

Indoor RU Installation Manual

for RT4429-77A

Describes product installation and requirement procedure.

Document Version 1.0
May 2022

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Preface

This installation manual describes the installation procedures of the indoor RU (RT4429-77A, Radio Unit). It also provides the procedures to connect power and interface cables.

Relevance

This manual applies to the following products/software.

Name	Type
RT4429-77A	Hardware

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 command and counter are presented in Courier New font and bold style. For example, **RTRV-NE-STS**, **eutran-cell-conf-idle** or **CSL**.
- The alarm is presented in bold style. For example, **A2100216R ump temperature-high**.

Revision History

The following table lists all versions of this document.

Document Version	Publication Date	Remarks
1.0	May 2022	First Version

Organization of This Document

Section	Title	Description
Chapter 1	Introduction	This chapter describes the introduction of the installation procedure.
Chapter 2	Before Installation	This chapter introduces the system and describes the equipment and items that should be understood before installation.
Chapter 3	Installing System	This chapter describes the procedures to install the system.
Chapter 4	Connecting Cables	This chapter describes the procedures to connect the cables to the installed system.
Chapter 5	Inspecting Installation	This chapter describes the procedures for inspecting the installation status after the system installation and cabling is complete.
Appendix A	Acronyms	This appendix spells out the acronyms used in this manual.
Appendix B	Cleaning 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

- 5G NR gNB System Description
- Indoor RU Product Specification for RT4429-77A

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 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 IEC/EN/UL/CSA 62368 or 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 optical modules rated as Class 1 radiation-emitting devices under IEC/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 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 mm²/14 AWG.

The equipment can be installed in multiple locations such as Network Telecommunications Facilities, OSP, and locations where the NEC applies.

- RT4429-77A: This product is installed on the Network Telecommunication Facilities.

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

To protect against potential fire due to current overload, 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.

Cooling

Natural convention cooling.

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 EN 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, ensure it is done so properly according to the installation instructions.

RT4429-77A is suitable for installation as part of the Common Bonding Network (CBN), an Isolated Bonding Network (IBN), or both.

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 IEC/EN/UL/CSA 62368 or 60950 providing double/reinforced insulation between hazardous voltages and SELV/TNV circuits.

Any battery must be separated from hazardous voltages by reinforced insulation.

The battery return of the terminals is an Isolated DC return. The RTN of the RT4429-77A is not connected to Ground.

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 B 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.

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, 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.



Hot surface warning

Allow to cool before servicing.

Do not touch before cooling.

Notice! Be careful not to touch due to high temperature.

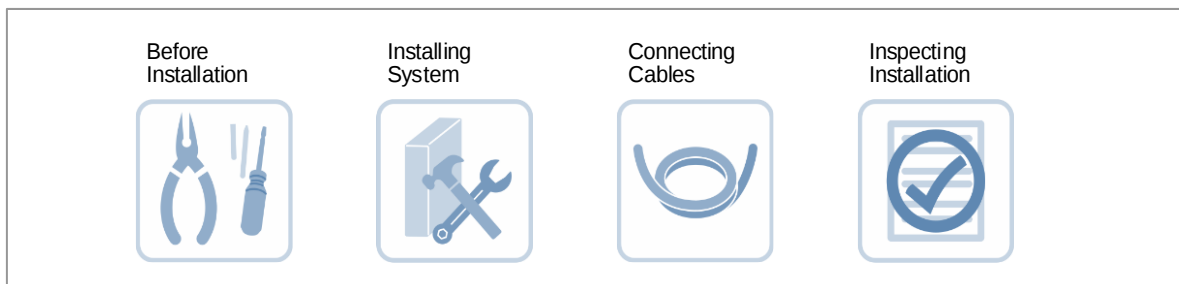
The system must be installed in a restricted area, and make sure the work is done by personnel properly trained for the job.

Chapter 1 Introduction

This chapter provides an overview of the procedures required for system installation. The sections include procedures to perform before installation, while installing the system, connecting cables, and confirming the installation status.

The following figure depicts the procedure for installing the system.

Figure 1. Installation Procedure



This manual is divided into the following chapters. This section provides a brief overview of the information covered in each chapter.

- **Before Installation**
This chapter introduces the system and describes the items you should understand before installation.
- **Installing System**
This chapter describes the procedures to install the system.
- **Connecting Cables**
This chapter describes the cabling procedure, the guidelines for handling cabling, the cabling diagram, the grounding process, and the external interface connection.
- **Inspecting Installation**
This chapter describes the procedures to check the installation status.

Chapter 2 Before Installation

This chapter provides a view of the RT4429-77A including details about the external interface. It also provides safety instructions and the installation tools required for installing the system.

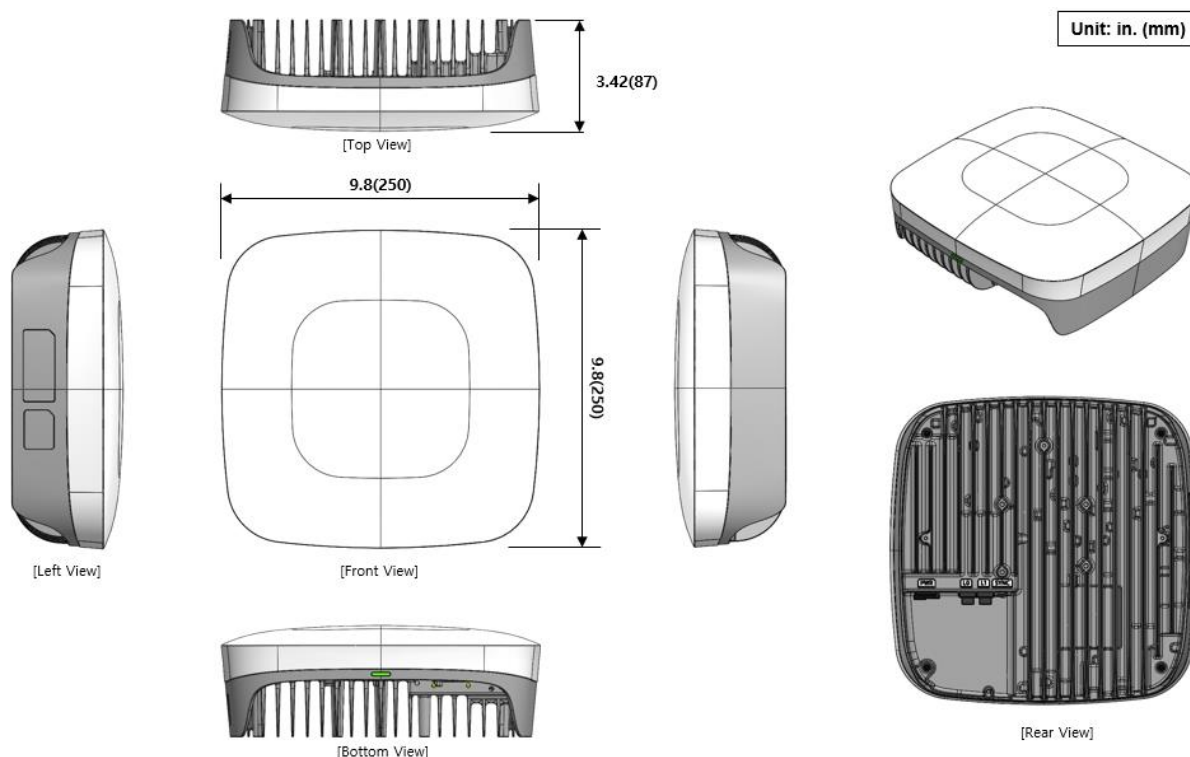
RU View and External Interface

This section provides the pictorial view of the RT4429-77A and its interfaces.

RU View

The following figures depict the all-round views of the RT4429-77A.

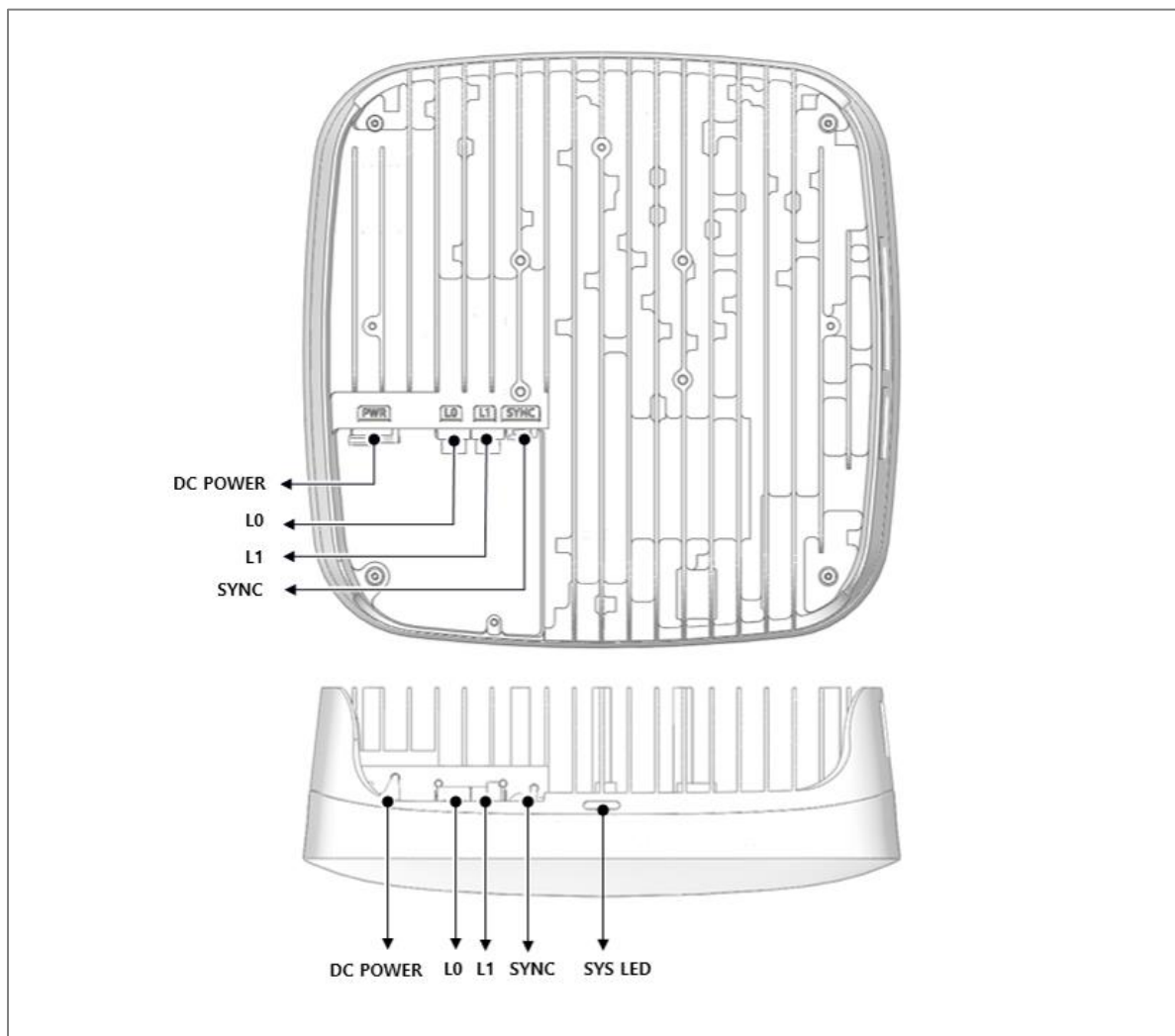
Figure 2. RT4429-77A View



RU External Interface

The following figure depicts the external interfaces of the RT4429-77A:

Figure 3. RT4429-77A External Interface



Specifications

The following table lists the key specifications of the RT4429-77A:

Table 1. Specifications

Item	RT4429-77A
Air Technology	NR
Antenna Port	4Tx/4Rx
Operating Frequency	- Tx: n77 3700~3980 MHz - Rx: n77 3700~3980 MHz
IBW	n77: 200 MHz
OBW	n77: 200 MHz
Path Configuration	4T4R
RF Output Power	Max. 1W (250mW × 4 path)
Indoor RU Capacity	n77: 2 carrier
Optic Port	Optical eCPRI 2 port (10G/25Gbps, 10Gbps)
Dimension (mm)	250 (W) × 87 (H) × 250 (D)
Weight	< 3.9 kg
Power Consumption	Typical: 78W, Max 85W
Input Voltage	-48 V DC (Operating voltage range: -36 to -58 V DC)
Operating Temperature	-20 °C to 50 °C (without solar load) -20 °C to 40 °C (Ceiling mount)
Operating Humidity	5% to 90% RH (Condensing, not to exceed 30 g/m ³ absolute humidity)
Altitude	Telcordia GR-63-CORE, Issue3, Altitude (Section 4.1.3)
Earthquake	Telcordia GR-63-CORE, Section 4.4.1 Earthquake (Zone 4)
Vibration	Telcordia GR-63-CORE
Ingress Protection Rating	IEC 60529 IP40
EMC	FCC Part 15 Subpart B Class B
Noise	Fanless (natural convection cooling)
Safety	- UL 62368-1 - UL 2043
RF	3GPP TS38.104 and 3GPP TS38.141 for NR Local Area BS

Cautions for Installation

This section describes the safety instructions that must be observed while installing the system.

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

Before Installing

- Post warning signs in areas where high-voltage cables are installed.
- Post 'off limit' signs in areas where accidents are most expected.
- With guardrails or fences, block open areas such as connecting parts, roof, and scaffold.



Keep a safe distance between the base station antenna (RU) and people.



For wall installations to be in compliance with FCC RF Exposure guidelines, install the base station with proper distance (38 cm) between bottom of the base station and people.

For the protection of the public from exposure to radio frequency electromagnetic field, do not co-locate nor operate in conjunction with any other antenna or transmitter.

- The system power must be cut off before installing.

While Installing

- Be careful not to damage or scratch the boards mounted on the system and the cables among the boards when the system is transported or installed.



Ensure the power switch of the power supply is OFF when installing the system. Installing the system with power switch ON can cause system damage or fatal human injury when the cables are not correctly connected.



Ensure that worker wears protection gloves and goggles to prevent damage from debris while drilling holes in a wall or ceiling.



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



Prevent contaminants from entering unused ports by covering them with a cap.



To prevent contaminants, outdoor air, and moisture from entering the cable inlet (including cable gland and conduit), finish it 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 silicon.

After Installing

Remove any debris produced during the work and clean up the installation site.



Optical modules and cables used in the system have laser beams that emit light. Be careful with handling as exposure to laser beams can cause serious damage to the eyes.



Ensure that the worker does not damage installed cables while cleaning the system.



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

Installation Tools

The following table lists the basic tools for installation. The additional tools required for each site should be identified and arranged during a site survey before starting the installation.

Table 2. Basic Installation Tools

No.	Name	Specification	Purpose of use
1	Torque Driver 	No.0~+ No.3 (M2.6-M6 '+' Driver) 0.07-4.34 lbf * ft (1.0~60 Kgf * cm)	For fastening the M3-M6 screw
2	Screw Driver Bit 	'+', No. 2	For fastening the M3, M4 screw
3	Screw Driver 	'+', No. 2	For loosening the M3, M4 screw
4	Torque Wrench 	Apply a torque range: 20-90 lbf.in	For tightening the M5 Hex. Bolt (Steel band fixing Hex. bolt)
5	Torque Wrench Spanner Head 	Apply Hex. Head: 8 mm (for 20-90 lbf.in)	For tightening the M5 Hex. Bolt (Steel band fixing Hex. bolt)
6	Spanner 	8 mm	For loosening the M5 Hex. bolt
7	Ratchet Wrench 	10 × 13/17 × 19 (4 in 1)	For fastening Hex. bolt
8	Tape Measure 	16.4 ft (5M)	Tape measure for length measurement
9	Power Extension Cable 	98.42 ft (30M)	Basic tool
10	Horizontal Ruler 	Spirit level 11.8 in (300 mm)	For horizontality and verticality
11	Hammer Drill 	Normal	Drilling
12	Concrete Drill Bit 	0.12-0.20 in (3-6 mm)	Drilling for Φ 6 plastic anchor
13	Vacuum Cleaner	Normal	For removing dust during the

No.	Name	Specification	Purpose of use
			drilling work
14	Industrial Scissor 	Basic Tool	Cutting
15	Knife 	Basic Tool	Cutting
16	Electric drill 	Normal	For fastening the M3, M4 tapping screw
17	Crimping Tool and Die 	20 AWG-12 AWG (0.5-2.5 mm ²) TE 539635-1, 539743-2 or the use of tools of the same specification	Pressure terminal for crimping
18	Wire Stripper 	Apply cable thickness: 1.5-6.2 in. (4-16 mm)	Cable sheath for removal
19	Nipper 	Basic Tool	For cutting the cable
20	Heating Gun 	50-300 °C	Shrinking the heat shrink tube
21	Optical Connector Cleaner 	For LC Connector	For optical connector cleaning
22	Multi tester 	Digital Pocket Tester	To check the voltage and current measurements when cable disconnection is suspected
23	Fiber Optical Test Set 	Wave length: 1310 nm, 1550 nm (single mode) 850 nm, 1310 nm (multi-mode)	Optical level check
24	ESD Gloves 	Normal	Electrostatic Protection
25	Heat Protection Gloves	Normal	Heat Protection

No.	Name	Specification	Purpose of use
			



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

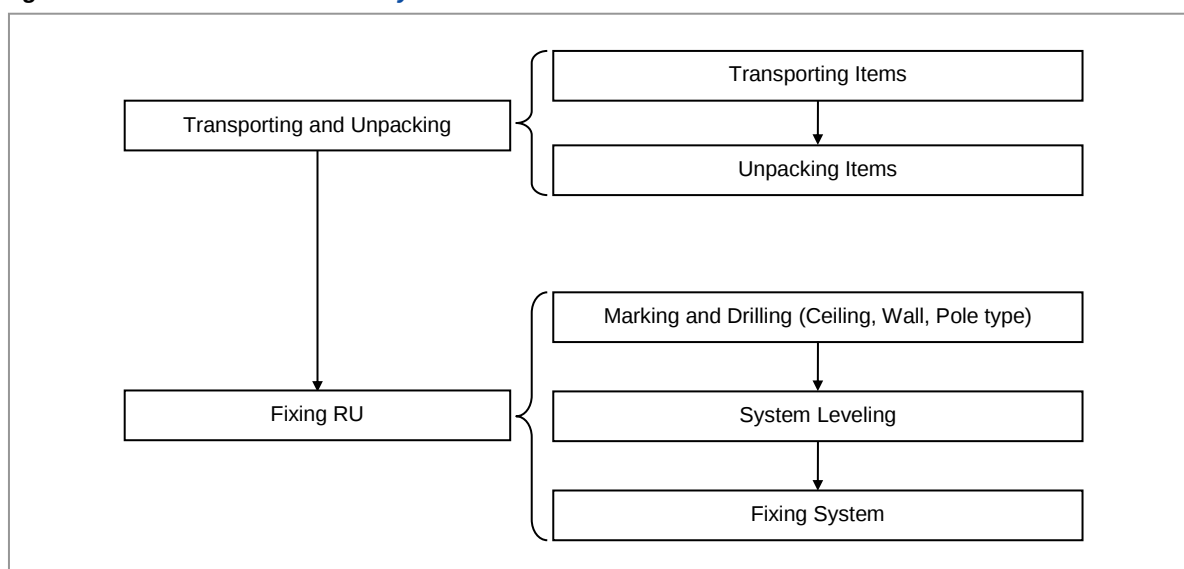
Chapter 3 Installing System

This chapter describes the installation procedures of the RT4429-77A.

Installation Procedure

The following figure outlines the installation procedures of the RT4429-77A.

Figure 4. Procedure to Install the System



Ensure that the power switch is OFF while installing the system. Installing the system with the power switch ON can cause system damage or fatal human injury when connecting or disconnecting the cables.



Do not wear accessories such as watches and rings to prevent the risk of electric shock.

Transporting and Unpacking

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

Bringing in Items

The following precautions must be taken while transporting the items.

- When transporting the system:
 - Firmly fix the system to the vehicle or means of transportation to prevent damage from a vibration or shock.
 - While transporting the system, ensure that the system is not damaged by physical impacts, dust, and static electricity.
 - To prevent accidents, use a lift or cart to carry the system.
 - If the system is required to be transported by people, ensure that there are enough people to carry it safely.
- Before transporting the system, secure storage space for the system and remove obstacles in advance.

Unpacking Items

To unpack the equipment, ensure the following:

- The equipment should be packed until it reaches the installation site.
- The equipment is classified in accordance with each job specification and are stored at a place that does not interfere with working.
- The unpacked systems should be installed immediately. If immediate installation of the systems is not planned, the systems should be stored in the installation place temporarily.
- The external packing should only be unpacked leaving the internal packing in packed state.
- The internal packing should be unpacked after each system is placed at its installation location.
- The by-products (packaging waste) should be disposed in accordance with waste management rules. Do not recycle the by-products.

System Arrangement

A minimum clearance must be secured around the RT4429-77A, in each direction for installation and maintenance.



The recommended clearance for installing the RT4429-77A is outlined in the following table.

Direction	Recommended Distances/in. (mm)		Remarks
	Wall/Ceiling	Pole	
Front	≥ 32 (800)	≥ 32 (800)	-
Sides	≥ 16 (400)	≥ 16 (400)	-
Top	≥ 16 (400)	≥ 16 (400)	-
Bottom	≥ 16 (400)	≥ 16 (400)	-

Figure 5. RU Arrangement_Wall and Ceiling Type Installation

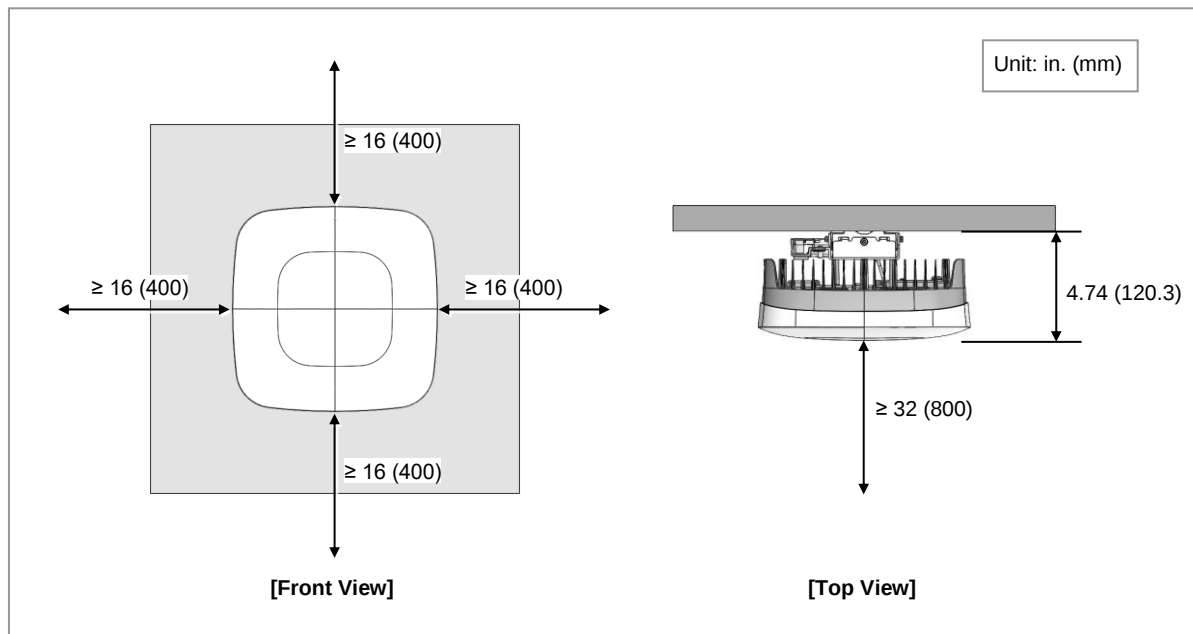
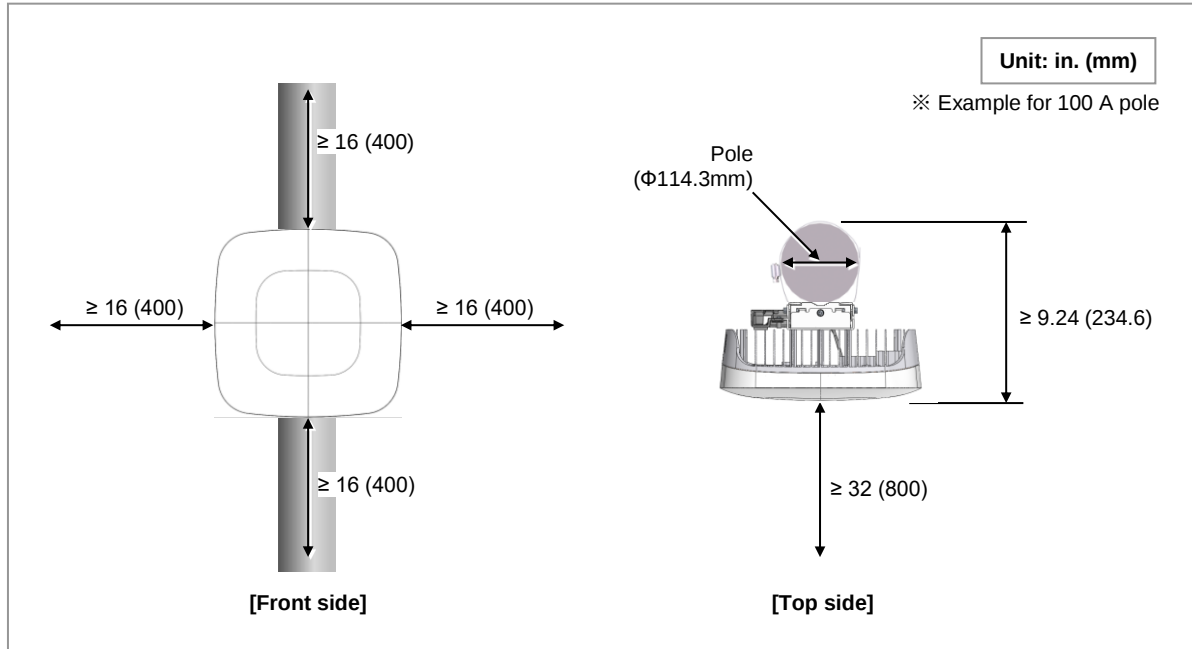
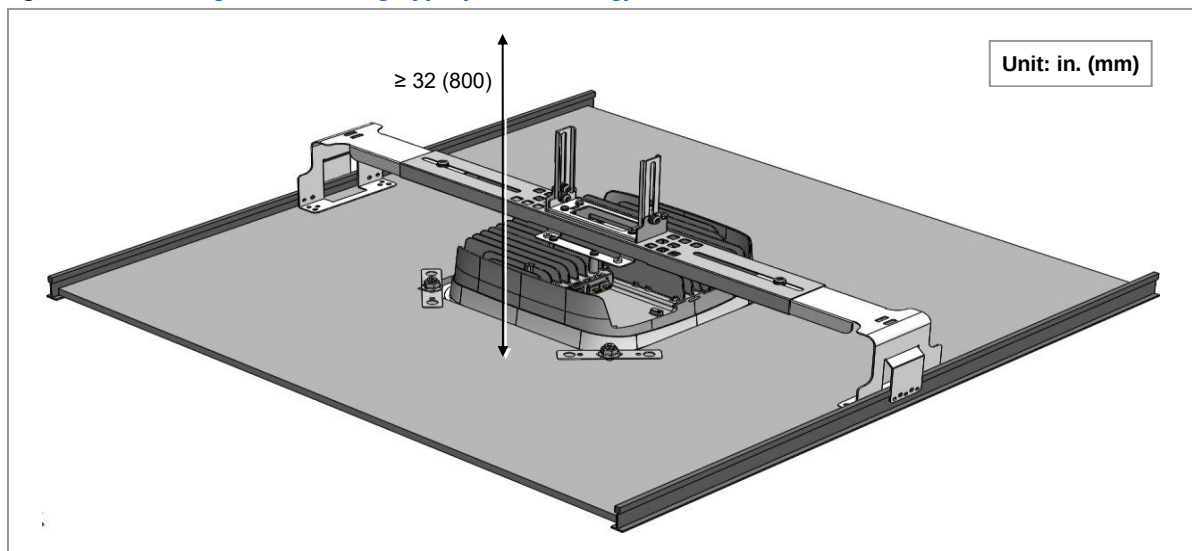


Figure 6. RU Arrangement_Pole Type Installation



The standard of the pole on which the mount bracket can be attached using steel bands is 32A (42.7 mm)-100A (114.3 mm).

