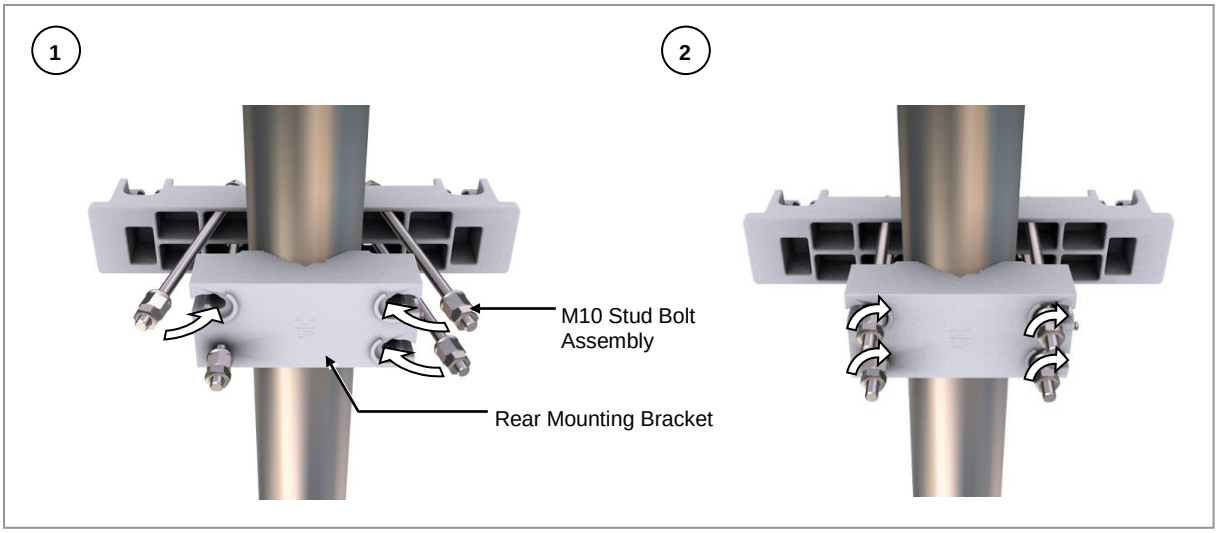
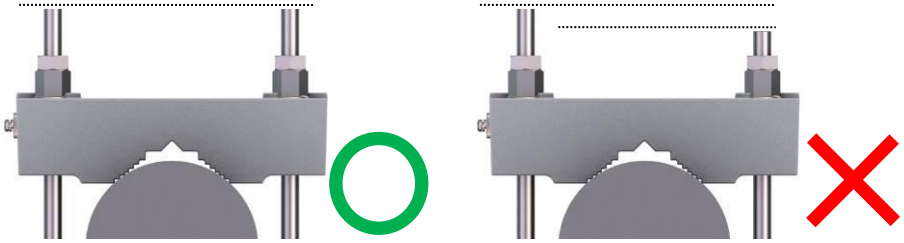
Figure 70. Fixing Side by Side Bracket Assembly_Pole Type (3)

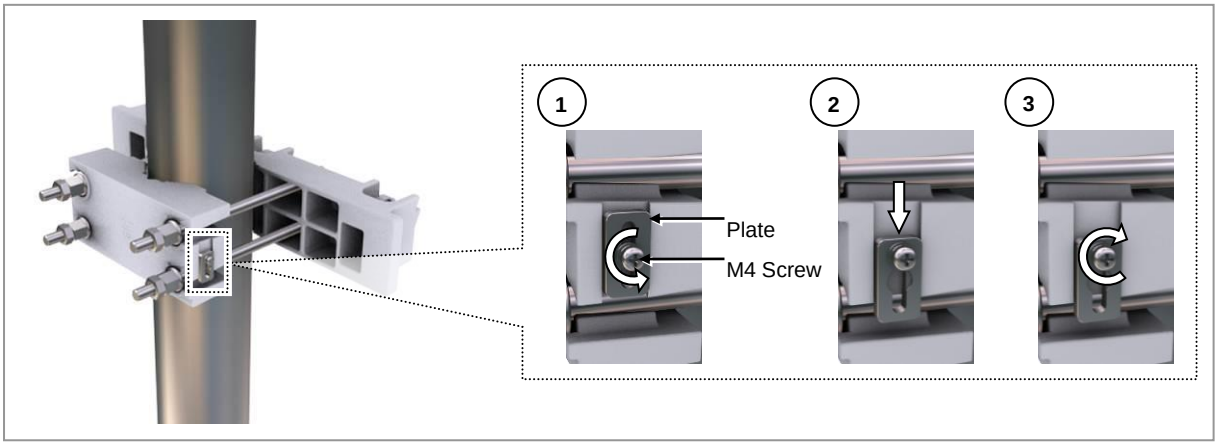


Make the length of left and right side stud bolts same after the fixation.

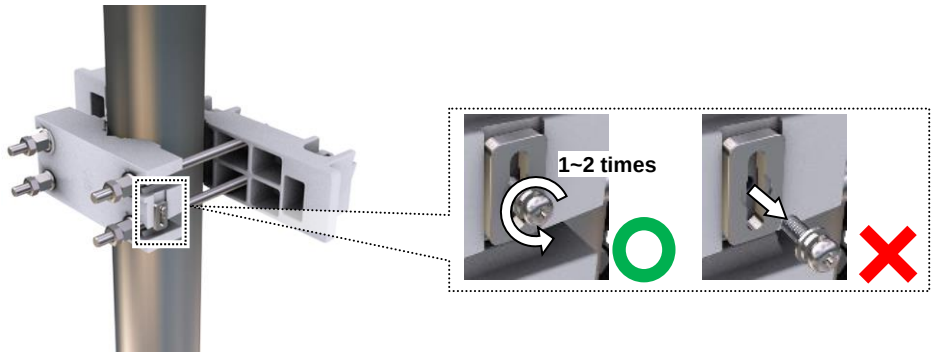


4 Slightly loosen the fixing screw for the plate at the right side of rear mounting bracket screw and rotate the fixing screw one or two times counter clockwise. Lower the plate and fix it using the screw.

Figure 71. Fixing Side by Side Bracket Assembly_Pole Type (4)

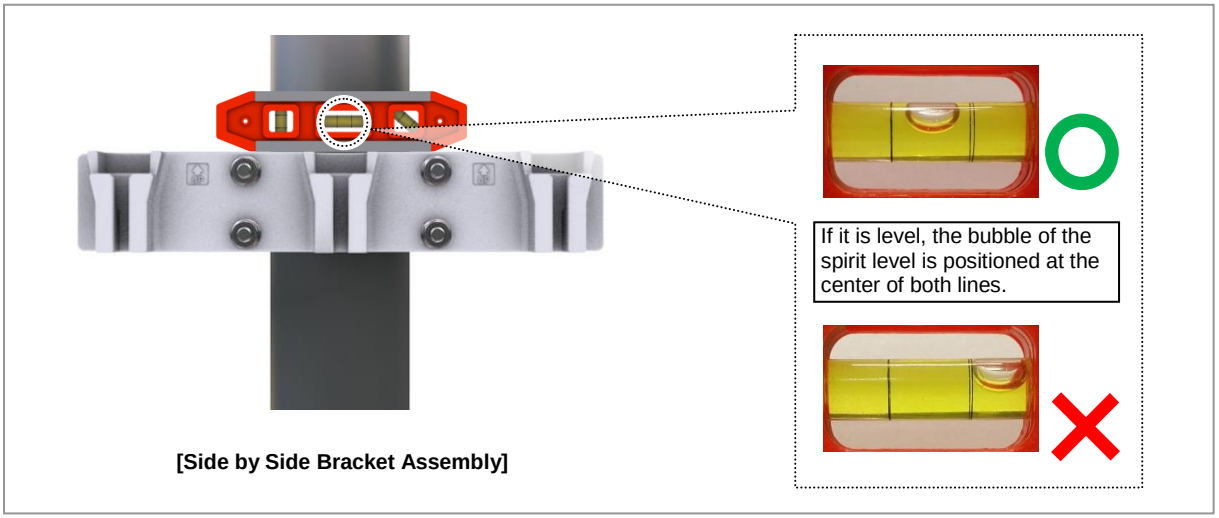


Do not loosen the fixing screw for the plate completely.



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

Figure 72. Levelling Side by Side Bracket Assembly_Pole Type



When fixing the mounting bracket assembly on the pole, ensure to check the level of the 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 leveling status.

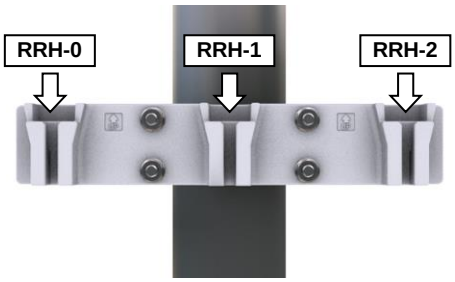
Fixing RRH on the Pole

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

Prerequisites

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

Check the location to install the RRH.



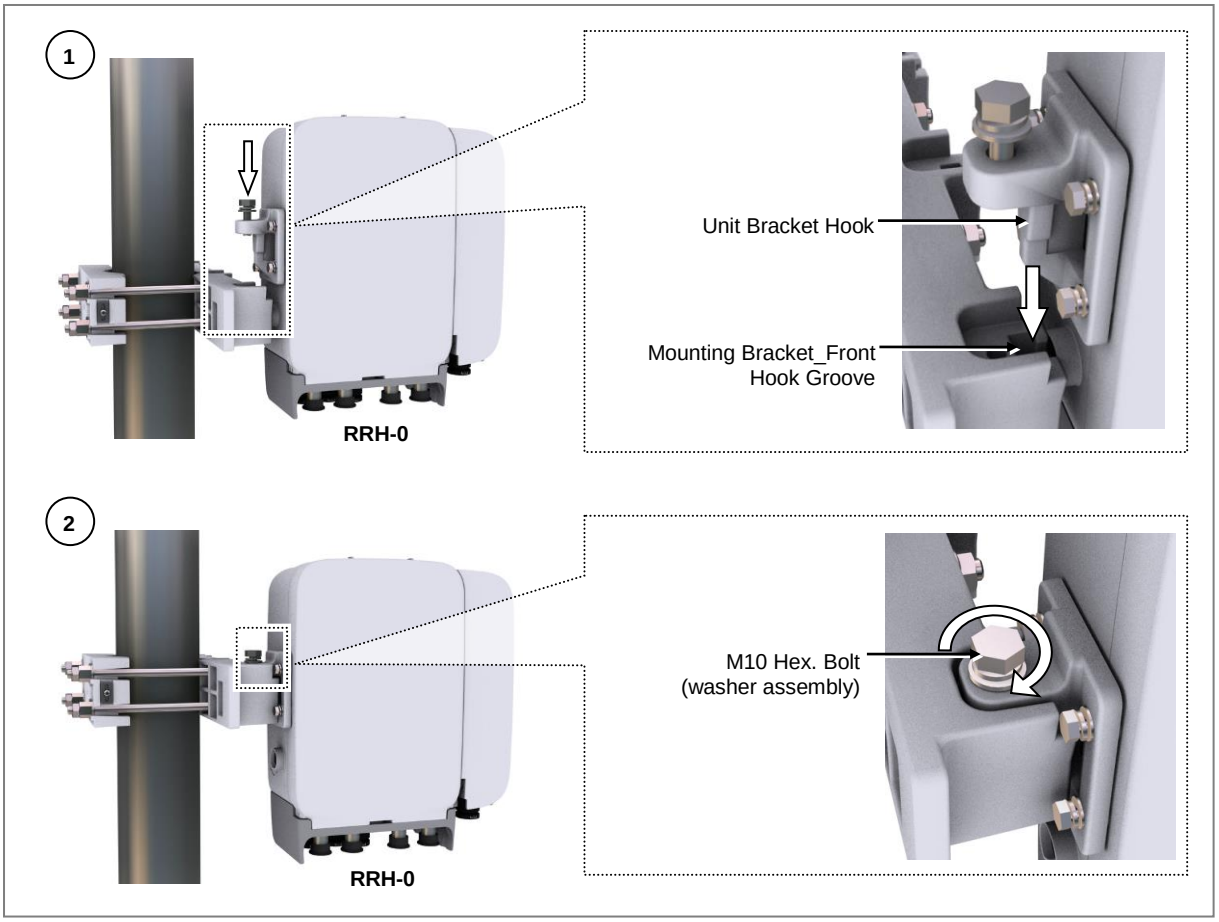
Fix the RRH according to the order of [RRH-0→RRH-1→RRH-2].

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

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

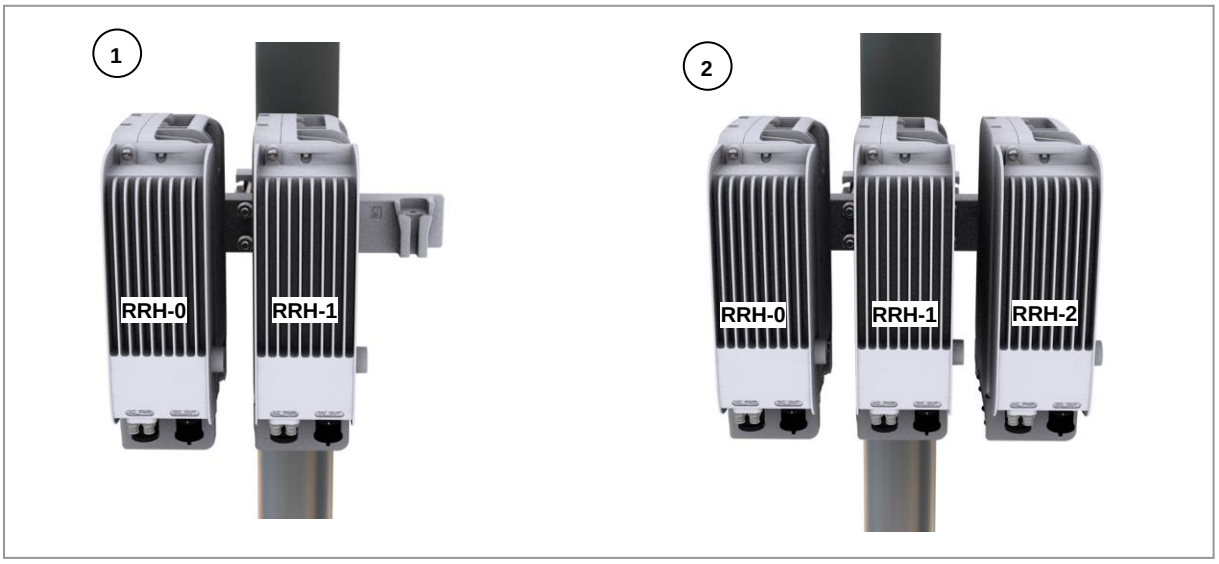
1 Hang the unit bracket hook of RRH side on the mounting bracket_front hook's groove and fix it using the fasteners.

Figure 73. Fixing RRH on the Pole Type Side by Side Installation (1)



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

Figure 74. Fixing RRH on the Pole Type Side by Side Installation (2)



Fixing Wall Type_Side by Side Bracket

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

Fixing Side by Side Bracket

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

Prerequisites

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

Table 26. Tools for Marking

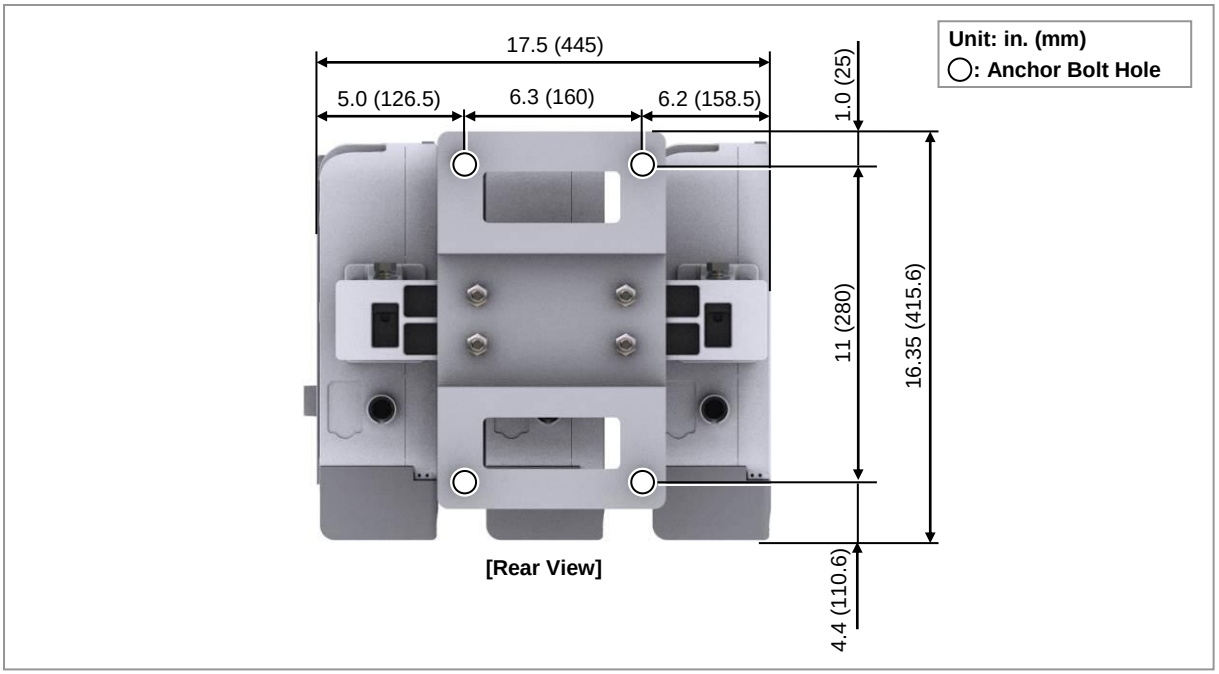
Category	Description
Working Tools	• Tape Measure • Permanent Maker • Level

To mount the system on a wall, perform the leveling test by referring to the System Leveling to check the positions that are marked as horizontal or vertical before the drilling process. If the result shows 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 will reduce marking error range.

1 Check the distance between the location for fixing the RRH and the anchor bolt hole.

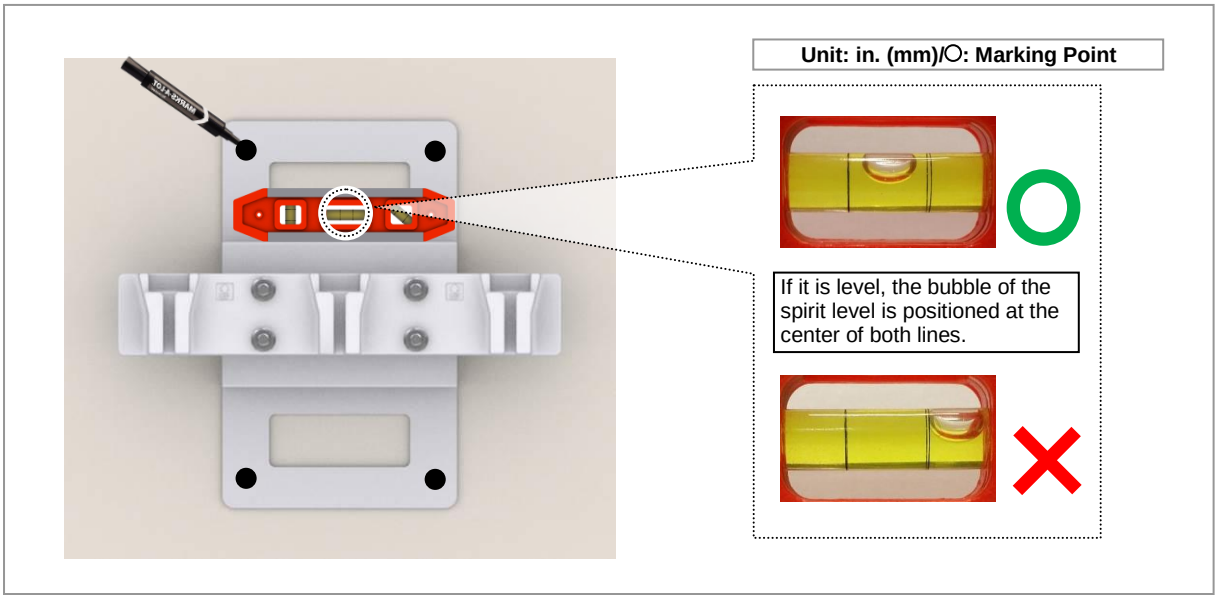
Figure 75. RRH Marking Dimensions



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

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

Figure 76. Marking



To drill an anchor hole, do the following:

Prerequisites

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

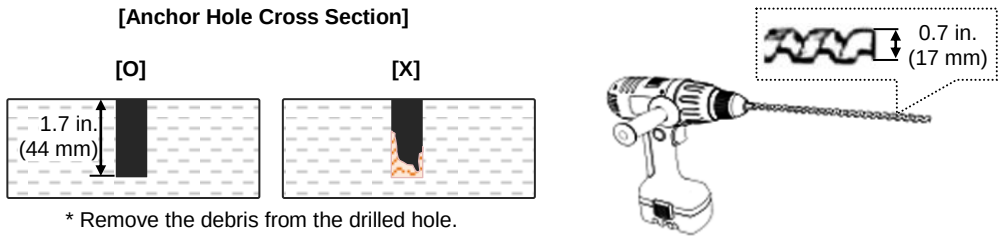
Table 27. Parts and Tools for Drilling

Category	Description
Woking Tools	• Hammer Drill • Concrete Drill Bit [0.6 in. (14 mm)] • Vacuum Cleaner

The table below outlines the drill bits of bolt and depth of hole.

