iPASOLINK 400

SECTION I INSTALLATION

CONTENTS

1. OVERVIEW

The standard installation is summarized in this section. Included herein is information on typical installation work flow and guides for IDU installation, ODU installation, Antenna (ANT) installation, waveguide connection and coaxial cable connections. The installation flow diagram is shown below.

This product is a part of radio link system, and is intended to be connected with a external antenna.

This product will be installed and operated by professional.

After installation, the professional person shall make sure that the system shall comply with the relevant limits for general public exposure specified as basic restrictions or reference levels in the council Recommendation 1999/519/EC.

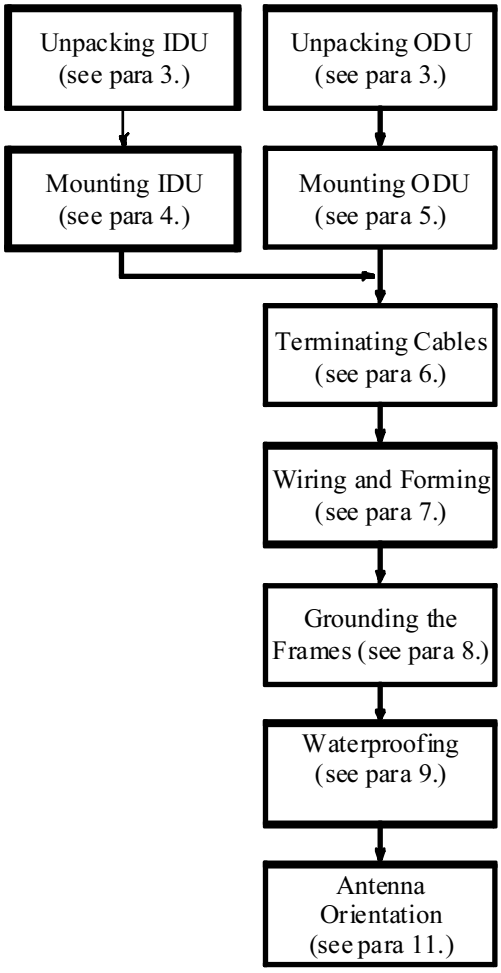

Fig. 1-1 Typical Installation Flow Diagram

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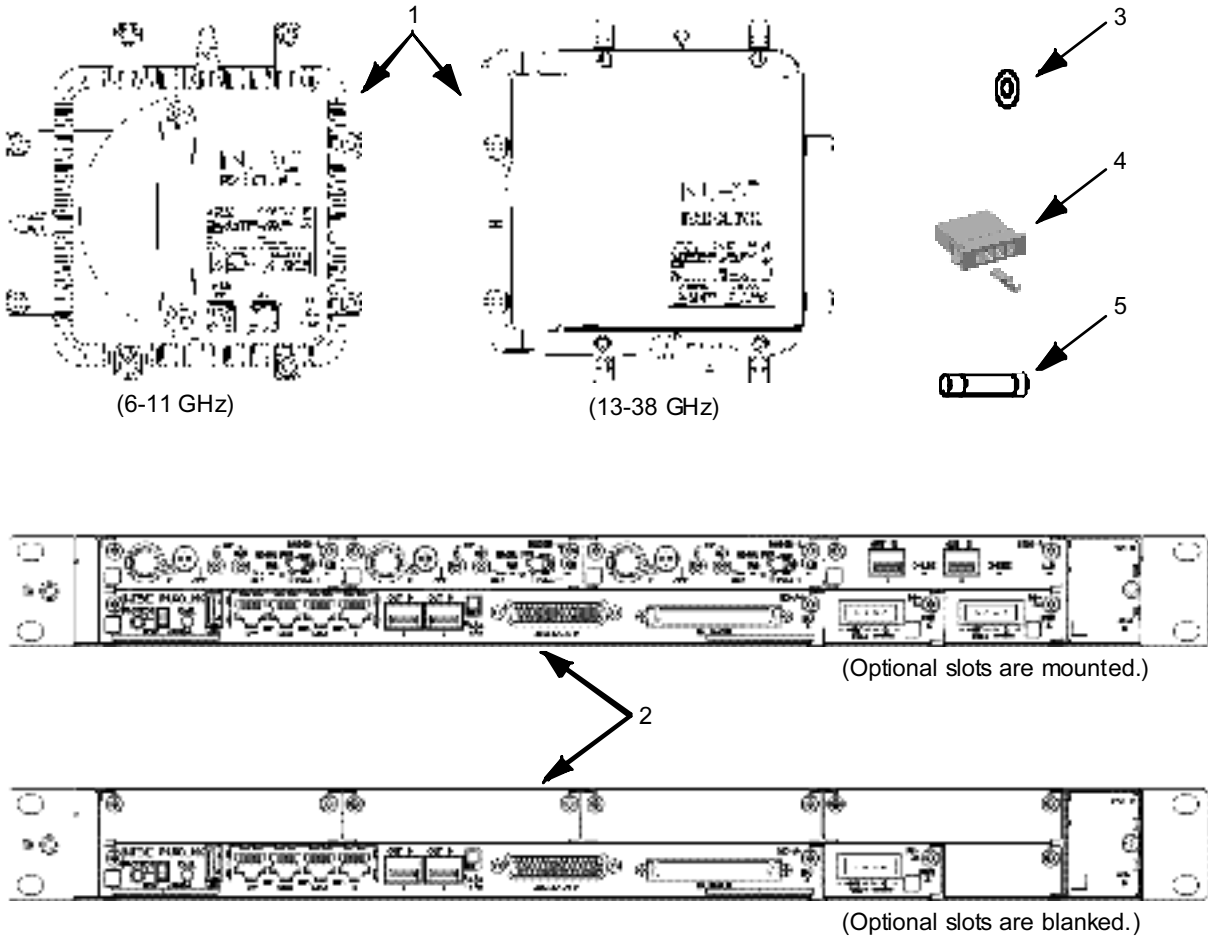
2. CARDS

Each unpacked component of the [ ] GHz [ ] MB digital radio system must be checked as shown below.

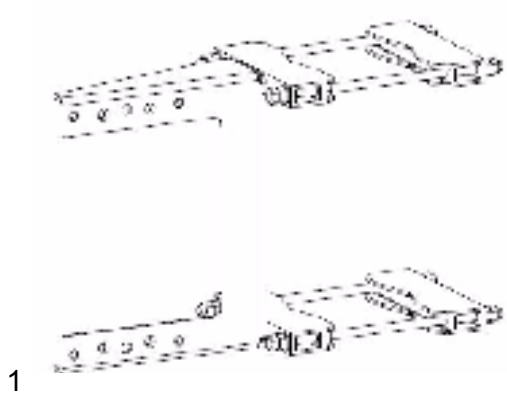
Contens List	Drawing No.
IDU and ODU	Figure 2-1
Mounting Bracket	Figure 2-2
Installation Kit	Figure 2-3 to Figure 2-5



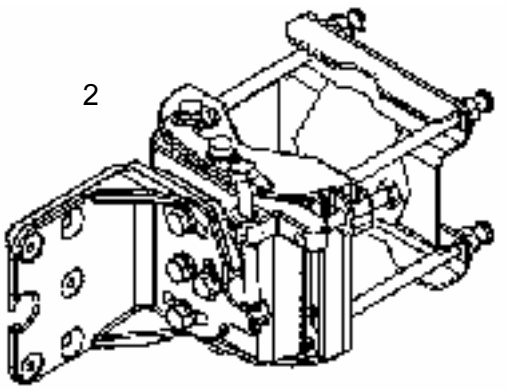
No.	Description
1	TRP-( )G-1D (ODU)
2	MDP-400MB-1AA (IDU)
3	O-Ring (Attached to the waveguide type ODU)
4	Power Connector (Housing (AMP: 1-178288-4 (x1 ea)) or DK-3100S-04R (x1 ea) and Socket contacts (AMP: 1-175218-2 (x4 ea)))
5	Cylindrical Fuse (ES1-12500 (250 V/12.5 AH))*

Note*: One spare fuse is provided in the packing box of IDU.

Figure 2-1 Contents of Unit Package



1



2

(Supplied with Antenna)

No.	Description
1	Pole Mounting Bracket for Coaxial Cable (6/7/8 GHz)/Waveguide Connection Type
2	Pole Mounting Bracket for Antenna direct Mounting Type

Figure 2-2 Pole Mounting Bracket

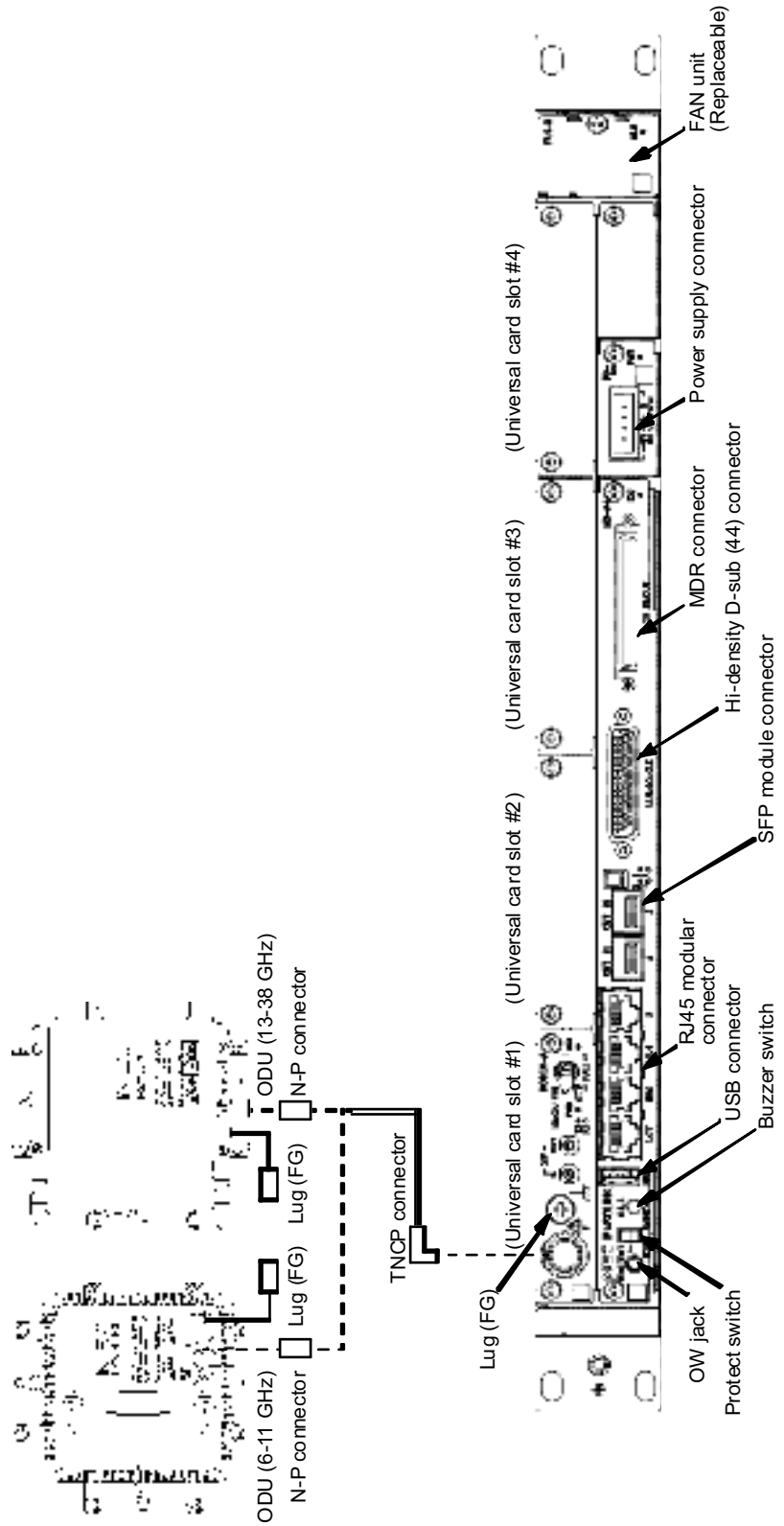


Figure 2-3 Installation Kit Packing List of IDU and ODU for 1+0 System

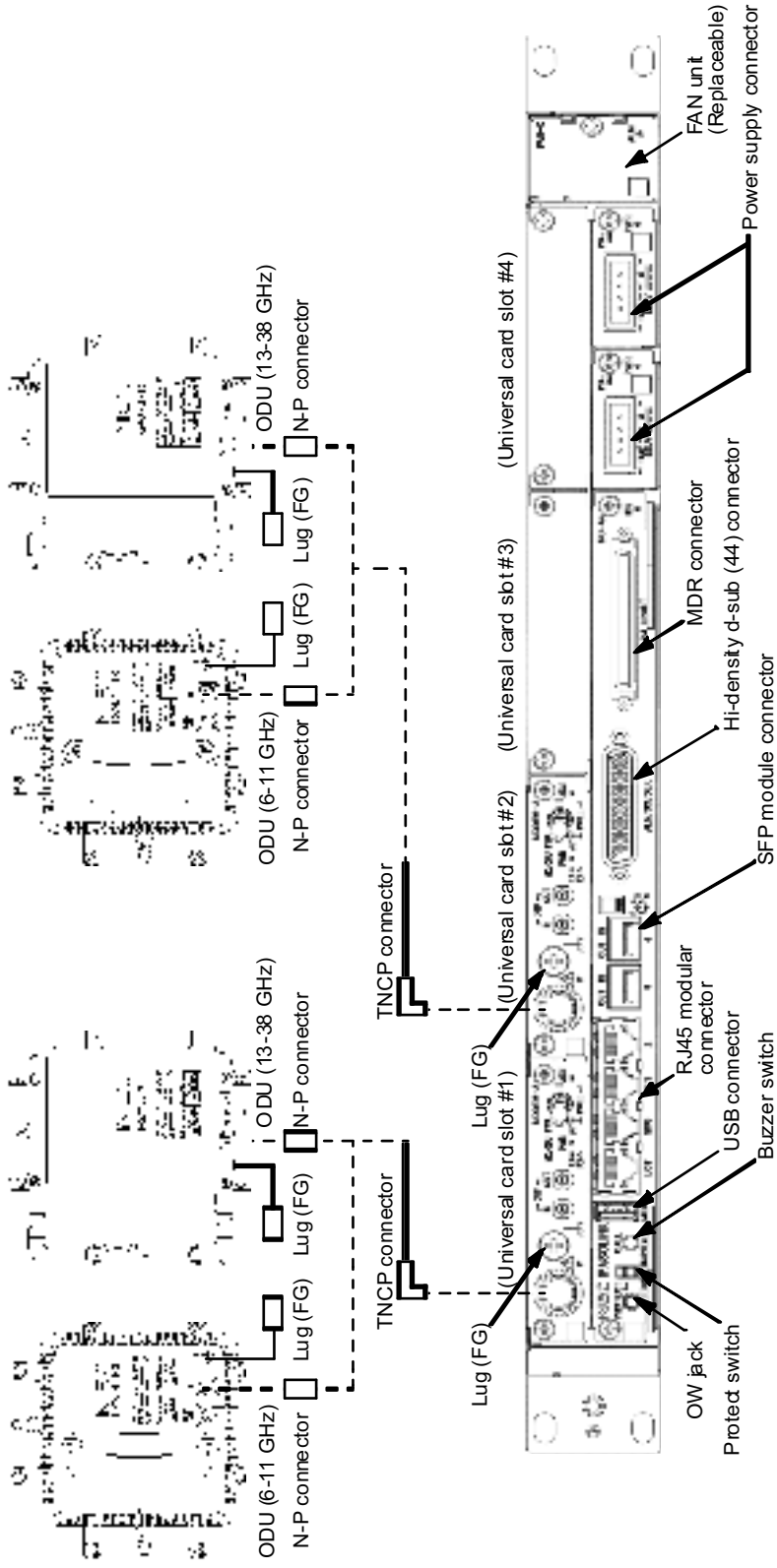


Figure 2-4 Installation Kit Packing List of IDU and ODU for 1+1 System

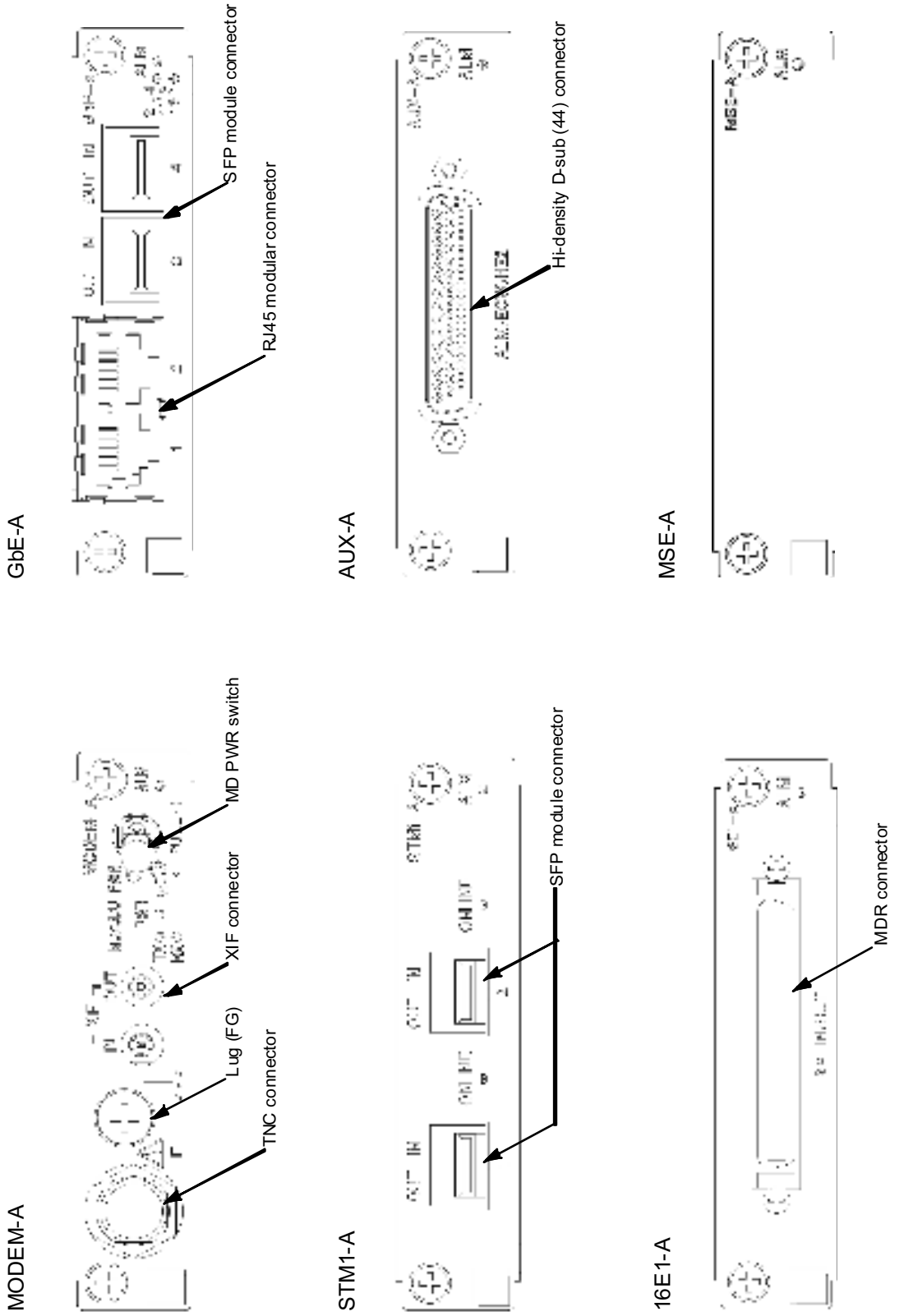


Figure 2-5 Installation Kit Packing List for Universal Card Slot of IDU

3. UNPACKING IDU and ODU

The unpacking procedures for the IDU and ODU are shown in following chart.

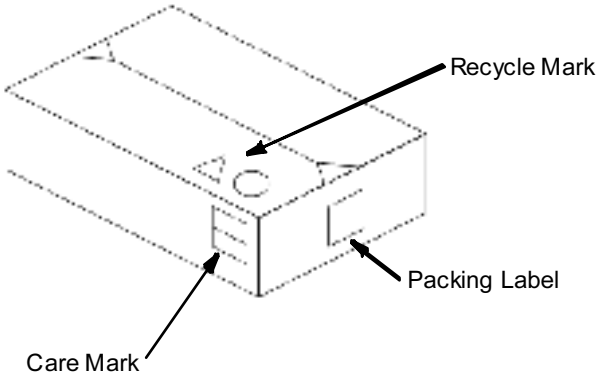
IDU: Procedure 3-1

ODU: Procedure 3-2

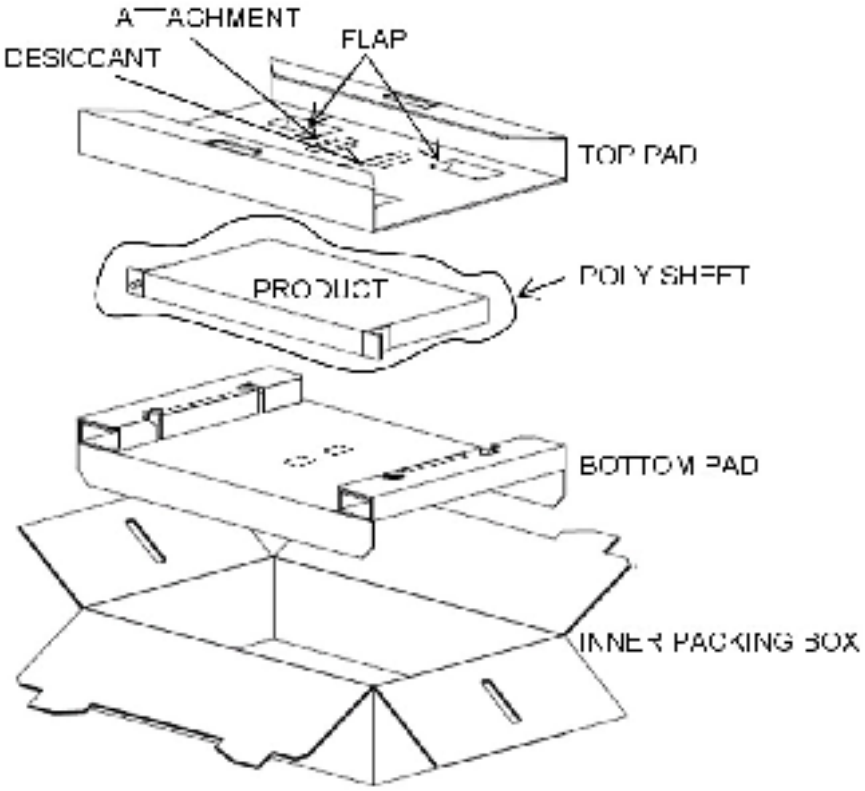
Note When conveying the IDU or ODU to another place, the original packing should be used to avoid damage.

Procedure 3-1 Unpacking Method for IDU

1 Open the top cover of the packing box.



2 Take out the accessories, IDU wrapped in the poly sheet and cushioning materials (pads).

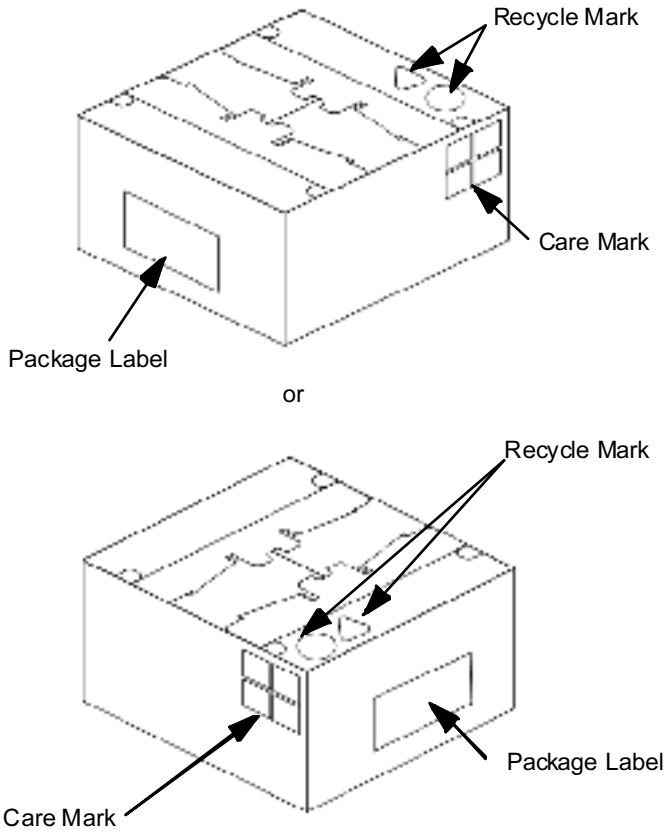


3 Take out the IDU from the poly sheet.

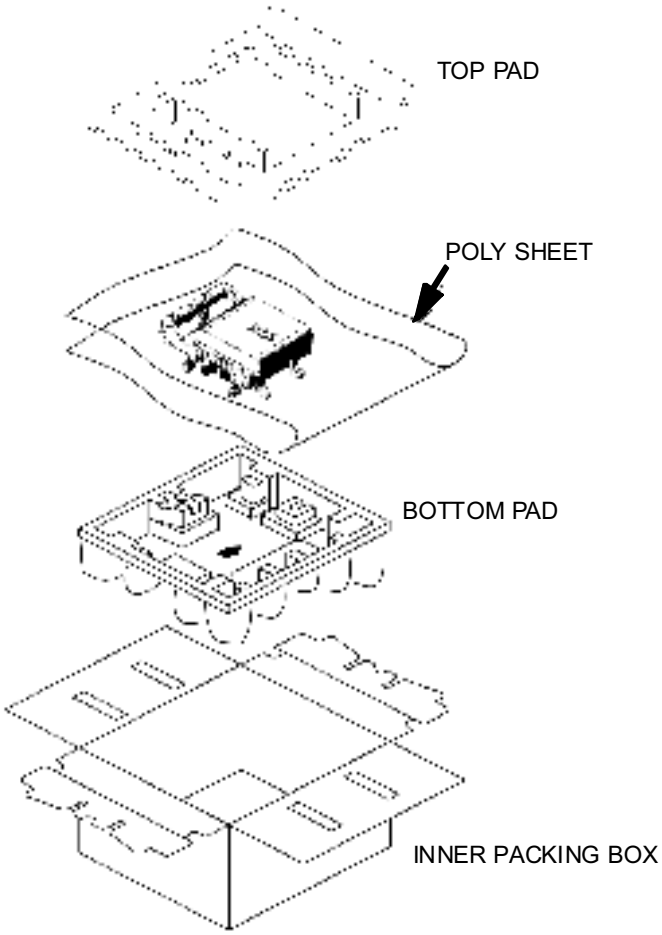
4 Inspect the IDU.

Procedure 3-2 Unpacking Method for ODU

1 Open the top cover of the packing box.



2 Take out the ODU, cushioning materials (pads) and poly sheet.



3 Take out the ODU from the poly sheet.

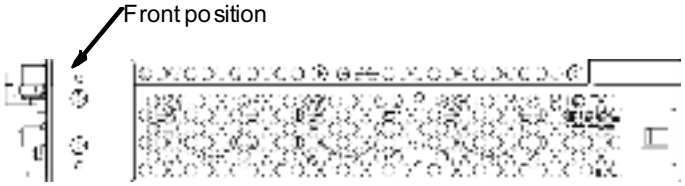
4 Inspect the ODU.

4. MOUNTING IDU

The installation procedure for the IDU explains in Procedure 4-1. The IDU should be installed in the radio station.

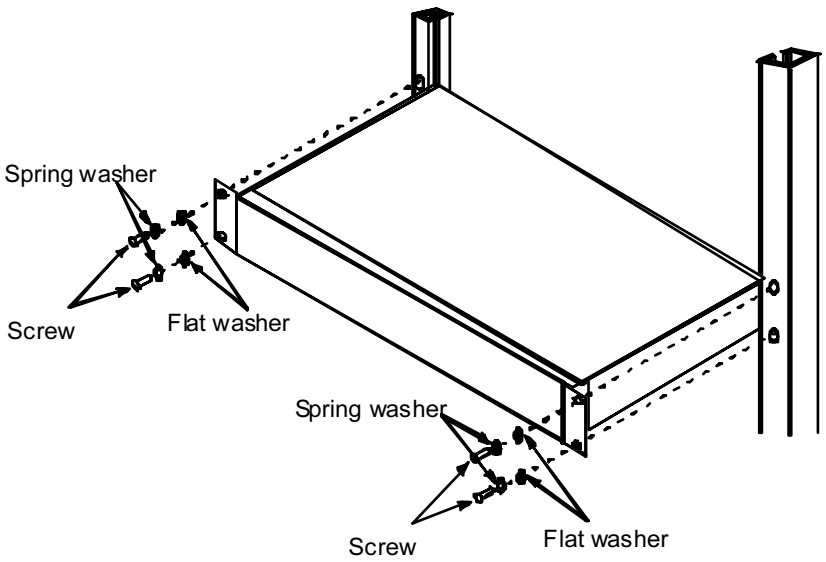
Procedure 4-1 Mounting Methods of the IDU

1 The supporting brackets are attached on front position of the IDU.

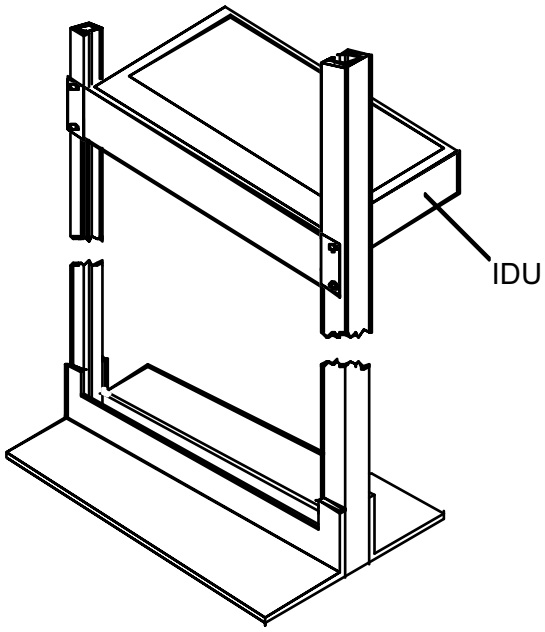


Side view

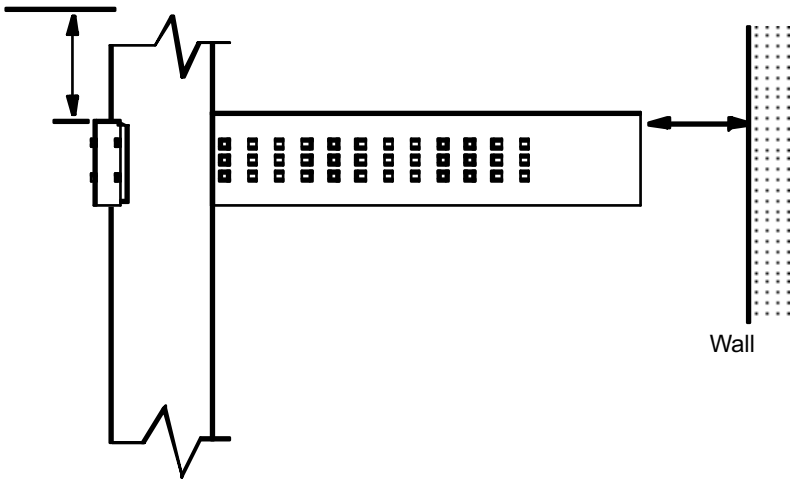
2 Align the IDU to the mounting position on the 19-inch rack.



3 Fix each side of the IDU to the 19-inch rack with the two screws.



4 To mount the IDU in a 19-inch rack, space for heat dissipation is not required for the top, bottom, and rear of the equipment because built-in forced air cooling fan is provided.



4.1 Mount SFP Module

The Small Form-factor Pluggable (SFP) is a compact, hot-pluggable transceiver designed to support for Gigabit Ethernet (GbE) or SDH (STM-1 optional) in the iPASOLINK.

It offers three options of SFP modules as follows:

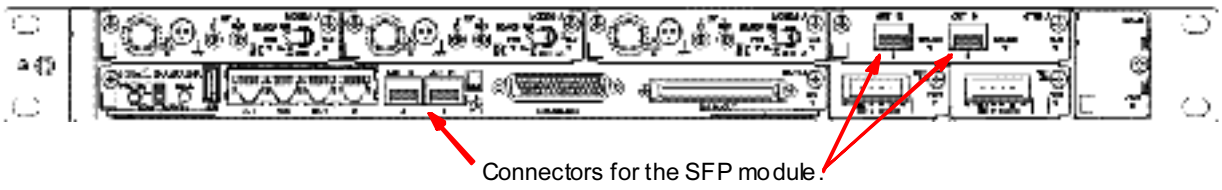
1) Single Mode Fiber (SMF): This SFP complies with GbE along with SDH and Fiber Channel. The SFP operates with 1310 nm laser transmitter and has a duplex LC connector.

2) Multi Mode Fiber (MMF): This SFP complies with 1.25 Gbps 1000 Base-SX Gigabit Ethernet. The SFP operates with 850 nm laser transmitter and has a duplex LC connector.

3) Electrical SFP (RJ45): This SFP compiles with 10/100/1000 BASE-T copper interface.

   Note SyncE function is not supported on Electrical SFP.

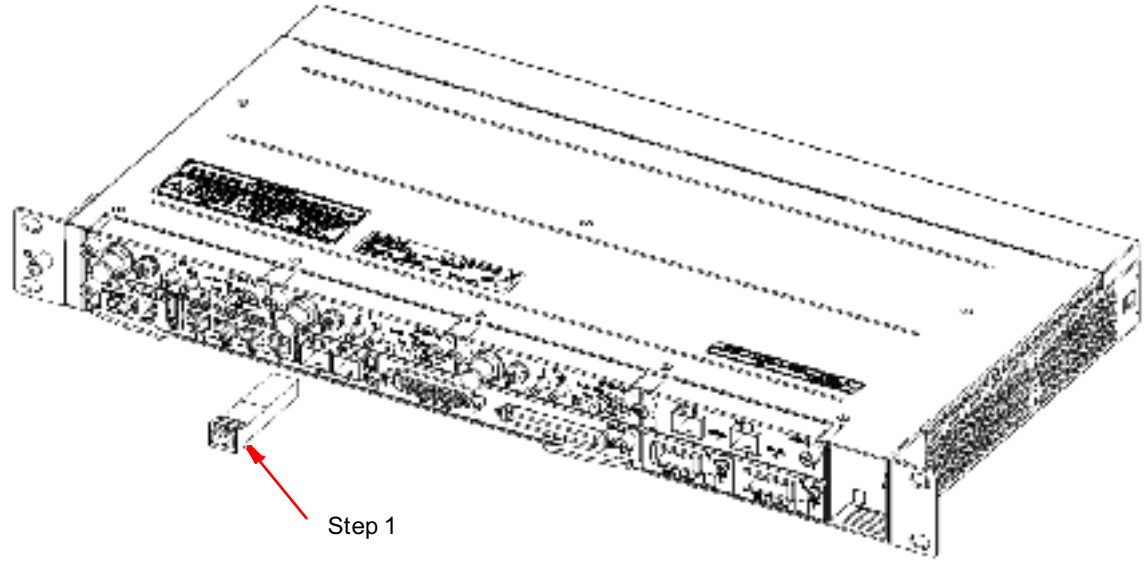
The SFP modules also accept LC fiber connectors with Polished Connector (LC-PC) or Ultra Polished Connector (LC-UPC).
The SFP modules purchasing from NEC are recommendable to use.



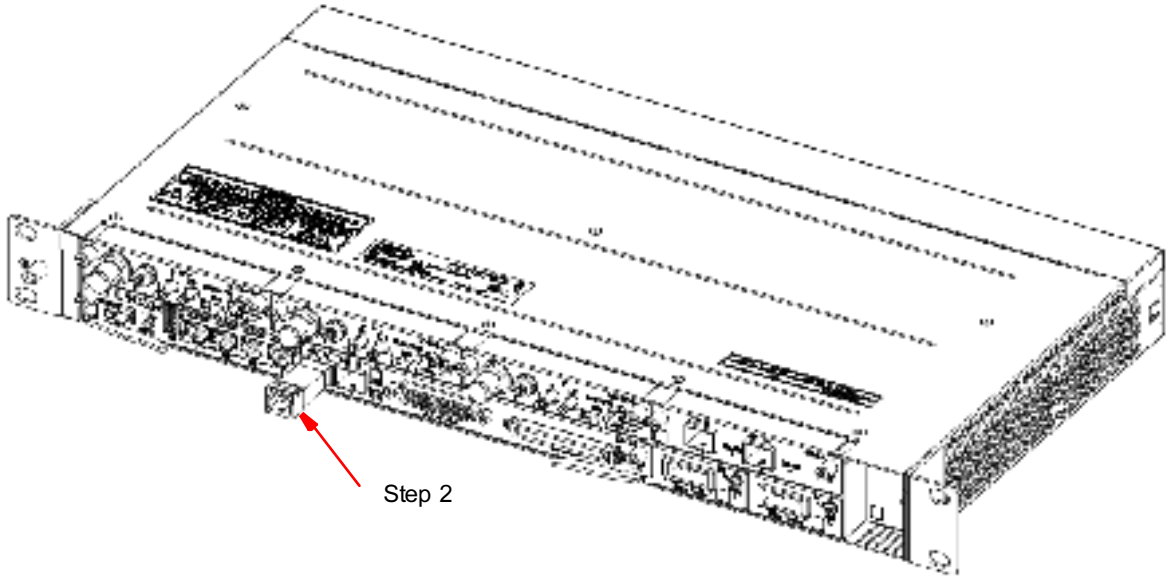
Procedure

Install the SFP module by the following steps:

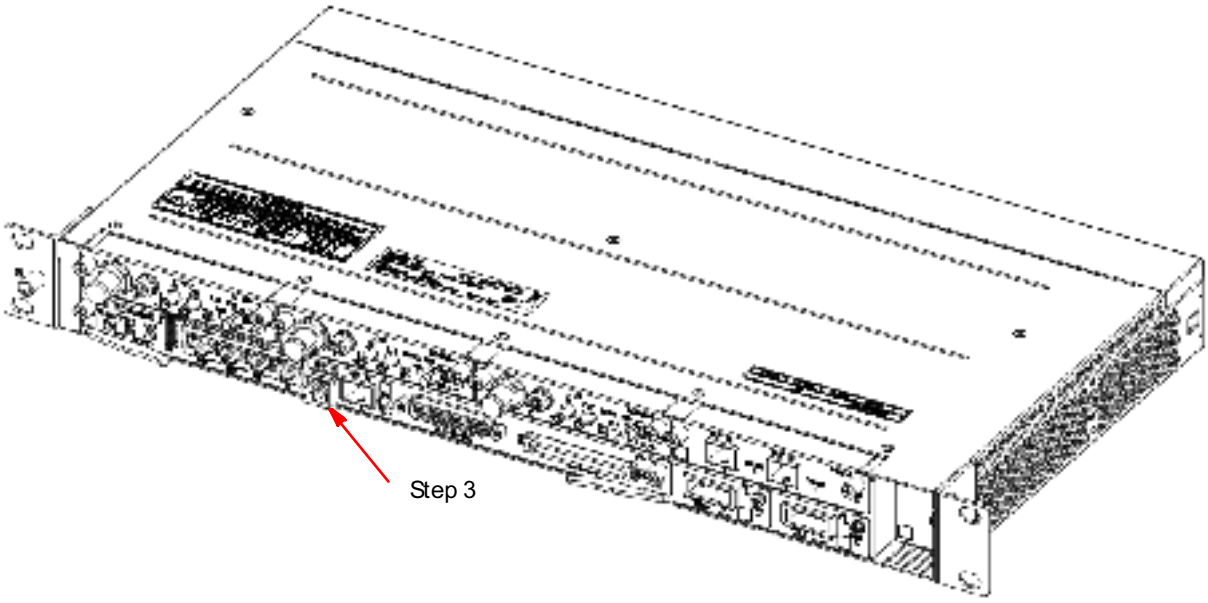
Step 1



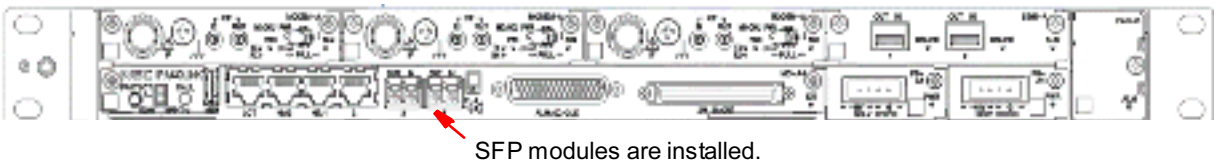
Step 2



Step 3



Step 4



Note A distinct detent ‘click’ will be heard when the SFP is fully and properly inserted.

4.2 Replace FAN Unit

When replacing the FAN unit used in the IDU, perform the following procedures.

Notes

1. NEC recommends replacement of the FAN unit approximately every three years, even if the FAN unit operates normally.
2. In the case FAN alarm occurred, replace the FAN unit immediately.
3. The FAN unit can be replaced under power-on condition (hot-swappable).
4. For FAN replacing, prepare the new FAN unit to the near.

(1) Removal of the old FAN

Perform the steps in order of 3-2-1 shown after the following figure.

Step 3: Using the screwdriver, loosen the screw.

Step 2, 1: Pull out the unit with holding the screw.

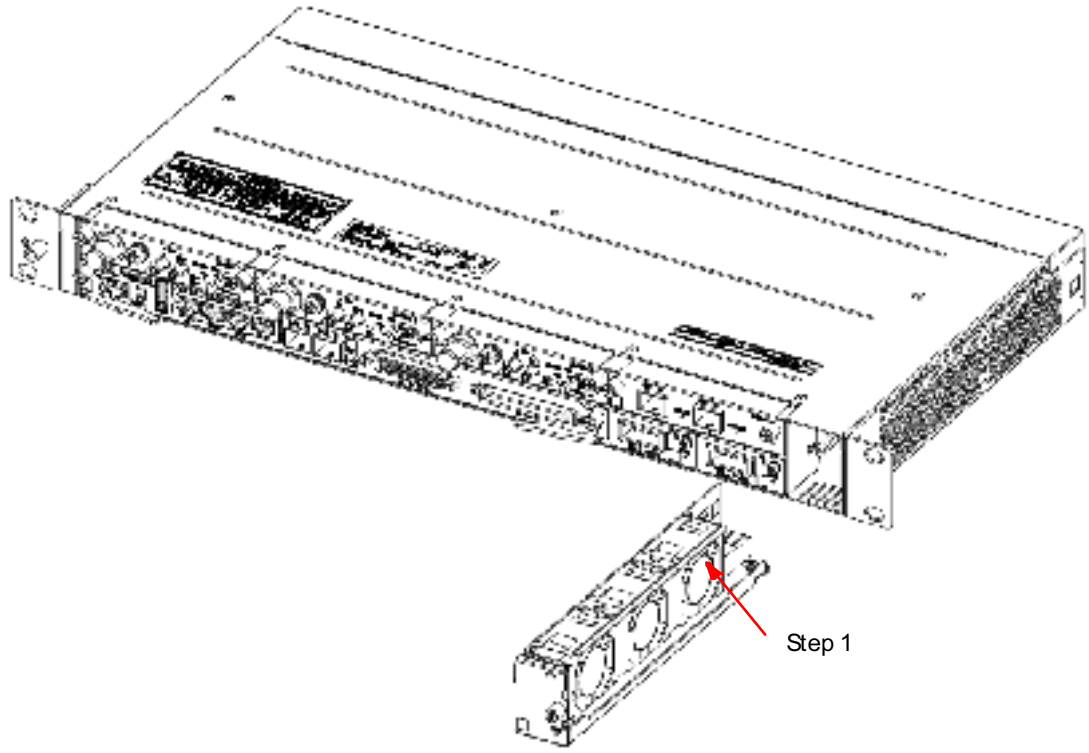
(2) Installation of the new FAN

Perform the steps in order of 1-2-3 shown after the following figure.

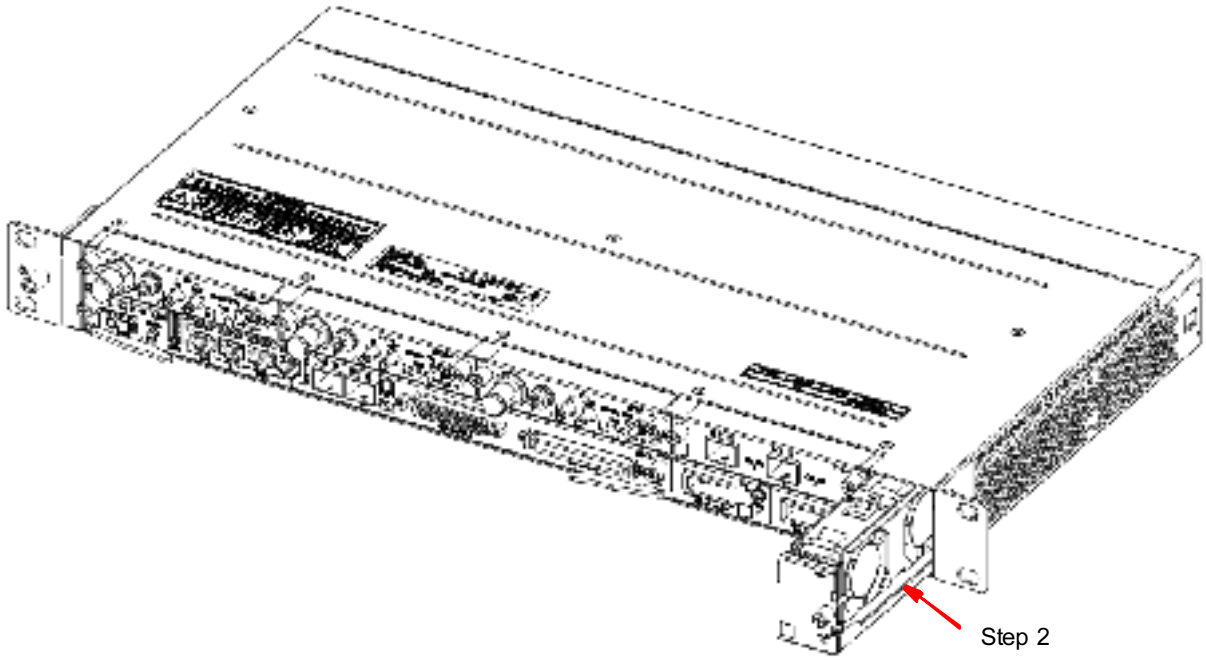
Step 1, 2: Insert the new FAN unit.

Step 3: Using the screwdriver, tighten the screw.

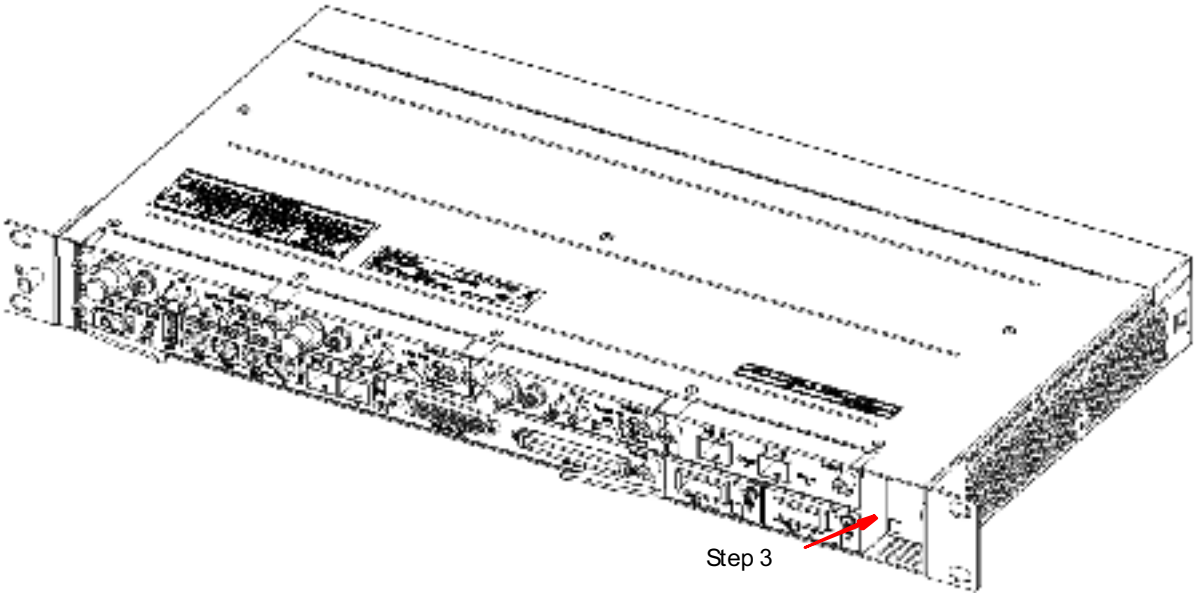
Step 1



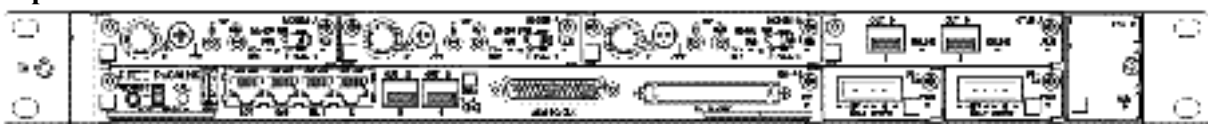
Step 2



Step 3



Step 4



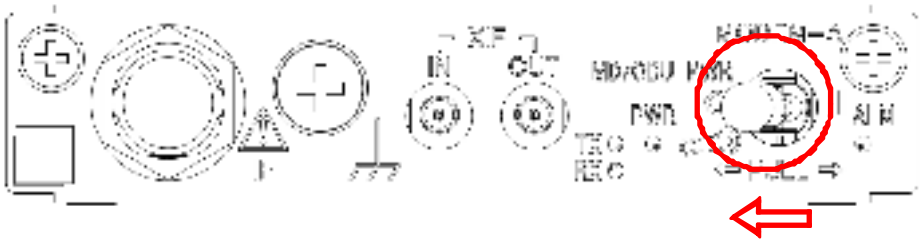
After FAN unit installation.
(The state that replacement was completed.)

4.3 Replace MODEM-A(*) Card

When replacing the MODEM-A(*) card in the universal card slot of the IDU, perform the following procedures.

Note (*) STM1-A/16E1-A/GBE-A/AUX-A card replacement is the same procedures as MODEM-A card without PWR switch.

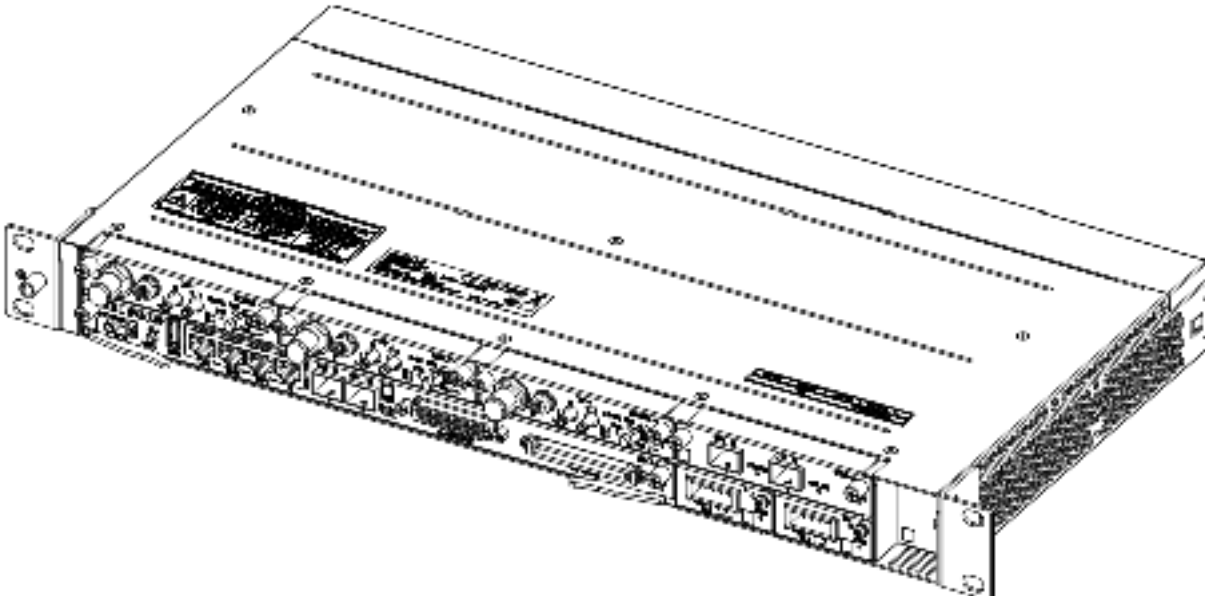
(1) Turn off the MD PWR switch on the MODEM-A card.



(2) Remove the old MODEM-A(*) card as following steps in order of 1-2-3.

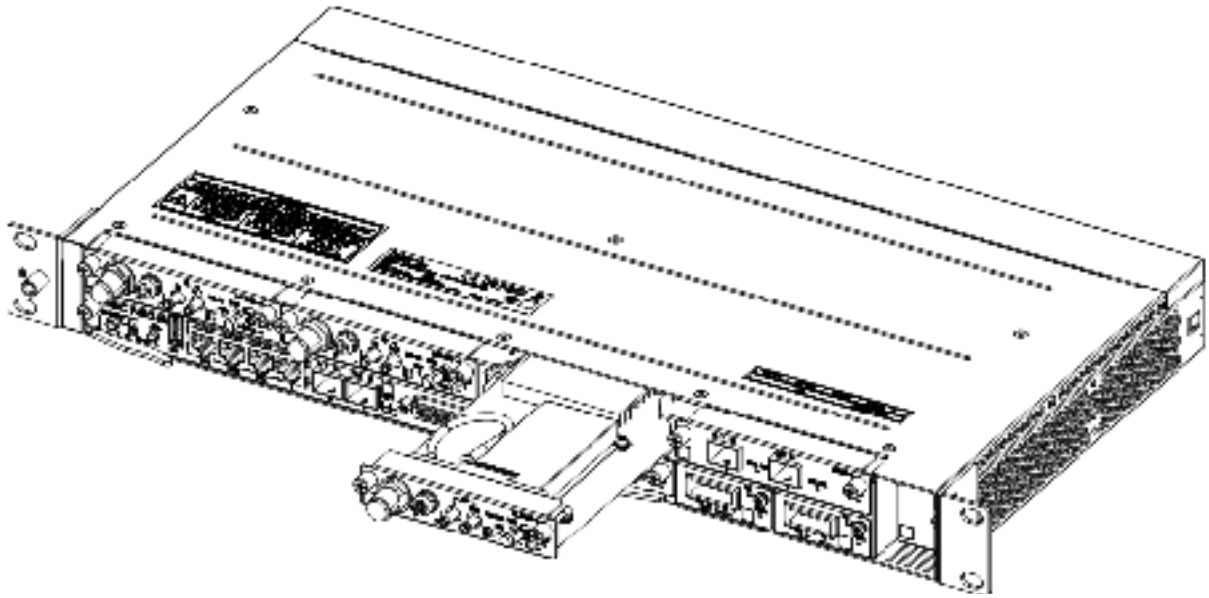
Remove Step 1: Using the screwdriver, loosen the screw.

