SAMSUNG

# 5G AU
# Installation Manual

*Describes product installation and requirement procedure.*

Document Version 2.0
December 2017

Radio Access Network

**Document Number: 2600-00LJ3ZGAA**

SNMTC-v3-0312

This manual should be read and used as a guideline for properly installing and/or operating the product. Owing to product variations across the range, any illustrations and photographs used in this manual may not be a wholly accurate depiction of the actual products you are using.
This manual may be changed for system improvement, standardization and other technical reasons without prior notice.
Samsung Networks documentation is available at **http://www.samsungdocs.com**

# Contents

# List of Figures

# List of Tables

# Preface

This manual describes how to install a 5G Access Unit (AU) and how to connect its cables. This manual includes the following 5G AU:

- NAU100
- NAU110

## Conventions in this Document

Samsung Networks product documentation uses the following conventions.

### Symbols

| Symbol | Description |
|---|---|
|  | Indicates a task. |
|  | Indicates a shortcut or an alternative method. |
|  | Provides additional information. |
|  | Provides information or instructions that you should follow to avoid service failure or damage to equipment. |
|  | Provides information or instructions that you should follow to avoid personal injury or fatality. |
|  | Provides antistatic precautions that you should observe. |

### Menu Commands

**menu** | **command**

This indicates that you must select a command on a menu, where **menu** is the name of the menu, and **command** is the name of the command on that menu.

### File Names and Paths

These are indicated by a bold typeface. For example:

Copy **filename.txt** into the **/home/folder1/folder2/bin/** folder.

### User Input and Console Screen Output Text

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

```
context <designated epc-context-name>
```

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

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

# New and Changed Information

The following table describes information that has been added/changed since the previous publication of this manual.

| Change Type | Change Description |
|---|---|
| Deleted | Deleted the figure of Table 3. (The number of GPS antennas for each 1~3 sector type) |

# Revision History

The following table lists all versions of this document.

| Document Version | Publication Date | Remarks |
|---|---|---|
| 1.0 | November 2017 | First version |
| 2.0 | December 2017 | - |

# Organization of This Document

| Section | Title | Description |
|---|---|---|
| Chapter 1 | Before Installation | This chapter introduces AU and describes items should be understood before installation. |
| Chapter 2 | Installing System | This chapter describes the procedures to install the AU. |
| Chapter 3 | Connecting Cables | This chapter describes the procedures to connect the cables to the AU installed. |
| Chapter 4 | Inspect the Installation | This chapter describes the procedures of inspecting installation status after AU installation and cabling is completed. |
| Appendix A | Acronyms | This annex describes the acronyms used in this manual. |
| Appendix B | Clean the Optical Connectors | This annex describes the procedure of cleaning the optical connector and cleaning tool. |
| Appendix C | Standard Torque | This annex describes the standard torque when fastening the bolt. |

# Related Documentation

- 5G RAN System Description

# Personal and Product Safety

*This product safety information includes European directives, which you must follow. If these do not apply in your country, please follow similar directives that do apply in your country.*

## Proposition 65 Warning (US Only)

State of California Proposition 65 Warning (US only)

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

## Electrical

The product is designed to operate from a -48 V DC supply and is therefore classified as Safe Extra Low Voltage (SELV) equipment.

All structural parts are grounded and all input and outputs have built-in isolation from the network. All input and output ports that connect to external power sources are designed to meet relevant national safety requirements.

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

## Lasers

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

## Manual Handling

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

## Installation

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

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

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

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

## Maintenance

Maintenance must only be carried out by a suitably trained and competent technician. All safety instructions must be carefully observed at all times. Equipment covers should not be removed while live power and transmission is connected unless in a controlled environment by trained technicians.

## Fire

The product is powered from a -48 V DC supply. To protect against fire, the equipment is fused.

## Environment

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

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

## Cooling

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

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

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

## Anti-Static Precautions

The circuit boards and other modules in the product are sensitive to and easily damaged by static electricity. If any card or sub-assembly is removed from the unit, the following anti-static precautions must be observed at all times:

- Service personnel must wear anti-static wrist straps.
- Circuit boards and sub-assemblies must be placed on ground conductive mats

or in conductive bags.

- All tools must be discharged to ground before use.
- The anti-static wrist strap and cord must be checked at regular intervals for their suitability for use.

## Grounding

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

If equipment is grounded through a cabinet or rack, make sure it is done so properly according to the installation instructions.

## Power Supply Connection

The equipment is designed to be powered from a -48 V DC supply. Power connections and installation of associated wiring must be carried out by a suitably qualified technician.

Only devices that comply with all relevant national safety requirements should be connected to the unit's power supply inlets. Other usage will invalidate any approval given to this equipment.

Connection of this equipment to devices that are not marked with all relevant national safety requirements may produce hazardous conditions on the network.

When the power supply is obtained by a rectifier/safety isolation transformer, the supply must meet the requirements of EN 60950 providing double/reinforced insulation between hazardous voltages and SELV/TNV circuits. Any battery must be separated from hazardous voltages by reinforced insulation.

## Indirect Connection

Before indirectly connecting any equipment to another device through a shared power supply, ALWAYS seek advice from a competent engineer.

Devices that are not marked according to the relevant national safety standards may produce hazardous conditions on the network.

## Product Disposal

To reduce the environmental impact of products, Samsung has joined WEEE compliance activities.

The WEEE symbol on the product indicates that the product is covered by the European Directive 2002/96/CE for the disposal of Waste Electrical and Electronic Equipment (WEEE). This means that the product should be disposed of separately from the municipal waste stream via designated collection facilities appointed by

the government or the local authorities. This will help prevent potential negative consequences for the environment and human health. Please check the terms and conditions of the purchase contract for information about correct disposal.

## Battery Disposal

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

End of life recycling materials information is available from Samsung.

## California USA Only

This Perchlorate warning applies only to primary CR (Manganese Dioxide) Lithium coin cells in the product sold or distributed ONLY in California USA

'Perchlorate Material-special handling may apply, See www.dtsc.ca.gov/hazardouswaste/perchlorate.'

# Equipment Markings

This marking on the product, accessories or literature indicates that the product and its electronic accessories (e.g. charger, headset, USB cable) should not be disposed of with other household waste at the end of their working life. To prevent possible harm to the environment or human health from uncontrolled waste disposal, please separate these items from other types of waste and recycle them responsibly to promote the sustainable reuse of material resources.

Household users should contact either the retailer where they purchased this product, or their local government office, for details of where and how they can take these items for environmentally safe recycling.

Business users should contact their supplier and check the terms and conditions of the purchase contract. This product and its electronic accessories should not be mixed with other commercial wastes for disposal.

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

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

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

**Protective earth**

AU should be grounded.

# Chapter 1 Before Installation

This chapter introduces Access Unit (AU) and describes the items that you should know before installation.

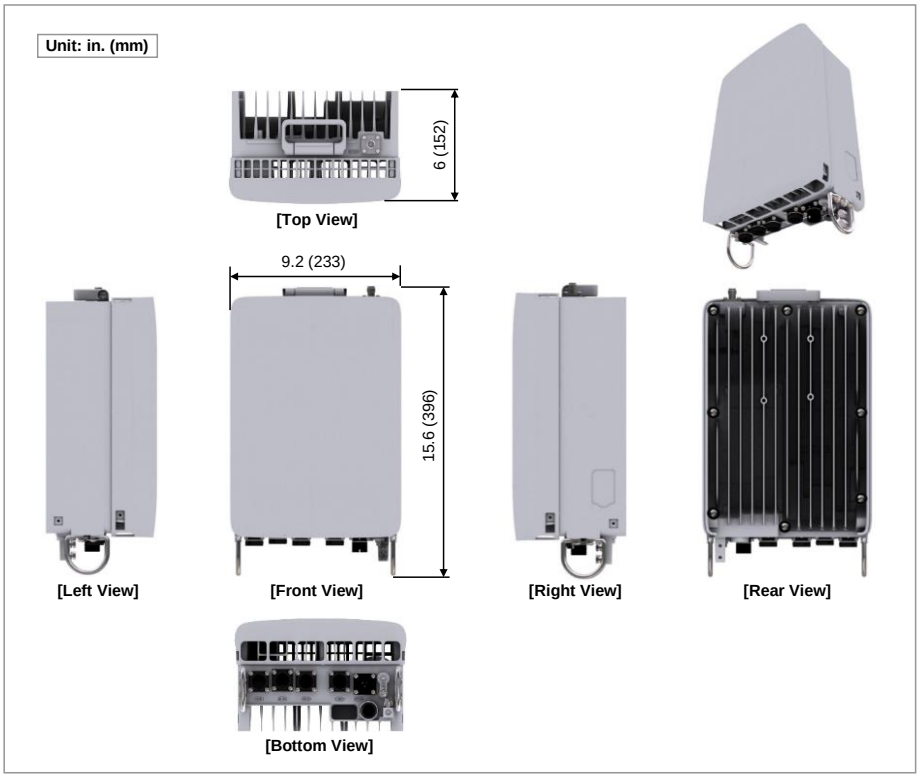
## System View and External Interface

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

### AU View

Figure below depicts the physical structure of the AU.

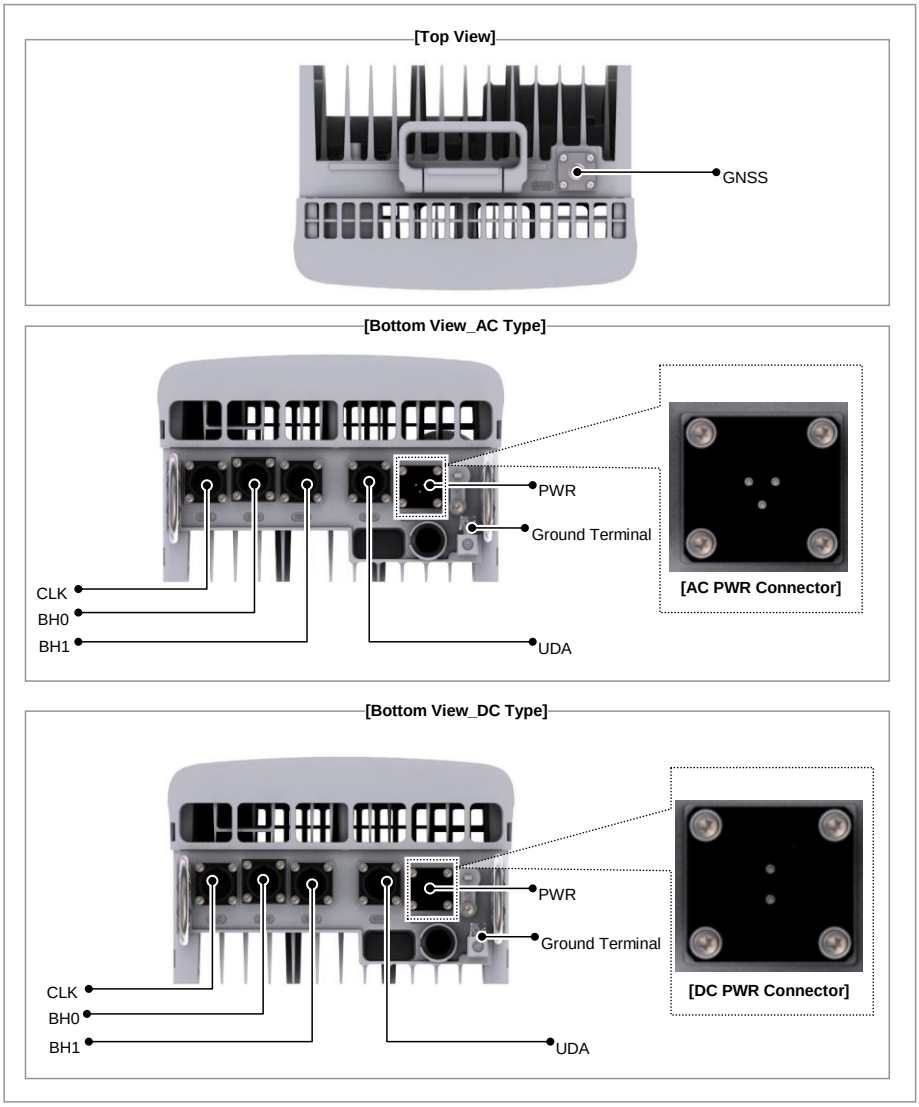
***Figure 1. AU View***



## AU External Interface

Figure below depicts the external interface structure of the AU.

***Figure 2. AU External Interface***



# Specifications

Table below lists the main specifications of the AU.

***Table 1. Specifications***

| Item | NAU100 | NAU110 |
|---|---|---|
| Input power | 100-240 V AC | -48 V DC |
| Power Consumption | (w/PoE + PSE): Typ. 260 W Max. 270 W | |
| Features | ASIC, RFIC Applied | |
| Size | < 11.8 L | |
| Carrier Frequency | 27.5-28.35 GHz | |
| Channel Bandwidth | 100 MHz × 8CC | |
| Duplexing | TDD | |
| Antenna Path | 4T4R | |
| RF Chain | 256 × 4 | |
| Output Power per path | 54 dBm (EIRP) | |
| Antenna Gain per path | 27.5 dBi | |
| Beam Scan Range | H ±60°, V ±20° | |
| HPBW | H 6°, V 6° | |
| Backhaul | 10 GbE × 2 (SFP+ × 1 ea, RJ45 × 1 ea) | |
| Cooling | Natural Convection | |
| Operation Temperature | -40-50°C | |

# Cautions for Installation

Observe the safety instructions described in this section when installing the system. Installation must be done in accordance with the applicable local electric codes.

## Before Installing

- Post warning signs in areas where high-voltage cables are installed.
- Post 'off limit' signs in areas where accidents are most expected.
- Use guardrails or fences to block open areas such as ditches, open roof areas, and scaffolds.

Install the system in the restricted access area.

## While Installing

The system power must be cut off before installing.

Ensure the power switch of power supply is off when installing the system. Installing the system with power switch on may cause system damage or fatal human injury when connecting or disconnecting cables.

Ensure that workers wear protection gloves and goggles to prevent injury from debris while drilling holes in a wall or ceiling.

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

Cover unused ports with a cap. This prevents foreign substances from entering into the unused ports.

To prevent foreign substances, outdoor air, and moisture from entering the cable inlet (including cable gland and conduit), finish the inlet as follows:
Unused inlet: Use the hole finishing materials including cap and rubber packing.
Cable-installed inlet: After cable installation, block any space in the inlet with tape, compressed sponge, rubber packing, and silicone.

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

| AU | Safe Distance |
|---|---|
| SFG-AA100AC (NAU100) | 300 cm |
| SFG-AA100DC (NAU110) | |

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

## After Installing

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

In the system, the laser beam light runs through the optical cable. The workers must handle the optical cables with care as the laser beam can seriously damage the eyes.

Ensure that the workers do not damage installed cables while cleaning the system.

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

# Installation Tools

Table below lists the basic tools needed for installation. The additional tools required for each site need to be identified and arranged during a site survey before starting the installation.

***Table 2. Basic Installation Tools***

| Number | Name | Specification | Purpose of use |
|---|---|---|---|
| 1 | Torque Driver  | Apply a torque range : 6-22 lbf·in | For fastening M4 Screw |
| | | Apply a torque range : 20-90 lbf·in | For fastening M6 SEMS (Hexagon+) |
| 2 | Screw Driver Bit  | +, Number 2 | For fastening M4 SEMS (Hexagon+) |
| | | +, Number 3 | For fastening M6 SEMS (Hexagon+) |
| 3 | Screw Driver  | +, Number 3 | For loosening M6 SEMS (Hexagon+) |
| 4 |  | T15H | For fastening Torx Screw (T15H) |
| 5 | Torque Wrench  | Apply a torque range : 6-30 lbf·in | TNC Connector |
| | | Apply a torque range :10-50 lbf·in | For tightening M6 Hexagon Bolt |
| | | Apply a torque range : 100-400 lbf·in | For tightening M8 Hexagon Bolt and M10 Hexagon Bolt |
| 6 | Torque Wrench Spanner Head  | Apply Hexagon Head: 10 mm (for 10-50 lbf·in) | For tightening M6 Hexagon Bolt |
| | | Apply Hexagon Head: 13 mm (for 100-400 lbf·in) | For tightening M8 Hexagon Bolt |
| | | Apply Hexagon Head: 17 mm (for 100-400 lbf·in) | For tightening M10 Hexagon Bolt and M10 Hexagon Nut |
| | | Apply Hexagon Head: 14 mm (for 6-30 lbf·in) | For tightening TNC connector |
| 7 | Spanner  | 17 mm | For tightening M10 Hexagon Nut<br>For loosening M10 Hexagon Bolt |
| 8 | Tape Measure  | 16 ft./150 ft. | Tape measure for length measurement |
| 9 | Power Extension Cable  | 100 ft. | Basic tool |
| 10 | Level | Normal | For horizontality and verticality |

| Number | Name | Specification | Purpose of use |
|---|---|---|---|
| |  | | |
| 11 | Hammer Drill  | Normal | Wall type drilling |
| 12 | Concrete Drill Bit  | 0.5 in. (12 mm) | For M8 Set Anchor |
| 13 | Cable Cutter  | 0.24-1.26 in. (6-32 mm) | Cable cutting |
| 14 | Crimping Tool  | 14 AWG-4 AWG (1.5-16 $mm^2$) | Pressure terminal for crimping |
| 15 | Wire Stripper  | Apply cable thickness: 1.5-6.2 in. (4-16 mm) | Cable sheath for removal |
| 16 | Nipper  | Basic Tool | For cutting cable |
| 17 | LAN Tool  | Basic Tool | RJ45 crimper |
| 18 | Industrial Scissor  | Basic Tool | Cutting |
| 19 | Knife  | Basic Tool | Cutting |
| 20 | Optical Connector Cleaner  | For LC Connector | For cleaning optical connector |
| 21 | Optical Transceiver Removal Tool  | Normal | To separate the optical module |
| 22 | Multi tester  | Digital Pocket Tester | To measure voltage and current to detect cable disconnection |
| 23 | Fiber Optical Test Set | Wave length: 1310 nm, 1550 nm (single mode) 850 nm, 1310 nm (multi-mode) | Optical level check |

| Number | Name | Specification | Purpose of use |
|---|---|---|---|
| |  | | |
| 24 | Compass  | Normal | Check azimuth during installation |
| 25 | Heating Gun  | 50-300°C | Shrinking Heat Shrink Tube |
| 26 | Anchor Punch  | M8 | For M8 Set Anchor |
| 27 | Hammer  | Normal | Anchor fixing |

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

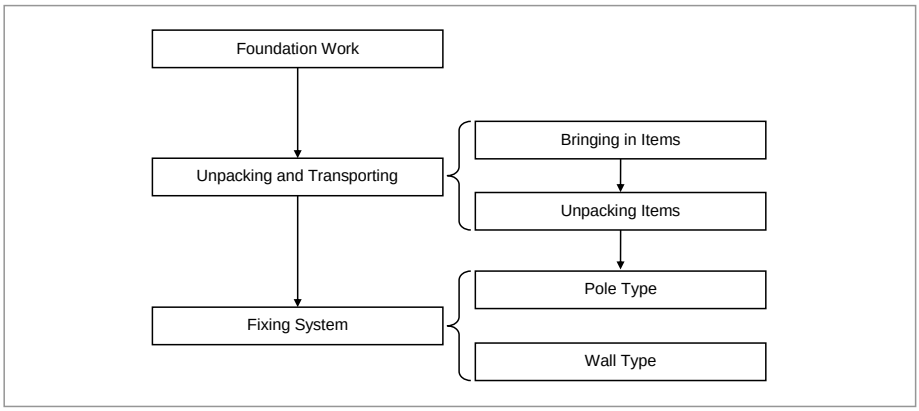
# Chapter 2 Installing System

This chapter describes installation procedure of the AU.

## Installation Procedure

Figure below depicts the procedure to install the AU.

***Figure 3. Procedure to Install the AU***



# System Arrangement

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

Figure below depicts the minimum distance that must be secured for pole type installation of the AU using mounting bracket.

***Figure 4. AU Arrangement Pole type Installation (Using Mounting Bracket)***

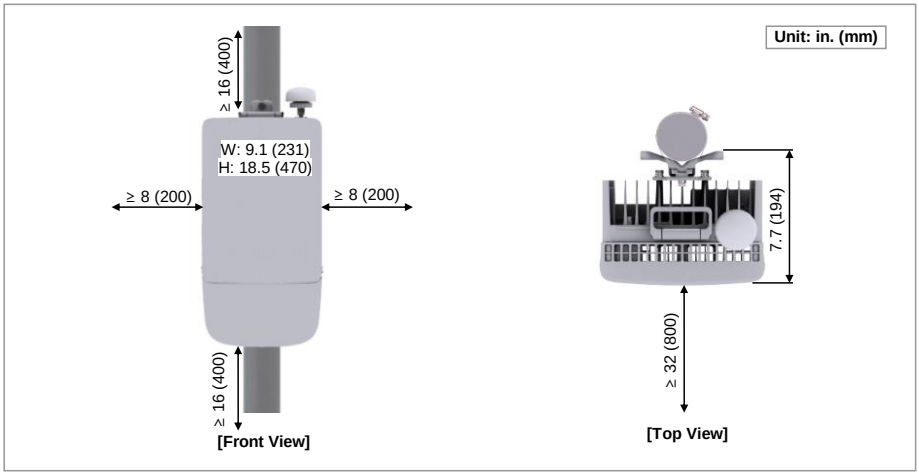



Figure below depicts the minimum distance that must be secured for pole type installation of the AU using chain bracket assembly.