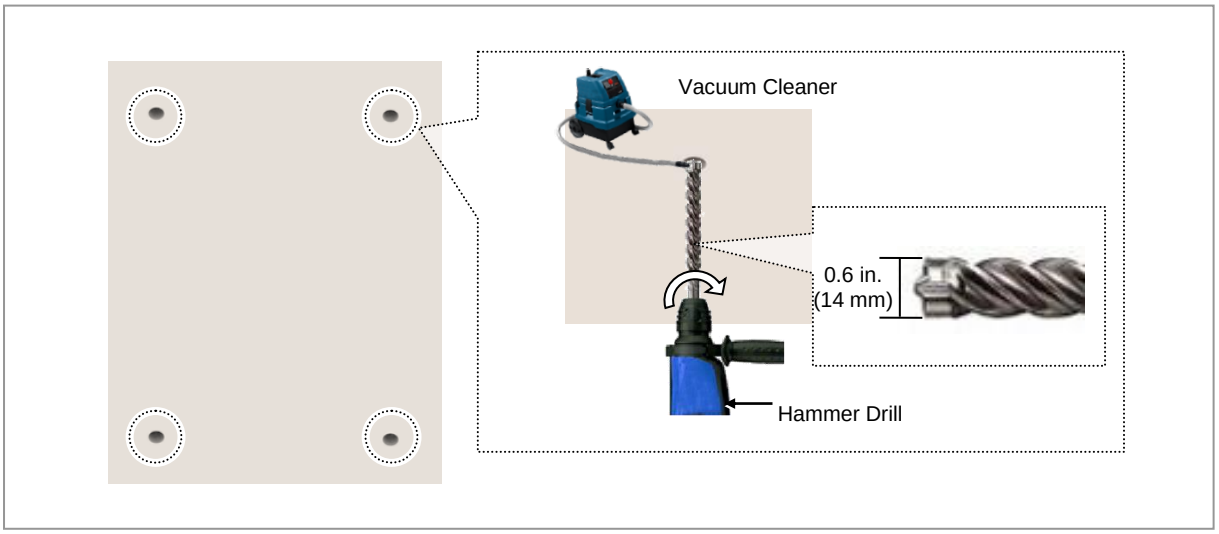
Table 28. Bolt Drill Bits and Hole Depth

Category	Anchor Bolt	Drill Bits	Hole Depth
RRH (Wall Type)	M10	0.6 in. (14 mm)	1.7 in. (44 mm)



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

Figure 77. Drilling



Fixing Side by Side Bracket on the Wall

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

Prerequisites

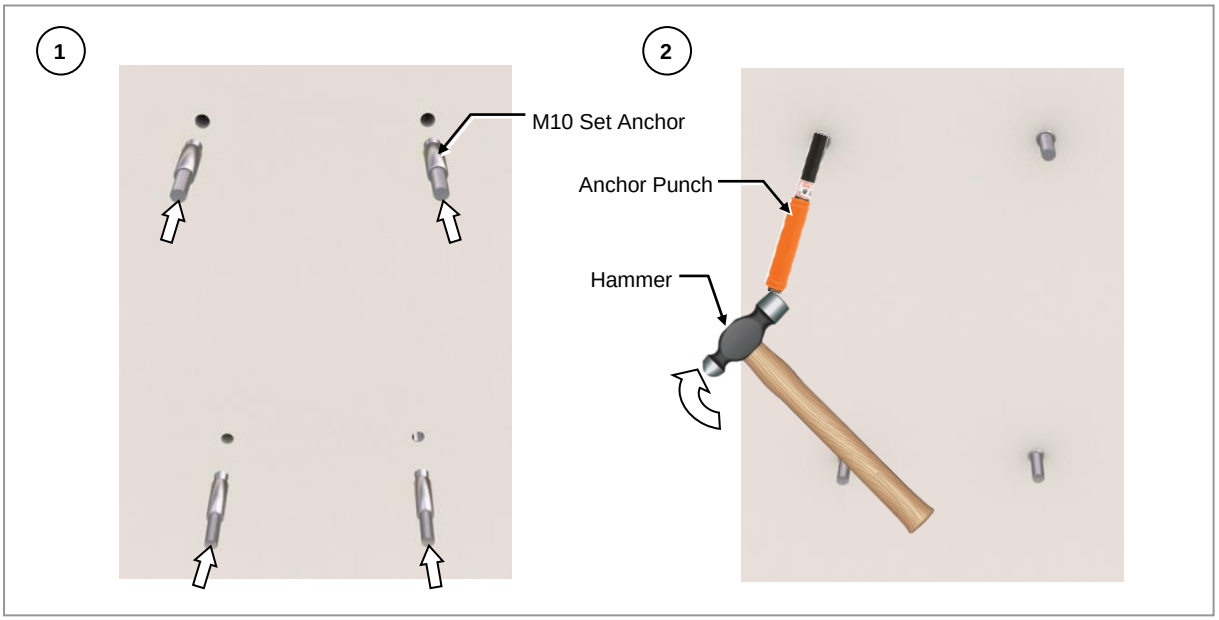
Before proceeding with fixing the side by side bracket for 3-sector on the wall, make sure that you have the items mentioned in the table below:

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

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

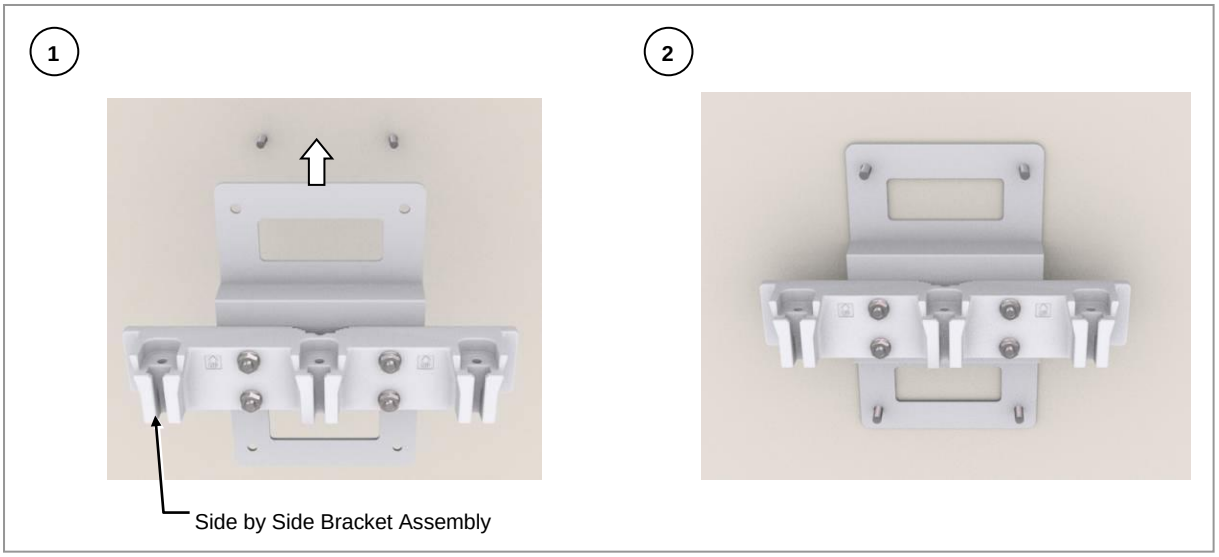
1 Fix the anchor to the drilled hole.

Figure 78. Fixing Side by Side Bracket on the Wall (1)



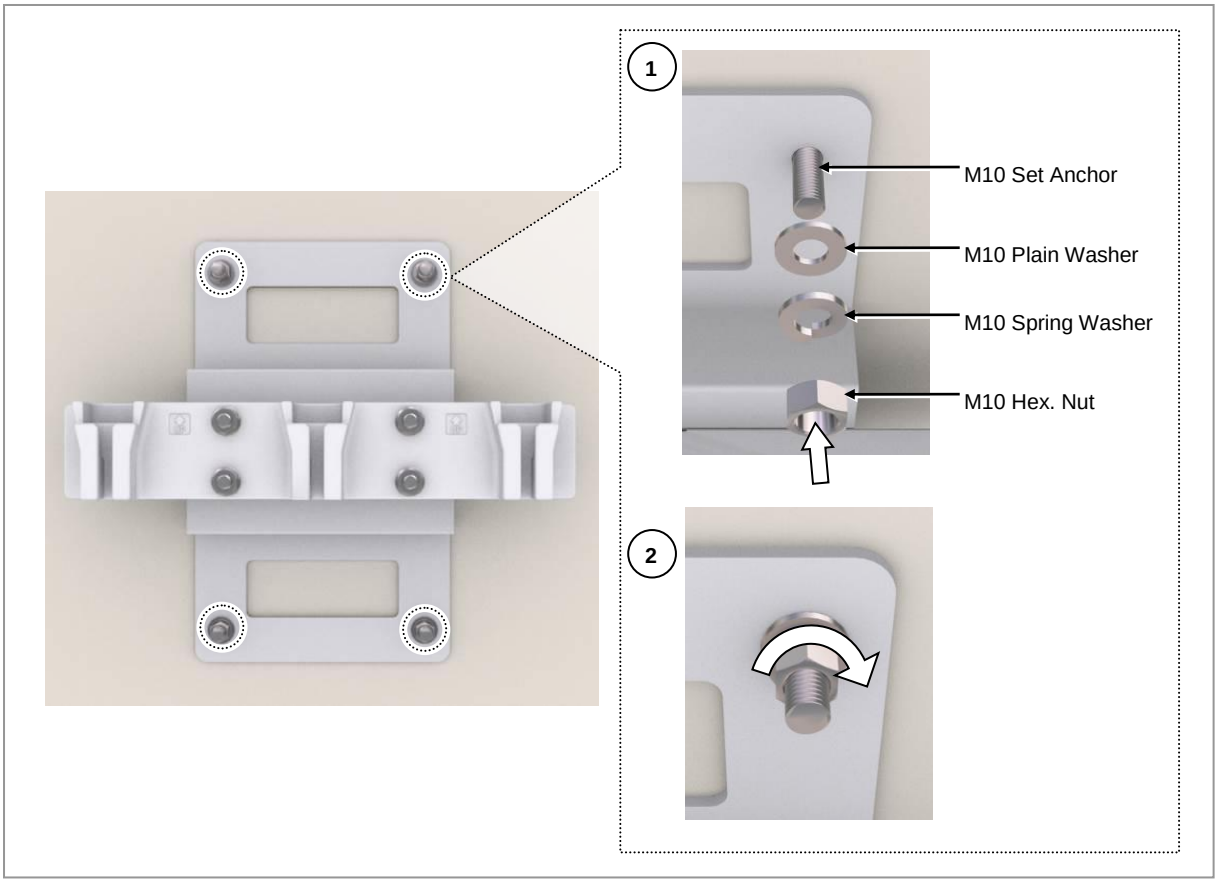
2 Place the side by side bracket on the wall.

Figure 79. Fixing Side by Side Bracket on the Wall (2)



3 Fix the side by side bracket assembly using the fasteners.

Figure 80. Fixing Side by Side Bracket on the Wall (3)



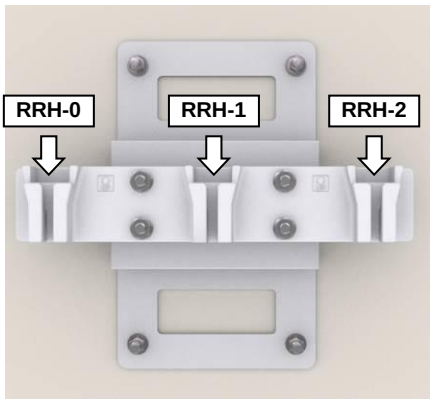
Fixing RRH on the Wall

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

Prerequisites

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

Check the location to install the RRH.



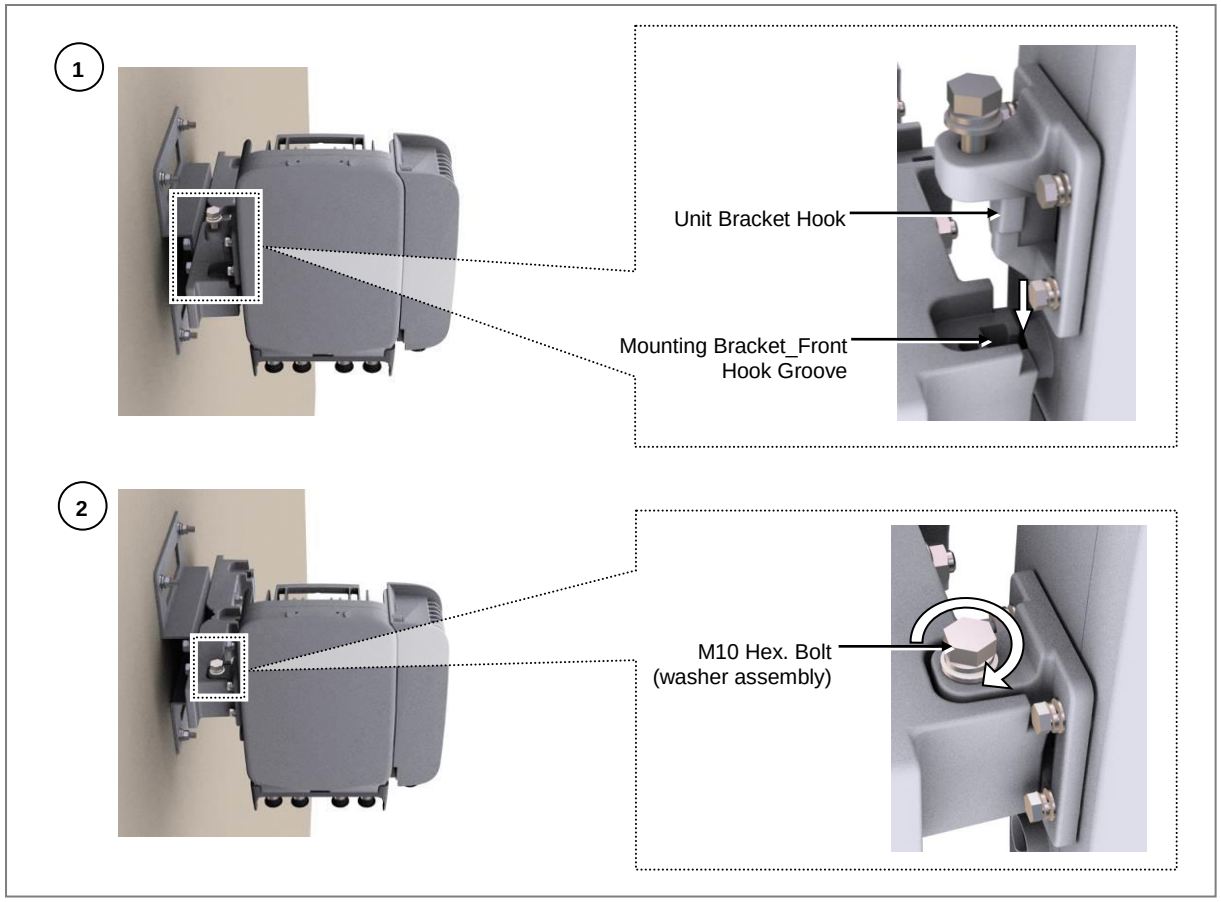
Fix the RRH according to the order of [RRH-0 → RRH-1 → RRH-2].

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

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

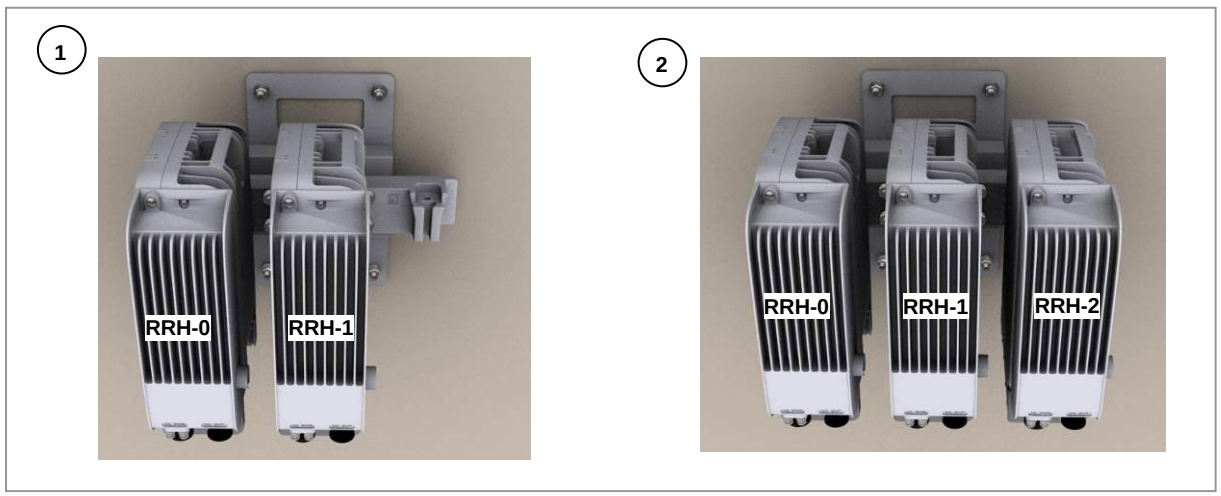
1 Hang the unit bracket hook of RRH side on the mounting bracket_front hook's groove and fix it using the fasteners.

Figure 81. Fixing RRH on the Wall (1)



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

Figure 82. Fixing RRH on the Wall (2)



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

For detailed instructions on how to use the RF alignment tool, refer to the user manual per manufacturer.

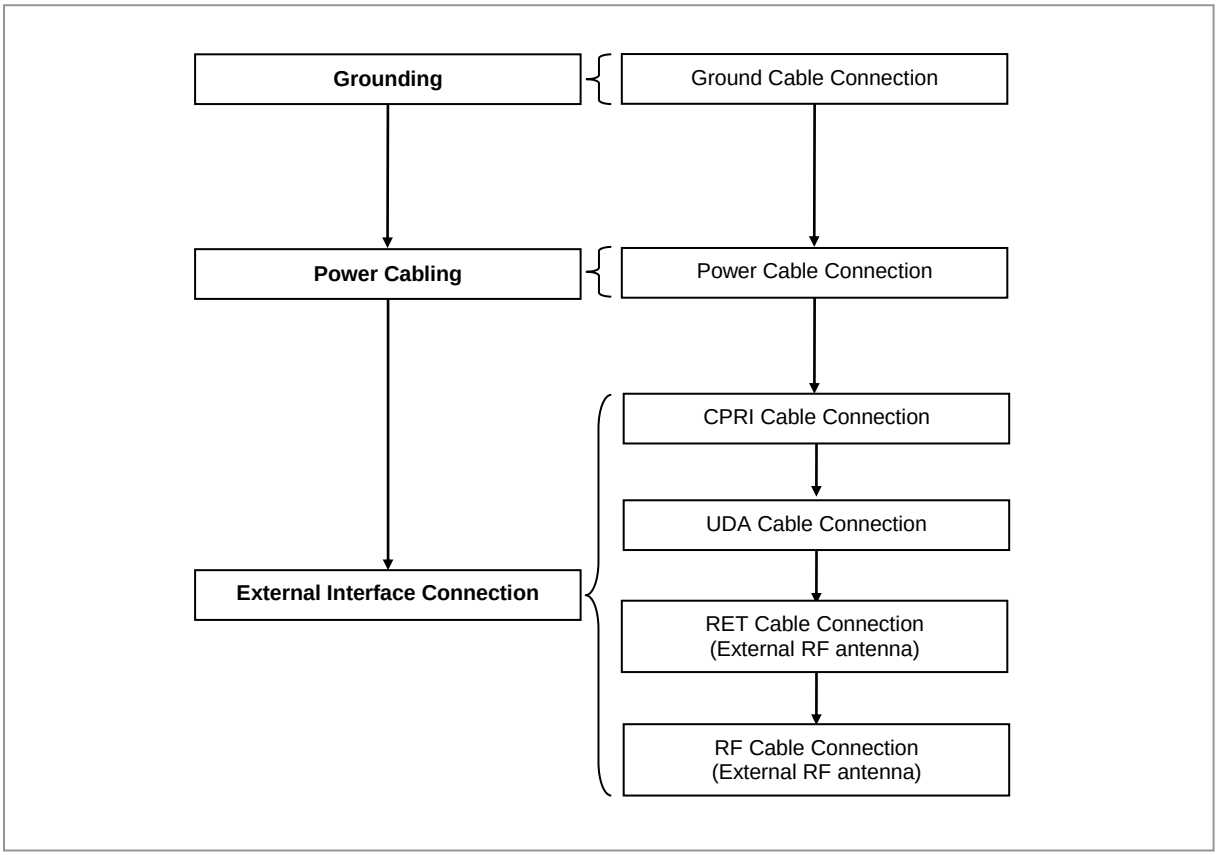
Chapter 3 Connecting Cables

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

Cabling Procedure

The figure below depicts the procedure to connect system cables.