Step 1

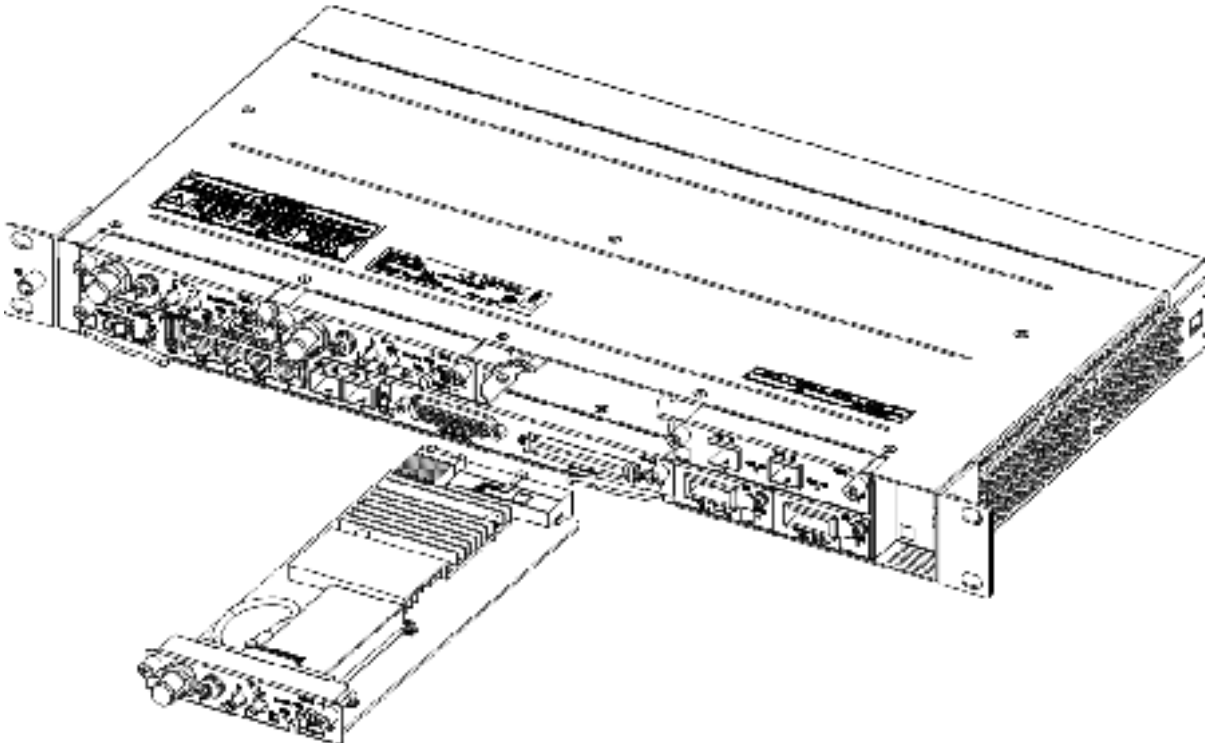


Remove Step 2, 3: Pull out the MODEM-A with holding the screw.

Step 2

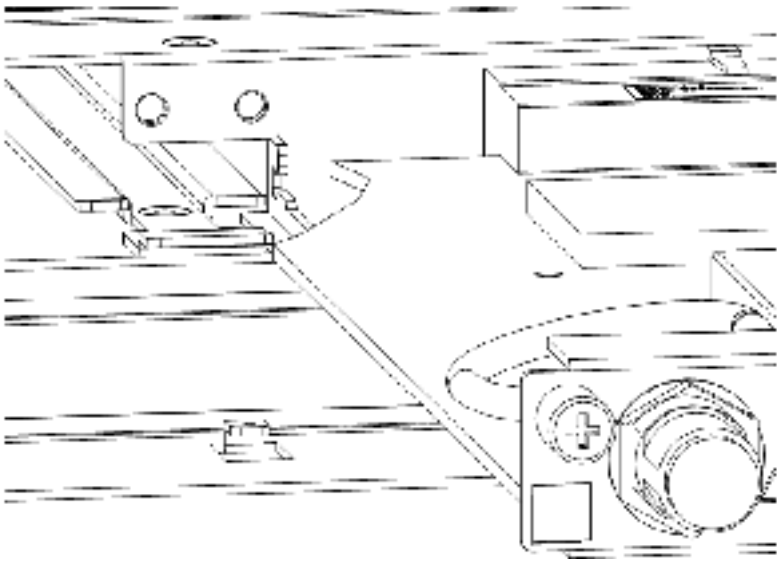


Step 3

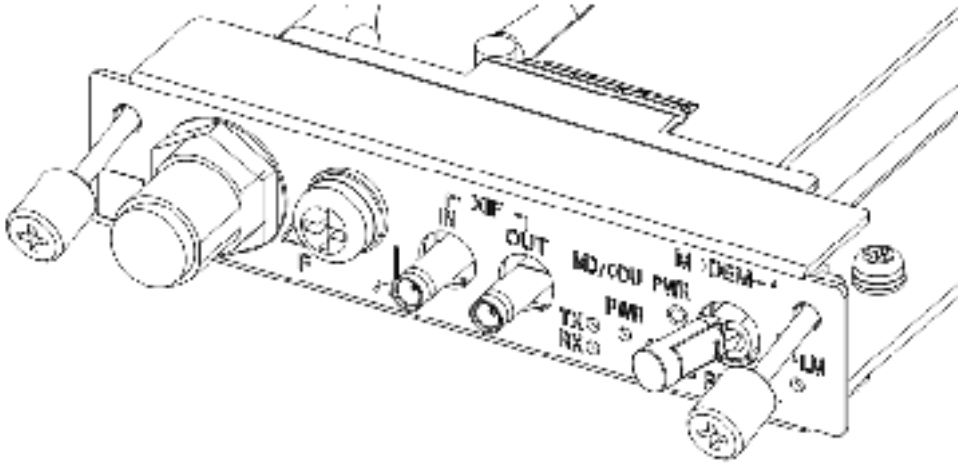


(3) Install the new MODEM-A(*) card as following steps in order of 1-2-3-4-5.

Install Step 1: Set the guide rail of the card to the rail of the chassis.



Install Step 2: Pull finger screws of the card as following.

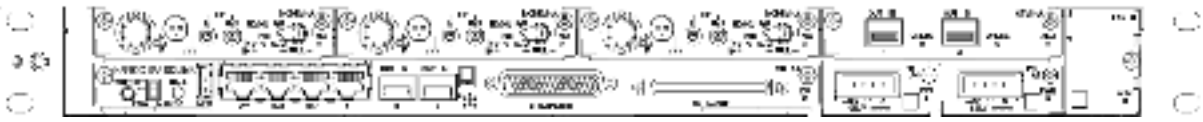


Install Step 3: Insert the card with pushing the no interface area of the front of the card.

Install Step 4: Push the card until no space remains between the card and the chassis.

Install Step 5: Using the screwdriver, tighten the screw.

Warning: Please don't touch electrical devices on the card.



After MODEM-A card installation.
(The state that replacement was completed.)

4.4 Replace MC-A4 Card

When replacing the MC-A4 card of the IDU, perform the following procedures.

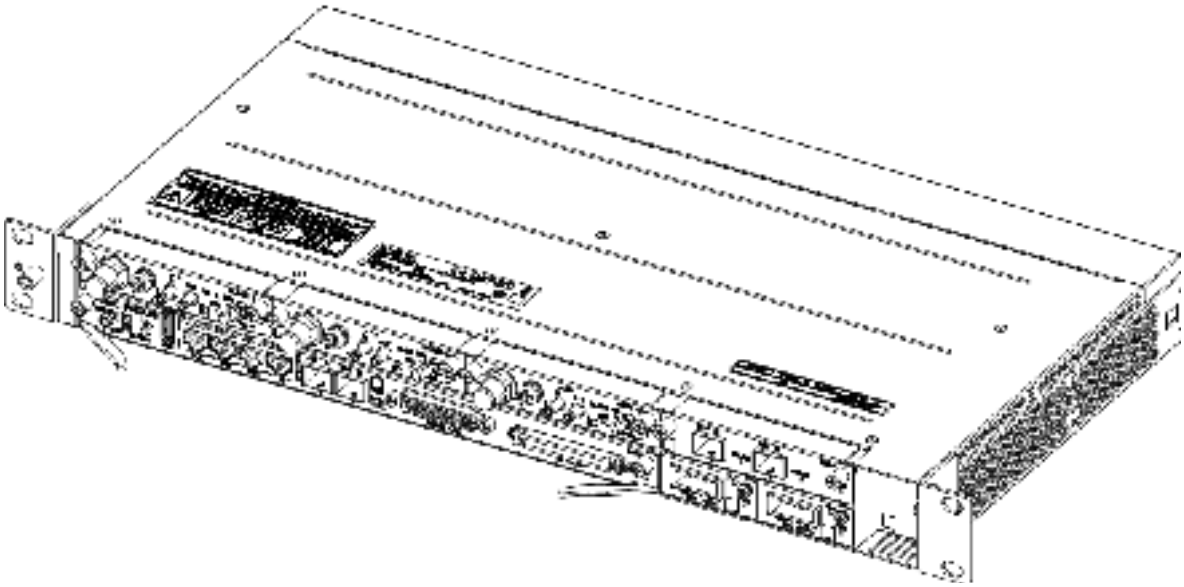
(1) Remove the old MC-A4 card as following steps in order of 1-2-3-4-5.

Step 1: Using the screwdriver, loosen two screws.

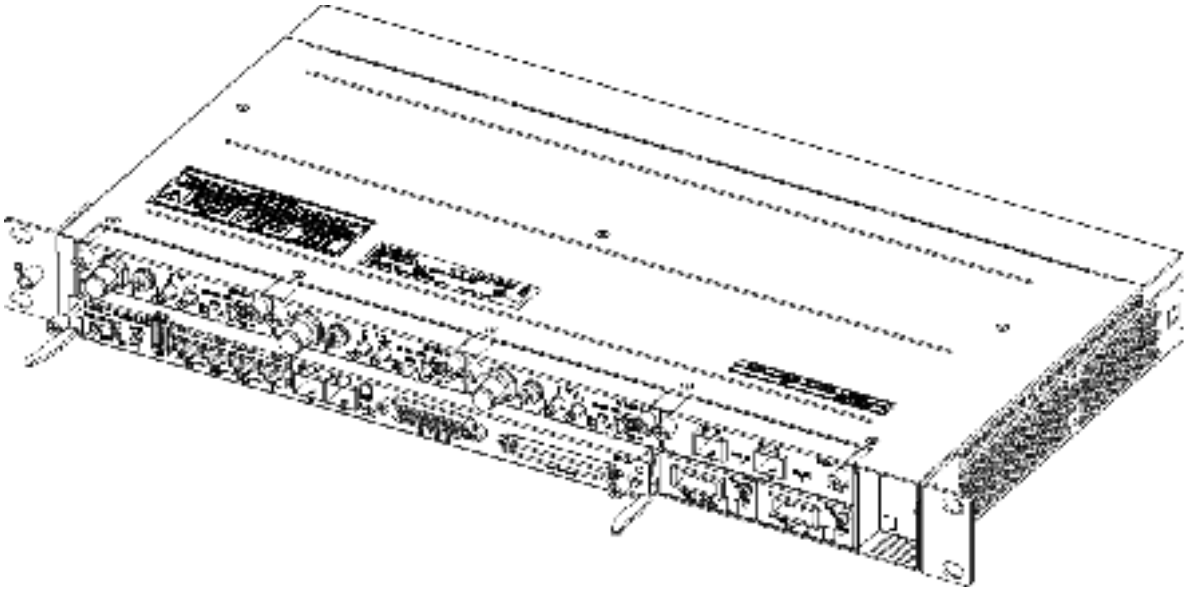
Step 2: Open two ejectors of the card.

Step 3-5: Pull out the card.

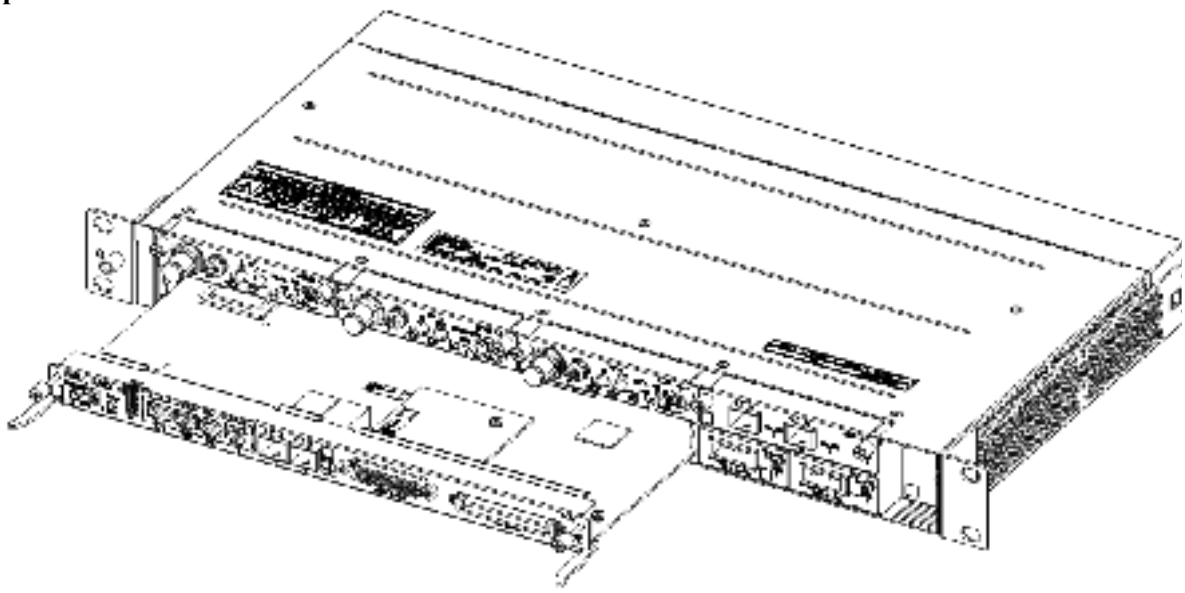
Step 1



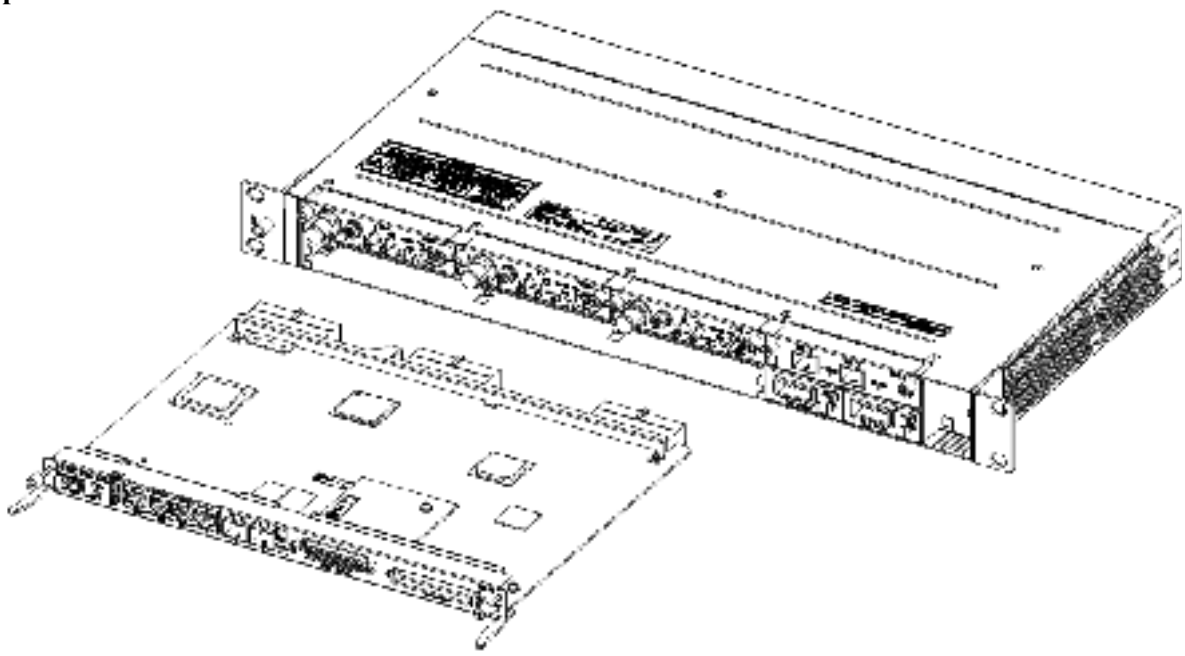
Step 2



Step 3



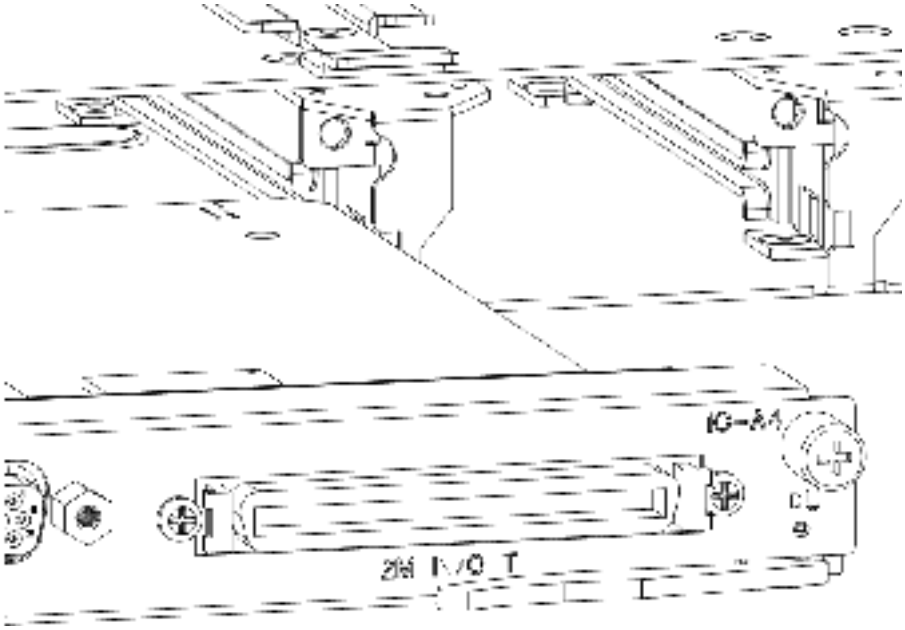
Step 4



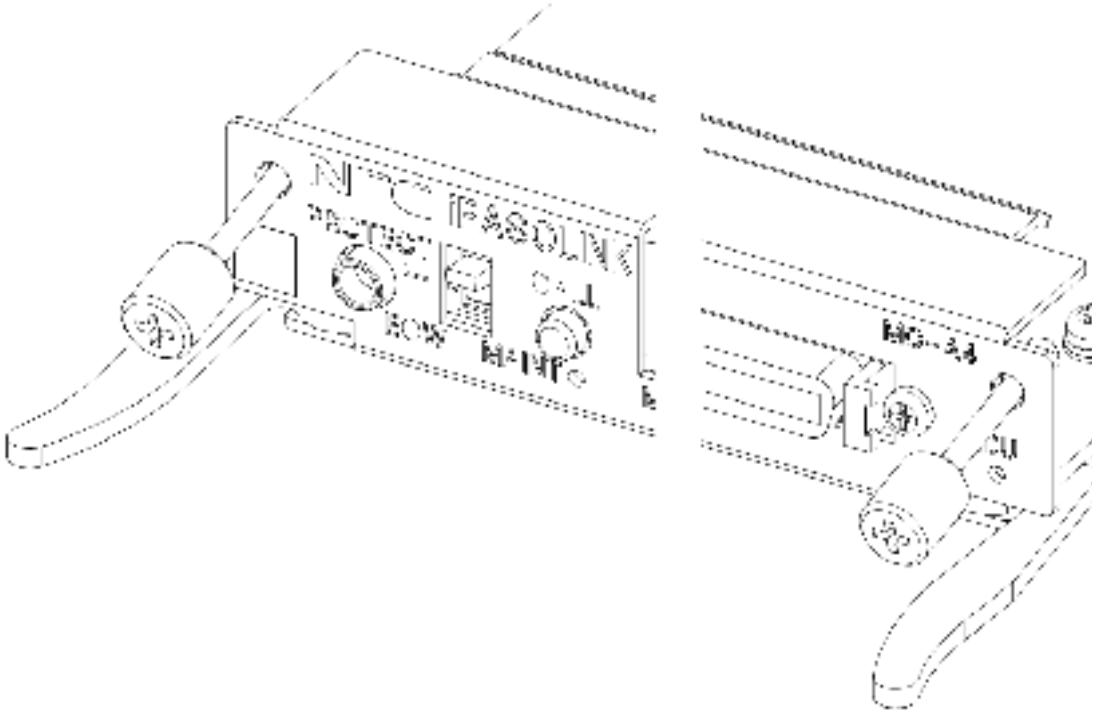
Step 5

(2) Install the new MC-A4 card as following steps in order of 1-2-3-4.

Install Step 1: Set the guide rail of the card to the rail of the chassis.



Install Step 2: Pull finger screws of the card as following.



Install Step 3: Insert the card with pushing two ejectors of the card.

Install Step 4: Using the screwdriver, tighten the screw.

Warning: Please don't touch electrical devices on the card.

4.5 Replace PS-A4 Card

When replacing the PS-A4 card of the IDU, perform the following procedures.

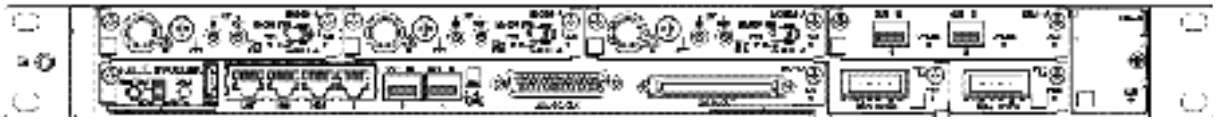
(1) Remove the old PS-A4 card as following steps in order of 1-2-3-4-5.

Step 1: Pull out the power cable.

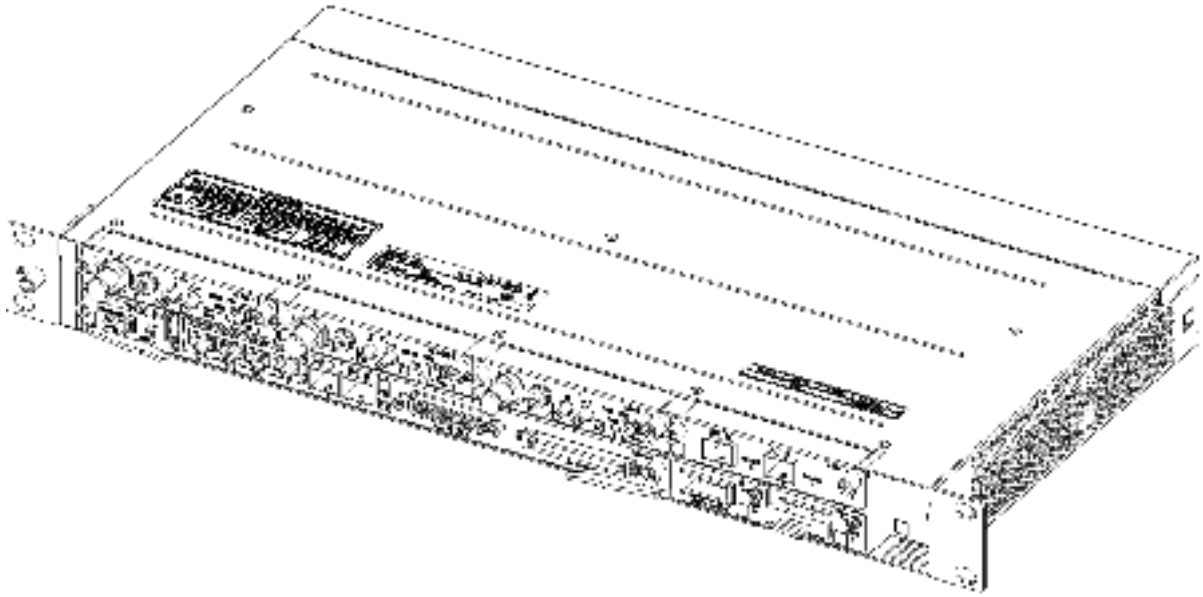
Step 2: Using the screwdriver, loosen the screw.

Step 3-5: Pull out the card with holding the screw.

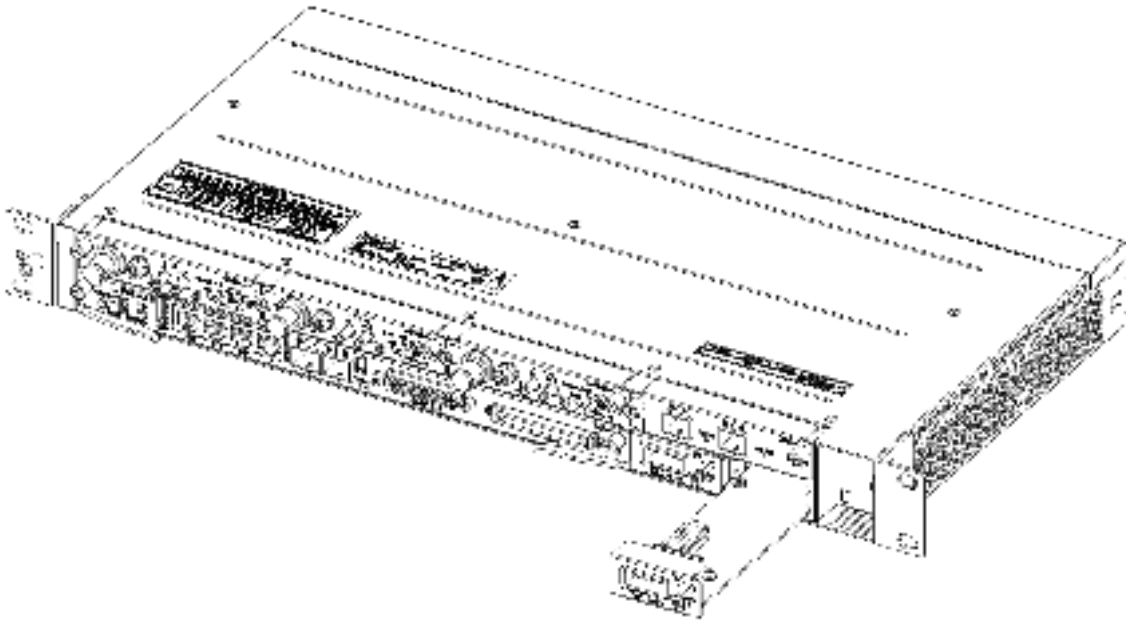
Step 1



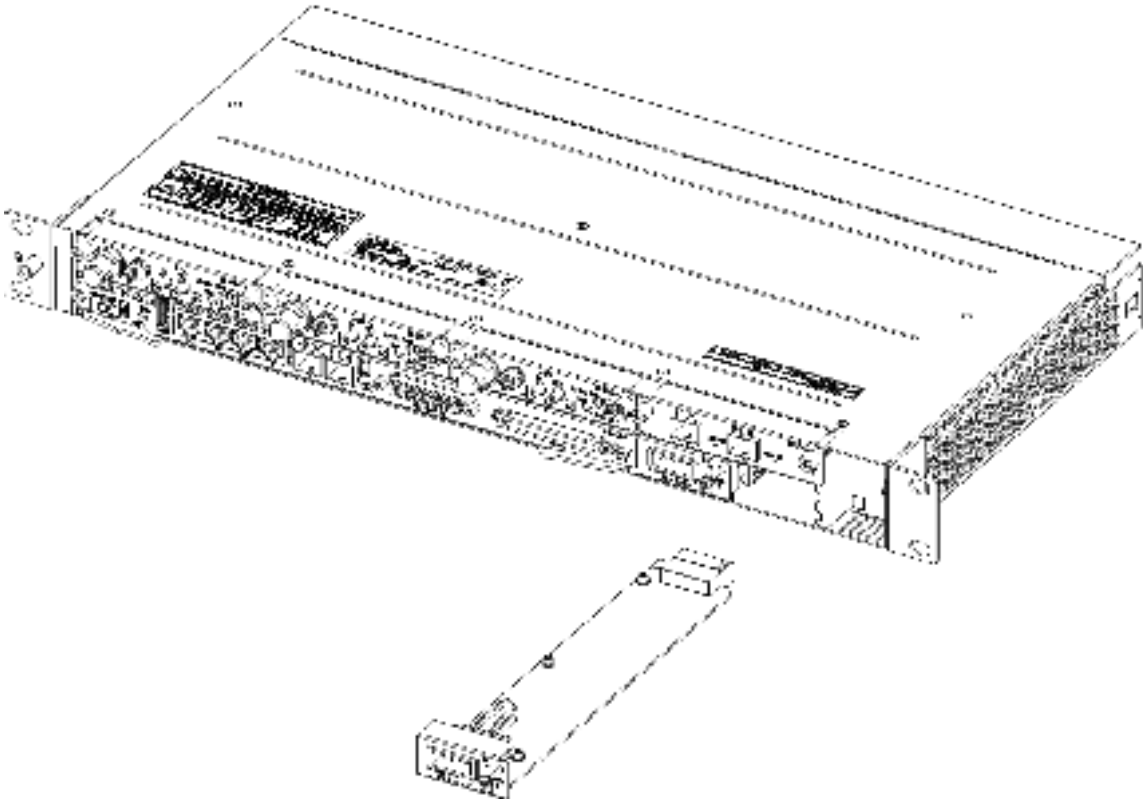
Step 2



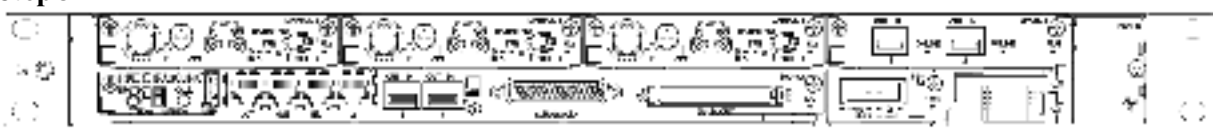
Step 3



Step 4

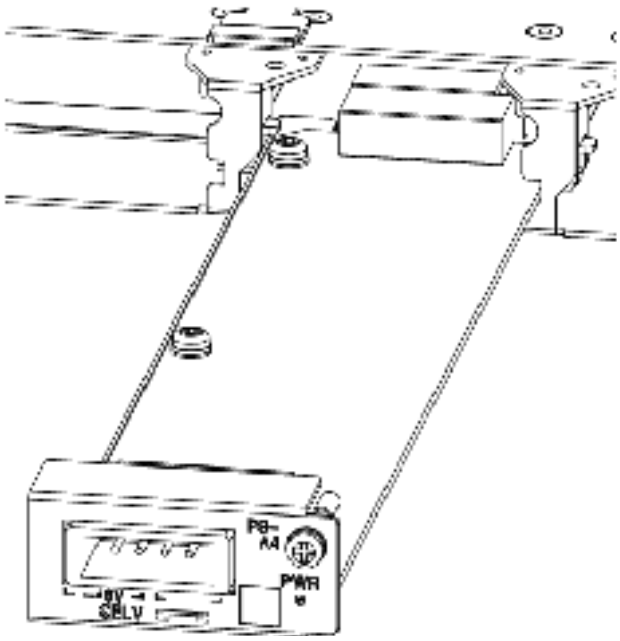


Step 5

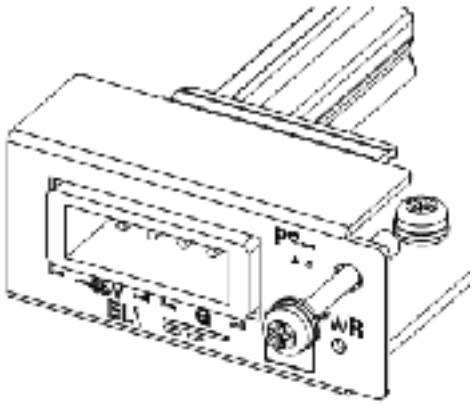


(2) Install the new PS-A4 card as following steps in order of 1-2-3-4-5.

Install Step 1: Set the guide rail of the card to the rail of the chassis.



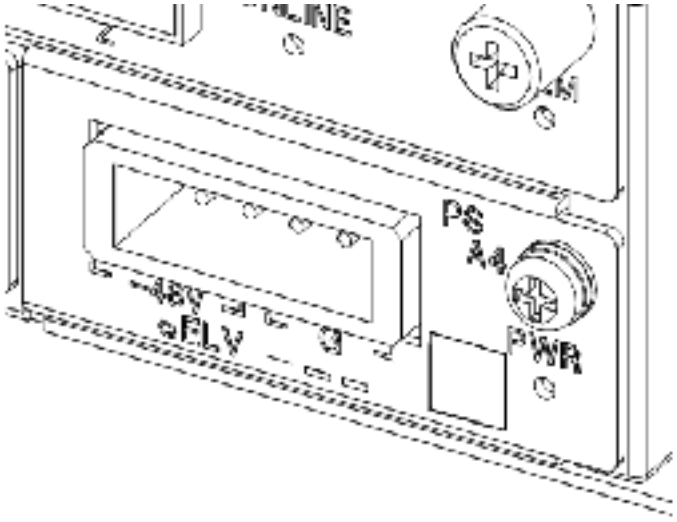
Install Step 2: Pull finger screws of the card as following.



Install Step 3: Insert the card with pushing the no interface area of the front of the card.

Install Step 4: Push the card until no space remains between the card and the chassis.

Install Step 5: Using the screwdriver, tighten the screw.



Warning: Please don't touch electrical devices on the card.

4.6 Replace PS-A4 Fuse

When replacing the Fuse mounted on the PS-A4 card of the IDU, perform the following procedures.

(1) Remove the PS-A4 card as steps in order of chapter 4.5.

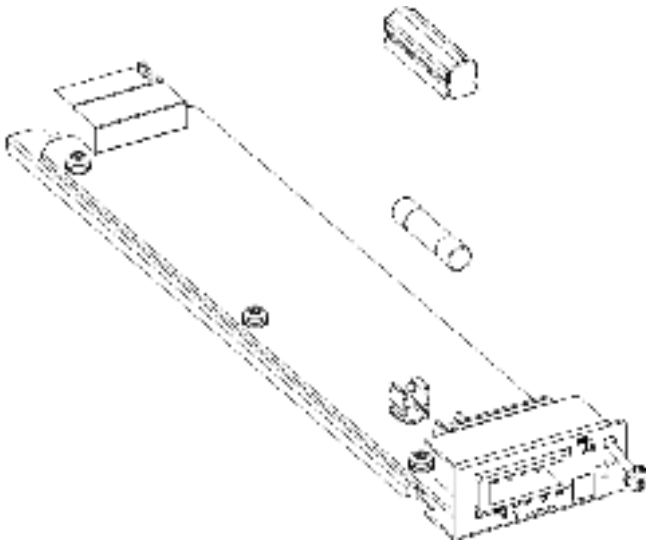
(2) Install the new PS-A4 card as following steps in order of 1-2-3.

Install Step 1: Remove the cover of the fuse.

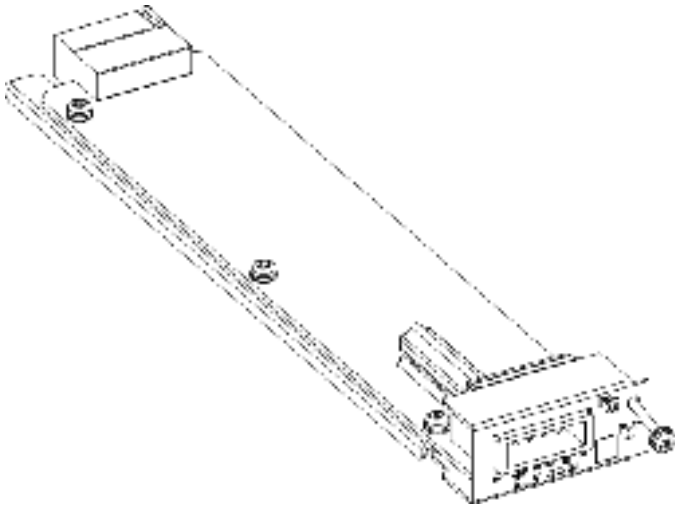
Install Step 2: Remove the fuse.

Install Step 3: Set the new fuse and cover.

Step 1, 2



Step 3



Warning: Please don't touch electrical devices on the card.

4.7 Mount CLK2M-C Card

When installing the CLK2M-C card mounted on the MC-A4 card of the IDU, perform the following procedures.

(1) Remove the MC-A4 card as steps in order of chapter 4.4.

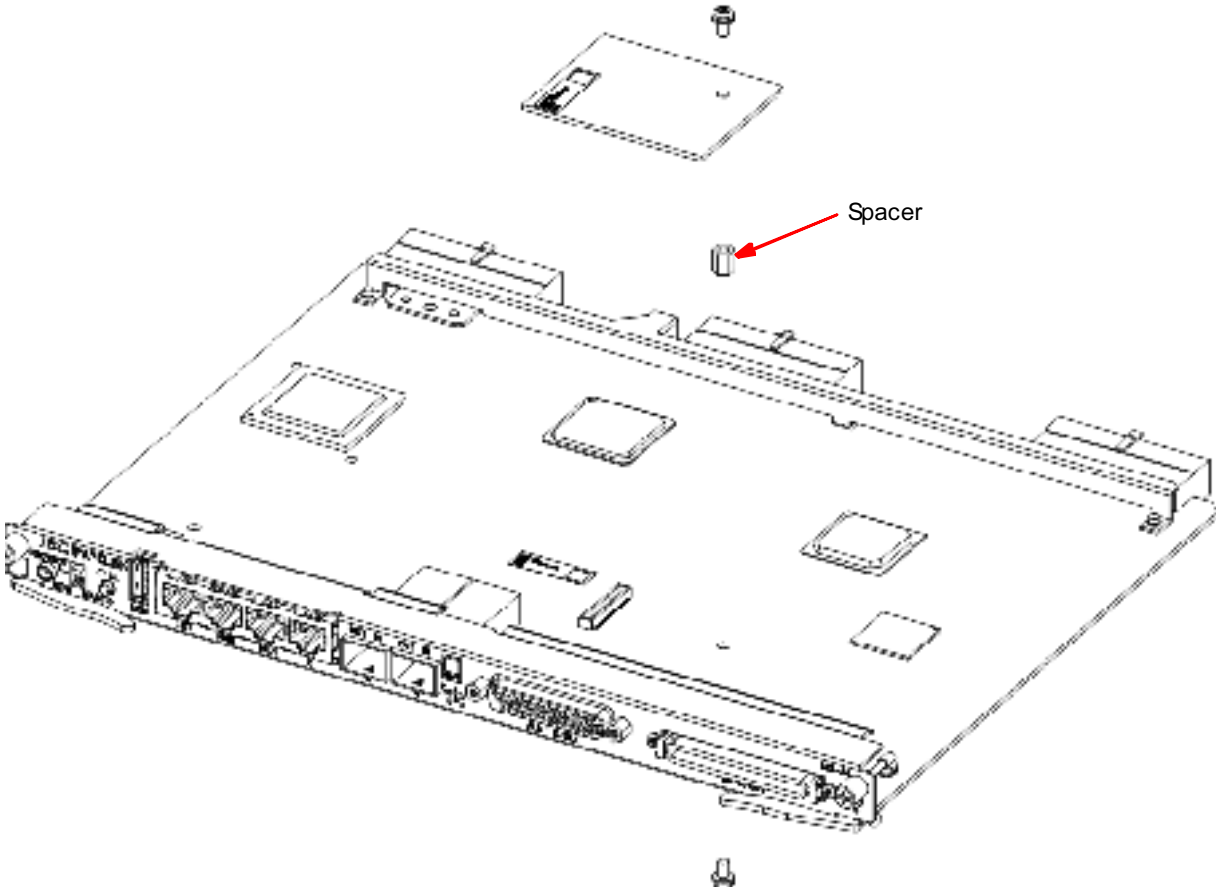
(2) Install the CLK2M-C card as following steps in order of 1-2-3.

Install Step 1: Using the screwdriver, tighten the screw from bottom side of the MC-A4 card with the spacer of front side of the card.

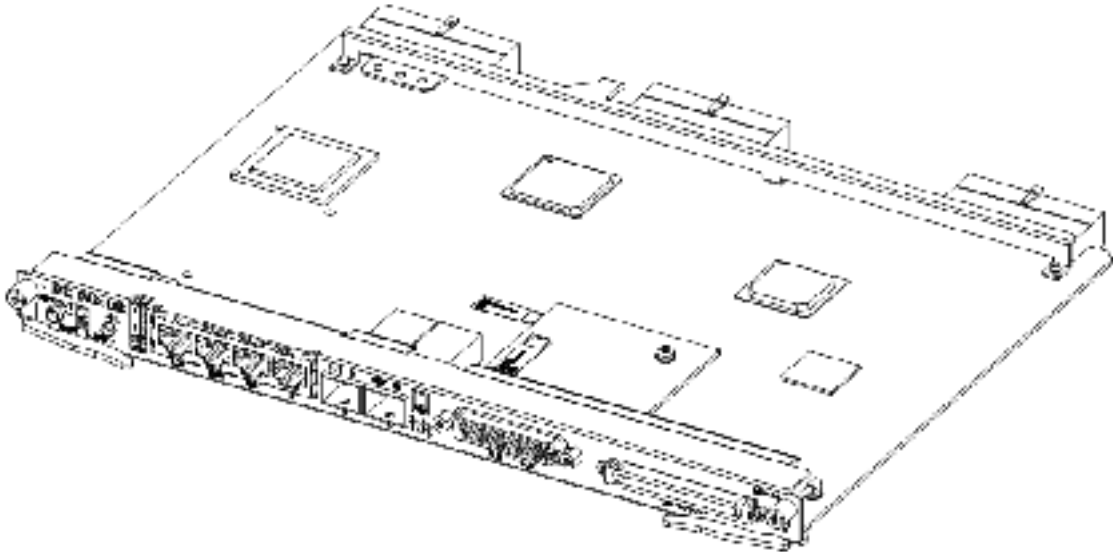
Install Step 2: Install the CLK2M-C card with inserting the connector to the connector of the MC-A4 card.

Install Step 3: Using the screwdriver, tighten the screw of the CLK2M-C card.

Step 1, 2



Step 3



Warning: Please don't touch electrical devices on the card.

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5. MOUNTING ODU

The procedures for mounting and demounting the ODU are described here. There are two types of mounting for the Antenna Direct Mounting type and Feeder Connecting type. The ODU should be installed in the radio station.

The tools for installation are listed in Table 5-1.

Table 5-1 Tools

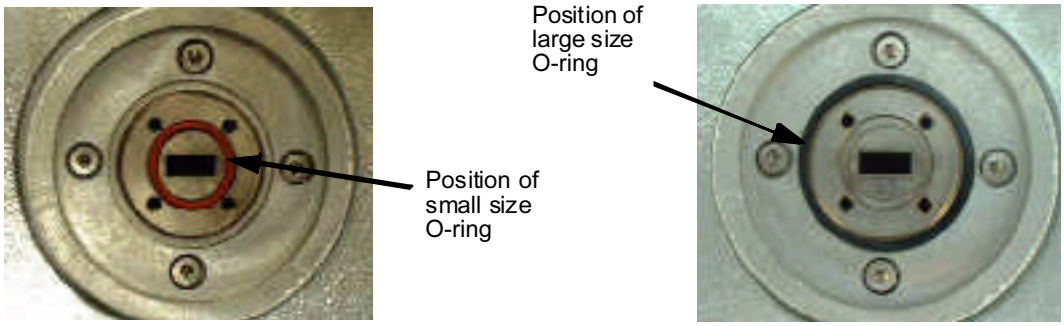
Tools
Wrench or Monkey Wrench
Screwdriver
Torque Wrench

Caution

1. **How to use small and large O-rings are shown in following table. Two (small and large) O-rings are attached in 18 to 38 GHz band Andrew/RFS direct mount antenna. 11/13/15 GHz band antenna does not have small O-ring (Small O-ring is not used for Andrew/RFS direct mount antenna). If the small O-ring is used for ODU direct mount installation, a gap may occur between ODU and antenna for RF interface. Therefore it may happen transmit or receive level down.**
2. **Do not apply silicon grease at O-ring.**

System	Attachenent Position of O-ring (Between:)	O-ring		Remarks
		Small Size	Large Size	
1+0	ANT — ODU	Not used	Used	Antenna direct mounting
	ANT — WG/ODU (18-38 GHz BAND)	Used	Not used	Waveguide connection
1+1	ANT — Hybrid/Coupler	Not used	Used	Antenna direct mounting
	ANT — WG/Hybrid/Coupler (18-38 GHz BAND)	Used	Not used	Waveguide connection

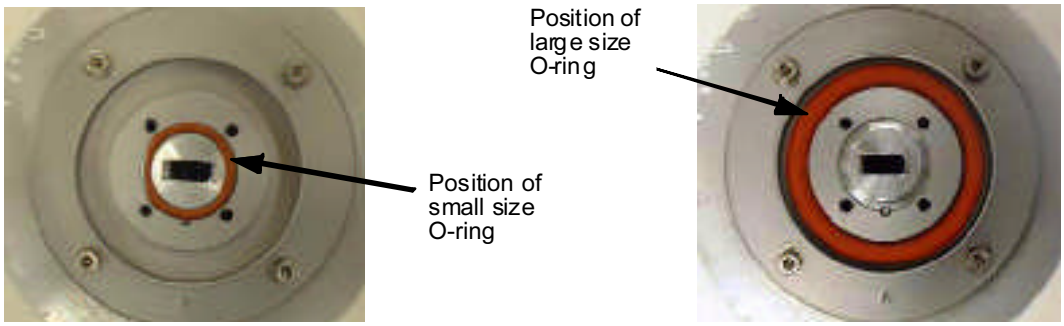
Note 11/13/15 GHz antenna for direct mount is not possible to connect the ordinary waveguide flanges.



For Waveguide Connection

For Antenna Direct Mounting

ANDREW Antenna



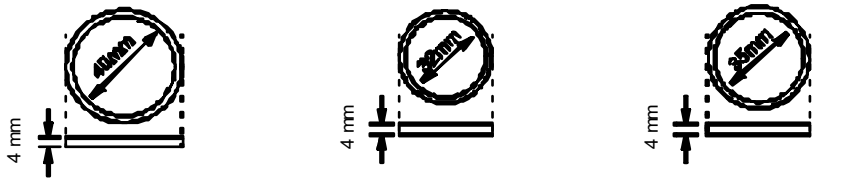
For Waveguide Connection

For Antenna Direct Mounting

RFS Antenna

Notes

1. Do not use both small O-ring and large O-ring simultaneously.
2. O-ring size is different with frequency band as follows:



10-11 GHz Band 13-23 GHz Band 26-38 GHz Band

Large Size O-ring for Antenna Direct Mounting

18/23 GHz Band 32/38 GHz Band

Small Size O-ring for Waveguide Connection

5.1 Antenna Direct Mounting

5.1.1 Basic Installation for Antenna & ODU

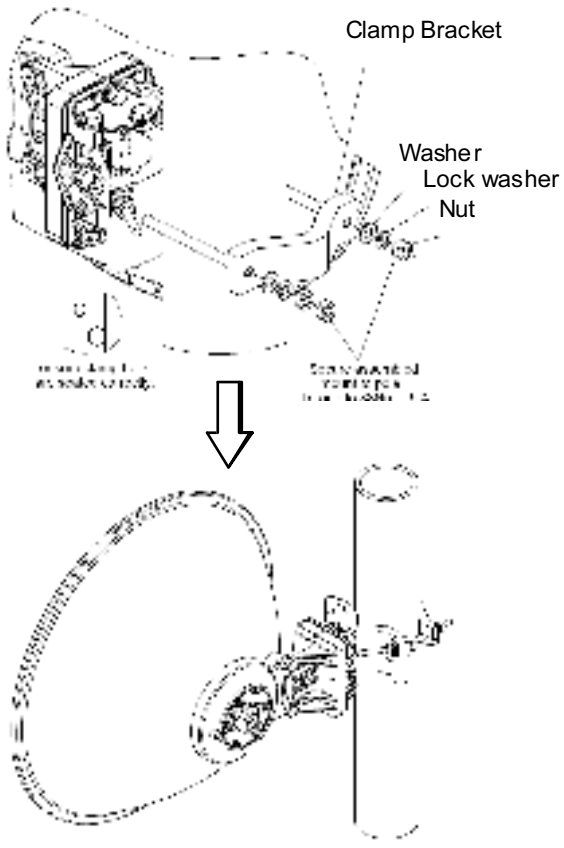
Note The details are referred to the installation manual which is attached to the antenna.

Installation of Bracket

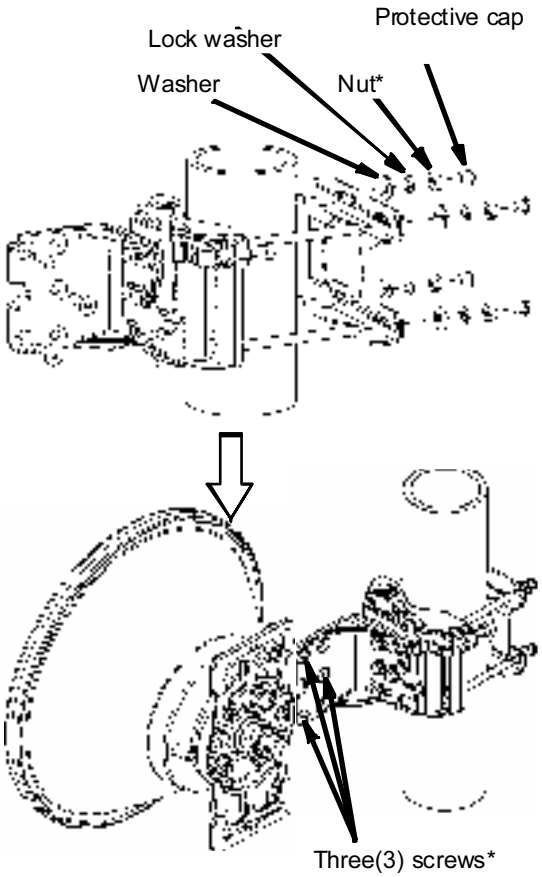
1 Install the bracket to the antenna pole,

2 Mount antenna to the bracket,

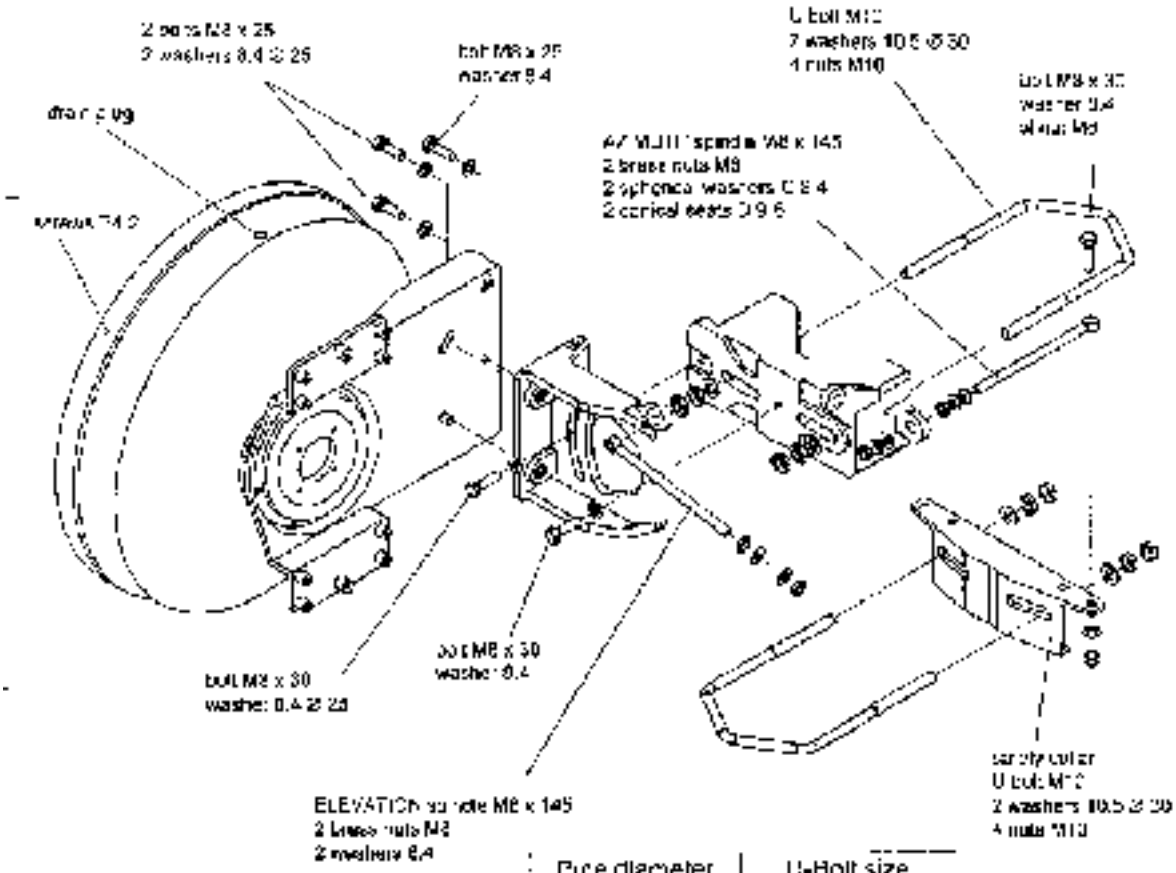
ANDREW pole mount bracket
for 1 or 2 ft reflector type



ANDREW pole mount bracket
for other reflector type



Note *: Tightening torque of 22 N·m for M10.



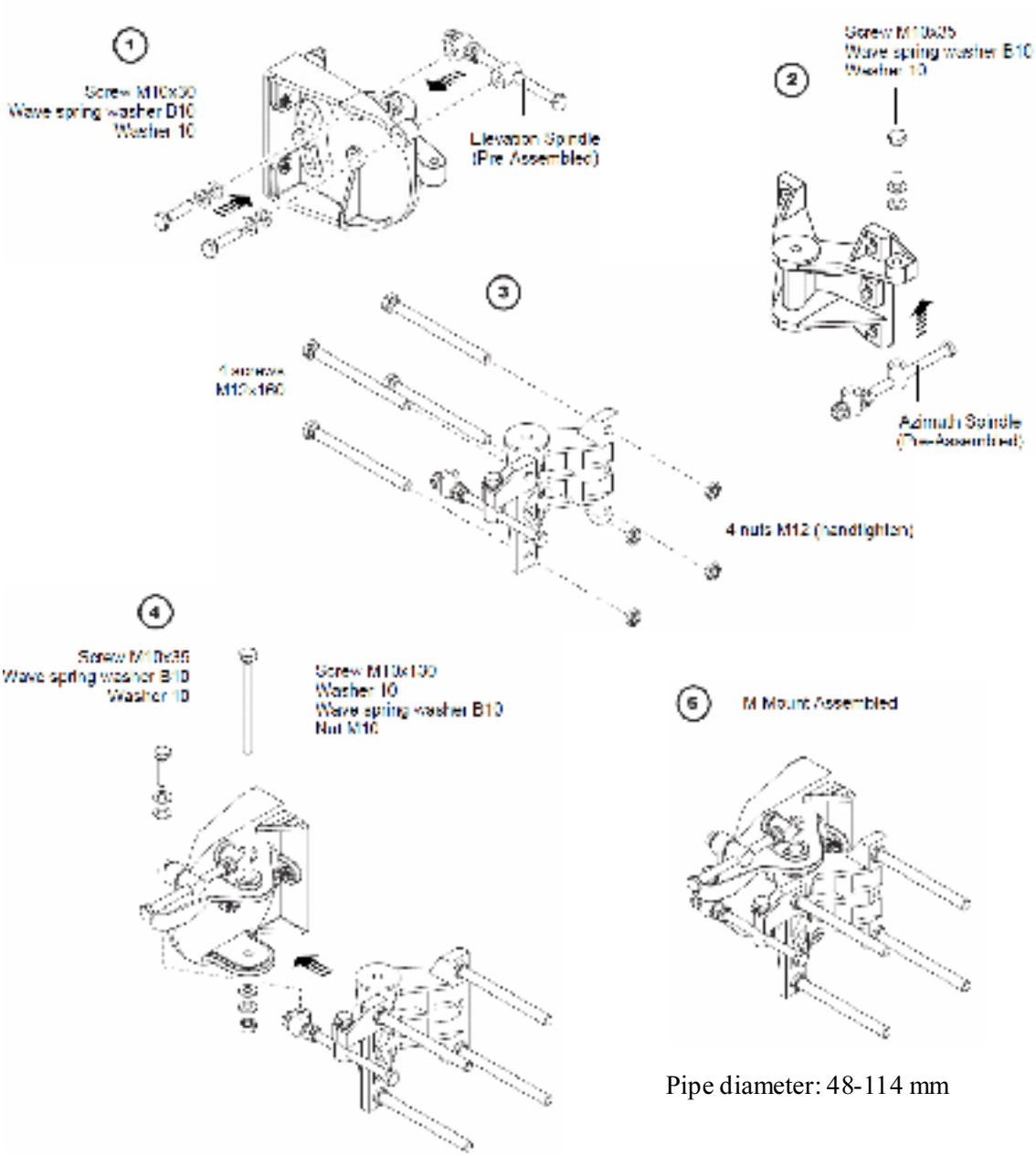
RFS SB1 Type Bracket

Pipe diameter [mm]	U-Bolt size [mm]
51 - 89	89
90 - 115	115

Note The values in the following table are valid for screws and bolts which have been greased according to the installation instructions.