Figure 7. RU Arrangement_Ceiling Type (Inside Ceiling)



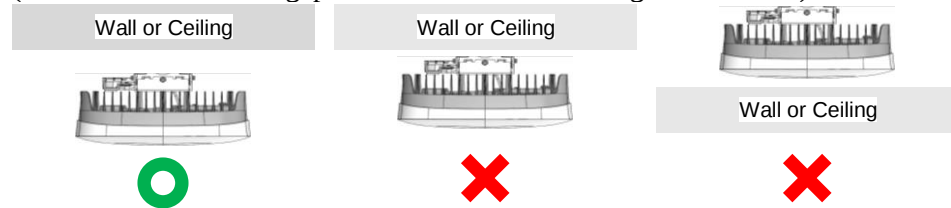
Fixing RU

This section provides general guidelines for mounting the system.

Fixing Wall or Ceiling Type

This section describes the procedures for a wall or ceiling type installation.

-  The ceiling or wall on which the RT4429-77A is installed should be able to withstand a load of four times the weight of the RT4429-77A (RT4429-77A including all the components) without damage.
-  When installing the RT4429-77A, the entire RT4429-77A, including the bracket, should be installed protruding outside the ceiling and wall. (Need to secure 33mm gap between the heat radiating fin and wall.)



Marking for Wall or Ceiling Mounting

▶ To mark on a Wall or Ceiling, do the following

- 1 Ensure you have the items described in the following table.

Table 3. Tools for Marking

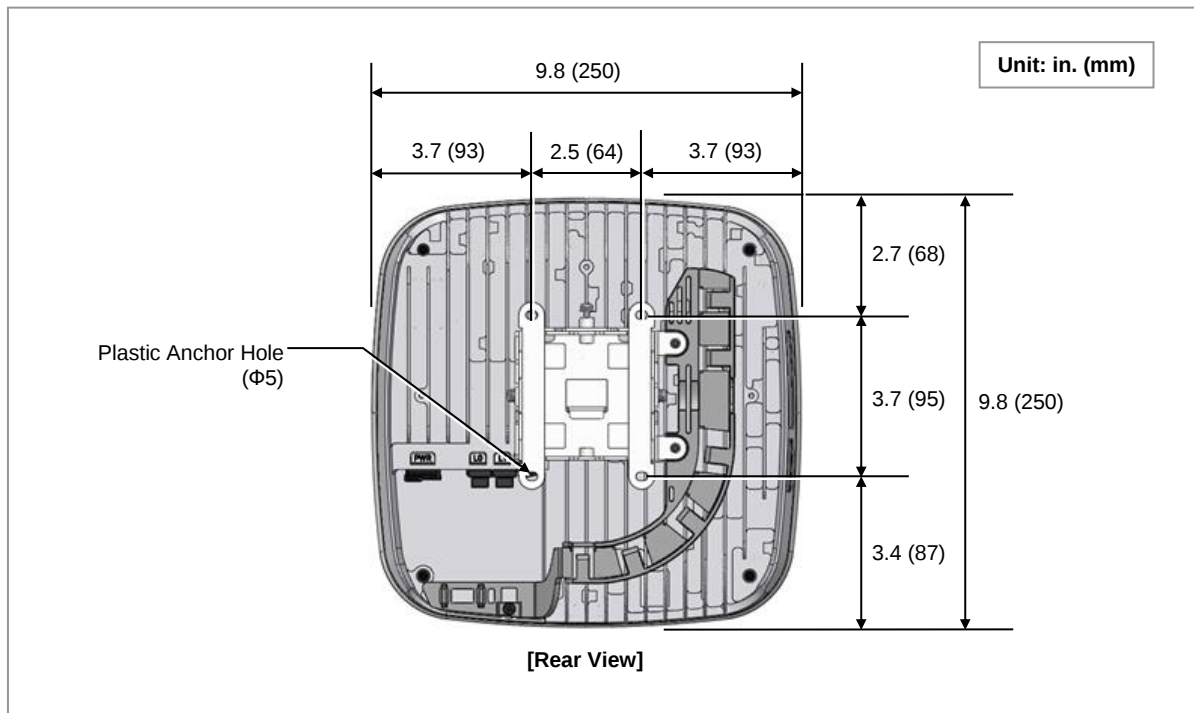
Category	Description
Working Tools	• Tape Measure • Permanent Marker • Level

-  To mount the system on a wall, perform the leveling test by referring to System Leveling. Check the positions that are marked as horizontal or vertical before drilling. If the result displays that 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 reduces the marking error range.

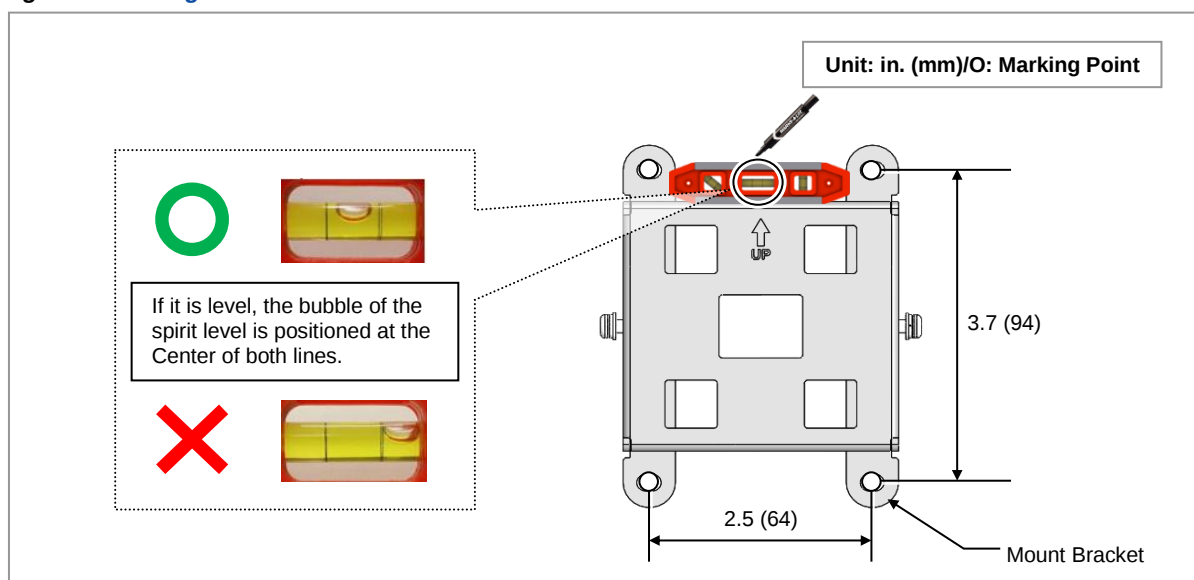
- 2 Check the distance between the location for fixing the RT4429-77A and anchor bolt hole.

Figure 8. RT4429-77A Marking Dimension



- 3 Place a mount bracket on the fixing location, Check the level status using a level and adjust the level of mount bracket.
- 4 If the level status is normal, mark the anchor bolt holes on a wall (or ceiling).

Figure 9. Marking





While fixing the wall mount bracket front, you must perform level test for the bracket, as only small adjustments can be made after installation. (Only wall type)

Drilling and Anchoring

This section provides information about drilling and anchoring for fixing the RT4429-77A.

Prerequisites

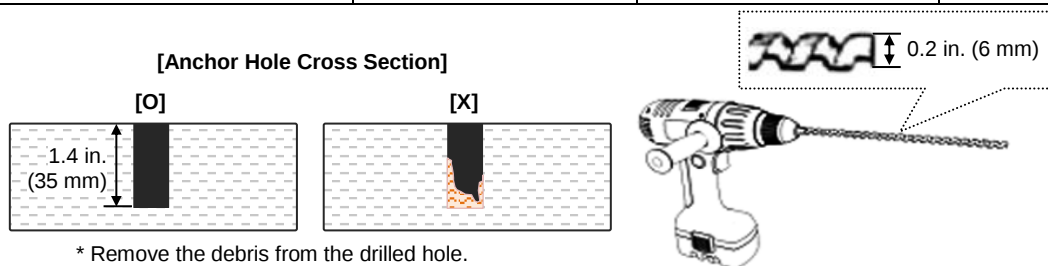
Before proceeding with the drilling and anchoring process, ensure that the items described in the following table are available.

Table 4. Parts and Tools for Drilling and Anchoring

Category	Description	
Parts	M6 × L30 Plastic Anchor	4 EA
Working Tools	• Hammer Drill • Concrete Drill Bit (6 mm) • Vacuum Cleaner	

Table 5. Anchor Bolt Drill Bits and Hole Depth

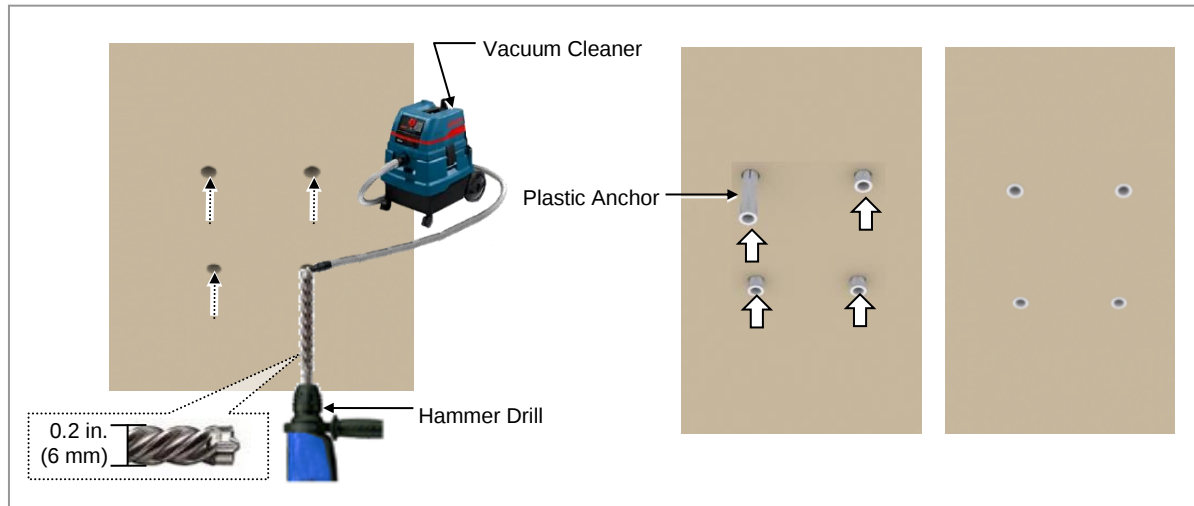
Category	Anchor Bolt	Drill Bits	Hole Depth
System (Wall and Ceiling Type)	M6	0.2 in. (6 mm)	1.4 in. (35 mm)



▶ To drill an anchor hole, do the following:

- Drill anchor holes at marked points. Additionally, remove dust from the holes using a cleaner. Fix plastic anchor to the drilled hole.

Figure 10. Drilling Example



Fixing RU-Fixed Mount

► To fix the wall and ceiling type mount bracket, do the following:

- 1 Ensure that the items described in the following table are available:

Table 6. Parts and Tools for Fixing Mount Bracket on the Wall and Ceiling

Category	Description		
Parts	Mount Bracket		1 EA
	Fastener	M4 × L30 (Taptite Screw)	4 EA
Recommended Torque Value	M4 Taptite Screw		13 lbf·in
Working Tools	• Torque Driver (6-22 lbf·in) • Screw Driver Bit ('+', No. 2) • Screw Driver ('+', No. 2)		

- 2 Place the mount bracket along with the fixed plastic anchors and fix it using fasteners.

Figure 11. Fixing Mount Bracket

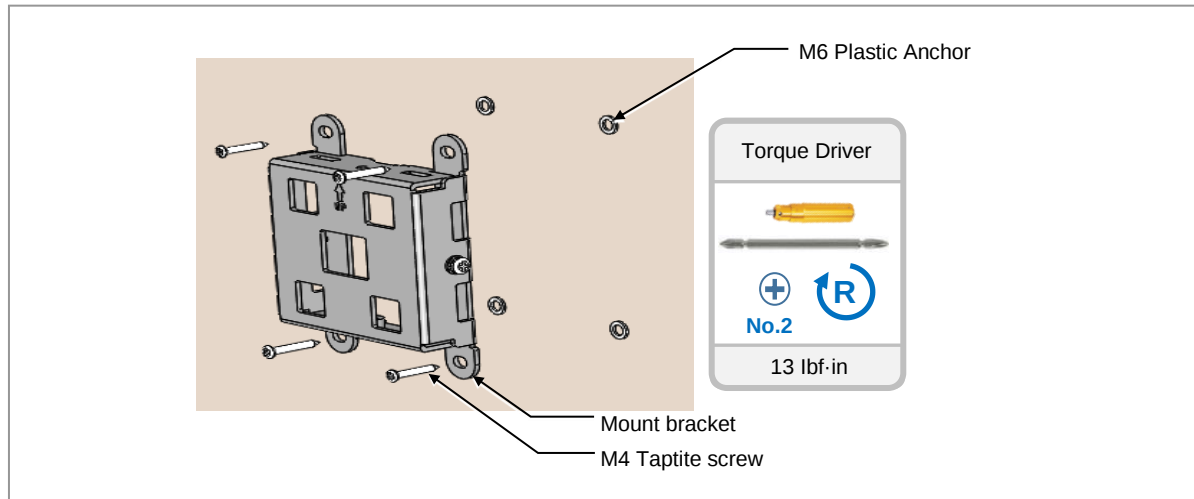
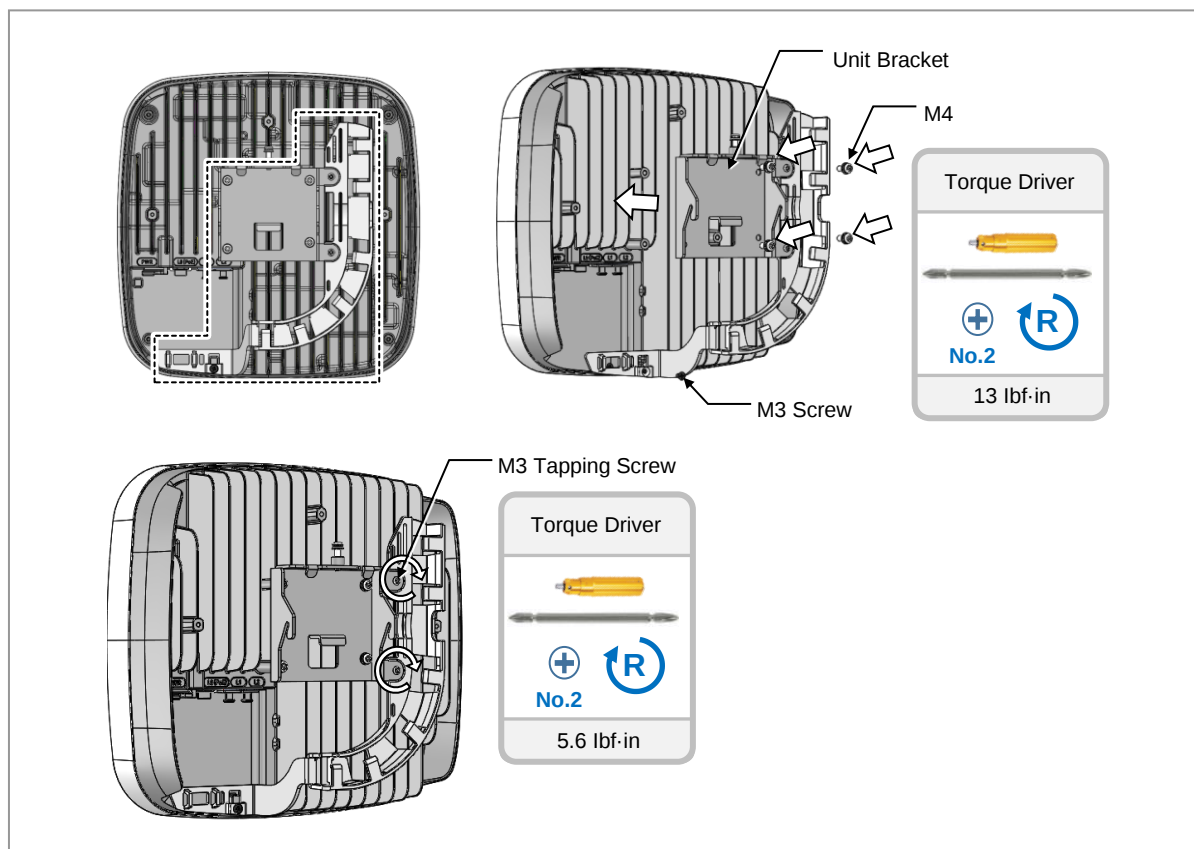


Figure 12. Fixing Unit Bracket Assembly



► To fix the RU, do the following:

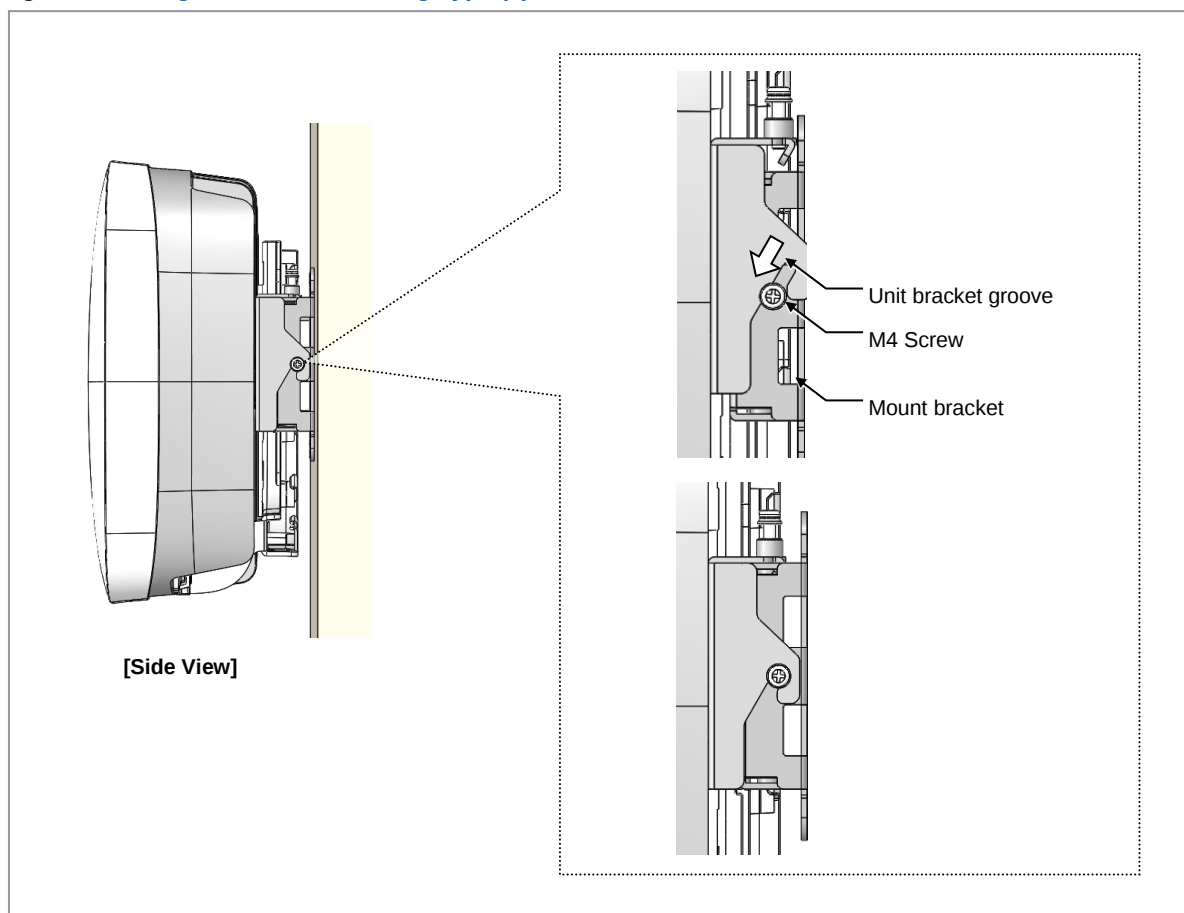
- 1 Ensure that the items described in the following table are available.

Table 7. Parts and Tools for Fixing RU on the Wall and Ceiling

Category	Description	
Parts	M4 × L16 Screw (Attached to the bracket)	2 EA
Recommended Torque Value	M4 Screw	13 lbf·in
Working Tools	• Torque Driver (6-22 lbf·in) • Screw Driver Bit ('+', No. 2) • Screw Driver ('+', No. 2)	

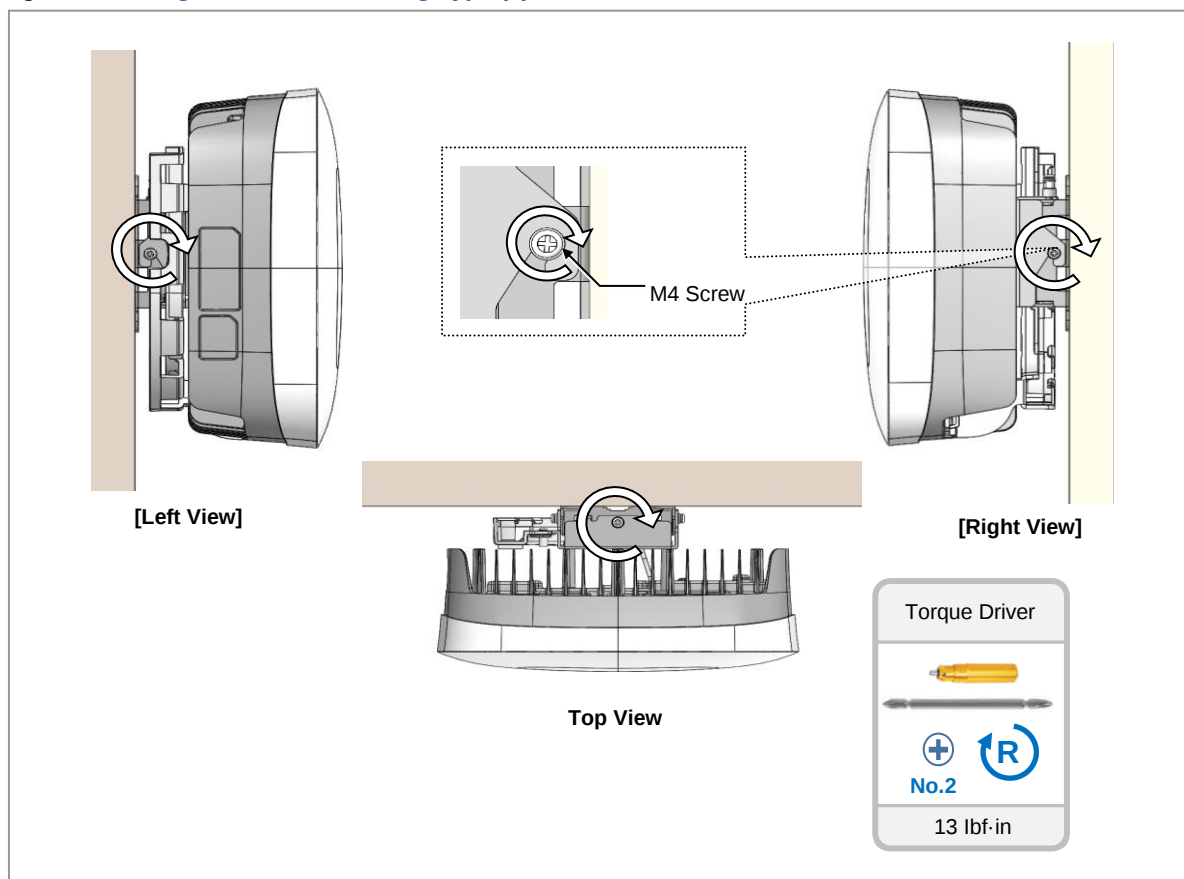
- 2 Place the unit bracket groove on the fasteners of the mount bracket.

Figure 13. Fixing RU_Wall and Ceiling Type (1)



- 3 Fix the three points of fasteners of the bracket.

