

**SAMSUNG**

# RFV01U-D2A Installation Manual

*Describes product installation and requirement procedure*

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July 2017

*Radio Access Network*

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# Preface

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This manual describes how to install a 700/850 MHz RRH and how to connect its cables. This manual includes the following 700/850 MHz RRH:

- RFV01U-D2A

## 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.txt** into the **/home/folder1/folder2/bin/** folder.

### User Input and Console Screen Output Text

Input and output text is presented in the Courier font. For example,

`context <designated epc-context-name>`

CLI commands are presented in bold small caps. For example,

Type the **RTRV-NE-STS** command in the input field.

## New and Changed Information

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

- Added antenna gain. (Personal and Product Safety)
- Added a safe distance between the base station antenna and people. (Caution for Installation in Chapter 1)

## Revision History

The following table lists all versions of this document.

Document Number	Product/Software Version	Document Version	Publication Date	Remarks
2600-00KTG7GAA	RFV01U-D2A	1.0	July 2017	-
2600-00KTG7GAA	RFV01U-D2A	2.0	July 2017	-

## Organization of This Document

Section	Title	Description
Chapter 1	Before Installation	This chapter introduces an RRH and describes 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 RRH installed.
Chapter 4	Inspect the Installation	This chapter describes the procedures of inspecting installation status after RRH installation and cabling is completed.
Appendix A	Acronyms	This annex describes the acronyms used in this manual.
Appendix B	Sector Antenna Installation	This annex describes the sector antenna installation.
Appendix C	Clean the Optical Connectors	This annex describes the procedure of cleaning the optical connector and cleaning tool.
Appendix D	Standard Torque	This annex 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.*

## Proposition 65 Warning (US Only)

State of California Proposition 65 Warning (US only)

**WARNING:** This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

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

## Lasers

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

## Manual Handling

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

## Installation

Installation must be carried out by trained and competent engineers only. All relevant safety measures should be taken to ensure equipment is not connected to

live power and transmission sources during installation. Equipment must be correctly installed in order to meet the relevant safety standards and approval conditions.

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

Rack-mountable equipment must be placed in a standard 19-inch rack and secured with the appropriate fixings as detailed in the installation manual.

## 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 supply. To protect against fire, the equipment is fused.

## Environment

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

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

## Cooling

The product cools down by its own set of cooling fans housed in a fan module. Each fan module detects a fan that is not operating normally. LEDs on the front panel of the fan module provide an alarm indication in the event of fan failure.

In the event of fan failure, take urgent remedial action to restore full cooling capacity.

Take appropriate measures to ensure that fan modules do not start spinning during repair and maintenance procedures.

## 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, make sure it is done so properly according to the installation instructions.

## Power Supply Connection

The equipment is designed to be powered from a -48 V DC supply. 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 EN 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.

## Battery Disposal

The product contains a battery on the processor card. The battery should not be disposed of with other household waste. Where marked, the chemical symbols Hg, Cd or Pb indicate that the battery contains mercury, cadmium or lead above the reference levels in EC Directive 2006/66. The battery incorporated in this product is not user replaceable. For information on its replacement, please contact your service provider. Do not attempt to remove the battery or dispose it in a fire. Do not disassemble, crush, or puncture the battery.

End of life recycling materials information is available from Samsung.

## 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](http://www.dtsc.ca.gov/hazardouswaste/perchlorate).’

## Antenna Gain

The antenna gain with a maximum of 10.865 dBi should be used to satisfy maximum ERP. But the antenna gain can be grown up to 13.875 dBi, when the operator is extending the coverage to the unserved area.

## 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.



### **Correct disposal of batteries in this product (Applicable in countries with separate collection systems.)**

The marking on the battery, manual or packaging indicates that the battery in this product should not be disposed of with other household waste. Where marked, the chemical symbols Hg, Cd or Pb indicate that the battery contains mercury, cadmium or lead above the reference levels in EC Directive 2006/66.

The battery incorporated in this product is not user replaceable. For information on its replacement, please contact your service provider. Do not attempt to remove the battery or dispose it in a fire. Do not disassemble, crush, or puncture the battery. If you intend to discard the product, the waste collection site will take the appropriate measures for the recycling and treatment of the product, including the battery.

# Chapter 1 Before Installation

---

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

## System Configuration and Interface

This section provides the pictorial view of the RRH and its interfaces.

### RRH Configuration

The following figures depict the physical view of the RRH with and without the finger guard configuration respectively.

Figure 1. Configuration (without Finger Guard)

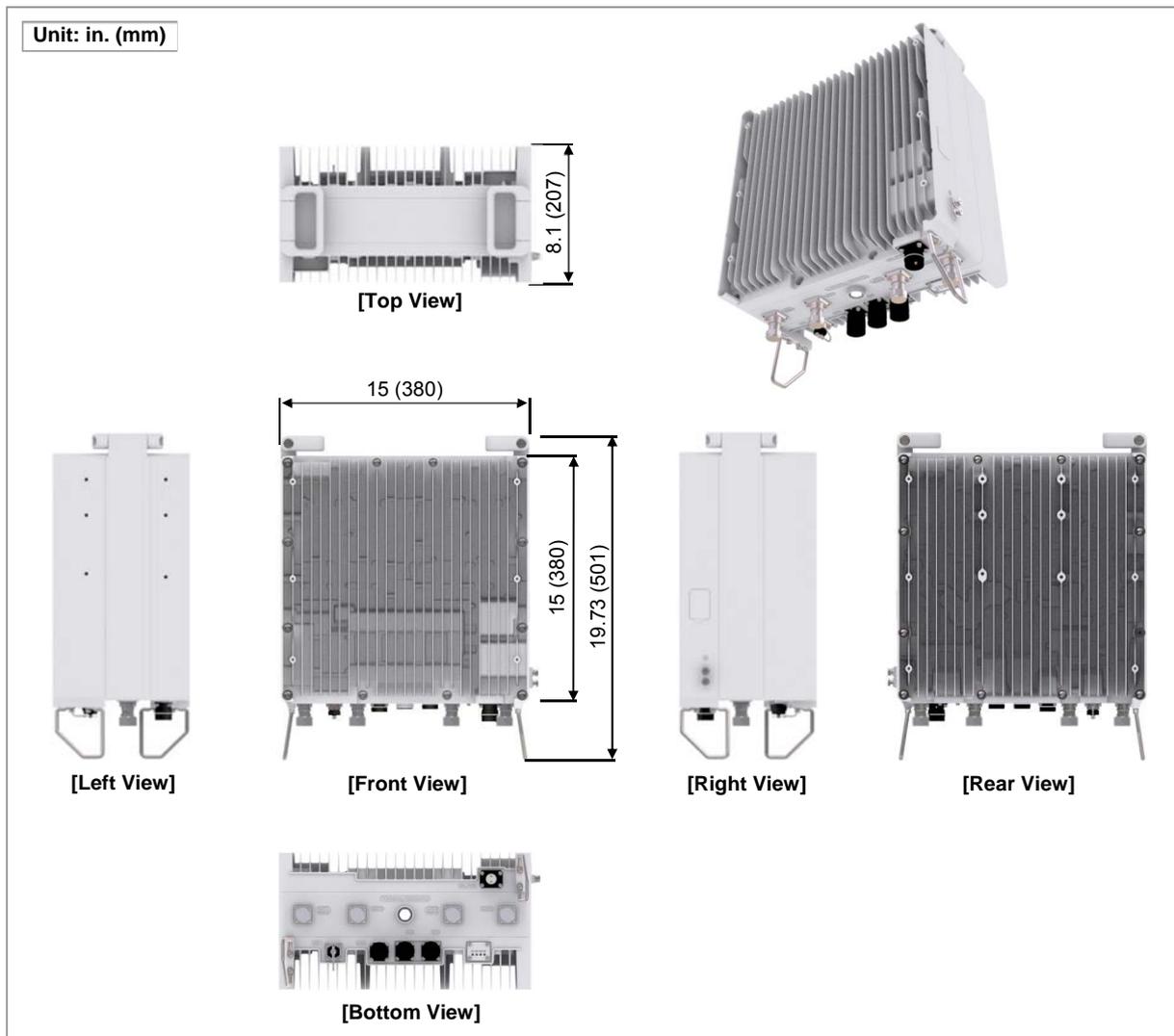
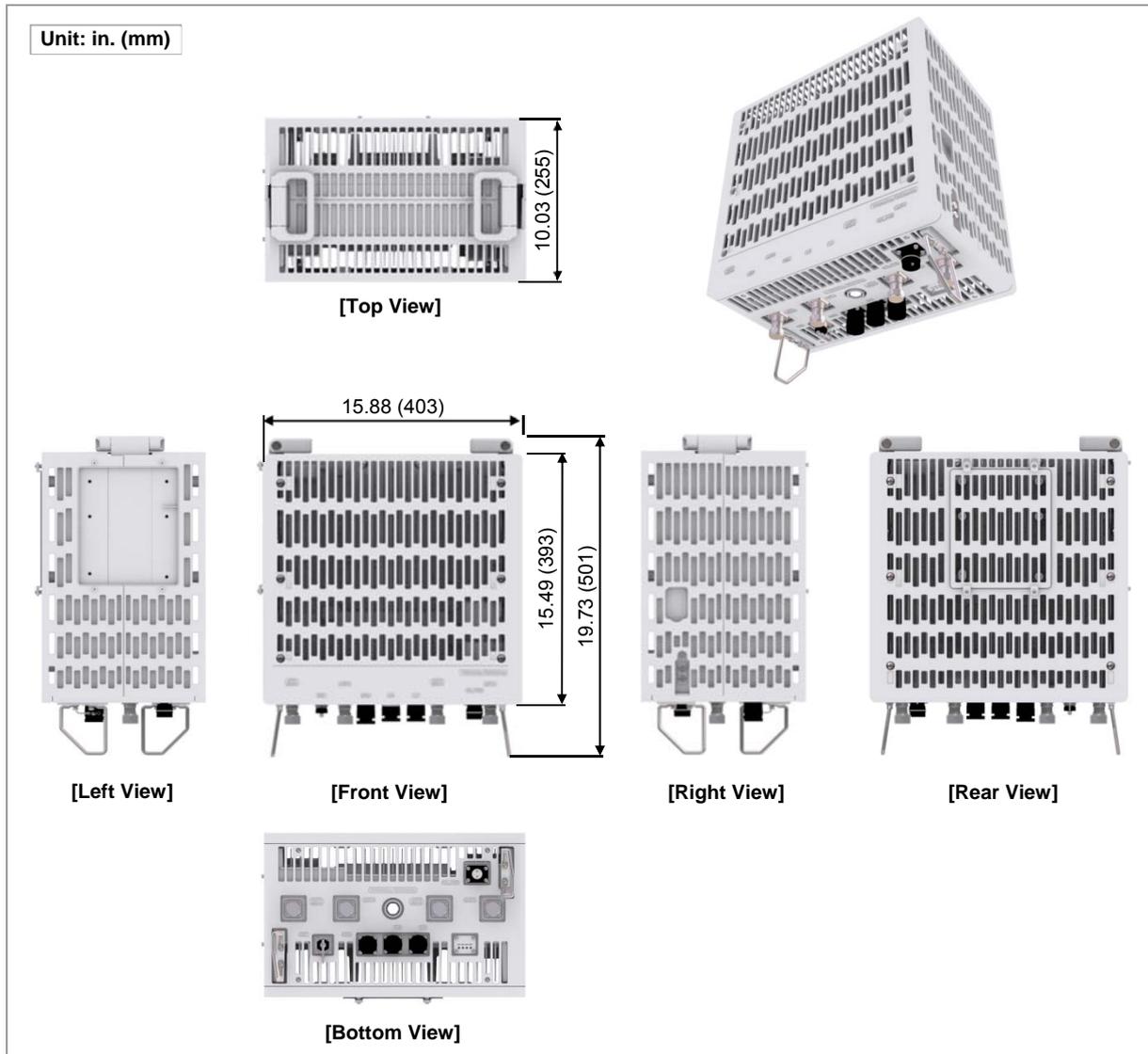


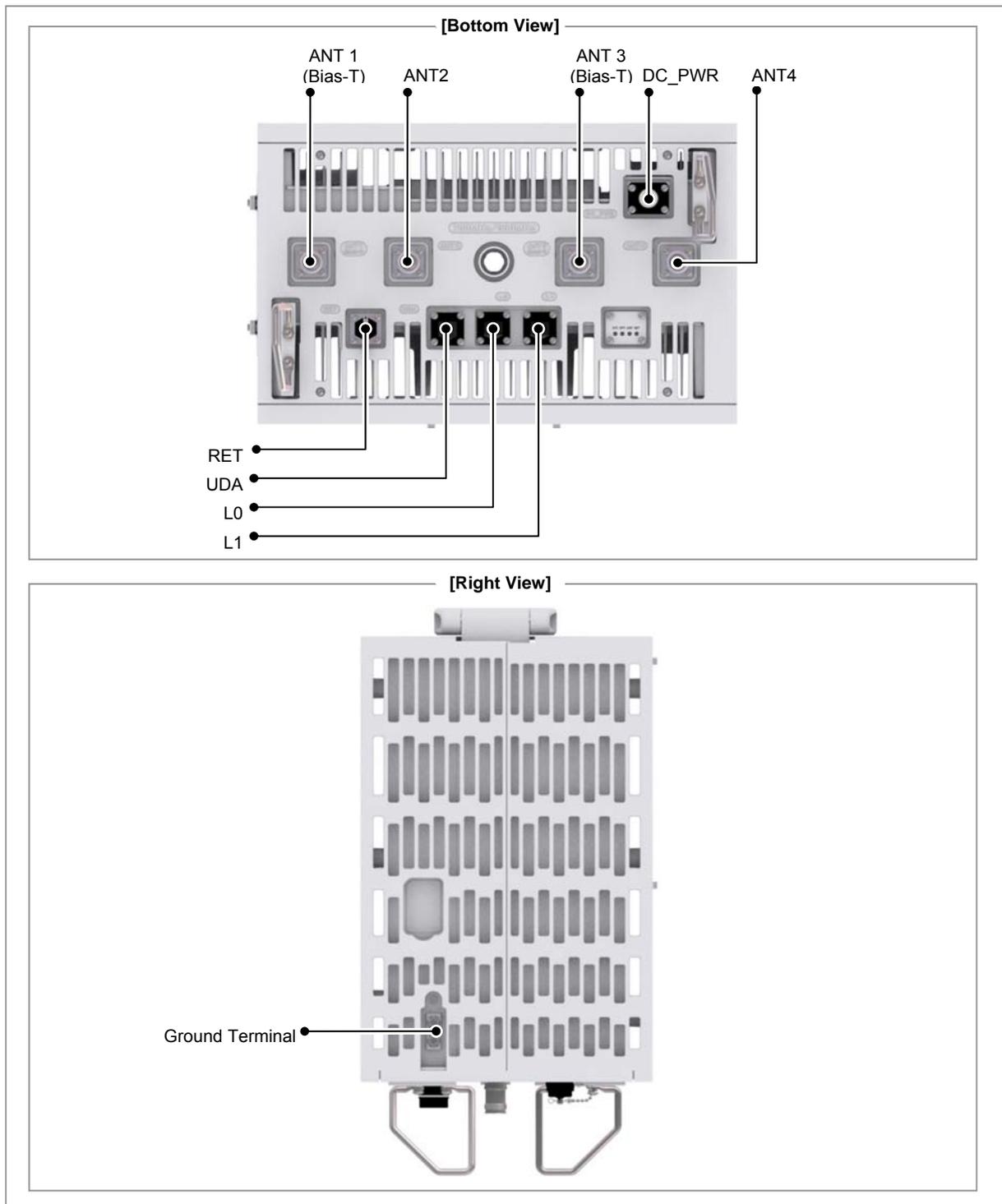
Figure 2. RRH Configuration (with Finger Guard)



## RRH Interface

The following figure depicts the physical view of the RRH interfaces.

Figure 3. RRH Interface



## Specifications

The following table lists the main specifications of the RRH.

*Table 1. Specifications*

Item	RRH
Input Current (MAX)	24 A @ -48 V DC

## Cautions for Installation

Observe the following safety instructions when installing the system. Installation should be 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.
- With guardrails or fences, block open areas such as connecting parts, roof, and scaffold.



Install the system in the Restrict Access Area.

---

### While Installing

While installation, ensure the following:

- The system power must be cut off before 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.



Make sure the power switch of power supply is off when installing the system. Installing the system with power switch on may cause system damage or fatal human injury when cables are not correctly connected.



Make sure 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.

---



Never allow foreign substances to be inserted into unused ports by covering them with a cap.



To prevent foreign substances, outdoor air and moisture from entering the cable inlet (including cable gland and conduit), do the following:

- 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.



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

---

RRH	Safe Distance
RFV01U-D2A	1000 cm

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## 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. Handle the optical cables with care as the laser beam can seriously damage the worker's eyes.

---



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



While cleaning the power supply device, take caution that the device is not exposed to foreign objects that may cause power failure.

---

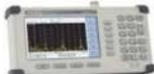
## Installation Tools

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

**Table 2. Basic Installation Tools**

No.	Name	Specification	Purpose of use
1	 Torque Driver	Apply a torque range : 2 to 10 lbf·in	For fastening finger guard (M3).
		Apply a torque range : 20 to 90 lbf·in	For fastening RRH ground pressure terminal (M5 and M6).
2	 Screw Driver Bit	'+', No. 2	For fastening finger guard (M3 and M5).
		'+', No. 3	For fastening RRH ground pressure terminal (M6).
3	 Screw Driver	'+', No. 2	For loosening M3 and M5 screws.
		'+', No. 3	For loosening M6 screws.
4	 Torque Wrench	Apply a torque range : 10 to 50 lbf·in	For tightening M6 Hex. Bolt and RF connector of system (4.3-10 type).
		Apply a torque range : 100 to 400 lbf·in	For tightening M10 Hex. Bolt and RF connector of antenna (DIN type).
5	 Torque Wrench Spanner Head	Apply Hex. Bolt Head: 10 mm (for 10 to 50 lbf·in)	For tightening M6 Hex. Bolt.
		Apply Hex. Bolt Head: 17 mm (for 100 to 400 lbf·in)	For tightening M10 Hex. Bolt.
		Apply Hex. Bolt Head: 22 mm (for 10 to 50 lbf·in)	For tightening RF connector of system (4.3-10 type).
		Apply Hex. Bolt Head: 32 mm (for 100 to 400 lbf·in)	For tightening RF connector of antenna (DIN type).
6	 Spanner	10 mm	For loosening M6 Hex. Bolt.
		17mm	For loosening M10 Hex. Bolt.
		22 mm	For loosening RF connector of system (4.3-10 type).
		32mm	For loosening RF connector of antenna (DIN type).
7	 Ratchet Wrench	10 × 13/17 × 19 (4 in 1)	For fastening Hex. Bolt.
8	 Tape Measure	16 ft./150 ft.	Tape measure for length measurement.
9	 Power Extension Cable	100 ft.	Basic tool.

No.	Name	Specification	Purpose of use
10	Level 	Normal	For horizontality and verticality.
11	Hammer Drill 	Normal	Wall type drilling.
12	Concrete Drill Bit 	0.55 in. (14 mm)	For the M10 strong Anchor.
13	Anchor Punch 	M10	For the M10 strong Anchor.
14	Hammer 	Normal	Anchor fixing.
15	Vacuum Cleaner 	Normal	For removing dust during the drilling work.
16	Heating Gun 	122 to 572°F (50 °C to 300 °C)	Shrinking feeder cable tube.
17	Cable Cutter 	0.24 to 1.26 in. (6 to 32 mm)	Cable cutting.
18	Crimping Tool 	AWG14 to AWG4 (1.5 to 16 mm <sup>2</sup> )	Pressure terminal for crimping.
19	Wire Stripper 	Apply cable thickness: 1.5 to 6.2 in. (4 to 16 mm)	Cable sheath for removal.
20	Nipper 	Basic Tool	For cutting cable.
21	LAN Tool 	Basic Tool	RJ45 crimper.
22	Industrial Scissor 	Basic Tool	Cutting.
23	Knife 	Basic Tool	Cutting.
24	Optical Connector Cleaner	For LC Connector	For optical connector cleaning.

No.	Name	Specification	Purpose of use
			
25	Optical Transceiver Removal Tool 	Normal	Separate the optical module.
26	Multi tester 	Digital Pocket Tester	The voltage and current measurements. Whether measured cable disconnection.
27	Fiber Optical Test Set 	Wave length: 1310 nm, 1550 nm (single mode) 850 nm, 1310 nm (multi-mode)	Optical level check.
28	Angle Meter 	Normal	Antenna angle measurement.
29	Multi master (VSWR and RF Power) 	Normal	Feeder VSWR measurement.
30	Compass 	Normal	Check azimuth during installation.



The required installation tools may vary depending on the conditions at the site. In addition to the basic tools, a protractor, ladder, safety equipment, cleaning tools, and so on should also be arranged in consideration of the site conditions.