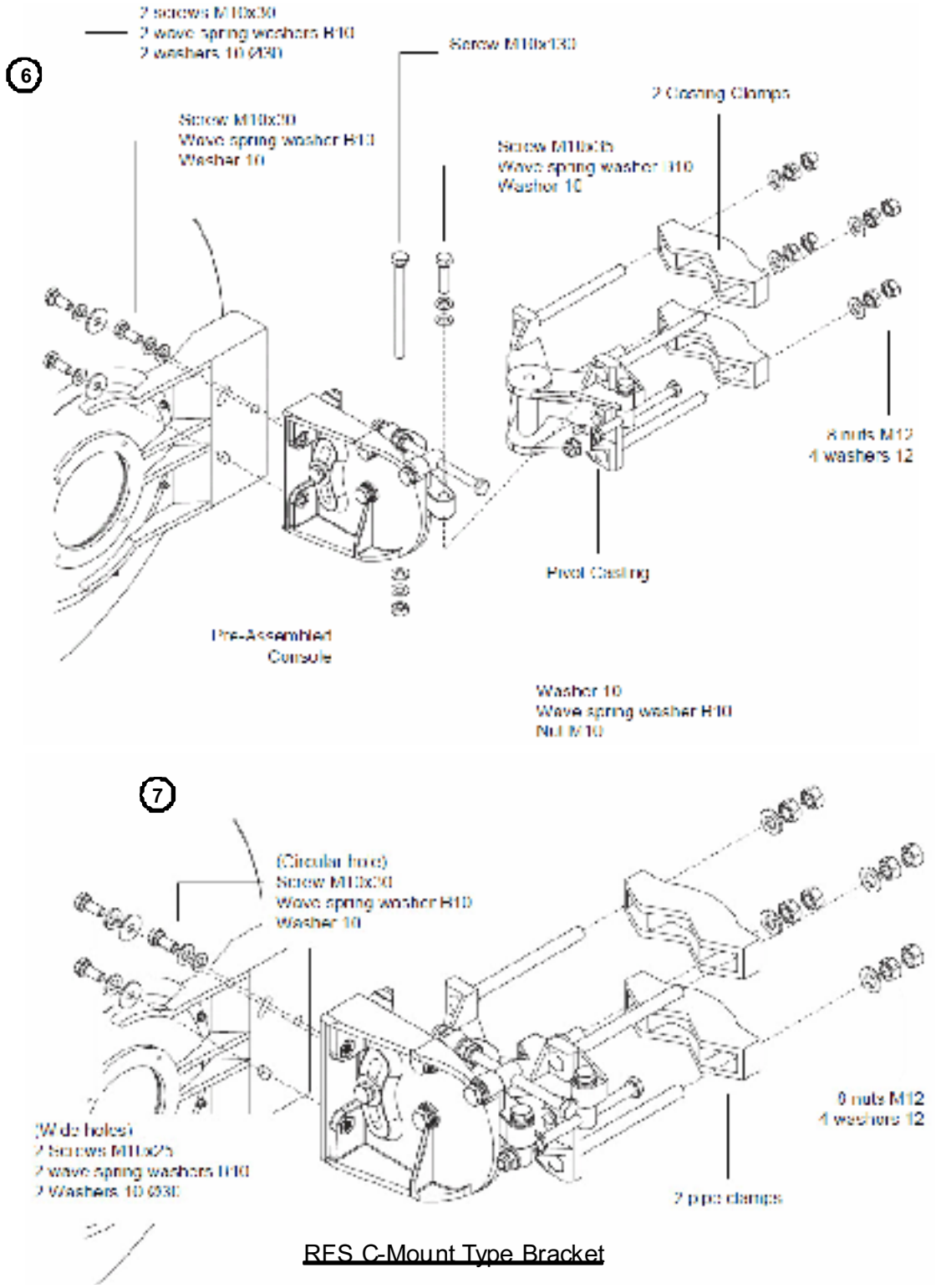
Torques for RFS			
Bolt	M5	5	Nm
	M6	8	Nm
	M8	17	Nm
	M10	35	Nm
	M12	50	Nm
U-Bolt, V-Bolt (Pipe mount & safety collar)	M10	20	Nm
Hexagonal brass nut of fine adjustment (Azimuth, Elevation)	M8	5	Nm
	M10	10	Nm
	M12	17	Nm
Hexagonal socket stainless steel screws	M3	0.2	Nm
(Feed systems install on aluminium mounting plate)	M4	0.4	Nm
Exceptions			
Fixing screw of the azimuth fine adjustment spindle	M8 x 30	8	Nm
	M12 x 55	17	Nm
Special application: NOT greased			
Fixing screw of the plastic radome	B4.2	3	Nm

Mount Assembly (RFS C-Mount Type)



Pipe diameter: 48-114 mm

RFS C-Mount Type Bracket

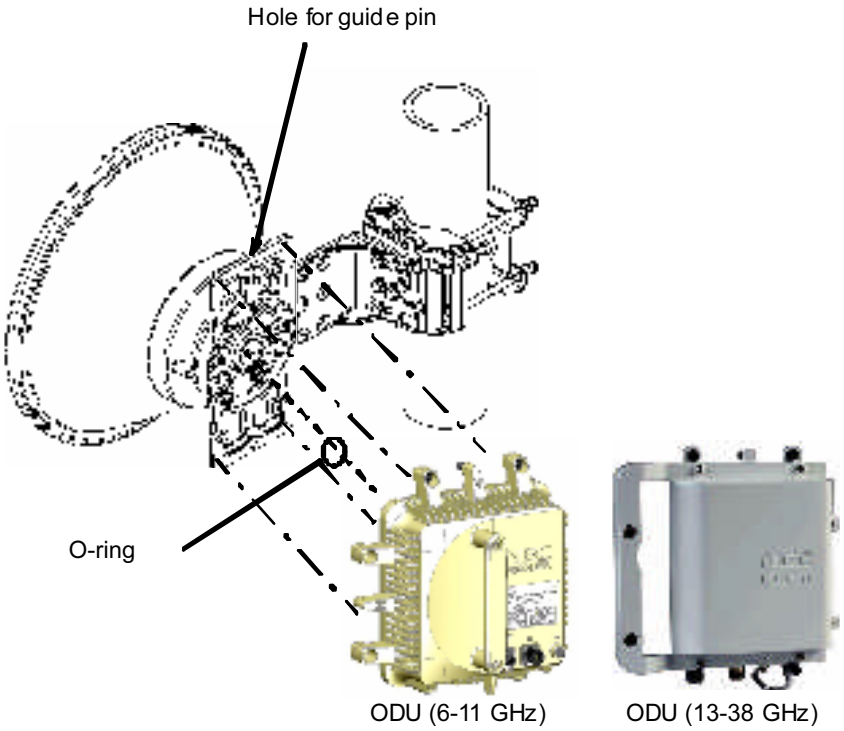


RFS C-Mount Type Bracket

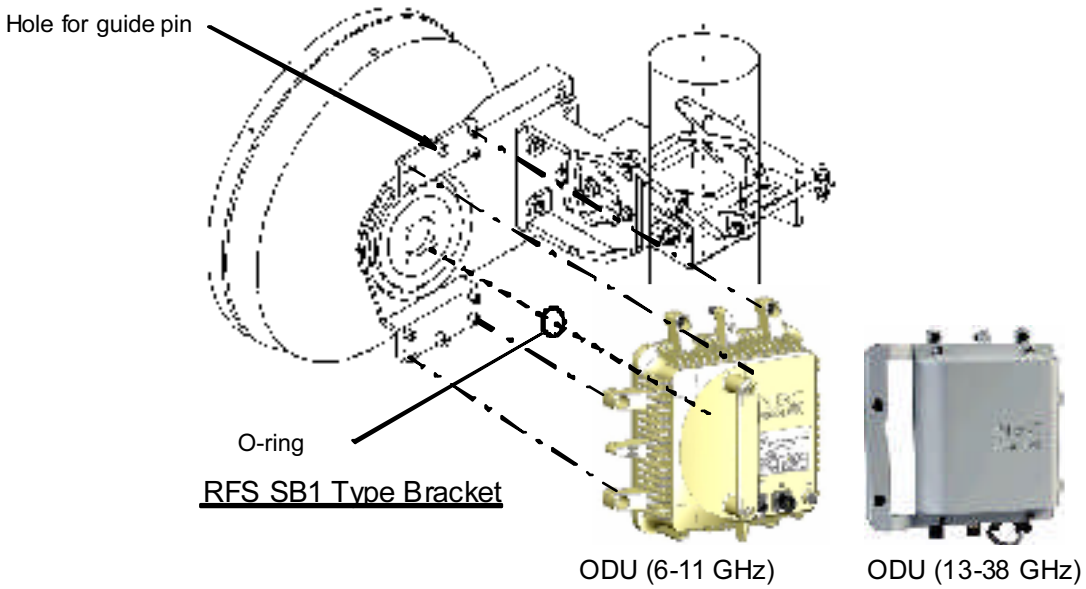
3 Fix the ODU to the bracket by tightening the M6 screws (four locations),

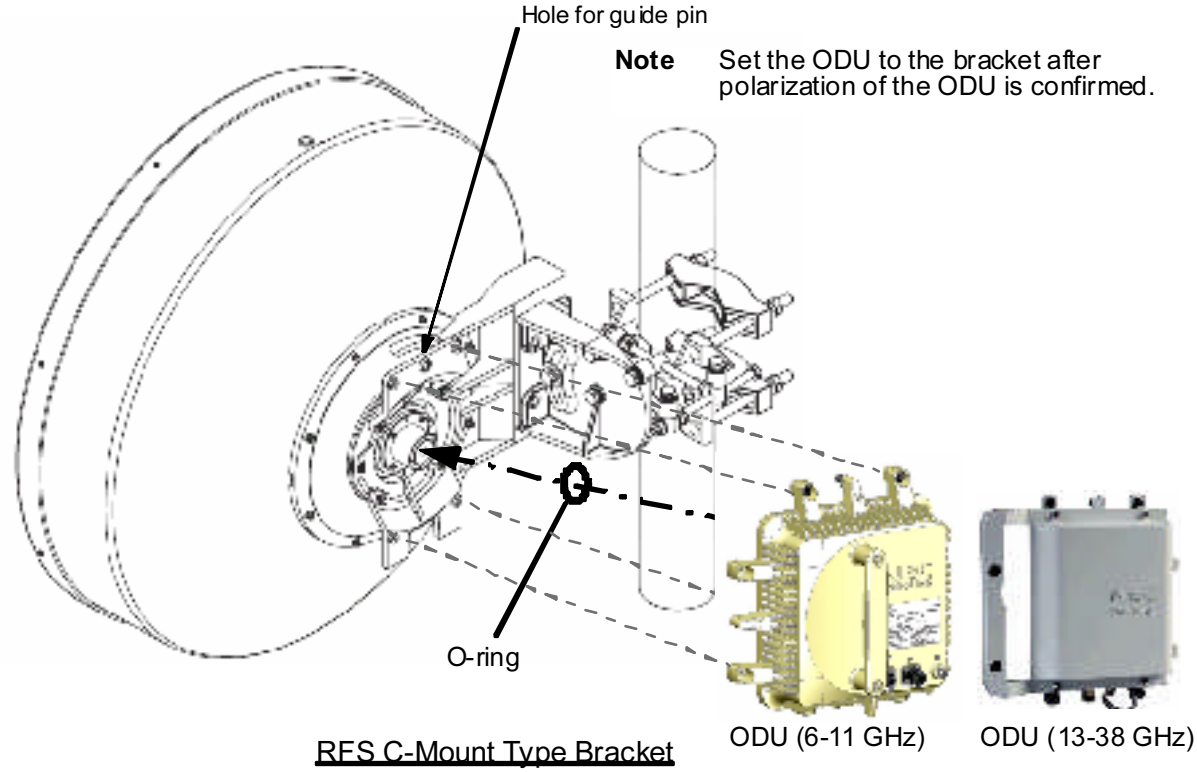
Notes

1. Being careful, tighten alternately and gradually four screws.
2. Figure shows V polarization.
3. Be careful not to damage the O-ring (Antenna).
4. The tightening torque is 4.0 N·m ±10%.



ANDREW VHLP Type Bracket



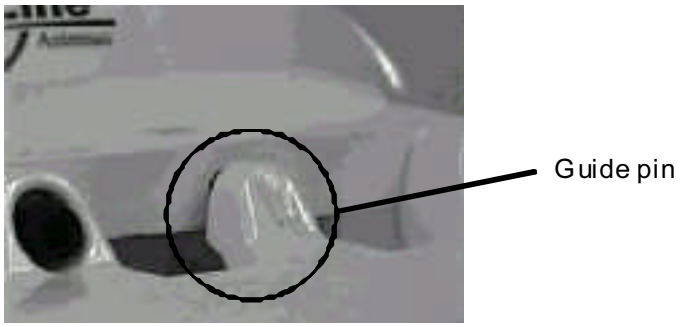


Note Set the ODU to the bracket after polarization of the ODU is confirmed.

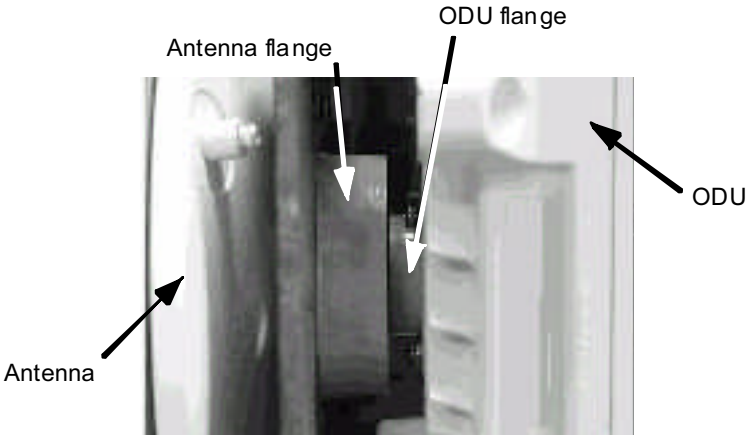
Notes

1. Figure shows V polarization.
2. Be careful not to damage the O-ring (Antenna).
3. The tightening torque is 4.0 N·m ±10%.

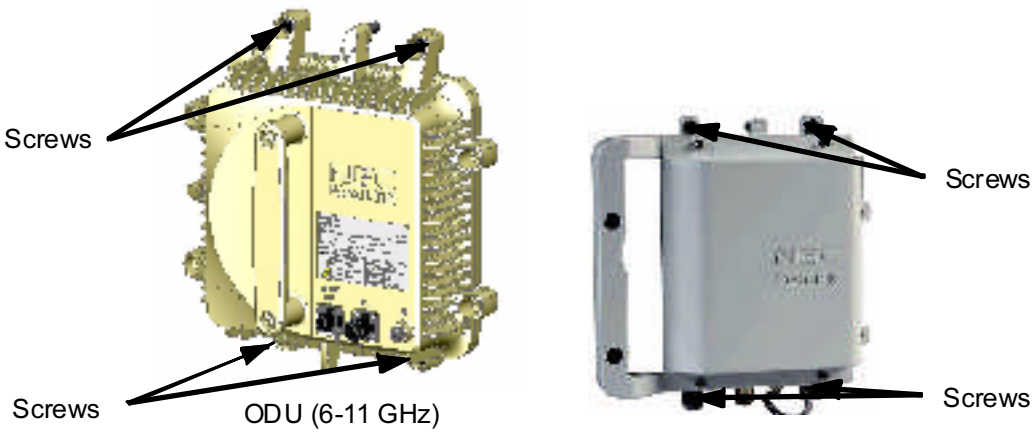
4 Insert guide pin on the hole of bracket to set the position of screws,



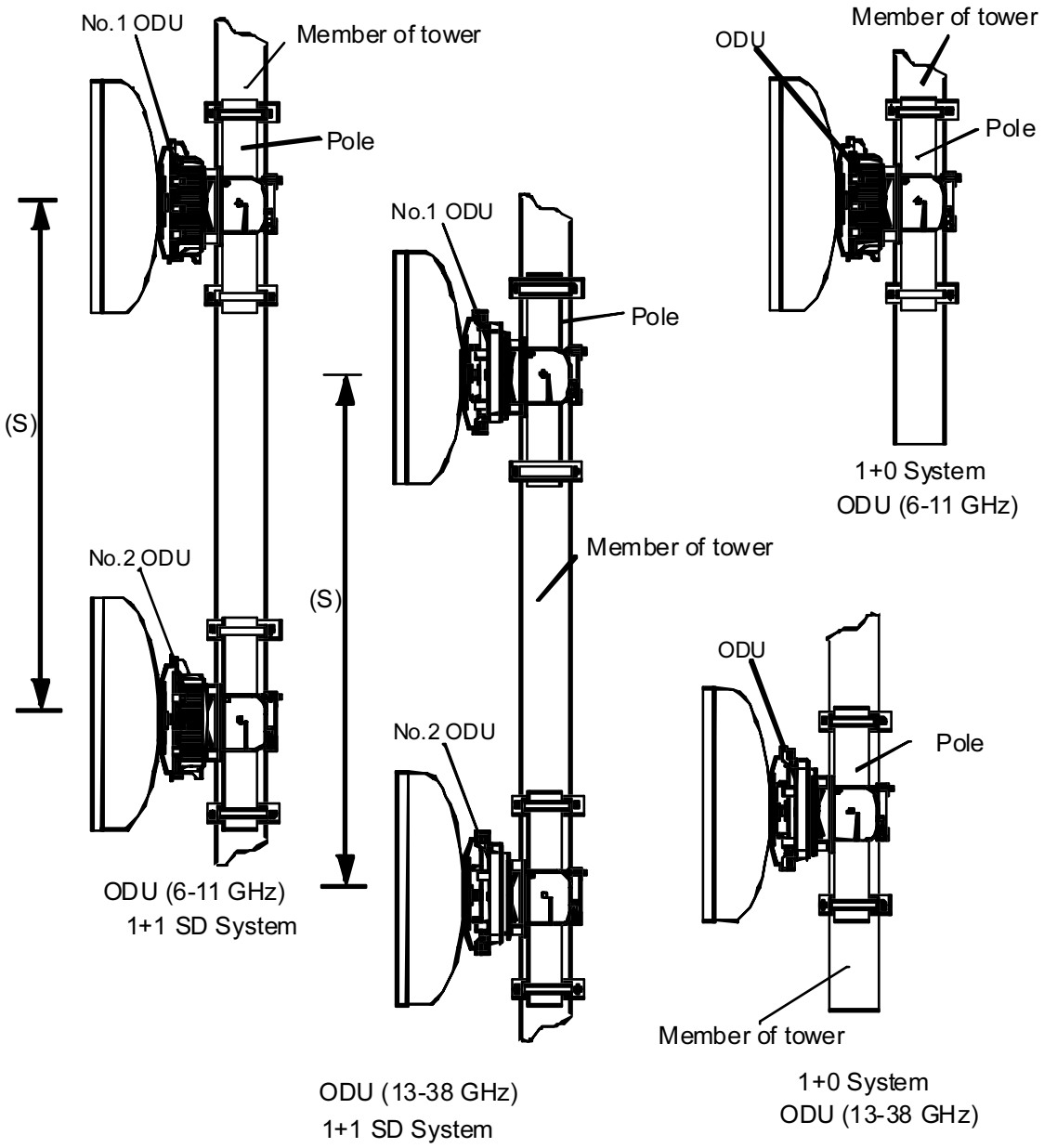
Caution **Align flanges on antenna and ODU correctly, and fix the ODU with four screws.**



5 Fix the ODU to the bracket with four screws.



Note Tightening torque is 4.0 N·m ±10%.



Note Antenna separation (S) is given by path calculation depending on the system parameter.

Procedure 5-1 Change of Polarization of Antenna

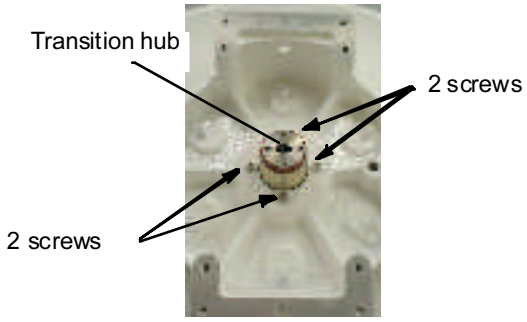
(1) ODU Direct Mounting Type Antenna (ANDREW Example #1)

Notes

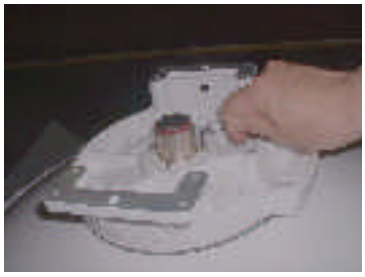
1. The details are referred to the installation manual which is attached to the antenna. The installation or removal of the antenna requires qualified experienced personnel.
2. The antenna is set to V-polarization when shipped from the factory.

1 Keep the antenna stand horizontally,

2 If you change to H polarization, loosen the four screws with the Allen key wrench and then rotate the Transition hub of feed, keeping the antenna stand horizontal,

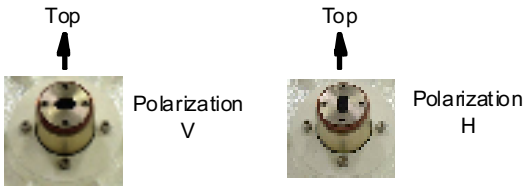


Note Do not remove the screw complete from the screw hole.
Hold the feed horn with hand.



3 Holding the feed with hand, rotate the feed 90 degrees,

Check that the aperture part of the Transition hub is rotated 90 degrees, then fix it with the screws that were loosened in step 2,



4 Check that the aperture part of the Transition hub is rotated 90 degrees, then fix it with the screws that were loosened in step 2.

Note When a large and a small gasket are included in the antenna package. Please use the large one. (The small gasket is not used in antenna mount.)

(2) ODU Direct Mounting Type Antenna (ANDREW Example #2)

Notes

1. The details are referred to the installation manual which is attached to the antenna. The installation or removal of the antenna requires qualified experienced personnel.
2. The antenna is set to V-polarization when shipped from the factory.

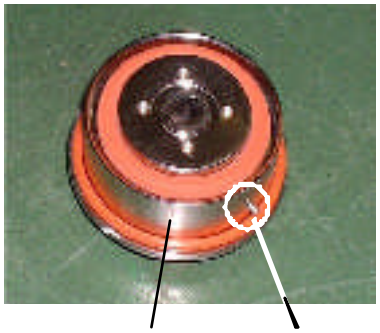
1 Keep the antenna stand horizontally,

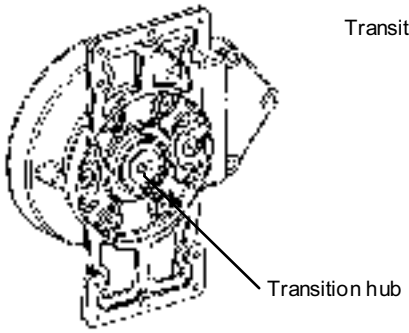
2 Loosen six screws with Allen wrench until transition can rotate freely,

Notes

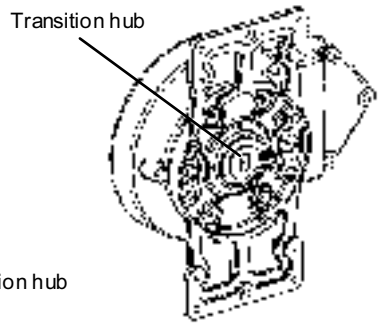
1. Do not remove the screw complete from the screw hole.
2. Because of the screwtight is applied, the strength to loosen screw is necessary.

3 Rotate the transition hub 90 degrees until timing pin locates in timing concavity.





Vertical Polarized Application



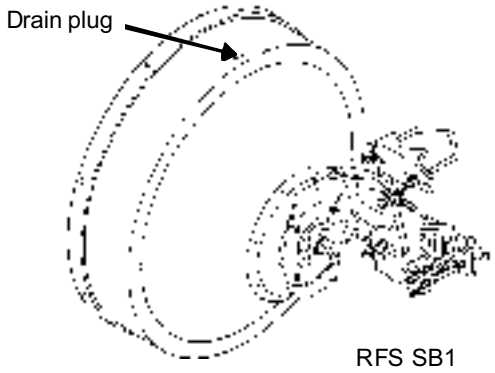
Horizontally Polarized Application

Tighten six screws when transition hub is located. (Tightening torque is 5.0 N·m ±10%.)

(3) ODU Direct Mounting Type Antenna (RFS Example)

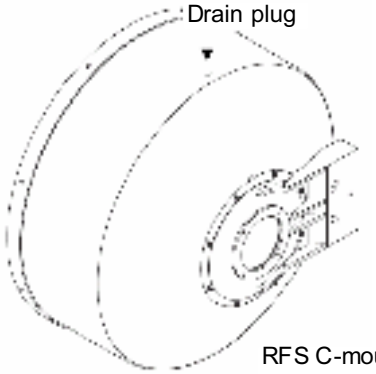
Notes

1. The details are referred to the installation manual which is attached to the antenna. The installation or removal of the antenna requires qualified experienced personnel.
2. The antenna is set to V-polarization when shipped from the factory.



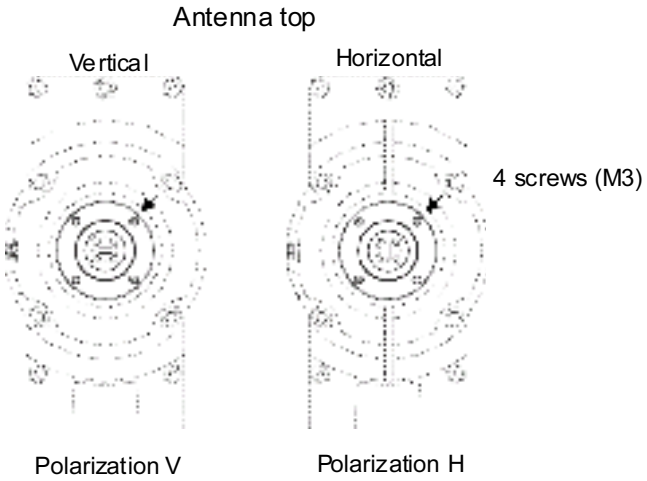
RFS SB1

1. Unscrew the 4 screws M3 at the refined steel ring,
2. Hold the feed tightly at the waveguide,
3. Rotate carefully the feed 90 degrees,
4. Mount the feed to the refined steel ring and lock the 4 screws M3.



RFS C-mount

1. Loosen the 4 screws M3,
2. Hold the feed tightly at the waveguide,
3. Rotate the casting plate carefully the feed 90 degrees,
4. Lock the 4 screws M3.


Antenna top
Vertical
Horizontal
4 screws (M3)
Polarization V
Polarization H

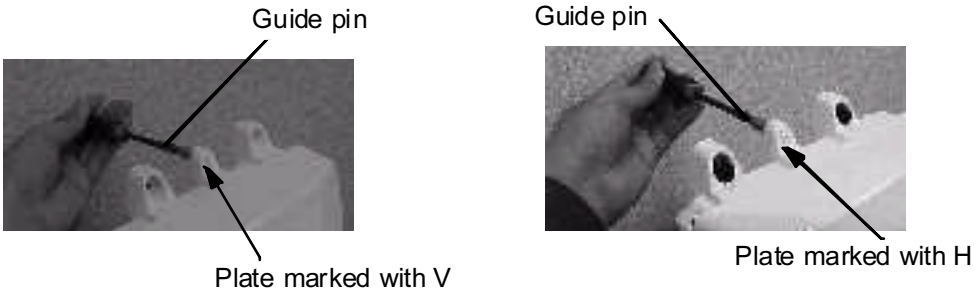
Procedure 5-2 Change of Polarization of ODU

1 When vertical polarization is required, rotate the ODU so as to go up the plate marked with V.

2 When horizontal polarization is required, remove the guide pin fixed on the plate marked with V.

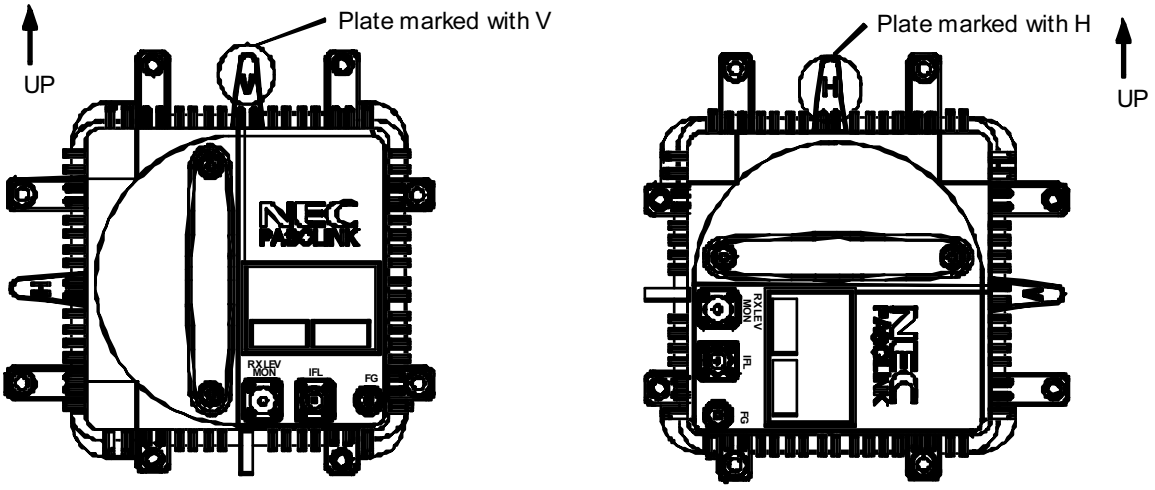
3 Screw in the guide pin removed in step 2 to the screw hole of the plate marked with H.

4 Rotate the ODU so as to go up the plate marked with H.



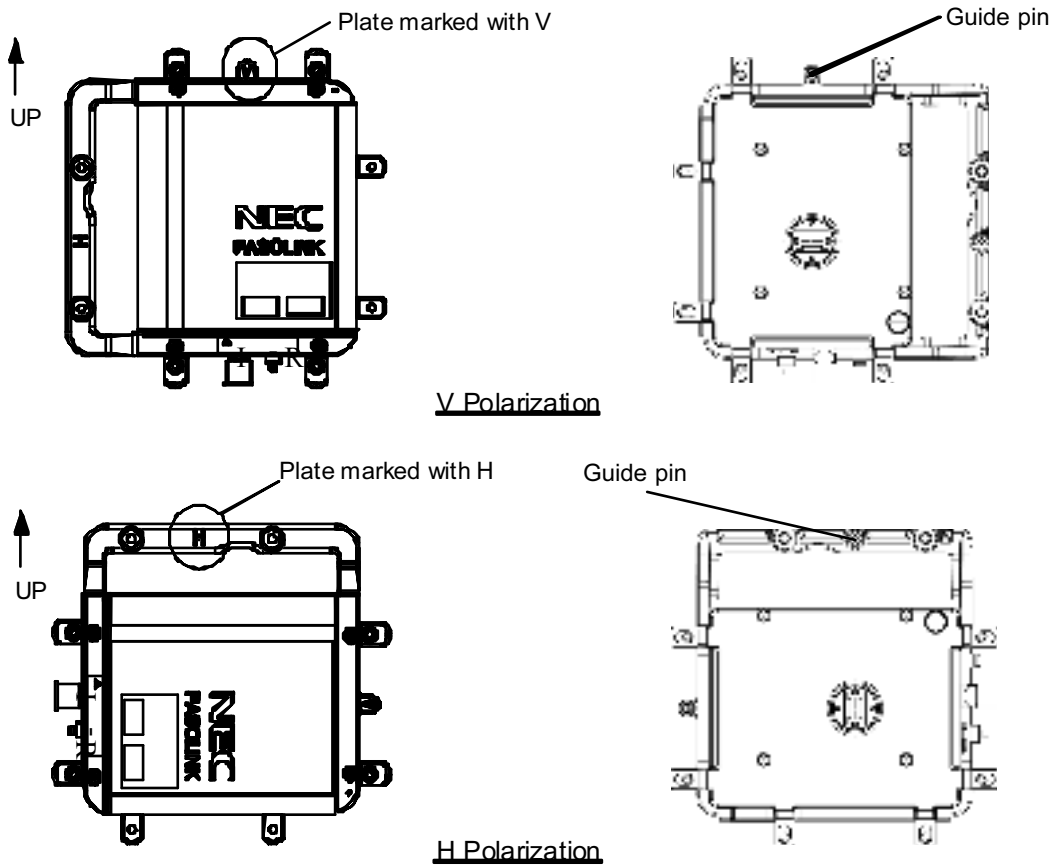
Notes

1. When the ODU is mounted on the NEC Hybrid/Coupler, only V polarization is applied.
2. When the waveguide or coaxial cable is connected between the ODU and antenna, the ODU in V polarization for up position is recommended for installation.



V Polarization H Polarization

6-11 GHz ODU
V/H Polarization Conversion



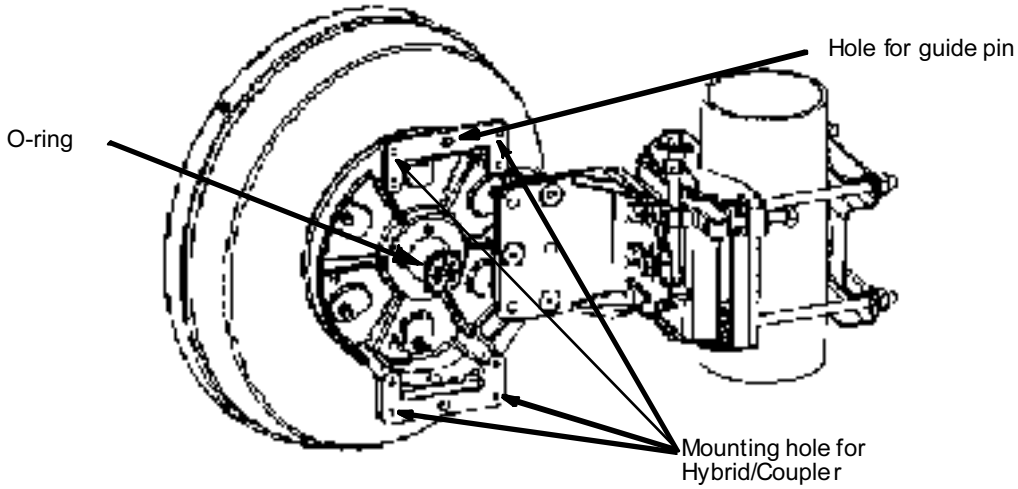
13-38 GHz ODU
V/H Polarization Conversion

5.1.2 With Hybrid/Coupler

This section explains the antenna direct mounting type ODU installation with Hybrid/Coupler.

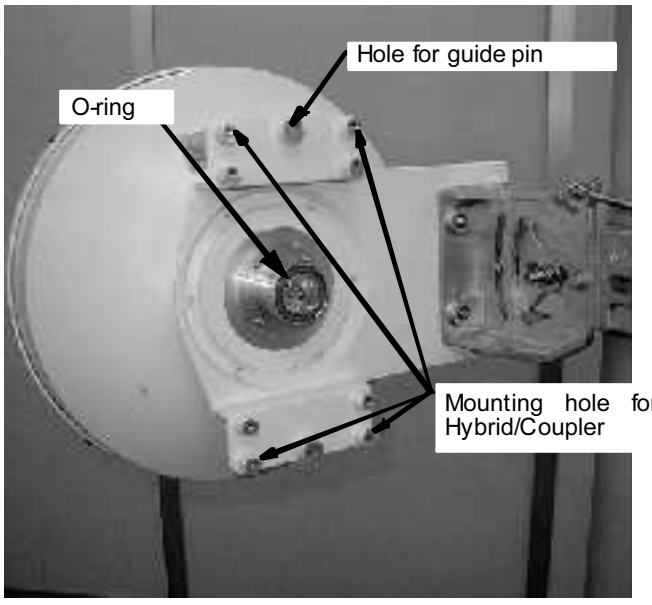
Mounting

Note The details are referred to the installation manual which is attached to the antenna.

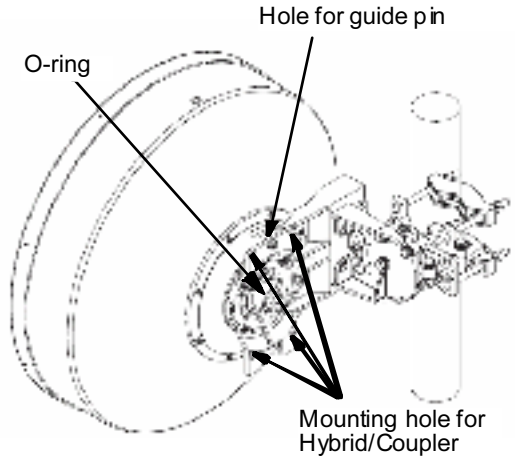


Note The tightening torque is 4.0 N·m ±10%.
Be careful not to damage the O-ring (Antenna).

ANDREW VHLP Type Bracket



RFS SB1 Type Bracket

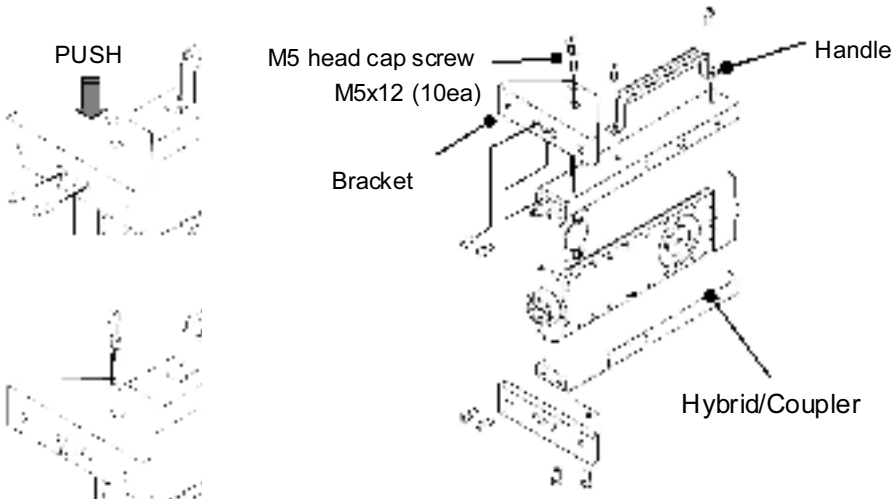


RFS C-mount type bracket

Note The tightening torque is 4.0 N·m ±10%.
Be careful not to damage the O-ring (Antenna).

[A] 10-38 GHz Hybrid/Coupler

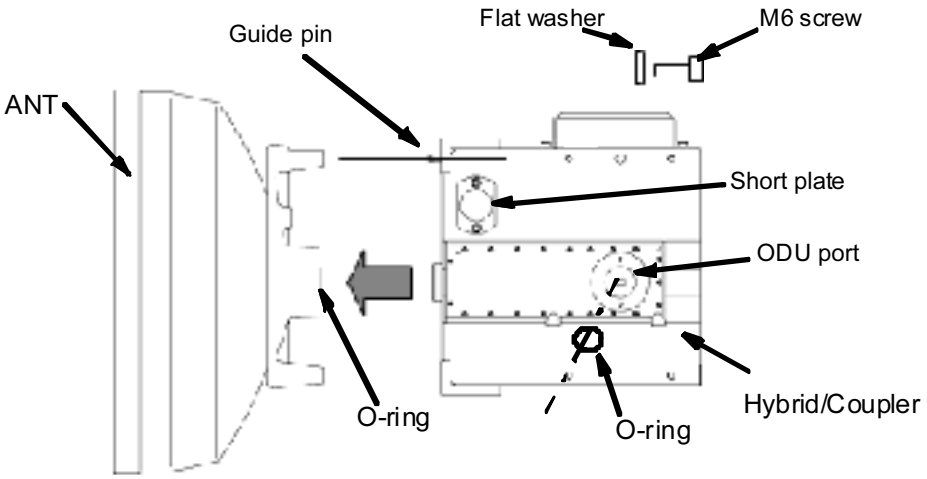
1 Fix the bracket and handle to the Hybrid/Coupler,



Note Tightening torque is 3.0 N·m ±10%.

2 Check the polarization and install the Hybrid/Coupler to the antenna by tightening the M6 screws (four locations),

.



Notes

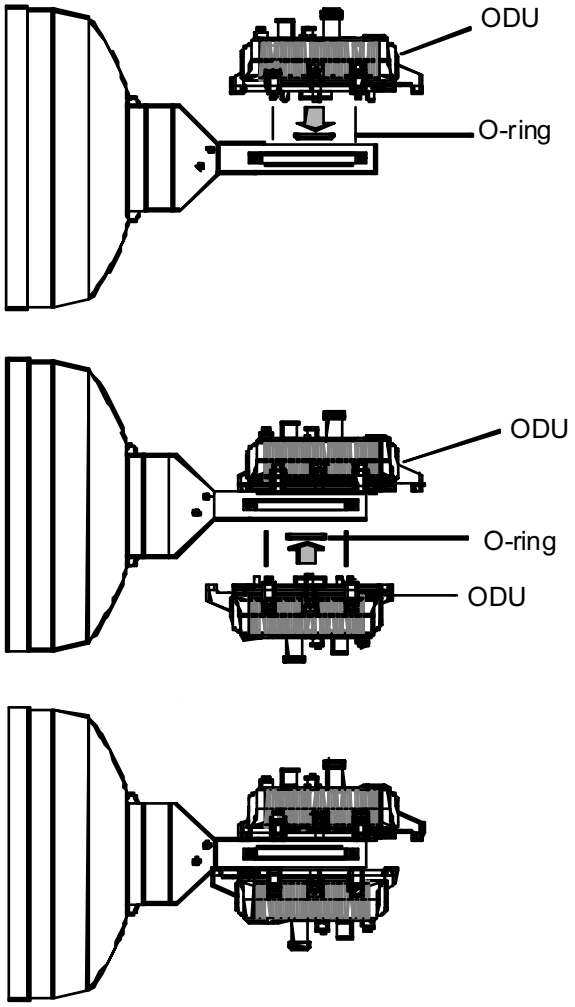
1. Be careful not to damage the O-ring.
2. Tightening torque is 4.0 N·m ±10%.

3 Insert the O-rings to the two ODU ports of the Hybrid/Coupler,

4 Install the two ODUs with hex screws (four locations) using the Allen key wrench.

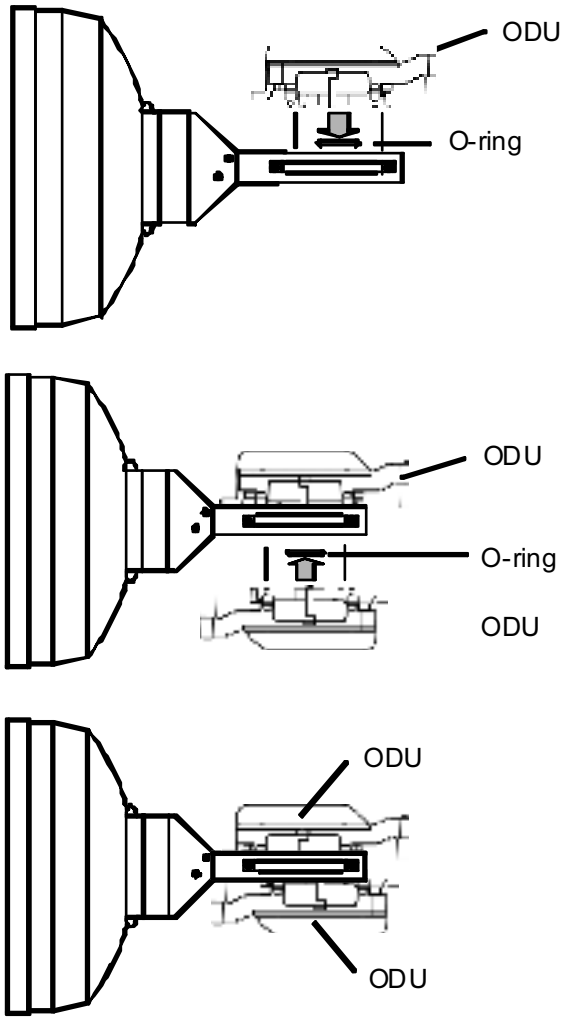
Note Be careful not to damage the O-rings (Hybrid/Coupler).

For 10/11 GHz ODU



Note Tightening torque is 4.0 N·m ±10%.

For 26-38 GHz ODU



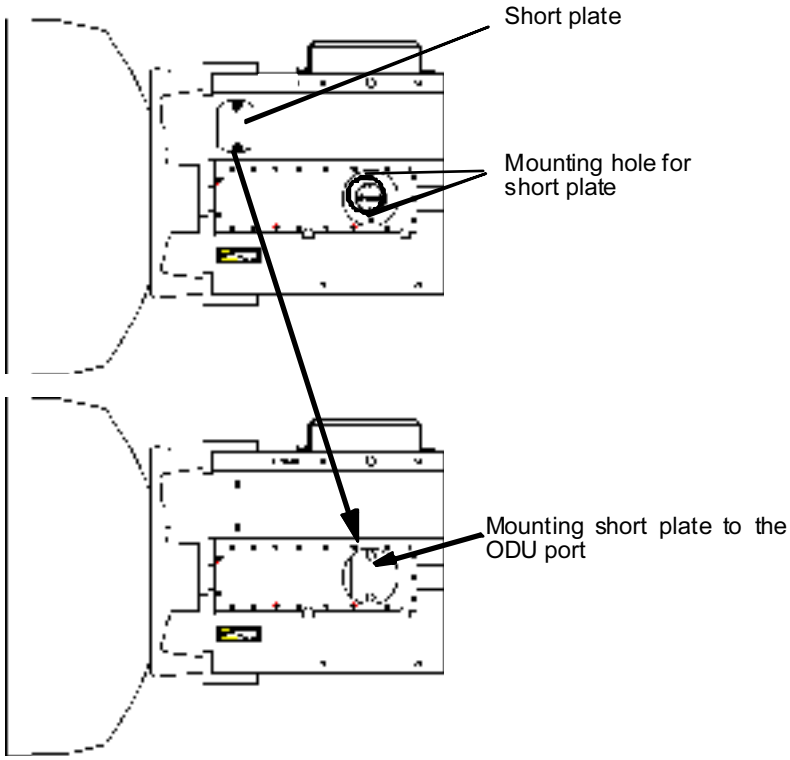
Note Tightening torque is 4.0 N·m ±10%.

Demounting from Hybrid/Coupler

1 Loosen the four (or six) bolts fixed the ODU,

2 Then demount the ODU.

Note When demounting the ODU from Hybrid/Coupler, mount the attached SHORT PLATE to the demounted port of the Hybrid/Coupler to avoid RF power leaking from the hybrid/coupler and for waterproofing.



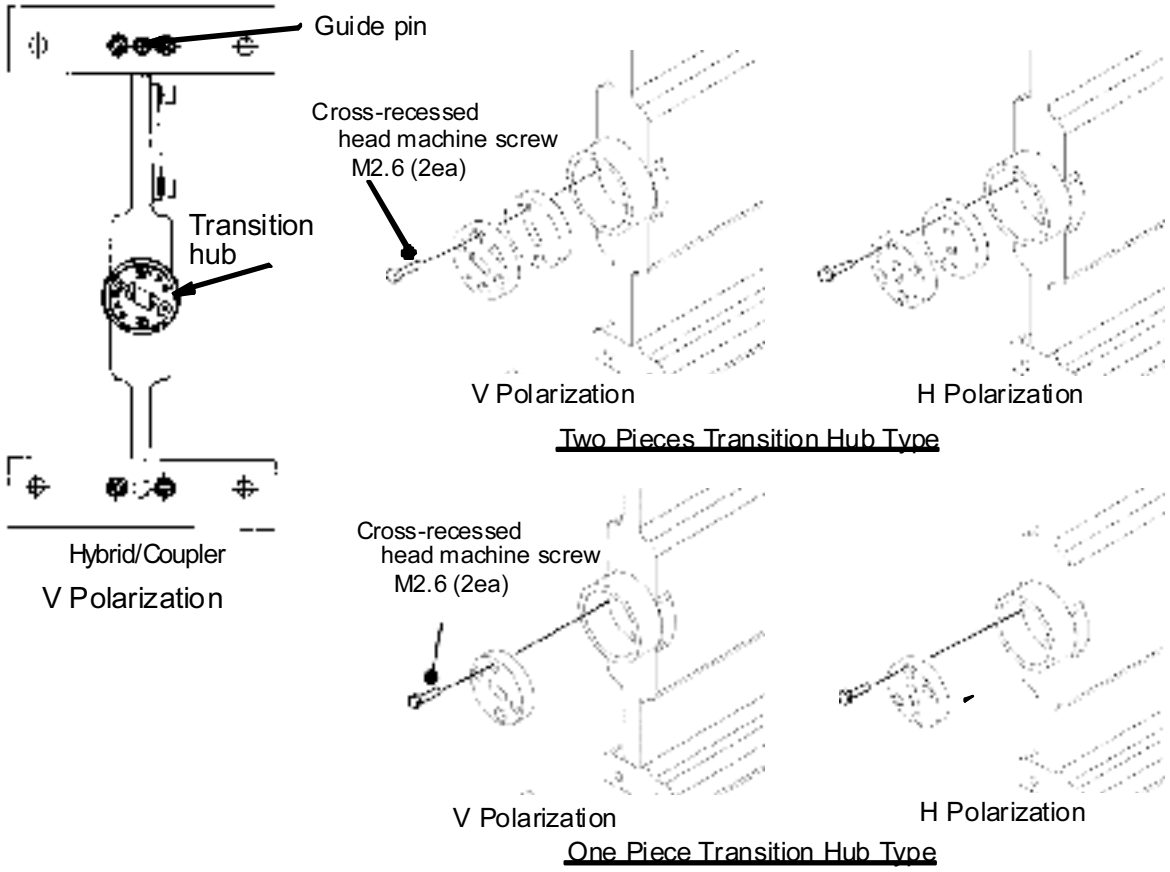
Note Tightening torque is 3.0 N·m ±10%.

Change of Polarization of Hybrid/Coupler

Note The hybrid/coupler is set to V-polarization when shipped from the factory.

1 If you change the polarization from V to H, loosen two screws, rotate the transition hub and put it to the Hybrid/Coupler,

Note There are two types Hybrid/Coupler. One uses two pieces transition hubs and another uses one piece.

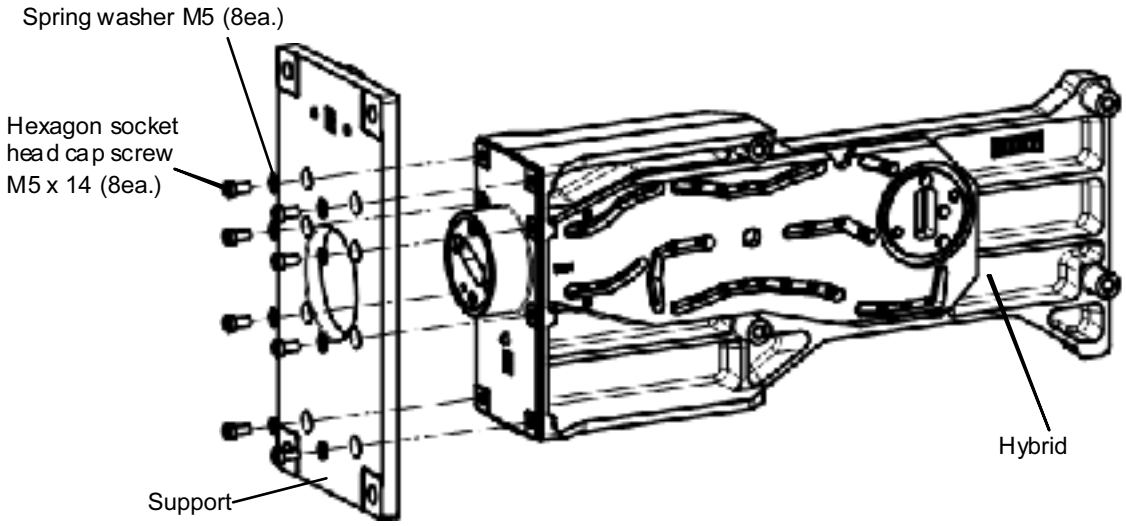


2 Then fix it with the two screws that were loosened in step 1.

[B] 7/8 GHz Hybrid

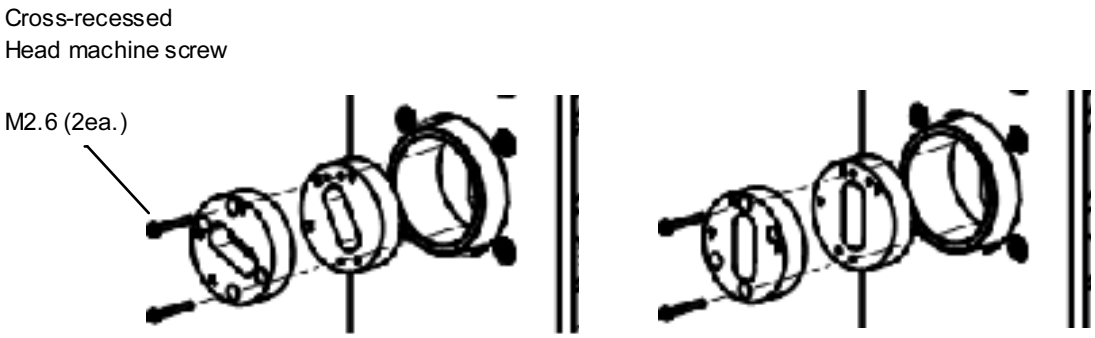
This Hybrid/coupler is designed to be attached to 0.6 to 1.8 m antennas with interface for direct mounting of ODU.

1 Hybrid assembly



Note Tightening torque is 3.0 N·m ±10%.

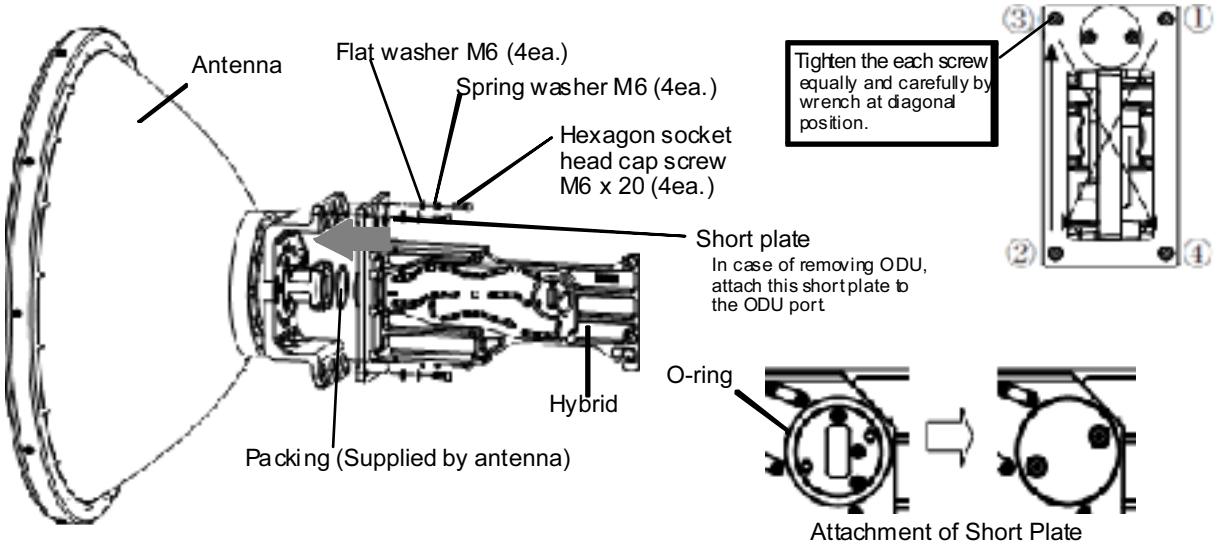
2 Polarization coarse alignment



V Polarization
(Shipment condition)

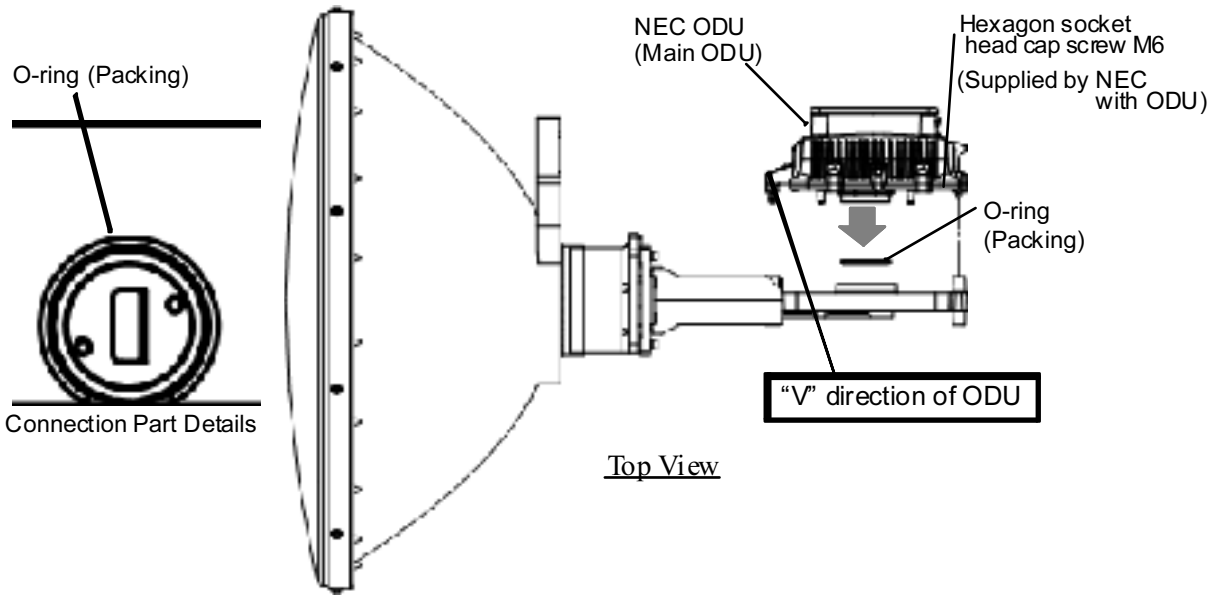
H Polarization

3 Installation to antenna



Note Tightening torque is 4.0 N·m ±10%.