Figure 14. Fixing RU_Wall and Ceiling Type (2)



Fixing RU-Tilt Mount

► To fix wall and ceiling type tilted mount bracket, do the following:

- 1 Ensure that the items described in the following table are available:

Table 8. Parts and Tools for Fixing Mount Bracket on the Wall and Ceiling

Category	Description		
Parts	Tilted Mount Bracket		1 EA
	Fastener	M4 × L30 (Taptite Screw)	4 EA
Recommended Torque Value	M4 Taptite Screw		13 lbf·in
Working Tools	• Torque Driver (6-22 lbf·in) • Screw Driver Bit ('+', No. 2) • Screw Driver ('+', No. 2)		

- 2 Place the tilted mount bracket along with the fixed plastic anchors and fix it using fasteners.

Figure 15. Fixing Tilted Mount Bracket

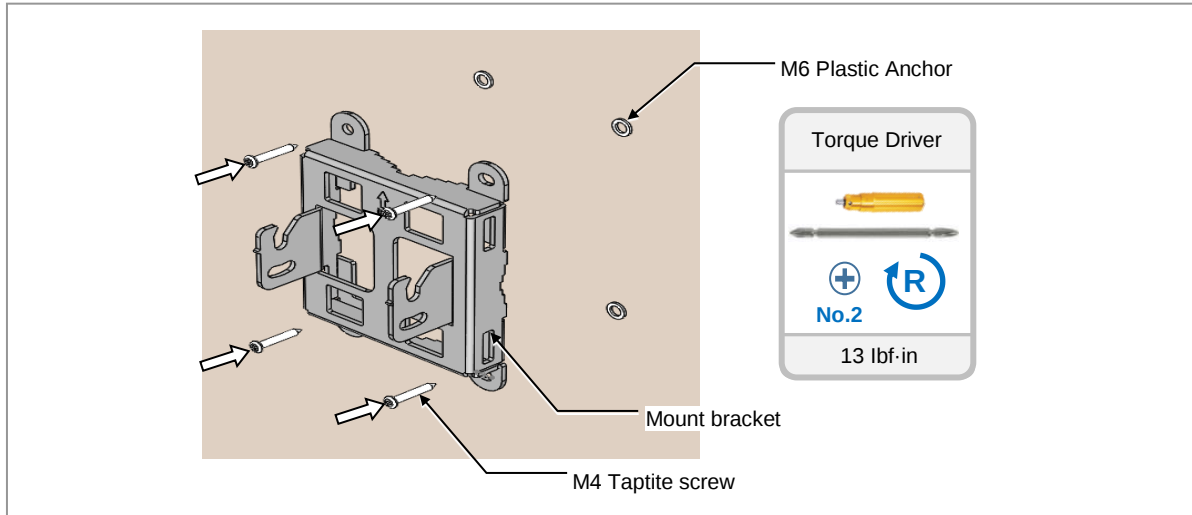
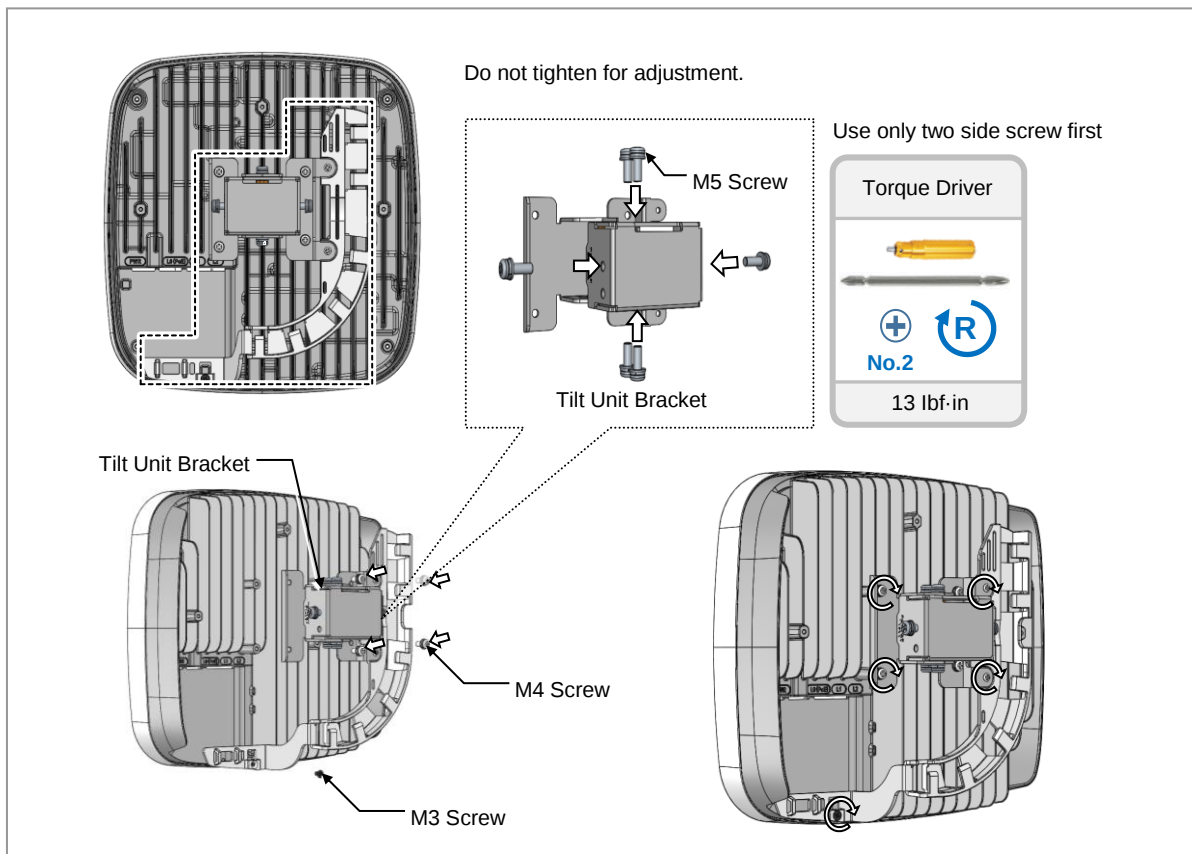


Figure 16. Fixing Unit Bracket Assembly



► To fix the RU, do the following:

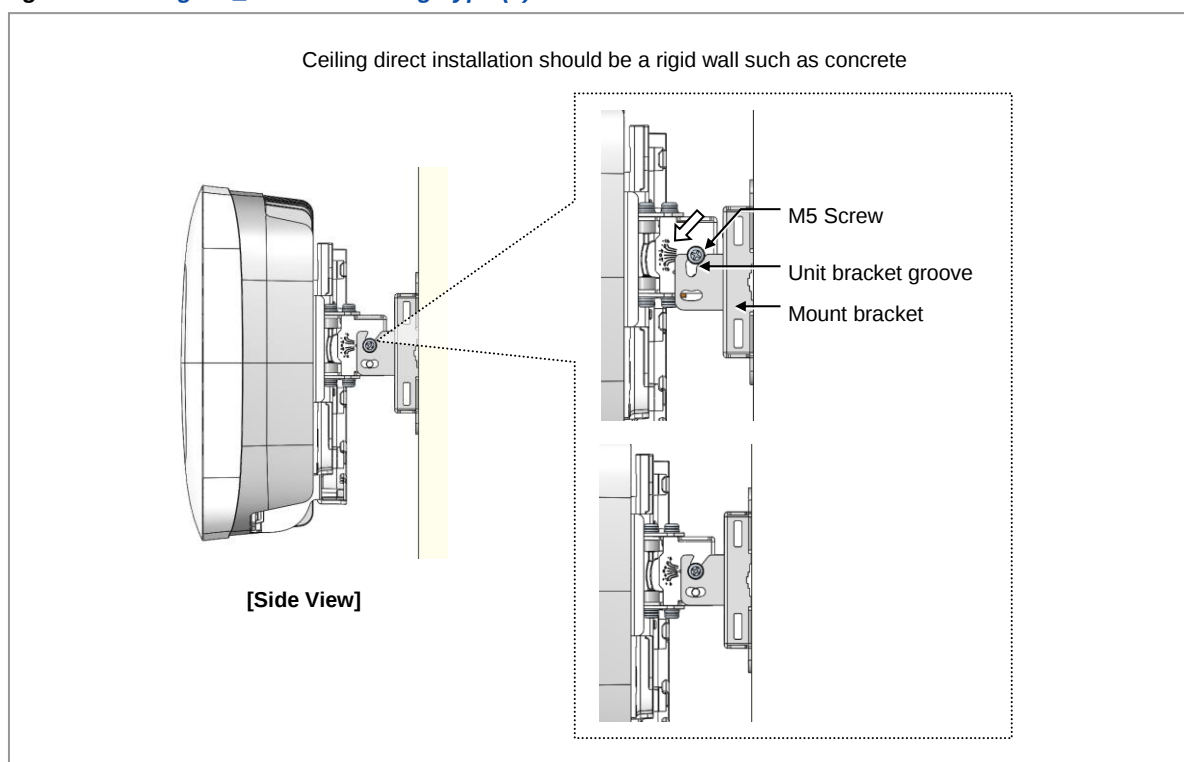
- 1 Ensure that the items described in the following table are available.

Table 9. Parts and Tools for Fixing RU on the Wall and Ceiling

Category	Description	
Parts	M5 × L14 Screw (Attached to the bracket)	8 EA
Recommended Torque Value	M5 Screw	13 lbf·in
Working Tools	• Torque Driver (6-22 lbf·in) • Screw Driver Bit ('+', No. 2) • Screw Driver ('+', No. 2)	

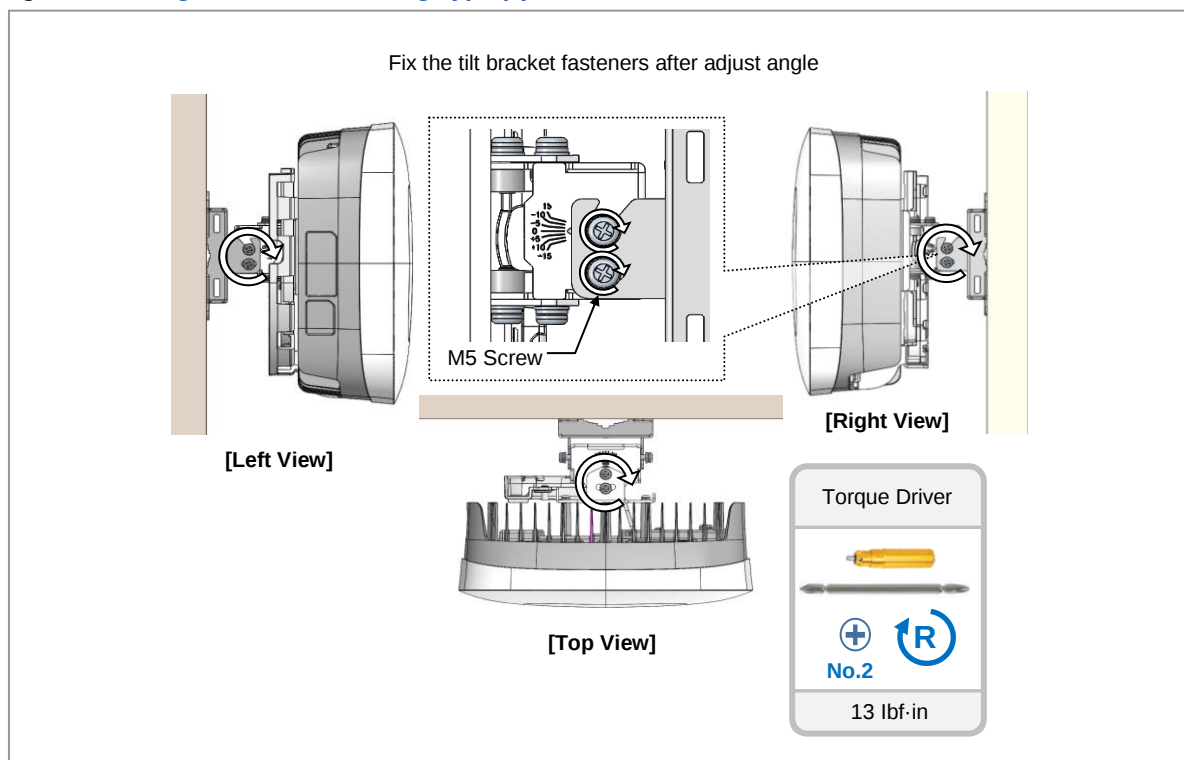
- 2 Place the tilted unit bracket groove on the fasteners of the tilted mount bracket.

Figure 17. Fixing RU_Wall and Ceiling Type (1)



- 3 Fix the three points of fasteners of the bracket.

Figure 18. Fixing RU_Wall and Ceiling Type (2)



Fixing Pole Type

This section describes the procedures for a pole type installation.

Fixing RU-Fixed Mount

► To fix cosmetic cover, do the following:

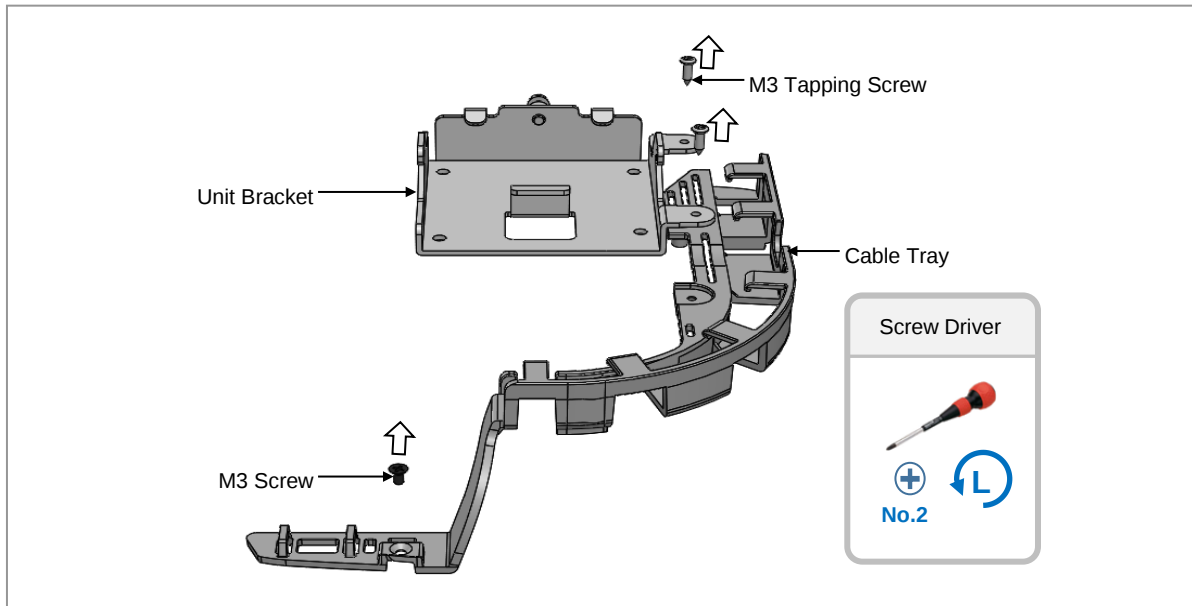
- 1 Ensure that the items described in the following table are available.

Table 10. Parts and Tools for Fixing Cosmetic Cover

Category	Description		
Parts	Cosmetic Cover		1 EA
	Fasteners	M3 × L8 Screw	3 EA
Recommended Torque Value	M3 Screw		5.6 lbf·in
	M4 Screw		13 lbf·in
Working Tools	• Torque Driver (6-22 lbf·in) • Screw Driver Bit ('+', No. 2) • Screw Driver ('+', No. 2)		

- 2 Remove the cable tray and unit bracket from the unit bracket assembly.

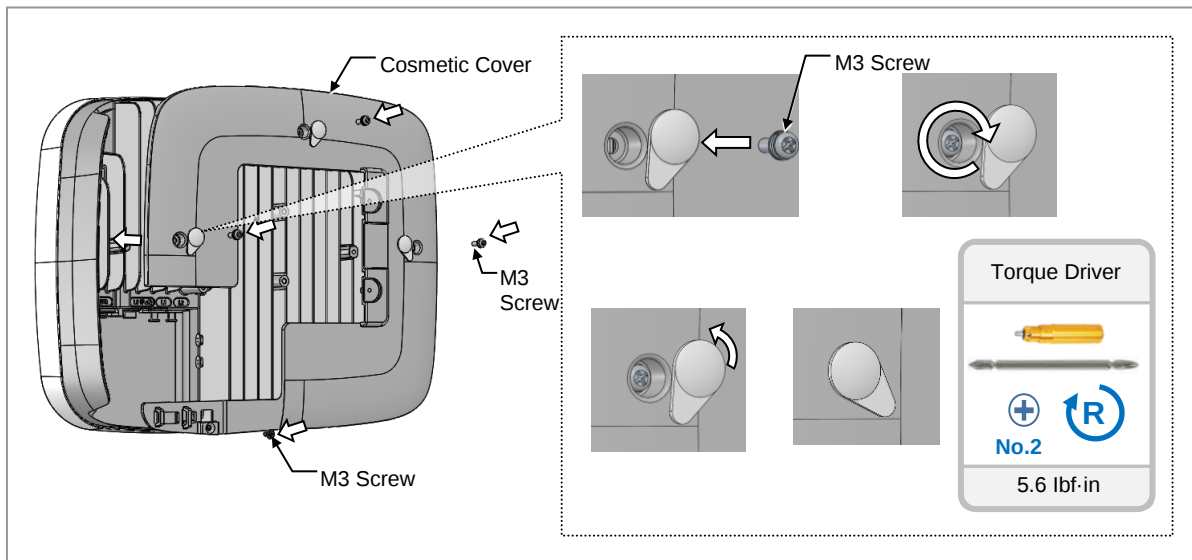
Figure 19. Fixed Mount-Cosmetic Cover Assembly (1)



The M3 screws should be reassembled. Be careful not to lose them.

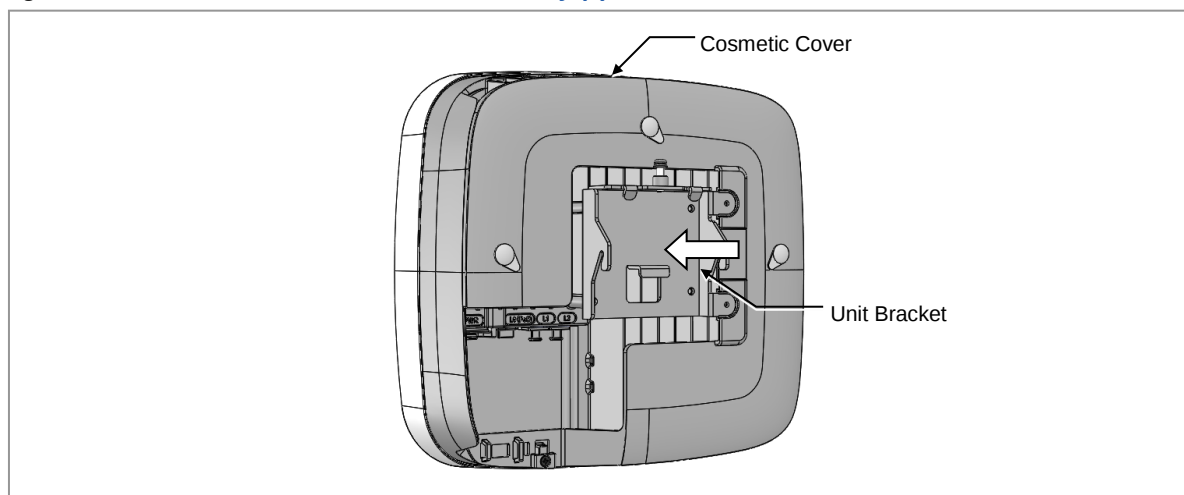
- 3 Fix the cosmetic cover using fasteners.

Figure 20. Fixed Mount-Cosmetic Cover Assembly (2)



- 4 Place the unit bracket on the RU.

Figure 21. Fixed Mount-Cosmetic Cover Assembly (3)



- 5 Fix the unit bracket using fasteners.

▶ To fix mount bracket (Pole Type), do the following:

- 1 Ensure that the items described in the following table are available.

Table 11. Parts and Tools for Fixing Mount Bracket on the Pole Type

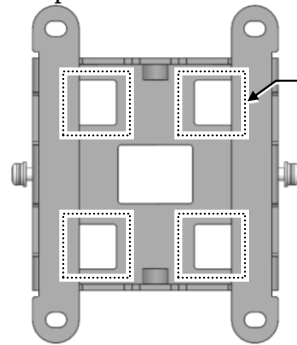
Category	Description		
Parts	Mount Bracket		1 EA
	Fasteners	Steel band	2 EA
Recommended Torque Value	Steel band fixing hex. bolt		70 lbf·in
Working Tools	• Torque Wrench (20-90 lbf·in) • Torque Wrench Spanner Head (Hex. Head: 8 mm) • Spanner (Hex. Head: 8 mm)		



The standard of the pole on which the mount bracket can be attached using steel bands is 32A (42.7 mm/1.68 inch)-100A (114.3 mm/4.5 inch).



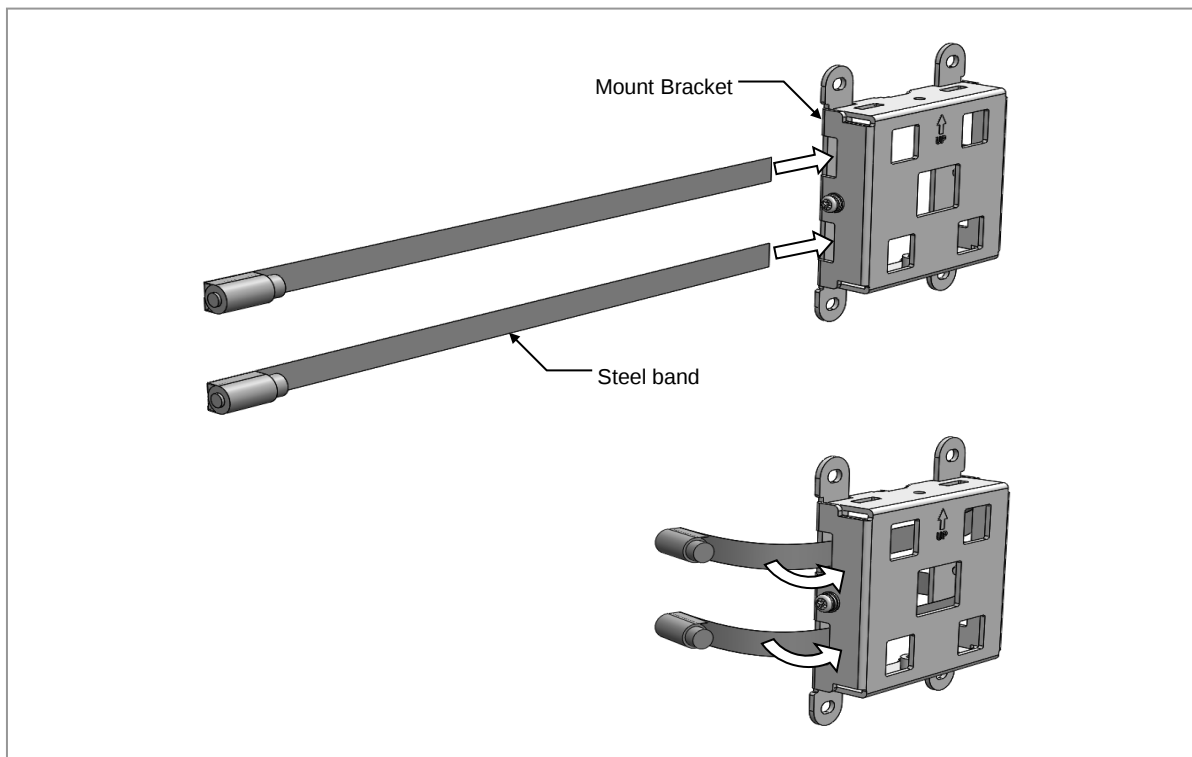
If installed on a pole smaller than 32A (42.7 mm), a small steel band suitable for the pole should be used.



If a small steel band is used, ensure to use the corresponding hole.

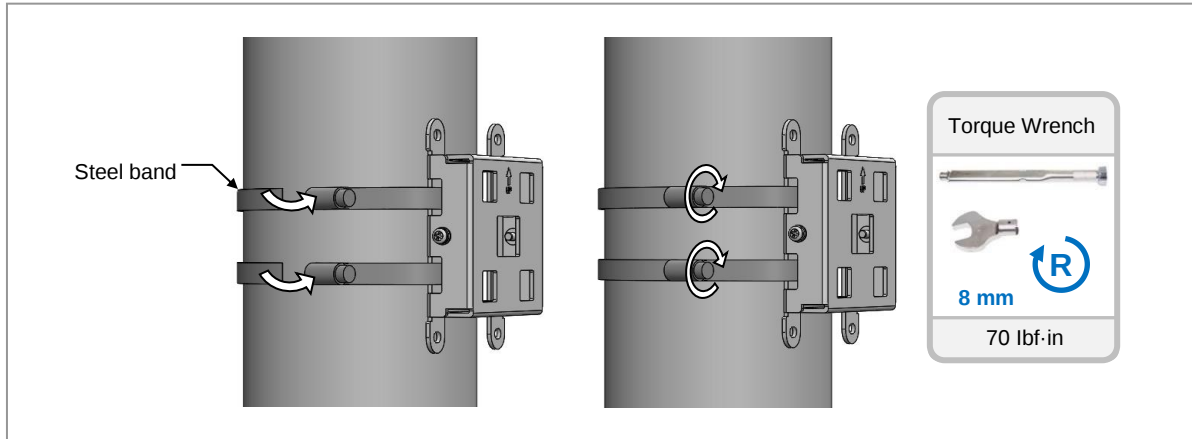
- 2 Pass the steel band through the fixing hole of the mount bracket.

