque Value	M6 Torx Screw	43 lbf·in
Working Tools	• Torx Driver Bit (T30H) • Torque Driver (20 to 90 lbf·in) • Antenna Alignment Tool	

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

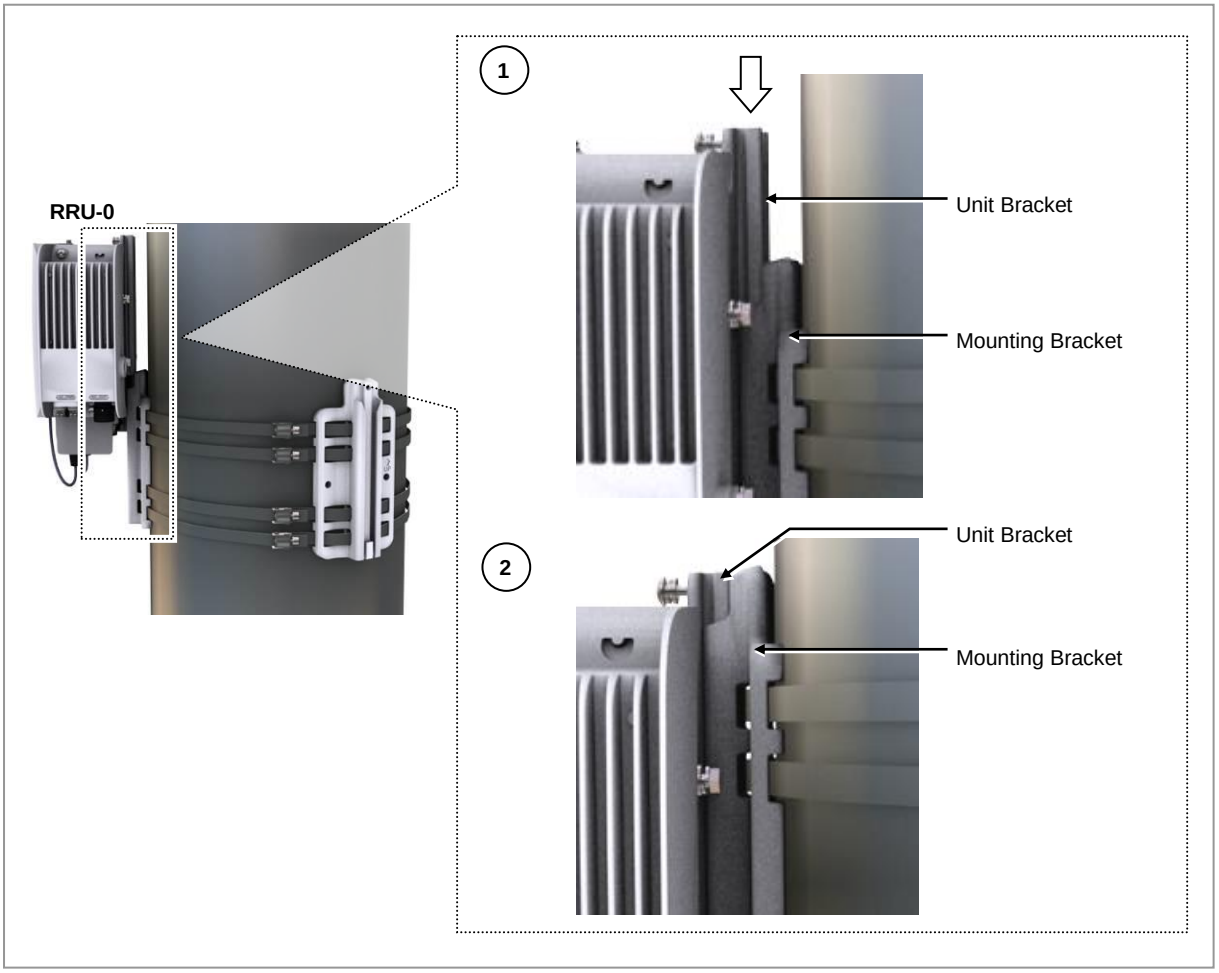
Do not pull out completely.

Figure 62. Fixing RRHs on the Pole (1)



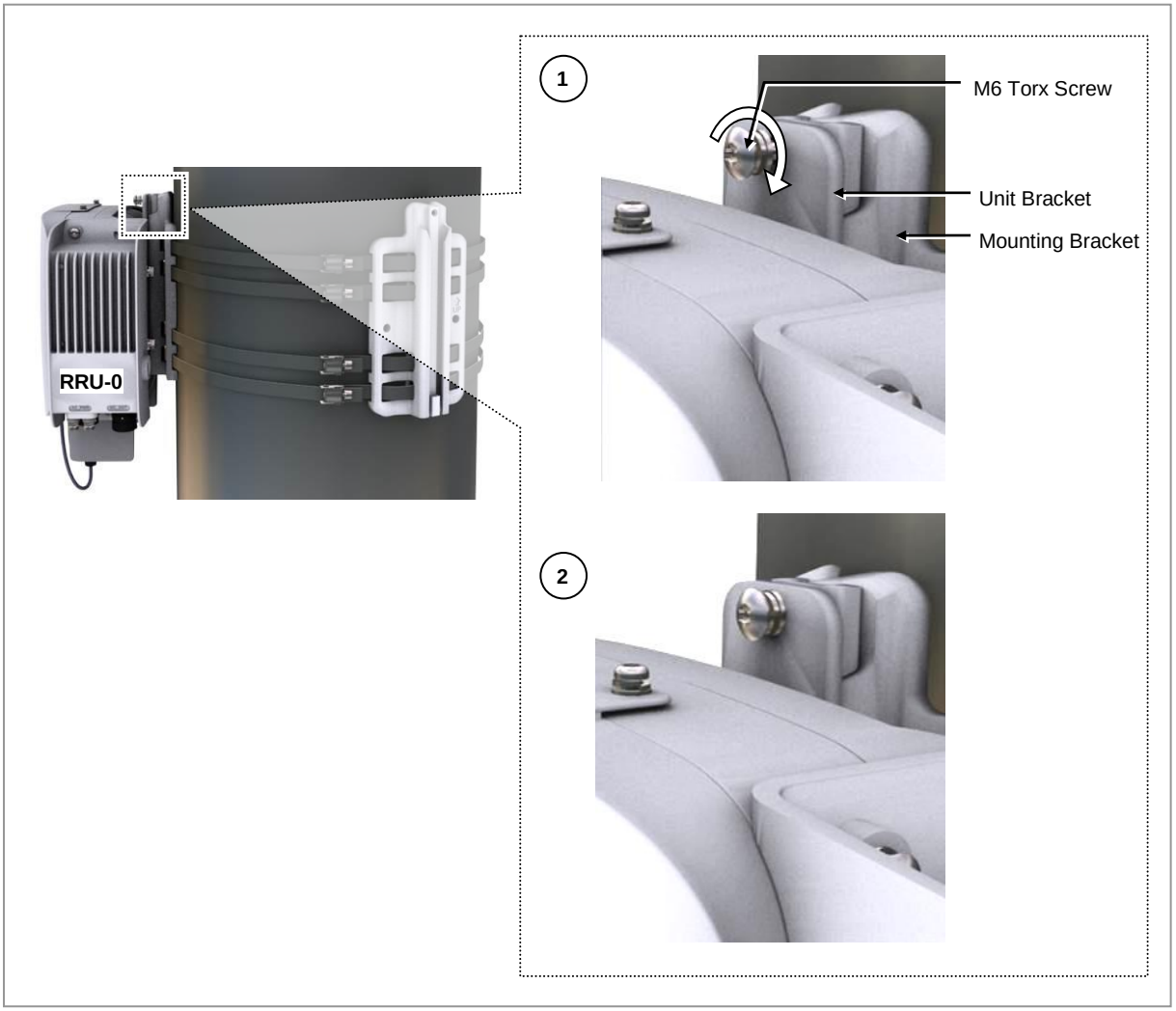
2 Place the unit bracket on the fixing grooves of the mounting bracket and push the unit bracket down to fix the RRH-0 in place.

Figure 63. Fixing RRHs on the Pole (2)



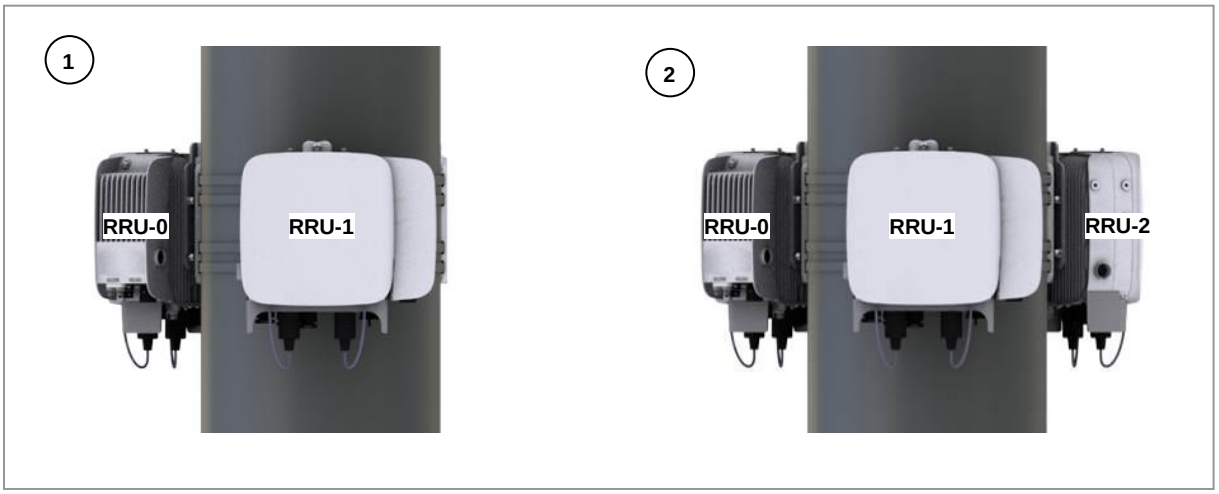
3 Fix the unit bracket of the RRH-0 to the mounting bracket using the fastener.

Figure 64. Fixing RRHs on the Pole (3)



4 Fix RRH-1 and RRH-2 in the same way as the RRH-0.

Figure 65. Fixing RRHs on the Pole (4)



5 By using the RF alignment tool, check the tilt and the azimuth and adjust when there is an issue.

For detail instructions on how to use the RF alignment tool, refer to the User Manual supplied by each manufacturer.

Using the Side-by-Side Bracket

Fixing the Unit Bracket

To fix the unit bracket, do the following:

Prerequisites

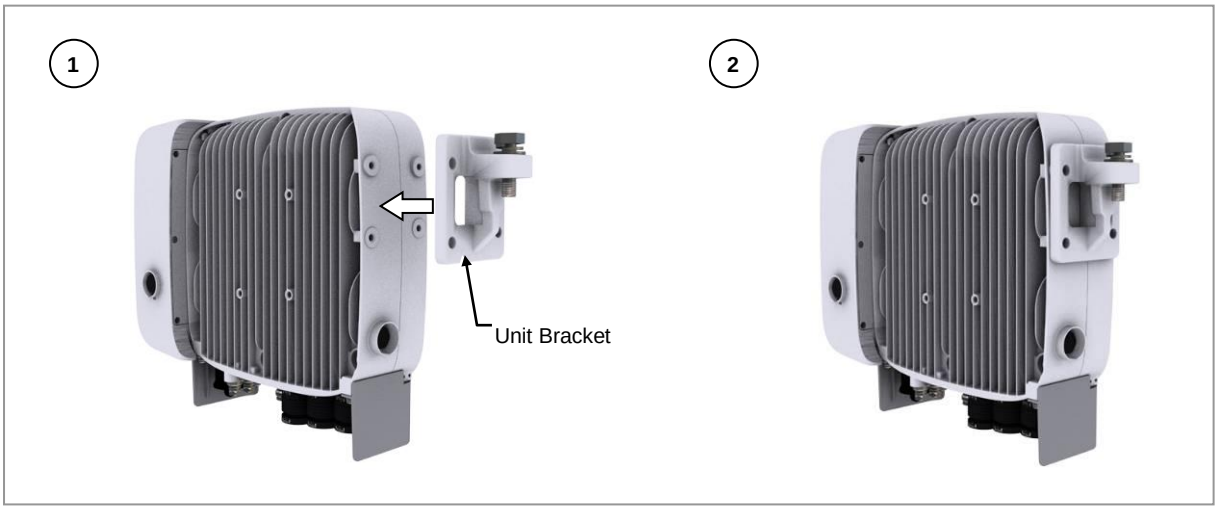
Before proceeding with fixing the unit bracket, make sure that you have the items mentioned in the table below.

Table 22. Parts and Tools for Fixing Unit Bracket on RRH

Category	Description		
Parts	Unit Bracket		1 EA/RRH
	Fasteners	M6 × L20 Hex. bolt (Washer assembly)	4 EA/RRH
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) • Spanner (apply hex head: 13 mm)		

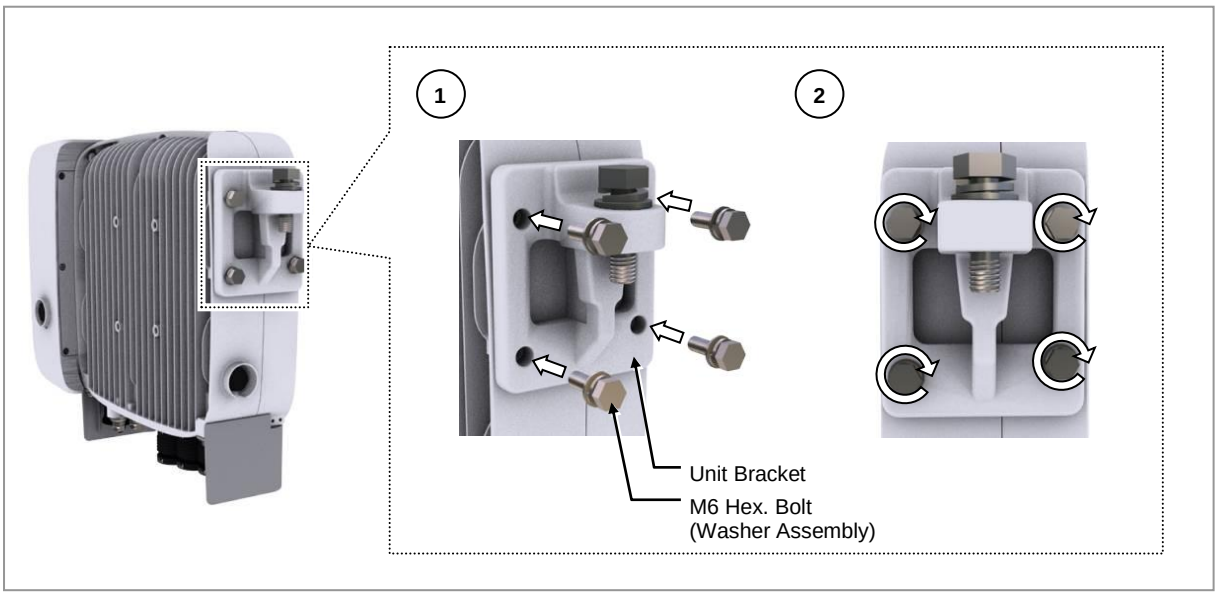
1 Place the unit bracket to the RRH left.

Figure 66. Fixing Unit Bracket_Side Installation (1)



2 Fix the unit bracket using fasteners.

Figure 67. Fixing Unit Bracket_Side Installation (2)



Fixing Pole Type_Side by Side

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

The standard of the pole on which the mounting bracket can be attached using steel bands is 50 A to 100 A.

Assembling Mounting Bracket

To assemble the mounting bracket for 1 sector, do the following:

Prerequisites

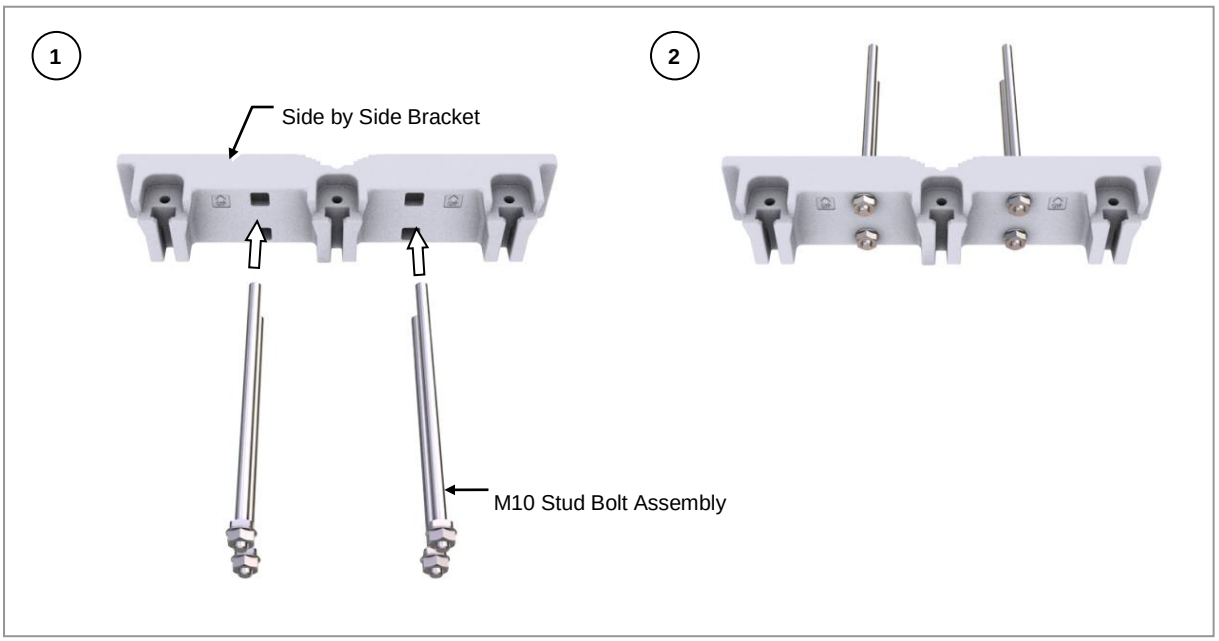
Before proceeding with assembling the side by side bracket, make sure that you have the items mentioned in the table below.

Table 23. Parts and Tools for Fixing Side by Side Bracket on the Pole

Category	Description		
Parts	Side by Side Bracket		1 EA
	Rear Mounting Bracket		1 EA
	Fasteners	• M10 × L220 Stud Bolt Assembly • M10 Flange Nut • M10 Hex. Nut	4 EA 4 EA 4 EA
Working Tools	Spanner (apply Hex. head: 17 mm)		

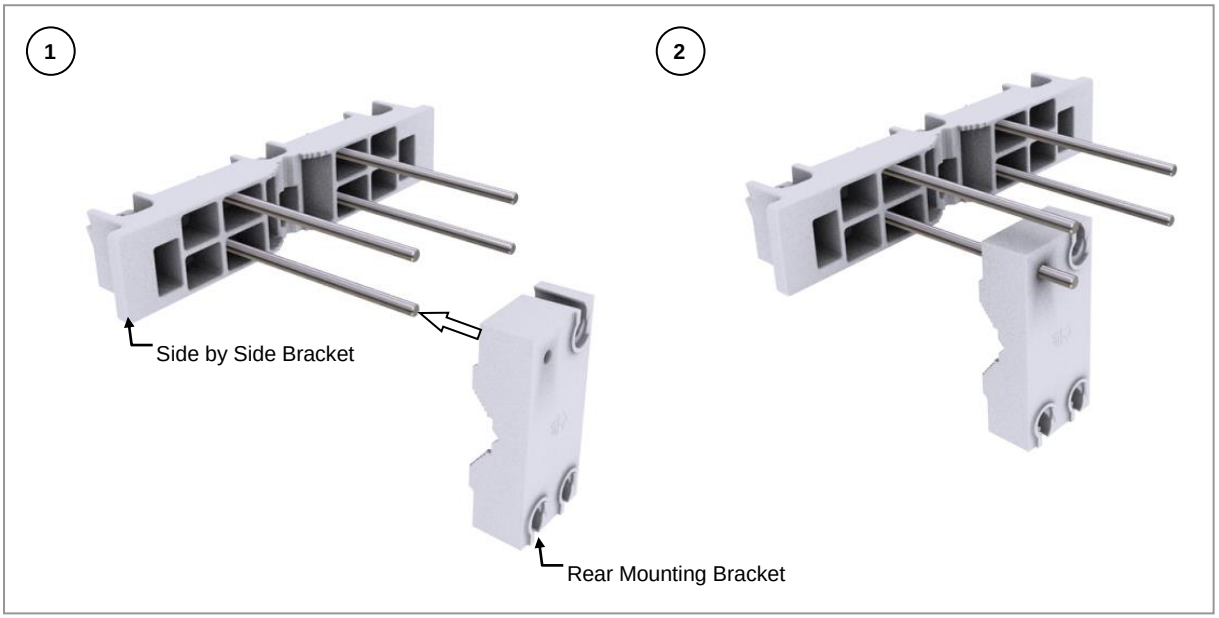
1 Insert stud bolts to the fixing hole of the side-by-side bracket assembly.

Figure 68. Assembling Mounting Bracket Assembly_Pole Type (1)



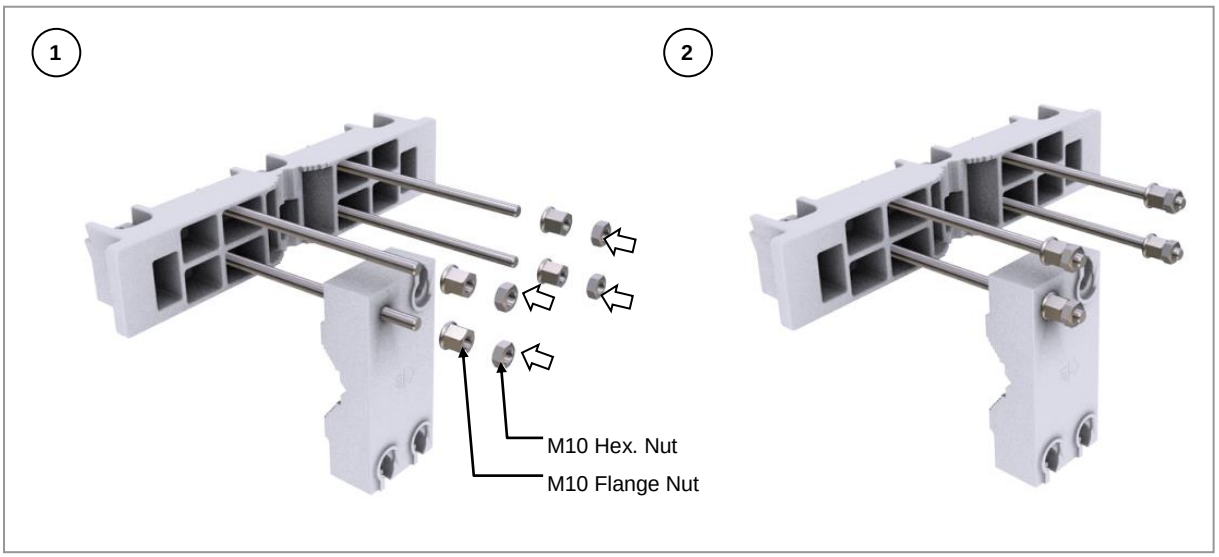
2 Insert a rear-mounting bracket with aligning the hole and stud bolt at the left lower side of the side-by-side bracket.