4 Attachment of main ODU



Note Tightening torque is 4.0 N·m ±10%.

5 Attachment of standby ODU

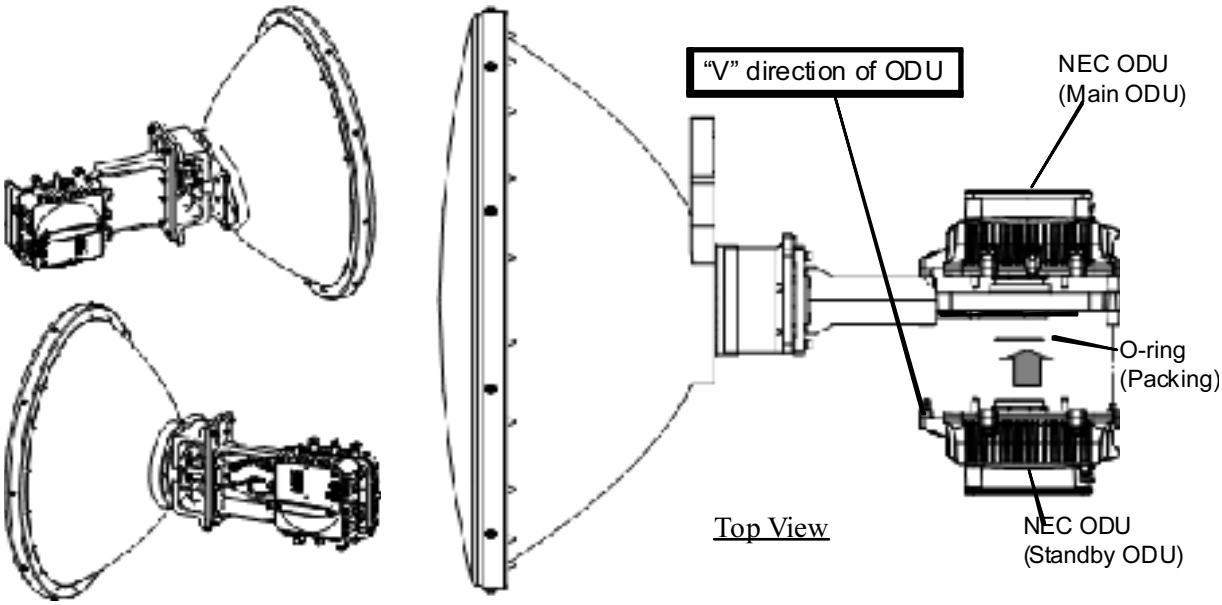


Table 5-2 Hybrid Parts List

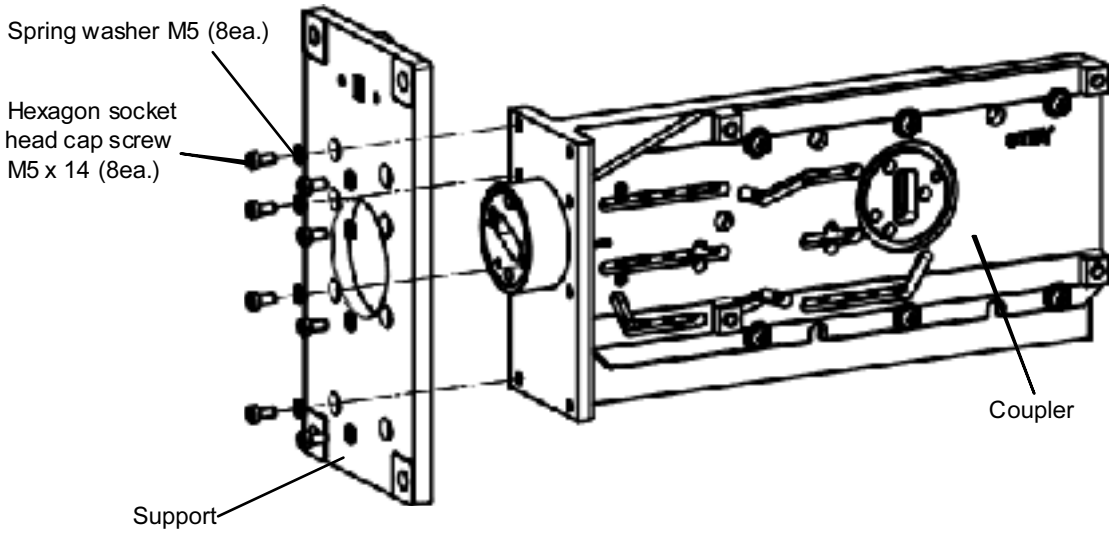
No.	Parts Name	Q'ty
1	Hybrid	1
2	Support	1
3	O-ring	2
4	M5 x 14 Hexagon Socket Head Cap Screw (SS)	8
5	M5 Spring Washer (SS)	8
6	M6 x 20 Hexagon Socket Head Cap Screw (SS)	4
7	M6 Flat Washer (SS)	4
8	M6 Spring Washer (SS)	4

SS: Stainless steel

[C] 7/8 GHz Coupler

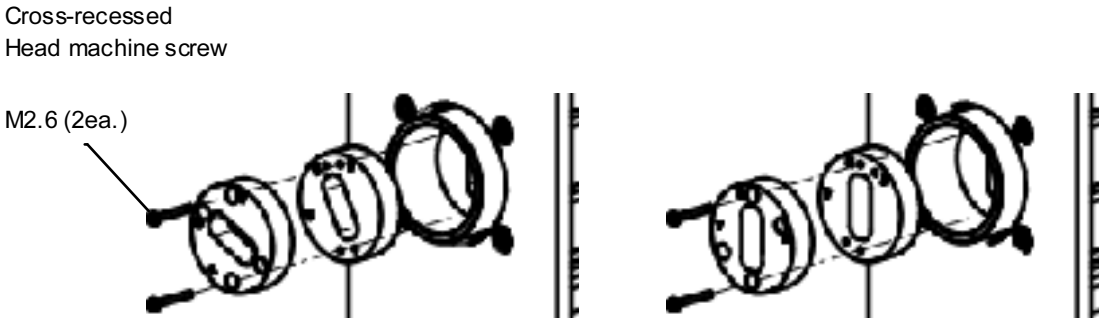
This Hybrid/coupler is designed to be attached to 0.6 to 1.8 m antennas with interface for direct mounting of ODU.

1 Coupler assembly,



Note Tightening torque is 3.0 N·m ±10%.

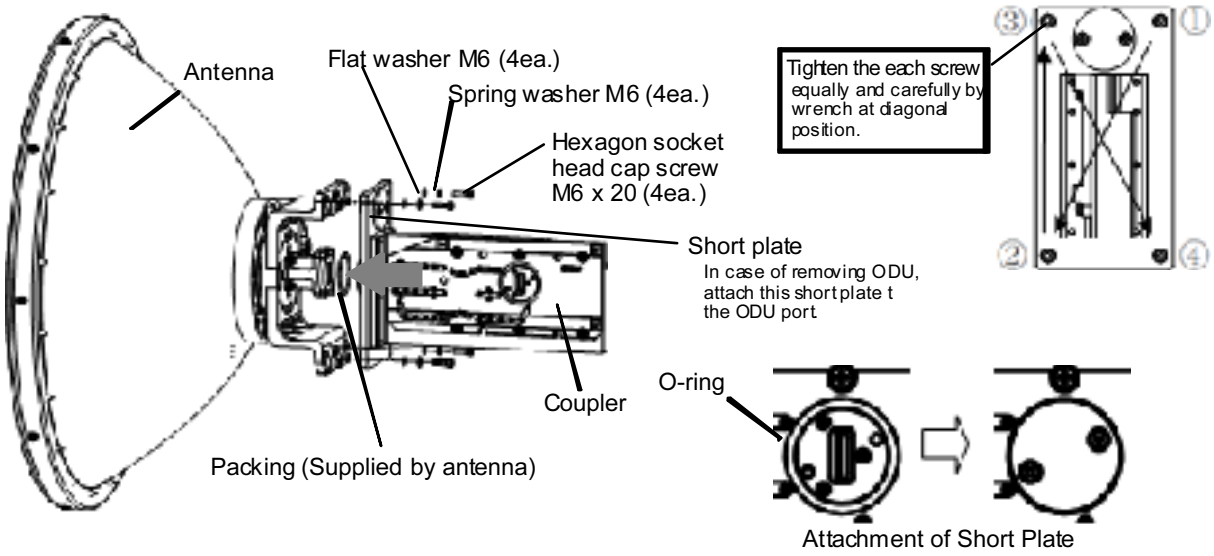
2 Polarization coarse alignment



V Polarization
(Shipment condition)

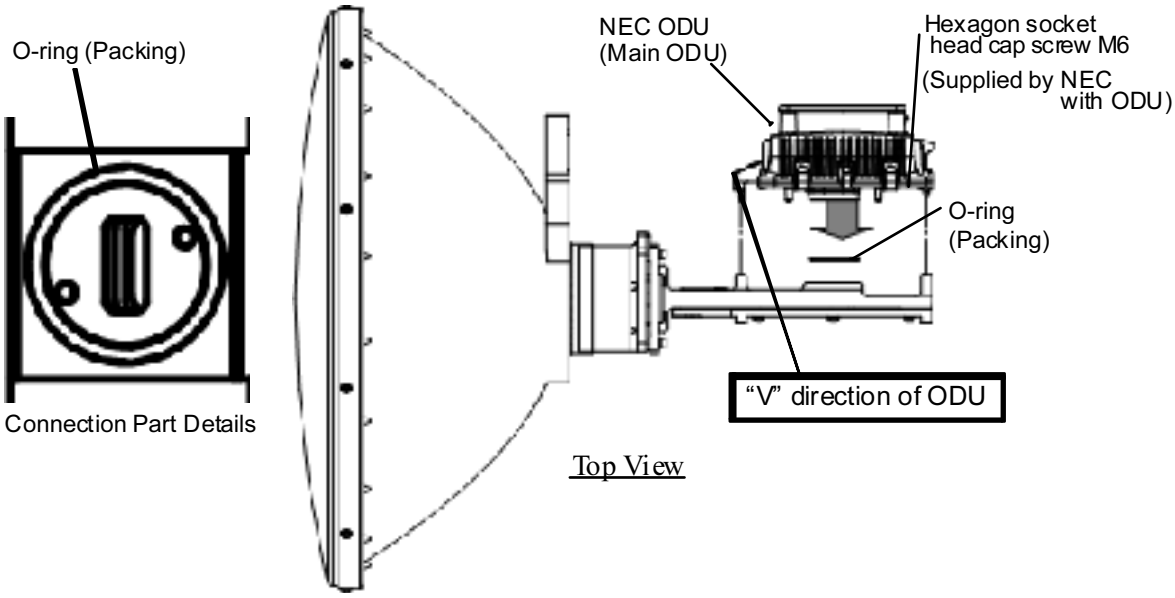
H Polarization

3 Installation to antenna



Note Tightening torque is 4.0 N·m ±10%.

4 Attachment of main ODU



Note Tightening torque is 4.0 N·m ±10%.

5 Attachment of standby ODU

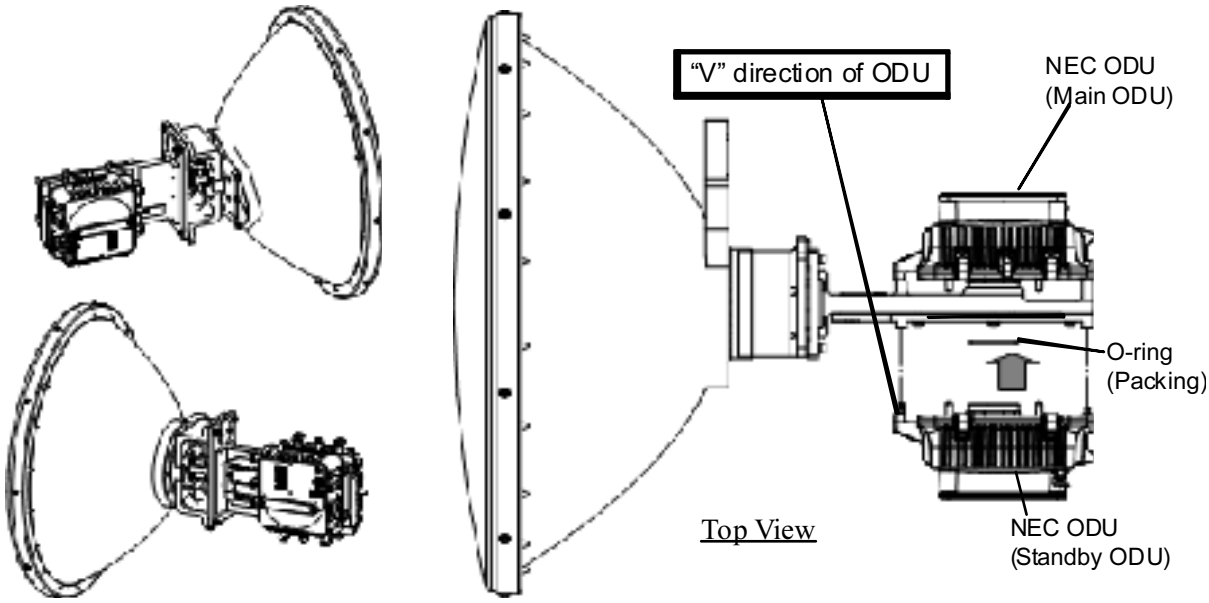


Table 5-3 Coupler Parts List

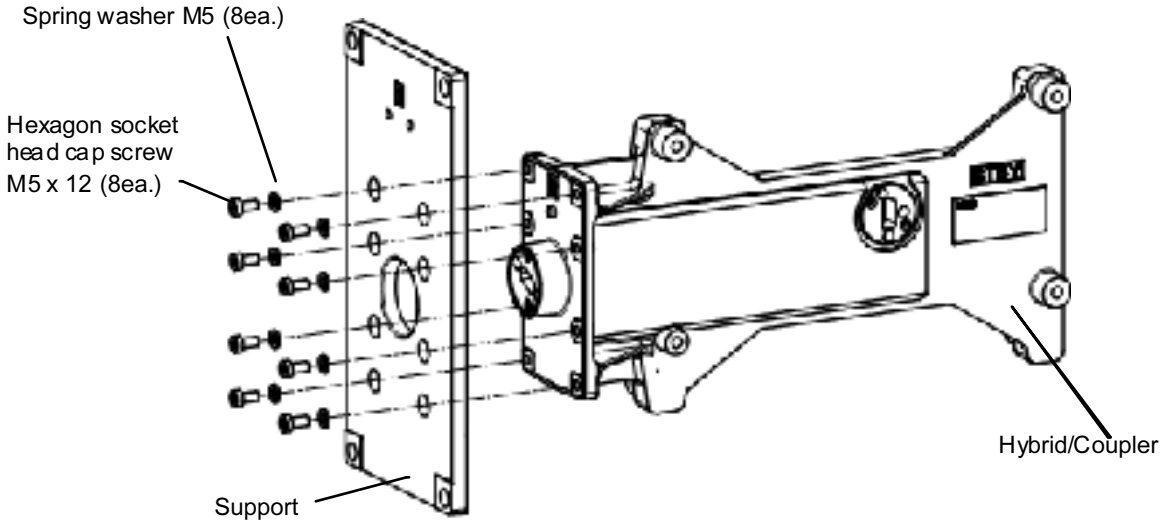
No.	Parts Name	Q'ty
1	Coupler	1
2	Support	1
3	O-ring	2
4	M5 x 14 Hexagon Socket Head Cap Screw (SS)	8
5	M5 Spring Washer (SS)	8
6	M6 x 20 Hexagon Socket Head Cap Screw (SS)	4
7	M6 Flat Washer (SS)	4
8	M6 Spring Washer (SS)	4

SS: Stainless steel

[D] 13/15 GHz Hybrid, 15 GHz Coupler

This Hybrid/coupler is designed to be attached to 0.2 to 1.8 m antennas with interface for direct mounting of ODU.

1 Hybrid/Coupler assembly

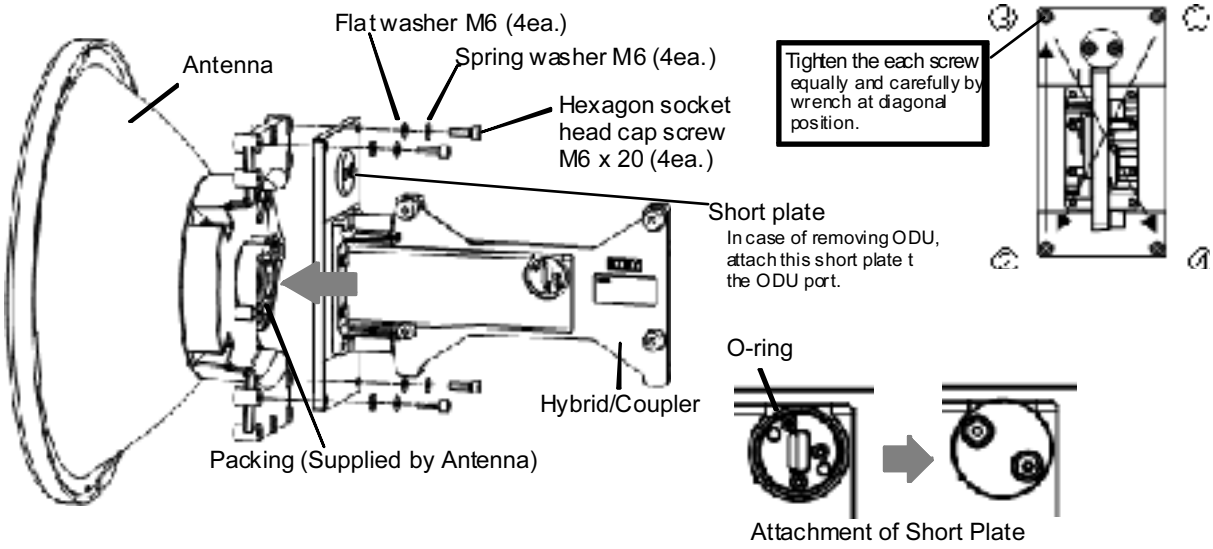


Note Tightening torque is 3.0 N·m ±10%.

2 Polarization coarse alignment

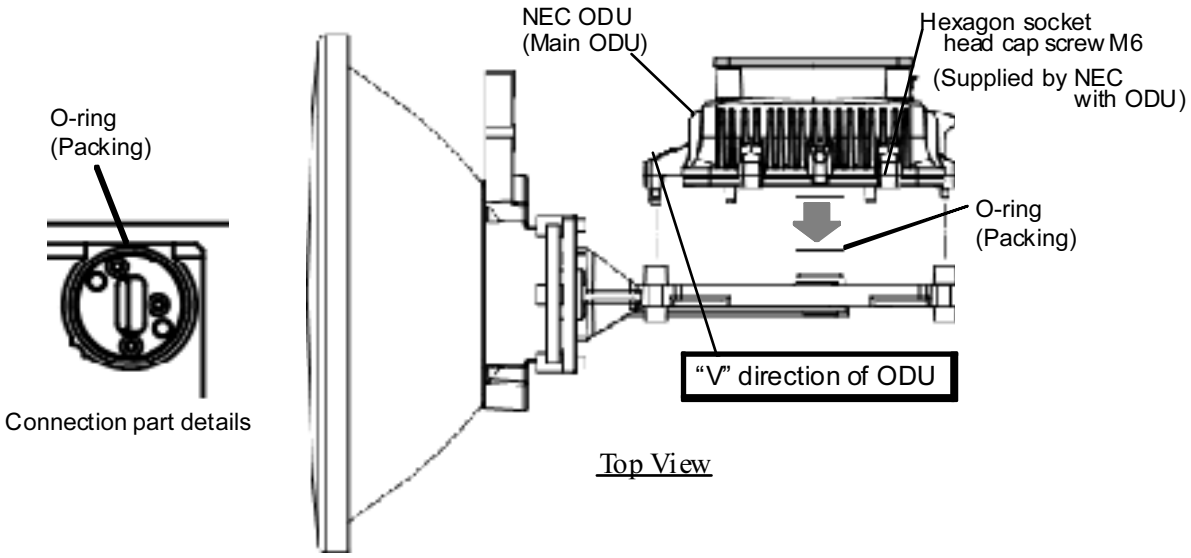
V Polarization H Polarization

3 Installation to antenna



Note Tightening torque is 4.0 N·m ±10%.

4 Attachment of main ODU



Note Tightening torque is 4.0 N·m ±10%.

5 Attachment of standby ODU

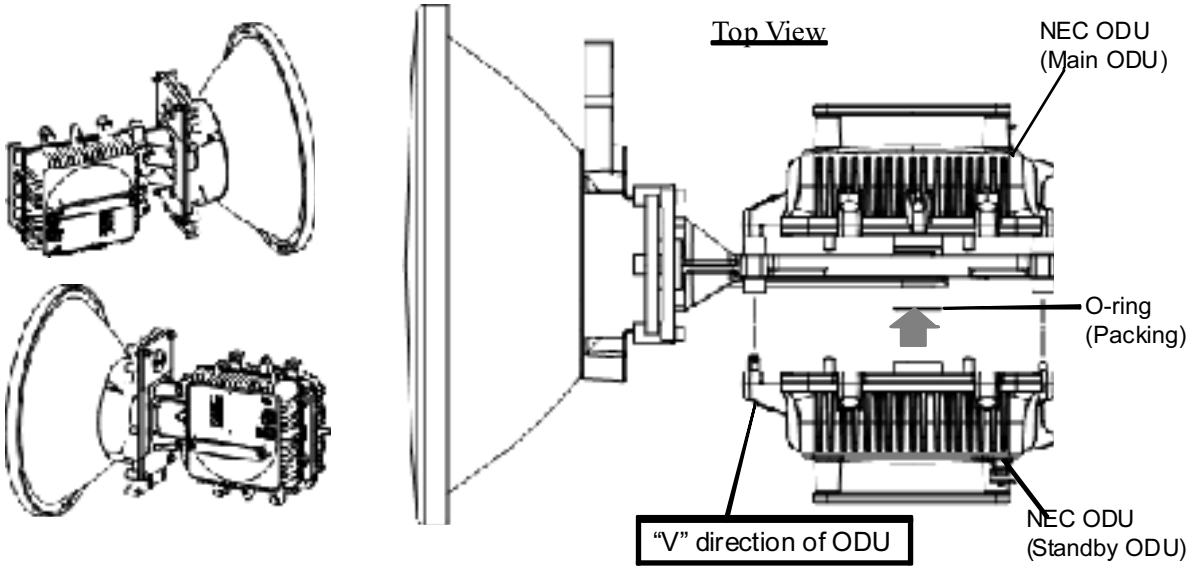


Table 5-4 Hybrid/Coupler Parts List

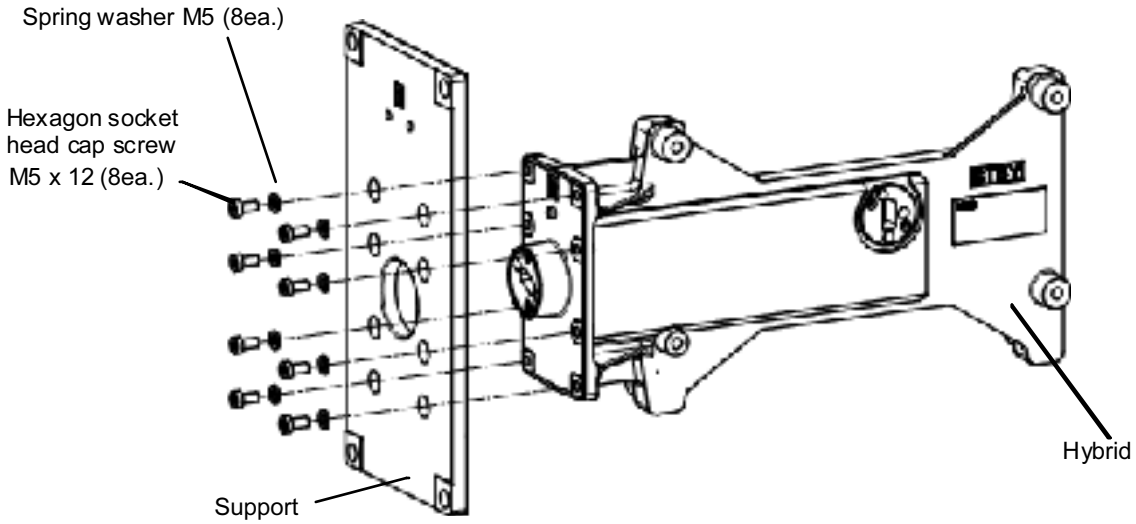
No.	Parts Name	Q'ty
1	Hybrid/Coupler	1
2	Support	1
3	O-ring	2
4	M5 x 12 Hexagon Socket Head Cap Screw (SS)	8
5	M5 Spring Washer (SS)	8
6	M6 x 20 Hexagon Socket Head Cap Screw (SS)	4
7	M6 Flat Washer (SS)	4
8	M6 Spring Washer (SS)	4

SS: Stainless steel

[E] 18/23 GHz Hybrid

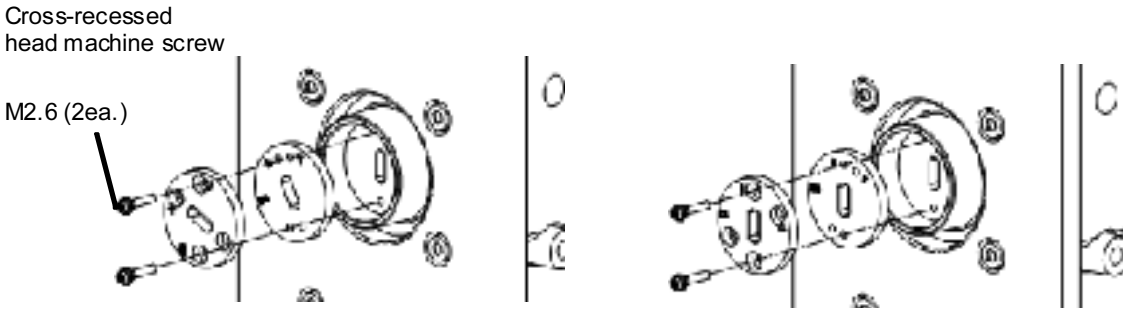
This Hybrid is designed to be attached to 0.2 to 1.8 m antennas with interface for direct mounting of ODU.

1 Hybrid assembly



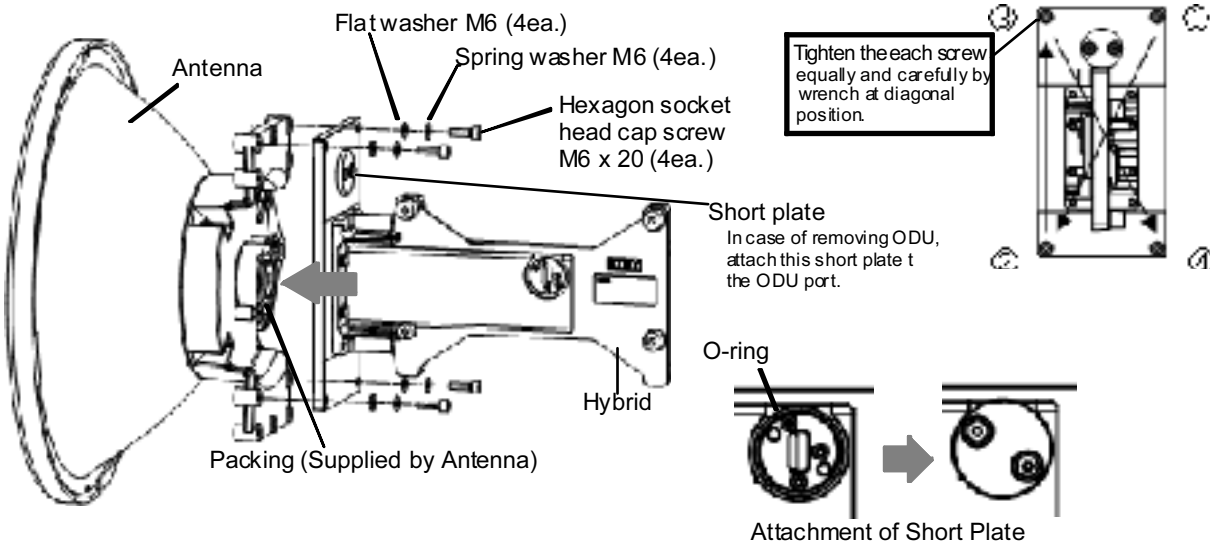
Note Tightening torque is 3.0 N·m ±10%

2 Polarization coarse alignment



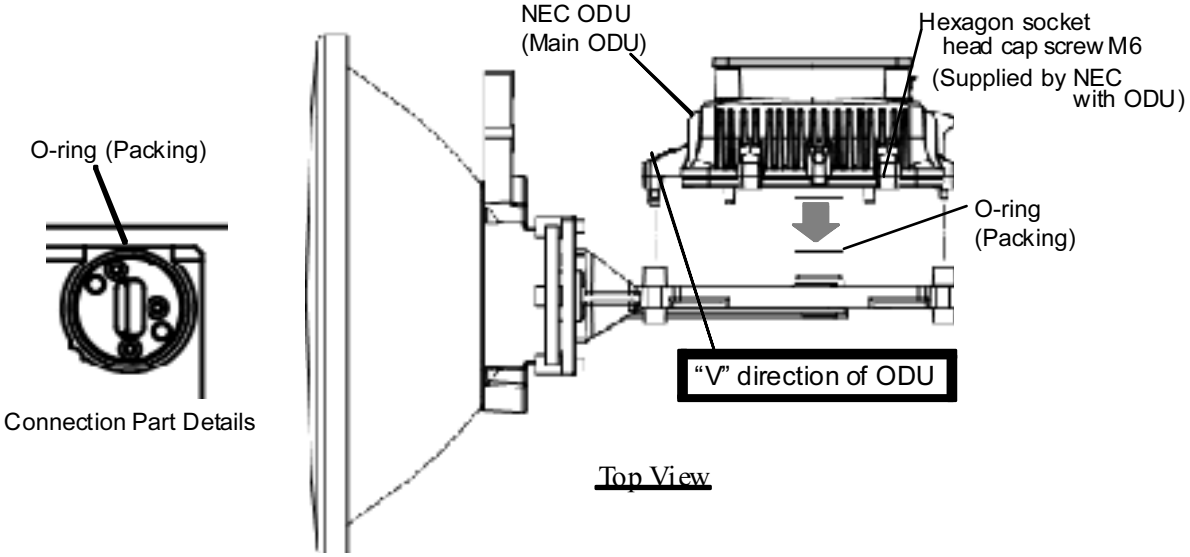
V Polarization H Polarization

3 Installation to antenna



Note Tightening torque is 4.0 N·m ±10%.

4 Attachment of main ODU



Note Tightening torque is 4.0 N·m ±10%.

5 Attachment of standby ODU

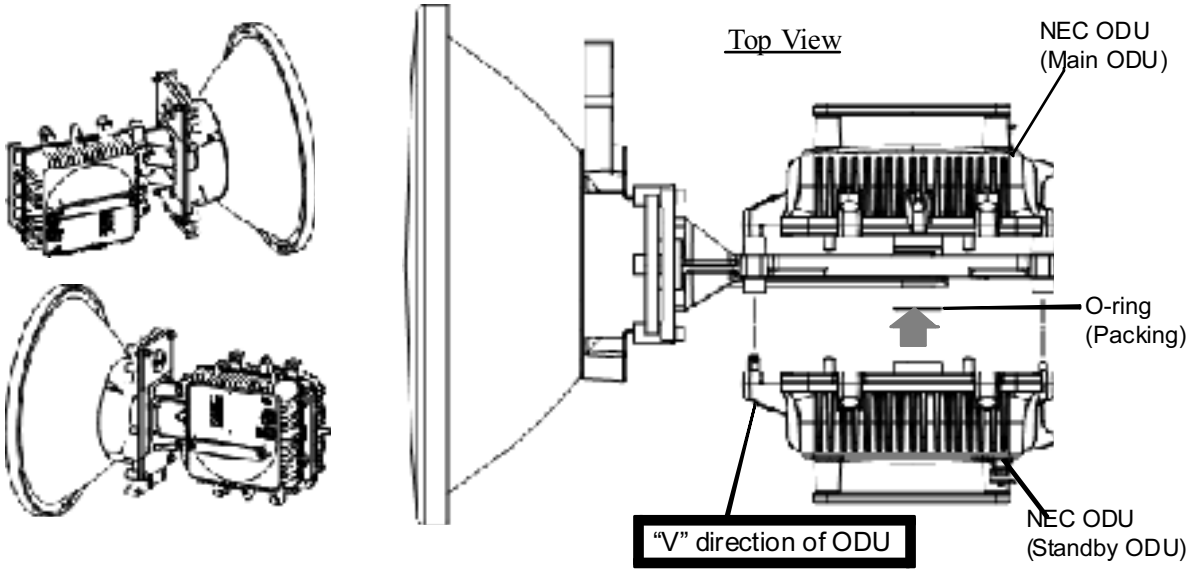


Table 5-5 Hybrid Parts List

No.	Parts Name	Q'ty
1	Hybrid	1
2	Support	1
3	O-ring	2
4	M5 x 12 Hexagon Socket Head Cap Screw (SS)	8
5	M5 Spring Washer (SS)	8
6	M6 x 20 Hexagon Socket Head Cap Screw (SS)	4
7	M6 Flat Washer (SS)	4
8	M6 Spring Washer (SS)	4

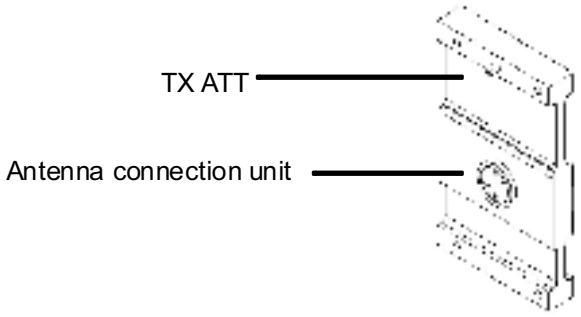
SS: Stainless steel

5.1.3 With TX Span Attenuator

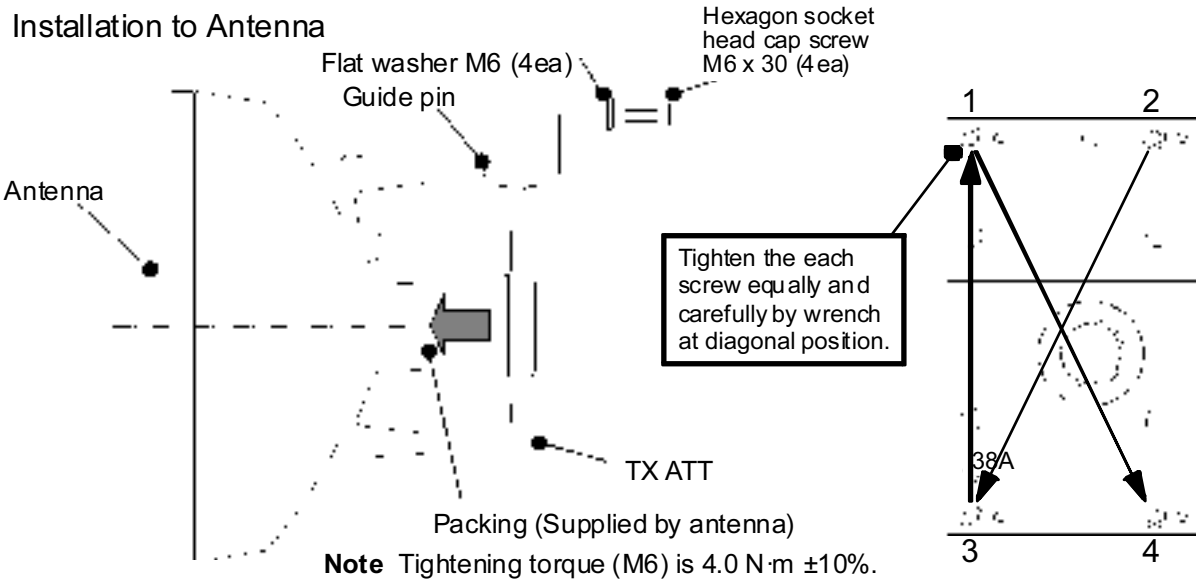
This section explains the antenna direct mounting type ODU installation with TX Span Attenuator (TX SPAN ATT).

Mounting

1 Check the polarization of the antenna connection unit of the TX ATT (Refer to "Change of Polarization of TX ATT" to be hereinafter described.),



2 Fix the TX ATT to the antenna by tightening the M6 screws (four locations),



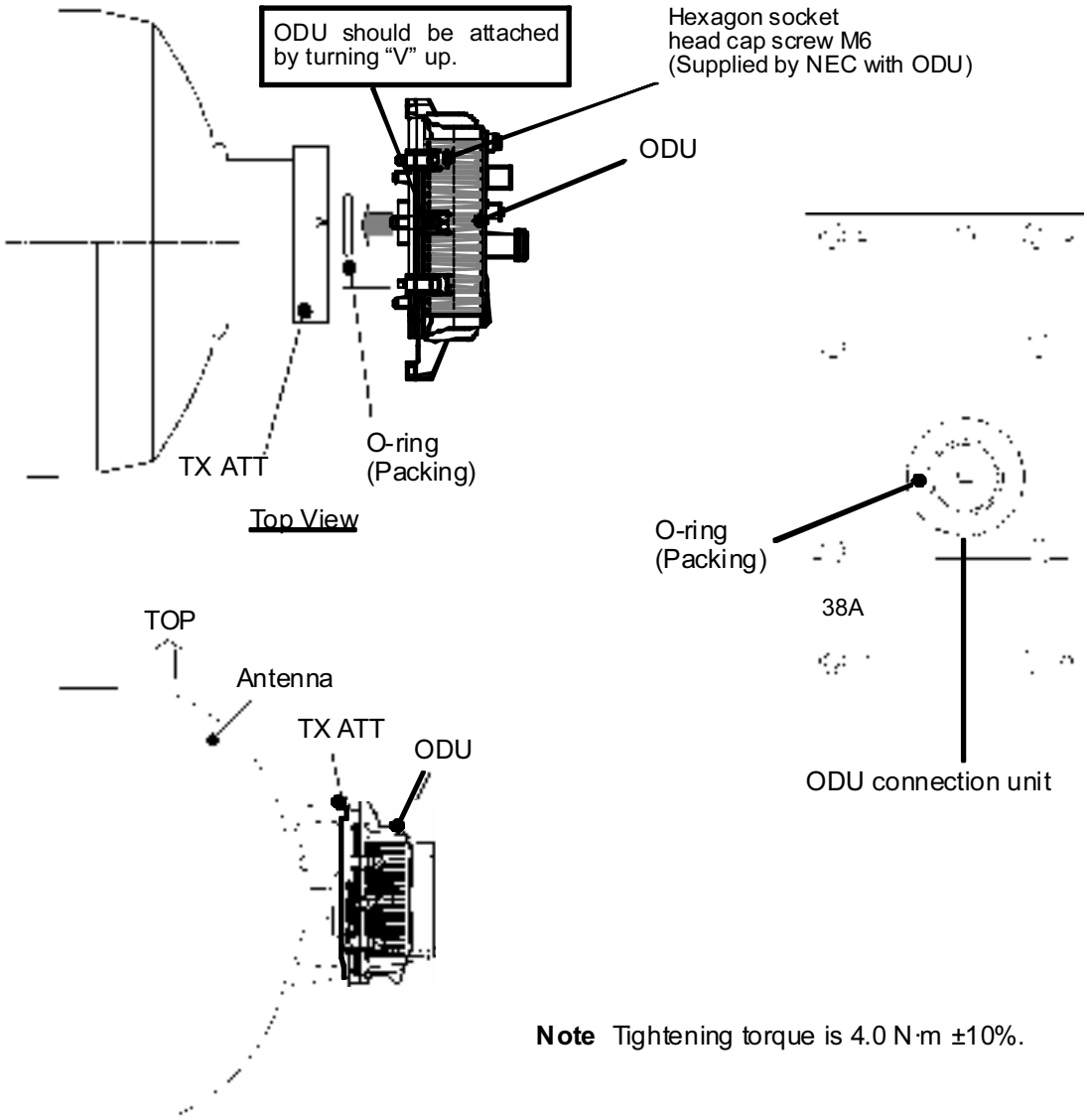
32/38 GHz Band ODU Mounting with TX SPAN ATT (1/2)

3 Insert the O-rings to port of the ODU,

4 Fix the ODU with hex screws (four locations) using the Allen key wrench.

Note Be careful not to damage the O-rings (TX ATT).

Attachment of ODU



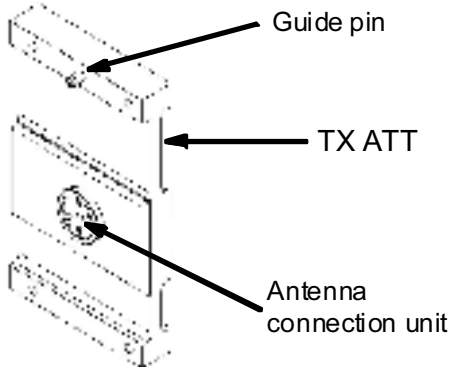
Note Tightening torque is 4.0 N·m ±10%.

32/38 GHz Band ODU Mounting with TX SPAN ATT (2/2)

Change of Polarization of TX SPAN ATT

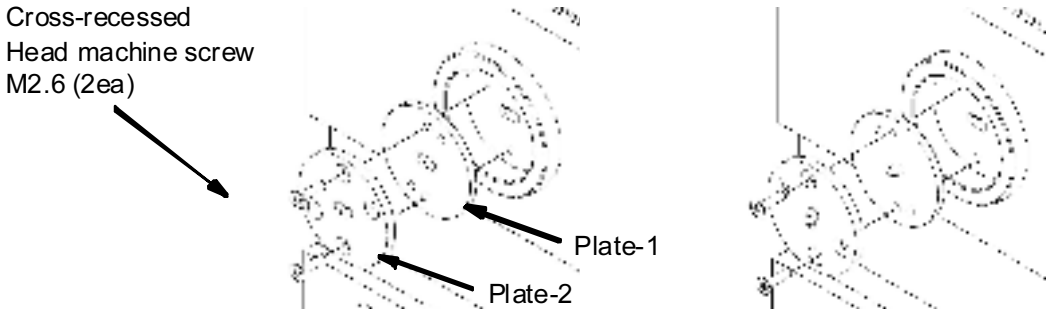
Note The TX ATT is set to V-polarization when shipped from the factory.

1 If you change to H polarization, loosen two screws, rotate the antenna connection unit and put the TX ATT horizontally,



V Polarization

2 Check that aperture of the connection unit is rotated as shown below, then fix it with the two screws that were loosened in step 1.



V Polarization H Polarization

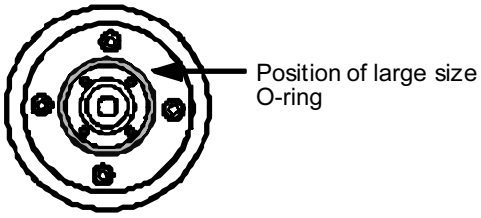
32/38 GHz Band TX SPAN ATT Polarization Change

5.1.4 With Ortho-Mode Transducer

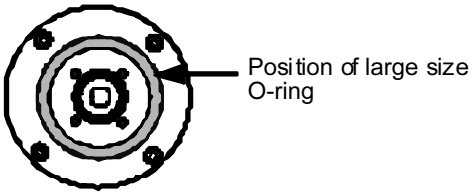
This section explains the antenna direct mounting type ODU installation with Ortho-Mode Transducer (OMT).

There are two types of O-rings for antenna mounting to the OMT depending on the frequency band.

Caution Do not apply silicon grease to O-ring.

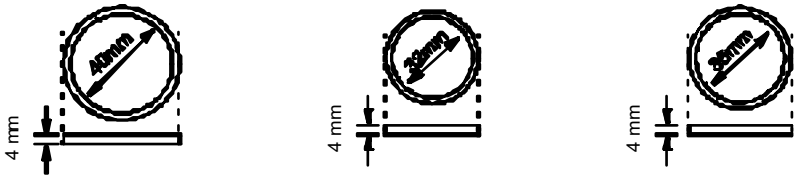


For Antenna Direct Mounting
ANDREW Antenna



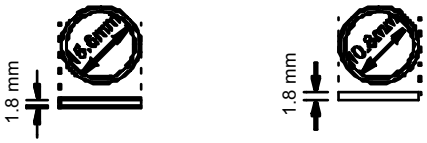
For Antenna Direct Mounting
RFS Antenna

Note O-ring size is different with frequency band as follows:



10-11 GHz Band 13-23 GHz Band 26-38 GHz Band

Large Size O-ring for Antenna Direct Mounting



13-23 GHz Band 38 GHz Band

Small Size O-ring for Waveguide Connection

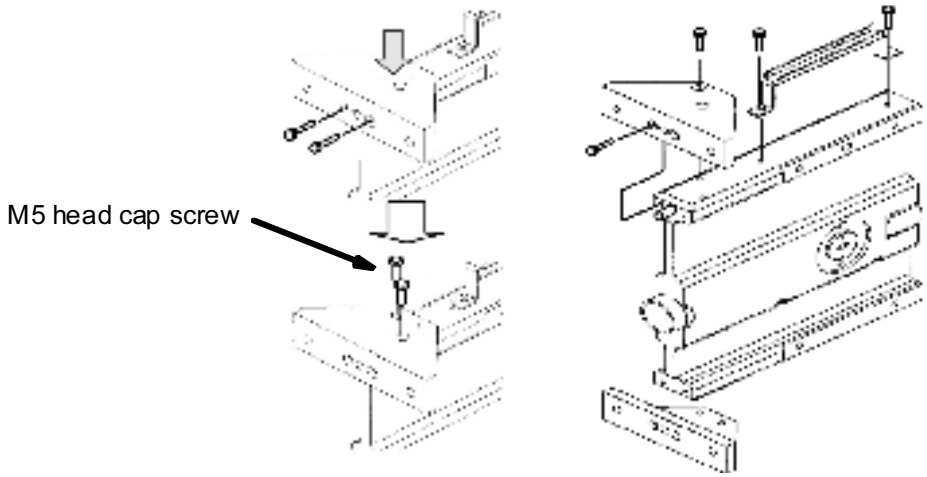
For the antenna direct mounting of the ODU, following OMT is used.

Frequency Band	Frequency Range (GHz)	Interface WG Inner Dia. (mm) (ANT Side)	Interface (ODU Side)
11 G	10.4 – 11.7 GHz	18.0	NEC Original
13 G	12.75 – 13.25 GHz	15.0	
15 G	14.5 – 15.35 GHz	13.5	
18 G	17.7 – 19.7 GHz	10.5	
23 G	21.2 – 23.6 GHz	9.0	
26 G	24.5 – 26.5 GHz	8.0	
28 G	27.5 – 29.5 GHz	7.0	
32 G	31.8 – 33.4 GHz	6.5	
38 G	37 – 39.5 GHz	5.5	

Cautions

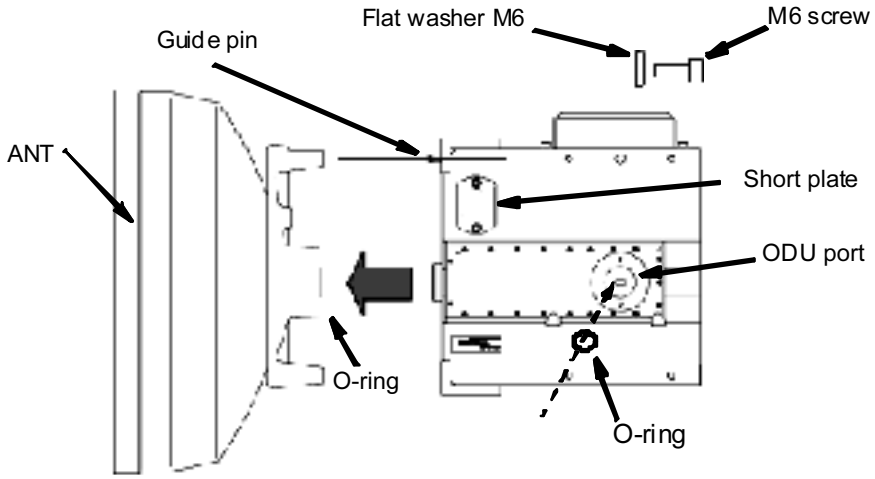
1. **For connecting the OMT to the antenna, the circular type waveguide flange of the antenna is applied to the system. When the V/H flange is mounted to the antenna, it must be changed to a circular type.**
2. **When mounting the ODU to the OMT, confirm the polarization for main master and sub master ODU. The installation of the corresponding ODUs in the opposite station must have the same polarization in order to make into line main master and sub master MODEMs.**

1 Fix the bracket and handle to the OMT,



Note Tightening torque is 3.0 N·m ±10%.

2 Fix the OMT to the antenna by tightening them with M6 screws (four locations),



Notes

1. Be careful not to damage the O-ring.
2. Tightening torque is 4.0 N·m ±10%.

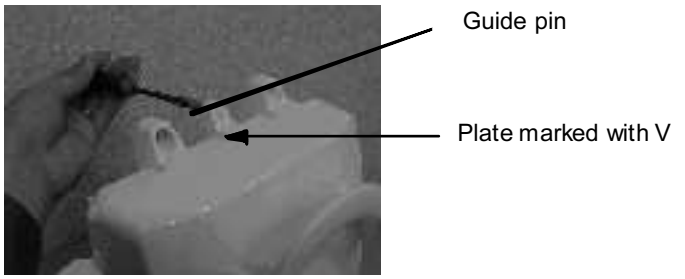
3 Loosen the two screws and move the short plate if it is fixed to the ODU port (see figure in step 9),

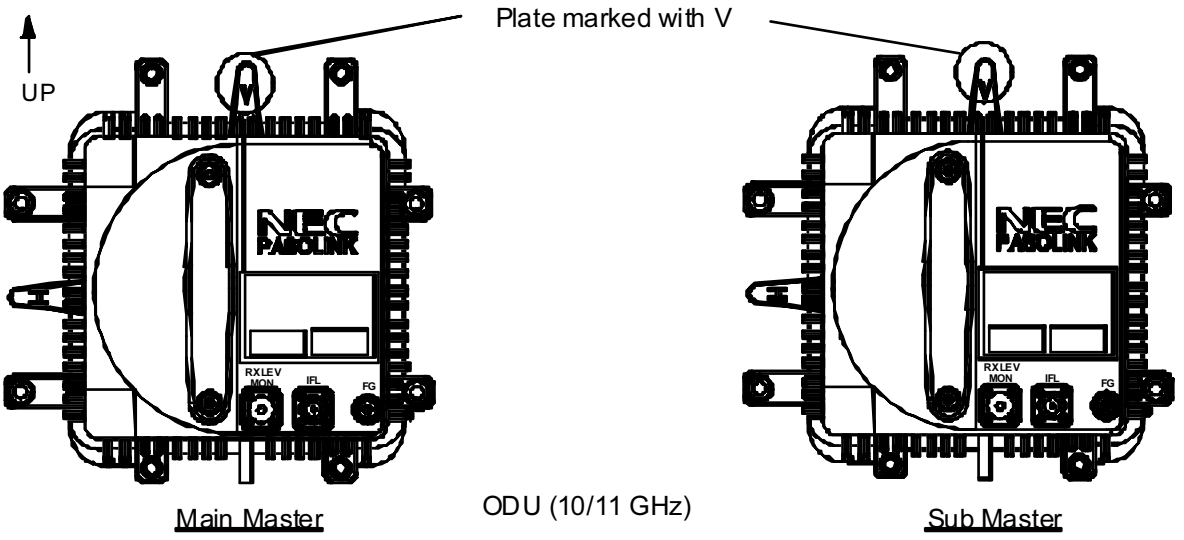
4 Set the two ODUs to vertical polarization for OMT mounting. If the guide pin behind the plate marked H is mounted, remove the guide pin,

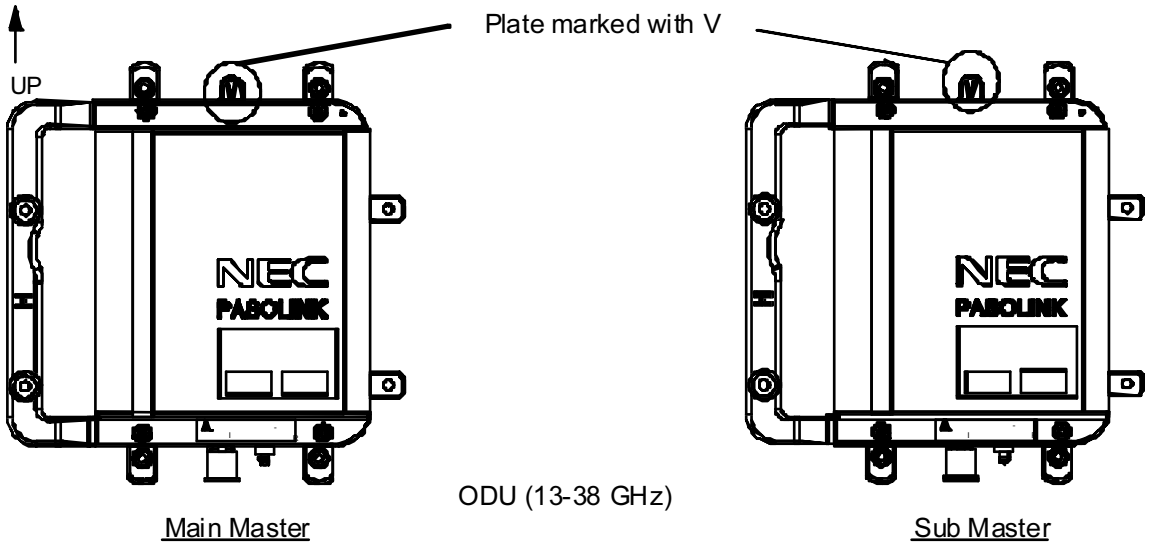
Note The ODU should be attached by turning the plate marked "V" up position for both main master odu and sub master ODU.

5 Insert the guide pin removed in step 4 behind the plate marked V,

Note Remove the protection metallic plate covering the waveguide hole on ODU.