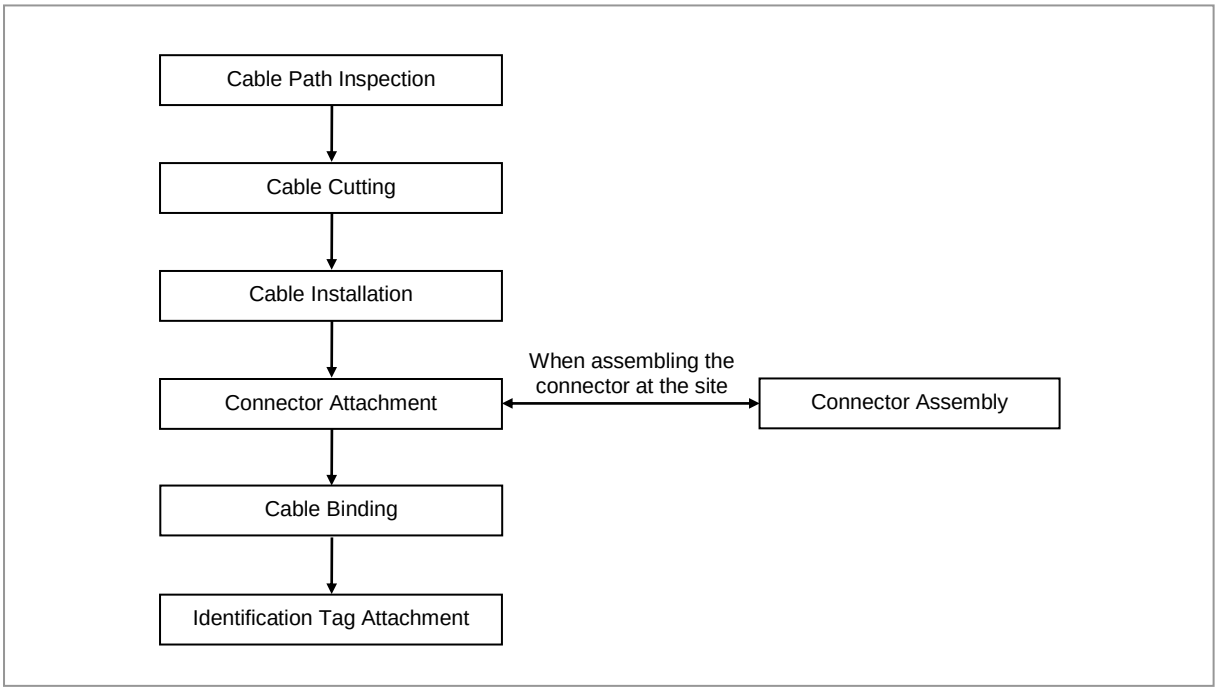
Figure 83. Procedure to Connect System Cable



Guidelines for Cable Connections

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

Figure 84. Cable Connection Procedure



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

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

Cable Path Inspection

When installing the cable that interconnects rectifier, the Main Ground Bar (MGB), the backhaul device, 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 the length does not affect the cable installation and maintenance.

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

Cable Cutting

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

To cut the cable, follow these guidelines:

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

Cable Installation

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

To install the cable, follow these guidelines:

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

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

Table 31. Recommended Minimum Allowed Cable bend Radius

No	Type	Allowed Cable Bend Radius

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

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

Cable Binding

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

When binding a cable, follow the guidelines below:

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

Connector Attachment

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

When attaching the connector, follow the guidelines below:

- 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 hook to prevent its core positions from being changed.
- Check the corresponding grooves before connecting the connector to another connector.
- Use a weather proof tape at the connector connection for cables that are installed outdoor, such as feeder lines, to prevent water leakage and corrosion from occurring at the part exposed to the outside.

- Connect each cable of the connector assembly in a straight line.
- Be careful when connecting the cable so that contact failure does not occur at the connector connection due to tension.

Identification Tag Attachment

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

When attaching an identification tag, follow the guidelines below:

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

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

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

After completing the cable installation, unused ports must be capped.

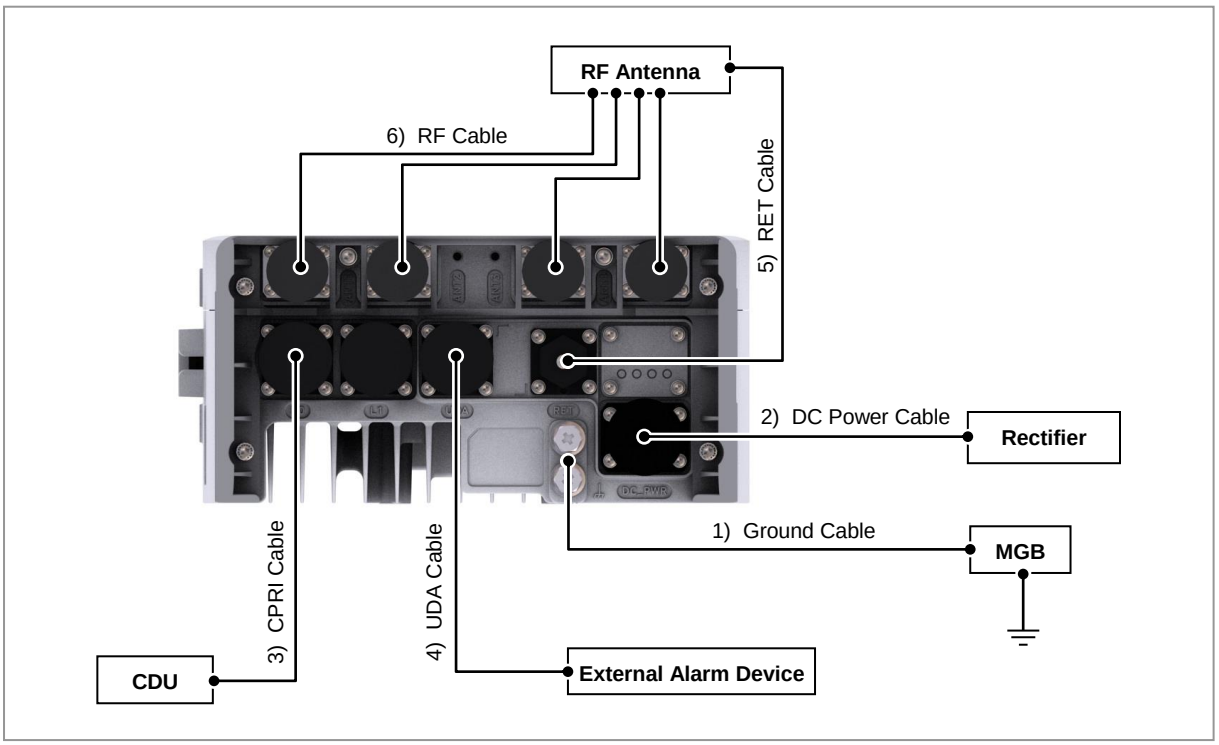
When installing, ensure not to overlap or tangle the cables. In addition, consider future expansion. Install the DC power cable and the data transmission cable away from the AC power cable to prevent electromagnetic induction.

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

Cabling Diagram

The figure below depicts the cabling connections of the RRH only.

Figure 85. RRH Cable Diagram (RRH only)



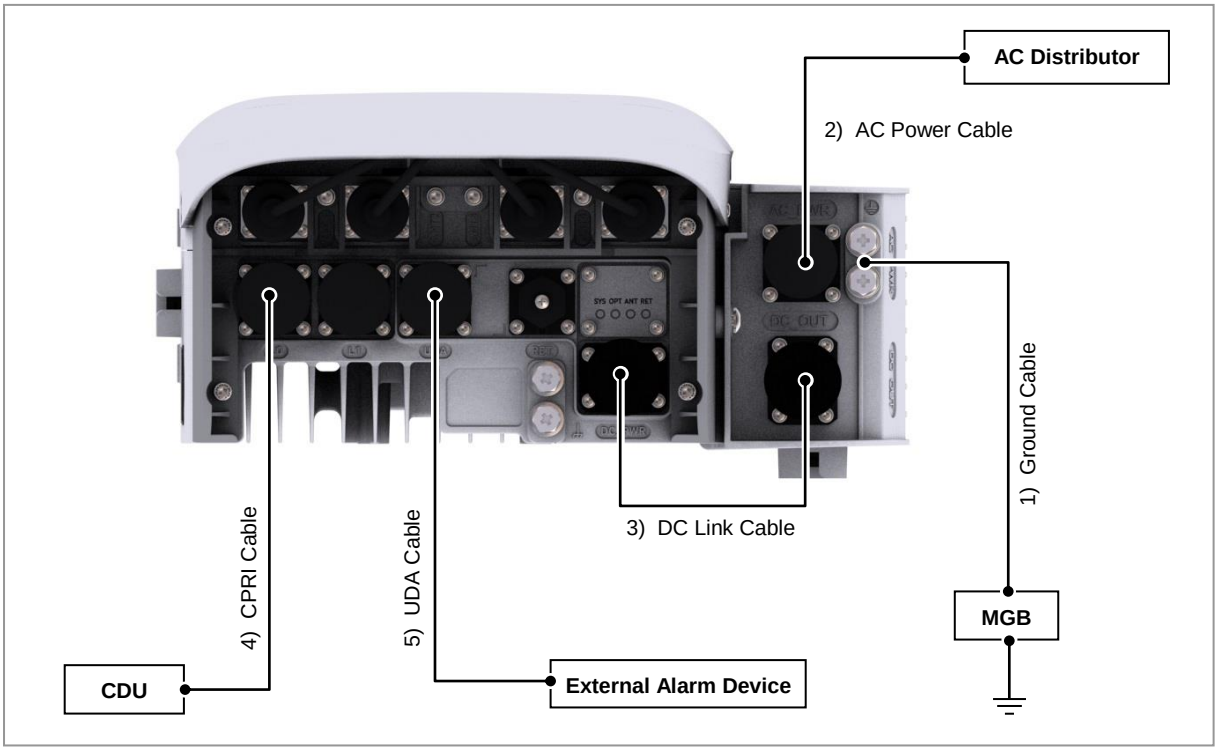
The table below outlines the RRH cable connections required for interconnecting different units and devices for RRH only.

Table 32. RRH Connection Cable

From	To	Cable
MGB	RRH	**1** Ground Cable : 6 AWG × 1C
RRH	Rectifier	**2** DC Power Cable : 10 AWG × 2C
	CDU	**3** CPRI Cable : Single Mode (Outdoor Type)
	External Alarm Device	**4** UDA Cable Assembly
	RF Antenna	**5** RET Cable Assembly
		6 RF Cable : 1/2 in. Feeder Line

The figure below depicts the different cabling options of the RRH with clip-on antenna and AC-DC power unit.

Figure 86. RRH Cable Diagram (with Clip-on Antenna and AC-DC Power Unit)



The table below outlines the RRH cable connections required for interconnecting different units and devices for clip-on antenna and AC-DC power unit.

Table 33. RRH Connection Cable

From	To	Cable
MGB	AC-DC Power Unit	**1** Ground Cable : 6 AWG × 1C
RRH	AC Distributor	**2** AC Power Cable : 14 AWG × 3C
	AC-DC Power Unit	**3** DC Link Cable Assembly : 14 AWG × 2C
	CDU	**4** CPRI Cable : Single Mode (Outdoor Type)
	External Alarm Device	**5** UDA Cable Assembly

If the cable is connected to external equipment such as optical distribution box, the inlet hole finishing method of external equipment must be done after consulting the operation company
- Cables: Power cable, CPRI cable, and UDA cable

Grounding

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

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

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

The purposes of the ground construction are as follows:

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

Connecting Ground Cable

To connect a ground cable, do the following:

Prerequisites

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

Table 34. Parts and Tools for Connecting Ground Cable

Category	Description	
Installation Section	RRH only	MGB to RRH Ground Terminal
	With AC-DC power unit	MGB to AC-DC power unit Ground Terminal
Cable	6 AWG × 1C	
Minimum Cable Bend Radius	8 × OD	
Heat Shrink Tube (Spec/Color/Length)	Φ 0.47 in. (12 mm)/Clear/1.96 in. (50 mm)	
Pressure Terminal	MGB	Checking MGB specifications per site and preparing connecting parts
	RRH or	6 AWG, 2 Hole, Hole diameter: 1/4 in. (6.4 mm), Hole

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

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

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

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

1 Install the ground cable from the MGB to the RRH (or AC-DC power unit) ground terminal, as depicted in the figures below:

Figure 87. Connecting Ground Cable_only RRH (1)

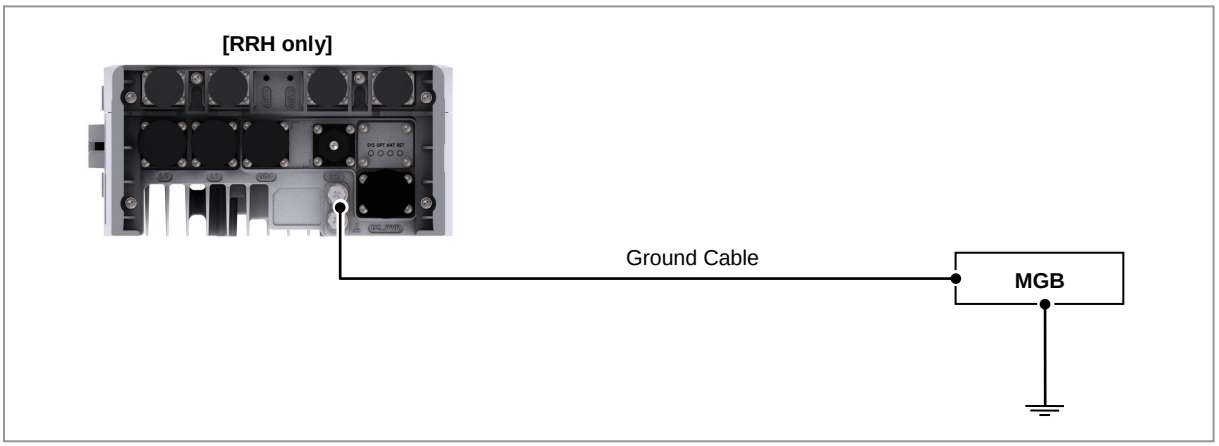
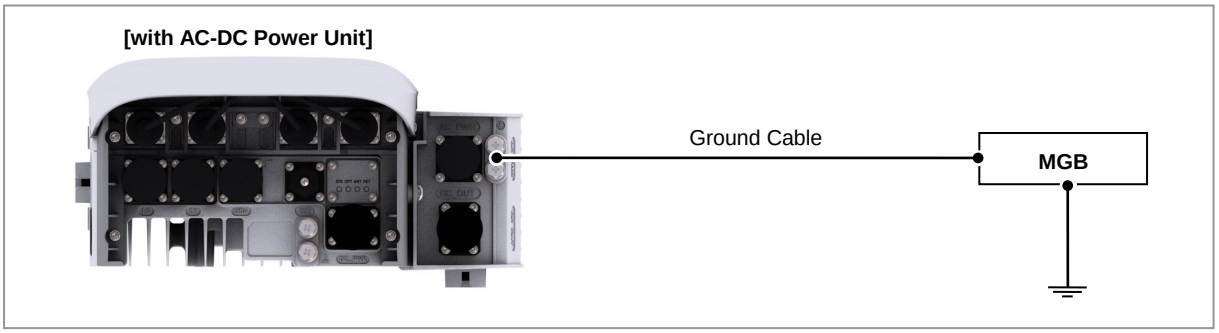


Figure 88. Connecting Ground Cable_with AC-DC Power Unit (2)



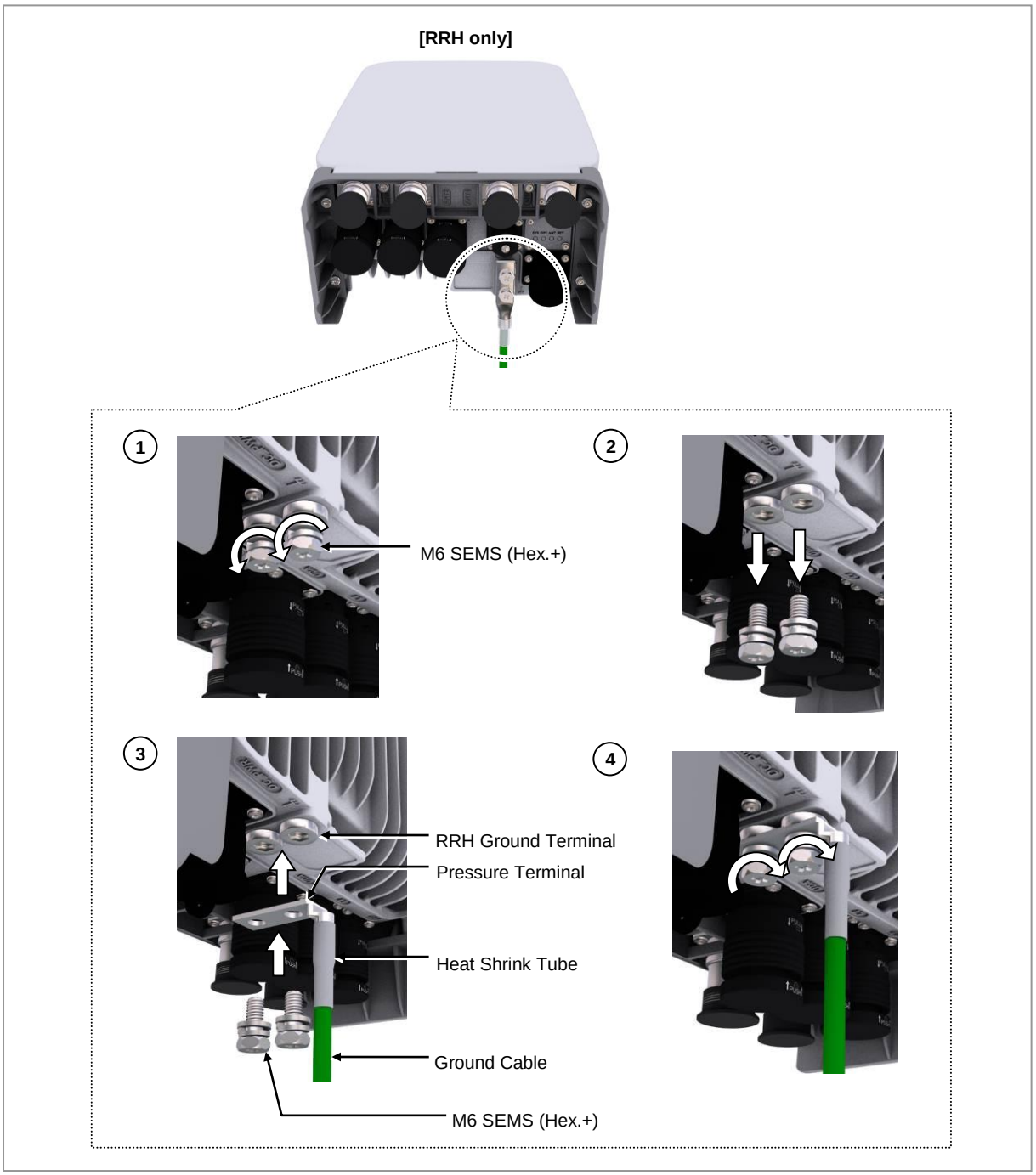
2 Remove the fastener (M6 SEMS) from the RRH (or AC-DC power unit) ground terminal.