Figure 69. Assembling Mounting Bracket Assembly_Pole Type (2)



3 Temporarily fix the fasteners to the stud bolts of the side-by-side bracket.

Figure 70. Assembling Mounting Bracket Assembly_Pole Type (3)



Fixing Side by Side Bracket on the Pole

To fix the side by side bracket on the wall, do the following:

Prerequisites

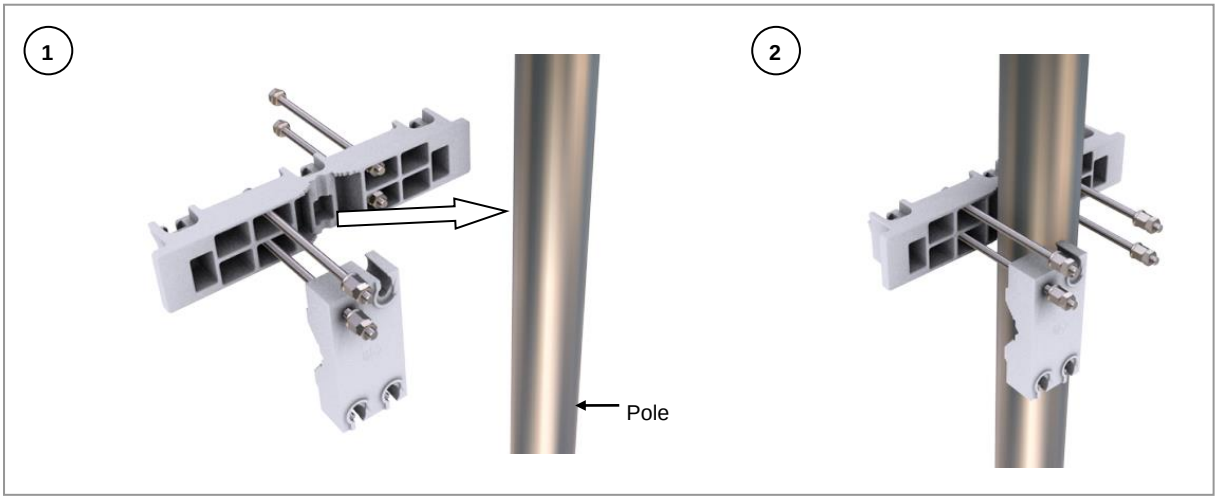
Before proceeding with fixing the side by side bracket for 3-sector on the pole, ensure that you have the items mentioned in the table below.

Table 24. Parts and Tools for Fixing Side by Side Bracket Assembly_Pole Type

Category	Description	
Parts	Side by Side Bracket Assembly	1 EA
Recommended Torque Value	M10 Flange Nut/M10 hex Nut	217 lb·in
Working Tools	• Torque Wrench (100 to 400 lbf·in) • Torque Wrench Spanner head (apply hex head: 17 mm) • Spanner (17 mm) • Level	

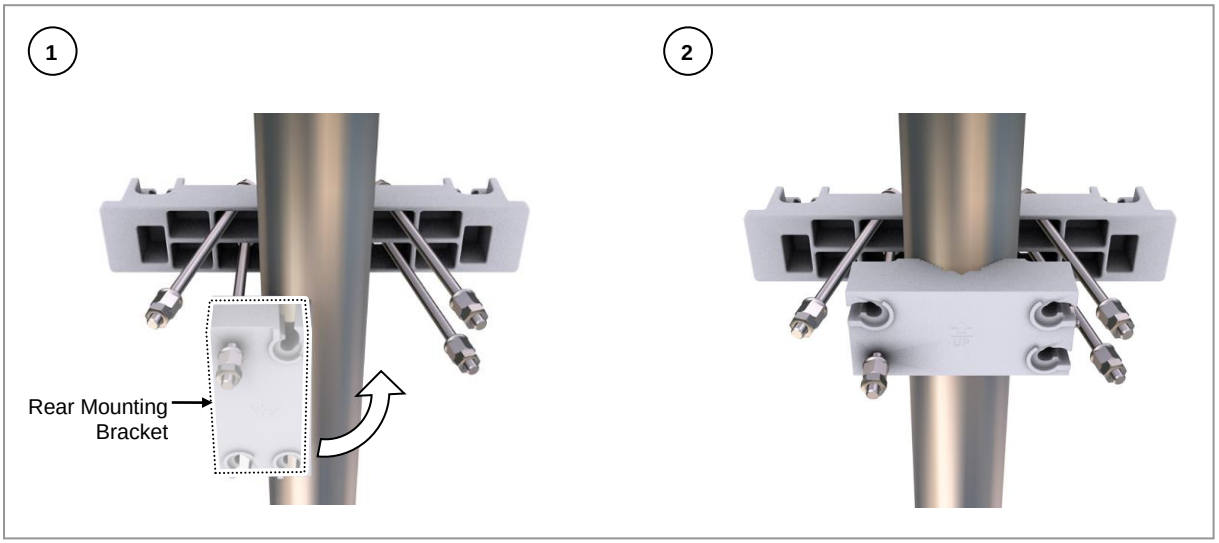
1 Place the side-by-side bracket assembly to the pole.

Figure 71. Fixing Side by Side Bracket Assembly_Pole Type (1)



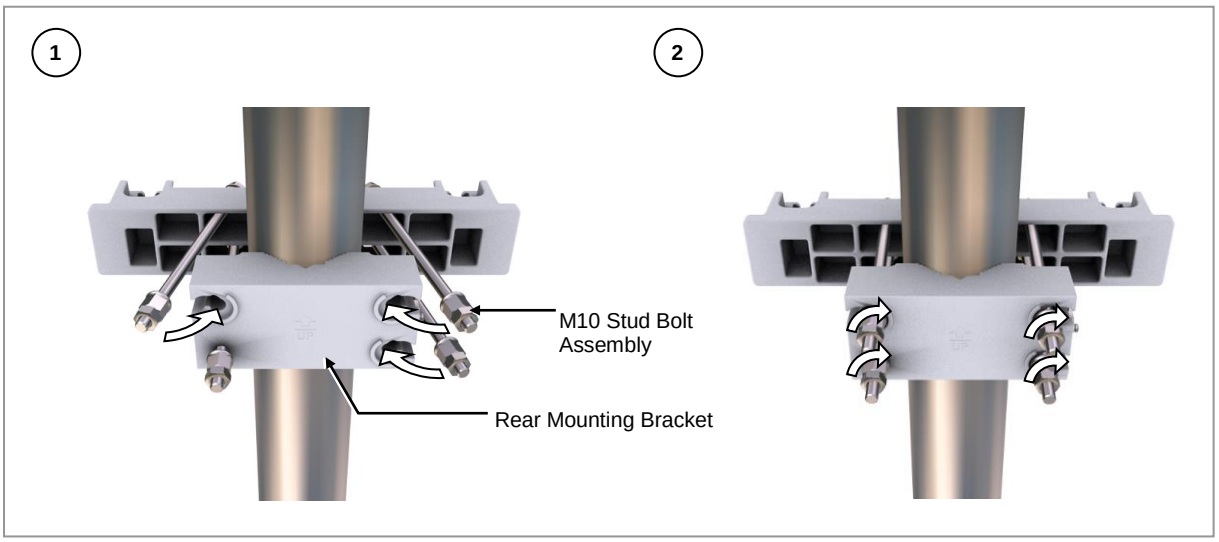
2 Locate a rear-mounting bracket on a fixing location with the ‘Up’ mark towards upper side.

Figure 72. Fixing Side by Side Bracket Assembly_Pole Type (2)

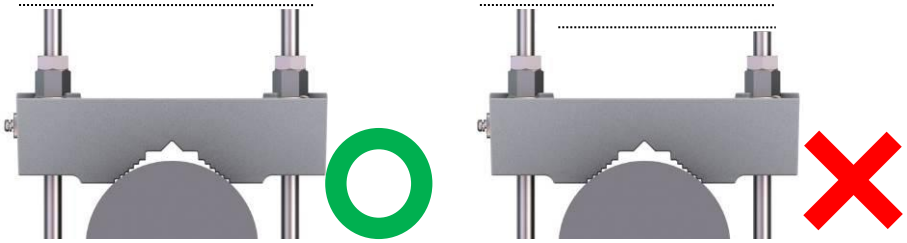


3 Place the rest three-stud bolts to the rear mounting bracket holes and fix the stud bolts using the fasteners.

Figure 73. Fixing Side by Side Bracket Assembly_Pole Type (3)

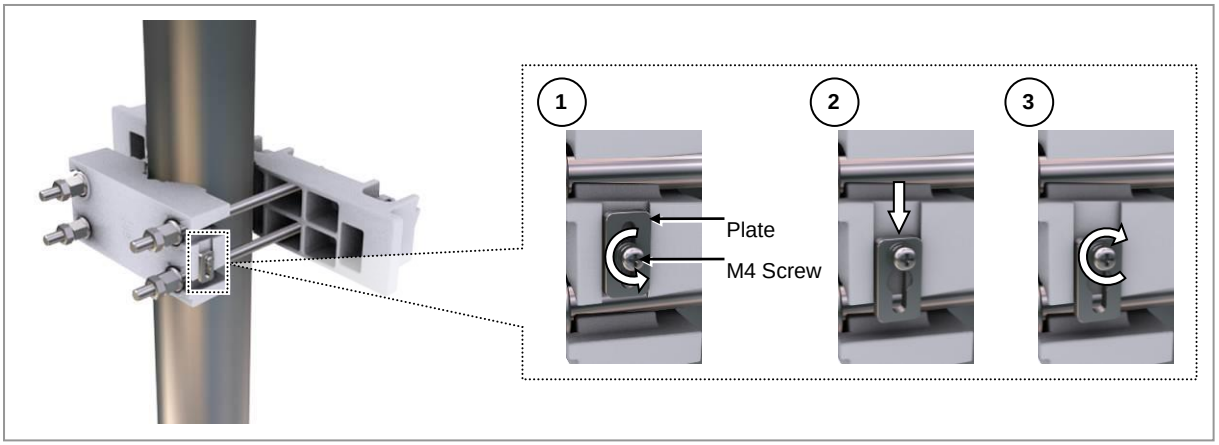


Make the length of left and right side equal of the stud bolts after fixation.

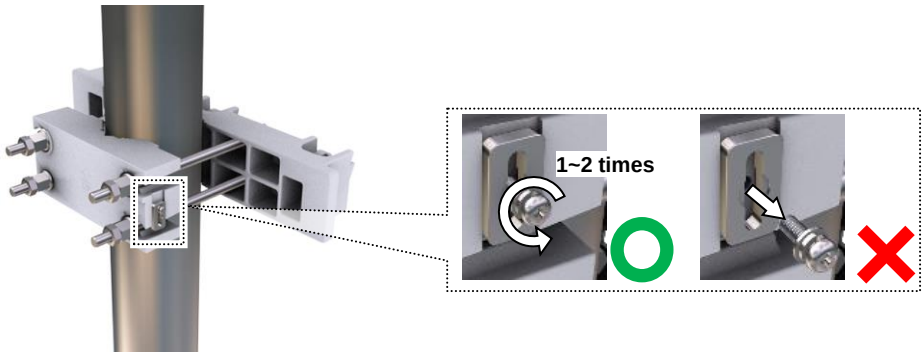


4 Slightly loosen the fixing screw for the plate at the right side of rear mounting bracket screw (rotate the fixing screw one or two times counter clockwise). Lower the plate and fix the plate using the screw.

Figure 74. Fixing Side by Side Bracket Assembly_Pole Type (4)

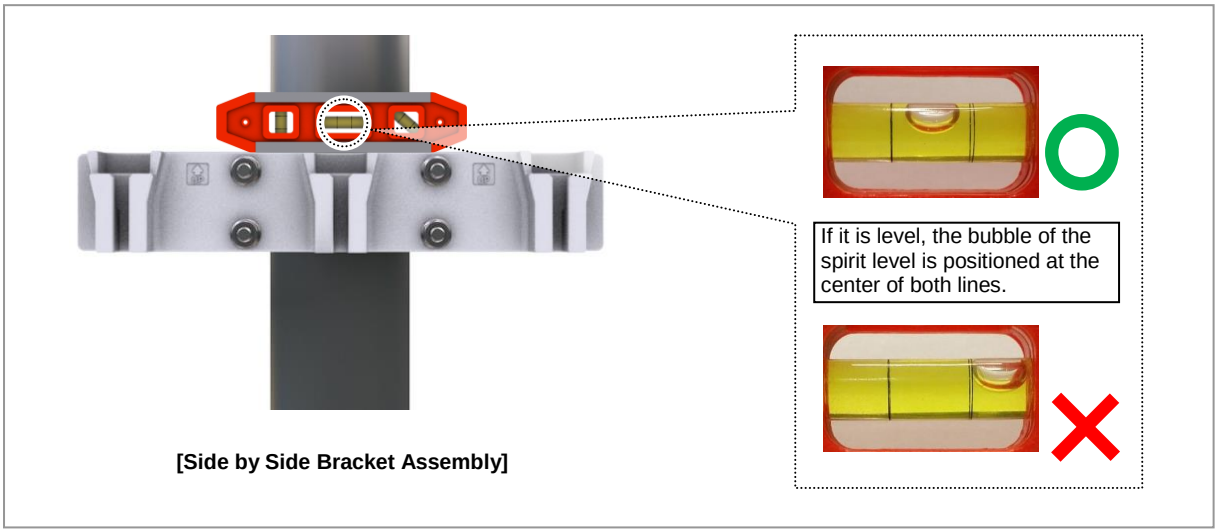


Do not loosen the fixing screw for the plate completely.



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

Figure 75. Levelling Side by Side Bracket Assembly_Pole Type



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

In case of poor levelling, adjust the position of fasteners used to fix the mounting bracket assembly or its levelling status.

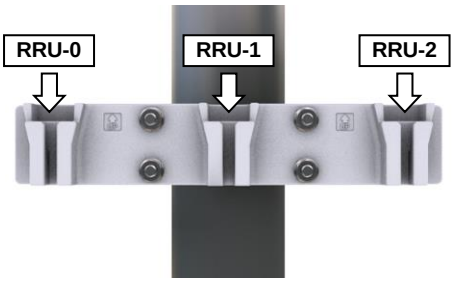
Fixing RRH on the Pole

To fix the RRH on the pole, do the following:

Prerequisites

Before proceeding with fixing the RRH on the pole, ensure that you have the items mentioned in the table below.

Check the location to install the RRH.



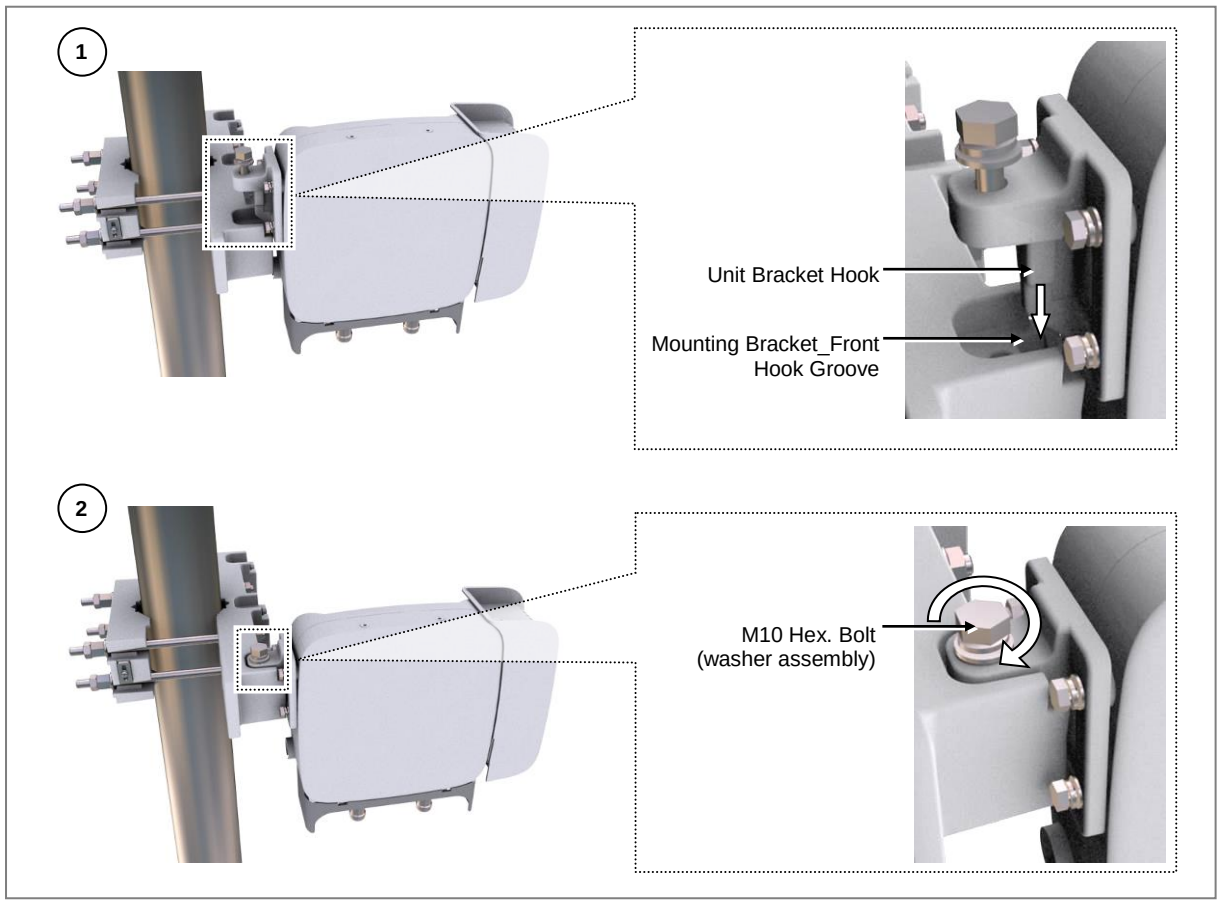
Fix the RRH according to the order of [RRH-0 → RRH-1 → RRH-2].

Table 25. Parts and Tools for fixing RRH_Pole Type Side by Side Installation

Category	Description	
Parts	M10 × L35 hex bolt (washer assembly, attached to the unit bracket)	1 EA/RRH
Recommended Torque Value	M10 hex bolt	217 lbf·in
Working Tools	• Torque Wrench (100 to 400 lbf·in) • Torque Wrench Spanner head (apply hex head: 17 mm) • Spanner (17 mm) • RF Alignment Tool	

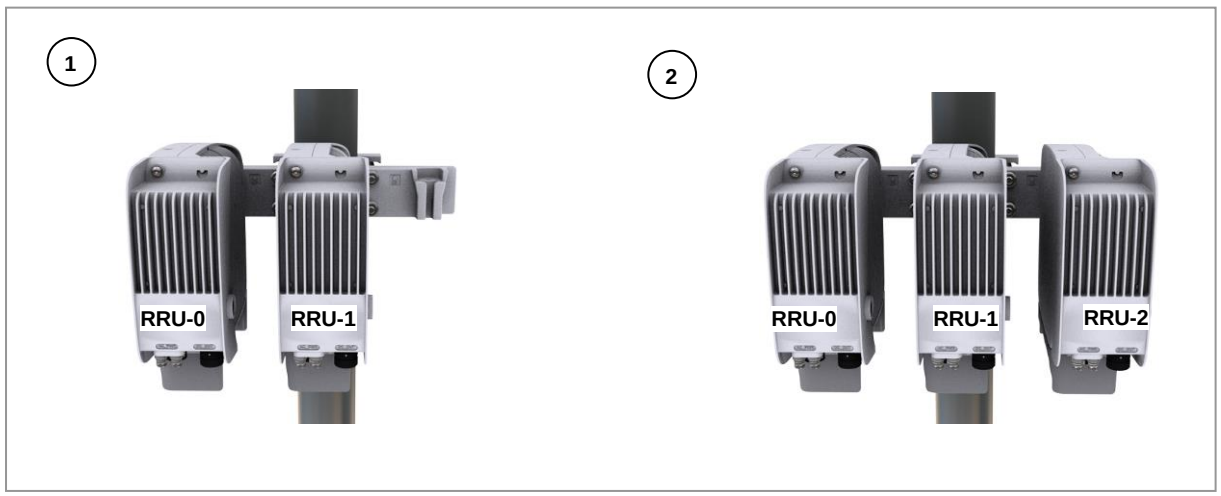
1 Hang the unit bracket hook of RRH side on the groove of mounting bracket_front hook and fix it using fasteners.

Figure 76. Fixing RRH on the Pole Type Side by Side Installation (1)



2 Fix RRH-1 and RRH-2 in the same way as the RRH-0.

Figure 77. Fixing RRH on the Pole Type Side by Side Installation (2)



Fixing Wall Type_Side by Side Bracket

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

Fixing Side by Side Bracket

To fix the side by side bracket on the wall, do the following:

Prerequisites

Before proceeding with fixing the side by side bracket for 3-sector on the wall, make sure that you have the items mentioned in the table below.

Table 26. Tools for Marking

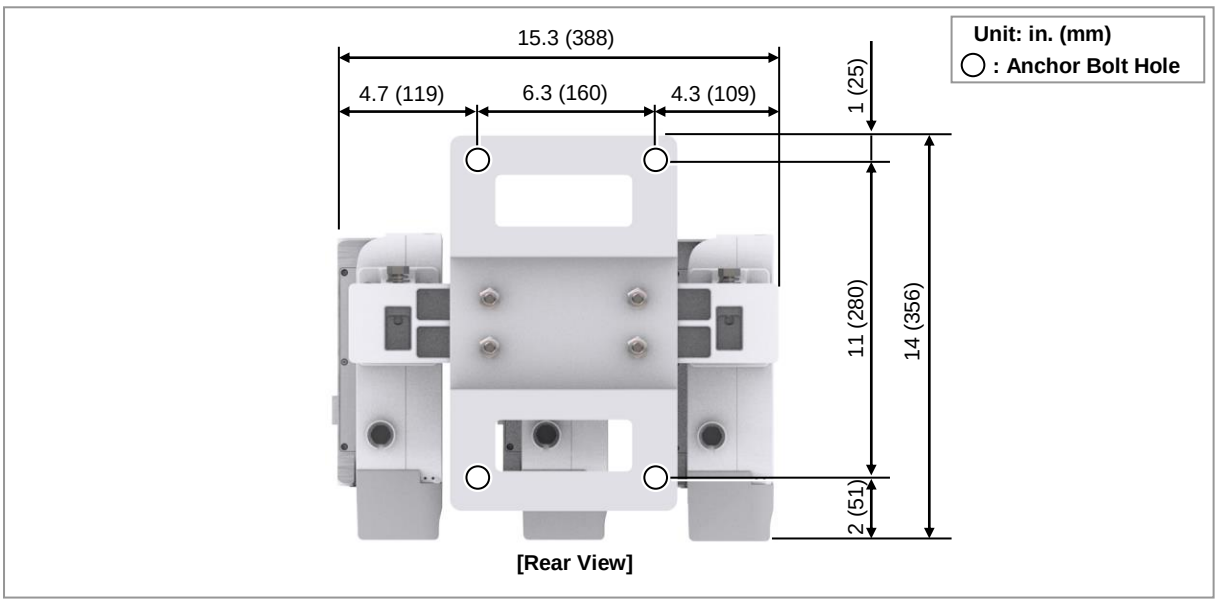
Category	Description
Working Tools	• Tape Measure • Permanent Maker • Level

To mount the system on a wall, perform the leveling test by referring to the 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 distance between the location for fixing the RRH and the anchor bolt hole.

Figure 78. RRH Marking Dimensions

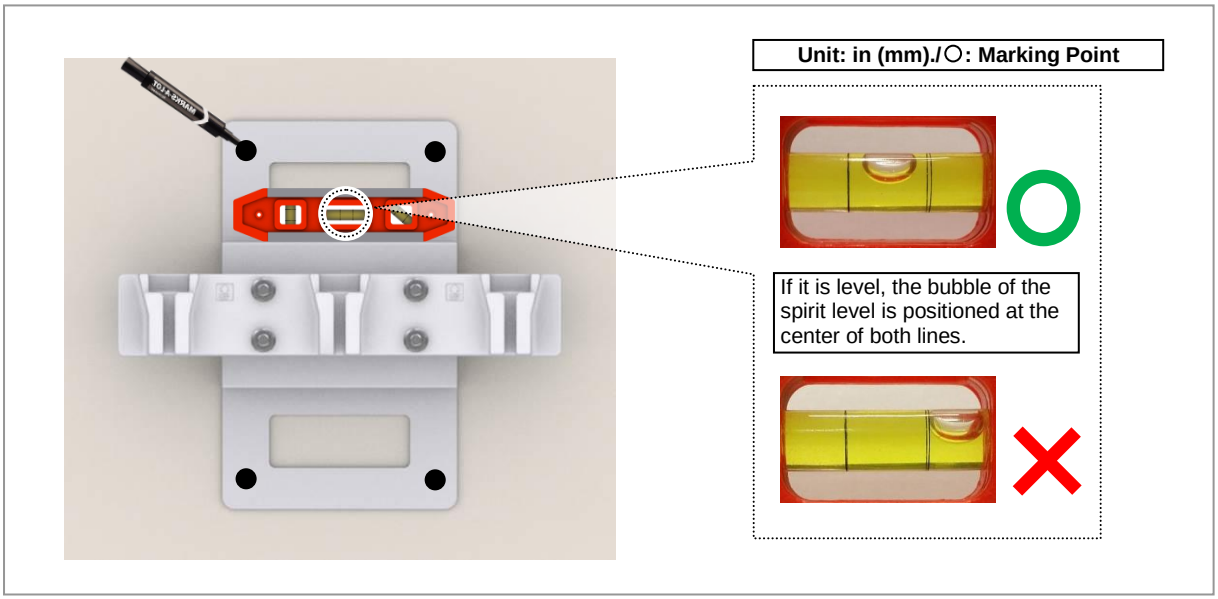


2 Place the side-by-side bracket on the fixing location, and then check the level

status using a level and adjust the level of bracket assembly.