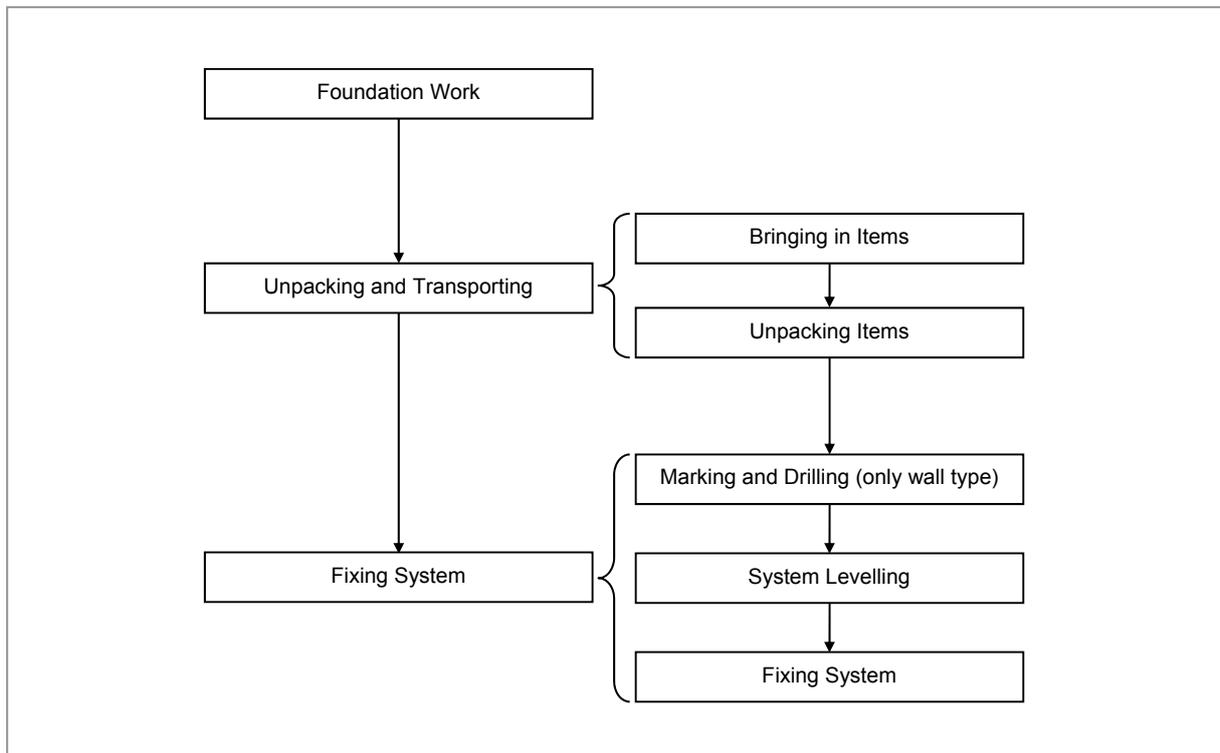
# Chapter 2 Installing System

This chapter describes the installation procedures of the RRH.

## Installation Procedure

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

*Figure 4. Procedure to Install the RRH*



Make sure that the power switch of the power supply is OFF when installing the system. Installing the system with the power switch ON may cause system damage or fatal human injury when connecting or disconnecting the cables.



To prevent the risk of electrical shock, do not wear accessories such as watches and rings.

## System Arrangement

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

The following figures depict the recommended distances for each direction of the RRH in different installation scenarios.

**Figure 5. RRH Arrangement\_1 Sector Pole Type Installation (Standard Installation)**

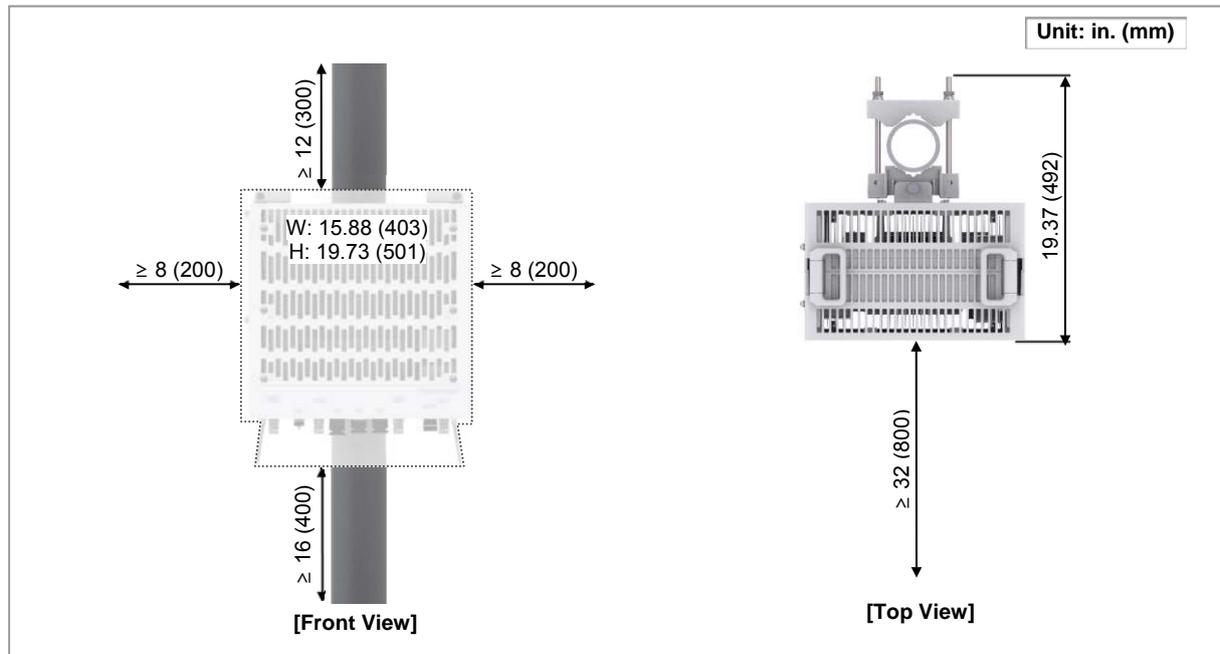


Figure 6. RRH Arrangement\_1 Sector Pole Type Installation (Side Installation)

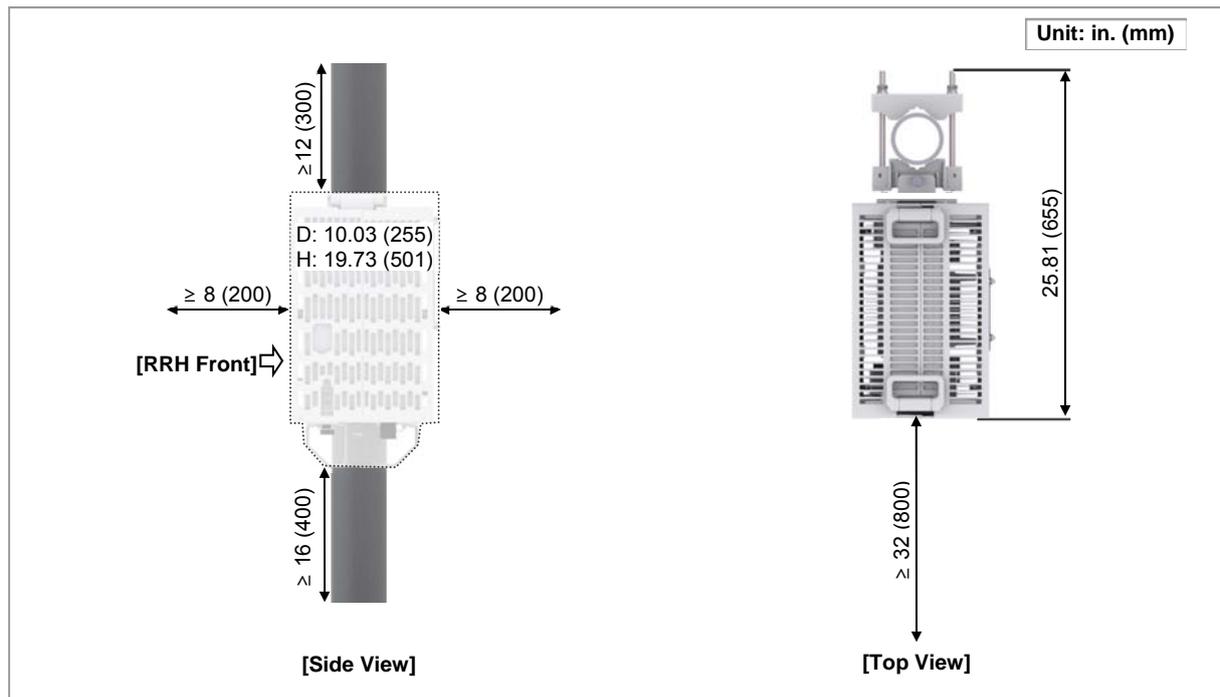
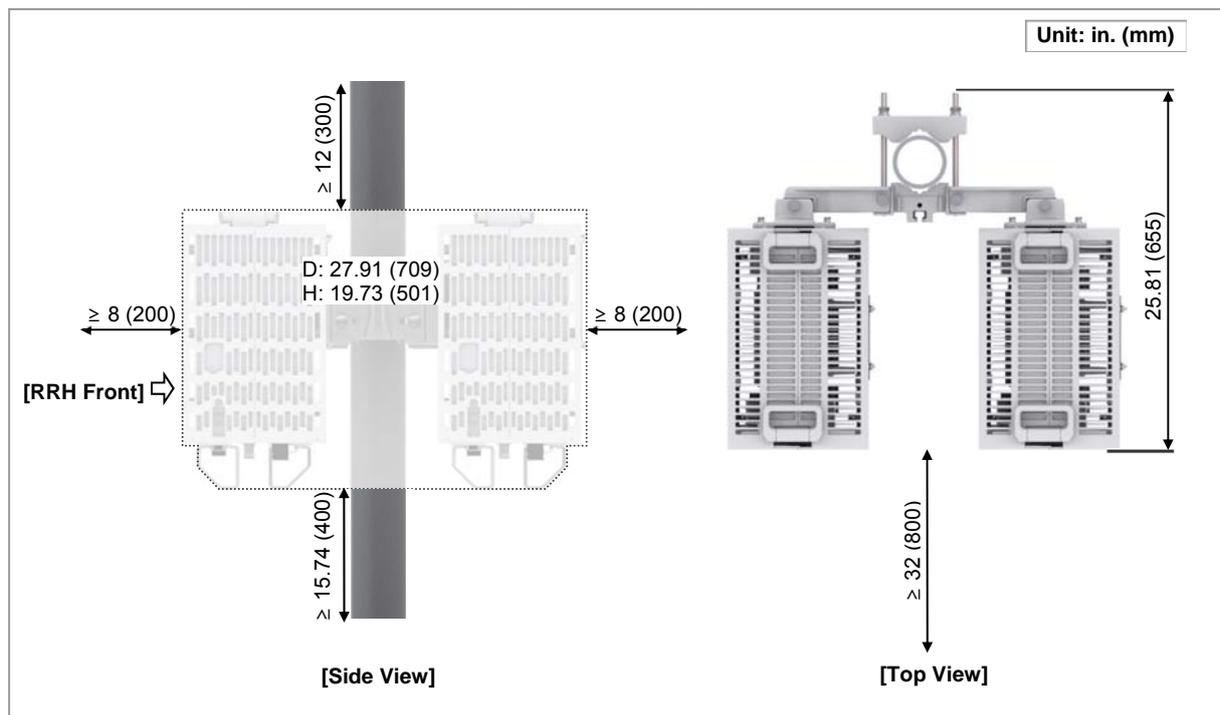
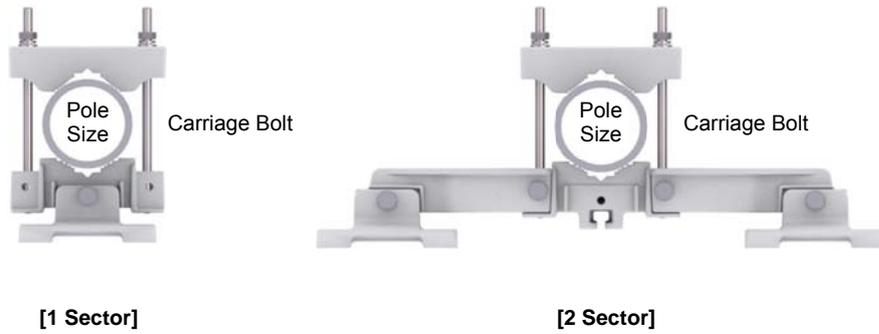


Figure 7. RRH Arrangement\_2 Sector Pole Type Installation (Side Installation)



When fixing a pole mounting bracket, the length of a carriage bolt is 220 mm for the pole diameter 50 to 100 A.

Pole Size (Diameter)	Length of Carriage Bolt
50 A (60.5 mm)	220 mm
65 A (76.3 mm)	
80 A (89.2 mm)	
90 A (101.6 mm)	
100 A (114.3 mm)	



When two sectors pole type (side installation) is installed, it is recommended to install it to the pole of the 80 to 100 A specification.

Figure 8. RRH Arrangement\_1 Sector Wall Type Installation (Standard Installation)

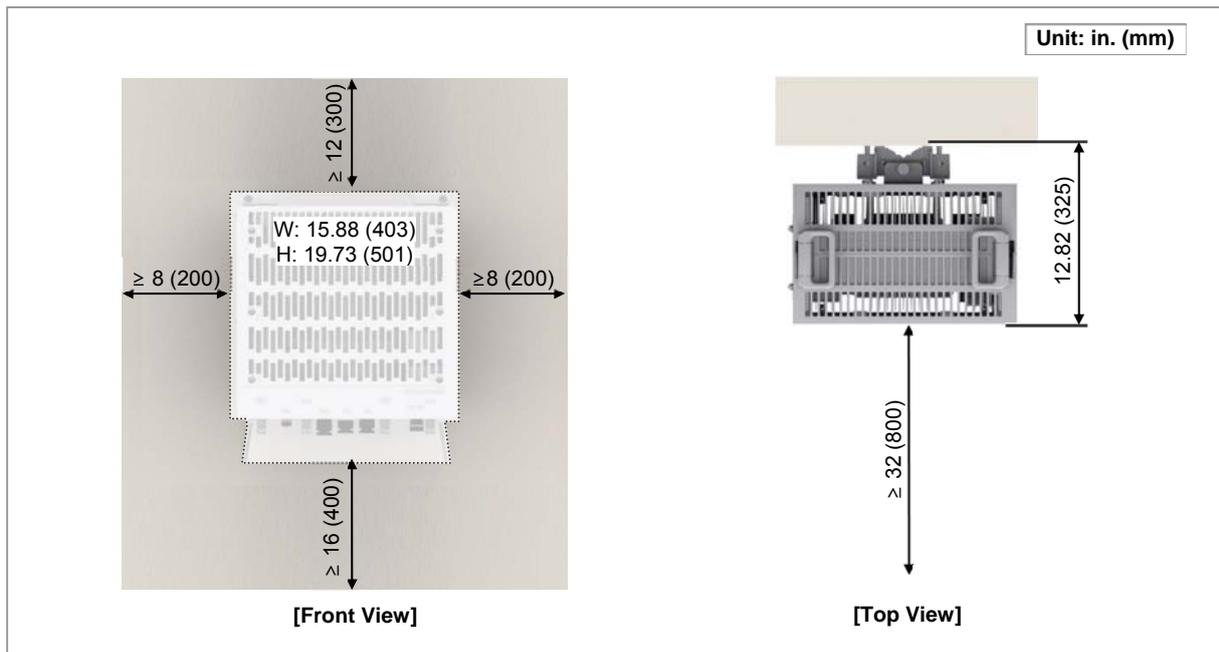


Figure 9. RRH Arrangement\_1 Sector Wall Type Installation (Side Installation)

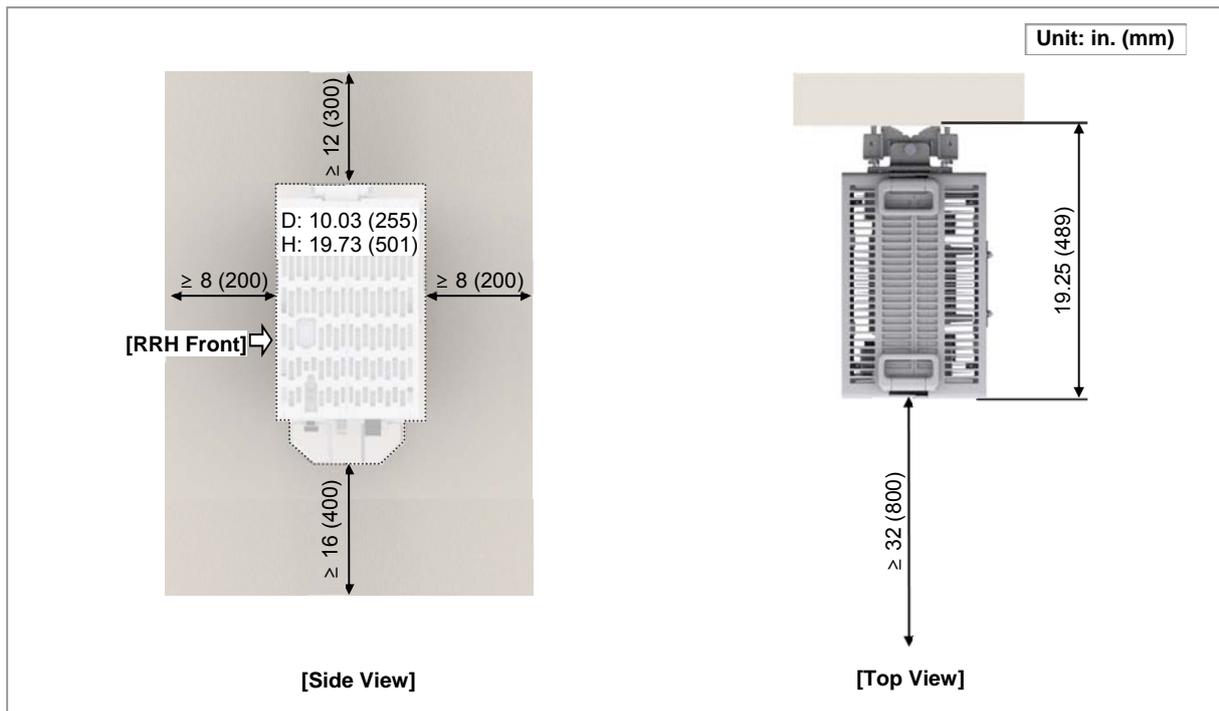


Figure 10. RRH Arrangement\_3 Sector Wall Type Installation (Standard Installation)

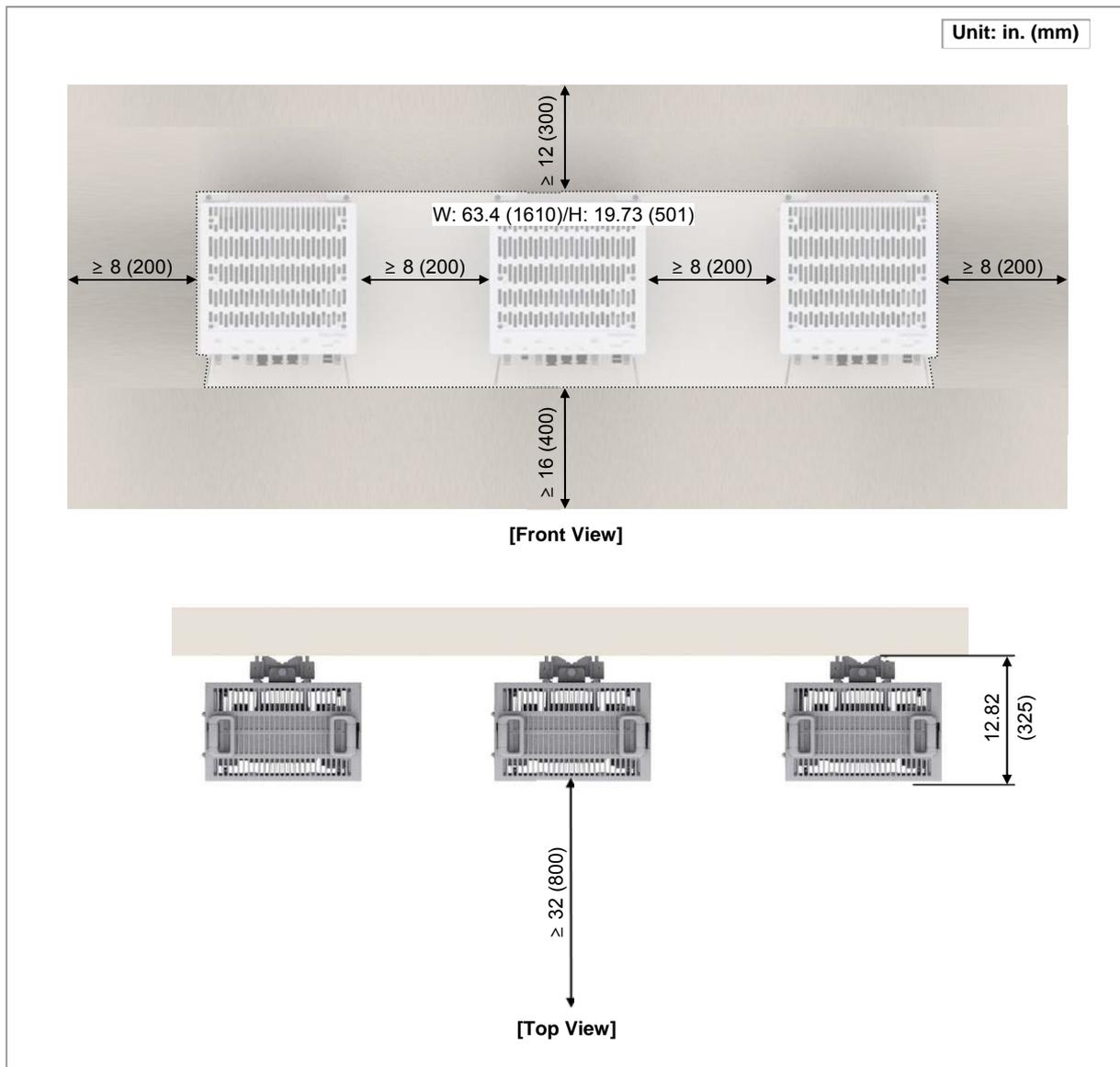
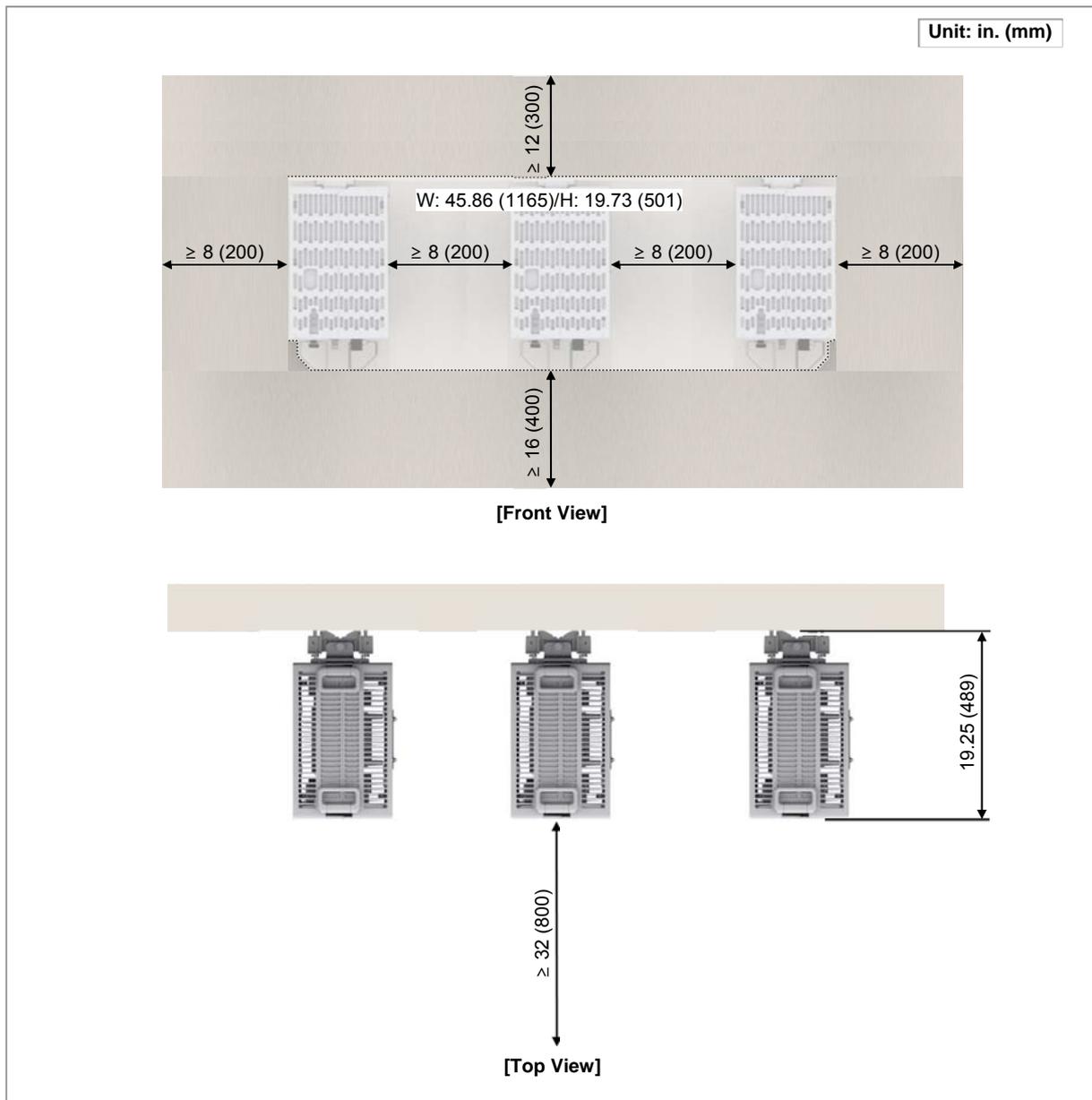