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

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

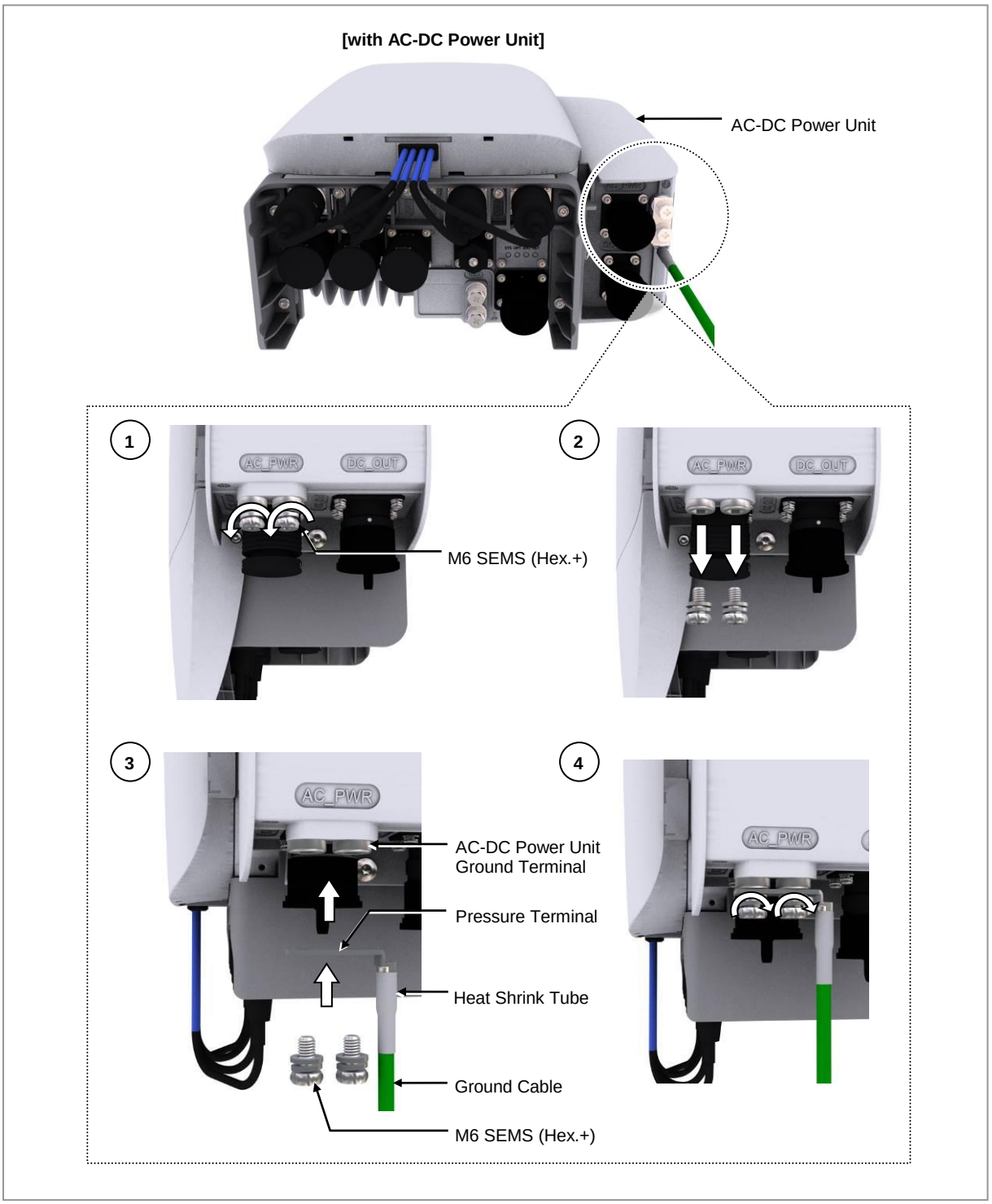
5 Firmly fix the pressure terminal onto the RRH (or AC-DC power unit) ground terminal using the fasteners.

Figure 89. Connecting Ground Cable_only RRH (3)



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

Figure 90. Connecting Ground Cable_with AC-DC Power Unit (4)



Power Cabling

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

Figure 91. Power Equipment Elements_RRH only

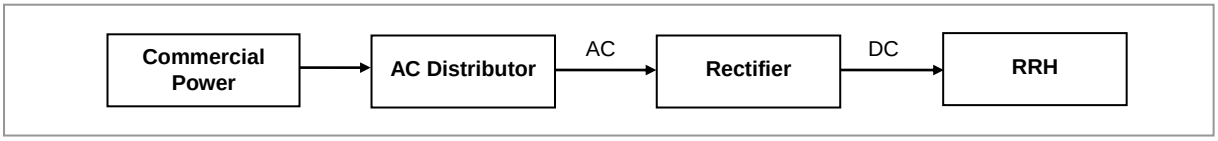
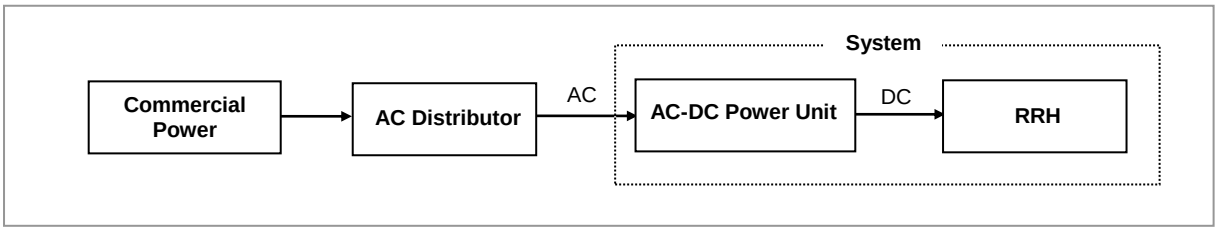


Figure 92. Power Equipment Elements_with AC-DC Power Unit



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

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

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

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

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

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

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

It must be verified that the rectifier or the power distributor has an output voltage

within the specified system input range before the power line is connected.

If using the power cable, the maximum installation length per type is as follows

The maximum installation length is based on the conditions under which each cable is normally installed and it may change if the conditions are changed.

Power Cable Size		Maximum Installation Length
DC power cable	10 AWG	180 m (590 ft)
AC power cable	14 AWG	35 m (115 ft)

Install a circuit breaker to the DC rectifier (or power distributor) for the stable power. The capacity of the circuit breaker is 10 A. (Use UL listed circuit breakers)

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

Connecting Power Cable

This section describes how to connect AC-DC power cables.

Connecting DC Link Cable

To connect a DC link cable, do the following:

Prerequisites

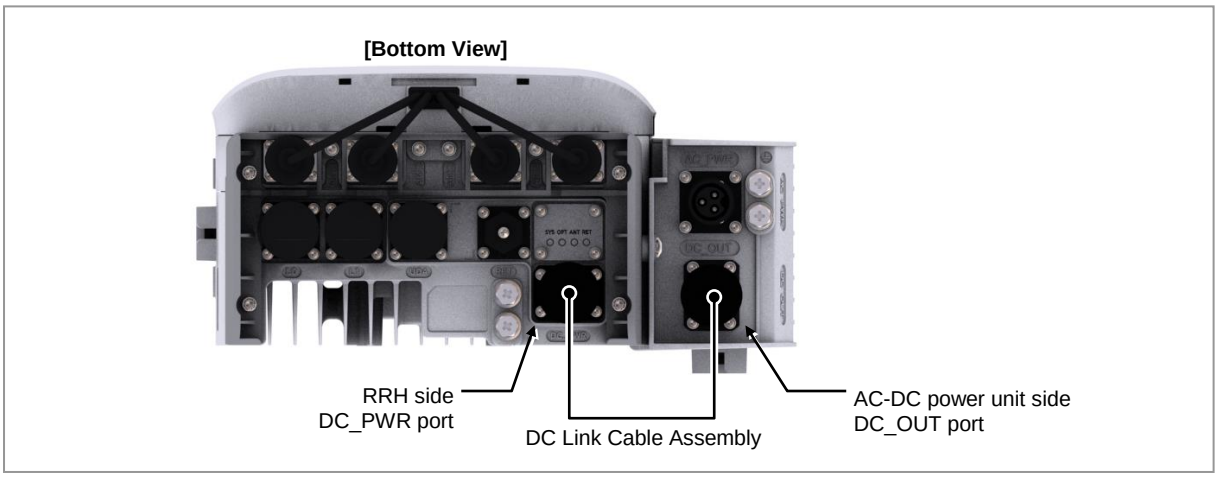
Before proceeding with connecting the DC link cable, make sure that you have the items mentioned in the table below:

Table 35. Parts and Tools for Connecting Power Cable

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

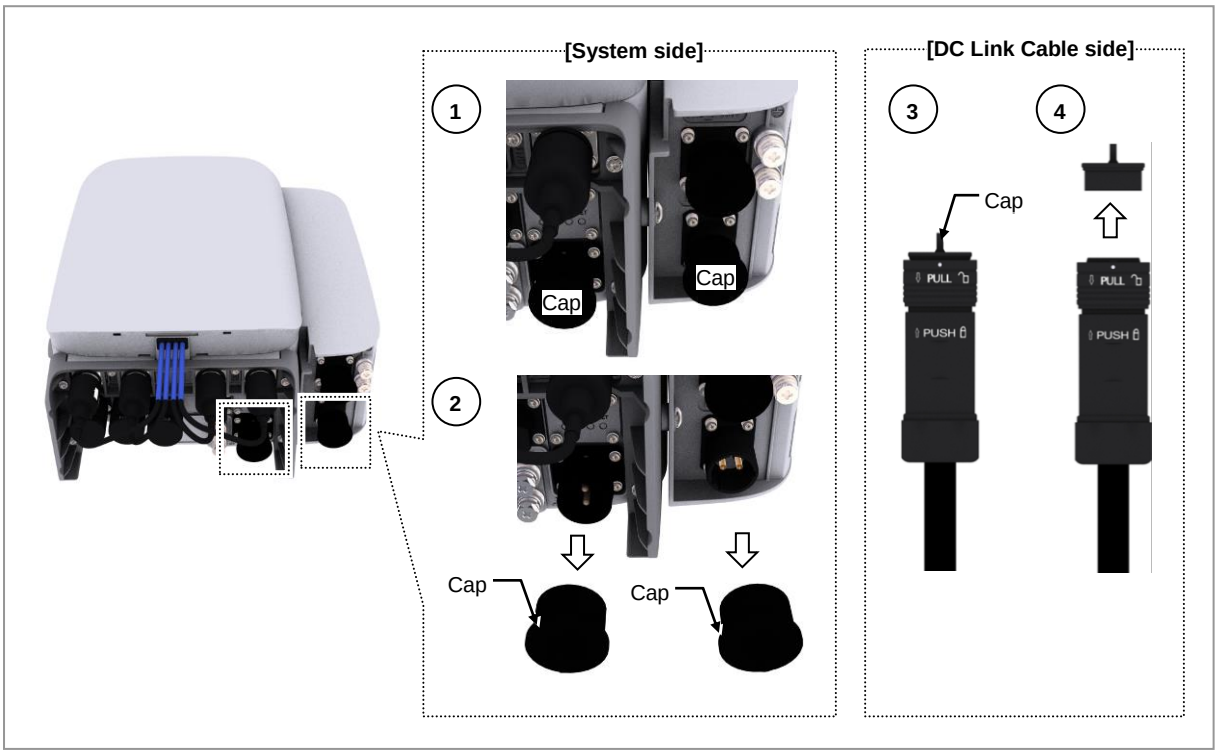
1 Install the power cable from the AC-DC power unit to the RRH.

Figure 93. Connecting DC Link Cable (1)



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

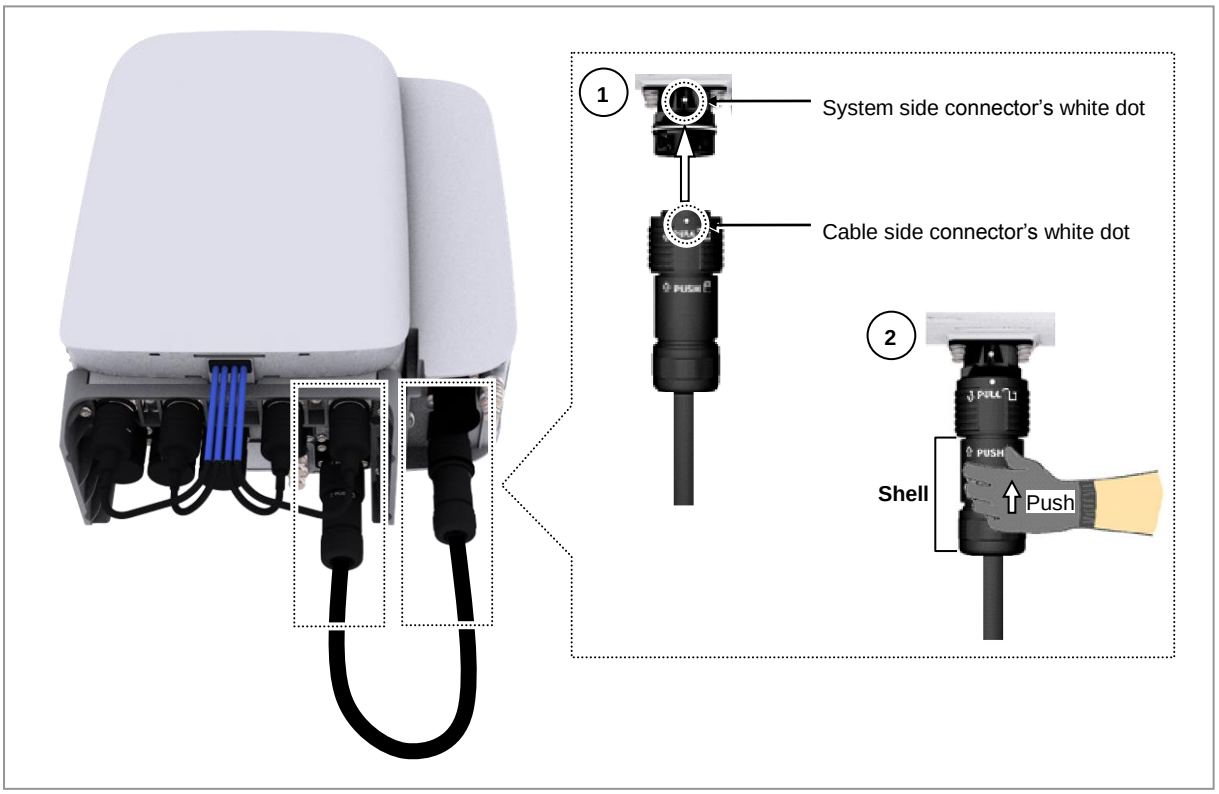
Figure 94. Connecting DC Link Cable (2)



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

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

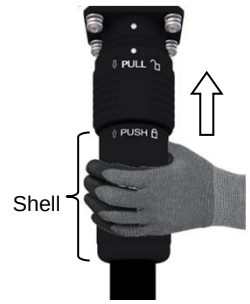
Figure 95. Connecting DC Link Cable (3)



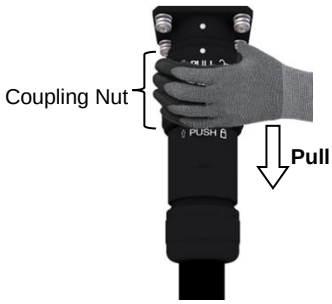
When the connector is fastened tight, the white line on the system side connector becomes invisible.

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

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



[Connecting]



[Disconnecting]

Connecting AC Power Cable

To connect an AC power cable, do the following:

Prerequisites

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

Table 36. Parts and Tools for Connecting AC Power Cable

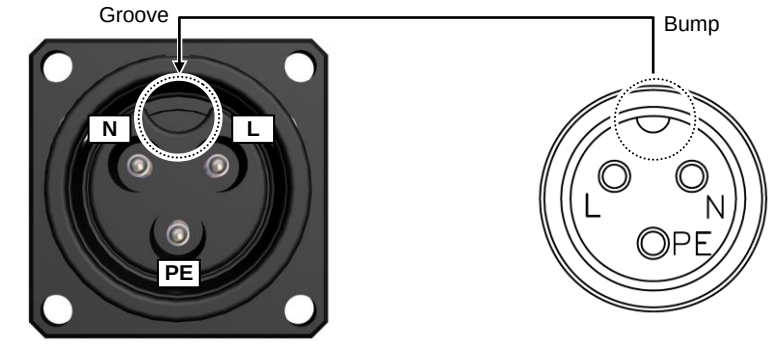
Category	Description	
Installation Section	AC Distributor and AC-DC Power Unit	
Cable	14 AWG × 3C	
Bend Radius	• Operation: 8 × OD • Installation: 12 × OD	
Connector	AC Distributor	Checking specifications of AC distributor output terminal per site and prepare the fasteners
	AC-DC Power Unit	JONHON, Push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

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

Table 37. AC/DC Power Unit AC Power Cable Connector Pin Map

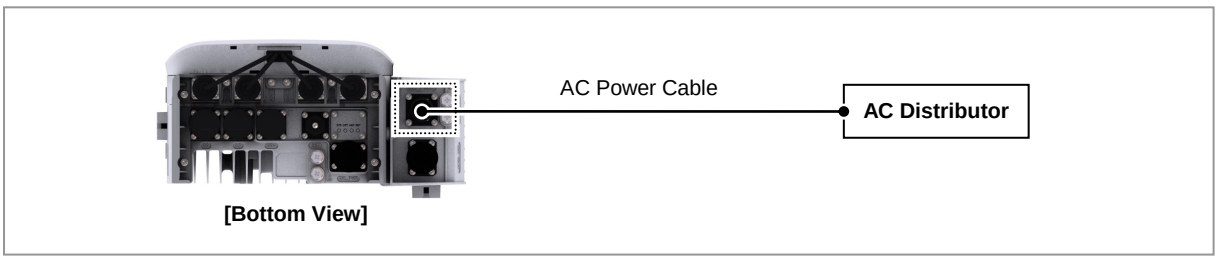
Power Connector Pin No.	Color
L	Black
N	White
PE	Green

Power Connector Pin No.	Color



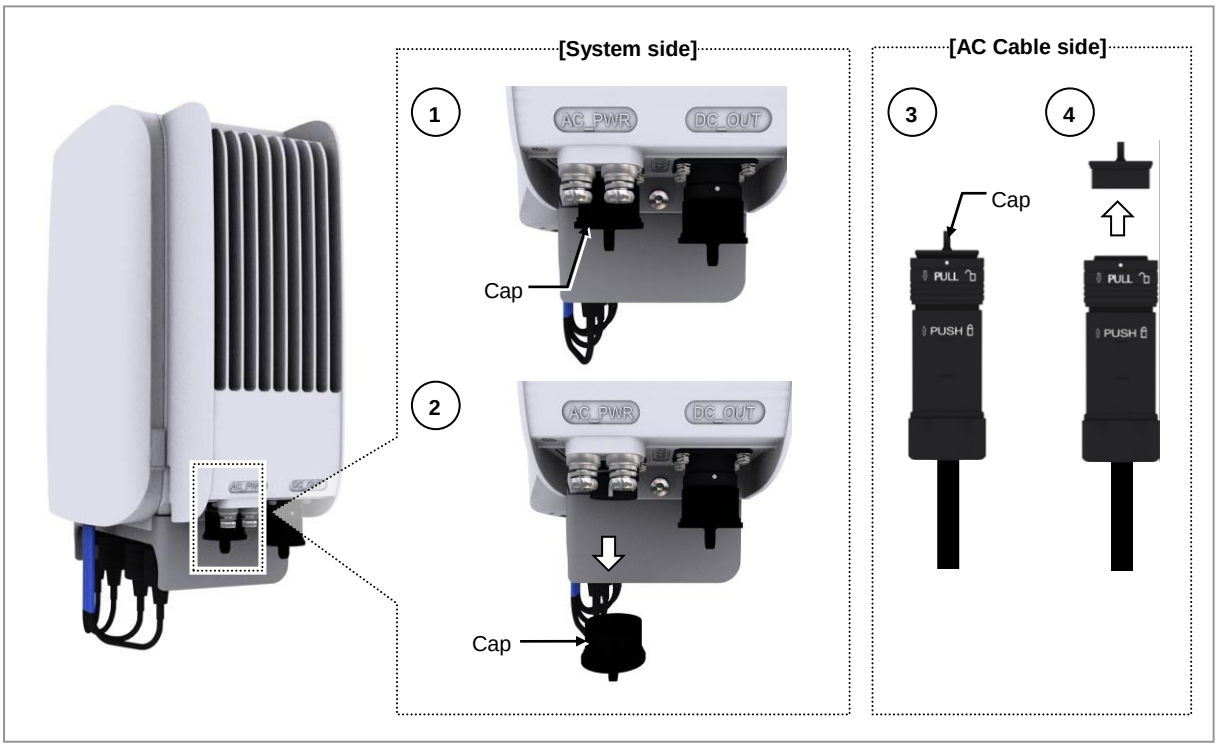
1 Install the AC power cable from the AC distributor to the AC-DC power unit.