3 If the level status is normal, mark the anchor bolt holes on a wall.

Figure 79. Marking



4 To drill an anchor hole, do the following:

Prerequisites

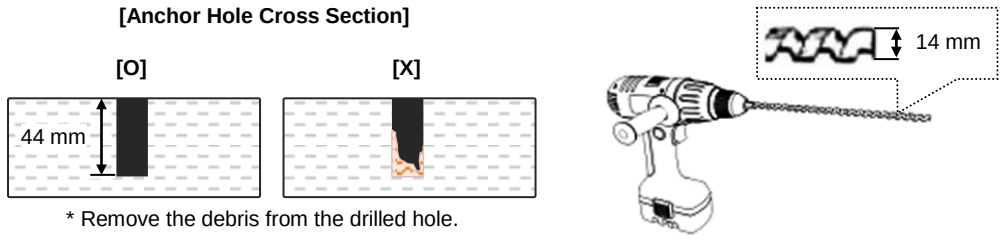
Before proceeding with the drilling process, make sure that you have items mentioned in the table below.

Table 27. Parts and Tools for Drilling

Category	Description
Woking Tools	• Hammer Drill • Concrete Drill Bit (14 mm) • Vacuum Cleaner

Table 28. Anchor Bolt Drill Bits and Hole Depth

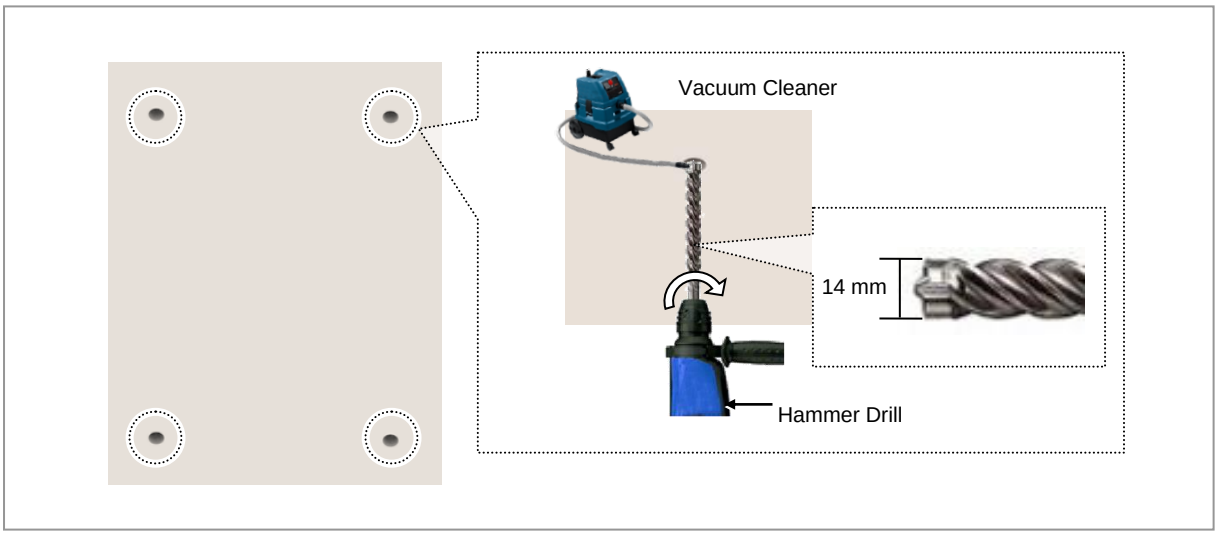
Category	Anchor Bolt	Drill Bits	Hole Depth
RRH (Wall Type)	M10	14 mm	44 mm



1 Drill the anchor holes at the marked points.

Remove dust from the holes using a vacuum cleaner.

Figure 80. Drilling



Fixing Side-by-Side Bracket on the Wall

To fix the side-by-side bracket on the wall, do the following:

Prerequisites

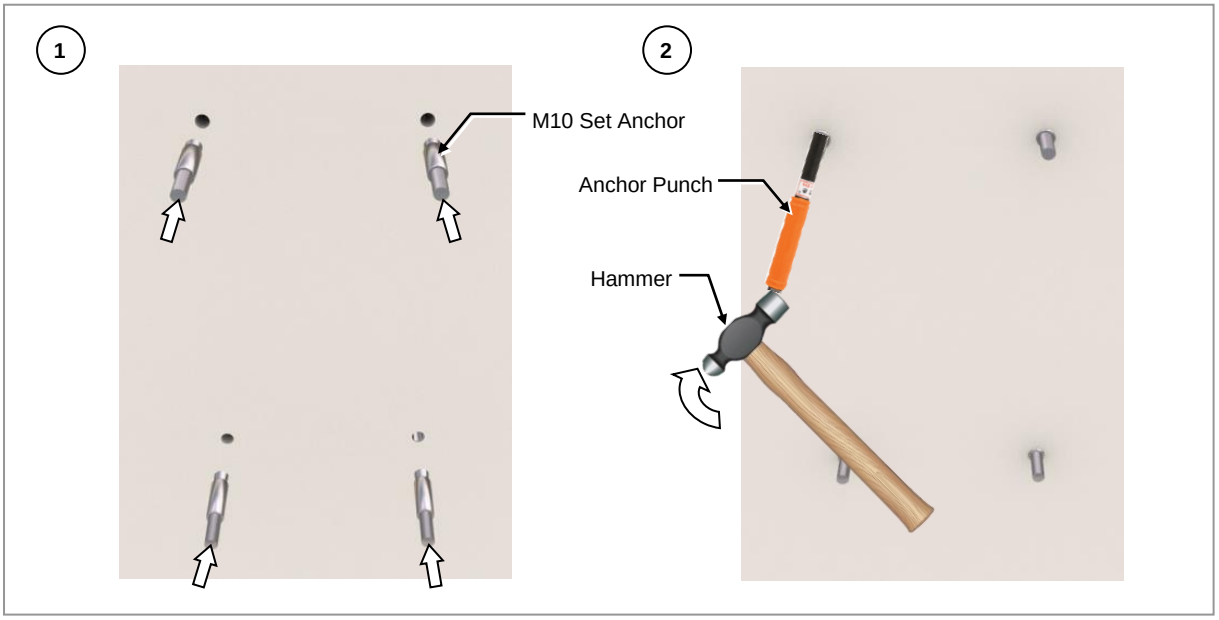
Before proceeding with fixing the side-by-side bracket for 3-sector on the wall, ensure that you have the items mentioned in the table below.

Table 29. Parts and Tools for Fixing Side by Side Bracket on the Wall

Category	Description		
Parts	Side by Side Bracket Assembly		1 EA
	Fasteners	M10 Set Anchor Assembly • M10 Set Anchor • M10 Plain Washer • M10 Spring Washer • M10 Hex. Nut	4 Set 1 EA/set 1 EA/set 1 EA/set 1 EA/set
Recommended Torque Value	M10 Hex. Nut		217 lbf·in
Working Tools	• Torque Wrench (100 to 400 lbf·in) • Torque Wrench Spanner head (apply hex head: 17 mm) • Spanner (17 mm) • Hammer • Anchor Punch (for M10 set anchor bolt)		

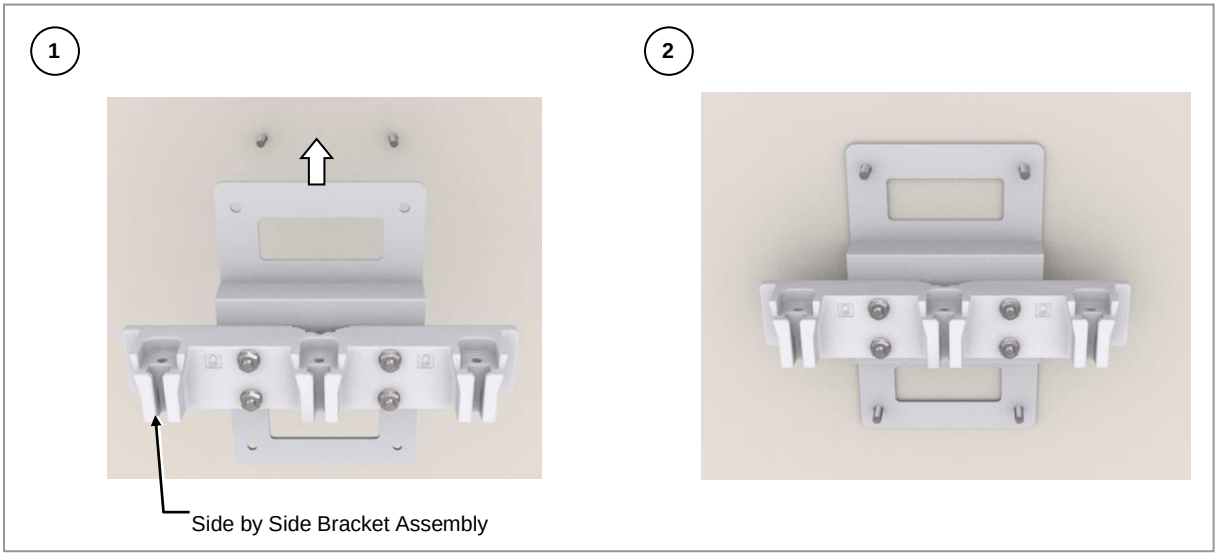
2 Fix the anchor to the drilled hole.

Figure 81. Fixing Side by Side Bracket on the Wall (1)



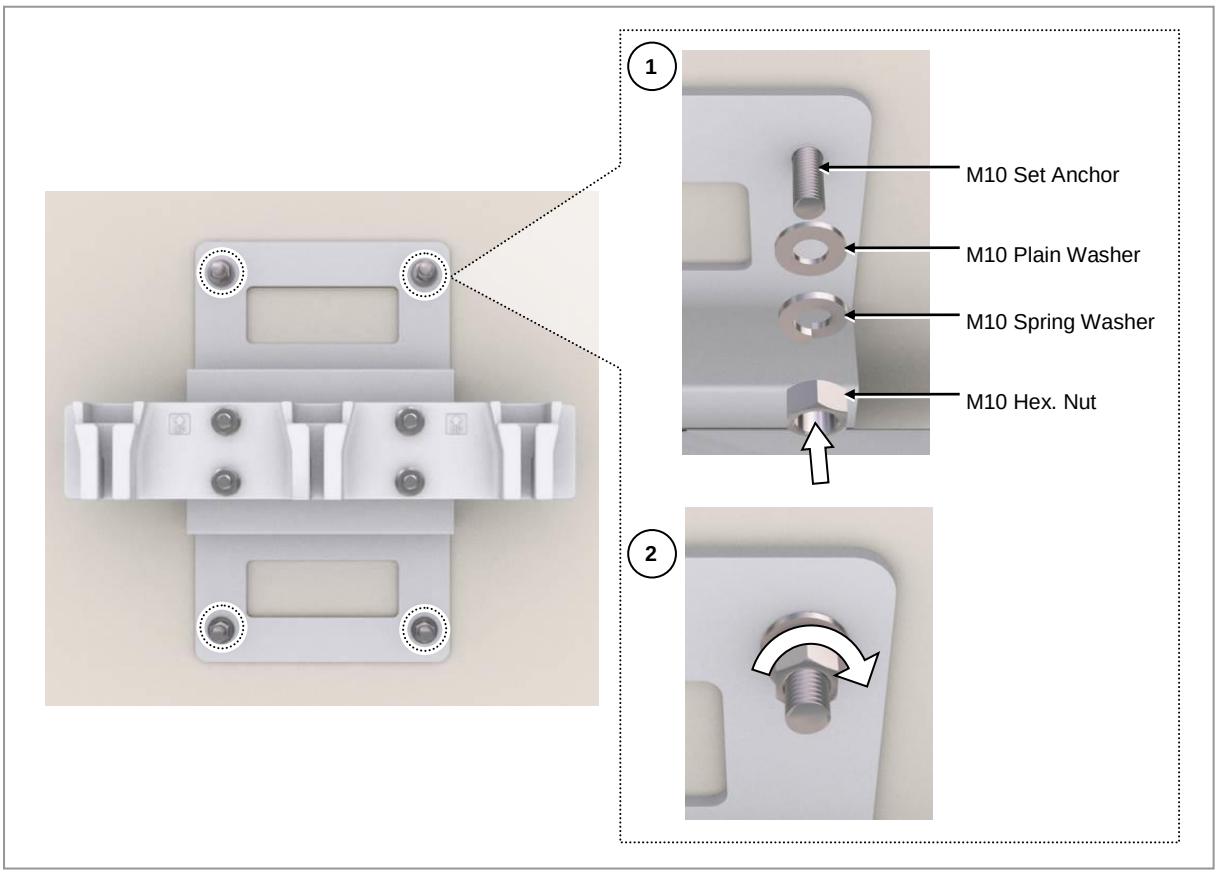
3 Place the side by side bracket on the wall.

Figure 82. Fixing Side by Side Bracket on the Wall (2)



4 Fix the side-by-side bracket assembly using fasteners.

Figure 83. Fixing Side by Side Bracket on the Wall (3)



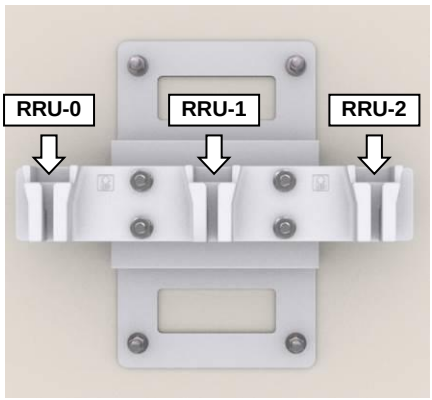
Fixing RRH on the Wall

To fix the RRH on the wall, do the following:

Prerequisites

Before proceeding with fixing the RRH on the wall, ensure that you have the items mentioned in the table below.

Check the location to install the RRH.



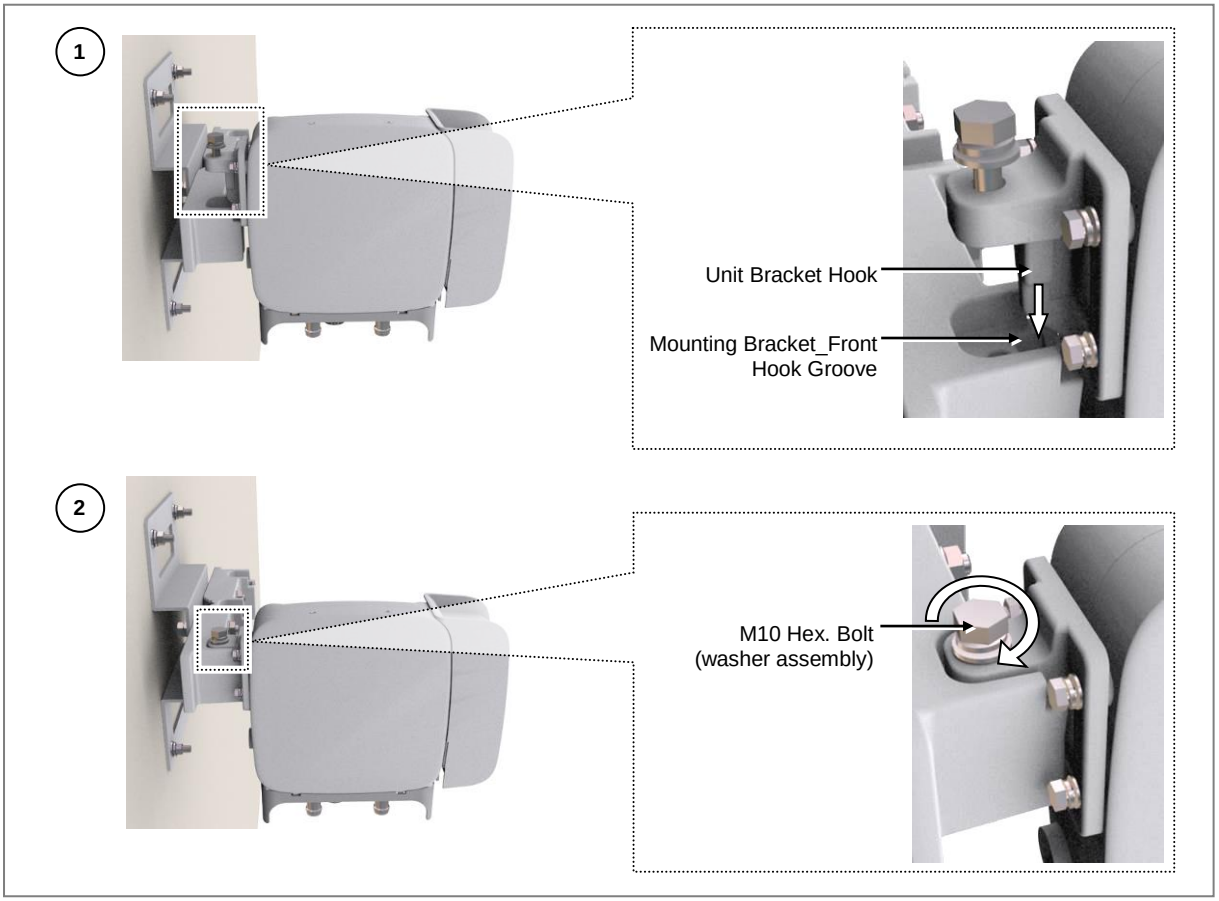
Fix the RRH according to the order of [RRH-0 → RRH-1 → RRH-2].

Table 30. Parts and Tools for Fixing RRH on the Wall

Category	Description	
Fasteners	M10 × L35 hex bolt (washer assembly, attached to the unit bracket)	1 EA/RRH
Recommended Torque Value	M10 Hex. bolt	217 lbf·in
Working Tools	• Torque Wrench (100 to 400 lbf·in) • Torque Wrench Spanner Head (apply hex head: 17 mm) • RF Alignment Tool	

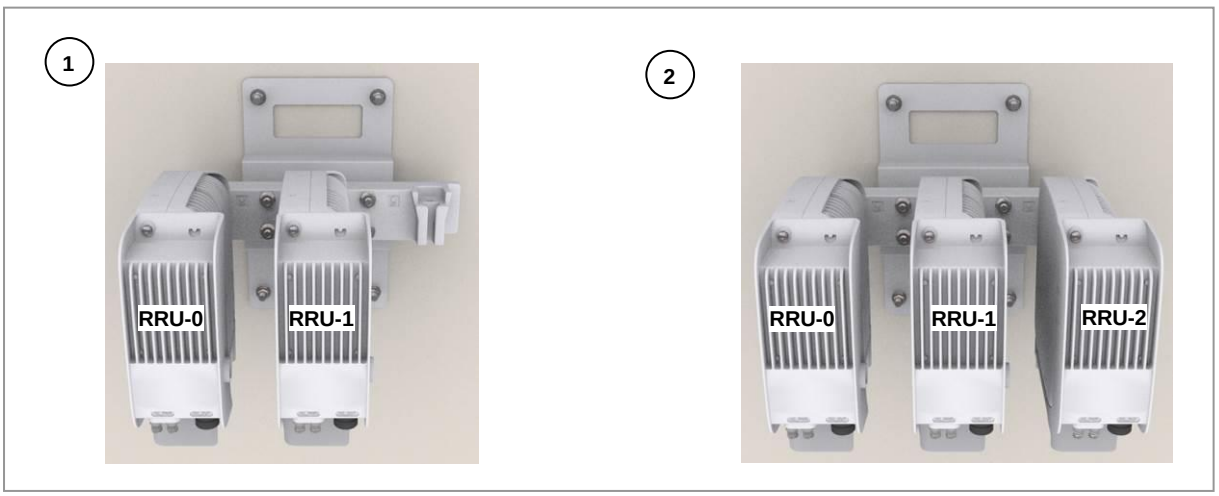
1 Hang the unit bracket hook of RRH side on the groove of mounting bracket_front hook and fix it using fasteners.

Figure 84. Fixing RRH on the Wall (1)



2 Fix RRH-1 and RRH-2 in the same way as the RRH-0.

Figure 85. Fixing RRH on the Wall (2)



3 By using the RF alignment tool, check the tilt and the azimuth and adjust when there is an issue.

For detail instructions on how to use the RF alignment tool, refer to the User Manual supplied by each manufacturer.

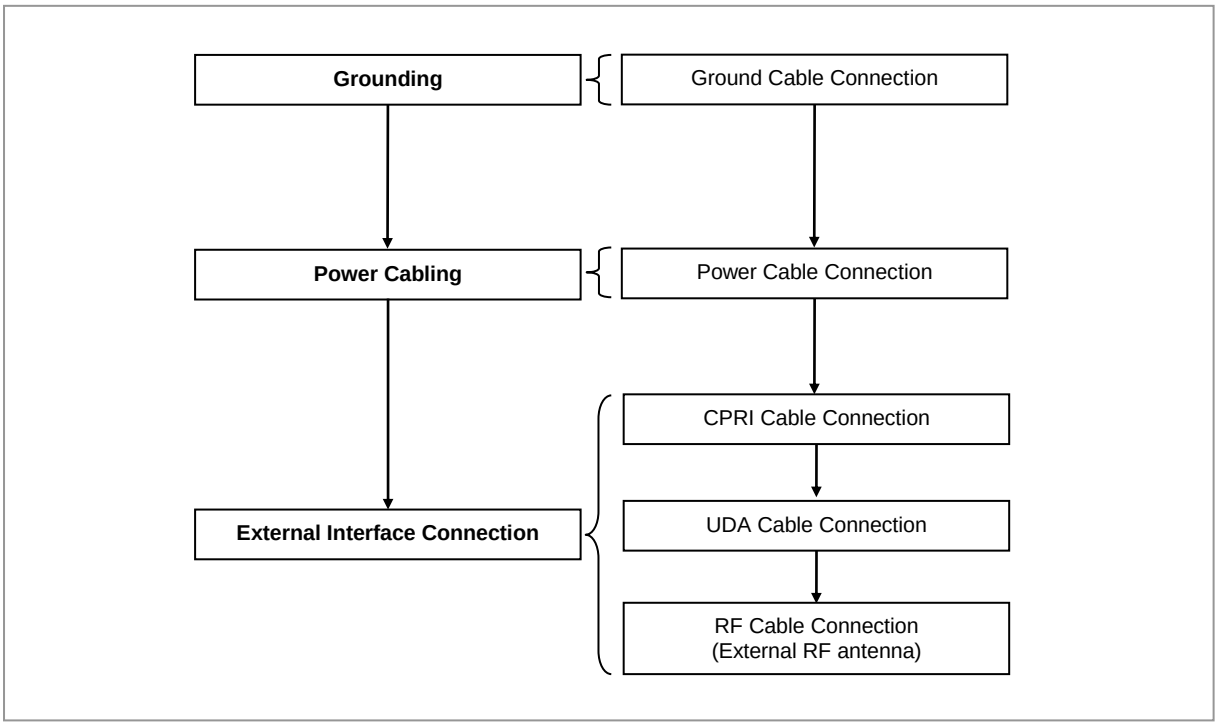
Chapter 3 Connecting Cables

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

Cabling Procedure

The figure below depicts the procedure to connect system cables.