Figure 11. RRH Arrangement\_3 Sector Wall Type Installation (Side Installation)



## Transporting and Unpacking

This section describes the procedure to unpack cabinets and other components and to transport them to the installation place.

### Bringing in Items

Bring in items, taking care of the followings:

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

### Unpacking Items

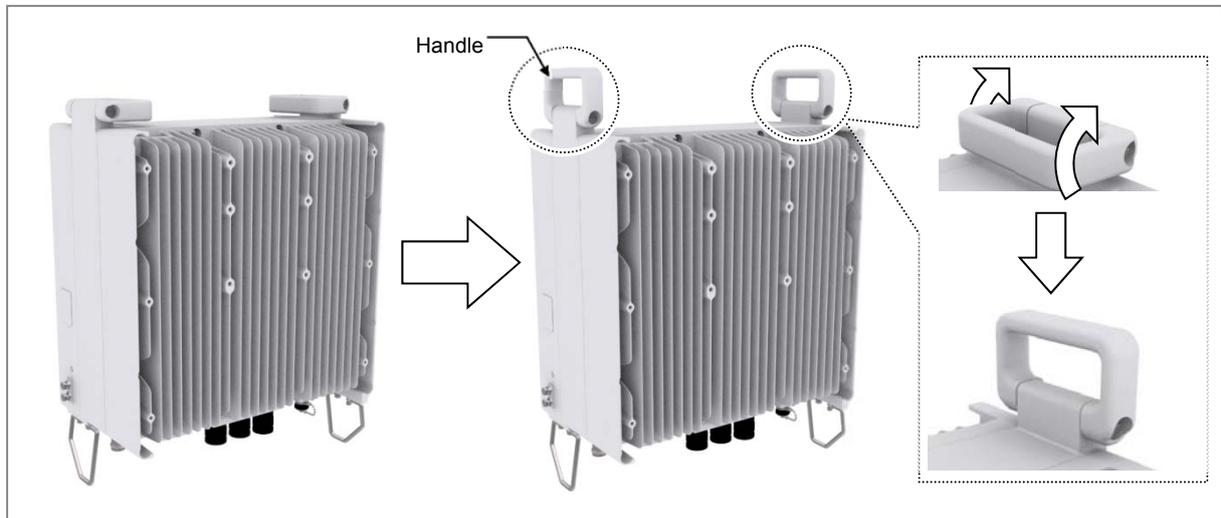
To unpack the items, ensure the following:

- The items must be packed until they reach the installation place.
- The items are classified in accordance with each job specification and stored on a place that does not interfere with working.
- Unpacked systems must be installed immediately. If not installed, 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.
- Scrap by-products (packaging waste) in accordance with the rule. Do not recycle the by-products.

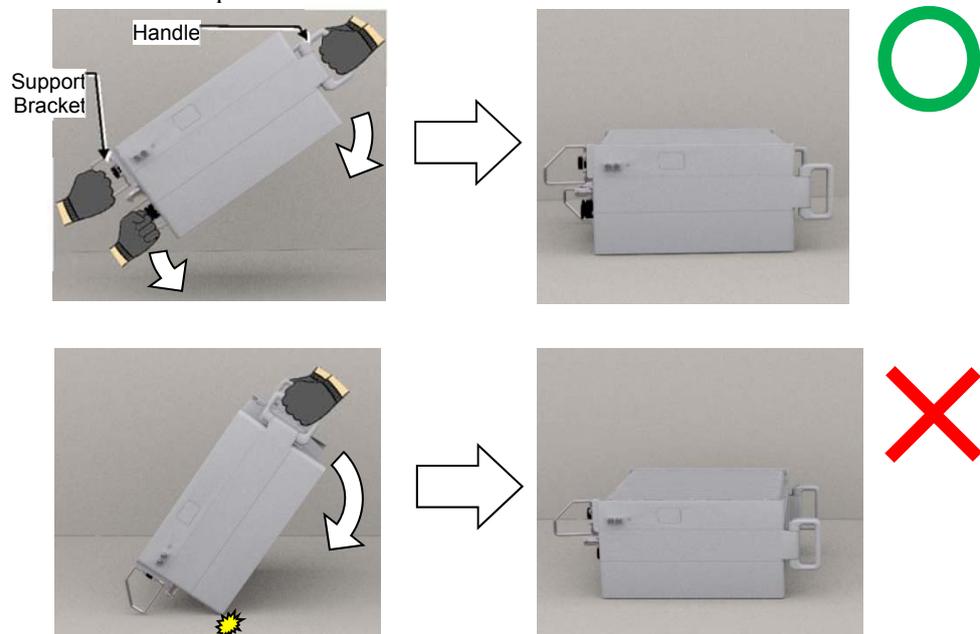
## RRH Handling

When transporting the RRH, hold the handle at the top of the RRH (No tool is needed for holding the handle).

Figure 12. RRH Handling



When lifting or putting down the RRH, two or more operators must hold the handle and the support bracket respectively. The corner of the RRH may be scratched if one operator holds the handles.



## Fixing RRH

This section describes the procedures to fix the system on a wall and a pole.

### Fixing Finger Guard

To fix the finger guard, do the following:

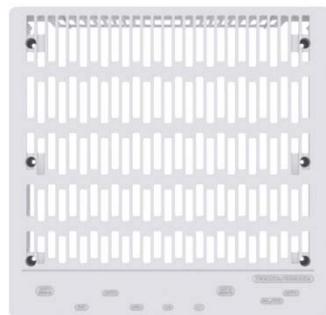
- 1 Make sure you have the following items:

**Table 3. Parts and Tools for fixing Finger Guard**

Category	Description		
Parts	Finger Guard_Front		1 EA/RRH
	Finger Guard_Rear		1 EA/RRH
	Finger Guard_Bottom		1 EA/RRH
	Fastener	M3 × 10L screw	4 EA/RRH
M5 × 10L SEMS		12 EA/RRH	
Recommended Torque Value	M3 screw		5.6 lbf·in (6.4 kgf·cm)
	M5 SEMS		25 lbf·in (29 kgf·cm)
Working Tools	<ul style="list-style-type: none"> <li>• Torque driver (2 to 10 lb·fin and 20 to 90 lbf·in)</li> <li>• Screw driver bit ('+', No. 2)</li> <li>• Screw driver ('+', No. 2)</li> </ul>		



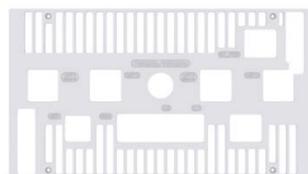
Check the type and fixing location of the finger guard before fixing it.



[Finger Guard\_Front]



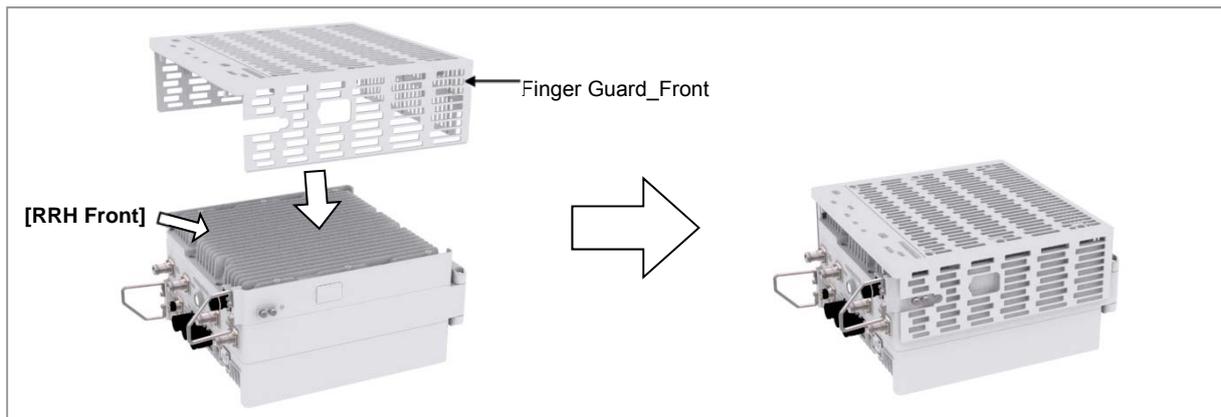
[Finger Guard\_Rear]



[Finger Guard\_Bottom]

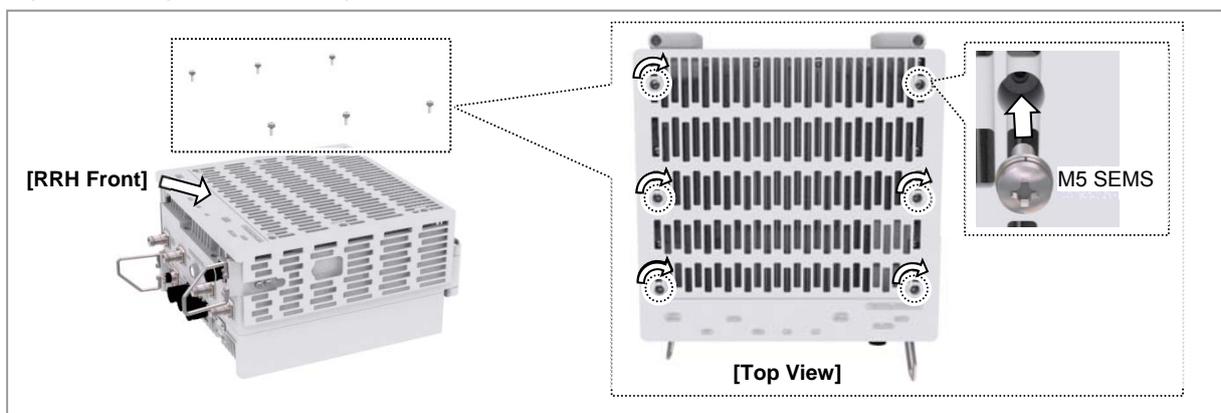
- 2 Place the finger guard\_front to the RRH front.

Figure 13. Finger Guard Fixing (1)



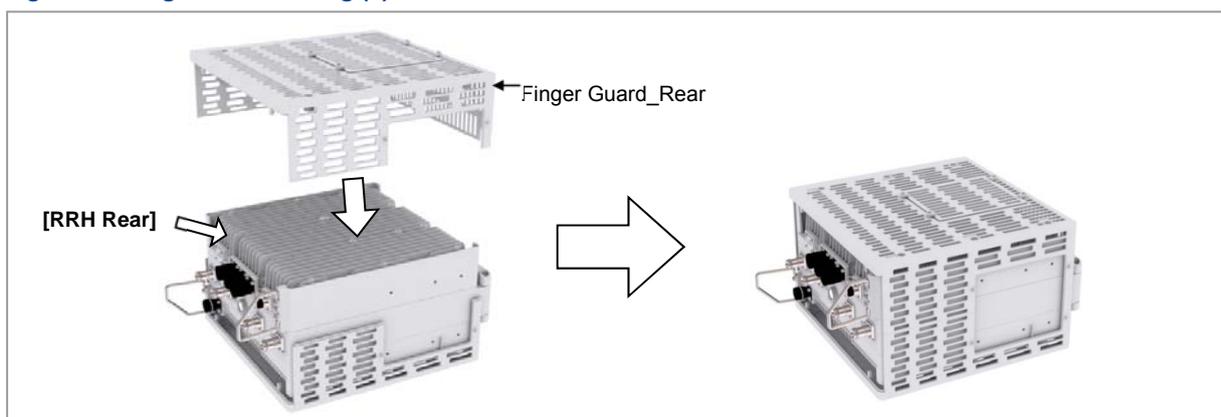
- 3 Fix the finger guard\_front using fasteners.

Figure 14. Finger Guard Fixing (2)



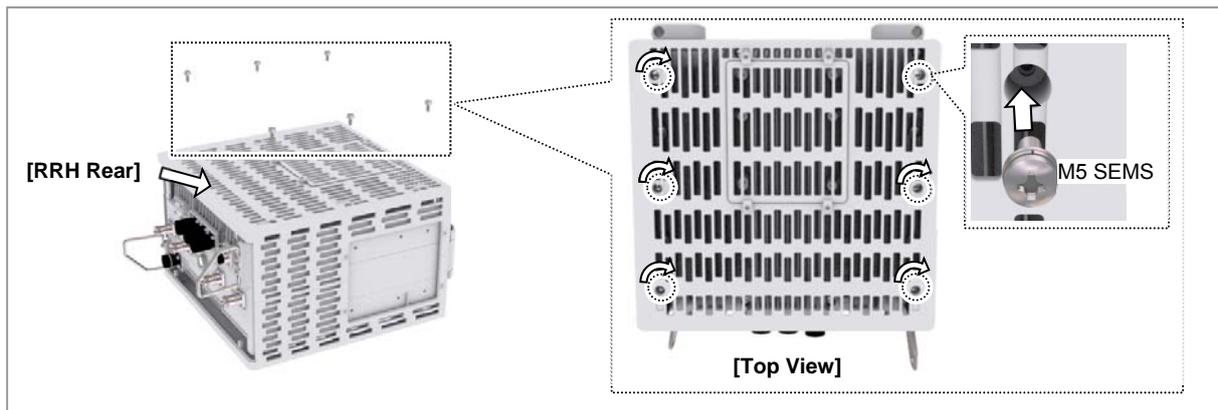
- 4 Place the finger guard\_rear to the RRH rear.

Figure 15. Finger Guard Fixing (3)



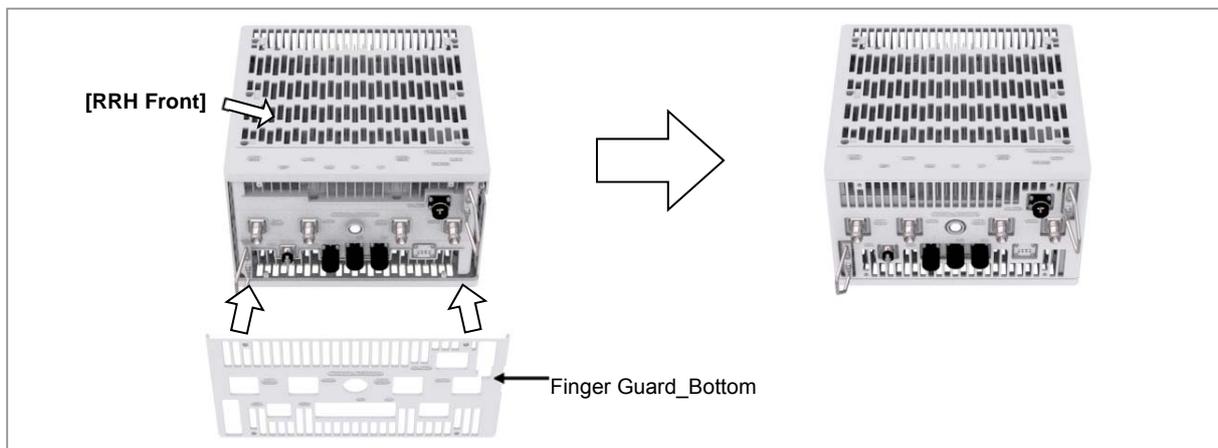
- 5 Fix the finger guard\_rear using fasteners.

Figure 16. Finger Guard Fixing (4)



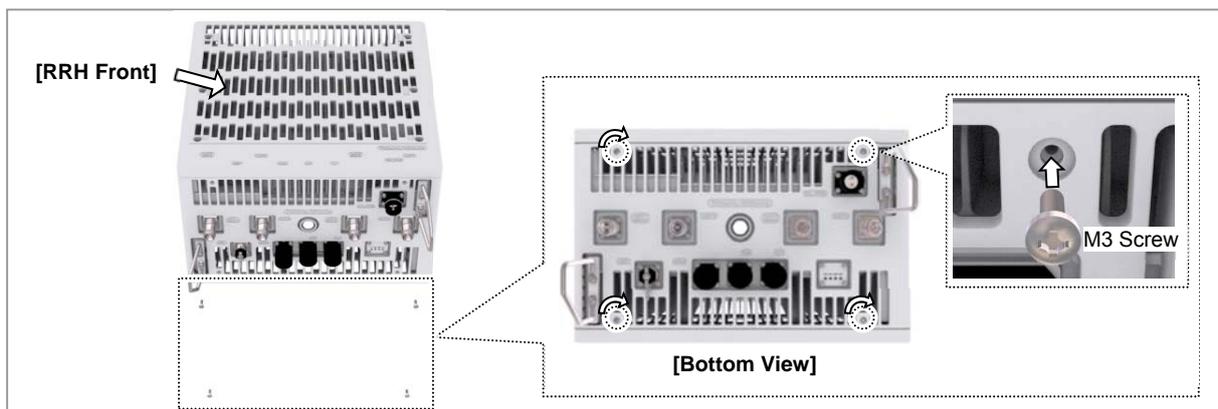
- 6 Place the finger guard\_bottom to the RRH bottom.

Figure 17. Finger Guard Fixing (5)



- 7 Fix the finger guard\_bottom using fasteners.

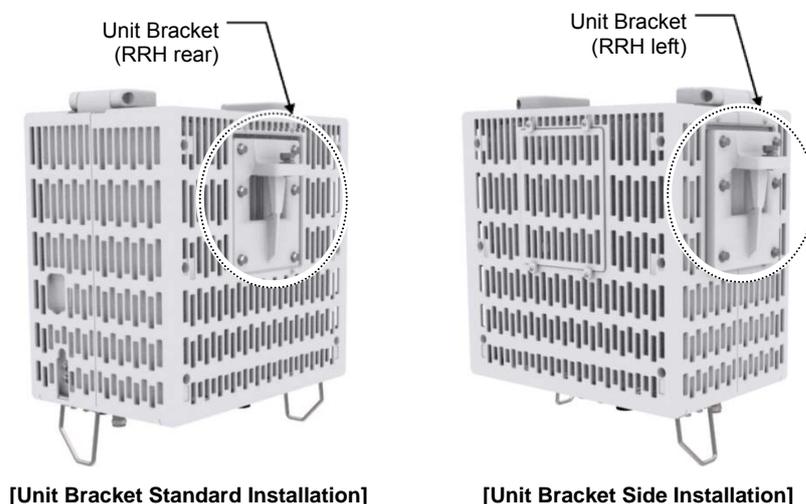
Figure 18. Finger Guard Fixing (6)



## Fixing Unit Bracket



There are two ways to fix a unit bracket to the RRH. One is fixing a unit mounting bracket to the rear side of RRH (standard installation). The other is fixing a unit bracket to the side of RRH (side installation). These are the same for the wall type and pole type installation procedures.