*Figure 5. AU Arrangement Pole Type Installation (Using Chain Bracket Assembly)*

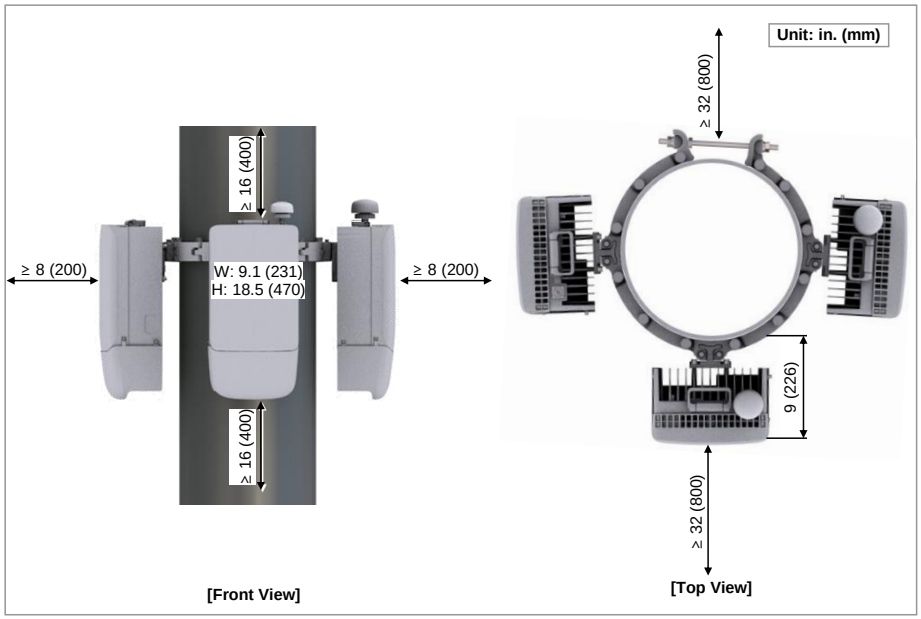
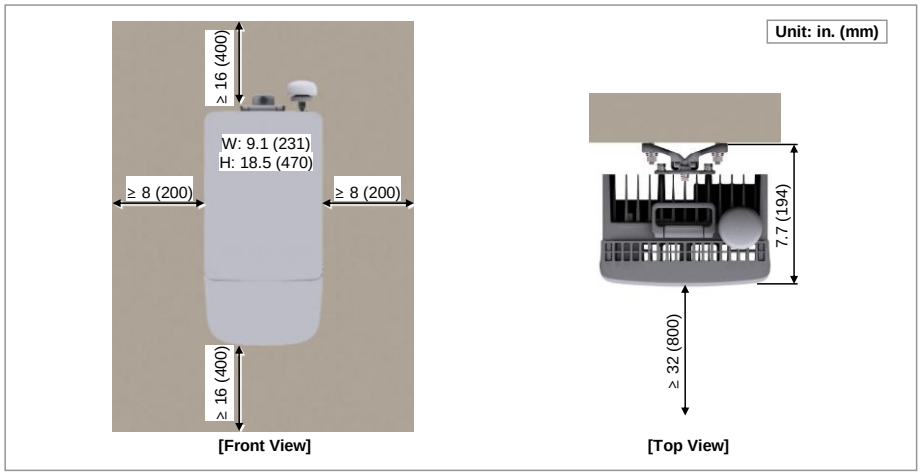



Figure below depicts the minimum distance that must be secured for wall type installation of the AU using mounting bracket.

*Figure 6. AU Arrangement Wall type Installation (Using Mounting Bracket)*



# Transporting and Unpacking

This section details how to transport the items to the installation place and describes the procedure to unpack cabinets and other components.

## Bringing in Items

Take care of the following at each stage of transportation of the items:

- Before moving a system, check storage place for the system and remove obstacles in advance.
- When carrying the system:
- Fasten the system firmly to the transport vehicle or carrier to prevent damage to the system from a vibration or shock.
- Use an elevator to prevent accidents. However, if the system must be carried by people, ensure there are enough people to carry the system.
- The system must not be shocked physically.
- Care must be taken to protect the system from dust, moisture, and static electricity.

## Unpacking Items

To unpack the items, ensure the following:

- The items must be packed until they reach the installation place.
- The items are classified in accordance with each job specification and stored at a place that does not interfere with working.
- Unpacked systems must be installed immediately. If immediate installation of the systems is not planned, the systems must be stored in the installation place temporarily.
- Unpack only external packing, leaving the internal packing in unpacked status.
- Unpack the inner packaging after each system is placed on its installation location.
- Dispose by-products (packaging waste) in accordance with waste management rules. Do not recycle the by-products.

# Fixing System

This section details the procedure to fix the AU.

### *Fixing GPS Antenna*

To fix GPS Antenna

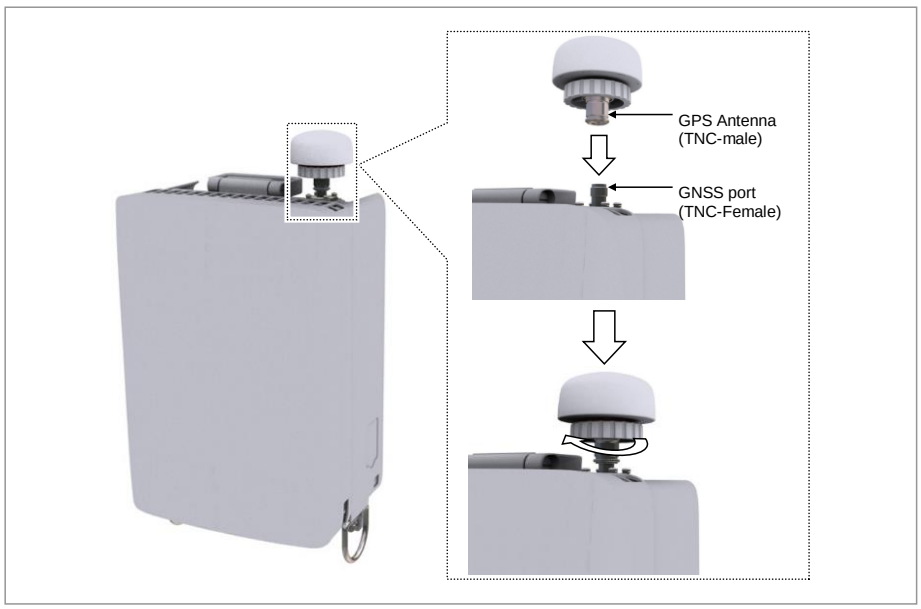
**1** Ensure that the items mentioned in below table are available.

***Table 3. Parts and Tools for Fixing GPS Antenna on AU***

| Category | Description | |
|---|---|---|
| Parts | GPS Antenna | 1 EA |
| Recommended Torque Value | GPS Antenna (TNC-Male) | 7.8 lbf·in (9 kgf·cm) |
| Working Tools | • Torque Wrench (6-30 lbf·in)<br>• Torque Wrench Spanner Head (apply Hexagon Head: 14 mm) | |

**2** Connect the GPS antenna to the AU GNSS port as shown in figure below.

***Figure 7. Fixing GPS Antenna***



### *Fixing Unit Bracket*

To fix a unit bracket on the AU (for mounting bracket)

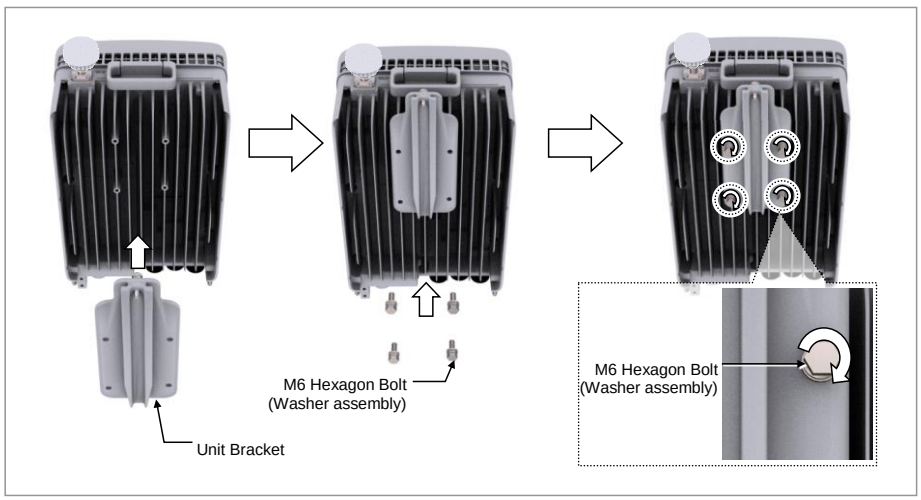
**1** Ensure that the items mentioned in below table are available.

***Table 4. Parts and Tools for Fixing Unit Bracket on AU***

| Category | Description | | |
|---|---|---|---|
| Parts | Unit Bracket | | 1 EA |
| | Fasteners | M6 × L20 Hexagon Bolt (Washer assembly) | 4 EA |
| Recommended Torque Value | M6 Hexagon Bolt | | 43 lbf·in (50 kgf·cm) |
| Working Tools | • Torque Wrench (10-50 lbf·in)<br>• Torque Wrench Spanner Head (apply Hexagon Head: 10 mm) | | |

**2** Fix the unit bracket to the fixing hole of the AU rear using fasteners as shown in figure below.

***Figure 8. Fixing Unit Bracket***




### *Fixing Clip on Unit Bracket*

To fix a clip-on unit bracket on the AU (for chain bracket assembly)

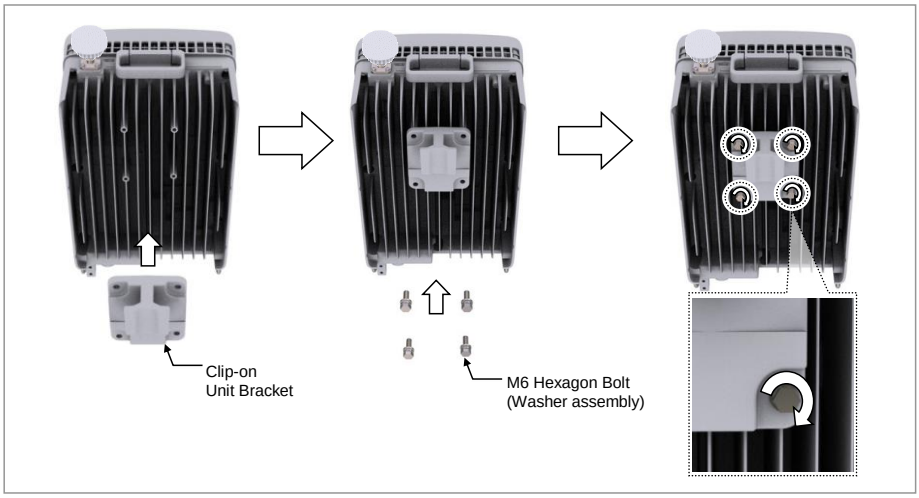
**1** Ensure that the items mentioned in below table are available.

*Table 5. Parts and Tools for Fixing Unit Bracket on AU*

| Category | Description | | |
|---|---|---|---|
| Parts | Clip-on Unit Bracket | | 1 EA |
| | Fasteners | M6 × L20 Hex Bolt (Washer assembly) | 4 EA |
| Recommended Torque Value | M6 Hexagon Bolt | | 43 lbf·in (50 kgf·cm) |
| Working Tools | • Torque Wrench (10~50 lbf·in)<br>• Torque Wrench Spanner Head (apply Hexagon Head: 10 mm) | | |

2 Fix the clip-on unit bracket to the fixing hole of the AU rear using fasteners as shown in figure below.

*Figure 9. Fixing Clip-on Unit Bracket*




## Pole Type

The AU can be fixed on pole using mounting bracket or chain bracket assembly. This section details both procedures.

### *Using Mounting Bracket*

#### Fixing Mounting Bracket on the Pole

▶ To fix a mounting bracket on the pole

1 Ensure that the items mentioned in below table are available.

*Table 6. Parts and Tools for Fixing Mounting bracket on the Pole*

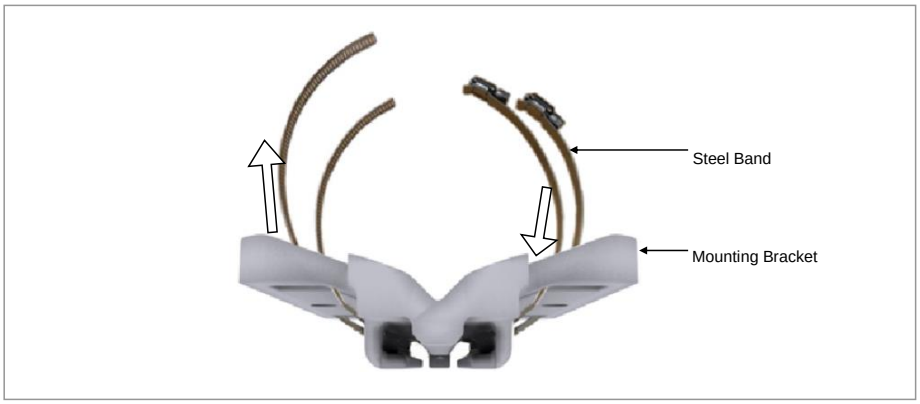
| Category | Description | | |
|---|---|---|---|
| Parts | Mounting bracket | | 1 EA |
| | Fastener | Steel Band | 2 EA |
| Recommended Torque Value | Steel Band Fixing Screw | | 48.5 lbf·in (56.1 kgf·cm) |
| Working Tools | • Torque Driver (20-90 lbf·in)<br>• Screw Driver Bit ('+', Number 3) | | |

The standard of the pole on which the mounting bracket can be attached using steel bands is 50 A to 125 A.

| Pole Size (Diameter) | Length of Steel Band |
|---|---|
| 50 A (2.4 in./60.5 mm) | 502 mm |
| 65 A (3 in./76.3 mm) | |
| 80 A (3.5 in./89.2 mm) | |
| 90 A (4 in./101.6 mm) | |
| 100 A (4.5 in./114.3 mm) | |
| 125 A (5.5 in./139.8 mm) | |

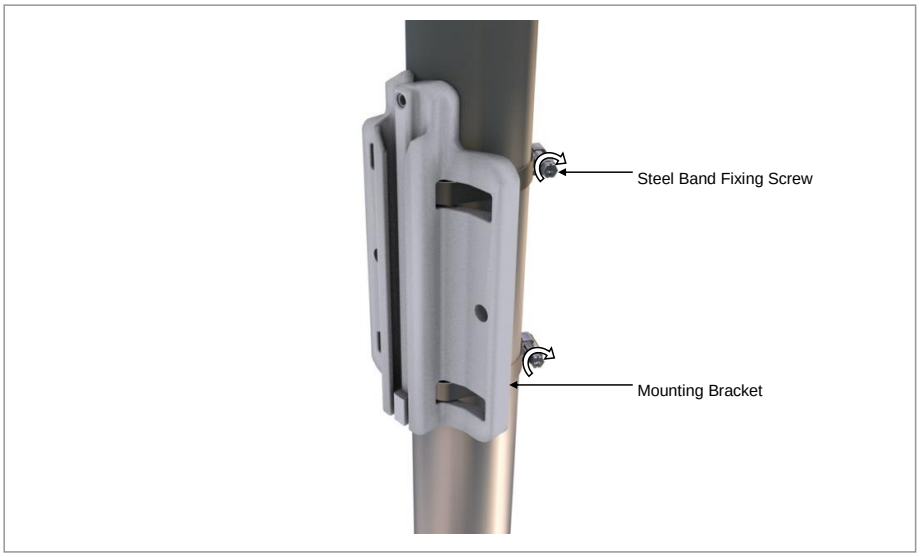
**2** Pass the steel band through the fixing hole of the mounting bracket, as shown in figure below.

*Figure 10. Fixing Mounting bracket on the Pole (1)*

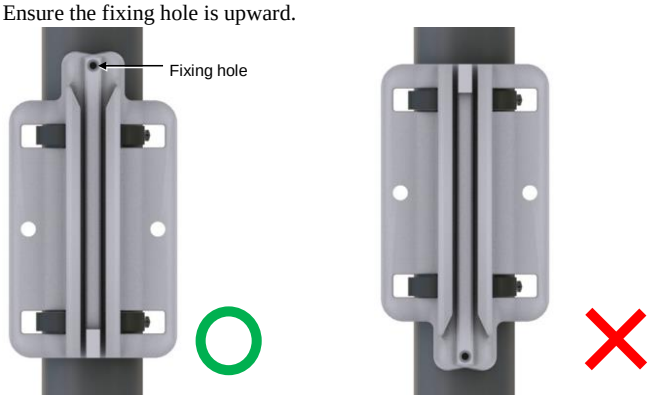



**3** Place a mounting bracket to the pole and fix the steel band, as shown in figure below.

***Figure 11.** Fixing Mounting bracket on the Pole (2)*

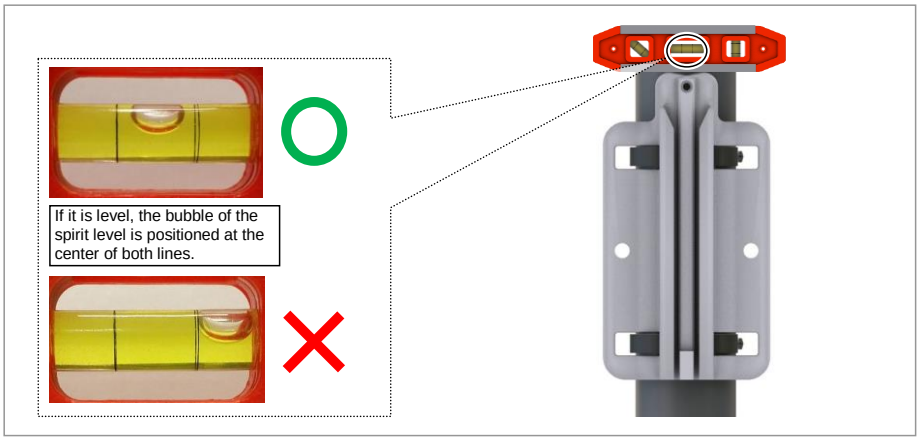



Ensure the fixing hole is upward.




**4** Check the level of mounting bracket on the pole and adjust the level, as detailed in figure below.

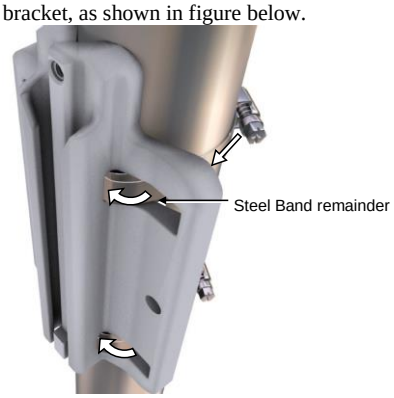
*Figure 12. Fixing Mounting bracket on the Pole (3)*




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

When poor leveling happens, adjust the position of fasteners used to fix the mounting bracket.

After fixing the steel band, push the remainder of band inside the mounting bracket, as shown in figure below.




### Fixing AU on the Mounting Bracket

To fix the AU on the pole mounting bracket

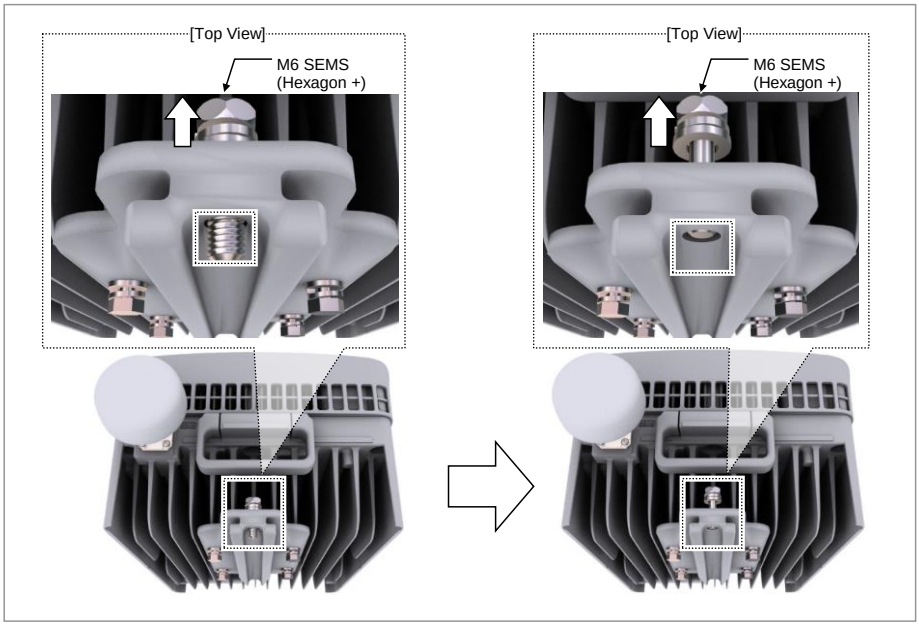
**1** Ensure that the items mentioned in below table are available.

*Table 7. Parts and Tools for Fixing AU on the Pole*

| Category | Description | | |
|---|---|---|---|
| Parts | Fasteners | M6 × L23 SEMS (Hexagon +)<br>(Fastened to the unit bracket) | 1 EA |
| Recommended Torque Value | M6 SEMS | | 43 lbf·in (50 kgf·cm) |
| Working Tools | • Screw Driver Bit ('+', Number 3)<br>• Torque Driver (20-90 lbf·in)<br>• Torque Wrench (10-50 lbf·in)<br>• Torque Wrench Spanner Head (apply Hexagon Head: 10 mm) | | |

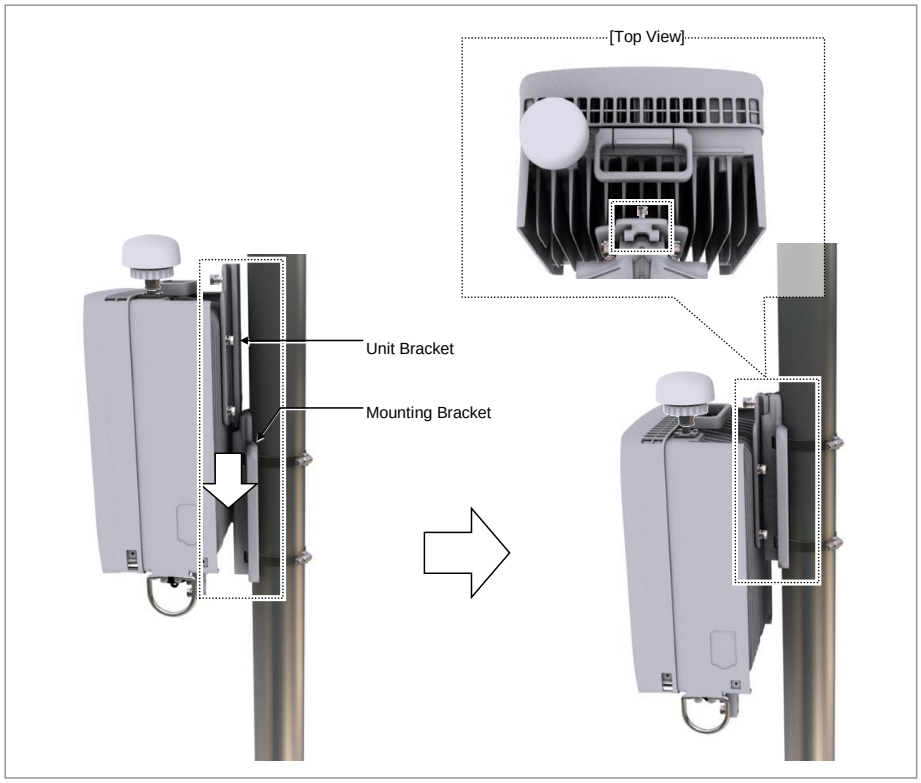
**2** Pull out the fastening materials so that they do not jut out from the fixing groove of the unit bracket. (Do not pull out completely.) This is depicted in figure below.