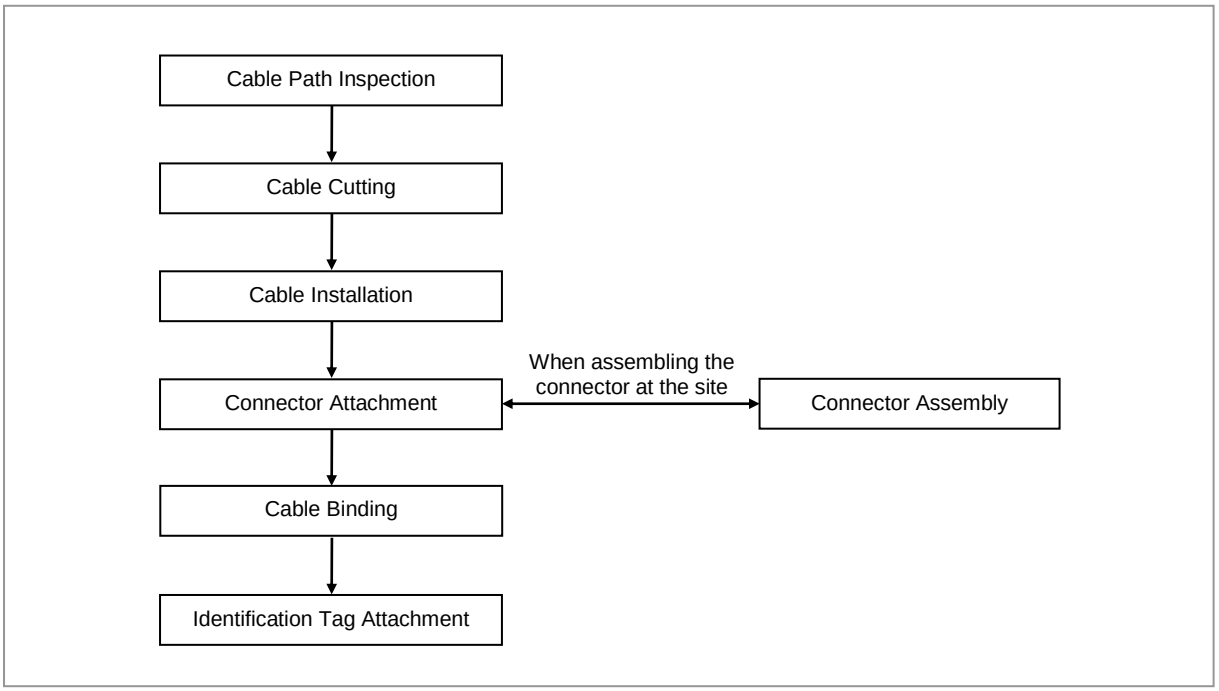
Figure 86. Procedure to Connect System Cable



Guidelines for Cable Connections

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

Figure 87. 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 31. Recommended Minimum Allowed Cable Bend Radius

No	Type	Allowed Cable Bend Radius

No	Type	Allowed Cable Bend Radius	
1	Ground Cable	8 × Outer Diameter (OD)	
2	AC Power Cable	Operation: 8 × OD	Installation: 12 × OD
3	DC Power Cable	Operation: 8 × OD	Installation: 10 × OD
4	DC Link Cable	30 mm	
5	Optical Cable (Outdoor)	10 × OD	
6	UDA Cable	Operation: 5 × OD	Installation: 10 × OD
7	1/2 in. Feeder Line (Flexible)	125 mm	

If the allowed cable bend radius is specified by the manufacturer, comply with the bend radius specified.
- OD: Outer Diameter

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.

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.

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.

When installing, ensure not to overlap or tangle the cables. In addition, consider future expansion. Install the DC power cable and the data transmission cable away from the AC power cable to prevent electromagnetic induction.

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

Cabling Diagram

The figure below depicts the different cabling options of the RRH.

Figure 88. RRH Cable Diagram (RRH only)

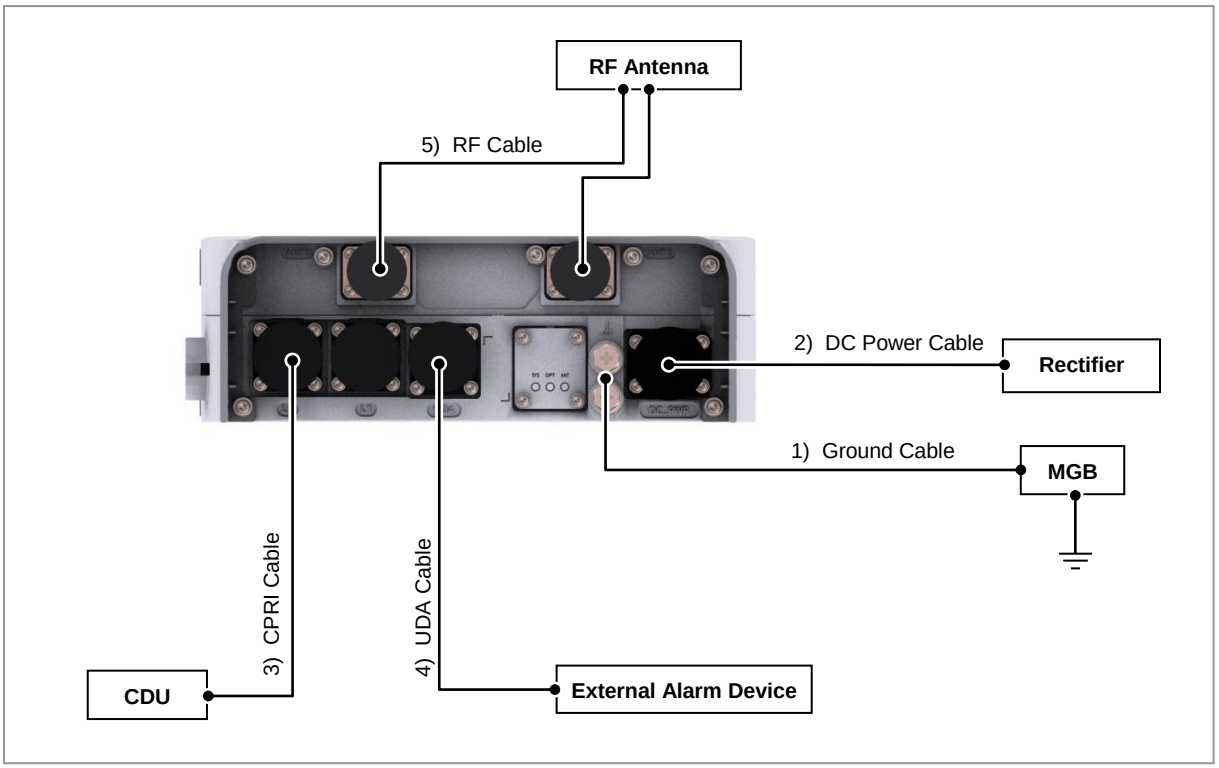


Table 32. RRH Connection Cable

From	To	Cable
MGB	RRH	**1** Ground Cable: 8 AWG × 1C
RRH	Rectifier	**2** DC Power Cable: 10 AWG × 2C
	CDU	**3** CPRI Cable: Single Mode
	External Alarm Device	**4** UDA Cable Assembly
	RF Antenna	**5** RF Cable: 1/2 in. Feeder Line

The figure below depicts the different cabling options of the RRH (with Clip-on Antenna + AC-DC Power Unit).

Figure 89. RRH Cable Diagram (with Clip-on Antenna + AC-DC Power Unit)

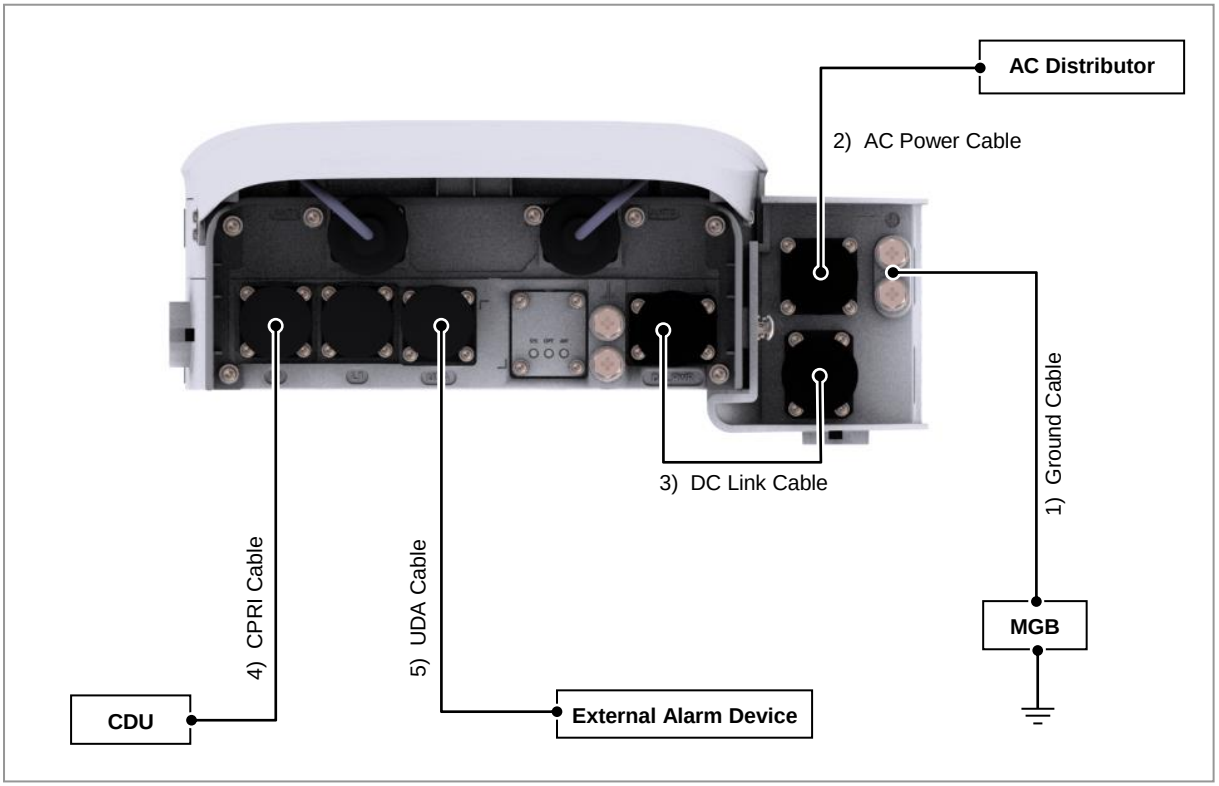


Table 33. RRH Connection Cable

From	To	Cable
MGB	AC-DC Power Unit	**1** Ground Cable: 8 AWG × 1C
AC Distributor	AC-DC Power Unit	**2** AC Power Cable: 14 AWG × 3C
RRH	AC-DC Power Unit	**3** DC Link Cable Assembly: 14 AWG × 2C
	CDU	**4** CPRI Cable: Single Mode
	External Alarm Device	**5** UDA Cable Assembly

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

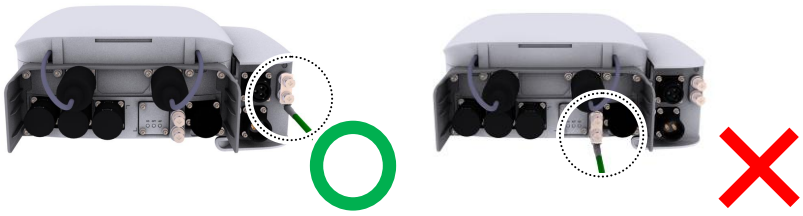
Before proceeding with connecting the ground cable, make sure that you have the items mentioned in the table below.

Table 34. Parts and Tools for Connecting Ground Cable

Category	Description	
Installation Section	RRH only	MGB to RRH Ground Terminal
	With AC-DC power unit	MGB to AC-DC power unit Ground Terminal
Cable	8 AWG × 1C	
Minimum Cable Bend 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
	RRH or	8 AWG, 2 Hole, Hole diameter: 1/4 in. (6.4 mm), Hole

Category	Description	
	AC-DC power unit	spacing: 0.63 in. (16 mm)
Fastener	MGB	Checking MGB specifications per site and preparing connecting parts
	RRH or AC-DC power unit	M6 × L12 SEMS (Hex.+)/2 EA
Recommended Torque Value	M6 SEMS	43 lbf·in
Working Tools	• Cable Cutter • Wire Stripper • Crimping tool • Heating Gun • Nipper • Screw Driver ('+', Number 3) • Torque Driver (20 to 90 lbf·in.) • Screw Driver Bit ('+', Number 3)	

When interoperating the AC-DC power unit, the ground cable must be connected to the ground terminal of the AC-DC power unit.



For the pressure terminals of the cable, the UL listed products or equivalent must be used.
For example, Manufacturer-Panduit
- RRH: 8 AWG Pressure Terminal (LCD8-14AF-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 RRH (or AC-DC power unit) ground terminal, as shown in figure below:

Figure 90. Connecting Ground Cable_only RRH (1)

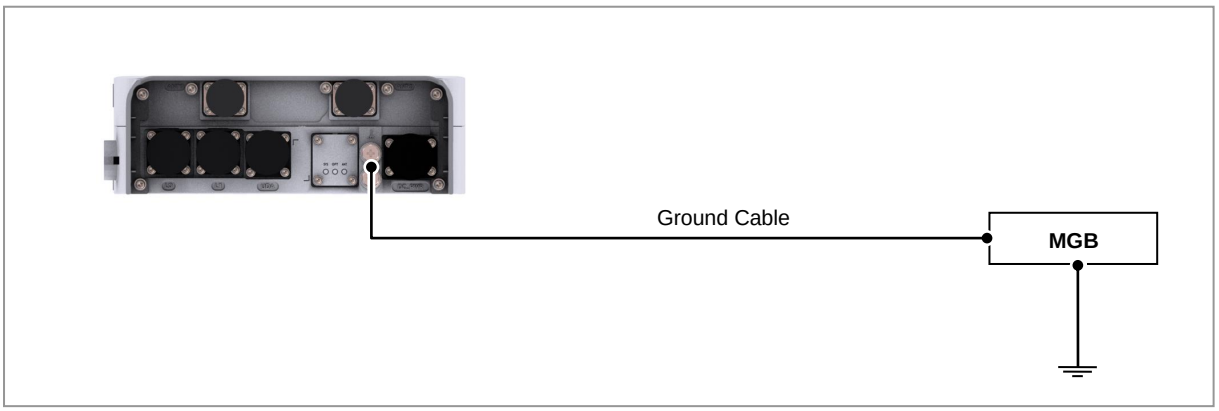
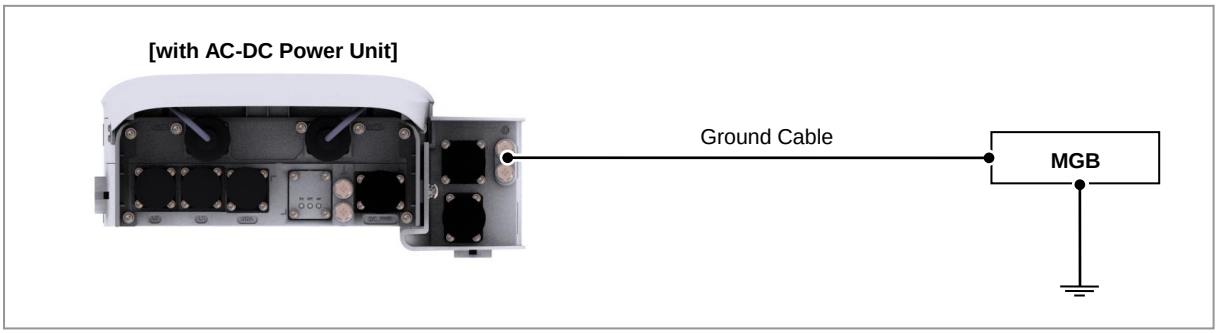


Figure 91. Connecting Ground Cable_with AC-DC Power Unit (1)



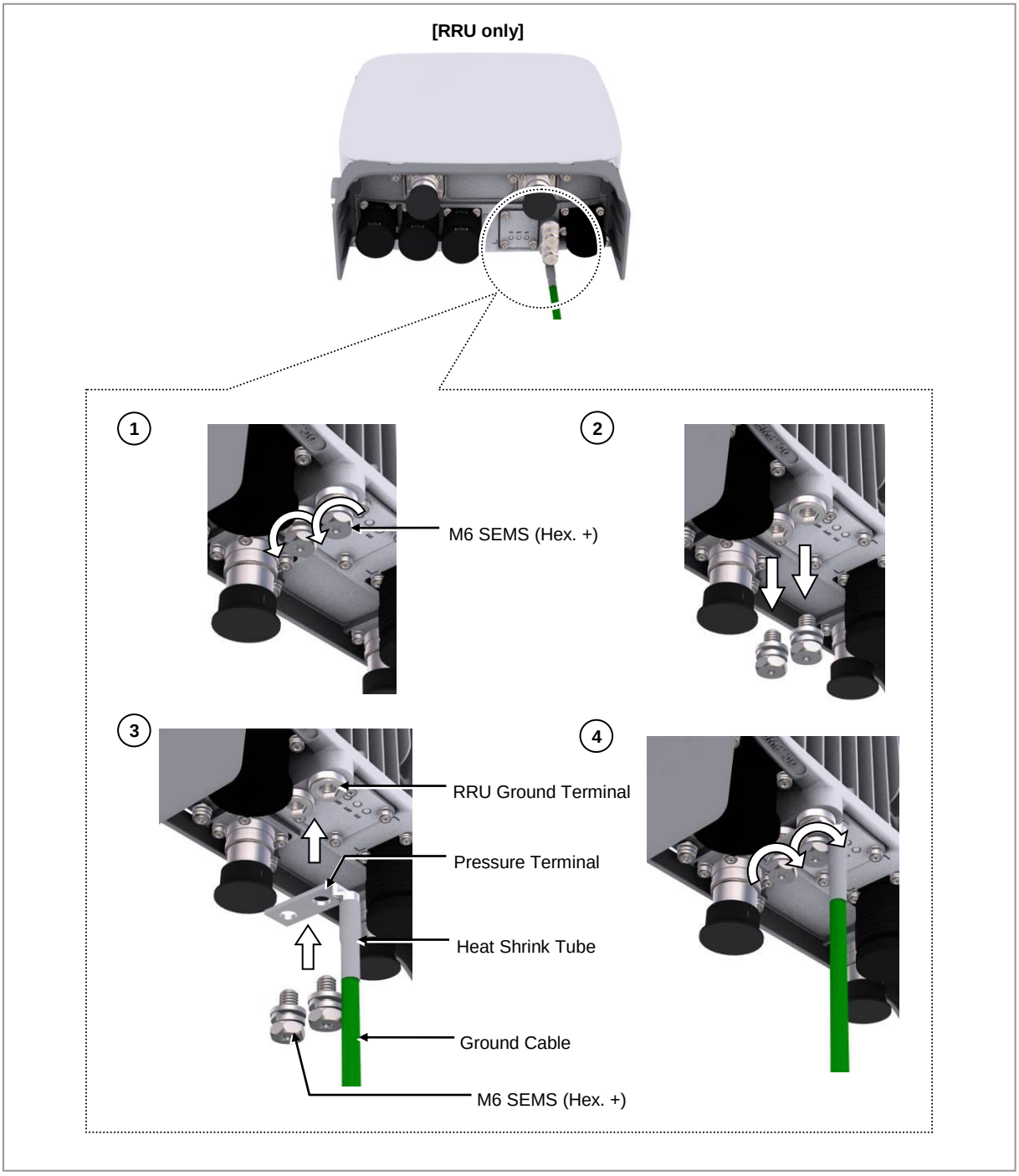
2 Remove the fastener (M6 SEMS) from the RRH (or AC-DC power unit) ground terminal.

3 Assemble a pressure terminal and a heat shrink tube at the end of the RRH (or AC-DC power unit) ground cable.

4 Align the pressure terminal to the mounting hole of the RRH (or AC-DC power unit) ground terminal.

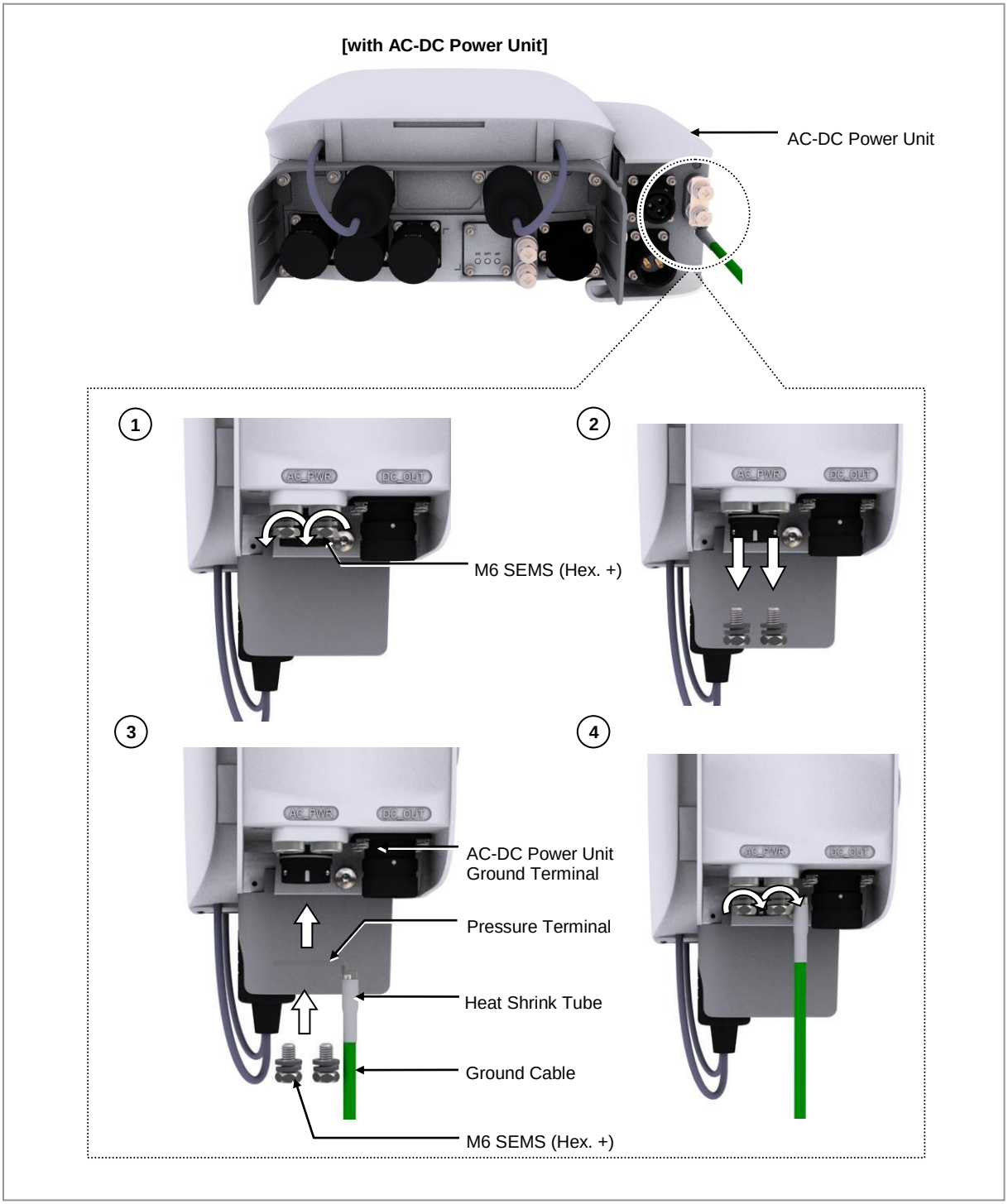
5 Fix the pressure terminal firmly onto the RRH (or AC-DC power unit) ground terminal using fasteners.

Figure 92. Connecting Ground Cable_only RRH (2)



When interoperating the AC-DC power unit, the ground cable must be connected to the ground terminal of the AC-DC power unit.

Figure 93. Connecting Ground Cable_with AC-DC Power Unit (2)



Power Cabling

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

Figure 94. Power Equipment Elements_RRH only

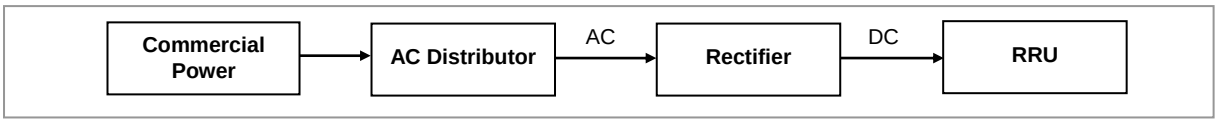
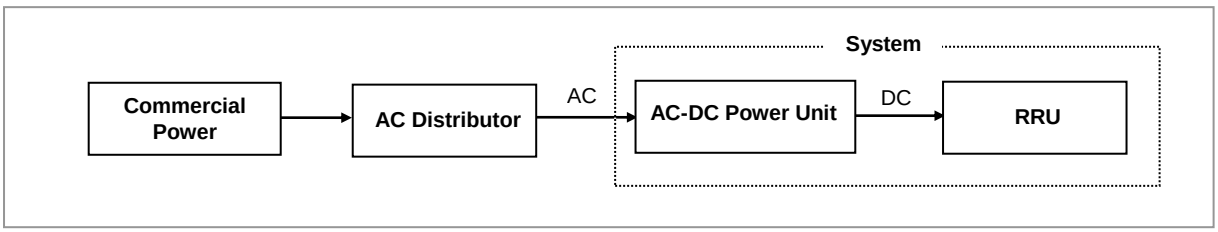


Figure 95. Power Equipment Elements_with AC-DC Power Unit



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.