To fix the unit Bracket\_Standard for standard installation, do the following:

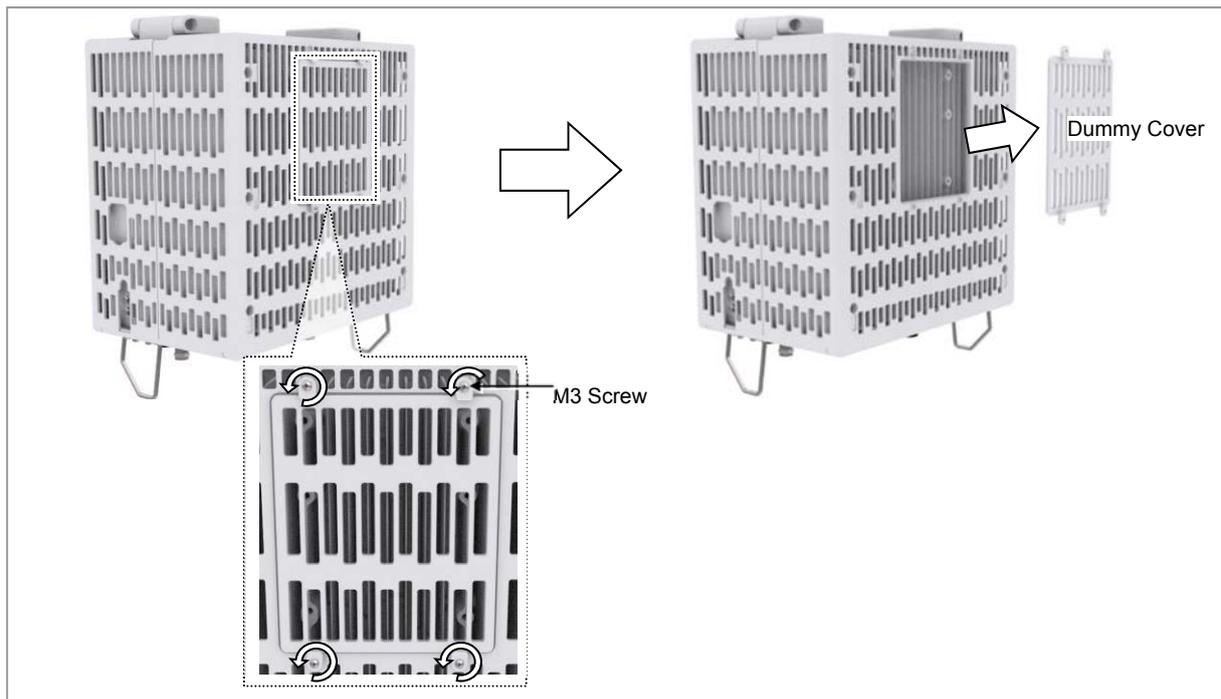
- 1 Make sure that you have the following items:

**Table 4. Parts and Tools for fixing Unit Bracket\_Standard installation**

Category	Description	
Parts	Unit bracket	
		1 EA/RRH
Recommended Torque Value	Fasteners	M6 × 35L Hex. Bolt (washer assembly)
		6 EA/RRH
Working Tools	M3 screw	5.6 lbf·in (6.4 kgf·cm)
	M6 Hex. Bolt	43 lbf·in (50 kgf·cm)
	<ul style="list-style-type: none"> <li>Torque Wrench (10~50 lbf·in)</li> <li>Torque Wrench Spanner head (apply Hex. Head: 10 mm)</li> <li>Spanner (10 mm)</li> <li>Torque driver (2 to 10 lbf·in)</li> <li>Screw driver bit ('+', No. 2)</li> <li>Screw driver ('+', No. 2)</li> </ul>	

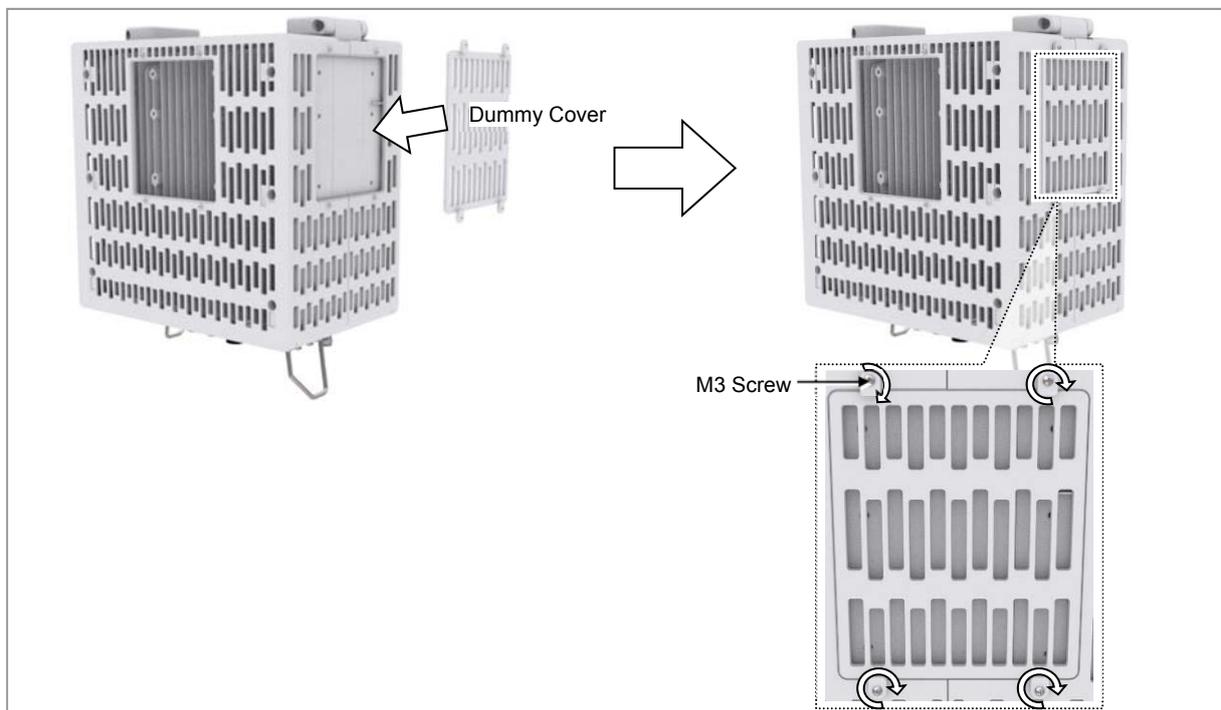
- 2 Loosen the fastener of finger guard\_rear and separate the dummy cover from it.

Figure 19. Fixing Unit Bracket\_Standard Installation (1)



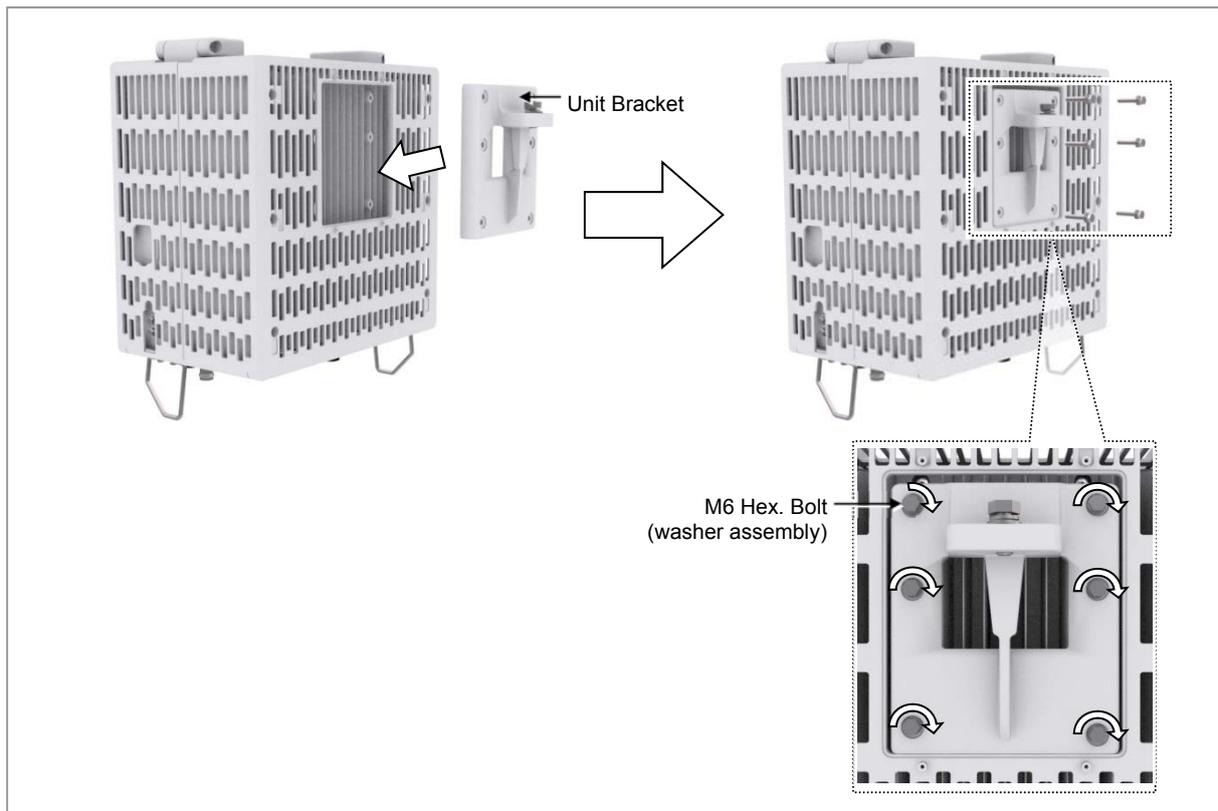
- 3 Place a dummy cover to the RRH left and fix it using fasteners.

Figure 20. Fixing Unit Bracket\_Standard Installation (2)



- 4 Place a unit bracket to the RRH rear and fix it using fasteners.

Figure 21. Fixing Unit Bracket\_Standard Installation (3)



To fix the unit Bracket\_Side for standard installation, do the following:

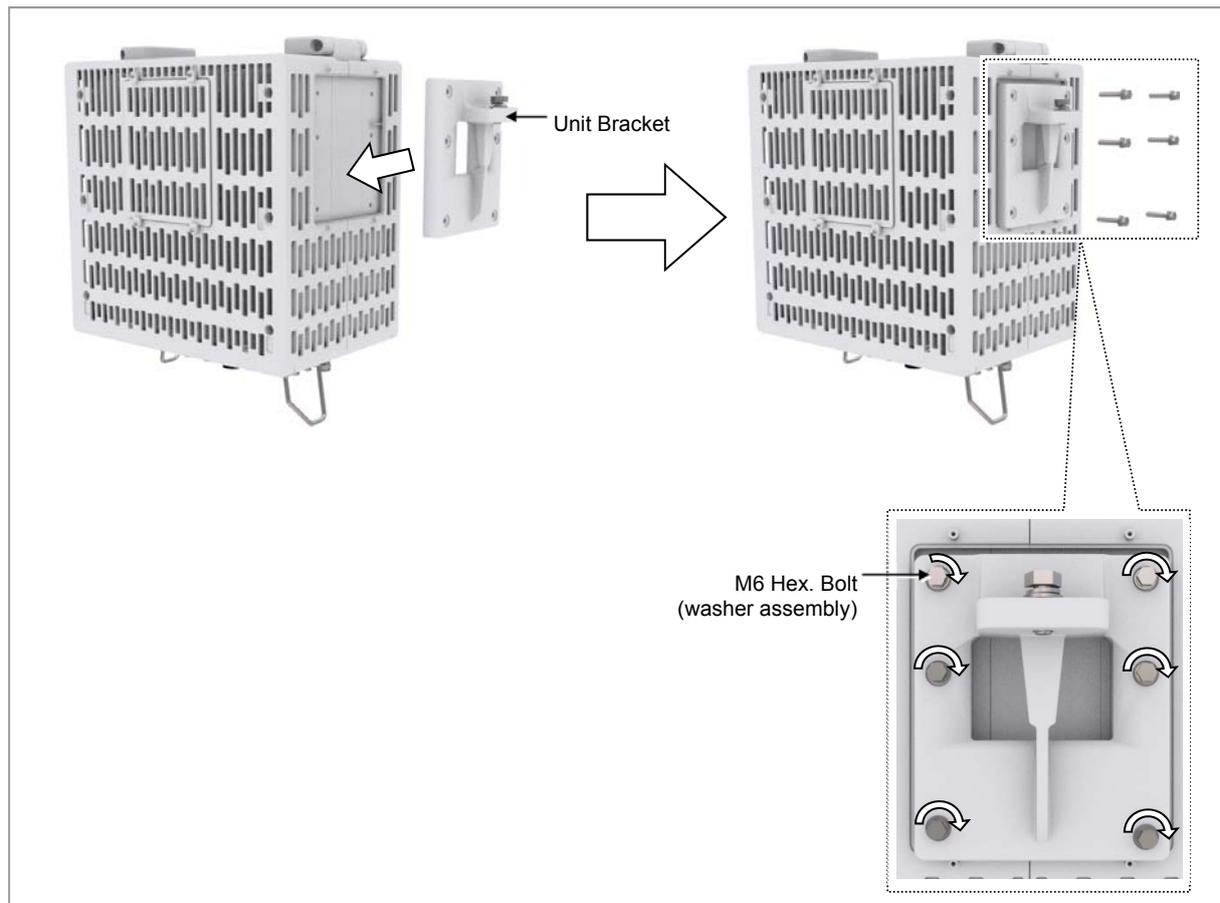
- 1 Make sure that you have the following items:

Table 5. Parts and Tools for fixing Unit Bracket\_Standard Installation

Category	Description	
Parts	Unit bracket	1 EA/RRH
	Fasteners	M6 × 35L Hex. Bolt (washer assembly) 6 EA/RRH
Recommended Torque Value	M6 × 20L Hex. Bolt	43 lbf-in (50 kgf-cm)
Working Tools	<ul style="list-style-type: none"> <li>• Torque wrench (10 to 50 lbf-in)</li> <li>• Torque wrench spanner head (apply Hex. Head: 10 mm)</li> <li>• Spanner (10 mm)</li> </ul>	

- 2 Place a unit bracket to the RRH left and fix it using fasteners.

Figure 22. Fixing Unit Bracket\_Side Installation



## Fixing Pole Type

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

### Assembling Mounting Bracket

To assemble the mounting bracket, do the following:

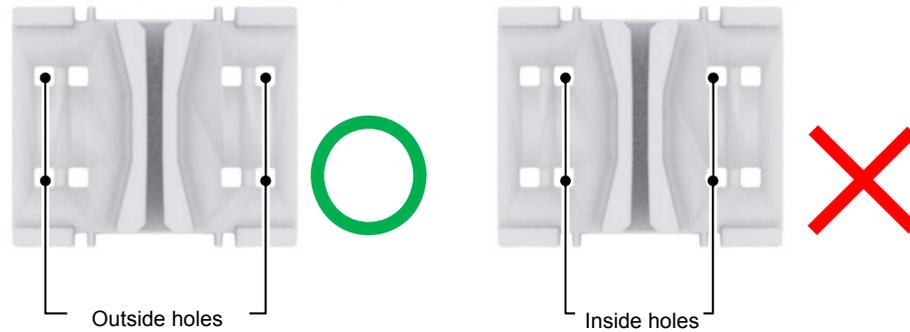
- 1 Make sure you have the following items:

Table 6. Parts and Tools for assembling Mounting Bracket

Category	Description		
Parts	Mounting Bracket_Front		1 EA
	Mounting Bracket_Rear		1 EA
	Fasteners	<ul style="list-style-type: none"> <li>• M10 × 220L Carriage Bolt</li> <li>• M10 Plain Washer</li> <li>• M10 Spring Washer</li> <li>• M10 Hex. Nut</li> </ul>	4 EA 4 EA 4 EA 4 EA
Working Tools	Spanner (17 mm)		

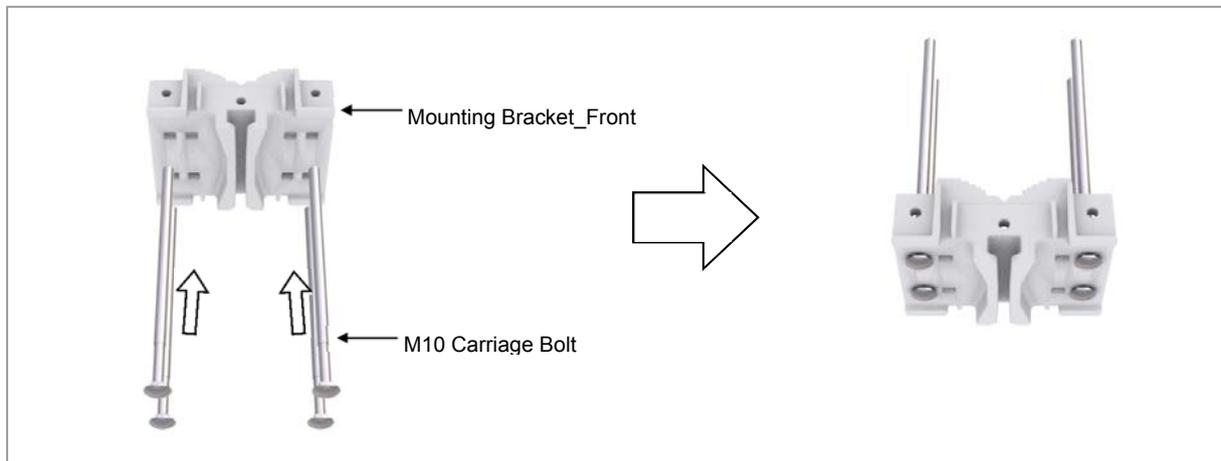
 When fixing the mounting bracket, the specification of pole should be from 50 A (2.38 in./60.5 mm) to 100 A (4.5 in./114.3 mm) and the specification of carriage bolt should be M10 × 220L.

 When fixing pole, fix it using the outside hole of mounting bracket\_front.



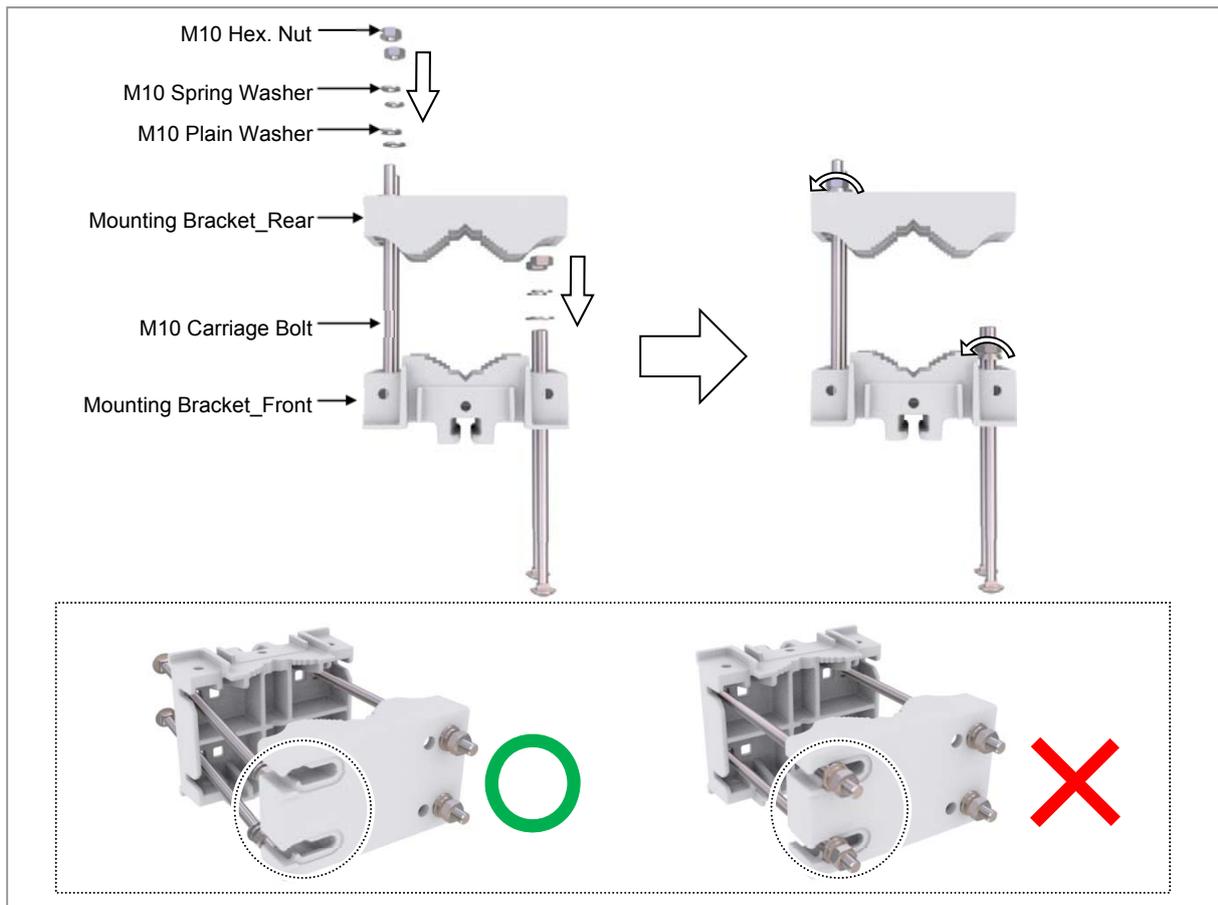
- 2 Insert carriage bolts to the outside hole of mounting bracket\_front.

**Figure 23. Assembling Mounting Bracket (1)**



- 3 Pass the carriage bolt through the side-closed hole of the mounting bracket\_rear and then fix the fastening material.
- 4 Fasten the other carriage bolt to the mounting bracket\_front only.