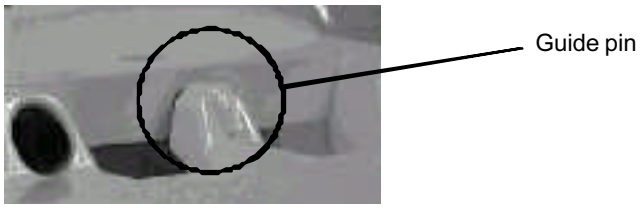






6 Insert the O-rings to the two ODU ports of the OMT (see figure in step 9),

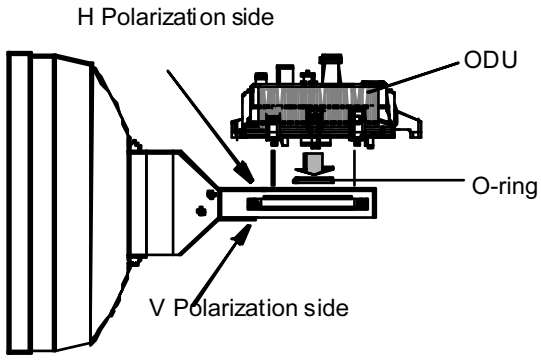
7 Insert the guide pin into the hole of the OMT and set the position of screws,

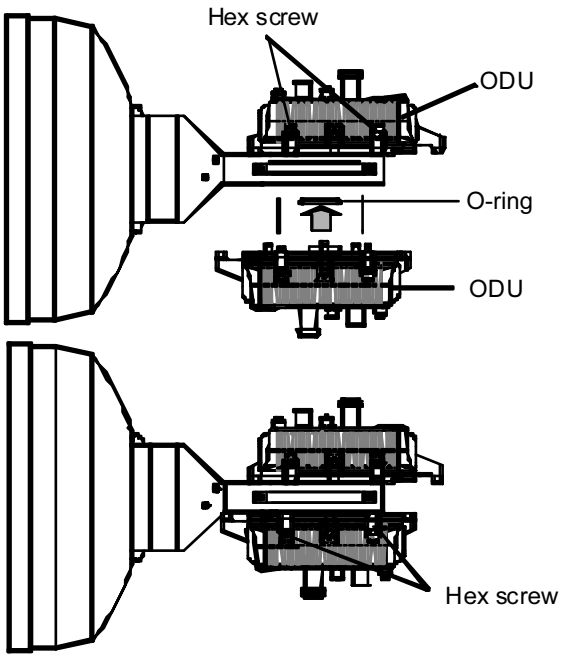


8 Confirm which polarization is applied to the master ODU.
Check the indication of polarization on the upper side of OMT,

9 Fix the two ODUs with hex screws (four locations) using the allen key wrench.

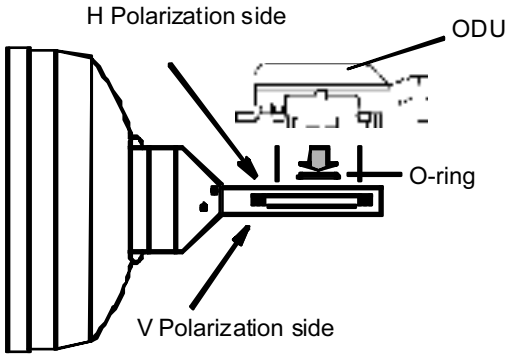
Note Be careful not to damage the O-rings.

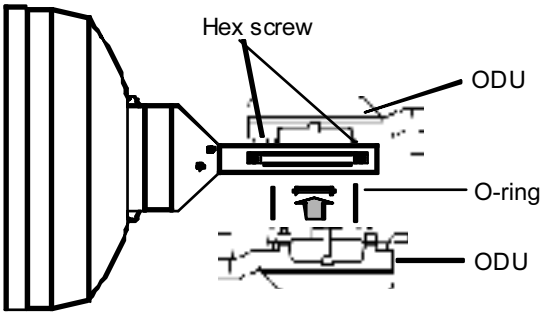


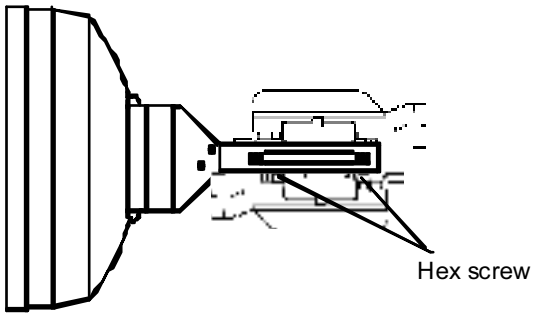


Note Tightening torque is 4.0 N·m ±10%.

ODU (10/11 GHz)





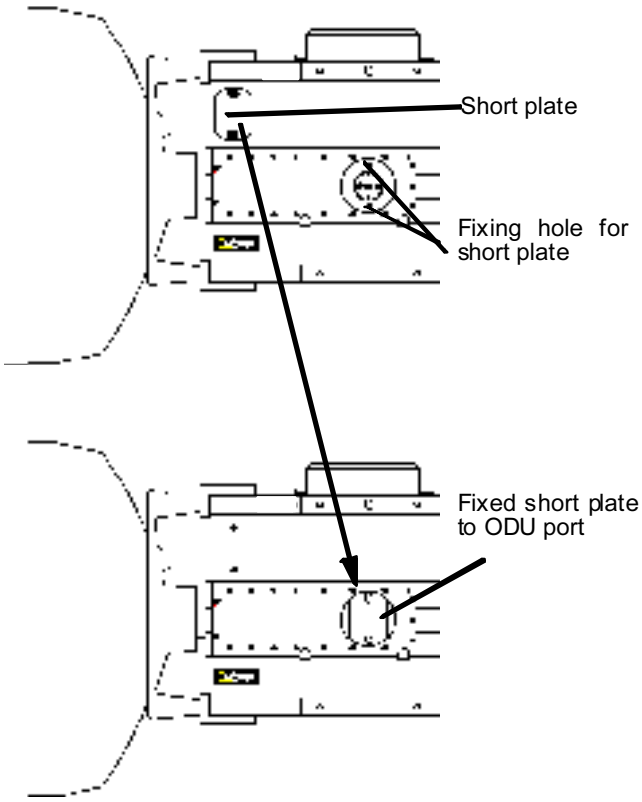


Note Tightening torque is 4.0 N·m ±10%.

ODU (13-38 GHz)

Cautions

1. **Tighten all screws with lighter torque at first, then full torque as specified.**
2. **When either ODU is demounting for ODU replacing or other reasons, fix the attached short plate to the demounted port of the OMT to avoid leaking of RF power from the OMT and for waterproof.**
3. **To avoid occurrence of bit errors due to microphonic properties, when installing the sub master ODU, protect the main master ODU from mechanical knocks.**



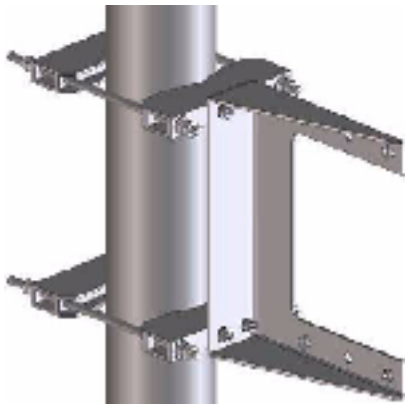
Note Tightening torque is 3.0 N·m ±10%.

5.2 Feeder Connection

5.2.1 For Coaxial Cable Connection

6/7/8GHz ODU MOUNTING BRACKET INSTALLATION

This mounting bracket is designed in order to install 6/7/8 GHz ODU with N-type connector or waveguide interface to a pole. The diameter of the pole is from 48.5 to 114.3 millimeters.



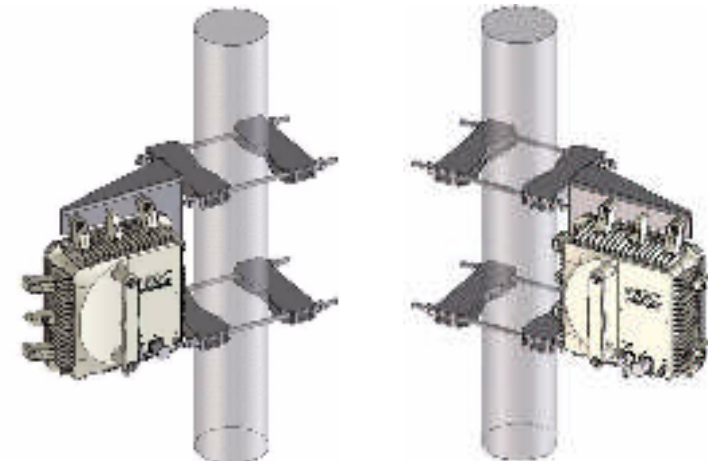
Mounting Bracket

Table 5-6 Mounting Bracket Parts List

Item	Description	Q'ty
1	Bracket	1
2	Holder-1 (with Two M6 Taps)	2
3	Holder-2	2
4	M8 Stud Bolt (SS)	4
5	M8 Hexagon Nut (SS)	20
6	M8 Flat Washer (SS)	8
7	M6×16 Hexagon Socket Head Screw (SS)	4
8	M6 Spring lock Washer (SS)	4
9	M6 Flat Washer (SS)	4
10	Cap	4
11	Band (Cable Clamp)	2

SS: Stainless steel

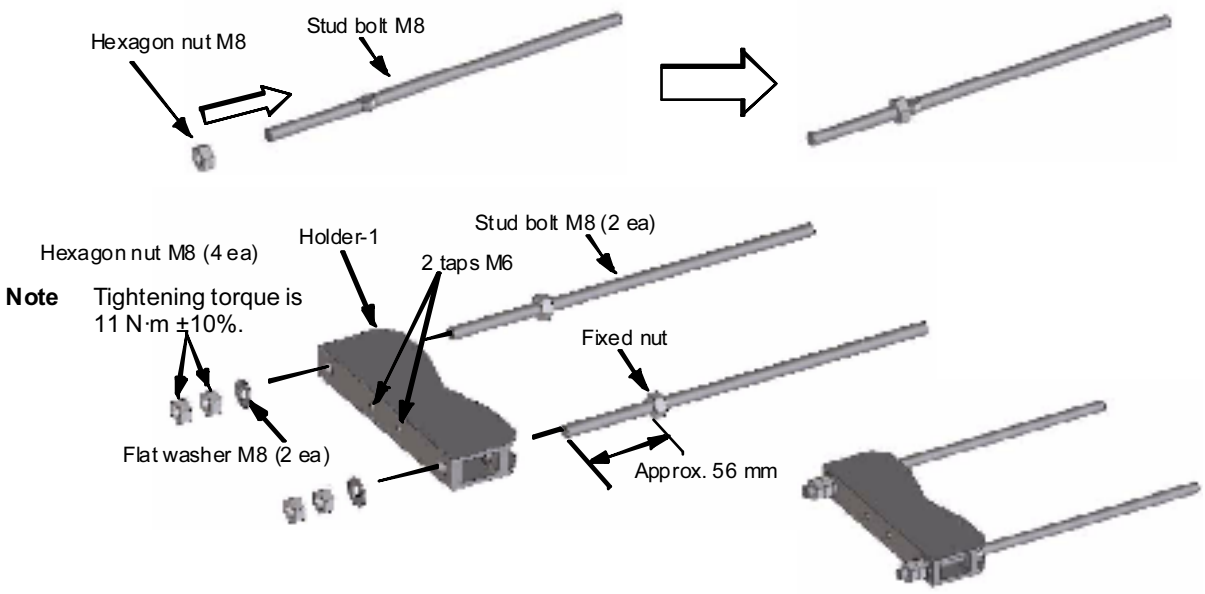
Note Tightening torque is 4 N·m ±10% (M6 screw).
Tightening torque is 11 N·m ±10% (M8 screw).



Standard Installation Reverse Installation

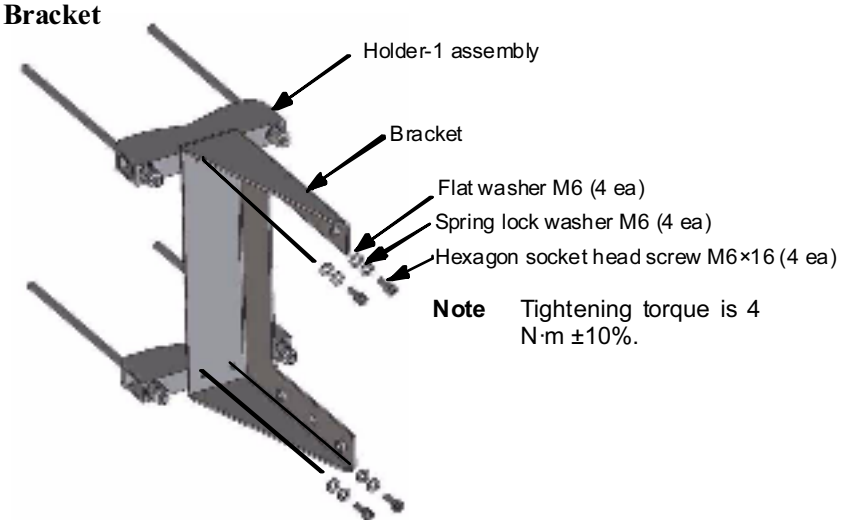
1 A nut is assembled to a stud bolt until a nut has come to a complete stop,

Assembly of the Holder-1 (2 sets)



2 Fix the two holder-1 to the bracket at four bolts,

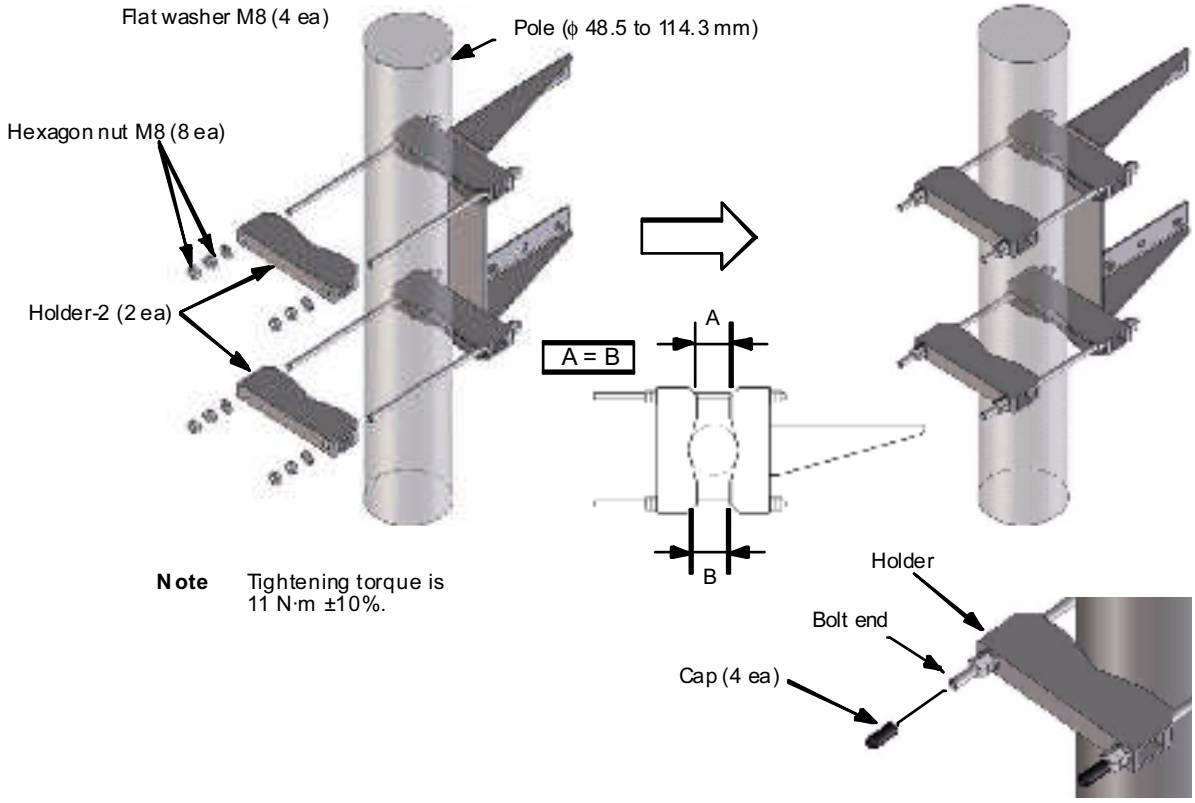
Assembly of the Bracket



Note Tightening torque is 4 N·m ±10%.

3 Mount the bracket to the pole, point to the opposite station and tighten it with four stud bolts,

Installation to the Pole

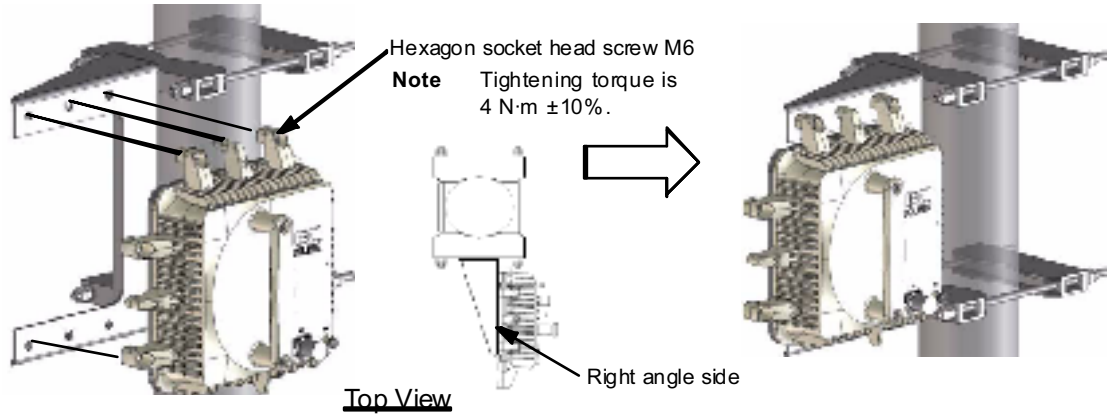


Note Tightening torque is 11 N·m ±10%.

Note Since a bolt projects from a holder when a pole diameter is small, please attach the cap to a bolt end.

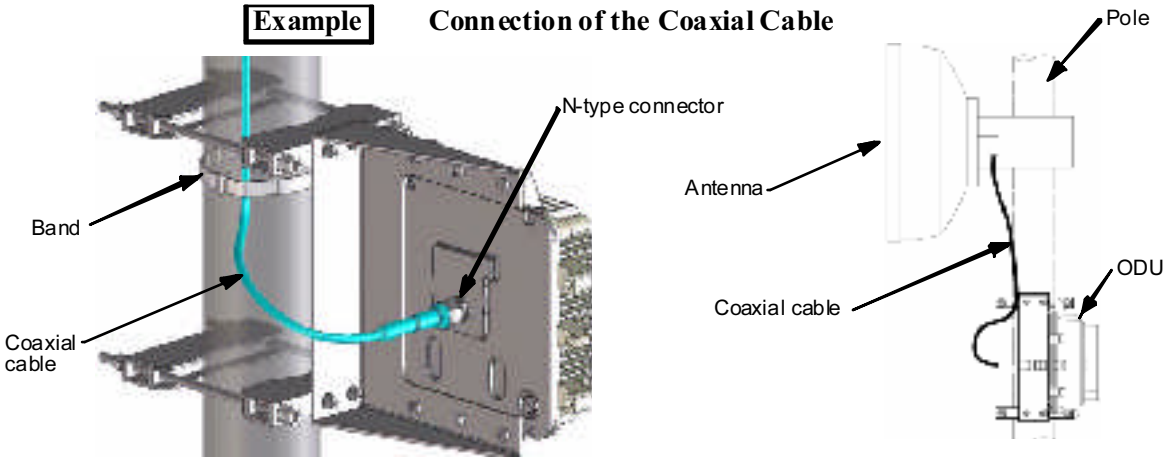
4 Mount the ODU on to the bracket and tighten four bolts (M6) at upper and lower parts of the ODU,

Attachment of the ODU



5 Connect the coaxial cable to the RF IN/OUT connector of the ODU,

Example **Connection of the Coaxial Cable**



6 Install the coaxial cables between the antenna and the ODU.

Notes

1. Fix the coaxial cable to the pole or member with band (cable ties) after antenna orientation has been completed.
2. Wrap the coaxial cable connection points with a self-bonding tape for waterproof. (The self-bonding tape shall be prepared by customer.)

5.2.2 For Waveguide Connection

10-38 GHz ODU MOUNTING BRACKET INSTALLATION

This mounting bracket is designed in order to install 10-38 GHz ODU with antenna direct mount interface to a pole. The diameter of the pole is from 48.5 to 114.3 millimeters.

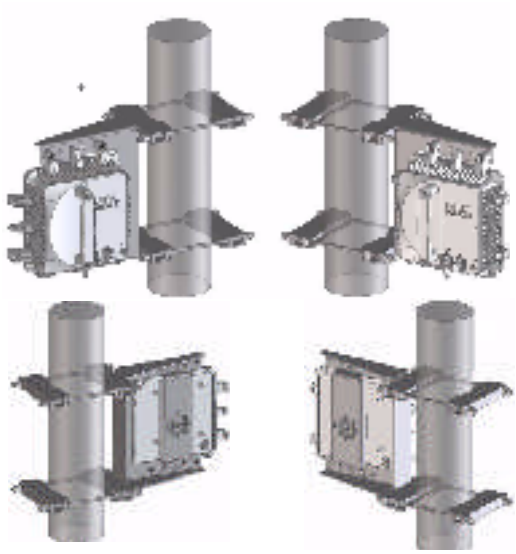
Mounting Bracket

Table 5-7 Mounting Bracket Parts List

Item	Description	Q'ty
1	Bracket (with Adapter)	1
2	Holder-1 (with two M6 taps)	2
3	Holder-2	2
4	M8 Stud Bolt (SS)	4
5	M8 Hexagon Nut (SS)	20
6	M8 Flat Washer (SS)	8
7	M6×16 Hexagon Socket Head Screw (SS)	4
8	M6 Spring Lock Washer (SS)	4
9	M6 Flat Washer (SS)	4
10	Cap	4
11	O-Ring (for ODU)	1
12	O-Ring (for Waveguide)	1
13	Screw of Waveguide Connecting	
	for 10/11 GHz M4×14 Hexagon Head Screw with Washer (SS)	8
	for 13/15 GHz M4×12 Hexagon Head Screw with Washer (SS)	4
	for 18/23/26/28/32/38 GHz M3×10 Hexagon Head	
	Screw with Washer (SS)	4

SS: Stainless steel

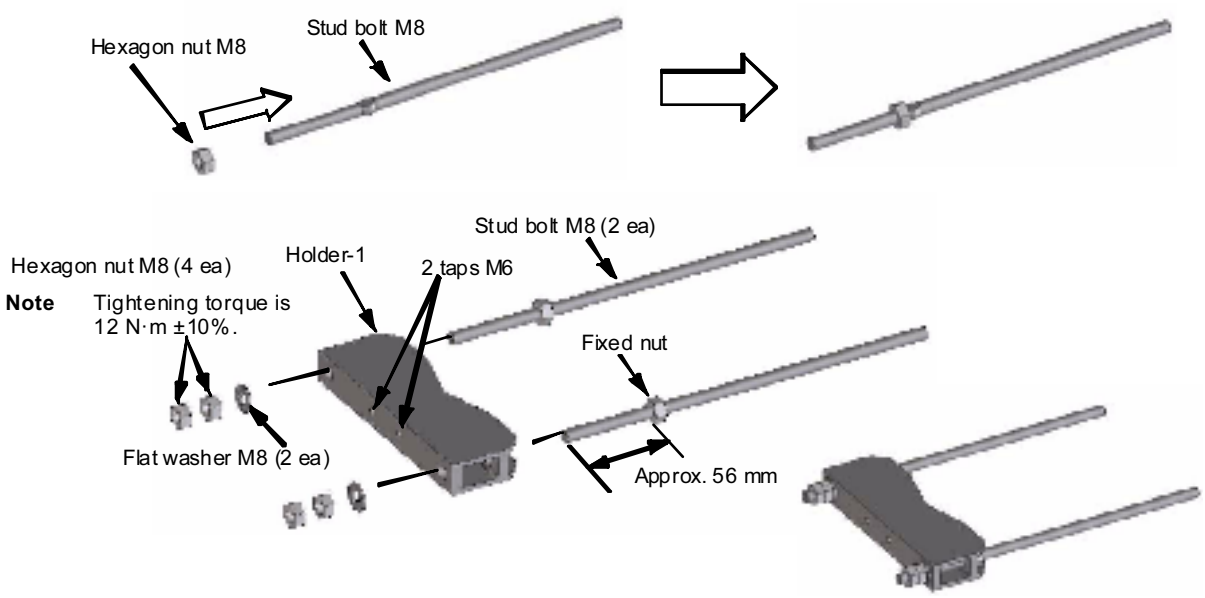
Note Tightening torque is 4 N·m ±10% (M6 screw).
Tightening torque is 11 N·m ±10% (M8 screw).



Standard Installation Reverse Installation

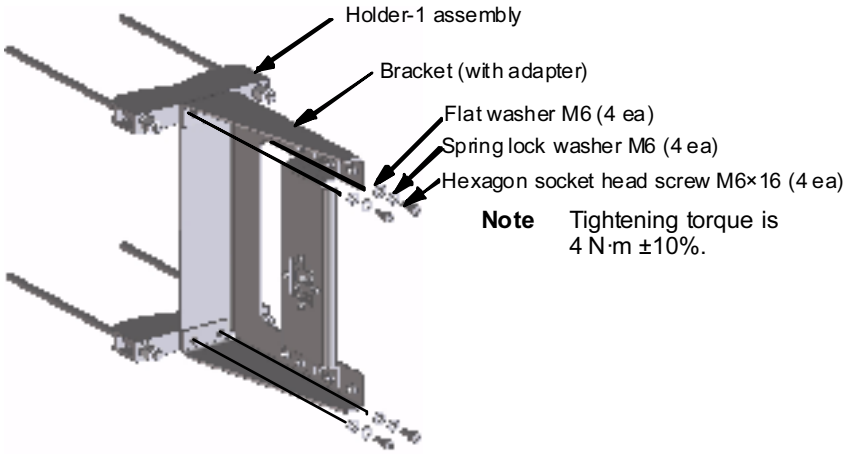
1 A nut is assembled to a stud bolt until a nut has come to a complete stop,

Assembly of the Holder-1 (2 sets)



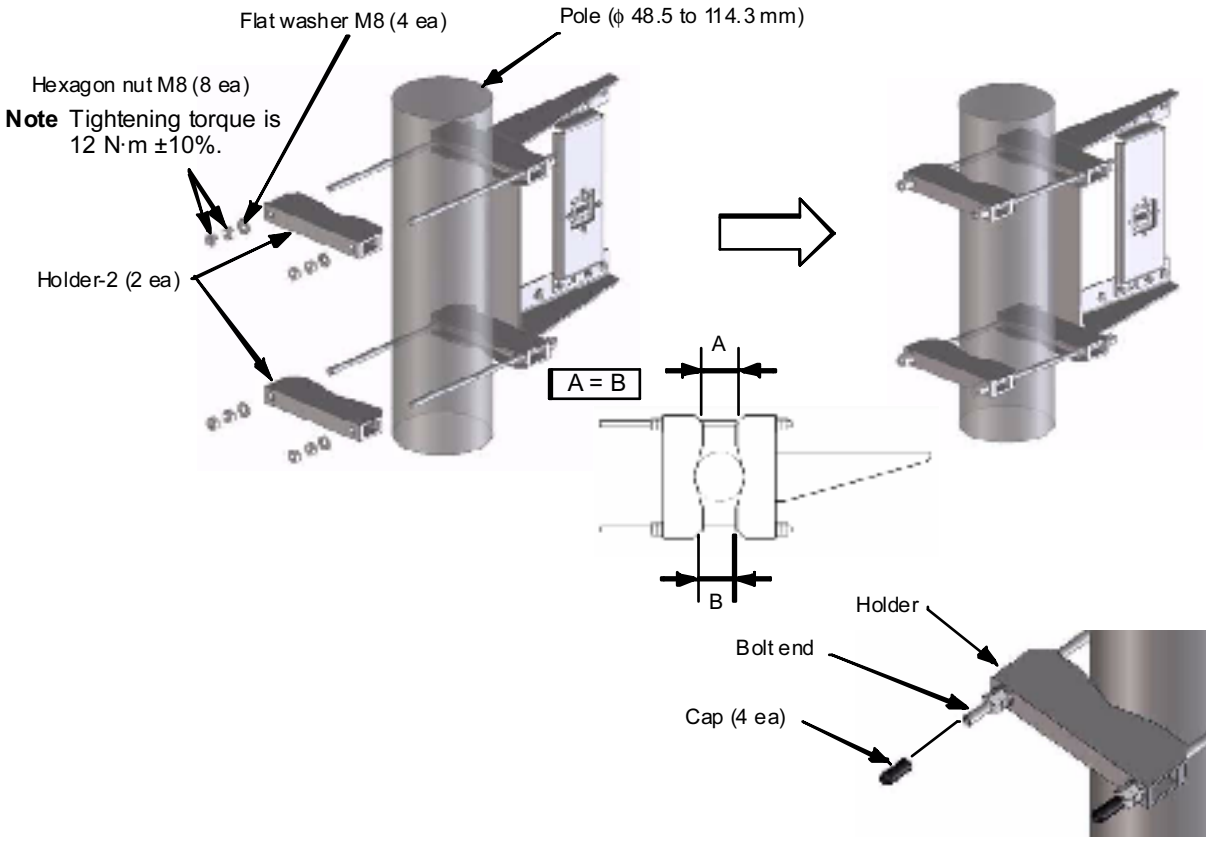
2 Fix the two holder-1 to the bracket at four bolts,

Assembly of the Bracket



3 Mount the bracket to the pole, point to the opposite station and tighten it with four stud bolts,

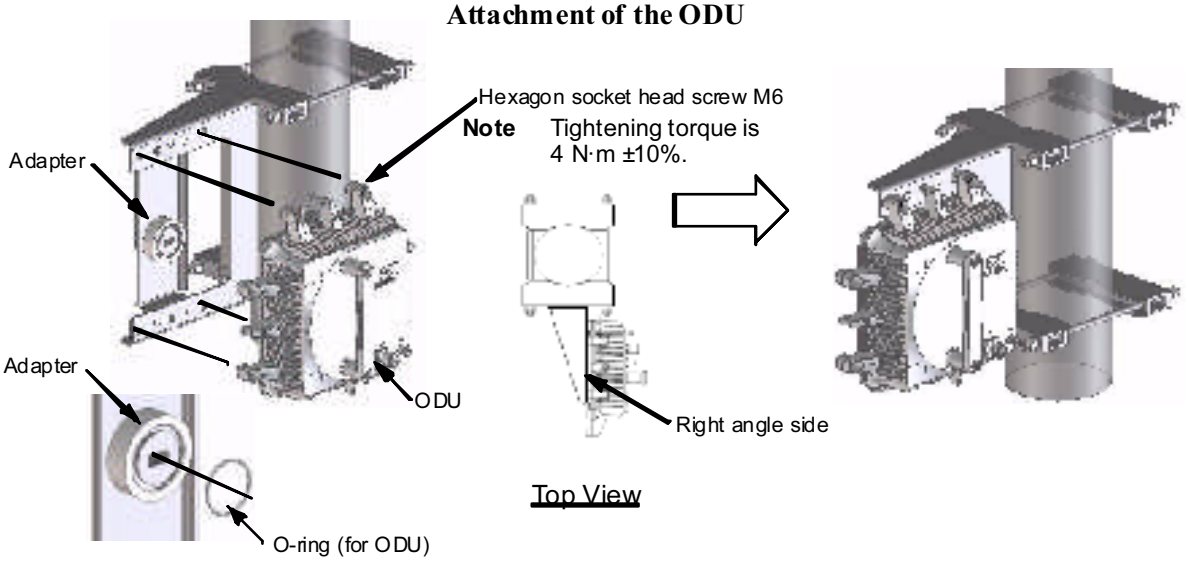
Installation to the Pole



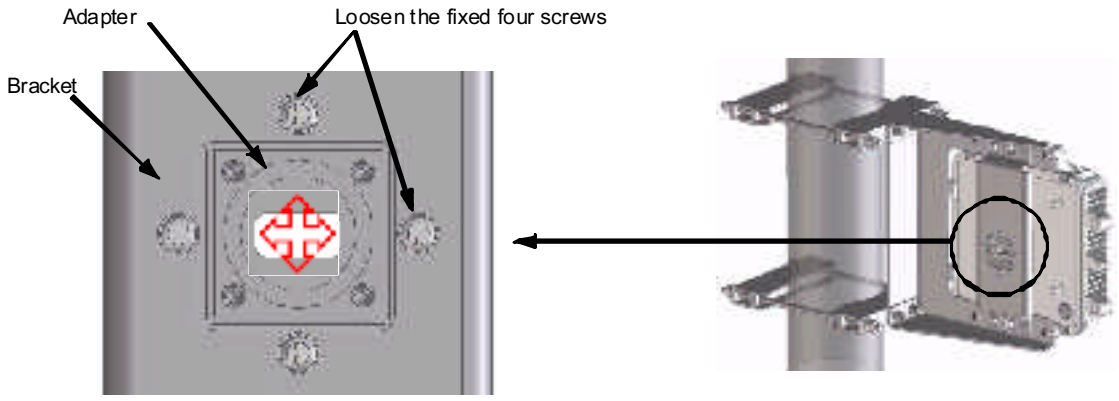
Note Since a bolt projects from a Holder when a pole diameter is small, please attach the cap to a bolt end.

4 Mount the ODU on to the bracket and tighten four bolts (M6) at upper and lower parts of the ODU. Please equip the terminal area of ODU and adapter with O-ring, and join together after that,

Attachment of the ODU



5 When the attachment screw of the ODU is hard, please loosen the fixed four screw of adapter once,



6 Please adjust the position of adapter to compensate for attachment of ODU. Then tighten four bolts (M6) of the ODU,

7 Connect the waveguide to the adapter of the mounting bracket,

Example **Connection of the Waveguide**

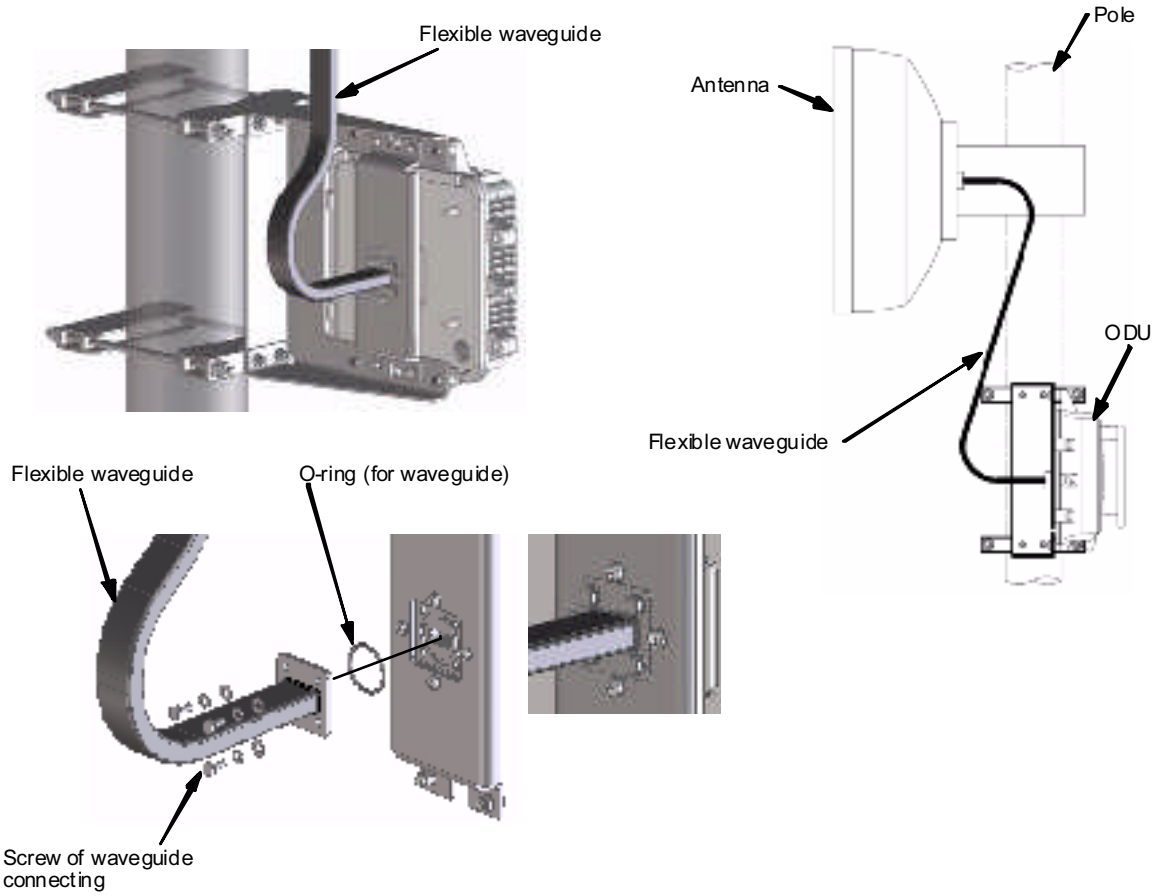


Table 5-8 Waveguide Flange Type

Frequency Band	Adapter	Waveguide
10/11 GHz	PDR100	PDR100
13 GHz	PBR120	UBR120
13/15 GHz	PBR140	UBR140
18/23 GHz	PBR220	UBR220
26 GHz	PBR260	UBR260
28/32/38 GHz	PBR320	UBR320

8 Install the waveguide between the antenna and the ODU.

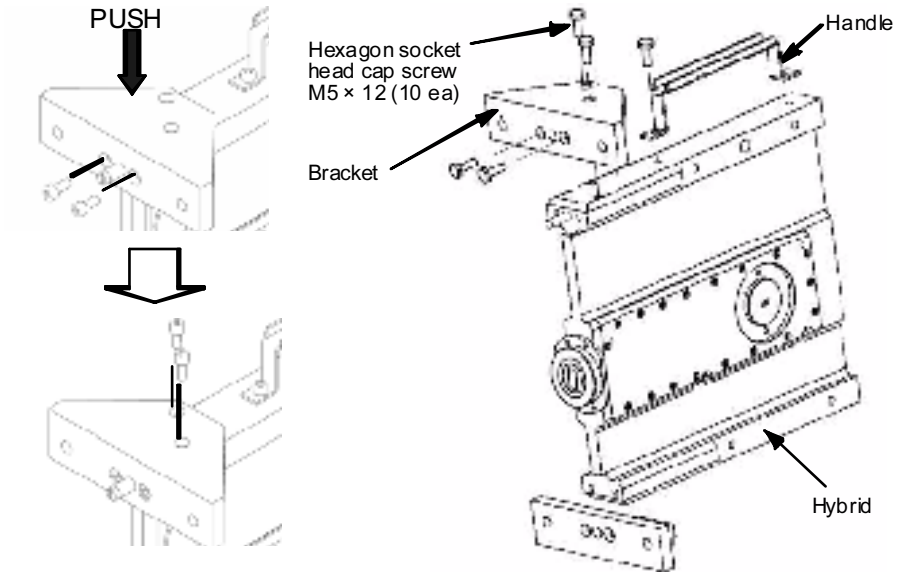
5.2.3 For Waveguide Connection with Hybrid

18/23 GHz Hybrid (FI)

This Hybrid is designed to be connect to waveguide with interface for direct mounting of ODU. (Waveguide flange type: Hybrid side-PBR220, Waveguide side-UBR220.)

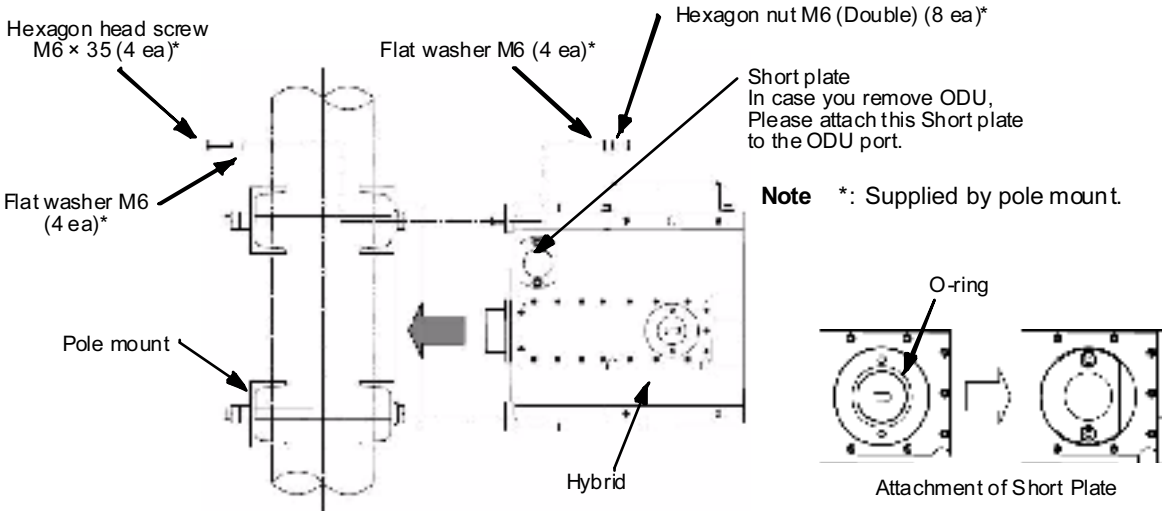
	Tightening Torque
M3	0.6 N·m ±10%
M5	3.0 N·m ±10%
M6	4.0 N·m ±10%

1 Hybrid assembly

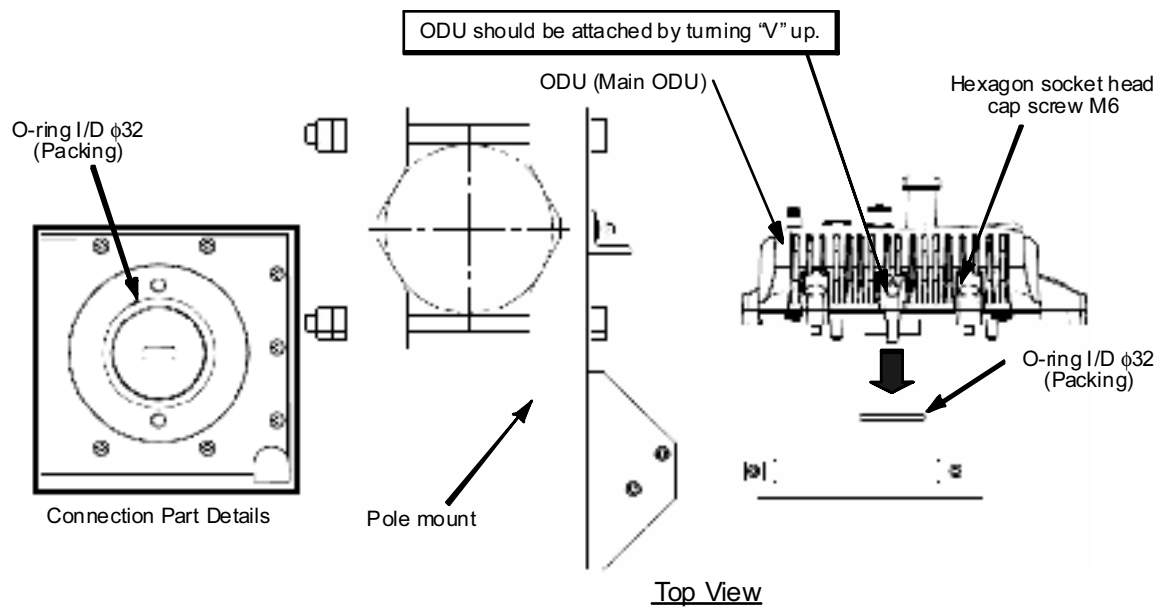


2 Installation to pole mount

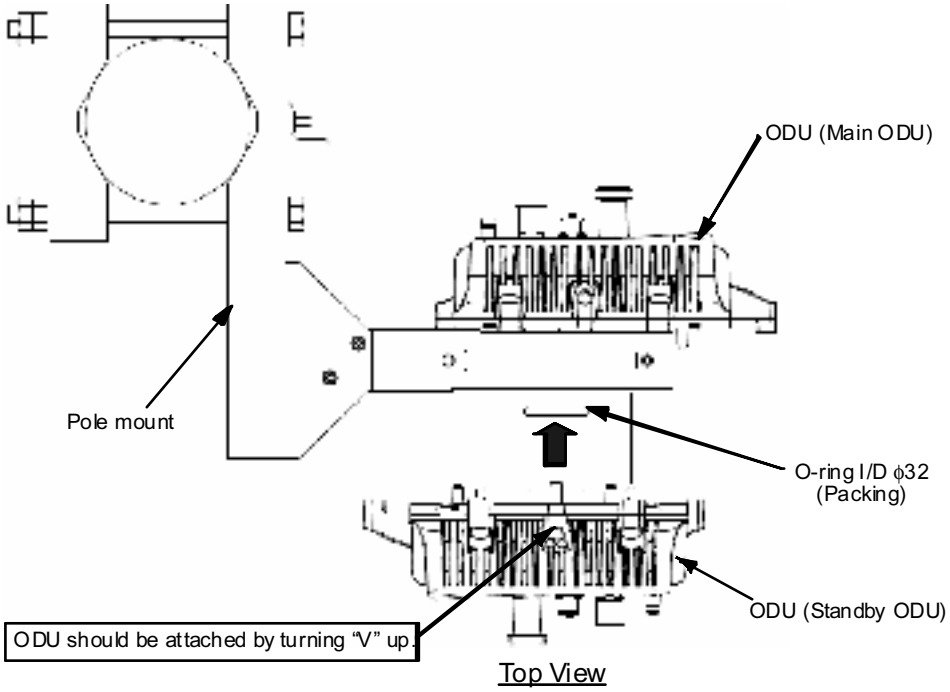
Case-1



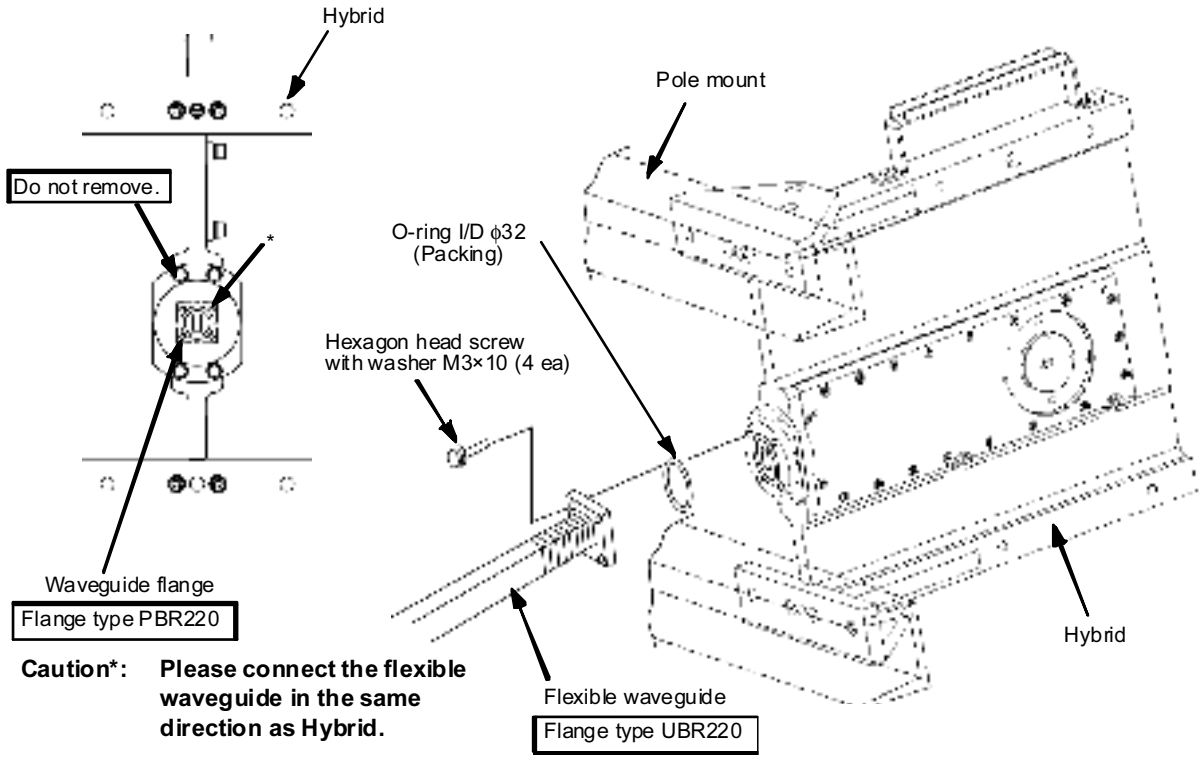
3 Attachment of main ODU



4 Attachment of standby ODU



5 Connection of waveguide



Caution*: Please connect the flexible waveguide in the same direction as Hybrid.

Caution **Be careful not to damage the Hybrid. Connection part will be damaged if excessive power is applied to the Hybrid by waveguide.**

Table 5-9 Hybrid (FI) Parts List (for Mounting Bracket)

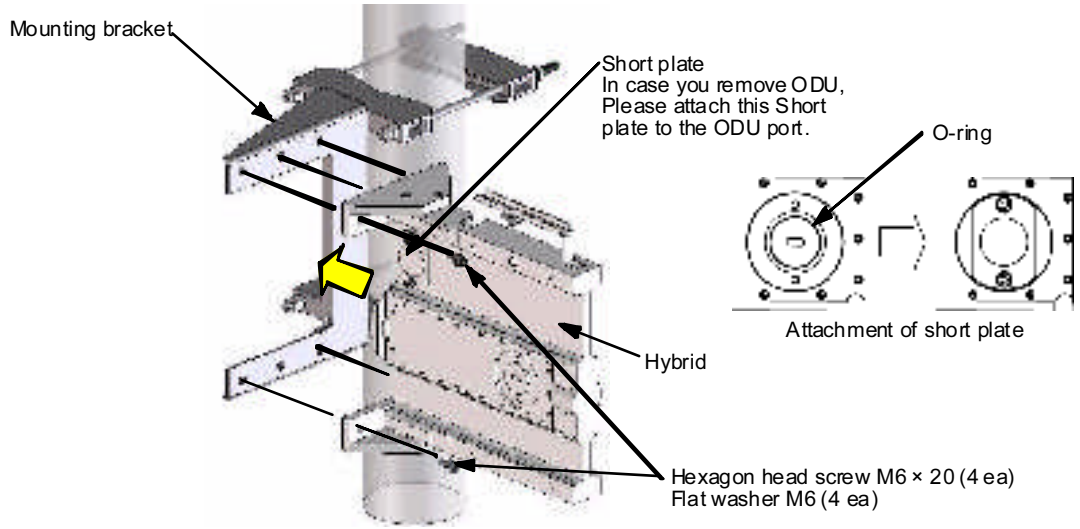
No.	Parts Name	Q'ty
1	Hybrid (Waveguide Flange Interface Type)	1
2	Bracket	2
3	Handle	1
4	O-ring Inner Dia. ϕ32 (for ODU)	2
5	O-ring Inner Dia. ϕ15.6 (for Waveguide)	1
6	M5 × 12 Hexagon Socket Head Cap Screw (SS)	14 (4 part for spare.)
7	M3 × 10 Hexagon Head Screw With Washer (SS)	4
*	M6 × 35 Hexagon Socket Head Cap Screw, Nut, Washer Set (SS)	4

*: Supplied by pole mount.

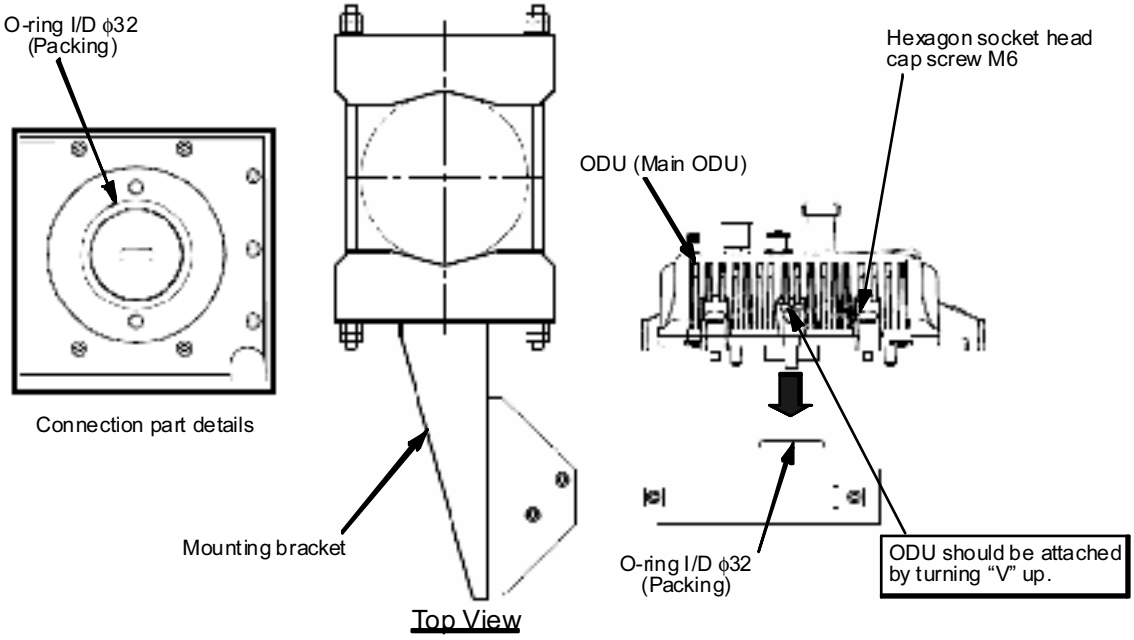
SS: Stainless steel

6 Installation to mounting bracket

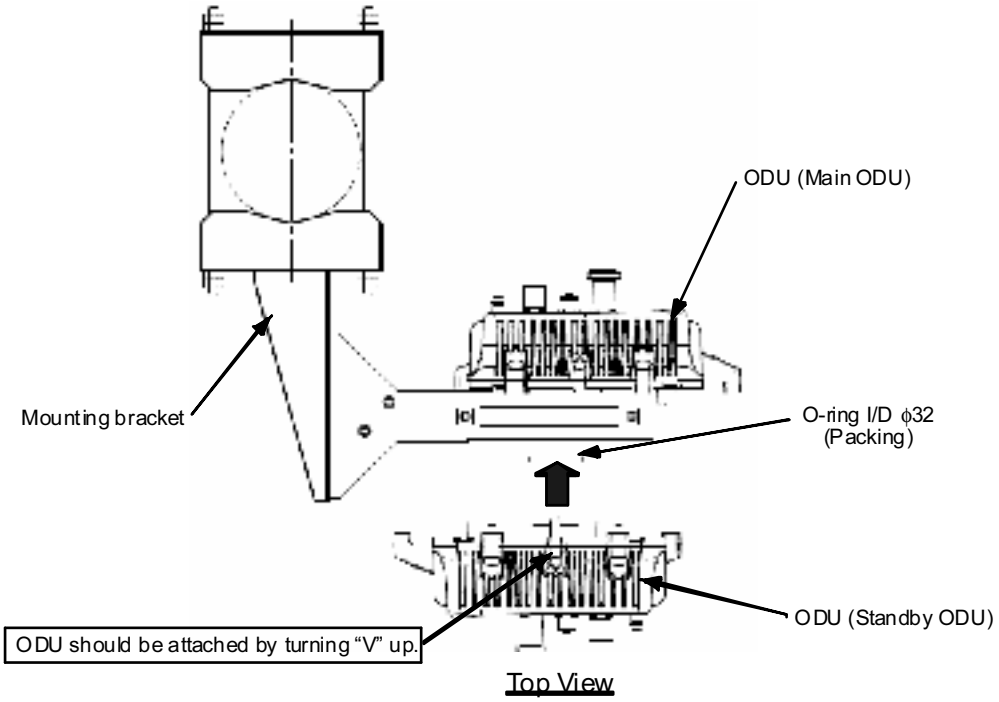
Case-2



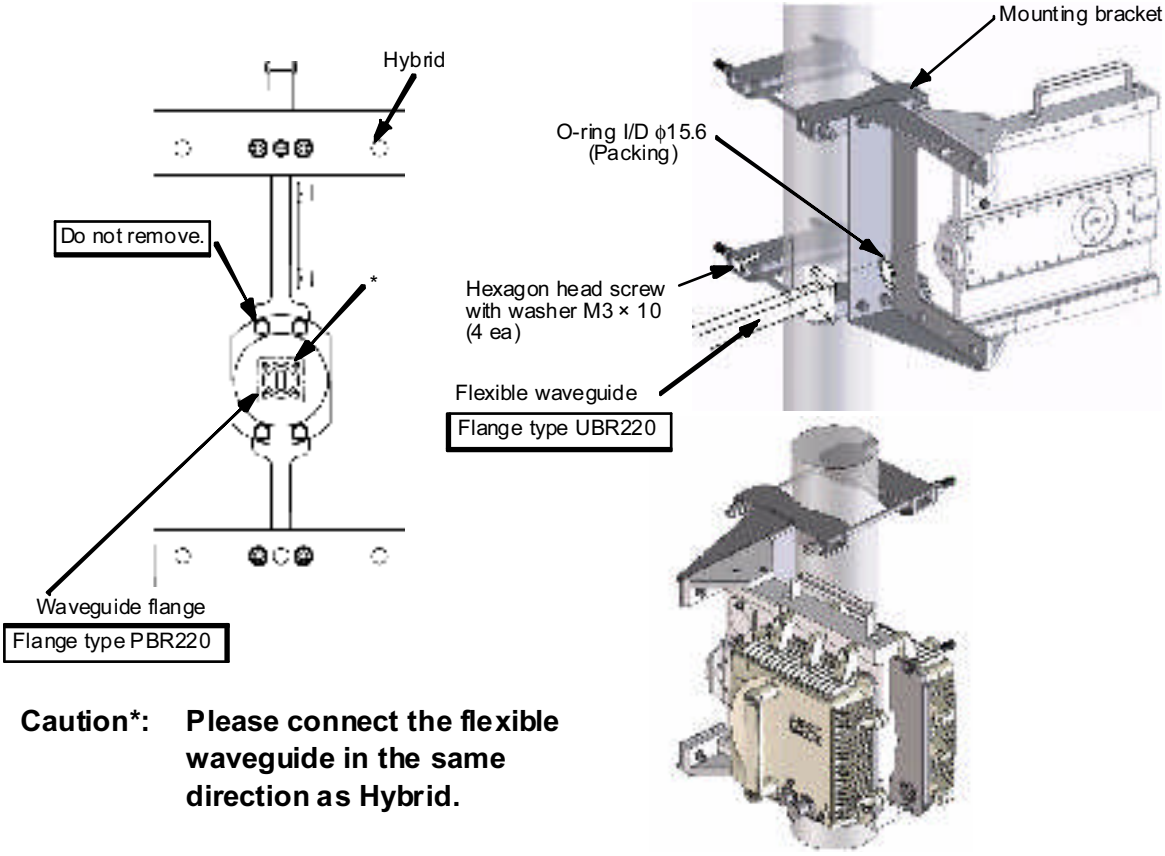
7 Attachment of main ODU



8 Attachment of standby ODU



9 Connection of waveguide



Caution*: Please connect the flexible waveguide in the same direction as Hybrid.