If using the power cable, the maximum installation length per type is as follows. Note, however, that the maximum installation length is based on the conditions under which each cable is normally installed and that it may change if the conditions change.

Power Cable Size		Maximum Installation Length
DC power cable	10 AWG	470 m (1542 ft), DC 47 V input
AC power cable	14 AWG	91 m (298 ft), AC 90 V input

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

Install a circuit breaker to AC distributor for the stable power. The capacity of the circuit breaker is 4 A. (Use UL listed circuit breakers.)

Connecting DC Link Cable

To connect a DC link cable, do the following:

Prerequisites

Before proceeding with connecting the DC link cable, make sure that you have the items mentioned in the table below.

Table 35. Parts and Tools for Connecting Power Cable

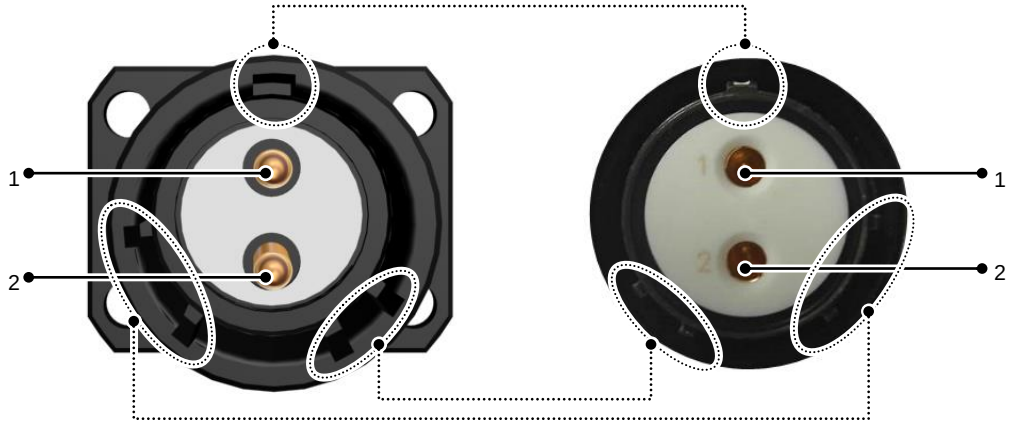
Category	Description	
Installation Section	AC-DC Power Unit to RRH power input port	
Cable	DC Link Cable Assembly (14 AWG × 2C)	0.75 ft (230 mm)
Minimum Cable bend Radius	30 mm	
Connector	AC-DC Power Unit	JONHON, Push Pull Type, CT48J-1502TSCBM
	RRH	JONHON, Push Pull Type, CT48J-1502TSCBM

The table below outlines the power cable connector pin map.

Table 36. DC Link Cable/Connector Pin Map

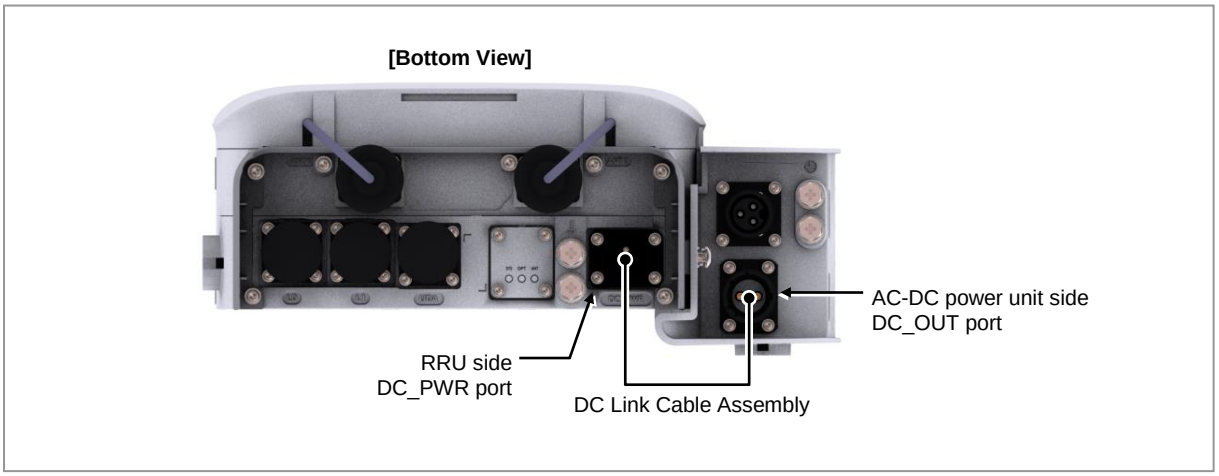
Power Connector Pin Number	Description	Color
Pin 1	-48 V DC	Black
Pin 2	RTN	Black

Power Connector Pin Number	Description	Color



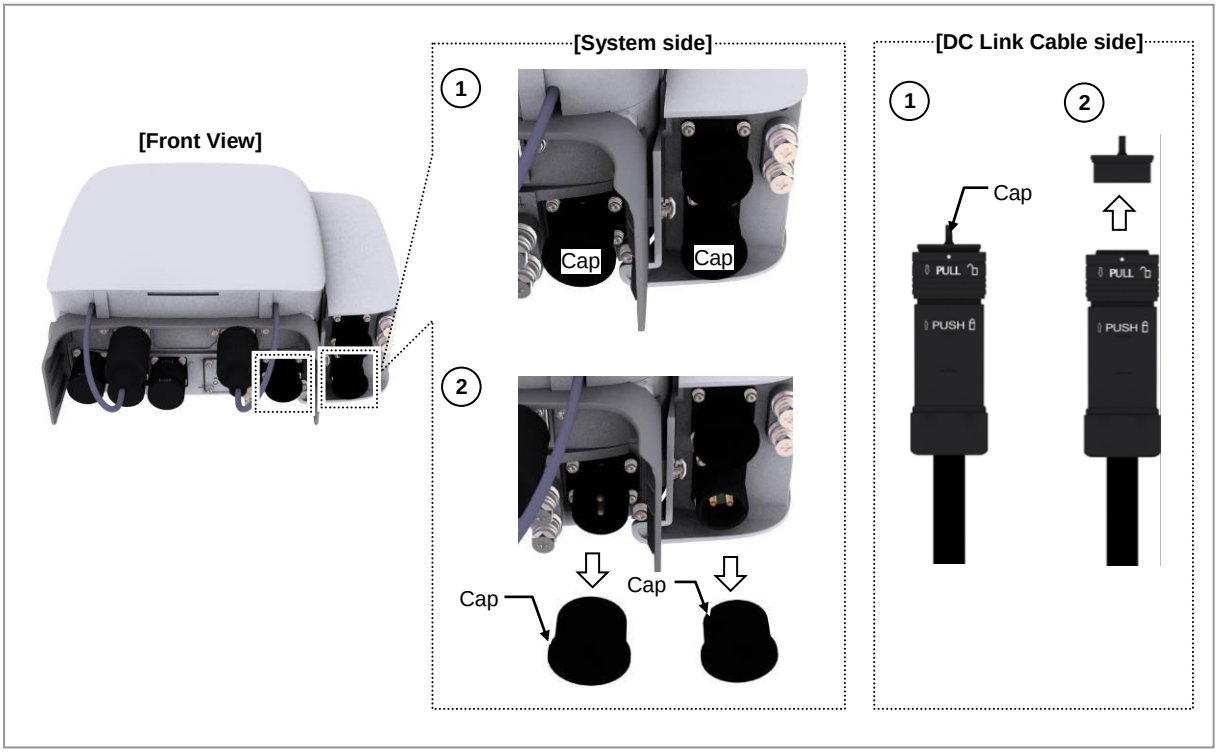
1 Install the power cable from the AC-DC power unit to the RRH.

Figure 96. Connecting DC Link Cable (1)



2 Separate the cap from the RRH and AC-DC power unit side and cable side connector.

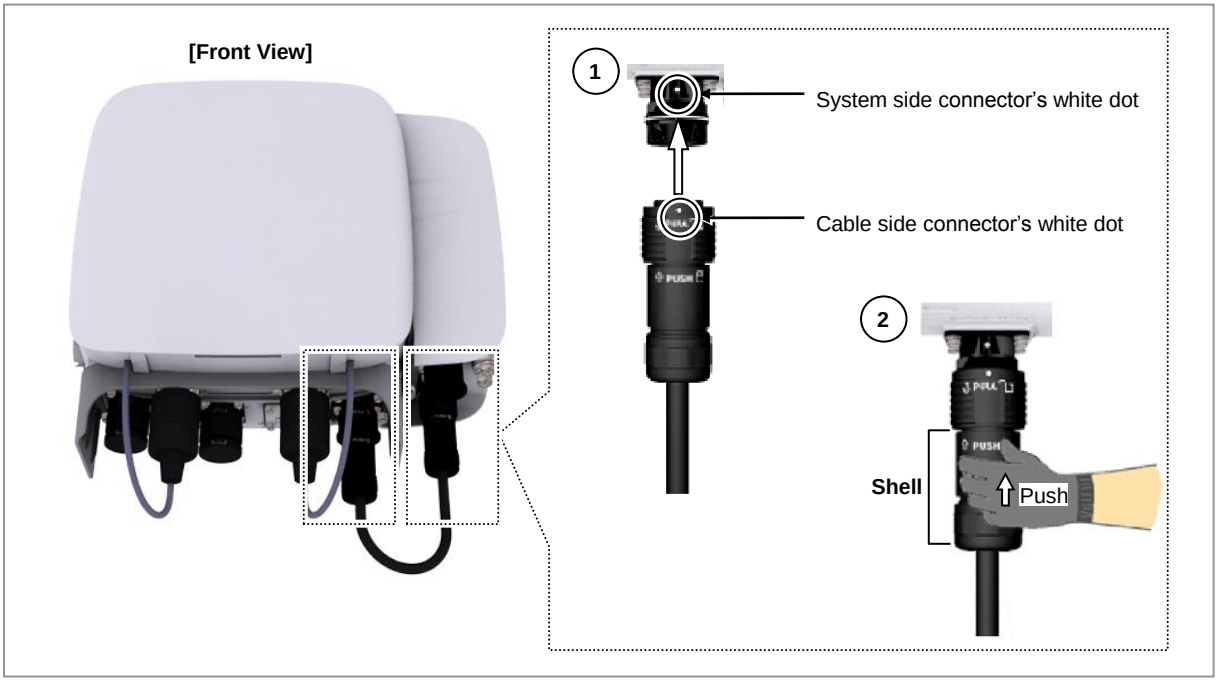
Figure 97. Connecting DC Link Cable (2)



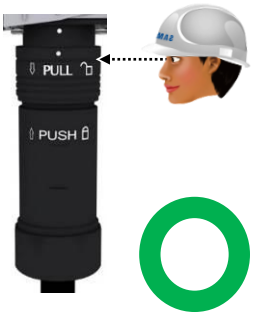
3 Insert the connector aligning white dot of the cable side connector and white dot of the AC-DC power and RRH unit side connector.

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

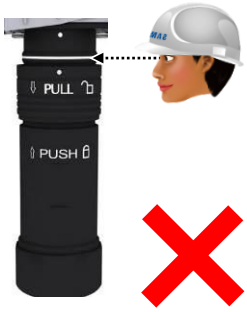
Figure 98. Connecting DC Link Cable (3)



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



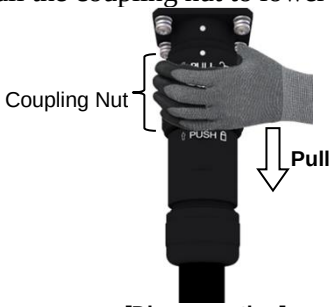
[White Line is invisible]



[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.

[Connecting]



[Disconnecting]

Connecting AC Power Cable

To connect AC power cable, do the following:

Prerequisites

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

Table 37. Parts and Tools for Connecting AC Power Cable

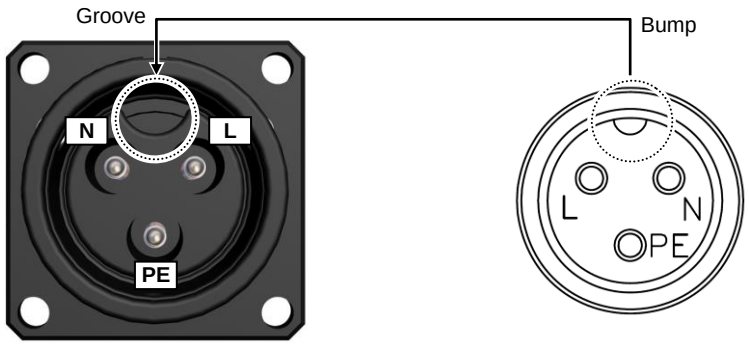
Category	Description	
Installation Section	AC Distributor to AC-DC Power Unit	
Cable	14 AWG × 3C	
Bend Radius	• Operation: 8 × OD • Installation: 12 × OD	
Connector	AC Distributor	Check specifications of AC distributor output terminal per site and prepare fasteners
	AC-DC Power Unit	JONHON, Push Pull Type, DY2T1403SNCBM-01 to Open
Working Tools	• Cable Cutter • Wire Stripper	

Category	Description
	• Compressor • Heating Gun • Nipper

The table below outlines the AC power cable connector pin map.

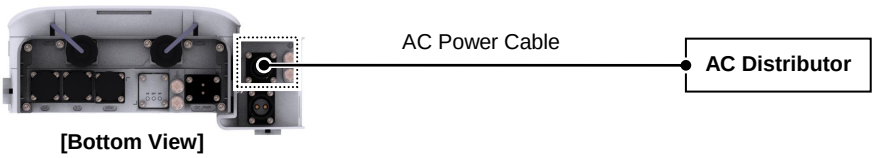
Table 38. AC/DC Power Unit AC Power Cable Connector Pin Map

Power Connector Pin No.	Color
L	Black
N	White
PE	Green



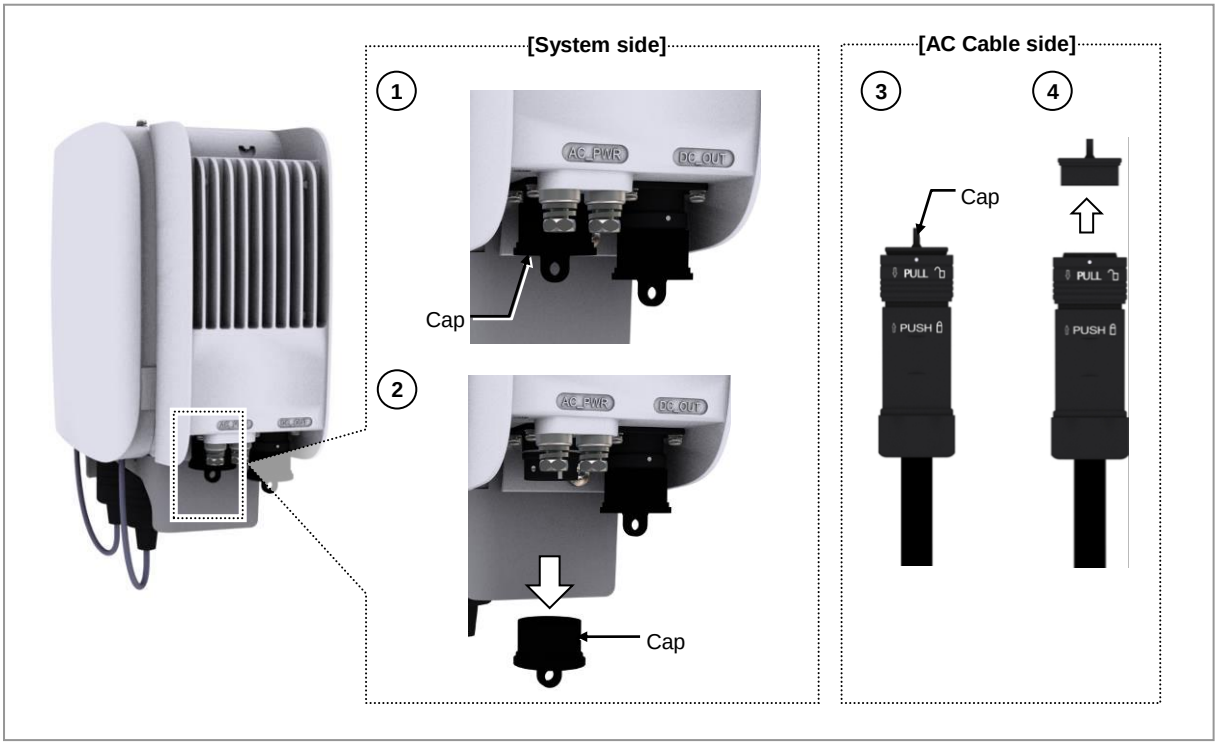
1 Install the AC power cable from the AC distributor to the AC/DC power unit.

Figure 99. Connecting AC/DC Power Unit AC Power Cable (1)



2 Separate the cap from the AC-DC power unit side (AC PWR port) and cable side connector.

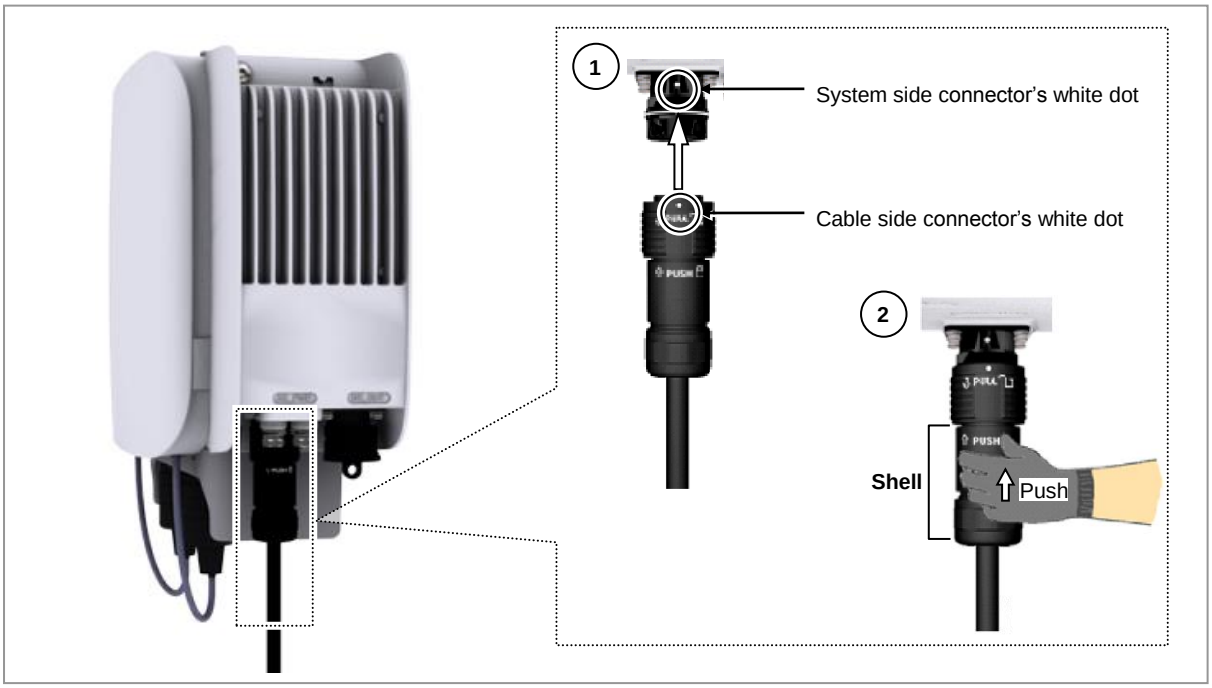
Figure 100. Connecting AC/DC Power Unit AC Power Cable (2)



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

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

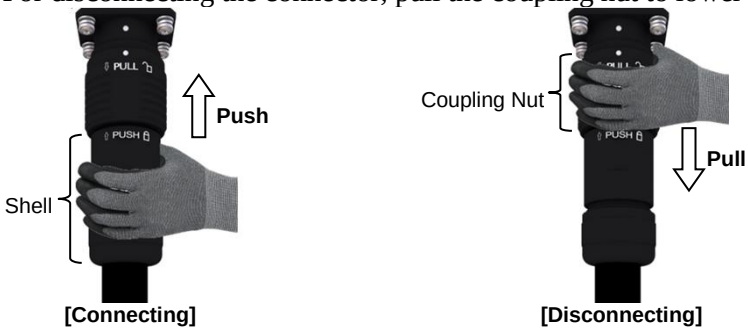
Figure 101. Connecting AC/DC Power Unit AC Power Cable (3)



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.



[Connecting] **[Disconnecting]**

Connecting DC Power Cable (External Rectifier Connection)

To connect DC power cable, do the following:

Prerequisites

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

Table 39. Parts and Tools for Connecting DC Power Cable

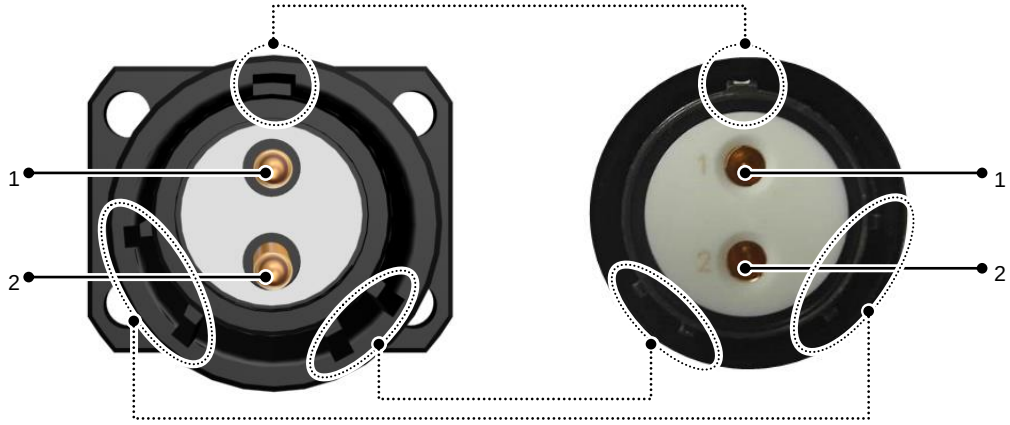
Category	Description	
Installation Section	Rectifier to RRH	
Cable	10 AWG × 2C	
Bend Radius	• Operation: 8 × OD • Installation: 10 × OD	
Connector	Rectifier	Check specifications of AC distributor output terminal per site and prepare fasteners
	RRH	JONHON, Push Pull Type, CT48J-1502TSCBM to Open
Working Tools	• Cable Cutter • Wire Stripper	

Category	Description
	• Compressor • Heating Gun • Nipper

The table below outlines the DC power cable connector pin map.