Figure 96. Connecting AC/DC Power Unit AC Power Cable (1)



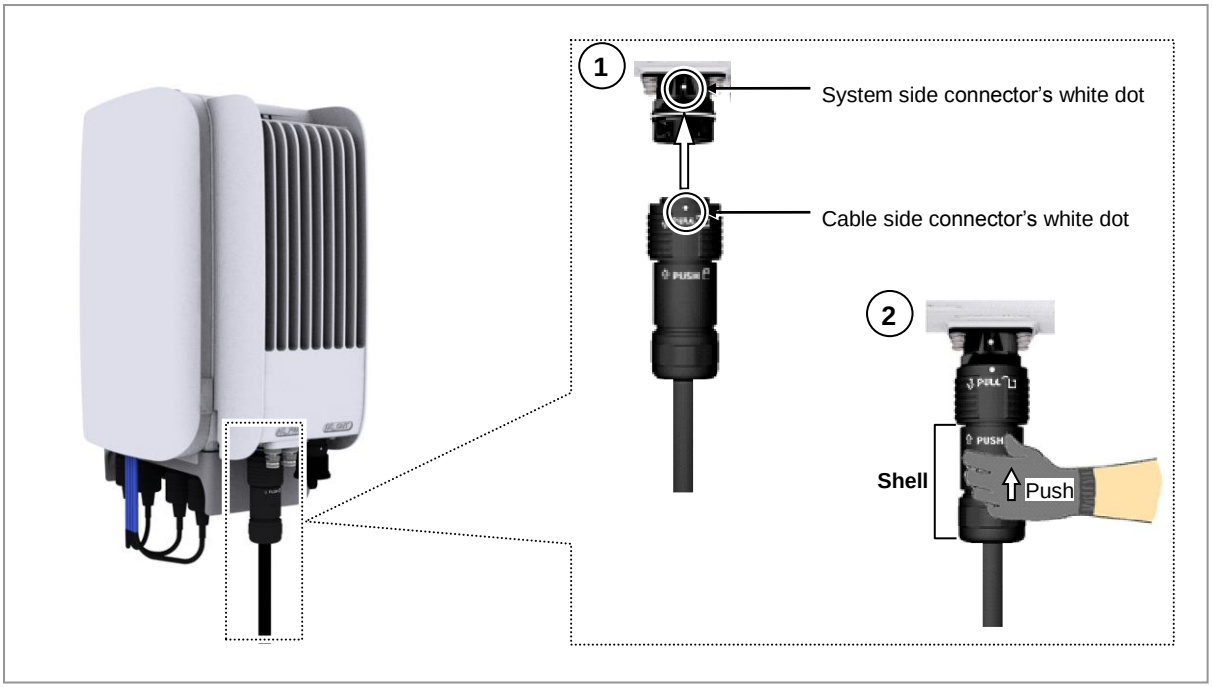
2 Separate the cap from the AC-DC power unit side (AC PWR port) and cable side connector.

Figure 97. Connecting AC/DC Power Unit AC Power Cable (2)



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

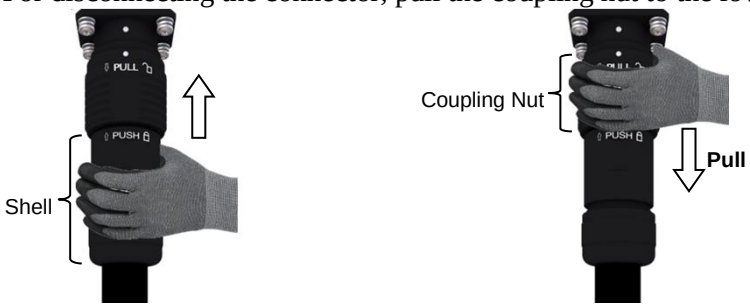
Figure 98. Connecting AC/DC Power Unit AC Power Cable (3)



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

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

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



[Connecting] **[Disconnecting]**

Connecting DC Power Cable (External rectifier connection)

To connect a DC power cable, do the following:

Prerequisites

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

Table 38. Parts and Tools for Connecting DC Power Cable

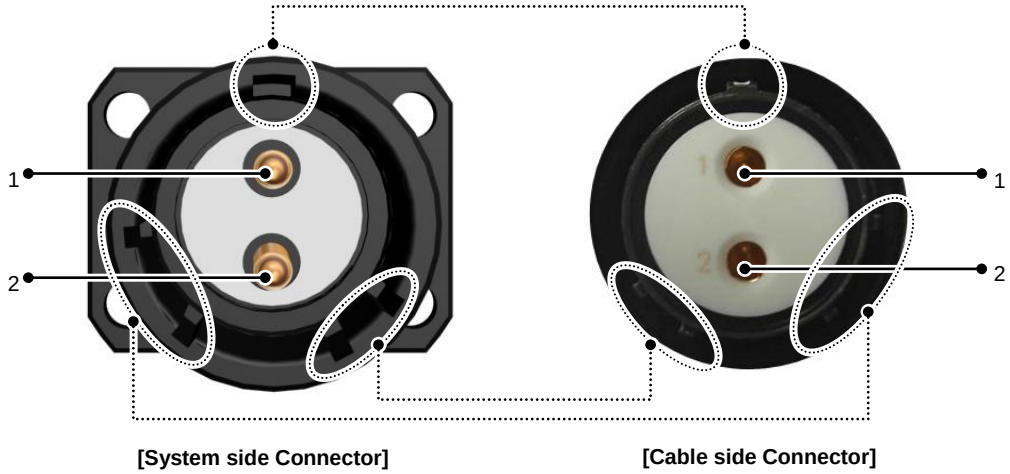
Category	Description	
Installation Section	Rectifier and RRH	
Cable	10 AWG × 2C	
Bend Radius	• Operation: 8 × OD • Installation: 10 × OD	
Connector	Rectifier	Check specifications of AC distributor output terminal per site and prepare the fasteners
	RRH	JONHON, Push Pull Type, CT48J-1502TSCBM to Open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

Category	Description
	• Wire Stripper • Compressor • Heating Gun • Nipper

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

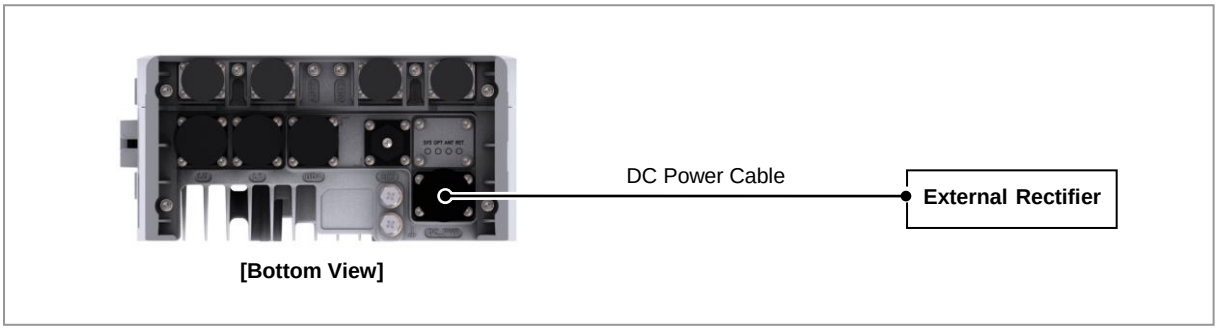
Table 39. DC Power Cable/Connector Pin Map

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



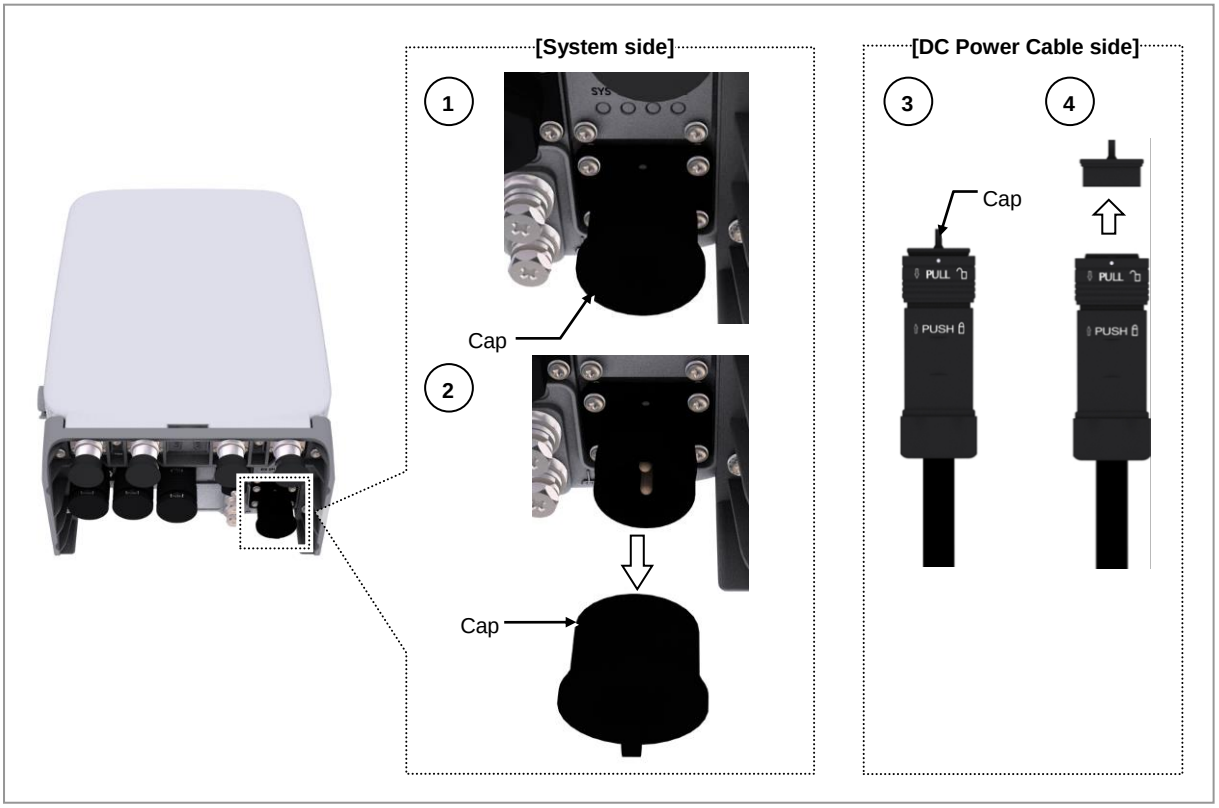
1 Install the power cable from the rectifier to the RRH.

Figure 99. Connecting DC Power Cable (1)



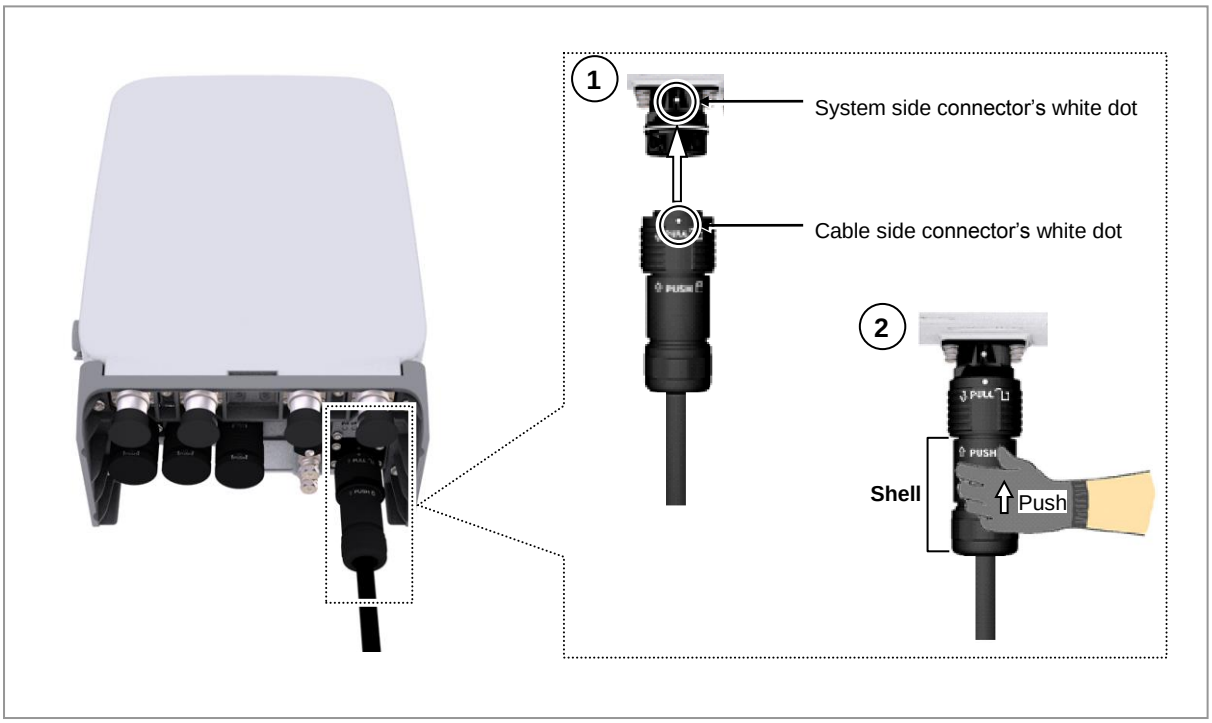
2 Separate the cap from the RRH side and cable side connector.

Figure 100. Connecting DC Power Cable (2)



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

Figure 101. Connecting DC Power Cable (3)

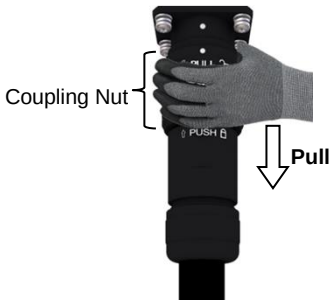


When the connector is fastened tight, the white line on the system side connector becomes invisible.

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

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

[Connecting]



[Disconnecting]

Interface Cable Connection

This section describes the procedures for connecting the interface cables.

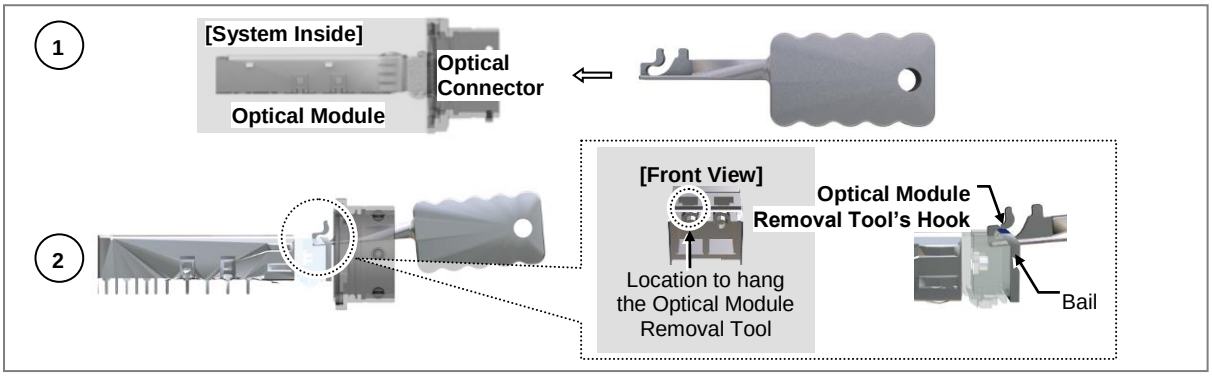
Remove/Insert Optical Module

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

To remove the optical module, do the following:

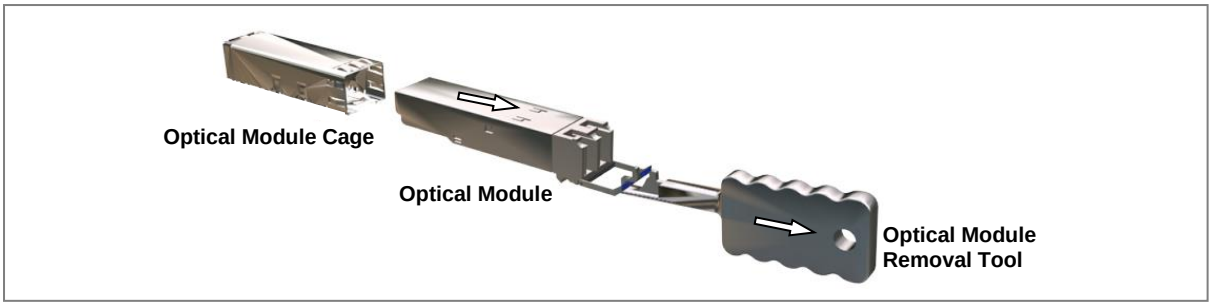
1 Hang the hook of the optical transceiver removal tool on the bail of the optical module within the system.

Figure 102. Optical Module Removal (1)

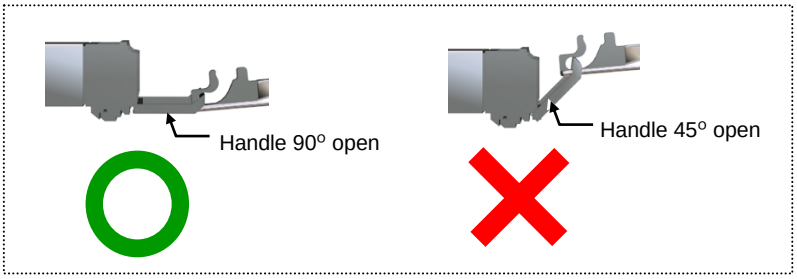


2 Remove the optical module from the optical module cage by pulling the optical module removal tool.

Figure 103. Optical Module Removal (2)



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

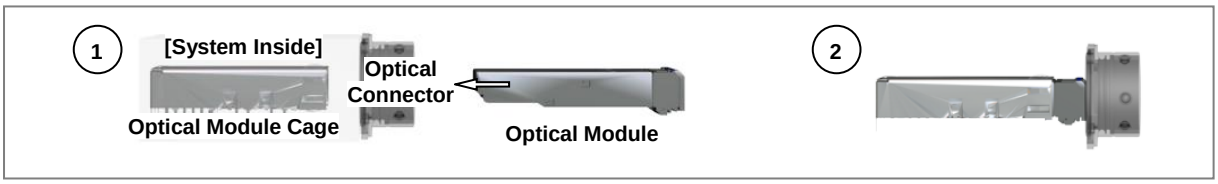


3 Remove the optical module and the jig by pressing the hook grip of the optical module removal tool.

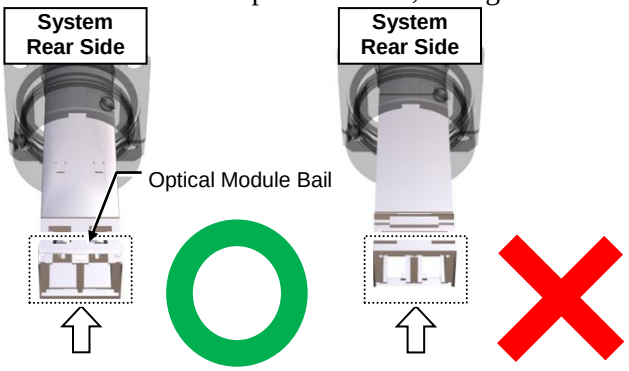
Figure 104. Optical Module Removal (3)

4 Insert the optical module by pushing the optical module into the optical module cage within the connector.

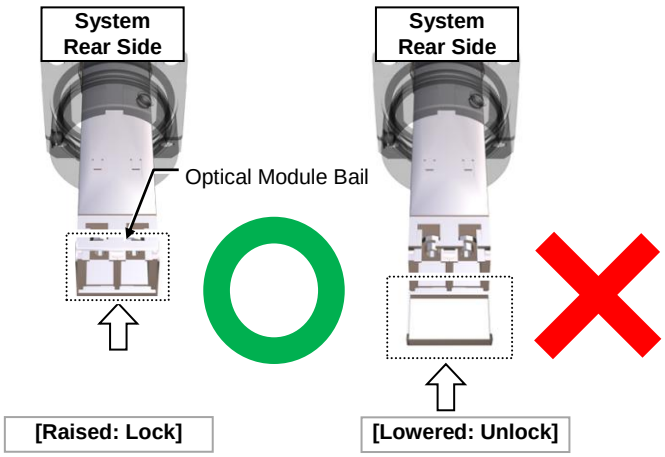
Figure 105. Optical Module Insert



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



Do not inset when the bail of the optical module is unlocked.