Table 5-10 Hybrid (FI) Parts List (for Mounting Bracket)

No.	Parts Name	Q'ty
1	Hybrid (Waveguide Flange Interface Type)	1
2	Bracket	2
3	Handle	1
4	O-ring Inner Dia. ϕ32 (for ODU)	2
5	O-ring Inner Dia. ϕ15.6 (for Waveguide)	1
6	M5 × 12 Hexagon Socket Head Cap Screw (SS)	14 (4 part for spare.)
7	M6 × 20 Hexagon Socket Head Cap Screw (SS)	4
8	M6 Flat Washer (SS)	4
9	M3 × 10 Hexagon Head Screw With Washer (SS)	4

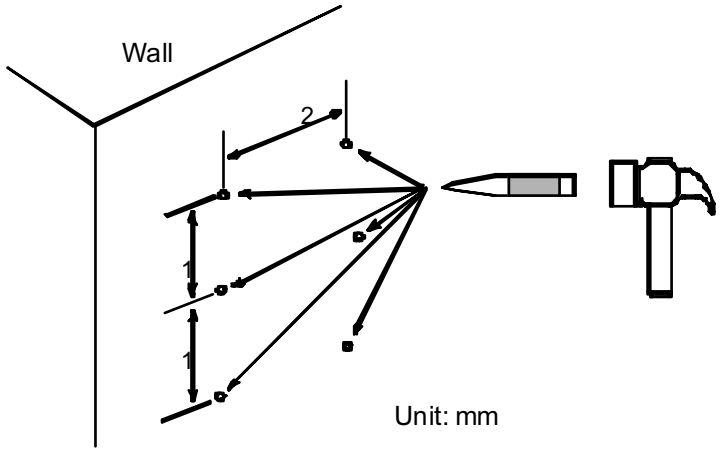
SS: Stainless steel

5.3 Other Mounting

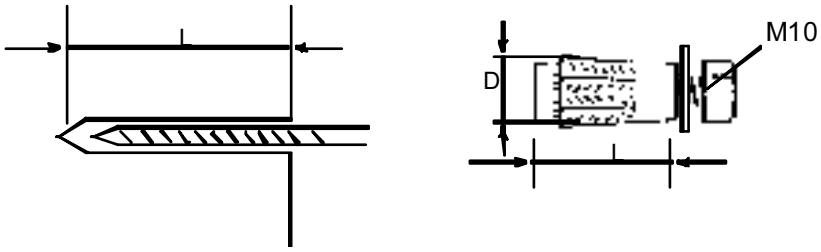
5.3.1 Wall Mounting

For the antenna direct mounting type ODU, wall mounting installation is explained in following procedure.

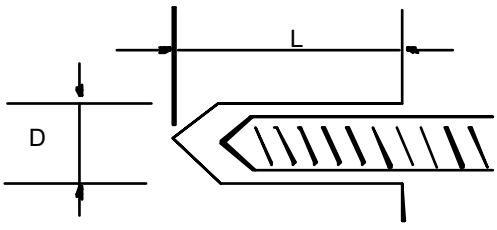
1 Using a center punch and hammer, mark the drilling holes for the ODU wall mount bracket. Dimensions are shown below,



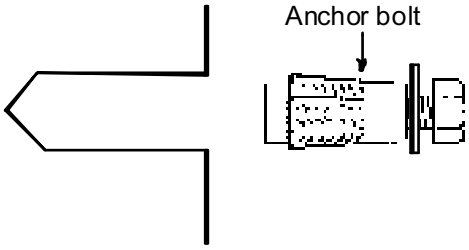
2 Using an electric drill for concrete, drill the guide holes,



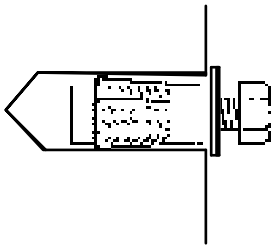
3 Change the concrete drill to enlarge the holes and drill the anchor bolt holes,



4 Remove debris from the specified hole and insert a plug-bolt into it,

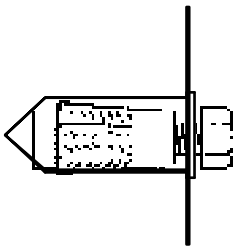


5 Make sure to insert the plug-bolt fully,

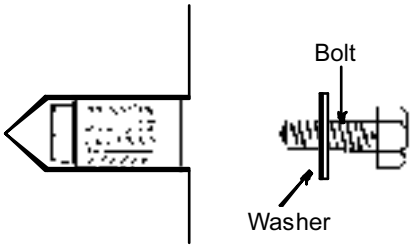


6 Tighten hardly the bolt using a wrench or monkey wrench,

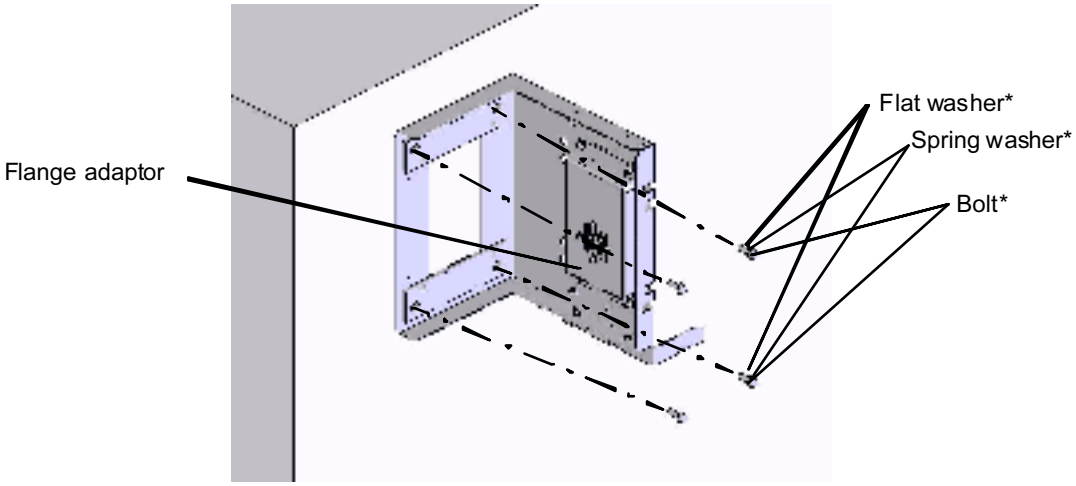
Note Anchor bolts of M10 bolt shall be prepared by the customer.



7 Loosen the bolt and remove it,

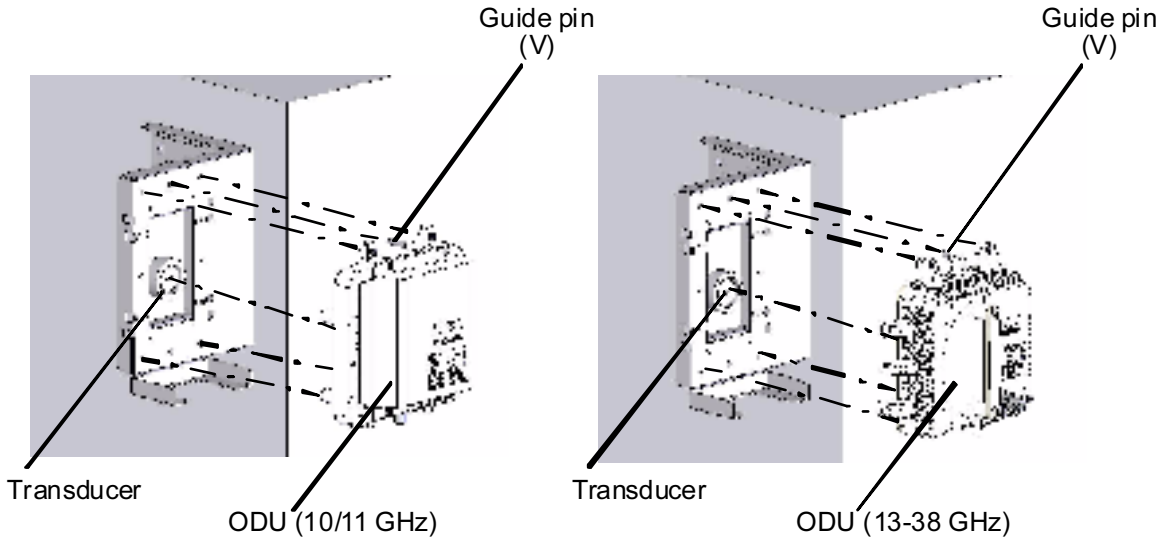


8 Fix the ODU wall mounting bracket to the wall with the six bolts (M6) of the anchor volt,



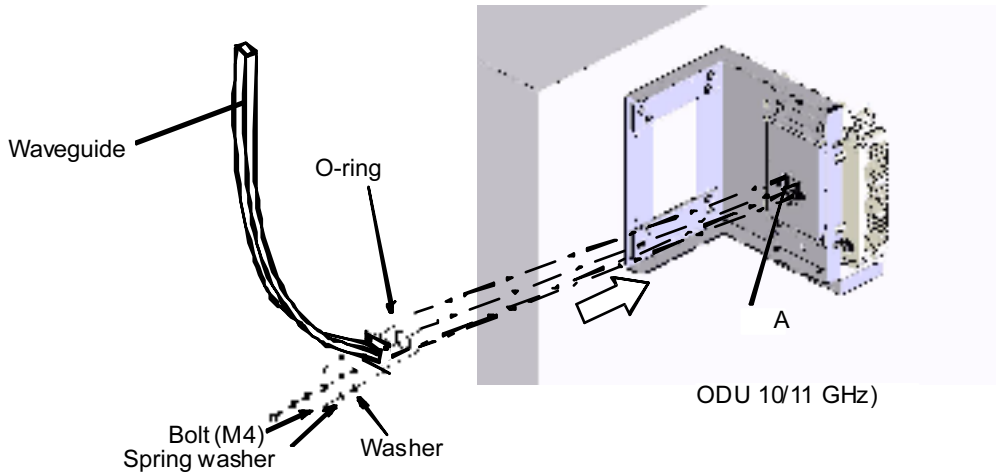
Note The bolt, flat washer and spring washer are the anchor bolt.

9 Mount the ODU onto the bracket and fix the ODU using the four bolts (M6) on the ODU,



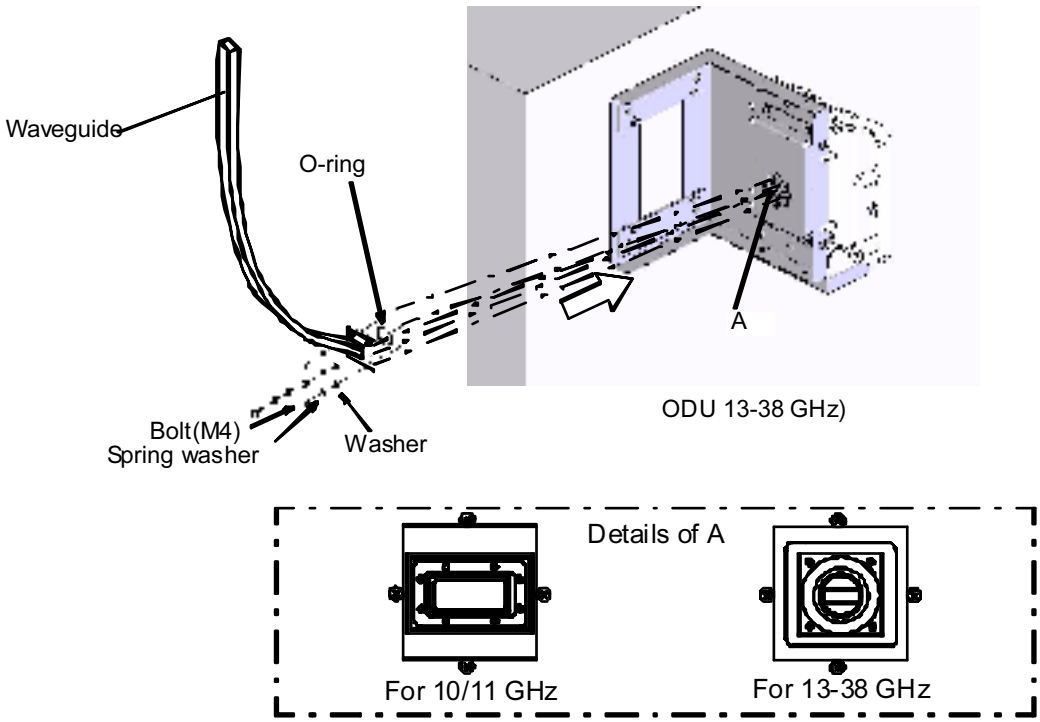
Note The tightening torque is 4.0 N·m ±10%.

10 Connect the wave guide to the transducer for the ODU.



Notes

1. Tightening torque is 1.4 N·m ±10% (up to 15 GHz).
   Tightening torque is 0.6 N·m ±10% (18 GHz or higher).
2. Be careful not to damage the O-ring.

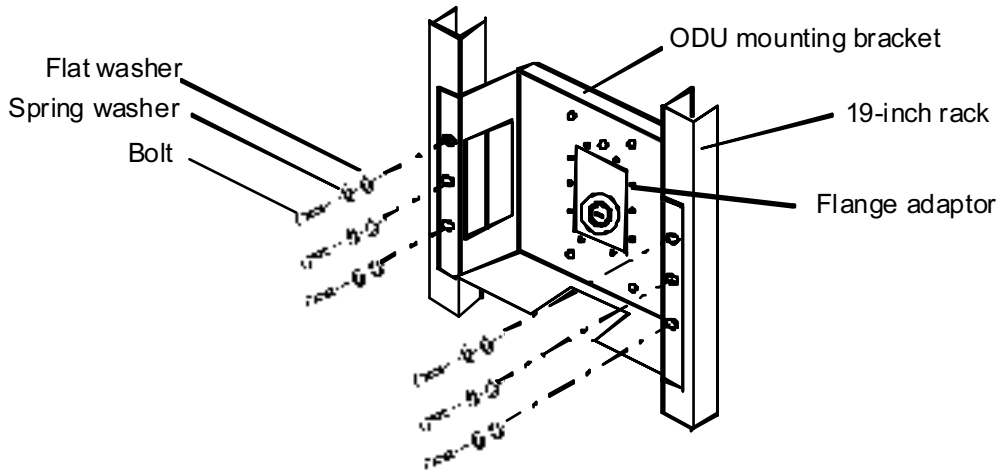


Refer to 5.2.2 ODU Mounting for Waveguide Connection.

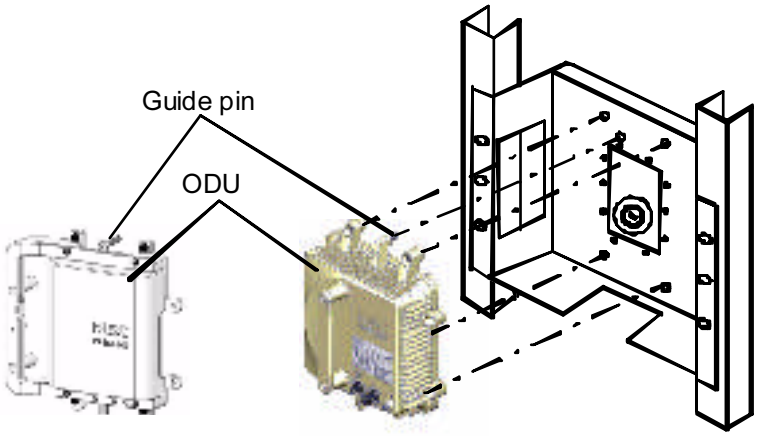
5.3.2 Rack Mounting

For the antenna direct mounting type ODU, rack mounting installation is explained in following procedure.

1 Fix the ODU rack mounting bracket into the 19-inch rack using the six fixing bolts,

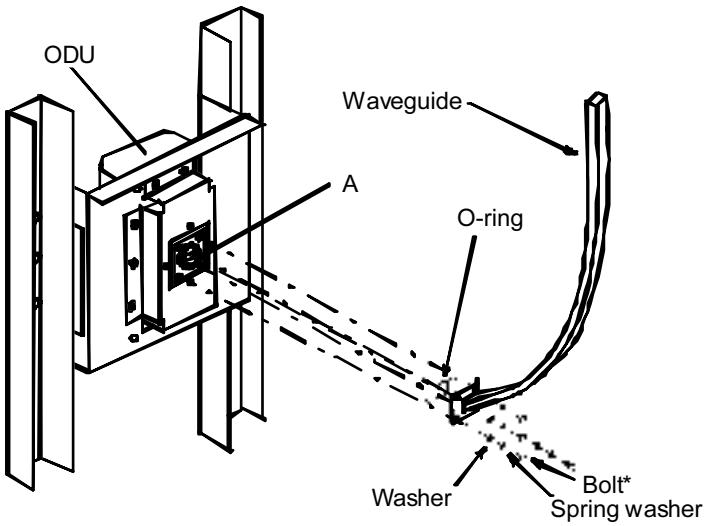


2 Mount the ODU onto the bracket and tighten the four fixing bolts (M6) on the ODU,



Note The tightening torque is 4.0 N·m ±10%.

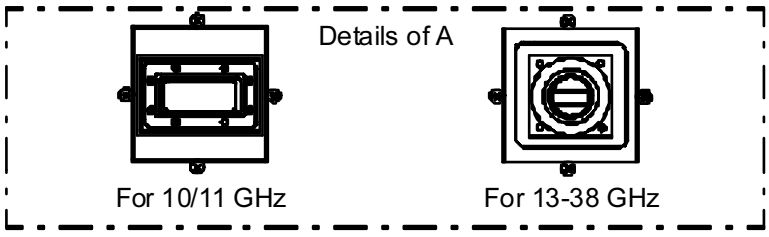
3 Connect the wave guide to the transducer for the ODU.



Notes

* M4: Up to 15 GHz.
M3: 18 GHz or higher.

1. Tightening torque is 1.4 N·m ±10% (up to 15 GHz).
   Tightening torque is 0.6 N·m ±10% (18 GHz or higher).
2. Be careful not to damage the O-ring.

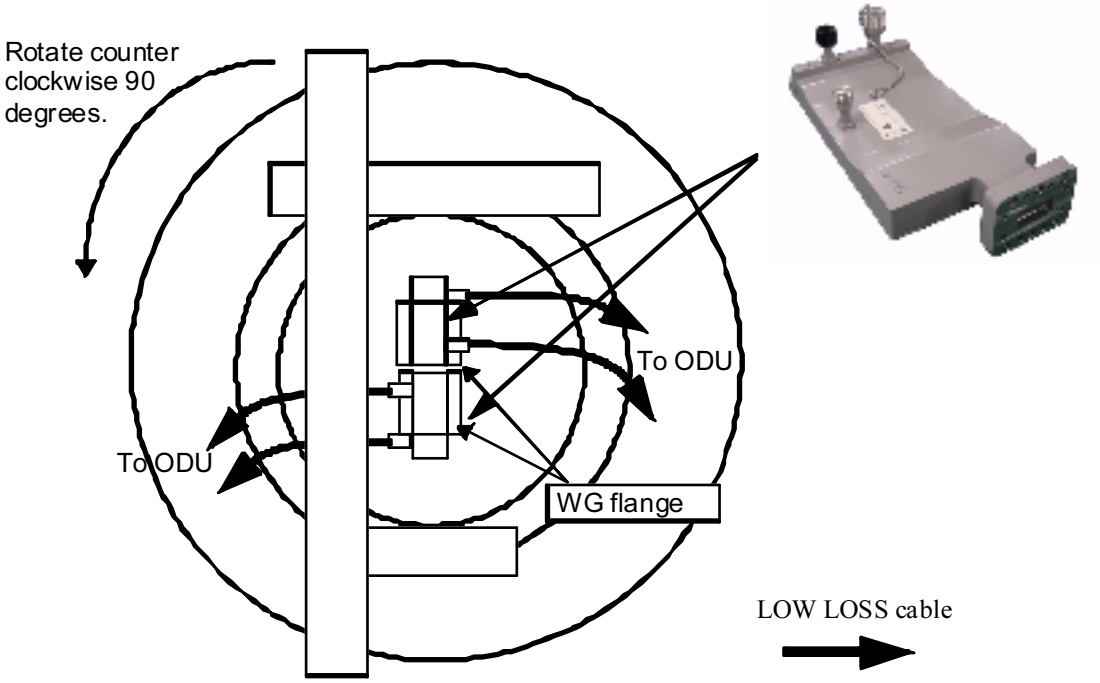


Refer to 5.2.2 ODU Mounting for Waveguide Connection.

5.4 Hybrid Combiner Installation

When you attach two Hybrids to one dual pol. antenna, for 1+1 or 2(1+1) system in 6/7/8 GHz rotate the antenna 90 degree counter clockwise, as shown below, to avoid hitting the hybrids to the antenna pole and its structures if necessary.

.



6. TERMINATING CABLES

In this section, list of tools, materials and the method for cable termination are described. The list of applicable cable is shown in Table 6-1.

Table 6-1 List of Applicable Cable

Applicable Cable		Connector Type		Model#	Procedure#
5D Coaxial Cable	for IDU	TNC-P	L-angle	TNC150(R0)	Procedure 6-1
	for IDU	TNC-P	L-angle	300PTR-C-NC	Procedure 6-2
	for IDU	TNC-P	L-angle	TNC156(R0)	Procedure 6-3
	for ODU	N-P	L-angle	300PNR-C-NC	Procedure 6-4
	for ODU	N-P	Straight	300PNM-C-NC	Procedure 6-5
	for ODU	N-P	Straight	N435(R0)	Procedure 6-6
8D Coaxial Cable	for IDU	TNC-P	L-angle	TNC141(R0)	Procedure 6-7
	for ODU	N-P	L-angle	N-LP-8DFB(B)	Procedure 6-8
	for ODU	N-P	Straight	N416(R0)	Procedure 6-9
Other Cables	for power supply	AMP	Housing & socket contacts	AMP: 1-178288-4 or DK-3100S-04R	Procedure 6-10
	for 120 ohms balanced signal	D-sub	Crimping	---	Procedure 6-11
	for auxiliary signal	D-sub	High Density	---	Procedure 6-12

Notes

1. In 1+1 system, the difference between the No.1 channel IF cable length and the No.2 channel IF cable length should be within 100 m. (differential absolute delay time: within 500 ns)
2. When the N (Male) straight connector is attached to the IF cable, use of the TNC (Male) - N (Female) (NJ-TNCP-LA) L-angle adapter is needed to connect to the IDU.
3. Use shielded cables which are connected to the D-Sub/RJ-45 connector to suppress interference from affecting the signal and to reduce electromagnetic radiation which may interfere with other signal cables.

The necessary tools and materials are summarized in Table 6-2.

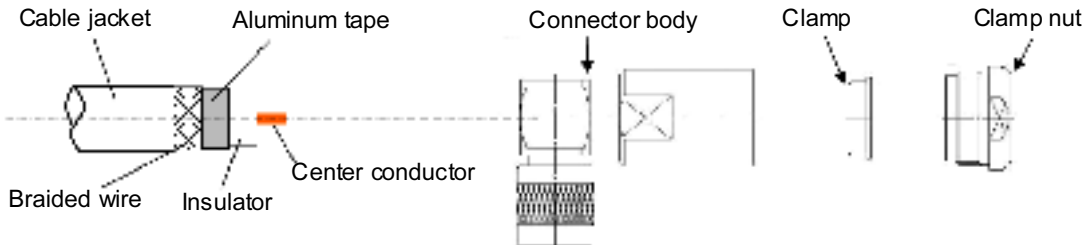
Table 6-2 Tools and Materials List

No.	Name		Remarks
1	Knife		For IF coaxial connector
2	Measure/Ruler		
3	Cutter		
4	Nipper		
5	File		
6	Spanner (14 mm, 16 mm)		
7	Torque spanner (14 mm, 15 mm, 16 mm)		
8	Clearance gauge		
9	Comb		
10	Tweezers		
11	Scissors		
12	Hand Crimping Tool	91558-1	For power supply connector
		TC-CD-111 TC-CD-112	For D-Sub connector
		09 88 999 0596	For D-Sub high density connector

6.1 5D Coaxial Cable

Procedure 6-1 TNC-P Connector used for IDU IF IN/OUT (L-angle: TNC150(R0))

Outlines of parts [Applicable cable: 5D-FB-E]

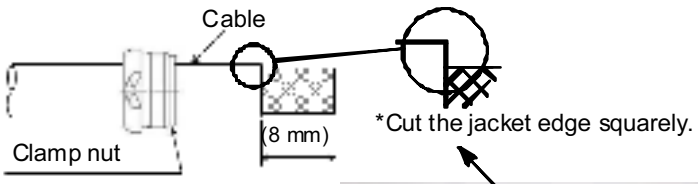


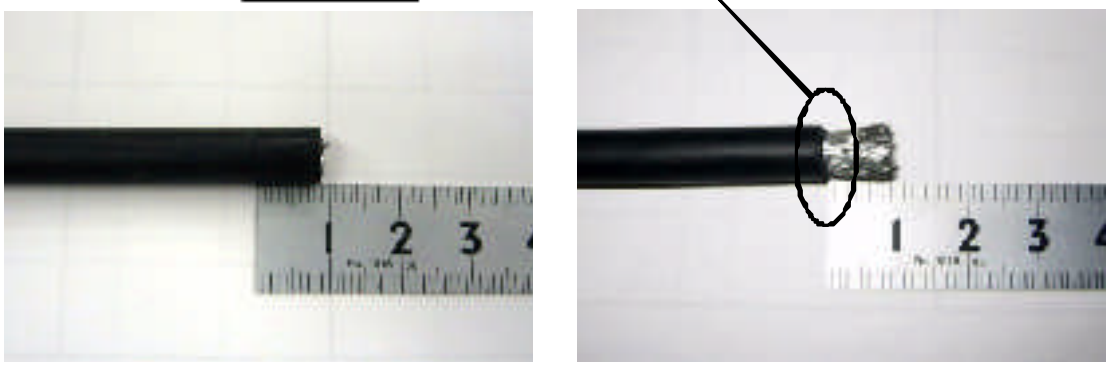
Tools	• knife, cutter, nipper, tweezers, file, measure, clearance gauge, etc. • spanner, torque spanner 14 mm

1 Insertion of parts, remove of jacket of cable.

(1) The clamp nut is inserted as shown.

(2) Remove 8 mm of jacket only.





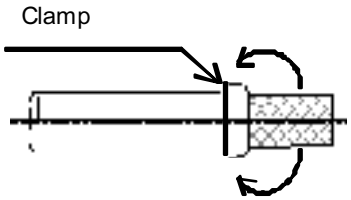
Note Do not damage the braided wire.

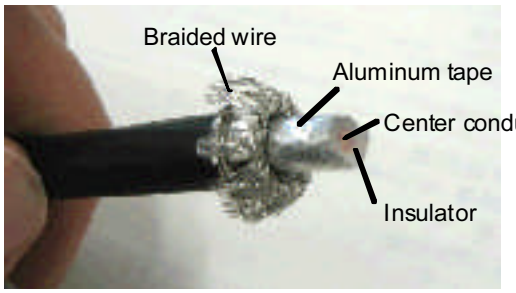
Tools	• knife • cutter • measure, etc.

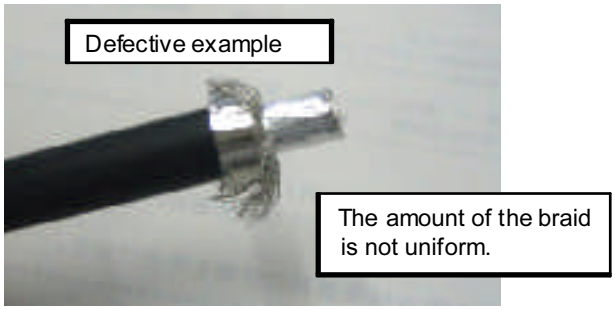
2 Insertion of parts.

(1) The clamp is inserted as shown.

(2) Braided wire is turned back to clamp side.

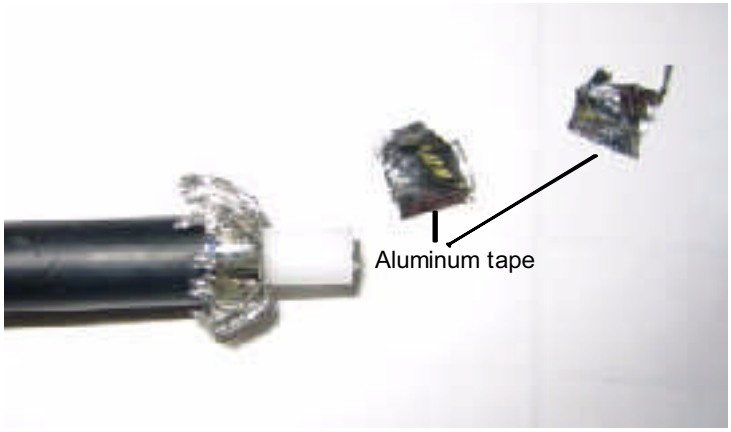


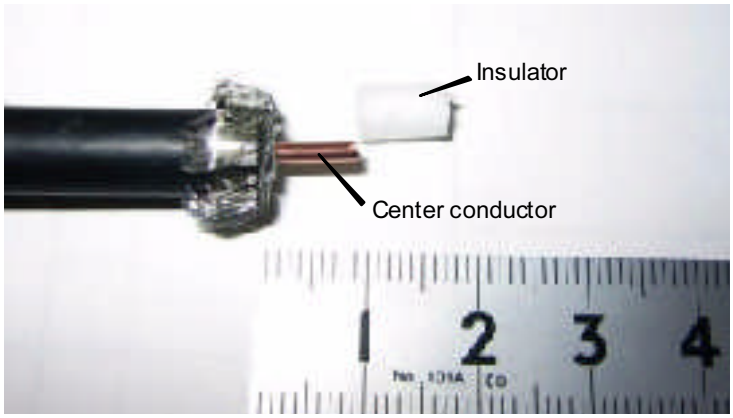




3 Remove of braided wire, insulator.

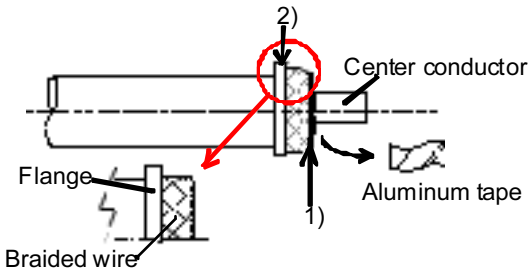
(1) The insulator and an aluminum tape are cut along an end face of turned up braided wire.

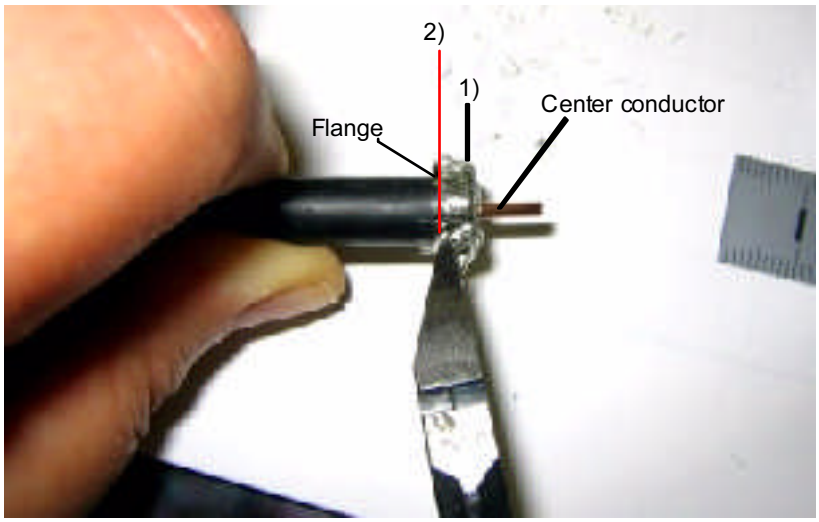




Note Do not damage the braided wire and the center conductor.

(2) The braided wire is cut according to flange of clamp.



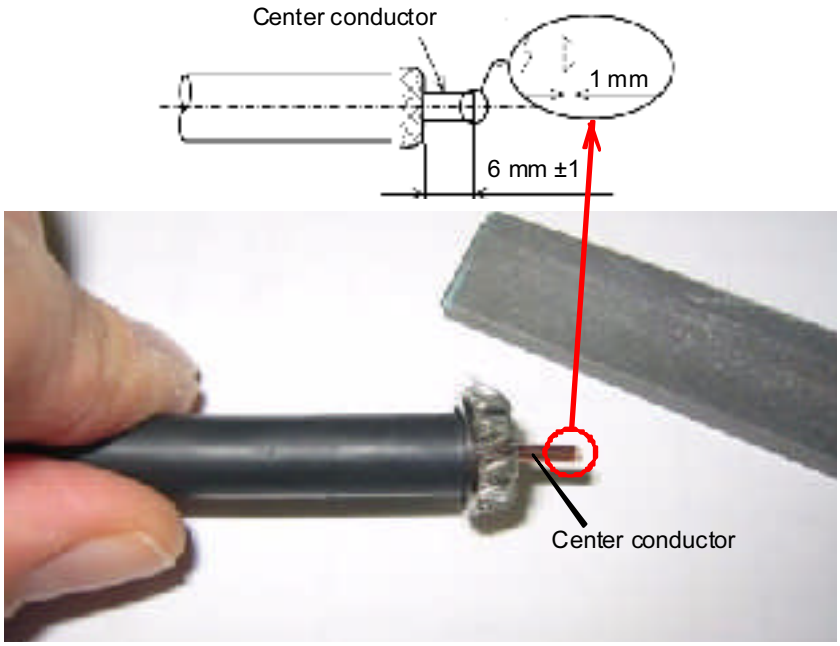


Tools	• cutter • nipper

4 Center conductor processing.

(1) Remove of the center conductor as shown.

(2) Chamfer the center conductor.

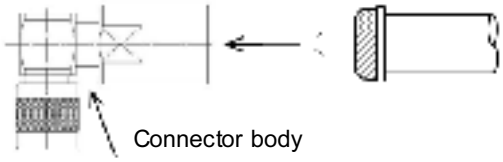


Tools	• nipper • file, etc.

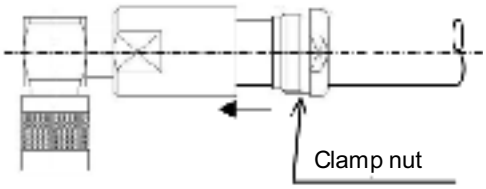
Note Do not damage the center conductor (burr, etc.).

5 Connector assembly

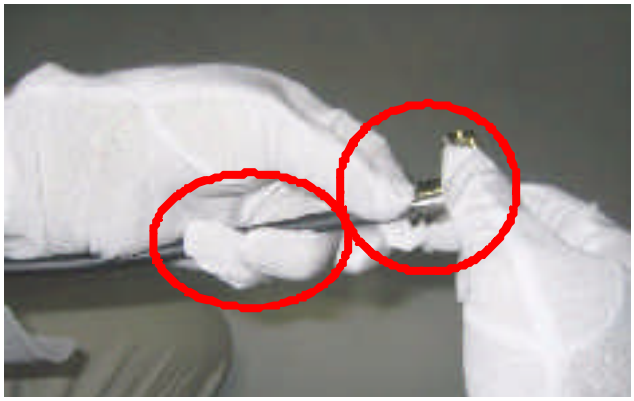
(1) The cable center conductor must be straight and aligned with the connector inner contact. Insert the cable into the connector body until stopped; the center conductor must be inserted into the connector inner contact fingers.



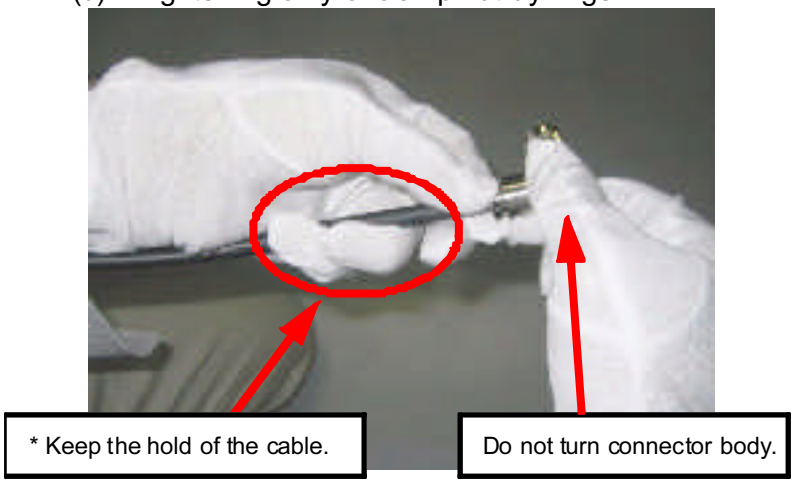
(2) Tighten the connection to the torque value of 9 to 11 N·m. (Refer to step (a) through (e).)



(a) Hold of cable and connector body.



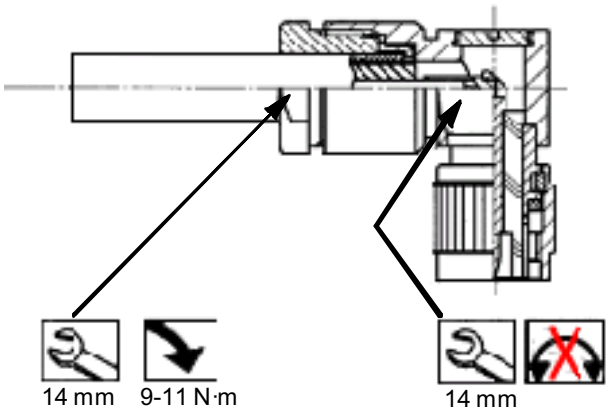
(b) Tightening only of clamp nut by finger.



(c) Hold of connector body by spanner.

(d) Hold of cable

(e) Set the torque spanner.
Tightening only of clamp nut by torque spanner.
Tightening the connection to the torque value of 9 to 11 N·m.



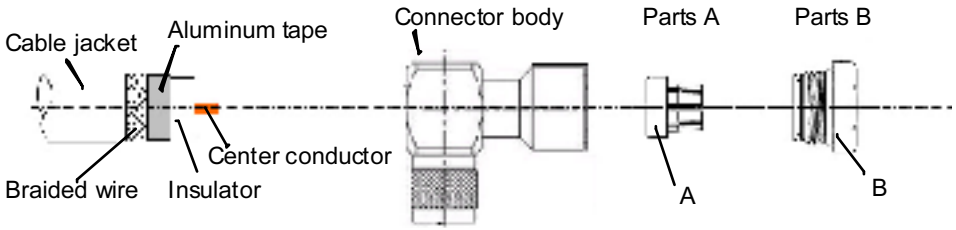
Notes

1. When inserting, do not put the chip which is braided wire inside the central conductor and the connector body.
2. Do not turn connector body, turn clamp nut attachment.

Tools	• spanner (14 mm) • torque spanner (14 mm) • clearance gauge, measure

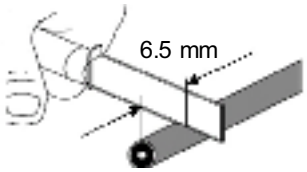
Procedure 6-2 TNC-P Connector used for IDU IF IN/OUT (L-angle: 300PTR-C-NC)

Outlines of parts [Applicable cable: 5D-FB-E]



Tools	• knife, cutter, nipper, tweezers, file, comb, measure, clearance gauge, etc. • spanner, torque spanner; 16 mm, 15 mm

1 Remove of Jacket of cable.
Remove 6.5 mm of Jacket only, exposing braided wire.



Note Do not damage the braided wire.

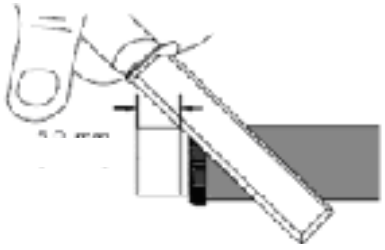
Tools	• knife • cutter • measure, etc.

2 The braided wires processing-1

(1) Fold the braided wire around jacket.

(2) Remove 5.0 mm of insulator.

(3) Remove all insulator/tape residue from the center conductor.

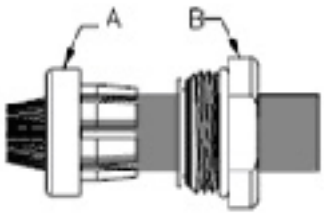


Note Do not damage the center conductor.

Tools	• cutter • measure etc.,

3 Insertion of parts

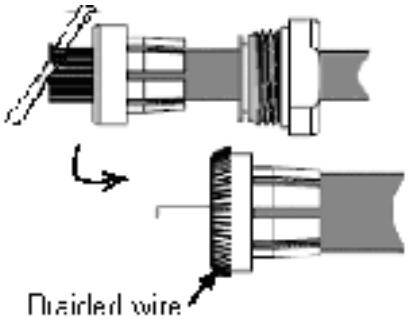
Make the braided wire small and sharp at the front;
Install parts B and parts A revolving as onto cable without damaging the braided wire.



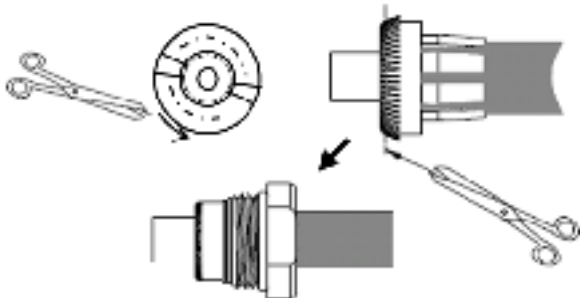
4 The braided wires processing-2

(1) The braided wire should be straight and equally spaced by tweezers.

(2) Fold the braided wire around parts A.



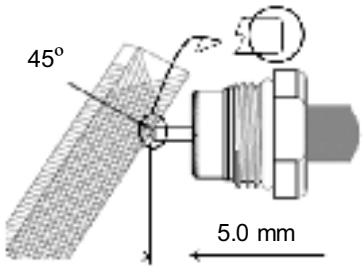
(3) The braided wire is cut according to outer of parts A.



Tools	• scissors • nipper • tweezers

5 Center conductor processing

Chamfer the center conductor at a 45º angle.

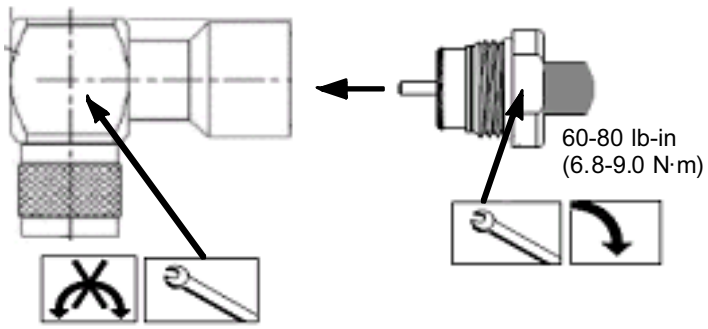


Note Do not damage the center conductor.

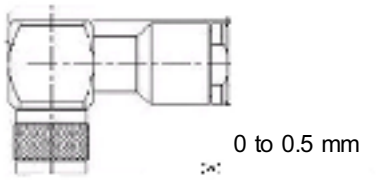
Tools	• cutter • measure • file, etc.

6 Connector assembly

(1) The cable center conductor must be straight and aligned with the connector inner contact. Insert the cable into the connector body until stopped; the center conductor must be inserted into the connector inner contact fingers. Tighten the connection to the torque value of 60 to 80 lb-in (6.8 to 9.0 N·m).



(2) The gap of the connector body and clamp nut is confirmed.
Gap: 0 to 0.5 mm



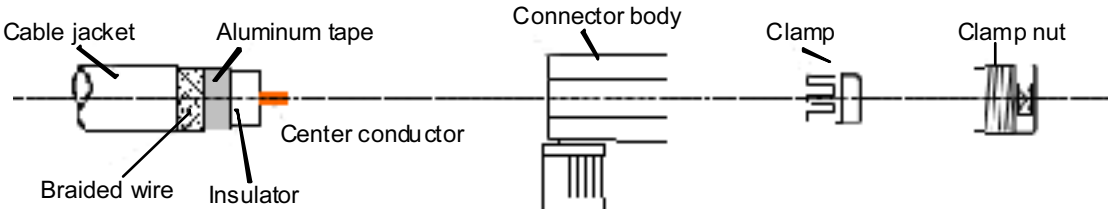
Notes

1. When inserting, do not put the chip which is braided wire inside the central conductor and the connector body.
2. Do not turn connector body, turn clamp nut attachment.

Tools	• spanner (16 mm) • torque spanner (15 mm)

Procedure 6-3 TNC-P Connector used for IDU IF IN/OUT (L-angle: TNC156(R0))

Outlines of parts [Applicable cable: 5D-FB-E]

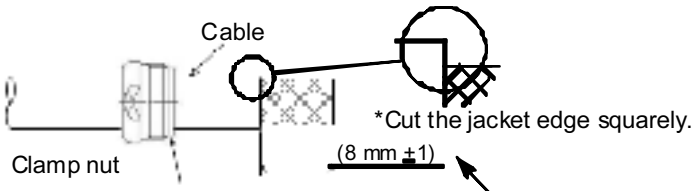


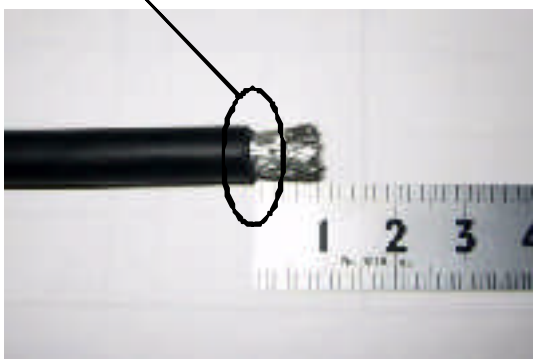
Tools	• knife, cutter, nipper, tweezers, file, measure, clearance gauge, etc. • spanner, torque spanner 12 mm, 16 mm

1 Insertion of parts, remove of jacket of cable.

(1) The clamp nut is inserted as shown.

(2) Remove 8 mm ±1 of jacket only.





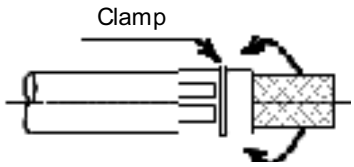
Note Do not damage the braided wire.

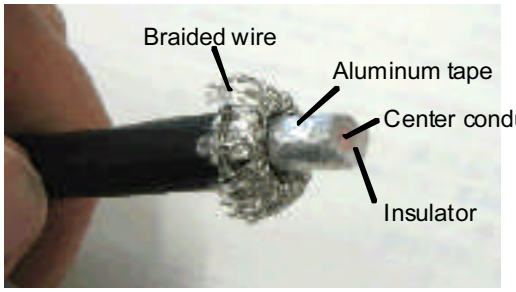
Tools	• knife • cutter • measure, etc.

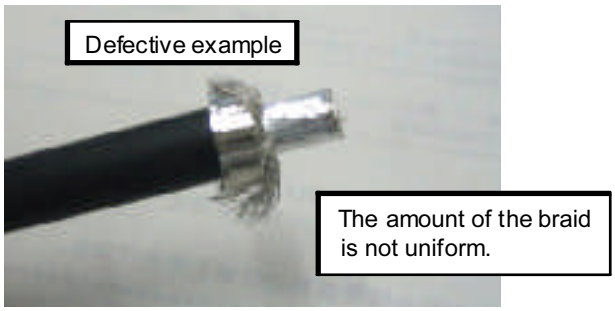
2 Insertion of parts.

(1) The clamp is inserted as shown.

(2) Braided wire is turned back to clamp side.





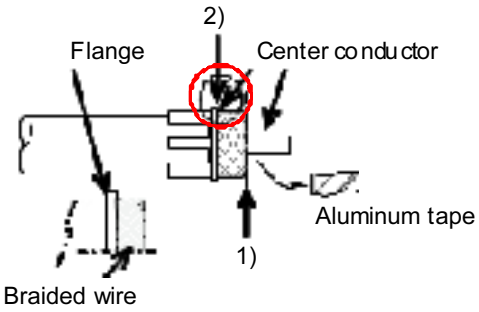


3 Remove of braided wire, insulator.

(1) The insulator and an aluminum tape are cut along an end face of turned up braided wire.

Note Do not damage the braided wire and the center conductor.

(2) The braided wire is cut according to flange of clamp.

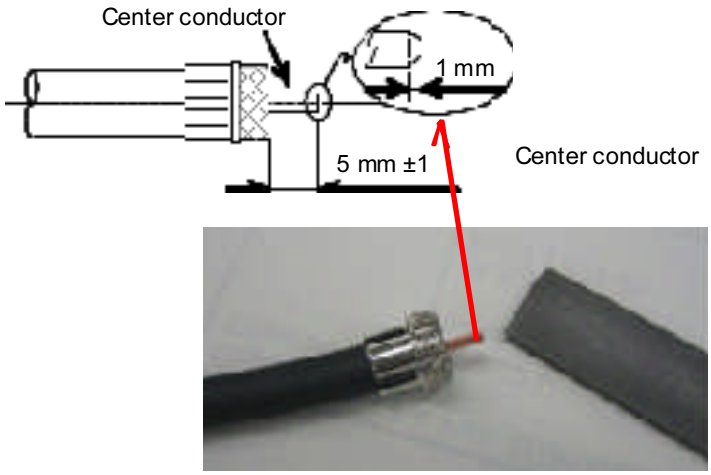


Tools	• cutter • nipper

4 Center conductor processing.

(1) Remove of the center conductor as shown.

(2) Chamfer the center conductor.

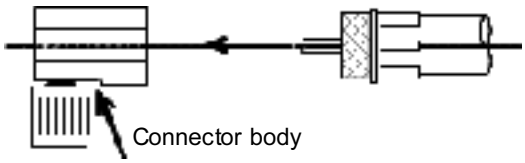


Tools	• nipper • file, etc.

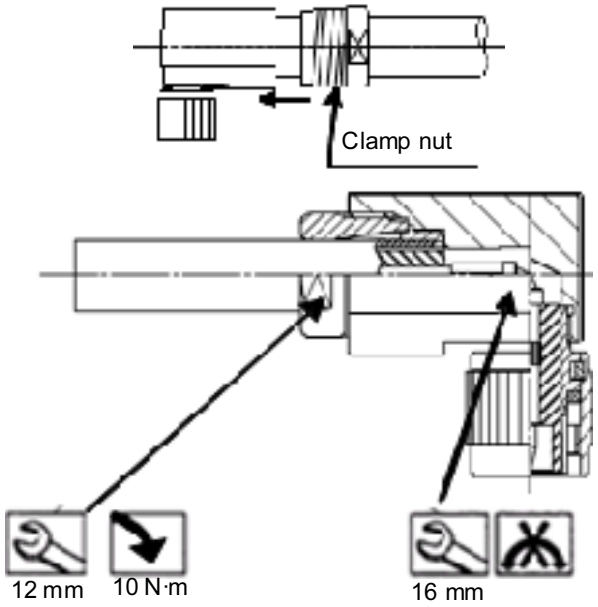
Note Do not damage the center conductor (burr, etc.).

5 Connector assembly

(1) The cable center conductor must be straight and aligned with the connector inner contact. Insert the cable into the connector body until stopped; the center conductor must be inserted into the connector inner contact fingers.

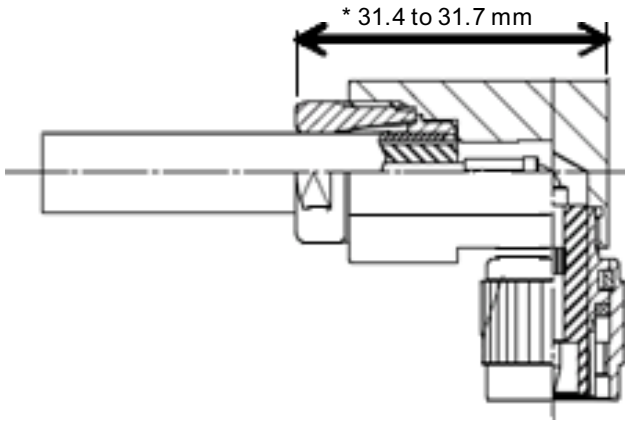


(2) Tighten the connection to the torque value of 10 N·m.



(3) Confirm the total length* of the connector.

* total length: 31.4 to 31.7 mm



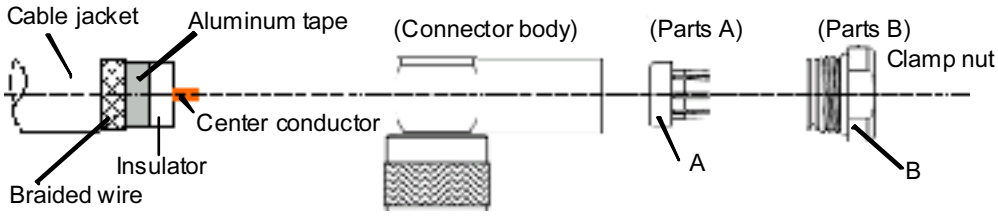
Notes

1. When inserting, do not put the chip which is braided wire inside the central conductor and the connector body.
2. Do not turn connector body, turn clamp nut attachment.

Tools	• spanner (16 mm) • torque spanner (12 mm)

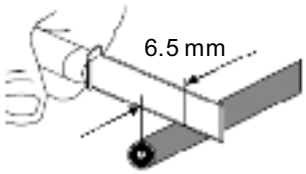
Procedure 6-4 N-P Connector used for ODU IF IN/OUT (L-angle: 300PNR-C-NC)

Outlines of parts [Applicable cable: 5D-FB-E]



Tools	• knife, cutter, nipper, tweezers, file, comb, measure, clearance gauge, etc. • spanner, torque spanner; 16 mm,15 mm

1 Remove of Jacket of cable.
Remove 6.5 mm of jacket only, exposing braided wire.



Note Do not damage the braided wire.

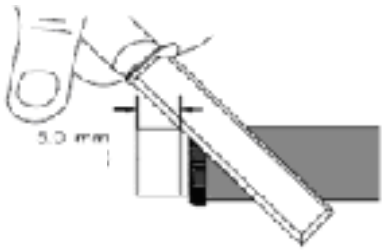
Tools	• knife • cutter • measure, etc.

2 The braided wires processing-1

(1) Fold the braided wire around jacket.

(2) Remove 5.0 mm of insulator.

(3) Remove all insulator/tape residue from the center conductor.

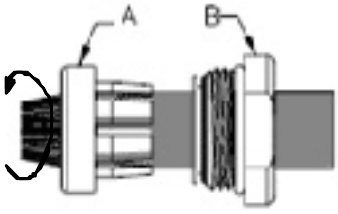


Note Do not damage the center conductor.

Tools	• cutter • measure etc.,

3 Insertion of parts

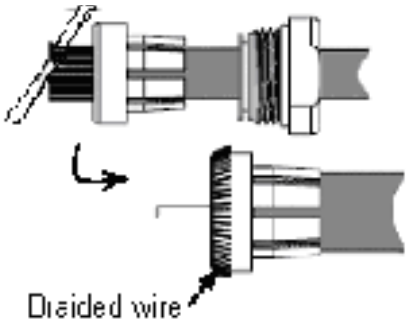
Make the braided wire small and sharp at the front;
Install parts B and parts A revolving as onto cable without damaging the braided wire.