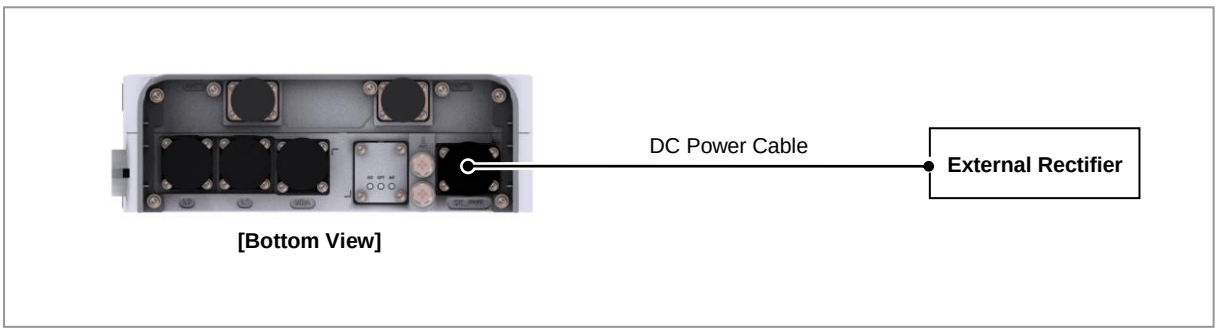
Table 40. DC Power Cable/Connector Pin Map

Power Connector Pin Number	Description	Color
Pin 1	-48 V DC	Black
Pin 2	RTN	Red



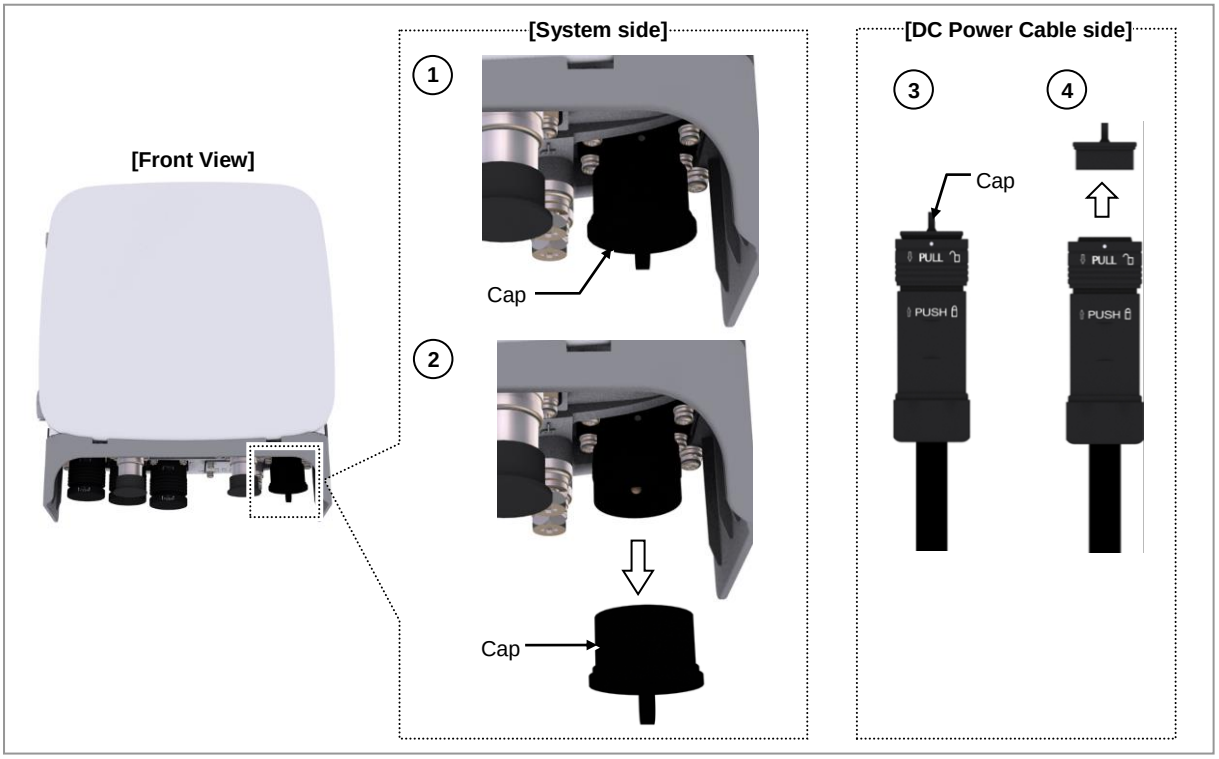
1 Install the power cable from the rectifier to the RRH.

Figure 102. Connecting DC Power Cable (1)



2 Separate the cap from the RRH side and cable side connector.

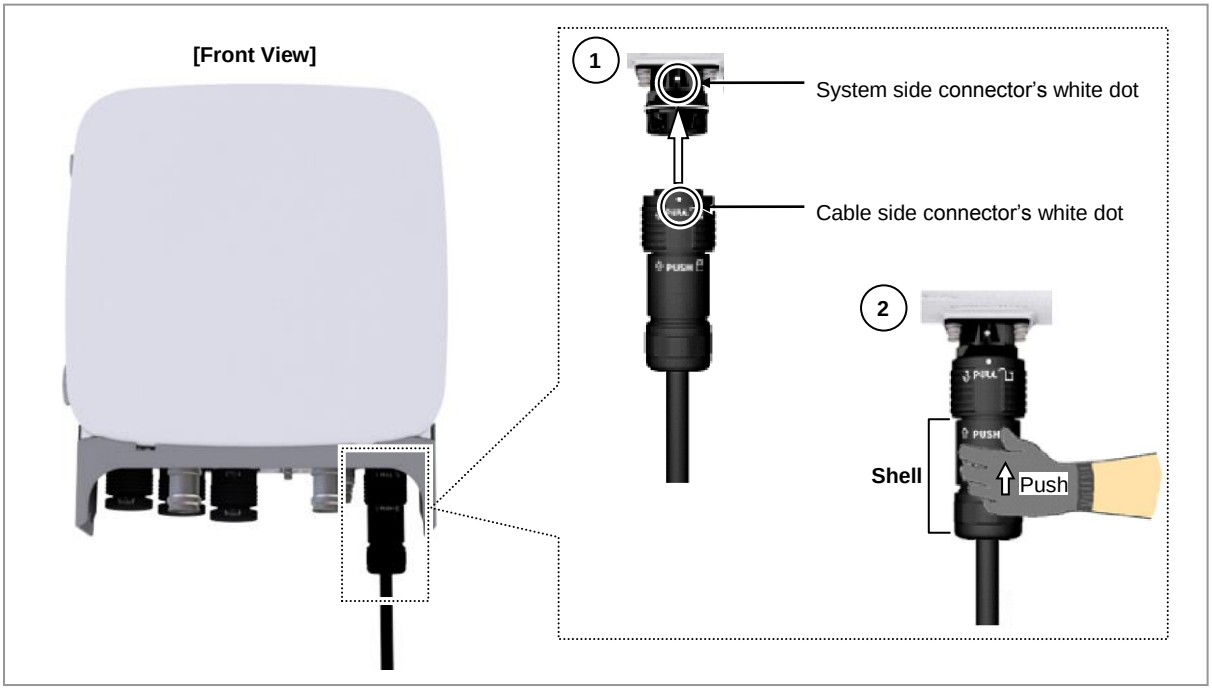
Figure 103. Connecting DC Power Cable (2)



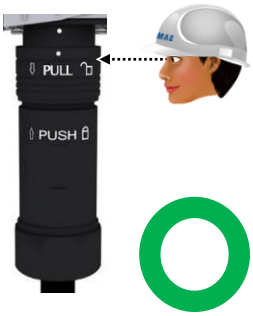
3 Insert the connector aligning the white dot of the cable side and the system side connectors.

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

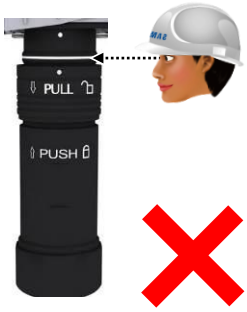
Figure 104. Connecting DC Power Cable (3)



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



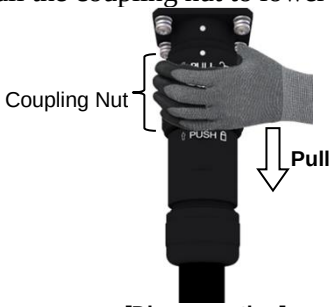
[White Line is invisible]



[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.

[Connecting]



[Disconnecting]

Interface Cable Connection

This section describes the procedures to connect the interface cables.

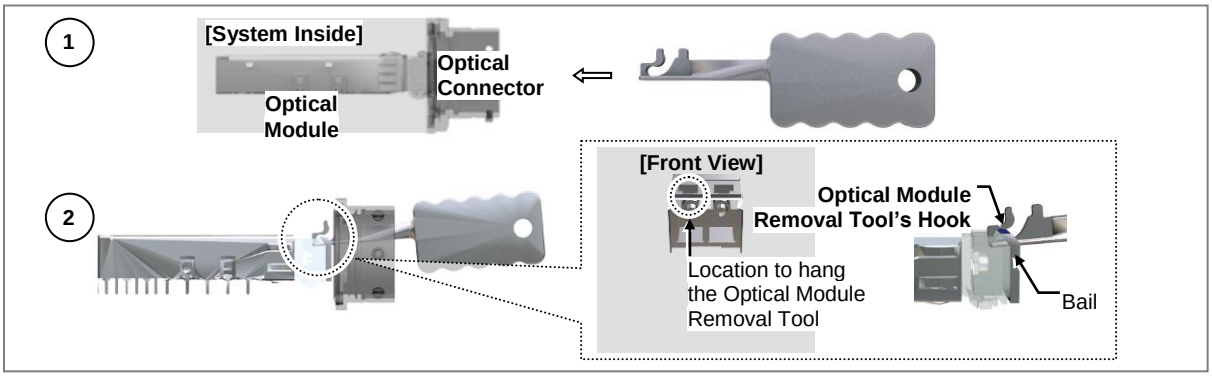
Remove/Insert Optical Module

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

To remove optical module, do the following:

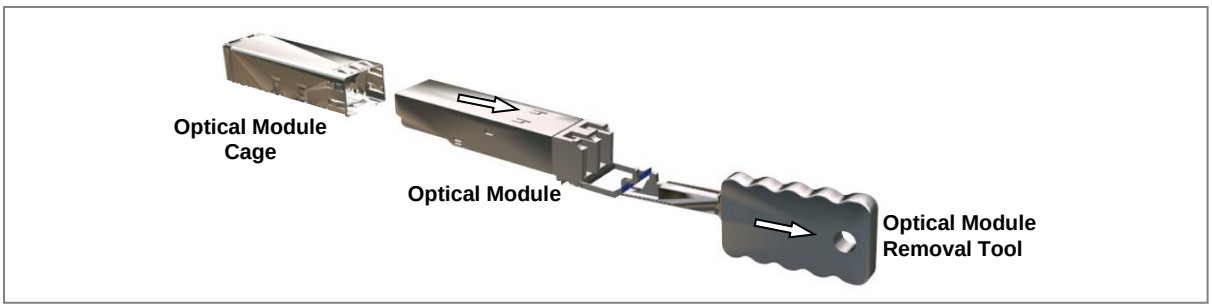
1 Hang the hook of the optical transceiver removal tool on the optical module bail within the system.

Figure 105. Optical Module Removal (1)

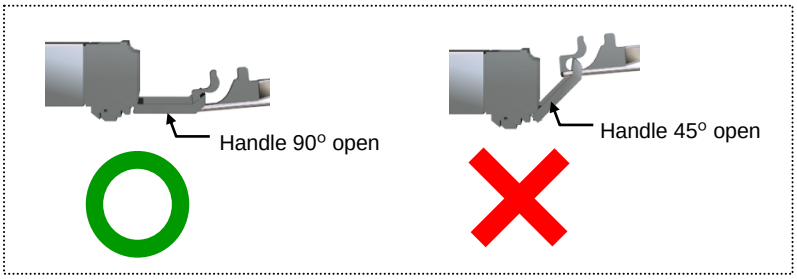


2 Completely remove the optical module from the optical module cage by pulling the optical module removal Tool.

Figure 106. Optical Module Removal (2)

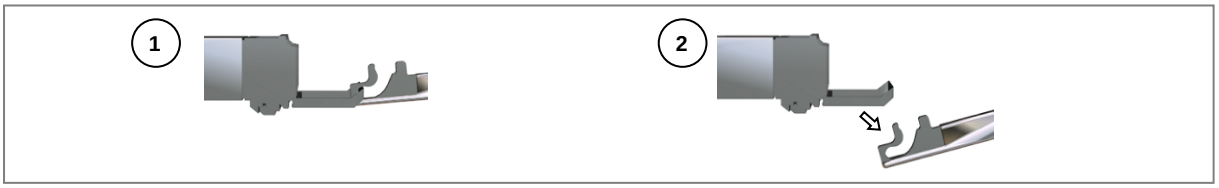


When desorbing an optical module, use a dedicated tool (optical module desorption tool) to remove the handle by opening it for about 90º.
When the optical module is detached without using the dedicated tool, the optical module may be jammed and the handle may be damaged due to a lack of opening capacity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



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

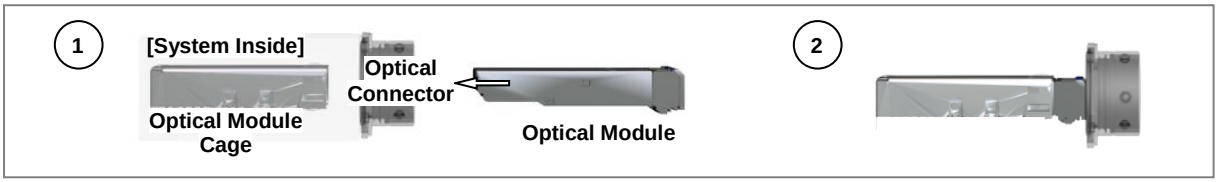
Figure 107. Optical Module Removal (3)



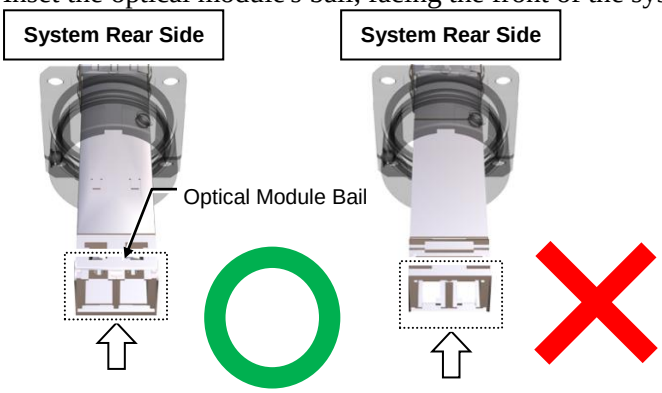
To inset optical module, do the following:

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

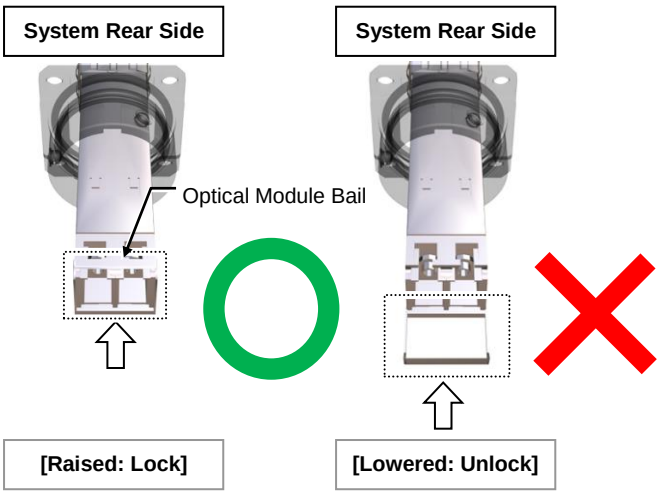
Figure 108. Optical Module Insert



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



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



Connecting CPRI Cable

To connect a CPRI cable, do the following:

Prerequisites

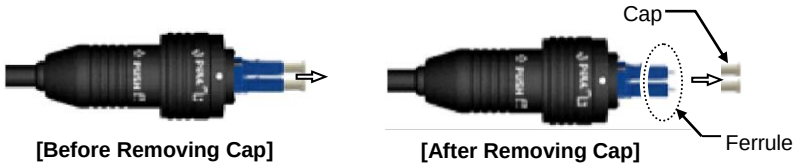
Before proceeding with connecting the CPRI cable, make sure that you have the items mentioned in the table below.

Table 41. Parts and Tools for connecting CPRI Cable

Category	Description	
Installation Section	CDU~RRH L0 Port	
Cable	CPRI Cable (Optical, Single Mode, for Outdoor Type)	
Bend Radius	10 × OD	
Connector	RRH	JONHON, Push Pull Type, PDLC03T03-A (DLC/UPC)
Working Tools	Optical Connector Cleaner	

In the system, the laser beam light runs through the optical cable.
The exposure of the laser beam on worker's eye may cause serious injury so that it should be handled with care.

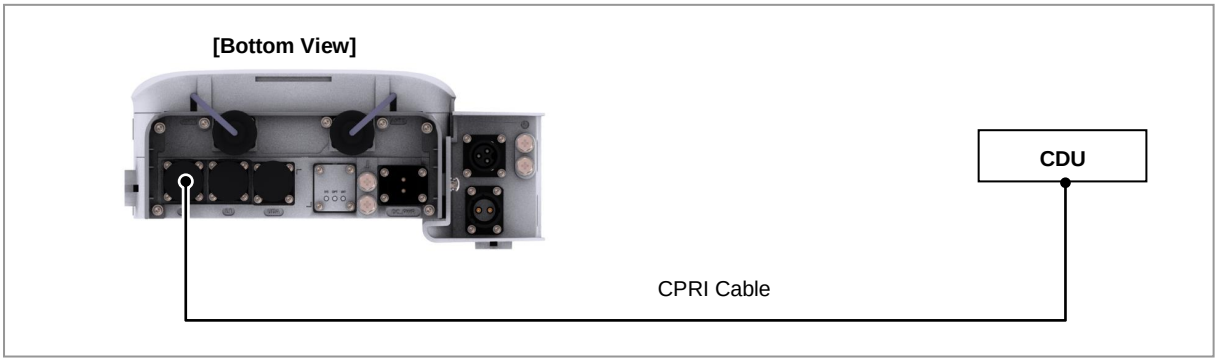
Remove the cap of the optical connector before connecting.
- Before connecting the optical cable, check if the ferrule of the connector is soiled. Be careful to keep the cutting section away from dust or foreign material.
If the cable is soiled with foreign material, do not blow to remove them.
- Make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



Before connecting the CPRI cable connector, the ferrule of the connecter of cable side should be cleaned first by using the optical connector cleaner. (Appendix B for more information.)

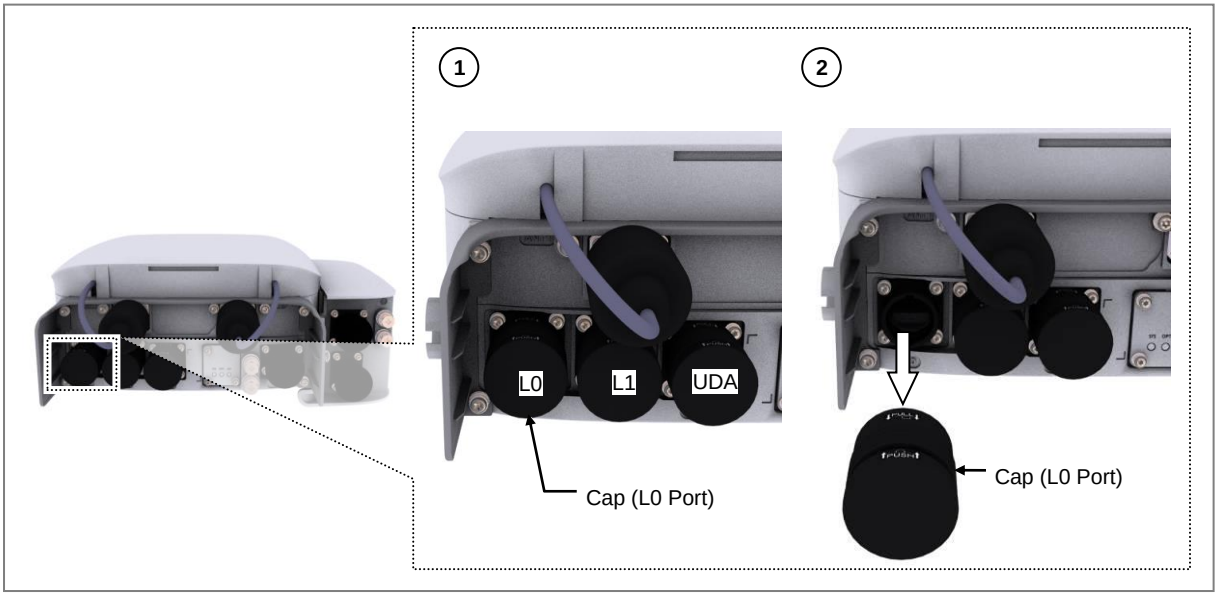
1 Install the CPRI cable from the CDU to the RRH L0 port.

Figure 109. Connecting CPRI Cable (1)

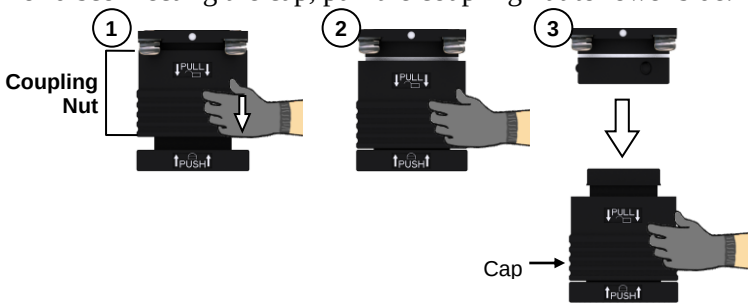


2 Separate the cap from the system side connector (L0 port).

Figure 110. Connecting CPRI Cable (2)

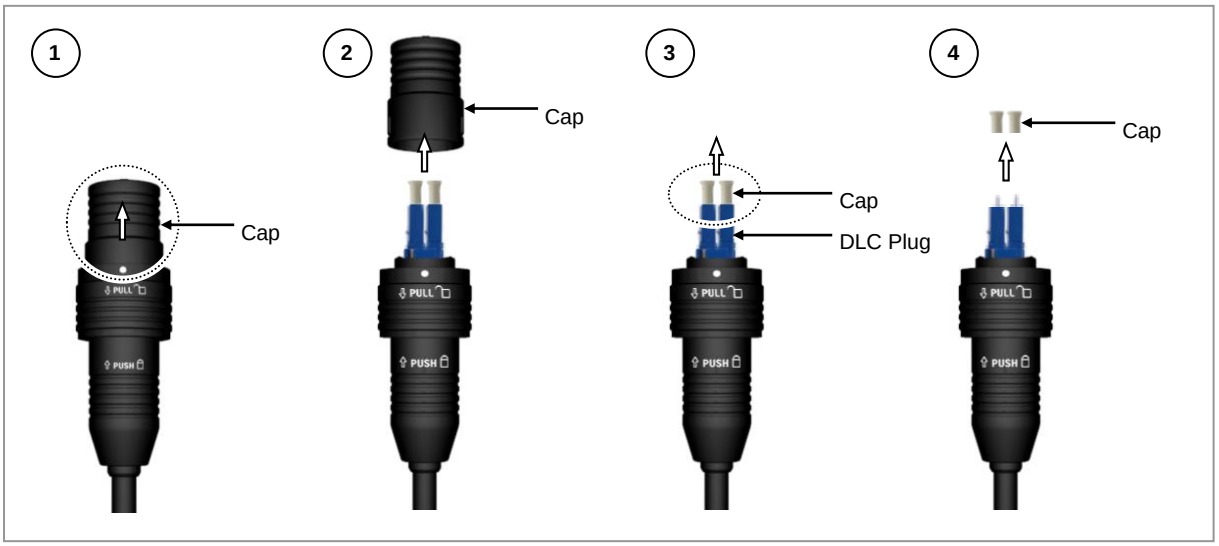


The method for connecting/disconnecting the cap (push-pull type) is as follows:
- For disconnecting the cap, pull the coupling nut to lower side.