Figure 22. Fixing Mount Bracket on the Pole (1)



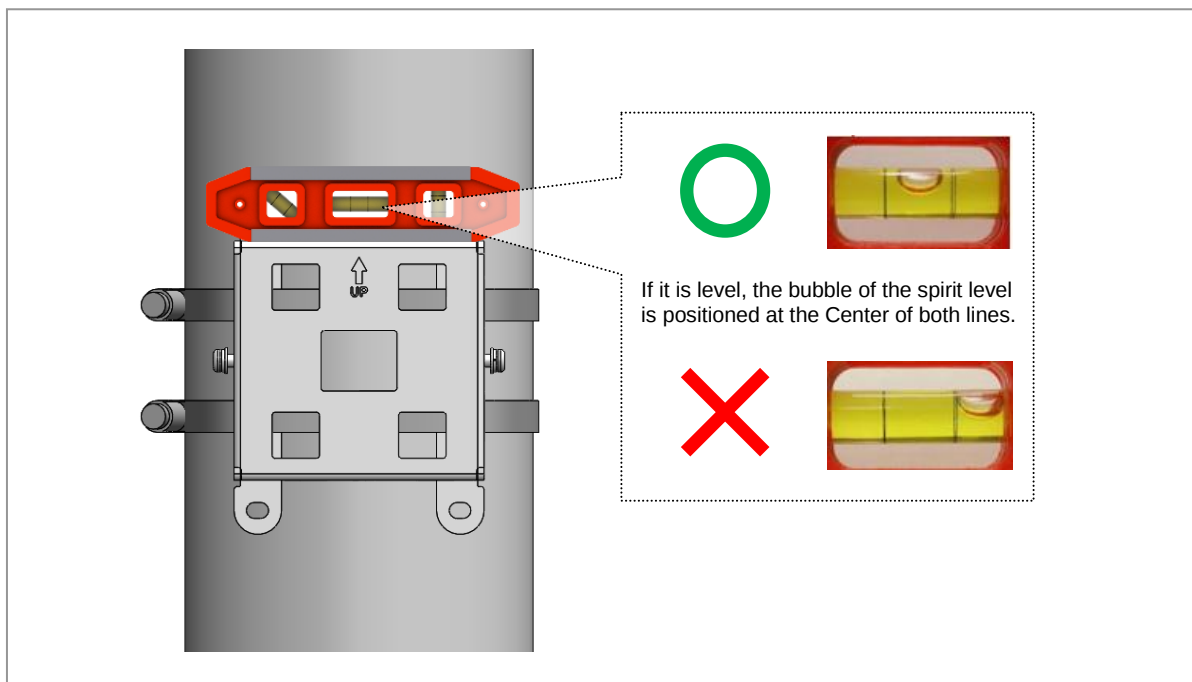
- 3 Fix the mount bracket to the pole using the steel band.

Figure 23. Fixing Mount Bracket on the Pole (2)



- 4 Check the level of mount bracket on the pole and adjust the level.

Figure 24. Fixing Mount Bracket on the Pole (3)



-  While fixing the mount bracket on the pole, check the level of bracket. After finishing the installation, adjust the level precisely.
-  In case of poor leveling, adjust the position of fasteners used to fix the mount bracket.
-  After fixing the steel band, push the remainder of band inside the mount bracket.

▶ To fix Pole Type RU, do the following:

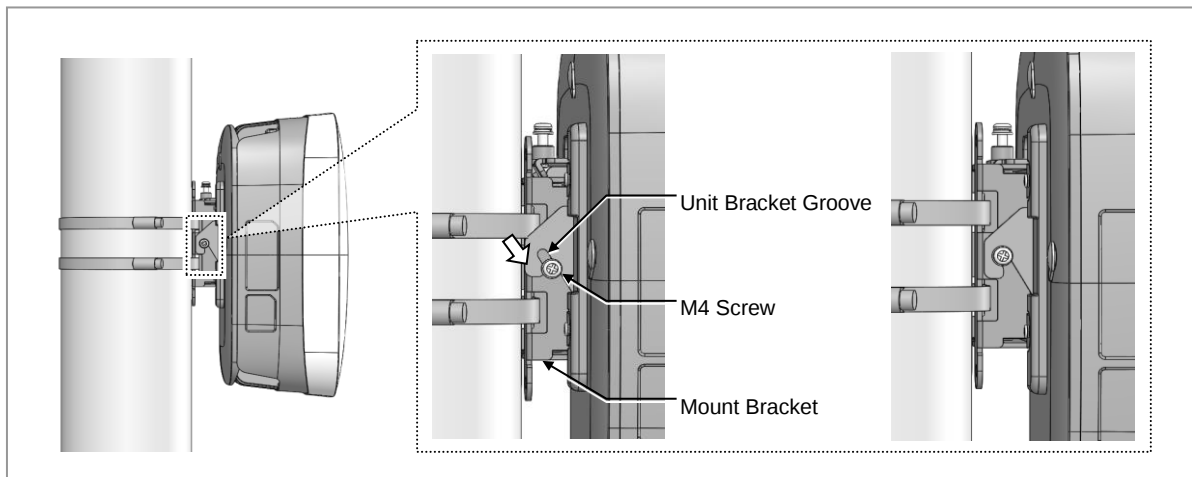
- 1 Ensure that the items described in the following table are available.

Table 12. Parts and Tools for fixing RU on the Pole Type

Category	Description	
Parts	M4 × L16 Screw (Attached to the bracket)	2 EA
Recommended Torque Value	M4 Screw	13 lbf·in
Working Tools	- Torque Driver (6-22 lbf·in) - Screw Driver Bit ('+', No. 2) - Screw Driver ('+', No. 2)	

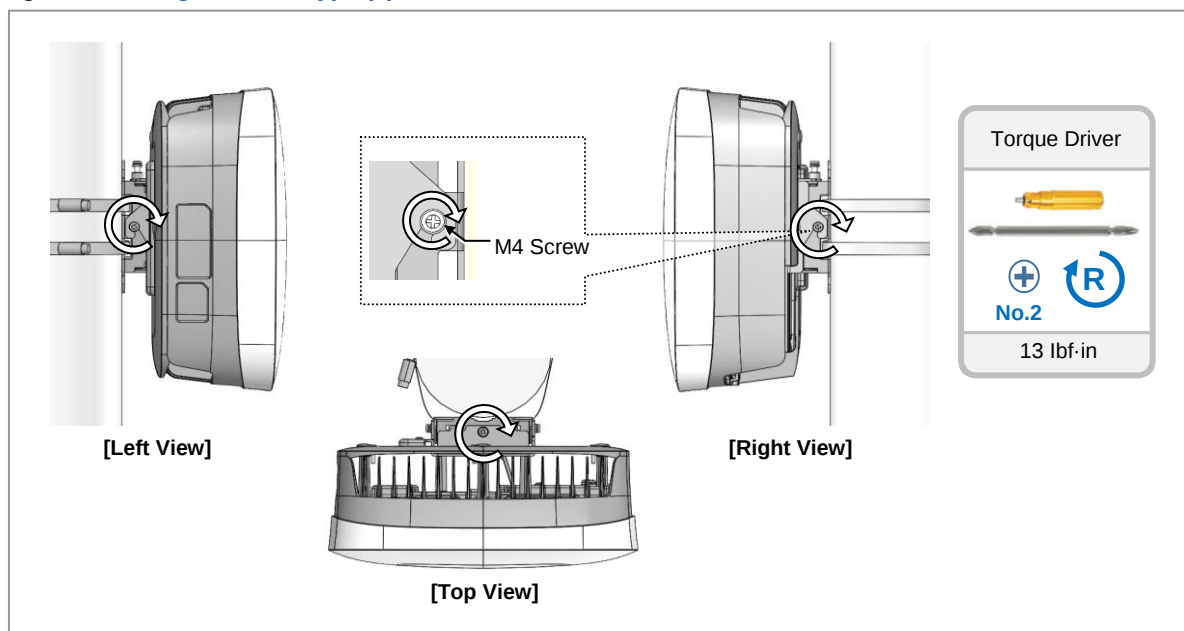
- 2 Place the unit bracket groove on the fasteners of the mount bracket.

Figure 25. Fixing RU_Pole Type (1)



- 3 Fix the three points of fasteners of the bracket.

Figure 26. Fixing RU_Pole Type (2)



Fixing RU-Tilted Mount

► To fix cosmetic cover, do the following:

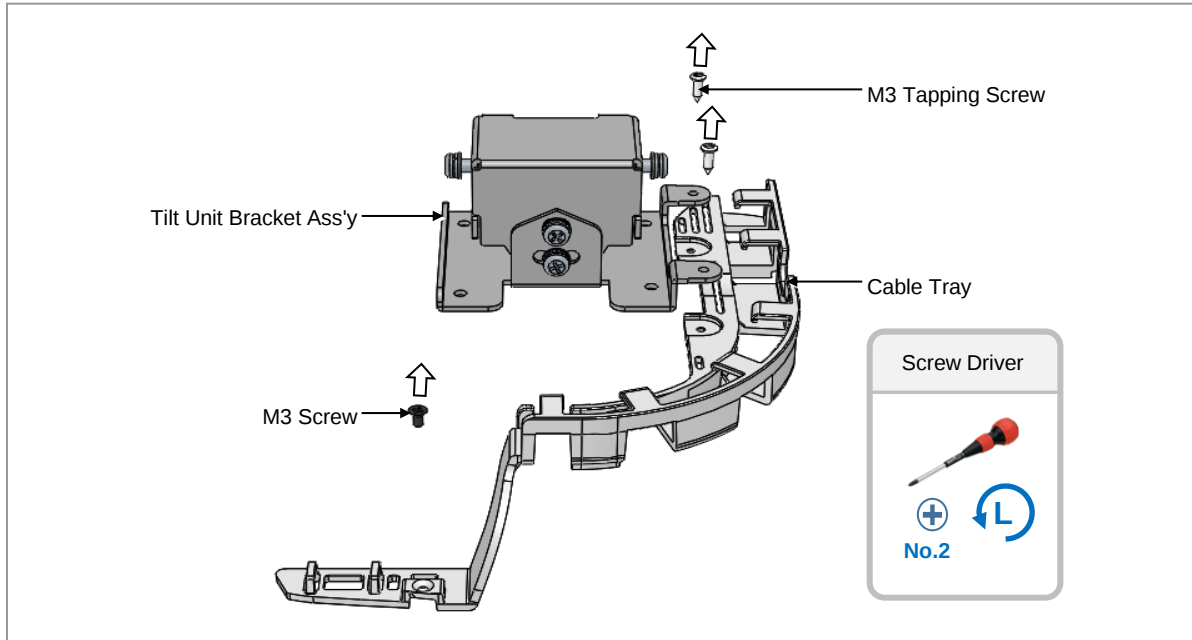
- 1 Ensure that the items described in the following table are available:

Table 13. Parts and Tools for Fixing Cosmetic Cover

Category	Description		
Parts	Cosmetic Cover		1 EA
	Fasteners	M3 × L8 Screw	3 EA
Recommended Torque Value	M3 Screw		5.6 lbf·in
	M4 Screw		13 lbf·in
Working Tools	• Torque Driver (6-22 lbf·in) • Screw Driver Bit ('+', No. 2) • Screw Driver ('+', No. 2)		

- 2 Remove the cable tray and unit bracket from the tilted unit bracket assembly.

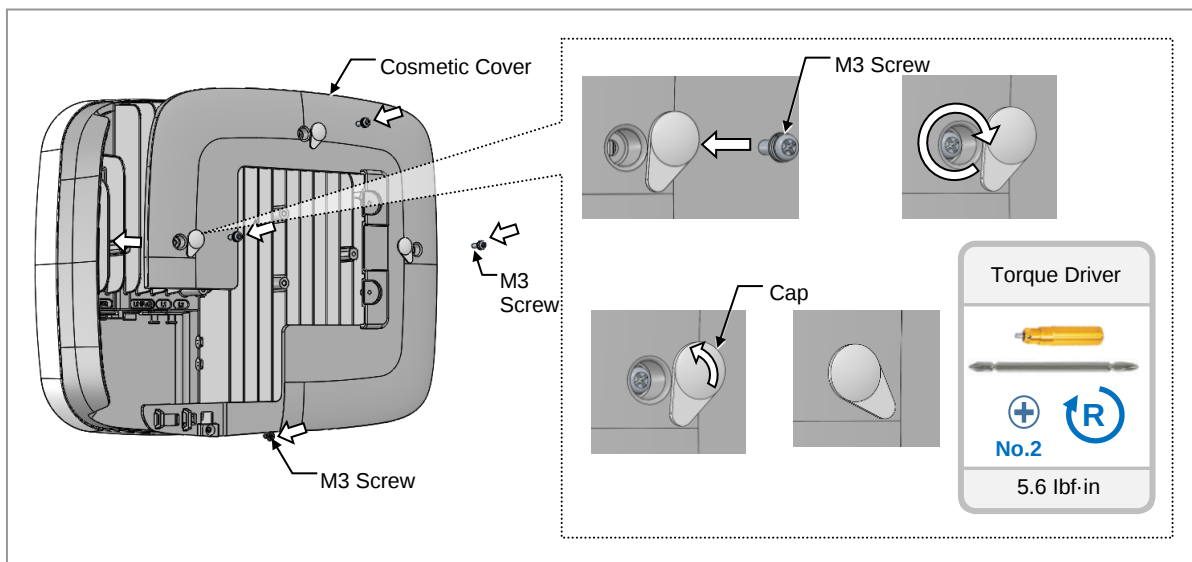
Figure 27. Tilted Mount-Cosmetic Cover Assembly (1)



The M3 screws should be reassembled. Be careful not to lose them.

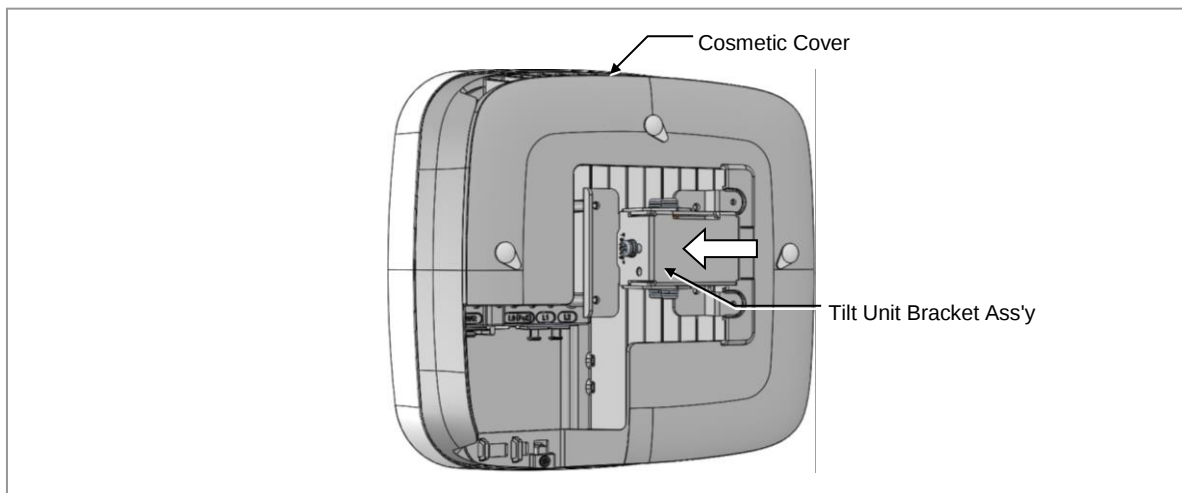
3 Fix the cosmetic cover using fasteners.

Figure 28. Tilted Mount-Cosmetic Cover Assembly (2)



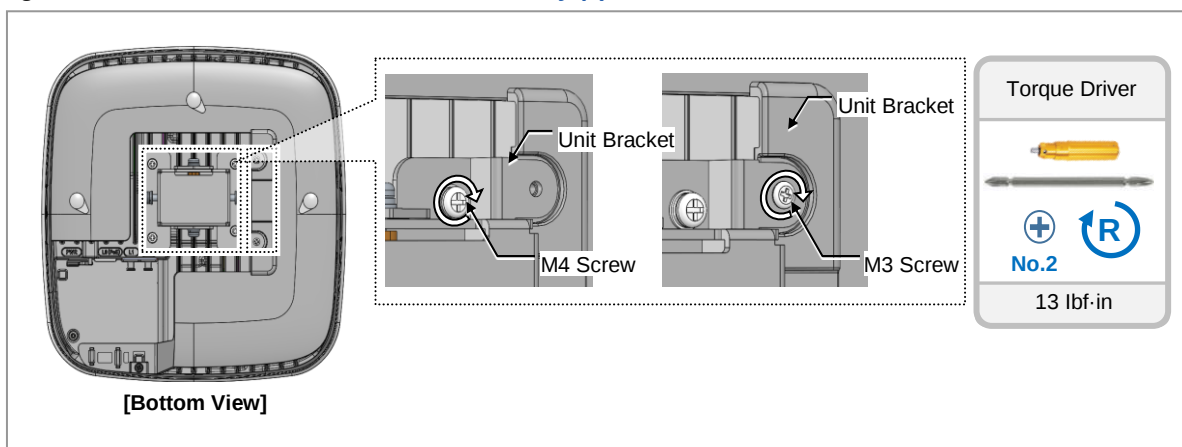
4 Place the unit bracket on the RU.

Figure 29. Tilted Mount-Cosmetic Cover Assembly (3)



- 5 Fix the unit bracket using fasteners.

Figure 30. Tilted Mount-Cosmetic Cover Assembly (4)



► To fix tilted mount bracket (Pole Type), do the following:

- 1 Ensure that the items described in the following table are available.

Table 14. Parts and Tools for Fixing Mount Bracket on the Pole Type

Category	Description		
Parts	Tilted Mount Bracket		1 EA
	Fasteners	Steel band	2 EA
Recommended Torque Value	Steel band fixing hex. bolt		70 lbf·in
Working Tools	• Torque Wrench (20-90 lbf·in) • Torque Wrench Spanner Head (Hex. Head: 8 mm) • Spanner (Hex. Head: 8 mm)		

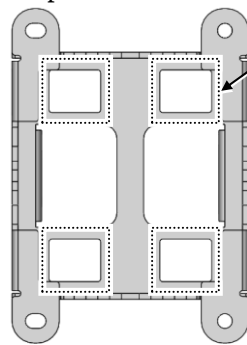


The standard of the pole on which the mount bracket can be attached using steel

bands is 32A (42.7 mm/1.68 inch)-100A (114.3 mm/4.5 inch).



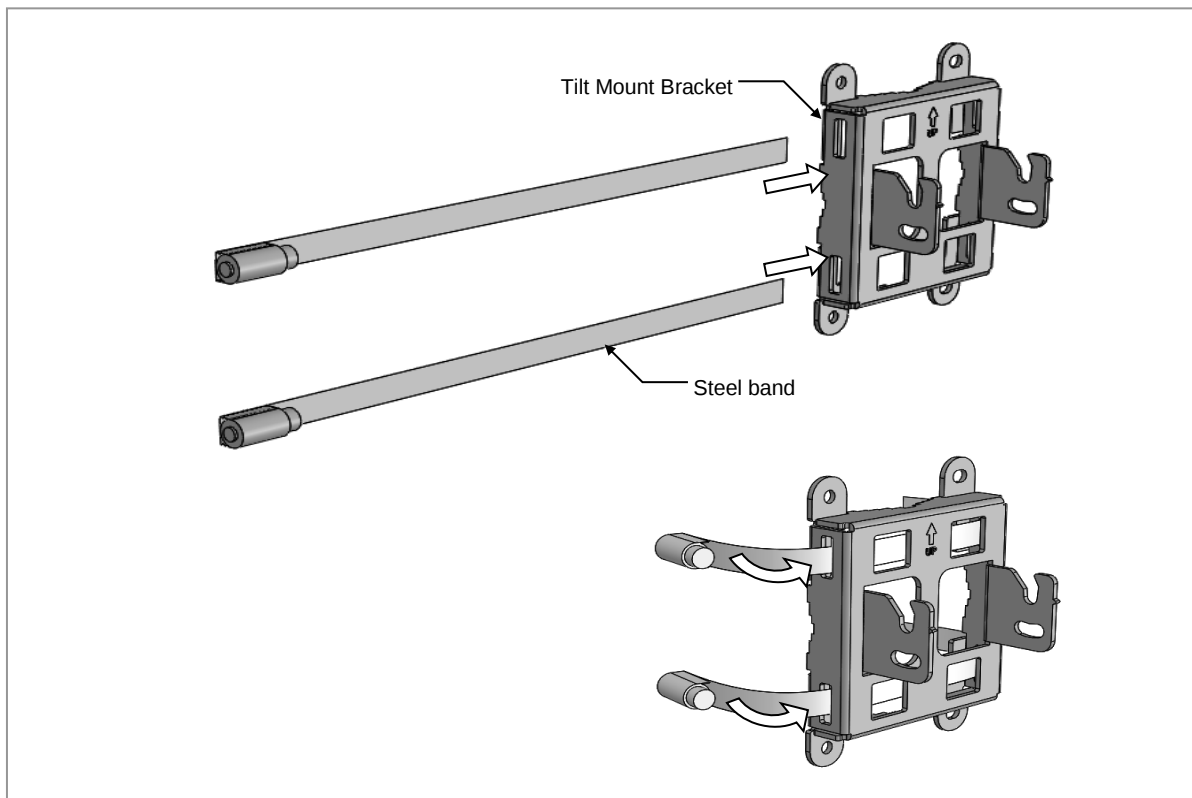
If installed in a pole smaller than 32A (42.7 mm), a small steel band suitable for the pole should be used.



If a small steel band is used, ensure to use the corresponding hole.

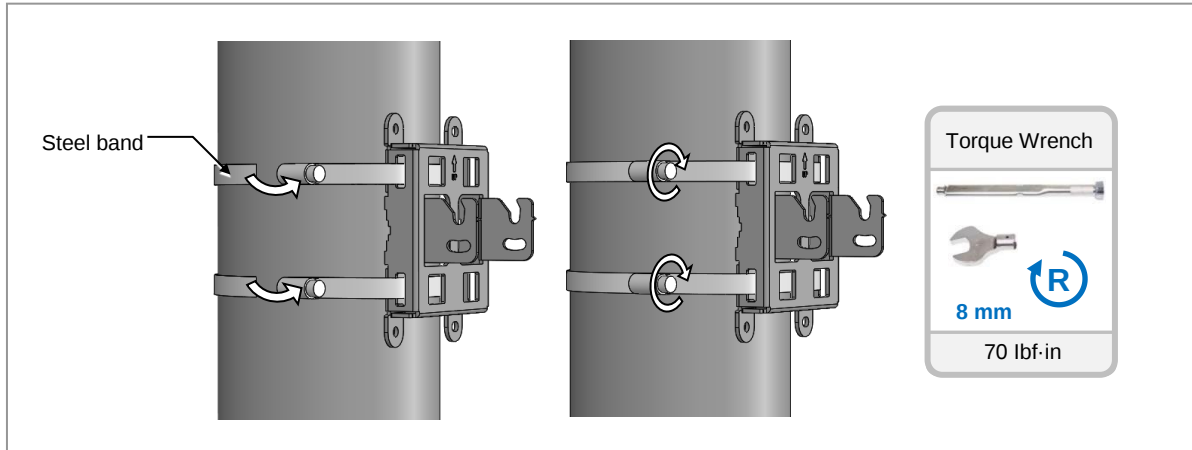
- 2 Pass the steel band through the fixing hole of the tilted mount bracket.

Figure 31. Fixing Mount Bracket on the Pole (1)



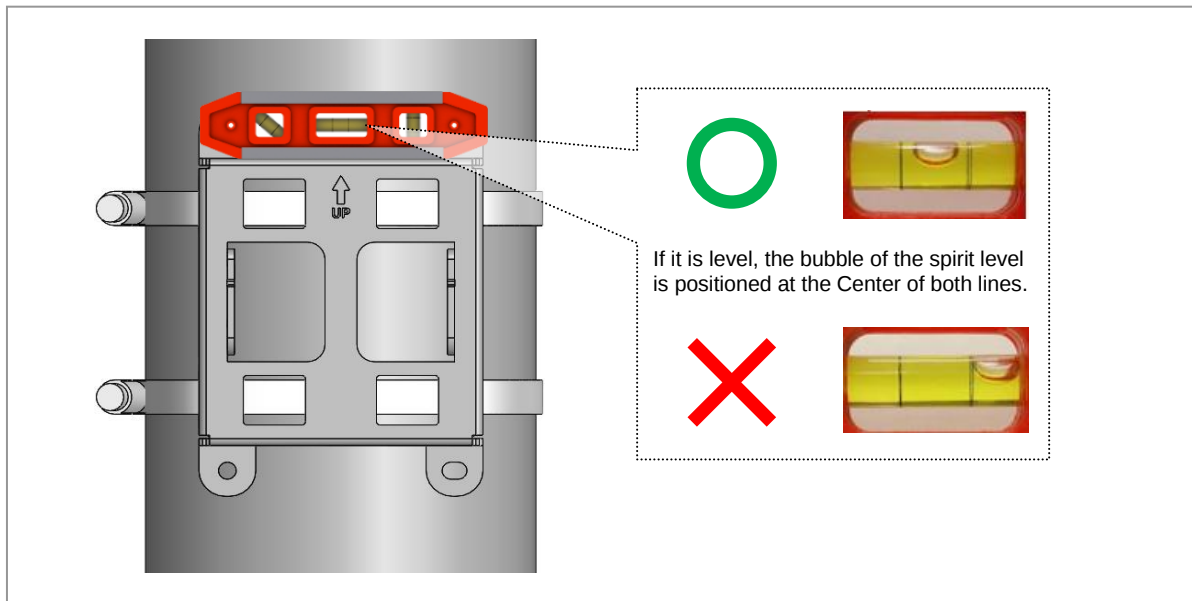
- 3 Fix the tilted mount bracket to the pole using the steel band.

Figure 32. Fixing Mount Bracket on the Pole (2)



- 4 Check the level of mount bracket on the pole and adjust the level.

Figure 33. Fixing Mount Bracket on the Pole (3)



While fixing the mount bracket on the pole, check the level of bracket. After finishing the installation, adjust the level precisely.



In case of poor leveling, adjust the position of fasteners used to fix the mount bracket.



After fixing the steel band, push the remainder of band inside the mount bracket.