*Figure 13. Fixing AU on the Pole Mounting Bracket (1)*



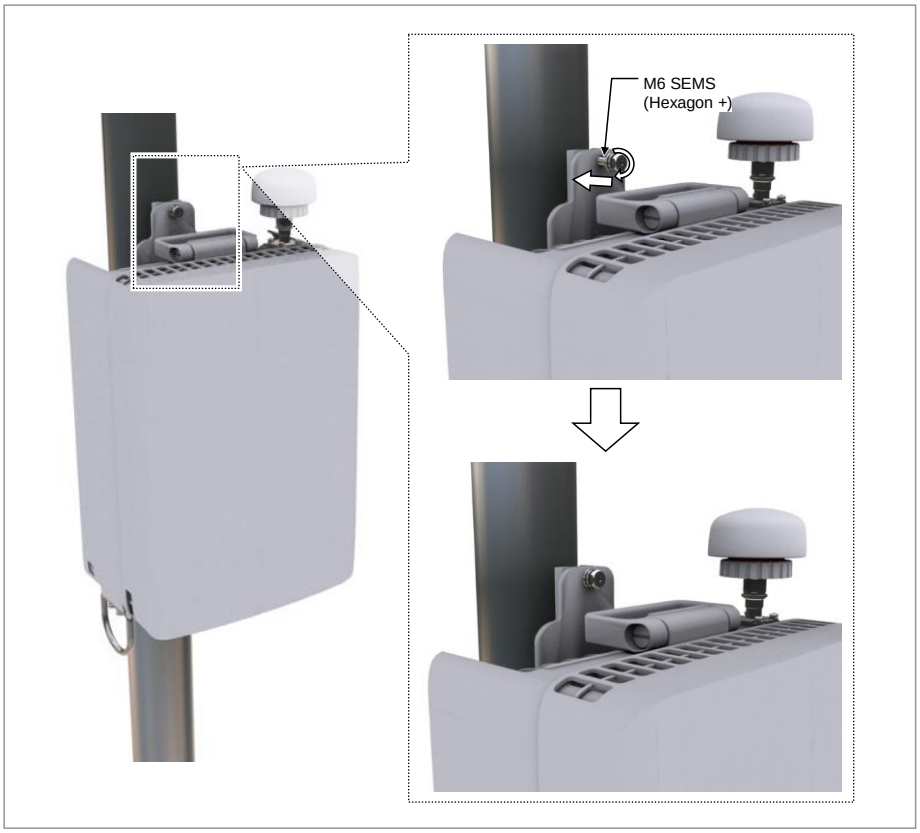

**3** Place the unit bracket on the fixing grooves of the mounting bracket and push the unit bracket down to fix the AU in place. Figure below depicts this.

***Figure 14.** Fixing AU on the Pole Mounting Bracket (2)*




**4** Fix the unit bracket to the mounting bracket using fasteners as shown in figure below.

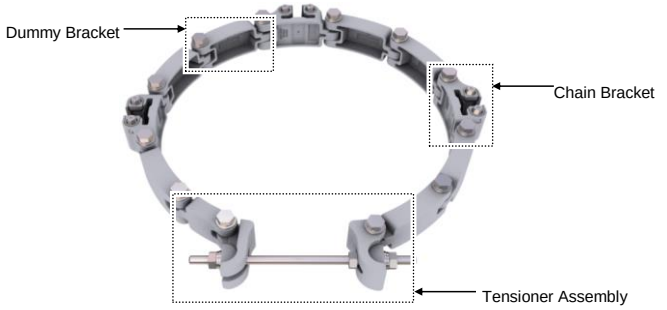
***Figure 15.** Fixing AU on the Pole Mounting Bracket (3)*




### *Using Chain Bracket Assembly*

To fix Chain Bracket Assembly on the Pole

The standard of the pole on which an AU can be attached using a chain bracket assembly is 100 A [Outer Diameter (OD): 4.5 in./114.5 mm]-350 A (OD: 14 in./355.6 mm). The number of AUs (1-3 sector) and the chain bracket assemblies that can be installed depends on the diameter of the pole. (See table below)




Unit: EA

| POLE SIZE (in/mm) | Dummy Bracket | Chain Bracket | Clip on Unit Bracket | Tensioner Assembly | M10 L50 Hex. Bolt (Washer assembly) | M6 L20 Hex. Bolt (Washer assembly × 4 EA) | AU |
|---|---|---|---|---|---|---|---|
| 350 A (14/355.6) | 7 | 3 | 1~3 | 1 | 11 | 1~3 | 1~3 |
| 300 A (12.5/318.5) | 6 | 3 | 1~3 | 1 | 10 | 1~3 | 1~3 |
| 250 A (10.5/267.4) | 5 | 3 | 1~3 | 1 | 9 | 1~3 | 1~3 |
| 200 A (8.5/216.3) | 3 | 3 | 1~3 | 1 | 7 | 1~3 | 1~3 |
| 150 A (6.5/165.2) | 2 | 2 | 1~2 | 1 | 5 | 1~2 | 1~2 |
| 125 A (5.5/139.8) | 2 | 2 | 1~2 | 1 | 5 | 1~2 | 1~2 |
| 100 A (4.5/114.5) | 2 | 1 | 1 | 1 | 4 | 1 | 1 |

Table below shows the configuration of the tensioner assembly.

| Parts | EA |
|---|---|
| Cork | 2 |
| M10 × L240 Stud bolt | 1 |
| M10 Hexagon nut | 3 |
| M10 Sprint washer | 2 |
| M10 Plain washer | 2 |
| M10 × L50 Hexagon bolt | 1 |
| Clamp nut | 1 |
| Clamp nut-2 | 1 |
| Link bracket | 1 |

To assemble the chain bracket assembly for 350 A pole (3 sector)

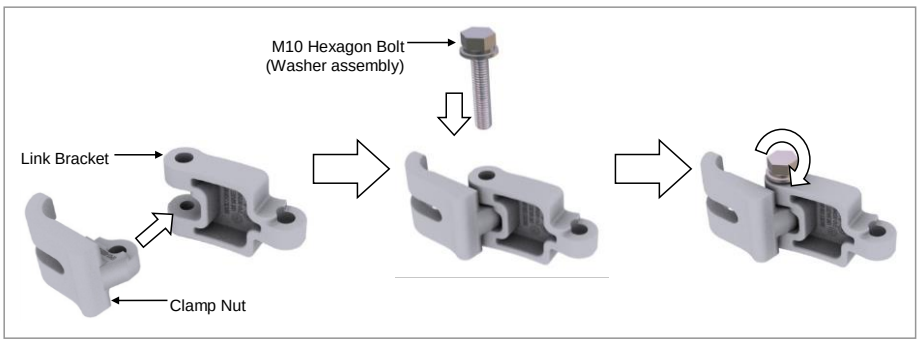
**1** Ensure that the items mentioned in below table are available.

***Table 8. Parts and Tools for Assembling Chain Bracket Assembly for 350 A pole (3 sector)***

| Category | Description | | |
|---|---|---|---|
| Parts | Chain bracket | | 3 EA |
| | Link bracket | | 1 EA |
| | Clamp nut | | 1 EA |
| | Clamp nut-2 | | 1 EA |
| | Dummy bracket | | 7 EA |
| | Fasteners | M10 × L50 Hexagon bolt (washer assembly) | 12 EA |
| | | M10 × L240 Stud bolt | 1 EA |
| | | M10 Hexagon nut | 3 EA |
| | | M10 Plain washer | 2 EA |
| | | M10 Spring washer | 2 EA |
| | | Cork | 2 EA |
| Recommended Torque Value | M10 Hexagon bolt | | 217 lbf·in (250 kgf·cm) |
| | M10 Hexagon Nut | | 217 lbf·in (250 kgf·cm) |
| Working Tools | • Torque Wrench (100-400 lbf·in)<br>• Torque Wrench Spanner Head (apply Hexagon Head: 17 mm)<br>• Spanner (17 mm) | | |

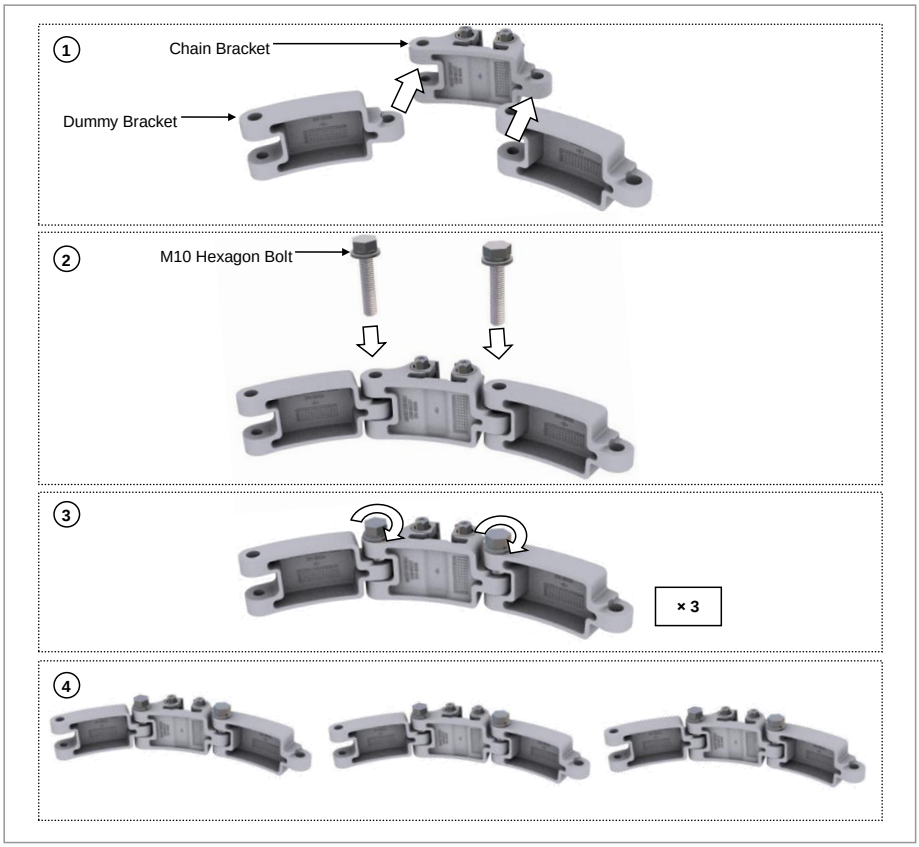
**2** Place a clamp nut to the link bracket fixing hole and fix it using fasteners, as shown in figure below.

***Figure 16. Fixing Chain Bracket Assembly for 350 A pole (3 sector) (1)***



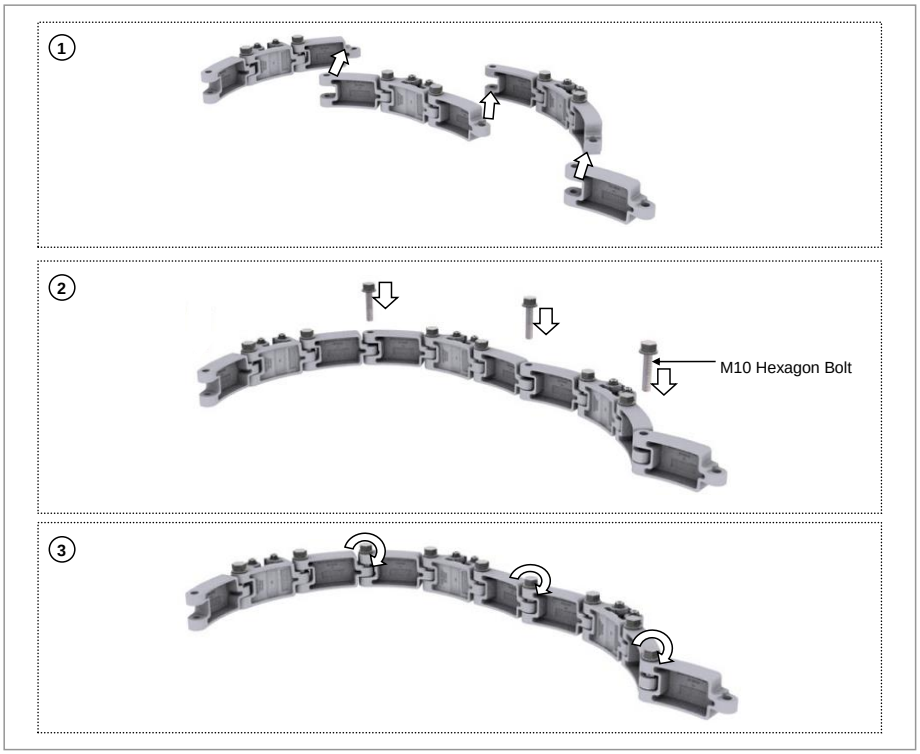

**3** Place a dummy bracket to the chain bracket fixing hole and fix it using fasteners. Figure below depicts this.

***Figure 17.** Fixing Chain Bracket Assembly for 350 A pole (3 sector) (2)*



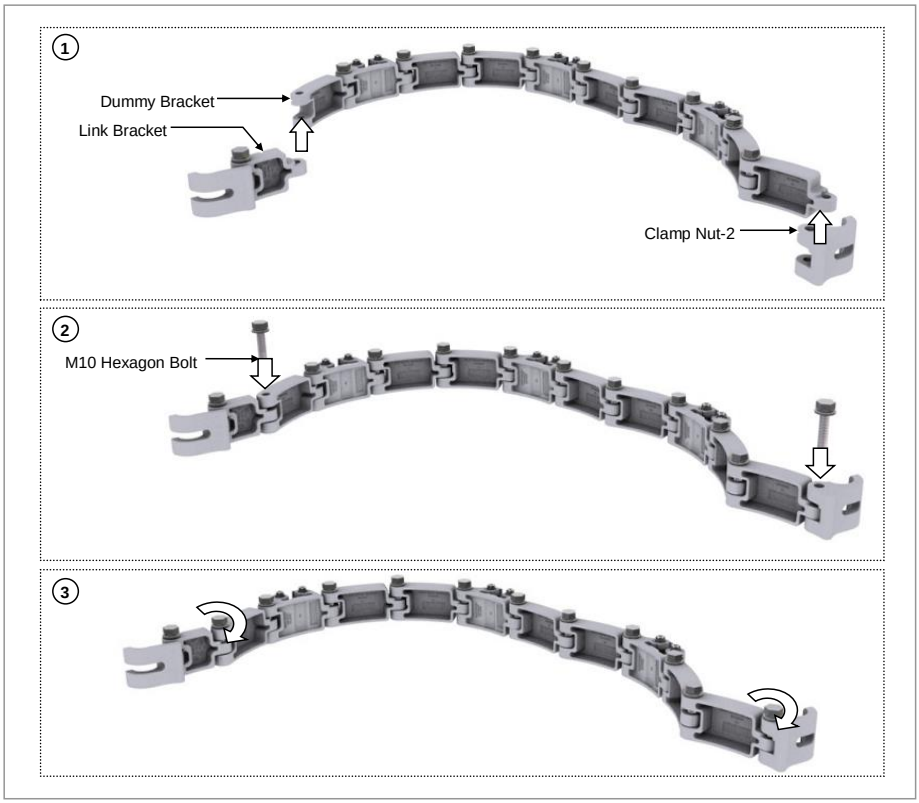

**4** Connect all dummy brackets using fasteners, as depicted in figure below.

***Figure 18.** Fixing Chain Bracket Assembly for 350 A pole (3 sector) (3)*



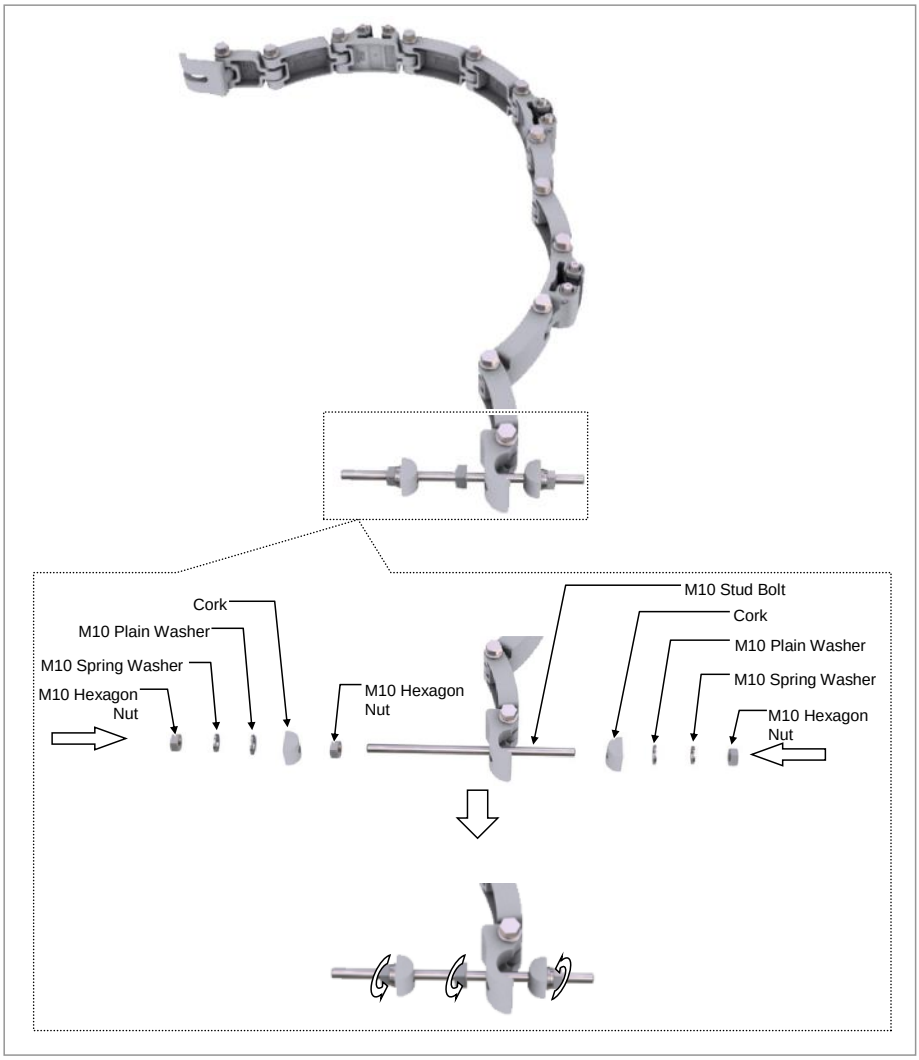

5 Place a link bracket and a clamp nut-2 to the dummy bracket fixing hole and fix it using fasteners. Figure below shows this.

***Figure 19.** Fixing Chain Bracket Assembly for 350 A pole (3 sector) (4)*

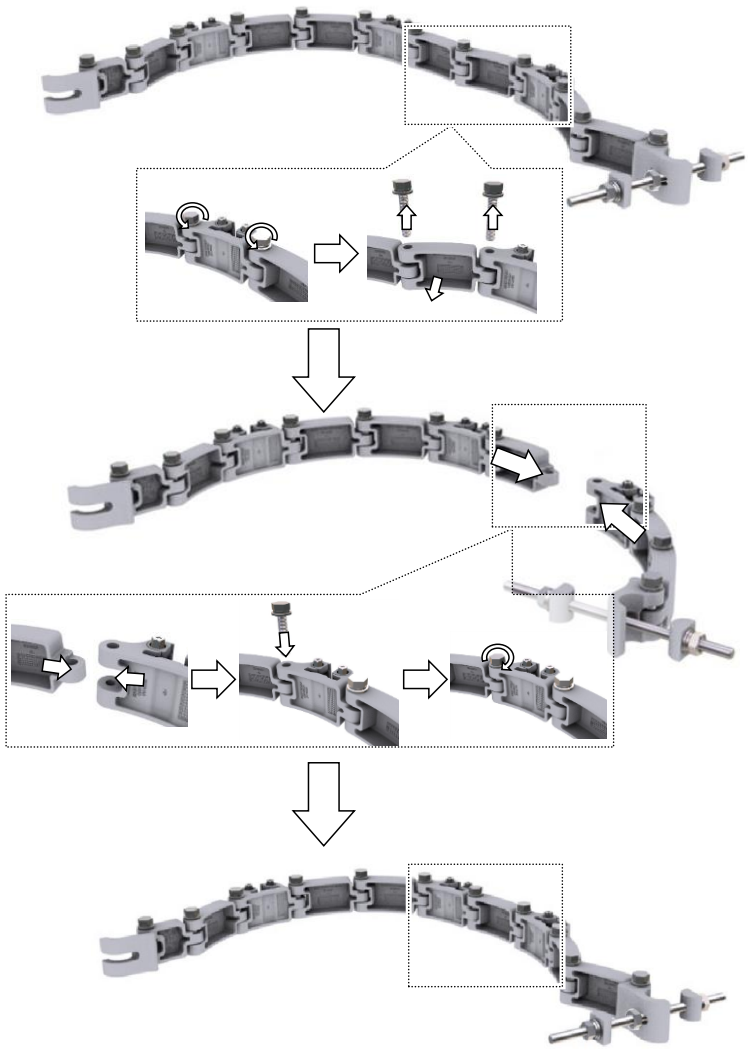



**6** Place a stud bolt to the clamp nut-2 fixing hole and fix it using fasteners. Figure below shows this.

***Figure 20.** Fixing Chain Bracket Assembly for 350 A pole (3 sector) (5)*




The length of the chain bracket assembly can be adjusted using the dummy bracket.