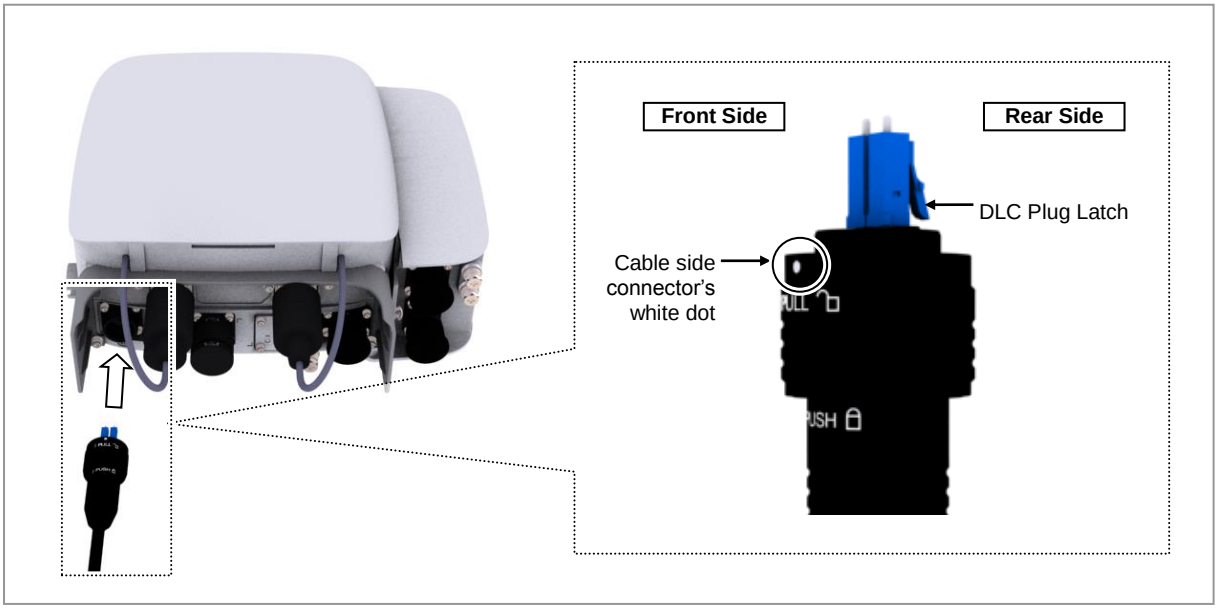
3 Separate the cap from the cable side connector.

Figure 111. Connecting CPRI Cable (3)



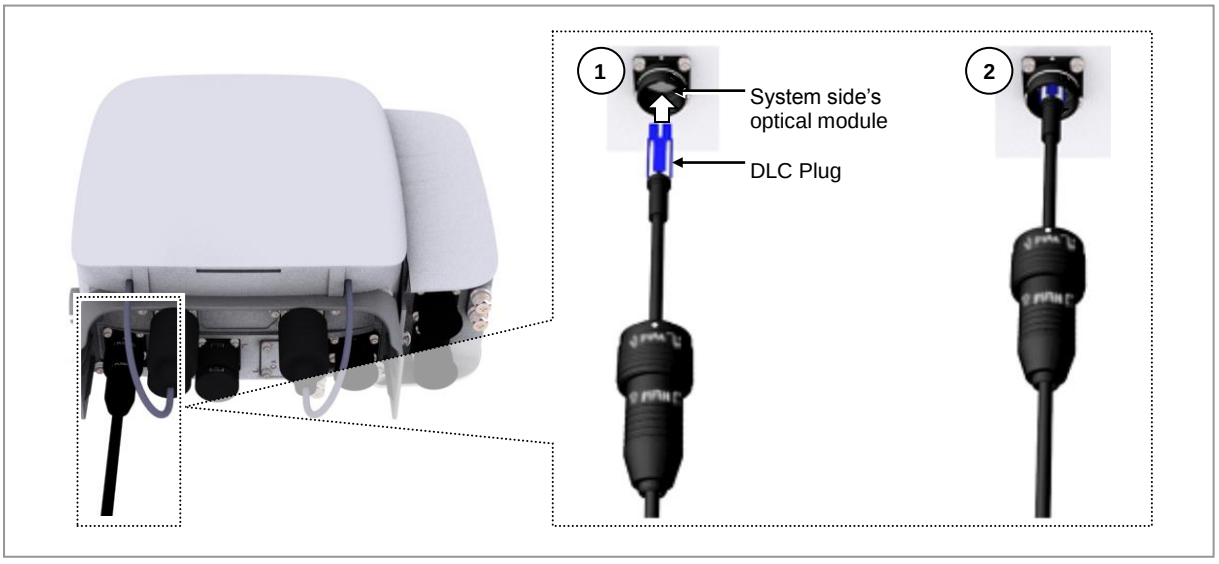
4 The latch of cable side connector should be toward the rear side.

Figure 112. Connecting CPRI Cable (4)



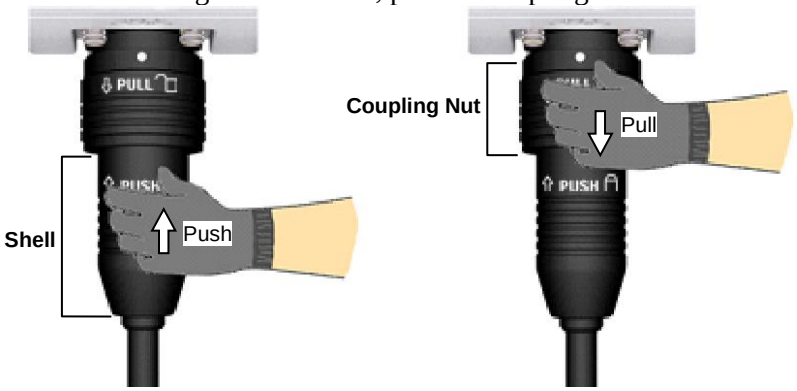
5 Insert the DLC plug to the optical module of the system side.

Figure 113. Connecting CPRI Cable (5)



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

The method for connecting/disconnecting the CPRI (optical) 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.



Connecting UDA Cable

To connect a UDA cable, do the following:

Prerequisites

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

Table 42. Parts and Tools for Connecting UDA Cable

Category	Description	
Installation Section	RRH UDA Port to External alarm device	
Cable	UDA Cable Assembly (Cat.5e 24AWG 4P)	
Minimum Cable bend Radius	Operation: 5 × OD	Installation: 10 × OD
Connector	External alarm device	Check specifications of external device output terminal per site and prepare fasteners.
	RRH	JONHON, Push Pull Type, RJ45MF-CT-07

Category	Description
Working Tools	• Cable Cutter • Wire Stripper • Nipper • LAN Tool

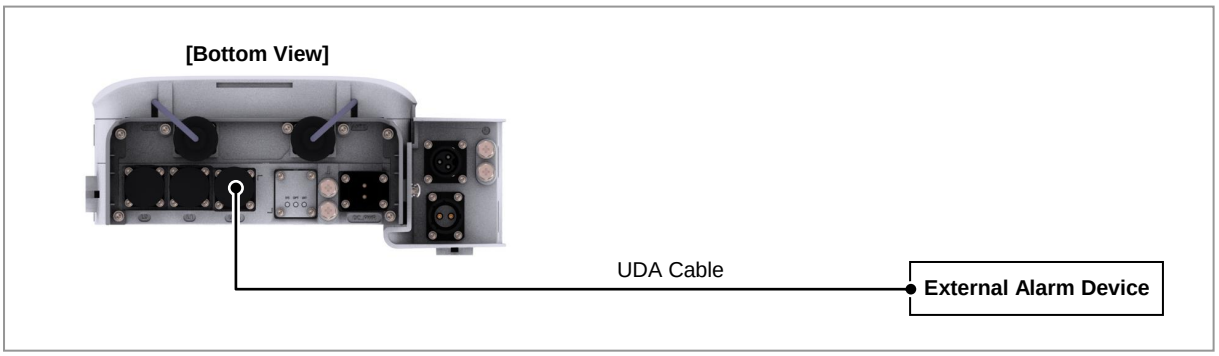
The table below outlines the UDA cable pin map:

Table 43. UDA Cable Pin Map

Pin	Color	Signal
1	White/Blue	RX_CH (3)_COM
2	Blue	RX_CH (3)_NO
3	White/Orange	RX_CH (2)_COM
4	Orange	RX_CH (2)_NO
5	White/Green	RX_CH (1)_COM
6	Green	RX_CH (1)_NO
7	White/Brown	RX_CH (0)_COM
8	Brown	RX_CH (0)_NO

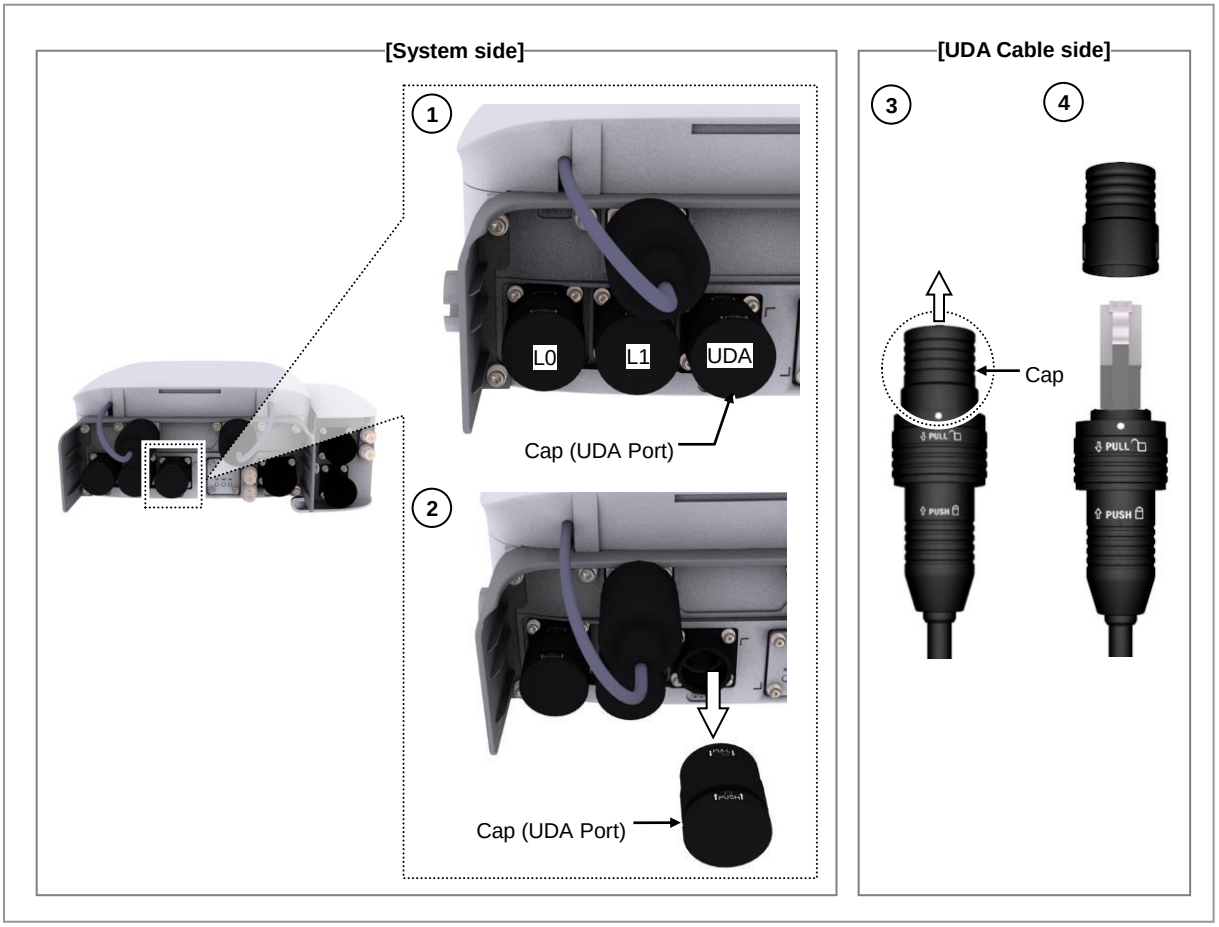
1 Install the UDA cable from the external alarm device to the RRH.

Figure 114. Connecting UDA Cable (1)



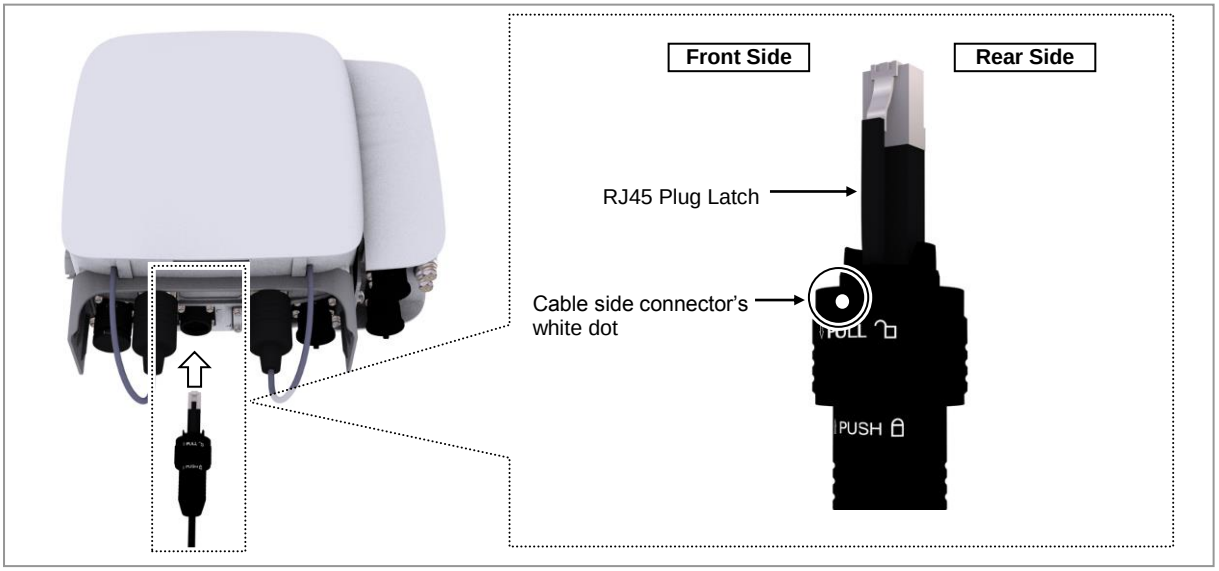
2 Separate the cap from the RRH side and cable side connector.

Figure 115. Connecting UDA Cable (2)



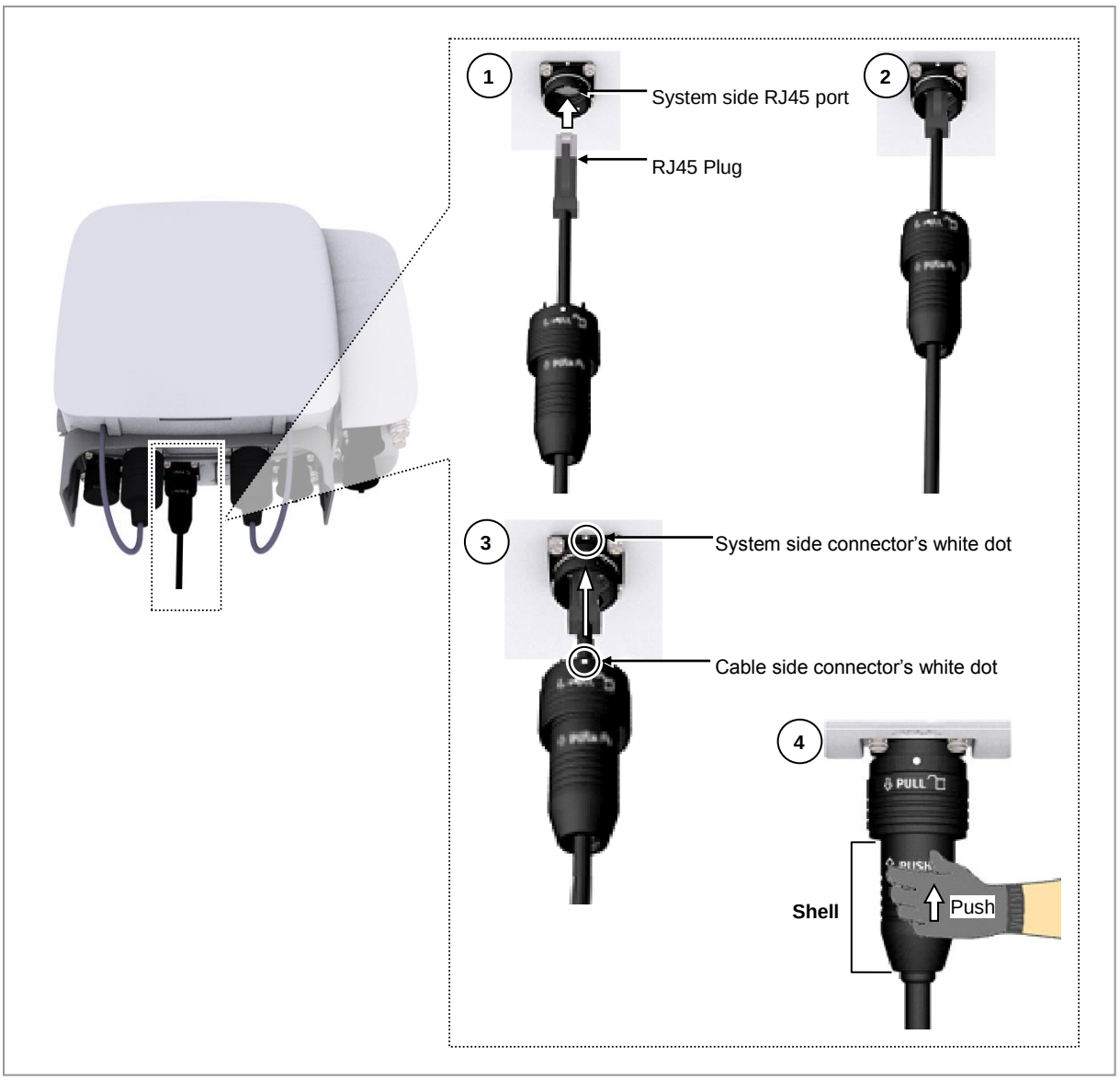
3 The latch of cable side connector should be toward the front of the RRH.

Figure 116. Connecting UDA Cable (3)

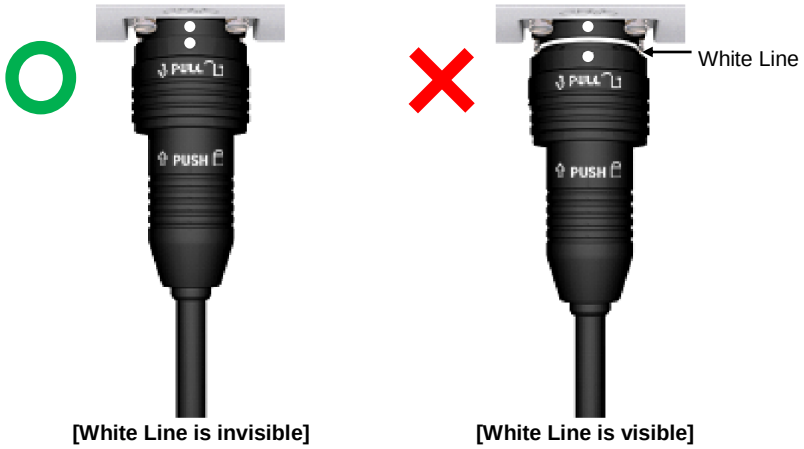


4 Insert the RJ-45 plug to the system side connector.

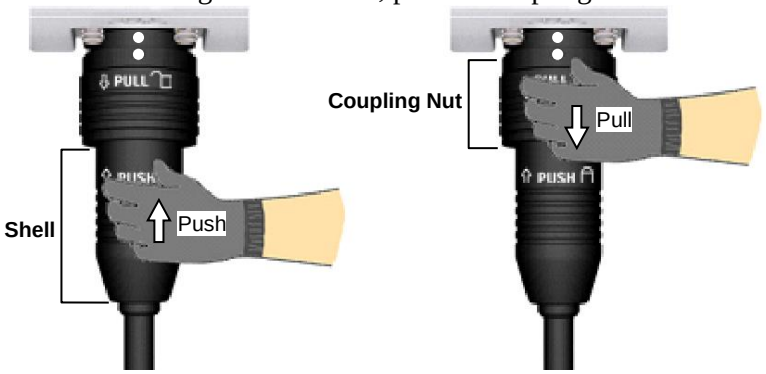
Figure 117. Connecting UDA Cable (4)



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.



Connecting RF Cable (External RF Antenna connection)

To connect a RF cable, do the following:

Prerequisites

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

The RF cable minimum radius of curvature must be observed.

Table 44. RF Cable Minimum Radius of Curvature

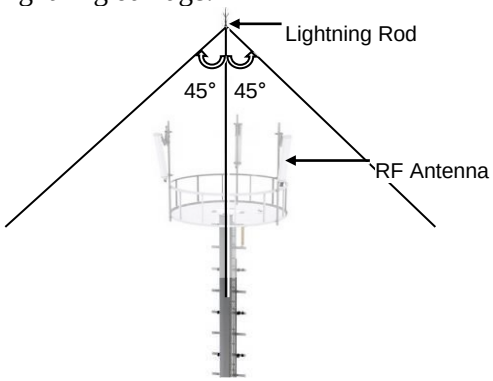
Category	Description		
RF cable min. radius of curvature	1/2 in. Feeder Line	Super Flexible Type	1.26 in. (32 mm)
		Flexible Type	4.92 in. (125 mm)

Make sure you have the items listed in the table below.

Table 45. Parts and Tools for connecting RF cable

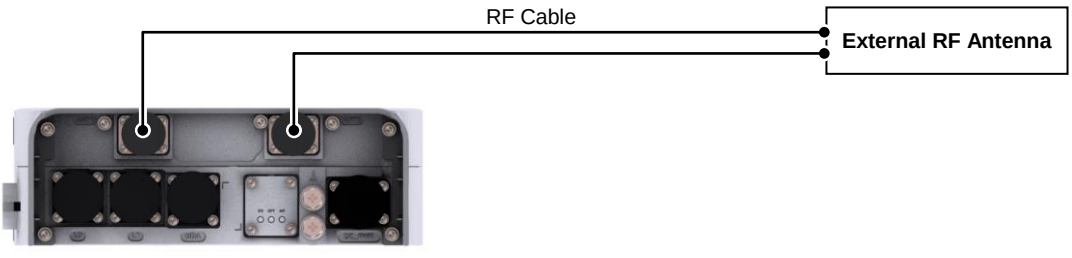
Category	Description	
Installation Section	RF Antenna to RRH ANT1, ANT2	
Cable	RF Cable Assembly (1/2 in. Feeder Line)	
Connector	RF antenna	DIN Type-Male (Check the RF antenna specification and prepare connecting parts.)
	RRH	4.3-10 (Plus) Type-Male
Recommended Torque Value	RF antenna	217 lbf·in
	RRH	44 lbf·in
Working Tools	RF antenna	• Torque Wrench (100 to 400 lbf·in) • Torque Wrench Spanner head (apply hex head: 32 mm) • Spanner (32 mm)
	RRH	• Torque Wrench (10 to 50 lbf·in) • Torque Wrench Spanner head (apply hex head: 22 mm) • Spanner (22 mm)

When operator installs the antenna, the antenna must be within the protective angle (left/right side 45° each from the central axis) to prevent the antenna from lightning damage.



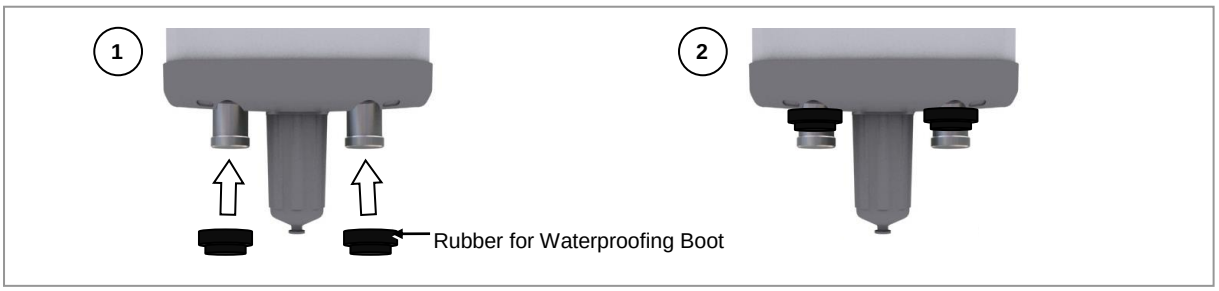
1 Install RF cable from the RRH to the RF antenna.