▶ To fix Pole Type RU, do the following:

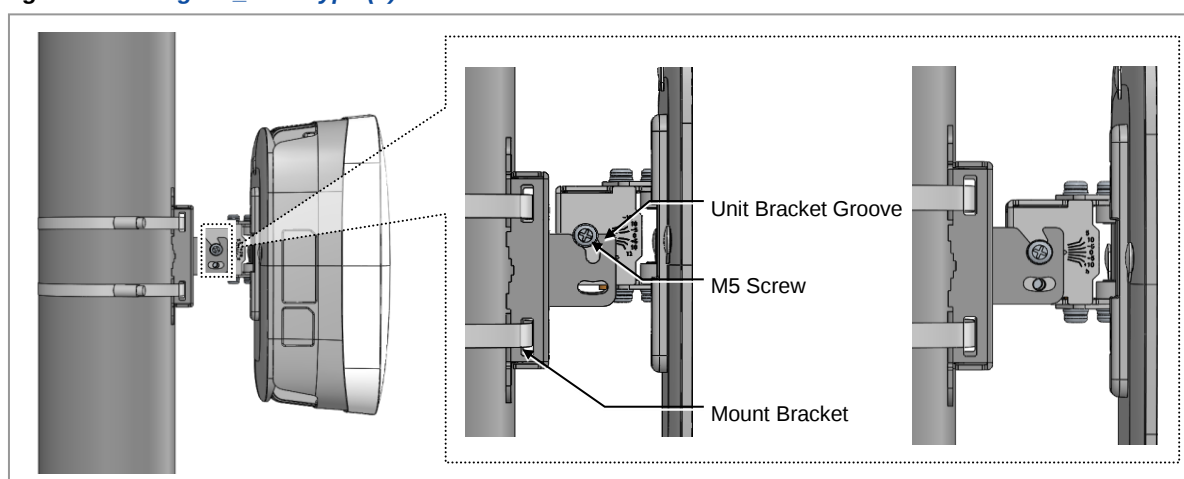
- 1 Ensure that the items described in the following table are available:

Table 15. Parts and Tools for fixing RU on the Pole Type

Category	Description	
Parts	M5 × L14 Screw (Attached to the bracket)	8 EA
Recommended Torque Value	M5 Screw	13 lbf·in
Working Tools	- Torque Driver (6-22 lbf·in) - Screw Driver Bit ('+', No. 2) - Screw Driver ('+', No. 2)	

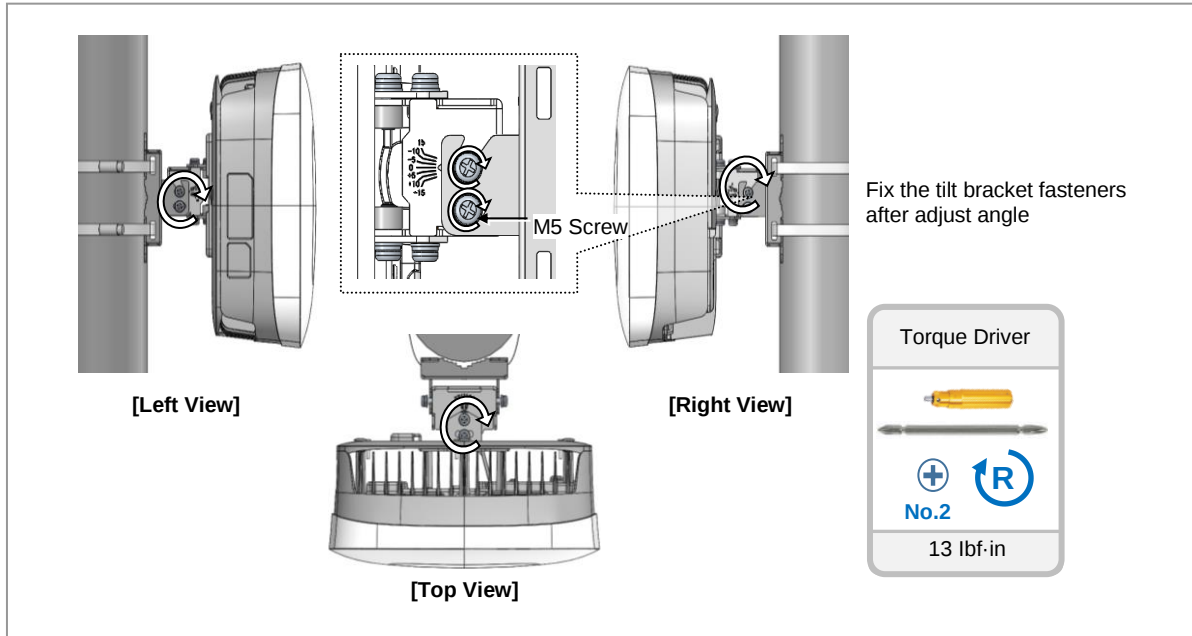
- 2 Place the unit bracket groove on the fasteners of the mount bracket.

Figure 34. Fixing RU_Pole Type (1)



- 3 Fix the three points of fasteners of the bracket.

Figure 35. Fixing RU_Pole Type (2)



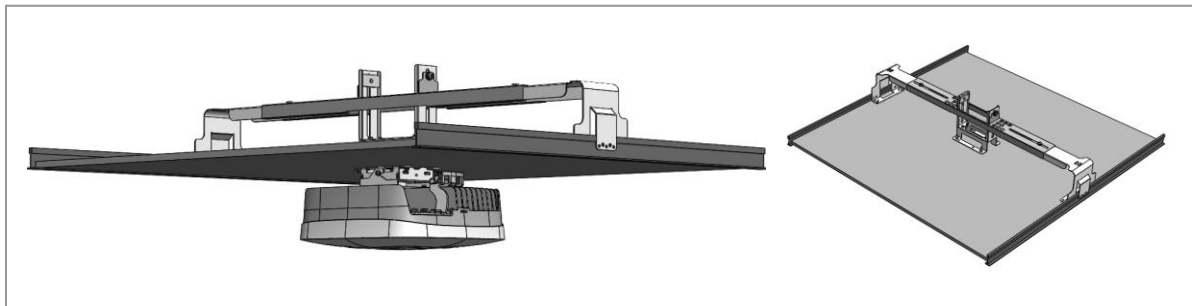
Fixing Ceiling Tile Type

This section describes the procedures for a ceiling tile installation.

There are two ways to install the RU on a ceiling tile, one using a fixed bracket and one using a tilted bracket.

The following figure depicts the installations of the RU on the ceiling tile.

Figure 36. Installing RU on Ceiling Tile



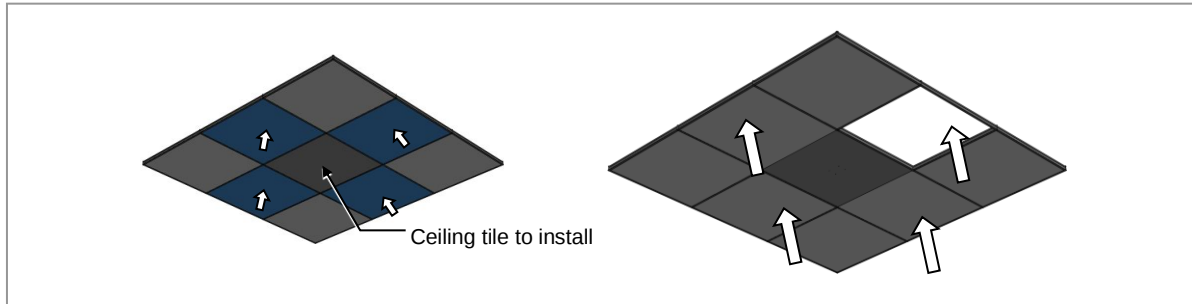
Drilling for Ceiling Tile

This section provides information about drilling and anchoring for fixing the RT4429-77A.

► Before installing the RU, do the following:

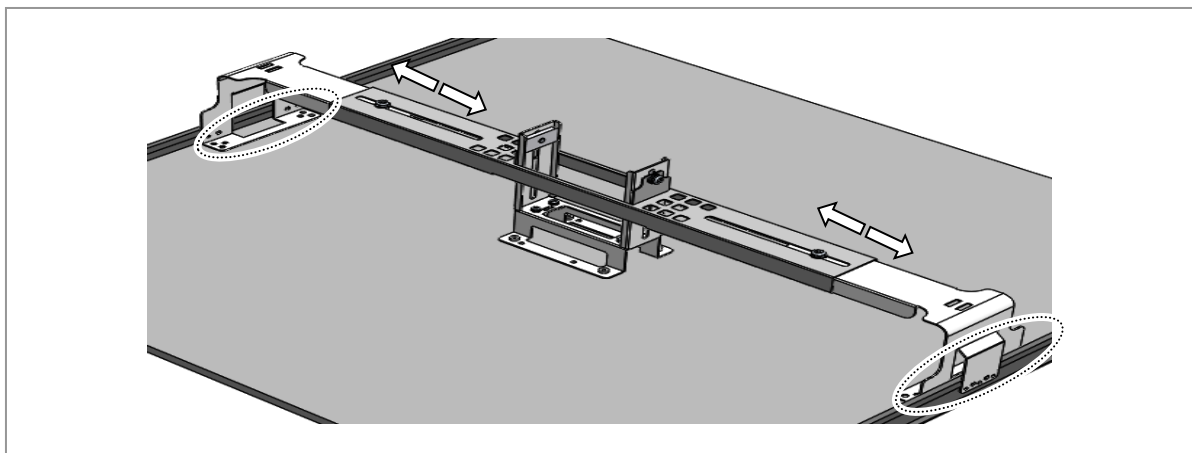
- 1 Open one of the four surrounding locations. Open at least one place.

Figure 37. Ceiling



- 2 Put the Ceiling Mount Kit on the tile and adjust it. (600-765 mm (24"-30") ceiling tile with T(M) Bar)

Figure 38. Ceiling Mount Kit



- 3 Drill anchor holes at marked points.

Figure 39. Drilling anchor holes

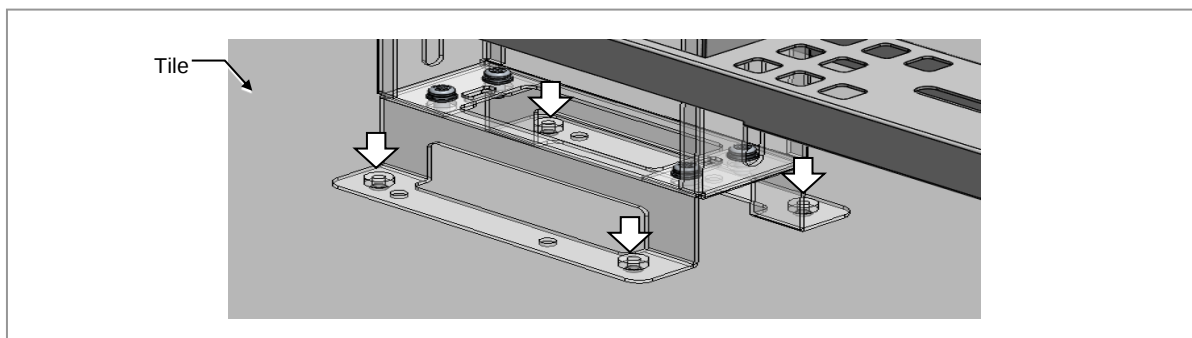
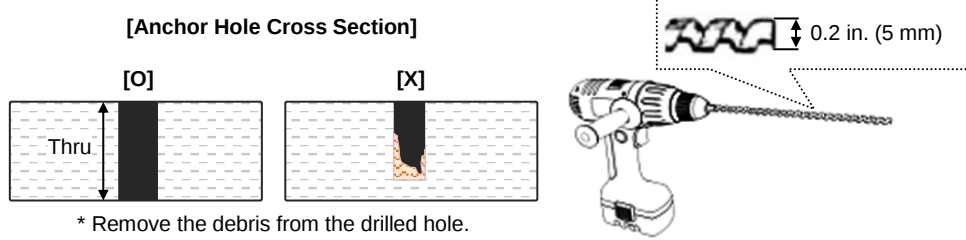


Table 16. Anchor Bolt Drill Bits and Hole Depth

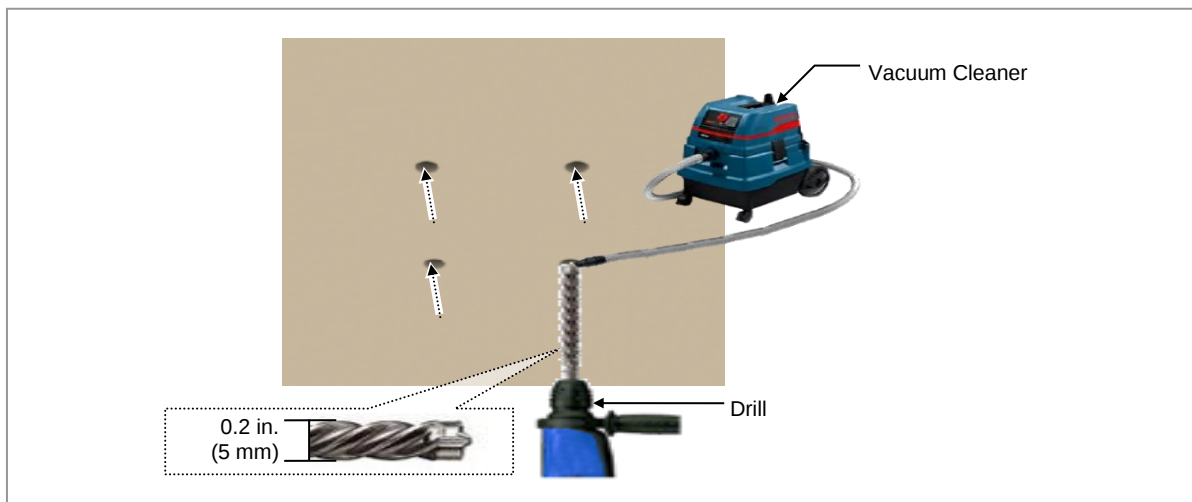
Category	Anchor Bolt	Drill Bits	Hole Depth
System (Ceiling Tile)	M4	0.2 in. (5 mm)	Thru



► To drill an anchor hole, do the following:

- Drill anchor holes at marked points. Additionally, remove dust from the holes using a cleaner. Fix plastic anchor to the drilled hole.

Figure 40. Drilling Example



Fixing Mount Bracket

This section describes the process to the fix mount bracket for ceiling tile.

Prerequisites

Before proceeding with fixing the mount bracket, ensure that the items described in the following table are available:

Table 17. Parts and Tools for Fixing Mount Bracket on the Wall and Ceiling

Category	Description		
Parts	Mount Bracket		1 EA
	Fastener	M4 × L30	4 EA
Recommended Torque Value	M4 Screw		13 lbf·in
Working Tools	• Torque Driver (6-22 lbf·in) • Screw Driver Bit ('+', No. 2) • Screw Driver ('+', No. 2)		

▶ To fix mount bracket _ Ceiling Tile, do the following:

- Place the mount bracket along with the fixed plastic anchors and fix it using fasteners.

Figure 41. Fixing Ceiling Mount Kit Assembly

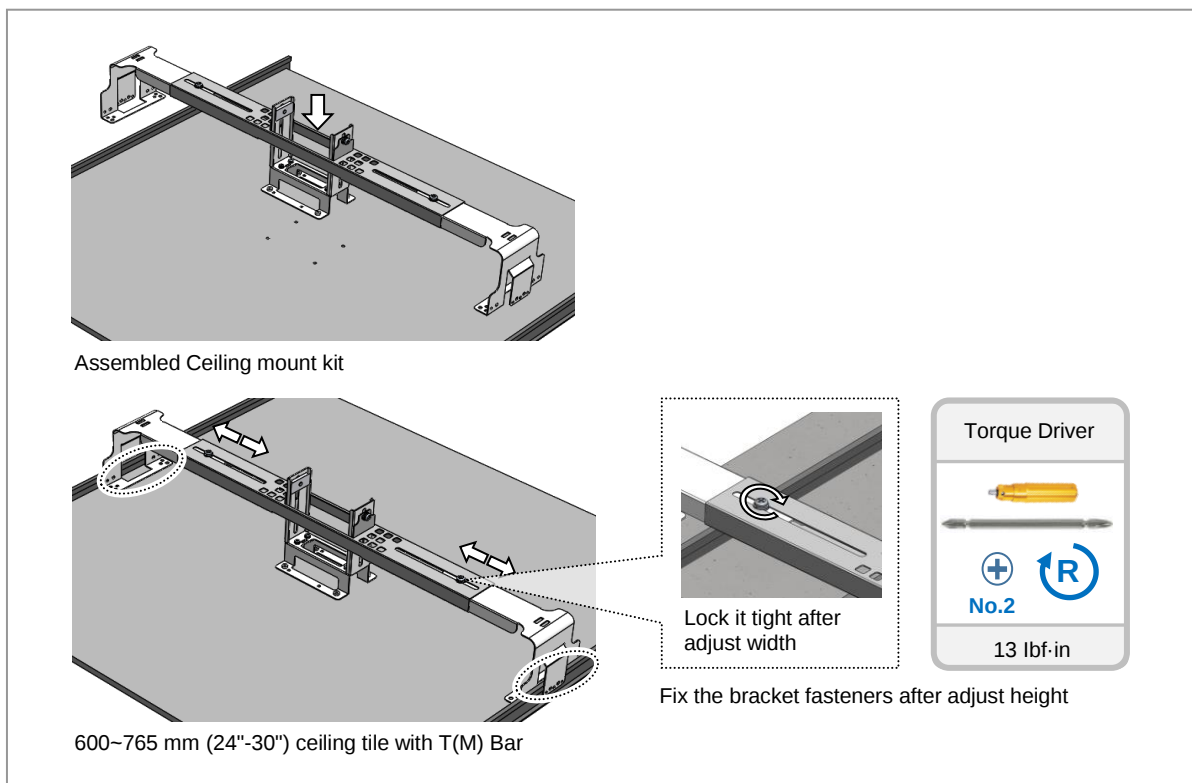


Figure 42. Fixing Fixed Ceiling Mount Bracket Assembly

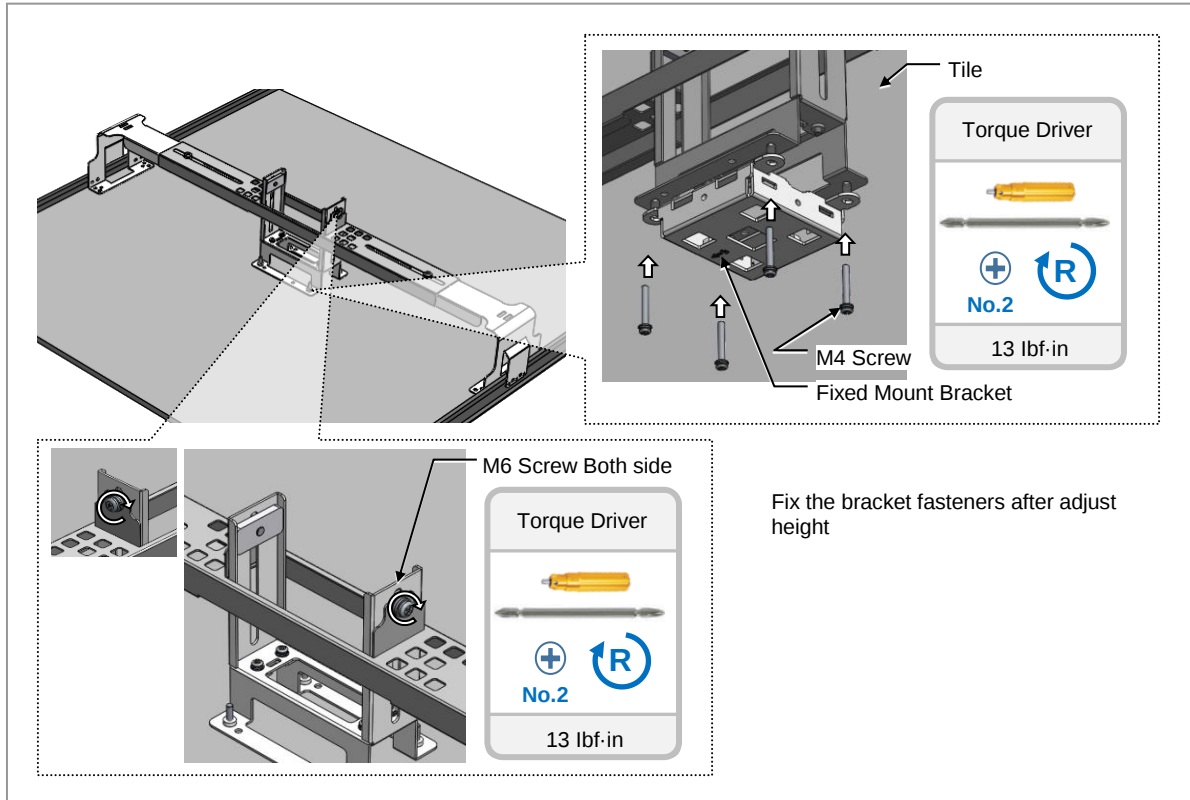
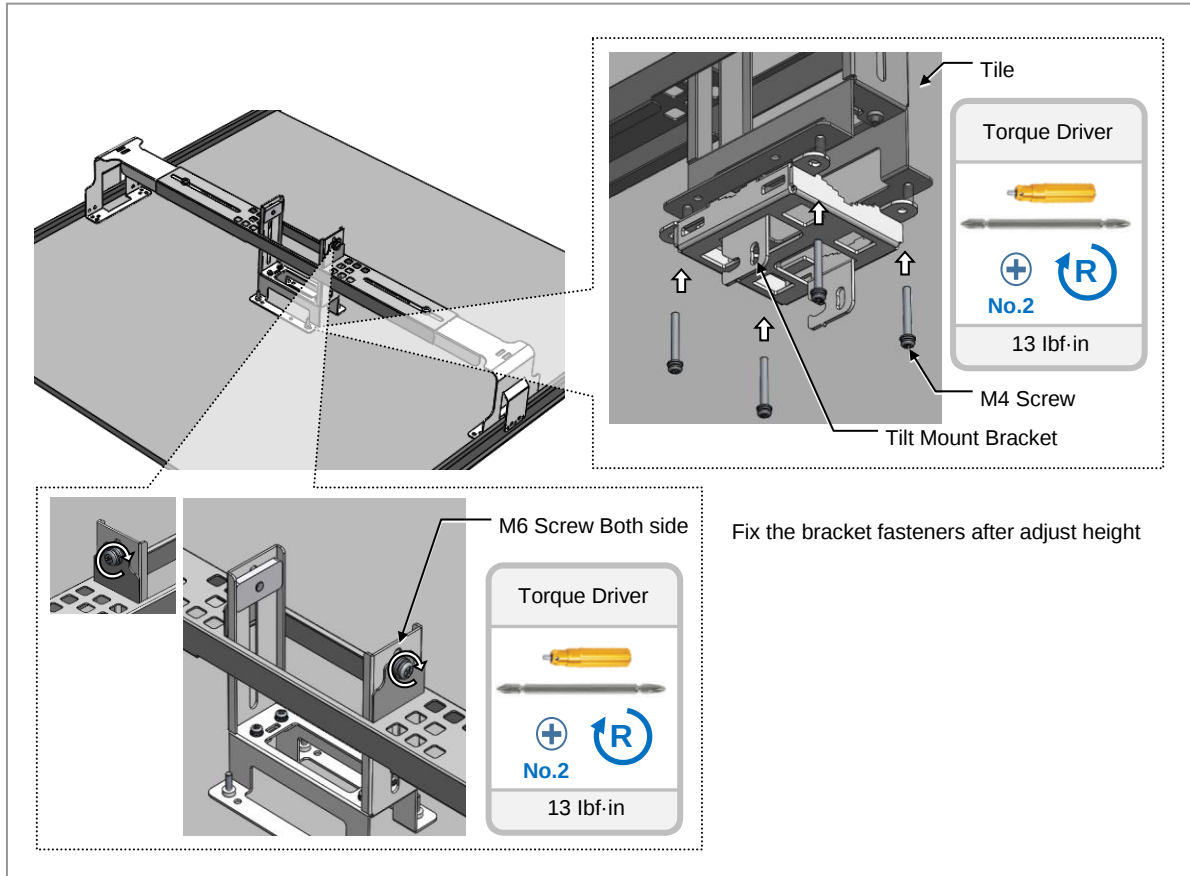


Figure 43. Fixing Tilted Ceiling Mount Bracket Assembly



Fixing RU

This section describes the process to fix the RU on the ceiling tile.

Prerequisites

Before proceeding with fixing the RU, ensure that the items described in the following table are available:

Table 18. Parts and Tools for Fixing RU on the Ceiling Tile

Category	Description	
Parts	M4 × L16 Screw (Attached to the bracket)	2 EA
Recommended Torque Value	M4 Screw	13 lbf·in
Working Tools	• Torque Driver (6-22 lbf·in) • Screw Driver Bit ('+', No. 2) • Screw Driver ('+', No. 2)	

► To fix the RU, do the following:

- 1 Place the unit bracket groove on the fasteners of the mount bracket.
- 2 Fix the points of fasteners of the bracket.

Figure 44. Fixing RU_Ceiling-Fixed Mount Kit

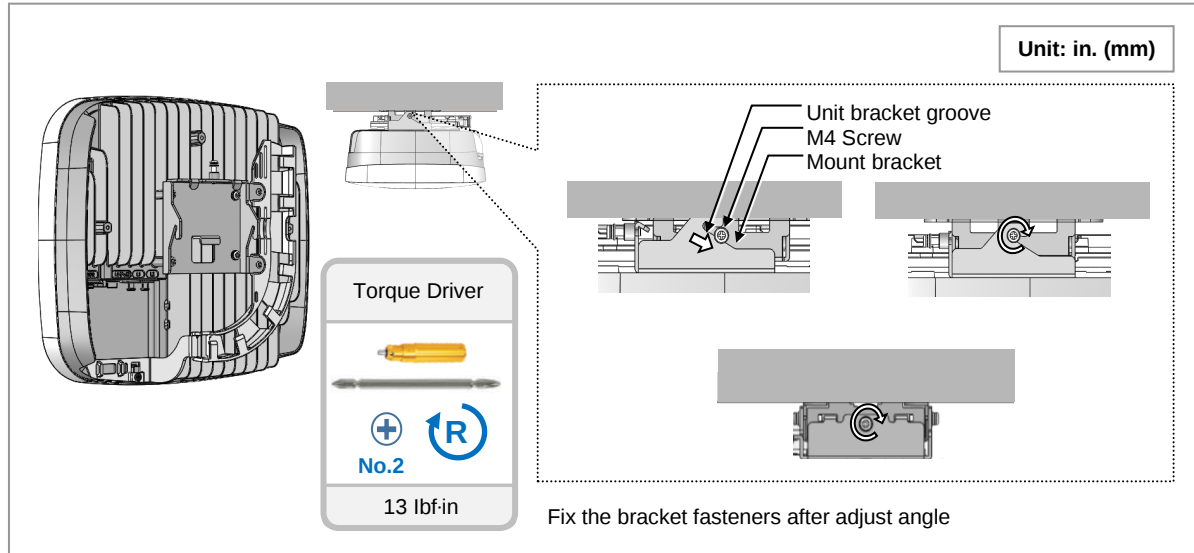
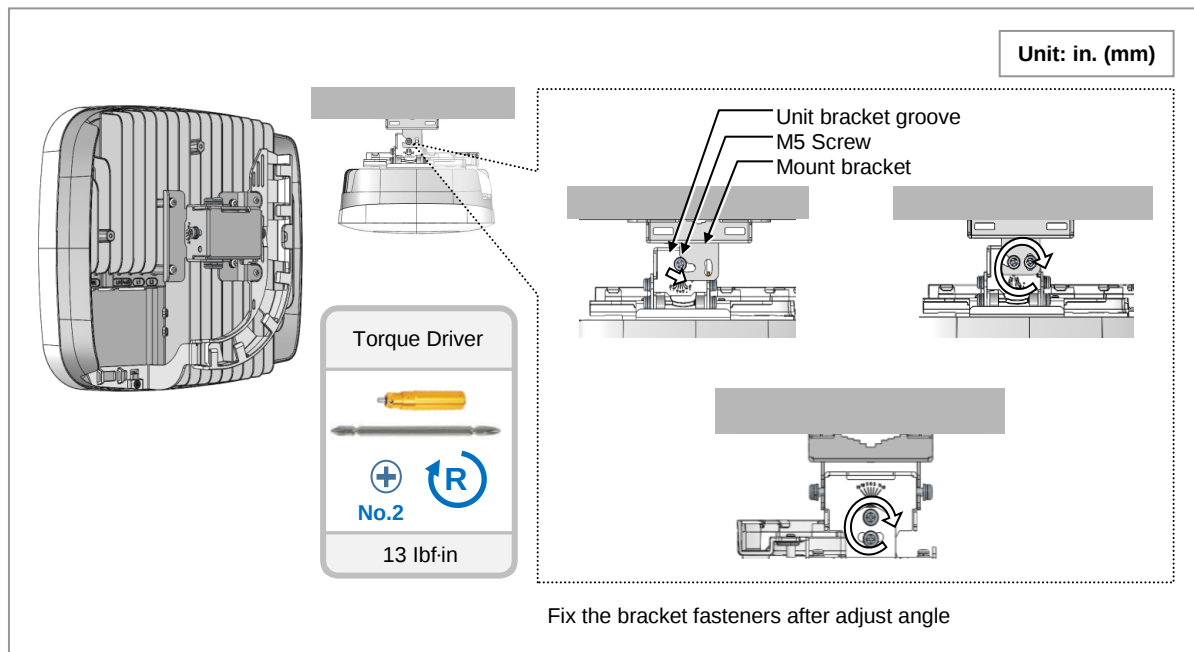


Figure 45. Fixing RU_Ceiling-Tilt Mount Kit



Fixing Ceiling Mount Kit Assembly to Building Structure

This section describes the process to fix the ceiling mount kit assembly to the building structure.