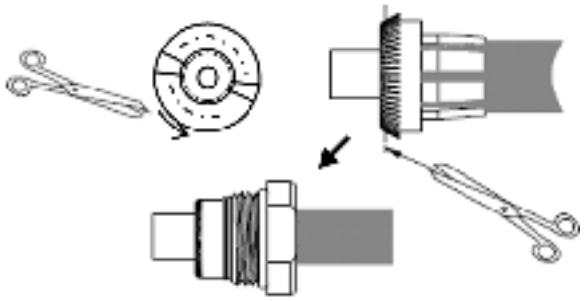
4 The braided wires processing-2

(1) The braided wire should be straight and equally spaced by tweezers.

(2) Fold the braided wire around parts A.



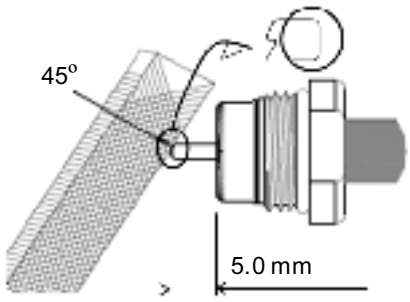
(3) The braided wire is cut according to outer of parts A.



Tools	• scissors • nipper • tweezers

5 Center conductor processing

Chamfer the center conductor at a 45º angle.

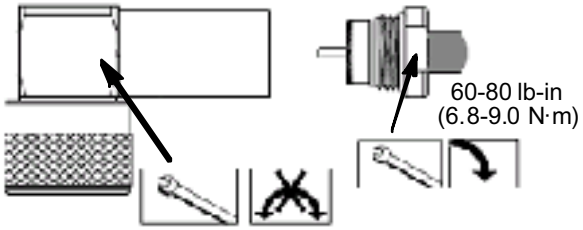


Note Do not damage the center conductor.

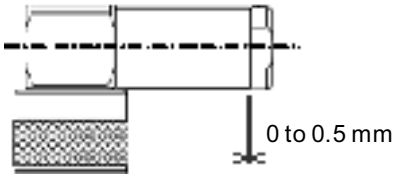
Tools	• cutter • measure • file, etc.

6 Connector assembly

(1) The cable center conductor must be straight and aligned with the connector inner contact. Insert the cable into the connector body until stopped; the center conductor must be inserted into the connector inner contact fingers. Tighten the connection to the torque value of 60 to 80 lb-in (6.8 to 9.0 N·m).



(2) The gap of the connector body and clamp nut is confirmed.
Gap: 0 to 0.5 mm



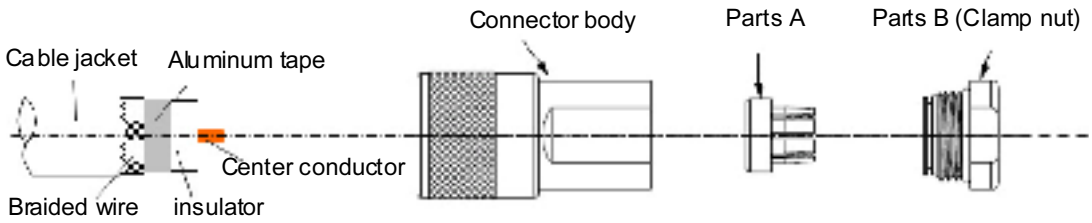
Notes

1. When inserting, do not put the chip which is braided wire inside the central conductor and the connector body
2. Do not turn connector body, turn clamp nut attachment.

Tools	• spanner (16 mm) • torque spanner (15 mm)

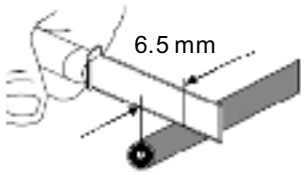
Procedure 6-5 N-P Connector used for ODU IF IN/OUT (Straight: 300PNM-C-NC)

Outlines of parts [Applicable cable: 5D-FB-E]



Tools	• knife, cutter, nipper, tweezers, file, comb, measure, clearance gauge, etc. • spanner, torque spanner; 16 mm,15 mm

1 Remove of Jacket of cable.
Remove 6.5 mm of jacket only, exposing braided wire.



Note Do not damage the braided wire.

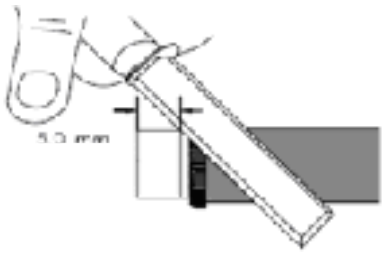
Tools	• knife • cutter • measure, etc.

2 The braided wires processing-1

(1) Fold the braided wire around jacket.

(2) Remove 5.0 mm of insulator.

(3) Remove all insulator/tape residue from the center conductor.

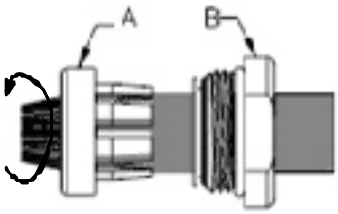


Note Do not damage the center conductor.

Tools	• cutter • measure etc.,

3 Insertion of parts

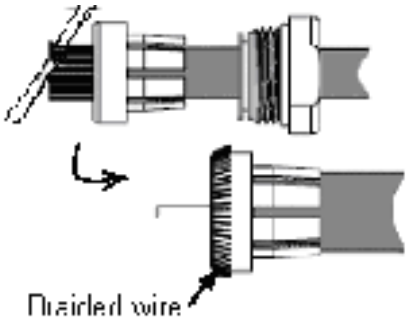
Make the braided wire small and sharp at the front;
Install parts B and parts A revolving as onto cable without damaging the braided wire.



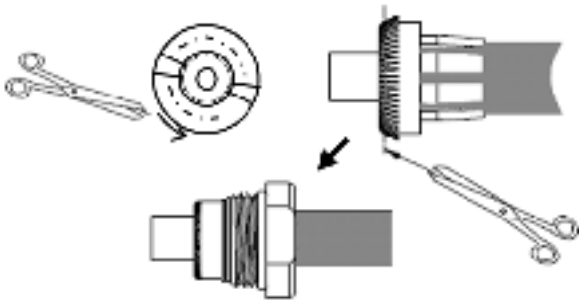
4 The braided wires processing-2

(1) The braided wire should be straight and equally spaced by tweezers.

(2) Fold the braided wire around parts A.



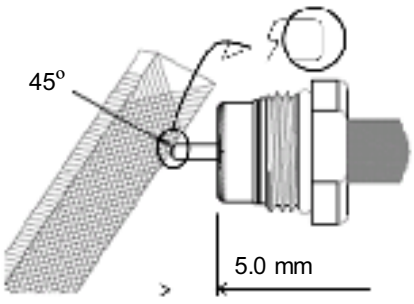
(3) The braided wire is cut according to outer of parts A.



Tools	• scissors • nipper • tweezers

5 Center conductor processing

Chamfer the center conductor at a 45º angle.

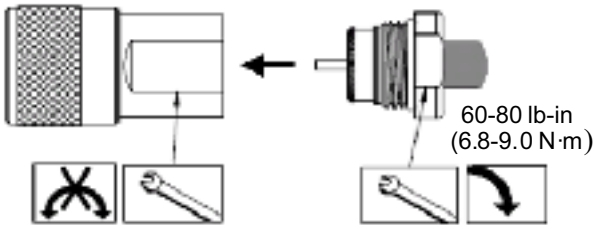


Note Do not damage the center conductor.

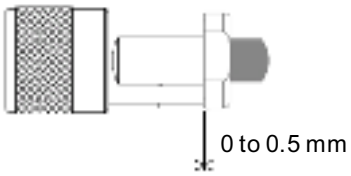
Tools	• cutter • measure • file, etc.

6 Connector assembly

(1) The cable center conductor must be straight and aligned with the connector inner contact. Insert the cable into the connector body until stopped; the center conductor must be inserted into the connector inner contact fingers. Tighten the connection to the torque value of 60 to 80 lb-in (6.8 to 9.0 N·m).



(2) The gap of the connector body and clamp nut is confirmed.
Gap: 0 to 0.5 mm



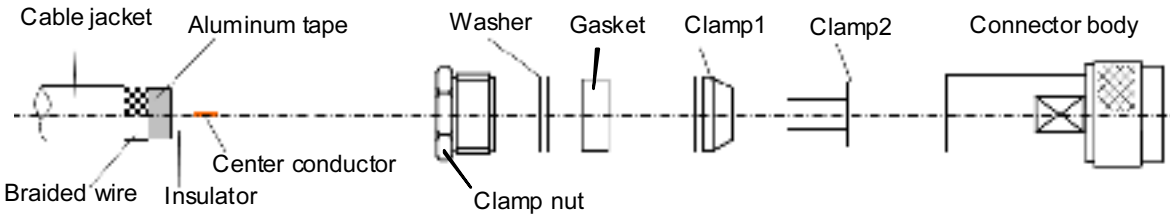
Notes

1. When inserting, do not put the chip which is braided wire inside the central conductor and the connector body
2. Do not turn connector body, turn clamp nut attachment.

Tools	• spanner (16 mm) • torque spanner (15 mm)

Procedure 6-6 N-P Connector used for ODU IF IN/OUT (Straight: N435(R0))

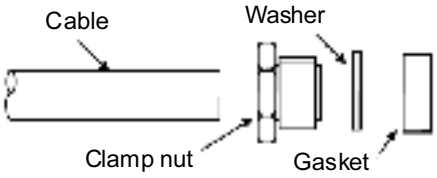
Outlines of parts [Applicable cable: 5D-FB-E]



Tools	• knife, cutter, nipper, tweezers, file, measure, clearance gauge, etc. • spanner, torque spanner; 16 mm

1 Insertion of parts

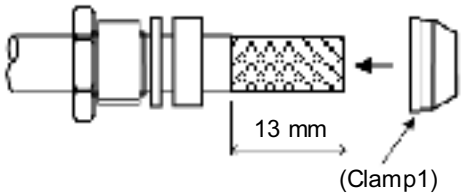
The clamp nut, the washer and the gasket are inserted in the cable.



2 Remove of jacket of cable, insertion of parts,

(1) Remove 13 mm of jacket only.

(2) The clamp1 is inserted as shown.

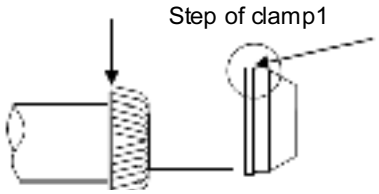


Note Do not damage the braided wire.

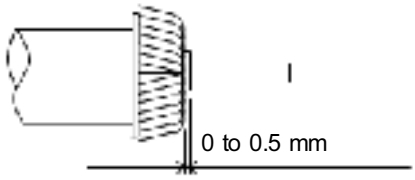
Tools	• knife • cutter • measure, etc.

3 Center conductor processing

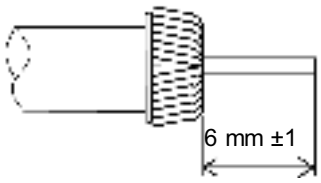
(1) Braided wire is disentangled.
Braided wires which became straight wires are turned back to clamp1 side. The braided wires are cut according to step of clamp1.



(2) Remove of insulator and aluminum tape as shown without damaging the center conductor.

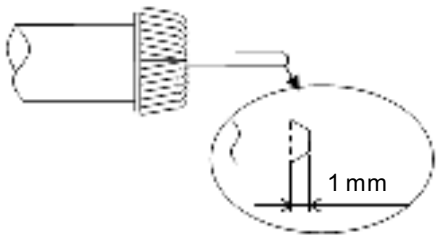


(3) Remove of the center conductor as shown.



Tools	• cutter • nipper

(4) Chamfer the center conductor.

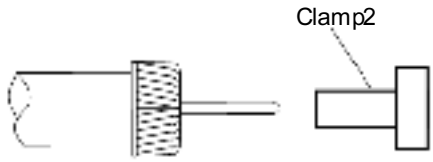


Note Do not damage the center conductor (burr etc.).

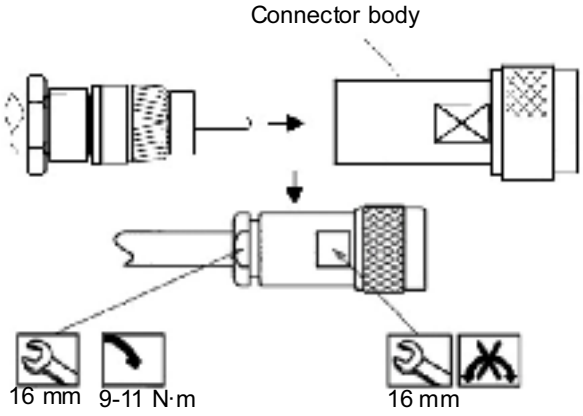
Tool	• file

4 Connector assembly

(1) The clamp2 is inserted between the aluminum tape and the braided wire.



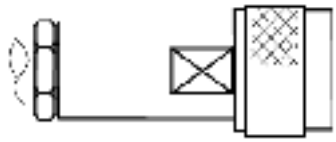
(2) The cable center conductor must be straight and aligned with the connector inner contact. Insert the cable into the connector body until stopped; the center conductor must be inserted into the connector inner contact fingers. Tighten the connection to the torque value of 9 to 11 N·m.



Notes

1. When inserting, do not put the chip which is braided wire inside the central conductor and the connector body.
2. Do not turn connector body, turn clamp nut attachment.

(3) The gap of the connector body and clamp nut is confirmed.
(*) Gap: 2.2 to 2.7 mm



(*): Check point

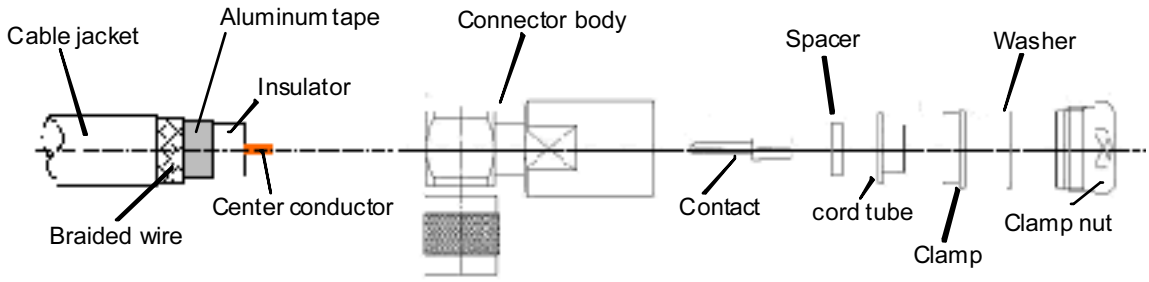
Tools	• spanner (16 mm) • torque spanner (16 mm) • clearance gauge, measure

Note Do not remove the connector body tightened up once. When removing, it is reworked from procedure 1 or a cable is exchanged.

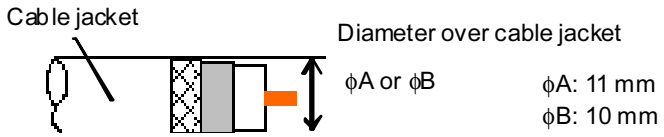
6.2 8D Coaxial Cable

Procedure 6-7 TNC-P Connector used for IDU IF IN/OUT (L-angle: TNC141(R0))

Outlines of parts [Applicable cable: 8D-FB-E]



Tools	• knife, cutter, nipper, tweezers, file, measure, clearance gauge, etc. • spanner, torque spanner 16 mm

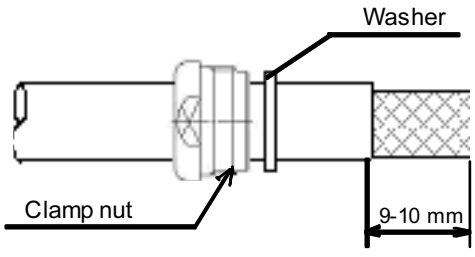


In case of cable type A (ϕA)

1 Insertion of parts and remove of jacket of cable.

(1) The clamp nut, the washer are inserted in the cable.

(2) Remove 9 to 10 mm of jacket only.



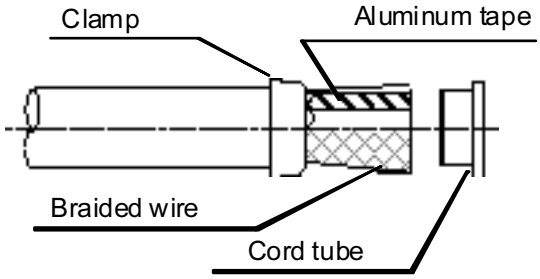
Tools	• knife • cutter • measure, etc.

Note Do not damage the braided wire.

2 Insertion of parts.

(1) The clamp are inserted in the cable.

(2) The braided wire is expanded a little. The cord tube is inserted between the aluminum tape and the braided wire.



Tool	• tweezers

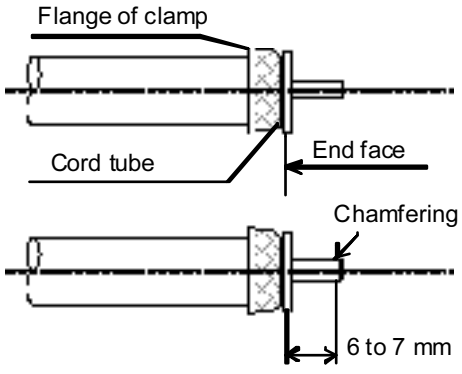
3 Center conductor, braided wire and insulator processing.

(1) After cord tube insertion, an aluminum tape and the insulator are cut along an end face.

(2) Turning back the braided wire in the clamp, it cuts off the part which comes out of the flange.

(3) A central conductor is 6 to 7 mm from an end face.
Cut it to become 6 to 7 mm when there are 7 mm or more.

(4) A point of a central conductor is chamfered.



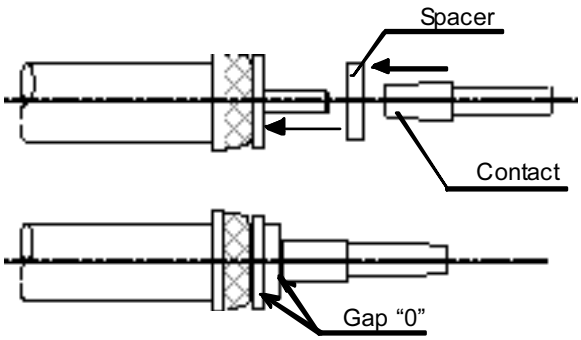
Tools	• cutter • nipper • file

Notes

1. Do not damage the braided wire.
2. Do not damage the center conductor (brr etc.).

4 Insertion of contact.

(1) A spacer is inserted in a central conductor and contact is inserted.



Note During the contact, the spacer and the insulator there is no gap.

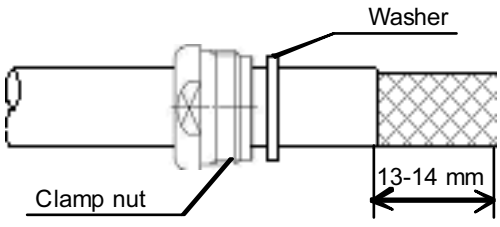
Refer to [common procedure] cable type A & type B for the next procedure.

In case of cable type B (ϕB)

1 Insertion of parts and remove of jacket of cable.

(1) The clamp nut, the washer are inserted in the cable.

(2) Remove 13 to 14 mm of jacket only.



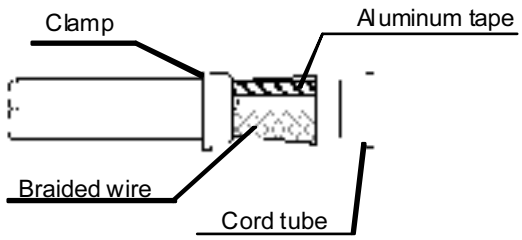
Note Do not damage the braided wire.

Tools	• knife • cutter • measure, etc.

2 Insertion of parts.

(1) The clamp are inserted in the cable.

(2) The braided wire is expanded a little. The cord tube is inserted between the aluminum tape and the braided wire.
Refer to the position of the cord tube by step 3.



Tool	• tweezers

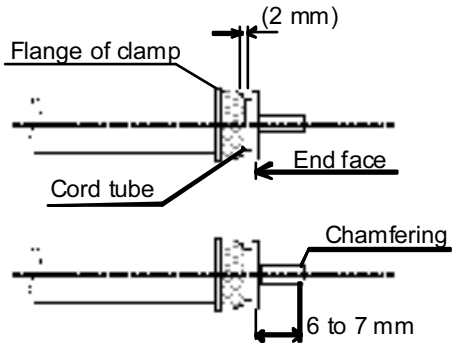
3 Center conductor, braided wire and insulator processing.

(1) After cord tube insertion, an aluminum tape and the insulator are cut along an end face.

(2) Turning back the braided wire in the clamp.

(3) A central conductor is 6 to 7 mm from an end face. Cut it to become 6 to 7 mm when there are 7 mm or more.

(4) A point of a central conductor is chamfered.



Tools	• cutter • nipper • file

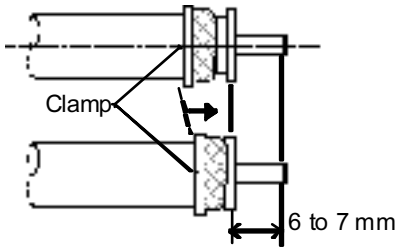
Notes

1. Please note the position of the cord tube.
2. Do not damage the braided wire.
3. Do not damage the center conductor (burr etc.).

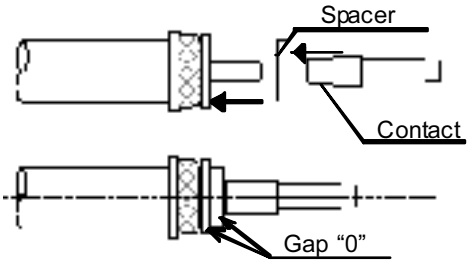
4 Insertion of contact.

(1) The clamp is moved to the cord tube side.

(2) Cut off the braided wire which comes out of the flange.



(3) A spacer is inserted in a central conductor and contact is inserted.



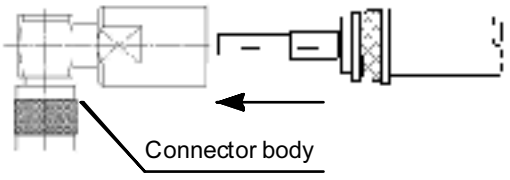
Note There must be no gap between the contact, the spacer and the cord tube.

Refer to [common procedure] cable type A & type B for the next procedure.

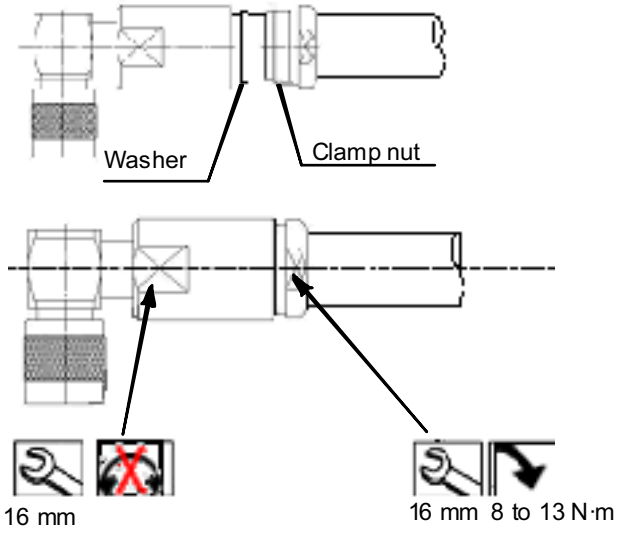
[Common procedure] cable type A & type B

5 Connector assembly.

(1) Insert it until the cable assembly bumps inner connector.



(2) The washer and clamp nut are moved to the connector side, and it tightens. The tightening torque of the clamp nut is 8 to13 N·m.

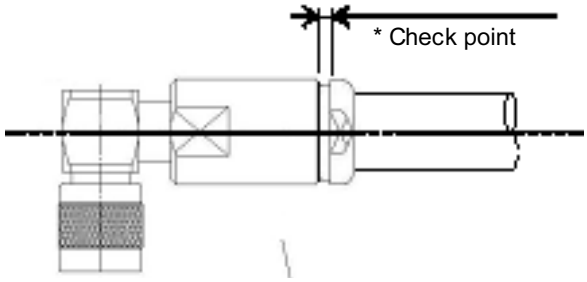


Notes

1. When inserting, do not put the chip which is braided wire inside the central conductor and the connector body.
2. Do not turn connector body, turn clamp nut attachment.

(3) The gap of the connector body and clamp nut is confirmed.
* Gap: 2.1 to 2.45 mm (reference)

Gap is reference, tightening must not become insufficient.

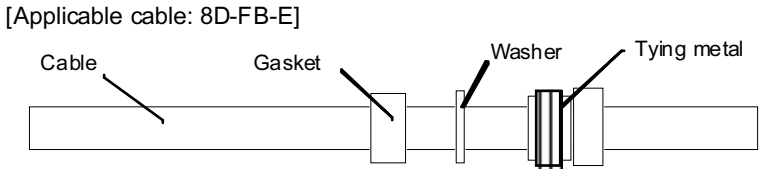


Tools	• spanner (16 mm) • torque spanner (16 mm) • clearance gauge, measure

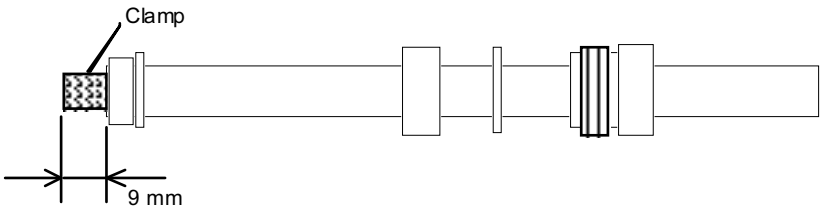
Note Do not remove the connector body tightened up once.
When removing, it is reworked from procedure 1 or a cable is exchanged.

Procedure 6-8 N-PConnector used for ODU IF IN/OUT (L-angle: N-LP-8DFB(B))

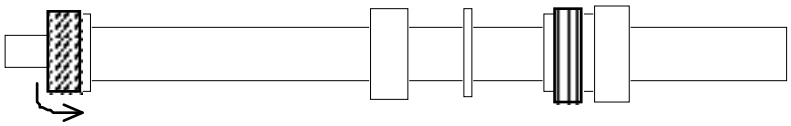
1 First fit the tying metal, washer and gasket on the cable,



2 Strip back the cable sheath, taking care not to damage the braided shield, and fit the clamp,

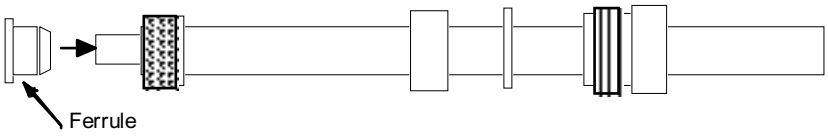


3 Fold back the braided shield (separating the strands of the braid) and trim it,

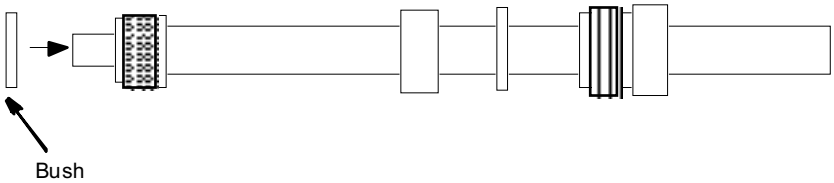


Note Pay attention not to damage the plait.

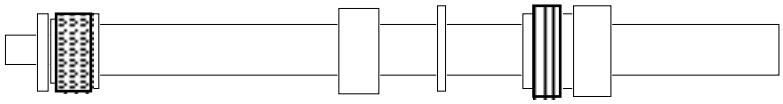
4 Insert the ferrule,



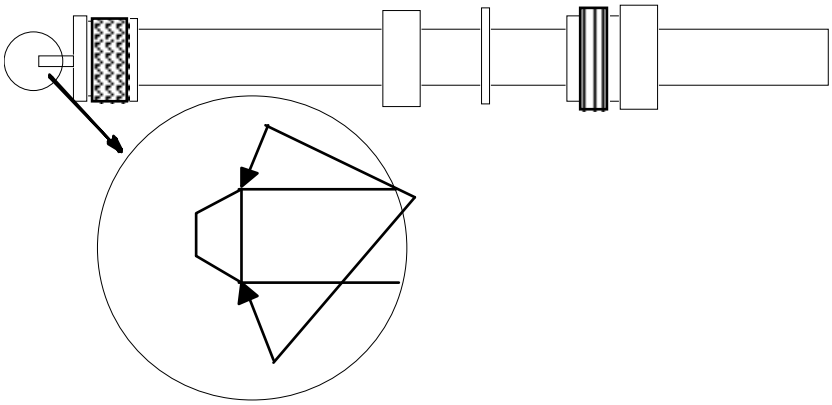
5 Fit the bushing,



6 Cut the aluminum foil and inner insulator away along the bushing and retain the inner conductor,

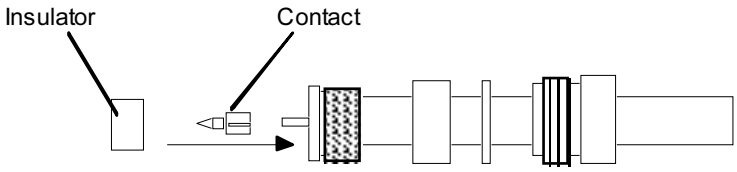


7 Taper the edge of the center conductor using a file as shown in the enlarged view below,

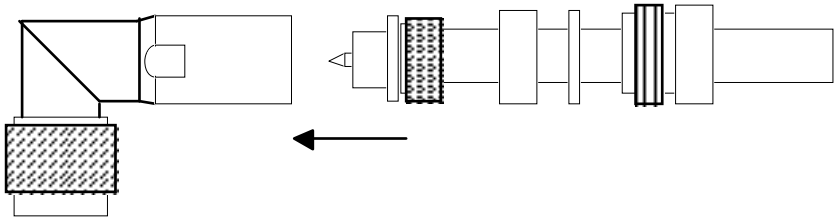


Note Pay attention not to let protrusions and indents to occur.

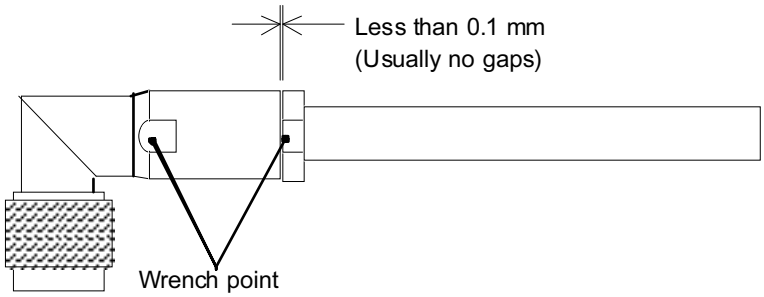
8 Mount the contact onto the center conductor and mount the insulator onto the contact,



9 Insert the cable into the shell,

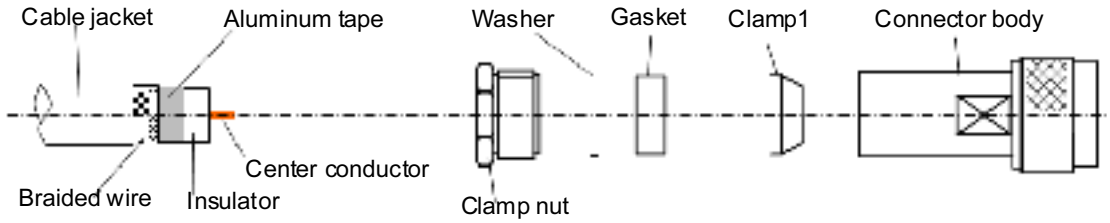


10 Tighten the tying metal by wrench using the wrench points (tighten with torque of 4 to 10 N·m).



Procedure 6-9 N-P Connector used for ODU IF IN/OUT (Straight: N416(R0))

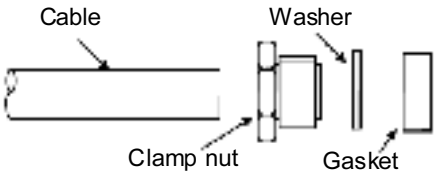
Outlines of parts [Applicable cable: 8D-FB-E]



Tools	• knife, cutter, nipper, tweezers, file, measure, clearance gauge, etc. • spanner, torque spanner; 16 mm

1 Insertion of parts

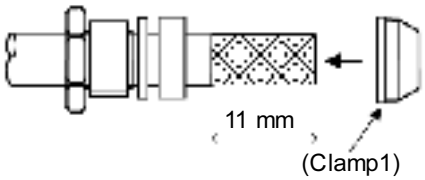
The clamp nut, the washer and the gasket are inserted in the cable.



2 Remove of jacket of cable, insertion of parts,

(1) Remove 11 mm of jacket only.

(2) The clamp1 is inserted as shown.

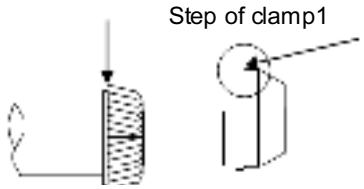


Note Do not damage the braided wire.

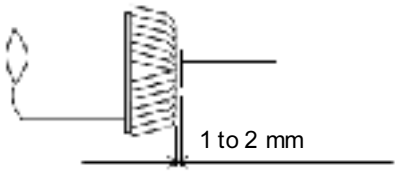
Tools	• knife • cutter • measure, etc.

3 Center conductor processing

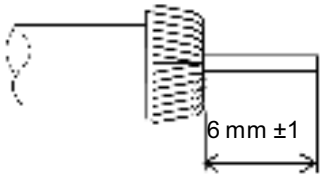
(1) Braided wire is disentangled.
Braided wires which became straight wires are turned back to clamp1 side. The braided wires are cut according to step of clamp1.



(2) Remove of insulator and aluminum tape as shown without damaging the center conductor.

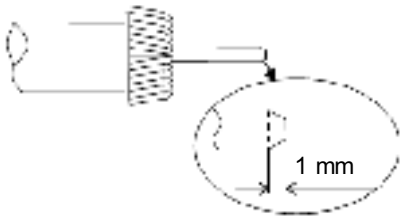


(3) Remove of the center conductor as shown.



Tools	• cutter • nipper

(4) Chamfer the center conductor.

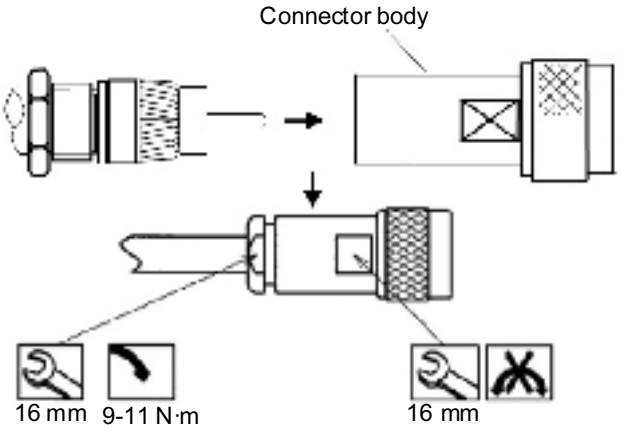


Note Do not damage the center conductor (burr etc.).

Tool	• file

4 Connector assembly

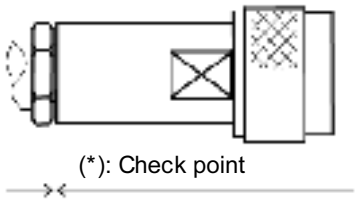
(1) The cable center conductor must be straight and aligned with the connector inner contact. Insert the cable into the connector body until stopped; the center conductor must be inserted into the connector inner contact fingers. Tighten the connection to the torque value of 9 to 11 N·m.



Notes

1. When inserting, do not put the chip which is braided wire inside the central conductor and the connector body.
2. Do not turn connector body, turn clamp nut attachment.

(2) The gap of the connector body and clamp nut is confirmed.
(*) Gap: 0 mm

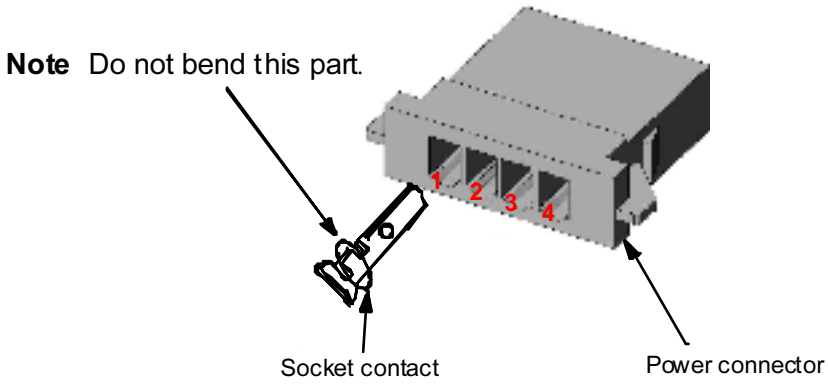


Tools	• spanner (16 mm) • torque spanner (16 mm) • clearance gauge, measure

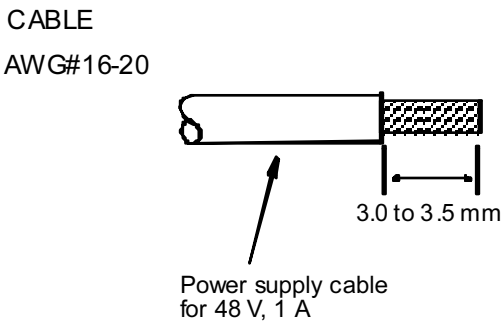
Note Do not remove the connector body tightened up once.
When removing, it is reworked from procedure 1 or a cable is exchanged.

6.3 Other Cable

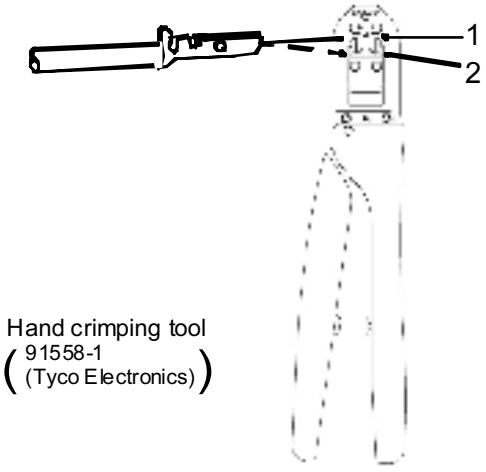
Procedure 6-10 Power Supply Cables with AMP Housing & Socket Contacts



1 Remove 3.0 to 3.5 mm of insulation,



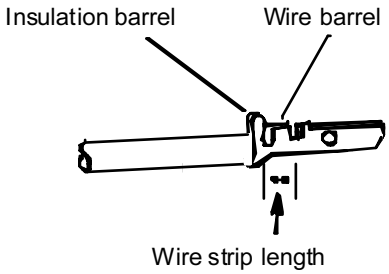
2 Set the socket contact to the hand crimping tool,



3 Squeeze the handle of the hand crimping tool, insert cable into socket contact,

4 The cable should fit, so insulation and bare wire are arranged as shown,

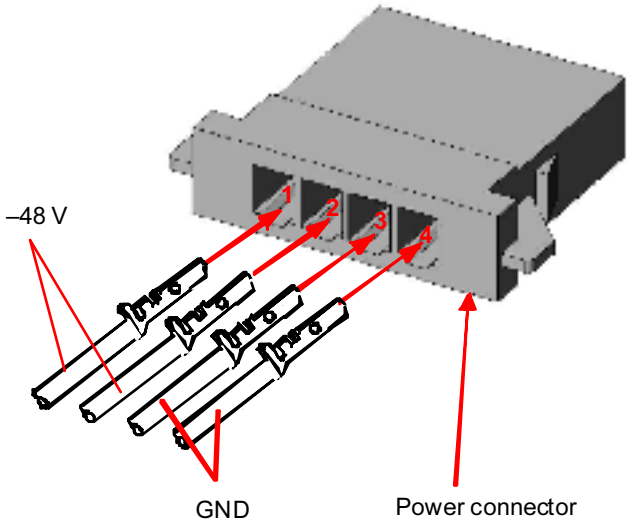
5 Squeeze the handle of the hand crimping tool until the ratchet is released,



6 Twist cables for the power supply,

Note Twist power cables (+)/(–) to suppress inductive interference signals.

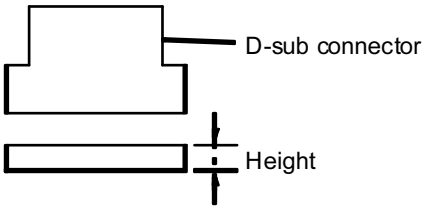
7 Insert the socket contacts into the power connector until they lock.



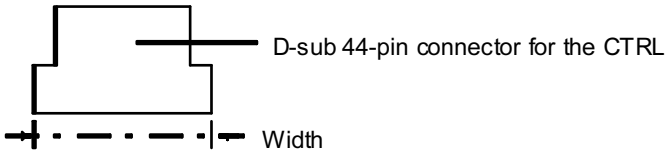
Procedure 6-11 120 ohms Balanced Interface with D-Sub Connector

Notes

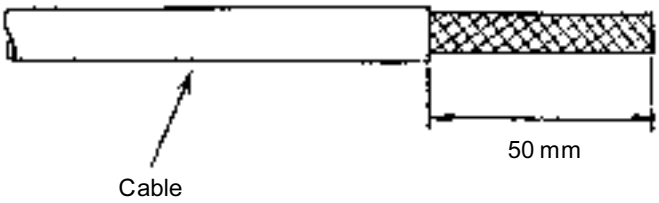
1. Use D-sub connectors of less than 16 mm in height as illustrated below.



2. Use D-sub 44-pin connector for the CTRL of less than 57 mm in width as illustrated below.



1 Strip back the cable sheath, taking care not to damage the braided shield,



Note Use shielded cables which are connected to the D-Sub connector to suppress interference from affecting the signal and to reduce electromagnetic radiation which may interfere with other signal cables.

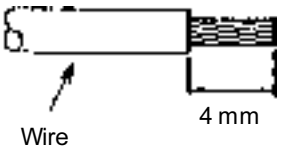
2 Fold back the braided shield (do not separate the strands) and trim it as shown,

3 Remove 4 mm of insulation from the end of the wire,

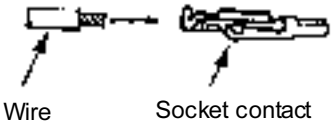
CONFORMING WIRE SOCKET CONTRACT

AWG#20-24: CD-PC-111

AWG#24-28: CD-PC-121



4 Insert the cable into the socket contact,



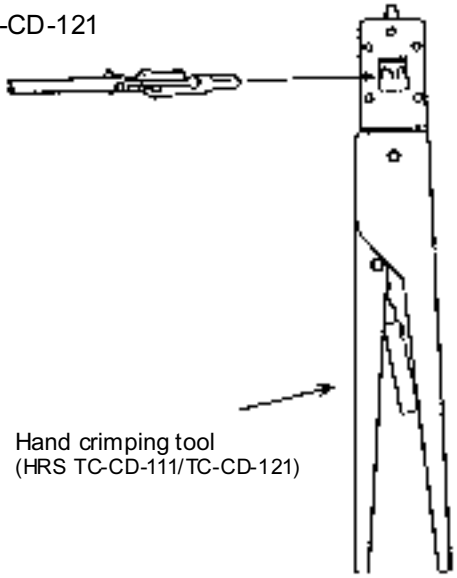
5 The cable should be fitted so that insulation and bare wire are arranged as shown,

6 Insert the socket contact into the hand crimping tool,

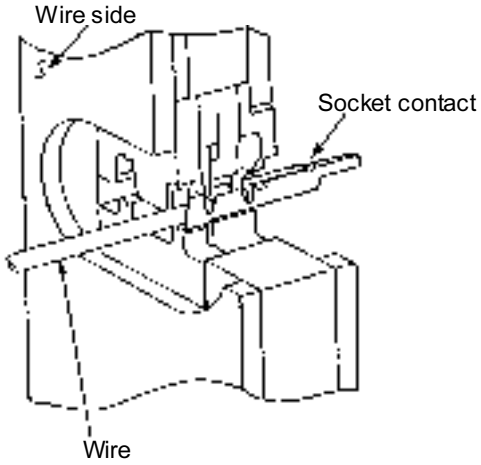
CONFORMING WIRE SOCKET CONTRACT

AWG#20-24: TC-CD-111

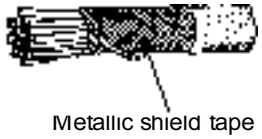
AWG#24-28: TC-CD-121



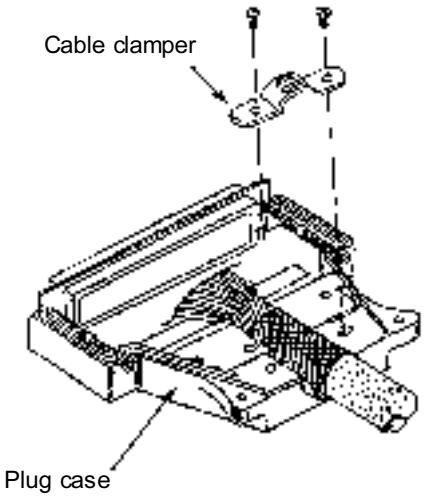
7 Recheck that the wire position is as shown in step 5 before crimping the socket contact (see illustration below),



8 Wind the metallic shield tape over the braided shield,

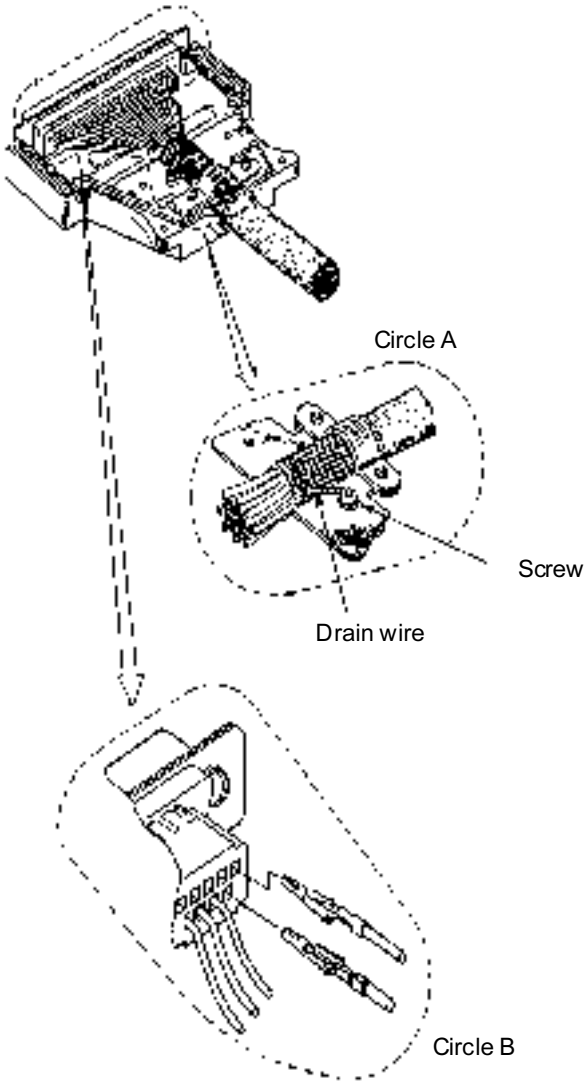


9 Set the cable into the plug case as shown in figure below. Then, fix the cable using the cable clamper and two screws,

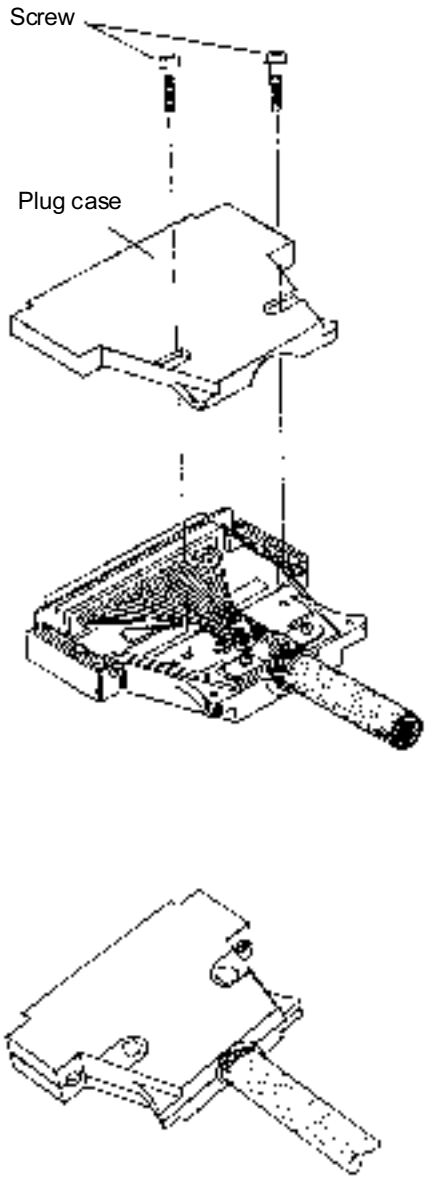


10 Referring to circle A, fix the drain wire with screw,

11 Referring to circle B, insert each wire to the specified position (Refer Interface Terminals and Jacks for IDU in Section II OPERATING EQUIPMENT.). Insert the socket contacts into the upper and lower row positions while taking care that the socket contacts are inserted the right way,



12 Fix the plug case with two screws, as shown in the figure.

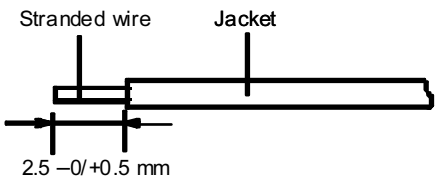


Procedure 6-12 Auxiliary Signal Interface with D-Sub High Density Crimp Contacts Assembly Connector

The following explains how to assemble high density crimp contacts used for HARTING hand crimp tool as an example.

Crimping/inserting contacts process

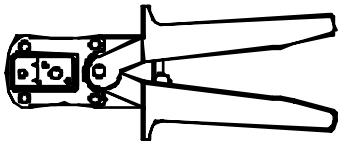
1 Strip the jacket for 2.5 –0/+0.5 mm as shown left and check if stranded wire is not damaged,



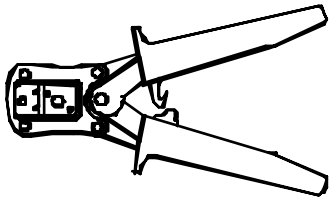
Applicable wire size: 0.14 - 0.22 mm^2 (AWG26 - 24), stranded, maximum insulation: ϕ1.38 mm

Stamped male contacts: 09 56 000 8175 (Level S4), High density male connectors: 09 56 300 5601 (#44)

Crimp Tool (09 88 999 0596)

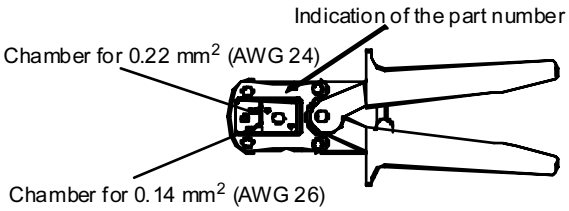


2 Place the handles in the open position as shown left,



Note When the handles are in close position, squeeze handles completely until safety ratchet is released.

3 Select the suitable chamber for the selected wire,



4 Insert contact in the selected chamber,

5 Insert the prepared wire in the contact,

6 Squeeze the handles together completely until the safety ratchet clicks to open,

7 Take out the crimped contacts from the chamber. Check if it should not be scratched or transformed,

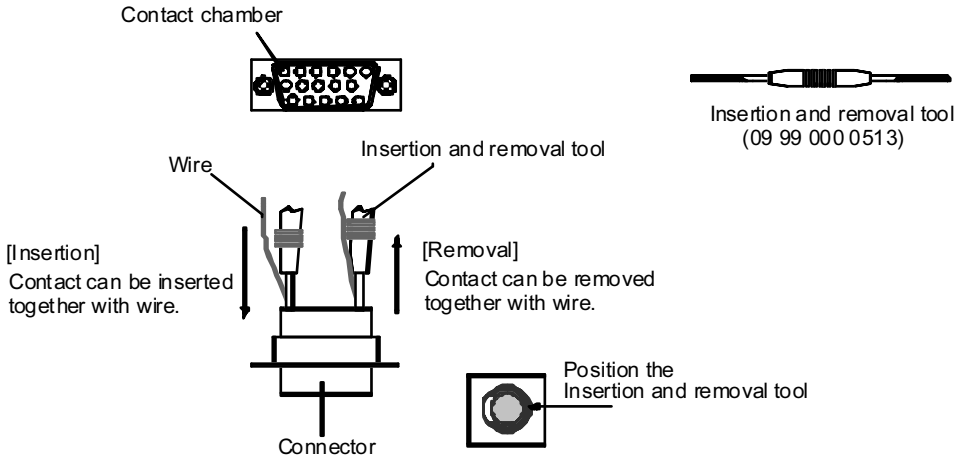
8 After crimping the stranded wire to the contact using a hand tool, insert the contact into the contact chamber with the tool, working from the wiring side,

9 You can here the contacts snap home, audible “click”,

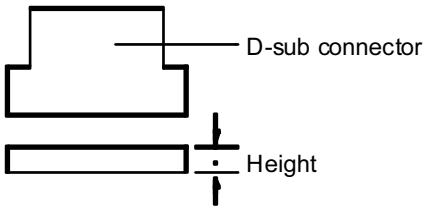
10 Check if they are securely in place with giving the wire a gentle pull.

Removing crimp contacts

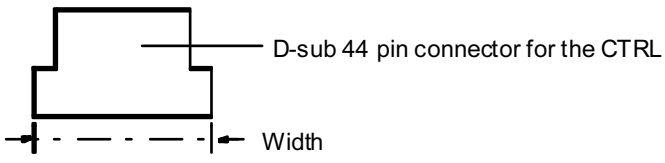
1 Position the tool from the wiring side as shown left and insert into the contact chamber. The contact can then easily be removed from the wiring side together with itself and reinserted in a different chamber.



Note Use D-sub connectors of less than 16 mm in height as illustrated below.



Note Use D-sub 44-pin connector for the CTRL of less than 57 mm in width as illustrated below.



7. WIRING and FORMING

Procedure

1 Connect cables for, signal interface, power supply, IF IN/OUT and ground to the proper connector of the IDU.

(1) Connect ground cable to the ground terminal.

(2) Connect IF cable to IF IN/OUT connector.

(3) Connect power supply cable to SELV connector.

(4) Connect 16/32/48E1, STM-1, Aux. signal cables to proper connector.

Note When disconnect cables, perform it in revers steps.

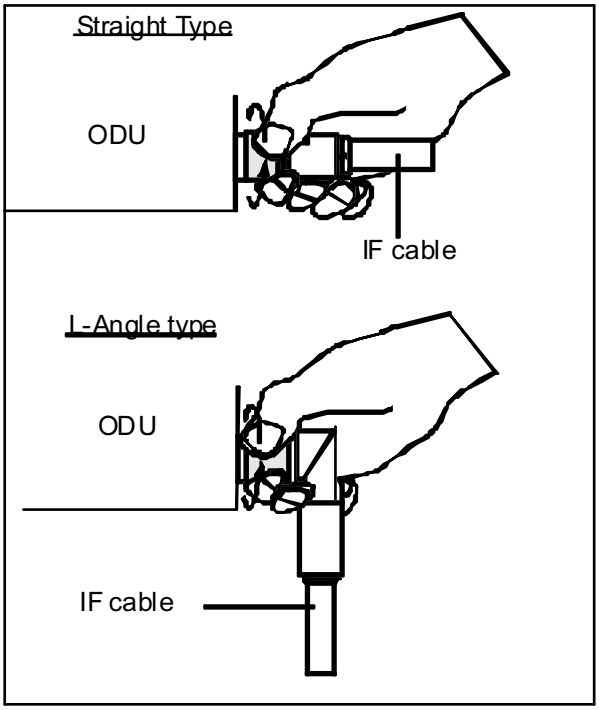
2 Fix the cables using cable binder to the rack as like as indicated position.

Notes

1. Do not cross the cables on front of indicators and power switch used for maintenance.
2. Take suitable bend radius to wiring the IF cable. (5DFB: 45 mm or more, 8DFB: 70 mm or more)
3. For the IF cable connection, it is recommended to use adapter. (Applicable adapters are listed table below.)