Connecting CPRI Cable

To connect a CPRI cable, do the following:

Prerequisites

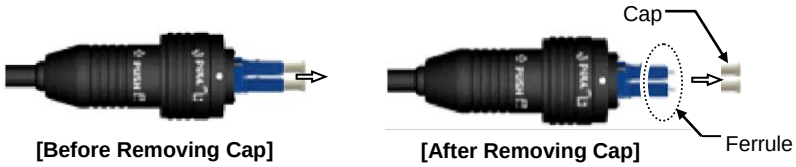
Before proceeding with connecting the CPRI cable, make sure that you have the items mentioned in the table below:

Table 40. Parts and Tools for connecting CPRI Cable

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

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

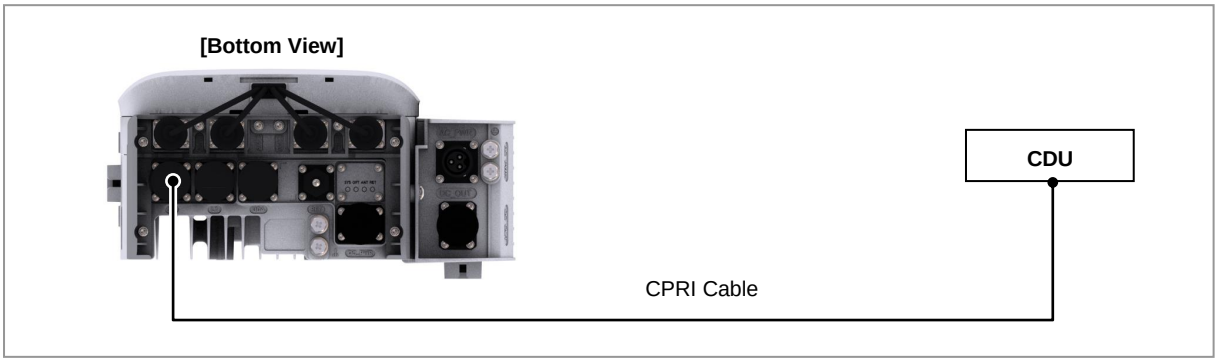
Remove the cap of the optical connector before connecting.
- Before connecting the optical cable, check whether the ferrule of the connector is soiled. Be careful to keep the cutting section away from dust or foreign material. If the cable is soiled with foreign material, do not blow to remove them.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



Before connecting the CPRI cable connector, the ferrule of the connecter of cable side should be cleaned first using the optical connector cleaner. For more information, see Appendix B.

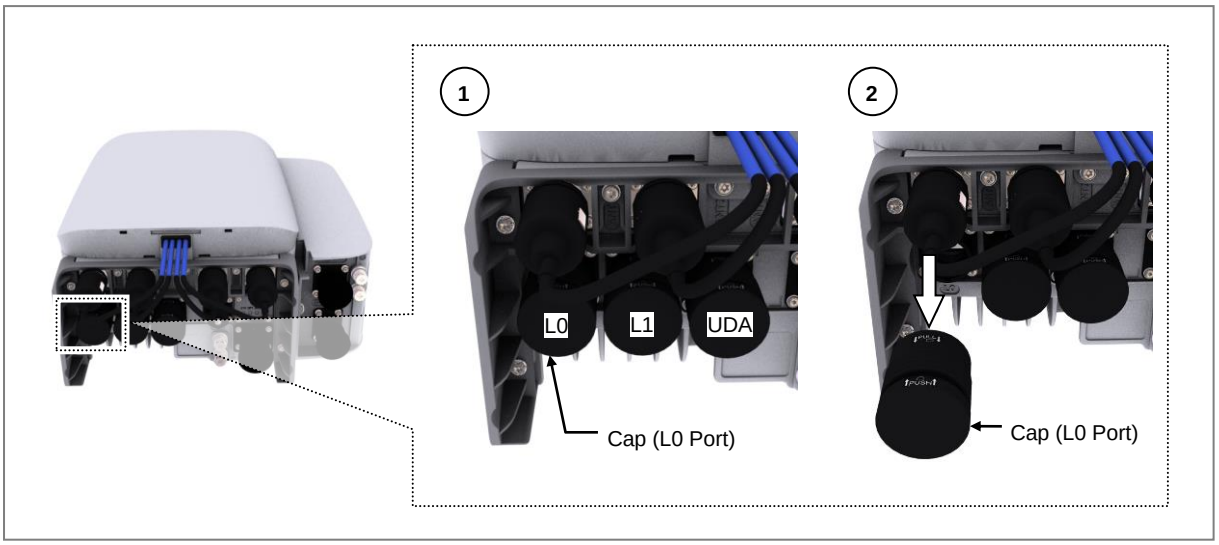
1 Install the CPRI cable from the CDU to the RRH L0 port.

Figure 106. Connecting CPRI Cable (1)

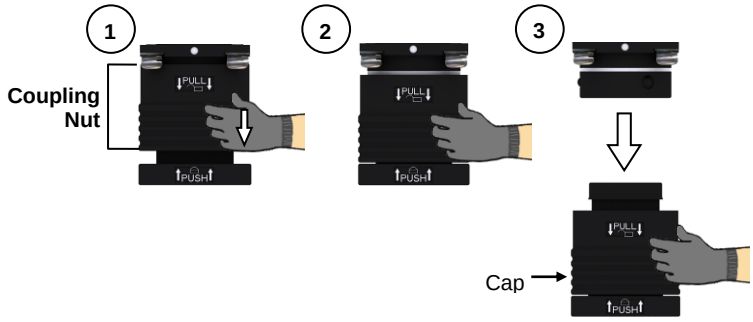


2 Separate the cap from the system side connector (L0 port).

Figure 107. Connecting CPRI Cable (2)

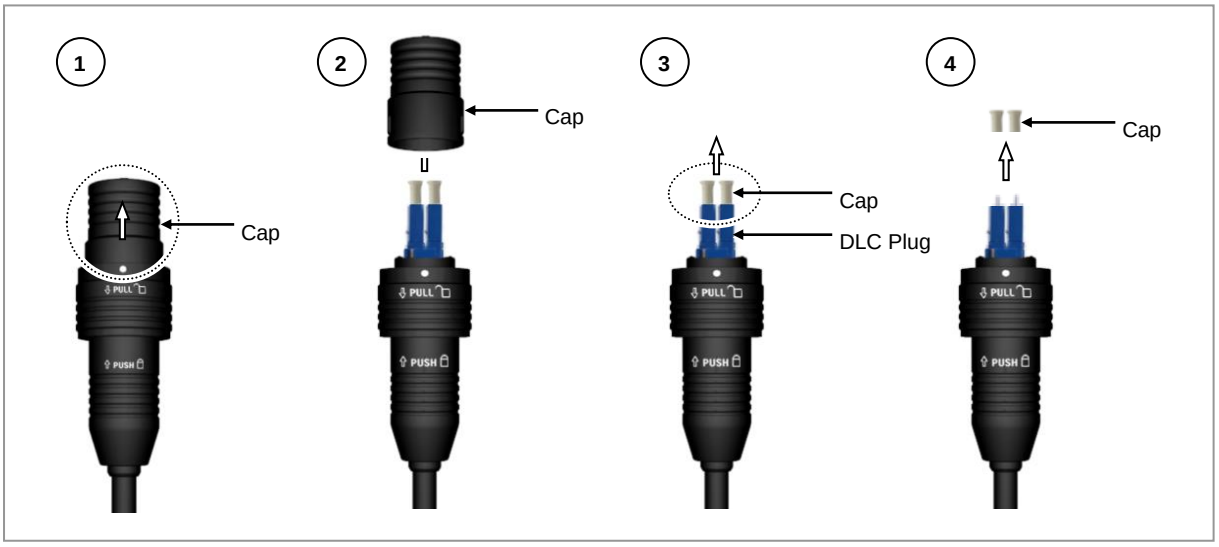


To disconnect the cap (push-pull type), pull the coupling nut to lower side.



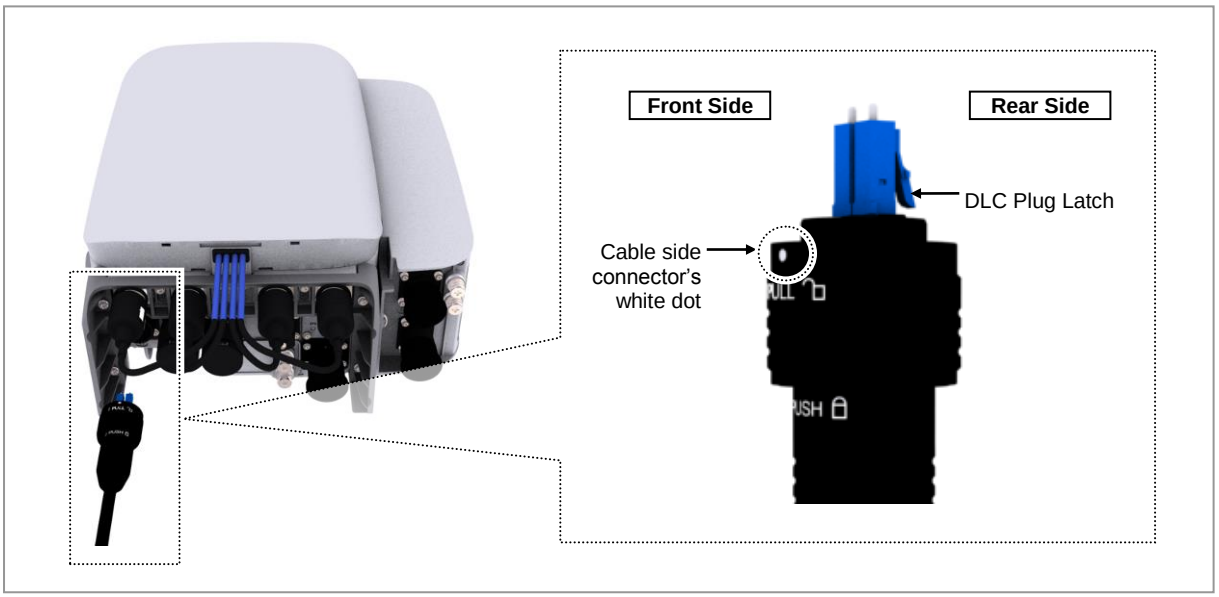
3 Separate the cap from the cable side connector.

Figure 108. Connecting CPRI Cable (3)



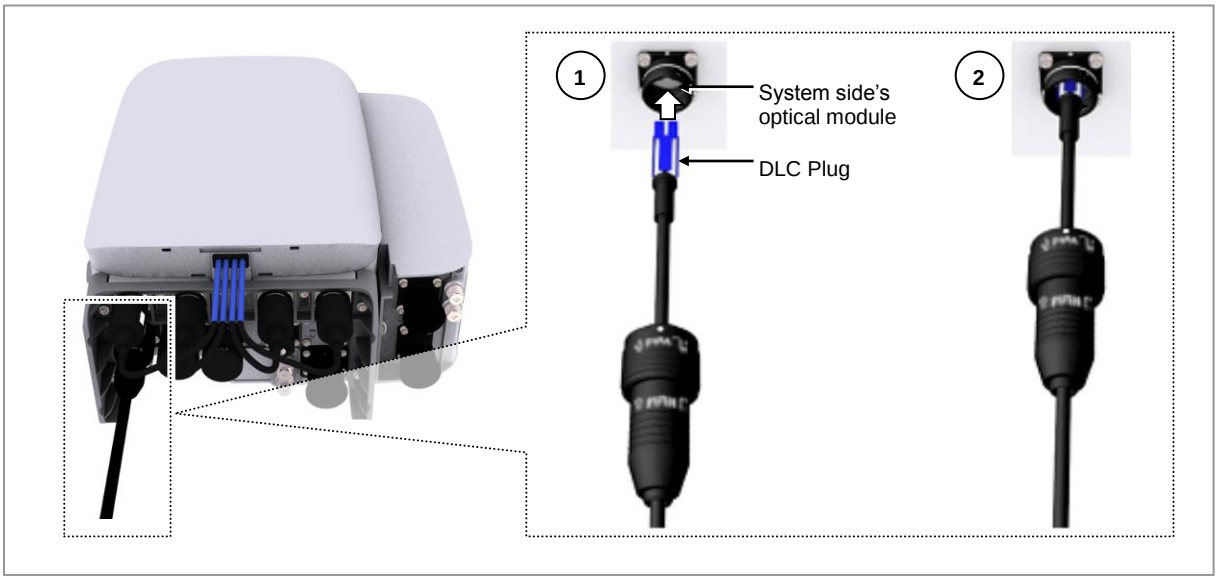
4 The latch of cable side connector should be towards the rear side.

Figure 109. Connecting CPRI Cable (4)



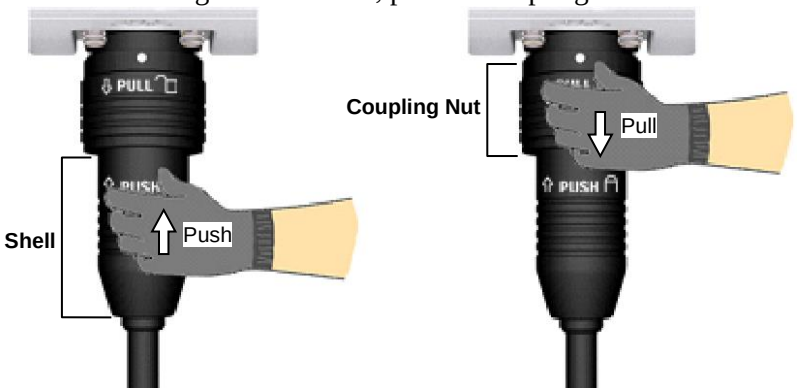
5 Insert the DLC plug to the system side's optical module.

Figure 110. Connecting CPRI Cable (5)



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

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



Connecting UDA Cable

To connect a UDA cable, do the following:

Prerequisites

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

Table 41. Parts and Tools for Connecting UDA Cable

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

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

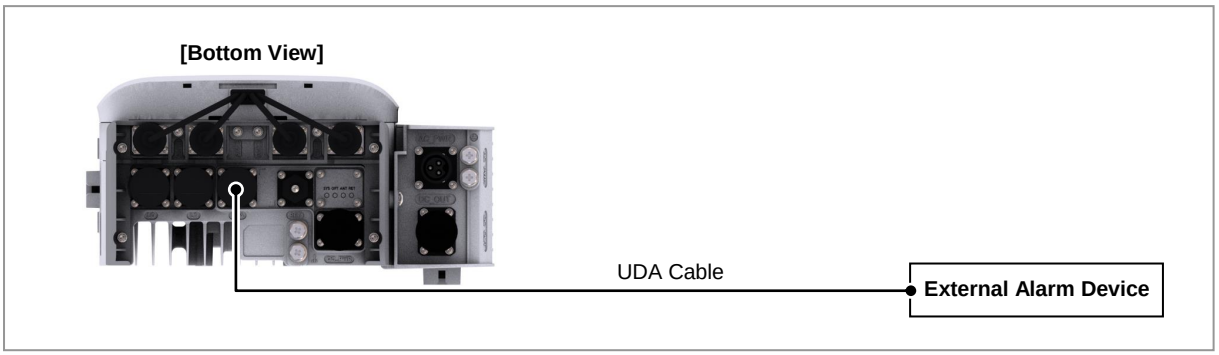
The table below outlines the pin map of the UDA cable.

Table 42. UDA Cable Pin Map

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

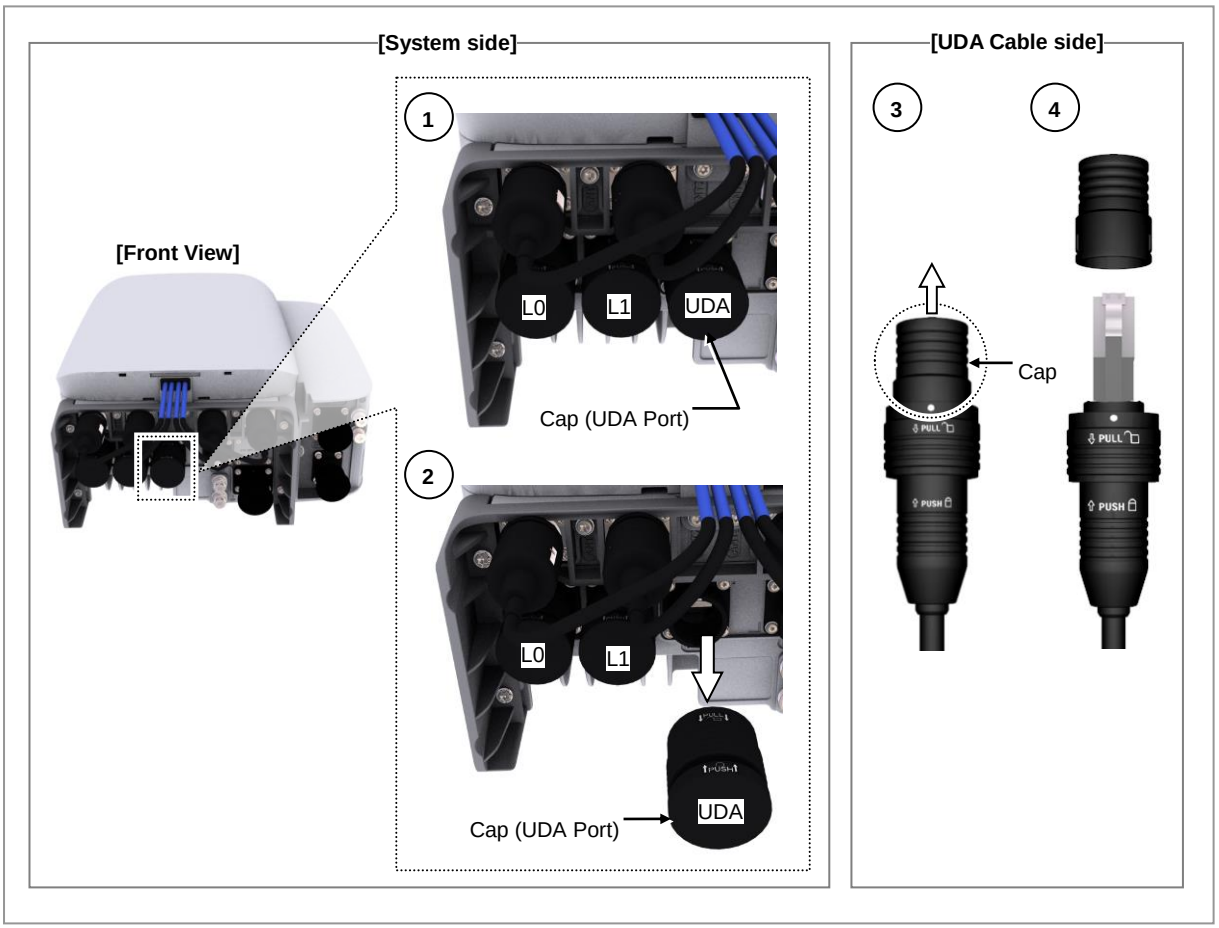
1 Install the UDA cable from the external alarm device to the RRH.

Figure 111. Connecting UDA Cable (1)



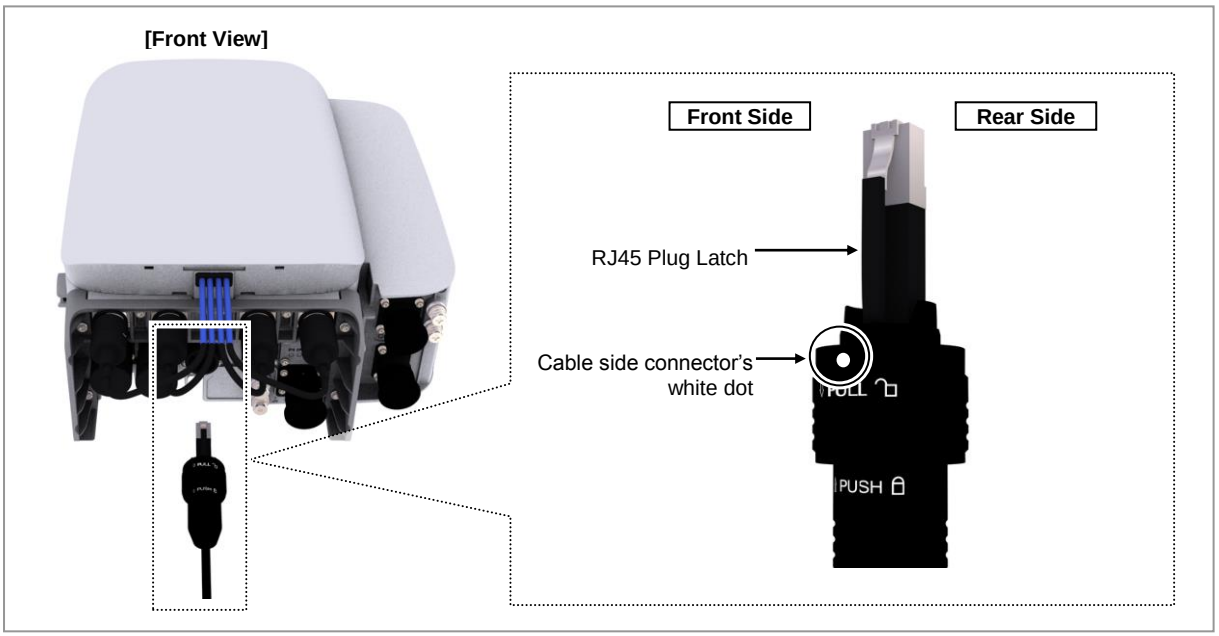
2 Separate the cap from the RRH side and cable side connector.