Prerequisites

Before proceeding with fixing the ceiling mount kit assembly, ensure that the items described in the following table are available:

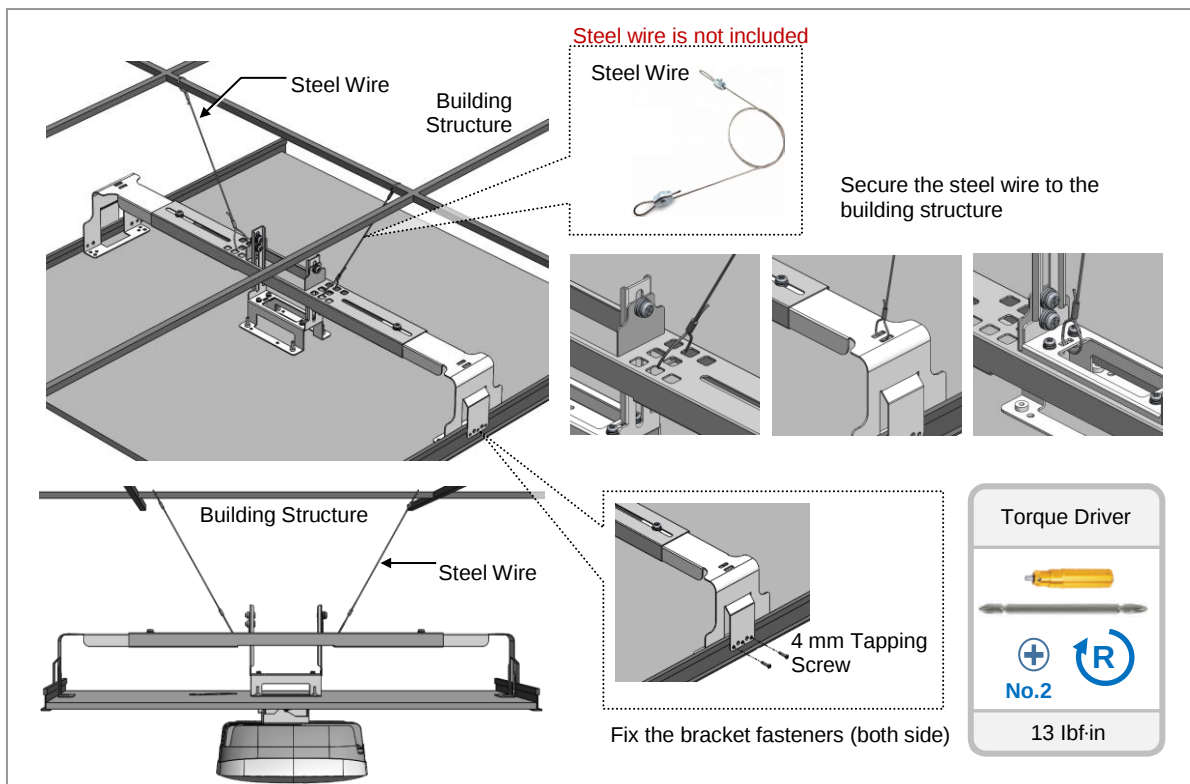
Table 19. Parts and Tools for Fixing Ceiling Mount Kit Assembly to Building Structure

Category	Description	
Parts	M4 × L15 (Taptite Screw)	4 EA
Recommended Torque Value	M4 Taptite Screw	13 lbf·in
Working Tools	• Torque Driver (6-22 lbf·in) • Screw Driver Bit ('+', No. 2) • Screw Driver ('+', No. 2)	

► To fix the Ceiling Mount Kit Assembly, do the following:

- 1 Place the unit bracket groove on the fasteners of the mount bracket.
- 2 Fix the points of fasteners of the bracket.

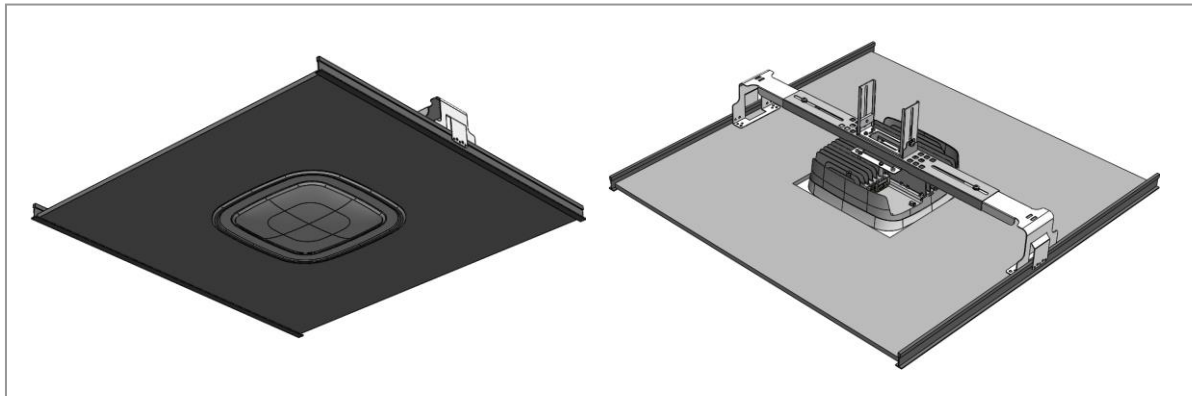
Figure 46. Fixing Ceiling Mount Kit Assembly to Building Structure



Fixing Suspended Ceiling Tile Type

This section describes the procedures for a suspended ceiling tile installation.
The following figure depicts installing a suspended RU on ceiling tile.

Figure 47. Installing Suspended RU on Ceiling Tile



Cutting Ceiling Tile

This section describes the procedure for cutting the ceiling tile.

Prerequisites

Before proceeding with the cutting process, ensure that the items described in the following table are available:

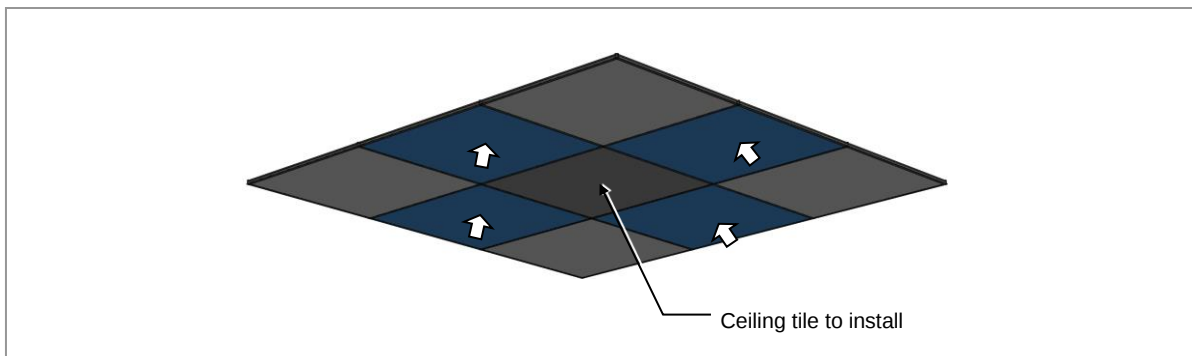
Table 20. Parts and Tools for Cutting

Category	Description
Parts	Ceiling Tile
Working Tools	Work saw or Knife

▶ Before cutting the ceiling, do the following:

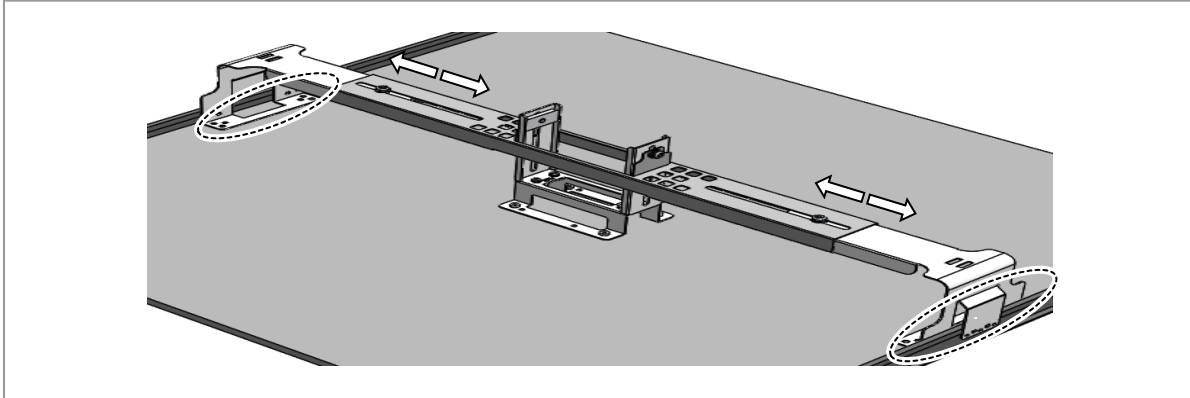
- 1 Open one of the four surrounding locations.

Figure 48. Ceiling



- 2 Put the Ceiling Mount Kit on the tile and adjust it. (600~765 mm (24"-30") ceiling tile with T(M) Bar)

Figure 49. Ceiling Mount Kit



- 3 Align unit bracket suspended with the picture in the drilling template. Cut the ceiling tile the same as the cutting line of the drilling template.

Figure 50. Cutting the Ceiling Tile (1)

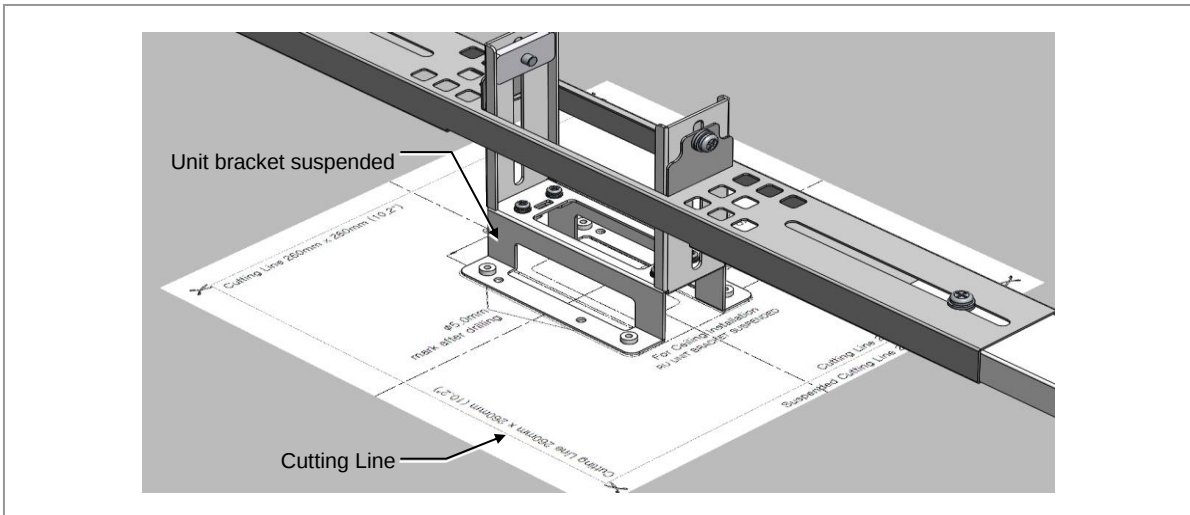
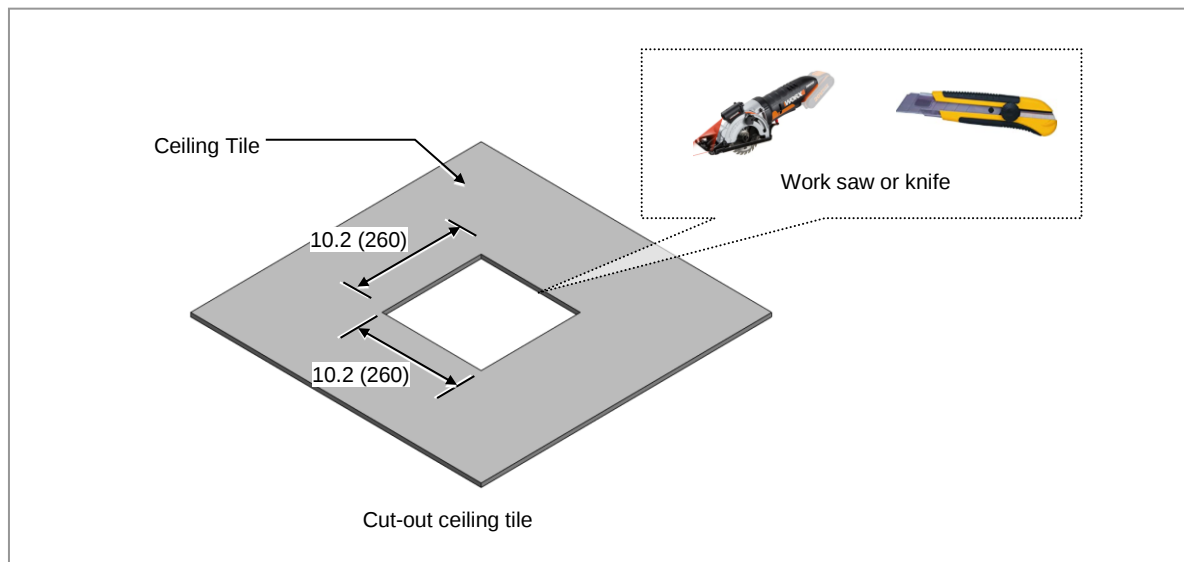


Figure 51. *Cutting the Ceiling Tile (2)*



Fixing Cosmetic Cover for Ceiling Tile

► To fix cosmetic cover, do the following:

- Ensure that the items described in the following table are available:

Table 21. *Parts and Tools for Fixing Cosmetic Cover*

Category	Description		
Parts	Cosmetic Cover, Cosmetic Cover Bracket		Parts
	Fasteners	M10 Nut	Fasteners
Recommended Torque Value	Do not use tools		Recommended Torque Value
Working Tools	Do not use tools		

Figure 52. *Ceiling Tile thickness less than 20 mm*

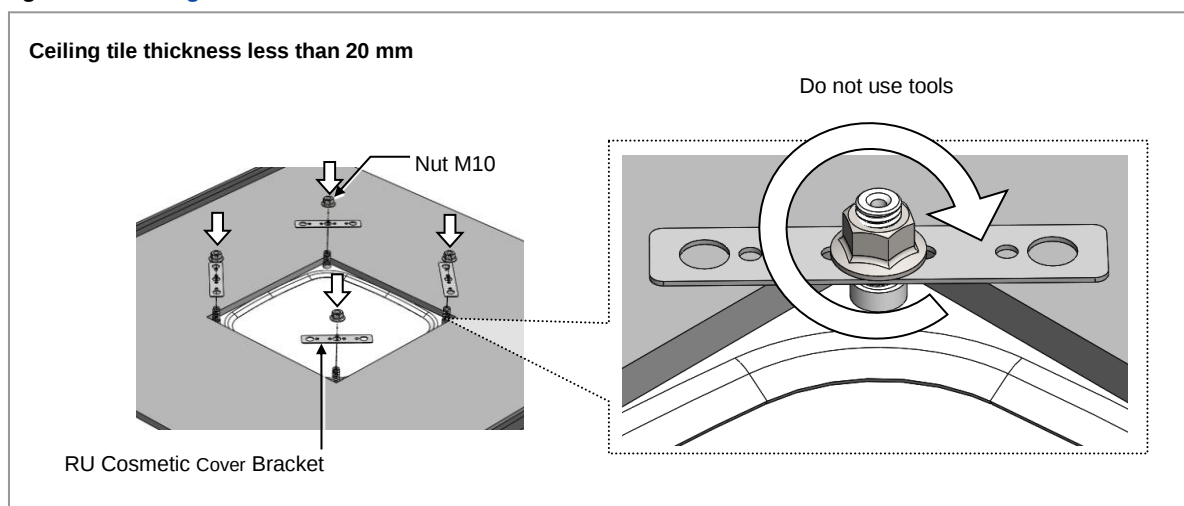
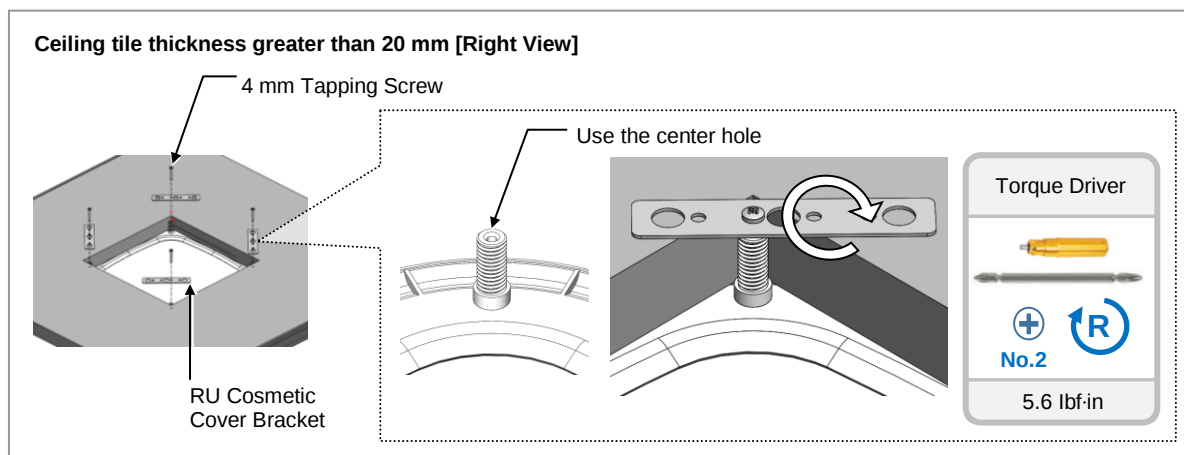


Figure 53. Ceiling Tile thickness greater than 20 mm



Fixing RU

This section describes the process to fix the RU on the ceiling tile with cosmetic cover.

Prerequisites

Before proceeding with fixing the RU, ensure that the items described in the following table are available:

Table 22. Parts and Tools for Fixing RU on the Ceiling Tile

Category	Description	
Parts	M4 × L10 Screw	4 EA
Recommended Torque Value	M4 Screw	13 lbf-in
Working Tools	- Torque Driver (6-22 lbf-in) - Screw Driver Bit ('+', No. 2) - Screw Driver ('+', No. 2)	

The following figure depicts the process to fix the RU:

Figure 54. *Installing Above Ceiling Kit on the RU*

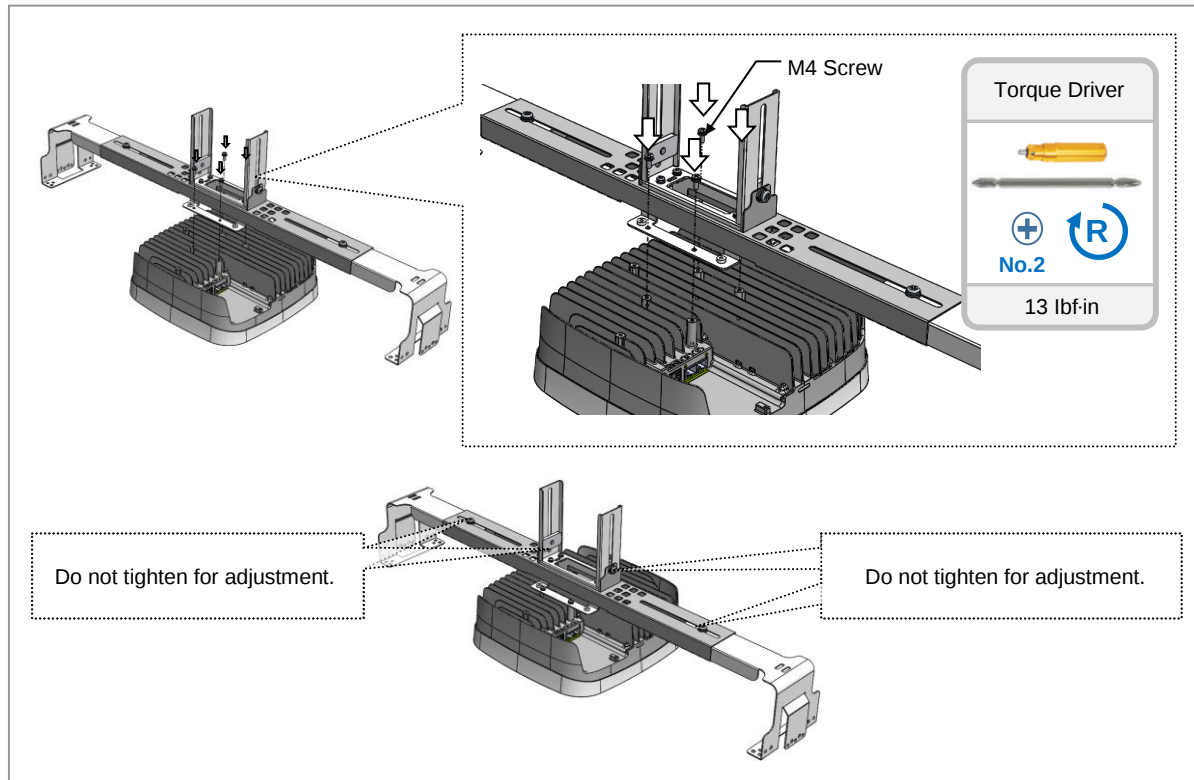
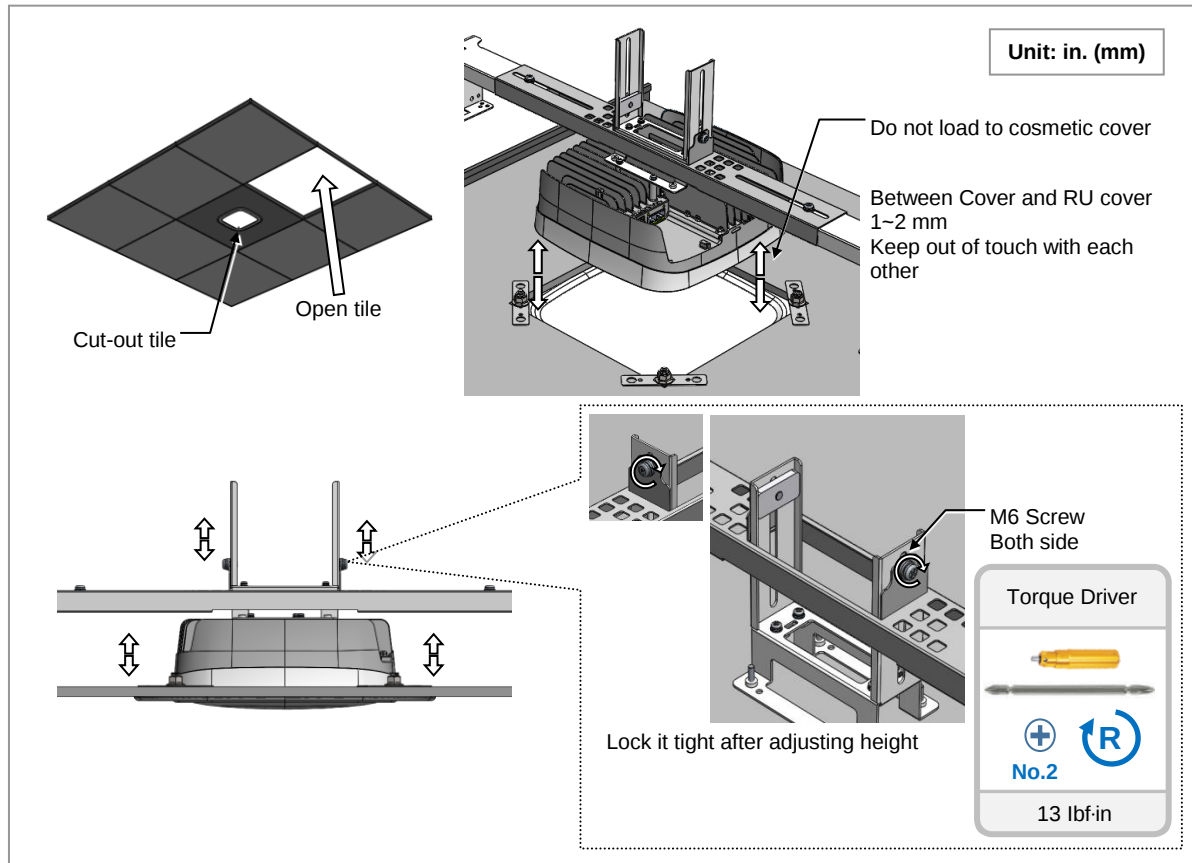


Figure 55. Installing the RU height adjustment



Fixing Ceiling Mount Kit Assembly to Building Structure

This section describes the process to fix the ceiling mount kit assembly to the building structure.