Table 7-1 IF Cable Adapter

IF Cable	Adapter	
	TNC(P) - N(J)	TNC(P) - TNC(J)
5D-FB	√	
8D-FB	√	√

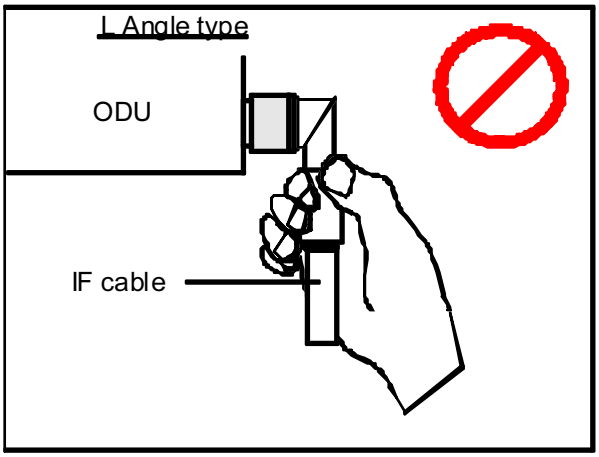


Caution

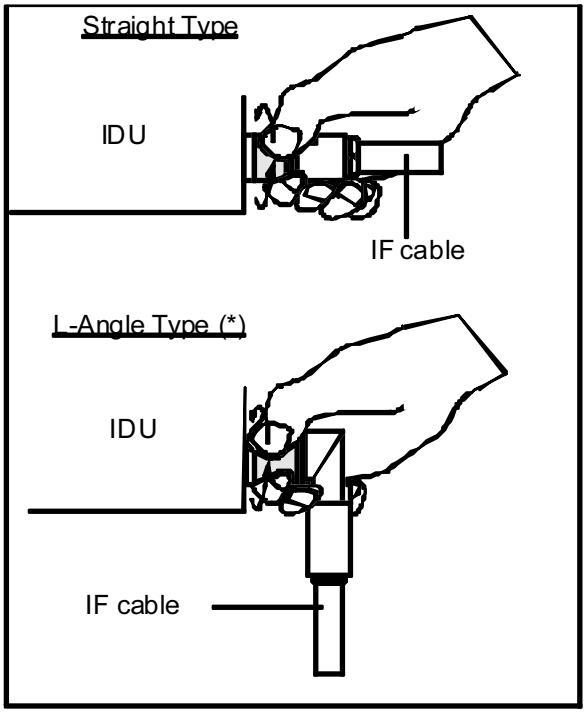
When connecting the IF cable to the ODU, tighten the N-male connector with engage connector nut only using fingers and holding the cable with another hand.

Tighten the engage connector nut only for the L-angle connector also.

(Tightening Torque: 0.7 to 1.2 N•m (7 to 12 kg•cm))



If rotate other parts of the L-angle connector as illustrated left, it can cause connector damage.

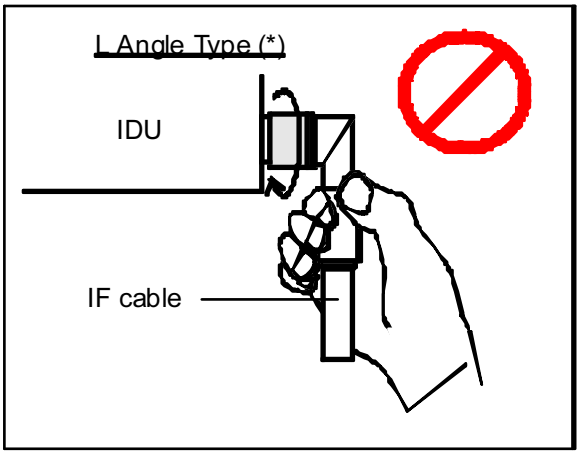


Caution

Tighten the TNC-male connector of IF cable to the IDU with engage connector nut only using fingers and holding the cable with another hand.

Tighten the engage connector nut only for the L-angle connector also.

(Tightening Torque: 0.3 to 0.5 N•m (3 to 5 kg•cm))



If rotate other parts of the L-angle connector as illustrated left, it can cause connector damaged.

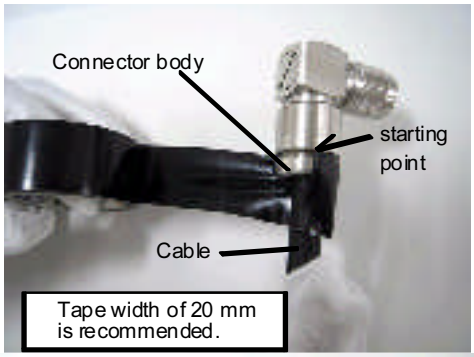
(*) When using L-angle connector, pay attention the following precaution to avoid the connector damaged.

Precaution for connecting the IF cable with a L-angle connector to the IDU

(a) Wrapping connector and cable by vinyl tape for protection.

After terminating the IF cable with a L-angle connector.

It is strongly recommended to wrap between connector and cable with vinyl tape to protect them as follows.



1) From the starting point as shown in photograph, wrap the tape 1 to 1.5 times carefully around the joint where the cable and connector body are connected.

Note While taping, use caution not to twist cable against the connector.

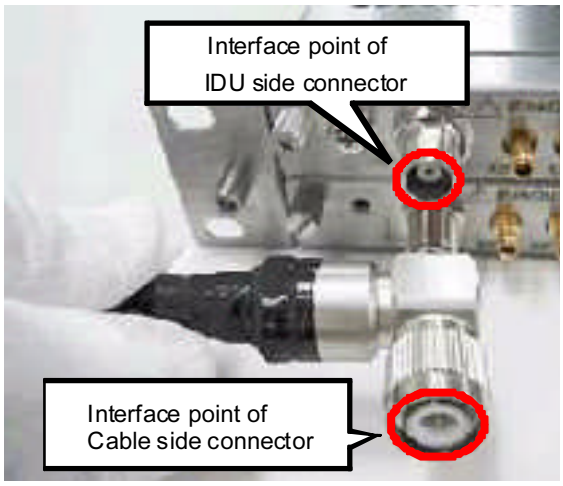
2) Wind the tape up to slightly above a half length of the connector. (See the photo 4 below.)

3) By pressing down the tape with fingers so it will be firmly attached to the joint, wrap the tape up to 4 or 5 times more around the joint.

4) Use slightly above L/2 of the connector and about the width of the tape below cable as the rough guideline for places to cover.

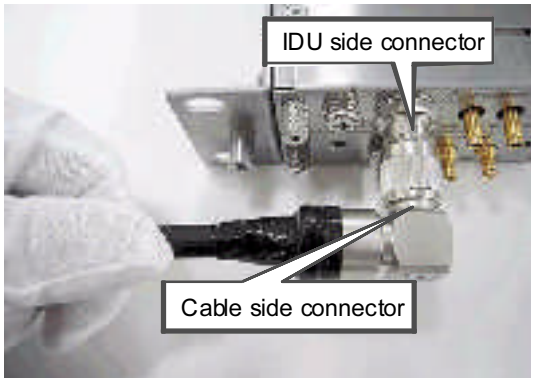
(b) Preparation for connecting the IF cable to the IDU.

When connecting the IF cable to the IDU, turn the IF cable itself to match face to face their interface points between the IF cable and the IDU.



Do not turn the L-angle connector itself to avoid high stress to cause it damaged.

(c) Matching those interface points between the IF cable and the IDU.



(d) Connecting the IF cable to the IDU.

If it is difficult to connect by single hand, do not twist the IF cable but support softly.

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8. GROUNDING THE FRAMES

In mounting the IDU and ODU, perform frame grounding. The location of the frame grounding in each IDU and ODU is shown in Figure 8-1, and the connection for frame grounding is shown in Figure 8-2.

Note Connect the Frame Ground (FG) terminal on the IDU to the mounting rack with the earth cable. In addition, connect the mounting rack to the indoor earth terminal with the earth cable and connect the FG terminal on the ODU to the ground (refer to Figure 8-2).

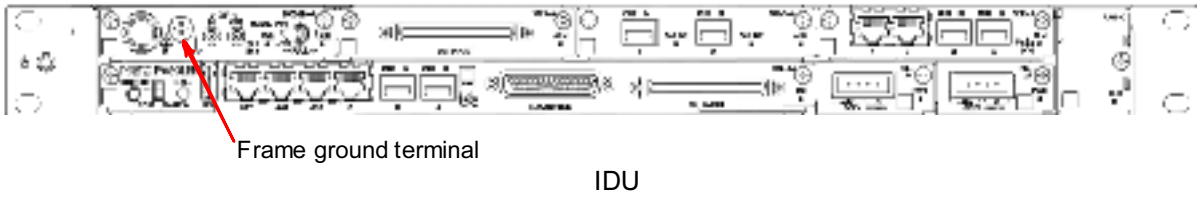
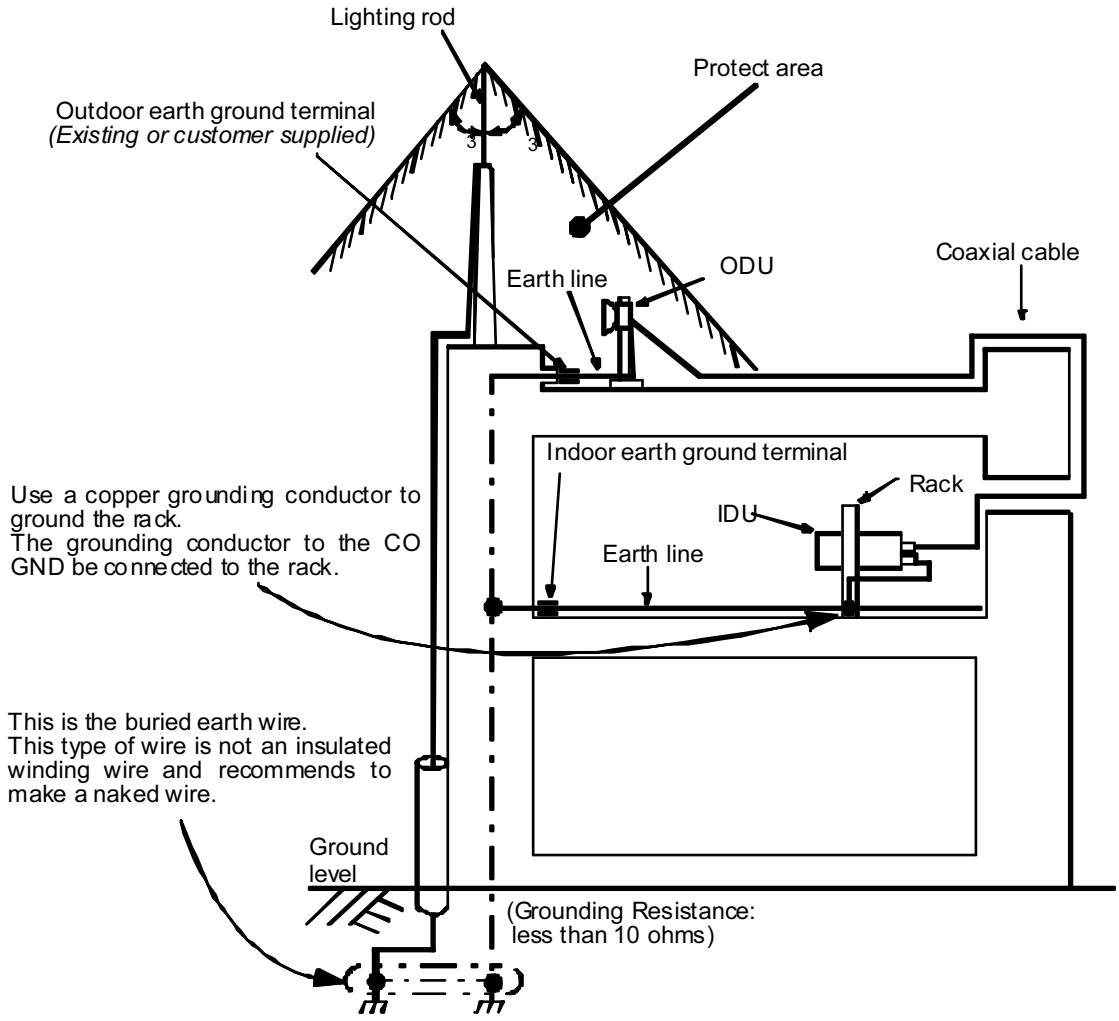


Figure 8-1 Location of Frame Ground



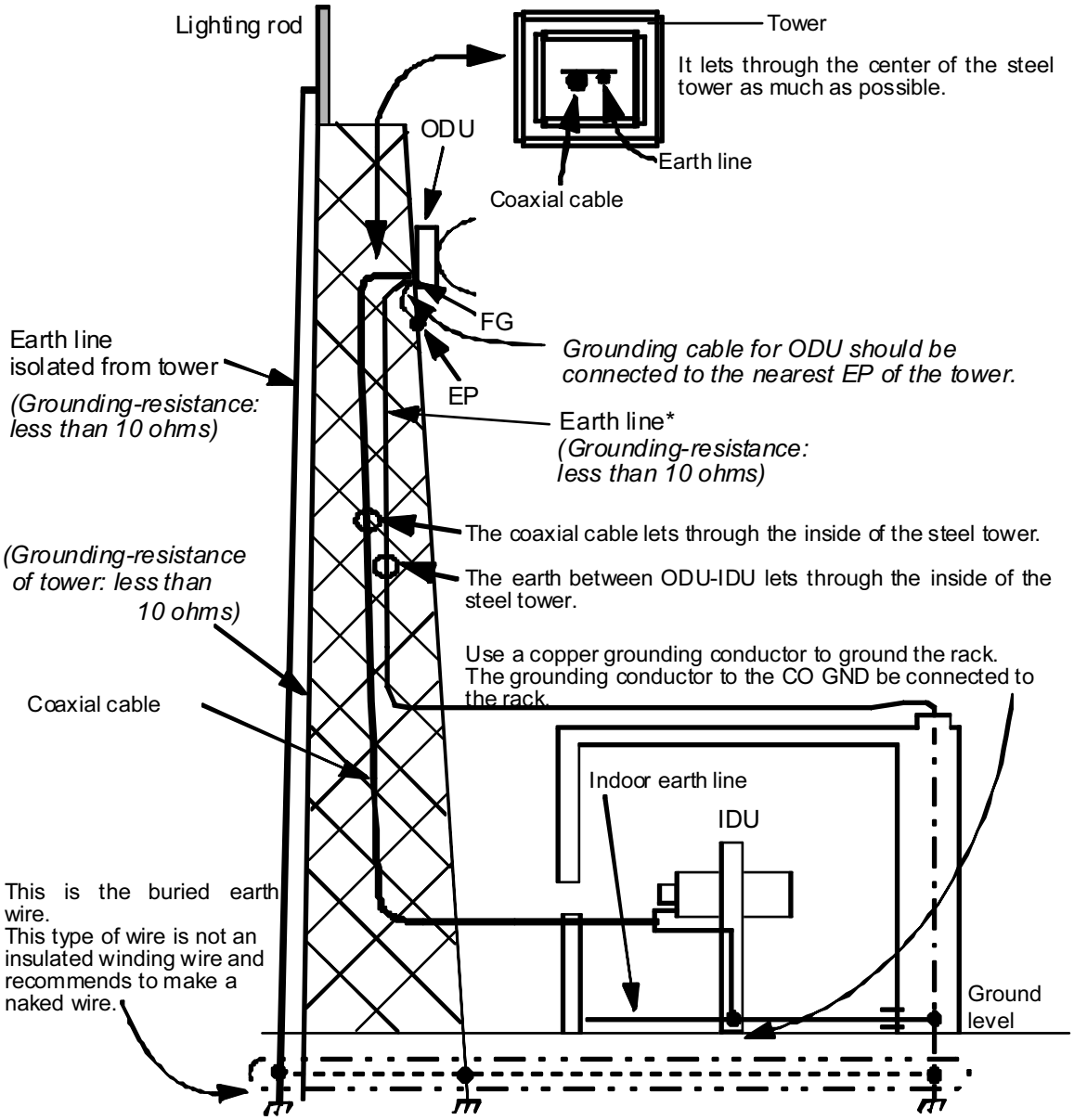
Cautions

1. **Install the ODU within the area protected by lightning rod.**
2. **To avoid surge currents caused by lightning circulating in the equipment earth system, connect the equipment earth system (frame ground) to ground of the lightning rod at ground level.**

   Note Frame Ground terminal of the IDU (5 mm square cable. (means more than 2.5 mm diameter cable (AWG #10) is recommended to apply for the earth grounding. The proper press fix terminal tool shall be used.)

This connection is an example.

Figure 8-2 Connection for Frame Grounding (1/2)



Notes

* NEC recommends that frame ground of ODU should be connected to earth line as NEC's standard installation.

EP Earth Ground Point of tower

FG Frame Ground terminal of the IDU (5 mm square cable (means more than 2.5 mm diameter cable (AWG #10) is recommended to apply for the earth grounding. The proper press fix terminal tool shall be used.)

This connection is an example.

Figure 8-3 Connection for Frame Grounding (2/2)

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9. WATERPROOFING

After cable connection, the following parts should be wrapped by self-bonding tape for waterproof (see Figure 9-1).

Caution

Before connecting the IF cable between the IDU and ODU, using the circuit tester, check that the resistance of the I/F cable between center conductor and insulation is more than 100 MΩ.

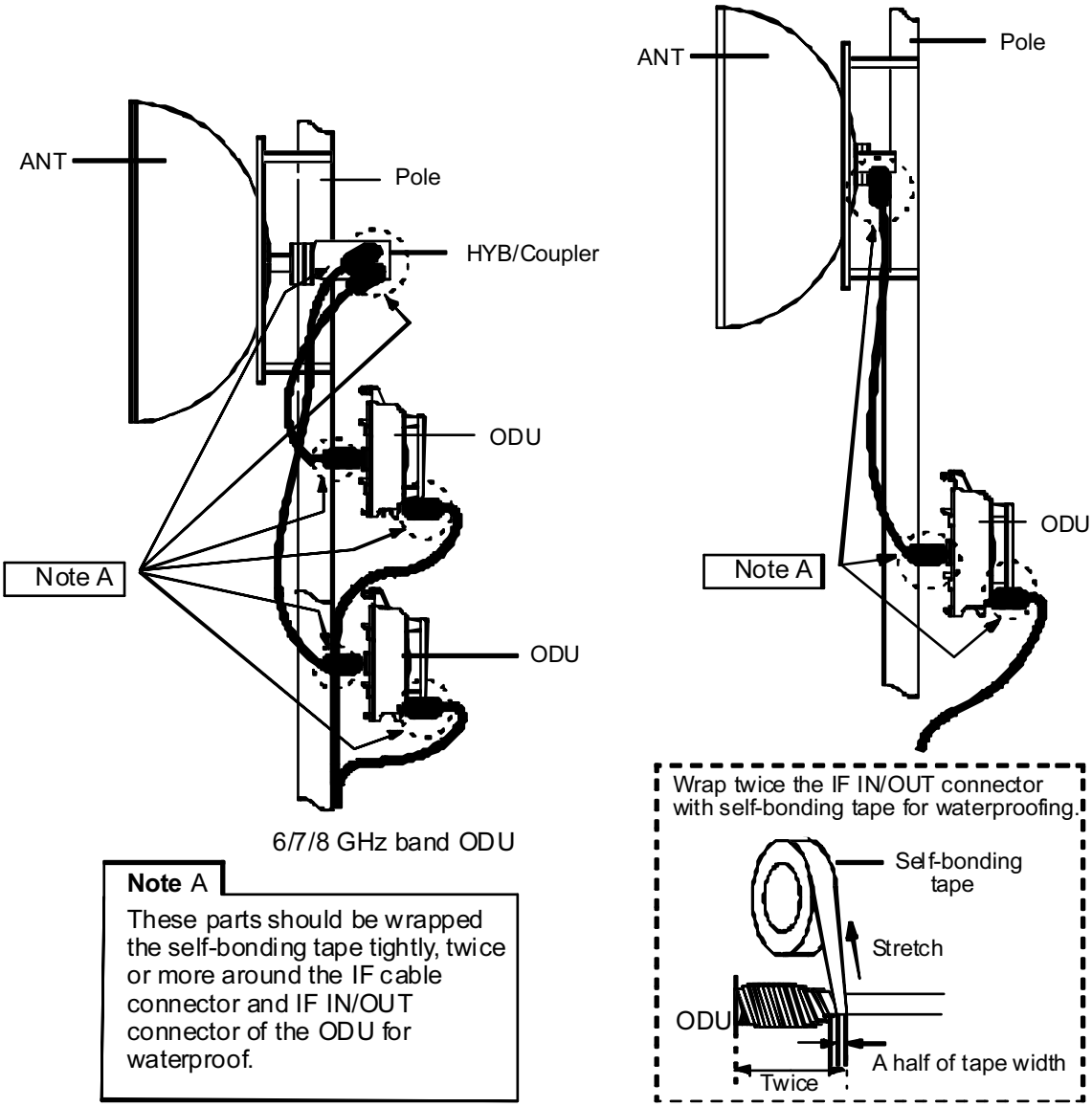
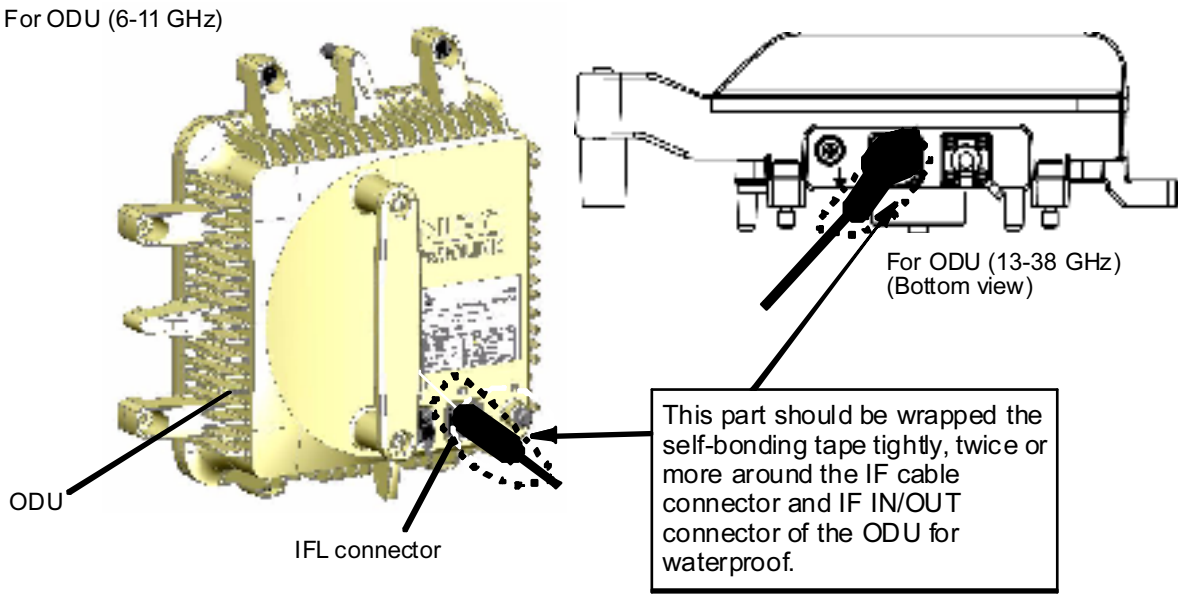
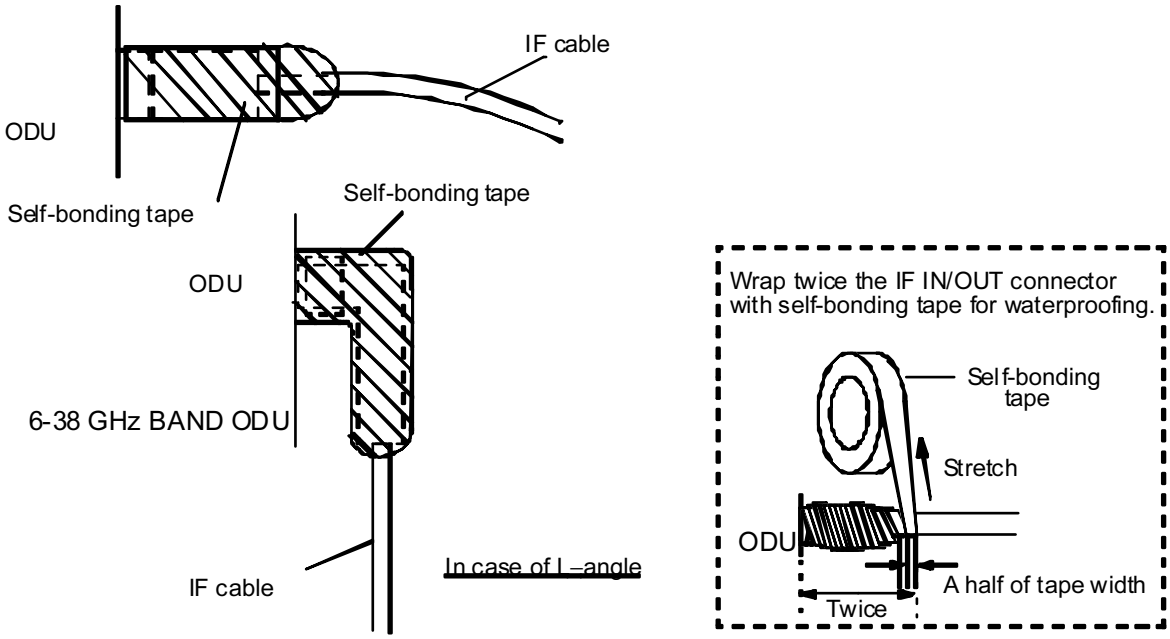


Figure 9-1 Location of Connector for Waterproof (1/2)



Caution

Before connecting the IF cable between the IDU and ODU, using the circuit tester, check that the resistance of the I/F cable between center conductor and insulation is more than 100 MΩ.



Note The self-bonding tape should be prepared by customer.

Fig. 9-1 Location of Connector for Waterproof (2/2)

10. START-UP and SHUT-DOWN

10.1 Start-up

The procedure for starting the equipment is shown as followings.

Warning

1. **The –48 V DC is superimposed on the centre conductor of the IF coaxial cable between the IDU and the ODU. Connecting test equipment directly to this terminal may damage it and touching the coaxial cable core may cause electrical shock.**
2. **Do not disconnect the IF cable between the IDU and the ODU in operating condition, to avoid damaging the equipment, turn the IDU power OFF before connecting/disconnecting the IF cable.**
3. **Do not allow open or short circuit of ODU TX output with the TX power on conditions. Perform the TX ODU PWR control in the Maintenance mode or turn the PWR switch off at the IDU before disconnecting cable or feeder from the ODU TX output.**
4. **After turning ON the equipment, wait at least 1 minute before turning it OFF again. Repeatedly turning the power ON and OFF within a short interval may cause the equipment to fail.**

Caution

1. **Be careful top surface above MODEM of the IDU and the ODU are hot in operation.**
2. **Do not apply a voltage to the equipment that varies sharply. The equipment may operate improperly.**

Procedure

Note The ODU power is supplied from the IDU.

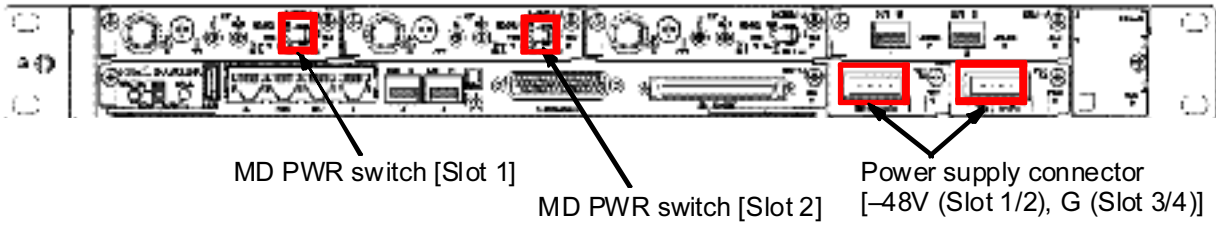
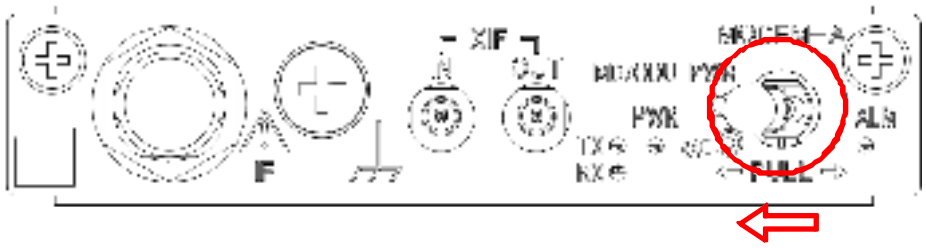


Fig. 10-1 IDU Front View

1 Check that the IF cable between the IDU and the ODU is firmly connected,

2 Check the MD PWR switches (Slot 1 and 2) off (left position) at the IDU,

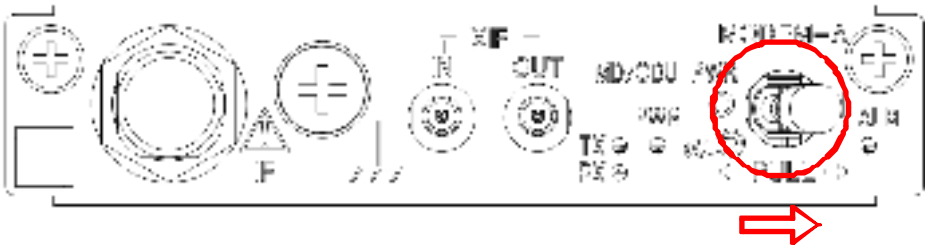


3 Before connecting the power cable connector to the IDU, check the input voltage is –48 V (allowable range; within –40.5 to –57 V) with the digital multi meter,

4 Connect the power cable to the IDU,

5 Confirm that the PWR indicator on the IDU is ON,

6 Turn the MD PWR switches on (right position) at the IDU.



10.2 Shut-down

The shut-down procedures for the equipment are shown as followings.

Warning **After turning ON the equipment, wait at least 1 minute before turning it OFF again. Repeatedly turning the power ON and OFF with in a short interval may cause the IDU/ODU to fail.**

Procedure

1 Turn off the MD PWR switches (Slot 1 and 2) at the IDU,

2 Disconnect the power cable from the IDU,

3 Confirm that all LED indicators on the IDU are OFF.

10.3 System #2 – #4 ODU Expansion

When setting up #2 – #4 ODU in addition to #1 ODU already in operation, the start-up procedures are shown as followings.

Procedure

1 Maintain the IDU and the #1 ODU power ON,

2 Check the MD PWR switch (Slot 2 – 4) off at the IDU,

3 Check that the IF cable between the IDU and the ODU is firmly connected,

4 Turn the MD PWR switch (Slot 2 – 4) on at the IDU,

5 Set the #2 – #4 ODU in-use by LCT.

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11. ORIENTING ANTENNA

After the initial setup has been completed, an antenna orientation will be performed between two stations according to the following procedure.

Procedure

Apparatus

Digital Multimeter with test leads or X0818 PASOLINK Monitor Wrench

1 Connect the PC to the LCT port on the iPASOLINK IDU using LAN cable (see Operation manual),

2 At each station, set Maintenance Control in LCT Menu,

Note In Maintenance "On" condition, every external Alarm outputs, excluding Maintenance/PS (IDU) ALM, are masked and remote control can not be performed.

3 Click and select for the following control items in Maintenance Control,

Notes

1. Retain the present status for other control items.
2. When the TX power control mode is set to ATPC, set it to MTPC and required level for the PASOLINK link on the "Equipment Setup" and "Provisioning".

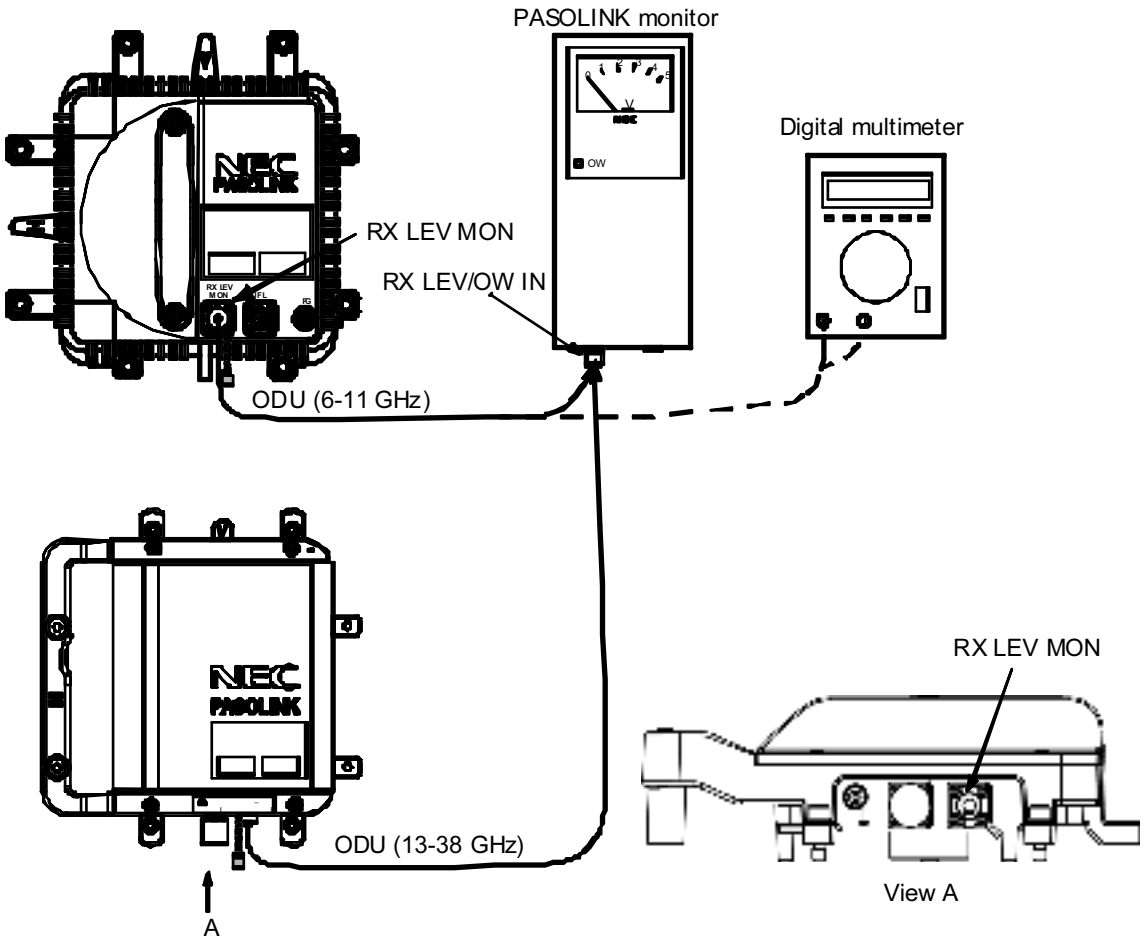
- TX SW Manual Control: Fix Slot No.1 or Slot No.2/Slot No.3 or Slot No.4 (in 1+1 configuration)
- RX SW Manual Control: Fix Slot No.1 or Slot No.2/Slot No.3 or Slot No.4 (which is the same side fixed by TX SW in 1+1 configuration.)
- TX Power Control: (at opposite site) MTPC in Equipment Setup / Required level in Provisioning

4 At receiving station, remove a cap from the RX LEV MON jack,

5 At each station connect the digital multimeter or PASOLINK Monitor to the RX LEV MON jack on the ODU,

6 At each station, adjust the azimuth and elevation angle of the antenna alternately so that the measured voltage becomes maximum,

Note The relation of the RX INPUT LEVEL versus RX LEVEL MON(V) is shown below.



Notes

1. The RX LEV MON terminal on the ODU (conformed to IEC61169-24).
2. The RX LEV MON terminal must be capped for waterproof.

Caution: Be careful, surface of the ODU is hot in operation.

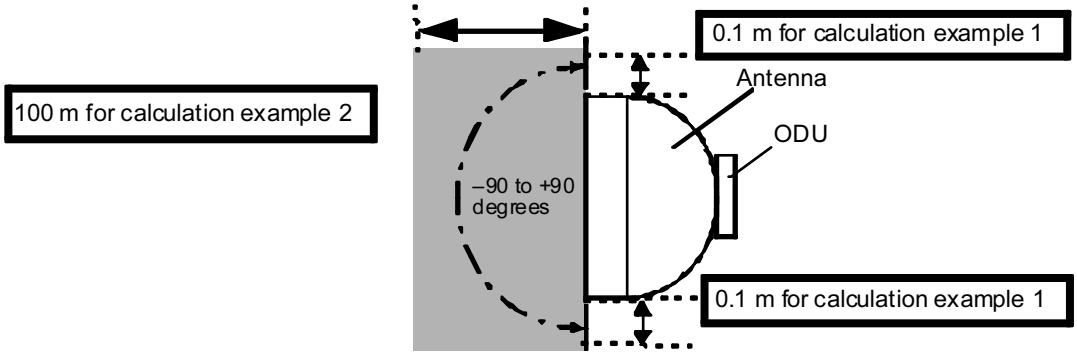
Figure 11-2 Antenna Orientation Test Setup

Note The fixed bolts and nuts to be used for the antenna orientation differ with antenna bracket types, refer to antenna bracket shown in Figure 11-4 to Figure 11-8.

Safety Guideline for Microwave Radiation Hazard

The Microwave and Millimetre-wave that iPASOLINK series are treating is very small radiation level and never been reported to effect human health. But advanced countries about health hazard have started to regulate the radiation levels. In case of EU country, it is specified by EN50385. In order to keep the regulation, the operator shouldn't work at near parabolic antenna during transmitter activating. Especially the area in side to front of antenna shows higher radiation level. (Please see below figure and calculation sample 1.)

On the other hand, in case of front side of antenna, the power density becomes high level along antenna beam. Therefore the user of this system should pay attention not to radiate the beam against humans any time. (Please refer below calculation sample 2.)



Hazard Area of Radiation

In addition, the power density and field strength level is calculated by equation below.

$$\text{Power density } S(mW/cm^2) = \frac{10^{\left(\frac{P+G-30}{10}\right)} \times K}{40 \times \pi \times R^2}$$

Where:

P = Output power of ODU (dBm),
G = Antenna Gain (dBi),
(in consideration of the angle from antenna)
K = Reflection factor = 2.56 (given),
R = Distance between human and antenna (m)

Calculation example 1, (90 degree side of antenna)

PASOLINK = 18 GHz/+23 dBm,
Antenna diameter = 0.6 m,
0 degree antenna gain = 39 dBi,
90 degrees side antenna gain = –24 dBi, (90 degrees attenuation = –63 dB),
Distance = 0.1 m

Power density S (mW/cm^2) = 0.0016 ≤ 0.01 (European safety guideline)

Calculation example 2, (0 degree, front side of antenna)

PASOLINK = 7 GHz/+27 dBm,
Antenna diameter = 1.8 m,
0 degree antenna gain = 40 dBi,
Distance = 100 m

Power density S (mW/cm^2) = 0.01 => Equal to European safety guideline

ANTENNA DIRECT MOUNTING TYPE

A. USING ANDREW VHLP TYPE BRACKET

Azimuth Angle Adjustment

A-1 Loosen bolts (1 in Figure 11-3),

A-2 Adjust the azimuth angle by adjusting bolt (2 in Figure 11-3),

A-3 Secure bolts loosened in step A-1,

Elevation Angle Adjustment

A-4 Loosen bolts (3 in Figure 11-3),

A-5 Adjust the elevation angle by adjusting bolt (4 in Figure 11-3),

A-6 Secure bolts loosened in step A-4.

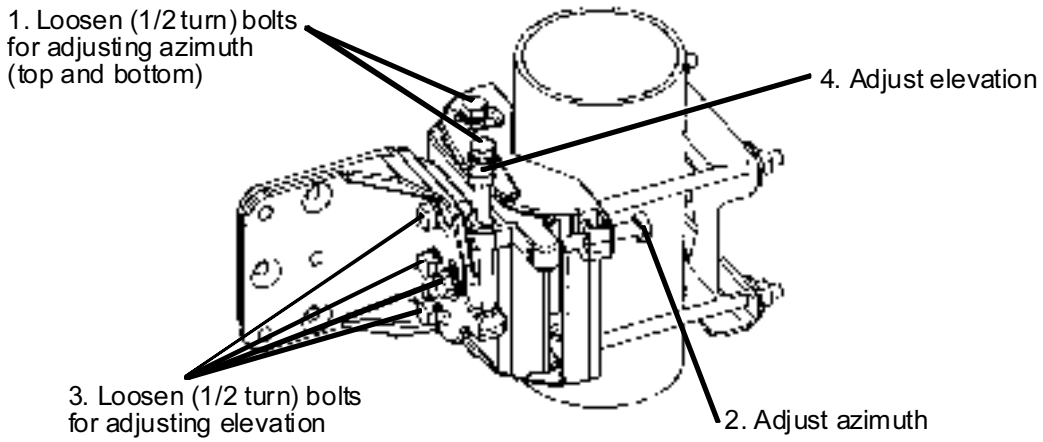


Figure 11-3 Location of Adjusting Nuts and Bolts (ANDREW VHLP Type Bracket)

B. USING RFS SB1 TYPE BRACKET

Azimuth Angle Adjustment

B-1 Loosen nuts (1 in Figure 11-4),

B-2 Adjust the azimuth angle by adjusting the nuts (2 in Figure 11-4),

B-3 Secure nuts loosened in step B-1,

Elevation Angle Adjustment

B-4 Loosen bolt(s) (3 in Figure 11-4),

B-5 Adjust the elevation angle by adjusting the nuts (4 in Figure 11-4),

B-6 Secure nut loosened in step B-1,

B-7 Secure nuts loosened in step B-4.

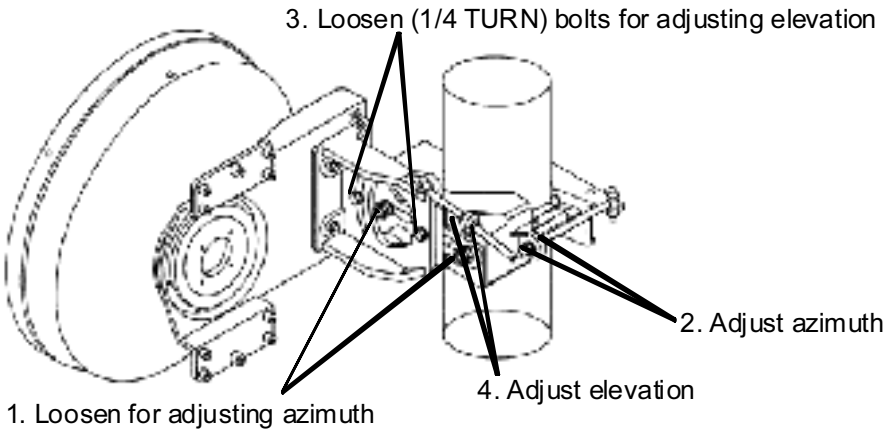


Figure 11-4 Location of Adjusting Nuts and Bolts (RFS SB1 Type Bracket)

C. USING RFS C-Mount TYPE BRACKET

Azimuth Angle Adjustment

C-1 Loosen three bolts (1 in Figure 11-5),

C-2 Adjust azimuth angle by adjusting bolt (2 in Figure 11-5),

C-3 Secure nuts loosened in step C-1,

Elevation Angle Adjustment

C-4 Loosen four bolts (3 in Figure 11-5),

C-5 Adjust elevation angle by adjusting bolt (4 in Figure 11-5),

C-6 Secure bolts loosened in step C-4.

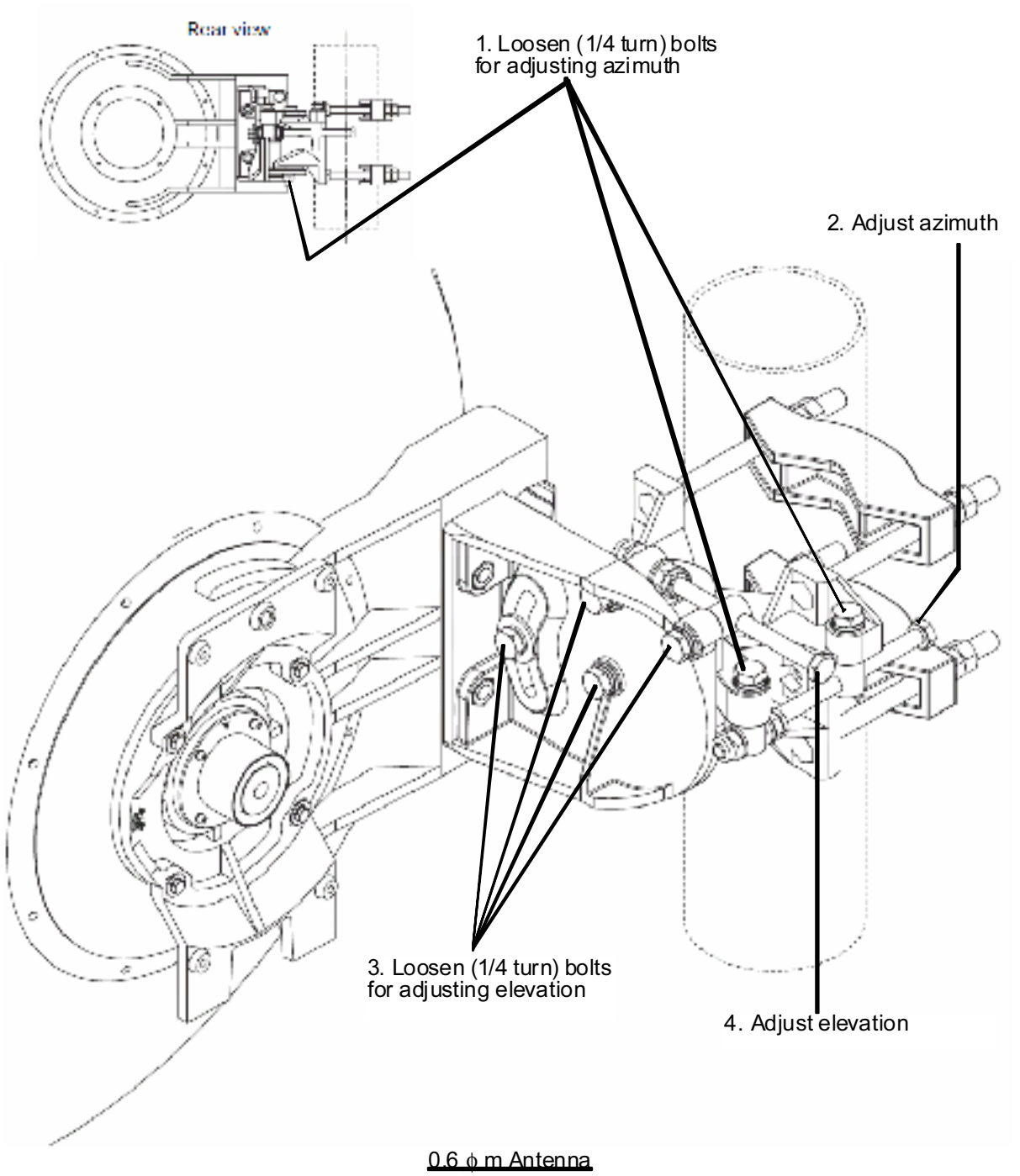


Figure 11-5 Location of Adjusting Nuts and Bolts (RFS C-Mount Type Bracket)

7 At each station, reset control items to original using LCT,

8 At each station, restore the "MAINT Mode" to "off" position using the LCT,

9 At each station, disconnect the digital multimeter or PASOLINK Monitor from the RX LEV MON connector,

10 At each station, reconnect the cap removed in step 4,

Note The RX LEV MON connector must be capped for waterproof.

XPD Adjustment (For Antenna Direct Mounting Type)

Note The XPD adjustment using cross-polarization signal should be done more carefully than using co-polarization signal because XPD changes sharply in the axial direction.

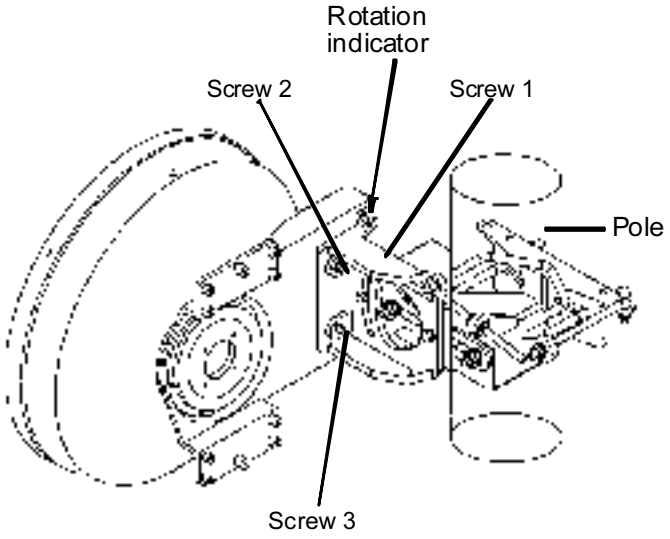
1 Loosen three screws (SCREW1, 2 and 3 in Figure 11-6) and rotate antenna (connected OMT/ODU) so that the RX LEVEL MON indicates the maximum value at the ODU of the Main Master and Sub Master channels,

2 At opposite station, turns the ODU of the Sub Master channel power OFF (for both No.1 and No.2 Sub Master channels in 1+1 system),

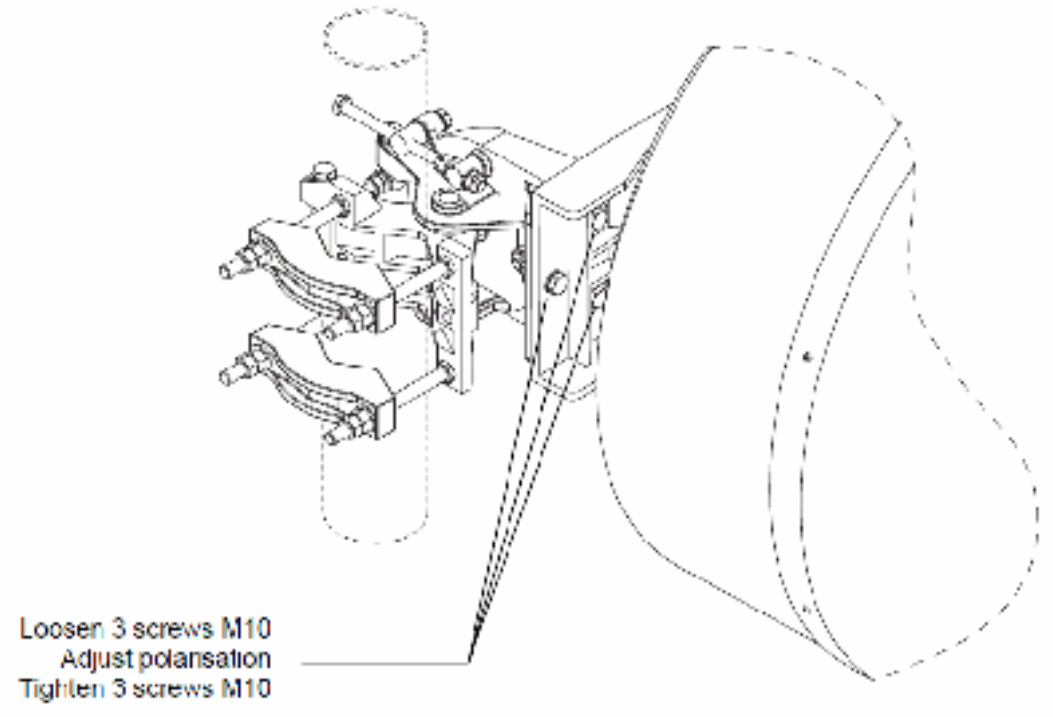
3 In this conditions, check the RX LEVEL MON indication value for XPD at the ODU of the Sub Master channel,

4 Confirm that the XPD is more than 25 dB, if not, repeat Azimuth Angle, Elevation Angle and XPD Adjustment,

5 At opposite station, turns the ODU of the Sub Master channel power ON,



A. RFS SB1 Type Bracket



B. RFS C-Mount Type Bracket

Figure 11-6 Location of Adjusting Nuts and Bolts (RFS C-Mount Type Bracket)

WAVEGUIDE CONNECTION TYPE

Azimuth Angle Adjustment (Waveguide Connection Type)

Note Take care that the flexible waveguide is not forcedly twisted by rotating the antenna.

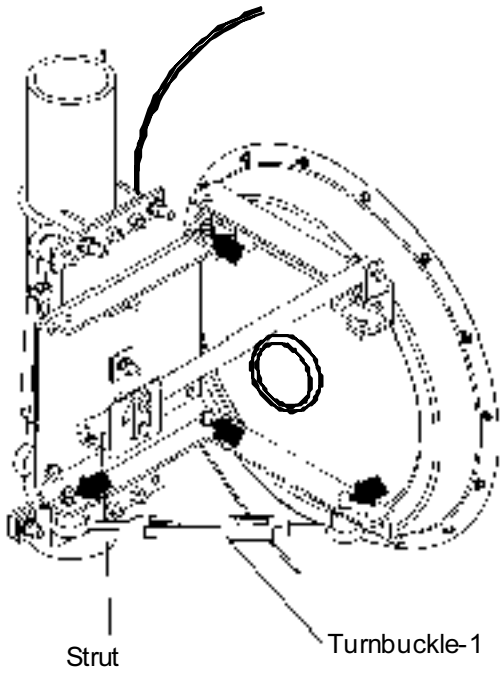
When the HS/SD system is configured, alternately switchover the transmitter to the other channel (No.1 or No.2) at the opposite station and repeat adjustment of elevation and azimuth to obtain satisfactory results in both No.1 and No.2 CH.

1 Loosen all strut attachment hardware,

2 Loosen bolts indicated by arrows in Figure 11-7,

3 Loosen jam nuts and rotate turnbuckle-1 in Figure 11-7 so that the RX LEVEL MON voltage obtains the maximum value,

4 Carefully, tighten turnbuckle-1 jam nuts and bolts indicated by arrows in Figure 11-7 to hold the adjustment.



ANDREW VHLP4 Type Bracket

Figure 11-7 Location of Adjusting Nuts and Bolts (Azimuth Adjustment)

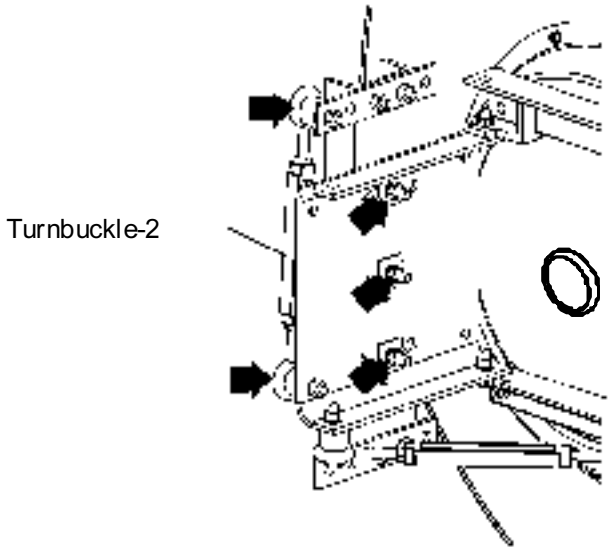
Elevation Angle Adjustment (Waveguide Connection Type)

1 Make sure that all strut attachment hardware is loosened,

2 Loosen bolts indicated by arrows in Figure 11-8,

3 Loosen jam nuts and rotate turnbuckle-2 in Figure 11-8 so that the RX LEVEL MON voltage obtains the maximum value,

4 Carefully, tighten turnbuckle-2 jam nuts and bolts indicated by arrows in Figure 11-8.



B. Elevation Adjustment

ANDREW VHLP4 Type Bracket

Figure 11-8 Location of Adjusting Nuts and Bolts (Elevation Adjustment)

XPD Adjustment (Waveguide Connection Type)

Note This XPD adjustment using cross-polarization signal should be done more carefully than using co-polarization signal because XPD changes sharply in the axial direction.

1 At opposite station, turns the ODU of the Sub Master channel power OFF (for both No.1 and No.2 Sub Master channels in 1+1 system),

2 In this conditions, check the RX LEVEL MON indication value for XPD at the ODU of the Sub Master channel,

3 Confirm that the XPD is more than 25 dB, if it is not obtained, repeat Azimuth Angle, Elevation Angle for the XPD Adjustment,

4 Tighten all strut attachment hardware, turnbackle jam nuts and bolts indicated by arrows in Figure 11-7 and Figure 11-8,

5 At opposite station, turns the ODU of the Sub Master channel power ON (for both No.1 and No.2 slave channels in 1+1 system),

6 At each station, disconnect the digital multimeter or OW/RX LEV Monitor from the RX LEV MON connector,

7 At each station, reconnect the cap removed in step 4,

Note The RX LEV MON connector must be capped for waterproof.

8 At the Main Master station, when the TX power control is operated in ATPC, restore the TX Power Control item of System Configuration changed in step 1 to “ATPC” using the LCT,

9 At the Main Master, when the TX power control is operated in MTPC, restore MTPC TX PWR item of “Provisioning Data” changed in step 2 to original setting value using the LCT,

10 At each station, reset Maintenance to “OFF”.

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