To fix the chain bracket assembly temporarily

**1** Ensure that the items mentioned in below table are available.

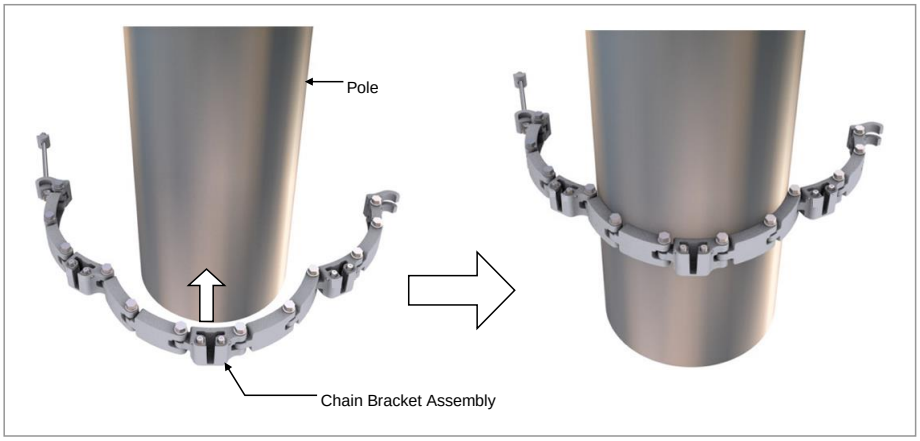
***Table 9. Parts and Tools for Fixing Chain Bracket Assembly on the Pole***

| Category | Description | |
|---|---|---|
| Parts | Chain bracket assembly | 1 EA |

| Category | Description | |
|---|---|---|
| Recommended Torque Value | M10 Hexagon Nut | 217 lbf·in (250 kgf·cm) |
| Working Tools | • Torque Wrench (100~400 lbf·in)<br>• Torque Wrench Spanner Head (apply Hexagon Head: 17 mm)<br>• Spanner (Hexagon Head: 17 mm) | |

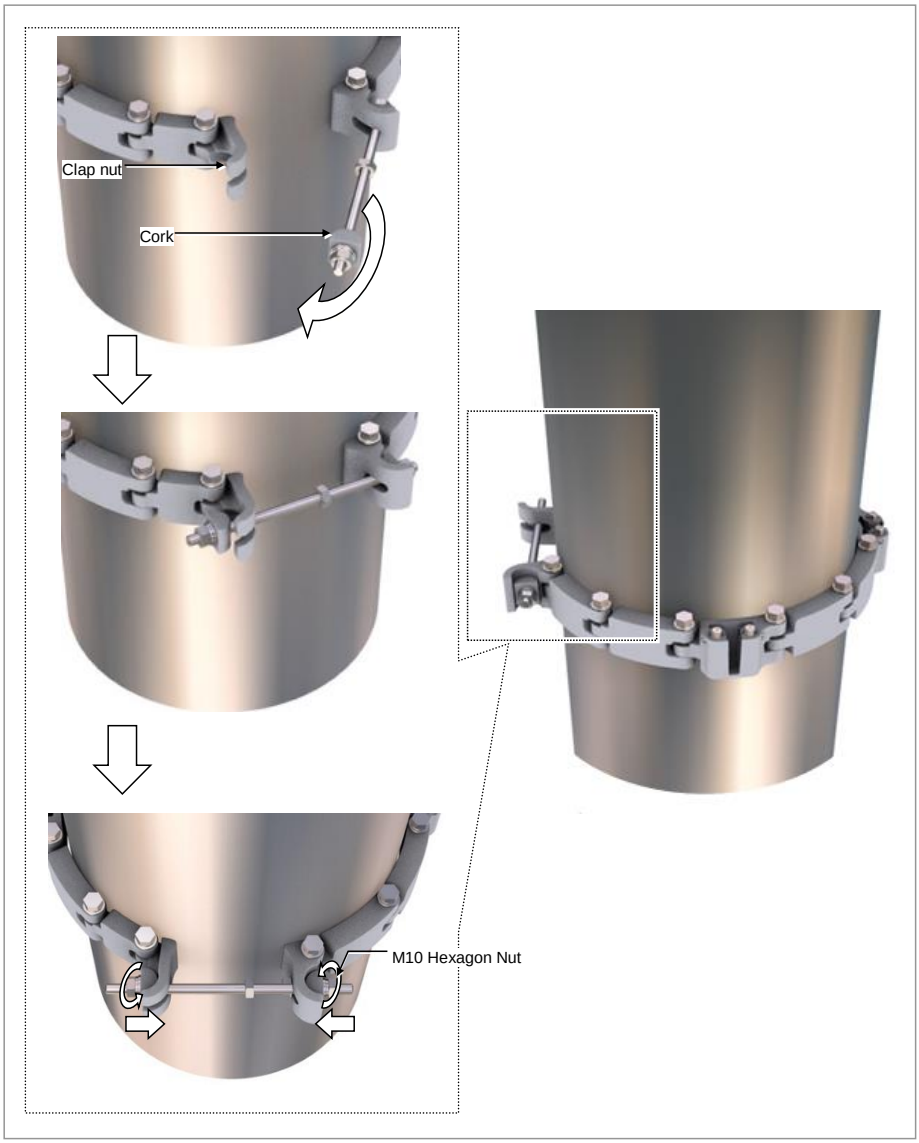
2 Open the chain bracket assembly on the ground and place it on the pole, as depicted in figure below.

***Figure 21. Fixing Chain Bracket Assembly on the Pole (1)***

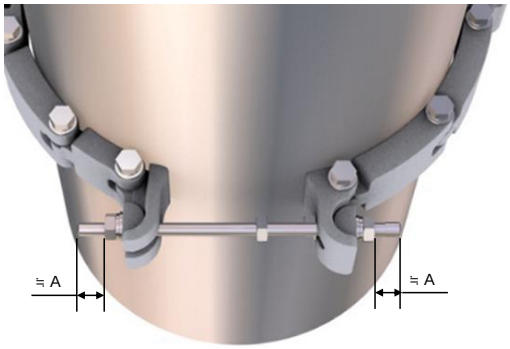



3 Fix the chain bracket assembly in place temporarily using the hexagon nuts on each side of the stud bolt, as depicted in figure below.

***Figure 22. Fixing Chain Bracket Assembly on the Pole (2)***

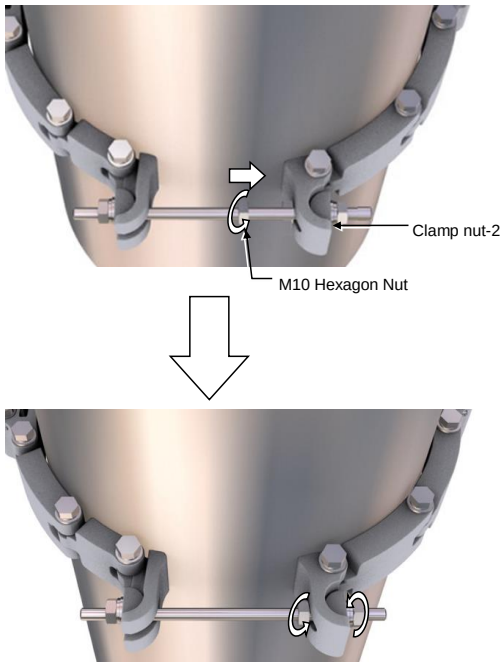



The extra space on each side of the stud bolt (A) must be equal when temporarily fixing the chain bracket assembly in place.



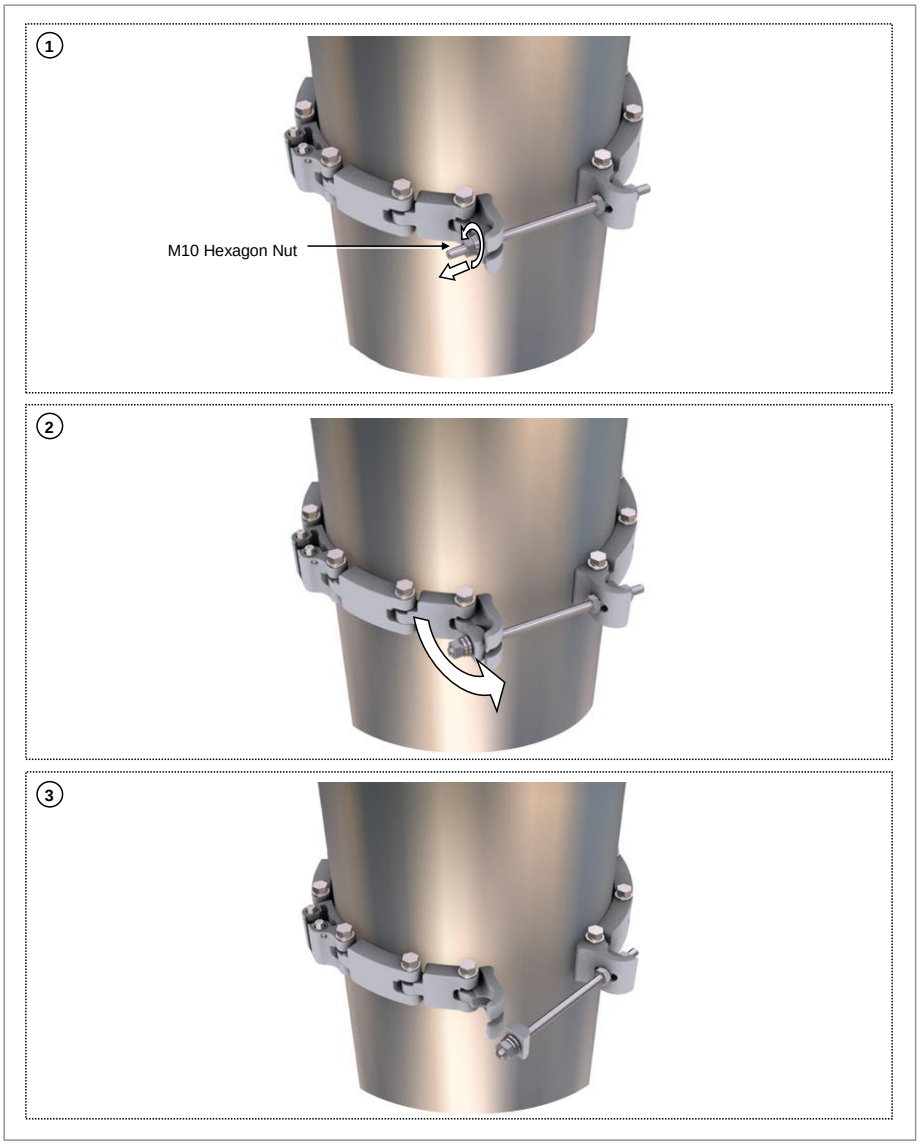

4 Use the hexagon nut in the center of the stud bolt to fix the clamp nut-2 in place, as depicted in figure below.

***Figure 23. Fixing Chain Bracket Assembly on the Pole (3)***




5 Unfasten the temporarily fixed hexagon nut to disassemble the chain bracket assembly, as depicted in figure below.

***Figure 24. Fixing Chain Bracket Assembly on the Pole (4)***




To fix the chain bracket assembly on the pole

The following is based on the 3 sector type that is installed on a 350 A pole (OD:

14 in./355.6 mm).

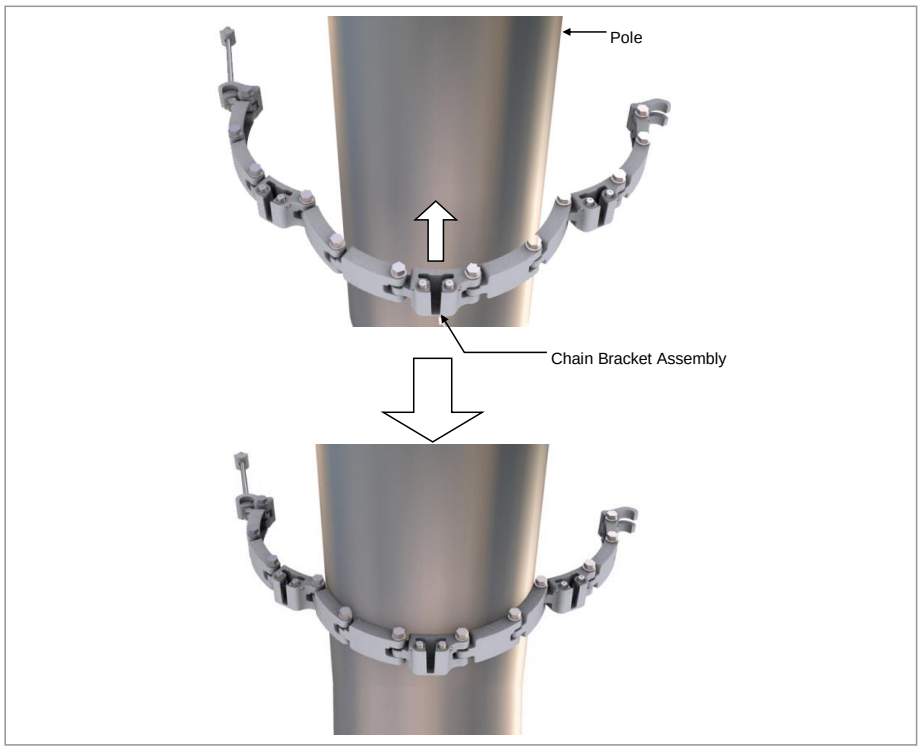
**1** Ensure that the items mentioned in below table are available.

***Table 10. Parts and Tools for Fixing Chain Bracket Assembly on the Pole***

| Category | Description | |
|---|---|---|
| Parts | Chain bracket assembly | 1 EA |
| Recommended Torque Value | M10 Hexagon Nut | 217 lbf·in (250 kgf·cm) |
| Working Tools | • Torque Wrench (100-400 lbf·in)<br>• Torque Wrench Spanner Head (apply Hexagon Head: 17 mm) | |

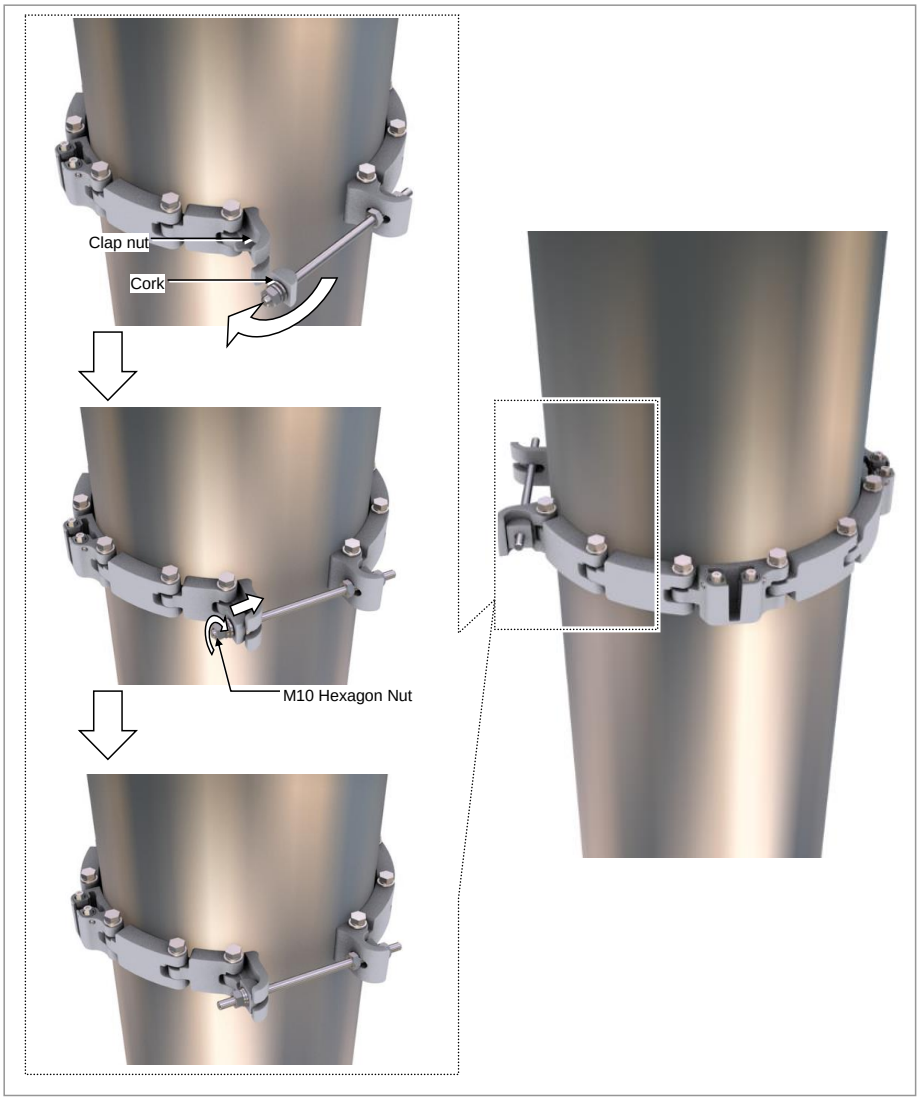
**2** Open the chain bracket assembly and place it in the position on the pole where the AU is to be installed. Figure below depicts this.

***Figure 25. Fixing Chain Bracket Assembly on the Pole (5)***




**3** Fix the chain bracket assembly to the pole using fasteners. Figure below depicts this.

***Figure 26. Fixing Chain Bracket Assembly on the Pole (6)***



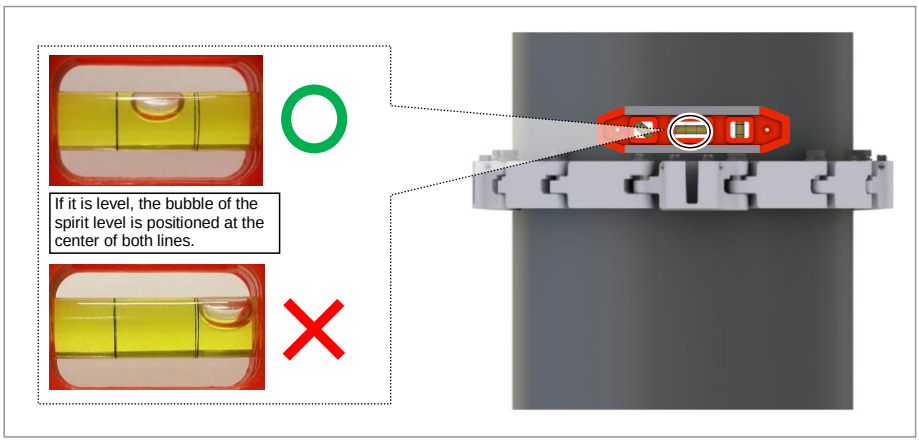

The chain bracket assembly is installed using the same method for all 1-3 sector types.

[1 Sector]

[2 Sector]

4 Check the level of chain bracket assembly on a pole and adjust the level as detailed in figure below.

***Figure 27.*** ***Fixing Chain Bracket Assembly on the Pole (7)***

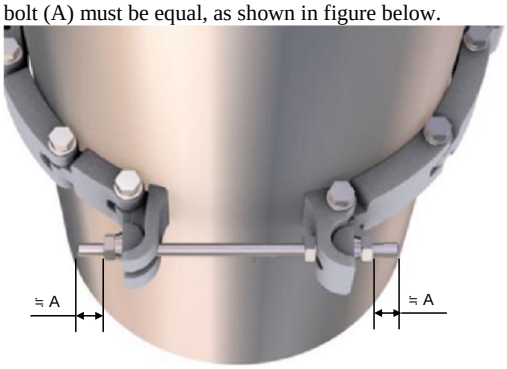



When fixing the chain bracket assembly on a pole, be sure to check the level of bracket. After finishing the installation, adjust the level minutely.

When poor leveling happens, adjust the position of fasteners used to fix the chain bracket assembly.

After the chain bracket assembly is fixed, the extra space on each side of the stud

bolt (A) must be equal, as shown in figure below.

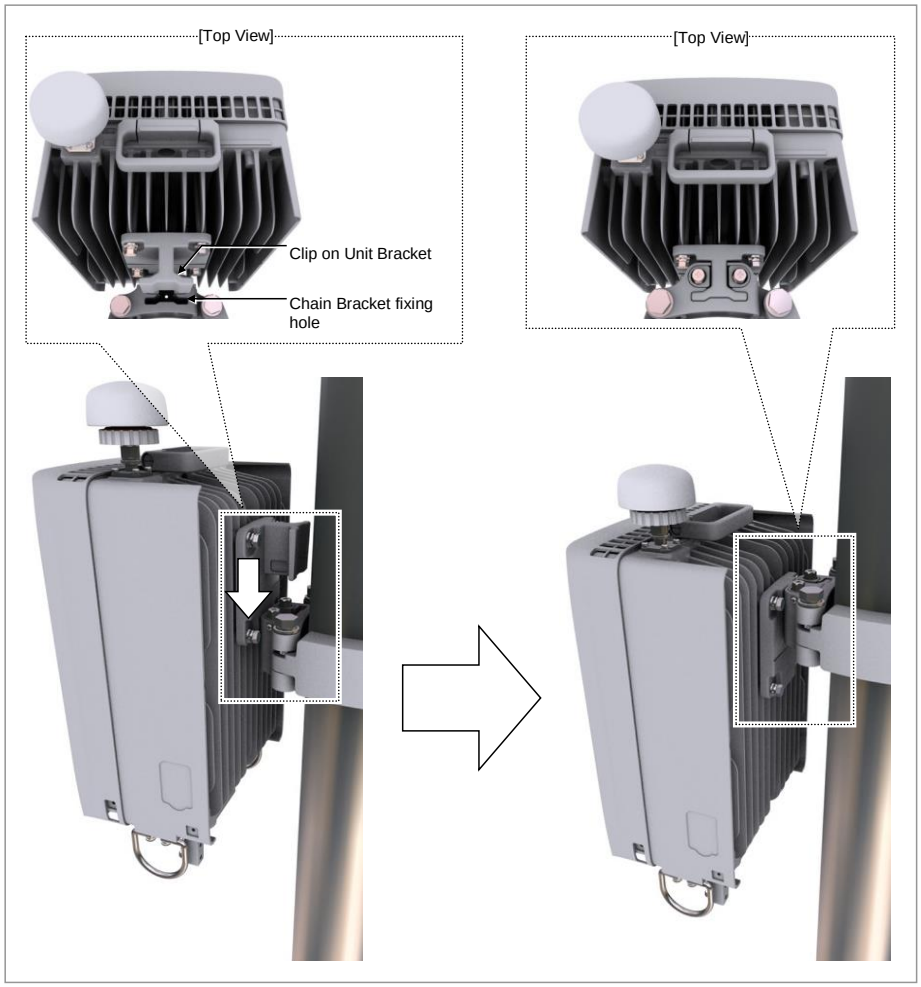



### Fixing AU on the Chain Bracket Assembly

To fix the AU on the chain bracket assembly

**1** Place the clip-on unit bracket on the fixing grooves of the chain bracket and push the clip-on bracket down until it clicks to fix the AU in place. Figure below depicts this.

***Figure 28. Fixing AU on the Pole Chain Bracket Assembly (1)***




**2** Fix all AUs using the same method, as shown in figure below.

***Figure 29.** Fixing AU on the Pole Chain Bracket Assembly (2)*


All AUs are fixed to the chain bracket assembly using the same method.

[1 sector]

[2 sector]

## Wall Type

An AU can be fixed on wall using a mounting bracket. This section details the procedures for fixing the mounting bracket on the wall and fixing the AU on the bracket.

### *Marking and Drilling for Wall Mounting*

To mark on the wall

**1** Ensure that the items mentioned in below table are available.

***Table 11. Tools for Marking***

| Category | Description |
|---|---|
| Working Tools | • Tape Measure<br>• Permanent Maker<br>• Level |

Perform leveling test before drilling by referring to *System Leveling*, to ensure the positions marked are horizontal or vertical. If the result shows the marked positions are not horizontal or vertical, modify the marking positions.