Figure 24. Assembling Mounting Bracket (2)

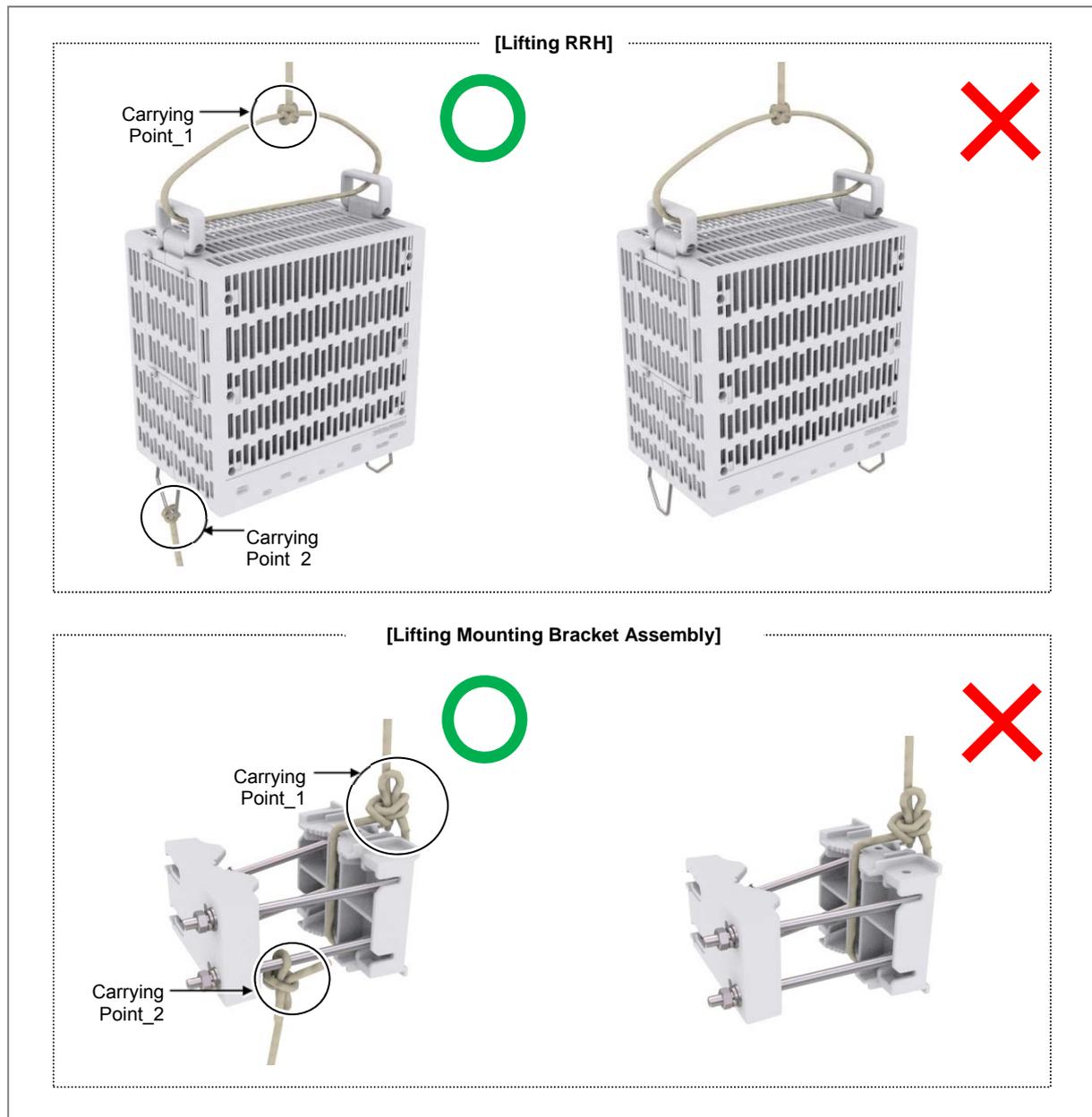


### Lifting RRH and Mounting Bracket Assembly

To lift the RRH/mounting bracket assembly, do the following:

- 1 Tie the rope in two carrying points of the RRH and the Mounting bracket assembly.

Figure 25. Lifting RRH and Mounting Bracket Assembly

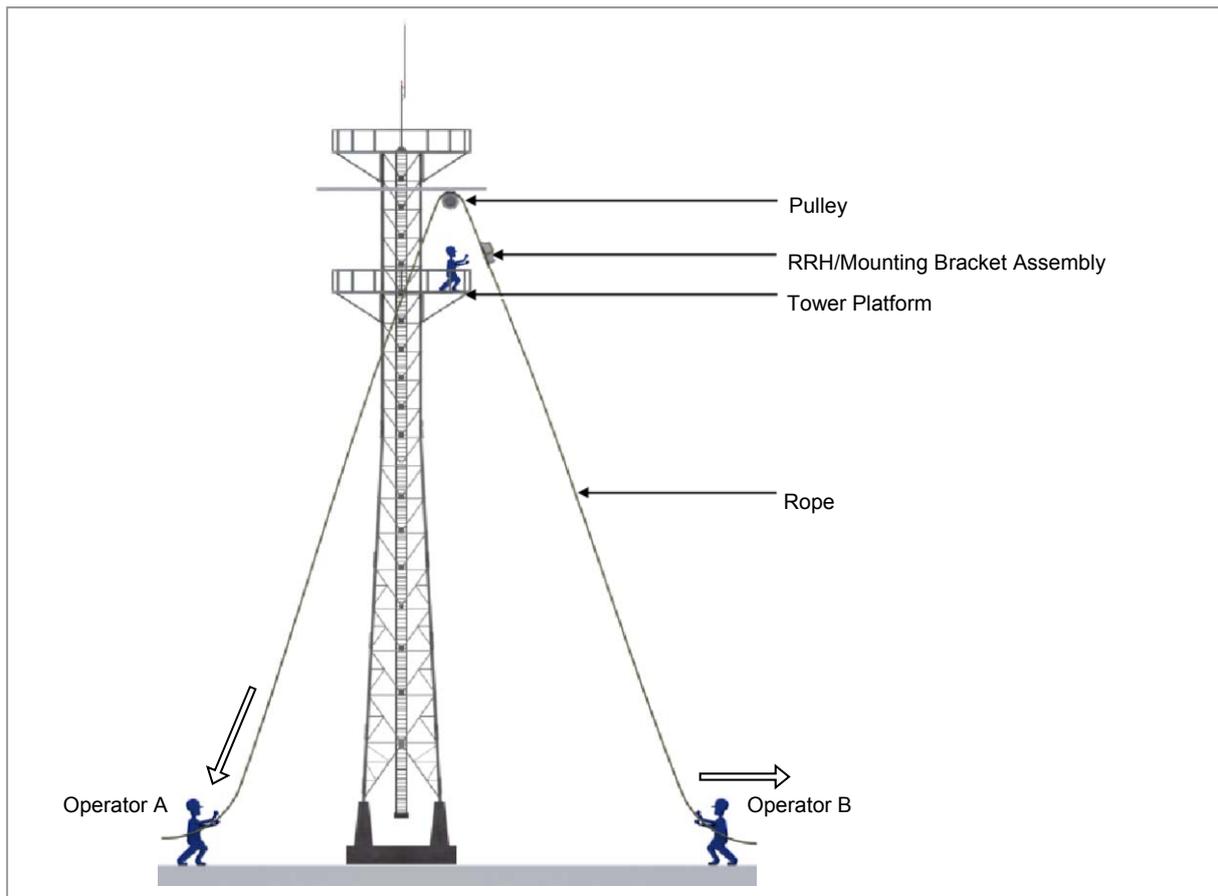


- 2 Haul the rope to carry up the RRH/Mounting bracket assembly and at the same time, pull the rope outward to avoid collision with the tower platform.



To perform the above step, two operators are required. One for hauling the rope and the other for pulling the rope outward. For more information, see Figure 25.

Figure 26. Lifting RRH and Mounting Bracket Assembly



### Fixing Mounting Bracket Assembly

#### For 1 Sector

To fix the mounting bracket Assembly\_1 sector pole type, do the following:

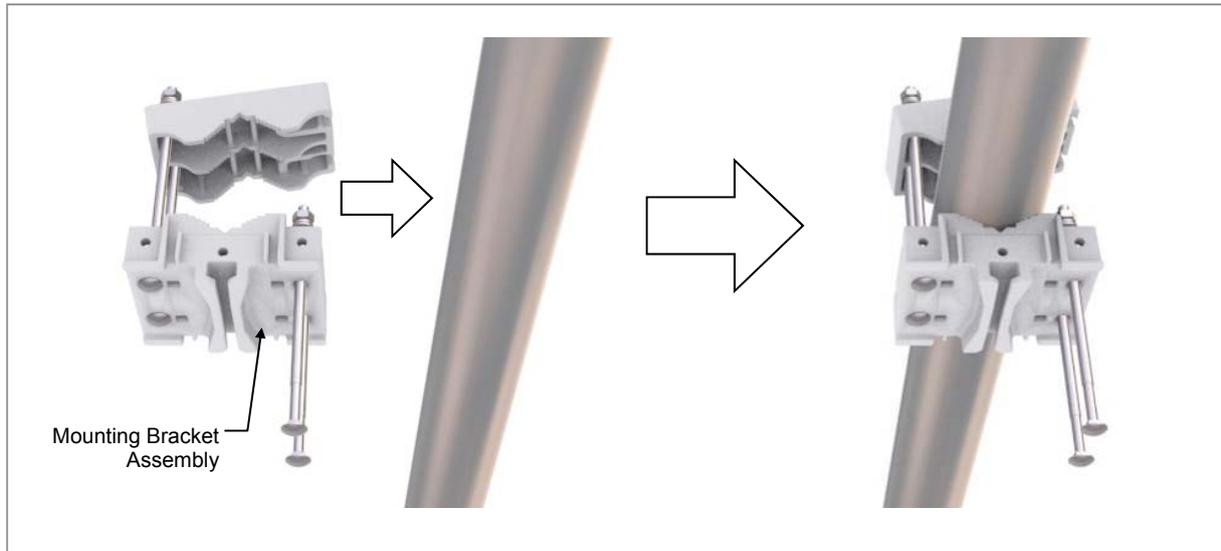
- 1 Make sure you have the following items:

Table 7. Parts and Tools for fixing Mounting Bracket Assembly\_1 Sector Pole Type

Category	Description	
Parts	1 Sector Mounting Bracket Assembly	1 Set
Recommended Torque Value	M10 Hex. Nut	217 lbf-in (250 kgf-cm)
Working Tools	<ul style="list-style-type: none"> <li>• Torque Wrench (100 to 400 lbf-in)</li> <li>• Torque Wrench Spanner head (apply Hex. Head: 17 mm)</li> <li>• Spanner (17 mm), Level</li> </ul>	

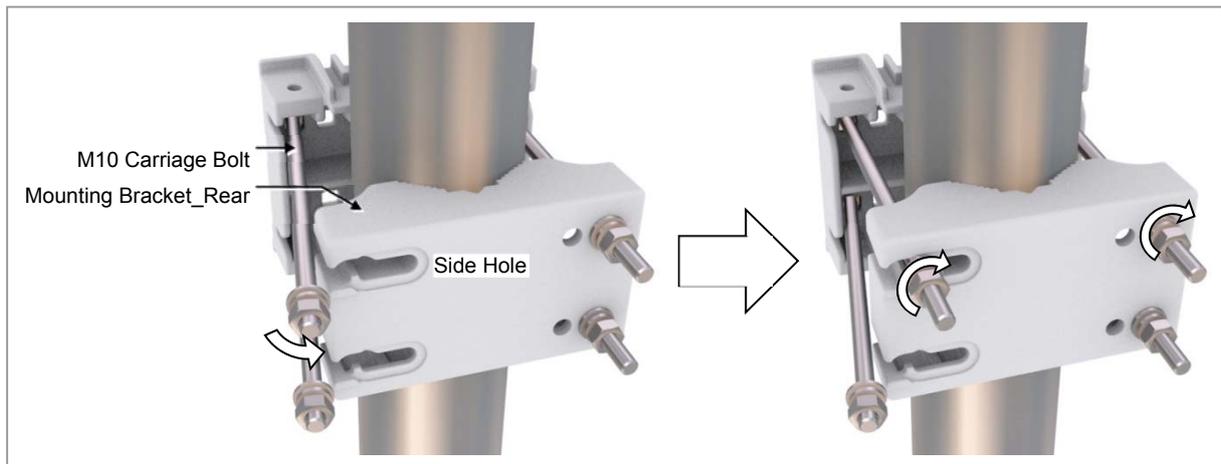
- 2 Place a mounting bracket assembly to the pole.

Figure 27. Fixing Mounting Bracket Assembly\_1 Sector Pole Type (1)



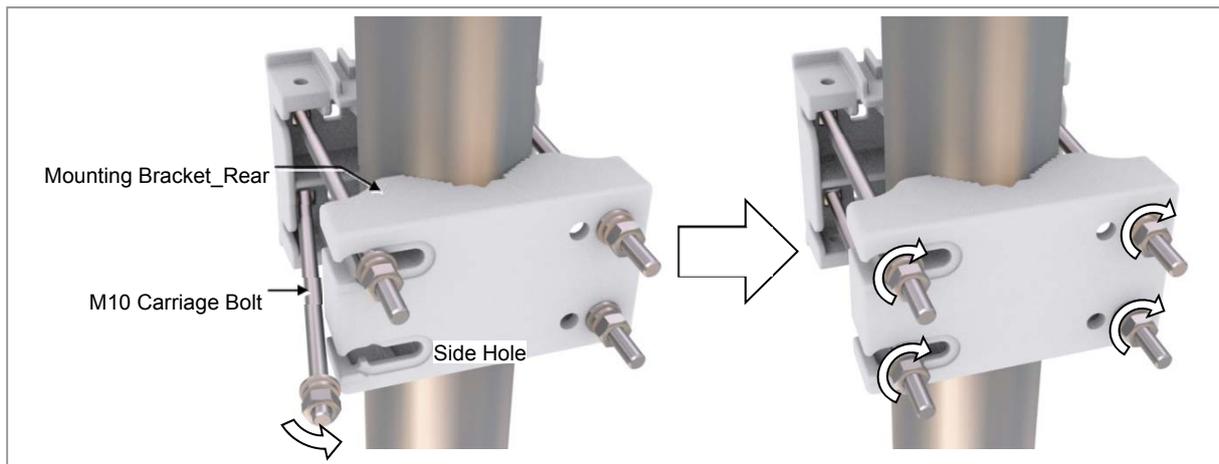
- 3 Locate the upper carriage bolt in the upper side hole of the mounting bracket\_rear and fix the fastening materials temporarily on upper side.

Figure 28. Fixing Mounting Bracket Assembly\_1 Sector Pole Type (2)



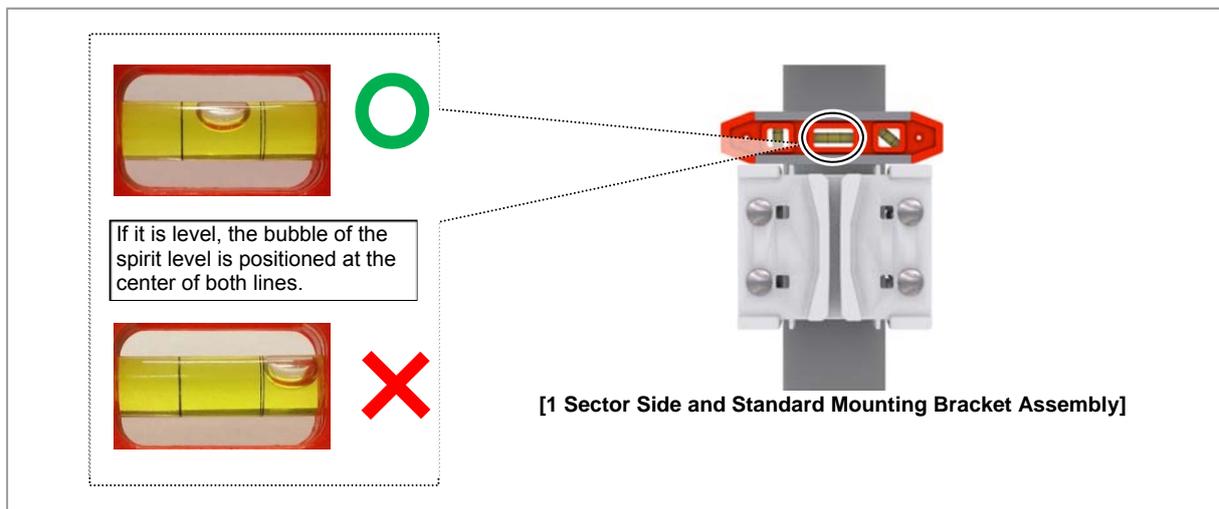
- 4 Locate the lower carriage bolt in the lower side hole of the mounting bracket\_rear and fix the all fastening materials.

Figure 29. Fixing Mounting Bracket Assembly\_1 Sector Pole Type (3)



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

Figure 30. Levelling Mounting Bracket Assembly\_1 Sector 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.

#### For 2 Sector

To fix the mounting bracket Assembly\_2 sector pole type for side installation, do the following:

- 1 Make sure you have the following items:

Table 8. Parts and Tools for fixing Mounting Bracket Assembly\_2 Sector Pole Type (Side Installation)

Category	Description
----------	-------------

Category	Description	
Parts	1 Sector Mounting Bracket Assembly	1 Set
	Extension Mounting Bracket	2 EA
	Fastener	M10 × 25L Hex. Bolt (washer assembly) 2 EA
Recommended Torque Value	M10 Hex. Bolt/Nut	217 lbf·in (250 kgf·cm)
Working Tools	<ul style="list-style-type: none"> <li>• Torque Wrench (100 to 400 lbf·in)</li> <li>• Torque Wrench Spanner head (apply Hex. Head: 17 mm)</li> <li>• Spanner (17 mm)</li> <li>• Level</li> </ul>	

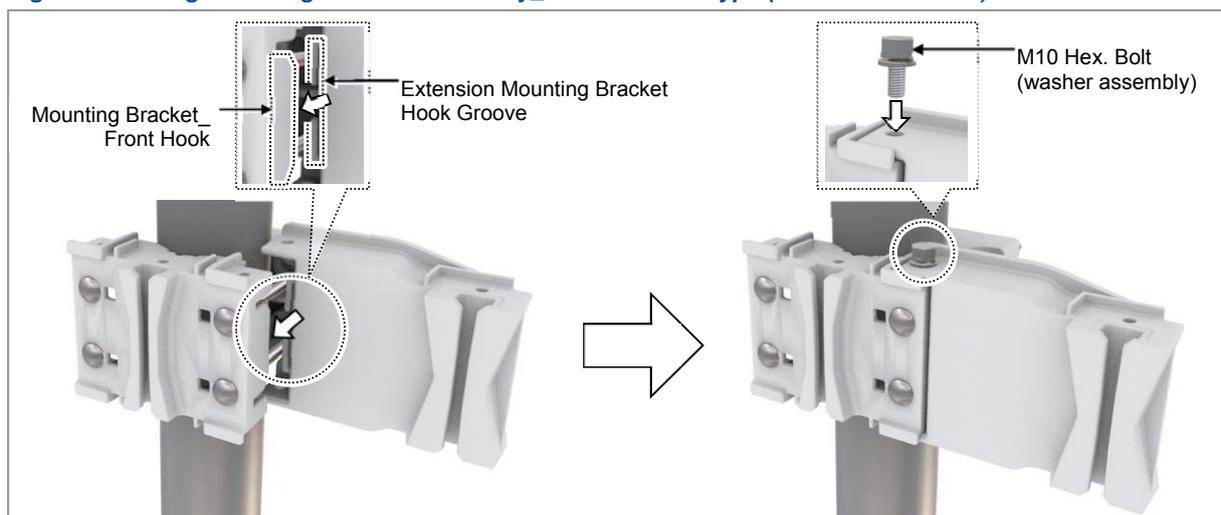
- 2 Fix 1 sector mounting bracket assembly to the pole (as described in the 'For 1 Sector' section).

**Figure 31. Fixing Mounting Bracket Assembly\_2 Sector Pole Type (Side Installation 1)**



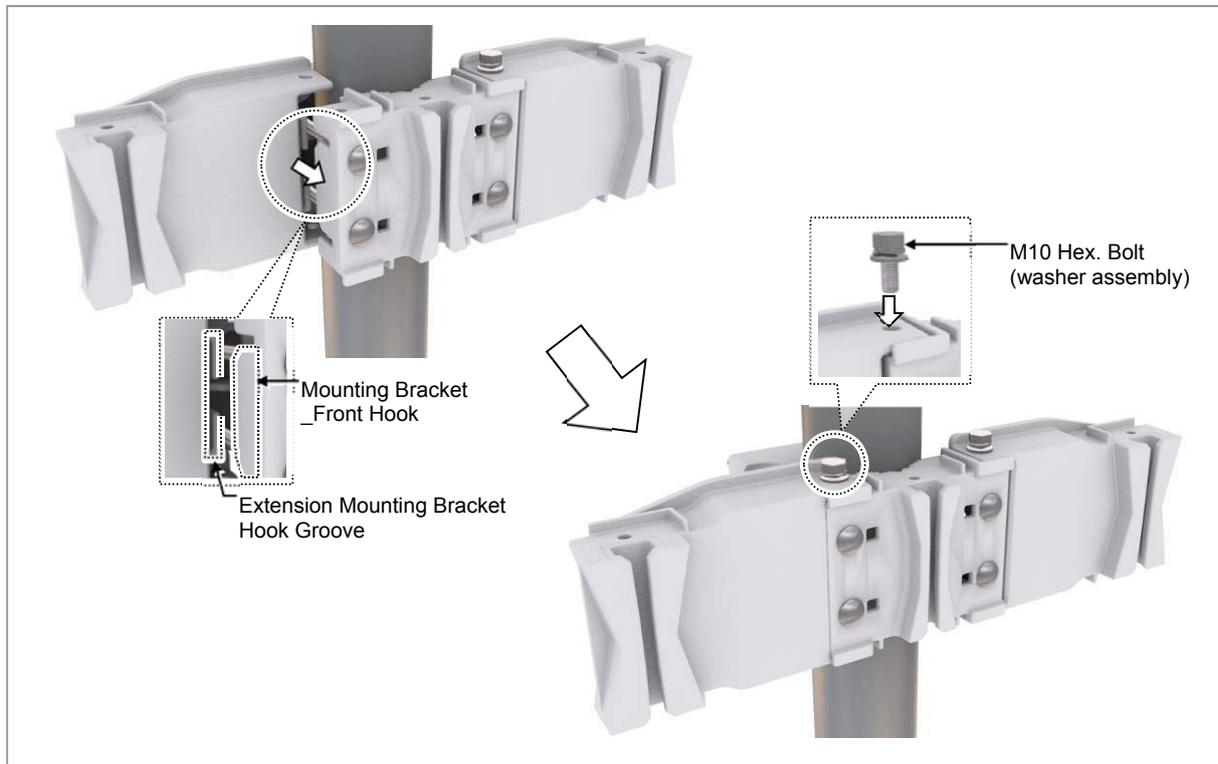
- 3 Fit the groove of the extension mounting bracket into the right hook of the mounting bracket\_front, and then fix it using fasteners.