Prerequisites

Before proceeding with fixing the ceiling mount kit assembly, ensure that the items described in the following table are available:

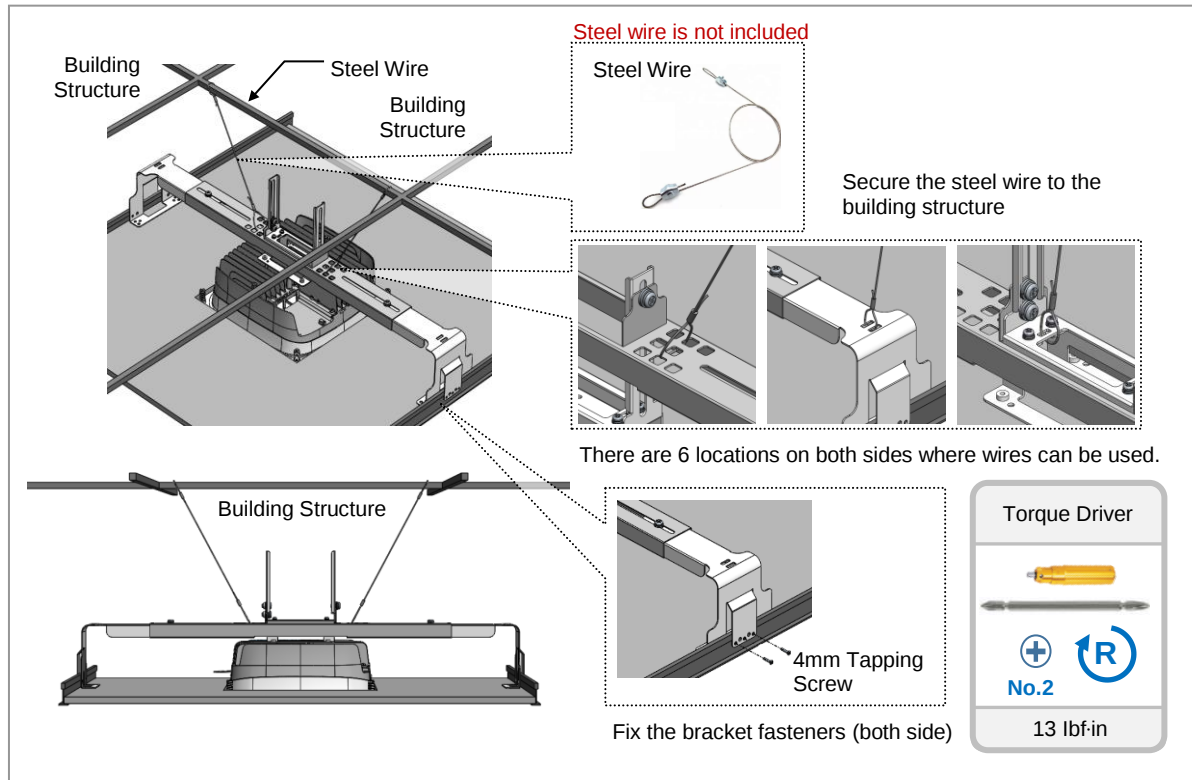
Table 23. Parts and Tools for Fixing Ceiling Mount Kit Assembly to Building Structure

Category	Description	
Parts	M4 × L15 (Taptite Screw)	4 EA
Recommended Torque Value	M4 Screw	13 lbf·in
Working Tools	- Torque Driver (6-22 lbf·in) - Screw Driver Bit ('+', No. 2) - Screw Driver ('+', No. 2)	

► To fix the Ceiling Mount Kit Assembly, do the following:

- Fix both sides of the bracket fasteners.

Figure 56. Fixing Ceiling Mount Kit Assembly to Building Structure



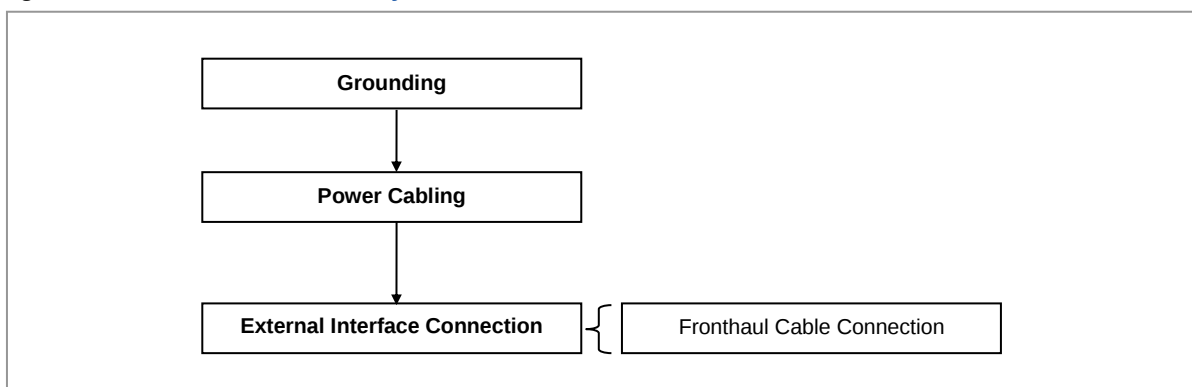
Chapter 4 Connecting Cables

This chapter describes the procedures to label and connect the cables to the RU.

Cabling Procedure

The following figure depicts procedure to connect the system cables.

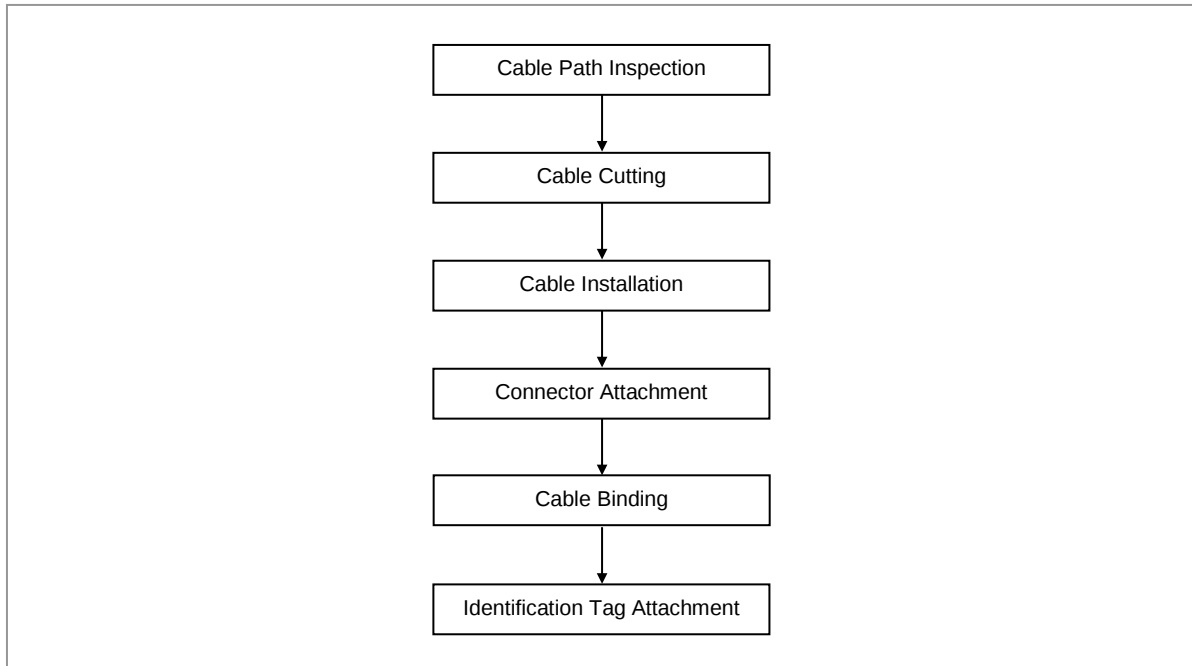
Figure 57. Procedure to Connect System Cable



Guidelines for Cable Connections

The following figure depicts the guidelines for connecting cables to the system.

Figure 58. *Cable Connection Procedure*



When cutting the cable after installation, ensure that the connector is disconnected from the equipment. Installation of the cable with the connector connected to the system can cause contact failure or damage to the assembled connector and the cable, due to cable tension or the operator's 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

While installing a cable that interconnects the rectifier, Main Ground Bar (MGB), and fronthaul device within the system, the cable path, the length, and the cable installation method must be inspected.

To inspect the cable path, ensure the following:

- A minimum cable length must be selected, so that it does not affect the cable installation and maintenance.
- The cable must be placed in a location where it will not be damaged by external factors, such as power line, flooding, and footpaths.
- In areas where the cable can be damaged by external factors, ensure that preventive measures are taken for the protection of 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, ensure the following:

- 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.
- Ensure to keep the cable away from moisture, iron, lead, dust, or other foreign substances when cutting.
- Remove any foreign substances attached to the cable using solvent or brush.

Cable Installation

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

To install the cable, ensure the following:

- Ensure not to damage the cable.
- If the cable is damaged, cut the damaged section before installation or replace the cable.
- Lay the cable so that it is not tangled. In particular, when installing a 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 is required to be protected, use a suitable protective cover. For example, a PVC channel, a spiral sleeve, a flexible pipe, and a cable rack.
- Install the DC power cable and the data transmission cable away from the AC power cable to prevent electromagnetic induction.
- Be careful when removing cables located by heatsink and wear protective gloves.
- The RF should be turned off while maintenance and wait for few minutes before touching the unit. This is to further reduce any surface temperature hazard to personnel when performing maintenance.

The following table outlines the recommended minimum allowed cable bend radius of different types of cables.

Table 24. Recommended Minimum Allowed Cable Bending Radius

No	Type	Allowed Cable Bend Radius	
1	Power Cable	Installed: $8 \times OD$	During Installation: $12 \times OD$
2	Optical Cable	Installed: $10 \times OD$	During Installation: $20 \times OD$



If the manufacturer specifies the allowed cable bending radius, comply with the specified bending radius.
OD: Outer Diameter

Connector Attachment

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

To attach the connector, ensure the following:

- Ensure that the 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 latch to prevent its core positions from being changed.
- Check the corresponding grooves before connecting the connector to another connector.
- Use a heat shrink tube at the connector connection for cables that are installed outdoor, such as feeder lines. It prevents water leakage and corrosion of the part exposed to the outer environment.
- Connect each cable of the connector assembly in a straight line.
- Be careful while connecting the cable to prevent from contact failure at the connector connection due to tension.

Cable Binding

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

To bend the cable, ensure the following:

- Ensure not to damage the cable during binding.
- Use appropriate cable binding materials 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 remaining cable thread by leaving about 50 mm of extra length to prevent the knot from easily getting untied.
- If there is a possibility of contact-failure to occur in the connector connection due to tension, bind the cable at the closest location to the connector.

Identification Tag Attachment

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

While attaching the identification tag, ensure the following:

- When installing an outdoor cable, use relief engraving and coated labels to prevent 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 comes in contact with the equipment, connects a cable, or performs maintenance without connecting the ground cable, the system can be damaged or the worker can be injured due to static electricity and short circuit.



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



After completing cable installation, unused ports should 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.

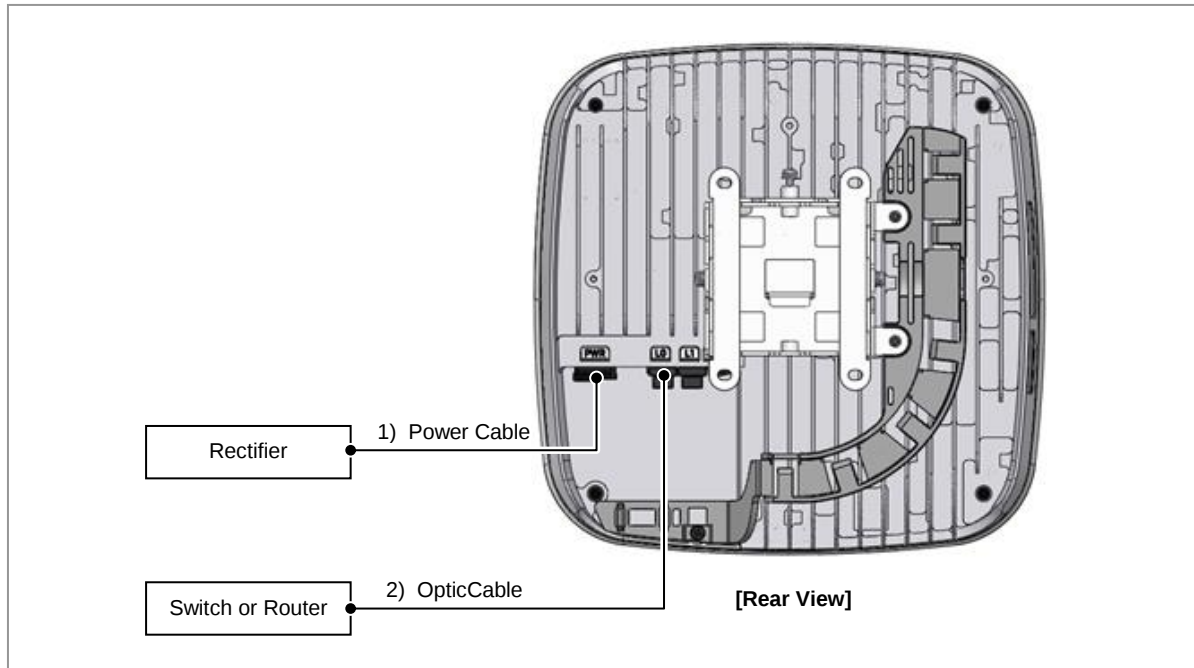


The cable installation process requires trained and experienced personnel trained in industry standard installation and field services procedures to include cable installation activities such as cable installation, securing, tying and binding.

Cabling Diagram

The following figure depicts the interfaces of the RU for cable connections.

Figure 59. Cable Diagram



The following table lists the cables required for interconnecting different units and devices.

Table 25. System Connection Cable

From	To	Cable
Rectifier	RU (PWR port)	1) Power Cable: 14 AWG × 2C
Switch or Router	RU (L0 port)	2) 10G/25Gbps,
Switch or Router	RU (L1 port)	3) 10Gbps,



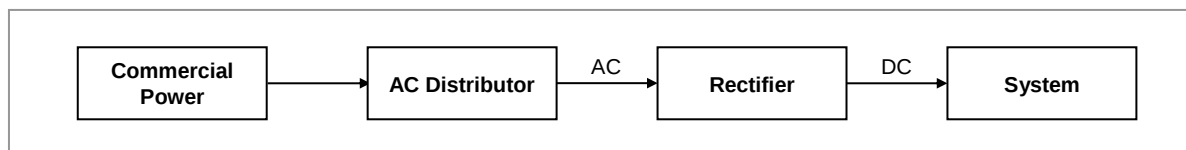
If the cable is connected to the external equipment, the inlet hole finishing method of the external equipment must be done after the consultation with the equipment manufacturer.

- The cable: Power Cable, Optic Cable

Power Cabling

The following figure depicts the elements of the power supply device.

Figure 60. Power Equipment Elements



Power is supplied to the system through the rectifier, which is protected by a circuit breaker. Before connecting a power cable to the power connector, verify that the circuit breaker is turned off (open). If the installation occurs while the circuit breaker is on, personnel can be critically injured when connecting or disconnecting cables.



Handling the power cable incorrectly can damage the rack or cause an electric short-circuit through the cable. Ensure that the rectifier power switch or the system power is turned off before proceeding with any tasks.



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



The heat-resistant temperature rating of the power cable must be 90 °C or more.



Ensure to consider the allowable curvature radius of a cable before you install or cut the cable. If you cut the cable without considering its radius of curvature, a contact failure can occur after the cable is connected.



When using the same DC power source with an outdoor device, discuss with the installation engineer of manufacturer to protect the system from a residual surge energy.



When using a DC power cable, it is possible to use up to 250 m for 14 AWG. However, the distance is under the condition that the cable is installed normally. When the condition changes, the distance changes.



Install a circuit breaker to a rectifier (or power distributor) for stable power. The capacity of circuit breaker is 4 A. (Use UL Listed circuit breakers.)

Connecting DC Power Cable

This section describes the process to connect the power cable.

Prerequisites

Before proceeding with the power cable connection, ensure that the items described in the following table are available:

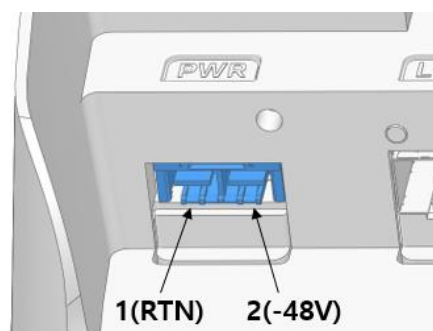
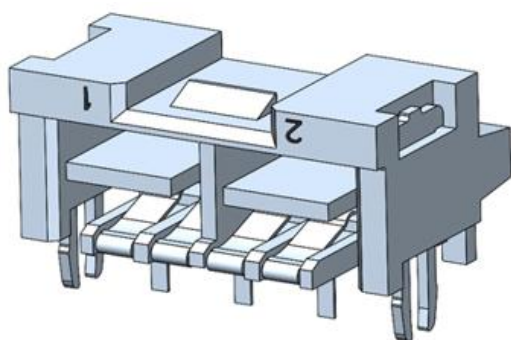
Table 26. Parts and Tools for Connecting DC Power Cable

Category	Description			
Installation Section	Rectifier to RU PWR Port			
Cable	14 AWG			
Bend Radius	Installed: 8 × OD	During Installation: 12 × OD		
Connector	Rectifier	Check specifications of rectifier output terminal per site and prepare fasteners.		
	RU	Pin No.	1	RTN
			2	-48 V DC
Working Tools	• Cable Cutter • Wire Stripper • Crimping Tool • Heating Gun • Nipper			

The following table outlines the pin connectors of the power cable.

Table 27. Power Cable/Connector Pin Map

Power Connector Pin No.	Description	Color
1	RTN	Black
2	-48 V DC	Red



► To connect the DC power cable, do the following:

- 1 Assemble the power cable and terminal.
- 2 Assemble the terminal according to the pin number of the connector and the color of the power cable. (Pin 1: Black/Pin 2: Red)
- 3 Install a DC power cable from the rectifier to the RU. (At this time, allow the

- power cable to enter the cable tray.)
- 4 Separate the PWR port cap from the system side.
 - 5 Connect the power cable to the power port. (PWR port)

Figure 61. *Connecting Power DC Cable-Fixed Mount Kit*

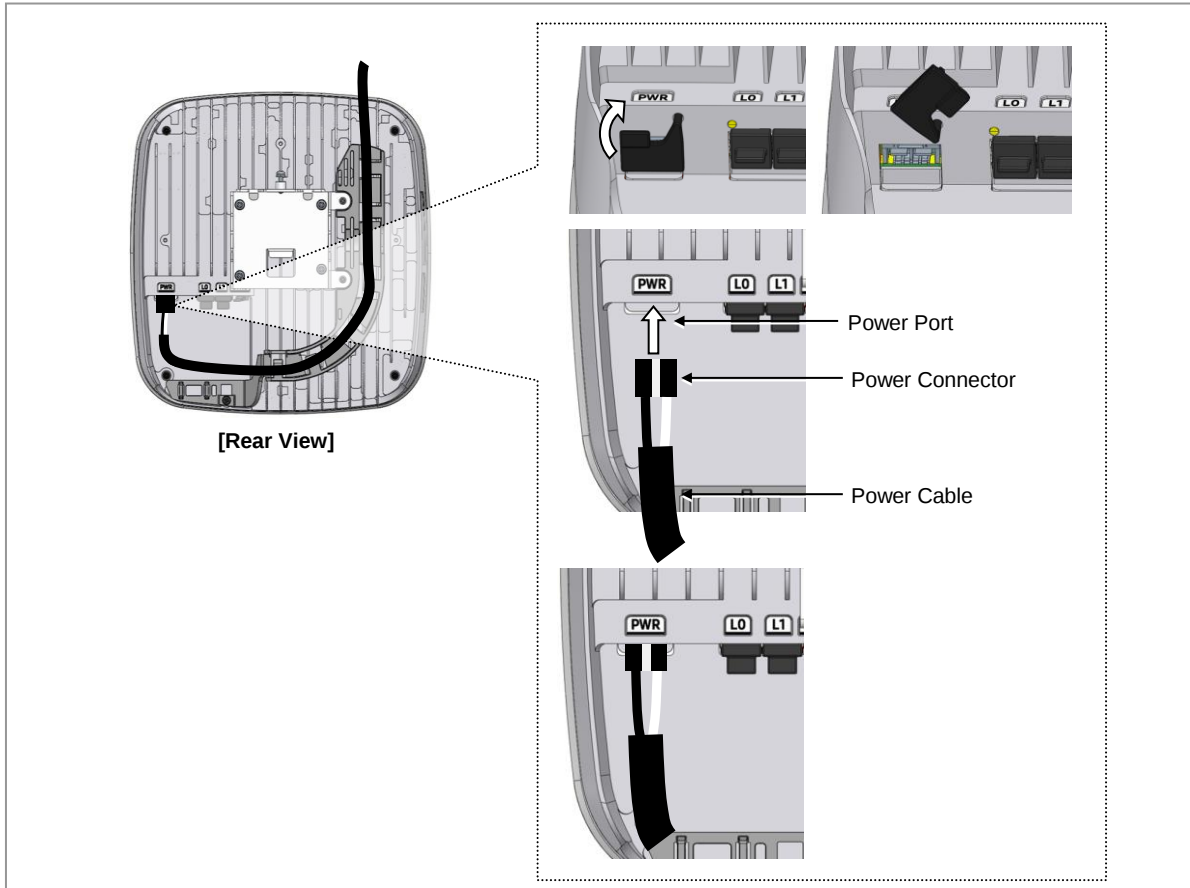
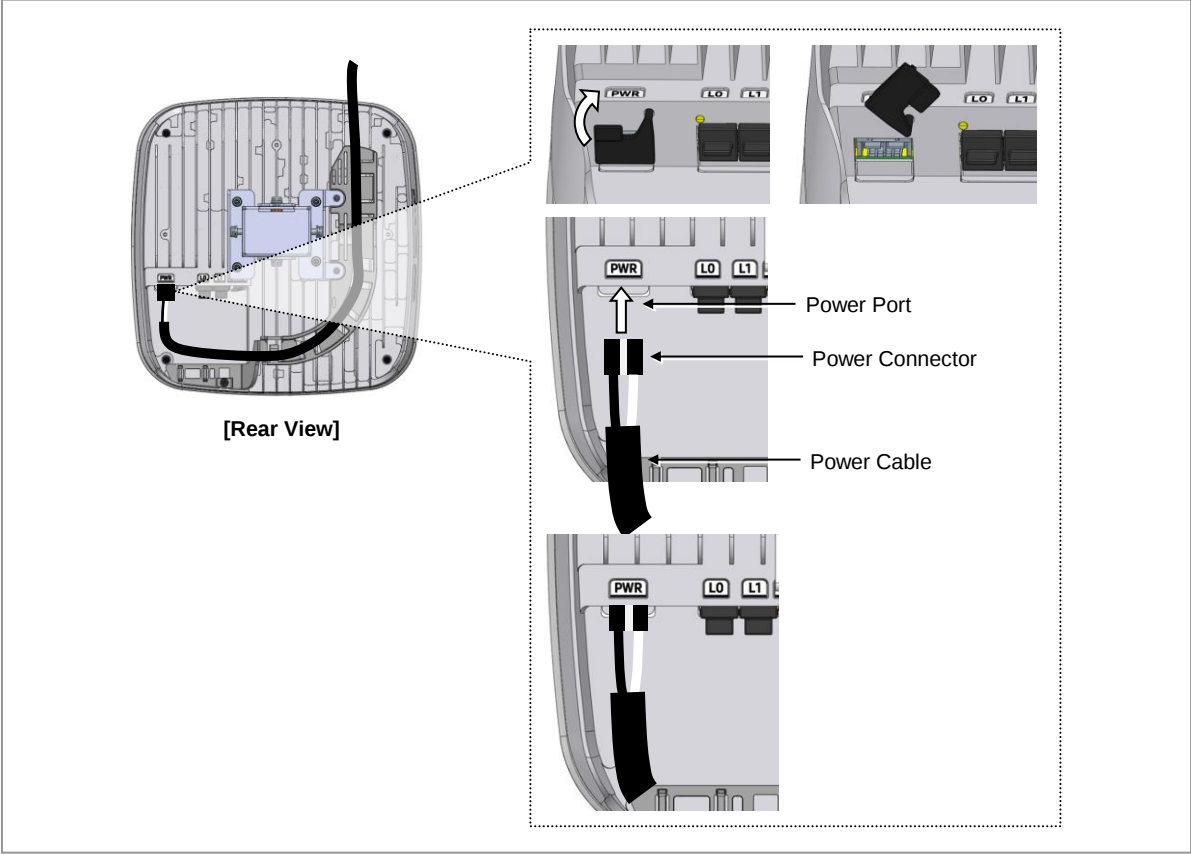


Figure 62. Connecting DC Power Cable-Ceiling Tile



Connecting Cable (Only Pole type)

This section describes the process of connecting pole type cable.