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

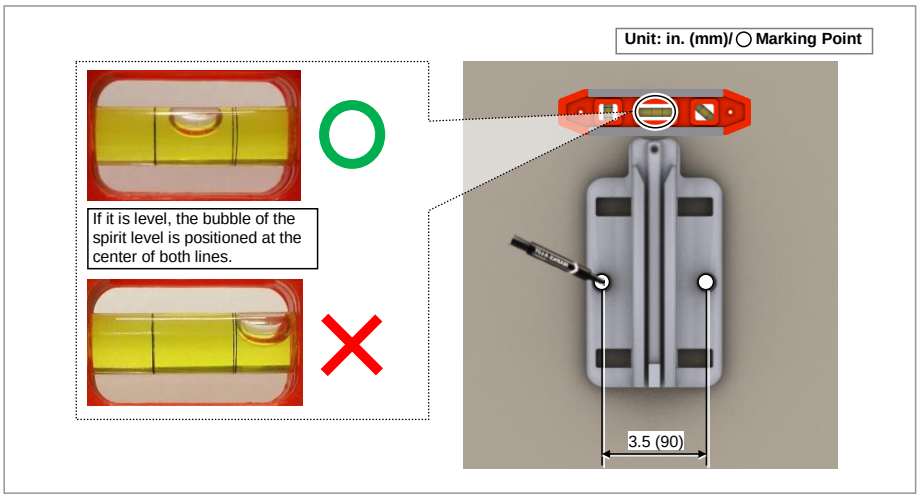
**2** Check the distance between the location for fixing the AU and the anchor bolt hole, as shown in figure below.

*Figure 30. AU Marking Dimensions for Wall Type*


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

4 If the level status is normal, mark the anchor bolt holes on the wall. This is detailed in figure below.

*Figure 31. Marking Wall Type*



To drill the anchor holes and fix the anchors

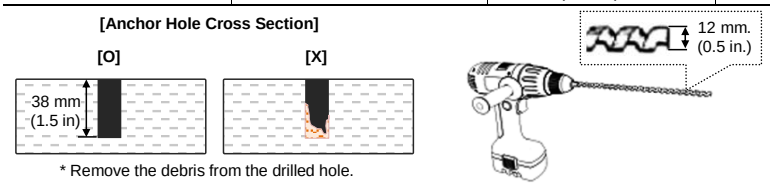
1 Ensure that the items mentioned in below table are available.

*Table 12. Parts and Tools for Drilling and Anchoring*

| Category | Description | |
|---|---|---|
| Parts | M8 Set Anchor Assembly | 2 EA |
| Woking Tools | • Hammer Drill<br>• Concrete Drill Bit (12 mm)<br>• Vacuum Cleaner<br>• Hammer<br>• Anchor Punch (For M8 Set Anchor) | |

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

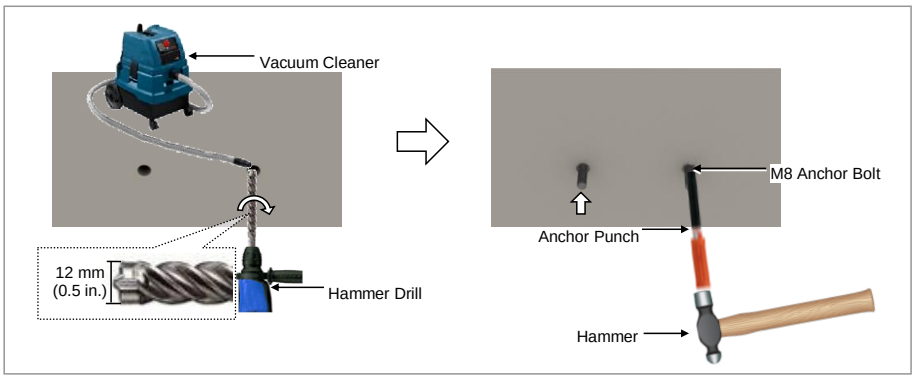
| Category | Anchor Bolt | Drill Bits | Hole Depth |
|---|---|---|---|
| AU | M8 | 12 mm (0.5 in.) | 38 mm (1.5 in.) |




2 Drill anchor holes at the marked points. Remove dust from the holes using a vacuum cleaner. Fix set anchor to the drilled hole. This is shown in figure below.

(Ensure you do not lose the M8 hexagon nut, spring washer, and plain washer.)

*Figure 32. Drilling and Anchoring*



### *Fixing Mounting Bracket on the Wall*

To fix the mounting bracket on the wall

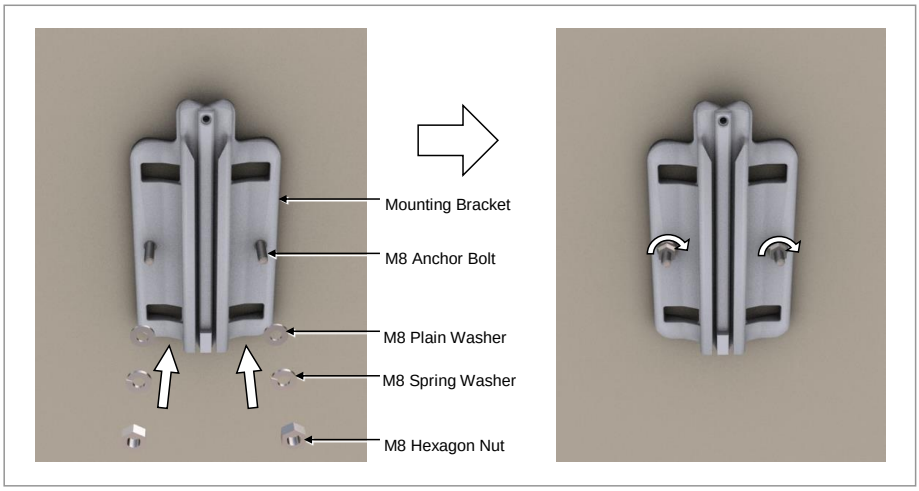
**1** Ensure that the items mentioned in below table are available.

***Table 14. Parts and Tools for Fixing Mounting Bracket on the Wall***

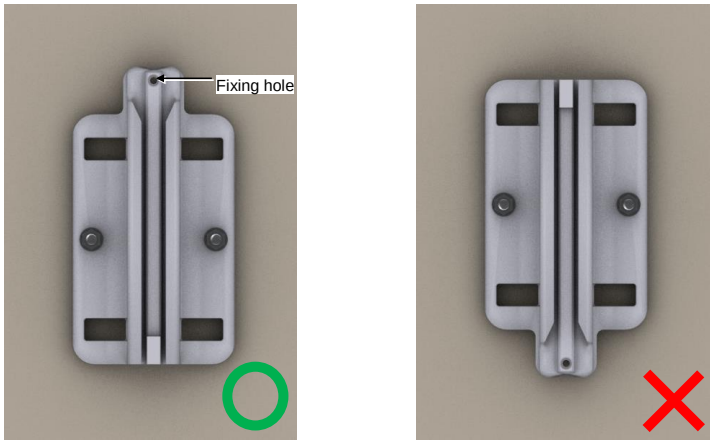
| Category | Description | | |
|---|---|---|---|
| Parts | Mounting bracket | | 1 EA |
| | Fastener | M8 Plain Washer<br>M8 Spring Washer<br>M8 Hexagon Nut | 2 EA<br>2 EA<br>2 EA |
| Recommended Torque Value | M8 Hexagon Nut | | 110 lbf·in (127 kgf·cm) |
| Working Tools | • Torque Wrench (100-400 lbf·in)<br>• Torque Wrench Spanner Head (apply Hexagon Head: 13 mm) | | |

**2** Place the mounting bracket to the anchor bolt and fix the bracket using fasteners, as depicted in figure below.

***Figure 33. Fixing Mounting Bracket on the Wall***




Ensure the fixing hole is upward, as depicted in figure below.




### *Fixing on the Wall*

To fix the AU on the wall

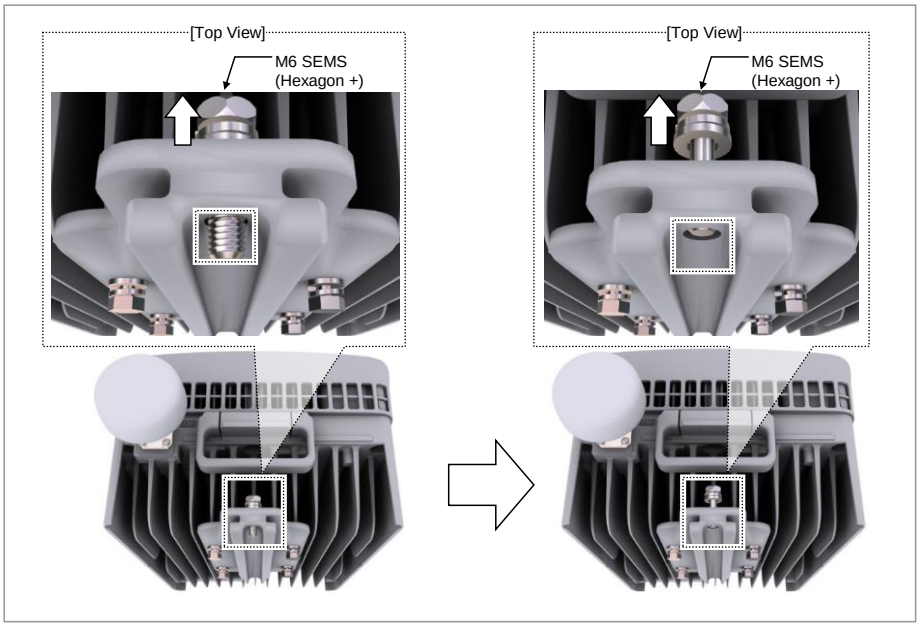
1 Ensure that the items mentioned in below table are available.

***Table 15. Parts and Tools for Fixing AU on the Wall***

| Category | Description | | |
|---|---|---|---|
| Parts | Fasteners | M6 × L23 SEMS (Hexagon +)<br>(Fastened to the unit bracket) | 1 EA |
| Recommended Torque Value | M6 SEMS | | 43 lbf·in (50 kgf·cm) |
| Working Tools | • Screw Driver Bit ('+', Number 3)<br>• Torque Driver (20-90 lbf·in)<br>• Torque Wrench (10-50 lbf·in)<br>• Torque Wrench Spanner Head (apply Hexagon Head: 10 mm) | | |

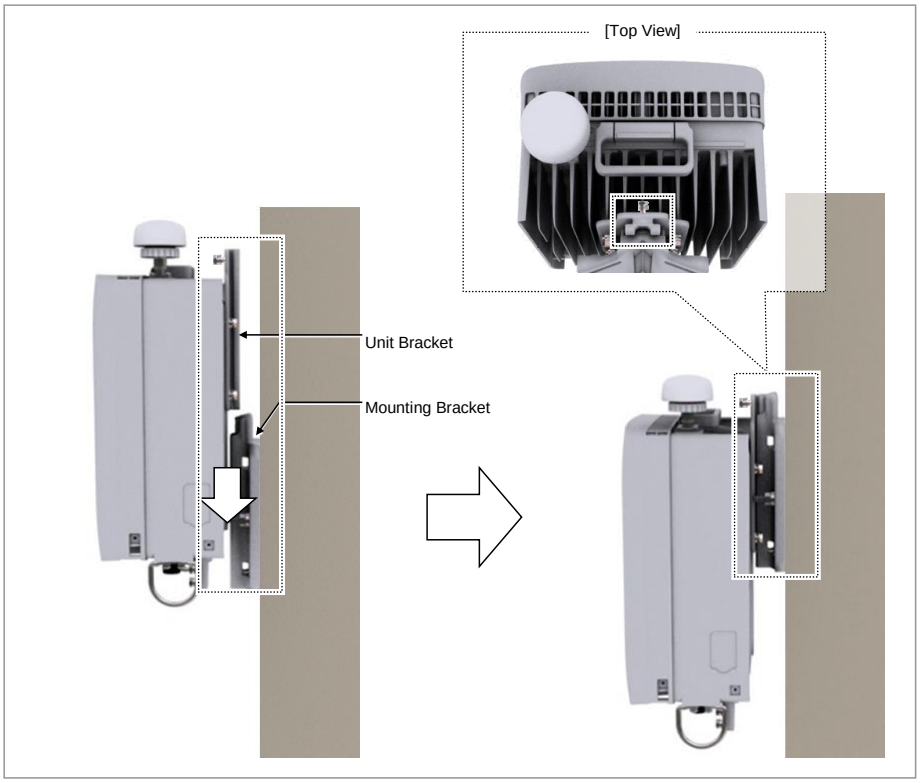
2 Pull out the fastening materials so that they do not jut out from the fixing grooves of the unit bracket. (Do not pull out completely.) This is depicted in figure below.

***Figure 34. Fixing AU on the Wall (1)***



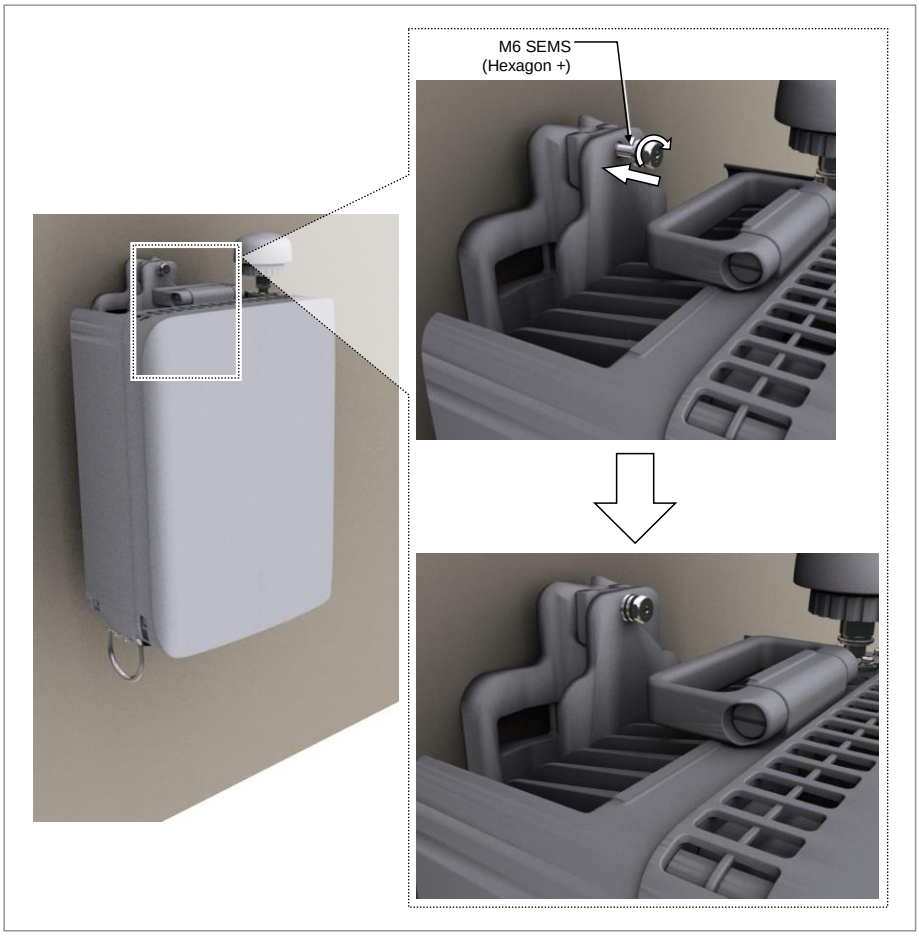

**3** Place the unit bracket on the fixing grooves of the mounting bracket and push the unit bracket down to fix the AU in place. Figure below depicts this.

***Figure 35.** Fixing AU on the Wall (2)*




**4** Fix the unit bracket to the mounting bracket using fasteners as shown in figure below.

***Figure 36. Fixing AU on the Wall (3)***



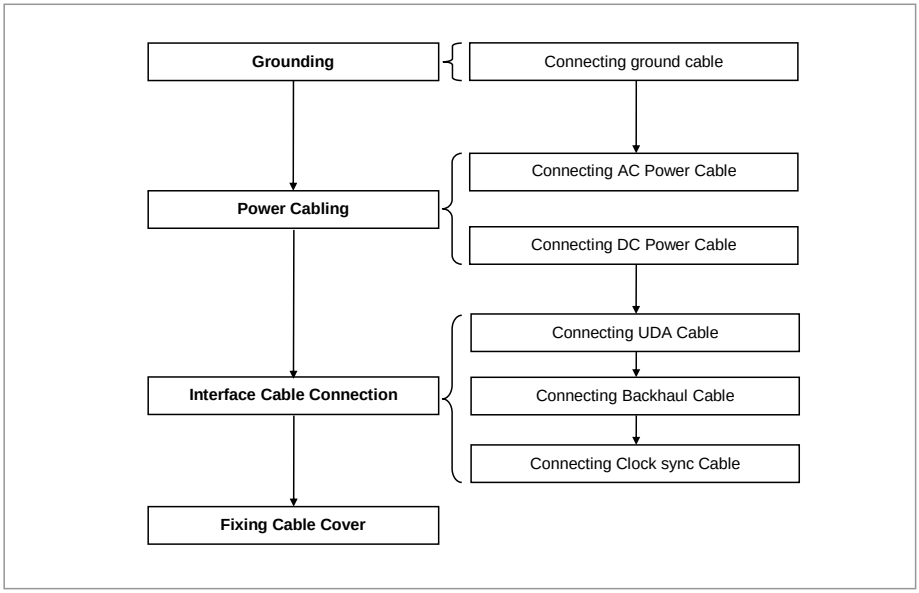
# Chapter 3 Connecting Cables

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

## Cabling Procedure

Figure below depicts the procedure to connect system cables.

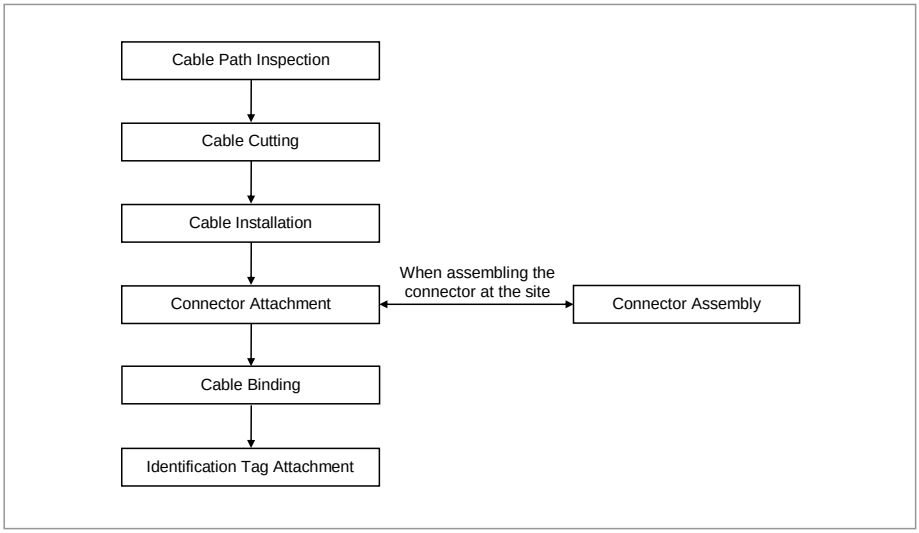
*Figure 37. Procedure to Connect System Cable*



# Guidelines for Cable Connections

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

***Figure 38. Cable Connection Procedure***




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

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

## Cable Path Inspection

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

To inspect the cable path, ensure the following.

- A minimum cable length must be selected, so that the length does not affect the cable installation and maintenance.

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

## Cable Cutting

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

To cut the cable, follow these guidelines:

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

## Cable Installation

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

To install the cable, follow these guidelines:

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

Table below provides the recommended minimum allowed cable bend radius of different types of cables

*Table 16. Recommended Minimum Allowed Cable Bend Radius*

| No | Type | Allowed Cable Bend Radius | |
|---|---|---|---|
| 1 | Ground/Power Cable | Eight times of the cable external diameter | |
| 2 | Optical Cable (indoor) | Unloaded Condition (Installed)<br>: 20 times of cable external diameter | Loaded Condition (During Installation)<br>: 40 times of cable external diameter |
| 3 | Optical Cable (Outdoor) | Unloaded Condition (Installed)<br>: 10 times of cable external diameter | Loaded Condition (During Installation)<br>: 20 times of cable external diameter |
| 4 | UTP/FTP/S-FTP/F-UDP Cable | Four times of the cable external diameter | |
| ※ If the allowed cable bend radius is specified by the manufacturer, comply with the bend radius specified. | | | |

## Cable Binding

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

Follow these guidelines when binding a cable.

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

## Connector Attachment

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

Follow these guidelines when attaching the connector.

- Ensure operator is fully aware of the connector assembly method before assembling the connector. Assemble the connector in accordance with its pin map.
- Each connector has a hook to prevent its core positions from being changed.
- Check the corresponding grooves before connecting the connector to another connector.
- Use a heat shrink tube at the connector connection for cables that are installed

outdoor, such as feeder lines, to prevent water leakage and corrosion from occurring at the part exposed to the outside.

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

## Identification Tag Attachment

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

Follow these guidelines when attaching an identification tag.

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

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

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

After completing cable installation, unused ports must be capped.

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

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

# Cabling Diagram

This section describes the different cabling options for the AU.

## For AC Type

Figure below depicts the cabling diagram of AC type AU.

***Figure 39. Cable Diagram-AC Type***

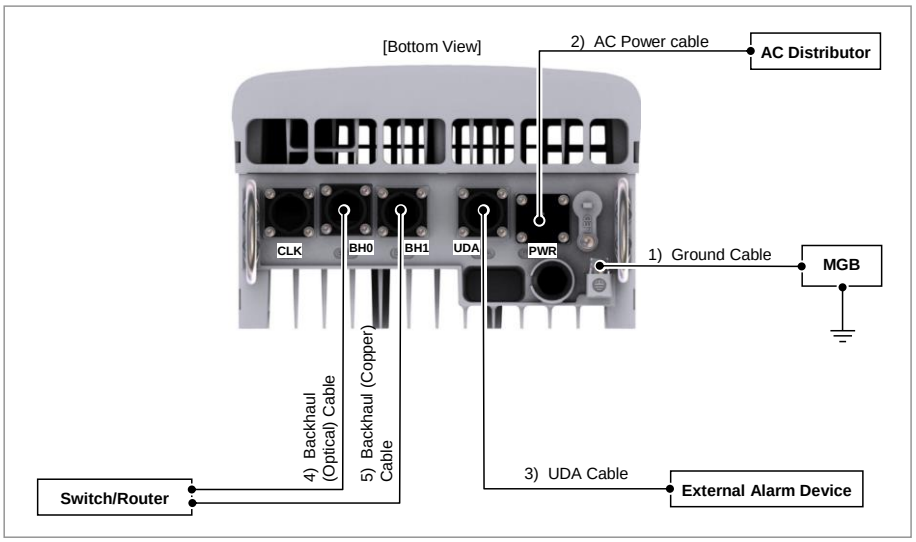



Table below lists the main specifications of the AC type AU cable connections.