Figure 112. Connecting UDA Cable (2)



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

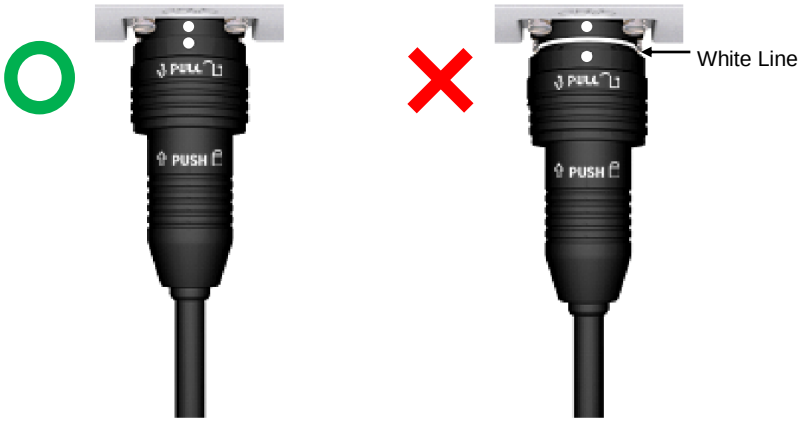
Figure 113. Connecting UDA Cable (3)



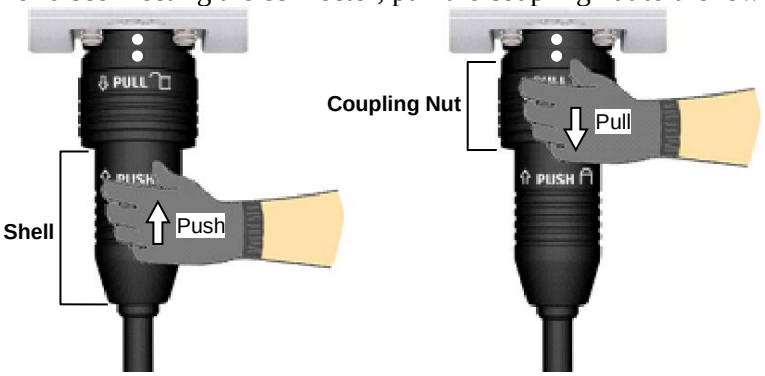
4 Insert the RJ-45 plug to the system side connector.

Figure 114. Connecting UDA Cable (4)

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



The method for connecting or disconnecting the backhaul (RJ45) connector is as follows:
- For connecting the connector, push the shell to the upper side.
- For disconnecting the connector, pull the coupling nut to the lower side.



Connecting RET Cable

To connect a RET cable, do the following:

Prerequisites

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

Table 43. Parts for connecting RET Cable

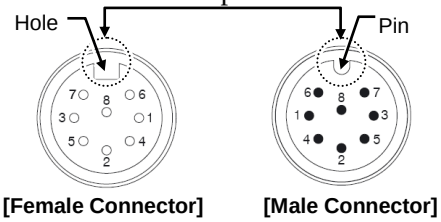
Category	Description	
Installation Section	RF Antenna to~RRH RET port	
Cable	RET Cable Assembly	
Bend Radius	Operation: 8 × OD	Installation: 12 × OD
Connector	RF Antenna	Check the RF antenna (RETu) RET connector specification per site
	RRH	AISG 2.2

The table below outlines the pin map of the RET cable.

Table 44. RET Cable Pin Map

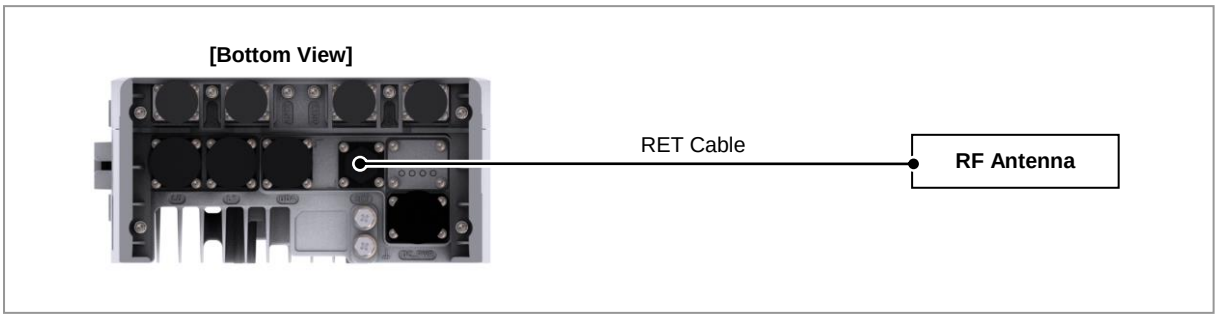
Pin No	Description	Cable Color
1	N/C (Not Connected)	-
2	N/C (Not Connected)	-
3	RS485 B	White
4	GND	Blue
5	RS485 A	Brown
6	+24 V DC	Red
7	DC Return	Black
8	N/C (Not Connected)	-

Before fitting the RET connector, make sure to align the hole of the female connector with the pin of the male connector first.



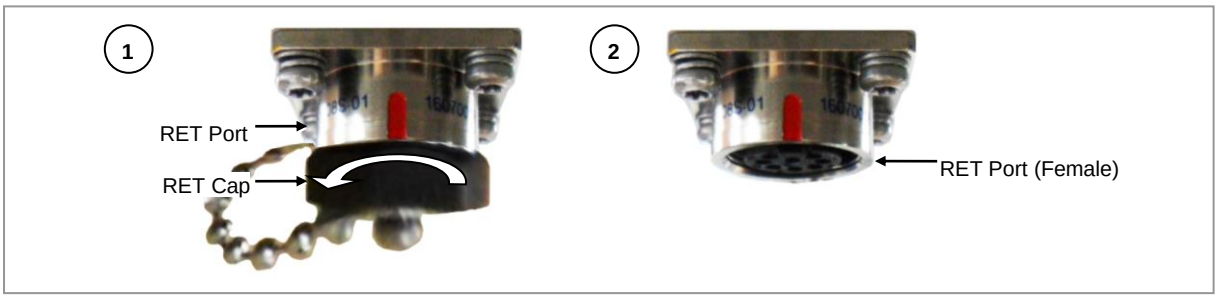
1 Install the RET cable from the RF Antenna to the RRH RET port.

Figure 115. Connecting RET Cable (1)



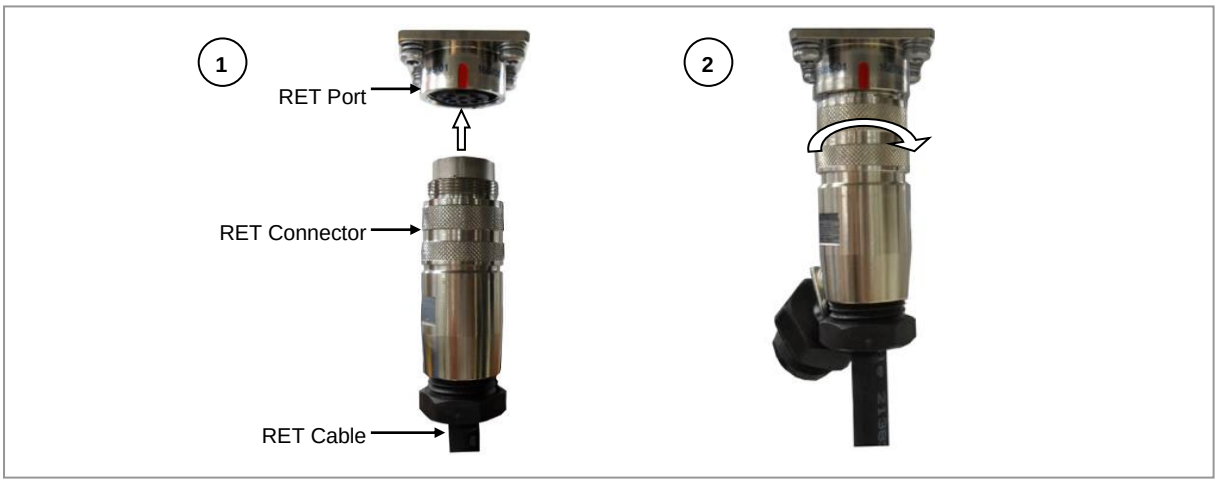
2 Separate the cap from the system side connector (RET port).

Figure 116. Connecting RET Cable (2)



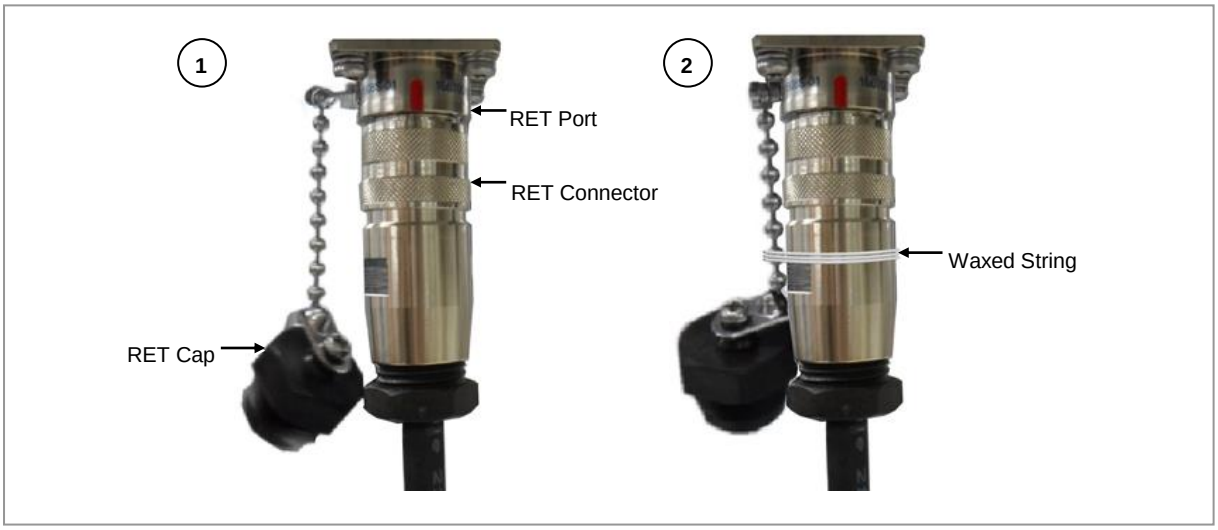
3 Connect the cable side RET connector to the system side RRH RET port.

Figure 117. Connecting RET Cable (3)



4 Tie the system side RET cap to the RET connector with a waxed string.

Figure 118. Connecting RET Cable (4)



Connecting RF Cable (External RF Antenna connection)

To connect a RF cable, do the following:

Prerequisites

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

The RF cable minimum radius of curvature must be observed.

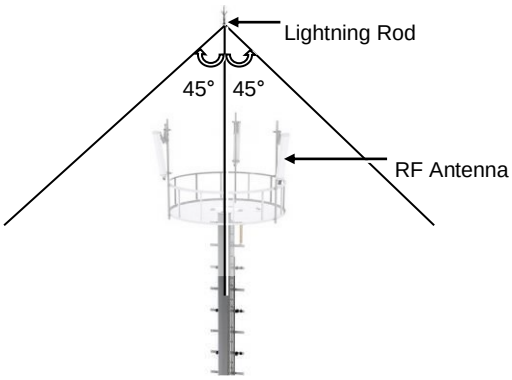
Table 45. RF Cable Minimum Radius of Curvature

Category	Description		
RF cable min. radius of curvature	1/2 in. Feeder Line	Super Flexible Type	1.3 in. (32 mm)
		Flexible Type	4.9 in. (125 mm)

Table 46. Parts and Tools for connecting RF cable

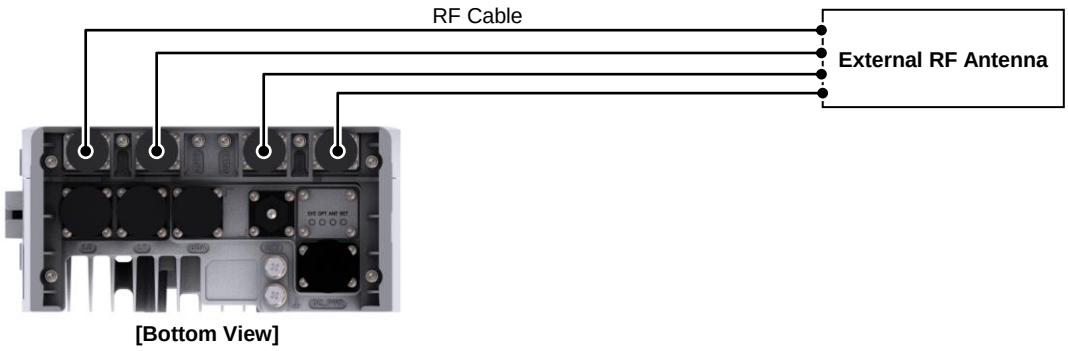
Category	Description	
Installation Section	RF Antenna to RRH ANT1, ANT2, ANT3, and ANT4	
Cable	RF Cable Assembly (1/2 in. Feeder Line)	
Connector	RF antenna	DIN Type-Male (Check the RF antenna specification and prepare connecting parts.)
	RRH	4.3-10 (Plus) Type- Male
Recommended Torque Value	RF antenna	217 lbf·in
	RRH	44 lbf·in
Working Tools	RF antenna	• Torque Wrench (100 to 400 lbf·in) • Torque Wrench Spanner head (apply hexagonal. head: 32 mm) • Spanner (32 mm)
	RRH	• Mini DIN Male Torque Wrench (TQ-78-F8) • Spanner (22 mm)

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



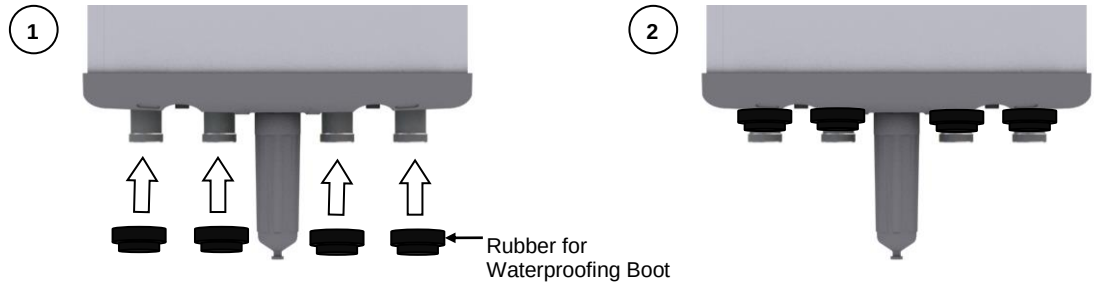
1 Install the RF cable from the RRH to the RF antenna.

Figure 119. Connecting RF Cable (1)



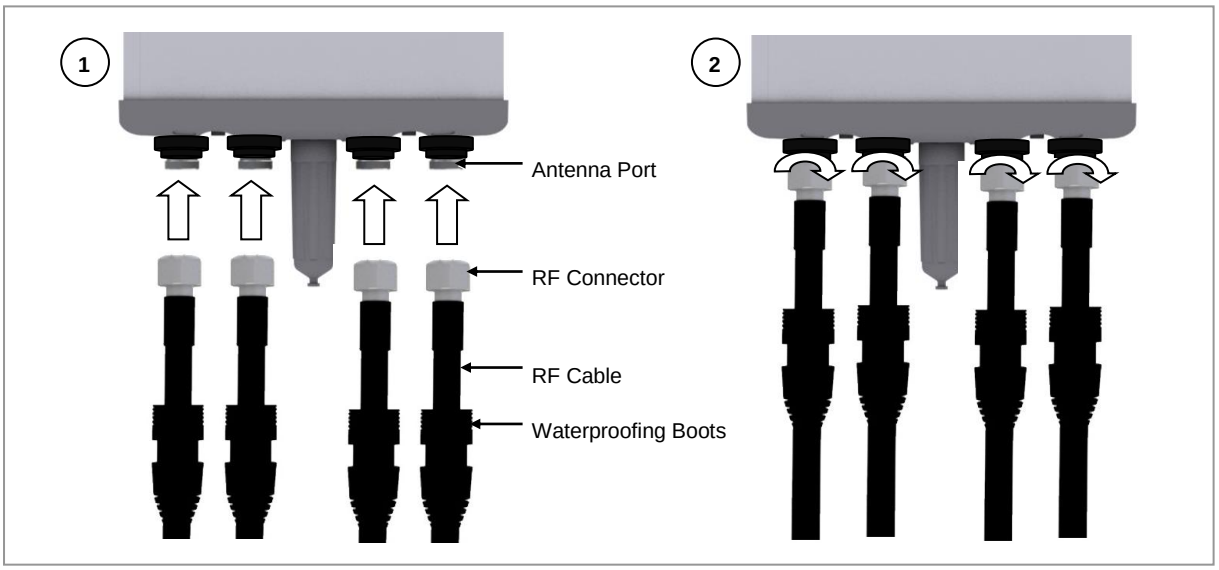
2 Insert the rubber for waterproofing boot to the RF antenna ports.

Figure 120. Connecting RF Cable (2)



3 Connect the cables to the RF antenna ports.

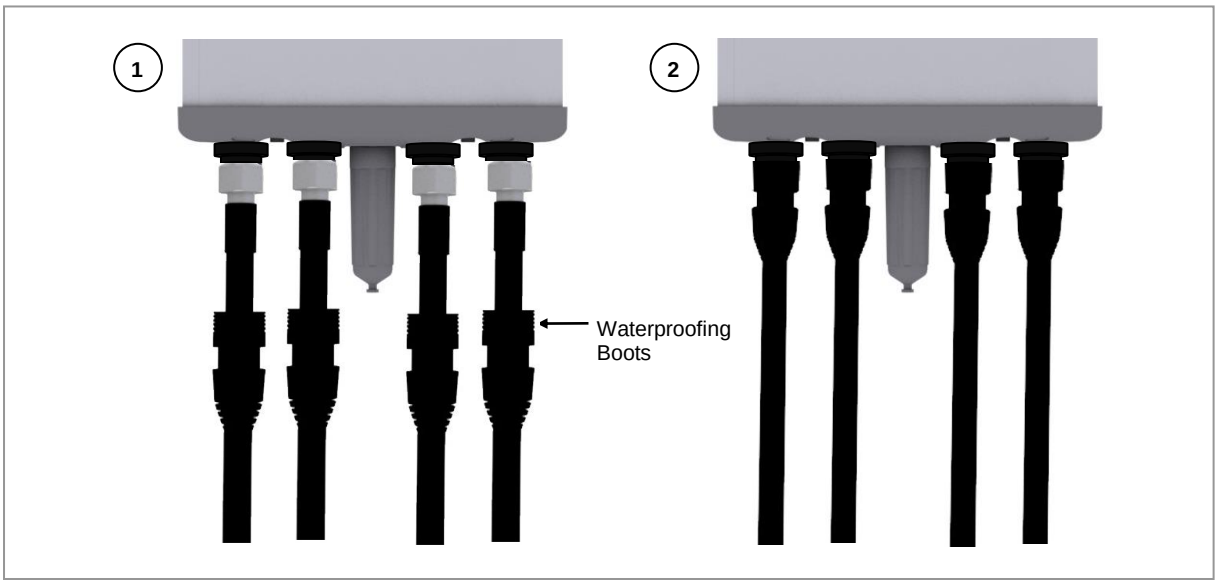
Figure 121. Connecting RF Cable (3)



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

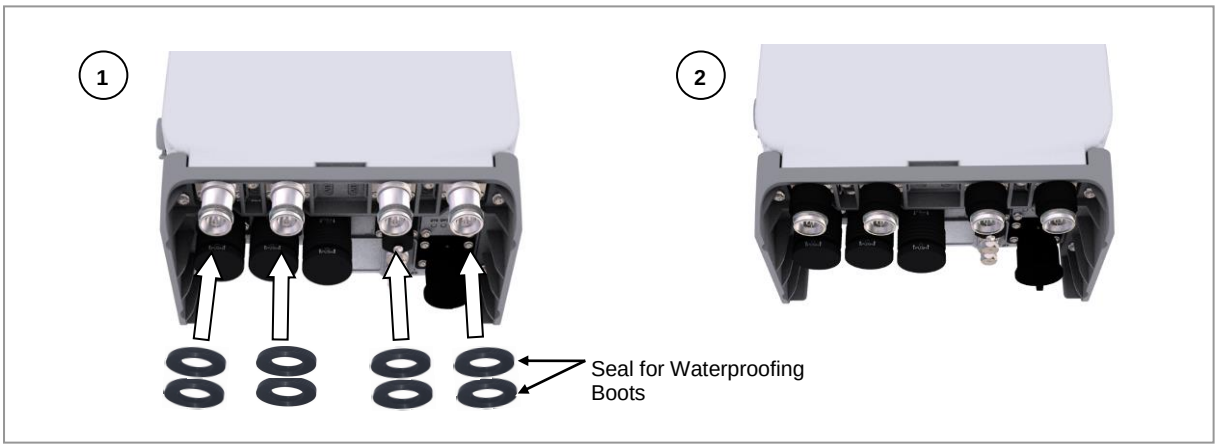
4 After connecting the connector, push the waterproofing boots up to the connector connection.