**Figure 32. Fixing Mounting Bracket Assembly\_2 Sector Pole Type (Side Installation 2)**



- 4 Fit the groove of the extension mounting bracket into the left hook of the mounting bracket\_front, and then fix it using fasteners.

Figure 33. Fixing Mounting Bracket Assembly\_2 Sector Pole Type (Side Installation 3)



### Fixing RRH

#### For 1 Sector

To fix the RRH\_1 sector pole type for standard and side installation, do the following:

- 1 Make sure you have the following items:

Table 9. Fixing RRH\_1 Sector Pole Type (Standard and Side Installation)

Category	Description	
Parts	M10 × 35L Hex. Bolt (washer assembly, attached to the unit bracket)	1 EA
Recommended Torque Value	M10 Hex. Bolt	217 lbf-in (250 kgf-cm)
Working Tools	<ul style="list-style-type: none"> <li>• Torque Wrench (100 to 400 lbf-in)</li> <li>• Torque Wrench Spanner head (apply Hex. Head: 17 mm)</li> <li>• Spanner (17 mm)</li> </ul>	

- 2 Hang the unit bracket hook of RRH side on the groove of the mounting bracket\_front hook, and then fix it using fasteners.

Figure 34. Fixing RRH\_1 Sector Pole Type (Standard Installation)

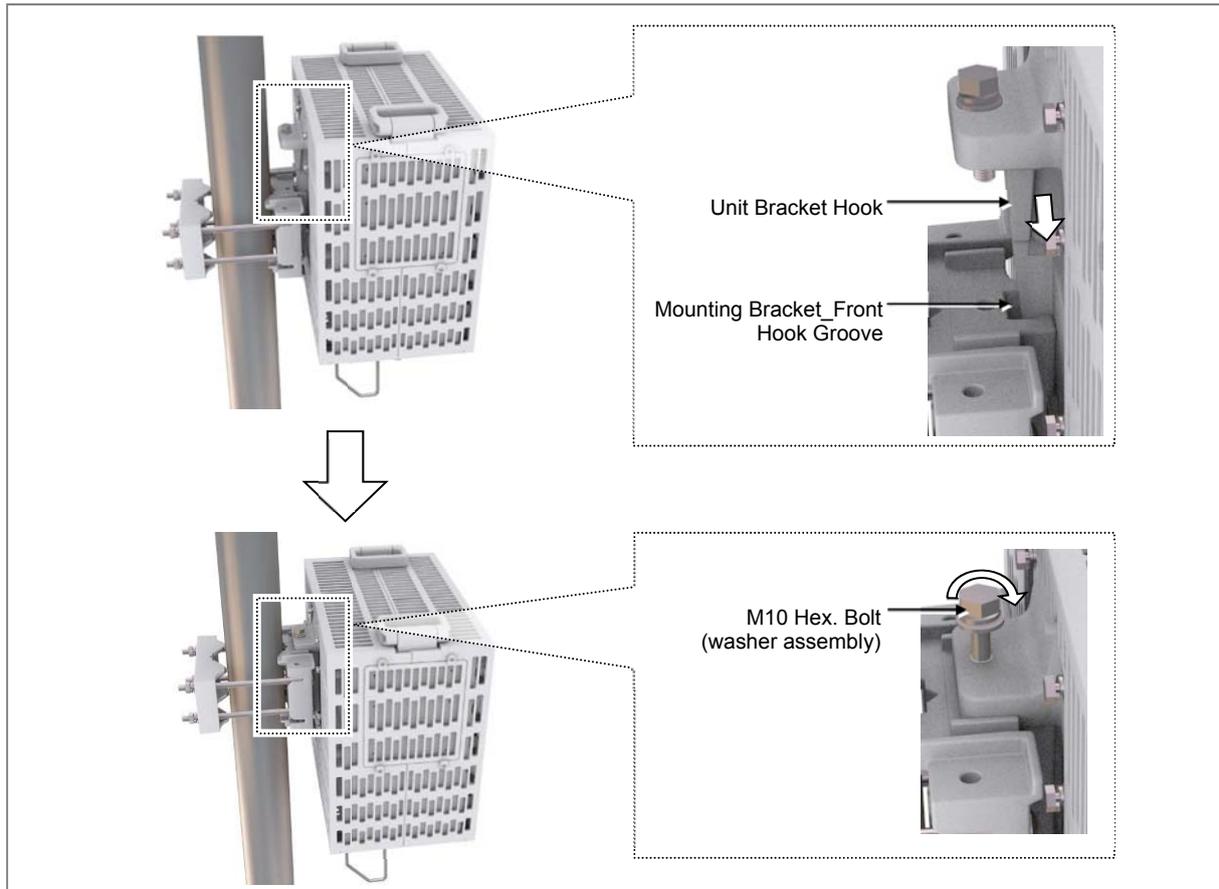
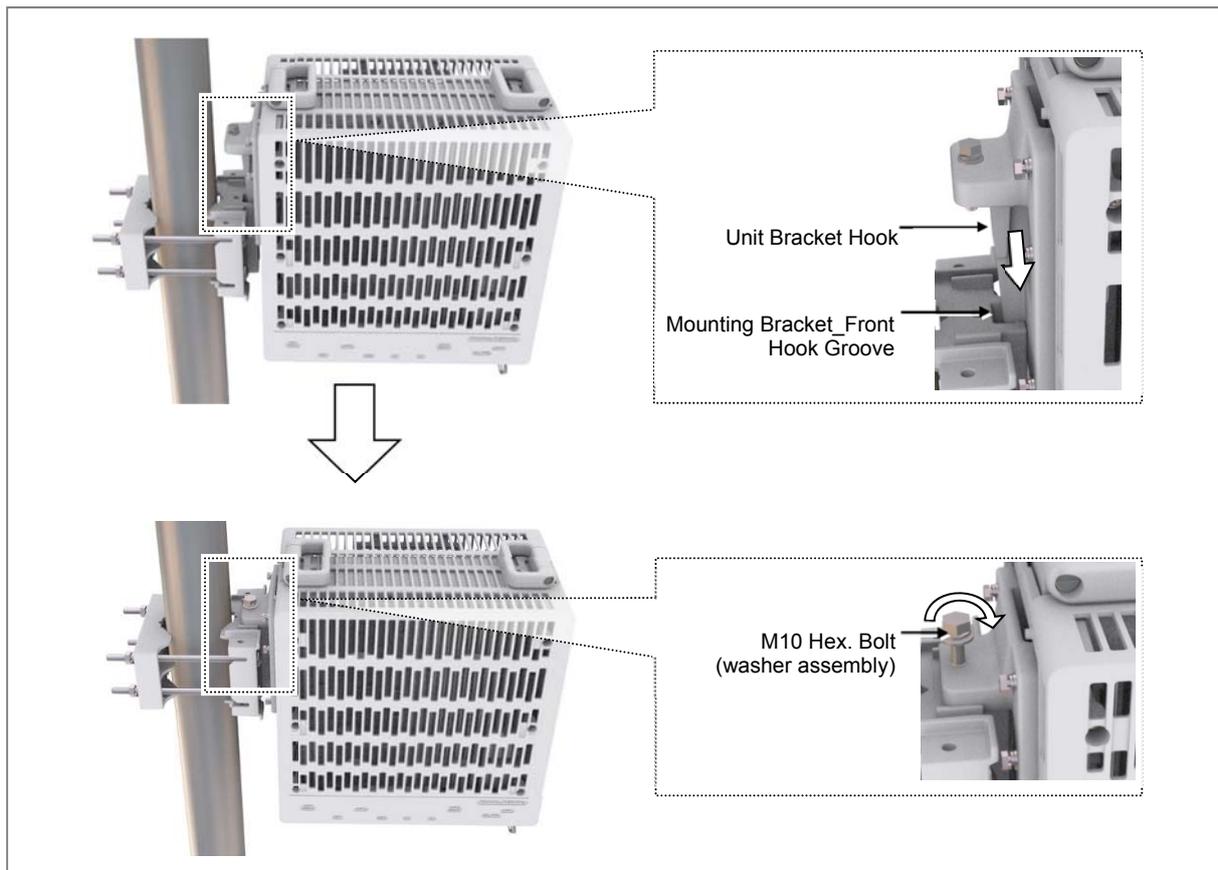


Figure 35. Fixing RRH\_1 Sector Pole Type (Side Installation)

**For 2 Sector**

To fix the RRH\_2 sector pole type for side installation, do the following:

- 1 Make sure you have the following items:

Table 10. Parts and Tools for fixing RRH\_2 Sector Pole Type (Side Installation)

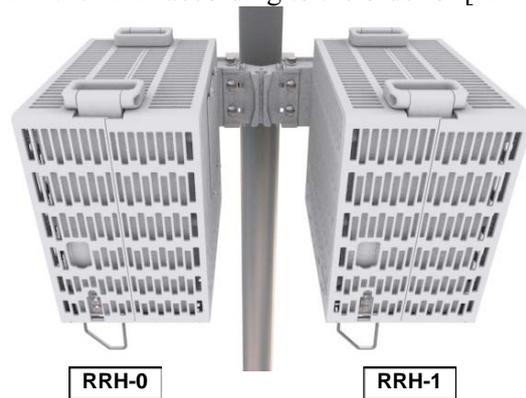
Category	Description	
Parts	M10 × 35L Hex. Bolt (washer assembly, attached to the unit bracket)	1 EA/RRH
Recommended Torque Value	M10 Hex. Bolt	217 lbf-in (250 kgf·cm)
Working Tools	<ul style="list-style-type: none"> <li>• Torque Wrench (100 to 400 lbf-in)</li> <li>• Torque Wrench Spanner head (apply Hex. Head: 17 mm)</li> <li>• Spanner (17 mm)</li> </ul>	



Check the location to install the RRH.

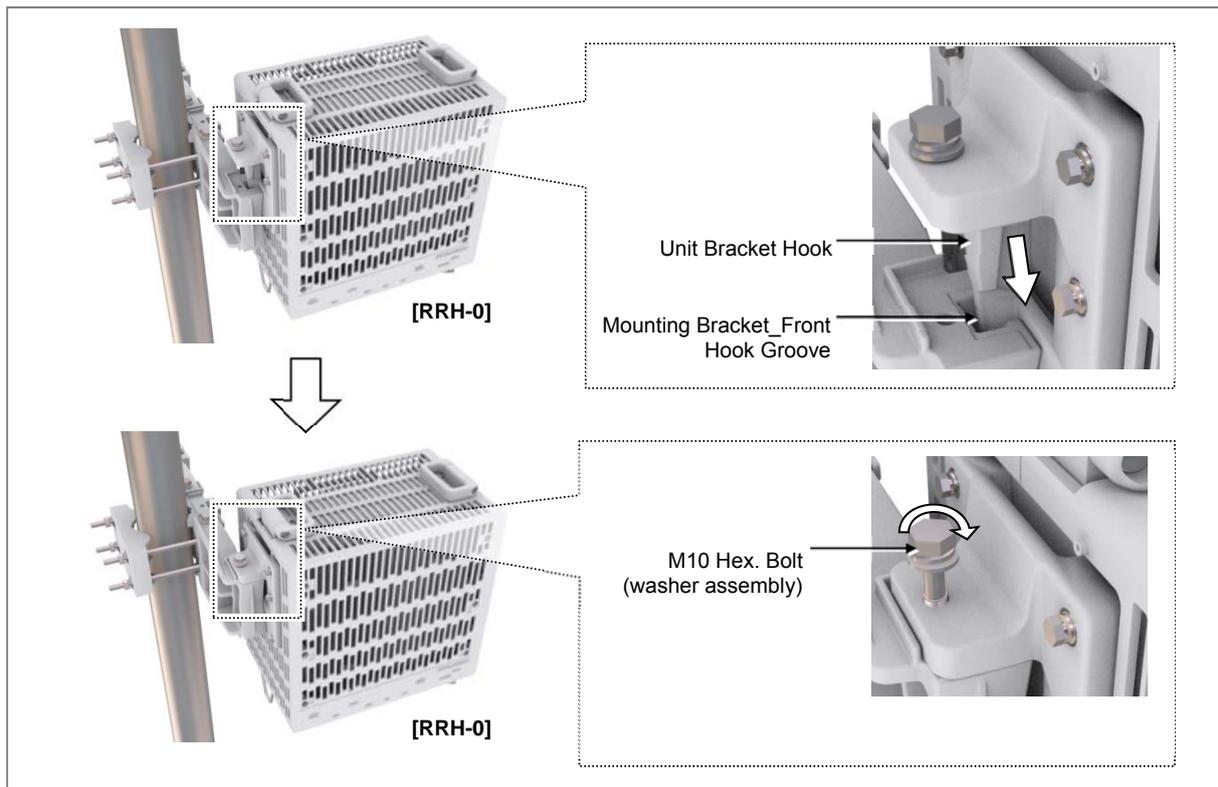


Fix the RRH according to the order of [RRH-0 → RRH-1].



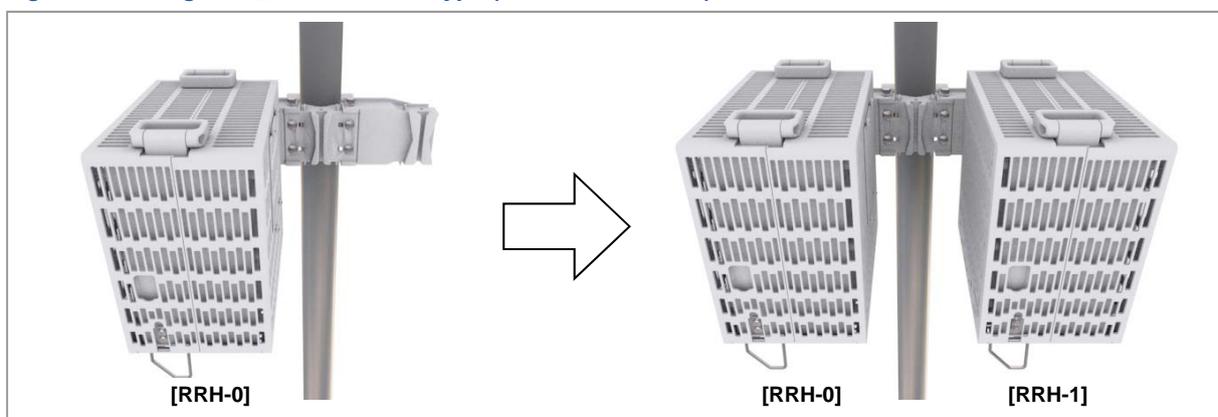
- 2 Hang the unit bracket hook of RRH-0 side on the groove of the mounting bracket\_front hook, and then fix it using fasteners.

Figure 36. Fixing RRH\_2 Sector Pole Type (Side Installation 1)



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

Figure 37. Fixing RRH\_2 Sector Pole Type (Side Installation 2)



## Fixing Wall Type

### Marking and Drilling for Wall Mounting

To mark on a wall, do the following:

- 1 Make sure you have the following items:

Table 11. Tools for Marking

Category	Description
Working Tools	<ul style="list-style-type: none"> <li>• Tape Measure</li> <li>• Permanent Marker</li> <li>• Level</li> </ul>



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



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

- 2 Check the distance between the locations for fixing the RRH and the anchor bolt hole.

Figure 38. RRH marking dimensions\_1 Sector Wall Type (Standard Installation)

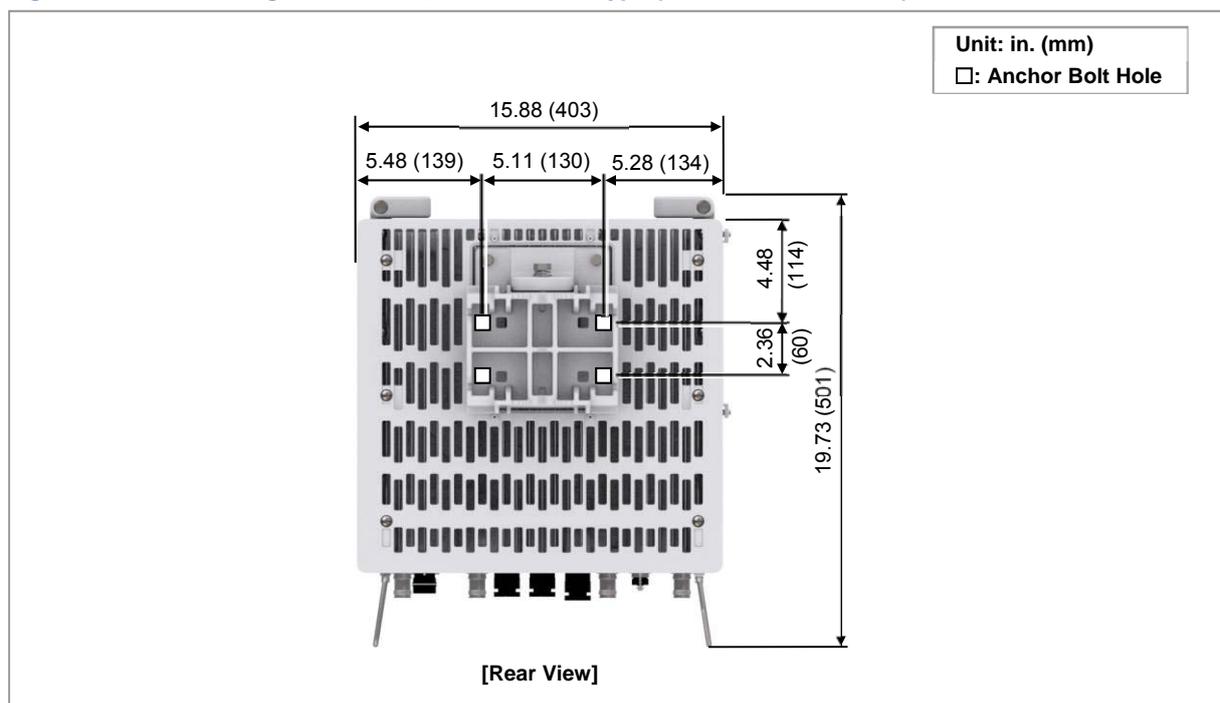


Figure 39. RRH marking dimensions\_1 Sector Wall Type (Side Installation)

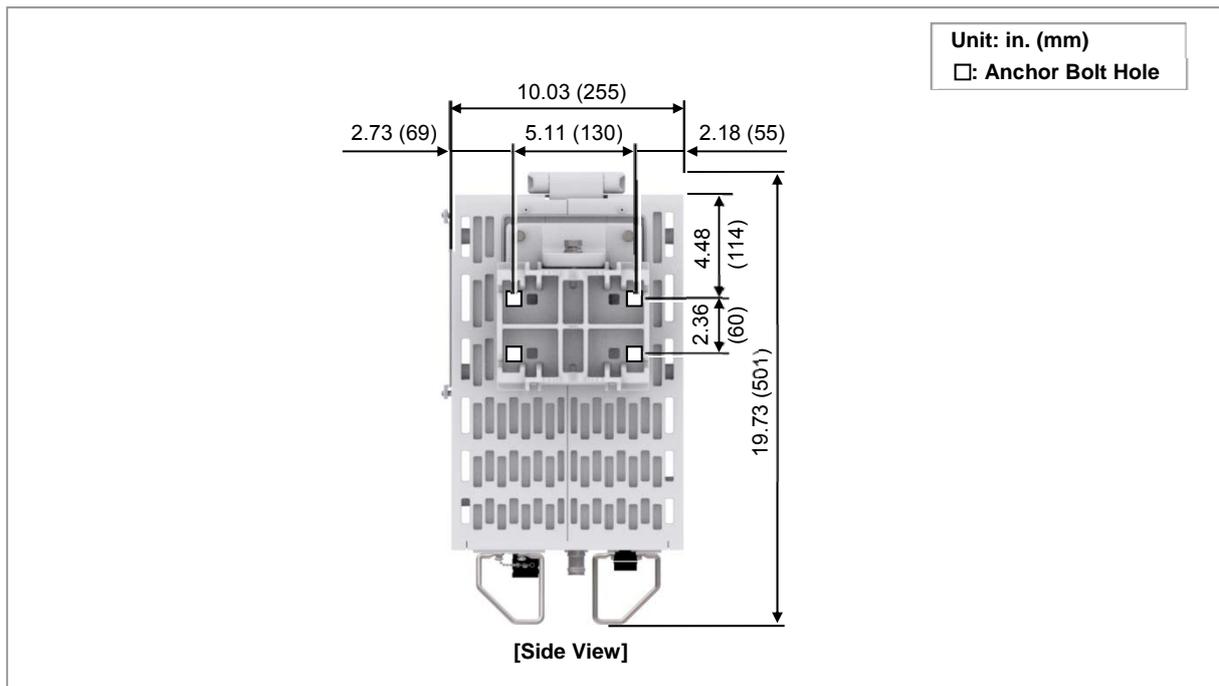


Figure 40. RRH marking dimensions\_3 Sector Wall Type (Standard Installation)