***Table 17. AU Connection Cable_AC Type***

| From | To | Cable |
|---|---|---|
| MGB | AU | **1** Ground Cable<br>: 6 AWG × 1C |
| AU | AC: Distributor | **2** AC Power Cable: 14 AWG or 1.5 $mm^2$ × 3C |
| | Switch | **3** Backhaul (Optical) Cable<br>: Single Mode (Outdoor Type) |
| | | **4** Backhaul (Copper) Cable Assembly<br>: (24 AWG, 4P, CAT6a, F-UDP) |
| | External Alarm Device | **5** UDA Cable<br>: UDA Cable Assembly |

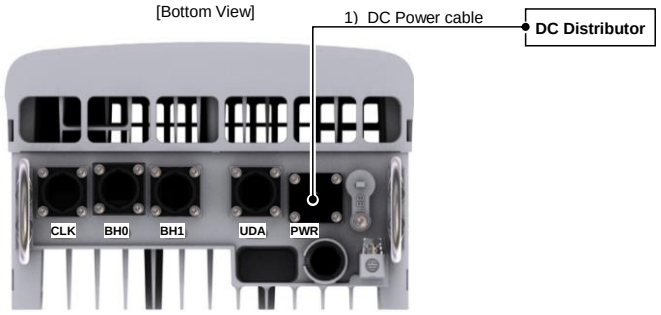
The inlet hole finishing method of external equipment must be done after

consultation with operation company, if the cable is connected to external equipment such as optical distribution box.
- The cables: Power cable, Backhaul (Optical and Copper) cables, and UDA cable

## For DC Type

Figure below depicts the cabling diagram of DC type AU.

***Figure 40. Cable Diagram-DC Type***




**For the DC type, all cable connections except the power cable are identical to the AC type.**

Table below lists the main specifications of the DC type AU cable connections.

***Table 18. AU Connection Cable_DC Type***

| From | To | Cable |
|---|---|---|
| MGB | AU | **1** Ground Cable<br>: 6 AWG × 1C |
| AU | DC: Distributor | **2** DC Power Cable: 12 AWG or 2.5 $mm^2$ × 2C |
| | Switch | **3** Backhaul (Optical) Cable<br>: Single Mode (Outdoor Type) |
| | | **4** Backhaul (Copper) Cable Assembly<br>: (24 AWG, 4P, CAT6a, F-UDP) |
| | External Alarm Device | **5** UDA Cable<br>: UDA Cable Assembly |

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

## Cascade Cabling (optional)

Figure below depicts the cabling diagram for 2 sector cascade AU.

***Figure 41.** Cable Diagram (Optional, 2 sector cascade)*

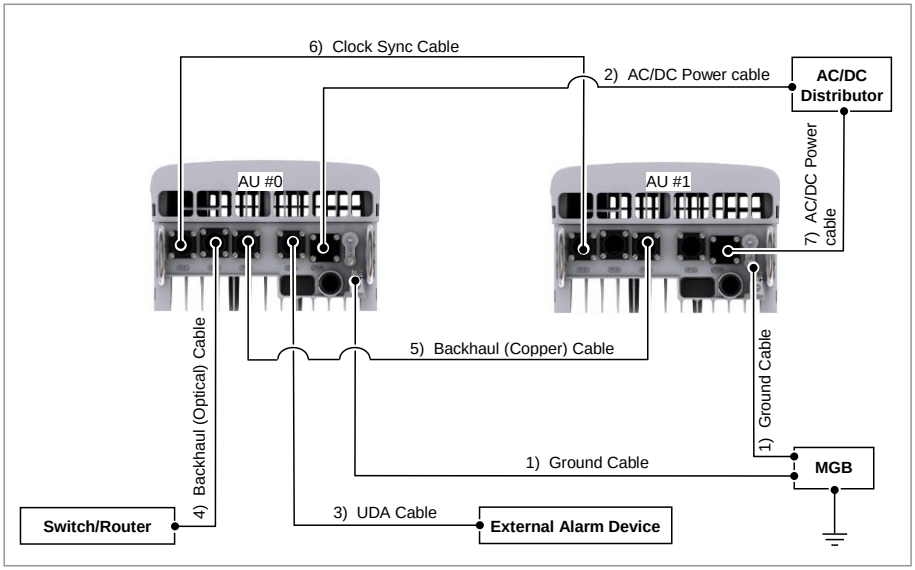



Table below lists the main specifications of the cascade type AU cable connections.

***Table 19.** AU Connection Cable (Optional, 2 sector cascade)*

| From | To | Cable |
|---|---|---|
| MGB | • AU #0<br>• AU #1 | **1** Ground Cable<br>: 6 AWG × 1C |
| #0 AU | • AC: Distributor<br>• DC: Distributor | **2** AC Power Cable: 14 AWG or 1.5 mm × 3C<br>DC Power Cable: 12 AWG or 2.5 mm × 2C |
| | External Alarm Device | **3** UDA Cable Assembly |
| | Switch/Router | **4** Backhaul (Optical) Cable<br>: Single Mode (Outdoor Type) |
| | #1 AU | **5** Backhaul (Copper) Cable Assembly<br>: (24 AWG, 4P, CAT6a, F-UDP) |
| | #1 AU | **6** Clock Sync Cable Assembly |
| #1 AU | AC or DC: Distributor | **7** AC Power Cable: 14 AWG or 1.5 mm × 3C<br>DC Power Cable: 12 AWG or 2.5 mm × 2C |

The inlet hole finishing method of external equipment must be done after

consultation with operation company, if the cable is connected to external equipment, such as optical distribution box.
- Cables: Power cable, Backhaul (Optical and Copper) cables, UDA cable, and Clock sync cable.

When connecting a 2 sector cascade, use one GPS antenna on the #0 AU, and have AUs exchange signals through a clock sync cable.

# Grounding

Grounding is the process of operating an electronic system such as power supply system, communication system, and control system, stably without damage from lightning, transient-current, transient-voltage, and electric noise. Grounding also helps in preventing injury from electric shock.

Ground equipment minimizes the electrical potential of the electronic device to that of the ground, which is zero electrical potential. This prevents electrification of the electronic device.

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

The purposes of the ground construction are as follows:

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

## Connecting Ground Cable

To connect a ground cable

1 Ensure that the items mentioned in below table are available.

***Table 20. Parts and Tools for Connecting Ground Cable***

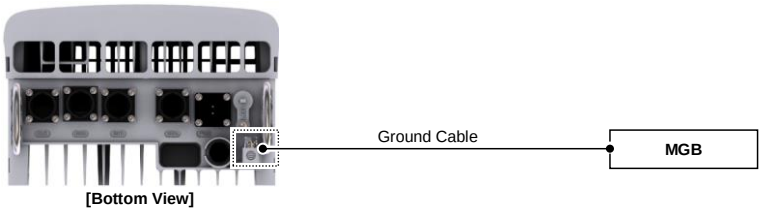
| Category | Description | |
|---|---|---|
| Installation Section | MGB-AU Ground Terminal | |
| Cable | 6 AWG × 1C | |
| Heat Shrink Tube (Spec/Color/Length) | Φ 0.47 in. (12 mm)/Clear/1.96 in. (50 mm) | |
| Pressure Terminal | MGB | Checking MGB specifications per site and preparing connecting parts |
| | AU | 6 AWG, 2 Hole, Hole diameter: 1/4 in. (6.4 mm), Hole spacing: 0.63 in. (16 mm) |
| Fastener | MGB | Checking MGB specifications per site and preparing connecting parts |
| | AU | M6 × L12 SEMS (Hexagon+)/2 EA |
| Recommended Torque Value | M6 SEMS | 43 lbf·in (50 kgf·cm) |

| Category | Description |
|---|---|
| Working Tools | • Cable Cutter<br>• Wire Stripper<br>• Crimping tool<br>• Heating Gun<br>• Nipper<br>• Screw Driver ('+', Number 3)<br>• Torque Driver (20-90 lbf·in.)<br>• Screw Driver Bit ('+', Number 3) |

For the pressure terminals of the cable, the UL Listed products or equivalent must be used.
Example: Manufacturer-Panduit
AU: 6 AWG Pressure Terminal (LCD6-14A-L)

2 Install the ground cable from the MGB to the AU ground terminal as shown in figure below.

***Figure 42. Connecting Ground Cable (1)***



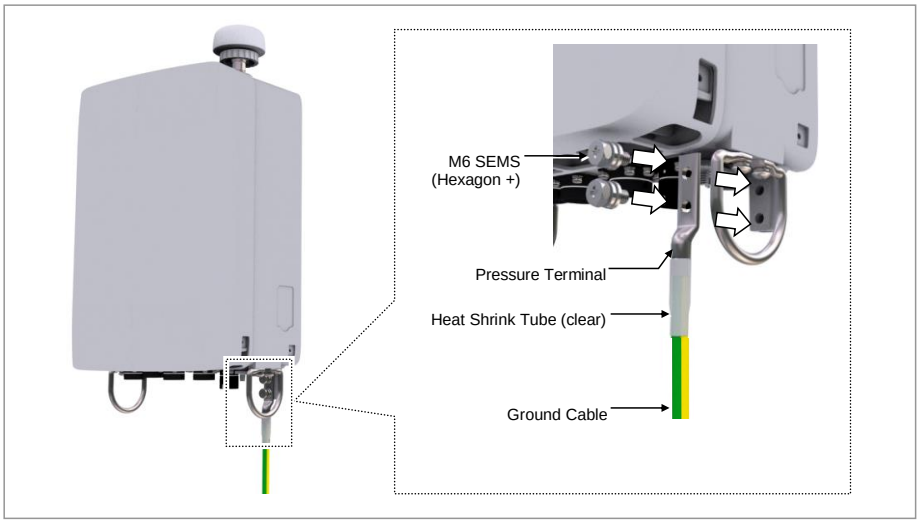

3 Assemble a pressure terminal and a heat shrink tube at the end of the AU ground cable.

4 Align the pressure terminal to the mounting hole of the AU ground terminal.

5 Firmly fix the pressure terminal onto the AU ground terminal using fasteners.

Figure below depicts the steps 3 to 5.

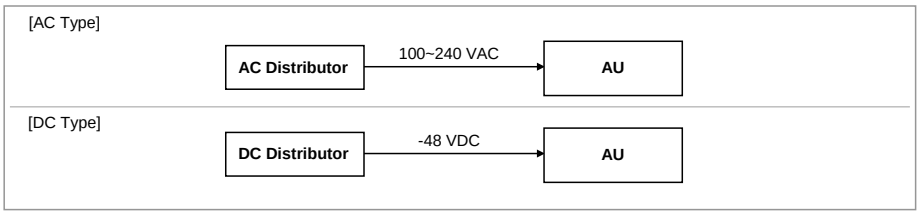
***Figure 43.*** ***Connecting Ground Cable (2)***



# Power Cabling

Figure below depicts the elements of a power supply device.

***Figure 44. Power Equipment Elements***




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

메모 포함[SSK1]: This element is not shown in the figure.

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

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

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

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

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

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

It must be verified that the rectifier or the power distributor has an output voltage within the specified system input range before the power line is connected.

## Connecting AC Power Cable

To connect an AC power cable

1 Ensure that the items mentioned in below table are available.

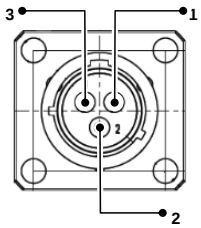
***Table 21. Parts and Tools for Connecting Power Cable***

| Category | Description | |
|---|---|---|
| Installation Section | AC Distributor-AU Ac power input port | |
| Cable | AC: 14 AWG or 1.5 $mm^2$ × 3C<br>(The color of the core wire can be changed according to the specification of the cable used.) | |
| Connector | AC Distributor | Check specifications of AC Distributor output terminal per site and prepare fasteners. |
| | AU (AC) | JONHON, DY6F1203PNFM-06 to OPEN |
| Working Tools | • Cable Cutter<br>• Wire Stripper<br>• Compressor<br>• Heating Gun<br>• Nipper | |

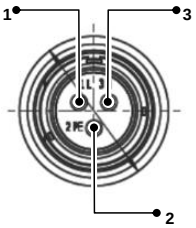
Table below provides the AC power cable connector pin map.

***Table 22. AC Power Cable/Connector Pin Map***

| Power Connector Pin Number | Description | Color |
|---|---|---|
| Pin 1 | L | Black |
| Pin 2 | PE | Green |
| Pin 3 | N | White |



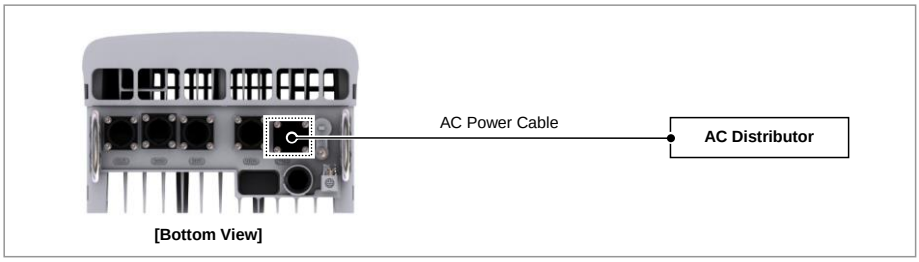
[System side Connector]



[Cable side Connector]

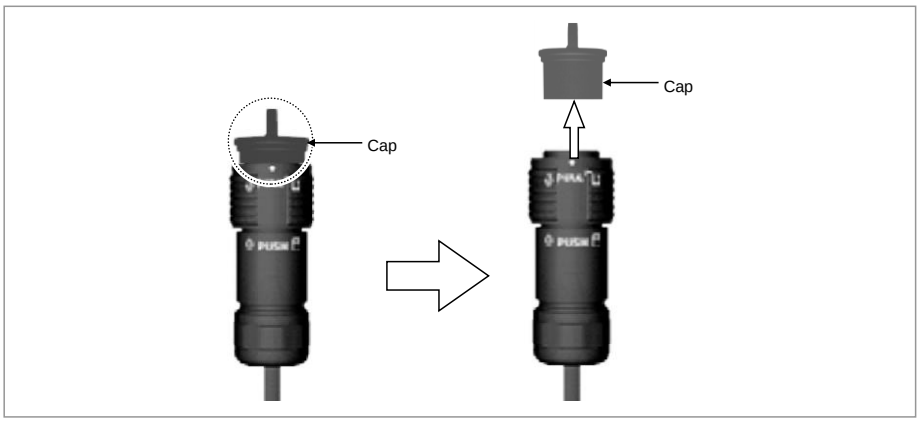
2 Install the AC power cable from the AC Distributor to the AU, as shown in figure below.

*Figure 45. Connecting AC Power Cable (1)*



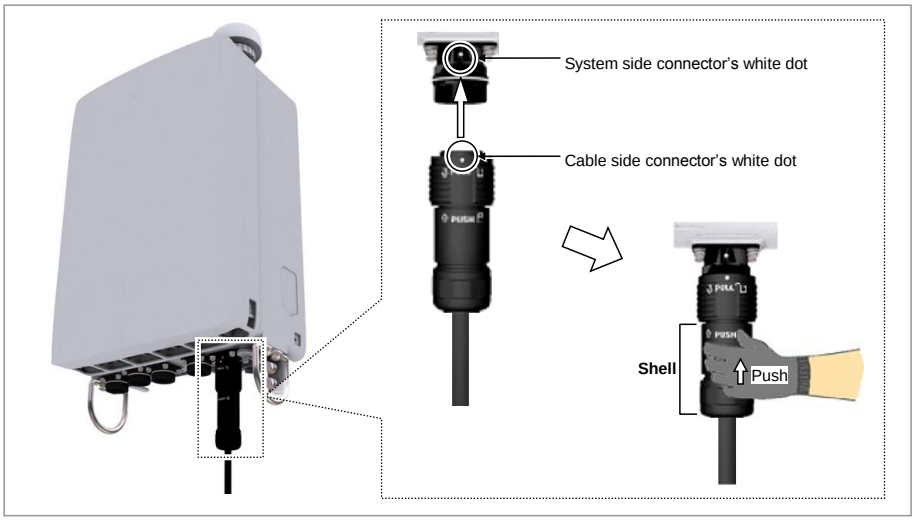

3 Separate the cap from the cable side connector, as shown in figure below.

*Figure 46. Connecting AC Power Cable (2)*




4 Insert the connector aligning white dot of the cable side connector and white dot of the system side connector. When inserting the connector, push the shell to upper side, as shown in figure below.

*Figure 47. Connecting AC Power Cable (3)*

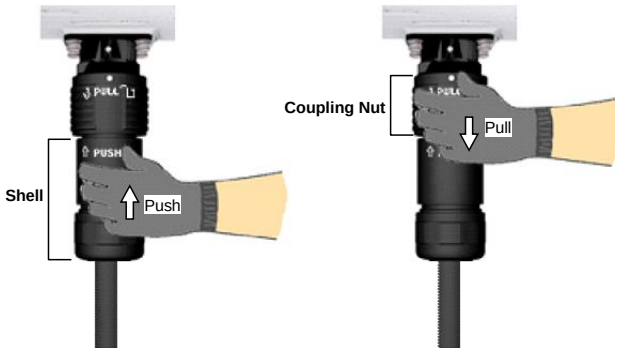



When the connector is fastened tight, the white line on the system side connector becomes invisible (or hidden).


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

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

This is depicted in figure below.




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

## Connecting DC Power Cable

To connect a DC power cable

1 Ensure that the items mentioned in below table are available.

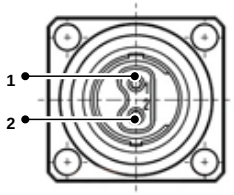
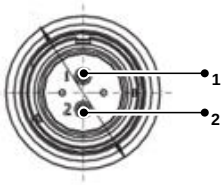
***Table 23. Parts and Tools for Connecting Power Cable***

| Category | Description | |
|---|---|---|
| Installation Section | DC Distributor-AU DC power input port | |
| Cable | DC: 12 AWG or 2.5 $mm^2$ × 2C<br>(The color of the core wire can be changed according to the specification of the cable used.) | |
| Connector | DC Distributor | Check specifications of DC Distributor output terminal per site and prepare fasteners. |
| | AU (DC) | JONHON, DY6F1202PNFM-06 to OPEN |
| Working Tools | • Cable Cutter<br>• Wire Stripper<br>• Compressor<br>• Heating Gun<br>• Nipper | |

Table below provides the DC power cable connector pin map.

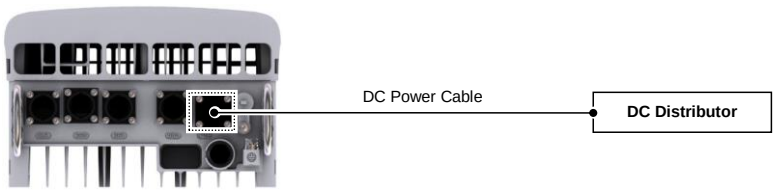
***Table 24. DC Power Cable/Connector Pin Map***

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

| Power Connector Pin Number | Description | Color |
|---|---|---|
|  [System side Connector] |  [Cable side Connector] | |

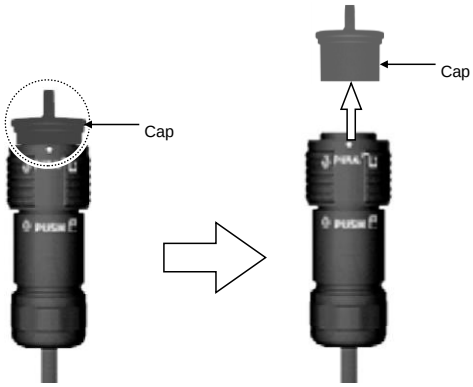
2 Install the DC power cable from the DC Distributor to the AU, as shown in figure below.

***Figure 48. Connecting DC Power Cable (1)***




3 Separate the cap from the cable side connector, as shown in figure below.

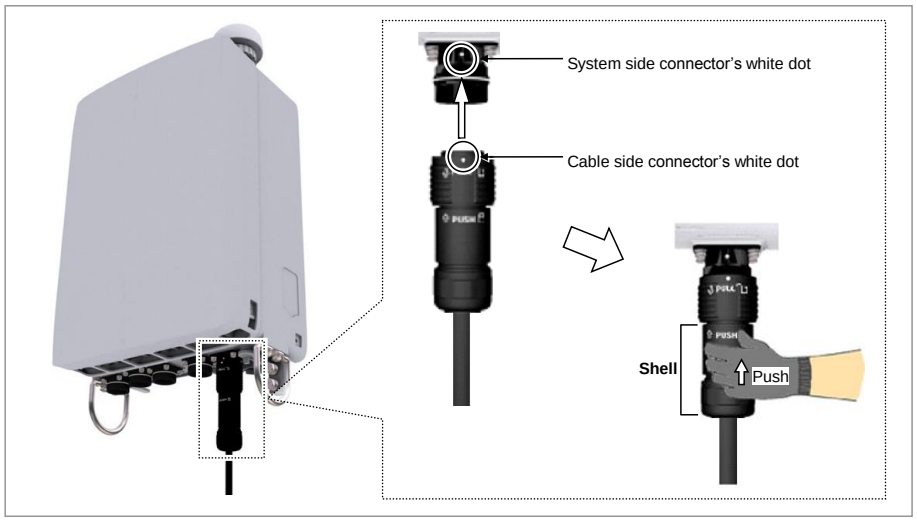
***Figure 49. Connecting DC Power Cable (2)***




4 Insert the connector aligning white dot of the cable side connector and white dot of the system side connector. When inserting the connector, push the shell

to upper side, as shown in figure below.

***Figure 50. Connecting DC Power Cable (3)***

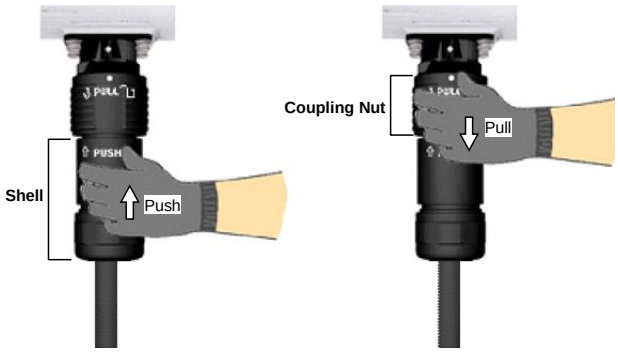



When the connector is fastened tight, the white line on the system side connector becomes invisible (or hidden).