Figure 122. Connecting RF Cable (4)



5 Insert the seal for waterproofing boot to the system side RF ports. (ANT1, ANT2, ANT3, and ANT4)

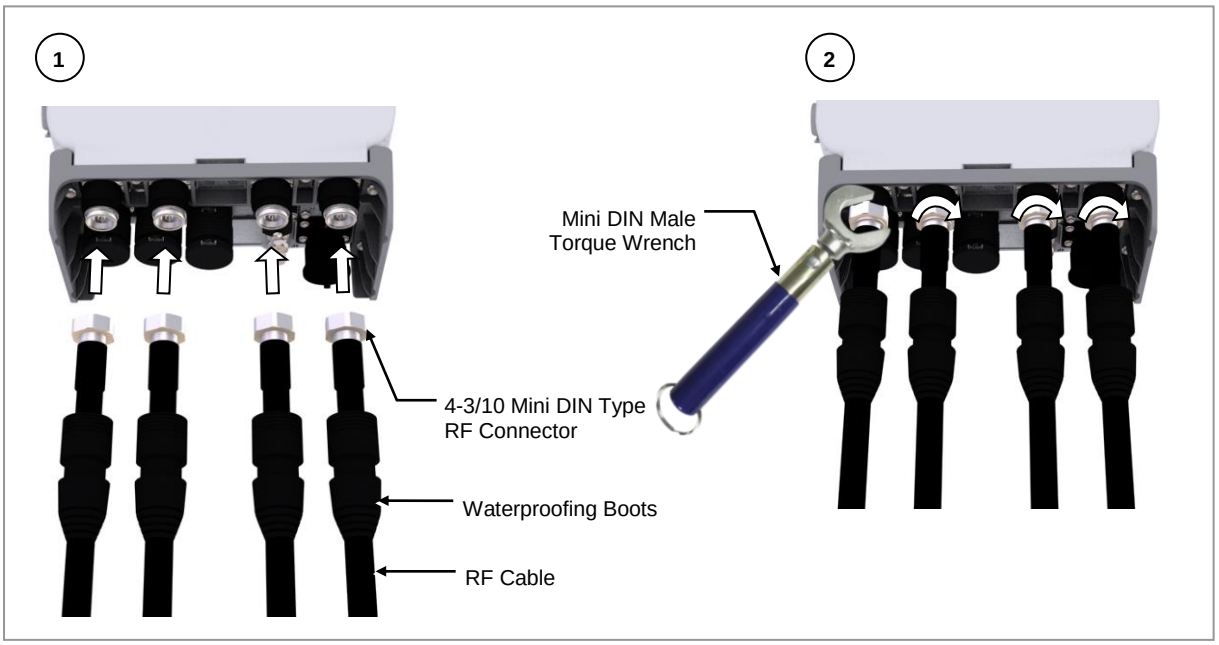
Figure 123. Connecting RF Cable (5)



When inserting the seal to 4.3-10 port, take care of the direction.

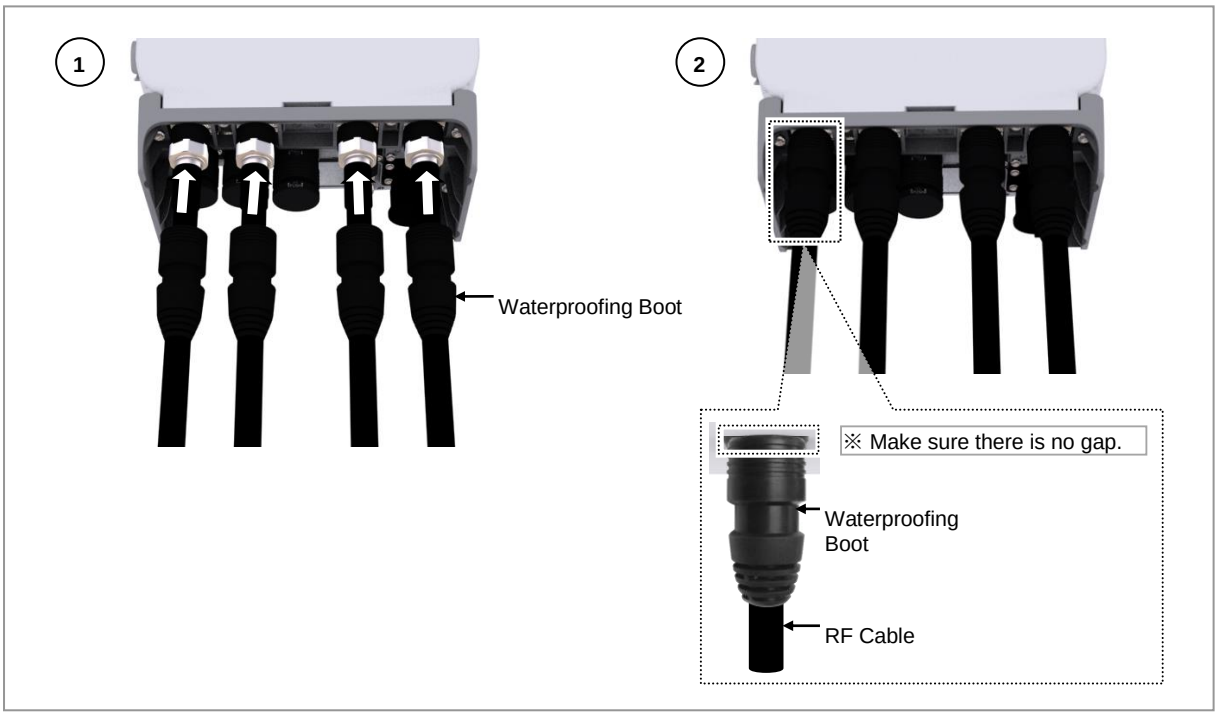
6 Connect the cables to the system side RF port. (ANT1, ANT2, ANT3, and ANT4)

Figure 124. Connecting RF Cable (6)



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

Figure 125. Connecting RF Cable (7)



Assembling Cable Cover

This section describes the procedures for assembling the cable cover.

Assembling Cable Cover

To assemble the cable cover for do the following:

Prerequisites

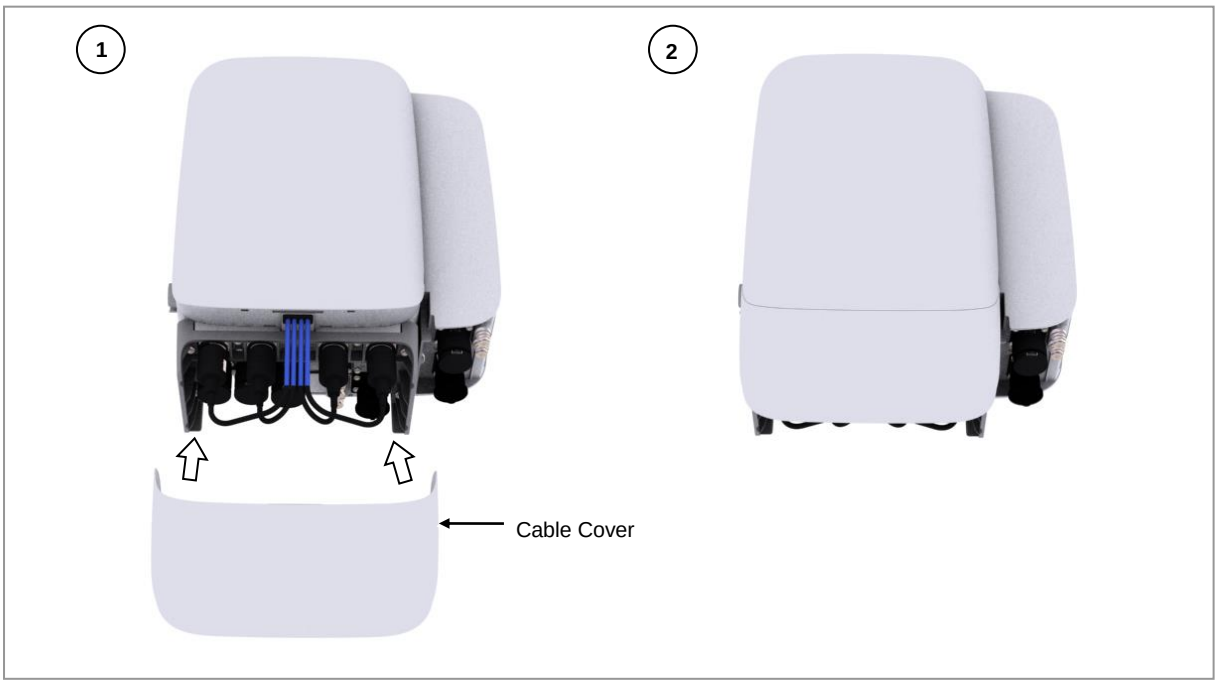
Before proceeding with assembling the cable cover, make sure that you have the items mentioned in the table below:

Table 47. Parts and Tools for Assembling Cable Cover

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

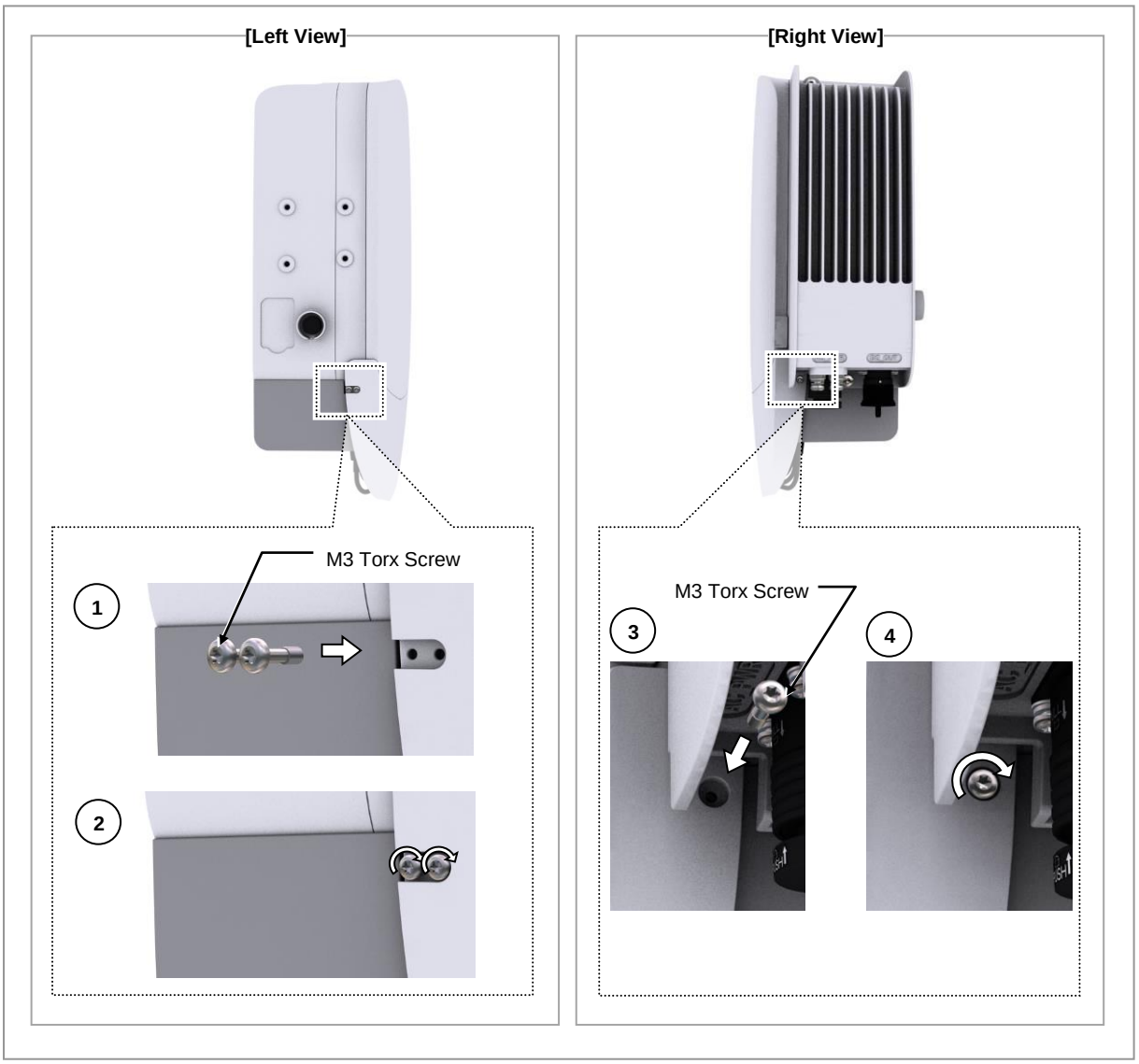
1 Place a unit bracket to the RRH lower part.

Figure 126. Assembling Cable Cover (1)



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

Figure 127. Assembling Cable Cover (2)

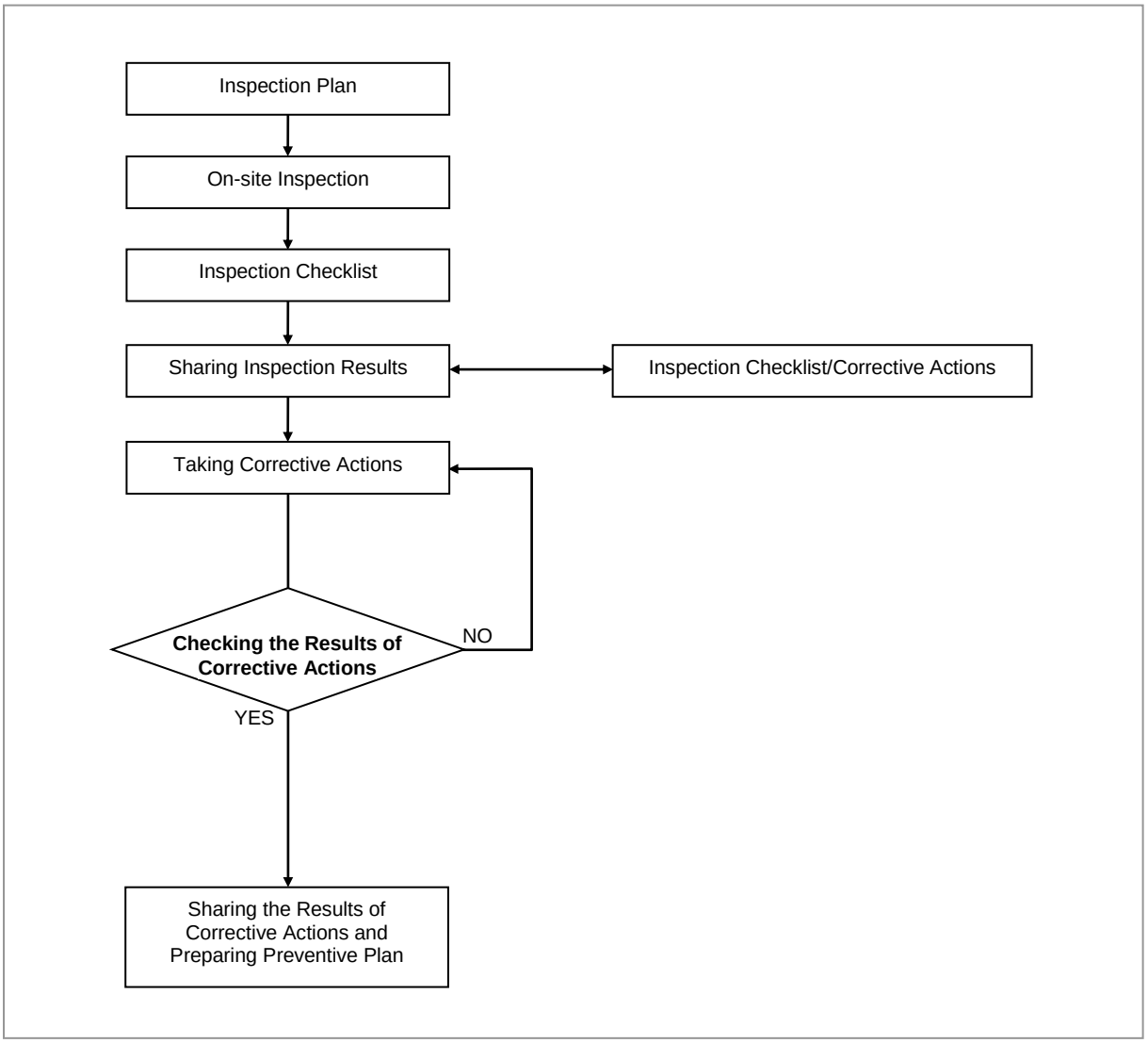


Chapter 4 Inspect the Installation

This chapter describes the procedures to check the installation status.

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

Figure 128. Installation Inspection Procedure



Inspection Plan

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

On-site Inspection and Inspection Checklist

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

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

Sharing Inspection Results and Taking Corrective Actions

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

Checking the Results of Corrective Actions

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

Sharing the Results of Corrective Actions and Preparing Preventive Plan

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

Construction Situation Checklist

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

Table 48. Construction Situation Checklist

Category	Check Items	Criteria	Result	
			Pass	Fail
Installing Equipment	Appearance of equipment and mechanical parts	Equipment damage such as dent, scratch, and crack		
	Placement of equipment and mechanical parts	Maintenance and horizontal/vertical placement		
	Leveling condition of equipment and mechanical parts	Horizontal/vertical status		
	Validity of status and specifications of fastening bolt, nut, and washer	Checking fasteners omission		
		Compliance with assembly order of fasteners		
		Compliance with fastening torque value		
	Insulation status	Checking electrical contact between the insulators (insulation resistance tester)		
	Azimuth and Tilt	Checking whether tilt result is right.		

Category	Check Items	Criteria	Result	
			Pass	Fail
Grounding	Installation of ground bar	Checking the separation of communication/power/lightning grounding		
	Cable specification	Checking the specification		
	Cabling	Cable damage		
		Proper installation route		
		Compliance with the radius of curvature		
	Cable binding status	Binding status		
		Binding interval		
		Checking binding materials		
	Cable connection	Assembly condition of a pressure terminal		
		Fastening condition of a pressure terminal		
		Checking compliance with fastening torque value		
	Installation status of cable tag	Position		
		Marking content		
		Checking tag installation method		
Power	Installation status of power supply	Power supply capacity		
		Output voltage (tester)		
	Installation of circuit breaker	Checking circuit breaker capacity		
	Cable specification	Checking the specification		
		Checking the limit distance		
	Cabling	Cable damage		
		Proper installation route		
		Compliance with the radius of curvature		
	Cable binding status	Binding status		
		Binding interval		
		Checking binding materials		
	Cable connection	Checking cable connection (Pin Map)		
		Input voltage		
		Assembly condition of a pressure terminal and connector		
		Fastening condition of a pressure terminal and connector		
		Checking compliance with fastening torque value		
	Installation status of cable tag	Position		
		Marking content		
		Checking tag installation method		
Other data	Cable specification	Checking the specification		

Category	Check Items	Criteria	Result	
			Pass	Fail
cables	Cabling	Cable damage		
		Proper installation route		
		Compliance with the radius of curvature		
	Cable binding status	Binding status		
		Binding interval		
		Checking binding materials		
	Cable connection	Checking cable connection (Pin Map)		
		Assembly condition of a connector		
		Fastening condition of a connector		
		Checking compliance with fastening torque value		
	Installation status of cable tag	Position		
		Marking content		
		Checking tag installation method		
		Checking tag installation method		
Others	Reserved ports	Checking port cap fastening status		
	Cable inlet status/Connection of equipment I/O port	Checking fastening status (Conduit/Cable Gland)		
	Cable tray and duct	Checking installation status		
	Status of inside/outside of the equipment and system surrounding area	Checking the stocking condition (waste parts, waste materials, and packing materials)		
Opinion				

■

Appendix A Acronyms

AC	Alternating Current
CBRS	Citizen Broadband Radio Service
CDU	Cabinet Digital Unit
CPRI	Common Public Radio Interface
DC	Direct Current
DL	Down Link
MGB	Main Ground Bar
RET	Remote Electrical Tilting
RRH	Hybrid Radio Unit
RTN	Return
SELV	Safe Extra Low Voltage
SEMS	pre-asSEMbled washers and screws
S-FTP	Screened-Foiled Twisted Pair
UDA	User Defined Alarm
UL	UpLink

Appendix B Clean the Optical Connectors

Introduction

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

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

- 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

To clean the optical connectors, follow the instructions of the manufacturer.

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

Table 49. Standard Torque Value for Fastening Bolts

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

Table 50. Brass Bolts Torque Value

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

Table 51. Connector Connection Torque Value

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

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

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RT4401-48A
Installation Manual

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