Prerequisites

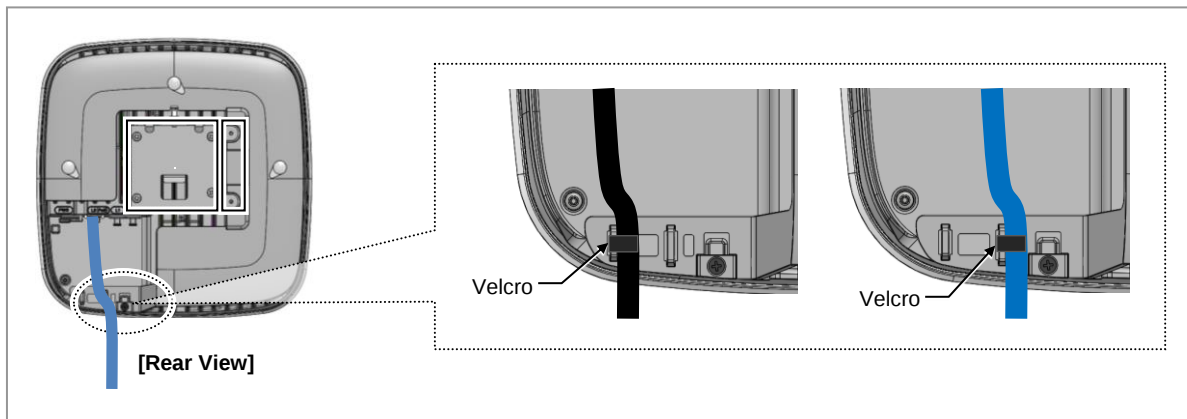
Before proceeding with the pole type cable connection, ensure that the items described in the following table are available:

Table 28. Parts and Tools for Cable Binding

Category	Description	
Parts	Velcro	1 EA
Working Tools	Scissors	

The following figure depicts the pole type cable connection.

Figure 63. Connecting Cables (Pole Type)



External Interface Connection

This section describes the external interface cable connection.

Remove/Insert Optical Module

If the optical module is to be removed or inserted before connecting the cable, perform the following process:

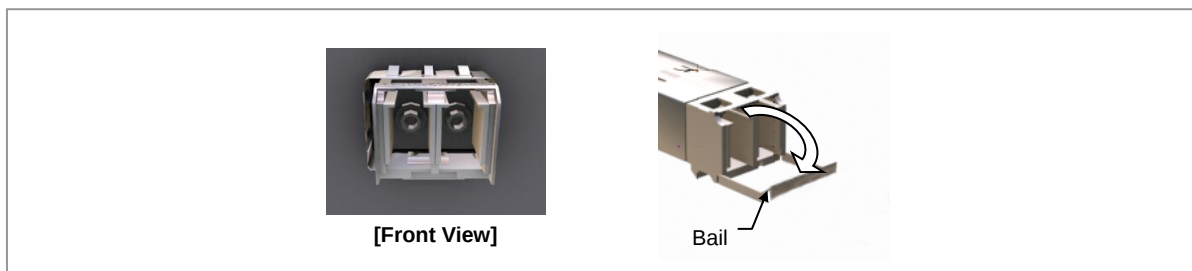


Port quantity (Duplex) and Bail of Optical module may differ from the figure.

▶ To remove optical module, do the following:

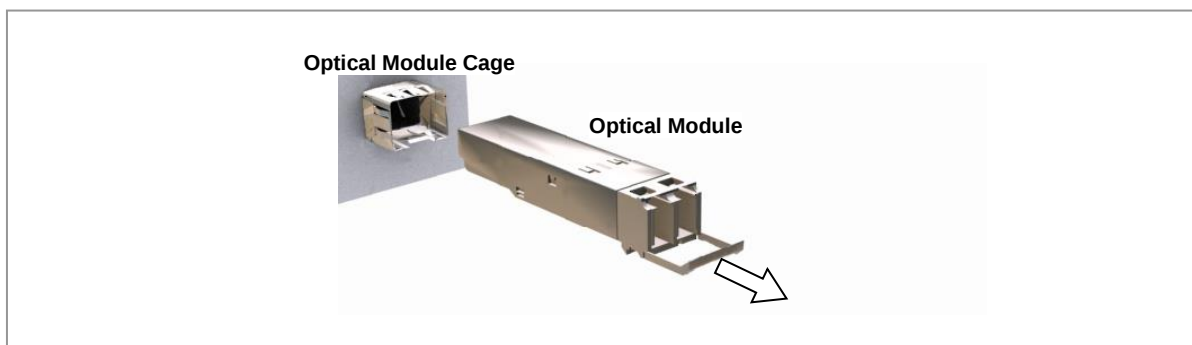
- 1 Hang the hook of the optical transceiver removal tool on the bail of the optical module within the system.

Figure 64. Optical Module Removal (1)



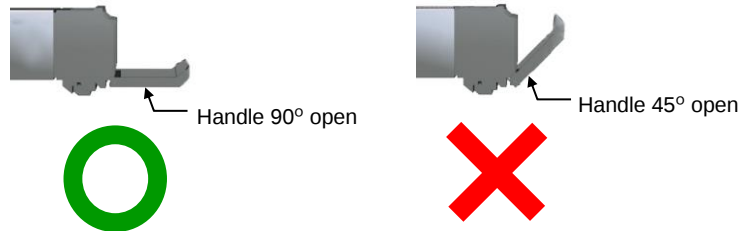
- 2 Completely remove the optical module from the optical module cage by pulling the optical module removal Tool.

Figure 65. Optical Module Removal (2)





When removing an optical module, open the handle at approximately 90° and remove the optical module using the dedicated tool (optical module removing tool). If the optical module is detached without using a dedicated tool, the optical module may be jammed and the handle may be damaged due to insufficient opening of the handle.



▶ To insert the optical module, do the following:

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

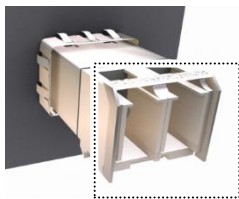
Figure 66. *Optical Module Insert*



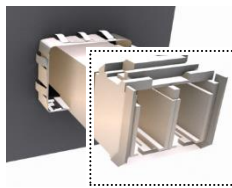


Facing the front of the system, insert the optical module's bail to the port. (Do not turn it upside down.)

↑
[System Front]

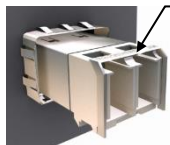


↑
[System Front]



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

↑
[System Front]

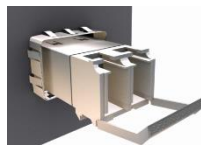


[Bail-up state: Lock]



Bail of Optical Module

↑
[System Front]



[Bail-down state: Lock]



Fronthaul Cable Connection

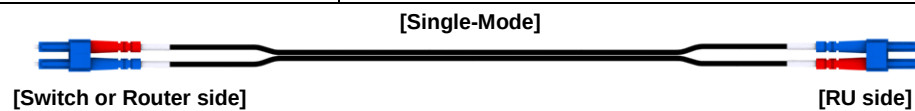
This section describes the process to connect the fronthaul cable.

Prerequisites

Before proceeding with connecting the fronthaul cable, ensure that the items described in the following table are available:

Table 29. Parts and Tools for connecting Fronthaul Cable

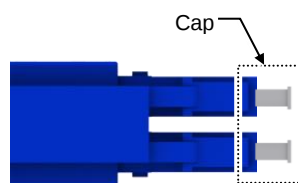
Category	Description	
Installation Section	Switch or Router to RU port	
Cable	Single Mode (Optical)	
Bending Radius	Installed: 10 × OD	During Installation: 20 × OD
Connector	Switch or Router	DLC/UPC
	RU	DLC/UPC
Working Tools	- Optical Connector Cleaner - SFP Tool (Jig)	



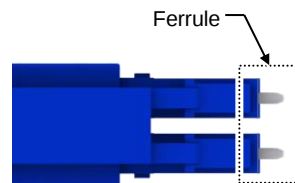
Optical modules and cables used in the system have laser beams that emit light. Be careful with handling as exposure to laser beams can cause serious damage to the eyes.



Remove the cap of the optical connector before connecting. Before connecting the optical cable, verify that 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. Ensure to clean the connector in accordance with the cleaning directions in *Appendix B: Cleaning the Optical Connectors*. Do not touch the ferrule at the end of optical cable as it can be easily damaged.



[Before Removing Cap]



[After Removing Cap]

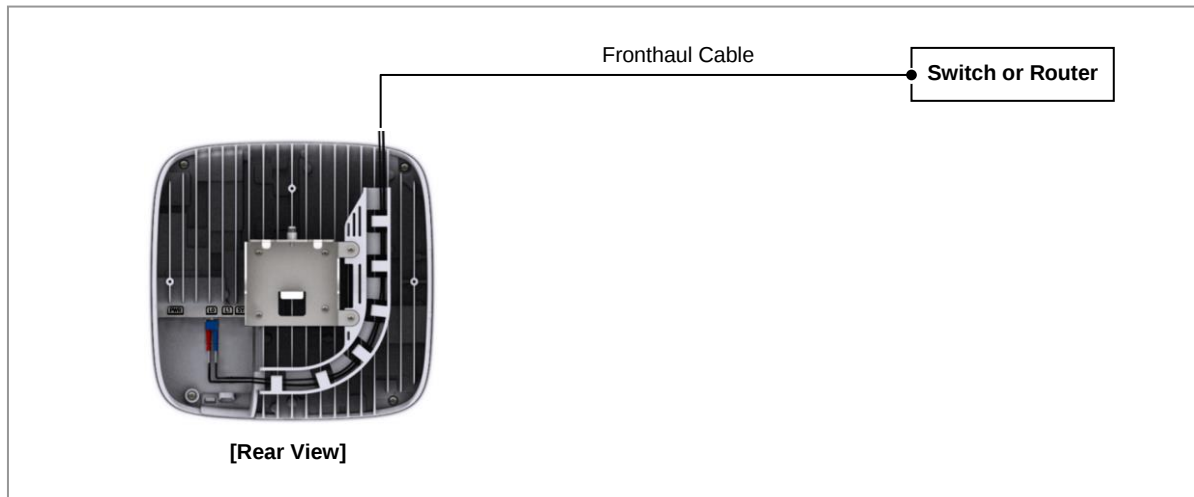


Before connecting the optical cable connector, the ferrule of the connector of cable side should be cleaned first by using the optical connector cleaner. (For more details, refer to *Appendix B: Cleaning the Optical Connectors*.)

► To connect a Fronthaul cable, do the following:

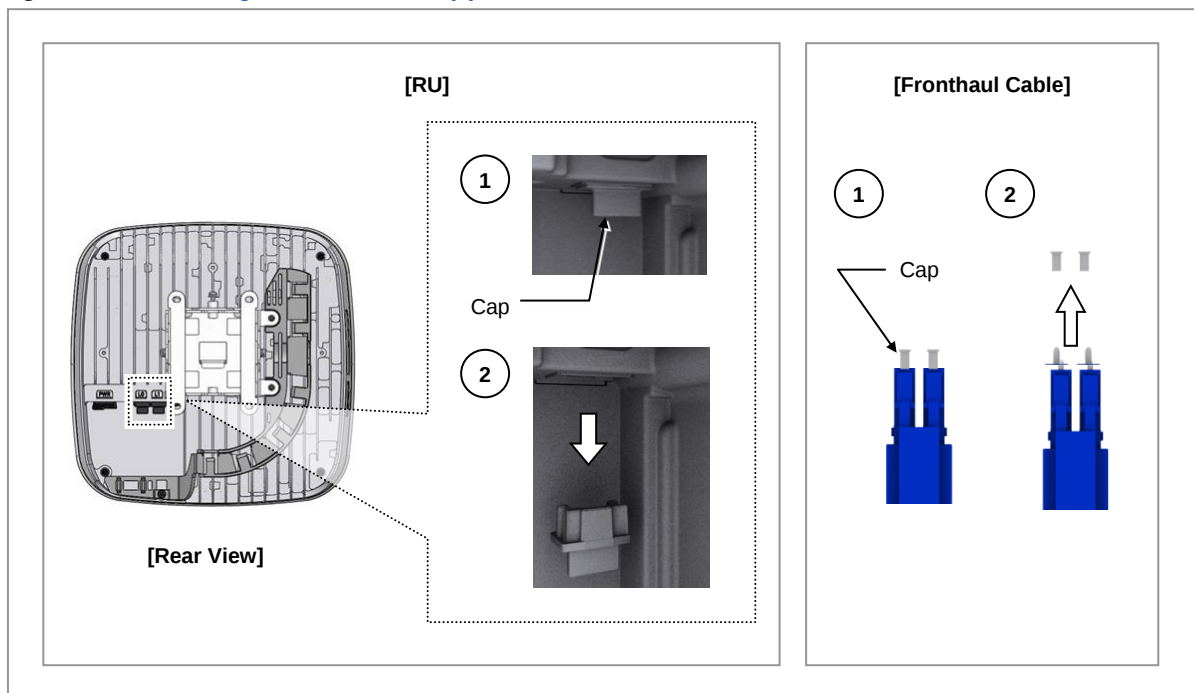
- 1 Connect the fronthaul cable from the switch/router to the RU L0/L1port. (While connecting, allow the fronthaul cable to enter the cable tray.)

Figure 67. Connecting Fronthaul Cable (1)



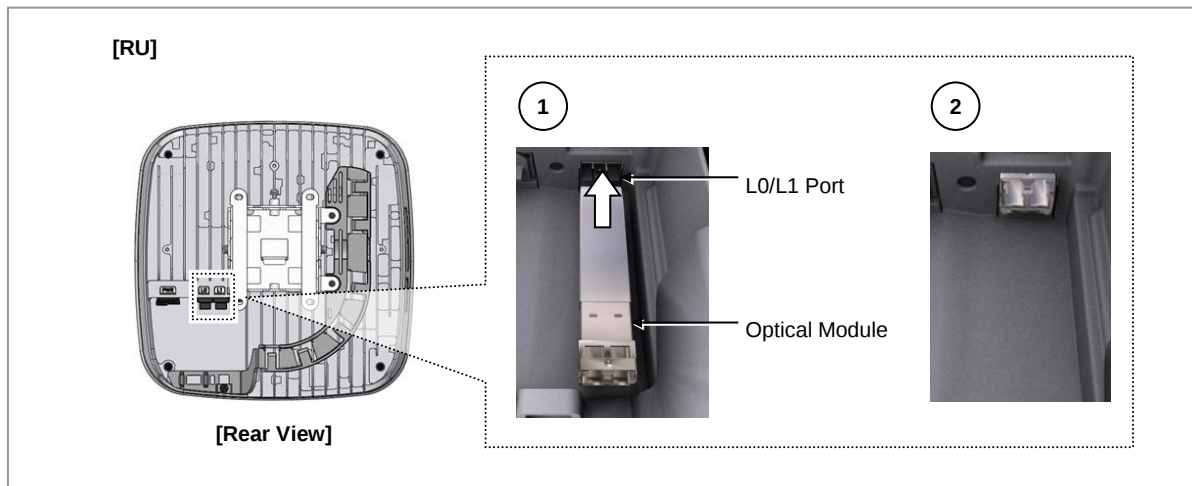
- 2 Separate the cap from the RU side and cable side connector.

Figure 68. Connecting Fronthaul Cable (2)



- 3 Connect the optical module to the RU fronthaul port as depicted in the following figure.

Figure 69. *Connecting Fronthaul Cable (3)*

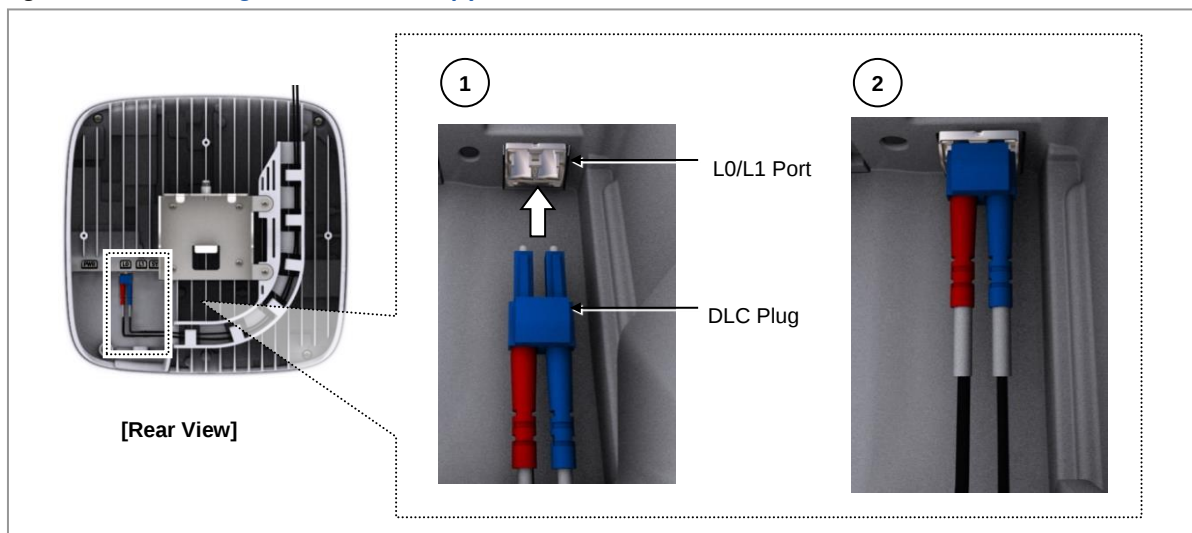


- 4 Insert the DLC plug to the system side's connector.

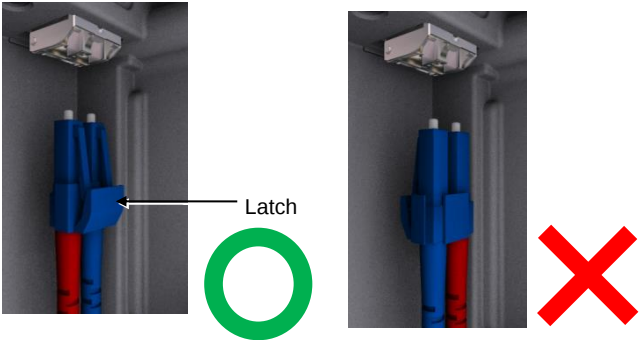


Before connecting the backhaul cable connector, the ferrule of the connector of cable side should be cleaned first by using the optical connector cleaner. (For more details, refer to *Appendix B: Cleaning the Optical Connectors*.)

Figure 70. *Connecting Fronthaul Cable (4)*



The 'Latch' of the DLC plug should be toward the upper side of the system, as depicted in the following figure:

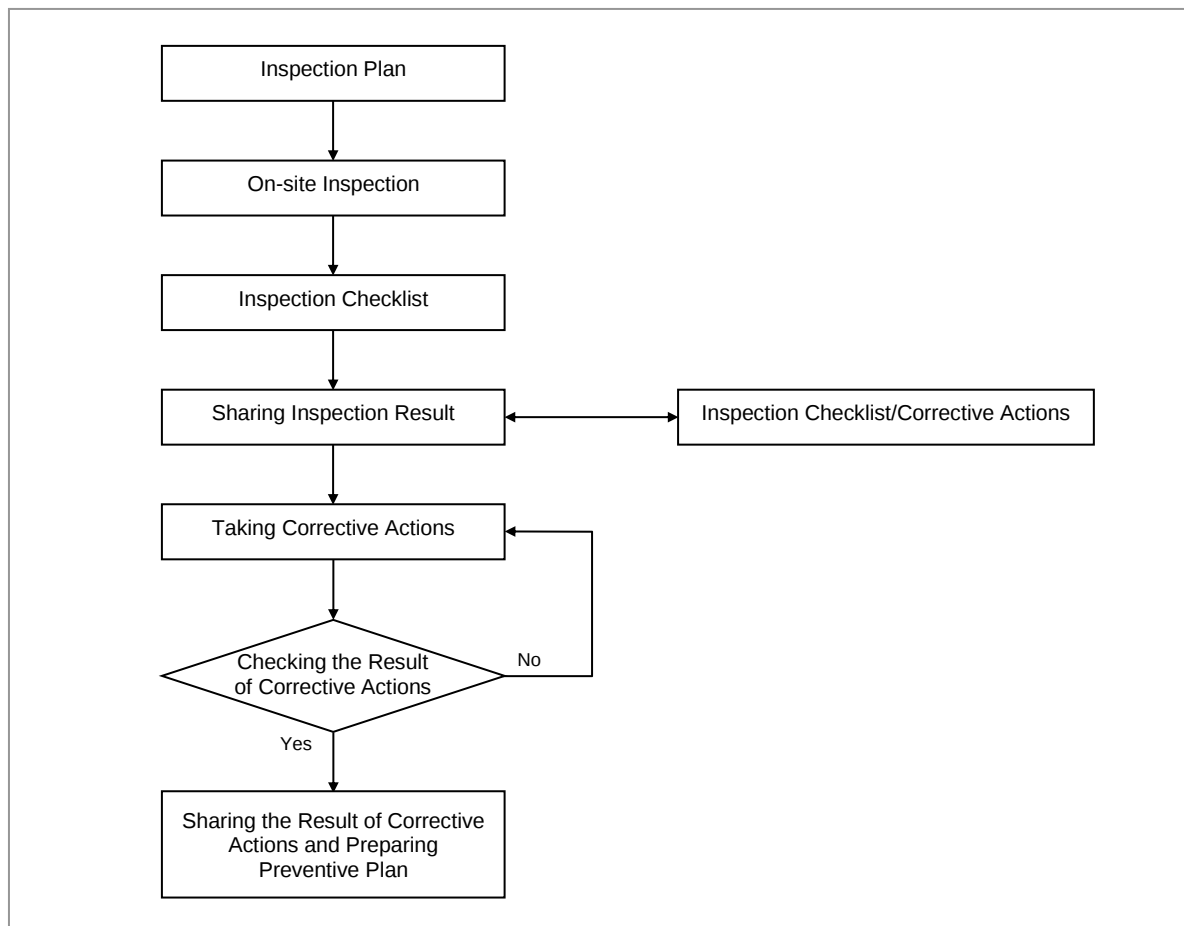


Chapter 5 Inspecting Installation

This chapter describes the procedures to check the installation status.

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

Figure 71. Installation Inspection Procedure



Inspection Plan

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

On-site Inspection and Inspection Checklist

The on-site inspection is to perform a visual inspection or use instruments for each specification, standard, and installation status — based on the onsite inspection checklist — onsite where the system is installed.

The inspector must record the inspection result on the inspection checklist during or after field inspection.

Sharing Inspection Results and Taking Corrective Actions

The inspector shares the inspection result (the completed inspection checklist and corrective actions) with the installation operator. The installation operator takes the necessary corrective actions after reviewing the requirements.

Checking the Results of Corrective Actions

The inspector must verify that the corrective actions are properly taken. If they are not sufficient, the inspector will request the installation operator to correct or complete any improperly performed corrective actions.

Sharing the Results of Corrective Actions and Preparing Preventive Plan

After all the corrective actions are completed, the inspector will share the result with the installation operator and all relevant departments. The inspector will prepare a preventive action plan to keep the same or similar problems from recurring.

Construction Situation Checklist

The following table outlines a checklist to check the installation of the AU and other devices.

Table 30. 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/washer, and so on	Checking fasteners omission		
		Compliance with assembly order of fasteners		
		Compliance with fastening torque value		
	Insulation status	Checking electrical contact between insulators (insulation resistance tester)		
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		

Category	Check Items	Criteria	Result	
			Pass	Fail
		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		
		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)		

Category	Check Items	Criteria	Result	
			Pass	Fail
		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		
RF	Antenna installation status	Checking specifications		
		Checking installation position		
		Checking fixing status		
		Checking gap between antennas		
	Cable specification	Checking the specification		
	Installation status of arrestor	Checking the specification		
		Checking installation position		
		Checking fixing status		
	Cabling	Cable damage		
		Proper installation route		
		Compliance with the radius of curvature		
	Cable binding status	Binding status		
		Binding interval		
		Checking binding materials		
	Cable connection	Compliance with connector finishing		
	Installation status of cable tag	Position		
		Marking content		
		Checking tag installation method		
		Checking compliance with fastening torque value		
		Compliance with connector finishing		
	Installation status of cable tag	Position		
		Marking content		
		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 interior or exterior of the equipment and system surrounding area	Checking the stocking condition (waste parts, waste materials, packing materials, and so on)		
Opinion				



Appendix A Acronyms

5G NR	5G New Radio
AWG	American Wire Gauge
DC	Direct Current
EMC	Electro Magnetic Compatibility
EN	European Norm
FCC	Federal Communications Commission
IBW	Instantaneous Band Width
IEC	International Electrotechnical Commission
IP40	International Protection 40
MGB	Main Ground Bar
OBW	Occupied Band Width
OD	Outer Diameter
PVC	Polyvinyl Chloride
PWR	Power
RF	Radio Frequency
RTN	Return
SELV	Safe Extra Low Voltage
SFP	Small Form-factor Pluggable
TNV	Telephone Network Voltage
UL	Underwriters Laboratories
WEEE	Waste Electrical and Electronic Equipment

Appendix B Cleaning Optical Connectors

This appendix describes the procedure of cleaning the optical connector and cleaning tool.

Introduction

When connecting an optical cable to the system, the performance of the system can be degraded, or failures can occur—if the core element of an optical connector is dirty—due to dust or other foreign material. Therefore, the operator must clean the optical connector before connecting an optical cable to the system.

When using an optical connector cleaner, use the products given in the following example or their equivalent.

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

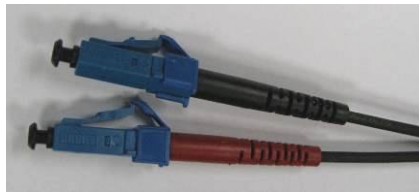


Follow the manufacturer's instructions for cleaning the optical connectors.

Measure the Optical Output and Connecting the Optical Connector

▶ To measure the optical output, do the following:

- 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 the operator fastens the bolt, refer to the following standard torque value to prevent the equipment and bolt from damage and secure by fastening. When the torque value for each connection part is defined already, refer to the defined value.

Table 31. Standard Torque Value for Fastening Bolts

Bolt Spec.	Torque Value (N·m)	Torque Value (lbf·in)	Torque Value (kgf·cm)
M3	0.5 to 0.8	4.5 to 6.7	5.1 to 7.7
M4	1.2 to 1.8	10 to 16	12 to 18
M5	2.2 to 3.4	20 to 30	23 to 35
M6	3.9 to 5.9	34 to 52	40 to 60
M8	10 to 14	88 to 132	102 to 152
M10	20 to 30	174 to 260	200 to 300
M12	34 to 50	298 to 446	342 to 514

Table 32. Connector Connection Torque Value

Connector	Torque Value (N·m)	Torque Value (lbf·in)	Torque Value (kgf·cm)
SMA connector	0.8 to 1.1	7 to 10	8.2 to 11.2
TNC connector	0.46 to 0.69	4.1 to 6.1	4.1 to 7
N-type connector	0.7 to 1.1	6.2 to 9.7	7.1 to 11.2
DIN-type connector	25 to 30	221 to 265	255 to 306
4.3-10-type connector	5 to 11	44 to 97	51 to 112



The torque values can be different, depending 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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Document Version 1.0