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

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

This is depicted in figure below.




Install a circuit breaker to the rectifier (or power distributor) for stable power. The capacity of the circuit breaker is 14 A.

# Interface Cable Connection

This section describes the procedures to connect interface cables.

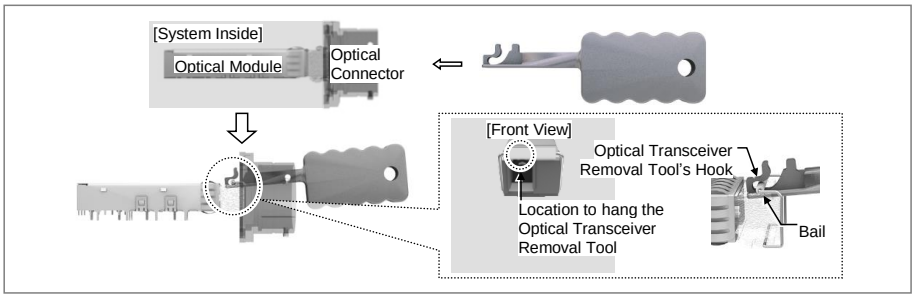
## Remove/Insert Optical Module

This section describes the process to follow if an optical module needs to be removed or inserted before connecting the cable. Each step is followed by its corresponding figure showing the location of the parts and direction of movement.

### To remove the optical module

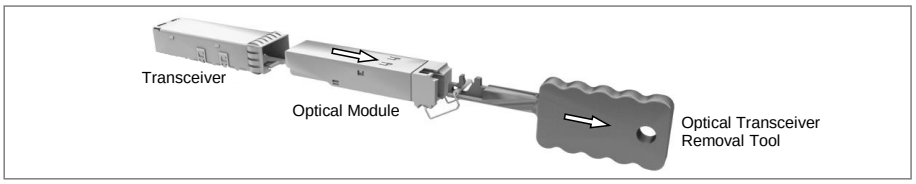
1 Hang the hook of Optical Transceiver Removal Tool (OTRT) on the bail of the optical module within the system.

***Figure 51. Optical Module Removal (1)***



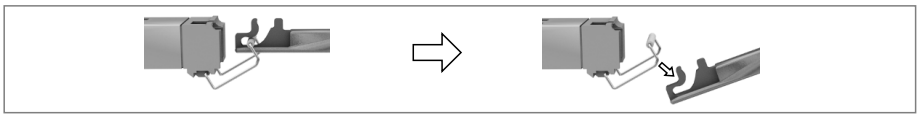

2 Completely remove the optical module from the transceiver by pulling the OTRT.

***Figure 52. Optical Module Removal (2)***




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

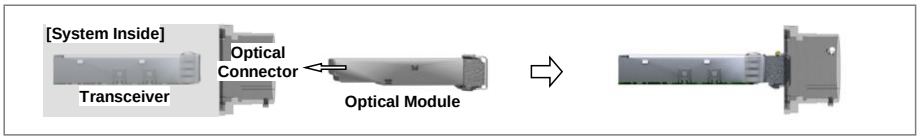
***Figure 53. Optical Module Removal (3)***



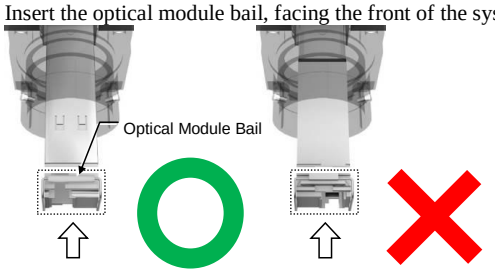
To insert the optical module

Push the optical module into the transceiver within the connector.

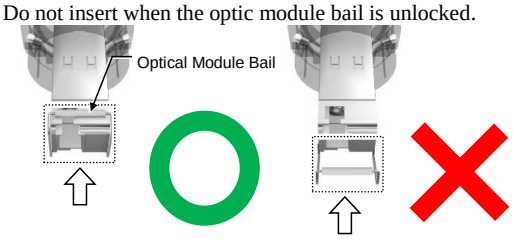
*Figure 54. Optical Module Inset*




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




Do not insert when the optic module bail is unlocked.




## Connecting UDA Cable

To connect a UDA cable

1 Ensure that the items mentioned in below table are available.

*Table 25. Parts and Tools for Connecting UDA Cable*

| Category | Description | |
|---|---|---|
| Installation Section | AU UDA Port~External alarm device | |
| Cable | UDA Cable Assembly (24 AWG, 5C) | |
| Connector | External alarm device | Check specifications of external device output terminal per site and prepare fasteners. |
| | AU | JONHON, Push Pull Type, RJ45MF-CT-07 |

| Category | Description |
|---|---|
| Working Tools | • Cable Cutter<br>• Wire Stripper<br>• Nipper<br>• LAN Tool |

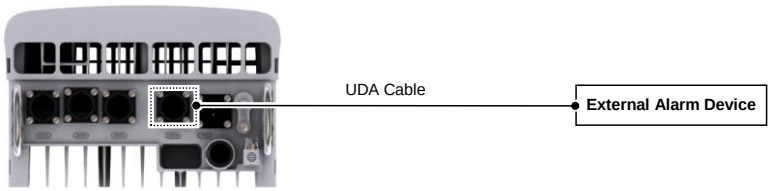
Table below provides the UDA cable pin map.

***Table 26. UDA Cable Pin Map***

| System Side | Color Map | Description |
|---|---|---|
| 1 | White/Blue | UDA Common RTN |
| 2 | Blue | UDA3 |
| 3 | Orange | UDA2 |
| 4 | Green | UDA1 |
| 5 | Brown | UDA0 |
| 6 | N.C | N.C |
| 7 | N.C | N.C |
| 8 | N.C | N.C |
| Shell | - | - |

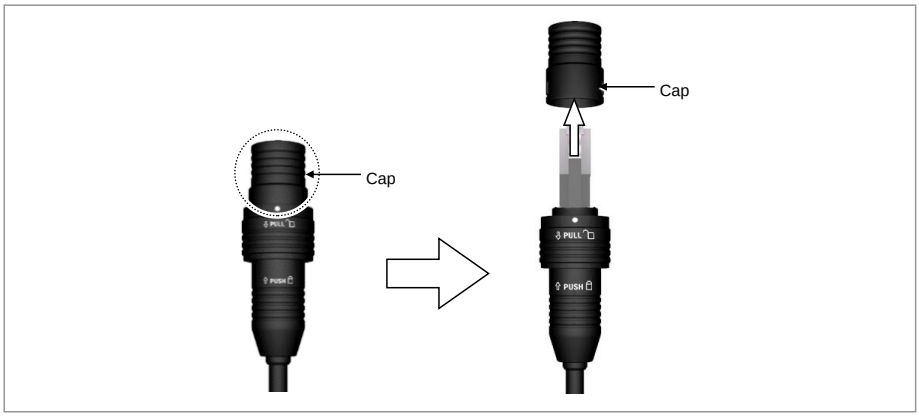
**2** Install the UDA cable from the external alarm device to the AU.

***Figure 55. Connecting UDA Cable (1)***



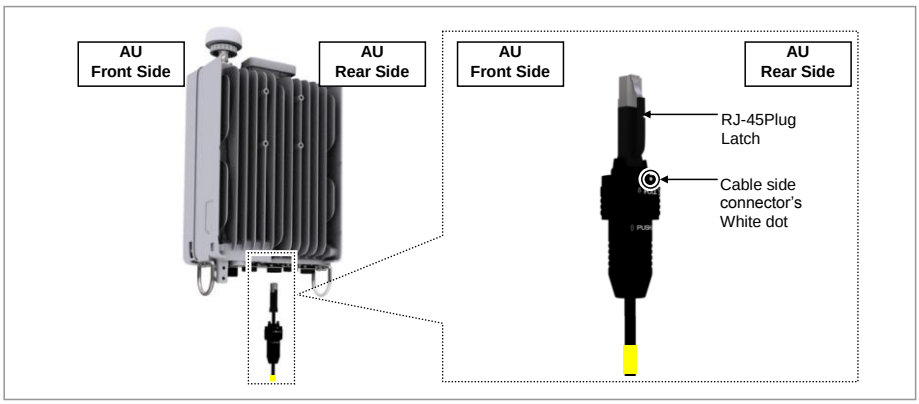

**3** Separate the cap from the cable side connector.

*Figure 56. Connecting UDA Cable (2)*



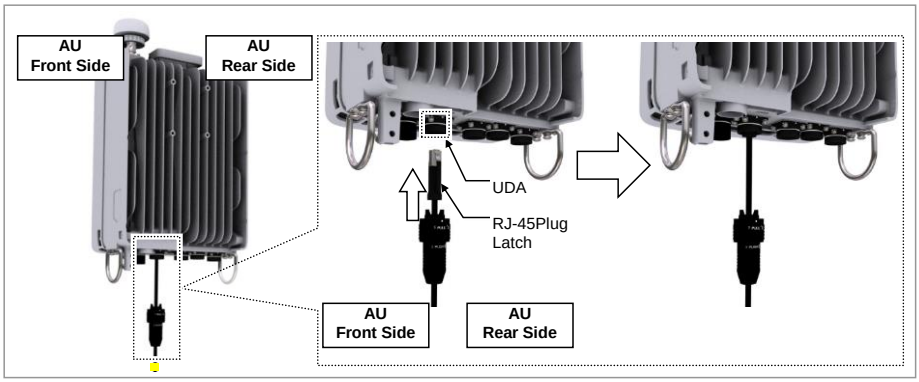

**4** The latch of cable side connector should be toward the rear of the system.

*Figure 57. Connecting UDA Cable (3)*



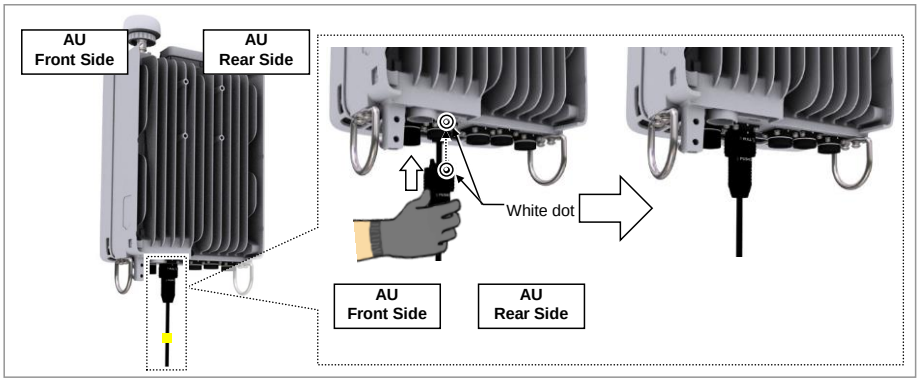

**5** Insert the RJ-45 plug to the system side connector.

*Figure 58. Connecting UDA Cable (4)*



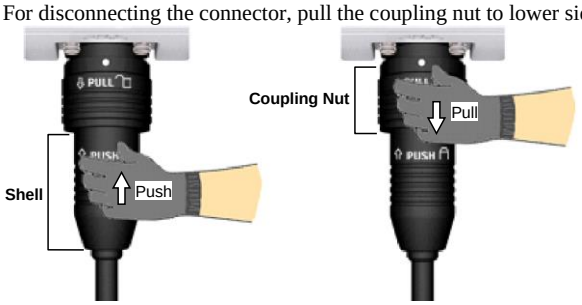

**6** Insert the connector aligning white dot of the cable side connector and white dot of the system side connector. When inserting the connector, push the shell to the system side.

*Figure 59. Connecting UDA Cable (5)*




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


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




## Connecting Backhaul Cable

To connect a backhaul (optical) cable

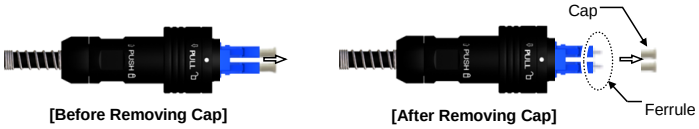
1 Ensure that the items mentioned in below table are available.

*Table 27. Parts and Tools for Connecting Backhaul (Optical) Cable*

| Category | Description | |
|---|---|---|
| Installation Section | AU BH0 Port-Switch/Router | |
| Cable | Backhaul (Optical) Cable (Optical, Single Mode, for Outdoor Type) | |
| Connector | AU | JONHON, Push Pull Type, PDLC03T03 (DLC/UPC) |
| Working Tools | Optical Connector Cleaner | |

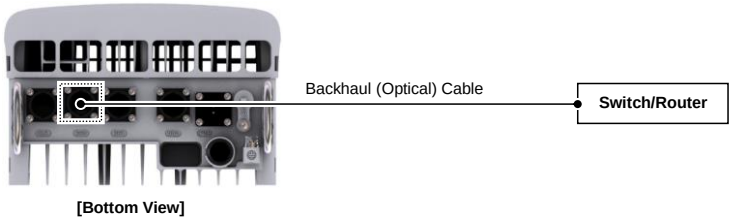
The laser beam light runs through the optical cable in the system. The laser beam can cause serious injury to worker's eyes. Therefore, avoid direct exposure to the laser source.

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



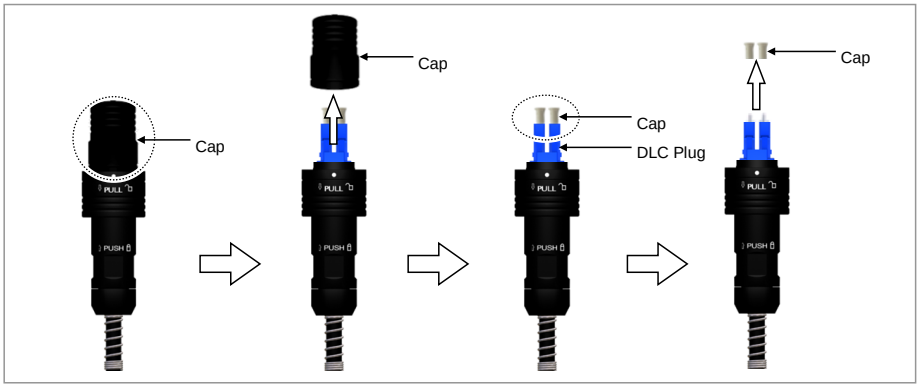

**2** Install the backhaul (optical) cable from the AU (BH0 port) to the switch/router.

***Figure 60. Connecting Backhaul (Optical) Cable (1)***



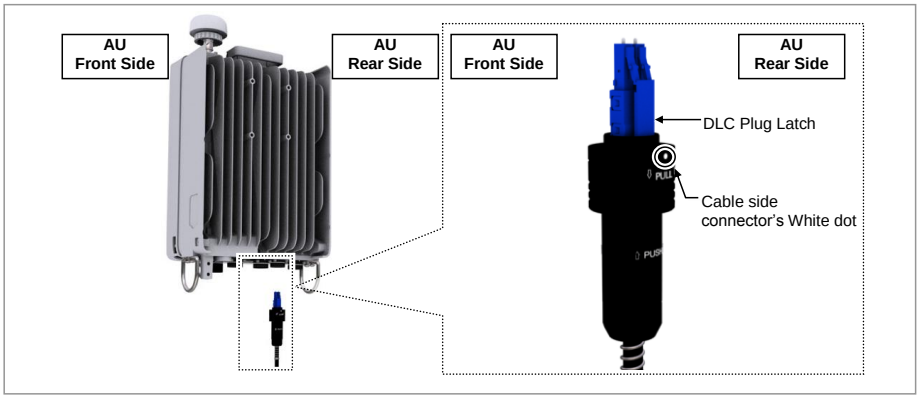

**3** Separate the cap from the cable side connector.

***Figure 61. Connecting Backhaul (Optical) Cable (2)***



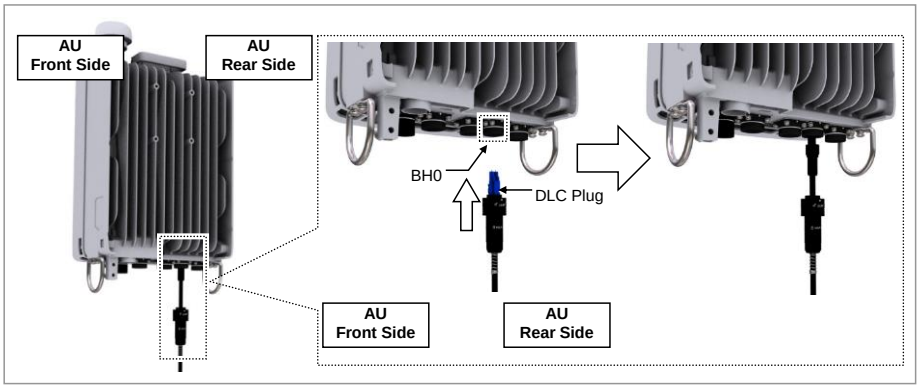
4 The latch of cable side connector should be toward the rear side.

*Figure 62. Connecting Backhaul (Optical) Cable (3)*



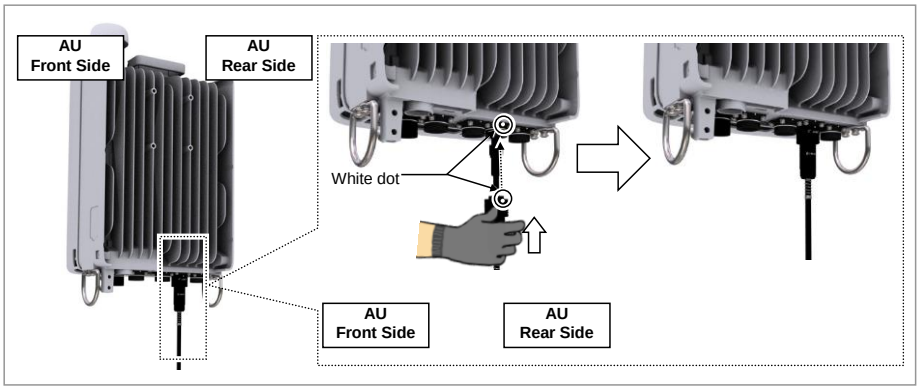

5 Insert the DLC plug to the system side optical module.

*Figure 63. Connecting Backhaul (Optical) Cable (4)*

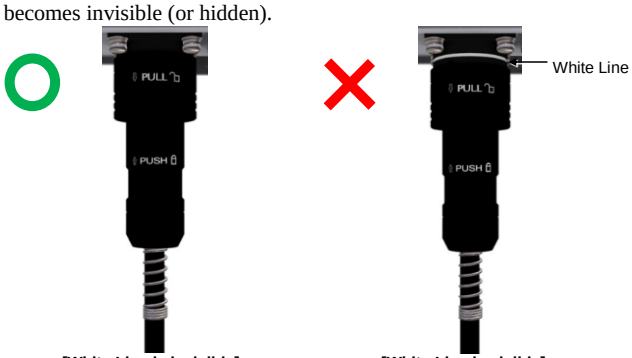



6 Insert the connector aligning white dot of the cable side connector and white dot of the system side connector. When inserting the connector, push the shell to the system side.

*Figure 64. Connecting Backhaul (Optical) Cable (5)*



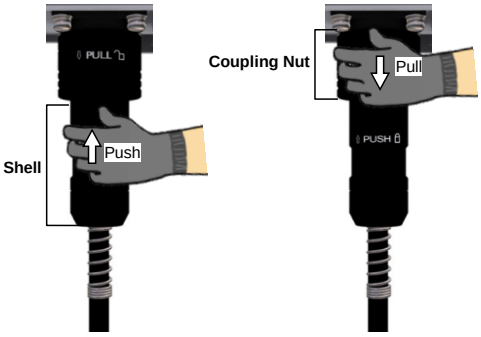

When the connector is fastened tight, the white line on the system side connector becomes invisible (or hidden).




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

The method for connecting or disconnecting the backhaul (optical) connector is as follows:

- For connecting the connector, push the shell to upper side.
- For disconnecting the connector, pull the coupling nut to lower side.




To connect a backhaul (Copper) cable

1 Ensure that the items mentioned in below table are available.

*Table 28. Parts and Tools for Connecting Backhaul (Copper) Cable*

| Category | Description | |
|---|---|---|
| Installation Section | AU BH1 Port-Switch/Router | |
| Cable | Backhaul (Copper) Cable Assembly (24 AWG, 4P, CAT6a, F-UDP) | |
| Connector | Switch | Check specifications of external device output terminal per site and prepare fasteners. |
| | AU | JONHON, Push Pull Type, RJ45MF-CT-10 |
| Working Tools | • Cable Cutter<br>• Wire Stripper<br>• Nipper<br>• LAN Tool | |

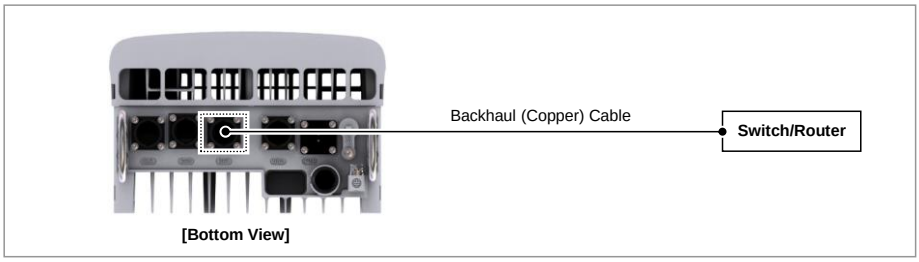
Table below provides the pin map of backhaul cable.

*Table 29. Backhaul (Copper) Cable Pin Map*

| System Side | Color Map | Description |
|---|---|---|
| 1 | White/Orange | 1 |
| 2 | Orange | 2 |
| 3 | White/Green | 3 |
| 4 | Blue | 4 |
| 5 | White/Blue | 5 |
| 6 | Green | 6 |
| 7 | White/Brown | 7 |
| 8 | Brown | 8 |
| Shell | Shield | Shell |

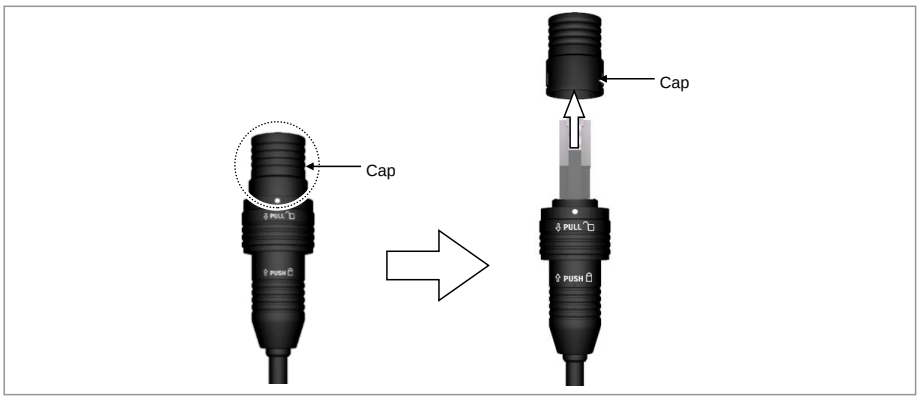
2 Install the backhaul (copper) cable from the external device to the AU.