Figure 118. Connecting RF Cable (1)



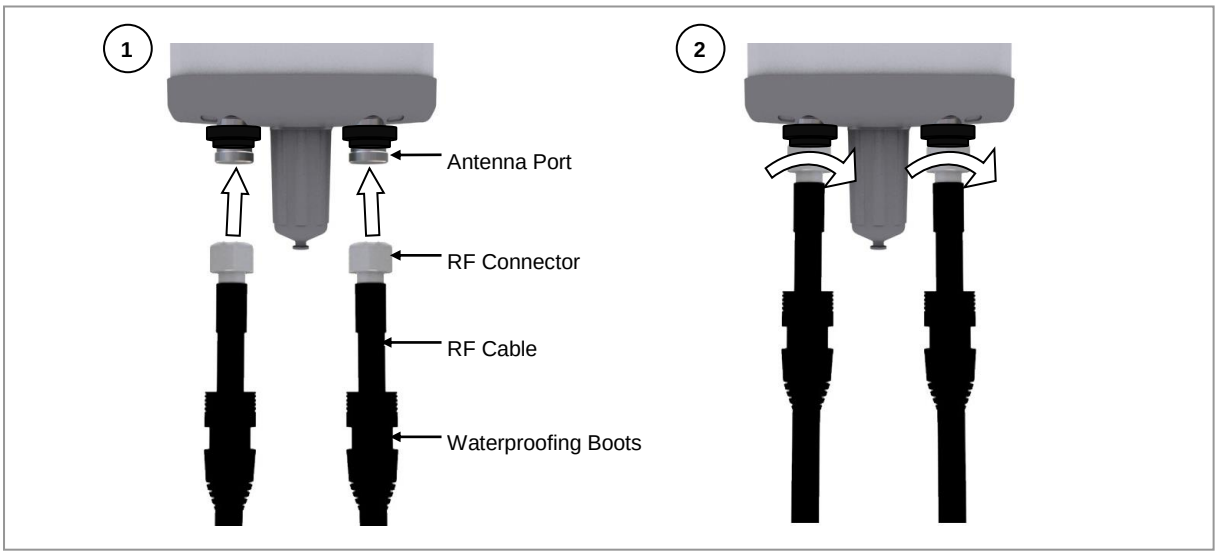
2 Insert the rubber for waterproofing boot to the RF antenna ports.

Figure 119. Connecting RF Cable (2)



3 Connect cables to the RF antenna ports.

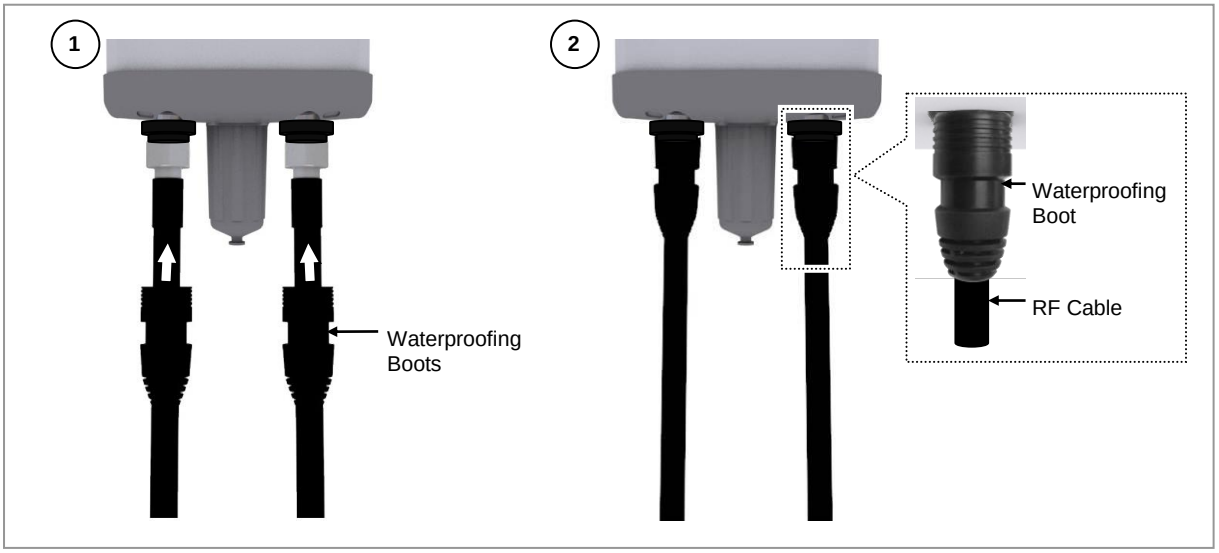
Figure 120. Connecting RF Cable (3)



As different connector types may be used depending on the RF antenna type, check the antenna connector before connecting the cable.

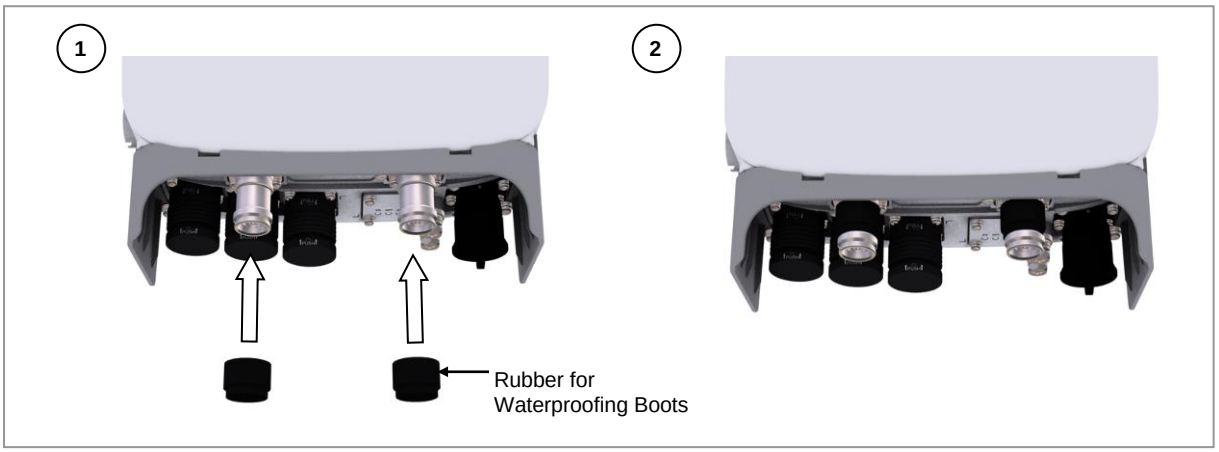
4 After connecting the connector, push waterproofing boots up to the connector connection.

Figure 121. Connecting RF Cable (4)



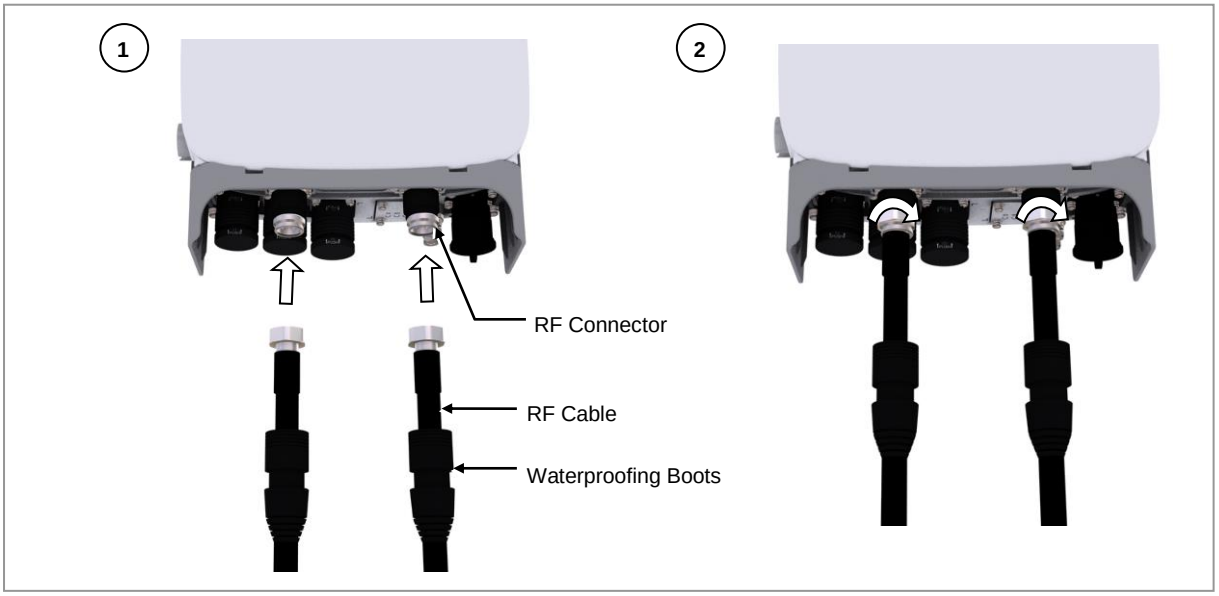
5 Insert the rubber for waterproofing boot to the system side RF ports (ANT1, ANT2).

Figure 122. Connecting RF Cable (5)



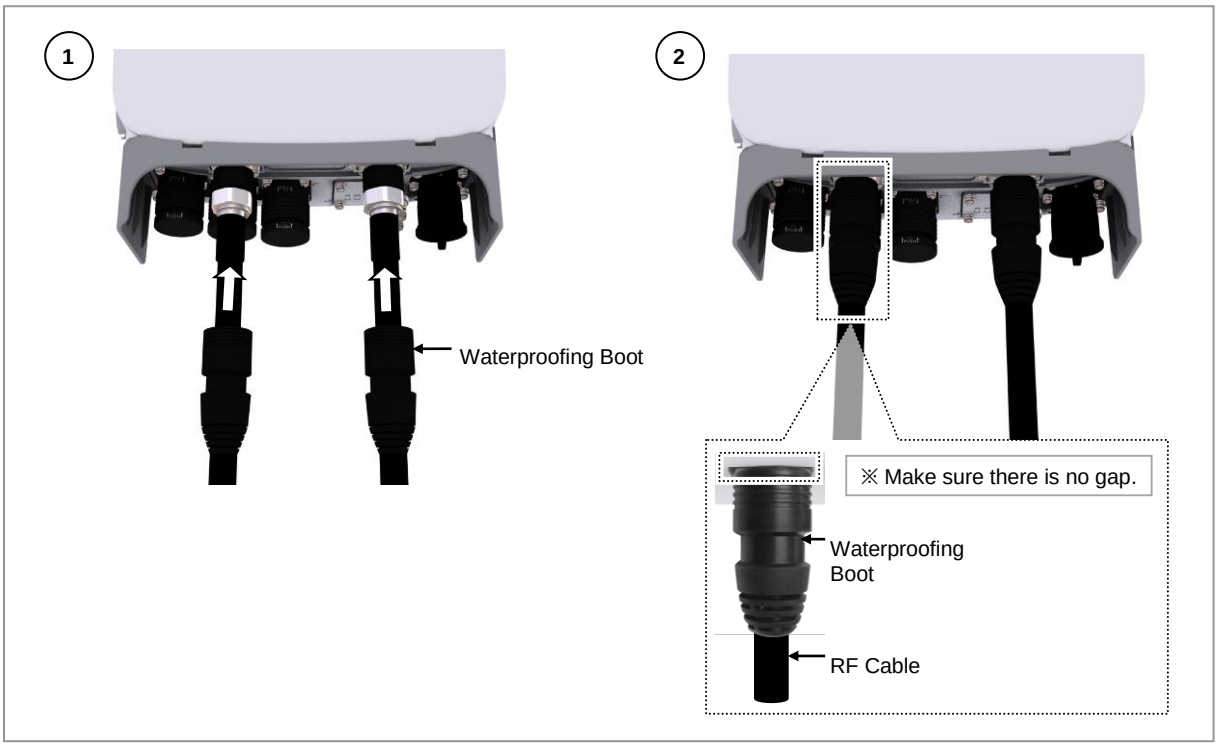
6 Connect cables to the system side RF port (ANT1, ANT2).

Figure 123. Connecting RF Cable (6)



7 After connecting the connector, push waterproofing boots up to the connector connection.

Figure 124. Connecting RF Cable (7)



Assembling Cable Cover

This section describes the procedures for assembling the cable cover.

Assembling Cable Cover

To assemble the cable cover for do the following:

Prerequisites

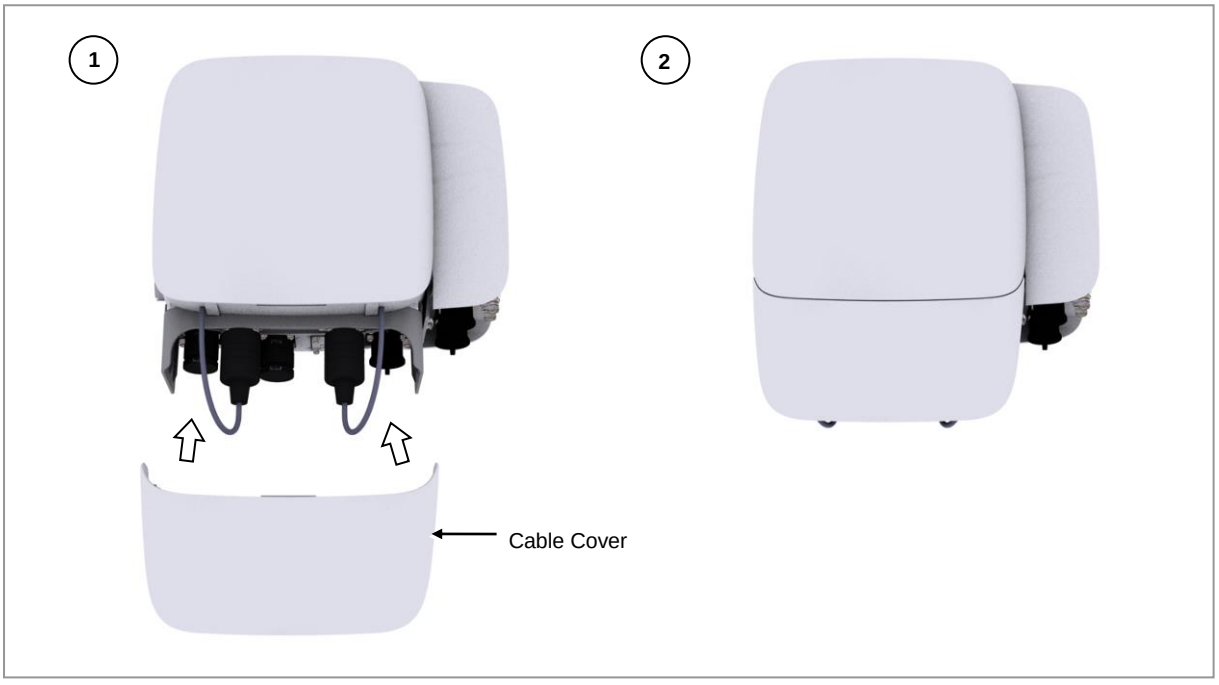
Before proceeding with assembling the cable cover, make sure that you have the items mentioned in the table below.

Table 46. Parts and Tools for Assembling Cable Cover

Category	Description	
Parts	Cable Cover	1 EA
Fasteners	M3 × L10 Torx Screw	3 EA
Recommended Torque Value	M3 Screw	5.6 lbf·in
Working Tools	• Torque Driver (6 to 22 lbf·in) • Screw Driver Bit (T10H) • Screw Driver (T10H)	

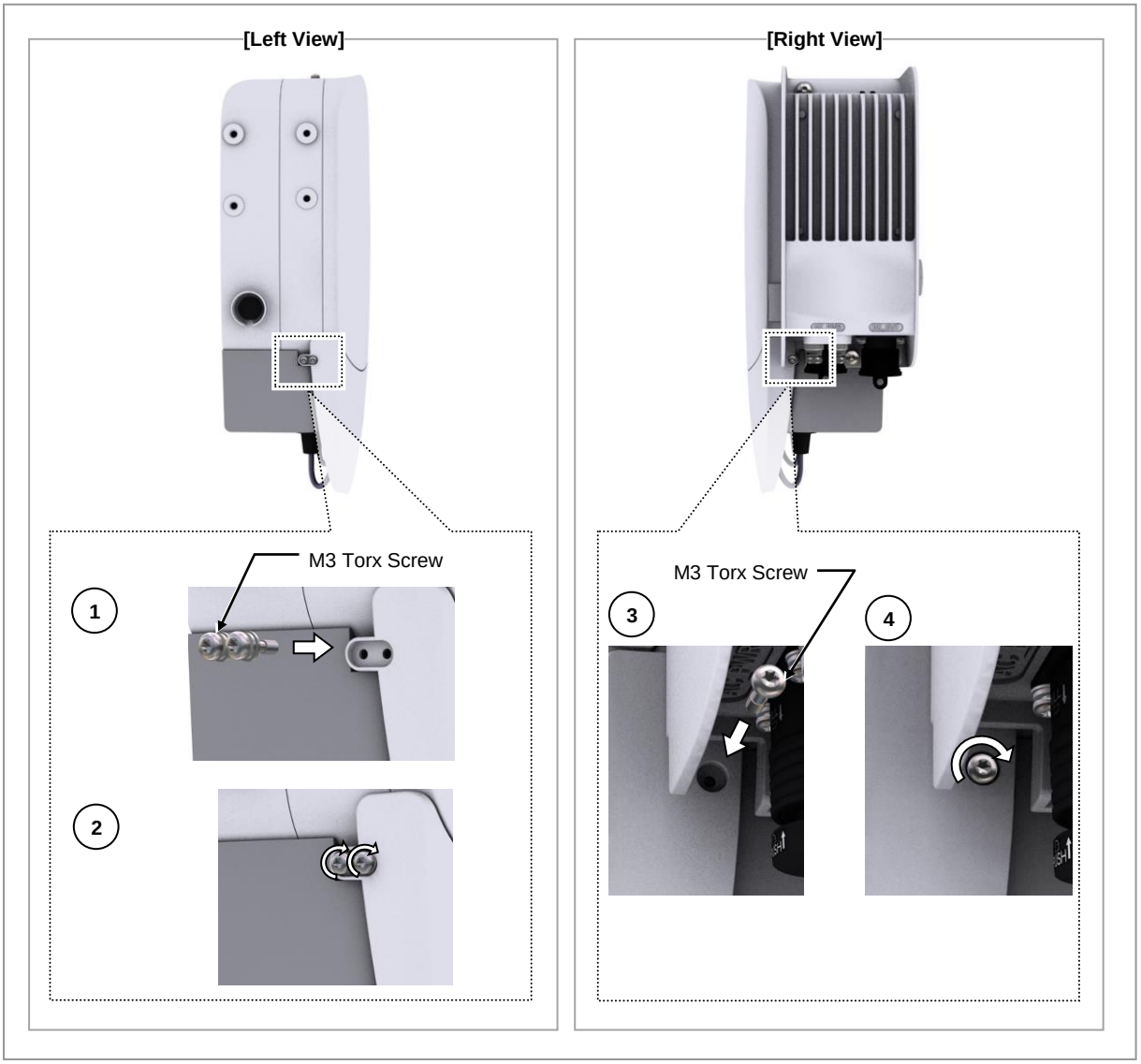
1 Place a unit bracket to the RRH lower part.

Figure 125. Assembling Cable Cover (1)



2 Fix the fasteners to the left and right of the RRH.

Figure 126. Assembling Cable Cover (2)

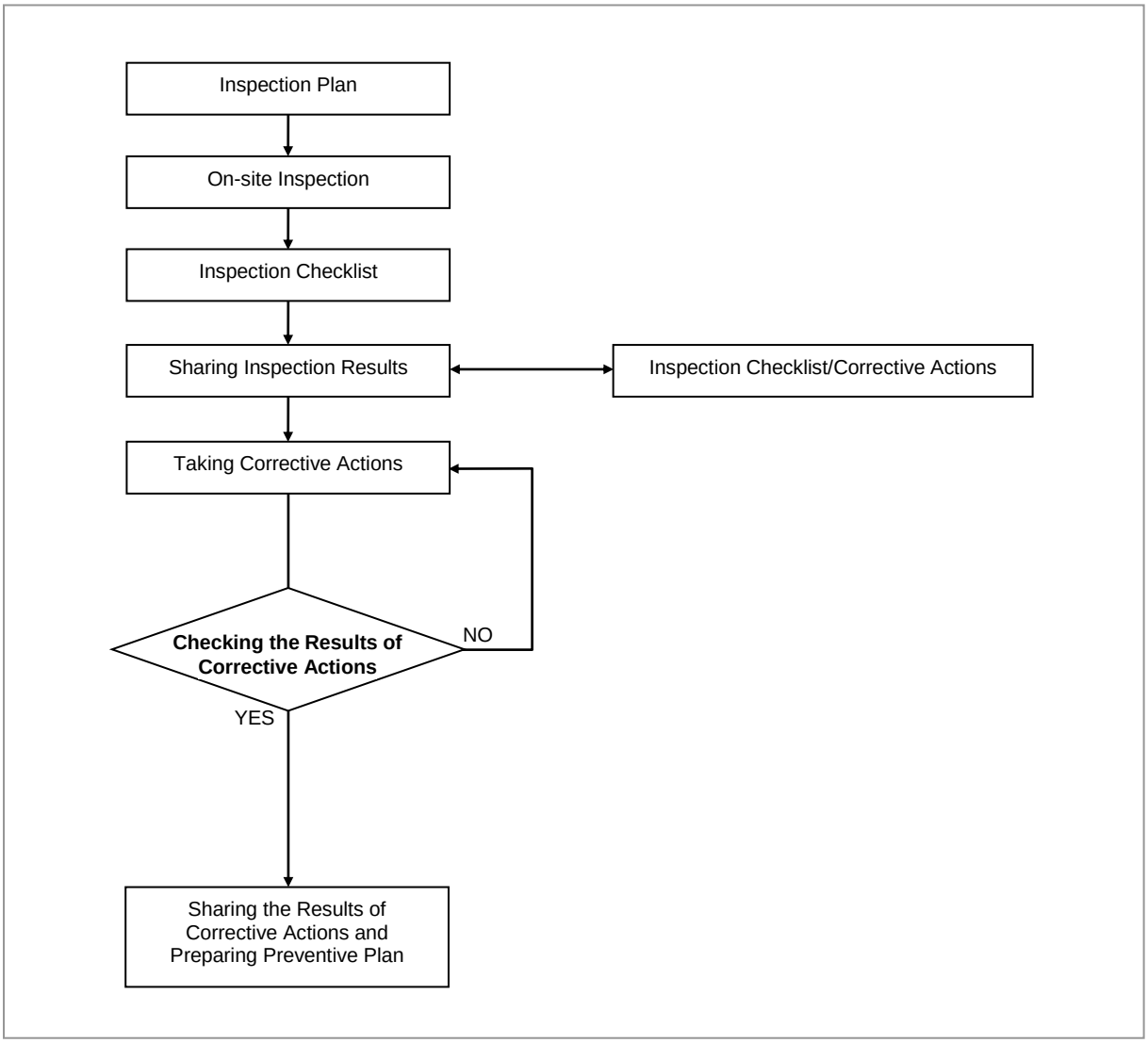


Chapter 4 Inspect the Installation

This chapter describes the procedures to check the installation status.

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

Figure 127. 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 RRH and other devices.

Table 47. 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)		
	Azimuth & Tilt	Checking the tilt result is right.		
Grounding	Installation of ground bar	Checking the separation of		

Category	Check Items	Criteria	Result	
			Pass	Fail
		communication/power/lightning grounding		
	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	Assembly condition of a pressure terminal		
		Fastening condition of a pressure terminal		
		Checking compliance with fastening torque value		
	Installation status of cable tag	Position		
		Marking content		
		Checking tag installation method		
Power	Installation status of power supply	Power supply capacity		
		Output voltage (tester)		
	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		

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

■

Appendix A Acronyms

AC	Alternating Current
DC	Direct Current
DL	Downlink
RRH	Remote Radio Head
MGB	Main Ground Bar
RTN	Return
SELV	Safe Extra Low Voltage
SEMS	pre-asSEMbled washers and screws
S-FTP	Screened-Foiled Twisted Pair
UL	Uplink

Appendix B Clean the Optical Connectors

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, operator 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.

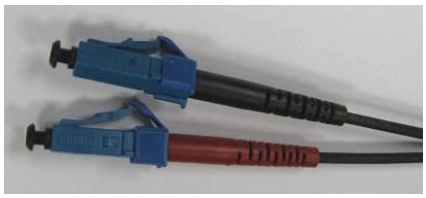
Measure the Optical Output and Connecting the Optical Connector

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 48. 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 49. 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 50. 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.

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