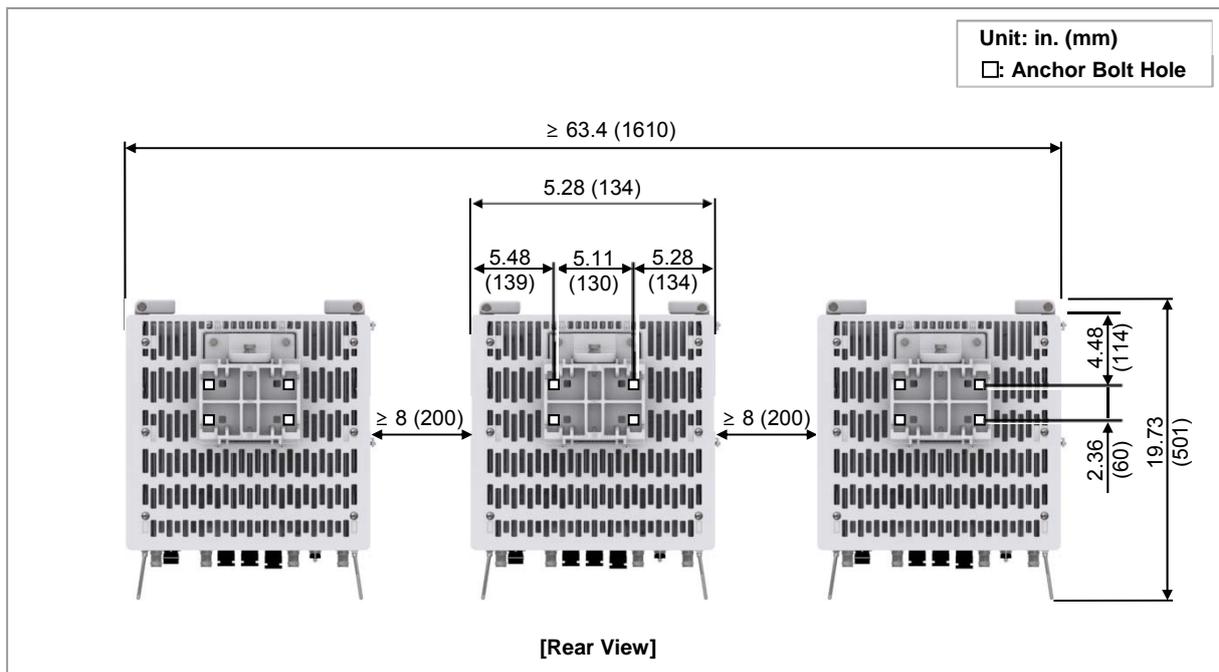
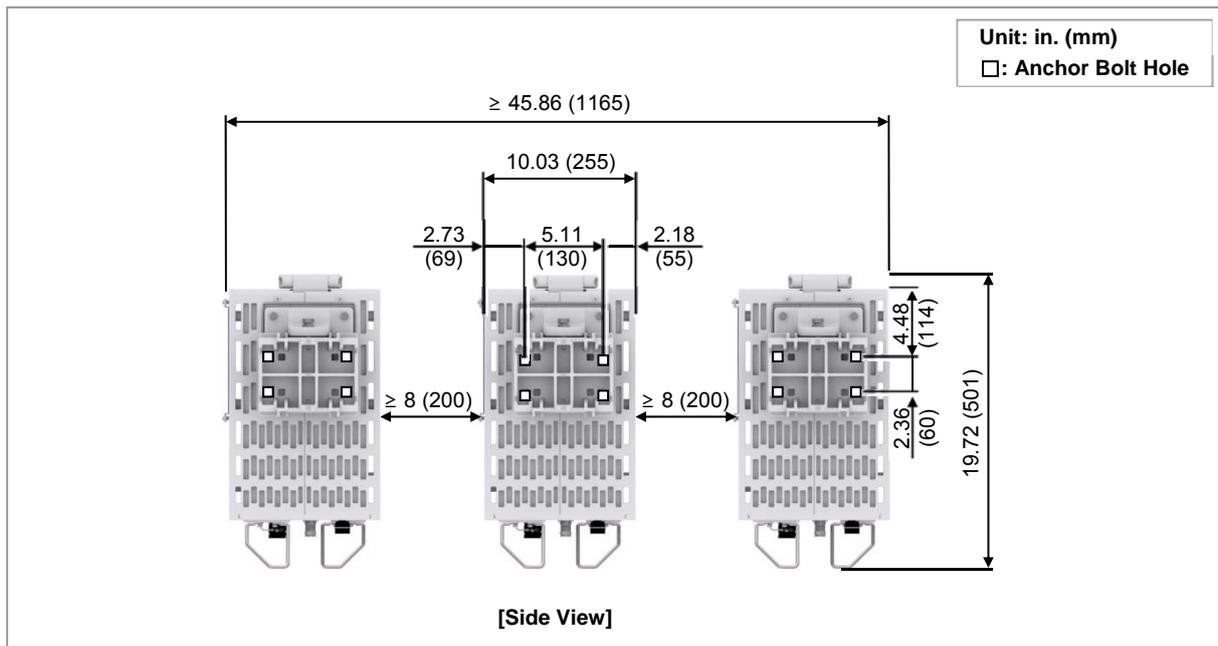
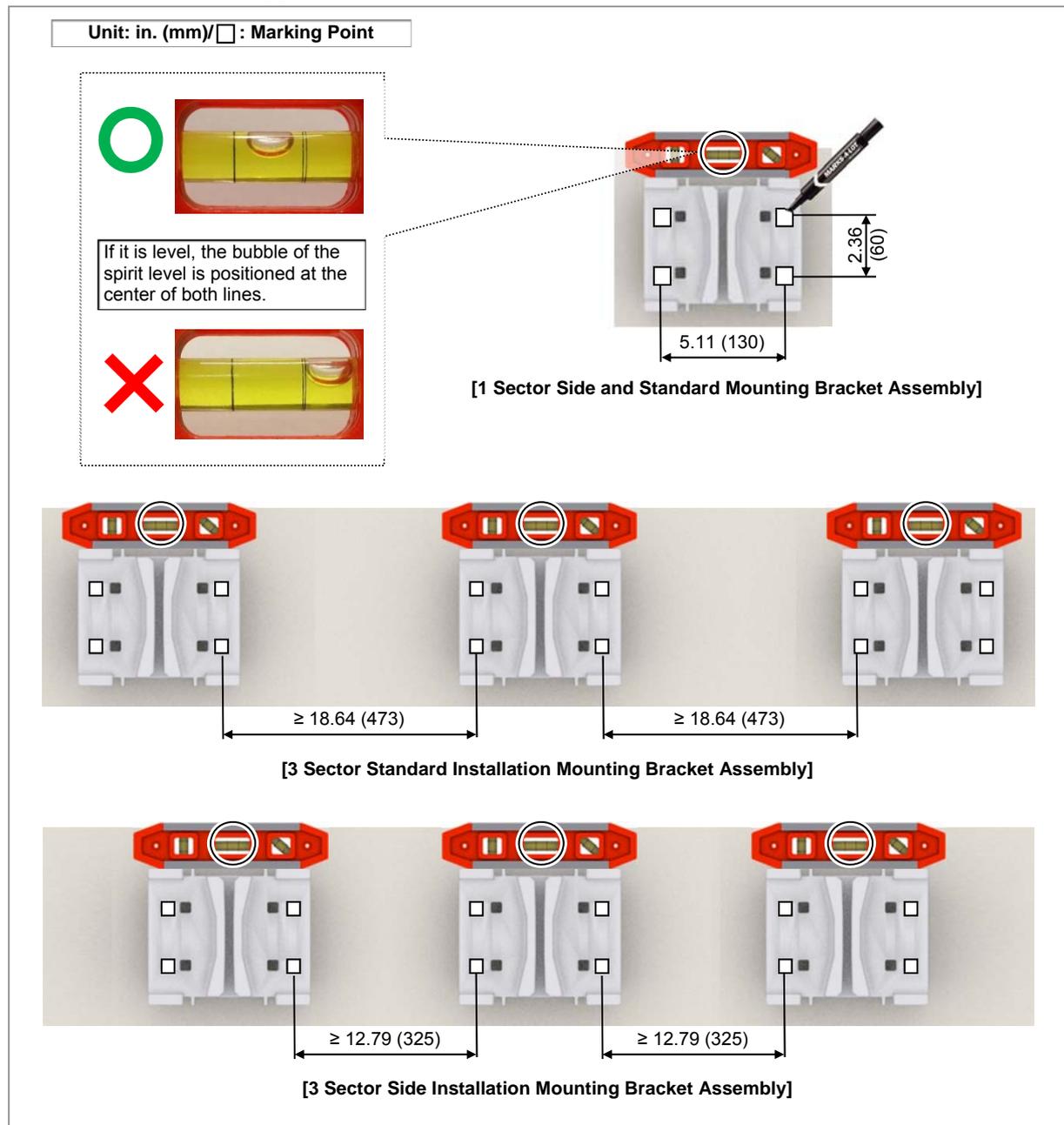


Figure 41. RRH marking dimensions\_3 Sector Wall Type (Side Installation)



- 3 Place a mounting bracket on the fixing location.
- 4 Check the level status using a level and adjust the level of bracket assembly.
- 5 Mark the anchor bolt holes on the wall after ensuring that the level status is normal.

Figure 42. Marking\_Wall Type



To drill anchor holes and fix anchors, do the following:

- 1 Make sure you have the following items:

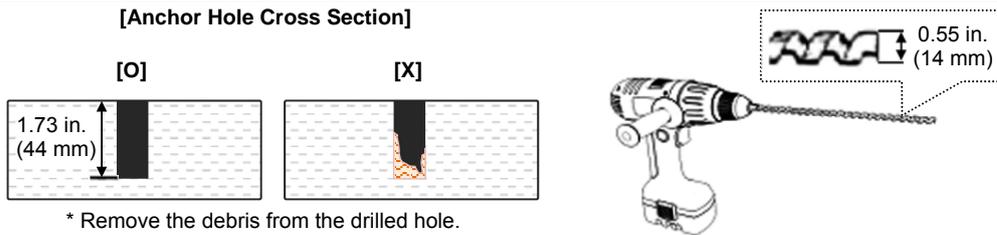
Table 12. Parts and Tools for Drilling and Anchoring

Category	Description		
Parts	1, 3 Sector Installation	M10 Strong Anchor	4 EA/RRH
	2 Sector Installation		4 EA
Working Tools	• Hammer Drill		

Category	Description
	<ul style="list-style-type: none"> <li>• Concrete Drill Bit [0.55 in. (14 mm)]</li> <li>• Vacuum Cleaner</li> <li>• Hammer</li> <li>• Anchor Punch (For M10 Strong Anchor)</li> </ul>

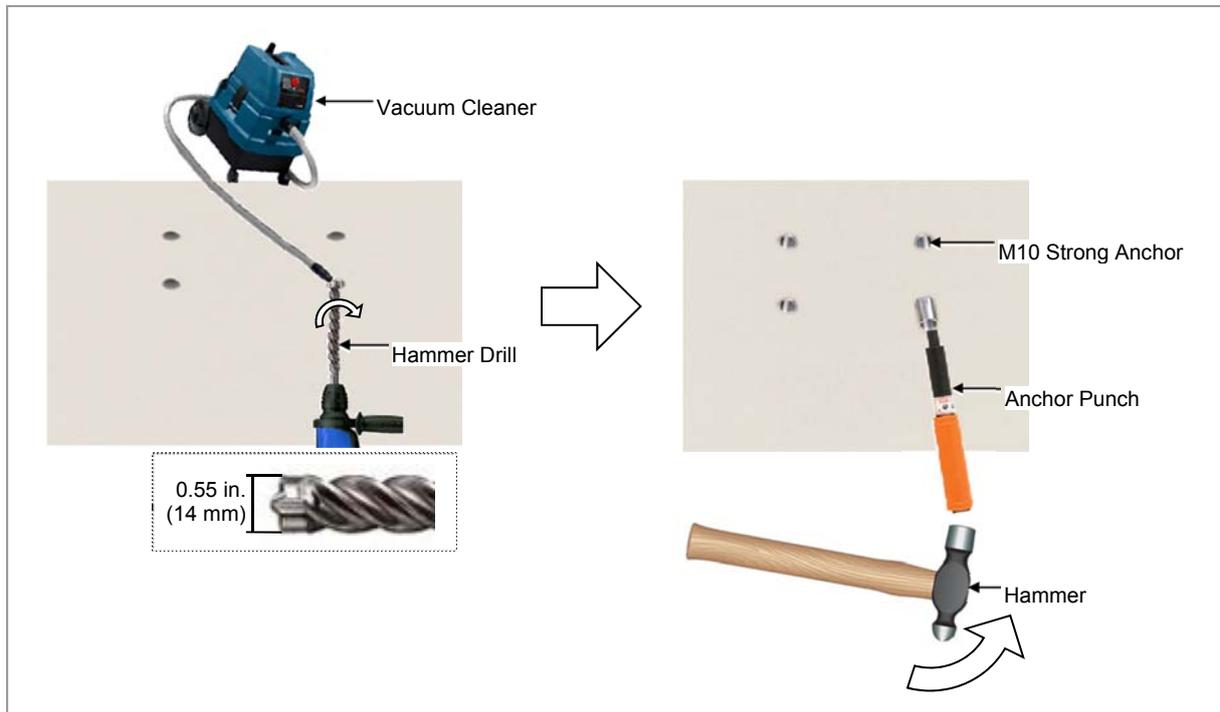
**Table 13. Anchor Bolt Drill Bits and Hole Depth**

Category	Anchor Bolt	Drill Bits	Hole Depth
RRH (Wall Type)	M10	0.55 in. (14 mm)	1.73 in. (44 mm)

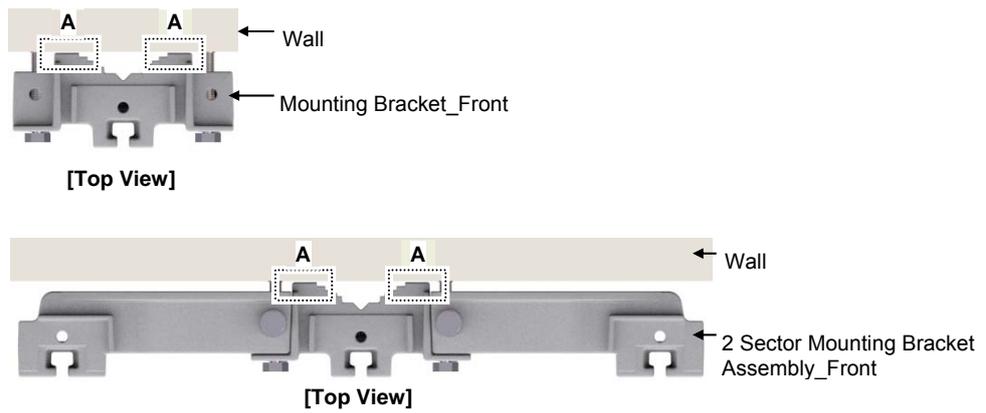


- 2 Drill anchor holes at the marked points and remove all the drilling dust from the holes using a cleaner.
- 3 Fix strong anchor to the drilled hole.

**Figure 43. Drilling and Anchoring**



When fixing the mounting bracket\_front or 2 sector mounting bracket assembly\_front on the wall, 'A' side should stick on the wall.



**For 1 Sector**

The way to fix 1 sector mounting bracket is as follows:

To fix the mounting Bracket\_1 sector for wall type installation, do the following:

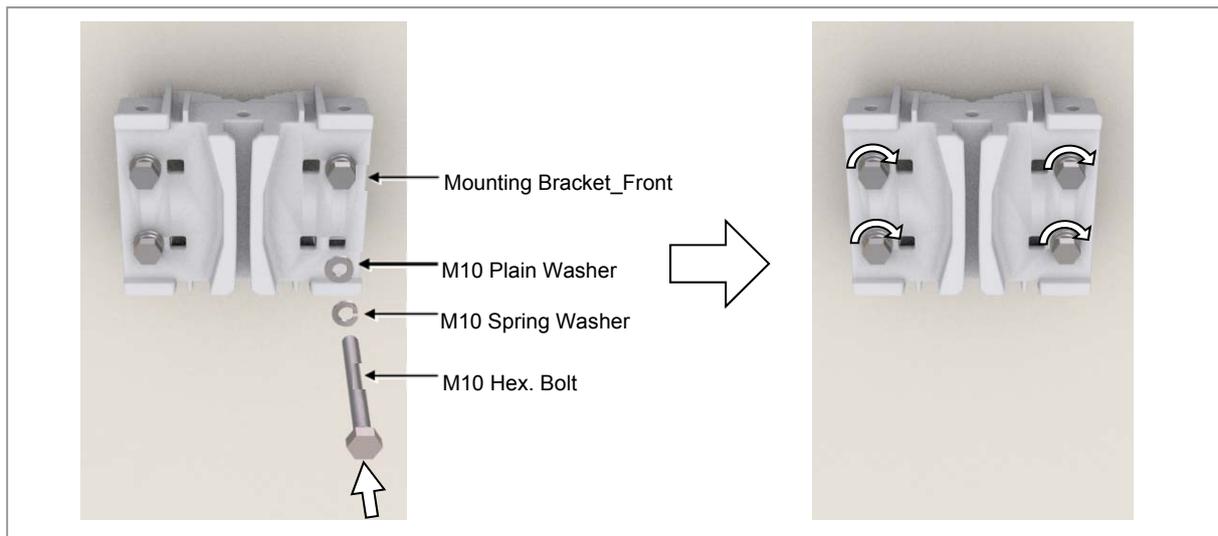
- 1 Make sure you have the following items:

**Table 14. Parts and Tools for fixing Mounting Bracket\_1 Sector Wall Type**

Category	Description		
Parts	Mounting Bracket_Front		1 EA
	Fastener	M10 Plain Washer	4 EA
		M10 Spring Washer	4 EA
		M10 × 70L Hex. Bolt	4 EA
Recommended Torque Value	M10 Hex. Bolt	217 lbf-in (250 kgf-cm)	
Working Tools	<ul style="list-style-type: none"> <li>• Torque Wrench (100 to 400 lbf-in)</li> <li>• Torque Wrench Spanner head (apply Hex. Head: 17 mm)</li> <li>• Spanner (17 mm)</li> </ul>		

- 2 Place the mounting bracket\_front along with the fixed strong anchors and fix it using fasteners.

Figure 44. Fixing Mounting Bracket\_1 Sector Wall Type

**For 3 Sector**

To fix the mounting Bracket\_3 sector for wall type installation, do the following:

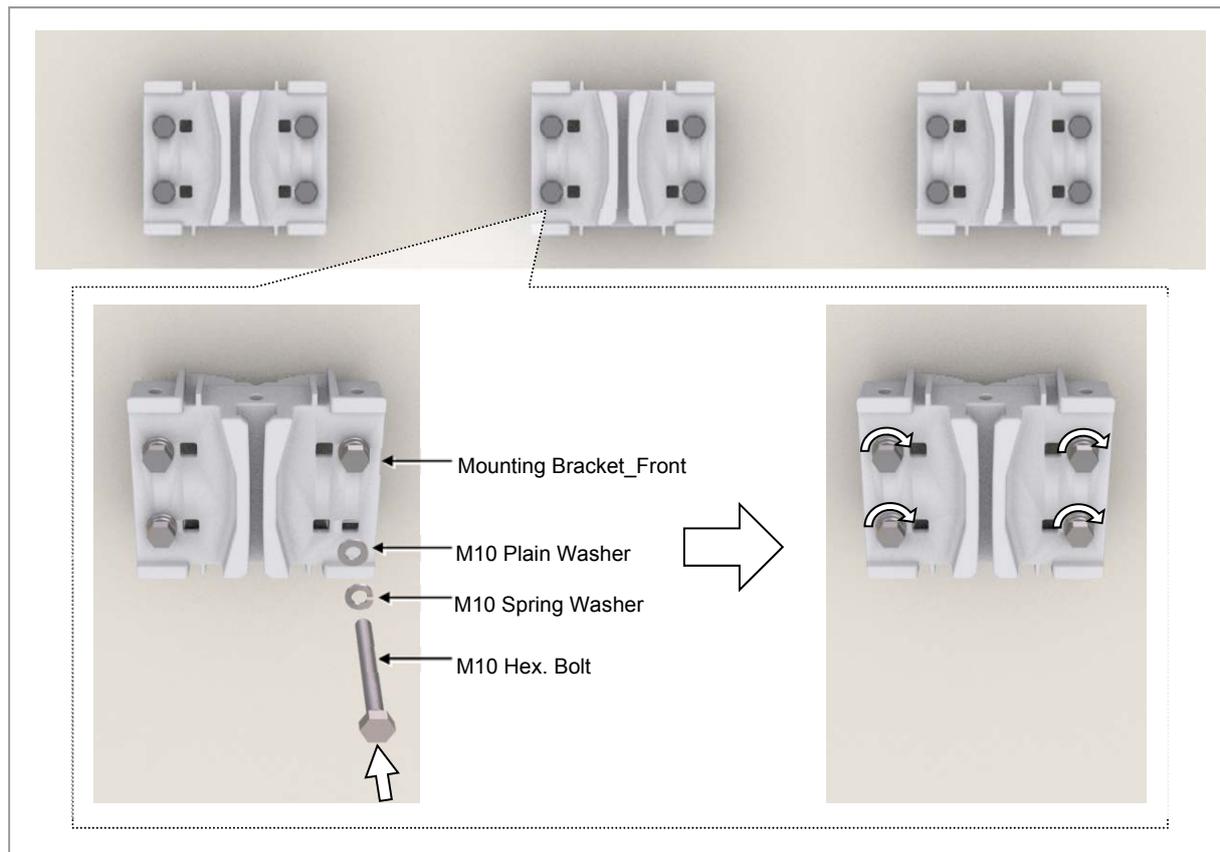
- 1 Make sure you have the following items:

Table 15. Parts and Tools for fixing Mounting Bracket\_3 Sector Wall Type

Category	Description		
Parts	Mounting Bracket_Front		1 EA/RRH
	Fastener	M10 Plain Washer	4 EA/RRH
		M10 Spring Washer	4 EA/RRH
		M10 × 70L Hex. Bolt	4 EA/RRH
Recommended Torque Value	M10 Hex. Bolt	217 lbf-in (250 kgf·cm)	
Working Tools	<ul style="list-style-type: none"> <li>• Torque Wrench (100 to 400 lbf-in)</li> <li>• Torque Wrench Spanner head (apply Hex. Head: 17 mm)</li> <li>• Spanner (17 mm)</li> </ul>		

- 2 Place the mounting bracket\_front along with the fixed strong anchors and fix it using fasteners.