*Figure 65. Connecting Backhaul (Copper) Cable (1)*



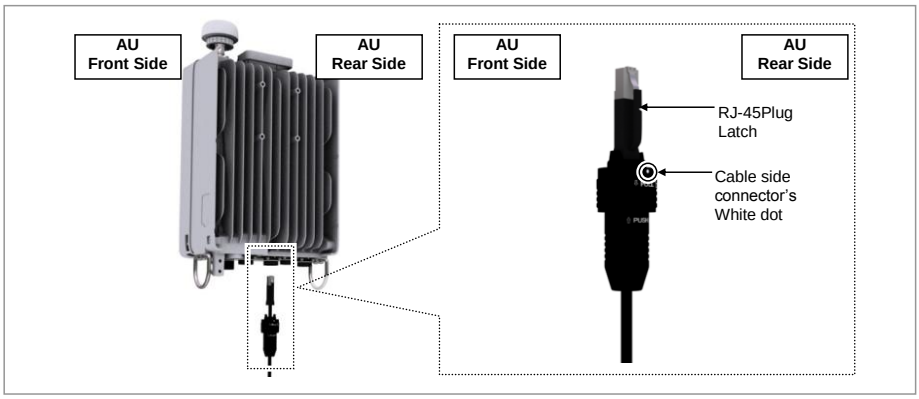

**3** Separate the cap from the cable side connector.

*Figure 66. Connecting Backhaul (Copper) Cable (2)*



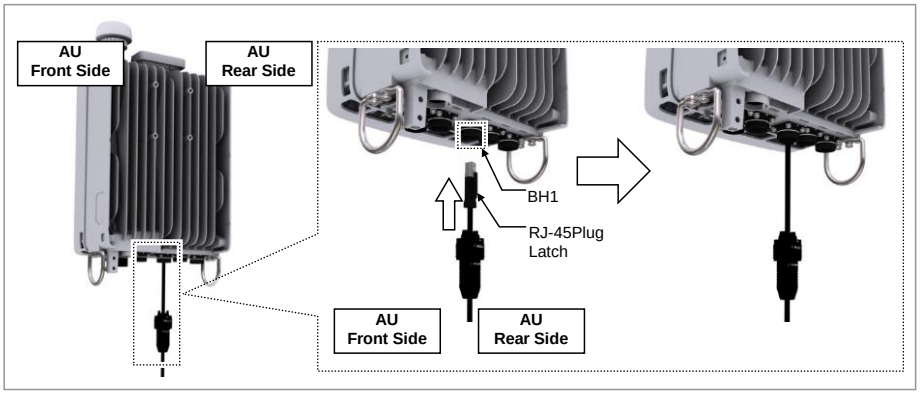

**4** The latch of cable side connector should be toward the rear of the system.

*Figure 67. Connecting Backhaul (Copper) Cable (3)*



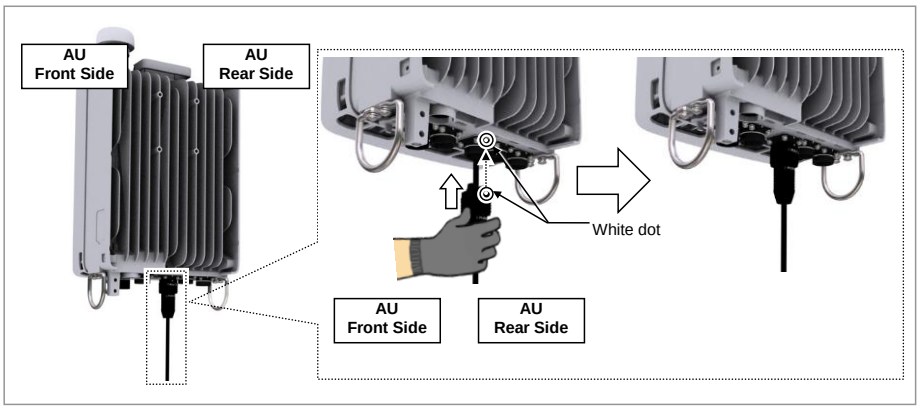
5 Insert the RJ-45 plug to the system side connector.

*Figure 68. Connecting Backhaul (Copper) Cable (4)*



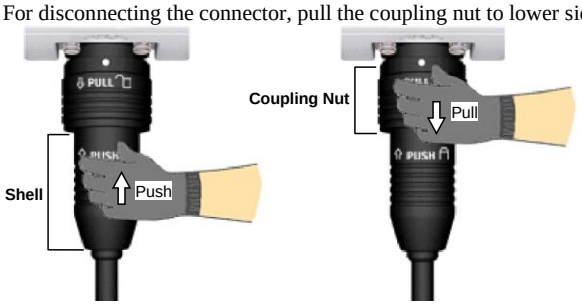

6 Insert the connector aligning white dot of the cable side connector and white dot of the system side connector. When inserting the connector, push the shell to the system side.

*Figure 69. Connecting Backhaul (Copper) Cable (5)*




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


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




## Connecting Clock Sync Cable

To connect a clock sync cable

The clock sync cable is only used for 2 sector cascade installation.

**1** Ensure that the items mentioned in below table are available.

***Table 30. Parts and Tools for Connecting Clock Sync Cable***

| Category | Description | |
|---|---|---|
| Installation Section | #0 AU CLK Port-#1 AU CLK Port | |
| Cable | Clock sync Cable Assembly (24 AWG, 4P, CAT5e, S-FTP) | |
| Connector | #0 AU | JONHON, Push Pull Type, RJ45MF-CT-07 |
| | #1 AU | JONHON, Push Pull Type, RJ45MF-CT-07 |
| Working Tools | • Cable Cutter<br>• Wire Stripper<br>• Nipper | |

| Category | Description |
|---|---|
| | • LAN Tool |

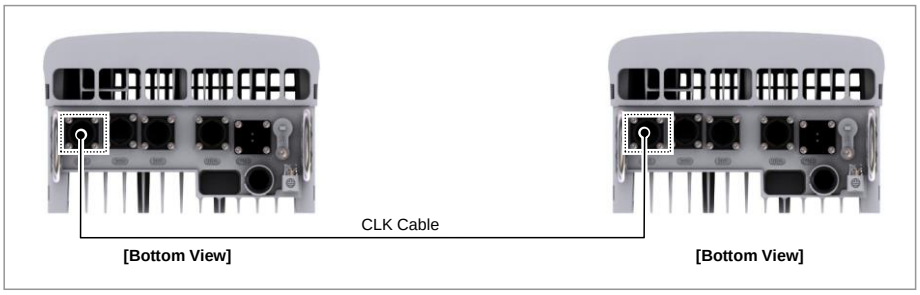
Table below provides the clock sync cable pin map.

***Table 31. Clock Sync Cable Pin Map***

| AU #0 Side | Color Map | AU #1 Side |
|---|---|---|
| 1 | White/Orange | 5 |
| 2 | Orange | 6 |
| 3 | White/Green | 4 |
| 4 | Green | 3 |
| 5 | White/Blue | 1 |
| 6 | Blue | 2 |
| 7 | Cut | 7 |
| 8 | Cut | 8 |
| Shell | - | Shell |

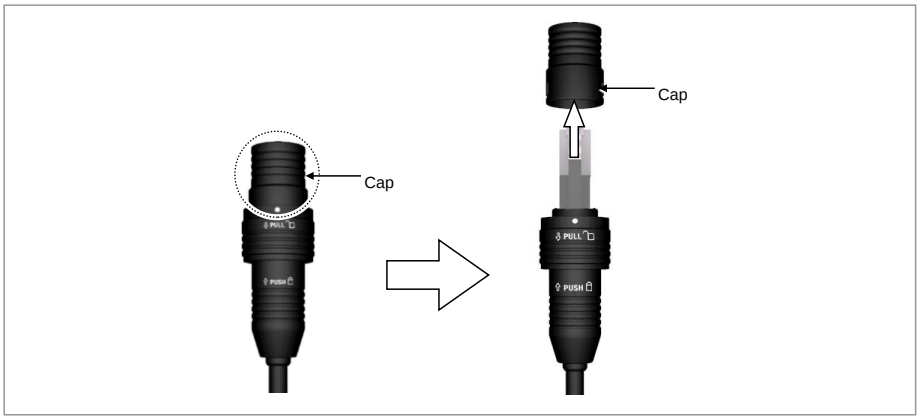
**2** Install the clock sync cable from the external alarm device to the AU.

***Figure 70. Connecting Clock Sync Cable (1)***



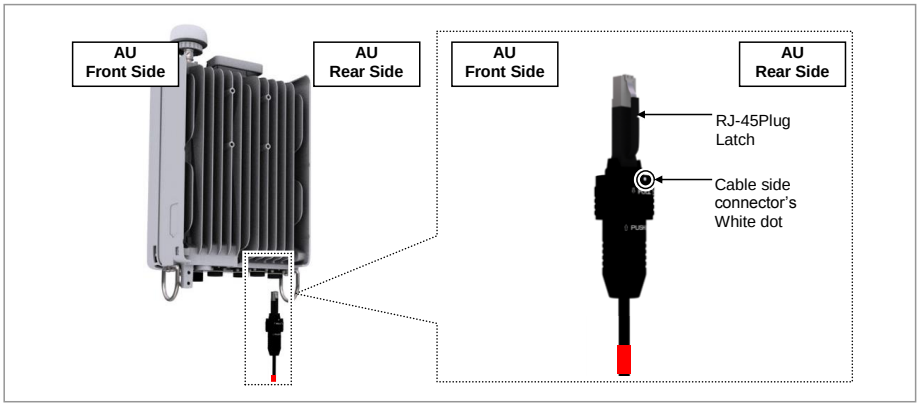

**3** Separate the cap from the cable side connector.

*Figure 71.* *Connecting Clock Sync Cable (2)*



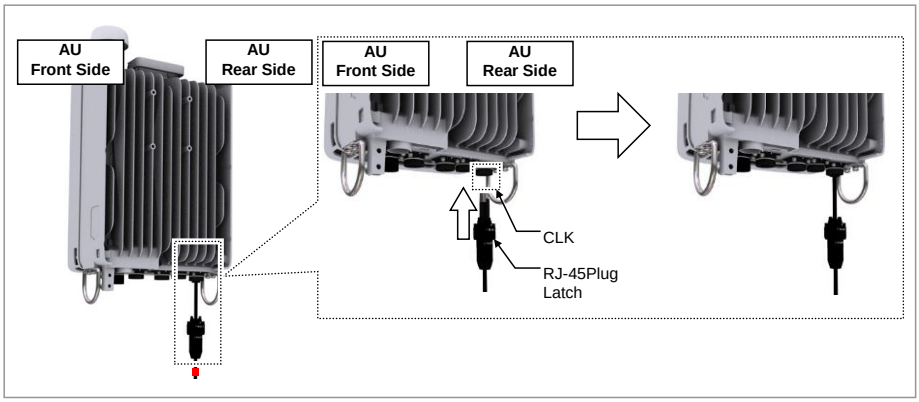

**4** The latch of cable side connector should be toward the rear of the system.

*Figure 72.* *Connecting Clock Sync Cable (3)*



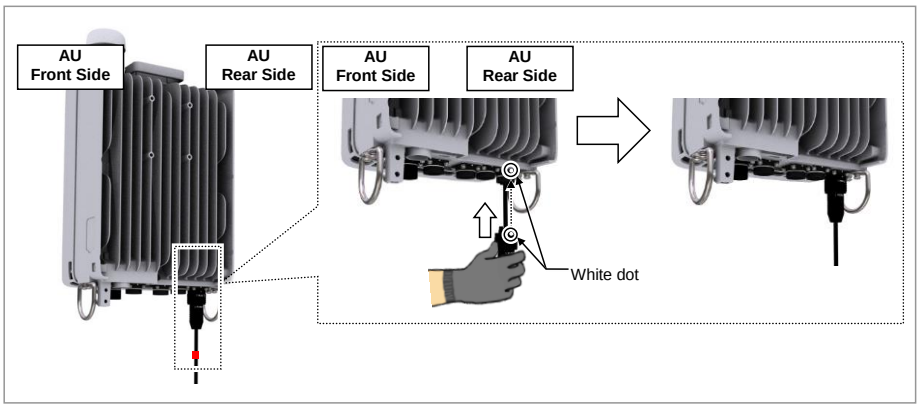

**5** Insert the RJ-45 plug to the system side connector.

*Figure 73. Connecting Clock Sync Cable (4)*




**6** Insert the connector aligning white dot of the cable side connector and white dot of the system side connector. When inserting the connector, push the shell to the system side.

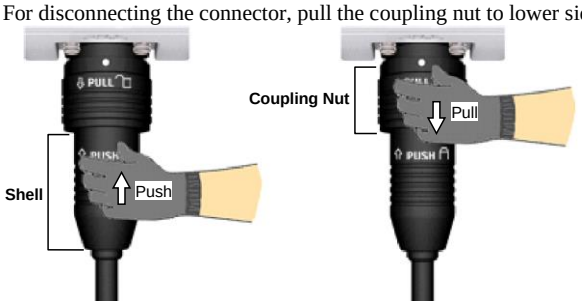
*Figure 74. Connecting Clock Sync Cable (5)*




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


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

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



# Fixing Cable Cover

To fix cable cover

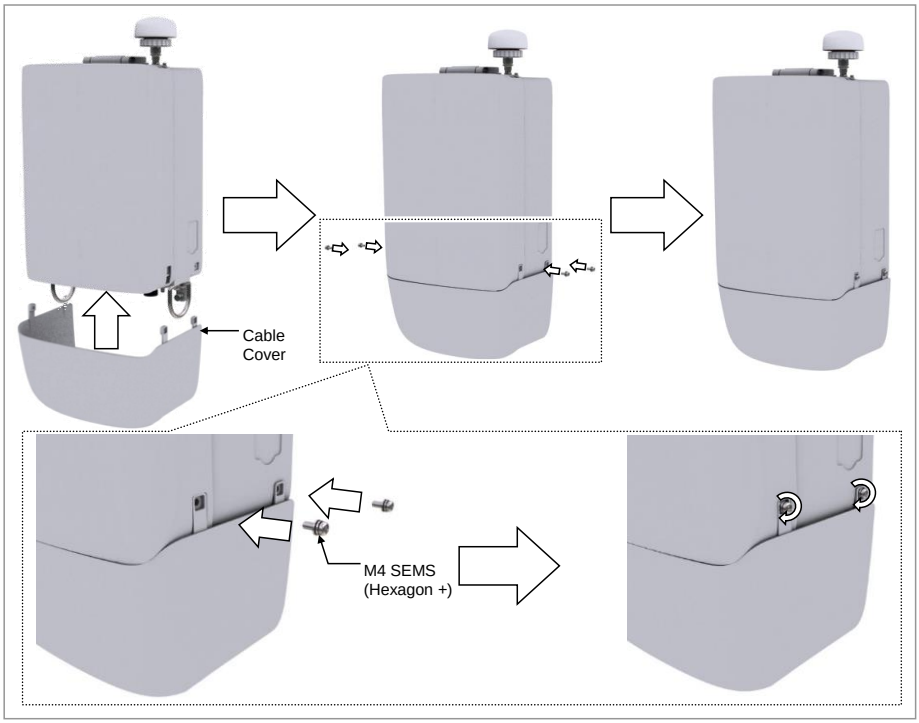
1 Ensure that the items mentioned in below table are available.

*Table 32. Parts and Tools for Fixing Cable Cover on AU*

| Category | Description | | |
|---|---|---|---|
| Parts | Cable cover | | 1 EA |
| | Fasteners | M4 × L10 Torx Screw | 4 EA |
| Recommended Torque Value | M4 Torx Screw | | 13 lbf·in (15 kgf·cm) |
| Working Tools | • Torque Driver (6-22 lbf·in)<br>• Torx Driver Bit (TH15) | | |

2 Place the cable cover to the AU fixing hole and fix it using fasteners.

*Figure 75. Fixing Cable Cover on AU*

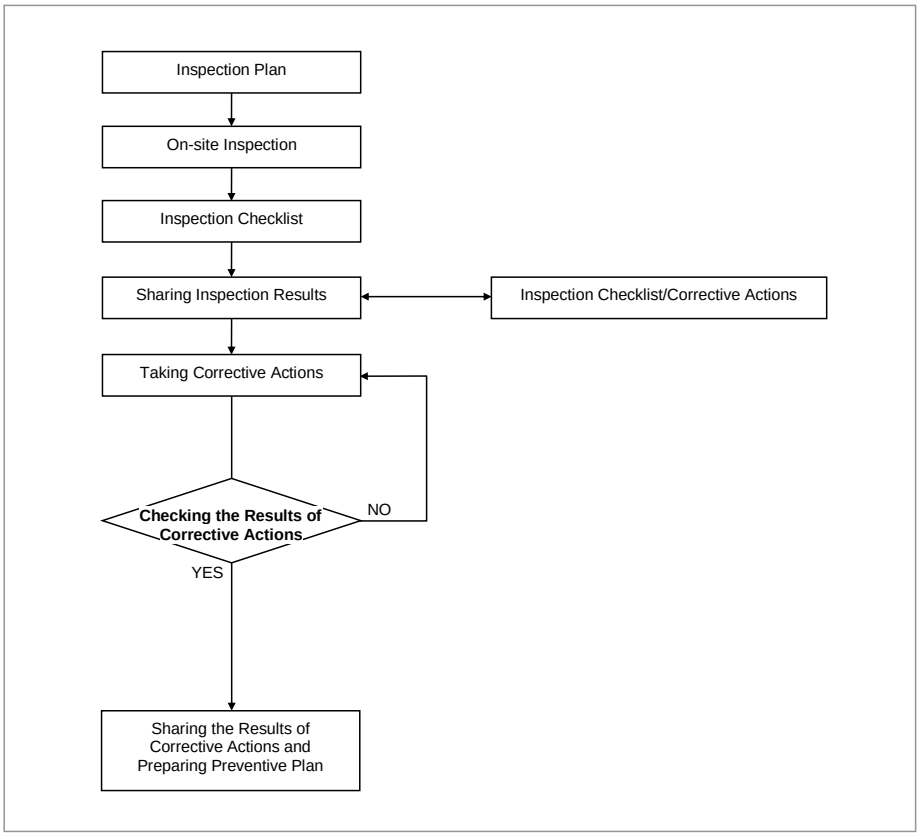


# Chapter 4 Inspect the Installation

This chapter describes the procedures to check installation status.

Figure below depicts the overall procedure for inspecting the installation status.

***Figure 76. Installation Inspection Procedure***




### *Inspection Plan*

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

### *On-site Inspection and Inspection Checklist*

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

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

### *Sharing Inspection Results and Taking Corrective Actions*

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

### *Checking the Results of Corrective Actions*

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

### *Sharing the Results of Corrective Actions and Preparing Preventive Plan*

After the corrective actions are all completed, the inspector must share the results with the installation operator and relevant departments. The inspector must prepare a preventive plan to prevent the same or similar problems from re-occurring.

### *Construction Situation Checklist*

Table below provides the checklist to check the installation of the AU and other devices.

***Table 33. Construction Situation Checklist***

| Category | Check Items | Criteria | Result | |
|---|---|---|---|---|
| | | | Pass | Fail |
| Installing Equipment | Appearance of equipment and mechanical parts | Equipment damage such as dent, scratch, and crack | | |
| | Placement of equipment and mechanical parts | Maintenance and horizontal/vertical placement | | |
| | Leveling condition of equipment and mechanical parts | Horizontal/vertical status | | |
| | Validity of status and specifications of fastening bolt, nut, and washer | Checking fasteners omission | | |
| | | Compliance with assembly order of fasteners | | |
| | | Compliance with fastening torque value | | |
| | Insulation status | Checking electrical contact between insulators (insulation resistance tester) | | |
| Grounding | Installation of ground bar | Checking the separation of communication/power/lightning | | |

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

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

■

# Appendix A Acronyms

| | |
|---|---|
| AC | Alternating Current |
| AU | Access Unit |
| BH | Back Haul |
| DC | Direct Current |
| DL | DownLink |
| GNSS | Global Navigation Satellite System |
| GPS | Global Positioning System |
| MGB | Main Ground Bar |
| NAU | Next generation Access Unit |
| PDLC | Polymer Dispersed Liquid Crystal |
| RTN | Return |
| SELV | Safe Extra Low Voltage |
| SEMS | pre-asSEMbled washers and screws |
| S-FTP | Screened-Foiled Twisted Pair |
| TDD | Time Division Duplex |
| UL | UpLink |
| UTP | Unshielded Twisted Pair |

# Appendix B Clean the Optical Connectors

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

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

Examples:

Manufacturer-USCONEC (http://www.usconec.com)

- IBC™ Brand Cleaner (P/N: 9393): For LC-LC and MU Connector Cleaning
- IBC™ Brand Cleaner (P/N: 9392): For SC Connector Cleaning
- IBC™ Brand Cleaner (P/N: 12910): For ODC Connector Cleaning

Manufacturer-The Fibers (www.thefibers.com)

- HuxCleaner 1.25 mm Type: For LC and MU Connector Cleaning
- HuxCleaner 2.5 mm Type: For SC, FC, and ST Connector Cleaning

Follow the instructions of the manufacturer for cleaning the optical connectors.

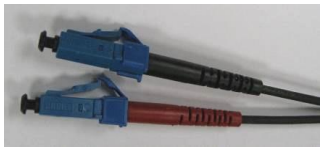
## Measuring the Optical Output and Connecting the Optical Connector

To measure the optical output

1. Using an optical power meter, check the optical output.
2. If the optical output measurement result meets the reference value, clean the

connector again and connect it.

3 If the measurement result does not meet the reference value, discard the cable and replace it with a new cable. Clean the new cable and connect it to the system.



[LC/PC Plug]


[Optical Power meter]

# Appendix C Standard Torque

When operator fastens the bolt, use the standard torque values provided in tables below to prevent the equipment and bolt from damage and secure by fastening. When the torque value for each connection part is defined already, use the defined value.

***Table 34. Standard Torque Value for Fastening Bolts***

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

***Table 35. Brass Bolts Torque Value***

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

***Table 36. Connector Connection Torque Value***

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

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

SAMSUNG

**5G AU**
**Installation Manual**

**Document Version 2.0**