Figure 45. Fixing Mounting Bracket\_3 Sector Wall Type



## Fixing RRH

### For 1 Sector

To fix the RRH\_1 sector for wall type (standard and side) installation, do the following:

- 1 Make sure you have the following items:

**Table 16. Parts and Tools for fixing RRH\_1 Sector Wall Type (Standard and Side Installation)**

Category	Description	
Parts	M10 × 35L Hex. Bolt (washer assembly, attached to the unit bracket)	1 EA
Recommended Torque Value	M10 Hex. Bolt	217 lbf-in (250 kgf-cm)
Working Tools	<ul style="list-style-type: none"> <li>• Torque Wrench (100 to 400 lbf-in)</li> <li>• Torque Wrench Spanner head (apply Hex. Head: 17 mm)</li> <li>• Spanner (17 mm)</li> </ul>	

- 2 Hang the unit bracket hook of RRH side on the groove of the mounting bracket\_front hook and fix it using fasteners.

Figure 46. Fixing RRH\_1 Sector Wall Type (Standard Installation)

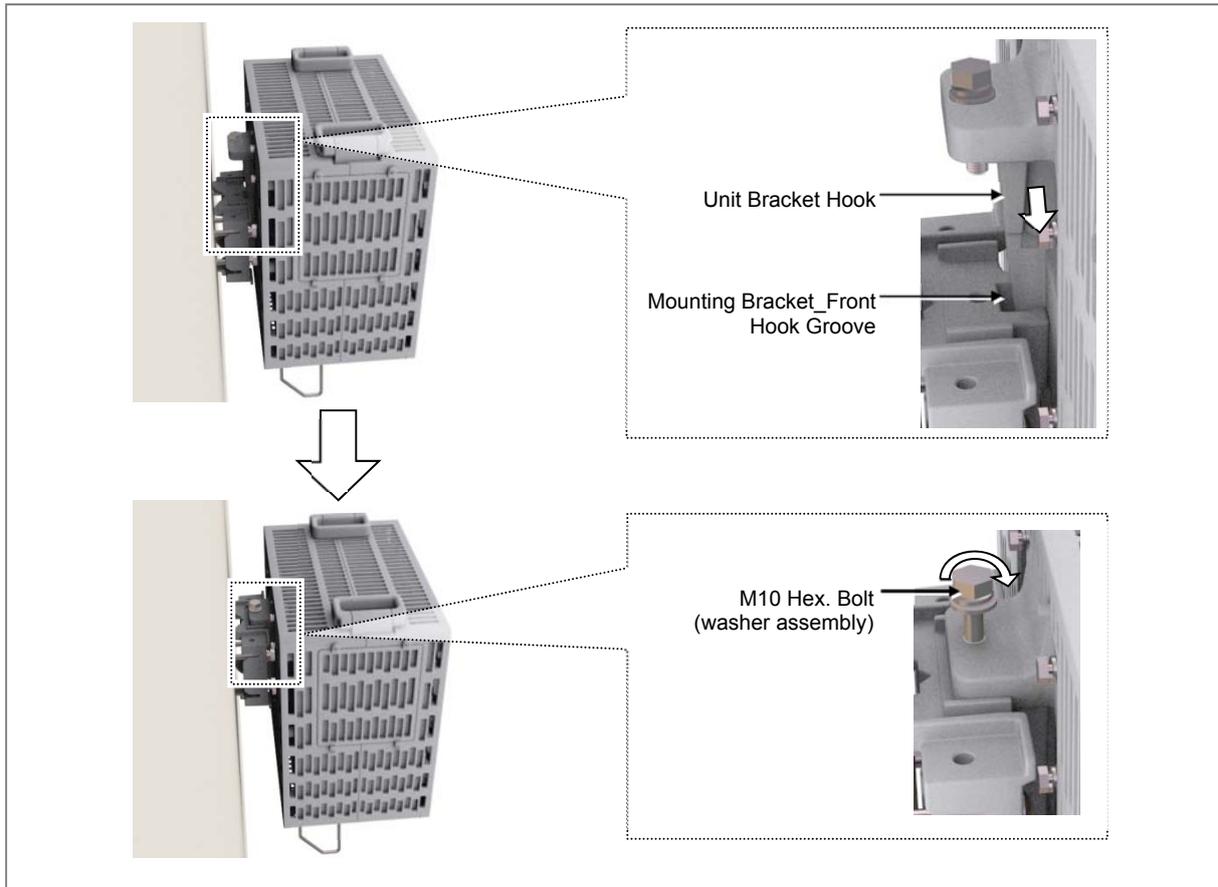
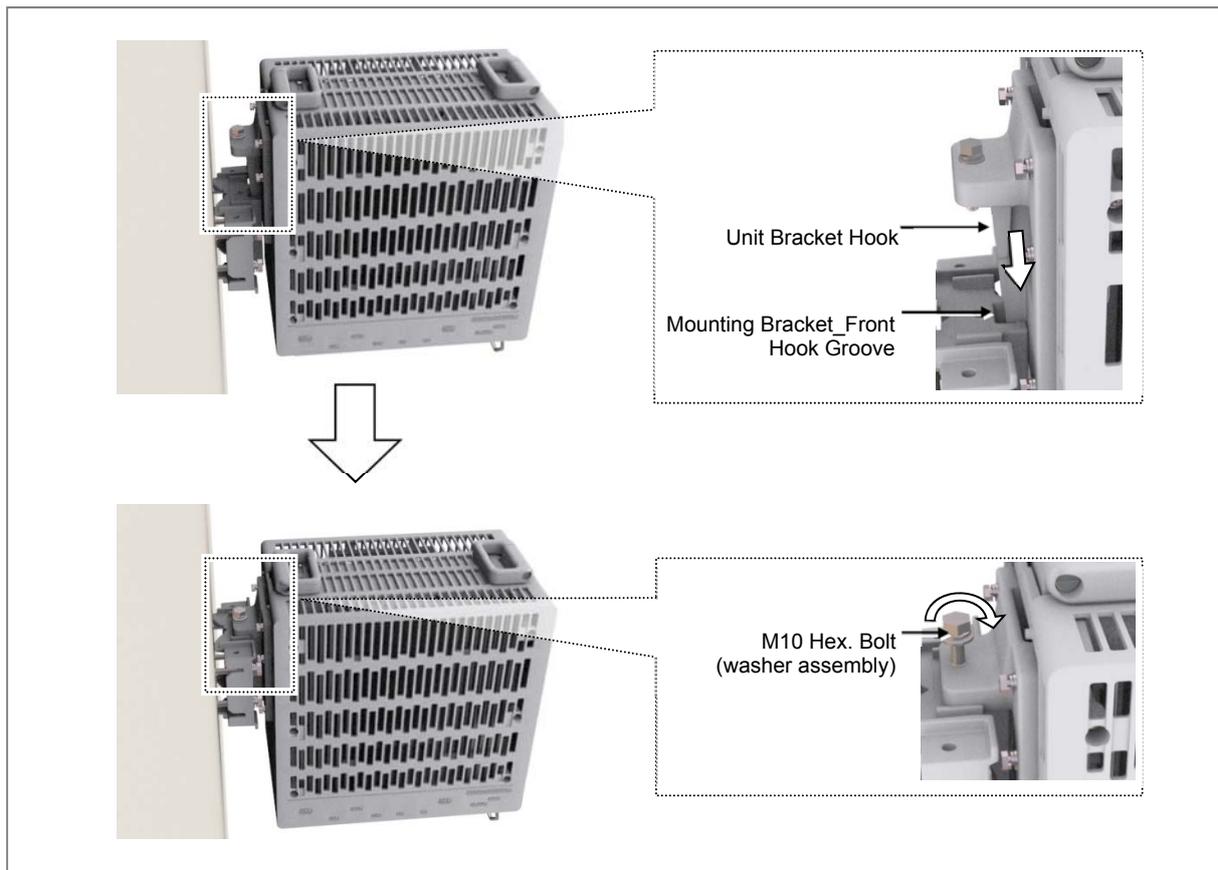


Figure 47. Fixing RRH\_1 Sector Wall Type (Side Installation)

**For 3 Sector**

To fix the RRH\_3 sector for wall type (standard) installation, do the following:

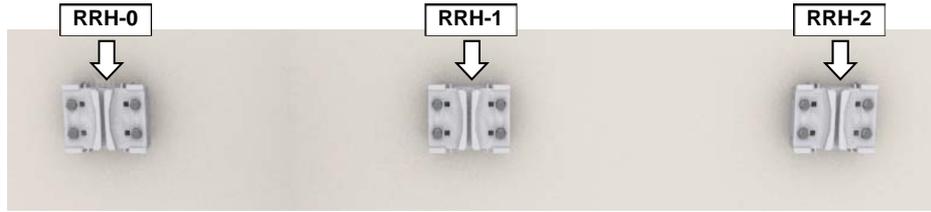
- 1 Make sure you have the following items:

Table 17. Parts and Tools for fixing RRH\_3 Sector Wall Type (Standard Installation)

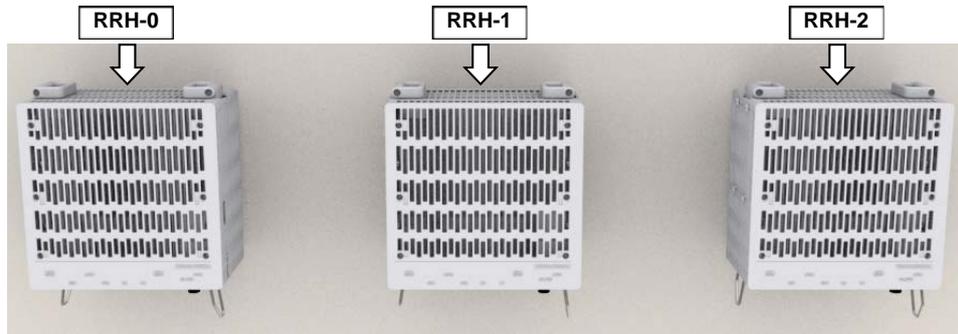
Category	Description	
Parts	M10 × 35L Hex. Bolt(washer assembly, attached to the unit bracket)	1 EA/RRH
Recommended Torque Value	M10 Hex. Bolt	217 lbf-in (250 kgf·cm)
Working Tools	<ul style="list-style-type: none"> <li>• Torque Wrench (100 to 400 lbf-in)</li> <li>• Torque Wrench Spanner head (apply Hex. Head: 17 mm)</li> <li>• Spanner (17 mm)</li> </ul>	



Check the location to install the RRH.

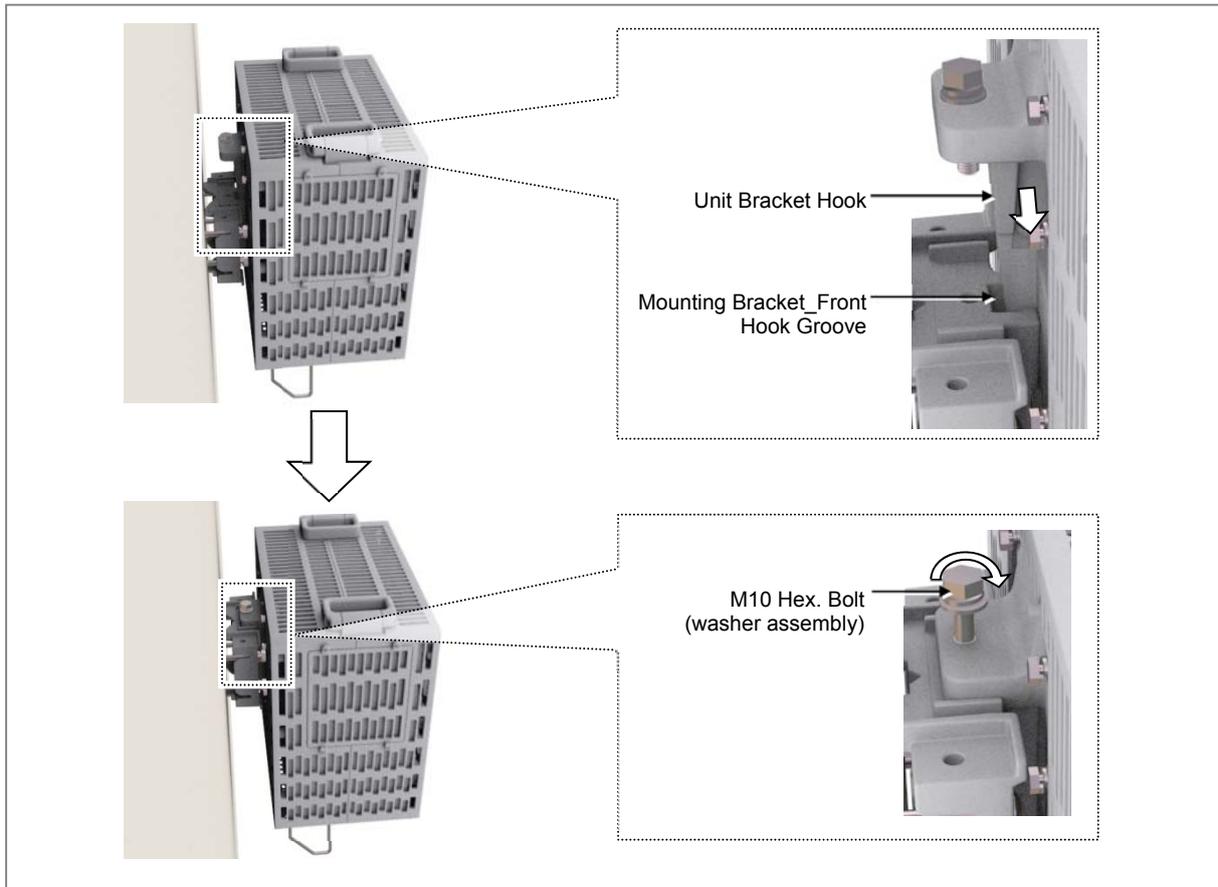


Fix the RRH according to the order of [RRH-0 → RRH-1 → RRH-2].



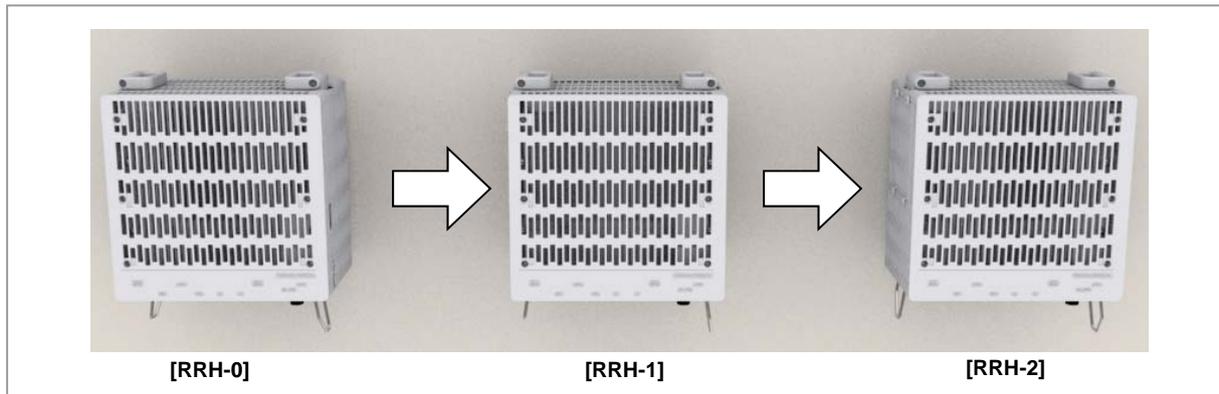
- 2 Hang the unit bracket hook of RRH-0 side on the groove of the mounting bracket\_front hook and fix it using fasteners.

Figure 48. Fixing RRH\_3 Sector Wall Type (Standard Installation 1)



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

Figure 49. Fixing RRH\_3 Sector Wall Type (Standard Installation 2)



To fix the RRH\_3 sector for pole type (side) installation, do the following:

- 1 Make sure you have the following items:

Table 18. Parts and Tools for fixing RRH\_3 Sector Wall Type (Side Installation)

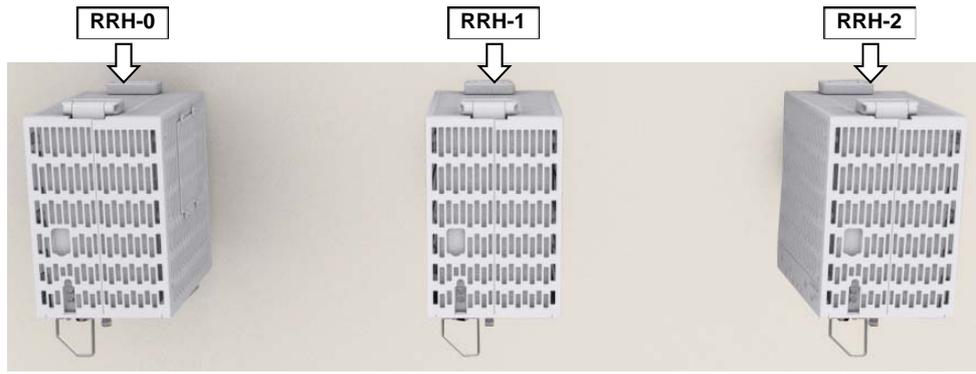
Category	Description	
Parts	M10 × 35L Hex. Bolt(washer assembly, attached to the unit bracket)	1 EA/RRH
Recommended Torque Value	M10 Hex. Bolt	217 lbf-in (250 kgf-cm)
Working Tools	<ul style="list-style-type: none"> <li>• Torque Wrench (100 to 400 lbf-in)</li> <li>• Torque Wrench Spanner head (apply Hex. Head: 17 mm)</li> <li>• Spanner (17 mm)</li> </ul>	



Check the location to install the RRH.

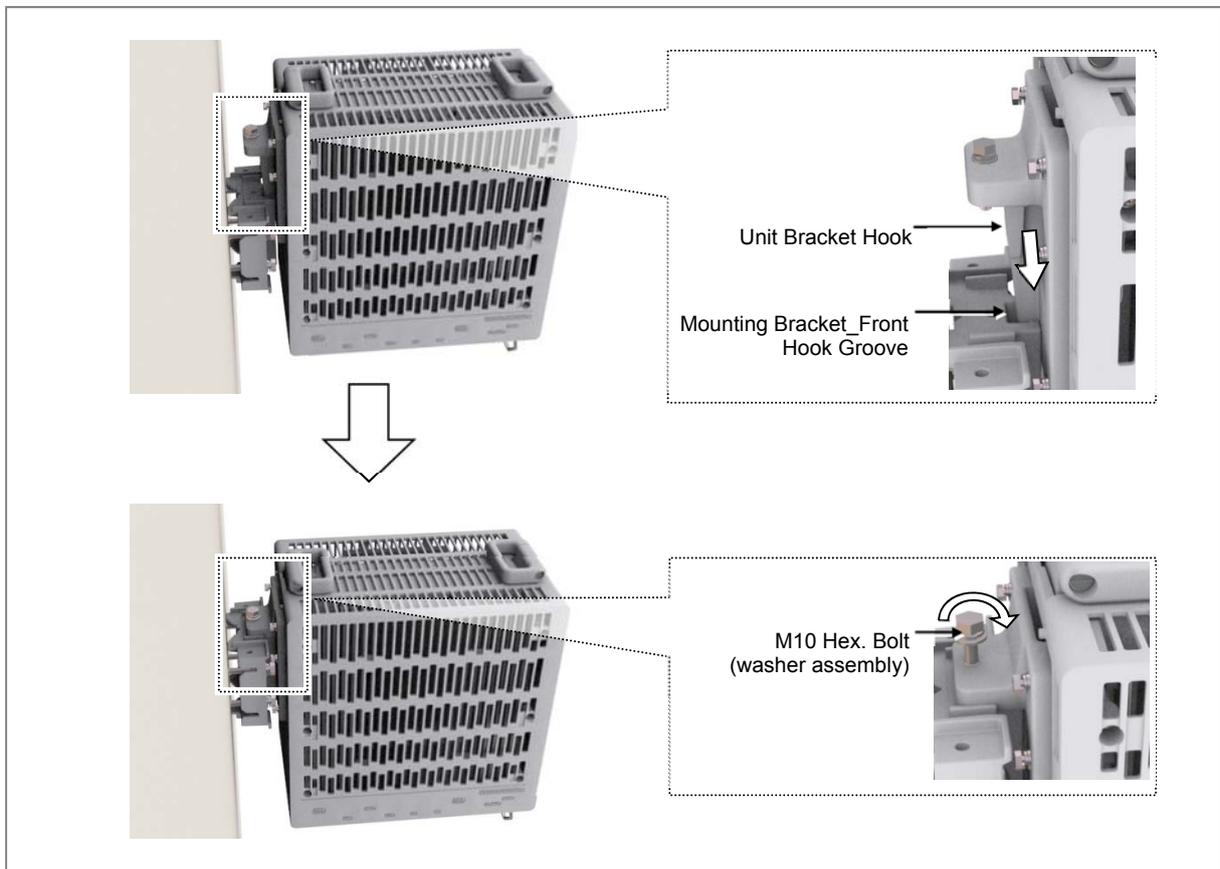


Fix the RRH according to the order of [RRH-0 → RRH-1 → RRH-2].



- 2 Hang the unit bracket hook of RRH-0 side on the groove of the mounting bracket\_front hook and fix it using fasteners.

*Figure 50. Fixing RRH\_3 Sector Wall Type (Side Installation 1)*



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

Figure 51. Fixing RRH\_3 Sector Wall Type (Side Installation 2)

